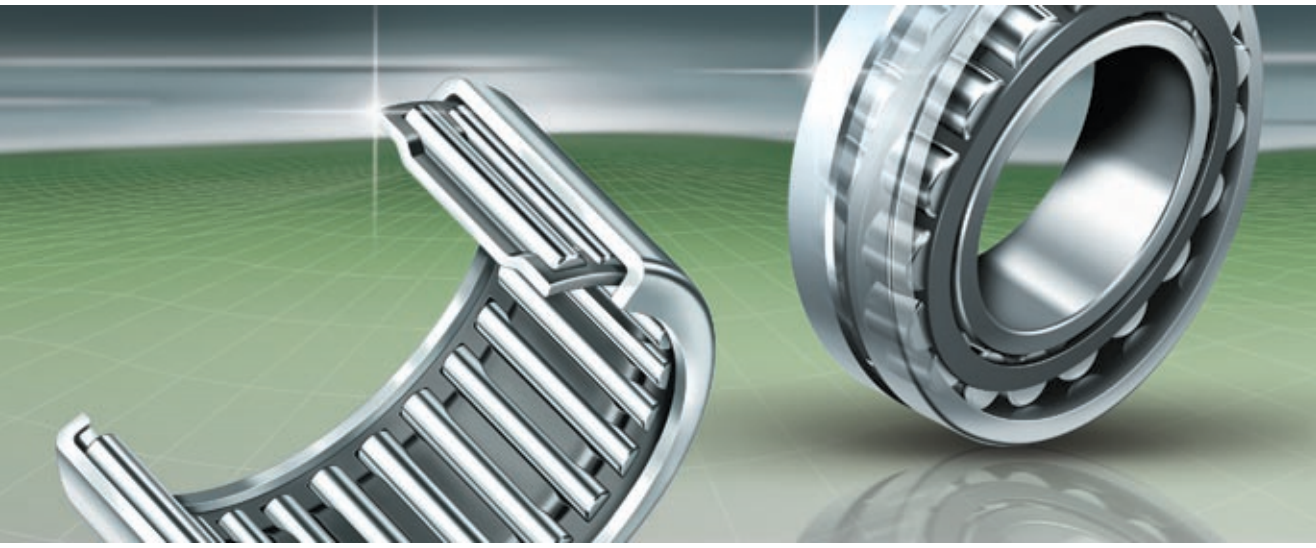


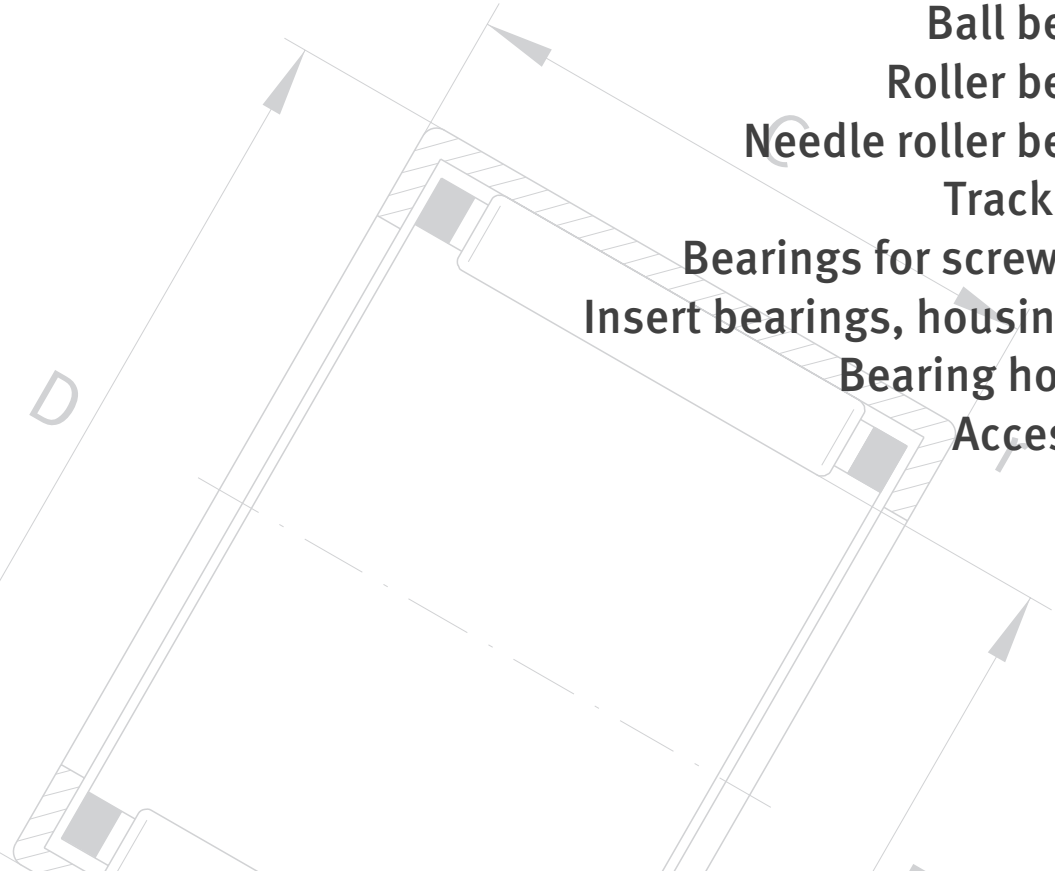
Rolling bearings

Ball bearings
Roller bearings
Needle roller bearings
Track rollers
Bearings for screw drives
Insert bearings, housing units
Bearing housings
Accessories

SCHAEFFLER GROUP
INDUSTRIAL

Rolling bearings

Ball bearings
Roller bearings
Needle roller bearings
Track rollers
Bearings for screw drives
Insert bearings, housing units
Bearing housings
Accessories



All data have been prepared with a great deal
of care and checked for their accuracy.
However, no liability can be assumed for
any incorrect or incomplete data.
We reserve the right to make technical changes.

© Schaeffler KG · 2008, December
1st revised and expanded edition

Reproduction in whole or in part without
our authorisation is prohibited.

Foreword

Schaeffler Group Industrial

Schaeffler Group Industrial with its brands INA and FAG is a leading worldwide supplier of rolling bearings, spherical plain bearings, plain bearings, linear products, accessories specific to bearings and comprehensive maintenance products and services.
It has approximately 40 000 catalogue products manufactured as standard, providing an extremely wide portfolio that gives secure coverage of applications from all 60 designated industrial market sectors.

The central factors responsible for success are our outstanding strength in innovation, our global focus on local customer proximity, highly developed manufacturing methods, extremely high quality standards in all processes and our ability to transform specific customer requirements quickly and accurately into cost-effective solutions. Against this background of expertise, knowledge and experience together with our wide range of catalogue items, we see ourselves as a high performance, customer-focussed partner.

Research and Development

As a company looking to the future, we are especially active in the field of research and development. The key areas in this respect include not only research into fundamental principles, materials technology, tribology and calculation but also extensive inspection and test methods as well as activities to optimise manufacturing technology. This is oriented towards ensuring the continuous development, improvement and application of our products in the long term.

We carry out research and development on a global basis.
Our development centres are linked with each other worldwide and are thus in a position to exchange current information on a very short timescale as well as access and communicate the most recent data. This ensures that a uniform level of knowledge and information is available worldwide.

In addition to continued development of standard products, we work closely in research and development activities with our customers where specific customer solutions are required. They can thus benefit from the best product for their application, with the maximum possible performance capacity at a cost-effective price.

Quality
Manufacturing technology
Environmental protection

“Zero defects” is our quality objective. We have matched all our processes to this target. In addition, our experience in forming, forging, heat treatment, surface technologies, grinding, honing and assembly ensures that our products fulfil the required quality level.

Ongoing quality inspections are a defined component of the manufacturing process. These are integrated directly as a feedback function in the manufacturing process. This ensures that all products continuously fulfil the same high standard of quality.

The quality of our products and processes is certified; for example, all manufacturing facilities comply with DIN-EN ISO 9001:2000, ISO/TS 16 949:2002.

With the validation and certification of our manufacturing sites, we are taking a pioneering role in environmental protection.
All larger manufacturing sites are certified to ISO 14001 and are also validated in accordance with the more stringent EC ECO Management and Audit Scheme (EMAS).

Foreword

Worldwide presence

Through a closely knit network of development and manufacturing sites, sales companies and an international distribution structure, we are represented throughout the world. This global presence ensures effective linkage between the major markets in Europe, India, South East Asia/Pacific Region, East Asia, North and South America. As a result, we have an on-site presence with service and technical advice in close proximity to the customer.

We take orders from all over the world and make deliveries worldwide too. Furthermore, we support our customers worldwide in resolving their bearing arrangement requirements, respond to technical queries and develop specific bearing arrangement solutions in local partnership with our customers.

Rolling Bearing Catalogue HR 1 The Engineering Compendium

Catalogue HR 1 describes the rolling bearings in accordance with DIN ISO that are required for original equipment manufacture, distribution and the aftermarket, specific rolling bearing accessories and further rolling bearing types and design variants.

It shows which products can be considered for a bearing arrangement, the factors that must be taken into consideration in the design, the tolerances required on the adjacent construction and how the bearing arrangement is sealed. It gives detailed information on the calculation of bearing rating life, on temperatures and loads, on the lubricants that are most suitable for the bearing arrangement and, last but not least, the correct methods of fitting and maintaining the products.

The data in the catalogue represent the current level of technology and manufacture as of August 2008. They reflect not only progress in rolling bearing technology but also the experience gathered in practical use. Any information in publications that does not concur with the data in this catalogue is therefore invalid.

A new edition required early

To date, more than 140 000 copies of the first edition published in 2006 have been distributed. This is an impressive indication of the importance of the catalogue as a fundamental information and advisory tool for all technical issues relating to the wide-ranging field of rotary rolling bearings. In a short space of time, it has become established worldwide as an importance handbook and engineering compendium for the calculation and design of rolling bearing arrangements.

Due to the rapid pace of development in rolling bearing engineering, it has now become necessary to issue a revised and expanded new edition at an early stage. A brief description of the important and interesting new content is given here. Further information can be found in the relevant sections of the catalogue.

Significant innovations

Technical principles

- Rating life calculation updated; expanded adjusted rating life now in accordance with ISO 281:2007, with new values for a_1, life adjustment factor a_{ISO} instead of a_{DIN}
- Refined calculation of the axial load carrying capacity of cylindrical roller bearings, bearings of TB design now included
- Performance data of products recalculated in some cases (basic load ratings, fatigue limit load, limiting speed, reference speed).

Friction and increases in temperature

- Bearing factors for tapered roller bearings and self-aligning ball bearings updated
- Diagram with bearing factor f_2 for bearings of TB design included.

Lubrication

- Updated overview of greases in use.

Bearing data

- Axial internal clearance added
- High performance steel Cronitect added
- Dimensional and geometrical tolerances: dimensions for tapered roller bearings added
- Limit values for chamfer dimensions updated.

Design of bearing arrangements

- Table with guide values for roughness of bearing seats added
- Devations for enveloping circle diameter included (tolerance zone F6, F8)
- Values for ISO fundamental tolerances (IT grades) to DIN ISO 286 included
- Raceways for bearings without inner and/or outer ring: surface hardening depth SHD (instead of Rht)
- Storage of rolling bearings revised
- Information on Arcanol rolling bearing greases updated.

Products

- Additional sizes and designs of cylindrical roller bearings, tapered roller bearings, spherical roller bearings and axial spherical roller bearings of X-life quality included
- Deep groove ball bearings: corrosion-resistant bearings are no longer described, see instead TPI 64; radial internal clearance added; further bearing sizes of series 618, 619 and 64 added
- Angular contact ball bearings, double row: sealed bearings 32..-B and 33..-B added
- Spindle bearings: section Equivalent dynamic load replaced by section Operating life; bearing tolerances updated
- Four point contact bearings: internal clearance C4 added
- Cylindrical roller bearings: section restructured; series NU4 and NJ4 included; new full complement design TB with higher axial load carrying capacity included
- High precision cylindrical roller bearings: section Equivalent dynamic load replaced by section Operating life; shaft and housing tolerances updated

Foreword

- Tapered roller bearings: X-life design for bearings of series T7FC; open bearings (included matched pair versions) as well as sealed bearings JK0S added, inch size bearings expanded
- Spherical roller bearings: X-life design E1 with sheet steel cage now also included in series 240 and 241; new vibrating screen design T41D (partially replacing T41A)
- Drawn cup needle roller bearings:
  minimum radial load included; suitable inner rings for full complement drawn cup needle roller bearings included
- Machined needle roller bearings: designations for mounting dimensions revised, roughness values for shaft design for bearings without inner ring revised
- Drawn cup roller clutches: calculation of minimum wall thicknesses for metal and plastic housings added; tolerances (roundness and parallelism) for raceway on shaft revised
- Axial angular contact ball bearings: section Equivalent dynamic load replaced by section Operating life
- Axial spherical roller bearings: X-life design E1 with sheet steel cage replaces the previous design E in many bearings of series 293 and 294
- High precision bearings for combined loads:
  rigidity values for rolling element set included
- Radial insert ball bearings, housing units: changes to grease in bearings with suffix FA101 and in series GE..-KLL-B, GLB..-KRR-B
- Bearing housings: outside diameter D now given in all tables
- Fasteners and retainers: shaft nuts HMZ added
- Arcanol rolling bearing greases: rolling bearing grease LOAD150 included; available containers updated; table with grease characteristics updated.

Other products

- Equipment and services for the mounting and maintenance of rolling bearings: new equipment for vibration diagnosis.

Market sectors

- Bearing arrangements and components for Fluid Technology added; bearings for food and packaging industry expanded.

New Attention symbol

This catalogue essentially describes standard products.
Since these are used in numerous applications, we cannot make a judgement as to whether any malfunctions will cause harm to persons or property.

Follow instructions

It is always and fundamentally the responsibility of the designer and user to ensure that all specifications are observed and that all necessary information is communicated to the end user. This applies in particular to applications in which product failure and malfunction may constitute a hazard to human beings.

In line with ANSI 535.6-2006, we have replaced the old Attention symbol by the new symbol.

In case of non-compliance, damage or malfunctions in the product or the adjacent construction may occur.

X-life
Maximum customer benefit

X-life is the premium brand of Schaeffler Group Industrial. It brings together the strengths of the two brands and gives completely new design opportunities for design engineers.

X-life is an all-encompassing concept: advice, product development, service and sales are fully integrated with each other in all phases of the product cycle. As a service surround system, it includes a comprehensive lubrication concept. X-life stands for continuous quality improvement and local customer focus applied worldwide.

Advantages of the X-life grade

The use of state of the art manufacturing technologies has resulted in a better, more uniform surface over the whole contact face between the rolling elements and raceway. As a result, under identical load there is a significant reduction in the stress conditions present on the rolling elements and raceway. The improved surface quality gives reduced friction and lower bearing temperatures, running resistance is lower and less strain is placed on the lubricant.

Thanks to such improvements, the basic dynamic load ratings are significantly higher than those of the previous design. As a result, the basic rating life is higher; i. e. the operating life of the bearings is considerably longer under the same operating conditions. Alternatively, higher loads can be applied while maintaining the same rating life values.

With their optimised characteristics, X-life bearings open up completely new application prospects, such as downsizing of the bearing arrangement. Furthermore, the improved price/performance ratio ultimately increases the overall cost-effectiveness of the bearing arrangement.

X-life bearings are described in the sections on product features and are indicated in the dimension tables by the symbol XL.

Product ranges for specific market sectors

Special product ranges are available for specific market sectors. In addition to standard products, these include a large number of special solutions. The range extends from simple, application-specific bearings via complete, ready-to-fit systems to special solutions that can be used to fulfil the most complex bearing technology requirements with high functional security and cost-effectiveness.

Contact our External Sales at the earliest possible stage and benefit from the broad knowledge and considerable experience of these specialists for your project.

Foreword

medias® *professional* Electronic information system

medias® *professional*, the proven selection and information system, contains the INA/FAG catalogue products in electronic format. As with the printed catalogue, this gives our customers product information on both brands in a single data source. This saves time and gives easier handling.

medias® *professional* is available online and on CD in several languages, is easy to navigate and is particularly clear thanks to the use of numerous pictures, diagrams and models. There are also highly representative application examples, classified by market sector.

Datasheets on the bearing series can be generated as PDF files. It includes a lubricant database and also the web2CAD link for direct download and inclusion of 3D models.

medias® *professional* focusses on the individual bearing. The complete shaft can be simulated and any influences arising from its deformation on the bearings can be determined using the calculation program BEARINX®. This program can also be made available to direct customers as BEARINX®-Online via the Internet (for conditions, see the INA/FAG homepage).

In conclusion, ***medias®*** *professional* is a comprehensive, reliable system to help you help yourself, giving answer to many questions on rolling bearing technology by electronic means, quickly and at any location.

Other technical publications

This catalogue contains a large proportion of the core range of rotary rolling bearings of the brands INA and FAG. In addition, we develop and manufacture many other products and systems of interest in terms of technical progress and cost-effectiveness for rotary and linear bearing arrangements as well as for the automotive sector. These are covered in separate technical publications that can be obtained upon request.

INA and FAG

When it comes to motion

Catalogue HR 1 stands for pioneering bearing technology, application-focussed advice, the highest product and performance density and continuous development.

The benefits to you:

- Selection of products from a vast product range
- Maximum benefit, since the most suitable product is used in the right place
- Worldwide product availability
- Short delivery times
- Long term supply capability
- Security of planning for the long view
- Simplified stockholding
- Market-competitive prices
- Global service
- Comprehensive, application-focussed advice.

Together we move the world

For us, technical progress means never standing still. In partnership with you, we are continually working on new solutions so that your vision and our technical ideas can continue to become a reality, to your benefit.

With our products and our knowledge, we can together continue to fulfil the challenges of your market in relation to rolling bearing arrangements. This catalogue is an important instrument in achieving this goal.

Contents

	Page
Product index	12
Technical principles	34
Product overview	202
Deep groove ball bearings	204
Angular contact ball bearings	257
Spindle bearings	302
Four point contact bearings	348
Self-aligning ball bearings	360
Cylindrical roller bearings	391
Tapered roller bearings	514
Barrel roller bearings	556
Spherical roller bearings	572
Needle roller and cage assemblies	664
Drawn cup needle roller bearings with open ends, drawn cup needle roller bearings with closed end	680
Machined needle roller bearings	699
Drawn cup roller clutches	788
Sealing rings	804
Product overview	812
Axial deep groove ball bearings	814
Axial angular contact ball bearings	842
Axial cylindrical roller bearings, axial cylindrical roller and cage assemblies, axial bearing washers	856
Axial needle roller and cage assemblies, axial bearing washers, axial needle roller bearings	872
Axial spherical roller bearings	882
Crossed roller bearings	896
Track rollers	923
Bearings for screw drives	1005
High precision bearings for combined loads	1107
Radial insert ball bearings, housing units	1155
Bearing housings	1320
Fasteners and retainers	1450
Rolling elements	1507
Arcanol rolling bearing greases	1534
Other products	1541
Market sectors	1602
Addresses	1631

Product index

		Page
10	Self-aligning ball bearings, cylindrical bore	362
112	Self-aligning ball bearings, extended inner ring	362
12	Self-aligning ball bearings, cylindrical bore	362
12..-K	Self-aligning ball bearings, tapered bore	362
12..-K + H	Self-aligning ball bearings, adapter sleeve	362
13	Self-aligning ball bearings, cylindrical bore	362
13..-K	Self-aligning ball bearings, tapered bore	362
13..-K + H	Self-aligning ball bearings, adapter sleeve	362
160	Deep groove ball bearings, single row	206
2..-KRR	Deep groove ball bearings, extended inner ring	1162
2..-NPP-B	Self-aligning deep groove ball bearings	1161
202	Barrel roller bearings, cylindrical bore	558
202..-K	Barrel roller bearings, tapered bore	558
202..-K + H	Barrel roller bearings, adapter sleeve	558
203	Barrel roller bearings, cylindrical bore	558
203..-K	Barrel roller bearings, tapered bore	558
203..-K + H	Barrel roller bearings, adapter sleeve	558
213..-E1	Spherical roller bearings, cylindrical bore	574
213..-E1-K	Spherical roller bearings, tapered bore	574
213..-E1-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve	575
213..-E1-K + H	Spherical roller bearings, tapered bore, adapter sleeve	575
22	Self-aligning ball bearings, cylindrical bore	362
22..-2RS	Self-aligning ball bearings, lip seals	362
22..-K	Self-aligning ball bearings, tapered bore	362
22..-K + H	Self-aligning ball bearings, adapter sleeve	362
22..-K-2RS	Self-aligning ball bearings, lip seals, tapered bore	362
22..-K-2RS + H	Self-aligning ball bearings, lip seals, tapered bore, adapter sleeve	362

		Page
222	Spherical roller bearings, cylindrical bore	574
222..-E1	Spherical roller bearings, cylindrical bore	574
222..-E1-K	Spherical roller bearings, tapered bore	574
222..-E1-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve	575
222..-E1-K + H	Spherical roller bearings, tapered bore, adapter sleeve	575
222..-K	Spherical roller bearings, tapered bore	574
222..-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve	575
222..-K + H	Spherical roller bearings, tapered bore, adapter sleeve	575
223	Spherical roller bearings, cylindrical bore	574
223..-E1	Spherical roller bearings, cylindrical bore	574
223..-E1-K	Spherical roller bearings, tapered bore	574
223..-E1-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve	575
223..-E1-K + H	Spherical roller bearings, tapered bore, adapter sleeve	575
223..-K	Spherical roller bearings, tapered bore	574
223..-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve	575
223..-K + H	Spherical roller bearings, tapered bore, adapter sleeve	575
23	Self-aligning ball bearings, cylindrical bore	362
23..-2RS	Self-aligning ball bearings, lip seals	362
23..-K	Self-aligning ball bearings, tapered bore	362
23..-K + H	Self-aligning ball bearings, adapter sleeve	362
230	Spherical roller bearings, cylindrical bore	574
230..-E1(A)	Spherical roller bearings, cylindrical bore	574
230..-E1(A)-K	Spherical roller bearings, tapered bore	574
230..-E1(A)-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve	575
230..-E1(A)-K + H	Spherical roller bearings, tapered bore, adapter sleeve	575
230..-K	Spherical roller bearings, tapered bore	574
230..-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve	575
230..-K + H	Spherical roller bearings, tapered bore, adapter sleeve	575

Product index

		Page
231	Spherical roller bearings, cylindrical bore	574
231..-E1(A)	Spherical roller bearings, cylindrical bore	574
231..-E1(A)-K	Spherical roller bearings, tapered bore	574
231..-E1(A)-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve	575
231..-E1(A)-K + H	Spherical roller bearings, tapered bore, adapter sleeve	575
231..-K	Spherical roller bearings, tapered bore	574
231..-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve	575
231..-K + H	Spherical roller bearings, tapered bore, adapter sleeve	575
232	Spherical roller bearings, cylindrical bore	574
232..-E1(A)	Spherical roller bearings, cylindrical bore	574
232..-E1(A)-K	Spherical roller bearings, tapered bore	574
232..-E1(A)-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve	575
232..-E1(A)-K + H	Spherical roller bearings, tapered bore, adapter sleeve	575
232..-K	Spherical roller bearings, tapered bore	574
232..-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve	575
232..-K + H	Spherical roller bearings, tapered bore, adapter sleeve	575
233..-A	Spherical roller bearings, cylindrical bore	574
2344	Axial angular contact ball bearings, double direction	844
2347	Axial angular contact ball bearings, double direction	844
239	Spherical roller bearings, cylindrical bore	574
239..-K	Spherical roller bearings, tapered bore	574
239..-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve	575
239..-K + H	Spherical roller bearings, tapered bore, adapter sleeve	575
240	Spherical roller bearings, cylindrical bore	574
240..-E1	Spherical roller bearings, cylindrical bore	574
240..-E1-K30	Spherical roller bearings, tapered bore	574
240..-E1-K30 + AH	Spherical roller bearings, tapered bore, withdrawal sleeve	575
240..-K30	Spherical roller bearings, tapered bore	574
240..-K30 + AH	Spherical roller bearings, tapered bore, withdrawal sleeve	575

		Page
241	Spherical roller bearings, cylindrical bore	574
241..-E1	Spherical roller bearings, cylindrical bore	574
241..-E1-K30	Spherical roller bearings, tapered bore	574
241..-E1-K30 + AH	Spherical roller bearings, tapered bore, withdrawal sleeve	575
241..-K30	Spherical roller bearings, tapered bore	574
241..-K30 + AH	Spherical roller bearings, tapered bore, withdrawal sleeve	575
292..-E	Axial spherical roller bearings, increased capacity design	884
293..-E (E1)	Axial spherical roller bearings, increased capacity design	884
294..-E (E1)	Axial spherical roller bearings, increased capacity design	884
30..-B	Angular contact ball bearings, double row	282
30..-B-2RSR	Angular contact ball bearings, double row, lip seals	282
30..-B-2Z	Angular contact ball bearings, double row, gap seals	282
302	Tapered roller bearings, single row	516
303	Tapered roller bearings, single row	516
313	Tapered roller bearings, single row	516
313..-N11CA	Tapered roller bearings, matched in pairs	516
32	Angular contact ball bearings, double row, filling slot	282
32..-B	Angular contact ball bearings, double row	282
32..-B-2RSR	Angular contact ball bearings, double row, lip seals	282
32..-B-2Z	Angular contact ball bearings, double row, gap seals	282
320	Tapered roller bearings, single row	516
322	Tapered roller bearings, single row	516
323	Tapered roller bearings, single row	516
323..-A	Tapered roller bearings, single row, modified internal construction	516
323..-B	Tapered roller bearings, single row, increased contact angle	516
329	Tapered roller bearings, single row	516
33	Angular contact ball bearings, double row, filling slot	282
33..-B	Angular contact ball bearings, double row	282
33..-B-2RSR	Angular contact ball bearings, double row, lip seals	282
33..-B-2Z	Angular contact ball bearings, double row, gap seals	282
33..-DA	Angular contact ball bearings, double row, split inner ring	282
330	Tapered roller bearings, single row	516
331	Tapered roller bearings, single row	516
332	Tapered roller bearings, single row	516

Product index

		Page
38..-B	Angular contact ball bearings, double row	282
38..-B-2RSR	Angular contact ball bearings, double row, lip seals	282
38..-B-2Z	Angular contact ball bearings, double row, gap seals	282
42..-B	Deep groove ball bearings, double row	206
43..-B	Deep groove ball bearings, double row	206
511	Axial deep groove ball bearings, single direction, flat housing locating washer	816
512	Axial deep groove ball bearings, single direction, flat housing locating washer	816
513	Axial deep groove ball bearings, single direction, flat housing locating washer	816
514	Axial deep groove ball bearings, single direction, flat housing locating washer	816
522	Axial deep groove ball bearings, double direction, flat housing locating washers	816
523	Axial deep groove ball bearings, double direction, flat housing locating washers	816
532	Axial deep groove ball bearings, single direction, spherical housing locating washer, without seating washer	816
532 + U2	Axial deep groove ball bearings, single direction, spherical housing locating washer, with seating washer	816
533	Axial deep groove ball bearings, single direction, spherical housing locating washer, without seating washer	816
533 + U3	Axial deep groove ball bearings, single direction, spherical housing locating washer, with seating washer	816
542	Axial deep groove ball bearings, double direction, spherical housing locating washers, without seating washers	816
542 + U2	Axial deep groove ball bearings, double direction, spherical housing locating washers, with seating washers	816
543	Axial deep groove ball bearings, double direction, spherical housing locating washers, without seating washers	816
543 + U3	Axial deep groove ball bearings, double direction, spherical housing locating washers, with seating washers	816

		Page
60	Deep groove ball bearings, single row	206
60..-2RSR	Deep groove ball bearings, single row, lip seals	206
60..-2Z	Deep groove ball bearings, single row, gap seals	206
618	Deep groove ball bearings, single row	206
618..-2RSR	Deep groove ball bearings, single row, lip seals	206
618..-2Z	Deep groove ball bearings, single row, gap seals	206
619	Deep groove ball bearings, single row	206
619..-2RSR	Deep groove ball bearings, single row, lip seals	206
619..-2Z	Deep groove ball bearings, single row, gap seals	206
62	Deep groove ball bearings, single row	206
62(622)..-2RSR	Deep groove ball bearings, single row, lip seals	206
62..-2Z	Deep groove ball bearings, single row, gap seals	206
63	Deep groove ball bearings, single row	206
63(623)..-2RSR	Deep groove ball bearings, single row, lip seals	206
63..-2Z	Deep groove ball bearings, single row, gap seals	206
64	Deep groove ball bearings, single row	206
70..-B	Angular contact ball bearings, single row	262
70..-B-2RS	Angular contact ball bearings, single row, lip seals	262
718..-B	Angular contact ball bearings, single row	262
72..-B	Angular contact ball bearings, single row	262
72..-B-2RS	Angular contact ball bearings, single row, lip seals	262
73..-B	Angular contact ball bearings, single row	262
73..-B-2RS	Angular contact ball bearings, single row, lip seals	262
7602	Axial angular contact ball bearings, single row, for sets	1013
7602..-2RS	Axial angular contact ball bearings, single row, for sets, lip seals	1013
7603	Axial angular contact ball bearings, single row, for sets	1013
7603..-2RS	Axial angular contact ball bearings, single row, for sets, lip seals	1013
811	Axial cylindrical roller bearings, single row	858
812	Axial cylindrical roller bearings, single row	858
893	Axial cylindrical roller bearings, double row	858
894	Axial cylindrical roller bearings, double row	858

Product index

		Page
AH(X)23	Withdrawal sleeves	1452
AH(X)3	Withdrawal sleeves	1452
AH(X)30	Withdrawal sleeves	1452
AH(X)31	Withdrawal sleeves	1452
AH(X)32	Withdrawal sleeves	1452
AH2	Withdrawal sleeves	1452
AH240	Withdrawal sleeves	1452
AH241	Withdrawal sleeves	1452
AH33	Withdrawal sleeves	1452
AH39	Withdrawal sleeves	1452
AM	Precision locknuts, axial locking	1094
Arcanol	Rolling bearing greases	1536
AS	Axial bearing washers	874
AXK	Axial needle roller and cage assemblies	874
AXW	Axial needle roller bearings, centring spigot	874
AY..-NPP-B	Insert bearings, spherical outer ring, grub screws in inner ring	1160
B70	Standard spindle bearings	304
B719	Standard spindle bearings	304
B72	Standard spindle bearings	304
BE	Self-aligning deep groove ball bearings, steel aligning ring	1162
BK	Drawn cup needle roller bearings with closed end, cage	682
BK..-RS	Drawn cup needle roller bearings with closed end, lip seal	682
BND	Plummer block housings, unsplit	1323
BSB	Axial angular contact ball bearings, single row, for sets	1013
BSB..-2RS	Axial angular contact ball bearings, single row, for sets, lip seals	1013

		Page
CRB	Insert bearings, rubber interliner, locking collar	1163
DKLFA..-2RS	Axial angular contact ball bearings, triple row, flattened flange, for screw mounting, lip seals	1013
DRS	Seal carrier assemblies for needle roller/axial cylindrical roller bearings ZARF	1094
E..-KLL	Insert bearings, cylindrical outer ring, locking collar	1198
E..-KRR	Insert bearings, cylindrical outer ring, locking collar	1198
E..-KRR-B	Insert bearings, spherical outer ring, locking collar	1160
F112	Flanged housings	1323
F5 (F505 to F513)	Flanged housings	1323
F5 (F515 to F522)	Flanged housings	1323
FLCTE	Two-bolt flanged housing units, cast iron, locking collar, P seals	1214
FLCTEY	Two-bolt flanged housing units, cast iron, grub screws in inner ring, P seals	1214
G	Sealing rings, single lip	806
G..-KRR-B-AS2/V	Insert bearings, spherical outer ring, locking collar, inch size bore	1164
GAY..-NPP-B	Insert bearings, spherical outer ring, grub screws in inner ring	1160
GAY..-NPP-B-FA164	Insert bearings, spherical outer ring, grub screws in inner ring, for high temperatures	1160
GE..-KLL-B	Insert bearings, spherical outer ring, locking collar	1160
GE..-KRR-B	Insert bearings, spherical outer ring, locking collar	1160
GE..-KRR-B-2C	Insert bearings, spherical outer ring, locking collar, flinger shields	1160
GE..-KRR-B-FA101	Insert bearings, spherical outer ring, locking collar, for high and low temperatures	1186
GE..-KRR-B-FA125.5	Insert bearings, spherical outer ring, locking collar, Corrotect®	1184
GE..-KRR-B-FA164	Insert bearings, spherical outer ring, locking collar, for high temperatures	1184
GE..-KTT-B	Insert bearings, spherical outer ring, locking collar, T seals	1160

Product index

		Page
GLCTE	Two-bolt flanged housing units, cast iron, locking collar, P seals	1214
GLE..-KRR-B	Insert bearings, spherical outer ring, drive slot in inner ring	1161
GNE..-KRR-B	Insert bearings, spherical outer ring, locking collar, heavy series	1160
GR	Sealing rings, single lip, external steel reinforcement	806
GRA	Three/four-bolt flanged housing units, sheet steel, locking collar, P seals	1217
GRA..-NPP-B-AS2/V	Insert bearings, spherical outer ring, locking collar, inch size bore	1164
GRAE..-NPP-B	Insert bearings, spherical outer ring, locking collar	1160
GRAE..-NPP-B-FA125.5	Insert bearings, spherical outer ring, locking collar, Corrotect®	1184
GRRY..-VA	Three/four-bolt flanged housing units, corrosion-resistant sheet steel, corrosion-resistant bearing, grub screws in inner ring, R seals	1217
GS811	Housing locating washers	858
GS812	Housing locating washers	858
GS893	Housing locating washers	858
GS894	Housing locating washers	858
GSH..-2RSR-B	Insert bearings, spherical outer ring, adapter sleeve	1161
GVK..-KTT-B-AS2/V	Insert bearings, spherical outer ring, square bore	1161
GY..-KRR-B-AS2/V	Insert bearings, spherical outer ring, grub screws in inner ring, inch size bore	1164
GYE..-KRR-B	Insert bearings, spherical outer ring, grub screws in inner ring	1160
GYE..-KRR-B-VA	Insert bearings, spherical outer ring, grub screws in inner ring, corrosion-resistant	1160

		Page
H2	Adapter sleeves, with nut and retainer	1452
H23	Adapter sleeves, with nut and retainer	1452
H240	Adapter sleeves, with nut and retainer	1452
H241	Adapter sleeves, with nut and retainer	1452
H3	Adapter sleeves, with nut and retainer	1452
H30	Adapter sleeves, with nut and retainer	1452
H31	Adapter sleeves, with nut and retainer	1452
H32	Adapter sleeves, with nut and retainer	1452
H33	Adapter sleeves, with nut and retainer	1452
H39	Adapter sleeves, with nut and retainer	1452
HCB70	Standard spindle bearings, ceramic balls	304
HCB719	Standard spindle bearings, ceramic balls	304
HCB72	Standard spindle bearings, ceramic balls	304
HCS70	High speed spindle bearings, ceramic balls, sealed	304
HCS719	High speed spindle bearings, ceramic balls, sealed	304
HF	Drawn cup roller clutches, without bearing arrangement, without knurling, steel springs	790
HF..-KF	Drawn cup roller clutches, without bearing arrangement, plastic springs	790
HF..-KF-R	Drawn cup roller clutches, without bearing arrangement, with knurling, plastic springs	790
HF..-R	Drawn cup roller clutches, without bearing arrangement, with knurling, steel springs	790
HFL	Drawn cup roller clutches, with bearing arrangement, without knurling, steel springs	790
HFL..-KF	Drawn cup roller clutches, with bearing arrangement, plastic springs	790
HFL..-KF-R	Drawn cup roller clutches, with bearing arrangement, with knurling, plastic springs	790
HFL..-R	Drawn cup roller clutches, with bearing arrangement, with knurling, steel springs	790

Product index

		Page
HK	Drawn cup needle roller bearings with open ends, cage	682
HK..-2RS	Drawn cup needle roller bearings with open ends, lip seals	682
HK..-RS	Drawn cup needle roller bearings with open ends, lip seal	682
HM	Locknuts	1452
HM30	Locknuts	1452
HM31	Locknuts	1452
HMZ	Shaft nuts	1452
HN	Drawn cup needle roller bearings, full complement	682
HSS70	High speed spindle bearings, sealed	304
HSS719	High speed spindle bearings, sealed	304
IR	Inner rings, precision machined	778
IR..-IS1	Inner rings, precision machined, lubrication hole	778
JK0S	Integral tapered roller bearings, sealed	516
K	Tapered roller bearings, single row, inch sizes	516
K	Needle roller and cage assemblies, single row	516
K..-ZW	Needle roller and cage assemblies, double row	666
K811	Axial cylindrical roller and cage assemblies, single row	858
K812	Axial cylindrical roller and cage assemblies, single row	858
K893	Axial cylindrical roller and cage assemblies, double row	858
K894	Axial cylindrical roller and cage assemblies, double row	858
KLRU	Track rollers with plastic tyre, spherical outside surface	987
KLRZ	Track rollers with plastic tyre, cylindrical outside surface	987
KM	Locknuts	1452
KML	Locknuts	1452
KR	Stud type track rollers, cage, gap seals	936
KR..-PP	Stud type track rollers, cage, axial plain washers	936
KR52..-2RS	Stud type track rollers, double row, lip seals	986
KRE..-PP	Stud type track rollers, eccentric collar, cage, axial plain washers	937
KRV..-PP	Stud type track rollers, full complement, axial plain washers	936

		Page
KSR..-B0	Roller chain idler sprocket units, radial insert ball bearing	1312
KSR..-L0	Roller chain idler sprocket units, deep groove ball bearing	1312
KSR..-L0..-22	Roller chain idler sprocket units, plastic sprocket, deep groove ball bearing	1312
KUG	Steel balls, to DIN 5 401-1/ISO 3 290	1512
LASE..-N	Plummer block housing units, cast iron, locking collar, L seals	1214
LCJT..-N	Two-bolt flanged housing units, cast iron, locking collar, L seals	1214
LOE	Plummer block housings, split, for oil lubrication	1322
LR	Inner rings, ground	778
LR2	Yoke type track rollers, single row, lip seals	986
LR50	Yoke type track rollers, double row, lip seals	986
LR52	Yoke type track rollers, double row, lip or gap seals	986
LR53	Yoke type track rollers, double row, lip or gap seals	986
LR6	Yoke type track rollers, single row, lip seals	986
LR60	Yoke type track rollers, single row, lip seals	986
LS	Bearing washers	858
LSL1923	Cylindrical roller bearings with disc cage	448
MB	Tab washers	1452
MBL	Tab washers	1452
MS30	Retaining brackets, with screw	1452
MS31	Retaining brackets, with screw	1452
MSTU	Take-up housing units, sheet steel, locking collar, P seals, without relubrication facility	1216
N2..-E	Cylindrical roller bearings with cage, non-locating bearings	396
N3..-E	Cylindrical roller bearings with cage, non-locating bearings	396
NA22..-2RSR	Yoke type track rollers, without axial guidance, inner ring, lip seals	930

Product index

		Page
NA48	Needle roller bearings with ribs, inner ring	704
NA49	Needle roller bearings with ribs, inner ring	704
NA49..-2RSR	Needle roller bearings with ribs, inner ring, lip seals	704
NA49..-RSR	Needle roller bearings with ribs, inner ring, lip seal	704
NA69	Needle roller bearings with ribs, inner ring	704
NA69..-ZW	Needle roller bearings with ribs, inner ring, double row	704
NAO	Needle roller bearings with ribs, inner ring, single row	738
NAO..-ZW-ASR1	Needle roller bearings without ribs, inner ring, double row	738
NATR	Yoke type track rollers, axial guidance, cage, gap seals	931
NATR..-PP	Yoke type track rollers, axial guidance, cage, axial plain washers	931
NATV	Yoke type track rollers, axial guidance, full complement needle roller set, gap seals	931
NATV..-PP	Yoke type track rollers, axial guidance, full complement needle roller set, axial plain washers	931
NJ2..-E	Cylindrical roller bearings with cage, semi-locating	396
NJ2..-E + HJ	Cylindrical roller bearings with cage, locating, L-section ring	396
NJ22..-E	Cylindrical roller bearings with cage, semi-locating	396
NJ22..-E + HJ	Cylindrical roller bearings with cage, locating, L-section ring	396
NJ23..-E	Cylindrical roller bearings with cage, semi-locating	396
NJ23..-E + HJ	Cylindrical roller bearings with cage, locating, L-section ring	396
NJ3..-E	Cylindrical roller bearings with cage, semi-locating	396
NJ3..-E + HJ	Cylindrical roller bearings with cage, locating, L-section ring	396
NJ4	Cylindrical roller bearings with cage, semi-locating	396
NJ4 + HJ	Cylindrical roller bearings with cage, locating, L-section ring	396
NK	Needle roller bearings with ribs, without inner ring	704
NKI	Needle roller bearings with ribs, inner ring	704
NKIA	Needle roller/angular contact ball bearings, inner ring	760
NKIB	Needle roller/angular contact ball bearings, inner ring	760
NKIS	Needle roller bearings with ribs, inner ring	704
NKS	Needle roller bearings with ribs, without inner ring	704

		Page
NKX	Needle roller/axial deep groove ball bearings, without inner ring, without end cap	760
NKX..-Z	Needle roller/axial deep groove ball bearings, without inner ring, with end cap	760
NKXR	Needle roller/axial cylindrical roller bearings, without inner ring, without end cap	760
NKXR..-Z	Needle roller/axial cylindrical roller bearings, without inner ring, with end cap	760
NN30..-AS-K-M-SP	High precision cylindrical roller bearings, non-locating, double row	502
NNTR..-2ZL	Yoke type track rollers, axial guidance, full complement cylindrical roller set, central rib, sealing shields with lamellar ring	931
NRB	Needle rollers, to DIN 5 402-3/ISO 3 096, type B, flat end faces, profiled ends	1530
NU10	Cylindrical roller bearings with cage, non-locating	396
NU19	Cylindrical roller bearings with cage, non-locating	396
NU2..-E	Cylindrical roller bearings with cage, non-locating	396
NU22..-E	Cylindrical roller bearings with cage, non-locating	396
NU23..-E	Cylindrical roller bearings with cage, non-locating	396
NU3..-E	Cylindrical roller bearings with cage, non-locating	396
NU4	Cylindrical roller bearings with cage, non-locating	396
NUKR	Stud type track rollers, full complement cylindrical roller set, labyrinth seals	936
NUKRE	Stud type track rollers, eccentric collar, full complement cylindrical roller set, labyrinth seals	937
NUP2..-E	Cylindrical roller bearings with cage, locating, rib washer	396
NUP22..-E	Cylindrical roller bearings with cage, locating, rib washer	396
NUP23..-E	Cylindrical roller bearings with cage, locating, rib washer	396
NUP3..-E	Cylindrical roller bearings with cage, locating, rib washer	396
NUTR	Yoke type track rollers, axial guidance, full complement cylindrical roller set, labyrinth seals	931
NX	Needle roller/axial deep groove ball bearings, without inner ring, without end cap	760
NX..-Z	Needle roller/axial deep groove ball bearings, without inner ring, with end cap	760

Product index

		Page
PASE..-N	Plummer block housing units, cast iron, locking collar, P seals	1214
PASE..-N-FA125	Plummer block housing units, cast iron, locking collar, P seals, Corrotect®	1242
PASEY..-N	Plummer block housing units, cast iron, grub screws in inner ring, P seals	1214
PB	Plummer block housing units, sheet steel, locking collar, P seals	1217
PBS	Plummer block housing units, sheet steel, locking collar, P seals	1217
PBY	Plummer block housing units, sheet steel, grub screws in inner ring, P seals	1217
PCCJ	Four-bolt flanged housing units, cast iron, centring spigot, double row angular contact ball bearing, P seals	1215
PCF	Four-bolt flanged housing units, cast iron, locking collar, P seals	1215
PCFT	Two-bolt flanged housing units, cast iron, locking collar, P seals	1214
PCFTR	Three-bolt flanged housing units, cast iron, locking collar, P seals	1215
PCJ..-N	Four-bolt flanged housing units, cast iron, locking collar, P seals	1215
PCJ..-N-FA125	Four-bolt flanged housing units, cast iron, locking collar, P seals, Corrotect®	1270
PCJT..-N	Two-bolt flanged housing units, cast iron, locking collar, P seals	1214
PCJT..-N-FA125	Two-bolt flanged housing units, cast iron, locking collar, P seals, Corrotect®	1258
PCJTY..-N	Two-bolt flanged housing units, cast iron, grub screws in inner ring, P seals	1214
PCJY..-N	Four-bolt flanged housing units, cast iron, grub screws in inner ring, P seals	1215

		Page
PCSLT	Two-bolt flanged housing units, sheet steel, locking collar, P seals	1217
PE	Insert bearings, steel aligning ring, locking collar, P seals	1162
PHE	Take-up housing units, cast iron, locking collar, P seals	1216
PHEY	Take-up housing units, cast iron, grub screws in inner ring, P seals	1216
PHUSE	Take-up housing units, cast iron and sheet steel, locking collar, P seals	1216
PME..-N	Four-bolt flanged housing units, cast iron, centring spigot, locking collar, P seals	1215
PMEY..-N	Four-bolt flanged housing units, cast iron, centring spigot, grub screws in inner ring, P seals	1215
PNA	Aligning needle roller bearings, inner ring	752
PSFT	Take-up housing units, cast iron, locking collar, P seals	1216
PSHE..-N	Plummer block housing units, cast iron, locking collar, P seals	1214
PSHEY..-N	Plummer block housing units, cast iron, grub screws in inner ring, P seals	1214
PTUE	Take-up housing units, cast iron, locking collar, P seals	1216
PTUEY	Take-up housing units, cast iron, grub screws in inner ring, P seals	1216
PWKR..-2RS	Stud type track rollers, full complement cylindrical roller set, central rib, protected lip seals	936
PWKRE..-2RS	Stud type track rollers, eccentric collar, full complement cylindrical roller set, central rib, protected lip seals	937
PWTR..-2RS	Yoke type track rollers, axial guidance, full complement cylindrical roller set, central rib, protected lip seals	931
QJ2	Four point contact bearings, without retaining slots	350
QJ2..-N2	Four point contact bearings, with retaining slots	350
QJ3	Four point contact bearings, without retaining slots	350
QJ3..-N2	Four point contact bearings, with retaining slots	350
RA	Three/four-bolt flanged housing units, sheet steel, locking collar, P seals	1217

Product index

		Page
RA..-NPP	Insert bearings, cylindrical outer ring, locking collar, inch size bore	1164
RA..-NPP-B	Insert bearings, spherical outer ring, locking collar, inch size bore	1164
RABRA(B)	Insert bearings, rubber interliner, locking collar	1163
RAE..-NPP	Insert bearings, cylindrical outer ring, locking collar	1162
RAE..-NPP-B	Insert bearings, spherical outer ring, locking collar	1160
RAE..-NPP-NR	Insert bearings, cylindrical outer ring with two slots, locking collar, snap ring	1163
RAL..-NPP	Insert bearings, cylindrical outer ring, locking collar, inch size bore, light series	1164
RALE..-NPP	Insert bearings, cylindrical outer ring, locking collar, light series	1162
RALE..-NPP-B	Insert bearings, spherical outer ring, locking collar, light series	1160
RALT	Two-bolt flanged housing units, sheet steel, locking collar, P seals, light series	1217
RALTR	Three-bolt flanged housing units, sheet steel, locking collar, P seals, light series, without relubrication facility	1217
RASE..-FA164	Plummer block housing units, cast iron, locking collar, R seals, for high temperatures	1242
RASE..-N	Plummer block housing units, cast iron, locking collar, R seals	1214
RASE..-N-FA125	Plummer block housing units, cast iron, locking collar, R seals, Corrotect®	1242
RASEA..-N	Plummer block housing units, cast iron, adapter sleeve, R seals	1214
RASEL..-N	Plummer block housing units, cast iron, drive slot in inner ring, R seals	1214
RASEY..-JIS	Plummer block housing units, cast iron, grub screws in inner ring, R seals, to JIS standard	1214
RASEY..-N	Plummer block housing units, cast iron, grub screws in inner ring, R seals	1214
RAT	Two-bolt flanged housing units, sheet steel, locking collar, P seals	1217
RATR	Three-bolt flanged housing units, sheet steel, locking collar, P seals	1217
RATRY	Three-bolt flanged housing units, sheet steel, grub screws in inner ring, P seals	1217

		Page
RATY	Two-bolt flanged housing units, sheet steel, grub screws in inner ring, P seals	1217
RAY	Three/four-bolt flanged housing units, sheet steel, grub screws in inner ring, P seals	1217
RCJ..-FA164	Four-bolt flanged housing units, cast iron, locking collar, R seals, for high temperatures	1274
RCJ..-N	Four-bolt flanged housing units, cast iron, locking collar, R seals	1215
RCJ..-N-FA125	Four-bolt flanged housing units, cast iron, locking collar, R seals, Corrotect®	1270
RCJL..-N	Four-bolt flanged housing units, cast iron, drive slot in inner ring, R seals	1215
RCJO	Four-bolt flanged housing units, cast iron, locking collar, R seals, heavy series	1215
RCJT..-FA164	Two-bolt flanged housing units, cast iron, locking collar, R seals, for high temperatures	1260
RCJT..-N	Two-bolt flanged housing units, cast iron, locking collar, R seals	1214
RCJT..-N-FA125	Two-bolt flanged housing units, cast iron, locking collar, R seals, Corrotect®	1258
RCJTA..-N	Two-bolt flanged housing units, cast iron, adapter sleeve, R seals	1214
RCJTY..-JIS	Two-bolt flanged housing units, cast iron, grub screws in inner ring, R seals, to JIS standard	1214
RCJTY..-N	Two-bolt flanged housing units, cast iron, grub screws in inner ring, R seals	1214
RCJTZ	Two-bolt flanged housing units, cast iron, centring spigot, locking collar, R seals	1214
RCJY..-JIS	Four-bolt flanged housing units, cast iron, grub screws in inner ring, R seals, to JIS standard	1215
RCJY..-N	Four-bolt flanged housing units, cast iron, grub screws in inner ring, R seals	1215
RCRA(B)	Insert bearings, rubber interliner, locking collar	1163
RCSMA(B)	Insert bearings, rubber interliner, locking collar	1163
RCSMF	Two-bolt flanged housing units, sheet steel, rubber interliner, locking collar, P seals	1217

Product index

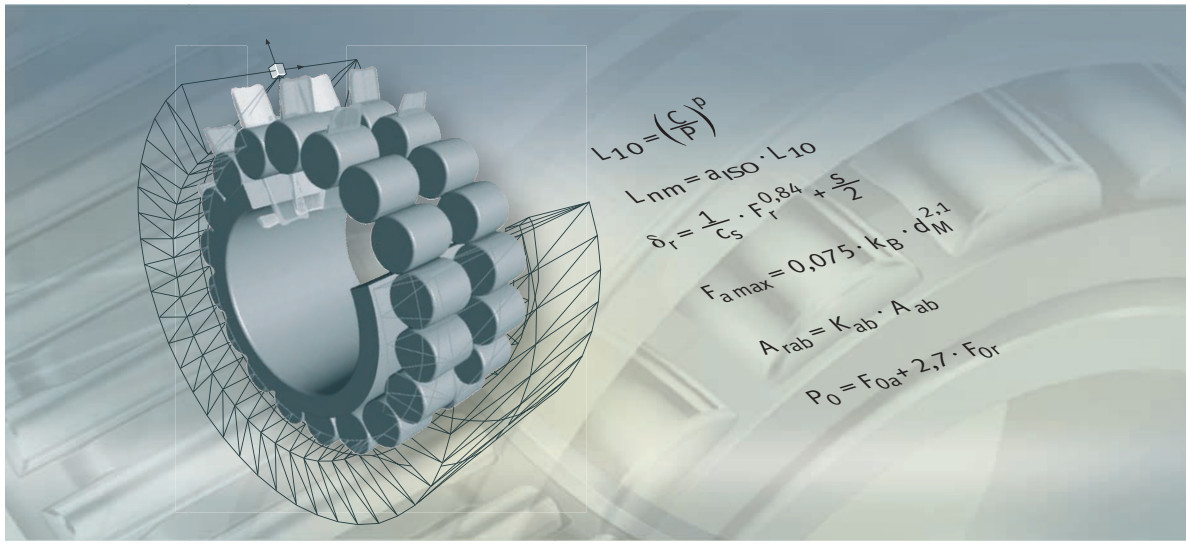
		Page
RFE	Four-bolt flanged housing units, cast iron, centring spigot, locking collar, R seals	1215
RHE	Take-up housing units, cast iron, locking collar, R seals	1216
RME..-N	Four-bolt flanged housing units, cast iron, centring spigot, locking collar, R seals	1215
RMEO	Four-bolt flanged housing units, cast iron, centring spigot, locking collar, R seals, heavy series	1215
RMEY..-N	Four-bolt flanged housing units, cast iron, centring spigot, grub screws in inner ring, R seals	1215
RNA22..-2RSR	Yoke type track rollers, without axial guidance, without inner ring, lip seals	930
RNA48	Needle roller bearings with ribs, without inner ring	704
RNA49	Needle roller bearings with ribs, without inner ring	704
RNA49..-2RSR	Needle roller bearings with ribs, without inner ring, lip seals	704
RNA49..-RSR	Needle roller bearings with ribs, without inner ring, lip seal	704
RNA69	Needle roller bearings with ribs, without inner ring, single row	704
RNA69..-ZW	Needle roller bearings with ribs, without inner ring, double row	704
RNAO	Needle roller bearings without ribs, without inner ring, single row	738
RNAO..-ZW-ASR1	Needle roller bearings without ribs, without inner ring, double row, lubrication hole in outer ring	738
RPB	Plummer block housing units, sheet steel, rubber interliner, locking collar, P seals	1217
RPNA	Aligning needle roller bearings, without inner ring	752
RRTR	Three-bolt flanged housing units, sheet steel, locking collar, R seals	1217
RRY..-VA	Three/four-bolt flanged housing units, corrosion-resistant sheet steel, corrosion-resistant bearing, grub screws in inner ring, R seals	1217
RSAO	Plummer block housing units, cast iron, locking collar, R seals, heavy series	1214
RSHE..-N	Plummer block housing units, cast iron, locking collar, R seals	1214
RSHEY..-N	Plummer block housing units, cast iron, grub screws in inner ring, R seals	1214

		Page
RSRA..-K0	Idler pulley units, deep groove ball bearing	1312
RSRA..-L0	Idler pulley units, deep groove ball bearing	1312
RSRB..-L0	Idler pulley units, deep groove ball bearing	1312
RSRD..-L0	Idler pulley units, deep groove ball bearing	1312
RSTO	Yoke type track rollers, without axial guidance, without inner ring	930
RTC	Axial/radial bearings, double direction	1112
RTUE	Take-up housing units, cast iron, locking collar, R seals	1216
RTUEO	Take-up housing units, cast iron, locking collar, R seals, heavy series	1216
RTUEY	Take-up housing units, cast iron, grub screws in inner ring, R seals	1216
S30	Plummer block housings, split	1322
SD	Sealing rings, double lip	806
SD31	Plummer block housings, split	1322
SK..-KRR-B	Insert bearings, spherical outer ring, hexagonal bore	1161
SL0148	Cylindrical roller bearings, full complement, locating, double row	480
SL0149	Cylindrical roller bearings, full complement, locating, double row	480
SL0248	Cylindrical roller bearings, full complement, non-locating, double row	480
SL0249	Cylindrical roller bearings, full complement, non-locating, double row	480
SL04..-PP	Cylindrical roller bearings, full complement, snap ring grooves, locating, lip seals	480
SL0450..-PP	Cylindrical roller bearings, full complement, snap ring grooves, locating, lip seals	480
SL1818	Cylindrical roller bearings, full complement, semi-locating, single row	462
SL1822	Cylindrical roller bearings, full complement, semi-locating, single row	462
SL1829	Cylindrical roller bearings, full complement, semi-locating, single row	462
SL1830	Cylindrical roller bearings, full complement, semi-locating, single row	462
SL1850	Cylindrical roller bearings, full complement, semi-locating, double row	480
SL1923	Cylindrical roller bearings, full complement, semi-locating, single row	462
SNV	Plummer block housings, split	1322
STO	Yoke type track rollers, without axial guidance, inner ring	930
SX	Crossed roller bearings, dimension series 18	898

Product index

		Page
T	Tapered roller bearings, single row	516
TASE..-N	Plummer block housing units, cast iron, locking collar, T seals	1214
TCJ	Four-bolt flanged housing units, cast iron, locking collar, T seals	1215
TCJT..-N	Two-bolt flanged housing units, cast iron, locking collar, T seals	1214
TFE	Four-bolt flanged housing units, cast iron, centring spigot, locking collar, T seals	1215
THE	Take-up housing units, cast iron, locking collar, T seals	1216
TME..-N	Four-bolt flanged housing units, cast iron, centring spigot, locking collar, T seals	1215
TSHE..-N	Plummer block housing units, cast iron, locking collar, T seals	1214
TTUE	Take-up housing units, cast iron, locking collar, T seals	1216
VK..-KTT-B	Insert bearings, spherical outer ring, square bore	1161
VR3	Plummer block housings, unsplit	1323
WS811	Shaft locating washers	858
WS812	Shaft locating washers	858
WS893	Shaft locating washers	858
WS894	Shaft locating washers	858
YRT	Axial/radial bearings, double direction	1112
YRTM	Axial/radial bearings with integral angular measuring system	1146
YRT_{Speed}	Axial/radial bearings, double direction, for higher speeds	1112
ZARF	Needle roller/axial cylindrical roller bearings, for screw mounting	1066
ZARF..-L	Needle roller/axial cylindrical roller bearings, for screw mounting, extended shaft locating washer	1066

		Page
ZARN	Needle roller/axial cylindrical roller bearings	1066
ZARN..-L	Needle roller/axial cylindrical roller bearings, extended shaft locating washer	1066
ZKLDF	Axial angular contact ball bearings, double direction	1112
ZKLF..-2RS	Axial angular contact ball bearings, double row, for screw mounting, lip seals	1012
ZKLF..-2RS-2AP	Axial angular contact ball bearings, double row, for screw mounting, matched pair, lip seals	1012
ZKLF..-2RS-PE	Axial angular contact ball bearings, double row, for screw mounting, lip seals, less stringent tolerances	1012
ZKLF..-2Z	Axial angular contact ball bearings, double direction, for screw mounting, gap seals	1012
ZKLFA..-2RS	Axial angular contact ball bearings, double row, flattened flange, for screw mounting, lip seals	1013
ZKLFA..-2Z	Axial angular contact ball bearings, double row, flattened flange, for screw mounting, gap seals	1013
ZKLN..-2RS	Axial angular contact ball bearings, double row, lip seals	1012
ZKLN..-2RS-2AP	Axial angular contact ball bearings, double row, matched pair, lip seals	1012
ZKLN..-2RS-PE	Axial angular contact ball bearings, double row, lip seals, less stringent tolerances	1012
ZKLN..-2Z	Axial angular contact ball bearings, double row, gap seals	1012
ZKLR..-2RS	Angular contact ball bearing units, for screw mounting, lip seals	1013
ZKLR..-2Z	Angular contact ball bearing units, for screw mounting, gap seals	1013
ZL2..-DRS	Stud type track rollers, single row, lip seal on stud side	986
ZL52..-DRS	Stud type track rollers, double row, lip seal on stud side	986
ZLE52..-2Z	Stud type track rollers, eccentric collar, double row, sealing shields	986
ZM(A)	Precision locknuts, radial locking	1094
ZRB	Cylindrical rollers, to DIN 5 402-1, profiled ends or logarithmic profile	1520
ZSL1923	Cylindrical roller bearings with spacers	448



Technical principles

Load carrying capacity and life
Rigidity
Friction and increases in temperature
Speeds
Lubrication
Bearing data
Design of bearing arrangements
Fitting and dismantling

Technical principles

Page

Load carrying capacity and life

Fatigue theory as a principle ... 40
Dimensioning of rolling bearings ... 41
Dynamic load carrying capacity and life ... 41
Life calculation ... 42
- Basic rating life ... 42
- Adjusted rating life ... 43
- Expanded adjusted rating life ... 46

Equivalent operating values ... 51
- Variable load and speed ... 51

Required basic rating life ... 53
Operating life ... 56
Axial load carrying capacity of cylindrical roller bearings ... 57
- Bearings of TB design ... 57
- Permissible and maximum axial load ... 57

Static load carrying capacity ... 59
- Static load safety factor ... 59

Rigidity

Deflection ... 61

Friction and increases in temperature

Friction ... 63
- Heat dissipation ... 63
- Determining the friction values ... 64
- Cylindrical roller bearings under axial load ... 69

Speeds

Thermal reference speed ... 71
- Reference conditions ... 71

Limiting speed ... 72
Thermally safe operating speed ... 72
- Calculation of the thermally safe operating speed ... 73

Technical principles

Page

Lubrication

Principles 76
- Functions of the lubricant 76
- Selection of the type of lubrication 77
- Design of lubricant feed 78

Grease lubrication 79
- Composition of a grease 79
- Type of grease 80
- Consistency of greases 80
- Selection of suitable grease 81
- Greases with special suitability 84
- Grease operating life 86
- Relubrication intervals 93
- Miscibility 95
- Storage life 95

Oil lubrication 96
- Operating temperatures 96
- Selection of suitable oil 96
- Compatibility 99
- Miscibility 99
- Cleanliness 99
- Lubrication methods 100
- Oil changes 107

Bearing data

	Page
Radial internal clearance	108
Enveloping circle	108
Operating clearance	109
Operating clearance value	109
Calculation of operating clearance	109
Axial internal clearance	111
Calculation example	112
Bearing materials	113
High Nitrogen Steel	113
High performance steels Cronidur and Cronitect	113
Ceramic materials	113
Materials and bearing components	114
Cages	114
Sheet metal cages	114
Solid section cages	115
Type of guidance	117
Operating temperature	118
Track rollers	118
Sealed bearings	118
Anti-corrosion protection	119
Corrotect® coating	119
Dimensional and geometrical tolerances	120
High precision bearings	120
Measurement methods	120
Radial bearings, excluding tapered roller bearings	122
Axial bearings	133
Chamfer dimensions	136
Radial bearings, excluding tapered roller bearings	136
Tapered roller bearings	138
Axial bearings	139

Technical principles

Design of bearing arrangements

Page

Selection of bearing arrangement ... 140
- Locating/non-locating bearing arrangement ... 140
- Adjusted bearing arrangement ... 144
- Floating bearing arrangement ... 146

Fits ... 147
- Criteria for selection of fits ... 147
- Conditions of rotation ... 147

Shaft and housing tolerances ... 149
- Tolerance zones ... 149
- Reference to tables of shaft and housing tolerances ... 149
- Tables of shaft and housing fits ... 153
- Enveloping circle ... 168

Geometrical tolerances of bearing seating surfaces ... 169
- Accuracy of bearing seating surfaces ... 169

Values for IT grades ... 172

Raceways for bearings without inner and/or outer ring ... 174
- Materials for raceways ... 174

Axial location of bearings ... 176
- Design guidelines ... 176
- Adjusted and floating bearing arrangements ... 180

Seals ... 181
- Non-contact seals in the adjacent construction ... 181
- Non-contact seals in the bearing ... 184
- Contact seals in the adjacent construction ... 185
- Contact seals in the bearing ... 187

Fitting and dismantling

Page

Handling 188
- Storage of rolling bearings 188
- Storage of Arcanol rolling bearing greases 189
- Unpacking of rolling bearings 190
- Compatibility, miscibility 190
- Cleaning of rolling bearings 190

Assembly 191
- Guidelines for fitting 191
- Fitting of rolling bearings with cylindrical seats 192
- Fitting of rolling bearings with tapered bore 195
- Guidelines for dismantling 196
- Dismantling of rolling bearings on cylindrical seats 197
- Dismantling of rolling bearings with tapered bore 198

Schaeffler KG introduced the “Expanded calculation of the adjusted rating life” in 1997. This method was standardised for the first time in DIN ISO 281 Appendix 1 and has been a constituent part of the international standard ISO 281 since 2007.

As part of the international standardisation work, the life adjustment factor a_{DIN} was renamed as a_{ISO} but without any change to the calculation method.

Fatigue theory as a principle

The basis of the rating life calculation in accordance with ISO 281 is Lundberg and Palmgren's fatigue theory which always gives a final rating life.

However, modern, high quality bearings can exceed by a considerable margin the values calculated for the basic rating life under favourable operating conditions. Ioannides and Harris have developed a further model of fatigue in rolling contact that expands on the Lundberg/Palmgren theory and gives a better description of the performance capability of modern bearings.

The method “Expanded calculation of the adjusted rating life” takes account of the following influences:

- the bearing load
- the fatigue limit of the material
- the extent to which the surfaces are separated by the lubricant
- the cleanliness in the lubrication gap
- additives in the lubricant
- the internal load distribution and frictional conditions in the bearing.

The influencing factors, especially those relating to contamination, are extremely complex. A great deal of experience is essential for an accurate assessment. As a result the Engineering Service of Schaeffler Group Industrial should be consulted for further advice.

The tables and diagrams can only give guide values.

Dimensioning of rolling bearings

The required size of a rolling bearing is dependent on the demands made on its:

- rating life
- load carrying capacity
- operational reliability.

Dynamic load carrying capacity and life

The dynamic load carrying capacity is described in terms of the basic dynamic load ratings. The basic dynamic load ratings are based on DIN ISO 281.

The basic dynamic load ratings for rolling bearings are matched to empirically proven performance standards and those published in previous FAG and INA catalogues.

The fatigue behaviour of the material determines the dynamic load carrying capacity of the rolling bearing.

The dynamic load carrying capacity is described in terms of the basic dynamic load rating and the basic rating life.

The fatigue life is dependent on:

- the load
- the operating speed
- the statistical probability of the first appearance of failure.

The basic dynamic load rating C applies to rotating rolling bearings. It is:

- a constant radial load C_r for radial bearings
- a constant, concentrically acting axial load C_a for axial bearings.

The basic dynamic load rating C is that load of constant magnitude and direction which a sufficiently large number of apparently identical bearings can endure for a basic rating life of one million revolutions.

Calculation of the rating life

The methods for calculating the rating life are:

- basic rating life L_{10} and L_{10h} to ISO 281, see page 42
- adjusted rating life L_{na} to DIN ISO 281:1990 (no longer a constituent part of ISO 281), see page 43
- expanded adjusted rating life L_{nm} to ISO 281, see page 46.

Basic rating life

The basic rating life L_{10} and L_{10h} is calculated as follows:

$$L_{10} = \left(\frac{C}{P}\right)^p$$

$$L_{10h} = \frac{16\,666}{n} \cdot \left(\frac{C}{P}\right)^p$$

L_{10} 10^6 revolutions
The basic rating life in millions of revolutions is the life reached or exceeded by 90% of a sufficiently large group of apparently identical bearings before the first evidence of material fatigue develops

L_{10h} h
The basic rating life as defined for L_{10} but expressed in operating hours

C N
Basic dynamic load rating

P N
Equivalent dynamic bearing load for radial and axial bearings

p –
Life exponent;
for roller bearings: p = 10/3
for ball bearings: p = 3

n min^{-1}
Operating speed.

Equivalent dynamic load

The equivalent dynamic load P is a calculated value. This value is constant in size and direction; it is a radial load for radial bearings and an axial load for axial bearings.

The load value P gives the same rating life as the combined load occurring in practice.

$$P = X \cdot F_r + Y \cdot F_a$$

P N
Equivalent dynamic bearing load

F_r N
Radial dynamic bearing load

F_a N
Axial dynamic bearing load

X –
Radial factor given in the dimension tables or product description

Y –
Axial factor given in the dimension tables or product description.

This calculation cannot be applied to radial needle roller bearings, axial needle roller bearings and axial cylindrical roller bearings. Combined loads are not permissible with these bearings.

Adjusted rating life

The adjusted rating life L_{na} can be calculated if, in addition to the load and speed, other influences are known such as:

- special material characteristics
- lubrication

or

- if a requisite reliability other than 90% is specified.

This calculation method was replaced in ISO 281:2007 by the calculation of the expanded adjusted rating life L_{nm}, see page 46.

$$L_{na} = a_1 \cdot a_2 \cdot a_3 \cdot L_{10}$$

L_{na} 10^6 revolutions
Adjusted rating life for special material characteristics and operating conditions with a requisite reliability of (100 – n) %

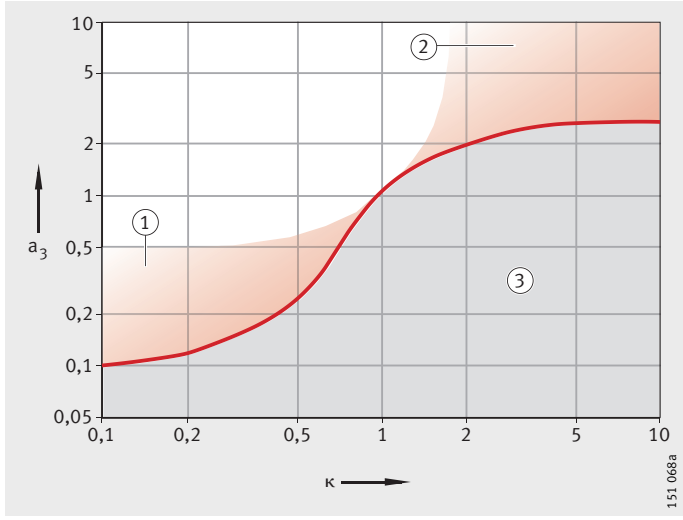
L_{10} 10^6 revolutions
Basic rating life

a_1 –
Life adjustment factor for a requisite reliability other than 90%.
In ISO 281:2007, the values for the life adjustment factor a_1 have been redefined, see table Life adjustment factor a_1, page 46

a_2 –
Life adjustment factor for special material characteristics.
For standard rolling bearing steels: $a_2 = 1$

a_3 –
Life adjustment factor for special operating conditions; in particular lubrication, *Figure 1*.

The viscosity ratio κ is determined according to the formula on page 44.



① Good cleanliness and suitable additives
② Very high cleanliness and low load
③ Contamination in the lubricant
a_3 = life adjustment factor
κ = viscosity ratio

Figure 1
Life adjustment factor a_3

Viscosity ratio

The viscosity ratio κ is an indication of the quality of lubricant film formation:

$$\kappa = \frac{\nu}{\nu_1}$$

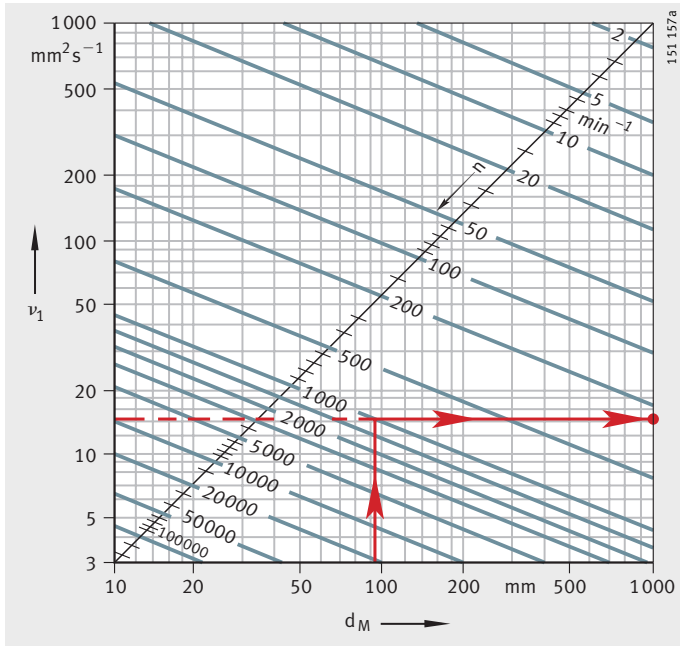
ν mm^2s^{-1}
Kinematic viscosity of the lubricant at operating temperature
ν_1 mm^2s^{-1}
Reference viscosity of the lubricant at operating temperature.

The reference viscosity ν_1 is determined from the mean bearing diameter $d_M = (D + d)/2$ and the operating speed n, *Figure 2*, page 45.

The nominal viscosity of the oil at +40 °C is determined from the required operating viscosity ν and the operating temperature ϑ, *Figure 3*, page 45. In the case of greases, ν is the operating viscosity of the base oil.

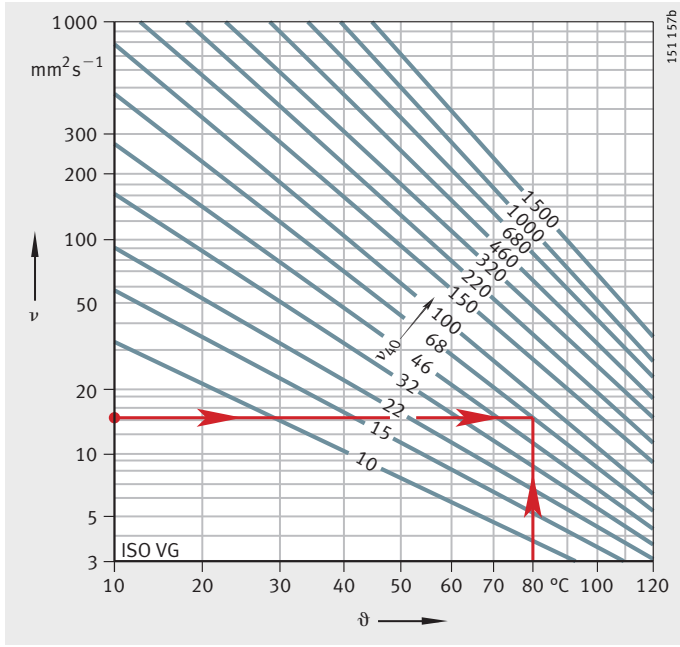
In the case of heavily loaded bearings with a high proportion of sliding contact, the temperature in the contact area of the rolling elements may be up to 20 K higher than the temperature measured on the stationary ring (without the influence of any external heat).

Taking account of EP additives in calculation of the expanded adjusted rating life L_{nm}: see page 47.



ν_1 = reference viscosity
d_M = mean bearing diameter
n = speed

Figure 2
Reference viscosity ν_1



ν = operating viscosity
ϑ = operating temperature
ν_{40} = viscosity at +40 °C

Figure 3
V/T diagram for mineral oils

Expanded adjusted rating life

The calculation of the expanded adjusted rating life L_{nm} was standardised in DIN ISO 281 Appendix 1. Since 2007, it has been standardised in the worldwide standard ISO 281. Computer-aided calculation in accordance with DIN ISO 281 Appendix 4 has been specified since 2008 in ISO/TS 16 281.

L_{nm} is calculated as follows:

$$L_{nm} = a_1 \cdot a_{ISO} \cdot L_{10}$$

L_{nm} 10^6 revolutions
Expanded adjusted rating life to ISO 281

a_1 –
Life adjustment factor for a requisite reliability other than 90%, see table

a_{ISO} –
Life adjustment factor for operating conditions

L_{10} 10^6 revolutions
Basic rating life, see page 42.

The values for the life adjustment factor a_1 were redefined in ISO 281:2007 and differ from the previous data.

Life adjustment factor a_1

Requisite reliability %	Expanded adjusted rating life L_{nm}	Life adjustment factor a_1
90	L_{10m}	1
95	L_{5m}	0,64
96	L_{4m}	0,55
97	L_{3m}	0,47
98	L_{2m}	0,37
99	L_{1m}	0,25
99,2	$L_{0,8m}$	0,22
99,4	$L_{0,6m}$	0,19
99,6	$L_{0,4m}$	0,16
99,8	$L_{0,2m}$	0,12
99,9	$L_{0,1m}$	0,093
99,92	$L_{0,08m}$	0,087
99,94	$L_{0,06m}$	0,08
99,95	$L_{0,05m}$	0,077

Life adjustment factor a_{ISO}

The standardised method for calculating the life adjustment factor a_{ISO} essentially takes account of:

- the load on the bearing
- the lubrication conditions (viscosity and type of lubricant, speed, bearing size, additives)
- the fatigue limit of the material
- the type of bearing
- the residual stress in the material
- the environmental conditions
- contamination in the lubricant.

$$a_{ISO} = f\left[\frac{e_C \cdot C_u}{P}, \kappa\right]$$

a_{ISO} –
Life adjustment factor for operating conditions, *Figure 4*, page 48 to *Figure 7*, page 49

e_C –
Life adjustment factor for contamination, see table, page 50

C_u N
Fatigue limit load

P N
Equivalent dynamic bearing load

κ –
Viscosity ratio, see page 44
For $\kappa > 4$, calculation should be carried out using $\kappa = 4$.
For $\kappa < 0{,}1$, this calculation method cannot be used.

Taking account of EP additives in the lubricant

In accordance with ISO 281, EP additives can be taken into consideration in the following way:

- For a viscosity ratio $\kappa < 1$ and a contamination factor $e_C \geqq 0{,}2$, calculation can be carried out using the value $\kappa = 1$ for lubricants with EP additives that have proven effective.
  With severe contamination (contamination factor $e_C < 0{,}2$), the effectiveness of the additives under these contamination conditions must be proven. The effectiveness of the EP additives can be demonstrated in the actual application or on a rolling bearing test rig FE 8 to DIN 51 819-1.

  If the EP additives are proven effective and calculation is carried out using the value $\kappa = 1$, the life adjustment factor must be restricted to $a_{ISO} \leqq 3$. If the value a_{ISO} calculated for the actual κ is greater than 3, this value can be used in calculation.

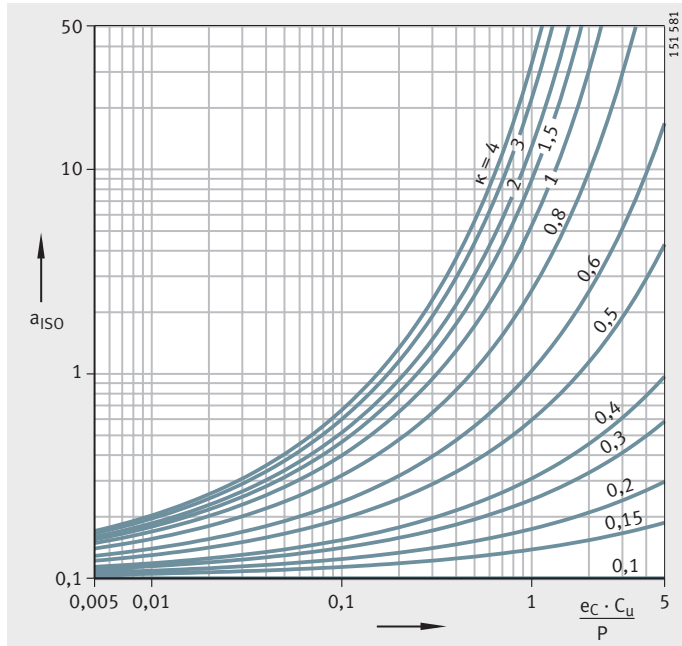


Figure 4
Life adjustment factor a_{ISO} for radial roller bearings

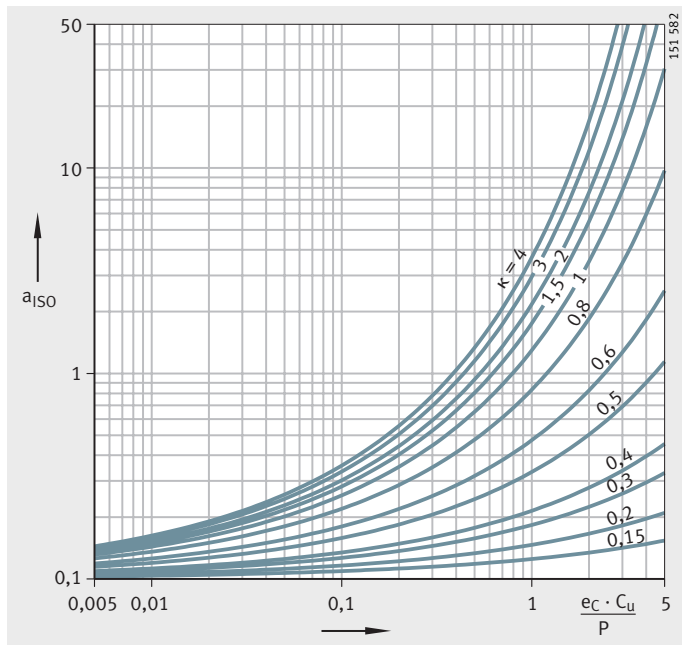


Figure 5
Life adjustment factor a_{ISO} for axial roller bearings

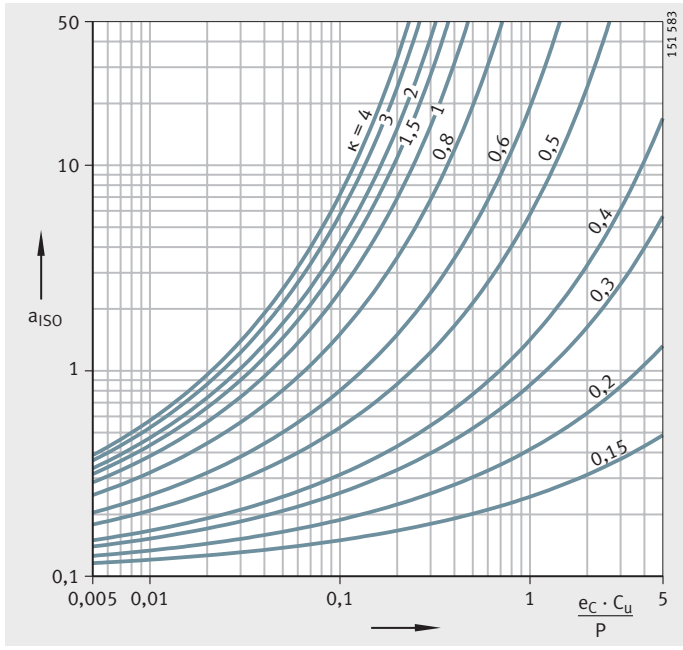


Figure 6
Life adjustment factor a_{ISO}
for radial ball bearings

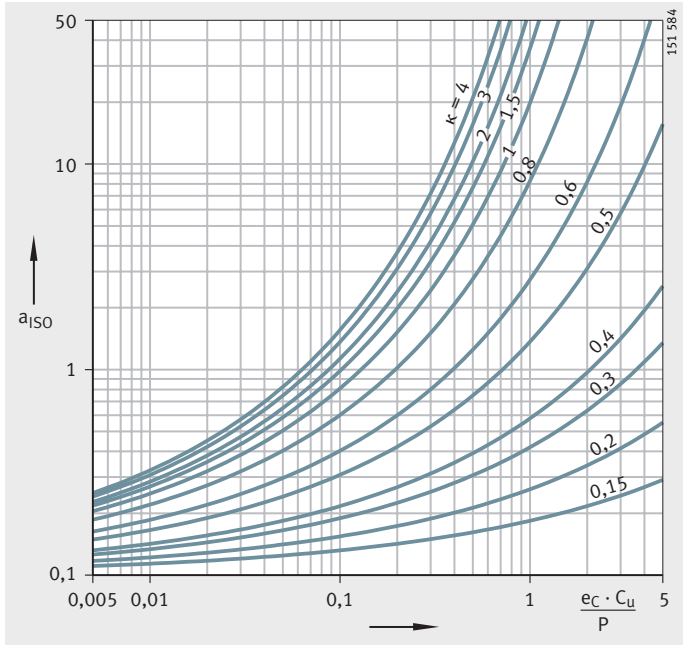


Figure 7
Life adjustment factor a_{ISO}
for axial ball bearings

Fatigue limit load

The fatigue limit load C_u in accordance with ISO 281 is defined as the load below which, under laboratory conditions, no fatigue occurs in the material.

Life adjustment factor for contamination

The life adjustment factor for contamination e_c takes into consideration the influence of contamination in the lubrication gap on the rating life, see table.

The rating life is reduced by solid particles in the lubrication gap and is dependent on:

- the type, size, hardness and number of particles
- the relative lubrication film thickness
- the bearing size.

Due to the complex nature of the interaction between these influencing factors, only an approximate guide value can be attained. The values in the tables are valid for contamination by solid particles (factor e_C). They do not take account of other contamination such as that caused by water or other fluids.

Under severe contamination ($e_C \rightarrow 0$) the bearings may fail due to wear. In this case, the operating life is substantially less than the calculated life.

Factor e_C

Contamination	Factor e_C	
	$d_M < 100$ mm[1]	$d_M \geqq 100$ mm[1]
Extreme cleanliness - Particle size within lubricant film thickness - Laboratory conditions	1	1
High cleanliness - Oil filtered through extremely fine filter - Sealed, greased bearings	0,8 to 0,6	0,9 to 0,8
Standard cleanliness - Oil filtered through fine filter	0,6 to 0,5	0,8 to 0,6
Slight contamination - Slight contamination of oil	0,5 to 0,3	0,6 to 0,4
Typical contamination - Bearing contaminated with abraded material from other machine elements	0,3 to 0,1	0,4 to 0,2
Heavy contamination - Bearing environment is heavily contaminated - Bearing arrangement is insufficiently sealed	0,1 to 0	0,1 to 0
Very heavy contamination	0	0

[1] $\overline{d_M}$ = mean bearing diameter (d + D)/2.

Equivalent operating values

The rating life formulae assume a constant bearing load P and constant bearing speed n. If the load and speed are not constant, equivalent operating values can be determined that induce the same fatigue as the actual conditions.

The equivalent operating values calculated here already take account of the life adjustment factors a_3 or a_{ISO}. They must not be applied again when calculating the adjusted rating life.

Variable load and speed

If the load and speed vary over a time period T, the speed n and equivalent bearing load P are calculated as follows:

$$n = \frac{1}{T}\int_0^T n(t)\cdot dt$$

$$P = \sqrt[p]{\frac{\int_0^T \frac{1}{a(t)}\cdot n(t)\cdot F^p(t)\cdot dt}{\int_0^T n(t)\cdot dt}}$$

Variation in steps

If the load and speed vary in steps over a time period T, n and P are calculated as follows:

$$n = \frac{q_1\cdot n_1 + q_2\cdot n_2 + \ldots + q_z\cdot n_z}{100}$$

$$P = \sqrt[p]{\frac{\frac{1}{a_i}\cdot q_i\cdot n_i\cdot F_i^p + \ldots + \frac{1}{a_z}\cdot q_z\cdot n_z\cdot F_z^p}{q_i\cdot n_i + \ldots + q_z\cdot n_z}}$$

Variable load at constant speed

If the function F describes the variation in the load over a time period T and the speed is constant, P is calculated as follows:

$$P = \sqrt[p]{\frac{1}{T}\int_0^T \frac{1}{a(t)}\cdot F^p(t)\cdot dt}$$

Load varying in steps and constant speed

If the load varies in steps over a time period T and the speed is constant, P is calculated as follows:

$$P = \sqrt[p]{\frac{\frac{1}{a_i}\cdot q_i\cdot F_i^p + \ldots + \frac{1}{a_z}\cdot q_z\cdot F_z^p}{100}}$$

Constant load at variable speed

If the speed varies but the load remains constant, the following applies:

$$n = \frac{1}{T}\int_0^T \frac{1}{a(t)}\cdot n(t)\cdot dt$$

Constant load with speed varying in steps

If the speed varies in steps, the following applies:

$$n = \frac{\frac{1}{a_i} \cdot q_i \cdot n_i + \ldots + \frac{1}{a_z} \cdot q_z \cdot n_z}{100}$$

Under oscillating bearing motion

The equivalent speed is calculated as follows:

$$n = n_{osc} \cdot \frac{\varphi}{180°}$$

The formula is valid only if the angle of oscillation is greater than twice the angular pitch of the rolling elements.
If the angle of oscillation is smaller, there is a risk of false brinelling.

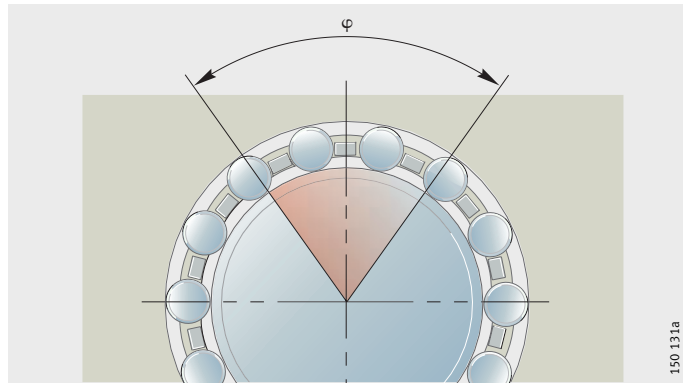


Figure 8
Angle of oscillation φ

Symbols, units and definitions

n	min^{-1}
Mean speed	
T	min
Time period under consideration	
P	N
Equivalent bearing load	
p	–
Life exponent; for roller bearings: p = 10/3 for ball bearings: p = 3	
a_i, a(t)	–
Life adjustment factor a_{ISO} for current operating condition, see page 47	
n_i, n(t)	min^{-1}
Bearing speed for current operating condition	
q_i	%
Duration of operating condition as a proportion of the total operating period; $q_i = (\Delta t_i / T) \cdot 100$	
F_i, F(t)	N
Bearing load during the current operating condition	
n_{osc}	min^{-1}
Frequency of oscillating motion	
φ	°
Angle of oscillation, *Figure 8*.	

Required rating life

If no information is available on the rating life, the guide values from the following tables may be used.

Do not overspecify the bearing. If the calculated life is > 60 000 h, this normally means that the bearing arrangement is overspecified. Pay attention to the minimum load for the bearings; see the design and safety guidelines in the product sections.

Motor vehicles

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Motorcycles	400	2 000	400	2 400
Passenger car powertrains	500	1 100	500	1 200
Passenger car gearboxes protected against contamination	200	500	200	500
Passenger car wheel bearings	1 400	5 300	1 500	7 000
Light commercial vehicles	2 000	4 000	2 400	5 000
Medium commercial vehicles	2 900	5 300	3 600	7 000
Heavy commercial vehicles	4 000	8 800	5 000	12 000
Buses	2 900	11 000	3 600	16 000
Internal combustion engines	900	4 000	900	5 000

Rail vehicles

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Wheelset bearings for freight wagons	7 800	21 000	–	–
Tram carriages	–	–	35 000	50 000
Passenger carriages	–	–	20 000	35 000
Goods wagons	–	–	20 000	35 000
Tipper wagons	–	–	20 000	35 000
Powered units	–	–	35 000	50 000
Locomotives, external bearings	–	–	35 000	50 000
Locomotives, internal bearings	–	–	75 000	110 000
Gearboxes for rail vehicles	14 000	46 000	20 000	75 000

Shipbuilding

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Marine thrust blocks	–	–	20 000	50 000
Marine shaft bearings	–	–	50 000	200 000
Large marine gearboxes	14 000	46 000	20 000	75 000
Small marine gearboxes	4 000	14 000	5 000	20 000
Boat propulsion systems	1 700	7 800	2 000	10 000

Agricultural machinery

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Tractors	1 700	4 000	2 000	5 000
Self-propelled machinery	1 700	4 000	2 000	5 000
Seasonal machinery	500	1 700	500	2 000

Construction machinery

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Dozers, loaders	4 000	7 800	5 000	10 000
Excavators, travelling gear	500	1 700	500	2 000
Excavators, slewing gear	1 700	4 000	2 000	5 000
Vibratory road rollers, imbalance generators	1 700	4 000	2 000	5 000
Vibrator bodies	500	1 700	500	2 000

Electric motors

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Electric motors for household appliances	1 700	4 000	–	–
Series motors	21 000	32 000	35 000	50 000
Large motors	32 000	63 000	50 000	110 000
Electric traction motors	14 000	21 000	20 000	35 000

Rolling mills, steelworks equipment

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Roll stands	500	14 000	500	20 000
Rolling mill gearboxes	14 000	32 000	20 000	50 000
Roller tables	7 800	21 000	10 000	35 000
Centrifugal casting machines	21 000	46 000	35 000	75 000

Machine tools

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Headstock spindles, milling spindles	14 000	46 000	20 000	75 000
Drilling spindles	14 000	32 000	20 000	50 000
Grinding spindles	7 800	21 000	10 000	35 000
Workpiece spindles in grinding machines	21 000	63 000	35 000	110 000
Machine tool gearboxes	14 000	32 000	20 000	50 000
Presses, flywheels	21 000	32 000	35 000	50 000
Presses, eccentric shafts	14 000	21 000	20 000	35 000
Electric tools and compressed air tools	4 000	14 000	5 000	20 000

Woodworking machinery

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Milling spindles and cutter blocks	14 000	32 000	20 000	50 000
Saw frames, main bearings	–	–	35 000	50 000
Saw frames, connecting rod bearings	–	–	10 000	20 000
Circular saws	4 000	14 000	5 000	20 000

Gearboxes in general machine building

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Universal gearboxes	4 000	14 000	5 000	20 000
Geared motors	4 000	14 000	5 000	20 000
Large gearboxes, stationary	14 000	46 000	20 000	75 000

Conveying equipment

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Belt drives, mining	–	–	75 000	150 000
Conveyor belt rollers, mining	46 000	63 000	75 000	110 000
Conveyor belt rollers, general	7 800	21 000	10 000	35 000
Belt drums	–	–	50 000	75 000
Bucket wheel excavators, travel drive	7 800	21 000	10 000	35 000
Bucket wheel excavators, bucket wheel	–	–	75 000	200 000
Bucket wheel excavators, bucket wheel drive	46 000	83 000	75 000	150 000
Winding cable sheaves	32 000	46 000	50 000	75 000
Sheaves	7 800	21 000	10 000	35 000

Pumps, fans, compressors

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Ventilators, fans	21 000	46 000	35 000	75 000
Large fans	32 000	63 000	50 000	110 000
Piston pumps	21 000	46 000	35 000	75 000
Centrifugal pumps	14 000	46 000	20 000	75 000
Hydraulic axial and radial piston engines	500	7 800	500	10 000
Gear pumps	500	7 800	500	10 000
Compressors	4 000	21 000	5 000	35 000

Centrifuges, stirrers

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Centrifuges	7 800	14 000	10 000	20 000
Large stirrers	21 000	32 000	35 000	50 000

Textile machinery

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Spinning machines, spinning spindles	21 000	46 000	35 000	75 000
Weaving and knitting machines	14 000	32 000	20 000	50 000

Plastics processing

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Plastics worm extruders	14 000	21 000	20 000	35 000
Rubber and plastics calenders	21 000	46 000	35 000	75 000

Crushers, mills, screens

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Jaw crushers	–	–	20 000	35 000
Gyratory crushers, roll crushers	–	–	20 000	35 000
Rigid hammer mills, hammer mills, impact crushers	–	–	50 000	110 000
Tube mills	–	–	50 000	100 000
Vibration grinding mills	–	–	5 000	20 000
Grinding track mills	–	–	50 000	110 000
Vibrating screens	–	–	10 000	20 000
Briquette presses	–	–	35 000	50 000
Rotary furnace track rollers	–	–	50 000	110 000

Paper and printing machinery

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Paper machinery, wet section	–	–	110 000	150 000
Paper machinery, dry section	–	–	150 000	250 000
Paper machinery, refiners	–	–	80 000	120 000
Paper machinery, calenders	–	–	80 000	110 000
Printing machinery	32 000	46 000	50 000	75 000

Operating life

The operating life is defined as the life actually achieved by the bearing. It may differ significantly from the calculated value.

This may be due to wear or fatigue as a result of:

- deviations in operating conditions
- misalignment between the shaft and housing
- insufficient or excessive operating clearance
- contamination
- insufficient lubrication
- excessive operating temperature
- oscillating bearing motion with very small angles of oscillation (false brinelling)
- high vibration and false brinelling
- very high shock loads (static overloading)
- prior damage during installation.

Due to the wide variety of possible installation and operating conditions, it is not possible to precisely predetermine the operating life. The most reliable way of arriving at a close estimate is by comparison with similar applications.

Axial load carrying capacity of cylindrical roller bearings

Radial cylindrical roller bearings used as semi-locating and locating bearings can support axial forces in one or both directions in addition to radial forces.

The axial load carrying capacity is dependent on:

- the size of the sliding surfaces between the ribs and the end faces of the rolling elements
- the sliding velocity at the ribs
- the lubrication on the contact surfaces
- the tilting of the bearing.

Ribs subjected to load must be supported across their entire height.

The permissible axial load $F_{a\,per}$ must not be exceeded, in order to avoid unacceptably high temperatures.

The limiting load $F_{a\,max}$ must not be exceeded, in order to avoid unacceptable pressure at the contact surfaces.

The ratio F_a/F_r must not exceed a value of 0,4. For bearings of TB design, the value 0,6 is permissible.

Continuous axial loading without simultaneous radial loading is not permissible.

Bearings of TB design

In the case of bearings of TB design, the axial load carrying capacity has been significantly improved through the use of new calculation and manufacturing methods.

Optimum contact conditions between the roller and rib are ensured by means of a special curvature of the roller end faces. As a result, axial surface pressures on the rib are significantly reduced and a lubricant film with improved load-carrying capabilities is achieved. Under normal operating conditions, wear and fatigue at the rib contact running and roller end faces is completely eliminated. The axial frictional torque is reduced by up to 50%. The bearing temperature during operation is therefore significantly lower.

Permissible and maximum axial load

$F_{a\,per}$ and $F_{a\,max}$ are calculated as follows:

Bearings of standard design

$$F_{a\,per} = k_S \cdot k_B \cdot d_M^{\,1,5} \cdot n^{-0,6} \leqq F_{a\,max}$$

Bearings of TB design

$$F_{a\,per} = 1,5 \cdot k_S \cdot k_B \cdot d_M^{\,1,5} \cdot n^{-0,6} \leqq F_{a\,max}$$

Bearings of standard and TB design

$$F_{a\,max} = 0,075 \cdot k_B \cdot d_M^{\,2,1}$$

$F_{a\,per}$ N
Permissible axial load

$F_{a\,max}$ N
Axial limiting load

k_S –
Factor dependent on the lubrication method, see table Factor k_S for lubrication method, page 58

k_B –
Factor dependent on the bearing series, see table Bearing factor k_B, page 58

d_M mm
Mean bearing diameter (d + D)/2

n min^{-1}
Operating speed.

Misalignment of the bearing

Misalignment caused by shaft deflection for example, may lead to alternating stresses on the inner ring ribs.
In this instance, the axial load must be restricted to F_{as} in accordance with the formula where the bearing is tilted up to a maximum of 2 angular minutes.

$$F_{as} = 20 \cdot d_M^{1,42}$$

For more severe tilting, a separate strength analysis is required.

Factor k_S for lubrication method

Lubrication methods[1]	Factor k_S
Minimal heat dissipation, drip feed oil lubrication, oil mist lubrication, low operating viscosity ($\nu < 0{,}5 \cdot \nu_1$)	7,5 to 10
Little heat dissipation, oil sump lubrication, oil spray lubrication, low oil flow	10 to 15
Good heat dissipation, recirculating oil lubrication (pressure oil lubrication)	12 to 18
Very good heat dissipation, recirculating oil lubrication with oil cooling, high operating viscosity ($\nu > 2 \cdot \nu_1$)	16 to 24

[1] The precondition for these k_S values is the reference viscosity ν_1 according to the section Oil lubrication. Doped oils should be used such as CLP (DIN 51 517) and HLP (DIN 51 524) of ISO-VG classes 32 to 460 and ATF oils (DIN 51 502) and gearbox oils (DIN 51 512) of SAE viscosity classes 75 W to 140 W.

Bearing factor k_B

Series	Factor k_B
SL1818, SL0148	4,5
SL1829, SL0149	11
SL1830, SL1850	17
SL1822	20
LSL1923, ZSL1923	28
SL1923	30
NJ2..-E, NJ22..-E, NUP2..-E, NUP22..-E	15
NJ3..-E, NJ23..-E, NUP3..-E, NUP23..-E	20
NJ4	22

Static load carrying capacity

Very high static loads or shock loads can cause plastic deformation on the raceways and rolling elements. This deformation limits the static load carrying capacity of the rolling bearing with respect to the permissible noise level during operation of the bearing.

If a rolling bearing operates with only infrequent rotary motion or completely without rotary motion, its size is determined in accordance with the basic static load rating C_0.

According to DIN ISO 76, this is:

- a constant radial load C_{0r} for radial bearings
- a constant, concentrically acting axial load C_{0a} for axial bearings.

The basic static load rating C_0 is that load under which the Hertzian pressure at the most heavily loaded point between the rolling elements and raceways reaches the following values:

- for roller bearings, 4 000 N/mm^2
- for ball bearings, 4 200 N/mm^2
- for self-aligning ball bearings, 4 600 N/mm^2.

Under normal contact conditions, this load causes a permanent deformation at the contact points of approx. 1/10 000 of the rolling element diameter.

Static load safety factor

In addition to dimensioning on the basis of the fatigue limit life, it is advisable to check the static load safety factor.
The guide values and shock loads occurring in operation to table must be taken into consideration, see table, page 60.

The static load safety factor S_0 is the ratio between the basic static load rating C_0 and the equivalent static load P_0:

$$S_0 = \frac{C_0}{P_0}$$

S_0 –
Static load safety factor
C_0 (C_{0r}, C_{0a}) N
Basic static load rating
P_0 (P_{0r}, P_{0a}) N
Equivalent static load on the radial or axial bearing, see page 60.

Guide values for axial spherical roller bearings and high precision bearings: see corresponding product description.

For drawn cup needle roller bearings, $S_0 \geqq 3$ is necessary.

Guide values for static load safety factor

Operating conditions	Static load safety factor S_0	
	for roller bearings	for ball bearings
Smooth, low-vibration, normal operation with minimal demands for smooth running; bearings with slight rotary motion	≧ 1	≧ 0,5
Normal operation with higher requirements for smooth running	≧ 2	≧ 1
Operation with pronounced shock loads	≧ 3	≧ 2
Bearing arrangement with high requirements for running accuracy and smooth running	≧ 4	≧ 3

Equivalent static load

The equivalent static load P_0 is a calculated value.
It corresponds to a radial load in radial bearings and a concentric axial load in axial bearings.

P_0 induces the same load at the centre point of the most heavily loaded contact point between the rolling element and raceway as the combined load occurring in practice.

$$P_0 = X_0 \cdot F_{0r} + Y_0 \cdot F_{0a}$$

P_0 N
Equivalent static bearing load

F_{0r} N
Radial static bearing load

F_{0a} N
Axial static bearing load

X_0 –
Radial factor given in the dimension tables or product description

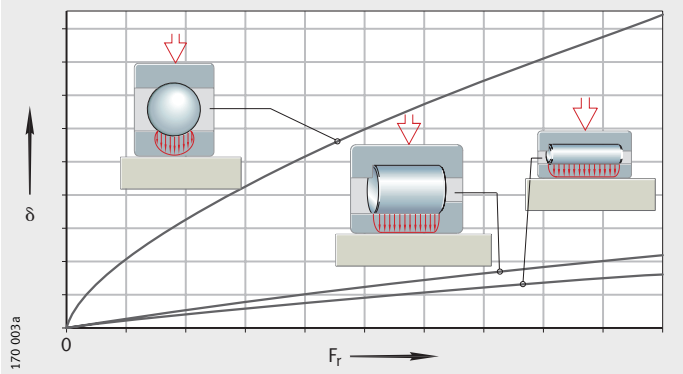
Y_0 –
Axial factor given in the dimension tables or product description.

This calculation cannot be applied to radial needle roller bearings, axial needle roller bearings and axial cylindrical roller bearings. Combined loads are not permissible with these bearings.

For radial needle roller bearings and all radial cylindrical roller bearings, $P_0 = F_{0r}$.

Rigidity

The rigidity is determined by the type, size and operating clearance of the bearing. This increases with the number of rolling elements supporting the load. Rolling bearings with line contact have a higher rigidity than rolling bearings with point contact, *Figure 1*.



δ = displacement
F_r = radial bearing load

Figure 1
Rigidity,
as a function of bearing type

Deflection

Rolling bearings have a progressive deflection rate.
The displacement values can be determined using approximation formulae.

The formulae are valid for bearings without misalignment and with a rigid surrounding structure. In axial bearings, a concentrically acting load is assumed.

$$\delta_r = \frac{1}{c_s} \cdot F_r^{0,84} + \frac{s}{2}$$

$$\delta_a = \frac{1}{c_s} \cdot \left[\left(F_{av} + F_a \right)^{0,84} - F_{av}^{\ 0,84} \right]$$

$$c_s = K_c \cdot d^{0,65}$$

c_S $N^{0,84}/\mu m$
Rigidity parameter

d mm
Bearing bore diameter

δ_r µm
Radial displacement between shaft axis and centre of bore, *Figure 2*, page 62

δ_a µm
Axial displacement between shaft locating washer and housing locating washer, *Figure 3*, page 62

s µm
Radial operating clearance of fitted, unloaded bearing

F_r N
Radial bearing load

F_a N
Axial bearing load

F_{av} N
Axial preload force

K_c –
Factor for determining the rigidity parameter, see table, page 62.

Factor K_c

Bearing series	Factor K_c	Series	Factor K_c
SL1818	12,8	NJ2..-E	11,1
SL1829, SL1830, SL1923	16	NJ3..-E	11,3
SL1850, SL0148, SL0248, SL0249	29,2	NJ22..-E	15,4
NA48	24,9	NJ23..-E	16,9
NA49	23,5	NU10	9,5
NA69	37,3	NU19	11,3
NKIS	21,3	NN30..-AS-K	18,6
NKI	$4{,}4 \cdot B^{0,8}/d^{0,2}$	ZNR31-22	21,1
HK, BK	$4{,}2 \cdot C^{0,8}/d^{0,2}$	ZNR31-23	23,2
K811, 811, K812, 812	36,7	ZNR31-30	30
K893, 893, K894, 894	59,7	ZNR31-31	29,3
		ZNR31-32	28,9

Radial cylindrical roller bearings

δ_r = radial displacement
F_r = radial bearing load

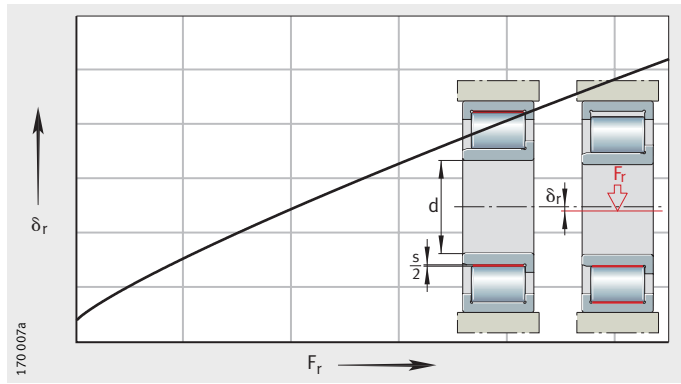


Figure 2
Radial displacement

Axial cylindrical roller bearing

δ_a = axial displacement
F_a = axial bearing load
F_{av} = axial preload force

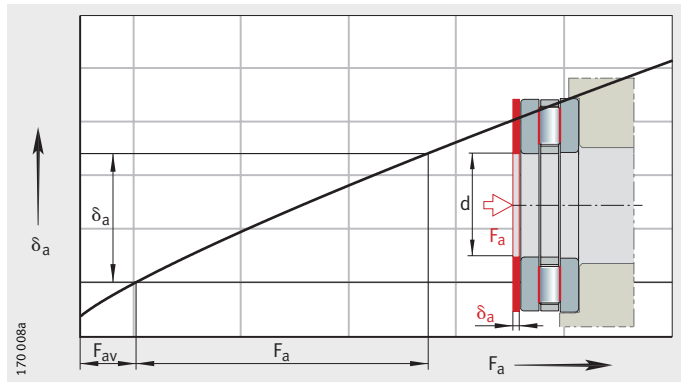


Figure 3
Axial displacement

Friction

The friction in a rolling bearing is made up of several components, see table. Due to the large number of influencing factors, such as dynamics in speed and load, tilting and skewing resulting from installation, actual frictional torques and frictional power may deviate significantly from the calculated values.
If the frictional torque is an important design criterion, please consult the Schaeffler Engineering Service.

Frictional component and influencing factor

Frictional component	Influencing factor
Rolling friction	Magnitude of load
Sliding friction of rolling elements Sliding friction of cage	Magnitude and direction of load Speed and lubrication conditions, running-in condition
Fluid friction (flow resistance)	Type and speed Type, quantity and operating viscosity of lubricant
Seal friction	Type and preload of seal

The idling friction is dependent on the lubricant quantity, speed, operating viscosity of the lubricant, seals and the running-in condition of the bearing.

Heat dissipation

Friction is converted into heat. This must be dissipated from the bearing. The equilibrium between the frictional energy and heat dissipation allows calculation of the thermally safe operating speed n_{per}, see page 72.

Heat dissipation by the lubricant

Lubricating oil dissipates a portion of the heat. Recirculating oil lubrication with additional cooling is particularly effective. Grease does not give dissipation of heat.

Heat dissipation via the shaft and housing

Heat dissipation via the shaft and housing is dependent on the temperature difference between the bearing and the surrounding structure, *Figure 1*.

Adjacent additional sources of heat or thermal radiation must be taken into consideration.

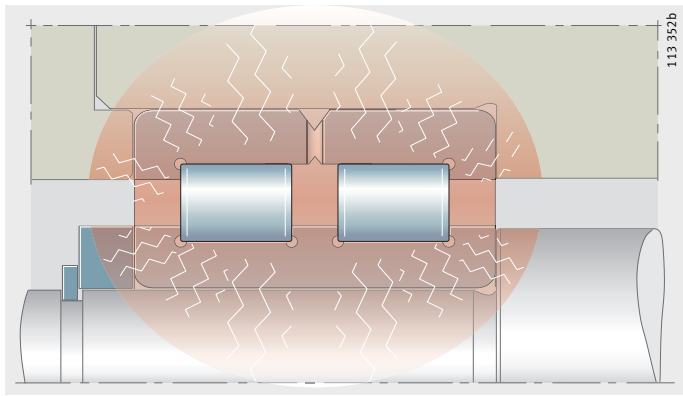


Figure 1
Temperature distribution between bearing, shaft and housing

Determining the friction values

The speed and load must also be known. The type of lubrication, lubrication method and viscosity of lubricant at operating temperature are further important factors in calculation.

Total frictional torque M_R
(calculation of axially loaded cylindrical roller bearings, see page 69):

$$M_R = M_0 + M_1$$

Frictional energy N_R:

$$N_R = M_R \cdot \frac{n}{9550}$$

Frictional torque as a function of speed for $\nu \cdot n \geqq 2\,000$:

$$M_0 = f_0 \cdot (\nu \cdot n)^{\frac{2}{3}} \cdot {d_M}^3 \cdot 10^{-7}$$

Frictional torque as a function of speed for $\nu \cdot n < 2\,000$:

$$M_0 = f_0 \cdot 160 \cdot {d_M}^3 \cdot 10^{-7}$$

Frictional torque as a function of load for needle roller and cylindrical roller bearings:

$$M_1 = f_1 \cdot F \cdot d_M$$

Frictional torque as a function of load for ball bearings, tapered roller bearings and spherical roller bearings:

$$M_1 = f_1 \cdot P_1 \cdot d_M$$

M_R Nmm
Total frictional torque

M_0 Nmm
Frictional torque as a function of speed

M_1 Nmm
Frictional torque as a function of load

N_R W
Frictional energy

n min^{-1}
Operating speed

f_0 –
Bearing factor for frictional torque as a function of speed, see *Figure 2*, page 65 and tables from page 66 to page 68

f_1 –
Bearing factor for frictional torque as a function of load, see tables from page 66 to page 68

ν mm^2s^{-1}
Kinematic viscosity of lubricant at operating temperature. In the case of grease, the decisive factor is the viscosity of the base oil at operating temperature

F_r, F_a N
Radial load for radial bearings, axial load for axial bearings

P_1 N
Decisive load for frictional torque. For ball bearings, tapered roller bearings and spherical roller bearings, see page 68

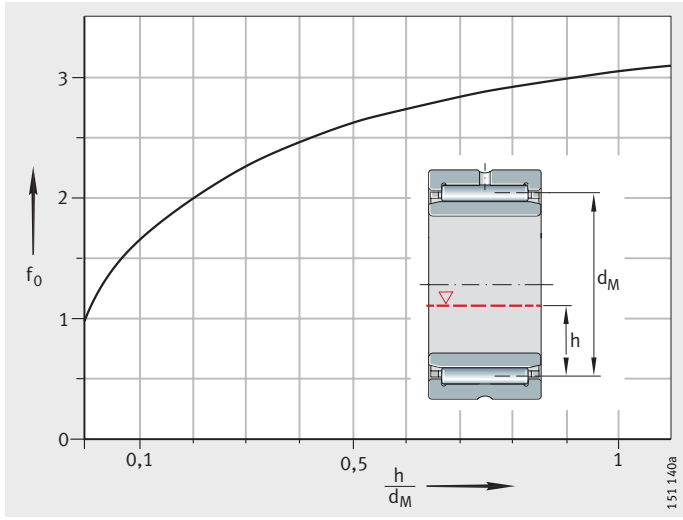
d_M mm
Mean bearing diameter (d + D)/2.

Bearing factors

The bearing factors f_0 and f_1 are mean values from series of tests and appropriate data according to ISO 15 312.

They are valid for bearings after running-in and with uniform distribution of lubricant. In the freshly greased state, the bearing factor f_0 can be two to five times higher.

If oil bath lubrication is used, the oil level must reach the centre of the lowest rolling element. If the oil level is higher, f_0 may be up to three times the value given in the table, *Figure 2*.



f_0 = bearing factor
h = oil level
d_M = mean bearing diameter (d +D)/2

Figure 2
Increase in the bearing factor, as a function of the oil level

Bearing factors for needle roller bearings, drawn cup needle roller bearings, needle roller and cage assemblies

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
NA48	3	5	0,0005
NA49	4	5,5	
RNA48	3	5	
RNA49	4	5,5	
NA69	7	10	
RNA69			
NKI, NK, NKIS, NKS, NAO, RNO, K	(12 · B)/(33 + d)	(18 · B)/(33 + d)	
HK, BK	(24 · B)/(33 + d)	(36 · B)/(33 + d)	
HN	(30 · B)/(33 + d)	(45 · B)/(33 + d)	

Bearing factors for cylindrical roller bearings, full complement

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
SL1818	3	5	0,00055
SL1829	4	6	
SL1830	5	7	
SL1822	5	8	
SL0148, SL0248	6	9	
SL0149, SL0249	7	11	
SL1923	8	12	
SL1850	9	13	

Bearing factors for cylindrical roller bearings with cage

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
LSL1923	1	3,7	0,00020
ZSL1923	1	3,8	0,00025
2..-E	1,3	2	0,00030
3..-E			0,00035
4			0,00040
10, 19			0,00020
22..-E	2	3	0,00040
23..-E	2,7	4	0,00040
30	1,7	2,5	0,00040

Bearing factors for axial roller bearings

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
AXK, AXW	3	4	0,0015
811, K811	2	3	
812, K812			
893, K893			
894, K894			

Bearing factors for combined bearings

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
ZARN, ZARF	3	4	0,0015
NKXR	2	3	
NX, NKX	2	3	$0,001 \cdot (F_a/C_0)^{0,33}$
ZKLN, ZKLF	4	6	
NKIA, NKIB	3	5	0,0005

Bearing factors for tapered roller bearings

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
302, 303, 320, 329, 330, T4CB, T7FC	2	3	0,0004
313, 322, 323, 331, 332, T2EE, T2ED, T5ED	3	4,5	

Bearing factors for axial and radial spherical roller bearings

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
213	2,3	3,5	$0,0005 \cdot (P_0/C_0)^{0,33}$
222	2,7	4	
223	3	4,5	$0,0008 \cdot (P_0/C_0)^{0,33}$
230, 239			$0,00075 \cdot (P_0/C_0)^{0,5}$
231	3,7	5,5	$0,0012 \cdot (P_0/C_0)^{0,5}$
232	4	6	$0,0016 \cdot (P_0/C_0)^{0,5}$
240	4,3	6,5	$0,0012 \cdot (P_0/C_0)^{0,5}$
241	4,7	7	$0,0022 \cdot (P_0/C_0)^{0,5}$
292..-E	1,7	2,5	0,00023
293..-E	2	3	0,00030
294..-E	2,2	3,3	0,00033

Bearing factors for deep groove ball bearings

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
618, 618..-2Z, (2RSR)	1,1	1,7	$0,0005 \cdot (P_0/C_0)^{0,5}$
160	1,1	1,7	$0,0007 \cdot (P_0/C_0)^{0,5}$
60, 60..-2RSR, 60..-2Z, 619, 619..-2Z, (2RSR)	1,1	1,7	
622..-2RSR	1,1	–	$0,0009 \cdot (P_0/C_0)^{0,5}$
623..-2RSR	1,1	–	
62, 62..-2RSR, 62..-2Z	1,3	2	
63, 63..-2RSR, 63..-2Z	1,5	2,3	
64	1,5	2,3	
42..-B	2,3	3,5	$0,0010 \cdot (P_0/C_0)^{0,5}$
43..-B	4	6	

Bearing factors for angular contact ball bearings

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
70..-B, 70..-B-2RS	1,3	2	$0{,}001 \cdot (P_0/C_0)^{0,33}$
718..-B, 72..-B, 72..-B-2RS			
73..-B, 73..-B-2RS	2	3	
30..-B, 30..-B-2RSR, 30..-B-2Z	2,3	3,5	
32..-B, 32..-B-2RSR, 32..-B-2Z, 32			
38..-B, 38..-B-2RSR, 38..-B-2Z			
33..-B, 33..-B-2RSR, 33, 33..-DA	4	6	

Bearing factors for self-aligning ball bearings

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
12	1	2,5	$0{,}0003 \cdot (P_0/C_0)^{0,4}$
13	1,3	3,5	
22	1,7	3	
23	2	4	

Bearing factors for four point contact bearings

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
QJ2, QJ3	2,7	4	$0{,}001 \cdot (P_0/C_0)^{0,33}$

Bearing factors for axial deep groove ball bearings

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
511, 512, 513, 514, 532, 533	1	1,5	$0{,}0012 \cdot (F_a/C_0)^{0,33}$
522, 523, 524, 542, 543	1,3	2	

Decisive load for ball bearings, tapered roller bearings and spherical roller bearings

Bearing type	Single bearing P_1	Bearing pair P_1
Deep groove ball bearings	$3{,}3 \cdot F_a - 0{,}1 \cdot F_r$	–
Angular contact ball bearings, single row	$F_a - 0{,}1 \cdot F_r$	$1{,}4 \cdot F_a - 0{,}1 \cdot F_r$
Angular contact ball bearings, double row	$1{,}4 \cdot F_a - 0{,}1 \cdot F_r$	–
Four point contact bearings	$1{,}5 \cdot F_a + 3{,}6 \cdot F_r$	–
Tapered roller bearings	$2 \cdot Y \cdot F_a$ or F_r, use the greater value	$1{,}21 \cdot Y \cdot F_a$ or F_r, use the greater value
Spherical roller bearings	$1{,}6 \cdot F_a/e$ if $F_a/F_r > e$ $F_r\,\{1 + 0{,}6 \cdot [F_a/(e \cdot F_r)]^3\}$ if $F_a/F_r \leqq e$.	

If $P_1 \leqq F_r$, then $P_1 = F_r$.

Cylindrical roller bearings under axial load

In cylindrical roller bearings under axial load, sliding friction between the end faces of the rolling elements and the ribs on the rings leads to an additional frictional torque M_2.

The total frictional torque is therefore:

$$M_R = M_0 + M_1 + M_2$$

$$M_2 = f_2 \cdot F_a \cdot d_M$$

$$A = k_B \cdot 10^{-3} \cdot {d_M}^{2,1}$$

M_R Nmm
Total frictional torque

M_0 Nmm
Frictional torque as a function of speed

M_1 Nmm
Frictional torque as a function of radial load

M_2 Nmm
Frictional torque as a function of axial load

f_2 –
Factor as a function of bearing series, *Figure 3* and *Figure 4*, page 70

A –
Bearing parameter according to formula

F_a N
Axial dynamic bearing load

k_B –
Factor as a function of bearing series, see table, page 70

d_M mm
Mean bearing diameter (d + D)/2.

The bearing factors f_2 are subject to wide scatter.
They are valid for recirculating oil lubrication with an adequate quantity of oil. The curves must not be extrapolated, *Figure 3* and *Figure 4*, page 70.

Bearings of TB design

In the case of bearings of TB design, the axial load carrying capacity was significantly improved through the use of new calculation and manufacturing methods.

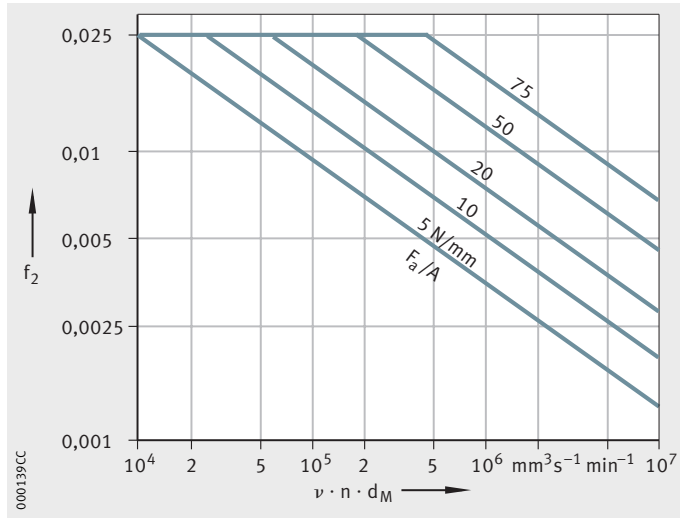
Optimum contact conditions between the roller and rib are ensured by means of a special curvature of the roller end faces. As a result, axial surface pressures on the rib are significantly reduced and a lubricant film with improved load-carrying capabilities is achieved. Under normal operating conditions, wear and fatigue at the rib contact running and roller end faces is completely eliminated.

In addition, the axial frictional torque is reduced by up to 50%. The bearing temperature during operation is therefore significantly lower.

Cylindrical roller bearings of standard design

f_2 = bearing factor
F_a = axial dynamic bearing load
A = bearing parameter
ν = operating viscosity
n = operating speed
d_M = mean bearing diameter
$\nu \cdot n \cdot d_M$ = operating parameter

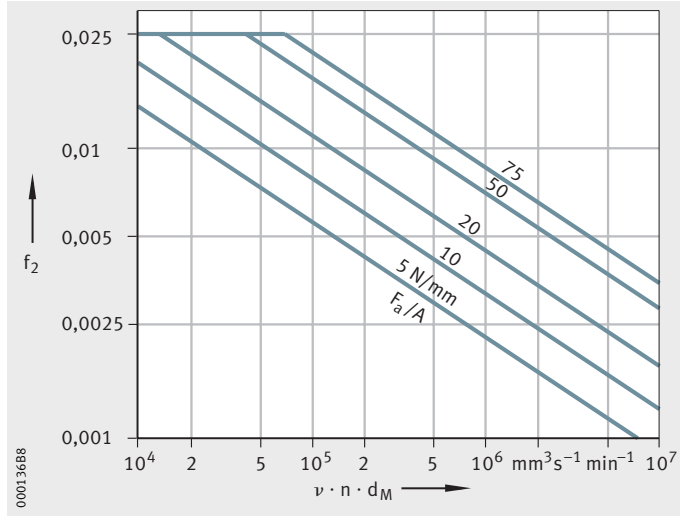
Figure 3
Bearing factor f_2,
as a function of operating parameter



Cylindrical roller bearings of TB design

f_2 = bearing factor
F_a = axial dynamic bearing load
A = bearing parameter
ν = operating viscosity
n = operating speed
d_M = mean bearing diameter
$\nu \cdot n \cdot d_M$ = operating parameter

Figure 4
Bearing factor f_2,
as a function of operating parameter



Bearing factor k_B

Bearing series	Factor k_B
SL1818, SL0148	4,5
SL1829, SL0149	11
SL1830, SL1850	17
SL1822	20
LSL1923, ZSL1923	28
SL1923	30
NJ2..-E, NJ22..-E, NUP2..-E, NUP22..-E	15
NJ3..-E, NJ23..-E, NUP3..-E, NUP23..-E	20
NJ4	22

Speeds

On the basis of DIN 732-1, calculation of the thermal reference speed n_B has been standardised in ISO 15 312. The calculation of reference speeds has been matched to this standard. As a result, the values are different from the previous catalogue data.

The symbols used in the formulae have been matched to the international standard.

Thermal reference speed

The thermal reference speed n_B is used as an ancillary value when calculating the thermally safe operating speed n_{per}. This is the speed at which, under defined reference conditions, a bearing operating temperature of +70 °C is achieved.

Reference conditions

The reference conditions are based on the usual operating conditions of the most significant bearing types and sizes.

They are defined as follows in ISO 15 312:

- mean ambient temperature ϑ_{Ar} = +20 °C
- mean bearing temperature at the outer ring ϑ_r = +70 °C
- load on radial bearings $P_{1r} = 0{,}05 \cdot C_{0r}$
- load on axial bearings $P_{1a} = 0{,}02 \cdot C_{0a}$
- the operating viscosities (axial bearings in accordance with DIN 732-1). These are selected for radial bearings such that similar reference speeds are achieved for both oil and grease lubrication
  - radial bearings: 12 mm^2s^{-1} (ISO VG 32)
  - axial spherical roller bearings: 24 mm^2s^{-1} (ISO VG 68)
  - axial cylindrical roller bearings and axial needle roller bearings: 48 mm^2s^{-1} (ISO VG 220)
- heat dissipation through the bearing seating surfaces, see formulae:

for radial bearings, bearing seat $A_r \leqq 50\,000$ mm^2:

$$q_r = 0{,}016\ W/mm^2$$

for radial bearings, bearing seat $A_r > 50\,000$ mm^2:

$$q_r = 0{,}016 \cdot \left(\frac{A_r}{50\,000} \right)^{-0{,}34} W/mm^2$$

for axial bearings, bearing seat $A_r \leqq 50\,000$ mm^2:

$$q_r = 0{,}020\ W/mm^2$$

for axial bearings, bearing seat $A_r > 50\,000$ mm^2:

$$q_r = 0{,}020 \cdot \left(\frac{A_r}{50\,000} \right)^{-0{,}16} W/mm^2$$

Speeds

Limiting speed

The limiting speed n_G is based on practical experience and takes account of additional criteria such as smooth running, sealing function and centrifugal forces.

The limiting speed must not be exceeded even under favourable operating and cooling conditions.

Thermally safe operating speed

The thermally safe operating speed n_{per} is calculated according to DIN 732-2 (draft). The basis for the calculation is the heat balance in the bearing, the equilibrium between the frictional energy as a function of speed and the heat dissipation as a function of temperature. When conditions are in equilibrium, the bearing temperature is constant.

The permissible operating temperature determines the thermally safe operating speed n_{per} of the bearing. The preconditions for calculation are correct fitting, normal operating clearance and constant operating conditions.

The calculation method is not valid for:

- sealed bearings with contact seals, since the maximum speed is restricted by the permissible sliding speed at the seal lip
- yoke and stud type track rollers
- aligning needle roller bearings
- axial deep groove and axial angular contact ball bearings.

The limiting speed n_G must always be observed.

Calculation of the thermally safe operating speed

The thermally safe operating speed n_{per} is a product of the reference speed n_B and the speed ratio f_n:

$$n_{per} = n_B \cdot f_n$$

The speed ratio is derived from *Figure 1*, page 74:

$$k_L \cdot {f_n}^{5/3} + k_P \cdot f_n = 1$$

In the normal operating range covering $0{,}01 < k_L < 10$ and $0{,}01 < k_P < 10$, f_n can be calculated using an approximation formula:

$$f_n = \frac{490{,}77}{1 + 498{,}78 \cdot {k_L}^{0{,}599} + 852{,}88 \cdot {k_P}^{0{,}963} - 504{,}5 \cdot {k_L}^{0{,}055} \cdot {k_P}^{0{,}832}}$$

Heat dissipation via the bearing seating surfaces $\dot{Q}_S$, *Figure 2*, page 74:

$$\dot{Q}_S = k_q \cdot A_r \cdot \Delta\vartheta_A$$

Heat dissipation by the lubricant $\dot{Q}_L$:

$$\dot{Q}_L = 0{,}0286 \frac{kW}{l/min \cdot K} \cdot \dot{V}_L \cdot \Delta\vartheta_L$$

Total dissipated heat flow $\dot{Q}$:

$$\dot{Q} = \dot{Q}_S + \dot{Q}_L - \dot{Q}_E$$

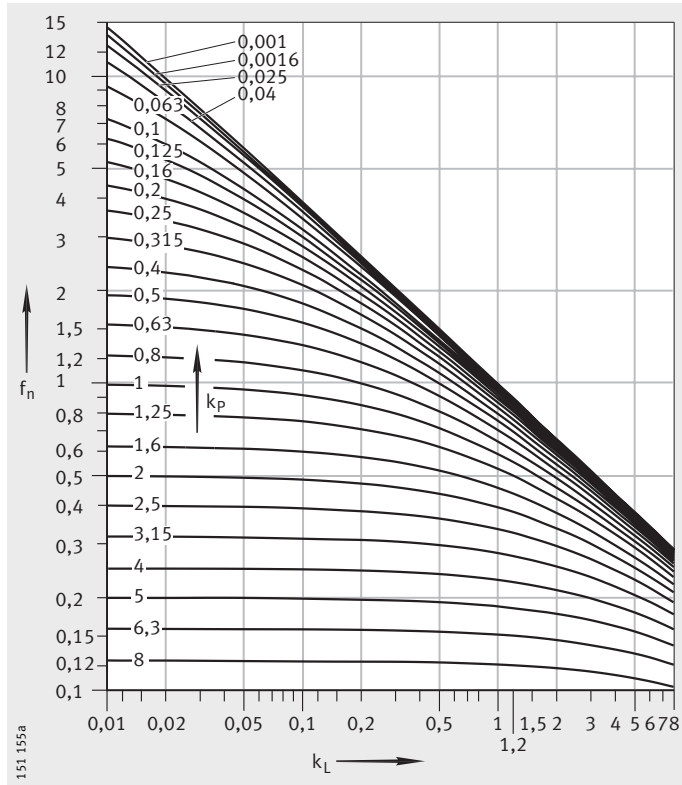
Lubricant film parameter k_L:

$$k_L = 10^{-6} \cdot \frac{\pi}{30} \cdot n_B \cdot \frac{10^{-7} \cdot f_0 \cdot (\nu \cdot n_B)^{\frac{2}{3}} \cdot {d_M}^3}{\dot{Q}}$$

Load parameter k_P:

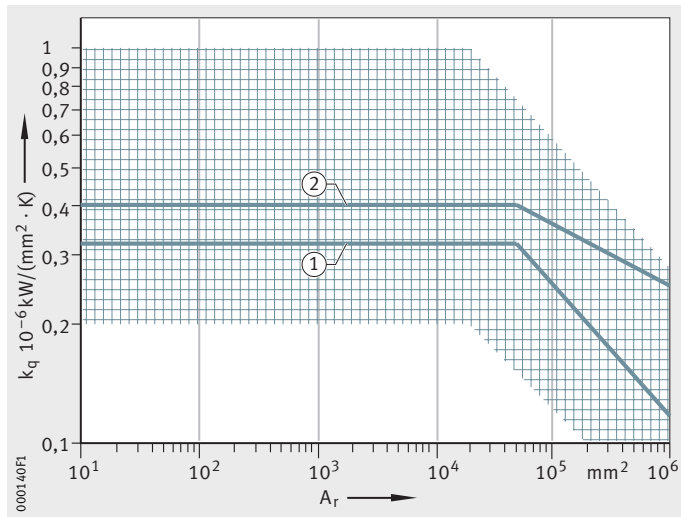
$$k_P = 10^{-6} \cdot \frac{\pi}{30} \cdot n_B \cdot \frac{f_1 \cdot P_1 \cdot d_M}{\dot{Q}}$$

Speeds



f_n = speed ratio
k_L = lubricant film parameter
k_p = load parameter

Figure 1
Speed ratio



① Reference condition for radial bearings
② Reference condition for axial bearings
k_q = heat transfer coefficient
A_r = bearing seating surface

Figure 2
Heat transfer coefficient, as a function of the bearing seating surface

Symbols, units and definitions

A_r	mm²	
Bearing seating surface for		
radial bearings:		$A_r = \pi \times B \times (D + d)$
axial bearings:		$A_r = \pi/2 \times (D^2 - d^2)$
tapered roller bearings:		$A_r = \pi \times T \times (D + d)$
axial spherical roller bearings:		$A_r = \pi/4 \times (D^2 + {d_1}^2 - {D_1}^2 - d^2)$

Symbols, units and definitions
continued

B mm
Bearing width

d mm
Bearing bore diameter

D mm
Bearing outside diameter

d_1 mm
Outside diameter of shaft locating washer

D_1 mm
Inside diameter of housing locating washer

d_M mm
Mean bearing diameter (D + d)/2

f_0 –
Bearing parameter for frictional torque as a function of speed,
see table Friction and increases in temperature, page 63

f_1 –
Bearing factor for frictional torque as a function of load,
see table Friction and increases in temperature, page 63

f_n –
Speed ratio, *Figure 1*, page 74

k_L –
Lubricant film parameter

k_P –
Load parameter

k_q 10^{-6} kW/(mm^2 · K)
Heat transfer coefficient of bearing seating surface, *Figure 2*, page 74.
This is dependent on the housing design and size, the housing material and the mounting position.
Under normal conditions, the heat transfer coefficient for bearing seating surfaces up to 25 000 mm^2 is between 0,2 and 1,0 · 10^{-6} kW/(mm^2 · K)

n_{per} min^{-1}
Thermally safe operating speed

n_B min^{-1}
Reference speed according to dimension tables

P_1 N
Radial load for radial bearings, axial load for axial bearings

q_r W/mm^2
Heat flow density

$\dot{Q}$ kW
Total dissipated heat flow

$\dot{Q}_E$ kW
Heat flow due to heating by external source

$\dot{Q}_L$ kW
Heat flow dissipated by the lubricant

$\dot{Q}_S$ kW
Heat flow dissipated via the bearing seating surfaces

T mm
Total width of tapered roller bearing

$\dot{V}_L$ l/min
Oil flow

$\Delta\vartheta_A$ K
Difference between mean bearing temperature and ambient temperature

$\Delta\vartheta_L$ K
Difference between oil input temperature and oil output temperature

ν mm^{2}s^{-1}
Kinematic viscosity of lubricant at operating temperature.

Lubrication

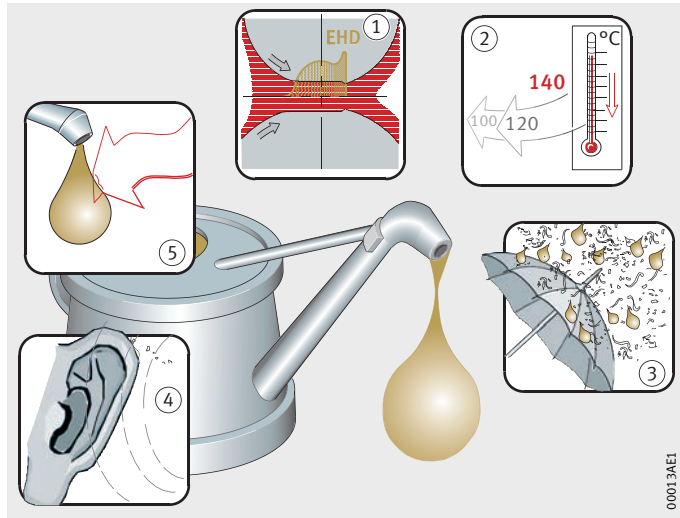
Basic principles

Lubrication and maintenance are important for the reliable operation and long operating life of rolling bearings.

Functions of the lubricant

The lubricant should, *Figure 1*:

- form a lubricant film on the contact surfaces that is sufficiently capable of supporting loads and thus preventing wear and premature fatigue ①
- dissipate heat in the case of oil lubrication ②
- give additional sealing of the bearing, in the case of grease lubrication, against the entry of both solid and fluid contaminants ③
- reduce the running noise ④
- protect the bearing against corrosion ⑤.



① Formation of a lubricant film capable of supporting loads
② Heat dissipation in the case of oil lubrication
③ Sealing of the bearing against external contaminants in the case of grease lubrication
④ Damping of running noise
⑤ Protection against corrosion

Figure 1
Functions of the lubricant

Selection of the type of lubrication

It should be determined as early as possible in the design process whether bearings should be lubricated using grease or oil.

The following factors are decisive in determining the type of lubrication and quantity of lubricant:

- the operating conditions
- the type and size of the bearing
- the adjacent construction
- the lubricant feed.

Criteria for grease lubrication

In the case of grease lubrication, the following criteria must be considered:

- very little design work required
- the sealing action
- the reservoir effect
- long operating life with little maintenance work (lifetime lubrication possible in certain circumstances)
- if relubrication is required, it may be necessary to provide collection areas for old grease and feed ducts
- no heat dissipation by the lubricant
- no rinsing out of wear debris and other particles.

Criteria for oil lubrication

In the case of oil lubrication, the following criteria must be considered:

- good lubricant distribution and supply to contact areas
- dissipation of heat possible from the bearing (significant principally at high speeds and/or loads)
- rinsing out of wear debris
- very low friction losses with minimal quantity lubrication
- more work required on feed and sealing.

Under extreme operating conditions (such as very high temperatures, vacuum, aggressive media), it may be possible to use special lubrication methods such as solid lubricants in consultation with the engineering service.

Design of lubricant feed

The feed lines and lubrication holes in the housings and shafts, *Figure 2* and *Figure 3*:

- should lead directly to the lubrication hole in the rolling bearing
- should be as short as possible
- must be provided individually for each bearing.

Ensure that the feeds are filled, *Figure 2*; the feed line should be bled if necessary.

Follow the instructions provided by the lubrication device manufacturer.

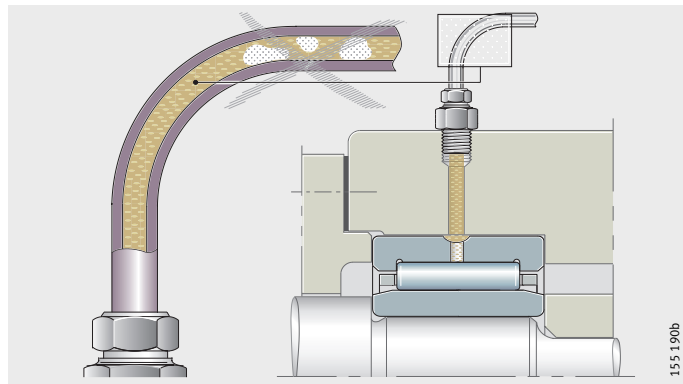


Figure 2
Lubricant feed lines

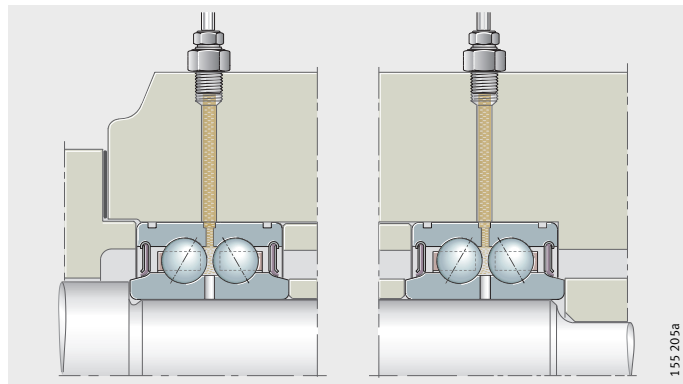


Figure 3
Arrangement of feed to more than one bearing on a shaft

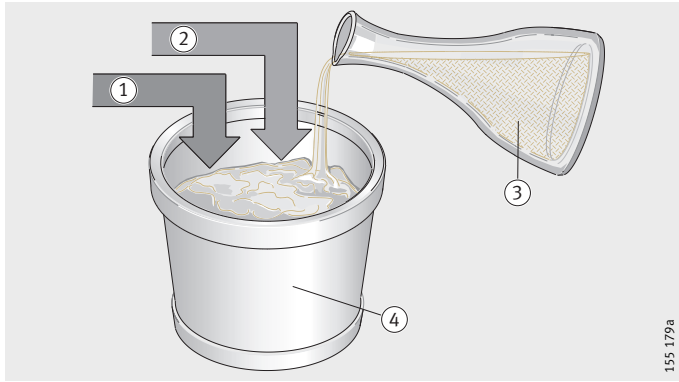
Grease lubrication

Greases can be differentiated in terms of their thickeners and base oils. The base oils of greases are covered by the information in the section Oil lubrication, page 96.

Composition of a grease

Conventional greases have metal soaps as thickeners and a mineral base oil. They also contain additives. These have a specific influence on, for example, the characteristics in relation to wear prevention, corrosion prevention or resistance to ageing. These combinations of additives are not, however, fully effective across every temperature and load range.

Greases exhibit widely varying behaviour in response to environmental influences such as temperature and moisture.



① Thickener
② Additives
③ Base oil
④ Grease

Figure 4
Type of grease

Lubricants must always be checked for their compatibility with:

- other lubricants
- anti-corrosion agents
- thermoplastics, thermosets and elastomers
- light and non-ferrous metals
- coatings
- colouring agents and paints
- and the environment.
  When considering compatibility with the environment, attention must be paid to toxicity, biodegradability and water pollution class.

Type of grease

The characteristics of a grease are dependent on:

- the base oil
- the viscosity of the base oil
  (this is important for the speed range)
- the thickener
  (the shear strength is significant for the speed range)
- the additives.

Consistency of greases

Greases are subdivided into consistency classes
(NLGI classes to DIN 51 818).

For rolling bearings, classes 1, 2, 3 should be used in preference, *Figure 5*.

NLGI classes

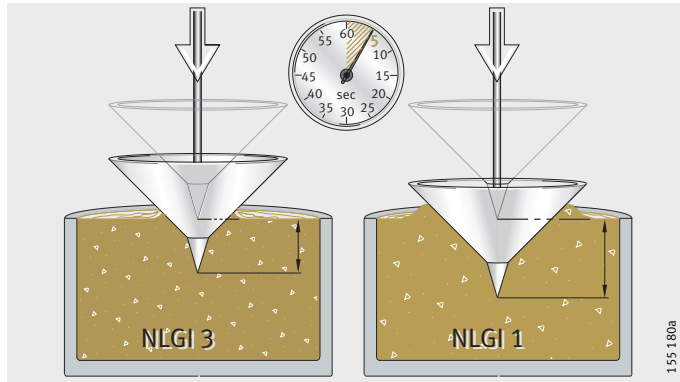


Figure 5
Consistency of greases

Selection of suitable grease

Rolling bearing greases K to DIN 51 825 are suitable.

Greases should be selected in accordance with the operating conditions of the bearing:

- temperature
- pressure conditions, see page 83
- speed, see page 83
- the presence of water and moisture, see page 83.

Operating temperature range

The operating temperature range of the grease must correspond to the range of possible operating temperatures in the rolling bearing.

Grease manufacturers indicate an operating temperature range for their rolling bearing greases K to DIN 51 825.

The upper value is determined in accordance with DIN 51 821 by means of testing on the FAG rolling bearing grease test rig FE 9. At the upper operating temperature, a 50% failure probability rate (F_{50}) of at least 100 hours must be achieved in this test.

The lower value is defined in accordance with DIN 51 825 by means of flow pressure. The flow pressure of a grease is the pressure required to press a stream of grease through a defined nozzle. For greases of type K, the flow pressure at the lower operating temperature must be less than 1 400 mbar.

The use of flow pressure in determining the lower operating temperature only indicates, however, whether the grease can be moved at this temperature. This cannot be used to make any statement about its suitability for use in rolling bearings at low temperatures.

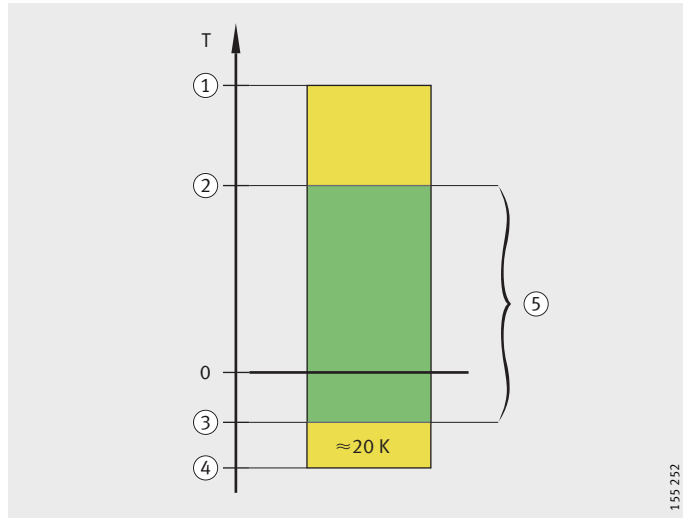
In addition to the lower operating temperature of a grease, therefore, the low temperature frictional torque is also determined in accordance with ASTM D 1478 or IP 186/93. At the lower operating temperature, the starting torque must not exceed 1 000 Nmm and the running torque must not exceed 100 Nmm.

Schaeffler Group Industrial recommends that greases should be used such that the normally occurring bearing temperature falls within the standard operating range, in order to achieve a reliable lubricating action and an acceptable grease operating life, *Figure 6*.

At low temperatures, greases release very little base oil. This can result in lubricant starvation. Schaeffler Group Industrial therefore recommends that greases are not used below the lower continuous limit temperature $T_{lowerlimit}$, *Figure 6*. This is approx. 20 K above the lower operating temperature of the grease as stated by the grease manufacturer.

The upper continuous limit temperature $T_{upperlimit}$ must not be exceeded if a temperature-induced reduction in grease operating life is to be avoided; see section Grease operating life, page 86.

At consistently low temperatures (for example in cold store applications), it must be ensured that the grease releases sufficient oil in relation to the bearing type.



① Upper operating temperature according to grease manufacturer
② $T_{upperlimit}$
③ $T_{lowerlimit}$
④ Lower operating temperature according to grease manufacturer
⑤ Standard operating range
T = operating temperature

Figure 6
Operating temperature range

Pressure properties

The viscosity at operating temperature must be sufficiently high for the formation of a lubricant film capable of supporting loads. At high loads, greases with EP characteristics (“extreme pressure”) and high base oil viscosity should be used (KP grease to DIN 51 825). Such greases should also be used for bearings with substantial sliding or line contact.

Silicone greases should only be used at low loads (P ≦ 3% C).

Greases with solid lubricants should preferably be used for applications with mixed or boundary friction conditions. The solid lubricant particle size must not exceed 5 µm.

Speed

Greases should be selected in accordance with the speed parameter $n \cdot d_M$ for grease, see table, page 85:

- For rolling bearings running at high speeds or with a low starting torque, greases with a high speed parameter should be used
- For bearings running at low speeds, greases with a low speed parameter should be used.

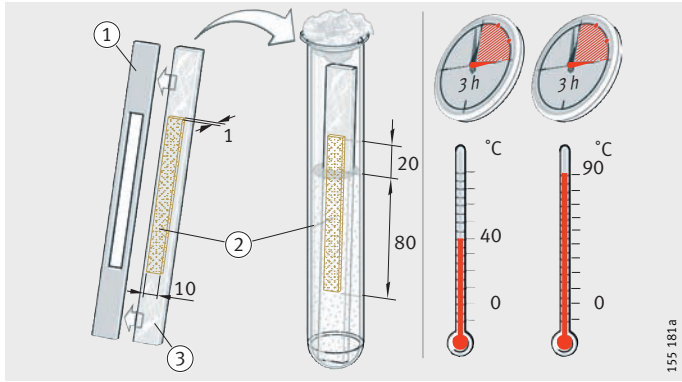
Under centrifugal accelerations > 500 g, separation (of the thickener and base oil) may occur. In this case, please consult the lubricant manufacturer.

The consistency of polycarbamide greases can be altered by shear stresses to a greater extent than that of metal soap greases.

Water and moisture

Water in the grease has a highly detrimental effect on the operating life of the bearing:

- the static behaviour of greases in the presence of water is assessed in accordance with DIN 51 807, see *Figure 7*
- the anti-corrosion characteristics can be tested according to DIN 51 802 (Emcor test) – information is given in the grease manufacturer’s data sheets.



① Blank
② Grease specimen
③ Glass slide

Figure 7
Behaviour in the presence of water in accordance with DIN 51 807

Greases with special suitability

Many of the rolling bearings supplied by Schaeffler Group Industrial are prefilled with grease. The greases used have proved particularly suitable for the applications in mechanical-dynamic tests, see table.

Greases

Desig-nation[5]	Classification	Type of grease
GA01	Ball bearing grease for T < +180 °C	Polycarbamide Ester oil
GA02	Ball bearing grease for T < +160 °C	Polycarbamide SHC
GA13	Standard ball bearing and insert bearing grease for D > 62 mm	Lithium soap Mineral oil
GA14	Low-noise ball bearing grease for D ≦62 mm	Lithium soap Mineral oil
GA15	Low-noise ball bearing grease for high speeds	Lithium soap Ester oil
GA22	Free-running grease with low frictional torque	Lithium soap Ester oil
L014[1]	Initial greasing for insert bearings for low temperatures	Gel Ester oil
L086[1]	Initial greasing for insert bearings for wide temperature range and low loads	Sodium complex soap Silicone oil
L069[1]	Insert bearing grease for wide temperature range	Polycarbamide Ester oil
GA08	Grease for line contact	Lithium complex soap Mineral oil
GA26	Standard grease for drawn cup roller clutches	Calcium/lithium soap Mineral oil
GA28	Screw drive bearing grease	Lithium soap Ester oil
GA11	Rolling bearing grease resistant to media for temperatures up to +250 °C	PTFE Alkoxyfluoroether
GA47	Rolling bearing grease resistant to media for temperatures up to +140 °C	Barium complex soap Mineral oil

1) Since January 2008, the grease L069 has been used in insert bearings instead of L014 and L086.

2) The upper continuous limit temperature $T_{upperlimit}$ must not be exceeded if a temperature-induced reduction in grease operating life is to be avoided.

3) Dependent on bearing type.

4) Operating temperature range determined not according to DIN 51 825 but to MIL specification.

5) GA.. stands for **G**rease **A**pplication Group.., based on Grease Spec 00.

Operating temperature range °C	Upper continuous limit temperature $T_{upperlimit}$ [2] °C	NLGI class	Speed parameter $n \cdot d_M$ $min^{-1} \cdot mm$	ISO-VG class (base oil) [3]	Designation [5]	Recommended Arcanol grease for relubrication
–40 to +180	+115	2 to 3	600 000	68 to 220	**GA01**	–
–40 to +160	+85	2 to 3	500 000	68 to 220	**GA02**	–
–30 to +140	+75	3	500 000	68 to 150	**GA13**	**MULTI3**
–30 to +140	+75	2	500 000	68 to 150	**GA14**	**MULTI2**
–50 to +150	+70	2 to 3	1 000 000	22 to 32	**GA15**	–
–50 to +120	+70	2	1 000 000	10 to 22	**GA22**	–
–54 to +204 [4]	+80	1 to 2	900 000	22 to 46	**L014** [1]	–
–40 to +180	+115	3	150 000	68 to 150	**L086** [1]	–
–40 to +180	+120	2	700 000	68 to 220	**L069** [1]	–
–30 to +140	+95	2 to 3	500 000	150 to 320	**GA08**	**LOAD150**
–20 to +80	+60	2	500 000	10 to 22	**GA26**	–
–30 to +160	+110	2	600 000	15 to 100	**GA28**	**MULTITOP**
–40 to +250	+180	2	300 000	460 to 680	**GA11**	**TEMP200**
–20 to +140	+70	1 to 2	350 000	150 to 320	**GA47**	–

Arcanol rolling bearing greases

For users who wish to charge their rolling bearings with grease themselves, there is a range of particularly suitable Arcanol rolling bearing greases.

The greases in the range are graded in terms of their performance capability such that they can be used to cover almost all areas of application, see section Arcanol greases, page 1538.

Grease operating life

The grease operating life t_{fG} applies where this is below the calculated bearing life and the bearings are not lubricated.

A guide value can be determined in approximate terms as follows:

$$t_{fG} = t_f \cdot K_T \cdot K_P \cdot K_R \cdot K_U \cdot K_S$$

t_{fG} h
Guide value for grease operating life

t_f h
Basic grease operating life

K_T, K_P, K_R, K_U, K_S –
Correction factors for temperature, load, oscillation, environment, vertical shaft, see page 89 to page 92.

Where a grease operating life > 3 years is required, this should be agreed in consultation with the lubricant manufacturer.

Observe the guidelines on calculating the grease operating life on page 88.

Basic grease operating life

This applies under the preconditions in the table.

Preconditions for the basic lubrication interval

	Precondition
Bearing temperature	< Upper continuous limit temperature $T_{upperlimit}$
Load ratio	$C_0/P = 20$
Speed and load	Constant
Load in main direction	Radial in radial bearings, axial in axial bearings
Axis of rotation	Horizontal for radial bearings
Inner ring	Rotating
Environmental influences	No disruptive influences

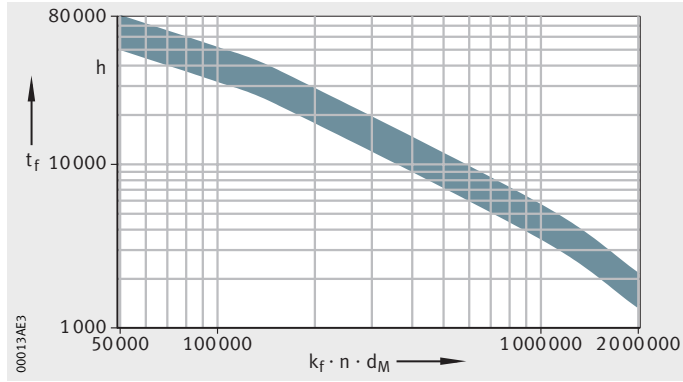
The basic grease operating life t_f is dependent on the bearing-specific speed parameter $k_f \cdot n \cdot d_M$ and is calculated using *Figure 8*.

k_f –
Factor for bearing type, see table Factor k_f, page 87

n min^{-1}
Operating speed or equivalent speed

d_M mm
Mean bearing diameter (d + D)/2.

Calculation of basic grease operating life



t_f = basic grease operating life
$k_f \cdot n \cdot d_M$ = bearing-specific speed parameter

Figure 8
Calculation of basic grease operating life

Factor k_f as a function of bearing type

Bearing type	Factor k_f
Deep groove ball bearings, single row	1
Deep groove ball bearings, double row	1,5
Angular contact ball bearings, single row	1,6
Angular contact ball bearings, double row	2
Four point contact bearings	1,6
Self-aligning ball bearings	1,45
Axial deep groove ball bearings	5,5
Axial angular contact ball bearings, double row	1,4
Cylindrical roller bearings, single row, with constant axial load	3,25
Cylindrical roller bearings, single row, with or without alternating axial load	2
Cylindrical roller bearings, double row[1)]	3,5
Cylindrical roller bearings, full complement	5,3
Tapered roller bearings	4
Barrel roller bearings	10
Spherical roller bearings without central rib	8
Spherical roller bearings with central rib	10,5
Needle roller and cage assemblies, needle roller bearings	3,6
Drawn cup needle roller bearings	4,2
Yoke and stud type track rollers, with cage or full complement cylindrical roller set	20
Yoke and stud type track rollers with full complement needle roller set	40
Ball bearing track rollers, single row	1
Ball bearing track rollers, double row	2
Yoke type track rollers PWTR, stud type track rollers PWKR	6
Cylindrical roller bearings LSL, ZSL	3,1
Crossed roller bearings	4,4
Axial needle roller bearings, axial cylindrical roller bearings	58
Radial insert ball bearings, housing units	1

1) Not valid for high precision cylindrical roller bearings NN30. In this case, please use the calculation scheme in the publication Super Precision Bearings, AC 41130/7.

Guidelines on calculating the grease operating life

Combined rolling bearings

The radial and axial bearing components must be calculated separately; the decisive value is the shorter grease operating life.

Rotating outer ring

If the outer ring rotates, there may be a reduction in the grease operating life.

In the case of yoke and stud type track rollers:

- the angular misalignment must be zero
- the effect of the rotating outer ring on the grease operating life is taken into consideration in the bearing type factor k_f.

Restrictions

The grease operating life cannot be determined using the above method:

- if the grease can leave the bearing arrangement
  - there is excessive evaporation of the base oil
  - in bearing positions without seals
  - in axial bearings with a horizontal axis of rotation
- if air is sucked into the rolling bearing during operation
  - this can cause the grease to oxidise
- in combined rotary and linear motion
  - the grease is distributed over the whole stroke length
- if contamination, water or other fluids enter the bearings
- for spindle bearings
- for drawn cup roller clutches
- for screw drive bearings
- for high precision bearings for combined loads
- for high precision cylindrical roller bearings NN30.

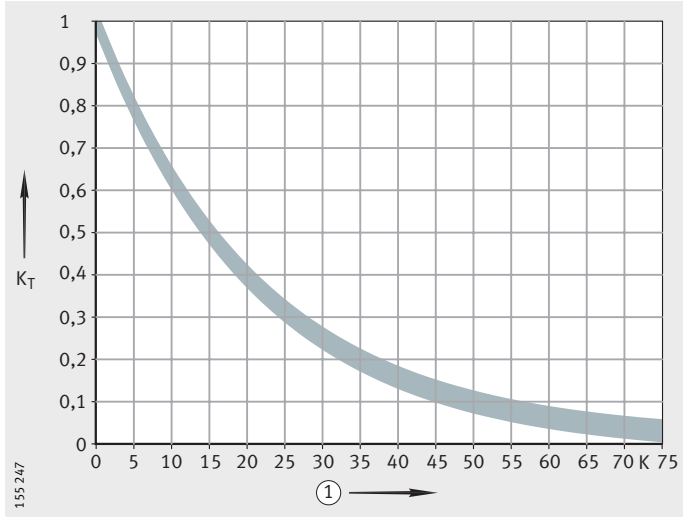
The additional guidelines on lubrication in the product sections must be observed.

Correction factors for determining the grease operating life

Temperature factor K_T

If the bearing temperature is higher than the continuous limit temperature $T_{upperlimit}$, K_T must be determined from the diagram, *Figure 9*.

The diagram should not be used if the bearing temperature is higher than the upper operating temperature of the grease used, see table Greases, page 84. If necessary, a different grease should be selected or contact should be made with the Schaeffler engineering service.

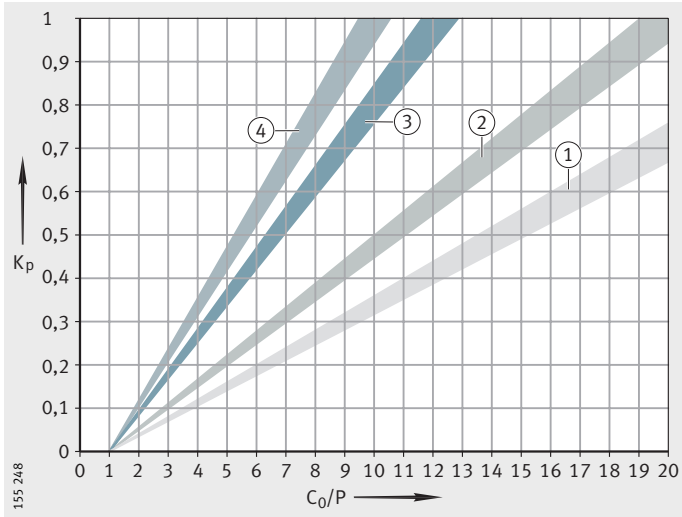


① K above $T_{upperlimit}$
K_T = temperature factor

Figure 9
Temperature factor K_T

Load factor K_P

The factor K_P is dependent on the bearing and describes the reduction at higher load (this places greater strain on the grease), see *Figure 10* and table.



This is based on high-quality lithium soap greases

①, ②, ③, ④ see table K_P factor
C_0/P = ratio between basic static load rating and equivalent dynamic bearing load
K_P = load factor

Figure 10
K_P factor for bearings

K_P factor

Curve[1)]	Bearing type
①	Axial angular contact ball bearings, double row
	Axial deep groove ball bearings
	Axial needle roller bearings, axial cylindrical roller bearings
	Crossed roller bearings
②	Spherical roller bearings with central rib
	Needle roller and cage assemblies, needle roller bearings
	Drawn cup needle roller bearings
	Cylindrical roller bearings, double row (excluding NN30)
	Yoke type track rollers PWTR, stud type track rollers PWKR
	Yoke and stud type track rollers with cage or full complement cylindrical roller set
	Yoke and stud type track rollers with full complement needle roller set
③	Cylindrical roller bearings LSL, ZSL
	Tapered roller bearings
	Spherical roller bearings without central rib (E1)
	Barrel roller bearings
	Cylindrical roller bearings, full complement
	Cylindrical roller bearings, single row (constant or alternating load)
	Four point contact bearings
④	Deep groove ball bearings (single or double row)
	Angular contact ball bearings (single or double row)
	Self-aligning ball bearings
	Ball bearing track rollers (single or double row)
	Radial insert ball bearings, housing units

1) Curves: see *Figure 10*.

Oscillation factor K_R

The factor K_R applies for an angle of oscillation $\varphi < 180°$, *Figure 11* and *Figure 12*. Oscillating motion places a greater strain on the grease than does rotating motion.

In order to reduce fretting corrosion, the lubrication interval should be reduced.

If the rolling elements do not undergo complete rotation, please contact the Schaeffler engineering service.

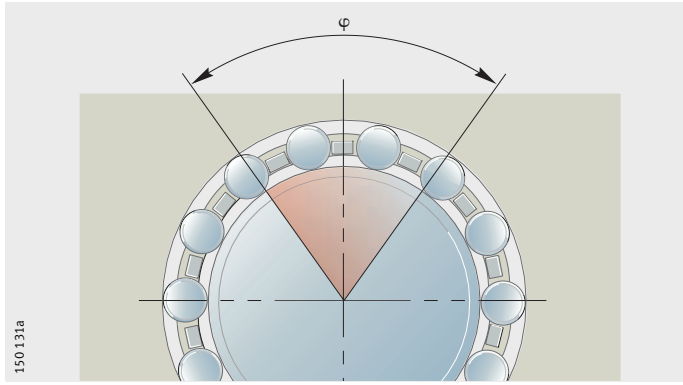
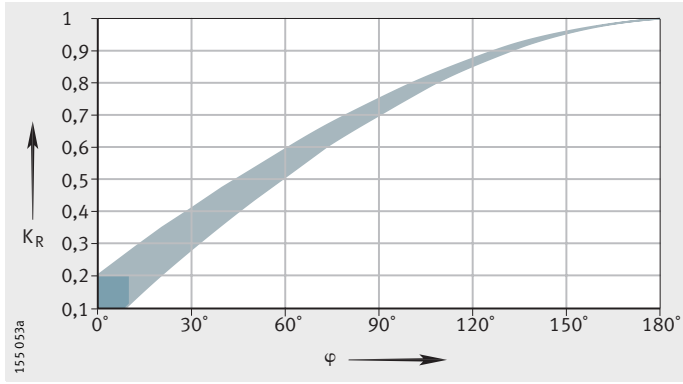


Figure 11
Angle of oscillation φ



K_R = oscillation factor
φ = angle of oscillation

Figure 12
Oscillation factor K_R

Environment factor K_U

The factor K_U takes account of the influences of moisture, shaking forces, slight vibration (leading to fretting corrosion) and shocks, see table Environment factor K_U.

It does not take account of extreme environmental influences such as water, aggressive media, contamination, radiation and extreme vibrations such as those occurring in vibratory machines.

In relation to contamination, the influence of contamination on rating life calculation must also be noted, see Load carrying capacity and life, page 40.

Environment factor K_U

Environmental influence	Factor K_U
Slight	1
Moderate	0,8
Heavy	0,5

Factor K_S for vertical shafts

If increased escape of grease is expected, for example in the case of radial bearings with a vertical axis of rotation, the factor K_S according to the table must be taken into consideration.

Factor K_S for vertical shaft

Arrangement of shaft	Factor K_S
Vertical (depending on sealing)	0,5 to 0,7
Other arrangement	1

Relubrication intervals

Where rolling bearings are relubricated, attention must be paid to the lubrication interval in order to ensure reliable function of the bearings.

The precise lubrication interval should be determined by tests conducted under application conditions.
To do this:

- sufficiently long observation periods must be used
- the condition of the grease must be checked at regular intervals.

For reasons of operational reliability, relubrication intervals of $>$ 1 year are not recommended.

Lubrication interval guide value

Experience shows that a guide value for most applications is:

$$t_{fR} = 0{,}5 \cdot t_{fG}$$

t_{fR} h
Guide value for relubrication interval

t_{fG} h
Guide value for grease operating life, see page 86.

Relubrication conditions

The grease used for relubrication must be the same as that used in initial greasing.

If different greases are used, their miscibility and compatibility must be checked; see Miscibility, page 95.

Relubrication quantity

Due to the compact construction of the bearings, relubrication should be carried out using 50% to 80% of the initial greasing quantity (recommendation).

If feed lines filled with air are present, the filling volume of the feed lines should be included in calculation of the relubrication quantity.

Relubrication

Relubrication should always be carried out as follows:

- with the bearing still warm from operation and rotating if safe to do so
- before the bearing comes to rest if safe to do so
- before extended breaks in operation.

Relubrication should continue until a fresh collar of grease appears at the seal gaps. Old grease must be allowed to leave the bearing unhindered.

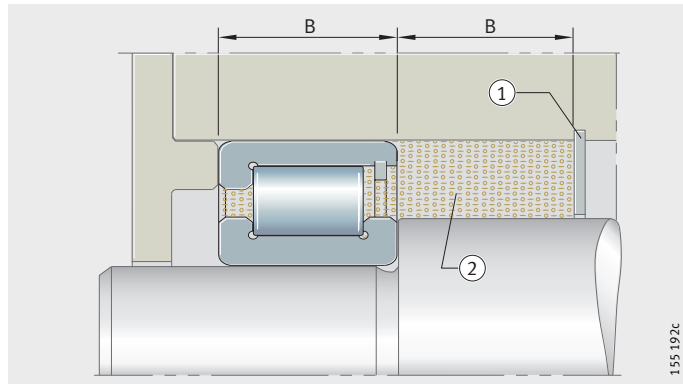
Grease reservoir

The initial greasing quantity is between 30% and 100% of the available volume in the bearing, dependent on the bearing type and operating conditions.

A grease reservoir can extend the grease operating life. The grease in the reservoir must be in constant contact with the grease on the raceway. The grease operating life does not increase proportionally with the size of the grease reservoir.

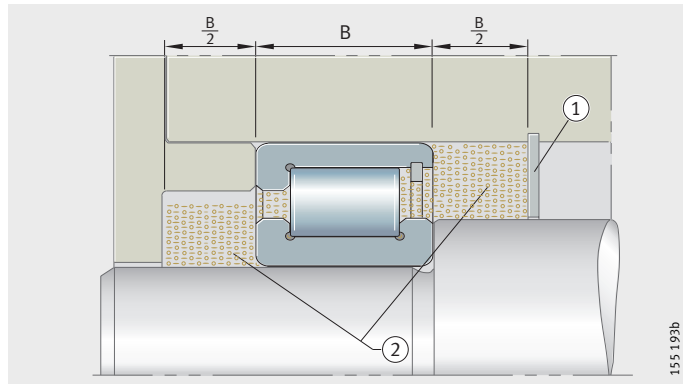
The volume of the grease reservoir should correspond to the volume in the bearing between the inner and outer ring (not taking account of the cage and rolling elements), *Figure 13* and *Figure 14*.

Evaporation of the base oil should be prevented by design measures, for example by sealing shields, *Figure 13* and *Figure 14*.



① Sealing shield
② Grease reservoir

Figure 13
Grease reservoir on one side



① Sealing shield
② Grease reservoir

Figure 14
Grease reservoir on both sides

Miscibility

Mixtures of greases should be avoided if at all possible.

Preconditions

If they are unavoidable, the following preconditions must be fulfilled:

- the base oil must be the same
- the thickener types must match
- the base oil viscosities must be similar (they must not differ by more than one ISO-VG class)
- the consistency must be identical (NLGI class).

Miscibility of greases must always be agreed in consultation with the lubricant manufacturer.

Even when these preconditions are fulfilled, impairment of the performance capability of the mixed grease cannot be ruled out.

If a decision is taken to change to a different grease grade, the grease should be rinsed out if this is possible.
Further relubrication should be carried out after a shortened period.

If incompatible greases are mixed, this can leading to considerable structural changes. Substantial softening of the grease mixture may also occur.

Definite statements on miscibility can only be obtained by means of suitable tests.

Storage

In general, the greases used can be stored for 3 years.

Preconditions

The preconditions are:

- a closed room or store
- temperatures between 0 °C and +40 °C
- relative humidity no more than 65%
- no influence of chemical agents (vapours, gases, fluids)
- the rolling bearings are sealed.

Lubricants age due to environmental influences. The information provided by lubricant manufacturers must always be observed.

After long periods of storage, the start-up frictional torque of greased bearings can be temporarily higher than normal.
The lubricity of the grease may also have deteriorated.

Since the lubrication characteristics of greases vary and different raw materials may be used for greases of the same name, we cannot offer any guarantees either for the lubricants used by customers for relubrication or for their characteristics.

Oil lubrication

For the lubrication of rolling bearings, mineral oils and synthetic oils are essentially suitable.

Oils with a mineral oil base are used most frequently. They must fulfil at least the requirements according to DIN 51 517 or DIN 51 524.

Special oils, often synthetic oils, are used under extreme operating conditions or where there are special requirements relating to oil resistance.

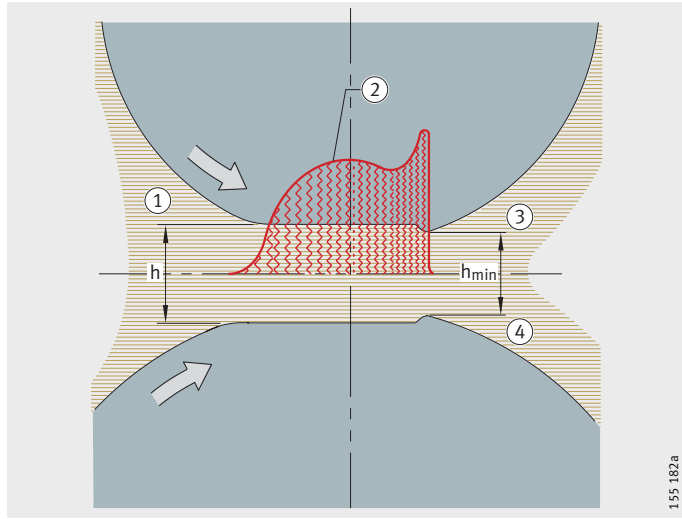
In these cases, please consult the lubricant manufacturer or the Schaeffler engineering service.

Operating temperatures

The information provided by the lubricant manufacturer should be taken as authoritative.

Selection of suitable oil

The achievable bearing life and security against wear are higher with better separation of the contact surfaces by a lubricant film, *Figure 15* and section Load carrying capacity and life, page 40.



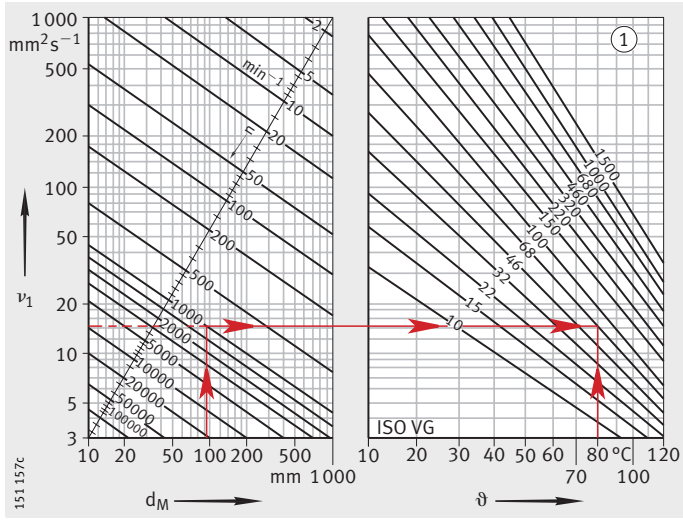
① Entry zone
② Pressure curve according to EHD theory
③ Exit zone
④ Lubricant

Figure 15
Lubricant film in the contact zones

Reference viscosity for mineral oils

The guide value for ν_1 is dependent on the mean bearing diameter d_M and the speed n. It takes account of the EHD theory of lubricant film formation and practical experience.

Depending on the operating speed, the oil at operating temperature must have at least the reference viscosity ν_1, *Figure 16*.



① Viscosity mm^2s^{-1} at +40 °C
n = operating speed
ν_1 = reference viscosity
d_M = mean bearing diameter (d + D)/2
ϑ = operating temperature

Figure 16
Reference viscosity and V/T diagram for mineral oils

Calculation of reference viscosity

The reference viscosity ν_1 is determined as follows:

- Assign ν_1 to a nominal viscosity with ISO-VG between 10 and 1 500 (mid-point viscosity to DIN 51 519)
- Round intermediate values to the nearest ISO-VG (due to the steps between groups).

This method cannot be used for synthetic oils, since these have different V/P (viscosity/pressure) and V/T (viscosity/temperature) characteristics.

In these cases, please consult the Schaeffler engineering service.

Influence of temperature on viscosity

As the temperature increases, the viscosity of the oil decreases. This temperature-dependent change in the viscosity is described using the viscosity index VI. For mineral oils, the VI index should be at least 95.

When selecting the viscosity, the lower operating temperature must be taken into consideration, since the increasing viscosity will reduce the flowability of the lubricant. As a result, the level of power losses may increase.

Very long life can be achieved with a viscosity ratio $\kappa = \nu/\nu_1 = 3$ to 4 (ν = operating viscosity). Highly viscous oils do not, however, bring only advantages. In addition to the power losses arising from lubricant friction, there may be problems with the feed and removal of oil at low or even at normal temperatures.

The oil selected must be sufficiently viscous that it gives the highest possible fatigue life. It must also be ensured that the bearings are always supplied with adequate quantities of oil.

Pressure properties and anti-wear additives

If the bearings are subjected to high loads or if the operating viscosity ν is less than the reference viscosity ν_1, oils with anti-wear additives (type P to DIN 51 502) should be used.

Such oils are also necessary for rolling bearings with a substantial proportion of sliding contact (for example bearings with line contact).

These additives form boundary layers to reduce the harmful effects of metallic contact occurring at various areas (wear).

The suitability of these additives varies and is normally heavily dependent on temperature. Their effectiveness can only be assessed by means of testing in the rolling bearing (for example on our test rig FE8 to DIN 51 819).

Silicone oils should only be used for low loads ($P \leqq 0{,}03 \cdot C$).

Compatibility

Before an oil is used, its behaviour must be checked in relation to plastics, seal materials (elastomers) and light and non-ferrous metals.

This must always be checked under dynamic loading and at operating temperature.

Synthetic oils must always be checked for their compatibility. The lubricant manufacturer must be consulted on this at the same time.

Miscibility

The mixing of different oils should be avoided wherever possible. In particular, the presence of different additive packages may lead to undesirable interactions.

In general, oils with a mineral oil base and the same classification are miscible, for example type HLP with type HLP.
The viscosities should vary by no more than one ISO-VG class.

Synthetic oils must always be checked for their compatibility. The lubricant manufacturer must be consulted on this at the same time.

Miscibility must be checked in advance for each individual case.

Cleanliness

The cleanliness of the oil influences the rating life of bearings, see also section Load carrying capacity and life, page 40.

The Schaeffler Group therefore recommends that an oil filter should be provided; attention must be paid to the filtration rate.
The filter mesh should be $< 25\ \mu m$.

Lubrication methods

The essential lubrication methods are:

- drip feed oil lubrication
- pneumatic oil lubrication
  (in order to protect the environment, this should be used as a substitute for oil mist lubrication)
- oil bath lubrication
  (immersion or sump lubrication)
- recirculating oil lubrication.

Drip feed oil lubrication

This is suitable for bearings running at high speeds, *Figure 17*.

The oil quantity required is dependent on the type and size of bearing, the operating speed and the load.

The guide value is between 3 drops/min and 50 drops/min for each rolling element raceway (one drop weighs approx. 0,025 g).

Excess oil must be allowed to flow out of the bearing arrangement.

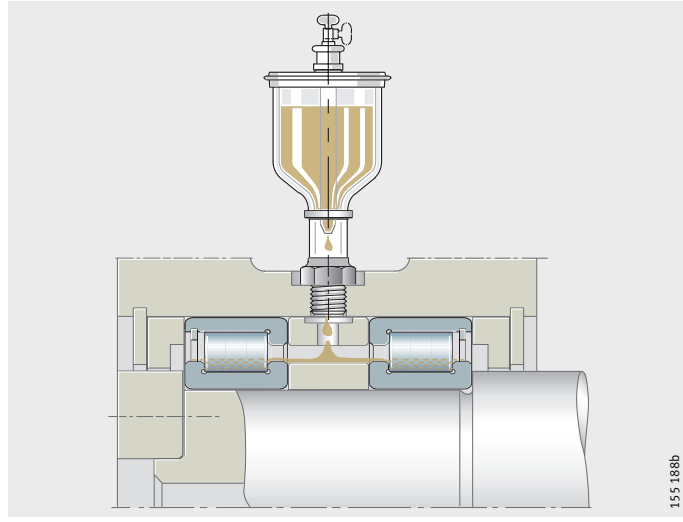


Figure 17
Drip feed oil lubrication (schematic)

Pneumatic oil lubrication

This method is particularly suitable for radial bearings running at high speeds and under low loads ($n \cdot d_M$ = 800 000 to 3 000 000 $min^{-1} \cdot mm$), *Figure 18*.

Clean compressed air free from moisture feeds oil to the bearing. This generates an excess pressure. This prevents contaminants from entering the bearing.

With a pneumatic oil lubrication system designed for minimal quantity lubrication, low frictional torque and a low operating temperature can be achieved.

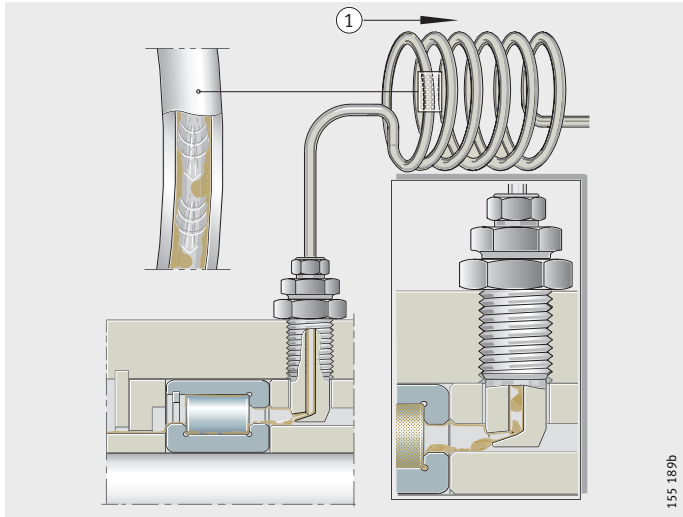
Parameters for design of the lubrication system should be requested from the equipment manufacturers.

Pneumatic oil lubrication of axial bearings should be avoided if possible.

The oil quantity required for adequate supply is dependent on the bearing type.

Pneumatic oil lubrication has little cooling effect.

Follow the instructions provided by the manufacturers of the lubrication systems.



① To the pneumatic oil unit

Figure 18
Pneumatic oil lubrication (schematic)

Oil bath lubrication

The oil level should reach the centre line of the lowest rolling element, *Figure 19*. If the oil level is higher than this, the bearing temperature may increase at high circumferential speeds and losses due to splashing may occur. Furthermore, foaming of the oil may occur.

In general, it is suitable for speeds up to $n \cdot d_M = 300\,000\ min^{-1} \cdot mm$.
At $n \cdot d_M < 150\,000\ min^{-1} \cdot mm$, the bearing may be completely immersed.

In bearings with an asymmetrical cross-section, oil return ducts must be provided due to the pumping effect so that recirculation can be achieved.

In axial bearings, the oil level must cover the inside diameter of the axial cage.

The oil quantity in the housing must be adequately proportioned, otherwise very short oil change intervals will be necessary.

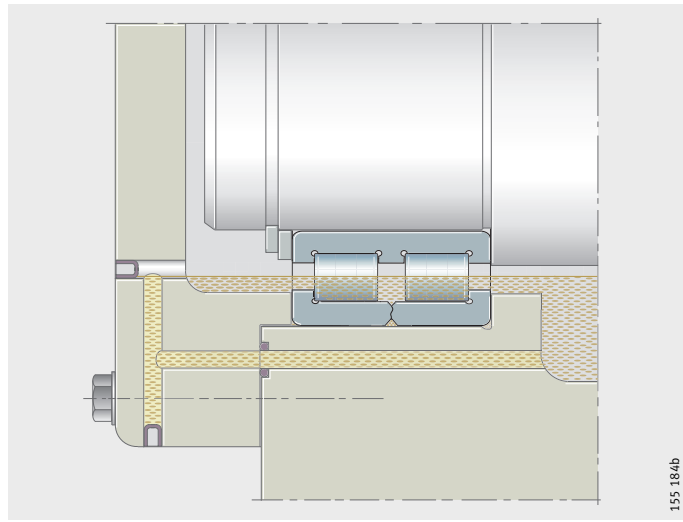
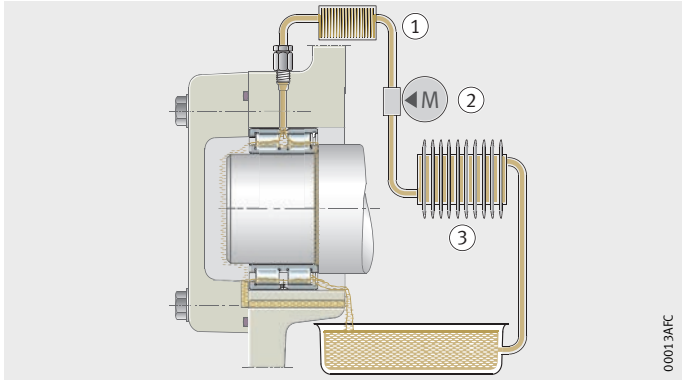


Figure 19
Oil bath lubrication (schematic)

Recirculating oil lubrication

In recirculating oil lubrication, the oil is subjected to additional cooling, *Figure 20*. The oil can therefore dissipate heat from the bearing. The quantity of oil required for heat dissipation is dependent on the cooling conditions, see section Speeds, page 71.

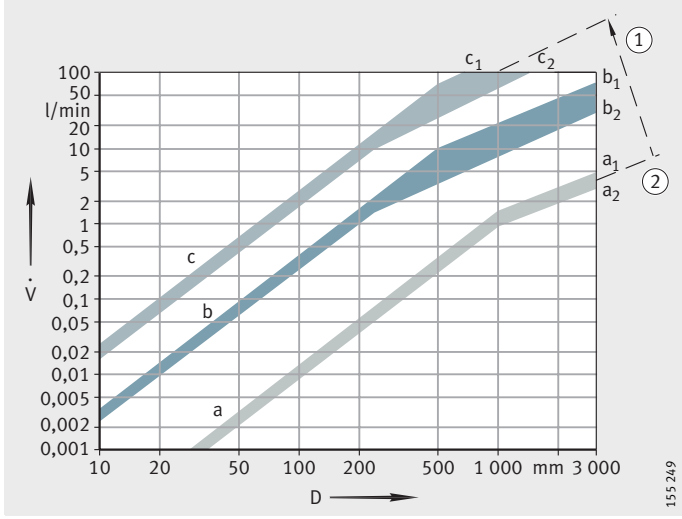


① Filter
② Pump
③ Cooling system

Figure 20
Recirculating oil lubrication (schematic)

The oil quantities $\dot{V}$ are matched to the operating conditions, *Figure 21*. The diagram indicates oil quantities that can be fed through the bearing without pressure with a side feed arrangement and banking up to the lower edge of the shaft.

For bearings with an asymmetrical cross-section (such as angular contact ball bearings, tapered roller bearings, axial spherical roller bearings), larger throughput quantities are permissible due to the pumping effect than for bearings with a symmetrical cross-section. Large quantities can used to dissipate wear debris or heat.



① Increasing oil quantity required for heat dissipation
② No heat dissipation necessary
D = outside bearing diameter
$\dot{V}$ = oil quantity
a = oil quantity sufficient for lubrication
b = upper limit for bearings of symmetrical design
c = upper limit for bearings of asymmetrical design
a_1; b_1; c_1: $D/d > 1,5$
a_2; b_2; c_2: $D/d \leqq 1,5$

Figure 21
Oil quantities

Design of adjacent construction for oil lubrication

The lubrication holes in the housing and shaft must align with those in the rolling bearings. Adequate cross-sections must be provided for annular slots, pockets, etc.

The oil must be able to flow out without pressure (this prevents oil build-up and additional heating of the oil).

In axial bearings, the oil must always be fed from the inside to the outside.

Outlet cross-section guide values for oil lubrication

The cross-section of the oil outlet hole should be significantly larger than that of the inlet, *Figure 22*.

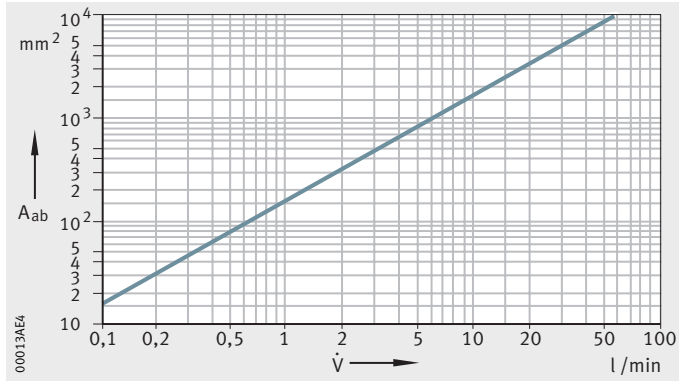
The cross-section A_{rab} is dependent on the oil quantity and the viscosity:

$$A_{rab} = K_{ab} \cdot A_{ab}$$

A_{rab} mm^2
Outlet cross-section taking account of viscosity

K_{ab} –
Correction factor for viscosity, see table

A_{ab} mm^2
Outlet cross-section, *Figure 22*.



A_{ab} = cross-section for pressure-free oil runout
$\dot{V}$ = oil quantity

Figure 22
Outlet cross-section (guide values)

Correction factor K_{ab}

Viscosity $mm^2 \cdot s^{-1}$	Factor K_{ab}
to 30	1
30 to 60	1,2 to 1,6
60 to 90	1,8 to 2,2
90 to 120	2,4 to 2,8
120 to 150	3 to 3,4

Oil injection lubrication

In bearings running at high speeds, the oil is injected into the gap between the cage and bearing ring, *Figure 23*. Injection lubrication using large recirculation quantities is associated with high power loss.

Heating of the bearings can only be held within limits with a considerable amount of effort. The appropriate upper limit for the speed parameter $n \cdot d_M = 1\,000\,000\ min^{-1} \cdot mm$ for recirculating lubrication with suitable bearings (for example spindle bearings) can be exceeded to a considerable degree when using injection lubrication.

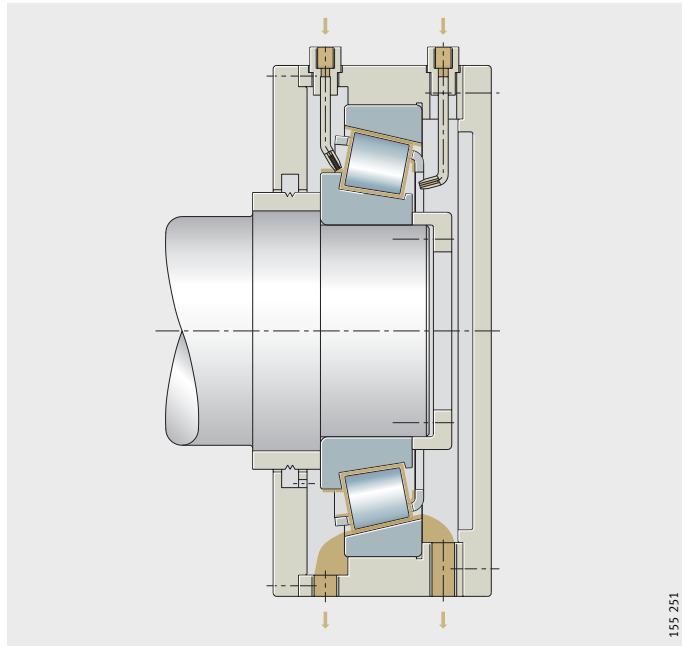


Figure 23
Oil injection lubrication (oil feed from both sides for tapered roller bearing running at high speeds)

Heat dissipation by the lubricant

Oil can dissipate frictional heat from the bearing. It is possible to calculate the heat flow $\dot{Q}_L$ that is dissipated by the lubricant and the necessary lubricant volume flow $\dot{V}_L$.

Heat flow

$$\dot{Q} = 10^{-6} \cdot \frac{\pi}{30} \cdot n \cdot (M_0 + M_1) + \dot{Q}_E$$

$$\dot{Q}_L = \dot{Q} - \dot{Q}_S$$

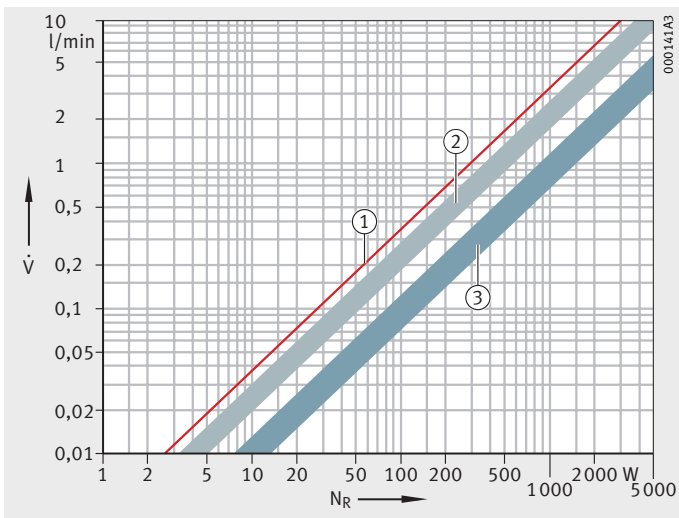
Approximate calculation

$$\dot{V}_L = \frac{\dot{Q}_L}{0{,}0286 \cdot \Delta\vartheta_L}$$

$\dot{Q}_L$ kW
Heat flow dissipated by the lubricant
$\dot{Q}$ kW
Total dissipated heat flow
$\dot{Q}_S$ kW
Heat flow dissipated via the bearing seating surfaces
$\dot{Q}_E$ kW
Heat flow due to heating by external source
n min^{-1}
Operating speed or equivalent speed
M_0 Nmm
Frictional torque as a function of speed
M_1 Nmm
Frictional torque as a function of load
$\dot{V}_L$ l/min
Lubricant volume flow
$\Delta\vartheta_L$ K
Difference between oil inlet and oil outlet temperature.

Guide values for the oil quantity in cooling and lubrication

If these values cannot be calculated, the guide values according to *Figure 24* apply for a temperature difference of $\Delta\vartheta_L$ = 10 K.



① No account is taken of thermal conduction, radiation or convection
② Empirical values for normal cooling conditions
③ Empirical values for very good cooling conditions
$\dot{V}$ = oil quantity
N_R = frictional energy

Figure 24
Guide values for the oil quantity in cooling and lubrication

Oil changes

At temperatures in the bearing of less than +50 °C and with only slight contamination, an oil change once per year is generally sufficient.

Guide values for oil change intervals are given in *Figure 25*.

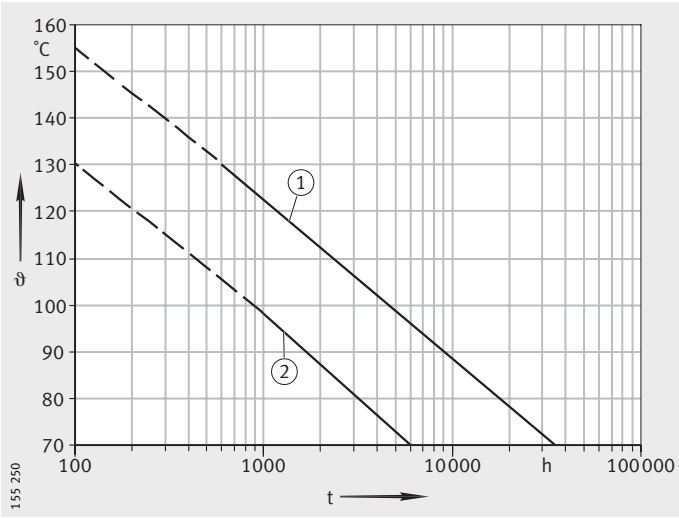
The precise oil change intervals should be agreed in consultation with the oil manufacturer.

Severe operating conditions

Under severe conditions, the oil should be changed more frequently. This applies, for example, in the case of higher temperatures and low oil quantities with a high circulation index.

The circulation index indicates how often the entire oil volume available is recirculated and pumped per hour:

$$\text{Circulation index} = \frac{\text{Pump displacement m}^3/\text{h}}{\text{Container volume m}^3}$$



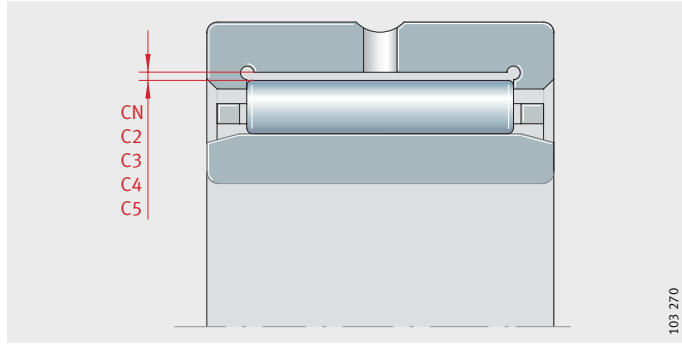
① Synthetic gearbox oils
② Mineral gearbox oils
t = oil change interval
ϑ = oil sump temperature
Source: FVA Project No. 171

Figure 25
Oil change intervals

Radial internal clearance

The radial internal clearance applies to bearings with an inner ring before the bearing is fitted. It is defined as the amount by which the inner ring can be moved in a radial direction from one extreme position to the other in relation to the outer ring, *Figure 1*.

In accordance with DIN 620-4, ISO 5 753, the radial internal clearance is divided into groups, see *Figure 1* and table.



CN, C2, C3, C4, C5
Internal clearance groups

Figure 1
Radial internal clearance

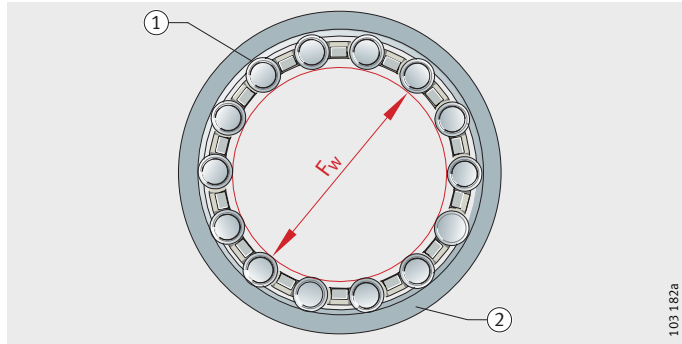
Radial internal clearance groups

Internal clearance group	Description	Standard	Application
CN	Normal radial internal clearance CN is not included in bearing designations	DIN 620-4 ISO 5 753	For normal operating conditions with shaft and housing tolerances, see section Operating clearance and Design of bearing arrangements
C2	Internal clearance < CN		For heavy alternating loads combined with oscillating motion
C3	Internal clearance > CN		For bearing rings with press fits and large temperature differential between inner and outer ring
C4	Internal clearance > C3		
C5	Internal clearance > C4	ISO 5 753	

Enveloping circle

For bearings without an inner ring, the enveloping circle F_w is used. This is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway, *Figure 2*. The enveloping circle for unfitted bearings is in the tolerance zone F6 (except for drawn cup needle roller bearings).

Deviations for F6 and F8, see table, page 168.



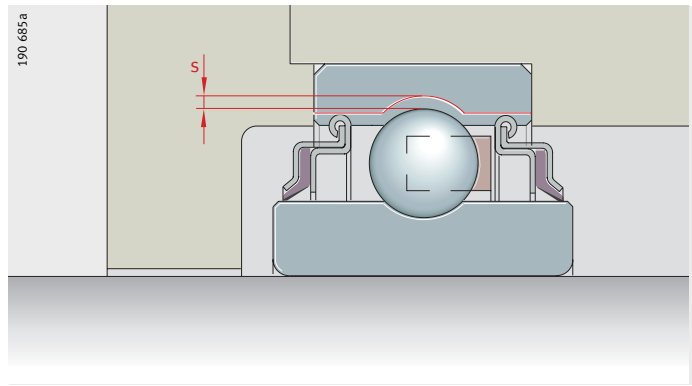
① Needle roller
② Outer raceway
F_w = enveloping circle diameter

Figure 2
Enveloping circle

Operating clearance

The operating clearance is determined on a fitted bearing still warm from operation. It is defined as the amount by which the shaft can be moved in a radial direction from one extreme position to the other, *Figure 3*.

The operating clearance is derived from the radial internal clearance and the change in the radial internal clearance as a result of interference fit and thermal influences in the fitted condition.



s = operating clearance

Figure 3
Operating clearance

Operating clearance value

The operating clearance value is dependent on the operating and installation conditions of the bearing, see also section Design of bearing arrangements, page 140.

A larger operating clearance is, for example, necessary if heat is transferred via the shaft, the shaft undergoes deflection or if misalignment occurs.

An operating clearance smaller than CN should only be used in special cases, for example in high precision bearing arrangements.

The normal operating clearance is achieved with internal clearance CN or, in larger bearings, predominantly with C3 if the recommended shaft and housing tolerances are fulfilled, see section Design of bearing arrangements, page 140.

Calculation of operating clearance

The operating clearance is derived from:

$$s = s_r - \Delta s_P - \Delta s_T$$

s µm
Radial operating clearance of fitted bearing warm from operation

s_r µm
Radial internal clearance

Δs_P µm
Reduction in radial internal clearance due to fit

Δs_T µm
Reduction in radial internal clearance due to temperature.

Reduction in radial internal clearance due to fit

The radial internal clearance is reduced due to the fit as a result of expansion of the inner ring and contraction of the outer ring:

$$\Delta s_P = \Delta d + \Delta D$$

Δd µm
Expansion of the inner ring
ΔD µm
Contraction of the outer ring.

Expansion of the inner ring

The expansion of the inner ring is calculated as follows:

$$\Delta d \approx 0{,}9 \cdot U \cdot d/F \approx 0{,}8 \cdot U$$

d mm
Bore diameter of the inner ring
U µm
Theoretical interference of the fitted parts with firm seating.
The theoretical oversize of the fitted parts with a firm seating is determined from the mean deviations and the upper and lower deviations of the tolerance zones of the fitted parts reduced by $^1/_3$ of their acceptable value. The amount of surface smoothing during assembly must be subtracted from this
F mm
Raceway diameter of the inner ring.

For very thin-walled housings and light metal housings, the reduction in the radial internal clearance must be determined by means of mounting trials.

Contraction of the outer ring

The contraction of the outer ring is calculated as follows:

$$\Delta D \approx 0{,}8 \cdot U \cdot E/D \approx 0{,}7 \cdot U$$

E mm
Raceway diameter of the outer ring
D mm
Outside diameter of the outer ring.

Reduction in radial internal clearance due to temperature

The radial internal clearance can alter considerably if there is a substantial temperature differential between the inner and outer ring.

$$\Delta s_T = \alpha \cdot d_M \cdot 1000 \cdot (\vartheta_{IR} - \vartheta_{AR})$$

Δs_T µm
Reduction in radial internal clearance due to temperature
α K^{-1}
Coefficient of thermal expansion of steel: $\alpha = 0{,}000011\ K^{-1}$
d_M mm
Mean bearing diameter (d + D)/2
ϑ_{IR} °C, K
Temperature of the inner ring
ϑ_{AR} °C, K
Temperature of the outer ring
(usual temperature difference between inner and outer ring: 5 K to 10 K).

A larger radial internal clearance should be used for shafts running at high speeds, since adequate thermal compensation between the bearing, shaft and housing does not occur in this situation.

Δs_T can be significantly higher in this case than for continuous operation.

Axial internal clearance

The axial internal clearance s_a is the extent to which one bearing ring can be displaced in relation to the other, without load, along the bearing axis, *Figure 4*.

s_a = axial internal clearance
s_r = radial internal clearance

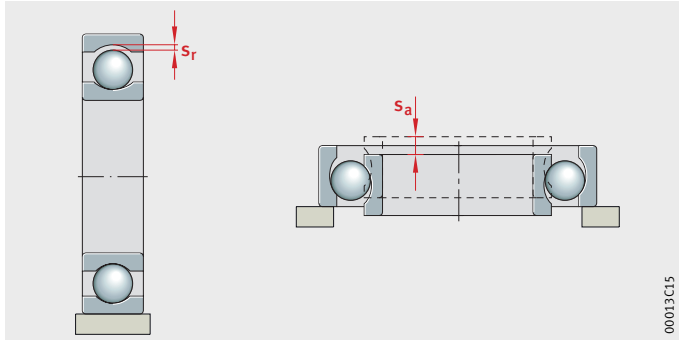


Figure 4
Axial internal clearance in comparison with radial internal clearance

With various bearing types, the radial internal clearance s_r and the axial internal clearance s_a are dependent on each other. Guide values for the correlation between the radial and axial internal clearance are shown for some bearing types in the table.

Correlation between axial internal clearance and radial internal clearance

Bearing type			Ratio between axial and radial internal clearance s_a/s_r
Self-aligning ball bearings			$2{,}3 \cdot Y_0$ [1]
Spherical roller bearings			$2{,}3 \cdot Y_0$ [1]
Tapered roller bearings	Single row, arranged in pairs		$4{,}6 \cdot Y_0$ [1]
	Matched pairs (N11CA)		$2{,}3 \cdot Y_0$ [1]
Angular contact ball bearings	Double row	Series 32 and 33	1,4
		Series 32..-B and 33..-B	2
	Single row	Series 72..-B and 73..-B, arranged in pairs	1,2
Four point contact bearings			1,4

[1] $\overline{Y_0}$ factor in accordance with dimension table.

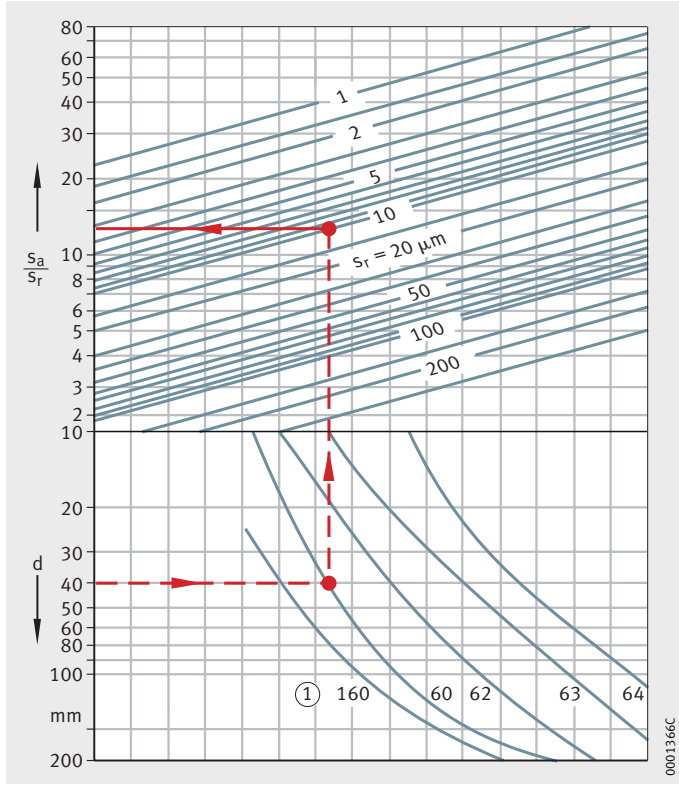
Calculation example

For deep groove ball bearings, the calculation of the axial internal clearance is shown in the following example:

Deep groove ball bearing		6008-C3
Bore diameter d		40 mm
Radial internal clearance before fitting		15 µm to 33 µm
Actual radial internal clearance		24 µm
Mounting tolerance	Shaft	k5
	Housing	J6
Reduction in radial internal clearance during fitting		14 µm
Radial internal clearance after fitting		24 µm – 14 µm = 10 µm
Ratio s_a/s_r, *Figure 5*		13

Axial internal clearance

$s_a = 13 \cdot 10\ \mu m = 130\ \mu m$



① Bearing series
s_a = axial internal clearance
s_r = radial internal clearance
d = bearing bore diameter

Figure 5
Relationship between radial and axial internal clearance in deep groove ball bearings

Bearing materials

INA and FAG rolling bearings fulfil the requirements for fatigue strength, wear resistance, hardness, toughness and structural stability.

The material used for the rings and rolling elements is generally a low-alloy, through hardening chromium steel of high purity. For bearings subjected to considerable shock loads and reversed bending stresses, case hardening steel is also used (supplied by agreement).

In recent years, the improved quality of rolling bearing steels has been the principal factor in achieving considerable increases in basic load ratings.

The results of research as well as practical experience confirm that bearings made from the steel currently used as standard can achieve their endurance limit if loads are not excessively high and the lubrication and cleanliness conditions are favourable.

High Nitrogen Steel

With special bearings made from HNS (High Nitrogen Steel), it is possible to achieve adequate service life even under the most challenging conditions (high temperatures, moisture, contamination); these are supplied by agreement.

High performance steels Cronidur and Cronitect

For increased performance requirements, highly corrosion-resistant, nitrogen-alloyed martensitic HNS steels are available such as Cronidur and the newly developed steel Cronitect.

In contrast to Cronidur, Cronitect has nitrogen introduced into the structure by means of a surface layer hardening process.

In terms of corrosion resistance, wear resistance and fatigue strength, both steels are considerably superior to conventional corrosion-resistant steels for rolling bearings, see also TPI 64, Corrosion-resistant products.

Ceramic materials

Ceramic hybrid spindle bearings contain balls made from silicon nitride. These ceramic balls are substantially lighter than steel balls. The centrifugal forces and friction are significantly lower.

Hybrid bearings allow very high speeds, even with grease lubrication, as well as long operating life and low operating temperatures.

Materials and bearing components

The following table shows suitable materials and their use in bearing technology.

Materials and bearing components

Material	Bearing components (example)
Through hardening steel – rolling bearing steel to ISO 683-17	Outer and inner ring, axial washer
HNS – High Nitrogen Steel	Outer and inner ring
Corrosion-resistant steel – rolling bearing steel to ISO 683-17	Outer and inner ring
Case hardening steel	For example, outer ring of yoke type track rollers
Flame or induction hardening steel	Roller stud of stud type track rollers
Steel strip to EN 10139, SAE J403	Outer ring of drawn cup needle roller bearings
Silicon nitride	Ceramic balls
Brass alloy	Cage
Aluminium alloy	Cage
Polyamide (thermoplastic)	Cage
NBR, FPM, PUR	Sealing ring

Cages

The most important functions of the cage are:

- to separate the rolling elements from each other in order to minimise friction and heat generation
- to maintain the rolling elements at the same distance from each other in order to ensure uniform load distribution
- to prevent the rolling elements from falling out where bearings can be dismantled or swivelled out
- to guide the rolling elements in the load zone of the bearing.

Rolling bearing cages are subdivided into sheet metal and solid section cages.

Sheet metal cages

These cages are predominantly made from steel and for some bearings from brass, *Figure 6*, page 116. In comparison with solid section cages made from metal, they are of lower mass.

Since a sheet metal cage only fills a small proportion of the gap between the inner and outer ring, lubricant can easily reach the interior of the bearing and is held on the cage.

In general, a sheet steel cage is only included in the bearing designation if it is not defined as a standard version of the bearing.

Solid section cages

These cages are made from metal, laminated fabric or plastic, *Figure 7*, page 116. They can be identified from the bearing designation.

Solid section cages made from metal or laminated fabric

Solid section cages made from metal are used where there are requirements for high cage strength and at high temperatures.

Solid section cages are also used if the cage must be guided on ribs. Rib-guided cages for bearings running at high speeds are made in many cases from light materials such as light metal or laminated fabric in order to achieve low inertia forces.

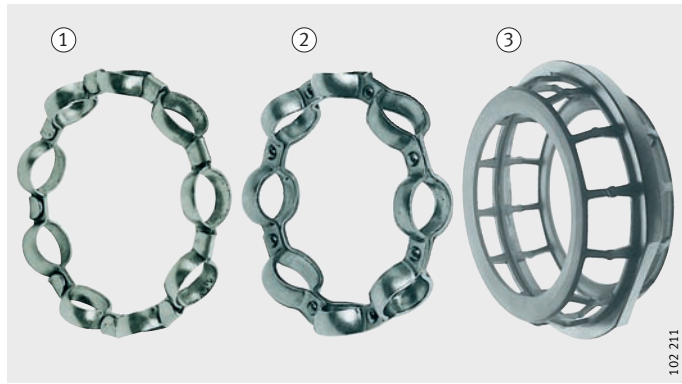
Solid section cages made from polyamide PA66

Solid section cages made from polyamide 66 are produced using injection moulding, *Figure 8*, page 116. As a result, cage types can generally be realised that allow designs with particularly high load carrying capacity. The elasticity and low mass of polyamide are favourable under shock type bearing loads, high accelerations and decelerations und tilting of the bearing rings in relation to each other. Polyamide cages have very good sliding and emergency running characteristics.

Cages made from glass fibre reinforced polyamide 66 are suitable for long term temperatures up to +120 °C.

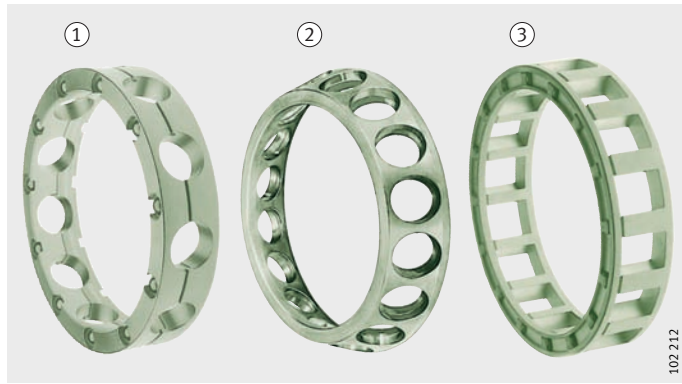
When using oil lubrication, additives in the oil can impair the cage operating life. The interrelationship between the cage operating life, the long term temperature of the stationary bearing ring and the lubricant is shown in *Figure 9*, page 117. Aged oil can also impair the cage operating life at high temperatures, so attention must be paid to compliance with the oil change intervals.

Cage designs



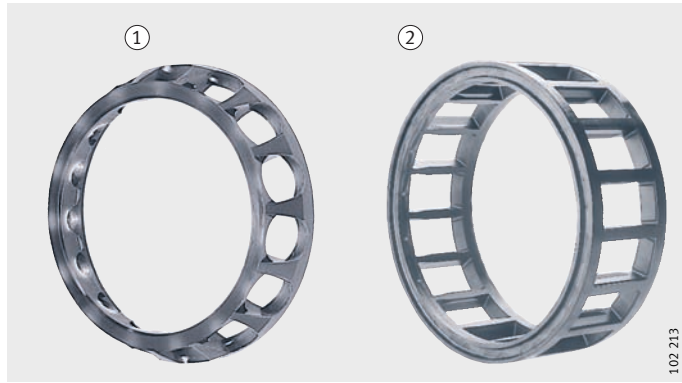
① Lug cage for deep groove ball bearings
② Riveted cage for deep groove ball bearings
③ Window cage for spherical roller bearings

Figure 6
Sheet steel cages



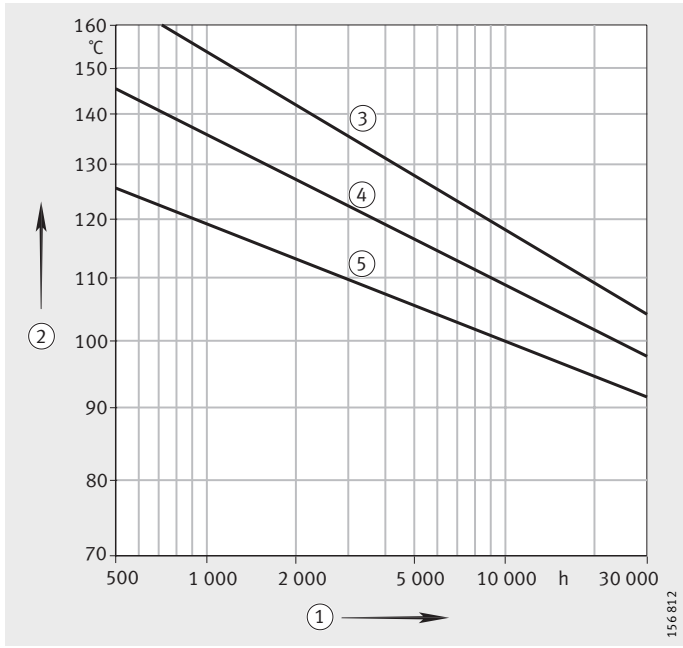
① Riveted solid section cage for deep groove ball bearings
② Window cage for angular contact ball bearings
③ Riveted cage with crosspiece rivets for cylindrical roller cages

Figure 7
Solid section brass cages



① Window cage for single row angular contact ball bearings
② Window cage for spherical roller bearings

Figure 8
Solid section cages made from glass fibre reinforced polyamide



① Operating life of window cages
② The curves are valid for the long term temperature of the stationary bearing ring
If the temperature is not continuously high, the cage operating life is longer
③ Rolling bearing grease K to DIN 51 825, engine oil or machine oil
④ Gearbox oil
⑤ Hypoid oil

Figure 9
Operating life of window cages made from polyamide PA66-GF25

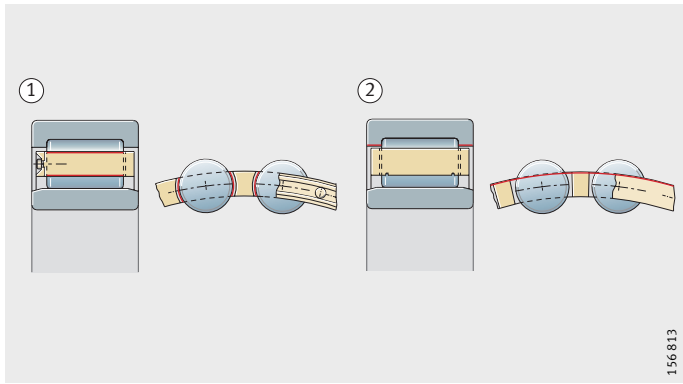
Guidance method

A further means of distinguishing between cages is their guidance method, *Figure 10*. Most cages are guided by the rolling elements and do not have a suffix for the guidance method.

If guidance is by the bearing outer ring, the suffix A is used. Cages that are guided on the inner ring have the suffix B.

Under normal operating conditions, the cage design defined as the standard cage is generally suitable. Standard cages that may differ within a bearing series according to the bearing size are described in the product sections.

Under special operating conditions, a cage that is suitable for the specific conditions must be selected.



Rolling bearing cages
① Guided by rolling elements
② Guided by ribs

Figure 10
Guidance of cages

Operating temperature

Rolling bearings are thermally stabilised such that, depending on the bearing type, they are generally dimensionally stable up to +120 °C (certain series up to +150 °C).

Operating temperatures above +150 °C require special heat treatment. Bearings treated in this way are available by agreement and are identified by the suffix S1, S2, S3 and S4 to DIN 623-1, see table.

Further temperature data in the product descriptions must be observed.

Suffixes for bearings for high temperatures

Suffix	S1	S2	S3	S4
Max. operating temperature	+200 °C	+250 °C	+300 °C	+350 °C

Track rollers

An operating temperature of +70 °C is regarded as a normal operating temperature. The additional information on temperature in the product descriptions must be observed.

Sealed bearings

The permissible temperature for sealed bearings is dependent on the requirements for the operating life of the grease filling and on the action of the contact seals.

Sealed bearings are greased with specially tested, high performance, high quality greases. These greases can withstand +120 °C for short periods. At long term temperatures of +70 °C and above, a reduction in the operating life of standard greases with a lithium soap base must be expected.

In many cases, adequate operating life values are only achieved at high temperatures through the use of special greases.
In these cases, it must also be checked whether seals made from especially heat-resistant materials must be used.
The operating limit of normal contact seals is +100 °C.

If high temperature synthetic materials are used for seals and greases, it must be noted that the particularly high performance materials containing fluoride may give off harmful gases and vapours when heated to approx. +300 °C and above.
This may occur, for example, if a welding torch is used in the dismantling of a bearing.

High temperatures are critical especially in the case of seals made from fluoro rubber (FKM, FPM, e.g. Viton) or greases containing fluoride such as the rolling bearing greases Arcanol TEMP200 and greases to GA11. If high temperatures are unavoidable, attention must be paid to the valid safety data sheet for the specific fluoride-containing material, which can be obtained upon request.

Anti-corrosion protection

Bearings are not resistant to corrosion by water or agents containing alkalis or acids but are often exposed to these corrosion-inducing agents. In these applications, anti-corrosion protection is therefore a decisive factor in achieving a long operating life of the bearings.

In principle, corrosion-resistant steels to ISO 693-17 can be used for components at risk of corrosion. These bearings have the prefix S. For higher requirements, the high performance steels Cronidur and Cronitect are available, see page 113.

Corrotect® coating

In many applications, the special coating Corrotect® is more cost-effective than corrosion-resistant steel.

Corrotect® is an extremely thin, electroplated surface coating (coating thickness 0,5 µm to 3 µm). The coating is effective against moisture, contaminated water, salt spray and weakly alkaline and weakly acidic cleaning agents.

Advantages of the coating

The advantages of the special coating Corrotect® are all-round rust protection, including the turned surfaces of chamfers and radii, *Figure 11*. It also gives long term prevention of rust penetration beneath seals and smaller bright spots are protected against rust by the cathodic protection effect. In comparison with uncoated parts, operating life is significantly increased by the anti-corrosion protection. Uncoated bearings can be easily replaced by coated bearings of the same dimensions, there is no decrease in load carrying capacity, in contrast to corrosion-resistant steels. During storage, there is no need to use organic-based preservatives.

① With Corrotect® coating
② Uncoated

Figure 11
Bearing rings after the salt spray test

Fitting of coated bearings

Before bearings with Corrotect® coating are fitted, compatibility with the media should always be checked.

In order to reduce the press-in forces, the surface of the parts should be lightly greased, since the tolerances are increased by the thickness of the coating.

Dimensional and geometrical tolerances

Unless stated otherwise, the tolerances for radial rolling bearings correspond to DIN 620-2 (ISO 492), the tolerances for axial rolling bearings correspond to DIN 620-3 (ISO 199), *Figure 12*.

The accuracy corresponds to tolerance class PN.
For bearings with increased accuracy, the tolerances are restricted to values in the classes P6, P5, P4 and P2. Tolerance tables for the individual tolerance classes: see page 122 to page 135.

High precision bearings

The standardised tolerance classes are not applied to high precision bearings, which are produced to the tolerance classes P4S, SP and UP. These tolerances are listed in the product descriptions for the high precision bearings.

Measurement methods

Measurement methods according to DIN 620-1 (ISO 1 132-2) are valid for the acceptance inspection of rolling bearings.

Further information on the measurement methods is given in TPI 138, Rolling bearing tolerances, Definitions and measurement principles. This TPI can be ordered via the Internet.

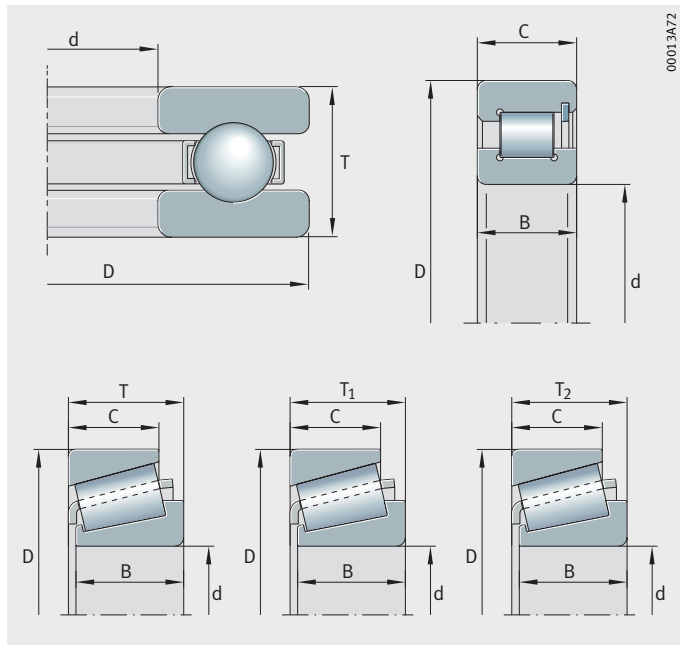


Figure 12
Main dimensions to DIN 620

Tolerance symbols and definitions

Tolerance symbol	Toleranced characteristic to DIN 1 132 and DIN 620
d	Nominal bore diameter
Δ_{dmp}	Deviation of mean bore diameter in a single plane
Δ_{d1mp}	Deviation of mean large end diameter in tapered bores
V_{dsp}	Variation of single bore diameter in a single plane
V_{dmp}	Variation of mean bore diameter
D	Nominal outside diameter
Δ_{Dmp}	Deviation of mean outside diameter in a single plane
V_{Dsp}	Variation of single outside diameter in a single plane
V_{Dmp}	Variation of mean outside diameter
B	Nominal inner ring width
Δ_{Bs}	Deviation of a single inner ring width
V_{Bs}	Variation of inner ring width
C	Nominal outer ring width
Δ_{Cs}	Deviation of a single outer ring width
V_{Cs}	Variation of outer ring width
K_{ia}	Radial runout of inner ring of assembled bearing
K_{ea}	Radial runout of outer ring of assembled bearing
S_d	Runout of inner ring face to the bore
S_D	Runout of outer ring outside surface generatrix to the face
S_{ia}	Axial runout of inner ring of assembled bearing
S_{ea}	Axial runout of outer ring of assembled bearing
S_i	Variation of washer thickness of shaft locating washer
S_e	Variation of washer thickness of housing locating washer
T	Nominal bearing height of a single direction axial bearing
T	Total width of tapered roller bearing
T_{1s}	Total width of tapered roller bearing over inner ring and normal outer ring measured at one point
T_{2s}	Total width of tapered roller bearing over inner ring and normal outer ring measured at one point
Δ_{Ts}, Δ_{T1s}, Δ_{T2s}	Deviation in total width from nominal dimension of tapered roller bearing measured at one point

Radial bearings, excluding tapered roller bearings

Tolerance class PN
Inner ring
Tolerances in μm

d		Δ_{dmp}		V_{dsp} Diameter series			V_{dmp}	K_{ia}
mm		Deviation		9	0, 1	2, 3, 4		
over	incl.	upper	lower	max.	max.	max.	max.	max.
0,6[1]	2,5	0	−8	10	8	6	6	10
2,5	10	0	−8	10	8	6	6	10
10	18	0	−8	10	8	6	6	10
18	30	0	−10	13	10	8	8	13
30	50	0	−12	15	12	9	9	15
50	80	0	−15	19	19	11	11	20
80	120	0	−20	25	25	15	15	25
120	180	0	−25	31	31	19	19	30
180	250	0	−30	38	38	23	23	40
250	315	0	−35	44	44	26	26	50
315	400	0	−40	50	50	30	30	60
400	500	0	−45	56	56	34	34	65
500	630	0	−50	63	63	38	38	70
630	800	0	−75	–	–	–	–	80
800	1 000	0	−100	–	–	–	–	90
1 000	1 250	0	−125	–	–	–	–	100
1 250	1 600	0	−160	–	–	–	–	120
1 600	2 000	0	−200	–	–	–	–	140

Tolerance class PN
Inner ring
continued
Tolerances in μm

d		Δ_{Bs}				V_{Bs}
mm		Normal deviation		Modified deviation[2]		
over	incl.	upper	lower	upper	lower	max.
0,6[1]	2,5	0	−40	0	–	12
2,5	10	0	−120	0	−250	15
10	18	0	−120	0	−250	20
18	30	0	−120	0	−250	20
30	50	0	−120	0	−250	20
50	80	0	−150	0	−380	25
80	120	0	−200	0	−380	25
120	180	0	−250	0	−500	30
180	250	0	−300	0	−500	30
250	315	0	−350	0	−500	35
315	400	0	−400	0	−630	40
400	500	0	−450	0	–	50
500	630	0	−500	0	–	60
630	800	0	−750	0	–	70
800	1 000	0	−1 000	0	–	80
1 000	1 250	0	−1 250	0	–	100
1 250	1 600	0	−1 600	0	–	120
1 600	2 000	0	−2 000	0	–	140

[1] This diameter is included in the group.

[2] Only for bearings manufactured specifically for use as matched pairs.

Tolerance class PN
Outer ring[1)]
Tolerances in μm

D		Δ_{Dmp}		V_{Dsp}				V_{Dmp}[3)]	K_{ea}
				Open bearings Diameter series			Bearings with sealing shields or sealing washers		
mm		Deviation		9	0, 1	2, 3, 4			
over	incl.	upper	lower	max.	max.	max.	max.	max.	max.
2,5[2)]	6	0	−8	10	8	6	10	6	15
6	18	0	−8	10	8	6	10	6	15
18	30	0	−9	12	9	7	12	7	15
30	50	0	−11	14	11	8	16	8	20
50	80	0	−13	16	13	10	20	10	25
80	120	0	−15	19	19	11	26	11	35
120	150	0	−18	23	23	14	30	14	40
150	180	0	−25	31	31	19	38	19	45
180	250	0	−30	38	38	23	–	23	50
250	315	0	−35	44	44	26	–	26	60
315	400	0	−40	50	50	30	–	30	70
400	500	0	−45	56	56	34	–	34	80
500	630	0	−50	63	63	38	–	38	100
630	800	0	−75	94	94	55	–	55	120
800	1 000	0	−100	125	125	75	–	75	140
1 000	1 250	0	−125	–	–	–	–	–	160
1 250	1 600	0	−160	–	–	–	–	–	190
1 600	2 000	0	−200	–	–	–	–	–	220
2 000	2 500	0	−250	–	–	–	–	–	250

1) $\overline{\Delta_{Cs}}$, $\overline{\Delta_{C1s}}$, V_{Cs} and V_{C2s} are identical to Δ_{Bs} and V_{Bs} for the inner ring of the corresponding bearing (table Tolerance class PN Inner ring, page 122).

2) This diameter is included in the group.

3) Applies before assembly of the bearing and after removal of internal and/or external snap rings.

Radial bearings, excluding tapered roller bearings

Tolerance class P6
Inner ring
Tolerances in μm

d		Δ_{dmp}		V_{dsp} Diameter series			V_{dmp}	K_{ia}
mm		Deviation		9	0, 1	2, 3, 4		
over	incl.	upper	lower	max.	max.	max.	max.	max.
0,6[1]	2,5	0	−7	9	7	5	5	5
2,5	10	0	−7	9	7	5	5	6
10	18	0	−7	9	7	5	5	7
18	30	0	−8	10	8	6	6	8
30	50	0	−10	13	10	8	8	10
50	80	0	−12	15	15	9	9	10
80	120	0	−15	19	19	11	11	13
120	180	0	−18	23	23	14	14	18
180	250	0	−22	28	28	17	17	20
250	315	0	−25	31	31	19	19	25
315	400	0	−30	38	38	23	23	30
400	500	0	−35	44	44	26	26	35
500	630	0	−40	50	50	30	30	40

Tolerance class P6
Inner ring
continued
Tolerances in μm

d		Δ_{Bs}				V_{Bs}
mm		Normal deviation		Modified deviation[2]		
over	incl.	upper	lower	upper	lower	max.
0,6[1]	2,5	0	−40	–	–	12
2,5	10	0	−120	0	−250	15
10	18	0	−120	0	−250	20
18	30	0	−120	0	−250	20
30	50	0	−120	0	−250	20
50	80	0	−150	0	−380	25
80	120	0	−200	0	−380	25
120	180	0	−250	0	−550	30
180	250	0	−300	0	−500	30
250	315	0	−350	0	−500	35
315	400	0	−400	0	−630	40
400	500	0	−450	–	–	45
500	630	0	−500	–	–	50

1) This diameter is included in the group.

2) Only for bearings manufactured specifically for use as matched pairs.

Tolerance class P6
Outer ring[1)]
Tolerances in μm

D mm		Δ_{Dmp} Deviation		V_{Dsp} Open bearings Diameter series			Bearings with sealing shields or sealing washers	V_{Dmp}[3)]	K_{ea}
				9	0, 1	2, 3, 4			
over	incl.	upper	lower	max.	max.	max.	max.	max.	max.
2,5[2)]	6	0	−7	9	7	5	9	5	8
6	18	0	−7	9	7	5	9	5	8
18	30	0	−8	10	8	6	10	6	9
30	50	0	−9	11	9	7	13	7	10
50	80	0	−11	14	11	8	16	8	13
80	120	0	−13	16	16	10	20	10	18
120	150	0	−15	19	19	11	25	11	20
150	180	0	−18	23	23	14	30	14	23
180	250	0	−20	25	25	15	–	15	25
250	315	0	−25	31	31	19	–	19	30
315	400	0	−28	35	35	21	–	21	35
400	500	0	−33	41	41	25	–	25	40
500	630	0	−38	48	48	29	–	29	50
630	800	0	−45	56	56	34	–	34	60
800	1 000	0	−60	75	75	45	–	45	75

1) Δ_{Cs}, Δ_{C1s}, V_{Cs} and V_{C2s} are identical to Δ_{Bs} and V_{Bs} for the inner ring of the corresponding bearing (table Tolerance class P6 Inner ring, page 124).

2) This diameter is included in the group.

3) Applies before assembly of the bearing and after removal of internal and/or external snap rings.

Radial bearings, excluding tapered roller bearings

Tolerance class P5
Inner ring
Tolerances in μm

d mm		Δ_{dmp} Deviation		V_{dsp} Diameter series 9	V_{dsp} Diameter series 0, 1, 2, 3, 4	V_{dmp}	K_{ia}	S_d
over	incl.	upper	lower	max.	max.	max.	max.	max.
0,6[1]	2,5	0	−5	5	4	3	4	7
2,5	10	0	−5	5	4	3	4	7
10	18	0	−5	5	4	3	4	7
18	30	0	−6	6	5	3	4	8
30	50	0	−8	8	6	4	5	8
50	80	0	−9	9	7	5	5	8
80	120	0	−10	10	8	5	6	9
120	180	0	−13	13	10	7	8	10
180	250	0	−15	15	12	8	10	11
250	315	0	−18	18	14	9	13	13
315	400	0	−23	23	18	12	15	15

Tolerance class P5
Inner ring
continued
Tolerances in μm

d mm		S_{ia}[2]	Δ_{Bs} Normal deviation		Δ_{Bs} Modified deviation[3]		V_{Bs}
over	incl.	max.	upper	lower	upper	lower	max.
0,6[1]	2,5	7	0	−40	0	−250	5
2,5	10	7	0	−40	0	−250	5
10	18	7	0	−80	0	−250	5
18	30	8	0	−120	0	−250	5
30	50	8	0	−120	0	−250	5
50	80	8	0	−150	0	−250	6
80	120	9	0	−200	0	−380	7
120	180	10	0	−250	0	−380	8
180	250	13	0	−300	0	−500	10
250	315	15	0	−350	0	−500	13
315	400	20	0	−400	0	−630	15

1) This diameter is included in the group.
2) Only for deep groove and angular contact ball bearings.
3) Only for bearings manufactured specifically for use as matched pairs.

Tolerance class P5
Outer ring[1)]
Tolerances in µm

D		Δ_{Dmp}		V_{Dsp}[3)] Diameter series		V_{Dmp}[4)]	K_{ea}	S_D	S_{ea}[5)]	V_{Cs}
mm		Deviation		9	0, 1, 2, 3, 4					
over	incl.	upper	lower	max.	max.	max.	max.	max.	max.	max.
2,5[2)]	6	0	−5	5	4	3	5	8	8	5
6	18	0	−5	5	4	3	5	8	8	5
18	30	0	−6	6	5	3	6	8	8	5
30	50	0	−7	7	5	4	7	8	8	5
50	80	0	−9	9	7	5	8	8	10	6
80	120	0	−10	10	8	5	10	9	11	8
120	150	0	−11	11	8	6	11	10	13	8
150	180	0	−13	13	10	7	13	10	14	8
180	250	0	−15	15	11	8	15	11	15	10
250	315	0	−18	18	14	9	18	13	18	11
315	400	0	−20	20	15	10	20	13	–	13
400	500	0	−23	23	17	12	23	15	–	15
500	630	0	−28	28	21	14	25	18	–	18
630	800	0	−35	35	26	18	30	20	–	20

1) $\overline{\Delta_{Cs}}$ is identical to Δ_{Bs} for the inner ring of the corresponding bearing (table Tolerance class P5 Inner ring, page 126).

2) This diameter is included in the group.

3) No values are defined for radial ball bearings with sealing shields or sealing washers.

4) Applies before assembly of the bearing and after removal of internal and/or external snap rings.

5) Only for deep groove and angular contact ball bearings.

Radial bearings, excluding tapered roller bearings

Tolerance class P4
Inner ring
Tolerances in μm

d		Δ_{dmp}		Δ_{ds}		V_{dsp}		V_{dmp}	K_{ia}
				Diameter series					
mm		Deviation		0, 1, 2, 3, 4 Deviation		9	0, 1, 2, 3, 4		
over	incl.	upper	lower	upper	lower	max.	max.	max.	max.
0,6[1]	2,5	0	−4	0	−4	4	3	2	2,5
2,5	10	0	−4	0	−4	4	3	2	2,5
10	18	0	−4	0	−4	4	3	2	2,5
18	30	0	−5	0	−5	5	4	2,5	3
30	50	0	−6	0	−6	6	5	3	4
50	80	0	−7	0	−7	7	5	3,5	4
80	120	0	−8	0	−8	8	6	4	5
120	180	0	−10	0	−10	10	8	5	6
180	250	0	−12	0	−12	12	9	6	8

Tolerance class P4
Inner ring
continued
Tolerances in μm

d		S_d	S_{ia}[2]	Δ_{Bs}				V_{Bs}
				Normal deviation		Modified deviation[3]		
mm								
over	incl.	max.	max.	upper	lower	upper	lower	max.
0,6[1]	2,5	3	3	0	−40	0	−250	2,5
2,5	10	3	3	0	−40	0	−250	2,5
10	18	3	3	0	−80	0	−250	2,5
18	30	4	4	0	−120	0	−250	2,5
30	50	4	4	0	−120	0	−250	3
50	80	5	5	0	−150	0	−250	4
80	120	5	5	0	−200	0	−380	4
120	180	6	6	0	−250	0	−380	5
180	250	7	7	0	−300	0	−500	6

1) This diameter is included in the group.

2) Only for deep groove and angular contact ball bearings.

3) Only for bearings manufactured specifically for use as matched pairs.

Tolerance class P4
Outer ring
Tolerances in μm

D mm		Δ_{Dmp} Deviation		Δ_{Ds} Diameter series 0, 1, 2, 3, 4 Deviation		V_{Dsp}[2] 9	V_{Dsp}[2] 0, 1, 2, 3, 4	V_{Dmp}	K_{ea}
over	incl.	upper	lower	upper	lower	max.	max.	max.	max.
2,5[1]	6	0	−4	0	−4	4	3	2	3
6	18	0	−4	0	−4	4	3	2	3
18	30	0	−5	0	−5	5	4	2,5	4
30	50	0	−6	0	−6	6	5	3	5
50	80	0	−7	0	−7	7	5	3,5	5
80	120	0	−8	0	−8	8	6	4	6
120	150	0	−9	0	−9	9	7	5	7
150	180	0	−10	0	−10	10	8	5	8
180	250	0	−11	0	−11	11	8	6	10
250	315	0	−13	0	−13	13	10	7	11
315	400	0	−15	0	−15	15	11	8	13

Tolerance class P4
Outer ring
continued
Tolerances in μm

D mm		S_D S_{D1}	S_{ea}[3]	Δ_{Cs}	V_{Cs}
over	incl.	max.	max.		max.
2,5[1]	6	4	5	Δ_{Cs} and V_{Cs} are identical to Δ_{Bs} and V_{Bs} for the inner ring of the corresponding bearing (table Tolerance class P4 Inner ring, page 128)	2,5
6	18	4	5		2,5
18	30	4	5		2,5
30	50	4	5		2,5
50	80	4	5		3
80	120	5	6		4
120	150	5	7		5
150	180	5	8		5
180	250	7	10		7
250	315	8	10		7
315	400	10	13		8

1) This diameter is included in the group.

2) No values are defined for bearings with sealing shields or sealing washers.

3) Only for deep groove and angular contact ball bearings.

Radial bearings, excluding tapered roller bearings

Tolerance class P2
Inner ring
Tolerances in μm

d mm		Δ_{dmp} Deviation		Δ_{ds} Deviation		V_{dsp}	V_{dmp}	K_{ia}
over	incl.	upper	lower	upper	lower	max.	max.	max.
0,6[1]	2,5	0	−2,5	0	−2,5	2,5	1,5	1,5
2,5	10	0	−2,5	0	−2,5	2,5	1,5	1,5
10	18	0	−2,5	0	−2,5	2,5	1,5	1,5
18	30	0	−2,5	0	−2,5	2,5	1,5	2,5
30	50	0	−2,5	0	−2,5	2,5	1,5	2,5
50	80	0	−4	0	−4	4	2	2,5
80	120	0	−5	0	−5	5	2,5	2,5
120	150	0	−7	0	−7	7	3,5	2,5
150	180	0	−7	0	−7	7	3,5	5
180	250	0	−8	0	−8	8	4	5

Tolerance class P2
Inner ring
continued
Tolerances in μm

d mm		S_d	S_{ia}[2]	Δ_{Bs} Normal deviation		V_{Bs}
over	incl.	max.	max.	upper	lower	max.
0,6[1]	2,5	1,5	1,5	0	−40	1,5
2,5	10	1,5	1,5	0	−40	1,5
10	18	1,5	1,5	0	−80	1,5
18	30	1,5	2,5	0	−120	1,5
30	50	1,5	2,5	0	−120	1,5
50	80	1,5	2,5	0	−150	1,5
80	120	2,5	2,5	0	−200	2,5
120	150	2,5	2,5	0	−250	2,5
150	180	4	5	0	−300	4
180	250	5	5	0	−350	5

[1] This diameter is included in the group.

[2] Only for deep groove and angular contact ball bearings.

Tolerance class P2
Outer ring
Tolerances in μm

D mm		Δ_{Dmp} Deviation		Δ_{Ds} Deviation		V_{Dsp} [2]	V_{Dmp}	K_{ea}
over	incl.	upper	lower	upper	lower	max.	max.	max.
2,5 [1]	6	0	−2,5	0	−2,5	2,5	1,5	1,5
6	18	0	−2,5	0	−2,5	2,5	1,5	1,5
18	30	0	−4	0	−4	4	2	2,5
30	50	0	−4	0	−4	4	2	2,5
50	80	0	−4	0	−4	4	2	4
80	120	0	−5	0	−5	5	2,5	5
120	150	0	−5	0	−5	5	2,5	5
150	180	0	−7	0	−7	7	2,5	5
180	250	0	−8	0	−8	8	4	7
250	315	0	−8	0	−8	8	4	7
315	400	0	−10	0	−10	10	5	8

Tolerance class P2
Outer ring
continued
Tolerances in μm

D mm		S_D S_{D1}	S_{ea} [3]	Δ_{Cs}	V_{Cs}
over	incl.	max.	max.		max.
2,5 [1]	6	1,5	1,5	Δ_{Cs} and V_{Cs} are identical to Δ_{Bs} and V_{Bs} for the inner ring of the corresponding bearing (table Tolerance class P2 Inner ring, page 130)	1,5
6	18	1,5	1,5		1,5
18	30	1,5	2,5		1,5
30	50	1,5	2,5		1,5
50	80	1,5	4		1,5
80	120	2,5	5		2,5
120	150	2,5	5		2,5
150	180	2,5	5		2,5
180	250	4	7		4
250	315	5	7		5
315	400	7	8		7

[1] This diameter is included in the group.

[2] No values are defined for bearings with sealing shields or sealing washers.

[3] Only for deep groove and angular contact ball bearings.

Tolerances for tapered bores, taper 1:12
Tolerances in μm

Bore diameter d mm		Tolerance class PN				
		Δ_{dmp} Deviation μm		V_{dp} [1]	$\Delta_{d1\,mp} - \Delta_{dmp}$ Deviation μm	
over	incl.	upper	lower	max.	upper	lower
18	30	+21	0	13	+21	0
30	50	+25	0	15	+25	0
50	80	+30	0	19	+30	0
80	120	+35	0	25	+35	0
120	180	+40	0	31	+40	0
180	250	+46	0	38	+46	0
250	315	+52	0	44	+52	0
315	400	+57	0	50	+57	0
400	500	+63	0	56	+63	0
500	630	+70	0	–	+70	0
630	800	+80	0	–	+80	0
800	1 000	+90	0	–	+90	0

1) Valid in any radial cross-section of the bore.

Tolerances for tapered bores, taper 1:30
Tolerances in μm

Bore diameter d mm		Tolerance class PN				
		Δ_{dmp} Deviation μm		V_{dp} [1]	$\Delta_{d1\,mp} - \Delta_{dmp}$ Deviation μm	
over	incl.	upper	lower	max.	upper	lower
–	80	+15	0	19	+35	0
80	120	+20	0	25	+40	0
120	180	+25	0	31	+50	0
180	250	+30	0	38	+55	0
250	315	+35	0	44	+60	0
315	400	+40	0	50	+65	0
400	500	+45	0	56	+75	0
500	630	+50	0	63	+85	0
630	800	+75	0	–	+100	0
800	1 000	+100	0	–	+100	0

1) Valid in any radial cross-section of the bore.

Taper 1:12
Half of taper angle $\alpha = 2°23' 9{,}4''$;
Theoretical large end diameter

$$d_1 = d + \frac{1}{12} \times B$$

Taper 1:30
Half of taper angle $\alpha = 0°57' 17{,}4''$;
Theoretical large end diameter

$$d_1 = d + \frac{1}{30} \times B$$

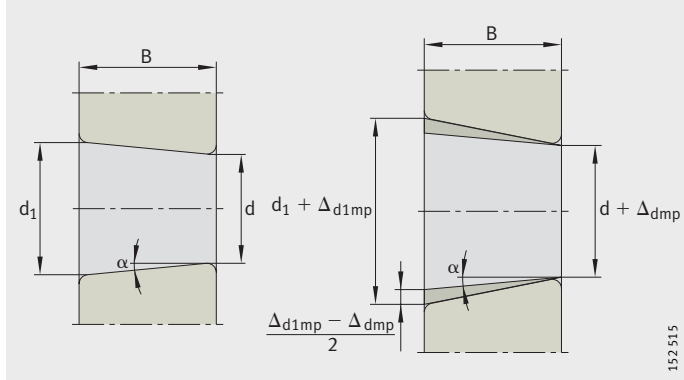


Figure 13
Tolerances for tapered bores

Axial bearings

Bore diameter tolerances for shaft locating washers to ISO 199, DIN 620-3 Tolerances in μm

d		PN (normal tolerance), P6 and P5			P4		
mm		Δ_{dmp} Deviation		V_{dp}	Δ_{dmp} Deviation		V_{dp}
over	incl.	upper	lower	max.	upper	lower	max.
–	18	0	−8	6	0	−7	5
18	30	0	−10	8	0	−8	6
30	50	0	−12	9	0	−10	8
50	80	0	−15	11	0	−12	9
80	120	0	−20	15	0	−15	11
120	180	0	−25	19	0	−18	14
180	250	0	−30	23	0	−22	17
250	315	0	−35	26	0	−25	19
315	400	0	−40	30	0	−30	23
400	500	0	−45	34	0	−35	26
500	630	0	−50	38	0	−40	30
630	800	0	−75	56	0	−50	–
800	1 000	0	−100	75	0	–	–
1 000	1 250	0	−125	95	0	–	–

Outside diameter tolerances for housing locating washers to ISO 199, DIN 620-3 Tolerances in μm

D		PN (normal tolerance), P6 and P5			P4		
mm		Δ_{Dmp} Deviation		V_{Dp}	Δ_{Dmp} Deviation		V_{Dp}
over	incl.	upper	lower	max.	upper	lower	max.
10	18	0	−11	8	0	−7	5
18	30	0	−13	10	0	−8	6
30	50	0	−16	12	0	−9	7
50	80	0	−19	14	0	−11	8
80	120	0	−22	17	0	−13	10
120	180	0	−25	19	0	−15	11
180	250	0	−30	23	0	−20	15
250	315	0	−35	26	0	−25	19
315	400	0	−40	30	0	−28	21
400	500	0	−45	34	0	−33	25
500	630	0	−50	38	0	−38	29
630	800	0	−75	55	0	−45	34
800	1 000	0	−100	75	–	–	–
1 000	1 250	0	−125	75	–	–	–
1 250	1 600	0	−160	120	–	–	–

Variation in washer thickness for shaft and housing locating washers Tolerances in μm

d mm		S_i				S_e
		PN (normal tolerance)	P6	P5	P4	PN (normal tolerance), P6, P5, P4
over	incl.	max.	max.	max.	max.	
–	18	10	5	3	2	Identical to S_i for the shaft locating washer of the corresponding bearing
18	30	10	5	3	2	
30	50	10	6	3	2	
50	80	10	7	4	3	
80	120	15	8	4	3	
120	180	15	9	5	4	
180	250	20	10	5	4	
250	315	25	13	7	5	
315	400	30	15	7	5	
400	500	30	18	9	6	
500	630	35	21	11	7	
630	800	40	25	13	8	
800	1 000	45	30	15	8	
1 000	1 250	50	35	18	9	

Tolerances for nominal bearing height

These tolerances are given in the table on page 135.
The corresponding dimensional symbols are shown in *Figure 14*.

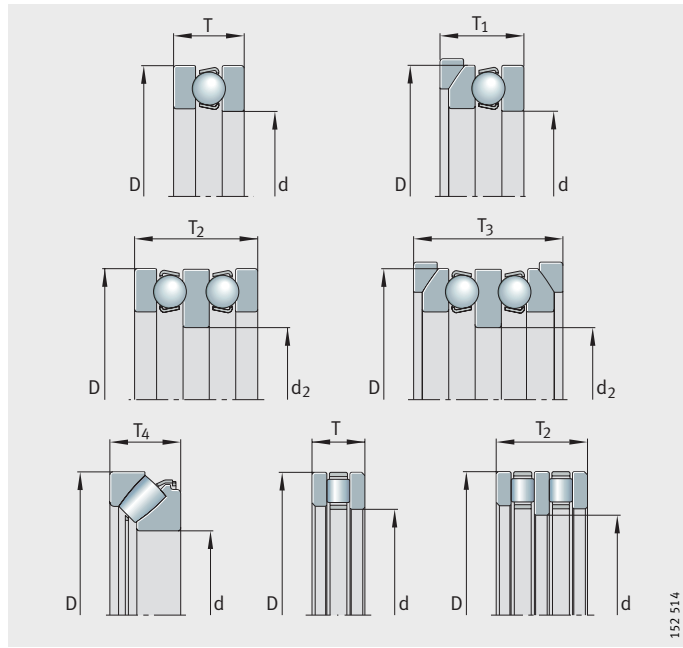


Figure 14
Tolerances
for nominal bearing height

Tolerances for nominal bearing height
Tolerances in μm

d mm		T Deviation		T_1 Deviation		T_2 Deviation	
over	incl.	upper	lower	upper	lower	upper	lower
–	30	20	–250	100	–250	150	–400
30	50	20	–250	100	–250	150	–400
50	80	20	–300	100	–300	150	–500
80	120	25	–300	150	–300	200	–500
120	180	25	–400	150	–400	200	–600
180	250	30	–400	150	–400	250	–600
250	315	40	–400	200	–400	350	–700
315	400	40	–500	200	–500	350	–700
400	500	50	–500	300	–500	400	–900
500	630	60	–600	350	–600	500	–1 100
630	800	70	–750	400	–750	600	–1 300
800	1 000	80	–1 000	450	–1 000	700	–1 500
1 000	1 250	100	–1 400	500	–1 400	900	–1 800

Tolerance for nominal bearing height
continued
Tolerances in μm

d mm		T_3 Deviation		T_4 Deviation	
over	incl.	upper	lower	upper	lower
–	30	300	–400	20	–300
30	50	300	–400	20	–300
50	80	300	–500	20	–400
80	120	400	–500	25	–400
120	180	400	–600	25	–500
180	250	500	–600	30	–500
250	315	600	–700	40	–700
315	400	600	–700	40	–700
400	500	750	–900	50	–900
500	630	900	–1 100	60	–1 200
630	800	1 100	–1 300	70	–1 400
800	1 000	1 300	–1 500	80	–1 800
1 000	1 250	1 600	–1 800	100	–2 400

Chamfer dimensions

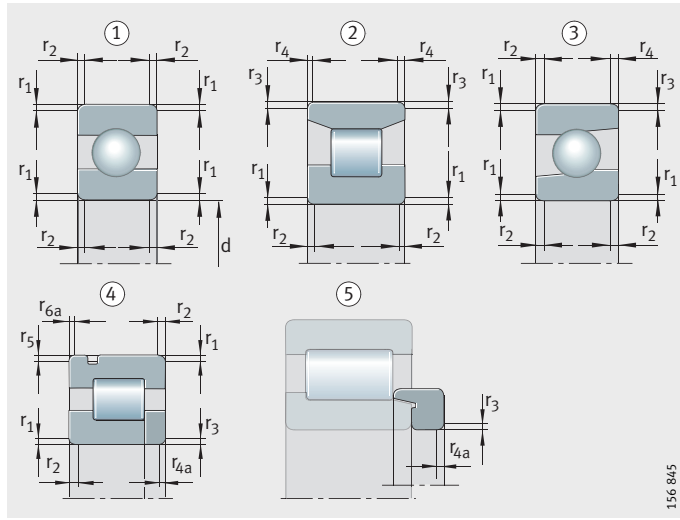
The chamfer dimensions correspond to DIN 620-6.

Radial bearings, excluding tapered roller bearings

The minimum and maximum values for the bearings are given in the table Limit values for chamfer dimensions to DIN 620-6, page 137.

For drawn cup needle roller bearings with open ends HK, drawn cup needle roller bearings with closed end BK and aligning needle roller bearings PNA and RPNA, the chamfer dimensions deviate from DIN 620-6. The lower limit values for r are given in the dimension tables.

Chamfer dimensions for tapered roller bearings: see page 138, for axial bearings see page 139.



① Symmetrical ring cross-section with identical chamfers on both rings
② Symmetrical ring cross-section with different chamfers on both rings
③ Asymmetrical ring cross-section
④ Annular slot on outer ring, bearing with rib washer
⑤ L-section ring

Figure 15
Chamfer dimensions for radial bearings excluding tapered roller bearings

Limit values for chamfer dimensions to DIN 620-6

$r^{1)}$	d		r_1 to r_{6a}	r_1, r_3, r_5	r_2, r_4, r_6 [2)]	r_{4a}, r_{6a}
	over	incl.	min.	max.	max.	max.
mm	mm	mm	mm	mm	mm	mm
0,05	–	–	0,05	0,1	0,2	0,1
0,08	–	–	0,08	0,16	0,3	0,16
0,1	–	–	0,1	0,2	0,4	0,2
0,15	–	–	0,15	0,3	0,6	0,3
0,2	–	–	0,2	0,5	0,8	0,5
0,3	–	40	0,3	0,6	1	0,8
	40	–	0,3	0,8	1	0,8
0,5	–	40	0,5	1	2	1,5
	40	–	0,5	1,3	2	1,5
0,6	–	40	0,6	1	2	1,5
	40	–	0,6	1,3	2	1,5
1	–	50	1	1,5	3	2,2
	50	–	1	1,9	3	2,2
1,1	–	120	1,1	2	3,5	2,7
	120	–	1,1	2,5	4	2,7
1,5	–	120	1,5	2,3	4	3,5
	120	–	1,5	3	5	3,5
2	–	80	2	3	4,5	4
	80	220	2	3,5	5	4
	220	–	2	3,8	6	4
2,1	–	280	2,1	4	6,5	4,5
	280	–	2,1	4,5	7	4,5
2,5	–	100	2,5	3,8	6	5
	100	280	2,5	4,5	6	5
	280	–	2,5	5	7	5
3	–	280	3	5	8	5,5
	280	–	3	5,5	8	5,5
4	–	–	4	6,5	9	6,5
5	–	–	5	8	10	8
6	–	–	6	10	13	10
7,5	–	–	7,5	12,5	17	12,5
9,5	–	–	9,5	15	19	15
12	–	–	12	18	24	18
15	–	–	15	21	30	21
19	–	–	19	25	38	25

1) The nominal chamfer dimension r is identical to the smallest permissible chamfer dimension r_{min}.

2) For bearings with a width of 2 mm or less, the values for r_1 apply.

Tapered roller bearings

The minimum and maximum values for metric tapered roller bearings are given in the table.

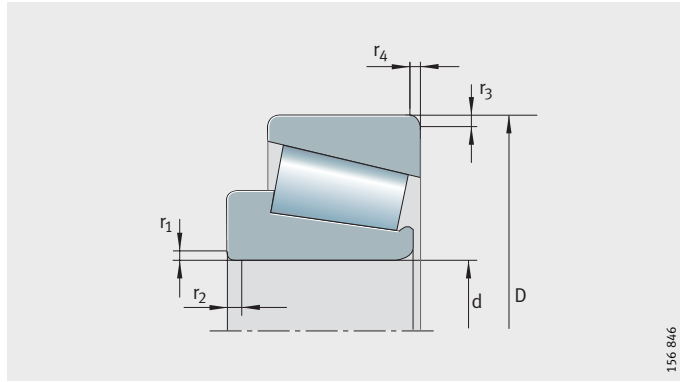


Figure 16
Chamfer dimensions
for metric tapered roller bearings

Limit values for chamfer dimensions

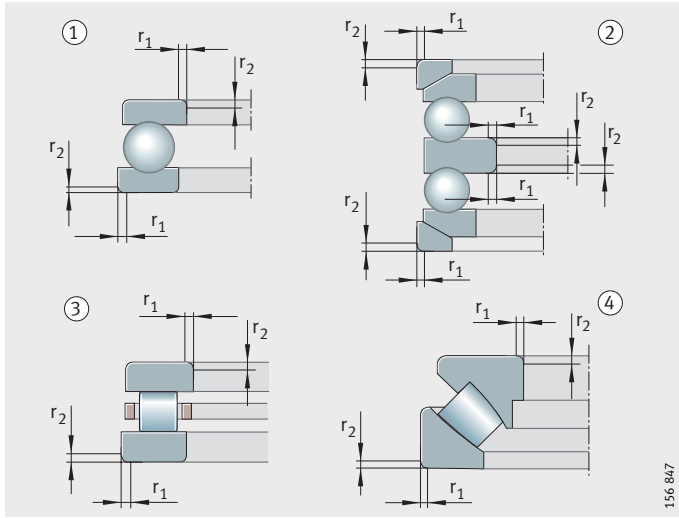
$r^{1)}$	d, D		r_1 to r_4	r_1, r_3	r_2, r_4
	over	incl.	min.	max.	max.
mm	mm	mm	mm	mm	mm
0,3	–	40	0,3	0,7	1,4
	40	–	0,3	0,9	1,6
0,6	–	40	0,6	1,1	1,7
	40	–	0,6	1,3	2
1	–	50	1	1,6	2,5
	50	–	1	1,9	3
1,5	–	120	1,5	2,3	3
	120	250	1,5	2,8	3,5
	250	–	1,5	3,5	4
2	–	120	2	2,8	4
	120	250	2	3,5	4,5
	250	–	2	4	5
2,5	–	120	2,5	3,5	5
	120	250	2,5	4	5,5
	250	–	2,5	4,5	6
3	–	120	3	4	5,5
	120	250	3	4,5	6,5
	250	400	3	5	7
	400	–	3	5,5	7,5
4	–	120	4	5	7
	120	250	4	5,5	7,5
	250	400	4	6	8
	400	–	4	6,5	8,5
5	–	180	5	6,5	8
	180	–	5	7,5	9
6	–	180	6	7,5	10
	180	–	6	9	11

1) The nominal chamfer dimension r is identical to the smallest permissible chamfer dimension r_{min}.

Axial bearings

The minimum and maximum values for the bearings are given in the table. The table corresponds to DIN 620-6.

For axial deep groove ball bearings, the tolerances for the chamfer dimensions are identical in both axial and radial directions.



① Single direction axial deep groove ball bearing with flat housing locating washer

② Double direction axial deep groove ball bearing with crowned housing locating washers and seating washers

③ Single direction axial cylindrical roller bearing

④ Single direction axial spherical roller bearing

Figure 17
Chamfer dimensions for axial bearings

Limit values for chamfer dimensions

$r^{1)}$	r_1, r_2	
	min.	max.
mm	mm	mm
0,05	0,05	0,1
0,08	0,08	0,16
0,1	0,1	0,2
0,15	0,15	0,3
0,2	0,2	0,5
0,3	0,3	0,8
0,6	0,6	1,5
1	1	2,2
1,1	1,1	2,7
1,5	1,5	3,5
2	2	4
2,1	2,1	4,5
3	3	5,5
4	4	6,5
5	5	8
6	6	10
7,5	7,5	12,5
9,5	9,5	15
12	12	18
15	15	21
19	19	25

1) The nominal chamfer dimension r is identical to the smallest permissible chamfer dimension r_{min}.

Design of bearing arrangements

Selection of bearing arrangement

The guidance and support of a rotating shaft requires at least two bearings arranged at a certain distance from each other. Depending on the application, a decision is made between a locating/non-locating bearing arrangement, an adjusted bearing arrangement and a floating bearing arrangement.

Locating/non-locating bearing arrangement

On a shaft supported by two radial bearings, the distances between the bearing seats on the shaft and in the housing frequently do not coincide as a result of manufacturing tolerances. The distances may also change as a result of temperature increases during operation. These differences in distance are compensated in the non-locating bearing. Examples of locating/non-locating bearing arrangements: see *Figure 1*, page 142 to *Figure 4*, page 143.

Non-locating bearings

Ideal non-locating bearings are cylindrical roller bearings with cage N and NU or needle roller bearings, *Figure 1* ②, ④, page 142. In these bearings, the roller and cage assembly can be displaced on the raceway of the bearing ring without ribs.

All other bearing types, for example deep groove ball bearings and spherical roller bearings, can only act as non-locating bearings if one bearing ring has a fit that allows displacement, *Figure 2*, page 142. The bearing ring subjected to point load therefore has a loose fit; this is normally the outer ring, see Conditions of rotation, page 148.

Locating bearings

The locating bearing guides the shaft in an axial direction and supports external axial forces. In order to prevent axial stresses, shafts with more than two bearings have only one locating bearing. The type of bearing selected as a locating bearing depends on the magnitude of the axial forces and the accuracy with which the shafts must be axially guided.

A double row angular contact ball bearing, *Figure 3* ①, page 142, for example, will give closer axial guidance than a deep groove ball bearing or a spherical roller bearing. A pair of symmetrically arranged angular contact ball bearings or tapered roller bearings, *Figure 4*, page 143, used as locating bearings will provide extremely close axial guidance.

Angular contact ball bearings of the universal design, *Figure 5*, page 143, give particular advantages. The bearings can be fitted in pairs in any O or X arrangement without shims. Angular contact ball bearings of the universal design are matched such that, in an X or O arrangement, they have a low axial internal clearance (design UA), zero clearance (UO) or slight preload (UL).

Spindle bearings of the universal design UL, *Figure 6*, page 143, have slight preload when fitted in an X or O arrangement (designs with higher preload are available by agreement).

In gearboxes, a four point contact bearing is sometimes fitted directly adjacent to a cylindrical roller bearing to give a locating bearing arrangement, *Figure 3* ③, page 142. The four point contact bearing, without radial support of the outer ring, can only support axial forces. The radial force is supported by the cylindrical roller bearing.

If a lower axial force is present, a cylindrical roller bearing with cage NUP can also be used as a locating bearing, *Figure 4* ③, page 143.

No adjustment or setting work with matched pairs of tapered roller bearings

Fitting is also made easier with a matched pair of tapered roller bearings as a locating bearing (313..-N11CA), *Figure 7* ②, page 143. They are matched with appropriate axial internal clearance so that no adjustment or setting work is required.

Examples of locating/non-locating bearing arrangements

Deep groove ball bearing
① Locating bearing
Cylindrical roller bearing NU
② Non-locating bearing
Axial angular contact ball bearing ZKLN
③ Locating bearing
Needle roller bearing NKIS
④ Non-locating bearing

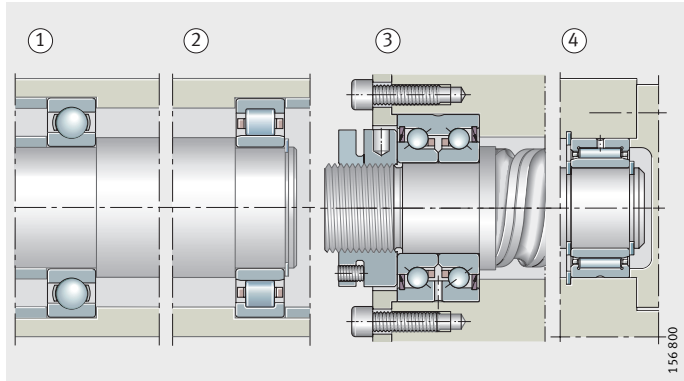


Figure 1
Locating/non-locating bearing arrangements

Deep groove ball bearings
① Locating bearing
② Non-locating bearing
Spherical roller bearings
③ Locating bearing
④ Non-locating bearing

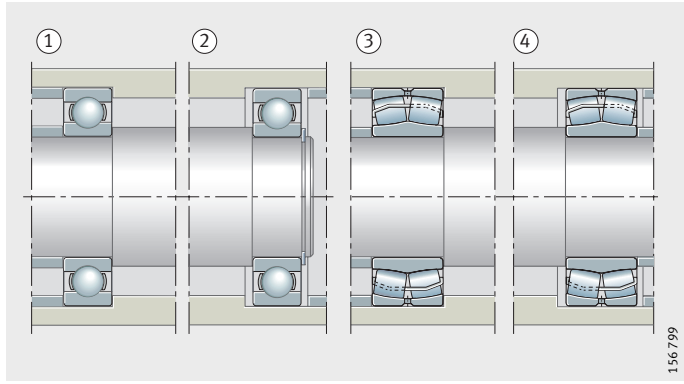


Figure 2
Locating/non-locating bearing arrangements

Double row angular contact ball bearing
① Locating bearing
Cylindrical roller bearing NU
② Non-locating bearing
Four point contact bearing and cylindrical roller bearing
③ Locating bearing
Cylindrical roller bearing NU
④ Non-locating bearing

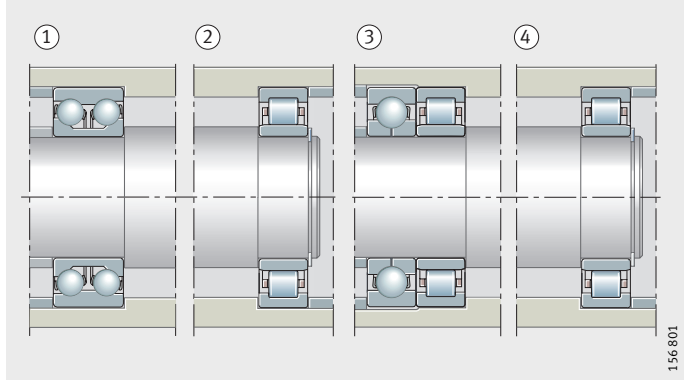
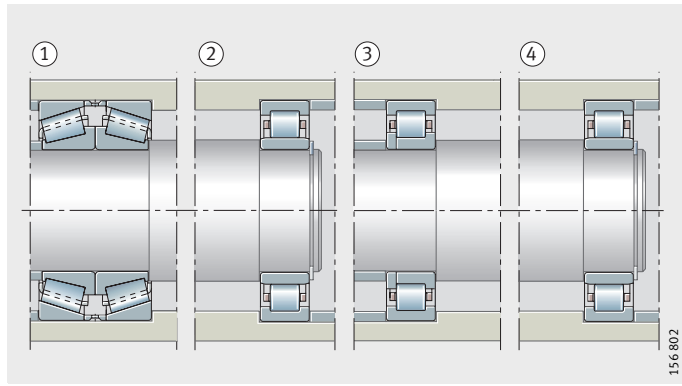


Figure 3
Locating/non-locating bearing arrangements

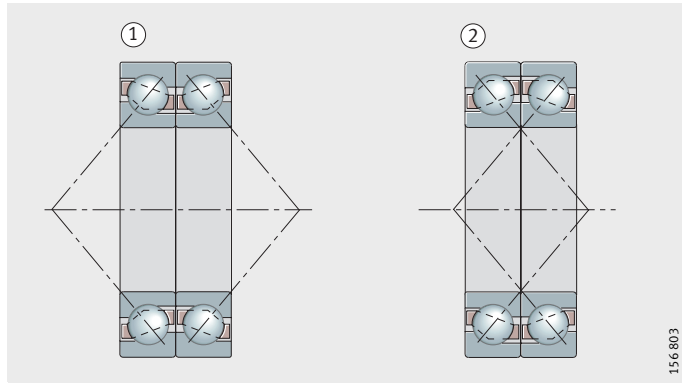
Two tapered roller bearings
① Locating bearing
Cylindrical roller bearing NU
② Non-locating bearing
Cylindrical roller bearing NUP
③ Locating bearing
Cylindrical roller bearing NU
④ Non-locating bearing

Figure 4
Locating/non-locating bearing arrangements



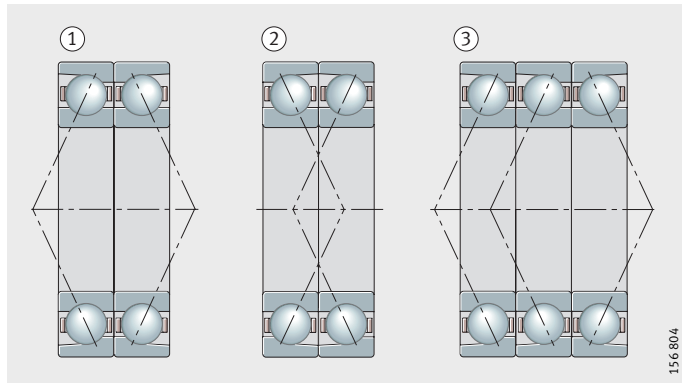
Pair of angular contact ball bearings of universal design
① O arrangement
② X arrangement

Figure 5
Locating bearing arrangements



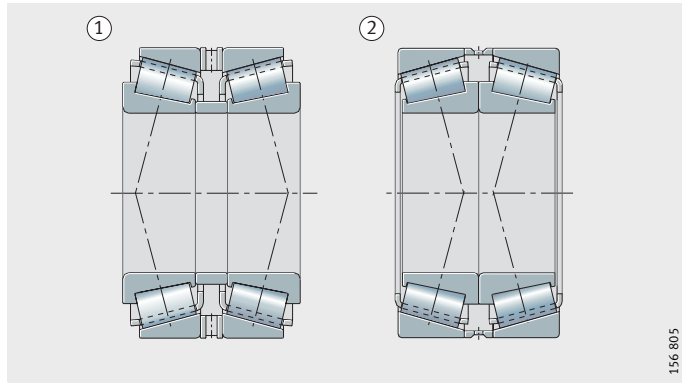
Spindle bearings of universal design
① O arrangement
② X arrangement
③ Tandem O arrangement

Figure 6
Locating bearing arrangements



Pair of tapered roller bearings
① O arrangement
② X arrangement

Figure 7
Locating bearing arrangements



Adjusted bearing arrangement

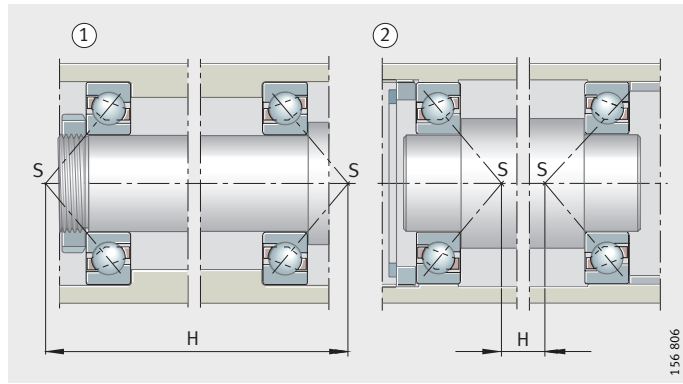
These bearing arrangements normally consist of two symmetrically arranged angular contact ball bearings or tapered roller bearings, *Figure 8*. During fitting, one bearing ring is displaced on its seat until the bearing arrangement achieves the required clearance or the necessary preload.

Area of application

Due to this adjustment facility, the adjusted bearing arrangement is particularly suitable where close guidance is required, for example in pinion bearing arrangements with spiral toothed bevel gears and spindle bearing arrangements in machine tools.

X and O arrangements

A fundamental distinction is drawn between the O arrangement, *Figure 8* ①, and the X arrangement, *Figure 8* ②, of the bearings. In the O arrangement, the cones and their apexes S formed by the contact lines point outwards; in the X arrangement, the cones point inwards. The support base H, in other words the distance between the apexes of the contact cones, is larger in the O arrangement than in the X arrangement. The O arrangement therefore gives the lower tilting clearance.

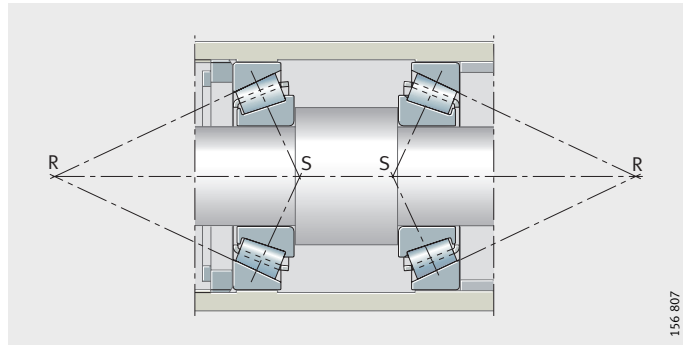


Angular contact ball bearings
① O arrangement
② X arrangement
S = apexes of the contact cones
H = support distance

Figure 8
Adjusted bearing arrangement

Influence of thermal expansion in X and O arrangements

When setting the axial internal clearance, thermal expansion must be taken into consideration. In the X arrangement, *Figure 9*, a temperature differential between the shaft and housing always leads to a reduction in the internal clearance (assuming the following preconditions: shaft and housing of identical material, inner ring and complete shaft at identical temperature, outer ring and complete housing at identical temperature).

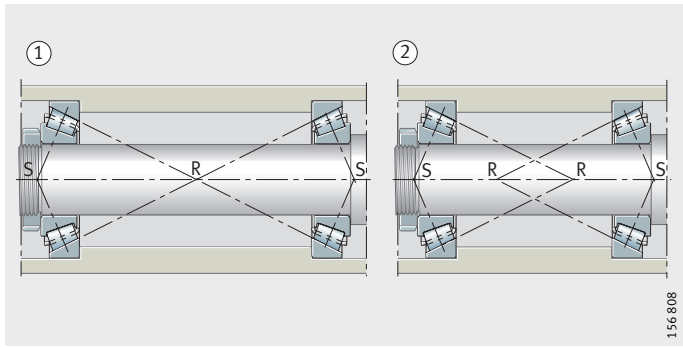


Tapered roller bearings in X arrangement
S = apexes of the contact cones
R = roller cone apexes

Figure 9
Adjusted bearing arrangement

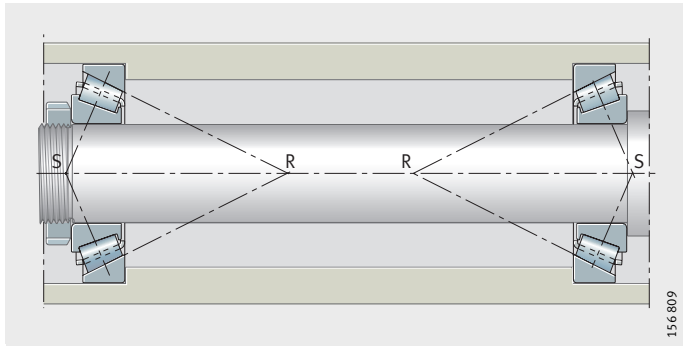
In the O arrangement, a distinction is drawn between three cases:

- The roller cone apexes R, i.e. the intersection points of the extended outer ring raceway with the bearing axis, coincide: the internal clearance set is maintained, *Figure 10* ①
- The roller cones overlap and there is a short distance between the bearings: the axial internal clearance is reduced, *Figure 10* ②
- The roller cones do not meet and there is a large distance between the bearings: the axial internal clearance is increased, *Figure 11*.



Tapered roller bearings in O arrangement
① Intersection points coincide
② Intersection points overlap
S = apexes of the contact cones
R = roller cone apexes

Figure 10
Adjusted bearing arrangement

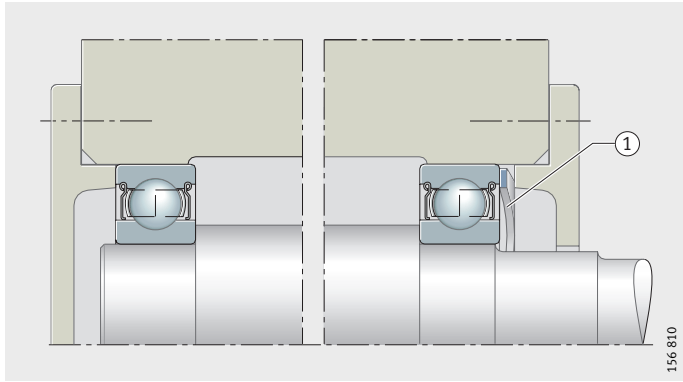


Tapered roller bearings in O arrangement, without overlapping of roller cone apexes
S = apexes of the contact cones
R = roller cone apexes

Figure 11
Adjusted bearing arrangement

Elastic adjustment

Adjusted bearing arrangements can also be achieved by preloading using springs, *Figure 12* ①. The elastic adjustment method compensates for thermal expansion. It can also be used where bearing arrangements are at risk of vibration while stationary.



Deep groove ball bearing preloaded by curved spring washer
① Curved spring washer

Figure 12
Adjusted bearing arrangement

Floating bearing arrangement

The floating bearing arrangement is an economical solution where close axial guidance of the shaft is not required, *Figure 13*. The construction is similar to that of the adjusted bearing arrangement.

In the floating bearing arrangement, however, the shaft can be displaced in relation to the housing to the extent of the axial clearance s. The value s is defined as a function of the required guidance accuracy such that the bearings are not axially clamped even under unfavourable thermal conditions.

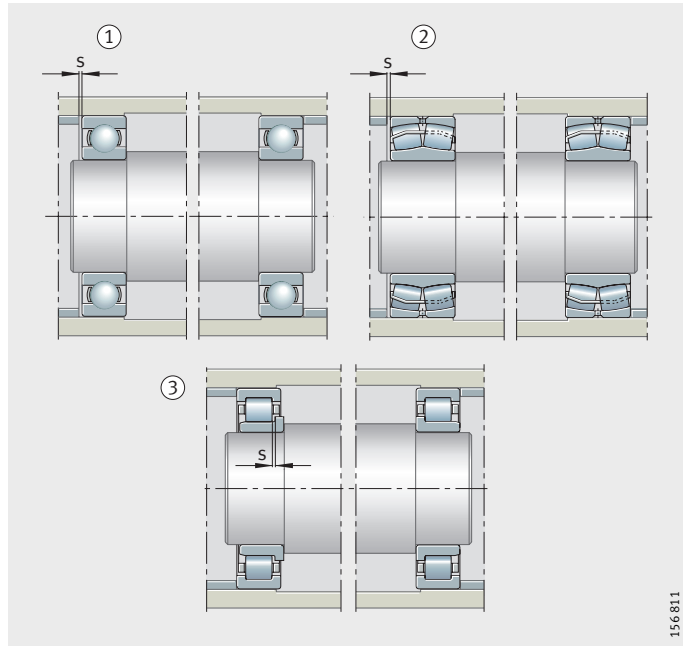
Suitable bearings

Suitable bearing types for the floating bearing arrangement include deep groove ball bearings, self-aligning ball bearings and spherical roller bearings.

In each of the bearings one ring, usually an outer ring, has a fit that allows displacement.

In floating bearing arrangements and cylindrical roller bearings with cage NJ, the length compensation takes place within the bearings. The inner and outer rings can have tight fits, *Figure 13* ③.

Tapered roller bearings and angular contact ball bearings are not suitable for a floating bearing arrangement, since they must be adjusted in order to run correctly.



① Two deep groove ball bearings
② Two spherical roller bearings
③ Two cylindrical roller bearings NJ
s = axial clearance

Figure 13
Floating bearing arrangements

Fits

Rolling bearings are located on the shaft and in the housing in a radial, axial and tangential direction in accordance with their function. Radial and tangential location is normally achieved by force locking, i. e. by tight fits on the bearing rings.
Axial location of the bearings is generally by geometrical locking.

Criteria for selection of fits

The following must be taken into consideration in the selection of fits:

- The bearing rings must be well supported on their circumference in order to allow full utilisation of the load carrying capacity of the bearing
- The rings must not creep on their mating parts, otherwise the seats will be damaged
- One ring of the non-locating bearing must adapt to changes in the length of the shaft and housing and must therefore be capable of axial displacement
- The bearings must be easy to fit and dismantle.

Good support of the bearing rings on their circumference requires rigid seating. The requirement that rings must not creep on their mating parts also requires rigid seating. If non-separable bearings must be fitted and dismantled, a tight fit can only be achieved for one bearing ring.

In cylindrical roller bearings N, NU and needle roller bearings, both rings can have tight fits, since the length compensation takes place within the bearing and since the rings can be fitted separately.

With tight fits and a temperature differential between the inner and outer ring, the radial internal clearance of the bearing is reduced. This must be taken into consideration when selecting the internal clearance.

If materials other than cast iron or steel are used for the adjacent construction, the modulus of elasticity and the differing coefficients of thermal expansion of the materials must also be be taken into consideration to achieve rigid seating.

For aluminium housings, thin-walled housings and hollow shafts, a closer fit should be selected if necessary in order to achieve the same force locking as with cast iron, steel or solid shafts.

Higher loads, especially shocks, require a fit with larger interference and narrower geometrical tolerances.

Seats for axial bearings

Axial bearings, which support axial loads only, must not be guided radially (with the exception of axial cylindrical roller bearings which have a degree of freedom in the radial direction due to flat raceways).
In the case of groove-shaped raceways this is not present and must be achieved by a loose seat for the stationary washer.
A rigid seat is normally selected for the rotating washer.

Where axial bearings also support radial forces, such as in axial spherical roller bearings, fits should be selected in the same way as for radial bearings.

The contact surfaces of the mating parts must be perpendicular to the axis of rotation (axial runout tolerance to IT5 or better), in order to ensure uniform load distribution over all the rolling elements.

Conditions of rotation

The conditions of rotation indicate the motion of one bearing ring with respect to the load direction and are expressed as either circumferential load or point load as shown in the table.

Point load

If the ring remains stationary relative to the load direction, there are no forces that displace the ring relative to its seating surface. This type of load is described as point load.

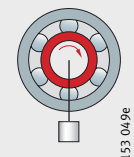
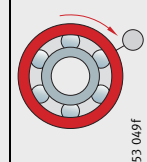
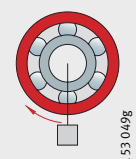
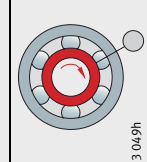
There is no risk that the seating surface will be damaged and a loose fit is possible.

Circumferential load

If forces are present that displace the ring relative to its seating surface, every point on the raceway is subjected to load over the course of one revolution of the bearing. A load with this characteristic is described as a circumferential load.

As damage to the bearing seating surface can occur, a tight fit should be used.

Conditions of rotation

Conditions of motion	Example	Schematic	Load case	Fit
Rotating inner ring Stationary outer ring Constant load direction	Shaft with weight load		Circum-ferential load on inner ring	Inner ring: tight fit necessary Outer ring: loose fit permissible
Stationary inner ring Rotating outer ring Load direction rotates with outer ring	Hub bearing arrangement with significant imbalance		and Point load on outer ring	
Stationary inner ring Rotating outer ring Constant load direction	Passenger car front wheel bearing (hub bearing arrangement)		Point load on inner ring	Inner ring: loose fit permissible Outer ring: tight fit necessary
Rotating inner ring Stationary outer ring Load direction rotates with inner ring	Centrifuge, vibrating screen		and Circum-ferential load on outer ring	

Shaft and housing tolerances

The fit is determined by the ISO tolerances for shafts and housings (ISO 286) in conjunction with the tolerances Δ_{dmp} for the bore and Δ_{Dmp} for the outside diameter of the bearings (DIN 620).

Tolerance zones

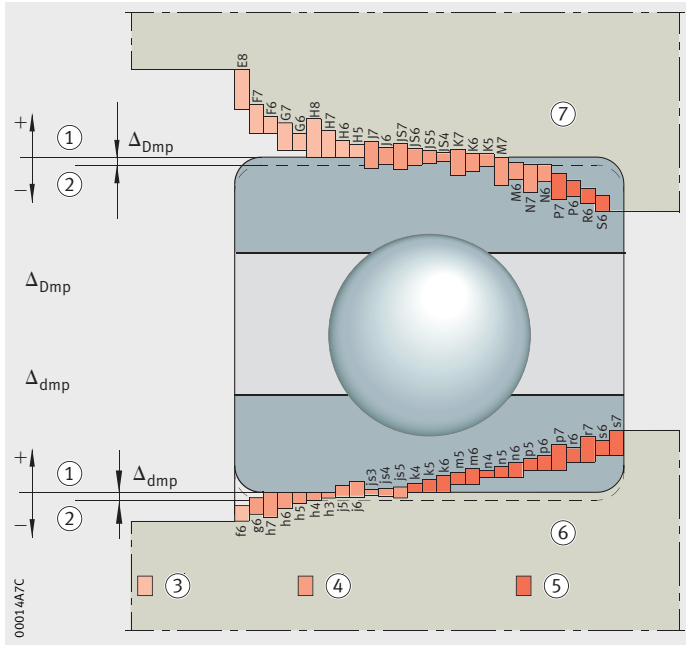
The ISO tolerances are defined in the form of tolerance zones. They are determined by their position relative to the zero line (= tolerance position) and their size (= tolerance grade, see ISO 286). The tolerance position is indicated by letters (upper case for housings, lower case for shafts).
For a schematic representation of the most common rolling bearing fits, see *Figure 14*.

Reference to tables of shaft and housing tolerances

The tables on pages 150 to 152 contain recommendations for the selection of shaft and housing tolerances that are valid for normal fitting and operating conditions.

Deviations are possible if particular requirements apply, for example in relation to running accuracy, smooth running or operating temperature. Increased running accuracies thus require closer tolerances such as tolerance grade 5 instead of 6.
If the inner ring is warmer than the shaft during operation, the seating may loosen to an impermissible extent. A tighter fit must then be selected, for example m6 instead of k6.

In such cases, the question of fits can only be resolved by a compromise. The individual requirements must be weighed against each other and those fulfilled that give the best overall solution.



① Zero line
② Nominal diameter
③ Loose fit
④ Transition fit
⑤ Tight fit
⑥ Shaft diameter
⑦ Housing bore
Δ_{Dmp} = tolerance for bearing outside diameter
Δ_{dmp} = tolerance for bearing bore

Figure 14
Fits for rolling bearings

Shaft tolerances for radial bearings with cylindrical bore

Condition of rotation	Bearing type	Shaft diameter mm	Displacement facility Load	Tolerance zone
Point load on inner ring	Ball bearings, roller bearings	All sizes	Inner ring easily displaced	g6 (g5)
			Inner ring not easily displaced, angular contact ball bearings and tapered roller bearings with adjusted inner ring	h6 (j6)
	Needle roller bearings	All sizes	Non-locating bearing	h6 (g6)[1]
Circum-ferential load on inner ring or indeter-minate load direction	Ball bearings	up to 50	Normal loads[2]	j6 (j5)
		50 to 100	Low loads[3]	j6 (j5)
			Normal and high loads[4]	k6 (k5)
		100 to 200	Low loads[2]	k6 (m6)
			Normal and high loads[5]	m6 (m5)
		over 200	Low loads	m6 (m5)
			Normal and high loads	n6 (n5)
	Roller bearings	up to 60	Low loads	j6 (j5)
			Normal and high loads	k6 (k5)
		60 to 200	Low loads	k6 (k5)
			Normal loads	m6 (m5)
			High loads	n6 (n5)
		200 to 500	Normal loads	m6 (n6)
			High loads, shocks	p6
		over 500	Normal loads	n6 (p6)
			High loads	p6
	Needle roller bearings	up to 50	Low loads	k6
			Normal and high loads	m6
		50 to 120	Low loads	m6
			Normal and high loads	n6
		120 to 250	Low loads	n6
			Normal and high loads	p6
		250 to 400	Low loads	p6
			Normal and high loads	r6
		400 to 500	Low loads	r6
			Normal and high loads	s6
		over 500	Low loads	r6
			Normal and high loads	s6

1) For easier fitting.
2) $C/P > 10$
3) $C/P > 12$
4) $C/P < 12$
5) $C/P < 10$

Shaft tolerances for axial bearings

Load	Bearing type	Shaft diameter	Operating conditions	Tolerance zone
Axial load	Axial deep groove ball bearings	All sizes	–	j6
	Axial deep groove ball bearings, double direction		–	k6
	Axial cylindrical roller bearings with shaft locating washer		–	h6 (j6)
	Axial cylindrical roller and cage assemblies		–	h8
Combined load	Axial spherical roller bearings	All sizes	Point load on shaft locating washer	j6
		up to 200 mm	Circumferential load on shaft locating washer	j6 (k6)
		over 200 mm		k6 (m6)

Housing tolerances radial bearings

Condition of rotation	Displacement facility Load	Operating conditions	Tolerance zone
Point load on outer ring	Outer ring easily displaced, housing unsplit	The tolerance grade is determined by the running accuracy required	H7 (H6)[1]
	Outer ring easily displaced, housing split		H8 (H7)
	Outer ring not easily displaced, housing unsplit	High running accuracy required	H6 (J6)
	Outer ring not easily displaced, angular contact ball bearings and tapered roller bearings with adjusted outer ring	Normal running accuracy	H7 (J7)
	Outer ring easily displaced	Heat input via shaft	G7[2]
Circum-ferential load on outer ring or indeter-minate load direction	Low loads, outer ring cannot be displaced	For high running accuracy requirements: K6, M6, N6 and P6	K7 (K6)
	Normal loads, shocks, outer ring cannot be displaced		M7 (M6)
	High loads, shocks ($C/P < 6$), outer ring cannot be displaced		N7 (N6)
	High loads, severe shocks, thin-walled housing, outer ring cannot be displaced		P7 (P6)

1) G7 for housings made from flake graphite cast iron GG, if bearing outside diameter $D > 250$ mm and temperature difference between outer ring and housing > 10 K.

2) F7 for housings made from flake graphite cast iron GG, if bearing outside diameter $D > 250$ mm and temperature difference between outer ring and housing > 10 K.

Housing tolerances for axial bearings

Load	Bearing type	Operating conditions	Tolerance zone
Axial load	Axial deep groove ball bearings	Normal running accuracy High running accuracy	E8 H6
	Axial cylindrical roller bearings with housing locating washer	–	H7 (K7)
	Axial cylindrical roller and cage assemblies	–	H10
	Axial spherical roller bearings	Normal loads High loads	E8 G7
Combined loads Point load on housing locating washer	Axial spherical roller bearings	–	H7
Combined loads Circumferential load on housing locating washer	Axial spherical roller bearings	–	K7

Tables of shaft and housing fits

The numerical values for the fits (page 154 to page 167) are valid for solid steel shafts and cast iron housings. In the table header, below the nominal diameters, are the normal tolerances for the bore or outside diameters of radial bearings (excluding tapered roller bearings). Below these are the deviations for the most important tolerance zones for fitting of rolling bearings.

Shaft fits

In each cell are five numbers in accordance with the following scheme, for example for shaft ∅40j5:

Example: table entry for shaft fit

Shaft deviation in µm		Fit interference or fit clearance in µm	
Maximum material value	+6	**18**[2)]	Interference or fit clearance if the maximum material values are combined
		10[1)2)]	Probable interference or fit clearance
Minimum material value	−5	5[3)]	Interference or fit clearance if the minimum material values are combined

1) The probable interference or fit clearance is the value obtained if the actual dimensions are one third away from the maximum material values.

2) Values printed in bold type indicate fit interference.

3) Values printed in regular type indicate fit clearance.

Shaft fits: see tables from page 154.

Housing fits

In each cell are five numbers in accordance with the following scheme, for example for a housing ∅100 K6:

Example: table entry for housing fit

Housing deviation in µm		Fit interference or fit clearance in µm	
Minimum material value	+4	**18**[2)]	Interference or fit clearance if the maximum material values are combined
		6[1)2)]	Probable interference or fit clearance
Maximum material value	−18	19[3)]	Interference or fit clearance if the minimum material values are combined

1) The probable interference or fit clearance is the value obtained if the actual dimensions are one third away from the maximum material values.

2) Values printed in bold type indicate fit interference.

3) Values printed in regular type indicate fit clearance.

Housing fits: see page 163 to page 167.

Shaft fits

Nominal shaft diameter in mm					
over incl.	**3** **6**	**6** **10**	**10** **18**	**18** **30**	**30** **50**
Deviation of bearing bore diameter in µm (normal tolerance)					
Δ_{dmp}	0 −8	0 −8	0 −8	0 −10	0 −12
Shaft deviation, fit interference or fit clearance in µm					
g5	−4 −9 | **4** **0** 9	−5 −11 | **3** 2 11	−6 −14 | **2** 3 14	−7 −16 | **3** 3 16	−9 −20 | **3** 5 20
g6	−4 −12 | **4** 1 12	−5 −14 | **3** 3 14	−6 −17 | **2** 4 17	−7 −20 | **3** 5 20	−9 −25 | **3** 6 25
h5	0 −5 | **8** **4** 5	0 −6 | **8** **3** 6	0 −8 | **8** **3** 8	0 −9 | **10** **4** 9	0 −11 | **12** **4** 11
h6	0 −8 | **8** **3** 8	0 −9 | **8** **2** 9	0 −11 | **8** **2** 11	0 −13 | **10** **2** 13	0 −16 | **12** **3** 16
j5	+3 −2 | **11** **7** 2	+4 −2 | **12** **7** 2	+5 −3 | **13** **8** 3	+5 −4 | **15** **9** 4	+6 −5 | **18** **10** 5
j6	+6 −2 | **14** **8** 2	+7 −2 | **15** **9** 2	+8 −3 | **16** **10** 3	+9 −4 | **19** **11** 4	+11 −5 | **23** **14** 5
js5	+2,5 −2,5 | **11** **6** 3	+3 −3 | **11** **6** 3	+4 −4 | **12** **6** 4	+4,5 −4,5 | **15** **9** 5	+5,5 −5,5 | **18** **10** 6
js6	+4 −4 | **12** **7** 4	+4,5 −4,5 | **13** **7** 5	+5,5 −5,5 | **14** **8** 6	+6,5 −6,5 | **17** **9** 7	+8 −8 | **20** **11** 8
k5	+6 +1 | **14** **9** **1**	+7 +1 | **15** **10** **1**	+9 +1 | **17** **12** **1**	+11 +2 | **21** **15** **2**	+13 +2 | **25** **17** **2**
k6	+9 +1 | **17** **11** **1**	+10 +1 | **18** **12** **1**	+12 +1 | **20** **14** **1**	+15 +2 | **25** **17** **2**	+18 +2 | **30** **21** **2**
m5	+9 +4 | **17** **13** **4**	+12 +6 | **20** **15** **6**	+15 +7 | **23** **18** **7**	+17 +8 | **27** **21** **8**	+20 +9 | **32** **24** **9**
m6	+12 +4 | **20** **15** **4**	+15 +6 | **23** **17** **6**	+18 +7 | **26** **20** **7**	+21 +8 | **31** **23** **8**	+25 +9 | **37** **27** **9**

50 65	65 80	80 100	100 120	120 140	140 160	160 180	180 200	200 225	225 250
0 −15	0 −15	0 −20	0 −20	0 −25	0 −25	0 −25	0 −30	0 −30	0 −30
−10 −23 **5** 4 23	−10 −23 **5** 4 23	−12 −27 **8** 4 27	−12 −27 **8** 4 27	−14 −32 **11** 3 32	−14 −32 **11** 3 32	−14 −32 **11** 3 32	−15 −35 **15** 2 35	−15 −35 **15** 2 35	−15 −35 **15** 2 35
−10 −29 **5** 6 29	−10 −29 **5** 6 29	−12 −34 **8** 6 34	−12 −34 **8** 6 34	−14 −39 **11** 6 39	−14 −39 **11** 6 39	−14 −39 **11** 6 39	−15 −44 **15** 5 44	−15 −44 **15** 5 44	−15 −44 **15** 5 44
0 −13 **15** **6** 13	0 −13 **15** **6** 13	0 −15 **20** **8** 15	0 −15 **20** **8** 15	0 −18 **25** **11** 18	0 −18 **25** **11** 18	0 −18 **25** **11** 18	0 −20 **30** **13** 20	0 −20 **30** **13** 20	0 −20 **30** **13** 20
0 −19 **15** **4** 19	0 −19 **15** **4** 19	0 −22 **20** **6** 22	0 −22 **20** **6** 22	0 −25 **25** **8** 25	0 −25 **25** **8** 25	0 −25 **25** **8** 25	0 −29 **30** **10** 29	0 −29 **30** **10** 29	0 −29 **30** **10** 29
+6 −7 **21** **12** 7	+6 −7 **21** **12** 7	+6 −9 **26** **14** 9	+6 −9 **26** **14** 9	+7 −11 **32** **18** 11	+7 −11 **32** **18** 11	+7 −11 **32** **18** 11	+7 −13 **37** **20** 13	+7 −13 **37** **20** 13	+7 −13 **37** **20** 13
+12 −7 **27** **16** 7	+12 −7 **27** **16** 7	+13 −9 **33** **19** 9	+13 −9 **33** **19** 9	+14 −11 **39** **22** 11	+14 −11 **39** **22** 11	+14 −11 **39** **22** 11	+16 −13 **46** **26** 13	+16 −13 **46** **26** 13	+16 −13 **46** **26** 13
+6,5 −6,5 **22** **13** 7	+6,5 −6,5 **22** **13** 7	+7,5 −7,5 **28** **16** 8	+7,5 −7,5 **28** **16** 8	+9 −9 **34** **20** 9	+9 −9 **34** **20** 9	+9 −9 **34** **20** 9	+10 −10 **40** **23** 10	+10 −10 **40** **23** 10	+10 −10 **40** **23** 10
+9,5 −9,5 **25** **13** 10	+9,5 −9,5 **25** **13** 10	+11 −11 **31** **17** 11	+11 −11 **31** **17** 11	+12,5 −12,5 **38** **21** 13	+12,5 −12,5 **38** **21** 13	+12,5 −12,5 **38** **21** 13	+14,5 −14,5 **45** **25** 15	+14,5 −14,5 **45** **25** 15	+14,5 −14,5 **45** **25** 15
+15 +2 **30** **21** **2**	+15 +2 **30** **21** **2**	+18 +3 **38** **26** **3**	+18 +3 **38** **26** **3**	+21 +3 **46** **32** **3**	+21 +3 **46** **32** **3**	+21 +3 **46** **32** **3**	+24 +4 **54** **37** **4**	+24 +4 **54** **37** **4**	+24 +4 **54** **37** **4**
+21 +2 **36** **25** **2**	+21 +2 **36** **25** **2**	+25 +3 **45** **31** **3**	+25 +3 **45** **31** **3**	+28 +3 **53** **36** **3**	+28 +3 **53** **36** **3**	+28 +3 **53** **36** **3**	+33 +4 **63** **43** **4**	+33 +4 **63** **43** **4**	+33 +4 **63** **43** **4**
+24 +11 **39** **30** **11**	+24 +11 **39** **30** **11**	+28 +13 **48** **36** **13**	+28 +13 **48** **36** **13**	+33 +15 **58** **44** **15**	+33 +15 **58** **44** **15**	+33 +15 **58** **44** **15**	+37 +17 **67** **50** **17**	+37 +17 **67** **50** **17**	+37 +17 **67** **50** **17**
+30 +11 **45** **34** **11**	+30 +11 **45** **34** **11**	+35 +13 **55** **42** **13**	+35 +13 **55** **42** **13**	+40 +15 **65** **48** **15**	+40 +15 **65** **48** **15**	+40 +15 **65** **48** **15**	+46 +17 **76** **56** **17**	+46 +17 **76** **56** **17**	+46 +17 **76** **56** **17**

Shaft fits
continued

Nominal shaft diameter in mm								
over	**250**		**280**		**315**		**355**	
incl.	**280**		**315**		**355**		**400**	
Deviation of bearing bore diameter in μm (normal tolerance)								
Δ_{dmp}	0		0		0		0	
	−35		−35		−40		−40	
Shaft deviation, fit interference or fit clearance in μm								
g5	−17	**18**	−17	**18**	−18	**22**	−18	**22**
	−40	1	−40	1	−43	**0**	−43	**0**
		40		40		43		43
g6	−17	**18**	−17	**18**	−18	**22**	−18	**22**
	−49	4	−49	4	−54	3	−54	3
		49		49		54		54
h5	0	**35**	0	**35**	0	**40**	0	**40**
	−23	**16**	−23	**16**	−25	**18**	−25	**18**
		23		23		25		25
h6	0	**35**	0	**35**	0	**40**	0	**40**
	−32	**13**	−32	**13**	−36	**15**	−36	**15**
		32		32		36		36
j5	+7	**42**	+7	**42**	+7	**47**	+7	**47**
	−16	**23**	−16	**23**	−18	**25**	−18	**25**
		16		16		18		18
j6	+16	**51**	+16	**51**	+18	**58**	+18	**58**
	−16	**29**	−16	**29**	−18	**33**	−18	**33**
		16		16		18		18
js5	+11,5	**47**	+11,5	**47**	+12,5	**53**	+12,5	**53**
	−11,5	**27**	−11,5	**27**	−12,5	**32**	−12,5	**32**
		12		12		13		13
js6	+16	**51**	+16	**51**	+18	**58**	+18	**58**
	−16	**29**	−16	**29**	−18	**33**	−18	**33**
		16		16		18		18
k5	+27	**62**	+27	**62**	+29	**69**	+29	**69**
	+4	**43**	+4	**43**	+4	**47**	+4	**47**
		4		**4**		**4**		**4**
k6	+36	**71**	+36	**71**	+40	**80**	+40	**80**
	+4	**49**	+4	**49**	+4	**55**	+4	**55**
		4		**4**		**4**		**4**
m5	+43	**78**	+43	**78**	+46	**86**	+46	**86**
	+20	**59**	+20	**59**	+21	**64**	+21	**64**
		20		**20**		**21**		**21**
m6	+52	**87**	+52	**87**	+57	**97**	+57	**97**
	+20	**65**	+20	**65**	+21	**72**	+21	**72**
		20		**20**		**21**		**21**

	400 **450**		**450** **500**		**500** **560**		**560** **630**		**630** **710**		**710** **800**		**800** **900**	
	0 −45		0 −45		0 −50		0 −50		0 −75		0 −75		0 −100	
−20 −47	**25** **1** 47		−20 −47	**25** **1** 47	−22 −51	**28** **1** 51	−22 −51	**28** **1** 51	−24 −56	**51** **15** 56	−24 −56	**51** **15** 56	−26 −62	**74** **29** 62
−20 −60	**25** 3 60		−20 −60	**25** 3 60	−22 −66	**28** 4 66	−22 −66	**28** 4 66	−24 −74	**51** **9** 74	−24 −74	**51** **9** 74	−26 −82	**74** **24** 82
0 −27	**45** **21** 27		0 −27	**45** **21** 27	0 −29	**50** **23** 29	0 −29	**50** **23** 29	0 −32	**75** **39** 32	0 −32	**75** **39** 32	0 −36	**100** **55** 36
0 −40	**45** **17** 40		0 −40	**45** **17** 40	0 −44	**50** **18** 44	0 −44	**50** **18** 44	0 −50	**75** **33** 50	0 −50	**75** **33** 50	0 −56	**100** **48** 56
+7 −20	**52** **28** 20		+7 −20	**52** **28** 20	–	–	–	–	–	–	–	–	–	–
+20 −20	**65** **37** 20		+20 −20	**65** **37** 20	+22 −22	**72** **40** 22	+22 −22	**72** **40** 22	+25 −25	**100** **58** 25	+25 −25	**100** **58** 25	+28 −28	**128** **76** 28
+13,5 −13,5	**59** **35** 14		+13,5 −13,5	**59** **35** 14	+14,5 −14,5	**65** **38** 15	+14,5 −14,5	**65** **38** 15	+16 −16	**91** **55** 16	+16 −16	**91** **55** 16	+18 −18	**118** **73** 18
+20 −20	**65** **37** 20		+20 −20	**65** **37** 20	+22 −22	**72** **40** 22	+22 −22	**72** **40** 22	+25 −25	**100** **58** 25	+25 −25	**100** **58** 25	+28 −28	**128** **76** 28
+32 +5	**77** **53** **5**		+32 +5	**77** **53** **5**	+29 0	**79** **53** **0**	+29 0	**79** **53** **0**	+32 0	**107** **71** **0**	+32 0	**107** **71** **0**	+36 0	**136** **91** **0**
+45 +5	**90** **62** **5**		+45 +5	**90** **62** **5**	+44 0	**94** **62** **0**	+44 0	**94** **62** **0**	+50 0	**125** **83** **0**	+50 0	**125** **83** **0**	+56 0	**156** **104** **0**
+50 +23	**95** **71** **23**		+50 +23	**95** **71** **23**	+55 +26	**105** **78** **26**	+55 +26	**105** **78** **26**	+62 +30	**137** **101** **30**	+62 +30	**137** **101** **30**	+70 +34	**170** **125** **34**
+63 +23	**108** **80** **23**		+63 +23	**108** **80** **23**	+70 +26	**120** **88** **26**	+70 +26	**120** **88** **26**	+80 +30	**155** **113** **30**	+80 +30	**155** **113** **30**	+90 +34	**190** **138** **34**

Shaft fits

Nominal shaft diameter in mm												
over	**3**		**6**		**10**		**18**		**30**		**50**	
incl.	**6**		**10**		**18**		**30**		**50**		**65**	
Deviation of bearing bore diameter in μm (normal tolerance)												
Δ_{dmp}	0 −8		0 −8		0 −8		0 −10		0 −12		0 −15	
Shaft deviation, fit interference or fit clearance in μm												
n5	+13 +8	**21** **17** **8**	+16 +10	**24** **19** **10**	+20 +12	**28** **23** **12**	+24 +15	**34** **28** **15**	+28 +17	**40** **32** **17**	+33 +20	**48** **39** **20**
n6	+16 +8	**24** **19** **8**	+19 +10	**27** **21** **10**	+23 +12	**31** **25** **12**	+28 +15	**38** **30** **15**	+33 +17	**45** **36** **17**	+39 +20	**54** **43** **20**
p6	+20 +12	**28** **23** **12**	+24 +15	**32** **26** **15**	+29 +18	**37** **31** **18**	+35 +22	**45** **37** **22**	+42 +26	**54** **45** **26**	+51 +32	**66** **55** **32**
p7	+24 +12	**32** **25** **12**	+30 +15	**38** **30** **15**	+36 +18	**44** **35** **18**	+43 +22	**53** **43** **22**	+51 +26	**63** **51** **26**	+62 +32	**77** **62** **32**
r6	+23 +15	**31** **25** **15**	+28 +19	**36** **30** **19**	+34 +23	**42** **35** **23**	+41 +28	**51** **44** **28**	+50 +34	**62** **53** **34**	+60 +41	**75** **64** **41**
r7	+27 +15	**35** **28** **15**	+34 +19	**42** **34** **19**	+41 +23	**49** **40** **23**	+49 +28	**59** **49** **28**	+59 +34	**71** **59** **34**	+71 +41	**86** **71** **41**
Shaft tolerances for adapter sleeves and withdrawal sleeves												
h7/ $\frac{IT5}{2}$	0 −12	*2,5*	0 −15	*3*	0 −18	*4*	0 −21	*4,5*	0 −25	*5,5*	0 −30	*6,5*
h8/ $\frac{IT5}{2}$	0 −18	*2,5*	0 −22	*3*	0 −27	*4*	0 −33	*4,5*	0 −39	*5,5*	0 −46	*6,5*
h9/ $\frac{IT6}{2}$	0 −30	*4*	0 −36	*4,5*	0 −43	*5,5*	0 −52	*6,5*	0 −62	*8*	0 −74	*9,5*

The values *printed in italics* indicate guide values for the cylindricity tolerance t_1 (DIN ISO 1101).

65 **80**	**80** **100**	**100** **120**	**120** **140**	**140** **160**	**160** **180**	**180** **200**	**200** **225**	**225** **250**
0 −15	0 −20	0 −20	0 −25	0 −25	0 −25	0 −30	0 −30	0 −30
+33 **48** +20 **39** **20**	+38 **58** +23 **46** **23**	+38 **58** +23 **46** **23**	+45 **70** +27 **56** **27**	+45 **70** +27 **56** **27**	+45 **70** +27 **56** **27**	+51 **81** +31 **64** **31**	+51 **81** +31 **64** **31**	+51 **81** +31 **64** **31**
+39 **54** +20 **43** **20**	+45 **65** +23 **51** **23**	+45 **65** +23 **51** **23**	+52 **77** +27 **60** **27**	+52 **77** +27 **60** **27**	+52 **77** +27 **60** **27**	+60 **90** +31 **70** **31**	+60 **90** +31 **70** **31**	+60 **90** +31 **70** **31**
+51 **66** +32 **55** **32**	+59 **79** +37 **65** **37**	+59 **79** +37 **65** **37**	+68 **93** +43 **76** **43**	+68 **93** +43 **76** **43**	+68 **93** +43 **76** **43**	+79 **109** +50 **89** **50**	+79 **109** +50 **89** **50**	+79 **109** +50 **89** **50**
+62 **77** +32 **62** **32**	+72 **92** +37 **73** **37**	+72 **92** +37 **73** **37**	+83 **108** +43 **87** **43**	+83 **108** +43 **87** **43**	+83 **108** +43 **87** **43**	+96 **126** +50 **101** **50**	+96 **126** +50 **101** **50**	+96 **126** +50 **101** **50**
+62 **77** +43 **66** **43**	+73 **93** +51 **79** **51**	+76 **96** +54 **82** **54**	+88 **113** +63 **97** **63**	+90 **115** +65 **99** **65**	+93 **118** +68 **102** **68**	+106 **136** +77 **116** **77**	+109 **139** +80 **119** **80**	+113 **143** +84 **123** **84**
+73 **88** +43 **73** **43**	+86 **106** +51 **87** **51**	+89 **109** +54 **90** **54**	+103 **128** +63 **107** **63**	+105 **130** +65 **109** **65**	+108 **133** +68 **112** **68**	+123 **153** +77 **128** **77**	+126 **156** +80 **131** **80**	+130 **160** +84 **135** **84**
0 *6,5* −30	0 *7,5* −35	0 *7,5* −35	0 *9* −40	0 *9* −40	0 *9* −40	0 *10* −46	0 *10* −46	0 *10* −46
0 *6,5* −46	0 *7,5* −54	0 *7,5* −54	0 *9* −63	0 *9* −63	0 *9* −63	0 *10* −72	0 *10* −72	0 *10* −72
0 *9,5* −74	0 *11* −87	0 *11* −87	0 *12,5* −100	0 *12,5* −100	0 *12,5* −100	0 *14,5* −115	0 *14,5* −115	0 *14,5* −115

Shaft fits
continued

Nominal shaft diameter in mm									
over	**250**		**280**		**315**		**355**		**400**
incl.	**280**		**315**		**355**		**400**		**450**
Deviation of bearing bore diameter in μm (normal tolerance)									
Δ_{dmp}	0		0		0		0		0
	−35		−35		−40		−40		−45
Shaft deviation, fit interference or fit clearance in μm									
n5	+57	**92**	+57	**92**	+62	**102**	+62	**102**	+67	**112**
	+34	**73**	+34	**73**	+37	**80**	+37	**80**	+40	**88**
		34		**34**		**37**		**37**		**40**
n6	+66	**101**	+66	**101**	+73	**113**	+73	**113**	+80	**125**
	+34	**79**	+34	**79**	+37	**88**	+37	**88**	+40	**97**
		34		**34**		**37**		**37**		**40**
p6	+88	**123**	+88	**123**	+98	**138**	+98	**138**	+108	**153**
	+56	**101**	+56	**101**	+62	**113**	+62	**113**	+68	**125**
		56		**56**		**62**		**62**		**68**
p7	+108	**143**	+108	**143**	+119	**159**	+119	**159**	+131	**176**
	+56	**114**	+56	**114**	+62	**127**	+62	**127**	+68	**139**
		56		**56**		**62**		**62**		**68**
r6	+126	**161**	+130	**165**	+144	**184**	+150	**190**	+166	**211**
	+94	**138**	+98	**142**	+108	**159**	+114	**165**	+126	**183**
		94		**98**		**108**		**114**		**126**
r7	+146	**181**	+150	**185**	+165	**205**	+171	**211**	+189	**234**
	+94	**152**	+98	**156**	+108	**173**	+114	**179**	+126	**198**
		94		**98**		**108**		**114**		**126**
Shaft tolerances for adapter sleeves and withdrawal sleeves									
h7/ $\frac{IT5}{2}$	0	*11,5*	0	*11,5*	0	*12,5*	0	*12,5*	0	*13,5*
	−52		−52		−57		−57		−63	
h8/ $\frac{IT5}{2}$	0	*11,5*	0	*11,5*	0	*12,5*	0	*12,5*	0	*13,5*
	−81		−81		−89		−89		−97	
h9/ $\frac{IT6}{2}$	0	*16*	0	*16*	0	*18*	0	*18*	0	*20*
	−130		−130		−140		−140		−155	

The values *printed in italics* indicate guide values for the cylindricity tolerance t_1 (DIN ISO 1101).

450 500		**500 560**		**560 630**		**630 710**		**710 800**		**800 900**	
0 −45		0 −50		0 −50		0 −75		0 −75		0 −100	
+67 +40	**112 88 40**	+73 +44	**123 96 44**	+73 +44	**123 96 44**	+82 +50	**157 121 50**	+82 +50	**157 121 50**	+92 +56	**192 147 56**
+80 +40	**125 97 40**	+88 +44	**138 106 44**	+88 +44	**138 106 44**	+100 +50	**175 133 50**	+100 +50	**175 133 50**	+112 +56	**212 160 56**
+108 +68	**153 125 68**	+122 +78	**172 140 78**	+122 +78	**172 140 78**	+138 +88	**213 171 88**	+138 +88	**213 171 88**	+156 +100	**256 204 100**
+131 +68	**176 139 68**	+148 +78	**198 158 78**	+148 +78	**198 158 78**	+168 +88	**243 199 88**	+168 +88	**243 199 88**	+190 +100	**290 227 100**
+172 +132	**217 189 132**	+194 +150	**244 212 150**	+199 +155	**249 217 155**	+225 +175	**300 258 175**	+235 +185	**310 268 185**	+266 +210	**366 314 210**
+195 +132	**240 204 132**	+220 +150	**270 230 150**	+225 +155	**275 235 155**	+255 +175	**330 278 175**	+265 +185	**340 288 185**	+300 +210	**400 337 210**
0 −63	*13,5*	0 −70	*14,5*	0 −70	*14,5*	0 −80	*16*	0 −80	*16*	0 −90	*18*
0 −97	*13,5*	0 −110	*14,5*	0 −110	*14,5*	0 −125	*16*	0 −125	*16*	0 −140	*18*
0 −155	*20*	0 −175	*22*	0 −175	*22*	0 −200	*25*	0 −200	*25*	0 −230	*28*

Housing fits

Nominal housing bore diameter in mm										
over incl.	**6** **10**		**10** **18**		**18** **30**		**30** **50**		**50** **80**	
Deviation of bearing outside diameter in µm (normal tolerance)										
Δ_{Dmp}	0 −8		0 −8		0 −9		0 −11		0 −13	
Housing deviation, fit interference or fit clearance in µm										
E8	+47 +25	25 35 55	+59 +32	32 44 67	+73 +40	40 54 82	+89 +50	50 67 100	+106 +60	60 79 119
F7	+28 +13	13 21 36	+34 +16	16 25 42	+41 +20	20 30 50	+50 +25	25 37 61	+60 +30	30 44 73
G6	+14 +5	5 11 22	+17 +6	6 12 25	+20 +7	7 14 29	+25 +9	9 18 36	+29 +10	10 21 42
G7	+20 +5	5 13 28	+24 +6	6 15 32	+28 +7	7 17 37	+34 +9	9 21 45	+40 +10	10 24 53
H6	+9 0	**0** 6 17	+11 0	**0** 6 19	+13 0	**0** 7 22	+16 0	**0** 9 27	+19 0	**0** 11 32
H7	+15 0	**0** 8 23	+18 0	**0** 9 26	+21 0	**0** 10 30	+25 0	**0** 12 36	+30 0	**0** 14 43
H8	+22 0	**0** 10 30	+27 0	**0** 12 35	+33 0	**0** 14 42	+39 0	**0** 17 50	+46 0	**0** 20 59
J6	+5 −4	**4** 2 13	+6 −5	**5** 1 14	+8 −5	**5** 2 17	+10 −6	**6** 3 21	+13 −6	**6** 5 26
J7	+8 −7	**7** 1 16	+10 −8	**8** 1 18	+12 −9	**9** 1 21	+14 −11	**11** 1 25	+18 −12	**12** 2 31
JS6	+4,5 −4,5	**4,5** 2 12,5	+5,5 −5,5	**5,5** 1 13,5	+6,5 −6,5	**6,5** **0** 15,5	+8 −8	**8** 1 19	+9,5 −9,5	**9,5** **0** 22,5
JS7	+7,5 −7,5	**7,5** 1 15,5	+9 −9	**9** **0** 17	+10,5 −10,5	**10,5** **1** 19,5	+12,5 −12,5	**12,5** **1** 23,5	+15 −15	**15** **1** 28
K6	+2 −7	**7** **1** 10	+2 −9	**9** **3** 10	+2 −11	**11** **4** 11	+3 −13	**13** **4** 14	+4 −15	**15** **4** 17
K7	+5 −10	**10** **2** 13	+6 −12	**12** **3** 14	+6 −15	**15** **5** 15	+7 −18	**18** **6** 18	+9 −21	**21** **7** 22

Housing fits

Nominal housing bore diameter in mm								
over incl.	**80** **120**		**120** **150**		**150** **180**		**180** **250**	
Deviation of bearing outside diameter in µm (normal tolerance)								
Δ_{Dmp}	0 −15		0 −18		0 −25		0 −30	
Housing deviation, fit interference or fit clearance in µm								
E8	+126 +72	72 85 141	+148 +85	85 112 166	+148 +85	85 114 173	+172 +100	100 134 202
F7	+71 +36	36 53 86	+83 +43	43 62 101	+83 +43	43 64 108	+96 +50	50 75 126
G6	+34 +12	12 24 49	+39 +14	14 28 57	+39 +14	14 31 64	+44 +15	15 35 74
G7	+47 +12	12 29 62	+54 +14	14 33 72	+54 +14	14 36 79	+61 +15	15 40 91
H6	+22 0	**0** 12 37	+25 0	**0** 14 43	+25 0	**0** 17 50	+29 0	**0** 20 59
H7	+35 0	**0** 17 50	+40 0	**0** 19 58	+40 0	**0** 22 65	+46 0	**0** 25 76
H8	+54 0	**0** 23 69	+63 0	**0** 27 81	+63 0	**0** 29 88	+72 0	**0** 34 102
J6	+16 −6	**6** 6 31	+18 −7	**7** 7 36	+18 −7	**7** 10 43	+22 −7	**7** 13 52
J7	+22 −13	**13** 4 37	+26 −14	**14** 5 44	+26 −14	**14** 8 51	+30 −16	**16** 9 60
JS6	+11 −11	**11** 1 26	+12,5 −12,5	**12,5** 1 30,5	+12,5 −12,5	**12,5** 3 37,5	+14,5 −14,5	**14,5** 5 44,5
JS7	+17,5 −17,5	**17,5** **1** 32,5	+20 −20	**20** 1 38	+20 −20	**20** 1 45	+23 −23	**23** 2 53
K6	+4 −18	**18** **6** 19	+4 −21	**21** **7** 22	+4 −21	**21** **4** 29	+5 −24	**24** **4** 35
K7	+10 −25	**25** **8** 25	+12 −28	**28** **9** 30	+12 −28	**28** **6** 37	+13 −33	**33** **8** 43

250 315		315 400		400 500		500 630		630 800		800 1000		1000 1250	
0 −35		0 −40		0 −45		0 −50		0 −75		0 −100		0 −125	
+191 +110	110 149 226	+214 +125	125 168 254	+232 +135	135 182 277	+255 +145	145 199 305	+285 +160	160 227 360	+310 +170	170 250 410	+360 +195	195 292 485
+108 +56	56 85 143	+119 +62	62 94 159	+131 +68	68 104 176	+146 +76	76 116 196	+160 +80	80 132 235	+176 +86	86 149 276	+203 +98	98 175 328
+49 +17	17 39 84	+54 +18	18 43 94	+60 +20	20 48 105	+66 +22	22 54 116	+74 +24	24 66 149	+82 +26	26 78 182	+94 +28	28 93 219
+69 +17	17 46 104	+75 +18	18 50 115	+83 +20	20 56 128	+92 +22	22 62 142	+104 +24	24 76 179	+116 +26	26 89 216	+133 +28	28 105 258
+32 0	**0** 22 67	+36 0	**0** 25 76	+40 0	**0** 28 85	+44 0	**0** 32 94	+50 0	**0** 42 125	+56 0	**0** 52 156	+66 0	**0** 64 191
+52 0	**0** 29 87	+57 0	**0** 32 97	+63 0	**0** 36 108	+70 0	**0** 40 120	+80 0	**0** 52 155	+90 0	**0** 63 190	+105 0	**0** 77 230
+81 0	**0** 39 116	+89 0	**0** 43 129	+97 0	**0** 47 142	+110 0	**0** 54 160	+125 0	**0** 67 200	+140 0	**0** 80 240	+165 0	**0** 97 290
+25 −7	**7** 15 60	+29 −7	**7** 18 69	+33 −7	**7** 21 78	–	–	–	–	–	–	–	–
+36 −16	**16** 13 71	+39 −18	**18** 14 79	+43 −20	**20** 16 88	–	–	–	–	–	–	–	–
+16 −16	**16** 7 51	+18 −18	**18** 6 58	+20 −20	**20** 8 65	+22 −22	**22** 10 72	+25 −25	**25** 17 100	+28 −28	**28** 24 128	+33 −33	**33** 31 158
+26 −26	**26** 3 61	+28,5 −28,5	**28,5** 3 68,5	+31,5 −31,5	**31,5** 4 76,5	+35 −35	**35** 5 85	+40 −40	**40** 12 115	+45 −45	**45** 18 145	+52 −52	**52** 24 177
+5 −27	**27** **5** 40	+7 −29	**29** **4** 47	+8 −32	**32** **4** 53	0 −44	**44** **12** 50	0 −50	**50** **8** 75	0 −56	**56** **4** 100	0 −66	**66** **2** 125
+16 −36	**36** **7** 51	+17 −40	**40** **8** 57	+18 −45	**45** **9** 63	0 −70	**70** **30** 50	0 −80	**80** **28** 75	0 −90	**90** **27** 100	0 −105	**105** **28** 125

Housing fits

	Nominal housing bore diameter in mm					
	over **6** incl. **10**	over **10** incl. **18**	over **18** incl. **30**	over **30** incl. **50**	over **50** incl. **80**	over **80** incl. **120**
	Deviation of bearing outside diameter in μm (normal tolerance)					
Δ_{Dmp}	0 −8	0 −8	0 −9	0 −11	0 −13	0 −15
	Housing deviation, fit interference or fit clearance in μm					
M6	−3 −12 **12** **6** 5	−4 −15 **15** **9** 4	−4 −17 **17** **10** 5	−4 −20 **20** **11** 7	−5 −24 **24** **13** 8	−6 −28 **28** **16** 9
M7	0 −15 **15** **7** 8	0 −18 **18** **9** 8	0 −21 **21** **11** 9	0 −25 **25** **13** 11	0 −30 **30** **16** 13	0 −35 **35** **18** 15
N6	−7 −16 **16** **10** 1	−9 −20 **20** **14** **1**	−11 −24 **24** **17** **2**	−12 −28 **28** **19** **1**	−14 −33 **33** **22** **1**	−16 −38 **38** **26** **1**
N7	−4 −19 **19** **11** 4	−5 −23 **23** **14** 3	−7 −28 **28** **18** 2	−8 −33 **33** **21** 3	−9 −39 **39** **25** 4	−10 −45 **45** **28** 5
P6	−12 −21 **21** **15** **4**	−15 −26 **26** **20** **7**	−18 −31 **31** **24** **9**	−21 −37 **37** **28** **10**	−26 −45 **45** **34** **13**	−30 −52 **52** **40** **15**
P7	−9 −24 **24** **16** **1**	−11 −29 **29** **20** **3**	−14 −35 **35** **25** **5**	−17 −42 **42** **30** **6**	−21 −51 **51** **37** **8**	−24 −59 **59** **42** **9**

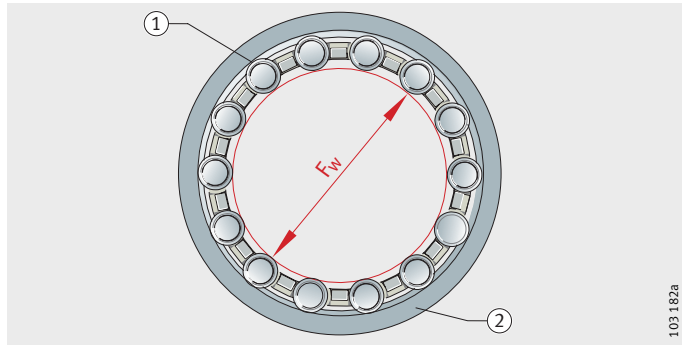
120 150	150 180	180 250	250 315	315 400	400 500	500 630	630 800	800 1000
0 −18	0 −25	0 −30	0 −35	0 −40	0 −45	0 −50	0 −75	0 −100
−8 −33 **33** **19** 10	−8 −33 **33** **16** 17	−8 −37 **37** **17** 22	−9 −41 **41** **19** 26	−10 −46 **46** **21** 30	−10 −50 **50** **22** 35	−26 −70 **70** **38** 24	−30 −80 **80** **38** 45	−34 −90 **90** **38** 66
0 −40 **40** **21** 18	0 −40 **40** **18** 25	0 −46 **46** **21** 30	0 −52 **52** **23** 35	0 −57 **57** **25** 40	0 −63 **63** **27** 45	−26 −96 **96** **56** 24	−30 −110 **110** **58** 45	−34 −124 **124** **61** 66
−20 −45 **45** **31** **2**	−20 −45 **45** **28** 5	−22 −51 **51** **31** 8	−25 −57 **57** **35** 10	−26 −62 **62** **37** 14	−27 −67 **67** **39** 18	−44 −88 **88** **56** 6	−50 −100 **100** **58** 25	−56 −112 **112** **60** 44
−12 −52 **52** **33** 6	−12 −52 **52** **30** 13	−14 −60 **60** **35** 16	−14 −66 **66** **37** 21	−16 −73 **73** **41** 24	−17 −80 **80** **44** 28	−44 −114 **114** **74** 6	−50 −130 **130** **78** 25	−56 −146 **146** **83** 44
−36 −61 **61** **47** **18**	−36 −61 **61** **44** **11**	−41 −70 **70** **50** **11**	−47 −79 **79** **57** **12**	−51 −87 **87** **62** **11**	−55 −95 **95** **67** **10**	−78 −122 **122** **90** **28**	−88 −138 **138** **96** **13**	−100 −156 **156** **104** **0**
−28 −68 **68** **49** **10**	−28 −68 **68** **46** **3**	−33 −79 **79** **54** **3**	−36 −88 **88** **59** **1**	−41 −98 **98** **66** **1**	−45 −108 **108** **72** **0**	−78 −148 **148** **108** **28**	−88 −168 **168** **126** **13**	−100 −190 **190** **127** **0**

Housing fits

Nominal housing bore diameter in mm	
over incl.	**1000** **1250**
Deviation of bearing outside diameter in µm (normal tolerance)	
Δ_{Dmp}	0 −125
Housing deviation, fit interference or fit clearance in µm	
M6	−40 −106 **106** **45** 85
M7	−40 −145 **145** **68** 85
N6	−66 −132 **132** **67** 59
N7	−66 −171 **171** **94** 59
P6	−120 −186 **186** **121** 5
P7	−120 −225 **225** **148** 5

Enveloping circle

For bearings without an inner ring, the enveloping circle F_w is used. This is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway, *Figure 15*.
The enveloping circle for unfitted bearings is in the tolerance zone F6 (except for drawn cup needle roller bearings).
Deviations for F6 and F8, see table.



① Needle roller
② Outer raceway
F_w = enveloping circle diameter

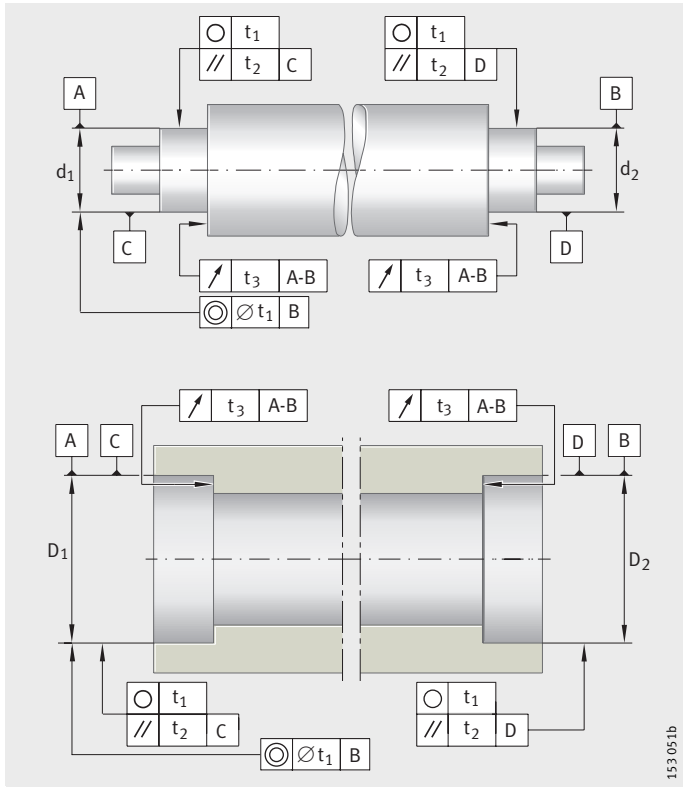
Figure 15
Enveloping circle

Deviations for the enveloping circle diameter

Enveloping circle diameter F_w mm		Tolerance zone F6 Tolerance for enveloping circle diameter F_w		Tolerance zone F8 Tolerance for enveloping circle diameter F_w	
		Upper deviation	Lower deviation	Upper deviation	Lower deviation
over	incl.	µm	µm	µm	µm
3	6	+18	+10	+28	+10
6	10	+22	+13	+35	+13
10	18	+27	+16	+43	+16
18	30	+33	+20	+53	+20
30	50	+41	+25	+64	+25
50	80	+49	+30	+76	+30
80	120	+58	+36	+90	+36
120	180	+68	+43	+106	+43
180	250	+79	+50	+122	+50
250	315	+88	+56	+137	+56
315	400	+98	+62	+151	+62
400	500	+108	+68	+165	+68

Geometrical tolerances of bearing seating surfaces

In order to achieve the required fit, the bearing seats and fit surfaces of the shaft and housing bore must conform to certain tolerances, *Figure 16* and table, page 170.



t_1 = roundness
t_2 = parallelism
t_3 = axial runout of abutment shoulders

Figure 16
Geometrical tolerances

Accuracy of bearing seating surfaces

The degree of accuracy for the bearing seat tolerances on the shaft and in the housing is given in the tables, page 170, and the ISO fundamental tolerances (ISO 286).

Second bearing seat

The tolerances for a second bearing seat on the shaft (d_2) or in the housing (D_2) (expressed in terms of coaxiality to DIN ISO 1101) must be based on the angular adjustment facility of the specific bearing. Misalignments due to elastic deformation of the shaft and housing must be taken into consideration.

Housings

In split housings, the joints must be free from burrs.

The accuracy of the bearing seats is determined as a function of the accuracy of the bearing selected.

Geometrical tolerances of bearing seating surfaces

Bearing tolerance class	Bearing seating surface	Diameter tolerance	Roundness tolerance t_1	Parallelism tolerance t_2	Abutment shoulder runout tolerance t_3
PN P6X	Shaft	IT6 (IT5)	Circumferential load IT4/2	IT4	IT4
			Point load IT5/2	IT5	
	Housing	IT7 (IT6)	Circumferential load IT5/2	IT5	IT5
			Point load IT6/2	IT6	
P5	Shaft	IT5	Circumferential load IT2/2	IT2	IT2
			Point load IT3/2	IT3	
	Housing	IT6	Circumferential load IT3/2	IT3	IT3
			Point load IT4/2	IT4	
P4 P4S SP	Shaft	IT4	Circumferential load IT1/2	IT1	IT1
			Point load IT2/2	IT2	
	Housing	IT5	Circumferential load IT2/2	IT2	IT2
			Point load IT3/2	IT3	
UP	Shaft	IT3	Circumferential load IT0/2	IT0	IT0
			Point load IT1/2	IT1	
	Housing	IT4	Circumferential load IT1/2	IT1	IT1
			Point load IT2/2	IT2	

ISO fundamental tolerances (IT grades) to DIN ISO 286: see table, page 172.

Roughness of bearing seats

The roughness of the bearing seats must be matched to the tolerance class of the bearings. The mean roughness value R_a must not be too high, in order to maintain the interference loss within limits. Shafts should be ground and bores should be precision turned. Guide values: see table.

The bore and shaft tolerances and permissible roughness values are also given in the design and safety guidelines in the product sections. The guide values for roughness correspond to DIN 5 425-1.

Guide values for roughness of bearing seating surfaces

Diameter of bearing seat d (D) mm		Recommended mean roughness value R_a and roughness classes for ground bearing seats Diameter tolerance corresponding to[2] µm			
over	incl.	IT7	IT6	IT5	IT4
–	80	1,6 (N7)	0,8 (N6)	0,4 (N5)	0,2 (N4)
80	500	1,6 (N7)	1,6 (N7)	0,8 (N6)	0,4 (N5)
500	1250	3,2 (N8)[1]	1,6 (N7)	1,6 (N7)	0,8 (N6)

[1] When fitting using the hydraulic method R_a = 1,6 µm should not be exceeded.

[2] The values in brackets are roughness classes to DIN ISO 1302.

Values for IT grades

The table shows numerical values for the ISO fundamental tolerances (IT grades) to DIN ISO 286.

IT grades and values

Nominal dimension in mm						
over	**1**	**3**	**6**	**10**	**18**	**30**
incl.	**3**	**6**	**10**	**18**	**30**	**50**
Values in µm						
IT0	0,5	0,6	0,6	0,8	1	1
IT1	0,8	1	1	1,2	1,5	1,5
IT2	1,2	1,5	1,5	2	2,5	2,5
IT3	2	2,5	2,5	3	4	4
IT4	3	4	4	5	6	7
IT5	4	5	6	8	9	11
IT6	6	8	9	11	13	16
IT7	10	12	15	18	21	25
IT8	14	18	22	27	33	39
IT9	25	30	36	43	52	62
IT10	40	48	58	70	84	100
IT11	60	75	90	110	130	160
IT12	100	120	150	180	210	250

50	**80**	**120**	**180**	**250**	**315**	**400**	**500**	**630**	**800**	**1 000**
80	**120**	**180**	**250**	**315**	**400**	**500**	**630**	**800**	**1 000**	**1 250**
1,2	1,5	2	3	4	5	6	–	–	–	–
2	2,5	3,5	4,5	6	7	8	–	–	–	–
3	4	5	7	8	9	10	–	–	–	–
5	6	8	10	12	13	15	–	–	–	–
8	10	12	14	16	18	20	–	–	–	–
13	15	18	20	23	25	27	29	32	36	42
19	22	25	29	32	36	40	44	50	56	66
30	35	40	46	52	57	63	70	80	90	105
46	54	63	72	81	89	97	110	125	140	165
74	87	100	115	130	140	155	175	200	230	260
120	140	160	185	210	230	250	280	320	360	420
190	220	250	290	320	360	400	440	500	560	660
300	350	400	460	520	570	630	700	800	900	1 050

Raceways for bearings without inner and/or outer ring

In rolling bearings which do not have an inner and/or outer ring to provide a raceway, the rolling elements run directly on the shaft or in the housing bore.

The shaft and housing bore must be suitable for use as rolling bearing raceways.

The raceways must always be free from undulations and precision machined (grinding and honing).
At a mean roughness $R_a > 0{,}2$ µm, it is not possible to utilise the full load carrying capacity of the bearings.

The guidelines on shaft design in the product sections must also be observed.

The diameter tolerances of the shaft and housing determine the internal clearance.

Materials for raceways

Through hardening steels

Through hardening steels to ISO 683-17 (such as 100Cr6) are suitable as materials for rolling bearing raceways in direct bearing arrangements. These steels can also be surface layer hardened.

Case hardening steels

Case hardening steels must conform to ISO 683-17 (such as 17MnCr5, 16CrNiMo6) or EN 10 084 (such as 16MnCr5).

Flame or induction hardening

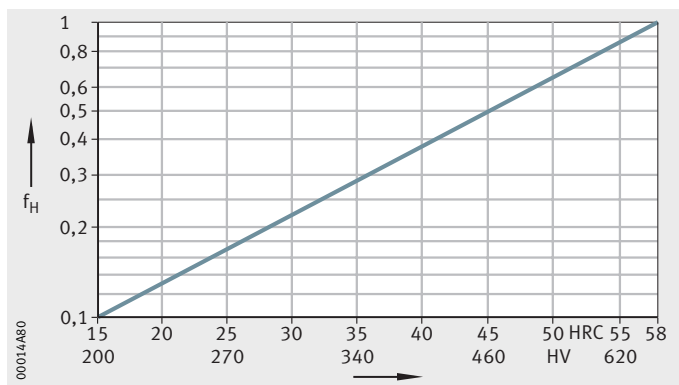
For flame and induction hardening, steels to ISO 683-17 (such as Cf54, 43CrMo4) or DIN 17 212 (such as Cf53) must be used.

Surface hardness and hardening depth

The values apply to raceways, washers and shaft shoulders. Case, flame or induction hardened steels must have a surface hardness of 670 HV + 170 HV and an adequate hardening depth CHD or SHD.

The hardening depth is, according to DIN 50 190, the depth of the hardened surface zone at which there is still a hardness of 550 HV. It is measured on the finish ground shaft and must correspond to the stated values, but must in any case be ≧ 0,3 mm.

If the raceways are softer than 650 HV (58 HRC), the bearing arrangement will not achieve the full load carrying capacity. In this case, the basic dynamic load rating C_r and the basic static load rating C_{0r} must be reduced by the factor f_H, *Figure 17*.



f_H = factor for taking account of raceway hardness
HRC, HV = surface hardness

Figure 17
Taking account of the raceway hardness

Hardness curves

The hardness curves are shown schematically, see *Figure 18* and *Figure 19*. The required hardness curve is derived from the strain on the material.

The formulae are based on hardness curves achieved with normal specialist heat treatment.

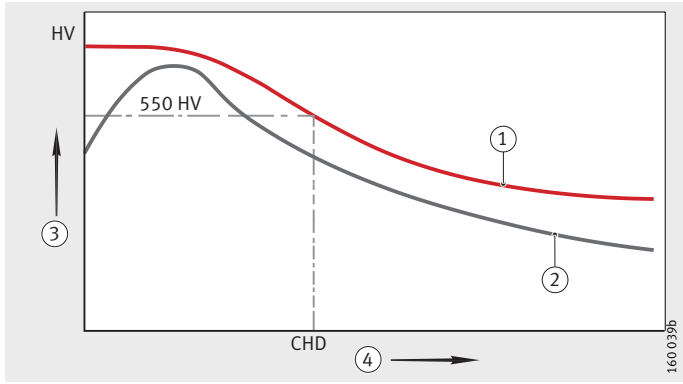
Case hardening:

$$CHD \geqq 0{,}078 \cdot D_w$$

Flame or induction hardening:

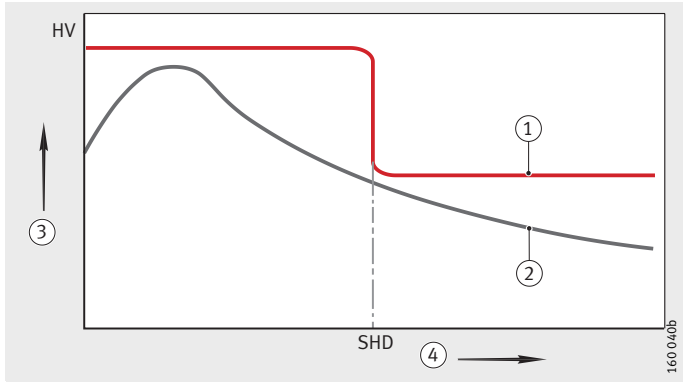
$$SHD \geqq 140 \cdot D_w / R_{p0,2}$$

CHD mm
Case hardening depth
SHD mm
Surface hardening depth
D_w mm
Rolling element diameter
$R_{p\,0,2}$ N/mm^2
Proof stress.



① Case hardening
② Required hardness
③ Hardness
④ Distance from surface
CHD = case hardening depth with hardness 550 HV

Figure 18
Case hardening depth CHD and hardness curve



① Flame or induction hardening
② Required hardness
③ Hardness
④ Distance from surface
SHD = surface hardening depth

Figure 19
Surface hardening depth SHD and hardness curve

Axial location of bearings

Axial location of the bearing rings is matched to the specific bearing arrangement (locating bearing, non-locating bearing, adjusted and floating arrangements of bearings).

Examples: see *Figure 20*, page 177 to *Figure 30*, page 180.

Design guidelines

The bearing rings must be located by force locking or geometrical locking in order to prevent lateral movement. The bearing rings must only be in contact with the shaft or housing shoulder, but not with the fillet.

Every radius of the mating part must be smaller than the smallest chamfer dimension r or r_1 of the bearing.

The radius should have rounding to DIN 5 418 or an undercut to DIN 509.

The shoulders on the mating parts must be large enough to provide a sufficiently wide contact surface even with the largest chamfer dimension of the bearing (DIN 5 418).

The bearing tables give the maximum values for the radius r_a or r_{a1} and the diameter of the abutment shoulders (D_a or d_a).

Any special characteristics of the individual bearing types, e.g. for needle roller bearings, cylindrical roller bearings, tapered roller bearings and axial bearings, are indicated in the product sections.

Locating bearings

Locating bearings can support axial forces. The retaining element must be matched to these axial forces. Shoulders on the shaft and housing, snap rings, housing cover, shaft covers, nuts and spacer rings are suitable.

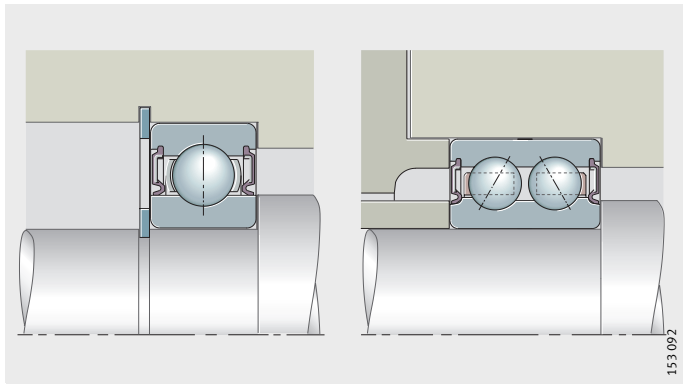
Non-locating bearings

Non-locating bearings only need to support slight axial forces occurring in thermal expansion. The means of axial location only needs to prevent creep of the rings. A tight fit is often sufficient.

Self-retaining bearings

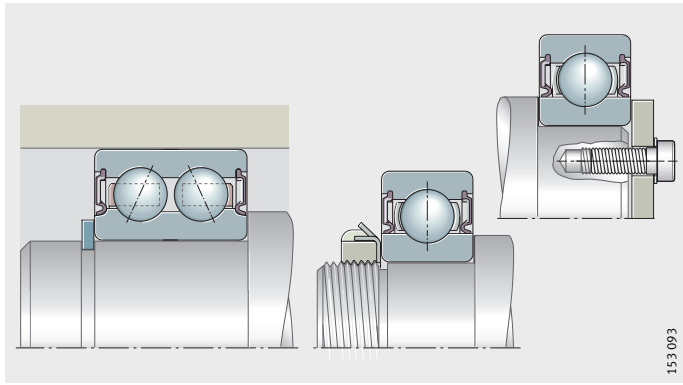
In non-separable bearings, one bearing ring requires a tight fit, the other ring is retained by the rolling elements.

Deep groove ball bearings, double row angular contact ball bearings



Support on both sides, inner and outer sides

Figure 20
Locating bearings



Support on both sides, inner side

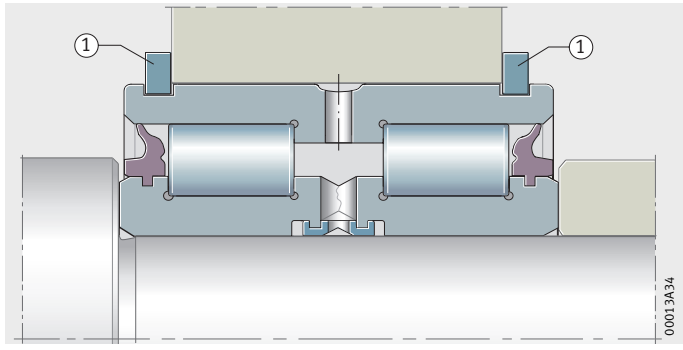
Figure 21
Non-locating bearings

Cylindrical roller bearings

The bearing rings must be supported on both the inner and outer sides, *Figure 22* to *Figure 24*, page 178.

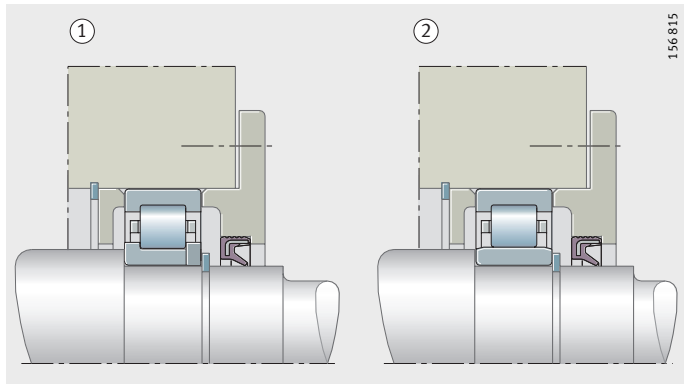
The ribs of axially loaded cylindrical roller bearings must be supported up to dimension d_1 and D_1.
Dimensions d_1, D_1: see dimension tables.

For semi-locating bearings, the bearing rib only requires support on one side, on the rib supporting the axial load.



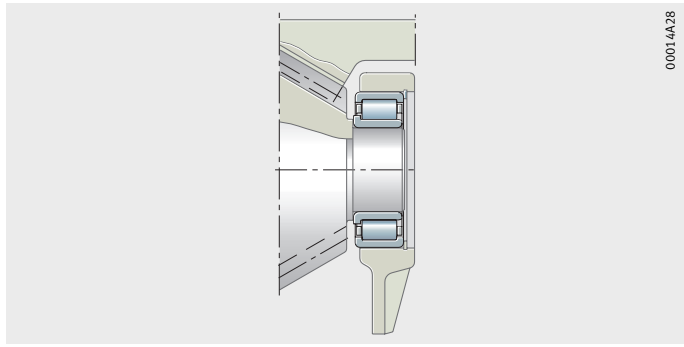
Outer ring axially located by retaining rings
① Retaining rings

Figure 22
Locating bearing



Axial location by geometrical locking
① Locating bearing
② Non-locating bearing

Figure 23
Locating and non-locating bearings



The inner ring rib prevents axial creep to one side

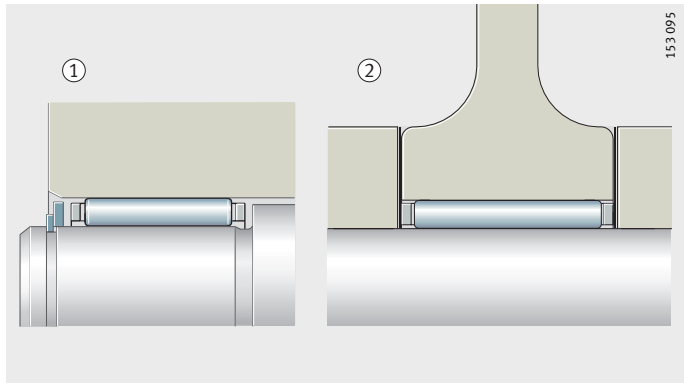
Figure 24
Non-locating bearing

Needle roller and cage assemblies

The axial running surfaces should be precision machined (R_a2) and wear resistant.

A washer should be fitted to provide a smooth running surface for retaining rings and snap rings, *Figure 25*.

Sufficient interference must be ensured between the snap ring and washer.

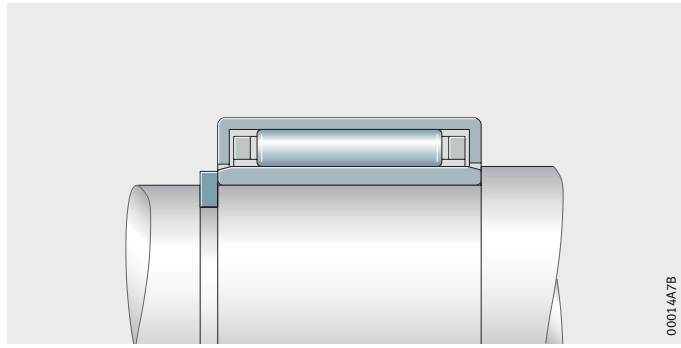


① Axial location by snap ring and washer
② Axial location by adjacent construction

Figure 25
Non-locating bearings

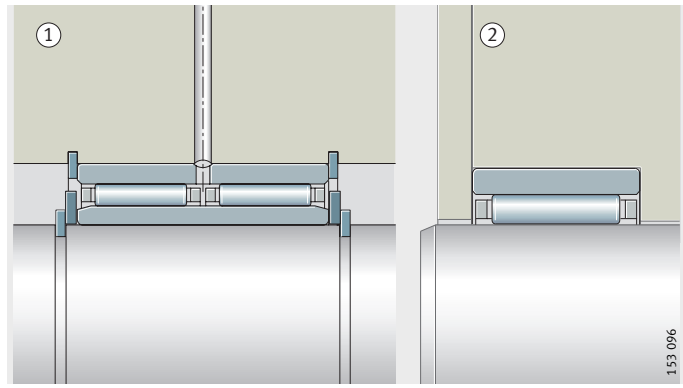
Drawn cup needle roller bearings, needle roller bearings without ribs, needle roller bearings without inner ring

Location is achieved by a snap ring and abutment shoulder, *Figure 26* and *Figure 27*. Sufficient interference must be ensured between the snap ring and the end face of the inner ring.



Drawn cup needle roller bearing
Axial location by snap ring and shaft shoulder

Figure 26
Non-locating bearing

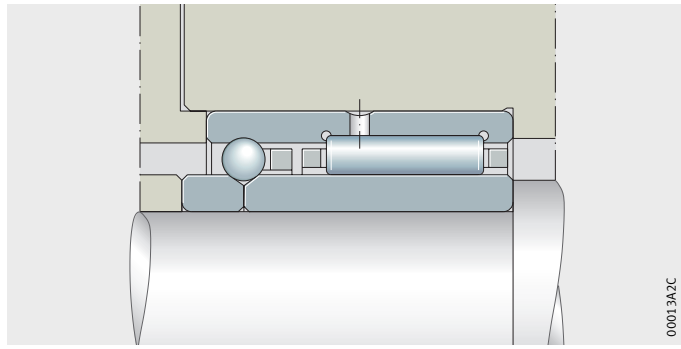


Needle roller bearing
① Axial location by snap rings
② Axial location by abutment shoulder

Figure 27
Axial location of needle roller bearings

Combined needle roller bearings

Axial support of bearing rings on both sides is particularly important for locating bearings and bearings with split inner ring or split outer ring, *Figure 28*.



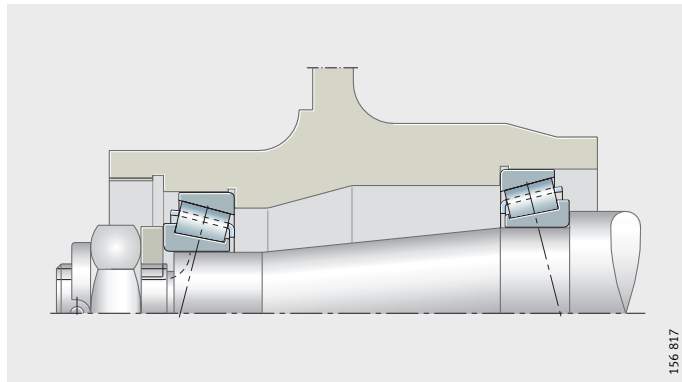
Needle roller/angular contact ball bearing
Axial support of bearing rings on both sides

Figure 28
Locating bearing

Adjusted and floating bearing arrangements

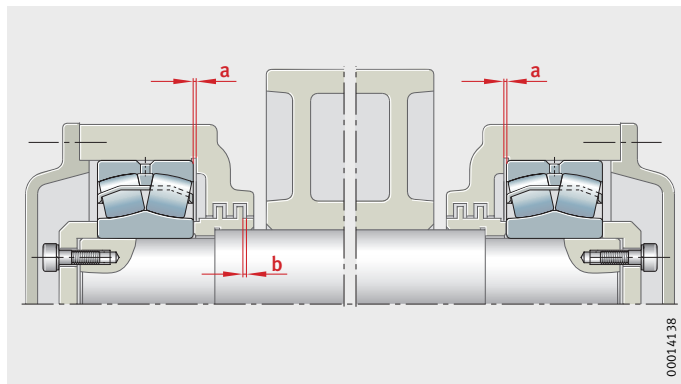
Since bearings in adjusted and floating arrangements support axial forces in one direction only, the bearing rings only need to be supported on one side. Counterguidance is performed by a second, symmetrically arranged bearing, *Figure 29* and *Figure 30*.
Shaft nuts, ring nuts, covers or spacer washers are suitable as adjustment elements.

In floating bearing arrangements, lateral movement of the rings is prevented by shaft or housing shoulders, covers, snap rings, *Figure 30*.



Axial location

Figure 29
Adjusted bearing arrangement



Axial location

a = guidance clearance;
a < b (b = axial labyrinth gap)

Figure 30
Floating bearing arrangement

Seals

The sealing arrangement has a considerable influence on the operating life of a bearing arrangement. It is intended to retain the lubricant in the bearing and prevent the ingress of contaminants into the bearing.

Contaminants may have various effects:

- a large number of very small, abrasive particles causes wear in the bearing. The increase in clearance or noise bring the operating life of the bearing to an end
- large, overrolled hard particles reduce the fatigue life since pittings occur at the indentation points under high bearing loads.

A basic distinction is made between contact and non-contact seals in the adjacent construction and in the bearing.

Non-contact seals in the adjacent construction

With non-contact seals, only lubricant friction occurs in the lubricant gap. The seals do not undergo wear and remain capable of operation for a long period. Since they generate no heat, non-contact seals are also suitable for very high speeds.

Gap seals

A simple design, although adequate in many cases, is a narrow seal gap between the shaft and housing, *Figure 31*.

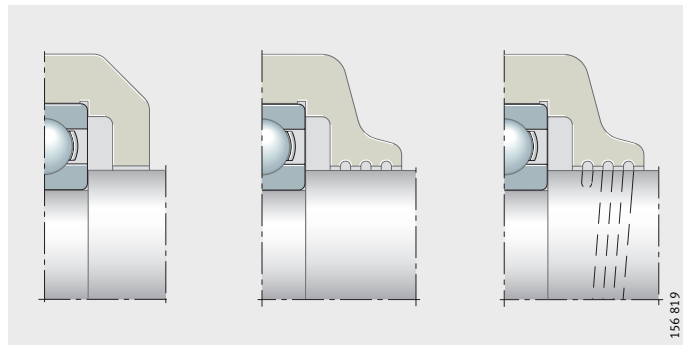


Figure 31
Simple gap seals

Labyrinth seals

A considerably greater sealing effect than with gap seals is achieved by labyrinths incorporating gaps filled with grease, *Figure 32*.

In contaminated environments, grease should be pressed from the interior into the seal gap at short intervals.

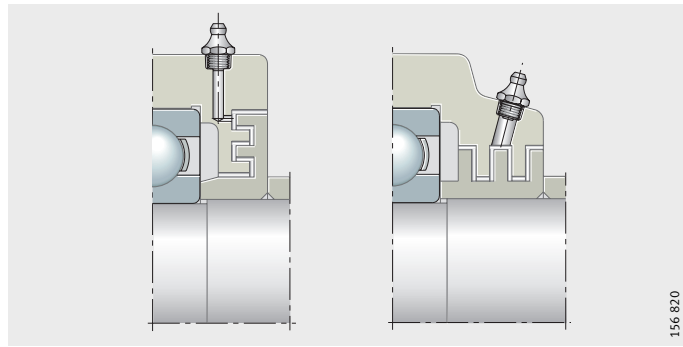


Figure 32
Labyrinth seals

Splash ring

Where oil lubrication is used with a horizontal shaft, splash rings are suitable for preventing the escape of oil, *Figure 33*.

The oil outlet hole on the underside of the seal location must be sufficiently large that it cannot be clogged by contamination.

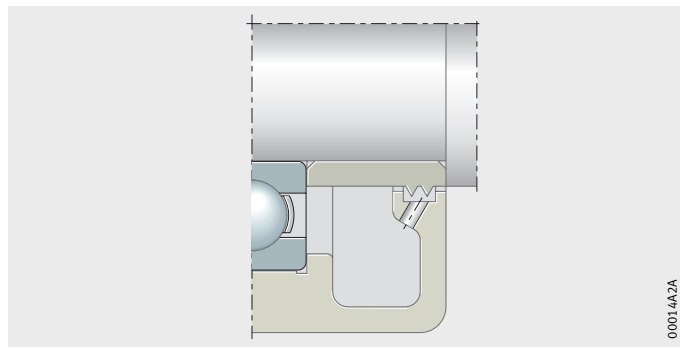


Figure 33
Splash ring

Flinger shields

Co-rotating flinger shields have the effect of shielding the seal gap from heavy contamination, *Figure 34*.

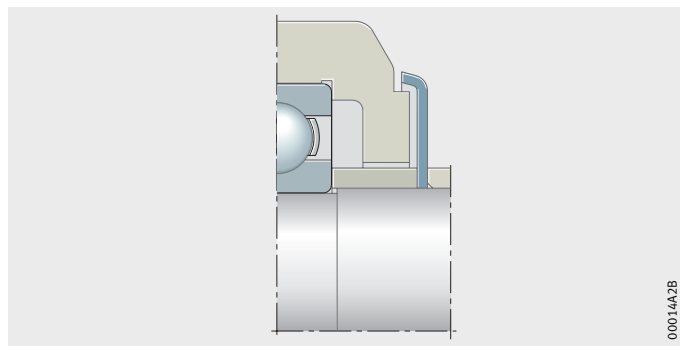


Figure 34
Flinger shield

Baffle plates

Stationary (rigid) baffle plates ensure that grease remains in the area around the bearing, *Figure 35*.

The grease collar that forms at the seal gap protects the bearing against contamination.

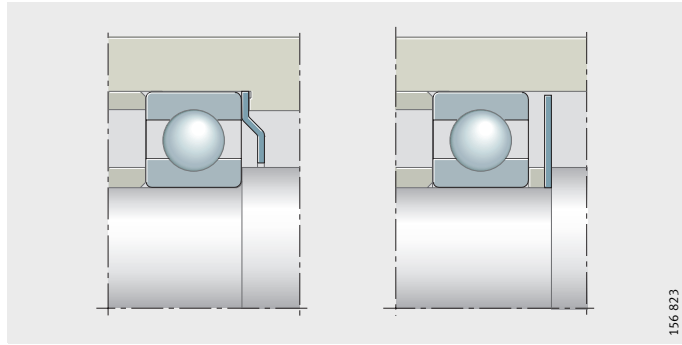


Figure 35
Rigid baffle plates

Lamellar rings

Lamellar rings made from steel and radially sprung either outwards or inwards require little mounting space, *Figure 36*. They give protection against loss of grease and ingress of contamination and are also used as an outer seal against spray water.

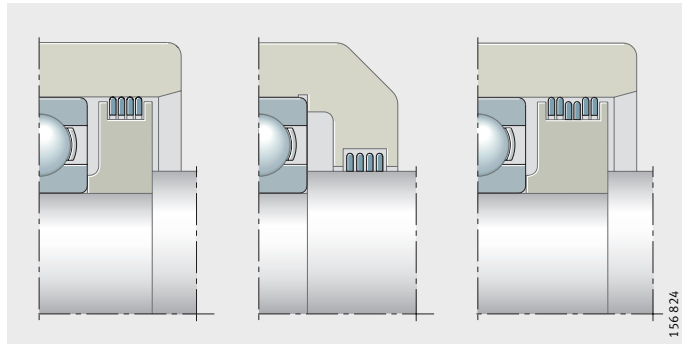


Figure 36
Lamellar rings

Non-contact seals in the bearing

Sealing shields in the bearing

Sealing shields are compact sealing elements fitted on one or both sides of the bearing, *Figure 37*.

Bearings with sealing shields on both sides are supplied with a grease filling.

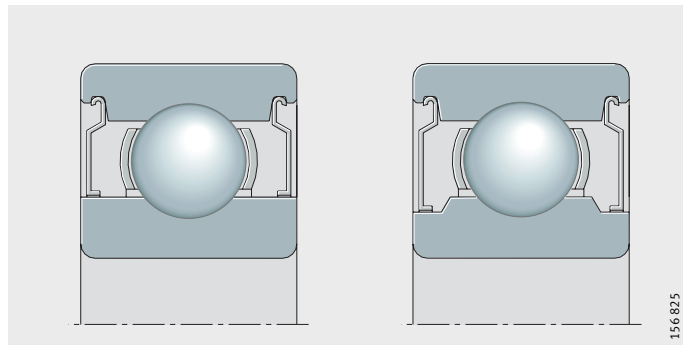


Figure 37
Sealing shields

BRS seals

The friction in this case is as low as that in bearings with sealing shields. They have the advantage over these, however, that the outer elastic rim gives good sealing when fitted in the slot in the outer ring. This is important with a rotating outer ring since the base oil is separated from the soap suspension by centrifugal force and would escape through the unsealed metallic seat in the outer ring if sealing shields were fitted.

Bearings with BRS seals are supplied by agreement only, *Figure 38*.

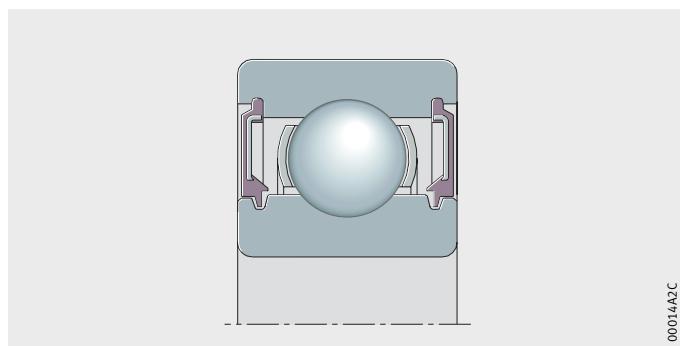


Figure 38
BRS seals

Contact seals in the adjacent construction

Contact seals are normally in contact with the running surface under radial contact force. The contact force should be kept small to avoid an excessive increase in frictional torque and temperature.
The frictional torque and temperature as well as the wear of the seal are also affected by the lubrication condition at the running surface, its roughness and the sliding speed.

With grease lubrication

Felt rings and felt strips are sealing elements that have proved very effective with grease lubrication, *Figure 39*. They are impregnated with oil before fitting and give particularly good sealing against dust. In unfavourable environmental conditions, two felt rings are arranged adjacent to each other. Felt rings and annular slots are standardised according to DIN 5 419.

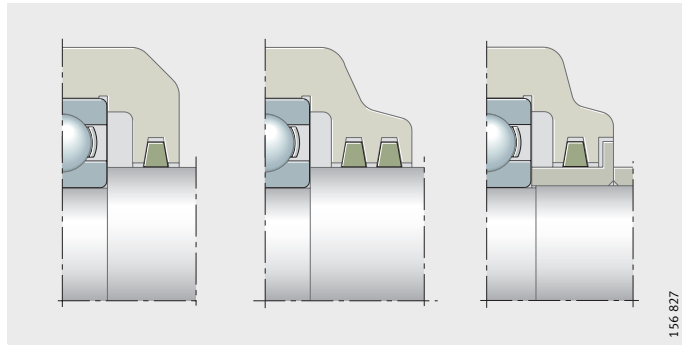


Figure 39
Felt rings or felt strips

With oil lubrication

If oil lubrication is used, sealing is primarily carried out with rotary shaft seals to DIN 3 760 and DIN 3 761, *Figure 40*. The seal collar with one lip is pressed against the shaft running surface by a spring.

If the principal objective is to prevent escape of lubricant, the lip is arranged on the inner side of the bearing arrangement. A sealing ring with an additional protective lip also prevents the ingress of contamination. Seal lips made from nitrile butadiene rubber (NBR) are suitable with oil lubrication for circumferential speeds up to 12 m/s.

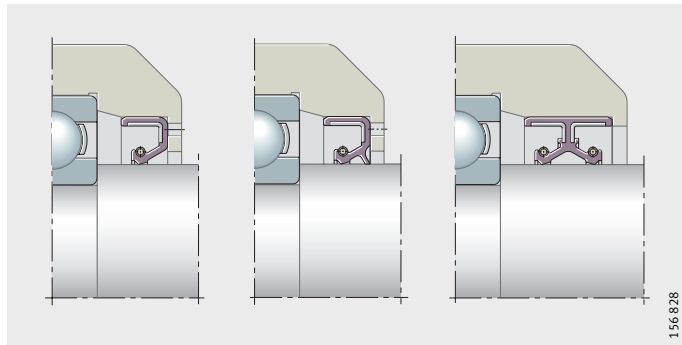
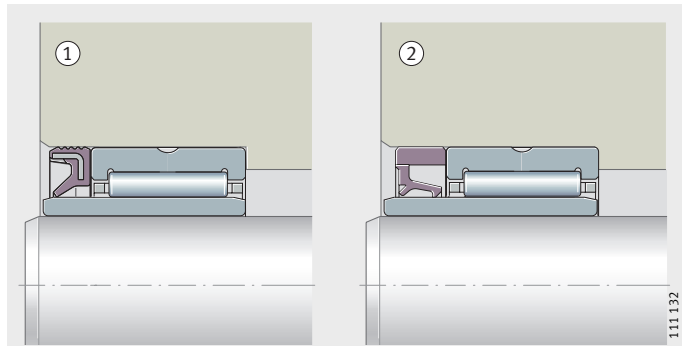


Figure 40
Rotary shaft seals

INA sealing rings for needle roller bearings

These compact sealing rings are matched to INA needle roller bearings and are suitable for circumferential speeds at the running surface of up to 10 m/s, *Figure 41*.
INA inner rings are recommended as sealing ring raceways.



① INA sealing ring G
② INA sealing ring SD

Figure 41
INA sealing rings for needle roller bearings

Lip seal with axial sealing action

The V ring is a lip seal with axial sealing action, *Figure 42*.
During fitting, this single piece rubber ring is pushed under tension along the shaft until its lip is in axial contact with the housing wall. The seal lip acts simultaneously as a flinger shield.

Axial lip seals are unaffected by radial misalignment and slight skewing of the shaft.

Rotating V rings are suitable with grease lubrication for circumferential speeds up to 12 m/s, stationary V rings up to 20 m/s. For circumferential speeds over 8 m/s, the V ring must be axially abutted and, from 12 m/s, it must be radially clamped in addition.

V rings are frequently used as outer seals in order to keep contamination away from a rotary shaft seal.

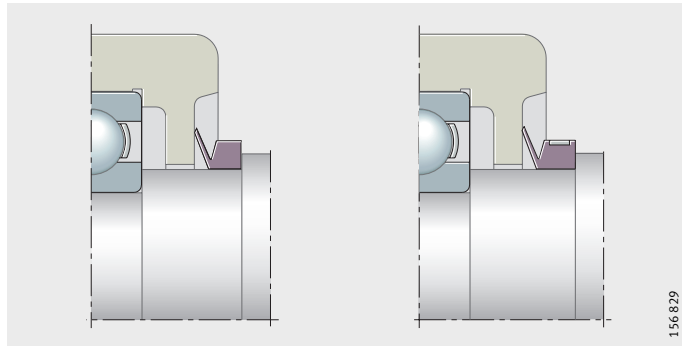


Figure 42
V ring

Axial spring seals

When using grease lubrication, effective sealing can also be achieved by means of axial spring seals, *Figure 43*. The thin sheet metal washers are clamped to the end face of the inner ring or outer ring and are axially sprung against the other bearing ring.

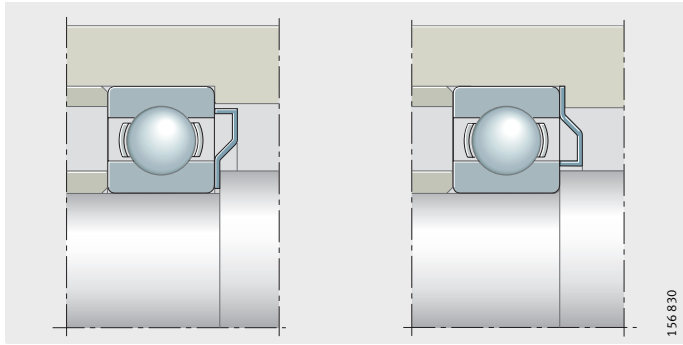


Figure 43
Spring seals

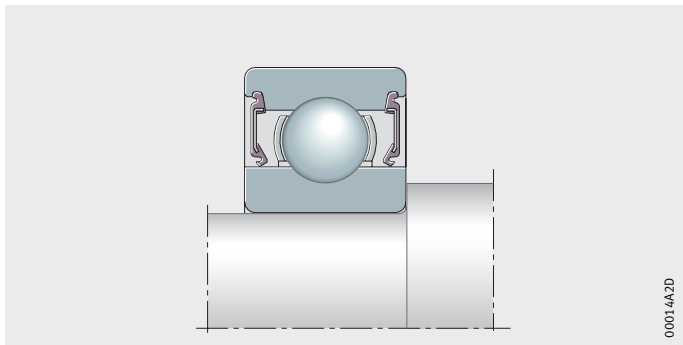
Contact seals in the bearing

Sealing washers

Bearings fitted with one or two sealing washers allow simple designs, *Figure 44*. The washers are suitable for giving protection against dust, contamination, damp atmospheres and slight pressure differentials.

Sealing washers are used, for example, in maintenance-free bearings with grease filling.

The sealing washer design RSR made from acrylonitrile butadiene rubber (NBR), normally used in deep groove ball bearings, is located under slight radial contact pressure against a cylindrically ground inner ring rib.



Sealing washers 2RSR

Figure 44
Sealing washers on both sides

Handling

Rolling bearings, rolling bearing parts and Arcanol rolling bearing greases are high quality goods and thus require careful handling.

Storage of rolling bearings

The performance capability of modern rolling bearings lies at the boundaries of what is technically feasible. The materials, dimensional and geometrical tolerances, surface quality and lubrication have been optimised for maximum levels of function, which means that even slight deviations in functional areas, such as those caused by corrosion, can impair the performance capacity.
In order to realise the full performance capability of rolling bearings, it is essential to match the anti-corrosion protection, packaging, storage and handling to each other.

The anti-corrosion protection and packaging are a constituent part of the bearing and are thus optimised so that they preserve all characteristics of the product at the same time as far as possible. In addition to protecting the surface against corrosion, this includes emergency running lubrication, friction, lubricant compatibility, noise behaviour, resistance to ageing and compatibility with rolling bearing components (cage and seal material).

Storage conditions for rolling bearings

As a basic prerequisite, parts must be stored in a closed storage area which cannot be affected by any aggressive media, such as exhaust gases from vehicles or gases, mist or aerosols of acids, lyes or salts. Direct sunlight should be avoided since, apart from the harmful effects of UV radiation, it can lead to wide temperature fluctuations in the packaging. The temperature should be constant and air humidity should be as low as possible. Jumps in temperature and increased humidity lead to condensation.

The following conditions must be fulfilled:

- frost-free storage, i.e. at a temperature $>$ +5 °C
  (to prevent formation of white frost, a limit of +2 °C is permissible for a maximum of 12 hours per day)
- maximum temperature +40 °C
  (to prevent excessive drainage of anti-corrosion oils)
- relative humidity $<$ 65%
  (if changes in temperature occur, a limit of 70 °C is permissible up to 12 hours per day).

The temperature and humidity must be continuously monitored. This can be carried out using a datalogger. The measurements must be taken at intervals of no more than 2 hours.

At least 2 measurement points must be selected: the highest point and the lowest point in the vicinity of an external wall at which the goods can be stored.

Storage periods for rolling bearings

Rolling bearings should not be stored for longer than 3 years. This applies both to open and to greased bearings with sealing shields or washers. In particular, specifically greased rolling bearings should not be stored for too long, since the chemical-physical behaviour of greases may change during storage. Even if the minimum performance capacity remains, the safety reserves of the grease may have diminished.

In general, rolling bearings can be used even after their permissible storage period has been exceeded if the storage conditions during storage and transport were observed. If the conditions are not fulfilled, shorter storage periods must be anticipated. If the periods are exceeded, it is recommended that the bearing should be checked for corrosion, the condition of the anti-corrosion oil and the condition of the grease before it is used.

Storage of Arcanol rolling bearing greases

The information on storage of rolling bearings applies correspondingly to Arcanol rolling bearing greases. The precondition is that the Arcanol rolling bearing grease is stored in closed, completely filled original containers.

Storage periods for Arcanol rolling bearing greases

Rolling bearing greases are mixtures of oil, thickener and additives. Such mixtures of liquid and solid substances do not have unlimited stability. During storage, their chemical-physical characteristics may change and they should therefore be used up as soon as possible.

If the storage conditions are observed, Arcanol greases can be stored without loss of performance for 3 years. As in the case of rolling bearings, the permissible storage period should not be seen as a rigid limit.

If stored as prescribed, most greases can be used after 3 years, if allowance is made for small changes. If there is any doubt when using older greases, the random sample checking of chemical-physical characteristics is recommended in order to determine any changes in the grease. It is therefore not possible to state storage periods for containers that have been opened. If containers are to be stored after opening, the grease surface should always be brushed flat, the container should be sealed airtight and it should be stored such that the empty space is upwards. High temperatures should be avoided in all cases.

Unpacking of rolling bearings

Perspiration leads to corrosion. Hands should be kept clean and dry and protective gloves worn if necessary. Bearings should only be removed from their original packaging immediately before assembly. If bearings are removed from multi-item packaging with dry preservation, the package must closed again immediately, since the protective vapour phase is only effective in closed packaging. Bearings should be oiled or greased immediately after unpacking.

Compatibility, miscibility

The anti-corrosion agents in bearings with an oil-based preservative are compatible and miscible with oils and greases having a mineral oil base. Compatibility should be checked if synthetic lubricants or thickeners other than lithium or lithium complex soaps are used. If there is an incompatibility, the anti-corrosion oil should be washed out before greasing, especially in the case of lubricants with a PTFE/alkoxyfluoroether base and thickeners based on polycarbamide. Bearings should be washed out if the lubricant is changed or the bearings are contaminated. If in doubt, please contact the relevant lubricant manufacturer.

Cleaning of rolling bearings

The following are suitable for degreasing and washing of rolling bearings:

- aqueous neutral, acidic or alkaline cleaning agents. Check the compatibility of alkaline agents with aluminium components before cleaning
- organic cleaning agents such as paraffin oil free from water and acid, petroleum ether (not petrol), spirit, dewatering fluids, freon 12 substitutes, cleaning agents containing chlorinated hydrocarbons.

Cleaning should be carried out using brushes, paint brushes or lint-free cloths. In the case of resinous oil or grease residues, precleaning by mechanical means followed by treatment with an aqueous, strongly alkaline cleaning agent is recommended.

Legal regulations relating to handling, environmental protection and health and safety at work must be observed. The specifications of the cleaning agent manufacturer must be observed.

Paraffin oil, petroleum ether, spirit and dewatering fluids are flammable, alkaline agents are corrosive. The use of chlorinated hydrocarbons is associated with the risk of fire, explosion and decomposition as well as with health hazards. These hazards and appropriate protective measures are described comprehensively in Code of Practice ZH1/425 of the Hauptverband der gewerblichen Berufsgenossenschaften (German Federation of Institutions for Statutory Accident Insurance and Prevention).

Rolling bearings must be dried and preservative applied immediately after cleaning (risk of corrosion).

Fitting

Comprehensive information on fitting and dismantling is given in the publications WL 80 100, Mounting of Rolling Bearings and WL 80 250, Equipment and Services for the Mounting and Maintenance of Rolling Bearings.

For more extensive work, a fitting manual should be available that precisely describes all relevant work. The manual should also contain details on means of transport, fitting equipment, measurement tools, type and quantity of lubricant and a precise description of the fitting procedure.

Guidelines for fitting

The following guidelines must always be taken into account:

- The assembly area must be kept clean and free from dust.
- Protect bearings from dust, contaminants and moisture. Contaminants have a detrimental influence on the running and operating life of rolling bearings.
- Before fitting, familiarise yourself with the design by means of the final assembly drawing.
- Before fitting, check whether the bearing presented for fitting corresponds to the data in the drawing.
- Check the housing bore and shaft seat for dimensional and geometrical accuracy and cleanliness.
- Check that the shaft and housing bore have a lead chamfer of 10° to 15°.
- Wipe away any anti-corrosion agent from the seating and contact surfaces, wash anti-corrosion agent out of tapered bores.
- Lubricate the seats of the bearing rings lightly with oil or solid lubricant.
- Do not cool the bearings excessively. Moisture due to condensation can lead to corrosion in the bearings and bearing seats.
- After fitting, provide the rolling bearings with lubricant.
- Check the correct functioning of the bearing arrangement.

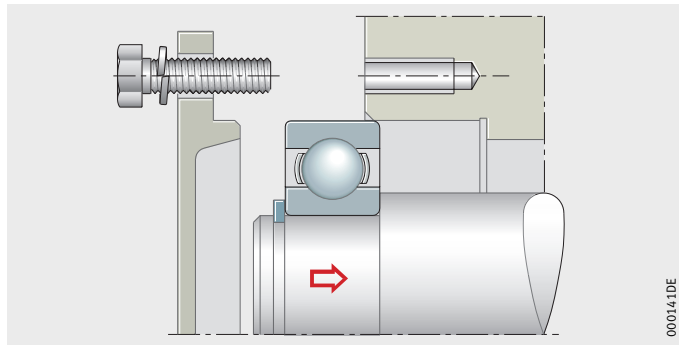
Fitting of rolling bearings with cylindrical seats

Avoid applying direct blows to the bearing rings with a hammer.

Non-separable bearings

In non-separable bearings, apply the fitting forces to the ring with a tight fit, which should also be fitted first, *Figure 1*.

If the inner ring of a non-separable bearing will have a tight fit, press the bearing onto the shaft first, *Figure 1*. The bearing together with the shaft is then pushed into the housing (fit clearance).

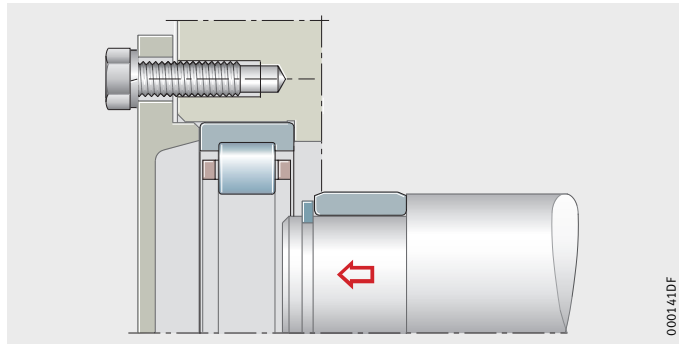


Tight fit of the inner ring, fitting of this ring first

Figure 1
Non-separable bearing

Separable bearings

In separable bearings fitting is easier; both rings can be fitted individually, *Figure 2*. Rotating the ring while fitting to give a screwdriver effect will help to avoid scraping marks.



Tight fit of the inner ring, individual fitting of rings

Figure 2
Separable bearing

Cold fitting of bearings by pressing

Bearings up to d = 80 mm can be pressed onto the shaft while cold for normal tight fits, *Figure 3*. Mechanical or hydraulic presses can be used for this purpose.

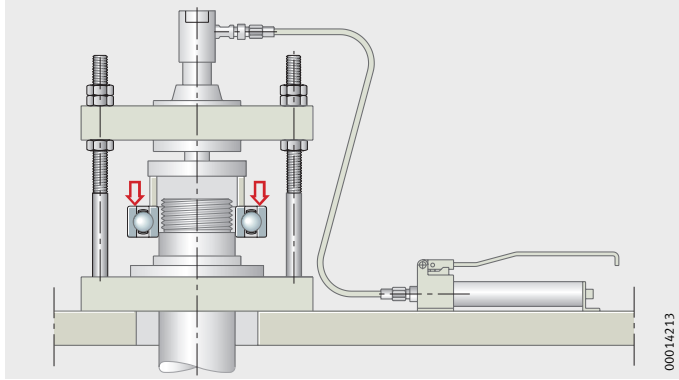
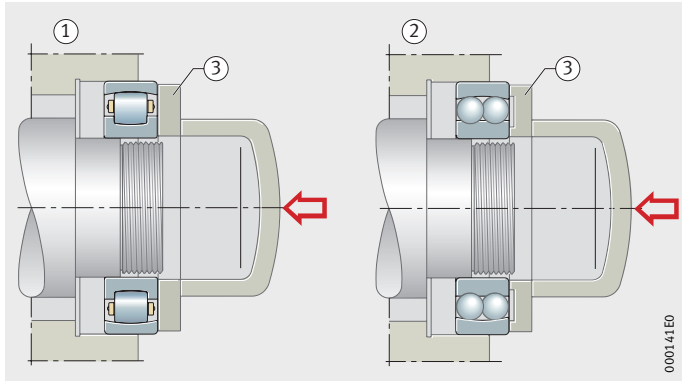


Figure 3
Fitting using hydraulic press

If a press is not available, the bearings can be fitted by means of a hammer and a mounting sleeve.

In bearings with an angular adjustment facility, tilting of the outer ring is prevented by a mounting disc that is in contact with both bearing rings, *Figure 4*. In bearings with axially protruding cages or balls (e.g. some self-aligning ball bearings), the disc must have a turned recess, *Figure 4* ②.

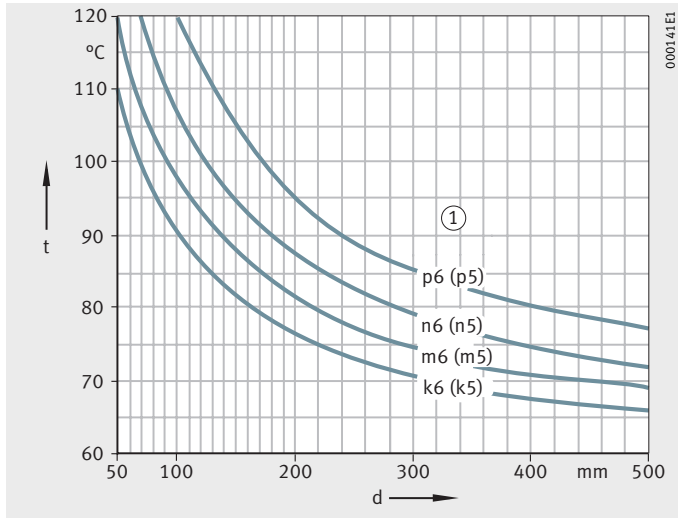


① Without turned recess,
for barrel roller bearings
② With turned recess,
for some self-aligning ball bearings
③ Mounting disc

Figure 4
Fitting with mounting disc

Heating of bearings

Bearings with a cylindrical bore should be heated before fitting if a tight fit on the shaft is intended and excessive effort is required for pressing by mechanical means. The temperature required for fitting is shown in *Figure 5*. The data are valid for maximum fit interference, a room temperature of +20 °C and a temperature safety margin of 30 K.



① Shaft tolerance
t = heating temperature
d = bearing bore diameter

Figure 5
Heating temperature

Induction heating devices

Induction heating devices are characterised by rapid, safe and clean operation. The devices are used mainly in volume fitting work.

Heating plate

Individual bearings can be heated on an electric heating plate. A thermostatic controller must be always be used.

Heating cabinet

Thermostatically controlled hot air or heating cabinets are safe and clean. This method is mainly used for small and medium sized bearings. The heating times are relatively long.

Oil bath

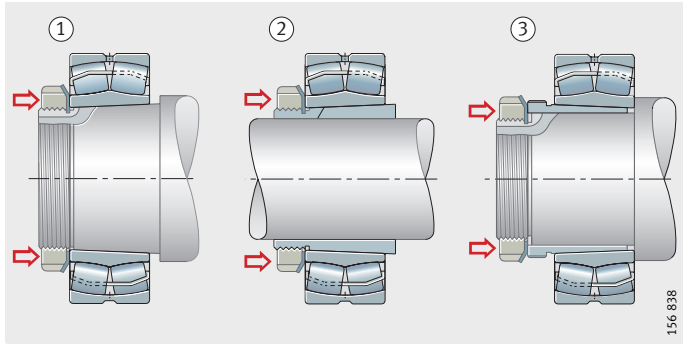
With the exception of sealed, greased bearings and high precision bearings, rolling bearings of all sizes and types can be heated in an oil bath. A thermostatic controller is advisable (temperature +80 °C to +100 °C). In order that the bearings are heated uniformly, they should be laid on a grid or suspended in the oil bath.

With this method, please note the risk of accidents, environmental pollution by oil vapour, flammability of hot oil and risk of bearing contamination.

Fitting of rolling bearings with tapered bore

Bearings with a tapered bore are mounted either directly on the tapered shaft seat or by means of an adapter sleeve or withdrawal sleeve on a cylindrical shaft, *Figure 6* ①, ②, ③.

Small bearings (up to approx. d = 80 mm) must be driven onto the tapered shaft seat or adapter sleeve using a locknut. The tight fit is achieved by pressing the inner ring on in an axial direction. The nut is tightened using, for example, a hook wrench. Small withdrawal sleeves can also be pressed into the gap between the shaft and inner ring bore using a locknut.



① Fitting using a locknut
② Fitting on an adapter sleeve using the adapter sleeve nut
③ Fitting on a withdrawal sleeve using a locknut

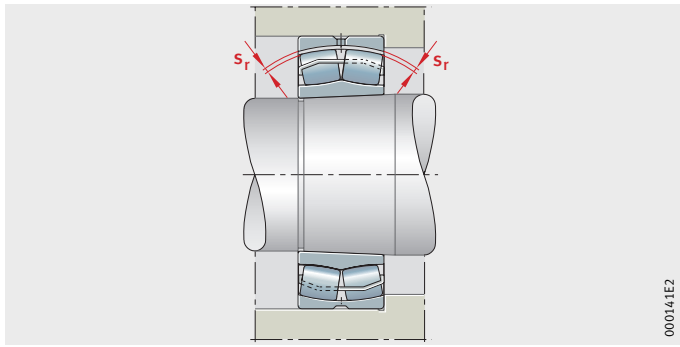
Figure 6
Mounting of rolling bearings with a tapered bore

Reduction in radial internal clearance

The reduction in radial internal clearance as a result of inner ring expansion is used as a means of checking the tight fit. In spherical roller bearings, the radial internal clearance (s_r) must be measured simultaneously over both rows of rollers, *Figure 7*. Alternatively, the axial displacement is measured.

Values for reduction in radial internal clearance and displacement in spherical roller bearings, see Spherical roller bearings, page 572.

For the measurement of radial internal clearance, aids such as feeler gauges FEELER-GAUGE-100 and FEELER-GAUGE-300 are suitable.



Spherical roller bearing
s_r = radial internal clearance

Figure 7
Radial internal clearance

Fitting using pressure screws or hydraulic tool

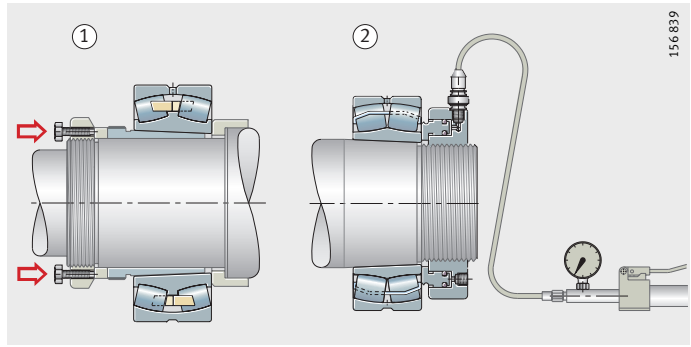
Even in the case of medium sized bearings, the forces required to tighten nuts are considerable. In such cases, fitting can be made easier by using locknuts with pressure screws, *Figure 8* ①.
This method is not suitable for spherical roller bearings of E1 design.

For the fitting of large bearings, a hydraulic device should be used to drive up the product or press in the sleeve, *Figure 8* ②.
Hydraulic nuts are available for all common threaded sleeves and shafts.

Hydraulic method

The hydraulic method gives considerable assistance in the fitting and particularly in the dismantling of bearings of approx. d = 160 mm and above.

For fitting, an oil with a viscosity of 75 mm^2/s at +20 °C (nominal viscosity 32 mm^2/s at +40 °C) is recommended.



① Fitting on withdrawal sleeve using locknut and pressure screws
② Fitting on tapered shaft using hydraulic nut

Figure 8
Mounting of rolling bearings with a tapered bore

Guidelines for dismantling

Information on fitting and dismantling is given in the publications WL 80 100, Mounting of Rolling Bearings and WL 80 250, FAG Equipment and Services for the Mounting and Maintenance of Rolling Bearings.

Dismantling should be taken into consideration in the original design of the bearing position. If bearing rings are to be mounted with a tight fit, slots should be provided in the shaft or housing bore, for example, to allow removal of the rings.

If the bearing is to be reused, the following guidelines should be taken into consideration:

- do not use a concentrated or “hard” flame
- direct blows on the bearing rings should be avoided
- fitting forces must never be directed through the rolling elements
- carefully clean the bearings after dismantling.

Dismantling of rolling bearings on cylindrical seats

If the bearings and adjacent parts are to be reused, the removal tool should be applied to the ring fitted with a tight fit. In non-separable bearings, the ring fitted with a drive fit is dismantled and the ring with a tight fit is then removed.

Removal of small bearings

For the removal of small bearings, mechanical withdrawal devices, *Figure 9* or hydraulic presses are suitable. Dismantling is made easier if there are slots on the shaft or housing so that the withdrawal tool can be applied to the bearing ring with a tight fit.

Special devices are available for cases where withdrawal slots are not present.

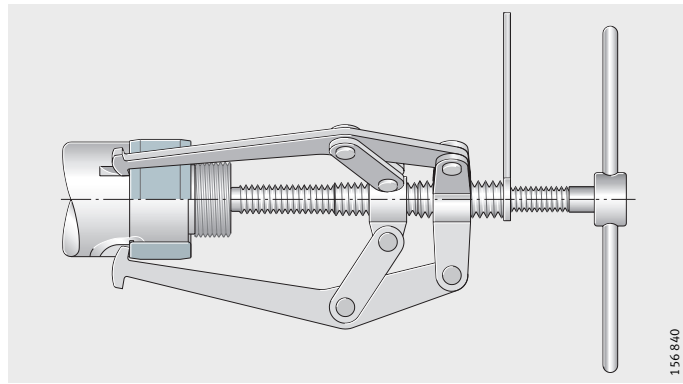


Figure 9
Withdrawal device with three adjustable arms

Removal of inner rings using an induction heating device

Induction heating devices are used to remove the shrink-fitted inner rings of cylindrical roller bearings, *Figure 10*.

Heating is achieved quickly and the rings are loosened easily without the transfer of substantial heat to the shaft.

Figure 10
Induction heating device

Heating rings

Heating rings made from light metal with radial slots can be used to dismantle the inner rings of cylindrical roller bearings that have no ribs or only one rigid rib, *Figure 11*. The rings are heated on an electric heating plate to between +200 °C and +300 °C, pushed over the bearing ring to be removed and clamped in place using the grips. Once the press fit on the shaft has been eliminated, both rings are removed together.

The bearing ring must be separated from the heating ring immediately after removal in order to prevent overheating.

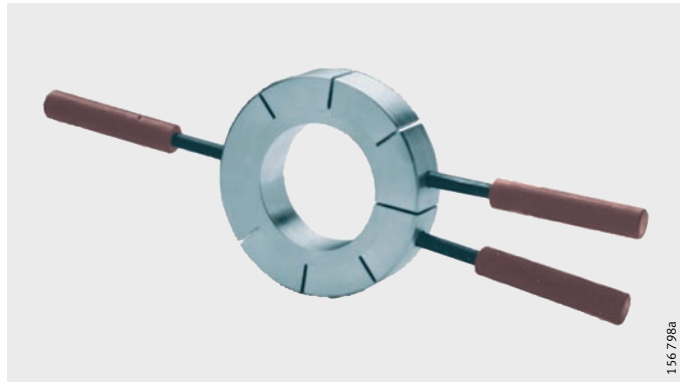


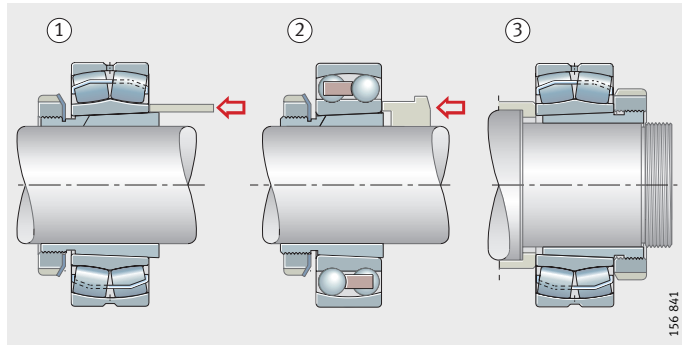
Figure 11
Heating ring

Dismantling of rolling bearings with tapered bore

Mechanical dismantling

Where bearings are mounted directly on a tapered shaft seat or on an adapter sleeve, the locking effect of the shaft or adapter sleeve nut must be loosened first. The nut is then unscrewed by the amount of the drive-up distance. The inner ring is then driven off the sleeve or shaft, for example using a metal drift or impact block, *Figure 12* ①, ②. An impact block avoids the risk of slipping.

Bearings located using withdrawal sleeves are dismantled using a withdrawal nut, *Figure 12* ③.



① Metal drift
② Impact block
③ Withdrawal nut

Figure 12
Dismantling of bearings

Large bearings located using a withdrawal sleeve require considerable force. In this case, locknuts with additional pressure screws can be used, *Figure 13* ①. A disc must be inserted between the inner ring and the pressure screws.

Hydraulic dismantling

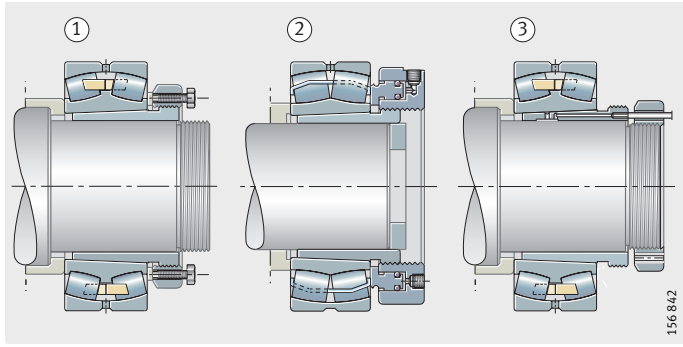
An easier and more economical method is the dismantling of withdrawal sleeves using hydraulic nuts, *Figure 13* ②.
The protruding withdrawal sleeve is supported by a heavy-section ring.

The dismantling of large bearings can be made easier by using the hydraulic method, *Figure 13* ③ and *Figure 14*. Oil is pressed between the fit surfaces. The adjacent parts can then moved in relation to each other by applying only slight force and without the risk of surface damage.

Tapered shafts must be provided with appropriate oil slots and feed holes. Oil injectors are sufficient to generate the pressure.
The arrangement of oil ducts in the hydraulic method for dismantling of a spherical roller bearing from a tapered shaft seat is shown in *Figure 14*.

The withdrawal sleeve becomes loose abruptly. Leave the nut on the shaft.

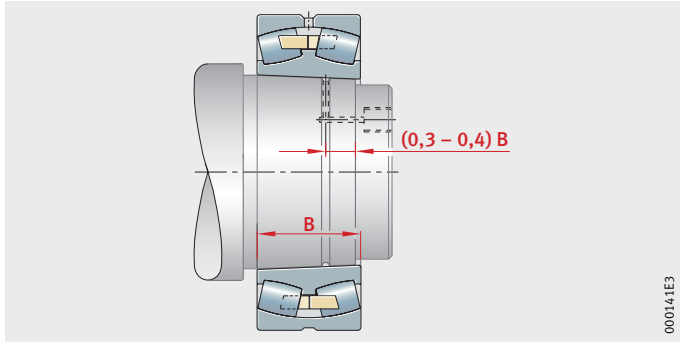
Large adapter and withdrawal sleeves already have the appropriate slots and holes. In this case, a pump must be used to generate the oil pressure required.



Dismantling of a withdrawal sleeve:
① Using a nut and pressure screws
② Using a hydraulic nut

Dismantling of a spherical roller bearing from the withdrawal sleeve:
③ Using the hydraulic method

Figure 13
Dismantling of a withdrawal sleeve and spherical roller bearing



B = bearing width

Figure 14
Oil ducts for dismantling a spherical roller bearing

Fitting and dismantling

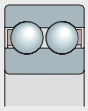
Suitable oils

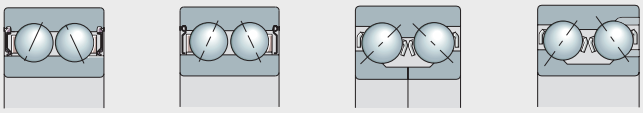
For dismantling, the oils used should have a viscosity of approx. 150 mm^2/s at +20 °C (nominal viscosity 46 mm^2/s at +40 °C).

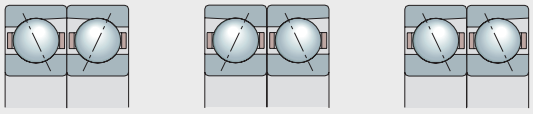
Fretting corrosion can be dissolved by rust-dissolving additives in the oil.

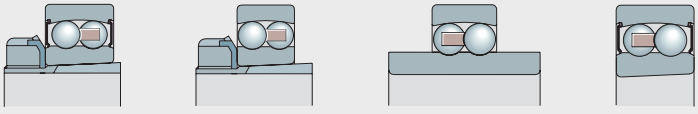
Disposal of bearings after dismantling

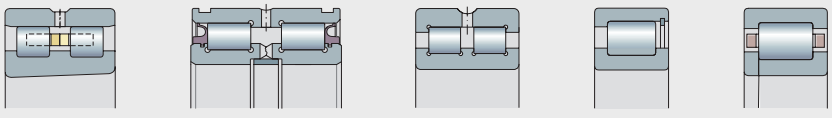
If the bearings are not to be reused after dismantling, the products should be separated into their constituent parts. Grease, seals and plastic parts should be disposed of in accordance with the relevant waste product guidelines. Bearing rings and rolling elements should be sent for recycling.

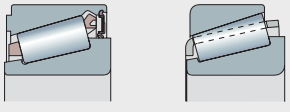

191 545

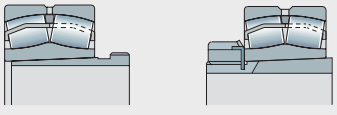

191 547


191 549

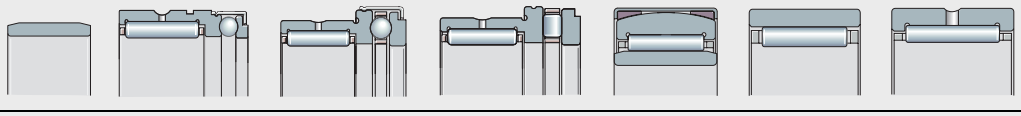

191 551

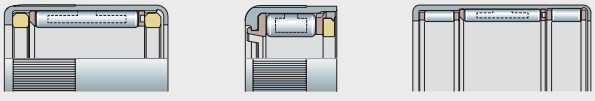

00014A12

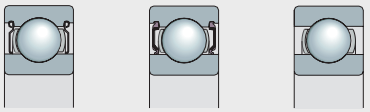

00013A00


191 560

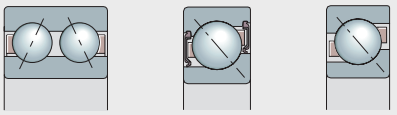
191 565


191 567

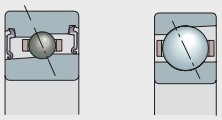

191 571


191 586

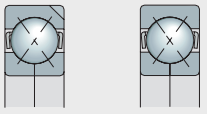
Deep groove ball bearings


191 548

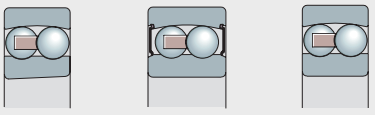
Angular contact ball bearings


191 587

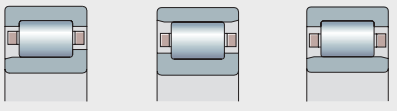
Spindle bearings


191 588

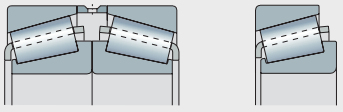
Four point contact bearings


191 552

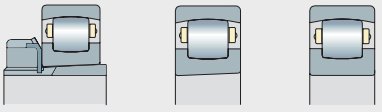
Self-aligning ball bearings


191 554

Cylindrical roller bearings


191 589

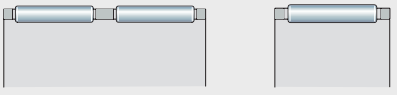
Tapered roller bearings


191 590

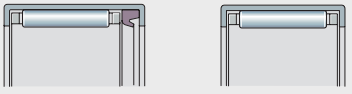
Barrel roller bearings

191 591

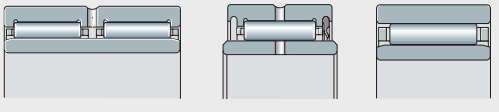
Spherical roller bearings


191 592

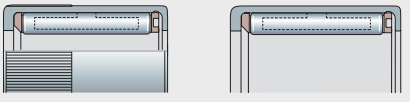
Needle roller and cage assemblies


191 566

Drawn cup needle roller bearings


191 568

Machined needle roller bearings
Inner rings

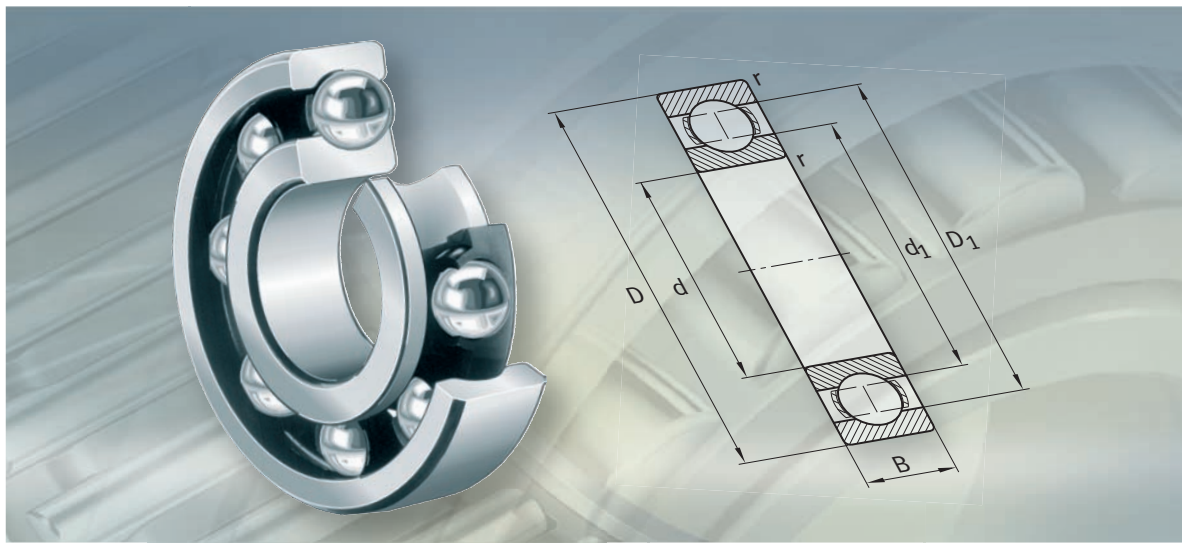

191 593

Drawn cup roller clutches

191 594

Sealing rings

FAG



Deep groove ball bearings

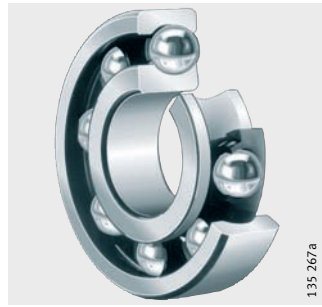
Single row
Double row

Deep groove ball bearings

		Page
Product overview	Deep groove ball bearings	206
Features	Radial and axial load capacity	207
	Single row deep groove ball bearings	207
	Double row deep groove ball bearings	208
	Operating temperature	209
	Cages	209
	Suffixes	210
Design and safety guidelines	Equivalent dynamic bearing load	211
	Equivalent static bearing load	213
	Axial load carrying capacity	214
	Minimum radial load	214
	Design of bearing arrangements	214
Accuracy		214
	Radial internal clearance of bearings with cylindrical bore	215
Dimension tables	Deep groove ball bearings, single row, open or sealed	216
	Deep groove ball bearings, single row, open	250
	Deep groove ball bearings, double row	254

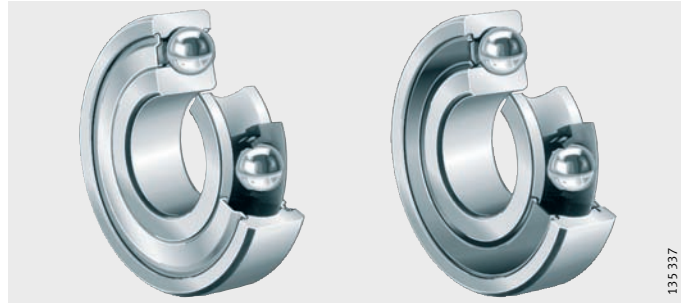
Single row

**160, 60, 62, 63, 64,
618, 619**



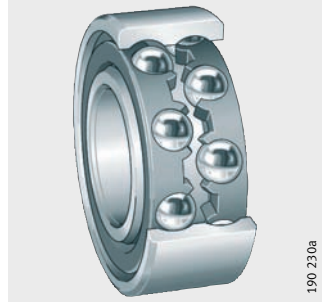
Gap seals
Lip seals

**60..-2Z, 62..-2Z, 63..-2Z, 618..-2Z, 619..-2Z,
60..-2RSR, 62(622)..-2RSR, 63(623)..-2RSR, 618(619)..-2RSR**



Double row

42..-B, 43..-B



Deep groove ball bearings

Features

Deep groove ball bearings are versatile, self-retaining bearings with solid outer rings, inner rings and ball and cage assemblies.

These products, which are of simple design, robust in operation and easy to maintain, are available in single and double row designs and in open and sealed variants. Due to the manufacturing processes used, open bearings can have turned recesses in the outer ring for seals or shields. Due to their low frictional torque, deep groove ball bearings are suitable for high speeds.

Radial and axial load capacity

Due to the raceway geometry and the balls used as rolling elements, deep groove ball bearings can support axial loads in both directions as well as radial loads, see Axial load carrying capacity, page 214.

Compensation of angular misalignments

The angular adjustment facility of single row deep groove ball bearings is limited, so the bearing positions must be well aligned.

Misalignments can lead to unfavourable ball running and induce additional loads in the bearing that shorten the operating life. In order to keep these loads at a low level, only small adjustment angles are permissible (dependent on the load) for single row deep groove ball bearings, see section Axial load carrying capacity, page 214.

Due to their internal construction, double row deep groove ball bearings do not have an angular adjustment facility. When using these bearings, therefore, misalignments are not permissible.

Load and adjustment angle for single row deep groove ball bearings

Series	Adjustment angle	
	Low loads	High loads
62, 622, 63, 623, 64	5′ to 10′	8′ to 16′
618, 619, 160, 60	2′ to 6′	5′ to 10′

Single row deep groove ball bearings

Single row deep groove ball bearings are the most frequently used type of rolling bearing. They are produced in numerous sizes and designs and are particularly economical.

Sealing

Open bearings are suitable for high to very high speeds.

Deep groove ball bearings with the suffix 2Z have gap seals on both sides and are suitable for high speeds.

Bearings with the suffix 2RSR have lip seals on both sides made from nitrile butadiene rubber NBR and are suitable for moderate speeds.

By agreement, we can supply bearings with non-contact BRS seals on both sides (suffix 2BRS). These bearings have favourable frictional behaviour equivalent to that of bearings with Z seals. If the inner ring is stationary and the outer ring rotates, the lubricant loss is less than that in bearings with Z seals.

Lubrication

Open bearings can be lubricated with grease or oil.

Deep groove ball bearings with gap or lip seals on both sides are greased with a high quality grease and are lubricated for life.

Anti-corrosion protection

For applications requiring high levels of anti-corrosion protection, we offer corrosion-resistant deep groove ball bearings in sealed and open designs. The range is described in detail in TPI 64, Corrosion-resistant products.

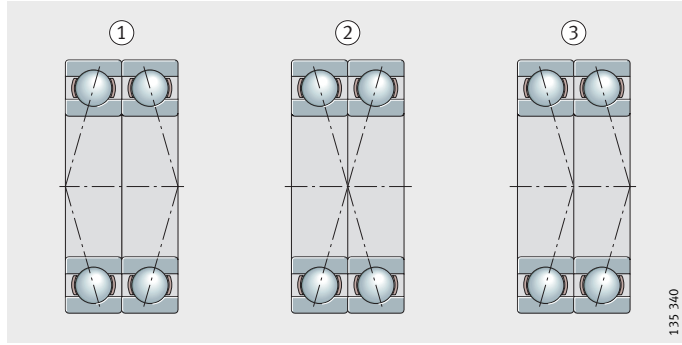
Matched single row deep groove ball bearings

By agreement, deep groove ball bearings of series 160, 60, 62, 63, 64 and 618 are available in various arrangements as matched pairs of bearings, *Figure 1*.

Sets in an O arrangement (suffix DB) can support axial loads in both directions as well as tilting moments.

Sets in an X arrangement (suffix DF) can support axial loads in both directions but are not suitable for tilting moments.

For high axial loads from one direction, pairs of bearings in a tandem arrangement are suitable (suffix DT).



① O arrangement, DB
② X arrangement, DF
③ Tandem arrangement, DT

Figure 1
Matched sets

Double row deep groove ball bearings

Double row deep groove ball bearings correspond in their structure and function to a pair of single row deep groove ball bearings. They are designed for high to very high speeds and are used where the load carrying capacity of single row deep groove ball bearings is not sufficient.

Double row deep groove ball bearings are wider than single row deep groove ball bearings of the same bore and outside diameter but have a significantly higher load carrying capacity.

Sealing

Double row deep groove ball bearings are not sealed.

Lubrication

The bearings are open and are greased using a high quality grease.

Operating temperature

Open deep groove ball bearings can be used up to an operating temperature of +120 °C. For applications at temperatures above +120 °C, please contact us. Bearings with a diameter D of more than 240 mm are dimensionally stable up to +200 °C.

Deep groove ball bearings with lip seals can be used at operating temperatures from –30 °C to +110 °C, limited by the grease and sealing ring material.

Bearings with gap seals can be used from –30 °C to +120 °C.

Bearings with cages made from glass fibre reinforced polyamide are suitable for operating temperatures up to +120 °C.

Cages

Single row deep groove ball bearings without a cage suffix have a sheet steel cage.

Deep groove ball bearings with ball-guided solid brass cages are indicated by the suffix M.

The suffix Y indicates bearings with a sheet brass cage.

Double row deep groove ball bearings have cages made from glass fibre reinforced polyamide (suffix TVH).

Check the chemical resistance of polyamide to synthetic greases and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures. The oil change intervals must be observed.

Cage and bore code

Series	Sheet steel cage	Sheet brass cage	Solid brass cage	Cage made from glass fibre reinforced polyamide
	Bore code			
42	–	–	–	All
43	–	–	–	All
60	up to 30, 34	–	32, from 36	–
62	up to 30	–	from 32	–
63	up to 24	–	from 26	–
64	up to 14	–	from 15	–
160	up to 52	–	from 56	–
618	up to 08, 26, 30 to 56	09 to 24, 28	from 60	–
619	up to 16	–	–	–
622	up to 10	–	–	–
623	up to 10	–	–	–

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
B	Modified internal construction	Standard
M	Solid brass cage, ball-guided	
DB	Two deep groove ball bearings in O arrangement, matched clearance-free	Special design, available by agreement
DF	Two deep groove ball bearings in X arrangement, matched clearance-free	
DT	Two deep groove ball bearings in tandem arrangement, matched clearance-free	
2RSR	Lip seals on both sides	Standard
RSR	Lip seal on one side	Special design, available by agreement
BRS	Labyrinth seal	
TVH	Cage made from glass fibre reinforced polyamide	
Y	Sheet brass cage	
2Z	Gap seals on both sides	
Z	Gap seal on one side	

Design and safety guidelines

Equivalent dynamic bearing load

For bearings under dynamic loading, the following applies:

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leqq e$	$P = F_r$
$\frac{F_a}{F_r} > e$	$P = X \cdot F_r + Y \cdot F_a$

P N
Equivalent dynamic bearing load for combined load
F_a N
Axial dynamic bearing load
F_r N
Radial dynamic bearing load
e, X, Y –
Factors: see table Factors e, X and Y.

The values according to the table Factors e, X and Y, are valid for normal fits:

- Shaft machined to j5 or k5, housing machined to J6.

Factors e, X and Y

$\frac{f_0 \cdot F_a}{C_{0r}}$	Factor for radial internal clearance								
	CN			C3			C4		
	e	X	Y	e	X	Y	e	X	Y
0,3	0,22	0,56	2	0,32	0,46	1,7	0,4	0,44	1,4
0,5	0,24	0,56	1,8	0,35	0,46	1,56	0,43	0,44	1,31
0,9	0,28	0,56	1,58	0,39	0,46	1,41	0,45	0,44	1,23
1,6	0,32	0,56	1,4	0,43	0,46	1,27	0,48	0,44	1,16
3	0,36	0,56	1,2	0,48	0,46	1,14	0,52	0,44	1,08
6	0,43	0,56	1	0,54	0,46	1	0,56	0,44	1

C_{0r} N
Basic static load rating according to dimension tables
f_0 –
Factor: see table Factor f_0 for deep groove ball bearings, page 212
F_a N
Axial dynamic bearing load.

Factor f_0 for deep groove ball bearings

Bore code	Factor f_0										
	618	619	160	60	62	622	63	623	64	42	43
3	–	–	–	–	12,9	–	–	–	–	–	–
4	–	–	–	–	12,2	–	12,4	–	–	–	–
5	–	–	–	–	13,2	–	12,2	–	–	–	–
6	–	–	–	–	13	–	–	–	–	–	–
7	–	–	–	13	12,4	–	–	–	–	–	–
8	–	–	–	12,4	13	–	–	–	–	–	–
9	–	–	–	13	12,4	–	–	–	–	–	–
00	14,8	14	–	12,4	12,1	12,1	11,3	–	–	12,1	–
01	15,3	14,5	–	13	12,3	12,2	11,1	–	–	12,7	–
02	15,8	14,3	13,9	13,9	13,1	13,1	12,1	12,1	–	13,4	12,8
03	16,1	14,7	14,3	14,3	13,1	13,1	12,3	12,2	12,4	13,1	13,1
04	15,8	14,5	14,9	13,9	13,1	13,1	12,4	12,1	13	13,8	13,1
05	16,3	15,2	15,4	14,5	13,8	13,8	12,4	12,4	13,1	14,3	13,2
06	16,5	15,6	15,2	14,8	13,8	13,8	13	13	12,2	14,3	13,8
07	16,3	15,5	15,6	14,8	13,8	13,8	13,1	13,1	12,1	14,5	13,1
08	16,1	15,4	16	15,3	14	14	13	13	12,2	14,9	13,2
09	16,2	15,7	15,9	15,4	14,3	14,1	13	13	12,1	15,3	13,9
10	16,1	16	16,1	15,6	14,3	14,3	13	13	13,1	15,5	13,8
11	16,2	16	16,1	15,4	14,3	–	12,9	–	13,2	15,5	13,8
12	16,3	16,1	16,3	15,5	14,3	–	13,1	–	13,2	15,4	13,8
13	16,2	16,3	16,4	15,7	14,3	–	13,2	–	13,2	15,3	–
14	16,1	16,1	16,2	15,5	14,4	–	13,2	–	13,3	15,5	–
15	16	16,2	16,4	15,7	14,7	–	13,2	–	13,3	15,7	–
16	15,9	16,4	16,4	15,6	14,6	–	13,2	–	12,3	15,7	–
17	16,2	–	16,4	15,7	14,7	–	13,1	–	12,3	15,7	–
18	16,1	–	16,3	15,6	14,5	–	13,9	–	12,2	15,5	–
19	16	–	16,5	15,7	14,4	–	13,9	–	–	–	–
20	16	–	16,5	15,9	14,4	–	13,8	–	–	–	–
21	15,9	–	16,3	15,8	14,3	–	13,8	–	–	–	–
22	16,1	–	16,3	15,6	14,3	–	13,8	–	–	–	–
24	16	–	16,5	15,9	14,8	–	13,5	–	–	–	–
26	16,1	–	16,4	15,8	14,5	–	13,6	–	–	–	–
28	16	–	16,5	16	14,8	–	13,6	–	–	–	–
30	16,1	–	16,4	16	15,2	–	13,7	–	–	–	–
32	16	–	16,5	16	15,2	–	13,9	–	–	–	–
34	16,1	–	16,4	15,7	15,3	–	13,9	–	–	–	–
36	16	–	16,3	15,6	15,3	–	13,9	–	–	–	–
38	16	–	16,4	15,8	15	–	14	–	–	–	–
40	16	–	16,3	15,6	15,3	–	14,1	–	–	–	–
44	15,9	–	16,3	15,6	15,2	–	14,1	–	–	–	–
48	15,9	–	16,5	15,8	15,2	–	14,2	–	–	–	–
52	15,9	–	16,4	15,7	15,2	–	–	–	–	–	–

continued
Factor f_0 for deep groove ball bearings

Bore code	Factor f_0										
	618	619	160	60	62	622	63	623	64	42	43
56	16	–	16,5	15,9	15,3	–	–	–	–	–	–
60	16	–	16,4	15,7	–	–	–	–	–	–	–
64	15,9	–	16,5	15,9	–	–	–	–	–	–	–
68	15,9	–	16,3	15,8	–	–	–	–	–	–	–
72	15,8	–	16,4	15,9	–	–	–	–	–	–	–
76	16	–	16,5	–	–	–	–	–	–	–	–
80	15,9	–	–	–	–	–	–	–	–	–	–
84	15,9	–	–	–	–	–	–	–	–	–	–
88	15,8	–	–	–	–	–	–	–	–	–	–
92	16	–	–	–	–	–	–	–	–	–	–
96	16	–	–	–	–	–	–	–	–	–	–
/500	15,9	–	–	–	–	–	–	–	–	–	–
/530	15,9	–	–	–	–	–	–	–	–	–	–
/560 ... / 850	15,8	–	–	–	–	–	–	–	–	–	–

Equivalent static bearing load

For bearings under static loading, the following applies:

Load ratio	Equivalent static load
$\frac{F_{0a}}{F_{0r}} \leqq 0,8$	$P_0 = F_{0r}$
$\frac{F_{0a}}{F_{0r}} > 0,8$	$P_0 = 0,6 \cdot F_{0r} + 0,5 \cdot F_{0a}$

P_0 N
Equivalent static bearing load for combined load

F_{0a} N
Axial static bearing load

F_{0r} N
Radial static bearing load.

Axial load carrying capacity

Deep groove ball bearings are also suitable for axial loads.

If the bearing is subjected to high loads and high speeds, a reduced life as well as increased friction and bearing temperature must be taken into consideration.

Minimum radial load

In order to ensure slippage-free operation, the bearings must be subjected to a minimum radial load. This applies particularly in the case of high speeds and high accelerations. In continuous operation, a minimum radial load of the order of $P/C_r > 0{,}01$ is necessary for ball bearings with cage.

Design of bearing arrangements

Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 150.

Recommended housing tolerances for radial bearings, see table, page 152.

Mounting dimensions

The dimension tables give the maximum dimension of the radius r_a and the diameters of the abutment shoulders D_a and d_a.

Accuracy

The main dimensions of single row deep groove ball bearings correspond to DIN 625-1, the main dimensions of double row deep groove ball bearings to DIN 625-3.

The dimensional and running tolerances correspond to tolerance class PN to DIN 620.

The width tolerance of matched bearings is different from this standard, see table.

Width tolerance of bearing rings in matched bearings

Bore diameter d mm		Width deviation Δ_{Bs} µm	
over	incl.	min.	max.
–	18	0	–250
18	50	0	–300
50	80	0	–450
80	120	0	–550
120	180	0	–750
180	250	0	–950
250	315	0	–1050
315	400	0	–1350
400	500	0	–1650

Radial internal clearance of bearings with cylindrical bore

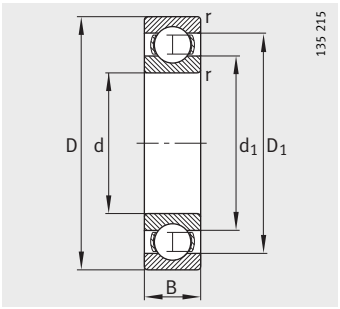
The radial internal clearance corresponds to internal clearance group CN to DIN 620-4.

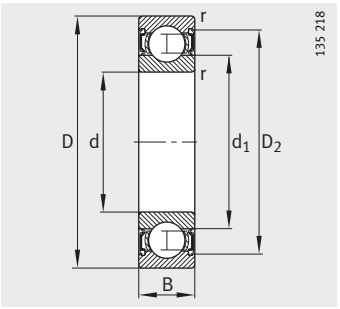
Radial internal clearance

Bore d mm		Radial internal clearance							
		C2 µm		CN µm		C3 µm		C4 µm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
1,5	6	0	7	2	13	8	23	–	–
6	10	0	7	2	13	8	23	14	29
10	18	0	9	3	18	11	25	18	33
18	24	0	10	5	20	13	28	20	36
24	30	1	11	5	20	13	28	23	41
30	40	1	11	6	20	15	33	28	46
40	50	1	11	6	23	18	36	30	51
50	65	1	15	8	28	23	43	38	61
65	80	1	15	10	30	25	51	46	71
80	100	1	18	12	36	30	58	53	84
100	120	2	20	15	41	36	66	61	97
120	140	2	23	18	48	41	81	71	114
140	160	2	23	18	53	46	91	81	130
160	180	2	25	20	61	53	102	91	147
180	200	2	30	25	71	63	117	107	163
200	225	2	35	25	85	75	140	125	195
225	250	2	40	30	95	85	160	145	225
250	280	2	45	35	105	90	170	155	245
280	315	2	55	40	115	100	190	175	270
315	355	3	60	45	125	110	210	195	300
355	400	3	70	55	145	130	240	225	340
400	450	3	80	60	170	150	270	250	380
450	500	3	90	70	190	170	300	280	420
500	560	10	100	80	210	190	330	310	470
560	630	10	110	90	230	210	360	340	520
630	710	20	130	110	260	240	400	380	570
710	800	20	140	120	290	270	450	430	630
800	900	20	160	140	320	300	500	480	700

Deep groove ball bearings

Single row
Open or sealed

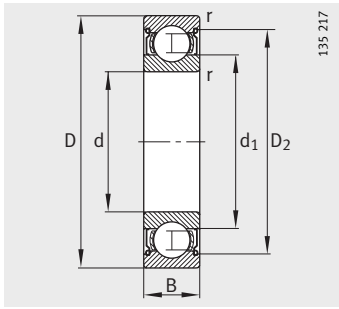




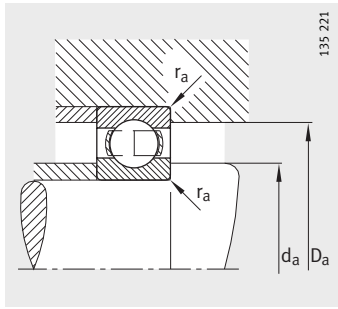
Seal 2RSR

Dimension table · Dimensions in mm

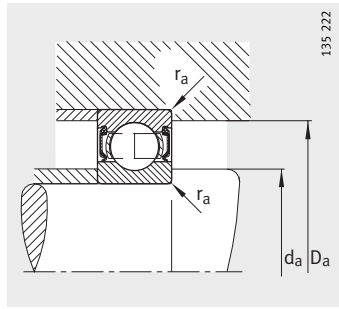
Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	D_2	d_1
	≈kg				min.	≈	≈	≈
623	0,001	**3**	10	4	0,15	7,7	–	5
623-2RSR	0,001	**3**	10	4	0,15	–	8,2	5
623-2Z	0,001	**3**	10	4	0,15	–	8,2	5
624	0,003	**4**	13	5	0,2	10,5	–	7
624-2RSR	0,003	**4**	13	5	0,2	–	11,2	7
624-2Z	0,004	**4**	13	5	0,2	–	11,2	7
634	0,006	**4**	16	5	0,3	12,5	–	8,5
634-2RSR	0,006	**4**	16	5	0,3	–	13,2	8,5
634-2Z	0,006	**4**	16	5	0,3	–	13,2	8,5
625	0,005	**5**	16	5	0,3	12,5	–	8,5
625-2RSR	0,005	**5**	16	5	0,3	–	13,2	8,5
625-2Z	0,005	**5**	16	5	0,3	–	13,2	8,5
635	0,008	**5**	19	6	0,3	15,5	–	10,8
635-2RSR	0,008	**5**	19	6	0,3	–	16,7	10,8
635-2Z	0,008	**5**	19	6	0,3	–	16,7	10,8
626	0,008	**6**	19	6	0,3	15,5	–	10,6
626-2RSR	0,008	**6**	19	6	0,3	–	16,7	10,6
626-2Z	0,008	**6**	19	6	0,3	–	16,7	10,6
607	0,007	**7**	19	6	0,3	15,5	–	10,6
607-2RSR	0,007	**7**	19	6	0,3	–	16,7	10,6
607-2Z	0,008	**7**	19	6	0,3	–	16,7	10,6
627	0,011	**7**	22	7	0,3	18	–	12,4
627-2RSR	0,011	**7**	22	7	0,3	–	19,1	12,4
627-2Z	0,012	**7**	22	7	0,3	–	19,1	12,4
608	0,01	**8**	22	7	0,3	18	–	12,4
608-2RSR	0,01	**8**	22	7	0,3	–	19,1	12,4
608-2Z	0,011	**8**	22	7	0,3	–	19,1	12,4
609	0,015	**9**	24	7	0,3	19,6	–	14
609-2RSR	0,016	**9**	24	7	0,3	–	20,5	14
609-2Z	0,016	**9**	24	7	0,3	–	20,5	14
629	0,02	**9**	26	8	0,3	21,4	–	14,7
629-2RSR	0,021	**9**	26	8	0,3	–	22,5	14,7
629-2Z	0,021	**9**	26	8	0,3	–	22,5	14,7



Seal 2Z



Mounting dimensions
Open design

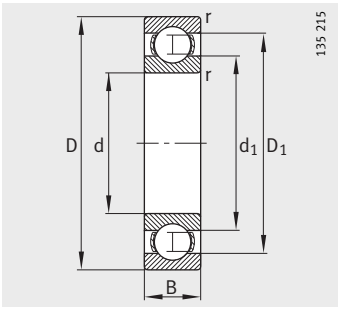


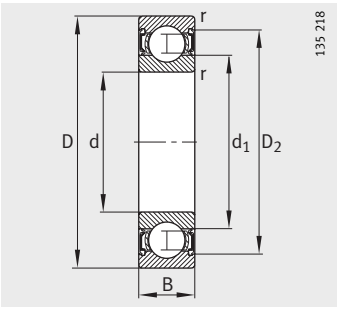
Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
4,4	8,6	0,15	640	220	10,6	53 000	57 000
4,4	8,6	0,15	640	220	10,6	32 000	–
4,4	8,6	0,15	640	220	10,6	45 000	57 000
5,8	11,2	0,2	1 290	490	24,6	45 000	46 500
5,8	11,2	0,2	1 290	490	24,6	26 000	–
5,8	11,2	0,2	1 290	490	24,6	38 000	46 500
6,4	13,6	0,3	1 730	670	35,5	43 000	35 000
6,4	13,6	0,3	1 730	670	35,5	24 000	–
6,4	13,6	0,3	1 730	670	35,5	36 000	35 000
7,4	13,6	0,3	1 320	440	22,4	43 000	36 500
7,4	13,6	0,3	1 320	440	22,4	24 000	–
7,4	13,6	0,3	1 320	440	22,4	36 000	36 500
7,4	16,6	0,3	2 600	1 100	53	40 000	31 500
7,4	16,6	0,3	2 600	1 100	53	22 000	–
7,4	16,6	0,3	2 600	1 100	53	32 000	31 500
8,4	16,6	0,3	2 600	1 100	53	38 000	32 500
8,4	16,6	0,3	2 600	1 100	53	22 000	–
8,4	16,6	0,3	2 600	1 100	53	32 000	32 500
9	17	0,3	2 600	1 100	53	38 000	34 500
9	17	0,3	2 600	1 100	53	22 000	–
9	17	0,3	2 600	1 100	53	32 000	35 500
9,4	19,6	0,3	3 250	1 370	72	36 000	30 000
9,4	19,6	0,3	3 250	1 370	72	20 000	–
9,4	19,6	0,3	3 250	1 370	72	30 000	30 000
10	20	0,3	3 250	1 370	72	36 000	31 500
10	20	0,3	3 250	1 370	72	20 000	–
10	20	0,3	3 250	1 370	72	30 000	32 500
11	22	0,3	3 650	1 630	89	36 000	28 500
11	22	0,3	3 650	1 630	89	20 000	–
11	22	0,3	3 650	1 630	89	30 000	29 000
11,4	23,6	0,3	4 550	1 960	93	34 000	25 500
11,4	23,6	0,3	4 550	1 960	93	19 000	–
11,4	23,6	0,3	4 550	1 960	93	28 000	25 500

Deep groove ball bearings

Single row
Open or sealed

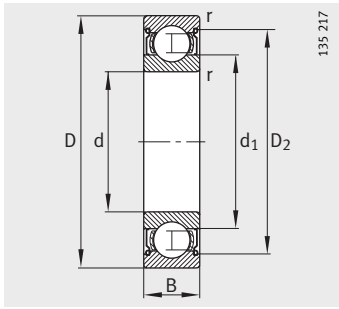




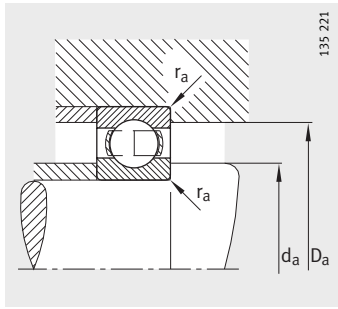
Seal 2RSR

Dimension table (continued) · Dimensions in mm

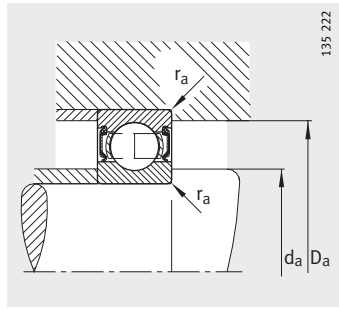
Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	D_2	d_1
	≈kg				min.	≈	≈	≈
61800	0,006	**10**	19	5	0,3	16,3	–	13
61800-2RSR	0,006	**10**	19	5	0,3	–	17	13
61800-2Z	0,006	**10**	19	5	0,3	–	17	13
61900	0,01	**10**	22	6	0,3	18,2	–	13,8
61900-2RSR	0,01	**10**	22	6	0,3	–	19,1	13,8
61900-2Z	0,01	**10**	22	6	0,3	–	19,1	13,8
6000	0,019	**10**	26	8	0,3	21,4	–	14,7
6000-2RSR	0,02	**10**	26	8	0,3	–	22,5	14,7
6000-2Z	0,02	**10**	26	8	0,3	–	22,5	14,7
6200	0,031	**10**	30	9	0,6	24	–	16,7
6200-2RSR	0,032	**10**	30	9	0,6	–	25	16,7
6200-2Z	0,032	**10**	30	9	0,6	–	25	16,7
62200-2RSR	0,048	**10**	30	14	0,6	–	25	16,7
6300	0,055	**10**	35	11	0,6	27	–	18,1
6300-2RSR	0,057	**10**	35	11	0,6	–	28,6	18,1
6300-2Z	0,057	**10**	35	11	0,6	–	28,6	18,1
61801	0,006	**12**	21	5	0,3	18,3	–	15
61801-2RSR	0,006	**12**	21	5	0,3	–	19	15
61801-2Z	0,006	**12**	21	5	0,3	–	19	15
61901	0,012	**12**	24	6	0,3	20,2	–	15,8
61801-2RSR	0,012	**12**	24	6	0,3	–	21,1	15,8
61801-2Z	0,012	**12**	24	6	0,3	–	21,1	15,8
6001	0,02	**12**	28	8	0,3	23,5	–	16,7
6001-2RSR	0,022	**12**	28	8	0,3	–	24,5	16,7
6001-2Z	0,02	**12**	28	8	0,3	–	24,5	16,7
6201	0,037	**12**	32	10	0,6	25,8	–	18,3
6201-2RSR	0,039	**12**	32	10	0,6	–	27,4	18,3
6201-2Z	0,039	**12**	32	10	0,6	–	27,4	18,3
62201-2RSR	0,051	**12**	32	14	0,6	–	27,4	18,3
6301	0,062	**12**	37	12	1	29,6	–	19,5
6301-2RSR	0,064	**12**	37	12	1	–	31,4	19,5
6301-2Z	0,064	**12**	37	12	1	–	31,4	19,5



Seal 2Z



Mounting dimensions
Open design

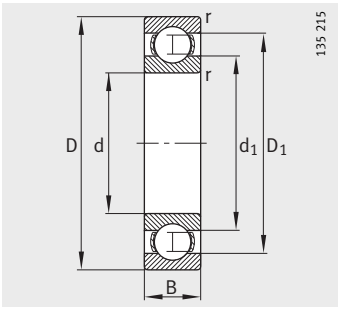


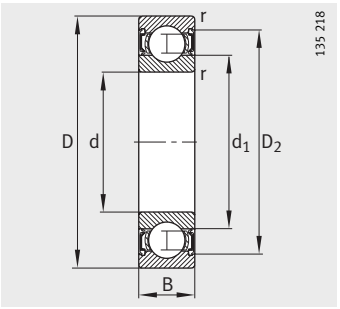
Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
12	17	0,3	1 450	590	29,5	43 000	27 500
12	17	0,3	1 450	590	29,5	18 000	–
12	17	0,3	1 450	590	29,5	36 000	27 500
12	20	0,3	2 200	840	42,5	40 000	27 000
12	20	0,3	2 200	840	42,5	17 300	–
12	20	0,3	2 200	840	42,5	34 000	27 000
12	24	0,3	4 550	1 960	93	34 000	28 500
12	24	0,3	4 550	1 960	93	19 000	–
12	24	0,3	4 550	1 960	93	28 000	28 500
14,2	25,8	0,6	6 000	2 600	171	32 000	23 400
14,2	25,8	0,6	6 000	2 600	171	17 000	–
14,2	25,8	0,6	6 000	2 600	171	26 000	23 400
14,2	25,8	0,6	6 000	2 600	158	17 000	–
14,2	30,8	0,6	8 150	3 450	230	56 000	21 100
14,2	30,8	0,6	8 150	3 450	230	15 000	–
14,2	30,8	0,6	8 150	3 450	230	22 000	21 100
14	19	0,3	1 520	670	33,5	38 000	23 600
14	19	0,3	1 520	670	33,5	18 000	–
14	19	0,3	1 520	670	33,5	32 000	23 600
14	22	0,3	2 360	980	49,5	36 000	23 500
14	22	0,3	2 360	980	49,5	18 000	–
14	22	0,3	2 360	980	49,5	30 000	23 500
14	26	0,3	5 100	2 360	130	32 000	25 000
14	26	0,3	5 100	2 360	130	18 000	–
14	26	0,3	5 100	2 360	130	26 000	25 000
16,2	27,8	0,6	6 950	3 100	198	30 000	22 200
16,2	27,8	0,6	6 950	3 100	198	16 000	–
16,2	27,8	0,6	6 950	3 100	198	24 000	22 200
16,2	27,8	0,6	6 950	3 100	198	16 000	–
17,6	31,4	1	9 650	4 150	280	53 000	20 000
17,6	31,4	1	9 650	4 150	280	13 000	–
17,6	31,4	1	9 650	4 150	280	20 000	20 000

Deep groove ball bearings

Single row
Open or sealed

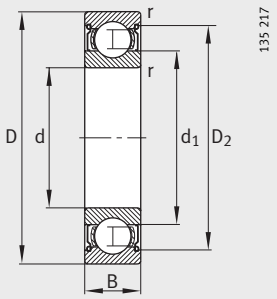




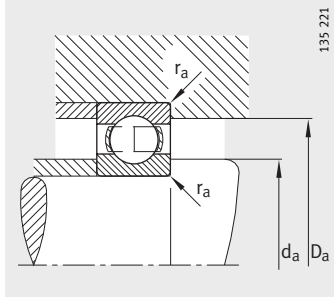
Seal 2RSR

Dimension table (continued) · Dimensions in mm

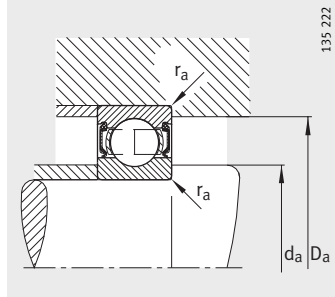
Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	D_2	d_1
	≈kg				min.	≈	≈	≈
61802	0,008	**15**	24	5	0,3	21,1	–	18
61802-2RSR	0,008	**15**	24	5	0,3	–	22	18
61802-2Z	0,008	**15**	24	5	0,3	–	22	18
61902	0,017	**15**	28	7	0,3	24,3	–	18,8
61902-2RSR	0,017	**15**	28	7	0,3	–	25,5	18,8
61902-2Z	0,017	**15**	28	7	0,3	–	25,5	18,8
16002	0,027	**15**	32	8	0,3	26,9	–	20,5
6002	0,031	**15**	32	9	0,3	26,9	–	20,5
6002-2RSR	0,033	**15**	32	9	0,3	–	28,4	20,5
6002-2Z	0,033	**15**	32	9	0,3	–	28,4	20,5
6202	0,043	**15**	35	11	0,6	29,3	–	21,1
6202-2RSR	0,045	**15**	35	11	0,6	–	30,9	21,1
6202-2Z	0,045	**15**	35	11	0,6	–	30,9	21,1
62202-2RSR	0,057	**15**	35	14	0,6	–	30,9	21,1
6302	0,088	**15**	42	13	1	33,5	–	23,6
6302-2RSR	0,09	**15**	42	13	1	–	35	23,6
6302-2Z	0,09	**15**	42	13	1	–	35	23,6
62302-2RSR	0,114	**15**	42	17	1	–	35	23,6



Seal 2Z



Mounting dimensions
Open design

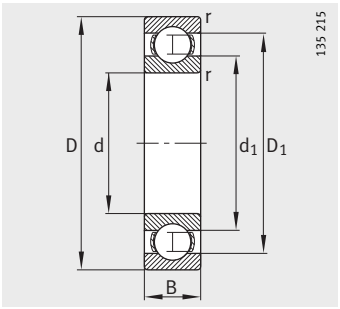


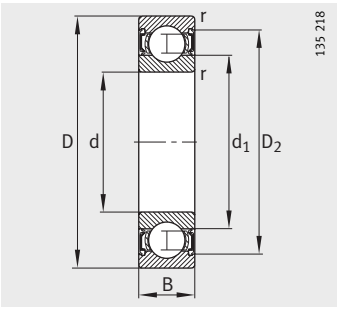
Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
17	22	0,3	1650	800	40,5	34000	19300
17	22	0,3	1650	800	40,5	16000	–
17	22	0,3	1650	800	40,5	28000	19300
17	26	0,3	4350	2260	125	30000	20600
17	26	0,3	4350	2260	125	15000	–
17	26	0,3	4350	2260	125	24000	20600
17	30	0,3	5600	2850	144	30000	20000
17	30	0,3	5600	2850	134	30000	22000
17	30	0,3	5600	2850	134	16000	–
17	30	0,3	5600	2850	134	24000	22000
19,2	30,8	0,6	7800	3750	220	26000	20200
19,2	30,8	0,6	7800	3750	220	14000	–
19,2	30,8	0,6	7800	3750	220	20000	20200
19,2	30,8	0,6	7800	3750	220	14000	–
20,6	36,4	1	11400	5400	350	43000	17500
20,6	36,4	1	11400	5400	350	12000	–
20,6	36,4	1	11400	5400	350	18000	17500
20,6	36,4	1	11400	5400	350	12000	–

Deep groove ball bearings

Single row
Open or sealed

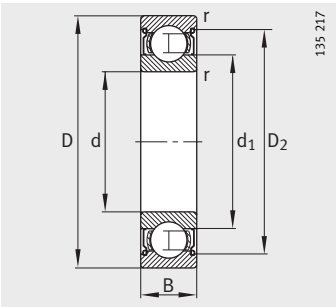




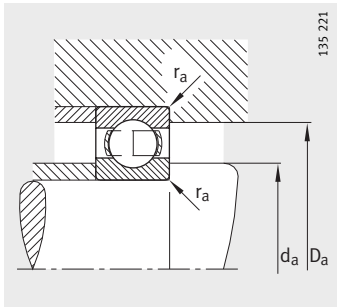
Seal 2RSR

Dimension table (continued) · Dimensions in mm

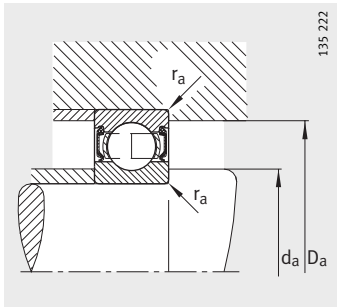
Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	D_2	d_1
	≈kg				min.	≈	≈	≈
61803	0,008	**17**	26	5	0,3	23	–	20
61803-2RSR	0,008	**17**	26	5	0,3	–	24	20
61803-2Z	0,008	**17**	26	5	0,3	–	24	20
61903	0,017	**17**	30	7	0,3	26,3	–	20,8
61903-2RSR	0,019	**17**	30	7	0,3	–	27,5	20,8
61903-2Z	0,019	**17**	30	7	0,3	–	27,5	20,8
16003	0,03	**17**	35	8	0,3	29,5	–	22,7
6003	0,038	**17**	35	10	0,3	29,5	–	22,7
6003-2RSR	0,04	**17**	35	10	0,3	–	30,8	22,7
6003-2Z	0,04	**17**	35	10	0,3	–	30,8	22,7
6203	0,065	**17**	40	12	0,6	33,1	–	24
6203-2RSR	0,067	**17**	40	12	0,6	–	34,4	24
6203-2Z	0,067	**17**	40	12	0,6	–	34,4	24
62203-2RSR	0,087	**17**	40	16	0,6	–	34,4	24
6303	0,114	**17**	47	14	1	37,9	–	26,2
6303-2RSR	0,118	**17**	47	14	1	–	39,3	26,2
6303-2Z	0,117	**17**	47	14	1	–	39,3	26,2
62303-2RSR	0,154	**17**	47	19	1	–	39,3	26,2
6403	0,269	**17**	62	17	1,1	50,2	–	36,4



Seal 2Z



Mounting dimensions
Open design

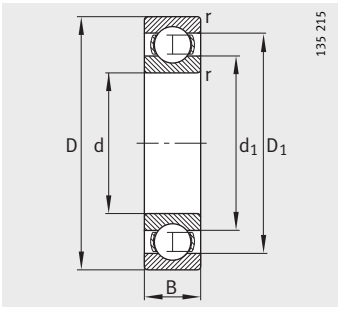


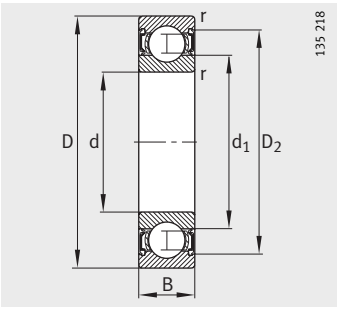
Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
19	24	0,3	1 770	930	47	30 000	17 200
19	24	0,3	1 770	930	47	15 000	–
19	24	0,3	1 770	930	47	24 000	17 200
19	28	0,3	4 600	2 550	135	28 000	18 500
19	28	0,3	4 600	2 550	135	14 000	–
19	28	0,3	4 600	2 550	135	22 000	18 500
19	33	0,3	6 000	3 250	157	28 000	17 700
19	33	0,3	6 000	3 250	157	28 000	21 000
19	33	0,3	6 000	3 250	157	14 000	–
19	33	0,3	6 000	3 250	157	22 000	21 000
21,2	35,8	0,6	9 500	4 750	275	22 000	18 100
21,2	35,8	0,6	9 500	4 750	275	12 000	–
21,2	35,8	0,6	9 500	4 750	275	18 000	18 100
21,2	35,8	0,6	9 500	4 750	280	12 000	–
22,6	41,4	1	13 400	6 550	425	30 000	15 900
22,6	41,4	1	13 400	6 550	425	11 000	–
22,6	41,4	1	13 400	6 550	425	16 000	15 900
22,6	41,4	1	13 400	6 550	425	11 000	–
26	53	1	22 400	11 400	750	28 000	13 700

Deep groove ball bearings

Single row
Open or sealed

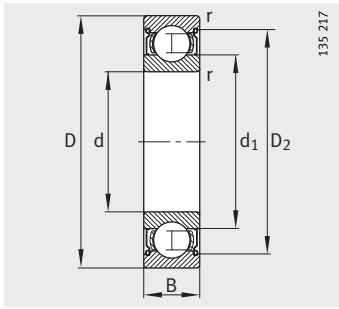




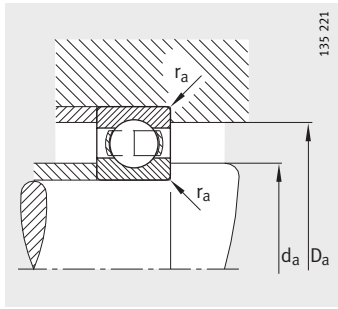
Seal 2RSR

Dimension table (continued) · Dimensions in mm

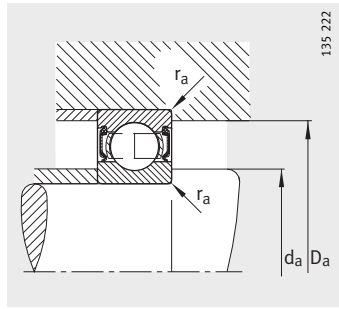
Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	D_2	d_1
	≈kg				min.	≈	≈	≈
61804	0,018	**20**	32	7	0,3	28,1	–	24
61804-2RSR	0,018	**20**	32	7	0,3	–	29,2	24
61804-2Z	0,018	**20**	32	7	0,3	–	29,2	24
61904	0,037	**20**	37	9	0,3	31,8	–	25,2
61904-2RSR	0,037	**20**	37	9	0,3	–	33,2	25,2
61904-2Z	0,037	**20**	37	9	0,3	–	33,2	25,2
16004	0,05	**20**	42	8	0,3	34,7	–	27,2
6004	0,069	**20**	42	12	0,6	35,5	–	26,6
6004-2RSR	0,071	**20**	42	12	0,6	–	37,4	26,6
6004-2Z	0,071	**20**	42	12	0,6	–	37,4	26,6
6204	0,106	**20**	47	14	1	38,4	–	28,8
6204-2RSR	0,11	**20**	47	14	1	–	41	28,8
6204-2Z	0,11	**20**	47	14	1	–	41	28,8
62204-2RSR	0,139	**20**	47	18	1	–	41	28,8
6304	0,151	**20**	52	15	1,1	41,9	–	30,3
6304-2RSR	0,155	**20**	52	15	1,1	–	44,4	30,3
6304-2Z	0,155	**20**	52	15	1,1	–	44,4	30,3
62304-2RSR	0,209	**20**	52	21	1,1	–	44,4	30,3
6404	0,414	**20**	72	19	1,1	59,6	–	44,6



Seal 2Z



Mounting dimensions
Open design

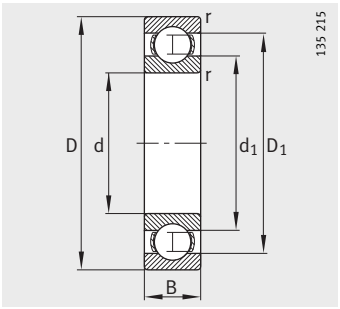


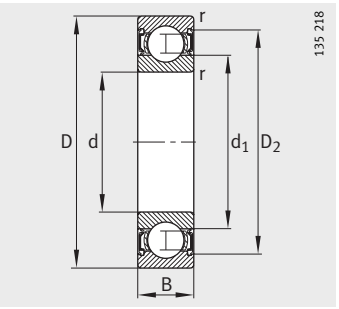
Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
22	30	0,3	3 900	2 320	117	24 000	16 600
22	30	0,3	3 900	2 320	117	11 500	–
22	30	0,3	3 900	2 320	117	19 000	16 600
22	35	0,3	6 300	3 700	191	22 000	17 000
22	35	0,3	6 300	3 700	191	11 500	–
22	35	0,3	6 300	3 700	191	18 000	17 000
22	40	0,3	6 950	4 050	202	22 000	14 300
23,2	38,8	0,6	9 300	5 000	285	20 000	18 900
23,2	38,8	0,6	9 300	5 000	285	12 000	–
23,2	38,8	0,6	9 300	5 000	285	17 000	18 900
25,6	41,4	1	12 700	6 550	440	18 000	16 300
25,6	41,4	1	12 700	6 550	440	10 000	–
25,6	41,4	1	12 700	6 550	440	15 000	16 300
25,6	41,4	1	12 700	6 550	385	10 000	–
27	45	1	16 000	7 800	530	34 000	14 400
27	45	1	16 000	7 800	530	9 500	–
27	45	1	16 000	7 800	530	14 000	14 400
27	45	1	16 000	7 800	495	9 500	–
27	65	1	29 000	16 300	1 020	24 000	12 100

Deep groove ball bearings

Single row
Open or sealed

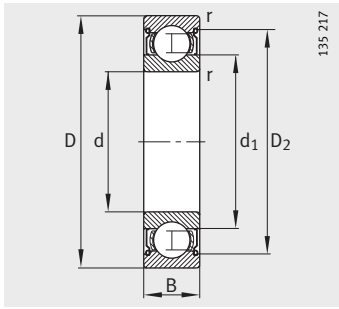




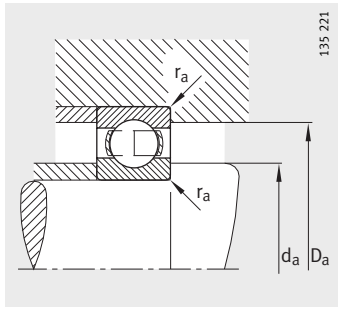
Seal 2RSR

Dimension table (continued) · Dimensions in mm

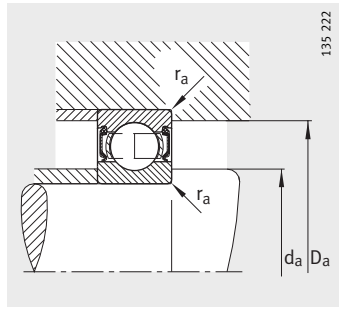
Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	D_2	d_1
	≈kg				min.	≈	≈	≈
61805	0,023	**25**	37	7	0,3	33,1	–	29
61805-2RSR	0,023	**25**	37	7	0,3	–	34,2	29
61805-2Z	0,023	**25**	37	7	0,3	–	34,2	29
61905	0,042	**25**	42	9	0,3	36,8	–	30,2
61905-2RSR	0,043	**25**	42	9	0,3	–	38,4	30,2
61905-2Z	0,043	**25**	42	9	0,3	–	38,4	30,2
16005	0,055	**25**	47	8	0,3	39,7	–	32,2
6005	0,081	**25**	47	12	0,6	40,2	–	32
6005-2RSR	0,085	**25**	47	12	0,6	–	42,5	32
6005-2Z	0,083	**25**	47	12	0,6	–	42,5	32
6205	0,129	**25**	52	15	1	43,6	–	33,5
6205-2RSR	0,133	**25**	52	15	1	–	45,4	33,5
6205-2Z	0,133	**25**	52	15	1	–	45,4	33,5
62205-2RSR	0,157	**25**	52	18	1	–	45,4	33,5
6305	0,234	**25**	62	17	1,1	50,2	–	36,4
6305-2RSR	0,242	**25**	62	17	1,1	–	52,5	36,4
6305-2Z	0,24	**25**	62	17	1,1	–	52,5	36,4
62305-2RSR	0,272	**25**	62	24	1,1	–	52,5	36,4
6405	0,549	**25**	80	21	1,5	65,5	–	49,3



Seal 2Z



Mounting dimensions
Open design

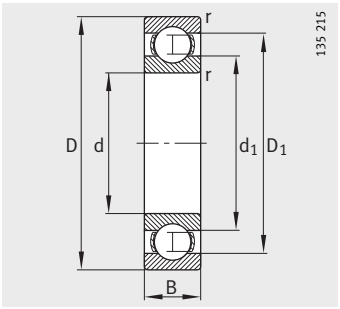


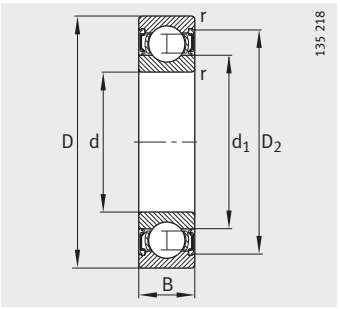
Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
27	35	0,3	4 150	2 600	132	20 000	13 500
27	35	0,3	4 150	2 600	132	9 800	–
27	35	0,3	4 150	2 600	132	17 000	13 500
27	40	0,3	6 900	4 350	219	19 000	14 000
27	40	0,3	6 900	4 350	219	9 800	–
27	40	0,3	6 900	4 350	219	16 000	14 000
27	45	0,3	7 200	4 650	215	19 000	12 000
28,2	43,8	0,6	10 000	5 850	305	36 000	15 800
28,2	43,8	0,6	10 000	5 850	305	10 000	–
28,2	43,8	0,6	10 000	5 850	305	15 000	15 800
30,6	46,4	1	14 000	7 800	510	17 000	14 400
30,6	46,4	1	14 000	7 800	510	9 000	–
30,6	46,4	1	14 000	7 800	510	14 000	14 400
30,6	46,4	1	14 000	7 800	415	9 000	–
32	55	1	22 400	11 400	750	28 000	12 300
32	55	1	22 400	11 400	750	7 500	–
32	55	1	22 400	11 400	750	11 000	12 300
32	55	1	22 400	11 400	750	7 500	–
36	71	1,5	33 500	19 000	1 250	20 000	11 000

Deep groove ball bearings

Single row
Open or sealed

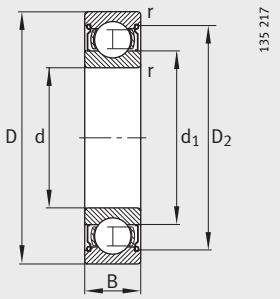




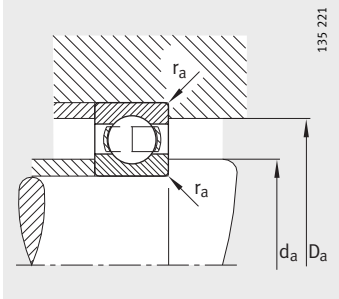
Seal 2RSR

Dimension table (continued) · Dimensions in mm

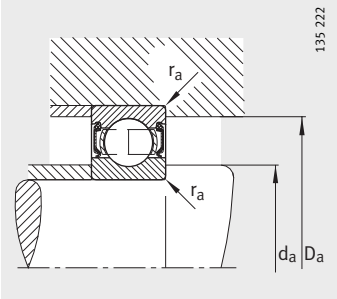
Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	D_2	d_1
	≈kg				min.	≈	≈	≈
61806	0,027	**30**	42	7	0,3	38,1	–	34
61806-2RSR	0,027	**30**	42	7	0,3	–	39,2	34
61806-2Z	0,027	**30**	42	7	0,3	–	39,2	34
61906	0,048	**30**	47	9	0,3	41,9	–	35,2
61906-2RSR	0,051	**30**	47	9	0,3	–	43,5	35,2
61906-2Z	0,051	**30**	47	9	0,3	–	43,5	35,2
16006	0,082	**30**	55	9	0,3	47,5	–	37,7
6006	0,122	**30**	55	13	1	47,2	–	38,3
6006-2RSR	0,126	**30**	55	13	1	–	49,2	38,3
6006-2Z	0,126	**30**	55	13	1	–	49,2	38,3
6206	0,195	**30**	62	16	1	52,1	–	40
6206-2RSR	0,201	**30**	62	16	1	–	54,9	40
6206-2Z	0,201	**30**	62	16	1	–	54,9	40
62206-2RSR	0,245	**30**	62	20	1	–	54,9	40
6306	0,355	**30**	72	19	1,1	59,6	–	44,6
6306-2RSR	0,365	**30**	72	19	1,1	–	61,6	44,6
6306-2Z	0,363	**30**	72	19	1,1	–	61,6	44,6
62306-2RSR	0,499	**30**	72	27	1,1	–	61,6	44,6
6406	0,74	**30**	90	23	1,5	74,6	–	55,6



Seal 2Z



Mounting dimensions
Open design

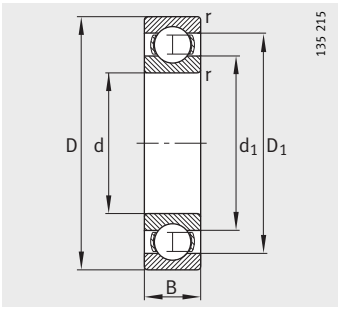


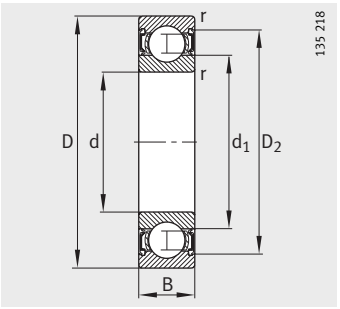
Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
32	40	0,3	4 300	2 900	249	18 000	11 300
32	40	0,3	4 300	2 900	249	8 400	–
32	40	0,3	4 300	2 900	249	15 000	11 300
32	45	0,3	7 000	4 600	231	17 000	11 900
32	45	0,3	7 000	4 600	231	8 100	–
32	45	0,3	7 000	4 600	231	14 000	11 900
32	53	0,3	11 200	7 350	365	16 000	10 400
34,6	50,4	1	12 700	8 000	390	32 000	13 600
34,6	50,4	1	12 700	8 000	390	8 500	–
34,6	50,4	1	12 700	8 000	390	13 000	13 600
35,6	56,4	1	19 300	11 200	680	14 000	12 000
35,6	56,4	1	19 300	11 200	680	7 500	–
35,6	56,4	1	19 300	11 200	680	11 000	12 000
35,6	56,4	1	19 300	11 200	680	7 500	–
37	65	1	29 000	16 300	1 020	24 000	10 800
37	65	1	29 000	16 300	1 020	6 300	–
37	65	1	29 000	16 300	1 020	9 500	10 800
37	65	1	29 000	16 300	1 020	6 300	–
39	81	1,5	42 500	25 000	1 640	18 000	10 000

Deep groove ball bearings

Single row
Open or sealed

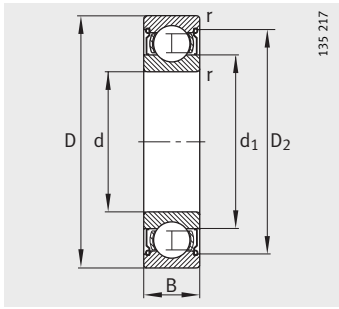




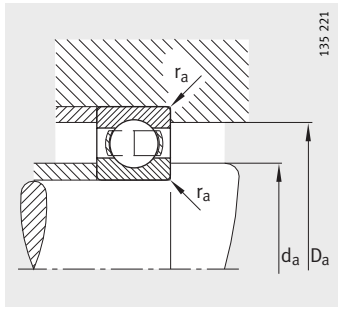
Seal 2RSR

Dimension table (continued) · Dimensions in mm

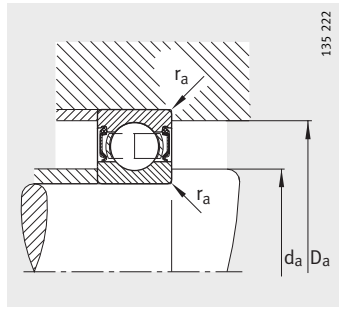
Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	D_2	d_1
	≈kg				min.	≈	≈	≈
61807	0,03	**35**	47	7	0,3	43,1	–	39
61807-2RSR	0,03	**35**	47	7	0,3	–	44,3	39
61807-2Z	0,03	**35**	47	7	0,3	–	44,3	39
61907	0,076	**35**	55	10	0,6	49	–	41,1
61907-2RSR	0,076	**35**	55	10	0,6	–	50,6	41,1
61907-2Z	0,076	**35**	55	10	0,6	–	50,6	41,1
16007	0,105	**35**	62	9	0,3	53,5	–	43,7
6007	0,157	**35**	62	14	1	53,3	–	43,2
6007-2RSR	0,163	**35**	62	14	1	–	55,4	43,2
6007-2Z	0,163	**35**	62	14	1	–	55,4	43,2
6207	0,291	**35**	72	17	1,1	60,7	–	47,2
6207-2RSR	0,301	**35**	72	17	1,1	–	63,3	47,2
6207-2Z	0,299	**35**	72	17	1,1	–	63,3	47,2
62207-2RSR	0,393	**35**	72	23	1,1	–	63,3	47,2
6307	0,471	**35**	80	21	1,5	65,5	–	49,3
6307-2RSR	0,483	**35**	80	21	1,5	–	67,6	49,3
6307-2Z	0,481	**35**	80	21	1,5	–	67,6	49,3
62307-2RSR	0,687	**35**	80	31	1,5	–	67,6	49,3
6407	0,971	**35**	100	25	1,5	83,3	–	62



Seal 2Z



Mounting dimensions
Open design

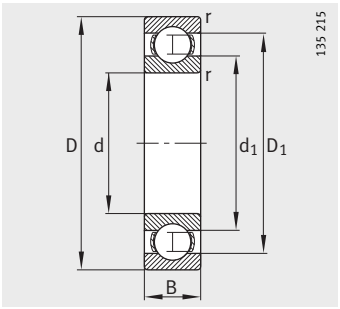


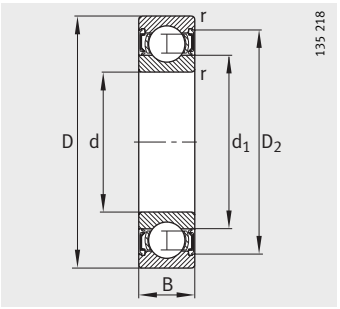
Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
37	45	0,3	4 450	3 200	285	16 000	9 600
37	45	0,3	4 450	3 200	285	7 300	–
37	45	0,3	4 450	3 200	285	13 000	9 600
38,2	51,8	0,6	9 500	6 800	325	14 000	10 500
38,2	51,8	0,6	9 500	6 800	325	6 900	–
38,2	51,8	0,6	9 500	6 800	325	11 500	10 500
37	60	0,3	12 200	8 800	415	14 000	8 900
39,6	57,4	1	16 000	10 200	550	28 000	12 100
39,6	57,4	1	16 000	10 200	550	7 500	–
39,6	57,4	1	16 000	10 200	550	11 000	12 100
42	65	1	25 500	15 300	920	24 000	10 300
42	65	1	25 500	15 300	920	6 300	–
42	65	1	25 500	15 300	920	9 500	10 300
42	65	1	25 500	15 300	920	6 300	–
44	71	1,5	33 500	19 000	1 250	20 000	9 900
44	71	1,5	33 500	19 000	1 250	5 600	–
44	71	1,5	33 500	19 000	1 250	8 500	9 900
44	71	1,5	33 500	19 000	1 250	5 600	–
46	89	1,5	53 000	31 500	2 180	16 000	8 900

Deep groove ball bearings

Single row
Open or sealed

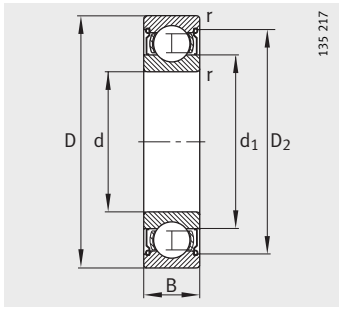




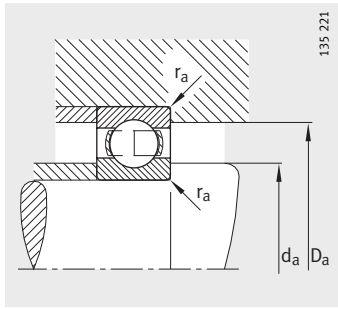
Seal 2RSR

Dimension table (continued) · Dimensions in mm

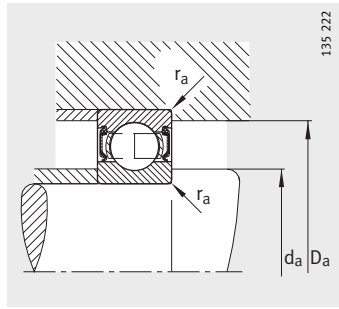
Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	D_2	d_1
	≈kg				min.	≈	≈	≈
61808	0,032	**40**	52	7	0,3	48,2	–	44
61808-2RSR	0,032	**40**	52	7	0,3	–	49,5	44
61808-2Z	0,032	**40**	52	7	0,3	–	49,5	44
61908	0,11	**40**	62	12	0,6	55,3	–	46,6
61908-2RSR	0,11	**40**	62	12	0,6	–	56,6	46,6
61908-2Z	0,11	**40**	62	12	0,6	–	56,6	46,6
16008	0,12	**40**	68	9	0,3	59,3	–	49,4
6008	0,194	**40**	68	15	1	59,1	–	49,3
6008-2RSR	0,202	**40**	68	15	1	–	61,6	49,3
6008-2Z	0,2	**40**	68	15	1	–	61,6	49,3
6208	0,372	**40**	80	18	1,1	67,5	–	53
6208-2RSR	0,384	**40**	80	18	1,1	–	70,4	53
6208-2Z	0,382	**40**	80	18	1,1	–	70,4	53
62208-2RSR	0,478	**40**	80	23	1,1	–	70,4	53
6308	0,64	**40**	90	23	1,5	74,6	–	55,6
6308-2RSR	0,654	**40**	90	23	1,5	–	76,5	55,6
6308-2Z	0,654	**40**	90	23	1,5	–	76,5	55,6
62308-2RSR	0,903	**40**	90	33	1,5	–	76,5	55,6
6408	0,805	**40**	110	27	2	91,6	–	68



Seal 2Z



Mounting dimensions
Open design

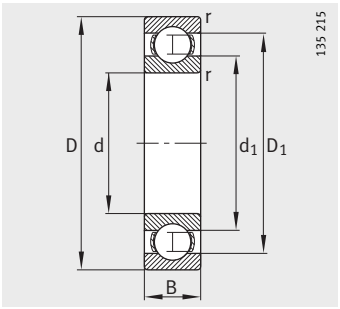


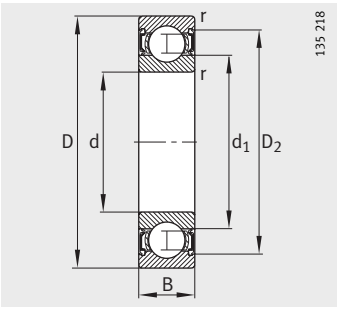
Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
42	50	0,3	4 600	3 500	320	14 000	8 400
42	50	0,3	4 600	3 500	320	6 500	–
42	50	0,3	4 600	3 500	320	11 000	8 400
43,2	58,8	0,6	13 700	10 000	540	12 000	10 000
43,2	58,8	0,6	13 700	10 000	540	6 100	–
43,2	58,8	0,6	13 700	10 000	540	10 000	10 000
42	66	0,3	13 200	10 200	465	13 000	7 800
44,6	63,4	1	16 600	11 600	580	26 000	11 100
44,6	63,4	1	16 600	11 600	580	6 700	–
44,6	63,4	1	16 600	11 600	580	10 000	11 100
47	73	1	29 000	18 000	1 050	20 000	9 300
47	73	1	29 000	18 000	1 050	5 600	–
47	73	1	29 000	18 000	1 050	8 500	9 300
47	73	1	29 000	18 000	1 050	5 600	–
49	81	1,5	42 500	25 000	1 640	18 000	9 000
49	81	1,5	42 500	25 000	1 640	5 000	–
49	81	1,5	42 500	25 000	1 640	7 500	9 000
49	81	1,5	42 500	25 000	1 640	5 000	–
53	97	2	62 000	38 000	2 500	14 000	8 200

Deep groove ball bearings

Single row
Open or sealed

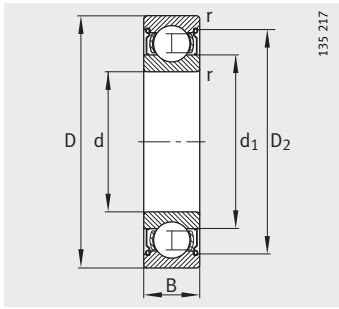




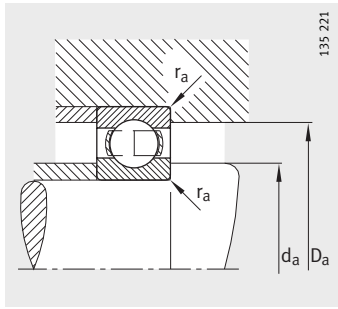
Seal 2RSR

Dimension table (continued) · Dimensions in mm

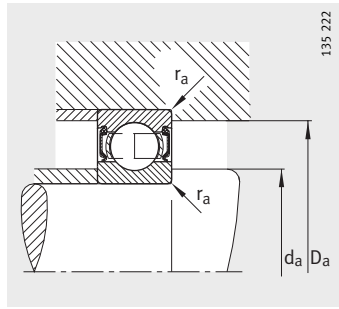
Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	D_2	d_1
	≈kg				min.	≈	≈	≈
61809-Y	0,039	**45**	58	7	0,3	54,1	–	49,1
61809-2RSR-Y	0,039	**45**	58	7	0,3	–	55,4	49,1
61809-2Z-Y	0,039	**45**	58	7	0,3	–	55,4	49,1
61909	0,13	**45**	68	12	0,6	60,8	–	52,1
61909-2RSR	0,13	**45**	68	12	0,6	–	62,1	52,1
61909-2Z	0,13	**45**	68	12	0,6	–	62,1	52,1
16009	0,167	**45**	75	10	0,6	65,6	–	55
6009	0,247	**45**	75	16	1	65,5	–	54,2
6009-2RSR	0,257	**45**	75	16	1	–	68	54,2
6009-2Z	0,253	**45**	75	16	1	–	68	54,2
6209	0,429	**45**	85	19	1,1	71,8	–	57,2
6209-2RSR	0,441	**45**	85	19	1,1	–	74,6	57,2
6209-2Z	0,441	**45**	85	19	1,1	–	74,6	57,2
62209-2RSR	0,522	**45**	85	23	1,1	–	74,6	57,2
6309	0,849	**45**	100	25	1,5	83,3	–	62,3
6309-2RSR	0,867	**45**	100	25	1,5	–	85,6	62
6309-2Z	0,869	**45**	100	25	1,5	–	85,6	62
62309-2RSR	1,2	**45**	100	36	1,5	–	85,6	62
6409	1,98	**45**	120	29	2	100,9	–	75,5



Seal 2Z



Mounting dimensions
Open design

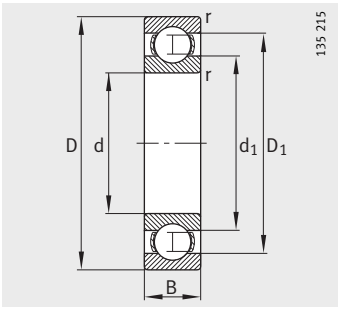


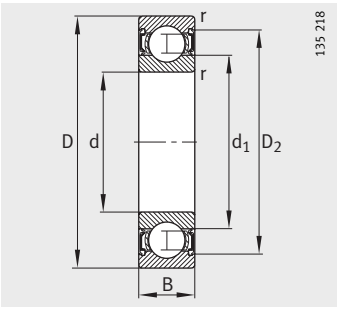
Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
47	56	0,3	6 400	5 600	285	14 000	9 000
47	56	0,3	6 400	5 600	285	7 500	–
47	56	0,3	6 400	5 600	285	11 000	9 000
48,2	64,8	0,6	14 000	10 800	570	26 000	8 900
48,2	64,8	0,6	14 000	10 800	570	6 700	–
48,2	64,8	0,6	14 000	10 800	570	10 000	8 900
48,2	71,8	0,6	15 600	12 200	580	22 000	7 300
49,6	70,4	1	20 000	14 300	730	22 000	10 200
49,6	70,4	1	20 000	14 300	730	6 000	–
49,6	70,4	1	20 000	14 300	730	9 000	10 200
52	78	1	31 000	20 400	1 150	19 000	8 700
52	78	1	31 000	20 400	1 150	5 300	–
52	78	1	31 000	20 400	1 150	8 000	8 700
52	78	1	31 000	20 400	1 150	5 300	–
54	91	1,5	53 000	31 500	2 180	16 000	8 300
54	91	1,5	53 000	31 500	2 180	4 500	–
54	91	1,5	53 000	31 500	2 180	6 700	8 300
54	91	1,5	53 000	31 500	2 180	4 500	–
58	107	2	76 500	47 500	3 050	13 000	7 600

Deep groove ball bearings

Single row
Open or sealed

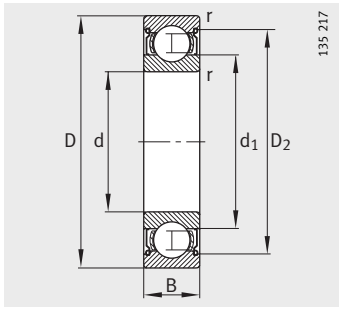




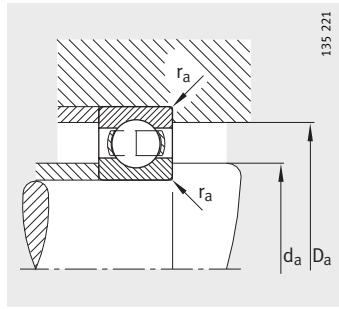
Seal 2RSR

Dimension table (continued) · Dimensions in mm

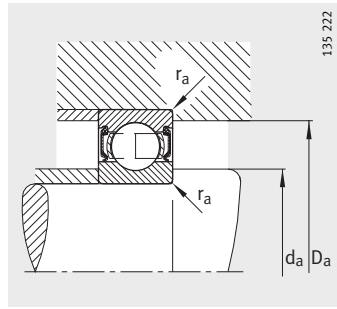
Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	D_2	d_1
	≈kg				min.	≈	≈	≈
61810-Y	0,052	**50**	65	7	0,3	60,5	–	55,1
61810-2RSR-Y	0,052	**50**	65	7	0,3	–	61,8	55,1
61810-2Z-Y	0,052	**50**	65	7	0,3	–	61,8	55,1
61910	0,13	**50**	72	12	0,6	65,5	–	56,6
61910-2RSR	0,13	**50**	72	12	0,6	–	68,6	56,6
16010	0,181	**50**	80	10	0,6	70,6	–	60,1
6010	0,272	**50**	80	16	1	70,1	–	59,8
6010-2RSR	0,283	**50**	80	16	1	–	72,9	59,8
6010-2Z	0,282	**50**	80	16	1	–	72,9	59,8
6210	0,466	**50**	90	20	1,1	77,9	–	62
6210-2RSR	0,48	**50**	90	20	1,1	–	80	62
6210-2Z	0,478	**50**	90	20	1,1	–	80	62
62210-2RSR	0,543	**50**	90	23	1,1	–	80	62
6310	1,1	**50**	110	27	2	91,6	–	68,3
6310-2RSR	1,12	**50**	110	27	2	–	95,1	68
6310-2Z	1,12	**50**	110	27	2	–	95,1	68
62310-2RSR	1,55	**50**	110	40	2	–	95,1	68,3
6410	1,96	**50**	130	31	2,1	108,4	–	81,6
61811-Y	0,084	**55**	72	9	0,3	66,5	–	60,6
61811-2RSR-Y	0,084	**55**	72	9	0,3	–	68,6	60,6
61811-2Z-Y	0,084	**55**	72	9	0,3	–	68,6	60,6
61911	0,18	**55**	80	13	1	72,3	–	62,6
61911-2RSR	0,18	**55**	80	13	1	–	74,2	62,6
16011	0,266	**55**	90	11	0,6	78	–	67,1
6011	0,397	**55**	90	18	1,1	78,9	–	66,2
6011-2RSR	0,41	**55**	90	18	1,1	–	81,5	66,2
6011-2Z	0,409	**55**	90	18	1,1	–	81,5	66,2
6211	0,618	**55**	100	21	1,5	86,1	–	68,9
6211-2RSR	0,632	**55**	100	21	1,5	–	88,2	68,7
6211-2Z	0,632	**55**	100	21	1,5	–	88,2	68,7
6311	1,39	**55**	120	29	2	100,9	–	75,5
6311-2RSR	1,43	**55**	120	29	2	–	104,3	75,2
6311-2Z	1,43	**55**	120	29	2	–	104,3	75,2
6411	1,38	**55**	140	33	2,1	117,5	–	88,6



Seal 2Z



Mounting dimensions
Open design

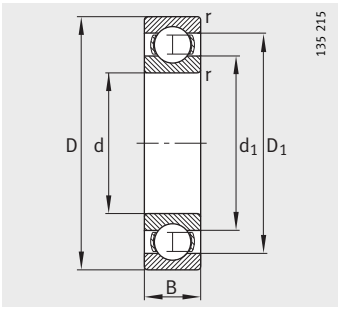


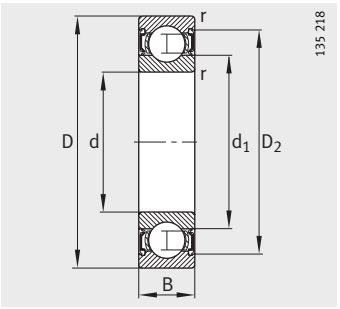
Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
52	63	0,3	6 800	6 300	265	13 000	8 000
52	63	0,3	6 800	6 300	265	6 700	–
52	63	0,3	6 800	6 300	265	9 300	8 000
53,2	68,8	0,6	14 600	11 800	600	22 000	8 100
53,2	68,8	0,6	14 600	11 800	600	6 000	–
53,2	76,8	0,6	16 000	13 200	610	20 000	6 700
54,6	75,4	1	20 800	15 600	770	20 000	9 300
54,6	75,4	1	20 800	15 600	770	5 600	–
54,6	75,4	1	20 800	15 600	770	8 500	9 300
57	83	1	36 500	24 000	1 420	18 000	8 200
57	83	1	36 500	24 000	1 420	4 800	–
57	83	1	36 500	24 000	1 420	7 500	8 200
57	83	1	36 500	24 000	1 420	4 800	–
61	99	2	62 000	38 000	2 600	14 000	7 700
61	99	2	62 000	38 000	2 600	4 000	–
61	99	2	62 000	38 000	2 600	6 000	7 700
61	99	2	62 000	38 000	2 600	4 000	–
64	116	2,1	81 500	52 000	3 400	12 000	7 200
57	70	0,3	9 000	8 500	375	11 000	8 000
57	70	0,3	9 000	8 500	375	6 000	–
57	70	0,3	9 000	8 500	375	9 000	8 000
59,6	75,4	1	16 600	14 000	700	19 000	7 500
59,6	75,4	1	16 600	14 000	700	5 600	–
58,2	86,8	0,6	19 300	16 300	780	18 000	6 200
61	84	1	28 500	21 200	1 120	18 000	8 700
61	84	1	28 500	21 200	1 120	5 000	–
61	84	1	28 500	21 200	1 120	7 500	8 300
64	91	1,5	43 000	29 000	1 720	16 000	7 500
64	91	1,5	43 000	29 000	1 720	4 300	–
64	91	1,5	43 000	29 000	1 720	6 700	7 500
66	109	2	76 500	47 500	3 050	13 000	7 100
66	109	2	76 500	47 500	3 050	3 600	–
66	109	2	76 500	47 500	3 050	5 300	7 100
69	126	2,1	93 000	60 000	3 950	11 000	6 700

Deep groove ball bearings

Single row
Open or sealed

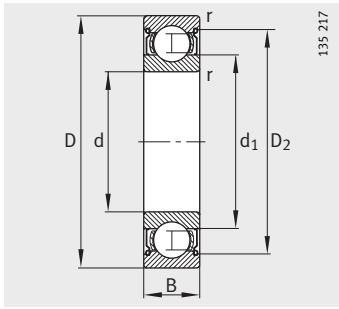




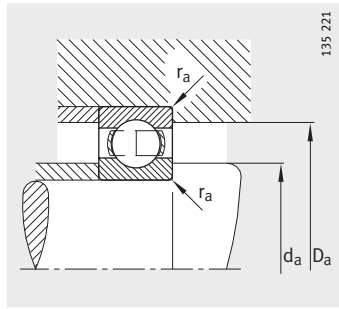
Seal 2RSR

Dimension table (continued) · Dimensions in mm

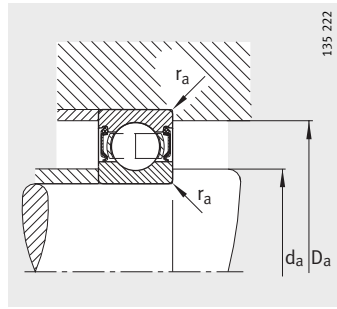
Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	D_2	d_1
	≈kg				min.	≈	≈	≈
61812-Y	0,105	**60**	78	10	0,3	72,6	–	65,6
61812-2RSR-Y	0,105	**60**	78	10	0,3	–	74,5	65,6
61812-2Z-Y	0,105	**60**	78	10	0,3	–	74,5	65,6
61912	0,19	**60**	85	13	1	77,3	–	67,6
61912-2RSR	0,19	**60**	85	13	1	–	79,2	67,6
16012	0,283	**60**	95	11	0,6	82,9	–	72,1
6012	0,419	**60**	95	18	1,1	83,9	–	71,3
6012-2RSR	0,432	**60**	95	18	1,1	–	86	71,3
6012-2Z	0,431	**60**	95	18	1,1	–	86	71,3
6212	0,791	**60**	110	22	1,5	95,6	–	76,1
6212-2RSR	0,809	**60**	110	22	1,5	–	97,7	75,8
6212-2Z	0,807	**60**	110	22	1,5	–	97,7	75,8
6312	1,75	**60**	130	31	2,1	108,4	–	81,6
6312-2RSR	1,79	**60**	130	31	2,1	–	113,1	81,3
6312-2Z	1,79	**60**	130	31	2,1	–	113,1	81,3
6412	2,83	**60**	150	35	2,1	126,3	–	95,1
61813-Y	0,13	**65**	85	10	0,6	78,6	–	71,6
61813-2RSR-Y	0,13	**65**	85	10	0,6	–	80,5	71,6
61813-2Z-Y	0,13	**65**	85	10	0,6	–	80,5	71,6
61913	0,2	**65**	90	13	1	82,3	–	72,6
16013	0,302	**65**	100	11	0,6	87,9	–	77,1
6013	0,448	**65**	100	18	1,1	88,8	–	76,2
6013-2RSR	0,463	**65**	100	18	1,1	–	91,5	76,2
6013-2Z	0,464	**65**	100	18	1,1	–	91,5	76,2
6213	1	**65**	120	23	1,5	103,1	–	82,3
6213-2RSR	1,03	**65**	120	23	1,5	–	106,3	82
6213-2Z	1,03	**65**	120	23	1,5	–	106,3	82
6313	2,14	**65**	140	33	2,1	117,5	–	88,6
6313-2RSR	2,18	**65**	140	33	2,1	–	122,2	88,3
6313-2Z	2,18	**65**	140	33	2,1	–	122,2	88,3
6413	3,49	**65**	160	37	2,1	133,2	–	101,7



Seal 2Z



Mounting dimensions
Open design

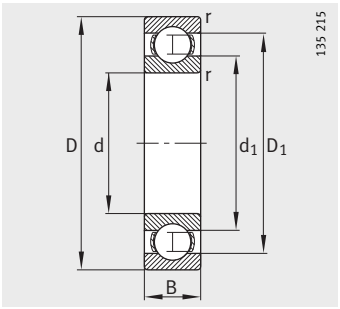


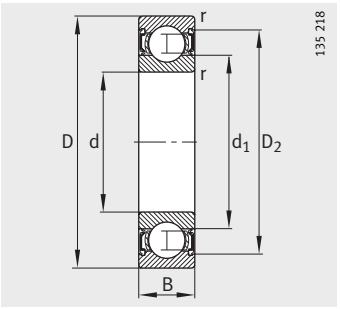
Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
62	76	0,3	11 800	11 000	485	9 500	8 000
62	76	0,3	11 800	11 000	485	5 600	–
62	76	0,3	11 800	11 000	485	8 000	8 000
64,6	80,4	1	16 300	14 300	700	18 000	6 900
64,6	80,4	1	16 300	14 300	700	5 000	–
63,2	91,8	0,6	20 000	17 600	820	17 000	5 700
66	89	1	29 000	23 200	1 190	17 000	8 000
66	89	1	29 000	23 200	1 190	4 500	–
66	89	1	29 000	23 200	1 190	7 000	8 000
69	101	1,5	52 000	36 000	2 240	14 000	6 800
69	101	1,5	52 000	36 000	2 240	4 000	–
69	101	1,5	52 000	36 000	2 240	6 000	6 800
72	118	2,1	81 500	52 000	3 400	12 000	6 700
72	118	2,1	81 500	52 000	3 400	3 400	–
72	118	2,1	81 500	52 000	3 400	5 000	6 700
74	136	2,1	104 000	68 000	4 450	10 000	6 400
68,2	81,8	0,6	12 200	12 000	520	9 000	7 000
68,2	81,8	0,6	12 200	12 000	520	5 000	–
68,2	81,8	0,6	12 200	12 000	520	7 500	7 000
69,6	85,4	1	20 000	17 600	860	17 000	6 400
68,2	96,8	0,6	21 200	19 600	910	16 000	5 300
71	94	1	30 500	25 000	1 270	15 000	7 500
71	94	1	30 500	25 000	1 270	4 300	–
71	94	1	30 500	25 000	1 270	6 300	7 500
74	111	1,5	60 000	41 500	2 550	13 000	6 300
74	111	1,5	60 000	41 500	2 550	3 600	–
74	111	1,5	60 000	41 500	2 550	5 300	6 300
77	128	2,1	93 000	60 000	3 950	11 000	6 400
77	128	2,1	93 000	60 000	3 950	3 000	–
77	128	2,1	93 000	60 000	3 950	4 500	6 400
79	146	2,1	114 000	76 500	4 650	9 500	6 100

Deep groove ball bearings

Single row
Open or sealed

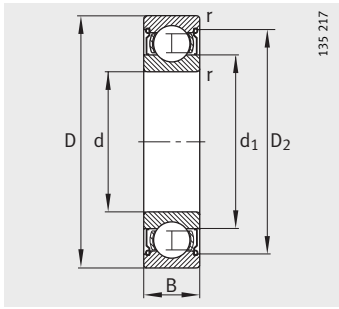




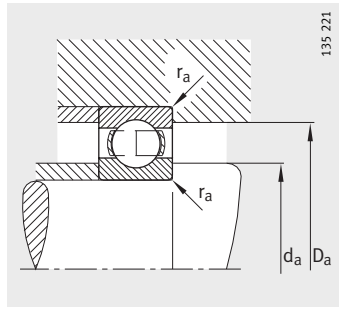
Seal 2RSR

Dimension table (continued) · Dimensions in mm

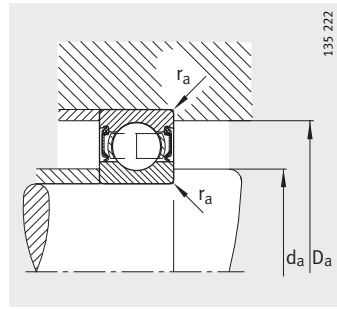
Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	D_2	d_1
	≈kg				min.	≈	≈	≈
61814-Y	0,14	**70**	90	10	0,6	83,6	–	76,6
61814-2RSR-Y	0,14	**70**	90	10	0,6	–	85,5	76,6
61814-2Z-Y	0,14	**70**	90	10	0,6	–	85,5	76,6
61914	0,34	**70**	100	16	1	90,9	–	79,1
61914-2RSR	0,34	**70**	100	16	1	–	92,8	79,1
16014	0,438	**70**	110	13	0,6	96,2	–	83,7
6014	0,622	**70**	110	20	1,1	97,3	–	82,8
6014-2Z	0,642	**70**	110	20	1,1	–	100	82,8
6214	1,09	**70**	125	24	1,5	108	–	87,1
6214-2RSR	1,11	**70**	125	24	1,5	–	110,7	86,8
6214-2Z	1,11	**70**	125	24	1,5	–	110,7	86,8
6314	2,55	**70**	150	35	2,1	126,3	–	95,1
6314-2RSR	2,6	**70**	150	35	2,1	–	130,2	94,8
6314-2Z	2,6	**70**	150	35	2,1	–	130,2	94,8
6414	5,06	**70**	180	42	3	151,6	–	114,4
61815-Y	0,15	**75**	95	10	0,6	88,7	–	81,6
61815-2RSR-Y	0,15	**75**	95	10	0,6	–	90,5	81,6
61815-2Z-Y	0,15	**75**	95	10	0,6	–	90,5	81,6
61915	0,356	**75**	105	16	1	96,2	–	84,1
61915-2RSR	0,356	**75**	105	16	1	–	98,2	84,1
16015	0,463	**75**	115	13	0,6	101,2	–	88,7
6015	0,654	**75**	115	20	1,1	102,6	–	88,1
6015-2RSR	0,678	**75**	115	20	1,1	–	105,3	88,1
6015-2Z	0,676	**75**	115	20	1,1	–	105,3	88,1
6215	1,19	**75**	130	25	1,5	112,8	–	92,5
6215-2RSR	1,22	**75**	130	25	1,5	–	115,5	92,1
6215-2Z	1,21	**75**	130	25	1,5	–	115,5	92,1
6315	3,18	**75**	160	37	2,1	133,2	–	101,8
6315-2RSR	3,18	**75**	160	37	2,1	–	137,2	101,8
6315-2Z	3,23	**75**	160	37	2,1	–	137,2	101,4
6415-M	7	**75**	190	45	3	151,6	–	114,4



Seal 2Z



Mounting dimensions
Open design

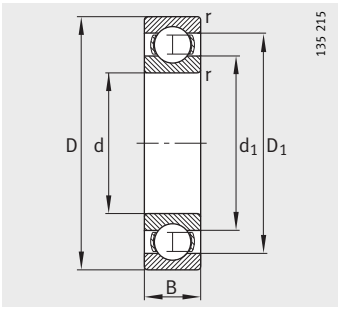


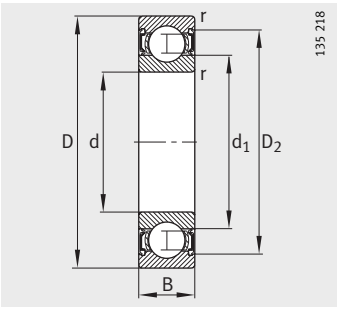
Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
73,2	86,8	0,6	12 500	12 500	540	8 500	6 700
73,2	86,8	0,6	12 500	12 500	540	4 800	–
73,2	86,8	0,6	12 500	12 500	540	7 000	6 700
74,6	95,4	1	27 000	23 200	1 160	15 000	6 400
74,6	95,4	1	27 000	23 200	1 160	4 300	–
73,2	106,8	0,6	28 000	25 000	1 230	14 000	5 300
76	104	1	38 000	31 000	1 850	14 000	7 200
76	104	1	38 000	31 000	1 850	6 000	7 200
79	116	1,5	62 000	44 000	2 900	12 000	6 100
79	116	1,5	62 000	44 000	2 900	3 400	–
79	116	1,5	62 000	44 000	2 900	5 000	6 100
82	138	2,1	104 000	68 000	4 450	10 000	6 100
82	138	2,1	104 000	68 000	4 450	2 800	–
82	138	2,1	104 000	68 000	4 450	4 300	6 100
86	164	2,5	132 000	96 500	5 800	8 500	5 700
78,2	91,8	0,6	12 900	13 400	690	8 000	6 000
78,2	91,8	0,6	12 900	13 400	690	4 500	–
78,2	91,8	0,6	12 900	13 400	690	6 700	6 000
79,6	100,4	1	24 500	22 400	1 100	14 000	6 700
79,6	100,4	1	24 500	22 400	1 100	4 000	–
78,2	111,8	0,6	28 500	27 000	1 290	13 000	4 900
81	109	1	39 000	33 500	1 960	13 000	6 700
81	109	1	39 000	33 500	1 960	3 800	–
81	109	1	39 000	33 500	1 960	5 600	6 700
84	121	1,5	65 500	49 000	3 350	11 000	5 900
84	121	1,5	65 500	49 000	3 350	3 200	–
84	121	1,5	65 500	49 000	3 350	4 800	5 900
87	148	2,1	114 000	76 500	4 650	9 500	5 800
87	148	2,1	114 000	76 500	4 650	2 600	–
87	148	2,1	114 000	76 500	4 650	4 000	5 800
91	174	2,5	132 000	96 500	5 800	8 500	5 600

Deep groove ball bearings

Single row
Open or sealed

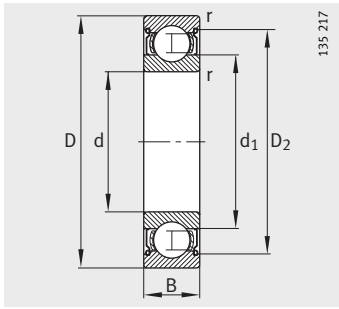




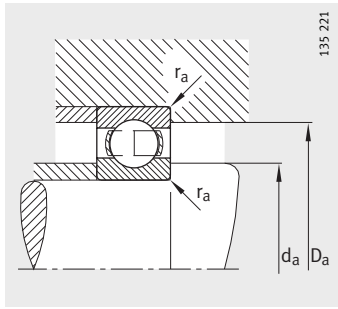
Seal 2RSR

Dimension table (continued) · Dimensions in mm

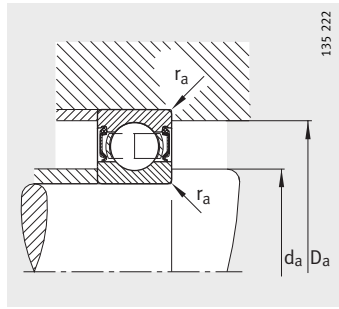
Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	D_2	d_1
	≈kg				min.	≈	≈	≈
61816-Y	0,155	**80**	100	10	0,6	93,7	–	86,6
61816-2RSR-Y	0,155	**80**	100	10	0,6	–	95,5	86,6
61816-2Z-Y	0,155	**80**	100	10	0,6	–	95,5	86,6
61916	0,379	**80**	110	16	1	100,8	–	89,1
16016	0,609	**80**	125	14	0,6	110,7	–	96,9
6016	0,845	**80**	125	22	1,1	111	–	94
6016-2Z	0,893	**80**	125	22	1,1	–	113,7	93,7
6216	1,46	**80**	140	26	2	121,3	–	98,8
6216-2Z	1,49	**80**	140	26	2	–	124,5	98,5
6316	3,75	**80**	170	39	2,1	141,8	–	108,6
6316-2RSR	3,75	**80**	170	39	2,1	–	145,5	108,6
6316-2Z	3,82	**80**	170	39	2,1	–	145,5	108,2
6416-M	8,29	**80**	200	48	3	162,1	–	117,9
61817-Y	0,27	**85**	110	13	1	101,7	–	93,2
61817-2RSR-Y	0,27	**85**	110	13	1	–	104,2	93,2
61817-2Z-Y	0,27	**85**	110	13	1	–	104,2	93,2
16017	0,666	**85**	130	14	0,6	113,8	–	101,6
6017	0,917	**85**	130	22	1,1	116	–	99,6
6017-2RSR	0,917	**85**	130	22	1,1	–	119,2	99,6
6017-2Z	0,94	**85**	130	22	1,1	–	119,2	99,2
6217	1,87	**85**	150	28	2	129,7	–	106,2
6217-2RSR	1,87	**85**	150	28	2	–	133,8	106,2
6217-2Z	1,91	**85**	150	28	2	–	133,8	106,2
6317	4,25	**85**	180	41	3	151,6	–	114,4
6317-2RSR	4,25	**85**	180	41	3	–	154,9	114,4
6317-2Z	4,33	**85**	180	41	3	–	154,9	114
6417-M	9,6	**85**	210	52	4	173	–	123,4



Seal 2Z



Mounting dimensions
Open design

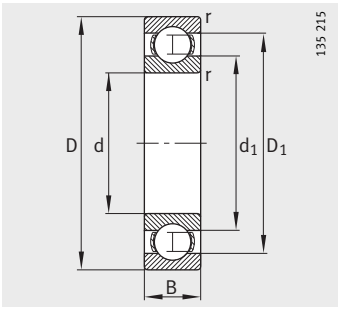


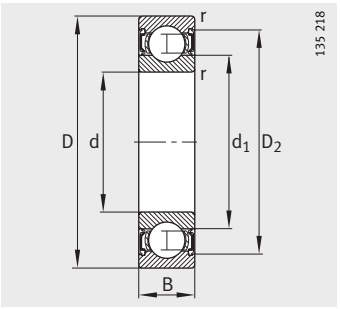
Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
83,2	96,8	0,6	12 900	13 700	600	7 500	5 600
83,2	96,8	0,6	12 900	13 700	600	4 300	–
83,2	96,8	0,6	12 900	13 700	600	6 300	5 600
84,6	105,4	1	25 000	24 000	1 160	13 000	6 300
83,2	121,8	0,6	32 000	31 000	1 510	13 000	4 700
86	119	1	47 500	40 000	2 340	12 000	6 500
86	119	1	47 500	40 000	2 340	5 000	6 500
91	129	2	72 000	54 000	3 450	11 000	5 500
91	129	2	72 000	54 000	3 450	4 500	5 500
92	158	2,1	122 000	86 500	5 200	9 000	5 500
92	158	2,1	122 000	86 500	5 200	2 600	–
92	158	2,1	122 000	86 500	5 200	3 800	5 500
96	184	2,5	163 000	125 000	6 900	7 500	5 400
89,6	105,4	1	19 300	20 000	960	6 700	6 000
89,6	105,4	1	19 300	20 000	960	3 800	–
89,6	105,4	1	19 300	20 000	960	5 600	6 000
88,2	126,8	0,6	34 000	33 500	1 570	12 000	4 400
91	124	1	49 000	43 000	2 430	11 000	6 100
91	124	1	49 000	43 000	2 430	3 200	–
91	124	1	49 000	43 000	2 430	4 800	6 100
96	139	2	83 000	64 000	4 050	10 000	5 300
96	139	2	83 000	64 000	4 050	2 800	–
96	139	2	83 000	64 000	4 050	4 300	5 300
99	166	2,5	132 000	96 500	5 800	8 000	5 300
99	166	2,5	132 000	96 500	5 800	2 400	–
99	166	2,5	132 000	96 500	5 800	3 400	5 300
105	190	3	173 000	137 000	7 500	7 000	5 300

Deep groove ball bearings

Single row
Open or sealed

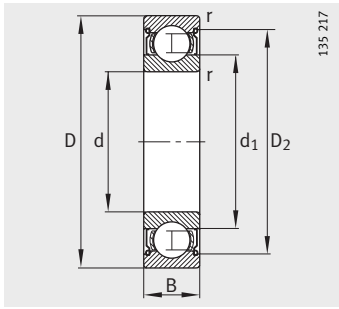




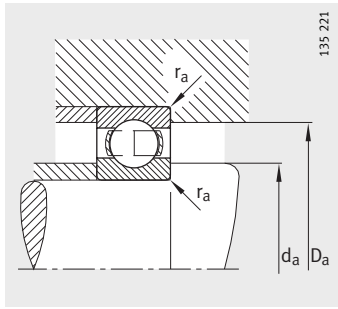
Seal 2RSR

Dimension table (continued) · Dimensions in mm

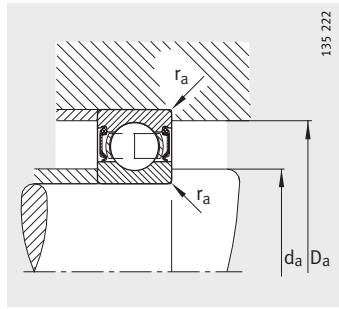
Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	D_2	d_1
	≈kg				min.	≈	≈	≈
61818-Y	0,28	**90**	115	13	1	106,7	–	98,2
61818-2RSR-Y	0,28	**90**	115	13	1	–	109,2	98,2
61818-2Z-Y	0,28	**90**	115	13	1	–	109,2	98,2
16018	0,866	**90**	140	16	1	122,7	–	107,6
6018	1,21	**90**	140	24	1,5	123,7	–	106,6
6018-2RSR	1,21	**90**	140	24	1,5	–	126,8	106,6
6018-2Z	1,23	**90**	140	24	1,5	–	126,8	106,2
6218	2,21	**90**	160	30	2	139,4	–	112,3
6218-2RSR	2,21	**90**	160	30	2	–	143,4	112,3
6218-2Z	2,26	**90**	160	30	2	–	143,4	112,3
6318	5,43	**90**	190	43	3	157,1	–	123,8
6318-2RSR	5,43	**90**	190	43	3	–	160,7	123,8
6318-2Z	5,53	**90**	190	43	3	–	160,7	123,3
6418-M	11,7	**90**	225	54	4	184	–	132,2
61819-Y	0,295	**95**	120	13	1	112	–	103,2
61819-2RSR-Y	0,295	**95**	120	13	1	–	114,2	103,2
61819-2Z-Y	0,295	**95**	120	13	1	–	114,2	103,2
16019	0,922	**95**	145	16	1	128,3	–	113,8
6019	1,27	**95**	145	24	1,5	129	–	111
6019-2RSR	1,27	**95**	145	24	1,5	–	131,8	111
6219	2,73	**95**	170	32	2,1	146,6	–	118,3
6219-2RSR	2,73	**95**	170	32	2,1	–	150,9	118,3
6219-2Z	2,79	**95**	170	32	2,1	–	150,9	118,3
6319	6,23	**95**	200	45	3	166,9	–	129,1
6319-2Z	7,14	**95**	200	45	3	–	170,4	128,7



Seal 2Z



Mounting dimensions
Open design

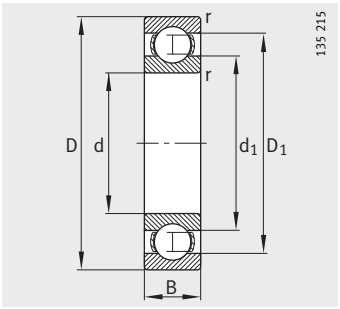


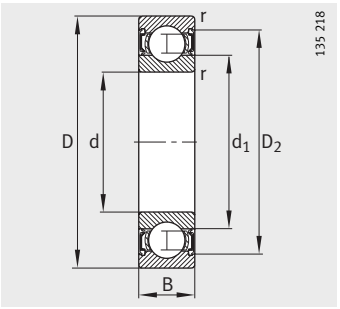
Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
94,6	110,4	1	19 600	20 400	990	6 300	5 600
94,6	110,4	1	19 600	20 400	990	3 600	–
94,6	110,4	1	19 600	20 400	990	5 300	5 600
94,6	135,4	1	41 500	39 000	1 870	11 000	4 400
97	133	1,5	58 500	50 000	2 650	11 000	6 000
97	133	1,5	58 500	50 000	2 650	3 000	–
97	133	1,5	58 500	50 000	2 650	4 500	6 000
101	149	2	96 500	72 000	4 200	9 000	5 100
101	149	2	96 500	72 000	4 200	2 600	–
101	149	2	96 500	72 000	4 200	3 800	5 100
104	176	2,5	134 000	102 000	5 800	8 000	5 100
104	176	2,5	134 000	102 000	5 800	2 200	–
104	176	2,5	134 000	102 000	5 800	3 400	5 100
110	205	3	196 000	163 000	8 900	6 700	4 900
99,6	115,4	1	20 000	21 200	1 100	6 300	5 300
99,6	115,4	1	20 000	21 200	1 100	3 400	–
99,6	115,4	1	20 000	21 200	1 100	5 300	5 300
99,6	140,4	1	40 000	40 500	1 990	11 000	4 200
102	138	1,5	60 000	54 000	2 800	10 000	5 800
102	138	1,5	60 000	54 000	2 800	2 800	–
107	158	2,1	108 000	81 500	4 700	8 500	4 950
107	158	2,1	108 000	81 500	4 700	2 400	–
107	158	2,1	108 000	81 500	4 700	3 600	4 950
109	186	2,5	146 000	114 000	6 400	7 500	4 950
109	186	2,5	146 000	114 000	6 400	3 200	4 950

Deep groove ball bearings

Single row
Open or sealed

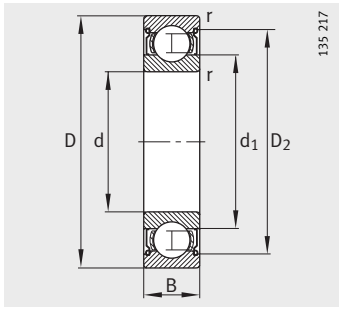




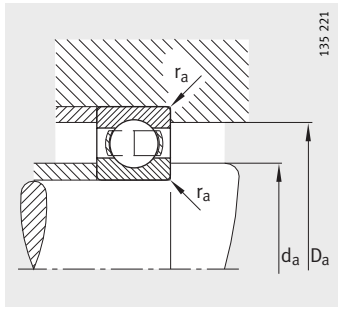
Seal 2RSR

Dimension table (continued) · Dimensions in mm

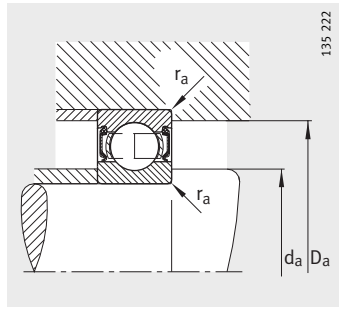
Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	D_2	d_1
	≈kg				min.	≈	≈	≈
61820-Y	0,31	**100**	125	13	1	116,7	–	108,2
61820-2RSR-Y	0,31	**100**	125	13	1	–	119,2	108,2
61820-2Z-Y	0,31	**100**	125	13	1	–	119,2	108,2
16020	0,956	**100**	150	16	1	132,7	–	117,6
6020	1,32	**100**	150	24	1,5	134	–	116,6
6020-2RSR	1,32	**100**	150	24	1,5	–	137,3	116,6
6020-2Z	1,35	**100**	150	24	1,5	–	137,3	116,2
6220	3,3	**100**	180	34	2,1	154,8	–	124,7
6220-2RSR	3,3	**100**	180	34	2,1	–	158,9	124,7
6220-2Z	3,36	**100**	180	34	2,1	–	158,9	124,7
6320	7,67	**100**	215	47	3	179	–	138,6
6320-2Z	7,78	**100**	215	47	3	–	184,6	138,1
61821-Y	0,33	**105**	130	13	1	121,7	–	113,2
61821-2RSR-Y	0,33	**105**	130	13	1	–	124,2	113,2
61821-2Z-Y	0,33	**105**	130	13	1	–	124,2	113,2
16021	1,24	**105**	160	18	1	141,2	–	124,2
6021	1,67	**105**	160	26	2	142,4	–	122,1
6021-2Z	1,7	**105**	160	26	2	–	145,3	121,7
6221	3,88	**105**	190	36	2,1	163,2	–	131,9
6221-2Z	3,99	**105**	190	36	2,1	–	168,1	131,5
6321	8,7	**105**	225	49	3	187	–	144,5
61822-Y	0,5	**110**	140	16	1	130,3	–	119,7
61822-2RSR-Y	0,5	**110**	140	16	1	–	133,3	119,7
61822-2Z-Y	0,5	**110**	140	16	1	–	133,3	119,7
16022	1,52	**110**	170	19	1	149,5	–	130,7
6022	2,06	**110**	170	28	2	150,9	–	129,2
6022-2RSR	2,06	**110**	170	28	2	–	155	129,2
6022-2Z	2,11	**110**	170	28	2	–	155	128,7
6222	4,64	**110**	200	38	2,1	171,6	–	138,5
6222-2Z	4,8	**110**	200	38	2,1	–	177,2	138
6322	10,3	**110**	240	50	3	197,4	–	153,4
6322-2RSR	10,3	**110**	240	50	3	–	203,1	153,4
6322-2Z	10,5	**110**	240	50	3	–	203,1	152,9



Seal 2Z



Mounting dimensions
Open design

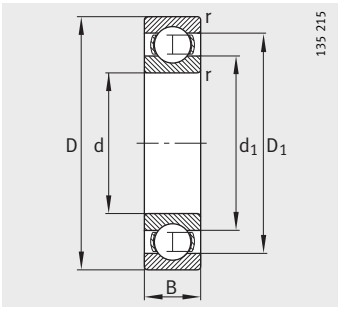


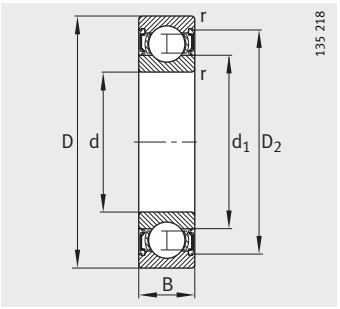
Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
104,6	120,4	1	20 000	22 000	1 010	6 000	5 000
104,6	120,4	1	20 000	22 000	1 010	3 400	–
104,6	120,4	1	20 000	22 000	1 010	5 000	5 000
104,6	145,4	1	44 000	44 000	1 990	10 000	4 000
107	143	1,5	60 000	54 000	2 700	9 500	5 400
107	143	1,5	60 000	54 000	2 700	2 800	–
107	143	1,5	60 000	54 000	2 700	4 000	5 400
112	168	2,1	122 000	93 000	5 400	8 000	4 800
112	168	2,1	122 000	93 000	5 400	2 400	–
112	168	2,1	122 000	93 000	5 400	3 400	4 800
114	201	2,5	163 000	134 000	7 400	7 000	4 650
114	201	2,5	163 000	134 000	7 400	3 000	4 650
109,6	125,4	1	20 800	23 600	1 060	5 600	4 800
109,6	125,4	1	20 800	23 600	1 060	3 200	–
109,6	125,4	1	20 800	23 600	1 060	4 800	4 800
109,6	155,4	1	54 000	54 000	2 390	9 500	3 950
113,8	151,2	2	71 000	64 000	3 100	9 000	5 300
113,8	151,2	2	71 000	64 000	3 100	3 800	5 300
117	178	2,1	132 000	104 000	5 700	7 500	4 650
117	178	2,1	132 000	104 000	5 700	3 200	4 650
119	211	2,5	173 000	146 000	7 500	6 700	4 500
114,6	135,4	1	28 000	30 500	1 320	5 000	5 000
114,6	135,4	1	28 000	30 500	1 320	3 000	–
114,6	135,4	1	28 000	30 500	1 320	4 300	5 000
114,6	165,4	1	57 000	57 000	2 800	9 000	3 850
118,8	161,2	2	80 000	71 000	3 450	8 500	5 200
118,8	161,2	2	80 000	71 000	3 450	2 400	–
118,8	161,2	2	80 000	71 000	3 450	3 600	5 200
122	188	2,1	143 000	116 000	6 300	7 000	4 550
122	188	2,1	143 000	116 000	6 300	3 000	4 550
124	226	2,5	190 000	166 000	8 600	6 300	4 150
124	226	2,5	190 000	166 000	8 600	1 800	–
124	226	2,5	190 000	166 000	8 600	2 600	4 150

Deep groove ball bearings

Single row
Open or sealed

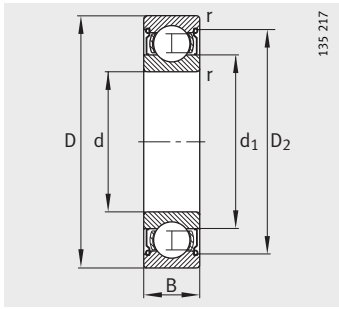




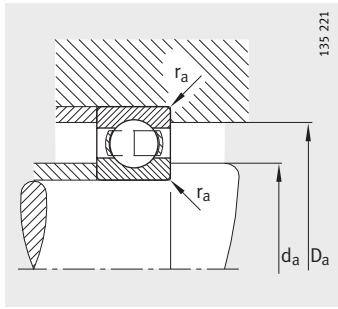
Seal 2RSR

Dimension table (continued) · Dimensions in mm

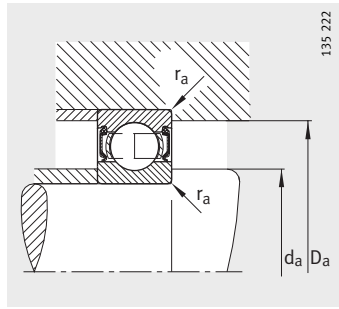
Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	D_2	d_1
	≈kg				min.	≈	≈	≈
61824-Y	0,55	**120**	150	16	1	140,6	–	129,7
61824-2Z-Y	0,55	**120**	150	16	1	–	143,3	129,7
16024	1,62	**120**	180	19	1	159,5	–	140,7
6024	2,18	**120**	180	28	2	161,2	–	139,9
6024-2RSR	2,18	**120**	180	28	2	–	165,4	139,9
6024-2Z	2,23	**120**	180	28	2	–	165,4	139,4
6224	5,62	**120**	215	40	2,1	184,9	–	151,6
6224-2Z	5,62	**120**	215	40	2,1	–	190,5	151,6
6324	12,8	**120**	260	55	3	214,9	–	165,1
61826	0,803	**130**	165	18	1,1	153,8	–	141,3
16026	2,41	**130**	200	22	1,1	176,7	–	154,7
6026	3,42	**130**	200	33	2	177,9	–	153,3
6026-2RSR	3,42	**130**	200	33	2	–	182,1	153,3
6026-2Z	3,4	**130**	200	33	2	–	182,1	152,9
6226	6,24	**130**	230	40	3	198,6	–	161,4
6226-2Z	6,24	**130**	230	40	3	–	203,5	161,4
6326-M	18,3	**130**	280	58	4	231,2	–	178,9
61828-Y	0,86	**140**	175	18	1,1	163,7	–	151,3
16028	2,55	**140**	210	22	1,1	186,6	–	164,8
6028	3,57	**140**	210	33	2	187,5	–	162,3
6028-2Z	3,65	**140**	210	33	2	–	191,3	161,9
6228	8,07	**140**	250	42	3	213,7	–	175,9
6328-M	22,3	**140**	300	62	4	248,7	–	191,3
61830	1,16	**150**	190	20	1,1	177,9	–	162,7
16030	3,17	**150**	225	24	1,1	199,6	–	176
6030	4,32	**150**	225	35	2,1	201,4	–	174,4
6230	10,3	**150**	270	45	3	229,1	–	191,6
6330-M	26,5	**150**	320	65	4	266,1	–	205,6
61832	1,26	**160**	200	20	1,1	187,3	–	172,7
16032	3,8	**160**	240	25	1,5	212,4	–	187,3
6032-M	6,16	**160**	240	38	2,1	214,6	–	186,2
6032-2RSR	6,16	**160**	240	38	2,1	–	219,7	186,2
6232-M	14,7	**160**	290	48	3	244,8	–	205
6332-M	31,8	**160**	340	68	4	280,9	–	219,7



Seal 2Z



Mounting dimensions
Open design

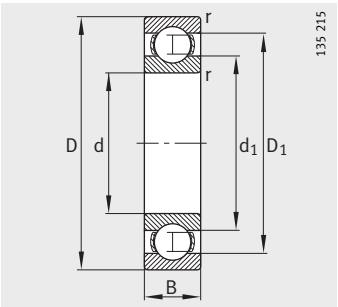


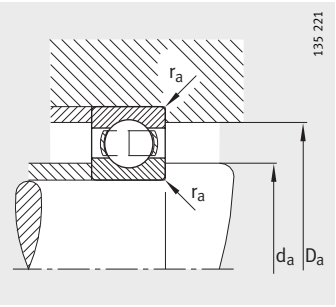
Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
124,6	145,4	1	29 000	32 500	1 370	4 800	4 500
124,6	145,4	1	29 000	32 500	1 370	4 000	4 500
124,6	175,4	1	61 000	64 000	3 000	8 000	3 550
128,8	171,2	2	83 000	78 000	3 550	8 000	4 750
128,8	171,2	2	83 000	78 000	3 550	2 200	–
128,8	171,2	2	83 000	78 000	3 550	3 400	4 750
132	203	2,1	146 000	122 000	6 200	6 700	4 300
132	203	2,1	146 000	122 000	6 200	2 800	4 300
134	246	2,5	212 000	190 000	9 000	6 000	3 850
136	159	1	38 000	43 000	1 690	8 500	4 500
136	194	1	78 000	81 500	3 650	7 500	3 450
138,8	191,2	2	106 000	100 000	4 850	7 000	4 650
138,8	191,2	2	106 000	100 000	4 850	2 000	–
138,8	191,2	2	106 000	100 000	4 850	3 000	4 650
144	216	2,5	166 000	146 000	7 500	6 300	3 900
144	216	2,5	166 000	146 000	7 500	2 600	3 900
147	263	3	228 000	216 000	9 800	5 600	3 500
146	169	1	39 000	46 500	1 750	4 000	4 000
146	204	1	80 000	86 500	3 700	7 000	3 200
148,8	201,2	2	108 000	108 000	4 950	6 700	4 350
148,8	201,2	2	108 000	108 000	4 950	2 800	4 350
154	236	2,5	176 000	166 000	8 100	6 000	3 600
157	283	3	255 000	245 000	11 100	5 300	3 250
156	184	1	51 000	60 000	2 420	7 500	4 000
156	219	1	91 500	98 000	3 650	6 700	3 100
160,2	214,8	2,1	122 000	125 000	5 400	6 300	3 850
164	256	2,5	176 000	170 000	7 800	5 600	3 350
167	303	3	280 000	290 000	13 100	4 800	3 000
166	194	1	52 000	62 000	2 430	7 000	3 800
167	233	1,5	102 000	114 000	4 600	6 300	2 950
170,2	229,8	2,1	134 000	137 000	5 800	6 300	3 750
170,2	229,8	2,1	134 000	137 000	5 800	1 700	–
174	276	2,5	200 000	204 000	8 900	5 600	3 100
177	323	3	300 000	325 000	14 000	4 300	2 800

Deep groove ball bearings

Single row
Open





Mounting dimensions

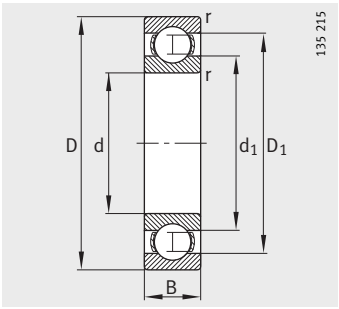
Dimension table (continued) · Dimensions in mm

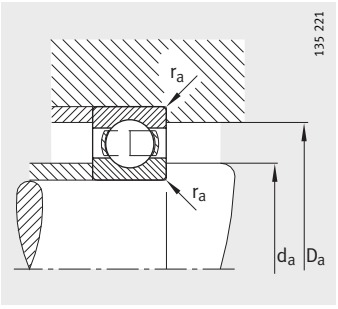
Designation	Mass	Dimensions					
	m	d	D	B	r	D_1	d_1
	≈kg				min.	≈	≈
61834	1,64	**170**	215	22	1,1	200,8	184,9
16034	5,15	**170**	260	28	1,5	228,6	202,3
6034	7,13	**170**	260	42	2,1	231,2	199,4
6234-M	18,3	**170**	310	52	4	260,7	219,1
6334-M	37,3	**170**	360	72	4	298	232,6
61836	1,77	**180**	225	22	1,1	211,4	194,4
16036	6,92	**180**	280	31	2	238,8	211,9
6036-M	10,6	**180**	280	46	2,1	249,3	211,8
6236-M	19	**180**	320	52	4	272	228,7
6336-M	43	**180**	380	75	4	317	245,2
61838	2,24	**190**	240	24	1,5	223,8	206,1
16038	7,04	**190**	290	31	2	255,1	225,8
6038-M	11,3	**190**	290	46	2,1	257,9	222,6
6238-M	22,6	**190**	340	55	4	291,5	239,9
6338-M	50,4	**190**	400	78	5	330,5	260,2
61840	2,31	**200**	250	24	1,5	234,4	216,2
16040	9	**200**	310	34	2	276,4	244,5
6040-M	14,4	**200**	310	51	2,1	276,3	234,8
6240-M	27	**200**	360	58	4	306,5	254,9
6340-M	56,6	**200**	420	80	5	345,9	274,7
61844	2,6	**220**	270	24	1,5	254,4	236,1
16044	11,8	**220**	340	37	2,1	298,1	262,8
6044-M	18,8	**220**	340	56	3	303,1	258,1
6244-M	37,9	**220**	400	65	4	337,6	282,2
6344-M	73,7	**220**	460	88	5	383	299,4
61848	3,93	**240**	300	28	2	280,7	260
16048	12,7	**240**	360	37	2,1	317,4	283,1
6048-M	20,5	**240**	360	56	3	321,9	278,8
6248-M	51,3	**240**	440	72	4	369,6	309,9
6348-M	96,4	**240**	500	95	5	411,3	328,7
61852	4,23	**260**	320	28	2	300,7	279,6
16052	19,1	**260**	400	44	3	351,2	310
6052-M	29,8	**260**	400	65	4	357	304,6
6252-M	68,4	**260**	480	80	5	402,4	337,3

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
176	209	1	61 000	73 500	2 850	6 700	3 600
177	253	1,5	122 000	137 000	5 400	6 000	2 850
180,2	249,8	2,1	170 000	173 000	7 400	5 600	3 550
187	293	3	212 000	224 000	9 400	5 300	2 950
187	343	3	325 000	365 000	14 700	4 000	2 600
186	219	1	62 000	76 500	2 850	6 300	3 400
188,8	271,2	2	132 000	146 000	5 200	5 600	2 800
190,2	269,8	2,1	190 000	200 000	8 200	5 600	3 300
197	303	3	224 000	245 000	10 300	4 800	2 750
197	363	3	355 000	405 000	16 300	3 800	2 440
197	233	1,5	69 500	85 000	3 300	6 000	3 200
198,8	281,2	2	150 000	166 000	6 300	5 300	2 650
200,2	279,8	2,1	196 000	212 000	8 500	5 300	3 150
207	323	3	255 000	280 000	11 600	4 300	2 600
210	380	4	375 000	440 000	17 500	3 600	2 300
207	243	1,5	69 500	88 000	3 350	6 000	3 000
208,8	301,2	2	176 000	204 000	7 300	4 800	2 550
210,2	299,8	2,1	216 000	245 000	9 600	4 800	3 000
217	343	3	270 000	310 000	12 400	4 000	2 430
220	400	4	380 000	465 000	18 000	3 400	2 170
227	263	1,5	73 500	96 500	3 550	5 600	2 600
230,2	329,8	2,1	200 000	240 000	8 400	4 300	2 310
232,4	327,6	2,5	245 000	290 000	11 100	4 000	2 700
237	383	3	300 000	355 000	13 500	3 600	2 200
240	440	4	440 000	560 000	20 000	3 200	1 960
248,8	291,2	2	91 500	120 000	4 200	4 800	2 400
250,2	349,8	2,1	204 000	255 000	8 500	3 800	2 100
252,4	347,6	2,5	255 000	315 000	11 400	3 800	2 450
257	423	3	360 000	475 000	16 700	3 400	1 980
260	480	4	465 000	620 000	21 800	3 000	1 800
268,8	311,2	2	96 500	132 000	4 550	4 300	2 200
272,4	387,6	2,5	236 000	310 000	9 900	3 600	1 960
274,6	385,4	3	300 000	390 000	13 300	3 400	2 260
280	460	4	405 000	560 000	19 200	3 000	1 820

Deep groove ball bearings

Single row
Open





Mounting dimensions

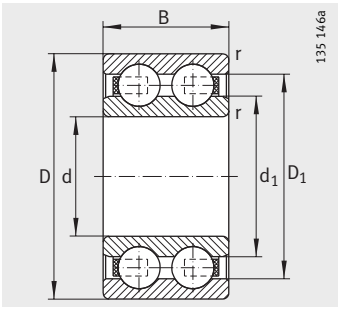
Dimension table (continued) · Dimensions in mm

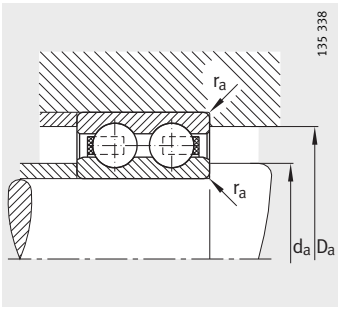
Designation	Mass	Dimensions					
	m	d	D	B	r	D_1	d_1
	≈kg				min.	≈	≈
61856	6,34	**280**	350	33	2	328,1	302,7
16056-M	23,2	**280**	420	44	3	370,6	329,9
6056-M	31,7	**280**	420	65	4	377,5	324,1
6256-M	72,9	**280**	500	80	5	423	356,7
61860-M	8,97	**300**	380	38	2,1	354,7	326,2
16060-M	32,6	**300**	460	50	4	404	357,3
6060-M	44,5	**300**	460	74	4	410,8	350,8
61864-M	11,3	**320**	400	38	2,1	373,8	347
16064-M	34,9	**320**	480	50	4	423,1	377,7
6064-M	47,4	**320**	480	74	4	430,8	370,9
61868-M	12	**340**	420	38	2,1	394,2	366,7
16068-M	47,5	**340**	520	57	4	457,1	403,6
6068-M	63,2	**340**	520	82	5	469,6	402,3
61872-M	12,8	**360**	440	38	2,1	413	387,7
16072-M	49,4	**360**	540	57	4	478,1	423,5
6072-M	66,2	**360**	540	82	5	489	423,7
61876-M	20,6	**380**	480	46	2,1	445,9	414,1
16076-M	51,7	**380**	560	57	4	498	443,5
61880-M	21,5	**400**	500	46	2,1	467,3	433,7
61884-M	22,8	**420**	520	46	2,1	485,8	454,3
61888-M	23,8	**440**	540	46	2,1	505,9	474,2
61892-M	35,8	**460**	580	56	3	540,9	500,2
61896-M	37,3	**480**	600	56	3	560,9	520,3
618/500-M	38,7	**500**	620	56	3	580,9	540,4
618/530-M	41,3	**530**	650	56	3	610,8	570,4
618/560-M	35,1	**560**	680	56	3	640,7	600,4
618/600-M	54,2	**600**	730	60	3	687,8	643,6
618/630-M	75,9	**630**	780	69	4	730,5	681,1
618/670-M	80,4	**670**	820	69	4	770,3	721,1
618/710-M	96	**710**	870	74	4	818,9	762,7
618/750-M	114	**750**	920	78	5	864,9	806,7
618/800-M	136	**800**	980	82	5	921,8	860
618/850-M	144	**850**	1 030	82	5	971,9	910

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
288,8	341,2	2	129 000	176 000	5 800	3 800	2 000
292,4	407,6	2,5	240 000	325 000	10 100	3 400	1 800
294,6	405,4	3	320 000	440 000	14 400	3 400	2 060
291	489	4	425 000	600 000	20 300	3 000	1 690
310,2	369,8	2,1	153 000	204 000	6 300	3 600	2 000
314,6	445,4	3	300 000	430 000	12 700	3 200	1 670
314,6	445,4	3	365 000	510 000	16 700	3 000	1 930
330,2	389,8	2,1	156 000	220 000	6 500	3 400	1 710
334,6	465,4	3	305 000	455 000	13 000	3 000	1 550
334,6	465,4	3	380 000	560 000	17 400	3 000	1 790
350,2	409,8	2,1	156 000	220 000	6 600	3 200	1 590
354,6	505,4	3	355 000	550 000	17 800	2 800	1 460
358	502	4	440 000	695 000	20 800	2 800	1 660
370,2	429,8	2,1	160 000	236 000	6 900	3 200	1 480
374,6	525,4	3	365 000	585 000	15 700	2 800	1 370
378	522	4	455 000	735 000	21 500	2 600	1 560
390,2	469,8	2,1	220 000	320 000	8 900	3 000	1 430
394,6	545,4	3	375 000	620 000	16 100	2 600	1 290
410,2	489,8	2,1	220 000	335 000	8 800	2 800	1 300
430,2	509,8	2,1	224 000	345 000	9 200	2 800	1 260
450,2	529,8	2,1	228 000	355 000	9 400	2 600	1 190
472,4	567,6	2,5	290 000	480 000	12 000	2 400	1 170
492,4	587,6	2,5	290 000	500 000	12 100	2 200	1 110
512,4	607,6	2,5	300 000	510 000	12 300	2 000	1 060
542,4	637,6	2,5	305 000	550 000	12 800	2 000	980
572,4	667,6	2,5	310 000	560 000	12 800	1 900	930
612,4	717,6	2,5	355 000	670 000	15 000	1 800	850
644,6	765,4	3	400 000	780 000	17 500	1 600	830
684,6	805,4	3	405 000	815 000	17 700	1 500	760
724,6	855,4	3	465 000	980 000	20 000	1 400	720
768	902	4	510 000	1 120 000	22 600	1 300	680
818	962	4	550 000	1 270 000	23 800	1 300	630
868	1 012	4	560 000	1 290 000	23 900	1 200	580

Deep groove ball bearings

Double row



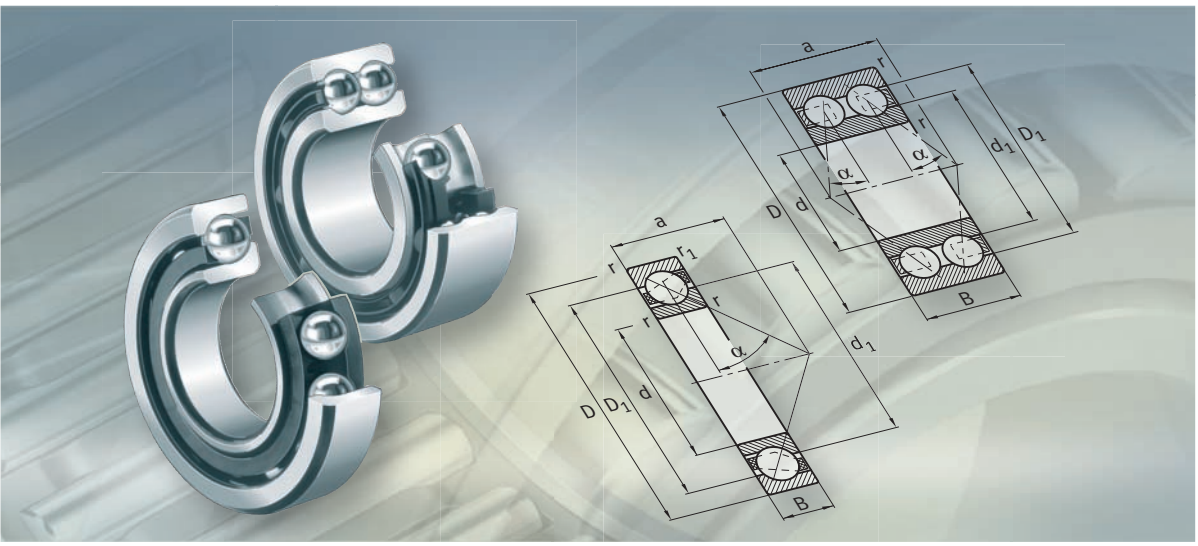


Mounting dimensions

Dimension table · Dimensions in mm

Designation	Mass	Dimensions					
	m	d	D	B	r	D_1	d_1
	≈kg				min.	≈	≈
4200-B-TVH	0,054	**10**	30	14	0,6	23,9	16,6
4201-B-TVH	0,057	**12**	32	14	0,6	25,9	18,6
4202-B-TVH	0,065	**15**	35	14	0,6	28,9	21,6
4302-B-TVH	0,116	**15**	42	17	1	33,5	24,2
4203-B-TVH	0,098	**17**	40	16	0,6	33,2	24
4303-B-TVH	0,16	**17**	47	19	1	39,1	28,7
4204-B-TVH	0,143	**20**	47	18	1	39,5	30,2
4304-B-TVH	0,211	**20**	52	21	1,1	43,1	31,5
4205-B-TVH	0,166	**25**	52	18	1	44	34,7
4305-B-TVH	0,336	**25**	62	24	1,1	51,7	38,4
4206-B-TVH	0,467	**30**	62	20	1	52,5	41,3
4306-B-TVH	0,51	**30**	72	27	1,1	61,1	46,6
4207-B-TVH	0,407	**35**	72	23	1,1	60,1	47,7
4307-B-TVH	0,758	**35**	80	31	1,5	66,9	49,2
4208-B-TVH	0,545	**40**	80	23	1,1	66,6	54,2
4308-B-TVH	1,03	**40**	90	33	1,5	75,5	55,7
4209-B-TVH	0,592	**45**	85	23	1,1	71,6	59,2
4309-B-TVH	1,23	**45**	100	36	1,5	86,8	66,7
4210-B-TVH	0,587	**50**	90	23	1,1	77,6	65,2
4310-B-TVH	1,62	**50**	110	40	2	96,2	73,6
4211-B-TVH	0,86	**55**	100	25	1,5	84,7	71,4
4311-B-TVH	2,06	**55**	120	43	2	105,3	80,4
4212-B-TVH	1,09	**60**	110	28	1,5	95,3	79,8
4312-B-TVH	2,51	**60**	130	46	2,1	113,8	87,7
4213-B-TVH	1,6	**65**	120	31	1,5	101,9	84,2
4214-B-TVH	1,7	**70**	125	31	1,5	109,4	91,7
4215-B-TVH	1,72	**75**	130	31	1,5	115,4	97,7
4216-B-TVH	2,14	**80**	140	33	2	124	105,2
4217-B-TVH	2,7	**85**	150	36	2	132,8	112,7
4218-B-TVH	3,7	**90**	160	40	2	140,2	117,6

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G
min.	max.	max.	N	N	N	min^{-1}
14,2	25,8	0,6	9 150	5 200	315	24 000
16,2	27,8	0,6	9 300	5 500	330	20 000
19,2	30,8	0,6	10 400	6 700	370	18 000
20,6	36,4	1	14 600	9 150	550	17 000
21,2	35,8	0,6	14 600	9 500	550	17 000
22,6	41,4	1	19 600	13 200	770	15 000
25,6	41,4	1	18 000	12 700	690	14 000
27	45	1	23 200	16 000	940	13 000
30,6	46,4	1	19 300	14 600	740	12 000
32	55	1	31 500	22 400	1 330	10 000
35,6	56,4	1	26 000	20 800	1 170	9 500
37	65	1	40 000	30 500	1 840	8 500
42	65	1	32 000	26 000	1 460	8 500
44	71	1,5	51 000	38 000	2 260	8 000
47	73	1	34 000	30 000	1 570	7 500
49	81	1,5	63 000	48 000	2 900	7 000
52	78	1	36 000	33 500	1 690	7 000
54	91	1,5	72 000	60 000	3 600	6 000
57	83	1	37 500	36 500	1 810	6 300
61	99	2	90 000	75 000	4 450	5 300
64	91	1,5	36 500	43 000	2 260	5 600
66	109	2	104 000	90 000	5 400	5 000
69	101	1,5	57 000	58 500	2 850	5 000
72	118	2,1	120 000	106 000	6 200	4 500
74	111	1,5	67 000	67 000	3 350	4 800
79	116	1,5	69 500	73 500	3 600	4 500
84	121	1,5	73 500	80 000	3 750	4 300
91	129	2	80 000	90 000	4 350	4 000
96	139	2	93 000	106 000	5 100	3 800
101	149	2	112 000	122 000	5 900	3 600


a
r
r
r

Angular contact ball bearings

X-life

Single row angular contact ball bearings

260

In single row angular contact ball bearings, the raceways are arranged such that the forces are transmitted from one raceway to the other at a specific contact angle (oblique to the radial plane).

The axial load carrying capacity increases with the contact angle. Due to the large contact angle, single row angular contact ball bearings are more suitable than deep groove ball bearings for supporting large axial forces acting in one direction.

Single row angular contact ball bearings can support radial loads and unilateral axial loads. They are adjusted against a second bearing that provides counterguidance.

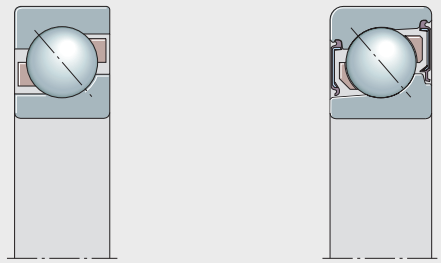
Double row angular contact ball bearings

280

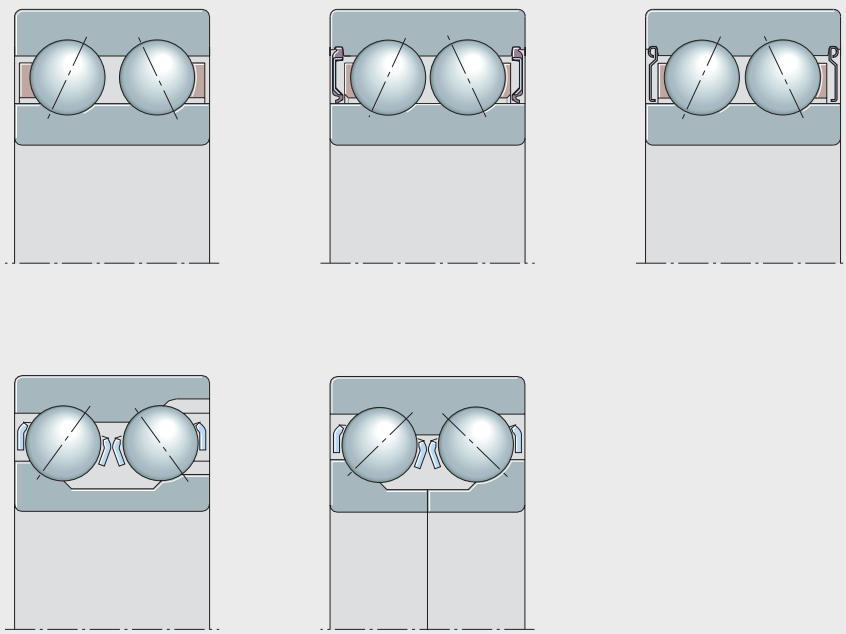
Double row angular contact ball bearings are similar in design to a pair of single row angular contact ball bearings in an O arrangement. In this case, the apexes of the cones formed by the ball contact lines point outwards.

Double row bearings can support high radial forces as well as axial forces in both directions and are particularly suitable for rigid axial guidance arrangements.

Depending on the series, the bearings are designed with or without filling slots.

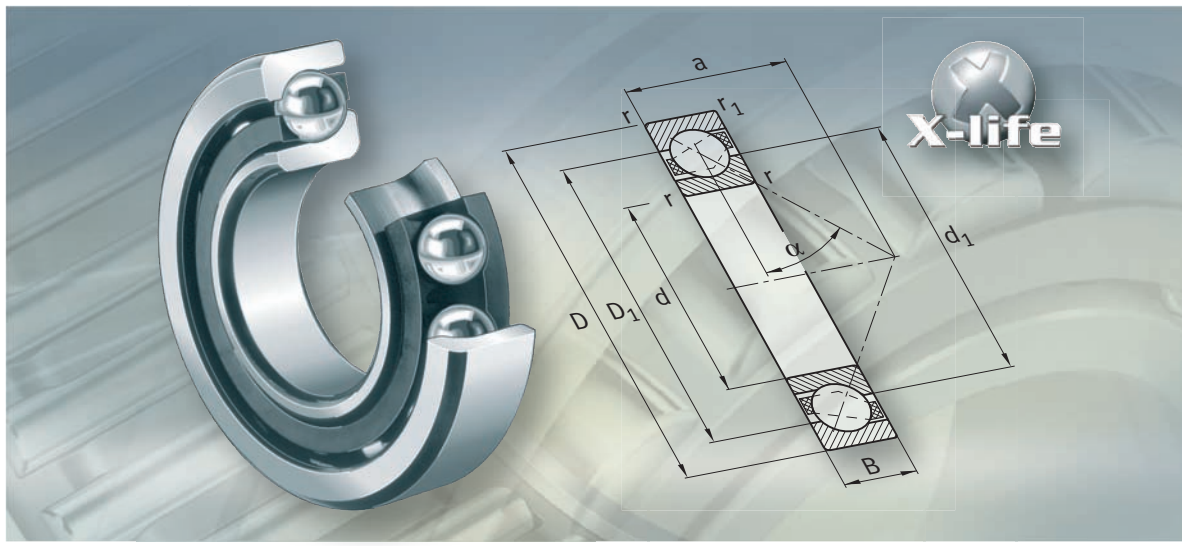


135 320



135 321

FAG



Single row angular contact ball bearings

Single row angular contact ball bearings

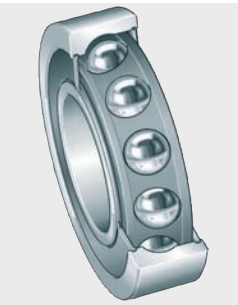
		Page
Product overview	Single row angular contact ball bearings	262
Features	X-life	263
	Radial and axial load capacity	263
	Operating temperature	264
	Cages	264
	Suffixes	265
Design and safety guidelines	Calculation of axial force	266
	Equivalent dynamic bearing load	267
	Equivalent static bearing load	268
	Basic dynamic and static load ratings for bearing pairs	268
	Minimum radial load	268
	Speeds	268
	Design of bearing arrangements	269
Accuracy	Tolerances for universal designs and for matched bearings	269
	Axial internal clearance and preload	270
Dimension tables	Angular contact ball bearings, single row, open or sealed	272
	Angular contact ball bearings, single row, open	276

Single row

718..-B, 70..-B, 72..-B, 73..-B

Lip seals

70..-B-2RS, 72..-B-2RS, 73..-B-2RS



Single row angular contact ball bearings

Features

Single row angular contact ball bearings are self-retaining units with solid inner and outer rings and ball and cage assemblies with polyamide, sheet metal or brass cages. The raceways of the inner and outer rings are offset from each other along the bearing axis. The bearings are available in open and sealed designs. Their angular adjustment facility is very limited.

X-life

Many sizes of angular contact ball bearings are classified as X-life products. These bearings are indicated in the dimension tables.

Bearings of X-life quality have an improved raceway geometry and optimised surfaces. This gives a significant increase in the fatigue limit load of the bearings. When calculating the expanded adjusted rating life, values up to 50% higher are achieved. In certain applications, this means that a smaller bearing arrangement can be designed.

Radial and axial load capacity

Single row angular contact ball bearings can support axial forces in one direction and high radial forces. They must be axially adjusted against a second bearing fitted in a mirror image arrangement.

The axial load carrying capacity is dependent on the contact angle; i. e. the larger the angle, the higher the load to which the bearing can be subjected. Due to the contact angle of 40°, these bearings can support high axial loads.

Universal design

Single row angular contact ball bearings of universal design have the suffix UA, UL or UO and are intended for fitting in pairs in an X, O or tandem arrangement or fitting in groups. These bearings can be fitted in any arrangement required.
For tandem arrangements, pay attention to the guidelines in the section Design of bearing arrangements, page 269.

The suffix UA indicates small axial internal clearance, the suffix UL indicates slight preload and the suffix UO indicates freedom from clearance in an X or O arrangement.

When ordering bearings, the total quantity of bearings must be stated, not the number of bearing pairs or bearing groups.

Matched bearings

Sets without an intermediate ring are available in an O arrangement (DB), X arrangement (DF) or tandem arrangement (DT).

When ordering bearings, the number of sets must be stated, not the number of single bearings.

Sealing

Bearings with the suffix 2RS have lip seals on both sides.
Contact RS seals are suitable for giving protection against dust, contamination and damp atmospheres.

Lubrication

Bearings with lip seals on both sides are greased with a high quality grease and are lubricated for life.

Open bearings and bearings with seals on one side are not greased. They can be lubricated with grease or oil.

Operating temperature

Open angular contact ball bearings can be used at operating temperatures from –30 °C to +150 °C.
Bearings with a diameter D > 240 mm are dimensionally stable up to +200 °C.

Angular contact ball bearings with cages made from glass fibre reinforced polyamide are suitable for operating temperatures up to +120 °C, restricted by the cage material.

Sealed bearings are suitable for operating temperatures from –30 °C to +110 °C, restricted by the lubricant and the seal material.

Cages

Angular contact ball bearings with solid cages made from glass fibre reinforced polyamide have the suffix TVP or TVH.

Solid brass cages have the suffix MP.

The bearings are also available with universally applicable sheet steel window cages (suffix JP).

Check the chemical resistance of polyamide to synthetic greases and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures.

The oil change intervals must be observed.

Cage and bore code

Series	Solid window cage made from polyamide[1)]	Solid window cage made from brass[1)]	Sheet steel cage[1)]
	Bore code		
718..-B	06 to 16	–	–
70..-B	All	–	–
72..-B	up to 20, 22 to 26	21, from 28	up to 22
73..-B	up to 20, 22 to 26	21, from 28	up to 22

1) Other cage designs are available by agreement.
With such cages, suitability for high speeds and high temperatures as well as the basic load ratings may differ from the values for bearings with standard cages.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
B	Modified internal construction	Standard
JP	Sheet steel cage	
MP	Solid brass cage	
DB	Two angular contact ball bearings in O arrangement, matched clearance-free	Special design, available by agreement
DF	Two angular contact ball bearings in X arrangement, matched clearance-free	
DT	Two angular contact ball bearings in tandem arrangement, matched	
TVH TVP	Solid cage made from glass fibre reinforced polyamide	Standard
UA	Universal design for fitting in pairs, bearing pair has small axial internal clearance in O and X arrangement	
UL	Universal design for fitting in pairs, bearing pair has slight preload in O and X arrangement	
UO	Universal design for fitting in pairs, bearing pair is clearance-free in O and X arrangement	
P5	Bearing in tolerance class P5	Special design, available by agreement
2RS	Contact seals on both sides	Standard

Design and safety guidelines
Calculation of axial force

Under radial load, an internal axial force is induced in the bearing that must be supported by a second bearing and taken into consideration when calculating the equivalent bearing load.

Depending on the bearing arrangement (O or X arrangement), the axial force must first be determined for bearings adjusted clearance-free without preload, see Load ratio and axial bearing load, page 267 and *Figure 1*, *Figure 2*.

The following preconditions apply:

- The radial forces act at the central contact points and are positive
- Bearing A is subjected to a radial load F_{rA}, bearing B to F_{rB}
- F is an external axial force acting on bearing A.

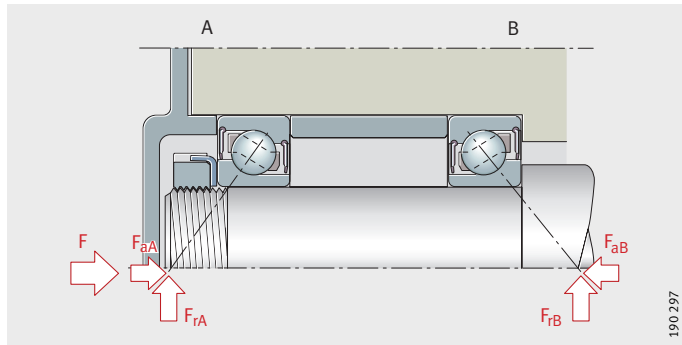


Figure 1
Bearings in O arrangement

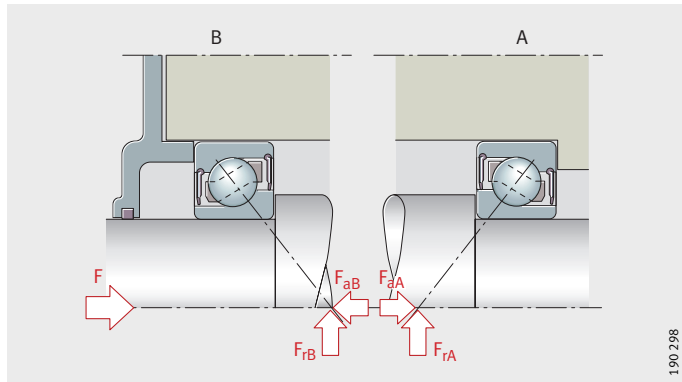


Figure 2
Bearings in X arrangement

Load ratio and axial bearing load

Load ratio[3]		Axial force F_a[1) 3)]	
Radial bearing load	External axial force	Bearing A	Bearing B
$\frac{F_{rA}}{Y_A} \leqq \frac{F_{rB}}{Y_B}$	$F \geqq 0$	$F_a = F + 0{,}5 \cdot \frac{F_{rB}}{Y_B}$	2)
$\frac{F_{rA}}{Y_A} > \frac{F_{rB}}{Y_B}$	$F > 0{,}5 \cdot \left(\frac{F_{rA}}{Y_A} - \frac{F_{rB}}{Y_B}\right)$	$F_a = F + 0{,}5 \cdot \frac{F_{rB}}{Y_B}$	2)
	$F \leqq 0{,}5 \cdot \left(\frac{F_{rA}}{Y_A} - \frac{F_{rB}}{Y_B}\right)$	2)	$F_a = 0{,}5 \cdot \frac{F_{rA}}{Y_A} - F$

1) Axial force F_a, to be used in calculation of the equivalent dynamic bearing load.

2) If no formula is given, the axial force is not taken into consideration.

3) For bearings of series 718..-B, 70..-B, 72..-B and 73..-B, the axial load component factor for Y = 0,57 is used in the formulae.

Equivalent dynamic bearing load

For bearings under dynamic loading, the following applies:

Contact angle 40°

Bearing arrangement	Load ratio	Equivalent dynamic bearing load
Single bearing[1)]	$\frac{F_a}{F_r} \leqq 1{,}14$	$P = F_r$
	$\frac{F_a}{F_r} > 1{,}14$	$P = 0{,}35 \cdot F_r + 0{,}57 \cdot F_a$
Bearing pair in O or X arrangement	$\frac{F_a}{F_r} \leqq 1{,}14$	$P = F_r + 0{,}55 \cdot F_a$
	$\frac{F_a}{F_r} > 1{,}14$	$P = 0{,}57 \cdot F_r + 0{,}93 \cdot F_a$

1) Calculation of axial force for single bearings, see table Load ratio and axial bearing load.

P N
Equivalent dynamic bearing load for combined load

F_a N
Axial dynamic bearing load

F_r N
Radial dynamic bearing load.

Equivalent static bearing load

Contact angle 40°

For bearings under static loading, the following applies:

Bearing arrangement	Load ratio	Equivalent static load
Single bearing	$\frac{F_{0a}}{F_{0r}} \leqq 1{,}9$	$P_0 = F_{0r}$
	$\frac{F_{0a}}{F_{0r}} > 1{,}9$	$P_0 = 0{,}5 \cdot F_{0r} + 0{,}26 \cdot F_{0a}$
Bearing pair in O or X arrangement	–	$P_0 = F_{0r} + 0{,}52 \cdot F_{0a}$

P_0 N
Equivalent static bearing load for combined load

F_{0a} N
Axial static bearing load

F_{0r} N
Radial static bearing load.

Basic dynamic and static load ratings for bearing pairs

If two bearings of the same size and design are fitted immediately adjacent to each other in an O or X arrangement, the basic dynamic load rating C_r and basic static load rating C_{0r} of the bearing pair are as follows:

- $C_r = 1{,}625 \cdot C_{r\ \text{single bearing}}$
- $C_{0r} = 2 \cdot C_{0r\ \text{single bearing}}$

Minimum radial load

In order to ensure slippage-free operation, the bearings must be subjected to a minimum radial load. This applies particularly in the case of high speeds and high accelerations. In continuous operation, a minimum radial load of the order of $P/C_r > 0{,}01$ is necessary for ball bearings with cage.

Speeds

For greased and sealed bearings, the speeds are lower than in the case of unsealed bearings.

The limiting speeds n_G given in the dimension tables must not be exceeded.

Bearings in universal design

Bearings with the suffix UA, UL or UO can be used in an X, O or tandem arrangement. The operating speed of the bearing pair is then approximately 20% below the calculated permissible operating speed of the single bearing.

The limiting speed n_G is possible if the less favourable thermal balance of the bearing pair is taken into consideration.

Design of bearing arrangements

Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see tables, page 150.

Recommended housing tolerances for radial bearings, see table, page 152.

Mounting dimensions

The bearing tables give the maximum dimension of the radii r_a and r_{a1} and the diameters of the abutment shoulders D_a, D_b and d_a.

Fitting in tandem arrangement

If single row angular contact bearings are fitted in a tandem arrangement, it must be ensured that the end faces of the outer rings in contact with each other have sufficient overlap.
If in doubt, please contact the Schaeffler engineering service.

Accuracy

The main dimensions of the bearings conform to DIN 628-1.

The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620-2.

Tolerances for universal designs and for matched bearings

Angular contact ball bearings of the universal designs UA, UL or UO are available not only in the normal tolerance (no tolerance suffix) but also by agreement in the tolerance class P5 (suffix P5-UL or P5-UA).

The following exceptions apply: bore tolerances for bearings of all tolerance classes uniformly to P5 (no special suffix), width tolerances for universal bearings and matched bearings, see table.

Tolerance for ring width

Bore d mm		Width deviation Δ_{Bs} µm			
		PN		P5	
over	incl.	min.	max.	min.	max.
–	50	0	–250	0	–250
50	80	0	–380	0	–250
80	120	0	–380	0	–380
120	180	0	–500	0	–380
180	315	0	–500	0	–500

Axial internal clearance and preload

Axial internal clearance or preload of series 70..-B, 72..-B and 73..-B of universal design, in pairs in an X or O arrangement, see table.

The axial internal clearance or freedom from clearance do not apply to fitted bearing pairs. If rigid fits are used, this leads to reduced axial internal clearance or increased preload of the bearing pair.

Axial internal clearance and preload

Bore code	Axial internal clearance or preload of bearing pair Nominal dimension µm					Preload $F_{v\,max}$ N		
	UA	UO	UL			UL		
	70B, 72B, 73B		70B	72B	73B	70B	72B	73B
	Tolerance classes					Tolerance class		
	PN, P6, P5		P5	P5	P5	P5	P5	P5
00	22	0	–	–3	–	–	38	–
01	24	0	–	–4	–5	–	53	82
02	24	0	–	–4	–5	–	62	99
03	24	0	–	–4	–6	–	77	123
04	28	0	–4	–5	–6	103	103	146
05	34	0	–4	–4	–6	115	112	200
06	34	0	–5	–5	–7	141	157	250
07	40	0	–5	–6	–7	172	208	300
08	40	0	–5	–6	–8	200	246	385
09	44	0	–	–6	–9	–	277	462
10	44	0	–	–6	–10	–	288	535
11	46	0	–	–7	–10	–	358	600
12	46	0	–	–7	–10	–	431	692
13	46	0	–	–8	–11	–	492	785
14	50	0	–	–8	–11	–	535	877
15	50	0	–	–8	–12	–	523	977
16	50	0	–	–8	–12	–	615	1 077
17	54	0	–	–8	–13	–	692	1 154
18	54	0	–	–9	–13	–	815	1 231
19	54	0	–	–10	–14	–	892	1 331
20	54	0	–	–11	–14	–	992	1 485
21	58	0	–	–11	–14	–	1 100	1 538
22	58	0	–	–12	–15	–	1 177	1 723
24	58	0	–	–12	–16	–	1 277	1 923
26	60	0	–	–12	–17	–	1 431	2 115
28	60	0	–	–12	–17	–	1 508	2 308
30	60	0	–	–13	–18	–	1 723	2 500
32	60	0	–	–13	–18	–	1 815	2 769
34	70	0	–	–14	–19	–	2 038	3 115

Tolerances for axial internal clearance or preload

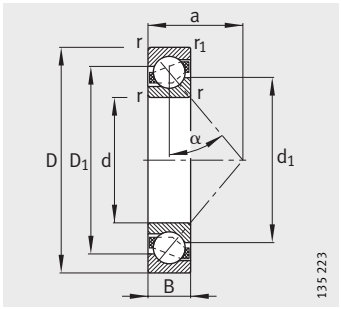
Tolerances for axial internal clearance or preload of pairs of angular contact ball bearings of universal design in X or O arrangement before fitting.

Tolerances

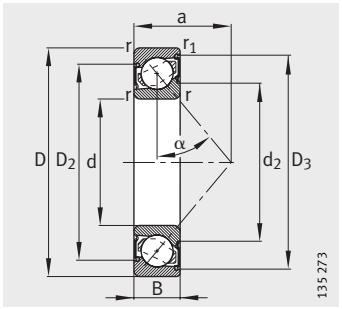
Bore code	Series 70B, 72B		Series 73B	
	Tolerance classes in µm			
	PN, P6	P5	PN, P6	P5
00 to 09	+8	+6	+8	+6
10 to 11	+8	+6	+12	+10
12 to 34	+12	+10	+12	+10

Angular contact ball bearings

Single row
Open or sealed



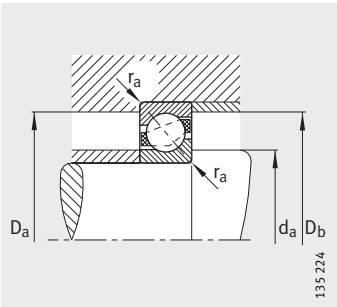
70..-B, 72..-B, 73..-B
$\alpha = 40°$



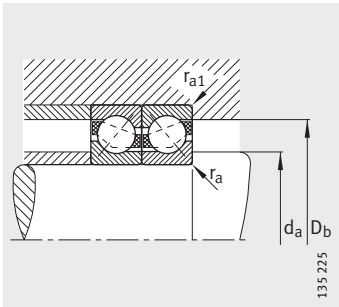
70..-B-2RS, 72..-B-2RS,
73..-B-2RS
Seal 2RS

Dimension table · Dimensions in mm

Designation		Mass	Dimensions								
	X-life	m ≈kg	d	D	B	r min.	r_1 min.	D_1 ≈	D_2 ≈	D_3 ≈	d_1 ≈
7200-B-JP	**XL**	0,033	**10**	30	9	0,6	0,3	22,1	–	–	18
7200-B-TVP	**XL**	0,032	**10**	30	9	0,6	0,3	22,1	–	–	18
7200-B-2RS-TVP	**XL**	0,032	**10**	30	9	0,6	0,3	–	23,3	25,6	–
7201-B-JP	**XL**	0,038	**12**	32	10	0,6	0,3	24,6	–	–	19,5
7201-B-TVP	**XL**	0,035	**12**	32	10	0,6	0,3	24,6	–	–	19,5
7201-B-2RS-TVP	**XL**	0,037	**12**	32	10	0,6	0,3	–	25,9	28,8	–
7301-B-JP	**XL**	0,066	**12**	37	12	1	0,6	27,2	–	–	22,1
7301-B-TVP	**XL**	0,06	**12**	37	12	1	0,6	27,2	–	–	22,1
7202-B-JP	**XL**	0,047	**15**	35	11	0,6	0,3	27,6	–	–	22,5
7202-B-TVP	**XL**	0,044	**15**	35	11	0,6	0,3	27,6	–	–	22,5
7202-B-2RS-TVP	**XL**	0,044	**15**	35	11	0,6	0,3	–	29,2	32,1	–
7302-B-JP	**XL**	0,088	**15**	42	13	1	0,6	31,8	–	–	25,5
7302-B-TVP	**XL**	0,082	**15**	42	13	1	0,6	31,8	–	–	25,5
7302-B-2RS-TVP	**XL**	0,082	**15**	42	13	1	0,6	–	33,3	38,1	–
7203-B-JP	**XL**	0,069	**17**	40	12	0,6	0,3	31,2	–	–	26,2
7203-B-TVP	**XL**	0,065	**17**	40	12	0,6	0,3	31,2	–	–	26,2
7203-B-2RS-TVP	**XL**	0,065	**17**	40	12	0,6	0,3	–	33,1	36,3	–
7303-B-JP	**XL**	0,117	**17**	47	14	1	0,6	35,8	–	–	28,5
7303-B-TVP	**XL**	0,109	**17**	47	14	1	0,6	35,8	–	–	28,5
7303-B-2RS-TVP	**XL**	0,109	**17**	47	14	1	0,6	–	37,2	42,6	–
7004-B-TVP	**XL**	0,06	**20**	42	12	0,6	0,3	34,7	–	–	29,1
7004-B-2RS-TVP	**XL**	0,061	**20**	42	12	0,6	0,3	–	37,1	39,8	–
7204-B-JP	**XL**	0,111	**20**	47	14	1	0,6	36,6	–	–	30,4
7204-B-TVP	**XL**	0,104	**20**	47	14	1	0,6	36,6	–	–	30,4
7204-B-2RS-TVP	**XL**	0,104	**20**	47	14	1	0,6	–	39,1	43	–
7304-B-JP	**XL**	0,152	**20**	52	15	1,1	0,6	39,9	–	–	32,4
7304-B-TVP	**XL**	0,143	**20**	52	15	1,1	0,6	39,9	–	–	32,4
7304-B-2RS-TVP	**XL**	0,143	**20**	52	15	1,1	0,6	–	41,4	47,1	–
7005-B-TVP	**XL**	0,071	**25**	47	12	0,6	0,3	39,7	–	–	34,1
7005-B-2RS-TVP	**XL**	0,071	**25**	47	12	0,6	0,3	–	41,5	44,8	–
7205-B-JP	**XL**	0,135	**25**	52	15	1	0,6	41,6	–	–	35,4
7205-B-TVP	**XL**	0,127	**25**	52	15	1	0,6	41,6	–	–	35,4
7205-B-2RS-TVP	**XL**	0,127	**25**	52	15	1	0,6	–	44,1	48	–
7305-B-JP	**XL**	0,242	**25**	62	17	1,1	0,6	48,1	–	–	39,3
7305-B-TVP	**XL**	0,223	**25**	62	17	1,1	0,6	48,1	–	–	39,3
7305-B-2RS-TVP	**XL**	0,231	**25**	62	17	1,1	0,6	–	50,4	57,1	–



Mounting dimensions

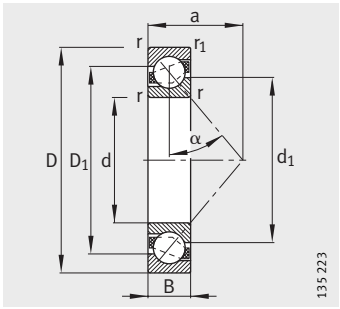


Mounting dimensions

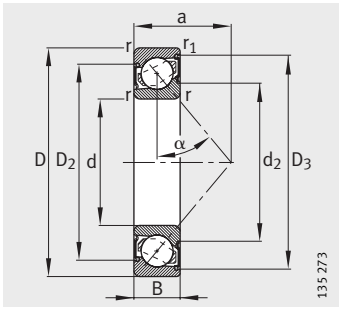
		Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_2	a	d_a	D_a	D_b	r_a	r_{a1}	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
≈	≈	min.	max.	max.	max.	max.	N	N	N	min^{-1}	min^{-1}
–	13	14,2	25,8	27,6	0,6	0,3	5 300	2 600	174	32 000	22 600
–	13	14,2	25,8	27,6	0,6	0,3	5 300	2 600	174	32 000	22 600
15,5	13	14,2	25,8	27,6	0,6	0,3	5 300	2 600	174	15 000	–
–	14	16,2	27,8	29,6	0,6	0,3	7 400	3 550	241	28 000	21 100
–	14	16,2	27,8	29,6	0,6	0,3	7 400	3 550	241	28 000	21 100
17	14	16,2	27,8	29,6	0,6	0,3	7 400	3 550	241	14 000	–
–	16	17,6	31,4	32,8	1	0,6	11 400	5 300	355	24 000	16 300
–	16	17,6	31,4	32,8	1	0,6	11 400	5 300	355	24 000	16 300
–	16	19,2	30,8	32,6	0,6	0,3	8 400	4 450	300	24 000	19 100
–	16	19,2	30,8	32,6	0,6	0,3	8 400	4 450	300	24 000	19 100
19,7	16	19,2	30,8	32,6	0,6	0,3	8 400	4 450	300	12 000	–
–	18	20,6	36,4	37,8	1	0,6	14 200	7 200	485	20 000	14 200
–	18	20,6	36,4	37,8	1	0,6	14 200	7 200	485	20 000	14 200
22,9	18	20,6	36,4	37,8	1	0,6	14 200	7 200	485	11 000	–
–	18	21,2	35,8	37,6	0,6	0,6	10 500	5 700	380	20 000	17 100
–	18	21,2	35,8	37,6	0,6	0,6	10 500	5 700	380	20 000	17 100
22,9	18	21,2	35,8	37,6	0,6	0,6	10 500	5 700	380	11 000	–
–	20	22,6	41,4	42,8	1	0,6	17 600	9 000	610	18 000	12 800
–	20	22,6	41,4	42,8	1	0,6	17 600	9 000	610	18 000	12 800
26,1	20	22,6	41,4	42,8	1	0,6	17 600	9 000	610	9 500	–
–	12	23,2	38,8	40	0,6	0,3	13 400	7 000	470	18 000	14 600
25,9	12	23,2	38,8	40	0,6	0,3	13 400	7 000	470	9 500	–
–	21	25,6	41,4	42,8	1	0,6	14 000	7 800	520	18 000	15 400
–	21	25,6	41,4	42,8	1	0,6	14 000	7 800	520	18 000	15 400
26,8	21	25,6	41,4	42,8	1	0,6	14 000	7 800	520	9 000	–
–	23	27	45	47,8	1	0,6	20 400	11 100	750	17 000	11 500
–	23	27	45	47,8	1	0,6	20 400	11 100	750	17 000	11 500
30	23	27	45	47,8	1	0,6	20 400	11 100	750	8 500	–
–	21	28,2	43,8	45	0,6	0,3	14 900	8 600	580	16 000	12 200
30,9	21	28,2	43,8	45	0,6	0,3	14 900	8 600	580	8 000	–
–	24	30,6	46,4	47,8	1	0,6	15 300	9 000	600	16 000	13 700
–	24	30,6	46,4	47,8	1	0,6	15 300	9 000	600	16 000	13 700
31,8	24	30,6	46,4	47,8	1	0,6	15 300	9 000	600	8 000	–
–	27	32	55	57,8	1	0,6	28 000	15 800	1 070	14 000	9 800
–	27	32	55	57,8	1	0,6	28 000	15 800	1 070	14 000	9 800
35,8	27	32	55	57,8	1	0,6	28 000	15 800	1 070	7 000	–

Angular contact ball bearings

Single row
Open or sealed



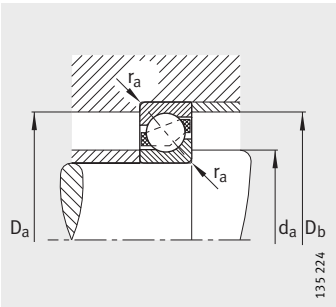
718..-B, 70..-B, 72..-B, 73..-B
$\alpha = 40°$



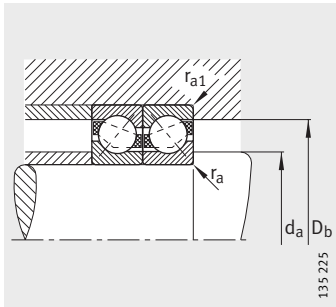
70..-B-2RS, 72..-B-2RS,
73..-B-2RS
Seal 2RS

Dimension table (continued) · Dimensions in mm

Designation		Mass	Dimensions								
	X-life	m ≈kg	d	D	B	r min.	r_1 min.	D_1 ≈	D_2 ≈	D_3 ≈	d_1 ≈
71806-B-TVH	–	0,025	**30**	42	7	0,3	0,2	37,3	–	–	34,7
7006-B-TVP	**XL**	0,109	**30**	55	13	1	0,6	46,9	–	–	40,7
7006-B-2RS-TVP	**XL**	0,109	**30**	55	13	1	0,6	–	48,8	53,6	–
7206-B-JP	**XL**	0,202	**30**	62	16	1	0,6	49,8	–	–	42,8
7206-B-TVP	**XL**	0,196	**30**	62	16	1	0,6	49,8	–	–	42,8
7206-B-2RS-TVP	**XL**	0,203	**30**	62	16	1	0,6	–	51,9	57	–
7306-B-JP	**XL**	0,362	**30**	72	19	1,1	0,6	56	–	–	46,5
7306-B-TVP	**XL**	0,341	**30**	72	19	1,1	0,6	56	–	–	46,5
7306-B-2RS-TVP	**XL**	0,341	**30**	72	19	1,1	0,6	–	58,6	65,9	–
71807-B-TVH	–	0,027	**35**	47	7	0,3	0,2	42,3	–	–	39,7
7007-B-TVP	**XL**	0,14	**35**	62	14	1	0,6	53,2	–	–	46,5
7007-B-2RS-TVP	**XL**	0,14	**35**	62	14	1	0,6	–	55	60,4	–
7207-B-JP	**XL**	0,3	**35**	72	17	1,1	0,6	57,9	–	–	49,5
7207-B-TVP	**XL**	0,282	**35**	72	17	1,1	0,6	57,9	–	–	49,5
7207-B-2RS-TVP	**XL**	0,282	**35**	72	17	1,1	0,6	–	60,2	66,5	–
7307-B-JP	**XL**	0,475	**35**	80	21	1,5	1	63,1	–	–	52,7
7307-B-TVP	**XL**	0,447	**35**	80	21	1,5	1	63,1	–	–	52,7
7307-B-2RS-TVP	**XL**	0,447	**35**	80	21	1,5	1	–	64,7	73,5	–
71808-B-TVH	–	0,029	**40**	52	7	0,3	0,2	47,3	–	–	44,7
7008-B-TVP	**XL**	0,17	**40**	68	15	1	0,6	58,6	–	–	51,3
7008-B-2RS-TVP	**XL**	0,17	**40**	68	15	1	0,6	–	60,5	66,3	–
7208-B-JP	**XL**	0,387	**40**	80	18	1,1	0,6	64,7	–	–	55,7
7208-B-TVP	**XL**	0,367	**40**	80	18	1,1	0,6	64,7	–	–	55,7
7208-B-2RS-TVP	**XL**	0,367	**40**	80	18	1,1	0,6	–	67	73,8	–
7308-B-JP	**XL**	0,646	**40**	90	23	1,5	1	71,7	–	–	59,2
7308-B-TVP	**XL**	0,61	**40**	90	23	1,5	1	71,7	–	–	59,2
7308-B-2RS-TVP	**XL**	0,61	**40**	90	23	1,5	1	–	73,9	83,3	–
71809-B-TVH	–	0,033	**45**	58	7	0,3	0,2	52,8	–	–	50,2
7209-B-JP	**XL**	0,428	**45**	85	19	1,1	0,6	70	–	–	60,5
7209-B-TVP	**XL**	0,405	**45**	85	19	1,1	0,6	70	–	–	60,5
7309-B-JP	**XL**	0,878	**45**	100	25	1,5	1	79,8	–	–	66,7
7309-B-TVP	**XL**	0,813	**45**	100	25	1,5	1	79,8	–	–	66,7



Mounting dimensions

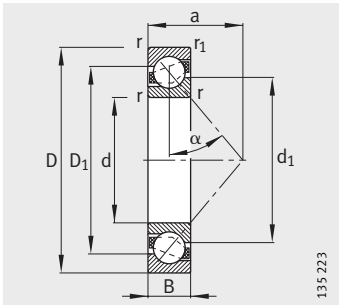


Mounting dimensions

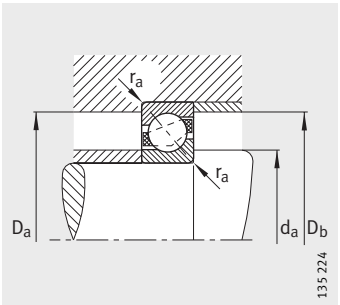
		Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_2	a	d_a	D_a	D_b	r_a	r_{a1}	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
≈	≈	min.	max.	max.	max.	max.	N	N	N	min^{-1}	min^{-1}
–	18,6	32	40	40,6	0,3	0,2	5 600	4 550	295	17 000	–
–	24	34,6	50,4	51,8	1	0,6	18 400	11 500	770	14 000	10 400
38,2	24	34,6	50,4	51,8	1	0,6	18 400	11 500	770	6 700	–
–	27	35,6	56,4	57,8	1	0,6	21 700	14 100	950	13 000	11 200
–	27	35,6	56,4	57,8	1	0,6	21 700	14 100	950	13 000	11 200
39,8	27	35,6	56,4	57,8	1	0,6	21 700	14 100	950	6 300	–
–	31	37	65	67,8	1	0,6	35 500	22 100	1 490	11 000	8 600
–	31	37	65	67,8	1	0,6	35 500	22 100	1 490	11 000	8 600
42,8	31	37	65	67,8	1	0,6	35 500	22 100	1 490	6 000	–
–	20,7	37	45	45,6	0,3	0,2	6 000	5 300	350	15 000	–
–	27	39,6	57,4	58,8	1	0,6	22 400	14 800	1 000	12 000	9 200
44	27	39,6	57,4	58,8	1	0,6	22 400	14 800	1 000	6 000	–
–	31	42	65	67,8	1	0,6	28 000	19 000	1 280	11 000	9 600
–	31	42	65	67,8	1	0,6	28 000	19 000	1 280	11 000	9 600
45,8	31	42	65	67,8	1	0,6	28 000	19 000	1 280	5 600	–
–	35	44	71	74,4	1,5	1	43 000	27 500	1 860	9 500	7 900
–	35	44	71	74,4	1,5	1	43 000	27 500	1 860	9 500	7 900
49,2	35	44	71	74,4	1,5	1	43 000	27 500	1 860	5 000	–
–	22,8	42	50	50,6	0,3	0,2	6 300	5 850	395	13 000	–
–	30	44,6	63,4	64,8	1	0,6	26 000	17 400	1 180	10 000	–
48,8	30	44,6	63,4	64,8	1	0,6	26 000	17 400	1 180	5 300	–
–	34	47	73	75,8	1	0,6	34 000	23 500	1 580	9 500	8 600
–	34	47	73	75,8	1	0,6	34 000	23 500	1 580	9 500	8 600
52	34	47	73	75,8	1	0,6	34 000	23 500	1 580	5 000	–
–	39	49	81	84,4	1,5	1	53 000	34 500	2 320	8 500	7 100
–	39	49	81	84,4	1,5	1	53 000	34 500	2 320	8 500	7 100
55,6	39	49	81	84,4	1,5	1	53 000	34 500	2 320	4 500	–
–	25,1	47	56	56,6	0,3	0,2	6 550	6 550	450	13 000	–
–	37	52	78	80,8	1	0,6	37 500	27 000	1 810	8 500	8 000
–	37	52	78	80,8	1	0,6	37 500	27 000	1 810	8 500	8 000
–	43	54	91	94,4	1,5	1	65 000	43 000	2 900	7 500	6 500
–	43	54	91	94,4	1,5	1	65 000	43 000	2 900	7 500	6 500

Angular contact ball bearings

Single row
Open



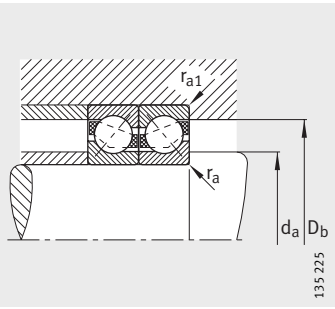
718..-B, 72..-B, 73..-B
$\alpha = 40°$



Mounting dimensions

Dimension table (continued) · Dimensions in mm

Designation		Mass	Dimensions							
	X-life	m ≈kg	d	D	B	r min.	r_1 min.	D_1 ≈	d_1 ≈	a ≈
71810-B-TVH	–	0,043	**50**	65	7	0,3	0,2	59,3	56,7	27,8
7210-B-JP	**XL**	0,493	**50**	90	20	1,1	0,6	74,8	66,2	39
7210-B-TVP	**XL**	0,458	**50**	90	20	1,1	0,6	74,8	66,2	39
7310-B-JP	**XL**	1,13	**50**	110	27	2	1	87,6	73,1	47
7310-B-TVP	**XL**	1,05	**50**	110	27	2	1	87,6	73,1	47
71811-B-TVH	–	0,058	**55**	72	9	0,3	0,2	65,3	61,7	31,1
7211-B-JP	**XL**	0,645	**55**	100	21	1,5	1	83	72,6	43
7211-B-TVP	**XL**	0,604	**55**	100	21	1,5	1	83	72,6	43
7311-B-JP	**XL**	1,46	**55**	120	29	2	1	95,3	80,3	51
7311-B-TVP	**XL**	1,38	**55**	120	29	2	1	95,3	80,3	51
71812-B-TVH	–	0,07	**60**	78	10	0,3	0,2	70,8	67,2	33,9
7212-B-JP	**XL**	0,847	**60**	110	22	1,5	1	91,1	79,5	47
7212-B-TVP	**XL**	0,78	**60**	110	22	1,5	1	91,1	79,5	47
7312-B-JP	**XL**	1,74	**60**	130	31	2,1	1,1	103,4	87,3	55
7312-B-TVP	**XL**	1,72	**60**	130	31	2,1	1,1	103,4	87,3	55
71813-B-TVH	–	0,085	**65**	85	10	0,6	0,3	77	73	36,5
7213-B-JP	**XL**	1,08	**65**	120	23	1,5	1	98,9	86	51
7213-B-TVP	**XL**	1	**65**	120	23	1,5	1	98,9	86	51
7313-B-JP	**XL**	2,22	**65**	140	33	2,1	1,1	112	95	60
7313-B-TVP	**XL**	2,12	**65**	140	33	2,1	1,1	112	95	60
71814-B-TVH	–	0,091	**70**	90	10	0,6	0,3	82	78	38,5
7214-B-JP	**XL**	1,17	**70**	125	24	1,5	1	104,7	91	53
7214-B-TVP	**XL**	1,08	**70**	125	24	1,5	1	104,7	91	53
7314-B-JP	**XL**	2,76	**70**	150	35	2,1	1,1	120,1	101,9	64
7314-B-TVP	**XL**	2,58	**70**	150	35	2,1	1,1	120,1	101,9	64
71815-B-TVH	–	0,096	**75**	95	10	0,6	0,3	87	83	40,6
7215-B-JP	**XL**	1,25	**75**	130	25	1,5	1	109,2	96,5	56
7215-B-TVP	**XL**	1,16	**75**	130	25	1,5	1	109,2	96,5	56
7315-B-JP	**XL**	3,29	**75**	160	37	2,1	1,1	128,5	108,8	68
7315-B-TVP	**XL**	3,1	**75**	160	37	2,1	1,1	128,5	108,8	68
71816-B-TVH	–	0,101	**80**	100	10	0,6	0,3	92	88	42,7
7216-B-JP	**XL**	1,53	**80**	140	26	2	1	117,8	102,9	59
7216-B-TVP	**XL**	1,42	**80**	140	26	2	1	117,8	102,9	59
7316-B-JP	**XL**	3,86	**80**	170	39	2,1	1,1	136,7	115,7	72
7316-B-TVP	**XL**	3,66	**80**	170	39	2,1	1,1	136,7	115,7	72

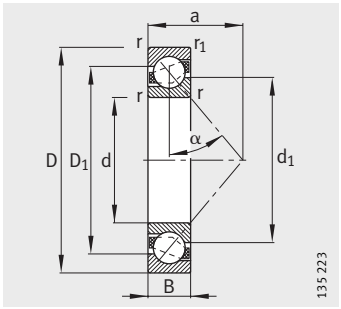


Mounting dimensions

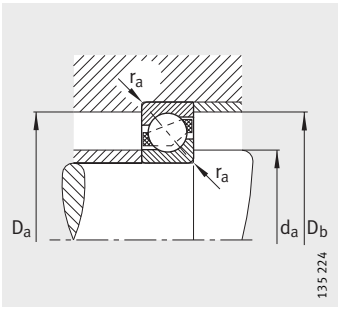
Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	D_b	r_a	r_{a1}	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	max.	max.	N	N	N	min^{-1}	min^{-1}
52	63	63,6	0,3	0,2	6 950	7 350	520	9 500	–
57	83	85,8	1	0,6	39 000	28 500	1 920	8 000	7 600
57	83	85,8	1	0,6	39 000	28 500	1 920	8 000	7 600
61	99	104,4	2	1	75 000	50 000	3 400	7 000	6 100
61	99	104,4	2	1	75 000	50 000	3 400	7 000	6 100
57	70	70,6	0,3	0,2	11 800	11 800	760	9 000	–
64	91	94,4	1,5	1	49 000	38 500	2 600	7 000	6 800
64	91	94,4	1,5	1	49 000	38 500	2 600	7 000	6 800
66	109	114,4	2	1	86 000	61 000	4 100	6 300	5 600
66	109	114,4	2	1	86 000	61 000	4 100	6 300	5 600
62	76	76,6	0,3	0,2	12 200	12 900	840	8 000	–
69	101	104,4	1,5	1	59 000	45 000	3 050	6 300	6 200
69	101	104,4	1,5	1	59 000	45 000	3 050	6 300	6 200
72	118	123	2,1	1	96 000	69 000	4 650	5 600	5 300
72	118	123	2,1	1	96 000	69 000	4 650	5 600	5 300
68,2	81,8	83	0,6	0,3	15 300	16 000	970	7 500	–
74	111	114,4	1,5	1	67 000	55 000	3 700	6 000	5 700
74	111	114,4	1,5	1	67 000	55 000	3 700	6 000	5 700
77	128	133	2,1	1	110 000	82 000	5 400	5 300	5 000
77	128	133	2,1	1	110 000	82 000	5 400	5 300	5 000
73,2	86,8	88	0,6	0,3	16 000	17 300	1 070	7 000	–
79	116	119,4	1,5	1	74 000	62 000	4 200	5 600	5 400
79	116	119,4	1,5	1	74 000	62 000	4 200	5 600	5 400
82	138	143	2,1	1	126 000	93 000	6 000	5 000	4 750
82	138	143	2,1	1	126 000	93 000	6 000	5 000	4 750
78,2	91,8	93	0,6	0,3	16 300	18 000	1 140	6 300	–
84	121	124,4	1,5	1	73 000	62 000	4 100	5 300	5 300
84	121	124,4	1,5	1	73 000	62 000	4 100	5 300	5 300
87	148	153	2,1	1	140 000	107 000	6 700	4 500	4 500
87	148	153	2,1	1	140 000	107 000	6 700	4 500	4 500
83,2	96,8	98	0,6	0,3	16 600	19 000	1 200	6 000	–
91	129	134,4	2	1	85 000	72 000	4 650	5 000	4 950
91	129	134,4	2	1	85 000	72 000	4 650	5 000	4 950
92	158	163	2,1	1	155 000	124 000	7 500	4 300	4 250
92	158	163	2,1	1	155 000	124 000	7 500	4 300	4 250

Angular contact ball bearings

Single row
Open



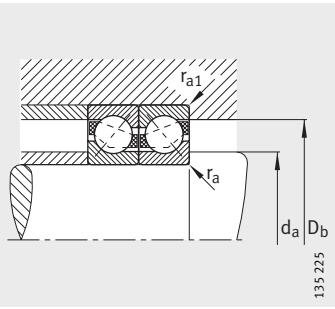
72..-B, 73..-B
$\alpha = 40°$



Mounting dimensions

Dimension table (continued) · Dimensions in mm

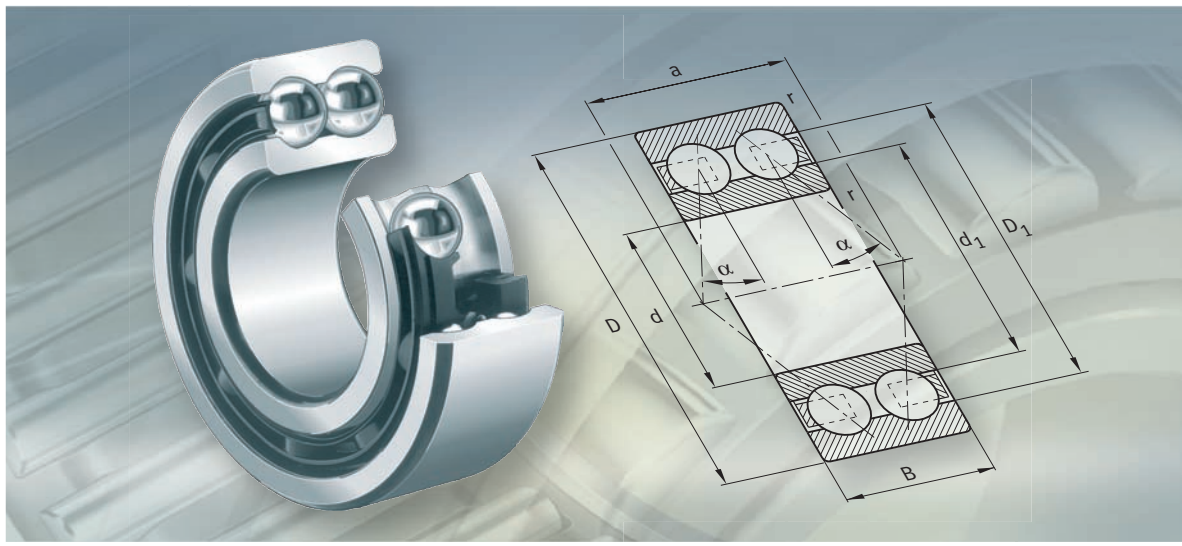
Designation		Mass	Dimensions							
	X-life	m ≈kg	d	D	B	r min.	r_1 min.	D_1 ≈	d_1 ≈	a ≈
7217-B-JP	**XL**	1,94	**85**	150	28	2	1	125	110,6	63
7217-B-TVP	**XL**	1,82	**85**	150	28	2	1	125	110,6	63
7317-B-JP	**XL**	4,4	**85**	180	41	3	1,1	144	122	76
7317-B-TVP	**XL**	4,26	**85**	180	41	3	1,1	144	122	76
7218-B-JP	**XL**	2,38	**90**	160	30	2	1	133,4	117,5	67
7218-B-TVP	**XL**	2,21	**90**	160	30	2	1	133,4	117,5	67
7318-B-JP	**XL**	5,14	**90**	190	43	3	1,1	153	129,7	80
7318-B-TVP	**XL**	5	**90**	190	43	3	1,1	153	129,7	80
7219-B-JP	**XL**	2,64	**95**	170	32	2,1	1,1	142	124,9	72
7219-B-TVP	**XL**	2,64	**95**	170	32	2,1	1,1	142	124,9	72
7319-B-JP	**XL**	5,93	**95**	200	45	3	1,1	160,1	136,7	84
7319-B-TVP	**XL**	5,78	**95**	200	45	3	1,1	160,1	136,7	84
7220-B-JP	**XL**	3,45	**100**	180	34	2,1	1,1	149,6	131,9	76
7220-B-TVP	**XL**	3,17	**100**	180	34	2,1	1,1	149,6	131,9	76
7320-B-JP	**XL**	7,38	**100**	215	47	3	1,1	172,3	145,8	90
7320-B-TVP	**XL**	7,16	**100**	215	47	3	1,1	172,3	145,8	90
7221-B-MP	**XL**	4,18	**105**	190	36	2,1	1,1	157,7	138,2	80
7321-B-MP	**XL**	9	**105**	225	49	3	1,1	179,6	153,5	94
7222-B-JP	**XL**	4,7	**110**	200	38	2,1	1,1	165,7	144,9	84
7222-B-TVP	**XL**	4,44	**110**	200	38	2,1	1,1	165,7	144,9	84
7322-B-JP	**XL**	9,97	**110**	240	50	3	1,1	191,5	161,9	98
7322-B-TVP	**XL**	9,74	**110**	240	50	3	1,1	191,5	161,9	98
7224-B-TVP	**XL**	5,31	**120**	215	40	2,1	1,1	179,5	157,2	90
7324-B-TVP	**XL**	12,5	**120**	260	55	3	1,1	207,7	175,9	107
7226-B-TVP	**XL**	6,12	**130**	230	40	3	1,1	191,8	169,2	96
7326-B-TVP	**XL**	15,1	**130**	280	58	4	1,5	222,5	188,5	115
7228-B-MP	**XL**	8,55	**140**	250	42	3	1,1	207,5	183,5	103
7328-B-MP	–	20,5	**140**	300	62	4	1,5	240,2	203,9	123
7230-B-MP	**XL**	10,9	**150**	270	45	3	1,1	223,5	197,5	111
7330-B-MP	–	24,8	**150**	320	65	4	1,5	256,5	217,8	131
7232-B-MP	–	13,5	**160**	290	48	3	1,1	238	212	118
7332-B-MP	–	29	**160**	340	68	4	1,5	272,2	232,4	139
7234-B-MP	–	16,7	**170**	310	52	4	1,5	256,5	226,9	127
7334-B-MP	–	34,4	**170**	360	72	4	1,5	291,6	248,4	147



Mounting dimensions

Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	D_b	r_a	r_{a1}	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	max.	max.	N	N	N	min^{-1}	min^{-1}
96	139	144,4	2	1	97 000	86 000	5 300	4 500	4 750
96	139	144,4	2	1	97 000	86 000	5 300	4 500	4 750
99	166	173	2,5	1	167 000	138 000	8 100	4 000	4 100
99	166	173	2,5	1	167 000	138 000	8 100	4 000	4 100
101	149	154,4	2	1	114 000	98 000	5 900	4 300	4 550
101	149	154,4	2	1	114 000	98 000	5 900	4 300	4 550
104	176	183	2,5	1	180 000	155 000	8 800	3 800	3 900
104	176	183	2,5	1	180 000	155 000	8 800	3 800	3 900
107	158	163	2,1	1	123 000	106 000	6 200	4 000	4 500
107	158	163	2,1	1	123 000	106 000	6 200	4 000	4 450
109	186	193	2,5	1	189 000	167 000	9 300	3 800	3 800
109	186	193	2,5	1	189 000	167 000	9 300	3 800	3 800
112	168	173	2,1	1	148 000	132 000	7 500	3 800	4 200
112	168	173	2,1	1	142 000	124 000	7 100	3 800	4 250
114	201	208	2,5	1	214 000	197 000	10 600	3 600	3 550
114	201	208	2,5	1	214 000	197 000	10 600	3 600	3 550
117	178	183	2,1	1	155 000	142 000	7 900	6 000	4 100
119	211	218	2,5	1	225 000	214 000	11 200	5 300	3 400
122	188	193	2,1	1	167 000	154 000	8 300	3 600	3 950
122	188	193	2,1	1	167 000	154 000	8 300	3 600	3 950
124	226	233	2,5	1	250 000	245 000	12 500	3 400	3 150
124	226	233	2,5	1	250 000	245 000	12 500	3 400	3 150
132	203	208	2,1	1	182 000	178 000	9 300	3 400	3 700
134	246	253	2,5	1	275 000	285 000	13 900	3 200	2 850
144	216	223	2,5	1	200 000	204 000	10 300	3 200	3 350
147	263	271	3	1,5	305 000	325 000	15 400	3 000	2 600
154	236	243	2,5	1	214 000	231 000	11 100	4 800	3 100
157	283	291	3	1,5	300 000	345 000	12 700	4 300	2 400
164	256	263	2,5	1	245 000	275 000	12 800	4 500	2 850
167	303	311	3	1,5	325 000	390 000	14 200	3 800	2 200
174	276	283	2,5	1	236 000	280 000	10 400	4 300	2 650
177	323	331	3	1,5	360 000	450 000	15 100	3 600	2 040
187	293	301	3	1,5	265 000	325 000	11 600	3 800	2 440
187	343	351	3	1,5	405 000	530 000	18 100	3 200	1 840

FAG



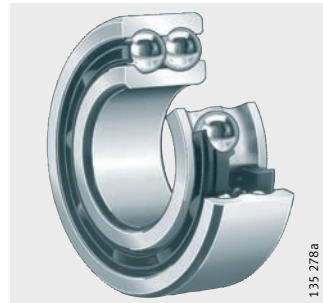
Double row angular contact ball bearings

Double row angular contact ball bearings

		Page
Product overview	Double row angular contact ball bearings	282
Features	Radial and axial load capacity	283
	Operating temperature	284
	Cages	284
	Suffixes	285
Design and safety guidelines	Equivalent dynamic bearing load	285
	Equivalent static bearing load	286
	Minimum radial load	286
	Speed	286
	Design of bearing arrangements	286
Accuracy	Axial internal clearance	287
Dimension tables	Angular contact ball bearings, double row, open or sealed	288
	Angular contact ball bearings, double row, open or sealed, split inner ring	292

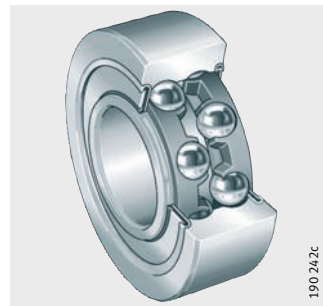
Double row

38..-B, 30..-B, 32..-B, 33..-B

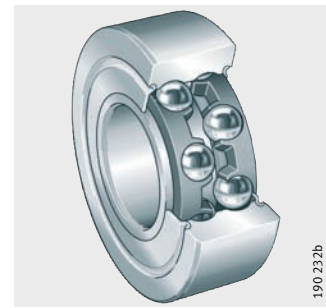


Lip seals or gap seals

38..-B-2RSR, 30..-B-2RSR, 32..-B-2RSR, 33..-B-2RSR

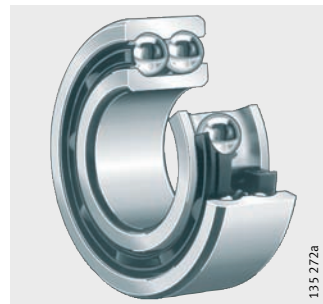


38..-B-2Z, 30..-B-2Z, 32..-B-2Z, 33..-B-2Z



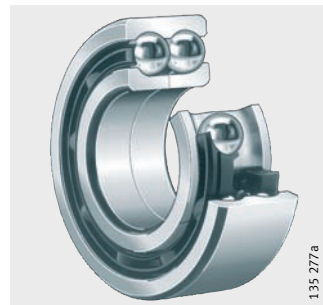
With filling slot

32, 33



Split inner ring

33..-DA



Double row angular contact ball bearings

Features

Double row angular contact ball bearings are units with solid inner and outer rings and ball and cage assemblies with polyamide, sheet steel or brass cages. Their construction is similar to a pair of single row angular contact ball bearings in an O arrangement but they are narrower to a certain extent. They differ in the size of the contact angle and the design of the bearing rings.

The bearings are available in open and sealed designs.
Due to the manufacturing processes used, open bearings can have turned recesses in the outer ring for seals or shields.
Sealed bearings are maintenance-free and therefore allow particularly economical bearing arrangements.

The angular adjustment facility of the angular contact ball bearings is very limited.

Radial and axial load capacity

Double row angular contact ball bearings can support axial forces in both directions and high radial forces. They are particularly suitable for bearing arrangements where rigid axial guidance is required.

The axial load carrying capacity is dependent on the contact angle; i.e. the larger the angle (α = 25°, 35° and 45°), the higher the axial load to which the bearing can be subjected.

Without filling slot

Bearings of series 38..-B, 30..-B, 32..-B and 33..-B are self-retaining and do not have filling slots in the end faces of the bearing rings. They have a contact angle of α = 25°. Their axial load carrying capacity is the same in both directions. These bearings are highly versatile.

With filling slot

Angular contact ball bearings of series 32 und 33 are self-retaining and have filling slots on one side.
They have a contact angle of α = 35°.

These series must be fitted such that the main load direction is supported by the raceways without filling slots.

With split inner ring

Bearings of series 33..-DA have a split inner ring. Due to the contact angle of α = 45°, they can support very high axial forces in both directions.

The inner ring halves are matched to the particular bearing and must not be interchanged with those of other bearings of the same size.

Sealing

Series 38..-B, 30..-B, 32..-B and 33..-B with the suffix 2RSR are sealed by lip seals on both sides. Contact seals are suitable for giving protection against dust, contamination and damp atmospheres.

Series with the suffix 2Z have gap seals on both sides.

Lubrication

Sealed bearings are greased with a high quality grease and are lubricated for life.

Operating temperature

Open bearings are suitable for operating temperatures from –30 °C to +150 °C.

Bearings with cages made from glass fibre reinforced polyamide are suitable for operating temperatures up to +120 °C, restricted by the cage material.

Bearings with the suffix 2RSR are suitable up to +110 °C, restricted by the lubricant and seal material.

Cages

Bearings without a cage suffix have standard cages made from sheet steel.

Angular contact ball bearings with cages made from glass fibre reinforced polyamide have the suffix TVH.

Bearings with ball-guided solid brass cages are indicated by the suffix M. Solid brass cages guided on the outer ring have the suffix MA.

Check the chemical resistance of polyamide to synthetic greases and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures.

The oil change intervals must be observed.

Cage and bore code

Series	Polyamide cage[1)]	Solid brass cage[1)]	Sheet steel cage[1)]
	Bore code		
32	–	19, 21, 22	17, 18, 20
33	–	17, 19, 20, 22	14 to 16, 18
30..-B	up to 08	–	–
32..-B	up to 16	–	–
33..-B	up to 13	–	–
38..-B	up to 16	–	–
33..-DA	05	08, 10, 11	06, 09, from 12

1) Other cage designs are available by agreement.
With such cages, suitability for high speeds and high temperatures as well as the basic load ratings may differ from the values for bearings with standard cages.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
B	Modified internal construction, contact angle α = 25°, without filling slot	Standard
C2	Axial internal clearance C2	Special design, available by agreement
C3	Axial internal clearance C3	
DA	Inner ring split	Standard
M	Solid brass cage, ball-guided	
MA	Solid brass cage, guidance on outer ring	
TVH	Solid polyamide snap cage, ball-guided	
2RSR	Lip seals on both sides	
2Z	Gap seals on both sides	

Design and safety guidelines

Equivalent dynamic bearing load

For bearings under dynamic loading, the following applies:

Contact angle 25°

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leqq 0{,}68$	$P = F_r + 0{,}92 \cdot F_a$
$\frac{F_a}{F_r} > 0{,}68$	$P = 0{,}67 \cdot F_r + 1{,}41 \cdot F_a$

Contact angle 35°

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leqq 0{,}95$	$P = F_r + 0{,}66 \cdot F_a$
$\frac{F_a}{F_r} > 0{,}95$	$P = 0{,}6 \cdot F_r + 1{,}07 \cdot F_a$

Contact angle 45°

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leqq 1{,}33$	$P = F_r + 0{,}47 \cdot F_a$
$\frac{F_a}{F_r} > 1{,}33$	$P = 0{,}54 \cdot F_r + 0{,}81 \cdot F_a$

Symbols, units and definitions

P N
Equivalent dynamic bearing load for combined load

F_a N
Axial dynamic bearing load

F_r N
Radial dynamic bearing load.

Equivalent static bearing load

For bearings under static loading, the following applies:

Contact angle 25°

$$P_0 = F_{0r} + 0{,}76 \cdot F_{0a}$$

Contact angle 35°

$$P_0 = F_{0r} + 0{,}58 \cdot F_{0a}$$

Contact angle 45°

$$P_0 = F_{0r} + 0{,}44 \cdot F_{0a}$$

Symbols, units and definitions

P_0 N
Equivalent static bearing load for combined load
F_{0a} N
Axial static bearing load
F_{0r} N
Radial static bearing load.

Minimum radial load

In order to ensure slippage-free operation, the bearings must be subjected to a minimum radial load. This applies particularly in the case of high speeds and high accelerations. In continuous operation, a minimum radial load of the order of $P/C_r > 0{,}01$ is necessary for ball bearings with cage.

Speed

The reference speed n_B can be exceeded up to the limiting speed n_G if permitted by the operating conditions. If the reference speed in the tables is higher than the limiting speed, the higher value cannot be used.

In bearings with lip seals 2RSR, the speed is limited by the permissible sliding speed of the sealing lips, so only the limiting speed is given in the dimension tables.

The limiting speed n_G given in the dimension tables must not be exceeded.

Design of bearing arrangements

Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 150.

Recommended housing tolerances for radial bearings, see table, page 152.

Mounting dimensions

The dimension tables give the maximum dimension of the radius r_a and the diameters of the abutment shoulders D_a and d_a.

Accuracy

The main dimensions of the bearings conform to DIN 628-3.

The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620-2.

Axial internal clearance

Double row angular contact ball bearings of the basic design have the normal axial internal clearance (CN). Bearings are available by agreement with an axial internal clearance larger (C3) or smaller (C2) than normal.

Bearings with a split inner ring are intended for higher axial loads. In general, they have a tighter fit than unsplit bearings. Their normal internal clearance corresponds to internal clearance group C3 for unsplit bearings.

Axial internal clearance to DIN 628-3 for bearings with unsplit inner ring

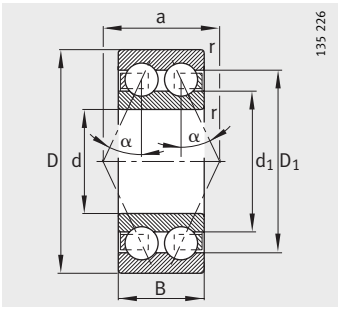
Bore d mm		Axial internal clearance					
		C2 µm		CN µm		C3 µm	
over	incl.	min.	max.	min.	max.	min.	max.
–	10	1	11	5	21	12	28
10	18	1	12	6	23	13	31
18	24	2	14	7	25	16	34
24	30	2	15	8	27	18	37
30	40	2	16	9	29	21	40
40	50	2	18	11	33	23	44
50	65	3	22	13	36	26	48
65	80	3	24	15	40	30	54
80	100	3	26	18	46	35	63
100	120	4	30	22	53	42	73

Axial internal clearance for bearings with split inner ring

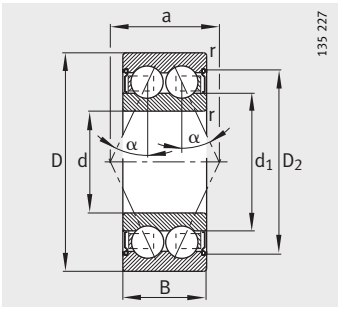
Bore d mm		Axial internal clearance					
		C2 µm		CN µm		C3 µm	
over	incl.	min.	max.	min.	max.	min.	max.
24	30	8	27	16	35	27	46
30	40	9	29	18	38	30	50
40	50	11	33	22	44	36	58
50	65	13	36	25	48	40	63
65	80	15	40	29	54	46	71

Angular contact ball bearings

Double row
Open or sealed



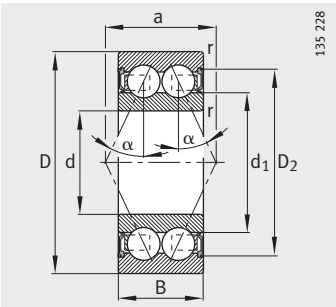
30..-B, 38..-B, 32..-B
$\alpha = 25°$



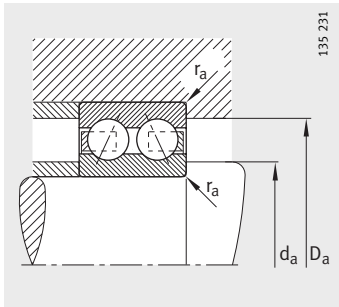
30..-B-2Z, 38..-B-2Z, 32-B-2Z
$\alpha = 25°$

Dimension table · Dimensions in mm

Designation	Mass	Dimensions							
	m	d	D	B	r	D_1	D_2	d_1	a
	≈kg				min.	≈	≈	≈	≈
30/5-B-TVH	0,008	**5**	14	7	0,2	–	–	7,5	6,3
30/5-B-2Z-TVH	0,008	**5**	14	7	0,2	–	–	7,5	6,3
30/5-B-2RSR-TVH	0,008	**5**	14	7	0,2	–	–	7,5	6,3
30/6-B-TVH	0,01	**6**	17	9	0,3	–	–	8,3	8,8
30/6-B-2Z-TVH	0,01	**6**	17	9	0,3	–	–	8,3	8,8
30/6-B-2RSR-TVH	0,01	**6**	17	9	0,3	–	–	8,3	8,8
30/7-B-TVH	0,012	**7**	19	10	0,3	–	–	9	10
30/7-B-2Z-TVH	0,012	**7**	19	10	0,3	–	–	9	10
30/7-B-2RSR-TVH	0,012	**7**	19	10	0,3	–	–	9	10
30/8-B-TVH	0,02	**8**	22	11	0,3	–	–	10,5	10,7
30/8-B-2Z-TVH	0,02	**8**	22	11	0,3	–	–	10,5	10,7
30/8-B-2RSR-TVH	0,02	**8**	22	11	0,3	–	–	10,5	10,7
3800-B-TVH	0,008	**10**	19	7	0,3	–	–	13	8,1
3800-B-2Z-TVH	0,008	**10**	19	7	0,3	–	–	13	8,1
3800-B-2RSR-TVH	0,008	**10**	19	7	0,3	–	–	13	8,1
3000-B-TVH	0,022	**10**	26	12	0,3	–	–	13,5	12,3
3000-B-2Z-TVH	0,022	**10**	26	12	0,3	–	–	13,5	12,3
3000-B-2RSR-TVH	0,022	**10**	26	12	0,3	–	–	13,5	12,3
3200-B-TVH	0,05	**10**	30	14	0,6	23,9	–	17,9	15
3200-B-2Z-TVH	0,051	**10**	30	14	0,6	–	25,3	17,9	15
3801-B-TVH	0,008	**12**	21	7	0,3	–	–	15	8,9
3801-B-2Z-TVH	0,008	**12**	21	7	0,3	–	–	15	8,9
3801-B-2RSR-TVH	0,008	**12**	21	7	0,3	–	–	15	8,9
3001-B-TVH	0,025	**12**	28	12	0,3	–	–	15,5	13
3001-B-2Z-TVH	0,025	**12**	28	12	0,3	–	–	15,5	13
3001-B-2RSR-TVH	0,025	**12**	28	12	0,3	–	–	15,5	13
3201-B-TVH	0,051	**12**	32	15,9	0,6	25,7	–	18,3	17
3201-B-2Z-TVH	0,053	**12**	32	15,9	0,6	–	28,1	18,3	17



30..-B-2RSR, 32-B-2RSR,
38..-B-2RSR
$\alpha = 25°$

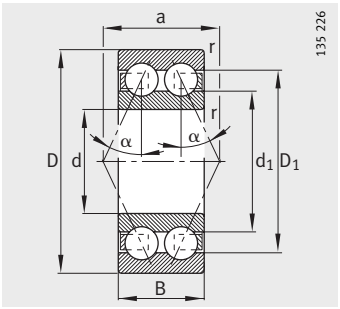


Mounting dimensions

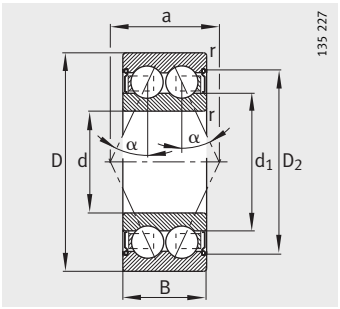
Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
6,4	12,6	0,2	1 810	950	48,5	30 000	32 000
6,4	12,6	0,2	1 810	950	48,5	24 000	32 000
6,4	12,6	0,2	1 810	950	48,5	15 000	–
8	15	0,3	3 100	1 420	72	28 000	32 000
8	15	0,3	3 100	1 420	72	22 000	32 000
8	15	0,3	3 100	1 420	72	15 000	–
9	17	0,3	3 650	1 700	86	26 000	31 500
9	17	0,3	3 650	1 700	86	20 000	31 500
9	17	0,3	3 650	1 700	86	15 000	–
10	20	0,3	5 200	2 650	133	26 000	26 000
10	20	0,3	5 200	2 650	133	19 000	26 000
10	20	0,3	5 200	2 650	133	14 000	–
12	17	0,3	2 120	1 400	71	26 000	21 100
12	17	0,3	2 120	1 400	71	18 000	21 100
12	17	0,3	2 120	1 400	71	16 000	–
12	24	0,3	5 700	3 250	164	24 000	22 100
12	24	0,3	5 700	3 250	164	17 000	22 100
12	24	0,3	5 700	3 250	164	14 000	–
14,2	25,8	0,6	7 800	4 550	223	22 000	19 300
14,2	25,8	0,6	7 800	4 550	223	16 000	19 300
14	19	0,3	2 190	1 550	79	24 000	18 100
14	19	0,3	2 190	1 550	79	17 000	18 100
14	19	0,3	2 190	1 550	79	15 000	–
14	26	0,3	6 200	3 750	191	22 000	19 400
14	26	0,3	6 200	3 750	191	16 000	19 400
14	26	0,3	6 200	3 750	191	13 000	–
16,2	27,8	0,6	10 600	5 850	295	20 000	20 000
16,2	27,8	0,6	10 600	5 850	295	15 000	20 000

Angular contact ball bearings

Double row
Open or sealed



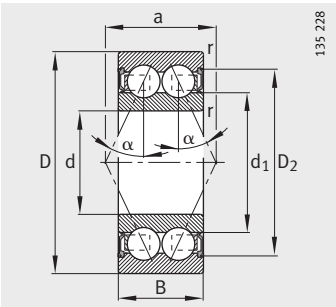
38..-B, 30..-B, 32..-B, 33..-B
$\alpha = 25°$



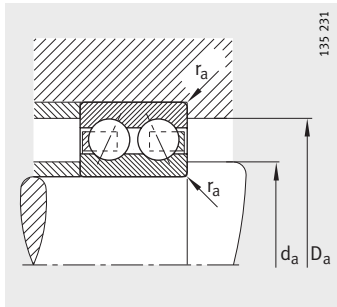
38..-B-2Z, 30..-B-2Z,
32..-B-2Z, 33..-B-2Z
$\alpha = 25°$

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions							
	m	d	D	B	r	D_1	D_2	d_1	a
	≈kg				min.	≈	≈	≈	≈
3802-B-TVH	0,009	**15**	24	7	0,3	–	–	18	10,1
3802-B-2Z-TVH	0,009	**15**	24	7	0,3	–	–	18	10,1
3802-B-2RSR-TVH	0,009	**15**	24	7	0,3	–	–	18	10,1
3002-B-TVH	0,036	**15**	32	13	0,3	–	–	20,4	14,8
3002-B-2Z-TVH	0,036	**15**	32	13	0,3	–	–	20,4	14,8
3002-B-2RSR-TVH	0,036	**15**	32	13	0,3	–	–	20,4	14,8
3202-B-TVH	0,065	**15**	35	15,9	0,6	28,8	–	21,1	18
3202-B-2Z-TVH	0,067	**15**	35	15,9	0,6	–	30,9	21,1	18
3202-B-2RSR-TVH	0,067	**15**	35	15,9	0,6	–	30,9	21,1	18
3302-B-TVH	0,124	**15**	42	19	1	34,5	–	25,6	21
3803-B-TVH	0,015	**17**	26	7	0,3	–	–	20	10,9
3803-B-2Z-TVH	0,015	**17**	26	7	0,3	–	–	20	10,9
3803-B-2RSR-TVH	0,015	**17**	26	7	0,3	–	–	20	10,9
3003-B-TVH	0,042	**17**	35	14	0,3	–	–	21,6	15,5
3003-B-2Z-TVH	0,042	**17**	35	14	0,3	–	–	21,6	15,5
3003-B-2RSR-TVH	0,042	**17**	35	14	0,3	–	–	21,6	15,5
3203-B-TVH	0,093	**17**	40	17,5	0,6	33,1	–	24	20
3203-B-2Z-TVH	0,095	**17**	40	17,5	0,6	–	35,1	24	20
3203-B-2RSR-TVH	0,095	**17**	40	17,5	0,6	–	35,1	24	20
3303-B-TVH	0,177	**17**	47	22,2	1	37,7	–	26,2	24
3804-B-TVH	0,02	**20**	32	10	0,3	–	–	24,3	14,3
3804-B-2Z-TVH	0,02	**20**	32	10	0,3	–	–	24,3	14,3
3804-B-2RSR-TVH	0,02	**20**	32	10	0,3	–	–	24,3	14,3
3004-B-TVH	0,08	**20**	42	16	0,6	–	–	25,2	19,1
3004-B-2Z-TVH	0,08	**20**	42	16	0,6	–	–	25,2	19,1
3004-B-2RSR-TVH	0,08	**20**	42	16	0,6	–	–	25,2	19,1
3204-B-TVH	0,154	**20**	47	20,6	1	38,7	–	28,9	24
3204-B-2Z-TVH	0,16	**20**	47	20,6	1	–	41,1	28,9	24
3204-B-2RSR-TVH	0,158	**20**	47	20,6	1	–	41,1	28,9	24
3304-B-TVH	0,217	**20**	52	22,2	1,1	42,7	–	31,2	26
3304-B-2Z-TVH	0,222	**20**	52	22,2	1,1	–	44,3	31,2	26
3304-B-2RSR-TVH	0,221	**20**	52	22,2	1,1	–	44,3	31,2	26



38..-B-2RSR, 30..-B-2RSR,
32..-B-2RSR, 33..-B-2RSR
$\alpha = 25°$

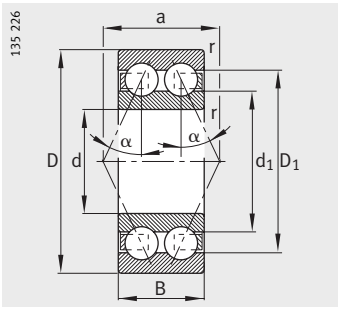


Mounting dimensions

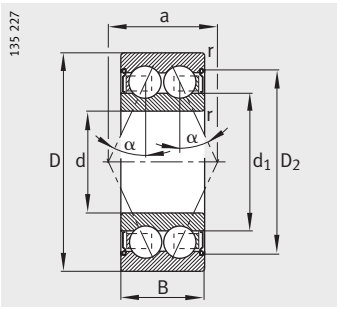
Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
17	22	0,3	2 430	1 960	99	22 000	14 800
17	22	0,3	2 430	1 960	99	16 000	14 800
17	22	0,3	2 430	1 960	99	14 000	–
17	30	0,3	8 600	5 400	275	20 000	15 800
17	30	0,3	8 600	5 400	275	15 000	15 800
17	30	0,3	8 600	5 400	275	12 000	–
19,2	30,8	0,6	11 800	7 100	360	19 000	17 100
19,2	30,8	0,6	11 800	7 100	360	14 000	17 100
19,2	30,8	0,6	11 800	7 100	360	12 000	–
20,6	36,4	1	16 300	10 000	460	16 000	11 000
19	24	0,3	2 480	2 080	107	19 000	13 200
19	24	0,3	2 480	2 080	107	14 000	13 200
19	24	0,3	2 480	2 080	107	12 000	–
19	33	0,3	9 200	6 200	315	18 000	15 400
19	33	0,3	9 200	6 200	315	13 000	15 400
19	33	0,3	9 200	6 200	315	11 000	–
21,2	35,8	0,6	14 600	9 000	420	17 000	15 500
21,2	35,8	0,6	14 600	9 000	420	12 000	15 500
21,2	35,8	0,6	14 600	9 000	420	10 000	–
22,6	41,4	1	20 800	12 500	570	15 000	11 500
22	30	0,3	5 800	4 850	245	17 000	11 900
22	30	0,3	5 800	4 850	245	12 000	11 900
22	30	0,3	5 800	4 850	245	10 000	–
23,2	38,8	0,6	14 500	9 600	485	16 000	13 300
23,2	38,8	0,6	14 500	9 600	485	11 000	13 300
23,2	38,8	0,6	14 500	9 600	485	9 000	–
25,6	41,4	1	19 600	12 500	610	15 000	13 600
25,6	41,4	1	19 600	12 500	610	10 000	13 600
25,6	41,4	1	19 600	12 500	610	8 500	–
27	45	1	23 200	15 000	690	13 000	9 500
27	45	1	23 200	15 000	690	9 000	9 500
27	45	1	23 200	15 000	690	8 000	–

Angular contact ball bearings

Double row
Open or sealed
Split inner ring



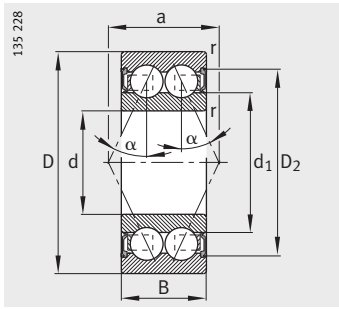
38..-B, 30..-B, 32..-B, 33..-B
$\alpha = 25°$



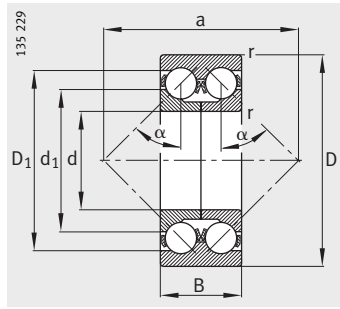
38..-B-2Z, 30..-B-2Z,
32..-B-2Z, 33..-B-2Z
$\alpha = 25°$

Dimension table (continued) · Dimensions in mm

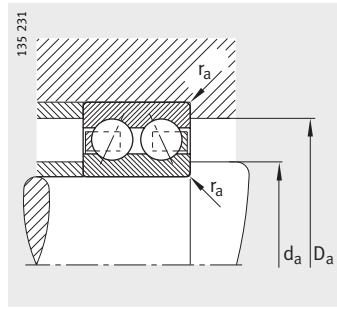
Designation	Mass	Dimensions							
	m	d	D	B	r	D_1	D_2	d_1	a
	≈kg				min.	≈	≈	≈	≈
3805-B-TVH	0,025	**25**	37	10	0,3	–	–	28,3	15,9
3805-B-2Z-TVH	0,025	**25**	37	10	0,3	–	–	28,3	15,9
3805-B-2RSR-TVH	0,025	**25**	37	10	0,3	–	–	28,3	15,9
3005-B-TVH	0,1	**25**	47	16	0,6	–	–	29,8	21,2
3005-B-2Z-TVH	0,1	**25**	47	16	0,6	–	–	29,8	21,2
3005-B-2RSR-TVH	0,1	**25**	47	16	0,6	–	–	29,8	21,2
3205-B-TVH	0,178	**25**	52	20,6	1	43,7	–	33,9	26
3205-B-2Z-TVH	0,182	**25**	52	20,6	1	–	46,1	33,9	26
3205-B-2RSR-TVH	0,182	**25**	52	20,6	1	–	46,1	33,9	26
3305-B-TVH	0,353	**25**	62	25,4	1,1	50	–	37,2	31
3305-B-2Z-TVH	0,359	**25**	62	25,4	1,1	–	53,1	37,2	31
3305-B-2RSR-TVH	0,359	**25**	62	25,4	1,1	–	53,1	37,2	31
3305-DA-TVP	0,341	**25**	62	25,4	1,1	51,8	–	47,5	56
3806-B-TVH	0,03	**30**	42	10	0,3	–	–	32,8	18,1
3806-B-2Z-TVH	0,03	**30**	42	10	0,3	–	–	32,8	18,1
3806-B-2RSR-TVH	0,03	**30**	42	10	0,3	–	–	32,8	18,1
3006-B-TVH	0,16	**30**	55	19	1	–	–	35,6	24,8
3006-B-2Z-TVH	0,16	**30**	55	19	1	–	–	35,6	24,8
3006-B-2RSR-TVH	0,16	**30**	55	19	1	–	–	35,6	24,8
3206-B-TVH	0,289	**30**	62	23,8	1	52,1	–	40	31
3206-B-2Z-TVH	0,295	**30**	62	23,8	1	–	55,7	40	31
3206-B-2RSR-TVH	0,296	**30**	62	23,8	1	–	55,7	40	31
3306-B-TVH	0,548	**30**	72	30,2	1,1	58,9	–	44	36
3306-B-2Z-TVH	0,558	**30**	72	30,2	1,1	–	62,5	44	36
3306-B-2RSR-TVH	0,558	**30**	72	30,2	1,1	–	62,5	44	36
3306-DA	0,657	**30**	72	30,2	1,1	61,5	–	55,2	67



38..-B-2RSR, 30..-B-2RSR,
32..-B-2RSR, 33..-B-2RSR
$\alpha = 25°$



33..-DA
Split inner ring
$\alpha = 45°$

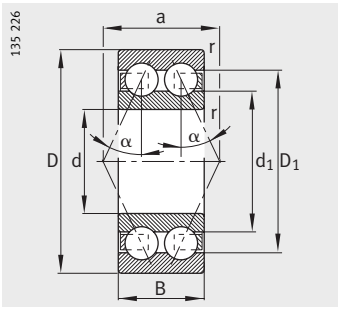


Mounting dimensions

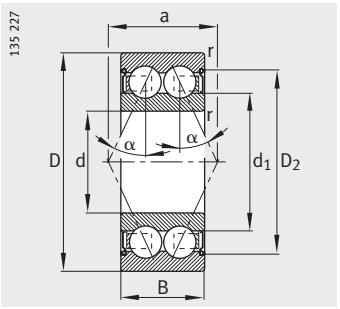
Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
27	35	0,3	6 000	5 600	280	14 000	10 300
27	35	0,3	6 000	5 600	280	9 500	10 300
27	35	0,3	6 000	5 600	280	8 500	–
28,2	43,8	0,6	15 500	11 100	560	13 000	11 200
28,2	43,8	0,6	15 500	11 100	560	9 000	11 200
28,2	43,8	0,6	15 500	11 100	560	8 000	–
30,6	46,4	1	21 200	14 600	710	12 000	11 600
30,6	46,4	1	21 200	14 600	710	8 500	11 600
30,6	46,4	1	21 200	14 600	710	7 500	–
32	55	1	30 000	20 000	900	10 000	8 600
32	55	1	30 000	20 000	900	7 500	8 600
32	55	1	30 000	20 000	900	6 700	–
32	55	1	30 000	23 200	1 270	10 000	8 400
32	40	0,3	6 300	6 100	320	11 000	8 700
32	40	0,3	6 300	6 100	320	8 000	8 700
32	40	0,3	6 300	6 100	320	7 000	–
34,6	50,4	1	20 300	15 600	790	10 000	10 200
34,6	50,4	1	20 300	15 600	790	7 500	10 200
34,6	50,4	1	20 300	15 600	790	6 700	–
35,6	56,4	1	30 000	21 200	980	9 500	10 400
35,6	56,4	1	30 000	21 200	980	7 000	10 400
35,6	56,4	1	30 000	21 200	980	6 300	–
37	65	1	41 500	28 500	1 310	8 500	7 800
37	65	1	41 500	28 500	1 310	6 300	7 800
37	65	1	41 500	28 500	1 310	5 600	–
37	65	1	41 500	34 500	2 070	8 500	7 500

Angular contact ball bearings

Double row
Open or sealed
Split inner ring



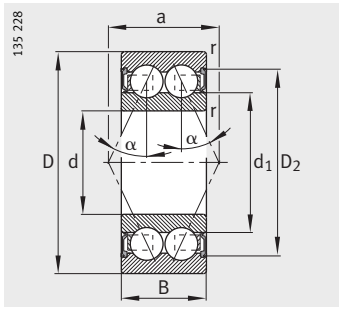
38..-B, 30..-B, 32..-B, 33..-B
$\alpha = 25°$



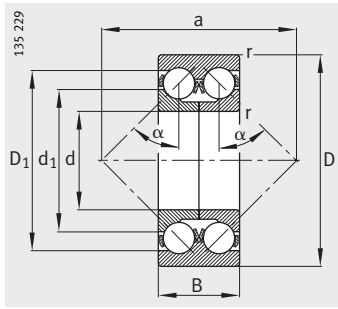
38..-B-2Z, 30..-B-2Z,
32..-B-2Z, 33..-B-2Z
$\alpha = 25°$

Dimension table (continued) · Dimensions in mm

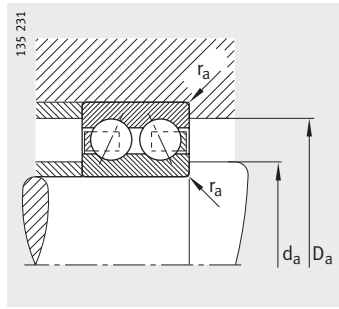
Designation	Mass	Dimensions							
	m	d	D	B	r	D_1	D_2	d_1	a
	≈kg				min.	≈	≈	≈	≈
3807-B-TVH	0,035	**35**	47	10	0,3	–	–	38,5	20
3807-B-2Z-TVH	0,035	**35**	47	10	0,3	–	–	38,5	20
3807-B-2RSR-TVH	0,035	**35**	47	10	0,3	–	–	38,5	20
3007-B-TVH	0,2	**35**	62	20	1	–	–	41,7	27,8
3007-B-2Z-TVH	0,2	**35**	62	20	1	–	–	41,7	27,8
3007-B-2RSR-TVH	0,2	**35**	62	20	1	–	–	41,7	27,8
3207-B-TVH	0,446	**35**	72	27	1,1	60,6	–	47,2	36
3207-B-2Z-TVH	0,454	**35**	72	27	1,1	–	64,2	47,2	36
3207-B-2RSR-TVH	0,454	**35**	72	27	1,1	–	64,2	47,2	36
3307-B-TVH	0,657	**35**	80	34,9	1,5	65,5	–	49,3	41
3307-B-2Z-TVH	0,667	**35**	80	34,9	1,5	–	68,5	49,3	41
3307-B-2RSR-TVH	0,739	**35**	80	34,9	1,5	–	68,5	49,3	41
3307-DA	0,889	**35**	80	34,9	1,5	69,6	–	62	75
3808-B-TVH	0,04	**40**	52	10	0,3	–	–	43,4	22,4
3808-B-2Z-TVH	0,04	**40**	52	10	0,3	–	–	43,4	22,4
3808-B-2RSR-TVH	0,04	**40**	52	10	0,3	–	–	43,4	22,4
3008-B-TVH	0,25	**40**	68	21	1	–	–	46,7	30,8
3008-B-2Z-TVH	0,25	**40**	68	21	1	–	–	46,7	30,8
3008-B-2RSR-TVH	0,25	**40**	68	21	1	–	–	46,7	30,8
3208-B-TVH	0,594	**40**	80	30,2	1,1	67,9	–	53	41
3208-B-2Z-TVH	0,604	**40**	80	30,2	1,1	–	71,3	53	41
3208-B-2RSR-TVH	0,605	**40**	80	30,2	1,1	–	71,3	53	41
3308-B-TVH	0,984	**40**	90	36,5	1,5	74,6	–	55,6	46
3308-B-2Z-TVH	0,998	**40**	90	36,5	1,5	–	77,4	55,6	46
3308-B-2RSR-TVH	0,998	**40**	90	36,5	1,5	–	77,4	55,6	46
3308-DA-MA	1,19	**40**	90	36,5	1,5	79,4	–	72,5	85



38..-B-2RSR, 30..-B-2RSR,
32..-B-2RSR, 33..-B-2RSR
$\alpha = 25°$



33..-DA
Split inner ring
$\alpha = 45°$

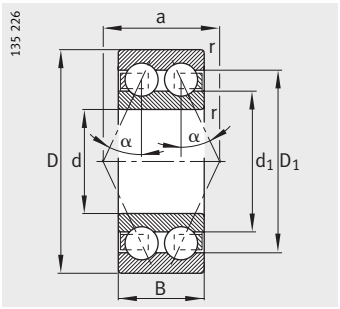


Mounting dimensions

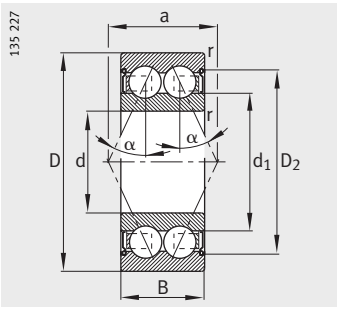
Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
37	45	0,3	6 700	7 000	370	9 500	7 400
37	45	0,3	6 700	7 000	370	7 000	7 400
37	45	0,3	6 700	7 000	370	6 000	–
39,6	57,4	1	24 500	19 400	980	9 000	8 800
39,6	57,4	1	24 500	19 400	980	6 700	8 800
39,6	57,4	1	24 500	19 400	980	5 600	–
42	65	1	39 000	28 500	1 370	8 500	9 200
42	65	1	39 000	28 500	1 370	6 300	9 200
42	65	1	39 000	28 500	1 370	5 300	–
44	71	1,5	51 000	34 500	1 650	7 500	7 400
44	71	1,5	51 000	34 500	1 650	5 600	7 400
44	71	1,5	51 000	34 500	1 650	5 000	–
44	71	1,5	50 000	41 500	2 480	7 500	7 100
42	50	0,3	7 000	7 800	425	8 500	6 400
42	50	0,3	7 000	7 800	425	6 300	6 400
42	50	0,3	7 000	7 800	425	5 300	–
44,6	63,4	1	25 500	21 700	1 100	8 000	8 000
44,6	63,4	1	25 500	21 700	1 100	6 000	8 000
44,6	63,4	1	25 500	21 700	1 100	5 000	–
47	73	1	48 000	36 500	1 840	7 500	8 500
47	73	1	48 000	36 500	1 840	5 600	8 500
47	73	1	48 000	36 500	1 840	4 800	–
49	81	1,5	62 000	45 000	2 500	6 700	6 400
49	81	1,5	62 000	45 000	2 500	5 000	6 400
49	81	1,5	62 000	45 000	2 500	4 500	–
49	81	1,5	62 000	53 000	3 150	6 300	6 000

Angular contact ball bearings

Double row
Open or sealed
Split inner ring



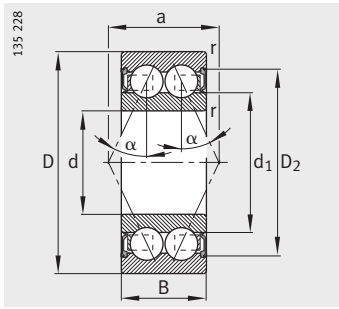
38..-B, 32..-B, 33..-B
$\alpha = 25°$



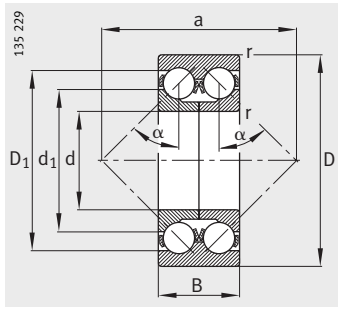
38..-B-2Z, 32..-B-2Z, 33..-B-2Z
$\alpha = 25°$

Dimension table (continued) · Dimensions in mm

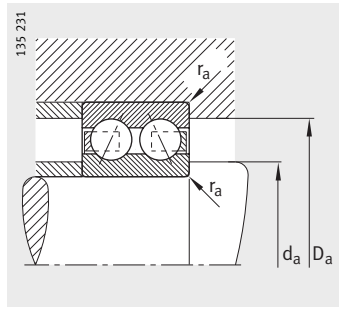
Designation	Mass	Dimensions							
	m	d	D	B	r	D_1	D_2	d_1	a
	≈kg				min.	≈	≈	≈	≈
3809-B-TVH	0,053	**45**	58	10	0,3	–	–	48,6	24,2
3809-B-2Z-TVH	0,053	**45**	58	10	0,3	–	–	48,6	24,2
3809-B-2RSR-TVH	0,053	**45**	58	10	0,3	–	–	48,6	24,2
3209-B-TVH	0,628	**45**	85	30,2	1,1	72,9	–	57,2	43
3209-B-2Z-TVH	0,64	**45**	85	30,2	1,1	–	75,5	57,2	43
3209-B-2RSR-TVH	0,64	**45**	85	30,2	1,1	–	75,5	57,2	43
3309-B-TVH	1,34	**45**	100	39,7	1,5	81,5	–	62,3	50
3309-B-2Z-TVH	1,36	**45**	100	39,7	1,5	–	86,5	62	50
3309-B-2RSR-TVH	1,36	**45**	100	39,7	1,5	–	86,5	62	50
3309-DA	1,55	**45**	100	39,7	1,5	86,7	–	78,6	93
3810-B-TVH	0,07	**50**	65	12	0,3	–	–	55,1	27,1
3810-B-2Z-TVH	0,07	**50**	65	12	0,3	–	–	55,1	27,1
3810-B-2RSR-TVH	0,07	**50**	65	12	0,3	–	–	55,1	27,1
3210-B-TVH	0,68	**50**	90	30,2	1,1	77,9	–	62	45
3210-B-2Z-TVH	0,692	**50**	90	30,2	1,1	–	80,9	62	45
3210-B-2RSR-TVH	0,693	**50**	90	30,2	1,1	–	80,9	62	45
3310-B-TVH	1,8	**50**	110	44,4	2	89,5	–	68,3	55
3310-B-2Z-TVH	1,82	**50**	110	44,4	2	–	96	64	55
3310-B-2RSR-TVH	1,82	**50**	110	44,4	2	–	96	64	55
3310-DA-MA	2,24	**50**	110	44,4	2	96,9	–	87,6	104
3811-B-TVH	0,09	**55**	72	13	0,3	–	–	61,9	30,7
3811-B-2Z-TVH	0,09	**55**	72	13	0,3	–	–	61,9	30,7
3811-B-2RSR-TVH	0,09	**55**	72	13	0,3	–	–	61,9	30,7
3211-B-TVH	0,954	**55**	100	33,3	1,5	85,3	–	69	50
3211-B-2Z-TVH	0,969	**55**	100	33,3	1,5	–	89,1	68,7	50
3211-B-2RSR-TVH	0,969	**55**	100	33,3	1,5	–	89,1	68,7	50
3311-B-TVH	2,32	**55**	120	49,2	2	98,4	–	75,2	61
3311-B-2Z-TVH	2,36	**55**	120	49,2	2	–	105,2	75,2	61
3311-B-2RSR-TVH	2,35	**55**	120	49,2	2	–	105,2	75,2	61
3311-DA-MA	2,85	**55**	120	49,2	2	105,3	–	94,6	111



38..-B-2RSR, 32..-B-2RSR,
33..-B-2RSR
$\alpha = 25°$



33..-DA
Split inner ring
$\alpha = 45°$

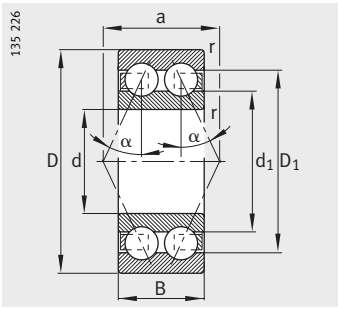


Mounting dimensions

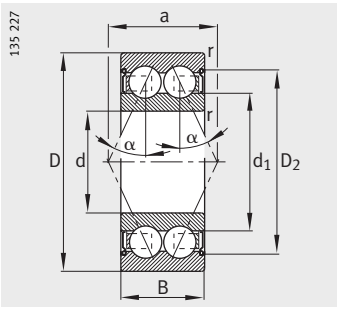
Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
47	56	0,3	7 200	8 300	465	7 500	5 700
47	56	0,3	7 200	8 300	465	5 600	5 700
47	56	0,3	7 200	8 300	465	5 000	–
52	78	1	48 000	37 500	1 800	6 700	7 800
52	78	1	48 000	37 500	1 800	5 000	7 800
52	78	1	48 000	37 500	1 800	4 500	–
54	91	1,5	68 000	51 000	2 750	6 000	6 100
54	91	1,5	68 000	51 000	2 750	4 500	6 100
54	91	1,5	68 000	51 000	2 750	4 000	–
54	91	1,5	75 000	64 000	3 400	6 000	5 800
52	63	0,3	8 700	10 400	580	7 000	5 400
52	63	0,3	8 700	10 400	580	5 300	5 400
52	63	0,3	8 700	10 400	580	4 500	–
57	83	1	51 000	42 500	2 120	6 300	7 100
57	83	1	51 000	42 500	2 120	4 800	7 100
57	83	1	51 000	42 500	2 120	4 000	–
61	99	2	81 500	62 000	3 450	5 300	5 800
61	99	2	81 500	62 000	3 450	4 000	5 800
61	99	2	81 500	62 000	3 450	3 600	–
61	99	2	90 000	85 000	5 200	5 300	5 300
57	70	0,3	12 100	15 700	880	6 300	5 100
57	70	0,3	12 100	15 700	880	4 500	5 100
57	70	0,3	12 100	15 700	880	4 300	–
64	91	1,5	58 500	49 000	2 390	5 600	6 800
64	91	1,5	58 500	49 000	2 390	4 300	6 800
64	91	1,5	58 500	49 000	2 390	3 800	–
66	109	2	102 000	78 000	4 250	5 000	5 400
66	109	2	102 000	78 000	4 250	3 800	5 400
66	109	2	102 000	78 000	4 250	3 400	–
66	109	2	110 000	100 000	5 400	5 000	5 200

Angular contact ball bearings

Double row
Open or sealed
Split inner ring



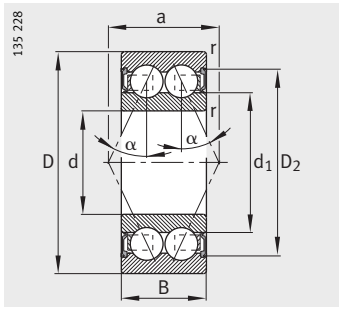
38..-B, 32..-B, 33..-B
$\alpha = 25°$



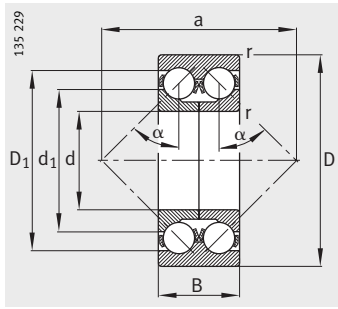
38..-B-2Z, 32..-B-2Z
$\alpha = 25°$

Dimension table (continued) · Dimensions in mm

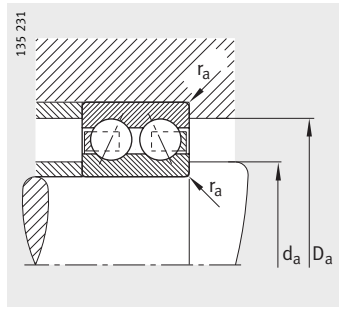
Designation	Mass	Dimensions							
	m	d	D	B	r	D_1	D_2	d_1	a
	≈kg				min.	≈	≈	≈	≈
3812-B-TVH	0,14	**60**	78	14	0,3	–	–	65,9	33,2
3812-B-2Z-TVH	0,14	**60**	78	14	0,3	–	–	65,9	33,2
3812-B-2RSR-TVH	0,14	**60**	78	14	0,3	–	–	65,9	33,2
3212-B-TVH	1,27	**60**	110	36,5	1,5	94,5	–	75,8	55
3212-B-2Z-TVH	1,29	**60**	110	36,5	1,5	–	98,6	75,8	55
3212-B-2RSR-TVH	1,29	**60**	110	36,5	1,5	–	98,6	75,8	55
3312-B-TVH	2,92	**60**	130	54	2,1	108,7	–	81,6	67
3312-B-2RSR-TVH	2,92	**60**	130	54	2,1	–	113,1	81,6	67
3312-DA	3,39	**60**	130	54	2,1	115,8	–	101,7	122
3813-B-TVH	0,16	**65**	85	15	0,6	–	–	71,2	36,2
3813-B-2Z-TVH	0,16	**65**	85	15	0,6	–	–	71,2	36,2
3813-B-2RSR-TVH	0,16	**65**	85	15	0,6	–	–	71,2	36,2
3213-B-TVH	1,64	**65**	120	38,1	1,5	103,9	–	84,8	60
3213-B-2RSR-TVH	1,66	**65**	120	38,1	1,5	–	107,2	84,5	60
3313-B-TVH	3,63	**65**	140	58,7	2,1	117,6	–	88,6	71
3313-DA	4,38	**65**	140	58,7	2,1	124,3	–	110,2	131
3814-B-TVH	0,19	**70**	90	15	0,6	–	–	76,5	38,5
3814-B-2Z-TVH	0,19	**70**	90	15	0,6	–	–	76,5	38,5
3814-B-2RSR-TVH	0,19	**70**	90	15	0,6	–	–	76,5	38,5
3214-B-TVH	1,8	**70**	125	39,7	1,5	106,3	–	87	62
3214-B-2RSR-TVH	1,83	**70**	125	39,7	1,5	–	111,6	86,8	62
3314	5,03	**70**	150	63,5	2,1	131,9	–	98,5	109
3314-DA	5,36	**70**	150	63,5	2,1	132,4	–	118,2	141
3815-B-TVH	0,21	**75**	95	15	0,6	–	–	81,2	40,4
3815-B-2Z-TVH	0,21	**75**	95	15	0,6	–	–	81,2	40,4
3815-B-2RSR-TVH	0,21	**75**	95	15	0,6	–	–	81,2	40,4
3215-B-TVH	1,91	**75**	130	41,3	1,5	112,6	–	92,4	65
3215-B-2RSR-TVH	1,94	**75**	130	41,3	1,5	–	116,4	92,1	65
3315	6,07	**75**	160	68,3	2,1	141,2	–	105,5	117



38..-B-2RSR, 32..-B-2RSR,
33..-B-2RSR
$\alpha = 25°$



33..-DA
Split inner ring
$\alpha = 45°$

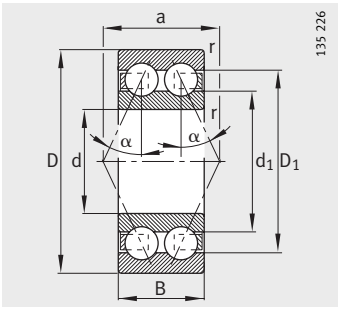


Mounting dimensions

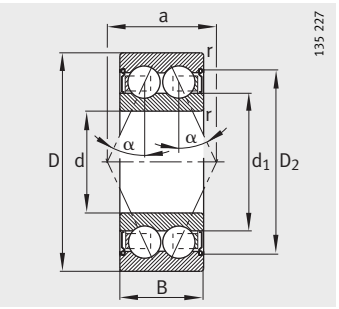
Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
62	76	0,3	14 500	17 500	960	5 600	4 700
62	76	0,3	14 500	17 500	960	4 300	4 700
62	76	0,3	14 500	17 500	960	3 800	–
69	101	1,5	72 000	61 000	3 450	5 000	6 200
69	101	1,5	72 000	61 000	3 450	3 800	6 200
69	101	1,5	72 000	61 000	3 450	3 400	–
72	118	2,1	125 000	98 000	5 400	4 500	5 100
72	118	2,1	125 000	98 000	5 400	3 000	–
72	118	2,1	127 000	118 000	6 500	4 500	4 850
68,2	81,8	0,6	17 700	21 400	1 120	5 000	4 500
68,2	81,8	0,6	17 700	21 400	1 120	4 000	4 500
68,2	81,8	0,6	17 700	21 400	1 120	3 600	–
74	111	1,5	80 000	73 500	3 700	4 500	5 600
74	111	1,5	80 000	73 500	3 700	3 000	–
77	128	2,1	143 000	112 000	6 100	4 300	4 850
77	128	2,1	143 000	137 000	7 200	4 300	4 650
73,2	86,8	0,6	19 200	23 800	1 300	5 000	4 100
73,2	86,8	0,6	19 200	23 800	1 300	3 800	4 100
73,2	86,8	0,6	19 200	23 800	1 300	3 400	–
79	116	1,5	83 000	76 500	4 000	4 500	5 600
79	116	1,5	83 000	76 500	4 000	3 400	–
82	138	2,1	143 000	166 000	8 500	4 000	4 500
82	138	2,1	163 000	156 000	8 200	4 000	4 550
78,2	91,8	0,6	19 400	24 400	1 370	4 800	3 950
78,2	91,8	0,6	19 400	24 400	1 370	3 600	3 950
78,2	91,8	0,6	19 400	24 400	1 370	3 200	–
84	121	1,5	91 500	85 000	4 250	4 300	5 300
84	121	1,5	91 500	85 000	4 250	2 800	–
87	148	2,1	163 000	193 000	9 700	3 800	4 350

Angular contact ball bearings

Double row
Open or sealed



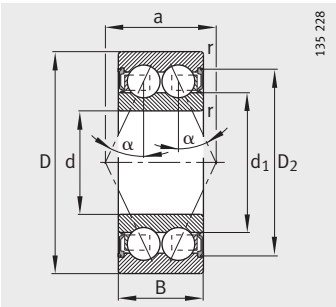
38..-B, 32..-B
$\alpha = 25°$



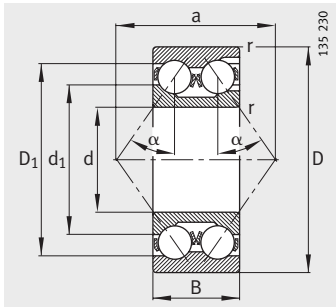
38..-B-2Z, 32..-B-2Z
$\alpha = 25°$

Dimension table (continued) · Dimensions in mm

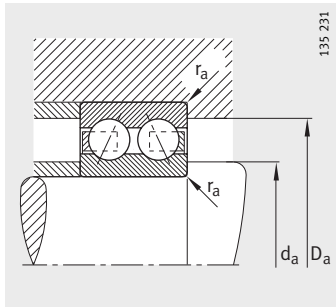
Designation	Mass	Dimensions							
	m	d	D	B	r	D_1	D_2	d_1	a
	≈kg				min.	≈	≈	≈	≈
3816-B-TVH	0,23	**80**	100	15	0,6	–	–	85,5	42,2
3816-B-2Z-TVH	0,23	**80**	100	15	0,6	–	–	85,5	42,2
3816-B-2RSR-TVH	0,23	**80**	100	15	0,6	–	–	85,5	42,2
3216-B-TVH	2,45	**80**	140	44,4	2	120,3	–	98,5	69
3216-B-2Z-TVH	2,48	**80**	140	44,4	2	–	125,4	98,5	69
3316	7,26	**80**	170	68,3	2,1	149,7	–	111,8	123
3217	3,44	**85**	150	49,2	2	135,1	–	108,5	106
3317-M	8,78	**85**	180	73	3	160	–	119,6	131
3218	4,22	**90**	160	52,4	2	143,7	–	115,6	113
3318	9,23	**90**	190	73	3	168,2	–	126,1	136
3219-M	5,31	**95**	170	55,6	2,1	152,8	–	122,2	120
3319-M	11,4	**95**	200	77,8	3	177,3	–	133	143
3220	6,19	**100**	180	60,3	2,1	163,7	–	131	127
3320-M	14,6	**100**	215	82,6	3	188,7	–	142,5	153
3221-M	7,78	**105**	190	65,1	2,1	172,9	–	138	135
3222-M	9,23	**110**	200	69,8	2,1	180,1	–	143,3	144
3322-M	20	**110**	240	92,1	3	209,6	–	161,5	171



38..-B-2RSR
$\alpha = 25°$



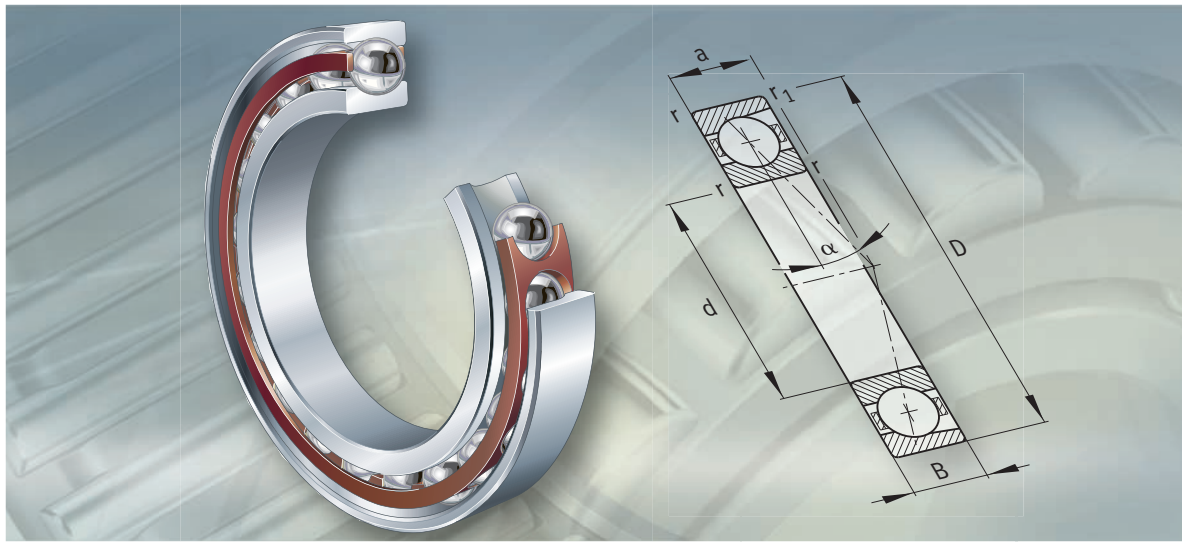
32, 33
$\alpha = 35°$



Mounting dimensions

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	max.	N	N	N	min^{-1}	min^{-1}
83,2	96,8	0,6	19 600	25 500	1 420	4 500	3 650
83,2	96,8	0,6	19 600	25 500	1 420	3 400	3 650
83,2	96,8	0,6	19 600	25 500	1 420	3 000	–
91	129	2	98 000	93 000	4 950	4 000	5 200
91	129	2	98 000	93 000	4 950	3 000	5 200
92	158	2,1	176 000	212 000	10 300	3 600	3 950
96	139	2	112 000	150 000	7 200	3 800	4 750
99	166	2,5	190 000	228 000	11 100	3 400	3 750
104	146	2	125 000	170 000	7 800	3 600	4 550
104	176	2,5	216 000	275 000	12 600	3 200	3 400
107	158	2,1	140 000	186 000	8 500	3 400	4 400
109	186	2,5	220 000	285 000	13 100	3 200	3 250
112	168	2,1	160 000	224 000	10 000	3 200	4 200
114	201	2,5	236 000	320 000	13 700	3 000	3 000
117	178	2,1	180 000	245 000	11 100	3 200	4 000
122	188	2,1	204 000	280 000	11 900	3 000	3 800
124	226	2,5	270 000	390 000	16 300	2 600	2 700

FAG



Spindle bearings

Spindle bearings

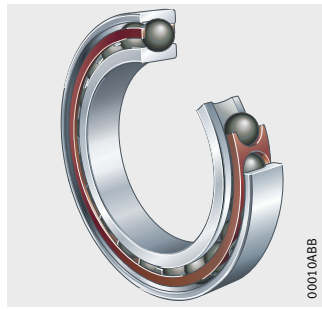
		Page
Product overview	Spindle bearings	304
Features	Radial and axial load capacity	305
	Standard spindle bearings	305
	High speed spindle bearings	305
	Further bearing designs	306
	Universal designs	306
	Operating temperature	307
	Cages	307
	Suffixes	307
Design and safety guidelines	Operating life	308
	Equivalent static bearing load	308
	Static load safety factor	309
	Speeds	309
	Universal bearing sets	309
	Ready-to-fit bearing sets	310
	Design of bearing arrangements	311
Accuracy		312
Dimension tables	Spindle bearings with steel balls	314
	Spindle bearings with ceramic balls	328
	High speed spindle bearings with steel balls, sealed	336
	High speed spindle bearings with ceramic balls, sealed	342

Standard spindle bearings

B719, B70, B72

With ceramic balls

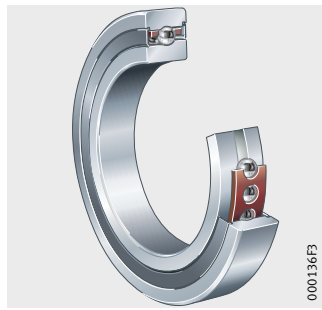
HCB719, HCB70, HCB72



High speed spindle bearings

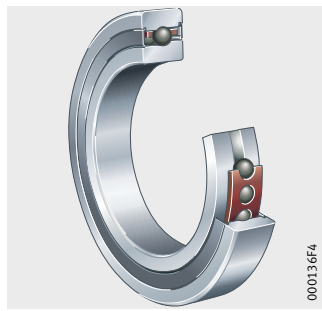
Sealed

HSS719, HSS70



With ceramic balls
Sealed

HCS719, HCS70



Spindle bearings

Features

Spindle bearings are single row angular contact ball bearings, comprising solid inner and outer rings and ball and cage assemblies with solid window cages. They cannot be dismantled.
The bearings are available in open and sealed designs.

Spindle bearings have restricted tolerances. They are particularly suitable for bearing arrangements with very high requirements for guidance accuracy and high speeds. They have proved extremely suitable for main spindle bearing arrangements in machine tools.

A detailed description of spindle bearings (designs, calculation, lubrication, speeds, fits) is given in Catalogue AC 41 130, Super Precision Bearings.

Radial and axial load capacity

The bearings can support axial forces in one direction as well as radial forces. Spindle bearings used in an O or X arrangement can support axial forces in both directions and moments. Bearings in a tandem arrangement can only support axial loads in one direction.

Spindle bearings are available with a contact angle $\alpha = 15°$ (suffix C) or $\alpha = 25°$ (suffix E).

Standard spindle bearings

Standard spindle bearings B70, B719 and B72 have steel balls.

With ceramic balls

Spindle bearings HCB70, HCB719 and HCB72 have balls in standard sizes made from ceramic (hybrid bearings).

Sealing

Spindle bearings B70..-2RSD, B719..-2RSD, B72..-2RSD, HCB70..-2RSD, HCB719..-2RSD and HCB72..-2RSD are sealed on both sides by gap seals.

Lubrication

Sealed bearings are greased with an FAG high performance grease and are maintenance-free.

High speed spindle bearings

High speed spindle bearings HSS70 and HSS719 have smaller steel balls.

With ceramic balls

In addition, high speed spindle bearings HCS70 and HCS719 with ceramic balls (hybrid bearings) are available.

These four series thus achieve higher speeds, have lower friction and heat generation, place less strain on the lubricant and have a longer operating life.

Sealing

The bearings are sealed on both sides by gap seals.

Open bearings of series HS70 and HS719 as well as HC70 and HC719 are also available.

Lubrication

Sealed bearings are greased with an FAG high performance grease and are maintenance-free.

Further bearing designs

X-life ultra bearings

X-life ultra bearings have bearing rings made from a nitrogen-containing, corrosion-resistant steel with a particularly fine structure (prefix X) and ceramic balls. They fulfil very high requirements for speed and load carrying capacity.
The bearings have longer life compared to conventional bearings. Most series of spindle bearings are available as X-life ultra bearings.

Direct Lube bearings

Where the limits of grease lubrication are reached, the spindle bearing range is supplemented by Direct Lube bearings (DLR). They ensure reliable supply of lubricant direct to the contact point via a circumferential annular slot and radial feed holes. DLR bearings can achieve extremely high speeds. They allow economical bearing soloutions since the adjacent construction of the bearing can be of a simpler design.

Universal designs

Spindle bearings of universal design can be fitted in any arrangement or combined in various sets without any loss of performance. The position of the pressure cone is marked on the cylindrical surface of the outer ring.

Bearings with the suffix UL are designed for slight preload in an X or O arrangement.

The preload is altered by mounting and the operating conditions.

Ordering data

When ordering, the number of individual bearings must be stated.

Operating temperature

The bearings are suitable for operating temperatures from –30 °C to +100 °C, restricted by the seal or cage material.

The standard grease for sealed spindle bearings is suitable up to a continuous temperature of +80 °C.

The operating temperature must be taken into consideration when selecting the lubricant.

Cages

Spindle bearings have solid window cages made from hard fabric (suffix T). The cage is guided on the outer ring.

Check the chemical resistance of the seal or cage material to synthetic greases and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of the cages and seals at high temperatures.

The oil change intervals must be observed.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
C	Contact angle 15°	Standard
E	Contact angle 25°	
H	High preload[1)]	
L	Slight preload[1)]	
M	Moderate preload[1)]	
P4S	Tolerance class P4S	
T	Solid window cage made from hard fabric	
UL	Universal design, for example for fitting in pairs, bearing pair has slight preload in O and X arrangement	
2RSD	Spindle bearing with sealing shields on both sides (in series B and HCB)	

1) For preload values, see Catalogue AC 41 130, Super Precision Bearings.

Design and safety guidelines

Operating life

High precision bearings must guide machine parts with very high precision and support forces at up to very high speeds.
They are selected predominantly from the perspectives of

- accuracy
- rigidity
- running behaviour.

In order that they can fulfil these tasks for as long as possible, the bearings must run without wear. The precondition for this is the creation of a load-bearing hydrodynamic lubricant film at the contact points of the rolling contact partners. Under these conditions, rolling bearings will achieve their fatigue life in a large number of applications. If the design is appropriate to the fatigue life, the operating life of the bearing is normally restricted by the lubricant operating life.

The decisive factors for the operating life from the perspective of load are the Hertzian pressures occurring at the contacts and the bearing kinematics. For high performance assemblies, individual design with the aid of special calculation programs is therefore advisable.

Since failure as a result of fatigue plays no part in practice in the case of high precision bearings, calculation of the rating life L_{10} in accordance with DIN ISO 281 is not suitable as a means of determining the operating life.

Equivalent static bearing load

For bearings under static loading, the following applies:

Bearings with contact angle 15°

Load ratio	Equivalent static load
$\frac{F_{0a}}{F_{0r}} \leqq 1{,}09$	$P_0 = F_{0r}$
$\frac{F_{0a}}{F_{0r}} > 1{,}09$	$P_0 = 0{,}5 \cdot F_{0r} + 0{,}46 \cdot F_{0a}$

Bearings with contact angle 25°

Load ratio	Equivalent static load
$\frac{F_{0a}}{F_{0r}} \leqq 1{,}3$	$P_0 = F_{0r}$
$\frac{F_{0a}}{F_{0r}} > 1{,}3$	$P_0 = 0{,}5 \cdot F_{0r} + 0{,}38 \cdot F_{0a}$

P_0 N
Equivalent static bearing load for combined load

F_{0a} N
Axial static bearing load

F_{0r} N
Radial static bearing load.

Static load safety factor

In order to maintain the accuracy of the bearings, a static load safety factor $S_0 > 3$ is required.

$$S_0 = \frac{C_{0r}}{P_0}$$

C_{0r} N
Basic static load rating according to dimension tables

P_0 N
Equivalent static load.
If several bearings are present, the external load is distributed over the individual bearings.
For further information, see Catalogue AC 41 130, Super Precision Bearings.

Speeds

The speeds of the bearing arrangements are dependent on:

- the preload of the bearings
- the elastic or rigid arrangement of the bearings in the spindle
- mounting as single bearings or in pairs
- the lubricants
- the cooling of the bearings.

The speeds stated in the dimension tables are guide values for single bearings under elastic preload and low loads.

The limiting speeds n_G given in the dimension tables are valid for lubrication with grease or minimal quantity lubrication with oil and must not be exceeded.

For a more detailed description, see Catalogue AC 41 130, Super Precision Bearings.

Universal bearing sets

Universal bearings of the same sort (same bore and outside diameter) are also available as sets. They can be used in any arrangement (O, X, tandem), *Figure 1* to *Figure 3*, page 310.

Sets with slight preload have the following designations:

- duplex (2 bearings), suffix DUL
- triplex (3 bearings), suffix TUL
- quadruplex (4 bearings), suffix QUL.

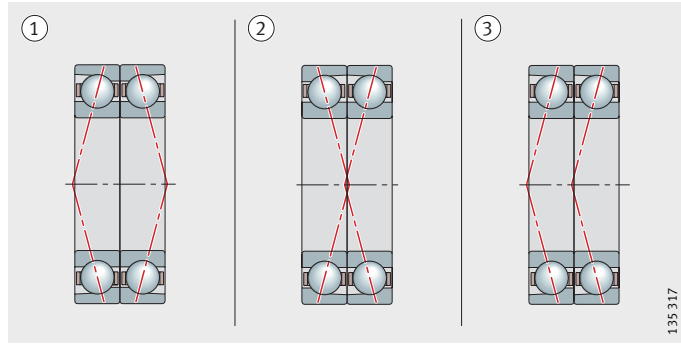
Ordering data

When ordering bearings, the number of sets must be stated, not the number of single bearings.

Ready-to-fit bearing sets

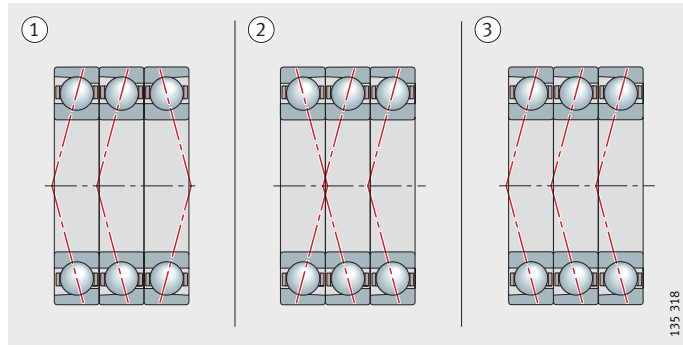
In ready-to-fit bearing sets, the bearings are supplied for use in a specifically defined arrangement.

The bearings must be fitted in the arrangement ordered.



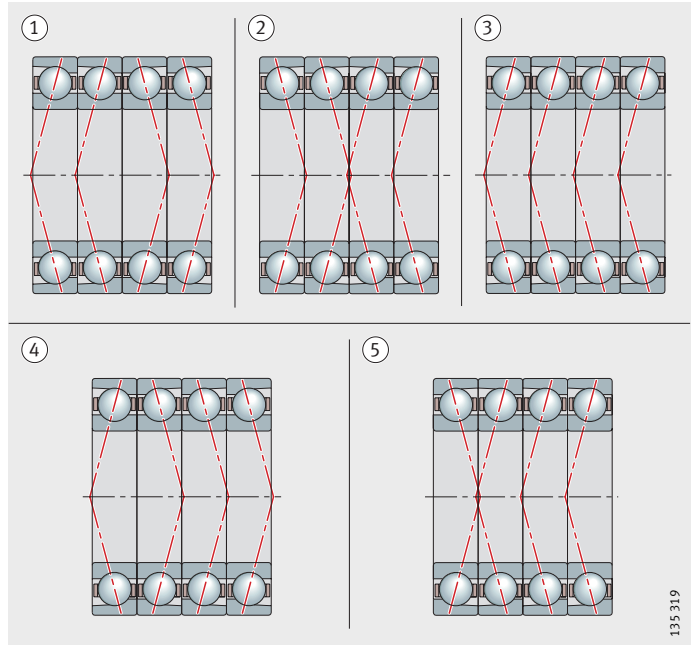
① DBL, O arrangement
② DFL, X arrangement
③ DTL, tandem arrangement

Figure 1
Sets of 2 bearings



① TBTL, combination of O arrangement and tandem arrangement
② TFTL, combination of X arrangement and tandem arrangement
③ TTL, tandem arrangement

Figure 2
Sets of 3 bearings



① QBCL, O arrangement
② QFCL, X arrangement
③ QTL, tandem arrangement
④ QBTL, combination of O arrangement and tandem arrangement
⑤ QFTL, combination of X arrangement and tandem arrangement

Figure 3
Sets of 4 bearings

Ordering example

1-HSS7012-C-T-P4S-DBL
Description: two spindle bearings in O arrangement, slight preload.

Design of bearing arrangements

Shaft and housing tolerances

For spindle bearings, fits are recommended as a function of the speeds, see Catalogue AC 41 130, Super Precision Bearings.

Mounting dimensions

The bearing tables give the maximum dimensions of the radii r_a and r_{a1} and the diameters of the abutment shoulders D_a and d_a.

Accuracy

The main dimensions of the bearings conform to DIN 628-1. The dimensional tolerances of the bearings correspond to tolerance class P4, the running tolerances correspond to tolerance class P2 to DIN 620-2.

The actual value codes for the bore and outside diameter as well as the nominal value deviation for the bearing width are indicated on the end faces of the inner and outer rings as well as on the packaging, where they are stated in the sequence “bore/outside diameter/bearing width”.

Inner ring tolerance

Bore		Bore deviation		Width deviation		Width variation	Radial runout	Axial runout	
d mm		Δ_{dmp} µm		Δ_{Bs} µm		V_{Bs} µm	K_{ia} µm	S_d µm	S_{ia} µm
over	incl.								
–	10	0	–4	0	–100	1,5	1,5	1,5	1,5
10	18	0	–4	0	–100	1,5	1,5	1,5	1,5
18	30	0	–5	0	–120	1,5	2,5	1,5	2,5
30	50	0	–6	0	–120	1,5	2,5	1,5	2,5
50	80	0	–7	0	–150	1,5	2,5	1,5	2,5
80	120	0	–8	0	–200	2,5	2,5	2,5	2,5
120	150	0	–10	0	–250	2,5	2,5	2,5	2,5
150	180	0	–10	0	–250	4	3	4	5
180	250	0	–12	0	–300	5	4	5	5

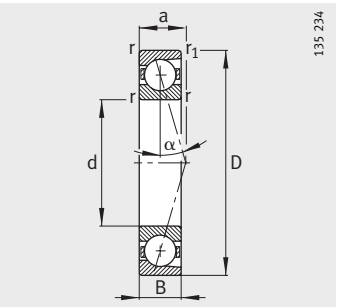
Outer ring tolerance

Outside diameter		Outside diameter deviation		Width variation	Radial runout	Axial runout	
D mm		Δ_{Dmp} µm		V_{Cs} µm	K_{ea} µm	S_D µm	S_{ea} µm
over	incl.						
18	30	0	–5	1,5	2,5	1,5	2,5
30	50	0	–6	1,5	2,5	1,5	2,5
50	80	0	–7	1,5	3	1,5	4
80	120	0	–8	2,5	4	2,5	5
120	150	0	–9	2,5	4	2,5	5
150	180	0	–10	2,5	5	2,5	5
180	250	0	–11	4	7	4	7
250	315	0	–13	5	7	5	7
315	400	0	–15	7	8	7	8

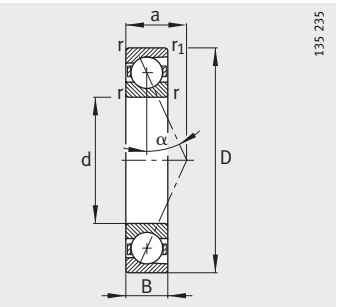
The width deviation Δ_{Cs} is identical to Δ_{Bs} of the corresponding inner ring.

Spindle bearings

With steel balls



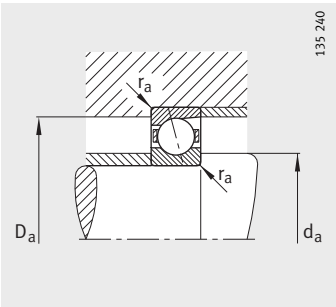
B719..-C, B70..-C, B72..-C
$\alpha = 15°$



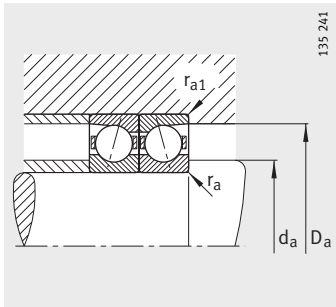
B719..-E, B70..-E, B72..-E
$\alpha = 25°$

Dimension table · Dimensions in mm

Designation	Mass	Dimensions					
	m	d	D	B	r	r_1	a
	≈kg				min.	min.	≈
B71900-C-T-P4S	0,009	**10**	22	6	0,3	0,3	5
B71900-E-T-P4S	0,009	**10**	22	6	0,3	0,3	7
B7000-C-T-P4S	0,019	**10**	26	8	0,3	0,3	6
B7000-E-T-P4S	0,019	**10**	26	8	0,3	0,3	8
B7200-C-T-P4S	0,031	**10**	30	9	0,6	0,6	7
B7200-E-T-P4S	0,031	**10**	30	9	0,6	0,6	9
B71901-C-T-P4S	0,01	**12**	24	6	0,3	0,3	5
B71901-E-T-P4S	0,01	**12**	24	6	0,3	0,3	7
B7001-C-T-P4S	0,021	**12**	28	8	0,3	0,3	5
B7001-E-T-P4S	0,021	**12**	28	8	0,3	0,3	6
B7201-C-T-P4S	0,038	**12**	32	10	0,6	0,6	8
B7201-E-T-P4S	0,037	**12**	32	10	0,6	0,6	10
B71902-C-T-P4S	0,015	**15**	28	7	0,3	0,3	6
B71902-E-T-P4S	0,015	**15**	28	7	0,3	0,3	9
B7002-C-T-P4S	0,03	**15**	32	9	0,3	0,3	8
B7002-E-T-P4S	0,03	**15**	32	9	0,3	0,3	10
B7202-C-T-P4S	0,044	**15**	35	11	0,6	0,6	9
B7202-E-T-P4S	0,044	**15**	35	11	0,6	0,6	11
B71903-C-T-P4S	0,017	**17**	30	7	0,3	0,3	7
B71903-E-T-P4S	0,017	**17**	30	7	0,3	0,3	9
B7003-C-T-P4S	0,039	**17**	35	10	0,3	0,3	9
B7003-E-T-P4S	0,039	**17**	35	10	0,3	0,3	11
B7203-C-T-P4S	0,066	**17**	40	12	0,6	0,6	10
B7203-E-T-P4S	0,066	**17**	40	12	0,6	0,6	13
B71904-C-T-P4S	0,036	**20**	37	9	0,3	0,3	8
B71904-E-T-P4S	0,036	**20**	37	9	0,3	0,3	11
B7004-C-T-P4S	0,068	**20**	42	12	0,6	0,6	10
B7004-E-T-P4S	0,068	**20**	42	12	0,6	0,6	13
B7204-C-T-P4S	0,105	**20**	47	14	1	1	12
B7204-E-T-P4S	0,105	**20**	47	14	1	1	15
B71905-C-T-P4S	0,042	**25**	42	9	0,3	0,3	9
B71905-E-T-P4S	0,042	**25**	42	9	0,3	0,3	12
B7005-C-T-P4S	0,081	**25**	47	12	0,6	0,6	11
B7005-E-T-P4S	0,081	**25**	47	12	0,6	0,6	14
B7205-C-T-P4S	0,13	**25**	52	15	1	1	13
B7205-E-T-P4S	0,13	**25**	52	15	1	1	17



Mounting dimensions

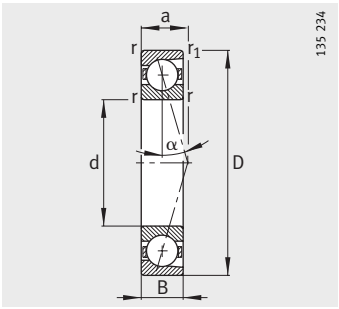


Mounting dimensions

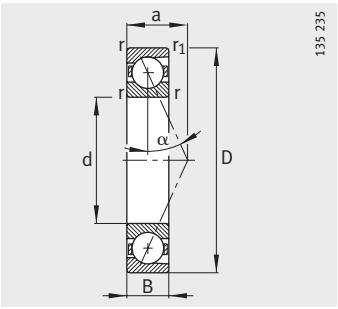
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	
d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G grease min^{-1}	n_G oil min^{-1}
13	19,5	0,3	0,3	3 000	1 530	110	70 000	110 000
13	19,5	0,3	0,3	2 900	1 460	105	63 000	95 000
14	22	0,3	0,1	4 250	2 080	151	60 000	90 000
14	22	0,3	0,1	4 050	2 000	145	56 000	85 000
14,5	25,5	0,6	0,6	5 850	2 900	305	53 000	80 000
14,5	25,5	0,6	0,6	5 600	2 800	295	48 000	70 000
15	21,5	0,3	0,3	3 350	1 860	135	60 000	90 000
15	21,5	0,3	0,3	3 200	1 760	128	56 000	85 000
16,5	24,5	0,3	0,1	4 750	2 600	188	56 000	85 000
16,5	24,5	0,3	0,1	4 550	2 500	180	50 000	75 000
16,5	27,5	0,6	0,6	7 650	3 900	400	50 000	75 000
16,5	27,5	0,6	0,6	7 350	3 750	385	45 000	67 000
18	25,5	0,3	0,3	5 000	2 900	209	50 000	75 000
18	25,5	0,3	0,3	4 800	2 750	200	45 000	67 000
19	29	0,3	0,1	6 200	3 400	248	48 000	70 000
19	29	0,3	0,1	6 000	3 250	237	43 000	63 000
19,5	30,5	0,6	0,6	9 650	5 000	520	45 000	67 000
19,5	30,5	0,6	0,6	9 300	4 800	510	40 000	60 000
20	27,5	0,3	0,3	5 300	3 150	229	48 000	70 000
20	27,5	0,3	0,3	5 000	3 000	219	43 000	63 000
21	32	0,3	0,1	8 650	4 900	360	43 000	63 000
21	32	0,3	0,1	8 300	4 750	345	38 000	56 000
22,5	34,5	0,6	0,6	10 800	5 850	600	38 000	56 000
22,5	34,5	0,6	0,6	10 400	5 600	580	36 000	53 000
24	33,5	0,3	0,3	7 350	4 550	330	38 000	56 000
24	33,5	0,3	0,3	6 950	4 400	315	36 000	53 000
25	37	0,6	0,3	10 400	6 000	435	36 000	53 000
25	37	0,6	0,3	10 000	5 700	415	32 000	48 000
26,5	40,5	1	1	14 600	8 150	820	32 000	48 000
26,5	40,5	1	1	14 000	7 800	790	30 000	45 000
29	38,5	0,3	0,3	8 150	5 700	415	32 000	48 000
29	38,5	0,3	0,3	7 800	5 500	395	30 000	45 000
30	42	0,6	0,3	14 600	9 150	660	30 000	45 000
30	42	0,6	0,3	13 700	8 650	640	28 000	43 000
31,5	45,5	1	1	15 600	9 300	950	28 000	43 000
31,5	45,5	1	1	15 000	9 000	910	26 000	40 000

Spindle bearings

With steel balls



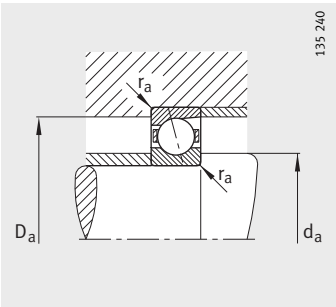
B719..-C, B70..-C, B72..-C
$\alpha = 15°$



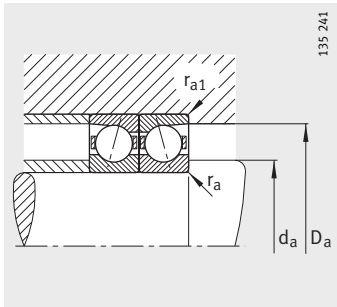
B719..-E, B70..-E, B72..-E
$\alpha = 25°$

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions					
	m	d	D	B	r	r_1	a
	≈kg				min.	min.	≈
B71906-C-T-P4S	0,049	**30**	47	9	0,3	0,3	10
B71906-E-T-P4S	0,049	**30**	47	9	0,3	0,3	14
B7006-C-T-P4S	0,12	**30**	55	13	1	1	12
B7006-E-T-P4S	0,12	**30**	55	13	1	1	17
B7206-C-T-P4S	0,197	**30**	62	16	1	1	14
B7206-E-T-P4S	0,196	**30**	62	16	1	1	19
B71907-C-T-P4S	0,083	**35**	55	10	0,6	0,6	11
B71907-E-T-P4S	0,082	**35**	55	10	0,6	0,6	16
B7007-C-T-P4S	0,159	**35**	62	14	1	1	14
B7007-E-T-P4S	0,159	**35**	62	14	1	1	18
B7207-C-T-P4S	0,28	**35**	72	17	1,1	1,1	16
B7207-E-T-P4S	0,279	**35**	72	17	1,1	1,1	21
B71908-C-T-P4S	0,113	**40**	62	12	0,6	0,6	13
B71908-E-T-P4S	0,113	**40**	62	12	0,6	0,6	18
B7008-C-T-P4S	0,196	**40**	68	15	1	1	15
B7008-E-T-P4S	0,195	**40**	68	15	1	1	20
B7208-C-T-P4S	0,376	**40**	80	18	1,1	1,1	17
B7208-E-T-P4S	0,375	**40**	80	18	1,1	1,1	23
B71909-C-T-P4S	0,127	**45**	68	12	0,6	0,6	14
B71909-E-T-P4S	0,127	**45**	68	12	0,6	0,6	19
B7009-C-T-P4S	0,24	**45**	75	16	1	1	16
B7009-E-T-P4S	0,24	**45**	75	16	1	1	22
B7209-C-T-P4S	0,401	**45**	85	19	1,1	1,1	18
B7209-E-T-P4S	0,4	**45**	85	19	1,1	1,1	25
B71910-C-T-P4S	0,132	**50**	72	12	0,6	0,6	14
B71910-E-T-P4S	0,132	**50**	72	12	0,6	0,6	20
B7010-C-T-P4S	0,259	**50**	80	16	1	1	17
B7010-E-T-P4S	0,258	**50**	80	16	1	1	23
B7210-C-T-P4S	0,455	**50**	90	20	1,1	1,1	19
B7210-E-T-P4S	0,453	**50**	90	20	1,1	1,1	26



Mounting dimensions

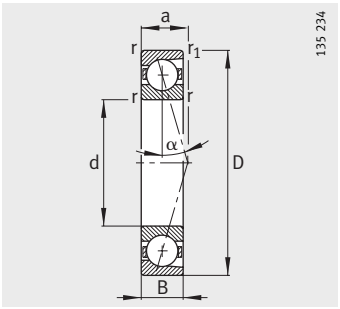


Mounting dimensions

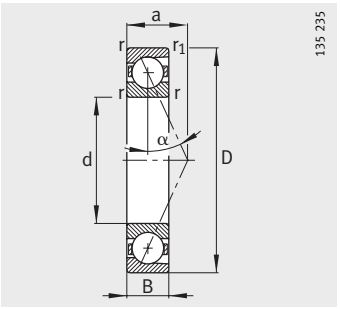
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	
d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G grease min^{-1}	n_G oil min^{-1}
34	43,5	0,3	0,3	8 650	6 550	480	28 000	43 000
34	43,5	0,3	0,3	8 150	6 300	455	26 000	40 000
36	49	1	0,3	15 000	10 200	750	26 000	40 000
36	49	1	0,3	14 300	9 800	720	24 000	38 000
37,5	54,5	1	1	23 200	14 600	1 540	24 000	38 000
37,5	54,5	1	1	22 000	14 000	1 470	22 000	36 000
40	51,5	0,6	0,6	11 800	9 500	700	24 000	38 000
40	51,5	0,6	0,6	11 000	9 000	660	22 000	36 000
41	56	1	0,3	19 000	13 700	990	22 000	36 000
41	56	1	0,3	18 300	12 900	940	20 000	34 000
44	63	1	1	25 500	18 000	1 880	20 000	34 000
44	63	1	1	24 500	17 000	1 790	19 000	32 000
45	58,5	0,6	0,6	17 600	13 700	1 020	22 000	36 000
45	58,5	0,6	0,6	16 600	13 200	970	20 000	34 000
46	62	1	0,3	20 400	16 000	1 150	20 000	34 000
46	62	1	0,3	19 600	15 000	1 100	19 000	32 000
48	72	1	1	32 000	22 400	1 660	18 000	30 000
48	72	1	1	30 500	21 600	1 580	17 000	28 000
50	63,5	0,6	0,6	18 600	15 600	1 150	19 000	32 000
50	63,5	0,6	0,6	17 600	15 000	1 090	18 000	30 000
51	69	1	0,3	27 500	21 200	1 530	18 000	30 000
51	69	1	0,3	26 500	20 000	1 460	17 000	28 000
52,5	78	1	1	33 500	24 500	1 820	17 000	28 000
52,5	78	1	1	32 000	23 600	1 740	15 000	24 000
55	67,5	0,6	0,6	19 000	16 600	1 230	18 000	30 000
55	67,5	0,6	0,6	18 000	15 600	1 160	16 000	26 000
56	74	1	0,3	28 500	22 800	1 660	17 000	28 000
56	74	1	0,3	27 000	21 600	1 580	15 000	24 000
57	83	1	1	43 000	31 500	2 300	16 000	26 000
57	83	1	1	40 500	30 500	2 200	14 000	22 000

Spindle bearings

With steel balls



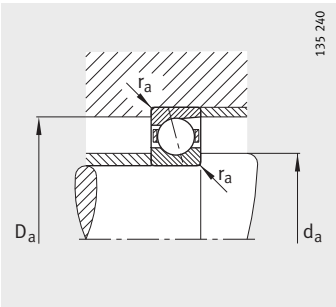
B719..-C, B70..-C, B72..-C
$\alpha = 15°$



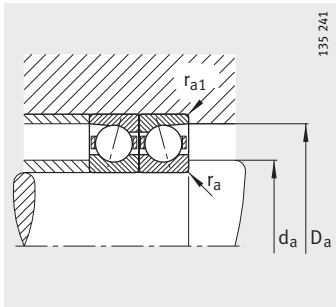
B719..-E, B70..-E, B72..-E
$\alpha = 25°$

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions					
	m	d	D	B	r	r_1	a
	≈kg				min.	min.	≈
B71911-C-T-P4S	0,182	**55**	80	13	1	1	16
B71911-E-T-P4S	0,181	**55**	80	13	1	1	22
B7011-C-T-P4S	0,374	**55**	90	18	1,1	1,1	19
B7011-E-T-P4S	0,373	**55**	90	18	1,1	1,1	26
B7211-C-T-P4S	0,609	**55**	100	21	1,5	1,5	21
B7211-E-T-P4S	0,599	**55**	100	21	1,5	1,5	29
B71912-C-T-P4S	0,196	**60**	85	13	1	1	16
B71912-E-T-P4S	0,195	**60**	85	13	1	1	23
B7012-C-T-P4S	0,397	**60**	95	18	1,1	1,1	19
B7012-E-T-P4S	0,396	**60**	95	18	1,1	1,1	27
B7212-C-T-P4S	0,795	**60**	110	22	1,5	1,5	23
B7212-E-T-P4S	0,793	**60**	110	22	1,5	1,5	31
B71913-C-T-P4S	0,202	**65**	90	13	1	1	17
B71913-E-T-P4S	0,202	**65**	90	13	1	1	25
B7013-C-T-P4S	0,421	**65**	100	18	1,1	1,1	20
B7013-E-T-P4S	0,42	**65**	100	18	1,1	1,1	28
B7213-C-T-P4S	1,01	**65**	120	23	1,5	1,5	24
B7213-E-T-P4S	1,01	**65**	120	23	1,5	1,5	33
B71914-C-T-P4S	0,332	**70**	100	16	1	1	19
B71914-E-T-P4S	0,331	**70**	100	16	1	1	28
B7014-C-T-P4S	0,595	**70**	110	20	1,1	1,1	22
B7014-E-T-P4S	0,593	**70**	110	20	1,1	1,1	31
B7214-C-T-P4S	1,1	**70**	125	24	1,5	1,5	25
B7214-E-T-P4S	1,1	**70**	125	24	1,5	1,5	35
B71915-C-T-P4S	0,352	**75**	105	16	1	1	20
B71915-E-T-P4S	0,351	**75**	105	16	1	1	29
B7015-C-T-P4S	0,618	**75**	115	20	1,1	1,1	23
B7015-E-T-P4S	0,616	**75**	115	20	1,1	1,1	32
B7215-C-T-P4S	1,21	**75**	130	25	1,5	1,5	26
B7215-E-T-P4S	1,2	**75**	130	25	1,5	1,5	36



Mounting dimensions

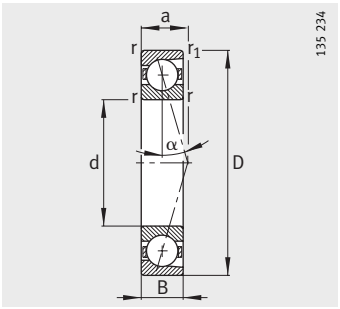


Mounting dimensions

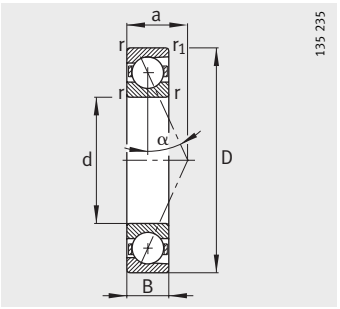
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	
d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G grease min^{-1}	n_G oil min^{-1}
60	75,5	0,6	0,6	22 800	20 400	1 490	16 000	26 000
60	75,5	0,6	0,6	21 600	19 300	1 410	15 000	24 000
62	83	1	0,6	38 000	31 000	2 270	15 000	24 000
62	83	1	0,6	36 000	29 000	2 160	14 000	22 000
63	92	1,5	1,5	46 500	37 500	2 700	14 000	22 000
63	92	1,5	1,5	44 000	35 500	2 600	13 000	20 000
65	80,5	0,6	0,6	24 000	22 800	1 650	15 000	24 000
65	80,5	0,6	0,6	22 800	21 600	1 560	14 000	22 000
67	88	1	0,6	39 000	33 500	2 440	14 000	22 000
67	88	1	0,6	36 500	31 500	2 320	13 000	20 000
69,5	101,5	1,5	1,5	55 000	44 000	3 200	13 000	20 000
69,5	101,5	1,5	1,5	52 000	42 500	3 050	12 000	19 000
70	85,5	0,6	0,6	24 500	24 000	1 740	14 000	22 000
70	85,5	0,6	0,6	22 800	22 400	1 640	13 000	20 000
72	93	1	0,6	40 000	35 500	2 600	13 000	20 000
72	93	1	0,6	38 000	33 500	2 480	12 000	19 000
75,5	109,5	1,5	1,5	67 000	54 000	3 950	12 000	19 000
75,5	109,5	1,5	1,5	64 000	52 000	3 750	11 000	18 000
76	94,5	0,6	0,6	33 500	32 500	2 360	13 000	20 000
76	94,5	0,6	0,6	31 500	31 000	2 240	12 000	19 000
77	102	1	0,6	50 000	43 000	3 150	12 000	19 000
77	102	1	0,6	46 500	41 500	3 000	11 000	18 000
80	115	1,5	1,5	69 500	58 500	4 250	11 000	18 000
80	115	1,5	1,5	65 500	56 000	4 050	10 000	17 000
81	99,5	0,6	0,6	34 000	34 500	2 490	12 000	19 000
81	99,5	0,6	0,6	32 000	32 500	2 360	11 000	18 000
82	107	1	0,6	51 000	46 500	3 350	12 000	19 000
82	107	1	0,6	48 000	44 000	3 200	11 000	18 000
85	120	1,5	1,5	72 000	63 000	4 550	11 000	18 000
85	120	1,5	1,5	68 000	60 000	4 300	9 500	16 000

Spindle bearings

With steel balls



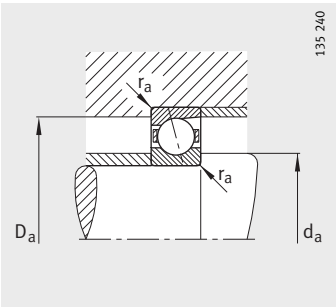
B719..-C, B70..-C, B72..-C
$\alpha = 15°$



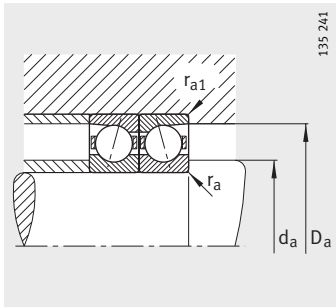
B719..-E, B70..-E, B72..-E
$\alpha = 25°$

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions					
	m	d	D	B	r	r_1	a
	≈kg				min.	min.	≈
B71916-C-T-P4S	0,367	**80**	110	16	1	1	21
B71916-E-T-P4S	0,366	**80**	110	16	1	1	30
B7016-C-T-P4S	0,837	**80**	125	22	1,1	1,1	25
B7016-E-T-P4S	0,834	**80**	125	22	1,1	1,1	35
B7216-C-T-P4S	1,43	**80**	140	26	2	2	28
B7216-E-T-P4S	1,42	**80**	140	26	2	2	39
B71917-C-T-P4S	0,526	**85**	120	18	1,1	1,1	23
B71917-E-T-P4S	0,524	**85**	120	18	1,1	1,1	33
B7017-C-T-P4S	0,878	**85**	130	22	1,1	1,1	25
B7017-E-T-P4S	0,875	**85**	130	22	1,1	1,1	36
B7217-C-T-P4S	1,81	**85**	150	28	2	2	30
B7217-E-T-P4S	1,8	**85**	150	28	2	2	42
B71918-C-T-P4S	0,558	**90**	125	18	1,1	1,1	23
B71918-E-T-P4S	0,556	**90**	125	18	1,1	1,1	34
B7018-C-T-P4S	1,14	**90**	140	24	1,5	1,5	27
B7018-E-T-P4S	1,13	**90**	140	24	1,5	1,5	39
B7218-C-T-P4S	2,2	**90**	160	30	2	2	32
B7218-E-T-P4S	2,19	**90**	160	30	2	2	44
B71919-C-T-P4S	0,576	**95**	130	18	1,1	1,1	24
B71919-E-T-P4S	0,575	**95**	130	18	1,1	1,1	35
B7019-C-T-P4S	1,18	**95**	145	24	1,5	1,5	28
B7019-E-T-P4S	1,18	**95**	145	24	1,5	1,5	40
B7219-C-T-P4S	2,73	**95**	170	32	2,1	2,1	34
B7219-E-T-P4S	2,72	**95**	170	32	2,1	2,1	47
B71920-C-T-P4S	0,784	**100**	140	20	1,1	1,1	26
B71920-E-T-P4S	0,781	**100**	140	20	1,1	1,1	38
B7020-C-T-P4S	1,24	**100**	150	24	1,5	1,5	29
B7020-E-T-P4S	1,23	**100**	150	24	1,5	1,5	41
B7220-C-T-P4S	3,21	**100**	180	34	2,1	2,1	36
B7220-E-T-P4S	3,2	**100**	180	34	2,1	2,1	50



Mounting dimensions

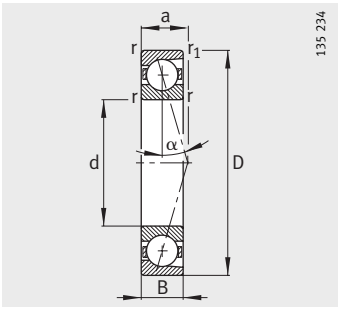


Mounting dimensions

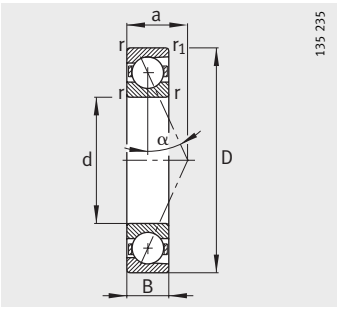
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	
d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G grease min^{-1}	n_G oil min^{-1}
86	104	0,6	0,6	34 500	36 000	2 600	12 000	19 000
86	104	0,6	0,6	32 500	34 000	2 470	11 000	18 000
88	117	1	0,6	63 000	58 500	4 150	11 000	18 000
88	117	1	0,6	60 000	55 000	3 950	9 500	16 000
91	129	2	2	93 000	78 000	5 400	10 000	17 000
91	129	2	2	88 000	73 500	5 100	9 000	15 000
92	114	0,6	0,6	45 000	46 500	3 400	11 000	18 000
92	114	0,6	0,6	42 500	44 000	3 200	9 500	16 000
93	122	1	0,6	65 500	62 000	4 300	10 000	17 000
93	122	1	0,6	62 000	58 500	4 100	9 000	15 000
98	138	2	2	96 500	85 000	5 600	9 000	15 000
98	138	2	2	91 500	80 000	5 400	8 000	13 000
97	119	0,6	0,6	45 500	49 000	3 450	10 000	17 000
97	119	0,6	0,6	43 000	46 500	3 300	9 000	15 000
100	131	1,5	0,6	76 500	72 000	4 900	9 500	16 000
100	131	1,5	0,6	72 000	68 000	4 650	8 500	14 000
104	147	2	2	122 000	104 000	6 900	8 500	14 000
104	147	2	2	116 000	100 000	6 600	7 500	12 000
102	124	0,6	0,6	46 500	51 000	3 550	9 500	16 000
102	124	0,6	0,6	44 000	48 000	3 350	8 500	14 000
105	136	1,5	0,6	78 000	76 500	5 100	9 000	15 000
105	136	1,5	0,6	75 000	72 000	4 850	8 000	13 000
110,5	154	2	2	127 000	114 000	7 300	8 000	13 000
110,5	154	2	2	122 000	108 000	6 900	7 000	11 000
107	133	0,6	0,6	58 500	64 000	4 200	9 000	15 000
107	133	0,6	0,6	55 000	60 000	3 950	8 000	13 000
110	141	1,5	0,6	81 500	81 500	5 300	8 500	14 000
110	141	1,5	0,6	76 500	76 500	5 000	7 500	12 000
114,5	165,5	2,1	2,1	132 000	122 000	7 600	7 500	12 000
114,5	165,5	2,1	2,1	125 000	116 000	7 300	6 700	10 000

Spindle bearings

With steel balls



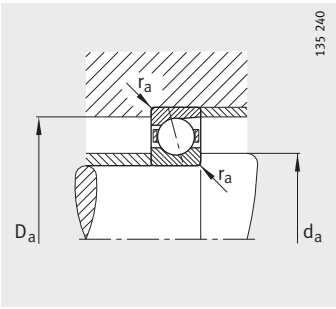
B719..-C, B70..-C, B72..-C
$\alpha = 15°$



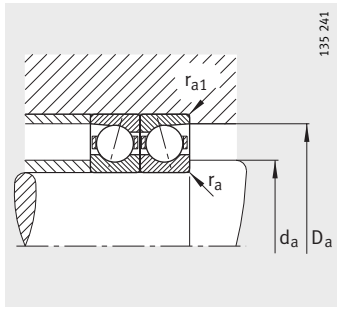
B719..-E, B70..-E, B72..-E
$\alpha = 25°$

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions					
	m	d	D	B	r	r_1	a
	≈kg				min.	min.	≈
B71921-C-T-P4S	0,814	**105**	145	20	1,1	1,1	27
B71921-E-T-P4S	0,813	**105**	145	20	1,1	1,1	39
B7021-C-T-P4S	1,52	**105**	160	26	2	2	31
B7021-E-T-P4S	1,51	**105**	160	26	2	2	44
B7221-C-T-P4S	3,89	**105**	190	36	2,1	2,1	38
B7221-E-T-P4S	3,88	**105**	190	36	2,1	2,1	52
B71922-C-T-P4S	0,848	**110**	150	20	1,1	1,1	27
B71922-E-T-P4S	0,845	**110**	150	20	1,1	1,1	40
B7022-C-T-P4S	1,94	**110**	170	28	2	2	33
B7022-E-T-P4S	1,94	**110**	170	28	2	2	47
B7222-C-T-P4S	4,59	**110**	200	38	2,1	2,1	40
B7222-E-T-P4S	4,58	**110**	200	38	2,1	2,1	55
B71924-C-T-P4S	1,16	**120**	165	22	1,1	1,1	30
B71924-E-T-P4S	1,16	**120**	165	22	1,1	1,1	44
B7024-C-T-P4S	2,07	**120**	180	28	2	2	34
B7024-E-T-P4S	2,06	**120**	180	28	2	2	49
B7224-C-T-P4S	5,29	**120**	215	40	2,1	2,1	43
B7224-E-T-P4S	5,27	**120**	215	40	2,1	2,1	59
B71926-C-T-P4S	1,52	**130**	180	24	1,5	1,5	33
B71926-E-T-P4S	1,52	**130**	180	24	1,5	1,5	48
B7026-C-T-P4S	3,15	**130**	200	33	2	2	39
B7026-E-T-P4S	3,14	**130**	200	33	2	2	55
B7226-C-T-P4S	6,1	**130**	230	40	3	3	44
B7226-E-T-P4S	6,08	**130**	230	40	3	3	62
B71928-C-T-P4S	1,63	**140**	190	24	1,5	1,5	34
B71928-E-T-P4S	1,62	**140**	190	24	1,5	1,5	50
B7028-C-T-P4S	3,34	**140**	210	33	2	2	40
B7028-E-T-P4S	3,33	**140**	210	33	2	2	57
B7228-C-T-P4S	7,87	**140**	250	42	3	3	47
B7228-E-T-P4S	7,85	**140**	250	42	3	3	66
B71930-C-T-P4S	2,49	**150**	210	28	2	1	38
B71930-E-T-P4S	2,49	**150**	210	28	2	1	56
B7030-C-T-P4S	3,99	**150**	225	35	2,1	2,1	43
B7030-E-T-P4S	3,98	**150**	225	35	2,1	2,1	61
B7230-C-T-P4S	10,1	**150**	270	45	3	3	51
B7230-E-T-P4S	10,1	**150**	270	45	3	3	71



Mounting dimensions

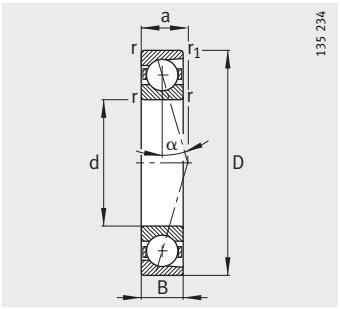


Mounting dimensions

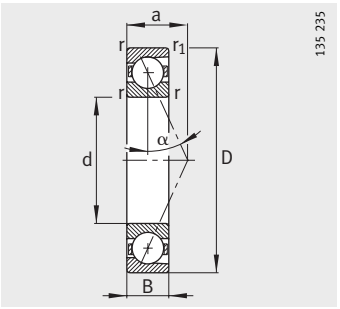
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	
d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G grease min^{-1}	n_G oil min^{-1}
112	138	0,6	0,6	58 500	64 000	4 150	8 500	14 000
112	138	0,6	0,6	55 000	60 000	3 900	7 500	12 000
116	150	2	1	83 000	85 000	5 400	8 000	13 000
116	150	2	1	78 000	81 500	5 200	7 000	11 000
120,5	174,5	2,1	2,1	163 000	146 000	8 800	7 000	11 000
120,5	174,5	2,1	2,1	156 000	140 000	8 400	6 300	9 500
117	143	0,6	0,6	58 500	67 000	4 250	8 000	13 000
117	143	0,6	0,6	56 000	63 000	4 000	7 500	12 000
121	159	2	1	110 000	110 000	6 700	7 500	12 000
121	159	2	1	104 000	104 000	6 400	6 700	10 000
126,5	183,5	2,1	2,1	163 000	150 000	8 700	6 700	10 000
126,5	183,5	2,1	2,1	153 000	143 000	8 300	6 000	9 000
128	157	0,6	0,6	73 500	85 000	5 100	7 000	11 000
128	157	0,6	0,6	69 500	80 000	4 850	6 700	10 000
131	169	2	1	112 000	116 000	6 900	6 700	10 000
131	169	2	1	106 000	110 000	6 500	6 300	9 500
140	195	2,1	2,1	204 000	196 000	11 000	6 000	9 000
140	195	2,1	2,1	196 000	186 000	10 500	5 300	8 000
139	171	0,6	0,6	86 500	100 000	5 800	6 700	10 000
139	171	0,6	0,6	81 500	95 000	5 500	6 000	9 000
142	189	2	1	143 000	150 000	8 600	6 000	9 000
142	189	2	1	137 000	143 000	8 100	5 600	8 500
148	211,5	2,5	2,5	212 000	216 000	11 600	5 600	8 500
148	211,5	2,5	2,5	204 000	204 000	11 000	5 000	7 500
149	181	0,6	0,6	90 000	108 000	6 100	6 000	9 000
149	181	0,6	0,6	85 000	102 000	5 800	5 600	8 500
152	199	2	1	146 000	160 000	8 800	5 600	8 500
152	199	2	1	140 000	150 000	8 400	5 000	7 500
163	226,5	2,5	2,5	220 000	232 000	12 100	5 000	7 500
163	226,5	2,5	2,5	212 000	224 000	11 500	4 500	6 700
160	199	1	1	122 000	143 000	7 700	5 600	8 500
160	199	1	1	114 000	134 000	7 300	5 000	7 500
163	213	2,1	1	183 000	193 000	10 300	5 300	8 000
163	213	2,1	1	173 000	186 000	9 800	4 800	7 000
178	241,5	2,5	2,5	228 000	255 000	12 600	4 500	6 700
178	241,5	2,5	2,5	216 000	240 000	12 000	4 000	6 000

Spindle bearings

With steel balls



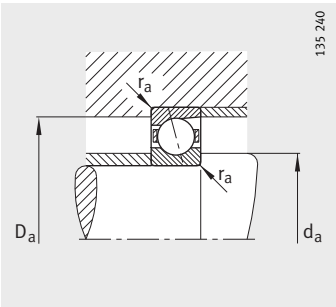
B719..-C, B70..-C, B72..-C
$\alpha = 15°$



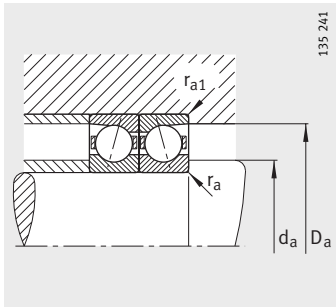
B719..-E, B70..-E, B72..-E
$\alpha = 25°$

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions					
	m	d	D	B	r	r_1	a
	≈kg				min.	min.	≈
B71932-C-T-P4S	2,62	**160**	220	28	2	1	40
B71932-E-T-P4S	2,61	**160**	220	28	2	1	58
B7032-C-T-P4S	5,01	**160**	240	38	2,1	2,1	46
B7032-E-T-P4S	4,99	**160**	240	38	2,1	2,1	66
B7232-C-T-P4S	12,9	**160**	290	48	3	3	54
B7232-E-T-P4S	12,9	**160**	290	48	3	3	76
B71934-C-T-P4S	2,78	**170**	230	28	2	1,5	41
B71934-E-T-P4S	2,77	**170**	230	28	2	1,5	61
B7034-C-T-P4S	6,51	**170**	260	42	2,1	2,1	50
B7034-E-T-P4S	6,48	**170**	260	42	2,1	2,1	71
B7234-C-T-P4S	15,6	**170**	310	52	4	4	58
B7234-E-T-P4S	15,6	**170**	310	52	4	4	82
B71936-C-T-P4S	4,13	**180**	250	33	2	1	45
B71936-E-T-P4S	4,11	**180**	250	33	2	1	67
B7036-C-T-P4S	8,77	**180**	280	46	2,1	2,1	54
B7036-E-T-P4S	8,74	**180**	280	46	2,1	2,1	77
B7236-C-T-P4S	16,3	**180**	320	52	4	4	60
B7236-E-T-P4S	16,3	**180**	320	52	4	4	84
B71938-C-T-P4S	4,31	**190**	260	33	2	1	47
B71938-E-T-P4S	4,29	**190**	260	33	2	1	69
B7038-C-T-P4S	9,18	**190**	290	46	2,1	2,1	55
B7038-E-T-P4S	9,15	**190**	290	46	2,1	2,1	79
B7238-C-T-P4S	20	**190**	340	55	4	4	63
B7238-E-T-P4S	19,9	**190**	340	55	4	4	89
B71940-C-T-P4S	6,03	**200**	280	38	2,1	1,1	51
B71940-E-T-P4S	6,01	**200**	280	38	2,1	1,1	75
B7040-C-T-P4S	11,6	**200**	310	51	2,1	2,1	60
B7040-E-T-P4S	11,5	**200**	310	51	2,1	2,1	85
B7240-C-T-P4S	24,1	**200**	360	58	4	4	67
B7240-E-T-P4S	24,1	**200**	360	58	4	4	94



Mounting dimensions

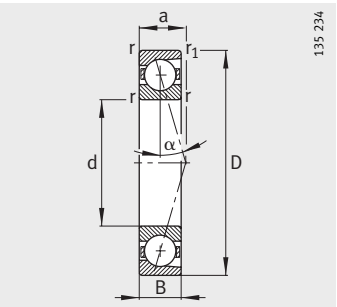


Mounting dimensions

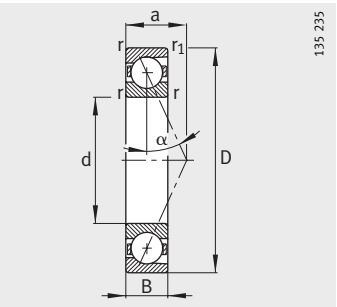
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	
d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G grease min^{-1}	n_G oil min^{-1}
170	209	1	1	125 000	150 000	7 900	5 000	7 500
170	209	1	1	116 000	140 000	7 500	4 800	7 000
174	228	2	1	190 000	208 000	10 600	4 800	7 000
174	228	2	1	176 000	196 000	10 100	4 300	6 300
191	259	2,5	2,5	245 000	285 000	13 800	4 300	6 300
191	259	2,5	2,5	232 000	270 000	13 200	3 800	5 600
180	219	1	1	129 000	163 000	8 300	4 800	7 000
180	219	1	1	122 000	150 000	7 900	4 300	6 300
185	246	2	1	236 000	270 000	13 300	4 500	6 700
185	246	2	1	224 000	255 000	12 600	4 000	6 000
205	275	3	3	300 000	360 000	16 800	3 800	5 600
205	275	3	3	280 000	345 000	16 000	3 600	5 300
192	238	1	1	163 000	204 000	10 200	4 500	6 700
192	238	1	1	156 000	193 000	9 700	4 000	6 000
196	264	2	1	245 000	285 000	13 800	4 000	6 000
196	264	2	1	232 000	275 000	13 100	3 800	5 600
213,5	286,5	3	3	305 000	390 000	17 600	3 800	5 600
213,5	286,5	3	3	290 000	365 000	16 800	3 400	5 000
202	247	1	1	166 000	212 000	10 400	4 300	6 300
202	247	1	1	156 000	200 000	9 900	3 800	5 600
206	274	2	1	250 000	305 000	14 300	3 800	5 600
206	274	2	1	236 000	290 000	13 600	3 600	5 300
223,5	306,5	3	3	315 000	415 000	18 300	3 400	5 000
223,5	306,5	3	3	300 000	390 000	17 400	3 200	4 800
214	266	1	1	204 000	255 000	11 900	3 800	5 600
214	266	1	1	193 000	240 000	11 300	3 600	5 300
217	293	2	1	305 000	390 000	17 500	3 600	5 300
217	293	2	1	290 000	365 000	16 700	3 200	4 800
238,5	321,5	3	3	325 000	440 000	19 000	3 200	4 800
238,5	321,5	3	3	310 000	415 000	18 000	3 000	4 500

Spindle bearings

With steel balls



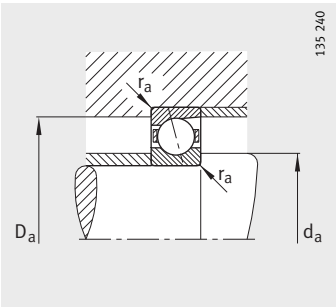
B719..-C, B70..-C, B72..-C
$\alpha = 15°$



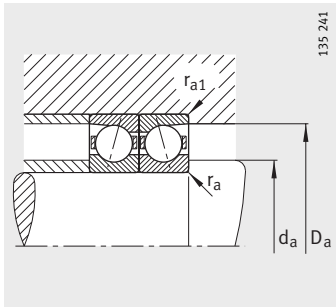
B719..-E, B70..-E, B72..-E
$\alpha = 25°$

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions					
	m	d	D	B	r	r_1	a
	≈kg				min.	min.	≈
B71944-C-T-P4S	6,57	**220**	300	38	2,1	1,1	54
B71944-E-T-P4S	6,55	**220**	300	38	2,1	1,1	80
B7044-C-T-P4S	15,7	**220**	340	56	3	3	66
B7044-E-T-P4S	15,6	**220**	340	56	3	3	93
B7244-C-T-P4S	33	**220**	400	65	4	4	74
B7244-E-T-P4S	32,9	**220**	400	65	4	4	105
B71948-C-T-P4S	7,08	**240**	320	38	2,1	1,1	57
B71948-E-T-P4S	7,06	**240**	320	38	2,1	1,1	84
B7048-C-T-P4S	16,7	**240**	360	56	3	3	68
B7048-E-T-P4S	16,7	**240**	360	56	3	3	98



Mounting dimensions

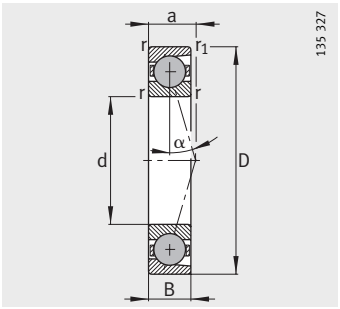


Mounting dimensions

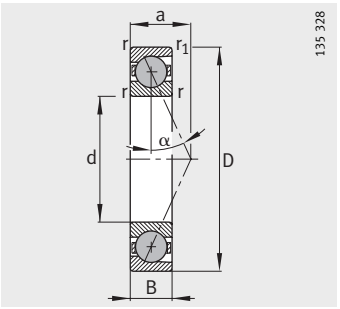
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	
d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G grease min^{-1}	n_G oil min^{-1}
234	286	1	1	216 000	285 000	12 900	3 600	5 300
234	286	1	1	204 000	270 000	12 200	3 200	4 800
239	321	2,5	1	325 000	440 000	19 000	3 200	4 800
239	321	2,5	1	310 000	415 000	18 000	3 000	4 500
264	356	3	3	400 000	560 000	23 200	2 800	4 300
264	356	3	3	380 000	540 000	22 100	2 600	4 000
254	307	1	1	224 000	310 000	13 500	3 200	4 800
254	307	1	1	212 000	285 000	12 800	3 000	4 500
260	341	2,5	1	335 000	465 000	19 500	3 000	4 500
260	341	2,5	1	315 000	440 000	18 500	2 800	4 300

Spindle bearings

With ceramic balls



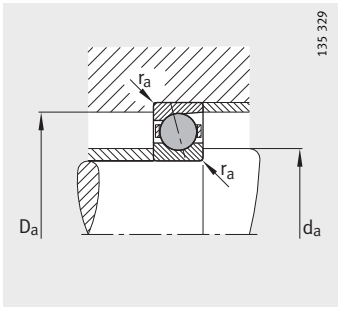
HCB719..-C, HCB70..-C,
HCB72..-C
$\alpha = 15°$



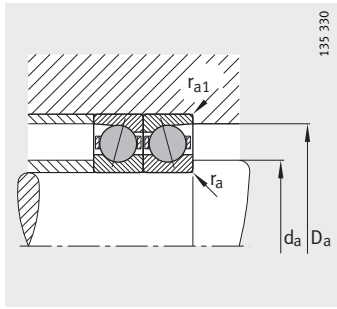
HCB719..-E, HCB70..-E,
HCB72..-E
$\alpha = 25°$

Dimension table · Dimensions in mm

Designation	Mass	Dimensions					
	m	d	D	B	r	r_1	a
	≈kg				min.	min.	≈
HCB71900-C-T-P4S	0,01	**10**	22	6	0,3	0,3	5
HCB71900-E-T-P4S	0,01	**10**	22	6	0,3	0,3	7
HCB7000-C-T-P4S	0,02	**10**	26	8	0,3	0,3	6
HCB7000-E-T-P4S	0,02	**10**	26	8	0,3	0,3	8
HCB7200-C-T-P4S	0,03	**10**	30	9	0,6	0,6	7
HCB7200-E-T-P4S	0,03	**10**	30	9	0,6	0,6	9
HCB71901-C-T-P4S	0,02	**12**	24	6	0,3	0,3	5
HCB71901-E-T-P4S	0,02	**12**	24	6	0,3	0,3	7
HCB7001-C-T-P4S	0,02	**12**	28	8	0,3	0,3	7
HCB7001-E-T-P4S	0,02	**12**	28	8	0,3	0,3	9
HCB7201-C-T-P4S	0,03	**12**	32	10	0,6	0,6	8
HCB7201-E-T-P4S	0,03	**12**	32	10	0,6	0,6	10
HCB71902-C-T-P4S	0,02	**15**	28	7	0,3	0,3	6
HCB71902-E-T-P4S	0,02	**15**	28	7	0,3	0,3	9
HCB7002-C-T-P4S	0,03	**15**	32	9	0,3	0,3	8
HCB7002-E-T-P4S	0,03	**15**	32	9	0,3	0,3	10
HCB7202-C-T-P4S	0,04	**15**	35	11	0,6	0,6	9
HCB7202-E-T-P4S	0,04	**15**	35	11	0,6	0,6	11
HCB71903-C-T-P4S	0,02	**17**	30	7	0,3	0,3	7
HCB71903-E-T-P4S	0,02	**17**	30	7	0,3	0,3	9
HCB7003-C-T-P4S	0,04	**17**	35	10	0,3	0,3	9
HCB7003-E-T-P4S	0,04	**17**	35	10	0,3	0,3	11
HCB7203-C-T-P4S	0,06	**17**	40	12	0,6	0,6	10
HCB7203-E-T-P4S	0,06	**17**	40	12	0,6	0,6	13
HCB71904-C-T-P4S	0,03	**20**	37	9	0,3	0,3	8
HCB71904-E-T-P4S	0,03	**20**	37	9	0,3	0,3	11
HCB7004-C-T-P4S	0,07	**20**	42	12	0,6	0,6	10
HCB7004-E-T-P4S	0,07	**20**	42	12	0,6	0,6	13
HCB7204-C-T-P4S	0,1	**20**	47	14	1	1	12
HCB7204-E-T-P4S	0,1	**20**	47	14	1	1	15
HCB71905-C-T-P4S	0,04	**25**	42	9	0,3	0,3	9
HCB71905-E-T-P4S	0,04	**25**	42	9	0,3	0,3	12
HCB7005-C-T-P4S	0,07	**25**	47	12	0,6	0,6	11
HCB7005-E-T-P4S	0,07	**25**	47	12	0,6	0,6	14
HCB7205-C-T-P4S	0,12	**25**	52	15	1	1	13
HCB7205-E-T-P4S	0,12	**25**	52	15	1	1	17



Mounting dimensions

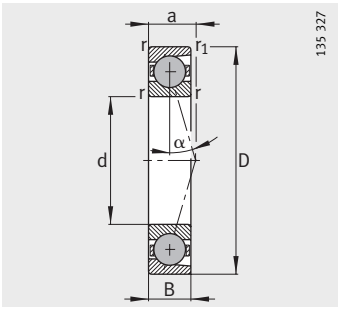


Mounting dimensions

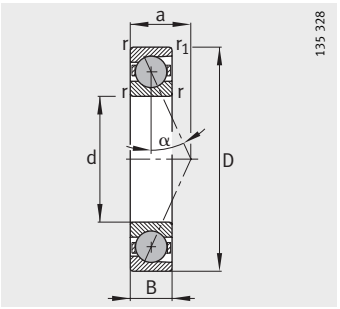
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	
d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G grease min^{-1}	n_G oil min^{-1}
13	19,5	0,3	0,3	2 080	1 060	78	90 000	150 000
13	19,5	0,3	0,3	1 990	1 010	75	75 000	120 000
14	22	0,3	0,1	2 900	1 440	107	80 000	130 000
14	22	0,3	0,1	2 800	1 390	102	67 000	100 000
14,5	25,5	0,6	0,6	4 000	2 040	217	70 000	110 000
14,5	25,5	0,6	0,6	3 850	1 960	208	60 000	90 000
15	21,5	0,3	0,3	2 320	1 290	95	80 000	130 000
15	21,5	0,3	0,3	2 210	1 230	91	67 000	100 000
16,5	24,5	0,3	0,1	3 300	1 810	133	70 000	110 000
16,5	24,5	0,3	0,1	3 150	1 730	128	60 000	90 000
16,5	27,5	0,6	0,6	5 300	2 700	285	63 000	95 000
16,5	27,5	0,6	0,6	5 100	2 600	275	56 000	85 000
18	25,5	0,3	0,3	3 450	2 010	148	67 000	100 000
18	25,5	0,3	0,3	3 300	1 920	141	56 000	85 000
19	29	0,3	0,1	4 300	2 360	176	60 000	90 000
19	29	0,3	0,1	4 100	2 260	168	50 000	75 000
19,5	30,5	0,6	0,6	6 700	3 500	370	56 000	85 000
19,5	30,5	0,6	0,6	6 400	3 350	360	48 000	70 000
20	27,5	0,3	0,3	3 650	2 200	162	60 000	90 000
20	27,5	0,3	0,3	3 450	2 100	155	50 000	75 000
21	32	0,3	0,1	6 000	3 450	255	53 000	80 000
21	32	0,3	0,1	5 800	3 300	246	45 000	67 000
22,5	34,5	0,6	0,6	7 500	4 050	425	50 000	75 000
22,5	34,5	0,6	0,6	7 200	3 900	410	43 000	63 000
24	33,5	0,3	0,3	5 000	3 200	234	50 000	75 000
24	33,5	0,3	0,3	4 800	3 050	223	43 000	63 000
25	37	0,6	0,3	7 200	4 200	310	45 000	67 000
25	37	0,6	0,3	6 900	4 000	295	38 000	56 000
26,5	40,5	1	1	10 100	5 600	580	43 000	63 000
26,5	40,5	1	1	9 700	5 400	560	36 000	53 000
29	38,5	0,3	0,3	5 200	3 550	260	43 000	63 000
29	38,5	0,3	0,3	5 300	3 800	280	36 000	53 000
30	42	0,6	0,3	10 000	6 300	470	38 000	56 000
30	42	0,6	0,3	9 600	6 000	450	34 000	50 000
31,5	45,5	1	1	10 800	6 500	670	36 000	53 000
31,5	45,5	1	1	10 300	6 200	640	32 000	48 000

Spindle bearings

With ceramic balls



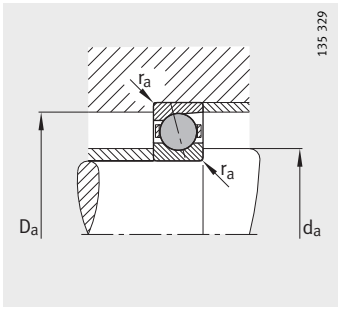
HCB719..-C, HCB70..-C,
HCB72..-C
$\alpha = 15°$



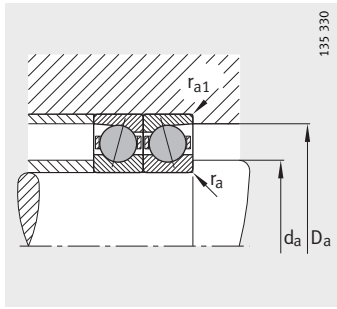
HCB719..-E, HCB70..-E,
HCB72..-E
$\alpha = 25°$

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions					
	m	d	D	B	r	r_1	a
	≈kg				min.	min.	≈
HCB71906-C-T-P4S	0,05	**30**	47	9	0,3	0,3	10
HCB71906-E-T-P4S	0,05	**30**	47	9	0,3	0,3	14
HCB7006-C-T-P4S	0,11	**30**	55	13	1	1	12
HCB7006-E-T-P4S	0,11	**30**	55	13	1	1	16
HCB7206-C-T-P4S	0,19	**30**	62	16	1	1	14
HCB7206-E-T-P4S	0,19	**30**	62	16	1	1	19
HCB71907-C-T-P4S	0,08	**35**	55	10	0,6	0,6	11
HCB71907-E-T-P4S	0,08	**35**	55	10	0,6	0,6	16
HCB7007-C-T-P4S	0,15	**35**	62	14	1	1	14
HCB7007-E-T-P4S	0,15	**35**	62	14	1	1	18
HCB7207-C-T-P4S	0,28	**35**	72	17	1,1	1,1	16
HCB7207-E-T-P4S	0,28	**35**	72	17	1,1	1,1	21
HCB71908-C-T-P4S	0,11	**40**	62	12	0,6	0,6	13
HCB71908-E-T-P4S	0,11	**40**	62	12	0,6	0,6	18
HCB7008-C-T-P4S	0,19	**40**	68	15	1	1	15
HCB7008-E-T-P4S	0,19	**40**	68	15	1	1	20
HCB7208-C-T-P4S	0,37	**40**	80	18	1,1	1,1	17
HCB7208-E-T-P4S	0,37	**40**	80	18	1,1	1,1	23
HCB71909-C-T-P4S	0,13	**45**	68	12	0,6	0,6	14
HCB71909-E-T-P4S	0,13	**45**	68	12	0,6	0,6	19
HCB7009-C-T-P4S	0,23	**45**	75	16	1	1	16
HCB7009-E-T-P4S	0,23	**45**	75	16	1	1	22
HCB7209-C-T-P4S	0,41	**45**	85	19	1,1	1,1	18
HCB7209-E-T-P4S	0,41	**45**	85	19	1,1	1,1	25
HCB71910-C-T-P4S	0,13	**50**	72	12	0,6	0,6	14
HCB71910-E-T-P4S	0,13	**50**	72	12	0,6	0,6	20
HCB7010-C-T-P4S	0,25	**50**	80	16	1	1	17
HCB7010-E-T-P4S	0,25	**50**	80	16	1	1	23
HCB7210-C-T-P4S	0,46	**50**	90	20	1,1	1,1	19
HCB7210-E-T-P4S	0,46	**50**	90	20	1,1	1,1	26
HCB71911-C-T-P4S	0,18	**55**	80	13	1	1	16
HCB71911-E-T-P4S	0,18	**55**	80	13	1	1	22
HCB7011-C-T-P4S	0,37	**55**	90	18	1,1	1,1	19
HCB7011-E-T-P4S	0,37	**55**	90	18	1,1	1,1	26
HCB7211-C-T-P4S	0,61	**55**	100	21	1,5	1,5	21
HCB7211-E-T-P4S	0,61	**55**	100	21	1,5	1,5	29



Mounting dimensions

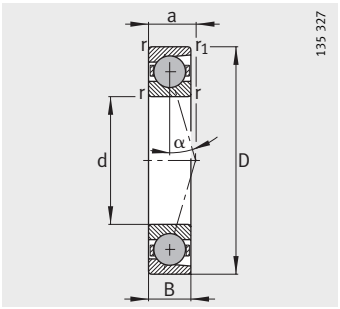


Mounting dimensions

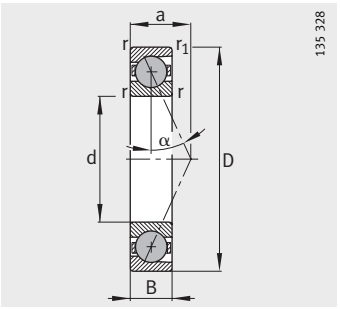
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	
d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G grease min^{-1}	n_G oil min^{-1}
34	43,5	0,3	0,3	5 900	4 600	340	36 000	53 000
34	43,5	0,3	0,3	5 600	4 350	320	32 000	48 000
36	49	1	0,3	10 400	7 200	530	32 000	48 000
36	49	1	0,3	9 900	6 800	510	28 000	43 000
37,5	54,5	1	1	15 900	10 200	1 090	30 000	45 000
37,5	54,5	1	1	15 200	9 800	1 040	26 000	40 000
40	51,5	0,6	0,6	8 100	6 600	495	32 000	48 000
40	51,5	0,6	0,6	7 700	6 300	470	26 000	40 000
41	56	1	0,3	13 200	9 500	700	28 000	43 000
41	56	1	0,3	12 600	9 100	670	24 000	38 000
44	63	1	1	17 600	12 500	1 330	26 000	40 000
44	63	1	1	16 800	11 900	1 270	22 000	36 000
45	58,5	0,6	0,6	12 100	9 600	720	28 000	43 000
45	58,5	0,6	0,6	11 500	9 100	680	24 000	38 000
46	62	1	0,3	14 200	11 100	820	26 000	40 000
46	62	1	0,3	13 500	10 500	780	22 000	36 000
48	72	1	1	22 100	15 600	1 170	24 000	38 000
48	72	1	1	21 100	14 900	1 120	20 000	34 000
50	63,5	0,6	0,6	12 800	10 900	820	24 000	38 000
50	63,5	0,6	0,6	12 100	10 300	770	22 000	36 000
51	69	1	0,3	19 100	14 700	1 090	24 000	38 000
51	69	1	0,3	18 100	14 000	1 030	20 000	34 000
52,5	78	1	1	23 200	17 200	1 290	22 000	36 000
52,5	78	1	1	22 100	16 400	1 230	18 000	30 000
55	67,5	0,6	0,6	13 100	11 600	870	22 000	36 000
55	67,5	0,6	0,6	12 300	11 000	820	20 000	34 000
56	74	1	0,3	19 700	15 900	1 170	22 000	36 000
56	74	1	0,3	18 700	15 200	1 120	18 000	30 000
57	83	1	1	29 500	22 100	1 630	20 000	34 000
57	83	1	1	28 000	21 100	1 560	17 000	28 000
60	75,5	0,6	0,6	15 800	14 300	1 050	20 000	34 000
60	75,5	0,6	0,6	14 900	13 500	1 000	18 000	30 000
62	83	1	0,6	26 000	21 500	1 610	19 000	32 000
62	83	1	0,6	24 800	20 400	1 530	17 000	28 000
63	92	1,5	1,5	32 000	26 000	1 910	18 000	30 000
63	92	1,5	1,5	30 500	24 700	1 820	15 000	24 000

Spindle bearings

With ceramic balls



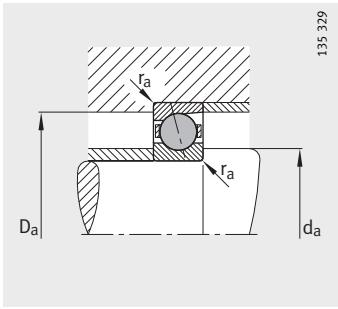
HCB719..-C, HCB70..-C,
HCB72..-C
$\alpha = 15°$



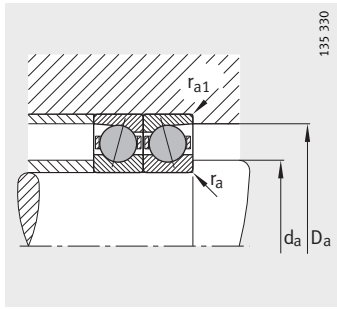
HCB719..-E, HCB70..-E,
HCB72..-E
$\alpha = 25°$

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions					
	m	d	D	B	r	r_1	a
	≈kg				min.	min.	≈
HCB71912-C-T-P4S	0,19	**60**	85	13	1	1	16
HCB71912-E-T-P4S	0,19	**60**	85	13	1	1	23
HCB7012-C-T-P4S	0,4	**60**	95	18	1,1	1,1	19
HCB7012-E-T-P4S	0,4	**60**	95	18	1,1	1,1	27
HCB7212-C-T-P4S	0,8	**60**	110	22	1,5	1,5	23
HCB7212-E-T-P4S	0,8	**60**	110	22	1,5	1,5	31
HCB71913-C-T-P4S	0,2	**65**	90	13	1	1	17
HCB71913-E-T-P4S	0,2	**65**	90	13	1	1	25
HCB7013-C-T-P4S	0,42	**65**	100	18	1,1	1,1	20
HCB7013-E-T-P4S	0,42	**65**	100	18	1,1	1,1	28
HCB7213-C-T-P4S	1,02	**65**	120	23	1,5	1,5	24
HCB7213-E-T-P4S	1,02	**65**	120	23	1,5	1,5	33
HCB71914-C-T-P4S	0,33	**70**	100	16	1	1	19
HCB71914-E-T-P4S	0,33	**70**	100	16	1	1	28
HCB7014-C-T-P4S	0,59	**70**	110	20	1,1	1,1	22
HCB7014-E-T-P4S	0,59	**70**	110	20	1,1	1,1	31
HCB7214-C-T-P4S	1,12	**70**	125	24	1,5	1,5	25
HCB7214-E-T-P4S	1,12	**70**	125	24	1,5	1,5	35
HCB71915-C-T-P4S	0,35	**75**	105	16	1	1	20
HCB71915-E-T-P4S	0,35	**75**	105	16	1	1	29
HCB7015-C-T-P4S	0,62	**75**	115	20	1,1	1,1	23
HCB7015-E-T-P4S	0,62	**75**	115	20	1,1	1,1	32
HCB7215-C-T-P4S	1,21	**75**	130	25	1,5	1,5	26
HCB7215-E-T-P4S	1,21	**75**	130	25	1,5	1,5	36
HCB71916-C-T-P4S	0,37	**80**	110	16	1	1	21
HCB71916-E-T-P4S	0,37	**80**	110	16	1	1	30
HCB7016-C-T-P4S	0,84	**80**	125	22	1,1	1,1	25
HCB7016-E-T-P4S	0,84	**80**	125	22	1,1	1,1	35
HCB71917-C-T-P4S	0,53	**85**	120	18	1,1	1,1	23
HCB71917-E-T-P4S	0,53	**85**	120	18	1,1	1,1	33
HCB7017-C-T-P4S	0,88	**85**	130	22	1,1	1,1	25
HCB7017-E-T-P4S	0,88	**85**	130	22	1,1	1,1	36
HCB71918-C-T-P4S	0,55	**90**	125	18	1,1	1,1	23
HCB71918-E-T-P4S	0,55	**90**	125	18	1,1	1,1	34
HCB7018-C-T-P4S	1,15	**90**	140	24	1,5	1,5	27
HCB7018-E-T-P4S	1,15	**90**	140	24	1,5	1,5	39



Mounting dimensions

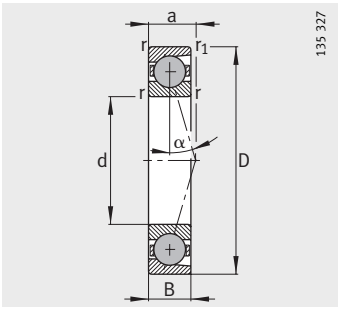


Mounting dimensions

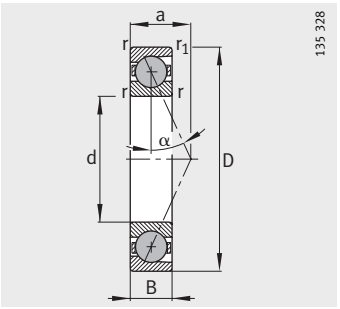
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	
d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G grease min^{-1}	n_G oil min^{-1}
65	80,5	0,6	0,6	16 600	15 800	1 170	19 000	32 000
65	80,5	0,6	0,6	15 600	15 000	1 100	17 000	28 000
67	88	1	0,6	27 000	23 100	1 730	18 000	30 000
67	88	1	0,6	25 500	21 900	1 650	15 000	24 000
69,5	101,5	1,5	1,5	38 000	30 500	2 260	16 000	26 000
69,5	101,5	1,5	1,5	36 000	29 000	2 150	14 000	22 000
70	85,5	0,6	0,6	16 800	16 700	1 230	18 000	30 000
70	85,5	0,6	0,6	15 900	15 800	1 160	15 000	24 000
72	93	1	0,6	27 500	24 700	1 850	17 000	28 000
72	93	1	0,6	26 000	23 500	1 760	15 000	24 000
75,5	109,5	1,5	1,5	46 000	37 500	2 800	15 000	24 000
75,5	109,5	1,5	1,5	44 000	36 000	2 650	13 000	20 000
76	94,5	0,6	0,6	23 100	22 700	1 670	16 000	26 000
76	94,5	0,6	0,6	21 800	21 500	1 580	14 000	22 000
77	102	1	0,6	34 000	30 000	2 230	16 000	26 000
77	102	1	0,6	32 500	29 000	2 120	13 000	20 000
80	115	1,5	1,5	48 000	40 500	3 000	14 000	22 000
80	115	1,5	1,5	45 500	38 500	2 900	12 000	19 000
81	99,5	0,6	0,6	23 500	23 900	1 760	16 000	26 000
81	99,5	0,6	0,6	22 200	22 700	1 670	13 000	20 000
82	107	1	0,6	35 000	32 500	2 380	15 000	24 000
82	107	1	0,6	33 500	30 500	2 260	13 000	20 000
85	120	1,5	1,5	49 500	43 500	3 200	14 000	22 000
85	120	1,5	1,5	47 000	41 500	3 050	12 000	19 000
86	104	0,6	0,6	23 900	25 000	1 850	15 000	24 000
86	104	0,6	0,6	22 500	23 700	1 750	13 000	20 000
88	117	1	0,6	44 000	40 500	2 950	14 000	22 000
88	117	1	0,6	41 500	38 500	2 800	12 000	19 000
92	114	0,6	0,6	31 000	32 500	2 400	13 000	20 000
92	114	0,6	0,6	29 500	30 500	2 270	12 000	19 000
93	122	1	0,6	45 000	43 000	3 050	13 000	20 000
93	122	1	0,6	42 500	41 000	2 900	11 000	18 000
97	119	0,6	0,6	31 500	34 000	2 460	13 000	20 000
97	119	0,6	0,6	30 000	32 000	2 330	11 000	18 000
100	131	1,5	0,6	53 000	50 000	3 450	12 000	19 000
100	131	1,5	0,6	50 000	47 500	3 300	10 000	17 000

Spindle bearings

With ceramic balls



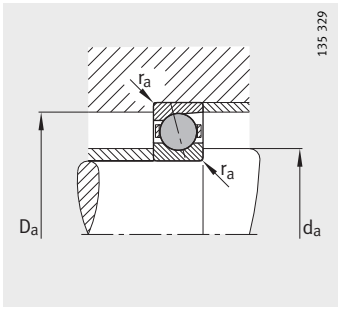
HCB719..-C, HCB70..-C,
$\alpha = 15°$



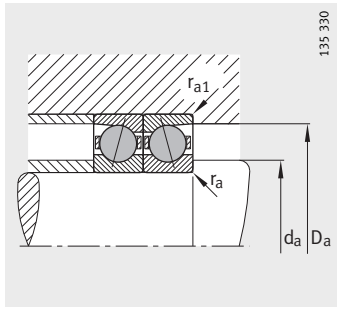
HCB719..-E, HCB70..-E,
$\alpha = 25°$

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions					
	m	d	D	B	r	r_1	a
	≈kg				min.	min.	≈
HCB71919-C-T-P4S	0,58	**95**	130	18	1,1	1,1	24
HCB71919-E-T-P4S	0,58	**95**	130	18	1,1	1,1	35
HCB7019-C-T-P4S	1,2	**95**	145	24	1,5	1,5	28
HCB7019-E-T-P4S	1,2	**95**	145	24	1,5	1,5	40
HCB71920-C-T-P4S	0,79	**100**	140	20	1,1	1,1	26
HCB71920-E-T-P4S	0,79	**100**	140	20	1,1	1,1	38
HCB7020-C-T-P4S	1,25	**100**	150	24	1,5	1,5	29
HCB7020-E-T-P4S	1,25	**100**	150	24	1,5	1,5	41
HCB71921-C-T-P4S	0,82	**105**	145	20	1,1	1,1	27
HCB71921-E-T-P4S	0,82	**105**	145	20	1,1	1,1	39
HCB7021-C-T-P4S	1,49	**105**	160	26	2	2	31
HCB7021-E-T-P4S	1,49	**105**	160	26	2	2	44
HCB71922-C-T-P4S	0,85	**110**	150	20	1,1	1,1	27
HCB71922-E-T-P4S	0,85	**110**	150	20	1,1	1,1	40
HCB7022-C-T-P4S	1,95	**110**	170	28	2	2	33
HCB7022-E-T-P4S	1,95	**110**	170	28	2	2	47
HCB71924-C-T-P4S	1,12	**120**	165	22	1,1	1,1	30
HCB71924-E-T-P4S	1,12	**120**	165	22	1,1	1,1	44
HCB7024-C-T-P4S	2,12	**120**	180	28	2	2	34
HCB7024-E-T-P4S	2,12	**120**	180	28	2	2	49
HCB71926-C-T-P4S	1,49	**130**	180	24	1,5	1,5	33
HCB71926-E-T-P4S	1,49	**130**	180	24	1,5	1,5	48
HCB7026-C-T-P4S	3,21	**130**	200	33	2	2	39
HCB7026-E-T-P4S	3,21	**130**	200	33	2	2	55
HCB71928-C-T-P4S	1,65	**140**	190	24	1,5	1,5	34
HCB71928-E-T-P4S	1,65	**140**	190	24	1,5	1,5	50
HCB7028-C-T-P4S	3,34	**140**	210	33	2	2	40
HCB7028-E-T-P4S	3,34	**140**	210	33	2	2	57



Mounting dimensions

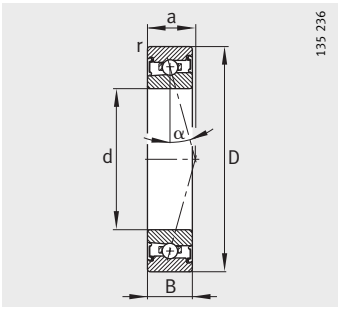


Mounting dimensions

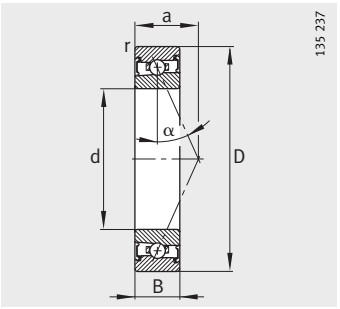
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	
d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G grease min^{-1}	n_G oil min^{-1}
102	124	0,6	0,6	32 000	35 500	2 500	12 000	19 000
102	124	0,6	0,6	30 500	33 500	2 380	10 000	17 000
105	136	1,5	0,6	54 000	53 000	3 600	11 000	18 000
105	136	1,5	0,6	51 000	51 000	3 450	9 500	16 000
107	133	0,6	0,6	40 500	44 500	2 950	11 000	18 000
107	133	0,6	0,6	38 000	42 000	2 800	9 500	16 000
110	141	1,5	0,6	56 000	56 000	3 750	11 000	18 000
110	141	1,5	0,6	53 000	53 000	3 550	9 000	15 000
112	138	0,6	0,6	40 000	44 500	2 950	11 000	18 000
112	138	0,6	0,6	38 000	42 000	2 800	9 000	15 000
116	150	2	1	57 000	60 000	3 850	10 000	17 000
116	150	2	1	54 000	57 000	3 650	8 500	14 000
117	143	0,6	0,6	41 000	46 500	3 000	10 000	17 000
117	143	0,6	0,6	38 500	43 500	2 850	9 000	15 000
121	159	2	1	76 000	76 000	4 750	9 500	16 000
121	159	2	1	72 000	72 000	4 500	8 000	13 000
128	157	0,6	0,6	51 000	59 000	3 600	9 000	15 000
128	157	0,6	0,6	48 000	55 000	3 450	8 000	13 000
131	169	2	1	77 000	81 000	4 900	8 500	14 000
131	169	2	1	73 000	77 000	4 650	7 500	12 000
139	171	0,6	0,6	60 000	70 000	4 100	8 500	14 000
139	171	0,6	0,6	46 000	53 000	3 200	7 000	11 000
142	189	2	1	100 000	104 000	6 100	7 500	12 000
142	189	2	1	95 000	99 000	5 800	6 700	10 000
149	181	0,6	0,6	62 000	76 000	4 350	7 500	12 000
149	181	0,6	0,6	47 500	57 000	3 350	6 700	10 000
152	199	2	1	102 000	110 000	6 300	7 000	11 000
152	199	2	1	97 000	105 000	5 900	6 300	9 500

High speed spindle bearings

With steel balls
Sealed



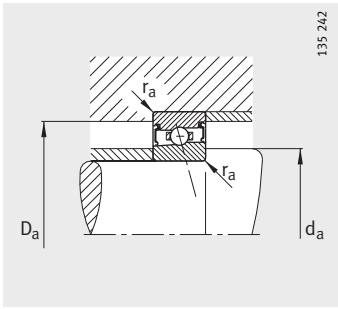
HSS719..-C, HSS70..-C
$\alpha = 15°$



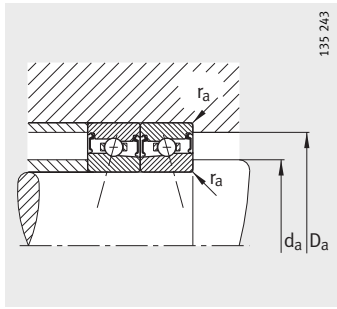
HSS719..-E, HSS70..-E
$\alpha = 25°$

Dimension table · Dimensions in mm

Designation	Mass	Dimensions				
	m	d	D	B	r	a
	≈kg				min.	≈
HSS71900-C-T-P4S	0,01	**10**	22	6	0,3	5
HSS71900-E-T-P4S	0,01	**10**	22	6	0,3	7
HSS7000-C-T-P4S	0,02	**10**	26	8	0,3	6
HSS7000-E-T-P4S	0,02	**10**	26	8	0,3	8
HSS71901-C-T-P4S	0,01	**12**	24	6	0,3	5
HSS71901-E-T-P4S	0,01	**12**	24	6	0,3	7
HSS7001-C-T-P4S	0,022	**12**	28	8	0,3	7
HSS7001-E-T-P4S	0,022	**12**	28	8	0,3	9
HSS71902-C-T-P4S	0,015	**15**	28	7	0,3	6
HSS71902-E-T-P4S	0,015	**15**	28	7	0,3	9
HSS7002-C-T-P4S	0,033	**15**	32	9	0,3	8
HSS7002-E-T-P4S	0,033	**15**	32	9	0,3	10
HSS71903-C-T-P4S	0,017	**17**	30	7	0,3	7
HSS71903-E-T-P4S	0,017	**17**	30	7	0,3	9
HSS7003-C-T-P4S	0,044	**17**	35	10	0,3	9
HSS7003-E-T-P4S	0,044	**17**	35	10	0,3	11
HSS71904-C-T-P4S	0,041	**20**	37	9	0,3	8
HSS71904-E-T-P4S	0,041	**20**	37	9	0,3	11
HSS7004-C-T-P4S	0,074	**20**	42	12	0,6	10
HSS7004-E-T-P4S	0,074	**20**	42	12	0,6	13
HSS71905-C-T-P4S	0,047	**25**	42	9	0,3	9
HSS71905-E-T-P4S	0,047	**25**	42	9	0,3	12
HSS7005-C-T-P4S	0,085	**25**	47	12	0,6	11
HSS7005-E-T-P4S	0,085	**25**	47	12	0,6	14
HSS71906-C-T-P4S	0,047	**30**	47	9	0,3	10
HSS71906-E-T-P4S	0,047	**30**	47	9	0,3	14
HSS7006-C-T-P4S	0,121	**30**	55	13	1	12
HSS7006-E-T-P4S	0,121	**30**	55	13	1	16
HSS71907-C-T-P4S	0,076	**35**	55	10	0,6	11
HSS71907-E-T-P4S	0,076	**35**	55	10	0,6	16
HSS7007-C-T-P4S	0,166	**35**	62	14	1	14
HSS7007-E-T-P4S	0,166	**35**	62	14	1	18
HSS71908-C-T-P4S	0,122	**40**	62	12	0,6	13
HSS71908-E-T-P4S	0,122	**40**	62	12	0,6	18
HSS7008-C-T-P4S	0,208	**40**	68	15	1	15
HSS7008-E-T-P4S	0,208	**40**	68	15	1	20



Mounting dimensions

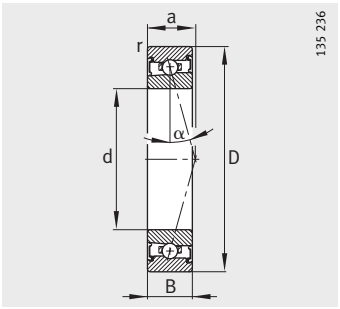


Mounting dimensions

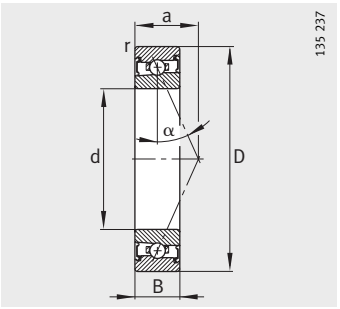
Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed
d_a h12	D_a H12	r_a max.	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G grease min^{-1}
13	19,5	0,3	1 960	1 100	67	90 000
13	19,5	0,3	1 860	1 040	64	75 000
14	22	0,3	2 750	1 600	97	80 000
14	22	0,3	2 600	1 500	92	67 000
15	21,5	0,3	2 040	1 200	74	80 000
15	21,5	0,3	1 930	1 140	71	67 000
16,5	24,5	0,3	2 700	1 630	99	70 000
16,5	24,5	0,3	2 550	1 530	94	60 000
18	25,5	0,3	2 800	1 760	107	67 000
18	25,5	0,3	2 650	1 660	102	56 000
19	29	0,3	3 750	2 450	152	60 000
19	29	0,3	3 550	2 320	145	50 000
20	27,5	0,3	2 900	1 900	116	60 000
20	27,5	0,3	2 700	1 800	110	50 000
21	32	0,3	3 800	2 650	165	53 000
21	32	0,3	3 650	2 500	157	45 000
24	33,5	0,3	3 900	2 850	178	50 000
24	33,5	0,3	3 750	2 700	168	43 000
25	37	0,6	6 200	4 550	280	45 000
25	37	0,6	5 850	4 300	265	38 000
29	38,5	0,3	4 250	3 350	212	43 000
29	38,5	0,3	4 000	3 150	201	36 000
30	42	0,6	6 300	4 900	305	38 000
30	42	0,6	6 000	4 650	285	34 000
34	43,5	0,3	6 400	5 200	320	36 000
34	43,5	0,3	6 000	4 900	305	32 000
36	49	1	8 800	7 100	435	32 000
36	49	1	8 300	6 700	415	28 000
40	51,5	0,6	6 950	6 200	390	32 000
40	51,5	0,6	6 550	5 850	370	26 000
41	56	1	9 300	8 300	510	28 000
41	56	1	8 800	7 800	485	24 000
45	58,5	0,6	7 200	6 950	445	28 000
45	58,5	0,6	6 800	6 400	420	24 000
46	62	1	10 000	9 300	590	26 000
46	62	1	9 300	8 650	560	22 000

High speed spindle bearings

With steel balls
Sealed



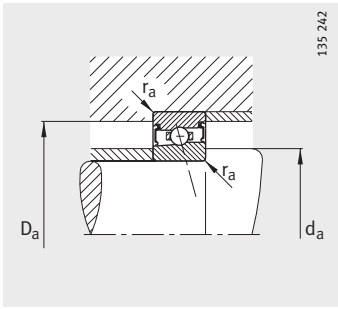
HSS719..-C, HSS70..-C
$\alpha = 15°$



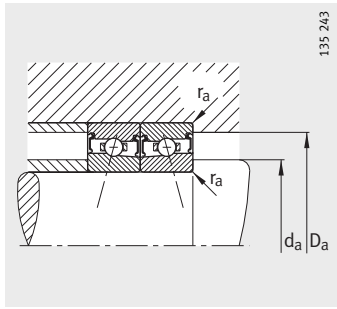
HSS719..-E, HSS70..-E
$\alpha = 25°$

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions				
	m	d	D	B	r	a
	≈kg				min.	≈
HSS71909-C-T-P4S	0,132	**45**	68	12	0,6	14
HSS71909-E-T-P4S	0,132	**45**	68	12	0,6	19
HSS7009-C-T-P4S	0,273	**45**	75	16	1	16
HSS7009-E-T-P4S	0,272	**45**	75	16	1	22
HSS71910-C-T-P4S	0,133	**50**	72	12	0,6	14
HSS71910-E-T-P4S	0,133	**50**	72	12	0,6	20
HSS7010-C-T-P4S	0,296	**50**	80	16	1	17
HSS7010-E-T-P4S	0,295	**50**	80	16	1	23
HSS71911-C-T-P4S	0,198	**55**	80	13	1	16
HSS71911-E-T-P4S	0,198	**55**	80	13	1	22
HSS7011-C-T-P4S	0,411	**55**	90	18	1,1	19
HSS7011-E-T-P4S	0,41	**55**	90	18	1,1	26
HSS71912-C-T-P4S	0,22	**60**	85	13	1	16
HSS71912-E-T-P4S	0,22	**60**	85	13	1	23
HSS7012-C-T-P4S	0,453	**60**	95	18	1,1	19
HSS7012-E-T-P4S	0,453	**60**	95	18	1,1	27
HSS71913-C-T-P4S	0,226	**65**	90	13	1	17
HSS71913-E-T-P4S	0,226	**65**	90	13	1	25
HSS7013-C-T-P4S	0,468	**65**	100	18	1,1	20
HSS7013-E-T-P4S	0,468	**65**	100	18	1,1	28
HSS71914-C-T-P4S	0,354	**70**	100	16	1	19
HSS71914-E-T-P4S	0,353	**70**	100	16	1	28
HSS7014-C-T-P4S	0,644	**70**	110	20	1,1	22
HSS7014-E-T-P4S	0,643	**70**	110	20	1,1	31
HSS71915-C-T-P4S	0,38	**75**	105	16	1	20
HSS71915-E-T-P4S	0,379	**75**	105	16	1	29
HSS7015-C-T-P4S	0,68	**75**	115	20	1,1	23
HSS7015-E-T-P4S	0,679	**75**	115	20	1,1	32
HSS71916-C-T-P4S	0,385	**80**	110	16	1	21
HSS71916-E-T-P4S	0,385	**80**	110	16	1	30
HSS7016-C-T-P4S	0,931	**80**	125	22	1,1	25
HSS7016-E-T-P4S	0,929	**80**	125	22	1,1	35
HSS71917-C-T-P4S	0,58	**85**	120	18	1,1	23
HSS71917-E-T-P4S	0,579	**85**	120	18	1,1	33
HSS7017-C-T-P4S	0,975	**85**	130	22	1,1	25
HSS7017-E-T-P4S	0,974	**85**	130	22	1,1	36



Mounting dimensions

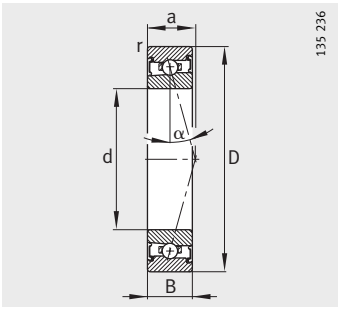


Mounting dimensions

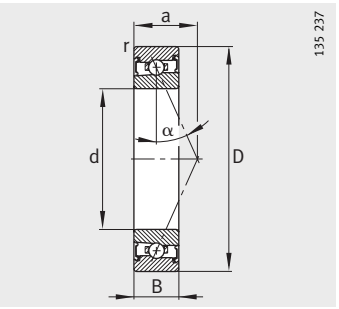
Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed
d_a h12	D_a H12	r_a max.	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G grease min^{-1}
50	63,5	0,6	10 000	9 650	610	24 000
50	63,5	0,6	9 500	9 000	580	22 000
51	69	1	12 900	12 200	770	24 000
51	69	1	12 200	11 400	730	20 000
55	67,5	0,6	10 400	10 200	670	22 000
55	67,5	0,6	9 800	9 650	630	20 000
56	74	1	13 400	13 200	840	22 000
56	74	1	12 500	12 200	790	18 000
60	75,5	0,6	13 400	13 700	870	20 000
60	75,5	0,6	12 700	12 700	830	18 000
62	83	1	18 600	19 000	1 180	19 000
62	83	1	17 600	17 600	1 120	17 000
65	80,5	0,6	14 000	14 600	940	19 000
65	80,5	0,6	13 200	13 400	890	17 000
67	88	1	19 300	20 000	1 280	18 000
67	88	1	18 300	19 000	1 210	15 000
70	85,5	0,6	14 300	15 300	1 010	18 000
70	85,5	0,6	13 400	14 300	960	15 000
72	93	1	20 000	21 600	1 380	17 000
72	93	1	19 000	20 000	1 310	15 000
76	94,5	0,6	18 300	20 000	1 330	16 000
76	94,5	0,6	17 300	18 600	1 250	14 000
77	102	1	26 000	28 000	1 770	16 000
77	102	1	24 500	26 000	1 670	13 000
81	99,5	0,6	19 000	21 200	1 420	16 000
81	99,5	0,6	17 600	20 000	1 340	13 000
82	107	1	26 500	29 000	1 850	15 000
82	107	1	25 000	27 000	1 740	13 000
86	104	0,6	21 200	24 000	1 590	15 000
86	104	0,6	19 600	22 400	1 500	13 000
88	117	1	31 500	34 500	2 220	14 000
88	117	1	30 000	32 500	2 100	12 000
92	114	0,6	22 000	26 000	1 720	14 000
92	114	0,6	20 400	24 500	1 630	12 000
93	122	1	32 000	36 000	2 250	13 000
93	122	1	30 000	33 500	2 130	11 000

High speed spindle bearings

With steel balls
Sealed



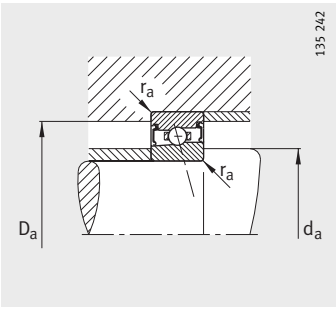
HSS719..-C, HSS70..-C
$\alpha = 15°$



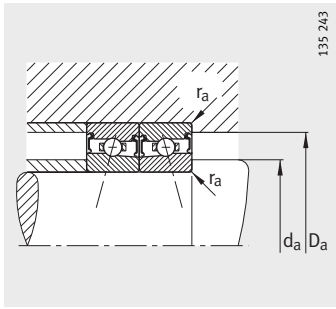
HSS719..-E, HSS70..-E
$\alpha = 25°$

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions				
	m	d	D	B	r	a
	≈kg				min.	≈
HSS71918-C-T-P4S	0,589	**90**	125	18	1,1	23
HSS71918-E-T-P4S	0,588	**90**	125	18	1,1	34
HSS7018-C-T-P4S	1,28	**90**	140	24	1,5	27
HSS7018-E-T-P4S	1,27	**90**	140	24	1,5	39
HSS71919-C-T-P4S	0,615	**95**	130	18	1,1	24
HSS71919-E-T-P4S	0,614	**95**	130	18	1,1	35
HSS7019-C-T-P4S	1,33	**95**	145	24	1,5	28
HSS7019-E-T-P4S	1,33	**95**	145	24	1,5	40
HSS71920-C-T-P4S	0,861	**100**	140	20	1,1	26
HSS71920-E-T-P4S	0,859	**100**	140	20	1,1	38
HSS7020-C-T-P4S	1,39	**100**	150	24	1,5	29
HSS7020-E-T-P4S	1,38	**100**	150	24	1,5	41
HSS71921-C-T-P4S	0,897	**105**	145	20	1,1	27
HSS71921-E-T-P4S	0,87	**105**	145	20	1,1	39
HSS7021-C-T-P4S	1,71	**105**	160	26	2	31
HSS7021-E-T-P4S	1,71	**105**	160	26	2	44
HSS71922-C-T-P4S	0,933	**110**	150	20	1,1	27
HSS71922-E-T-P4S	0,932	**110**	150	20	1,1	40
HSS7022-C-T-P4S	2,17	**110**	170	28	2	33
HSS7022-E-T-P4S	2,17	**110**	170	28	2	47
HSS71924-C-T-P4S	1,3	**120**	165	22	1,1	30
HSS71924-E-T-P4S	1,3	**120**	165	22	1,1	44
HSS7024-C-T-P4S	2,33	**120**	180	28	2	34
HSS7024-E-T-P4S	2,33	**120**	180	28	2	49
HSS71926-C-T-P4S	1,71	**130**	180	24	1,5	33
HSS71926-E-T-P4S	1,71	**130**	180	24	1,5	48
HSS7026-C-T-P4S	3,52	**130**	200	33	2	39
HSS7026-E-T-P4S	3,51	**130**	200	33	2	55



Mounting dimensions

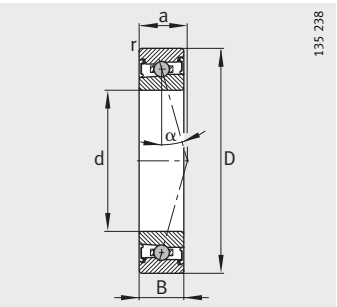


Mounting dimensions

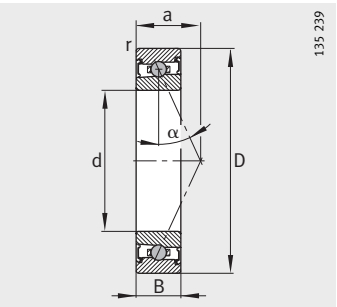
Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed
d_a h12	D_a H12	r_a max.	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G grease min^{-1}
97	119	0,6	23 600	28 500	1 860	13 000
97	119	0,6	22 400	26 500	1 750	11 000
100	131	1,5	37 500	43 000	2 550	12 000
100	131	1,5	35 500	40 000	2 410	10 000
102	124	0,6	24 500	30 000	1 930	12 000
102	124	0,6	22 800	28 000	1 820	10 000
105	136	1,5	38 000	44 000	2 600	11 000
105	136	1,5	35 500	41 500	2 450	9 500
107	133	0,6	29 000	36 000	2 200	11 000
107	133	0,6	27 500	33 500	2 080	9 500
110	141	1,5	38 000	45 500	2 650	11 000
110	141	1,5	36 000	42 500	2 490	9 000
112	138	0,6	30 000	38 000	2 280	11 000
112	138	0,6	28 000	35 500	2 150	9 000
116	150	2	49 000	58 500	3 250	10 000
116	150	2	46 500	54 000	3 050	8 500
117	143	0,6	34 500	44 000	2 550	10 000
117	143	0,6	32 500	40 500	2 430	9 000
121	159	2	50 000	60 000	3 300	9 500
121	159	2	46 500	56 000	3 100	8 000
128	157	0,6	36 500	48 000	2 750	9 000
128	157	0,6	34 000	45 000	2 600	8 000
131	169	2	51 000	63 000	3 400	8 500
131	169	2	48 000	58 500	3 200	7 500
139	171	0,6	41 500	56 000	3 000	8 500
139	171	0,6	39 000	52 000	2 850	7 000
142	189	2	65 500	83 000	4 250	7 500
142	189	2	62 000	78 000	4 000	6 700

High speed spindle bearings

With ceramic balls
Sealed



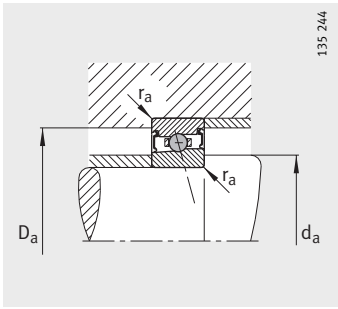
HCS719..-C, HCS70..-C
$\alpha = 15°$



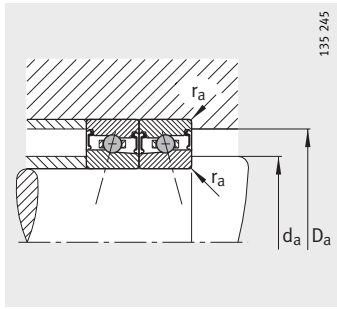
HCS719..-E, HCS70..-E
$\alpha = 25°$

Dimension table · Dimensions in mm

Designation	Mass	Dimensions				
	m	d	D	B	r	a
	≈kg				min.	≈
HCS71900-C-T-P4S	0,01	**10**	22	6	0,3	5
HCS71900-E-T-P4S	0,009	**10**	22	6	0,3	7
HCS7000-C-T-P4S	0,02	**10**	26	8	0,3	6
HCS7000-E-T-P4S	0,02	**10**	26	8	0,3	8
HCS71901-C-T-P4S	0,01	**12**	24	6	0,3	5
HCS71901-E-T-P4S	0,01	**12**	24	6	0,3	7
HCS7001-C-T-P4S	0,022	**12**	28	8	0,3	7
HCS7001-E-T-P4S	0,022	**12**	28	8	0,3	9
HCS71902-C-T-P4S	0,015	**15**	28	7	0,3	6
HCS71902-E-T-P4S	0,015	**15**	28	7	0,3	9
HCS7002-C-T-P4S	0,033	**15**	32	9	0,3	8
HCS7002-E-T-P4S	0,033	**15**	32	9	0,3	10
HCS71903-C-T-P4S	0,017	**17**	30	7	0,3	7
HCS71903-E-T-P4S	0,017	**17**	30	7	0,3	9
HCS7003-C-T-P4S	0,044	**17**	35	10	0,3	9
HCS7003-E-T-P4S	0,044	**17**	35	10	0,3	11
HCS71904-C-T-P4S	0,041	**20**	37	9	0,3	8
HCS71904-E-T-P4S	0,041	**20**	37	9	0,3	11
HCS7004-C-T-P4S	0,074	**20**	42	12	0,6	10
HCS7004-E-T-P4S	0,074	**20**	42	12	0,6	13
HCS71905-C-T-P4S	0,047	**25**	42	9	0,3	9
HCS71905-E-T-P4S	0,047	**25**	42	9	0,3	12
HCS7005-C-T-P4S	0,085	**25**	47	12	0,6	11
HCS7005-E-T-P4S	0,085	**25**	47	12	0,6	14
HCS71906-C-T-P4S	0,047	**30**	47	9	0,3	10
HCS71906-E-T-P4S	0,047	**30**	47	9	0,3	14
HCS7006-C-T-P4S	0,123	**30**	55	13	1	12
HCS7006-E-T-P4S	0,123	**30**	55	13	1	16
HCS71907-C-T-P4S	0,076	**35**	55	10	0,6	11
HCS71907-E-T-P4S	0,076	**35**	55	10	0,6	16
HCS7007-C-T-P4S	0,168	**35**	62	14	1	14
HCS7007-E-T-P4S	0,168	**35**	62	14	1	18
HCS71908-C-T-P4S	0,122	**40**	62	12	0,6	13
HCS71908-E-T-P4S	0,122	**40**	62	12	0,6	18
HCS7008-C-T-P4S	0,211	**40**	68	15	1	15
HCS7008-E-T-P4S	0,211	**40**	68	15	1	20



Mounting dimensions

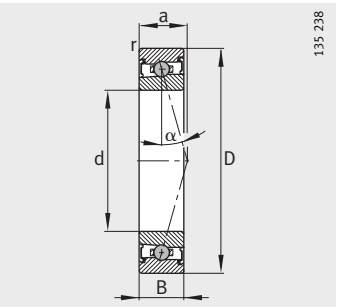


Mounting dimensions

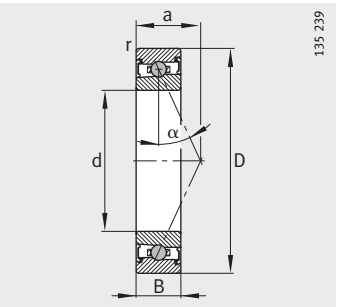
Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed
d_a h12	D_a H12	r_a max.	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G grease min^{-1}
13	19,5	0,3	1 360	760	47,5	100 000
13	19,5	0,3	1 290	720	45,5	85 000
14	22	0,3	1 900	1 100	68	90 000
14	22	0,3	1 800	1 050	65	75 000
15	21,5	0,3	1 410	840	53	90 000
15	21,5	0,3	1 330	800	50	75 000
16,5	24,5	0,3	1 870	1 130	70	80 000
16,5	24,5	0,3	1 770	1 070	67	70 000
18	25,5	0,3	1 940	1 230	76	75 000
18	25,5	0,3	1 830	1 170	72	63 000
19	29	0,3	2 600	1 700	108	70 000
19	29	0,3	2 450	1 610	103	60 000
20	27,5	0,3	1 990	1 330	82	70 000
20	27,5	0,3	1 880	1 260	78	60 000
21	32	0,3	2 650	1 840	117	63 000
21	32	0,3	2 500	1 740	111	53 000
24	33,5	0,3	2 700	1 980	126	56 000
24	33,5	0,3	2 550	1 870	119	48 000
25	37	0,6	4 300	3 200	198	53 000
25	37	0,6	4 100	3 000	188	45 000
29	38,5	0,3	2 900	2 360	150	48 000
29	38,5	0,3	2 750	2 200	142	40 000
30	42	0,6	4 350	3 450	214	45 000
30	42	0,6	4 100	3 250	203	38 000
34	43,5	0,3	4 400	3 650	227	43 000
34	43,5	0,3	4 150	3 450	215	36 000
36	49	1	6 000	4 950	310	38 000
36	49	1	5 700	4 700	295	32 000
40	51,5	0,6	4 800	4 350	275	36 000
40	51,5	0,6	4 500	4 050	260	30 000
41	56	1	6 500	5 800	365	34 000
41	56	1	6 100	5 400	345	28 000
45	58,5	0,6	5 000	4 800	315	32 000
45	58,5	0,6	4 750	4 500	295	28 000
46	62	1	6 800	6 500	415	30 000
46	62	1	6 400	6 100	395	26 000

High speed spindle bearings

With ceramic balls
Sealed



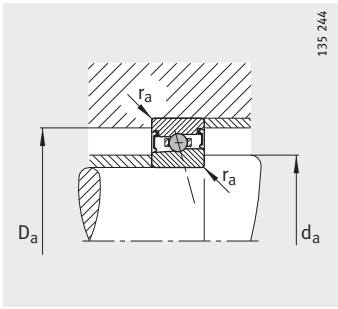
HCS719..-C, HCS70..-C
$\alpha = 15°$



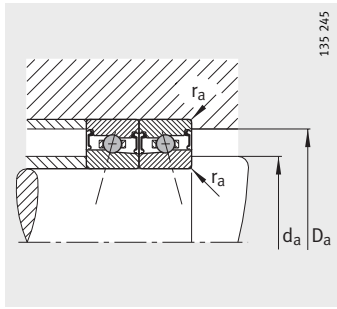
HCS719..-E, HCS70..-E
$\alpha = 25°$

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions				
	m	d	D	B	r	a
	≈kg				min.	≈
HCS71909-C-T-P4S	0,135	**45**	68	12	0,6	14
HCS71909-E-T-P4S	0,135	**45**	68	12	0,6	19
HCS7009-C-T-P4S	0,248	**45**	75	16	1	16
HCS7009-E-T-P4S	0,247	**45**	75	16	1	22
HCS71910-C-T-P4S	0,136	**50**	72	12	0,6	14
HCS71910-E-T-P4S	0,136	**50**	72	12	0,6	20
HCS7010-C-T-P4S	0,269	**50**	80	16	1	17
HCS7010-E-T-P4S	0,268	**50**	80	16	1	23
HCS71911-C-T-P4S	0,17	**55**	80	13	1	16
HCS71911-E-T-P4S	0,17	**55**	80	13	1	22
HCS7011-C-T-P4S	0,348	**55**	90	18	1,1	19
HCS7011-E-T-P4S	0,347	**55**	90	18	1,1	26
HCS71912-C-T-P4S	0,19	**60**	85	13	1	16
HCS71912-E-T-P4S	0,19	**60**	85	13	1	23
HCS7012-C-T-P4S	0,388	**60**	95	18	1,1	19
HCS7012-E-T-P4S	0,388	**60**	95	18	1,1	27
HCS71913-C-T-P4S	0,194	**65**	90	13	1	17
HCS71913-E-T-P4S	0,194	**65**	90	13	1	25
HCS7013-C-T-P4S	0,402	**65**	100	18	1,1	20
HCS7013-E-T-P4S	0,402	**65**	100	18	1,1	28
HCS71914-C-T-P4S	0,322	**70**	100	16	1	19
HCS71914-E-T-P4S	0,321	**70**	100	16	1	28
HCS7014-C-T-P4S	0,611	**70**	110	20	1,1	22
HCS7014-E-T-P4S	0,61	**70**	110	20	1,1	31
HCS71915-C-T-P4S	0,347	**75**	105	16	1	20
HCS71915-E-T-P4S	0,346	**75**	105	16	1	29
HCS7015-C-T-P4S	0,645	**75**	115	20	1,1	23
HCS7015-E-T-P4S	0,644	**75**	115	20	1,1	32
HCS71916-C-T-P4S	0,317	**80**	110	16	1	21
HCS71916-E-T-P4S	0,317	**80**	110	16	1	30
HCS7016-C-T-P4S	0,873	**80**	125	22	1,1	25
HCS7016-E-T-P4S	0,871	**80**	125	22	1,1	35
HCS71917-C-T-P4S	0,512	**85**	120	18	1,1	23
HCS71917-E-T-P4S	0,511	**85**	120	18	1,1	33
HCS7017-C-T-P4S	0,916	**85**	130	22	1,1	25
HCS7017-E-T-P4S	0,915	**85**	130	22	1,1	36



Mounting dimensions

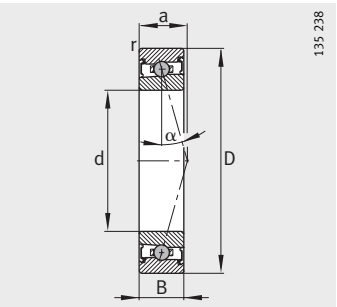


Mounting dimensions

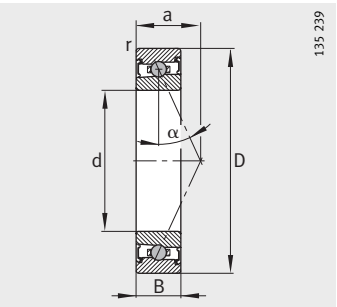
Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed
d_a h12	D_a H12	r_a max.	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G grease min^{-1}
50	63,5	0,6	6 900	6 700	435	28 000
50	63,5	0,6	6 500	6 300	410	24 000
51	69	1	8 900	8 600	550	26 000
51	69	1	8 400	8 000	520	24 000
55	67,5	0,6	7 100	7 200	470	26 000
55	67,5	0,6	6 700	6 700	445	22 000
56	74	1	9 200	9 200	590	24 000
56	74	1	8 700	8 600	560	22 000
60	75,5	0,6	9 300	9 500	620	24 000
60	75,5	0,6	8 800	8 800	590	20 000
62	83	1	13 000	13 200	840	22 000
62	83	1	12 200	12 300	790	19 000
65	80,5	0,6	9 600	10 100	670	22 000
65	80,5	0,6	9 000	9 400	630	19 000
67	88	1	13 400	14 000	910	20 000
67	88	1	12 600	13 100	860	18 000
70	85,5	0,6	9 900	10 700	720	20 000
70	85,5	0,6	9 300	10 000	680	18 000
72	93	1	13 800	15 000	980	20 000
72	93	1	13 000	14 000	930	17 000
76	94,5	0,6	12 700	14 000	940	19 000
76	94,5	0,6	11 900	13 100	890	16 000
77	102	1	18 000	19 500	1 250	18 000
77	102	1	17 000	18 200	1 190	15 000
81	99,5	0,6	13 000	14 800	1 010	18 000
81	99,5	0,6	12 200	13 800	950	15 000
82	107	1	18 200	20 100	1 310	17 000
82	107	1	17 200	18 700	1 240	15 000
86	104	0,6	14 500	16 800	1 130	17 000
86	104	0,6	13 700	15 600	1 060	15 000
88	117	1	21 700	24 300	1 570	16 000
88	117	1	20 500	22 700	1 480	13 000
92	114	0,6	15 100	18 100	1 220	16 000
92	114	0,6	14 200	16 900	1 150	13 000
93	122	1	22 000	25 000	1 590	15 000
93	122	1	20 700	23 400	1 510	13 000

High speed spindle bearings

With ceramic balls
Sealed



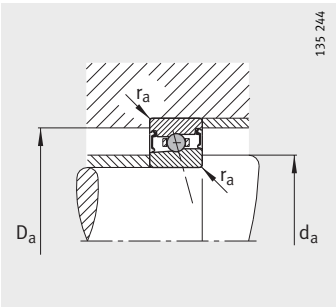
HCS719..-C, HCS70..-C
$\alpha = 15°$



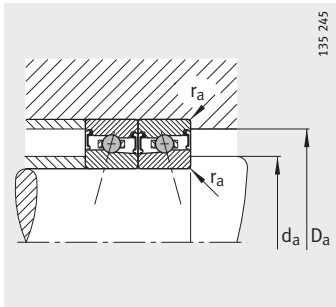
HCS719..-E, HCS70..-E
$\alpha = 25°$

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions				
	m	d	D	B	r	a
	≈kg				min.	≈
HCS71918-C-T-P4S	0,588	**90**	125	18	1,1	23
HCS71918-E-T-P4S	0,587	**90**	125	18	1,1	34
HCS7018-C-T-P4S	1,19	**90**	140	24	1,5	27
HCS7018-E-T-P4S	1,18	**90**	140	24	1,5	39
HCS71919-C-T-P4S	0,615	**95**	130	18	1,1	24
HCS71919-E-T-P4S	0,614	**95**	130	18	1,1	35
HCS7019-C-T-P4S	1,24	**95**	145	24	1,5	28
HCS7019-E-T-P4S	1,24	**95**	145	24	1,5	40
HCS71920-C-T-P4S	0,818	**100**	140	20	1,1	26
HCS71920-E-T-P4S	0,816	**100**	140	20	1,1	38
HCS7020-C-T-P4S	1,29	**100**	150	24	1,5	29
HCS7020-E-T-P4S	1,29	**100**	150	24	1,5	41
HCS71921-C-T-P4S	0,851	**105**	145	20	1,1	27
HCS71921-E-T-P4S	0,85	**105**	145	20	1,1	39
HCS7021-C-T-P4S	1,59	**105**	160	26	2	31
HCS7021-E-T-P4S	1,59	**105**	160	26	2	44
HCS71922-C-T-P4S	0,859	**110**	150	20	1,1	27
HCS71922-E-T-P4S	0,858	**110**	150	20	1,1	40
HCS7022-C-T-P4S	2,05	**110**	170	28	2	33
HCS7022-E-T-P4S	2,05	**110**	170	28	2	47
HCS71924-C-T-P4S	1,22	**120**	165	22	1,1	30
HCS71924-E-T-P4S	1,22	**120**	165	22	1,1	44
HCS7024-C-T-P4S	2,2	**120**	180	28	2	34
HCS7024-E-T-P4S	2,2	**120**	180	28	2	49
HCS71926-C-T-P4S	1,59	**130**	180	24	1,5	33
HCS71926-E-T-P4S	1,59	**130**	180	24	1,5	48
HCS7026-C-T-P4S	3,52	**130**	200	33	2	39
HCS7026-E-T-P4S	3,51	**130**	200	33	2	55



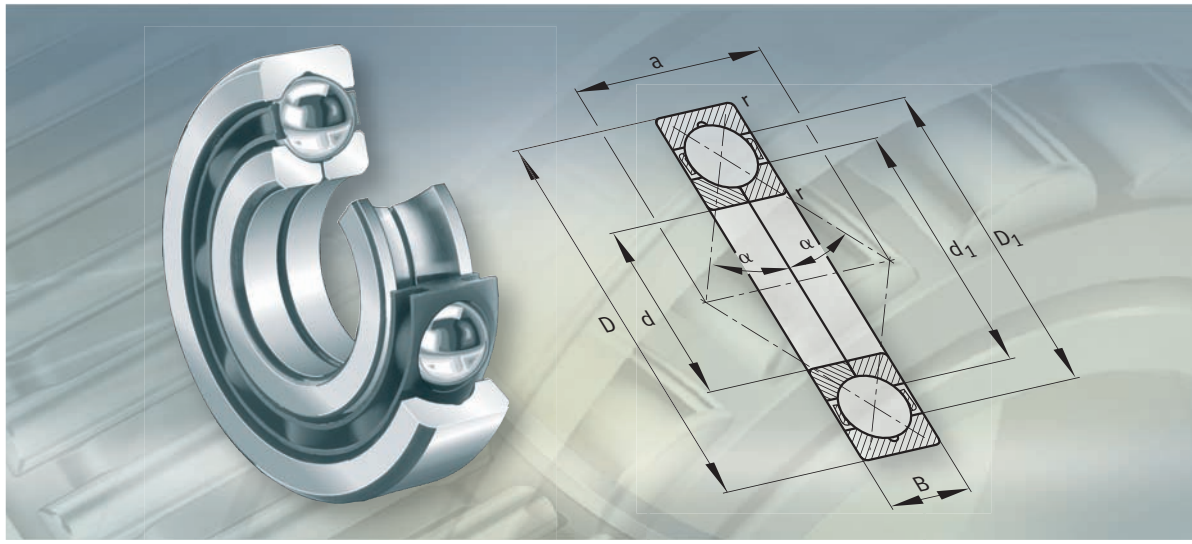
Mounting dimensions



Mounting dimensions

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed
d_a h12	D_a H12	r_a max.	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G grease min^{-1}
97	119	0,6	16 400	19 800	1 320	15 000
97	119	0,6	15 500	18 500	1 240	13 000
100	131	1,5	26 000	30 000	1 810	14 000
100	131	1,5	24 300	28 000	1 710	12 000
102	124	0,6	16 800	20 800	1 360	14 000
102	124	0,6	15 800	19 400	1 290	12 000
105	136	1,5	26 000	31 000	1 840	13 000
105	136	1,5	24 600	28 500	1 730	11 000
107	133	0,6	20 200	25 000	1 560	13 000
107	133	0,6	19 000	23 400	1 470	11 000
110	141	1,5	26 500	31 500	1 860	12 000
110	141	1,5	24 900	29 500	1 760	11 000
112	138	0,6	20 700	26 500	1 620	12 000
112	138	0,6	19 500	24 600	1 530	11 000
116	150	2	34 000	40 500	2 300	12 000
116	150	2	32 000	38 000	2 180	10 000
117	143	0,6	24 100	30 500	1 820	12 000
117	143	0,6	22 600	28 500	1 720	10 000
121	159	2	34 500	42 000	2 330	11 000
121	159	2	32 500	39 000	2 200	9 000
128	157	0,6	25 000	33 500	1 950	11 000
128	157	0,6	23 700	31 000	1 830	9 000
131	169	2	35 500	44 500	2 410	10 000
131	169	2	33 000	41 500	2 280	8 500
139	171	0,6	29 000	39 000	2 140	9 500
139	171	0,6	27 000	36 500	2 010	8 000
142	189	2	45 500	58 000	3 000	9 000
142	189	2	42 500	54 000	2 850	7 500

FAG



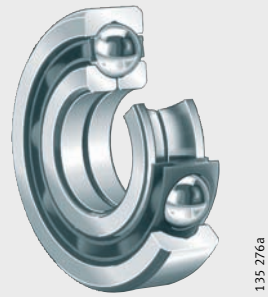
Four point contact bearings

Four point contact bearings

		Page
Product overview	Four point contact bearings	350
Features	Axial load capacity in both directions	351
	Operating temperature	352
	Cages	352
	Suffixes	352
Design and safety guidelines	Equivalent dynamic bearing load	353
	Equivalent static bearing load	353
	Minimum axial load	353
	Application as axial bearings only	353
	Speeds	353
	Design of bearing arrangements	354
Accuracy	Axial internal clearance	354
Dimension tables	Four point contact bearings	356

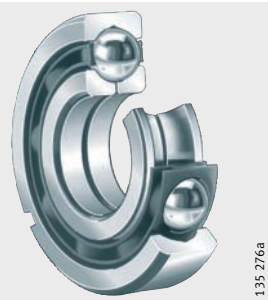
Without retaining slots

QJ2, QJ3



With retaining slots

QJ2..-N2, QJ3..-N2



Four point contact bearings

Features

Four point contact bearings are single row angular contact ball bearings and therefore require significantly less space in an axial direction than double row designs.

The bearings comprise solid outer rings, split inner rings and ball and cage assemblies with brass or polyamide cages. The two-piece inner rings allow a large complement of balls to be accommodated. The inner ring halves are matched to the particular bearing and must not be interchanged with those of other bearings of the same size. The outer ring with the ball and cage assembly can be mounted separately from the two inner ring halves.

Axial load capacity in both directions

Due to the design of the rolling element raceways with their high raceway shoulders, the contact angle of 35° and the large number of rolling elements, four point contact bearings have a high load carrying capacity. They can support high axial forces in both directions as well as small radial loads.

With or without retaining slots in the outer ring

Single row four point contact bearings capable of supporting axial loads in both directions are often combined with a radial bearing and used as an axial bearing with radial clearance in a housing. For quick and secure location, larger four point contact bearings therefore have two retaining slots in the outer ring offset by 180°. These bearings have the suffix N2.

Compensation of angular misalignments

The possible skewing of the inner rings in relation to the outer ring depends on the bearing load, the operating clearance and the bearing size and is very small. Four point contact bearings are not therefore suitable for the compensation of angular misalignments in housing bores or due to shaft deflections.

Skewing of the bearing rings increases the running noise, places increased strain on the cages and has a harmful influence on the operating life of the bearings.

Sealing

Four point contact bearings are not sealed.

Lubrication

They are not greased and can be lubricated with grease or oil.

Operating temperature

Bearings with solid brass cages can be used at operating temperatures from –30 °C to +150 °C.

Bearings with an outside diameter of more than 240 mm are dimensionally stable up to +200 °C.

Bearings with cages made from glass fibre reinforced polyamide are suitable for operating temperatures up to +120 °C.

Cages

Standard cages for four point contact bearings, see table.

Four point contact bearings with brass cages have the suffix MPA. These window cages are guided on the outer ring.

Cages made from glass fibre reinforced polyamide are indicated by the suffix TVP.

Check the chemical resistance of polyamide to synthetic greases and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures.

The oil change intervals must be observed.

Cage and bore code

Series	Solid brass cage[1)] Bore code	Polyamide window cage[1)]
QJ2	up to 07, 10, 13, from 16	08, 09, 11, 12, 14, 15
QJ3	04, from 10	05 to 09

1) Other cage designs available by agreement. In such cages, suitability for high speeds and temperatures as well as the basic load ratings may differ from the values for bearings with standard cages.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
C3	Axial internal clearance larger than normal	Special design, available by agreement
MPA	Solid brass cage	Standard
TVP	Window cage made from glass fibre reinforced polyamide 66	
N2	Two retaining slots in outer ring	Standard for larger bearings

Design and safety guidelines

Equivalent dynamic bearing load

Load ratio and equivalent dynamic load

For bearings under dynamic loading, the following applies:

Load ratio	Equivalent dynamic bearing load
$\frac{F_a}{F_r} \leqq 0{,}95$	$P = F_r + 0{,}66 \cdot F_a$
$\frac{F_a}{F_r} > 0{,}95$	$P = 0{,}6 \cdot F_r + 1{,}07 \cdot F_a$

P N
Equivalent dynamic bearing load for combined load

F_a N
Axial dynamic bearing load

F_r N
Radial dynamic bearing load.

Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r} + 0{,}58 \cdot F_{0a}$$

P_0 N
Equivalent static bearing load for combined load

F_{0a} N
Axial static bearing load

F_{0r} N
Radial static bearing load.

Minimum axial load

In order to ensure low friction in the bearing, especially at high speeds, a minimum axial load is required. In order to prevent an excessive increase in friction, the axial force should be sufficiently high that the rolling bearings are in contact with the inner and outer ring raceway at only one point. This is ensured if $F_a \geqq 1{,}2 \cdot F_r$.

Application as axial bearings only

If four point contact bearings are to be used as axial bearings only, the outer ring must have a large radial clearance in the housing. As a result, the bearings are not subjected to radial load.

Speeds

High speeds can be achieved if four point contact ball bearings are subjected to purely axial load.

ISO 15 312 does not give thermal reference speeds for these bearings.

The dimension tables therefore only state the limiting speeds n_G. These values are for oil lubrication and must not be exceeded. If higher speeds are required, please contact us.

Design of bearing arrangements

Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see tables, page 150.

Recommended housing tolerances for radial bearings, see table, page 152.

Mounting dimensions

The dimension tables give the maximum dimension of the radius r_a and the diameters of the abutment shoulders D_a and d_a.

Accuracy

The main dimensions of the bearings conform to DIN 628-4.

The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620-2.

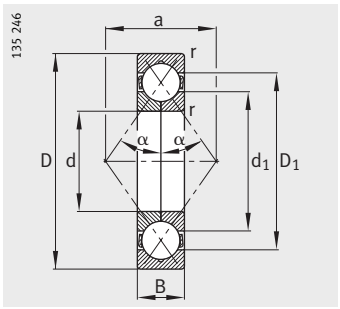
Axial internal clearance

The axial internal clearance corresponds to internal clearance group CN to DIN 628-4.

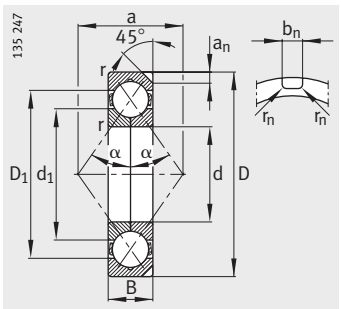
Axial internal clearance

Bore d mm		Axial internal clearance							
		C2 µm		CN µm		C3 µm		C4 µm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
18	40	30	70	60	110	100	150	140	190
40	60	40	90	80	130	120	170	160	210
60	80	50	100	90	140	130	180	170	220
80	100	60	120	100	160	140	200	180	240
100	140	70	140	120	180	160	220	200	260
140	180	80	160	140	200	180	240	220	280
180	220	100	180	160	220	200	260	240	300
220	260	120	200	180	240	220	300	280	360

Four point contact bearings



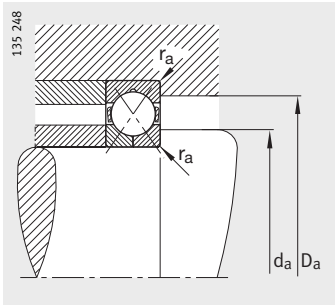
Without retaining slots
$\alpha = 35°$



N2, two retaining slots
$\alpha = 35°$

Dimension table · Dimensions in mm

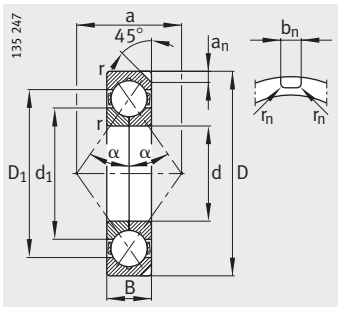
Designation	Mass	Dimensions							
	m	d	D	B	r	D_1	d_1	a	a_n
	≈kg				min.	≈	≈	≈	
QJ304-MPA	0,184	**20**	52	15	1,1	41,4	30,6	26	–
QJ205-MPA	0,171	**25**	52	15	1	43,1	34,2	27	–
QJ305-TVP	0,256	**25**	62	17	1,1	49,5	37,5	31	–
QJ206-MPA	0,254	**30**	62	16	1	50,7	40,3	32	–
QJ306-TVP	0,379	**30**	72	19	1,1	58	43,9	36	–
QJ207-MPA	0,359	**35**	72	17	1,1	59,1	47,9	38	–
QJ307-TVP	0,516	**35**	80	21	1,5	64,8	50,7	41	–
QJ208-TVP	0,399	**40**	80	18	1,1	66,8	53,6	42	–
QJ308-TVP	0,695	**40**	90	23	1,5	73,4	56,6	46	–
QJ209-TVP	0,467	**45**	85	19	1,1	72	58,4	45	–
QJ309-TVP	0,934	**45**	100	25	1,5	81,7	63,6	51	–
QJ210-MPA	0,609	**50**	90	20	1,1	76,4	63,6	49	–
QJ310-MPA	1,39	**50**	110	27	2	89,6	70,8	56	–
QJ211-TVP	0,697	**55**	100	21	1,5	84,7	70,6	54	–
QJ311-MPA	1,76	**55**	120	29	2	97,8	77,5	61	–
QJ212-TVP	0,889	**60**	110	22	1,5	93	77,3	60	–
QJ312-MPA	2,2	**60**	130	31	2,1	106,9	84,2	67	–
QJ213-MPA	1,27	**65**	120	23	1,5	101,5	84,1	65	–
QJ313-MPA	2,71	**65**	140	33	2,1	114,4	90,9	72	–
QJ214-TVP	1,22	**70**	125	24	1,5	106,3	89	68	–
QJ314-MPA	3,29	**70**	150	35	2,1	123,6	97,6	77	–
QJ215-TVP	1,34	**75**	130	25	1,5	111,5	94	72	–
QJ315-N2-MPA	3,95	**75**	160	37	2,1	131	104,3	82	10,1
QJ216-MPA	1,84	**80**	140	26	2	119,6	100,9	77	–
QJ316-N2-MPA	4,65	**80**	170	39	2,1	140,8	110,6	88	10,1
QJ217-MPA	2,3	**85**	150	28	2	128,6	107,5	82	–
QJ317-N2-MPA	5,54	**85**	180	41	3	148,6	117,8	93	11,7
QJ218-N2-MPA	2,8	**90**	160	30	2	136,1	114,2	88	8,1
QJ318-N2-MPA	6,44	**90**	190	43	3	157,1	124,5	98	11,7
QJ219-N2-MPA	3,41	**95**	170	32	2,1	144,4	121	93	8,1
QJ319-N2-MPA	7,45	**95**	200	45	3	165,4	131,2	103	11,7
QJ220-N2-MPA	4,1	**100**	180	34	2,1	153,6	127,7	98	10,1
QJ320-N2-MPA	9,04	**100**	215	47	3	176,6	138,9	110	11,7
QJ221-N2-MPA	4,81	**105**	190	36	2,1	161,6	134,7	103	10,1



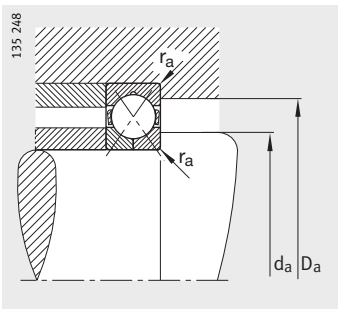
Mounting dimensions

		Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed
b_n	r_n	d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G
		min.	max.	max.	N	N	N	min^{-1}
–	–	27	45	1	30 000	19 600	990	28 000
–	–	31	46	1	25 500	18 600	950	26 000
–	–	32	55	1	44 000	31 500	1 590	14 000
–	–	36	56	1	36 500	27 500	1 410	20 000
–	–	37	65	1	58 500	43 000	2 170	11 000
–	–	42	65	1	44 000	35 500	1 800	18 000
–	–	44	71	1,5	62 000	51 000	2 550	9 500
–	–	47	73	1	56 000	46 500	2 380	9 500
–	–	49	81	1,5	86 500	68 000	3 500	8 500
–	–	52	78	1	64 000	57 000	2 900	8 500
–	–	54	91	1,5	102 000	83 000	4 550	7 500
–	–	57	83	1	61 000	56 000	2 900	13 000
–	–	61	99	2	110 000	91 500	4 950	11 000
–	–	64	91	1,5	80 000	76 500	3 900	7 000
–	–	66	109	2	127 000	108 000	5 900	10 000
–	–	69	101	1,5	96 500	93 000	4 800	6 300
–	–	72	118	2,1	146 000	127 000	6 700	9 000
–	–	74	111	1,5	104 000	104 000	3 950	9 500
–	–	77	128	2,1	163 000	146 000	7 900	8 500
–	–	79	116	1,5	118 000	122 000	6 800	5 600
–	–	82	138	2,1	183 000	166 000	8 600	8 000
–	–	84	121	1,5	125 000	129 000	6 800	5 300
8,5	2	87	148	2,1	212 000	204 000	10 500	7 000
–	–	91	129	2	132 000	137 000	7 100	8 000
8,5	2	92	158	2,1	224 000	220 000	10 800	7 000
–	–	96	139	2	153 000	160 000	8 100	7 000
10,5	2	99	166	2,5	245 000	255 000	11 700	6 300
6,5	1	101	149	2	176 000	186 000	8 800	7 000
10,5	2	104	176	2,5	265 000	285 000	12 900	6 000
6,5	1	107	158	2,1	200 000	212 000	10 100	6 300
10,5	2	109	186	2,5	285 000	310 000	14 100	6 000
8,5	2	112	168	2,1	224 000	240 000	11 200	6 000
10,5	2	114	201	2,5	325 000	365 000	16 300	5 600
8,5	2	117	178	2,1	232 000	260 000	11 600	6 000

Four point contact bearings



N2, two retaining slots
$\alpha = 35°$



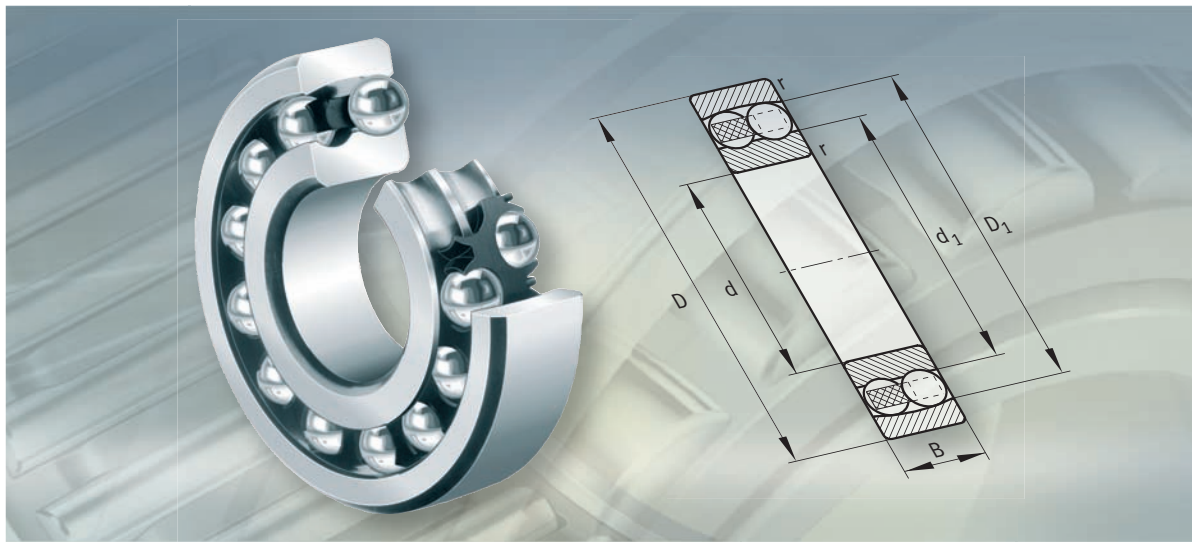
Mounting dimensions

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions							
	m	d	D	B	r	D_1	d_1	a	a_n
	≈kg				min.	≈	≈	≈	
QJ222-N2-MPA	5,66	**110**	200	38	2,1	169,8	141,6	109	10,1
QJ322-N2-MPA	12,2	**110**	240	50	3	195,5	156,4	123	11,7
QJ224-N2-MPA	6,74	**120**	215	40	2,1	183,6	152,8	117	11,7
QJ324-N2-MPA	15,6	**120**	260	55	3	210,6	169,8	133	11,7
QJ226-N2-MPA	7,66	**130**	230	40	3	195	165,4	127	11,7
QJ326-N2-MPA	19,2	**130**	280	58	4	228	184	144	12,7
QJ228-N2-MPA	9,69	**140**	250	42	3	210,5	180	137	11,7
QJ328-N2-MPA	23,2	**140**	300	62	4	243	197	154	12,7
QJ230-N2-MPA	12,2	**150**	270	45	3	226,7	193,7	147	11,7
QJ330-N2-MPA	28	**150**	320	65	4	261	211,3	165	12,7
QJ232-N2-MPA	15,3	**160**	290	48	3	240	210	158	12,7
QJ332-N2-MPA	32,8	**160**	340	68	4	279,9	222,7	175	12,7
QJ234-N2-MPA	18,9	**170**	310	52	4	260,5	221,4	168	12,7
QJ334-N2-MPA	38,4	**170**	360	72	4	292	238	186	12,7
QJ236-N2-MPA	19,6	**180**	320	52	4	269	231	175	12,7
QJ336-N2-MPA	44,9	**180**	380	75	4	311	249,1	196	12,7
QJ238-N2-MPA	23,8	**190**	340	55	4	286,3	245,8	186	12,7
QJ338-N2-MPA	52,1	**190**	400	78	5	327	262,5	207	12,7
QJ240-N2-MPA	28	**200**	360	58	4	302	258,6	196	12,7
QJ244-N2-MPA	38,6	**220**	400	65	4	336	284,6	217	12,7
QJ344-N2-MPA	77,1	**220**	460	88	5	378	302	238	15
QJ248-N2-MPA	53,1	**240**	440	72	4	367	312,5	238	15
QJ348-N2-MPA	98,2	**240**	500	95	5	410	330,7	259	15

		Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed
b_n	r_n	d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G
		min.	max.	max.	N	N	N	min^{-1}
8,5	2	122	188	2,1	250 000	285 000	12 300	5 600
10,5	2	124	226	2,5	345 000	415 000	17 400	5 300
10,5	2	132	203	2,1	280 000	340 000	13 800	5 300
10,5	2	134	246	2,5	380 000	480 000	19 300	5 000
10,5	2	144	216	2,5	290 000	365 000	14 500	5 000
10,5	2	147	263	3	425 000	570 000	21 600	4 800
10,5	2	154	236	2,5	315 000	415 000	16 500	4 800
10,5	2	157	283	3	475 000	655 000	19 700	4 300
10,5	2	164	256	2,5	345 000	480 000	18 400	4 500
10,5	2	167	303	3	510 000	735 000	25 500	3 800
10,5	2	174	276	2,5	375 000	530 000	16 800	4 300
10,5	2	177	323	3	585 000	865 000	29 500	3 600
10,5	2	187	293	3	425 000	630 000	22 800	3 800
10,5	2	187	343	3	585 000	915 000	24 900	3 200
10,5	2	197	303	3	430 000	670 000	18 900	3 600
10,5	2	197	363	3	680 000	1 080 000	33 000	3 000
10,5	2	207	323	3	455 000	735 000	24 400	3 200
10,5	2	210	380	4	735 000	1 250 000	37 000	2 800
10,5	2	217	343	3	510 000	850 000	22 600	3 000
10,5	2	237	383	3	630 000	1 120 000	31 000	2 800
12,5	2,5	240	440	4	900 000	1 660 000	44 500	2 800
12,5	2,5	257	423	3	680 000	1 270 000	30 500	2 800
12,5	2,5	260	480	4	1 020 000	1 960 000	52 000	2 600

FAG



Self-aligning ball bearings

Self-aligning ball bearings

		Page
Product overview	Self-aligning ball bearings	362
Features	Radial and axial load capacity	363
	Compensation of angular misalignments	363
	Operating temperature	363
	Cages	364
	Suffixes	364
Design and safety guidelines	Equivalent dynamic bearing load	365
	Equivalent static bearing load	365
	Minimum load	365
	Speeds	365
	Design of bearing arrangements	366
Accuracy	Radial internal clearance of bearings with cylindrical bore	367
	Radial internal clearance of bearings with tapered bore	367
Dimension tables	Self-aligning ball bearings with cylindrical bore, open or sealed	368
	Self-aligning ball bearings with cylindrical or tapered bore, open or sealed	370
	Self-aligning ball bearings with cylindrical or tapered bore, open	378
	Self-aligning ball bearings with extended inner ring	382
	Self-aligning ball bearings with adapter sleeve, open or sealed	384
	Self-aligning ball bearings with adapter sleeve, open	388

With cylindrical or tapered bore

10, 12, 13, 22, 23

12..-K, 13..-K, 22..-K, 23..-K

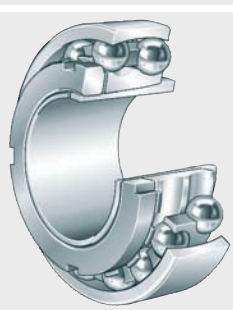
Lip seals

22..-2RS, 22..-K-2RS, 23..-2RS

With adapter sleeve

Without or with lip seals

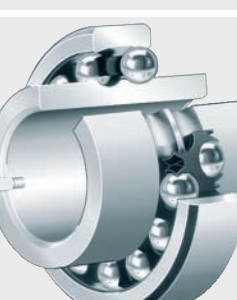
12..-K + H, 13..-K + H, 22..-K + H, 23..-K + H



22..-K-2RS + H

With extended inner ring

112



Self-aligning ball bearings

Features

Self-aligning ball bearings are double row, self-retaining units comprising outer rings with a concave raceway, inner rings with a cylindrical or tapered bore and ball and cage assemblies.
The bearings are available in open and sealed designs.

Radial and axial load capacity

Self-aligning ball bearings can support axial forces in both directions as well as radial forces.

With cylindrical or tapered bore

Bearings of series 12, 13, 22 and 23 are available with a cylindrical or tapered bore.

Bearings with a tapered bore have a bore taper of 1:12 and the suffix K.

With adapter sleeve

Self-aligning ball bearings with a tapered bore are also available with an adapter sleeve, locknut and tab washer.
Adapter sleeves must be ordered in addition to the bearing.

With extended inner ring

Bearings of series 112 have an extended inner ring, a locating slot on one side of the inner ring and are located by means of dowel pins.

These bearings are intended for simple bearing arrangements with conventional shafts. Due to the bearing bore tolerance (J7), they are very easy to fit.

Sealing

Self-aligning ball bearings of series 12, 13, 22 and 23 are also available in sealed designs. Sealed bearings have contact seals on both sides and the suffix 2RS.

Lubrication

Sealed bearings are greased with a high quality grease and are maintenance-free.

Compensation of angular misalignments

Under normal operating conditions and with a rotating inner ring, self-aligning ball bearings can swivel approx. 4° about their central position; sealed bearings can swivel by max. 1,5°. As a result, they permit skewing between the inner and outer ring and can thus compensate misalignments, shaft deflections and housing deformations.

If the outer ring rotates or the inner ring undergoes tumbling motion, the angular adjustment facility is smaller.
In this case, please contact us.

Operating temperature

Open bearings with brass cages can be used at operating temperatures from –30 °C to +150 °C.

Bearings with cages made from glass fibre reinforced polyamide are suitable for operating temperatures up to +120 °C.

Sealed self-aligning ball bearings are suitable for operating temperatures from –30 °C to +100 °C, restricted by the grease and seal material.

Self-aligning ball bearings

Cages

The standard cages for self-aligning ball bearings are shown in the table Cage and bore code.

Self-aligning ball bearings with cages made from glass fibre reinforced polyamide 66 have the suffix TVH.

Ball-guided solid brass cages are indicated by the suffix M.

Check the chemical resistance of polyamide to synthetic greases and oils and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures.

The oil change intervals must be observed.

Cage and bore code

Series	Solid polyamide cage[1)] Bore code	Solid brass cage[1)]
10	8	–
12	up to 18	from 19
13	up to 13	from 14
22	up to 13, 15, 16, 18	14, 17, from 19
23	up to 13	from 14
112	04 to 12	–

1) Other cage designs available by agreement. In such cages, suitability for high speeds and temperatures as well as the basic load ratings may differ from the values for bearings with standard cages.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
C3	Radial internal clearance larger than normal	Standard for tapered bore
K	Tapered bore	Standard
M	Solid brass cage	
TVH	Solid cage made from glass fibre reinforced polyamide 66	
2RS	Contact seals on both sides	

Design and safety guidelines

Equivalent dynamic bearing load

For bearings under dynamic loading, the following applies:

Load ratio and equivalent dynamic load

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leqq e$	$P = F_r + Y_1 \cdot F_a$
$\frac{F_a}{F_r} > e$	$P = 0{,}65 \cdot F_r + Y_2 \cdot F_a$

P N
Equivalent dynamic bearing load for combined load
F_a N
Axial dynamic bearing load
F_r N
Radial dynamic bearing load
e, Y_1, Y_2 –
Factors from dimension tables.

Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r} + Y_0 \cdot F_{0a}$$

P_0 N
Equivalent static bearing load for combined load
F_{0a} N
Axial static bearing load
F_{0r} N
Radial static bearing load
Y_0 –
Factor from dimension tables.

Minimum load

In order to ensure slippage-free operation, the bearings must be subjected to sufficient load. If insufficient load is applied (for example at high speeds during a test run), slippage can occur that may lead to bearing damage if lubrication is inadequate.

The minimum load should be $P/C_r = 0{,}01$.

Speeds

If the reference speed n_B in the dimension tables is higher than the limiting speed n_G, the higher value cannot be used.

In bearings with contact seals (suffix 2RS), the speed is limited by the permissible sliding speed of the sealing lips, so only the limiting speed n_G is given in the tables.

Design of bearing arrangements

Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 150.

Recommended housing tolerances for radial bearings, see table, page 152.

Mounting dimensions

The dimension tables give the maximum dimension of the radius r_a and the diameters of the abutment shoulders D_a and d_a.

Bearings with a tapered inner ring bore are:

- located either directly on tapered shaft seats or
- located on a cylindrical shaft seat using an adapter sleeve, locknut and tab washer.

If high axial forces are present, a support ring can be used.
For fitting, attention must be paid to the support ring dimensions given in the dimension tables.

Ball projection

In some bearings with a brass cage, the balls project to a certain extent at the sides. The projection C_1 must be taken into consideration when designing the adjacent construction.
Values for C_1: see dimension tables page 380 and page 389.

Location of series 122

These bearings are axially located by means of thread studs that engage in the slot in the inner ring, *Figure 1*. The studs also prevent the inner rings creeping on the shaft.

If a shaft is to be supported by two bearings, the locating slots must be arranged on the sides of the bearing facing towards or away from each other, *Figure 1*.

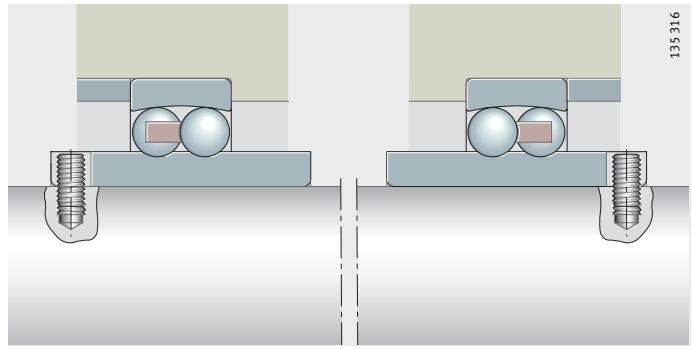


Figure 1
Location and arrangement of bearings

Accuracy

The main dimensions of the bearings conform to DIN 630.

The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620-2.

In series 112, the bearing bore has a J7 tolerance.

Radial internal clearance of bearings with cylindrical bore

The radial internal clearance is CN in accordance with DIN 620-4.

Radial internal clearance

Bore d mm		Radial internal clearance CN µm		C3 µm	
over	incl.	min.	max.	min.	max.
–	6	5	15	10	20
6	10	6	17	12	25
10	14	6	19	13	26
14	18	8	21	15	28
18	24	10	23	17	30
24	30	11	24	19	35
30	40	13	29	23	40
40	50	14	31	25	44
50	65	16	36	30	50
65	80	18	40	35	60
80	100	22	48	42	70
100	120	25	56	50	83
120	140	30	68	60	100
140	160	35	80	70	120

Radial internal clearance of bearings with tapered bore

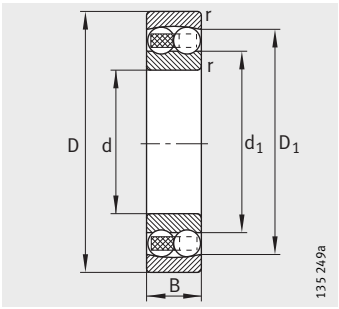
Bearings with a tapered bore have the internal clearance group C3 in accordance with DIN 620-4.

Radial internal clearance

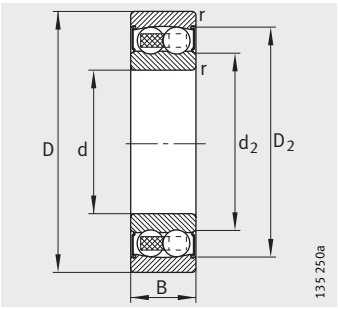
Bore d mm		Radial internal clearance CN µm		C3 µm	
over	incl.	min.	max.	min.	max.
18	24	13	26	20	33
24	30	15	28	23	39
30	40	19	35	29	46
40	50	22	39	33	52
50	65	27	47	41	61
65	80	35	57	50	75
80	100	42	68	62	90
100	120	50	81	75	108
120	140	60	98	90	130
140	160	65	110	100	150

Self-aligning ball bearings

With cylindrical bore
Open or sealed



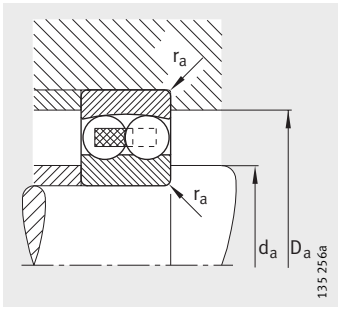
Cylindrical bore



Cylindrical bore
Seal 2RS

Dimension table · Dimensions in mm

Designation	Mass	Dimensions							
	m	d	D	B	r	D_1	D_2	d_1	d_2
	≈kg				min.	≈	≈	≈	≈
135-TVH	0,01	**5**	19	6	0,3	14,5	–	10,1	–
126-TVH	0,009	**6**	19	6	0,3	14,5	–	10,1	–
127-TVH	0,014	**7**	22	7	0,3	16,8	–	12,4	–
108-TVH	0,014	**8**	22	7	0,3	16,8	–	12,4	–
129-TVH	0,022	**9**	26	8	0,6	20	–	14,5	–
1200-TVH	0,034	**10**	30	9	0,6	23,5	–	16,3	–
2200-2RS-TVH	0,053	**10**	30	14	0,6	–	25,9	–	14,1
2200-TVH	0,045	**10**	30	14	0,6	24,2	–	15,1	–
1201-TVH	0,041	**12**	32	10	0,6	25,4	–	18,2	–
2201-2RS-TVH	0,058	**12**	32	14	0,6	–	27,9	–	16,2
2201-TVH	0,05	**12**	32	14	0,6	26,2	–	17,1	–
1202-TVH	0,048	**15**	35	11	0,6	29,2	–	20,2	–
2202-2RS-TVH	0,061	**15**	35	14	0,6	–	31	–	19
2202-TVH	0,057	**15**	35	14	0,6	29,5	–	20,3	–
2302-TVH	0,111	**15**	42	17	1	34,8	–	22,5	–
1203-TVH	0,073	**17**	40	12	0,6	32,3	–	23,7	–
2203-2RS-TVH	0,098	**17**	40	16	0,6	–	34,3	–	21,7
2203-TVH	0,054	**17**	40	16	0,6	34,1	–	23,9	–
1303-TVH	0,065	**17**	47	14	1	37,3	–	26,7	–
2303-2RS-TVH	0,175	**17**	47	19	1	–	40,3	–	23,9
2303-TVH	0,155	**17**	47	19	1	37,3	–	26,2	–

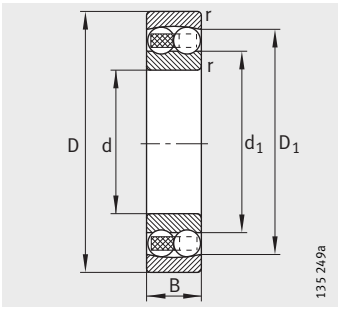


Mounting dimensions

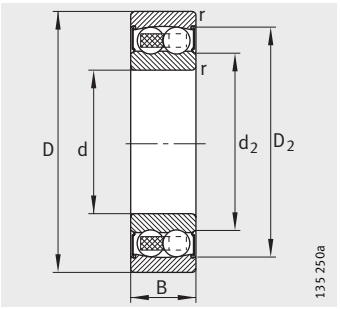
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
7,4	16,6	0,3	2600	475	0,35	1,82	2,82	1,91	29,5	36000	34500
8,4	16,6	0,3	2600	475	0,35	1,82	2,82	1,91	29,5	36000	41500
9,4	19,6	0,3	2750	560	0,33	1,92	2,97	2,01	34,5	36000	36000
10,6	19,4	0,3	2750	560	0,33	1,92	2,97	2,01	34,5	36000	–
13,2	21,8	0,6	3950	800	0,32	1,95	3,01	2,04	50	32000	32500
14,2	25,8	0,6	5700	1180	0,32	1,95	3,02	2,05	73	30000	30000
14,2	25,8	0,6	5700	1180	0,32	1,95	3,02	2,05	73	18000	–
14,2	25,8	0,6	8800	1730	0,58	1,09	1,69	1,14	107	28000	29000
16,2	27,8	0,6	5700	1260	0,37	1,69	2,62	1,77	78	30000	29000
16,2	27,8	0,6	5700	1260	0,37	1,69	2,62	1,77	78	17000	–
16,2	27,8	0,6	9400	1920	0,53	1,2	1,85	1,25	120	26000	26000
19,2	30,8	0,6	7700	1730	0,34	1,86	2,88	1,95	108	26000	26000
19,2	30,8	0,6	7700	1730	0,34	1,86	2,88	1,95	108	15000	–
19,2	30,8	0,6	9600	2080	0,46	1,37	2,13	1,44	130	24000	21900
20,6	36,4	1	17000	3700	0,51	1,23	1,91	1,29	232	18000	18600
21,2	35,8	0,6	8100	2000	0,33	1,93	2,99	2,03	124	22000	23600
21,2	35,8	0,6	8100	2000	0,33	1,93	2,99	2,03	124	14000	–
21,2	35,8	0,6	11800	2750	0,46	1,37	2,12	1,43	171	19000	19300
22,6	41,4	1	12900	3150	0,32	1,94	3	2,03	197	18000	18500
22,6	41,4	1	12900	3150	0,32	1,94	3	2,03	197	11000	–
22,6	41,4	1	13900	3150	0,53	1,19	1,85	1,25	197	17000	16900

Self-aligning ball bearings

With cylindrical or tapered bore
Open or sealed



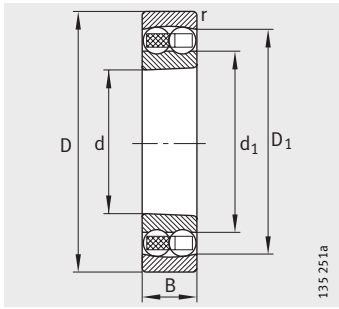
Cylindrical bore



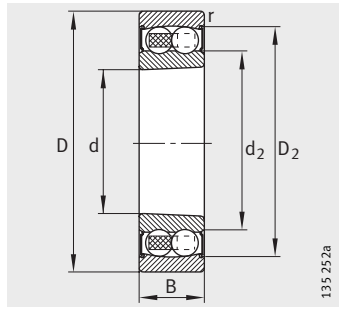
Cylindrical bore
Seal 2RS

Dimension table (continued) · Dimensions in mm

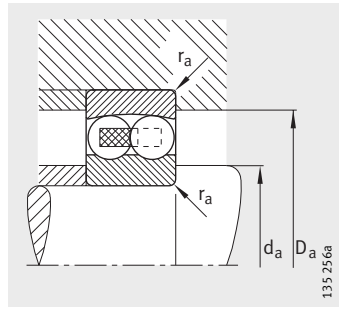
Designation	Mass	Dimensions							
	m	d	D	B	r	D_1	D_2	d_1	d_2
	≈kg				min.	≈	≈	≈	≈
1204-K-TVH-C3	0,116	**20**	47	14	1	38,1	–	29,2	–
1204-TVH	0,118	**20**	47	14	1	38,1	–	29,2	–
2204-2RS-TVH	0,151	**20**	47	18	1	–	41,7	–	25,9
2204-TVH	0,134	**20**	47	18	1	39,5	–	28	–
1304-TVH	0,163	**20**	52	15	1,1	41,9	–	31,6	–
2304-2RS-TVH	0,23	**20**	52	21	1,1	–	45,2	–	27,2
2304-TVH	0,206	**20**	52	21	1,1	41,5	–	29,1	–
1205-K-TVH-C3	0,135	**25**	52	15	1	43,9	–	33,3	–
1205-TVH	0,138	**25**	52	15	1	43,9	–	33,3	–
2205-2RS-TVH	0,161	**25**	52	18	1	–	46,3	–	30,7
2205-K-2RS-TVH-C3	0,157	**25**	52	18	1	–	46,3	–	30,7
2205-K-TVH-C3	0,152	**25**	52	18	1	44,7	–	32,3	–
2205-TVH	0,156	**25**	52	18	1	44,7	–	32,3	–
1305-K-TVH-C3	0,254	**25**	62	17	1,1	50,8	–	38,1	–
1305-TVH	0,258	**25**	62	17	1,1	50,8	–	38,1	–
2305-2RS-TVH	0,367	**25**	62	24	1,1	–	53,2	–	33,5
2305-K-TVH-C3	0,328	**25**	62	24	1,1	50,1	–	35,5	–
2305-TVH	0,335	**25**	62	24	1,1	50,1	–	35,5	–
1206-K-TVH-C3	0,217	**30**	62	16	1	51,9	–	40,1	–
1206-TVH	0,221	**30**	62	16	1	51,9	–	40,1	–
2206-2RS-TVH	0,274	**30**	62	20	1	–	54,3	–	37,3
2206-K-2RS-TVH-C3	0,268	**30**	62	20	1	–	54,3	–	37,3
2206-K-TVH-C3	0,246	**30**	62	20	1	54	–	38,5	–
2206-TVH	0,252	**30**	62	20	1	54	–	38,5	–
1306-K-TVH-C3	0,379	**30**	72	19	1,1	59,4	–	45	–
1306-TVH	0,384	**30**	72	19	1,1	59,4	–	45	–
2306-2RS-TVH	0,554	**30**	72	27	1,1	–	63	–	40,6
2306-K-TVH-C3	0,476	**30**	72	27	1,1	59,3	–	41,5	–
2306-TVH	0,488	**30**	72	27	1,1	59,3	–	41,5	–



Tapered bore
K = taper 1:12



Tapered bore
K = taper 1:12
Seal 2RS

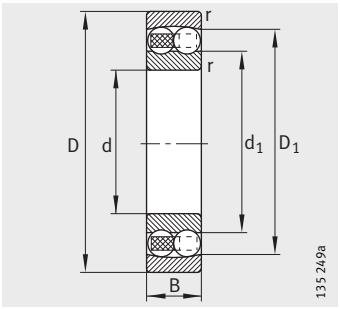


Mounting dimensions

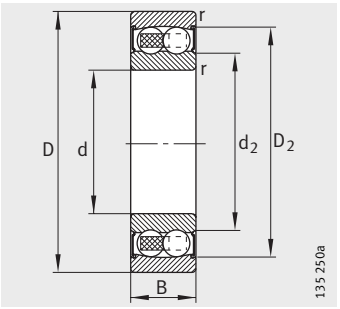
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
25,6	41,4	1	10 100	2 600	0,28	2,24	3,46	2,34	161	18 000	20 700
25,6	41,4	1	10 100	2 600	0,28	2,24	3,46	2,34	161	18 000	20 700
25,6	41,4	1	10 100	2 600	0,28	2,24	3,46	2,34	161	11 000	–
25,6	41,4	1	14 700	3 500	0,44	1,45	2,24	1,51	219	17 000	17 400
27	45	1	12 700	3 300	0,29	2,17	3,35	2,27	206	16 000	16 100
27	45	1	12 700	3 300	0,29	2,17	3,35	2,27	206	10 000	–
27	45	1	17 600	4 250	0,51	1,23	1,9	1,29	265	16 000	16 400
30,6	46,4	1	12 300	3 250	0,27	2,37	3,66	2,48	203	16 000	18 100
30,6	46,4	1	12 300	3 250	0,27	2,37	3,66	2,48	203	16 000	18 100
30,6	46,4	1	12 300	3 250	0,27	2,37	3,66	2,48	203	9 500	–
30,6	46,4	1	12 300	3 250	0,27	2,37	3,66	2,48	203	9 500	–
30,6	46,4	1	17 300	4 400	0,35	1,78	2,75	1,86	275	15 000	14 900
30,6	46,4	1	17 300	4 400	0,35	1,78	2,75	1,86	275	15 000	14 900
32	55	1	18 300	4 950	0,28	2,29	3,54	2,4	310	14 000	13 900
32	55	1	18 300	4 950	0,28	2,29	3,54	2,4	310	14 000	13 900
32	55	1	18 300	4 950	0,28	2,29	3,54	2,4	310	8 000	–
32	55	1	25 000	6 500	0,48	1,32	2,04	1,38	405	13 000	14 100
32	55	1	25 000	6 500	0,48	1,32	2,04	1,38	405	13 000	14 100
35,6	56,4	1	15 900	4 600	0,25	2,53	3,91	2,65	285	14 000	15 400
35,6	56,4	1	15 900	4 600	0,25	2,53	3,91	2,65	285	14 000	15 400
35,6	56,4	1	15 900	4 600	0,25	2,53	3,91	2,65	285	8 000	–
35,6	56,4	1	15 900	4 600	0,25	2,53	3,91	2,65	285	8 000	–
35,6	56,4	1	26 000	6 900	0,3	2,13	3,29	2,23	430	12 000	12 700
35,6	56,4	1	26 000	6 900	0,3	2,13	3,29	2,23	430	12 000	12 700
37	65	1	21 700	6 300	0,26	2,39	3,71	2,51	390	11 000	12 200
37	65	1	21 700	6 300	0,26	2,39	3,71	2,51	390	11 000	12 200
37	65	1	21 700	6 300	0,26	2,39	3,71	2,51	390	6 700	–
37	65	1	32 500	8 700	0,45	1,4	2,17	1,47	540	10 000	12 300
37	65	1	32 500	8 700	0,45	1,4	2,17	1,47	540	10 000	12 300

Self-aligning ball bearings

With cylindrical or tapered bore
Open or sealed



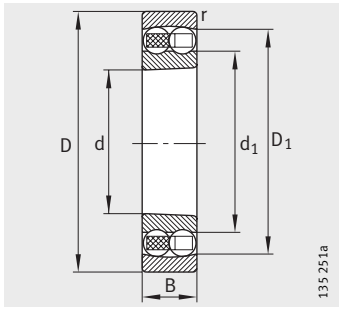
Cylindrical bore



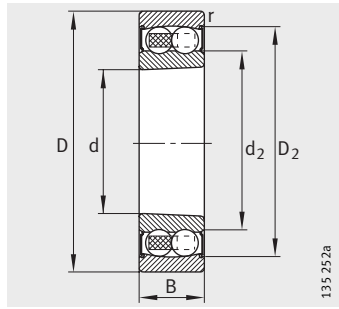
Cylindrical bore
Seal 2RS

Dimension table (continued) · Dimensions in mm

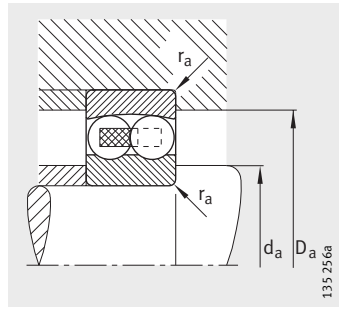
Designation	Mass	Dimensions							
	m	d	D	B	r	D_1	D_2	d_1	d_2
	≈kg				min.	≈	≈	≈	≈
1207-K-TVH-C3	0,319	**35**	72	17	1,1	59,6	–	47,7	–
1207-TVH	0,324	**35**	72	17	1,1	59,6	–	47,7	–
2207-2RS-TVH	0,442	**35**	72	23	1,1	–	64,3	–	43,5
2207-K-2RS-TVH-C3	0,432	**35**	72	23	1,1	–	64,3	–	43,5
2207-K-TVH-C3	0,38	**35**	72	23	1,1	62,9	–	45,7	–
2207-TVH	0,389	**35**	72	23	1,1	62,9	–	45,7	–
1307-K-TVH-C3	0,5	**35**	80	21	1,5	67,5	–	51,3	–
1307-TVH	0,507	**35**	80	21	1,5	67,5	–	51,3	–
2307-2RS-TVH	0,744	**35**	80	31	1,5	–	69,1	–	44,9
2307-K-TVH-C3	0,96	**35**	80	31	1,5	66,8	–	46,9	–
2307-TVH	0,975	**35**	80	31	1,5	66,8	–	46,9	–
1208-K-TVH-C3	0,408	**40**	80	18	1,1	67,8	–	54	–
1208-TVH	0,414	**40**	80	18	1,1	67,8	–	54	–
2208-2RS-TVH	0,528	**40**	80	23	1,1	–	71,1	–	49,2
2208-K-2RS-TVH-C3	0,517	**40**	80	23	1,1	–	71,1	–	49,2
2208-K-TVH-C3	0,465	**40**	80	23	1,1	70,7	–	52,5	–
2208-TVH	0,476	**40**	80	23	1,1	70,7	–	52,5	–
1308-K-TVH-C3	0,698	**40**	90	23	1,5	75,3	–	57,8	–
1308-TVH	0,708	**40**	90	23	1,5	75,3	–	57,8	–
2308-2RS-TVH	1,01	**40**	90	33	1,5	–	78	–	51
2308-K-TVH-C3	0,899	**40**	90	33	1,5	75	–	53,7	–
2308-TVH	0,922	**40**	90	33	1,5	75	–	53,7	–
1209-K-TVH-C3	0,454	**45**	85	19	1,1	72,7	–	57,7	–
1209-TVH	0,462	**45**	85	19	1,1	72,7	–	57,7	–
2209-2RS-TVH	0,548	**45**	85	23	1,1	–	75,4	–	53,8
2209-K-2RS-TVH-C3	0,535	**45**	85	23	1,1	–	75,4	–	53,8
2209-K-TVH-C3	0,505	**45**	85	23	1,1	75,9	–	59	–
2209-TVH	0,517	**45**	85	23	1,1	75,9	–	59	–
1309-K-TVH-C3	0,939	**45**	100	25	1,5	84,1	–	64,1	–
1309-TVH	0,953	**45**	100	25	1,5	84,1	–	64,1	–
2309-2RS-TVH	1,34	**45**	100	36	1,5	–	86,6	–	57,5
2309-K-TVH-C3	1,19	**45**	100	36	1,5	84,2	–	60,1	–
2309-TVH	1,22	**45**	100	36	1,5	84,2	–	60,1	–



Tapered bore
K = taper 1:12



Tapered bore
K = taper 1:12
Seal 2RS

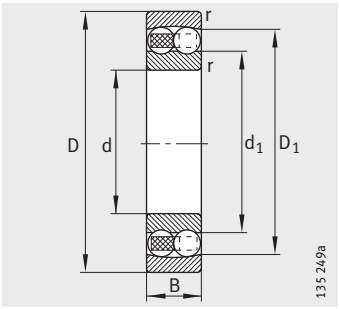


Mounting dimensions

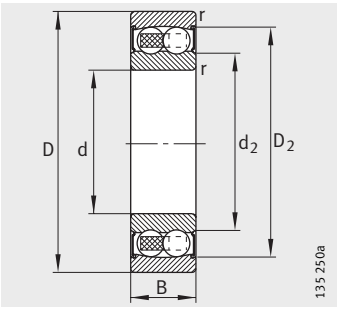
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
42	65	1	16 000	5 100	0,22	2,8	4,34	2,94	315	12 000	13 200
42	65	1	16 000	5 100	0,22	2,8	4,34	2,94	315	12 000	13 200
42	65	1	16 000	5 100	0,22	2,8	4,34	2,94	315	7 000	–
42	65	1	16 000	5 100	0,22	2,8	4,34	2,94	315	7 000	–
42	65	1	33 000	8 900	0,3	2,13	3,29	2,23	560	9 500	11 500
42	65	1	33 000	8 900	0,3	2,13	3,29	2,23	560	9 500	11 500
44	71	1,5	25 500	7 800	0,26	2,47	3,82	2,59	485	9 500	10 900
44	71	1,5	25 500	7 800	0,26	2,47	3,82	2,59	485	9 500	10 900
44	71	1,5	25 500	7 800	0,26	2,47	3,82	2,59	485	6 000	–
44	71	1,5	40 500	11 100	0,47	1,35	2,1	1,42	690	9 000	11 600
44	71	1,5	40 500	11 100	0,47	1,35	2,1	1,42	690	9 000	11 600
47	73	1	19 400	6 500	0,22	2,9	4,49	3,04	400	10 000	11 600
47	73	1	19 400	6 500	0,22	2,9	4,49	3,04	400	10 000	11 600
47	73	1	19 400	6 500	0,22	2,9	4,49	3,04	400	6 300	–
47	73	1	19 400	6 500	0,22	2,9	4,49	3,04	400	6 300	–
47	73	1	32 500	9 400	0,26	2,43	3,76	2,54	580	9 000	9 700
47	73	1	32 500	9 400	0,26	2,43	3,76	2,54	580	9 000	9 700
49	81	1,5	30 000	9 600	0,25	2,52	3,9	2,64	600	8 500	10 000
49	81	1,5	30 000	9 600	0,25	2,52	3,9	2,64	600	8 500	10 000
49	81	1,5	30 000	9 600	0,25	2,52	3,9	2,64	600	5 300	–
49	81	1,5	46 000	13 400	0,43	1,45	2,25	1,52	830	8 000	10 300
49	81	1,5	46 000	13 400	0,43	1,45	2,25	1,52	830	8 000	10 300
52	78	1	22 000	7 300	0,21	3,04	4,7	3,18	455	9 000	11 100
52	78	1	22 000	7 300	0,21	3,04	4,7	3,18	455	9 000	11 100
52	78	1	22 000	7 300	0,21	3,04	4,7	3,18	455	5 600	–
52	78	1	22 000	7 300	0,21	3,04	4,7	3,18	455	5 600	–
52	78	1	28 500	8 900	0,26	2,43	3,76	2,54	550	8 500	8 700
52	78	1	28 500	8 900	0,26	2,43	3,76	2,54	550	8 500	8 700
54	91	1,5	38 500	12 600	0,25	2,5	3,87	2,62	780	7 500	9 300
54	91	1,5	38 500	12 600	0,25	2,5	3,87	2,62	780	7 500	9 300
54	91	1,5	38 500	12 600	0,25	2,5	3,87	2,62	780	4 800	–
54	91	1,5	55 000	16 500	0,43	1,48	2,29	1,55	1 030	7 000	9 400
54	91	1,5	55 000	16 500	0,43	1,48	2,29	1,55	1 030	7 000	9 400

Self-aligning ball bearings

With cylindrical or tapered bore
Open or sealed



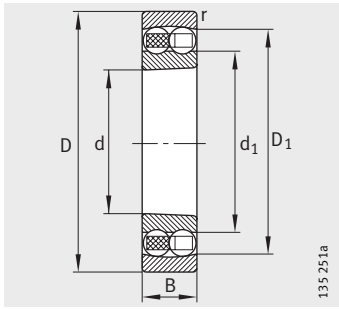
Cylindrical bore



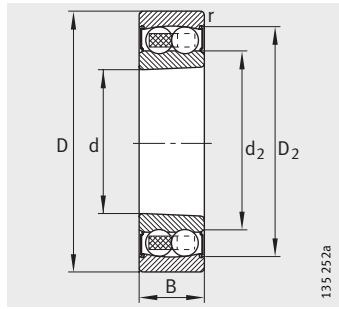
Cylindrical bore
Seal 2RS

Dimension table (continued) · Dimensions in mm

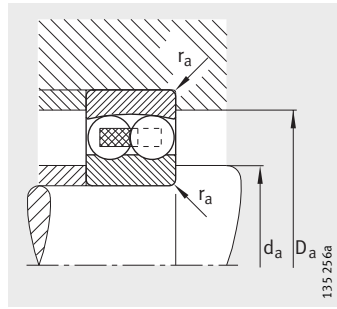
Designation	Mass	Dimensions							
	m	d	D	B	r	D_1	D_2	d_1	d_2
	≈kg				min.	≈	≈	≈	≈
1210-K-TVH-C3	0,516	**50**	90	20	1,1	77,6	–	62,7	–
1210-TVH	0,526	**50**	90	20	1,1	77,6	–	62,7	–
2210-2RS-TVH	0,606	**50**	90	23	1,1	–	80	–	60,6
2210-K-2RS-TVH-C3	0,593	**50**	90	23	1,1	–	80	–	60,6
2210-K-TVH-C3	0,543	**50**	90	23	1,1	81	–	64	–
2210-TVH	0,556	**50**	90	23	1,1	81	–	64	–
1310-K-TVH-C3	1,52	**50**	110	27	2	91,9	–	71,2	–
1310-TVH	1,54	**50**	110	27	2	91,9	–	71,2	–
2310-2RS-TVH	1,82	**50**	110	40	2	–	96	–	65,9
2310-TVH	1,64	**50**	110	40	2	92	–	66,9	–
1211-K-TVH-C3	0,682	**55**	100	21	1,5	86,9	–	69,5	–
1211-TVH	0,693	**55**	100	21	1,5	86,9	–	69,5	–
2211-2RS-TVH	0,825	**55**	100	25	1,5	–	88,9	–	68
2211-K-2RS-TVH-C3	0,808	**55**	100	25	1,5	–	88,9	–	68
2211-K-TVH-C3	0,73	**55**	100	25	1,5	90	–	69,6	–
2211-TVH	0,746	**55**	100	25	1,5	90	–	69,6	–
1311-K-TVH-C3	1,55	**55**	120	29	2	101,6	–	78	–
1311-TVH	1,57	**55**	120	29	2	101,6	–	78	–
2311-2RS-TVH	2,28	**55**	120	43	2	–	107	–	70,5
2311-K-TVH-C3	2,02	**55**	120	43	2	100,7	–	71,7	–
2311-TVH	2,07	**55**	120	43	2	100,7	–	71,7	–



Tapered bore
K = taper 1:12



Tapered bore
K = taper 1:12
Seal 2RS

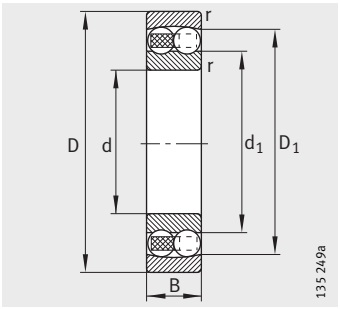


Mounting dimensions

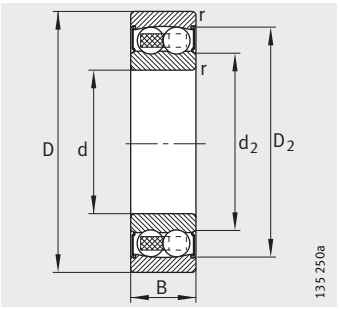
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
57	83	1	22 900	8 000	0,2	3,17	4,9	3,32	500	8 500	10 500
57	83	1	22 900	8 000	0,2	3,17	4,9	3,32	500	8 500	10 500
57	83	1	22 900	8 000	0,2	3,17	4,9	3,32	500	5 300	–
57	83	1	22 900	8 000	0,2	3,17	4,9	3,32	500	5 300	–
57	83	1	28 500	9 400	0,24	2,61	4,05	2,74	580	8 000	8 000
57	83	1	28 500	9 400	0,24	2,61	4,05	2,74	580	8 000	8 000
61	99	2	42 000	14 100	0,24	2,6	4,03	2,73	880	6 700	8 700
61	99	2	42 000	14 100	0,24	2,6	4,03	2,73	880	6 700	8 700
61	99	2	42 000	14 100	0,24	2,6	4,03	2,73	880	4 300	–
61	99	2	66 000	19 900	0,43	1,47	2,27	1,54	1 240	6 300	9 000
64	91	1,5	27 000	9 900	0,19	3,31	5,12	3,47	620	7 500	9 300
64	91	1,5	27 000	9 900	0,19	3,31	5,12	3,47	620	7 500	9 300
64	91	1,5	27 000	9 900	0,19	3,31	5,12	3,47	620	4 800	–
64	91	1,5	27 000	9 900	0,19	3,31	5,12	3,47	620	4 800	–
64	91	1,5	39 000	12 400	0,22	2,92	4,52	3,06	770	6 700	7 500
64	91	1,5	39 000	12 400	0,22	2,92	4,52	3,06	770	6 700	7 500
66	109	2	52 000	17 700	0,24	2,66	4,12	2,79	1 100	6 000	8 100
66	109	2	52 000	17 700	0,24	2,66	4,12	2,79	1 100	6 000	8 100
66	109	2	52 000	17 700	0,24	2,66	4,12	2,79	1 100	3 800	–
66	109	2	77 000	23 800	0,42	1,51	2,33	1,58	1 480	5 600	8 500
66	109	2	77 000	23 800	0,42	1,51	2,33	1,58	1 480	5 600	8 500

Self-aligning ball bearings

With cylindrical or tapered bore
Open or sealed



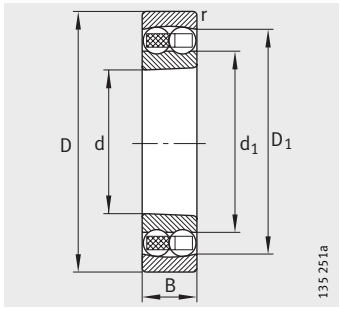
Cylindrical bore



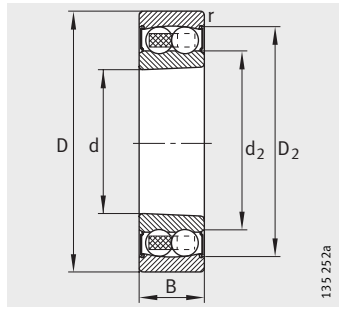
Cylindrical bore
Seal 2RS

Dimension table (continued) · Dimensions in mm

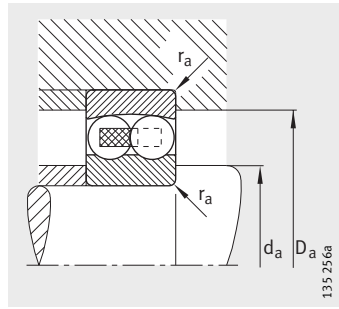
Designation	Mass	Dimensions							
	m	d	D	B	r	D_1	D_2	d_1	d_2
	≈kg				min.	≈	≈	≈	≈
1212-K-TVH-C3	0,88	**60**	110	22	1,5	95,8	–	78	–
1212-TVH	0,894	**60**	110	22	1,5	95,8	–	78	–
2212-2RS-TVH	1,13	**60**	110	28	1,5	–	98,5	–	70,4
2212-K-2RS-TVH-C3	1,13	**60**	110	28	1,5	–	98,5	–	70,4
2212-K-TVH-C3	1,03	**60**	110	28	1,5	98,8	–	76,6	–
2212-TVH	1,06	**60**	110	28	1,5	98,8	–	76,6	–
1312-K-TVH-C3	1,94	**60**	130	31	2,1	112,2	–	87	–
1312-TVH	1,97	**60**	130	31	2,1	112,2	–	87	–
2312-K-TVH-C3	2,52	**60**	130	46	2,1	109,1	–	77	–
2312-TVH	2,58	**60**	130	46	2,1	109,1	–	77	–
1213-K-TVH-C3	1,13	**65**	120	23	1,5	103,2	–	85,2	–
1213-TVH	1,14	**65**	120	23	1,5	103,2	–	85,2	–
2213-2RS-TVH	1,53	**65**	120	31	1,5	–	106,6	–	78
2213-K-2RS-TVH-C3	1,5	**65**	120	31	1,5	–	106,6	–	78
2213-K-TVH-C3	1,33	**65**	120	31	1,5	107,5	–	82,4	–
2213-TVH	1,36	**65**	120	31	1,5	107,5	–	82,4	–
1313-K-TVH-C3	2,41	**65**	140	33	2,1	118,8	–	92,7	–
1313-TVH	2,44	**65**	140	33	2,1	118,8	–	92,7	–
2313-K-TVH-C3	3,16	**65**	140	48	2,1	118,9	–	85,6	–
2313-TVH	3,23	**65**	140	48	2,1	118,9	–	85,6	–
1214-K-TVH-C3	1,23	**70**	125	24	1,5	106,6	–	87,7	–
1214-TVH	1,25	**70**	125	24	1,5	106,6	–	87,7	–
2214-2RS-TVH	1,59	**70**	125	31	1,5	–	111,4	–	84,7
2214-M	1,69	**70**	125	31	1,5	108,9	–	87,6	–
1314-M	3,22	**70**	150	35	2,1	126,4	–	97,7	–
2314-M	4,38	**70**	150	51	2,1	127,2	–	91,5	–
1215-K-TVH-C3	1,32	**75**	130	25	1,5	114,1	–	93,7	–
1215-TVH	1,34	**75**	130	25	1,5	114,1	–	93,7	–
2215-K-TVH-C3	1,6	**75**	130	31	1,5	114,3	–	93,3	–
2215-TVH	1,6	**75**	130	31	1,5	114,3	–	93,3	–
1315-K-M-C3	3,81	**75**	160	37	2,1	134,8	–	104,4	–
1315-M	3,86	**75**	160	37	2,1	134,8	–	104,4	–
2315-K-M-C3	5,21	**75**	160	55	2,1	136,7	–	100,5	–
2315-M	5,33	**75**	160	55	2,1	136,7	–	100,5	–



Tapered bore
K = taper 1:12



Tapered bore
K = taper 1:12
Seal 2RS

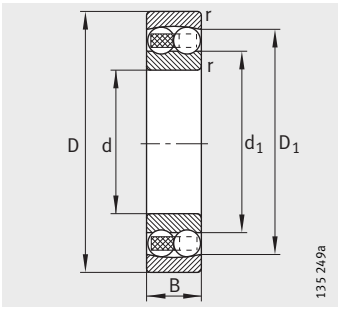


Mounting dimensions

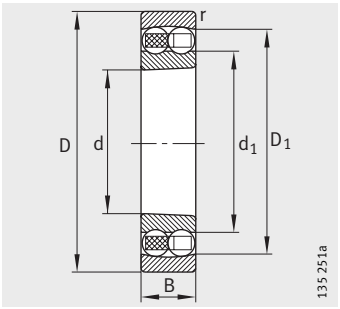
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
69	101	1,5	30 500	11 400	0,18	3,47	5,37	3,64	710	6 700	8 500
69	101	1,5	30 500	11 400	0,18	3,47	5,37	3,64	710	6 700	8 500
69	101	1,5	30 500	11 400	0,18	3,47	5,37	3,64	710	4 300	–
69	101	1,5	30 500	11 400	0,18	3,47	5,37	3,64	710	4 300	–
69	101	1,5	48 000	16 300	0,23	2,69	4,16	2,82	1 020	6 300	7 100
69	101	1,5	48 000	16 300	0,23	2,69	4,16	2,82	1 020	6 300	7 100
72	118	2,1	58 000	20 600	0,23	2,77	4,28	2,9	1 280	5 300	7 300
72	118	2,1	58 000	20 600	0,23	2,77	4,28	2,9	1 280	5 300	7 300
72	118	2,1	89 000	28 000	0,41	1,55	2,4	1,62	1 740	5 000	8 000
72	118	2,1	89 000	28 000	0,41	1,55	2,4	1,62	1 740	5 000	8 000
74	111	1,5	31 000	12 400	0,18	3,57	5,52	3,74	770	6 300	7 900
74	111	1,5	31 000	12 400	0,18	3,57	5,52	3,74	770	6 300	7 900
74	111	1,5	31 000	12 400	0,18	3,57	5,52	3,74	770	4 000	–
74	111	1,5	31 000	12 400	0,18	3,57	5,52	3,74	770	4 000	–
74	111	1,5	58 000	19 000	0,23	2,78	4,31	2,92	1 190	5 300	6 900
74	111	1,5	58 000	19 000	0,23	2,78	4,31	2,92	1 190	5 300	6 900
77	128	2,1	63 000	22 700	0,23	2,75	4,26	2,88	1 380	5 000	7 100
77	128	2,1	63 000	22 700	0,23	2,75	4,26	2,88	1 380	5 000	7 100
77	128	2,1	98 000	32 000	0,39	1,62	2,51	1,7	1 980	4 800	7 300
77	128	2,1	98 000	32 000	0,39	1,62	2,51	1,7	1 980	4 800	7 300
79	116	1,5	35 000	13 700	0,19	3,36	5,21	3,52	850	6 000	7 900
79	116	1,5	35 000	13 700	0,19	3,36	5,21	3,52	850	6 000	7 900
79	116	1,5	35 000	13 700	0,19	3,36	5,21	3,52	850	3 800	–
79	116	1,5	44 000	16 900	0,27	2,34	3,62	2,45	1 050	8 500	6 600
82	138	2,1	75 000	27 500	0,23	2,79	4,32	2,93	1 620	7 000	6 900
82	138	2,1	112 000	37 000	0,38	1,65	2,55	1,73	2 210	6 300	6 900
84	121	1,5	39 000	15 500	0,19	3,32	5,15	3,48	950	5 600	7 400
84	121	1,5	39 000	15 500	0,19	3,32	5,15	3,48	950	5 600	7 400
84	121	1,5	44 500	17 600	0,26	2,47	3,82	2,59	1 080	5 300	6 200
84	121	1,5	44 500	17 600	0,26	2,47	3,82	2,59	1 080	5 300	6 200
87	148	2,1	80 000	29 500	0,23	2,77	4,29	2,9	1 690	6 300	6 600
87	148	2,1	80 000	29 500	0,23	2,77	4,29	2,9	1 690	6 300	6600
87	148	2,1	124 000	42 000	0,38	1,64	2,54	1,72	2 420	6 000	6 700
87	148	2,1	124 000	42 000	0,38	1,64	2,54	1,72	2 420	6 000	6 700

Self-aligning ball bearings

With cylindrical or tapered bore
Open



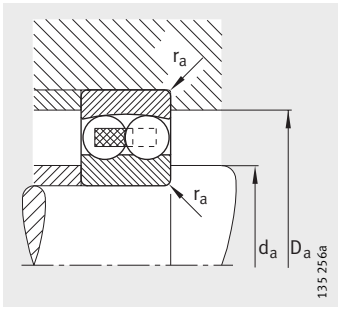
Cylindrical bore



Tapered bore
K = taper 1:12

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions					
	m	d	D	B	r	D_1	d_1
	≈kg				min.	≈	≈
1216-K-TVH-C3	1,62	**80**	140	26	2	122,1	102
1216-TVH	1,65	**80**	140	26	2	122,1	102
2216-K-TVH-C3	1,97	**80**	140	33	2	120,8	99,5
2216-TVH	2,01	**80**	140	33	2	120,8	99,5
1316-K-M-C3	4,5	**80**	170	39	2,1	144,3	110,2
1316-M	4,56	**80**	170	39	2,1	144,3	110,2
2316-K-M-C3	6,18	**80**	170	58	2,1	144,5	107,6
2316-M	6,31	**80**	170	58	2,1	144,5	107,6
1217-K-TVH-C3	2,03	**85**	150	28	2	130,4	107,5
1217-TVH	2,07	**85**	150	28	2	130,4	107,5
2217-K-M-C3	2,73	**85**	150	36	2	130	105,2
2217-M	2,79	**85**	150	36	2	130	105,2
1317-K-M-C3	5,32	**85**	180	41	3	152	117,2
1317-M	5,39	**85**	180	41	3	152	117,2
2317-K-M-C3	7,36	**85**	180	60	3	153,3	114
2317-M	7,35	**85**	180	60	3	153,3	114
1218-K-TVH-C3	2,48	**90**	160	30	2	138,7	112,7
1218-TVH	2,52	**90**	160	30	2	138,7	112,7
2218-K-TVH-C3	3,18	**90**	160	40	2	139,4	111,5
2218-TVH	3,18	**90**	160	40	2	139,4	111,5
1318-K-M-C3	6,27	**90**	190	43	3	159,9	124,4
1318-M	6,35	**90**	190	43	3	159,9	124,4
2318-K-M-C3	8,6	**90**	190	64	3	161	115,7
2318-M	8,78	**90**	190	64	3	161	115,7

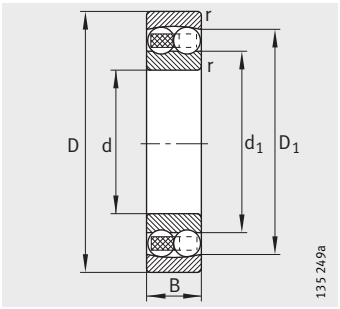


Mounting dimensions

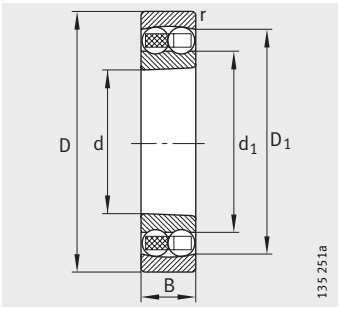
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
91	129	2	40 000	16 800	0,16	3,9	6,03	4,08	990	5 000	6 800
91	129	2	40 000	16 800	0,16	3,9	6,03	4,08	990	5 000	6 800
91	129	2	49 500	19 800	0,25	2,48	3,84	2,6	1 180	5 000	6 000
91	129	2	49 500	19 800	0,25	2,48	3,84	2,6	1 180	5 000	6 000
92	158	2,1	89 000	33 000	0,22	2,87	4,44	3	1 810	6 000	6 300
92	158	2,1	89 000	33 000	0,22	2,87	4,44	3	1 810	6 000	6 300
92	158	2,1	139 000	48 500	0,37	1,7	2,62	1,78	2 700	5 600	6 400
92	158	2,1	139 000	48 500	0,37	1,7	2,62	1,78	2 700	5 600	6 400
96	139	2	49 500	20 600	0,17	3,73	5,78	3,91	1 180	4 800	6 700
96	139	2	49 500	20 600	0,17	3,73	5,78	3,91	1 180	4 800	6 700
96	139	2	59 000	23 400	0,26	2,46	3,81	2,58	1 340	7 000	5 800
96	139	2	59 000	23 400	0,26	2,46	3,81	2,58	1 340	7 000	5 800
99	166	2,5	99 000	37 500	0,22	2,88	4,46	3,02	2 010	5 600	6 000
99	166	2,5	99 000	37 500	0,22	2,88	4,46	3,02	2 010	5 600	6 000
99	166	2,5	143 000	51 000	0,37	1,68	2,61	1,76	2 750	5 300	6 100
99	166	2,5	143 000	51 000	0,37	1,68	2,61	1,76	2 750	5 300	6 100
101	149	2	57 000	23 300	0,17	3,74	5,79	3,92	1 300	4 500	6 600
101	149	2	57 000	23 300	0,17	3,74	5,79	3,92	1 300	4 500	6 600
101	149	2	71 000	28 500	0,27	2,33	3,61	2,44	1 580	4 300	5 700
101	149	2	71 000	28 500	0,27	2,33	3,61	2,44	1 580	4 300	5 700
104	176	2,5	109 000	42 500	0,22	2,83	4,38	2,97	2 230	5 300	5 800
104	176	2,5	109 000	42 500	0,22	2,83	4,38	2,97	2 230	5 300	5 800
104	176	2,5	156 000	57 000	0,39	1,63	2,53	1,71	3 000	5 000	5 900
104	176	2,5	156 000	57 000	0,39	1,63	2,53	1,71	3 000	5 000	5 900

Self-aligning ball bearings

With cylindrical or tapered bore
Open



Cylindrical bore

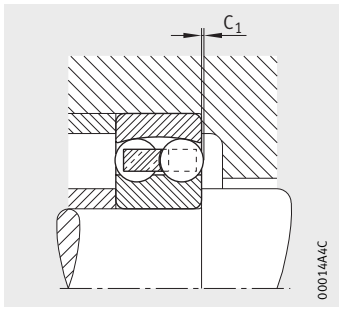


Tapered bore
K = taper 1:12

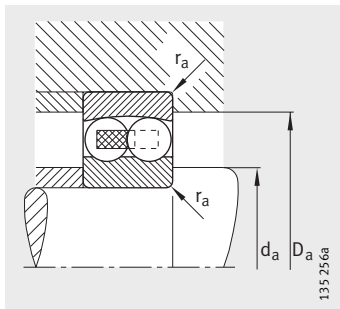
Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	d_1	C_1 [1]
	≈kg				min.	≈	≈	
1219-K-M-C3	3,28	**95**	170	32	2,1	148,2	120,5	–
1219-M	3,32	**95**	170	32	2,1	148,2	120,5	–
2219-K-M-C3	4,24	**95**	170	43	2,1	148,6	118,9	–
2219-M	4,33	**95**	170	43	2,1	148,6	118,9	–
1319-K-M-C3	7,2	**95**	200	45	3	170,5	127,7	1,6
1319-M	7,29	**95**	200	45	3	170,5	127,6	1,6
2319-K-M-C3	9,97	**95**	200	67	3	168,5	121,6	–
2319-M	10,2	**95**	200	67	3	168,5	121,6	–
1220-K-M-C3	3,94	**100**	180	34	2,1	155,2	127,7	–
1220-M	3,99	**100**	180	34	2,1	155,2	127,7	–
2220-K-M-C3	5,1	**100**	180	46	2,1	156,9	124,4	–
2220-M	5,21	**100**	180	46	2,1	156,9	124,4	–
1320-K-M-C3	8,95	**100**	215	47	3	182,6	135,5	2,4
1320-M	9,06	**100**	215	47	3	182,6	135,5	2,4
2320-K-M-C3	12,7	**100**	215	73	3	183	130,8	–
2320-M	12,9	**100**	215	73	3	183	130,8	–
1221-M	4,75	**105**	190	36	2,1	164,4	133,9	–
1321-M	10,3	**105**	225	49	3	191,3	143,2	2,5
1222-K-M-C3	5,49	**110**	200	38	2,1	173,9	140,7	–
1222-M	5,57	**110**	200	38	2,1	173,9	140,7	–
2222-K-M-C3	7,27	**110**	200	53	2,1	174,1	136,9	–
2222-M	7,45	**110**	200	53	2,1	174,1	136,9	–
1322-K-M-C3	12,2	**110**	240	50	3	203,2	154,7	2,7
1322-M	12,3	**110**	240	50	3	203,2	154,5	2,7
2322-K-M-C3	17,5	**110**	240	80	3	203	145,5	–
2322-M	18,1	**110**	240	80	3	203	145,5	–
1224-M	7,13	**120**	215	42	2,1	187,3	149	1,8
1226-M	8,67	**130**	230	46	3	200,1	161,5	0,6
1228-M	11,2	**140**	250	50	3	221,2	175	2,7
1230-M	14,6	**150**	270	54	3	237,9	186,7	3,8

[1] The projection must be taken into consideration when designing the adjacent construction.



Ball projection C_1

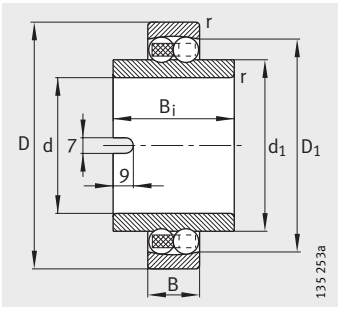


Mounting dimensions

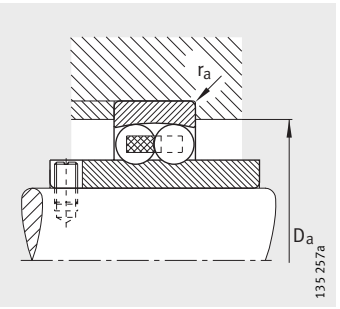
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
107	158	2,1	64 000	27 000	0,17	3,73	5,78	3,91	1 450	6 000	6 200
107	158	2,1	64 000	27 000	0,17	3,73	5,78	3,91	1 450	6 000	6 200
107	158	2,1	84 000	34 000	0,27	2,32	3,59	2,43	1 840	6 000	5 600
107	158	2,1	84 000	34 000	0,27	2,32	3,59	2,43	1 840	6 000	5 600
109	186	2,5	134 000	50 000	0,23	2,73	4,23	2,86	2 550	5 000	5 700
109	186	2,5	134 000	50 000	0,23	2,73	4,23	2,86	2 550	5 000	5 700
109	186	2,5	167 000	63 000	0,38	1,66	2,57	1,74	3 250	4 800	5 600
109	186	2,5	167 000	63 000	0,38	1,66	2,57	1,74	3 250	4 800	5 600
112	168	2,1	70 000	29 500	0,18	3,58	5,53	3,75	1 550	5 600	6 100
112	168	2,1	70 000	29 500	0,18	3,58	5,53	3,75	1 550	5 600	6 100
112	168	2,1	98 000	40 000	0,27	2,33	3,61	2,44	2 120	5 600	5 400
112	168	2,1	98 000	40 000	0,27	2,33	3,61	2,44	2 120	5 600	5 400
114	201	2,5	145 000	57 000	0,24	2,68	4,15	2,81	2 800	4 800	5 400
114	201	2,5	145 000	57 000	0,24	2,68	4,15	2,81	2 800	4 800	5 400
114	201	2,5	196 000	78 000	0,38	1,67	2,58	1,75	3 900	4 500	5 200
114	201	2,5	196 000	78 000	0,38	1,67	2,58	1,75	3 900	4 500	5 200
117	178	2,1	75 000	32 000	0,18	3,54	5,48	3,71	1 640	5 300	5 900
119	211	2,5	158 000	64 000	0,23	2,75	4,25	2,88	3 100	4 500	5 200
122	188	2,1	89 000	38 000	0,17	3,61	5,59	3,78	1 900	5 000	5 700
122	188	2,1	89 000	38 000	0,17	3,61	5,59	3,78	1 900	5 000	5 700
122	188	2,1	126 000	51 000	0,28	2,23	3,45	2,33	2 550	5 000	5 200
122	188	2,1	126 000	51 000	0,28	2,23	3,45	2,33	2 550	5 000	5 200
124	226	2,5	165 000	71 000	0,23	2,79	4,32	2,92	3 300	4 500	4 700
124	226	2,5	165 000	71 000	0,23	2,79	4,32	2,92	3 300	4 500	4 700
124	226	2,5	221 000	94 000	0,37	1,69	2,62	1,77	4 400	4 300	4 600
124	226	2,5	221 000	94 000	0,37	1,69	2,62	1,77	4 400	4 300	4 600
132	203	2,1	121 000	52 000	0,2	3,11	4,81	3,25	2 500	4 800	5 600
144	216	2,5	125 000	55 000	0,19	3,24	5,02	3,4	2 550	4 500	5 400
154	236	2,5	163 000	74 000	0,21	3,05	4,71	3,19	3 300	4 300	4 950
164	256	2,5	180 000	86 000	0,22	2,9	4,49	3,04	3 700	3 800	4 550

Self-aligning ball bearings

With extended inner ring



Extended inner ring



Mounting dimensions

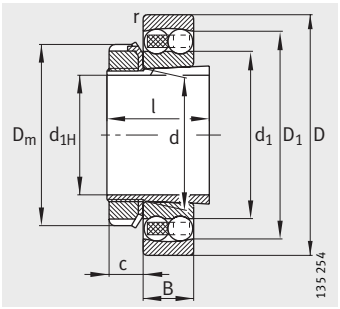
Dimension table · Dimensions in mm

Designation	Mass	Dimensions							Mounting dimensions	
	m	d	D	B	r	B_i	D_1	d_1	D_a	r_a
	≈kg				min.		≈	≈	max.	max.
11204-TVH	0,085	**20**	47	14	1	40	38,1	29,2	41,4	1
11205-TVH	0,226	**25**	52	15	1	44	43,9	33,3	46,4	1
11206-TVH	0,364	**30**	62	16	1	48	51,9	40,1	56,4	1
11207-TVH	0,554	**35**	72	17	1,1	52	59,6	47,7	65	1
11208-TVH	0,722	**40**	80	18	1,1	56	67,8	54	73	1
11209-TVH	0,78	**45**	85	19	1,1	58	72,7	57,7	78	1
11210-TVH	0,866	**50**	90	20	1,1	58	77,6	62,7	83	1
11211-TVH	1,13	**55**	100	21	1,5	60	86,9	69,5	91	1,5
11212-TVH	1,51	**60**	110	22	1,5	62	95,8	78	101	1,5

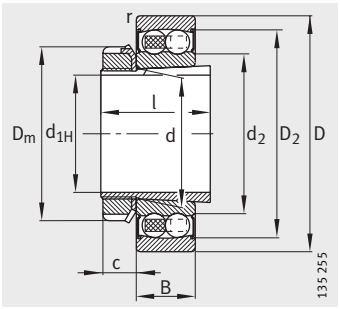
Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed
dyn. C_r N	stat. C_{0r} N	e	Y_1	Y_2	Y_0	C_{ur} N	n_G min^{-1}
10 100	2 600	0,28	2,24	3,46	2,34	161	13 000
12 300	3 250	0,27	2,37	3,66	2,48	203	10 000
15 900	4 600	0,25	2,53	3,91	2,65	285	8 500
16 000	5 100	0,22	2,8	4,34	2,94	315	7 500
19 400	6 500	0,22	2,9	4,49	3,04	400	6 700
22 000	7 300	0,21	3,04	4,7	3,18	455	6 000
22 900	8 000	0,2	3,17	4,9	3,32	500	5 600
27 000	9 900	0,19	3,31	5,12	3,47	620	5 000
30 500	11 400	0,18	3,47	5,37	3,64	710	4 500

Self-aligning ball bearings

With adapter sleeve
Open or sealed



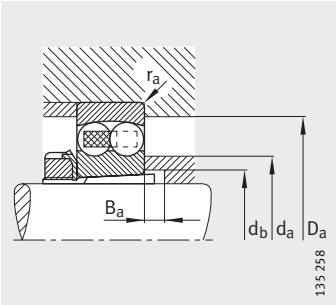
Open



Seal 2RS

Dimension table · Dimensions in mm

Designation		Mass m		Dimensions									
Bearing	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d_{1H}	d	D	B	r min.	D_1 ≈	D_2 ≈	d_1 ≈	d_2 ≈	D_m
1204-K-TVH-C3	**H204**	0,116	0,041	**17**	20	47	14	1	38,1	–	29,2	–	32
1205-K-TVH-C3	**H205**	0,135	0,069	**20**	25	52	15	1	43,9	–	33,3	–	38
2205-K-2RS-TVH-C3	**H305**	0,157	0,075	**20**	25	52	18	1	–	46,3	–	30,7	38
2205-K-TVH-C3	**H305**	0,152	0,075	**20**	25	52	18	1	44,7	–	32,3	–	38
1305-K-TVH-C3	**H305**	0,254	0,075	**20**	25	62	17	1,1	50,8	–	38,1	–	38
2305-K-TVH-C3	**H2305**	0,328	0,085	**20**	25	62	24	1,1	50,1	–	35,5	–	38
1206-K-TVH-C3	**H206**	0,217	0,091	**25**	30	62	16	1	51,9	–	40,1	–	45
2206-K-2RS-TVH-C3	**H306**	0,268	0,099	**25**	30	62	20	1	–	54,3	–	37,3	45
2206-K-TVH-C3	**H306**	0,246	0,099	**25**	30	62	20	1	54	–	38,5	–	45
1306-K-TVH-C3	**H306**	0,379	0,099	**25**	30	72	19	1,1	59,4	–	45	–	45
2306-K-TVH-C3	**H2306**	0,476	0,116	**25**	30	72	27	1,1	59,3	–	41,5	–	45
1207-K-TVH-C3	**H207**	0,319	0,129	**30**	35	72	17	1,1	59,6	–	47,7	–	57
2207-K-2RS-TVH-C3	**H307**	0,432	0,147	**30**	35	72	23	1,1	–	64,3	–	43,5	57
2207-K-TVH-C3	**H307**	0,38	0,147	**30**	35	72	23	1,1	62,9	–	45,7	–	57
1307-K-TVH-C3	**H307**	0,5	0,147	**30**	35	80	21	1,5	67,5	–	51,3	–	57
2307-K-TVH-C3	**H2307**	0,96	0,171	**30**	35	80	31	1,5	66,8	–	46,9	–	52
1208-K-TVH-C3	**H208**	0,408	0,17	**35**	40	80	18	1,1	67,8	–	54	–	58
2208-K-2RS-TVH-C3	**H308**	0,517	0,185	**35**	40	80	23	1,1	–	71,1	–	49,2	58
2208-K-TVH-C3	**H308**	0,465	0,185	**35**	40	80	23	1,1	70,7	–	52,5	–	58
1308-K-TVH-C3	**H308**	0,698	0,185	**35**	40	90	23	1,5	75,3	–	57,8	–	58
2308-K-TVH-C3	**H2308**	0,899	0,222	**35**	40	90	33	1,5	75	–	53,7	–	58
1209-K-TVH-C3	**H209**	0,454	0,216	**40**	45	85	19	1,1	72,7	–	57,7	–	65
2209-K-2RS-TVH-C3	**H309**	0,535	0,246	**40**	45	85	23	1,1	–	75,4	–	53,8	65
2209-K-TVH-C3	**H309**	0,505	0,246	**40**	45	85	23	1,1	75,9	–	59	–	65
1309-K-TVH-C3	**H309**	0,939	0,246	**40**	45	100	25	1,5	84,1	–	64,1	–	65
2309-K-TVH-C3	**H2309**	1,19	0,283	**40**	45	100	36	1,5	84,2	–	60,1	–	65

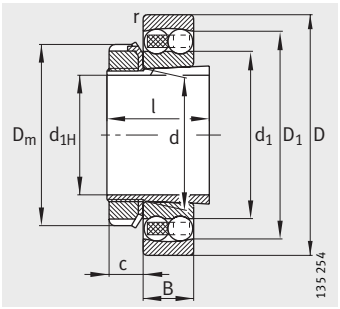


Mounting dimensions

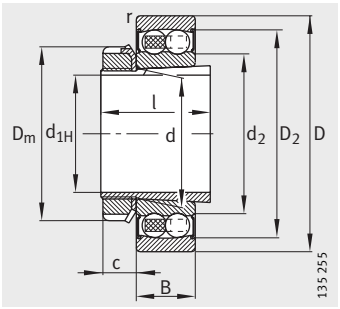
		Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
l	c	d_a	D_a	d_b	B_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
	≈	max.	max.	min.	min.	max.	N	N					N	min^{-1}	min^{-1}
24	7	27	41,4	23	5	1	10 100	2 600	0,28	2,24	3,46	2,34	161	18 000	20 700
26	9	32	46,4	28	5	1	12 300	3 250	0,27	2,37	3,66	2,48	203	16 000	18 100
29	9	32	46,4	28	5	1	12 300	3 250	0,27	2,37	3,66	2,48	203	9 500	–
29	9	32	46,4	28	5	1	17 300	4 400	0,35	1,78	2,75	1,86	275	15 000	14 900
29	9	35	55	28	6	1	18 300	4 950	0,28	2,29	3,54	2,4	310	14 000	13 900
35	9	34	55	30	5	1	25 000	6 500	0,48	1,32	2,04	1,38	405	13 000	14 100
27	9	38	56,4	33	5	1	15 900	4 600	0,25	2,53	3,91	2,65	285	14 000	15 400
31	9	38	56,4	33	5	1	15 900	4 600	0,25	2,53	3,91	2,65	285	8 000	–
31	9	38	56,4	33	5	1	26 000	6 900	0,3	2,13	3,29	2,23	430	12 000	12 700
31	9	42	65	33	6	1	21 700	6 300	0,26	2,39	3,71	2,51	390	11 000	12 200
38	9	40	65	35	5	1	32 500	8 700	0,45	1,4	2,17	1,47	540	10 000	12 300
29	10	45	65	38	5	1	16 000	5 100	0,22	2,8	4,34	2,94	315	12 000	13 200
35	10	45	65	38	5	1	16 000	5 100	0,22	2,8	4,34	2,94	315	7 000	–
35	10	44	65	39	5	1	33 000	8 900	0,3	2,13	3,29	2,23	560	9 500	11 500
35	10	49	71	39	8	1,5	25 500	7 800	0,26	2,47	3,82	2,59	485	9 500	10 900
43	10	45	71	40	5	1,5	40 500	11 100	0,47	1,35	2,1	1,42	690	9 000	11 600
31	11	52	73	43	5	1	19 400	6 500	0,22	2,9	4,49	3,04	400	10 000	11 600
36	11	52	73	43	5	1	19 400	6 500	0,22	2,9	4,49	3,04	400	6 300	–
36	11	50	73	44	5	1	32 500	9 400	0,26	2,43	3,76	2,54	580	9 000	9 700
36	11	55	81	44	5	1,5	30 000	9 600	0,25	2,52	3,9	2,64	600	8 500	10 000
46	11	51	81	45	5	1,5	46 000	13 400	0,43	1,45	2,25	1,52	830	8 000	10 300
33	12	57	78	48	5	1	22 000	7 300	0,21	3,04	4,7	3,18	455	9 000	11 100
39	12	57	78	48	5	1	22 000	7 300	0,21	3,04	4,7	3,18	455	5 600	–
39	12	56	78	50	8	1	28 500	8 900	0,26	2,43	3,76	2,54	550	8 500	8 700
39	12	61	91	50	5	1,5	38 500	12 600	0,25	2,5	3,87	2,62	780	7 500	9 300
50	12	57	91	50	5	1,5	55 000	16 500	0,43	1,48	2,29	1,55	1 030	7 000	9 400

Self-aligning ball bearings

With adapter sleeve
Open or sealed



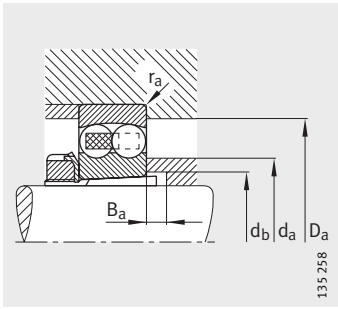
Open



Seal 2RS

Dimension table (continued) · Dimensions in mm

Designation		Mass m		Dimensions									
Bearing	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d_{1H}	d	D	B	r min.	D_1 ≈	D_2 ≈	d_1 ≈	d_2 ≈	D_m
1210-K-TVH-C3	**H210**	0,516	0,264	**45**	50	90	20	1,1	77,6	–	62,7	–	70
2210-K-2RS-TVH-C3	**H310**	0,593	0,301	**45**	50	90	23	1,1	–	80	–	60,6	70
2210-K-TVH-C3	**H310**	0,543	0,301	**45**	50	90	23	1,1	81	–	64	–	70
1310-K-TVH-C3	**H310**	1,52	0,301	**45**	50	110	27	2	91,9	–	71,2	–	70
1211-K-TVH-C3	**H211**	0,682	0,292	**50**	55	100	21	1,5	86,9	–	69,5	–	75
2211-K-2RS-TVH-C3	**H311**	0,808	0,35	**50**	55	100	25	1,5	–	88,9	–	68	75
2211-K-TVH-C3	**H311**	0,73	0,35	**50**	55	100	25	1,5	90	–	69,6	–	75
1311-K-TVH-C3	**H311**	1,55	0,35	**50**	55	120	29	2	101,6	–	78	–	75
2311-K-TVH-C3	**H2311**	2,02	0,426	**50**	55	120	43	2	100,7	–	71,7	–	75
1212-K-TVH-C3	**H212**	0,88	0,325	**55**	60	110	22	1,5	95,8	–	78	–	80
2212-K-2RS-TVH-C3	**H312**	1,13	0,373	**55**	60	110	28	1,5	–	98,5	–	70,4	80
2212-K-TVH-C3	**H312**	1,03	0,373	**55**	60	110	28	1,5	98,8	–	76,6	–	80
1312-K-TVH-C3	**H312**	1,94	0,373	**55**	60	130	31	2,1	112,2	–	87	–	80
2312-K-TVH-C3	**H2312**	2,52	0,464	**55**	60	130	46	2,1	109,1	–	77	–	80
1213-K-TVH-C3	**H213**	1,13	0,393	**60**	65	120	23	1,5	103,2	–	85,2	–	92
2213-K-2RS-TVH-C3	**H313**	1,5	0,452	**60**	65	120	31	1,5	–	106,6	–	78	92
2213-K-TVH-C3	**H313**	1,33	0,452	**60**	65	120	31	1,5	107,5	–	82,4	–	92
1313-K-TVH-C3	**H313**	2,41	0,452	**60**	65	140	33	2,1	118,8	–	92,7	–	92
2313-K-TVH-C3	**H2313**	3,16	0,553	**60**	65	140	48	2,1	118,9	–	85,6	–	92
1214-K-TVH-C3	**H214**	1,23	0,603	**60**	70	125	24	1,5	106,6	–	87,7	–	98
1215-K-TVH-C3	**H215**	1,32	0,693	**65**	75	130	25	1,5	114,1	–	93,7	–	98
2215-K-TVH-C3	**H315**	1,6	0,826	**65**	75	130	31	1,5	114,3	–	93,3	–	104
1315-K-M-C3	**H315**	3,81	0,826	**65**	75	160	37	2,1	134,8	–	104,4	–	104
2315-K-M-C3	**H2315**	5,21	1,05	**65**	75	160	55	2,1	136,7	–	100,5	–	98
1216-K-TVH-C3	**H216**	1,62	0,876	**70**	80	140	26	2	122,1	–	102	–	105
2216-K-TVH-C3	**H316**	1,97	1,01	**70**	80	140	33	2	120,8	–	99,5	–	105
1316-K-M-C3	**H316**	4,5	1,01	**70**	80	170	39	2,1	144,3	–	110,2	–	105
2316-K-M-C3	**H2316**	6,18	1,27	**70**	80	170	58	2,1	144,5	–	107,6	–	105
1217-K-TVH-C3	**H217**	2,03	0,995	**75**	85	150	28	2	130,4	–	107,5	–	110
2217-K-M-C3	**H317**	2,73	1,16	**75**	85	150	36	2	130	–	105,2	–	110
1317-K-M-C3	**H317**	5,32	1,16	**75**	85	180	41	3	152	–	117,2	–	110
2317-K-M-C3	**H2317**	7,36	1,44	**75**	85	180	60	3	153,3	–	114	–	110

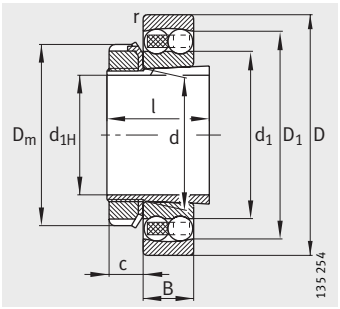


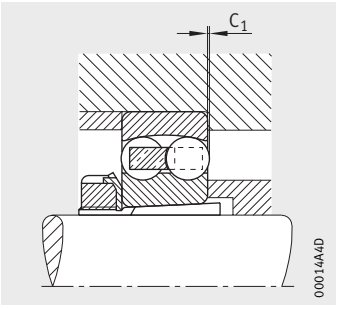
Mounting dimensions

		Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
l	c	d_a	D_a	d_b	B_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
	≈	max.	max.	min.	min.	max.	N	N					N	min^{-1}	min^{-1}
35	13	62	83	53	5	1	22 900	8 000	0,2	3,17	4,9	3,32	500	8 500	10 500
42	13	62	83	53	5	1	22 900	8 000	0,2	3,17	4,9	3,32	500	5 300	–
42	13	61	83	55	10	1	28 500	9 400	0,24	2,61	4,05	2,74	580	8 000	8 000
42	13	68	99	55	5	2	42 000	14 100	0,24	2,6	4,03	2,73	880	6 700	8 700
37	13	69	91	60	6	1,5	27 000	9 900	0,19	3,31	5,12	3,47	620	7 500	9 300
45	13	69	91	60	6	1,5	27 000	9 900	0,19	3,31	5,12	3,47	620	4 800	–
45	13	68	91	60	10	1,5	39 000	12 400	0,22	2,92	4,52	3,06	770	6 700	7 500
45	13	74	109	60	6	2	52 000	17 700	0,24	2,66	4,12	2,79	1 100	6 000	8 100
59	13	69	109	61	6	2	77 000	23 800	0,42	1,51	2,33	1,58	1 480	5 600	8 500
38	13	75	101	64	5	1,5	30 500	11 400	0,18	3,47	5,37	3,64	710	6 700	8 500
47	13	75	101	64	5	1,5	30 500	11 400	0,18	3,47	5,37	3,64	710	4 300	–
47	13	73	101	65	8	1,5	48 000	16 300	0,23	2,69	4,16	2,82	1 020	6 300	7 100
47	13	83	118	65	5	2,1	58 000	20 600	0,23	2,77	4,28	2,9	1 280	5 300	7 300
62	13	74	118	66	5	2,1	89 000	28 000	0,41	1,55	2,4	1,62	1 740	5 000	8 000
40	14	83	111	70	5	1,5	31 000	12 400	0,18	3,57	5,52	3,74	770	6 300	7 900
50	14	83	111	70	5	1,5	31 000	12 400	0,18	3,57	5,52	3,74	770	4 000	–
50	14	79	111	70	8	1,5	58 000	19 000	0,23	2,78	4,31	2,92	1 190	5 300	6 900
50	14	89	128	70	5	2,1	63 000	22 700	0,23	2,75	4,26	2,88	1 380	5 000	7 100
65	14	82	128	72	5	2,1	98 000	32 000	0,39	1,62	2,51	1,7	1 980	4 800	7 300
41	14	86	116	75	5	1,5	35 000	13 700	0,19	3,36	5,21	3,52	850	6 000	7 900
43	15	92	121	80	5	1,5	39 000	15 500	0,19	3,32	5,15	3,48	950	5 600	7 400
55	15	90	121	80	12	1,5	44 500	17 600	0,26	2,47	3,82	2,59	1 080	5 300	6 200
55	15	100	148	80	5	2,1	80 000	29 500	0,23	2,77	4,29	2,9	1 690	6 300	6 600
73	15	94	148	82	5	2,1	124 000	42 000	0,38	1,64	2,54	1,72	2 420	6 000	6 700
46	17	99	129	85	5	2	40 000	16 800	0,16	3,9	6,03	4,08	990	5 000	6 800
59	17	96	129	85	12	2	49 500	19 800	0,25	2,48	3,84	2,6	1 180	5 000	6 000
59	17	107	158	85	5	2,1	89 000	33 000	0,22	2,87	4,44	3	1 810	6 000	6 300
78	17	100	158	88	5	2,1	139 000	48 500	0,37	1,7	2,62	1,78	2 700	5 600	6 400
50	18	105	139	90	6	2	49 500	20 600	0,17	3,73	5,78	3,91	1 180	4 800	6 700
63	18	102	139	91	12	2	59 000	23 400	0,26	2,46	3,81	2,58	1 340	7 000	5 800
63	18	114	166	91	6	2,5	99 000	37 500	0,22	2,88	4,46	3,02	2 010	5 600	6 000
82	18	106	166	94	6	2,5	143 000	51 000	0,37	1,68	2,61	1,76	2 750	5 300	6 100

Self-aligning ball bearings

With adapter sleeve
Open



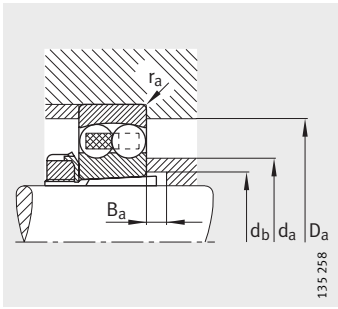


Ball projection C_1 [1)]

Dimension table (continued) · Dimensions in mm

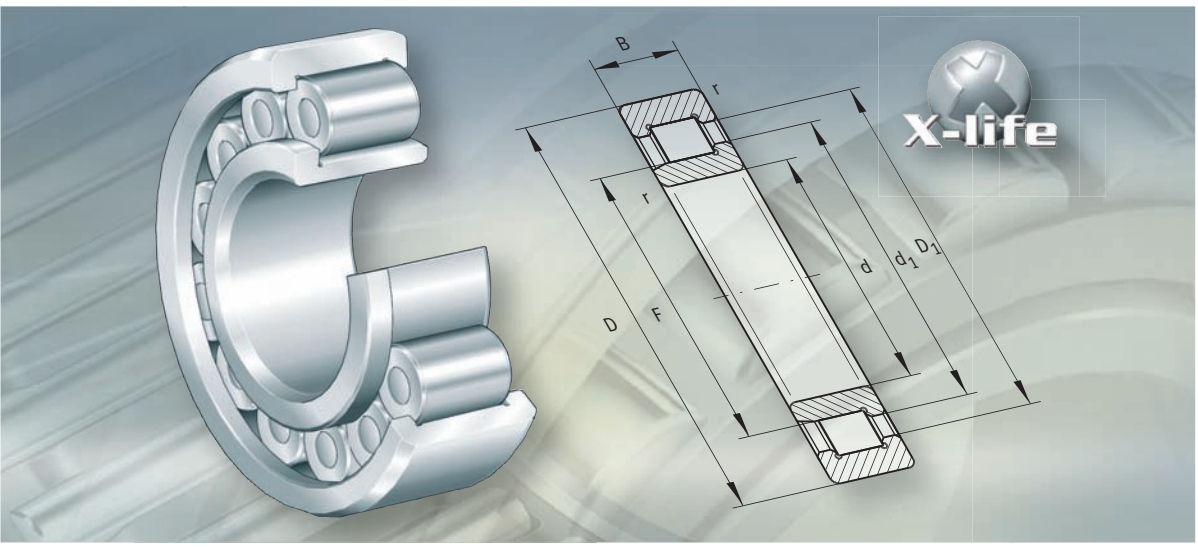
Designation		Mass m		Dimensions									
Bearing	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d_{1H}	d	D	B	r min.	D_1 ≈	d_1 ≈	D_m	l	c ≈
1218-K-TVH-C3	**H218**	2,48	1,17	**80**	90	160	30	2	138,7	112,7	126	52	18
2218-K-TVH-C3	**H318**	3,18	1,36	**80**	90	160	40	2	139,4	111,5	126	65	18
1318-K-M-C3	**H318**	6,27	1,36	**80**	90	190	43	3	159,9	124,4	126	65	18
2318-K-M-C3	**H2318**	8,6	1,68	**80**	90	190	64	3	161	115,7	126	86	18
1219-K-M-C3	**H219**	3,28	1,32	**85**	95	170	32	2,1	148,2	120,5	125	55	19
2219-K-M-C3	**H319**	4,24	1,51	**85**	95	170	43	2,1	148,6	118,9	125	68	19
1319-K-M-C3	**H319**	7,2	1,51	**85**	95	200	45	3	170,5	127,7	125	68	19
2319-K-M-C3	**H2319**	9,97	1,89	**85**	95	200	67	3	168,5	121,6	133	90	19
1220-K-M-C3	**H220**	3,94	1,48	**90**	100	180	34	2,1	155,2	127,7	130	58	20
2220-K-M-C3	**H320**	5,1	1,69	**90**	100	180	46	2,1	156,9	124,4	130	71	20
1320-K-M-C3	**H320**	8,95	1,69	**90**	100	215	47	3	182,6	135,5	130	71	20
2320-K-M-C3	**H2320**	12,7	2,17	**90**	100	215	73	3	183	130,8	142	97	20
1222-K-M-C3	**H222**	5,49	1,9	**100**	110	200	38	2,1	173,9	140,7	145	63	21
2222-K-M-C3	**H322**	7,27	2,15	**100**	110	200	53	2,1	174,1	136,9	154	77	21
1322-K-M-C3	**H322**	12,2	2,15	**100**	110	240	50	3	203,2	154,7	154	77	21
2322-K-M-C3	**H2322**	17,5	2,74	**100**	110	240	80	3	203	145,5	154	105	21

1) The projection must be taken into consideration when designing the adjacent construction.



Mounting dimensions

	Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
C_1 [1]	d_a	D_a	d_b	B_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
	max.	max.	min.	min.	max.	N	N					N	min^{-1}	min^{-1}
–	110	149	95	6	2	57 000	23 300	0,17	3,74	5,79	3,92	1 300	4 500	6 600
–	108	149	96	10	2	71 000	28 500	0,27	2,33	3,61	2,44	1 580	4 300	5 700
–	120	176	96	6	2,5	109 000	42 500	0,22	2,83	4,38	2,97	2 230	5 300	5 800
–	112	176	100	6	2,5	156 000	57 000	0,39	1,63	2,53	1,71	3 000	5 000	5 900
–	117	158	100	7	2,1	64 000	27 000	0,17	3,73	5,78	3,91	1 450	6 000	6 200
–	114	158	102	9	2,1	84 000	34 000	0,27	2,32	3,59	2,43	1 840	6 000	5 600
1,6	126	186	102	7	2,5	134 000	50 000	0,23	2,73	4,23	2,86	2 550	5 000	5 700
–	117	186	105	7	2,5	167 000	63 000	0,38	1,66	2,57	1,74	3 250	4 800	5 600
–	124	168	106	7	2,1	70 000	29 500	0,18	3,58	5,53	3,75	1 550	5 600	6 100
–	120	168	108	8	2,1	98 000	40 000	0,27	2,33	3,61	2,44	2 120	5 600	5 400
2,4	132	201	108	7	2,5	145 000	57 000	0,24	2,68	4,15	2,81	2 800	4 800	5 400
–	125	201	110	7	2,5	196 000	78 000	0,38	1,67	2,58	1,75	3 900	4 500	5 200
–	138	188	116	7	2,1	89 000	38 000	0,17	3,61	5,59	3,78	1 900	5 000	5 700
–	132	188	118	6	2,1	126 000	51 000	0,28	2,23	3,45	2,33	2 550	5 000	5 200
2,7	150	226	118	9	2,5	165 000	71 000	0,23	2,79	4,32	2,92	3 300	4 500	4 700
–	139	226	121	7	2,5	221 000	94 000	0,37	1,69	2,62	1,77	4 400	4 300	4 600



Cylindrical roller bearings

Cylindrical roller bearings with cage
Cylindrical roller bearings with disc cage or spacers
Single row full complement cylindrical roller bearings
Double row full complement cylindrical roller bearings
High precision cylindrical roller bearings

Cylindrical roller bearings

X-life
Cylindrical roller bearings with cage **394**

Single row cylindrical roller bearings with cage have a very high radial load carrying capacity and are suitable for higher speeds compared to full complement designs. The rollers are guided between rigid ribs in one of the two bearing rings and are combined by means of the cage to form a unit with this ring.
Since one bearing ring of this type can always be removed, the rings can be mounted separately. The bearings are available as non-locating, semi-locating and locating bearings.

X-life
Cylindrical roller bearings with disc cage or spacers **446**

In these cylindrical roller bearings, contact between the rolling elements is prevented by a brass disc cage or plastic spacers. The bearings constitute the transition from the full complement bearing design to the cage type bearing. The rollers are guided in the inner ring between rigid ribs. The inner ring is separable and can therefore be mounted separately. The bearings are exclusively in the form of semi-locating bearings.

X-life
Single row full complement cylindrical roller bearings **460**

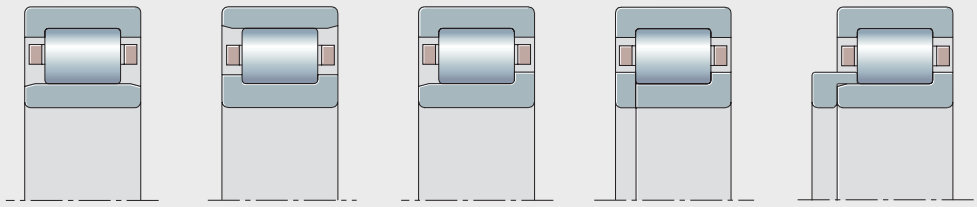
These single bearings have full complement cylindrical roller sets. The rolling elements are guided by ribs on the bearing rings.
Since they have the maximum possible number of rolling elements, bearings with a full complement of cylindrical rollers have extremely high load carrying capacity and high rigidity. Due to the kinematic conditions, however, they do not achieve the high speeds that are possible when using cylindrical roller bearings with cage.
The bearings are exclusively in the form of semi-locating bearings.

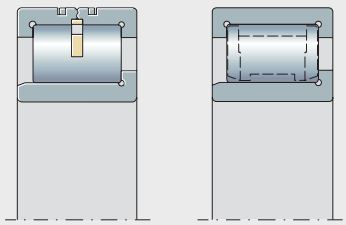
Double row full complement cylindrical roller bearings **478**

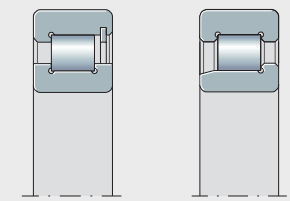
The rolling elements are guided by ribs on the bearing rings.
The bearings have extremely high load carrying capacity and rigidity. However, they do not achieve the high speeds that are possible when using cylindrical roller bearings with a cage. In cable sheave bearings (bearings with grooves in the outer rings), the bearing rings can easily be axially located using retaining rings. Double row full complement bearings are available as non-locating, semi-locating and locating bearings.

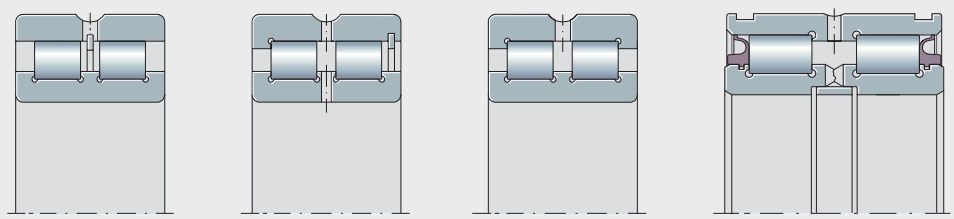
High precision cylindrical roller bearings **500**

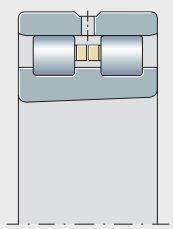
Cylindrical roller bearings of this design are double row high precision bearings (non-locating bearings) for machine tools and correspond to tolerance class SP. They are used to give radial support for main spindles. The bearings are separable and are therefore easier to fit and dismantle. The inner ring has a tapered bore for optimum setting of the radial internal clearance.


NU
N
NJ
NUP
NJ+HJ
000140C5

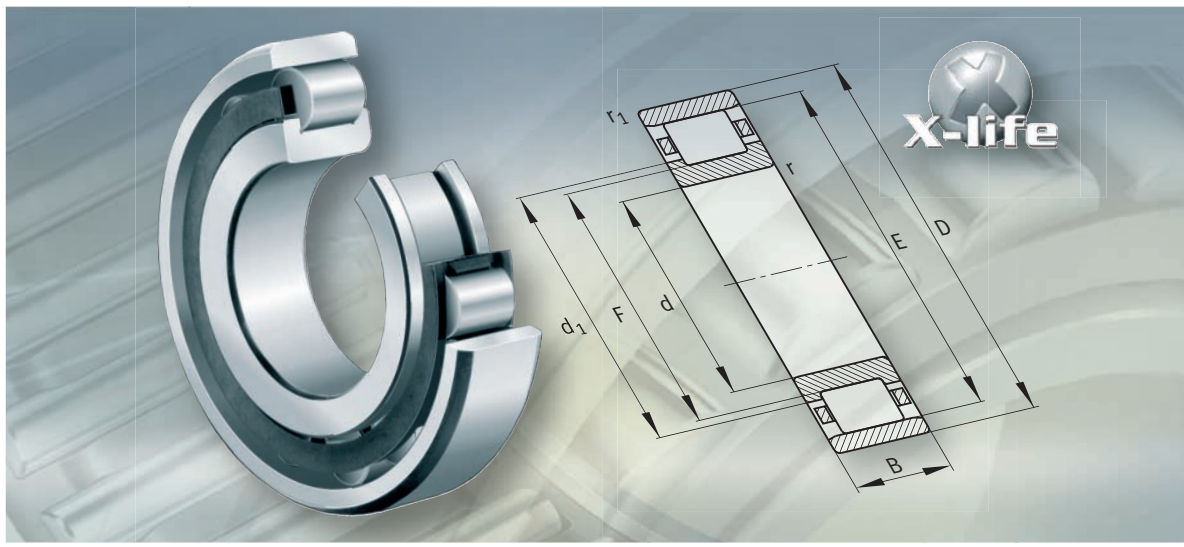

LSL1923
ZSL1923
000140C6


SL1818, SL1829,
SL1830, SL1822
SL1923
00014087


SL0248, SL0249
SL1850
SL0148, SL0149
SL0450..-PP, SL04..-PP
00014088


NN30..-AS-K-M-SP
000140C7

FAG



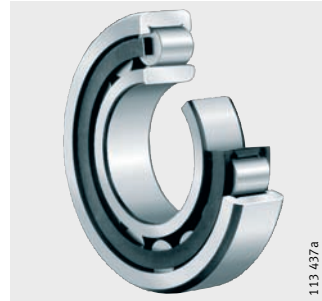
Cylindrical roller bearings with cage

Cylindrical roller bearings with cage

		Page
Product overview	Cylindrical roller bearings with cage	396
Features	X-life	397
	Non-locating bearings	397
	Semi-locating bearings	397
	Locating bearings	398
	Sealing	398
	Lubrication	398
	Operating temperature	398
	Cages	398
	Suffixes	399
Design and safety guidelines	Permissible skewing	400
	Axial load carrying capacity	400
	Minimum radial load	401
	Equivalent dynamic bearing load	402
	Equivalent static bearing load	402
	Design of bearing arrangements	402
Accuracy	Radial internal clearance	403
Dimension tables	Cylindrical roller bearings with cage, non-locating bearings	404
	Cylindrical roller bearings with cage, semi-locating and locating bearings	420

Non-locating bearings

NU10, NU19, NU2..-E, NU3..-E, NU4, NU22..-E, NU23..-E



N2..-E, N3..-E

Semi-locating bearings

NJ2..-E, NJ3..-E, NJ4, NJ22..-E, NJ23..-E

Locating bearings

With rib washer

NUP2..-E, NUP3..-E, NUP22..-E, NUP23..-E

With L-section ring

NJ2..-E + HJ, NJ3..-E + HJ, NJ4 + HJ, NJ22..-E + HJ, NJ23..-E + HJ

Cylindrical roller bearings with cage

Features

Single row cylindrical roller bearings with cage are units comprising solid inner and outer rings together with cylindrical roller and cage assemblies. The outer rings have rigid ribs on both sides or no ribs, the inner rings have one or two rigid ribs or are designed without ribs. The cage prevents the cylindrical rollers from coming into contact with each other during rolling.

The cage type bearings are very rigid, can support high radial loads and, due to the cage, are suitable for higher speeds than the full complement designs. Bearings with the suffix E have a higher capacity roller set and are thus designed for very high load carrying capacity.

The bearings are separable and are therefore easier to fit and dismantle. Both bearing rings can be given a tight fit by this process.

Single row cylindrical roller bearings with cage are available as non-locating, semi-locating and locating bearings.

X-life

Numerous sizes are supplied in the X-life grade.
These bearings are indicated in the dimension tables.

Bearings of X-life quality have, for example, lower roughness R_a and higher geometrical accuracy of the raceways than comparable designs that are not X-life. As a result, these bearings have higher load carrying capacity and longer life for the same dimensioning. In certain applications, this means that a smaller bearing arrangement can be designed.

Non-locating bearings

Cylindrical roller bearings NU and N are non-locating bearings and can support radial forces only.
In series NU, the outer ring has two ribs, while the inner ring has no ribs. Bearings N have two ribs on the inner ring and an outer ring without ribs.

Axial displacement

The outer and inner ring can be axially displaced relative to each other from the central position by the value “s”.

Semi-locating bearings

Cylindrical roller bearings NJ are semi-locating bearings.
Semi-locating bearings can support not only high radial forces but also axial forces in one direction and can therefore guide shafts axially in one direction. They act as non-locating bearings in the opposite direction.
The bearings have two ribs on the outer ring and one rib on the inner ring.

Bearings with L-section ring

Non-locating bearings NU can be combined with an L-section ring HJ to form a semi-locating bearing unit. They must not be installed with two L-section rings (due to the risk of jamming).

Axial displacement

The outer and inner ring can be axially displaced relative to each other in one direction only by the value “s”.

Locating bearings

Cylindrical roller bearings NUP and NJ with HJ are locating bearings. They can support not only high radial forces but also axial forces in both directions and can therefore guide shafts axially in both directions.

Bearings with rib washer

Type NUP has two ribs on the outer ring and one rigid rib on the inner ring. A loose rib washer is fitted on the opposite side.

Bearings with L-section ring

Non-locating bearings NJ can be combined with an L-section ring HJ to form a locating bearing unit. This design has two ribs on the outer ring, one rib on the inner ring and an L-section ring for the ribless side of the inner ring. The L-section rings suitable for the bearings are indicated in the dimension tables. The bearing and L-section ring must be ordered separately.

L-section rings

L-section rings are advantageous where, under high loads, the seating surface of the inner ring in NUP bearings with a loose rib washer is too small to provide a sufficiently high bearing seat. In some applications, they make it easier to fit and dismantle the bearings.

Sealing

The bearings are supplied without seals.

Lubrication

They can be lubricated from the end faces using grease or oil.

Operating temperature

Single row cylindrical roller bearings with cage can be used at operating temperatures from –30 °C to +150 °C.
For continuous operating temperatures above +120 °C, please contact us.

Bearings with a plastic cage (suffix TVP2) are suitable up to +120 °C; the operating life is heavily dependent on the lubricant used.

Cages

The suffix M1 indicates bearings with brass cages guided by rollers.

Cylindrical roller bearings with the suffix TVP2 have a cage made from glass fibre reinforced polyamide PA66.
Other cage suffixes: see table Available designs, page 399.

Check the chemical resistance of polyamide to synthetic greases and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures.
The oil change intervals must be observed.

Standard cages

Standard cages for single row cylindrical roller bearings: see table, page 399.

Bearing series and cage material

Series	Solid cage made from polyamide PA66 TVP2 Bore code	Solid brass cage M1
NU10	–	from 05
NU19	–	from 92
NU2..-E	up to 26	from 28
NU3..-E	up to 28	from 30
NU4	–	All
NU22..-E	up to 26	from 28
NU23..-E	up to 22	from 24
N2..-E	up to 20, 22 to 26	21, from 28
N3..-E	up to 16	from 17
NJ2..-E	up to 26	from 28
NJ3..-E	up to 28	from 30
NJ4	–	All
NJ22..-E	up to 26	from 28
NJ23..-E	up to 22	from 24
NUP2..-E	up to 26	from 28
NUP3..-E	up to 28	from 30
NUP22..-E	up to 26	from 28
NUP23..-E	up to 22	from 24

Other cage designs

Other cage designs are available by agreement. In such cages, suitability for high speeds and temperatures as well as the basic load ratings may differ from the values for bearings with standard cages.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
C3	Radial internal clearance larger than normal	by agreement
C4	Radial internal clearance larger than C3	
J30P	Black oxide coated	
E	Increased capacity design	Standard
EX	Increased capacity design, design modified in accordance with standard (parts from these bearings must not be interchanged with parts from bearings of the same size of the previous design E)	
M1	Solid brass cage, two-piece, roller-guided	
TVP2	Solid window cage made from glass fibre reinforced polyamide PA66	
JP3	Sheet steel window cage, single-piece, roller-guided	by agreement
MP1A	Solid brass cage, single-piece, rib-guided on outer ring	
MP1B	Machined brass cage, single-piece, rib-guided on inner ring	
M1A	Solid brass cage, two-piece, rib-guided on outer ring	
M1B	Solid brass cage, two-piece, rib-guided on inner ring	

Design and safety guidelines

Permissible skewing

There is no significant reduction in rating life if the misalignment of the inner ring relative to the outer ring does not exceed the following values:

4′ in bearings of series 10, 19, 2, 3, 4

3′ in bearings of series 22, 23.

Axial load carrying capacity

The axial load carrying capacity is dependent on:

- the size of the sliding surfaces between the ribs and the end faces of the rolling elements
- the sliding velocity at the ribs
- the lubrication on the contact surfaces
- tilting of the bearing.

Ribs subjected to load must be supported across their entire height.

The permissible axial load $F_{a\,per}$ must not be exceeded, in order to avoid an unacceptable increase in temperature.

The axial limiting load $F_{a\,max}$ must not be exceeded, in order to avoid impermissible pressure at the contact surfaces.

The ratio F_a/F_r should not exceed the value 0,4.
Continuous axial loading without simultaneous radial loading is not permissible.

Permissible and maximum axial load

$$F_{a\,per} = k_S \cdot k_B \cdot {d_M}^{1,5} \cdot n^{-0,6} \leqq F_{a\,max}$$

$$F_{a\,max} = 0,075 \cdot k_B \cdot {d_M}^{2,1}$$

$F_{a\,per}$ N
Permissible axial load

$F_{a\,max}$ N
Axial limiting load

k_S –
Factor dependent on the lubrication method, see table, page 401

k_B –
Factor dependent on the bearing series, see table, page 401

d_M mm
Mean bearing diameter (d + D)/2, see dimension table

n min^{-1}
Operating speed.

Factor k_S for the lubrication method

Lubrication method[1)]	Factor k_S
Minimal heat dissipation, drip feed oil lubrication, oil mist lubrication, low operating viscosity ($\nu < 0{,}5 \cdot \nu_1$)	7,5 to 10
Poor heat dissipation, oil sump lubrication, oil spray lubrication, low oil flow	10 to 15
Good heat dissipation, recirculating oil lubrication (pressurised oil lubrication)	12 to 18
Very good heat dissipation, recirculating oil lubrication with oil cooling, high operating viscosity ($\nu > 2 \cdot \nu_1$)	16 to 24

1) Doped oils should be used, e.g. CLP (DIN 51517) and HLP (DIN 51524) of ISO-VG classes 32 to 460 and ATF oils (DIN 51502) and gearbox oils (DIN 51512) of SAE viscosity classes 75 W to 140 W.

Bearing factor k_B

Series	Bearing factor k_B
NJ2..-E, NJ22..-E, NUP2..-E, NUP22..-E	15
NJ3..-E, NJ23..-E, NUP3..-E, NUP23..-E	20
NJ4	22

Skewing of the bearing, for example due to shaft deflection, can lead to alternating stresses on the inner ring ribs.
In this case, the axial load must be restricted to F_{as} for bearing tilting of up to max. 2 angular minutes.

$$F_{as} = 20 \cdot d_M^{1,42}$$

If even greater tilting is present, special strength analysis is required.

Minimum radial load

In continuous operation, a minimum radial load of the order of $F_{r\,min} = C_{0r}/60$ is necessary.
If $F_{r\,min} < C_{0r}/60$, please contact us.

Equivalent dynamic bearing load

Non-locating bearings

For bearings under dynamic loading, the following applies:

$$P = F_r$$

Semi-locating and locating bearings

If an axial force F_a is present in addition to the radial force F_r, the load ratio must be taken into consideration.

Load ratio and equivalent dynamic load

Load ratio	Equivalent dynamic bearing load
$\frac{F_a}{F_r} \leqq e$	$P = F_r$
$\frac{F_a}{F_r} > e$	$P = 0,92 \cdot F_r + Y \cdot F_a$

P N
Equivalent dynamic bearing load for combined load
F_a N
Axial dynamic bearing load
F_r N
Radial dynamic bearing load
e, Y –
Factors: see table Factors e and Y.

Factors e and Y

Series	Calculation factors	
	e	Y
NJ2, NUP2, NJ3, NUP3, NJ4	0,2	0,6
NJ22, NUP22, NJ23, NUP23	0,3	0,4

Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

Design of bearing arrangements

Shaft and housing tolerances

Recommended shaft tolerances for bearings with cylindrical bore, see table, page 150.
Recommended housing tolerances for radial bearings, see table, page 152.

Axial location

In order to prevent lateral creep of the bearing rings, they must be located by force or physical locking means.

The abutment shoulders (shaft and housing) should be sufficiently high and perpendicular to the bearing axis.

The transition from the bearing seat to the abutment shoulder must be designed with rounding to DIN 5 418 or an undercut to DIN 509. The minimum values for the chamfer dimensions r in the dimension tables must be observed.

In the case of semi-locating bearings, the bearing rings only require support on one side, on the rib supporting the axial load.

Full support must be provided for ribs transmitting forces in axially loaded bearings.

Accuracy

The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620.

Radial internal clearance

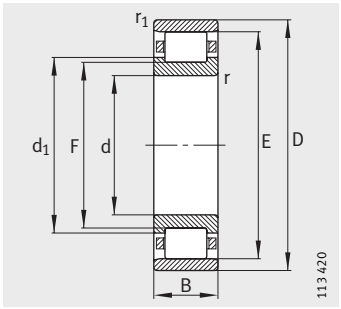
The radial internal clearance corresponds to internal clearance group CN to DIN 620-4.

Radial internal clearance

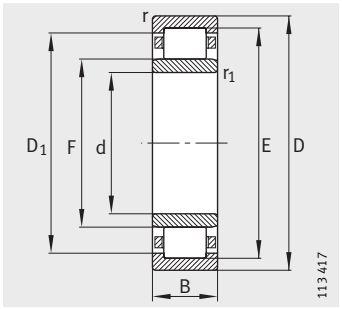
Bore		Radial internal clearance					
d mm		CN µm		C3 µm		C4 µm	
over	incl.	min.	max.	min.	max.	min.	max.
–	24	20	45	35	60	50	75
24	30	20	45	35	60	50	75
30	40	25	50	45	70	60	85
40	50	30	60	50	80	70	100
50	65	40	70	60	90	80	110
65	80	40	75	65	100	90	125
80	100	50	85	75	110	105	140
100	120	50	90	85	125	125	165
120	140	60	105	100	145	145	190
140	160	70	120	115	165	165	215
160	180	75	125	120	170	170	220
180	200	90	145	140	195	195	250
200	225	105	165	160	220	220	280
225	250	110	175	170	235	235	300
250	280	125	195	190	260	260	330
280	315	130	205	200	275	275	350
315	355	145	225	225	305	305	385
355	400	190	280	280	370	370	460
400	450	210	310	310	410	410	510
450	500	220	330	330	440	440	550
500	560	240	360	360	480	480	600
560	630	260	380	380	500	500	620
630	710	285	425	425	565	565	705

Cylindrical roller bearings with cage

Non-locating bearings



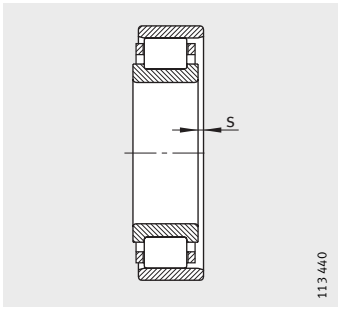
N



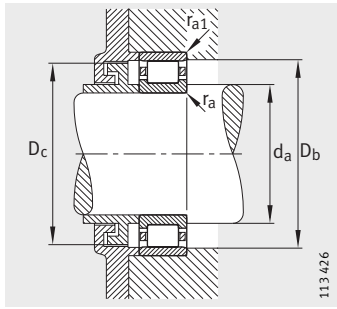
NU

Dimension table · Dimensions in mm

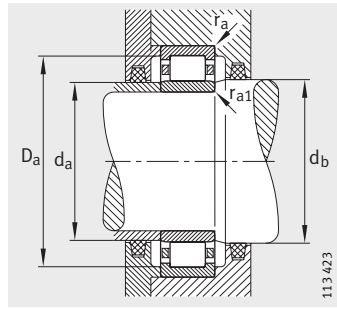
Designation		Mass	Dimensions									
	X-life	m ≈kg	d	D	B	r min.	r_1 min.	$s^{1)}$	E	F	D_1 ≈	d_1 ≈
N202-E-TVP2	**XL**	0,047	**15**	35	11	0,6	0,3	0,5	30,3	19,3	–	21,6
NU202-E-TVP2	**XL**	0,048	**15**	35	11	0,6	0,3	1,6	30,3	19,3	28	–
N203-E-TVP2	**XL**	0,068	**17**	40	12	0,6	0,3	1,2	35,1	22,1	–	24,9
NU203-E-TVP2	**XL**	0,069	**17**	40	12	0,6	0,3	1,2	35,1	22,1	32,5	–
NU2203-E-TVP2	**XL**	0,051	**17**	40	16	0,6	0,3	1,7	35,1	22,1	32,5	–
NU303-E-TVP2	**XL**	0,121	**17**	47	14	1	0,6	1,2	40,2	24,2	37,1	–
N204-E-TVP2	**XL**	0,112	**20**	47	14	1	0,6	0,8	41,5	26,5	–	29,7
NU204-E-TVP2	**XL**	0,114	**20**	47	14	1	0,6	0,8	41,5	26,5	38,8	–
NU2204-E-TVP2	**XL**	0,146	**20**	47	18	1	0,6	1,8	41,5	26,5	38,8	–
NU304-E-TVP2	**XL**	0,153	**20**	52	15	1,1	0,6	1	45,5	27,5	42,4	–
NU2304-E-TVP2	**XL**	0,215	**20**	52	21	1,1	0,6	1,9	45,5	27,5	42,4	–
NU1005-M1	**XL**	0,092	**25**	47	12	0,6	0,3	2,4	41,5	30,5	39,3	–
N205-E-TVP2	**XL**	0,135	**25**	52	15	1	0,6	1,3	46,5	31,5	–	34,7
NU205-E-TVP2	**XL**	0,137	**25**	52	15	1	0,6	1,2	46,5	31,5	43,8	–
NU2205-E-TVP2	**XL**	0,165	**25**	52	18	1	0,6	1,7	46,5	31,5	43,8	–
N305-E-TVP2	**XL**	0,242	**25**	62	17	1,1	1,1	1,4	54	34	–	38,1
NU305-E-TVP2	**XL**	0,245	**25**	62	17	1,1	1,1	1,5	54	34	50,7	–
NU2305-E-TVP2	**XL**	0,349	**25**	62	24	1,1	1,1	1,9	54	34	50,7	–
NU1006-M1	**XL**	0,134	**30**	55	13	1	0,6	2,4	48,5	36,5	46,1	–
N206-E-TVP2	**XL**	0,205	**30**	62	16	1	0,6	1,4	55,5	37,5	–	41,1
NU206-E-TVP2	**XL**	0,207	**30**	62	16	1	0,6	1,5	55,5	37,5	52,5	–
NU2206-E-TVP2	**XL**	0,255	**30**	62	20	1	0,6	1,6	55,5	37,5	52,5	–
N306-E-TVP2	**XL**	0,366	**30**	72	19	1,1	1,1	0,6	62,5	40,5	–	45
NU306-E-TVP2	**XL**	0,368	**30**	72	19	1,1	1,1	1,2	62,5	40,5	59,2	–
NU2306-E-TVP2	**XL**	0,529	**30**	72	27	1,1	1,1	2,2	62,5	40,5	59,2	–
NU406-M1	**XL**	0,859	**30**	90	23	1,5	1,5	2,3	73	45	68,4	–
NU1007-M1	**XL**	0,177	**35**	62	14	1	0,6	2,6	55	42	52,4	–
N207-E-TVP2	**XL**	0,301	**35**	72	17	1,1	0,6	0,7	64	44	–	48
NU207-E-TVP2	**XL**	0,303	**35**	72	17	1,1	0,6	0,7	64	44	61	–
NU2207-E-TVP2	**XL**	0,406	**35**	72	23	1,1	0,6	2,2	64	44	61	–
N307-E-TVP2	**XL**	0,486	**35**	80	21	1,5	1,1	0,6	70,2	46,2	–	51
NU307-E-TVP2	**XL**	0,486	**35**	80	21	1,5	1,1	0,6	70,2	46,2	66,6	–
NU2307-E-TVP2	**XL**	0,723	**35**	80	31	1,5	1,1	3	70,2	46,2	66,6	–
NU407-M1	**XL**	1,14	**35**	100	25	1,5	1,5	2,6	83	53	78,2	–



[1] Axial displacement “s” for N and NU



Mounting dimensions for N

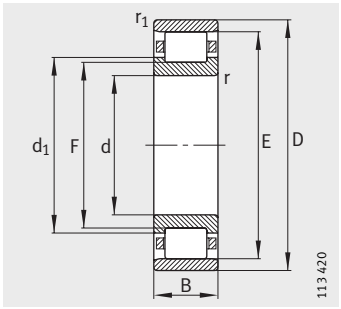


Mounting dimensions for NU

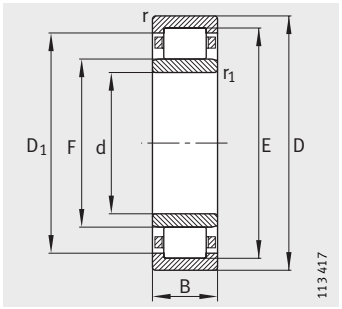
Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a		d_b	D_a	D_b	D_c	r_a	r_{a1}	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	min.	max.	min.	max.	max.	max.	N	N	N	min^{-1}	min^{-1}
17,4	–	–	32,6	31	29	0,6	0,3	15 100	10 400	1 470	22 000	17 600
17,4	18,5	20	32,6	–	–	0,6	0,3	15 100	10 400	1 290	22 000	17 600
21	–	–	36	36	34	0,6	0,3	20 800	14 600	2 110	18 000	15 400
21	21,5	23	36	–	–	0,6	0,3	20 800	14 600	1 820	18 000	15 400
21	21,5	23	36	–	–	0,6	0,3	28 500	21 900	3 500	18 000	13 300
21,2	23,5	25	42,8	–	–	1	0,6	30 000	21 200	2 650	16 000	13 700
24	–	–	41	43	40	1	0,6	32 500	24 700	3 850	16 000	13 100
24	26	29	41	–	–	1	0,6	32 500	24 700	3 100	16 000	13 100
24	26	29	41	–	–	1	0,6	38 500	31 000	5 000	16 000	11 400
24	27	30	45	–	–	1	0,6	36 500	26 000	3 250	14 000	12 100
24	27	30	45	–	–	1	0,6	48 500	38 000	6 300	14 000	9 900
27	30	32	44	–	–	0,6	0,3	16 700	12 900	1 520	28 000	13 100
29	–	–	46	48	45	1	0,6	34 500	27 500	4 350	15 000	11 800
29	31	34	46	–	–	1	0,6	34 500	27 500	3 500	15 000	11 800
29	31	34	46	–	–	1	0,5	41 500	34 500	5 700	15 000	9 800
32	–	–	55	55	53	1	1	48 000	36 500	5 800	12 000	10 200
32	33	37	55	–	–	1	1	48 000	36 500	4 700	12 000	10 200
32	33	37	55	–	–	1	1	66 000	55 000	9 400	12 000	8 400
33	35	38	50	–	–	1	0,6	22 900	19 300	2 400	24 000	11 000
34	–	–	56	57	54	1	0,6	45 000	36 000	5 700	12 000	9 800
34	37	40	56	–	–	1	0,6	45 000	36 000	4 650	12 000	9 800
34	37	40	56	–	–	1	0,6	57 000	48 500	8 100	12 000	8 200
37	–	–	65	64	61	1	1	61 000	48 000	8 000	10 000	9 000
37	40	44	65	–	–	1	1	61 000	48 000	6 400	10 000	9 000
37	40	44	65	–	–	1	1	86 000	75 000	13 200	10 000	7 300
41	44	47	79	–	–	1,5	1,5	83 000	64 000	10 400	14 000	–
38	41	44	57	–	–	1	0,6	29 000	26 000	3 150	20 000	9 700
39	–	–	65	65	63	1	0,6	58 000	48 500	7 900	10 000	8 300
39	43	46	65	–	–	1	0,6	58 000	48 500	6 400	10 000	8 300
39	43	46	65	–	–	1	0,6	72 000	64 000	10 800	10 000	7 300
42	–	–	71	71	69	1,5	1	76 000	63 000	10 700	9 000	8 100
42	45	48	71	–	–	1,5	1	76 000	63 000	8 600	9 000	8 100
42	45	48	71	–	–	1,5	1	108 000	98 000	17 400	9 000	6 700
46	52	55	89	–	–	1,5	1,5	102 000	83 000	10 900	12 000	–

Cylindrical roller bearings with cage

Non-locating bearings



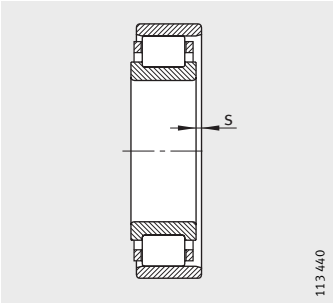
N



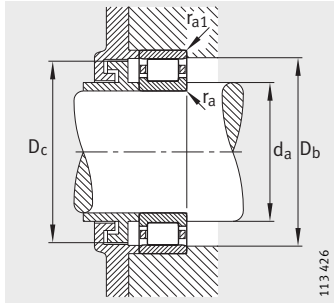
NU

Dimension table (continued) · Dimensions in mm

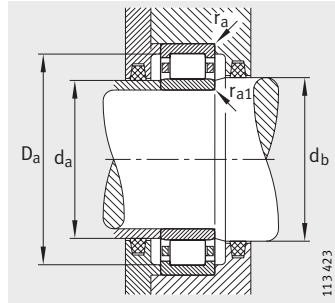
Designation		Mass	Dimensions									
	X-life	m ≈kg	d	D	B	r min.	r_1 min.	$s^{1)}$	E	F	D_1 ≈	d_1 ≈
NU1008-M1	**XL**	0,216	**40**	68	15	1	0,6	2	61	47	58,2	–
N208-E-TVP2	**XL**	0,358	**40**	80	18	1,1	1,1	1	71,5	49,5	–	54
NU208-E-TVP2	**XL**	0,379	**40**	80	18	1,1	1,1	1	71,5	49,5	68,3	–
NU2208-E-TVP2	**XL**	0,492	**40**	80	23	1,1	1,1	1,5	71,5	49,5	68,3	–
N308-E-TVP2	**XL**	0,656	**40**	90	23	1,5	1,5	1,2	80	52	–	57,6
NU308-E-TVP2	**XL**	0,659	**40**	90	23	1,5	1,5	1,3	80	52	75,9	–
NU2308-E-TVP2	**XL**	0,958	**40**	90	33	1,5	1,5	2,7	80	52	75,9	–
NU408-M1	**XL**	1,47	**40**	110	27	2	2	2,8	92	58	86,4	–
NU1009-M1	**XL**	0,277	**45**	75	16	1	0,6	2,5	67,5	52,5	64,5	–
N209-E-TVP2	**XL**	0,434	**45**	85	19	1,1	1,1	1	76,5	54,5	–	59
NU209-E-TVP2	**XL**	0,434	**45**	85	19	1,1	1,1	1	76,5	54,5	73,3	–
NU2209-E-TVP2	**XL**	0,532	**45**	85	23	1,1	1,1	1,5	76,5	54,5	73,3	–
N309-E-TVP2	**XL**	0,891	**45**	100	25	1,5	1,5	1	88,5	58,5	–	64,4
NU309-E-TVP2	**XL**	0,893	**45**	100	25	1,5	1,5	1	88,5	58,5	84,1	–
NU2309-E-TVP2	**XL**	1,3	**45**	100	36	1,5	1,5	2,5	88,5	58,5	84,1	–
NU409-M1	**XL**	1,87	**45**	120	29	2	2	2,9	100,5	64,5	94,6	–
NU1010-M1	**XL**	0,305	**50**	80	16	1	0,6	2,1	72,5	57,5	69,5	–
N210-E-TVP2	**XL**	0,488	**50**	90	20	1,1	1,1	1,3	81,5	59,5	–	64
NU210-E-TVP2	**XL**	0,49	**50**	90	20	1,1	1,1	1,3	81,5	59,5	78,3	–
NU2210-E-TVP2	**XL**	0,573	**50**	90	23	1,1	1,1	1,3	81,5	59,5	78,3	–
N310-E-TVP2	**XL**	1,16	**50**	110	27	2	2	1,7	97	65	–	71,3
NU310-E-TVP2	**XL**	1,16	**50**	110	27	2	2	1,7	97	65	92,5	–
NU2310-E-TVP2	**XL**	1,75	**50**	110	40	2	2	3,2	97	65	92,5	–
NU410-M1	**XL**	2,33	**50**	130	31	2,1	2,1	3	110,8	70,8	104,3	–
NU1011-E-M1	**XL**	0,451	**55**	90	18	1,1	1	2,1	82	64	79,2	–
N211-E-TVP2	**XL**	0,668	**55**	100	21	1,5	1,1	0,8	90	66	–	70,8
NU211-E-TVP2	**XL**	0,665	**55**	100	21	1,5	1,1	0,8	90	66	86,6	–
NU2211-E-TVP2	**XL**	0,796	**55**	100	25	1,5	1,1	1,3	90	66	86,6	–
N311-E-TVP2	**XL**	1,48	**55**	120	29	2	2	1,8	106,5	70,5	–	77,5
NU311-E-TVP2	**XL**	1,48	**55**	120	29	2	2	1,8	106,5	70,5	101,4	–
NU2311-E-TVP2	**XL**	2,23	**55**	120	43	2	2	3,3	106,5	70,5	101,4	–
NU411-M1	**XL**	2,83	**55**	140	33	2,1	2,1	3,3	117,2	77,2	110,7	–



[1] Axial displacement “s” for N and NU



Mounting dimensions for N

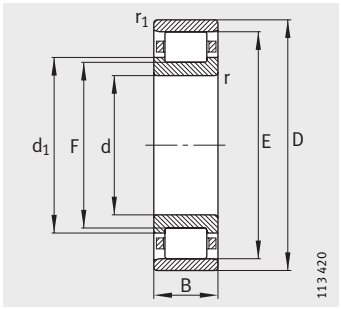


Mounting dimensions for NU

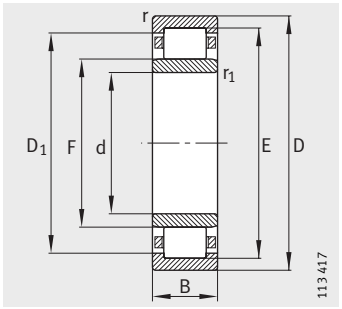
Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a		d_b	D_a	D_b	D_c	r_a	r_{a1}	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	min.	max.	min.	max.	max.	max.	N	N	N	min^{-1}	min^{-1}
43	46	49	63	–	–	1	0,6	33 500	30 500	3 350	19 000	8 900
47	–	–	73	73	70	1	1	63 000	53 000	8 700	9 000	7 600
47	49	52	73	–	–	1	1	63 000	53 000	7 000	9 000	7 600
47	49	52	73	–	–	1	1	83 000	75 000	12 900	9 000	6 400
49	–	–	81	81	79	1,5	1,5	95 000	78 000	12 900	7 500	7 300
49	51	55	81	–	–	1,5	1,5	95 000	78 000	10 400	7 500	7 300
49	51	55	81	–	–	1,5	1,5	132 000	119 000	20 700	7 500	6 000
53	57	60	97	–	–	2	2	119 000	95 000	12 700	11 000	–
48	52	54	70	–	–	1	0,6	40 000	37 500	4 800	16 000	8 100
52	–	–	78	78	75	1	1	72 000	63 000	10 600	8 500	7 100
52	54	57	78	–	–	1	1	72 000	63 000	8 600	8 500	7 100
52	54	57	78	–	–	1	1	87 000	82 000	14 100	8 500	5 800
54	–	–	91	90	87	1,5	1,5	115 000	98 000	16 400	6 700	6 500
54	57	60	91	–	–	1,5	1,5	115 000	98 000	13 300	6 700	6 500
54	57	60	91	–	–	1,5	1,5	162 000	153 000	27 000	6 700	5 400
58	63	66	107	–	–	2	2	143 000	119 000	16 000	9 500	–
53	57	59	75	–	–	1	0,6	42 500	41 500	5 300	15 000	7 400
57	–	–	83	83	80	1	1	75 000	69 000	11 500	8 000	6 700
57	58	62	83	–	–	1	1	75 000	69 000	9 300	8 000	6 700
57	58	62	83	–	–	1	1	92 000	88 000	15 300	8 000	5 400
61	–	–	99	98	96	2	2	130 000	113 000	19 100	6 300	6 100
61	63	67	99	–	–	2	2	130 000	113 000	15 500	6 300	6 100
61	63	67	99	–	–	2	2	192 000	187 000	33 000	6 300	5 000
64	69	73	116	–	–	2	2	175 000	148 000	25 000	8 500	–
60	63	65	84	–	–	1,1	1	61 000	60 000	7 100	13 000	6 900
62	–	–	91	91	89	1,5	1	99 000	95 000	16 300	7 000	5 800
62	65	68	91	–	–	1,5	1	99 000	95 000	13 200	7 000	5 800
62	65	68	91	–	–	1,5	1	117 000	118 000	20 700	7 000	4 750
66	–	–	109	108	105	2	2	159 000	139 000	23 600	5 600	5 600
66	69	72	109	–	–	2	2	159 000	139 000	19 100	5 600	5 600
66	69	72	109	–	–	2	2	235 000	230 000	41 000	5 600	4 600
69	76	79	126	–	–	2	2	187 000	164 000	22 400	8 000	–

Cylindrical roller bearings with cage

Non-locating bearings



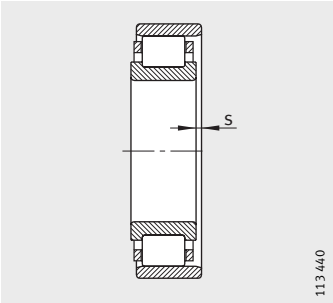
N



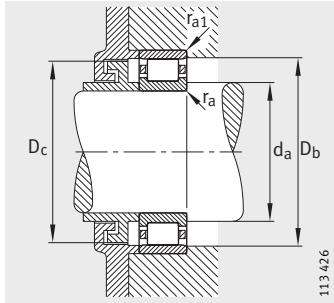
NU

Dimension table (continued) · Dimensions in mm

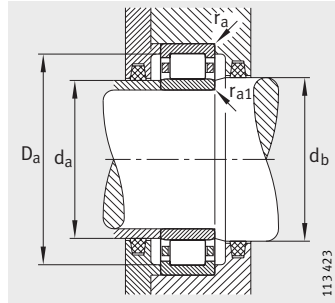
Designation		Mass	Dimensions									
	X-life	m ≈kg	d	D	B	r min.	r_1 min.	$s^{1)}$	E	F	D_1 ≈	d_1 ≈
NU1012-M1	**XL**	0,48	**60**	95	18	1,1	1	3,3	85,5	69,5	82,3	–
N212-E-TVP2	**XL**	0,827	**60**	110	22	1,5	1,5	1,6	100	72	–	77,6
NU212-E-TVP2	**XL**	0,824	**60**	110	22	1,5	1,5	1,6	100	72	96,1	–
NU2212-E-TVP2	**XL**	1,08	**60**	110	28	1,5	1,5	1,6	100	72	96,1	–
N312-E-TVP2	**XL**	1,84	**60**	130	31	2,1	2,1	1,9	115	77	–	84,4
NU312-E-TVP2	**XL**	1,85	**60**	130	31	2,1	2,1	1,8	115	77	109,6	–
NU2312-E-TVP2	**XL**	2,78	**60**	130	46	2,1	2,1	3,5	115	77	109,6	–
NU412-M1	**XL**	2,3	**60**	150	35	2,1	2,1	3,4	127	83	119,5	–
NU1013-M1	**XL**	0,507	**65**	100	18	1,1	1	3,3	90,5	74,5	87,3	–
N213-E-TVP2	**XL**	1,05	**65**	120	23	1,5	1,5	1,4	108,5	78,5	–	84,4
NU213-E-TVP2	**XL**	1,04	**65**	120	23	1,5	1,5	1,4	108,5	78,5	104,3	–
NU2213-E-TVP2	**XL**	1,43	**65**	120	31	1,5	1,5	1,9	108,5	78,5	104,3	–
N313-E-TVP2	**XL**	2,28	**65**	140	33	2,1	2,1	1,4	124,5	82,5	–	90,5
NU313-E-TVP2	**XL**	2,28	**65**	140	33	2,1	2,1	1,5	124,5	82,5	118,6	–
NU2313-E-TVP2	**XL**	3,32	**65**	140	48	2,1	2,1	4	124,5	82,5	118,6	–
NU413-M1	**XL**	4,08	**65**	160	37	2,1	2,1	3,5	135,3	89,3	127,7	–
NU1014-M1	**XL**	0,706	**70**	110	20	1,1	1	2,5	100	80	96	–
N214-E-TVP2	**XL**	1,16	**70**	125	24	1,5	1,5	1,6	113,5	83,5	–	89,4
NU214-E-TVP2	**XL**	1,15	**70**	125	24	1,5	1,5	1,6	113,5	83,5	109,4	–
NU2214-E-TVP2	**XL**	1,52	**70**	125	31	1,5	1,5	1,6	113,5	83,5	109,4	–
N314-E-TVP2	**XL**	2,79	**70**	150	35	2,1	2,1	1,6	133	89	–	97,4
NU314-E-TVP2	**XL**	2,79	**70**	150	35	2,1	2,1	1,7	133	89	126,8	–
NU2314-E-TVP2	**XL**	4,02	**70**	150	51	2,1	2,1	4,7	133	89	126,8	–
NU414-M1	**XL**	5,97	**70**	180	42	3	3	4	152	100	142,7	–
NU1015-M1	**XL**	0,737	**75**	115	20	1,1	1	2,5	105	85	101,7	–
N215-E-TVP2	**XL**	1,29	**75**	130	25	1,5	1,5	1,1	118,5	88,5	–	94,4
NU215-E-TVP2	**XL**	1,27	**75**	130	25	1,5	1,5	1,2	118,5	88,5	114,4	–
NU2215-E-TVP2	**XL**	1,6	**75**	130	31	1,5	1,5	1,6	118,5	88,5	114,4	–
N315-E-TVP2	**XL**	3,34	**75**	160	37	2,1	2,1	1,1	143	95	–	104,1
NU315-E-TVP2	**XL**	3,33	**75**	160	37	2,1	2,1	1,2	143	95	136,2	–
NU2315-E-TVP2	**XL**	4,95	**75**	160	55	2,1	2,1	4,2	143	95	136,2	–
NU415-M1	**XL**	7,09	**75**	190	45	3	3	4,5	160,5	104,5	150,7	–



[1] Axial displacement “s” for N and NU



Mounting dimensions for N

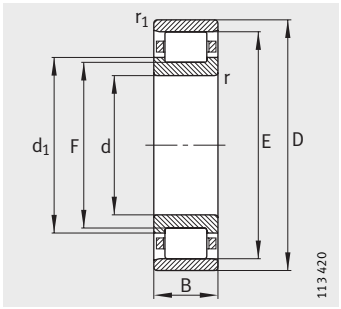


Mounting dimensions for NU

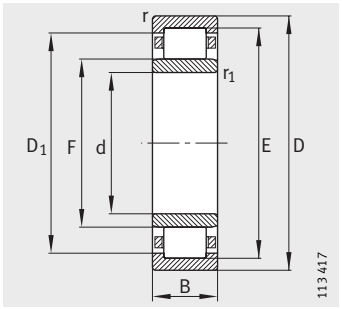
Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a		d_b	D_a	D_b	D_c	r_a	r_{a1}	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	min.	max.	min.	max.	max.	max.	N	N	N	min^{-1}	min^{-1}
65	68	71	89	–	–	1,1	1	52 000	55 000	7 100	13 000	6 400
69	–	–	101	101	99	1,5	1,5	111 000	102 000	16 800	6 300	5 400
69	71	75	101	–	–	1,5	1,5	111 000	102 000	13 900	6 300	5 400
69	71	75	101	–	–	1,5	1,5	151 000	152 000	26 500	6 300	4 400
72	–	–	118	116	114	2,1	2,1	177 000	157 000	26 500	5 000	5 300
72	75	79	118	–	–	2,1	2,1	177 000	157 000	21 700	5 000	5 300
72	75	79	118	–	–	2,1	2,1	265 000	260 000	47 000	5 000	4 300
74	82	85	136	–	–	2	2	211 000	184 000	24 700	7 500	–
70	73	76	94	–	–	1,1	1	53 000	58 000	7 500	12 000	5 900
74	–	–	111	110	107	1,5	1,5	127 000	119 000	19 800	6 000	5 000
74	77	81	111	–	–	1,5	1,5	127 000	119 000	16 300	6 000	5 000
74	77	81	111	–	–	1,5	1,5	176 000	181 000	32 000	5 600	4 150
77	–	–	128	126	123	2,1	2,1	214 000	191 000	32 000	4 800	4 900
77	81	85	128	–	–	2,1	2,1	214 000	191 000	26 000	4 800	4 900
77	81	85	128	–	–	2,1	2,1	295 000	285 000	50 000	4 800	4 050
79	88	91	146	–	–	2	2	230 000	203 000	26 500	7 000	–
75	78	82	104	–	–	1	1	75 000	78 000	10 600	11 000	5 500
79	–	–	116	115	112	1,5	1,5	140 000	137 000	23 100	5 300	4 750
79	82	86	116	–	–	1,5	1,5	140 000	137 000	19 000	5 300	4 750
79	82	86	116	–	–	1,5	1,5	184 000	194 000	34 000	5 300	3 900
82	–	–	138	135	131	2,1	2,1	242 000	222 000	37 000	4 500	4 550
82	87	92	138	–	–	2,1	2,1	242 000	222 000	30 000	4 500	4 550
82	87	92	138	–	–	2,1	2,1	325 000	325 000	56 000	4 500	3 850
86	99	102	164	–	–	2,5	2,5	285 000	255 000	33 500	6 300	–
80	83	87	109	–	–	1,1	1	76 000	82 000	11 100	10 000	5 200
84	–	–	121	120	117	1,5	1,5	154 000	156 000	26 500	5 300	4 500
84	87	90	121	–	–	1,5	1,5	154 000	156 000	21 700	5 300	4 500
84	87	90	121	–	–	1,5	1,5	191 000	207 000	36 000	5 300	3 700
87	–	–	148	145	141	2,1	2,1	285 000	265 000	43 000	4 000	4 200
87	93	97	148	–	–	2,1	2,1	285 000	265 000	34 500	4 000	4 200
87	93	97	148	–	–	2,1	2,1	390 000	395 000	67 000	4 000	3 600
91	103	107	174	–	–	2,5	2,5	325 000	295 000	37 500	6 000	–

Cylindrical roller bearings with cage

Non-locating bearings



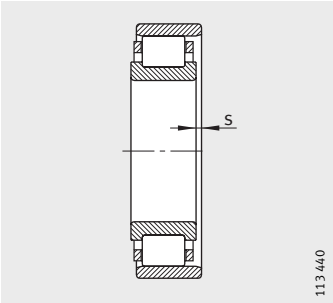
N



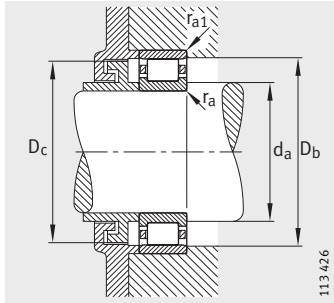
NU

Dimension table (continued) · Dimensions in mm

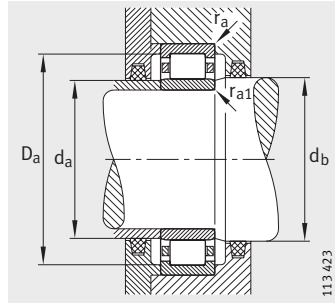
Designation		Mass	Dimensions									
	X-life	m ≈kg	d	D	B	r min.	r_1 min.	$s^{1)}$	E	F	D_1 ≈	d_1 ≈
NU1016-M1	**XL**	0,99	**80**	125	22	1,1	1	2,7	113,5	91,5	109,8	–
N216-E-TVP2	**XL**	1,55	**80**	140	26	2	2	1,2	127,3	95,3	–	101,5
NU216-E-TVP2	**XL**	1,55	**80**	140	26	2	2	1,3	127,3	95,3	122,9	–
NU2216-E-TVP2	**XL**	2,01	**80**	140	33	2	2	1,3	127,3	95,3	122,9	–
N316-E-TVP2	**XL**	4,12	**80**	170	39	2,1	2,1	0,6	151	101	–	110,4
NU316-E-TVP2	**XL**	3,96	**80**	170	39	2,1	2,1	0,7	151	101	143,9	–
NU2316-E-TVP2	**XL**	5,89	**80**	170	58	2,1	2,1	3,7	151	101	143,9	–
NU416-M1	**XL**	8,37	**80**	200	48	3	3	4,6	170	110	159,7	–
NU1017-M1	**XL**	1,04	**85**	130	22	1,1	1	4	118,5	96,5	114,8	–
N217-E-TVP2	**XL**	1,92	**85**	150	28	2	2	0,7	136,5	100,5	–	107,5
NU217-E-TVP2	**XL**	1,91	**85**	150	28	2	2	0,8	136,5	100,5	131,5	–
NU2217-E-TVP2	**XL**	2,5	**85**	150	36	2	2	1,3	136,5	100,5	131,5	–
N317-E-M1	**XL**	5,3	**85**	180	41	3	3	1,1	160	108	–	117,8
NU317-E-TVP2	**XL**	4,62	**85**	180	41	3	3	1,3	160	108	152,7	–
NU2317-E-TVP2	**XL**	6,72	**85**	180	60	3	3	4,7	160	108	152,7	–
NU417-M1	**XL**	9,85	**85**	210	52	4	4	5,2	177	113	165,7	–
NU1018-M1	**XL**	1,31	**90**	140	24	1,5	1,1	3	127	103	122,9	–
N218-E-TVP2	**XL**	2,37	**90**	160	30	2	2	1,4	145	107	–	114,3
NU218-E-TVP2	**XL**	2,36	**90**	160	30	2	2	1,5	145	107	139,7	–
NU2218-E-TVP2	**XL**	3,17	**90**	160	40	2	2	2,5	145	107	139,7	–
N318-E-M1	**XL**	6,19	**90**	190	43	3	3	1,3	169,5	113,5	–	124
NU318-E-TVP2	**XL**	5,39	**90**	190	43	3	3	1,5	169,5	113,5	161,6	–
NU2318-E-TVP2	**XL**	8,04	**90**	190	64	3	3	5	169,5	113,5	161,6	–
NU418-M1	**XL**	11,8	**90**	225	54	4	4	5	191,5	123,5	179,7	–
NU1019-M1	**XL**	1,41	**95**	145	24	1,5	1,1	4,1	132	108	127,9	–
N219-E-TVP2	**XL**	2,89	**95**	170	32	2,1	2,1	0,6	154,5	112,5	–	120,5
NU219-E-TVP2	**XL**	2,88	**95**	170	32	2,1	2,1	0,7	154,5	112,5	148,6	–
NU2219-E-TVP2	**XL**	3,9	**95**	170	43	2,1	2,1	2,2	154,5	112,5	148,6	–
N319-E-M1	**XL**	7,05	**95**	200	45	3	3	1,4	177,5	121,5	–	132
NU319-E-TVP2	**XL**	6,32	**95**	200	45	3	3	1,4	177,5	121,5	169,6	–
NU2319-E-TVP2	**XL**	9,4	**95**	200	67	3	3	5,6	177,5	121,5	169,6	–
NU419-M1	**XL**	13,9	**95**	240	55	4	4	5,2	201,5	133,5	189,7	–



[1] Axial displacement “s” for N and NU



Mounting dimensions for N

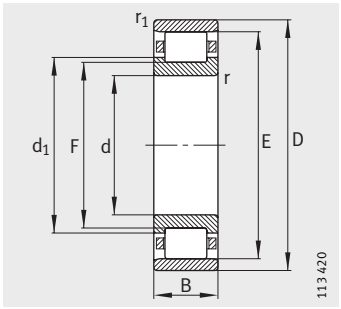


Mounting dimensions for NU

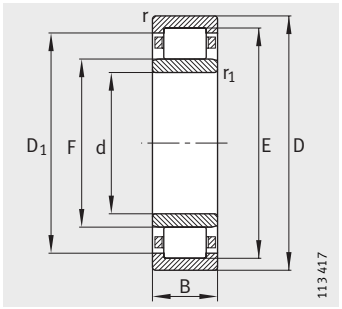
Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a		d_b	D_a	D_b	D_c	r_a	r_{a1}	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	min.	max.	min.	max.	max.	max.	N	N	N	min^{-1}	min^{-1}
85	90	94	119	–	–	1	1	91 000	99 000	13 600	9 500	5 000
91	–	–	129	129	126	2	2	165 000	167 000	27 500	4 800	4 250
91	94	97	129	–	–	2	2	165 000	167 000	22 600	4 800	4 250
91	94	97	129	–	–	2	2	220 000	243 000	42 000	4 800	3 450
92	–	–	158	153	149	2,1	2,1	300 000	275 000	46 000	3 800	4 150
92	99	105	158	–	–	2,1	2,1	300 000	275 000	37 000	3 800	4 150
92	99	105	158	–	–	2,1	2,1	420 000	425 000	73 000	3 800	3 500
96	109	112	184	–	–	2,5	2,5	395 000	365 000	57 000	5 600	–
90	95	99	124	–	–	1	1	93 000	103 000	14 000	9 000	4 750
96	–	–	139	138	135	2	2	194 000	194 000	31 500	4 500	4 100
96	99	104	139	–	–	2	2	194 000	194 000	26 000	4 500	4 100
96	99	104	139	–	–	2	2	255 000	275 000	46 500	4 500	3 350
99	–	–	166	162	158	2,5	2,5	340 000	325 000	53 000	5 600	3 850
99	106	110	166	–	–	2,5	2,5	320 000	300 000	40 000	3 600	4 000
99	106	110	166	–	–	2,5	2,5	435 000	445 000	75 000	3 600	3 350
105	111	115	190	–	–	3	3	420 000	385 000	60 000	5 300	–
96	101	106	133	–	–	1,5	1	111 000	124 000	16 800	8 500	4 550
101	–	–	149	147	143	2	2	215 000	217 000	35 000	4 300	3 950
101	105	109	149	–	–	2	2	215 000	217 000	28 500	4 300	3 950
101	105	109	149	–	–	2	2	285 000	315 000	52 000	4 300	3 300
104	–	–	176	171	168	2,5	2,5	370 000	350 000	55 000	5 300	3 750
104	111	117	176	–	–	2,5	2,5	370 000	350 000	44 000	3 400	3 750
104	111	117	176	–	–	2,5	2,5	510 000	530 000	86 000	3 400	3 050
110	122	125	205	–	–	3	3	465 000	425 000	67 000	5 000	–
101	106	111	138	–	–	1,5	1	113 000	130 000	17 300	8 000	4 350
107	–	–	158	156	153	2,1	2,1	260 000	265 000	41 500	3 800	3 700
107	111	116	158	–	–	2,1	2,1	260 000	265 000	34 000	3 800	3 700
107	111	116	158	–	–	2,1	2,1	340 000	370 000	60 000	3 800	3 100
109	–	–	186	179	176	2,5	2,5	390 000	380 000	59 000	5 300	3 600
109	119	124	186	–	–	2,5	2,5	390 000	380 000	48 000	3 400	3 600
109	119	124	186	–	–	2,5	2,5	540 000	580 000	93 000	3 400	2 850
115	132	136	220	–	–	3	3	495 000	470 000	73 000	4 800	–

Cylindrical roller bearings with cage

Non-locating bearings



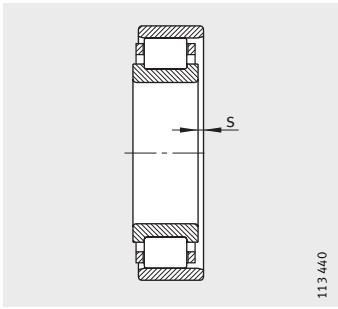
N



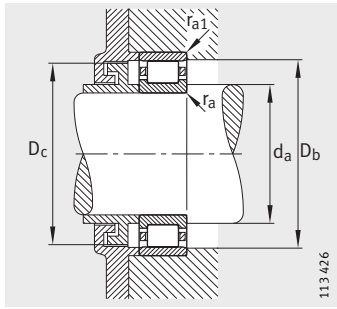
NU

Dimension table (continued) · Dimensions in mm

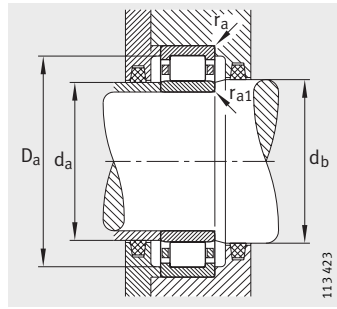
Designation		Mass	Dimensions									
	X-life	m ≈kg	d	D	B	r min.	r_1 min.	$s^{1)}$	E	F	D_1 ≈	d_1 ≈
NU1020-M1	**XL**	1,46	**100**	150	24	1,5	1,1	4,3	137	113	132,9	–
N220-E-TVP2	**XL**	3,5	**100**	180	34	2,1	2,1	1,4	163	119	–	127,3
NU220-E-TVP2	**XL**	3,49	**100**	180	34	2,1	2,1	1,5	163	119	156,9	–
NU2220-E-TVP2	**XL**	4,77	**100**	180	46	2,1	2,1	2,5	163	119	156,9	–
N320-E-M1	**XL**	8,75	**100**	215	47	3	3	1,2	191,5	127,5	–	139,4
NU320-E-TVP2	**XL**	7,67	**100**	215	47	3	3	1,2	191,5	127,5	182	–
NU2320-E-TVP2	**XL**	12,1	**100**	215	73	3	3	4,2	191,5	127,5	182	–
NU420-M1	**XL**	15,8	**100**	250	58	4	4	5,7	211	139	198,2	–
NU1021-M1	**XL**	1,84	**105**	160	26	2	1,1	4,5	145,5	119,5	141	–
N221-E-M1	**XL**	4,63	**105**	190	36	2,1	2,1	1,2	171,5	125,5	–	134,5
NU221-E-TVP2	**XL**	4,08	**105**	190	36	2,1	2,1	1,3	171,5	125,5	165,1	–
NU421-M1	**XL**	17,7	**105**	260	60	4	4	5,7	220,5	144,5	207,4	–
NU1022-M1	**XL**	2,31	**110**	170	28	2	1,1	3,2	155	125	149,7	–
N222-E-TVP2	**XL**	4,85	**110**	200	38	2,1	2,1	1,4	180,5	132,5	–	141,6
NU222-E-TVP2	**XL**	4,84	**110**	200	38	2,1	2,1	1,5	180,5	132,5	173,8	–
NU2222-E-TVP2	**XL**	6,76	**110**	200	53	2,1	2,1	4	180,5	132,5	173,8	–
N322-E-M1	**XL**	11,7	**110**	240	50	3	3	1,3	211	143	–	155,6
NU322-E-TVP2	**XL**	10,3	**110**	240	50	3	3	1,3	211	143	200,9	–
NU2322-E-TVP2	**XL**	16,6	**110**	240	80	3	3	5,8	211	143	200,9	–
NU422-M1	**XL**	22,4	**110**	280	65	4	4	6,2	235	155	220,9	–
NU1024-M1	**XL**	2,47	**120**	180	28	2	1,1	3,2	165	135	159,7	–
N224-E-TVP2	**XL**	5,67	**120**	215	40	2,1	2,1	1,4	195,5	143,5	–	153,2
NU224-E-TVP2	**XL**	5,8	**120**	215	40	2,1	2,1	1,4	195,5	143,5	187,8	–
NU2224-E-TVP2	**XL**	8,38	**120**	215	58	2,1	2,1	4,5	195,5	143,5	187,8	–
N324-E-M1	**XL**	15,1	**120**	260	55	3	3	3,5	230	154	–	168,7
NU324-E-TVP2	**XL**	13,3	**120**	260	55	3	3	3,5	230	154	218,7	–
NU2324-E-M1	**XL**	23,2	**120**	260	86	3	3	7,2	230	154	218,7	–
NU424-M1	**XL**	30,8	**120**	310	72	5	5	6,9	260	170	243,9	–
NU1026-M1	**XL**	3,81	**130**	200	33	2	1,1	3,9	182	148	175,9	–
N226-E-TVP2	**XL**	6,51	**130**	230	40	3	3	1,2	209,5	153,5	–	164
NU226-E-TVP2	**XL**	6,5	**130**	230	40	3	3	1,2	209,5	153,5	201,2	–
NU2226-E-TVP2	**XL**	10,4	**130**	230	64	3	3	5,2	209,5	153,5	201,2	–
N326-E-M1	**XL**	18,4	**130**	280	58	4	4	3,5	247	167	–	181,7
NU326-E-TVP2	**XL**	16,2	**130**	280	58	4	4	3,5	247	167	235,2	–
NU2326-E-M1	**XL**	28,8	**130**	280	93	4	4	8,1	247	167	235,2	–



[1] Axial displacement “s” for N and NU



Mounting dimensions for N

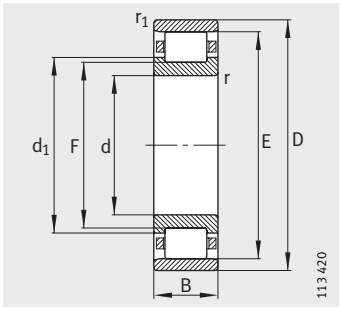


Mounting dimensions for NU

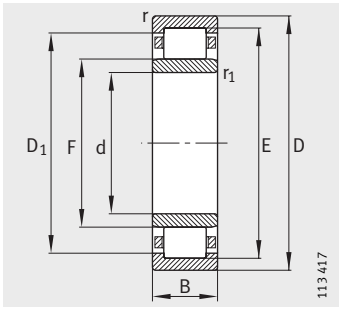
Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a		d_b	D_a	D_b	D_c	r_a	r_{a1}	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	min.	max.	min.	max.	max.	max.	N	N	N	min^{-1}	min^{-1}
106	111	116	143	–	–	1,5	1	116 000	135 000	17 900	7 500	4 150
112	–	–	168	165	161	2,1	2,1	295 000	305 000	47 500	3 800	3 500
112	117	122	168	–	–	2,1	2,1	295 000	305 000	38 500	3 800	3 500
112	117	122	168	–	–	2,1	2,1	395 000	445 000	72 000	3 800	2 900
114	–	–	201	193	190	2,5	2,5	450 000	425 000	65 000	5 000	3 400
114	125	132	201	–	–	2,5	2,5	450 000	425 000	53 000	3 200	3 400
114	125	132	201	–	–	2,5	2,5	680 000	720 000	114 000	3 200	2 550
120	137	141	230	–	–	3	3	550 000	530 000	79 000	4 800	–
111	118	122	151	–	–	2	1	131 000	153 000	19 400	7 000	4 050
117	–	–	178	173	170	2,1	2,1	310 000	320 000	49 000	5 600	3 450
117	123	128	178	–	–	2,1	2,1	310 000	320 000	40 000	3 600	3 450
125	143	147	240	–	–	3	3	610 000	590 000	70 000	4 500	–
116	124	128	161	–	–	2	1	166 000	190 000	24 200	7 000	3 850
122	–	–	188	182	179	2	2	345 000	365 000	56 000	3 400	3 300
122	130	135	188	–	–	2,1	2,1	345 000	365 000	56 000	3 400	3 300
122	130	135	188	–	–	2,1	2,1	455 000	520 000	81 000	3 400	2 800
124	–	–	226	213	209	2,5	2,5	520 000	510 000	78 000	4 800	3 000
124	140	145	226	–	–	2,5	2,5	495 000	475 000	59 000	3 000	3 100
124	140	145	226	–	–	2,5	2,5	750 000	800 000	126 000	2 800	2 320
130	153	157	260	–	–	3	3	680 000	660 000	96 000	4 500	–
126	134	138	171	–	–	2	1	174 000	207 000	26 000	6 300	3 550
132	–	–	203	197	194	2,1	2,1	390 000	415 000	64 000	3 200	3 100
132	141	146	203	–	–	2,1	2,1	390 000	415 000	52 000	3 200	3 100
132	141	146	203	–	–	2,1	2,1	530 000	610 000	97 000	3 200	2 550
134	–	–	246	232	228	2,5	2,5	610 000	600 000	87 000	4 500	2 700
134	151	156	246	–	–	2,5	2,5	610 000	600 000	70 000	2 800	2 700
134	151	156	246	–	–	2,5	2,5	930 000	1 010 000	153 000	4 300	2 000
144	168	172	286	–	–	4	4	850 000	840 000	96 000	3 800	–
136	146	151	191	–	–	2	1	212 000	250 000	31 000	5 600	3 500
144	–	–	216	212	207	2,5	2,5	425 000	445 000	65 000	3 000	2 850
144	151	158	216	–	–	2,5	2,5	425 000	445 000	54 000	3 000	2 850
144	151	158	216	–	–	2,5	2,5	620 000	730 000	111 000	3 000	2 300
147	–	–	263	249	245	3	3	720 000	720 000	103 000	4 300	2 460
147	164	169	263	–	–	3	3	680 000	670 000	79 000	2 600	2 460
147	164	169	263	–	–	3	3	1 080 000	1 220 000	180 000	3 800	1 780

Cylindrical roller bearings with cage

Non-locating bearings



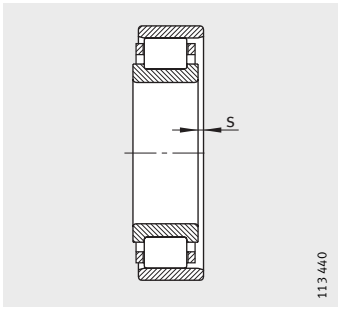
N



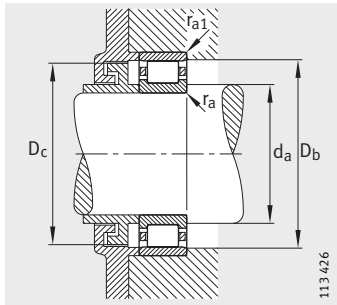
NU

Dimension table (continued) · Dimensions in mm

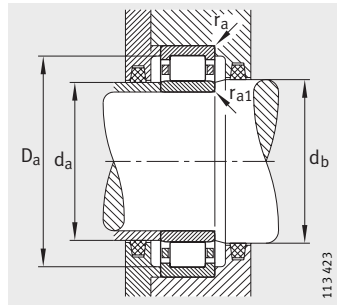
Designation		Mass	Dimensions									
	X-life	m ≈kg	d	D	B	r min.	r_1 min.	$s^{1)}$	E	F	D_1 ≈	d_1 ≈
NU1028-M1	**XL**	3,94	**140**	210	33	2	1,1	3,8	192	158	185,9	–
N228-E-M1	**XL**	9,3	**140**	250	42	3	3	2	225	169	–	179,4
NU228-E-M1	**XL**	9,31	**140**	250	42	3	3	2	225	169	216,7	–
NU2228-E-M1	**XL**	14,5	**140**	250	68	3	3	7	225	169	216,7	–
N328-E-M1	**XL**	22,5	**140**	300	62	4	4	5,2	264	180	–	195,4
NU328-E-TVP2	**XL**	20,1	**140**	300	62	4	4	5,2	264	180	251,7	–
NU2328-E-M1	**XL**	36	**140**	300	102	4	4	9,2	264	180	251,7	–
NU1030-M1	**XL**	4,93	**150**	225	35	2,1	1,5	4,2	205,5	169,5	199	–
N230-E-M1	**XL**	11,7	**150**	270	45	3	3	4	242	182	–	193,1
NU230-E-M1	**XL**	11,8	**150**	270	45	3	3	4	242	182	233,2	–
NU2230-E-M1	**XL**	18,4	**150**	270	73	3	3	7,5	242	182	233,2	–
N330-E-M1	**XL**	26,8	**150**	320	65	4	4	5,5	283	193	–	209,5
NU330-E-M1	**XL**	26,8	**150**	320	65	4	4	5,5	283	193	269,8	–
NU2330-E-M1	**XL**	43,2	**150**	320	108	4	4	9,7	283	193	269,8	–
NU1032-M1	**XL**	5,92	**160**	240	38	2,1	1,5	4,3	220	180	212,9	–
N232-E-M1	**XL**	14,6	**160**	290	48	3	3	4,1	259	195	–	206,8
NU232-E-M1	**XL**	14,6	**160**	290	48	3	3	4,1	259	195	249,6	–
NU2232-E-M1	**XL**	23,5	**160**	290	80	3	3	7,2	261	193	251,1	–
N332-E-M1	–	32,6	**160**	340	68	4	4	5,5	300	204	–	221,6
NU332-E-M1	–	31,8	**160**	340	68	4	4	5,6	300	204	286	–
NU2332-E-M1	–	51,5	**160**	340	114	4	4	9,9	300	204	286	–
NU1034-M1	**XL**	8,03	**170**	260	42	2,1	2,1	4,8	237	193	229,1	–
N234-E-M1	**XL**	18	**170**	310	52	4	4	4,3	279	207	–	218,4
NU234-E-M1	**XL**	18,1	**170**	310	52	4	4	4,3	279	207	268,5	–
NU2234-E-M1	**XL**	29,4	**170**	310	86	4	4	7,2	281	205	269,9	–
N334-E-M1	–	37,9	**170**	360	72	4	4	5,9	318	218	–	237
NU334-E-M1	–	38	**170**	360	72	4	4	6	318	218	301,6	–
NU2334-EX-M1	–	61,4	**170**	360	120	4	4	10,2	320	216	303	–
NU1036-M1	**XL**	10,5	**180**	280	46	2,1	2,1	5	255	205	245,9	–
N236-E-M1	**XL**	18,9	**180**	320	52	4	4	4,7	289	217	–	230,2
NU236-E-M1	**XL**	18,9	**180**	320	52	4	4	4,7	289	217	278,6	–
NU2236-E-M1	**XL**	30,5	**180**	320	86	4	4	7,2	291	215	280	–
NU336-E-M1	–	43,9	**180**	380	75	4	4	6,1	335	231	319,8	–
NU2336-EX-M1	–	71,8	**180**	380	126	4	4	10,5	339	227	320,8	–



[1] Axial displacement “s” for N and NU



Mounting dimensions for N

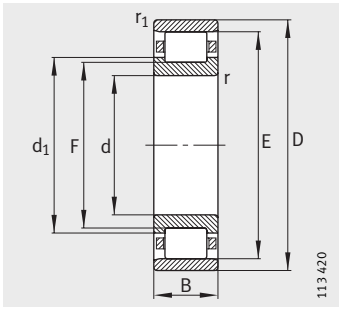


Mounting dimensions for NU

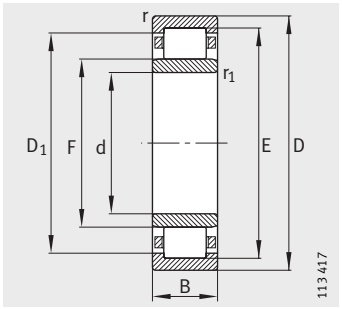
Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a		d_b	D_a	D_b	D_c	r_a	r_{a1}	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	min.	max.	min.	max.	max.	max.	N	N	N	min^{-1}	min^{-1}
146	156	161	201	–	–	2	1	216 000	265 000	32 000	5 300	3 250
154	–	–	236	227	223	2,5	2,5	460 000	510 000	72 000	4 800	2 600
154	166	171	236	–	–	2,5	2,5	460 000	510 000	59 000	4 800	2 600
154	166	171	236	–	–	2,5	2,5	670 000	830 000	123 000	4 500	2 080
157	–	–	283	266	262	3	3	790 000	800 000	113 000	3 800	2 200
157	176	182	283	–	–	3	3	790 000	800 000	92 000	2 400	2 200
157	176	182	283	–	–	3	3	1 210 000	1 390 000	202 000	3 600	1 640
158	167	173	215	–	–	2,1	1,5	248 000	310 000	37 000	5 000	3 100
164	–	–	256	244	240	2,5	2,5	520 000	590 000	82 000	4 500	2 390
164	179	184	256	–	–	2,5	2,5	520 000	590 000	68 000	4 500	2 390
164	179	184	256	–	–	2,5	2,5	780 000	970 000	142 000	4 300	1 860
167	–	–	303	285	281	3	3	900 000	930 000	126 000	3 600	1 970
167	190	195	303	–	–	3	3	900 000	930 000	103 000	3 600	1 970
167	190	195	303	–	–	3	3	1 380 000	1 600 000	226 000	3 200	1 480
168	178	184	230	–	–	2,1	1,5	290 000	355 000	42 500	4 800	3 000
174	–	–	276	261	257	2,5	2,5	590 000	670 000	93 000	4 300	2 190
174	192	197	276	–	–	2,5	2,5	590 000	670 000	76 000	4 300	2 190
174	192	197	276	–	–	2,5	2,5	940 000	1 170 000	172 000	3 800	1 670
177	–	–	323	302	298	3	3	865 000	1 060 000	114 000	3 000	1 790
177	200	211	323	–	–	3	3	865 000	1 060 000	96 000	3 000	1 790
177	200	211	323	–	–	3	3	1 320 000	1 830 000	204 000	3 000	1 350
180	190	197	250	–	–	2,1	2,1	350 000	435 000	49 500	4 500	2 800
187	–	–	293	281	277	3	3	700 000	780 000	107 000	3 600	2 010
187	204	211	293	–	–	3	3	700 000	780 000	88 000	3 600	2 010
187	204	211	293	–	–	3	3	1 130 000	1 400 000	198 000	3 200	1 500
187	–	–	343	320	316	3	3	965 000	1 220 000	132 000	3 000	1 630
187	215	221	343	–	–	3	3	965 000	1 220 000	105 000	3 000	1 630
187	214	218	343	–	–	3	3	1 500 000	2 080 000	231 000	2 800	1 230
190	203	209	270	–	–	2,1	2,1	425 000	520 000	61 000	4 500	2 550
197	–	–	303	292	286	3	3	730 000	830 000	112 000	3 600	1 880
197	214	221	303	–	–	3	3	730 000	830 000	93 000	3 600	1 880
197	214	221	303	–	–	3	3	1 180 000	1 490 000	209 000	3 200	1 390
197	228	234	363	–	–	3	3	1 040 000	1 320 000	112 000	2 800	1 520
197	225	229	363	–	–	3	3	1 660 000	2 320 000	260 000	2 800	1 130

Cylindrical roller bearings with cage

Non-locating bearings



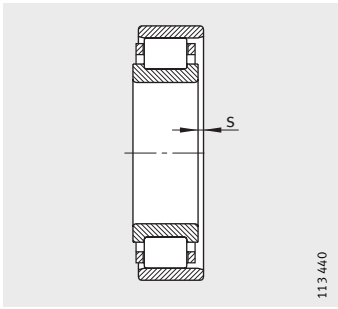
N



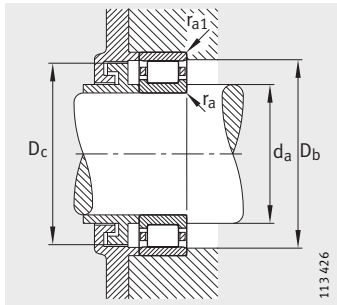
NU

Dimension table (continued) · Dimensions in mm

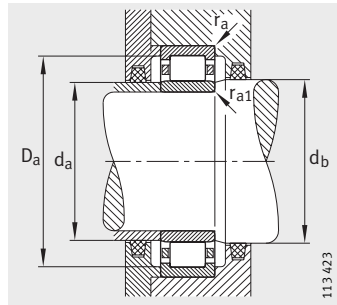
Designation		Mass	Dimensions									
	X-life	m ≈kg	d	D	B	r min.	r_1 min.	$s^{1)}$	E	F	D_1 ≈	d_1 ≈
NU1038-M1	**XL**	10,9	**190**	290	46	2,1	2,1	5	265	215	255,9	–
N238-E-M1	–	22,8	**190**	340	55	4	4	4,7	306	230	–	244
NU238-E-M1	–	22,8	**190**	340	55	4	4	4,7	306	230	295	–
NU2238-E-M1	–	37,1	**190**	340	92	4	4	8	308	228	296,4	–
NU338-E-M1	–	50,6	**190**	400	78	5	5	6,3	353	245	336	–
NU2338-EX-M1	–	83,1	**190**	400	132	5	5	11	360	240	340,5	–
NU1040-M1	**XL**	14,1	**200**	310	51	2,1	2,1	8,3	281	229	271,5	–
N240-E-M1	–	27,2	**200**	360	58	4	4	4,8	323	243	–	257,6
NU240-E-M1	–	27,2	**200**	360	58	4	4	4,8	323	243	311,5	–
NU2240-E-M1	–	44,7	**200**	360	98	4	4	8,2	325	241	312,9	–
NU340-E-M1	–	57,3	**200**	420	80	5	5	6,3	370	258	351,8	–
NU2340-EX-M1	–	95,6	**200**	420	138	5	5	11,3	377	253	356,9	–
NU1044-M1	–	20,5	**220**	340	56	3	3	6,2	310	250	298,9	–
NU244-E-M1	–	38,5	**220**	400	65	4	4	5,5	358	268	344,9	–
NU2244-EX-M1	–	61,6	**220**	400	108	4	4	8,4	367	259	349,4	–
NU344-E-M1	–	75,5	**220**	460	88	5	5	7	406	282	386	–
NU2344-EX-M1	–	121	**220**	460	145	5	5	11,9	413	277	391,2	–
NU1048-M1	–	19,8	**240**	360	56	3	3	6,4	330	270	318,9	–
N248-E-M1	–	51,5	**240**	440	72	4	4	6	393	293	–	312
NU248-E-M1	–	51,8	**240**	440	72	4	4	6	393	293	376,6	–
NU2248-EX-M1	–	82,8	**240**	440	120	4	4	10,2	399	287	380,7	–
NU348-E-M1	–	95,7	**240**	500	95	5	5	7,4	442	306	421,2	–
NU2348-EX-M1	–	151	**240**	500	155	5	5	13,3	447	303	424	–
NU1052-M1	–	29,7	**260**	400	65	4	4	7,2	364	296	351,3	–
NU252-E-M1	–	68,4	**260**	480	80	5	5	6,2	429	317	410,8	–
NU2252-E-M1	–	109	**260**	480	130	5	5	10,5	433	313	413,6	–
NU352-E-M1	–	121	**260**	540	102	6	6	10	477	337	454,6	–
NU2352-EX-M1	–	189	**260**	540	165	6	6	13,7	484	324	458,4	–
NU1056-M1	–	31,3	**280**	420	65	4	4	7,2	384	316	371,3	–
NU256-E-M1	–	72,1	**280**	500	80	5	5	6,3	449	337	430,8	–
NU2256-E-M1	–	114	**280**	500	130	5	5	10,5	453	333	436	–
NU356-E-M1	–	147	**280**	580	108	6	6	8,7	512	362	488	–
NU2356-EX-M1	–	234	**280**	580	175	6	6	13,8	521	351	493,8	–



[1] Axial displacement “s” for N and NU



Mounting dimensions for N

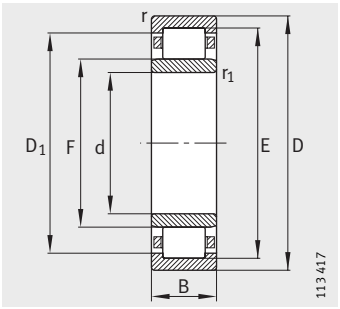


Mounting dimensions for NU

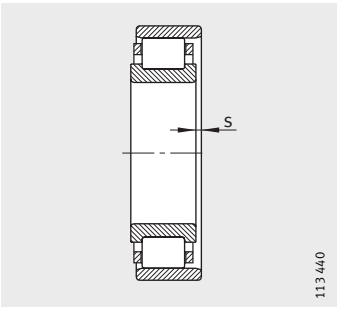
Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a		d_b	D_a	D_b	D_c	r_a	r_{a1}	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	min.	max.	min.	max.	max.	max.	N	N	N	min^{-1}	min^{-1}
200	213	219	280	–	–	2,1	2,1	435 000	550 000	63 000	4 300	2 410
207	–	–	323	309	303	3	3	680 000	930 000	100 000	3 200	1 750
207	227	234	323	–	–	3	3	680 000	930 000	85 000	3 200	1 750
207	227	234	323	–	–	3	3	1 100 000	1 660 000	184 000	3 000	1 300
210	242	248	380	–	–	4	4	1 120 000	1 430 000	120 000	2 800	1 430
210	237,8	242,2	380	–	–	4	4	1 900 000	2 650 000	285 000	2 600	1 030
210	226	233	300	–	–	2,1	2,1	470 000	600 000	68 000	3 800	2 310
217	–	–	343	326	320	3	3	750 000	1 040 000	110 000	3 000	1 620
217	240	247	343	–	–	3	3	750 000	1 040 000	94 000	3 000	1 620
217	240	247	343	–	–	3	3	1 220 000	1 860 000	206 000	2 800	1 210
220	255	261	400	–	–	4	4	1 180 000	1 530 000	128 000	2 600	1 340
220	250,7	255,3	400	–	–	4	4	2 040 000	2 900 000	310 000	2 400	960
232	248	254	328	–	–	2,5	2,5	510 000	765 000	69 000	3 200	2 040
237	265	271	383	–	–	3	3	950 000	1 320 000	109 000	2 800	1 400
237	256,7	261,3	383	–	–	3	3	1 630 000	2 360 000	250 000	2 600	1 020
240	279	285	440	–	–	4	4	1 430 000	1 900 000	152 000	2 400	1 160
240	274,7	279,3	440	–	–	4	4	2 360 000	3 350 000	340 000	2 200	840
252	268	275	348	–	–	2,5	2,5	540 000	850 000	74 000	3 000	1 840
257	–	–	423	396	390	3	3	1 140 000	1 600 000	163 000	2 600	1 240
257	290	296	423	–	–	3	3	1 140 000	1 600 000	132 000	2 600	1 240
257	284,5	289,5	423	–	–	3	3	1 830 000	2 800 000	295 000	2 400	910
260	303	309	480	–	–	4	4	1 730 000	2 280 000	176 000	2 200	1 010
260	300,5	305,5	480	–	–	4	4	2 600 000	3 750 000	375 000	2 000	770
275	292	300	385	–	–	3	3	655 000	1 020 000	90 000	2 800	1 690
280	314	320	460	–	–	4	4	1 340 000	1 900 000	154 000	2 400	1 120
280	310	316	460	–	–	4	4	2 160 000	3 350 000	345 000	2 200	790
286	334,3	339,7	514	–	–	5	5	1 900 000	2 600 000	198 000	2 000	920
286	321,3	326,7	514	–	–	5	5	3 100 000	4 500 000	435 000	1 800	670
295	312	321	405	–	–	3	3	680 000	1 100 000	96 000	2 800	1 550
300	334	340	480	–	–	4	4	1 400 000	2 000 000	163 000	2 200	1 040
300	330	336	480	–	–	4	4	2 280 000	3 600 000	360 000	2 000	730
306	359	366	554	–	–	5	5	2 160 000	3 050 000	224 000	1 900	810
306	348	354	554	–	–	5	5	3 550 000	5 200 000	495 000	1 600	600

Cylindrical roller bearings with cage

Non-locating bearings



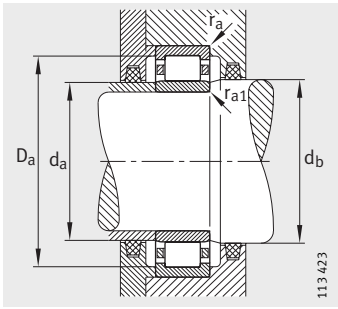
NU



1) Axial displacement “s” for N and NU

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions								
	m	d	D	B	r	r_1	s[1)]	E	F	D_1
	≈kg				min.	min.				≈
NU1060-M1	44,6	**300**	460	74	4	4	7,9	420	340	405,2
NU260-E-M1	90,4	**300**	540	85	5	5	6,9	484	364	464,6
NU2260-EX-M1	143	**300**	540	140	5	5	12,2	495	355	472,6
NU1064-M1	46,9	**320**	480	74	4	4	11,5	440	360	425,1
NU264-EX-M1	113	**320**	580	92	5	5	7,5	520	392	499,4
NU2264-EX-M1	180	**320**	580	150	5	5	11,9	530	380	506
NU1068-M1	63,2	**340**	520	82	5	5	12,5	475	385	458,2
NU1072-M1	66	**360**	540	82	5	5	12,5	495	405	478,1
NU2272-E-M1	254	**360**	650	170	6	6	15	588	428	562
NU1076-M1	69,1	**380**	560	82	5	5	9	515	425	498,1
NU2276-E-M1	288	**380**	680	175	6	6	13,8	615	451	588,8
NU1080-M1	89,8	**400**	600	90	5	5	13,5	550	450	531,5
NU1084-M1	92,9	**420**	620	90	5	5	9,6	570	470	551,5
NU1088-M1	107	**440**	650	94	6	6	9,8	597	493	577,6
NU1992-M1	63,1	**460**	620	74	4	4	8,4	578	502	562,8
NU1092-M1	125	**460**	680	100	6	6	11,2	624	516	603,9
NU1996-M1	74,2	**480**	650	78	5	5	6,8	605	525	589
NU1096-M1	129	**480**	700	100	6	6	10,7	644	536	623,9
NU10/500-M1	133	**500**	720	100	6	6	10,7	664	556	643,9
NU19/560-M1	105	**560**	750	85	5	5	9,6	700	610	682
NU10/560-M1	213	**560**	820	115	6	6	9,8	754	626	731
NU19/600-M1	125	**600**	800	90	5	5	9,9	748	652	730,7
NU19/670-M1	186	**670**	900	103	6	6	11,3	839	731	817
NU19/710-M1	213	**710**	950	106	6	6	9,3	886	774	867,7

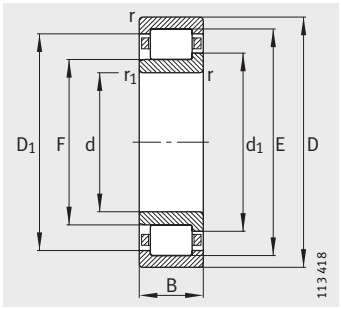


Mounting dimensions for NU

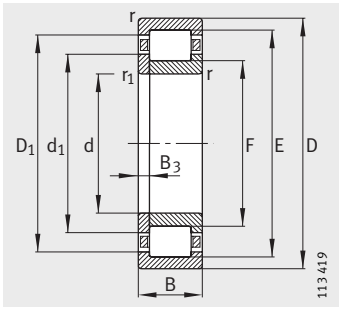
Mounting dimensions						Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a		d_b	D_a	r_a	r_{a1}	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
min.	max.	min.	max.	max.	max.	N	N	N	min^{-1}	min^{-1}
315	336	345	445	3	3	900 000	1 430 000	120 000	2 400	1 390
320	359	367	520	4	4	1 600 000	2 320 000	182 000	2 000	930
320	352	358	520	4	4	2 700 000	4 150 000	395 000	1 900	660
335	356	365	465	3	3	915 000	1 500 000	124 000	2 400	1 300
340	388,5	395,5	560	4	4	1 800 000	2 700 000	204 000	1 900	850
340	376,5	383,5	560	4	4	3 150 000	4 900 000	460 000	1 600	580
357	381	390	503	4	4	1 120 000	1 830 000	147 000	2 200	1 190
377	400	410	523	4	4	1 140 000	1 900 000	151 000	2 200	1 120
386	424	432	624	5	5	3 600 000	5 700 000	520 000	1 400	520
397	420	430	543	4	4	1 180 000	2 000 000	156 000	2 000	1 050
406	446	456	654	5	5	4 050 000	6 700 000	610 000	1 400	455
417	445	455	583	4	4	1 370 000	2 320 000	177 000	1 900	980
437	465	475	603	4	4	1 400 000	2 450 000	183 000	1 800	920
463	488	498	627	5	5	1 560 000	2 750 000	203 000	1 600	860
475	498	506	605	3	3	1 020 000	1 960 000	135 000	1 800	–
483	510	522	657	5	5	1 660 000	3 000 000	218 000	1 600	820
497	521	529	633	4	4	1 140 000	2 240 000	172 000	1 800	–
503	530	542	677	5	5	1 700 000	3 100 000	225 000	1 500	780
523	550	562	697	5	5	1 760 000	3 200 000	232 000	1 500	750
577	606	614	733	4	4	1 460 000	3 000 000	215 000	1 400	–
583	620	632	797	5	5	2 700 000	5 100 000	355 000	1 200	590
617	647	657	783	4	4	1 700 000	3 450 000	249 000	1 400	–
693	726	736	877	5	5	2 040 000	4 250 000	300 000	1 200	–
733	769	779	927	5	5	2 240 000	4 750 000	300 000	1 100	–

Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



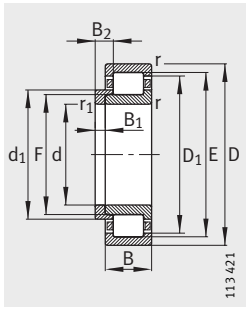
NJ
Semi-locating bearings



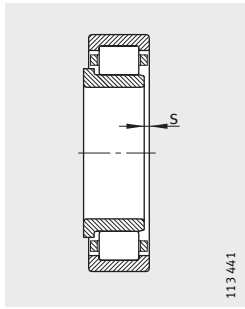
NUP
Locating bearings

Dimension table · Dimensions in mm

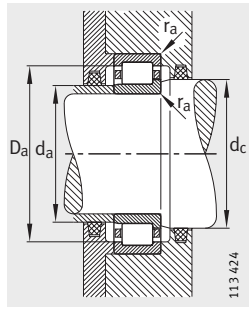
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r_1 min.	$s^{1)}$	E	F	D_1 ≈	d_1 ≈
NJ202-E-TVP2	**XL**	–	0,049	–	**15**	35	11	0,6	0,3	1,6	30,3	19,3	28	21,6
NJ202-E-TVP2	**XL**	**HJ202-E**	0,049	0,005	**15**	35	11	0,6	0,3	–	30,3	19,3	28	21,6
NJ203-E-TVP2	**XL**	–	0,07	–	**17**	40	12	0,6	0,3	1,2	35,1	22,1	32,5	24,7
NJ203-E-TVP2	**XL**	**HJ203-E**	0,07	0,008	**17**	40	12	0,6	0,3	–	35,1	22,1	32,5	24,7
NUP203-E-TVP2	**XL**	–	0,073	–	**17**	40	12	0,6	0,3	–	35,1	22,1	32,5	24,7
NJ2203-E-TVP2	**XL**	–	0,053	–	**17**	40	16	0,6	0,3	1,7	35,1	22,1	32,5	24,7
NJ2203-E-TVP2	**XL**	**HJ2203-E**	0,053	0,008	**17**	40	16	0,6	0,3	–	35,1	22,1	32,5	24,7
NUP2203-E-TVP2	**XL**	–	0,055	–	**17**	40	16	0,6	0,6	–	35,1	22,1	32,5	24,7
NJ303-E-TVP2	**XL**	–	0,124	–	**17**	47	14	1	0,6	1,2	40,2	24,2	37,1	27,6
NJ303-E-TVP2	**XL**	**HJ303-E**	0,124	0,014	**17**	47	14	1	0,6	–	40,2	24,2	37,1	27,6
NUP303-E-TVP2	**XL**	–	0,142	–	**17**	47	14	1	0,6	–	40,2	24,2	37,1	27,6
NJ204-E-TVP2	**XL**	–	0,117	–	**20**	47	14	1	0,6	1	41,5	26,5	38,8	29,7
NJ204-E-TVP2	**XL**	**HJ204-E**	0,117	0,011	**20**	47	14	1	0,6	–	41,5	26,5	38,8	29,7
NUP204-E-TVP2	**XL**	–	0,119	–	**20**	47	14	1	0,6	–	41,5	26,5	38,8	29,7
NJ2204-E-TVP2	**XL**	–	0,15	–	**20**	47	18	1	0,6	1,8	41,5	26,5	38,8	29,7
NJ2204-E-TVP2	**XL**	**HJ2204-E**	0,15	0,012	**20**	47	18	1	0,6	–	41,5	26,5	38,8	29,7
NUP2204-E-TVP2	**XL**	–	0,154	–	**20**	47	18	1	0,6	–	41,5	26,5	38,8	29,7
NJ304-E-TVP2	**XL**	–	0,156	–	**20**	52	15	1,1	0,6	1	45,5	27,5	42,4	31,3
NJ304-E-TVP2	**XL**	**HJ304-E**	0,156	0,017	**20**	52	15	1,1	0,6	–	45,5	27,5	42,4	31,3
NUP304-E-TVP2	**XL**	–	0,16	–	**20**	52	15	1,1	0,6	–	45,5	27,5	42,4	31,3
NJ2304-E-TVP2	**XL**	–	0,219	–	**20**	52	21	1,1	0,6	1,9	45,5	27,5	42,4	31,3
NJ2304-E-TVP2	**XL**	**HJ2304-E**	0,219	0,019	**20**	52	21	1,1	0,6	–	45,5	27,5	42,4	31,3
NUP2304-E-TVP2	**XL**	–	0,224	–	**20**	52	21	1,1	0,6	–	45,5	27,5	42,4	31,3
NJ205-E-TVP2	**XL**	–	0,14	–	**25**	52	15	1	0,6	1,2	46,5	31,5	43,8	34,7
NJ205-E-TVP2	**XL**	**HJ205-E**	0,14	0,014	**25**	52	15	1	0,6	–	46,5	31,5	43,8	34,7
NUP205-E-TVP2	**XL**	–	0,145	–	**25**	52	15	1	0,6	–	46,5	31,5	43,8	34,7
NJ2205-E-TVP2	**XL**	–	0,17	–	**25**	52	18	1	0,6	1,7	46,5	31,5	43,8	34,7
NJ2205-E-TVP2	**XL**	**HJ2205-E**	0,17	0,015	**25**	52	18	1	0,6	–	46,5	31,5	43,8	34,7
NUP2205-E-TVP2	**XL**	–	0,174	–	**25**	52	18	1	0,6	–	46,5	31,5	43,8	34,7
NJ305-E-TVP2	**XL**	–	0,25	–	**25**	62	17	1,1	1,1	1,5	54	34	50,7	38,1
NJ305-E-TVP2	**XL**	**HJ305-E**	0,25	0,025	**25**	62	17	1,1	1,1	–	54	34	50,7	38,1
NUP305-E-TVP2	**XL**	–	0,256	–	**25**	62	17	1,1	1,1	–	54	34	50,7	38,1
NJ2305-E-TVP2	**XL**	–	0,356	–	**25**	62	24	1,1	1,1	1,9	54	34	50,7	38,1
NJ2305-E-TVP2	**XL**	**HJ2305-E**	0,356	0,027	**25**	62	24	1,1	1,1	–	54	34	50,7	38,1
NUP2305-E-TVP2	**XL**	–	0,364	–	**25**	62	24	1,1	1,1	–	54	34	50,7	38,1



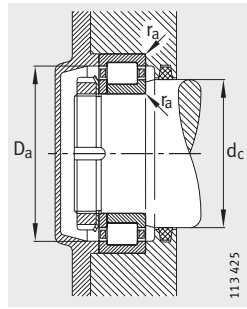
NJ and HJ
Locating bearings



[1] Axial displacement “s” for NJ



Mounting dimensions for NJ



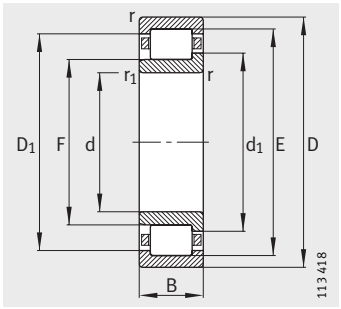
Mounting dimensions for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B_1	B_2	B_3	d_a		d_c	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
			min.[2]	max.	min.	max.[2]	max.	N	N	N	min^{-1}	min^{-1}
–	–	–	17,4	18,5	22	32,6	0,6	15 100	10 400	1 460	22 000	17 600
2,5	5	–	17,4	–	22	32,6	0,6	15 100	10 400	1 460	22 000	17 600
–	–	–	21	21,5	28	36	0,6	20 800	14 600	2 100	18 000	15 400
3	5,5	–	21	–	28	36	0,6	20 800	14 600	2 100	18 000	15 400
–	–	2,5	21	–	28	36	0,6	20 800	14 600	2 110	18 000	15 400
–	–	–	21	21,5	26	36	0,6	28 500	21 900	3 500	18 000	13 300
3	6	–	21	–	26	36	0,6	28 500	21 900	3 500	18 000	13 300
–	–	3	21	–	26	36	0,6	28 500	21 900	3 500	18 000	13 300
–	–	–	21,2	23,5	28	42,8	1	30 000	21 200	3 300	16 000	13 700
4	6,5	–	21,2	–	28	42,8	1	30 000	21 200	3 300	16 000	13 700
–	–	2,5	21,2	–	28	42,8	1	30 000	21 200	3 250	16 000	13 700
–	–	–	24	26	32	41	1	32 500	24 700	3 850	16 000	13 100
3	5,5	–	24	–	32	41	1	32 500	24 700	3 850	16 000	13 100
–	–	2,5	24	–	32	41	1	32 500	24 700	3 850	16 000	13 100
–	–	–	24	26	32	41	1	38 500	31 000	5 000	16 000	11 400
3	6,5	–	24	–	32	41	1	38 500	31 000	5 000	16 000	11 400
–	–	3,5	24	–	32	41	1	38 500	31 000	5 000	16 000	11 400
–	–	–	24	27	33	45	1	36 500	26 000	4 050	14 000	12 100
4	6,5	–	24	–	33	45	1	36 500	26 000	4 050	14 000	12 100
–	–	2,5	24	–	33	45	1	36 500	26 000	4 050	14 000	12 100
–	–	–	24	27	33	45	1	48 500	38 000	6 300	14 000	9 900
4	7,5	–	24	–	33	45	1	48 500	38 000	6 300	14 000	9 900
–	–	3,5	24	–	33	45	1	48 500	38 000	6 300	14 000	9 900
–	–	–	29	31	37	46	1	34 500	27 500	4 350	15 000	11 800
3	6	–	29	–	37	46	1	34 500	27 500	4 350	15 000	11 800
–	–	3	29	–	37	46	1	34 500	27 500	4 350	15 000	11 800
–	–	–	29	31	37	46	1	41 500	34 500	5 700	15 000	9 800
3	6,5	–	29	–	37	46	1	41 500	34 500	5 700	15 000	9 800
–	–	3,5	29	–	37	46	1	41 500	34 500	5 700	15 000	9 800
–	–	–	32	33	40	55	1	48 000	36 500	5 800	12 000	10 200
4	7	–	32	–	40	55	1	48 000	36 500	5 800	12 000	10 200
–	–	3	32	–	40	55	1	48 000	36 500	5 800	12 000	10 200
–	–	–	32	33	40	55	1	66 000	55 000	9 400	12 000	8 400
4	8	–	32	–	40	55	1	66 000	55 000	9 400	12 000	8 400
–	–	4	32	–	40	55	1	66 000	55 000	9 400	12 000	8 400

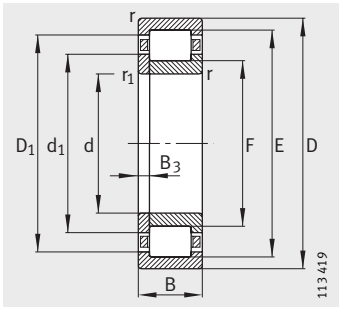
[2] If axial load is present, observe the dimensions D_1 and d_1.

Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



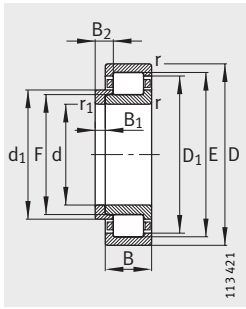
NJ
Semi-locating bearings



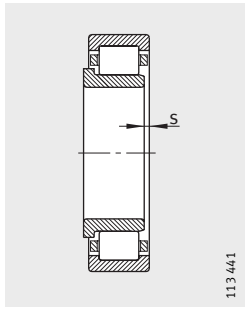
NUP
Locating bearings

Dimension table (continued) · Dimensions in mm

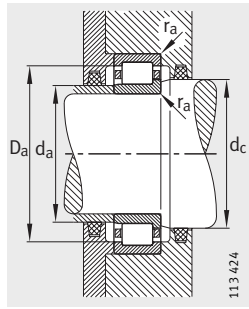
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r_1 min.	$s^{1)}$	E	F	D_1 ≈	d_1 ≈
NJ206-E-TVP2	**XL**	–	0,213	–	**30**	62	16	1	0,6	1,5	55,5	37,5	52,5	41,1
NJ206-E-TVP2	**XL**	**HJ206-E**	0,213	0,024	**30**	62	16	1	0,6	–	55,5	37,5	52,5	41,1
NUP206-E-TVP2	**XL**	–	0,219	–	**30**	62	16	1	0,6	–	55,5	37,5	52,5	41,1
NJ2206-E-TVP2	**XL**	–	0,261	–	**30**	62	20	1	0,6	1,6	55,5	37,5	52,5	41,3
NJ2206-E-TVP2	**XL**	**HJ2206-E**	0,261	0,025	**30**	62	20	1	0,6	–	55,5	37,5	52,5	41,3
NUP2206-E-TVP2	**XL**	–	0,268	–	**30**	62	20	1	0,6	–	55,5	37,5	52,5	41,3
NJ306-E-TVP2	**XL**	–	0,376	–	**30**	72	19	1,1	1,1	1,2	62,5	40,5	59,2	45
NJ306-E-TVP2	**XL**	**HJ306-E**	0,376	0,042	**30**	72	19	1,1	1,1	–	62,5	40,5	59,2	45
NUP306-E-TVP2	**XL**	–	0,385	–	**30**	72	19	1,1	1,1	–	62,5	40,5	59,2	45
NJ2306-E-TVP2	**XL**	–	0,54	–	**30**	72	27	1,1	1,1	2,2	62,5	40,5	59,2	45
NJ2306-E-TVP2	**XL**	**HJ2306-E**	0,54	0,044	**30**	72	27	1,1	1,1	–	62,5	40,5	59,2	45
NUP2306-E-TVP2	**XL**	–	0,551	–	**30**	72	27	1,1	1,1	–	62,5	40,5	59,2	45
NJ406-M1	**XL**	–	0,859	–	**30**	90	23	1,5	1,5	2,3	73	45	68,4	50,3
NJ406-M1	**XL**	**HJ406**	0,859	0,082	**30**	90	23	1,5	1,5	–	73	45	68,4	50,3
NJ207-E-TVP2	**XL**	–	0,309	–	**35**	72	17	1,1	0,6	0,7	64	44	61	48
NJ207-E-TVP2	**XL**	**HJ207-E**	0,309	0,032	**35**	72	17	1,1	0,6	–	64	44	61	48
NUP207-E-TVP2	**XL**	–	0,317	–	**35**	72	17	1,1	0,6	–	64	44	61	48
NJ2207-E-TVP2	**XL**	–	0,416	–	**35**	72	23	1,1	0,6	2,2	64	44	61	48
NJ2207-E-TVP2	**XL**	**HJ2207-E**	0,416	0,035	**35**	72	23	1,1	0,6	–	64	44	61	48
NUP2207-E-TVP2	**XL**	–	0,427	–	**35**	72	23	1,1	0,6	–	64	44	61	48
NJ307-E-TVP2	**XL**	–	0,496	–	**35**	80	21	1,5	1,1	0,6	70,2	46,2	66,6	51
NJ307-E-TVP2	**XL**	**HJ307-E**	0,496	0,06	**35**	80	21	1,5	1,1	–	70,2	46,2	66,6	51
NUP307-E-TVP2	**XL**	–	0,506	–	**35**	80	21	1,5	1,1	–	70,2	46,2	66,6	51
NJ2307-E-TVP2	**XL**	–	0,736	–	**35**	80	31	1,5	1,1	2,1	70,2	46,2	66,6	51
NJ2307-E-TVP2	**XL**	**HJ2307-E**	0,736	0,063	**35**	80	31	1,5	1,1	–	70,2	46,2	66,6	51
NUP2307-E-TVP2	**XL**	–	0,751	–	**35**	80	31	1,5	1,5	–	70,2	46,2	66,6	51
NJ407-M1	**XL**	–	1,16	–	**35**	100	25	1,5	1,5	2,6	83	53	78,2	58,8
NJ407-M1	**XL**	**HJ407**	1,16	0,127	**35**	100	25	1,5	1,5	–	83	53	78,2	58,8



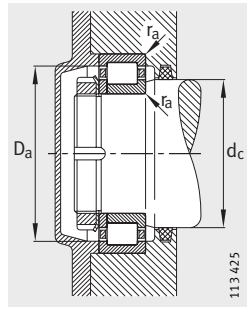
NJ and HJ
Locating bearings



[1] Axial displacement “s” for NJ



Mounting dimensions for NJ



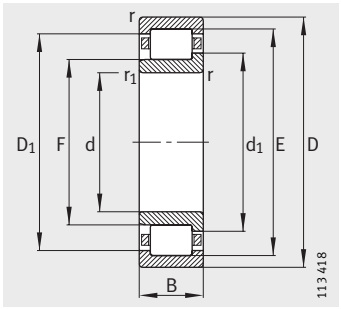
Mounting dimensions for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B_1	B_2	B_3	d_a		d_c	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
			min.[2]	max.	min.	max.[2]	max.	N	N	N	min^{-1}	min^{-1}
–	–	–	34	37	44	56	1	45 000	36 000	5 700	12 000	9 800
4	7	–	34	–	44	56	1	45 000	36 000	5 700	12 000	9 800
–	–	3	34	–	44	56	1	45 000	36 000	5 700	12 000	9 800
–	–	–	34	37	44	56	1	57 000	48 500	8 100	12 000	8 200
4	7,5	–	34	–	44	56	1	57 000	48 500	8 100	12 000	8 200
–	–	3,5	34	–	44	56	1	57 000	48 500	8 100	12 000	8 200
–	–	–	37	40	48	65	1	61 000	48 000	8 000	10 000	9 000
5	8,5	–	37	–	48	65	1	61 000	48 000	8 000	10 000	9 000
–	–	3,5	37	–	48	65	1	61 000	48 000	8 000	10 000	9 000
–	–	–	37	40	48	65	1	86 000	75 000	13 200	10 000	7 300
5	9,5	–	37	–	48	65	1	86 000	75 000	13 200	10 000	7 300
–	–	4,5	37	–	48	65	1	86 000	75 000	13 200	10 000	7 300
–	–	–	41	44	52	79	1,5	83 000	64 000	8 500	14 000	–
7	11,5	–	41	–	52	79	1,5	83 000	64 000	8 500	14 000	–
–	–	–	39	43	50	65	1	58 000	48 500	7 900	10 000	8 300
4	7	–	39	–	50	65	1	58 000	48 500	7 900	10 000	8 300
–	–	3	39	–	50	65	1	58 000	48 500	7 900	10 000	8 300
–	–	–	39	43	50	65	1	72 000	64 000	10 800	10 000	7 300
4	8,5	–	39	–	50	65	1	72 000	64 000	10 800	10 000	7 300
–	–	4,5	39	–	50	65	1	72 000	64 000	10 800	10 000	7 300
–	–	–	42	45	53	71	1,5	76 000	63 000	10 700	9 000	8 100
6	9,5	–	42	–	53	71	1,5	76 000	63 000	10 700	9 000	8 100
–	–	3,5	42	–	53	71	1,5	76 000	63 000	10 700	9 000	8 100
–	–	–	42	45	53	71	1,5	108 000	98 000	17 400	9 000	6 700
6	11	–	42	–	53	71	1,5	108 000	98 000	17 400	9 000	6 700
–	–	5	42	–	53	71	1,5	108 000	98 000	17 400	9 000	6 700
–	–	–	46	52	61	89	1,5	102 000	83 000	13 600	12 000	–
8	13	–	46	–	61	89	1,5	102 000	83 000	13 600	12 000	–

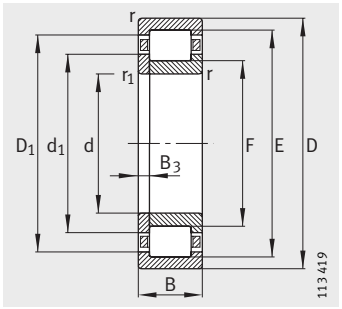
[2] If axial load is present, observe the dimensions D_1 and d_1.

Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



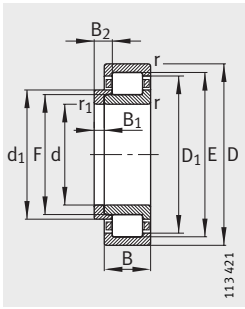
NJ
Semi-locating bearings



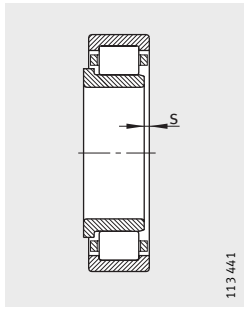
NUP
Locating bearings

Dimension table (continued) · Dimensions in mm

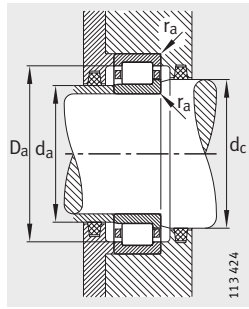
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r_1 min.	$s^{1)}$	E	F	D_1 ≈	d_1 ≈
NJ208-E-TVP2	**XL**	–	0,389	–	**40**	80	18	1,1	1,1	1	71,5	49,5	68,3	54
NJ208-E-TVP2	**XL**	**HJ208-E**	0,389	0,049	**40**	80	18	1,1	1,1	–	71,5	49,5	68,3	54
NUP208-E-TVP2	**XL**	–	0,399	–	**40**	80	18	1,1	1,1	–	71,5	49,5	68,3	54
NJ2208-E-TVP2	**XL**	–	0,504	–	**40**	80	23	1,1	1,1	1,5	71,5	49,5	68,3	54
NJ2208-E-TVP2	**XL**	**HJ2208-E**	0,504	0,05	**40**	80	23	1,1	1,1	–	71,5	49,5	68,3	54
NUP2208-E-TVP2	**XL**	–	0,518	–	**40**	80	23	1,1	1,1	–	71,5	49,5	68,3	54
NJ308-E-TVP2	**XL**	–	0,674	–	**40**	90	23	1,5	1,5	1,3	80	52	75,9	57,6
NJ308-E-TVP2	**XL**	**HJ308-E**	0,674	0,087	**40**	90	23	1,5	1,5	–	80	52	75,9	57,6
NUP308-E-TVP2	**XL**	–	0,688	–	**40**	90	23	1,5	1,5	–	80	52	75,9	57,6
NJ2308-E-TVP2	**XL**	–	0,978	–	**40**	90	33	1,5	1,5	2,7	80	52	75,9	57,6
NJ2308-E-TVP2	**XL**	**HJ2308-E**	0,978	0,091	**40**	90	33	1,5	1,5	–	80	52	75,9	57,6
NUP2308-E-TVP2	**XL**	–	0,999	–	**40**	90	33	1,5	1,5	–	80	52	75,9	57,6
NJ408-M1	**XL**	–	1,5	–	**40**	110	27	2	2	2,8	92	58	86,4	64,6
NJ408-M1	**XL**	**HJ408**	1,5	0,148	**40**	110	27	2	2	–	92	58	86,4	64,6
NJ209-E-TVP2	**XL**	–	0,445	–	**45**	85	19	1,1	1,1	1,9	76,5	54,5	73,3	59
NJ209-E-TVP2	**XL**	**HJ209-E**	0,445	0,054	**45**	85	19	1,1	1,1	–	76,5	54,5	73,3	59
NUP209-E-TVP2	**XL**	–	0,457	–	**45**	85	19	1,1	1,1	–	76,5	54,5	73,3	59
NJ2209-E-TVP2	**XL**	–	0,544	–	**45**	85	23	1,1	1,1	1,5	76,5	54,5	73,3	59
NJ2209-E-TVP2	**XL**	**HJ2209-E**	0,544	0,055	**45**	85	23	1,1	1,1	–	76,5	54,5	73,3	59
NUP2209-E-TVP2	**XL**	–	0,559	–	**45**	85	23	1,1	1,1	–	76,5	54,5	73,3	59
NJ309-E-TVP2	**XL**	–	0,913	–	**45**	100	25	1,5	1,5	1	88,5	58,5	84,1	64,4
NJ309-E-TVP2	**XL**	**HJ309-E**	0,913	0,109	**45**	100	25	1,5	1,5	–	88,5	58,5	84,1	64,4
NUP309-E-TVP2	**XL**	–	0,937	–	**45**	100	25	1,5	1,5	–	88,5	58,5	84,1	64,4
NJ2309-E-TVP2	**XL**	–	1,33	–	**45**	100	36	1,5	1,5	2,5	88,5	58,5	84,1	64,4
NJ2309-E-TVP2	**XL**	**HJ2309-E**	1,33	0,115	**45**	100	36	1,5	1,5	–	88,5	58,5	84,1	64,4
NUP2309-E-TVP2	**XL**	–	1,36	–	**45**	100	36	1,5	1,5	–	88,5	58,5	84,1	64,4
NJ409-M1	**XL**	–	1,84	–	**45**	120	29	2	2	2,9	100,5	64,5	94,6	71,6
NJ409-M1	**XL**	**HJ409**	1,84	0,181	**45**	120	29	2	2	–	100,5	64,5	94,6	71,6



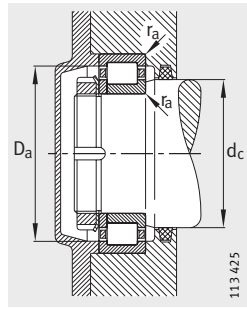
NJ and HJ
Locating bearings



[1] Axial displacement “s” for NJ



Mounting dimensions for NJ



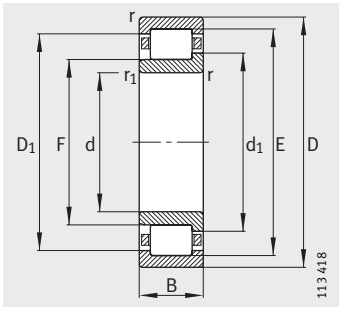
Mounting dimensions for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B_1	B_2	B_3	d_a		d_c	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
			min.[2]	max.	min.	max.[2]	max.	N	N	N	min^{-1}	min^{-1}
–	–	–	47	49	56	73	1	63 000	53 000	8 700	9 000	7 600
5	8,5	–	47	–	56	73	1	63 000	53 000	8 700	9 000	7 600
–	–	3,5	47	–	56	73	1	63 000	53 000	8 700	9 000	7 600
–	–	–	47	49	56	73	1	83 000	75 000	12 900	9 000	6 400
5	9	–	47	–	56	73	1	83 000	75 000	12 900	9 000	6 400
–	–	4	47	–	56	73	1	83 000	75 000	12 900	9 000	6 400
–	–	–	49	51	60	81	1,5	95 000	78 000	12 900	7 500	7 300
7	11	–	49	–	60	81	1,5	95 000	78 000	12 900	7 500	7 300
–	–	4	49	–	60	81	1,5	95 000	78 000	12 900	7 500	7 300
–	–	–	49	51	60	81	1,5	132 000	119 000	20 700	7 500	6 000
7	12,5	–	49	–	60	81	1,5	132 000	119 000	20 700	7 500	6 000
–	–	5,5	49	–	60	81	1,5	132 000	119 000	20 700	7 500	6 000
–	–	–	53	57	67	97	2	119 000	95 000	15 800	11 000	–
8	13	–	53	–	67	97	2	119 000	95 000	15 800	11 000	–
–	–	–	52	54	61	78	1	72 000	63 000	10 600	8 500	7 100
5	8,5	–	52	–	61	78	1	72 000	63 000	10 600	8 500	7 100
–	–	3,5	52	–	61	78	1	72 000	63 000	10 600	8 500	7 100
–	–	–	52	54	61	78	1	87 000	82 000	14 100	8 500	5 800
5	9	–	52	–	61	78	1	87 000	82 000	14 100	8 500	5 800
–	–	4	52	–	61	78	1	87 000	82 000	14 100	8 500	5 800
–	–	–	54	57	66	91	1,5	115 000	98 000	16 400	6 700	6 500
7	11,5	–	54	–	66	91	1,5	115 000	98 000	16 400	6 700	6 500
–	–	4,5	54	–	66	91	1,5	115 000	98 000	16 400	6 700	6 500
–	–	–	54	57	66	91	1,5	162 000	153 000	27 000	6 700	5 400
7	13	–	54	–	66	91	1,5	162 000	153 000	27 000	6 700	5 400
–	–	6	54	–	66	91	1,5	162 000	153 000	27 000	6 700	5 400
–	–	–	58	63	74	107	2	143 000	119 000	16 000	6 000	–
8	13,5	–	58	–	74	107	2	143 000	119 000	16 000	6 000	–

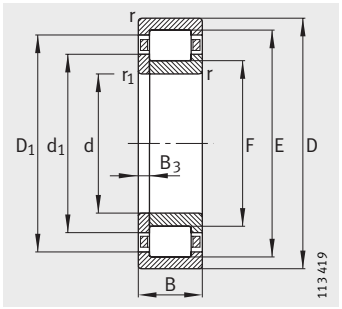
[2] If axial load is present, observe the dimensions D_1 and d_1.

Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



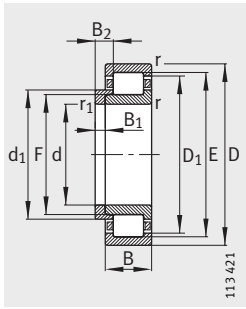
NJ
Semi-locating bearings



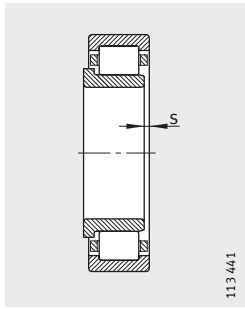
NUP
Locating bearings

Dimension table (continued) · Dimensions in mm

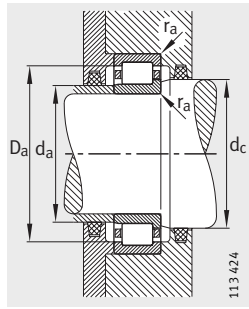
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r_1 min.	$s^{1)}$	E	F	D_1 ≈	d_1 ≈
NJ210-E-TVP2	**XL**	–	0,503	–	**50**	90	20	1,1	1,1	1,3	81,5	59,5	78,3	64
NJ210-E-TVP2	**XL**	**HJ210-E**	0,503	0,06	**50**	90	20	1,1	1,1	–	81,5	59,5	78,3	64
NUP210-E-TVP2	**XL**	–	0,517	–	**50**	90	20	1,1	1,1	–	81,5	59,5	78,3	64
NJ2210-E-TVP2	**XL**	–	0,586	–	**50**	90	23	1,1	1,1	1,3	81,5	59,5	78,3	64
NJ2210-E-TVP2	**XL**	**HJ210-E**	0,586	0,06	**50**	90	23	1,1	1,1	–	81,5	59,5	78,3	64
NUP2210-E-TVP2	**XL**	–	0,597	–	**50**	90	23	1,1	1,1	–	81,5	59,5	78,3	64
NJ310-E-TVP2	**XL**	–	1,19	–	**50**	110	27	2	2	1,7	97	65	92,5	71,3
NJ310-E-TVP2	**XL**	**HJ310-E**	1,19	0,149	**50**	110	27	2	2	–	97	65	92,5	71,3
NUP310-E-TVP2	**XL**	–	1,21	–	**50**	110	27	2	2	–	97	65	92,5	71,3
NJ2310-E-TVP2	**XL**	–	1,77	–	**50**	110	40	2	2	4,2	97	65	92,5	71,3
NJ2310-E-TVP2	**XL**	**HJ2310-E**	1,77	0,156	**50**	110	40	2	2	–	97	65	92,5	71,3
NUP2310-E-TVP2	**XL**	–	1,82	–	**50**	110	40	2	2	–	97	65	92,5	71,3
NJ410-M1	**XL**	–	2,36	–	**50**	130	31	2,1	2,1	3	110,8	70,8	104,3	78,6
NJ410-M1	**XL**	**HJ410**	2,36	0,238	**50**	130	31	2,1	2,1	–	110,8	70,8	104,3	78,6
NJ211-E-TVP2	**XL**	–	0,679	–	**55**	100	21	1,5	1,1	0,8	90	66	86,6	70,8
NJ211-E-TVP2	**XL**	**HJ211-E**	0,679	0,087	**55**	100	21	1,5	1,1	–	90	66	86,6	70,8
NUP211-E-TVP2	**XL**	–	0,693	–	**55**	100	21	1,5	1,1	–	90	66	86,6	70,8
NJ2211-E-TVP2	**XL**	–	0,812	–	**55**	100	25	1,5	1,1	1,3	90	66	86,6	70,8
NJ2211-E-TVP2	**XL**	**HJ2211-E**	0,812	0,087	**55**	100	25	1,5	1,1	–	90	66	86,6	70,8
NUP2211-E-TVP2	**XL**	–	0,828	–	**55**	100	25	1,5	1,1	–	90	66	86,6	70,8
NJ311-E-TVP2	**XL**	–	1,51	–	**55**	120	29	2	2	1,8	106,5	70,5	101,4	77,5
NJ311-E-TVP2	**XL**	**HJ311-E**	1,51	0,192	**55**	120	29	2	2	–	106,5	70,5	101,4	77,5
NUP311-E-TVP2	**XL**	–	1,54	–	**55**	120	29	2	2	–	106,5	70,5	101,4	77,5
NJ2311-E-TVP2	**XL**	–	2,27	–	**55**	120	43	2	2	3,3	106,5	70,5	101,4	77,5
NJ2311-E-TVP2	**XL**	**HJ2311-E**	2,27	0,2	**55**	120	43	2	2	–	106,5	70,5	101,4	77,5
NUP2311-E-TVP2	**XL**	–	2,31	–	**55**	120	43	2	2	–	106,5	70,5	101,4	77,5
NJ411-M1	**XL**	–	2,88	–	**55**	140	33	2,1	2,1	3,3	117,2	77,2	110,7	85
NJ411-M1	**XL**	**HJ411**	2,88	0,302	**55**	140	33	2,1	2,1	–	117,2	77,2	110,7	85



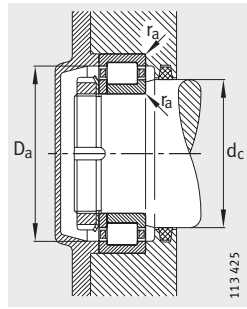
NJ and HJ
Locating bearings



[1] Axial displacement “s” for NJ



Mounting dimensions for NJ



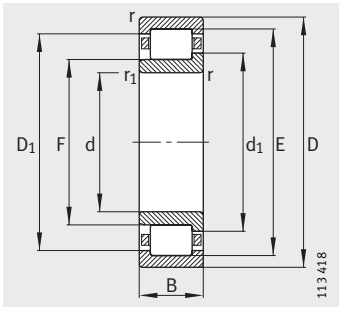
Mounting dimensions for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B_1	B_2	B_3	d_a		d_c	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
			min.[2]	max.	min.	max.[2]	max.	N	N	N	min^{-1}	min^{-1}
–	–	–	57	58	67	83	1	75 000	69 000	11 500	8 000	6 700
5	9	–	57	–	67	83	1	75 000	69 000	11 500	8 000	6 700
–	–	4	57	–	67	83	1	75 000	69 000	11 500	8 000	6 700
–	–	–	57	58	67	83	1	92 000	88 000	15 300	8 000	5 400
5	9	–	57	–	67	83	1	92 000	88 000	15 300	8 000	5 400
–	–	4	57	–	67	83	1	92 000	88 000	15 300	8 000	5 400
–	–	–	61	63	73	99	2	130 000	113 000	19 100	6 300	6 100
8	13	–	61	–	73	99	2	130 000	113 000	19 100	6 300	6 100
–	–	5	61	–	73	99	2	130 000	113 000	19 100	6 300	6 100
–	–	–	61	63	73	99	2	192 000	187 000	33 000	6 300	5 000
8	14,5	–	61	–	73	99	2	192 000	187 000	33 000	6 300	5 000
–	–	6,5	61	–	73	99	2	192 000	187 000	33 000	6 300	5 000
–	–	–	64	69	81	116	2	175 000	148 000	20 200	8 500	–
9	14,5	–	64	–	81	116	2	175 000	148 000	20 200	8 500	–
–	–	–	62	65	73	91	1,5	99 000	95 000	16 300	7 000	5 800
6	9,5	–	62	–	73	91	1,5	99 000	95 000	16 300	7 000	5 800
–	–	3,5	62	–	73	91	1,5	99 000	95 000	16 300	7 000	5 800
–	–	–	62	65	73	91	1,5	117 000	118 000	20 700	7 000	4 750
6	10	–	62	–	73	91	1,5	117 000	118 000	20 700	7 000	4 750
–	–	4	62	–	73	91	1,5	117 000	118 000	20 700	7 000	4 750
–	–	–	66	69	80	109	2	159 000	139 000	23 600	5 600	6 000
9	14	–	66	–	80	109	2	159 000	139 000	23 600	5 600	6 000
–	–	5	66	–	80	109	2	159 000	139 000	23 600	5 600	5 600
–	–	–	66	69	80	109	2	235 000	230 000	41 000	5 600	4 600
9	15,5	–	66	–	80	109	2	235 000	230 000	41 000	5 600	4 600
–	–	6,5	66	–	80	109	2	235 000	230 000	41 000	5 600	4 600
–	–	–	69	76	87	126	2,1	187 000	164 000	28 000	8 000	–
10	16,5	–	69	–	87	126	2,1	187 000	164 000	28 000	8 000	–

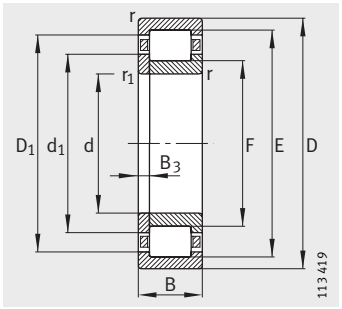
[2] If axial load is present, observe the dimensions D_1 and d_1.

Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



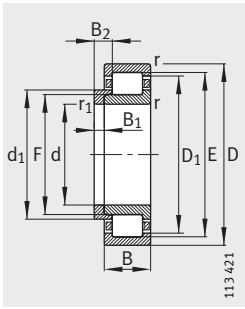
NJ
Semi-locating bearings



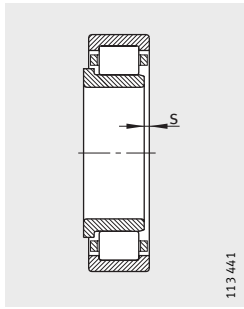
NUP
Locating bearings

Dimension table (continued) · Dimensions in mm

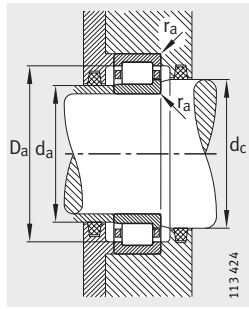
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r_1 min.	$s^{1)}$	E	F	D_1 ≈	d_1 ≈
NJ212-E-TVP2	**XL**	–	0,845	–	**60**	110	22	1,5	1,5	1,6	100	72	96,1	77,6
NJ212-E-TVP2	**XL**	**HJ212-E**	0,845	0,106	**60**	110	22	1,5	1,5	–	100	72	96,1	77,6
NUP212-E-TVP2	**XL**	–	0,865	–	**60**	110	22	1,5	1,5	–	100	72	96,1	77,6
NJ2212-E-TVP2	**XL**	–	1,1	–	**60**	110	28	1,5	1,5	1,6	100	72	96,1	77,6
NJ2212-E-TVP2	**XL**	**HJ212-E**	1,1	0,106	**60**	110	28	1,5	1,5	–	100	72	96,1	77,6
NUP2212-E-TVP2	**XL**	–	1,12	–	**60**	110	28	1,5	1,5	–	100	72	96,1	77,6
NJ312-E-TVP2	**XL**	–	1,89	–	**60**	130	31	2,1	2,1	1,8	115	77	109,6	84,4
NJ312-E-TVP2	**XL**	**HJ312-E**	1,89	0,229	**60**	130	31	2,1	2,1	–	115	77	109,6	84,4
NUP312-E-TVP2	**XL**	–	1,93	–	**60**	130	31	2,1	2,1	–	115	77	109,6	84,4
NJ2312-E-TVP2	**XL**	–	2,83	–	**60**	130	46	2,1	2,1	3,5	115	77	109,6	84,4
NJ2312-E-TVP2	**XL**	**HJ2312-E**	2,83	0,238	**60**	130	46	2,1	2,1	–	115	77	109,6	84,4
NUP2312-E-TVP2	**XL**	–	2,88	–	**60**	130	46	2,1	2,1	–	115	77	109,6	84,4
NJ412-M1	**XL**	–	3,42	–	**60**	150	35	2,1	2,1	3,4	127	83	119,5	91,6
NJ412-M1	**XL**	**HJ412**	3,42	0,347	**60**	150	35	2,1	2,1	–	127	83	119,5	91,6
NJ213-E-TVP2	**XL**	–	1,06	–	**65**	120	23	1,5	1,5	1,4	108,5	78,5	104,3	84,4
NJ213-E-TVP2	**XL**	**HJ213-E**	1,06	0,127	**65**	120	23	1,5	1,5	–	108,5	78,5	104,3	84,4
NUP213-E-TVP2	**XL**	–	1,09	–	**65**	120	23	1,5	1,5	–	108,5	78,5	104,3	84,4
NJ2213-E-TVP2	**XL**	–	1,46	–	**65**	120	31	1,5	1,5	1,9	108,5	78,5	104,3	84,4
NJ2213-E-TVP2	**XL**	**HJ2213-E**	1,46	0,13	**65**	120	31	1,5	1,5	–	108,5	78,5	104,3	84,4
NUP2213-E-TVP2	**XL**	–	1,54	–	**65**	120	31	1,5	1,5	–	108,5	78,5	104,3	84,4
NJ313-E-TVP2	**XL**	–	2,32	–	**65**	140	33	2,1	2,1	1,5	124,5	82,5	118,6	90,5
NJ313-E-TVP2	**XL**	**HJ313-E**	2,32	0,285	**65**	140	33	2,1	2,1	–	124,5	82,5	118,6	90,5
NUP313-E-TVP2	**XL**	–	2,37	–	**65**	140	33	2,1	2,1	–	124,5	82,5	118,6	90,5
NJ2313-E-TVP2	**XL**	–	3,38	–	**65**	140	48	2,1	2,1	4	124,5	82,5	118,6	90,5
NJ2313-E-TVP2	**XL**	**HJ2313-E**	3,38	0,303	**65**	140	48	2,1	2,1	–	124,5	82,5	118,6	90,5
NUP2313-E-TVP2	**XL**	–	3,45	–	**65**	140	48	2,1	2,1	–	124,5	82,5	118,6	90,5
NJ413-M1	**XL**	–	4,15	–	**65**	160	37	2,1	2,1	3,5	135,3	89,3	127,7	98,3
NJ413-M1	**XL**	**HJ413**	4,15	0,432	**65**	160	37	2,1	2,1	–	135,3	89,3	127,7	98,3



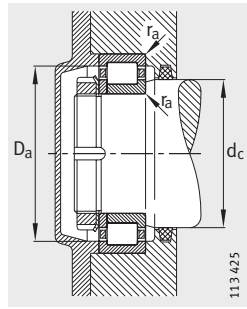
NJ and HJ
Locating bearings



[1] Axial displacement “s” for NJ



Mounting dimensions for NJ



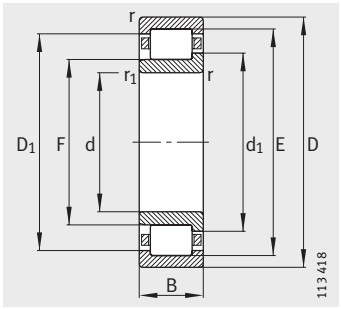
Mounting dimensions for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B_1	B_2	B_3	d_a		d_c	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
			min.[2]	max.	min.	max.[2]	max.	N	N	N	min^{-1}	min^{-1}
–	–	–	69	71	80	101	1,5	111 000	102 000	16 800	6 300	5 400
6	10	–	69	–	80	101	1,5	111 000	102 000	16 800	6 300	5 400
–	–	4	69	–	80	101	1,5	111 000	102 000	16 800	6 300	5 400
–	–	–	69	71	80	101	1,5	151 000	152 000	26 500	6 300	4 400
6	10	–	69	–	80	101	1,5	151 000	152 000	26 500	6 300	4 400
–	–	4	69	–	80	101	1,5	151 000	152 000	26 500	6 300	4 400
–	–	–	72	75	86	118	2,1	177 000	157 000	26 500	5 000	5 300
9	14,5	–	72	–	86	118	2,1	177 000	157 000	26 500	5 000	5 300
–	–	5,5	72	–	86	118	2,1	177 000	157 000	26 500	5 000	5 300
–	–	–	72	75	86	118	2,1	265 000	260 000	47 000	5 000	4 300
9	16	–	72	–	86	118	2,1	265 000	260 000	47 000	5 000	4 300
–	–	7	72	–	86	118	2,1	265 000	260 000	47 000	5 000	4 300
–	–	–	74	82	94	136	2	211 000	184 000	30 500	7 500	–
10	16,5	–	74	–	94	136	2	211 000	184 000	30 500	7 500	–
–	–	–	74	77	87	111	1,5	127 000	119 000	19 800	6 000	5 000
6	10	–	74	–	87	111	1,5	127 000	119 000	19 800	6 000	5 000
–	–	4	74	–	87	111	1,5	127 000	119 000	19 800	6 000	5 000
–	–	–	74	77	87	111	1,5	176 000	181 000	32 000	5 600	4 150
6	10,5	–	74	–	87	111	1,5	176 000	181 000	32 000	5 600	4 150
–	–	4,5	74	–	87	111	1,5	176 000	181 000	32 000	5 600	4 150
–	–	–	77	81	93	128	2,1	214 000	191 000	32 000	4 800	4 900
10	15,5	–	77	–	93	128	2,1	214 000	191 000	32 000	4 800	4 900
–	–	5,5	77	–	93	128	2,1	214 000	191 000	32 000	4 800	4 900
–	–	–	77	81	93	128	2,1	295 000	285 000	50 000	4 800	4 050
10	18	–	77	–	93	128	2,1	295 000	285 000	50 000	4 800	4 050
–	–	8	77	–	93	128	2,1	295 000	285 000	50 000	4 800	4 050
–	–	–	79	88	100	146	2,1	230 000	203 000	33 000	7 000	–
11	18	–	79	–	100	146	2,1	230 000	203 000	33 000	7 000	–

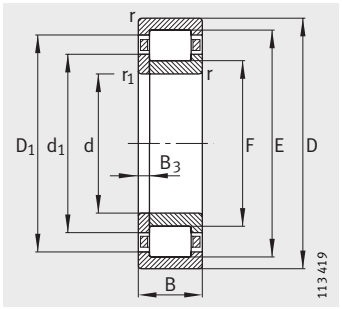
[2] If axial load is present, observe the dimensions D_1 and d_1.

Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



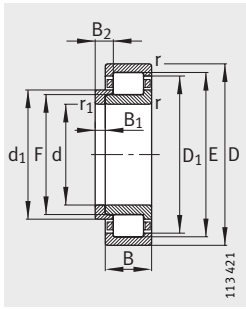
NJ
Semi-locating bearings



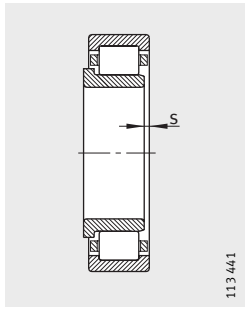
NUP
Locating bearings

Dimension table (continued) · Dimensions in mm

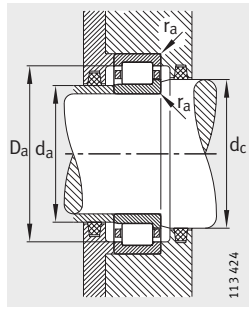
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r_1 min.	$s^{1)}$	E	F	D_1 ≈	d_1 ≈
NJ214-E-TVP2	**XL**	–	1,18	–	**70**	125	24	1,5	1,5	1,6	113,5	83,5	109,4	89,4
NJ214-E-TVP2	**XL**	**HJ214-E**	1,18	0,155	**70**	125	24	1,5	1,5	–	113,5	83,5	109,4	89,4
NUP214-E-TVP2	**XL**	–	1,2	–	**70**	125	24	1,5	1,5	–	113,5	83,5	109,4	89,4
NJ2214-E-TVP2	**XL**	–	1,54	–	**70**	125	31	1,5	1,5	1,6	113,5	83,5	109,4	89,4
NJ2214-E-TVP2	**XL**	**HJ2214-E**	1,54	0,157	**70**	125	31	1,5	1,5	–	113,5	83,5	109,4	89,4
NUP2214-E-TVP2	**XL**	–	1,58	–	**70**	125	31	1,5	1,5	–	113,5	83,5	109,4	89,4
NJ314-E-TVP2	**XL**	–	2,84	–	**70**	150	35	2,1	2,1	1,7	133	89	126,8	97,4
NJ314-E-TVP2	**XL**	**HJ314-E**	2,84	0,328	**70**	150	35	2,1	2,1	–	133	89	126,8	97,4
NUP314-E-TVP2	**XL**	–	2,89	–	**70**	150	35	2,1	2,1	–	133	89	126,8	97,4
NJ2314-E-TVP2	**XL**	–	4,1	–	**70**	150	51	2,1	2,1	4,7	133	89	126,8	97,4
NJ2314-E-TVP2	**XL**	**HJ2314-E**	4,1	0,352	**70**	150	51	2,1	2,1	–	133	89	126,8	97,4
NUP2314-E-TVP2	**XL**	–	4,18	–	**70**	150	51	2,1	2,1	–	133	89	126,8	97,4
NJ414-M1	**XL**	–	6,07	–	**70**	180	42	3	3	4	152	100	142,7	110,3
NJ414-M1	**XL**	**HJ414**	6,07	0,63	**70**	180	42	3	3	–	152	100	142,7	110,3
NJ215-E-TVP2	**XL**	–	1,3	–	**75**	130	25	1,5	1,5	1,2	118,5	88,5	114,4	94,4
NJ215-E-TVP2	**XL**	**HJ215-E**	1,3	0,164	**75**	130	25	1,5	1,5	–	118,5	88,5	114,4	94,4
NUP215-E-TVP2	**XL**	–	1,33	–	**75**	130	25	1,5	1,5	–	118,5	88,5	114,4	94,4
NJ2215-E-TVP2	**XL**	–	1,64	–	**75**	130	31	1,5	1,5	1,6	118,5	88,5	114,4	94,4
NJ2215-E-TVP2	**XL**	**HJ2215-E**	1,64	0,165	**75**	130	31	1,5	1,5	–	118,5	88,5	114,4	94,4
NUP2215-E-TVP2	**XL**	–	1,67	–	**75**	130	31	1,5	1,5	–	118,5	88,5	114,4	94,4
NJ315-E-TVP2	**XL**	–	3,39	–	**75**	160	37	2,1	2,1	1,2	143	95	136,2	104,1
NJ315-E-TVP2	**XL**	**HJ315-E**	3,39	0,407	**75**	160	37	2,1	2,1	–	143	95	136,2	104,1
NUP315-E-TVP2	**XL**	–	3,45	–	**75**	160	37	2,1	2,1	–	143	95	136,2	104,1
NJ2315-E-TVP2	**XL**	–	5,04	–	**75**	160	55	2,1	2,1	4,2	143	95	136,2	104,1
NJ2315-E-TVP2	**XL**	**HJ2315-E**	5,04	0,436	**75**	160	55	2,1	2,1	–	143	95	136,2	104,1
NUP2315-E-TVP2	**XL**	–	5,14	–	**75**	160	55	2,1	2,1	–	143	95	136,2	104,1
NJ415-M1	**XL**	–	7,21	–	**75**	190	45	3	3	4,5	160,5	104,5	150,7	115,8
NJ415-M1	**XL**	**HJ415**	7,21	0,737	**75**	190	45	3	3	–	160,5	104,5	150,7	115,8



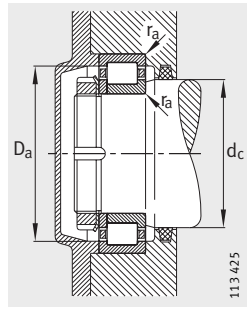
NJ and HJ
Locating bearings



[1] Axial displacement “s” for NJ



Mounting dimensions for NJ



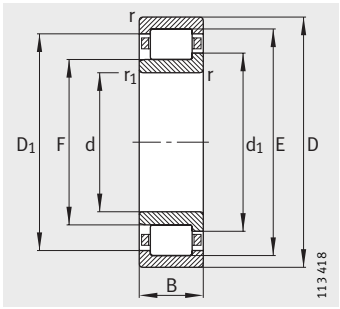
Mounting dimensions for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B_1	B_2	B_3	d_a		d_c	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
			min.[2]	max.	min.	max.[2]	max.	N	N	N	min^{-1}	min^{-1}
–	–	–	79	82	92	116	1,5	140 000	137 000	23 100	5 300	4 750
7	11	–	79	–	92	116	1,5	140 000	137 000	23 100	5 300	4 750
–	–	4	79	–	92	116	1,5	140 000	137 000	23 100	5 300	4 750
–	–	–	79	82	92	116	1,5	184 000	194 000	34 000	5 300	3 900
7	11,5	–	79	–	92	116	1,5	184 000	194 000	34 000	5 300	3 900
–	–	4,5	79	–	92	116	1,5	184 000	194 000	34 000	5 300	3 900
–	–	–	82	87	100	138	2,1	242 000	222 000	37 000	4 500	4 550
10	15,5	–	82	–	100	138	2,1	242 000	222 000	37 000	4 500	4 550
–	–	5,5	82	–	100	138	2,1	242 000	222 000	37 000	4 500	4 550
–	–	–	82	87	100	138	2,1	325 000	325 000	56 000	4 500	3 850
10	18,5	–	82	–	100	138	2,1	325 000	325 000	56 000	4 500	3 850
–	–	8,5	82	–	100	138	2,1	325 000	325 000	56 000	4 500	3 850
–	–	–	86	99	112	164	2,5	285 000	255 000	42 000	6 300	–
12	20	–	86	–	112	164	2,5	285 000	255 000	42 000	6 300	–
–	–	–	84	87	96	121	1,5	154 000	156 000	26 500	5 300	4 500
7	11	–	84	–	96	121	1,5	154 000	156 000	26 500	5 300	4 500
–	–	4	84	–	96	121	1,5	154 000	156 000	26 500	5 300	4 500
–	–	–	84	87	96	121	1,5	191 000	207 000	36 000	5 300	3 700
7	11,5	–	84	–	96	121	1,5	191 000	207 000	36 000	5 300	3 700
–	–	4,5	84	–	96	121	1,5	191 000	207 000	36 000	5 300	3 700
–	–	–	87	93	106	148	2,1	285 000	265 000	43 000	4 000	4 200
11	16,5	–	87	–	106	148	2,1	285 000	265 000	43 000	4 000	4 200
–	–	5,5	87	–	106	148	2,1	285 000	265 000	43 000	4 000	4 200
–	–	–	87	93	106	148	2,1	390 000	395 000	67 000	4 000	3 600
11	19,5	–	87	–	106	148	2,1	390 000	395 000	67 000	4 000	3 600
–	–	8,5	87	–	106	148	2,1	390 000	395 000	67 000	4 000	3 600
–	–	–	91	103	118	174	2,5	325 000	295 000	46 500	6 000	–
13	21,5	–	91	–	118	174	2,5	325 000	295 000	46 500	6 000	–

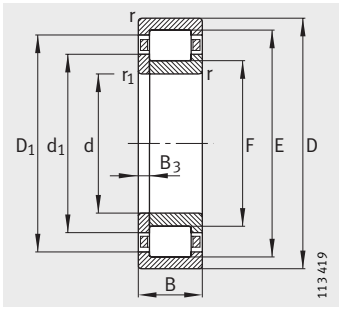
[2] If axial load is present, observe the dimensions D_1 and d_1.

Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



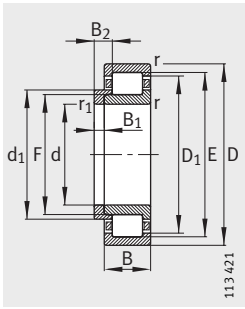
NJ
Semi-locating bearings



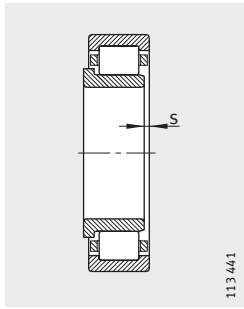
NUP
Locating bearings

Dimension table (continued) · Dimensions in mm

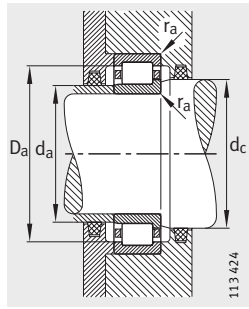
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r_1 min.	$s^{1)}$	E	F	D_1 ≈	d_1 ≈
NJ216-E-TVP2	**XL**	–	1,58	–	**80**	140	26	2	2	1,3	127,3	95,3	122,9	101,5
NJ216-E-TVP2	**XL**	**HJ216-E**	1,58	0,22	**80**	140	26	2	2	–	127,3	95,3	122,9	101,5
NUP216-E-TVP2	**XL**	–	1,62	–	**80**	140	26	2	2	–	127,3	95,3	122,9	101,5
NJ2216-E-TVP2	**XL**	–	2,04	–	**80**	140	33	2	2	1,3	127,3	95,3	122,9	101,5
NJ2216-E-TVP2	**XL**	**HJ216-E**	2,04	0,22	**80**	140	33	2	2	–	127,3	95,3	122,9	101,5
NUP2216-E-TVP2	**XL**	–	2,08	–	**80**	140	33	2	2	–	127,3	95,3	122,9	101,5
NJ316-E-TVP2	**XL**	–	4,03	–	**80**	170	39	2,1	2,1	0,7	151	101	143,9	110,4
NJ316-E-TVP2	**XL**	**HJ316-E**	4,03	0,456	**80**	170	39	2,1	2,1	–	151	101	143,9	110,4
NUP316-E-TVP2	**XL**	–	4,11	–	**80**	170	39	2,1	2,1	–	151	101	143,9	110,4
NJ2316-E-TVP2	**XL**	–	6	–	**80**	170	58	2,1	2,1	3,7	151	101	143,9	110,4
NJ2316-E-TVP2	**XL**	**HJ2316-E**	6	0,488	**80**	170	58	2,1	2,1	–	151	101	143,9	110,4
NUP2316-E-TVP2	**XL**	–	6,11	–	**80**	170	58	2,1	2,1	–	151	101	143,9	110,4
NJ416-M1	**XL**	–	8,52	–	**80**	200	48	3	3	4,6	170	110	159,7	121,8
NJ416-M1	**XL**	**HJ416**	8,52	0,808	**80**	200	48	3	3	–	170	110	159,7	121,8
NJ217-E-TVP2	**XL**	–	1,95	–	**85**	150	28	2	2	0,8	136,5	100,5	131,5	107,5
NJ217-E-TVP2	**XL**	**HJ217-E**	1,95	0,247	**85**	150	28	2	2	–	136,5	100,5	131,5	107,5
NUP217-E-TVP2	**XL**	–	2,08	–	**85**	150	28	2	2	–	136,5	100,5	131,5	107,5
NJ2217-E-TVP2	**XL**	–	2,55	–	**85**	150	36	2	2	1,3	136,5	100,5	131,5	107,5
NJ2217-E-TVP2	**XL**	**HJ2217-E**	2,55	0,249	**85**	150	36	2	2	–	136,5	100,5	131,5	107,5
NUP2217-E-TVP2	**XL**	–	2,6	–	**85**	150	36	2	2	–	136,5	100,5	131,5	107,5
NJ317-E-TVP2	**XL**	–	4,71	–	**85**	180	41	3	3	1,3	160	108	152,7	117,8
NJ317-E-TVP2	**XL**	**HJ317-E**	4,71	0,566	**85**	180	41	3	3	–	160	108	152,7	117,8
NUP317-E-TVP2	**XL**	–	4,8	–	**85**	180	41	3	3	–	160	108	152,7	117,8
NJ2317-E-TVP2	**XL**	–	6,85	–	**85**	180	60	3	3	4,7	160	108	152,7	117,8
NJ2317-E-TVP2	**XL**	**HJ2317-E**	6,85	0,606	**85**	180	60	3	3	–	160	108	152,7	117,8
NUP2317-E-TVP2	**XL**	–	6,99	–	**85**	180	60	3	3	–	160	108	152,7	117,8
NJ417-M1	**XL**	–	10	–	**85**	210	52	4	4	5,2	177	113	165,7	125,8
NJ417-M1	**XL**	**HJ417**	10	0,901	**85**	210	52	4	4	–	177	113	165,7	125,8



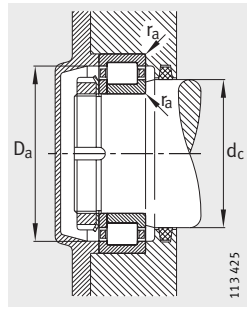
NJ and HJ
Locating bearings



1) Axial displacement “s” for NJ



Mounting dimensions for NJ



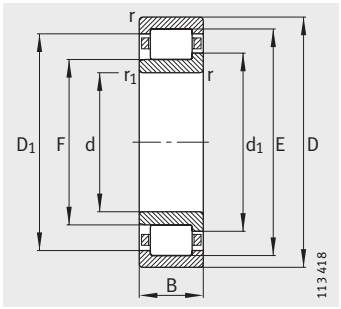
Mounting dimensions for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B_1	B_2	B_3	d_a		d_c	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
			min.[2]	max.	min.	max.[2]	max.	N	N	N	min^{-1}	min^{-1}
–	–	–	91	94	104	129	2	165 000	167 000	27 500	4 800	4 250
8	12,5	–	91	–	104	129	2	165 000	167 000	27 500	4 800	4 250
–	–	4,5	91	–	104	129	2	165 000	167 000	27 500	4 800	4 250
–	–	–	91	94	104	129	2	220 000	243 000	42 000	4 800	3 450
8	12,5	–	91	–	104	129	2	220 000	243 000	42 000	4 800	3 450
–	–	4,5	91	–	104	129	2	220 000	243 000	42 000	4 800	3 450
–	–	–	92	99	114	158	2,1	300 000	275 000	46 000	3 800	4 150
11	17	–	92	–	114	158	2,1	300 000	275 000	46 000	3 800	4 150
–	–	6	92	–	114	158	2,1	300 000	275 000	46 000	3 800	4 150
–	–	–	92	99	114	158	2,1	420 000	425 000	73 000	3 800	3 500
11	20	–	92	–	114	158	2,1	420 000	425 000	73 000	3 800	3 500
–	–	9	92	–	114	158	2,1	420 000	425 000	73 000	3 800	3 500
–	–	–	96	109	124	184	2,5	395 000	365 000	46 500	5 600	–
13	22	–	96	–	124	184	2,5	395 000	365 000	46 500	5 600	–
–	–	–	96	99	110	139	2	194 000	194 000	31 500	4 500	4 100
8	12,5	–	96	–	110	139	2	194 000	194 000	31 500	4 500	4 100
–	–	4,5	96	–	110	139	2	194 000	194 000	31 500	4 500	4 100
–	–	–	96	99	110	139	2	255 000	275 000	46 000	4 500	3 350
8	13	–	96	–	110	139	2	255 000	275 000	46 000	4 500	3 350
–	–	5	96	–	110	139	2	255 000	275 000	46 000	4 500	3 350
–	–	–	99	106	119	166	2,5	320 000	300 000	49 500	3 600	4 000
12	18,5	–	99	–	119	166	2,5	320 000	300 000	49 500	3 600	4 000
–	–	6,5	99	–	119	166	2,5	320 000	300 000	49 500	3 600	4 000
–	–	–	99	106	119	166	2,5	435 000	445 000	75 000	3 600	3 350
12	22	–	99	–	119	166	2,5	435 000	445 000	75 000	3 600	3 350
–	–	10	99	–	119	166	2,5	435 000	445 000	75 000	3 600	3 350
–	–	–	105	111	128	190	3	420 000	385 000	48 500	5 300	–
14	24	–	105	–	128	190	3	420 000	385 000	48 500	5 300	–

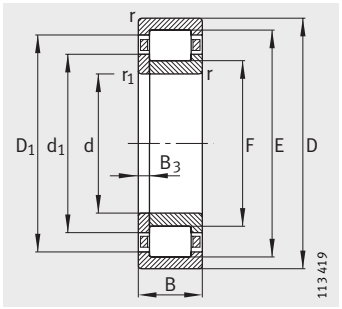
2) If axial load is present, observe the dimensions D_1 and d_1.

Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



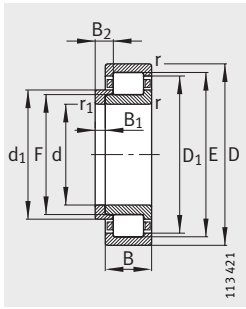
NJ
Semi-locating bearings



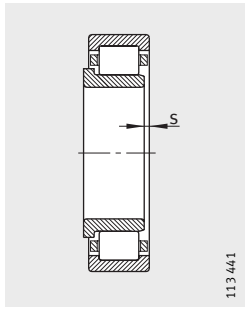
NUP
Locating bearings

Dimension table (continued) · Dimensions in mm

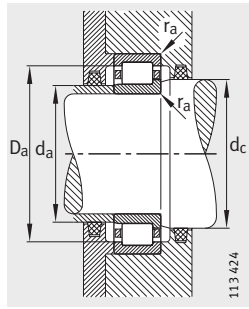
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r_1 min.	$s^{1)}$	E	F	D_1 ≈	d_1 ≈
NJ218-E-TVP2	**XL**	–	2,41	–	**90**	160	30	2	2	1,5	145	107	139,7	114,3
NJ218-E-TVP2	**XL**	**HJ218-E**	2,41	0,317	**90**	160	30	2	2	–	145	107	139,7	114,3
NUP218-E-TVP2	**XL**	–	2,46	–	**90**	160	30	2	2	–	145	107	139,7	114,3
NJ2218-E-TVP2	**XL**	–	3,23	–	**90**	160	40	2	2	2,5	145	107	139,7	114,3
NJ2218-E-TVP2	**XL**	**HJ2218-E**	3,23	0,323	**90**	160	40	2	2	–	145	107	139,7	114,3
NUP2218-E-TVP2	**XL**	–	3,29	–	**90**	160	40	2	2	–	145	107	139,7	114,3
NJ318-E-TVP2	**XL**	–	5,49	–	**90**	190	43	3	3	1,5	169,5	113,5	161,6	124
NJ318-E-TVP2	**XL**	**HJ318-E**	5,49	0,623	**90**	190	43	3	3	–	169,5	113,5	161,6	124
NUP318-E-TVP2	**XL**	–	5,59	–	**90**	190	43	3	3	–	169,5	113,5	161,6	124
NJ2318-E-TVP2	**XL**	–	8,19	–	**90**	190	64	3	3	5	169,5	113,5	161,6	124
NJ2318-E-TVP2	**XL**	**HJ2318-E**	8,19	0,669	**90**	190	64	3	3	–	169,5	113,5	161,6	124
NUP2318-E-TVP2	**XL**	–	8,35	–	**90**	190	64	3	3	–	169,5	113,5	161,6	124
NJ418-M1	**XL**	–	11,8	–	**90**	225	54	4	4	5	191,5	123,5	179,7	136,8
NJ418-M1	**XL**	**HJ418**	11,8	1,1	**90**	225	54	4	4	–	191,5	123,5	179,7	136,8
NJ219-E-TVP2	**XL**	–	2,94	–	**95**	170	32	2,1	2,1	0,7	154,5	112,5	148,6	120,5
NJ219-E-TVP2	**XL**	**HJ219-E**	2,94	0,352	**95**	170	32	2,1	2,1	–	154,5	112,5	148,6	120,5
NUP219-E-TVP2	**XL**	–	2,99	–	**95**	170	32	2,1	2,1	–	154,5	112,5	148,6	120,5
NJ2219-E-TVP2	**XL**	–	3,98	–	**95**	170	43	2,1	2,1	2,2	154,5	112,5	148,6	120,5
NJ2219-E-TVP2	**XL**	**HJ2219-E**	3,98	0,366	**95**	170	43	2,1	2,1	–	154,5	112,5	148,6	120,5
NUP2219-E-TVP2	**XL**	–	4,05	–	**95**	170	43	2,1	2,1	–	154,5	112,5	148,6	120,5
NJ319-E-TVP2	**XL**	–	6,44	–	**95**	200	45	3	3	1,4	177,5	121,5	169,6	132
NJ319-E-TVP2	**XL**	**HJ319-E**	6,44	0,777	**95**	200	45	3	3	–	177,5	121,5	169,6	132
NUP319-E-TVP2	**XL**	–	6,56	–	**95**	200	45	3	3	–	177,5	121,5	169,6	132
NJ2319-E-TVP2	**XL**	–	9,58	–	**95**	200	67	3	3	5,6	177,5	121,5	169,6	132
NJ2319-E-TVP2	**XL**	**HJ2319-E**	9,58	0,83	**95**	200	67	3	3	–	177,5	121,5	169,6	132
NUP2319-E-TVP2	**XL**	–	9,77	–	**95**	200	67	3	3	–	177,5	121,5	169,6	132
NJ419-M1	**XL**	–	14,1	–	**95**	240	55	4	4	5,2	201,5	133,5	189,7	146,8
NJ419-M1	**XL**	**HJ419**	14,1	1,36	**95**	240	55	4	4	–	201,5	133,5	189,7	146,8



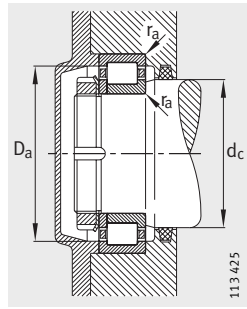
NJ and HJ
Locating bearings



1) Axial displacement “s” for NJ



Mounting dimensions for NJ



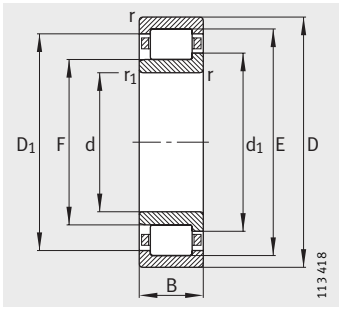
Mounting dimensions for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B_1	B_2	B_3	d_a		d_c	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
			min.[2]	max.	min.	max.[2]	max.	N	N	N	min^{-1}	min^{-1}
–	–	–	101	105	116	149	2	215 000	217 000	35 000	4 300	3 950
9	14	–	101	–	116	149	2	215 000	217 000	35 000	4 300	3 950
–	–	5	101	–	116	149	2	215 000	217 000	35 000	4 300	3 950
–	–	–	101	105	116	149	2	285 000	315 000	52 000	4 300	3 300
9	15	–	101	–	116	149	2	285 000	315 000	52 000	4 300	3 300
–	–	6	101	–	116	149	2	285 000	315 000	52 000	4 300	3 300
–	–	–	104	111	127	176	2,5	370 000	350 000	55 000	3 400	3 750
12	18,5	–	104	–	127	176	2,5	370 000	350 000	55 000	3 400	3 750
–	–	6,5	104	–	127	176	2,5	370 000	350 000	55 000	3 400	3 750
–	–	–	104	111	127	176	2,5	510 000	530 000	86 000	3 400	3 050
12	22	–	104	–	127	176	2,5	510 000	530 000	86 000	3 400	3 050
–	–	10	104	–	127	176	2,5	510 000	530 000	86 000	3 400	3 050
–	–	–	110	122	139	205	3	465 000	425 000	54 000	5 000	–
14	24	–	110	–	139	205	3	465 000	425 000	54 000	5 000	–
–	–	–	107	111	123	158	2,1	260 000	265 000	41 500	3 800	3 700
9	14	–	107	–	123	158	2,1	260 000	265 000	41 500	3 800	3 700
–	–	5	107	–	123	158	2,1	260 000	265 000	41 500	3 800	3 700
–	–	–	107	111	123	158	2,1	340 000	370 000	60 000	3 800	3 100
9	15,5	–	107	–	123	158	2,1	340 000	370 000	60 000	3 800	3 100
–	–	6,5	107	–	123	158	2,1	340 000	370 000	60 000	3 800	3 100
–	–	–	109	119	134	186	2,5	390 000	380 000	59 000	3 400	3 600
13	20,5	–	109	–	134	186	2,5	390 000	380 000	59 000	3 400	3 600
–	–	7,5	109	–	134	186	2,5	390 000	380 000	59 000	3 400	3 600
–	–	–	109	119	134	186	2,5	540 000	580 000	92 000	3 400	2 850
13	24,5	–	109	–	134	186	2,5	540 000	580 000	92 000	3 400	2 850
–	–	11,5	109	–	134	186	2,5	540 000	580 000	92 000	3 400	2 850
–	–	–	115	132	149	220	3	495 000	470 000	58 000	4 800	–
15	25,5	–	115	–	149	220	3	495 000	470 000	58 000	4 800	–

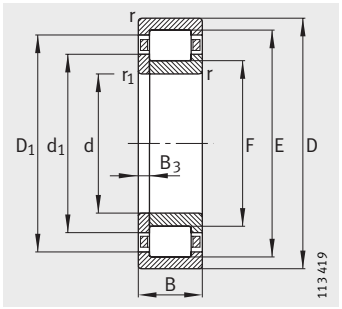
2) If axial load is present, observe the dimensions D_1 and d_1.

Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



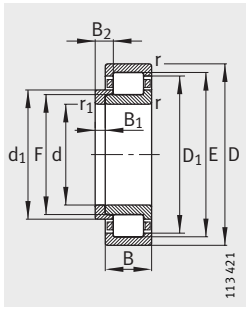
NJ
Semi-locating bearings



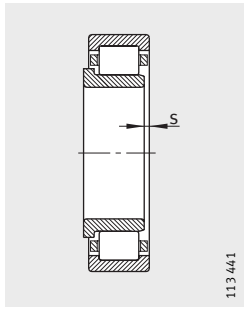
NUP
Locating bearings

Dimension table (continued) · Dimensions in mm

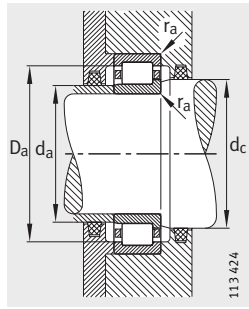
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r_1 min.	$s^{1)}$	E	F	D_1 ≈	d_1 ≈
NJ220-E-TVP2	**XL**	–	3,55	–	**100**	180	34	2,1	2,1	1,5	163	119	156,9	127,3
NJ220-E-TVP2	**XL**	**HJ220-E**	3,55	0,436	**100**	180	34	2,1	2,1	–	163	119	156,9	127,3
NUP220-E-TVP2	**XL**	–	3,61	–	**100**	180	34	2,1	2,1	–	163	119	156,9	127,3
NJ2220-E-TVP2	**XL**	–	4,85	–	**100**	180	46	2,1	2,1	3	163	119	156,9	127,3
NJ2220-E-TVP2	**XL**	**HJ2220-E**	4,85	0,446	**100**	180	46	2,1	2,1	–	163	119	156,9	127,3
NUP2220-E-TVP2	**XL**	–	4,92	–	**100**	180	46	2,1	2,1	–	163	119	156,9	127,3
NJ320-E-TVP2	**XL**	–	7,82	–	**100**	215	47	3	3	1,2	191,5	127,5	182	139,4
NJ320-E-TVP2	**XL**	**HJ320-E**	7,82	0,883	**100**	215	47	3	3	–	191,5	127,5	182	139,4
NUP320-E-TVP2	**XL**	–	7,96	–	**100**	215	47	3	3	–	191,5	127,5	182	139,4
NJ2320-E-TVP2	**XL**	–	12,3	–	**100**	215	73	3	3	4,2	191,5	127,5	182	139,4
NJ2320-E-TVP2	**XL**	**HJ2320-E**	12,3	0,934	**100**	215	73	3	3	–	191,5	127,5	182	139,4
NUP2320-E-TVP2	**XL**	–	12,5	–	**100**	215	73	3	3	–	191,5	127,5	182	139,4
NJ420-M1	**XL**	–	16,1	–	**100**	250	58	4	4	5,7	211	139	198,2	152,8
NJ420-M1	**XL**	**HJ420**	16,1	1,55	**100**	250	58	4	4	–	211	139	198,2	152,8
NJ221-E-TVP2	**XL**	–	4,17	–	**105**	190	36	2,1	2,1	1,3	171,5	125,5	165,1	134,5
NJ221-E-TVP2	**XL**	**HJ221-E**	4,17	0,51	**105**	190	36	2,1	2,1	–	171,5	125,5	165,1	134,5
NUP221-E-TVP2	**XL**	–	4,26	–	**105**	190	36	2,1	2,1	–	171,5	125,5	165,1	134,5
NJ421-M1	**XL**	–	18	–	**105**	260	60	4	4	5,7	220,5	144,5	207,4	158,8
NJ421-M1	**XL**	**HJ421**	18	1,65	**105**	260	60	4	4	–	220,5	144,5	207,4	158,8
NJ222-E-TVP2	**XL**	–	4,93	–	**110**	200	38	2,1	2,1	1,5	180,5	132,5	173,8	141,6
NJ222-E-TVP2	**XL**	**HJ222-E**	4,93	0,616	**110**	200	38	2,1	2,1	–	180,5	132,5	173,8	141,6
NUP222-E-TVP2	**XL**	–	5,02	–	**110**	200	38	2,1	2,1	–	180,5	132,5	173,8	141,6
NJ2222-E-TVP2	**XL**	–	6,89	–	**110**	200	53	2,1	2,1	4	180,5	132,5	173,8	141,6
NJ2222-E-TVP2	**XL**	**HJ2222-E**	6,89	0,647	**110**	200	53	2,1	2,1	–	180,5	132,5	173,8	141,6
NUP2222-E-TVP2	**XL**	–	7,02	–	**110**	200	53	2,1	2,1	–	180,5	132,5	173,8	141,6
NJ322-E-TVP2	**XL**	–	10,3	–	**110**	240	50	3	3	1,3	211	143	200,9	155,6
NJ322-E-TVP2	**XL**	**HJ322-E**	10,3	1,21	**110**	240	50	3	3	–	211	143	200,9	155,6
NUP322-E-TVP2	**XL**	–	10,7	–	**110**	240	50	3	3	–	211	143	200,9	155,6
NJ2322-E-TVP2	**XL**	–	16,9	–	**110**	240	80	3	3	5,8	211	143	200,9	155,6
NJ2322-E-TVP2	**XL**	**HJ2322-E**	16,9	1,3	**110**	240	80	3	3	–	211	143	200,9	155,6
NUP2322-E-TVP2	**XL**	–	17,2	–	**110**	240	80	3	3	–	211	143	200,9	155,6
NJ422-M1	**XL**	–	22,8	–	**110**	280	65	4	4	6,2	235	155	220,9	170,3
NJ422-M1	**XL**	**HJ422**	22,8	2,1	**110**	280	65	4	4	–	235	155	220,9	170,3



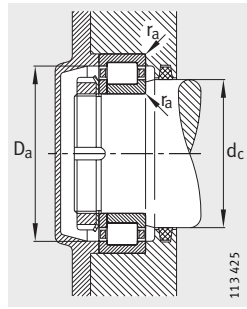
NJ and HJ
Locating bearings



1) Axial displacement “s” for NJ



Mounting dimensions for NJ



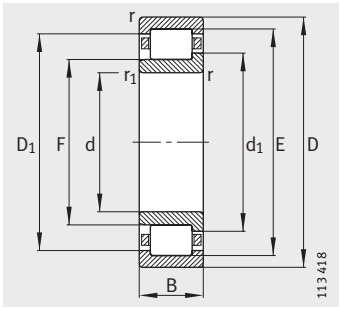
Mounting dimensions for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B_1	B_2	B_3	d_a		d_c	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
			min.[2]	max.	min.	max.[2]	max.	N	N	N	min^{-1}	min^{-1}
–	–	–	112	117	130	168	2,1	295 000	305 000	47 500	3 800	3 500
10	15	–	112	–	130	168	2,1	295 000	305 000	47 500	3 800	3 500
–	–	5	112	–	130	168	2,1	295 000	305 000	47 500	3 800	3 500
–	–	–	112	117	130	168	2,1	395 000	445 000	72 000	3 800	2 900
10	16	–	112	–	130	168	2,1	395 000	445 000	72 000	3 800	2 900
–	–	6	112	–	130	168	2,1	395 000	445 000	72 000	3 800	2 900
–	–	–	114	125	143	201	2,5	450 000	425 000	65 000	3 200	3 400
13	20,5	–	114	–	143	201	2,5	450 000	425 000	65 000	3 200	3 400
–	–	7,5	114	–	143	201	2,5	450 000	425 000	65 000	3 200	3 400
–	–	–	114	125	143	201	2,5	680 000	720 000	114 000	3 200	2 550
13	23,5	–	114	–	143	201	2,5	680 000	720 000	114 000	3 200	2 550
–	–	10,5	114	–	143	201	2,5	680 000	720 000	114 000	3 200	2 550
–	–	–	120	137	156	230	3	550 000	530 000	63 000	4 800	–
16	27	–	120	–	156	230	3	550 000	530 000	63 000	4 800	–
–	–	–	117	123	137	178	2,1	310 000	320 000	49 000	3 600	3 450
10	16	–	117	–	137	178	2,1	310 000	320 000	49 000	3 600	3 450
–	–	6	117	–	137	178	2,1	310 000	320 000	49 000	3 600	3 450
–	–	–	125	143	162	240	3	610 000	590 000	87 000	4 500	–
16	27	–	125	–	162	240	3	610 000	590 000	87 000	4 500	–
–	–	–	122	130	144	188	2,1	345 000	365 000	55 000	3 400	3 300
11	17	–	122	–	144	188	2,1	345 000	365 000	55 000	3 400	3 300
–	–	6	122	–	144	188	2,1	345 000	365 000	56 000	3 400	3 300
–	–	–	122	130	144	188	2,1	455 000	520 000	81 000	3 400	2 800
11	19,5	–	122	–	144	188	2,1	455 000	520 000	81 000	3 400	2 800
–	–	8,5	122	–	144	188	2,1	455 000	520 000	81 000	3 400	2 800
–	–	–	124	140	158	226	2,5	495 000	475 000	73 000	3 000	3 100
14	22	–	124	–	158	226	2,5	495 000	475 000	73 000	3 000	3 100
–	–	8	124	–	158	226	2,5	495 000	475 000	72 000	3 000	3 100
–	–	–	124	140	158	226	2,5	750 000	800 000	126 000	2 800	2 320
14	26,5	–	124	–	158	226	2,5	750 000	800 000	126 000	2 800	2 320
–	–	12,5	124	–	158	226	2,5	750 000	800 000	126 000	2 800	2 320
–	–	–	130	153	173	260	3	680 000	660 000	77 000	4 500	–
17	29,5	–	130	–	173	260	3	680 000	660 000	77 000	4 500	–

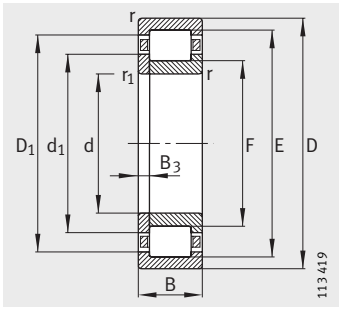
2) If axial load is present, observe the dimensions D_1 and d_1.

Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



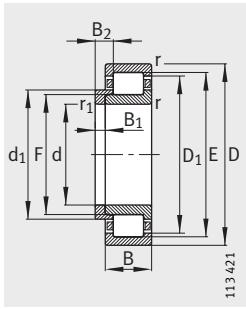
NJ
Semi-locating bearings



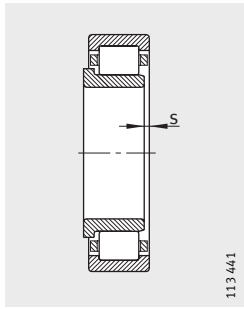
NUP
Locating bearings

Dimension table (continued) · Dimensions in mm

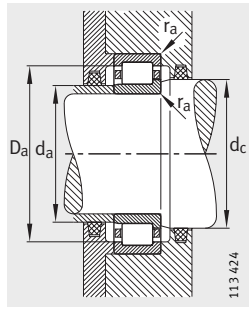
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r_1 min.	$s^{1)}$	E	F	D_1 ≈	d_1 ≈
NJ224-E-TVP2	**XL**	–	5,91	–	**120**	215	40	2,1	2,1	1,4	195,5	143,5	187,8	153,2
NJ224-E-TVP2	**XL**	**HJ224-E**	5,91	0,707	**120**	215	40	2,1	2,1	–	195,5	143,5	187,8	153,2
NUP224-E-TVP2	**XL**	–	6,02	–	**120**	215	40	2,1	2,1	–	195,5	143,5	187,8	153,2
NJ2224-E-TVP2	**XL**	–	8,54	–	**120**	215	58	2,1	2,1	4,5	195,5	143,5	187,8	153,2
NJ2224-E-TVP2	**XL**	**HJ2224-E**	8,54	0,75	**120**	215	58	2,1	2,1	–	195,5	143,5	187,8	153,2
NUP2224-E-TVP2	**XL**	–	8,7	–	**120**	215	58	2,1	2,1	–	195,5	143,5	187,8	153,2
NJ324-E-TVP2	**XL**	–	13,5	–	**120**	260	55	3	3	3,5	230	154	218,7	168,1
NJ324-E-TVP2	**XL**	**HJ324-E**	13,5	1,41	**120**	260	55	3	3	–	230	154	218,7	168,1
NUP324-E-TVP2	**XL**	–	13,8	–	**120**	260	55	3	3	–	230	154	218,7	168,1
NJ2324-E-M1	**XL**	–	23,5	–	**120**	260	86	3	3	7,2	230	154	218,7	168,1
NJ2324-E-M1	**XL**	**HJ2324-E**	23,5	1,49	**120**	260	86	3	3	–	230	154	218,7	168,1
NUP2324-E-M1	**XL**	–	23,8	–	**120**	260	86	3	3	–	230	154	218,7	168,1
NJ424-M1	**XL**	–	31,3	–	**120**	310	72	5	5	6,9	260	170	243,9	187,3
NJ424-M1	**XL**	**HJ424**	31,3	2,61	**120**	310	72	5	5	–	260	170	243,9	187,3
NJ226-E-TVP2	**XL**	–	6,63	–	**130**	230	40	3	3	1,2	209,5	153,5	201,2	164
NJ226-E-TVP2	**XL**	**HJ226-E**	6,63	0,78	**130**	230	40	3	3	–	209,5	153,5	201,2	164
NUP226-E-TVP2	**XL**	–	6,74	–	**130**	230	40	3	3	–	209,5	153,5	201,2	164
NJ2226-E-TVP2	**XL**	–	10,6	–	**130**	230	64	3	3	5,2	209,5	153,5	201,2	164
NJ2226-E-TVP2	**XL**	**HJ2226-E**	10,6	0,849	**130**	230	64	3	3	–	209,5	153,5	201,2	164
NUP2226-E-TVP2	**XL**	–	10,8	–	**130**	230	64	3	3	–	209,5	153,5	201,2	164
NJ326-E-TVP2	**XL**	–	16,5	–	**130**	280	58	4	4	3,5	247	167	235,2	181,7
NJ326-E-TVP2	**XL**	**HJ326-E**	16,5	1,64	**130**	280	58	4	4	–	247	167	235,2	181,7
NUP326-E-TVP2	**XL**	–	16,7	–	**130**	280	58	4	4	–	247	167	235,2	181,7
NJ2326-E-M1	**XL**	–	29,2	–	**130**	280	93	4	4	8,1	247	167	235,2	181,7
NJ2326-E-M1	**XL**	**HJ2326-E**	29,2	1,77	**130**	280	93	4	4	–	247	167	235,2	181,7
NUP2326-E-M1	**XL**	–	29,7	–	**130**	280	93	4	4	–	247	167	235,2	181,7



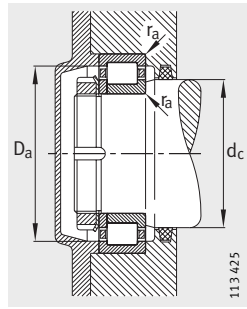
NJ and HJ
Locating bearings



1) Axial displacement “s” for NJ



Mounting dimensions for NJ



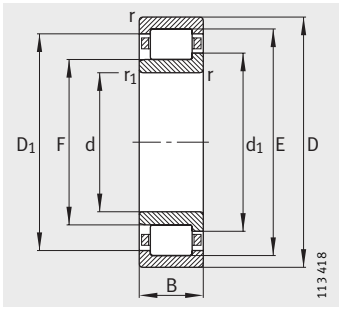
Mounting dimensions for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B_1	B_2	B_3	d_a		d_c	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
			min.[2]	max.	min.	max.[2]	max.	N	N	N	min^{-1}	min^{-1}
–	–	–	132	141	156	203	2,1	390 000	415 000	64 000	3 200	3 100
11	17	–	132	–	156	203	2,1	390 000	415 000	64 000	3 200	3 100
–	–	6	132	–	156	203	2,1	390 000	415 000	64 000	3 200	3 100
–	–	–	132	141	156	203	2,1	530 000	610 000	960 00	3 200	2 550
11	20	–	132	–	156	203	2,1	530 000	610 000	960 00	3 200	2 550
–	–	9	132	–	156	203	2,1	530 000	610 000	96 000	3 200	2 550
–	–	–	134	151	171	246	2,5	610 000	600 000	87 000	2 800	2 700
14	22,5	–	134	–	171	246	2,5	610 000	600 000	87 000	2 800	2 700
–	–	8,5	134	–	171	246	2,5	610 000	600 000	87 000	2 800	2 700
–	–	–	134	151	171	246	2,5	930 000	1 010 000	153 000	4 300	2 000
14	26	–	134	–	171	246	2,5	930 000	1 010 000	153 000	4 300	2 000
–	–	12	134	–	171	246	2,5	930 000	1 010 000	153 000	4 300	2 000
–	–	–	144	168	190	286	4	850 000	840 000	117 000	3 800	–
17	30,5	–	144	–	190	286	4	850 000	840 000	117 000	3 800	–
–	–	–	144	151	168	216	2,5	425 000	445 000	65 000	3 000	2 850
11	17	–	144	–	168	216	2,5	425 000	445 000	65 000	3 000	2 850
–	–	6	144	–	168	216	2,5	425 000	445 000	65 000	3 000	2 850
–	–	–	144	151	168	216	2,5	620 000	730 000	111 000	3 000	2 300
11	21	–	144	–	168	216	2,5	620 000	730 000	111 000	3 000	2 300
–	–	10	144	–	168	216	2,5	620 000	730 000	111 000	3 000	2 300
–	–	–	147	164	184	263	3	680 000	670 000	96 000	2 600	2 460
14	23	–	147	–	184	263	3	680 000	670 000	96 000	2 600	2 460
–	–	9	147	–	184	263	3	680 000	670 000	96 000	2 600	2 460
–	–	–	147	164	184	263	3	1 080 000	1 220 000	180 000	3 800	1 780
14	28	–	147	–	184	263	3	1 080 000	1 220 000	180 000	3 800	1 780
–	–	14	147	–	184	263	3	1 080 000	1 220 000	180 000	3 800	1 780

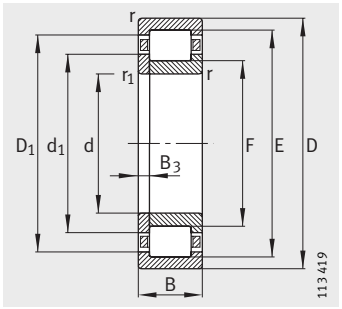
2) If axial load is present, observe the dimensions D_1 and d_1.

Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



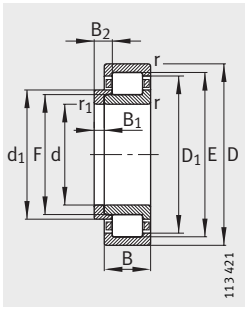
NJ
Semi-locating bearings



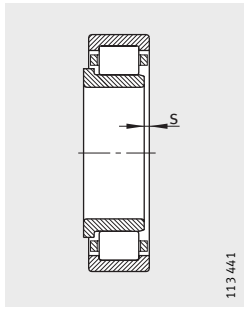
NUP
Locating bearings

Dimension table (continued) · Dimensions in mm

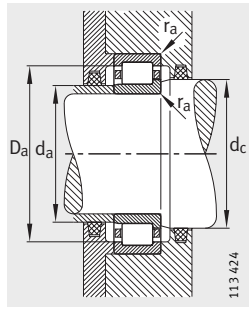
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r_1 min.	$s^{1)}$	E	F	D_1 ≈	d_1 ≈
NJ228-E-M1	**XL**	–	9,46	–	**140**	250	42	3	3	2	225	169	216,7	179,4
NJ228-E-M1	**XL**	**HJ228-E**	9,46	0,986	**140**	250	42	3	3	–	225	169	216,7	179,4
NUP228-E-M1	**XL**	–	9,61	–	**140**	250	42	3	3	–	225	169	216,7	179,4
NJ2228-E-M1	**XL**	–	14,7	–	**140**	250	68	3	3	7	225	169	216,7	179,4
NJ2228-E-M1	**XL**	**HJ2228-E**	14,7	1,08	**140**	250	68	3	3	–	225	169	216,7	179,4
NUP2228-E-M1	**XL**	–	16,8	–	**140**	250	68	3	3	–	225	169	216,7	180
NJ328-E-TVP2	**XL**	–	20,5	–	**140**	300	62	4	4	5,2	264	180	251,7	195,4
NJ328-E-TVP2	**XL**	**HJ328-E**	20,5	2,03	**140**	300	62	4	4	–	264	180	251,7	195,4
NUP328-E-TVP2	**XL**	–	20,8	–	**140**	300	62	4	4	–	264	180	251,7	195,4
NJ2328-E-M1	**XL**	–	36,6	–	**140**	300	102	4	4	9,2	264	180	251,7	195,4
NJ2328-E-M1	**XL**	**HJ2328-E**	36,6	2,2	**140**	300	102	4	4	–	264	180	251,7	195,4
NUP2328-E-M1	**XL**	–	37,1	–	**140**	300	102	4	4	–	264	180	251,7	195,4
NJ230-E-M1	**XL**	–	11,9	–	**150**	270	45	3	3	4	242	182	233,2	193,1
NJ230-E-M1	**XL**	**HJ230-E**	11,9	1,26	**150**	270	45	3	3	–	242	182	233,2	193,1
NUP230-E-M1	**XL**	–	12,1	–	**150**	270	45	3	3	–	242	182	233,2	193,1
NJ2230-E-M1	**XL**	–	18,7	–	**150**	270	73	3	3	7,5	242	182	233,2	193,1
NJ2230-E-M1	**XL**	**HJ2230-E**	18,7	1,36	**150**	270	73	3	3	–	242	182	233,2	193,1
NUP2230-E-M1	**XL**	–	19,1	–	**150**	270	73	3	3	–	242	182	233,2	193,1
NJ330-E-M1	**XL**	–	27,2	–	**150**	320	65	4	4	5,5	283	193	269,8	209,5
NJ330-E-M1	**XL**	**HJ330-E**	27,2	2,33	**150**	320	65	4	4	–	283	193	269,8	209,5
NUP330-E-M1	**XL**	–	27,7	–	**150**	320	65	4	4	–	283	193	269,8	209,5
NJ2330-E-M1	**XL**	–	43,8	–	**150**	320	108	4	4	9,7	283	193	269,8	209,5
NJ2330-E-M1	**XL**	**HJ2330-E**	43,8	2,55	**150**	320	108	4	4	–	283	193	269,8	209,5
NUP2330-E-M1	**XL**	–	44,6	–	**150**	320	108	4	4	–	283	193	269,8	209,5



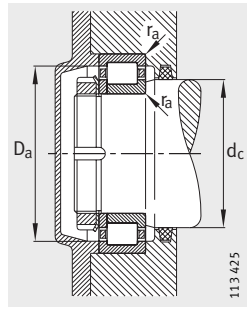
NJ and HJ
Locating bearings



[1] Axial displacement “s” for NJ



Mounting dimensions for NJ



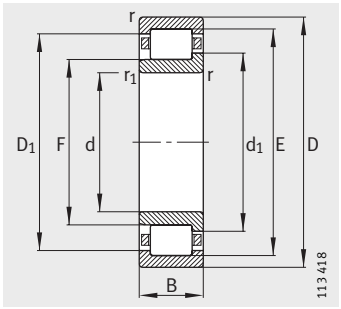
Mounting dimensions for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B_1	B_2	B_3	d_a		d_c	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
			min.[2]	max.	min.	max.[2]	max.	N	N	N	min^{-1}	min^{-1}
–	–	–	154	166	182	236	2,5	460 000	510 000	72 000	4 800	2 600
11	18	–	154	–	182	236	2,5	460 000	510 000	72 000	4 800	2 600
–	–	7	154	–	182	236	2,5	460 000	510 000	72 000	4 800	2 600
–	–	–	154	166	182	236	2,5	670 000	830 000	123 000	4 500	2 080
11	23	–	154	–	182	236	2,5	670 000	830 000	123 000	4 500	2 080
–	–	12	154	–	182	236	2,5	670 000	830 000	123 000	4 500	2 080
–	–	–	157	176	198	283	3	790 000	800 000	113 000	2 400	2 200
15	25	–	157	–	198	283	3	790 000	800 000	113 000	2 400	2 200
–	–	10	157	–	198	283	3	790 000	800 000	113 000	2 400	2 200
–	–	–	157	176	198	283	3	1 210 000	1 390 000	202 000	3 600	1 640
15	31	–	157	–	198	283	3	1 210 000	1 390 000	202 000	3 600	1 640
–	–	16	157	–	198	283	3	1 210 000	1 390 000	202 000	3 600	1 640
–	–	–	164	179	196	256	2,5	520 000	590 000	82 000	4 500	2 390
12	19,5	–	164	–	196	256	2,5	520 000	590 000	82 000	4 500	2 390
–	–	7,5	164	–	196	256	2,5	520 000	590 000	82 000	4 500	2 390
–	–	–	164	179	196	256	2,5	780 000	970 000	142 000	4 300	1 860
12	24,5	–	164	–	196	256	2,5	780 000	970 000	142 000	4 300	1 860
–	–	12,5	164	–	196	256	2,5	780 000	970 000	142 000	4 300	1 860
–	–	–	167	190	213	303	3	900 000	930 000	126 000	3 600	1 970
15	25	–	167	–	213	303	3	900 000	930 000	126 000	3 600	1 970
–	–	10	167	–	213	303	3	900 000	930 000	126 000	3 600	1 970
–	–	–	167	190	213	303	3	1 380 000	1 600 000	226 000	3 200	1 480
15	31,5	–	167	–	213	303	3	1 380 000	1 600 000	226 000	3 200	1 480
–	–	16,5	167	–	213	303	3	1 380 000	1 600 000	226 000	3 200	1 480

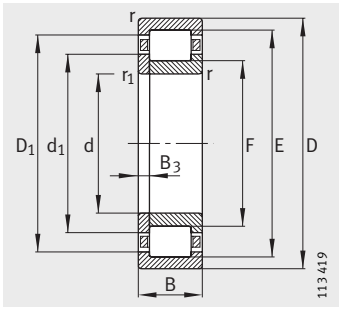
[2] If axial load is present, observe the dimensions D_1 and d_1.

Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



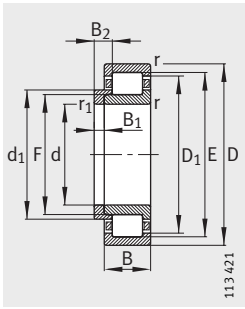
NJ
Semi-locating bearings



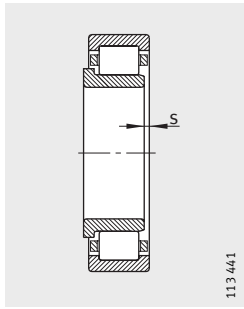
NUP
Locating bearings

Dimension table (continued) · Dimensions in mm

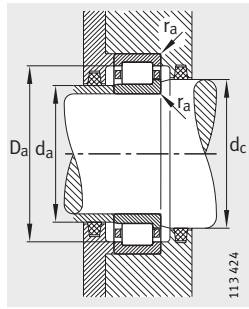
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r_1 min.	$s^{1)}$	E	F	D_1 ≈	d_1 ≈
NJ232-E-M1	**XL**	–	14,8	–	**160**	290	48	3	3	4,1	259	195	249,6	206,8
NJ232-E-M1	**XL**	**HJ232-E**	14,8	1,47	**160**	290	48	3	3	–	259	195	249,6	206,8
NUP232-E-M1	**XL**	–	15,1	–	**160**	290	48	3	3	–	259	195	249,6	206,8
NJ2232-E-M1	**XL**	–	23,9	–	**160**	290	80	3	3	7,2	261	193	251,1	205,5
NJ2232-E-M1	**XL**	**HJ2232-E**	23,9	1,56	**160**	290	80	3	3	–	261	193	251,1	205,5
NUP2232-E-M1	**XL**	–	24,3	–	**160**	290	80	3	3	–	261	193	251,1	205,5
NJ332-E-M1	–	–	32,3	–	**160**	340	68	4	4	5,6	300	204	286	221,6
NJ332-E-M1	–	**HJ332-E**	32,3	2,58	**160**	340	68	4	4	–	300	204	286	221,6
NJ2332-E-M1	–	–	52,3	–	**160**	340	114	4	4	9,9	300	204	286	221,6
NJ2332-E-M1	–	**HJ2332-E**	52,3	2,85	**160**	340	114	4	4	–	300	204	286	221,6
NJ234-E-M1	**XL**	–	18,4	–	**170**	310	52	4	4	4,3	279	207	268,5	218,4
NJ234-E-M1	**XL**	**HJ234-E**	18,4	1,58	**170**	310	52	4	4	–	279	207	268,5	218,4
NUP234-E-M1	**XL**	–	18,6	–	**170**	310	52	4	4	–	279	207	268,5	218,4
NJ2234-E-M1	**XL**	–	29,8	–	**170**	310	86	4	4	7,2	281	205	269,9	219
NJ2234-E-M1	**XL**	**HJ2234-E**	29,8	1,78	**170**	310	86	4	4	–	281	205	269,9	219
NUP2234-E-M1	**XL**	–	30,2	–	**170**	310	86	4	4	–	281	205	269,9	219
NJ334-E-M1	–	–	38,6	–	**170**	360	72	4	4	6	318	218	301,6	237
NJ334-E-M1	–	**HJ334-E**	38,6	3,21	**170**	360	72	4	4	–	318	218	301,6	237
NJ2334-EX-M1	–	–	62,3	–	**170**	360	120	4	4	10,2	320	216	303	235,7
NJ2334-EX-M1	–	**HJ2334-EX**	62,3	3,53	**170**	360	120	4	4	–	320	216	303	235,7
NJ236-E-M1	**XL**	–	19,2	–	**180**	320	52	4	4	4,7	289	217	278,6	230,2
NJ236-E-M1	**XL**	**HJ236-E**	19,2	1,76	**180**	320	52	4	4	–	289	217	278,6	230,2
NUP236-E-M1	**XL**	–	17,3	–	**180**	320	52	4	4	–	289	217	278,6	230,2
NJ2236-E-M1	**XL**	–	30,9	–	**180**	320	86	4	4	7,2	291	215	280	229
NJ2236-E-M1	**XL**	**HJ2236-E**	30,9	1,87	**180**	320	86	4	4	–	291	215	280	229
NUP2236-E-M1	**XL**	–	31,4	–	**180**	320	86	4	4	–	291	215	280	229
NJ336-E-M1	–	–	44,6	–	**180**	380	75	4	4	6,1	335	231	319,8	250,5
NJ336-E-M1	–	**HJ336E**	44,6	3,77	**180**	380	75	4	4	–	335	231	319,8	250,5
NJ2336-EX-M1	–	–	72,9	–	**180**	380	126	4	4	10,5	339	227	320,8	248
NJ2336-EX-M1	–	**HJ2336-EX**	72,9	4,05	**180**	380	126	4	4	–	339	227	320,8	248



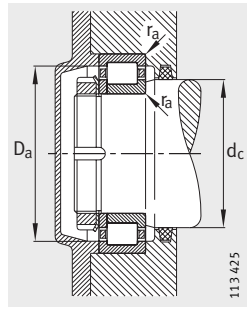
NJ and HJ
Locating bearings



1) Axial displacement “s” for NJ



Mounting dimensions for NJ



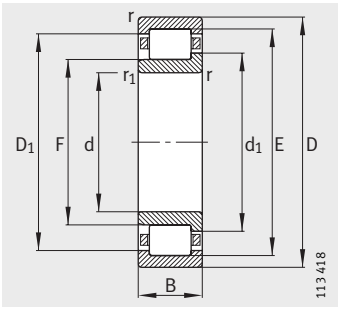
Mounting dimensions for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B_1	B_2	B_3	d_a		d_c	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
			min.[2]	max.	min.	max.[2]	max.	N	N	N	min^{-1}	min^{-1}
–	–	–	174	192	210	276	2,5	590 000	670 000	93 000	4 300	2 190
12	20	–	174	–	210	276	2,5	590 000	670 000	93 000	4 300	2 190
–	–	8	174	–	210	276	2,5	590 000	670 000	93 000	4 300	2 190
–	–	–	174	192	210	276	2,5	940 000	1 170 000	171 000	3 800	1 670
12	24,5	–	174	–	210	276	2,5	940 000	1 170 000	171 000	3 800	1 670
–	–	12,5	174	–	210	276	2,5	940 000	1 170 000	171 000	3 800	1 670
–	–	–	177	200	228	323	3	865 000	1 060 000	114 000	3 000	1 790
15	25	–	177	–	228	323	3	865 000	1 060 000	114 000	3 000	1 790
–	–	–	177	200	228	323	3	1 320 000	1 830 000	204 000	3 000	1 350
15	32	–	177	–	228	323	3	1 320 000	1 830 000	204 000	3 000	1 350
–	–	–	187	204	223	293	3	700 000	780 000	107 000	3 600	2 010
12	20	–	187	–	223	293	3	700 000	780 000	107 000	3 600	2 010
–	–	8	187	–	223	293	3	700 000	780 000	107 000	3 600	2 010
–	–	–	187	204	223	293	3	1 130 000	1 400 000	198 000	3 200	1 500
12	24	–	187	–	223	293	3	1 130 000	1 400 000	198 000	3 200	1 500
–	–	12	187	–	223	293	3	1 130 000	1 400 000	197 000	3 200	1 500
–	–	–	187	215	240	343	3	965 000	1 220 000	132 000	3 000	1 630
16	27	–	187	–	240	343	3	965 000	1 220 000	132 000	3 000	1 630
–	–	–	187	214	238,3	343	3	1 500 000	2 080 000	230 000	2 800	1 230
16	33,5	–	187	–	238,3	343	3	1 500 000	2 080 000	230 000	2 800	1 230
–	–	–	197	214	233	303	3	730 000	830 000	112 000	3 600	1 880
12	20	–	197	–	233	303	3	730 000	830 000	112 000	3 600	1 880
–	–	8	197	–	233	303	3	730 000	830 000	112 000	3 600	1 880
–	–	–	197	214	233	303	3	1 180 000	1 490 000	208 000	3 200	1 390
12	24	–	197	–	233	303	3	1 180 000	1 490 000	208 000	3 200	1 390
–	–	12	197	–	233	303	3	1 180 000	1 490 000	208 000	3 200	1 390
–	–	–	197	228	254	363	3	1 040 000	1 320 000	141 000	2 800	1 520
17	28,5	–	197	–	254	363	3	1 040 000	1 320 000	141 000	2 800	1 520
–	–	–	197	225	250,6	363	3	1 660 000	2 320 000	260 000	2 800	1 130
17	35	–	197	–	250,6	363	3	1 660 000	2 320 000	260 000	2 800	1 130

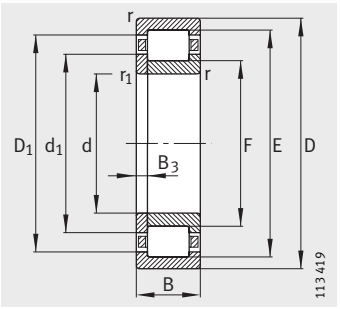
2) If axial load is present, observe the dimensions D_1 and d_1.

Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



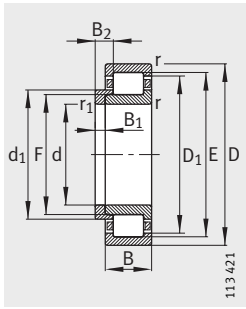
NJ
Semi-locating bearings



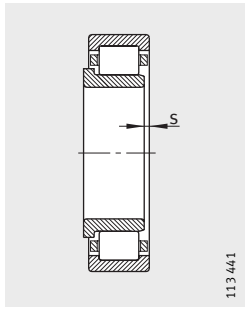
NUP
Locating bearings

Dimension table (continued) · Dimensions in mm

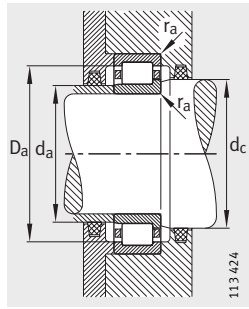
Designation		Mass m		Dimensions									
Bearing	L-section ring	Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r_1 min.	$s^{1)}$	E	F	D_1 ≈	d_1 ≈
NJ238-E-M1	–	23,2	–	**190**	340	55	4	4	4,7	306	230	295	244
NJ238-E-M1	**HJ238-E**	23,2	2,17	**190**	340	55	4	4	–	306	230	295	244
NUP238-E-M1	–	23,5	–	**190**	340	55	4	4	–	306	230	295	244
NJ2238-E-M1	–	37,7	–	**190**	340	92	4	4	8	308	228	296,4	242,7
NJ2238-E-M1	**HJ2238-E**	37,7	2,31	**190**	340	92	4	4	–	308	228	296,4	242,7
NJ2338-EX-M1	–	84,4	–	**190**	400	132	5	5	11	360	240	340,5	262,5
NJ2338-EX-M1	**HJ2338-EX**	84,4	4,8	**190**	400	132	5	5	–	360	240	340,5	262,5
NJ240-E-M1	–	27,5	–	**200**	360	58	4	4	4,8	323	243	311,5	257,6
NJ240-E-M1	**HJ240-E**	27,5	2,62	**200**	360	58	4	4	–	323	243	311,5	257,6
NUP240-E-M1	–	28	–	**200**	360	58	4	4	–	323	243	311,5	257,6
NJ2240-E-M1	–	45,3	–	**200**	360	98	4	4	8,2	325	241	312,9	256,3
NJ2240-E-M1	**HJ2240-E**	45,3	2,78	**200**	360	98	4	4	–	325	241	312,9	256,3
NJ340-E-M1	–	58,1	–	**200**	420	80	5	5	6,3	370	258	351,8	279
NJ340-E-M1	**HJ340-E**	58,1	4,94	**200**	420	80	5	5	–	370	258	351,8	279
NJ2340-EX-M1	–	97,2	–	**200**	420	138	5	5	11,3	377	253	356,9	276,1
NJ2340-EX-M1	**HJ2340-EX**	97,2	5,28	**200**	420	138	5	5	–	377	253	356,9	276,1
NJ244-E-M1	–	38,7	–	**220**	400	65	4	4	5,5	358	268	344,9	285,2
NJ244-E-M1	**HJ244-E**	38,7	3,55	**220**	400	65	4	4	–	358	268	344,9	285,2
NUP244-E-M1	–	39,3	–	**220**	400	65	4	4	–	358	268	344,9	285,2
NUP2244-EX-M1	–	63,4	–	**220**	400	108	4	4	–	367	259	349,4	279,4
NUP2344-EX-M1	–	124	–	**220**	460	145	5	5	–	413	277	391,2	302,2
NJ248-E-M1	–	52,5	–	**240**	440	72	4	4	6	393	293	376,6	312
NJ248-E-M1	**HJ248-E**	52,5	4,6	**240**	440	72	4	4	–	393	293	376,6	312
NJ348-E-M1	–	97	–	**240**	500	95	5	5	7,4	442	306	421,2	331,3
NJ348-E-M1	**HJ348-E**	97	8,3	**240**	500	95	5	5	–	442	306	421,2	331,3
NJ252-E-M1	–	69,4	–	**260**	480	80	5	5	6,2	429	317	410,8	336,9
NJ252-E-M1	**HJ252-E**	69,4	5,92	**260**	480	80	5	5	–	429	317	410,8	336,9
NJ356-E-M1	–	149	–	**280**	580	108	6	6	8,7	512	362	488	389,8
NJ356-E-M1	**HJ356-E**	149	13,7	**280**	580	108	6	6	–	512	362	488	389,8



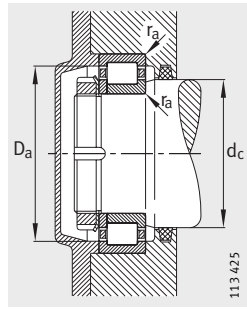
NJ and HJ
Locating bearings



1) Axial displacement “s” for NJ



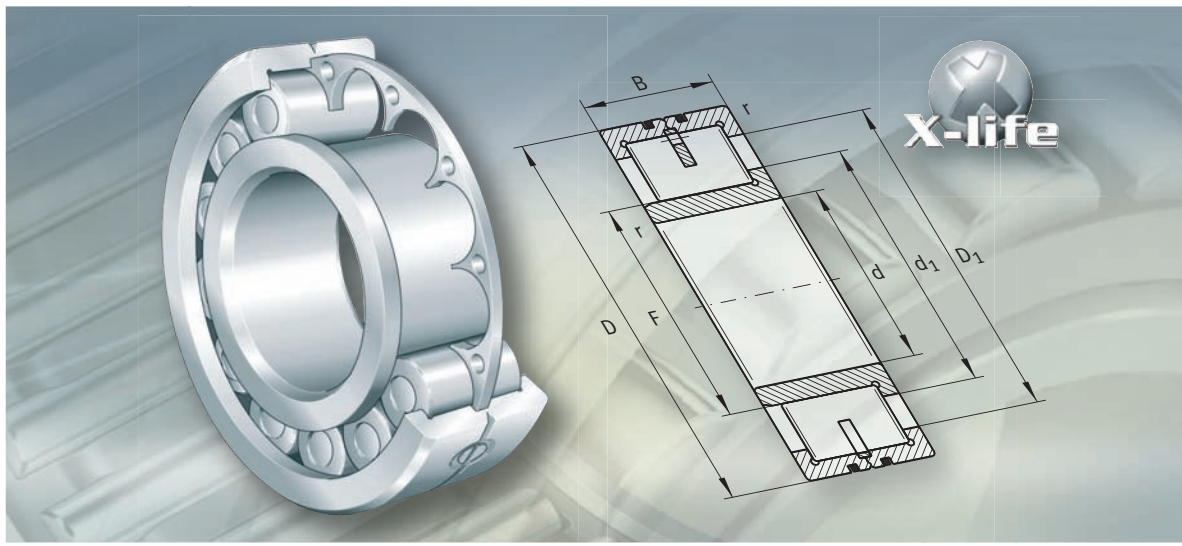
Mounting dimensions for NJ



Mounting dimensions for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B_1	B_2	B_3	d_a		d_c	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
			min.[2]	max.	min.	max.[2]	max.	N	N	N	min^{-1}	min^{-1}
–	–	–	207	227	247	323	3	680 000	930 000	100 000	3 200	1 750
13	21,5	–	207	–	247	323	3	680 000	930 000	100 000	3 200	1 750
–	–	8,5	207	–	247	323	3	680 000	930 000	100 000	3 200	1 750
–	–	–	207	227	247	323	3	1 100 000	1 660 000	184 000	3 000	1 300
13	26,5	–	207	–	247	323	3	1 100 000	1 660 000	184 000	3 000	1 300
–	–	–	210	237,8	265,3	380	4	1 900 000	2 650 000	285 000	2 600	1 030
18	36,5	–	210	–	265,3	380	4	1 900 000	2 650 000	285 000	2 600	1 030
–	–	–	217	240	261	343	3	750 000	1 040 000	110 000	3 000	1 620
14	23	–	217	–	261	343	3	750 000	1 040 000	110 000	3 000	1 620
–	–	9	217	–	261	343	3	750 000	1 040 000	110 000	3 000	1 620
–	–	–	217	240	261	343	3	1 220 000	1 860 000	206 000	2 800	1 210
14	28	–	217	–	261	343	3	1 220 000	1 860 000	206 000	2 800	1 210
–	–	–	220	255	282	400	4	1 180 000	1 530 000	161 000	2 600	1 340
18	30	–	220	–	282	400	4	1 180 000	1 530 000	161 000	2 600	1 340
–	–	–	220	250,7	279	400	4	2 040 000	2 900 000	310 000	2 400	960
18	37	–	220	–	279	400	4	2 040 000	2 900 000	310 000	2 400	960
–	–	–	237	265	288	383	3	950 000	1 320 000	134 000	2 800	1 400
15	25	–	237	–	288	383	3	950 000	1 320 000	134 000	2 800	1 400
–	–	10	237	–	288	383	3	950 000	1 320 000	135 000	2 800	1 400
–	–	14	237	–	282,3	383	3	1 630 000	2 360 000	250 000	2 600	1 020
–	–	20	240	–	305,1	440	4	2 360 000	3 350 000	340 000	2 200	840
–	–	–	257	290	315	423	3	1 140 000	1 600 000	163 000	2 600	1 240
16	27	–	257	–	315	423	3	1 140 000	1 600 000	163 000	2 600	1 240
–	–	–	260	303	335	480	4	1 730 000	2 280 000	221 000	2 200	1 010
22	35,5	–	260	–	335	480	4	1 730 000	2 280 000	221 000	2 200	1 010
–	–	–	280	314	341	460	4	1 340 000	1 900 000	191 000	2 400	1 120
18	30	–	280	–	341	460	4	1 340 000	1 900 000	191 000	2 400	1 120
–	–	–	306	359	393,4	554	5	2 160 000	3 050 000	285 000	1 900	810
26	42,5	–	306	–	393,4	554	5	2 160 000	3 050 000	285 000	1 900	810

2) If axial load is present, observe the dimensions D_1 and d_1.



Cylindrical roller bearings with disc cage or spacers

Cylindrical roller bearings with disc cage or spacers

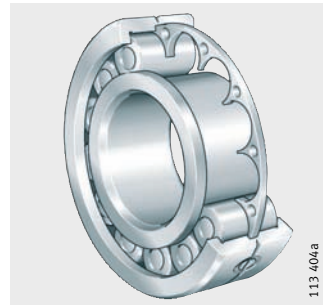
		Page
Product overview	Cylindrical roller bearings with disc cage or spacers	448
Features	X-life	449
	Bearings of TB design	449
	Semi-locating bearings	450
	Operating temperature	451
	Suffixes	451
Design and safety guidelines	Permissible skewing	452
	Axial load carrying capacity	452
	Equivalent dynamic bearing load	454
	Equivalent static bearing load	454
	Minimum radial load	454
	Design of bearing arrangements	455
Accuracy	Radial internal clearance	455
Dimension tables	Cylindrical roller bearings with disc cage, semi-locating bearings	456
	Cylindrical roller bearings with spacers, semi-locating bearings	458

Cylindrical roller bearings with disc cage or spacers

Semi-locating bearings

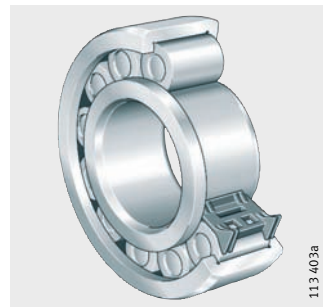
With disc cage

LSL1923



With spacers

ZSL1923



Cylindrical roller bearings with disc cage or spacers

Features

Cylindrical roller bearings with a disc cage (series LSL) or with spacers (series ZSL) are of a single row, self-retaining design and correspond to dimension series 23. They have solid outer rings with two ribs, while the inner rings have one rib. The inner ring is removable and thus allows easier mounting of the bearings.
The disc cages or spacers prevent the cylindrical rollers from coming into contact with each other during rolling.

Cylindrical roller bearings NJ23..-E and spherical roller bearings 223..-E1 have the same design envelope as LSL1923 and ZSL1923.

X-life

Numerous sizes are supplied in the X-life grade.
These bearings are indicated in the dimension tables.

Bearings of X-life quality have, for example, lower roughness R_a and higher geometrical accuracy of the raceways than comparable designs that are not X-life. As a result, they have higher load carrying capacity and longer life for the same dimensioning. In certain applications, this means that a smaller bearing arrangement can be designed.

Bearings of TB design

In the case of bearings of TB design, the axial load carrying capacity of cylindrical roller bearings was significantly improved with the aid of new calculation and manufacturing methods.

Optimum contact conditions between the roller and rib are ensured by means of a special curvature of the roller end faces. As a result, the axial contact pressures on the rib are significantly minimised and a lubricant film capable of supporting higher loads is formed. Under normal operating conditions, wear and fatigue at the rib contact running and roller end faces is completely eliminated.

In addition, axial frictional torque is reduced by up to 50%. The bearing temperature during operation is therefore significantly lower.

Cylindrical roller bearings with disc cage or spacers

Semi-locating bearings

Cylindrical roller bearings LSL1923 and ZSL1923 are semi-locating bearings. Semi-locating bearings can support not only high radial forces but also axial forces in one direction and can therefore guide shafts axially in one direction. They act as non-locating bearings in the opposite direction.

The bearings have two ribs on the outer ring and one rib on the inner ring.

Due to the large number of rolling elements and their dimensions, LSL and ZSL bearings have very high radial load carrying capacity. They can also withstand high shock loads and vibrations.

Due to the low frictional torque and the low level of heat generation, the bearings are characterised by high limiting speeds. In addition, the optimum heat dissipation ensures thermally stable conditions in the bearing.

With disc cage

In cylindrical roller bearings LSL1923, an externally-guided flat brass disc cage prevents the cylindrical rollers from coming into contact with each other during rolling.

The cage has pockets to accommodate the rolling elements. The rolling elements are guided between the ribs on the outer ring. Due to its low mass, the cage is subjected to only minimal strain under acceleration.

The outer ring is axially split and held together by fasteners.

With spacers

In cylindrical roller bearings ZSL1923, plastic spacers prevent the cylindrical rollers from coming into contact with each other during rolling.
The spacers are designed such that the rolling element set is self-retaining, so the bearing and inner ring can be mounted separately.

The spacers are guided axially between the two outer ring ribs.

Axial displacement

The outer and inner ring can be axially displaced relative to each other in one direction only by the dimension “s” stated in the dimension table.

Sealing

The cylindrical roller bearings are open on both sides.

Lubrication

They can be lubricated via the end faces with grease or oil.

Special design for vibratory machinery

In addition to high basic dynamic load ratings and thus long rating life values, bearings in vibratory machinery must also be able to compensate or support considerable shaft tilting due to load or misalignment. The bearings LSL and ZSL are therefore also available by agreement in the BIR design. In these bearings, the inner ring raceway is ground slightly spherical.

Operating temperature

Cylindrical roller bearings with disc cage or spacers are suitable for operating temperatures from –30 °C to +120 °C.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
BIR	Inner ring raceway ground slightly spherical	Available by agreement
BR	Black oxide coated	
C3	Radial internal clearance larger than normal	
C4	Radial internal clearance larger than C3	
C5	Radial internal clearance larger than C4	
TB	Bearing with increased axial load carrying capacity	Standard depending on bearing size, see dimension table

Available bearings of TB design

Series[1)]	From bore diameter d mm
LSL1923	90
ZSL1923	

1) Available by agreement.

Cylindrical roller bearings with disc cage or spacers

Design and safety guidelines

Permissible skewing

There is no significant reduction in rating life if the misalignment of the inner ring relative to the outer ring does not exceed the following values:

3′ in bearings of series LSL1923, ZSL1923.

Axial load carrying capacity

Radial cylindrical roller bearings of a semi-locating bearing design can support axial forces in one direction as well as radial forces.

The axial load carrying capacity is dependent on:

- the size of the sliding surfaces between the ribs and the end faces of the rolling elements
- the sliding velocity at the ribs
- the lubrication on the contact surfaces
- tilting of the bearing.

Ribs subjected to load must be supported across their entire height.

The permissible axial load $F_{a\,per}$ must not be exceeded, in order to avoid an unacceptable increase in temperature.

The axial limiting load $F_{a\,max}$ according to the formula must not be exceeded, in order to avoid impermissible pressure at the contact surfaces.

The ratio F_a/F_r should not exceed 0,4.
In the case of bearings of TB design, the value 0,6 is permissible.

Continuous axial loading without simultaneous radial loading is not permissible.

Permissible and maximum axial load

The axial load $F_{a\,per}$ and the limiting load $F_{a\,max}$ are calculated as follows:

Bearings of standard design

$$F_{a\,per} = k_S \cdot k_B \cdot {d_M}^{1,5} \cdot n^{-0,6} \leqq F_{a\,max}$$

Bearings of TB design

$$F_{a\,per} = 1,5 \cdot k_S \cdot k_B \cdot {d_M}^{1,5} \cdot n^{-0,6} \leqq F_{a\,max}$$

Bearings of standard and TB design

$$F_{a\,max} = 0,075 \cdot k_B \cdot {d_M}^{2,1}$$

$F_{a\,per}$ N
Permissible axial load

$F_{a\,max}$ N
Axial limiting load

k_S –
Factor dependent on the lubrication method, see table, page 453

k_B –
Bearing factor, $k_B = 28$

d_M mm
Mean bearing diameter (d + D)/2 , see dimension table

n min^{-1}
Operating speed.

Factor k_S for the lubrication method

Lubrication method[1]	k_S
Minimal heat dissipation, drip feed oil lubrication, oil mist lubrication, low operating viscosity ($\nu < 0{,}5 \cdot \nu_1$)	7,5 to 10
Poor heat dissipation, oil sump lubrication, oil spray lubrication, low oil flow	10 to 15
Good heat dissipation, recirculating oil lubrication (pressurised oil lubrication)	12 to 18
Very good heat dissipation, recirculating oil lubrication with oil cooling, high operating viscosity ($\nu > 2 \cdot \nu_1$)	16 to 24

[1] Doped oils should be used, e.g. CLP (DIN 51 517) and HLP (DIN 51 524) of ISO-VG classes 32 to 460 as well as ATF oils (DIN 51 502) and gearbox oils (DIN 51 512) of SAE viscosity classes 75 W to 140 W.

Misalignment of bearings

Misalignment caused by shaft deflection for example, may lead to alternating stresses on the inner ring ribs.
In this case, the axial load must be restricted to F_{as} for bearing tilting of up to max. 2 angular minutes.

$$F_{as} = 20 \cdot d_M^{1,42}$$

If even greater tilting is present, special strength analysis is required.

Cylindrical roller bearings with disc cage or spacers

Equivalent dynamic bearing load

Non-locating bearings

For bearings under dynamic loading, the following applies:

$$P = F_r$$

Semi-locating bearings

If an axial force F_a is present in addition to the radial force F_r, the load ratio must be taken into consideration.

Load ratio and equivalent dynamic load

Load ratio	Equivalent dynamic bearing load
$\frac{F_a}{F_r} \leqq e$	$P = F_r$
$\frac{F_a}{F_r} > e$	$P = 0,92 \cdot F_r + Y \cdot F_a$

P N
Equivalent dynamic bearing load for combined load
F_a N
Axial dynamic bearing load
F_r N
Radial dynamic bearing load
e, Y –
Factors: see table Factors e and Y.

Factors e and Y

Series	Calculation factors	
	e	Y
LSL1923, ZSL1923	0,3	0,4

Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

Minimum radial load

In continuous operation, a minimum radial load of the order of $F_{r\,min} = C_{0r}/60$ is necessary.

If $F_{r\,min} < C_{0r}/60$, please contact us.

Design of bearing arrangements

Shaft and housing tolerances

Recommended shaft tolerances for bearings with cylindrical bore, see table, page 150.
Recommended housing tolerances for radial bearings, see table, page 152.

Axial location

In order to prevent lateral creep of the bearing rings, they must be located by force or physical locking means.

The abutment shoulders (shaft and housing) should be sufficiently high and perpendicular to the bearing axis.

The transition from the bearing seating to the abutting shoulders must be designed with rounding to DIN 5 418 or an undercut to DIN 509. Observe the minimum values for the chamfer dimensions r in the dimension tables.

In the case of semi-locating bearings, the bearing rings only require support on one side, on the rib supporting the axial load.

Full support must be provided for ribs transmitting forces in axially loaded bearings.

Accuracy

The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620.

Radial internal clearance

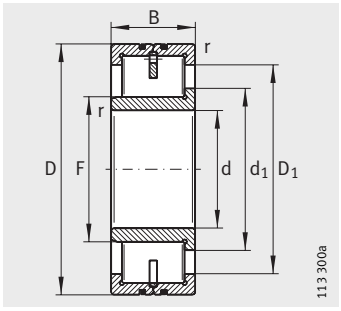
The radial internal clearance corresponds to internal clearance group CN to DIN 620-4.

Radial internal clearance

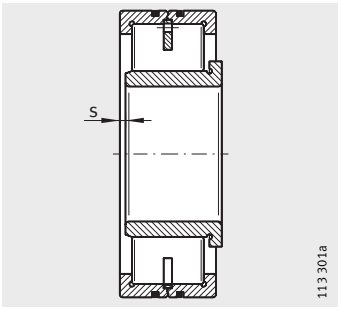
Bore d mm		Radial internal clearance							
		CN µm		C3 µm		C4 µm		C5 µm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	24	20	45	35	60	50	75	65	90
24	30	20	45	35	60	50	75	70	95
30	40	25	50	45	70	60	85	80	105
40	50	30	60	50	80	70	100	95	125
50	65	40	70	60	90	80	110	110	140
65	80	40	75	65	100	90	125	130	165
80	100	50	85	75	110	105	140	155	190
100	120	50	90	85	125	125	165	180	220
120	140	60	105	100	145	145	190	200	245
140	160	70	120	115	165	165	215	225	275
160	180	75	125	120	170	170	220	250	300
180	200	90	145	140	195	195	250	275	330
200	225	105	165	160	220	220	280	305	365
225	250	110	175	170	235	235	300	330	395
250	280	125	195	190	260	260	330	370	440
280	315	130	205	200	275	275	350	410	485

Cylindrical roller bearings with disc cage

Semi-locating bearings



LSL1923



[1] Axial displacement “s”

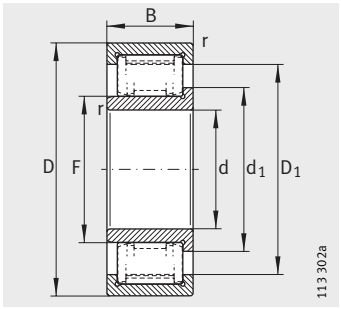
Dimension table · Dimensions in mm

Designation		Mass	Dimensions					Mounting dimensions		
	X-life	m ≈kg	d	D	B	r min.	s[1]	F	d_1 ≈	D_1 ≈
LSL192316	**XL**	6,1	**80**	170	58	2,1	3,5	94	104,5	134,8
LSL192317	**XL**	7,3	**85**	180	60	3	4	100	111,3	143,9
LSL192318-TB	**XL**	8,6	**90**	190	64	3	4	105,26	117,2	152,5
LSL192319-TB	**XL**	10	**95**	200	67	3	4	114,66	126,6	161
LSL192320-TB	**XL**	12,8	**100**	215	73	3	4	119,3	132,7	172
LSL192322-TB	**XL**	17,3	**110**	240	80	3	5	135,5	150,7	193,1
LSL192324-TB	**XL**	22	**120**	260	86	3	5	147,39	164,2	213,1
LSL192326-TB	**XL**	27,2	**130**	280	93	4	5	157,9	176	227,9
LSL192328-TB	**XL**	34	**140**	300	102	4	7	168,45	187,5	243,2
LSL192330-TB	–	40,7	**150**	320	108	4	7	182,49	203,3	263,9
LSL192332-TB	–	48,1	**160**	340	114	4	7	196,38	219	284,8
LSL192334-TB	–	57,5	**170**	360	120	4	7	230,55	226,6	295,4
LSL192336-TB	–	67,4	**180**	380	126	4	7	221,56	245	313,3
LSL192338-TB	–	78,1	**190**	400	132	5	7	224,43	250	325,5
LSL192340-TB	–	89,3	**200**	420	138	5	7	238,45	265,7	345,9
LSL192344-TB	–	108	**220**	460	145	5	7	266,71	297	385,9
LSL192348-TB	–	138,6	**240**	500	155	5	10	280,55	312,5	406,1
LSL192352-TB	–	168	**260**	540	165	6	10	315,6	351,6	457,2
LSL192356-TB	–	206,6	**280**	580	175	6	12	333,1	371	485
LSL192360-TB	–	253	**300**	620	185	7,5	12	350,93	390,9	508,5

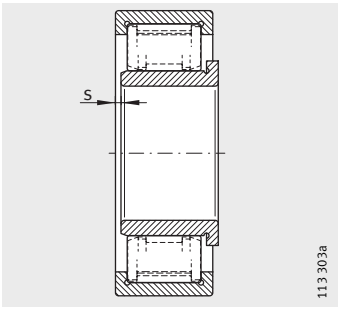
Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
N	N	N	min^{-1}	min^{-1}
475 000	495 000	89 000	8 300	4 600
500 000	520 000	90 000	7 800	4 350
590 000	610 000	104 000	7 400	4 050
610 000	660 000	112 000	6 900	3 750
750 000	790 000	133 000	6 500	3 450
880 000	930 000	151 000	5 800	3 000
1 060 000	1 140 000	181 000	5 300	2 650
1 190 000	1 280 000	200 000	4 950	2 450
1 340 000	1 460 000	224 000	4 600	2 300
1 410 000	1 760 000	199 000	4 250	2 020
1 600 000	2 010 000	224 000	3 950	1 820
1 740 000	2 210 000	241 000	3 800	1 760
1 840 000	2 430 000	260 000	3 600	1 620
2 100 000	2 750 000	295 000	3 450	1 540
2 340 000	3 050 000	315 000	3 250	1 420
2 500 000	3 200 000	320 000	2 900	1 270
2 750 000	3 550 000	350 000	2 750	1 220
3 350 000	4 350 000	425 000	2 470	1 010
3 700 000	4 850 000	460 000	2 330	950
4 150 000	5 500 000	510 000	2 220	890

Cylindrical roller bearings with spacers

Semi-locating bearings



ZSL1923

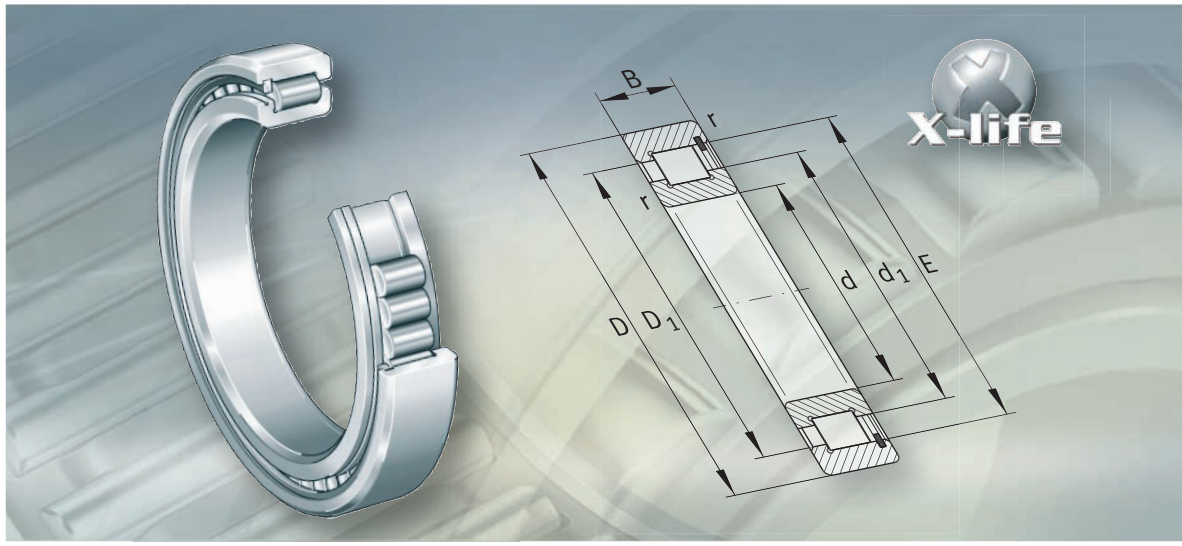


[1] Axial displacement “s”

Dimension table · Dimensions in mm

Designation		Mass	Dimensions					Mounting dimensions		
	X-life	m ≈kg	d	D	B	r min.	s[1]	F	d_1 ≈	D_1 ≈
ZSL192305	**XL**	0,36	**25**	62	24	1,1	2	31,72	36,7	47,5
ZSL192306	**XL**	0,55	**30**	72	27	1,1	2	38,3	43,5	56
ZSL192307	**XL**	0,72	**35**	80	31	1,5	2	44,68	50,7	65,8
ZSL192308	**XL**	1	**40**	90	33	1,5	2	51,12	57,5	75,2
ZSL192309	**XL**	1,34	**45**	100	36	1,5	3	56,1	62,5	80,3
ZSL192310	**XL**	1,76	**50**	110	40	2	3	60,72	68,3	89,7
ZSL192311	**XL**	2,22	**55**	120	43	2	3	67,11	75,5	99,3
ZSL192312	**XL**	2,82	**60**	130	46	2,1	3	73,62	82	105,8
ZSL192313	**XL**	3,44	**65**	140	48	2,1	3,5	80,69	90	116,5
ZSL192314	**XL**	4,27	**70**	150	51	2,1	3,5	84,14	93,5	121,6
ZSL192315	**XL**	5,2	**75**	160	55	2,1	3,5	91,22	101,6	131,9
ZSL192316	**XL**	6,2	**80**	170	58	2,1	3,5	98,24	109,5	142,1
ZSL192317	**XL**	7,23	**85**	180	60	3	4	107,01	118,2	150,9
ZSL192318-TB	**XL**	8,7	**90**	190	64	3	4	105,26	117,5	152,5
ZSL192319-TB	**XL**	10	**95**	200	67	3	4	114,65	126,6	161,9
ZSL192320-TB	**XL**	12,7	**100**	215	73	3	4	119,3	132,7	172,8
ZSL192322-TB	**XL**	16,5	**110**	240	80	3	5	134,27	151,1	199,9
ZSL192324-TB	**XL**	21,9	**120**	260	86	3	5	147,39	164,2	213,1

Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G min^{-1}	n_B min^{-1}
68 000	54 000	8 700	16 400	10 000
94 000	80 000	13 400	13 900	8 500
118 000	101 000	17 500	11 900	7 500
160 000	142 000	25 000	10 400	6 300
171 000	157 000	27 500	9 700	6 300
219 000	199 000	35 500	8 800	5 800
255 000	231 000	42 000	7 900	5 400
270 000	255 000	46 500	7 400	5 200
335 000	320 000	59 000	6 800	4 600
365 000	355 000	64 000	6 500	4 600
435 000	435 000	78 000	6 000	4 200
510 000	520 000	90 000	5 500	3 850
540 000	570 000	96 000	5 200	3 600
590 000	610 000	104 000	5 200	3 750
620 000	660 000	112 000	4 850	3 450
750 000	790 000	133 000	4 550	3 200
890 000	900 000	144 000	3 950	2 700
1 060 000	1 140 000	181 000	3 700	2 400



Single row full complement cylindrical roller bearings

Single row full complement cylindrical roller bearings

		Page
Product overview	Single row full complement cylindrical roller bearings	462
Features	X-life	463
	Bearings of TB design	463
	Semi-locating bearings	464
	Operating temperature	464
	Suffixes	464
Design and safety guidelines	Permissible skewing	465
	Axial load carrying capacity	465
	Equivalent dynamic bearing load	467
	Equivalent static bearing load	467
	Minimum radial load	467
	Design of bearing arrangements	467
Accuracy	Radial internal clearance	468
Dimension tables	Single row full complement cylindrical roller bearings, semi-locating bearings	470

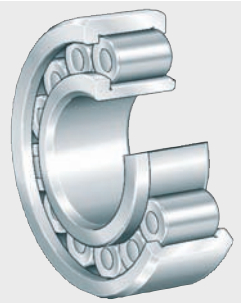
Single row full complement cylindrical roller bearings

Semi-locating bearings

Single row

SL1818, SL1829, SL1830, SL1822

SL1923



Single row full complement cylindrical roller bearings

Features

Single row full complement cylindrical roller bearings have solid outer and inner rings together with rib-guided cylindrical rollers. Since these bearings have the largest possible number of rolling elements, they have extremely high radial load carrying capacity, high rigidity and are suitable for particularly compact designs. Due to the kinematic conditions, however, they do not achieve the high speeds that are possible when using cylindrical roller bearings with cage.

Single row full complement cylindrical roller bearings are in the form of semi-locating bearings.

X-life

Numerous sizes are supplied in the X-life grade. These bearings are indicated in the dimension tables.

Bearings of X-life quality have, for example, lower roughness R_a and higher geometrical accuracy of the raceways than comparable designs that are not X-life. As a result, they have higher load carrying capacity and longer life for the same dimensioning.
In certain applications, this means that a smaller bearing arrangement can be designed.

Bearings of TB design

In the case of bearings of TB design, the axial load carrying capacity of cylindrical roller bearings was significantly improved with the aid of new calculation and manufacturing methods.

Optimum contact conditions between the roller and rib are ensured by means of a special curvature of the roller end faces. As a result, axial surface pressures on the rib are significantly reduced and a lubricant film with improved load-carrying capabilities is achieved. Under normal operating conditions, wear and fatigue at the rib contact running and roller end faces is completely eliminated.

In addition, axial frictional torque is reduced by up to 50%. The bearing temperature during operation is therefore significantly lower.

Single row full complement cylindrical roller bearings

Semi-locating bearings

Semi-locating bearings are available in single row design as SL1818 (dimension series 18), SL1829 (dimension series 29), SL1830 (dimension series 30), SL1822 (dimension series 22) and SL1923 (dimension series 23).
They can support not only high radial forces but also axial forces in one direction and can therefore guide shafts axially in one direction. They act as non-locating bearings in the opposite direction.

Series SL1923 has only one rib on the inner ring and a self-retaining rolling element set. As a result, the inner ring can be removed from the bearing. This makes fitting and dismantling considerably easier.

The bearings SL1818, SL1829, SL1830 and SL1822 are held together in handling and transport by a transport and mounting retaining device on the outer ring. This retaining device remains in the bearing and must not be subjected to axial load.

Axial displacement of inner ring

The inner ring can be axially displaced in one direction by the dimension “s” stated in the dimension table.

Sealing

The cylindrical roller bearings are supplied in an open design.

Lubrication

They are not supplied greased and can be lubricated with oil or grease via the end faces.

Operating temperature

Full complement cylindrical roller bearings are suitable for operating temperatures from –30 °C to +120 °C.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
BR	Black oxide coated	Available by agreement
C3	Radial internal clearance larger than normal	
C4	Radial internal clearance larger than C3	
C5	Radial internal clearance larger than C4	
E	Increased capacity design	Standard depending on series, see dimension table
TB	Bearing with increased axial load carrying capacity	Standard depending on bearing size, see dimension table

Available bearings of TB design

Series[1)]	From bore diameter d mm
SL1818	460
SL1822	140
SL1829	300
SL1830	180
SL1923	90

1) Available by agreement.

Design and safety guidelines

Permissible skewing

There is no significant reduction in rating life if the misalignment of the inner ring relative to the outer ring does not exceed the following values:

4′ in bearings of series SL1818

3′ in bearings of series SL1923, SL1822, SL1829, SL1830.

Axial load carrying capacity

Radial cylindrical roller bearings of a semi-locating bearing design can support axial forces in one direction as well as radial forces.

The axial load carrying capacity is dependent on:

- the size of the sliding surfaces between the ribs and the end faces of the rolling elements
- the sliding velocity at the ribs
- the lubrication on the contact surfaces
- tilting of the bearing.

Ribs subjected to load must be supported across their entire height.

The permissible axial load $F_{a\,per}$ must not be exceeded, in order to avoid an unacceptable increase in temperature.

The axial limiting load $F_{a\,max}$ according to the formula must not be exceeded, in order to avoid impermissible pressure at the contact surfaces.

The ratio F_a/F_r should not exceed 0,4. In the case of bearings of TB design, the value 0,6 is permissible.
Continuous axial loading without simultaneous radial loading is not permissible.

Permissible and maximum axial load

The axial load $F_{a\,per}$ and the limiting load $F_{a\,max}$ are calculated as follows:

Bearings of standard design

$$F_{a\,per} = k_S \cdot k_B \cdot {d_M}^{1,5} \cdot n^{-0,6} \leqq F_{a\,max}$$

Bearings of TB design

$$F_{a\,per} = 1,5 \cdot k_S \cdot k_B \cdot {d_M}^{1,5} \cdot n^{-0,6} \leqq F_{a\,max}$$

Bearings of standard and TB design

$$F_{a\,max} = 0,075 \cdot k_B \cdot {d_M}^{2,1}$$

$F_{a\,per}$ N
Permissible axial load

$F_{a\,max}$ N
Axial limiting load

k_S –
Factor dependent on the lubrication method, see table, page 466

k_B –
Bearing factor, see table, page 466

d_M mm
Mean bearing diameter (d + D)/2 , see dimension table

n min^{-1}
Operating speed.

Factor k_S for the lubrication method

Lubrication method[1)]	k_S
Minimal heat dissipation, drip feed oil lubrication, oil mist lubrication, low operating viscosity ($\nu < 0{,}5 \cdot \nu_1$)	7,5 to 10
Poor heat dissipation, oil sump lubrication oil spray lubrication, low oil flow	10 to 15
Good heat dissipation, recirculating oil lubrication (pressurised oil lubrication)	12 to 18
Very good heat dissipation recirculating oil lubrication with oil cooling, high operating viscosity ($\nu > 2 \cdot \nu_1$)	16 to 24

1) Doped oils should be used, e.g. CLP (DIN 51517) and HLP (DIN 51524) of ISO-VG classes 32 to 460 as well as ATF oils (DIN 51502) and gearbox oils (DIN 51512) of SAE viscosity classes 75 W to 140 W.

Bearing factor k_B

Series	k_B
SL1818	4,5
SL1829	11
SL1830	17
SL1822	20
SL1923	30

Misalignment of bearings

Misalignment caused by shaft deflection for example, may lead to alternating stresses on the inner ring ribs.
In this case, the axial load must be restricted to F_{as} for bearing tilting of up to max. 2 angular minutes.

$$F_{as} = 20 \cdot d_M^{1,42}$$

If even greater tilting is present, special strength analysis is required.

Equivalent dynamic bearing load

Semi-locating bearings

If an axial force F_a is present in addition to the radial force F_r, the load ratio must be taken into consideration.

Load ratio and equivalent dynamic load

Load ratio	Equivalent dynamic bearing load
$\frac{F_a}{F_r} \leqq e$	$P = F_r$
$\frac{F_a}{F_r} > e$	$P = 0,92 \cdot F_r + Y \cdot F_a$

P N
Equivalent dynamic bearing load for combined load
F_a N
Axial dynamic bearing load
F_r N
Radial dynamic bearing load
e, Y –
Factors: see table Factors e and Y.

Factors e and Y

Series	Calculation factors	
	e	Y
SL1818	0,2	0,6
SL1923, SL1822, SL1829, SL1830	0,3	0,4

Equivalent static bearing load

For bearings under static loading, the following applies:

$P_0 = F_{0r}$

Minimum radial load

In continuous operation, a minimum radial load of the order of $F_{r\,min} = C_{0r}/60$ is necessary.

If $F_{r\,min} < C_{0r}/60$, please contact us.

Design of bearing arrangements

Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 150.
Recommended housing tolerances for radial bearings, see table, page 152.

Axial location

In order to prevent lateral creep of the bearing rings, they must be located by force or physical locking means.

The abutment shoulders (shaft and housing) should be sufficiently high and perpendicular to the bearing axis.

The transition from the bearing seating to the abutting shoulders must be designed with rounding to DIN 5 418 or an undercut to DIN 509. Note the minimum chamfer dimensions r as given in the dimension tables.

In the case of semi-locating bearings, the bearing rings only require support on one side, on the rib supporting the axial load.

Full support must be provided for ribs transmitting forces in axially loaded bearings.

Single row full complement cylindrical roller bearings

Accuracy

The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620.

Radial internal clearance

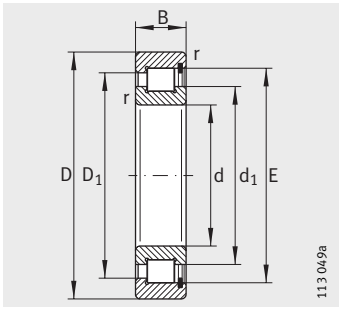
The radial internal clearance corresponds to internal clearance group CN to DIN 620-4.

Radial internal clearance

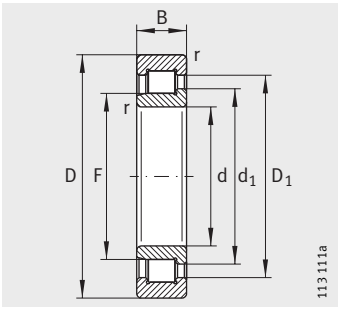
Bore d mm		Radial internal clearance							
		CN µm		C3 µm		C4 µm		C5 µm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	24	20	45	35	60	50	75	65	90
24	30	20	45	35	60	50	75	70	95
30	40	25	50	45	70	60	85	80	105
40	50	30	60	50	80	70	100	95	125
50	65	40	70	60	90	80	110	110	140
65	80	40	75	65	100	90	125	130	165
80	100	50	85	75	110	105	140	155	190
100	120	50	90	85	125	125	165	180	220
120	140	60	105	100	145	145	190	200	245
140	160	70	120	115	165	165	215	225	275
160	180	75	125	120	170	170	220	250	300
180	200	90	145	140	195	195	250	275	330
200	225	105	165	160	220	220	280	305	365
225	250	110	175	170	235	235	300	330	395
250	280	125	195	190	260	260	330	370	440
280	315	130	205	200	275	275	350	410	485
315	355	145	225	225	305	305	385	455	535
355	400	190	280	280	370	370	460	510	600
400	450	210	310	310	410	410	510	565	665
450	500	220	330	330	440	440	550	625	735

Single row full complement cylindrical roller bearings

Semi-locating bearings



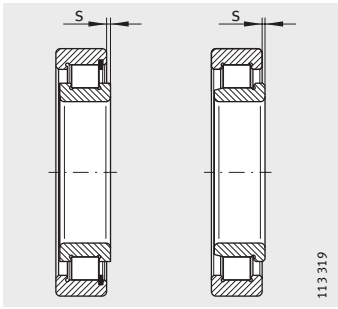
SL1829, SL1830, SL1822



SL1923

Dimension table · Dimensions in mm

Designation		Mass	Dimensions					Mounting dimensions	
	X-life	m ≈kg	d	D	B	r min.	s[1)]	F	d_1 ≈
SL183004	**XL**	0,11	**20**	42	16	0,6	1,5	–	28,8
SL182204	**XL**	0,16	**20**	47	18	1	1	–	30,3
SL183005	**XL**	0,12	**25**	47	16	0,6	1,5	–	34,6
SL182205	**XL**	0,18	**25**	52	18	1	1	–	35,3
SL192305	**XL**	0,37	**25**	62	24	1,1	2	31,72	36,7
SL183006	**XL**	0,2	**30**	55	19	1	2	–	40
SL182206	**XL**	0,3	**30**	62	20	1	1	–	42
SL192306	**XL**	0,56	**30**	72	27	1,1	2	38,3	43,5
SL183007	**XL**	0,26	**35**	62	20	1	2	–	44,9
SL182207	**XL**	0,44	**35**	72	23	1,1	1	–	47
SL192307	**XL**	0,74	**35**	80	31	1,5	2	44,68	50,7
SL183008	**XL**	0,31	**40**	68	21	1	2	–	50,5
SL182208	**XL**	0,55	**40**	80	23	1,1	1	–	54
SL192308	**XL**	1,01	**40**	90	33	1,5	2	51,12	57,5
SL183009	**XL**	0,4	**45**	75	23	1	2	–	55,3
SL182209	**XL**	0,59	**45**	85	23	1,1	1	–	57,5
SL192309	**XL**	1,37	**45**	100	36	1,5	3	56,1	62,5
SL183010	**XL**	0,43	**50**	80	23	1	2	–	59,1
SL182210	**XL**	0,64	**50**	90	23	1,1	1	–	64,4
SL192310	**XL**	1,81	**50**	110	40	2	3	60,72	68,3
SL183011	**XL**	0,64	**55**	90	26	1,1	2	–	68,5
SL182211	**XL**	0,87	**55**	100	25	1,5	1	–	70
SL192311	**XL**	2,28	**55**	120	43	2	3	67,11	75,5
SL182912	**XL**	0,29	**60**	85	16	1	1	–	69
SL183012	**XL**	0,69	**60**	95	26	1,1	2	–	71,7
SL182212	**XL**	1,18	**60**	110	28	1,5	1,5	–	76,8
SL192312	**XL**	2,88	**60**	130	46	2,1	3	73,62	82
SL182913	**XL**	0,31	**65**	90	16	1	1	–	75,7
SL183013	**XL**	0,73	**65**	100	26	1,1	2	–	78,1
SL182213	**XL**	1,57	**65**	120	31	1,5	1,5	–	82,3
SL192313	**XL**	3,52	**65**	140	48	2,1	3,5	80,69	90
SL182914	**XL**	0,49	**70**	100	19	1	1	–	81,2
SL183014	**XL**	1,02	**70**	110	30	1,1	3	–	81,5
SL182214	–	1,66	**70**	125	31	1,5	1,5	–	87
SL192314	**XL**	4,33	**70**	150	51	2,1	3,5	84,14	93,5

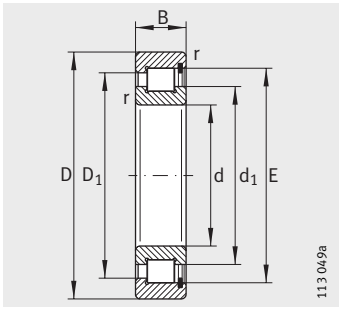


[1] Axial displacement “s”

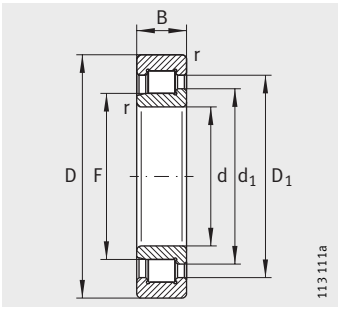
		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
D_1	E	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
≈		N	N	N	min^{-1}	min^{-1}
32,8	36,81	30 500	26 000	4 450	10 500	7 500
36,9	41,47	45 500	37 000	6 100	9 700	6 500
38,5	42,51	35 000	32 000	5 500	8 900	6 000
41,9	46,52	51 000	44 500	7 400	8 400	5 500
47,5	–	73 000	60 000	9 400	7 600	4 800
45,4	49,6	45 000	42 000	7 500	7 600	5 600
50,6	55,19	70 000	64 000	10 200	7 000	4 550
56	–	100 000	88 000	14 500	6 400	4 050
51,3	55,52	55 000	53 000	9 400	6 700	4 950
59,3	63,97	88 000	78 000	12 700	6 100	4 250
65,8	–	126 000	112 000	19 000	5 500	3 600
57,1	61,74	66 000	67 000	11 200	6 000	4 350
66,3	70,94	97 000	91 000	14 900	5 400	3 650
75,2	–	170 000	156 000	27 000	4 850	3 050
62,2	66,85	70 000	74 000	12 500	5 500	4 200
69,8	74,43	101 000	98 000	16 000	5 100	3 450
80,3	–	181 000	165 000	28 500	4 450	3 000
67,7	72,33	88 000	94 000	15 100	5 100	3 700
76,7	81,4	109 000	111 000	18 100	4 600	3 000
89,7	–	232 000	219 000	38 500	4 050	2 800
78,8	83,54	120 000	136 000	22 600	4 400	3 100
84,1	88,81	140 000	148 000	25 000	4 200	2 700
99,3	–	270 000	255 000	45 500	3 700	2 550
74,4	78,55	63 000	76 000	13 700	4 550	2 900
82,1	86,74	123 000	143 000	23 700	4 200	3 000
93,9	99,17	169 000	176 000	31 000	3 800	2 550
105,8	–	285 000	280 000	50 000	3 400	2 480
81	85,24	67 000	84 000	15 100	4 150	2 550
88,4	93,09	130 000	157 000	26 000	3 900	2 700
100,7	106,25	198 000	210 000	37 000	3 550	2 480
116,5	–	350 000	355 000	63 000	3 100	2 180
87,8	92,31	88 000	111 000	18 800	3 850	2 550
95,6	100,28	153 000	174 000	29 500	3 650	2 800
105,2	111,45	181 000	223 000	32 000	3 350	2 340
121,6	–	385 000	390 000	69 000	3 000	2 170

Single row full complement cylindrical roller bearings

Semi-locating bearings



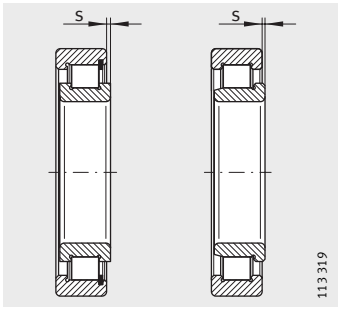
SL1829, SL1830, SL1822



SL1923

Dimension table (continued) · Dimensions in mm

Designation		Mass	Dimensions					Mounting dimensions	
	X-life	m ≈kg	d	D	B	r min.	s[1)]	F	d_1 ≈
SL182915	**XL**	0,52	**75**	105	19	1	1	–	86,3
SL183015	**XL**	1,06	**75**	115	30	1,1	3	–	89
SL182215	–	1,75	**75**	130	31	1,5	1,5	–	91,8
SL192315	**XL**	5,3	**75**	160	55	2,1	3,5	91,22	101,6
SL182916	**XL**	0,55	**80**	110	19	1	1	–	91,4
SL183016	–	1,43	**80**	125	34	1,1	4	–	95
SL182216	–	2,15	**80**	140	33	2	1,5	–	98,6
SL192316	**XL**	6,32	**80**	170	58	2,1	3,5	98,24	109,5
SL182917	**XL**	0,81	**85**	120	22	1,1	1	–	96,4
SL183017	–	1,51	**85**	130	34	1,1	4	–	99,4
SL182217	–	2,74	**85**	150	36	2	1,5	–	104,4
SL192317	**XL**	7,34	**85**	180	60	3	4	107,01	118,2
SL182918	**XL**	0,84	**90**	125	22	1,1	1	–	102
SL183018	–	1,97	**90**	140	37	1,5	4	–	106,1
SL182218	–	3,48	**90**	160	40	2	2,5	–	110,2
SL192318-TB	**XL**	8,83	**90**	190	64	3	4	105,26	117,5
SL182919	**XL**	0,86	**95**	130	22	1,1	1	–	106,7
SL182219	–	4,17	**95**	170	43	2,1	2,5	–	122
SL192319-TB	**XL**	10,2	**95**	200	67	3	4	114,65	126,6
SL182920	**XL**	1,14	**100**	140	24	1,1	1,5	–	113,4
SL183020	–	2,15	**100**	150	37	1,5	4	–	115,7
SL182220	–	5,13	**100**	180	46	2,1	2,5	–	127,5
SL192320-TB	**XL**	13	**100**	215	73	3	4	119,3	132,7
SL182922	**XL**	1,23	**110**	150	24	1,1	1,5	–	124
SL183022	–	3,5	**110**	170	45	2	5,5	–	127,3
SL182222	–	7,24	**110**	200	53	2,1	4	–	137
SL192322-TB	**XL**	17	**110**	240	80	3	5	134,27	151,1
SL182924	**XL**	1,73	**120**	165	27	1,1	1,5	–	134,8
SL183024	–	3,8	**120**	180	46	2	5,5	–	138,8
SL182224	–	9,08	**120**	215	58	2,1	4	–	150,7
SL192324-TB	**XL**	22,3	**120**	260	86	3	5	147,39	164,2
SL182926	**XL**	2,33	**130**	180	30	1,5	2	–	146
SL183026	–	5,65	**130**	200	52	2	5,5	–	148,6
SL182226	–	11,25	**130**	230	64	3	5	–	162,3
SL192326-TB	**XL**	27,95	**130**	280	93	4	5	157,9	176

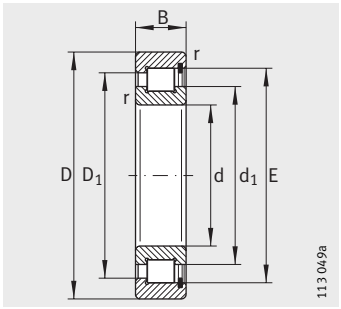


[1] Axial displacement “s”

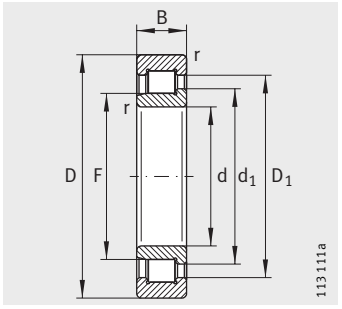
		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
D_1	E	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
≈		N	N	N	min^{-1}	min^{-1}
92,8	97,41	91 000	119 000	20 100	3 600	2 370
103,2	107,9	162 000	192 000	32 500	3 400	2 490
110	116,2	187 000	236 000	33 500	3 200	2 210
131,5	–	460 000	475 000	83 000	2 750	2 000
98	102,51	94 000	126 000	21 400	3 450	2 220
111,7	117,4	170 000	220 000	31 000	3 150	2 470
119,3	126,3	223 000	280 000	38 500	3 000	2 040
142,1	–	540 000	560 000	96 000	2 550	1 820
105	109,58	118 000	159 000	25 500	3 200	2 200
116,1	121,95	175 000	231 000	32 000	3 000	2 360
126,3	133,75	255 000	320 000	44 500	2 800	2 000
150,9	–	570 000	620 000	103 000	2 400	1 710
110,7	115,75	122 000	169 000	26 500	3 050	2 050
124,5	130,65	205 000	275 000	38 000	2 800	2 240
133,3	141,15	285 000	365 000	51 000	2 650	1 990
152,5	–	620 000	650 000	112 000	2 400	1 760
117	122,25	132 000	177 000	27 500	2 900	1 940
147,3	155,95	330 000	425 000	58 000	2 410	1 780
161,9	–	650 000	710 000	120 000	2 240	1 620
125,7	130,95	152 000	203 000	31 500	2 700	1 870
134	140,2	216 000	300 000	40 500	2 600	2 040
154,3	163,35	390 000	510 000	70 000	2 300	1 700
172,8	–	790 000	850 000	143 000	2 110	1 490
136,2	141,5	155 000	213 000	34 000	2 490	1 710
149,3	156,7	280 000	385 000	52 000	2 350	2 010
168	177,6	450 000	580 000	78 000	2 130	1 720
199,9	–	950 000	970 000	156 000	1 840	1 270
149	154,3	199 000	285 000	45 500	2 290	1 590
160,7	168,15	295 000	425 000	56 000	2 170	1 840
183	192,9	530 000	720 000	95 000	1 950	1 500
213,1	–	1 130 000	1 230 000	195 000	1 710	1 120
161,1	167,15	238 000	350 000	54 000	2 110	1 500
175,5	184,4	425 000	600 000	79 000	2 000	1 660
197	207,75	620 000	850 000	110 000	1 810	1 360
227,9	–	1 260 000	1 380 000	216 000	1 600	1 040

Single row full complement cylindrical roller bearings

Semi-locating bearings



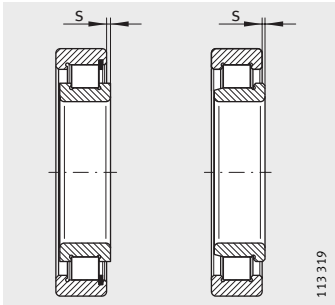
SL1818, SL1829, SL1830, SL1822



SL1923

Dimension table (continued) · Dimensions in mm

Designation		Mass	Dimensions					Mounting dimensions		
	X-life	m ≈kg	d	D	B	r min.	s[1)]	F	d_1 ≈	D_1 ≈
SL182928	**XL**	2,42	**140**	190	30	1,5	2	–	157	174
SL183028	–	6,04	**140**	210	53	2	5,5	–	162,2	189,5
SL182228	–	14,47	**140**	250	68	3	5	–	173,9	211,1
SL192328-TB	**XL**	34,9	**140**	300	102	4	7	168,45	187,8	243,4
SL182930	**XL**	3,77	**150**	210	36	2	2,5	–	169	189,6
SL183030	–	7,33	**150**	225	56	2,1	7	–	170	198
SL182230	–	18,43	**150**	270	73	3	6	–	185,5	225,2
SL192330-TB	–	42,1	**150**	320	108	4	7	182,49	203,3	263,5
SL182932	**XL**	4	**160**	220	36	2	2,5	–	179,7	200,5
SL183032	–	8,8	**160**	240	60	2,1	7	–	184,8	215,8
SL182232	–	23	**160**	290	80	3	6	–	208,7	253,4
SL192332-TB	–	49,7	**160**	340	114	4	7	196,38	219	284,4
SL182934	**XL**	4,3	**170**	230	36	2	2,5	–	190,6	211,3
SL183034	–	12,2	**170**	260	67	2,1	7	–	198,1	232,7
SL182234	–	28,65	**170**	310	86	4	7	–	220,3	267,4
SL192334-TB	–	59,2	**170**	360	120	4	7	203,55	226,6	295
SL182936	**XL**	6,2	**180**	250	42	2	3	–	200,7	224
SL183036	–	16,1	**180**	280	74	2,1	7	–	212,2	249,4
SL182236	–	29,8	**180**	320	86	4	7	–	232,4	279,5
SL192336-TB	–	69,1	**180**	380	126	4	7	221,56	245	312,9
SL182938	**XL**	6,5	**190**	260	42	2	2	–	211,5	238,5
SL183038	–	17	**190**	290	75	2,1	9	–	221,8	259
SL182238	–	35,65	**190**	340	92	4	9	–	243,5	295,5
SL192338-TB	–	80,3	**190**	400	132	5	7	224,43	250	326,8
SL181840	–	2,57	**200**	250	24	1,5	2	–	216,6	231,6
SL182940	**XL**	9,1	**200**	280	48	2,1	3	–	225,5	252,4
SL183040	–	21,8	**200**	310	82	2,1	9	–	236,6	276,2
SL182240	–	43,12	**200**	360	98	4	9	–	246,6	302,4
SL192340-TB	–	92,1	**200**	420	138	5	7	238,45	265,7	347,2
SL181844	–	2,8	**220**	270	24	1,5	2	–	237,3	252,3
SL182944	**XL**	9,9	**220**	300	48	2,1	3	–	246,3	273,2
SL183044	–	28,4	**220**	340	90	3	9	–	254,6	299,2
SL192344-TB	–	111,2	**220**	460	145	5	7	266,71	297	388,3
SL181848-E	–	4,29	**240**	300	28	2	2	–	260,5	281
SL182948	–	10,6	**240**	320	48	2,1	3	–	267,5	294,4
SL183048	–	30,9	**240**	360	92	3	11	–	277,5	322,1
SL192348-TB	–	142,3	**240**	500	155	5	10	280,55	312,5	408,5

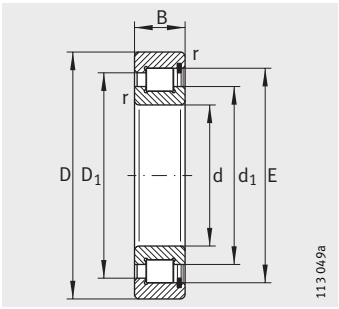


[1] Axial displacement “s”

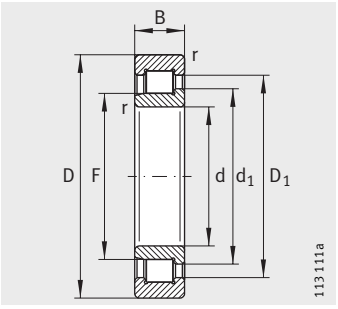
	Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
E	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
	N	N	N	min^{-1}	min^{-1}
180	260 000	375 000	57 000	1 960	1 370
198,4	450 000	660 000	85 000	1 840	1 470
222,55	720 000	1 000 000	127 000	1 690	1 230
–	1 410 000	1 570 000	241 000	1 500	970
196,75	340 000	480 000	73 000	1 810	1 360
207,45	475 000	700 000	88 000	1 760	1 430
237,35	820 000	1 160 000	147 000	1 580	1 130
–	1 680 000	1 900 000	265 000	1 380	840
207,6	350 000	510 000	77 000	1 710	1 270
225,45	540 000	800 000	99 000	1 620	1 280
267,1	1 020 000	1 470 000	178 000	1 410	920
–	1 900 000	2 170 000	300 000	1 280	760
218,45	365 000	540 000	80 000	1 610	1 190
243,55	700 000	1 050 000	129 000	1 510	1 120
281,9	1 140 000	1 660 000	199 000	1 330	870
–	2 070 000	2 380 000	320 000	1 240	730
231,85	455 000	680 000	100 000	1 530	1 150
261	810 000	1 240 000	150 000	1 410	1 020
294	1 180 000	1 760 000	208 000	1 270	800
–	2 190 000	2 600 000	345 000	1 160	670
244,15	510 000	770 000	112 000	1 450	1 030
270,6	830 000	1 300 000	155 000	1 350	970
311,5	1 300 000	1 900 000	223 000	1 210	770
–	2 500 000	2 950 000	390 000	1 120	630
237,6	178 000	320 000	33 500	1 450	1 040
261,6	610 000	940 000	134 000	1 360	950
288,6	950 000	1 510 000	178 000	1 270	890
319,4	1 410 000	2 010 000	235 000	1 180	770
–	2 800 000	3 300 000	420 000	1 060	570
258,5	187 000	350 000	36 000	1 320	940
282,45	650 000	1 030 000	144 000	1 250	840
312	1 150 000	1 820 000	209 000	1 170	800
–	3 000 000	3 450 000	425 000	950	520
287,5	265 000	490 000	51 000	1 200	870
303,7	600 000	1 120 000	124 000	1 150	750
336	1 210 000	1 990 000	224 000	1 080	720
–	3 300 000	3 800 000	465 000	900	500

Single row full complement cylindrical roller bearings

Semi-locating bearings



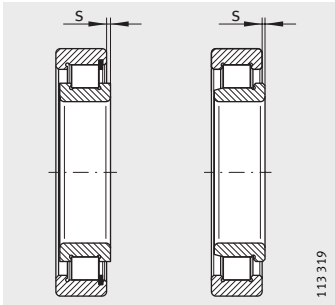
SL1818, SL1829, SL1830



SL1923

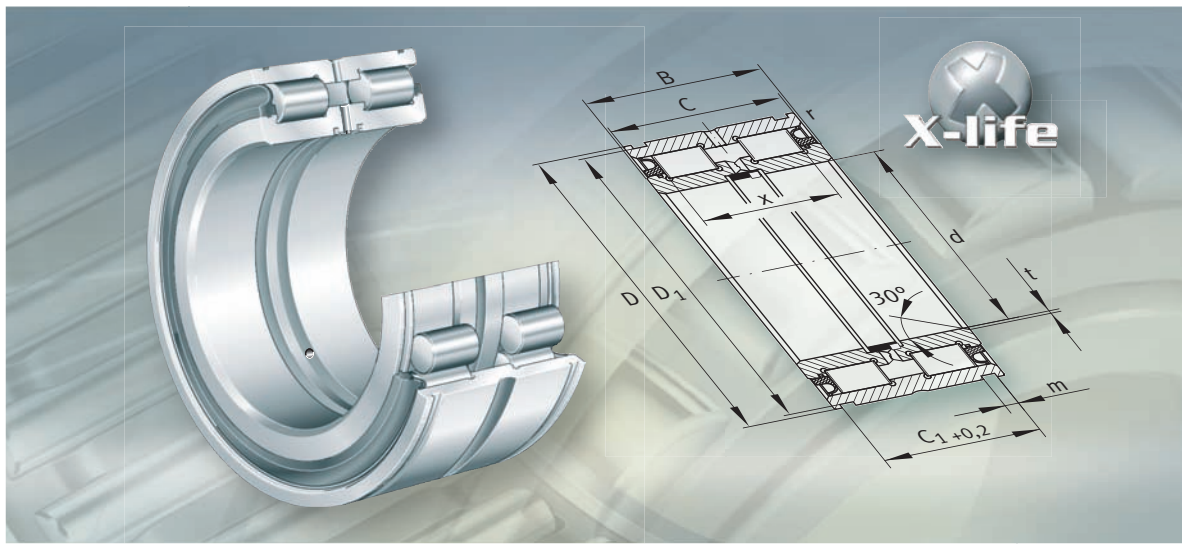
Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions					Mounting dimensions		
	m	d	D	B	r	s[1]	F	d_1	D_1
	≈kg				min.			≈	≈
SL181852-E	4,61	**260**	320	28	2	2	–	281	301,5
SL182952	18,5	**260**	360	60	2,1	5	–	291,5	323,4
SL183052	44,5	**260**	400	104	4	11	–	304	358,4
SL192352-TB	173,2	**260**	540	165	6	10	315,6	351,6	459,6
SL181856-E	6,89	**280**	350	33	2	2,5	–	304	327
SL182956	19,7	**280**	380	60	2,1	3,5	–	314	348,5
SL183056	48	**280**	420	106	4	11	–	319,5	372,9
SL181860-E	9,79	**300**	380	38	2,1	3	–	323,5	350,5
SL182960	31,2	**300**	420	72	3	5	–	338	376,9
SL183060-TB	66,6	**300**	460	118	4	14	–	353,6	415,6
SL181864-E	10,36	**320**	400	38	2,1	3	–	344,5	371,5
SL182964	32,9	**320**	440	72	3	5	–	358,5	397,4
SL183064-TB	71,7	**320**	480	121	4	14	–	369,5	430,1
SL181868-E	10,93	**340**	420	38	2,1	3	–	365,5	392,5
SL182968	34,7	**340**	460	72	3	5	–	379	418,7
SL183068-TB	95,8	**340**	520	133	5	16	–	396,1	463,9
SL181872-E	11,49	**360**	440	38	2,1	3	–	387	413,5
SL182972	36,4	**360**	480	72	3	5	–	399,5	438,6
SL183072-TB	101	**360**	540	134	5	16	–	414	481,6
SL181876-E	18,87	**380**	480	46	2,1	4	–	415,5	448
SL182976	52,1	**380**	520	82	4	5	–	426	472,1
SL183076-TB	106	**380**	560	135	5	16	–	431,7	499,5
SL181880-E	19,81	**400**	500	46	2,1	4	–	432	464,5
SL182980	54,3	**400**	540	82	4	5	–	450	496,1
SL183080-TB	140	**400**	600	148	5	18	–	462,5	535,1
SL181884-E	20,6	**420**	520	46	2,1	4	–	457	489,5
SL182984	56,9	**420**	560	82	4	5	–	462	509
SL181888-E	21,54	**440**	540	46	2,1	4	–	473,5	506
SL182988	78,1	**440**	600	95	4	7	–	490	544,6
SL181892-E	33,21	**460**	580	56	3	5	–	501,5	541
SL182992	81,1	**460**	620	95	4	7	–	504	559,6
SL181896-E	34,53	**480**	600	56	3	5	–	522	561
SL182996	94,7	**480**	650	100	5	7	–	538	596,6
SL1818/500-E	35,73	**500**	620	56	3	5	–	542	581,5
SL1829/500	98,3	**500**	670	100	5	7	–	553	612,7



1) Axial displacement “s”

	Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
E	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
	N	N	N	min^{-1}	min^{-1}
308	275 000	530 000	54 000	1 110	790
333,7	780 000	1 450 000	160 000	1 060	690
375,97	1 600 000	2 500 000	280 000	980	620
–	4 000 000	4 700 000	560 000	800	410
335	355 000	670 000	69 000	1 030	730
359,5	910 000	1 710 000	184 000	980	590
390,3	1 650 000	2 650 000	290 000	940	590
360	455 000	840 000	86 000	960	680
389,45	1 170 000	2 200 000	235 000	910	540
434,85	2 020 000	3 300 000	325 000	840	500
381	470 000	900 000	90 000	910	620
409,85	1 210 000	2 340 000	246 000	860	495
449,5	2 080 000	3 450 000	340 000	810	480
402,2	485 000	960 000	94 000	860	570
430,2	1 250 000	2 470 000	255 000	810	460
485,65	2 490 000	4 150 000	400 000	750	430
423,5	500 000	1 010 000	98 000	810	530
450,6	1 280 000	2 600 000	265 000	770	430
503,45	2 550 000	4 350 000	410 000	720	405
459	650 000	1 290 000	126 000	750	490
486,7	1 660 000	3 300 000	335 000	720	380
521,25	2 600 000	4 450 000	425 000	700	390
475,5	660 000	1 340 000	130 000	720	470
510,85	1 710 000	3 500 000	350 000	690	350
558,52	3 050 000	5 400 000	500 000	650	345
500	680 000	1 420 000	135 000	690	430
522,95	1 730 000	3 600 000	355 000	670	340
517	700 000	1 470 000	139 000	660	415
562	2 090 000	4 100 000	405 000	630	325
554	940 000	1 890 000	179 000	620	385
576,3	2 130 000	4 250 000	410 000	610	310
474,5	960 000	1 970 000	185 000	600	365
614,75	2 390 000	4 800 000	460 000	570	280
594,5	980 000	2 050 000	190 000	580	345
630	2 430 000	4 950 000	470 000	560	270



Double row full complement cylindrical roller bearings

Double row full complement cylindrical roller bearings

		Page
Product overview	Double row full complement cylindrical roller bearings	480
Features	X-life	481
	Bearings of TB design	481
	Non-locating bearings	481
	Semi-locating bearings	482
	Locating bearings	482
	Operating temperature	483
	Suffixes	483
Design and safety guidelines	Axial load carrying capacity	484
	Equivalent dynamic bearing load	485
	Equivalent static bearing load	486
	Minimum radial load	486
	Design of bearing arrangements	486
Accuracy	Radial internal clearance	487
Dimension tables	Double row full complement cylindrical roller bearings, semi-locating, locating and non-locating bearings	488
	Cable sheave bearings, cylindrical roller bearings with snap ring grooves, full complement, sealed, locating bearings	496

Product overview

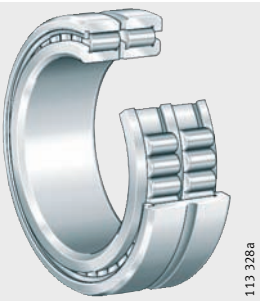
Double row full complement cylindrical roller bearings

Non-locating bearings

SL0248, SL0249

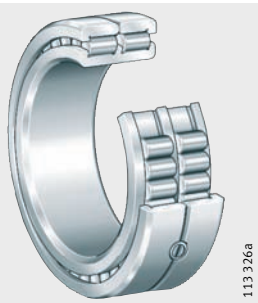
Semi-locating bearings

SL1850



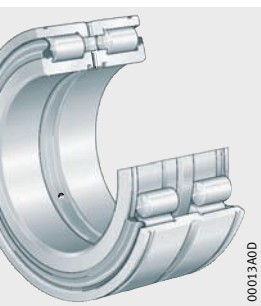
Locating bearings

SL0148, SL0149



Cable sheave bearings
With snap ring grooves
Sealed

SL0450..-PP, SL04..-PP



Double row full complement cylindrical roller bearings

Features

The bearings have solid outer and inner rings and rib-guided cylindrical rollers. Since these bearings have the largest possible number of rolling elements, they have extremely high radial load carrying capacity, high rigidity and are suitable for particularly compact designs. Due to the kinematic conditions, however, they do not achieve the high speeds that are possible when using cylindrical roller bearings with cage.

Double row full complement cylindrical roller bearings are available as non-locating, semi-locating and locating bearings. The bearings do not permit any skewing between the inner and outer ring.

X-life

Numerous sizes are supplied in the X-life grade. These bearings are indicated in the dimension tables.

Bearings of X-life quality have, for example, lower roughness R_a and higher geometrical accuracy of the raceways than comparable designs that are not X-life. As a result, for example, they have higher load carrying capacity and longer life for the same dimensioning. In certain applications, this means that a smaller bearing arrangement can be designed.

Bearings of TB design

In the case of bearings of TB design, the axial load carrying capacity was significantly improved through the use of new calculation and manufacturing methods.

Optimum contact conditions between the roller and rib are ensured by means of a special curvature of the roller end faces. As a result, the axial contact pressures on the rib are significantly minimised and a lubricant film capable of supporting higher loads is formed. Under normal operating conditions, wear and fatigue at the rib contact running and roller end faces is completely eliminated.

In addition, axial frictional torque is reduced by up to 50%. The bearing temperature during operation is therefore significantly lower.

Available bearings

By agreement, series SL1850 is available starting from a bore diameter d = 180 mm in the form of the TB design.

Non-locating bearings

Bearings SL0248 (designation to DIN 5 412-9: NNCL 48..V) and SL0249 (designation to DIN 5 412-9: NNCL 49..V) are non-locating bearings and can support radial forces only.

The bearings are held together in handling and transport by a transport and mounting retaining device on the outer ring. This retaining device remains in the bearing and must not be subjected to axial load.

Axial displacement

The outer ring without ribs can be axially displaced in both directions in relation to the inner ring. The inner ring has ribs on both sides.

Sealing

The cylindrical roller bearings are of an open design.

Lubrication

Oil or grease lubrication is possible. For lubrication, the outer ring has a lubrication groove and lubrication holes.

Double row full complement cylindrical roller bearings

Semi-locating bearings

The semi-locating bearings are available as SL1850 (dimension series 50). They can support not only high radial forces but also axial forces in one direction and can therefore guide shafts axially in one direction. They act as non-locating bearings in the opposite direction.

The bearings are held together in handling and transport by a transport and mounting retaining device on the outer ring. This retaining device remains in the bearing and must not be subjected to axial load.

Axial displacement of inner ring

The inner ring can be axially displaced in one direction by the dimension “s” stated in the dimension table.

Sealing

The cylindrical roller bearings are supplied in an open design.

Lubrication

Oil or grease lubrication is possible. The bearings can be lubricated via the end faces as well as via a lubrication groove and lubrication holes in the outer ring.

Locating bearings

Bearings SL0148 (designation to DIN 5 412-9: NNC 48..V) and SL0149 (designation to DIN 5 412-9: NNC 49..V) are locating bearings. These bearings can support axial forces from both directions as well as radial forces.

The outer ring has ribs on both sides, is axially split and held together by retaining rings. The inner ring has an additional central rib. The retaining rings must not be subjected to axial load.

Cable sheave bearings

Cable sheave bearings (cylindrical roller bearings with snap ring grooves) are locating bearings. These bearings are very rigid and can support moderate axial forces in both directions as well as high radial forces. They consist of solid outer and inner rings with ribs, rib-guided cylindrical rollers and sealing rings.

The outer rings have snap ring grooves for retaining rings. The inner rings are axially split, 1 mm wider than the outer rings and held together by a rolled-in steel strip.

Cylindrical roller bearings with snap ring grooves are available as a light series SL04..-PP and in the dimension series 50 as SL0450..-PP.

Sealing

In the case of cable sheave bearings, the running system is protected against contamination and moisture by sealing rings on both sides.

Lubrication

Open locating bearings can be lubricated with oil or grease. For lubrication, the outer ring has a lubrication groove and lubrication holes.

Cable sheave bearings are greased using a lithium complex soap grease to GA08 and can be lubricated via the outer or inner ring. Arcanol LOAD150 is suitable for relubrication.

Operating temperature

Open full complement cylindrical roller bearings are suitable for operating temperatures from –30 °C to +120 °C.

Cylindrical roller bearings with snap ring grooves are suitable for operating temperatures from –20 °C to +80 °C, restricted by the grease and seal material.

Suffixes

Suffixes for available designs: see table.

Available designs of SL01, SL02, SL1850

Suffix	Description	Design
BR	Black oxide coated	Available by agreement
C3	Radial internal clearance larger than normal	
C4	Radial internal clearance larger than C3	
C5	Radial internal clearance larger than C4	
TB	Bearing with increased axial load carrying capacity	

Available designs of cable sheave bearings

Suffix	Description	Design
C3	Radial internal clearance larger than normal	Available by agreement
C4	Radial internal clearance larger than C3	
C5	Radial internal clearance larger than C4	
RR	Corrosion-resistant design, with Corrotect® coating	
2NR	Cable sheave bearing supplied with two loose-packed retaining rings WRE	
–	Without seals	
P	Seal on one side	
PP	Seals on both sides, for cable sheave bearings	Standard

Double row full complement cylindrical roller bearings

Design and safety guidelines

Axial load carrying capacity

Radial cylindrical roller bearings used as semi-locating and locating bearings can support axial forces in one or both directions in addition to radial forces.

The axial load carrying capacity is dependent on:

- the size of the sliding surfaces between the ribs and the end faces of the rolling elements
- the sliding velocity at the ribs
- the lubrication on the contact surfaces.

Ribs subjected to load must be supported across their entire height.

The permissible axial load $F_{a\ per}$ must not be exceeded, in order to avoid an unacceptable increase in temperature.

The axial limiting load $F_{a\ max}$ according to the formula must not be exceeded, in order to avoid impermissible pressure at the contact surfaces.

The ratio F_a/F_r should not exceed 0,4. In the case of bearings of TB design, the value 0,6 is permissible.
Continuous axial loading without simultaneous radial loading is not permissible.

Permissible and maximum axial load

The axial load $F_{a\ per}$ and the limiting load $F_{a\ max}$ are calculated as follows:

Bearings of standard design

$$F_{a\,per} = k_S \cdot k_B \cdot {d_M}^{1,5} \cdot n^{-0,6} \leqq F_{a\,max}$$

Bearings of TB design

$$F_{a\,per} = 1,5 \cdot k_S \cdot k_B \cdot {d_M}^{1,5} \cdot n^{-0,6} \leqq F_{a\,max}$$

Bearings of standard and TB design

$$F_{a\,max} = 0,075 \cdot k_B \cdot {d_M}^{2,1}$$

$F_{a\ per}$ N
Permissible axial load

$F_{a\ max}$ N
Axial limiting load

k_S –
Factor dependent on the lubrication method, see table, page 485

k_B –
Bearing factor, see table, page 485

d_M mm
Mean bearing diameter (d + D)/2, see dimension table

n min^{-1}
Operating speed.

Cable sheave bearings

In the case of cylindrical roller bearings with snap ring grooves, application engineering advice is necessary. The limit values and calculations for $F_{a\ per}$ and $F_{a\ max}$ are not therefore valid for these bearings.

Factor k_S for the lubrication method

Lubrication method[1]	Factor k_S
Minimal heat dissipation, drip feed oil lubrication, oil mist lubrication, low operating viscosity ($\nu < 0{,}5 \cdot \nu_1$)	7,5 to 10
Poor heat dissipation, oil sump lubrication, oil spray lubrication, low oil flow	10 to 15
Good heat dissipation, recirculating oil lubrication (pressurised oil lubrication)	12 to 18
Very good heat dissipation, recirculating oil lubrication with oil cooling, high operating viscosity ($\nu > 2 \cdot \nu_1$)	16 to 24

[1] Doped oils should be used, e.g. CLP (DIN 51 517) and HLP (DIN 51 524) of ISO-VG classes 32 to 460 as well as ATF oils (DIN 51 502) and gearbox oils (DIN 51 512) of SAE viscosity classes 75 W to 140 W.

Bearing factor k_B

Series	Factor k_S
SL0148	4,5
SL0149	11
SL1850	17

Equivalent dynamic bearing load

Non-locating bearings and cable sheave bearings

For bearings under dynamic loading, the following applies:

$$P = F_r$$

Semi-locating and locating bearings

If an axial force F_a is present in addition to the radial force F_r, the load ratio must be taken into consideration.

Load ratio and equivalent dynamic load

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leqq e$	$P = F_r$
$\frac{F_a}{F_r} > e$	$P = 0{,}92 \cdot F_r + Y \cdot F_a$

P N
Equivalent dynamic bearing load for combined load

F_a N
Axial dynamic bearing load

F_r N
Radial dynamic bearing load

e, Y –
Factors: see table Factors e and Y.

Factors e and Y

Series	Calculation factors	
	e	Y
SL1850	0,2	0,6
SL0148, SL0149	0,4	0,5

Double row full complement cylindrical roller bearings

Equivalent static bearing load

For bearings under static loading, the following applies:

$P_0 = F_{0r}$

Minimum radial load

In continuous operation, a minimum radial load of the order of $F_{r\,min} = C_{0r}/60$ is necessary.

If $F_{r\,min} < C_{0r}/60$, please contact us.

Design of bearing arrangements

Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 150.
Recommended housing tolerances for radial bearings, see table, page 152.

Cable sheave bearings

Cable sheave bearings normally have circumferential load on the outer ring and a press fit is therefore required on the outer ring.

Axial location

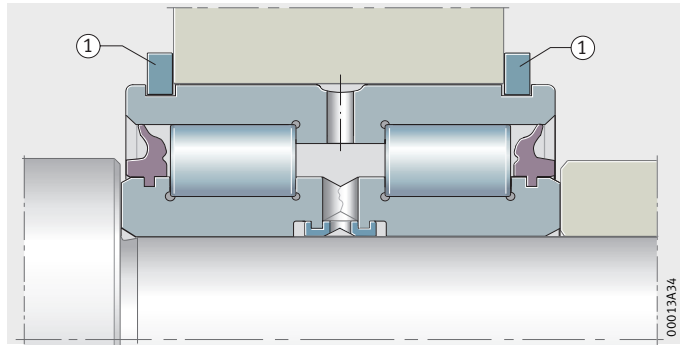
In order to prevent lateral creep of the bearing rings, they must be located by force or physical locking means.

The abutment shoulders (shaft and housing) should be sufficiently high and perpendicular to the bearing axis.

The transition from the bearing seating point to the abutment shoulder must be designed with rounding to DIN 5 418 or an undercut to DIN 509. The minimum chamfer dimensions r in the dimension tables must be observed.

In the case of semi-locating bearings, the bearing rings only require support on one side, on the rib supporting the axial load.

In axially loaded bearings, full support must be provided for the ribs transmitting forces, *Figure 1*.



① Retaining ring

Figure 1
Axial location of outer and inner ring, support of ribs

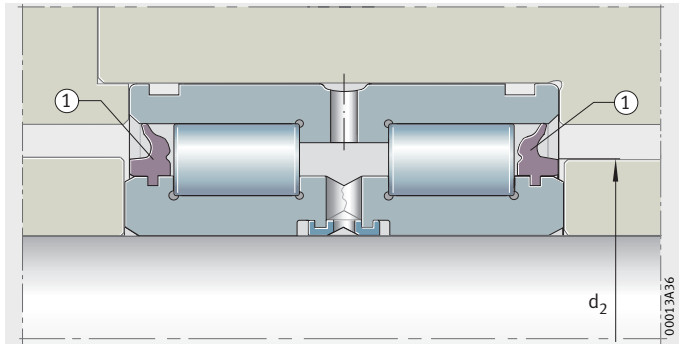
Location of cable sheave bearings

The grooves allow the outer rings to be axially located using retaining rings, *Figure 1*. Suitable fasteners are WRE rings or rings to DIN 471. Locating rings are not included in the delivery. The design 2NR is supplied with two retaining rings WRE packed loose.

The split inner ring must be axially secured, *Figure 1*.
The fasteners must not be subjected to axial load.

Support of sealing rings

The sealing rings must be supported to a sufficient height, so that they are not pressed out during lubrication of the bearings, *Figure 2*. The dimension d_2 in the dimension table must be observed.



① Sealing ring

Figure 2
Support of sealing rings

Fitting and dismantling of cable sheave bearings

During fitting and dismantling of the bearings, the mounting forces must never be directed through the rolling elements, sealing rings or the fasteners on the split inner ring.

Accuracy

The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620.

Radial internal clearance

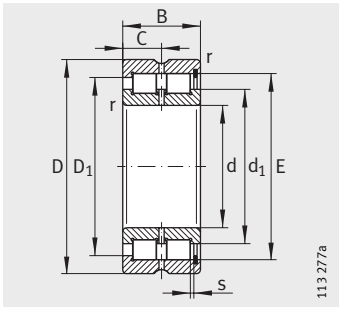
The radial internal clearance corresponds to internal clearance group CN to DIN 620-4.

Radial internal clearance

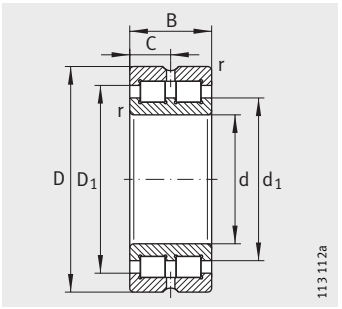
Bore d mm		Radial internal clearance							
		CN µm		C3 µm		C4 µm		C5 µm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	24	20	45	35	60	50	75	65	90
24	30	20	45	35	60	50	75	70	95
30	40	25	50	45	70	60	85	80	105
40	50	30	60	50	80	70	100	95	125
50	65	40	70	60	90	80	110	110	140
65	80	40	75	65	100	90	125	130	165
80	100	50	85	75	110	105	140	155	190
100	120	50	90	85	125	125	165	180	220
120	140	60	105	100	145	145	190	200	245
140	160	70	120	115	165	165	215	225	275
160	180	75	125	120	170	170	220	250	300
180	200	90	145	140	195	195	250	275	330
200	225	105	165	160	220	220	280	305	365
225	250	110	175	170	235	235	300	330	395
250	280	125	195	190	260	260	330	370	440
280	315	130	205	200	275	275	350	410	485
315	355	145	225	225	305	305	385	455	535
355	400	190	280	280	370	370	460	510	600

Double row full complement cylindrical roller bearings

Semi-locating, locating and non-locating bearings



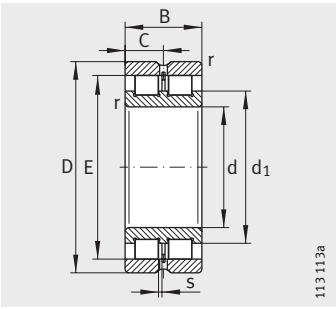
SL1850
Semi-locating bearings



SL0148, SL0149
Locating bearings

Dimension table · Dimensions in mm

Semi-locating bearings Designation		Locating bearings Designation	Non-locating bearings Designation	Designation to DIN 5 412	Mass	Dimensions				
	X-life				m ≈kg	d	D	B	r min.	s
SL185004	**XL**	–	–	–	0,2	**20**	42	30	0,6	1
SL185005	**XL**	–	–	–	0,23	**25**	47	30	0,6	1
SL185006	**XL**	–	–	–	0,35	**30**	55	34	1	1,5
SL185007	**XL**	–	–	–	0,46	**35**	62	36	1	1,5
SL185008	**XL**	–	–	–	0,56	**40**	68	38	1	1,5
SL185009	**XL**	–	–	–	0,71	**45**	75	40	1	1,5
SL185010	**XL**	–	–	–	0,76	**50**	80	40	1	1,5
SL185011	**XL**	–	–	–	1,16	**55**	90	46	1,1	1,5
–	–	**SL014912**	–	NNC 4912 V	0,49	**60**	85	25	1	–
–	–	–	**SL024912**	NNCL 4912 V	0,47	**60**	85	25	1	1
SL185012	**XL**	–	–	–	1,24	**60**	95	46	1,1	1,5
SL185013	**XL**	–	–	–	1,32	**65**	100	46	1,1	1,5
–	–	**SL014914**	–	NNC 4914 V	0,78	**70**	100	30	1	–
–	–	–	**SL024914**	NNCL 4914 V	0,75	**70**	100	30	1	1
SL185014	**XL**	–	–	–	1,85	**70**	110	54	1,1	3
SL185015	**XL**	–	–	–	1,93	**75**	115	54	1,1	3
–	–	**SL014916**	–	NNC 4916 V	0,88	**80**	110	30	1	–
–	–	–	**SL024916**	NNCL 4916 V	0,85	**80**	110	30	1	1
SL185016	–	–	–	–	2,59	**80**	125	60	1,1	3,5
SL185017	–	–	–	–	2,72	**85**	130	60	1,1	3,5
–	–	**SL014918**	–	NNC 4918 V	1,35	**90**	125	35	1,1	–
–	–	–	**SL024918**	NNCL 4918 V	1,3	**90**	125	35	1,1	1,5
SL185018	–	–	–	–	3,62	**90**	140	67	1,5	4
–	–	**SL014920**	–	NNC 4920 V	1,95	**100**	140	40	1,1	–
–	–	–	**SL024920**	NNCL 4920 V	1,9	**100**	140	40	1,1	2
SL185020	–	–	–	–	3,94	**100**	150	67	1,5	4
–	–	**SL014922**	–	NNC 4922 V	2,15	**110**	150	40	1,1	–
–	–	–	**SL024922**	NNCL 4922 V	2,1	**110**	150	40	1,1	2
SL185022	–	–	–	–	6,32	**110**	170	80	2	5
–	–	**SL014924**	–	NNC 4924 V	2,95	**120**	165	45	1,1	–
–	–	–	**SL024924**	NNCL 4924 V	2,85	**120**	165	45	1,1	3
SL185024	–	–	–	–	6,77	**120**	180	80	2	5

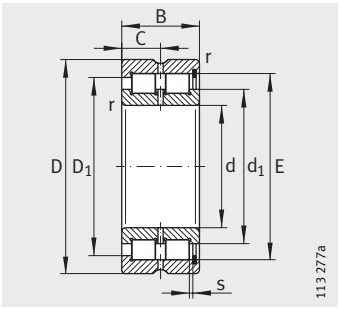


SL0248, SL0249
Non-locating bearings

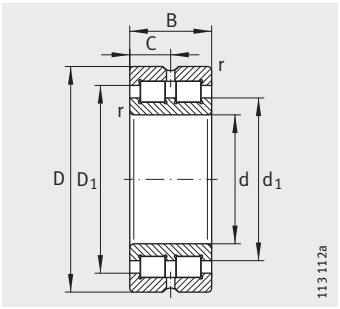
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
C	d_1 ≈	D_1 ≈	E	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G min^{-1}	n_B min^{-1}
15	28,4	33,3	36,81	53 000	52 000	8 900	10 500	7 400
15	34,5	39	42,51	60 000	64 000	11 100	8 900	6 000
17	40	45,3	49,6	78 000	84 000	15 000	7 600	5 300
18	44,9	51,2	55,52	94 000	107 000	18 800	6 700	4 750
19	50,5	57,2	61,74	113 000	133 000	22 400	6 000	4 200
20	55,3	62,6	66,85	120 000	148 000	24 900	5 500	3 950
20	59,1	67,6	72,33	151 000	188 000	30 000	5 100	3 450
23	68,5	78,7	83,54	206 000	275 000	45 000	4 400	2 900
12,5	70,3	73,5	–	70 000	121 000	17 300	4 500	2 650
12,5	70,3	–	77,51	70 000	121 000	17 300	4 500	2 650
23	71,7	81,9	86,74	212 000	285 000	47 500	4 200	2 800
23	78,1	88,3	93,09	223 000	315 000	52 000	3 900	2 500
15	82,5	87,4	–	106 000	185 000	27 000	3 800	2 330
15	82,5	–	91,87	106 000	185 000	27 000	3 800	2 330
27	81,5	95,7	100,28	265 000	350 000	59 000	3 650	2 650
27	89	102,9	107,9	275 000	385 000	65 000	3 400	2 370
15	91,4	96,2	–	112 000	206 000	30 000	3 450	2 090
15	91,4	–	100,78	112 000	206 000	30 000	3 450	2 090
30	95	111,7	117,4	290 000	440 000	62 000	3 150	2 320
30	99	116,1	121,95	300 000	465 000	64 000	3 000	2 210
17,5	103,9	110,7	–	153 000	290 000	39 000	3 000	1 870
17,5	103	–	115,2	153 000	290 000	39 000	3 000	1 870
33,5	106,1	124,5	130,65	350 000	550 000	76 000	2 800	2 140
20	116,4	125	–	191 000	370 000	47 500	2 700	1 720
20	116,4	–	129,6	191 000	370 000	47 500	2 700	1 720
33,5	115,7	134	140,2	370 000	600 000	81 000	2 600	1 930
20	125	133,6	–	198 000	400 000	50 000	2 500	1 600
20	125	–	138,2	198 000	400 000	50 000	2 500	1 600
40	127,3	149,3	156,7	485 000	770 000	104 000	2 350	1 730
22,5	138,6	148,6	–	222 000	440 000	55 000	2 260	1 540
22,5	138,6	–	153,55	222 000	440 000	55 000	2 260	1 540
40	138,8	160,7	168,15	510 000	850 000	111 000	2 170	1 530

Double row full complement cylindrical roller bearings

Semi-locating, locating and non-locating bearings



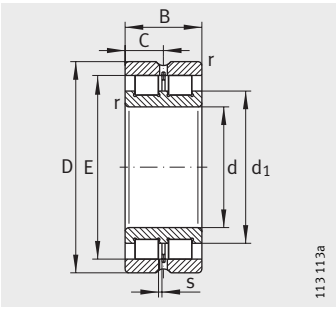
SL1850
Semi-locating bearings



SL0148, SL0149
Locating bearings

Dimension table (continued) · Dimensions in mm

Semi-locating bearings Designation	Locating bearings Designation	Non-locating bearings Designation	Designation to DIN 5 412	Mass	Dimensions				
				m	d	D	B	r	s
				≈kg				min.	
–	**SL014926**	–	NNC 4926 V	3,95	**130**	180	50	1,5	–
–	–	**SL024926**	NNCL 4926 V	3,8	**130**	180	50	1,5	4
SL185026	–	–	–	10,2	**130**	200	95	2	5
–	**SL014928**	–	NNC 4928 V	4,2	**140**	190	50	1,5	–
–	–	**SL024928**	NNCL 4928 V	4,1	**140**	190	50	1,5	4
SL185028	–	–	–	11,1	**140**	210	95	2	5
–	**SL014830**	–	NNC 4830 V	2,9	**150**	190	40	1,1	–
–	–	**SL024830**	NNCL 4830 V	2,8	**150**	190	40	1,1	2
–	**SL014930**	–	NNC 4930 V	6,65	**150**	210	60	2	–
–	–	**SL024930**	NNCL 4930 V	6,45	**150**	210	60	2	4
SL185030	–	–	–	13,3	**150**	225	100	2	6
–	**SL014832**	–	NNC 4832 V	3,1	**160**	200	40	1,1	–
–	–	**SL024832**	NNCL 4832 V	3	**160**	200	40	1,1	2
–	**SL014932**	–	NNC 4932 V	7	**160**	220	60	2	–
–	–	**SL024932**	NNCL 4932 V	6,8	**160**	220	60	2	4
SL185032	–	–	–	12,2	**160**	240	109	2,1	6
–	**SL014834**	–	NNC 4834 V	4,1	**170**	215	45	1,1	–
–	–	**SL024834**	NNCL 4834 V	3,95	**170**	215	45	1,1	3
–	**SL014934**	–	NNC 4934 V	7,35	**170**	230	60	2	–
–	–	**SL024934**	NNCL 4934 V	7,1	**170**	230	60	2	4
SL185034	–	–	–	22,5	**170**	260	122	2,1	6
–	**SL014836**	–	NNC 4836 V	4,3	**180**	225	45	1,1	–
–	–	**SL024836**	NNCL 4836 V	4,15	**180**	225	45	1,1	3
–	**SL014936**	–	NNC 4936 V	10,8	**180**	250	69	2	–
–	–	**SL024936**	NNCL 4936 V	10,5	**180**	250	69	2	4
SL185036	–	–	–	29,9	**180**	280	136	2,1	8
–	**SL014838**	–	NNC 4838 V	5,65	**190**	240	50	1,5	–
–	–	**SL024838**	NNCL 4838 V	5,45	**190**	240	50	1,5	4
–	**SL014938**	–	NNC 4938 V	11,2	**190**	260	69	2	–
–	–	**SL024938**	NNCL 4938 V	10,9	**190**	260	69	2	4
SL185038	–	–	–	31,3	**190**	290	136	2,1	8,2
–	**SL014840**	–	NNC 4840 V	5,9	**200**	250	50	1,5	–
–	–	**SL024840**	NNCL 4840 V	5,7	**200**	250	50	1,5	4
–	**SL014940**	–	NNC 4940 V	15,8	**200**	280	80	2,1	–
–	–	**SL024940**	NNCL 4940 V	15,3	**200**	280	80	2,1	5
SL185040	–	–	–	40,4	**200**	310	150	2,1	8,9

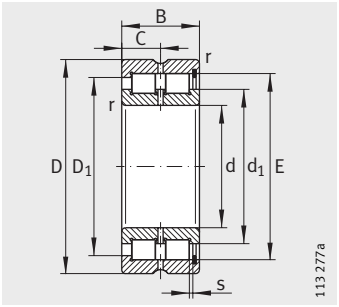


SL0248, SL0249
Non-locating bearings

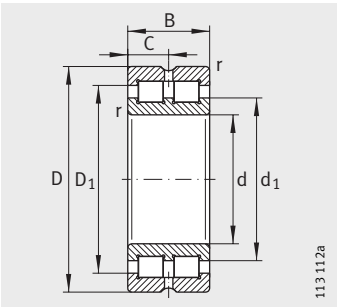
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
C	d_1 ≈	D_1 ≈	E	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G min^{-1}	n_B min^{-1}
25	148,4	160	–	260 000	510 000	63 000	2 100	1 500
25	149,5	–	165,4	260 000	510 000	63 000	2 100	1 500
47,5	148,6	175,5	184,4	730 000	1 210 000	158 000	2 000	1 340
25	159	170,5	–	270 000	550 000	66 000	1 960	1 370
25	160	–	175,9	270 000	550 000	66 000	1 960	1 370
47,5	162,6	189,5	198,4	770 000	1 330 000	169 000	1 840	1 180
20	165,1	174,2	–	231 000	530 000	62 000	1 910	1 270
20	165,1	–	178,3	231 000	530 000	62 000	1 910	1 270
30	171,8	187,2	–	410 000	820 000	98 000	1 810	1 200
30	171,8	–	192,77	410 000	820 000	98 000	1 810	1 200
50	170	198	207,45	810 000	1 390 000	175 000	1 760	1 150
20	173,7	182,8	–	237 000	560 000	64 000	1 820	1 200
20	173,7	–	186,9	237 000	560 000	64 000	1 820	1 200
30	184,2	200,3	–	425 000	880 000	104 000	1 690	1 080
30	184,2	–	206,16	425 000	880 000	104 000	1 690	1 080
54,5	184,8	215,8	224,8	930 000	1 610 000	199 000	1 620	1 030
22,5	186,3	197	–	260 000	600 000	68 000	1 690	1 180
22,5	186,3	–	201,3	260 000	600 000	68 000	1 690	1 180
30	193,1	209,1	–	435 000	930 000	108 000	1 610	1 010
30	193,1	–	215,08	435 000	930 000	108 000	1 610	1 010
61	198	332,7	242,85	1 200 000	2 110 000	260 000	1 510	900
22,5	199,1	209,8	–	270 000	640 000	72 000	1 590	1 070
22,5	199,1	–	214,1	270 000	640 000	72 000	1 590	1 070
34,5	204,9	224,1	–	570 000	1 200 000	140 000	1 510	920
34,5	204,9	–	230,5	570 000	1 200 000	140 000	1 510	920
68	212,2	249,4	260,22	1 390 000	2 480 000	300 000	1 410	820
25	207,6	220,7	–	310 000	730 000	81 000	1 510	1 030
25	207,6	–	225	310 000	730 000	81 000	1 510	1 030
34,5	215	234,3	–	580 000	1 270 000	145 000	1 440	860
34,5	215	–	240,7	580 000	1 270 000	145 000	1 440	860
68	221,8	259	269,76	1 430 000	2 600 000	310 000	1 350	770
25	218,1	231,2	–	320 000	770 000	84 000	1 440	960
25	218,1	–	235,5	320 000	770 000	84 000	1 440	960
40	230,5	252,3	–	680 000	1 440 000	165 000	1 340	820
40	230,5	–	259,34	680 000	1 440 000	165 000	1 340	820
75	236,6	276,2	287,75	1 630 000	3 000 000	355 000	1 270	710

Double row full complement cylindrical roller bearings

Semi-locating, locating and non-locating bearings



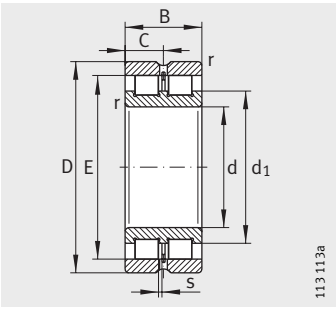
SL1850
Semi-locating bearings



SL0148, SL0149
Locating bearings

Dimension table (continued) · Dimensions in mm

Semi-locating bearings Designation	Locating bearings Designation	Non-locating bearings Designation	Designation to DIN 5 412	Mass	Dimensions				
				m	d	D	B	r	s
				≈kg				min.	
–	**SL014844**	–	NNC 4844 V	6,4	**220**	270	50	1,5	–
–	–	**SL024844**	NNCL 4844 V	6,2	**220**	270	50	1,5	4
–	**SL014944**	–	NNC 4944 V	17,2	**220**	300	80	2,1	–
–	–	**SL024944**	NNCL 4944 V	16,7	**220**	300	80	2,1	5
SL185044	–	–	–	51,6	**220**	340	160	3	9
–	**SL014848**	–	NNC 4848 V	10	**240**	300	60	2	–
–	–	**SL024848**	NNCL 4848 V	9,9	**240**	300	60	2	4
–	**SL014948**	–	NNC 4948 V	18,5	**240**	320	80	2,1	–
–	–	**SL024948**	NNCL 4948 V	17,9	**240**	320	80	2,1	5
SL185048	–	–	–	55,2	**240**	360	160	3	9
–	**SL014852**	–	NNC 4852 V	11	**260**	320	60	2	–
–	–	**SL024852**	NNCL 4852 V	10,6	**260**	320	60	2	4
–	**SL014952**	–	NNC 4952 V	32	**260**	360	100	2,1	–
–	–	**SL024952**	NNCL 4952 V	31,2	**260**	360	100	2,1	6
SL185052	–	–	–	82,6	**260**	400	190	4	11,3
–	**SL014856**	–	NNC 4856 V	16	**280**	350	69	2	–
–	–	**SL024856**	NNCL 4856 V	15,6	**280**	350	69	2	4
–	**SL014956**	–	NNC 4956 V	34	**280**	380	100	2,1	–
–	–	**SL024956**	NNCL 4956 V	33,1	**280**	380	100	2,1	6
SL185056	–	–	–	88	**280**	420	190	4	11,3
–	**SL014860**	–	NNC 4860 V	23	**300**	380	80	2,1	–
–	–	**SL024860**	NNCL 4860 V	22	**300**	380	80	2,1	6
–	**SL014960**	–	NNC 4960 V	53	**300**	420	118	3	–
–	–	**SL024960**	NNCL 4960 V	51,9	**300**	420	118	3	6
SL185060-TB	–	–	–	124	**300**	460	218	4	12,5
–	**SL014864**	–	NNC 4864 V	24	**320**	400	80	2,1	–
–	–	**SL024864**	NNCL 4864 V	23,5	**320**	400	80	2,1	6
–	**SL014964**	–	NNC 4964 V	56	**320**	440	118	3	–
–	–	**SL024964**	NNCL 4964 V	54,9	**320**	440	118	3	6
SL185064-TB	–	–	–	128,4	**320**	480	218	4	12,5
–	**SL014868**	–	NNC 4868 V	25,5	**340**	420	80	2,1	–
–	–	**SL024868**	NNCL 4868 V	25	**340**	420	80	2,1	6
–	**SL014968**	–	NNC 4968 V	59	**340**	460	118	3	–
–	–	**SL024968**	NNCL 4968 V	57,8	**340**	460	118	3	6
SL185068-TB	–	–	–	178	**340**	520	243	5	14,3

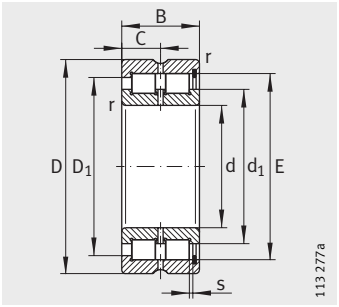


SL0248, SL0249
Non-locating bearings

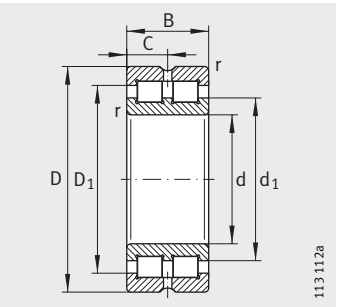
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
C	d_1 ≈	D_1 ≈	E	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G min^{-1}	n_B min^{-1}
25	239,1	252,3	–	335 000	840 000	90 000	1 320	850
25	239,1	–	256,5	335 000	840 000	90 000	1 320	850
40	248	268,5	–	700 000	1 550 000	174 000	1 250	750
40	248	–	276,52	700 000	1 550 000	174 000	1 250	750
80	254,6	297,8	312,2	1 980 000	3 650 000	420 000	1 170	630
30	259,5	276,7	–	510 000	1 260 000	135 000	1 210	730
30	259,5	–	281,9	510 000	1 260 000	135 000	1 210	730
40	270,6	292,3	–	740 000	1 700 000	186 000	1 150	660
40	270,6	–	299,46	740 000	1 700 000	186 000	1 150	660
80	277,5	322,1	335,1	2 080 000	4 000 000	445 000	1 080	550
30	281,8	298,8	–	540 000	1 370 000	143 000	1 120	650
30	281,8	–	304,2	540 000	1 370 000	143 000	1 120	650
50	294,5	322,1	–	1 100 000	2 470 000	270 000	1 050	570
50	294,5	–	331,33	1 100 000	2 470 000	270 000	1 050	570
95	304	359,7	375,97	2 750 000	5 000 000	560 000	980	490
34,5	306,8	326,4	–	700 000	1 820 000	189 000	1 020	570
34,5	306,8	–	332,4	700 000	1 820 000	189 000	1 020	570
50	316,5	344,6	–	1 150 000	2 650 000	285 000	980	520
50	316,5	–	353,34	1 150 000	2 650 000	285 000	980	520
95	318,3	374,1	390,3	2 850 000	5 300 000	580 000	940	460
40	327,9	349,9	–	820 000	2 070 000	214 000	960	550
40	327,9	–	356,7	820 000	2 070 000	214 000	960	550
59	340,7	374,3	–	1 630 000	3 700 000	390 000	910	445
59	340,7	–	385,51	1 630 000	3 700 000	390 000	910	445
109	353,6	413,6	433,6	3 450 000	6 600 000	650 000	840	395
40	350,9	372,9	–	850 000	2 220 000	225 000	900	495
40	350,9	–	379,7	850 000	2 220 000	225 000	900	495
59	367,5	401,1	–	1 700 000	4 050 000	415 000	840	395
59	367,5	–	412,27	1 700 000	4 050 000	415 000	840	395
109	369,5	431,5	449,5	3 550 000	6 900 000	680 000	810	375
40	368,1	390,1	–	870 000	2 330 000	233 000	860	465
40	368,1	–	396,9	870 000	2 330 000	233 000	860	465
59	385,3	418,9	–	1 750 000	4 250 000	430 000	810	375
59	385,3	–	430,11	1 750 000	4 250 000	430 000	810	375
121,5	396	465,5	485,65	4 250 000	8 300 000	800 000	750	355

Double row full complement cylindrical roller bearings

Semi-locating, locating and non-locating bearings



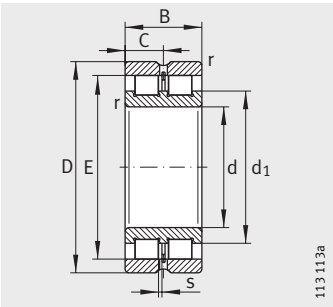
SL1850
Semi-locating bearings



SL0148, SL0149
Locating bearings

Dimension table (continued) · Dimensions in mm

Semi-locating bearings Designation	Locating bearings Designation	Non-locating bearings Designation	Designation to DIN 5 412	Mass	Dimensions				
				m	d	D	B	r	s
				≈kg				min.	
–	**SL014872**	–	NNC 4872 V	27	**360**	440	80	2,1	–
–	–	**SL024872**	NNCL 4872 V	26	**360**	440	80	2,1	6
–	**SL014972**	–	NNC 4972 V	62,1	**360**	480	118	3	–
–	–	**SL024972**	NNCL 4972 V	60,8	**360**	480	118	3	6
SL185072-TB	–	–	–	178	**360**	540	243	5	14
–	**SL014876**	–	NNC 4876 V	45,5	**380**	480	100	2,1	–
–	–	**SL024876**	NNCL 4876 V	44	**380**	480	100	2,1	6
–	**SL014976**	–	NNC 4976 V	92,4	**380**	520	140	4	–
–	–	**SL024976**	NNCL 4976 V	90,5	**380**	520	140	4	7
SL185076-TB	–	–	–	196,5	**380**	560	243	5	14,1
–	**SL014880**	–	NNC 4880 V	46,5	**400**	500	100	2,1	–
–	–	**SL024880**	NNCL 4880 V	45,8	**400**	500	100	2,1	6
–	**SL014980**	–	NNC 4980 V	96,5	**400**	540	140	4	–
–	–	**SL024980**	NNCL 4980 V	94,6	**400**	540	140	4	7

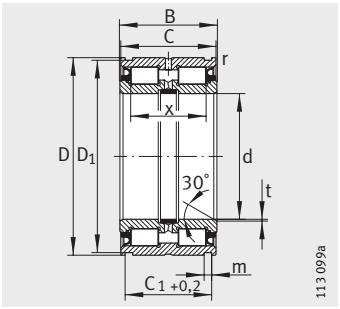


SL0248, SL0249
Non-locating bearings

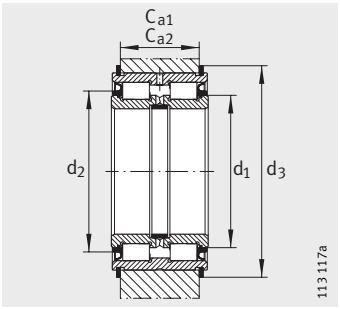
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
C	d_1	D_1	E	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
	≈	≈		N	N	N	min^{-1}	min^{-1}
40	391	413,2	–	900 000	2 480 000	244 000	810	430
40	391	–	419,8	900 000	2 480 000	244 000	810	430
59	404	436,8	–	1 790 000	4 450 000	445 000	770	350
59	404	–	447,95	1 790 000	4 450 000	445 000	770	350
121,5	413,8	481	503,45	4 400 000	8 700 000	820 000	720	320
50	419	447,2	–	1 320 000	3 500 000	345 000	750	375
50	419	–	455,8	1 320 000	3 500 000	345 000	750	375
70	430,2	468,7	–	2 250 000	5 500 000	560 000	720	325
70	430,2	–	481,35	2 250 000	5 500 000	560 000	720	325
121,5	432	499	521,25	4 450 000	8 900 000	850 000	700	305
50	433,8	462	–	1 350 000	3 650 000	355 000	720	360
50	433,8	–	470,59	1 350 000	3 650 000	355 000	720	360
70	450,5	489	–	2 310 000	5 800 000	580 000	690	300
70	450,5	–	501,74	2 310 000	5 800 000	580 000	690	300

Cable sheave bearings

Cylindrical roller bearings
with snap ring grooves
Full complement, sealed
Locating bearings



SL0450..-PP
SL04..-PP



Mounting dimensions

Dimension table · Dimensions in mm

Designation	Mass	Dimensions									
	m	d	D	B	C	C_1	D_1	m	r	t	x
	≈kg					+0,2			min.		
SL045004-PP	0,2	**20**	42	30	29	24,7	40,2	1,8	0,3	0,5	22,5
SL045005-PP	0,24	**25**	47	30	29	24,7	45,2	1,8	0,3	0,5	22,5
SL045006-PP	0,37	**30**	55	34	33	28,2	53	2,1	0,3	0,5	25,5
SL045007-PP	0,48	**35**	62	36	35	30,2	60	2,1	0,3	0,5	27,5
SL045008-PP	0,56	**40**	68	38	37	32,2	65,8	2,7	0,6	0,8	28,5
SL045009-PP	0,7	**45**	75	40	39	34,2	72,8	2,7	0,6	0,8	30,5
SL045010-PP	0,76	**50**	80	40	39	34,2	77,8	2,7	0,6	0,8	30,5
SL045011-PP	1,18	**55**	90	46	45	40,2	87,4	3,2	0,6	1	36
SL045012-PP	1,26	**60**	95	46	45	40,2	92,4	3,2	0,6	1	36
SL045013-PP	1,33	**65**	100	46	45	40,2	97,4	3,2	0,6	1	36
SL045014-PP	1,87	**70**	110	54	53	48,2	107,1	4,2	0,6	1	42
SL045015-PP	1,96	**75**	115	54	53	48,2	112,1	4,2	0,6	1	42
SL045016-PP	2,71	**80**	125	60	59	54,2	122,1	4,2	0,6	1,5	48
SL045017-PP	2,83	**85**	130	60	59	54,2	127,1	4,2	0,6	1,5	48
SL045018-PP	3,71	**90**	140	67	66	59,2	137	4,2	0,6	1,5	54
SL045019-PP	3,88	**95**	145	67	66	59,2	142	4,2	0,6	1,5	54
SL045020-PP	3,95	**100**	150	67	66	59,2	147	4,2	0,6	1,5	54
SL045022-PP	6,57	**110**	170	80	79	70,2	167	4,2	0,6	1,8	64
SL045024-PP	7,04	**120**	180	80	79	71,2	176	4,2	0,6	1,8	64
SL045026-PP	10,5	**130**	200	95	94	83,2	196	4,2	0,6	1,8	77
SL04130-PP	7,5	**130**	190	80	79	71,2	186	4,2	0,6	1,8	64
SL045028-PP	11,1	**140**	210	95	94	83,2	206	5,2	0,6	1,8	77
SL04140-PP	8	**140**	200	80	79	71,2	196	4,2	0,6	1,8	64
SL045030-PP	13,3	**150**	225	100	99	87,2	221	5,2	0,6	2	80
SL04150-PP	8,4	**150**	210	80	79	71,2	206	5,2	0,6	1,8	64
SL045032-PP	16,6	**160**	240	109	108	95,2	236	5,2	0,6	2	89
SL04160-PP	8,8	**160**	220	80	79	71,2	216	5,2	0,6	1,8	64

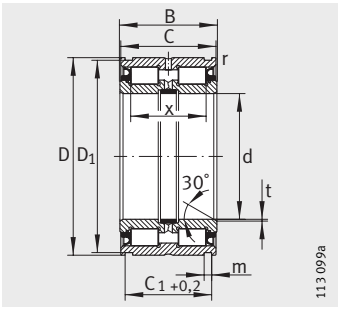
1) For snap rings WRE.

2) For retaining ring to DIN 471.

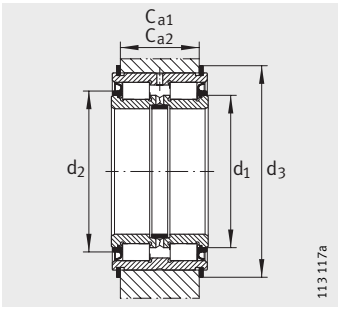
Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Snap ring WRE	Retaining ring to DIN 471
C_{a1} 1) −0,2	C_{a2} 2) −0,2	d_1	d_2	d_3 1)	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G grease min^{-1}		
21,5	21	30,55	34	47	41 500	51 000	6 900	4 000	WRE42	42X1,75
21,5	21	35,35	39	52	46 000	60 000	8 100	3 600	WRE47	47X1,75
25	24	40,6	44	60	50 000	67 000	9 500	3 000	WRE55	55X2
27	26	46,1	50	67	63 000	88 000	12 400	2 600	WRE62	62X2
28	27	51,4	55	75	80 000	111 000	16 000	2 400	WRE68	68X2,5
30	29	57	61	82	97 000	139 000	19 900	2 200	WRE75	75X2,5
30	29	61,8	66	87	102 000	151 000	21 700	2 000	WRE80	80X2,5
35	34	68,6	73	99	120 000	186 000	25 500	1 800	WRE90	90X3
35	34	73,7	79	104	125 000	201 000	27 500	1 700	WRE95	95X3
35	34	78,8	84	109	130 000	215 000	29 500	1 600	WRE100	100X3
43	40	84,5	91	119	175 000	275 000	36 000	1 400	WRE110	110X4
43	40	89,95	97	124	201 000	315 000	42 000	1 400	WRE115	115X4
49	46	97,1	105	137	210 000	340 000	45 000	1 300	WRE125	125X4
49	46	103,9	112	142	219 000	365 000	47 500	1 200	WRE130	130X4
54	51	109,3	118	152	305 000	510 000	69 000	1 100	WRE140	140X4
54	51	113,35	122	157	315 000	530 000	71 000	1 100	WRE145	145X4
54	51	117,35	128	162	330 000	550 000	73 000	1 000	WRE150	150X4
65	62	131,55	143	182	395 000	680 000	89 000	900	WRE170	170X4
65	63	140,9	153	196	410 000	740 000	94 000	900	WRE180	180X4
77	75	156,75	170	216	540 000	960 000	122 000	800	WRE200	200X4
65	63	150,55	160	206	430 000	790 000	99 000	800	WRE190	190X4
77	73	165,4	181	226	610 000	1 100 000	139 000	750	WRE210	210X5
65	63	159,95	170	216	445 000	840 000	104 000	750	WRE200	200X4
81	77	175,7	192	245	710 000	1 260 000	156 000	700	WRE225	225X5
65	61	174,4	185	226	465 000	920 000	111 000	700	WRE210	210X5
89	85	189	207	260	740 000	1 360 000	165 000	650	WRE240	240X5
65	61	184,05	196	236	480 000	970 000	116 000	700	WRE220	220X5

Cable sheave bearings

Cylindrical roller bearings
with snap ring grooves
Full complement, sealed
Locating bearings



SL0450..-PP
SL04..-PP



Mounting dimensions

Dimension table (continued) · Dimensions in mm

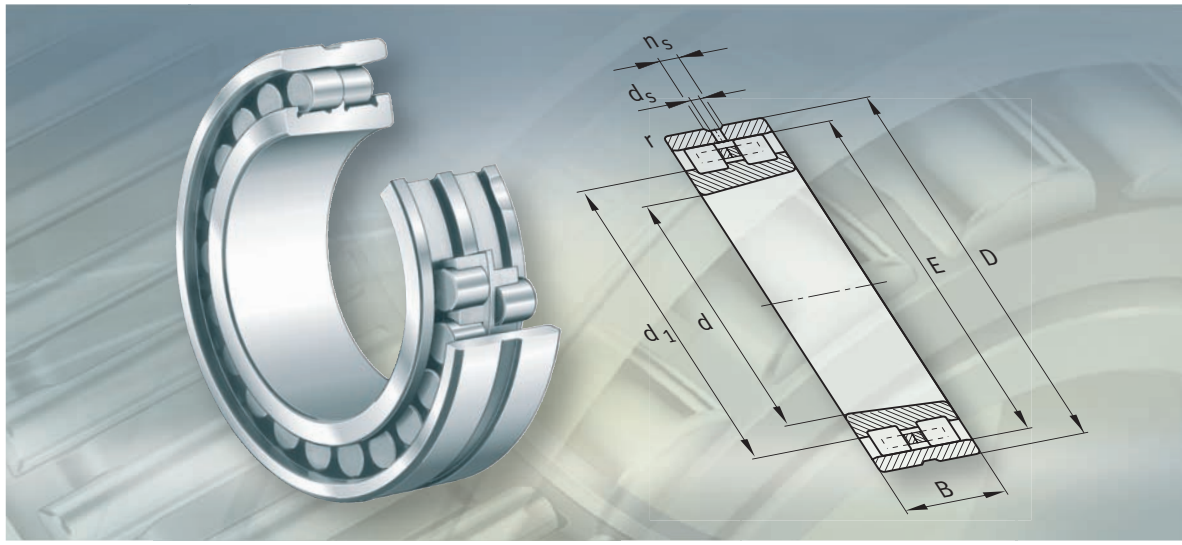
Designation	Mass	Dimensions									
	m	d	D	B	C	C_1	D_1	m	r	t	x
	≈kg					+0,2			min.		
SL045034-PP	22,6	**170**	260	122	121	107,2	254	5,2	0,6	2	100
SL04170-PP	9,3	**170**	230	80	79	71,2	226	5,2	0,6	1,8	64
SL045036-PP	30,1	**180**	280	136	135	118,2	274	5,2	0,6	2	112
SL04180-PP	9,8	**180**	240	80	79	71,2	236	5,2	0,6	1,8	64
SL045038-PP	31,5	**190**	290	136	135	118,2	284	5,2	0,6	2	112
SL04190-PP	12,7	**190**	260	80	79	73,2	254	5,2	0,6	1,8	64
SL045040-PP	40,8	**200**	310	150	149	128,2	304	6,3	0,6	2	126
SL04200-PP	13,2	**200**	270	80	79	73,2	264	5,2	0,6	1,8	64
SL045044-PP	52,5	**220**	340	160	159	138,2	334	6,3	1	2	132
SL04220-PP	19,5	**220**	300	95	94	83,2	294	5,2	1	2	72
SL045048-PP	56	**240**	360	160	159	138,2	354	6,3	1	2	132
SL04240-PP	21	**240**	320	95	94	83,2	314	6,3	1	2	72
SL045052-PP	84,5	**260**	400	190	189	162,2	394	6,3	1,1	3	150
SL04260-PP	22,5	**260**	340	95	94	83,2	334	6,3	1	3	75
SL045056-PP	90	**280**	420	190	189	163,2	413	7,3	1,1	3	150
SL045060-PP	126	**300**	460	218	216	185,2	453	7,3	1,1	3	170
SL04300-PP	25,5	**300**	380	95	94	83,2	374	6,3	1	3	75

1) For snap rings WRE.

2) For retaining ring to DIN 471.

Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Snap ring WRE	Retaining ring to DIN 471
C_{a1} [1] −0,2	C_{a2} [2] −0,2	d_1	d_2	d_3 [1]	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G grease min^{-1}		
99	97	200,7	220	282	960 000	1 750 000	212 000	600	WRE260	260X5
65	61	193,9	206	250	490 000	1 030 000	120 000	650	WRE230	230X5
110	108	217,8	239	302	1 140 000	2 130 000	255 000	550	WRE280	280X5
65	61	203,1	216	260	500 000	1 080 000	125 000	600	WRE240	240X5
110	108	225,65	248	312	1 160 000	2 210 000	260 000	550	WRE290	290X5
65	63	217,55	231	282	520 000	1 160 000	131 000	550	WRE260	260X5
120	116	243,05	267	336	1 350 000	2 600 000	300 000	500	WRE310	310X6
65	63	227,15	241	292	540 000	1 210 000	136 000	550	WRE270	270X5
130	126	259,85	286	366	1 570 000	3 050 000	350 000	480	WRE340	340X6
75	73	248,7	264	322	700 000	1 550 000	174 000	480	WRE300	300X5
130	126	279,25	305	386	1 630 000	3 300 000	370 000	440	WRE360	360X6
75	71	271,7	287	346	740 000	1 700 000	186 000	480	WRE320	320X6
154	150	304,95	336	426	2 380 000	4 700 000	520 000	400	WRE400	400X6
75	71	292,7	310	366	840 000	1 990 000	215 000	440	WRE340	340X6
154	149	320,95	354	453	2 600 000	5 200 000	570 000	380	WRE420	420X7
176	171	346,85	375	493	3 000 000	5 800 000	620 000	340	WRE460	460X7
75	71	328	346	406	900 000	2 250 000	234 000	380	WRE380	380X6

FAG



High precision cylindrical roller bearings

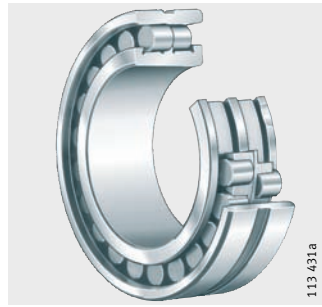
Double row

High precision cylindrical roller bearings

		Page
Product overview	High precision cylindrical roller bearings	502
Features	Non-locating bearings	503
	Operating temperature	503
	Cage	503
	Suffixes	503
Design and safety guidelines	Operating life of the bearings	504
	Equivalent static bearing load	504
	Static load safety factor	504
	Speeds	504
	Design of bearing arrangements	505
Accuracy		508
	Radial internal clearance	509
Dimension tables	High precision cylindrical roller bearings, double row, non-locating bearings	510

Non-locating bearings

NN30..-AS-K-M-SP



High precision cylindrical roller bearings

Features

Cylindrical roller bearings of this design are double row precision bearings for machine tools. They allow radially rigid, high precision bearing arrangements and are principally used to give radial support for main spindles.

The bearings comprise solid outer rings without ribs, solid inner rings with three ribs and cylindrical roller and cage assemblies with solid brass cages. For optimum setting of the radial internal clearance, the inner ring has a tapered bore with a bore taper 1:12. The cylindrical roller bearings are separable and are therefore easier to fit and dismantle. Both bearing rings can be given a tight fit by this process.

A detailed description of high precision cylindrical roller bearings (designs, calculation, lubrication, clearance adjustment) is given in Catalogue AC 41 130, Super Precision Bearings.

Non-locating bearings

Cylindrical roller bearings NN30..-AS-K-M-SP are non-locating bearings and can support radial forces only. Axial forces are normally supported by double direction axial angular contact ball bearings.

Axial displacement

The outer and inner ring can be axially displaced relative to each other from the central position by the values “s” stated in the dimension tables.

Sealing

The bearings are supplied without seals.

Lubrication

High precision cylindrical roller bearings can be lubricated from the end faces as well as through a lubrication groove and lubrication holes in the outer ring. The bearings can be lubricated with grease or oil.

Operating temperature

Cylindrical roller bearings with special precision (SP) can be used at operating temperatures from –30 °C to +150 °C.

For continuous operation above +120 °C, please contact us.

Cage

The cylindrical roller bearings have two roller-guided solid brass cages.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
A	Modified internal construction	Standard
K	Tapered bore, taper 1:12	
M	Solid brass cage, roller-guided	
S	Lubrication groove and lubrication holes in outer ring	
SP	Tolerance class SP	

Design and safety guidelines

Operating life of the bearings

High precision bearings must guide machine parts with very high precision and must support forces at up to very high speeds. They are predominantly selected on the basis of accuracy, rigidity and running behaviour. In order that they can fulfil their tasks for as long as possible, the bearings must run without wear.
The precondition for this is the creation of a load-bearing hydrodynamic lubricant film at the contact points of the rolling contact partners. Under these conditions, they will achieve their fatigue life in a large number of applications. If the design is appropriate to the fatigue life, the operating life of the bearing is normally restricted by the lubricant operating life.

The decisive factors for the operating life from the perspective of load are the Hertzian pressures occurring at the contacts and the bearing kinematics. For high performance assemblies, individual design with the aid of special calculation programs is therefore advisable.

Since failure as a result of fatigue plays no part in practice, calculation of the rating life L_{10} in accordance with DIN ISO 281 is not appropriate as a means of determining the operating life.

Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

Static load safety factor

$$S_0 = \frac{C_{0r}}{P_0}$$

S_0 –
Static load safety factor

C_{0r} N
Basic static load rating, see dimension tables

P_0 N
Equivalent static bearing load.

In order to achieve sufficiently smooth running, the static load safety factor should be $S_0 > 3$.

Speeds

The speed depends on the radial internal clearance while warm from operation. For calculation, the values from the dimension table are multiplied by the correction factor in the table.

The limiting speeds n_G are valid for lubrication with grease or minimal quantity lubrication with oil and must not be exceeded.

Correction factors

Clearance or preload in operation µm		Correction factor
0 to 5	(clearance)	1 to 1,1
–5 to 0	(preload)	0,8 to 1

Design of bearing arrangements

Design of tapered shaft

Recommendations for machining of the tapered shaft, see table and *Figure 1*.

Tapered shaft

Shaft diameter				Roundness	Flatness	Axial runout	Mean roughness
d mm		Deviation of small taper diameter µm		t_2 µm	t_3 µm	t_4 µm	R_a µm
over	incl.	upper	lower				
18	30	+73	+64	1	1	1,5	0,2
30	40	+91	+80	1	1	1,5	0,2
40	50	+108	+97	1	1	1,5	0,2
50	65	+135	+122	1,2	1,2	2	0,2
65	80	+159	+146	1,2	1,2	2	0,2
80	100	+193	+178	1,5	1,5	2,5	0,2
100	120	+225	+210	1,5	1,5	2,5	0,2
120	140	+266	+248	2	2	3,5	0,2
140	160	+298	+280	2	2	3,5	0,2
160	180	+328	+310	2	2	3,5	0,2
180	200	+370	+350	3	3	4,5	0,2
200	225	+405	+385	3	3	4,5	0,2
225	250	+445	+425	3	3	4,5	0,2
250	280	+498	+475	4	4	6	0,4
280	315	+548	+525	4	4	6	0,4
315	355	+615	+590	5	5	7	0,4
355	400	+685	+660	5	5	7	0,4
400	450	+767	+740	6	6	8	0,4
450	500	+847	+820	6	6	8	0,4

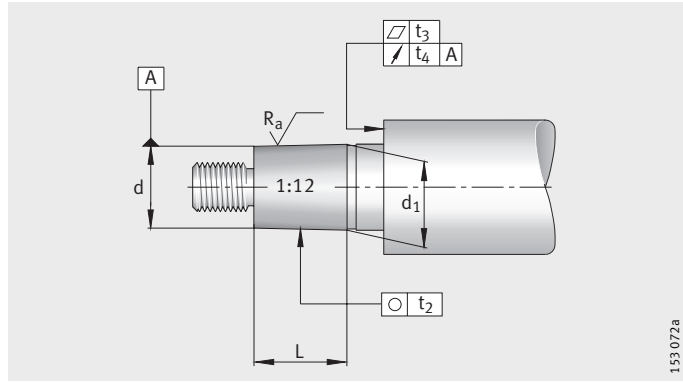


Figure 1
Design of shaft

Deviation of taper angle

The deviation of the taper angle of the shaft seat for bearings of tolerance class SP is shown in the table.

Taper length L mm		Taper angle tolerance AT_D µm			
L_U over	L_O incl.	AT_{DU}		AT_{DO}	
16	25	+2	0	+3,2	0
25	40	+2,5	0	+4	0
40	63	+3,2	0	+5	0
63	100	+4	0	+6,3	0
100	160	+5	0	+8	0
160	250	+6,3	0	+10	0

The taper angle tolerance AT_D applies vertical to the axis and is defined as the differential diameter.

If FAG taper gauges MGK132 are used, the AT_D values listed should be halved (inclination angle tolerance).

For taper lengths with nominal dimensions between the values listed in the table, the taper angle tolerance AT_D should be determined by means of interpolation.

Calculation example

Taper length of shaft seat 50 mm, tolerance class SP.

$$AT_D = AT_{DU} + \frac{AT_{DO} - AT_{DU}}{L_o - L_u} \cdot (L - L_u)$$

$$AT_D = 3{,}2 + \frac{5 - 3{,}2}{63 - 40} \cdot (50 - 40) = 3{,}98\ \mu m$$

Taper angle tolerance AT_D = +4 µm.

Design of housing

In order to allow fitting and dismantling of the bearings, the dimension $D_{b\ min}$ in the dimension tables must be observed.

Recommendations for machining of housings, see table and *Figure 2*.

Housing bore

Housing bore				Cylindricity	Flatness	Axial runout	Coaxiality	Mean roughness
D mm		Deviation µm		t_1 µm	t_3 µm	t_4 µm	t_5 µm	R_a µm
over	incl.	upper	lower					
30	50	+2	−9	1,5	1,5	2,5	4	0,4
50	80	+3	−10	2	2	3	5	0,4
80	120	+2	−13	2,5	2,5	4	6	0,8
120	180	+3	−15	3,5	3,5	5	8	0,8
180	250	+2	−18	4,5	4,5	7	10	0,8
250	315	+3	−20	6	6	8	12	1,6
315	400	+3	−22	7	7	9	13	1,6
400	500	+2	−25	8	8	10	15	1,6
500	630	0	−29	9	9	11	16	1,6
630	800	0	−32	10	10	12	18	1,6

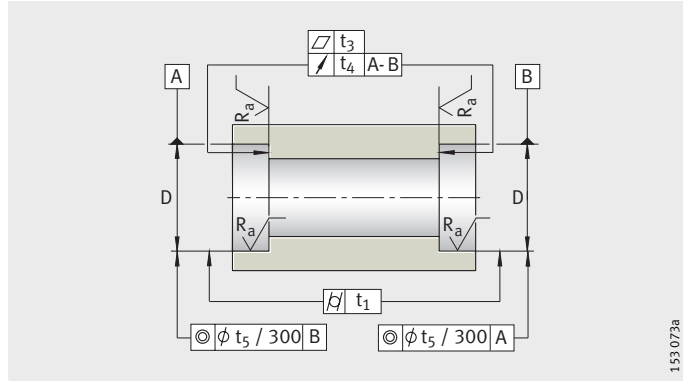


Figure 2
Design of housing

Mounting dimensions

The dimension tables give the maximum value of the radius r_a and the diameters of the abutment shoulders d_a, D_a and D_b.

Accuracy

The bearings correspond to tolerance class SP.
Bearings of the higher tolerance class UP are available by agreement.

Width tolerances

Bore d mm		Width deviation (in relation to bore) Δ_{Bs} µm		Width variation V_{Bs} µm
over	incl.			
18	30	0	−120	2,5
30	50	0	−120	3
50	80	0	−150	4
80	120	0	−200	4
120	180	0	−250	5
180	250	0	−300	6
250	315	0	−350	8
315	400	0	−400	10
400	500	0	−450	12

Tolerances of inner ring with tapered bore

Bore d mm		Deviation Δ_{dmp} µm		$\Delta_{d1\,mp} - \Delta_{dmp}$ µm		Variation V_{dp} µm	Radial runout K_{ia} µm	Axial runout S_d µm	Axial runout S_{ia} µm
over	incl.								
18	30	10	0	4	0	3	3	4	4
30	50	12	0	4	0	4	4	4	4
50	80	15	0	5	0	5	4	5	5
80	120	20	0	6	0	5	5	5	5
120	180	25	0	8	0	7	6	6	7
180	250	30	0	9	0	8	8	7	8
250	315	35	0	11	0	9	8	8	10
315	400	40	0	12	0	12	10	10	12
400	500	45	0	14	0	14	10	12	15

Outer ring tolerances

Outside diameter D mm		Outside diameter deviation Δ_{Ds} µm		Variation V_{Dp} µm	Radial runout K_{ea} µm	Axial runout S_D µm	Axial runout S_{ea} µm
over	incl.						
30	50	0	−7	4	5	4	5
50	80	0	−9	5	5	4	5
80	120	0	−10	5	6	5	6
120	150	0	−11	6	7	5	7
150	180	0	−13	7	8	5	8
180	250	0	−15	8	10	7	10
250	315	0	−18	9	11	8	10
315	400	0	−20	10	13	10	13
400	500	0	−23	12	15	11	15
500	630	0	−28	14	17	13	18
630	800	0	−35	18	20	15	22

Radial internal clearance

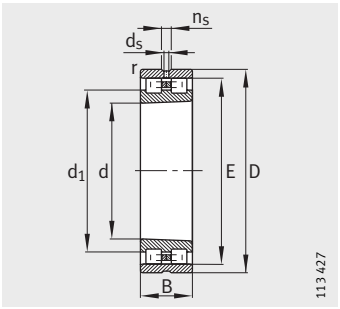
The radial internal clearance smaller than normal internal clearance corresponds to internal clearance group C1NA for accuracy SP and UP. The internal clearance is not stated in the designation. The bearing rings are not interchangeable.

Radial internal clearance of bearings with tapered bore (without measurement load)

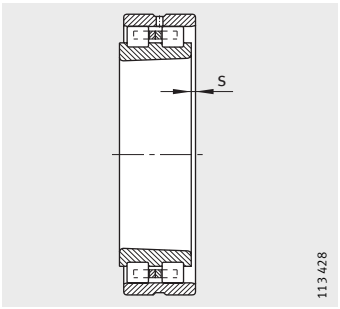
Bore d mm		Radial internal clearance C1NA µm	
over	incl.	min.	max.
24	30	15	25
30	40	15	25
40	50	17	30
50	65	20	35
65	80	25	40
80	100	35	55
100	120	40	60
120	140	45	70
140	160	50	75
160	180	55	85
180	200	60	90
200	225	60	95
225	250	65	100
250	280	75	110
280	315	80	120
315	355	90	135
355	400	100	150
400	450	110	170
450	500	120	190

High precision cylindrical roller bearings

Double row
Non-locating bearings



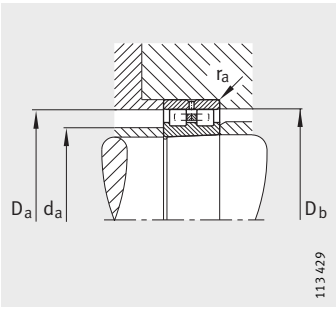
NN30..-AS-K-M-SP
Taper 1:12



[1] Axial displacement “s”

Dimension table · Dimensions in mm

Designation	Mass	Dimensions								
	m	d	D	B	r	s[1]	E	d_1	d_s	n_s
	≈kg				min.			≈		
NN3006-AS-K-M-SP	0,191	**30**	55	19	1	1,4	48,5	39,7	3,2	4,8
NN3007-AS-K-M-SP	0,249	**35**	62	20	1	1,4	55	45,4	3,2	4,8
NN3008-AS-K-M-SP	0,303	**40**	68	21	1	1,4	61	50,6	3,2	4,8
NN3009-AS-K-M-SP	0,393	**45**	75	23	1	1,7	67,5	56,3	3,2	4,8
NN3010-AS-K-M-SP	0,426	**50**	80	23	1	1,7	72,5	61,3	3,2	4,8
NN3011-AS-K-M-SP	0,63	**55**	90	26	1,1	1,9	81	68,2	3,2	4,8
NN3012-AS-K-M-SP	0,674	**60**	95	26	1,1	1,9	86,1	73,3	3,2	4,8
NN3013-AS-K-M-SP	0,715	**65**	100	26	1,1	1,9	91	78,2	3,2	4,8
NN3014-AS-K-M-SP	1,04	**70**	110	30	1,1	2,3	100	85,6	3,2	6,5
NN3015-AS-K-M-SP	1,09	**75**	115	30	1,1	2,3	105	90,6	3,2	6,5
NN3016-AS-K-M-SP	1,51	**80**	125	34	1,1	2,5	113	97	3,2	6,5
NN3017-AS-K-M-SP	1,58	**85**	130	34	1,1	2,5	118	102	3,2	6,5
NN3018-AS-K-M-SP	2,05	**90**	140	37	1,5	2,5	127	109,4	3,2	6,5
NN3019-AS-K-M-SP	2,14	**95**	145	37	1,5	2,5	132	114,4	3,2	6,5
NN3020-AS-K-M-SP	2,23	**100**	150	37	1,5	2,5	137	119,4	3,2	6,5
NN3021-AS-K-M-SP	2,84	**105**	160	41	2	2,6	146	125,2	3,2	6,5
NN3022-AS-K-M-SP	3,61	**110**	170	45	2	2,9	155	132,6	3,2	6,5
NN3024-AS-K-M-SP	3,94	**120**	180	46	2	3,1	165	142,6	3,2	6,5
NN3026-AS-K-M-SP	5,79	**130**	200	52	2	3,4	182	156,4	4,8	9,5
NN3028-AS-K-M-SP	6,22	**140**	210	53	2	3,4	192	166,4	4,8	9,5
NN3030-AS-K-M-SP	7,58	**150**	225	56	2,1	3,7	206	178,8	4,8	9,5
NN3032-AS-K-M-SP	9,23	**160**	240	60	2,1	4,2	219	190,2	4,8	9,5
NN3034-AS-K-M-SP	12,5	**170**	260	67	2,1	4,5	236	204	4,8	9,5
NN3036-AS-K-M-SP	16,4	**180**	280	74	2,1	4,8	255	218,2	6,3	12,2
NN3038-AS-K-M-SP	17,3	**190**	290	75	2,1	4,8	265	228,2	6,3	12,2
NN3040-AS-K-M-SP	22,2	**200**	310	82	2,1	5,3	282	242	6,3	12,2
NN3044-AS-K-M-SP	29,1	**220**	340	90	3	4,5	310	265,2	8	15
NN3048-AS-K-M-SP	31,6	**240**	360	92	3	6	330	285,2	8	15
NN3052-AS-K-M-SP	46,2	**260**	400	104	4	6,5	364	312,8	8	15
NN3056-AS-K-M-SP	49,7	**280**	420	106	4	6,8	384	332,8	8	15
NN3060-AS-K-M-SP	68,8	**300**	460	118	4	7,5	418	360,4	9,5	17,7
NN3064-AS-K-M-SP	74,2	**320**	480	121	4	7,9	438	380,4	9,5	17,7
NN3068-AS-K-M-SP	99,3	**340**	520	133	5	8,7	473	409	9,5	17,7
NN3072-AS-K-M-SP	104	**360**	540	134	5	8,7	493	429	9,5	17,7

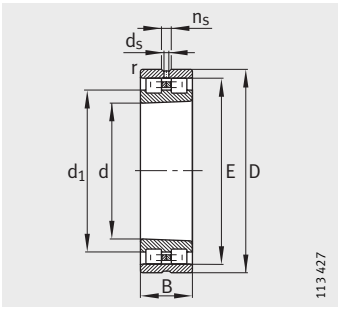


Mounting dimensions

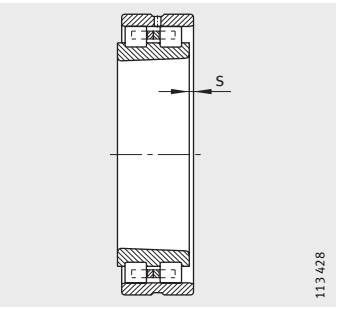
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speeds	
d_a	D_a	D_b	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G grease	n_G oil
min.	max.	min.	max.	N	N	N	min^{-1}	min^{-1}
35	50	49	1	29 000	34 000	4 800	16 000	19 000
40	57	56	1	35 500	44 000	6 500	14 000	17 000
45	63	62	1	45 000	58 500	8 400	12 000	15 000
50	70	69	1	54 000	72 000	10 700	11 000	14 000
55	75	74	1	57 000	80 000	11 800	10 000	13 000
61	84	82	1	72 000	100 000	15 600	9 000	11 000
66	89	87	1	75 000	110 000	17 200	8 500	10 000
71	94	92	1	76 500	116 000	18 000	8 000	9 500
76	104	102	1	98 000	150 000	22 400	7 000	8 500
81	109	107	1	100 000	156 000	23 400	6 700	8 000
86	119	115	1	120 000	186 000	28 500	6 300	7 500
91	124	120	1	125 000	200 000	30 500	6 000	7 000
98	132	129	1,5	140 000	224 000	36 000	5 600	6 700
103	137	134	1,5	143 000	236 000	37 000	5 300	6 300
108	142	139	1,5	146 000	245 000	38 000	5 300	6 300
114	151	148	2	190 000	310 000	46 000	4 800	5 600
119	161	157	2	220 000	360 000	54 000	4 500	5 300
129	171	167	2	232 000	390 000	57 000	4 300	5 000
139	191	184	2	290 000	500 000	72 000	3 800	4 500
149	201	194	2	300 000	520 000	74 000	3 600	4 300
160	215	208	2,1	335 000	585 000	83 000	3 400	4 000
170	230	222	2,1	375 000	670 000	93 000	3 200	3 800
180	250	239	2,1	450 000	800 000	111 000	3 000	3 600
190	270	258	2,1	570 000	1 000 000	134 000	2 800	3 400
200	280	268	2,1	585 000	1 040 000	138 000	2 600	3 200
210	300	285	2,1	655 000	1 200 000	161 000	2 400	3 000
232	328	313	2,5	800 000	1 460 000	187 000	2 200	2 800
252	348	334	2,5	850 000	1 560 000	199 000	2 000	2 600
275	385	368	3	1 060 000	2 000 000	249 000	1 900	2 400
295	405	388	3	1 080 000	2 080 000	255 000	1 800	2 200
315	445	422	3	1 270 000	2 400 000	290 000	1 600	1 900
335	465	442	3	1 320 000	2 600 000	310 000	1 600	1 900
357	503	477	4	1 630 000	3 250 000	380 000	1 400	1 700
377	523	497	4	1 660 000	3 350 000	390 000	1 400	1 700

High precision cylindrical roller bearings

Double row
Non-locating bearings



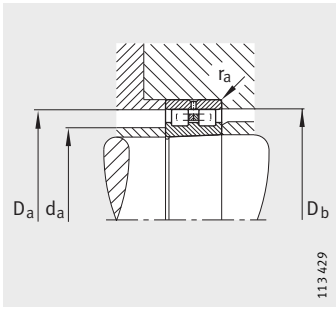
NN30..-AS-K-M-SP
Taper 1:12



[1] Axial displacement “s”

Dimension table (continued) · Dimensions in mm

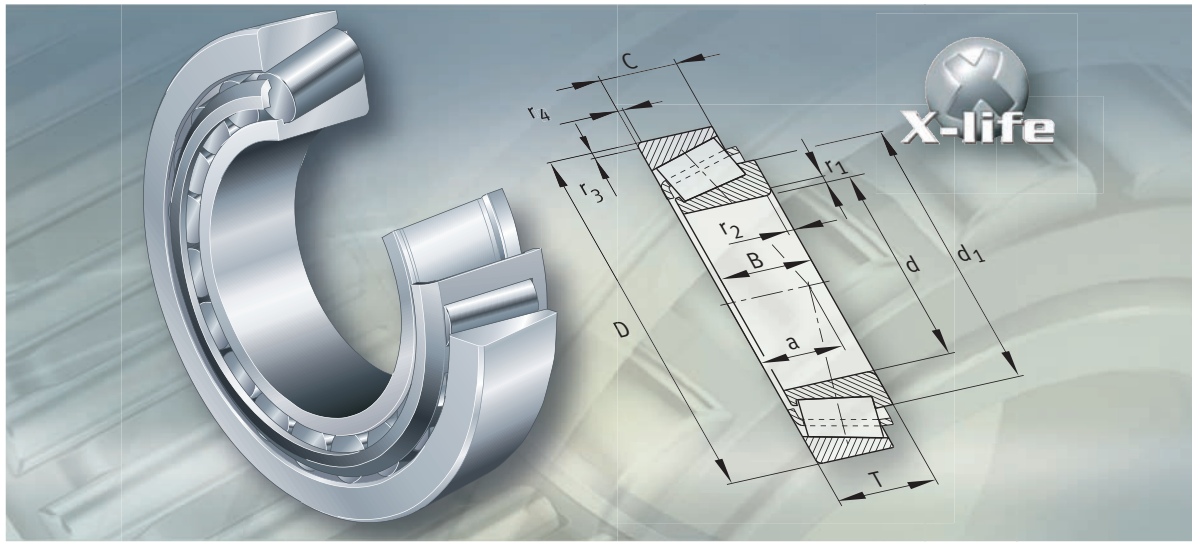
Designation	Mass	Dimensions								
	m	d	D	B	r	s[1]	E	d_1	d_s	n_s
	≈kg				min.			≈		
NN3076-AS-K-M-SP	110	**380**	560	135	5	9	513	449	9,5	17,7
NN3080-AS-K-M-SP	143	**400**	600	148	5	9,5	549	477	9,5	17,7
NN3084-AS-K-M-SP	150	**420**	620	150	5	10	569	497	9,5	17,7
NN3088-AS-K-M-SP	172	**440**	650	157	6	10,3	597	520,2	12,5	23,5
NN3092-AS-K-M-SP	197	**460**	680	163	6	10,5	624	544	12,5	23,5
NN3096-AS-K-M-SP	206	**480**	700	165	6	11	644	564	12,5	23,5
NN30/500-AS-K-M-SP	214	**500**	720	167	6	11,5	664	584	12,5	23,5



Mounting dimensions

Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speeds	
d_a	D_a	D_b	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G grease	n_G oil
min.	max.	min.	max.	N	N	N	min^{-1}	min^{-1}
397	543	517	4	1 700 000	3 450 000	400 000	1 300	1 600
417	583	553	4	2 160 000	4 500 000	490 000	1 200	1 500
437	603	573	4	2 120 000	4 500 000	490 000	1 200	1 500
463	627	601	5	2 450 000	5 100 000	550 000	1 100	1 400
483	657	628	5	2 600 000	5 400 000	590 000	1 100	1 400
503	677	648	5	2 700 000	5 850 000	630 000	1 000	1 300
523	697	668	5	2 650 000	5 850 000	620 000	1 000	1 300

FAG



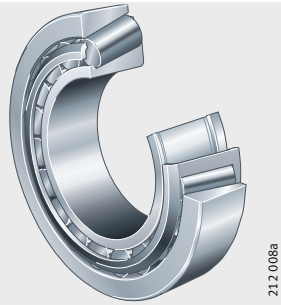
Tapered roller bearings

Tapered roller bearings

		Page
Product overview	Tapered roller bearings	516
Features	X-life	517
	Radial and axial load capacity	517
	Compensation of angular misalignments	518
	Matched bearings N11CA	518
	Integral tapered roller bearings JK0S	518
	Sealing	518
	Lubrication	518
	Operating temperature	519
	Cages	519
	Suffixes	519
Design and safety guidelines	Calculation of axial force	520
	Equivalent dynamic bearing load	522
	Equivalent static bearing load	523
	Basic load ratings and fatigue limit load for bearing pairs	524
	Minimum radial load	524
	Speeds	524
	Design of bearing arrangements	524
Accuracy	Bearings in metric sizes	525
	Bearings in inch sizes	528
	Axial internal clearance	529
Dimension tables	Tapered roller bearings, single row	530
	Tapered roller bearings, matched pairs	546
	Tapered roller bearings, single row, inch sizes	550
	Integral tapered roller bearings, sealed on one side	554

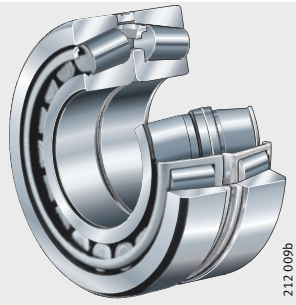
Single row

302, 303, 313, 320, 322, 323, 323..-A, 323..-B, 329, 330, 331, 332, T, K



Matched pairs

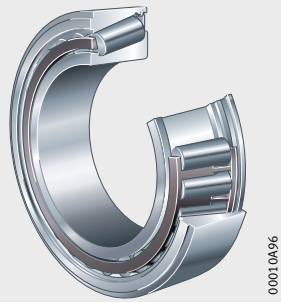
313..-N11CA, 320..-N11CA, 322..-N11CA, 329..-N11CA



Integral tapered roller bearings

Sealed on one side

JK0S



Tapered roller bearings

Features

Tapered roller bearings comprise solid inner and outer rings with tapered raceways and tapered rollers in a window cage.

The bearings are in the form of:

- standard designs
- open variants matched in pairs
- integral designs sealed on one side, JK0S.

Open bearings are not self-retaining. As a result, the inner ring with the rollers and the cage can be fitted separately from the outer ring.

Metric and inch size bearings are available.
Designs with a K in the designation have inch dimensions.
For new designs, however, bearings in metric sizes should always be used in preference.

X-life

Tapered roller bearings of series T7FC are supplied in X-life design. These bearings have improved surfaces, a higher performance combination of material and heat treatment as well as an optimised contact geometry. This improves the friction behaviour and increases the basic dynamic load rating. Under the same operating conditions, a significant increase in basic rating life is achieved. For certain applications, this means that a smaller bearing arrangement can be designed.

X-life bearings are indicated in the dimension tables.

Radial and axial load capacity

Tapered roller bearings can support axial loads in one direction and high radial loads.

They must normally be axially adjusted against a second bearing fitted in a mirror image arrangement. This bearing combination is fitted in an O or X arrangement, *Figure 1* and *Figure 2*, page 520.

Contact angle

The axial load carrying capacity is dependent on the contact angle; i. e. the larger the angle, the higher the load to which the bearing can be subjected.

The size of the contact angle and thus the load carrying capacity is indicated by the bearing-specific value e in the dimension tables. Bearings of series 313, 323..-B, T5ED and T7FC have a very high axial load carrying capacity due to their particularly large contact angle.

Compensation of angular misalignments

The modified line contact between the tapered rollers and the raceways ensures optimum stress distribution at the contact points, prevents edge stresses and allows the bearings to undergo angular adjustment.

At a load ratio $P/C_r \leqq 0{,}2$, the tilting of the bearing rings relative to each other must not exceed a maximum of 4 angular minutes. For higher loads or tilting angles, please contact us.

Matched bearings

Tapered roller bearings with the suffix N11CA are matched in pairs in an X arrangement and can therefore support high axial forces in both directions and moment loads.

The axial internal clearance of the bearing pair is defined by a ring between the two outer rings and is indicated in the suffix, see section Axial internal clearance, page 529.

We can also supply tapered roller bearings by agreement as matched pairs in an O arrangement (N11CB).

When ordering, the number of bearings must be stated, not the number of bearing pairs.

Integral tapered roller bearings

Tapered roller bearings of series JK0S are ready-to-fit units sealed on one side and are predominantly fitted in pairs in an O arrangement. They are not separable and do not require regreasing.

No setting of axial internal clearance required

There is no need to set the axial internal clearance of the bearing pair. It is the result of the very narrowly toleranced projection (dimension u) between the inner and outer ring when the inner rings are clamped using a shaft nut or shaft end cover.

In order to achieve the correct axial internal clearance after fitting, the inner and outer rings have a tight fit.

In the case of integral tapered roller bearings fitted in pairs in an O arrangement, a suitable slot is formed on the outer ring for the snap ring BR. The snap ring must be ordered separately.

Sealing

Tapered roller bearings of standard design and matched in pairs are not sealed.

Integral tapered roller bearings JK0S have a lip seal on one side.

Lubrication

Tapered roller bearings of standard design and matched in pairs can be lubricated with oil or grease.

Integral tapered roller bearings JK0S are filled with a high quality grease.

Operating temperature

Open tapered roller bearings can be used at operating temperatures from –30 °C to +120 °C.
For continuous operating temperatures above +120 °C, please contact us.

Bearings with a lip seal can be used at operating temperatures from –30 °C to +110 °C, restricted by the grease and sealing ring material.

Cages

Open tapered roller bearings have sheet steel cages.

Integral bearings JK0S have cages made from glass fibre reinforced polyamide 66.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
A	Modified internal construction	Standard
N11CA-A..	Two tapered roller bearings matched in an X arrangement, with an intermediate ring between the outer rings. Axial internal clearance in μm	
B	Increased contact angle	
X	External dimensions matched to international standards	
P5	Increased accuracy	Special design, available by agreement and in certain series only

Design and safety guidelines
Calculation of axial force

Under radial load, an internal axial force is induced in the bearing that must be supported by a second bearing and taken into consideration when calculating the equivalent bearing load.

Depending on the bearing arrangement (O or X arrangement), the axial force must first be determined for bearings adjusted clearance-free without preload, *Figure 1*, *Figure 2* and table Load ratio and axial bearing load, page 521.

The following preconditions apply:

- The radial forces act at the central contact points and are positive
- Bearing A is subjected to a radial load F_{rA}, bearing B to a load F_{rB}
- F is an external axial force acting on bearing A.

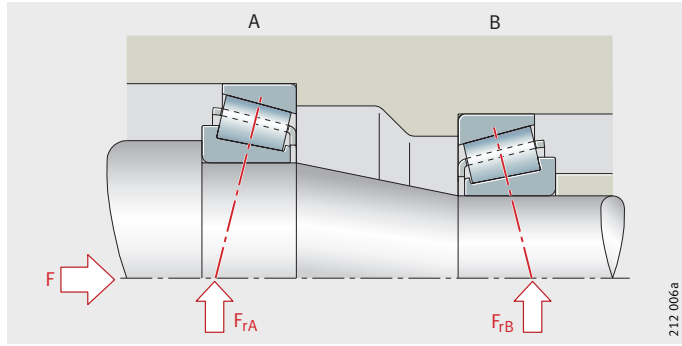


Figure 1
Bearings in O arrangement

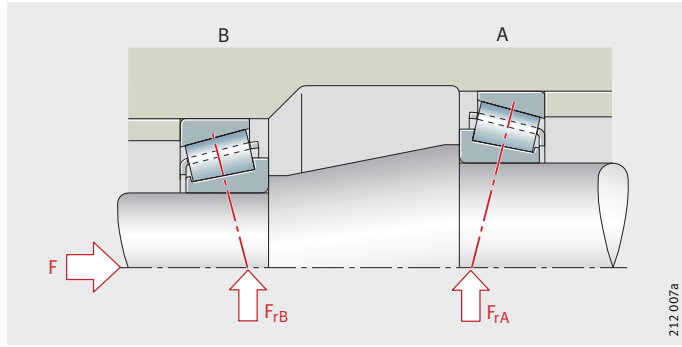


Figure 2
Bearings in X arrangement

Load ratio and axial bearing load

Load ratio		Axial force F_a [1]	
Radial bearing load	External axial force	Bearing A	Bearing B
$\frac{F_{rA}}{Y_A} \leqq \frac{F_{rB}}{Y_B}$	$F \geqq 0$	$F_a = F + 0{,}5 \cdot \frac{F_{rB}}{Y_B}$	[2]
$\frac{F_{rA}}{Y_A} > \frac{F_{rB}}{Y_B}$	$F > 0{,}5 \cdot \left(\frac{F_{rA}}{Y_A} - \frac{F_{rB}}{Y_B}\right)$	$F_a = F + 0{,}5 \cdot \frac{F_{rB}}{Y_B}$	[2]
	$F \leqq 0{,}5 \cdot \left(\frac{F_{rA}}{Y_A} - \frac{F_{rB}}{Y_B}\right)$	[2]	$F_a = 0{,}5 \cdot \frac{F_{rA}}{Y_A} - F$

[1] Axial force F_a, to be used in calculation of the equivalent dynamic bearing load.

[2] If no formula is given, the axial force is not taken into consideration.

Load ratio and axial bearing load for JK0S

Load ratio [1] $Y = Y_A = Y_B$	Axial force F_a [2]	
	Bearing A	Bearing B
$F_{rA} \leqq F_{rB}$	$F_a = F + 0{,}5 \cdot \frac{F_{rB}}{Y}$	–
$F_{rA} > F_{rB}$ $F > 0{,}5 \cdot \left(\frac{F_{rA} - F_{rB}}{Y}\right)$	$F_a = F + 0{,}5 \cdot \frac{F_{rB}}{Y}$	–
$F_{rA} > F_{rB}$ $F \leqq 0{,}5 \cdot \left(\frac{F_{rA} - F_{rB}}{Y}\right)$	–	$F_a = 0{,}5 \cdot \frac{F_{rA}}{Y} - F$

[1] Bearings arranged in pairs.

[2] Axial force F_a, to be used in calculation of the equivalent dynamic bearing load.

Equivalent dynamic bearing load

For single bearings under dynamic load (and also for integral tapered roller bearings JK0S), the following applies:

Single bearing under dynamic load

Load ratio	Equivalent dynamic bearing load
$\frac{F_a}{F_r} \leqq e$	$P = F_r$
$\frac{F_a}{F_r} > e$	$P = 0{,}4 \cdot F_r + Y \cdot F_a$

P N
Equivalent dynamic bearing load for combined load
F_a N
Axial dynamic bearing load
F_r N
Radial dynamic bearing load
e, Y –
Factors from dimension tables.

For bearing pairs under dynamic load in an X or O arrangement, the following applies:

Bearing pairs under dynamic load

Load ratio	Equivalent dynamic bearing load
$\frac{F_a}{F_r} \leqq e$	$P = F_r + 1{,}12 \cdot Y \cdot F_a$
$\frac{F_a}{F_r} > e$	$P = 0{,}67 \cdot F_r + 1{,}68 \cdot Y \cdot F_a$

P N
Equivalent dynamic bearing load for combined load
F_a N
Axial dynamic bearing load of bearing pair
F_r N
Radial dynamic bearing load of bearing pair
e, Y –
Factors for single bearings from dimension tables.

For matched bearing pairs 313(320, 322, 329)..-N11CA under dynamic load, the following applies:

Matched bearing pairs under dynamic load

Load ratio	Equivalent dynamic bearing load
$\frac{F_a}{F_r} \leqq e$	$P = F_r + Y_1 \cdot F_a$
$\frac{F_a}{F_r} > e$	$P = 0{,}67 \cdot F_r + Y_2 \cdot F_a$

P N
Equivalent dynamic bearing load for combined load
F_a N
Axial dynamic bearing load of bearing pair
F_r N
Radial dynamic bearing load of bearing pair
e, Y_1, Y_2 –
Factors for bearing pairs from dimension tables.

Equivalent static bearing load

For single bearings under static load (and also for integral tapered roller bearings JK0S), the following applies:

Single bearing under static load

Load ratio	Equivalent static load
$\frac{F_{0a}}{F_{0r}} \leqq \frac{1}{2 \cdot Y_0}$	$P_0 = F_{0r}$
$\frac{F_{0a}}{F_{0r}} > \frac{1}{2 \cdot Y_0}$	$P_0 = 0{,}5 \cdot F_{0r} + Y_0 \cdot F_{0a}$

P_0 N
Equivalent static bearing load for combined load

F_{0a} N
Axial static bearing load

F_{0r} N
Radial static bearing load

Y_0 –
Factor from dimension tables.

Bearing pairs under static load

For bearing pairs under static load in an X or O arrangement, the following applies:

$$P_0 = F_{0r} + 2 \cdot Y_0 \cdot F_{0a}$$

P_0 N
Equivalent static bearing load for combined load

F_{0a} N
Axial static bearing load of bearing pair

F_{0r} N
Radial static bearing load of bearing pair

Y_0 –
Factor for single bearings from dimension tables.

Matched bearing pairs under static load

For matched bearing pairs 313(320, 322, 329)..-N11CA under static load, the following applies:

$$P_0 = F_{0r} + Y_0 \cdot F_{0a}$$

P_0 N
Equivalent static bearing load for combined load

F_{0a} N
Axial static bearing load of bearing pair

F_{0r} N
Radial static bearing load of bearing pair

Y_0 –
Factor for bearing pairs from dimension tables.

Basic load ratings and fatigue limit load for bearing pairs

If two bearings of the same size and design are fitted immediately adjacent to each other in an O or X arrangement, the basic dynamic load rating C_r, the basic static load rating C_{0r} and the fatigue limit load C_{ur} of the bearing pair are as follows:

- $C_r = 1{,}715 \cdot C_{r\ single\ bearing}$
- $C_{0r} = 2 \cdot C_{0r\ single\ bearing}$
- $C_{ur} = 2 \cdot C_{ur\ single\ bearing}$.

Matched bearings

For matched bearing pairs 313..-N11CA, 320..-N11CA, 322..-N11CA and 329..-N11CA, the basic load ratings are given in the dimension tables.

Minimum radial load

In order to ensure operation without slippage, the bearings must be subjected to a minimum load $F_{r\ min}$ in a radial direction. This applies particularly in the case of high speeds and high accelerations. In continuous operation, roller bearings with cage must have a minimum radial load of the order of $P/C_r > 0{,}02$.

Speeds

The limiting speeds n_G in the dimension tables must not be exceeded.

Matched bearings

The limiting speed n_G is possible if the less favourable thermal balance of the bearing pair is taken into consideration in the operating conditions.

Design of bearing arrangements

Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 150.

Recommended housing tolerances for radial bearings, see table, page 152.

Recommended shaft and housing tolerances for JKOS bearings, see table.

Tolerances for JK0S bearings

Circumferential load		Tolerance	
		Shaft	Housing
on	inner ring	m6	H7
	outer ring	g6	M7

Mounting dimensions

The dimension tables give the maximum dimensions of the radii r_a and r_b and the diameters of the abutment shoulders.

Cage projection

In the open bearings, the cages project laterally to a certain extent. In order to prevent the cages grazing the adjacent construction, the lateral minimum distances C_a and C_b in the dimension tables must be taken into consideration in the design of the adjacent construction.

Accuracy
Metric bearings

The main dimensions conform to DIN ISO 355 and DIN 720, the dimensional and geometrical tolerances conform to DIN 620-2.

Width tolerance to PN

Single row tapered roller bearings 303, 313, 322, 323..-A, 323..-B, T2EE, T4CB, T4DB, T5ED and T7FC as well as JK0S correspond to tolerance class PN.

Bearings 320, 329, 330, 331 and 332 for shaft diameters over 200 mm have width tolerances to tolerance class PN.

Inner ring tolerances, Part 1

Bore mm d		Bore deviation µm Δ_{dmp}		Variation µm V_{dp}	V_{dmp}	Radial runout µm K_{ia}
over	incl.	max.	min.	max.	max.	max.
10	18	0	−12	12	9	15
18	30	0	−12	12	9	18
30	50	0	−12	12	9	20
50	80	0	−15	15	11	25
80	120	0	−20	20	15	30
120	180	0	−25	25	19	35
180	250	0	−30	30	23	50
250	315	0	−35	35	26	60
315	400	0	−40	40	30	70

Inner ring tolerances, Part 2

Bore mm d		Width deviation µm Δ_{Bs}		Width deviation µm Δ_{Ts}		Δ_{T1s}		Δ_{T2s}	
over	incl.	max.	min.	max.	min.	max.	min.	max.	min.
10	18	0	−120	+200	0	+100	0	+100	0
18	30	0	−120	+200	0	+100	0	+100	0
30	50	0	−120	+200	0	+100	0	+100	0
50	80	0	−150	+200	0	+100	0	+100	0
80	120	0	−200	+200	−200	+100	−100	+100	−100
120	180	0	−250	+350	−250	+150	−150	+200	−100
180	250	0	−300	+350	−250	+150	−150	+200	−100
250	315	0	−350	+350	−250	+150	−150	+200	−100
315	400	0	−400	+400	−400	+200	−200	+200	−200

Outer ring tolerances

Outside diameter mm D		Outside diameter deviation µm Δ_{Dmp}		Variation µm V_{Dp}	V_{Dmp}	Radial runout µm K_{ea}
over	incl.	max.	min.	max.	max.	max.
18	30	0	−12	12	9	18
30	50	0	−14	14	11	20
50	80	0	−16	16	12	25
80	120	0	−18	18	14	35
120	150	0	−20	20	15	40
150	180	0	−25	25	19	45
180	250	0	−30	30	23	50
250	315	0	−35	35	26	60
315	400	0	−40	40	30	70
400	500	0	−45	45	34	80

The width tolerance Δ_{Cs} is identical to Δ_{Bs} for the inner ring of the same bearing.

Width tolerance to P6X

Tapered roller bearings 320, 329, 330, 331 and 332 for shaft diameters up to 200 mm have restricted width tolerances to tolerance class P6X.

Inner ring tolerances, Part 1

Bore mm d		Bore deviation µm Δ_{dmp}		Variation µm V_{dp}	V_{dmp}	Radial runout µm K_{ia}
over	incl.	max.	min.	max.	max.	max.
10	18	0	−12	12	9	15
18	30	0	−12	12	9	18
30	50	0	−12	12	9	20
50	80	0	−15	15	11	25
80	120	0	−20	20	15	30
120	180	0	−25	25	19	35
180	200	0	−30	30	23	50

Inner ring tolerances, Part 2

Bore mm d		Width deviation µm Δ_{Bs}		Width deviation µm Δ_{Ts}		Δ_{T1s}		Δ_{T2s}	
over	incl.	max.	min.	max.	min.	max.	min.	max.	min.
10	18	0	−50	+100	0	+50	0	+50	0
18	30	0	−50	+100	0	+50	0	+50	0
30	50	0	−50	+100	0	+50	0	+50	0
50	80	0	−50	+100	0	+50	0	+50	0
80	120	0	−50	+100	0	+50	0	+50	0
120	180	0	−50	+150	0	+50	0	+100	0
180	200	0	−50	+150	0	+50	0	+100	0

Outer ring tolerances

Outside diameter mm D		Outside diameter deviation µm Δ_{Dmp}		Variation µm V_{Dp}	V_{Dmp}	Radial runout µm K_{ea}	Width deviation µm Δ_{Cs}	
over	incl.	max.	min.	max.	max.	max.	max.	min.
30	50	0	−14	14	11	20	0	−100
50	80	0	−16	16	12	25	0	−100
80	120	0	−18	18	14	35	0	−100
120	150	0	−20	20	15	40	0	−100
150	180	0	−25	25	19	45	0	−100
180	250	0	−30	30	23	50	0	−100
250	315	0	−35	35	26	60	0	−100

Restricted tolerance P5

We can by agreement supply tapered roller bearings with restricted tolerances to tolerance class P5 to DIN 620-2.

Inner ring tolerances, Part 1

Bore mm d		Bore deviation µm Δ_{dmp}		Variation µm V_{dp}	V_{dmp}	Radial runout µm K_{ia}
over	incl.	max.	min.	max.	max.	max.
10	18	0	−7	5	5	5
18	30	0	−8	6	5	5
30	50	0	−10	8	5	6
50	80	0	−12	9	6	7
80	120	0	−15	11	8	8
120	180	0	−18	14	9	11
180	250	0	−22	17	11	13
250	315	0	−25	–	–	–
315	400	0	−30	–	–	–

Inner ring tolerances, Part 2

Bore mm d		Width deviation µm Δ_{Bs}		Width deviation µm Δ_{Ts}	
over	incl.	max.	min.	max.	min.
10	18	0	−200	+200	−200
18	30	0	−200	+200	−200
30	50	0	−240	+200	−200
50	80	0	−300	+200	−200
80	120	0	−400	+200	−200
120	180	0	−500	+350	−250
180	250	0	−600	+350	−250
250	315	0	–	+350	−250
315	400	0	–	+400	−400

Outer ring tolerances

Outside diameter		Outside diameter deviation		Variation		Radial runout
mm		µm		µm		µm
D		Δ_{Dmp}		V_{Dp}	V_{Dmp}	K_{ea}
over	incl.	max.	min.	max.	max.	max.
18	30	0	–8	6	5	6
30	50	0	–9	7	5	7
50	80	0	–11	8	6	8
80	120	0	–13	10	7	10
120	150	0	–15	11	8	11
150	180	0	–18	14	9	13
180	250	0	–20	15	10	15
250	315	0	–25	19	13	18
315	400	0	–28	22	14	20
400	500	0	–33	–	–	23

Total width tolerance of matched bearings

The total width tolerance of bearing pairs 313..-N11CA, 320..-N11CA, 322..-N11CA and 329..-N11CA is determined from the axial internal clearance and the deviations of the width Δ_{Ts} of the single bearings, see Inner ring tolerances, Part 2, page 525.

Bearings in inch sizes

Tapered roller bearings of series K are manufactured as standard with normal tolerances to ANSI/ABMA. The width Δ_{Bs} and radial runout correspond to tolerance class PN to DIN 620-2.
The bore and outside diameters of bearings in inch sizes have plus tolerances.

Inner ring tolerances, Part 1

Bore		Bore deviation		Width deviation	
mm		µm		µm	
d		Δ_{dmp}		Δ_{Ts}	
over	incl.	max.	min.	max.	min.
–	81	+13	0	+200	0
81	102	+25	0	+200	0

Inner ring tolerances, Part 2

Bore		Width deviation (in relation to bore)		Radial runout
mm		µm		µm
d		Δ_{Bs}		K_{ia}
over	incl.	max.	min.	
10	18	0	–120	15
18	30	0	–120	18
30	50	0	–120	20
50	80	0	–150	25
80	120	0	–200	30

Outer ring tolerances

Outside diameter mm D		Outside diameter deviation µm Δ_{Dmp}		Radial runout µm K_{ea}
over	incl.	max.	min.	
18	30	+25	0	18
30	50	+25	0	20
50	80	+25	0	25
80	120	+25	0	35
120	150	+25	0	40

Chamfer dimensions

The limit values for chamfer dimensions r are only valid for tapered roller bearings with inch dimensions.
Values for metric tapered roller bearings, see Limit values for chamfer dimensions, page 138.

Limit values for chamfer dimensions r_{max} for the inner ring

Nominal bearing bore diameter d mm		Chamfer dimension[1)]	
		r_1 mm	r_2 mm
over	incl.		
–	50,8	+0,4	+0,9
50,8	101,6	+0,5	+1,25
101,6	254	+0,65	+1,8

1) $\overline{r_{min}}$: see dimension tables.

Limit values for chamfer dimensions r_{max} for the outer ring

Nominal outside diameter D mm		Chamfer dimension[1)]	
		r_3 mm	r_4 mm
over	incl.		
–	101,6	+0,6	+1,05
101,6	168,3	+0,65	+1,15
168,3	266,7	+0,85	+1,35
266,7	355,6	+1,7	+1,7

1) $\overline{r_{min}}$: see dimension tables.

Axial internal clearance

In tapered roller bearings, the axial internal clearance is the result of mounting against a second bearing during installation.

Matched bearings

The axial internal clearance is defined here by an intermediate ring and is indicated in the suffix.

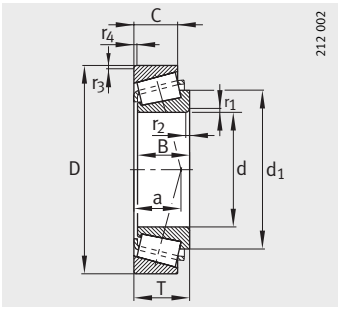
Example:

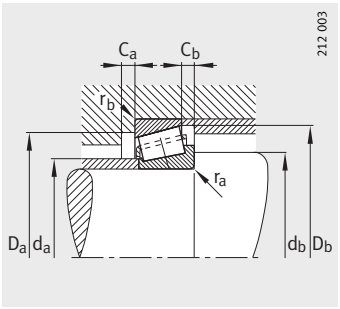
- A80-120 indicates that the axial internal clearance of the bearing pair before fitting is between 80 µm and 120 µm.

Once bearing pairs are fitted, the preset axial internal clearance is reduced by the fit conditions and the axial clamping forces.

Tapered roller bearings

Single row





Mounting dimensions

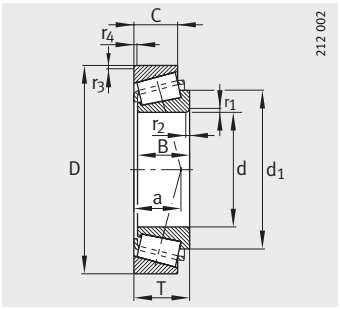
Dimension table · Dimensions in mm

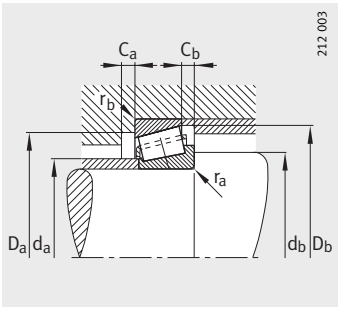
Designation	Interchange designation to ISO 355	Mass	Dimensions									Mounting dimensions		
		m	d	D	B	C	T	r_1, r_2	r_3, r_4	a	d_1	d_a	d_b	D_a
		≈kg						min.	min.	≈	≈	max.	min.	min.
30202-A	–	0,054	**15**	35	11	10	11,75	0,6	0,6	8	26,4	20	19	29
30302-A	T2FB015	0,096	**15**	42	13	11	14,25	1	1	10	28,2	22	21	36
30203-A	T2DB017	0,056	**17**	40	12	11	13,25	1	1	10	29,1	23	23	34
32203-A	T2DD017	0,105	**17**	40	16	14	17,25	1	1	11	28,7	22	23	34
30303-A	T2FB017	0,129	**17**	47	14	12	15,25	1	1	11	31,6	25	23	40
32303-A	T2FD017	0,18	**17**	47	19	16	20,25	1	1	12	31,5	24	23	39
32004-X	T3CC020	0,108	**20**	42	15	12	15	0,6	0,6	10	33	25	25	36
30204-A	T2DB020	0,092	**20**	47	14	12	15,25	1	1	11	34,5	27	26	40
30304-A	T2FB020	0,188	**20**	52	15	13	16,25	1,5	1,5	11	36,1	28	27	44
32304-A	T2FD020	0,241	**20**	52	21	18	22,25	1,5	1,5	14	35,3	27	27	43
32005-X	T4CC025	0,12	**25**	47	15	11,5	15	0,6	0,6	12	38	30	30	40
33005	–	0,139	**25**	47	17	14	17	0,6	0,6	11	36,8	30	30	41
30205-A	T3CC025	0,155	**25**	52	15	13	16,25	1	1	13	38,5	31	31	44
32205-A	T2CD025	0,186	**25**	52	18	16	19,25	1	1	14	40,2	31	31	44
33205	T2DE025	0,214	**25**	52	22	18	22	1	1	14	39,6	30	31	43
31305-A	T7FB025	0,297	**25**	62	17	13	18,25	1,5	1,5	20	46,3	34	32	47
30305-A	T2FB025	0,289	**25**	62	17	15	18,25	1,5	1,5	13	42,3	34	32	54
32305-A	T2FD025	0,362	**25**	62	24	20	25,25	1,5	1,5	16	42,3	33	32	53
320/28-X	T4CC028	0,156	**28**	52	16	12	16	1	1	13	41	33	34	45
32006-X	T4CC030	0,195	**30**	55	17	13	17	1	1	14	44,1	35	36	48
30206-A	T3DB030	0,237	**30**	62	16	14	17,25	1	1	14	45,6	37	36	53
32206-A	T3DC030	0,274	**30**	62	20	17	21,25	1	1	16	45,9	37	36	52
33206	T2DE030	0,394	**30**	62	25	19,5	25	1	1	16	46,1	36	36	53
31306-A	T7FB030	0,441	**30**	72	19	14	20,75	1,5	1,5	24	54	40	37	55
30306-A	T2FB030	0,445	**30**	72	19	16	20,75	1,5	1,5	15	49,3	40	37	62
32306-A	T2FD030	0,587	**30**	72	27	23	28,75	1,5	1,5	18	49,3	39	37	59
320/32-X	T4CC032	0,188	**32**	58	17	13	17	1	1	14	46,5	38	38	50
32007-X	T4CC035	0,257	**35**	62	18	14	18	1	1	15	50	40	41	54
30207-A	T3DB035	0,334	**35**	72	17	15	18,25	1,5	1,5	15	52,7	44	42	62
32207-A	T3DC035	0,482	**35**	72	23	19	24,25	1,5	1,5	18	53,9	43	42	61
33207	T2DE035	0,585	**35**	72	28	22	28	1,5	1,5	18	53	42	42	61
31307-A	T7FB035	0,582	**35**	80	21	15	22,75	2	1,5	26	59,9	44	44	62
30307-A	T2FB035	0,573	**35**	80	21	18	22,75	2	1,5	16	55,2	45	44	70
32307-B	T5FE035	0,802	**35**	80	31	25	32,75	2	1,5	25	59,8	42	44	61
32307-A	T2FE035	0,741	**35**	80	31	25	32,75	2	1,5	20	55,2	44	44	66

						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D_a	D_b	C_a	C_b	r_a	r_b	dyn. C_r	stat. C_{0r}	e	Y	Y_0	C_{ur}	n_G	n_B
max.	min.	min.	min.	max.	max.	N	N				N	min^{-1}	min^{-1}
29	32	2	1,5	0,6	0,6	14 700	14 100	0,35	1,73	0,95	1 320	23 800	13 500
36	38	2	3	1	1	23 000	20 500	0,29	2,11	1,16	2 110	21 000	12 500
34	37	2	2	1	1	18 500	17 800	0,35	1,74	0,96	1 890	21 000	12 100
34	37	3	3	1	1	28 500	29 000	0,31	1,92	1,06	3 000	21 000	10 800
41	42	2	3	1	1	27 500	24 500	0,29	2,11	1,16	2 600	18 200	12 400
41	43	3	4	1	1	36 000	35 000	0,29	2,11	1,16	4 050	18 200	11 500
37	39	3	3	0,6	0,6	24 000	28 500	0,37	1,6	0,88	3 000	18 200	10 900
41	43	2	3	1	1	27 000	27 000	0,35	1,74	0,96	2 900	16 800	10 500
45	47	2	3	1,5	1,5	34 000	32 500	0,3	2	1,1	3 600	15 400	9 800
45	47	3	4	1,5	1,5	46 000	47 500	0,3	2	1,1	5 600	15 400	9 300
42	44	3	3,5	0,6	0,6	26 500	33 500	0,43	1,39	0,77	3 600	15 400	9 200
42	44	3	3	0,6	0,6	33 000	41 500	0,29	2,07	1,14	4 650	15 400	9 400
46	48	2	3	1	1	32 500	35 000	0,37	1,6	0,88	3 900	14 000	9 100
46	48	3	3	1	1	40 000	44 500	0,36	1,67	0,92	5 100	14 000	8 100
46	49	4	4	1	1	48 500	58 000	0,35	1,71	0,94	6 900	14 000	8 200
55	59	3	5	1,5	1,5	37 000	38 500	0,83	0,73	0,4	4 400	11 900	7 200
55	57	2	3	1,5	1,5	47 000	45 500	0,3	2	1,1	5 100	12 600	8 200
55	57	3	5	1,5	1,5	62 000	66 000	0,3	2	1,1	7 800	12 600	7 900
46	49	3	4	1	1	34 000	40 500	0,43	1,39	0,77	4 550	13 300	8 300
49	52	3	4	1	1	38 500	46 500	0,43	1,39	0,77	5 300	12 600	7 900
56	57	2	3	1	1	43 500	48 000	0,37	1,6	0,88	5 500	11 900	7 400
56	59	3	4	1	1	53 000	62 000	0,37	1,6	0,88	7 400	11 900	6 700
56	59	5	5,5	1	1	65 000	77 000	0,34	1,76	0,97	9 400	11 200	7 100
65	68	3	6,5	1,5	1,5	45 000	46 500	0,83	0,73	0,4	5 300	9 800	6 500
65	66	3	4,5	1,5	1,5	60 000	61 000	0,31	1,9	1,05	6 900	10 500	7 200
65	66	4	5,5	1,5	1,5	80 000	89 000	0,31	1,9	1,05	10 800	10 500	6 900
52	55	3	4	1	1	39 000	48 500	0,45	1,32	0,73	5 600	11 900	7 500
56	59	4	4	1	1	45 500	57 000	0,45	1,32	0,73	6 700	11 200	6 900
65	67	3	3	1,5	1,5	54 000	59 000	0,37	1,6	0,88	6 800	9 800	6 400
65	67	3	5,5	1,5	1,5	71 000	84 000	0,37	1,6	0,88	10 200	9 800	6 000
65	68	5	6	1,5	1,5	86 000	105 000	0,35	1,7	0,93	12 800	9 800	6 200
71	76	4	7,5	2	1,5	60 000	64 000	0,83	0,73	0,4	7 500	8 800	5 800
71	74	3	4,5	2	1,5	73 000	75 000	0,31	1,9	1,05	8 600	9 400	6 600
71	76	4	7,5	2	1,5	95 000	116 000	0,55	1,1	0,6	14 300	8 800	6 300
71	74	4	7,5	2	1,5	100 000	113 000	0,31	1,9	1,05	13 500	9 400	6 400

Tapered roller bearings

Single row





Mounting dimensions

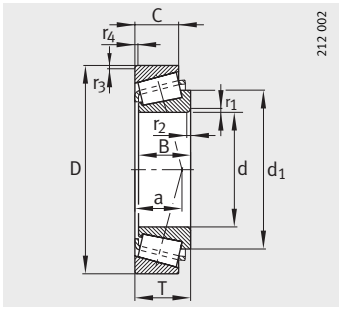
Dimension table (continued) · Dimensions in mm

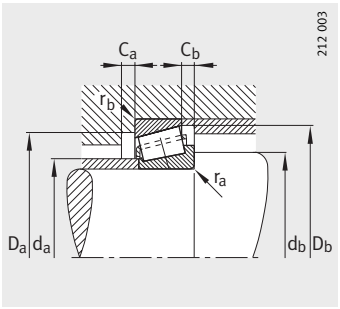
Designation	Interchange designation to ISO 355	X-life	Mass	Dimensions									Mounting dimensions		
			m	d	D	B	C	T	r_1, r_2	r_3, r_4	a	d_1	d_a	d_b	D_a
			≈kg						min.	min.	≈	≈	max.	min.	min.
32008-XA	T3CD040	–	0,312	**40**	68	19	14,5	19	1	1	15	55	46	46	60
33108	T2CE040	–	0,541	**40**	75	26	20,5	26	1,5	1,5	18	58,7	47	47	65
30208-A	T3DB040	–	0,435	**40**	80	18	16	19,75	1,5	1,5	17	58,4	49	47	69
32208-A	T3DC040	–	0,551	**40**	80	23	19	24,75	1,5	1,5	19	59,2	48	47	68
33208	T2DE040	–	0,741	**40**	80	32	25	32	1,5	1,5	21	60,1	47	47	67
T2EE040	–	–	0,881	**40**	85	32,5	28	33	2,5	2	22	61,9	48	51	70
31308-A	T7FB040	–	0,727	**40**	90	23	17	25,25	2	1,5	30	68,2	51	49	71
30308-A	T2FB040	–	0,812	**40**	90	23	20	25,25	2	1,5	20	63,3	52	49	77
32308-A	T2FD040	–	1,06	**40**	90	33	27	35,25	2	1,5	23	63,3	50	49	73
32308-B	–	–	1,18	**40**	90	33	27	35,25	2	1,5	28	67	50	49	69
32009-XA	T3CC045	–	0,329	**45**	75	20	15,5	20	1	1	17	62	51	51	67
33109	T3CE045	–	0,597	**45**	80	26	20,5	26	1,5	1,5	19	63,8	52	52	69
30209-A	T3DB045	–	0,47	**45**	85	19	16	20,75	1,5	1,5	18	64	54	52	74
32209-A	T3DC045	–	0,57	**45**	85	23	19	24,75	1,5	1,5	20	64,8	53	52	73
33209	T3DE045	–	0,895	**45**	85	32	25	32	1,5	1,5	22	66,2	52	52	72
T7FC045	–	**XL**	0,92	**45**	95	26,5	20	29	2,5	2,5	33	73,6	53	59	71
T2ED045	–	–	1,2	**45**	95	35	30	36	2,5	2,5	24	68,8	54	56	80
31309-A	T7FB045	–	0,998	**45**	100	25	18	27,25	2	1,5	32	75,8	56	54	79
30309-A	T2FB045	–	1	**45**	100	25	22	27,25	2	1,5	21	70,7	59	54	86
32309-BA	T5FD045	–	1,48	**45**	100	36	30	38,25	2	1,5	30	74,2	55	54	76
32309-A	T2FD045	–	1,43	**45**	100	36	30	38,25	2	1,5	25	71,1	56	54	82
32010-X	T3CC050	–	0,384	**50**	80	20	15,5	20	1	1	18	67,5	56	56	72
33010	T2CE050	–	0,47	**50**	80	24	19	24	1	1	17	65,8	56	56	72
33110	T3CE050	–	0,604	**50**	85	26	20	26	1,5	1,5	20	69,1	56	57	74
30210-A	T3DB050	–	0,603	**50**	90	20	17	21,75	1,5	1,5	20	68,8	58	57	79
32210-A	T3DC050	–	0,602	**50**	90	23	19	24,75	1,5	1,5	21	70	58	57	78
33210	T3DE050	–	0,971	**50**	90	32	24,5	32	1,5	1,5	23	71,8	57	57	77
T7FC050	–	**XL**	1,24	**50**	105	29	22	32	3	3	36	80,9	59	65	78
31310-A	T7FB050	–	1,23	**50**	110	27	19	29,25	2,5	2	35	81,4	62	60	87
30310-A	T2FB050	–	1,27	**50**	110	27	23	29,25	2,5	2	23	77,6	65	60	95
32310-A	T2FD050	–	1,9	**50**	110	40	33	42,25	2,5	2	29	78,4	62	60	90

						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D_a	D_b	C_a	C_b	r_a	r_b	dyn. C_r	stat. C_{0r}	e	Y	Y_0	C_{ur}	n_G	n_B
max.	min.	min.	min.	max.	max.	N	N				N	min^{-1}	min^{-1}
62	65	4	4,5	1	1	53 000	71 000	0,38	1,58	0,87	8 300	9 800	6 200
68	71	4	5,5	1,5	1,5	79 000	103 000	0,36	1,69	0,93	12 800	8 800	5 500
73	74	3	3,5	1,5	1,5	61 000	67 000	0,37	1,6	0,88	7 600	8 800	5 900
73	75	3	5,5	1,5	1,5	79 000	93 000	0,37	1,6	0,88	11 200	8 800	5 300
73	76	5	7	1,5	1,5	105 000	134 000	0,36	1,68	0,92	16 600	8 400	5 700
75	80	6	5	2,5	2	114 000	139 000	0,34	1,74	0,96	17 000	8 400	5 600
81	86	4	8	2	1,5	76 000	83 000	0,83	0,73	0,4	9 400	7 400	5 200
81	82	3	5	2	1,5	91 000	102 000	0,35	1,74	0,96	11 900	7 800	5 800
81	82	4	8	2	1,5	120 000	146 000	0,35	1,74	0,96	17 900	7 800	5 600
81	85	4	8	2	1,5	120 000	149 000	0,55	1,1	0,6	18 100	7 400	5 500
69	72	4	4,5	1	1	61 000	86 000	0,39	1,53	0,84	10 200	8 800	5 500
73	77	4	5,5	1,5	1,5	84 000	115 000	0,38	1,57	0,86	14 400	8 400	5 000
78	80	3	4,5	1,5	1,5	70 000	82 000	0,4	1,48	0,81	9 600	7 800	5 400
78	80	3	5,5	1,5	1,5	82 000	100 000	0,4	1,48	0,81	12 000	7 800	4 900
78	81	5	7	1,5	1,5	107 000	146 000	0,39	1,56	0,86	18 300	7 800	5 200
83	91	5	9	2,5	2,5	105 000	109 000	0,87	0,69	0,38	15 100	7 000	5 900
83	89	6	6	2,5	2,5	143 000	175 000	0,32	1,86	1,02	21 500	7 400	5 000
91	95	4	9	2	1,5	96 000	108 000	0,83	0,73	0,4	12 700	6 700	4 650
91	92	3	5	2	1,5	111 000	125 000	0,35	1,74	0,96	14 800	7 000	5 200
91	94	5	8	2	1,5	144 000	187 000	0,55	1,1	0,6	23 000	6 700	5 000
91	93	4	8	2	1,5	154 000	193 000	0,35	1,74	0,96	23 900	7 000	4 950
74	77	4	4,5	1	1	64 000	93 000	0,42	1,42	0,78	11 200	7 800	5 000
74	76	4	5	1	1	75 000	113 000	0,32	1,9	1,04	13 900	7 800	5 400
78	82	4	6	1,5	1,5	86 000	122 000	0,41	1,46	0,8	15 200	7 400	4 600
83	85	3	4,5	1,5	1,5	79 000	96 000	0,42	1,43	0,79	11 300	7 400	5 000
83	85	3	5,5	1,5	1,5	88 000	109 000	0,42	1,43	0,79	13 200	7 400	4 750
83	87	5	7,5	1,5	1,5	115 000	163 000	0,41	1,45	0,8	20 400	7 000	4 700
91	100	5	10	3	3	127 000	135 000	0,87	0,69	0,38	18 900	6 300	5 500
100	104	4	10	2,5	2	111 000	125 000	0,83	0,73	0,4	14 700	6 300	4 300
100	102	4	6	2,5	2	130 000	148 000	0,35	1,74	0,96	17 600	6 300	4 800
100	102	5	9	2,5	2	187 000	237 000	0,35	1,74	0,96	29 500	6 300	4 550

Tapered roller bearings

Single row





Mounting dimensions

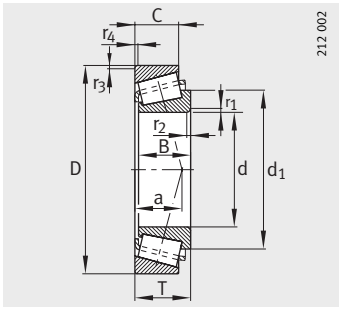
Dimension table (continued) · Dimensions in mm

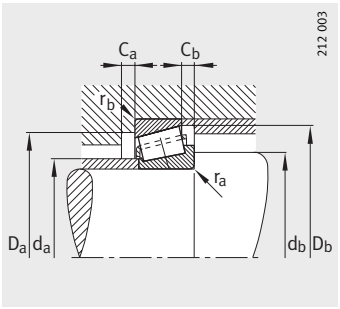
Designation	Interchange designation to ISO 355	X-life	Mass	Dimensions									Mounting dimensions		
			m	d	D	B	C	T	r_1, r_2	r_3, r_4	a	d_1	d_a	d_b	D_a
			≈kg						min.	min.	≈	≈	max.	min.	min.
32011-X	T3CC055	–	0,64	**55**	90	23	17,5	23	1,5	1,5	20	75,8	63	62	81
33011	T2CE055	–	0,673	**55**	90	27	21	27	1,5	1,5	19	74,2	63	62	81
33111	T3CE055	–	0,894	**55**	95	30	23	30	1,5	1,5	22	76,2	62	62	83
30211-A	T3DB055	–	0,92	**55**	100	21	18	22,75	2	1,5	21	76,5	64	64	88
32211-A	T3DC055	–	0,87	**55**	100	25	21	26,75	2	1,5	23	76,2	63	64	87
33211	T3DE055	–	1,17	**55**	100	35	27	35	2	1,5	26	78,8	62	64	85
T7FC055	–	**XL**	1,64	**55**	115	31	23,5	34	3	3	40	88,6	65	72	86
31311-A	T7FB055	–	1,57	**55**	120	29	21	31,5	2,5	2	39	88	68	65	94
30311-A	T2FB055	–	1,8	**55**	120	29	25	31,5	2,5	2	25	84,7	71	65	104
32311-B	T5FD055	–	2,47	**55**	120	43	35	45,5	2,5	2	36	89,6	65	65	91
32311-A	T2FD055	–	2,4	**55**	120	43	35	45,5	2,5	2	30	85	68	65	99
32012-X	T4CC060	–	0,614	**60**	95	23	17,5	23	1,5	1,5	21	80	67	67	85
33012	T2CE060	–	0,714	**60**	95	27	21	27	1,5	1,5	20	78,6	67	67	85
33112	T3CE060	–	1,01	**60**	100	30	23	30	1,5	1,5	23	81,3	67	67	88
30212-A	T3EB060	–	0,919	**60**	110	22	19	23,75	2	1,5	22	82,3	70	69	96
32212-A	T3EC060	–	1,18	**60**	110	28	24	29,75	2	1,5	24	82,8	69	69	95
33212	T3EE060	–	1,55	**60**	110	38	29	38	2	1,5	28	86,2	69	69	93
T5ED060	–	–	1,82	**60**	115	38	31	39	4	2,5	33	90,9	69	76	91
T7FC060	–	**XL**	2,03	**60**	125	33,5	26	37	3	3	42	96,5	71	78	94
31312-A	T7FB060	–	1,94	**60**	130	31	22	33,5	3	2,5	41	95,6	73	72	103
30312-A	T2FB060	–	2,02	**60**	130	31	26	33,5	3	2,5	26	92,1	77	72	112
32312-BA	T5FD060	–	3,15	**60**	130	46	37	48,5	3	2,5	39	97	71	72	100
32312-A	T2FD060	–	3,19	**60**	130	46	37	48,5	3	2,5	32	92,1	74	72	107
32013-X	T4CC065	–	0,62	**65**	100	23	17,5	23	1,5	1,5	23	85,2	72	72	90
33013	T2CE065	–	0,766	**65**	100	27	21	27	1,5	1,5	21	84,6	72	72	89
33113	T3DE065	–	1,31	**65**	110	34	26,5	34	1,5	1,5	26	89,6	73	72	96
30213-A	T3EB065	–	1,27	**65**	120	23	20	24,75	2	1,5	23	90	77	74	106
32213-A	T3EC065	–	1,49	**65**	120	31	27	32,75	2	1,5	27	91	76	74	104
T5ED065	–	–	1,91	**65**	120	38	31	39	4	2,5	35	95,9	74	80	95
33213	T3EE065	–	2,02	**65**	120	41	32	41	2	1,5	30	92,5	74	74	102
T7FC065	–	**XL**	2,23	**65**	130	33,5	26	37	3	3	44,5	100,9	75	83	98
31313-A	T7GB065	–	2,36	**65**	140	33	23	36	3	2,5	44	102,6	79	77	111
30313-A	T2GB065	–	2,4	**65**	140	33	28	36	3	2,5	28	99,6	83	77	122
32313-BA	T5GD065	–	3,7	**65**	140	48	39	51	3	2,5	42	104,3	77	77	109
32313-A	T2GD065	–	3,61	**65**	140	48	39	51	3	2,5	34	99,6	80	77	117

						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D_a	D_b	C_a	C_b	r_a	r_b	dyn. C_r	stat. C_{0r}	e	Y	Y_0	C_{ur}	n_G	n_B
max.	min.	min.	min.	max.	max.	N	N				N	min^{-1}	min^{-1}
83	86	4	5,5	1,5	1,5	81 000	118 000	0,41	1,48	0,81	14 600	7 000	4 700
83	86	5	6	1,5	1,5	94 000	142 000	0,31	1,92	1,06	18 000	7 000	4 950
88	91	5	7	1,5	1,5	113 000	163 000	0,37	1,6	0,88	20 400	6 700	4 250
91	94	4	4,5	2	1,5	91 000	107 000	0,4	1,48	0,81	12 400	6 700	4 600
91	95	4	5,5	2	1,5	109 000	135 000	0,4	1,48	0,81	16 200	6 700	4 050
91	96	6	8	2	1,5	138 000	194 000	0,4	1,5	0,83	24 400	6 700	4 400
101	109	5	10,5	3	3	152 000	165 000	0,87	0,69	0,38	23 400	5 600	4 950
110	113	4	10,5	2,5	2	123 000	139 000	0,83	0,73	0,4	16 400	5 600	4 100
110	111	4	6,5	2,5	2	151 000	173 000	0,35	1,74	0,96	20 600	6 000	4 500
110	112	5	10,5	2,5	2	194 000	265 000	0,55	1,1	0,6	33 000	5 600	4 350
110	111	5	10,5	2,5	2	211 000	270 000	0,35	1,74	0,96	33 500	6 000	4 300
88	91	4	5,5	1,5	1,5	82 000	123 000	0,43	1,39	0,77	15 200	6 700	4 400
88	90	5	6	1,5	1,5	95 000	148 000	0,33	1,83	1,01	18 800	6 700	4 650
93	96	5	7	1,5	1,5	116 000	171 000	0,4	1,51	0,83	21 500	6 300	4 000
101	103	4	4,5	2	1,5	102 000	121 000	0,4	1,48	0,81	14 000	6 300	4 250
101	104	4	5,5	2	1,5	133 000	169 000	0,4	1,48	0,81	20 600	6 000	3 800
101	105	6	9	2	1,5	169 000	237 000	0,4	1,48	0,82	29 500	6 000	4 050
103	110	6	8	4	2,5	156 000	223 000	0,53	1,13	0,62	28 000	5 600	4 100
111	119	6	11	3	3	181 000	200 000	0,82	0,73	0,4	28 500	5 300	4 600
118	123	5	11,5	3	2,5	146 000	169 000	0,83	0,73	0,4	20 100	5 300	3 750
118	120	5	7,5	3	2,5	174 000	202 000	0,35	1,74	0,96	24 200	5 300	4 300
118	122	6	11,5	3	2,5	220 000	300 000	0,55	1,1	0,6	38 000	5 300	4 050
118	120	6	11,5	3	2,5	242 000	310 000	0,35	1,74	0,96	38 500	5 300	4 000
93	97	4	5,5	1,5	1,5	82 000	125 000	0,46	1,31	0,72	15 800	6 300	4 200
93	96	5	6	1,5	1,5	100 000	161 000	0,35	1,72	0,95	20 300	6 300	4 300
103	106	6	7,5	1,5	1,5	149 000	225 000	0,39	1,55	0,85	28 500	6 000	3 700
111	113	4	4,5	2	1,5	119 000	142 000	0,4	1,48	0,81	16 600	5 600	3 850
111	115	4	5,5	2	1,5	156 000	200 000	0,4	1,48	0,81	24 500	5 600	3 600
108	115	6	8	4	2,5	161 000	235 000	0,56	1,07	0,59	29 500	5 300	3 850
111	115	6	9	2	1,5	203 000	285 000	0,39	1,54	0,85	35 500	5 600	3 750
116	124	5	11	3	3	186 000	211 000	0,87	0,69	0,38	30 500	5 000	4 350
128	132	5	13	3	2,5	163 000	188 000	0,83	0,73	0,4	22 200	5 000	3 600
128	130	5	8	3	2,5	196 000	228 000	0,35	1,74	0,96	27 000	5 000	3 950
128	133	6	12	3	2,5	248 000	340 000	0,55	1,1	0,6	43 000	5 000	3 800
128	130	6	12	3	2,5	270 000	345 000	0,35	1,74	0,96	43 500	5 000	3 800

Tapered roller bearings

Single row





Mounting dimensions

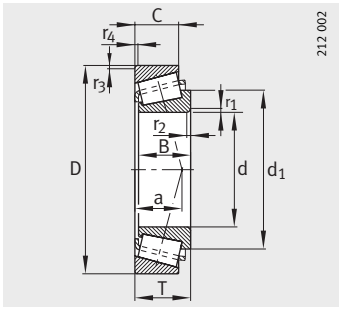
Dimension table (continued) · Dimensions in mm

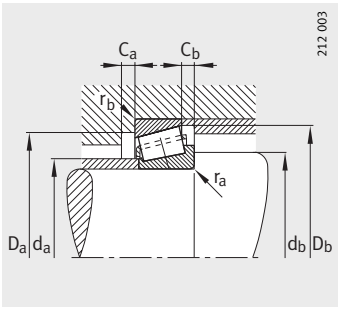
Designation	Interchange designation to ISO 355	X-life	Mass	Dimensions										Mounting dimensions		
			m	d	D	B	C	T	r_1, r_2	r_3, r_4	a	d_1		d_a	d_b	D_a
			≈kg						min.	min.	≈	≈		max.	min.	min.
32914	T2BC070	–	0,494	**70**	100	20	16	20	1	1	18	85,9		76	76	93
32014-X	T4CC070	–	0,967	**70**	110	25	19	25	1,5	1,5	24	92		78	77	98
33014	T2CE070	–	1,14	**70**	110	31	25,5	31	1,5	1,5	22	91		78	77	99
33114	T3DE070	–	1,71	**70**	120	37	29	37	2	1,5	28	96		79	79	104
30214-A	T3EB070	–	1,31	**70**	125	24	21	26,25	2	1,5	25	95,4		81	79	110
32214-A	T3EC070	–	1,82	**70**	125	31	27	33,25	2	1,5	28	96		80	79	108
33214	T3EE070	–	2,06	**70**	125	41	32	41	2	1,5	31	97,9		79	79	107
T7FC070	–	**XL**	2,62	**70**	140	35,5	27	39	3	3	47	108,6		81	90	106
31314-A	T7GB070	–	2,9	**70**	150	35	25	38	3	2,5	47	109		84	82	118
30314-A	T2GB070	–	3,02	**70**	150	35	30	38	3	2,5	30	106,6		89	82	130
32314-BA	T5GD070	–	4,52	**70**	150	51	42	54	3	2,5	44	112		83	82	117
32314-A	T2GD070	–	4,27	**70**	150	51	42	54	3	2,5	37	106,6		86	82	125
32915	T2BC075	–	0,519	**75**	105	20	16	20	1	1	19	90,5		81	81	98
32015-X	T4CC075	–	0,922	**75**	115	25	19	25	1,5	1,5	25	97,3		83	82	103
33015	T2CE075	–	1,16	**75**	115	31	25,5	31	1,5	1,5	23	96,4		83	82	104
33115	T3DE075	–	1,79	**75**	125	37	29	37	2	1,5	30	101,4		84	84	109
30215-A	T4DB075	–	1,55	**75**	130	25	22	27,25	2	1,5	27	100,1		86	84	115
32215-A	T4DC075	–	1,93	**75**	130	31	27	33,25	2	1,5	29	101,6		85	84	115
33215	T3EE075	–	2,47	**75**	130	41	31	41	2	1,5	32	104,5		83	84	111
T7FC075	–	**XL**	3,34	**75**	150	38	29	42	3	3	51	116,2		87	96	114
31315	T7GB075	–	3,79	**75**	160	37	26	40	3	2,5	50	115,8		91	87	127
30315-A	T2GB075	–	3,64	**75**	160	37	31	40	3	2,5	32	114		95	87	139
32315-B	T5GD075	–	5,7	**75**	160	55	45	58	3	2,5	47	120,4		90	87	124
32315-A	T2GD075	–	5,37	**75**	160	55	45	58	3	2,5	39	114		91	87	133
32016-X	T3CC080	–	1,29	**80**	125	29	22	29	1,5	1,5	27	103,6		89	87	112
33016	T2CE080	–	1,67	**80**	125	36	29,5	36	1,5	1,5	26	102,6		90	87	112
33116	T3DE080	–	1,9	**80**	130	37	29	37	2	1,5	31	106,6		89	89	114
30216-A	T3EB080	–	1,68	**80**	140	26	22	28,25	2,5	2	28	106,9		91	90	124
32216-A	T3EC080	–	2,36	**80**	140	33	28	35,25	2,5	2	31	107,5		90	90	122
33216	T3EE080	–	2,93	**80**	140	46	35	46	2,5	2	35	111,8		89	90	119
T7FC080	–	**XL**	3,95	**80**	160	41	31	45	3	3	54	123,6		93	103	121
31316	T7GB080	–	4,19	**80**	170	39	27	42,5	3	2,5	53	122,4		97	92	134
30316-A	T2GB080	–	4,34	**80**	170	39	33	42,5	3	2,5	34	121,7		102	92	148
32316-B	T5GD080	–	7,02	**80**	170	58	48	61,5	3	2,5	49	126,9		96	92	130
32316-A	T2GD080	–	6,57	**80**	170	58	48	61,5	3	2,5	42	122		98	92	142

						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D_a	D_b	C_a	C_b	r_a	r_b	dyn. C_r	stat. C_{0r}	e	Y	Y_0	C_{ur}	n_G	n_B
max.	min.	min.	min.	max.	max.	N	N				N	min^{-1}	min^{-1}
94	96	4	4	1	1	71 000	116 000	0,32	1,9	1,05	14 000	6 300	3 800
103	105	5	6	1,5	1,5	104 000	159 000	0,43	1,38	0,76	20 100	5 600	3 800
103	105	5	5,5	1,5	1,5	136 000	223 000	0,28	2,11	1,16	28 500	5 600	3 900
111	115	6	8	2	1,5	174 000	260 000	0,38	1,58	0,87	33 000	5 300	3 500
116	118	4	5	2	1,5	130 000	160 000	0,42	1,43	0,79	19 000	5 300	3 700
116	119	4	6	2	1,5	163 000	214 000	0,42	1,43	0,79	26 500	5 300	3 400
116	120	7	9	2	1,5	210 000	300 000	0,41	1,47	0,81	38 000	5 300	3 500
126	133	6	12	3	3	208 000	237 000	0,87	0,69	0,38	34 000	4 750	4 100
138	141	5	13	3	2,5	187 000	219 000	0,83	0,73	0,4	26 000	4 750	3 400
138	140	5	8	3	2,5	223 000	260 000	0,35	1,74	0,96	30 500	4 750	3 750
138	143	7	12	3	2,5	285 000	395 000	0,55	1,1	0,6	48 500	4 750	3 550
138	140	6	12	3	2,5	310 000	405 000	0,35	1,74	0,96	49 500	4 750	3 500
99	101	4	4	1	1	74 000	124 000	0,33	1,8	0,99	15 000	6 000	3 550
108	110	5	6	1,5	1,5	105 000	165 000	0,46	1,31	0,72	20 900	5 600	3 600
108	110	6	5,5	1,5	1,5	139 000	232 000	0,3	2,01	1,11	30 000	5 600	3 700
116	120	6	8	2	1,5	178 000	275 000	0,4	1,51	0,83	34 500	5 300	3 300
115	124	4	5	2	1,5	135 000	169 000	0,44	1,38	0,76	20 200	5 300	3 600
121	124	4	6	2	1,5	170 000	227 000	0,44	1,38	0,76	28 000	5 000	3 200
121	125	7	10	2	1,5	206 000	310 000	0,43	1,4	0,77	39 000	5 000	3 350
136	143	6	13	3	3	238 000	275 000	0,87	0,69	0,38	38 500	4 750	3 850
148	151	6	14	3	2,5	203 000	236 000	0,83	0,73	0,4	27 500	4 500	3 250
148	149	5	9	3	2,5	250 000	295 000	0,35	1,74	0,96	34 500	4 500	3 600
148	151	7	14	3	2,5	330 000	470 000	0,55	1,1	0,6	57 000	4 500	3 350
148	149	7	13	3	2,5	360 000	475 000	0,35	1,74	0,96	57 000	4 500	3 300
117	120	6	7	1,5	1,5	137 000	211 000	0,42	1,42	0,78	26 000	5 000	3 500
117	119	6	6,5	1,5	1,5	175 000	290 000	0,28	2,16	1,19	37 000	5 000	3 600
121	126	6	8	2	1,5	188 000	300 000	0,42	1,44	0,79	37 000	5 000	3 100
130	132	4	6	2,5	2	154 000	190 000	0,42	1,43	0,79	21 900	5 000	3 350
130	134	5	7	2,5	2	197 000	260 000	0,42	1,43	0,79	31 000	5 000	3 050
130	135	7	11	2,5	2	250 000	380 000	0,43	1,41	0,78	47 000	4 750	3 200
146	152	7	14	3	3	270 000	315 000	0,87	0,69	0,38	44 000	4 500	3 700
158	159	6	15,5	3	2,5	227 000	270 000	0,83	0,73	0,4	30 500	4 500	3 100
158	159	5	9,5	3	2,5	285 000	345 000	0,35	1,74	0,96	39 500	4 500	3 300
158	160	7	13,5	3	2,5	355 000	510 000	0,55	1,1	0,6	61 000	4 200	3 250
158	159	7	13,5	3	2,5	400 000	530 000	0,35	1,74	0,96	63 000	4 500	3 200

Tapered roller bearings

Single row





Mounting dimensions

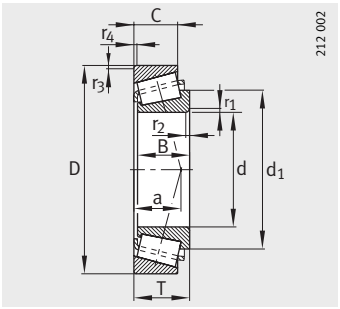
Dimension table (continued) · Dimensions in mm

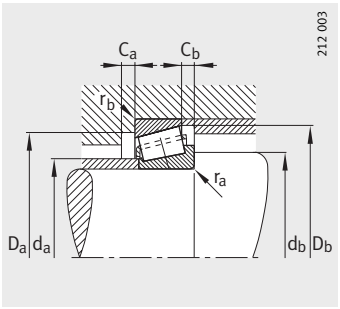
Designation	Interchange designation to ISO 355	X-life	Mass	Dimensions										Mounting dimensions		
			m	d	D	B	C	T	r_1, r_2	r_3, r_4	a	d_1		d_a	d_b	D_a
			≈kg						min.	min.	≈	≈		max.	min.	min.
32017-X	T4CC085	–	1,36	**85**	130	29	22	29	1,5	1,5	29	109,5		94	92	117
33017	T2CE085	–	1,75	**85**	130	36	29,5	36	1,5	1,5	26	108,5		94	92	118
33117	T3DE085	–	2,38	**85**	140	41	32	41	2,5	2	33	114,2		95	95	122
30217-A	T3EB085	–	2,29	**85**	150	28	24	30,5	2,5	2	30	114,4		97	95	132
32217-A	T3EC085	–	2,72	**85**	150	36	30	38,5	2,5	2	34	114,6		96	95	130
33217	T3EE085	–	3,58	**85**	150	49	37	49	2,5	2	37	117,8		95	95	128
T7FC085	–	**XL**	4,92	**85**	170	45	33	48	4	4	55	131,1		100	110	131
31317	T7GB085	–	4,88	**85**	180	41	28	44,5	4	3	55	129,3		103	99	143
30317-A	T2GB085	–	4,83	**85**	180	41	34	44,5	3	3	36	127,6		107	99	156
32317-B	T5GD085	–	7,86	**85**	180	60	49	63,5	4	3	51	133,9		102	99	138
32317-A	T2GD085	–	7,5	**85**	180	60	49	63,5	4	3	44	128		103	99	150
32018-XA	T3CC090	–	1,76	**90**	140	32	24	32	2	1,5	30	115,3		100	99	125
33018	T2CE090	–	2,48	**90**	140	39	32,5	39	2	1,5	28	116		100	99	127
33118	T3DE090	–	3,19	**90**	150	45	35	45	2,5	2	36	121,5		100	100	130
30218-A	T3FB090	–	2,64	**90**	160	30	26	32,5	2,5	2	32	121,3		103	100	140
32218-A	T3FC090	–	3,78	**90**	160	40	34	42,5	2,5	2	36	122		102	100	138
31318	T7GB090	–	5,5	**90**	190	43	30	46,5	4	3	58	135,9		109	104	151
30318-A	T2GB090	–	5,83	**90**	190	43	36	46,5	4	3	37	135		113	104	165
32318-A	T2GD090	–	8,51	**90**	190	64	53	67,5	4	3	47	137,4		108	104	157
32919	T2BC095	–	0,825	**95**	130	23	18	23	1,5	1,5	23	113		102	102	121
32019-XA	T4CC095	–	1,86	**95**	145	32	24	32	2	1,5	32	121		105	104	130
33019	T2CE095	–	2,33	**95**	145	39	32,5	39	2	1,5	29	120,2		104	104	131
30219-A	T3FB095	–	3,13	**95**	170	32	27	34,5	3	2,5	34	128		110	107	149
32219-A	T3FC095	–	4,24	**95**	170	43	37	45,5	3	2,5	39	129,6		108	107	145
T7FC095	–	**XL**	5,23	**95**	180	45	33	49	4	4	61	141,5		108	119	138
31319-A	T7GB095	–	7,08	**95**	200	45	32	49,5	4	3	61	142,5		114	109	157
30319-A	T2GB095	–	6,77	**95**	200	45	38	49,5	4	3	40	139		118	109	172
32319-A	T2GD095	–	10,3	**95**	200	67	55	71,5	4	3	49	141		115	109	166

						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D_a	D_b	C_a	C_b	r_a	r_b	dyn. C_r	stat. C_{0r}	e	Y	Y_0	C_{ur}	n_G	n_B
max.	min.	min.	min.	max.	max.	N	N				N	min^{-1}	min^{-1}
122	125	6	7	1,5	1,5	141 000	224 000	0,44	1,36	0,75	28 000	5 000	3 300
122	125	6	6,5	1,5	1,5	184 000	315 000	0,29	2,06	1,13	39 500	5 000	3 350
130	135	7	9	2,5	2	221 000	350 000	0,41	1,48	0,81	43 000	4 750	3 000
140	141	5	6,5	2,5	2	178 000	224 000	0,42	1,43	0,79	25 500	4 750	3 200
140	142	5	8,5	2,5	2	226 000	305 000	0,42	1,43	0,79	36 000	4 750	2 900
140	144	7	12	2,5	2	295 000	435 000	0,42	1,43	0,79	53 000	4 500	3 050
153	161	7	15	4	4	310 000	365 000	0,8	0,75	0,41	50 000	4 200	3 500
166	169	6	16,5	4	3	255 000	300 000	0,83	0,73	0,4	34 000	4 200	2 950
166	167	6	10,5	3	3	310 000	375 000	0,35	1,74	0,96	42 000	4 200	3 150
166	169	7	14,5	4	3	405 000	590 000	0,55	1,1	0,6	69 000	4 200	2 950
166	167	8	14,5	4	3	435 000	580 000	0,35	1,74	0,96	67 000	4 200	2 950
131	134	6	8	2	1,5	164 000	255 000	0,42	1,42	0,78	30 500	4 750	3 200
131	135	7	6,5	2	1,5	216 000	365 000	0,27	2,23	1,23	45 000	4 750	3 150
140	144	7	10	2,5	2	265 000	420 000	0,4	1,51	0,83	51 000	4 500	2 850
150	150	5	6,5	2,5	2	201 000	255 000	0,42	1,43	0,79	29 000	4 500	3 050
150	152	5	8,5	2,5	2	260 000	355 000	0,42	1,43	0,79	42 000	4 500	2 800
176	179	6	16,5	4	3	275 000	325 000	0,83	0,73	0,4	35 500	3 900	2 850
176	176	6	10,5	4	3	330 000	395 000	0,35	1,74	0,96	43 500	3 900	3 100
176	177	8	14,5	4	3	485 000	660 000	0,35	1,74	0,96	75 000	3 900	2 750
123	125	5	5	1,5	1,5	102 000	181 000	0,36	1,68	0,92	22 000	4 750	2 900
136	140	6	8	2	1,5	170 000	275 000	0,44	1,36	0,75	32 500	4 500	3 000
136	139	7	6,5	2	1,5	221 000	380 000	0,28	2,16	1,19	46 500	4 500	3 050
158	159	5	7,5	3	2,5	222 000	285 000	0,42	1,43	0,79	31 500	4 200	2 900
158	161	5	8,5	3	2,5	300 000	415 000	0,42	1,43	0,79	48 500	4 200	2 750
164	172	7	16	4	4	325 000	400 000	0,87	0,69	0,38	54 000	3 900	3 250
186	187	6	17,5	4	3	305 000	370 000	0,83	0,73	0,4	39 500	3 650	2 750
186	184	6	11,5	4	3	360 000	440 000	0,35	1,74	0,96	47 500	3 650	3 000
186	186	8	16,5	4	3	530 000	710 000	0,35	1,74	0,96	80 000	3 650	2 600

Tapered roller bearings

Single row





Mounting dimensions

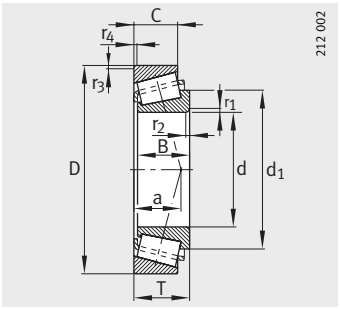
Dimension table (continued) · Dimensions in mm

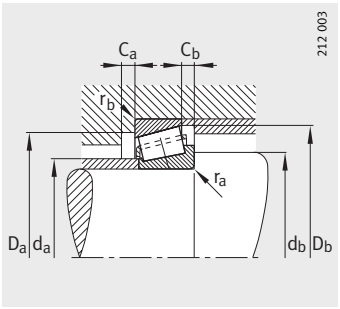
Designation	Interchange designation to ISO 355	Mass	Dimensions									Mounting dimensions		
		m	d	D	B	C	T	r_1, r_2	r_3, r_4	a	d_1	d_a	d_b	D_a
		≈kg						min.	min.	≈	≈	max.	min.	min.
32020-X	T4CC100	1,94	**100**	150	32	24	32	2	1,5	33	126,6	109	109	134
33020	T2CE100	2,42	**100**	150	39	32,5	39	2	1,5	29	124,7	108	109	135
T2EE100	–	4,25	**100**	165	46	39	47	3	3	36	131,3	112	116	145
30220-A	T3FB100	3,75	**100**	180	34	29	37	3	2,5	36	135	116	112	157
32220-A	T3FC100	5,15	**100**	180	46	39	49	3	2,5	42	138,5	114	112	154
33220	T3FE100	6,77	**100**	180	63	48	63	3	2,5	46	140	112	112	151
30320-A	T2GB100	8,3	**100**	215	47	39	51,5	4	3	42	151	127	114	184
31320-X	T7GB100	8,81	**100**	215	51	35	56,5	4	3	68	159,5	121	114	168
32320-A	T2GD100	12,9	**100**	215	73	60	77,5	4	3	53	152	123	114	177
32921	T2CC105	1,15	**105**	145	25	20	25	1,5	1,5	25	125	114	112	135
32021-X	T4DC105	2,33	**105**	160	35	26	35	2,5	2	35	133	116	115	143
33021	T2DE105	3,34	**105**	160	43	34	43	2,5	2	31	131,5	116	115	145
32221-A	T3FC105	6,07	**105**	190	50	43	53	3	2,5	44	144,6	120	117	161
32321-A	T2GD105	15,1	**105**	225	77	63	81,5	4	3	56	160,9	128	119	185
32992	T2CC110	1,26	**110**	150	25	20	25	1,5	1,5	26	130,9	118	117	140
32022-X	T4DC110	3,35	**110**	170	38	29	38	2,5	2	37	141	122	120	152
33022	T2DE110	4,16	**110**	170	47	37	47	2,5	2	33	139,2	123	120	152
33122	T2EE110	5,54	**110**	180	56	43	56	2,5	2	44	147,5	121	120	155
30222-A	T3FB110	5,23	**110**	200	38	32	41	3	2,5	39	148,7	129	122	174
32222-A	T3FC110	7,35	**110**	200	53	46	56	3	2,5	46	153,5	126	122	170
30322-A	T2GB110	11	**110**	240	50	42	54,5	4	3	45	169,2	141	124	206
31322-X	T7GB110	12,3	**110**	240	57	38	63	4	3	75	178	135	124	188
32322-A	T2GD110	19	**110**	240	80	65	84,5	4	3	58	171,5	137	124	198
32924	T2CC120	1,82	**120**	165	29	23	29	1,5	1,5	29	141	128	127	154
T4CB120	–	1,97	**120**	170	25	19,5	27	3	3	35	144,7	130	132	157
32024-X	T4DC120	3,29	**120**	180	38	29	38	2,5	2	40	151	131	130	161
33024	T2DE120	4,55	**120**	180	48	38	48	2,5	2	36	148,5	132	130	160
30224-A	T4FB120	6,25	**120**	215	40	34	43,5	3	2,5	44	163	140	132	187
32224-A	T4FD120	9,28	**120**	215	58	50	61,5	3	2,5	51	165,2	136	132	181
30324-A	T2GB120	14,3	**120**	260	55	46	59,5	4	3	48	183,5	152	134	221
31324-X	T7GB120	15,4	**120**	260	62	42	68	4	3	82	192	145	134	203
32324	–	21,1	**120**	260	86	69	90,5	4	3	66	187	148	134	213

						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D_a	D_b	C_a	C_b	r_a	r_b	dyn. C_r	stat. C_{0r}	e	Y	Y_0	C_{ur}	n_G	n_B
max.	min.	min.	min.	max.	max.	N	N				N	min^{-1}	min^{-1}
141	144	6	8	2	1,5	173 000	285 000	0,46	1,31	0,72	33 500	4 500	2 900
141	143	7	6,5	2	1,5	225 000	395 000	0,29	2,09	1,15	47 500	4 500	2 900
151	157	8	8	3	3	300 000	470 000	0,32	1,88	1,04	56 000	4 200	2 600
168	168	5	8	3	2,5	250 000	325 000	0,42	1,43	0,79	35 500	4 200	2 800
168	171	5	10	3	2,5	335 000	475 000	0,42	1,43	0,79	54 000	3 900	2 600
168	172	10	15	3	2,5	430 000	660 000	0,4	1,48	0,82	77 000	3 900	2 650
201	197	6	12,5	4	3	410 000	500 000	0,35	1,74	0,96	54 000	3 350	2 750
201	202	7	21,5	4	3	385 000	480 000	0,83	0,73	0,4	51 000	3 100	2 550
201	200	8	17,5	4	3	610 000	840 000	0,35	1,74	0,96	94 000	3 350	2 370
136	140	5	5	1,5	1,5	128 000	217 000	0,34	1,75	0,96	25 500	4 500	2 650
150	154	6	9	2,5	2	202 000	330 000	0,44	1,35	0,74	38 000	4 200	2 800
150	153	7	9	2,5	2	265 000	450 000	0,28	2,12	1,17	53 000	4 200	2 850
178	180	5	10	3	2,5	385 000	550 000	0,42	1,43	0,79	63 000	3 650	2 490
211	209	9	18,5	4	3	670 000	930 000	0,35	1,74	0,96	102 000	3 100	2 220
141	145	5	5	1,5	1,5	133 000	231 000	0,36	1,69	0,93	27 000	4 500	2 500
160	163	7	9	2,5	2	242 000	395 000	0,43	1,39	0,77	45 000	3 900	2 650
160	161	7	10	2,5	2	295 000	520 000	0,29	2,09	1,15	61 000	4 200	2 750
170	174	9	13	2,5	2	370 000	630 000	0,42	1,43	0,79	73 000	3 650	2 470
188	187	6	9	3	2,5	315 000	415 000	0,42	1,43	0,79	45 500	3 650	2 550
188	190	6	10	3	2,5	410 000	590 000	0,42	1,43	0,79	66 000	3 350	2 380
226	220	8	12,5	4	3	480 000	590 000	0,35	1,74	0,96	71 000	2 800	2 410
226	224	7	25	4	3	465 000	590 000	0,83	0,73	0,4	70 000	2 800	2 240
226	222	9	19,5	4	3	740 000	1 020 000	0,35	1,74	0,96	126 000	2 800	2 050
158	160	6	6	1,5	1,5	176 000	305 000	0,35	1,72	0,95	34 500	3 900	2 370
157	164	5	7,5	3	3	153 000	238 000	0,47	1,27	0,7	26 000	3 900	2 420
170	173	7	9	2,5	2	250 000	420 000	0,46	1,31	0,72	47 500	3 650	2 460
170	171	6	10	2,5	2	310 000	560 000	0,31	1,97	1,08	65 000	3 650	2 600
203	201	6	9,5	3	2,5	330 000	445 000	0,44	1,38	0,76	48 000	3 100	2 460
203	204	7	11,5	3	2,5	485 000	730 000	0,44	1,38	0,76	81 000	3 100	2 120
246	237	10	13,5	4	3	560 000	700 000	0,35	1,74	0,96	83 000	2 650	2 160
246	244	9	26	4	3	540 000	700 000	0,83	0,73	0,4	82 000	2 500	2 010
246	239	9	21,5	4	3	670 000	970 000	0,39	1,53	0,84	118 000	2 650	2 020

Tapered roller bearings

Single row





Mounting dimensions

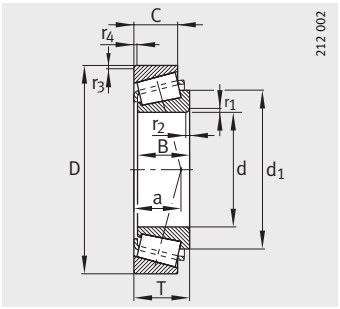
Dimension table (continued) · Dimensions in mm

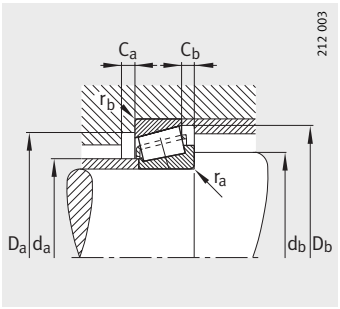
Designation	Interchange designation to ISO 355	Mass	Dimensions									Mounting dimensions		
		m	d	D	B	C	T	r_1, r_2	r_3, r_4	a	d_1	d_a	d_b	D_a
		≈kg						min.	min.	≈	≈	max.	min.	min.
32926	T2CC130	2,4	**130**	180	32	25	32	2	1,5	32	154,7	141	139	167
T4CB130	–	2,53	**130**	185	27	21	29	3	3	38	156,3	140	143	171
32026-X	T4EC130	5,02	**130**	200	45	34	45	2,5	2	44	166,2	144	140	178
30226-A	T4FB130	7,08	**130**	230	40	34	43,75	4	3	46	177,1	152	144	203
32226-A	T4FD130	11,7	**130**	230	64	54	67,75	4	3	56	178	146	144	193
30326	–	17,2	**130**	280	58	49	63,75	5	4	53	194	164	148	239
31326-X	T7GB130	19,1	**130**	280	66	44	72	5	4	87	206	157	148	218
32326	–	26,7	**130**	280	93	78	98,75	5	4	68	197,3	160	147	230
32928	T2CC140	2,6	**140**	190	32	25	32	2	1,5	34	164,8	150	149	177
32028-X	T4DC140	5,39	**140**	210	45	34	45	2,5	2	46	175,8	153	150	187
30228-A	T4FB140	8,81	**140**	250	42	36	45,75	4	3	48	187	163	154	219
32228-A	T4FD140	14	**140**	250	68	58	71,75	4	3	60	193,5	159	154	210
31328-X	T7GB140	23,1	**140**	300	70	47	77	5	4	94	223	169	158	235
32328-A	–	37,8	**140**	300	102	85	107,75	5	4	74	215	170	157	247
32030-X	T4EC150	6,47	**150**	225	48	36	48	3	2,5	50	188	164	162	200
33030	T2EE150	8,23	**150**	225	59	46	59	3	2,5	48	190	164	162	200
30230-A	T4GB150	11,1	**150**	270	45	38	49	4	3	52	201	175	164	234
32230-A	T4GD150	18,5	**150**	270	73	60	77	4	3	64	206,7	171	164	226
31330-X	T7GB150	28	**150**	320	75	50	82	5	4	100	237	181	168	251
32330-A	–	46,1	**150**	320	108	90	114	5	4	79	230	184	167	264
32932	T2DC160	4,13	**160**	220	38	30	38	2,5	2	38	188	173	170	204
32032-X	T4EC160	7,81	**160**	240	51	38	51	3	2,5	53	201	175	172	213
30232	–	13,8	**160**	290	48	40	52	4	3	51	216,5	189	174	252
32232-A	T4GD160	23,4	**160**	290	80	67	84	4	3	69	223	183	174	242
30332-A	T2GB160	29,9	**160**	340	68	58	75	5	4	63	237	201	178	290

						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D_a	D_b	C_a	C_b	r_a	r_b	dyn. C_r	stat. C_{0r}	e	Y	Y_0	C_{ur}	n_G	n_B
max.	min.	min.	min.	max.	max.	N	N				N	min^{-1}	min^{-1}
171	173	6	7	2	1,5	208 000	370 000	0,34	1,77	0,97	41 500	3 650	2 220
171	178	6	8	3	3	179 000	275 000	0,47	1,27	0,7	29 500	3 350	2 270
190	192	8	11	2,5	2	325 000	550 000	0,43	1,38	0,76	61 000	3 100	2 330
216	217	7	9,5	4	3	355 000	470 000	0,44	1,38	0,76	49 000	2 800	2 300
216	219	7	13,5	4	3	560 000	850 000	0,44	1,38	0,76	93 000	2 800	1 950
262	255	8	14,5	5	4	600 000	740 000	0,35	1,73	0,95	86 000	2 500	2 030
262	261	9	28	5	4	610 000	790 000	0,83	0,73	0,4	92 000	2 380	1 830
262	260	10	20,5	5	4	830 000	1 120 000	0,34	1,75	0,96	133 000	2 500	1 850
181	184	6	7	2	1,5	214 000	395 000	0,36	1,67	0,92	43 000	3 350	2 070
200	202	8	11	2,5	2	340 000	590 000	0,46	1,31	0,72	65 000	2 800	2 170
236	234	9	9,5	4	3	415 000	560 000	0,44	1,38	0,76	66 000	2 650	2 030
236	238	8	13,5	4	3	640 000	990 000	0,44	1,38	0,76	120 000	2 500	1 740
282	280	9	30	5	4	700 000	910 000	0,83	0,73	0,4	102 000	2 380	1 670
282	280	10	22,5	5	4	1 170 000	1 710 000	0,35	1,74	0,96	198 000	2 380	1 460
213	216	8	12	3	2,5	385 000	680 000	0,46	1,31	0,72	73 000	2 650	1 980
213	217	8	13	3	2,5	465 000	880 000	0,36	1,65	0,9	96 000	2 650	1 930
256	250	9	11	4	3	465 000	630 000	0,44	1,38	0,76	74 000	2 500	1 870
256	254	8	17	4	3	740 000	1 150 000	0,44	1,38	0,76	137 000	2 500	1 570
302	300	9	32	5	4	790 000	1 040 000	0,83	0,73	0,4	115 000	2 240	1 530
302	299	12	24	5	4	1 330 000	1 950 000	0,35	1,74	0,96	221 000	2 240	1 320
210	212	7	8	2,5	2	295 000	530 000	0,35	1,73	0,95	56 000	2 650	1 890
228	231	8	13	3	2,5	420 000	740 000	0,46	1,31	0,72	90 000	2 500	1 850
276	269	9	12	4	3	405 000	570 000	0,37	1,61	0,89	65 000	2 380	1 870
276	274	10	17	4	3	870 000	1 380 000	0,44	1,38	0,76	162 000	2 380	1 410
322	310	9	17	5	4	890 000	1 140 000	0,35	1,74	0,96	123 000	2 240	1 510

Tapered roller bearings

Single row





Mounting dimensions

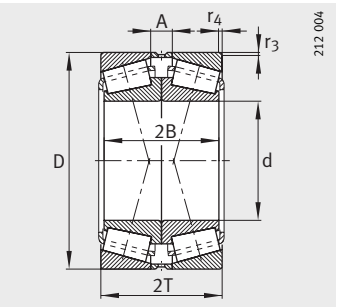
Dimension table (continued) · Dimensions in mm

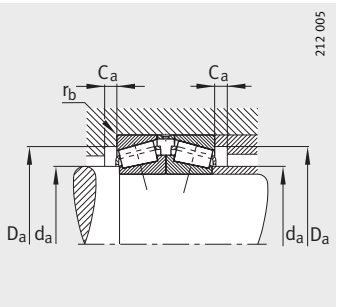
Designation	Interchange designation to ISO 355	Mass	Dimensions									Mounting dimensions		
		m	d	D	B	C	T	r_1, r_2	r_3, r_4	a	d_1	d_a	d_b	D_a
		≈kg						min.	min.	≈	≈	max.	min.	min.
32934	T3DC170	4,42	**170**	230	38	30	38	2,5	2	42	199	183	180	213
32034-X	T4EC170	11,4	**170**	260	57	43	57	3	2,5	57	216	187	182	230
30234-A	T4GB170	19,2	**170**	310	52	43	57	5	4	60	233	203	188	269
32234-A	T4GD170	28,6	**170**	310	86	71	91	5	4	74	238	196	188	259
32936	T4DC180	7,08	**180**	250	45	34	45	2,5	2	54	217	193	190	225
32036-X	T3FD180	14,2	**180**	280	64	48	64	3	2,5	60	230	199	192	247
30236-A	T4GB180	17,9	**180**	320	52	43	57	5	4	62	242	211	198	278
32236-A	T4GD180	32,5	**180**	320	86	71	91	5	4	77	249,5	204	198	267
32938	T4DC190	7,55	**190**	260	45	34	45	2,5	2	55	226	204	200	235
32038-X	T4FD190	14,8	**190**	290	64	48	64	3	2,5	63	241	209	202	257
32238-A	T4GD190	39,1	**190**	340	92	75	97	5	4	81	263	216	207	286
32940-A	T3EC200	8,97	**200**	280	51	39	51	3	2,5	54	239	216	212	257
32040-X	T4FD200	19	**200**	310	70	53	70	3	2,5	67	256	221	212	273
30240-A	T4GB200	25,5	**200**	360	58	48	64	5	4	69	272	237	217	315
32240-A	T3GD200	43	**200**	360	98	82	104	5	4	83	274,5	226	217	302
32944	T3EC220	10,3	**220**	300	51	39	51	3	2,5	59	260	234	232	275
32044-X	T4FD220	24,3	**220**	340	76	57	76	4	3	73	280	243	234	300
32244-A	–	59,5	**220**	400	108	90	114	5	4	95	310,5	258	237	336
32948	T4EC240	11	**240**	320	51	39	51	3	2,5	65	281	254	252	294
32048-X	T4FD240	28,2	**240**	360	76	57	76	4	3	79	300	261	254	318
32248-A	–	80,5	**240**	440	120	100	127	5	4	105	332	286	257	372
32952	T3EC260	18,6	**260**	360	63,5	48	63,5	3	2,5	70	309	279	272	328
32052-X	T4FC260	41,1	**260**	400	87	65	87	5	4	86	331,5	287	278	352
32956	T4EC280	19,9	**280**	380	63,5	48	63,5	3	2,5	75	330	298	292	348
32056-X	T4FC280	40,5	**280**	420	87	65	87	5	4	91	349	305	298	370
32960	T3FD300	31,2	**300**	420	76	57	76	4	3	80	362	324	314	383
32064-X	T4GD320	60,5	**320**	480	100	74	100	5	4	104	397,5	350	338	424
32264	–	170	**320**	580	150	125	159	6	5	136	439	372	340	486
32968	T4FD340	35,5	**340**	460	76	57	76	4	3	91	404	361	354	421
32972	T4FD360	37,1	**360**	480	76	57	76	4	3	97	423	380	374	439

						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D_a	D_b	C_a	C_b	r_a	r_b	dyn. C_r	stat. C_{0r}	e	Y	Y_0	C_{ur}	n_G	n_B
max.	min.	min.	min.	max.	max.	N	N				N	min^{-1}	min^{-1}
220	222	7	8	2,5	2	295 000	560 000	0,38	1,57	0,86	59 000	2 650	1 780
248	249	10	14	3	2,5	500 000	880 000	0,44	1,35	0,74	106 000	2 380	1 690
292	288	8	14	5	4	590 000	810 000	0,44	1,38	0,76	89 000	2 240	1 590
292	294	10	20	5	4	980 000	1 560 000	0,44	1,38	0,76	179 000	2 240	1 310
240	241	8	11	2,5	2	360 000	710 000	0,48	1,25	0,69	84 000	2 380	1 660
268	267	10	16	3	2,5	620 000	1 090 000	0,42	1,42	0,78	128 000	2 240	1 520
302	297	9	14	5	4	610 000	850 000	0,45	1,33	0,73	93 000	2 240	1 500
302	303	10	20	5	4	1 010 000	1 640 000	0,45	1,33	0,73	187 000	2 100	1 230
249	251	8	11	2,5	2	370 000	750 000	0,48	1,26	0,69	89 000	2 380	1 550
278	279	10	16	3	2,5	630 000	1 120 000	0,44	1,36	0,75	130 000	2 240	1 450
322	323	10	22	5	4	1 140 000	1 820 000	0,44	1,38	0,76	203 000	1 960	1 150
268	271	9	12	3	2,5	495 000	930 000	0,39	1,52	0,84	107 000	2 240	1 410
298	297	11	17	3	2,5	760 000	1 370 000	0,43	1,39	0,77	154 000	2 100	1 290
342	336	9	16	5	4	760 000	1 060 000	0,44	1,38	0,76	113 000	1 960	1 300
342	340	11	22	5	4	1 320 000	2 080 000	0,41	1,48	0,81	225 000	1 960	1 060
288	290	9	12	3	2,5	495 000	980 000	0,43	1,41	0,78	110 000	2 100	1 280
326	326	12	19	4	3	890 000	1 630 000	0,43	1,39	0,77	179 000	1 820	1 130
382	380	12	24	5	4	1 540 000	2 550 000	0,44	1,38	0,76	270 000	1 540	910
308	311	9	12	3	2,5	510 000	1 050 000	0,46	1,31	0,72	116 000	1 960	1 160
346	346	12	19	4	3	900 000	1 680 000	0,46	1,31	0,72	181 000	1 680	1 060
422	415	14	27	5	4	1 850 000	3 100 000	0,44	1,38	0,76	320 000	1 400	800
348	347	11	15,5	3	2,5	750 000	1 500 000	0,41	1,48	0,81	161 000	1 680	990
382	383	14	22	5	4	1 150 000	2 140 000	0,43	1,38	0,76	225 000	1 540	920
368	368	11	15,5	3	2,5	740 000	1 520 000	0,43	1,39	0,76	162 000	1 540	940
402	402	14	22	5	4	1 200 000	2 300 000	0,46	1,31	0,72	238 000	1 400	840
406	405	12	19	4	3	990 000	2 030 000	0,39	1,52	0,84	208 000	1 330	820
462	461	15	26	5	4	1 560 000	3 050 000	0,46	1,31	0,72	305 000	1 190	690
560	555	16	34	6	6	3 000 000	5 200 000	0,44	1,38	0,76	490 000	1 050	530
446	446	12	19	4	3	1 080 000	2 370 000	0,44	1,37	0,75	236 000	1 190	690
466	466	14	19	4	3	1 060 000	2 370 000	0,46	1,31	0,72	233 000	1 120	660

Tapered roller bearings

Matched pairs





Mounting dimensions

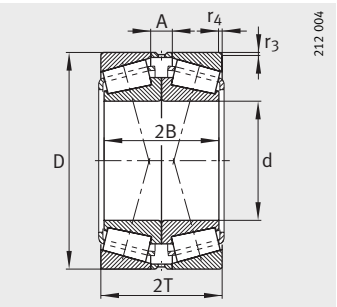
Dimension table · Dimensions in mm

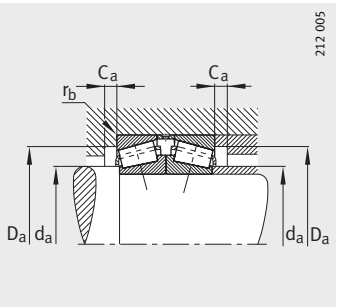
Designation	Mass for bearing pair	Dimensions						Mounting dimensions	
	m	d	D	2B	2T	r_3, r_4	A	d_a	D_a
	≈kg					min.		max.	min.
31306-A-N11CA-A50-90	0,85	**30**	72	38	41,5	1,5	13,5	40	55
31307-A-N11CA-A40-70	1,13	**35**	80	42	45,5	1,5	15,5	44	62
31308-A-N11CA-A50-90	1,52	**40**	90	46	50,5	1,5	16,5	51	71
31309-A-N11CA-A60-100	2,1	**45**	100	50	54,5	1,5	18,5	56	79
31310-A-N11CA-A60-100	2,9	**50**	110	54	58,5	2	20,5	62	87
31311-A-N11CA-A80-120	3,4	**55**	120	58	63	2	21	68	94
31312-A-N11CA-A80-120	4,2	**60**	130	62	67	2,5	23	73	103
31313-A-N11CA-A80-120	5,05	**65**	140	66	72	2,5	26	79	111
31314-A-N11CA-A100-140	6,2	**70**	150	70	76	2,5	26	84	118
31315-N11CA-A100-140	7,2	**75**	160	74	80	2,5	28	91	127
32016-X-N11CA-A150-200	2,58	**80**	125	58	58	2	14	89	112
31316-N11CA-A100-140	8,9	**80**	170	78	85	2,5	31	97	134
31317-N11CA-A120-160	10,4	**85**	180	82	89	3	33	103	143
31318-N11CA-A120-160	11,8	**90**	190	86	93	3	33	109	151
31318-N11CA-A160-200	11,8	**90**	190	86	93	3	33	109	151
31319-A-N11CA-A120-160	14	**95**	200	90	99	3	35	114	157
32020-X-N11CA-A200-230	4	**100**	150	64	64	1,5	16	109	134
31320-X-N11CA-A120-160	19	**100**	215	102	113	3	43	121	168
32222-A-N11CA-A250-280	14,9	**110**	200	106	112	2,5	20	126	170
31322-X-N11CA-A140-180	26,2	**110**	240	114	126	3	50	135	188
32224-A-N11CA-A230-280	19,1	**120**	215	116	123	2,5	23	136	181
31324-X-N11CA-A140-180	33,7	**120**	260	124	136	3	52	145	203
32026-X-N11CA-A200-250	10,3	**130**	200	90	90	2	22	144	178
31326-X-N11CA-A160-200	40,9	**130**	280	132	144	4	56	157	218

			Basic load ratings for bearing pair		Calculation factors				Fatigue limit load	Limiting speed Bearing pair	Reference speed Bearing pair
D_a	C_a	r_b	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
max.	min.	max.	N	N					N	min^{-1}	min^{-1}
65	3	1,5	77 000	93 000	0,83	0,82	1,22	0,8	10 600	9 800	5 200
71	4	1,5	103 000	128 000	0,83	0,82	1,22	0,8	14 900	8 800	4 600
81	4	1,5	130 000	165 000	0,83	0,82	1,22	0,8	18 900	7 400	4 150
91	4	1,5	165 000	217 000	0,83	0,82	1,22	0,8	25 500	6 700	3 750
100	4	2	189 000	250 000	0,83	0,82	1,22	0,8	29 500	6 300	3 450
110	4	2	210 000	275 000	0,83	0,82	1,22	0,8	32 500	5 600	3 250
118	5	2,5	250 000	335 000	0,83	0,82	1,22	0,8	40 000	5 300	3 000
128	5	2,5	280 000	375 000	0,83	0,82	1,22	0,8	44 500	5 000	2 900
138	5	2,5	320 000	435 000	0,83	0,82	1,22	0,8	52 000	4 750	3 200
148	6	2,5	350 000	475 000	0,83	0,82	1,22	0,8	55 000	4 500	2 600
117	6	2	235 000	420 000	0,42	1,6	2,38	1,56	52 000	5 000	2 800
158	6	2,5	390 000	540 000	0,83	0,82	1,22	0,8	61 000	4 500	2 470
166	6	3	435 000	600 000	0,83	0,82	1,22	0,8	68 000	4 200	2 360
176	6	3	470 000	650 000	0,83	0,82	1,22	0,8	71 000	3 900	2 270
176	6	3	470 000	650 000	0,83	0,82	1,22	0,8	71 000	3 900	2 270
186	6	3	520 000	740 000	0,83	0,82	1,22	0,8	79 000	3 650	2 180
141	6	1,5	295 000	570 000	0,46	1,47	2,19	1,44	67 000	4 500	2 300
201	7	3	660 000	960 000	0,83	0,82	1,22	0,8	102 000	3 100	2 040
188	5	2,5	710 000	1 180 000	0,42	1,61	2,39	1,57	133 000	3 350	1 910
226	7	3	790 000	1 170 000	0,83	0,82	1,22	0,8	141 000	2 800	1 790
203	7	2,5	830 000	1 450 000	0,44	1,55	2,31	1,52	162 000	3 100	1 700
246	9	3	930 000	1 400 000	0,83	0,82	1,22	0,8	165 000	2 500	1 610
190	8	2	560 000	1 100 000	0,43	1,55	2,31	1,52	122 000	3 100	1 870
262	9	4	1 050 000	1 590 000	0,83	0,82	1,22	0,8	184 000	2 380	1 460

Tapered roller bearings

Matched pairs





Mounting dimensions

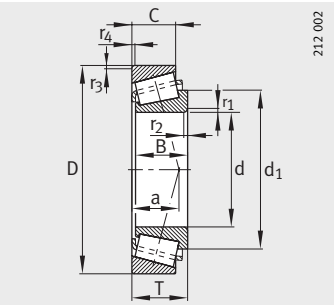
Dimension table (continued) · Dimensions in mm

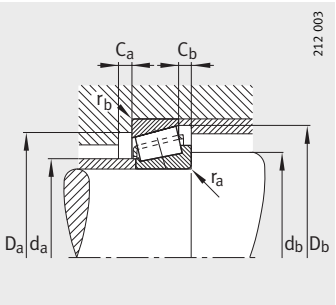
Designation	Mass for bearing pair	Dimensions						Mounting dimensions	
	m	d	D	2B	2T	r_3, r_4	A	d_a	D_a
	≈kg					min.		max.	min.
32228-A-N11CA-A250-300	29,5	**140**	250	136	143,5	3	27,5	159	210
31328-X-N11CA-A160-200	45,6	**140**	300	140	154	4	60	165	242
32030-X-N11CA-A280-330	13,1	**150**	225	96	96	2,5	24	164	200
31330-X-N11CA-A180-230	57,7	**150**	320	150	164	4	64	177	260
32234-A-N11CA-A300-380	59,4	**170**	310	172	182	4	40	196	259
32038-X-N11CA-A350-400	29,6	**190**	290	128	128	2,5	32	209	257
32040-X-N11CA-A350-400	39,1	**200**	310	140	140	2,5	34	221	273
32944-N11CA-A420-470	20,3	**220**	300	102	102	2,5	24	235	275
32244-A-N11CA-A400-450	123	**220**	400	216	228	4	48	258	336
32048-X-N11CA-A450-500	58,3	**240**	360	228	152	3	38	261	318
32960-N11CA-A650-700	63,6	**300**	420	152	152	3	38	324	383
32964-N11CA-A600-650	67,2	**320**	440	152	152	3	38	344	402
32968-N11CA-A550-600	73,1	**340**	460	152	152	3	38	361	421

			Basic load ratings for bearing pair		Calculation factors				Fatigue limit load	Limiting speed Bearing pair	Reference speed Bearing pair
D_a	C_a	r_b	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
max.	min.	max.	N	N					N	min^{-1}	min^{-1}
236	8	3	1100 000	1980 000	0,44	1,55	2,31	1,52	241 000	2 500	1 390
282	14	4	1200 000	1810 000	0,83	0,82	1,22	0,8	204 000	2 380	1 340
213	8	2,5	660 000	1350 000	0,46	1,47	2,19	1,44	167 000	2 650	1 580
302	14	4	1360 000	2090 000	0,83	0,82	1,22	0,8	230 000	2 240	1 220
292	10	4	1680 000	3100 000	0,44	1,55	2,31	1,52	360 000	2 240	1 050
278	10	2,5	1080 000	2250 000	0,44	1,53	2,27	1,49	260 000	2 240	1 160
298	11	2,5	1300 000	2750 000	0,43	1,57	2,34	1,53	310 000	2 100	1 030
288	10	2,5	850 000	1960 000	0,43	1,59	2,36	1,55	221 000	2 100	1 020
382	12	4	2650 000	5100 000	0,44	1,55	2,31	1,52	540 000	1 540	730
346	12	3	1540 000	3350 000	0,46	1,47	2,19	1,44	360 000	1 680	850
406	12	3	1760 000	4300 000	0,39	1,71	2,54	1,67	440 000	1 330	660
426	12	3	1810 000	4550 000	0,42	1,62	2,42	1,59	460 000	1 260	360
446	12	3	1850 000	4750 000	0,44	1,54	2,3	1,51	475 000	1 260	550

Tapered roller bearings

Single row
Inch sizes





Mounting dimensions

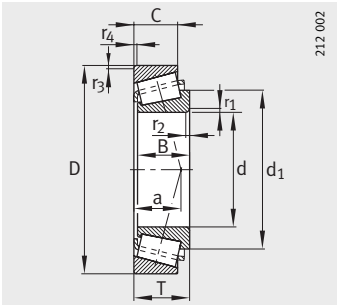
Dimension table · Dimensions in mm

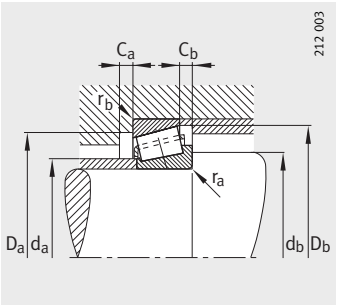
Designation	Mass	Dimensions								
	m	d	D	B	C	T	r_1, r_2	r_3, r_4	a	d_1
	≈kg						min.	min.	≈	≈
KLM11749-LM11710	0,086	**17,462**	39,878	14,605	10,668	13,843	1,3	1,3	9	29,6
KM12649-M12610	0,163	**21,43**	50,005	18,288	13,97	17,526	1,3	1,3	11	34,5
KLM12749-LM12710	0,12	**21,986**	45,237	16,637	12,065	15,494	1,3	1,3	10	34,8
K15578-15520	0,217	**25,4**	57,15	17,462	13,495	17,462	1,3	1,5	12	42,8
KL44649-L44610	0,137	**26,988**	50,292	14,732	10,668	14,224	3,5	1,3	11	40,1
KM86647-M86610	0,353	**28,575**	64,292	21,432	16,67	21,433	1,5	1,5	18	50,3
KM86649-M86610	0,375	**30,162**	64,292	21,433	16,67	21,433	1,5	1,5	18	50,7
KLM48548-LM48510	0,273	**34,925**	65,088	18,288	13,97	18,034	3,5	1,3	14	49,7
KHM88649-HM88610	0,5	**34,925**	72,233	25,4	19,842	25,4	2,3	2,3	21	56,8
KL68149-L68111	0,179	**34,988**	59,974	16,764	11,938	15,875	3,5	1,3	13	48,8
KJL69349-JL69310	0,217	**38**	63	17	13,5	17	3,5	1,3	15	51,8
K3382-3320	0,651	**39,688**	80,167	30,391	23,812	29,37	3,5	3,3	19	57
KLM300849-LM300811	0,255	**40,987**	67,975	18	13,5	17,5	3,5	1,5	14	55,8
KLM501349-LM501310	0,365	**41,275**	73,431	19,812	14,732	19,558	3,5	0,8	16	57,2
KLM501349-LM501314	0,385	**41,275**	73,431	19,812	16,604	21,43	3,5	0,8	18	57,2
KM802048-M802011	0,661	**41,275**	82,55	25,654	20,193	26,543	3,5	3,3	23	64,15
K3585-3525	0,857	**41,275**	87,313	30,886	23,812	30,163	1,5	3,3	20	64,5
K25577-25523	0,715	**42,875**	82,931	25,4	22,225	26,988	3,5	2,3	21	64,1
K3782-3720	0,976	**44,45**	93,264	30,302	23,812	30,162	3,5	3,3	22	72,3
K53178-53377	0,95	**44,45**	95,25	28,3	20,638	30,958	2	2,3	31	70,65
K527-522	1,29	**44,45**	101,6	36,068	26,988	34,925	3,5	3,3	22	73,8
K17887-17831	0,421	**45,23**	79,985	20,638	15,08	19,842	2	1,3	16	63
K45284-45220	1,25	**50,8**	104,775	30,958	23,813	30,162	6,4	3,3	22	79,6
K4580-4535	1,7	**50,8**	104,775	40,157	33,338	39,688	3,5	3,3	28	81,5
K72200-72487	2,181	**50,8**	123,825	32,791	25,4	36,512	3,5	3,3	38	89,6
KLM806649-LM806610	0,445	**53,975**	88,9	19,05	13,492	19,05	2,3	2	21	72,3
KL507949-L507910	0,4	**57,15**	87,312	18,258	14,288	18,258	1,5	1,5	17	73,3
K387-A-382-A	0,593	**57,15**	96,838	21,946	15,875	21	3,5	0,8	19	76,6
K39580-39520	1,44	**57,15**	112,712	30,162	23,812	30,162	3,5	3,3	23	89,95
K39581-39520	1,44	**57,15**	112,712	30,162	23,812	30,162	7,9	3,3	23	89,6
K555-S-552-A	2,44	**57,15**	123,825	36,678	30,163	38,1	3,5	3,3	30	92,8
K28985-28921	0,77	**60,325**	100	25,4	19,845	25,4	3,5	3,3	23	82,9
K3982-3920	1,3	**63,5**	112,712	30,048	23,812	30,162	3,5	3,3	27	89
K559-552-A	2,07	**63,5**	123,825	36,678	30,163	38,1	3,5	3,3	30	92,8

Mounting dimensions								Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed
d_a	d_b	D_a	D_b	C_a	C_b	r_a	r_b	dyn. C_r	stat. C_{0r}	e	Y	Y_0	C_{ur}	n_G
max.	min.	min.	min.	min.	min.	max.	max.	N	N				N	min^{-1}
21,5	23	34	37	3	3	1,3	1,3	21 200	20 800	0,29	2,1	1,15	2 190	21 000
25,5	27,5	44	46	4	3,5	1,3	1,3	37 500	39 000	0,28	2,16	1,19	4 400	16 800
26	27,5	39,5	42	3	3	1,3	1,3	28 500	32 000	0,31	1,96	1,08	3 550	16 800
30,5	32,5	51	53	2	4	1,3	1,5	38 500	44 000	0,35	1,73	0,95	4 950	12 600
31	37,5	44,5	47	2,5	3,5	3,5	1,3	26 000	29 500	0,37	1,6	0,88	3 150	14 000
38	40	54	61	4	4,5	1,5	1,5	52 000	67 000	0,55	1,1	0,6	8 000	11 200
38,2	41	54	61	3	4,5	1,5	1,5	52 000	67 000	0,55	1,1	0,6	8 000	11 200
40	46	58	61	3	4	3,5	1,3	46 500	56 000	0,38	1,59	0,88	6 400	10 500
42,5	48,5	60	69	3	5	2,3	2,3	68 000	91 000	0,55	1,1	0,6	11 300	9 400
39	45,5	53	56	3	4	3,5	1,3	34 000	44 500	0,42	1,44	0,79	5 000	11 200
42,5	49	56	60	3	4	3,5	1,3	39 500	53 000	0,42	1,44	0,79	6 100	10 500
45,5	52	71	74,8	2	5	3,5	3,3	94 000	109 000	0,27	2,2	1,21	13 400	8 800
45	52	61	65	3	4	3,5	1,5	46 000	63 000	0,35	1,72	0,95	7 300	9 800
46,5	53	67	70	4	4,5	3,5	0,8	55 000	68 000	0,4	1,5	0,83	8 100	9 400
46,5	53	66	70	1,5	4,5	3,5	0,8	55 000	68 000	0,4	1,5	0,83	8 100	9 400
51	57	70	79	3	5,5	3,5	3,3	83 000	111 000	0,55	1,1	0,6	13 800	7 800
48	50	75	81	3,5	6	1,5	3,3	97 000	121 000	0,31	1,96	1,08	14 900	7 800
49	55	72	77	6	15	3,5	2,3	81 000	105 000	0,33	1,79	0,99	12 900	8 400
52	58	82	88	3	5	3,5	3,3	104 000	137 000	0,34	1,77	0,97	17 000	7 000
53	60	80	89	2	7	2	2,3	89 000	98 000	0,74	0,81	0,45	11 500	7 400
53	59	89	95	4	8	3,5	3,3	127 000	152 000	0,28	2,12	1,17	18 800	7 000
52	56	70	74	3	4,5	2	1,3	60 000	77 000	0,37	1,64	0,9	9 200	8 400
59	71	93	99	4	6	6,4	3,3	126 000	162 000	0,33	1,81	0,99	20 000	6 300
61	67	90	99	4	6	3,5	3,3	159 000	226 000	0,34	1,79	0,98	28 500	6 300
67	79	102	116	3,5	8,5	3,5	3,3	135 000	150 000	0,74	0,81	0,45	17 900	5 600
60	63	80	85	4	5,5	2,3	2	59 000	78 000	0,55	1,1	0,6	9 500	7 400
62	65	79	83	2	3,5	1,5	1,5	56 000	88 000	0,39	1,54	0,85	10 400	7 400
62	69	89	92	4	5	3,5	0,8	76 000	95 000	0,35	1,69	0,93	11 200	6 700
66	72	101	107	6	6	3,5	3,3	137 000	192 000	0,34	1,77	0,97	23 800	5 600
66	81	101	107	6	6	7,9	3,3	137 000	192 000	0,34	1,77	0,97	23 800	5 600
67	73	109	116	2,5	7,5	3,5	3,3	169 000	236 000	0,35	1,73	0,95	29 500	5 600
67	73	89	96	3	5,5	3,5	3,3	91 000	135 000	0,43	1,41	0,78	16 700	6 300
71	77	99	106	4	6	3,5	3,3	119 000	176 000	0,4	1,49	0,82	21 900	6 000
72	78	108	116	4	7,5	3,5	3,3	169 000	236 000	0,35	1,73	0,95	29 500	5 600

Tapered roller bearings

Single row
Inch sizes





Mounting dimensions

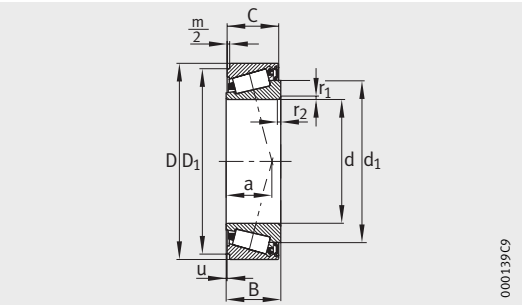
Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions								
	m	d	D	B	C	T	r_1, r_2	r_3, r_4	a	d_1
	≈kg						min.	min.	≈	≈
K3984-3920	1,31	**66,675**	112,712	30,048	23,812	30,162	3,5	3,3	27	89
KHM212049-HM212011	1,93	**66,675**	122,238	38,354	29,718	38,1	3,5	3,3	27	91,5
KH414242-H414210	2,77	**66,675**	136,525	41,275	31,75	41,275	3,5	3,3	30	100,9
KH715341-H715311	3,42	**66,675**	136,525	46,038	36,512	46,038	3,5	3,3	38	111,1
K47490-47420	1,61	**71,438**	120	32,545	26,195	32,545	3,5	3,3	27	95,2
K33287-33462	1,21	**73,025**	117,475	30,162	23,812	30,162	3,5	3,3	28	95,2
AK47686-47620	1,94	**82,55**	133,35	33,338	26,195	33,338	3,5	3,3	30	108,2
K580-572	2,21	**82,55**	139,992	36,098	28,575	36,512	3,5	3,3	31	110,7
K663-653	2,71	**82,55**	146,05	41,275	31,75	41,275	3,5	3,3	33	114
K498-492-A	1,69	**84,138**	133,35	29,769	22,225	30,163	3,5	3,3	30	110,6
K497-492-A	1,63	**85,725**	133,35	29,769	22,225	30,162	3,5	3,3	30	110,6
KHM218248-HM218210	2,57	**89,975**	146,975	40	32,5	40	7,1	3,5	32	119
K598-A-593-X	2,37	**92,075**	150	36,322	27	35,992	6,4	3	33	121,5
K594-592-A	2,55	**95,25**	152,4	36,322	30,162	39,688	3,5	3,3	37	122,7
K594-A-592-A	2,75	**95,25**	152,4	36,322	30,162	39,688	5,1	3,3	37	121,5
K683-672	4,03	**95,25**	168,275	41,275	30,162	41,275	3,5	3,3	38	133,2
K42381-42584	1,92	**96,838**	148,43	28,971	21,433	28,575	3,5	3	32	123,3
K90381-90744	5,69	**96,838**	188,912	46,038	31,75	50,8	3,5	3,3	64	142,9
KJM720249-JM720210	2,38	**100**	155	35	28	36	3	2,5	36	127,5
KJM822049-JM822010	2,51	**110**	165	35	26,5	35	3	2,5	38	139
KJHM522649-JHM522610	4,7	**110**	180	46	38	47	3	2,5	41	145
K64450-64700	3,55	**114,3**	177,8	41,275	30,162	41,275	3,5	3,3	43	147,2
KHH231649-HH231615	24,1	**139,7**	295,275	87,312	57,15	82,55	9,7	6,4	56	199,1
K107060-107105	16,7	**152,4**	268,288	74,612	57,15	74,612	6,4	6,4	60	204
K36990-36920	3,18	**177,8**	227,012	30,162	23,02	30,162	1,5	1,5	43	203,8
KLL352149-LL352110	2,6	**279,4**	317,5	24,384	18,288	24,384	1,5	1,5	45	299
KLL481448-LL481411	52,7	**673,1**	793,75	61,912	49,212	66,675	6,4	6,4	117	725

Mounting dimensions								Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed
d_a	d_b	D_a	D_b	C_a	C_b	ra	r_b	dyn. C_r	stat. C_{0r}	e	Y	Y_0	C_{ur}	n_G
max.	min.	min.	min.	min.	min.	max.	max.	N	N				N	min^{-1}
74	80	99	106	4	6	3,5	3,3	119 000	176 000	0,4	1,49	0,82	21 900	6 000
75,5	82	108	116	4	8	3,5	3,3	193 000	255 000	0,34	1,78	0,98	32 000	5 600
81	85	121	129	6	9	3,5	3,3	225 000	290 000	0,36	1,67	0,92	36 000	5 000
83	89	118	132	8	9,5	3,5	3,3	230 000	370 000	0,47	1,27	0,7	46 500	4 750
79	86	107	114	4	6	3,5	3,3	152 000	224 000	0,36	1,67	0,92	28 000	5 300
79	87	104	112	4	6	3,5	3,3	124 000	189 000	0,44	1,38	0,76	23 900	5 600
90	97	119	128	5	7	3,5	3,3	153 000	235 000	0,4	1,48	0,82	29 000	5 000
91	98	125	133	5	7,5	3,5	3,3	177 000	265 000	0,4	1,49	0,82	32 000	4 750
92	99	131	139	5	8	3,5	3,3	211 000	305 000	0,41	1,47	0,81	37 000	4 750
91	98	120	128	4	7,5	3,5	3,3	134 000	200 000	0,44	1,35	0,74	24 100	5 000
93	99	120	128	4	7,5	3,5	3,3	134 000	200 000	0,44	1,35	0,74	24 100	5 000
99	112	133	141	5,5	7,5	7,1	3,5	233 000	355 000	0,33	1,8	0,99	43 000	4 750
101	113	135	144	4	9	6,4	3	182 000	285 000	0,44	1,36	0,75	34 000	4 500
104	110	135	144	1	8	3,5	3,3	182 000	285 000	0,44	1,36	0,75	34 000	4 500
104	113	135	144	4	9	5,1	3,3	182 000	285 000	0,44	1,36	0,75	34 000	4 500
106	113	149	160	5	9	3,5	3,3	226 000	350 000	0,47	1,28	0,7	41 000	4 200
104	110	134	142	4	6,5	3,5	3	139 000	216 000	0,49	1,22	0,67	25 500	4 500
113	125	161	179	2,5	12	3,5	3,3	270 000	340 000	0,87	0,69	0,38	38 000	3 650
109	115	140	149	4	6,5	3	2,5	187 000	305 000	0,47	1,27	0,7	36 000	4 500
119	124	149	159	4,5	8	3	2,5	188 000	305 000	0,5	1,21	0,66	35 500	4 200
122	127	162	172	5	7	3	2,5	320 000	510 000	0,41	1,48	0,81	58 000	3 900
125	131	160	172	5	9	3,5	3,3	241 000	395 000	0,52	1,16	0,64	45 000	3 650
161	177	258	264	9	19	9,7	6,4	830 000	1 120 000	0,32	1,88	1,04	130 000	2 380
171	181	237	249	8	13,5	6,4	6,4	670 000	1 070 000	0,39	1,55	0,85	127 000	2 500
186	188	214	221	4	7	1,5	1,5	187 000	395 000	0,44	1,36	0,75	41 500	2 500
286	288	309	312	4	4,5	1,5	1,5	162 000	440 000	0,35	1,73	0,95	28 500	1 820
690	702	765	771	7	14	6,4	6,4	1 170 000	3 300 000	0,36	1,67	0,92	270 000	630

Integral tapered roller bearings

Sealed on one side



Dimension table · Dimensions in mm

Designation		Mass	Dimensions											Mounting dimensions		
Bearing	Snap ring	Bearing[1]												Shaft		
		m	d	D	B	C	r_1, r_2	D_1	$m/2$	a	u	Δ_u	d_1	d_a	d_b	r_a
		≈kg					min.			≈		Deviation	≈	max.	min.	max.
JK0S030	**BR55**	0,19	**30**	55	19	18,5	1	51,4	0,75	15	0,02	+0,05	43,6	35	36	1
JK0S040[3]	**BR68**	0,3	**40**	68	21	20,5	1	64,4	0,75	16	0,03	+0,05	53,8	46	46	1
JK0S050	**BR80**	0,41	**50**	80	22	21,5	1	75,7	1	19	0,02	+0,05	66,4	56	56	1
JK0S060	**BR95**	0,67	**60**	95	26	25	1,5	89,3	1,25	23	0,03	+0,05	79,5	67	67	1,5
JK0S070-A	**BR110**	0,93	**70**	110	27	26,5	1,5	104,8	1,25	25	0,03	+0,05	91,5	78	77	1,5
JK0S080-A	**BR125**	1,32	**80**	125	30	29,5	1,5	119,8	1,25	28	0,03	+0,05	104,2	89	87	1,5

Other sizes and designs are also available; please contact us.

Ordering note

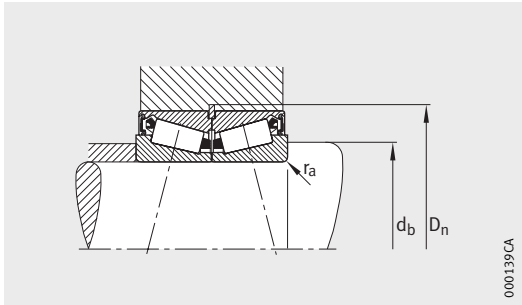
FAG integral tapered roller bearings are interchangeable with each other.
When ordering, please always state the number of individual bearings, not the number of bearing pairs.
The snap ring must be ordered separately, for example

2 tapered roller bearings JK0S080-A
1 snap ring BR125

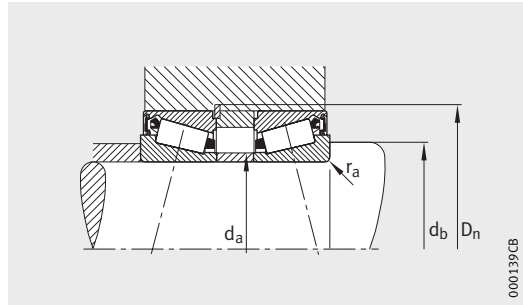
1) Ungreased.

2) For snap ring connection located against a sharp edge.

3) Also available with 95% grease filling; designation: JK0S040-J14.



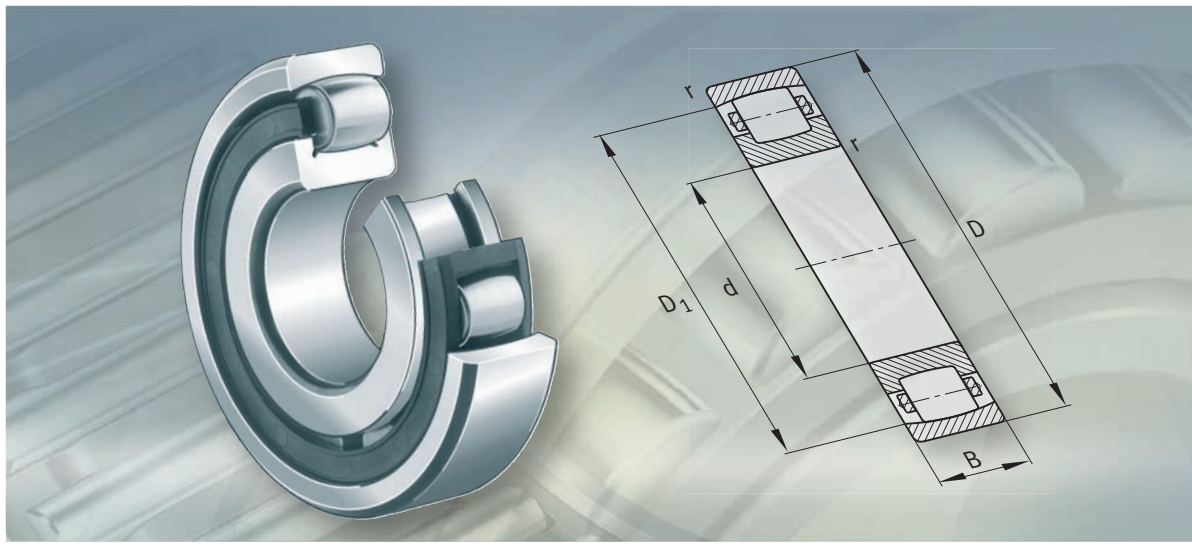
Mounting dimensions



Mounting dimensions

Slot		Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Load carrying capacity	Max. axial assembly clamping force
D_n	Δ_{Dn}	dyn. C_r	stat. C_{0r}	e	Y	Y_0	C_{ur}	n_G grease	F_{BR} [2]	Bearing pair
Nominal dimension	Deviation	N	N				N	min^{-1}	N	N
56,5	+0,19	38 500	46 500	0,43	1,4	0,77	5 300	5 700	15 700	7 700
69,5	+0,19	53 000	71 000	0,37	1,6	0,88	8 300	4 550	12 900	10 600
81,8	+0,22	64 000	93 000	0,42	1,43	0,79	11 200	3 700	31 400	12 800
97	+0,22	82 000	123 000	0,43	1,4	0,77	15 200	3 050	59 300	16 400
112,3	+0,22	104 000	159 000	0,43	1,38	0,76	20 100	2 600	49 000	20 800
127,3	+0,25	137 000	211 000	0,42	1,42	0,78	26 000	2 280	40 200	27 400

FAG



Barrel roller bearings

Barrel roller bearings

		Page
Product overview	Barrel roller bearings	558
Features	Compensation of angular misalignments	559
	Operating temperature	559
	Cages	560
	Suffixes	560
Design and safety guidelines	Equivalent dynamic bearing load	561
	Equivalent static bearing load	561
	Minimum radial load	561
	Speeds	561
	Design of bearing arrangements	562
Accuracy	Radial internal clearance of bearings with cylindrical bore	563
	Radial internal clearance of bearings with tapered bore	563
Dimension tables	Barrel roller bearings, cylindrical or tapered bore	564
	Barrel roller bearings with adapter sleeve	570

Cylindrical bore

202, 203

Tapered bore

202..-K, 203..-K

With adapter sleeve

202..-K + H, 203..-K + H

Barrel roller bearings

Features

Barrel roller bearings are single row, self-aligning roller bearings. They comprise solid outer rings with a concave raceway, solid inner rings with two ribs and a cylindrical or tapered bore as well as barrel rollers with cages. The bearings cannot be dismantled.

Barrel roller bearings are particularly suitable where high radial shock type loads occur and misalignments must be compensated, see Compensation of angular misalignments.
They have only a low axial load carrying capacity.

With tapered bore and with adapter sleeve

Bearings with a tapered bore have a bore taper 1:12 and the suffix K.

These bearings are also available with an adapter sleeve for locating purposes. The adapter sleeves are included in the dimension tables and must be specified in addition when ordering.

Sealing

Barrel roller bearings are not sealed.

Lubrication

The bearings can be lubricated from the end faces using oil or grease.

Compensation of angular misalignments

Under normal operating conditions and with a rotating inner ring, barrel roller bearings can swivel approx. 4° about their central position. As a result, they permit skewing between the inner and outer ring and can thus compensate misalignments, shaft deflections and housing deformations.

If the outer ring rotates or the inner ring undergoes tumbling motion, the angular adjustment facility is smaller.
In this case, please contact us.

Operating temperature

Barrel roller bearings with brass cages can be used at operating temperatures from –30 °C to +150 °C.

Bearing with an outside diameter over 120 mm are dimensionally stable up to +200 °C.

Bearings with cages made from glass fibre reinforced polyamide are suitable for operating temperatures up to +120 °C.

Barrel roller bearings

Cages

The standard cages for barrel roller bearings are shown in the table Cage and bore code.

Barrel roller bearings with solid brass cages have the suffix MB. The cages are guided on the inner ring.

Solid window cages made from glass fibre reinforced polyamide are indicated by the suffix TVP.

Check the chemical resistance of polyamide to synthetic greases and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures.

The oil change intervals must be observed.

Cage and bore code

Series	Solid window cage made from polyamide[1)]	Solid brass cage[1)]
	Bore code	
202	up to 16	from 17
203	up to 12	from 13

1) Other cage designs (for example brass cages instead of polyamide cages) are available by agreement. In such cages, suitability for high speeds and temperatures as well as the basic load ratings may differ from the values for bearings with standard cages.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
C3	Radial internal clearance larger than normal	Standard for tapered bore
K	Tapered bore	Standard
MB	Solid brass cage	
TVP	Solid window cage made from glass fibre reinforced polyamide	

Design and safety guidelines

Equivalent dynamic bearing load

For bearings under dynamic loading, the following applies:

$$P = F_r + 9{,}5 \cdot F_a$$

P N
Equivalent dynamic bearing load for combined load
F_a N
Axial dynamic bearing load
F_r N
Radial dynamic bearing load.

Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r} + 5 \cdot F_{0a}$$

P_0 N
Equivalent static bearing load for combined load
F_{0a} N
Axial static bearing load
F_{0r} N
Radial static bearing load.

Minimum radial load

In order to ensure slippage-free operation, the bearings must be subjected to a minimum radial load. This applies particularly in the case of high speeds and high accelerations. In continuous operation, a minimum radial load of the order of $P/C_r > 0{,}02$ is necessary for roller bearings with cage.

Speeds

ISO 15 312 does not give thermal reference speeds for barrel roller bearings.

The dimension tables therefore only state limiting speeds n_G. These values are for oil lubrication and must not be exceeded.

Design of bearing arrangements

Shaft and housing tolerances

Recommended shaft tolerances for bearings with cylindrical bore, see table, page 150.

Recommended housing tolerances for radial bearings, see table, page 152.

Mounting dimensions

The dimension tables give the maximum dimensions of the radii r_a and the diameters of the abutment shoulders D_a and d_a.

Bearings with a tapered inner ring bore are:

- located either directly on tapered shaft seats or
- located on a cylindrical shaft seat using an adapter sleeve, locknut and tab washer.

If high axial forces are present, a support ring can be used.
For fitting, attention must be paid to the dimensions of the support ring according to the dimension tables.

Accuracy

The main dimensions of the bearings conform to DIN 635-1.

The dimensional and geometrical tolerances correspond to tolerance class PN in accordance with DIN 620-2.

Radial internal clearance of bearings with cylindrical bore

The radial internal clearance corresponds to internal clearance group CN to DIN 620-4.

Radial internal clearance

Bore d mm		Radial internal clearance							
		C2 µm		CN µm		C3 µm		C4 µm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	30	2	9	9	17	17	28	28	40
30	40	3	10	10	20	20	30	30	45
40	50	3	13	13	23	23	35	35	50
50	65	4	15	15	27	27	40	40	55
65	80	5	20	20	35	35	55	55	75
80	100	7	25	25	45	45	65	65	90
100	120	10	30	30	50	50	70	70	95
120	140	15	35	35	55	55	80	80	110
140	160	20	40	40	65	65	95	95	125
160	180	25	45	45	70	70	100	100	130
180	225	30	50	50	75	75	105	105	135
225	250	35	55	55	80	80	110	110	140
250	280	40	60	60	85	85	115	115	145

Radial internal clearance of bearings with tapered bore

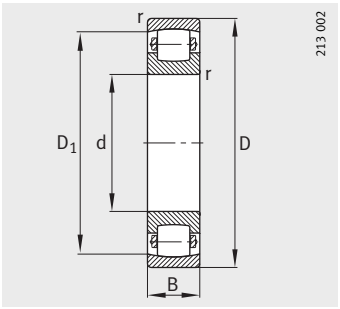
Bearings with a tapered bore have the internal clearance group C3 to DIN 620-4.

Radial internal clearance

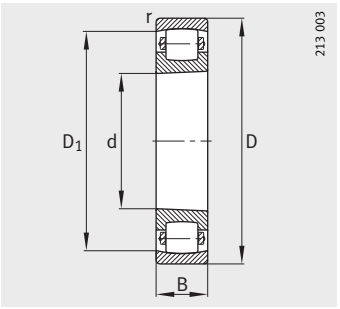
Bore d mm		Radial internal clearance							
		C2 µm		CN µm		C3 µm		C4 µm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	30	9	17	17	28	28	40	40	55
30	40	10	20	20	30	30	45	45	60
40	50	13	23	23	35	35	50	50	65
50	65	15	27	27	40	40	55	55	75
65	80	20	35	35	55	55	75	75	95
80	100	25	45	45	65	65	90	90	120
100	120	30	50	50	70	70	95	95	125
120	140	35	55	55	80	80	110	110	140
140	160	40	65	65	95	95	125	125	155
160	180	45	70	70	100	100	130	130	160
180	225	50	75	75	105	105	135	135	165
225	250	55	80	80	110	110	140	140	170
250	280	60	85	85	115	115	145	145	175

Barrel roller bearings

Cylindrical or tapered bore



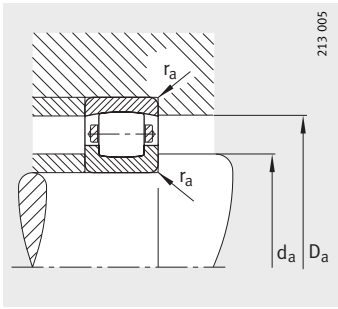
Cylindrical bore



Tapered bore
K = taper 1:12

Dimension table · Dimensions in mm

Designation	Mass	Dimensions				
	m	d	D	B	r	D_1
	≈kg				min.	≈
20204-TVP	0,114	**20**	47	14	1	39
20304-TVP	0,152	**20**	52	15	1,1	43,5
20205-K-TVP-C3	0,132	**25**	52	15	1	43,9
20205-TVP	0,134	**25**	52	15	1	43,9
20305-TVP	0,243	**25**	62	17	1,1	51,9
20206-K-TVP-C3	0,203	**30**	62	16	1	53
20206-TVP	0,207	**30**	62	16	1	53
20306-TVP	0,37	**30**	72	19	1,1	60,7
20207-K-TVP-C3	0,296	**35**	72	17	1,1	62,3
20207-TVP	0,301	**35**	72	17	1,1	62,3
20307-TVP	0,493	**35**	80	21	2,5	67,4
20208-K-TVP-C3	0,38	**40**	80	18	1,1	70,1
20208-TVP	0,386	**40**	80	18	1,1	70,1
20308-TVP	0,671	**40**	90	23	1,5	76,8
20209-K-TVP-C3	0,433	**45**	85	19	1,1	74,6
20209-TVP	0,441	**45**	85	19	1,1	74,6
20309-TVP	0,914	**45**	100	25	1,5	85,2
20210-K-TVP-C3	0,489	**50**	90	20	1,1	79,5
20210-TVP	0,499	**50**	90	20	1,1	79,5
20310-TVP	1,17	**50**	110	27	2	94,4
20211-K-TVP-C3	0,642	**55**	100	21	1,5	89,2
20211-TVP	0,653	**55**	100	21	1,5	89,2
20311-K-TVP-C3	1,49	**55**	120	29	2	101,7
20311-TVP	1,53	**55**	120	29	2	101,7
20212-K-TVP-C3	0,822	**60**	110	22	1,5	97,8
20212-TVP	0,836	**60**	110	22	1,5	97,8
20312-K-TVP-C3	1,89	**60**	130	31	2,1	111,2
20312-TVP	1,92	**60**	130	31	2,1	111,2
20213-K-TVP-C3	1,07	**65**	120	23	1,5	105,1
20213-TVP	1,08	**65**	120	23	1,5	105,1
20313-K-MB-C3	2,14	**65**	140	33	1,5	120,6
20313-MB	2,18	**65**	140	33	1,5	120,6

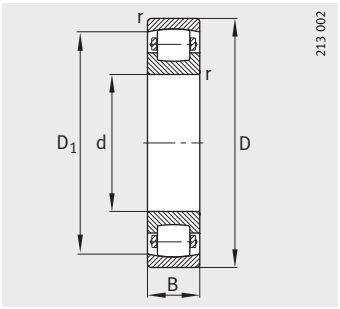


Mounting dimensions

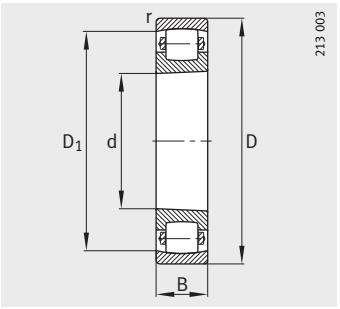
Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G
min.	max.	max.	N	N	N	min^{-1}
25,6	41,4	1	20 400	19 300	1 700	7 500
27	45	1	27 000	24 500	2 300	7 000
30,6	46,4	1	24 000	25 000	2 190	6 700
30,6	46,4	1	24 000	25 000	2 190	6 700
32	55	1	36 000	34 500	3 000	6 000
35,6	56,4	1	27 500	28 500	2 850	5 600
35,6	56,4	1	27 500	28 500	2 850	5 600
37	65	1	49 000	49 000	4 250	5 000
42	65	1	40 500	43 000	4 900	4 800
42	65	1	40 500	43 000	4 900	4 800
44	71	1,5	58 500	61 000	5 400	4 500
47	73	1	49 000	53 000	5 400	4 300
47	73	1	49 000	53 000	5 400	4 300
49	81	1,5	76 500	81 500	7 200	4 000
52	78	1	52 000	57 000	5 900	4 000
52	78	1	52 000	57 000	5 900	4 000
54	91	1,5	86 500	95 000	8 500	3 600
57	83	1	58 500	68 000	7 000	3 600
57	83	1	58 500	68 000	7 000	3 600
61	99	2	108 000	118 000	10 600	3 400
64	91	1,5	73 500	85 000	9 300	3 400
64	91	1,5	73 500	85 000	9 300	3 400
66	109	2	120 000	137 000	12 400	3 000
66	109	2	120 000	137 000	12 400	3 000
69	101	1,5	85 000	100 000	10 900	3 200
69	101	1,5	85 000	100 000	10 900	3 200
72	118	2,1	146 000	170 000	15 200	2 800
72	118	2,1	146 000	170 000	15 200	2 800
74	111	1,5	95 000	116 000	12 700	3 000
74	111	1,5	95 000	116 000	12 700	3 000
77	128	2,1	170 000	196 000	17 900	2 800
77	128	2,1	170 000	196 000	17 900	2 800

Barrel roller bearings

Cylindrical or tapered bore



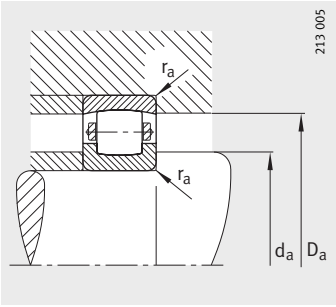
Cylindrical bore



Tapered bore
K = taper 1:12

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions				
	m	d	D	B	r	D_1
	≈kg				min.	≈
20214-TVP	1,17	**70**	125	24	1,5	111
20314-MB	3,15	**70**	150	35	2,1	128,7
20215-K-TVP-C3	1,25	**75**	130	25	1,5	115,9
20215-TVP	1,28	**75**	130	25	1,5	115,9
20315-MB	3,76	**75**	160	37	2,1	138,1
20216-K-TVP-C3	1,56	**80**	140	26	2	124,5
20216-TVP	1,58	**80**	140	26	2	124,5
20316-MB	4,58	**80**	170	39	2,1	147,5
20217-K-MB-C3	2,19	**85**	150	28	2	133,9
20217-MB	2,22	**85**	150	28	2	133,9
20317-MB	5,25	**85**	180	41	3	156,9
20218-K-MB-C3	2,68	**90**	160	30	2	143,8
20218-MB	2,72	**90**	160	30	2	143,8
20318-K-MB-C3	6,17	**90**	190	43	3	165,1
20318-MB	6,25	**90**	190	43	3	165,1
20219-MB	3,19	**95**	170	32	2,1	152,7
20319-MB	7,29	**95**	200	45	3	174,5
20220-K-MB-C3	3,9	**100**	180	34	2,1	160,8
20220-MB	3,96	**100**	180	34	2,1	160,8
20320-K-MB-C3	8,58	**100**	215	47	3	186,6
20320-MB	8,69	**100**	215	47	3	186,6
20221-MB	4,74	**105**	190	36	2,1	169,2
20222-K-MB-C3	5,45	**110**	200	38	2,1	178,6
20222-MB	5,53	**110**	200	38	2,1	178,6
20322-MB	11,6	**110**	240	50	3	208,1
20224-K-MB-C3	6,51	**120**	215	40	2,1	191,1
20224-MB	6,6	**120**	215	40	2,1	191,1
20324-MB	15,2	**120**	260	55	3	222,3
20226-K-MB-C3	7,21	**130**	230	40	3	205,7
20226-MB	7,31	**130**	230	40	3	205,7
20326-MB	18,4	**130**	280	58	4	240,3
20228-K-MB-C3	8,98	**140**	250	42	3	223,9
20228-MB	9,09	**140**	250	42	3	223,9
20328-MB	22,5	**140**	300	62	4	257,9

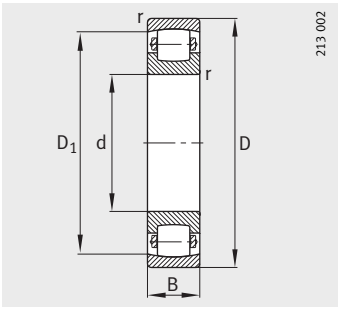


Mounting dimensions

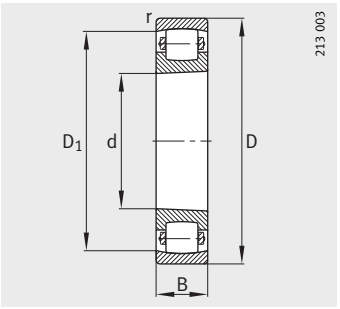
Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G
min.	max.	max.	N	N	N	min^{-1}
79	116	1,5	106 000	134 000	14 100	2 800
82	138	2,1	183 000	216 000	19 600	2 600
84	121	1,5	112 000	143 000	16 100	2 800
84	121	1,5	112 000	143 000	16 100	2 800
87	148	2,1	216 000	255 000	22 400	2 200
91	129	2	125 000	163 000	17 100	2 600
91	129	2	125 000	163 000	17 100	2 600
92	158	2,1	245 000	285 000	25 500	2 000
96	139	2	156 000	200 000	20 400	2 400
96	139	2	156 000	200 000	20 400	2 400
99	166	2,5	270 000	320 000	28 500	1 900
101	149	2	173 000	220 000	22 000	2 000
101	149	2	173 000	220 000	22 000	2 000
104	176	2,5	300 000	360 000	30 500	1 900
104	176	2,5	300 000	360 000	30 500	1 900
107	158	2,1	208 000	265 000	26 000	1 900
109	186	2,5	335 000	400 000	34 000	1 800
112	168	2,1	224 000	290 000	28 000	1 900
112	168	2,1	224 000	290 000	28 000	1 900
114	201	2,5	365 000	440 000	38 000	1 700
114	201	2,5	365 000	440 000	38 000	1 700
117	178	2,1	245 000	315 000	30 500	1 800
122	188	2,1	285 000	375 000	34 500	1 700
122	188	2,1	285 000	375 000	34 500	1 700
124	226	2,5	430 000	520 000	45 500	1 500
132	203	2,1	305 000	415 000	38 000	1 600
132	203	2,1	305 000	415 000	38 000	1 600
134	246	2,5	490 000	630 000	52 000	1 400
144	216	2,5	335 000	450 000	42 500	1 500
144	216	2,5	335 000	450 000	42 500	1 500
147	263	3	550 000	720 000	59 000	1 400
154	236	2,5	390 000	530 000	50 000	1 400
154	236	2,5	390 000	530 000	50 000	1 400
157	283	3	640 000	850 000	66 000	1 300

Barrel roller bearings

Cylindrical or tapered bore



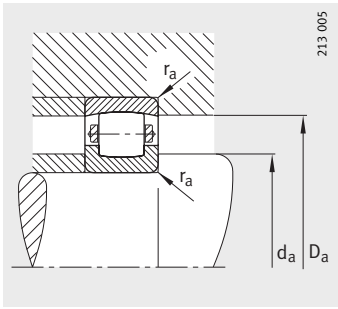
Cylindrical bore



Tapered bore
K = taper 1:12

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions				
	m	d	D	B	r	D_1
	≈kg				min.	≈
20230-K-MB-C3	11,6	**150**	270	45	3	238,6
20230-MB	11,7	**150**	270	45	3	238,6
20330-MB	26,9	**150**	320	65	4	275,8
20232-K-MB-C3	14,4	**160**	290	48	3	256,5
20232-MB	14,5	**160**	290	48	3	256,5
20234-MB	17,9	**170**	310	52	4	273,1
20236-MB	18,4	**180**	320	52	4	284,3
20238-MB	22,5	**190**	340	55	4	301,2
20240-MB	26,7	**200**	360	58	4	319
20244-MB	37,4	**220**	400	65	4	353,5
20248-MB	50,5	**240**	440	72	4	388
20252-MB	68,2	**260**	480	80	5	421,3

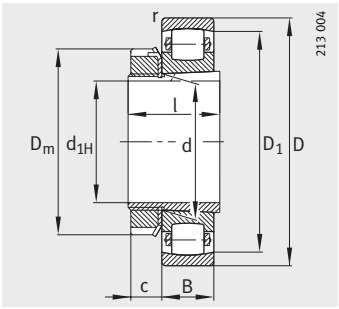


Mounting dimensions

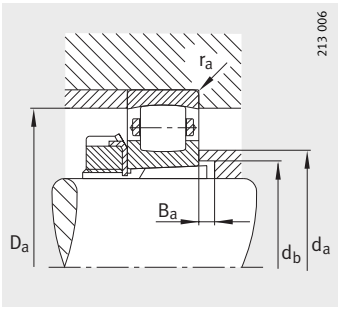
Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G
min.	max.	max.	N	N	N	min^{-1}
164	256	2,5	430 000	610 000	55 000	1 300
164	256	2,5	430 000	610 000	55 000	1 300
167	303	3	720 000	950 000	74 000	1 200
174	276	2,5	500 000	720 000	64 000	1 200
174	276	2,5	500 000	720 000	64 000	1 200
187	293	3	570 000	830 000	70 000	1 100
197	303	3	585 000	850 000	74 000	1 000
207	323	3	640 000	950 000	81 000	950
217	343	3	735 000	1 080 000	91 000	950
237	383	3	880 000	1 320 000	109 000	850
257	423	3	1 060 000	1 600 000	129 000	750
280	460	4	1 270 000	1 930 000	148 000	700

Barrel roller bearings

With adapter sleeve



With adapter sleeve



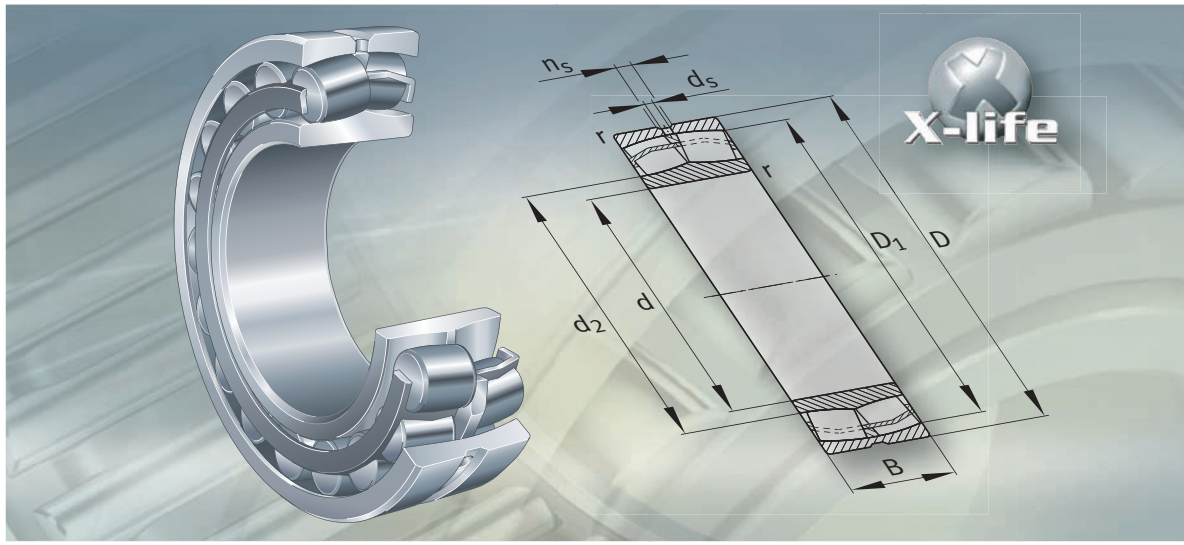
Mounting dimensions

Dimension table · Dimensions in mm

Designation		Mass m		Dimensions						
Bearing	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d_{1H}	d	D	B	r min.	D_1 ≈	D_m ≈
20205-K-TVP-C3	**H205**	0,132	0,069	**20**	25	52	15	1	43,9	38
20206-K-TVP-C3	**H206**	0,203	0,091	**25**	30	62	16	1	53	45
20207-K-TVP-C3	**H207**	0,296	0,129	**30**	35	72	17	1,1	62,3	57
20208-K-TVP-C3	**H208**	0,38	0,17	**35**	40	80	18	1,1	70,1	58
20209-K-TVP-C3	**H209**	0,433	0,216	**40**	45	85	19	1,1	74,6	65
20210-K-TVP-C3	**H210**	0,489	0,264	**45**	50	90	20	1,1	79,5	70
20211-K-TVP-C3	**H211**	0,642	0,292	**50**	55	100	21	1,5	89,2	75
20311-K-TVP-C3	**H311**	1,49	0,35	**50**	55	120	29	2	101,7	75
20212-K-TVP-C3	**H212**	0,822	0,325	**55**	60	110	22	1,5	97,8	80
20312-K-TVP-C3	**H312**	1,89	0,373	**55**	60	130	31	2,1	111,2	80
20213-K-TVP-C3	**H213**	1,07	0,393	**60**	65	120	23	1,5	105,1	92
20313-K-MB-C3	**H313**	2,14	0,452	**60**	65	140	33	1,5	120,6	92
20215-K-TVP-C3	**H215**	1,25	0,693	**65**	75	130	25	1,5	115,9	98
20216-K-TVP-C3	**H216**	1,56	0,876	**70**	80	140	26	2	124,5	105
20217-K-MB-C3	**H217**	2,19	0,995	**75**	85	150	28	2	133,9	110
20218-K-MB-C3	**H218**	2,68	1,17	**80**	90	160	30	2	143,8	126
20318-K-MB-C3	**H318**	6,17	1,36	**80**	90	190	43	3	165,1	126
20220-K-MB-C3	**H220**	3,9	1,48	**90**	100	180	34	2,1	160,8	130
20320-K-MB-C3	**H320**	8,58	1,69	**90**	100	215	47	3	186,6	130
20222-K-MB-C3	**H222**	5,45	1,9	**100**	110	200	38	2,1	178,6	145
20224-K-MB-C3	**H3024**	6,51	1,95	**110**	120	215	40	2,1	191,1	145
20226-K-MB-C3	**H3026**	7,21	2,9	**115**	130	230	40	3	205,7	155
20228-K-MB-C3	**H3028**	8,98	3,25	**125**	140	250	42	3	223,9	165
20230-K-MB-C3	**H3030**	11,6	3,98	**135**	150	270	45	3	238,6	180
20232-K-MB-C3	**H3032**	14,4	5,33	**140**	160	290	48	3	256,5	190

		Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed
l	c	d_a	D_a	d_b	B_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G
	≈	max.	max.	min.	min.	max.	N	N	N	min^{-1}
26	9	33	46,4	28	6	1	24 000	25 000	2 190	6 700
27	9	39	56,4	33	5	1	27 500	28 500	2 850	5 600
29	10	45	65	38	5	1	40 500	43 000	4 900	4 800
31	11	51	73	43	5	1	49 000	53 000	5 400	4 300
33	12	56	78	48	5	1	52 000	57 000	5 900	4 000
35	13	61	83	53	5	1	58 500	68 000	7 000	3 600
37	13	68	91	60	6	1,5	73 500	85 000	9 300	3 400
45	13	72	109	60	6	2	120 000	137 000	12 400	3 000
38	13	73	101	64	6	1,5	85 000	100 000	10 900	3 200
47	13	78	118	65	5	2,1	146 000	170 000	15 200	2 800
40	14	80	111	70	5	1,5	95 000	116 000	12 700	3 000
50	14	84	128	70	5	2,1	170 000	196 000	17 900	2 800
43	15	90	121	80	5	1,5	112 000	143 000	16 100	2 800
46	17	96	129	85	5	2	125 000	163 000	17 100	2 600
50	18	102	139	90	6	2	156 000	200 000	20 400	2 400
52	18	108	149	95	6	2	173 000	220 000	22 000	2 000
65	18	113	176	96	6	2,5	300 000	360 000	30 500	1 900
58	20	120	168	106	7	2,1	224 000	290 000	28 000	1 900
71	20	127	201	108	7	2,5	365 000	440 000	38 000	1 700
63	21	132	188	116	7	2,1	285 000	375 000	34 500	1 700
72	22	143	203	127	13	2,1	305 000	415 000	38 000	1 600
80	23	154	216	137	20	2,5	335 000	450 000	42 500	1 500
82	24	166	236	147	19	2,5	390 000	530 000	50 000	1 400
87	26	181	256	158	19	2,5	430 000	610 000	55 000	1 300
93	28	193	276	168	20	2,5	500 000	720 000	64 000	1 200

FAG



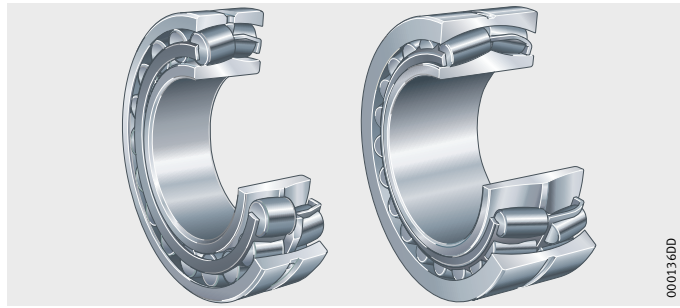
Spherical roller bearings

Spherical roller bearings

		Page
Product overview	Spherical roller bearings	574
Features	X-life	576
	Radial and axial load capacity	576
	Compensation of angular misalignments	576
	Bearings with cylindrical bore	577
	Bearings with tapered bore	577
	Sealing	577
	Lubrication	577
	Operating temperature	577
	Cages	578
	Suffixes	581
Design and safety guidelines	Equivalent dynamic bearing load	581
	Equivalent static bearing load	582
	Minimum radial load	582
	Axial load carrying capacity	582
	Speeds	582
	Design of bearing arrangements	582
Accuracy	Tolerances for bearings to specification T41A and T41D	585
	Radial internal clearance of bearings with cylindrical bore	586
	Radial internal clearance of bearings with tapered bore	587
Dimension tables	Spherical roller bearings, cylindrical or tapered bore	588
	Spherical roller bearings with adapter sleeve	632
	Spherical roller bearings with withdrawal sleeve	646

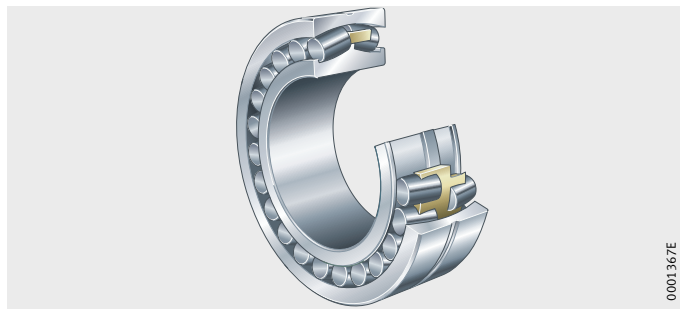
Cylindrical bore
E1 design

213..-E1, 222..-E1, 223..-E1, 230..-E1, 230..-E1A, 231..-E1, 231..-E1A, 232..-E1, 232..-E1A, 240..-E1, 241..-E1



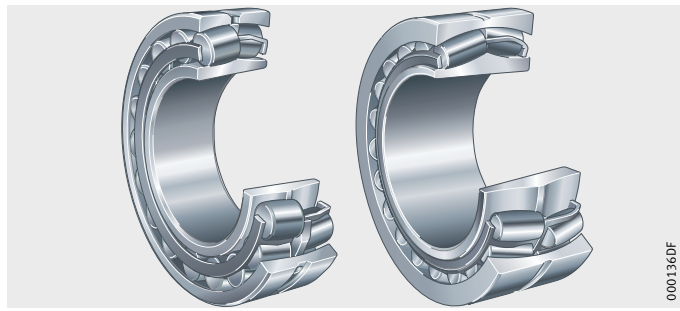
Rigid central rib

222, 223, 230, 231, 232, 233..-A, 239, 240, 241



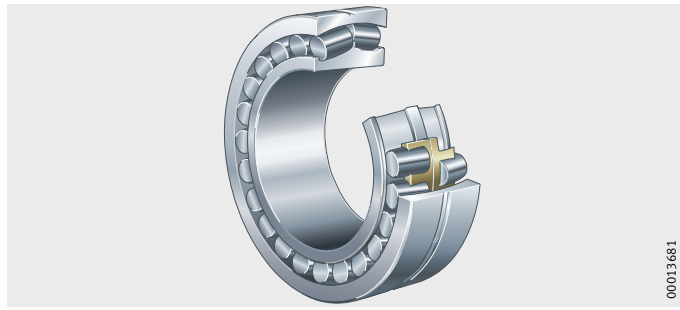
Tapered bore
E1 design

213..-E1-K, 222..-E1-K, 223..-E1-K, 230..-E1(A)-K, 231..-E1(A)-K, 232..-E1(A)-K, 240..-E1-K30, 241..-E1-K30



Rigid central rib

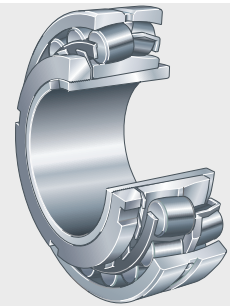
222..-K, 223..-K, 230..-K, 231..-K, 232..-K, 239..-K, 240..-K30, 241..-K30



With adapter sleeve

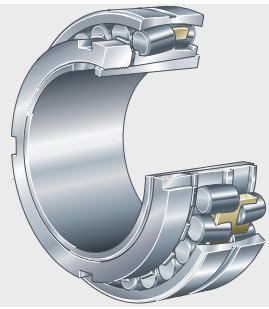
E1 design

213..-E1-K + H, 222..-E1-K + H, 223..-E1-K + H, 230..-E1(A)-K + H, 231..-E1(A)-K + H, 232..-E1(A)-K + H



Rigid central rib

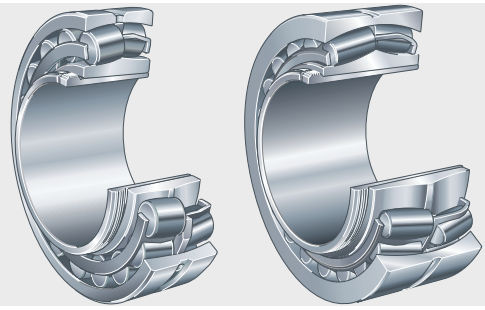
222..-K + H, 223..-K + H, 230..-K + H, 231..-K + H, 232..-K + H, 239..-K + H



With withdrawal sleeve

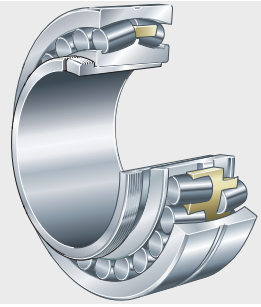
E1 design

213..-E1-K + AH, 222..-E1-K + AH, 223..-E1-K + AH, 230..-E1(A)-K + AH, 231..-E1(A)-K + AH, 232..-E1(A)-K + AH, 240..-E1-K30 + AH, 241..-E1-K30 + AH



Rigid central rib

222..-K + AH, 223..-K + AH, 230..-K + AH, 231..-K + AH, 232..-K + AH, 239..-K + AH, 240..-K30 + AH, 241..-K30 + AH



Spherical roller bearings

Features

Spherical roller bearings are double row, self-retaining units comprising solid outer rings with a concave raceway, solid inner rings and barrel rollers with cages.
The inner rings have cylindrical or tapered bores.

The symmetrical barrel rollers orient themselves freely on the concave outer ring raceway. As a result, shaft flexing and misalignment of the bearing seats are compensated, see Compensation of angular misalignments.

X-life

Many sizes of spherical roller bearings are of an X-life design. These bearings have improved kinematics and optimised surfaces, are made from higher performance materials and do not have a rigid central rib. As a result, the basic dynamic load rating and, under identical operating conditions, the basic rating life of the bearings is significantly improved. In certain applications, this means that a smaller bearing arrangement can be designed.

X-life spherical roller bearings have the suffix E1 and are indicated in the dimension tables.

Radial and axial load capacity

Spherical roller bearings can support axial forces in both directions and high radial forces. They are designed for very high load carrying capacity and, since they have the maximum possible number of large and particularly long barrel rollers, are also suitable for the heaviest loads.

Due to the narrow osculation between the rollers and raceways, uniform stress distribution is achieved in the bearing.

Compensation of angular misalignments

Spherical roller bearings compensate for angular misalignments. The permissible adjustment angle is stated for loads $P < 0{,}1 \cdot C_r$, see table.

These adjustment angles are permissible if:

- the angular deviation is constant (static angular misalignment)
- the rotating component is the inner ring.

Reduced adjustment angle

If the rotating component is the outer ring, the inner ring undergoes tumbling motion or the adjustment angles are larger than stated in the table, the angular adjustment facility is smaller.
If such applications are present, please contact us.

Adjustment angle

Series	Adjustment angle for $P < 0{,}1 \cdot C_r$ °
213..-E1, 222, 222..-E1 230, 230..-E1(E1A), 239, 240, 240..-E1, 241..-E1	1,5
223, 223..-E1, 231, 231..-E1(E1A), 232, 232..-E1(E1A), 233..-A, 241	2

Bearings with cylindrical bore

Spherical roller bearings of all series are available with inner rings having a cylindrical bore.

Bearings with tapered bore

Spherical roller bearings are also available, with the exception of series 233..-A, with inner rings having a tapered bore.

Bearings with the suffix K have a bore taper 1:12, bearings of series 240 and 241 have a bore taper 1:30 and the suffix K30.

Bearings with adapter sleeve or withdrawal sleeve

Bearings with a tapered bore are also available with an adapter sleeve, locknut and tab washer or with a withdrawal sleeve.

Adapter and withdrawal sleeves must be ordered in addition to the bearing.

Sealing

We can by agreement supply sealed and greased bearings.

Lubrication

Open spherical roller bearings can be lubricated with oil or grease.

Most spherical roller bearings have a circumferential groove and three lubrication holes in the outer ring for lubrication.
In bearings of series 239 with an outside diameter < 320 mm, this is indicated by the suffix S.

Bearings of series 213 with a bore diameter up to 35 mm do not have a lubrication groove and lubrication hole.

If shafts with a vertical axis are supported using spherical roller bearings, particular attention must be paid to ensuring the reliable provision of lubricant. In such cases, oil lubrication should be used.

Operating temperature

Spherical roller bearings are dimensionally stable up to +200 °C. Bearings with metal cages can be used at operating temperatures from –30 °C to +200 °C.

Bearings with cages made from glass fibre reinforced polyamide are suitable up to +120 °C.

Cages

The standard cages for spherical roller bearings are shown in the table Cage and bore code, page 579 and page 580.

Spherical roller bearings with a rigid central rib on the inner ring (design without suffix E1) have solid cages or sheet metal cages made from brass. Bearings with sheet metal cages do not have a cage suffix.

In bearings with the suffix MB, the solid brass cages are guided on the inner ring while, in bearings with the suffix MA, they are guided on the outer ring, *Figure 2*, page 580.
Bearings with the suffix M have a roller-guided solid brass cage, *Figure 2*, page 580.

X-life bearings

Bearings of series 213..-E1, 222..-E1, 223..-E1, 240..-E1 and 241..-E1 without a cage suffix have sheet steel cages.
The two cage halves are retained by a guidance ring in the outer or inner ring, *Figure 1*, page 579.

In bearings of series 223..-E1, 240..-E1 and 241..-E1, all sheet steel cages have special protection against wear by means of surface hardening or coating.

The other bearings of E1 design have solid cages made from glass fibre reinforced polyamide 66 or solid brass cages (suffix TVPB or M), *Figure 2*, page 580.

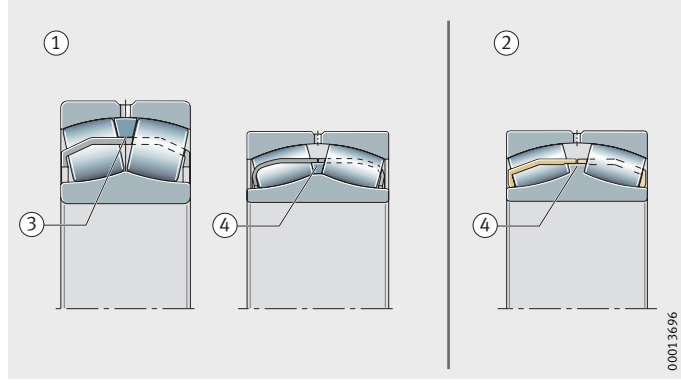
Check the chemical resistance of polyamide to synthetic greases and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures.

The oil change intervals must be observed.

Cage and bore code

Series	Sheet metal cage made from		
	Steel		Brass
	Guidance on		Guidance on
	outer ring	inner ring	inner ring
	Bore code		
213..-E1	08 to 18	–	–
222	–	–	–
222..-E1	up to 36	–	–
223	–	–	–
223..-A (T41A)	–	–	–
223..-E1	up to 30	–	–
223..-E1 (T41A, T41D)	up to 30	–	–
230	–	–	–
230..-E1	–	–	–
230..-E1A	–	–	–
231	–	–	–
231..-E1	–	–	–
231..-E1A	–	–	–
232	–	–	–
232..-E1	–	–	–
232..-E1A	–	–	–
233..-A (T41A)	–	–	–
239	–	–	–
240	–	–	–
240..-E1	–	up to 40	–
241	–	–	40 to 88
241..-E1	–	up to 38	–

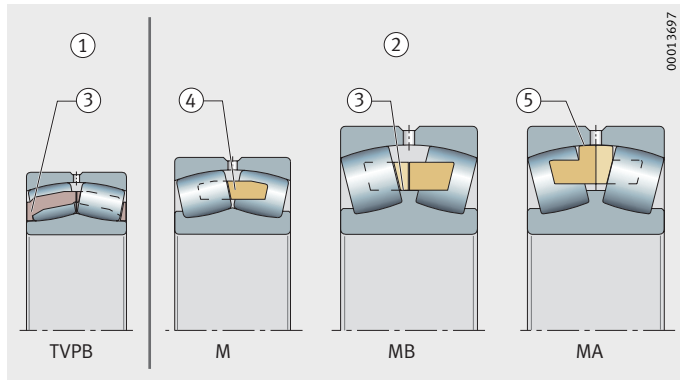


① Sheet steel cages
② Sheet brass cage
③ Cage guidance on outer ring
④ Cage guidance on inner ring

Figure 1
Sheet metal cages
made from steel or brass

Cage and bore code
continued

Series	Solid cage made from			
	Polyamide	Brass		
	Guidance on inner ring TVPB	Guidance by rollers M	Guidance on inner ring MB	Guidance on outer ring MA
	Bore code			
213..-E1	04 to 07 19 to 22	–	–	–
222	–	–	from 38	–
222..-E1	–	–	–	–
223	–	–	from 32	–
223..-A (T41A)	–	–	–	from 32
223..-E1	–	–	–	–
223..-E1 (T41A, T41D)	–	–	–	–
230	–	–	from 44	–
230..-E1	up to 40	–	–	–
230..-E1A	–	up to 40	–	–
231	–	–	from 40	–
231..-E1	up to 38	–	–	–
231..-E1A	–	up to 38	–	–
232	–	–	from 38	–
232..-E1	up to 36	–	–	–
232..-E1A	–	up to 36	–	–
233..-A (T41A)	–	–	–	from 20
239	–	–	from 36	–
240	–	–	from 44	–
240..-E1	–	–	–	–
241	–	–	from 92	–
241..-E1	–	–	–	–



① Solid polyamide cage
② Solid brass cages
③ Cage guidance on inner ring
④ Cage guided by rollers
⑤ Cage guidance on outer ring

Figure 2
Solid cages
made from polyamide or brass

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
A	Modified internal construction	Standard
B	Modified internal construction	
E1	Increased capacity design	
K	Tapered bore, taper 1:12	
K30	Tapered bore, taper 1:30	
M	Solid brass cage, guided by rollers	
MA	Solid brass cage, guidance on outer ring	
MB	Solid brass cage, guidance on inner ring	
S	Lubrication groove and lubrication holes in outer ring	
T41A	For oscillating load with restricted diameter tolerances, radial internal clearance C4	
T41D	For oscillating load with restricted diameter tolerances, radial internal clearance C4, bore with thin layer chromium coating	
TVPB	Solid window cage made from glass fibre reinforced polyamide, guidance on inner ring	

Design and safety guidelines

Equivalent dynamic bearing load

For bearings under dynamic loading, the following applies:

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leqq e$	$P = F_r + Y_1 \cdot F_a$
$\frac{F_a}{F_r} > e$	$P = 0{,}67 \cdot F_r + Y_2 \cdot F_a$

P N
Equivalent dynamic bearing load for combined load

F_a N
Axial dynamic bearing load

F_r N
Radial dynamic bearing load

e, Y_1, Y_2 –
Factors from dimension tables.

Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r} + Y_0 \cdot F_{0a}$$

P_0 N
Equivalent static bearing load for combined load

F_{0a} N
Axial static bearing load

F_{0r} N
Radial static bearing load

Y_0 –
Factor from dimension tables.

Minimum radial load

The minimum radial load on the spherical roller bearings should be:

- $P = 0{,}02 \cdot C_r$
- $P = 0{,}015 \cdot C_r$ for bearings of E1 design.

Axial load carrying capacity

Spherical roller bearings are suitable for axial loads. If very high loads occur in combination with very high speeds, the increased friction and bearing temperature must be taken into consideration.

Speeds

The limiting speeds n_G given in the dimension tables must not be exceeded.

Design of bearing arrangements

Shaft and housing tolerances

Recommended shaft tolerances for bearings with cylindrical bore, see table, page 150.

Recommended housing tolerances for radial bearings, see table, page 152.

Mounting dimensions

The dimension tables give the maximum dimensions of the radii r_a and the diameters of the abutment shoulders D_a, d_a. In order to achieve acceptable running of the spherical roller bearings, the abutment shoulders must be no smaller than D_1 and no larger than d_2 according to the dimension tables.

Reduced radial internal clearance in fitting

When bearings with a tapered bore are fitted, there is a reduction in the radial internal clearance.

The values given in the tables will ensure secure seating on the shaft, see tables page 583 and page 584.

Reduction in radial internal clearance and displacement distance on taper 1:12

Nominal bearing bore diameter d mm		Reduction in radial internal clearance mm		Displacement distance on taper 1:12				Control value for minimum radial internal clearance after fitting		
				Shaft mm		Sleeve mm		CN mm	C3 mm	C4 mm
over	incl.	min.	max.	min.	max.	min.	max.	min.	min.	min.
24	30	0,015	0,02	0,3	0,35	0,3	0,4	0,015	0,02	0,035
30	40	0,02	0,025	0,35	0,4	0,35	0,45	0,015	0,025	0,04
40	50	0,025	0,03	0,4	0,45	0,45	0,5	0,02	0,03	0,05
50	65	0,03	0,04	0,45	0,6	0,5	0,7	0,025	0,035	0,055
65	80	0,04	0,05	0,6	0,75	0,7	0,85	0,025	0,04	0,07
80	100	0,045	0,06	0,7	0,9	0,75	1	0,035	0,05	0,08
100	120	0,05	0,07	0,7	1,1	0,8	1,2	0,05	0,065	0,1
120	140	0,065	0,09	1,1	1,4	1,2	1,5	0,055	0,08	0,11
140	160	0,075	0,1	1,2	1,6	1,3	1,7	0,055	0,09	0,13
160	180	0,08	0,11	1,3	1,7	1,4	1,9	0,06	0,1	0,15
180	200	0,09	0,13	1,4	2	1,5	2,2	0,07	0,1	0,16
200	225	0,1	0,14	1,6	2,2	1,7	2,4	0,08	0,12	0,18
225	250	0,11	0,15	1,7	2,4	1,8	2,6	0,09	0,13	0,2
250	280	0,12	0,17	1,9	2,6	2	2,9	0,1	0,14	0,22
280	315	0,13	0,19	2	3	2,2	3,2	0,11	0,15	0,24
315	355	0,15	0,21	2,4	3,4	2,6	3,6	0,12	0,17	0,26
355	400	0,17	0,23	2,6	3,6	2,9	3,9	0,13	0,19	0,29
400	450	0,2	0,26	3,1	4,1	3,4	4,4	0,13	0,2	0,31
450	500	0,21	0,28	3,3	4,4	3,6	4,8	0,16	0,23	0,35
500	560	0,24	0,32	3,7	5	4,1	5,4	0,17	0,25	0,36
560	630	0,26	0,35	4	5,4	4,4	5,9	0,2	0,29	0,41
630	710	0,3	0,4	4,6	6,2	5,1	6,8	0,21	0,31	0,45
710	800	0,34	0,45	5,3	7	5,8	7,6	0,23	0,35	0,51
800	900	0,37	0,5	5,7	7,8	6,3	8,5	0,27	0,39	0,57

Reduction in radial internal clearance and displacement distance on taper 1:30

Nominal bearing bore diameter d mm		Reduction in radial internal clearance mm		Displacement distance on taper 1:30				Control value for minimum radial internal clearance after fitting		
				Shaft mm		Sleeve mm		CN mm	C3 mm	C4 mm
over	incl.	min.	max.	min.	max.	min.	max.	min.	min.	min.
24	30	0,015	0,02	–	–	–	–	0,015	0,02	0,035
30	40	0,02	0,025	–	–	–	–	0,015	0,025	0,04
40	50	0,025	0,03	–	–	–	–	0,02	0,03	0,05
50	65	0,03	0,04	–	–	–	–	0,025	0,035	0,055
65	80	0,04	0,05	–	–	–	–	0,025	0,04	0,07
80	100	0,045	0,06	1,7	2,2	1,8	2,4	0,035	0,05	0,08
100	120	0,05	0,07	1,9	2,7	2	2,8	0,05	0,065	0,1
120	140	0,065	0,09	2,7	3,5	2,8	3,6	0,055	0,08	0,11
140	160	0,075	0,1	3	4	3,1	4,2	0,055	0,09	0,13
160	180	0,08	0,11	3,2	4,2	3,3	4,6	0,06	0,1	0,15
180	200	0,09	0,13	3,5	4,5	3,6	5	0,07	0,1	0,16
200	225	0,1	0,14	4	5,5	4,2	5,7	0,08	0,12	0,18
225	250	0,11	0,15	4,2	6	4,6	6,2	0,09	0,13	0,2
250	280	0,12	0,17	4,7	6,7	4,8	6,9	0,1	0,14	0,22
280	315	0,13	0,19	5	7,5	5,2	7,7	0,11	0,15	0,24
315	355	0,15	0,21	6	8,2	6,2	8,4	0,12	0,17	0,26
355	400	0,17	0,23	6,5	9	6,8	9,2	0,13	0,19	0,29
400	450	0,2	0,26	7,7	10	8	10,4	0,13	0,2	0,31
450	500	0,21	0,28	8,2	11	8,4	11,2	0,16	0,23	0,35
500	560	0,24	0,32	9,2	12,5	9,6	12,8	0,17	0,25	0,36
560	630	0,26	0,35	10	13,5	10,4	14	0,2	0,29	0,41
630	710	0,3	0,4	11,5	15,5	12	16	0,21	0,31	0,45
710	800	0,34	0,45	13,3	17,5	13,6	18	0,23	0,35	0,51
800	900	0,37	0,5	14,3	19,5	14,8	20	0,27	0,39	0,57

Accuracy

The main dimensions of the bearings conform to DIN 635-2, the dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620-2.

Tolerances for bearings to specification T41A and T41D

Bearings to specification T41A (D) have restricted tolerances, see table. In bearings with a tapered bore, the reduced tolerance range applies to the outside diameter only.

Tolerances

Inner ring			Outer ring		
Nominal bearing bore diameter Dimensions in mm		Deviation Δ_{dmp} Tolerances in µm	Nominal outside diameter Dimensions in mm		Deviation Δ_{Dmp} Tolerances in µm
over	incl.		over	incl.	
30	50	0 −7	80	150	−5 −13
50	80	0 −9	150	180	−5 −18
80	120	0 −12	180	315	−10 −23
120	180	0 −15	315	400	−13 −28
180	250	0 −18	400	500	−13 −30
250	315	0 −21	500	630	−15 −35

Radial internal clearance of bearings with cylindrical bore

The radial internal clearance corresponds to internal clearance group CN to DIN 620-4.

Radial internal clearance

Bore d mm		Radial internal clearance							
		C2 µm		CN µm		C3 µm		C4 µm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
18	24	10	20	20	35	35	45	45	60
24	30	15	25	25	40	40	55	55	75
30	40	15	30	30	45	45	60	60	80
40	50	20	35	35	55	55	75	75	100
50	65	20	40	40	65	65	90	90	120
65	80	30	50	50	80	80	110	110	145
80	100	35	60	60	100	100	135	135	180
100	120	40	75	75	120	120	160	160	210
120	140	50	95	95	145	145	190	190	240
140	160	60	110	110	170	170	220	220	280
160	180	65	120	120	180	180	240	240	310
180	200	70	130	130	200	200	260	260	340
200	225	80	140	140	220	220	290	290	380
225	250	90	150	150	240	240	320	320	420
250	280	100	170	170	260	260	350	350	460
280	315	110	190	190	280	280	370	370	500
315	355	120	200	200	310	310	410	410	550
355	400	130	220	220	340	340	450	450	600
400	450	140	240	240	370	370	500	500	660
450	500	140	260	260	410	410	550	550	720
500	560	150	280	280	440	440	600	600	780
560	630	170	310	310	480	480	650	650	850
630	710	190	350	350	530	530	700	700	920
710	800	210	390	390	580	580	770	770	1 010
800	900	230	430	430	650	650	860	860	1 120

Radial internal clearance of bearings with tapered bore

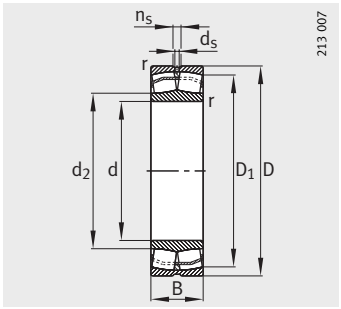
The radial internal clearance corresponds to internal clearance group CN to DIN 620-4.

Radial internal clearance

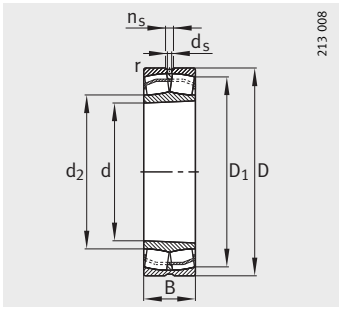
Bore		Radial internal clearance							
d mm		C2 µm		CN µm		C3 µm		C4 µm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
18	24	15	25	25	35	35	45	45	60
24	30	20	30	30	40	40	55	55	75
30	40	25	35	35	50	50	65	65	85
40	50	30	45	45	60	60	80	80	100
50	65	40	55	55	75	75	95	95	120
65	80	50	70	70	95	95	120	120	150
80	100	55	80	80	110	110	140	140	180
100	120	65	100	100	135	135	170	170	220
120	140	80	120	120	160	160	200	200	260
140	160	90	130	130	180	180	230	230	300
160	180	100	140	140	200	200	260	260	340
180	200	110	160	160	220	220	290	290	370
200	225	120	180	180	250	250	320	320	410
225	250	140	200	200	270	270	350	350	450
250	280	150	220	220	300	300	390	390	490
280	315	170	240	240	330	330	430	430	540
315	355	190	270	270	360	360	470	470	590
355	400	210	300	300	400	400	520	520	650
400	450	230	330	330	440	440	570	570	720
450	500	260	370	370	490	490	630	630	790
500	560	290	410	410	540	540	680	680	870
560	630	320	460	460	600	600	760	760	980
630	710	350	510	510	670	670	850	850	1 090
710	800	390	570	570	750	750	960	960	1 220
800	900	440	640	640	840	840	1 070	1 070	1 370

Spherical roller bearings

Cylindrical or tapered bore



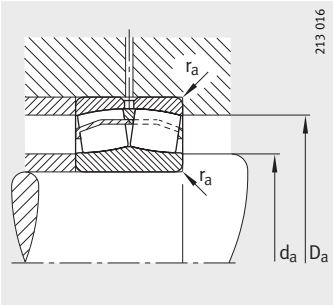
E1 design
Cylindrical bore



Tapered bore
K = taper 1:12

Dimension table · Dimensions in mm

Designation		Mass	Dimensions							
	X-life	m ≈kg	d	D	B	r min.	D_1 ≈	d_2 ≈	d_s	n_s
21304-E1-TVPB	**XL**	0,16	**20**	52	15	1,1	43	28,9	–	–
22205-E1-K	**XL**	0,175	**25**	52	18	1	44,5	31,3	3,2	4,8
22205-E1	**XL**	0,18	**25**	52	18	1	44,5	31,3	3,2	4,8
21305-E1-TVPB	**XL**	0,254	**25**	62	17	1,1	51	35,2	–	–
22206-E1-K	**XL**	0,269	**30**	62	20	1	53,7	37,9	3,2	4,8
22206-E1	**XL**	0,275	**30**	62	20	1	53,7	37,9	3,2	4,8
21306-E1-TVPB	**XL**	0,386	**30**	72	19	1,1	59,9	41,5	–	–
22207-E1-K	**XL**	0,425	**35**	72	23	1,1	62,5	43,8	3,2	4,8
22207-E1	**XL**	0,434	**35**	72	23	1,1	62,5	43,8	3,2	4,8
21307-E1-K-TVPB	**XL**	0,496	**35**	80	21	1,5	66,6	47,4	–	–
21307-E1-TVPB	**XL**	0,503	**35**	80	21	1,5	66,6	47,4	–	–
22208-E1-K	**XL**	0,517	**40**	80	23	1,1	70,4	48,6	3,2	4,8
22208-E1	**XL**	0,528	**40**	80	23	1,1	70,4	48,6	3,2	4,8
21308-E1	**XL**	0,701	**40**	90	23	1,5	80,8	59,7	3,2	4,8
21308-E1-K	**XL**	0,702	**40**	90	23	1,5	80,8	59,7	3,2	4,8
22308-E1-K	**XL**	1,03	**40**	90	33	1,5	76	52,4	3,2	4,8
22308-E1	**XL**	1,05	**40**	90	33	1,5	76	52,4	3,2	4,8
22308-E1-T41A	**XL**	1,05	**40**	90	33	1,5	76	52,4	3,2	4,8
22209-E1-K	**XL**	0,577	**45**	85	23	1,1	75,6	54,8	3,2	4,8
22209-E1	**XL**	0,589	**45**	85	23	1,1	75,6	54,8	3,2	4,8
21309-E1-K	**XL**	0,845	**45**	100	25	1,5	89,8	67,6	3,2	4,8
21309-E1	**XL**	0,845	**45**	100	25	1,5	89,8	67,6	3,2	4,8
22309-E1-K	**XL**	1,36	**45**	100	36	1,5	84,7	58,9	3,2	6,5
22309-E1	**XL**	1,39	**45**	100	36	1,5	84,7	58,9	3,2	6,5
22309-E1-T41A	**XL**	1,39	**45**	100	36	1,5	84,7	58,9	3,2	6,5
22210-E1-K	**XL**	0,608	**50**	90	23	1,1	80,8	59,7	3,2	4,8
22210-E1	**XL**	0,622	**50**	90	23	1,1	80,8	59,7	3,2	4,8
21310-E1-K	**XL**	1,28	**50**	110	27	2	89,8	67,3	3,2	4,8
21310-E1	**XL**	1,28	**50**	110	27	2	89,8	67,3	3,2	4,8
22310-E1-K	**XL**	1,86	**50**	110	40	2	92,6	63	3,2	6,5
22310-E1	**XL**	1,9	**50**	110	40	2	92,6	63	3,2	6,5
22310-E1-T41A	**XL**	1,9	**50**	110	40	2	92,6	63	3,2	6,5

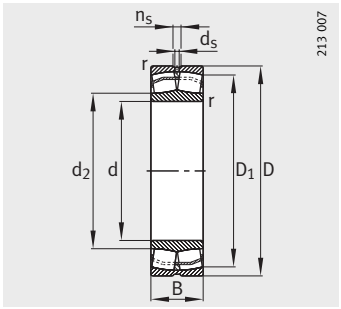


Mounting dimensions

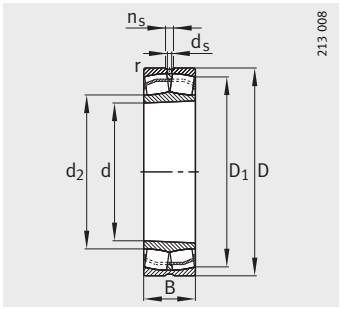
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
27	45	1	41 000	33 000	0,3	2,25	3,34	2,2	3 700	15 000	9 700
30,6	46,4	1	48 000	42 500	0,34	1,98	2,94	1,93	4 800	17 000	9 200
30,6	46,4	1	48 000	42 500	0,34	1,98	2,94	1,93	4 800	17 000	9 200
32	55	1	52 000	43 500	0,28	2,43	3,61	2,37	4 750	13 000	8 400
35,6	54,6	1	64 000	57 000	0,31	2,15	3,2	2,1	6 900	13 000	7 800
35,6	56,4	1	64 000	57 000	0,31	2,15	3,2	2,1	6 900	13 000	7 800
37	65	1	72 000	63 000	0,27	2,49	3,71	2,43	7 000	11 000	7 300
42	65	1	88 000	81 500	0,31	2,16	3,22	2,12	9 400	11 000	7 000
42	65	1	88 000	81 500	0,31	2,16	3,22	2,12	9 400	11 000	7 000
44	71	1,5	83 000	74 000	0,26	2,55	3,8	2,5	8 100	9 500	6 800
44	71	1,5	83 000	74 000	0,26	2,55	3,8	2,5	8 100	9 500	6 800
47	73	1	101 000	91 000	0,28	2,41	3,59	2,35	11 800	10 000	6 200
47	73	1	101 000	91 000	0,28	2,41	3,59	2,35	11 800	10 000	6 200
49	81	1,5	109 000	107 000	0,24	2,81	4,19	2,75	14 300	9 500	5 200
49	81	1,5	109 000	107 000	0,24	2,81	4,19	2,75	14 300	9 500	5 200
49	81	1,5	156 000	149 000	0,36	1,86	2,77	1,82	13 100	7 500	5 500
49	81	1,5	156 000	149 000	0,36	1,86	2,77	1,82	13 100	7 500	5 500
49	81	1,5	156 000	149 000	0,36	1,86	2,77	1,82	13 100	7 500	5 500
52	78	1	104 000	99 000	0,26	2,62	3,9	2,56	12 700	10 000	5 600
52	78	1	104 000	99 000	0,26	2,62	3,9	2,56	12 700	10 000	5 600
54	91	1,5	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	5 500
54	91	1,5	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	5 500
54	91	1,5	187 000	183 000	0,36	1,9	2,83	1,86	16 100	6 700	5 000
54	91	1,5	187 000	183 000	0,36	1,9	2,83	1,86	16 100	6 700	5 000
54	91	1,5	187 000	183 000	0,36	1,9	2,83	1,86	16 100	6 700	5 000
57	83	1	109 000	107 000	0,24	2,81	4,19	2,75	14 300	9 500	5 100
57	83	1	109 000	107 000	0,24	2,81	4,19	2,75	14 300	9 500	5 100
61	99	2	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	5 400
61	99	2	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	5 300
61	99	2	229 000	223 000	0,36	1,86	2,77	1,82	20 300	6 000	4 800
61	99	2	229 000	223 000	0,36	1,86	2,77	1,82	20 300	6 000	4 800
61	99	2	229 000	223 000	0,36	1,86	2,77	1,82	20 300	6 000	4 800

Spherical roller bearings

Cylindrical or tapered bore



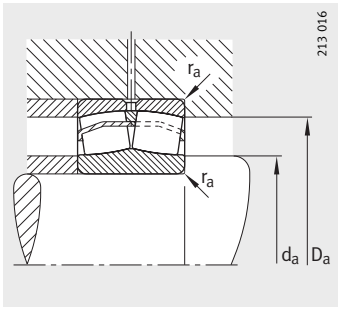
E1 design
Cylindrical bore



Tapered bore
K = taper 1:12

Dimension table (continued) · Dimensions in mm

Designation		Mass	Dimensions							
	X-life	m ≈kg	d	D	B	r min.	D_1 ≈	d_2 ≈	d_s	n_s
22211-E1-K	**XL**	0,825	**55**	100	25	1,5	89,8	67,3	3,2	4,8
22211-E1	**XL**	0,851	**55**	100	25	1,5	89,8	67,3	3,2	4,8
21311-E1-K	**XL**	1,19	**55**	120	29	2	98,3	71,4	3,2	6,5
21311-E1	**XL**	1,19	**55**	120	29	2	98,3	71,4	3,2	6,5
22311-E1-K	**XL**	2,22	**55**	120	43	2	101,4	68,9	3,2	6,5
22311-E1-K-T41A	**XL**	2,22	**55**	120	43	2	101,4	68,9	3,2	6,5
22311-E1	**XL**	2,27	**55**	120	43	2	101,4	68,9	3,2	6,5
22311-E1-T41A	**XL**	2,27	**55**	120	43	2	101,4	68,9	3,2	6,5
22212-E1-K	**XL**	1,09	**60**	110	28	1,5	98,7	71,4	3,2	6,5
22212-E1	**XL**	1,12	**60**	110	28	1,5	98,7	71,4	3,2	6,5
21312-E1-K	**XL**	1,78	**60**	130	31	2,1	112,5	84,4	3,2	6,5
21312-E1	**XL**	1,78	**60**	130	31	2,1	112,5	84,4	3,2	6,5
22312-E1-K	**XL**	2,83	**60**	130	46	2,1	110,1	74,8	3,2	6,5
22312-E1-K-T41A	**XL**	2,83	**60**	130	46	2,1	110,1	74,8	3,2	6,5
22312-E1	**XL**	2,89	**60**	130	46	2,1	110,1	74,8	3,2	6,5
22312-E1-T41A	**XL**	2,89	**60**	130	46	2,1	110,1	74,8	3,2	6,5
22213-E1-K	**XL**	1,52	**65**	120	31	1,5	107,3	79,1	3,2	6,5
22213-E1	**XL**	1,55	**65**	120	31	1,5	107,3	79,1	3,2	6,5
21313-E1-K	**XL**	2,42	**65**	140	33	2,1	126,8	94,9	3,2	6,5
21313-E1	**XL**	2,42	**65**	140	33	2,1	126,8	94,9	3,2	6,5
22313-E1-K	**XL**	3,49	**65**	140	48	2,1	119,3	83,2	4,8	9,5
22313-E1-K-T41A	**XL**	3,49	**65**	140	48	2,1	119,3	83,2	4,8	9,5
22313-E1	**XL**	3,57	**65**	140	48	2,1	119,3	83,2	4,8	9,5
22313-E1-T41A	**XL**	3,57	**65**	140	48	2,1	119,3	83,2	4,8	9,5
22214-E1-K	**XL**	1,61	**70**	125	31	1,5	112,5	84,4	3,2	6,5
22214-E1	**XL**	1,65	**70**	125	31	1,5	112,5	84,4	3,2	6,5
21314-E1-K	**XL**	3	**70**	150	35	2,1	126,2	94,9	3,2	6,5
21314-E1	**XL**	3	**70**	150	35	2,1	126,2	94,9	3,2	6,5
22314-E1-K	**XL**	4,12	**70**	150	51	2,1	128	86,7	4,8	9,5
22314-E1-K-T41A	**XL**	4,12	**70**	150	51	2,1	128	86,7	4,8	9,5
22314-E1	**XL**	4,21	**70**	150	51	2,1	128	86,7	4,8	9,5
22314-E1-T41A	**XL**	4,21	**70**	150	51	2,1	128	86,7	4,8	9,5

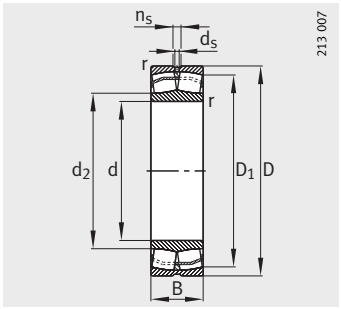


Mounting dimensions

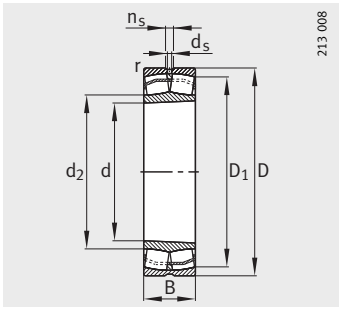
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
64	91	1,5	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	4 650
64	91	1,5	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	4 650
66	109	2	160 000	155 000	0,24	2,84	4,23	2,78	20 200	6 300	5 100
66	109	2	160 000	155 000	0,24	2,84	4,23	2,78	20 200	6 300	5 100
66	109	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 500
66	109	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 500
66	109	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 500
66	109	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 500
69	101	1,5	160 000	155 000	0,24	2,84	4,23	2,78	20 200	7 500	4 550
69	101	1,5	160 000	155 000	0,24	2,84	4,23	2,78	20 200	7 500	4 550
72	118	2,1	211 000	226 000	0,23	2,95	4,4	2,89	28 000	6 300	4 100
72	118	2,1	211 000	226 000	0,23	2,95	4,4	2,89	28 000	6 300	4 100
72	118	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 200
72	118	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 200
72	118	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 200
72	118	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 200
74	111	1,5	202 000	210 000	0,24	2,81	4,19	2,75	25 500	6 700	4 200
74	111	1,5	202 000	210 000	0,24	2,81	4,19	2,75	25 500	6 700	4 200
77	128	2,1	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 000	3 600
77	128	2,1	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 000	3 600
77	128	2,1	350 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 800
77	128	2,1	350 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 800
77	128	2,1	350 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 800
77	128	2,1	350 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 800
79	116	1,5	211 000	226 000	0,23	2,95	4,4	2,89	28 000	6 300	3 950
79	116	1,5	211 000	226 000	0,23	2,95	4,4	2,89	28 000	6 300	3 950
82	138	2,1	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 000	3 950
82	138	2,1	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 000	3 950
82	138	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 700
82	138	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 700
82	138	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 700
82	138	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 700

Spherical roller bearings

Cylindrical or tapered bore



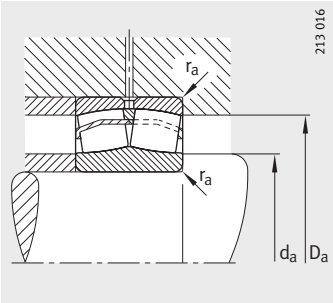
E1 design
Cylindrical bore



Tapered bore
K = taper 1:12

Dimension table (continued) · Dimensions in mm

Designation		Mass	Dimensions							
	X-life	m ≈kg	d	D	B	r min.	D_1 ≈	d_2 ≈	d_s	n_s
22215-E1-K	**XL**	1,68	**75**	130	31	1,5	117,7	89,8	3,2	6,5
22215-E1	**XL**	1,72	**75**	130	31	1,5	117,7	89,8	3,2	6,5
21315-E1-K	**XL**	2,86	**75**	160	37	2,1	135,2	99,7	3,2	6,5
21315-E1	**XL**	2,86	**75**	160	37	2,1	135,2	99,7	3,2	6,5
22315-E1-K	**XL**	5,06	**75**	160	55	2,1	136,3	92,4	4,8	9,5
22315-E1-K-T41A	**XL**	5,06	**75**	160	55	2,1	136,3	92,4	4,8	9,5
22315-E1	**XL**	5,18	**75**	160	55	2,1	136,3	92,4	4,8	9,5
22315-E1-T41A	**XL**	5,18	**75**	160	55	2,1	136,3	92,4	4,8	9,5
22216-E1-K	**XL**	2,08	**80**	140	33	2	126,8	94,9	3,2	6,5
22216-E1	**XL**	2,13	**80**	140	33	2	126,8	94,9	3,2	6,5
21316-E1-K	**XL**	2,65	**80**	170	39	2,1	135,4	99,8	3,2	6,5
21316-E1	**XL**	2,65	**80**	170	39	2,1	135,4	99,7	3,2	6,5
22316-E1-K	**XL**	6,05	**80**	170	58	2,1	145,1	98,3	4,8	9,5
22316-E1-K-T41A	**XL**	6,05	**80**	170	58	2,1	145,1	98,3	4,8	9,5
22316-E1	**XL**	6,27	**80**	170	58	2,1	145,1	98,3	4,8	9,5
22316-E1-T41A	**XL**	6,27	**80**	170	58	2,1	145,1	98,3	4,8	9,5
22217-E1-K	**XL**	2,59	**85**	150	36	2	135,4	99,7	3,2	6,5
22217-E1	**XL**	2,65	**85**	150	36	2	135,4	99,7	3,2	6,5
21317-E1-K	**XL**	5,37	**85**	180	41	3	143,9	106,1	4,8	9,5
21317-E1	**XL**	5,37	**85**	180	41	3	143,9	106,1	4,8	9,5
22317-E1	**XL**	7,06	**85**	180	60	3	154,2	104,4	4,8	9,5
22317-E1-T41D	**XL**	7,06	**85**	180	60	3	154,2	104,4	4,8	9,5
22317-E1-K	**XL**	7,06	**85**	180	60	3	154,2	104,4	4,8	9,5
22317-E1-K-T41A	**XL**	7,06	**85**	180	60	3	154,2	104,4	4,8	9,5
22218-E1-K	**XL**	3,35	**90**	160	40	2	143,9	106,1	3,2	6,5
22218-E1	**XL**	3,43	**90**	160	40	2	143,9	106,1	3,2	6,5
23218-E1-K-TVPB	**XL**	4,08	**90**	160	52,4	2	140	104,1	3,2	6,5
23218-E1-TVPB	**XL**	4,27	**90**	160	52,4	2	140	104,1	3,2	6,5
23218-E1A-K-M	**XL**	4,34	**90**	160	52,4	2	140	–	3,2	6,5
21318-E1-K	**XL**	6,26	**90**	190	43	3	152,7	112,6	4,8	9,5
21318-E1	**XL**	6,26	**90**	190	43	3	152,7	112,6	4,8	9,5
22318-E1-K	**XL**	8,33	**90**	190	64	3	162,5	110,2	6,3	12,2
22318-E1-K-T41A	**XL**	8,33	**90**	190	64	3	162,5	110,2	6,3	12,2
22318-E1	**XL**	8,51	**90**	190	64	3	162,5	110,2	6,3	12,2
22318-E1-T41D	**XL**	8,51	**90**	190	64	3	162,5	110,2	6,3	12,2

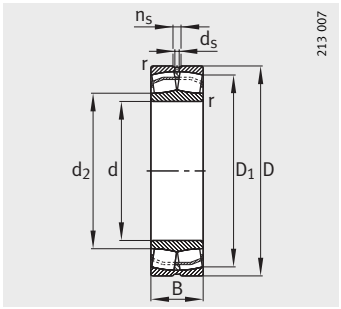


Mounting dimensions

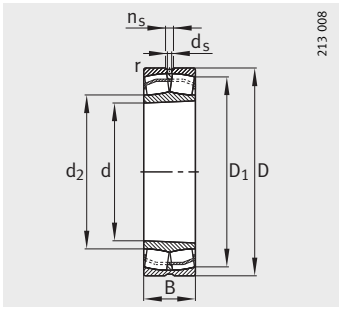
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
84	121	1,5	216 000	236 000	0,22	3,1	4,62	3,03	29 500	6 300	3 700
84	121	1,5	216 000	236 000	0,22	3,1	4,62	3,03	29 500	6 300	3 700
87	148	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	3 750
87	148	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	3 750
87	148	2,1	445 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 550
87	148	2,1	445 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 550
87	148	2,1	445 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 550
87	148	2,1	445 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 550
91	129	2	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 600	3 550
91	129	2	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 600	3 550
92	158	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	4 050
92	158	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	4 050
92	158	2,1	495 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 400
92	158	2,1	495 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 400
92	158	2,1	495 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 400
92	158	2,1	495 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 400
96	139	2	305 000	325 000	0,22	3,04	4,53	2,97	38 500	5 300	3 450
96	139	2	305 000	325 000	0,22	3,04	4,53	2,97	38 500	5 300	3 450
99	166	2,5	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 800
99	166	2,5	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 800
99	166	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 200
99	166	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 200
99	166	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 200
99	166	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 200
101	149	2	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 400
101	149	2	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 400
101	149	2	445 000	520 000	0,31	2,2	3,27	2,15	48 500	4 300	2 650
101	149	2	445 000	520 000	0,31	2,2	3,27	2,15	48 500	4 300	2 650
101	149	2	445 000	520 000	0,31	2,2	3,27	2,15	48 500	4 300	2 650
104	176	2,5	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 600
104	176	2,5	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 600
104	176	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 000
104	176	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 000
104	176	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 000
104	176	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 000

Spherical roller bearings

Cylindrical or tapered bore



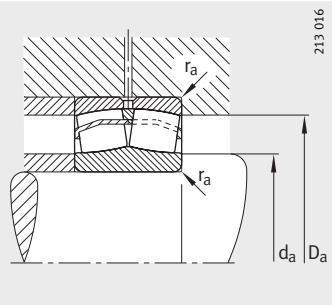
E1 design
Cylindrical bore



Tapered bore
K = taper 1:12

Dimension table (continued) · Dimensions in mm

Designation		Mass	Dimensions							
	X-life	m ≈kg	d	D	B	r min.	D_1 ≈	d_2 ≈	d_s	n_s
22219-E1-K	**XL**	4,04	**95**	170	43	2,1	152,7	112,6	4,8	9,5
22219-E1	**XL**	4,13	**95**	170	43	2,1	152,7	112,6	4,8	9,5
21319-E1-K-TVPB	**XL**	6,53	**95**	200	45	3	169,4	124,3	4,8	9,5
21319-E1-TVPB	**XL**	6,63	**95**	200	45	3	169,4	124,3	4,8	9,5
22319-E1-K	**XL**	9,46	**95**	200	67	3	171,2	116	6,3	12,2
22319-E1-K-T41A	**XL**	9,46	**95**	200	67	3	171,2	116	6,3	12,2
22319-E1	**XL**	9,69	**95**	200	67	3	171,2	116	6,3	12,2
22319-E1-T41D	**XL**	9,69	**95**	200	67	3	171,2	116	6,3	12,2
23120-E1-K-TVPB	**XL**	4,06	**100**	165	52	2	146,3	113,9	3,2	6,5
23120-E1-TVPB	**XL**	4,22	**100**	165	52	2	146,3	113,9	3,2	6,5
23120-E1A-K-M	**XL**	4,23	**100**	165	52	2	146,3	–	3,2	6,5
23120-E1A-M	**XL**	4,37	**100**	165	52	2	146,3	–	3,2	6,5
22220-E1-K	**XL**	4,91	**100**	180	46	2,1	161,4	119	4,8	9,5
22220-E1	**XL**	4,96	**100**	180	46	2,1	161,4	119	4,8	9,5
23220-E1-K-TVPB	**XL**	6,13	**100**	180	60,3	2,1	156,7	116,7	4,8	9,5
23220-E1-TVPB	**XL**	6,32	**100**	180	60,3	2,1	156,7	116,7	4,8	9,5
23220-E1A-K-M	**XL**	6,33	**100**	180	60,3	2,1	156,7	–	4,8	9,5
23220-E1A-M	**XL**	6,45	**100**	180	60,3	2,1	156,7	–	4,8	9,5
21320-E1-K-TVPB	**XL**	8,08	**100**	215	47	3	182	132	4,8	9,5
21320-E1-TVPB	**XL**	8,19	**100**	215	47	3	182	132	4,8	9,5
22320-E1	**XL**	13,1	**100**	215	73	3	184,7	130,2	6,3	12,2
22320-E1-T41D	**XL**	13,1	**100**	215	73	3	184,7	130,2	6,3	12,2
22320-E1-K	**XL**	13,1	**100**	215	73	3	184,7	130,2	6,3	12,2
22320-E1-K-T41A	**XL**	13,1	**100**	215	73	3	184,7	130,2	6,3	12,2
23320-AS-MA-T41A	–	15,5	**100**	215	82,6	3	179,5	–	4,8	9,5

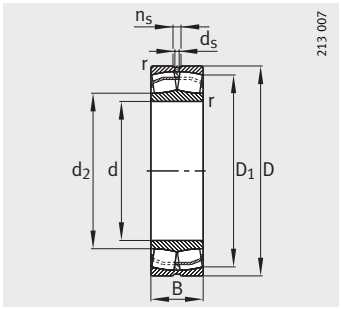


Mounting dimensions
E1 design

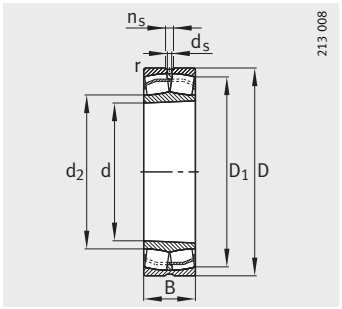
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
107	158	2,1	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 300
107	158	2,1	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 300
109	186	2,5	430 000	460 000	0,22	3,04	4,53	2,97	47 500	4 000	3 200
109	186	2,5	430 000	460 000	0,22	3,04	4,53	2,97	47 500	4 000	3 200
109	186	2,5	670 000	700 000	0,33	2,03	3,02	1,98	60 000	3 000	2 800
109	186	2,5	670 000	700 000	0,33	2,03	3,02	1,98	60 000	3 000	2 800
109	186	2,5	670 000	700 000	0,33	2,03	3,02	1,98	60 000	3 000	2 800
109	186	2,5	670 000	700 000	0,33	2,03	3,02	1,98	60 000	3 000	2 800
111	154	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 750
111	154	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 750
111	154	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 750
111	154	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 750
112	168	2,1	430 000	475 000	0,24	2,84	4,23	2,78	52 000	4 300	3 150
112	168	2,1	430 000	475 000	0,24	2,84	4,23	2,78	52 000	4 300	3 150
112	168	2,1	550 000	660 000	0,31	2,15	3,2	2,1	60 000	3 600	2 410
112	168	2,1	550 000	660 000	0,31	2,15	3,2	2,1	60 000	3 600	2 410
112	168	2,1	550 000	660 000	0,31	2,15	3,2	2,1	60 000	3 600	2 410
112	168	2,1	550 000	660 000	0,31	2,15	3,2	2,1	60 000	3 600	2 410
114	201	2,5	495 000	530 000	0,22	3,14	4,67	3,07	61 000	3 600	3 050
114	201	2,5	495 000	530 000	0,22	3,14	4,67	3,07	61 000	3 600	3 050
114	201	2,5	810 000	920 000	0,33	2,03	3,02	1,98	75 000	3 000	2 380
114	201	2,5	810 000	920 000	0,33	2,03	3,02	1,98	75 000	3 000	2 380
114	201	2,5	810 000	920 000	0,33	2,03	3,02	1,98	75 000	3 000	2 380
114	201	2,5	810 000	920 000	0,33	2,03	3,02	1,98	75 000	3 000	2 380
114	201	2,5	680 000	900 000	0,43	1,57	2,34	1,53	69 000	2 800	–

Spherical roller bearings

Cylindrical or tapered bore



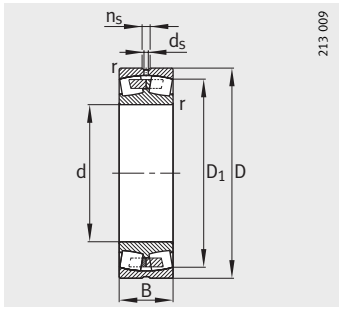
E1 design
Cylindrical bore



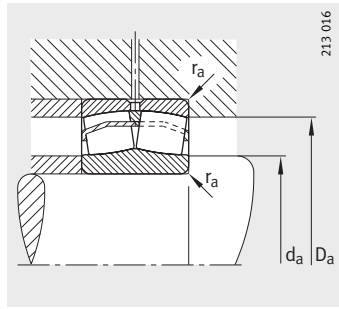
Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

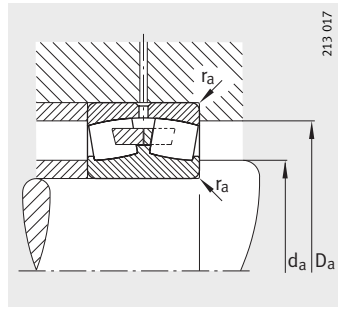
Designation		Mass	Dimensions							
	X-life	m ≈kg	d	D	B	r min.	D_1 ≈	d_2 ≈	d_s	n_s
23022-E1-TVPB	**XL**	3,55	**110**	170	45	2	154,6	123,7	3,2	6,5
23022-E1A-M	**XL**	3,67	**110**	170	45	2	154,6	–	3,2	6,5
23122-E1-K-TVPB	**XL**	4,95	**110**	180	56	2	160	124,6	4,8	9,5
23122-E1A-K-M	**XL**	5,1	**110**	180	56	2	160	–	4,8	9,5
23122-E1-TVPB	**XL**	5,31	**110**	180	56	2	160	124,6	4,8	9,5
23122-E1A-M	**XL**	5,51	**110**	180	56	2	160	–	4,8	9,5
24122-E1-K30	**XL**	6,76	**110**	180	69	2	155,3	125,6	3,2	6,5
24122-E1	**XL**	6,92	**110**	180	69	2	155,3	125,6	3,2	6,5
22222-E1-K	**XL**	6,82	**110**	200	53	2,1	178,7	129,4	4,8	9,5
22222-E1	**XL**	6,99	**110**	200	53	2,1	178,7	129,4	4,8	9,5
23222-E1-K-TVPB	**XL**	8,82	**110**	200	69,8	2,1	172,7	129,1	4,8	9,5
23222-E1-TVPB	**XL**	9,18	**110**	200	69,8	2,1	172,7	129,1	4,8	9,5
23222-E1A-K-M	**XL**	9,32	**110**	200	69,8	2,1	172,7	–	4,8	9,5
23222-E1A-M	**XL**	9,54	**110**	200	69,8	2,1	172,7	–	4,8	9,5
21322-E1-K-TVPB	**XL**	10,9	**110**	240	50	3	202,5	146,4	6,3	12,2
21322-E1-TVPB	**XL**	11,1	**110**	240	50	3	202,5	146,4	6,3	12,2
22322-E1-K	**XL**	17,4	**110**	240	80	3	204,9	143,1	8	15
22322-E1-K-T41A	**XL**	17,4	**110**	240	80	3	204,9	143,1	8	15
22322-E1	**XL**	17,7	**110**	240	80	3	204,9	143,1	8	15
22322-E1-T41D	**XL**	17,7	**110**	240	80	3	204,9	143,1	8	15
23322-AS-MA-T41A	–	21,3	**110**	240	92,1	3	199,6	–	6,3	12,2



With central rib
Cylindrical bore



Mounting dimensions
E1 design

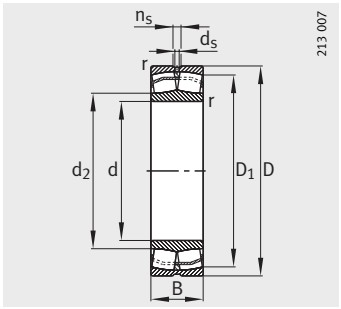


Mounting dimensions
With central rib

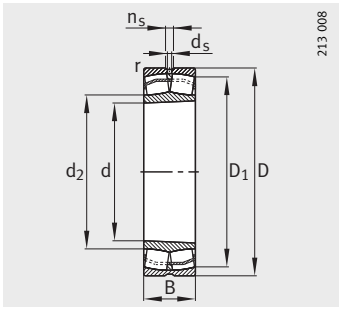
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
118,8	161,2	2	400 000	530 000	0,23	2,9	4,31	2,83	52 000	4 300	3 000
118,8	161,2	2	400 000	530 000	0,23	2,9	4,31	2,83	52 000	4 300	3 000
121	169	2	530 000	680 000	0,28	2,39	3,56	2,34	61 000	4 000	2 550
121	169	2	530 000	680 000	0,28	2,41	3,59	2,35	61 000	4 000	2 550
121	169	2	530 000	680 000	0,28	2,39	3,56	2,34	61 000	4 000	2 550
121	169	2	530 000	680 000	0,28	2,41	3,59	2,35	61 000	4 000	2 550
121	169	2	530 000	750 000	0,32	1,96	2,92	1,92	84 000	2 800	1 960
121	169	2	530 000	750 000	0,32	1,96	2,92	1,92	84 000	2 800	1 960
122	188	2,1	550 000	600 000	0,25	2,71	4,04	2,65	62 000	4 000	3 000
122	188	2,1	550 000	600 000	0,25	2,71	4,04	2,65	62 000	4 000	3 000
122	188	2,1	710 000	870 000	0,33	2,06	3,06	2,01	72 000	3 000	2 100
122	188	2,1	710 000	870 000	0,33	2,06	3,06	2,01	72 000	3 000	2 100
122	188	2,1	710 000	870 000	0,33	2,06	3,06	2,01	72 000	3 000	2 100
122	188	2,1	710 000	870 000	0,33	2,06	3,06	2,01	72 000	3 000	2 100
124	226	2,5	600 000	640 000	0,21	3,24	4,82	3,16	69 000	3 000	2 700
124	226	2,5	600 000	640 000	0,21	3,24	4,82	3,16	69 000	3 000	2 700
124	226	2,5	950 000	1 070 000	0,33	2,07	3,09	2,03	91 000	2 600	2 130
124	226	2,5	950 000	1 070 000	0,33	2,07	3,09	2,03	91 000	2 600	2 130
124	226	2,5	950 000	1 070 000	0,33	2,07	3,09	2,03	91 000	2 600	2 130
124	226	2,5	950 000	1 070 000	0,33	2,07	3,09	2,03	91 000	2 600	2 130
124	226	2,5	830 000	1 080 000	0,43	1,57	2,34	1,53	86 000	2 600	–

Spherical roller bearings

Cylindrical or tapered bore



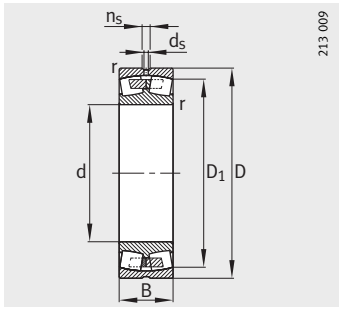
E1 design
Cylindrical bore



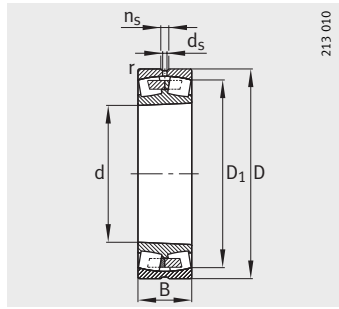
Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

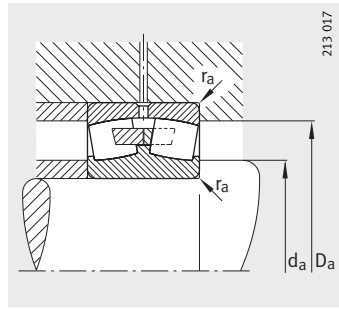
Designation		Mass	Dimensions							
	X-life	m ≈kg	d	D	B	r min.	D_1 ≈	d_2 ≈	d_s	n_s
23024-E1-K-TVPB	**XL**	3,67	**120**	180	46	2	164,7	133	3,2	6,5
23024-E1-TVPB	**XL**	3,86	**120**	180	46	2	164,7	133	3,2	6,5
23024-E1A-K-M	**XL**	4,09	**120**	180	46	2	164,7	–	3,2	6,5
23024-E1A-M	**XL**	4,17	**120**	180	46	2	164,7	–	3,2	6,5
24024-E1-K30	**XL**	5,32	**120**	180	60	2	159,8	134,4	3,2	6,5
24024-E1	**XL**	5,43	**120**	180	60	2	159,8	134,4	3,2	6,5
23124-E1-K-TVPB	**XL**	7,06	**120**	200	62	2	177,4	136,2	4,8	9,5
23124-E1-TVPB	**XL**	7,39	**120**	200	62	2	177,4	136,2	4,8	9,5
23124-E1A-K-M	**XL**	7,57	**120**	200	62	2	177,4	–	4,8	9,5
23124-E1A-M	**XL**	7,7	**120**	200	62	2	177,4	–	4,8	9,5
24124-E1-K30	**XL**	10	**120**	200	80	2	170,7	136,7	3,2	6,5
24124-E1	**XL**	10,1	**120**	200	80	2	170,7	136,7	3,2	6,5
22224-E1	**XL**	8,84	**120**	215	58	2,1	192	141,8	6,3	12,2
22224-E1-K	**XL**	8,84	**120**	215	58	2,1	192	141,8	6,3	12,2
23224-E1-K-TVPB	**XL**	11,1	**120**	215	76	2,1	185,5	139	4,8	9,5
23224-E1A-K-M	**XL**	11,4	**120**	215	76	2,1	185,5	–	4,8	9,5
23224-E1-TVPB	**XL**	11,5	**120**	215	76	2,1	185,5	139	4,8	9,5
23224-E1A-M	**XL**	12,1	**120**	215	76	2,1	185,5	–	4,8	9,5
22324-E1-K	**XL**	22,1	**120**	260	86	3	222,4	150,7	8	15
22324-E1-K-T41A	**XL**	22,1	**120**	260	86	3	222,4	150,7	8	15
22324-E1	**XL**	22,5	**120**	260	86	3	222,4	150,8	8	15
22324-E1-T41D	**XL**	22,5	**120**	260	86	3	222,4	150,8	8	15
23324-AS-MA-T41A	–	29,1	**120**	260	106	3	213,9	–	6,3	12,2



With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

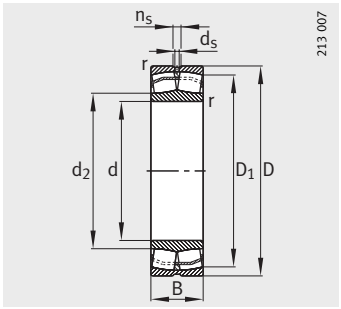


Mounting dimensions

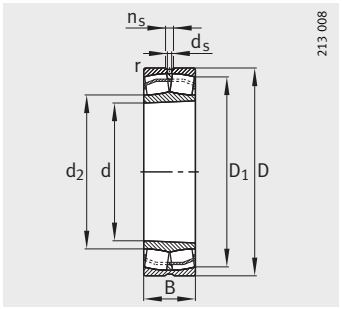
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
128,8	171,2	2	430 000	580 000	0,22	3,04	4,53	2,97	58 000	4 300	2 800
128,8	171,2	2	430 000	580 000	0,22	3,04	4,53	2,97	58 000	4 300	2 800
128,8	171,2	2	430 000	580 000	0,22	3,04	4,53	2,97	58 000	4 300	2 800
128,8	171,2	2	430 000	580 000	0,22	3,04	4,53	2,97	58 000	4 300	2 800
128,8	171,2	2	450 000	690 000	0,27	2,33	3,47	2,28	84 000	4 000	2 400
128,8	171,2	2	450 000	690 000	0,27	2,33	3,47	2,28	84 000	4 000	2 400
131	189	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 290
131	189	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 290
131	189	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 290
131	189	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 290
131	189	2	680 000	950 000	0,34	1,84	2,74	1,8	101 000	2 600	1 760
131	189	2	680 000	950000	0,34	1,84	2,74	1,8	101 000	2 600	1 760
132	203	2,1	640 000	740 000	0,25	2,71	4,04	2,65	71 000	3 400	2 700
132	203	2,1	640 000	740 000	0,25	2,71	4,04	2,65	71 000	3 400	2 700
132	203	2	820 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 910
132	203	2	820 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 910
132	203	2	820 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 910
132	203	2	820 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 910
134	246	2,5	1 080 000	1 170 000	0,33	2,06	3,06	2,01	103 000	2 600	2 000
134	246	2,5	1 080 000	1 170 000	0,33	2,06	3,06	2,01	103 000	2 600	2 000
134	246	2,5	1 080 000	1 170 000	0,33	2,06	3,06	2,01	103 000	2 600	2 000
134	246	2,5	1 080 000	1 170 000	0,33	2,06	3,06	2,01	103 000	2 600	2 000
134	246	2,5	1 020 000	1 430 000	0,45	1,5	2,23	1,46	103 000	2 400	–

Spherical roller bearings

Cylindrical or tapered bore



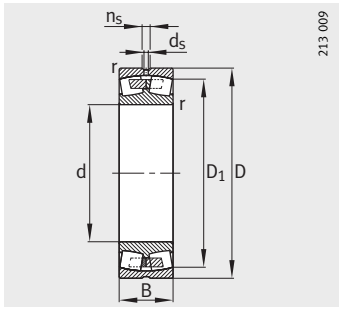
E1 design
Cylindrical bore



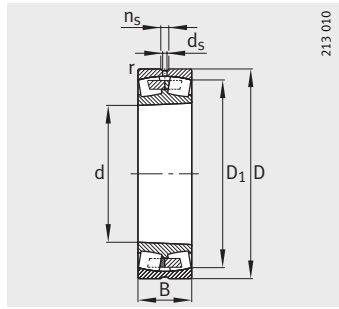
Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

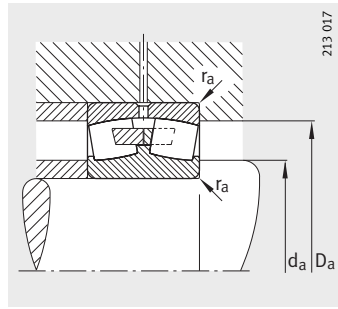
Designation		Mass	Dimensions							
	X-life	m ≈kg	d	D	B	r min.	D_1 ≈	d_2 ≈	d_s	n_s
23026-E1-K-TVPB	**XL**	5,42	**130**	200	52	2	182,3	145,9	4,8	9,5
23026-E1-TVPB	**XL**	5,61	**130**	200	52	2	182,3	145,9	4,8	9,5
23026-E1A-K-M	**XL**	5,7	**130**	200	52	2	182,3	–	4,8	9,5
23026-E1A-M	**XL**	5,96	**130**	200	52	2	182,3	–	4,8	9,5
24026-E1-K30	**XL**	7,83	**130**	200	69	2	176,1	146,2	3,2	6,5
24026-E1	**XL**	7,98	**130**	200	69	2	176,1	146,2	3,2	6,5
23126-E1-K-TVPB	**XL**	7,82	**130**	210	64	2	187,3	146	4,8	9,5
23126-E1A-K-M	**XL**	8,1	**130**	210	64	2	187,3	–	4,8	9,5
23126-E1-TVPB	**XL**	8,11	**130**	210	64	2	187,3	146	4,8	9,5
23126-E1A-M	**XL**	8,45	**130**	210	64	2	187,3	–	4,8	9,5
24126-E1-K30	**XL**	10,3	**130**	210	80	2	181,5	148,4	3,2	6,5
24126-E1	**XL**	10,8	**130**	210	80	2	181,5	148,4	3,2	6,5
22226-E1-K	**XL**	10,9	**130**	230	64	3	205	151,7	6,3	12,2
22226-E1	**XL**	11,3	**130**	230	64	3	205	151,7	6,3	12,2
23226-E1-K-TVPB	**XL**	12,6	**130**	230	80	3	199,3	150	4,8	9,5
23226-E1-TVPB	**XL**	13,4	**130**	230	80	3	199,3	150	4,8	9,5
23226-E1A-K-M	**XL**	13,6	**130**	230	80	3	199,3	–	4,8	9,5
23226-E1A-M	**XL**	14	**130**	230	80	3	199,3	–	4,8	9,5
22326-E1-K	**XL**	27,4	**130**	280	93	4	239,5	162,2	9,5	17,7
22326-E1-K-T41A	**XL**	27,4	**130**	280	93	4	239,5	162,2	9,5	17,7
22326-E1	**XL**	28	**130**	280	93	4	239,5	162,2	9,5	17,7
22326-E1-T41D	**XL**	28	**130**	280	93	4	239,5	162,2	9,5	17,7
23326-AS-MA-T41A	–	35,2	**130**	280	112	4	232,1	–	6,3	12,2



With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

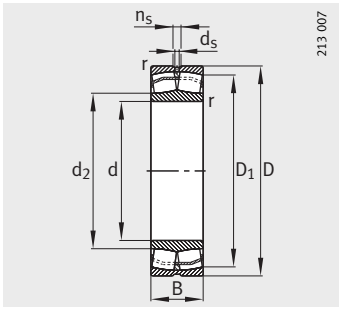


Mounting dimensions

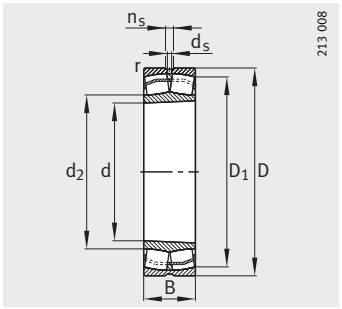
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
138,8	191,2	2	540 000	730 000	0,23	2,95	4,4	2,89	70 000	3 600	2 600
138,8	191,2	2	540 000	730 000	0,23	2,95	4,4	2,89	70 000	3 600	2 600
138,8	191,2	2	540 000	730 000	0,23	2,95	4,4	2,89	70 000	3 600	2 600
138,8	191,2	2	540 000	730 000	0,23	2,95	4,4	2,89	70 000	3 600	2 600
138,8	191,2	2	570 000	860 000	0,28	2,21	3,29	2,16	101 000	3 000	2 130
138,8	191,2	2	570 000	860 000	0,28	2,21	3,29	2,16	101 000	3 000	2 130
141	199	2	680 000	890 000	0,28	2,45	3,64	2,39	79 000	3 000	2 110
141	199	2	680 000	890 000	0,28	2,45	3,64	2,39	79 000	3 000	2 110
141	199	2	680 000	890 000	0,28	2,45	3,64	2,39	79 000	3 000	2 110
141	199	2	680 000	890 000	0,28	2,45	3,64	2,39	79 000	3 000	2 110
141	199	2	710 000	1 050 000	0,32	1,98	2,94	1,93	110 000	2 600	1 590
141	199	2	710 000	1 050 000	0,32	1,98	2,94	1,93	110 000	2 600	1 590
144	216	2,5	760 000	890 000	0,26	2,62	3,9	2,56	79 000	3 000	2 500
144	216	2,5	760 000	890 000	0,26	2,62	3,9	2,56	79 000	3 000	2 500
144	216	2,5	910 000	1 150 000	0,33	2,07	3,09	2,03	89 000	2 600	1 740
144	216	2,5	910 000	1 150 000	0,33	2,07	3,09	2,03	89 000	2 600	1 740
144	216	2,5	910 000	1 150 000	0,33	2,07	3,09	2,03	89 000	2 600	1 740
144	216	2,5	910 000	1 150 000	0,33	2,07	3,09	2,03	89 000	2 600	1 740
147	263	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 820
147	263	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 820
147	263	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 820
147	263	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 820
147	263	3	1 160 000	1 600 000	0,45	1,51	2,25	1,48	108 000	2 200	–

Spherical roller bearings

Cylindrical or tapered bore



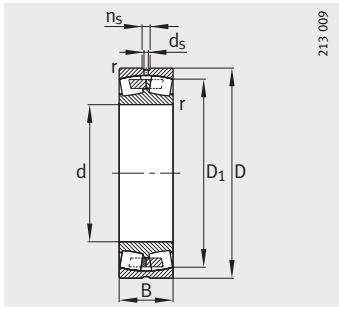
E1 design
Cylindrical bore



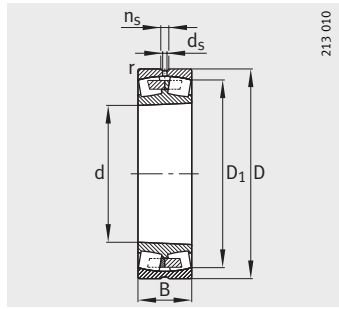
Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

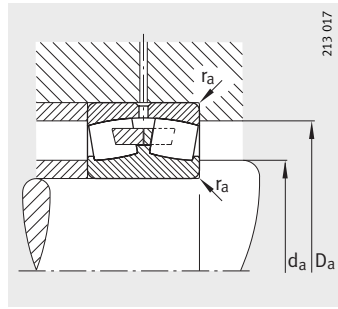
Designation		Mass	Dimensions							
	X-life	m ≈kg	d	D	B	r min.	D_1 ≈	d_2 ≈	d_s	n_s
23028-E1-K-TVPB	**XL**	5,81	**140**	210	53	2	192,3	155,4	4,8	9,5
23028-E1A-K-M	**XL**	6	**140**	210	53	2	192,3	–	4,8	9,5
23028-E1-TVPB	**XL**	6,04	**140**	210	53	2	192,3	155,4	4,8	9,5
23028-E1A-M	**XL**	6,45	**140**	210	53	2	192,3	–	4,8	9,5
24028-E1-K30	**XL**	8,29	**140**	210	69	2	186,8	157,1	3,2	6,5
24028-E1	**XL**	8,48	**140**	210	69	2	186,8	157,1	3,2	6,5
23128-E1A-K-M	**XL**	7,78	**140**	225	68	2,1	201	–	4,8	9,5
23128-E1-K-TVPB	**XL**	9,46	**140**	225	68	2,1	201	157,1	4,8	9,5
23128-E1-TVPB	**XL**	9,81	**140**	225	68	2,1	201	157,1	4,8	9,5
23128-E1A-M	**XL**	10,4	**140**	225	68	2,1	201	–	4,8	9,5
24128-E1-K30	**XL**	12,1	**140**	225	85	2,1	194,8	158,9	4,8	9,5
24128-E1	**XL**	13,1	**140**	225	85	2,1	194,8	158,9	4,8	9,5
22228-E1-K	**XL**	13,7	**140**	250	68	3	223,4	164,9	6,3	12,2
22228-E1	**XL**	14,2	**140**	250	68	3	223,4	164,9	6,3	12,2
23228-E1-K-TVPB	**XL**	17,1	**140**	250	88	3	216	162	6,3	12,2
23228-E1A-K-M	**XL**	17,6	**140**	250	88	3	216	–	6,3	12,2
23228-E1-TVPB	**XL**	17,7	**140**	250	88	3	216	162	6,3	12,2
23228-E1A-M	**XL**	18,3	**140**	250	88	3	216	–	6,3	12,2
22328-E1-K	**XL**	34,4	**140**	300	102	4	255,7	173,5	9,5	17,7
22328-E1-K-T41A	**XL**	34,4	**140**	300	102	4	255,7	173,5	9,5	17,7
22328-E1	**XL**	35,1	**140**	300	102	4	255,7	173,5	9,5	17,7
22328-E1-T41D	**XL**	35,1	**140**	300	102	4	255,7	173,5	9,5	17,7
23328-AS-MA-T41A	–	40,9	**140**	300	118	4	249,2	–	6,3	12,2



With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

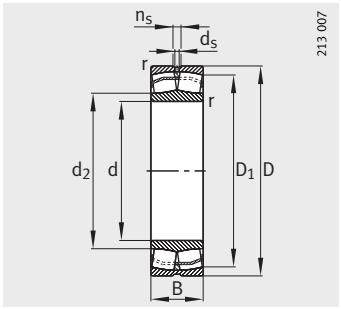


Mounting dimensions

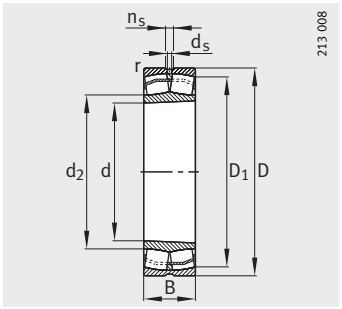
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
148,8	201,2	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 390
148,8	201,2	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 390
148,8	201,2	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 390
148,8	201,2	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 390
148,8	201,2	2	590 000	930 000	0,27	2,37	3,53	2,32	109 000	3 400	1 950
148,8	201,2	2	590 000	930 000	0,27	2,37	3,53	2,32	109 000	3 400	1 950
152	213	2,1	760 000	1 010 000	0,27	2,49	3,71	2,43	88 000	2 800	1 930
152	213	2,1	760 000	1 010 000	0,27	2,49	3,71	2,43	88 000	2 800	1 930
152	213	2,1	760 000	1 010 000	0,27	2,49	3,71	2,43	88 000	2 800	1 930
152	213	2,1	760 000	1 010 000	0,27	2,49	3,71	2,43	88 000	2 800	1 930
152	213	2,1	800 000	1 190 000	0,32	1,99	2,96	1,94	124 000	2 400	1 430
152	213	2,1	800 000	1 190 000	0,32	1,99	2,96	1,94	124 000	2 400	1 430
154	236	2,5	870 000	1 040 000	0,25	2,67	3,97	2,61	97 000	2 400	2 250
154	236	2,5	870 000	1 040 000	0,25	2,67	3,97	2,61	97 000	2 400	2 250
154	236	2,5	1 090 000	1 400 000	0,33	2,04	3,04	2	113 000	2 400	1 550
154	236	2,5	1 090 000	1 400 000	0,33	2,04	3,04	2	113 000	2 400	1 550
154	236	2,5	1 090 000	1 400 000	0,33	2,04	3,04	2	113 000	2 400	1 550
154	236	2,5	1 090 000	1 400 000	0,33	2,04	3,04	2	113 000	2 400	1 550
157	283	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 660
157	283	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 660
157	283	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 660
157	283	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 660
157	283	3	1 270 000	1 800 000	0,43	1,57	2,34	1,53	123 000	2 000	–

Spherical roller bearings

Cylindrical or tapered bore



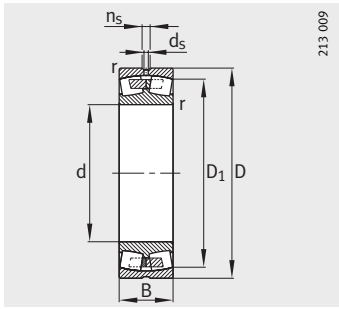
E1 design
Cylindrical bore



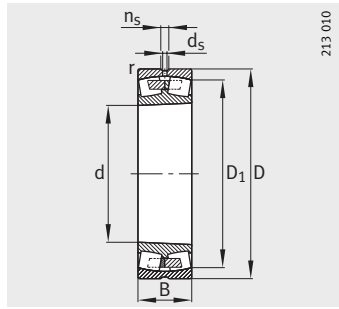
Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

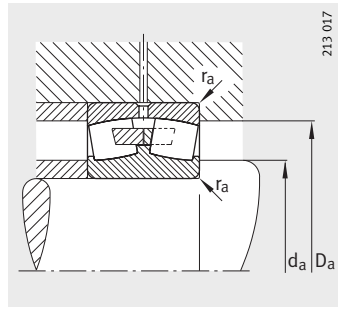
Designation		Mass	Dimensions							
	X-life	m ≈kg	d	D	B	r min.	D_1 ≈	d_2 ≈	d_s	n_s
23030-E1-K-TVPB	**XL**	7,29	**150**	225	56	2,1	206,3	166,6	4,8	9,5
23030-E1A-K-M	**XL**	7,33	**150**	225	56	2,1	206,3	–	4,8	9,5
23030-E1-TVPB	**XL**	7,63	**150**	225	56	2,1	206,3	166,6	4,8	9,5
23030-E1A-M	**XL**	7,83	**150**	225	56	2,1	206,3	–	4,8	9,5
24030-E1-K30	**XL**	10,4	**150**	225	75	2,1	199,7	168,1	3,2	6,5
24030-E1	**XL**	10,6	**150**	225	75	2,1	199,7	168,1	3,2	6,5
23130-E1-K-TVPB	**XL**	14,5	**150**	250	80	2,1	220,8	170,1	6,3	12,2
23130-E1-TVPB	**XL**	15	**150**	250	80	2,1	220,8	170,2	6,3	12,2
23130-E1A-K-M	**XL**	15,8	**150**	250	80	2,1	220,8	–	6,3	12,2
23130-E1A-M	**XL**	16,2	**150**	250	80	2,1	220,8	–	6,3	12,2
24130-E1-K30	**XL**	18,8	**150**	250	100	2,1	213	170,4	4,8	9,5
24130-E1	**XL**	19,8	**150**	250	100	2,1	213	170,4	4,8	9,5
22230-E1-K	**XL**	17,8	**150**	270	73	3	240,8	177,9	8	15
22230-E1	**XL**	18,2	**150**	270	73	3	240,8	177,9	8	15
23230-E1-K-TVPB	**XL**	22,3	**150**	270	96	3	232,6	174	6,3	12,2
23230-E1A-K-M	**XL**	22,9	**150**	270	96	3	232,6	–	6,3	12,2
23230-E1-TVPB	**XL**	22,9	**150**	270	96	3	232,6	174	6,3	12,2
23230-E1A-M	**XL**	23,7	**150**	270	96	3	232,6	–	6,3	12,2
22330-E1-K	**XL**	41,2	**150**	320	108	4	273,2	185,3	9,5	17,7
22330-E1-K-T41A	**XL**	41,2	**150**	320	108	4	273,2	185,3	9,5	17,7
22330-E1	**XL**	42,2	**150**	320	108	4	273,2	185,3	9,5	17,7
22330-E1-T41D	**XL**	42,2	**150**	320	108	4	273,2	185,3	9,5	17,7
23330-A-MA-T41A	–	49,8	**150**	320	128	4	264,5	–	8	15



With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

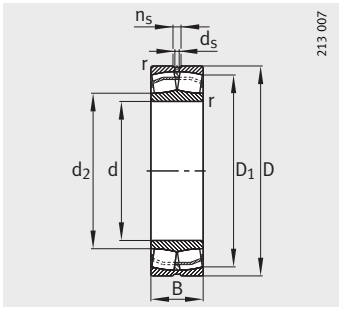


Mounting dimensions

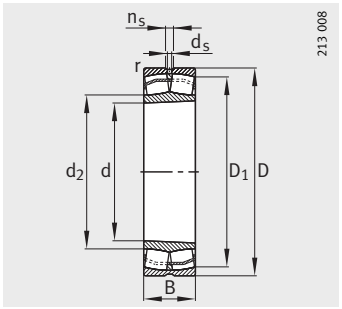
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
160,2	214,8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 210
160,2	214,8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 210
160,2	214,8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 210
160,2	214,8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 210
160,2	214,8	2,1	680 000	1 090 000	0,27	2,32	3,45	2,26	123 000	2 800	1 790
160,2	214,8	2,1	680 000	1 090 000	0,27	2,32	3,45	2,26	123 000	2 800	1 790
162	238	2,1	1 000 000	1 330 000	0,29	2,32	3,45	2,26	143 000	2 600	1 720
162	238	2,1	1 000 000	1 330 000	0,29	2,32	3,45	2,26	143 000	2 600	1 720
162	238	2,1	1 000 000	1 330 000	0,29	2,32	3,45	2,26	143 000	2 600	1 720
162	238	2,1	1 000 000	1 330 000	0,29	2,32	3,45	2,26	143 000	2 600	1 720
162	238	2,1	1 050 000	1 520 000	0,34	1,83	2,72	1,79	149 000	2 200	1 270
162	238	2,1	1 050 000	1 520 000	0,34	1,83	2,72	1,79	149 000	2 200	1 270
164	256	2,5	1 010 000	1 210 000	0,25	2,69	4	2,63	111 000	2 600	2 050
164	256	2,5	1 010 000	1 210 000	0,25	2,69	4	2,63	111 000	2 600	2 050
164	256	2,5	1 280 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 400
164	256	2,5	1 280 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 400
164	256	2,5	1 280 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 400
164	256	2,5	1 280 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 400
167	303	3	1 640 000	1 850 000	0,33	2,02	3	1,97	148 000	2 000	1 520
167	303	3	1 640 000	1 850 000	0,33	2,02	3	1,97	148 000	2 000	1 520
167	303	3	1 640 000	1 850 000	0,33	2,02	3	1,97	148 000	2 000	1 520
167	303	3	1 640 000	1 850 000	0,33	2,02	3	1,97	148 000	2 000	1 520
167	303	3	1 500 000	2 120 000	0,44	1,52	2,26	1,49	135 000	2 000	–

Spherical roller bearings

Cylindrical or tapered bore



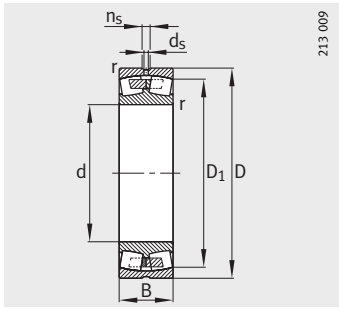
E1 design
Cylindrical bore



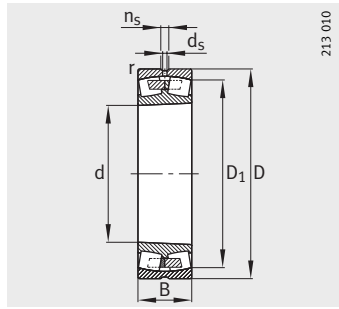
Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

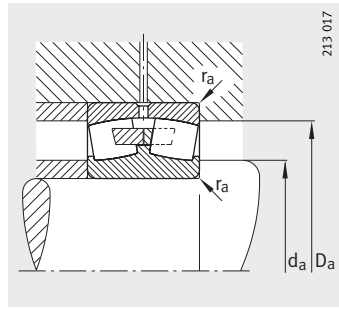
Designation		Mass	Dimensions							
	X-life	m ≈kg	d	D	B	r min.	D_1 ≈	d_2 ≈	d_s	n_s
23032-E1-K-TVPB	**XL**	8,67	**160**	240	60	2,1	219,9	177	6,3	12,2
23032-E1-TVPB	**XL**	8,97	**160**	240	60	2,1	219,9	177,5	6,3	12,2
23032-E1A-K-M	**XL**	9,42	**160**	240	60	2,1	219,9	–	6,3	12,2
23032-E1A-M	**XL**	9,71	**160**	240	60	2,1	219,9	–	6,3	12,2
24032-E1-K30	**XL**	12,4	**160**	240	80	2,1	212,9	179,2	4,8	9,5
24032-E1	**XL**	12,9	**160**	240	80	2,1	212,9	179,2	4,8	9,5
23132-E1-K-TVPB	**XL**	18,4	**160**	270	86	2,1	238,3	183,2	8	15
23132-E1A-K-M	**XL**	18,6	**160**	270	86	2,1	238,3	–	8	15
23132-E1-TVPB	**XL**	19,1	**160**	270	86	2,1	238,3	183,2	8	15
23132-E1A-M	**XL**	20	**160**	270	86	2,1	238,3	–	8	15
24132-E1-K30	**XL**	23,6	**160**	270	109	2,1	228,9	183,6	4,8	9,5
24132-E1	**XL**	25,6	**160**	270	109	2,1	228,9	183,6	4,8	9,5
22232-E1-K	**XL**	22,4	**160**	290	80	3	258,2	190,9	8	15
22232-E1	**XL**	23,3	**160**	290	80	3	258,2	190,9	8	15
23232-E1-K-TVPB	**XL**	27,7	**160**	290	104	3	249,3	186,7	8	15
23232-E1A-K-M	**XL**	28,5	**160**	290	104	3	249,3	–	8	15
23232-E1-TVPB	**XL**	28,6	**160**	290	104	3	249,3	186,7	8	15
23232-E1A-M	**XL**	29,8	**160**	290	104	3	249,3	–	8	15
22332-K-MB	–	50,1	**160**	340	114	4	288,3	–	9,5	17,7
22332-MB	–	51,1	**160**	340	114	4	288,3	–	9,5	17,7
22332-A-MA-T41A	–	52,4	**160**	340	114	4	288,3	–	9,5	17,7
23332-A-MA-T41A	–	61,3	**160**	340	136	4	280,6	–	9,5	17,7



With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

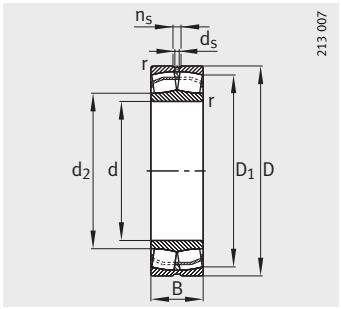


Mounting dimensions

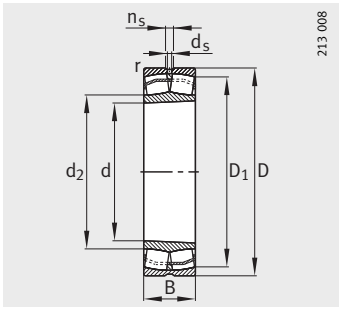
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
170,2	229,8	2,1	720 000	1 010 000	0,22	3,1	4,62	3,03	94 000	2 800	2 060
170,2	229,8	2,1	720 000	1 010 000	0,22	3,1	4,62	3,03	94 000	2 800	2 060
170,2	229,8	2,1	720 000	1 010 000	0,22	3,1	4,62	3,03	94 000	2 800	2 060
170,2	229,8	2,1	720 000	1 010 000	0,22	3,1	4,62	3,03	94 000	2 800	2 060
170,2	229,8	2,1	770 000	1 240 000	0,27	2,32	3,45	2,26	137 000	2 600	1 660
170,2	229,8	2,1	770 000	1 240 000	0,27	2,32	3,45	2,26	137 000	2 600	1 660
172	258	2,1	1 160 000	1 550 000	0,29	2,32	3,45	2,26	164 000	2 400	1 560
172	258	2,1	1 160 000	1 550 000	0,29	2,32	3,45	2,26	164 000	2 400	1 560
172	258	2,1	1 160 000	1 550 000	0,29	2,32	3,45	2,26	164 000	2 400	1 560
172	258	2,1	1 160 000	1 550 000	0,29	2,32	3,45	2,26	164 000	2 400	1 560
172	258	2,1	1 220 000	1 800 000	0,35	1,8	2,69	1,76	168 000	1 800	1 140
172	258	2,1	1 220 000	1 800 000	0,35	1,8	2,69	1,76	168 000	1 800	1 140
174	276	2,5	1 150 000	1 400 000	0,26	2,64	3,93	2,58	125 000	2 600	1 900
174	276	2,5	1 150 000	1 400 000	0,26	2,64	3,93	2,58	125 000	2 600	1 900
174	276	2,5	1 460 000	1 910 000	0,34	2	2,98	1,96	146 000	2 200	1 280
174	276	2,5	1 460 000	1 910 000	0,34	2	2,98	1,96	146 000	2 200	1 280
174	276	2,5	1 460 000	1 910 000	0,34	2	2,98	1,96	146 000	2 200	1 280
174	276	2,5	1 460 000	1 910 000	0,34	2	2,98	1,96	146 000	2 200	1 280
177	323	3	1 430 000	1 900 000	0,37	1,8	2,69	1,76	121 000	2 000	1 490
177	323	3	1 430 000	1 900 000	0,37	1,8	2,69	1,76	121 000	2 000	1 490
177	323	3	1 430 000	1 900 000	0,37	1,8	2,69	1,76	136 000	2 000	1 500
177	323	3	1 660 000	2 320 000	0,44	1,54	2,3	1,51	152 000	2 000	–

Spherical roller bearings

Cylindrical or tapered bore



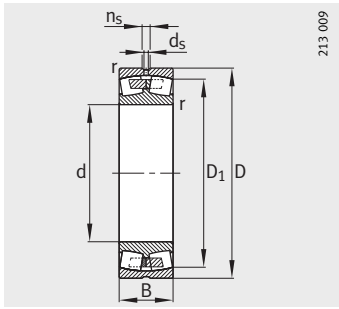
E1 design
Cylindrical bore



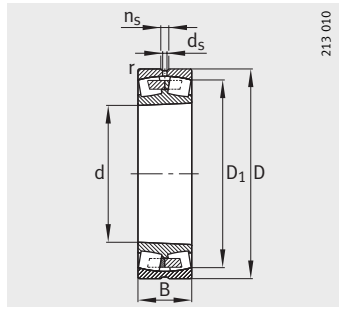
Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

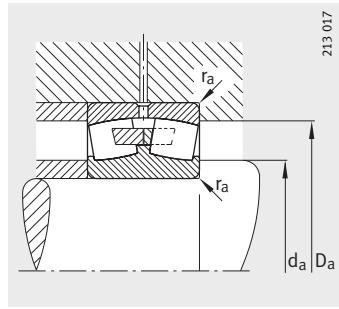
Designation		Mass	Dimensions							
	X-life	m ≈kg	d	D	B	r min.	D_1 ≈	d_2 ≈	d_s	n_s
23034-E1-K-TVPB	**XL**	11,9	**170**	260	67	2,1	237,2	189,8	6,3	12,2
23034-E1A-K-M	**XL**	12	**170**	260	67	2,1	237,2	–	6,3	12,2
23034-E1-TVPB	**XL**	12,3	**170**	260	67	2,1	237,2	189,8	6,3	12,2
23034-E1A-M	**XL**	13	**170**	260	67	2,1	237,2	–	6,3	12,2
24034-E1-K30	**XL**	16,7	**170**	260	90	2,1	228,8	190	4,8	9,5
24034-E1	**XL**	17,4	**170**	260	90	2,1	228,8	190	4,8	9,5
23134-E1A-K-M	**XL**	19,5	**170**	280	88	2,1	248,1	–	8	15
23134-E1-K-TVPB	**XL**	19,9	**170**	280	88	2,1	248,1	193,4	8	15
23134-E1-TVPB	**XL**	20,7	**170**	280	88	2,1	248,1	193,4	8	15
23134-E1A-M	**XL**	22,1	**170**	280	88	2,1	248,1	–	8	15
24134-E1-K30	**XL**	26	**170**	280	109	2,1	240	194,2	4,8	9,5
24134-E1	**XL**	26,8	**170**	280	109	2,1	240	194,2	4,8	9,5
22234-E1-K	**XL**	27,1	**170**	310	86	4	275,4	199,8	9,5	17,7
22234-E1	**XL**	27,8	**170**	310	86	4	275,4	199,8	9,5	17,7
23234-E1-K-TVPB	**XL**	33,1	**170**	310	110	4	267,4	199,8	8	15
23234-E1A-K-M	**XL**	34,6	**170**	310	110	4	267,4	–	8	15
23234-E1-TVPB	**XL**	34,9	**170**	310	110	4	267,4	199,8	8	15
23234-E1A-M	**XL**	36,5	**170**	310	110	4	267,4	–	8	15
22334-K-MB	–	56,9	**170**	360	120	4	304,2	–	9,5	17,7
22334-A-MA-T41A	–	59,5	**170**	360	120	4	304,2	–	9,5	17,7
22334-MB	–	59,5	**170**	360	120	4	304,2	–	9,5	17,7



With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

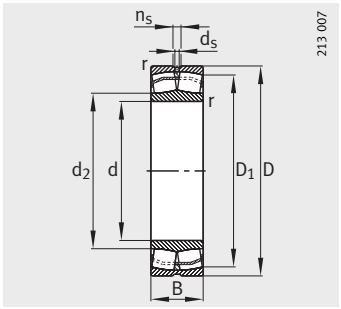


Mounting dimensions

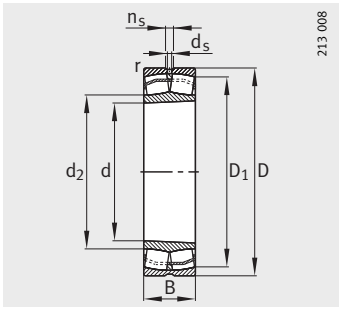
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
180,2	249,8	2,1	870 000	1 230 000	0,23	2,98	4,44	2,92	146 000	2 600	1 890
180,2	249,8	2,1	880 000	1 230 000	0,23	2,98	4,44	2,92	146 000	2 600	1 890
180,2	249,8	2,1	870 000	1 230 000	0,23	2,98	4,44	2,92	146 000	2 600	1 890
180,2	249,8	2,1	870 000	1 230 000	0,23	2,98	4,44	2,92	146 000	2 600	1 890
180,2	249,8	2,1	940 000	1 480 000	0,29	2,2	3,27	2,15	159 000	2 400	1 540
180,2	249,8	2,1	940 000	1 480 000	0,29	2,2	3,27	2,15	159 000	2 400	1 540
182	268	2,1	1 220 000	1 690 000	0,28	2,37	3,53	2,32	174 000	2 400	1 460
182	268	2,1	1 220 000	1 690 000	0,28	2,37	3,53	2,32	174 000	2 400	1 460
182	268	2,1	1 220 000	1 690 000	0,28	2,37	3,53	2,32	174 000	2 400	1 460
182	268	2,1	1 220 000	1 690 000	0,28	2,37	3,53	2,32	174 000	2 400	1 460
182	268	2,1	1 260 000	1 900 000	0,33	1,9	2,83	1,86	179 000	1 800	1 060
182	268	2,1	1 260 000	1 900 000	0,33	1,9	2,83	1,86	179 000	1 800	1 060
187	293	3	1 320 000	1 570 000	0,26	2,6	3,87	2,54	140 000	2 400	1 780
187	293	3	1 320 000	1 570 000	0,26	2,6	3,87	2,54	140 000	2 400	1 780
187	293	3	1 640 000	2 170 000	0,33	2,03	3,02	1,98	163 000	2 000	1 160
187	293	3	1 640 000	2 170 000	0,33	2,03	3,02	1,98	163 000	2 000	1 160
187	293	3	1 640 000	2 170 000	0,33	2,03	3,02	1,98	163 000	2 000	1 160
187	293	3	1 640 000	2 170 000	0,33	2,03	3,02	1,98	163 000	2 000	1 160
187	343	3	1 600 000	2 120 000	0,37	1,83	2,72	1,79	134 000	1 800	1 380
187	343	3	1 600 000	2 120 000	0,37	1,83	2,72	1,79	144 000	1 800	1 380
187	343	3	1 600 000	2 120 000	0,37	1,83	2,72	1,79	134 000	1 800	1 380

Spherical roller bearings

Cylindrical or tapered bore



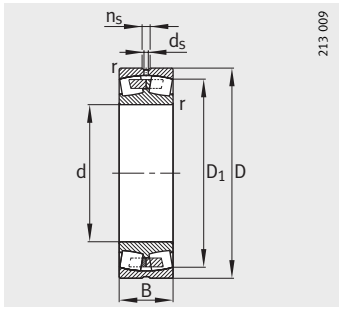
E1 design
Cylindrical bore



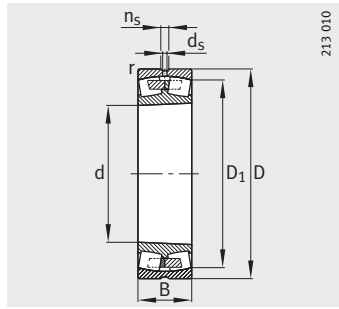
Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

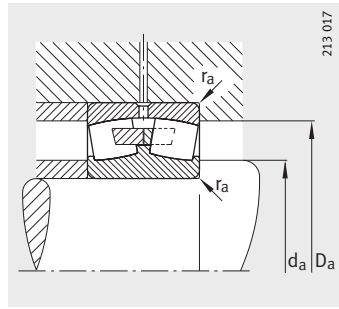
Designation		Mass	Dimensions							
	X-life	m ≈kg	d	D	B	r min.	D_1 ≈	d_2 ≈	d_s	n_s
23936-S-K-MB	–	7,76	**180**	250	52	2	230,9	–	4,8	9,5
23936-S-MB	–	7,96	**180**	250	52	2	230,9	–	4,8	9,5
23036-E1-K-TVPB	**XL**	15,6	**180**	280	74	2,1	254,3	201,8	8	15
23036-E1-TVPB	**XL**	15,9	**180**	280	74	2,1	254,3	201,8	8	15
23036-E1A-K-M	**XL**	16	**180**	280	74	2,1	254,3	–	8	15
23036-E1A-M	**XL**	16,8	**180**	280	74	2,1	254,3	–	8	15
24036-E1-K30	**XL**	22,7	**180**	280	100	2,1	244,6	201,7	4,8	9,5
24036-E1	**XL**	23,1	**180**	280	100	2,1	244,6	201,7	4,8	9,5
23136-E1A-K-M	**XL**	25,5	**180**	300	96	3	264,8	–	8	15
23136-E1-K-TVPB	**XL**	25,9	**180**	300	96	3	264,8	204,1	8	15
23136-E1A-M	**XL**	26,1	**180**	300	96	3	264,8	–	8	15
23136-E1-TVPB	**XL**	27,3	**180**	300	96	3	264,8	204,1	8	15
24136-E1-K30	**XL**	33,2	**180**	300	118	3	256,2	204,9	6,3	12,2
24136-E1	**XL**	33,6	**180**	300	118	3	256,2	204,9	6,3	12,2
22236-E1-K	**XL**	28,5	**180**	320	86	4	285,9	211,3	9,5	17,7
22236-E1	**XL**	29,2	**180**	320	86	4	285,9	211,3	9,5	17,7
23236-E1-K-TVPB	**XL**	36	**180**	320	112	4	277,3	210,6	8	15
23236-E1A-K-M	**XL**	37	**180**	320	112	4	277,3	–	8	15
23236-E1-TVPB	**XL**	37,2	**180**	320	112	4	277,3	210,6	8	15
23236-E1A-M	**XL**	38,5	**180**	320	112	4	277,3	–	8	15
22336-A-MA-T41A	–	71,7	**180**	380	126	4	323,4	–	12,5	23,5
22336-K-MB	–	66,7	**180**	380	126	4	323,4	–	12,5	23,5
22336-MB	–	69	**180**	380	126	4	323,4	–	12,5	23,5



With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

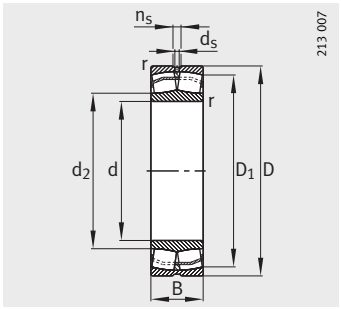


Mounting dimensions

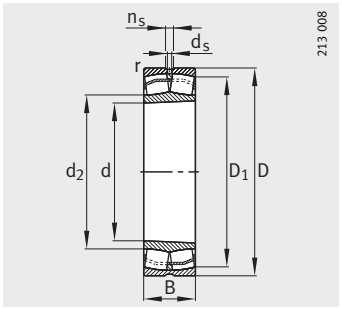
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
188,8	241,2	2	440 000	850 000	0,2	3,42	5,09	3,34	57 000	2 200	1 850
188,8	241,2	2	440 000	850 000	0,2	3,42	5,09	3,34	57 000	2 200	1 850
190,2	269,8	2,1	1 040 000	1 450 000	0,23	2,9	4,31	2,83	170 000	2 600	1 760
190,2	269,8	2,1	1 040 000	1 450 000	0,23	2,9	4,31	2,83	170 000	2 600	1 760
190,2	269,8	2,1	1 040 000	1 450 000	0,23	2,9	4,31	2,83	170 000	2 600	1 760
190,2	269,8	2,1	1 040 000	1 450 000	0,23	2,9	4,31	2,83	170 000	2 600	1 760
190,2	269,8	2,1	1 130 000	1 770 000	0,3	2,1	3,13	2,06	181 000	2 200	1 420
190,2	269,8	2,1	1 130 000	1 770 000	0,3	2,1	3,13	2,06	181 000	2 200	1 420
194	286	2,5	1 420 000	1 950 000	0,29	2,32	3,45	2,26	196 000	2 200	1 350
194	286	2,5	1 420 000	1 950 000	0,29	2,32	3,45	2,26	196 000	2 200	1 350
194	286	2,5	1 420 000	1 950 000	0,29	2,32	3,45	2,26	196 000	2 200	1 350
194	286	2,5	1 420 000	1 950 000	0,29	2,32	3,45	2,26	196 000	2 200	1 350
194	286	2,5	1 460 000	2 170 000	0,34	1,86	2,77	1,82	203 000	1 700	980
194	286	2,5	1 460 000	2 170 000	0,34	1,86	2,77	1,82	203 000	1 700	980
197	303	3	1 360 000	1 680 000	0,25	2,71	4,04	2,65	148 000	2 400	1 670
197	303	3	1 360 000	1 680 000	0,25	2,71	4,04	2,65	148 000	2 400	1 670
197	303	3	1 710 000	2 340 000	0,33	2,07	3,09	2,03	173 000	2 000	1 090
197	303	3	1 710 000	2 340 000	0,33	2,07	3,09	2,03	173 000	2 000	1 090
197	303	3	1 710 000	2 340 000	0,33	2,07	3,09	2,03	173 000	2 000	1 090
197	303	3	1 710 000	2 340 000	0,33	2,07	3,09	2,03	173 000	2 000	1 090
197	363	3	1 760 000	2 360 000	0,37	1,83	2,72	1,79	234 000	1 500	1 270
197	363	3	1 760 000	2 360 000	0,37	1,83	2,72	1,79	209 000	1 500	1 270
197	363	3	1 760 000	2 360 000	0,37	1,83	2,72	1,79	209 000	1 500	1 270

Spherical roller bearings

Cylindrical or tapered bore



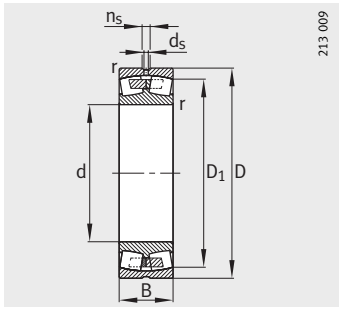
E1 design
Cylindrical bore



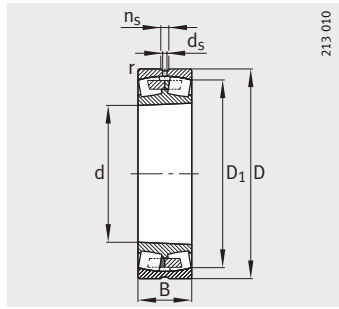
Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

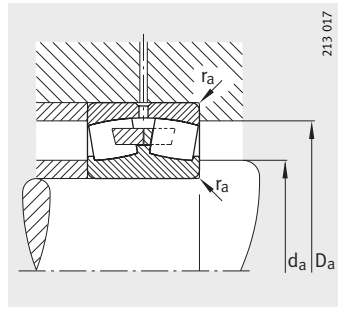
Designation		Mass	Dimensions							
	X-life	m ≈kg	d	D	B	r min.	D_1 ≈	d_2 ≈	d_s	n_s
23938-S-MB	–	8,43	**190**	260	52	2	240,2	–	4,8	9,5
23038-E1-K-TVPB	**XL**	16,3	**190**	290	75	2,1	264,5	211,9	8	15
23038-E1-TVPB	**XL**	17,2	**190**	290	75	2,1	264,5	211,9	8	15
23038-E1A-K-M	**XL**	17,7	**190**	290	75	2,1	264,5	–	8	15
23038-E1A-M	**XL**	18,3	**190**	290	75	2,1	264,5	–	8	15
24038-E1-K30	**XL**	23,8	**190**	290	100	2,1	255,5	212	4,8	9,5
24038-E1	**XL**	24,1	**190**	290	100	2,1	255,5	212	4,8	9,5
23138-E1-K-TVPB	**XL**	30,3	**190**	320	104	3	281,6	217	8	15
23138-E1-TVPB	**XL**	32	**190**	320	104	3	281,6	217	8	15
23138-E1A-K-M	**XL**	32,4	**190**	320	104	3	281,6	–	8	15
23138-E1A-M	**XL**	33,9	**190**	320	104	3	281,6	–	8	15
24138-E1-K30	**XL**	41,4	**190**	320	128	3	271,6	217,5	6,3	12,2
24138-E1	**XL**	42,1	**190**	320	128	3	271,6	217,5	6,3	12,2
22238-K-MB	–	36,2	**190**	340	92	4	296	–	9,5	17,7
22238-MB	–	37	**190**	340	92	4	296	–	9,5	17,7
23238-B-K-MB	–	46	**190**	340	120	4	291,2	–	9,5	17,7
23238-B-MB	–	48,4	**190**	340	120	4	291,2	–	9,5	17,7
22338-K-MB	–	77,3	**190**	400	132	5	338,2	–	12,5	23,5
22338-A-MA-T41A	–	80,5	**190**	400	132	5	338,2	–	12,5	23,5
22338-MB	–	80,5	**190**	400	132	5	338,2	–	12,5	23,5
23338-A-MA-T41A	–	97,1	**190**	400	155	5	331,6	–	9,5	17,7



With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

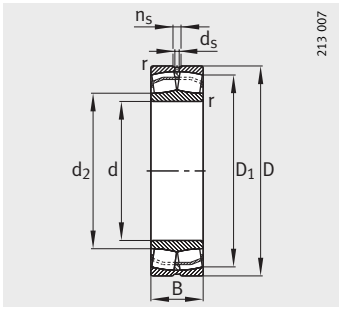


Mounting dimensions

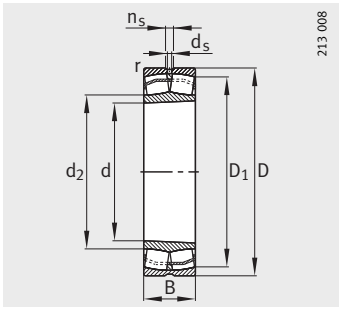
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
198,8	251,2	2	465 000	900 000	0,18	3,66	5,46	3,58	62 000	2 000	1 750
200,2	279,8	2,1	1 080 000	1 550 000	0,23	2,98	4,44	2,92	180 000	2 400	1 660
200,2	279,8	2,1	1 080 000	1 550 000	0,23	2,98	4,44	2,92	180 000	2 400	1 660
200,2	279,8	2,1	1 080 000	1 550 000	0,23	2,98	4,44	2,92	180 000	2 400	1 660
200,2	279,8	2,1	1 080 000	1 550 000	0,23	2,98	4,44	2,92	180 000	2 400	1 660
200,2	279,8	2,1	1 160 000	1 860 000	0,29	2,2	3,27	2,15	192 000	2 200	1 330
200,2	279,8	2,1	1 160 000	1 860 000	0,29	2,2	3,27	2,15	192 000	2 200	1 330
204	306	2,5	1 610 000	2 220 000	0,3	2,28	3,39	2,23	218 000	2 000	1 260
204	306	2,5	1 610 000	2 220 000	0,3	2,28	3,39	2,23	218 000	2 000	1 260
204	306	2,5	1 610 000	2 220 000	0,3	2,28	3,39	2,23	218 000	2 000	1 260
204	306	2,5	1 610 000	2 220 000	0,3	2,28	3,39	2,23	218 000	2 000	1 260
204	306	2,5	1 680 000	2 550 000	0,35	1,82	2,7	1,78	226 000	1 400	880
204	306	2,5	1 680 000	2 550 000	0,35	1,82	2,7	1,78	226 000	1 400	880
207	323	3	1 200 000	1 830 000	0,28	2,39	3,56	2,34	122 000	1 800	1 600
207	323	3	1 200 000	1 830 000	0,28	2,39	3,56	2,34	122 000	1 800	1 600
207	323	3	1 560 000	2 600 000	0,36	1,86	2,77	1,82	156 000	1 700	1 020
207	323	3	1 560 000	2 600 000	0,36	1,86	2,77	1,82	156 000	1 700	1 020
210	380	4	1 860 000	2 500 000	0,37	1,83	2,72	1,79	213 000	1 500	1 220
210	380	4	1 860 000	2 500 000	0,37	1,83	2,72	1,79	173 000	1 500	1 220
210	380	4	1 860 000	2 500 000	0,37	1,83	2,72	1,79	213 000	1 500	1 220
210	380	4	2 200 000	3 200 000	0,43	1,57	2,34	1,53	223 000	1 400	–

Spherical roller bearings

Cylindrical or tapered bore



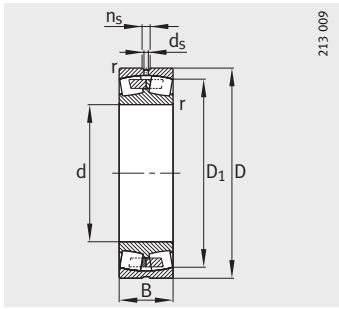
E1 design
Cylindrical bore



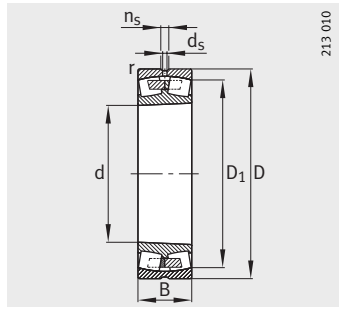
Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

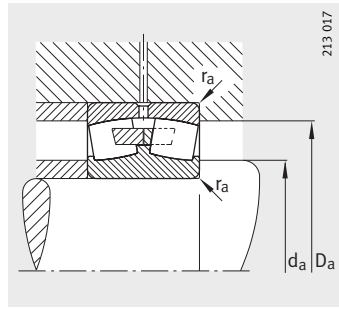
Designation		Mass	Dimensions							
	X-life	m ≈kg	d	D	B	r min.	D_1 ≈	d_2 ≈	d_s	n_s
23940-S-K-MB	–	11,5	**200**	280	60	2,1	256,9	–	6,3	12,2
23940-S-MB	–	11,8	**200**	280	60	2,1	256,9	–	6,3	12,2
23040-E1-K-TVPB	**XL**	20,8	**200**	310	82	2,1	281,6	223,4	8	15
23040-E1A-K-M	**XL**	21,4	**200**	310	82	2,1	281,6	–	8	15
23040-E1-TVPB	**XL**	21,5	**200**	310	82	2,1	281,6	223,4	8	15
23040-E1A-M	**XL**	22,8	**200**	310	82	2,1	281,6	–	8	15
24040-E1-K30	**XL**	30,3	**200**	310	109	2,1	271,6	223,7	6,3	12,2
24040-E1	**XL**	30,7	**200**	310	109	2,1	271,6	223,7	6,3	12,2
23140-B-K-MB	–	41,7	**200**	340	112	3	293,3	–	9,5	17,7
23140-B-MB	–	43	**200**	340	112	3	293,3	–	9,5	17,7
24140-B-K30	–	51,6	**200**	340	140	3	285,9	–	6,3	12,2
24140-B	–	52,4	**200**	340	140	3	285,9	–	6,3	12,2
22240-B-K-MB	–	42,3	**200**	360	98	4	312	–	9,5	17,7
22240-B-MB	–	44,2	**200**	360	98	4	312	–	9,5	17,7
23240-B-K-MB	–	55,8	**200**	360	128	4	307,5	–	9,5	17,7
23240-B-MB	–	60,5	**200**	360	128	4	307,5	–	9,5	17,7
22340-K-MB	–	89,5	**200**	420	138	5	357,4	–	12,5	23,5
22340-MB	–	91	**200**	420	138	5	357,4	–	12,5	23,5
22340-A-MA-T41A	–	92,4	**200**	420	138	5	357,4	–	12,5	23,5
23340-A-MA-T41A	–	108	**200**	420	165	5	350,2	–	9,5	17,7



With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

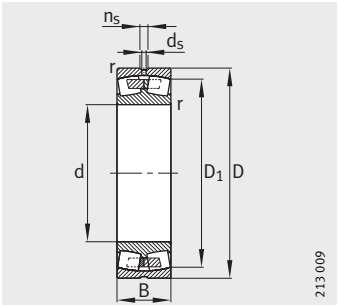


Mounting dimensions

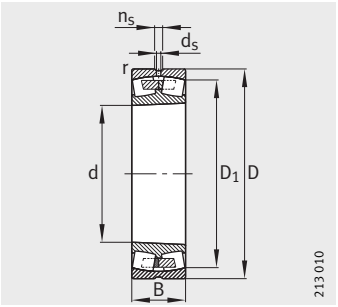
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
210,2	269,8	2,1	550 000	1 080 000	0,2	3,42	5,09	3,34	71 000	2 000	1 650
210,2	269,8	2,1	550 000	1 080 000	0,2	3,42	5,09	3,34	71 000	2 000	1 650
210,2	299,8	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 550
210,2	299,8	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 550
210,2	299,8	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 550
210,2	299,8	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 550
210,2	299,8	2,1	1 350 000	2 150 000	0,3	2,13	3,17	2,08	216 000	2 000	1 240
210,2	299,8	2,1	1 350 000	2 150 000	0,3	2,13	3,17	2,08	216 000	2 000	1 240
214	326	2,5	1 320 000	2 280 000	0,35	1,95	2,9	1,91	131 000	1 700	1 240
214	326	2,5	1 320 000	2 280 000	0,35	1,95	2,9	1,91	131 000	1 700	1 240
214	326	2,5	1 700 000	3 000 000	0,42	1,62	2,42	1,59	190 000	1 400	810
214	326	2,5	1 700 000	3 000 000	0,42	1,62	2,42	1,59	190 000	1 400	810
217	343	3	1 320 000	2 000 000	0,29	2,35	3,5	2,3	123 000	1 700	1 530
217	343	3	1 320 000	2 000 000	0,29	2,35	3,5	2,3	123 000	1 700	1 530
217	343	3	1 660 000	2 750 000	0,37	1,83	2,72	1,79	163 000	1 500	980
217	343	3	1 660 000	2 750 000	0,37	1,83	2,72	1,79	163 000	1 500	980
220	400	4	2 080 000	2 800 000	0,36	1,87	2,79	1,83	189 000	1 400	1 120
220	400	4	2 080 000	2 800 000	0,36	1,87	2,79	1,83	189 000	1 400	1 120
220	400	4	2 080 000	2 800 000	0,36	1,87	2,79	1,83	189 000	1 400	1 120
220	400	4	2 450 000	3 600 000	0,43	1,55	2,31	1,52	238 000	1 300	–

Spherical roller bearings

Cylindrical or tapered bore



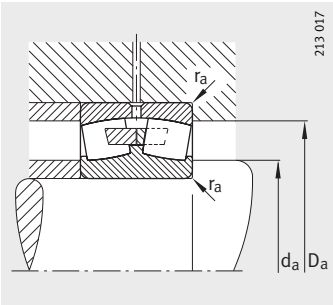
With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	d_s	n_s
	≈kg				min.	≈		
23944-S-MB	12,3	**220**	300	60	2,1	277,4	6,3	12,2
23944-S-K-MB	12,3	**220**	300	60	2,1	277,4	6,3	12,2
23044-K-MB	29,9	**220**	340	90	3	301,8	8	15
23044-MB	31,7	**220**	340	90	3	301,8	8	15
24044-B-K30-MB	38,9	**220**	340	118	3	297,4	6,3	12,2
24044-B-MB	39,5	**220**	340	118	3	297,4	6,3	12,2
23144-B-K-MB	52	**220**	370	120	4	319,2	9,5	17,7
23144-B-MB	54,5	**220**	370	120	4	319,2	9,5	17,7
24144-B-K30	64,4	**220**	370	150	4	311,7	6,3	12,2
24144-B	65,6	**220**	370	150	4	311,7	6,3	12,2
22244-B-K-MB	59,6	**220**	400	108	4	348,7	9,5	17,7
22244-B-MB	61,5	**220**	400	108	4	348,7	9,5	17,7
23244-K-MB	79	**220**	400	144	4	337,6	9,5	17,7
23244-MB	81,1	**220**	400	144	4	337,6	9,5	17,7
22344-K-MB	114	**220**	460	145	5	391,2	12,5	23,5
22344-A-MA-T41A	119	**220**	460	145	5	391,2	12,5	23,5
22344-MB	119	**220**	460	145	5	391,2	12,5	23,5
23948-K-MB	13,4	**240**	320	60	2,1	297,8	6,3	12,2
23948-MB	13,9	**240**	320	60	2,1	297,8	6,3	12,2
23048-K-MB	31,9	**240**	360	92	3	322,1	8	15
23048-MB	34,8	**240**	360	92	3	322,1	8	15
24048-B-K30-MB	43,2	**240**	360	118	3	318,9	6,3	12,2
24048-B-MB	43,6	**240**	360	118	3	318,9	6,3	12,2
23148-B-K-MB	65,3	**240**	400	128	4	346,2	9,5	17,7
23148-B-MB	67,3	**240**	400	128	4	346,2	9,5	17,7
24148-B-K30	78,7	**240**	400	160	4	338	6,3	12,2
24148-B	80,7	**240**	400	160	4	338	6,3	12,2
22248-B-K-MB	81,2	**240**	440	120	4	380,7	12,5	23,5
22248-B-MB	83,4	**240**	440	120	4	380,7	12,5	23,5
23248-B-K-MB	105	**240**	440	160	4	371	12,5	23,5
23248-B-MB	111	**240**	440	160	4	371	12,5	23,5
22348-K-MB	145	**240**	500	155	5	420	12,5	23,5
22348-MB	151	**240**	500	155	5	420	12,5	23,5

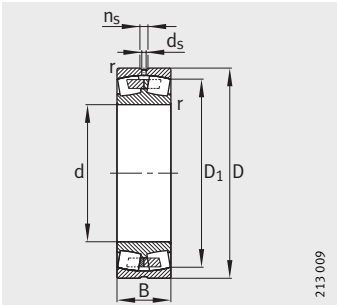


Mounting dimensions

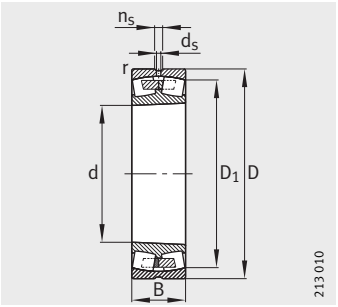
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
230,2	289,8	2,1	600 000	1 250 000	0,18	3,76	5,59	3,67	72 000	1 800	1 460
230,2	289,8	2,1	600 000	1 250 000	0,18	3,76	5,59	3,67	72 000	1 800	1 460
232,4	327,6	2,5	1 100 000	2 000 000	0,26	2,55	3,8	2,5	132 000	1 700	1 440
232,4	327,6	2,5	1 100 000	2 000 000	0,26	2,55	3,8	2,5	132 000	1 700	1 440
232,4	327,6	2,5	1 400 000	2 700 000	0,34	1,96	2,92	1,92	139 000	1 300	1 070
232,4	327,6	2,5	1 400 000	2 700 000	0,34	1,96	2,92	1,92	139 000	1 300	1 070
237	353	3	1 630 000	2 900 000	0,33	2,03	3,02	1,98	165 000	1 400	1 060
237	353	3	1 630 000	2 900 000	0,33	2,03	3,02	1,98	165 000	1 400	1 060
237	353	3	1 900 000	3 450 000	0,41	1,63	2,43	1,6	197 000	1 300	720
237	353	3	1 900 000	3 450 000	0,41	1,63	2,43	1,6	197 000	1 300	720
237	383	3	1 630 000	2 450 000	0,29	2,35	3,5	2,3	153 000	1 400	1 340
237	383	3	1 630 000	2 450 000	0,29	2,35	3,5	2,3	153 000	1 400	1 340
237	383	3	2 040 000	3 450 000	0,37	1,83	2,72	1,79	181 000	1 400	850
237	383	3	2 040 000	3 450 000	0,37	1,83	2,72	1,79	181 000	1 400	850
240	440	4	2 320 000	3 350 000	0,35	1,95	2,9	1,91	217 000	1 300	970
240	440	4	2 320 000	3 350 000	0,35	1,95	2,9	1,91	217 000	1 300	970
240	440	4	2 320 000	3 350 000	0,35	1,95	2,9	1,91	217 000	1 300	970
250,2	309,8	2,1	640 000	1 370 000	0,17	4,05	6,04	3,96	93 000	1 500	1 310
250,2	309,8	2,1	640 000	1 370 000	0,17	4,05	6,04	3,96	93 000	1 500	1 310
252,4	347,6	2,5	1 160 000	2 200 000	0,25	2,74	4,08	2,68	130 000	1 400	1 320
252,4	347,6	2,5	1 160 000	2 200 000	0,25	2,74	4,08	2,68	130 000	1 400	1 320
252,4	347,6	2,5	1 500 000	2 900 000	0,32	2,1	3,13	2,06	150 000	1 300	970
252,4	347,6	2,5	1 500 000	2 900 000	0,32	2,1	3,13	2,06	150 000	1 300	970
257	383	3	1 860 000	3 250 000	0,33	2,06	3,06	2,01	177 000	1 300	970
257	383	3	1 860 000	3 250 000	0,33	2,06	3,06	2,01	177 000	1 300	970
257	383	3	2 120 000	3 900 000	0,41	1,66	2,47	1,62	231 000	1 200	660
257	383	3	2 120 000	3 900 000	0,41	1,66	2,47	1,62	231 000	1 200	660
257	423	3	1 960 000	3 050 000	0,29	2,35	3,5	2,3	184 000	1 300	1 180
257	423	3	1 960 000	3 050 000	0,29	2,35	3,5	2,3	184 000	1 300	1 180
257	423	3	2 450 000	4 250 000	0,37	1,8	2,69	1,76	231 000	1 300	750
257	423	3	2 450 000	4 250 000	0,37	1,8	2,69	1,76	231 000	1 300	750
260	480	4	2 650 000	3 900 000	0,35	1,95	2,9	1,91	249 000	1 500	870
260	480	4	2 650 000	3 900 000	0,35	1,95	2,9	1,91	249 000	1 500	870

Spherical roller bearings

Cylindrical or tapered bore



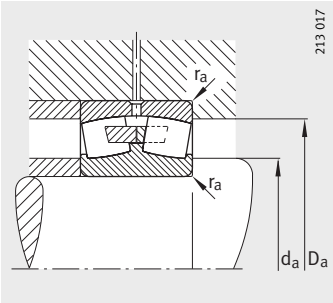
With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	d_s	n_s
	≈kg				min.	≈		
23952-K-MB	22,4	**260**	360	75	2,1	330,5	8	15
23952-MB	24,1	**260**	360	75	2,1	330,5	8	15
23052-K-MB	46,2	**260**	400	104	4	357,2	9,5	17,7
23052-MB	49,3	**260**	400	104	4	357,2	9,5	17,7
24052-B-K30-MB	64,5	**260**	400	140	4	349,1	6,3	12,2
24052-B-MB	67,2	**260**	400	140	4	349,1	6,3	12,2
23152-K-MB	89,6	**260**	440	144	4	379,7	9,5	17,7
23152-MB	92,5	**260**	440	144	4	379,7	9,5	17,7
24152-B-K30	112	**260**	440	180	4	370,3	8	15
24152-B	114	**260**	440	180	4	370,3	8	15
22252-B-K-MB	106	**260**	480	130	5	415,3	12,5	23,5
22252-B-MB	110	**260**	480	130	5	415,3	12,5	23,5
23252-B-K-MB	136	**260**	480	174	5	405,4	12,5	23,5
23252-B-MB	144	**260**	480	174	5	405,4	12,5	23,5
22352-K-MB	177	**260**	540	165	6	452,1	12,5	23,5
22352-MB	181	**260**	540	165	6	452,1	12,5	23,5
23956-K-MB	24,7	**280**	380	75	2,1	350	8	15
23956-MB	25,5	**280**	380	75	2,1	350	8	15
23056-B-K-MB	50,3	**280**	420	106	4	376,5	9,5	17,7
23056-B-MB	52,9	**280**	420	106	4	376,5	9,5	17,7
24056-B-K30-MB	69,7	**280**	420	140	4	369,5	6,3	12,2
24056-B-MB	70,8	**280**	420	140	4	369,5	6,3	12,2
23156-B-K-MB	96,4	**280**	460	146	5	401,4	9,5	17,7
23156-B-MB	99,5	**280**	460	146	5	401,4	9,5	17,7
24156-B-K30	118	**280**	460	180	5	392,8	8	15
24156-B	119	**280**	460	180	5	392,8	8	15
22256-B-K-MB	110	**280**	500	130	5	435,2	12,5	23,5
22256-B-MB	113	**280**	500	130	5	435,2	12,5	23,5
23256-K-MB	153	**280**	500	176	5	426,3	12,5	23,5
23256-MB	157	**280**	500	176	5	426,3	12,5	23,5
22356-K-MB	224	**280**	580	175	6	489,3	12,5	23,5
22356-MB	233	**280**	580	175	6	489,3	12,5	23,5

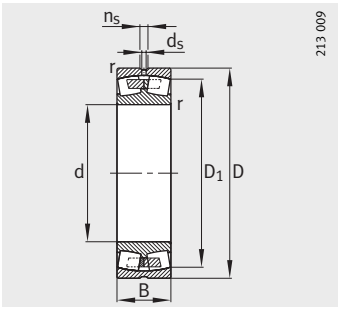


Mounting dimensions

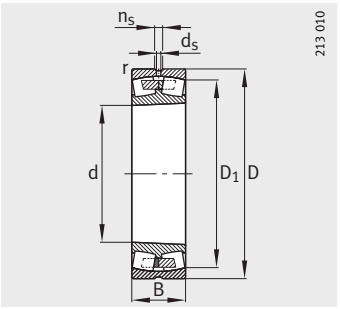
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
270,2	349,8	2,1	930 000	1 930 000	0,19	3,54	5,27	3,46	108 000	1 400	1 190
270,2	349,8	2,1	930 000	1 930 000	0,19	3,54	5,27	3,46	108 000	1 400	1 190
274,6	385,4	3	1 500 000	2 800 000	0,26	2,64	3,93	2,58	154 000	1 300	1 170
274,6	385,4	3	1 500 000	2 800 000	0,26	2,64	3,93	2,58	154 000	1 300	1 170
274,6	385,4	3	1 900 000	3 800 000	0,35	1,94	2,88	1,89	204 000	1 100	870
274,6	385,4	3	1 900 000	3 800 000	0,35	1,94	2,88	1,89	204 000	1 100	870
277	423	3	2 200 000	4 000 000	0,33	2,03	3,02	1,98	213 000	1 200	850
277	423	3	2 200 000	4 000 000	0,33	2,03	3,02	1,98	213 000	1 200	850
277	423	3	2 700 000	5 100 000	0,42	1,61	2,4	1,58	315 000	1 100	550
277	423	3	2 700 000	5 100 000	0,42	1,61	2,4	1,58	315 000	1 100	550
280	460	4	2 240 000	3 450 000	0,29	2,32	3,45	2,26	217 000	1 100	1 070
280	460	4	2 240 000	3 450 000	0,29	2,32	3,45	2,26	217 000	1 100	1 070
280	460	4	2 900 000	4 900 000	0,37	1,8	2,69	1,76	270 000	1 100	660
280	460	4	2 900 000	4 900 000	0,37	1,8	2,69	1,76	270 000	1 100	660
286	514	5	3 000 000	4 400 000	0,34	2	2,98	1,96	290 000	1 100	790
286	514	5	3 000 000	4 400 000	0,34	2	2,98	1,96	290 000	1 100	790
290,2	369,8	2,1	970 000	2 040 000	0,18	3,76	5,59	3,67	129 000	1 300	1 100
290,2	369,8	2,1	970 000	2 040 000	0,18	3,76	5,59	3,67	129 000	1 300	1 100
294,6	405,4	3	1 560 000	3 000 000	0,25	2,74	4,08	2,68	156 000	1 300	1 090
294,6	405,4	3	1 560 000	3 000 000	0,25	2,74	4,08	2,68	156 000	1 300	1 090
294,6	405,4	3	2 000 000	4 000 000	0,33	2,04	3,04	2	225 000	1 100	810
294,6	405,4	3	2 000 000	4 000 000	0,33	2,04	3,04	2	225 000	1 100	810
300	440	4	2 360 000	4 400 000	0,32	2,12	3,15	2,07	241 000	1 100	780
300	440	4	2 360 000	4 400 000	0,32	2,12	3,15	2,07	241 000	1 100	780
300	440	4	2 700 000	5 200 000	0,39	1,71	2,54	1,67	365 000	1 000	520
300	440	4	2 700 000	5 200 000	0,39	1,71	2,54	1,67	365 000	1 000	520
300	480	4	2 360 000	3 650 000	0,28	2,43	3,61	2,37	238 000	1 100	1 010
300	480	4	2 360 000	3 650 000	0,28	2,43	3,61	2,37	238 000	1 100	1 010
300	480	4	3 000 000	5 300 000	0,36	1,86	2,77	1,82	260 000	1 100	620
300	480	4	3 000 000	5 300 000	0,36	1,86	2,77	1,82	260 000	1 100	620
306	554	5	3 550 000	5 400 000	0,33	2,03	3,02	1,98	335 000	950	680
306	554	5	3 550 000	5 400 000	0,33	2,03	3,02	1,98	335 000	950	680

Spherical roller bearings

Cylindrical or tapered bore



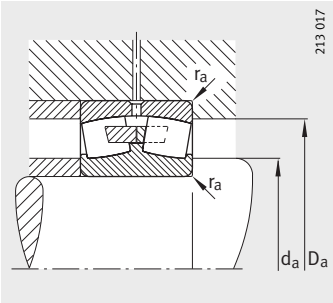
With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	d_s	n_s
	≈kg				min.	≈		
23960-B-K-MB	39,1	**300**	420	90	3	384,6	9,5	17,7
23960-B-MB	40,6	**300**	420	90	3	384,6	9,5	17,7
23060-K-MB	72,2	**300**	460	118	4	412,6	9,5	17,7
23060-MB	73,8	**300**	460	118	4	412,6	9,5	17,7
24060-B-K30-MB	97,7	**300**	460	160	4	401,5	8	15
24060-B-MB	102	**300**	460	160	4	401,5	8	15
23160-B-K-MB	123	**300**	500	160	5	434,7	9,5	17,7
23160-B-MB	134	**300**	500	160	5	434,7	9,5	17,7
24160-B-K30	158	**300**	500	200	5	424,4	8	15
24160-B	159	**300**	500	200	5	424,4	8	15
22260-K-MB	136	**300**	540	140	5	468,8	12,5	23,5
22260-MB	142	**300**	540	140	5	468,8	12,5	23,5
23260-K-MB	192	**300**	540	192	5	458,7	12,5	23,5
23260-MB	198	**300**	540	192	5	458,7	12,5	23,5
23964-K-MB	41	**320**	440	90	3	406,2	9,5	17,7
23964-MB	41,8	**320**	440	90	3	406,2	9,5	17,7
23064-K-MB	77,1	**320**	480	121	4	432,6	9,5	17,7
23064-MB	79,9	**320**	480	121	4	432,6	9,5	17,7
24064-B-K30-MB	103	**320**	480	160	4	424	8	15
24064-B-MB	107	**320**	480	160	4	424	8	15
23164-K-MB	159	**320**	540	176	5	466,2	12,5	23,5
23164-MB	170	**320**	540	176	5	466,2	12,5	23,5
24164-B-K30	197	**320**	540	218	5	456,1	9,5	17,7
24164-B	204	**320**	540	218	5	456,1	9,5	17,7
22264-K-MB	166	**320**	580	150	5	503,5	12,5	23,5
22264-MB	177	**320**	580	150	5	503,5	12,5	23,5
23264-K-MB	229	**320**	580	208	5	489,6	12,5	23,5
23264-MB	242	**320**	580	208	5	489,6	12,5	23,5

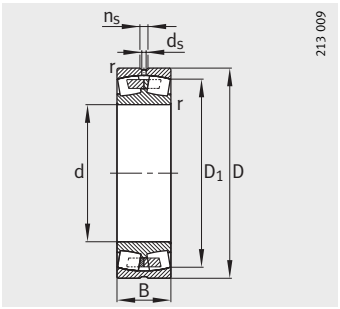


Mounting dimensions

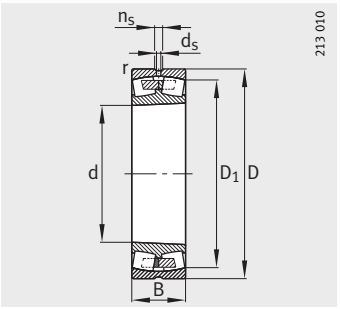
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
312,4	407,6	2,5	1 270 000	2 650 000	0,2	3,42	5,09	3,34	165 000	1 200	1 000
312,4	407,6	2,5	1 270 000	2 650 000	0,2	3,42	5,09	3,34	165 000	1 200	1 000
314,6	445,4	3	1 960 000	3 650 000	0,25	2,69	4	2,63	223 000	1 100	960
314,6	445,4	3	1 960 000	3 650 000	0,25	2,69	4	2,63	223 000	1 100	960
314,6	445,4	3	2 500 000	5 200 000	0,35	1,95	2,9	1,91	300 000	1 000	700
314,6	445,4	3	2 500 000	5 200 000	0,35	1,95	2,9	1,91	300 000	1 000	700
320	480	4	2 650 000	4 900 000	0,33	2,06	3,06	2,01	270 000	1 100	720
320	480	4	2 650 000	4 900 000	0,33	2,06	3,06	2,01	270 000	1 100	720
320	480	4	3 250 000	6 300 000	0,4	1,67	2,49	1,63	540 000	900	455
320	480	4	3 250 000	6 300 000	0,4	1,67	2,49	1,63	540 000	900	455
320	520	4	2 750 000	4 400 000	0,27	2,47	3,67	2,41	300 000	1 000	900
320	520	4	2 750 000	4 400 000	0,27	2,47	3,67	2,41	300 000	1 000	900
320	520	4	3 450 000	6 200 000	0,37	1,83	2,72	1,79	300 000	1 000	560
320	520	4	3 450 000	6 200 000	0,37	1,83	2,72	1,79	300 000	1 000	560
332,4	427,6	2,5	1 310 000	2 750 000	0,19	3,62	5,39	3,54	202 000	1 100	930
332,4	427,6	2,5	1 310 000	2 750 000	0,19	3,62	5,39	3,54	202 000	1 100	930
334,6	465,4	3	2 040 000	4 000 000	0,25	2,74	4,08	2,68	243 000	1 100	900
334,6	465,4	3	2 040 000	4 000 000	0,25	2,74	4,08	2,68	243 000	1 100	900
334,6	465,4	3	2 600 000	5 400 000	0,33	2,06	3,06	2,01	360 000	950	660
334,6	465,4	3	2 600 000	5 400 000	0,33	2,06	3,06	2,01	360 000	950	660
340	520	4	3 200 000	6 000 000	0,34	1,98	2,94	1,93	305 000	950	650
340	520	4	3 200 000	6 000 000	0,34	1,98	2,94	1,93	305 000	950	650
340	520	4	3 800 000	7 350 000	0,41	1,65	2,46	1,61	530 000	850	415
340	520	4	3 800 000	7 350 000	0,41	1,65	2,46	1,61	530 000	850	415
340	560	4	3 050 000	4 900 000	0,27	2,47	3,67	2,41	345 000	950	830
340	560	4	3 050 000	4 900 000	0,27	2,47	3,67	2,41	345 000	950	830
340	560	4	3 900 000	6 950 000	0,37	1,8	2,69	1,76	330 000	950	510
340	560	4	3 900 000	6 950 000	0,37	1,8	2,69	1,76	330 000	950	510

Spherical roller bearings

Cylindrical or tapered bore



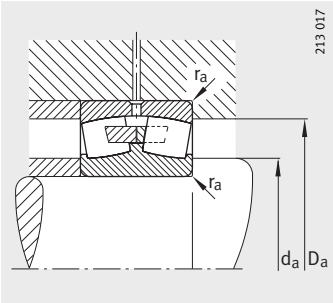
With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	d_s	n_s
	≈kg				min.	≈		
23968-MB	47,8	**340**	460	90	3	426,7	9,5	17,7
23068-K-MB	101	**340**	520	133	5	464,6	12,5	23,5
23068-MB	105	**340**	520	133	5	464,6	12,5	23,5
24068-B-K30-MB	143	**340**	520	180	5	457,1	9,5	17,7
24068-B-MB	146	**340**	520	180	5	457,1	9,5	17,7
23168-B-K-MB	203	**340**	580	190	5	499,5	12,5	23,5
23168-B-MB	215	**340**	580	190	5	499,5	12,5	23,5
24168-B-K30	260	**340**	580	243	5	481,1	9,5	17,7
24168-B	266	**340**	580	243	5	481,1	9,5	17,7
23268-B-K-MB	291	**340**	620	224	6	521,2	12,5	23,5
23268-B-MB	309	**340**	620	224	6	521,2	12,5	23,5
23972-K-MB	45	**360**	480	90	3	447,1	9,5	17,7
23972-MB	46,5	**360**	480	90	3	447,1	9,5	17,7
23072-K-MB	107	**360**	540	134	5	485,2	12,5	23,5
23072-MB	112	**360**	540	134	5	485,2	12,5	23,5
24072-B-MB	138	**360**	540	180	5	478,5	9,5	17,7
23172-K-MB	217	**360**	600	192	5	520	12,5	23,5
23172-MB	230	**360**	600	192	5	520	12,5	23,5
24172-B-K30	275	**360**	600	243	5	503,6	9,5	17,7
24172-B	279	**360**	600	243	5	503,6	9,5	17,7
23272-B-K-MB	328	**360**	650	232	6	548,3	12,5	23,5
23272-B-MB	347	**360**	650	232	6	548,3	12,5	23,5
23976-K-MB	66,3	**380**	520	106	4	477,6	9,5	17,7
23976-MB	68,5	**380**	520	106	4	477,6	9,5	17,7
23076-B-K-MB	113	**380**	560	135	5	505,6	12,5	23,5
23076-B-MB	117	**380**	560	135	5	505,6	12,5	23,5
24076-B-K30-MB	155	**380**	560	180	5	499	9,5	17,7
24076-B-MB	158	**380**	560	180	5	499	9,5	17,7
23176-K-MB	226	**380**	620	194	5	539,6	12,5	23,5
23176-MB	241	**380**	620	194	5	539,6	12,5	23,5
24176-B-K30	277	**380**	620	243	5	525,8	9,5	17,7
24176-B	279	**380**	620	243	5	525,8	9,5	17,7
23276-B-K-MB	367	**380**	680	240	6	576,4	12,5	23,5
23276-B-MB	390	**380**	680	240	6	576,4	12,5	23,5

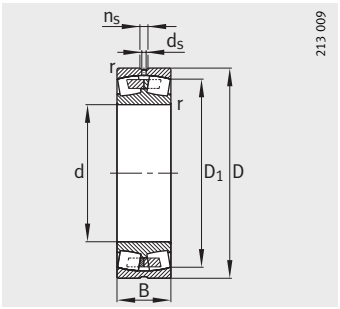


Mounting dimensions

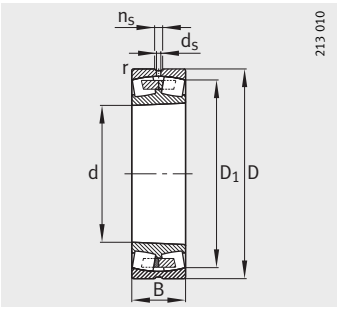
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
352,4	447,6	2,5	1 370 000	3 000 000	0,18	3,85	5,73	3,76	199 000	1 100	860
358	502	4	2 360 000	4 550 000	0,25	2,69	4	2,63	285 000	1 000	840
358	502	4	2 360 000	4 550 000	0,25	2,69	4	2,63	285 000	1 000	840
358	502	4	3 100 000	6 550 000	0,34	1,98	2,94	1,93	530 000	850	600
358	502	4	3 100 000	6 550 000	0,34	1,98	2,94	1,93	530 000	850	600
360	560	4	3 650 000	6 950 000	0,34	1,98	2,94	1,93	570 000	900	590
360	560	4	3 650 000	6 950 000	0,34	1,98	2,94	1,93	570 000	900	590
360	560	4	4 400 000	8 500 000	0,43	1,56	2,32	1,53	680 000	800	380
360	560	4	4 400 000	8 500 000	0,43	1,56	2,32	1,53	680 000	800	380
366	594	5	4 500 000	8 150 000	0,38	1,78	2,65	1,74	650 000	850	465
366	594	5	4 500 000	8 150 000	0,38	1,78	2,65	1,74	650 000	850	465
372,4	467,6	2,5	1 430 000	3 200 000	0,17	4,05	6,04	3,96	209 000	1 000	800
372,4	467,6	2,5	1 430 000	3 200 000	0,17	4,05	6,04	3,96	209 000	1 000	800
378	522	4	2 450 000	4 800 000	0,25	2,74	4,08	2,68	295 000	950	790
378	522	4	2 450 000	4 800 000	0,25	2,74	4,08	2,68	295 000	950	790
378	522	4	3 250 000	6 800 000	0,33	2,06	3,06	2,01	530 000	800	560
380	580	4	3 800 000	7 350 000	0,33	2,06	3,06	2,01	360 000	850	550
380	580	4	3 800 000	7 350 000	0,33	2,06	3,06	2,01	360 000	850	550
380	580	4	4 500 000	9 000 000	0,41	1,63	2,43	1,6	550 000	750	355
380	580	4	4 500 000	9 000 000	0,41	1,63	2,43	1,6	550 000	750	355
386	624	5	4 900 000	9 150 000	0,38	1,78	2,65	1,74	720 000	800	425
386	624	5	4 900 000	9 150 000	0,38	1,78	2,65	1,74	720 000	800	425
394,6	505,4	3	1 760 000	4 000 000	0,19	3,58	5,33	3,5	265 000	950	750
394,6	505,4	3	1 760 000	4 000 000	0,19	3,58	5,33	3,5	265 000	950	750
398	542	4	2 550 000	5 300 000	0,24	2,84	4,23	2,78	430 000	900	730
398	542	4	2 550 000	5 300 000	0,24	2,84	4,23	2,78	430 000	900	730
398	542	4	3 350 000	7 200 000	0,31	2,15	3,2	2,1	580 000	750	520
398	542	4	3 350 000	7 200 000	0,31	2,15	3,2	2,1	580 000	750	520
400	600	4	4 050 000	8 150 000	0,32	2,12	3,15	2,07	385 000	800	510
400	600	4	4 050 000	8 150 000	0,32	2,12	3,15	2,07	385 000	800	510
400	600	4	4 650 000	9 500 000	0,39	1,71	2,54	1,67	770 000	700	330
400	600	4	4 650 000	9 500 000	0,39	1,71	2,54	1,67	770 000	700	330
406	654	5	5 300 000	9 800 000	0,37	1,8	2,69	1,76	780 000	750	395
406	654	5	5 300 000	9 800 000	0,37	1,8	2,69	1,76	780 000	750	395

Spherical roller bearings

Cylindrical or tapered bore



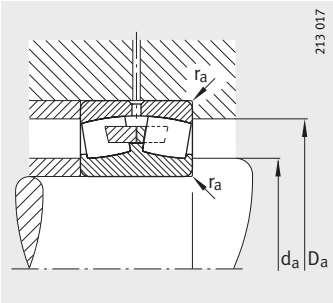
With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	d_s	n_s
	≈kg				min.	≈		
23980-B-K-MB	68,2	**400**	540	106	4	499	9,5	17,7
23980-B-MB	72,9	**400**	540	106	4	499	9,5	17,7
23080-K-MB	143	**400**	600	148	5	540,5	12,5	23,5
23080-MB	151	**400**	600	148	5	540,5	12,5	23,5
24080-B-K30-MB	196	**400**	600	200	5	530,9	12,5	23,5
24080-B-MB	198	**400**	600	200	5	530,9	12,5	23,5
23180-B-K-MB	261	**400**	650	200	6	567,2	12,5	23,5
23180-B-MB	270	**400**	650	200	6	567,2	12,5	23,5
24180-B-K30	312	**400**	650	250	6	553,5	12,5	23,5
24180-B	326	**400**	650	250	6	553,5	12,5	23,5
23280-B-K-MB	442	**400**	720	256	6	609,8	12,5	23,5
23280-B-MB	469	**400**	720	256	6	609,8	12,5	23,5
23984-K-MB	78	**420**	560	106	4	519,5	9,5	17,7
23984-MB	80,5	**420**	560	106	4	519,5	9,5	17,7
23084-B-K-MB	155	**420**	620	150	5	560,7	12,5	23,5
23084-B-MB	162	**420**	620	150	5	560,7	12,5	23,5
24084-B-K30-MB	214	**420**	620	200	5	550,2	12,5	23,5
24084-B-MB	217	**420**	620	200	5	550,2	12,5	23,5
23184-K-MB	339	**420**	700	224	6	605,4	12,5	23,5
23184-MB	360	**420**	700	224	6	605,4	12,5	23,5
24184-B-K30	407	**420**	700	280	6	590,3	12,5	23,5
24184-B	442	**420**	700	280	6	590,3	12,5	23,5
23284-B-K-MB	537	**420**	760	272	7,5	642,2	12,5	23,5
23284-B-MB	558	**420**	760	272	7,5	642,2	12,5	23,5

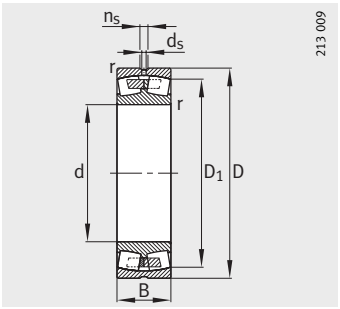


Mounting dimensions

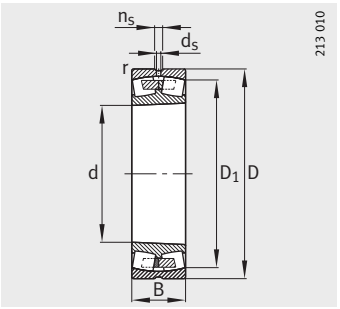
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
414,6	525,4	3	1 830 000	4 150 000	0,18	3,71	5,52	3,63	275 000	900	710
414,6	525,4	3	1 830 000	4 150 000	0,18	3,71	5,52	3,63	275 000	900	710
418	582	4	3 050 000	6 200 000	0,24	2,79	4,15	2,73	365 000	800	670
418	582	4	3 050 000	6 200 000	0,24	2,79	4,15	2,73	365 000	800	670
418	582	4	3 900 000	8 500 000	0,33	2,06	3,06	2,01	670 000	700	485
418	582	4	3 900 000	8 500 000	0,33	2,06	3,06	2,01	670 000	700	485
426	624	5	4 250 000	8 500 000	0,31	2,15	3,2	2,1	670 000	750	485
426	624	5	4 250 000	8 500 000	0,31	2,15	3,2	2,1	670 000	750	485
426	624	5	5 100 000	10 400 000	0,39	1,72	2,56	1,68	720 000	670	310
426	624	5	5 100 000	10 400 000	0,39	1,72	2,56	1,68	720 000	670	310
426	694	5	5 700 000	10 800 000	0,38	1,78	2,65	1,74	820 000	700	370
426	694	5	5 700 000	10 800 000	0,38	1,78	2,65	1,74	820 000	700	370
434,6	545,4	3	1 900 000	4 500 000	0,18	3,85	5,73	3,76	300 000	850	660
434,6	545,4	3	1 900 000	4 500 000	0,18	3,85	5,73	3,76	300 000	850	660
438	602	4	3 150 000	6 550 000	0,24	2,84	4,23	2,78	395 000	800	640
438	602	4	3 150 000	6 550 000	0,24	2,84	4,23	2,78	395 000	800	640
438	602	4	4 000 000	8 800 000	0,32	2,13	3,17	2,08	710 000	670	460
438	602	4	4 000 000	8 800 000	0,32	2,13	3,17	2,08	710 000	670	460
446	674	5	5 000 000	9 650 000	0,33	2,03	3,02	1,98	465 000	700	455
446	674	5	5 000 000	9 650 000	0,33	2,03	3,02	1,98	465 000	700	455
446	674	5	6 200 000	12 700 000	0,4	1,67	2,49	1,63	980 000	630	265
446	674	5	6 200 000	12 700 000	0,4	1,67	2,49	1,63	980 000	630	265
452	728	6	6 550 000	12 200 000	0,38	1,77	2,64	1,73	930 000	670	340
452	728	6	6 550 000	12 200 000	0,38	1,77	2,64	1,73	930 000	670	340

Spherical roller bearings

Cylindrical or tapered bore



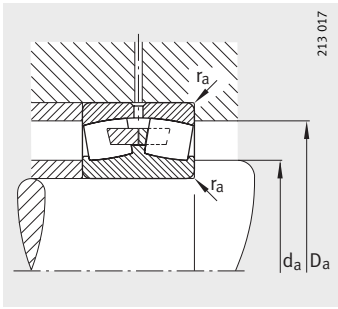
With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	d_s	n_s
	≈kg				min.	≈		
23988-K-MB	98,3	**440**	600	118	4	552,8	12,5	23,5
23988-MB	101	**440**	600	118	4	552,8	12,5	23,5
23088-K-MB	177	**440**	650	157	6	586,8	12,5	23,5
23088-MB	190	**440**	650	157	6	586,8	12,5	23,5
24088-B-K30-MB	247	**440**	650	212	6	575,6	12,5	23,5
24088-B-MB	250	**440**	650	212	6	575,6	12,5	23,5
23188-K-MB	378	**440**	720	226	6	626	12,5	23,5
23188-MB	381	**440**	720	226	6	626	12,5	23,5
24188-B-K30	451	**440**	720	280	6	612,4	12,5	23,5
24188-B	453	**440**	720	280	6	612,4	12,5	23,5
23288-B-K-MB	586	**440**	790	280	7,5	669,3	12,5	23,5
23288-B-MB	615	**440**	790	280	7,5	669,3	12,5	23,5
23992-B-K-MB	103	**460**	620	118	4	573,3	12,5	23,5
23992-B-MB	111	**460**	620	118	4	573,3	12,5	23,5
23092-B-K-MB	204	**460**	680	163	6	612,2	12,5	23,5
23092-B-MB	208	**460**	680	163	6	612,2	12,5	23,5
24092-B-MB	282	**460**	680	218	6	603,3	12,5	23,5
23192-K-MB	420	**460**	760	240	7,5	661,4	12,5	23,5
23192-MB	447	**460**	760	240	7,5	661,4	12,5	23,5
24192-B-K30-MB	578	**460**	760	300	7,5	642,8	12,5	23,5
24192-B-MB	582	**460**	760	300	7,5	642,8	12,5	23,5
23292-K-MB	699	**460**	830	296	7,5	701,6	12,5	23,5
23292-MB	700	**460**	830	296	7,5	701,6	12,5	23,5
23996-B-K-MB	121	**480**	650	128	5	598,8	12,5	23,5
23996-B-MB	126	**480**	650	128	5	598,8	12,5	23,5
23096-K-MB	208	**480**	700	165	6	632,6	12,5	23,5
23096-MB	222	**480**	700	165	6	632,6	12,5	23,5
24096-B-K30-MB	289	**480**	700	218	6	625,4	12,5	23,5
24096-B-MB	291	**480**	700	218	6	625,4	12,5	23,5
23196-K-MB	470	**480**	790	248	7,5	688,3	12,5	23,5
23196-MB	508	**480**	790	248	7,5	688,3	12,5	23,5
24196-B-K30-MB	700	**480**	790	308	7,5	669,9	12,5	23,5
23296-K-MB	806	**480**	870	310	7,5	734,8	12,5	23,5
23296-MB	830	**480**	870	310	7,5	734,8	12,5	23,5

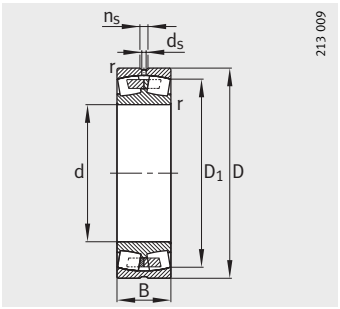


Mounting dimensions

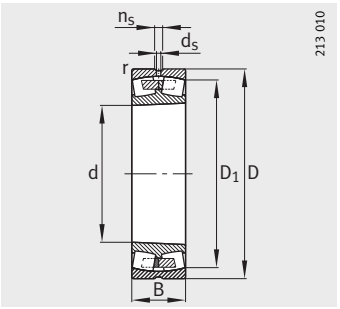
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
454,6	585,4	3	2 240 000	5 200 000	0,18	3,66	5,46	3,58	295 000	800	620
454,6	585,4	3	2 240 000	5 200 000	0,18	3,66	5,46	3,58	295 000	800	620
463	627	5	3 400 000	7 100 000	0,24	2,84	4,23	2,78	405 000	750	610
463	627	5	3 400 000	7 100 000	0,24	2,84	4,23	2,78	405 000	750	610
463	627	5	4 300 000	9 650 000	0,32	2,12	3,15	2,07	750 000	630	430
463	627	5	4 300 000	9 650 000	0,32	2,12	3,15	2,07	750 000	630	430
466	694	5	5 200 000	10 400 000	0,32	2,1	3,13	2,06	485 000	700	425
466	694	5	5 200 000	10 400 000	0,32	2,1	3,13	2,06	485 000	700	425
466	694	5	6 400 000	13 200 000	0,38	1,76	2,62	1,72	1 020 000	600	255
466	694	5	6 400 000	13 200 000	0,38	1,76	2,62	1,72	1 020 000	600	255
472	758	6	7 100 000	13 400 000	0,37	1,8	2,69	1,76	990 000	630	320
472	758	6	7 100 000	13 400 000	0,37	1,8	2,69	1,76	990 000	630	320
474,6	605,4	3	2 280 000	5 400 000	0,18	3,85	5,73	3,76	370 000	750	590
474,6	605,4	3	2 280 000	5 400 000	0,18	3,85	5,73	3,76	370 000	750	590
483	657	5	3 650 000	7 650 000	0,24	2,84	4,23	2,78	520 000	700	580
483	657	5	3 650 000	7 650 000	0,24	2,84	4,23	2,78	520 000	700	580
483	657	5	4 750 000	10 600 000	0,31	2,16	3,22	2,12	710 000	630	405
492	728	6	5 850 000	11 600 000	0,32	2,12	3,15	2,07	530 000	630	390
492	728	6	5 850 000	11 600 000	0,32	2,12	3,15	2,07	530 000	630	390
492	728	6	7 500 000	15 600 000	0,39	1,73	2,58	1,69	1 160 000	560	227
492	728	6	7 500 000	15 600 000	0,39	1,73	2,58	1,69	1 160 000	560	227
492	798	6	7 800 000	15 000 000	0,37	1,8	2,69	1,76	620 000	600	295
492	798	6	7 800 000	15 000 000	0,37	1,8	2,69	1,76	620 000	600	295
498	632	4	2 550 000	6 000 000	0,18	3,76	5,59	3,67	460 000	700	570
498	632	4	2 550 000	6 000 000	0,18	3,76	5,59	3,67	460 000	700	570
503	677	5	3 800 000	8 150 000	0,23	2,9	4,31	2,83	455 000	670	550
503	677	5	3 800 000	8 150 000	0,23	2,9	4,31	2,83	455 000	670	550
503	677	5	4 900 000	11 200 000	0,3	2,25	3,34	2,2	830 000	600	380
503	677	5	4 900 000	11 200 000	0,3	2,25	3,34	2,2	830 000	600	380
512	758	6	6 300 000	12 700 000	0,32	2,12	3,15	2,07	570 000	630	370
512	758	6	6 300 000	12 700 000	0,32	2,12	3,15	2,07	570 000	630	370
512	758	6	8 000 000	16 600 000	0,39	1,75	2,61	1,71	1 190 000	560	213
512	838	6	8 800 000	17 000 000	0,37	1,83	2,72	1,79	700 000	600	265
512	838	6	8 800 000	17 000 000	0,37	1,83	2,72	1,79	700 000	600	265

Spherical roller bearings

Cylindrical or tapered bore



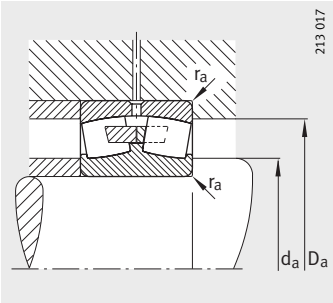
With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	d_s	n_s
	≈kg				min.	≈		
239/500-K-MB	124	**500**	670	128	5	619,3	12,5	23,5
239/500-MB	132	**500**	670	128	5	619,3	12,5	23,5
230/500-B-K-MB	219	**500**	720	167	6	653,5	12,5	23,5
230/500-B-MB	233	**500**	720	167	6	653,5	12,5	23,5
240/500-B-MB	297	**500**	720	218	6	645,8	12,5	23,5
231/500-B-K-MB	556	**500**	830	264	7,5	720,9	12,5	23,5
231/500-B-MB	588	**500**	830	264	7,5	720,9	12,5	23,5
241/500-B-K30-MB	717	**500**	830	325	7,5	701,8	12,5	23,5
241/500-B-MB	725	**500**	830	325	7,5	701,8	12,5	23,5
239/530-K-MB	146	**530**	710	136	5	656,4	12,5	23,5
239/530-MB	160	**530**	710	136	5	656,4	12,5	23,5
230/530-B-K-MB	291	**530**	780	185	6	703,7	12,5	23,5
230/530-B-MB	321	**530**	780	185	6	703,7	12,5	23,5
240/530-B-MB	415	**530**	780	250	6	691,9	12,5	23,5
231/530-K-MB	643	**530**	870	272	7,5	756,3	12,5	23,5
241/530-B-K30-MB	845	**530**	870	335	7,5	739,1	12,5	23,5
239/560-B-K-MB	169	**560**	750	140	5	693,4	12,5	23,5
239/560-B-MB	181	**560**	750	140	5	693,4	12,5	23,5
230/560-B-K-MB	339	**560**	820	195	6	741,5	12,5	23,5
230/560-B-MB	358	**560**	820	195	6	741,5	12,5	23,5
240/560-B-MB	468	**560**	820	258	6	731,2	12,5	23,5
231/560-K-MB	737	**560**	920	280	7,5	800,2	12,5	23,5
231/560-MB	760	**560**	920	280	7,5	800,2	12,5	23,5
241/560-B-K30-MB	974	**560**	920	355	7,5	785	12,5	23,5
239/600-B-K-MB	210	**600**	800	150	5	740,5	12,5	23,5
239/600-B-MB	224	**600**	800	150	5	740,5	12,5	23,5
230/600-B-K-MB	388	**600**	870	200	6	791,9	12,5	23,5
230/600-B-MB	409	**600**	870	200	6	791,9	12,5	23,5
240/600-B-MB	540	**600**	870	272	6	773,3	12,5	23,5
231/600-K-MB	901	**600**	980	300	7,5	852,6	12,5	23,5
231/600-MB	929	**600**	980	300	7,5	852,6	12,5	23,5
241/600-B-K30-MB	1 170	**600**	980	375	7,5	833	12,5	23,5
241/600-B-MB	1 180	**600**	980	375	7,5	833	12,5	23,5

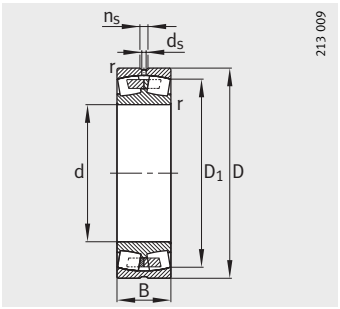


Mounting dimensions

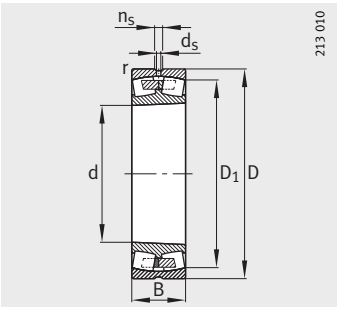
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
518	652	4	2 600 000	6 300 000	0,17	3,9	5,81	3,81	400 000	670	540
518	652	4	2 600 000	6 300 000	0,17	3,9	5,81	3,81	400 000	670	540
523	697	5	3 900 000	8 500 000	0,22	3,01	4,48	2,94	510 000	670	520
523	697	5	3 900 000	8 500 000	0,22	3,01	4,48	2,94	510 000	670	520
523	697	5	4 900 000	11 200 000	0,29	2,32	3,45	2,26	850 000	560	370
532	798	6	7 100 000	14 300 000	0,32	2,1	3,13	2,06	990 000	600	340
532	798	6	7 100 000	14 300 000	0,32	2,1	3,13	2,06	990 000	600	340
532	798	6	8 650 000	18 300 000	0,39	1,73	2,58	1,69	1 340 000	530	199
532	798	6	8 650 000	18 300 000	0,39	1,73	2,58	1,69	1 340 000	530	199
548	692	4	2 850 000	6 800 000	0,18	3,85	5,73	3,76	385 000	630	500
548	692	4	2 850 000	6 800 000	0,18	3,85	5,73	3,76	385 000	630	500
553	757	5	4 400 000	9 500 000	0,22	3,04	4,53	2,97	540 000	600	490
553	757	5	4 400 000	9 500 000	0,22	3,04	4,53	2,97	540 000	600	490
553	757	5	6 000 000	13 700 000	0,31	2,15	3,2	2,1	910 000	530	335
562	838	6	7 350 000	15 300 000	0,32	2,12	3,15	2,07	670 000	560	325
562	838	6	9 500 000	20 000 000	0,38	1,77	2,64	1,73	1 450 000	500	184
578	732	4	3 100 000	7 650 000	0,17	3,95	5,88	3,86	570 000	600	465
578	732	4	3 100 000	7 650 000	0,17	3,95	5,88	3,86	570 000	600	465
583	797	5	5 100 000	11 000 000	0,23	2,95	4,4	2,89	740 000	560	450
583	797	5	5 100 000	11 000 000	0,23	2,95	4,4	2,89	740 000	560	450
583	797	5	6 400 000	14 600 000	0,31	2,2	3,27	2,15	1 050 000	500	315
592	888	6	8 150 000	16 600 000	0,31	2,21	3,29	2,16	750 000	530	300
592	888	6	8 150 000	16 600 000	0,31	2,21	3,29	2,16	750 000	530	300
592	888	6	10 600 000	22 400 000	0,38	1,77	2,64	1,73	1 600 000	480	167
618	782	4	3 450 000	8 650 000	0,17	3,95	5,88	3,86	630 000	560	430
618	782	4	3 450 000	8 650 000	0,17	3,95	5,88	3,86	630 000	560	430
623	847	5	5 700 000	12 500 000	0,22	3,07	4,57	3	890 000	530	405
623	847	5	5 700 000	12 500 000	0,22	3,07	4,57	3	890 000	530	405
623	847	5	7 100 000	16 600 000	0,31	2,21	3,29	2,16	1 200 000	630	285
632	948	6	9 000 000	19 300 000	0,31	2,2	3,27	2,15	810 000	500	270
632	948	6	9 000 000	19 300 000	0,31	2,2	3,27	2,15	810 000	500	270
632	948	6	11 600 000	26 000 000	0,38	1,79	2,67	1,75	1 780 000	450	149
632	948	6	11 600 000	26 000 000	0,38	1,79	2,67	1,75	1 780 000	450	149

Spherical roller bearings

Cylindrical or tapered bore



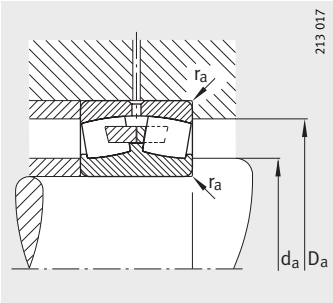
With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						
	m	d	D	B	r	D_1	d_s	n_s
	≈kg				min.	≈		
239/630-B-K-MB	283	**630**	850	165	6	784,5	12,5	23,5
239/630-B-MB	292	**630**	850	165	6	784,5	12,5	23,5
230/630-B-MB	496	**630**	920	212	7,5	834,3	12,5	23,5
230/630-B-K-MB	502	**630**	920	212	7,5	834,3	12,5	23,5
240/630-B-K30-MB	649	**630**	920	290	7,5	817,9	12,5	23,5
240/630-B-MB	660	**630**	920	290	7,5	817,9	12,5	23,5
241/630-B-K30-MB	1 360	**630**	1 030	400	7,5	872,2	12,5	23,5
239/670-B-K-MB	310	**670**	900	170	6	831,5	12,5	23,5
239/670-B-MB	320	**670**	900	170	6	831,5	12,5	23,5
230/670-B-K-MB	590	**670**	980	230	7,5	888,7	12,5	23,5
230/670-B-MB	600	**670**	980	230	7,5	888,7	12,5	23,5
241/670-B-K30-MB	1 540	**670**	1 090	412	7,5	929,4	12,5	23,5
239/710-K-MB	336	**710**	950	180	6	877,5	12,5	23,5
239/710-MB	355	**710**	950	180	6	877,5	12,5	23,5
230/710-B-K-MB	650	**710**	1 030	236	7,5	938,8	12,5	23,5
230/710-B-MB	674	**710**	1 030	236	7,5	938,8	12,5	23,5
240/710-B-K30-MB	873	**710**	1 030	315	7,5	921,6	12,5	23,5
241/710-B-K30-MB	1 820	**710**	1 150	438	9,5	982	12,5	23,5
241/710-B-MB	1 830	**710**	1 150	438	9,5	982	12,5	23,5
239/750-K-MB	394	**750**	1 000	185	6	923,2	12,5	23,5
239/750-MB	426	**750**	1 000	185	6	923,2	12,5	23,5
230/750-K-MB	792	**750**	1 090	250	7,5	990,9	12,5	23,5
230/750-MB	806	**750**	1 090	250	7,5	990,9	12,5	23,5
240/750-B-K30-MB	1 070	**750**	1 090	335	7,5	976,2	12,5	23,5
239/800-B-K-MB	490	**800**	1 060	195	6	983,7	12,5	23,5
239/800-B-MB	506	**800**	1 060	195	6	983,7	12,5	23,5
230/800-K-MB	861	**800**	1 150	258	7,5	1 050,9	12,5	23,5
230/800-MB	899	**800**	1 150	258	7,5	1 050,9	12,5	23,5
240/800-B-MB	1 200	**800**	1 150	345	7,5	1 034,1	12,5	23,5
239/850-K-MB	554	**850**	1 120	200	6	1 039,9	12,5	23,5
239/850-MB	579	**850**	1 120	200	6	1 039,9	12,5	23,5
240/850-B-K30-MB	1 420	**850**	1 220	365	7,5	1 092,9	12,5	23,5
239/900-K-MB	641	**900**	1 180	206	6	1 098,8	12,5	23,5
239/900-MB	653	**900**	1 180	206	6	1 098,8	12,5	23,5

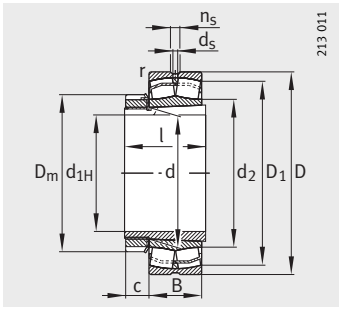


Mounting dimensions

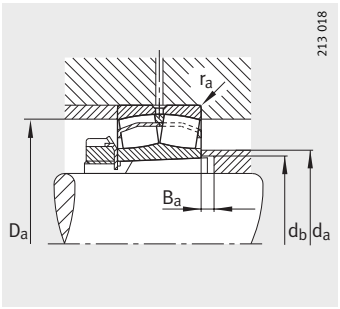
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
min.	max.	max.	N	N					N	min^{-1}	min^{-1}
653	827	5	4 050 000	9 800 000	0,18	3,8	5,66	3,72	710 000	530	405
653	827	5	4 050 000	9 800 000	0,18	3,8	5,66	3,72	710 000	530	405
658	892	6	6 300 000	13 700 000	0,22	3,01	4,48	2,94	890 000	500	380
658	892	6	6 300 000	13 700 000	0,22	3,01	4,48	2,94	890 000	500	380
658	892	6	8 000 000	19 000 000	0,31	2,21	3,29	2,16	1 350 000	480	260
658	892	6	8 000 000	19 000 000	0,31	2,21	3,29	2,16	1 350 000	480	260
662	998	6	12 900 000	29 000 000	0,38	1,78	2,65	1,74	1 960 000	450	136
693	877	5	4 300 000	10 600 000	0,17	3,95	5,88	3,86	750 000	500	375
693	877	5	4 300 000	10 600 000	0,17	3,95	5,88	3,86	750 000	500	375
698	952	6	7 200 000	16 000 000	0,22	3,01	4,48	2,94	1 100 000	480	350
698	952	6	7 200 000	16 000 000	0,22	3,01	4,48	2,94	1 100 000	480	350
702	1 058	6	14 000 000	31 500 000	0,37	1,83	2,72	1,79	2 110 000	430	127
733	927	5	4 800 000	12 000 000	0,18	3,85	5,73	3,76	720 000	480	350
733	927	5	4 800 000	12 000 000	0,18	3,85	5,73	3,76	720 000	480	350
738	1 002	6	7 650 000	17 000 000	0,22	3,07	4,57	3	1 140 000	480	325
738	1 002	6	7 650 000	17 000 000	0,22	3,07	4,57	3	1 140 000	480	325
738	1 002	6	9 500 000	22 800 000	0,3	2,26	3,37	2,21	1 550 000	430	223
750	1 110	8	15 600 000	35 500 000	0,38	1,79	2,67	1,75	2 340 000	400	116
750	1 110	8	15 600 000	35 500 000	0,38	1,79	2,67	1,75	2 340 000	400	116
773	977	5	5 200 000	12 900 000	0,17	3,95	5,88	3,86	790 000	480	325
773	977	5	5 200 000	12 900 000	0,17	3,95	5,88	3,86	790 000	480	325
778	1 062	6	8 500 000	19 000 000	0,22	3,01	4,48	2,94	1 010 000	450	305
778	1 062	6	8 500 000	19 000 000	0,22	3,01	4,48	2,94	1 010 000	450	305
778	1 062	6	10 800 000	26 000 000	0,3	2,26	3,37	2,21	1 730 000	400	204
823	1037	5	5 850 000	15 000 000	0,17	4,05	6,04	3,96	1 010 000	450	295
823	1037	5	5 850 000	15 000 000	0,17	4,05	6,04	3,96	1 010 000	450	295
828	1 122	6	9 300 000	21 200 000	0,22	3,07	4,57	3	1 430 000	430	280
828	1 122	6	9 300 000	21 200 000	0,22	3,07	4,57	3	1 430 000	430	280
828	1 122	6	11 600 000	28 500 000	0,29	2,33	3,47	2,28	1 810 000	360	188
873	1 097	5	6 300 000	16 300 000	0,16	4,11	6,12	4,02	960 000	430	275
873	1 097	5	6 300 000	16 300 000	0,16	4,11	6,12	4,02	960 000	430	275
878	1 192	6	12 900 000	32 000 000	0,29	2,33	3,47	2,28	2 060 000	480	173
923	1 157	5	6 550 000	17 300 000	0,16	4,28	6,37	4,19	1 010 000	400	260
923	1 157	5	6 550 000	17 300 000	0,16	4,28	6,37	4,19	1 010 000	400	260

Spherical roller bearings

With adapter sleeve



E1 design



Mounting dimensions

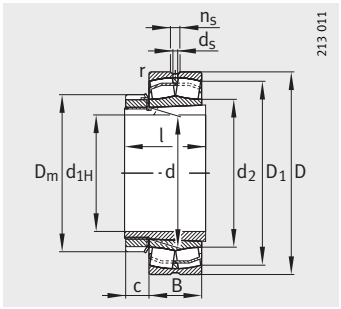
Dimension table · Dimensions in mm

Designation			Mass m		Dimensions											
Bearing	X-life	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d_{1H}	d	D	B	r min.	D_1 ≈	d_2 ≈	d_s	n_s	D_m	l	c ≈
22205-E1-K	**XL**	**H305**	0,175	0,075	**20**	25	52	18	1	44,5	31,3	3,2	4,8	38	29	9
22206-E1-K	**XL**	**H306**	0,269	0,099	**25**	30	62	20	1	53,7	37,9	3,2	4,8	45	31	9
22207-E1-K	**XL**	**H307**	0,425	0,147	**30**	35	72	23	1,1	62,5	43,8	3,2	4,8	57	35	10
21307-E1-K-TVPB	**XL**	**H307**	0,496	0,147	**30**	35	80	21	1,5	66,6	47,4	–	–	57	35	10
22208-E1-K	**XL**	**H308**	0,517	0,185	**35**	40	80	23	1,1	70,4	48,6	3,2	4,8	58	36	11
21308-E1-K	**XL**	**H308**	0,702	0,185	**35**	40	90	23	1,5	80,8	59,7	3,2	4,8	58	36	11
22308-E1-K	**XL**	**H2308**	1,03	0,222	**35**	40	90	33	1,5	76	52,4	3,2	4,8	58	46	11
22209-E1-K	**XL**	**H309**	0,577	0,246	**40**	45	85	23	1,1	75,6	54,8	3,2	4,8	65	39	12
21309-E1-K	**XL**	**H309**	0,845	0,246	**40**	45	100	25	1,5	89,8	67,6	3,2	4,8	65	39	12
22309-E1-K	**XL**	**H2309**	1,36	0,283	**40**	45	100	36	1,5	84,7	58,9	3,2	6,5	65	50	12
22210-E1-K	**XL**	**H310**	0,608	0,301	**45**	50	90	23	1,1	80,8	59,7	3,2	4,8	70	42	13
21310-E1-K	**XL**	**H310**	1,28	0,301	**45**	50	110	27	2	89,8	67,3	3,2	4,8	70	42	13
22310-E1-K	**XL**	**H2310**	1,86	0,353	**45**	50	110	40	2	92,6	63	3,2	6,5	70	55	13
22211-E1-K	**XL**	**H311**	0,825	0,35	**50**	55	100	25	1,5	89,8	67,3	3,2	4,8	75	45	13
21311-E1-K	**XL**	**H311**	1,19	0,35	**50**	55	120	29	2	98,3	71,4	3,2	6,5	75	45	13
22311-E1-K	**XL**	**H2311**	2,22	0,426	**50**	55	120	43	2	101,4	68,9	3,2	6,5	75	59	13
22311-E1-K-T41A	**XL**	**H2311**	2,22	0,426	**50**	55	120	43	2	101,4	68,9	3,2	6,5	75	59	13
22212-E1-K	**XL**	**H312**	1,09	0,373	**55**	60	110	28	1,5	98,7	71,4	3,2	6,5	80	47	13
21312-E1-K	**XL**	**H312**	1,78	0,373	**55**	60	130	31	2,1	112,5	84,4	3,2	6,5	80	47	13
22312-E1-K	**XL**	**H2312**	2,83	0,464	**55**	60	130	46	2,1	110,1	74,8	3,2	6,5	80	62	13
22312-E1-K-T41A	**XL**	**H2312**	2,83	0,464	**55**	60	130	46	2,1	110,1	74,8	3,2	6,5	80	62	13
22213-E1-K	**XL**	**H313**	1,52	0,452	**60**	65	120	31	1,5	107,3	79,1	3,2	6,5	92	50	14
21313-E1-K	**XL**	**H313**	2,42	0,452	**60**	65	140	33	2,1	126,8	94,9	3,2	6,5	92	50	14
22313-E1-K	**XL**	**H2313**	3,49	0,553	**60**	65	140	48	2,1	119,3	83,2	4,8	9,5	92	65	14
22313-E1-K-T41A	**XL**	**H2313**	3,49	0,553	**60**	65	140	48	2,1	119,3	83,2	4,8	9,5	92	65	14
22214-E1-K	**XL**	**H314**	1,61	0,715	**60**	70	125	31	1,5	112,5	84,4	3,2	6,5	92	52	14
21314-E1-K	**XL**	**H314**	3	0,715	**60**	70	150	35	2,1	126,2	94,9	3,2	6,5	92	52	14
22314-E1-K	**XL**	**H2314**	4,12	0,895	**60**	70	150	51	2,1	128	86,7	4,8	9,5	98	68	14
22314-E1-K-T41A	**XL**	**H2314**	4,12	0,895	**60**	70	150	51	2,1	128	86,7	4,8	9,5	98	68	14
22215-E1-K	**XL**	**H315**	1,68	0,826	**65**	75	130	31	1,5	117,7	89,8	3,2	6,5	104	55	15
21315-E1-K	**XL**	**H315**	2,86	0,826	**65**	75	160	37	2,1	135,2	99,7	3,2	6,5	104	55	15
22315-E1-K	**XL**	**H2315**	5,06	1,05	**65**	75	160	55	2,1	136,3	92,4	4,8	9,5	98	73	15
22315-E1-K-T41A	**XL**	**H2315**	5,06	1,05	**65**	75	160	55	2,1	136,3	92,4	4,8	9,5	98	73	15

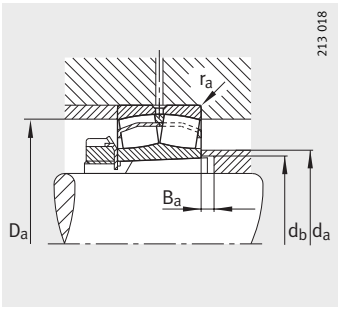
Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	d_b	B_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
max.	max.	min.	min.	max.	N	N					N	min^{-1}	min^{-1}
31	46,4	28	5	1	48 000	42 500	0,34	1,98	2,94	1,93	4 800	17 000	9 200
37	54,6	33	5	1	64 000	57 000	0,31	2,15	3,2	2,1	6 900	13 000	7 800
43	65	39	5	1	88 000	81 500	0,31	2,16	3,22	2,12	9 400	11 000	7 000
47	71	39	8	1,5	83 000	74 000	0,26	2,55	3,8	2,5	8 100	9 500	6 800
48	73	44	5	1	101 000	91 000	0,28	2,41	3,59	2,35	11 800	10 000	6 200
59	81	44	5	1,5	109 000	107 000	0,24	2,81	4,19	2,75	14 300	9 500	5 200
52	81	45	5	1,5	156 000	149 000	0,36	1,86	2,77	1,82	13 100	7 500	5 500
54	78	50	8	1	104 000	99 000	0,26	2,62	3,9	2,56	12 700	10 000	5 600
67	91	50	5	1,5	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	5 500
58	91	50	5	1,5	187 000	183 000	0,36	1,9	2,83	1,86	16 100	6 700	5 000
59	83	55	10	1	109 000	107 000	0,24	2,81	4,19	2,75	14 300	9 500	5 100
67	99	55	5	2	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	5 400
63	99	56	5	2	229 000	223 000	0,36	1,86	2,77	1,82	20 300	6 000	4 800
67	91	60	10	1,5	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	4 650
71	109	60	6	2	160 000	155 000	0,24	2,84	4,23	2,78	20 200	6 300	5 100
67	109	61	6	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 500
67	109	61	6	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 500
71	101	65	8	1,5	160 000	155 000	0,24	2,84	4,23	2,78	20 200	7 500	4 550
84	118	65	5	2,1	211 000	226 000	0,23	2,95	4,4	2,89	28 000	6 300	4 100
74	118	66	5	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 200
74	118	66	5	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 200
79	111	70	8	1,5	202 000	210 000	0,24	2,81	4,19	2,75	25 500	6 700	4 200
94	128	70	5	2,1	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 000	3 600
83	128	72	5	2,1	350 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 800
83	128	72	5	2,1	350 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 800
84	116	75	11	1,5	211 000	226 000	0,23	2,95	4,4	2,89	28 000	6 300	3 950
94	138	75	6	2,1	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 000	3 950
86	138	77	5	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 700
86	138	77	5	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 700
89	121	80	12	1,5	216 000	236 000	0,22	3,1	4,62	3,03	29 500	6 300	3 700
99	148	80	5	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	3 750
92	148	82	5	2,1	445 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 550
92	148	82	5	2,1	445 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 550

Spherical roller bearings

With adapter sleeve



E1 design



Mounting dimensions

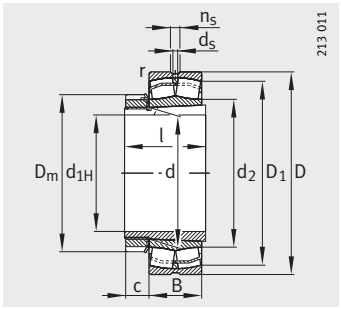
Dimension table (continued) · Dimensions in mm

Designation			Mass m		Dimensions											
Bearing	X-life	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d_{1H}	d	D	B	r min.	D_1 ≈	d_2 ≈	d_s	n_s	D_m	l	c ≈
22216-E1-K	**XL**	**H316**	2,08	1,01	**70**	80	140	33	2	126,8	94,9	3,2	6,5	105	59	17
21316-E1-K	**XL**	**H316**	2,65	1,01	**70**	80	170	39	2,1	135,4	99,8	3,2	6,5	105	59	17
22316-E1-K	**XL**	**H2316**	6,05	1,27	**70**	80	170	58	2,1	145,1	98,3	4,8	9,5	105	78	17
22316-E1-K-T41A	**XL**	**H2316**	6,05	1,27	**70**	80	170	58	2,1	145,1	98,3	4,8	9,5	105	78	17
22217-E1-K	**XL**	**H317**	2,59	1,16	**75**	85	150	36	2	135,4	99,7	3,2	6,5	110	63	18
21317-E1-K	**XL**	**H317**	5,37	1,16	**75**	85	180	41	3	143,9	106,1	4,8	9,5	110	63	18
22317-E1-K	**XL**	**H2317**	7,06	1,44	**75**	85	180	60	3	154,2	104,4	4,8	9,5	110	82	18
22317-E1-K-T41A	**XL**	**H2317**	7,06	1,44	**75**	85	180	60	3	154,2	104,4	4,8	9,5	110	82	18
22218-E1-K	**XL**	**H318**	3,35	1,36	**80**	90	160	40	2	143,9	106,1	3,2	6,5	126	65	18
23218-E1A-K-M	**XL**	**H2318**	4,34	1,68	**80**	90	160	52,4	2	140	–	3,2	6,5	126	86	18
23218-E1-K-TVPB	**XL**	**H2318**	4,08	1,68	**80**	90	160	52,4	2	140	104,1	3,2	6,5	126	86	18
21318-E1-K	**XL**	**H318**	6,26	1,36	**80**	90	190	43	3	152,7	112,6	4,8	9,5	126	65	18
22318-E1-K	**XL**	**H2318**	8,33	1,68	**80**	90	190	64	3	162,5	110,2	6,3	12,2	126	86	18
22318-E1-K-T41A	**XL**	**H2318**	8,33	1,68	**80**	90	190	64	3	162,5	110,2	6,3	12,2	126	86	18
22219-E1-K	**XL**	**H319**	4,04	1,51	**85**	95	170	43	2,1	152,7	112,6	4,8	9,5	125	68	19
21319-E1-K-TVPB	**XL**	**H319**	6,53	1,51	**85**	95	200	45	3	169,4	124,3	4,8	9,5	125	68	19
22319-E1-K	**XL**	**H2319**	9,46	1,89	**85**	95	200	67	3	171,2	116	6,3	12,2	133	90	19
22319-E1-K-T41A	**XL**	**H2319**	9,46	1,89	**85**	95	200	67	3	171,2	116	6,3	12,2	133	90	19
23120-E1A-K-M	**XL**	**H3120**	4,23	1,78	**90**	100	165	52	2	146,3	–	3,2	6,5	130	76	20
23120-E1-K-TVPB	**XL**	**H3120**	4,06	1,78	**90**	100	165	52	2	146,3	113,9	3,2	6,5	130	76	20
22220-E1-K	**XL**	**H320**	4,91	1,69	**90**	100	180	46	2,1	161,4	119	4,8	9,5	130	71	20
23220-E1A-K-M	**XL**	**H2320**	6,33	2,17	**90**	100	180	60,3	2,1	156,7	–	4,8	9,5	142	97	20
23220-E1-K-TVPB	**XL**	**H2320**	6,13	2,17	**90**	100	180	60,3	2,1	156,7	116,7	4,8	9,5	142	97	20
21320-E1-K-TVPB	**XL**	**H320**	8,08	1,69	**90**	100	215	47	3	182	132	4,8	9,5	130	71	20
22320-E1-K	**XL**	**H2320**	13,1	2,17	**90**	100	215	73	3	184,7	130,2	6,3	12,2	142	97	20
22320-E1-K-T41A	**XL**	**H2320**	13,1	2,17	**90**	100	215	73	3	184,7	130,2	6,3	12,2	142	97	20
23122-E1A-K-M	**XL**	**H3122**	5,1	2,23	**100**	110	180	56	2	160	–	4,8	9,5	154	81	21
23122-E1-K-TVPB	**XL**	**H3122**	4,95	2,23	**100**	110	180	56	2	160	124,6	4,8	9,5	154	81	21
22222-E1-K	**XL**	**H322**	6,82	2,15	**100**	110	200	53	2,1	178,7	129,4	4,8	9,5	154	77	21
23222-E1A-K-M	**XL**	**H2322**	9,32	2,74	**100**	110	200	69,8	2,1	172,7	–	4,8	9,5	154	105	21
23222-E1-K-TVPB	**XL**	**H2322**	8,82	2,74	**100**	110	200	69,8	2,1	172,7	129,1	4,8	9,5	154	105	21
21322-E1-K-TVPB	**XL**	**H322**	10,9	2,15	**100**	110	240	50	3	202,5	146,4	6,3	12,2	154	77	21
22322-E1-K	**XL**	**H2322**	17,4	2,74	**100**	110	240	80	3	204,9	143,1	8	15	154	105	21
22322-E1-K-T41A	**XL**	**H2322**	17,4	2,74	**100**	110	240	80	3	204,9	143,1	8	15	154	105	21

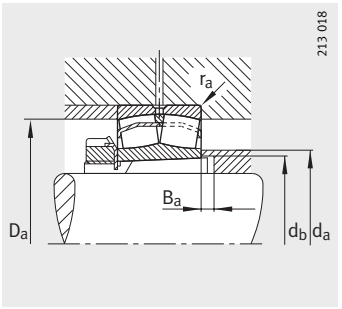
Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	d_b	B_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
max.	max.	min.	min.	max.	N	N					N	min^{-1}	min^{-1}
94	129	85	12	2	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 600	3 550
99	158	85	5	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	4 050
98	158	88	5	2,1	495 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 400
98	158	88	5	2,1	495 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 400
99	139	91	12	2	305 000	325 000	0,22	3,04	4,53	2,97	38 500	5 300	3 450
106	166	91	6	2,5	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 800
104	166	94	6	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 200
104	166	94	6	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 200
106	149	96	10	2	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 400
107	149	100	18	2	445 000	520 000	0,31	2,2	3,27	2,15	48 500	4 300	2 650
104	149	100	18	2	445 000	520 000	0,31	2,2	3,27	2,15	48 500	4 300	2 650
112	176	96	6	2,5	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 600
110	176	100	6	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 000
110	176	100	6	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 000
112	158	102	9	2,1	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 300
124	186	102	7	2,5	430 000	460 000	0,22	3,04	4,53	2,97	47 500	4 000	3 200
115	186	105	7	2,5	670 000	700 000	0,33	2,03	3,02	1,98	60 000	3 000	2 800
115	186	105	7	2,5	670 000	700 000	0,33	2,03	3,02	1,98	60 000	3 000	2 800
115	154	107	7	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 750
113	154	107	7	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 750
118	168	108	8	2,1	430 000	475 000	0,24	2,84	4,23	2,78	52 000	4 300	3 150
120	168	110	19	2,1	550 000	660 000	0,31	2,15	3,2	2,1	60 000	3 600	2 410
116	168	110	19	2,1	550 000	660 000	0,31	2,15	3,2	2,1	60 000	3 600	2 410
131	201	108	7	2,5	495 000	530 000	0,22	3,14	4,67	3,07	61 000	3 600	3 050
129	201	110	7	2,5	810 000	920 000	0,33	2,03	3,02	1,98	75 000	3 000	2 380
129	201	110	7	2,5	810 000	920 000	0,33	2,03	3,02	1,98	75 000	3 000	2 380
127	169	117	7	2	530 000	680 000	0,28	2,41	3,59	2,35	61 000	4 000	2 550
124	169	117	7	2	530 000	680 000	0,28	2,39	3,56	2,34	61 000	4 000	2 550
129	188	118	6	2,1	550 000	600 000	0,25	2,71	4,04	2,65	62 000	4 000	3 000
130	188	121	17	2,1	710 000	870 000	0,33	2,06	3,06	2,01	72 000	3 000	2 100
129	188	121	17	2,1	710 000	870 000	0,33	2,06	3,06	2,01	72 000	3 000	2 100
146	226	118	9	2,5	600 000	640 000	0,21	3,24	4,82	3,16	69 000	3 000	2 700
135	226	121	7	2,5	950 000	1 070 000	0,33	2,07	3,09	2,03	91 000	2 600	2 130
135	226	121	7	2,5	950 000	1 070 000	0,33	2,07	3,09	2,03	91 000	2 600	2 130

Spherical roller bearings

With adapter sleeve



E1 design



Mounting dimensions

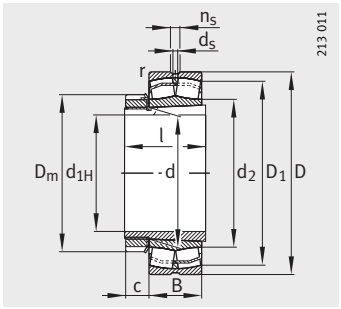
Dimension table (continued) · Dimensions in mm

Designation			Mass m		Dimensions											
Bearing	X-life	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d_{1H}	d	D	B	r min.	D_1 ≈	d_2 ≈	d_s	n_s	D_m	l	c ≈
23024-E1A-K-M	**XL**	**H3024**	4,09	1,95	**110**	120	180	46	2	164,7	–	3,2	6,5	145	72	22
23024-E1-K-TVPB	**XL**	**H3024**	3,67	1,95	**110**	120	180	46	2	164,7	133	3,2	6,5	145	72	22
23124-E1A-K-M	**XL**	**H3124**	7,57	2,61	**110**	120	200	62	2	177,4	–	4,8	9,5	155	88	22
23124-E1-K-TVPB	**XL**	**H3124**	7,06	2,61	**110**	120	200	62	2	177,4	136,2	4,8	9,5	155	88	22
22224-E1-K	**XL**	**H3124**	8,84	2,61	**110**	120	215	58	2,1	192	141,8	6,3	12,2	155	88	22
23224-E1A-K-M	**XL**	**H2324**	11,4	3,18	**110**	120	215	76	2,1	185,5	–	4,8	9,5	155	112	22
23224-E1-K-TVPB	**XL**	**H2324**	11,1	3,18	**110**	120	215	76	2,1	185,5	139	4,8	9,5	155	112	22
22324-E1-K	**XL**	**H2324**	22,1	3,18	**110**	120	260	86	3	222,4	150,7	8	15	155	112	22
22324-E1-K-T41A	**XL**	**H2324**	22,1	3,18	**110**	120	260	86	3	222,4	150,7	8	15	155	112	22
23026-E1A-K-M	**XL**	**H3026**	5,7	2,9	**115**	130	200	52	2	182,3	–	4,8	9,5	155	80	23
23026-E1-K-TVPB	**XL**	**H3026**	5,42	2,9	**115**	130	200	52	2	182,3	145,9	4,8	9,5	155	80	23
23126-E1A-K-M	**XL**	**H3126**	8,1	3,63	**115**	130	210	64	2	187,3	–	4,8	9,5	175	92	23
23126-E1-K-TVPB	**XL**	**H3126**	7,82	3,63	**115**	130	210	64	2	187,3	146	4,8	9,5	175	92	23
22226-E1-K	**XL**	**H3126**	10,9	3,63	**115**	130	230	64	3	205	151,7	6,3	12,2	175	92	23
23226-E1A-K-M	**XL**	**H2326**	13,6	4,61	**115**	130	230	80	3	199,3	–	4,8	9,5	165	121	23
23226-E1-K-TVPB	**XL**	**H2326**	12,6	4,61	**115**	130	230	80	3	199,3	150	4,8	9,5	165	121	23
22326-E1-K	**XL**	**H2326**	27,4	4,61	**115**	130	280	93	4	239,5	162,2	9,5	17,7	165	121	23
22326-E1-K-T41A	**XL**	**H2326**	27,4	4,61	**115**	130	280	93	4	239,5	162,2	9,5	17,7	165	121	23
23028-E1A-K-M	**XL**	**H3028**	6	3,25	**125**	140	210	53	2	192,3	–	4,8	9,5	165	82	24
23028-E1-K-TVPB	**XL**	**H3028**	5,81	3,25	**125**	140	210	53	2	192,3	155,4	4,8	9,5	165	82	24
23128-E1A-K-M	**XL**	**H3128**	7,78	4,33	**125**	140	225	68	2,1	201	–	4,8	9,5	180	97	24
23128-E1-K-TVPB	**XL**	**H3128**	9,46	4,33	**125**	140	225	68	2,1	201	157,1	4,8	9,5	180	97	24
22228-E1-K	**XL**	**H3128**	13,7	4,33	**125**	140	250	68	3	223,4	164,9	6,3	12,2	180	97	24
23228-E1A-K-M	**XL**	**H2328**	17,6	5,6	**125**	140	250	88	3	216	–	6,3	12,2	180	131	24
23228-E1-K-TVPB	**XL**	**H2328**	17,1	5,6	**125**	140	250	88	3	216	162	6,3	12,2	180	131	24
22328-E1-K	**XL**	**H2328**	34,4	5,6	**125**	140	300	102	4	255,7	173,5	9,5	17,7	180	131	24
22328-E1-K-T41A	**XL**	**H2328**	34,4	5,6	**125**	140	300	102	4	255,7	173,5	9,5	17,7	180	131	24
23030-E1A-K-M	**XL**	**H3030**	7,33	3,98	**135**	150	225	56	2,1	206,3	–	4,8	9,5	180	87	26
23030-E1-K-TVPB	**XL**	**H3030**	7,29	3,98	**135**	150	225	56	2,1	206,3	166,6	4,8	9,5	180	87	26
23130-E1A-K-M	**XL**	**H3130**	15,8	5,49	**135**	150	250	80	2,1	220,8	–	6,3	12,2	195	111	26
23130-E1-K-TVPB	**XL**	**H3130**	14,5	5,49	**135**	150	250	80	2,1	220,8	170,1	6,3	12,2	195	111	26
22230-E1-K	**XL**	**H3130**	17,8	5,49	**135**	150	270	73	3	240,8	177,9	8	15	195	111	26
23230-E1A-K-M	**XL**	**H2330**	22,9	6,71	**135**	150	270	96	3	232,6	–	6,3	12,2	195	139	26
23230-E1-K-TVPB	**XL**	**H2330**	22,3	6,71	**135**	150	270	96	3	232,6	174	6,3	12,2	195	139	26
22330-E1-K	**XL**	**H2330**	41,2	6,71	**135**	150	320	108	4	273,2	185,3	9,5	17,7	195	139	26
22330-E1-K-T41A	**XL**	**H2330**	41,2	6,71	**135**	150	320	108	4	273,2	185,3	9,5	17,7	195	139	26

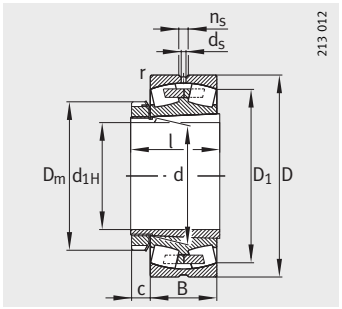
Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	d_b	B_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
max.	max.	min.	min.	max.	N	N					N	min^{-1}	min^{-1}
133	171,2	127	7	2	430 000	580 000	0,22	3,04	4,53	2,97	58 000	4 300	2 800
133	171,2	127	7	2	430 000	580 000	0,22	3,04	4,53	2,97	58 000	4 300	2 800
139	189	128	7	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 290
136	189	128	7	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 290
141	203	128	11	2,1	640 000	740 000	0,25	2,71	4,04	2,65	71 000	3 400	2 700
141	203	131	17	2	820 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 910
139	203	131	17	2	820 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 910
150	246	131	7	2,5	1 080 000	1 170 000	0,33	2,06	3,06	2,01	103 000	2 600	2 000
150	246	131	7	2,5	1 080 000	1 170 000	0,33	2,06	3,06	2,01	103 000	2 600	2 000
146	191,2	137	8	2	540 000	730 000	0,23	2,95	4,4	2,89	70 000	3 600	2 600
145	191,2	137	8	2	540 000	730 000	0,23	2,95	4,4	2,89	70 000	3 600	2 600
149	199	138	8	2	680 000	890 000	0,28	2,45	3,64	2,39	79 000	3 000	2 110
145	199	138	8	2	680 000	890 000	0,28	2,45	3,64	2,39	79 000	3 000	2 110
151	216	138	8	2,5	760 000	890 000	0,26	2,62	3,9	2,56	79 000	3 000	2 500
152	216	142	21	2,5	910 000	1 150 000	0,33	2,07	3,09	2,03	89 000	2 600	1 740
150	216	142	21	2,5	910 000	1 150 000	0,33	2,07	3,09	2,03	89 000	2 600	1 740
162	263	142	8	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 820
162	263	142	8	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 820
155	201,2	147	8	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 390
155	201,2	147	8	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 390
159	213	149	8	2,1	760 000	1 010 000	0,27	2,49	3,71	2,43	88 000	2 800	1 930
157	213	149	8	2,1	760 000	1 010 000	0,27	2,49	3,71	2,43	88 000	2 800	1 930
164	236	149	8	2,5	870 000	1 040 000	0,25	2,67	3,97	2,61	97 000	2 400	2 250
162	236	152	22	2,5	1 090 000	1 400 000	0,33	2,04	3,04	2	113 000	2 400	1 550
162	236	152	22	2,5	1 090 000	1 400 000	0,33	2,04	3,04	2	113 000	2 400	1 550
169	283	152	8	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 660
169	283	152	8	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 660
166	214,8	158	8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 210
166	214,8	158	8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 210
170	238	160	8	2,1	1 000 000	1 330 000	0,29	2,32	3,45	2,26	143 000	2 600	1 720
170	238	160	8	2,1	1 000 000	1 330 000	0,29	2,32	3,45	2,26	143 000	2 600	1 720
177	256	160	15	2,5	1 010 000	1 210 000	0,25	2,69	4	2,63	111 000	2 600	2 050
174	256	163	20	2,5	1 280 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 400
174	256	163	20	2,5	1 280 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 400
185	303	163	8	3	1 640 000	1 850 000	0,33	2,02	3	1,97	148 000	2 000	1 520
185	303	163	8	3	1 640 000	1 850 000	0,33	2,02	3	1,97	148 000	2 000	1 520

Spherical roller bearings

With adapter sleeve



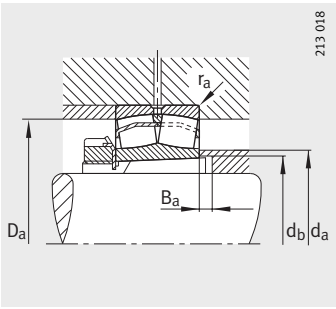
E1 design



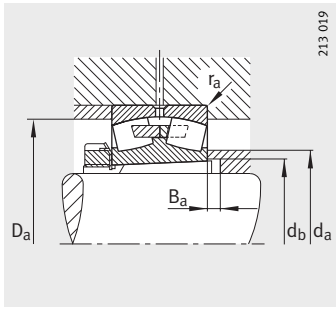
With central rib

Dimension table (continued) · Dimensions in mm

Designation			Mass m		Dimensions											
Bearing	X-life	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d_{1H}	d	D	B	r min.	D_1 ≈	d_2 ≈	d_s	n_s	D_m	l	c ≈
23032-E1A-K-M	**XL**	**H3032**	9,42	5,33	**140**	160	240	60	2,1	219,9	–	6,3	12,2	190	93	28
23032-E1-K-TVPB	**XL**	**H3032**	8,67	5,33	**140**	160	240	60	2,1	219,9	177	6,3	12,2	190	93	28
23132-E1A-K-M	**XL**	**H3132**	18,6	7,57	**140**	160	270	86	2,1	238,3	–	8	15	210	119	28
23132-E1-K-TVPB	**XL**	**H3132**	18,4	7,57	**140**	160	270	86	2,1	238,3	183,2	8	15	210	119	28
22232-E1-K	**XL**	**H3132**	22,4	7,57	**140**	160	290	80	3	258,2	190,9	8	15	210	119	28
23232-E1A-K-M	**XL**	**H2332**	28,5	9,1	**140**	160	290	104	3	249,3	–	8	15	210	147	28
23232-E1-K-TVPB	**XL**	**H2332**	27,7	9,1	**140**	160	290	104	3	249,3	186,7	8	15	210	147	28
22332-K-MB	–	**H2332**	50,1	9,1	**140**	160	340	114	4	288,3	–	9,5	17,7	210	147	28
23034-E1A-K-M	**XL**	**H3034**	12	6,13	**150**	170	260	67	2,1	237,2	–	6,3	12,2	211	101	29
23034-E1-K-TVPB	**XL**	**H3034**	11,9	6,13	**150**	170	260	67	2,1	237,2	189,8	6,3	12,2	211	101	29
23134-E1A-K-M	**XL**	**H3134**	19,5	8,35	**150**	170	280	88	2,1	248,1	–	8	15	220	122	29
23134-E1-K-TVPB	**XL**	**H3134**	19,9	8,35	**150**	170	280	88	2,1	248,1	193,4	8	15	220	122	29
22234-E1-K	**XL**	**H3134**	27,1	8,35	**150**	170	310	86	4	275,4	199,8	9,5	17,7	220	122	29
23234-E1A-K-M	**XL**	**H2334**	34,6	10,2	**150**	170	310	110	4	267,4	–	8	15	232	154	29
23234-E1-K-TVPB	**XL**	**H2334**	33,1	10,2	**150**	170	310	110	4	267,4	199,8	8	15	232	154	29
22334-K-MB	–	**H2334**	56,9	10,2	**150**	170	360	120	4	304,2	–	9,5	17,7	232	154	29
23936-S-K-MB	–	**H3936**	7,76	6,25	**160**	180	250	52	2	230,9	–	4,8	9,5	210	87	30
23036-E1A-K-M	**XL**	**H3036**	16	7,01	**160**	180	280	74	2,1	254,3	–	8	15	221	109	30
23036-E1-K-TVPB	**XL**	**H3036**	15,6	7,01	**160**	180	280	74	2,1	254,3	201,8	8	15	221	109	30
23136-E1A-K-M	**XL**	**H3136**	25,5	9,46	**160**	180	300	96	3	264,8	–	8	15	230	131	30
23136-E1-K-TVPB	**XL**	**H3136**	25,9	9,46	**160**	180	300	96	3	264,8	204,1	8	15	230	131	30
22236-E1-K	**XL**	**H3136**	28,5	9,46	**160**	180	320	86	4	285,9	211,3	9,5	17,7	230	131	30
23236-E1A-K-M	**XL**	**H2336**	37	11,4	**160**	180	320	112	4	277,3	–	8	15	230	161	30
23236-E1-K-TVPB	**XL**	**H2336**	36	11,4	**160**	180	320	112	4	277,3	210,6	8	15	230	161	30
22336-K-MB	–	**H2336**	66,7	11,4	**160**	180	380	126	4	323,4	–	12,5	23,5	230	161	30
23038-E1A-K-M	**XL**	**H3038**	17,7	7,66	**170**	190	290	75	2,1	264,5	–	8	15	220	112	31
23038-E1-K-TVPB	**XL**	**H3038**	16,3	7,66	**170**	190	290	75	2,1	264,5	211,9	8	15	220	112	31
23138-E1A-K-M	**XL**	**H3138**	32,4	10,8	**170**	190	320	104	3	281,6	–	8	15	252	141	31
23138-E1-K-TVPB	**XL**	**H3138**	30,3	10,8	**170**	190	320	104	3	281,6	217	8	15	252	141	31
22238-K-MB	–	**H3138**	36,2	10,8	**170**	190	340	92	4	296	–	9,5	17,7	252	141	31
23238-B-K-MB	–	**H2338**	46	12,7	**170**	190	340	120	4	291,2	–	9,5	17,7	240	169	31
22338-K-MB	–	**H2338**	77,3	12,7	**170**	190	400	132	5	338,2	–	12,5	23,5	240	169	31



Mounting dimensions
E1 design

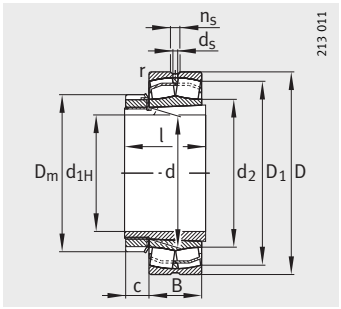


Mounting dimensions
With central rib

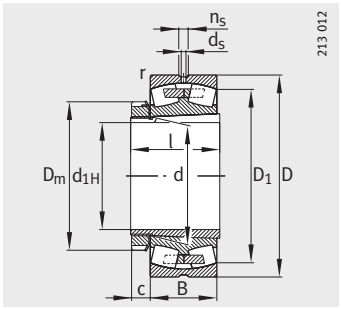
Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	d_b	B_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
max.	max.	min.	min.	max.	N	N					N	min^{-1}	min^{-1}
177	229,8	168	8	2,1	720 000	1 010 000	0,22	3,1	4,62	3,03	94 000	2 800	2 060
177	229,8	168	8	2,1	720 000	1 010 000	0,22	3,1	4,62	3,03	94 000	2 800	2 060
183	258	170	8	2,1	1 160 000	1 550 000	0,29	2,32	3,45	2,26	164 000	2 400	1 560
183	258	170	8	2,1	1 160 000	1 550 000	0,29	2,32	3,45	2,26	164 000	2 400	1 590
190	276	170	14	2,5	1 150 000	1 400 000	0,26	2,64	3,93	2,58	125 000	2 600	1 900
186	276	174	18	2,5	1 460 000	1 910 000	0,34	2	2,98	1,96	146 000	2 200	1 280
186	276	174	18	2,5	1 460 000	1 910 000	0,34	2	2,98	1,96	146 000	2 200	1 280
191	323	174	8	3	1 430 000	1 900 000	0,37	1,8	2,69	1,76	121 000	2 000	1 490
190	249,8	179	8	2,1	880 000	1 230 000	0,23	2,98	4,44	2,92	146 000	2 600	1 890
189	249,8	179	8	2,1	870 000	1 230 000	0,23	2,98	4,44	2,92	146 000	2 600	1 890
193	268	180	8	2,1	1 220 000	1 690 000	0,28	2,37	3,53	2,32	174 000	2 400	1 460
193	268	180	8	2,1	1 220 000	1 690 000	0,28	2,37	3,53	2,32	174 000	2 400	1 460
199	293	180	10	3	1 320 000	1 570 000	0,26	2,6	3,87	2,54	140 000	2 400	1 780
199	293	185	18	3	1 640 000	2 170 000	0,33	2,03	3,02	1,98	163 000	2 000	1 160
199	293	185	18	3	1 640 000	2 170 000	0,33	2,03	3,02	1,98	163 000	2 000	1 160
204	343	185	8	3	1 600 000	2 120 000	0,37	1,83	2,72	1,79	134 000	1 800	1 380
198	241,2	188	8	2	440 000	850 000	0,2	3,42	5,09	3,34	57 000	2 200	1 850
201	269,8	189	8	2,1	1 040 000	1 450 000	0,23	2,9	4,31	2,83	170 000	2 600	1 760
201	269,8	189	8	2,1	1 040 000	1 450 000	0,23	2,9	4,31	2,83	170 000	2 600	1 760
204	286	180	8	2,5	1 420 000	1 950 000	0,29	2,32	3,45	2,26	196 000	2 200	1 350
204	286	191	8	2,5	1 420 000	1 950 000	0,29	2,32	3,45	2,26	196 000	2 200	1 350
211	303	191	18	3	1 360 000	1 680 000	0,25	2,71	4,04	2,65	148 000	2 400	1 670
210	303	195	22	3	1 710 000	2 340 000	0,33	2,07	3,09	2,03	173 000	2 000	1 090
210	303	195	22	3	1 710 000	2 340 000	0,33	2,07	3,09	2,03	173 000	2 000	1 090
217	363	195	8	3	1 760 000	2 360 000	0,37	1,83	2,72	1,79	209 000	1 500	1 270
211	279,8	199	9	2,1	1 080 000	1 550 000	0,23	2,98	4,44	2,92	180 000	2 400	1 660
211	279,8	199	9	2,1	1 080 000	1 550 000	0,23	2,98	4,44	2,92	180 000	2 400	1 660
216	306	202	9	2,5	1 610 000	2 220 000	0,3	2,28	3,39	2,23	218 000	2 000	1 260
216	306	202	9	2,5	1 610 000	2 220 000	0,3	2,28	3,39	2,23	218 000	2 000	1 260
223	323	202	21	3	1 200 000	1 830 000	0,28	2,39	3,56	2,34	122 000	1 800	1 600
222	323	206	21	3	1 560 000	2 600 000	0,36	1,86	2,77	1,82	156 000	1 700	1 020
228	380	206	9	4	1 860 000	2 500 000	0,37	1,83	2,72	1,79	213 000	1 500	1 220

Spherical roller bearings

With adapter sleeve



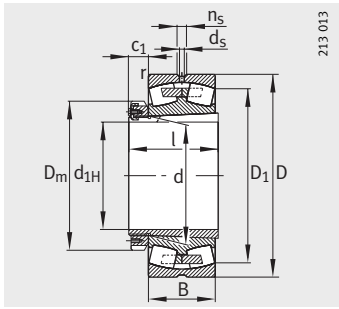
E1 design



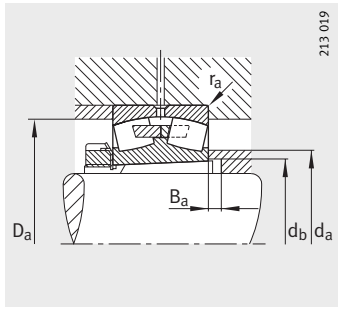
With central rib

Dimension table (continued) · Dimensions in mm

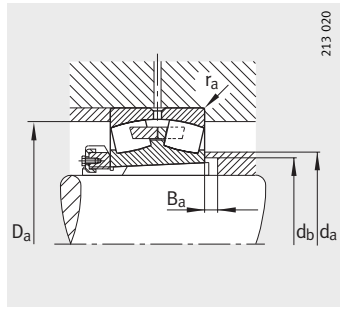
Designation			Mass m		Dimensions										
Bearing	X-life	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d_{1H}	d	D	B	r min.	D_1 ≈	d_2	d_s	n_s	D_m	l
23940-S-K-MB	–	**H3940**	11,5	7,82	**180**	200	280	60	2,1	256,9	–	6,3	12,2	240	98
23040-E1A-K-M	**XL**	**H3040**	21,4	9,22	**180**	200	310	82	2,1	281,6	–	8	15	240	120
23040-E1-K-TVPB	**XL**	**H3040**	20,8	9,22	**180**	200	310	82	2,1	281,6	223,4	8	15	240	120
23140-B-K-MB	–	**H3140**	41,7	12,1	**180**	200	340	112	3	293,3	–	9,5	17,7	250	150
22240-B-K-MB	–	**H3140**	42,3	12,1	**180**	200	360	98	4	312	–	9,5	17,7	250	150
23240-B-K-MB	–	**H2340**	55,8	14	**180**	200	360	128	4	307,5	–	9,5	17,7	250	176
22340-K-MB	–	**H2340**	89,5	14	**180**	200	420	138	5	357,4	–	12,5	23,5	250	176
23944-S-K-MB	–	**H3944**	12,3	8,27	**200**	220	300	60	2,1	277,4	–	6,3	12,2	260	96
23044-K-MB	–	**H3044X**	29,9	10,4	**200**	220	340	90	3	301,8	–	8	15	260	126
23144-B-K-MB	–	**H3144X**	52	15,4	**200**	220	370	120	4	319,2	–	9,5	17,7	292	161
22244-B-K-MB	–	**H3144X**	59,6	15,4	**200**	220	400	108	4	348,7	–	9,5	17,7	292	161
23244-K-MB	–	**H2344X**	79	17,5	**200**	220	400	144	4	337,6	–	9,5	17,7	280	186
22344-K-MB	–	**H2344X**	114	17,5	**200**	220	460	145	5	391,2	–	12,5	23,5	280	186
23948-K-MB	–	**H3948**	13,4	10,9	**220**	240	320	60	2,1	297,8	–	6,3	12,2	290	101
23048-K-MB	–	**H3048**	31,9	13,4	**220**	240	360	92	3	322,1	–	8	15	290	133
23148-B-K-MB	–	**H3148X**	65,3	18,1	**220**	240	400	128	4	346,2	–	9,5	17,7	312	172
22248-B-K-MB	–	**H3148X**	81,2	18,1	**220**	240	440	120	4	380,7	–	12,5	23,5	312	172
23248-B-K-MB	–	**H2348X**	105	20,6	**220**	240	440	160	4	371	–	12,5	23,5	300	199
22348-K-MB	–	**H2348X**	145	20,6	**220**	240	500	155	5	420	–	12,5	23,5	300	199
23952-K-MB	–	**H3952**	22,4	13,1	**240**	260	360	75	2,1	330,5	–	8	15	310	116
23052-K-MB	–	**H3052X**	46,2	15,6	**240**	260	400	104	4	357,2	–	9,5	17,7	310	145
23152-K-MB	–	**H3152X**	89,6	22,9	**240**	260	440	144	4	379,7	–	9,5	17,7	330	190
22252-B-K-MB	–	**H3152X**	106	22,9	**240**	260	480	130	5	415,3	–	12,5	23,5	330	190
23252-B-K-MB	–	**H2352X**	136	25,1	**240**	260	480	174	5	405,4	–	12,5	23,5	330	211
22352-K-MB	–	**H2352X**	177	25,1	**240**	260	540	165	6	452,1	–	12,5	23,5	330	211
23956-K-MB	–	**H3956**	24,7	15	**260**	280	380	75	2,1	350	–	8	15	330	121
23056-B-K-MB	–	**H3056**	50,3	18	**260**	280	420	106	4	376,5	–	9,5	17,7	330	152
23156-B-K-MB	–	**H3156X**	96,4	25,4	**260**	280	460	146	5	401,4	–	9,5	17,7	362	195
22256-B-K-MB	–	**H3156X**	110	25,4	**260**	280	500	130	5	435,2	–	12,5	23,5	362	195
23256-K-MB	–	**H2356X**	153	28,8	**260**	280	500	176	5	426,3	–	12,5	23,5	350	224
22356-K-MB	–	**H2356X**	224	28,8	**260**	280	580	175	6	489,3	–	12,5	23,5	350	224
23960-B-K-MB	–	**H3960**	39,1	20,3	**280**	300	420	90	3	384,6	–	9,5	17,7	360	140
23060-K-MB	–	**H3060**	72,2	23,2	**280**	300	460	118	4	412,6	–	9,5	17,7	360	168
23160-B-K-MB	–	**H3160**	123	29,9	**280**	300	500	160	5	434,7	–	9,5	17,7	380	208
22260-K-MB	–	**H3160**	136	29,9	**280**	300	540	140	5	468,8	–	12,5	23,5	380	208
23260-K-MB	–	**H3260**	192	34,1	**280**	300	540	192	5	458,7	–	12,5	23,5	380	240



With central rib
Locknut with retaining bracket



Mounting dimensions
With central rib

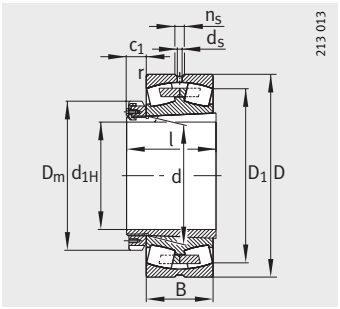


With central rib
Locknut with retaining bracket

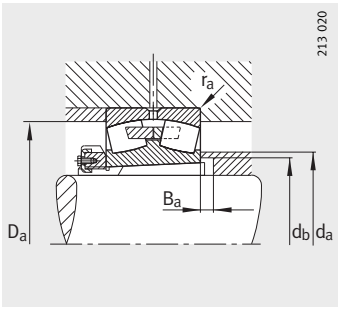
		Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
c	c_1	d_a	D_a	d_b	B_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
≈	≈	max.	max.	min.	min.	max.	N	N					N	min^{-1}	min^{-1}
32	–	220	269,8	210	9	2,1	550 000	1 080 000	0,2	3,42	5,09	3,34	71 000	2 000	1 650
32	–	223	299,8	210	10	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 550
32	–	223	299,8	210	10	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 550
32	–	231	326	212	10	2,5	1 320 000	2 280 000	0,35	1,95	2,9	1,91	131 000	1 700	1 240
32	–	234	343	212	24	3	1 320 000	2 000 000	0,29	2,35	3,5	2,3	123 000	1 700	1 530
32	–	237	343	216	20	3	1 660 000	2 750 000	0,37	1,83	2,72	1,79	163 000	1 500	980
32	–	240	400	216	10	4	2 080 000	2 800 000	0,36	1,87	2,79	1,83	189 000	1 400	1 120
–	40	241	289,8	230	9	2,1	600 000	1 250 000	0,18	3,76	5,59	3,67	72 000	1 800	1 460
–	40	247	327,6	231	12	2,5	1 100 000	2 000 000	0,26	2,55	3,8	2,5	132 000	1 700	1 440
35	–	253	353	233	10	3	1 630 000	2 900 000	0,33	2,03	3,02	1,98	165 000	1 400	1 060
35	–	258	383	233	22	3	1 630 000	2 450 000	0,29	2,35	3,5	2,3	153 000	1 400	1 340
35	–	259	383	236	11	3	2 040 000	3 450 000	0,37	1,83	2,72	1,79	181 000	1 400	850
35	–	272	440	236	10	4	2 320 000	3 350 000	0,35	1,95	2,9	1,91	217 000	1 300	970
–	45	261	309,8	250	11	2,1	640 000	1 370 000	0,17	4,05	6,04	3,96	93 000	1 500	1 310
–	45	268	347,6	251	11	2,5	1 160 000	2 200 000	0,25	2,74	4,08	2,68	130 000	1 400	1 320
37	–	276	383	254	11	3	1 860 000	3 250 000	0,33	2,06	3,06	2,01	177 000	1 300	970
37	–	283	423	254	19	3	1 960 000	3 050 000	0,29	2,35	3,5	2,3	184 000	1 300	1 180
37	–	284	423	257	6	3	2 450 000	4 250 000	0,37	1,8	2,69	1,76	231 000	1 300	750
37	–	296	480	257	11	4	2 650 000	3 900 000	0,35	1,95	2,9	1,91	249 000	1 500	870
–	45	285	349,8	270	11	2,1	930 000	1 930 000	0,19	3,54	5,27	3,46	108 000	1 400	1 190
–	45	291	385,4	272	13	3	1 500 000	2 800 000	0,26	2,64	3,93	2,58	154 000	1 300	1 170
39	–	302	423	276	11	3	2 200 000	4 000 000	0,33	2,03	3,02	1,98	213 000	1 200	850
39	–	308	460	276	25	4	2 240 000	3 450 000	0,29	2,32	3,45	2,26	217 000	1 100	1 070
39	–	309	460	278	2	4	2 900 000	4 900 000	0,37	1,8	2,69	1,76	270 000	1 100	660
39	–	322	514	278	11	5	3 000 000	4 400 000	0,34	2	2,98	1,96	290 000	1 100	790
–	49	303	369,8	290	12	2,1	970 000	2 040 000	0,18	3,76	5,59	3,67	129 000	1 300	1 100
–	49	310	405,4	292	12	3	1 560 000	3 000 000	0,25	2,74	4,08	2,68	156 000	1 300	1 090
39	–	321	440	296	12	4	2 360 000	4 400 000	0,32	2,12	3,15	2,07	241 000	1 100	780
39	–	324	480	296	28	4	2 360 000	3 650 000	0,28	2,43	3,61	2,37	238 000	1 100	1 010
41	–	329	480	299	11	4	3 000 000	5 300 000	0,36	1,86	2,77	1,82	260 000	1 100	620
41	–	349	554	299	12	5	3 550 000	5 400 000	0,33	2,03	3,02	1,98	335 000	950	680
–	53	329	407,6	311	12	2,5	1 270 000	2 650 000	0,2	3,42	5,09	3,34	165 000	1 200	1 000
–	53	337	445,4	313	12	3	1 960 000	3 650 000	0,25	2,69	4	2,63	223 000	1 100	960
–	53	347	480	318	12	4	2 650 000	4 900 000	0,33	2,06	3,06	2,01	270 000	1 100	720
–	53	352	520	318	32	4	2 750 000	4 400 000	0,27	2,47	3,67	2,41	300 000	1 000	900
–	53	353	520	321	12	4	3 450 000	6 200 000	0,37	1,83	2,72	1,79	300 000	1 000	560

Spherical roller bearings

With adapter sleeve



With central rib
Locknut with retaining bracket



Mounting dimensions

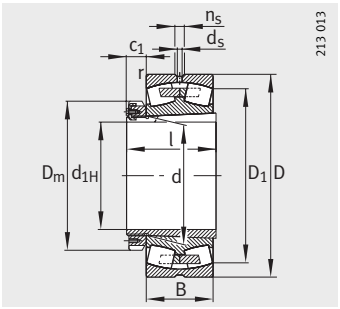
Dimension table (continued) · Dimensions in mm

Designation		Mass m		Dimensions											
Bearing	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d_{1H}	d	D	B	r min.	D_1 ≈	d_s	n_s	D_m	l	c_1 ≈
23964-K-MB	**H3964**	41	21,5	**300**	320	440	90	3	406,2	9,5	17,7	380	140	56
23064-K-MB	**H3064**	77,1	25,1	**300**	320	480	121	4	432,6	9,5	17,7	380	171	56
23164-K-MB	**H3164**	159	34,8	**300**	320	540	176	5	466,2	12,5	23,5	400	226	56
22264-K-MB	**H3164**	166	34,8	**300**	320	580	150	5	503,5	12,5	23,5	400	226	56
23264-K-MB	**H3264**	229	39,3	**300**	320	580	208	5	489,6	12,5	23,5	400	258	56
23068-K-MB	**H3068**	101	29,3	**320**	340	520	133	5	464,6	12,5	23,5	400	187	57
23168-B-K-MB	**H3168**	203	49,5	**320**	340	580	190	5	499,5	12,5	23,5	440	254	70
23268-B-K-MB	**H3268**	291	54,9	**320**	340	620	224	6	521,2	12,5	23,5	440	288	70
23972-K-MB	**H3972**	45	27,1	**340**	360	480	90	3	447,1	9,5	17,7	420	144	57
23072-K-MB	**H3072**	107	30,9	**340**	360	540	134	5	485,2	12,5	23,5	420	188	57
23172-K-MB	**H3172**	217	54,3	**340**	360	600	192	5	520	12,5	23,5	460	259	73
23272-B-K-MB	**H3272**	328	61,1	**340**	360	650	232	6	548,3	12,5	23,5	460	299	73
23976-K-MB	**H3976**	66,3	32,4	**360**	380	520	106	4	477,6	9,5	17,7	450	164	62
23076-B-K-MB	**H3076**	113	36,5	**360**	380	560	135	5	505,6	12,5	23,5	450	193	62
23176-K-MB	**H3176**	226	60,9	**360**	380	620	194	5	539,6	12,5	23,5	490	264	75
23276-B-K-MB	**H3276**	367	69,3	**360**	380	680	240	6	576,4	12,5	23,5	490	310	75
23980-B-K-MB	**H3980**	68,2	38,5	**380**	400	540	106	4	499	9,5	17,5	470	168	66
23080-K-MB	**H3080**	143	42,3	**380**	400	600	148	5	540,5	12,5	23,5	470	210	66
23180-B-K-MB	**H3180**	261	69,6	**380**	400	650	200	6	567,2	12,5	23,5	520	272	81
23280-B-K-MB	**H3280**	442	80,5	**380**	400	720	256	6	609,8	12,5	23,5	520	328	81
23984-K-MB	**H3984**	78	37,5	**400**	420	560	106	4	519,5	9,5	17,7	490	168	66
23084-B-K-MB	**H3084X**	155	44,6	**400**	420	620	150	5	560,7	12,5	23,5	490	212	66
23184-K-MB	**H3184**	339	84,5	**400**	420	700	224	6	605,4	12,5	23,5	540	304	89
23284-B-K-MB	**H3284**	537	94,8	**400**	420	760	272	7,5	642,2	12,5	23,5	540	352	89
23988-K-MB	**H3988**	98,3	58,3	**410**	440	600	118	4	552,8	12,5	23,5	520	189	75
23088-K-MB	**H3088**	177	67	**410**	440	650	157	6	586,8	12,5	23,5	520	228	75
23188-K-MB	**H3188**	378	103	**410**	440	720	226	6	626	12,5	23,5	560	307	89
23288-B-K-MB	**H3288**	586	125	**410**	440	790	280	7,5	669,3	12,5	23,5	560	361	89
23992-B-K-MB	**H3992**	103	64,7	**430**	460	620	118	4	573,3	12,5	23,5	540	189	75
23092-B-K-MB	**H3092**	204	71,6	**430**	460	680	163	6	612,2	12,5	23,5	540	234	75
23192-K-MB	**H3192**	420	120	**430**	460	760	240	7,5	661,4	12,5	23,5	580	326	94
23292-K-MB	**H3292**	699	137	**430**	460	830	296	7,5	701,6	12,5	23,5	580	382	94
23996-B-K-MB	**H3996**	121	70,2	**450**	480	650	128	5	598,8	12,5	23,5	560	200	75
23096-K-MB	**H3096**	208	75,3	**450**	480	700	165	6	632,6	12,5	23,5	560	237	75
23196-K-MB	**H3196**	470	135	**450**	480	790	248	7,5	688,3	12,5	23,5	620	335	94
23296-K-MB	**H3296**	806	154	**450**	480	870	310	7,5	734,8	12,5	23,5	620	397	94

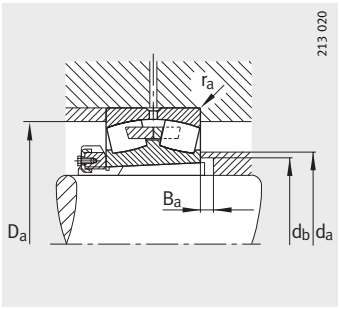
Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	d_b	B_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
max.	max.	min.	min.	max.	N	N					N	min^{-1}	min^{-1}
349	427,6	332	12	2,5	1 310 000	2 750 000	0,19	3,62	5,39	3,54	202 000	1 100	930
357	465,4	334	13	3	2 040 000	4 000 000	0,25	2,74	4,08	2,68	243 000	1 100	900
369	520	338	13	4	3 200 000	6 000 000	0,34	1,98	2,94	1,93	305 000	950	650
378	560	338	39	4	3 050 000	4 900 000	0,27	2,47	3,67	2,41	345 000	950	830
378	560	343	13	4	3 900 000	6 950 000	0,37	1,8	2,69	1,76	330 000	950	510
382	502	355	14	4	2 360 000	4 550 000	0,25	2,69	4	2,63	285 000	1 000	840
395	560	360	14	4	3 650 000	6 950 000	0,34	1,98	2,94	1,93	570 000	900	590
402	594	364	14	5	4 500 000	8 150 000	0,38	1,78	2,65	1,74	650 000	850	465
389	467,6	372	14	2,5	1 430 000	3 200 000	0,17	4,05	6,04	3,96	209 000	1 000	800
402	522	375	14	4	2 450 000	4 800 000	0,25	2,74	4,08	2,68	295 000	950	790
416	580	380	14	4	3 800 000	7 350 000	0,33	2,06	3,06	2,01	360 000	850	550
424	624	385	14	5	4 900 000	9 150 000	0,38	1,78	2,65	1,74	720 000	800	425
415	505,4	393	15	3	1 760 000	4 000 000	0,19	3,58	5,33	3,5	265 000	950	750
422	542	396	15	4	2 550 000	5 300 000	0,24	2,84	4,23	2,78	430 000	900	730
436	600	401	15	4	4 050 000	8 150 000	0,32	2,12	3,15	2,07	385 000	800	510
447	654	405	15	5	5 300 000	9 800 000	0,37	1,8	2,69	1,76	780 000	750	395
435	525,4	413	15	3	1 830 000	4 150 000	0,18	3,71	5,52	3,63	275 000	900	710
448	582	417	15	4	3 050 000	6 200 000	0,24	2,79	4,15	2,73	365 000	800	670
457	624	421	15	5	4 250 000	8 500 000	0,31	2,15	3,2	2,1	670 000	750	485
473	694	427	15	5	5 700 000	10 800 000	0,38	1,78	2,65	1,74	820 000	700	370
455	545,4	433	15	3	1 900 000	4 500 000	0,18	3,85	5,73	3,76	300 000	850	660
468	602	437	16	4	3 150 000	6 550 000	0,24	2,84	4,23	2,78	395 000	800	640
483	674	443	16	5	5 000 000	9 650 000	0,33	2,03	3,02	1,98	465 000	700	455
495	728	449	16	6	6 550 000	12 200 000	0,38	1,77	2,64	1,73	930 000	670	340
482	585,4	454	17	3	2 240 000	5 200 000	0,18	3,66	5,46	3,58	295 000	800	620
488	627	458	17	5	3 400 000	7 100 000	0,24	2,84	4,23	2,78	405 000	750	610
504	694	463	17	5	5 200 000	10 400 000	0,32	2,1	3,13	2,06	485 000	700	425
516	758	469	17	6	7 100 000	13 400 000	0,37	1,8	2,69	1,76	990 000	630	320
500	605,4	474	17	3	2 280 000	5 400 000	0,18	3,85	5,73	3,76	370 000	750	590
509	657	478	17	5	3 650 000	7 650 000	0,24	2,84	4,23	2,78	520 000	700	580
533	728	484	17	6	5 850 000	11 600 000	0,32	2,12	3,15	2,07	530 000	630	390
541	798	490	17	6	7 800 000	15 000 000	0,37	1,8	2,69	1,76	620 000	600	295
523	632	496	18	4	2 550 000	6 000 000	0,18	3,76	5,59	3,67	460 000	700	570
529	677	499	18	5	3 800 000	8 150 000	0,23	2,9	4,31	2,83	455 000	670	550
554	758	505	18	6	6 300 000	12 700 000	0,32	2,12	3,15	2,07	570 000	630	370
568	838	512	18	6	8 800 000	17 000 000	0,37	1,83	2,72	1,79	700 000	600	265

Spherical roller bearings

With adapter sleeve



With central rib



Mounting dimensions

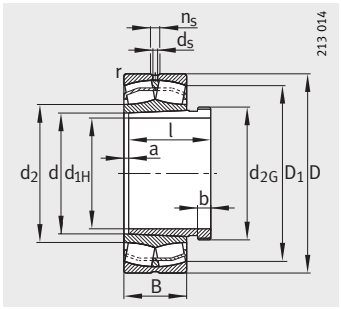
Dimension table (continued) · Dimensions in mm

Designation		Mass m		Dimensions										
Bearing	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d_{1H}	d	D	B	r min.	D_1 ≈	d_s	n_s	D_m	l	c_1 ≈
239/500-K-MB	**H39/500**	124	74,3	**470**	500	670	128	5	619,3	12,5	23,5	580	208	83
230/500-B-K-MB	**H30/500**	219	84,5	**470**	500	720	167	6	653,5	12,5	23,5	580	247	83
231/500-B-K-MB	**H31/500**	556	143	**470**	500	830	264	7,5	720,9	12,5	23,5	630	356	99
239/530-K-MB	**H39/530**	146	89,3	**500**	530	710	136	5	656,4	12,5	23,5	630	216	89
230/530-B-K-MB	**H30/530**	291	103	**500**	530	780	185	6	703,7	12,5	23,5	630	265	89
231/530-K-MB	**H31/530**	643	160	**500**	530	870	272	7,5	756,3	12,5	23,5	670	364	102
239/560-B-K-MB	**H39/560**	169	95,8	**530**	560	750	140	5	693,4	12,5	23,5	650	227	96
230/560-B-K-MB	**H30/560**	339	113	**530**	560	820	195	6	741,5	12,5	23,5	650	282	96
231/560-K-MB	**H31/560**	737	183	**530**	560	920	280	7,5	800,2	12,5	23,5	710	377	107
239/600-B-K-MB	**H39/600**	210	129	**560**	600	800	150	5	740,5	12,5	23,5	700	239	96
230/600-B-K-MB	**H30/600**	388	149	**560**	600	870	200	6	791,9	12,5	23,5	700	289	96
231/600-K-MB	**H31/600**	901	233	**560**	600	980	300	7,5	852,6	12,5	23,5	750	399	107
239/630-B-K-MB	**H39/630**	283	123	**600**	630	850	165	6	784,5	12,5	23,5	730	254	96
230/630-B-K-MB	**H30/630**	502	140	**600**	630	920	212	7,5	834,3	12,5	23,5	730	301	96
239/670-B-K-MB	**H39/670**	310	166	**630**	670	900	170	6	831,5	12,5	23,5	780	264	101
230/670-B-K-MB	**H30/670**	590	194	**630**	670	980	230	7,5	888,7	12,5	23,5	780	324	101
239/710-K-MB	**H39/710**	336	201	**670**	710	950	180	6	877,5	12,5	23,5	830	286	111
230/710-B-K-MB	**H30/710**	650	229	**670**	710	1 030	236	7,5	938,8	12,5	23,5	830	342	111
239/750-K-MB	**H39/750**	394	215	**710**	750	1 000	185	6	923,2	12,5	23,5	870	291	111
230/750-K-MB	**H30/750**	792	250	**710**	750	1 090	250	7,5	990,9	12,5	23,5	870	356	111
239/800-B-K-MB	**H39/800**	490	263	**750**	800	1 060	195	6	983,7	12,5	23,5	920	303	111
230/800-K-MB	**H30/800**	861	306	**750**	800	1 150	258	7,5	1 050,9	12,5	23,5	920	366	111
239/850-K-MB	**H39/850**	554	300	**800**	850	1 120	200	6	1 039,9	12,5	23,5	980	308	112
239/900-K-MB	**H39/900**	641	327	**850**	900	1 180	206	6	1 098,8	12,5	23,5	1 030	326	112

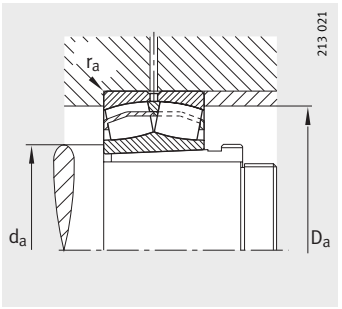
Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	d_b	B_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
max.	max.	min.	min.	max.	N	N					N	min^{-1}	min^{-1}
543	652	516	18	4	2 600 000	6 300 000	0,17	3,9	5,81	3,81	400 000	670	540
550	697	519	18	5	3 900 000	8 500 000	0,22	3,01	4,48	2,94	510 000	670	520
578	798	527	18	6	7 100 000	14 300 000	0,32	2,1	3,13	2,06	990 000	600	340
576	692	546	18	4	2 850 000	6 800 000	0,18	3,85	5,73	3,76	385 000	630	500
589	757	550	18	5	4 400 000	9 500 000	0,22	3,04	4,53	2,97	540 000	600	490
609	838	558	18	6	7 350 000	15 300 000	0,32	2,12	3,15	2,07	670 000	560	325
609	732	577	18	4	3 100 000	7 650 000	0,17	3,95	5,88	3,86	570 000	600	465
619	797	581	18	5	5 100 000	11 000 000	0,23	2,95	4,4	2,89	740 000	560	450
644	888	589	18	6	8 150 000	16 600 000	0,31	2,21	3,29	2,16	750 000	530	300
653	782	618	20	4	3 450 000	8 650 000	0,17	3,95	5,88	3,86	630 000	560	430
661	847	622	20	5	5 700 000	12 500 000	0,22	3,07	4,57	3	890 000	530	405
693	948	629	20	6	9 000 000	19 300 000	0,31	2,2	3,27	2,15	810 000	500	270
688	827	649	20	5	4 050 000	9 800 000	0,18	3,8	5,66	3,72	710 000	530	405
696	892	653	20	6	6 300 000	13 700 000	0,22	3,01	4,48	2,94	890 000	500	380
730	877	689	20	5	4 300 000	10 600 000	0,17	3,95	5,88	3,86	750 000	500	375
741	952	694	20	6	7 200 000	16 000 000	0,22	3,01	4,48	2,94	1 100 000	480	350
770	927	730	22	5	4 800 000	12 000 000	0,18	3,85	5,73	3,76	720 000	480	350
785	1 002	735	23	6	7 650 000	17 000 000	0,22	3,07	4,57	3	1 140 000	480	325
810	977	771	23	5	5 200 000	12 900 000	0,17	3,95	5,88	3,86	790 000	480	325
828	1 062	776	23	6	8 500 000	19 000 000	0,22	3,01	4,48	2,94	1 010 000	450	305
865	1 037	822	25	5	5 850 000	15 000 000	0,17	4,05	6,04	3,96	1 010 000	450	295
879	1 122	828	25	6	9 300 000	21 200 000	0,22	3,07	4,57	3	1 430 000	430	280
917	1 097	873	25	5	6 300 000	16 300 000	0,16	4,11	6,12	4,02	960 000	430	275
972	1 157	923	27	5	6 550 000	17 300 000	0,16	4,28	6,37	4,19	1 010 000	400	260

Spherical roller bearings

With withdrawal sleeve



E1 design



Mounting dimensions

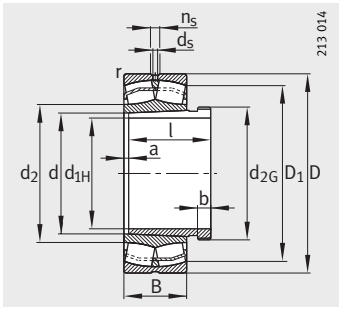
Dimension table · Dimensions in mm

Designation			Mass m		Dimensions										
Bearing	X-life	With-drawal sleeve	Bearing ≈kg	With-drawal sleeve ≈kg	d_{1H}	d	D	B	r min.	D_1 ≈	d_2 ≈	d_s	n_s	a ≈	b
22208-E1-K	**XL**	**AH308**	0,517	0,089	**35**	40	80	23	1,1	70,4	48,6	3,2	4,8	3	6
21308-E1-K	**XL**	**AH308**	0,702	0,089	**35**	40	90	23	1,5	80,8	59,7	3,2	4,8	3	6
22308-E1-K	**XL**	**AH2308**	1,03	0,128	**35**	40	90	33	1,5	76	52,4	3,2	4,8	3	7
22209-E1-K	**XL**	**AH309**	0,577	0,108	**40**	45	85	23	1,1	75,6	54,8	3,2	4,8	3	6
21309-E1-K	**XL**	**AH309**	0,845	0,108	**40**	45	100	25	1,5	89,8	67,6	3,2	4,8	3	6
22309-E1-K	**XL**	**AH2309**	1,36	0,163	**40**	45	100	36	1,5	84,7	58,9	3,2	6,5	3	7
22210-E1-K	**XL**	**AHX310**	0,608	0,138	**45**	50	90	23	1,1	80,8	59,7	3,2	4,8	3	7
21310-E1-K	**XL**	**AHX310**	1,28	0,138	**45**	50	110	27	2	89,8	67,3	3,2	4,8	3	7
22310-E1-K	**XL**	**AHX2310**	1,86	0,213	**45**	50	110	40	2	92,6	63	3,2	6,5	3	9
22211-E1-K	**XL**	**AHX311**	0,825	0,164	**50**	55	100	25	1,5	89,8	67,3	3,2	4,8	3	7
21311-E1-K	**XL**	**AHX311**	1,19	0,164	**50**	55	120	29	2	98,3	71,4	3,2	6,5	3	7
22311-E1-K	**XL**	**AHX2311**	2,22	0,255	**50**	55	120	43	2	101,4	68,9	3,2	6,5	3	10
22311-E1-K-T41A	**XL**	**AHX2311**	2,22	0,255	**50**	55	120	43	2	101,4	68,9	3,2	6,5	3	10
22212-E1-K	**XL**	**AHX312**	1,09	0,195	**55**	60	110	28	1,5	98,7	71,4	3,2	6,5	3	8
21312-E1-K	**XL**	**AHX312**	1,78	0,195	**55**	60	130	31	2,1	112,5	84,4	3,2	6,5	3	8
22312-E1-K	**XL**	**AHX2312**	2,83	0,3	**55**	60	130	46	2,1	110,1	74,8	3,2	6,5	3	11
22312-E1-K-T41A	**XL**	**AHX2312**	2,83	0,3	**55**	60	130	46	2,1	110,1	74,8	3,2	6,5	3	11
22213-E1-K	**XL**	**AH313G**	1,52	0,224	**60**	65	120	31	1,5	107,3	79,1	3,2	6,5	3	8
21313-E1-K	**XL**	**AH313G**	2,42	0,224	**60**	65	140	33	2,1	126,8	94,9	3,2	6,5	3	8
22313-E1-K	**XL**	**AH2313G**	3,49	0,4	**60**	65	140	48	2,1	119,3	83,2	4,8	9,5	3	12
22313-E1-K-T41A	**XL**	**AH2313G**	3,49	0,4	**60**	65	140	48	2,1	119,3	83,2	4,8	9,5	3	12
22214-E1-K	**XL**	**AH314G**	1,61	0,25	**65**	70	125	31	1,5	112,5	84,4	3,2	6,5	4	8
21314-E1-K	**XL**	**AH314G**	3	0,25	**65**	70	150	35	2,1	126,2	94,9	3,2	6,5	4	8
22314-E1-K	**XL**	**AHX2314G**	4,12	0,407	**65**	70	150	51	2,1	128	86,7	4,8	9,5	4	12
22314-E1-K-T41A	**XL**	**AHX2314G**	4,12	0,407	**65**	70	150	51	2,1	128	86,7	4,8	9,5	4	12
22215-E1-K	**XL**	**AH315G**	1,68	0,284	**70**	75	130	31	1,5	117,7	89,8	3,2	6,5	4	8
21315-E1-K	**XL**	**AH315G**	2,86	0,284	**70**	75	160	37	2,1	135,2	99,7	3,2	6,5	4	8
22315-E1-K	**XL**	**AHX2315G**	5,06	0,5	**70**	75	160	55	2,1	136,3	92,4	4,8	9,5	4	12
22315-E1-K-T41A	**XL**	**AHX2315G**	5,06	0,5	**70**	75	160	55	2,1	136,3	92,4	4,8	9,5	4	12
22216-E1-K	**XL**	**AH316**	2,08	0,366	**75**	80	140	33	2	126,8	94,9	3,2	6,5	4	8
21316-E1-K	**XL**	**AH316**	2,65	0,366	**75**	80	170	39	2,1	135,4	99,8	3,2	6,5	4	8
22316-E1-K	**XL**	**AHX2316**	6,05	0,6	**75**	80	170	58	2,1	145,1	98,3	4,8	9,5	4	12
22316-E1-K-T41A	**XL**	**AHX2316**	6,05	0,6	**75**	80	170	58	2,1	145,1	98,3	4,8	9,5	4	12

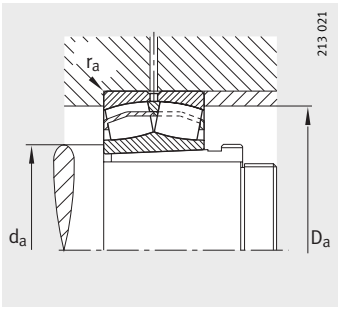
		Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
Thread d_{2G}	l	d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
		min.	max.	max.	N	N					N	min^{-1}	min^{-1}
M45X1,5	29	47	73	1	101 000	91 000	0,28	2,41	3,59	2,35	11 800	10 000	6 200
M45X1,5	29	49	81	1,5	109 000	107 000	0,24	2,81	4,19	2,75	14 300	9 500	5 200
M45X1,5	40	49	81	1,5	156 000	149 000	0,36	1,86	2,77	1,82	13 100	7 500	5 500
M50X1,5	31	52	78	1	104 000	99 000	0,26	2,62	3,9	2,56	12 700	10 000	5 600
M50X1,5	31	54	91	1,5	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	5 500
M50X1,5	44	54	91	1,5	187 000	183 000	0,36	1,9	2,83	1,86	16 100	6 700	5 000
M55X2	35	57	83	1	109 000	107 000	0,24	2,81	4,19	2,75	14 300	9 500	5 100
M55X2	35	61	99	2	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	5 400
M55X2	50	61	99	2	229 000	223 000	0,36	1,86	2,77	1,82	20 300	6 000	4 800
M60X2	37	64	91	1,5	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	4 650
M60X2	37	66	109	2	160 000	155 000	0,24	2,84	4,23	2,78	20 200	6 300	5 100
M60X2	54	66	109	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 500
M60X2	54	66	109	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 500
M65X2	40	69	101	1,5	160 000	155 000	0,24	2,84	4,23	2,78	20 200	7 500	4 550
M65X2	40	72	118	2,1	211 000	226 000	0,23	2,95	4,4	2,89	28 000	6 300	4 100
M65X2	58	72	118	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 200
M65X2	58	72	118	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 200
M70X2	42	74	111	1,5	202 000	210 000	0,24	2,81	4,19	2,75	25 500	6 700	4 200
M70X2	42	77	128	2,1	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 000	3 600
M70X2	61	77	128	2,1	350 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 800
M70X2	61	77	128	2,1	350 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 800
M75X2	43	79	116	1,5	211 000	226 000	0,23	2,95	4,4	2,89	28 000	6 300	3 950
M75X2	43	82	138	2,1	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 000	3 950
M75X2	64	82	138	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 700
M75X2	64	82	138	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 700
M80X2	45	84	121	1,5	216 000	236 000	0,22	3,1	4,62	3,03	29 500	6 300	3 700
M80X2	45	87	148	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	3 750
M80X2	68	87	148	2,1	445 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 550
M80X2	68	87	148	2,1	445 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 550
M90X2	48	91	129	2	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 600	3 550
M90X2	48	92	158	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	4 050
M90X2	71	92	158	2,1	495 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 400
M90X2	71	92	158	2,1	495 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 400

Spherical roller bearings

With withdrawal sleeve



E1 design



Mounting dimensions

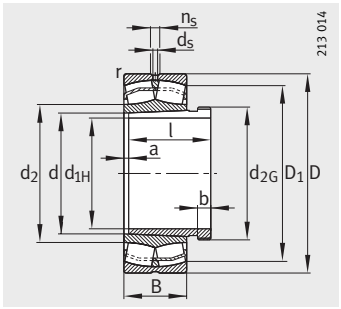
Dimension table (continued) · Dimensions in mm

Designation			Mass m		Dimensions										
Bearing	X-life	With-drawal sleeve	Bearing ≈kg	With-drawal sleeve ≈kg	d_{1H}	d	D	B	r min.	D_1 ≈	d_2 ≈	d_S	n_S	a ≈	b
22217-E1-K	**XL**	**AHX317**	2,59	0,43	**80**	85	150	36	2	135,4	99,7	3,2	6,5	4	9
21317-E1-K	**XL**	**AHX317**	5,37	0,43	**80**	85	180	41	3	143,9	106,1	4,8	9,5	4	9
22317-E1-K	**XL**	**AHX2317**	7,06	0,7	**80**	85	180	60	3	154,2	104,4	4,8	9,5	4	13
22317-E1-K-T41A	**XL**	**AHX2317**	7,06	0,7	**80**	85	180	60	3	154,2	104,4	4,8	9,5	4	13
22218-E1-K	**XL**	**AHX318**	3,35	0,466	**85**	90	160	40	2	143,9	106,1	3,2	6,5	4	9
23218-E1A-K-M	**XL**	**AHX3218**	4,34	0,6	**85**	90	160	52,4	2	140	–	3,2	6,5	4	10
23218-E1-K-TVPB	**XL**	**AHX3218**	4,08	0,6	**85**	90	160	52,4	2	140	104,1	3,2	6,5	4	10
21318-E1-K	**XL**	**AHX318**	6,26	0,466	**85**	90	190	43	3	152,7	112,6	4,8	9,5	4	9
22318-E1-K	**XL**	**AHX2318**	8,33	0,8	**85**	90	190	64	3	162,5	110,2	6,3	12,2	4	14
22318-E1-K-T41A	**XL**	**AHX2318**	8,33	0,8	**85**	90	190	64	3	162,5	110,2	6,3	12,2	4	14
22219-E1-K	**XL**	**AHX319**	4,04	0,54	**90**	95	170	43	2,1	152,7	112,6	4,8	9,5	4	10
21319-E1-K-TVPB	**XL**	**AHX319**	6,53	0,54	**90**	95	200	45	3	169,4	124,3	4,8	9,5	4	10
22319-E1-K	**XL**	**AHX2319**	9,46	0,894	**90**	95	200	67	3	171,2	116	6,3	12,2	4	16
22319-E1-K-T41A	**XL**	**AHX2319**	9,46	0,894	**90**	95	200	67	3	171,2	116	6,3	12,2	4	16
23120-E1A-K-M	**XL**	**AHX3120**	4,23	0,654	**95**	100	165	52	2	146,3	–	3,2	6,5	4	11
23120-E1-K-TVPB	**XL**	**AHX3120**	4,06	0,654	**95**	100	165	52	2	146,3	113,9	3,2	6,5	4	11
22220-E1-K	**XL**	**AHX320**	4,91	0,595	**95**	100	180	46	2,1	161,4	119	4,8	9,5	4	10
23220-E1A-K-M	**XL**	**AHX3220**	6,33	0,765	**95**	100	180	60,3	2,1	156,7	–	4,8	9,5	4	11
23220-E1-K-TVPB	**XL**	**AHX3220**	6,13	0,765	**95**	100	180	60,3	2,1	156,7	116,7	4,8	9,5	4	11
21320-E1-K-TVPB	**XL**	**AHX320**	8,08	0,595	**95**	100	215	47	3	182	132	4,8	9,5	4	10
22320-E1-K	**XL**	**AHX2320**	13,1	1,01	**95**	100	215	73	3	184,7	130,2	6,3	12,2	4	16
22320-E1-K-T41A	**XL**	**AHX2320**	13,1	1,01	**95**	100	215	73	3	184,7	130,2	6,3	12,2	4	16
23122-E1A-K-M	**XL**	**AHX3122**	5,1	0,774	**105**	110	180	56	2	160	–	4,8	9,5	4	11
23122-E1-K-TVPB	**XL**	**AHX3122**	4,95	0,774	**105**	110	180	56	2	160	124,6	4,8	9,5	4	11
24122-E1-K30	**XL**	**AH24122**	6,76	0,725	**105**	110	180	69	2	155,3	125,6	3,2	6,5	9	13
22222-E1-K	**XL**	**AHX3122**	6,82	0,774	**105**	110	200	53	2,1	178,7	129,4	4,8	9,5	4	11
23222-E1A-K-M	**XL**	**AHX3222A**	9,32	0,974	**105**	110	200	69,8	2,1	172,7	–	4,8	9,5	4	11
23222-E1-K-TVPB	**XL**	**AHX3222A**	8,82	0,974	**105**	110	200	69,8	2,1	172,7	129,1	4,8	9,5	4	11
21322-E1-K-TVPB	**XL**	**AHX322**	10,9	0,663	**105**	110	240	50	3	202,5	146,4	6,3	12,2	4	12
22322-E1-K	**XL**	**AHX2322G**	17,4	1,24	**105**	110	240	80	3	204,9	143,1	8	15	4	16
22322-E1-K-T41A	**XL**	**AHX2322G**	17,4	1,24	**105**	110	240	80	3	204,9	143,1	8	15	4	16

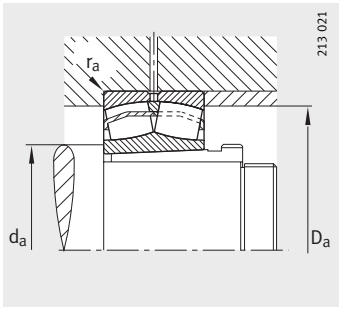
		Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
Thread d_{2G}	l	d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
		min.	max.	max.	N	N					N	min^{-1}	min^{-1}
M95X2	52	96	139	2	305 000	325 000	0,22	3,04	4,53	2,97	38 500	5 300	3 450
M95X2	52	99	166	2,5	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 800
M95X2	74	99	166	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 200
M95X2	74	99	166	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 200
M100X2	53	101	149	2	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 400
M100X2	63	101	149	2	445 000	520 000	0,31	2,2	3,27	2,15	48 500	4 300	2 650
M100X2	63	101	149	2	445 000	520 000	0,31	2,2	3,27	2,15	48 500	4 300	2 650
M100X2	53	104	176	2,5	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 600
M100X2	79	104	176	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 000
M100X2	79	104	176	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 000
M105X2	57	107	158	2,1	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 300
M105X2	57	109	186	2,5	430 000	460 000	0,22	3,04	4,53	2,97	47 500	4 000	3 200
M105X2	85	109	186	2,5	670 000	700 000	0,33	2,03	3,02	1,98	60 000	3 000	2 800
M105X2	85	109	186	2,5	670 000	700 000	0,33	2,03	3,02	1,98	60 000	3 000	2 800
M110X2	64	111	154	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 750
M110X2	64	111	154	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 750
M110X2	59	112	168	2,1	430 000	475 000	0,24	2,84	4,23	2,78	52 000	4 300	3 150
M110X2	73	112	168	2,1	550 000	660 000	0,31	2,15	3,2	2,1	60 000	3 600	2 410
M110X2	73	112	168	2,1	550 000	660 000	0,31	2,15	3,2	2,1	60 000	3 600	2 410
M110X2	59	114	201	2,5	495 000	530 000	0,22	3,14	4,67	3,07	61 000	3 600	3 050
M110X2	90	114	201	2,5	810 000	920 000	0,33	2,03	3,02	1,98	75 000	3 000	2 380
M110X2	90	114	201	2,5	810 000	920 000	0,33	2,03	3,02	1,98	75 000	3 000	2 380
M120X2	68	121	169	2	530 000	680 000	0,28	2,41	3,59	2,35	61 000	4 000	2 550
M120X2	68	121	169	2	530 000	680 000	0,28	2,39	3,56	2,34	61 000	4 000	2 550
M115X2	82	121	169	2	530 000	750 000	0,32	1,96	2,92	1,92	84 000	2 800	1 960
M120X2	68	122	188	2,1	550 000	600 000	0,25	2,71	4,04	2,65	62 000	4 000	3 000
M120X2	82	122	188	2,1	710 000	870 000	0,33	2,06	3,06	2,01	72 000	3 000	2 100
M120X2	82	122	188	2,1	710 000	870 000	0,33	2,06	3,06	2,01	72 000	3 000	2 100
M120X2	63	124	226	2,5	600 000	640 000	0,21	3,24	4,82	3,16	69 000	3 000	2 700
M120X2	98	124	226	2,5	950 000	1 070 000	0,33	2,07	3,09	2,03	91 000	2 600	2 130
M120X2	98	124	226	2,5	950 000	1 070 000	0,33	2,07	3,09	2,03	91 000	2 600	2 130

Spherical roller bearings

With withdrawal sleeve



E1 design



Mounting dimensions
E1 design

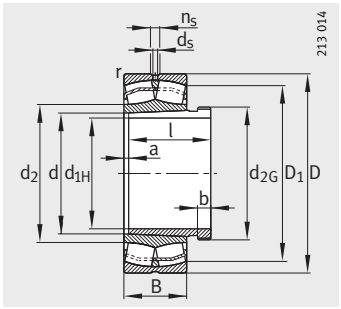
Dimension table (continued) · Dimensions in mm

Designation			Mass m		Dimensions										
Bearing	X-life	With-drawal sleeve	Bearing ≈kg	With-drawal sleeve ≈kg	d_{1H}	d	D	B	r min.	D_1 ≈	d_2 ≈	d_S	n_S	a ≈	b
23024-E1A-K-M	**XL**	**AHX3024**	4,09	0,741	**115**	120	180	46	2	164,7	–	3,2	6,5	4	13
23024-E1-K-TVPB	**XL**	**AHX3024**	3,67	0,741	**115**	120	180	46	2	164,7	133	3,2	6,5	4	13
24024-E1-K30+AH	**XL**	**AH24024**	5,32	0,694	**115**	120	180	60	2	159,8	134,4	3,2	6,5	9	13
23124-E1A-K-M	**XL**	**AHX3124**	7,57	0,954	**115**	120	200	62	2	177,4	–	4,8	9,5	4	12
23124-E1-K-TVPB	**XL**	**AHX3124**	7,06	0,954	**115**	120	200	62	2	177,4	136,2	4,8	9,5	4	12
24124-E1-K30+AH	**XL**	**AH24124**	10	1	**115**	120	200	80	2	170,7	136,7	3,2	6,5	9	13
22224-E1-K	**XL**	**AHX3124**	8,84	0,954	**115**	120	215	58	2,1	192	141,8	6,3	12,2	4	12
23224-E1A-K-M	**XL**	**AHX3224A**	11,4	1,2	**115**	120	215	76	2,1	185,5	–	4,8	9,5	4	13
23224-E1-K-TVPB	**XL**	**AHX3224A**	11,1	1,2	**115**	120	215	76	2,1	185,5	139	4,8	9,5	4	13
22324-E1-K	**XL**	**AHX2324G**	22,1	1,5	**115**	120	260	86	3	222,4	150,7	8	15	4	17
22324-E1-K-T41A	**XL**	**AHX2324G**	22,1	1,5	**115**	120	260	86	3	222,4	150,7	8	15	4	17
23026-E1A-K-M	**XL**	**AHX3026**	5,7	0,916	**125**	130	200	52	2	182,3	–	4,8	9,5	4	14
23026-E1-K-TVPB	**XL**	**AHX3026**	5,42	0,916	**125**	130	200	52	2	182,3	145,9	4,8	9,5	4	19
24026-E1-K30+AH	**XL**	**AH24026**	7,83	0,875	**125**	130	200	69	2	176,1	146,2	3,2	6,5	10	14
23126-E1A-K-M	**XL**	**AHX3126**	8,1	1,1	**125**	130	210	64	2	187,3	–	4,8	9,5	4	12
23126-E1-K-TVPB	**XL**	**AHX3126**	7,82	1,1	**125**	130	210	64	2	187,3	146	4,8	9,5	4	12
24126-E1-K30+AH	**XL**	**AH24126**	10,3	1,12	**125**	130	210	80	2	181,5	148,4	3,2	6,5	10	14
22226-E1-K	**XL**	**AHX3126**	10,9	1,1	**125**	130	230	64	3	205	151,7	6,3	12,2	4	12
23226-E1A-K-M	**XL**	**AHX3226G**	13,6	1,5	**125**	130	230	80	3	199,3	–	4,8	9,5	4	15
23226-E1-K-TVPB	**XL**	**AHX3226G**	12,6	1,5	**125**	130	230	80	3	199,3	150	4,8	9,5	4	15
22326-E1-K	**XL**	**AHX2326G**	27,4	1,8	**125**	130	280	93	4	239,5	162,2	9,5	17,7	4	19
22326-E1-K-T41A	**XL**	**AHX2326G**	27,4	1,8	**125**	130	280	93	4	239,5	162,2	9,5	17,7	4	19
23028-E1A-K-M	**XL**	**AHX3028**	6	1,01	**135**	140	210	53	2	192,3	–	4,8	9,5	5	14
23028-E1-K-TVPB	**XL**	**AHX3028G**	5,81	1,01	**135**	140	210	53	2	192,3	155,4	4,8	9,5	5	14
24028-E1-K30+AH	**XL**	**AH24028**	8,29	0,944	**135**	140	210	69	2	186,8	157,1	3,2	6,5	10	14
23128-E1A-K-M	**XL**	**AHX3128**	7,78	1,28	**135**	140	225	68	2,1	201	–	4,8	9,5	5	14
23128-E1-K-TVPB	**XL**	**AHX3128**	9,46	1,28	**135**	140	225	68	2,1	201	157,1	4,8	9,5	5	14
24128-E1-K30+AH	**XL**	**AH24128**	12,1	1,28	**135**	140	225	85	2,1	194,8	158,9	4,8	9,5	10	14
22228-E1-K	**XL**	**AHX3128**	13,7	1,28	**135**	140	250	68	3	223,4	164,9	6,3	12,2	5	14
23228-E1A-K-M	**XL**	**AHX3228G**	17,6	1,72	**135**	140	250	88	3	216	–	6,3	12,2	5	15
23228-E1-K-TVPB	**XL**	**AHX3228G**	17,1	1,72	**135**	140	250	88	3	216	162	6,3	12,2	5	15
22328-E1-K	**XL**	**AHX2328G**	34,4	2,21	**135**	140	300	102	4	255,7	173,5	9,5	17,7	5	20
22328-E1-K-T41A	**XL**	**AHX2328G**	34,4	2,21	**135**	140	300	102	4	255,7	173,5	9,5	17,7	5	20

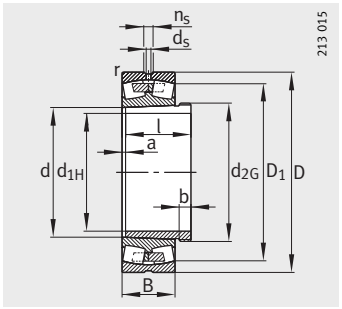
		Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
Thread d_{2G}	l	d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
		min.	max.	max.	N	N					N	min^{-1}	min^{-1}
M130X2	60	128,8	171,2	2	430 000	580 000	0,22	3,04	4,53	2,97	58 000	4 300	2 800
M130X2	60	128,8	171,2	2	430 000	580 000	0,22	3,04	4,53	2,97	58 000	4 300	2 800
M125X2	73	128,8	171,2	2	450 000	690 000	0,27	2,33	3,47	2,28	84 000	4 000	2 260
M130X2	75	131	189	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 290
M130X2	75	131	189	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 290
M130X2	93	131	189	2	680 000	950 000	0,34	1,84	2,74	1,8	101 000	2 600	1 580
M130X2	75	132	203	2,1	640 000	740 000	0,25	2,71	4,04	2,65	71 000	3 400	2 700
M130X2	90	132	203	2,1	820 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 910
M130X2	90	132	203	2,1	820 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 910
M130X2	105	134	246	2,5	1 080 000	1 170 000	0,33	2,06	3,06	2,01	103 000	2 600	2 000
M130X2	105	134	246	2,5	1 080 000	1 170 000	0,33	2,06	3,06	2,01	103 000	2 600	2 000
M140X2	67	138,8	191,2	2	540 000	730 000	0,23	2,95	4,4	2,89	70 000	3 600	2 600
M140X2	67	138,8	191,2	2	540 000	730 000	0,23	2,95	4,4	2,89	70 000	3 600	2 600
M135X2	83	138,8	191,2	2	570 000	860 000	0,28	2,21	3,29	2,16	101 000	3 000	2 010
M140X2	78	141	199	2	680 000	890 000	0,28	2,45	3,64	2,39	79 000	3 000	2 110
M140X2	78	141	199	2	680 000	890 000	0,28	2,45	3,64	2,39	79 000	3 000	2 110
M140X2	94	141	199	2	710 000	1 050 000	0,32	1,98	2,94	1,93	110 000	2 600	1 460
M140X2	78	144	216	2,5	760 000	890 000	0,26	2,62	3,9	2,56	79 000	3 000	2 500
M140X2	98	144	216	2,5	910 000	1 150 000	0,33	2,07	3,09	2,03	89 000	2 600	1 740
M140X2	98	144	216	2,5	910 000	1 150 000	0,33	2,07	3,09	2,03	89 000	2 600	1 740
M140X2	115	147	263	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 820
M140X2	115	147	263	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 820
M150X2	68	148,8	201,2	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 390
M150X2	68	148,8	201,2	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 390
M145X2	83	148,8	201,2	2	590 000	930 000	0,27	2,37	3,53	2,32	109 000	3 400	1 860
M150X2	83	152	213	2,1	760 000	1 010 000	0,27	2,49	3,71	2,43	88 000	2 800	1 930
M150X2	83	152	213	2,1	760 000	1 010 000	0,27	2,49	3,71	2,43	88 000	2 800	1 930
M150X2	99	152	213	2,1	800 000	1 190 000	0,32	1,99	2,96	1,94	124 000	2 400	1 320
M150X2	83	154	236	2,5	870 000	1 040 000	0,25	2,67	3,97	2,61	97 000	2 400	2 250
M150X2	104	154	236	2,5	1 090 000	1 400 000	0,33	2,04	3,04	2	113 000	2 400	1 550
M150X2	104	154	236	2,5	1 090 000	1 400 000	0,33	2,04	3,04	2	113 000	2 400	1 550
M150X2	125	157	283	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 660
M150X2	125	157	283	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 660

Spherical roller bearings

With withdrawal sleeve



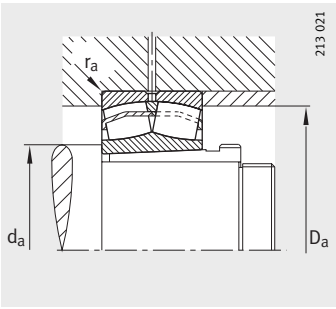
E1 design



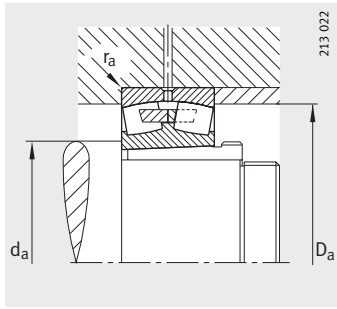
With central rib

Dimension table (continued) · Dimensions in mm

Designation			Mass m		Dimensions										
Bearing	X-life	With-drawal sleeve	Bearing ≈kg	With-drawal sleeve ≈kg	d_{1H}	d	D	B	r min.	D_1 ≈	d_2 ≈	d_s	n_s	a ≈	b
23030-E1A-K-M	**XL**	**AHX3030**	7,33	1,15	**145**	150	225	56	2,1	206,3	–	4,8	9,5	5	15
23030-E1-K-TVPB	**XL**	**AHX3030**	7,29	1,15	**145**	150	225	56	2,1	206,3	166,6	4,8	9,5	5	15
24030-E1-K30	**XL**	**AH24030**	10,4	1,1	**145**	150	225	75	2,1	199,7	168,1	3,2	6,5	11	15
23130-E1A-K-M	**XL**	**AHX3130G**	15,8	1,64	**145**	150	250	80	2,1	220,8	–	6,3	12,2	5	15
23130-E1-K-TVPB	**XL**	**AHX3130G**	14,5	1,64	**145**	150	250	80	2,1	220,8	170,1	6,3	12,2	5	15
24130-E1-K30	**XL**	**AH24130**	18,8	1,61	**145**	150	250	100	2,1	213	170,4	4,8	9,5	11	15
22230-E1-K	**XL**	**AHX3130G**	17,8	1,64	**145**	150	270	73	3	240,8	177,9	8	15	5	15
23230-E1A-K-M	**XL**	**AHX3230G**	22,9	2,07	**145**	150	270	96	3	232,6	–	6,3	12,2	5	17
23230-E1-K-TVPB	**XL**	**AHX3230G**	22,3	2,07	**145**	150	270	96	3	232,6	174	6,3	12,2	5	17
22330-E1-K	**XL**	**AHX2330G**	41,2	2,6	**145**	150	320	108	4	273,2	185,3	9,5	17,7	5	24
22330-E1-K-T41A	**XL**	**AHX2330G**	41,2	2,6	**145**	150	320	108	4	273,2	185,3	9,5	17,7	5	24
23032-E1A-K-M	**XL**	**AH3032**	9,42	2,04	**150**	160	240	60	2,1	219,9	–	6,3	12,2	5	16
23032-E1-K-TVPB	**XL**	**AH3032**	8,67	2,04	**150**	160	240	60	2,1	219,9	177	6,3	12,2	5	16
24032-E1-K30	**XL**	**AH24032**	12,4	2,27	**150**	160	240	80	2,1	212,9	179,2	4,8	9,5	11	15
23132-E1A-K-M	**XL**	**AH3132A**	18,6	2,87	**150**	160	270	86	2,1	238,3	–	8	15	5	16
23132-E1-K-TVPB	**XL**	**AH3132A**	18,4	2,87	**150**	160	270	86	2,1	238,3	183,2	8	15	5	16
24132-E1-K30	**XL**	**AH24132**	23,6	3,02	**150**	160	270	109	2,1	228,9	183,6	4,8	9,5	11	15
22232-E1-K	**XL**	**AH3132A**	22,4	2,87	**150**	160	290	80	3	258,2	190,9	8	15	5	16
23232-E1A-K-M	**XL**	**AH3232G**	28,5	3,6	**150**	160	290	104	3	249,3	–	8	15	6	20
23232-E1-K-TVPB	**XL**	**AH3232G**	27,7	3,6	**150**	160	290	104	3	249,3	186,7	8	15	6	20
22332-K-MB	–	**AH2332G**	50,1	4,24	**150**	160	340	114	4	288,3	–	9,5	17,7	6	24
23034-E1A-K-M	**XL**	**AH3034**	12	2,43	**160**	170	260	67	2,1	237,2	–	6,3	12,2	5	17
23034-E1-K-TVPB	**XL**	**AH3034**	11,9	2,43	**160**	170	260	67	2,1	237,2	189,8	6,3	12,2	5	17
24034-E1-K30	**XL**	**AH24034**	16,7	2,7	**160**	170	260	90	2,1	228,8	190	4,8	9,5	11	16
23134-E1A-K-M	**XL**	**AH3134A**	19,5	3,09	**160**	170	280	88	2,1	248,1	194,2	8	15	5	16
23134-E1-K-TVPB	**XL**	**AH3134A**	19,9	3,09	**160**	170	280	88	2,1	248,1	193,4	8	15	5	16
24134-E1-K30	**XL**	**AH24134**	26	3,25	**160**	170	280	109	2,1	240	194,2	4,8	9,5	11	16
22234-E1-K	**XL**	**AH3134A**	27,1	3,09	**160**	170	310	86	4	275,4	199,8	9,5	17,7	5	16
23234-E1A-K-M	**XL**	**AH3234G**	34,6	4,25	**160**	170	310	110	4	267,4	–	8	15	6	24
23234-E1-K-TVPB	**XL**	**AH3234G**	33,1	4,25	**160**	170	310	110	4	267,4	199,8	8	15	6	24
22334-K-MB	–	**AH2334G**	56,9	4,76	**160**	170	360	120	4	304,2	–	9,5	17,7	6	24



Mounting dimensions
E1 design

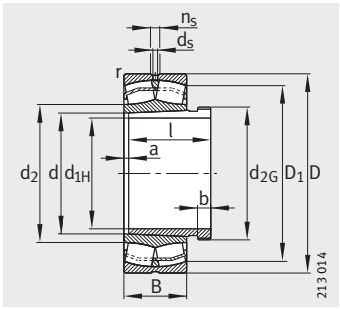


Mounting dimensions
With central rib

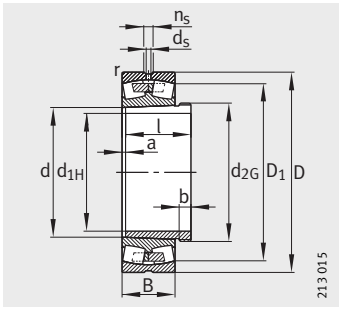
		Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
Thread d_{2G}	l	d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
		min.	max.	max.	N	N					N	min^{-1}	min^{-1}
M160X3	72	160,2	214,8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 210
M160X3	72	160,2	214,8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 210
M155X3	90	160,2	214,8	2,1	680 000	1 090 000	0,27	2,32	3,45	2,26	123 000	2 800	1 820
M160X3	96	162	238	2,1	1 000 000	1 330 000	0,29	2,32	3,45	2,26	143 000	2 600	1 720
M160X3	96	162	238	2,1	1 000 000	1 330 000	0,29	2,32	3,45	2,26	143 000	2 600	1 720
M160X3	115	162	238	2,1	1 050 000	1 520 000	0,34	1,83	2,72	1,79	149 000	2 200	1 270
M160X3	96	164	256	2,5	1 010 000	1 210 000	0,25	2,69	4	2,63	111 000	2 600	2 050
M160X3	114	164	256	2,5	1 280 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 400
M160X3	114	164	256	2,5	1 280 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 400
M160X3	135	167	303	3	1 640 000	1 850 000	0,33	2,02	3	1,97	148 000	2 000	1 520
M160X3	135	167	303	3	1 640 000	1 850 000	0,33	2,02	3	1,97	148 000	2 000	1 520
M170X3	77	170,2	229,8	2,1	720 000	1 010 000	0,22	3,1	4,62	3,03	94 000	2 800	2 060
M170X3	77	170,2	229,8	2,1	720 000	1 010 000	0,22	3,1	4,62	3,03	94 000	2 800	2 060
M170X3	95	170,2	229,8	2,1	770 000	1 240 000	0,27	2,32	3,45	2,26	137 000	2 650	1 660
M170X3	103	172	258	2,1	1 160 000	1 550 000	0,29	2,32	3,45	2,26	164 000	2 400	1 560
M170X3	103	172	258	2,1	1 160 000	1 550 000	0,29	2,32	3,45	2,26	164 000	2 400	1 590
M170X3	124	172	258	2,1	1 220 000	1 800 000	0,35	1,8	2,69	1,76	168 000	1 800	1 150
M170X3	103	174	276	2,5	1 150 000	1 400 000	0,26	2,64	3,93	2,58	125 000	2 600	1 900
M170X3	124	174	276	2,5	1 460 000	1 910 000	0,34	2	2,98	1,96	146 000	2 200	1 280
M170X3	124	174	276	2,5	1 460 000	1 910 000	0,34	2	2,98	1,96	146 000	2 200	1 280
M170X3	140	177	323	3	1 430 000	1 900 000	0,37	1,8	2,69	1,76	121 000	2 000	1 490
M180X3	85	180,2	249,8	2,1	880 000	1 230 000	0,23	2,98	4,44	2,92	146 000	2 600	1 890
M180X3	85	180,2	249,8	2,1	870 000	1 230 000	0,23	2,98	4,44	2,92	146 000	2 600	1 890
M180X3	106	180,2	249,8	2,1	940 000	1 480 000	0,29	2,2	3,27	2,15	159 000	2 400	1 540
M180X3	104	182	268	2,1	1 220 000	1 690 000	0,28	2,37	3,53	2,32	174 000	2 400	1 460
M180X3	104	182	268	2,1	1 220 000	1 690 000	0,28	2,37	3,53	2,32	174 000	2 400	1 460
M180X3	125	182	268	2,1	1 260 000	1 900 000	0,33	1,9	2,83	1,86	179 000	1 800	1 060
M180X3	104	187	293	3	1 320 000	1 570 000	0,26	2,6	3,87	2,54	140 000	2 400	1 780
M180X3	134	187	293	3	1 640 000	2 170 000	0,33	2,03	3,02	1,98	163 000	2 000	1 160
M180X3	134	187	293	3	1 640 000	2 170 000	0,33	2,03	3,02	1,98	163 000	2 000	1 160
M180X3	146	187	343	3	1 600 000	2 120 000	0,37	1,83	2,72	1,79	134 000	1 800	1 380

Spherical roller bearings

With withdrawal sleeve



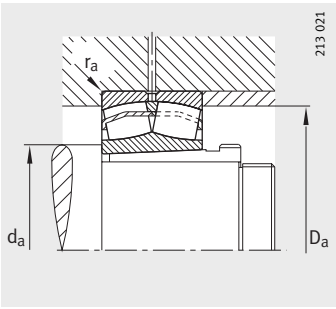
E1 design



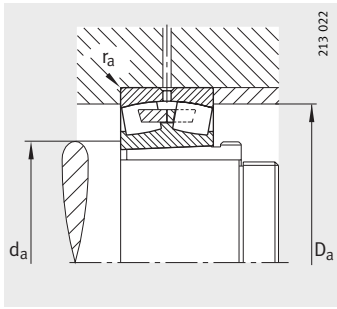
With central rib

Dimension table (continued) · Dimensions in mm

Designation			Mass m		Dimensions										
Bearing	X-life	With-drawal sleeve	Bearing ≈kg	With-drawal sleeve ≈kg	d_{1H}	d	D	B	r min.	D_1 ≈	d_2 ≈	d_s	n_s	a ≈	b
23936-S-K-MB	–	**AH3936**	7,76	1,91	**170**	180	250	52	2	230,9	–	4,8	9,5	5	13
23036-E1A-K-M	**XL**	**AH3036**	16	2,84	**170**	180	280	74	2,1	254,3	–	8	15	6	17
23036-E1-K-TVPB	**XL**	**AH3036**	15,6	2,84	**170**	180	280	74	2,1	254,3	201,8	8	15	6	17
24036-E1-K30	**XL**	**AH24036**	22,7	3,18	**170**	180	280	100	2,1	244,6	201,7	4,8	9,5	11	16
23136-E1A-K-M	**XL**	**AH3136A**	25,5	3,77	**170**	180	300	96	3	264,8	–	8	15	6	19
23136-E1-K-TVPB	**XL**	**AH3136A**	25,9	3,77	**170**	180	300	96	3	264,8	204,1	8	15	6	19
24136-E1-K30	**XL**	**AH24136**	33,2	3,72	**170**	180	300	118	3	256,2	204,9	6,3	12,2	11	16
22236-E1-K	**XL**	**AH2236G**	28,5	3,3	**170**	180	320	86	4	285,9	211,3	9,5	17,7	5	17
23236-E1A-K-M	**XL**	**AH3236G**	37	4,8	**170**	180	320	112	4	277,3	–	8	15	6	25
23236-E1-K-TVPB	**XL**	**AH3236G**	36	4,8	**170**	180	320	112	4	277,3	210,6	8	15	6	25
22336-K-MB	–	**AH2336G**	66,7	5,4	**170**	180	380	126	4	323,4	–	12,5	23,5	6	26
23038-E1A-K-M	**XL**	**AH3038G**	17,7	3,16	**180**	190	290	75	2,1	264,5	–	8	15	6	18
23038-E1-K-TVPB	**XL**	**AH3038G**	16,3	3,16	**180**	190	290	75	2,1	264,5	211,9	8	15	6	18
24038-E1-K30	**XL**	**AH24038**	23,8	3,46	**180**	190	290	100	2,1	255,5	212	4,8	9,5	13	18
23138-E1A-K-M	**XL**	**AH3138G**	32,4	4,4	**180**	190	320	104	3	281,6	–	8	15	6	20
23138-E1-K-TVPB	**XL**	**AH3138G**	30,3	4,4	**180**	190	320	104	3	281,6	217	8	15	6	20
24138-E1-K30	**XL**	**AH24138**	41,4	4,37	**180**	190	320	128	3	271,6	217,5	6,3	12,2	13	18
22238-K-MB	–	**AH2238G**	36,2	3,8	**180**	190	340	92	4	296	–	9,5	17,7	5	18
23238-B-K-MB	–	**AH3238G**	46	5,3	**180**	190	340	120	4	291,2	–	9,5	17,7	7	25
22338-K-MB	–	**AH2338G**	77,3	6,04	**180**	190	400	132	5	338,2	–	12,5	23,5	7	26
23940-S-K-MB	–	**AH3940**	11,5	2,62	**190**	200	280	60	2,1	256,9	–	6,3	12,2	6	16
23040-E1A-K-M	**XL**	**AH3040G**	21,4	3,57	**190**	200	310	82	2,1	281,6	–	8	15	6	19
23040-E1-K-TVPB	**XL**	**AH3040G**	20,8	3,57	**190**	200	310	82	2,1	281,6	223,4	8	15	6	19
24040-E1-K30	**XL**	**AH24040**	30,3	3,93	**190**	200	310	109	2,1	271,6	223,7	6,3	12,2	13	18
23140-B-K-MB	–	**AH3140**	41,7	5,5	**190**	200	340	112	3	293,3	–	9,5	17,7	6	21
24140-B-K30	–	**AH24140**	51,6	5	**190**	200	340	140	3	285,9	–	6,3	12,2	13	18
22240-B-K-MB	–	**AH2240**	42,3	4,73	**190**	200	360	98	4	312	–	9,5	17,7	5	19
23240-B-K-MB	–	**AH3240**	55,8	6,59	**190**	200	360	128	4	307,5	–	9,5	17,7	7	24
22340-K-MB	–	**AH2340**	89,5	7,6	**190**	200	420	138	5	357,4	–	12,5	23,5	7	30



Mounting dimensions
E1 design

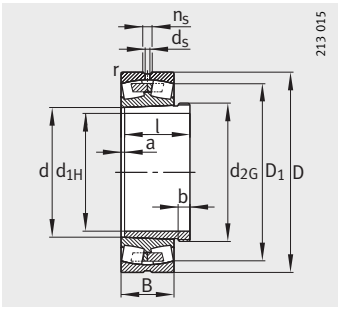


Mounting dimensions
With central rib

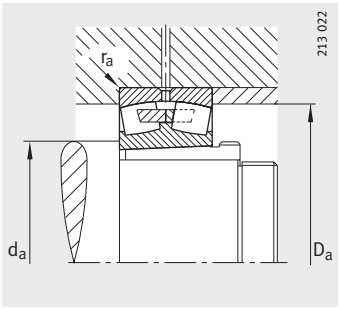
		Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
Thread d_{2G}	l	d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N	e	Y_1	Y_2	Y_0	C_{ur} N	n_G min^{-1}	n_B min^{-1}
M190X3	66	188,8	241,2	2	440 000	850 000	0,2	3,42	5,09	3,34	57 000	2 200	1 850
M190X3	92	190,2	269,8	2,1	1 040 000	1 450 000	0,23	2,9	4,31	2,83	170 000	2 600	1 760
M190X3	92	190,2	269,8	2,1	1 040 000	1 450 000	0,23	2,9	4,31	2,83	170 000	2 600	1 760
M190X3	116	190,2	269,8	2,1	1 130 000	1 770 000	0,3	2,1	3,13	2,06	181 000	2 200	1 420
M190X3	116	194	286	2,5	1 420 000	1 950 000	0,29	2,32	3,45	2,26	196 000	2 200	1 350
M190X3	116	194	286	2,5	1 420 000	1 950 000	0,29	2,32	3,45	2,26	196 000	2 200	1 350
M190X3	134	194	286	2,5	1 460 000	2 170 000	0,34	1,86	2,77	1,82	203 000	1 700	980
M190X3	105	197	303	3	1 360 000	1 680 000	0,25	2,71	4,04	2,65	148 000	2 400	1 670
M190X3	140	197	303	3	1 710 000	2 340 000	0,33	2,07	3,09	2,03	173 000	2 000	1 090
M190X3	140	197	303	3	1 710 000	2 340 000	0,33	2,07	3,09	2,03	173 000	2 000	1 090
M190X3	154	197	363	3	1 760 000	2 360 000	0,37	1,83	2,72	1,79	209 000	1 500	1 270
M200X3	96	200,2	279,8	2,1	1 080 000	1 550 000	0,23	2,98	4,44	2,92	180 000	2 400	1 660
M200X3	96	200,2	279,8	2,1	1 080 000	1 550 000	0,23	2,98	4,44	2,92	180 000	2 400	1 660
M200X3	118	200,2	279,8	2,1	1 160 000	1 860 000	0,29	2,2	3,27	2,15	192 000	2 200	1 330
M200X3	125	204	306	2,5	1 610 000	2 220 000	0,3	2,28	3,39	2,23	218 000	2 000	1 260
M200X3	125	204	306	2,5	1 610 000	2 220 000	0,3	2,28	3,39	2,23	218 000	2 000	1 260
M200X3	146	204	306	2,5	1 680 000	2 550 000	0,35	1,82	2,7	1,78	226 000	1 400	880
M200X3	112	207	323	3	1 200 000	1 830 000	0,28	2,39	3,56	2,34	122 000	1 800	1 600
M200X3	145	207	323	3	1 560 000	2 600 000	0,36	1,86	2,77	1,82	156 000	1 700	1 020
M200X3	160	210	380	4	1 860 000	2 500 000	0,37	1,83	2,72	1,79	213 000	1 500	1 220
Tr210X4	77	210,2	269,8	2,1	550 000	1 080 000	0,2	3,42	5,09	3,34	71 000	2 000	1 650
Tr210X4	102	210,2	299,8	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 550
Tr210X4	102	210,2	299,8	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 550
Tr210X4	127	210,2	299,8	2,1	1 350 000	2 150 000	0,3	2,13	3,17	2,08	216 000	2 000	1 240
Tr220X4	134	214	326	2,5	1 320 000	2 280 000	0,35	1,95	2,9	1,91	131 000	1 700	1 240
Tr210X4	158	214	326	2,5	1 700 000	3 000 000	0,42	1,62	2,42	1,59	190 000	1 400	810
Tr220X4	118	217	343	3	1 320 000	2 000 000	0,29	2,35	3,5	2,3	123 000	1 700	1 530
Tr220X4	153	217	343	3	1 660 000	2 750 000	0,37	1,83	2,72	1,79	163 000	1 500	980
Tr220X4	170	220	400	4	2 080 000	2 800 000	0,36	1,87	2,79	1,83	189 000	1 400	1 120

Spherical roller bearings

With withdrawal sleeve



With central rib



Mounting dimensions

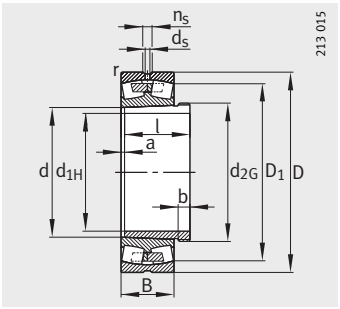
Dimension table (continued) · Dimensions in mm

Designation		Mass m		Dimensions									
Bearing	With-drawal sleeve	Bearing ≈kg	With-drawal sleeve ≈kg	d_{1H}	d	D	B	r min.	D_1 ≈	d_s	n_s	a ≈	b
23944-S-K-MB	**AH3944**	12,3	4,74	**200**	220	300	60	2,1	277,4	6,3	12,2	6	16
23044-K-MB	**AH3044G**	29,9	7,13	**200**	220	340	90	3	301,8	8	15	6	20
24044-B-K30-MB	**AH24044**	38,9	8,11	**200**	220	340	118	3	297,4	6,3	12,2	14	18
23144-B-K-MB	**AH3144**	52	10,4	**200**	220	370	120	4	319,2	9,5	17,7	6	23
24144-B-K30	**AH24144**	64,4	3,61	**200**	220	370	150	4	311,7	6,3	12,2	14	20
22244-B-K-MB	**AH2244**	59,6	9,1	**200**	220	400	108	4	348,7	9,5	17,7	6	20
23244-K-MB	**AH2344**	79	13,6	**200**	220	400	144	4	337,6	9,5	17,7	8	30
22344-K-MB	**AH2344**	114	13,6	**200**	220	460	145	5	391,2	12,5	23,5	8	30
23948-K-MB	**AH3948**	13,4	5,29	**220**	240	320	60	2,1	297,8	6,3	12,2	6	16
23048-K-MB	**AH3048**	31,9	8,8	**220**	240	360	92	3	322,1	8	15	7	21
24048-B-K30-MB	**AH24048**	43,2	8,87	**220**	240	360	118	3	318,9	6,3	12,2	15	20
23148-B-K-MB	**AH3148**	65,3	12,2	**220**	240	400	128	4	346,2	9,5	17,7	7	25
24148-B-K30	**AH24148**	78,7	12,4	**220**	240	400	160	4	338	6,3	12,2	15	20
22248-B-K-MB	**AH2248**	81,2	11,2	**220**	240	440	120	4	380,7	12,5	23,5	6	21
23248-B-K-MB	**AH2348**	105	15,6	**220**	240	440	160	4	371	12,5	23,5	8	30
22348-K-MB	**AH2348**	145	15,6	**220**	240	500	155	5	420	12,5	23,5	8	30
23952-K-MB	**AH3952G**	22,4	7,58	**240**	260	360	75	2,1	330,5	8	15	6	18
23052-K-MB	**AH3052**	46,2	10,7	**240**	260	400	104	4	357,2	9,5	17,7	7	23
24052-B-K30-MB	**AH24052**	64,5	11,8	**240**	260	400	140	4	349,1	6,3	12,2	16	20
23152-K-MB	**AH3152G**	89,6	15,1	**240**	260	440	144	4	379,7	9,5	17,7	7	26
24152-B-K30	**AH24152**	112	15,4	**240**	260	440	180	4	370,3	8	15	16	22
22252-B-K-MB	**AH2252G**	106	13,3	**240**	260	480	130	5	415,3	12,5	23,5	6	23
23252-B-K-MB	**AH2352G**	136	18,7	**240**	260	480	174	5	405,4	12,5	23,5	8	30
22352-K-MB	**AH2352G**	177	18,7	**240**	260	540	165	6	452,1	12,5	23,5	8	30
23956-K-MB	**AH3956G**	24,7	8,19	**260**	280	380	75	2,1	350	8	15	6	18
23056-B-K-MB	**AH3056**	50,3	11,9	**260**	280	420	106	4	376,5	9,5	17,7	8	24
24056-B-K30-MB	**AH24056**	69,7	12,4	**260**	280	420	140	4	369,5	6,3	12,2	17	22
23156-B-K-MB	**AH3156G**	96,4	17,6	**260**	280	460	146	5	401,4	9,5	17,7	8	28
24156-B-K30	**AH24156**	118	16,6	**260**	280	460	180	5	392,8	8	15	17	22
22256-B-K-MB	**AH2256G**	110	14,4	**260**	280	500	130	5	435,2	12,5	23,5	8	24
23256-K-MB	**AH2356G**	153	21	**260**	280	500	176	5	426,3	12,5	23,5	8	30
22356-K-MB	**AH2356G**	224	21	**260**	280	580	175	6	489,3	12,5	23,5	8	30

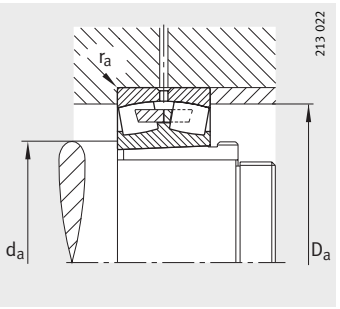
		Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
Thread d_{2G}	l	d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N	e	Y_1	Y_2	Y_0	C_{ur} N	n_G min^{-1}	n_B min^{-1}
Tr230X4	77	230,2	289,8	2,1	600 000	1 250 000	0,18	3,76	5,59	3,67	72 000	1 800	1 460
Tr230X4	111	232,4	327,6	2,5	1 100 000	2 000 000	0,26	2,55	3,8	2,5	132 000	1 700	1 440
Tr230X4	138	232,4	327,6	2,5	1 400 000	2 700 000	0,34	1,96	2,92	1,92	139 000	1 300	1 070
Tr240X4	145	237	353	3	1 630 000	2 900 000	0,33	2,03	3,02	1,98	165 000	1 400	1 060
Tr230X4	170	237	353	3	1 900 000	3 450 000	0,41	1,63	2,43	1,6	197 000	1 300	720
Tr240X4	130	237	383	3	1 630 000	2 450 000	0,29	2,35	3,5	2,3	153 000	1 400	1 340
Tr240X4	181	237	383	3	2 040 000	3 450 000	0,37	1,83	2,72	1,79	181 000	1 400	850
Tr240X4	181	240	440	4	2 320 000	3 350 000	0,35	1,95	2,9	1,91	217 000	1 300	970
Tr250X4	77	250,2	309,8	2,1	640 000	1 370 000	0,17	4,05	6,04	3,96	93 000	1 500	1 310
Tr260X4	116	252,4	347,6	2,5	1 160 000	2 200 000	0,25	2,74	4,08	2,68	130 000	1 400	1 320
Tr250X4	138	252,4	347,6	2,5	1 500 000	2 900 000	0,32	2,1	3,13	2,06	150 000	1 300	970
Tr260X4	154	257	383	3	1 860 000	3 250 000	0,33	2,06	3,06	2,01	177 000	1 300	970
Tr260X4	180	257	383	3	2 120 000	3 900 000	0,41	1,66	2,47	1,62	231 000	1 200	660
Tr260X4	144	257	423	3	1 960 000	3 050 000	0,29	2,35	3,5	2,3	184 000	1 300	1 180
Tr260X4	189	257	423	3	2 450 000	4 250 000	0,37	1,8	2,69	1,76	231 000	1 300	750
Tr260X4	189	260	480	4	2 650 000	3 900 000	0,35	1,95	2,9	1,91	249 000	1 500	870
Tr280X4	94	270,2	349,8	2,1	930 000	1 930 000	0,19	3,54	5,27	3,46	108 000	1 400	1 190
Tr280X4	128	274,6	385,4	3	1 500 000	2 800 000	0,26	2,64	3,93	2,58	154 000	1 300	1 170
Tr270X4	162	274,6	385,4	3	1 900 000	3 800 000	0,35	1,94	2,88	1,89	204 000	1 100	870
Tr280X4	172	277	423	3	2 200 000	4 000 000	0,33	2,03	3,02	1,98	213 000	1 200	850
Tr280X4	202	277	423	3	2 700 000	5 100 000	0,42	1,61	2,4	1,58	315 000	1 100	550
Tr280X4	155	280	460	4	2 240 000	3 450 000	0,29	2,32	3,45	2,26	217 000	1 100	1 070
Tr280X4	205	280	460	4	2 900 000	4 900 000	0,37	1,8	2,69	1,76	270 000	1 100	660
Tr280X4	205	286	514	5	3 000 000	4 400 000	0,34	2	2,98	1,96	290 000	1 100	790
Tr300X4	94	290,2	369,8	2,1	970 000	2 040 000	0,18	3,76	5,59	3,67	129 000	1 300	1 100
Tr300X4	131	294,6	405,4	3	1 560 000	3 000 000	0,25	2,74	4,08	2,68	156 000	1 300	1 090
Tr290X4	162	294,6	405,4	3	2 000 000	4 000 000	0,33	2,04	3,04	2	225 000	1 100	810
Tr300X4	175	300	440	4	2 360 000	4 400 000	0,32	2,12	3,15	2,07	241 000	1 100	780
Tr300X4	202	300	440	4	2 700 000	5 200 000	0,39	1,71	2,54	1,67	365 000	1 000	520
Tr300X4	155	300	480	4	2 360 000	3 650 000	0,28	2,43	3,61	2,37	238 000	1 100	1 010
Tr300X4	212	300	480	4	3 000 000	5 300 000	0,36	1,86	2,77	1,82	260 000	1 100	620
Tr300X4	212	306	554	5	3 550 000	5 400 000	0,33	2,03	3,02	1,98	335 000	950	680

Spherical roller bearings

With withdrawal sleeve



With central rib



Mounting dimensions

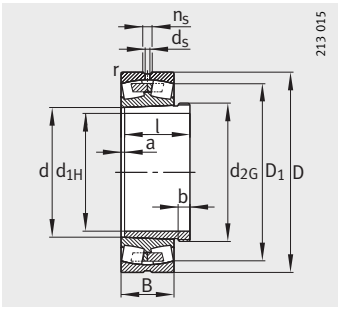
Dimension table (continued) · Dimensions in mm

Designation		Mass m		Dimensions									
Bearing	With-drawal sleeve	Bearing ≈kg	With-drawal sleeve ≈kg	d_{1H}	d	D	B	r min.	D_1 ≈	d_s	n_s	a ≈	b
23960-B-K-MB	**AH3960G**	39,1	10,7	**280**	300	420	90	3	384,6	9,5	17,7	7	21
23060-K-MB	**AH3060**	72,2	14,3	**280**	300	460	118	4	412,6	9,5	17,7	8	26
24060-B-K30-MB	**AH24060**	97,7	15,3	**280**	300	460	160	4	401,5	8	15	18	24
23160-B-K-MB	**AH3160G**	123	19,9	**280**	300	500	160	5	434,7	9,5	17,7	8	30
24160-B-K30	**AH24160**	158	20	**280**	300	500	200	5	424,4	8	15	18	24
22260-K-MB	**AH2260G**	136	17,2	**280**	300	540	140	5	468,8	12,5	23,5	8	26
23260-K-MB	**AH3260G**	192	24,6	**280**	300	540	192	5	458,7	12,5	23,5	8	34
23964-K-MB	**AH3964G**	41	11,4	**300**	320	440	90	3	406,2	9,5	17,7	7	21
23064-K-MB	**AH3064G**	77,1	15,8	**300**	320	480	121	4	432,6	9,5	17,7	8	27
24064-B-K30-MB	**AH24064**	103	16,6	**300**	320	480	160	4	424	8	15	18	24
23164-K-MB	**AH3164G**	159	23,6	**300**	320	540	176	5	466,2	12,5	23,5	8	31
24164-B-K30	**AH24164**	197	23,4	**300**	320	540	218	5	456,1	9,5	17,7	18	24
22264-K-MB	**AH2264G**	166	19,8	**300**	320	580	150	5	503,5	12,5	23,5	10	27
23264-K-MB	**AH3264G**	229	28,9	**300**	320	580	208	5	489,6	12,5	23,5	8	36
23068-K-MB	**AH3068G**	101	18,6	**320**	340	520	133	5	464,6	12,5	23,5	9	28
24068-B-K30-MB	**AH24068**	143	21,7	**320**	340	520	180	5	457,1	9,5	17,7	19	26
23168-B-K-MB	**AH3168G**	203	27,6	**320**	340	580	190	5	499,5	12,5	23,5	9	33
24168-B-K30	**AH24168**	260	27,9	**320**	340	580	243	5	481,1	9,5	17,7	19	26
23268-B-K-MB	**AH3268G**	291	33,7	**320**	340	620	224	6	521,2	12,5	23,5	9	38
23972-K-MB	**AH3972G**	45	12,8	**340**	360	480	90	3	447,1	9,5	17,7	7	21
23072-K-MB	**AH3072G**	107	20,4	**340**	360	540	134	5	485,2	12,5	23,5	9	30
23172-K-MB	**AH3172G**	217	29,9	**340**	360	600	192	5	520	12,5	23,5	9	35
24172-B-K30	**AH24172**	275	29,6	**340**	360	600	243	5	503,6	9,5	17,7	20	26
23272-B-K-MB	**AH3272G**	328	37,5	**340**	360	650	232	6	548,3	12,5	23,5	9	40
23976-K-MB	**AH3976G**	66,3	16	**360**	380	520	106	4	477,6	9,5	17,7	8	22
23076-B-K-MB	**AH3076G**	113	22,1	**360**	380	560	135	5	505,6	12,5	23,5	10	31
24076-B-K30-MB	**AH24076**	155	23,7	**360**	380	560	180	5	499	9,5	17,7	20	28
23176-K-MB	**AH3176G**	226	32,2	**360**	380	620	194	5	539,6	12,5	23,5	10	36
24176-B-K30	**AH24176**	277	31,3	**360**	380	620	243	5	525,8	9,5	17,7	20	28
23276-B-K-MB	**AH3276G**	367	41,5	**360**	380	680	240	6	576,4	12,5	23,5	10	42
23980-B-K-MB	**AH3980G**	68,2	16,9	**380**	400	540	106	4	499	9,5	17,7	8	22
23080-K-MB	**AH3080G**	143	25,4	**380**	400	600	148	5	540,5	12,5	23,5	10	33
24080-B-K30-MB	**AH24080**	196	27,1	**380**	400	600	200	5	530,9	12,5	23,5	20	28
23180-B-K-MB	**AH3180G**	261	35,3	**380**	400	650	200	6	567,2	12,5	23,5	10	38
24180-B-K30	**AH24180**	312	34,3	**380**	400	650	250	6	553,5	12,5	23,5	20	28
23280-B-K-MB	**AH3280G**	442	47,4	**380**	400	720	256	6	609,8	12,5	23,5	10	44

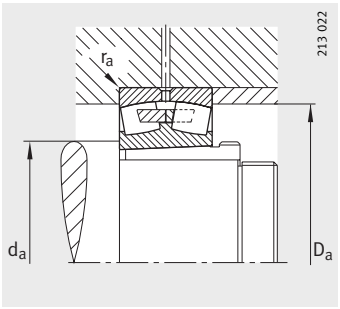
		Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
Thread d_{2G}	l	d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
		min.	max.	max.	N	N					N	min^{-1}	min^{-1}
Tr320X5	112	312,4	407,6	2,5	1 270 000	2 650 000	0,2	3,42	5,09	3,34	165 000	1 200	1 000
Tr320X5	145	314,6	445,4	3	1 960 000	3 650 000	0,25	2,69	4	2,63	223 000	1 100	960
Tr310X4	184	314,6	445,4	3	2 500 000	5 200 000	0,35	1,95	2,9	1,91	300 000	1 000	700
Tr320X5	192	320	480	4	2 650 000	4 900 000	0,33	2,06	3,06	2,01	270 000	1 100	720
Tr320X5	224	320	480	4	3 250 000	6 300 000	0,4	1,67	2,49	1,63	540 000	900	455
Tr320X5	170	320	520	4	2 750 000	4 400 000	0,27	2,47	3,67	2,41	300 000	1 000	900
Tr320X5	228	320	520	4	3 450 000	6 200 000	0,37	1,83	2,72	1,79	300 000	1 000	560
Tr340X5	112	332,4	427,6	2,5	1 310 000	2 750 000	0,19	3,62	5,39	3,54	202 000	1 100	930
Tr340X5	149	334,6	465,4	3	2 040 000	4 000 000	0,25	2,74	4,08	2,68	243 000	1 100	900
Tr330X5	184	334,6	465,4	3	2 600 000	5 400 000	0,33	2,06	3,06	2,01	360 000	950	660
Tr340X5	209	340	520	4	3 200 000	6 000 000	0,34	1,98	2,94	1,93	305 000	950	650
Tr340X5	242	340	520	4	3 800 000	7 350 000	0,41	1,65	2,46	1,61	530 000	850	415
Tr340X5	180	340	560	4	3 050 000	4 900 000	0,27	2,47	3,67	2,41	345 000	950	830
Tr340X5	246	340	560	4	3 900 000	6 950 000	0,37	1,8	2,69	1,76	330 000	950	510
Tr360X5	162	358	502	4	2 360 000	4 550 000	0,25	2,69	4	2,63	285 000	1 000	840
Tr360X5	206	358	502	4	3 100 000	6 550 000	0,34	1,98	2,94	1,93	530 000	850	600
Tr360X5	225	360	560	4	3 650 000	6 950 000	0,34	1,98	2,94	1,93	570 000	900	590
Tr360X5	269	360	560	4	4 400 000	8 500 000	0,43	1,56	2,32	1,53	680 000	800	380
Tr360X5	264	366	594	5	4 500 000	8 150 000	0,38	1,78	2,65	1,74	650 000	850	465
Tr380X5	112	372,4	467,6	2,5	1 430 000	3 200 000	0,17	4,05	6,04	3,96	209 000	1 000	800
Tr380X5	167	378	522	4	2 450 000	4 800 000	0,25	2,74	4,08	2,68	295 000	950	790
Tr380X5	229	380	580	4	3 800 000	7 350 000	0,33	2,06	3,06	2,01	360 000	850	550
Tr380X5	269	380	580	4	4 500 000	9 000 000	0,41	1,63	2,43	1,6	550 000	750	355
Tr380X5	274	386	624	5	4 900 000	9 150 000	0,38	1,78	2,65	1,74	720 000	800	425
Tr400X5	130	394,6	505,4	3	1 760 000	4 000 000	0,19	3,58	5,33	3,5	265 000	950	750
Tr400X5	170	398	542	4	2 550 000	5 300 000	0,24	2,84	4,23	2,78	430 000	900	730
Tr400X5	208	398	542	4	3 350 000	7 200 000	0,31	2,15	3,2	2,1	580 000	750	520
Tr400X5	232	400	600	4	4 050 000	8 150 000	0,32	2,12	3,15	2,07	385 000	800	510
Tr400X5	271	400	600	4	4 650 000	9 500 000	0,39	1,71	2,54	1,67	770 000	700	330
Tr400X5	284	406	654	5	5 300 000	9 800 000	0,37	1,8	2,69	1,76	780 000	750	395
Tr420X5	130	414,6	525,4	3	1 830 000	4 150 000	0,18	3,71	5,52	3,63	275 000	900	710
Tr420X5	183	418	582	4	3 050 000	6 200 000	0,24	2,79	4,15	2,73	365 000	800	670
Tr420X5	228	418	582	4	3 900 000	8 500 000	0,33	2,06	3,06	2,01	670 000	700	485
Tr420X5	240	426	624	5	4 250 000	8 500 000	0,31	2,15	3,2	2,1	670 000	750	485
Tr420X5	278	426	624	5	5 100 000	10 400 000	0,39	1,72	2,56	1,68	720 000	670	310
Tr420X5	302	426	694	5	5 700 000	10 800 000	0,38	1,78	2,65	1,74	820 000	700	370

Spherical roller bearings

With withdrawal sleeve



With central rib



Mounting dimensions

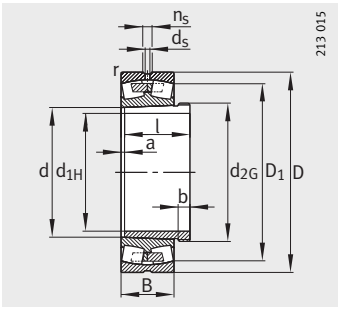
Dimension table (continued) · Dimensions in mm

Designation		Mass m		Dimensions									
Bearing	With-drawal sleeve	Bearing ≈kg	With-drawal sleeve ≈kg	d_{1H}	d	D	B	r min.	D_1 ≈	d_s	n_s	a ≈	b
23984-K-MB	**AH3984G**	78	17,8	**400**	420	560	106	4	519,5	9,5	17,7	8	22
23084-B-K-MB	**AH3084G**	155	27,2	**400**	420	620	150	5	560,7	12,5	23,5	10	34
24084-B-K30-MB	**AH24084**	214	29	**400**	420	620	200	5	550,2	12,5	23,5	22	30
23184-K-MB	**AH3184G**	339	42,3	**400**	420	700	224	6	605,4	12,5	23,5	10	40
24184-B-K30	**AH24184**	407	40,3	**400**	420	700	280	6	590,3	12,5	23,5	22	30
23284-B-K-MB	**AH3284G**	537	54	**400**	420	760	272	7,5	642,2	12,5	23,5	10	46
23988-K-MB	**AH3988**	98,3	21,2	**420**	440	600	118	4	552,8	12,5	23,5	8	25
23088-K-MB	**AHX3088G**	177	30,1	**420**	440	650	157	6	586,8	12,5	23,5	11	35
24088-B-K30-MB	**AH24088**	247	31,9	**420**	440	650	212	6	575,6	12,5	23,5	22	30
23188-K-MB	**AHX3188G**	378	45,3	**420**	440	720	226	6	626	12,5	23,5	11	42
24188-B-K30	**AH24188**	451	42,3	**420**	440	720	280	6	612,4	12,5	23,5	22	30
23288-B-K-MB	**AHX3288G**	586	58,8	**420**	440	790	280	7,5	669,3	12,5	23,5	11	48
23992-B-K-MB	**AH3992**	103	22,5	**440**	460	620	118	4	573,3	12,5	23,5	8	25
23092-B-K-MB	**AHX3092G**	204	33,1	**440**	460	680	163	6	612,2	12,5	23,5	11	37
23192-K-MB	**AHX3192G**	420	50,8	**440**	460	760	240	7,5	661,4	12,5	23,5	11	43
24192-B-K30-MB	**AH24192**	578	47,4	**440**	460	760	300	7,5	642,8	12,5	23,5	23	32
23292-K-MB	**AHX3292G**	699	66,2	**440**	460	830	296	7,5	701,6	12,5	23,5	11	50
23996-B-K-MB	**AH3996**	121	25,7	**460**	480	650	128	5	598,8	12,5	23,5	9	28
23096-K-MB	**AHX3096G**	208	35,2	**460**	480	700	165	6	632,6	12,5	23,5	12	38
24096-B-K30-MB	**AH24096**	289	36,6	**460**	480	700	218	6	625,4	12,5	23,5	23	32
23196-K-MB	**AHX3196G**	470	55,5	**460**	480	790	248	7,5	688,3	12,5	23,5	12	45
24196-B-K30-MB	**AH24196**	700	53,1	**460**	480	790	308	7,5	669,9	12,5	23,5	25	35
23296-K-MB	**AHX3296G**	806	73,3	**460**	480	870	310	7,5	734,8	12,5	23,5	12	52
239/500-K-MB	**AH39/500**	124	27,7	**480**	500	670	128	5	619,3	12,5	23,5	10	32
230/500-B-K-MB	**AHX30/500**	219	42,5	**480**	500	720	167	6	653,5	12,5	23,5	12	40
231/500-B-K-MB	**AHX31/500**	556	71,3	**480**	500	830	264	7,5	720,9	12,5	23,5	12	47
241/500-B-K30-MB	**AH241/500**	717	60,5	**480**	500	830	325	7,5	701,8	12,5	23,5	25	37
239/530-K-MB	**AH39/530**	146	43,4	**500**	530	710	136	5	656,4	12,5	23,5	10	37
230/530-B-K-MB	**AH30/530A**	291	61,8	**500**	530	780	185	6	703,7	12,5	23,5	12	45
231/530-K-MB	**AH31/530A**	643	93,4	**500**	530	870	272	7,5	756,3	12,5	23,5	12	53
241/530-B-K30-MB	**AH241/530**	845	89	**500**	530	870	335	7,5	739,1	12,5	23,5	25	40
239/560-B-K-MB	**AH39/560**	169	47	**530**	560	750	140	5	693,4	12,5	23,5	10	37
230/560-B-K-MB	**AH30/560A**	339	68,6	**530**	560	820	195	6	741,5	12,5	23,5	12	45
231/560-K-MB	**AH31/560A**	737	102	**530**	560	920	280	7,5	800,2	12,5	23,5	12	55
241/560-B-K30-MB	**AH241/560**	974	101	**530**	560	920	355	7,5	785	12,5	23,5	28	45

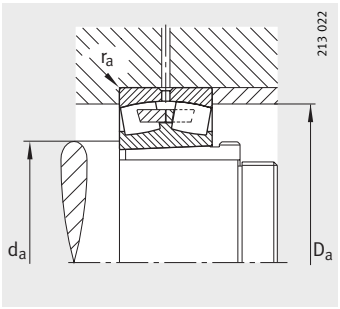
		Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
Thread d_{2G}	l	d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
		min.	max.	max.	N	N					N	min^{-1}	min^{-1}
Tr440X5	130	434,6	545,4	3	1 900 000	4 500 000	0,18	3,85	5,73	3,76	300 000	850	660
Tr440X5	186	438	602	4	3 150 000	6 550 000	0,24	2,84	4,23	2,78	395 000	800	640
Tr440X5	230	438	602	4	4 000 000	8 800 000	0,32	2,13	3,17	2,08	710 000	670	460
Tr440X5	266	446	674	5	5 000 000	9 650 000	0,33	2,03	3,02	1,98	465 000	700	455
Tr440X5	310	446	674	5	6 200 000	12 700 000	0,4	1,67	2,49	1,63	980 000	630	265
Tr440X5	321	452	728	6	6 550 000	12 200 000	0,38	1,77	2,64	1,73	930 000	670	340
Tr460X5	145	454,6	585,4	3	2 240 000	5 200 000	0,18	3,66	5,46	3,58	295 000	800	620
Tr460X5	194	463	627	5	3 400 000	7 100 000	0,24	2,84	4,23	2,78	405 000	750	610
Tr460X5	242	463	627	5	4 300 000	9 650 000	0,32	2,12	3,15	2,07	750 000	630	430
Tr460X5	270	466	694	5	5 200 000	10 400 000	0,32	2,1	3,13	2,06	485 000	700	425
Tr460X5	310	466	694	5	6 400 000	13 200 000	0,38	1,76	2,62	1,72	1 020 000	600	255
Tr460X5	330	472	758	6	7 100 000	13 400 000	0,37	1,8	2,69	1,76	990 000	630	320
Tr480X5	145	474,6	605,4	3	2 280 000	5 400 000	0,18	3,85	5,73	3,76	370 000	750	590
Tr480X5	202	483	657	5	3 650 000	7 650 000	0,24	2,84	4,23	2,78	520 000	700	580
Tr480X5	285	492	728	6	5 850 000	11 600 000	0,32	2,12	3,15	2,07	530 000	630	390
Tr480X5	332	492	728	6	7 500 000	15 600 000	0,39	1,73	2,58	1,69	1 160 000	560	227
Tr480X5	349	492	798	6	7 800 000	15 000 000	0,37	1,8	2,69	1,76	620 000	600	295
Tr500X5	158	498	632	4	2 550 000	6 000 000	0,18	3,76	5,59	3,67	460 000	700	570
Tr500X5	205	503	677	5	3 800 000	8 150 000	0,23	2,9	4,31	2,83	455 000	670	550
Tr500X5	250	503	677	5	4 900 000	11 200 000	0,3	2,25	3,34	2,2	830 000	600	380
Tr500X5	295	512	758	6	6 300 000	12 700 000	0,32	2,12	3,15	2,07	570 000	630	370
Tr500X5	343	512	758	6	8 000 000	16 600 000	0,39	1,75	2,61	1,71	1 190 000	560	213
Tr500X5	364	512	838	6	8 800 000	17 000 000	0,37	1,83	2,72	1,79	700 000	600	265
Tr520X6	162	518	652	4	2 600 000	6 300 000	0,17	3,9	5,81	3,81	400 000	670	540
Tr540X6	209	523	697	5	3 900 000	8 500 000	0,22	3,01	4,48	2,94	510 000	670	520
Tr550X6	313	532	798	6	7 100 000	14 300 000	0,32	2,1	3,13	2,06	990 000	600	340
Tr520X6	362	532	798	6	8 650 000	18 300 000	0,39	1,73	2,58	1,69	1 340 000	530	199
Tr550X6	175	548	692	4	2 850 000	6 800 000	0,18	3,85	5,73	3,76	385 000	630	500
Tr560X6	230	553	757	5	4 400 000	9 500 000	0,22	3,04	4,53	2,97	540 000	600	490
Tr560X6	325	562	838	6	7 350 000	15 300 000	0,32	2,12	3,15	2,07	670 000	560	325
Tr550X6	375	562	838	6	9 500 000	20 000 000	0,38	1,77	2,64	1,73	1 450 000	500	184
Tr580X6	180	578	732	4	3 100 000	7 650 000	0,17	3,95	5,88	3,86	570 000	600	465
Tr590X6	240	583	797	5	5 100 000	11 000 000	0,23	2,95	4,4	2,89	740 000	560	450
Tr590X6	335	592	888	6	8 150 000	16 600 000	0,31	2,21	3,29	2,16	750 000	530	300
Tr580X6	400	592	888	6	10 600 000	22 400 000	0,38	1,77	2,64	1,73	1 600 000	480	167

Spherical roller bearings

With withdrawal sleeve



With central rib

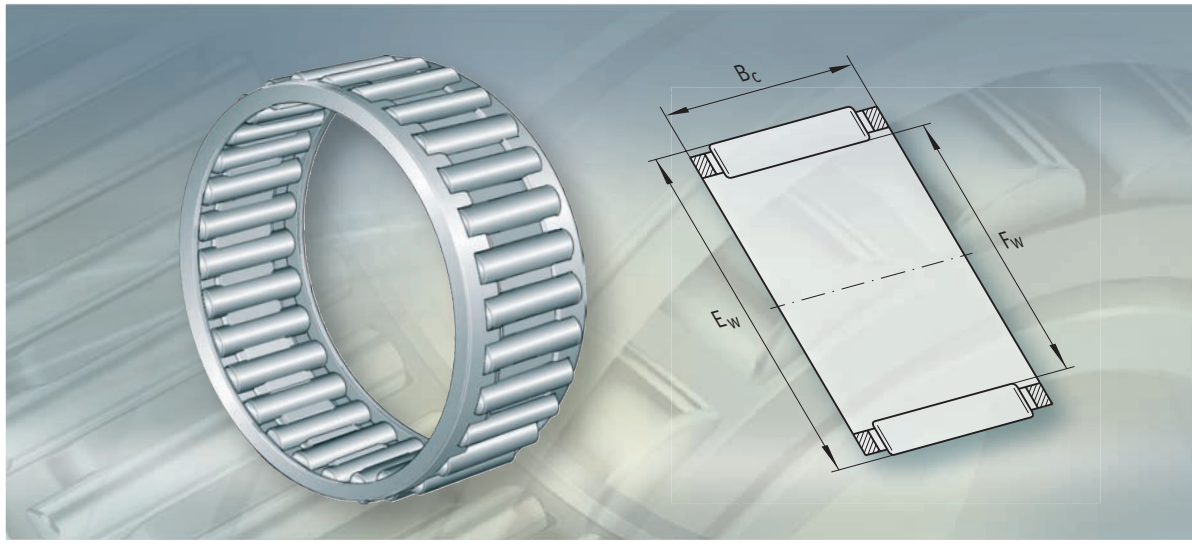


Mounting dimensions

Dimension table (continued) · Dimensions in mm

Designation		Mass m		Dimensions									
Bearing	With-drawal sleeve	Bearing ≈kg	With-drawal sleeve ≈kg	d_{1H}	d	D	B	r min.	D_1 ≈	d_s	n_s	a ≈	b
239/600-B-K-MB	**AH39/600**	210	55,6	**570**	600	800	150	5	740,5	12,5	23,5	10	38
230/600-B-K-MB	**AH30/600A**	388	75,6	**570**	600	870	200	6	791,9	12,5	23,5	14	45
231/600-K-MB	**AH31/600A**	901	118	**570**	600	980	300	7,5	852,6	12,5	23,5	14	55
241/600-B-K30-MB	**AH241/600**	1 170	118	**570**	600	980	375	7,5	833	12,5	23,5	30	50
239/630-B-K-MB	**AH39/630**	283	64,7	**600**	630	850	165	6	784,5	12,5	23,5	12	40
230/630-B-K-MB	**AH30/630A**	502	87,8	**600**	630	920	212	7,5	834,3	12,5	23,5	14	46
240/630-B-K30-MB	**AH240/630**	649	95,1	**600**	630	920	290	7,5	817,9	12,5	23,5	30	45
241/630-B-K30-MB	**AH241/630**	1 360	133	**600**	630	1 030	400	7,5	872,2	12,5	23,5	30	50
239/670-B-K-MB	**AH39/670**	310	88	**630**	670	900	170	6	831,5	12,5	23,5	12	41
230/670-B-K-MB	**AH30/670A**	590	125	**630**	670	980	230	7,5	888,7	12,5	23,5	14	50
241/670-B-K30-MB	**AH241/670**	1 540	184	**630**	670	1 090	412	7,5	929,4	12,5	23,5	30	55
239/710-K-MB	**AH39/710**	336	102	**670**	710	950	180	6	877,5	12,5	23,5	12	43
230/710-B-K-MB	**AH30/710A**	650	136	**670**	710	1 030	236	7,5	938,8	12,5	23,5	16	50
240/710-B-K30-MB	**AH240/710**	873	153	**670**	710	1 030	315	7,5	921,6	12,5	23,5	33	50
241/710-B-K30-MB	**AH241/710**	1 820	209	**670**	710	1 150	438	9,5	982	12,5	23,5	26	45
239/750-K-MB	**AH39/750**	394	110	**710**	750	1 000	185	6	923,2	12,5	23,5	12	44
230/750-K-MB	**AH30/750A**	792	156	**710**	750	1 090	250	7,5	990,9	12,5	23,5	16	50
240/750-B-K30-MB	**AH240/750**	1 070	170	**710**	750	1 090	335	7,5	976,2	12,5	23,5	35	50
239/800-B-K-MB	**AH39/800**	490	146	**750**	800	1 060	195	6	983,7	12,5	23,5	12	45
230/800-K-MB	**AH30/800A**	861	200	**750**	800	1 150	258	7,5	1 050,9	12,5	23,5	18	50
239/850-K-MB	**AH39/850**	554	165	**800**	850	1 120	200	6	1 039,9	12,5	23,5	12	50
240/850-B-K30-MB	**AH240/850**	1 420	252	**800**	850	1 220	365	7,5	1 092,9	12,5	23,5	40	53
239/900-K-MB	**AH39/900**	641	180	**850**	900	1 180	206	6	1 098,8	12,5	23,5	12	51

		Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
Thread d_{2G}	l	d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
		min.	max.	max.	N	N					N	min^{-1}	min^{-1}
Tr625X6	192	618	782	4	3 450 000	8 650 000	0,17	3,95	5,88	3,86	630 000	560	430
Tr630X6	245	623	847	5	5 700 000	12 500 000	0,22	3,07	4,57	3	890 000	530	405
Tr630X6	355	632	948	6	9 000 000	19 300 000	0,31	2,2	3,27	2,15	810 000	500	270
Tr625X6	425	632	948	6	11 600 000	26 000 000	0,38	1,79	2,67	1,75	1 780 000	450	149
Tr655X6	210	653	827	5	4 050 000	9 800 000	0,18	3,8	5,66	3,72	710 000	530	405
Tr670X6	258	658	892	6	6 300 000	13 700 000	0,22	3,01	4,48	2,94	890 000	500	380
Tr655X6	335	658	892	6	8 000 000	19 000 000	0,31	2,21	3,29	2,16	1 350 000	480	260
Tr655X6	450	662	998	6	12 900 000	29 000 000	0,38	1,78	2,65	1,74	1 960 000	450	136
Tr695X6	216	693	877	5	4 300 000	10 600 000	0,17	3,95	5,88	3,86	750 000	500	375
Tr710X7	280	698	952	6	7 200 000	16 000 000	0,22	3,01	4,48	2,94	1 100 000	480	350
Tr710X7	467	702	1 058	6	14 000 000	31 500 000	0,37	1,83	2,72	1,79	2 110 000	430	127
Tr740X7	228	733	927	5	4 800 000	12 000 000	0,18	3,85	5,73	3,76	720 000	480	350
Tr750X7	286	738	1 002	6	7 650 000	17 000 000	0,22	3,07	4,57	3	1 140 000	480	325
Tr740X7	365	738	1 002	6	9 500 000	22 800 000	0,3	2,26	3,37	2,21	1 550 000	430	223
Tr740X7	483	750	1 110	8	15 600 000	35 500 000	0,38	1,79	2,67	1,75	2 340 000	400	116
Tr780X7	234	773	977	5	5 200 000	12 900 000	0,17	3,95	5,88	3,86	790 000	480	325
Tr800X7	300	778	1 062	6	8 500 000	19 000 000	0,22	3,01	4,48	2,94	1 010 000	450	305
Tr800X7	385	778	1 062	6	10 800 000	26 000 000	0,3	2,26	3,37	2,21	1 730 000	400	204
Tr830X7	245	823	1 037	5	5 850 000	15 000 000	0,17	4,05	6,04	3,96	1 010 000	450	295
Tr850X7	308	828	1 122	6	9 300 000	21 200 000	0,22	3,07	4,57	3	1 430 000	430	280
Tr880X7	258	873	1 097	5	6 300 000	16 300 000	0,16	4,11	6,12	4,02	960 000	430	275
Tr900X7	418	878	1 192	6	12 900 000	32 000 000	0,29	2,33	3,47	2,28	2 060 000	480	173
Tr830X8	265	923	1 157	5	6 550 000	17 300 000	0,16	4,28	6,37	4,19	1 010 000	400	260



Needle roller and cage assemblies

Needle roller and cage assemblies

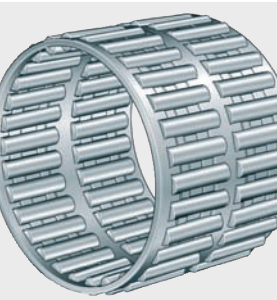
		Page
Product overview	Needle roller and cage assemblies	666
Features	Needle rollers	667
	Operating temperature	667
	Cages	668
	Other products	668
	Suffixes	668
Design and safety guidelines	Raceway design	668
	Axial location	669
Accuracy	Radial internal clearance	669
Dimension tables	Needle roller and cage assemblies, single row	670
	Needle roller and cage assemblies, single row and double row	671
	Needle roller and cage assemblies, single row	678

Single row

K

Double row

K..-ZW



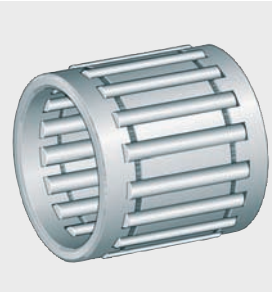
Other products

Needle roller and cage assemblies for crank pin bearing arrangements

KZK

Needle roller and cage assemblies for piston pin bearing arrangements

KBK



Needle roller and cage assemblies

Features

Needle roller and cage assemblies are single or double row units comprising cages and needle rollers. The single row design is based on DIN 5 405-1.

Very small cross-section height

Since its radial section height is equivalent to the diameter of the needle rollers, needle roller and cage assemblies allow bearing arrangements requiring only a very small radial design envelope. They have high load carrying capacity, are suitable for high speeds and are particularly easy to fit.

If the raceways are produced to high geometrical accuracy, bearing arrangements with high runout accuracy can be achieved.

The radial internal clearance can be influenced by the needle roller sort as well as by the shaft and housing tolerances.

Needle roller and cage assemblies require a hardened and ground raceway on the shaft and in the housing.

Double row

Double row needle roller and cage assemblies are only available in particular enveloping circle diameters F_W. These are indicated by the suffix ZW.

Needle rollers

Needle roller and cage assemblies are supplied with standard needle roller sorts in accordance with the table.
However, each needle roller and cage assembly is fitted with needle rollers of one sort only. The sort is printed on the packaging and is colour coded, see table.

The sorts are indicated by the upper and lower deviation (in µm), the maximum diameter tolerance is 2 µm, see table. In each case, two neighbouring needle roller sorts are matched as sort pairs.

Standard needle roller sorts

Sort pair Colour code	Needle roller sorts µm
Red	0–2 / –1–3
Blue	–2–4 / –3–5
White (grey)	–4–6 / –5–7

Operating temperature

Needle roller and cage assemblies with a plastic cage can be used at operating temperatures from –20 °C to +120 °C.

Cages

Needle roller and cage assemblies are available with plastic cages and sheet steel cages. Plastic cages have the suffix TV and are only available in particular sizes.

Other products

Needle roller and cage assemblies are also available in designs for connecting rod bearing arrangements:

- series KZK for crank pin bearing arrangements
- series KBK for piston pin bearing arrangements.

These needle roller and cage assemblies are described in detail in TPI 94, Needle roller and cage assemblies for crank pins and piston pins.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
TV	Cage made from glass fibre reinforced polyamide 66 Bearings with plastic cage: see dimension table	Standard
ZW	Double row design (certain sizes only)	

Design and safety guidelines

Raceway design

Where needle roller and cage assemblies are to be used, the housing bore and the shaft raceway must be hardened and ground. The surface hardness of the raceways must be 670 HV + 170 HV, the hardening depth CHD or SHD must be sufficiently large.

Design of raceways, see table and section Design of bearing arrangements, from page 174.

Raceway design

Shaft diameter Nominal dimension mm		Bore tolerance	Shaft tolerance Bearing clearance			Roughness	Roundness	Parallelism
over	incl.		Small	Normal	Large	max.	max.	max.
–	80	G6	j5	h5	g6	R_a0,2 (R_z1)	IT3	IT3
		H6	h5	g5	f6			
80	120	G6	h5	g5	f6	R_a0,3 (R_z1,6)		
120	–	G6	h5	g5	f6	R_a0,4 (R_z2,5)		
		H6	–	f5	e6			

Raceway width

The raceway width must be at least equal to the cage width B_c (B_c is produced with a minus (–) tolerance); values for B_c, see dimension tables. The distance between the axial limit surfaces should therefore be toleranced to H12, *Figure 1*.

The axial running surfaces for the needle roller and cage assemblies must be precision machined (R_a2 recommended) and resistant to wear.

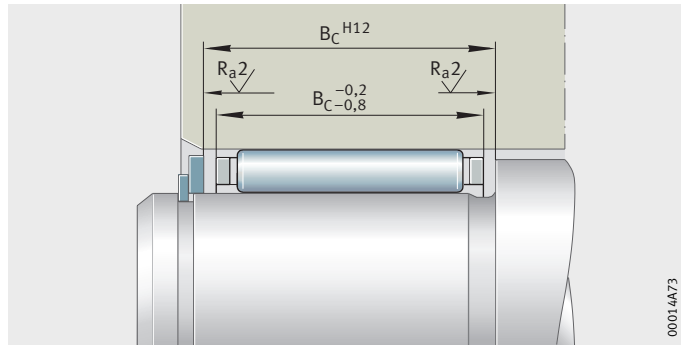


Figure 1
Raceway width
and axial running surfaces

Axial location

Needle roller and cage assemblies must be axially located. They are located by means of snap rings or appropriate design of the adjacent construction, *Figure 1* and *Figure 2*.

If location is by means of snap rings or retaining rings, a washer must be arranged in front of the ring. It must be ensured that there is sufficient interference between the ring and washer.

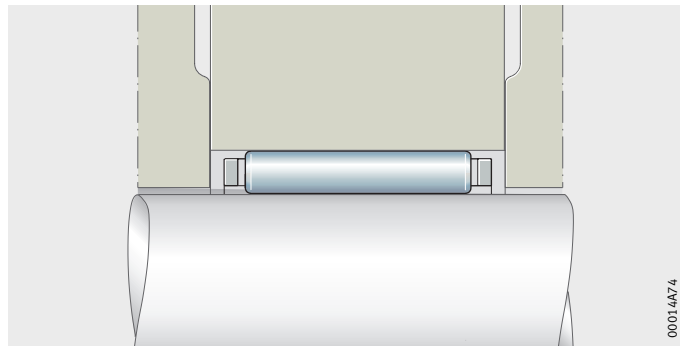


Figure 2
Axial location
by adjacent construction

Accuracy

The width of the needle roller and cage assembly $B_{c\,-0,8}^{-0,2}$ corresponds to DIN 5 405-1.

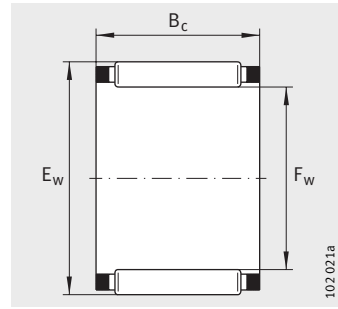
Radial internal clearance

When standard needle roller sorts are used, a radial internal clearance of C2 to CN is achieved (radial internal clearance for needle and cylindrical roller bearings to DIN 620-4), if the shaft and housing tolerances according to table Raceway design, page 668, are observed.

If the actual values are on the plus side, a radial internal clearance of 0 can be achieved.

Needle roller and cage assemblies

Single row



K

Dimension table · Dimensions in mm

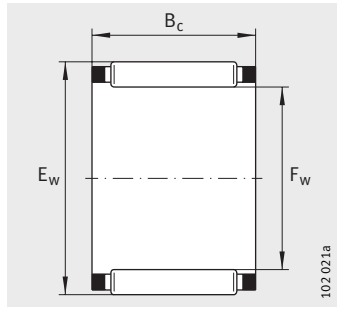
Designation	Mass	Dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
	m	F_w	E_w	B_c	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
	≈g				N	N	N	min^{-1}	min^{-1}
K3X5X7-TV	0,3	**3**	5	7	1 540	1 290	152	50 000	78 000
K3X5X9-TV	0,4	**3**	5	9	1 710	1 480	188	50 000	80 000
K3X6X7-TV	0,4	**3**	6	7	1 430	970	109	47 000	75 000
K4X7X7-TV	0,5	**4**	7	7	1 740	1 270	145	42 500	59 000
K4X7X10-TV	0,7	**4**	7	10	2 330	1 840	236	42 500	59 000
K5X8X8-TV	0,7	**5**	8	8	2 350	1 920	237	39 000	48 000
K5X8X10-TV	0,9	**5**	8	10	3 000	2 650	350	39 000	47 000
K6X9X8-TV	0,8	**6**	9	8	2 600	2 280	285	36 500	41 000
K6X9X10-TV	1,1	**6**	9	10	3 350	3 150	420	36 500	40 000
K6X10X13-TV	1,9	**6**	10	13	3 800	3 100	395	35 500	40 000
K7X9X7-TV	0,6	**7**	9	7	1 730	1 770	215	35 500	40 000
K7X10X8-TV	0,9	**7**	10	8	2 850	2 650	330	34 500	36 000
K7X10X10-TV	1	**7**	10	10	3 650	3 600	485	34 500	35 000
K8X11X8-TV	1	**8**	11	8	3 100	3 000	375	32 500	32 000
K8X11X10-TV	1,2	**8**	11	10	3 950	4 100	560	32 500	31 000
K8X11X13-TV	1,7	**8**	11	13	5 100	5 800	790	32 500	30 500
K8X12X10-TV	2	**8**	12	10	5 000	4 700	560	31 500	29 000
K9X12X10-TV	1,5	**9**	12	10	4 500	5 000	680	31 000	27 500
K9X12X13-TV	2,1	**9**	12	13	5 900	7 100	970	31 000	27 000
K10X13X10-TV	1,6	**10**	13	10	4 750	5 500	750	29 500	24 900
K10X13X13-TV	2,3	**10**	13	13	6 200	7 800	1 060	29 500	24 400
K10X13X16-TV	2,9	**10**	13	16	7 100	9 300	1 310	29 500	24 600
K10X14X10-TV	2,5	**10**	14	10	5 800	6 000	720	29 000	23 500
K10X14X13-TV	4,6	**10**	14	13	7 500	8 400	1 020	29 000	23 000
K10X16X12-TV	5,5	**10**	16	12	8 100	7 200	1 000	27 500	21 800
K12X15X10-TV	2,9	**12**	15	10	4 900	6 100	830	27 000	21 500
K12X15X13-TV	2,3	**12**	15	13	6 400	8 500	1 170	27 000	21 100
K12X16X13-TV	5,5	**12**	16	13	8 000	9 400	1 150	26 500	19 900
K12X17X13-TV	4,9	**12**	17	13	9 600	10 400	1 330	26 500	18 800
K12X18X12-TV	6	**12**	18	12	10 000	9 900	1 400	26 000	18 100

Dimension table (continued) · Dimensions in mm

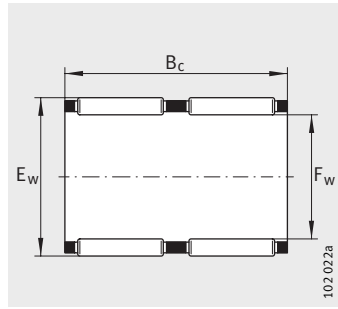
Designation	Mass	Dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
	m	F_w	E_w	B_c	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
	≈g				N	N	N	min^{-1}	min^{-1}
K14X18X10	4	**14**	18	10	7 100	8 500	1 060	25 000	17 300
K14X18X13	6,5	**14**	18	13	8 200	10 100	1 320	25 000	17 700
K14X18X15-TV	5	**14**	18	15	9 500	12 300	1 540	25 000	17 400
K14X18X17	8	**14**	18	17	10 800	14 400	1 890	25 000	17 300
K14X20X12	8,5	**14**	20	12	10 300	10 600	1 490	24 300	16 200
K15X18X17-TV	4,6	**15**	18	17	8 000	12 100	1 730	24 600	17 700
K15X19X10	5	**15**	19	10	7 500	9 200	1 140	24 300	16 200
K15X19X13	7	**15**	19	13	8 500	10 900	1 420	24 300	16 600
K15X19X17	9,5	**15**	19	17	11 300	15 600	2 040	24 300	16 200
K15X20X13	7	**15**	20	13	9 900	11 500	1 430	23 900	15 900
K15X21X15	11	**15**	21	15	14 300	16 400	2 210	23 600	14 700
K15X21X21	17	**15**	21	21	19 400	24 300	3 300	23 600	14 400
K16X20X10	5,5	**16**	20	10	7 800	9 900	1 230	23 600	15 200
K16X20X13	7,5	**16**	20	13	8 900	11 800	1 530	23 600	15 600
K16X20X17	10	**16**	20	17	11 700	16 800	2 190	23 600	15 200
K16X22X12	10	**16**	22	12	11 500	12 500	1 780	22 900	14 300
K16X22X16	12	**16**	22	16	14 800	17 500	2 390	22 900	14 100
K16X22X20	17	**16**	22	20	18 300	22 800	3 050	22 900	14 000
K16X24X20	22	**16**	24	20	21 400	23 500	2 950	22 400	13 200
K17X21X10	5,5	**17**	21	10	8 100	10 600	1 310	22 900	14 400
K17X21X13	6,5	**17**	21	13	10 400	14 600	1 810	22 900	14 100
K17X21X17	9,5	**17**	21	17	12 200	17 900	2 350	22 900	14 400
K18X22X10	6	**18**	22	10	8 400	11 300	1 400	22 400	13 600
K18X22X13	8	**18**	22	13	9 200	12 700	1 650	22 400	14 200
K18X22X17	11	**18**	22	17	12 100	18 000	2 360	22 400	13 900
K18X24X12	12	**18**	24	12	12 800	14 900	2 120	21 800	12 700
K18X24X13	13	**18**	24	13	13 100	15 300	1 990	21 800	12 900
K18X24X20	18	**18**	24	20	20 200	27 000	3 550	21 800	12 400
K18X25X22	23	**18**	25	22	23 100	29 000	3 750	21 600	12 200
K19X23X13	8	**19**	23	13	9 500	13 500	1 750	21 800	13 500
K19X23X17	11	**19**	23	17	12 500	19 200	2 500	21 800	13 200

Needle roller and cage assemblies

Single row and double row



K



K..-ZW

Dimension table (continued) · Dimensions in mm

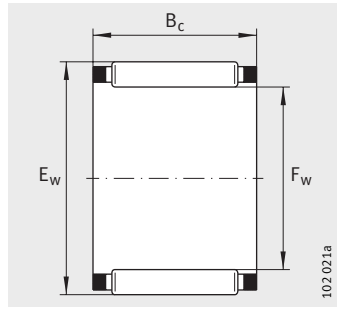
Designation	Mass	Dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
	m	F_w	E_w	B_c	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
	≈g				N	N	N	min^{-1}	min^{-1}
K20X24X10	6,5	**20**	24	10	8 900	12 600	1 570	21 300	12 400
K20X24X13	9	**20**	24	13	9 800	14 300	1 860	21 300	12 800
K20X24X17	12	**20**	24	17	12 900	20 400	2 650	21 300	12 500
K20X26X12	11	**20**	26	12	13 400	16 200	2 310	20 900	11 700
K20X26X13	12	**20**	26	13	14 400	17 900	2 330	20 900	11 600
K20X26X17	16	**20**	26	17	19 200	26 000	3 300	20 900	11 200
K20X26X20	19	**20**	26	20	21 100	29 000	3 900	20 900	11 400
K20X28X16	20	**20**	28	16	19 800	22 400	3 000	20 400	11 100
K20X28X20	27	**20**	28	20	23 900	28 500	3 600	20 400	11 100
K20X28X25	32	**20**	28	25	30 500	39 000	5 300	20 400	10 800
K20X30X30	49	**20**	30	30	35 500	41 500	5 500	19 600	10 800
K21X25X13	9	**21**	25	13	10 100	15 100	1 970	20 900	12 300
K22X26X10	7,5	**22**	26	10	9 100	13 400	1 670	20 400	11 500
K22X26X13	9,5	**22**	26	13	10 400	15 900	2 080	20 400	11 800
K22X26X17	12	**22**	26	17	13 700	22 700	3 000	20 400	11 500
K22X28X17	18	**22**	28	17	19 400	27 000	3 450	19 600	10 500
K22X29X16	16	**22**	29	16	20 000	25 500	3 350	19 200	10 300
K22X30X15-TV	18	**22**	30	15	20 100	23 400	3 050	18 800	10 200
K22X32X24	43	**22**	32	24	34 000	40 000	4 900	18 100	9 700
K23X35X16-TV	29	**23**	35	16	24 500	23 900	2 950	16 900	9 500
K24X28X10	8,5	**24**	28	10	9 600	14 800	1 840	18 800	10 600
K24X28X13	10	**24**	28	13	11 000	17 600	2 290	18 800	10 800
K24X28X17	13	**24**	28	17	14 500	25 000	3 300	18 800	10 600
K24X30X17	19	**24**	30	17	19 500	27 500	3 500	18 100	10 000
K24X30X31-ZW	32	**24**	30	31	27 500	43 500	5 800	18 100	10 400

Dimension table (continued) · Dimensions in mm

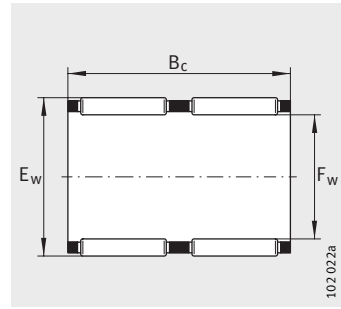
Designation	Mass	Dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
	m	F_w	E_w	B_c	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
	≈g				N	N	N	min^{-1}	min^{-1}
K25X29X10	8,5	**25**	29	10	9 900	15 400	1 930	18 100	10 200
K25X29X13	11	**25**	29	13	11 300	18 400	2 400	18 100	10 400
K25X29X17	14	**25**	29	17	14 900	26 000	3 450	18 100	10 200
K25X30X17	16	**25**	30	17	18 700	30 000	3 850	17 800	9 600
K25X30X20	18	**25**	30	20	21 700	36 500	4 850	17 800	9 500
K25X30X26-ZW	19	**25**	30	26	21 400	35 500	4 500	17 800	10 400
K25X31X17	19	**25**	31	17	19 600	28 500	3 600	17 500	9 600
K25X31X21	20	**25**	31	21	24 700	38 000	5 100	17 500	9 400
K25X32X16	21	**25**	32	16	20 800	27 500	3 650	17 200	9 400
K25X33X20	33	**25**	33	20	28 500	38 000	4 850	16 900	9 000
K25X33X24	39	**25**	33	24	34 000	47 000	6 300	16 900	8 900
K25X35X30	65	**25**	35	30	47 000	62 000	8 300	16 300	8 500
K26X30X13	11	**26**	30	13	11 600	19 200	2 500	17 500	10 100
K26X30X17	15	**26**	30	17	15 200	27 500	3 600	17 500	9 800
K26X30X22-ZW	12	**26**	30	22	15 700	28 500	3 550	17 500	10 400
K28X33X13	13	**28**	33	13	15 300	24 200	3 100	16 100	8 900
K28X33X17	17	**28**	33	17	19 700	33 500	4 250	16 100	8 700
K28X34X17	24	**28**	34	17	21 800	33 500	4 300	15 800	8 600
K28X35X16	24	**28**	35	16	21 500	29 500	3 950	15 600	8 700
K28X35X18	27	**28**	35	18	24 000	34 000	4 700	15 600	8 600
K28X40X25	70	**28**	40	25	45 500	55 000	6 600	14 400	7 700
K30X34X13	14	**30**	34	13	12 300	21 700	2 850	15 300	8 900
K30X35X13	14	**30**	35	13	15 600	25 500	3 250	15 100	8 400
K30X35X17	19	**30**	35	17	19 600	34 000	4 300	15 100	8 300
K30X35X27	30	**30**	35	27	30 500	59 000	8 500	15 100	8 100
K30X37X16	27	**30**	37	16	23 100	33 500	4 450	14 600	8 000
K30X37X18	30	**30**	37	18	26 000	38 500	5 300	14 600	8 000
K30X40X18	48	**30**	40	18	32 000	40 000	5 000	14 000	7 600
K30X40X30	73	**30**	40	30	49 000	69 000	9 200	14 000	7 500

Needle roller and cage assemblies

Single row and double row



K



K..-ZW

Dimension table (continued) · Dimensions in mm

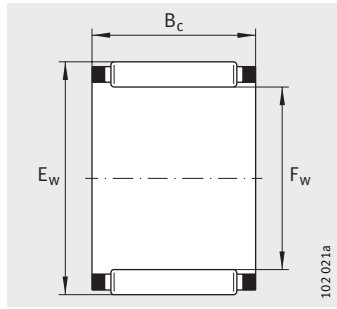
Designation	Mass	Dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
	m	F_w	E_w	B_c	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
	≈g				N	N	N	min^{-1}	min^{-1}
K32X37X13	18	**32**	37	13	15 500	25 500	3 300	14 200	8 100
K32X37X17	19	**32**	37	17	19 900	35 500	4 500	14 200	7 900
K32X37X27	30	**32**	37	27	30 000	60 000	8 500	14 200	7 800
K32X38X20	30	**32**	38	20	26 500	45 000	6 000	14 000	7 700
K32X39X16	37	**32**	39	16	23 800	35 500	4 700	13 800	7 600
K32X39X18	31	**32**	39	18	26 500	41 000	5 600	13 800	7 500
K32X40X25	49	**32**	40	25	37 500	58 000	7 900	13 600	7 400
K32X40X42-ZW-TV	77	**32**	40	42	50 000	84 000	10 500	13 600	7 800
K32X46X32	119	**32**	46	32	66 000	84 000	11 100	12 600	6 700
K35X40X13	19	**35**	40	13	16 200	28 000	3 600	13 100	7 500
K35X40X17	21	**35**	40	17	20 800	38 500	4 900	13 100	7 400
K35X40X25	31	**35**	40	25	29 500	60 000	8 400	13 100	7 200
K35X40X27-TV	39	**35**	40	27	25 000	48 500	6 700	13 100	7 900
K35X42X16	34	**35**	42	16	24 400	37 500	5 000	12 700	7 100
K35X42X18	34	**35**	42	18	27 500	43 000	6 000	12 700	7 100
K35X42X20	37	**35**	42	20	30 000	49 000	6 200	12 700	7 000
K35X42X30	67	**35**	42	30	39 000	68 000	9 400	12 700	7 200
K35X45X20	56	**35**	45	20	37 000	50 000	6 500	12 300	6 800
K35X45X30	80	**35**	45	30	53 000	79 000	10 500	12 300	6 700
K37X42X17	22	**37**	42	17	22 400	43 000	5 500	12 400	6 900
K38X43X17	29	**38**	43	17	20 500	38 500	4 850	12 100	7 000
K38X43X27	43	**38**	43	27	31 500	68 000	9 600	12 100	6 800
K38X46X20	47	**38**	46	20	35 500	57 000	7 200	11 700	6 300
K38X46X32	76	**38**	46	32	55 000	99 000	14 200	11 700	6 200
K39X44X26-ZW	45	**39**	44	26	27 500	56 000	7 100	11 800	7 000

Dimension table (continued) · Dimensions in mm

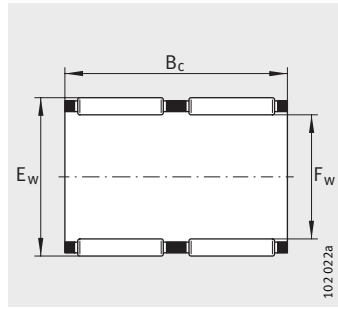
Designation	Mass	Dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
	m	F_w	E_w	B_c	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
	≈g				N	N	N	min^{-1}	min^{-1}
K40X45X13	22	**40**	45	13	17 600	32 500	4 200	11 500	6 600
K40X45X17	31	**40**	45	17	21 400	41 500	5 200	11 500	6 700
K40X45X27	46	**40**	45	27	33 000	73 000	10 300	11 500	6 500
K40X47X18	39	**40**	47	18	29 500	50 000	6 900	11 300	6 300
K40X47X20	42	**40**	47	20	32 500	57 000	7 200	11 300	6 200
K40X48X20	49	**40**	48	20	36 000	59 000	7 500	11 100	6 100
K42X47X13	18	**42**	47	13	17 800	33 500	4 350	11 000	6 400
K42X47X17	32	**42**	47	17	21 700	43 000	5 400	11 000	6 400
K42X47X30-ZW	54	**42**	47	30	33 500	76 000	10 000	11 000	6 400
K42X50X20	53	**42**	50	20	35 000	57 000	7 300	10 700	6 000
K43X48X17	30	**43**	48	17	21 600	43 000	5 400	10 800	6 300
K43X48X27	50	**43**	48	27	33 500	75 000	10 700	10 800	6 200
K45X50X17	34	**45**	50	17	22 500	46 000	5 800	10 300	6 100
K45X50X27	51	**45**	50	27	34 500	80 000	11 400	10 300	5 900
K45X52X18	42	**45**	52	18	31 500	57 000	7 900	10 100	5 700
K45X53X20	55	**45**	53	20	39 000	67 000	8 700	10 000	5 500
K45X53X21	60	**45**	53	21	38 500	67 000	8 600	10 000	5 600
K45X53X28	81	**45**	53	28	52 000	98 000	13 700	10 000	5 400
K45X59X18-TV	72	**45**	59	18	44 500	54 000	6 900	9 400	5 400
K45X59X32	148	**45**	59	32	73 000	103 000	13 800	9 400	5 300
K47X52X17	35	**47**	52	17	23 300	49 000	6 100	9 900	5 800
K47X52X27	51	**47**	52	27	35 000	83 000	11 800	9 900	5 700

Needle roller and cage assemblies

Single row and double row



K



K..-ZW

Dimension table (continued) · Dimensions in mm

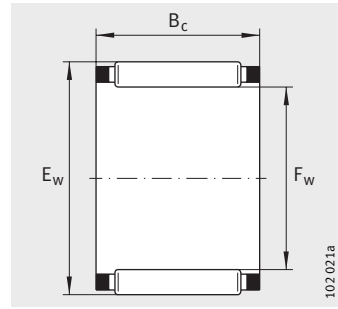
Designation	Mass	Dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
	m	F_w	E_w	B_c	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
	≈g				N	N	N	min^{-1}	min^{-1}
K50X55X13,5	30	**50**	55	13,5	18 200	36 500	4 600	9 300	5 700
K50X55X17	35	**50**	55	17	22 100	47 000	6 300	9 300	5 700
K50X55X20	43	**50**	55	20	26 500	60 000	7 800	9 300	5 500
K50X55X30	65	**50**	55	30	39 000	97 000	13 900	9 300	5 400
K50X57X18	47	**50**	57	18	33 500	63 000	8 800	9 200	5 200
K50X58X20	75	**50**	58	20	35 500	62 000	8 800	9 100	5 400
K50X58X25	90	**50**	58	25	44 000	81 000	10 800	9 100	5 300
K52X57X12	24	**52**	57	12	18 000	36 500	4 600	9 000	5 400
K55X60X20	40	**55**	60	20	28 500	66 000	8 600	8 500	5 100
K55X60X27	60	**55**	60	27	38 000	97 000	13 600	8 500	4 950
K55X60X30	71	**55**	60	30	41 000	108 000	15 400	8 500	4 950
K55X62X18	52	**55**	62	18	35 500	70 000	9 800	8 400	4 750
K55X63X20	67	**55**	63	20	40 000	74 000	9 500	8 300	4 800
K55X63X25	80	**55**	63	25	50 000	100 000	13 700	8 300	4 700
K55X63X32	102	**55**	63	32	62 000	130 000	18 600	8 300	4 650
K58X65X18	52	**58**	65	18	35 000	70 000	9 800	8 000	4 650
K58X65X36-ZW	127	**58**	65	36	49 000	107 000	14 600	8 000	5 100
K60X65X20	52	**60**	65	20	29 500	72 000	9 300	7 800	4 750
K60X65X30	77	**60**	65	30	42 500	116 000	16 600	7 800	4 650
K60X66X33-ZW	104	**60**	66	33	46 000	112 000	15 100	7 800	4 800
K60X66X40-ZW	116	**60**	66	40	58 000	151 000	19 900	7 800	4 650
K60X68X20	71	**60**	68	20	43 500	85 000	11 000	7 700	4 400
K60X68X23	94	**60**	68	23	49 500	101 000	13 500	7 700	4 350
K60X68X25	89	**60**	68	25	53 000	111 000	15 200	7 700	4 350
K60X68X30-ZW	129	**60**	68	30	44 500	88 000	11 300	7 700	4 950
K60X75X42	240	**60**	75	42	118 000	199 000	27 000	7 300	4 050
K62X70X40-ZW	174	**62**	70	40	66 000	146 000	20 500	7 400	4 550
K64X70X16	53	**64**	70	16	28 000	60 000	8 100	7 300	4 500

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
	m	F_w	E_w	B_c	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
	≈g				N	N	N	min^{-1}	min^{-1}
K65X70X20	56	**65**	70	20	30 500	77 000	10 000	7 300	4 450
K65X70X30	83	**65**	70	30	44 000	124 000	17 800	7 300	4 350
K65X73X23	108	**65**	73	23	46 000	94 000	12 200	7 100	4 300
K65X73X30	141	**65**	73	30	57 000	123 000	17 100	7 100	4 300
K68X74X20	71	**68**	74	20	35 500	84 000	11 000	6 900	4 200
K68X74X30	100	**68**	74	30	46 500	118 000	16 900	6 900	4 300
K68X74X35-ZW	120	**68**	74	35	48 500	125 000	17 200	6 900	4 450
K70X76X20	71	**70**	76	20	36 000	86 000	11 300	6 700	4 100
K70X76X30	110	**70**	76	30	52 000	139 000	20 100	6 700	4 000
K70X78X30	148	**70**	78	30	60 000	135 000	18 800	6 600	4 000
K72X80X20	98	**72**	80	20	41 500	85 000	11 900	6 400	4 000
K73X79X20	75	**73**	79	20	37 000	90 000	11 800	6 400	4 000
K75X81X20	79	**75**	81	20	37 500	94 000	12 300	6 300	3 850
K75X81X30	114	**75**	81	30	52 000	143 000	20 400	6 300	3 850
K75X83X23	124	**75**	83	23	50 000	109 000	14 200	6 200	3 800
K75X83X30	147	**75**	83	30	62 000	143 000	20 000	6 200	3 800
K75X83X35-ZW	182	**75**	83	35	63 000	147 000	19 900	6 200	3 950
K75X83X40-ZW	211	**75**	83	40	73 000	177 000	25 000	6 200	3 900
K80X86X20	60	**80**	86	20	38 500	98 000	12 900	5 900	3 700
K80X88X30	138	**80**	88	30	71 000	176 000	25 000	5 800	3 400
K80X88X40-ZW	227	**80**	88	40	76 000	192 000	27 000	5 800	3 700
K80X88X46-ZW	260	**80**	88	46	88 000	231 000	30 000	5 800	3 650
K85X92X20	102	**85**	92	20	44 500	108 000	15 100	5 500	3 450
K90X97X20	109	**90**	97	20	45 000	113 000	15 800	5 200	3 300
K90X98X27	150	**90**	98	27	61 000	150 000	20 300	5 200	3 300
K90X98X30	172	**90**	98	30	68 000	172 000	24 000	5 200	3 300
K95X103X30	165	**95**	103	30	69 000	180 000	25 000	4 950	3 150
K95X103X40-ZW	266	**95**	103	40	83 000	228 000	32 500	4 950	3 200

Needle roller and cage assemblies

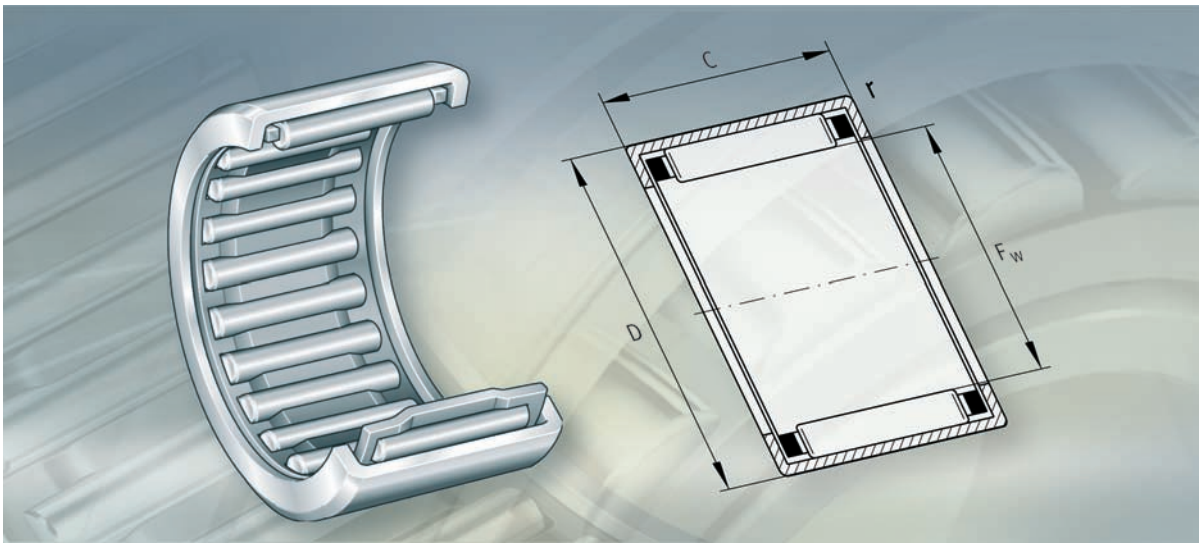
Single row



K

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
	m	F_w	E_w	B_c	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
	≈g				N	N	N	min^{-1}	min^{-1}
K100X107X21	120	**100**	107	21	48 000	127 000	17 600	4 750	3 100
K100X108X27	185	**100**	108	27	57 000	143 000	18 900	4 700	3 200
K100X108X30	180	**100**	108	30	71 000	188 000	26 000	4 700	3 050
K105X112X21	129	**105**	112	21	47 500	127 000	17 400	4 500	3 000
K110X117X24	172	**110**	117	24	56 000	158 000	19 800	4 300	2 850
K110X118X30	217	**110**	118	30	78 000	219 000	29 500	4 300	2 750
K115X123X27	200	**115**	123	27	63 000	170 000	21 600	4 100	2 850
K120X127X24	165	**120**	127	24	59 000	174 000	21 400	3 950	2 650
K125X133X35	275	**125**	133	35	86 000	260 000	34 500	3 800	2 600
K130X137X24	170	**130**	137	24	61 000	186 000	22 300	3 650	2 500
K135X143X35	300	**135**	143	35	91 000	290 000	37 500	3 550	2 390
K145X153X26	262	**145**	153	26	74 000	225 000	27 000	3 300	2 280
K150X160X46	570	**150**	160	46	147 000	470 000	60 000	3 150	2 100
K155X163X26	265	**155**	163	26	75 000	236 000	28 000	3 100	2 180
K160X170X46	550	**160**	170	46	152 000	510 000	63 000	2 950	1 970
K165X173X26	320	**165**	173	26	81 000	265 000	30 500	2 900	2 030
K175X183X32	400	**175**	183	32	99 000	350 000	41 500	2 750	1 930
K185X195X37	607	**185**	195	37	128 000	425 000	48 500	2 600	1 840
K195X205X37	620	**195**	205	37	133 000	450 000	51 000	2 450	1 760
K210X220X42	740	**210**	220	42	154 000	560 000	63 000	2 280	1 590
K220X230X42	790	**220**	230	42	158 000	590 000	66 000	2 180	1 510
K240X250X42	850	**240**	250	42	164 000	630 000	69 000	2 000	1 390
K265X280X50	1 810	**265**	280	50	255 000	860 000	91 000	1 800	1 160



Drawn cup needle roller bearings with open ends
Drawn cup needle roller bearings with closed end

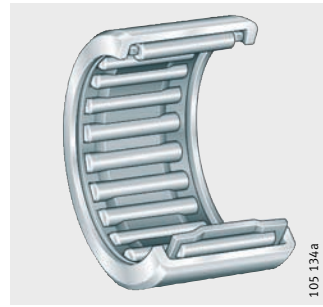
Drawn cup needle roller bearings

		Page
Product overview	Drawn cup needle roller bearings with open ends, drawn cup needle roller bearings with closed end	682
Features	Drawn cup needle roller bearings with open ends	683
	Drawn cup needle roller bearings with closed end	683
	Sealing	684
	Lubrication	684
	Operating temperature	684
	Cages	684
	Special designs	684
	Suffixes	684
Design and safety guidelines	Static load safety factor	685
	Minimum radial load	685
	Speeds	685
	Design of bearing arrangements	686
	Location	687
Accuracy	Enveloping circle	688
Dimension tables	Drawn cup needle roller bearings with open ends, drawn cup needle roller bearings with closed end, unsealed	690
	Drawn cup needle roller bearings with open ends, drawn cup needle roller bearings with closed end, sealed	694
	Drawn cup needle roller bearings, full complement, unsealed	696

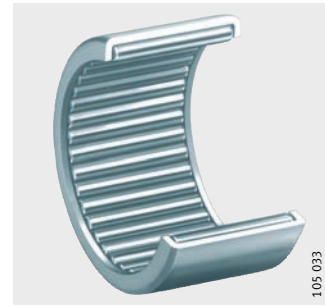
Drawn cup needle roller bearings with open ends

With cage or full complement

HK

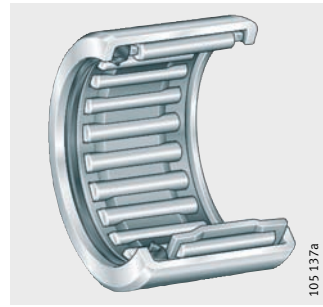


HN

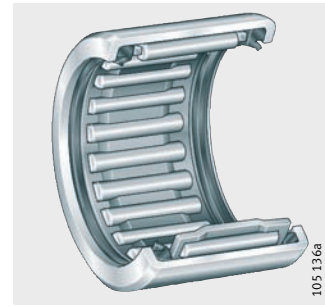


Lip seals

HK..-RS

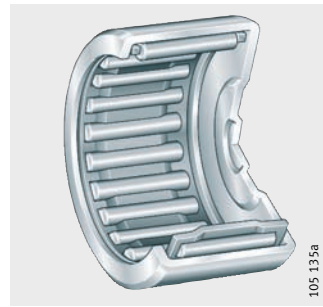


HK..-2RS



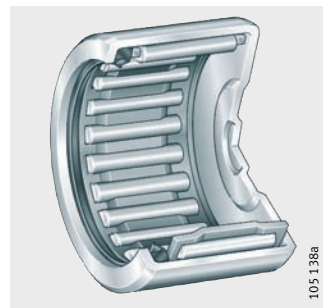
Drawn cup needle roller bearings with closed end

BK



Lip seal

BK..-RS



Drawn cup needle roller bearings

Features

Drawn cup needle roller bearings with open ends and with closed end are needle roller bearings with a very small radial section height. They comprise thin-walled, drawn cup outer rings and needle roller and cage assemblies which together form a complete unit.

These bearings allow the design of particularly compact and easy-to-fit bearing arrangements with high radial load carrying capacity. In order to support axial forces, they can also be combined with axial needle roller bearings AXW, series AXW, see dimension table, page 880.

The majority of the bearings are of a single row design and do not have a lubrication hole. Double row designs have a lubrication hole and the suffix ZW.

For particular applications, drawn cup needle roller bearings with open ends are also available in a full complement design.

Drawn cup needle roller bearings require a hardened and ground bearing raceway on the shaft. If the shaft cannot be used as a raceway, the bearings can be combined with inner rings IR or LR. Suitable inner rings: see page 778.

If axial locating elements such as shoulders, snap rings etc. are not used, the housing bore can be produced easily and particularly economically. As a result, fitting of the bearings is simplified.

Drawn cup needle roller bearings with open ends

Drawn cup needle roller bearings with open ends are supplied with a needle roller and cage assembly or a full complement needle roller set. Bearings with needle roller and cage assemblies allow higher speeds than the full complement designs.

Full complement drawn cup needle roller bearings with open ends

Full complement drawn cup needle roller bearings have the maximum number of needle rollers and therefore offer extremely high load carrying capacity within a very small design envelope. However, their use at high speeds is restricted.

Since the needle rollers are not retained by mechanical means, they are secured for transport and fitting by means of a special grease (DIN 51825–K1/2K–30). However, this does not have adequate long term lubrication capacity. Relubrication is therefore recommended after fitting.

Drawn cup needle roller bearings with closed end

Some designs of drawn cup needle roller bearings are closed at one end. They are thus suitable for closing off the shaft ends of bearing arrangements. This gives protection against injury by rotating shafts and protects the bearing against contamination and moisture.

Depending on the size, the base is either smooth or lock-beaded (stiffened). Due to the profiled base, small axial guidance forces are possible.

Sealing

Drawn cup needle roller bearings with open ends and drawn cup needle roller bearings with closed end are available in an unsealed design in accordance with DIN 618-1/ISO 3 245 and a sealed design in accordance with DIN 618-2.

Under normal operating conditions, the lip seals give protection against contamination, spray water and the loss of lubricant.

Lubrication

Sealed bearings are greased with a lithium complex soap grease to GA08.

Operating temperature

Unsealed bearings can be used at temperatures up to +140 °C.

Sealed drawn cup needle roller bearings with open ends and with closed end are suitable for temperatures from –30 °C to +100 °C, restricted by the lubricant and seal material.

Bearings with a plastic cage are suitable for operating temperatures from –20 °C to +120 °C.

Cages

With only a few exceptions, the cages are made from sheet steel.

Bearings with a plastic cage have the suffix TV.

Special designs

The following special designs are available by agreement:

- unsealed bearings, greased with lithium complex soap grease to GA08 (suffix GA08)
- bearings with a lubrication hole for sizes from HK0609 (suffix AS1).

Special bearings

In addition to the catalogue designs, special designs are available by agreement:

- with an enveloping circle diameter F_w from 2 mm to 100 mm
- for special noise requirements (bearings with special noise testing).

Universal joint bearings

For universal joints, universal joint bearings of series BU and BBU are available by agreement.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
AS1	With lubrication hole from HK0609	Special design, available by agreement only
GA08	Unsealed, greased bearings for operating temperatures from –30 °C to +140 °C	
RS	Contact seal on one side	Standard
TV	Cage made from glass fibre reinforced polyamide 66	
ZW	Double row design, with lubrication hole	
2RS	Contact seals on both sides	

Design and safety guidelines

Static load safety factor

The static load safety factor S_0 is the security against permanent deformation at the rolling contact and is determined as follows:

$$S_0 = \frac{C_{0r}}{P_0}$$

S_0 –
Static load safety factor

C_{0r} N
Basic radial static load rating according to dimension tables

P_0 N
Equivalent static bearing load.

The static load safety factor S_0 must be $\geqq 3$.

Minimum radial load

In order to ensure operation without slippage, the bearings must be subjected to a minimum load $F_{r\,min}$ in a radial direction. This applies in particular to high speed bearings since, if the radial load is insufficient or not present, damaging sliding motion may occur between the rolling elements and raceways. In continuous operation, a minimum radial load of the order of $P \geqq 0{,}02 \cdot C_r$ is necessary.

Speeds

The speeds n_G in the dimension tables are valid for oil lubrication. If grease lubrication is used, the permissible value is 60% of the stated value.

Design of bearing arrangements

Raceway for bearings without inner ring

For drawn cup needle roller bearings without an inner ring, the rolling element raceway must be hardened and ground, see table.
The surface hardness must be 670 HV, the hardening depth CHD or SHD must be sufficiently large.

In order to fully utilise the load carrying capacity of the bearings, sufficient rigid support must be provided for the thin-walled outer rings.

Design of housing bore

The bore tolerance is dependent on the housing material.
The recommended tolerances are listed in the table.

Tolerances for shaft raceway and housing bore

Housing material		Tolerance	
		Shaft for bearings without inner ring	Housing bore
Steel or cast iron		h6	N6
Light metal	Al		R6
	Mg		S6

Surface for shaft raceway and housing bore

Surface quality	Shaft raceway for bearings without inner ring	Housing bore
Roughness max.	R_a0,2 (R_z1)	R_a0,8 (R_z4)
Roundness	IT 3	IT 5/2
Parallelism	IT 3	IT 5/2

Lead chamfer

The shaft and housing bore must have a lead chamfer of 10° to 15°.

Location

Radial and axial location

Drawn cup needle roller bearings are located in the housing bore by means of a press fit. They are pressed into the bore and require no further axial locating elements.

Installation with fitting mandrel

The bearings should be installed using a special fitting mandrel, *Figure 1*. The shoulder of the fitting mandrel must rest against the end face of the bearing. This is indicated by the designation.

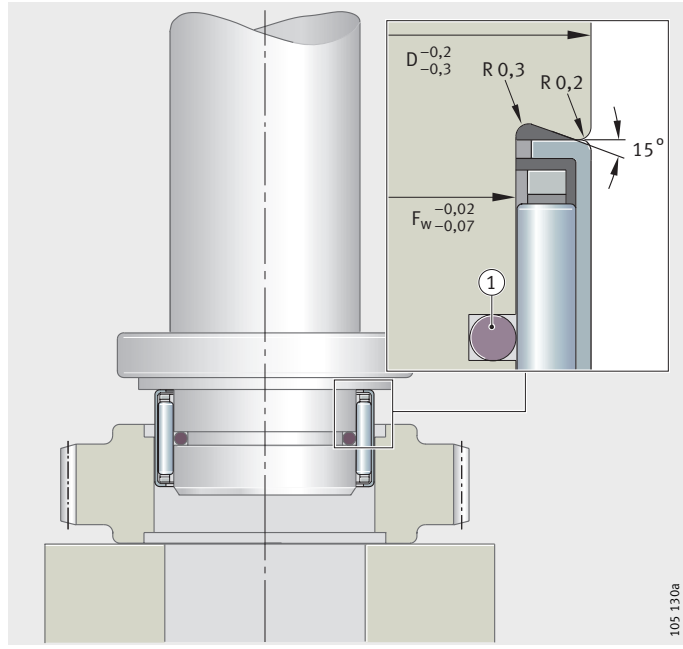
A toroidal ring should be used to retain the bearing. The length and oversize of the ring must be matched by the customer to the dimensions and mass of the bearing.

If grease lubrication is to be used, the bearings should be lubricated with grease before fitting.

Drawn cup bearings must not be tilted while they are being pressed in.

The forces occurring during pressing-in are dependent on several factors. The fitting situation should be arranged so that the bearing rib on the end face is not deformed.

If the application requires a fitting procedure different from the one described, fitting trials must be carried out in order to ensure that the bearings can be fitted correctly and without causing damage.



① Toroidal ring

Figure 1
Installation using a fitting mandrel

Accuracy

The main dimensions of the bearings conform to DIN 618/ISO 3 245.

The thin-walled outer rings adopt the dimensional and geometrical accuracy of the housing bore.

Enveloping circle

In the case of bearings without an inner ring, the dimension for the enveloping circle F_w is used instead of the radial internal clearance. The enveloping circle is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway.

Once the bearings are fitted, the enveloping circle F_w is approximately in tolerance zone F8; for bore tolerances to table, page 686. Deviations for the tolerance zone F8, see table, page 168.

Inspection dimensions

The enveloping circle is determined on the basis of the inspection dimensions in the table according to DIN 620-1.

Bearings used for enveloping circle measurement should not be repeatedly pushed in and out of the gauge. Bearings that have been checked in the ring gauge should not be used again.

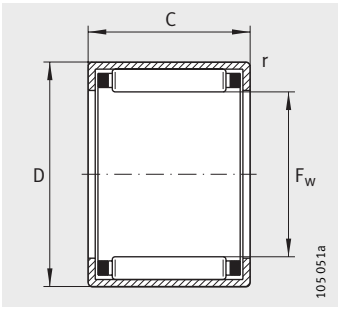
Inspection dimensions for drawn cup needle roller bearings

Enveloping circle	Outside diameter	Ring gauge bore Actual dimension	Enveloping circle	
			Upper deviation	Lower deviation
F_w mm	D mm	mm	µm	µm
2	4,6	4,587	+24	+6
3	6,5	6,484	+24	+6
4	8	7,984	+28	+10
5	9	8,984	+28	+10
6	10	9,984	+28	+10
7	11	10,980	+31	+13
8	12	11,980	+31	+13
9	13	12,980	+31	+13
10	14	13,980	+31	+13
12	16	15,980	+34	+16
12	18	17,980	+34	+16
13	19	18,976	+34	+16
14	20	19,976	+34	+16
15	21	20,976	+34	+16
16	22	21,976	+34	+16
17	23	22,976	+34	+16
18	24	23,976	+34	+16
20	26	25,976	+41	+20
22	28	27,976	+41	+20
25	32	31,972	+41	+20
28	35	34,972	+41	+20
30	37	36,972	+41	+20
32	39	38,972	+50	+25
35	42	41,972	+50	+25
40	47	46,972	+50	+25
45	52	51,967	+50	+25
50	58	57,967	+50	+25
55	63	62,967	+60	+30
60	68	67,967	+60	+30

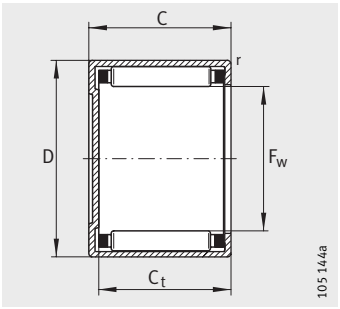
Drawn cup needle roller bearings with open ends

Drawn cup needle roller bearings with closed end

Unsealed



HK



BK

Dimension table · Dimensions in mm

Drawn cup needle roller bearings with open ends		Drawn cup needle roller bearings with closed end		Dimensions				
Designation	Mass m ≈g	Designation	Mass m ≈g	F_w	D	C –0,3	C_t min.	r min.
+ **HK0205-TV**	0,3	–	–	**2**	4,6	5	–	0,3
+ **HK0306-TV**	1	+ **BK0306-TV**	1	**3**	6,5	6	5,2	0,3
+ **HK0408**	2	+ **BK0408**	2,1	**4**	8	8	6,4	0,3
+ **HK0509**	2	+ **BK0509**	2,1	**5**	9	9	7,4	0,4
+ **HK0606**	1,5	–	–	**6**	10	6	–	0,4
+ **HK0608**	2,1	–	–	**6**	10	8	–	0,4
HK0609	2,5	**BK0609**	2,6	**6**	10	9	7,4	0,4
HK0709	2,6	**BK0709**	2,9	**7**	11	9	7,4	0,4
HK0808	2,7	**BK0808**	3	**8**	12	8	6,4	0,4
HK0810	3	**BK0810**	3,4	**8**	12	10	8,4	0,4
HK0908	3	–	–	**9**	13	8	–	0,4
HK0910	4	**BK0910**	4,3	**9**	13	10	8,4	0,4
HK0912	4,6	**BK0912**	4,9	**9**	13	12	10,4	0,4
HK1010	4,1	**BK1010**	4,3	**10**	14	10	8,4	0,4
HK1012	4,8	**BK1012**	5	**10**	14	12	10,4	0,4
HK1015	6	**BK1015**	6,2	**10**	14	15	13,4	0,4
HK1210	4,6	**BK1210**	5,2	**12**	16	10	8,4	0,4
HK1212	9	**BK1212**	10	**12**	18	12	9,3	0,8
HK1312	10	**BK1312**	11	**13**	19	12	9,3	0,8
HK1412	10,5	**BK1412**	12	**14**	20	12	9,3	0,8
HK1512	11	**BK1512**	13	**15**	21	12	9,3	0,8
HK1516	15	**BK1516**	17	**15**	21	16	13,3	0,8
HK1522-ZW	20	–	–	**15**	21	22	–	0,8
HK1612	12	**BK1612**	14	**16**	22	12	9,3	0,8
HK1616	16	**BK1616**	18	**16**	22	16	13,3	0,8
HK1622-ZW	22	**BK1622-ZW**	24	**16**	22	22	19,3	0,8
HK1712	12	–	–	**17**	23	12	–	0,8
HK1812	13	**BK1812**	15	**18**	24	12	9,3	0,8
HK1816	18	**BK1816**	20	**18**	24	16	13,3	0,8
HK2010	12	–	–	**20**	26	10	–	0,8
HK2012	14	–	–	**20**	26	12	–	0,8
HK2016	19	**BK2016**	22	**20**	26	16	13,3	0,8
HK2020	24	**BK2020**	27	**20**	26	20	17,3	0,8
HK2030-ZW	35	–	–	**20**	26	30	–	0,8

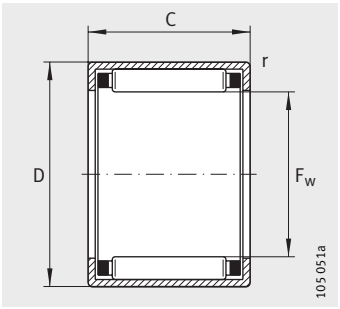
+ Not available with lubrication hole.

Basic load ratings		Fatigue limit load	Limiting speed	Reference speed	Suitable inner rings (to be ordered separately)	
dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G min^{-1}	n_B min^{-1}	LR Designation	IR Designation
465	265	28,5	58 000	93 000	–	–
1 230	840	113	48 000	57 000	–	–
1 780	1 310	144	42 500	44 500	–	–
2 400	1 990	239	39 000	36 500	–	–
1 610	1 220	167	36 500	31 500	–	–
2 030	1 650	184	36 500	31 500	–	–
2 850	2 600	310	36 500	30 500	–	–
3 100	2 950	355	33 000	26 500	–	–
2 750	2 600	290	29 500	23 800	–	–
3 800	3 950	500	29 500	23 200	–	**IR5X8X12**
3 550	3 750	440	26 500	20 600	–	–
4 250	4 650	600	26 500	20 600	–	–
5 300	6 300	860	26 500	20 200	–	**IR6X9X12**
4 400	5 100	650	24 300	18 700	**LR7X10X10,5**	**IR7X10X10,5**
5 500	6 800	930	24 300	18 400	–	**IR7X10X12**
6 800	8 800	1 210	24 300	18 200	–	**IR7X10X16**
4 950	6 200	800	20 700	15 700	**LR8X12X10,5**	**IR8X12X10,5**
6 500	7 300	860	20 000	15 500	**LR8X12X12,5**	**IR8X12X12,5**
6 800	7 900	940	18 700	14 400	**LR10X13X12,5**	**IR10X13X12,5**
7 100	8 500	1 010	17 500	13 500	–	**IR10X14X13**
7 900	9 400	1 150	16 300	12 300	**LR12X15X12,5**	**IR12X15X12,5**
10 500	14 400	1 780	16 500	12 300	**LR12X15X16,5**	**IR12X15X16,5**
13 400	19 500	2 380	16 500	12 300	**LR12X15X22,5**	**IR12X15X22,5**
7 600	9 700	1 160	15 600	11 900	–	**IR12X16X13**
10 900	15 300	1 900	15 600	11 600	–	**IR12X16X16**
13 100	19 400	2 310	15 600	11 700	–	**IR12X16X22**
7 900	10 300	1 230	14 700	11 200	–	–
8 100	10 900	1 300	14 000	10 700	**LR15X18X12,5**	–
11 600	17 300	2 140	14 000	10 400	**LR15X18X16,5**	**IR15X18X16,5**
6 400	8 200	1 040	12 700	10 000	–	–
8 600	12 100	1 450	12 700	9 700	–	**IR15X20X13**
12 700	20 100	2 500	12 700	9 300	**LR17X20X16,5**	**IR17X20X16,5**
15 700	26 000	3 500	12 700	9 300	**LR17X20X20,5**	**IR17X20X20,5**
21 800	40 000	5 000	12 700	9 200	**LR17X20X30,5**	**IR17X20X30,5**

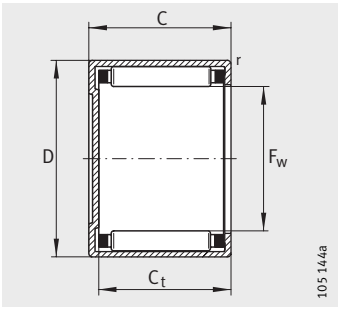
Drawn cup needle roller bearings with open ends

Drawn cup needle roller bearings with closed end

Unsealed



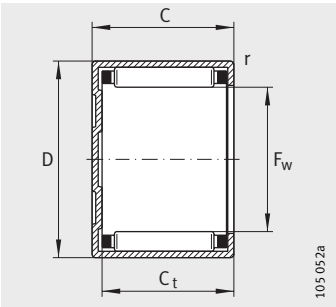
HK



BK with $F_w < 25$ mm

Dimension table (continued) · Dimensions in mm

Drawn cup needle roller bearings with open ends		Drawn cup needle roller bearings with closed end		Dimensions				
Designation	Mass m ≈g	Designation	Mass m ≈g	F_w	D	C –0,3	C_t min.	r min.
HK2210	13	–	–	**22**	28	10	–	0,8
HK2212	15	**BK2212**	18	**22**	28	12	9,3	0,8
HK2216	21	**BK2216**	24	**22**	28	16	13,3	0,8
HK2220	26	–	–	**22**	28	20	–	0,8
HK2512	20	–	–	**25**	32	12	–	0,8
HK2516	27	**BK2516**	32	**25**	32	16	13,3	0,8
HK2520	33	**BK2520**	38	**25**	32	20	17,3	0,8
HK2526	44	**BK2526**	48	**25**	32	26	23,3	0,8
HK2538-ZW	64	**BK2538-ZW**	68	**25**	32	38	35,3	0,8
HK2816	29	–	–	**28**	35	16	–	0,8
HK2820	36	–	–	**28**	35	20	–	0,8
HK3012	23	**BK3012**	28	**30**	37	12	9,3	0,8
HK3016	31	**BK3016**	38	**30**	37	16	13,3	0,8
HK3020	39	**BK3020**	47	**30**	37	20	17,3	0,8
HK3022	42	–	–	**30**	37	22	–	0,8
HK3026	51	**BK3026**	58	**30**	37	26	23,3	0,8
HK3038-ZW	76	**BK3038-ZW**	84	**30**	37	38	35,3	0,8
HK3220	40,6	–	–	**32**	39	20	–	0,8
HK3224	49	–	–	**32**	39	24	–	0,8
HK3512	27	–	–	**35**	42	12	–	0,8
HK3516	36	–	–	**35**	42	16	–	0,8
HK3520	44	**BK3520**	53	**35**	42	20	17,3	0,8
HK4012	30	–	–	**40**	47	12	–	0,8
HK4016	39	–	–	**40**	47	16	–	0,8
HK4020	54	**BK4020**	62	**40**	47	20	17,3	0,8
HK4512	33	–	–	**45**	52	12	–	0,8
HK4516	46	–	–	**45**	52	16	–	0,8
HK4520	56	**BK4520**	72	**45**	52	20	17,3	0,8
HK5020	70	–	–	**50**	58	20	–	0,8
HK5025	90	–	–	**50**	58	25	–	0,8
HK5520	74	–	–	**55**	63	20	–	0,8
HK5528	105	–	–	**55**	63	28	–	0,8
HK6012	49	–	–	**60**	68	12	–	0,8
HK6020	81	–	–	**60**	68	20	–	0,8
HK6032	136	–	–	**60**	68	32	–	0,8



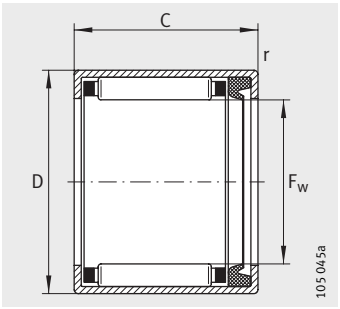
BK with $F_w \geqq 25$ mm

Basic load ratings		Fatigue limit load	Limiting speed	Reference speed	Suitable inner rings (to be ordered separately)	
dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G min^{-1}	n_B min^{-1}	LR Designation	IR Designation
7 500	10 500	1 360	11 700	9 000	–	–
9 100	13 400	1 600	11 700	8 900	–	**IR17X22X13**
13 400	22 100	2 800	11 700	8 500	–	**IR17X22X16**
16 500	29 000	3 850	11 700	8 500	–	**IR17X22X23**
11 000	15 200	1 990	10 200	7 800	**LR20X25X12,5**	–
15 600	24 000	3 150	10 200	7 500	**LR20X25X16,5**	**IR20X25X17**
19 900	33 000	4 200	10 200	7 400	**LR20X25X20,5**	**IR20X25X20,5**
25 500	45 000	6 200	10 200	7 300	**LR20X25X26,5**	**IR20X25X26,5**
34 000	66 000	8 400	10 200	7 300	**LR20X25X38,5**	**IR20X25X38,5**
16 400	26 500	3 450	9 200	6 800	–	**IR22X28X17**
20 900	36 000	4 650	9 200	6 700	**LR22X28X20,5**	**IR22X28X20,5**
12 100	18 200	2 390	8 600	6 600	**LR25X30X12,5**	–
17 200	29 000	3 750	8 600	6 400	**LR25X30X16,5**	**IR25X30X17**
22 000	39 500	5 100	8 600	6 300	**LR25X30X20,5**	**IR25X30X20,5**
24 800	46 000	6 100	8 600	6 200	–	–
28 000	54 000	7 400	8 600	6 200	**LR25X30X26,5**	**IR25X30X26,5**
37 500	79 000	10 100	8 600	6 200	**LR25X30X38,5**	**IR25X30X38,5**
23 000	42 500	5 500	8 100	5 900	**LR28X32X20**	–
27 500	54 000	7 300	8 100	5 800	–	–
13 100	21 300	2 800	7 500	5 800	**LR30X35X12,5**	–
18 700	33 500	4 400	7 500	5 600	**LR30X35X16,5**	**IR30X35X17**
23 800	46 000	5 900	7 500	5 500	**LR30X35X20,5**	**IR30X35X20,5**
14 000	24 300	3 200	6 600	5 200	**LR35X40X12,5**	–
20 000	38 500	5 000	6 600	5 000	**LR35X40X16,5**	**IR35X40X17**
25 500	52 000	6 800	6 600	4 900	**LR35X40X20,5**	**IR35X40X20,5**
14 900	27 500	3 600	5 900	4 650	–	–
21 300	43 000	5 700	5 900	4 550	**LR40X45X16,5**	**IR40X45X17**
27 000	59 000	7 600	5 900	4 450	**LR40X45X20,5**	**IR40X45X20,5**
31 000	63 000	8 200	5 300	4 050	**LR45X50X20,5**	–
38 500	84 000	11 700	5 300	4 000	**LR45X50X25,5**	**IR45X50X25,5**
31 500	67 000	8 700	4 850	3 800	**LR50X55X20,5**	–
44 000	103 000	14 700	4 850	3 700	–	–
17 400	32 000	4 250	4 450	3 750	–	–
33 500	75 000	9 800	4 450	3 500	–	–
53 000	135 000	19 700	4 450	3 400	–	–

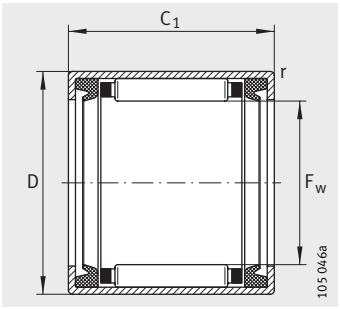
Drawn cup needle roller bearings with open ends

Drawn cup needle roller bearings with closed end

Sealed



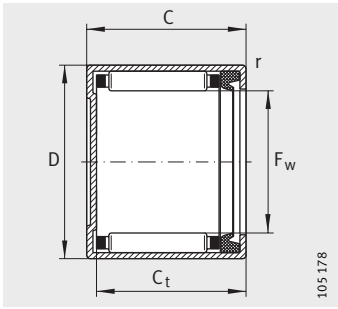
HK..-RS



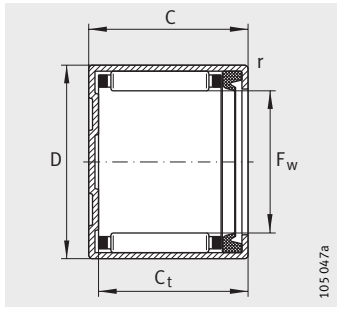
HK..-2RS

Dimension table · Dimensions in mm

Drawn cup needle roller bearings with open ends				**Drawn cup needle roller bearings with closed end**		Dimensions			
Sealed on one side		Sealed on both sides		Sealed					
Designation	Mass m ≈g	Designation	Mass m ≈g	Designation	Mass m ≈g	F_w	D	C –0,3	C_1 –0,3
–	–	**HK0810-2RS**	3,2	–	–	**8**	12	–	10
HK0810-RS	3	**HK0812-2RS**	3,3	–	–	**8**	12	10	12
HK0812-RS	3,1	–	–	–	–	**8**	12	12	–
–	–	**HK1012-2RS**	4,3	–	–	**10**	14	–	12
HK1012-RS	4,2	**HK1014-2RS**	4,6	**BK1012-RS**	4,3	**10**	14	12	14
–	–	**HK1214-2RS**	8	–	–	**12**	16	–	14
HK1214-RS	10	**HK1216-2RS**	11	–	–	**12**	18	14	16
HK1414-RS	12	**HK1416-2RS**	13	**BK1414-RS**	13	**14**	20	14	16
HK1514-RS	12	**HK1516-2RS**	15	–	–	**15**	21	14	16
HK1518-RS	16	**HK1520-2RS**	18	–	–	**15**	21	18	20
HK1614-RS	13	**HK1616-2RS**	14	**BK1614-RS**	15	**16**	22	14	16
–	–	**HK1620-2RS**	18	–	–	**16**	22	–	20
HK1814-RS	14	**HK1816-2RS**	15	–	–	**18**	24	14	16
–	–	**HK2016-2RS**	18	–	–	**20**	26	–	16
HK2018-RS	21	**HK2020-2RS**	23	**BK2018-RS**	24	**20**	26	18	20
HK2214-RS	16	**HK2216-2RS**	18	–	–	**22**	28	14	16
HK2218-RS	24	**HK2220-2RS**	26	–	–	**22**	28	18	20
–	–	**HK2516-2RS**	27	–	–	**25**	32	–	16
HK2518-RS	29	**HK2520-2RS**	31	**BK2518-RS**	34	**25**	32	18	20
–	–	**HK2524-2RS**	40	–	–	**25**	32	–	24
–	–	**HK2530-2RS**	47	–	–	**25**	32	–	30
HK2818-RS	31	**HK2820-2RS**	34	–	–	**28**	35	18	20
–	–	**HK3016-2RS**	31	–	–	**30**	37	–	16
HK3018-RS	37	**HK3020-2RS**	36	–	–	**30**	37	18	20
–	–	**HK3024-2RS**	44	–	–	**30**	37	–	24
–	–	**HK3516-2RS**	32	–	–	**35**	42	–	16
HK3518-RS	39	**HK3520-2RS**	41	–	–	**35**	42	18	20
–	–	**HK4016-2RS**	37	–	–	**40**	47	–	16
HK4018-RS	45	**HK4020-2RS**	48	–	–	**40**	47	18	20
HK4518-RS	50	**HK4520-2RS**	54	–	–	**45**	52	18	20
HK5022-RS	76	**HK5024-2RS**	81	–	–	**50**	58	22	24



BK..-RS with $F_w < 25$ mm

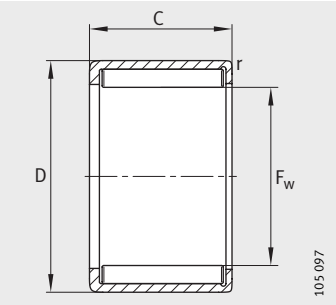


BK..-RS with $F_w \geqq 25$ mm

		Basic load ratings		Fatigue limit load	Limiting speed	Suitable inner rings (to be ordered separately)		
C_t	r	dyn. C_r	stat. C_{0r}	C_{ur}	n_G grease	For HK..-RS and HK..-2RS		For BK..-RS, LR, IR
min.	min.	N	N	N	min^{-1}	LR Designation	IR Designation	Designation
–	0,4	2 180	1 930	265	20 000	–	–	–
–	0,4	2 750	2 600	290	20 000	–	–	–
–	0,4	3 800	3 950	500	20 000	–	–	–
–	0,4	3 200	3 350	380	17 000	–	–	–
–	0,4	4 400	5 100	650	17 000	–	–	–
–	0,4	4 950	6 200	800	14 000	–	–	–
–	0,8	6 500	7 300	860	14 000	–	–	–
11,3	0,8	7 100	8 500	1 010	12 000	–	–	–
–	0,8	7 800	9 800	1 190	11 000	**LR12X15X16,5**	**IR12X15X16,5**	**LR12X15X12,5**
–	0,8	10 500	14 400	1 780	11 000	–	–	–
11,3	0,8	7 600	9 700	1 160	11 000	–	**IR12X16X20**	**IR12X16X13**
–	0,8	10 900	15 300	1 900	11 000	–	–	–
–	0,8	8 100	10 900	1 300	9 500	**LR15X18X16,5**	**IR15X18X16,5**	–
–	0,8	8 600	12 100	1 450	8 500	**LR17X20X16,5**	**IR17X20X16,5**	–
15,3	0,8	12 700	20 100	2 500	8 500	**LR17X20X20,5**	**IR17X20X20,5**	**LR17X20X16,5**
–	0,8	9 100	13 400	1 600	8 000	–	**IR17X22X16**	–
–	0,8	13 400	22 100	2 800	8 000	–	**IR17X22X23**	–
–	0,8	11 000	15 200	1 990	7 000	**LR20X25X16,5**	**IR20X25X17**	–
15,3	0,8	15 600	24 000	3 150	7 000	**LR20X25×20,5**	**IR20X25X20,5**	**LR20X25X16,5**
–	0,8	19 900	33 000	4 200	7 000	–	–	–
–	0,8	25 500	45 000	6 200	7 000	–	**IR20X25X30**	–
–	0,8	16 400	26 500	3 450	6 000	**LR22X28X20,5**	**IR22X28X20,5**	–
–	0,8	12 100	18 200	2 390	6 000	**LR25X30X16,5**	**IR25X30X17**	–
–	0,8	17 200	29 000	3 750	6 000	**LR25X30X20,5**	**IR25X30X20,5**	–
–	0,8	22 000	39 500	5 100	6 000	–	–	–
–	0,8	13 100	21 300	2 800	5 000	**LR30X35X16,5**	**IR30X35X17**	–
–	0,8	18 700	33 500	4 400	5 000	**LR30X35X20,5**	**IR30X35X20,5**	–
–	0,8	14 000	24 300	3 200	4 500	**LR35X40X16,5**	**IR35X40X17**	–
–	0,8	20 000	38 500	5 000	4 500	**LR35X40X20,5**	**IR35X40X20,5**	–
–	0,8	21 300	43 000	5 700	4 000	**LR40X45X20,5**	**IR40X45X20,5**	–
–	0,8	31 000	63 000	8 200	3 600	**LR45X50X25,5**	**IR45X50X25,5**	–

Drawn cup needle roller bearings with open ends

Full complement needle roller set
Unsealed

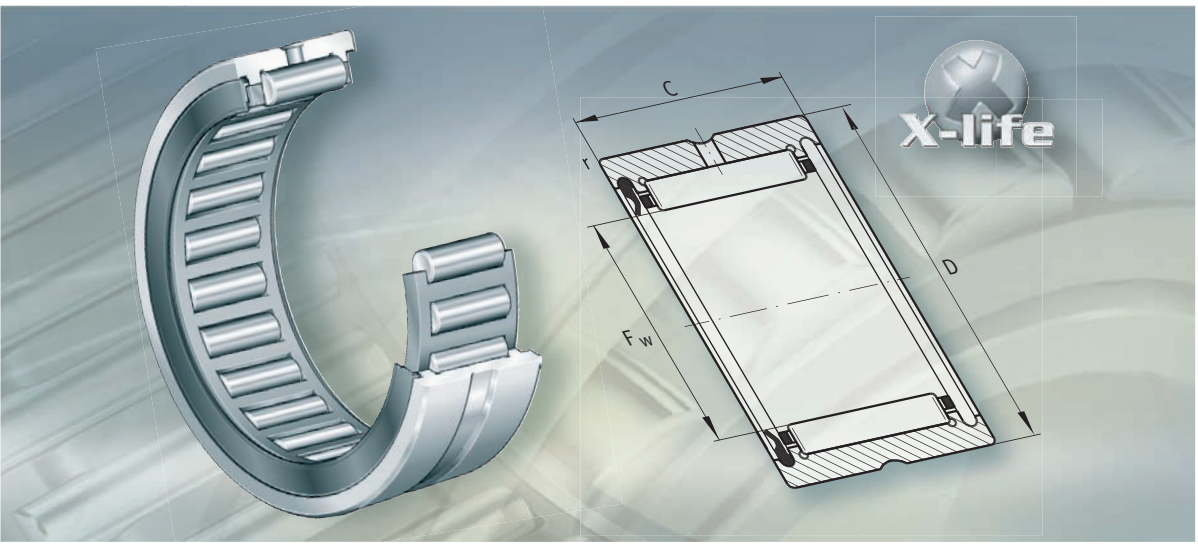


HN

Dimension table · Dimensions in mm

Designation	Mass	Dimensions				Basic load ratings	
	m	F_w	D	C	r	dyn. C_r	stat. C_{0r}
	≈g				min.	N	N
HN0808	3	**8**	12	8	0,4	5 000	6 700
HN1010	4,6	**10**	14	10	0,4	7 200	11 100
HN1210	5,3	**12**	16	10	0,4	8 000	13 400
HN1212	10,5	**12**	18	12	0,8	10 200	15 200
HN1412	12	**14**	20	12	0,8	11 000	17 500
HN1516	14	**15**	21	16	0,8	15 400	27 500
HN1612	13	**16**	22	12	0,8	12 000	20 300
HN1816	20	**18**	24	16	0,8	17 000	32 500
HN2016	22	**20**	26	16	0,8	18 100	36 500
HN2020	29,5	**20**	26	20	0,8	22 400	48 000
HN2520	39,6	**25**	32	20	0,8	28 000	59 000
HN2820	44	**28**	35	20	0,8	30 000	67 000
HN3520	54	**35**	42	20	0,8	33 500	83 000
HN4020	60,5	**40**	47	20	0,8	36 000	95 000
HN4520	66	**45**	52	20	0,8	38 500	108 000
HN4525	85	**45**	52	25	0,8	47 000	139 000
HN5020	85,3	**50**	58	20	0,8	44 500	119 000
HN5025	107	**50**	58	25	0,8	54 000	152 000

Fatigue limit load	Limiting speed	Reference speed	Suitable inner rings (to be ordered separately)	
C_{ur}	n_G grease	n_B	LR Designation	IR Designation
N	min^{-1}	min^{-1}		
870	12 700	18 000	–	–
1 540	10 400	14 200	**LR7X10X10,5**	**IR7X10X10,5**
1 850	8 900	11 900	**LR8X12X10,5**	**IR8X12X10,5**
1 950	8 900	11 400	**LR8X12X12,5**	**IR8X12X12,5**
2 260	7 500	10 400	–	**IR10X14X13**
3 600	7 100	9 600	**LR12X15X16,5**	**IR12X15X16,5**
2 600	6 700	9 200	–	**IR12X16X13**
4 250	6 000	8 000	**LR15X18X16,5**	**IR15X18X16,5**
4 750	5 400	7 300	**LR17X20X16,5**	**IR17X20X16,5**
6 600	5 400	7 200	**LR17X20X20,5**	**IR17X20X20,5**
7 900	4 350	5 800	**LR20X25X20,5**	**IR20X25X20,5**
9 000	3 950	5 200	**LR22X28X20,5**	**IR22X28X20,5**
11 100	3 200	4 250	**LR30X35X20,5**	**IR30X35X20,5**
12 700	2 800	3 750	**LR35X40X20,5**	**IR35X40X20,5**
14 500	2 500	3 400	**LR40X45X20,5**	**IR40X45X20,5**
19 500	2 500	3 350	–	–
16 200	2 260	3 100	**LR45X50X20,5**	–
21 700	2 260	3 050	**LR45X50X25,5**	**IR45X50X25,5**



Machined needle roller bearings

Needle roller bearings with ribs
Needle roller bearings without ribs
Aligning needle roller bearings
Combined needle roller bearings
Inner rings

Machined needle roller bearings

X-life
Needle roller bearings with ribs

... **702**

In needle roller bearings with ribs, the outer ring forms a self-retaining unit with the needle roller and cage assembly. These radially compact bearings with high load capacity are highly suitable for designs with limited radial space. The bearings are available with and without inner ring and in both sealed and open versions.

Bearings without an inner ring are the best solution for bearing arrangements where the shaft can be hardened and ground.

Needle roller bearings with inner ring are used if the shaft is not configured as a rolling bearing raceway.

X-life
Needle roller bearings without ribs

... **736**

Needle roller bearings without ribs on the outer ring are not self-retaining. This means that the outer ring, needle roller and cage assembly and inner ring can be fitted independently of each other. This makes fitting of the bearings considerably easier.

The bearings are available with and without an inner ring and in single row and double row designs. Bearings without an inner ring are used if the shaft is hardened and ground.

X-life
Aligning needle roller bearings

... **750**

Aligning needle roller bearings have a raceway ring with a spherical outside surface and a concave support ring. As a result, they can compensate for static misalignment of the bearing axis by up to 3°, but are not suitable for supporting swivel or tumbling motion.

The bearings are available with and without an inner ring. Bearings without an inner ring are used if the shaft is hardened and ground.

X-life
Combined needle roller bearings

... **758**

Combined needle roller bearings are radial bearings with an axial component capable of supporting loads. They are used as locating or semi-locating bearings and do not permit any skewing between the shaft and housing.

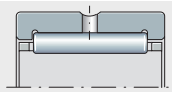
The bearings are available with and without an inner ring. Bearings without an inner ring are used if the shaft is hardened and ground.

Inner rings

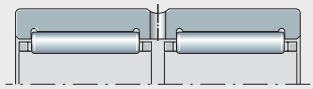
... **776**

Inner rings are used as raceways for rolling elements or seal lips where the shaft is unsuitable for this purpose.

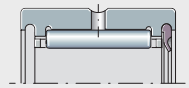
Where there is considerable axial displacement between the shaft and housing, wider inner rings can be used.



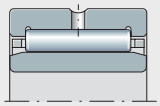
NK, NKS,
RNA48, RNA49, RNA69



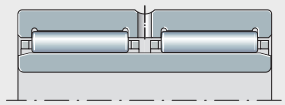
RNA69..-ZW



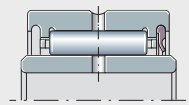
RNA49..-RSR



NKI, NKIS,
NA48, NA49, NA69

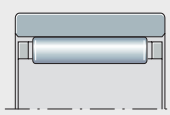


NA69..-ZW

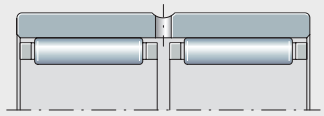


NA49..-RSR

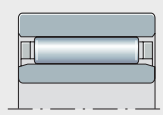
0001390 7



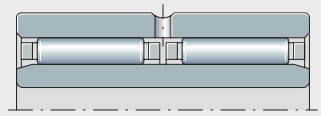
RNAO



RNAO..-ZW

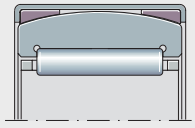


NAO

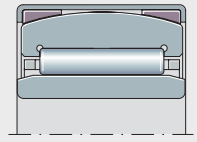


NAO..-ZW

105 174

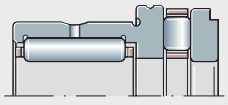


RPNA

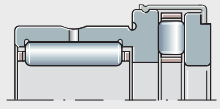


PNA

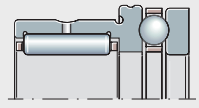
106 016c



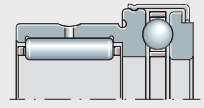
NKXR



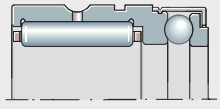
NKXR..-Z



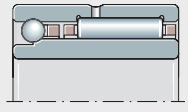
NKX



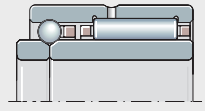
NKX..-Z



NX, NX..-Z

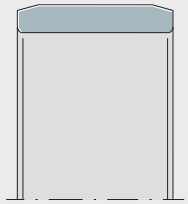


NKIA

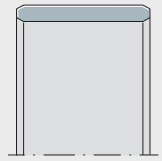


NKIB

107 545

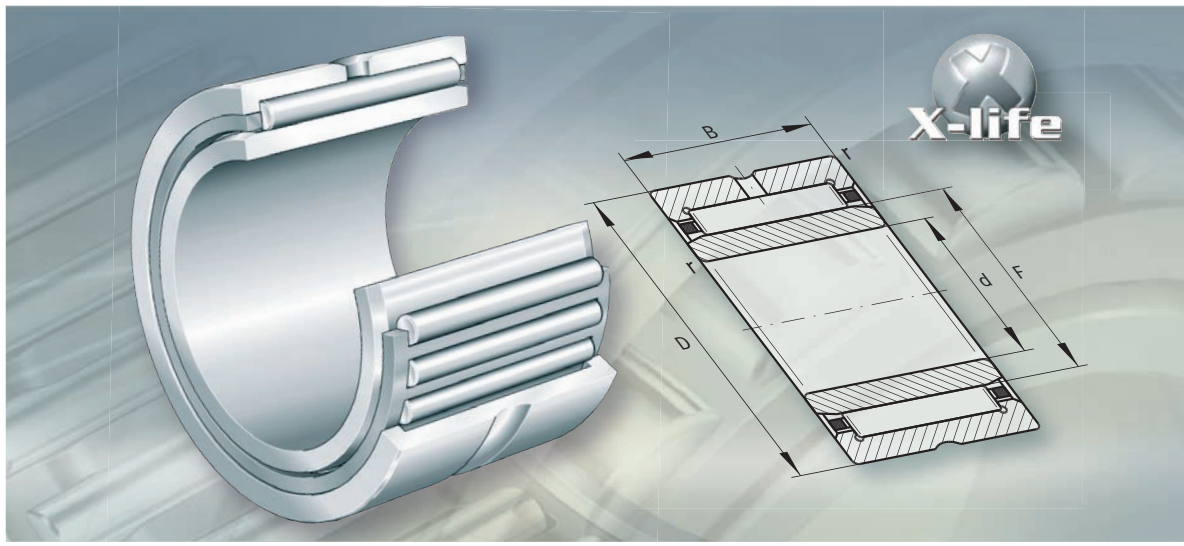


IR, IR..-IS1



LR

103 267



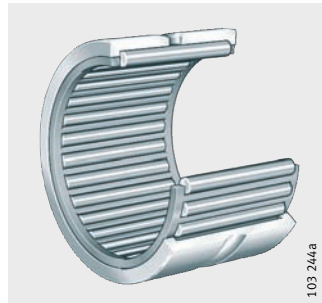
Needle roller bearings with ribs

Needle roller bearings with ribs

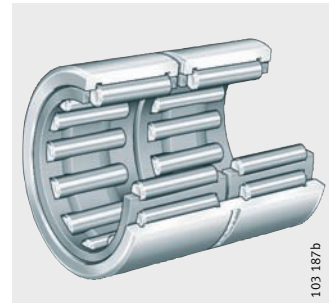
		Page
Product overview	Needle roller bearings with ribs	704
Features	X-life	705
	Needle roller bearings without inner ring	705
	Needle roller bearings with inner ring	705
	Sealing	705
	Lubrication	705
	Sealing rings and wider inner rings	706
	Operating temperature	706
	Cages	706
	Suffixes	706
Design and safety guidelines	Minimum radial load	707
	Speeds	707
	Design of bearing arrangements	707
Accuracy	Radial internal clearance	709
	Enveloping circle	709
Dimension tables	Needle roller bearings without inner ring	710
	Needle roller bearing with inner ring	722
	Needle roller bearings without inner ring, sealed	734
	Needle roller bearings with inner ring, sealed	735

Without inner ring
Single row or double row

NK, NKS, RNA48, RNA49, RNA69

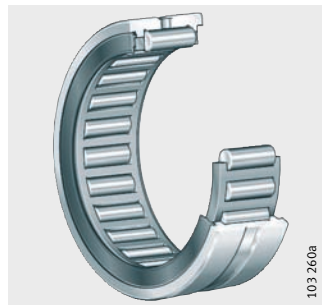


RNA69..-ZW

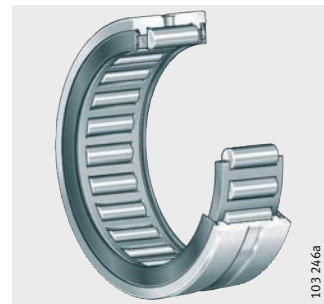


Lip seals

RNA49..-RSR

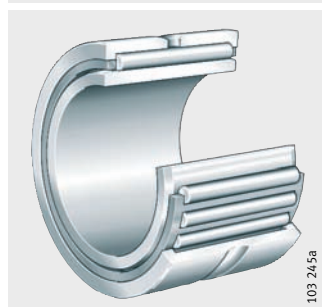


RNA49..-2RSR

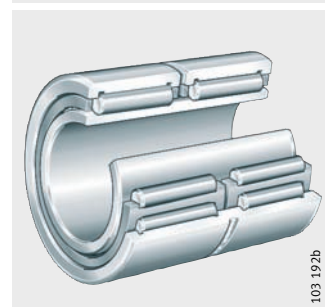


With inner ring
Single row or double row

NKI, NKIS, NA48, NA49, NA69

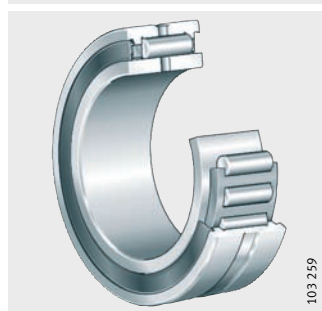


NA69..-ZW

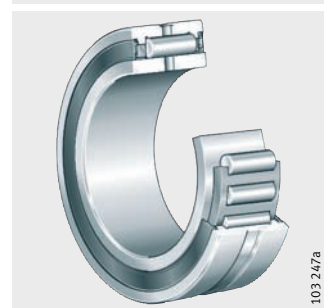


Lip seals

NA49..-RSR



NA49..-2RSR



Needle roller bearings with ribs

Features

Needle roller bearings with ribs are single or double row units comprising machined outer rings with ribs, needle roller and cage assemblies and removable inner rings.

X-life

Needle roller bearings with ribs are X-life bearings.
These bearings have optimised raceway surfaces.
This gives higher load carrying capacity and longer rating life.

Needle roller bearings without inner ring

Bearings without inner ring have particularly compact radial dimensions. However, they require a shaft raceway that is hardened and ground.

The bearings are of a single row design, RNA69 is of a double row design from $F_w \geqq 40$ mm.

Needle roller bearings with inner ring

Bearings with an inner ring are used if the shaft is not configured as a rolling bearing raceway.

The bearings are of a single row design, NA69 is of a double row design from $d \geqq 32$ mm.

Displacement of the inner ring

The standard inner ring allows axial displacement within the values “s” stated in the dimension tables. Where larger displacements occur, the standard ring can be replaced by a wider inner ring IR. Inner rings: see pages starting page 776.

Sealing

Series RNA49..-RSR and NA49..-RSR are sealed on one side.
The designs RNA49..-2RSR and NA49..-2RSR have contact seals on both sides.

Lubrication

The bearings are greased using the lithium complex soap grease GA08. Arcanol LOAD150 is suitable for relubrication. For this purpose, the outer ring has a lubrication groove and a lubrication hole.

There is no relubrication facility in series NK with $F_w \leqq 10$ mm and NKI with $d \leqq 7$ mm.

Sealing rings and wider inner rings

The bearings can be sealed against external influences using sealing rings of series G, GR and SD in combination with wider inner rings IR. The sealing rings and inner rings are matched to the needle roller bearings.

The outer surface of the inner rings can be used as the sliding surface for seal lips.

Sealing rings: see page 804, and TPI 128, Sealing rings, single lip and double lip.

Operating temperature

Open bearings can be used at operating temperatures from –20 °C to +120 °C.

Sealed needle roller bearings are suitable for operating temperatures from –20 °C to +100 °C, restricted by the grease and seal material.

Cages

The cages are made from sheet steel or plastic.
Bearings with a plastic cage have the suffix TV.

Before using bearings with plastic cages, the compatibility of the lubricant used with the cage material (PA66-GF/H) must be checked.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
C3	Radial internal clearance larger than normal	Special design, available by agreement
P5	High dimensional and geometrical accuracy	
RSR	Contact seal on one side	Standard
TV	Bearing with cage made from glass fibre reinforced polyamide 66	
ZW	Double row design, dependent on the size	
2RSR	Contact seals on both sides	

Design and safety guidelines

Minimum radial load

In order to ensure operation without slippage, the bearings must be subjected to a minimum load $F_{r\,min}$ in a radial direction. This applies in particular to high speed bearings since, if the radial load is insufficient or not present, damaging sliding motion may occur between the rolling elements and raceways. In continuous operation, a minimum radial load of the order of $C_r/P < 50$ is necessary.

Speeds

The limiting speeds n_G given in the dimension tables for RNA49..-RSR (2RSR) and NA49..-RSR (2RSR) are valid for grease lubrication.

Design of bearing arrangements

Shaft and housing tolerances

Recommended shaft tolerances for bearings with an inner ring, see page 150.

For the design of shafts for bearings without an inner ring, see the section Raceway for bearings without inner ring and the association table.

Recommended housing tolerances, see page 152.

Raceway for bearings without inner ring

Where bearings without an inner ring are to be used, the rolling element raceway on the shaft must be hardened and ground, see table. The surface hardness of the raceway must be 670 HV + 170 HV, the hardening depth CHD or SHD must be sufficiently large.

The values in the tables are valid for housing tolerances up to K7. For tighter housing bores, the operating clearance should be checked by either calculation or measurement.

If the surface of the shaft raceway is produced to DIN 617, the basic load ratings C_r in the dimension tables must be reduced by 15%.

Raceway design

Shaft							
Diameter Nominal dimension mm		Tolerance Bearing clearance			Roughness max.	Roundness max.	Parallelism max.
over	incl.	Small	Normal	Large			
–	65	k5	h5	g6	R_a0,1 (R_z0,4)	IT3	IT3
65	80	k5	h5	f6			
80	120	k5	g5	f6	R_a0,15 (R_z0,63)		
120	160	k5	g5	f6	R_a0,2 (R_z1)		
160	180	k5	g5	e6			
180	200	j5	g5	e6			
200	250	j5	f6	e6			
250	315	h5	f6	e6			
315	415	g5	f6	d6			

Replacement of inner rings

In needle roller bearings with ribs, the inner ring is not self-retaining.

In the standard bearings, the inner rings are matched to the enveloping circle tolerance F6 and can be interchanged with each other within the same accuracy class.

Radial location

Needle roller bearings with an inner ring are radially located by means of a fit on the shaft and in the housing.

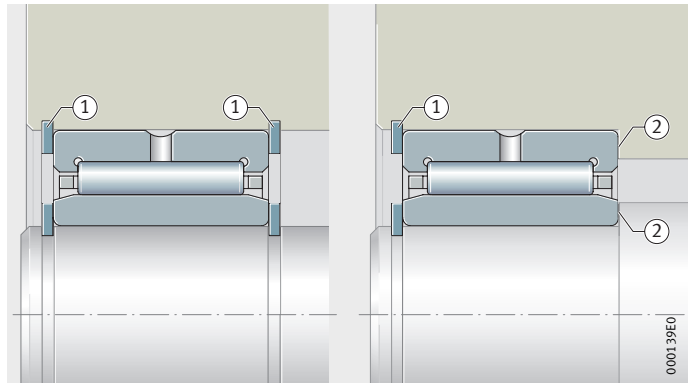
Axial location

In order to prevent lateral creep of the bearing rings, they must be located by means of physical locking, *Figure 1*.

The abutment shoulders (shaft, housing) should be sufficiently high and perpendicular to the bearing axis. The transition from the bearing seat to the abutment shoulder must be designed with rounding to DIN 5 418 or an undercut to DIN 509. The minimum values for the chamfer dimensions r in the dimension tables must be observed.

The overlap between the snap rings and the end faces of the bearing rings must be sufficiently large, *Figure 1*.

Maximum inner ring chamfer dimensions to DIN 620-6 must be taken into consideration.



NA49

① Snap rings
② Abutment shoulders

Figure 1
Axial location of bearing rings

Accuracy

The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620.

Radial internal clearance

Bearings with inner ring have a radial internal clearance CN to DIN 620-4.

Radial internal clearance

Bore d mm		Radial internal clearance			
		CN µm		C3 µm	
over	incl.	min.	max.	min.	max.
–	24	20	45	35	60
24	30	20	45	35	60
30	40	25	50	45	70
40	50	30	60	50	80
50	65	40	70	60	90
65	80	40	75	65	100
80	100	50	85	75	110
100	120	50	90	85	125
120	140	60	105	100	145
140	160	70	120	115	165
160	180	75	125	120	170
180	200	90	145	140	195
200	225	105	165	160	220
225	250	110	175	170	235
250	280	125	195	190	260
280	315	130	205	200	275
315	355	145	225	225	305
355	400	190	280	280	370
400	450	210	310	310	410
450	500	220	330	330	440

Enveloping circle

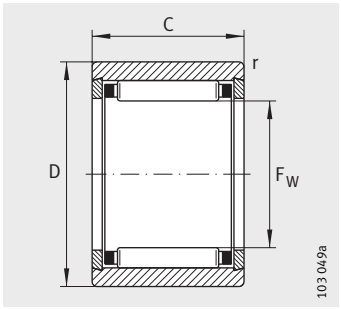
In the case of bearings without an inner ring, the dimension for the enveloping circle F_w is used instead of the radial internal clearance.

The enveloping circle is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway.

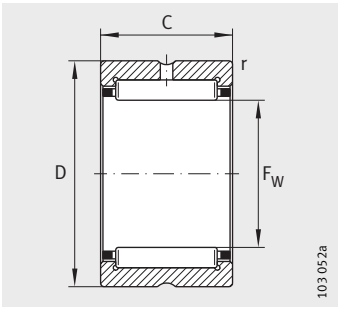
For bearings before fitting, the enveloping circle F_w is in the tolerance zone F6. Deviations for the tolerance zone F6: see table, page 168.

Needle roller bearings

Without inner ring



NK ($F_w \leqq 10$ mm)



NK ($F_w \geqq 12$ mm), RNA49, RNA69

Dimension table · Dimensions in mm

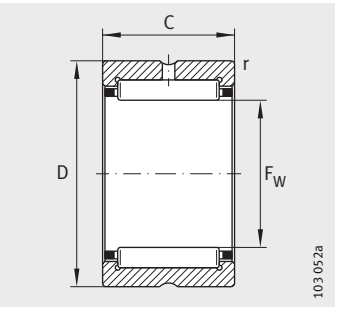
Designation			X-life	Mass m ≈g	Dimensions F_w	D	C	r min.
NK5/10-TV[1]	–	–	**XL**	3,1	**5**	10	10	0,15
NK5/12-TV[1]	–	–	**XL**	3,7	**5**	10	12	0,15
NK6/10-TV[1]	–	–	**XL**	4,7	**6**	12	10	0,15
NK6/12-TV[1]	–	–	**XL**	5,7	**6**	12	12	0,15
NK7/10-TV[1]	–	–	**XL**	6,9	**7**	14	10	0,3
NK7/12-TV[1]	–	–	**XL**	8,2	**7**	14	12	0,3
NK8/12-TV[1]	–	–	**XL**	8,7	**8**	15	12	0,3
NK8/16-TV[1]	–	–	**XL**	12	**8**	15	16	0,3
NK9/12-TV[1]	–	–	**XL**	10,3	**9**	16	12	0,3
NK9/16-TV[1]	–	–	**XL**	12,8	**9**	16	16	0,3
NK10/12-TV[1]	–	–	**XL**	10,1	**10**	17	12	0,3
NK10/16-TV[1]	–	–	**XL**	13,3	**10**	17	16	0,3
NK12/12	–	–	**XL**	12,1	**12**	19	12	0,3
NK12/16	–	–	**XL**	15,9	**12**	19	16	0,3
NK14/16	–	–	**XL**	20,7	**14**	22	16	0,3
NK14/20	–	–	**XL**	25,5	**14**	22	20	0,3
–	**RNA4900**	–	**XL**	16,5	**14**	22	13	0,3
NK15/16	–	–	**XL**	21,8	**15**	23	16	0,3
NK15/20	–	–	**XL**	26,6	**15**	23	20	0,3
NK16/16	–	–	**XL**	22,4	**16**	24	16	0,3
NK16/20	–	–	**XL**	28,4	**16**	24	20	0,3
–	**RNA4901**	–	**XL**	17,4	**16**	24	13	0,3
–	–	**RNA6901**	**XL**	31	**16**	24	22	0,3
NK17/16	–	–	**XL**	23,7	**17**	25	16	0,3
NK17/20	–	–	**XL**	29,8	**17**	25	20	0,3
NK18/16	–	–	**XL**	24,9	**18**	26	16	0,3
NK18/20	–	–	**XL**	31,4	**18**	26	20	0,3
NK19/16	–	–	**XL**	26,1	**19**	27	16	0,3
NK19/20	–	–	**XL**	32,2	**19**	27	20	0,3

[1] With closing rings, without lubrication hole and groove.

Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
N	N	N	min^{-1}	min^{-1}
2 650	1 920	295	39 000	55 000
3 400	2 650	435	39 000	54 000
2 950	2 280	355	36 500	48 500
3 800	3 150	520	36 500	47 500
3 250	2 650	410	34 500	43 000
4 150	3 600	600	34 500	42 000
4 450	4 100	690	32 500	37 000
5 800	5 800	970	32 500	36 500
5 100	5 000	840	31 000	32 000
6 600	7 100	1 190	31 000	32 000
5 300	5 500	930	29 500	29 000
7 000	7 800	1 310	29 500	28 500
7 200	7 100	1 280	26 500	22 400
10 100	11 000	1 920	26 500	21 600
11 400	11 500	2 100	24 600	18 600
14 500	15 600	2 700	24 600	18 300
9 600	9 200	1 630	23 600	15 400
12 100	12 700	2 320	23 900	17 300
15 400	17 200	3 000	23 900	17 000
12 800	13 900	2 550	23 200	16 200
16 300	18 800	3 250	23 200	15 900
10 600	10 900	1 940	23 200	15 900
18 100	21 600	3 800	23 200	15 900
13 500	15 000	2 750	22 600	15 300
17 100	20 400	3 550	22 600	15 000
14 100	16 200	3 000	22 100	14 400
17 900	22 000	3 850	22 100	14 100
14 700	17 400	3 200	21 600	13 700
18 700	23 600	4 150	21 600	13 400

Needle roller bearings

Without inner ring
Open



NK, NKS, RNA49, RNA69

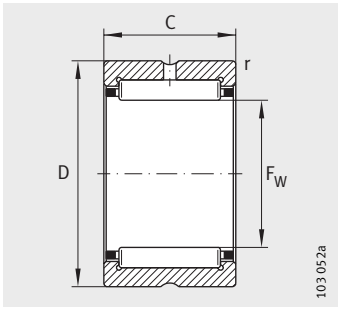
Dimension table (continued) · Dimensions in mm

Designation					Mass	Dimensions			
				X-life	m ≈g	F_w	D	C	r min.
NK20/16	–	–	–	**XL**	27	**20**	28	16	0,3
NK20/20	–	–	–	**XL**	33,9	**20**	28	20	0,3
–	**RNA4902**	–	–	**XL**	21,7	**20**	28	13	0,3
–	–	**RNA6902**	–	**XL**	39,7	**20**	28	23	0,3
–	–	–	**NKS20**	**XL**	48,7	**20**	32	20	0,6
NK21/16	–	–	–	**XL**	28,1	**21**	29	16	0,3
NK21/20	–	–	–	**XL**	35,2	**21**	29	20	0,3
NK22/16	–	–	–	**XL**	30	**22**	30	16	0,3
NK22/20	–	–	–	**XL**	37	**22**	30	20	0,3
–	**RNA4903**	–	–	**XL**	22,2	**22**	30	13	0,3
–	–	**RNA6903**	–	**XL**	42,4	**22**	30	23	0,3
–	–	–	**NKS22**	**XL**	61,5	**22**	35	20	0,6
NK24/16	–	–	–	**XL**	31,9	**24**	32	16	0,3
NK24/20	–	–	–	**XL**	40	**24**	32	20	0,3
–	–	–	**NKS24**	**XL**	65,5	**24**	37	20	0,6
NK25/16	–	–	–	**XL**	32,6	**25**	33	16	0,3
NK25/20	–	–	–	**XL**	42	**25**	33	20	0,3
–	**RNA4904**	–	–	**XL**	52,3	**25**	37	17	0,3
–	–	**RNA6904**	–	**XL**	100	**25**	37	30	0,3
–	–	–	**NKS25**	**XL**	68,1	**25**	38	20	0,6
NK26/16	–	–	–	**XL**	34	**26**	34	16	0,3
NK26/20	–	–	–	**XL**	42	**26**	34	20	0,3
NK28/20	–	–	–	**XL**	52,2	**28**	37	20	0,3
NK28/30	–	–	–	**XL**	82	**28**	37	30	0,3
–	**RNA49/22**	–	–	**XL**	50,2	**28**	39	17	0,3
–	–	**RNA69/22**	–	**XL**	98	**28**	39	30	0,3
–	–	–	**NKS28**	**XL**	83,6	**28**	42	20	0,6
NK29/20-TV	–	–	–	**XL**	50	**29**	38	20	0,3
NK29/30	–	–	–	**XL**	84,3	**29**	38	30	0,3
NK30/20-TV	–	–	–	**XL**	61	**30**	40	20	0,3
NK30/30-TV	–	–	–	**XL**	92,4	**30**	40	30	0,3
–	**RNA4905**	–	–	**XL**	61	**30**	42	17	0,3
–	–	**RNA6905**	–	**XL**	112	**30**	42	30	0,3
–	–	–	**NKS30**	**XL**	104	**30**	45	22	0,6

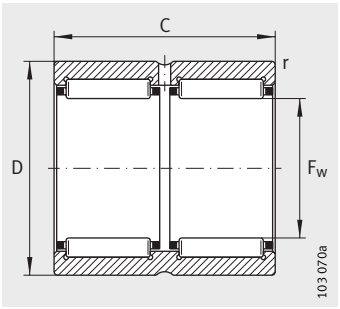
Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
N	N	N	min^{-1}	min^{-1}
14 600	17 500	3 200	21 100	13 200
18 600	23 800	4 150	21 100	12 900
12 000	13 600	2 430	20 400	10 800
19 500	25 500	4 450	20 400	10 600
26 000	25 000	4 400	18 800	10 700
15 200	18 700	3 450	20 600	12 600
19 300	25 500	4 450	20 600	12 300
15 800	19 900	3 650	20 000	12 000
20 000	27 000	4 700	20 000	11 700
12 400	14 600	2 600	18 800	9 900
21 100	29 000	5 100	18 800	9 500
27 500	28 000	4 900	17 200	9 700
16 900	22 300	4 100	18 500	11 000
21 400	30 500	5 300	18 500	10 700
29 500	31 000	5 400	16 100	9 100
16 800	22 400	4 150	17 800	10 700
21 300	30 500	5 300	17 800	10 400
23 700	25 500	4 600	15 800	8 900
40 500	51 000	9 100	15 800	8 500
31 000	33 500	5 800	15 600	8 700
17 300	23 600	4 350	17 200	10 300
22 000	32 000	5 600	17 200	10 100
24 800	34 000	5 900	15 800	9 300
37 000	57 000	10 500	15 800	9 000
26 000	29 500	5 300	14 600	8 000
42 000	55 000	9 900	14 600	7 800
32 500	36 500	6 400	14 000	7 900
27 500	39 000	6 900	15 300	8 700
37 000	57 000	10 600	15 300	8 800
28 000	41 000	7 200	14 800	8 500
42 000	69 000	12 700	14 800	8 200
26 500	31 500	5 700	13 600	7 400
44 000	59 000	10 600	13 600	7 200
36 500	40 000	6 900	13 100	7 600

Needle roller bearings

Without inner ring
Open



NK, NKS, RNA49, RNA69



RNA69..-ZW

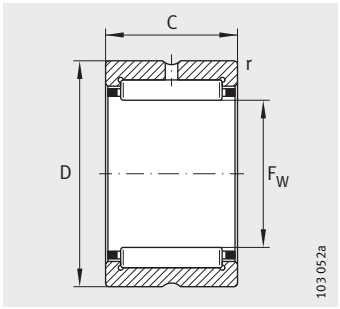
Dimension table (continued) · Dimensions in mm

Designation					Mass	Dimensions			
				X-life	m ≈g	F_w	D	C	r min.
NK32/20-TV	–	–	–	**XL**	64	**32**	42	20	0,3
NK32/30	–	–	–	**XL**	102	**32**	42	30	0,3
–	**RNA49/28**	–	–	**XL**	73,2	**32**	45	17	0,3
–	–	**RNA69/28**	–	**XL**	135	**32**	45	30	0,3
–	–	–	**NKS32**	**XL**	110	**32**	47	22	0,6
NK35/20-TV	–	–	–	**XL**	69,4	**35**	45	20	0,3
NK35/30-TV	–	–	–	**XL**	106	**35**	45	30	0,3
–	**RNA4906**	–	–	**XL**	69,4	**35**	47	17	0,3
–	–	**RNA6906**	–	**XL**	126	**35**	47	30	0,3
–	–	–	**NKS35**	**XL**	118	**35**	50	22	0,6
NK37/20	–	–	–	**XL**	77	**37**	47	20	0,3
NK37/30	–	–	–	**XL**	113	**37**	47	30	0,3
–	–	–	**NKS37**	**XL**	123	**37**	52	22	0,6
NK38/20	–	–	–	**XL**	79,4	**38**	48	20	0,3
NK38/30	–	–	–	**XL**	116	**38**	48	30	0,3
NK40/20-TV	–	–	–	**XL**	78	**40**	50	20	0,3
NK40/30	–	–	–	**XL**	125	**40**	50	30	0,3
–	**RNA49/32**	–	–	**XL**	89,1	**40**	52	20	0,6
–	–	**RNA69/32-ZW**	–	**XL**	162	**40**	52	36	0,6
–	–	–	**NKS40**	**XL**	129	**40**	55	22	0,6
NK42/20	–	–	–	**XL**	85,8	**42**	52	20	0,3
NK42/30	–	–	–	**XL**	130	**42**	52	30	0,3
–	**RNA4907**	–	–	**XL**	107	**42**	55	20	0,6
–	–	**RNA6907-ZW**	–	**XL**	193	**42**	55	36	0,6
NK43/20	–	–	–	**XL**	86	**43**	53	20	0,3
NK43/30	–	–	–	**XL**	133	**43**	53	30	0,3
–	–	–	**NKS43**	**XL**	139	**43**	58	22	0,6
NK45/20-TV	–	–	–	**XL**	85,3	**45**	55	20	0,3
NK45/30-TV	–	–	–	**XL**	132	**45**	55	30	0,3
–	–	–	**NKS45**	**XL**	145	**45**	60	22	0,6
NK47/20	–	–	–	**XL**	94,5	**47**	57	20	0,3
NK47/30	–	–	–	**XL**	142	**47**	57	30	0,3
–	**RNA4908**	–	–	**XL**	140	**48**	62	22	0,6
–	–	**RNA6908-ZW**	–	**XL**	256	**48**	62	40	0,6

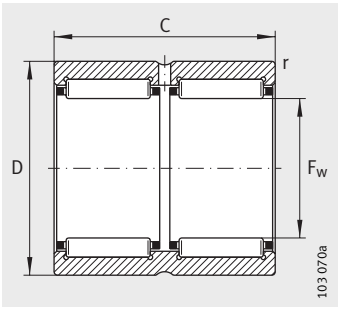
Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
N	N	N	min^{-1}	min^{-1}
29 500	44 500	7 800	14 000	8 000
39 000	63 000	11 700	14 000	9 300
27 500	33 500	6 100	12 700	6 900
45 500	63 000	11 400	12 700	6 700
38 000	43 500	7 400	12 400	7 200
31 000	48 500	8 500	12 900	7 400
46 000	81 000	15 000	12 300	6 600
28 500	35 500	6 400	12 000	6 400
49 000	71 000	12 900	12 000	6 100
39 500	47 000	8 000	11 500	6 700
28 000	43 500	7 600	12 300	7 400
42 000	73 000	13 500	12 300	7 200
41 500	50 000	8 600	11 000	6 400
29 000	45 000	7 900	12 000	7 200
43 000	76 000	14 000	12 000	7 000
33 500	56 000	9 800	11 400	6 500
44 000	79 000	14 600	11 400	6 700
34 500	47 500	8 900	10 700	6 000
53 000	82 000	15 100	10 700	6 000
42 500	54 000	9 200	10 300	6 100
30 000	49 000	8 600	10 900	6 600
44 500	82 000	15 200	10 900	6 400
35 500	50 000	9 400	10 100	5 600
54 000	86 000	15 900	10 100	5 700
30 500	51 000	8 900	10 700	6 500
45 500	85 000	15 800	10 700	6 300
44 000	57 000	9 800	9 700	5 800
35 000	62 000	10 800	10 200	5 900
52 000	103 000	19 100	9 800	5 400
45 500	60 000	10 400	9 300	5 600
32 500	56 000	9 900	9 800	6 000
48 500	94 000	17 500	9 800	5 800
48 500	67 000	11 500	8 900	5 000
74 000	116 000	19 400	8 900	5 100

Needle roller bearings

Without inner ring
Open



NK, NKS, RNA49



RNA69..-ZW

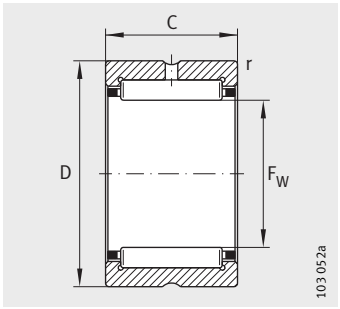
Dimension table (continued) · Dimensions in mm

Designation				X-life	Mass m ≈g	Dimensions F_w	D	C	r min.
NK50/25-TV	–	–	–	**XL**	146	**50**	62	25	0,6
NK50/35-TV	–	–	–	**XL**	207	**50**	62	35	0,6
–	–	–	**NKS50**	**XL**	157	**50**	65	22	1
–	**RNA4909**	–	–	**XL**	182	**52**	68	22	0,6
–	–	**RNA6909-ZW**	–	**XL**	338	**52**	68	40	0,6
NK55/25	–	–	–	**XL**	180	**55**	68	25	0,6
NK55/35	–	–	–	**XL**	250	**55**	68	35	0,6
–	–	–	**NKS55**	**XL**	221	**55**	72	22	1
–	**RNA4910**	–	–	**XL**	163	**58**	72	22	0,6
–	–	**RNA6910-ZW**	–	**XL**	310	**58**	72	40	0,6
NK60/25-TV	–	–	–	**XL**	170	**60**	72	25	0,6
NK60/35	–	–	–	**XL**	258	**60**	72	35	0,6
–	–	–	**NKS60**	**XL**	335	**60**	80	28	1,1
–	**RNA4911**	–	–	**XL**	255	**63**	80	25	1
–	–	**RNA6911-ZW**	–	**XL**	470	**63**	80	45	1
NK65/25	–	–	–	**XL**	221	**65**	78	25	0,6
NK65/35	–	–	–	**XL**	310	**65**	78	35	0,6
–	–	–	**NKS65**	**XL**	356	**65**	85	28	1,1
NK68/25	–	–	–	**XL**	241	**68**	82	25	0,6
NK68/35	–	–	–	**XL**	338	**68**	82	35	0,6
–	**RNA4912**	–	–	**XL**	275	**68**	85	25	1
–	–	**RNA6912-ZW**	–	**XL**	488	**68**	85	45	1
NK70/25	–	–	–	**XL**	260	**70**	85	25	0,6
NK70/35	–	–	–	**XL**	370	**70**	85	35	0,6
–	–	–	**NKS70**	**XL**	380	**70**	90	28	1,1
–	**RNA4913**	–	–	**XL**	312	**72**	90	25	1
–	–	**RNA6913-ZW**	–	**XL**	580	**72**	90	45	1
NK73/25	–	–	–	**XL**	302	**73**	90	25	1
NK73/35	–	–	–	**XL**	428	**73**	90	35	1
NK75/25	–	–	–	**XL**	315	**75**	92	25	1
NK75/35	–	–	–	**XL**	445	**75**	92	35	1
–	–	–	**NKS75**	**XL**	402	**75**	95	28	1,1

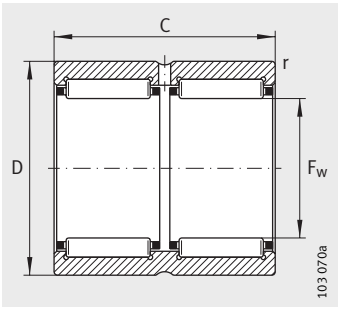
Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
N	N	N	min^{-1}	min^{-1}
48 500	87 000	14 800	9 200	5 700
67 000	132 000	23 900	8 800	4 900
48 000	67 000	11 500	8 500	5 100
51 000	73 000	12 600	8 200	4 550
79 000	127 000	21 400	8 200	4 600
45 500	82 000	14 000	8 400	5 200
60 000	118 000	21 300	8 400	5 200
51 000	74 000	12 700	7 700	4 700
53 000	80 000	13 800	7 500	4 100
82 000	139 000	23 400	7 500	4 150
53 000	103 000	17 500	7 400	4 350
63 000	130 000	23 500	7 700	4 800
71 000	98 000	17 300	7 000	4 350
65 000	100 000	17 300	6 900	3 900
102 000	176 000	30 000	6 900	3 900
50 000	98 000	16 700	7 200	4 500
66 000	142 000	25 500	7 200	4 450
75 000	108 000	19 100	6 500	4 100
49 500	89 000	15 200	6 800	4 500
70 000	139 000	25 500	6 800	4 350
68 000	108 000	18 800	6 400	3 600
106 000	191 000	32 500	6 400	3 600
50 000	92 000	15 700	6 600	4 450
71 000	144 000	26 500	6 600	4 300
77 000	113 000	20 000	6 100	3 900
69 000	112 000	19 500	6 000	3 400
108 000	198 000	33 500	6 000	3 400
60 000	100 000	17 500	6 300	4 150
85 000	156 000	27 000	6 300	4 050
61 000	104 000	18 200	6 100	4 050
87 000	162 000	28 000	6 100	3 950
81 000	123 000	21 900	5 800	3 700

Needle roller bearings

Without inner ring
Open



NK, RNA49



RNA69..-ZW

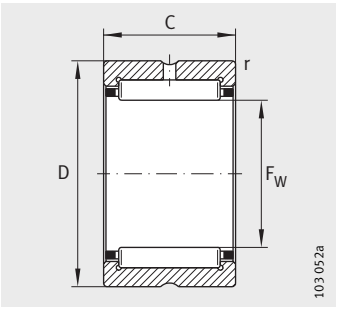
Dimension table (continued) · Dimensions in mm

Designation				Mass	Dimensions			
			X-life	m ≈g	F_w	D	C	r min.
NK80/25	–	–	**XL**	301	**80**	95	25	1
NK80/35	–	–	**XL**	425	**80**	95	35	1
–	**RNA4914**	–	**XL**	460	**80**	100	30	1
–	–	**RNA6914-ZW**	**XL**	857	**80**	100	54	1
NK85/25	–	–	**XL**	425	**85**	105	25	1
NK85/35	–	–	**XL**	600	**85**	105	35	1
–	**RNA4915**	–	**XL**	489	**85**	105	30	1
–	–	**RNA6915-ZW**	**XL**	935	**85**	105	54	1
NK90/25	–	–	**XL**	450	**90**	110	25	1
NK90/35	–	–	**XL**	630	**90**	110	35	1
–	**RNA4916**	–	**XL**	516	**90**	110	30	1
–	–	**RNA6916-ZW**	**XL**	987	**90**	110	54	1
NK95/26	–	–	**XL**	490	**95**	115	26	1
NK95/36	–	–	**XL**	680	**95**	115	36	1
NK100/26	–	–	**XL**	515	**100**	120	26	1
NK100/36	–	–	**XL**	715	**100**	120	36	1
–	**RNA4917**	–	**XL**	657	**100**	120	35	1,1
–	–	**RNA6917-ZW**	**XL**	1 200	**100**	120	63	1,1
NK105/26	–	–	**XL**	540	**105**	125	26	1
NK105/36	–	–	**XL**	713	**105**	125	36	1
–	**RNA4918**	–	**XL**	745	**105**	125	35	1,1
–	–	**RNA6918-ZW**	**XL**	1 330	**105**	125	63	1,1
NK110/30	–	–	**XL**	650	**110**	130	30	1,1
NK110/40	–	–	**XL**	830	**110**	130	40	1,1
–	**RNA4919**	–	**XL**	719	**110**	130	35	1,1
–	–	**RNA6919-ZW**	**XL**	1 460	**110**	130	63	1,1

Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
N	N	N	min^{-1}	min^{-1}
63 000	119 000	19 700	5 800	3 750
89 000	184 000	32 500	5 800	3 650
95 000	156 000	27 500	5 400	3 200
145 000	265 000	47 500	5 400	3 250
78 000	123 000	21 700	5 400	3 550
111 000	193 000	34 500	5 400	3 450
97 000	162 000	28 500	5 200	3 050
147 000	275 000	49 500	5 200	3 050
81 000	132 000	23 300	5 100	3 400
116 000	208 000	37 000	5 100	3 250
101 000	174 000	30 500	4 900	2 850
153 000	300 000	53 000	4 900	2 850
83 000	137 000	24 000	4 850	3 300
121 000	223 000	39 500	4 850	3 150
86 000	146 000	25 000	4 600	3 150
125 000	237 000	41 500	4 600	3 000
125 000	237 000	41 500	4 450	2 650
188 000	400 000	71 000	4 450	2 700
89 000	155 000	26 500	4 400	3 050
129 000	250 000	43 500	4 400	2 850
129 000	250 000	43 500	4 250	2 500
195 000	425 000	74 000	4 250	2 700
111 000	210 000	35 500	4 200	2 800
143 000	290 000	50 000	4 200	2 750
131 000	260 000	44 500	4 100	2 410
197 000	440 000	76 000	4 100	2 450

Needle roller bearings

Without inner ring
Open



RNA49, RNA48

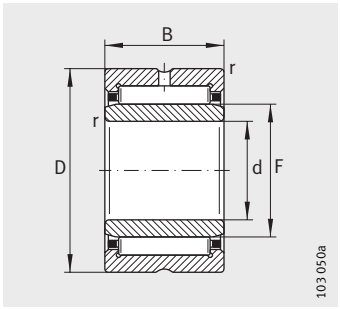
Dimension table (continued) · Dimensions in mm

Designation			Mass	Dimensions			
		X-life	m ≈g	F_w	D	C	r min.
RNA4920	–	**XL**	1 150	**115**	140	40	1,1
–	**RNA4822**	**XL**	670	**120**	140	30	1
RNA4922	–	**XL**	1 240	**125**	150	40	1,1
–	**RNA4824**	**XL**	730	**130**	150	30	1
RNA4924	–	**XL**	1 860	**135**	165	45	1,1
–	**RNA4826**	**XL**	990	**145**	165	35	1,1
RNA4926	–	**XL**	2 210	**150**	180	50	1,5
–	**RNA4828**	**XL**	1 050	**155**	175	35	1,1
RNA4928	–	**XL**	2 350	**160**	190	50	1,5
–	**RNA4830**	**XL**	1 600	**165**	190	40	1,1
–	**RNA4832**	**XL**	1 700	**175**	200	40	1,1
–	**RNA4834**	**XL**	2 540	**185**	215	45	1,1
–	**RNA4836**	**XL**	2 680	**195**	225	45	1,1
–	**RNA4838**	**XL**	3 210	**210**	240	50	1,5
–	**RNA4840**	**XL**	3 350	**220**	250	50	1,5
–	**RNA4844**	**XL**	3 620	**240**	270	50	1,5
–	**RNA4848**	**XL**	5 400	**265**	300	60	2
–	**RNA4852**	**XL**	5 800	**285**	320	60	2
–	**RNA4856**	**XL**	9 300	**305**	350	69	2
–	**RNA4860**	**XL**	12 700	**330**	380	80	2,1
–	**RNA4864**	**XL**	13 400	**350**	400	80	2,1
–	**RNA4868**	**XL**	14 000	**370**	420	80	2,1
–	**RNA4872**	**XL**	14 800	**390**	440	80	2,1
–	**RNA4876**	**XL**	26 000	**415**	480	100	2,1

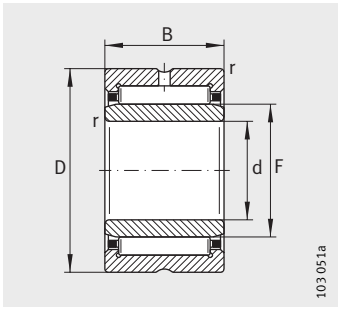
Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
N	N	N	min^{-1}	min^{-1}
144 000	270 000	45 500	4 000	2 650
106 000	216 000	36 000	3 750	2 220
149 000	290 000	47 500	3 700	2 430
112 000	239 000	39 000	3 500	2 030
205 000	390 000	64 000	3 400	2 250
134 000	310 000	48 500	3 150	1 920
229 000	470 000	74 000	3 100	2 080
136 000	325 000	50 000	2 950	1 800
237 000	500 000	78 000	2 900	1 910
172 000	400 000	62 000	2 750	1 750
181 000	435 000	66 000	2 600	1 630
209 000	510 000	75 000	2 450	1 550
219 000	550 000	80 000	2 330	1 430
255 000	690 000	100 000	2 180	1 290
260 000	720 000	102 000	2 090	1 220
275 000	790 000	110 000	1 920	1 080
400 000	1 080 000	150 000	1 730	940
415 000	1 160 000	158 000	1 620	860
510 000	1 300 000	175 000	1 500	810
700 000	1 770 000	235 000	1 380	710
710 000	1 850 000	242 000	1 310	660
730 000	1 940 000	249 000	1 240	620
740 000	2 020 000	255 000	1 180	580
1 130 000	2 900 000	370 000	1 090	500

Needle roller bearings

With inner ring
Open



NKI (d ≦ 7 mm)

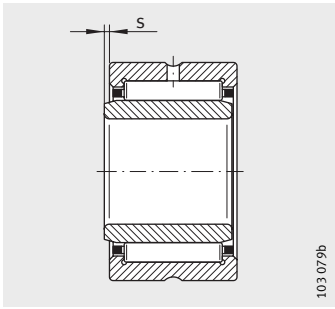


NKI (d ≧ 9 mm), NKIS, NA49, NA69 (d ≦ 30 mm)

Dimension table · Dimensions in mm

Designation					Mass	Dimensions		
				X-life	m ≈g	d	F	D
NKI5/12-TV[1]	–	–	–	**XL**	11,5	**5**	8	15
NKI5/16-TV[1]	–	–	–	**XL**	15,3	**5**	8	15
NKI6/12-TV[1]	–	–	–	**XL**	13,5	**6**	9	16
NKI6/16-TV[1]	–	–	–	**XL**	17,4	**6**	9	16
NKI7/12-TV[1]	–	–	–	**XL**	13,7	**7**	10	17
NKI7/16-TV[1]	–	–	–	**XL**	18,2	**7**	10	17
NKI9/12	–	–	–	**XL**	16,6	**9**	12	19
NKI9/16	–	–	–	**XL**	21,9	**9**	12	19
NKI10/16	–	–	–	**XL**	29,4	**10**	14	22
NKI10/20	–	–	–	**XL**	37,1	**10**	14	22
–	**NA4900**	–	–	**XL**	23	**10**	14	22
NKI12/16	–	–	–	**XL**	33,3	**12**	16	24
NKI12/20	–	–	–	**XL**	41,9	**12**	16	24
–	**NA4901**	–	–	**XL**	26	**12**	16	24
–	–	**NA6901**	–	**XL**	46	**12**	16	24
NKI15/16	–	–	–	**XL**	38,8	**15**	19	27
NKI15/20	–	–	–	**XL**	48,7	**15**	19	27
–	**NA4902**	–	–	**XL**	34	**15**	20	28
–	–	**NA6902**	–	**XL**	63,6	**15**	20	28
–	–	–	**NKIS15**	**XL**	92	**15**	22	35
NKI17/16	–	–	–	**XL**	42,4	**17**	21	29
NKI17/20	–	–	–	**XL**	53,4	**17**	21	29
–	**NA4903**	–	–	**XL**	37	**17**	22	30
–	–	**NA6903**	–	**XL**	72	**17**	22	30
–	–	–	**NKIS17**	**XL**	98	**17**	24	37

[1] With closing rings, without lubrication hole and groove.

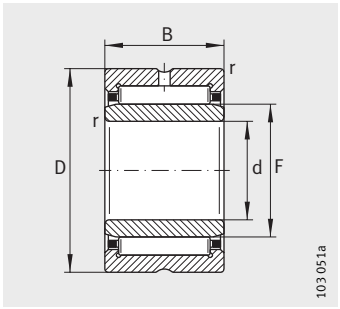


2) Axial displacement “s”

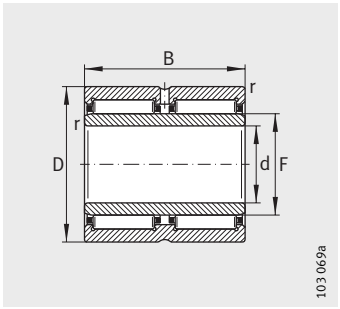
			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B	r	s[2)]	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
	min.		N	N	N	min^{-1}	min^{-1}
12	0,3	1,5	4 450	4 100	690	32 500	32 500
16	0,3	2	5 800	5 800	970	32 500	32 000
12	0,3	1,5	5 100	5 000	840	31 000	28 500
16	0,3	2	6 600	7 100	1 190	31 000	28 000
12	0,3	1,5	5 300	5 500	930	29 500	26 000
16	0,3	2	7 000	7 800	1 310	29 500	25 500
12	0,3	1,5	7 200	7 100	1 280	26 500	20 200
16	0,3	2	10 100	11 000	1 920	26 500	19 500
16	0,3	0,5	11 400	11 500	2 100	24 600	16 400
20	0,3	0,5	14 500	15 600	2 700	24 600	16 100
13	0,3	0,5	9 600	9 200	1 630	25 000	17 300
16	0,3	0,5	12 800	13 900	2 550	23 200	14 500
20	0,3	0,5	16 300	18 800	3 250	23 200	14 200
13	0,3	0,5	10 600	10 900	1 940	23 600	14 900
22	0,3	1	18 100	21 600	3 800	23 600	13 900
16	0,3	0,5	14 700	17 400	3 200	21 600	12 400
20	0,3	0,5	18 700	23 600	4 150	21 600	12 100
13	0,3	0,5	12 000	13 600	2 430	21 600	12 000
23	0,3	1	19 500	25 500	4 450	21 600	11 700
20	0,6	0,5	27 500	28 000	4 900	19 600	10 300
16	0,3	0,5	15 200	18 700	3 450	20 600	11 400
20	0,3	0,5	19 300	25 500	4 450	20 600	11 200
13	0,3	0,5	12 400	14 600	2 600	20 600	10 900
23	0,3	1	21 100	29 000	5 100	20 600	10 500
20	0,6	0,5	29 500	31 000	5 400	18 100	9 500

Needle roller bearings

With inner ring
Open



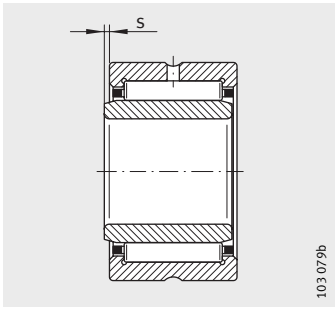
NKI, NKIS, NA49,
NA69 (d ≦ 30 mm)



NA69..-ZW

Dimension table (continued) · Dimensions in mm

Designation					Mass	Dimensions		
				X-life	m ≈g	d	F	D
NKI20/16	–	–	–	**XL**	49	**20**	24	32
NKI20/20	–	–	–	**XL**	61	**20**	24	32
–	**NA4904**	–	–	**XL**	75,2	**20**	25	37
–	–	**NA6904**	–	**XL**	141	**20**	25	37
–	–	–	**NKIS20**	**XL**	129	**20**	28	42
NKI22/16	–	–	–	**XL**	52	**22**	26	34
NKI22/20	–	–	–	**XL**	65,4	**22**	26	34
–	**NA49/22**	–	–	**XL**	80	**22**	28	39
–	–	**NA69/22**	–	**XL**	150	**22**	28	39
NKI25/20-TV	–	–	–	**XL**	75,8	**25**	29	38
NKI25/30	–	–	–	**XL**	124	**25**	29	38
–	**NA4905**	–	–	**XL**	88	**25**	30	42
–	–	**NA6905**	–	**XL**	161	**25**	30	42
–	–	–	**NKIS25**	**XL**	162	**25**	32	47
NKI28/20-TV	–	–	–	**XL**	92,4	**28**	32	42
NKI28/30	–	–	–	**XL**	146	**28**	32	42
–	**NA49/28**	–	–	**XL**	97,7	**28**	32	45
–	–	**NA69/28**	–	**XL**	182	**28**	32	45
NKI30/20-TV	–	–	–	**XL**	108	**30**	35	45
NKI30/30-TV	–	–	–	**XL**	165	**30**	35	45
–	**NA4906**	–	–	**XL**	101	**30**	35	47
–	–	**NA6906**	–	**XL**	192	**30**	35	47
–	–	–	**NKIS30**	**XL**	184	**30**	37	52
NKI32/20	–	–	–	**XL**	118	**32**	37	47
NKI32/30	–	–	–	**XL**	180	**32**	37	47
–	**NA49/32**	–	–	**XL**	158	**32**	40	52
–	–	**NA69/32-ZW**	–	**XL**	288	**32**	40	52
NKI35/20-TV	–	–	–	**XL**	122	**35**	40	50
NKI35/30	–	–	–	**XL**	193	**35**	40	50
–	**NA4907**	–	–	**XL**	170	**35**	42	55
–	–	**NA6907-ZW**	–	**XL**	310	**35**	42	55
–	–	–	**NKIS35**	**XL**	220	**35**	43	58

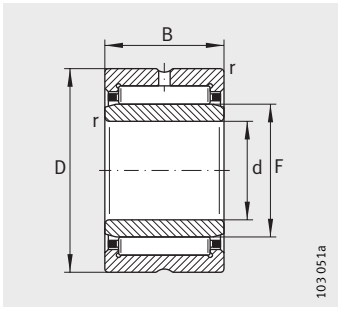


[1] Axial displacement “s”

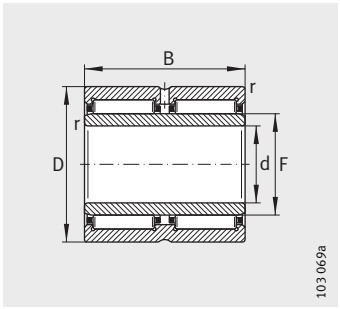
			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B	r	s[1]	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
	min.		N	N	N	min^{-1}	min^{-1}
16	0,3	0,5	16 900	22 300	4 100	18 500	10 100
20	0,3	0,5	21 400	30 500	5 300	18 500	9 900
17	0,3	0,8	23 700	25 500	4 600	17 200	9 600
30	0,3	1	40 500	51 000	9 100	17 200	9 200
20	0,6	0,5	32 500	36 500	6 400	15 800	8 300
16	0,3	0,5	17 300	23 600	4 350	17 200	9 500
20	0,3	0,5	22 000	32 000	5 600	17 200	9 300
17	0,3	0,8	26 000	29 500	5 300	16 100	8 700
30	0,3	0,5	42 000	55 000	9 900	16 100	8 500
20	0,3	1	27 500	39 000	6 900	15 300	8 100
30	0,3	1,5	37 000	57 000	10 600	15 300	8 200
17	0,3	0,8	26 500	31 500	5 700	14 600	7 900
30	0,3	1	44 000	59 000	10 600	14 600	7 700
22	0,6	1	38 000	43 500	7 400	13 600	7 400
20	0,3	1	29 500	44 500	7 800	14 000	7 500
30	0,3	1,5	39 000	63 000	11 700	14 000	8 600
17	0,3	0,8	27 500	33 500	6 100	13 400	7 200
30	0,3	1	45 500	63 000	11 400	13 400	7 000
20	0,3	0,5	31 000	48 500	8 500	12 900	6 800
30	0,3	1	46 000	81 000	15 000	12 900	6 600
17	0,3	0,8	28 500	35 500	6 400	12 700	6 800
30	0,3	1	49 000	71 000	12 900	12 700	6 400
22	0,6	1	41 500	50 000	8 600	12 000	6 600
20	0,3	0,5	28 000	43 500	7 600	12 300	6 900
30	0,3	1	42 000	73 000	13 500	12 300	6 600
20	0,6	0,8	34 500	47 500	8 900	11 700	6 500
36	0,6	0,5	53 000	82 000	15 100	11 700	6 500
20	0,3	0,5	33 500	56 000	9 800	11 400	6 100
30	0,3	1	44 000	79 000	14 600	11 400	6 200
20	0,6	0,8	35 500	50 000	9 400	10 900	6 000
36	0,6	0,5	54 000	86 000	15 900	10 900	6 100
22	0,6	0,5	44 000	57 000	9 800	10 500	5 900

Needle roller bearings

With inner ring
Open



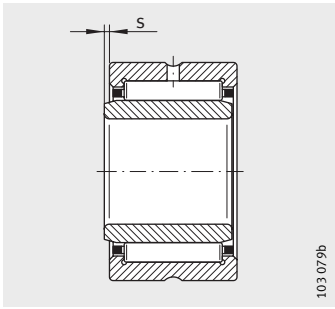
NKI, NKIS, NA49



NA69..-ZW

Dimension table (continued) · Dimensions in mm

Designation					Mass	Dimensions		
				X-life	m ≈g	d	F	D
NKI38/20	–	–	–	**XL**	136	**38**	43	53
NKI38/30	–	–	–	**XL**	207	**38**	43	53
NKI40/20-TV	–	–	–	**XL**	136	**40**	45	55
NKI40/30-TV	–	–	–	**XL**	216	**40**	45	55
–	**NA4908**	–	–	**XL**	230	**40**	48	62
–	–	**NA6908-ZW**	–	**XL**	430	**40**	48	62
–	–	–	**NKIS40**	**XL**	281	**40**	50	65
NKI42/20	–	–	–	**XL**	148	**42**	47	57
NKI42/30	–	–	–	**XL**	222	**42**	47	57
NKI45/25-TV	–	–	–	**XL**	217	**45**	50	62
NKI45/35-TV	–	–	–	**XL**	308	**45**	50	62
–	**NA4909**	–	–	**XL**	271	**45**	52	68
–	–	**NA6909-ZW**	–	**XL**	495	**45**	52	68
–	–	–	**NKIS45**	**XL**	336	**45**	55	72
NKI50/25	–	–	–	**XL**	270	**50**	55	68
NKI50/35	–	–	–	**XL**	379	**50**	55	68
–	**NA4910**	–	–	**XL**	274	**50**	58	72
–	–	**NA6910-ZW**	–	**XL**	515	**50**	58	72
–	–	–	**NKIS50**	**XL**	518	**50**	60	80
NKI55/25-TV	–	–	–	**XL**	255	**55**	60	72
NKI55/35	–	–	–	**XL**	379	**55**	60	72
–	**NA4911**	–	–	**XL**	393	**55**	63	80
–	–	**NA6911-ZW**	–	**XL**	780	**55**	63	80
–	–	–	**NKIS55**	**XL**	558	**55**	65	85
NKI60/25	–	–	–	**XL**	394	**60**	68	82
NKI60/35	–	–	–	**XL**	553	**60**	68	82
–	**NA4912**	–	–	**XL**	426	**60**	68	85
–	–	**NA6912-ZW**	–	**XL**	808	**60**	68	85
–	–	–	**NKIS60**	**XL**	560	**60**	70	90

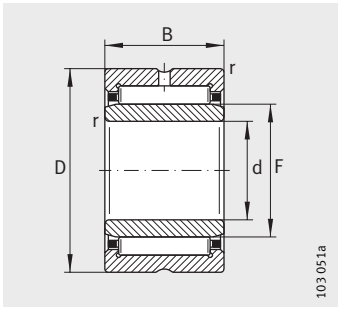


[1] Axial displacement “s”

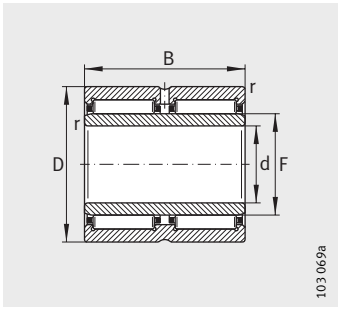
			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B	r	s[1]	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
	min.		N	N	N	min^{-1}	min^{-1}
20	0,3	0,5	30 500	51 000	8 900	10 700	6 000
30	0,3	1	45 500	85 000	15 800	10 700	5 900
20	0,3	0,5	35 000	62 000	10 800	10 200	5 600
30	0,3	1	52 000	103 000	19 100	10 200	5 400
22	0,6	1	48 500	67 000	11 500	9 600	5 300
40	0,6	0,5	74 000	116 000	19 400	9 600	5 400
22	1	0,5	48 000	67 000	11 500	9 300	5 200
20	0,3	0,5	32 500	56 000	9 900	9 800	5 600
30	0,3	1	48 500	94 000	17 500	9 800	5 400
25	0,6	1,5	48 500	87 000	14 800	9 200	5 300
35	0,6	2	67 000	132 000	23 900	9 200	4 950
22	0,6	1	51 000	73 000	12 600	8 700	4 750
40	0,6	0,5	79 000	127 000	21 400	8 700	4 850
22	1	0,5	51 000	74 000	12 700	8 400	4 750
25	0,6	1,5	45 500	82 000	14 000	8 400	4 950
35	0,6	2	60 000	118 000	21 300	8 400	4 900
22	0,6	1	53 000	80 000	13 800	8 000	4 350
40	0,6	0,5	82 000	139 000	23 400	8 000	4 400
28	1,1	2	71 000	98 000	17 300	7 500	4 450
25	0,6	1,5	53 000	103 000	17 500	7 700	4 400
35	0,6	2	63 000	130 000	23 500	7 700	4 550
25	1	1,5	65 000	100 000	17 300	7 300	4 100
45	1	1,5	102 000	176 000	30 000	7 300	4 100
28	1,1	2	75 000	108 000	22 200	7 000	4 150
25	0,6	1	49 500	89 000	15 200	6 800	4 200
35	0,6	1	70 000	139 000	25 500	6 800	4 050
25	1	1,5	68 000	108 000	18 800	6 800	3 750
45	1	1,5	106 000	191 000	32 500	6 800	3 750
28	1,1	2	77 000	113 000	23 400	6 500	3 950

Needle roller bearings

With inner ring
Open



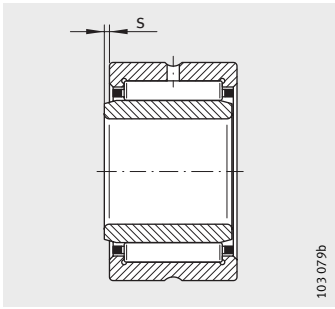
NKI, NKIS, NA49



NA69..-ZW

Dimension table (continued) · Dimensions in mm

Designation					Mass	Dimensions		
				X-life	m ≈g	d	F	D
NKI65/25	–	–	–	**XL**	467	**65**	73	90
NKI65/35	–	–	–	**XL**	659	**65**	73	90
–	**NA4913**	–	–	**XL**	456	**65**	72	90
–	–	**NA6913-ZW**	–	**XL**	833	**65**	72	90
–	–	–	**NKIS65**	**XL**	641	**65**	75	95
NKI70/25	–	–	–	**XL**	521	**70**	80	95
NKI70/35	–	–	–	**XL**	737	**70**	80	95
–	**NA4914**	–	–	**XL**	728	**70**	80	100
–	–	**NA6914-ZW**	–	**XL**	1 340	**70**	80	100
NKI75/25	–	–	–	**XL**	641	**75**	85	105
NKI75/35	–	–	–	**XL**	908	**75**	85	105
–	**NA4915**	–	–	**XL**	775	**75**	85	105
–	–	**NA6915-ZW**	–	**XL**	1 450	**75**	85	105
NKI80/25	–	–	–	**XL**	677	**80**	90	110
NKI80/35	–	–	–	**XL**	959	**80**	90	110
–	**NA4916**	–	–	**XL**	878	**80**	90	110
–	–	**NA6916-ZW**	–	**XL**	1 522	**80**	90	110
NKI85/26	–	–	–	**XL**	743	**85**	95	115
NKI85/36	–	–	–	**XL**	1 040	**85**	95	115
–	**NA4917**	–	–	**XL**	1 250	**85**	100	120
–	–	**NA6917-ZW**	–	**XL**	2 200	**85**	100	120
NKI90/26	–	–	–	**XL**	778	**90**	100	120
NKI90/36	–	–	–	**XL**	1 090	**90**	100	120
–	**NA4918**	–	–	**XL**	1 312	**90**	105	125
–	–	**NA6918-ZW**	–	**XL**	2 310	**90**	105	125
NKI95/26	–	–	–	**XL**	816	**95**	105	125
NKI95/36	–	–	–	**XL**	1 145	**95**	105	125
–	**NA4919**	–	–	**XL**	1 371	**95**	110	130
–	–	**NA6919-ZW**	–	**XL**	2 500	**95**	110	130

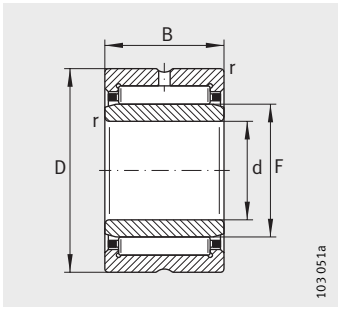


[1] Axial displacement “s”

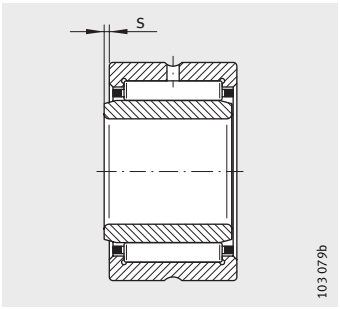
			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B	r	s[1]	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
	min.		N	N	N	min^{-1}	min^{-1}
25	1	1	60 000	100 000	17 500	6 300	3 900
35	1	1	85 000	156 000	27 000	6 300	3 750
25	1	1,5	69 000	112 000	19 500	6 300	3 500
45	1	1,5	108 000	198 000	33 500	6 300	3 550
28	1,1	2	81 000	123 000	25 500	6 100	3 700
25	1	0,8	63 000	119 000	19 700	5 800	3 500
35	1	0,8	89 000	184 000	32 500	5 800	3 350
30	1	1,5	95 000	156 000	27 500	5 800	3 350
54	1	1	145 000	265 000	47 500	5 800	3 400
25	1	1	78 000	123 000	21 700	5 400	3 300
35	1	1	111 000	193 000	34 500	5 400	3 200
30	1	1,5	97 000	162 000	28 500	5 400	3 150
54	1	1	147 000	275 000	49 500	5 400	3 200
25	1	1	81 000	132 000	23 300	5 100	3 150
35	1	1	116 000	208 000	37 000	5 100	3 050
30	1	1,5	101 000	174 000	30 500	5 200	2 950
54	1	1	153 000	300 000	53 000	5 200	3 000
26	1	1,5	83 000	137 000	24 000	4 850	3 100
36	1	1,5	121 000	223 000	39 500	4 850	2 950
35	1,1	1	125 000	237 000	41 500	4 800	2 800
63	1,1	1	188 000	400 000	71 000	4 800	2 850
26	1	1,5	86 000	146 000	25 000	4 600	2 950
36	1	1,5	125 000	237 000	41 500	4 600	2 800
35	1,1	1	129 000	250 000	43 500	4 550	2 650
63	1,1	1	195 000	425 000	74 000	4 550	2 700
26	1	1,5	89 000	155 000	26 500	4 400	2 850
36	1	1,5	129 000	250 000	43 500	4 400	2 700
35	1,1	1	131 000	260 000	44 500	4 350	2 550
63	1,1	1	197 000	440 000	76 000	4 350	2 600

Needle roller bearings

With inner ring
Open



NKI, NA49, NA48



[1] Axial displacement “s”

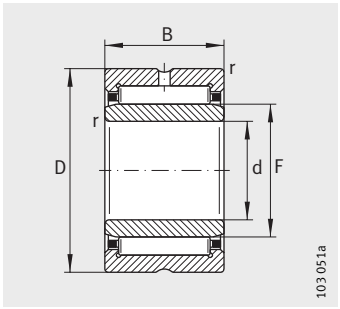
Dimension table (continued) · Dimensions in mm

Designation				Mass	Dimensions		
			X-life	m ≈g	d	F	D
NKI100/30	–	–	**XL**	990	**100**	110	130
NKI100/40	–	–	**XL**	1 330	**100**	110	130
–	**NA4920**	–	**XL**	1 900	**100**	115	140
–	**NA4922**	–	**XL**	2 070	**110**	125	150
–	–	**NA4822**	**XL**	1 080	**110**	120	140
–	**NA4924**	–	**XL**	2 860	**120**	135	165
–	–	**NA4824**	**XL**	1 170	**120**	130	150
–	**NA4926**	–	**XL**	3 900	**130**	150	180
–	–	**NA4826**	**XL**	1 810	**130**	145	165
–	**NA4928**	–	**XL**	4 150	**140**	160	190
–	–	**NA4828**	**XL**	1 920	**140**	155	175
–	–	**NA4830**	**XL**	2 720	**150**	165	190
–	–	**NA4832**	**XL**	2 890	**160**	175	200
–	–	**NA4834**	**XL**	3 960	**170**	185	215
–	–	**NA4836**	**XL**	4 200	**180**	195	225
–	–	**NA4838**	**XL**	5 610	**190**	210	240

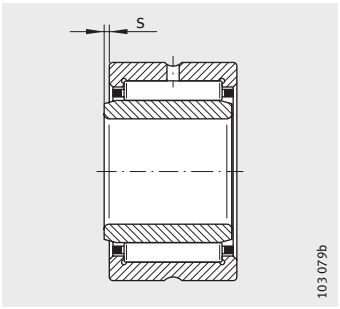
			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B	r	s[1)]	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
	min.		N	N	N	min^{-1}	min^{-1}
30	1,1	1,5	111 000	210 000	35 500	4 200	2 650
40	1,1	2	143 000	290 000	50 000	4 200	2 600
40	1,1	2	144 000	270 000	45 500	4 100	2 600
40	1,1	2	149 000	290 000	47 500	3 750	2 400
30	1	0,8	106 000	216 000	36 000	3 900	2 300
45	1,1	2	205 000	390 000	64 000	3 450	2 200
30	1	0,8	112 000	239 000	39 000	3 650	2 090
50	1,5	1,5	229 000	470 000	74 000	3 150	2 080
35	1,1	1	134 000	310 000	48 500	3 300	2 000
50	1,5	1,5	237 000	500 000	78 000	2 950	1 920
35	1,1	1	136 000	325 000	50 000	3 100	1 870
40	1,1	1,5	172 000	400 000	62 000	2 900	1 810
40	1,1	1,5	181 000	435 000	66 000	2 700	1 680
45	1,1	1,5	209 000	510 000	75 000	2 550	1 610
45	1,1	1,5	219 000	550 000	80 000	2 420	1 490
50	1,5	1,5	255 000	690 000	100 000	2 280	1 350

Needle roller bearings

With inner ring
Open



NA48



[1] Axial displacement “s”

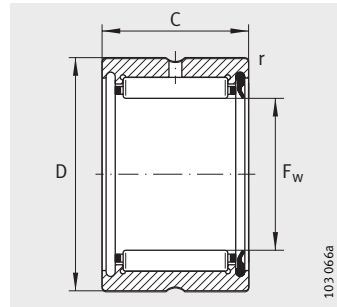
Dimension table (continued) · Dimensions in mm

Designation		Mass	Dimensions					
	X-life	m ≈g	d	F	D	B	r min.	s[1]
NA4840	**XL**	5 840	**200**	220	250	50	1,5	1,5
NA4844	**XL**	6 380	**220**	240	270	50	1,5	1,5
NA4848	**XL**	10 000	**240**	265	300	60	2	2
NA4852	**XL**	10 600	**260**	285	320	60	2	2
NA4856	**XL**	15 300	**280**	305	350	69	2	2,5
NA4860	**XL**	21 800	**300**	330	380	80	2,1	2
NA4864	**XL**	23 000	**320**	350	400	80	2,1	2
NA4868	**XL**	24 200	**340**	370	420	80	2,1	2
NA4872	**XL**	25 600	**360**	390	440	80	2,1	2
NA4876	**XL**	42 600	**380**	415	480	100	2,1	2

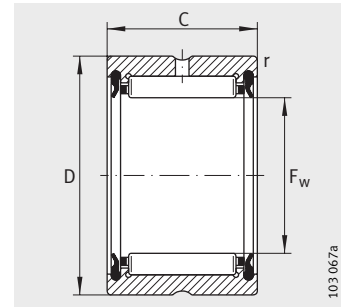
Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
N	N	N	min^{-1}	min^{-1}
260 000	720 000	102 000	2 150	1 250
275 000	790 000	110 000	1 980	1 110
400 000	1 080 000	150 000	1 780	960
415 000	1 160 000	158 000	1 660	870
510 000	1 300 000	175 000	1 540	840
700 000	1 770 000	235 000	1 420	720
710 000	1 850 000	242 000	1 340	670
730 000	1 940 000	249 000	1 270	620
740 000	2 020 000	255 000	1 210	590
1 130 000	2 900 000	370 000	1 130	510

Needle roller bearings

Without inner ring
Sealed



RNA49..-RSR



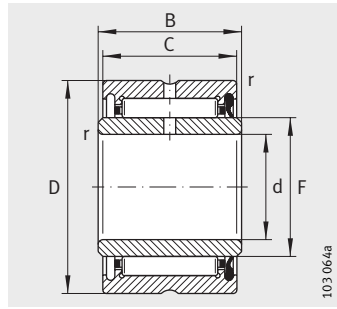
RNA49..-2RSR

Dimension table · Dimensions in mm

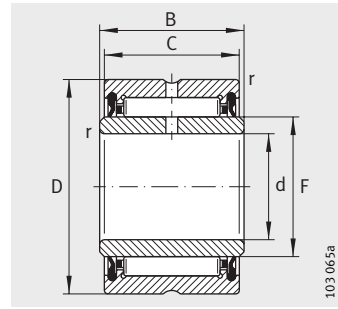
Designation			Mass	Dimensions				Basic load ratings		Fatigue limit load	Limiting speed
		X-life	m	F_w	D	C	r	dyn. C_r	stat. C_{0r}	C_{ur}	n_G grease
			≈g				min.	N	N	N	min^{-1}
RNA4900-RSR	**RNA4900-2RSR**	**XL**	16	**14**	22	13	0,3	7 700	6 900	1 360	13 000
RNA4901-RSR	**RNA4901-2RSR**	**XL**	18	**16**	24	13	0,3	8 600	8 300	1 630	12 000
RNA4902-RSR	**RNA4902-2RSR**	**XL**	21,5	**20**	28	13	0,3	9 700	10 300	2 040	10 000
RNA4903-RSR	**RNA4903-2RSR**	**XL**	23	**22**	30	13	0,3	10 000	11 000	2 180	9 000
RNA4904-RSR	**RNA4904-2RSR**	**XL**	56	**25**	37	17	0,3	19 500	19 900	3 750	7 500
RNA4905-RSR	**RNA4905-2RSR**	**XL**	60	**30**	42	17	0,3	21 800	24 200	4 550	6 500
RNA4906-RSR	**RNA4906-2RSR**	**XL**	69	**35**	47	17	0,3	23 900	28 500	5 400	5 500
RNA4907-RSR	**RNA4907-2RSR**	**XL**	107	**42**	55	20	0,6	29 500	39 500	7 200	4 800
RNA4908-RSR	**RNA4908-2RSR**	**XL**	154	**48**	62	22	0,6	41 000	53 000	8 800	4 200
RNA4909-RSR	**RNA4909-2RSR**	**XL**	157	**52**	68	22	0,6	43 000	59 000	9 700	3 900
RNA4910-RSR	**RNA4910-2RSR**	**XL**	160	**58**	72	22	0,6	45 000	64 000	10 600	3 500

Needle roller bearings

With inner ring
Sealed



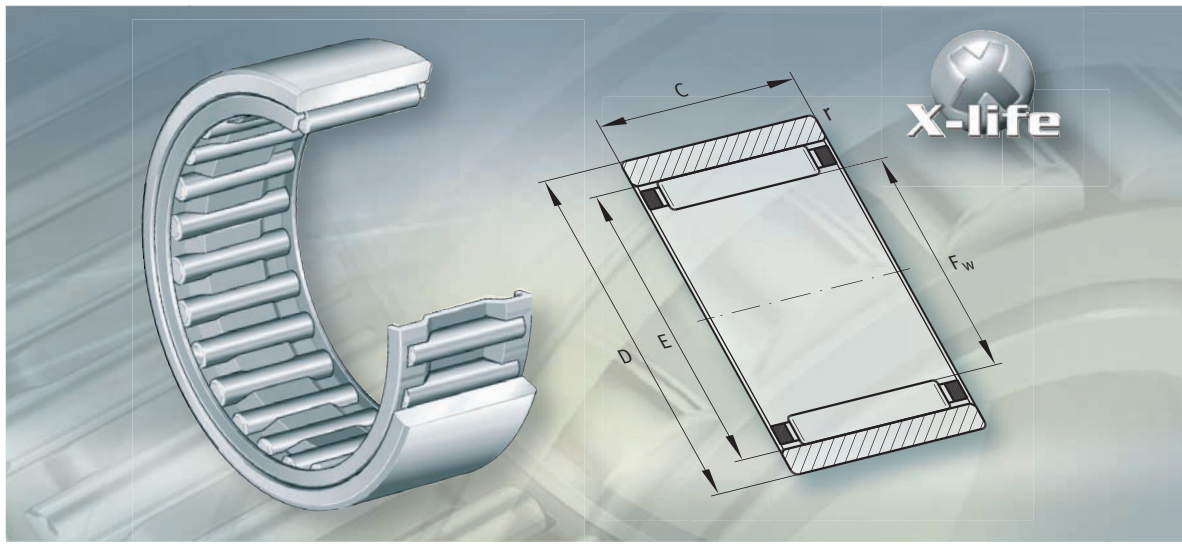
NA49..-RSR



NA49..-2RSR

Dimension table · Dimensions in mm

Designation			Mass	Dimensions						Basic load ratings		Fatigue limit load	Limiting speed
		X-life	m	d	F	D	C	B	r	dyn. C_r	stat. C_{0r}	C_{ur}	n_G grease
			≈g						min.	N	N	N	min^{-1}
NA4900-RSR	**NA4900-2RSR**	**XL**	24,5	**10**	14	22	13	14	0,3	7 700	6 900	1 360	13 000
NA4901-RSR	**NA4901-2RSR**	**XL**	27,5	**12**	16	24	13	14	0,3	8 600	8 300	1 630	12 000
NA4902-RSR	**NA4902-2RSR**	**XL**	37	**15**	20	28	13	14	0,3	9 700	10 300	2 040	10 000
NA4903-RSR	**NA4903-2RSR**	**XL**	40	**17**	22	30	13	14	0,3	10 000	11 000	2 180	9 000
NA4904-RSR	**NA4904-2RSR**	**XL**	80	**20**	25	37	17	18	0,3	19 500	19 900	3 750	7 500
NA4905-RSR	**NA4905-2RSR**	**XL**	89,5	**25**	30	42	17	18	0,3	21 800	24 200	4 550	6 500
NA4906-RSR	**NA4906-2RSR**	**XL**	104	**30**	35	47	17	18	0,3	23 900	28 500	5 400	5 500
NA4907-RSR	**NA4907-2RSR**	**XL**	175	**35**	42	55	20	21	0,6	29 500	39 500	7 200	4 800
NA4908-RSR	**NA4908-2RSR**	**XL**	252	**40**	48	62	22	23	0,6	41 000	53 000	8 800	4 200
NA4909-RSR	**NA4909-2RSR**	**XL**	290	**45**	52	68	22	23	0,6	43 000	59 000	9 700	3 900
NA4910-RSR	**NA4910-2RSR**	**XL**	295	**50**	58	72	22	23	0,6	45 000	64 000	10 600	3 500



Needle roller bearings without ribs

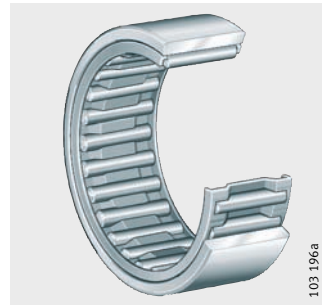
Needle roller bearings without ribs

		Page
Product overview	Needle roller bearings without ribs	738
Features	X-life	739
	Needle roller bearings without inner ring	739
	Needle roller bearings with inner ring	739
	Sealing	739
	Lubrication	739
	Sealing rings and wider inner rings	740
	Operating temperature	740
	Cages	740
	Suffixes	740
Design and safety guidelines	Minimum radial load	741
	Design of bearing arrangements	741
Accuracy	Radial internal clearance	743
	Enveloping circle	743
Dimension tables	Needle roller bearings without ribs, without inner ring	744
	Needle roller bearings without ribs, with inner ring	748

Without inner ring

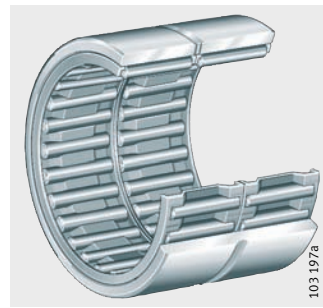
Single row

RNAO



Double row

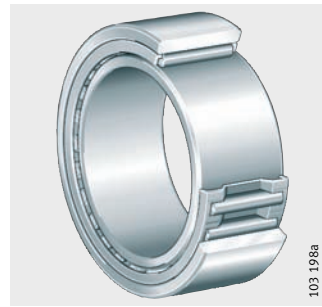
RNAO..-ZW-ASR1



With inner ring

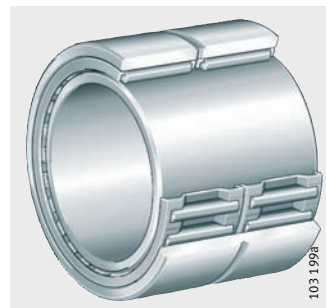
Single row

NAO



Double row

NAO..-ZW-ASR1



Needle roller bearings without ribs

Features

These single or double row units comprise machined outer rings without ribs, needle roller and cage assemblies and removable inner rings. Since the bearings are not self-retaining, the outer ring, needle roller and cage assembly and inner ring can be fitted independently of each other.

X-life

Needle roller bearings without ribs are X-life bearings.
In this design, the raceway surfaces are optimised.
This gives higher load carrying capacity and longer rating life.

Needle roller bearings without inner ring

Bearings without inner ring have particularly compact radial dimensions. However, they require a shaft raceway that is hardened and ground.

The needle roller and cage assembly can be fitted either together with the outer ring or with the shaft. It can also be subsequently slid between the outer ring and shaft.

Needle roller bearings with inner ring

Bearings with an inner ring are used if the shaft is not configured as a rolling bearing raceway.

The needle roller and cage assembly can be fitted either together with the outer ring or with the inner ring. It can also be subsequently slid between the outer ring and inner ring.

Displacement of the inner ring

The standard inner ring allows axial displacement within the values “s” stated in the dimension tables. Where larger displacements occur, the standard ring can be replaced by a wider inner ring IR. Inner rings: see pages starting page 778.

Sealing

Needle roller bearings without ribs are not sealed.

Lubrication

Open needle roller bearings without ribs can be lubricated with grease or oil. Double row bearings can be lubricated via a lubrication groove and lubrication hole in the outer ring and have the suffix ZW-ASR1.

Bearings with a lubrication hole in the inner ring have the suffix IS1.

Sealing rings and wider inner rings

The bearings can be sealed against external influences using sealing rings of series G, GR and SD in combination with wider inner rings IR. The sealing rings and inner rings are matched to the needle roller bearings.

The outer surface of the inner rings can be used as the sliding surface for seal lips.

Sealing rings: see page 804, and TPI 128, Sealing rings, single lip and double lip.

Sealing rings must not be used as running surfaces for the cage.

Operating temperature

Bearings with plastic cage can be used at operating temperatures from –20 °C to +120 °C.

Cages

The cages are made from sheet steel or plastic. Bearings with a plastic cage have the suffix TV.

Before using bearings with plastic cages, the compatibility of the lubricant used with the cage material (PA66-GF/H) must be checked.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
ASR1	Lubrication hole and lubrication groove in the outer ring, dependent on the size	Standard
IS1	Lubrication hole in the inner ring, dependent on the size	
TV	Bearing with cage made from glass fibre reinforced polyamide 66, dependent on the size	
ZW	Double row design, dependent on the size	

Design and safety guidelines

Minimum radial load

In order to ensure operation without slippage, the bearings must be subjected to a minimum load $F_{r\,min}$ in a radial direction. This applies in particular to high speed bearings since, if the radial load is insufficient or not present, damaging sliding motion may occur between the rolling elements and raceways. In continuous operation, a minimum radial load of the order of $C_r/P < 50$ is necessary.

Design of bearing arrangements

Shaft and housing tolerances

Recommended shaft tolerances for bearings with an inner ring, see page 150.

For the design of shafts for bearings without an inner ring, see the section Raceway for bearings without inner ring and the associated table.

Recommended housing tolerances, see page 152.

Mounting dimensions

The dimension tables give the maximum value of the radius r_a, the diameters of the abutment shoulder d_a, D_a and the dimension d_b, D_b for axial guidance of the needle roller and cage assembly.

Raceway for bearings without inner ring

Where bearings without an inner ring are to be used, the rolling element raceway on the shaft must be hardened and ground, see table. The surface hardness of the raceway must be 670 HV + 170 HV, the hardening depth CHD or SHD must be sufficiently large.

The values in the tables are valid for housing tolerances up to K7. For tighter housing bores, the operating clearance should be checked by either calculation or measurement.

If the surface of the shaft raceway is produced to DIN 617, the basic load ratings C_r in the dimension tables must be reduced by 15%.

Raceway design

Shaft							
Diameter Nominal dimension mm		Tolerance Operating clearance			Roughness max.	Roundness max.	Parallelism max.
over	incl.	Small	Normal	Large			
–	65	k5	h5	g6	R_a0,1 (R_z0,4)	IT3	IT3
65	80	k5	h5	f6			
80	120	k5	g5	f6	R_a0,15 (R_z0,63)		

Axial guidance of needle roller and cage assemblies

The needle roller and cage assemblies must be axially guided on lateral, burr-free running surfaces, see dimension tables.

The axial running surfaces for the cage must be precision machined (R_a2) and resistant to wear.
Note the mounting dimensions in the dimension tables.

Replacement of inner rings

In needle roller bearings without ribs, the inner ring is not self-retaining.

The outer ring and the needle roller and cage assembly are matched to each other and must not be interchanged during fitting with components from other bearings of the same size.

In the standard bearings, the inner rings are matched to the enveloping circle tolerance F6 and can be interchanged with each other within the same accuracy class.

Radial location

Needle roller bearings with an inner ring are radially located by means of a fit on the shaft and in the housing.

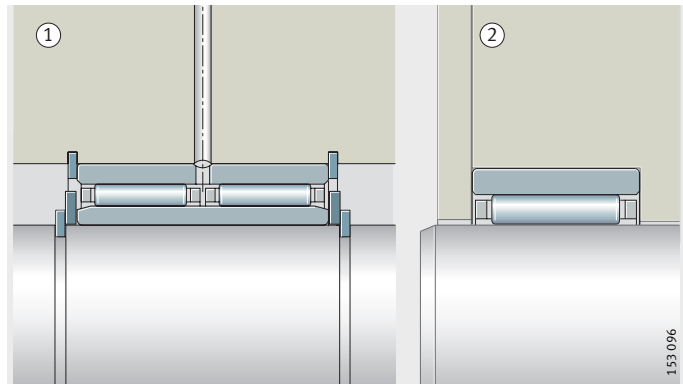
Axial location

In order to prevent lateral creep of the bearing rings, they must be located by means of physical locking, *Figure 1*.

The abutment shoulders (shaft, housing) should be sufficiently high and perpendicular to the bearing axis. The transition from the bearing seat to the abutment shoulder must be designed with rounding to DIN 5 418 or an undercut to DIN 509.
The minimum values for the chamfer dimensions r in the dimension tables must be observed.

The overlap between the snap rings and the end faces of the bearing rings must be sufficiently large, *Figure 1*.

Maximum inner ring chamfer dimensions to DIN 620-6 must be taken into consideration.



NAO..-ZW-ASR1
RNAO

① Snap rings
② Abutment shoulders

Figure 1
Axial location of bearing rings

Accuracy

The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620.

Radial internal clearance

Bearings with inner ring have a radial internal clearance CN to DIN 620-4.

Radial internal clearance

Bore d mm		Radial internal clearance CN µm	
over	incl.	min.	max.
–	24	20	45
24	30	20	45
30	40	25	50
40	50	30	60
50	65	40	70
65	80	40	75
80	100	50	85
100	120	50	90

Enveloping circle

In the case of bearings without an inner ring, the dimension for the enveloping circle F_w is used instead of the radial internal clearance.

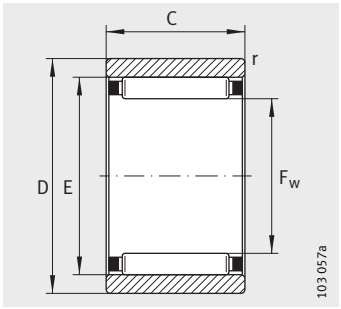
The enveloping circle is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway.

For bearings before fitting, the enveloping circle F_w is in the tolerance zone F6.
Deviations for the tolerance zone F6: see table, page 168.

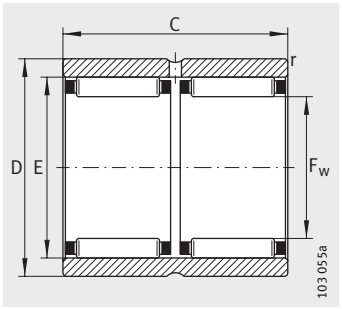
If the enveloping circle is to be in tolerance zone F6, the parts as delivered (outer ring/needle roller and cage assembly as a matched pair) must not be interchanged with other matched pairs.

Needle roller bearings without ribs

Without inner ring
Open



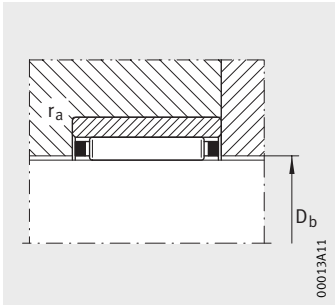
RNAO



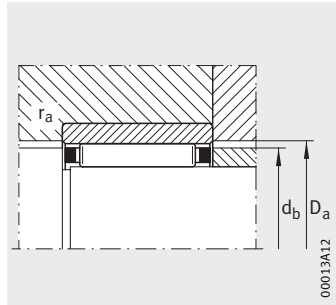
RNAO..-ZW-ASR1

Dimension table · Dimensions in mm

Designation		Mass	Dimensions					Mounting dimensions	
	X-life	m ≈g	F_w	D	C	E	r min.	D_b	d_b
RNAO5X10X8-TV	**XL**	3	**5**	10	8	8	0,15	5,3	7,7
RNAO6X13X8-TV	**XL**	6	**6**	13	8	9	0,3	6,3	8,7
RNAO7X14X8-TV	**XL**	6	**7**	14	8	10	0,3	7,3	9,7
RNAO8X15X10-TV	**XL**	8	**8**	15	10	11	0,3	8,3	10,7
RNAO10X17X10-TV	**XL**	10	**10**	17	10	13	0,3	10,3	12,7
RNAO12X22X12-TV	**XL**	19	**12**	22	12	18	0,3	12,3	17,6
RNAO15X23X13	**XL**	20	**15**	23	13	19	0,3	15,4	18,6
RNAO16X24X13	**XL**	21	**16**	28	12	20	0,3	16,4	19,6
RNAO16X28X12	**XL**	32	**16**	28	12	22	0,3	16,4	21,6
RNAO17X25X13	**XL**	22	**17**	25	13	21	0,3	17,4	20,6
RNAO18X30X24-ZW-ASR1	**XL**	69	**18**	30	24	24	0,3	18,4	23,6
RNAO20X28X13	**XL**	25	**20**	28	13	24	0,3	20,4	23,6
RNAO20X28X26-ZW-ASR1	**XL**	50	**20**	28	26	24	0,3	20,4	23,6
RNAO20X32X12	**XL**	38	**20**	32	12	26	0,3	20,4	25,6
RNAO22X30X13	**XL**	27	**22**	30	13	26	0,3	22,4	25,6
RNAO22X35X16	**XL**	59	**22**	35	16	29	0,3	22,4	28,4
RNAO25X35X17	**XL**	53	**25**	35	17	29	0,3	25,6	28,4
RNAO25X35X26-ZW-ASR1	**XL**	76	**25**	35	26	29	0,3	25,6	28,4
RNAO25X37X16	**XL**	60	**25**	37	16	32	0,3	25,6	31,4
RNAO30X40X17	**XL**	60	**30**	40	17	35	0,3	30,6	34,4
RNAO30X42X16	**XL**	59	**30**	42	16	37	0,3	30,6	36,4
RNAO30X42X32-ZW-ASR1	**XL**	137	**30**	42	32	37	0,3	30,6	36,4
RNAO35X45X13	**XL**	53	**35**	45	13	40	0,3	35,6	39,4
RNAO35X45X17	**XL**	69	**35**	45	17	40	0,3	35,6	39,4
RNAO35X45X26-ZW-ASR1	**XL**	91	**35**	45	26	40	0,3	35,6	39,4
RNAO35X47X16	**XL**	78	**35**	47	16	42	0,3	35,6	41,4
RNAO35X47X18	**XL**	89	**35**	47	16	42	0,3	35,6	41,4
RNAO35X47X32-ZW-ASR1	**XL**	156	**35**	47	32	42	0,3	35,6	41,4



Axial guidance of needle roller and cage assembly in housing

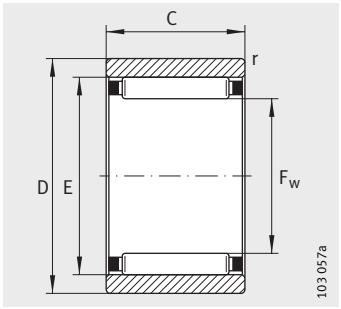


Axial guidance of needle roller and cage assembly on shaft

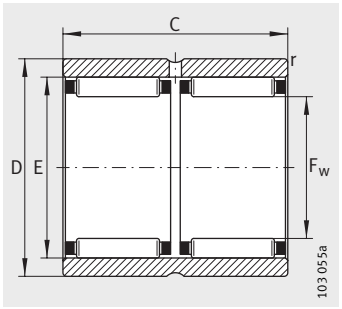
		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
	max.	N	N	N	min^{-1}	min^{-1}
8,3	0,1	2 650	1 920	295	39 000	53 000
9,3	0,3	2 950	2 280	355	36 500	48 500
10,3	0,3	3 250	2 650	410	34 500	41 500
11,3	0,3	4 450	4 100	690	32 500	35 500
13,3	0,3	5 300	5 500	930	29 500	28 000
18,3	0,3	11 300	9 900	1 740	26 000	19 700
19,3	0,3	9 700	10 900	1 760	22 900	15 000
20,3	0,3	10 100	11 800	1 890	23 600	16 800
22,3	0,3	13 000	12 500	2 210	22 900	15 900
21,3	0,3	11 700	14 600	2 240	22 900	15 200
24,5	0,3	24 800	30 000	5 300	21 800	14 000
24,3	0,3	11 100	14 300	2 310	21 300	13 700
24,3	0,3	19 000	28 500	4 600	21 300	13 700
26,5	0,3	15 100	16 200	2 850	20 900	12 700
26,3	0,3	11 800	15 900	2 550	20 400	12 400
29,5	0,3	22 600	25 500	4 200	19 200	11 200
29,5	0,3	16 800	26 000	4 250	18 100	11 000
29,5	0,3	21 900	37 000	5 900	18 100	11 200
32,5	0,3	23 800	28 000	4 650	17 200	10 000
35,5	0,3	22 100	34 000	5 300	15 100	8 800
37,5	0,3	26 000	33 500	5 500	14 600	8 500
37,5	0,3	45 000	67 000	11 100	14 600	8 500
40,5	0,3	18 300	28 000	4 450	13 100	7 800
40,5	0,3	23 500	38 500	6 100	13 100	7 700
40,5	0,3	31 500	56 000	8 900	13 100	7 800
42,5	0,3	27 500	37 500	6 200	12 700	7 500
42,5	0,3	31 000	43 000	7 400	12 700	7 400
42,5	0,3	47 500	75 000	12 400	12 700	7 500

Needle roller bearings without ribs

Without inner ring
Open



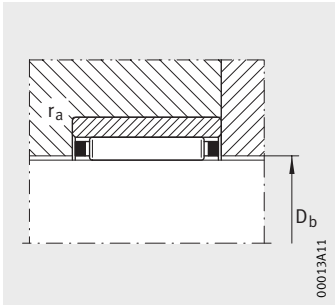
RNAO



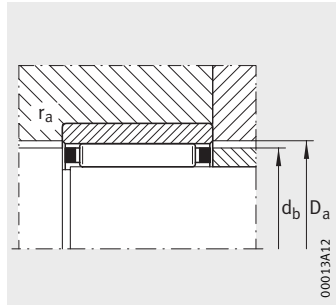
RNAO..-ZW-ASR1

Dimension table (continued) · Dimensions in mm

Designation		Mass	Dimensions					Mounting dimensions	
	X-life	m ≈g	F_w	D	C	E	r min.	D_b	d_b
RNAO40X50X17	**XL**	74	**40**	50	17	45	0,3	40,6	44,4
RNAO40X50X34-ZW-ASR1	**XL**	152	**40**	50	34	45	0,3	40,6	44,4
RNAO40X55X20	**XL**	145	**40**	55	20	47	0,3	40,6	46,2
RNAO40X55X40-ZW-ASR1	**XL**	275	**40**	55	40	48	0,3	40,6	47,2
RNAO45X55X17	**XL**	83	**45**	55	17	50	0,3	45,6	49,2
RNAO45X62X40-ZW-ASR1	**XL**	377	**45**	62	40	53	0,3	45,6	52,2
RNAO50X62X20	**XL**	140	**50**	62	20	55	0,3	50,6	54,2
RNAO50X65X20	**XL**	168	**50**	65	20	58	0,3	50,6	57,2
RNAO50X65X40-ZW-ASR1	**XL**	355	**50**	65	40	58	0,6	50,6	57,2
RNAO55X68X20	**XL**	166	**55**	68	20	60	0,6	55,8	59,4
RNAO60X78X20	**XL**	255	**60**	78	20	68	1	60,8	67,2
RNAO60X78X40-ZW-ASR1	**XL**	435	**60**	78	40	68	1	60,8	67,2
RNAO65X85X30	**XL**	464	**65**	85	30	73	1	66	72,2
RNAO70X90X30	**XL**	499	**70**	90	30	78	1	71	77,2
RNAO80X100X30	**XL**	580	**80**	100	30	88	1	81	87,2
RNAO90X105X26	**XL**	373	**90**	105	26	98	1	91	97,2
RNAO90X110X30	**XL**	610	**90**	110	30	98	1	91	97,2
RNAO100X120X30	**XL**	694	**100**	120	30	108	1	101	107,2



Axial guidance of needle roller and cage assembly in housing

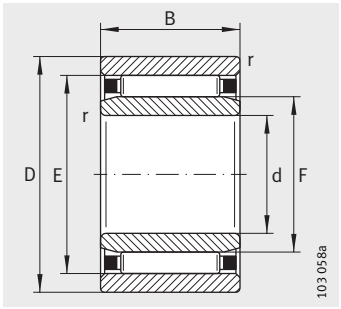


Axial guidance of needle roller and cage assembly on shaft

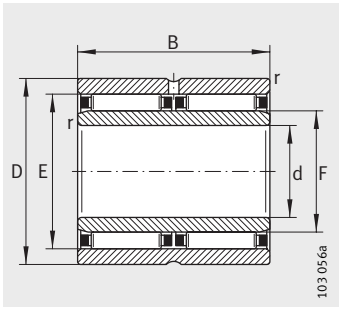
		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	n_B
	max.	N	N	N	min^{-1}	min^{-1}
45,5	0,3	24 200	41 500	6 400	11 500	7 000
45,5	0,3	41 500	83 000	12 900	11 500	7 000
47,5	0,3	37 000	57 000	8 900	11 300	6 600
47,5	0,3	70 000	118 000	18 700	11 100	6 500
50,5	0,3	25 500	46 000	7 100	10 300	6 300
53,5	0,3	76 000	135 000	21 500	10 000	5 900
55,8	0,3	30 000	60 000	9 600	9 300	5 800
58,5	0,3	40 500	62 000	10 800	9 100	5 600
58,5	0,6	69 000	124 000	21 700	9 100	5 600
60,8	0,6	32 000	66 000	10 700	8 500	5 400
68,8	1	49 500	85 000	13 600	7 700	4 650
68,8	1	85 000	171 000	27 500	7 700	4 650
73,8	1	64 000	123 000	21 100	7 100	4 550
78,8	1	68 000	135 000	23 200	6 600	4 250
89	1	80 000	176 000	31 000	5 800	3 600
99	1	69 000	150 000	25 000	5 200	3 350
99	1	76 000	172 000	29 500	5 200	3 450
109	1	80 000	188 000	32 000	4 700	3 150

Needle roller bearings without ribs

With inner ring
Open



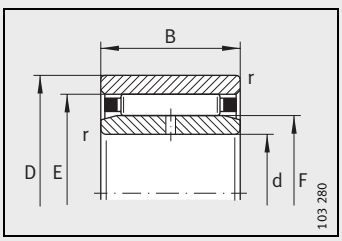
NAO



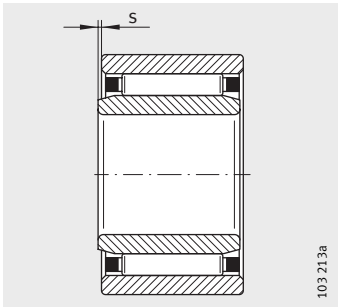
NAO..-ZW-ASR1

Dimension table · Dimensions in mm

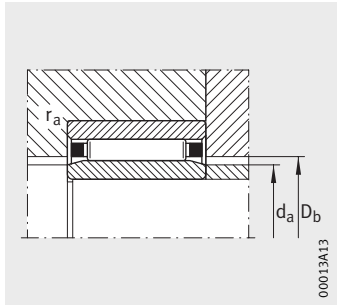
Designation		Mass	Dimensions						
	X-life	m ≈g	d	D	B	F	E	r min.	s[1)]
NAO6X17X10-TV-IS1	**XL**	14	**6**	17	10	10	13	0,3	0,5
NAO9X22X12-TV	**XL**	23,5	**9**	22	12	12	18	0,3	0,5
NAO12X24X13	**XL**	30	**12**	24	13	16	20	0,3	0,5
NAO12X28X12-IS1	**XL**	40	**12**	28	12	16	22	0,3	0,5
NAO15X28X13	**XL**	29	**15**	28	13	20	24	0,3	0,5
NAO15X32X12-IS1	**XL**	50	**15**	32	12	20	26	0,3	0,5
NAO17X30X13	**XL**	42	**17**	30	13	22	26	0,3	0,5
NAO17X35X16	**XL**	78	**17**	35	16	22	29	0,3	0,5
NAO20X35X17	**XL**	76	**20**	35	17	25	29	0,3	0,5
NAO20X37X16	**XL**	82	**20**	37	16	25	32	0,3	0,5
NAO25X40X17	**XL**	88	**25**	40	17	30	35	0,3	0,8
NAO25X42X16-IS1	**XL**	86	**25**	42	16	30	37	0,3	0,8
NAO25X42X32-ZW-ASR1	**XL**	190	**25**	43	32	30	37	0,3	0,8
NAO30X45X17	**XL**	102	**30**	45	17	35	40	0,3	0,8
NAO30X45X26-ZW-ASR1	**XL**	157	**30**	45	26	35	40	0,3	0,8
NAO30X47X16	**XL**	109	**30**	47	16	35	42	0,3	0,8
NAO30X47X18	**XL**	119	**30**	47	18	35	42	0,3	0,8
NAO35X50X17	**XL**	113	**35**	50	17	40	45	0,3	0,8
NAO35X55X20	**XL**	190	**35**	55	20	40	47	0,3	0,8
NAO40X55X17	**XL**	127	**40**	55	17	45	50	0,3	0,8
NAO50X68X20-IS1	**XL**	230	**50**	68	20	55	60	0,6	1
NAO70X100X30	**XL**	850	**70**	100	30	80	88	1	1
NAO80X110X30	**XL**	920	**80**	110	30	90	98	1	1
NAO90X120X30	**XL**	1 044	**90**	120	30	100	108	1	1



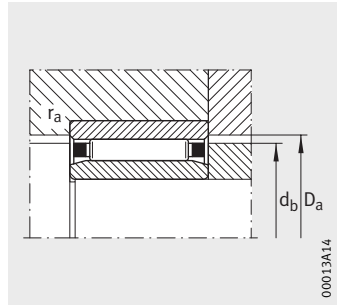
NAO..-IS1



[1] Axial displacement “s”

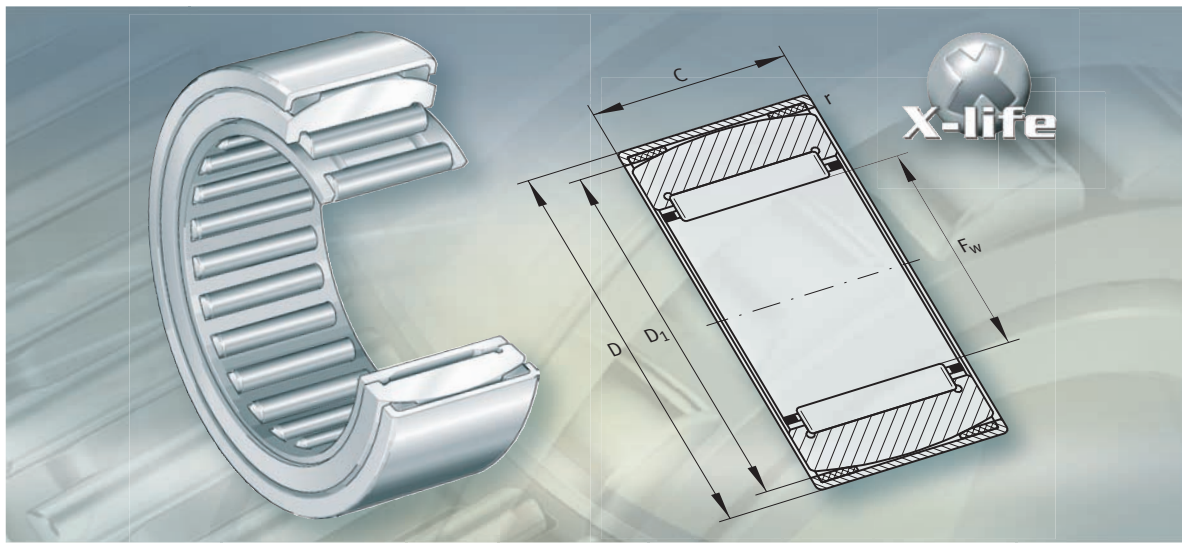


Axial guidance of needle roller and cage assembly in housing



Axial guidance of needle roller and cage assembly on shaft

Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_b	d_b	D_a	r_a max.	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G min^{-1}	n_B min^{-1}
9,7	10,3	12,7	13,3	0,3	5 300	5 500	930	29 500	23 800
11,7	12,3	17,6	18,3	0,3	11 300	9 900	1 740	26 000	17 900
15,7	16,4	19,6	20,3	0,3	10 100	11 800	1 890	23 600	15 000
15,7	16,4	21,6	22,3	0,3	13 000	12 500	2 210	22 900	14 300
19,7	20,4	23,6	24,3	0,3	11 100	14 300	2 310	21 300	12 100
19,7	20,4	25,6	26,5	0,3	15 100	16 200	2 850	20 900	11 400
21,5	22,4	25,6	26,3	0,3	11 800	15 900	2 550	20 400	11 100
21,5	22,4	28,4	29,5	0,3	22 600	25 500	4 200	19 200	10 100
24,5	25,6	28,4	29,5	0,3	16 800	26 000	4 250	18 100	10 000
24,5	25,6	31,4	32,5	0,3	23 800	28 000	4 650	17 200	9 000
29,5	30,6	34,4	35,5	0,3	22 100	34 000	5 300	15 100	8 100
29,5	30,6	36,4	37,5	0,3	26 000	33 500	5 500	14 600	7 800
29,5	30,6	36,4	37,5	0,3	45 000	67 000	11 000	14 600	7 800
34,5	35,6	39,4	40,5	0,3	23 500	38 500	6 100	13 100	7 100
34,5	35,6	39,4	40,5	0,3	31 500	56 000	8 900	13 100	7 200
34,5	35,6	41,4	42,5	0,3	27 500	37 500	6 200	12 700	6 900
34,5	35,6	41,4	42,5	0,3	31 000	43 000	7 400	12 700	6 900
39,5	40,6	44,4	45,5	0,3	24 200	41 500	6 400	11 500	6 500
39,5	40,6	46,2	47,5	0,3	37 000	57 000	8 900	11 300	6 200
44,5	45,6	49,2	50,5	0,3	25 500	46 000	7 100	10 300	5 900
54,5	55,8	59,2	60,8	0,6	32 000	66 000	10 700	8 500	5 100
79,3	81	87,2	89	1	80 000	176 000	31 000	5 800	3 350
89,3	91	97,2	99	1	76 000	172 000	29 500	5 200	3 200
99,3	101	107,2	109	1	80 000	188 000	32 000	4 700	2 950



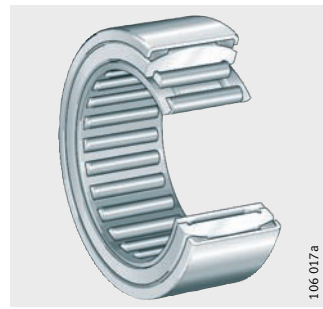
Aligning needle roller bearings

Aligning needle roller bearings

		Page
Product overview	Aligning needle roller bearings	752
Features	X-life	753
	Compensation of misalignments	753
	Needle roller bearings without inner ring	753
	Needle roller bearings with inner ring	753
	Sealing	753
	Lubrication	753
	Operating temperature	753
	Cages	753
Design and safety guidelines	Minimum radial load	754
	Speeds	754
	Design of bearing arrangements	754
Accuracy	Radial internal clearance	755
	Enveloping circle	755
Dimension tables	Aligning needle roller bearings, with and without inner ring	756

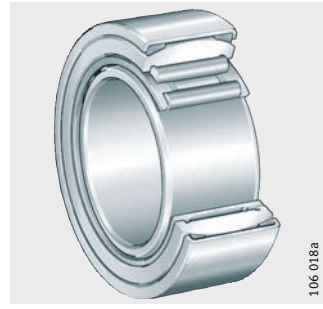
Without inner ring

RPNA



With inner ring

PNA



Aligning needle roller bearings

Features

The bearings comprise drawn outer cups, plastic support rings with a concave inner profile, outer rings with a spherical outside surface, needle roller and cage assemblies and removable inner rings.

X-life

Aligning needle roller bearings are X-life bearings.
These bearings have optimised raceway surfaces.
This gives higher load carrying capacity and longer rating life.

Compensation of misalignments

Due to the spherical outer ring and the concave support ring, aligning bearings can compensate static misalignments between the shaft and housing of up to 3°.

The bearings must not be used to support swivel or tumbling motion.

During adjustment motion between the outer cup and the ring, a breakaway torque occurs. In order that adjustment motion can take place, the tolerances for the housing bore according to the table must be observed, see table, page 754.

Needle roller bearings without inner ring

Bearings without inner ring have particularly compact radial dimensions. However, they require a shaft raceway that is hardened and ground.

Needle roller bearings with inner ring

Bearings with an inner ring are used if the shaft is not configured as a rolling bearing raceway.

Displacement of the inner ring

The standard inner ring allows axial displacement within the values “s” stated in the dimension tables. Where larger displacements occur, the standard ring can be replaced by a wider inner ring IR. Inner rings: see page 776.

Sealing

Aligning needle roller bearings are not sealed.

Lubrication

The open bearings can be lubricated with oil or grease.

Operating temperature

The range of possible operating temperatures is from –20 °C to +100 °C, restricted by the plastic support rings.

Cages

The cages are made from sheet steel.

Design and safety guidelines

Minimum radial load

In order to ensure operation without slippage, the bearings must be subjected to a minimum load $F_{r\,min}$ in a radial direction.
This applies in particular to high speed bearings since, if the radial load is insufficient or not present, damaging sliding motion may occur between the rolling elements and raceways. In continuous operation, a minimum radial load of the order of $C_r/P < 50$ is necessary.

Speeds

The limiting speeds n_G in the dimension tables are valid for oil lubrication.

With grease lubrication, the permissible value is 60% of the value in the table.

Design of bearing arrangements

Shaft and housing tolerances

Recommended shaft tolerances for bearings with an inner ring, see table, page 150.

For the design of shafts for bearings without an inner ring, see the section Raceway for bearings without inner ring and the associated tables.

Recommended housing tolerances, see table, page 152.

Raceway for bearings without inner ring

Where bearings without an inner ring are to be used, the rolling element raceway on the shaft must be hardened and ground. The surface hardness of the raceway must be 670 HV + 170 HV, the hardening depth CHD or SHD must be sufficiently large.

If the surface of the shaft raceway is produced to DIN 617, the basic load ratings C_r in the dimension tables must be reduced by 15%.

Tolerances for shaft raceway and housing bore

Housing material	Shaft tolerance for bearings without inner ring	Bore tolerance
Steel or cast iron	h6	N6
Light metal		R6

Surfaces for shaft raceway and housing bore

Surface	Shaft raceway for bearings without inner ring	Housing bore
Roughness max.	R_a0,1 (R_z0,4)	R_a0,8 (R_z4)
Roundness max.	IT3	IT 5/2
Parallelism max.	IT3	IT 5/2

Radial and axial location

Aligning needle roller bearings are firmly seated in the housing bore. No further axial location is required.
The bore can therefore be produced easily and economically.

Replacement of inner rings

In aligning needle roller bearings, the inner ring is not self-retaining.

In the standard bearings, the inner rings are matched to the enveloping circle tolerance F6 and can be interchanged with each other within the same accuracy class.

Installation with fitting mandrel

Due to the drawn outer cup, the bearings must be fitted using a special pressing mandrel: see the section Drawn cup needle roller bearings, page 687.
The marked side of the bearing should be in contact with the flange of the mandrel. A toroidal ring on the mandrel holds the bearing securely on the mandrel.

Accuracy

The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620, with the exception of the outside diameter and the width of the outer cup. The width has a tolerance of ±0,5 mm.

Radial internal clearance

Bearings with inner ring have a radial internal clearance CN to DIN 620-4.

Radial internal clearance

Bore d mm		Radial internal clearance CN µm	
over	incl.	min.	max.
–	24	20	45
24	30	20	45
30	40	25	50
40	50	30	60

Enveloping circle

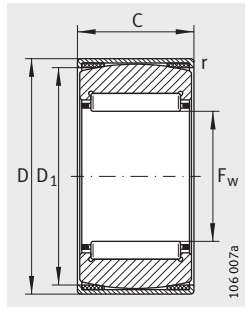
In the case of bearings without an inner ring, the dimension for the enveloping circle F_w is used instead of the radial internal clearance.

The enveloping circle is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway.

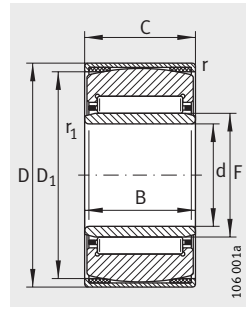
For bearings before fitting, the enveloping circle F_w is in the tolerance zone F6.
Deviations for the tolerance zone F6: see table, page 168.

Aligning needle roller bearings

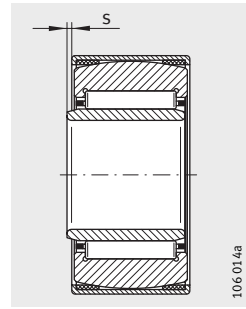
With or without inner ring



RPNA



PNA



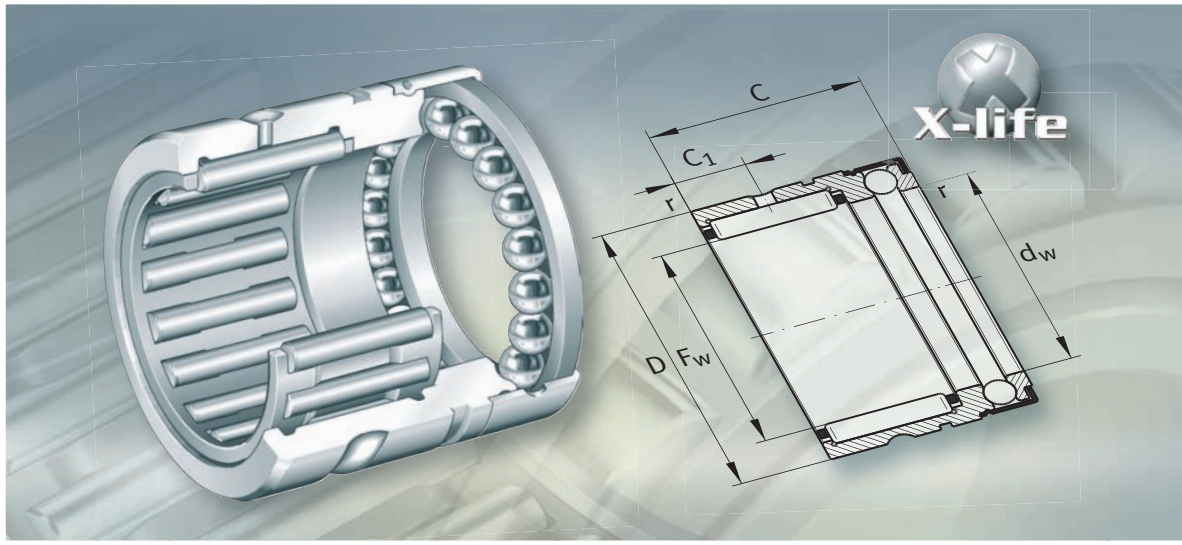
[1] Axial displacement “s”

Dimension table · Dimensions in mm

Designation		Mass	Dimensions					Basic load ratings		Fatigue limit load	Limiting speed
	X-life	m ≈g	F_w	D	C ±0,5	D_1	r min.	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G min^{-1}
RPNA15/28	**XL**	32	**15**	28	12	24,5	0,8	7 800	7 900	1 430	24 000
RPNA18/32	**XL**	52	**18**	32	16	27	0,8	14 100	16 200	3 000	22 000
RPNA20/35	**XL**	62	**20**	35	16	30,5	0,8	14 600	17 500	3 200	21 000
RPNA25/42	**XL**	109	**25**	42	20	36,5	0,8	21 300	30 500	5 300	18 000
RPNA28/44	**XL**	112	**28**	44	20	38,5	0,8	24 800	34 000	5 900	16 000
RPNA30/47	**XL**	125	**30**	47	20	42	0,8	25 500	36 000	6 300	15 000
RPNA35/52	**XL**	131	**35**	52	20	47,5	0,8	27 500	41 500	7 300	13 000
RPNA40/55	**XL**	141	**40**	55	20	50,5	0,8	29 500	47 000	8 300	11 000
RPNA45/62	**XL**	176	**45**	62	20	58	0,8	31 000	53 000	9 300	10 000

Dimension table · Dimensions in mm

Designation		Mass	Dimensions									Basic load ratings		Fatigue limit load	Limiting speed
	X-life	m ≈g	d	F	D	C ±0,5	B	D_1	r min.	r_1 min.	s[1] min.	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G min^{-1}
PNA12/28	**XL**	37	**12**	15	28	12	12	24,5	0,8	0,3	0,5	7 800	7 900	1 430	24 000
PNA15/32	**XL**	62	**15**	18	32	16	16	27	0,8	0,3	0,5	14 100	16 200	3 000	22 000
PNA17/35	**XL**	73	**17**	20	35	16	16	30,5	0,8	0,3	0,5	14 600	17 500	3 200	21 000
PNA20/42	**XL**	136	**20**	25	42	20	20	36,5	0,8	0,3	0,5	21 300	30 500	5 300	18 000
PNA22/44	**XL**	145	**22**	28	44	20	20	38,5	0,8	0,3	0,5	24 800	34 000	5 900	16 000
PNA25/47	**XL**	157	**25**	30	47	20	20	42	0,8	0,3	0,5	25 500	36 000	6 300	15 000
PNA30/52	**XL**	181	**30**	35	52	20	20	47,5	0,8	0,3	0,5	27 500	41 500	7 300	13 000
PNA35/55	**XL**	177	**35**	40	55	20	20	50,5	0,8	0,3	0,5	29 500	47 000	8 300	11 000
PNA40/62	**XL**	227	**40**	45	62	20	20	58	0,8	0,3	0,5	31 000	53 000	9 300	10 000



Combined needle roller bearings

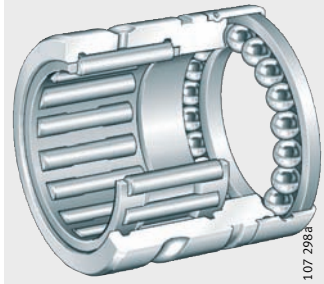
Combined needle roller bearings

		Page
Product overview	Combined needle roller bearings	760
Features	X-life	761
	Needle roller/axial deep groove ball bearings	761
	Needle roller/axial cylindrical roller bearings	762
	Needle roller/angular contact ball bearings	762
	Operating temperature	762
	Cages	762
	Suffixes	762
Design and safety guidelines	Minimum radial load	763
	Support of axial forces	763
	Speeds	764
	Lubrication	764
	Design of bearing arrangements	765
Accuracy	Radial internal clearance	766
	Enveloping circle	766
Dimension tables	Needle roller/axial deep groove ball bearings without inner ring	768
	Needle roller/axial deep groove ball bearings without inner ring, with or without end cap	770
	Needle roller/axial cylindrical roller bearings without inner ring, with or without end cap	772
	Needle roller/angular contact ball bearings with inner ring	774

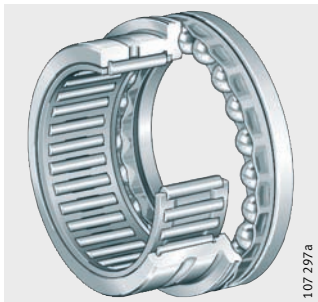
Needle roller/ axial deep groove ball bearings

Without inner ring
With or without end cap

NX, NX..-Z



NKX, NKX..-Z



Needle roller/ axial cylindrical roller bearings

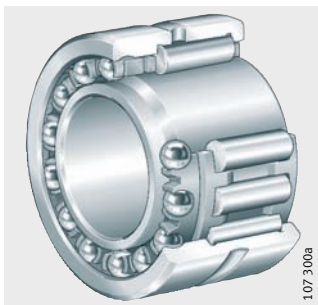
Without inner ring
With or without end cap

NKXR, NKXR..-Z

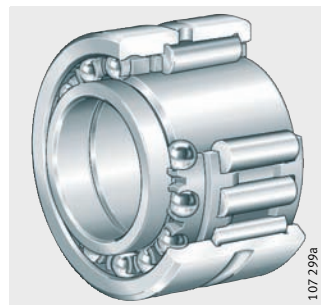
Needle roller/angular contact ball bearings

With inner ring

NKIA



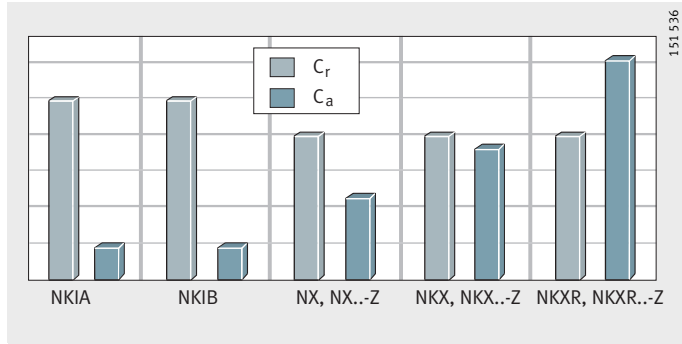
NKIB



Combined needle roller bearings

Features

These series comprise radial needle roller bearings and a rolling bearing component capable of supporting axial loads. They can support high radial forces as well as axial forces in one direction, while NKIB can support axial forces from both directions, and are used as locating or semi-locating bearings, *Figure 1*.



C_r = radial dynamic load carrying capacity
C_a = axial dynamic load carrying capacity

Figure 1
Radial and axial dynamic load carrying capacity

X-life

Combined needle roller bearings are X-life bearings. These bearings have optimised raceway surfaces. This gives higher load carrying capacity and longer rating life.

The bearings are available in the following designs:

- needle roller/axial deep groove ball bearings
- needle roller/axial cylindrical roller bearings
- needle roller/angular contact ball bearings.

Needle roller/axial deep groove ball bearings

These series do not have an inner ring and are therefore particularly compact in a radial direction. However, they require a shaft raceway that is hardened and ground.

Bearings NX and NX..-Z have a full complement axial ball bearing component and end caps.

Series NKX and NKX..-Z have an axial bearing component comprising a ball and cage assembly with a sheet steel or plastic cage. NKX..-Z also has an end cap on the axial bearing component.

Lubrication

For lubrication, the outer ring has a lubrication groove and lubrication holes.

NX and NKX are lubricated with oil.
The end cap in NX has lubrication holes.

NX..-Z and NKX..-Z are lubricated with grease. The axial bearing component is greased using a lithium complex soap grease to GA08. The end caps do not have lubrication holes.

Needle roller/ axial cylindrical roller bearings

These bearings do not have an inner ring and are therefore particularly compact in a radial direction. However, they require a shaft raceway that is hardened and ground.

Series NKXR and NKXR..-Z have an axial bearing component comprising a roller and cage assembly with a plastic cage. NKXR..-Z also has an end cap on the axial bearing component.

Lubrication

For lubrication, the outer ring has a lubrication groove and lubrication holes.

NKXR is lubricated with oil.

NKXR..-Z is intended for grease lubrication. The axial bearing component is greased using a lithium complex soap grease to GA08. The end cap does not have lubrication holes.

Needle roller/ angular contact ball bearings

Combined bearings NKIA and NKIB have an inner ring.

Series NKIA corresponds to DIN 5 429-2. It can support axial loads from one direction.

For alternating axial forces

NKIB has one narrow inner ring and one wide inner ring. The axial bearing component has a plastic ball cage. At the point where the inner rings join, there is a shoulder on both sides for guidance of the ball and cage assembly. As a result, these bearings are also suitable for supporting axial forces alternating in direction.

The bearings guide the shaft with an axial clearance of 0,08 mm to 0,25 mm.

Lubrication

NKIA and NKIB can be lubricated with grease or oil. For lubrication, the outer ring has a lubrication groove and lubrication hole.

Operating temperature

They are suitable for operating temperatures from –20 °C to +120 °C.

Cages

The radial cages are made from sheet steel or plastic. Bearings with a plastic cage have the suffix TV.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
TV	Bearing with radial cage made from glass fibre reinforced polyamide 66	Standard
Z	Bearing with end cap Axial bearing component greased with lithium complex soap grease to GA08	

Design and safety guidelines

Minimum radial load

In order to ensure operation without slippage, the bearings must be subjected to a minimum load $F_{r\,min}$ in a radial direction.
This applies in particular to high speed bearings since, if the radial load is insufficient or not present, damaging sliding motion may occur between the rolling elements and raceways.
In continuous operation, a minimum radial load of the order of $C_r/P < 50$ is necessary.

Support of axial forces

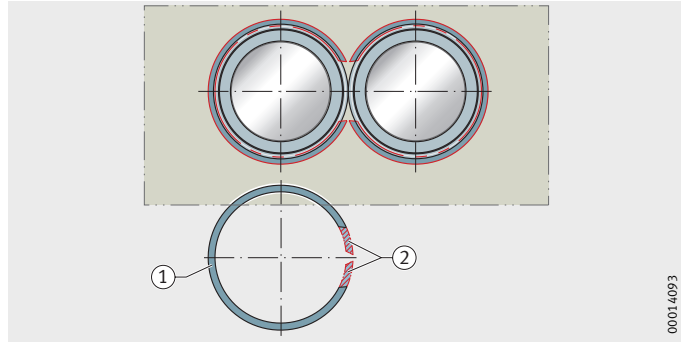
The axial bearing component must be preloaded to 1% of the axial basic static load rating C_{0a}.
The basic load ratings C_{0a} are stated in the dimension tables.

Needle roller/axial deep groove ball bearings, needle roller/axial cylindrical roller bearings

In order to support axial forces, the bearing must be abutted by means of snap rings on the outer ring or a housing shoulder.
If there is little distance between the shaft centres, the snap rings should be shortened, *Figure 2*. Snap rings WR and SW are available from trade outlets.

If the bearings are to support axial forces from alternating directions, two bearings must be fitted opposed to each other. The unloaded bearing must be axially preloaded, for example by means of springs. This allows compensation of thermal expansion.

In order to avoid double fits on NKX and NKXR, the axial bearing component must be free in the housing (outside diameter D_1 and D_2+0,5 mm min.).



① Snap ring
② Shortened area

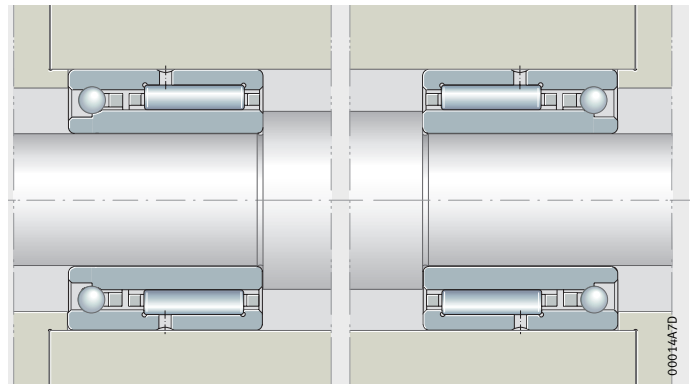
Figure 2
Shortened snap rings

Needle roller/ angular contact ball bearings

Series NKIA can support axial forces in one direction, while NKIB can support axial forces in both directions.

If bearings NKIA are to support axial forces from alternating directions, two bearings must be fitted opposed to each other, *Figure 3*.

In the case of NKIB, the wide and narrow inner ring must be axially clamped against each other. The narrow inner ring has a larger bore diameter. This results in an interference fit if a shaft tolerance k6 is used.



NKIA

Figure 3
Two bearings adjusted against each other

Axial static load safety factor

The axial load must not exceed 25% of the radial load.

The axial static load safety factor S_0 must be $> 1{,}5$.

Speeds

The limiting speeds n_G in the dimension tables are valid for oil lubrication.

With grease lubrication, the permissible value is 60% of the value in the table.

The reference speed n_B for NKXR, NKXR..-Z, NKIA, NKIB is given in the dimension tables. In order to calculate the thermally safe operating speed n_{per}, NKXR(Z) must be regarded as axial bearings, while NKIA and NKIB must be regarded as radial bearings.

Lubrication

In bearings with grease lubrication, the radial bearing component should be greased before initial operation using a grease of similar quality to that used in the axial bearing component.

In order to determine the relubrication interval, values must be calculated separately for the axial and radial bearing components and the lower value should be used.

Design of bearing arrangements

Shaft and housing tolerances

Recommended shaft and housing tolerances are given in the following tables.

Mounting dimensions

As far as possible, the dimension tables give the maximum value of the radius r_a and the diameters of the abutment shoulders d_a.

Raceway for bearings without inner ring

Where bearings without an inner ring are to be used, the rolling element raceway on the shaft must be hardened and ground, see tables. The surface hardness of the raceway must be 670 HV + 170 HV, the hardening depth CHD or SHD must be sufficiently large.

If the shaft cannot be configured as a raceway, inner rings of series IR can be used. The inner rings must be ordered separately. Inner rings: see page 778.

For NKIA and NKIB, the shaft tolerance must not be greater than k6 and the bore tolerance must not be less than M6.

If the surface of the shaft raceway is produced to DIN 617, the basic load ratings C_r in the dimension tables must be reduced by 15%.

Tolerances for shaft raceway and housing bore

Series	Shaft tolerance		Bore tolerance
	For bearings without inner ring	For bearings with inner ring	
NKIA, NKIB	–	k6	M6
NX, NKX, NKXR	k6		K6, M6 (for rigid bearing arrangement)

Surfaces for shaft raceway and housing bore

Surface	Shaft raceway		Housing bore
	For bearings without inner ring	For bearings with inner ring	
Roughness max.	R_a0,1 (R_z0,4)	–	–
Roundness max.	IT3	IT 4/2	IT 5/2
Parallelism max.	IT3	IT 4	IT 4

Replacement of inner rings

Combined needle roller bearings are not self-retaining.

In the standard bearings of series NKIA and NKIB, the inner rings are matched to the enveloping circle tolerance F6 and can be interchanged with each other within the same accuracy class.

Radial location

Bearings with an inner ring are radially located by means of a fit on the shaft and in the housing.

Axial location

The abutment shoulders (shaft, housing) should be sufficiently high and perpendicular to the bearing axis. The transition from the bearing seat to the abutment shoulder must be designed with rounding to DIN 5 418 or an undercut to DIN 509.
The minimum values for the chamfer dimensions r in the dimension tables must be observed.

The overlap between the snap rings and the end faces of the bearing rings must be sufficiently large.

Maximum inner ring chamfer dimensions to DIN 620-6 must be taken into consideration.

In order to prevent lateral creep of the bearing rings, they must be located by means of physical locking. For locating bearings and for bearings with a split inner ring, axial abutment of the bearing rings on both sides is particularly important.

Accuracy

The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620. This excludes bearings NKIB, the bore d_1 of the narrow inner ring and the width (–0,3 mm) over both inner rings as well as bearings NKX and NKXR with diameters D_1, D_2.

Radial internal clearance

Bearings with inner ring have a radial internal clearance CN to DIN 620-4.

Radial internal clearance

Bore d mm		Radial internal clearance CN µm	
over	incl.	min.	max.
–	24	20	45
24	30	20	45
30	40	25	50
40	50	30	60
50	65	40	70
65	80	40	75
80	100	50	85

Enveloping circle

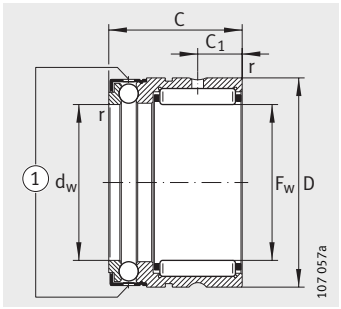
In the case of bearings without an inner ring, the dimension for the enveloping circle F_w is used instead of the radial internal clearance.

The enveloping circle is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway.

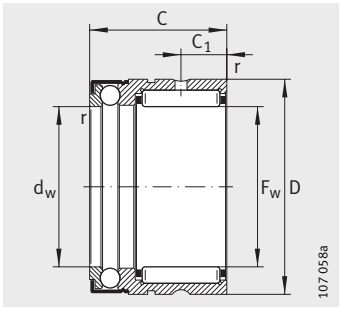
For bearings before fitting, the enveloping circle F_w is in the tolerance zone F6.
Deviations for the tolerance zone F6: see table, page 168.

Needle roller/ axial deep groove ball bearings

Without inner ring



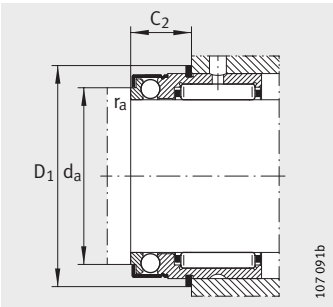
NX
① Oil holes



NX..-Z

Dimension table · Dimensions in mm

Designation				Dimensions						Mounting dimensions			
For oil lubrication	For grease lubrication	X-life	Mass m ≈g	F_w	D	C –0,25	C_1	d_w E8	r min.	C_2	D_1	d_a	r_a max.
NX7-TV	**NX7-Z-TV**	**XL**	14	**7**	14	18	4,7	7	0,3	10	16,5	9,6	0,3
NX10	**NX10-Z**	**XL**	25	**10**	19	18	4,7	10	0,3	10	21,9	14,6	0,3
NX12	**NX12-Z**	**XL**	28	**12**	21	18	4,7	12	0,3	10	23,7	16,6	0,3
NX15	**NX15-Z**	**XL**	48	**15**	24	28	8	15	0,3	12,2	26,5	19	0,3
NX17	**NX17-Z**	**XL**	53	**17**	26	28	8	17	0,3	12,2	28,5	21	0,3
NX20	**NX20-Z**	**XL**	68	**20**	30	28	8	20	0,3	12,2	33,6	25	0,3
NX25	**NX25-Z**	**XL**	115	**25**	37	30	8	25	0,3	14,2	40,4	31,6	0,3
NX30	**NX30-Z**	**XL**	130	**30**	42	30	10	30	0,3	14,2	45,1	36,5	0,3
NX35	**NX35-Z**	**XL**	160	**35**	47	30	10	35	0,3	14,2	50,1	40,5	0,3

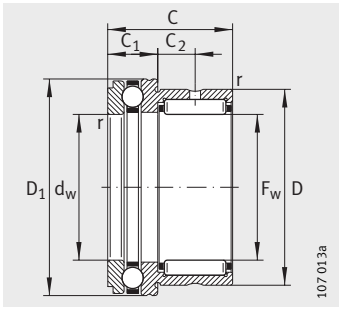


Mounting dimensions
Snap ring in outer ring

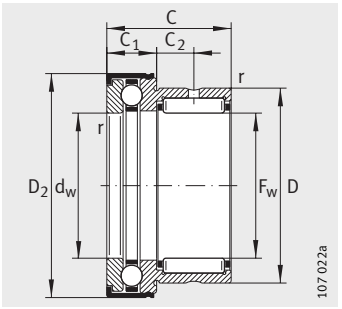
Basic load ratings				Fatigue limit load		Limiting speed	Recommended inner rings Designation	Suitable snap rings
radial		axial		C_{ur}	C_{ua}	n_G		
dyn. C_r N	stat. C_{0r} N	dyn. C_a N	stat. C_{0a} N	N	N	min^{-1}		
3 250	2 650	3 150	4 300	410	190	15 000	–	**WR14, SW14**
5 000	3 700	4 600	7 200	720	320	11 000	**IR6X10X10-IS1**	**WR19, SW19**
5 400	4 300	4 850	8 200	830	365	9 500	**IR8X12X10-IS1**	**WR21, SW21**
12 100	12 700	5 600	10 400	2 320	460	8 000	**IR12X15X16**	**WR24, SW24**
13 500	15 000	5 800	11 500	2 750	510	7 500	**IR14X17X17**	**WR26, SW26**
14 600	17 500	7 000	14 700	3 200	650	6 500	**IR17X20X16**	**WR30, SW30**
16 800	22 400	11 100	24 300	4 150	1 080	4 900	**IR20X25X16-IS1**	**WR37, SW37**
25 500	36 000	11 700	28 000	6 300	1 230	4 300	**IR25X30X20**	**WR42, SW42**
27 500	41 500	12 400	32 500	7 300	1 440	3 700	**IR30X35X20**	**WR47, SW47**

Needle roller/ axial deep groove ball bearings

Without inner ring
With or without end cap



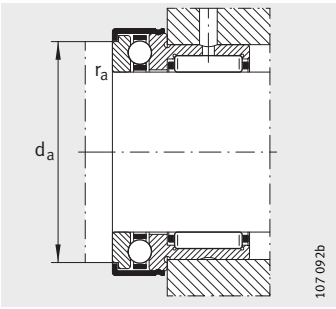
NKX



NKX..-Z

Dimension table · Dimensions in mm

Without end cap Designation		Mass	With end cap Designation		Mass	Dimensions					
	X-life	m ≈g		X-life	m ≈g	F_w	D	D_1 max.	D_2 max.	C −0,25	C_1 −0,2
NKX10-TV	**XL**	34	**NKX10-Z-TV**	**XL**	36	**10**	19	24,1	25,2	23	9
NKX12	**XL**	38	**NKX12-Z**	**XL**	40	**12**	21	26,1	27,2	23	9
NKX15	**XL**	44	**NKX15-Z**	**XL**	47	**15**	24	28,1	29,2	23	9
NKX17	**XL**	53	**NKX17-Z**	**XL**	55	**17**	26	30,1	31,2	25	9
NKX20	**XL**	83	**NKX20-Z**	**XL**	90	**20**	30	35,1	36,2	30	10
NKX25	**XL**	125	**NKX25-Z**	**XL**	132	**25**	37	42,1	43,2	30	11
NKX30	**XL**	141	**NKX30-Z**	**XL**	148	**30**	42	47,1	48,2	30	11
NKX35	**XL**	163	**NKX35-Z**	**XL**	168	**35**	47	52,1	53,2	30	12
NKX40	**XL**	200	**NKX40-Z**	**XL**	208	**40**	52	60,1	61,2	32	13
NKX45	**XL**	252	**NKX45-Z**	**XL**	265	**45**	58	65,2	66,5	32	14
NKX50	**XL**	280	**NKX50-Z**	**XL**	300	**50**	62	70,2	71,5	35	14
NKX60	**XL**	360	**NKX60-Z**	**XL**	380	**60**	72	85,2	86,5	40	17
NKX70	**XL**	500	**NKX70-Z**	**XL**	520	**70**	85	95,2	96,5	40	18

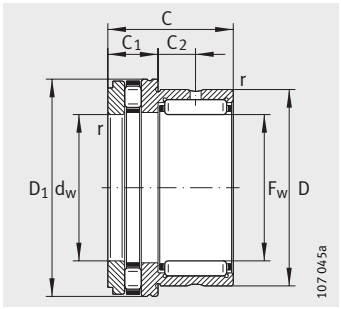


Mounting dimensions

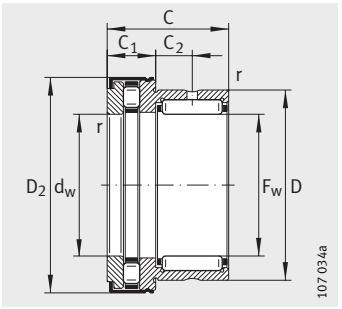
			Mounting dimensions		Basic load ratings				Fatigue limit load		Limiting speed	Recommended inner rings Designation
C_2	d_w	r	d_a	r_a	radial		axial		C_{ur}	C_{ua}	n_G	
					dyn. C_r	stat. C_{0r}	dyn. C_a	stat. C_{0a}				
	E8	min.		max.	N	N	N	N	N	N	min^{-1}	
6,5	10	0,3	19,7	0,3	7 000	7 800	10 000	14 000	1 310	670	12 400	**IR7X10X16**
6,5	12	0,3	21,7	0,3	10 100	11 000	10 300	15 400	1 920	740	10 900	**IR9X12X16**
6,5	15	0,3	23,7	0,3	12 100	12 700	10 500	16 800	2 320	810	9 200	**IR12X15X16**
8	17	0,3	25,7	0,3	13 500	15 000	10 800	18 200	2 750	870	8 400	**IR14X17X17**
10,5	20	0,3	30,7	0,3	18 600	23 800	14 300	24 700	4 150	1 190	7 200	**IR17X20X20**
9,5	25	0,6	37,7	0,6	21 300	30 500	19 600	37 500	5 300	1 790	5 800	**IR20X25X20**
9,5	30	0,6	42,7	0,6	25 500	36 000	20 400	42 000	6 300	2 030	5 000	**IR25X30X20**
9	35	0,6	47,7	0,6	27 500	41 500	21 200	47 000	7 300	2 270	4 400	**IR30X35X20**
10	40	0,6	55,7	0,6	29 500	47 000	27 000	63 000	8 300	3 000	3 900	**IR35X40X20**
9	45	0,6	60,5	0,6	31 000	53 000	28 000	69 000	9 300	3 350	3 500	**IR40X45X20**
10	50	0,6	65,5	0,6	43 000	74 000	29 000	75 000	12 700	3 650	3 200	**IR45X50X25**
12	60	1	80,5	1	47 500	90 000	41 500	113 000	15 400	5 400	2 750	**IR50X60X25**
11	70	1	90,5	1	50 000	92 000	43 000	127 000	15 700	6 100	2 320	**IR60X70X25**

Needle roller/ axial cylindrical roller bearings

Without inner ring
With or without end cap



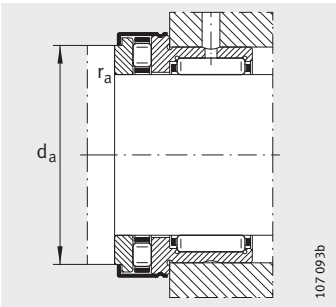
NKXR



NKXR..-Z

Dimension table · Dimensions in mm

Without end cap Designation		Mass	With end cap Designation		Mass	Dimensions					
	X-life	m ≈g		X-life	m ≈g	F_w	D	D_1 max.	D_2 max.	C −0,25	C_1 −0,2
NKXR15	**XL**	42	**NKXR15-Z**	**XL**	45	**15**	24	28,1	29,2	23	9
NKXR17	**XL**	50	**NKXR17-Z**	**XL**	53	**17**	26	30,1	31,2	25	9
NKXR20	**XL**	80	**NKXR20-Z**	**XL**	84	**20**	30	35,1	36,2	30	10
NKXR25	**XL**	120	**NKXR25-Z**	**XL**	125	**25**	37	42,1	43,2	30	11
NKXR30	**XL**	135	**NKXR30-Z**	**XL**	141	**30**	42	47,1	48,2	30	11
NKXR35	**XL**	157	**NKXR35-Z**	**XL**	165	**35**	47	52,1	53,2	30	12
NKXR40	**XL**	204	**NKXR40-Z**	**XL**	214	**40**	52	60,1	61,2	32	13
NKXR45	**XL**	244	**NKXR45-Z**	**XL**	260	**45**	58	65,2	66,5	32	14
NKXR50	**XL**	268	**NKXR50-Z**	**XL**	288	**50**	62	70,2	71,5	35	14

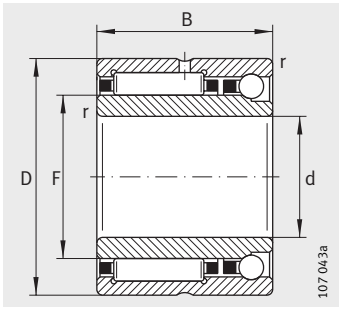


Mounting dimensions

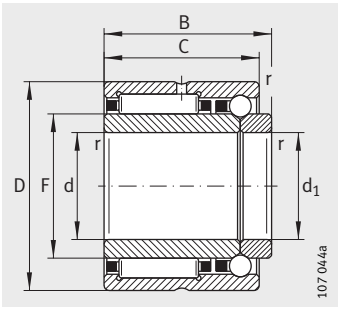
			Mounting dimensions		Basic load ratings				Fatigue limit load		Limiting speed	Reference speed	Recommended inner rings Designation
C_2	d_w	r	d_a	r_a	radial		axial		C_{ur}	C_{ua}	n_G	n_B	
					dyn. C_r	stat. C_{0r}	dyn. C_a	stat. C_{0a}					
	E8	min.		max.	N	N	N	N	N	N	min^{-1}	min^{-1}	
6,5	15	0,3	23,7	0,3	12 100	12 700	14 400	28 500	2 320	4 000	9 200	6 500	**IR12X15X16**
8	17	0,3	25,7	0,3	13 500	15 000	15 900	33 500	2 750	4 650	8 400	5 500	**IR14X17X17**
10,5	20	0,3	30,7	0,3	18 600	23 800	24 900	53 000	4 150	7 300	7 200	4 200	**IR17X20X20**
9,5	25	0,6	37,7	0,6	21 300	30 500	33 500	76 000	5 300	7 100	5 800	3 400	**IR20X25X20**
9,5	30	0,6	42,7	0,6	25 500	36 000	35 500	86 000	6 300	8 000	5 000	2 900	**IR25X30X20**
9	35	0,6	47,7	0,6	27 500	41 500	39 000	101 000	7 300	9 500	4 400	2 500	**IR30X35X20**
10	40	0,6	55,7	0,6	29 500	47 000	56 000	148 000	8 300	14 500	3 900	2 000	**IR35X40X20**
9	45	0,6	60,6	0,6	31 000	53 000	59 000	163 000	9 300	16 000	3 500	1 900	**IR40X45X20**
10	50	0,6	65,5	0,6	43 000	74 000	61 000	177 000	12 700	17 400	3 200	1 700	**IR45X50X25**

Needle roller/ angular contact ball bearings

With inner ring



NKIA
Single direction

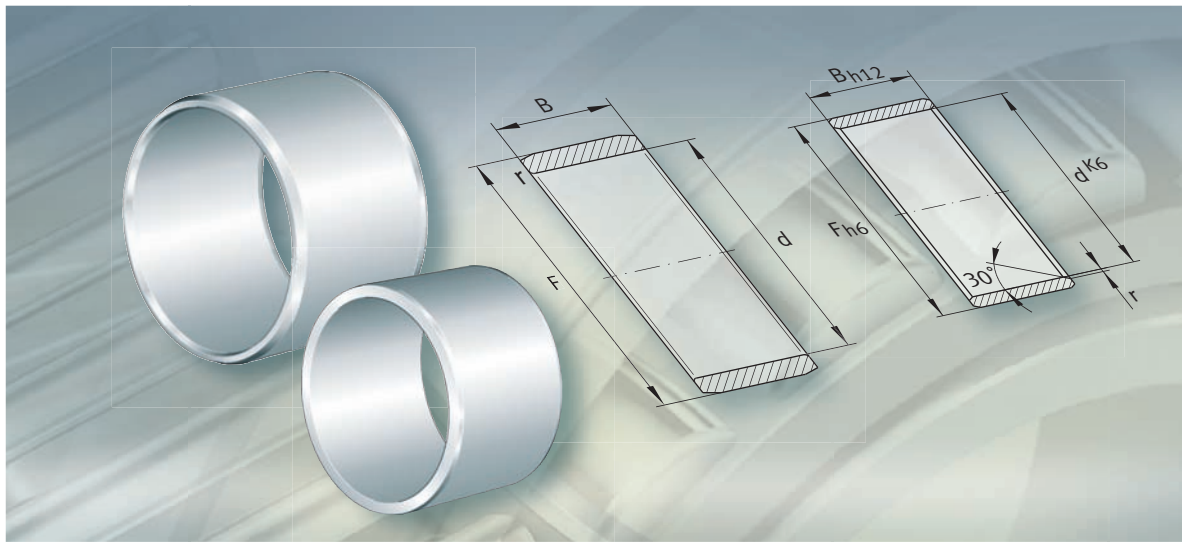


NKIB
Double direction

Dimension table · Dimensions in mm

Designation		Mass	Dimensions						Basic load ratings	
		m	d	F	D	B	C	r	radial	
	X-life	≈g						min.	dyn. C_r N	stat. C_{0r} N
NKIA5901	**XL**	40	**12**	16	24	16	–	0,3	8 600	8 300
NKIB5901	**XL**	43	**12**	16	24	17,5	16	0,3	8 600	8 300
NKIA5902	**XL**	50	**15**	20	28	18	–	0,3	12 000	13 600
NKIB5902	**XL**	52	**15**	20	28	20	18	0,3	12 000	13 600
NKIA5903	**XL**	56	**17**	22	30	18	–	0,3	12 400	14 600
NKIB5903	**XL**	58	**17**	22	30	20	18	0,3	12 400	14 600
NKIA5904	**XL**	103	**20**	25	37	23	–	0,3	23 700	25 500
NKIB5904	**XL**	107	**20**	25	37	25	23	0,3	23 700	25 500
NKIA59/22	**XL**	118	**22**	28	39	23	–	0,3	26 000	29 500
NKIB59/22	**XL**	122	**22**	28	39	25	23	0,3	26 000	29 500
NKIA5905	**XL**	130	**25**	30	42	23	–	0,3	26 500	31 500
NKIB5905	**XL**	134	**25**	30	42	25	23	0,3	26 500	31 500
NKIA5906	**XL**	147	**30**	35	47	23	–	0,3	28 500	35 500
NKIB5906	**XL**	151	**30**	35	47	25	23	0,3	28 500	35 500
NKIA5907	**XL**	243	**35**	42	55	27	–	0,6	35 500	50 000
NKIB5907	**XL**	247	**35**	42	55	30	27	0,6	35 500	50 000
NKIA5908	**XL**	315	**40**	48	62	30	–	0,6	48 500	67 000
NKIB5908	**XL**	320	**40**	48	62	34	30	0,6	48 500	67 000
NKIA5909	**XL**	375	**45**	52	68	30	–	0,6	51 000	73 000
NKIB5909	**XL**	380	**45**	52	68	34	30	0,6	51 000	73 000
NKIA5910	**XL**	380	**50**	58	72	30	–	0,6	53 000	80 000
NKIB5910	**XL**	385	**50**	58	72	34	30	0,6	53 000	80 000
NKIA5911	**XL**	550	**55**	63	80	34	–	1	65 000	100 000
NKIB5911	**XL**	555	**55**	63	80	38	34	1	65 000	100 000
NKIA5912	**XL**	590	**60**	68	85	34	–	1	68 000	108 000
NKIB5912	**XL**	595	**60**	68	85	38	34	1	68 000	108 000
NKIA5913	**XL**	635	**65**	72	90	34	–	1	69 000	112 000
NKIB5913	**XL**	640	**65**	72	90	38	34	1	69 000	112 000
NKIA5914	**XL**	980	**70**	80	100	40	–	1	95 000	156 000
NKIB5914	**XL**	985	**70**	80	100	45	40	1	95 000	156 000

		Fatigue limit load		Limiting speed	Reference speed
axial		C_{ur}	C_{ua}	n_G	n_B
dyn. C_a	stat. C_{0a}				
N	N	N	N	min^{-1}	min^{-1}
2 700	3 450	1 630	152	23 600	21 000
2 700	3 450	1 630	152	23 600	21 000
2 900	4 200	2 430	186	21 600	17 000
2 900	4 200	2 430	186	21 600	17 000
3 150	4 900	2 600	216	20 600	15 000
3 150	4 900	2 600	216	20 600	15 000
4 900	7 400	4 600	330	17 200	14 000
4 900	7 400	4 600	330	17 200	14 000
5 300	8 600	5 300	380	16 100	12 000
5 300	8 600	5 300	380	16 100	12 000
5 400	9 300	5 700	410	14 600	12 000
5 400	9 300	5 700	410	14 600	12 000
5 900	11 200	6 400	495	12 700	10 000
5 900	11 200	6 400	495	12 700	10 000
7 400	14 900	9 400	660	10 900	9 000
7 400	14 900	9 400	660	10 900	9 000
9 200	19 400	11 500	860	9 600	7 500
9 200	19 400	11 500	860	9 600	7 500
9 600	21 400	12 600	950	8 700	7 000
9 600	21 400	12 600	950	8 700	7 000
10 100	24 300	13 800	1 080	8 000	6 500
10 100	24 300	13 800	1 080	8 000	6 500
12 100	29 500	17 300	1 300	7 300	6 000
12 100	29 500	17 300	1 300	7 300	6 000
12 400	32 000	18 800	1 410	6 800	5 500
12 400	32 000	18 800	1 410	6 800	5 500
12 800	34 000	19 500	1 510	6 300	5 500
12 800	34 000	19 500	1 510	6 300	5 500
16 800	44 500	27 500	1 970	5 800	4 900
16 800	44 500	27 500	1 970	5 800	4 900



Inner rings

Inner rings

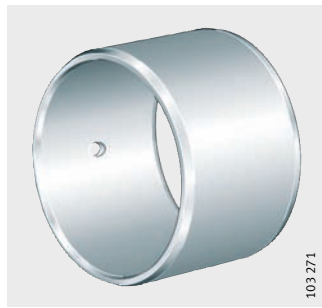
		Page
Product overview	Inner rings	778
Features	Precision machined raceway	779
	Ground raceway	779
	Machining allowance on raceway	779
	Suffixes	780
Design and safety guidelines	Design of bearing arrangements	780
Accuracy	Normal tolerances	781
	Radial internal clearance	781
Dimension tables	Inner rings without lubrication hole	782
	Inner rings with lubrication hole	786

Precision machined raceway

IR

With lubrication hole

IR..-IS1



Ground raceway

LR

Inner rings

Features

Inner rings are made from hardened rolling bearing steel and have precision machined or ground raceways.

They are used where:

- the shaft cannot be used as a raceway for needle roller and cage assemblies, drawn cup needle roller bearings with open ends, drawn cup needle roller bearings with closed end and needle roller bearings
- needle roller bearings must be combined with wider inner rings in order to allow larger axial displacements of the shaft in relation to the housing
- optimum running surfaces are required for seal lips.

Precision machined raceway

Inner rings IR have a precision machined raceway.

Chamfers on the end faces allow easy insertion into the bearing and prevent damage to the seal lips of the bearing.

Inner rings are available with and without a lubrication hole. Rings with a lubrication hole have the suffix IS1.

Ground raceway

Inner rings LR have a ground raceway.
The end faces are turned and the edges are broken.

These rings have larger tolerances than the rings IR. They are thus suitable for applications that allow larger width tolerances and less demanding requirements for axial runout.

Machining allowance on raceway

Inner rings are available as a special design with a machining allowance z on the raceway (suffix VGS). The size of the allowance is dependent on the raceway diameter, see table.

Machining allowance

Raceway diameter F mm		Machining allowance z mm	Preground raceway diameter F_{VGS}
over	incl.		
–	50	0,1	$F_{VGS} = F + z$ (tolerance h7)
50	80	0,15	
80	180	0,2	
180	250	0,25	
250	315	0,3	
315	400	0,35	
400	500	0,4	

Inner rings

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
C3, C4	Radial internal clearance larger than normal	Special design, available by agreement
C2	Radial internal clearance smaller than normal	
EGS	Surface ground free from spiral marks for rotary shaft seals to DIN 3 760 and DIN 3 761	
IS1	With lubrication hole	
VGS	Machining allowance z on raceway[1)]	

1) See table Machining allowance, page 779.

Design and safety guidelines

Design of bearing arrangements

Axial location

In order to prevent lateral creep of the bearing rings, they must be located by means of physical locking.

The abutment shoulders (shaft, housing) should be sufficiently high and perpendicular to the bearing axis. The transition from the bearing seat to the abutment shoulder must be designed with rounding to DIN 5 418 or an undercut to DIN 509. The minimum values for the chamfer dimensions r in the dimension tables must be observed.

The overlap between the snap rings and the end faces of the bearing rings must be sufficiently large.

Maximum inner ring chamfer dimensions to DIN 620-6 must be taken into consideration.

Accuracy

Normal tolerances

The dimensional and geometrical tolerances of inner rings IR correspond to tolerance class PN to DIN 620.

Radial internal clearance

When combined with INA needle roller bearings, inner rings have an internal clearance CN to DIN 620-4.

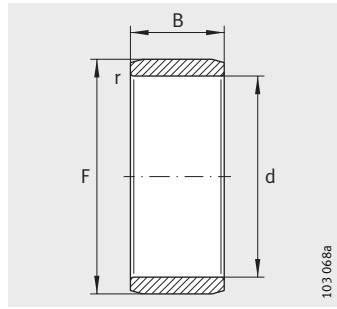
When combined with INA drawn cup needle roller bearings with open ends or closed end, inner rings have an internal clearance C2 to C3 to DIN 620-4, depending on the raceway diameter.

Radial internal clearance

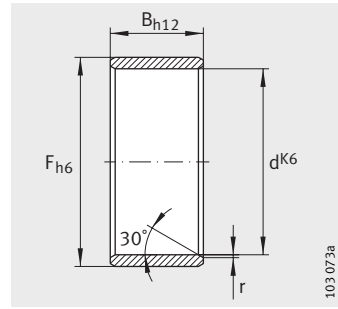
Bore d mm		Radial internal clearance							
		C2 µm		CN µm		C3 µm		C4 µm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	24	0	25	20	45	35	60	50	75
24	30	0	25	20	45	35	60	50	75
30	40	5	30	25	50	45	70	60	85
40	50	5	35	30	60	50	80	70	100
50	65	10	40	40	70	60	90	80	110
65	80	10	45	40	75	65	100	90	125
80	100	15	50	50	85	75	110	105	140
100	120	15	55	50	90	85	125	125	165
120	140	15	60	60	105	100	145	145	190
140	160	20	70	70	120	115	165	165	215
160	180	25	75	75	125	120	170	170	220
180	200	35	90	90	145	140	195	195	250
200	225	45	105	105	165	160	220	220	280
225	250	45	110	110	175	170	235	235	300
250	280	55	125	125	195	190	260	260	330
280	315	55	130	130	205	200	275	275	350
315	355	65	145	145	225	225	305	305	385
355	400	100	190	190	280	280	370	370	460
400	450	110	210	210	310	310	410	410	510

Inner rings

Without lubrication hole



IR



LR

Dimension table · Dimensions in mm

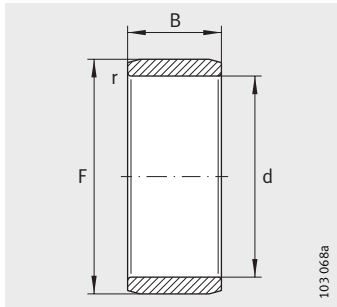
Designation	Mass	Dimensions				Tolerance of raceway F µm	
	m	d	F	B	r		
	≈g				min.	upper	lower
IR5X8X12	2,8	**5**	8	12	0,3	–7	–23
IR5X8X16	3,7	**5**	8	16	0,3	–7	–23
IR6X9X12	3	**6**	9	12	0,3	–7	–23
IR6X9X16	4,3	**6**	9	16	0,3	–7	–23
IR7X10X10,5	3,1	**7**	10	10,5	0,3	–7	–23
LR7X10X10,5	3,1	**7**	10	10,5	0,3	–	–
IR7X10X12	3,6	**7**	10	12	0,3	–7	–23
IR7X10X16	4,9	**7**	10	16	0,3	–7	–23
IR8X12X10,5	5	**8**	12	10,5	0,3	–4	–18
LR8X12X10,5	5	**8**	12	10,5	0,3	–	–
IR8X12X12,5	5,9	**8**	12	12,5	0,3	–4	–18
LR8X12X12,5	5	**8**	12	12,5	0,3	–	–
IR9X12X12	4,4	**9**	12	12	0,3	–4	–18
IR9X12X16	6	**9**	12	16	0,3	–4	–18
IR10X13X12,5	5,2	**10**	13	12,5	0,3	–4	–18
LR10X13X12,5	5,2	**10**	13	12,5	0,3	–	–
IR10X14X13	7,4	**10**	14	13	0,3	–4	–18
IR10X14X16	9,2	**10**	14	16	0,3	–4	–18
IR10X14X20	11,5	**10**	14	20	0,3	–4	–18
IR12X15X12	5,7	**12**	15	12	0,3	–4	–18
IR12X15X12,5	6,1	**12**	15	12,5	0,3	–4	–18
LR12X15X12,5	6,1	**12**	15	12,5	0,3	–	–
IR12X15X16	7,6	**12**	15	16	0,3	–4	–18
IR12X15X16,5	8,1	**12**	15	16,5	0,3	–4	–18
LR12X15X16,5	8,1	**12**	15	16,5	0,3	–	–
IR12X15X22,5	10,9	**12**	15	22,5	0,3	–4	–18
LR12X15X22,5	10,9	**12**	15	22,5	0,3	–	–
IR12X16X13	8,5	**12**	16	13	0,3	–4	–18
IR12X16X16	10,7	**12**	16	16	0,3	–4	–18
IR12X16X20	13,5	**12**	16	20	0,3	–4	–18
IR12X16X22	14,9	**12**	16	22	0,3	–4	–18
IR14X17X17	9,5	**14**	17	17	0,3	–4	–18

Dimension table (continued) · Dimensions in mm

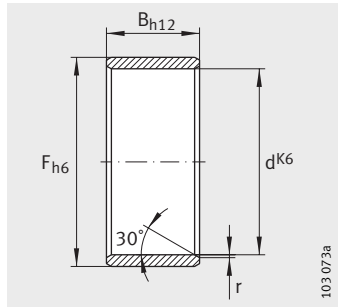
Designation	Mass	Dimensions				Tolerance of raceway F µm	
	m	d	F	B	r		
	≈g				min.	upper	lower
LR15X18X12,5	7,2	**15**	18	12,5	0,3	–	–
IR15X18X16	9,4	**15**	18	16	0,3	–4	–18
IR15X18X16,5	9,8	**15**	18	16,5	0,3	–4	–18
LR15X18X16,5	9,8	**15**	18	16,5	0,3	–	–
IR15X19X16	12,9	**15**	19	16	0,3	0	–12
IR15X19X20	16,3	**15**	19	20	0,3	0	–12
IR15X20X13	13,5	**15**	20	13	0,3	0	–12
IR15X20X23	24,4	**15**	20	23	0,3	0	–12
IR17X20X16	10,6	**17**	20	16	0,3	0	–12
IR17X20X16,5	11,1	**17**	20	16,5	0,3	0	–12
LR17X20X16,5	11,1	**17**	20	16,5	0,3	–	–
IR17X20X20	13,5	**17**	20	20	0,3	0	–12
IR17X20X20,5	13,8	**17**	20	20,5	0,3	0	–12
LR17X20X20,5	13,8	**17**	20	20,5	0,3	–	–
IR17X20X30,5	20,6	**17**	20	30,5	0,3	0	–12
LR17x20X30,5	20,6	**17**	20	30,5	0,3	–	–
IR17X21X16	15	**17**	21	16	0,3	0	–12
IR17X21X20	18	**17**	21	20	0,3	0	–12
IR17X22X13	14,9	**17**	22	13	0,3	0	–12
IR17X22X16	18,4	**17**	22	16	0,3	0	–12
IR17X22X23	27,1	**17**	22	23	0,3	0	–12
IR17X24X20	33,8	**17**	24	20	0,6	0	–12

Inner rings

Without lubrication hole



IR



LR

Dimension table (continued) · Dimensions in mm

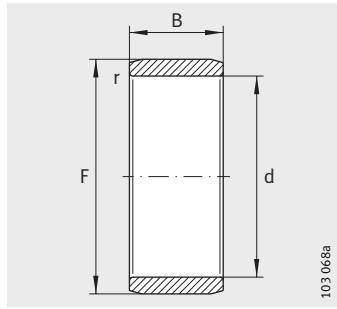
Designation	Mass	Dimensions				Tolerance of raceway F µm	
	m	d	F	B	r		
	≈g				min.	upper	lower
IR20X24X16	15	**20**	24	16	0,3	0	–12
IR20X24X20	21,3	**20**	24	20	0,3	0	–12
LR20X25X12,5	16,3	**20**	25	12,5	0,3	–	–
LR20X25X16,5	21,7	**20**	25	16,5	0,3	–	–
IR20X25X17	25	**20**	25	17	0,3	0	–12
IR20X25X20	27,5	**20**	25	20	0,3	0	–12
IR20X25X20,5	27,4	**20**	25	20,5	0,3	0	–12
LR20X25X20,5	27,4	**20**	25	20,5	0,3	–	–
IR20X25X26,5	38	**20**	25	26,5	0,3	0	–12
LR20X25X26,5	38	**20**	25	26,5	0,3	–	–
IR20X25X30	40,4	**20**	25	30	0,3	0	–12
IR20X25X38,5	52,5	**20**	25	38,5	0,3	0	–12
LR20X25X38,5	52,5	**20**	25	38,5	0,3	–	–
IR20X28X20	45,2	**20**	28	20	0,6	0	–12
IR22X26X16	18,2	**22**	26	16	0,3	0	–12
IR22X26X20	23	**22**	26	20	0,3	0	–12
IR22X28X17	29,5	**22**	28	17	0,3	0	–12
IR22X28X20	35	**22**	28	20	0,3	0	–12
IR22X28X20,5	36	**22**	28	20,5	0,3	0	–12
LR22X28X20,5	36	**22**	28	20,5	0,3	–	–
IR22X28X30	54,4	**22**	28	30	0,3	0	–12

Dimension table (continued) · Dimensions in mm

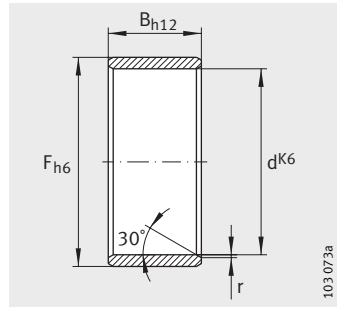
Designation	Mass	Dimensions				Tolerance of raceway F µm	
	m	d	F	B	r		
	≈g				min.	upper	lower
IR25X29X20	25,9	**25**	29	20	0,3	0	–12
IR25X29X30	39,3	**25**	29	30	0,3	0	–12
LR25X30X12,5	20	**25**	30	12,5	0,3	–	–
LR25X30X16,5	26,7	**25**	30	16,5	0,3	–	–
IR25x30X17	27,4	**25**	30	17	0,3	0	–12
IR25X30X20	32,8	**25**	30	20	0,3	0	–12
IR25X30X20,5	33,4	**25**	30	20,5	0,3	0	–12
LR25X30X20,5	33,4	**25**	30	20,5	0,3	–	–
IR25X30X26,5	46	**25**	30	26,5	0,3	0	–12
LR25X30X26,5	46	**25**	30	26,5	0,3	–	–
IR25X30X30	53	**25**	30	30	0,3	0	–12
IR25X30X32	56	**25**	30	32	0,3	0	–12
IR25X30X38,5	64,5	**25**	30	38,5	0,3	0	–12
LR25X30X38,5	64,5	**25**	30	38,5	0,3	–	–
IR25X32X22	52,5	**25**	32	22	0,6	+5	–4
IR28X32X17	24,5	**28**	32	17	0,3	+5	–4
IR28X32X20	28,5	**28**	32	20	0,3	+5	–4
IR28X32X30	43,5	**28**	32	30	0,3	+5	–4
LR30x35X12,5	23,3	**30**	35	12,5	0,3	–	–
IR30X35X13	25	**30**	35	13	0,3	+5	–4
IR30X35X16	34	**30**	35	16	0,3	+5	–4
LR30X35X16,5	31,4	**30**	35	16,5	0,3	–	–
IR30X35X17	36	**30**	35	17	0,3	+5	–4
IR30X35X20	39	**30**	35	20	0,3	+5	–4
IR30X35X20,5	39,7	**30**	35	20,5	0,3	+5	–4
LR30X35X20,5	39,7	**30**	35	20,5	0,3	–	–
IR30X35X26	50,4	**30**	35	26	0,3	+5	–4
IR30X35X30	58,5	**30**	35	30	0,3	+5	–4
IR30X37X18	50	**30**	37	18	0,6	+5	–4
IR30X37X22	61,6	**30**	37	22	0,6	+5	–4
IR32X37X20	42	**32**	37	20	0,3	0	–9
IR32x37X30	62	**32**	37	30	0,3	0	–9
IR32X40X20	68	**32**	40	20	0,6	0	–9
IR32X40X36	124	**32**	40	36	0,6	0	–9
IR33X37X13	21,9	**33**	37	13	0,3	0	–9

Inner rings

Without lubrication hole



IR



LR

Dimension table (continued) · Dimensions in mm

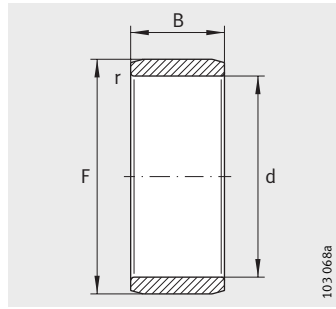
Designation	Mass	Dimensions				Tolerance of raceway F µm	
	m	d	F	B	r		
	≈g				min.	upper	lower
LR35X40X12,5	27,2	**35**	40	12,5	0,3	–	–
LR35X40X16,5	37,4	**35**	40	16,5	0,3	–	–
IR35X40X17	37,8	**35**	40	17	0,3	0	–9
IR35X40X20	44,2	**35**	40	20	0,3	0	–9
IR35X40X20,5	46,1	**35**	40	20,5	0,3	0	–9
LR35X40X20,5	46,1	**35**	40	20,5	0,3	–	–
IR35X40X30	67,1	**35**	40	30	0,3	0	–9
IR35X42X36	117	**35**	42	36	0,6	0	–9
IR35X43X22	82	**35**	43	22	0,6	0	–9
IR38X43X20	48,1	**38**	43	20	0,3	0	–9
IR38X43X30	73,6	**38**	43	30	0,3	0	–9
LR40X45X16,5	41,4	**40**	45	16,5	0,3	–	–
IR40X45X17	42,5	**40**	45	17	0,3	0	–9
IR40X45X20	50,8	**40**	45	20	0,3	0	–9
IR40X45X20,5	51,8	**40**	45	20,5	0,3	0	–9
LR40X45X20,5	51,8	**40**	45	20,5	0,3	–	–
IR40X45X30	84	**40**	45	30	0,3	0	–9
IR40X48X22	91,6	**40**	48	22	0,6	0	–9
IR40X48X40	170	**40**	48	40	0,6	0	–9
IR40X50X22	118	**40**	50	22	1	0	–9
IR42X47X20	52,8	**42**	47	20	0,3	–5	–19
IR42X47X30	81	**42**	47	30	0,3	–5	–19
LR45X50X20,5	58,8	**45**	50	20,5	0,3	–	–
IR45X50X25	70,8	**45**	50	25	0,6	–5	–19
IR45X50X25,5	75,1	**45**	50	25,5	0,3	–5	–19
LR45X50X25,5	75,1	**45**	50	25,5	0,3	–	–
IR45X50X35	101	**45**	50	35	0,6	–5	–19
IR45X52X22	89	**45**	52	22	0,6	0	–11
IR45X52X40	164	**45**	52	40	0,6	0	–11
IR45X55X22	129	**45**	55	22	1	0	–11
LR50X55X20,5	64,1	**50**	55	20,5	0,6	–	–
IR50X55X25	78	**50**	55	25	0,6	0	–11
IR50X55X35	112	**50**	55	35	0,6	0	–11

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions				Tolerance of raceway F µm	
	m	d	F	B	r		
	≈g				min.	upper	lower
IR50X58X22	115	**50**	58	22	0,6	0	–11
IR50X58X40	208	**50**	58	40	0,6	0	–11
IR50X60X25	162	**50**	60	25	1	0	–11
IR50X60X28	181	**50**	60	28	1,1	0	–11
IR55X60X25	85,5	**55**	60	25	0,6	–10	–21
IR55X60X35	121	**55**	60	35	0,6	–10	–21
IR55X63X25	141	**55**	63	25	1	–10	–21
IR55X63X45	256	**55**	63	45	1	–10	–21
IR55X65X28	198	**55**	65	28	1,1	–10	–21
IR60X68X25	152	**60**	68	25	1	–10	–21
IR60X68X35	213	**60**	68	35	0,6	–10	–21
IR60X68X45	276	**60**	68	45	1	–10	–21
IR60X70X25	195	**60**	70	25	1	–10	–21
IR60X70X28	215	**60**	70	28	1,1	–10	–21
IR65X72X25	141	**65**	72	25	1	–10	–21
IR65X72X45	259	**65**	72	45	1	–10	–21
IR65X73X25	164	**65**	73	25	1	–10	–21
IR65X73X35	231	**65**	73	35	1	–10	–21
IR65X75X28	229	**65**	75	28	1,1	–10	–21
IR70X80x25	221	**70**	80	25	1	–10	–26
IR70X80X30	267	**70**	80	30	1	–10	–26
IR70X80X35	312	**70**	80	35	1	–10	–26
IR70X80X54	488	**70**	80	54	1	–10	–26
IR75X85X25	238	**75**	85	25	1	–4	–17
IR75X85X30	287	**75**	85	30	1	–4	–17
IR75X85X35	336	**75**	85	35	1	–4	–17
IR75X85X54	520	**75**	85	54	1	–4	–17
IR80X90X25	253	**80**	90	25	1	–4	–17
IR80X90X30	304	**80**	90	30	1	–4	–17
IR80X90X35	355	**80**	90	35	1	–4	–17
IR80X90X54	556	**80**	90	54	1	–4	–17
IR85X95X26	277	**85**	95	26	1	–14	–27
IR85X95X36	388	**85**	95	36	1	–14	–27
IR85X100X35	582	**85**	100	35	1,1	–14	–27
IR85X100X63	1 054	**85**	100	63	1,1	–14	–27

Inner rings

Without lubrication hole



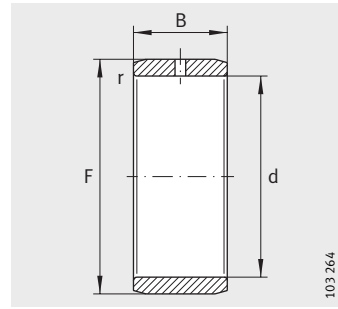
IR

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions				Tolerance of raceway F	
	m	d	F	B	r	µm	
	≈g				min.	upper	lower
IR90X100X26	294	**90**	100	26	1	−14	−27
IR90X100X30	340	**90**	100	30	1	−14	−27
IR90X100X36	406	**90**	100	36	1	−14	−27
IR90X105X35	610	**90**	105	35	1,1	−14	−27
IR90X105X63	1 110	**90**	105	63	1,1	−14	−27
IR95X105X26	313	**95**	105	26	1	−14	−27
IR95X105X36	431	**95**	105	36	1	−14	−27
IR95X110X35	657	**95**	110	35	1,1	−14	−27
IR95X110X63	1 170	**95**	110	63	1,1	−14	−27
IR100X110X30	350	**100**	110	30	1,1	−14	−27
IR100X110X40	505	**100**	110	40	1,1	−14	−27
IR100X115X40	797	**100**	115	40	1,1	−14	−27
IR110X120X30	409	**110**	120	30	1	−14	−32
IR110X125X40	840	**110**	125	40	1,1	−7	−22
IR120X130X30	442	**120**	130	30	1	−7	−22
IR120X135X45	1 044	**120**	135	45	1,1	−7	−22
IR130X145X35	855	**130**	145	35	1,1	−17	−37
IR130X150X50	1 690	**130**	150	50	1,5	−17	−37
IR140X155X35	917	**140**	155	35	1,1	−17	−37
IR140X160X50	1 800	**140**	160	50	1,5	−17	−37
IR150X165X40	1 122	**150**	165	40	1,1	−27	−52
IR160X175X40	1 200	**160**	175	40	1,1	−27	−52
IR170X185X45	1 441	**170**	185	45	1,1	−25	−46
IR180X195X45	1 510	**180**	195	45	1,1	−25	−46
IR190X210X50	2 410	**190**	210	50	1,5	−40	−66
IR200X220X50	2 518	**200**	220	50	1,5	−40	−66
IR220X240X50	2 753	**220**	240	50	1,5	−55	−86
IR240X265X60	4 600	**240**	265	60	2	−55	−86
IR260X285X60	4 980	**260**	285	60	2	−69	−107
IR280X305X69	6 100	**280**	305	69	2	−69	−107
IR300X330X80	9 200	**300**	330	80	2,1	−69	−107
IR320X350X80	9 800	**320**	350	80	2,1	−83	−127
IR340X370X80	10 200	**340**	370	80	2,1	−83	−127
IR360X390X80	10 900	**360**	390	80	2,1	−128	−182
IR380X415X100	16 700	**380**	415	100	2,1	−122	−172

Inner rings

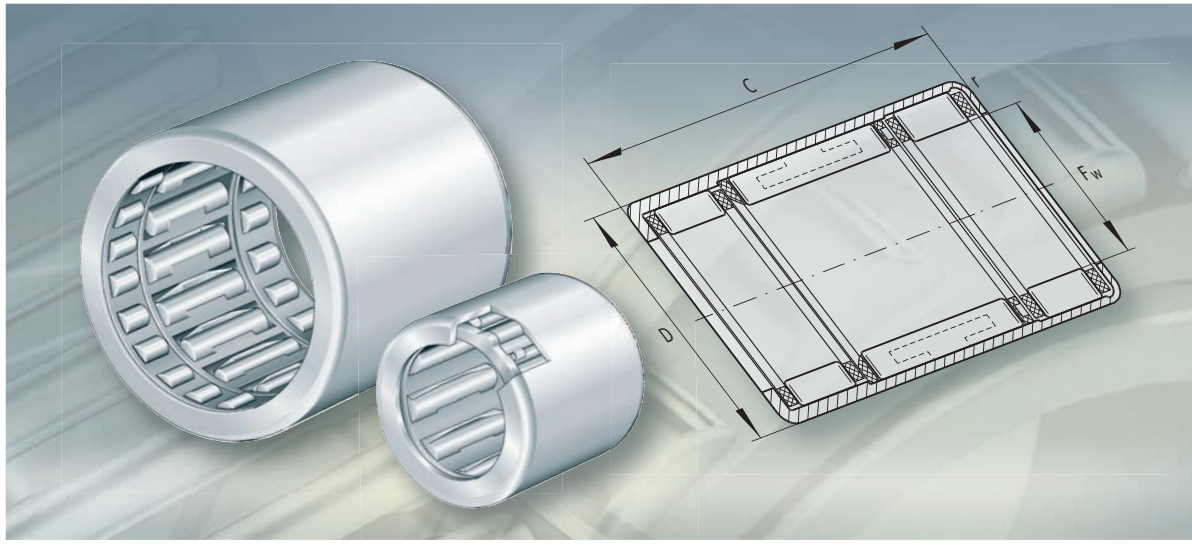
With lubrication hole



IR..-IS1

Dimension table · Dimensions in mm

Designation	Mass	Dimensions				Tolerance of raceway F	
	m	d	F	B	r	µm	
	≈g				min.	upper	lower
IR6X10X10-IS1	3,7	**6**	10	10	0,3	–7	–23
IR8X12X10-IS1	4,8	**8**	12	10	0,3	–4	–18
IR10X14X12-IS1	7,3	**10**	14	12	0,3	–4	–18
IR12X16X12-IS1	7,9	**12**	16	12	0,3	–4	–18
IR15X20X12-IS1	12,2	**15**	20	12	0,3	0	–12
IR20X25X16-IS1	24	**20**	25	16	0,3	0	–12
IR25X30X16-IS1	25,7	**25**	30	16	0,3	0	–12
IR30X38X20-IS1	77	**30**	38	20	0,6	+5	–4
IR35X42X20-IS1	63,9	**35**	42	20	0,6	0	–9
IR40X50X20-IS1	106	**40**	50	20	1	0	–9
IR45X55X20-IS1	117	**45**	55	20	1	0	–11
IR50X55X20-IS1	62,5	**50**	55	20	0,6	0	–11
IR50X60X20-IS1	128	**50**	60	20	1	0	–11



Drawn cup roller clutches

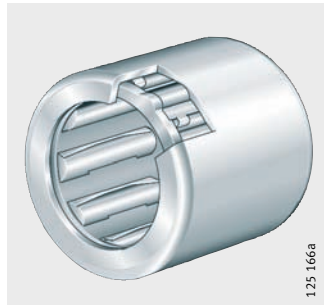
Drawn cup roller clutches

		Page
Product overview	Drawn cup roller clutches	790
Features	Drawn cup roller clutches without bearing arrangement	791
	Drawn cup roller clutches with bearing arrangement	792
	Sealing	792
	Lubrication	792
	Operating temperature	792
	Suffixes	792
Design and safety guidelines	Limiting load	793
	Indexing frequency and indexing accuracy	793
	Transmissible torque	793
	Frictional torque and frictional energy	794
	Speeds	795
	Housing design	795
	Shaft design	798
	Axial location	799
	Sealing of the bearing position	799
	Lubrication	799
	Retention for transport	800
	Fitting using pressing-in mandrel	800
Accuracy	Enveloping circle	800
Dimension tables	Drawn cup roller clutches without bearing arrangement, with and without knurling	801
	Drawn cup roller clutches with bearing arrangement, with and without knurling	802

Without bearing arrangement

With or without knurling
With steel springs

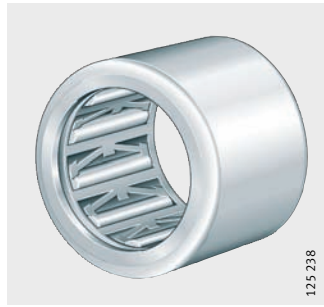
HF



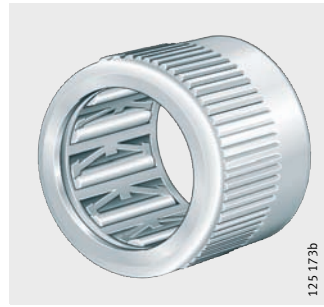
HF..-R

With or without knurling
With plastic springs

HF..-KF



HF..-KF-R

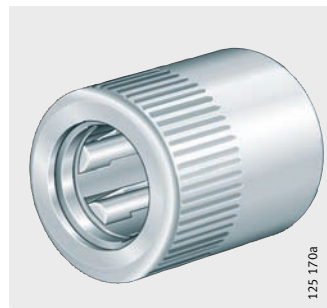


With bearing arrangement

With or without knurling
With steel springs

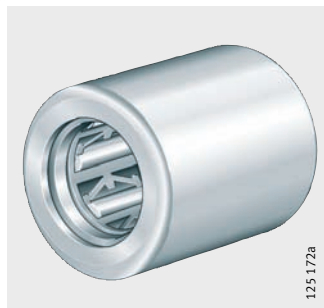
HFL

HFL..-R

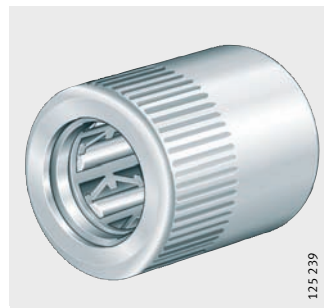


With or without knurling
With plastic springs

HFL..-KF



HFL..-KF-R



Drawn cup roller clutches

Features

Drawn cup roller clutches are one-way clutches comprising thin-walled, drawn outer rings with a series of ramps on the inside diameter, plastic cages, pressure springs and needle rollers. They can transmit high torques in one direction and are particularly compact in a radial direction. The roller clutches are available with and without bearing arrangements.

Drawn cup roller clutches give very precise indexing, since the individual spring loading of the needle rollers ensures continuous contact between the shaft, needle rollers and ramps. They allow high indexing frequencies due to their low mass and the resulting low moment of inertia of the clamping elements. They also have a low overrunning frictional torque.

Drawn cup roller clutches can be used in various applications such as indexing clutches, back-stopping clutches and overrunning clutches. In these cases, the drawn cup roller clutch performs an overrunning or locking function.

Drawn cup roller clutches without bearing arrangement

Roller clutches HF do not have a bearing arrangement and can only transmit torques.

Drawn cup roller clutches HF have steel pressure springs, while roller clutches HF..KF have plastic pressure springs.

In the case of drawn cup roller clutches without a bearing arrangement, concentricity to the shaft axis must be secured by additional rolling bearings or drawn cup roller clutches with a bearing arrangement must be used.

With knurling

Roller clutches with a knurled outside surface have the suffix R and are suitable for use with plastic housings.

The knurling covers all or part of the length of the drawn cup.

Drawn cup roller clutches with bearing arrangement

Roller clutches HFL have an integral plain or rolling bearing arrangement and can support torques as well as radial forces.

Drawn cup roller clutches HFL have steel pressure springs, roller clutches HFL..KF have plastic pressure springs.

With knurling

Roller clutches with a knurled outside surface have the suffix R and are suitable for use with plastic housings.

The knurling covers all or part of the length of the drawn cup.

Sealing

Drawn cup roller clutches are supplied open on both sides.

Lubrication

The roller clutches are greased using a lithium soap grease to GA26. In many cases, the initial greasing is sufficient to last the operating life of the bearings.

For applications with oil lubrication, roller clutches are available without greasing. These roller clutches are coated with a preservative. Further information on lubrication: see page 799.

Operating temperature

Drawn cup roller clutches are suitable for operating temperatures from –10 °C to +70 °C, restricted by the grease.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
–	Steel pressure springs	Standard
KF	Plastic pressure springs	
R	Knurled outside surface	
RR	Drawn cup roller clutch with Corrotect® coating	Special design, available by agreement

Design and safety guidelines

Drawn cup roller clutches should not be used if a malfunction could lead to personal injury.

New applications, especially those involving extreme conditions, should first be verified by tests.

Correct functioning can only be guaranteed if the concentricity error between the support bearing and the shaft can be kept to a low value.

Limiting load

In the case of drawn cup roller clutches with plain bearings, the product of the actual speed n and the radial load F_r must not exceed the value stated for the limiting load $(F_r \cdot n)_{max}$.

The operating limits are determined by the limiting speeds stated in the dimension tables and the permissible radial load.

Indexing frequency and indexing accuracy

In order not to overload the roller clutch, the inertia of the entire system must be taken into consideration. The high indexing accuracy is due to the individual spring loading of the needle rollers, which ensures continuous contact between the shaft, needle rollers and clamping surface.

The indexing accuracy is influenced by the indexing frequency, lubrication, fitting tolerances, adjacent construction, elastic deformation of the adjacent parts and the drive method, either through the shaft or the housing. Optimum accuracy is achieved if the drive is via the shaft.

Transmissible torque

Transmission of torque requires a rigid housing. The transmissible torque is therefore dependent on the shaft and housing material, the shaft hardness, the wall thickness of the housing and the shaft and housing tolerances.

When calculating the torque, the maximum drive torque and the moment of inertia of the masses during acceleration must be taken into consideration.

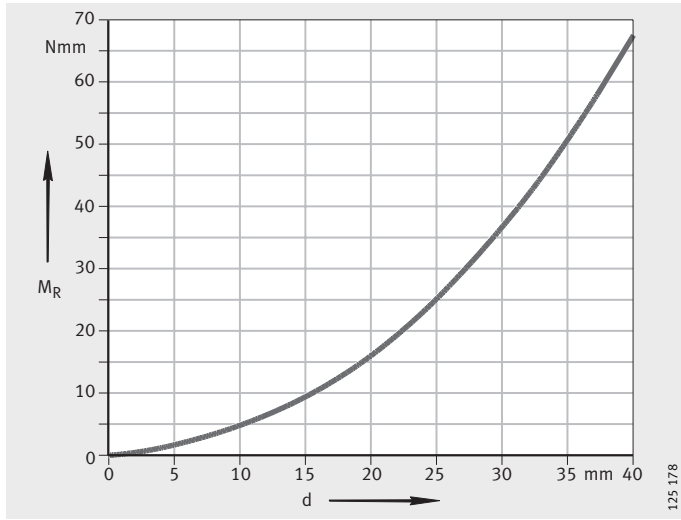
Frictional torque and frictional energy

The frictional torque curve is shown in *Figure 1*.

The frictional energy during idling is dependent on whether the shaft or the outer ring is rotating, *Figure 2*.

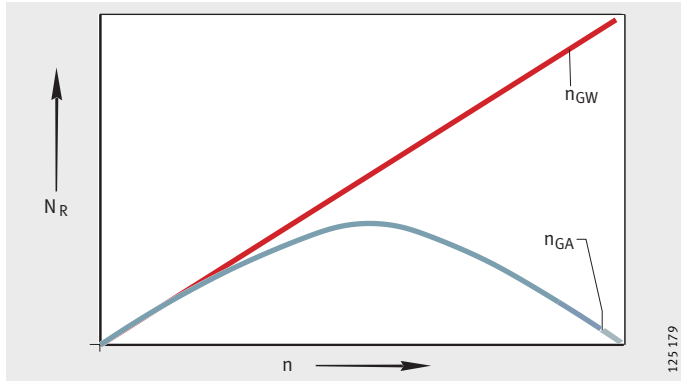
Rotating outer ring

If the outer ring rotates, the frictional energy increases with speed at first but then, due to the centrifugal force of the needle rollers, it decreases gradually towards zero. At this speed, there is no longer any frictional contact between the needle rollers and the shaft. Due to the increasing centrifugal force, the needle rollers lift from the shaft.



M_R = frictional torque during idling
d = shaft diameter

Figure 1
Frictional torque during idling, as a function of shaft diameter



n = speed
N_R = frictional torque during idling
n_{GA} = limiting speed with rotating outer ring
n_{GW} = limiting speed with rotating shaft

Figure 2
Frictional energy during idling, as a function of speed

Speeds

The limiting speeds n_{GW} and n_{GA} in the dimension tables are valid for oil and grease lubrication.

The limiting speed n_{GW} is valid for a rotating shaft, while n_{GA} is valid for a rotating outer ring.

Housing design

Design of housing bore

The accuracy of the locating bore essentially determines the geometrical accuracy of the drawn cup and thus the functioning of the clutch.

Housing bores must be chamfered to 15°.
The bore tolerances should be produced in accordance with the table and should have a surface quality $R_a0{,}8$.

The cylindricity tolerance of the housing bore in metal housings should be within the tolerance grade IT 5/2.

Tolerances for housing bore

Series	Springs	Bore Housing material		
		Steel Cast iron	Light metal	Max. bore in plastic[2]
HF, HFL	Steel	N6 (N7)[1]	R6 (R7)[1]	–
HF..-KF, HFL..-KF	Plastic	N7	R7	–
HF..-R, HFL..-R	Steel	–	–	$D_{-0,05}$
HF..-KF-R, HFL..-KF-R	Plastic	–	–	$D_{-0,05}$
HFL0606-KF-R, HFL0806-KF-R	Plastic	–	–	$D_{-0,05}$

1) The values in brackets can be used if the actual torque is no more than 50% of the permissible torque $M_{d\,per}$ (see dimension tables).

2) Guide values as a function of the plastic used.
Outside diameter D: see dimension tables.

Minimum wall thickness for metal housings

For metal housings, the maximum transmissible torque is determined as a function of the diameter ratio Q_A to *Figure 3* (steel housing) or to *Figure 4*, page 797 (aluminium housing), see calculation examples.

Guide values

Guide values for $Q_{A\,max}$ for steel and aluminium as housing materials are given in the table.

Housing material	Diameter ratio $Q_{A\,max}$
Steel	0,8
Aluminium	0,6

The comparative stress σ_V must not exceed the yield stress of the housing material.

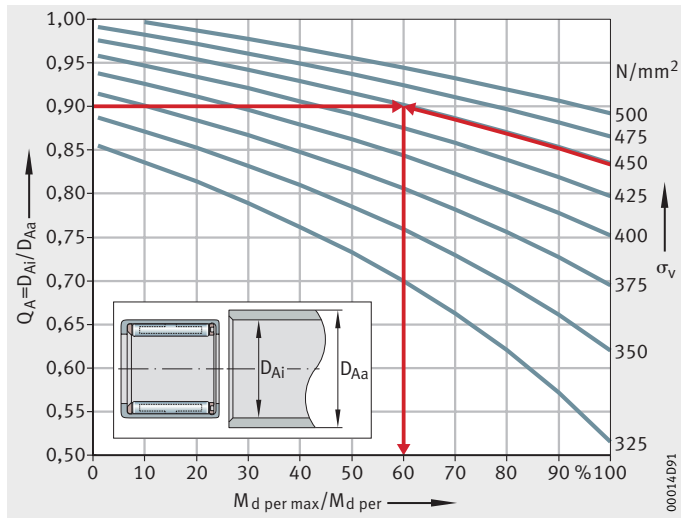
Steel housing – calculation example

For drawn cup roller clutches HF0612, the maximum transmissible torque $M_{d\,per\,max}$ is determined as follows:

Drawn cup roller clutch	HF0612
Housing	Steel
Housing bore tolerance	N6, see table, page 795
Permissible housing stress ($R_{p0,2}$) σ_v	450 N/mm²
Diameter ratio Q_A of housing	0,9
Permissible torque $M_{d\,per}$	see dimension table, page 801

Calculation

$$M_{d\,per\,max} = 60\%\ M_{d\,per}$$
$$= 0{,}6 \cdot 1{,}76\ Nm$$
$$= 1{,}056\ Nm$$



Modulus of elasticity
$E = 210\,000\ N/mm^2$

σ_V = comparative stress
$M_{d\,per}$ = permissible torque (see dimension tables for values)
$M_{d\,per\,max}$ = maximum transmissible torque
Q_A = diameter ratio of housing
D_{Ai} = housing bore
D_{Aa} = housing outside diameter

Figure 3
Steel housing

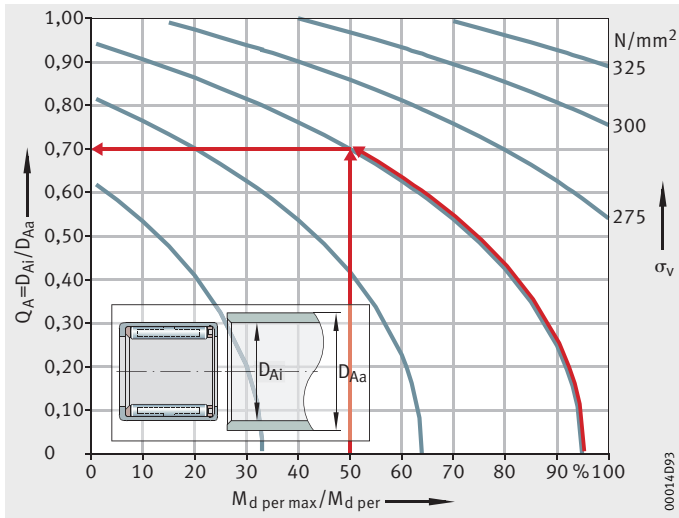
Aluminium housing – calculation example

For drawn cup roller clutch HF1616, the diameter ratio Q_A of the housing should be determined as follows:

Drawn cup roller clutch	HF1616
Housing	Aluminium
Housing bore tolerance	R6, see table, page 795
Permissible housing stress ($R_{p0,2}$) σ_v	250 N/mm²
Maximum transmissible torque $M_{d\ per\ max}$	10 Nm
giving $M_{d\ per\ max}/M_{d\ per}$	50%
Permissible torque $M_{d\ per}$	see dimension table, page 801

Diameter ratio

$Q_A \leqq 0{,}7 = D_{Aa} = \text{min. } 31{,}5$



Modulus of elasticity
$E = 70\,000\ N/mm^2$

σ_V = comparative stress
$M_{d\ per}$ = permissible torque (see dimension tables for values)
$M_{d\ per\ max}$ = maximum transmissible torque
Q_A = diameter ratio of housing
D_{Ai} = housing bore
D_{Aa} = housing outside diameter

Figure 4
Aluminium housing

Minimum wall thickness for plastic housing

For plastic housings, drawn cup roller clutches with a partially or fully knurled outside surface should be used (suffix R).

The guide value for the minimum wall thickness of plastic housings is:

$$s_{min} \geqq D - F_w$$

s_{min}	mm	Minimum wall thickness
D	mm	Outside diameter of roller clutch
F_w	mm	Enveloping circle.

Shaft design

The raceway on the shaft must be hardened and ground.
The surface hardness of the raceway must be 670 HV + 170 HV and the hardening depth CHD or SHD must be sufficiently large (CHD ≧ 0,3 mm).

The end face of the shaft must be chamfered to approx. 1 mm and 15°.

For design of the shaft, see table.

Shaft tolerance

Series	Springs	Shaft			
		Tolerance	Roughness max.	Roundness max.	Parallelism max.
HF, HFL	Steel	h5 (h6)[1]	R_a0,4 (R_z2)	IT 3	IT 3
HF..-KF, HFL..-KF	Plastic	h8			
HF..-R, HFL..-R	Steel	h5 (h6)[1]			
HF..-KF-R, HFL..-KF-R	Plastic	h8			
HFL0606-KF-R, HFL0806-KF-R	Plastic	h9			

[1] The values in brackets can be used if the actual torque is no more than 50% of the permissible torque $M_{d\ per}$ (see dimension tables).

Axial location

Drawn cup roller clutches are pressed into the housing bore and require no further axial location (assuming compliance with the recommendations according to tables, page 795).

Sealing of the bearing position

If there is a risk of contamination, sealing rings or series G or SD should be fitted. The sealing rings are matched to the dimensions of the drawn cup roller clutches and can be combined with wider inner rings of series IR.

Lubrication

For general applications (mixed operation involving locking and overrunning), the Schaeffler initial greasing has proved effective.

In order to ensure optimum function, it may be necessary to use different lubricants. The suitability of the lubricant must be verified by means of tests.

For applications in which one operating condition (overrunning or locking) is heavily predominant, a special greasing should be used. In this case, please consult Schaeffler Application Engineering.

It is not possible to calculate the grease operating life or lubrication interval for drawn cup roller clutches.

If relubrication is carried out, oil should used for lubrication or a changeover to oil lubrication should generally be made.

At temperatures < -10 °C and speeds $> 0{,}7\ n_G$, recommendations on lubrication should be requested.

For temperatures above +70 °C, oil lubrication should be used. The oil level should be such that, when the drawn cup roller clutch is stationary and the axis is horizontal, it is immersed approx. $^1/_3$ in the oil bath.

Suitable oils are CL and CLP to DIN 51 517 or HL and HLP to DIN 51 524. Viscosity classes: see table.

Viscosity classes

Operating temperature	Viscosity class
+15 °C to +30 °C	ISO VG 10
+15 °C to +90 °C	ISO VG 32
+60 °C to +120 °C	ISO VG 100

Drawn cup roller clutches

Retention for transport

Drawn cup roller clutches are normally packed individually in the case of small quantities.

Where larger quantities are involved, drawn cup roller clutches are placed in a specific orientation in blister packaging and delivered in this form. The blister packaging serves to retain the parts in position during transport.

Installation using a fitting mandrel

Drawn cup roller clutches should only be pressed into the locating bore using a special fitting mandrel, see Drawn cup needle roller bearings, page 687. Attention must be paid to the clamping direction of the roller clutch. The clamping direction is indicated by an arrow on the end face of the drawn cup.

Pressing-in forces must never be directed through the rolling elements. Roller clutches should not be tilted during fitting.

Guidelines for fitting

Drawn cup roller clutches should be protected against dust, contaminants and moisture. Contaminants can impair the function and operating life of roller clutches.

Accuracy

The thin-walled outer rings adopt the dimensional and geometrical accuracy of the housing bore.

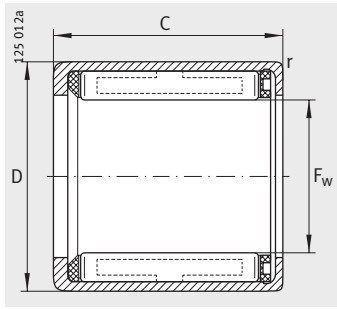
Enveloping circle

The enveloping circle is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway.

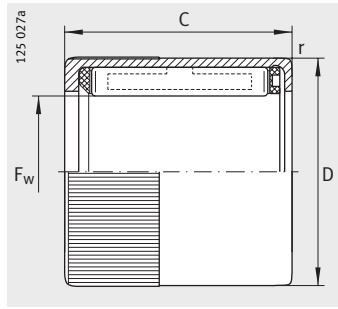
In drawn cup roller clutches with a rolling bearing arrangement, the enveloping circle F_w of the bearings once fitted (in the solid section ring gauge) is approximately in tolerance zone F8 (for values according to table Tolerances for housing bore, page 795, and table Shaft tolerance, page 798). Deviations for tolerance zone F8: see table, page 168.

Drawn cup roller clutches

Without
bearing arrangement
With or without knurling



HF, HF..-KF



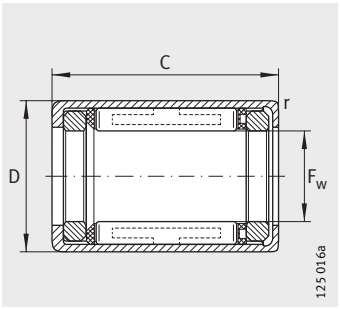
HF..-R, HF..-KF-R
With knurling

Dimension table · Dimensions in mm

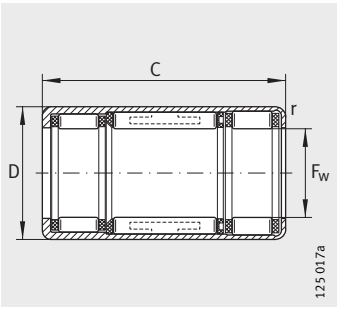
Spring design		Mass	Dimensions				Permissible torque	Limiting speeds		Drawn cup needle roller bearings for radial bearing arrangement
Plastic springs	Steel springs	m	F_w	D	C	r	$M_{d\,per}$	n_{GW}	n_{GA}	
Designation	Designation	≈g			–0,3	min.	Nm	min^{-1}	min^{-1}	Designation
HF0306-KF	–	1	**3**	6,5	6	0,3	0,18	45 000	8 000	**HK0306-TV**
HF0306-KF-R	–	1	**3**	6,5	6	0,3	0,06	45 000	8 000	**HK0306-TV**
HF0406-KF	–	1	**4**	8	6	0,3	0,34	34 000	8 000	**HK0408**
HF0406-KF-R	–	1	**4**	8	6	0,3	0,1	34 000	8 000	**HK0408**
HF0612-KF	**HF0612**	3	**6**	10	12	0,3	1,76	23 000	13 000	**HK0608**
HF0612-KF-R	**HF0612-R**	3	**6**	10	12	0,3	0,6	23 000	13 000	**HK0608**
HF0812-KF	**HF0812**	3,5	**8**	12	12	0,3	3,15	17 000	12 000	**HK0808**
HF0812-KF-R	**HF0812-R**	3,5	**8**	12	12	0,3	1	17 000	12 000	**HK0808**
HF1012-KF	**HF1012**	4	**10**	14	12	0,3	5,3	14 000	11 000	**HK1010**
–	**HF1216**	11	**12**	18	16	0,3	12,2	11 000	8 000	**HK1212**
–	**HF1416**	13	**14**	20	16	0,3	17,3	9 500	8 000	**HK1412**
–	**HF1616**	14	**16**	22	16	0,3	20,5	8 500	7 500	**HK1612**
–	**HF1816**	16	**18**	24	16	0,3	24,1	7 500	7 500	**HK1812**
–	**HF2016**	17	**20**	26	16	0,3	28,5	7 000	6 500	**HK2010**
–	**HF2520**	30	**25**	32	20	0,3	66	5 500	5 500	**HK2512**
–	**HF3020**	36	**30**	37	20	0,3	90	4 500	4 500	**HK3012**
–	**HF3520**	40	**35**	42	20	0,3	121	3 900	3 900	**HK3512**

Drawn cup roller clutches

With bearing arrangement
With or without knurling



HFL, HFL..-KF, plain bearing arr. (HFL0308-KF, HFL0408-KF, HFL0615-KF, HFL0615)



HFL, HFL..-KF, rolling bearing arr. ($F_w \geqq 8$ mm, $C \geqq 22$ mm), HFL0822-KF-R, HFL0822-R

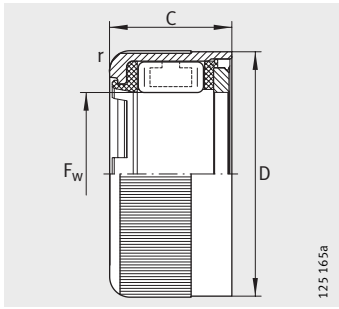
Dimension table · Dimensions in mm

Spring design		Mass	Dimensions				Permissible torque
Plastic springs	Steel springs	m	F_w	D	C	r	$M_{d\ per}$
Designation	Designation	≈g			–0,3	min.	Nm
HFL0308-KF	–	1,4	**3**	6,5	8	0,3	0,18
HFL0308-KF-R	–	1,4	**3**	6,5	8	0,3	0,06
HFL0408-KF	–	1,6	**4**	8	8	0,3	0,34
HFL0408-KF-R	–	1,6	**4**	8	8	0,3	0,1
HFL0606-KF-R	–	1	**6**	10	6	0,3	0,5
HFL0615-KF	**HFL0615**	4	**6**	10	15	0,3	1,76
HFL0615-KF-R	**HFL0615-R**	4	**6**	10	15	0,3	0,6
HFL0806-KF-R	–	2	**8**	12	6	0,3	0,7
HFL0822-KF	**HFL0822**	7	**8**	12	22	0,3	3,15
HFL0822-KF-R	**HFL0822-R**	7	**8**	12	22	0,3	1
–	**HFL1022**	8	**10**	14	22	0,3	5,3
–	**HFL1226**	18	**12**	18	26	0,3	12,2
–	**HFL1426**	20	**14**	20	26	0,3	17,3
–	**HFL1626**	22	**16**	22	26	0,3	20,5
–	**HFL1826**	25	**18**	24	26	0,3	24,1
–	**HFL2026**	27	**20**	26	26	0,3	28,5
–	**HFL2530**	44	**25**	32	30	0,3	66
–	**HFL3030**	51	**30**	37	30	0,3	90
–	**HFL3530**	58	**35**	42	30	0,3	121

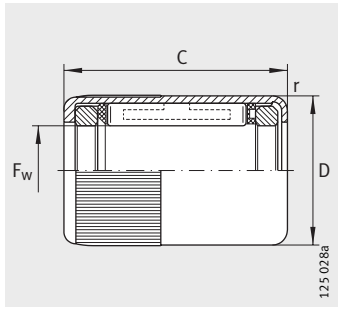
1) Attention!
Drawn cup roller clutches with plain bearing arrangement:
During operation, the product of the actual speed n and the radial load F_r must not exceed the value stated for the limiting load $(F_r \cdot n)_{max}$.
The operating limits are determined by the limiting speeds stated and the permissible radial load.

2) Drawn cup roller clutches with rolling bearing arrangement.

3) No arrow on end face.

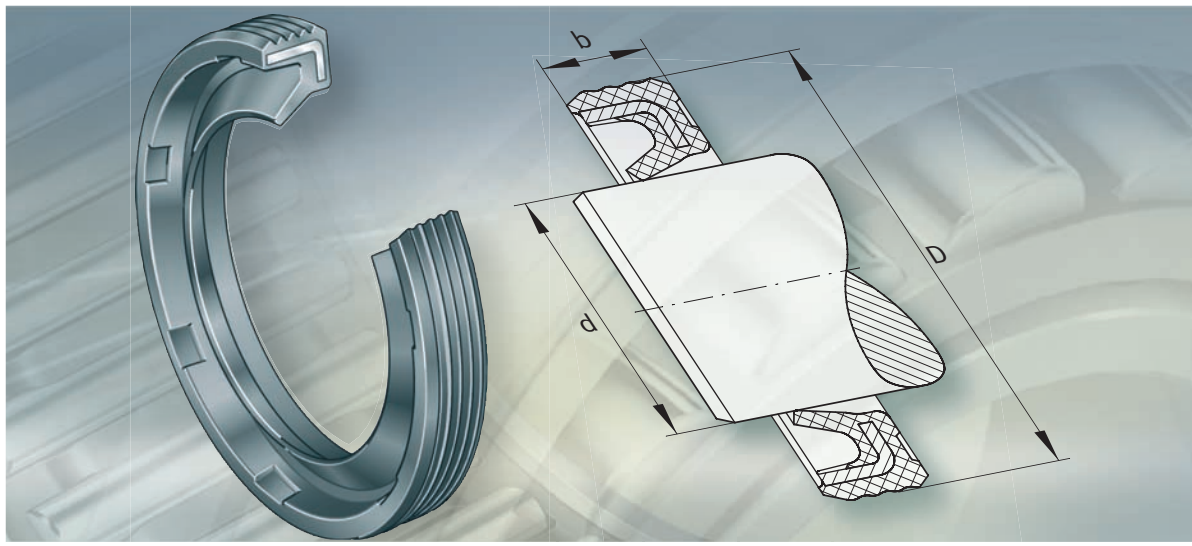


HFL0606-KF-R[3], HFL0806-KF-R[3]



HFL0308-KF-R, HFL0408-KF-R,
HFL0615-R, HFL0615-KF-R

Limiting speeds		Permissible radial load[1]	Limiting load $(F_r \cdot n)_{max}$[1]	Basic load ratings[2]		Fatigue limit load
n_{GW}	n_{GA}	$F_{r\,max}$		dyn. C_r	stat. C_{0r}	C_{ur}
min^{-1}	min^{-1}	N	N/min	N	N	N
45 000	8 000	60	16 000	–	–	–
45 000	8 000	60	16 000	–	–	–
34 000	8 000	80	16 000	–	–	–
34 000	8 000	80	16 000	–	–	–
23 000	13 000	40	4 200	–	–	–
23 000	13 000	110	18 000	–	–	–
23 000	13 000	110	18 000	–	–	–
17 000	12 000	54	4 200	–	–	–
17 000	12 000	–	–	3 650	3 950	550
17 000	12 000	–	–	3 650	3 950	550
14 000	11 000	–	–	3 950	4 500	630
11 000	8 000	–	–	6 300	6 700	920
9 500	8 000	–	–	6 800	7 800	1 080
8 500	7 500	–	–	7 400	9 000	1 250
7 500	7 500	–	–	8 000	10 200	1 420
7 000	6 500	–	–	8 500	11 400	1 590
5 500	5 500	–	–	10 600	14 000	1 900
4 500	4 500	–	–	11 600	16 900	2 290
3 900	3 900	–	–	12 200	18 800	2 550



Sealing rings

Sealing rings

		Page
Product overview	Sealing rings	806
Features	Sealing rings, single lip	807
	Sealing rings, double lip	807
	Operating temperature	807
	Suffixes	808
Design and safety guidelines	Resistance and leakage	808
	Sealing lip orientation	808
	Shaft and housing design	809
Dimension tables	Sealing rings	810

Single lip

Angled reinforcing ring encased in rubber

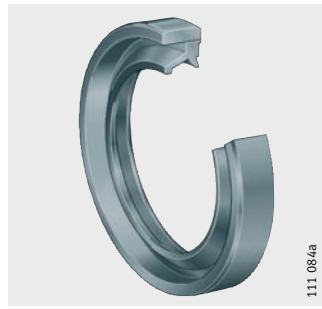
G

With external steel reinforcement

GR

Double lip

SD



Sealing rings

Features

Sealing rings are designed as contact seals.
They protect the bearing position against contamination, spray water and the excessive loss of grease.

Sealing rings are matched to the small radial dimensions of drawn cup needle roller bearings and needle roller bearings.
They are very easy to fit, since they are simply pressed into the housing bore.

Sealing rings allow circumferential speeds at the seal lip of up to 10 m/s, depending on the surface quality of the shaft.

Sealing rings, single lip

Sealing rings G and GR are single lip seals made from synthetic NBR elastomer (colour: green).

The design GR is suitable for shaft diameters up to 7 mm as standard and has an external steel reinforcement for stiffening purposes.

Sealing rings G are suitable for shaft diameters over 8 mm and have a rubber-encased steel reinforcement for stiffening purposes with a wave-shaped rubber profile. This provides good sealing on the outside diameter. At the same time, it also reduces the forces required for fitting.

Sealing rings, double lip

Sealing rings SD have a contact lip and a non-contact dust shield lip facing the shaft (on the marked side). They comprise two plastic components.

The seal carrier is made from reinforced polyamide (colour: black), while the seal lip area is made from thermoplastic PU elastomer (colour: green).

Sealing rings SD can also be used as wipers on shafts with axial motion. Stroke speeds up to 3 m/s are possible, dependent on the condition of the shaft.

Operating temperature

The permissible temperature is dependent on the interaction between the medium and the temperature and its effect on the sealing ring material. The suitability of the sealing rings should be checked by tests as extremes of operation are approached.

Sealing rings G and GR are suitable for operating temperatures from –30 °C to +110 °C, depending on the medium acting on the sealing ring.

Sealing rings SD are suitable for operating temperatures from –30 °C to +100 °C, depending on the medium acting on the sealing ring.

Sealing rings

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
FPM	Sealing rings G and GR for temperatures from –20 °C to +160 °C or circumferential speeds up to 16 m/s	Special design, available by agreement
HNBR	Sealing rings G and GR for temperatures from –30 °C to +140 °C or circumferential speeds up to 12 m/s	

Further information

Further information on sealing rings and the basic principles of sealing ring technology is given in TPI 128, Sealing rings, single lip and double lip.

Design and safety guidelines

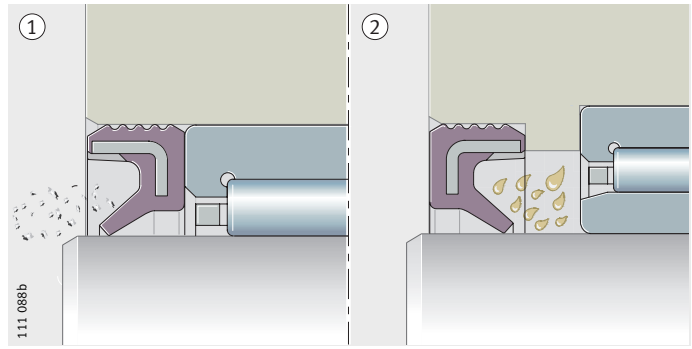
Resistance and leakage

Sealing rings are resistant to undoped lubricants with a mineral oil base. For other media, please check the resistance of the sealing rings.

Low leakage rates are possible (grease or fluid film).
The sealing effect is aided by a grease collar.

Sealing lip orientation

In order to protect against dust and contamination, the seal lip should face outwards, *Figure 1* ①. In order to prevent egress of lubricant, the seal lip should face inwards, *Figure 1* ②.



① Seal lip facing outwards
② Seal lip facing inwards

Figure 1
Sealing lip orientation

Shaft and housing design

The sliding surface for the seal lips must be free from cracks and damage such as impact points, scratches, cracks, rust, raised areas.

Tolerances and surface quality

Sealing ring	Shaft movement	Bore tolerance	Shaft		
			Tolerance	Roughness	Hardness
G, GR, SD	Rotation only	G7 to R7	g7 to k7	$0,2 \leqq R_a \leqq 0,8$	55 HRC or 600 HV
SD	Axial motion			$R_a 0,3$	

In order to protect the sealing lips during fitting, the shaft ends and the housing bore should be chamfered in accordance with DIN 3 760, see table and *Figure 2*.

Chamfer dimensions

Chamfer	D ≦ 30 mm	D > 30 mm	d ≦ 30 mm	d > 30 mm
v_{min}	0,3	1% of D	–	–
w_{min}	–	–	0,3	0,5

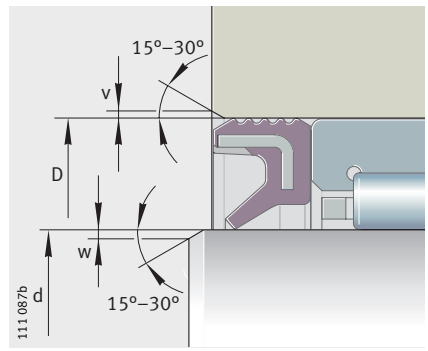
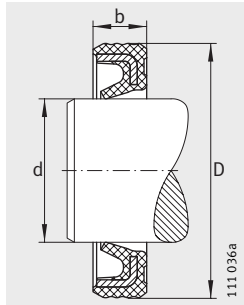
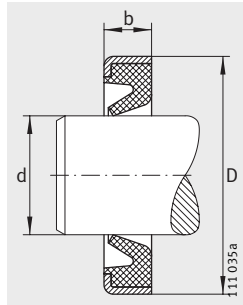


Figure 2
Chamfers on housing bore and shaft end

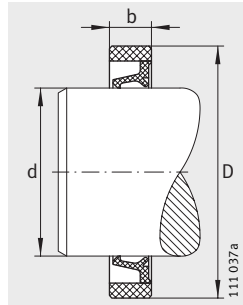
Sealing rings



G



GR



SD

Dimension table · Dimensions in mm

Type			Designation			Mass		
G	GR	SD	d_x	D_x	b[1]	G ≈g	GR ≈g	SD ≈g
–	■[2]	–	**4**	**8**	**2**	–	0,2	–
–	■[2]	–	**5**	**9**	**2**	–	0,2	–
–	■[2]	–	**5**	**10**	**2**	–	0,2	–
–	■[2]	–	**6**	**10**	**2**	–	0,2	–
–	■[2]	–	**6**	**12**	**2**	–	0,4	–
–	■[2]	–	**7**	**11**	**2**	–	0,3	–
–	■[2]	–	**7**	**14**	**2**	–	0,5	–
■[2]	[4]	[4]	**8**	**12**	**3**	0,4	–	–
■[2]	[4]	■[2]	**8**	**15**	**3**	0,7	–	0,3
■[2]	■[2]	[4]	**9**	**13**	**3**	0,5	0,5	–
■[2]	[4]	[4]	**9**	**16**	**3**	0,7	–	–
■[2]	■[2]	[4]	**10**	**14**	**3**	0,5	0,5	–
■[2]	[4]	■[2]	**10**	**17**	**3**	0,9	–	0,4
■[2]	■[2]	[4]	**12**	**16**	**3**	0,6	0,6	–
■[2]	[4]	■[2]	**12**	**18**	**3**	0,9	–	–
■[2]	■[2]	■[2]	**12**	**19**	**3**	1	1	0,5
■[2]	[4]	[4]	**13**	**19**	**3**	0,9	–	–
■[2]	[3]	■[2]	**14**	**20**	**3**	1	1	0,5
■[2]	[4]	[4]	**14**	**21**	**3**	1,1	–	–
■[2]	[3]	■[2]	**14**	**22**	**3**	1,3	1,1	0,7
■[2]	[3]	■[2]	**15**	**21**	**3**	1	1	0,5
■[2]	[3]	■[2]	**15**	**23**	**3**	1,3	1,3	0,7
■[2]	[3]	■[2]	**16**	**22**	**3**	1,3	1,3	0,6
■[2]	[3]	■[2]	**16**	**24**	**3**	1,3	1,3	0,7
■[2]	[4]	[4]	**16**	**25**	**3**	1,6	–	–
■[2]	[3]	■[2]	**17**	**23**	**3**	1,3	1,3	0,6
■[2]	[4]	■[2]	**17**	**25**	**3**	1,5	–	0,8
■[2]	[4]	■[2]	**18**	**24**	**3**	1,2	–	0,6
■[2]	[4]	■[2]	**18**	**26**	**4**	1,8	–	1,1
■[2]	[4]	■[2]	**19**	**27**	**4**	2	–	1,1
■[2]	[3]	■[2]	**20**	**26**	**4**	1,8	1,8	0,8
■[2]	[3]	■[2]	**20**	**28**	**4**	2,1	2,1	1,1
■[2]	[4]	[4]	**21**	**29**	**4**	2,2	–	–
■[2]	[3]	■[2]	**22**	**28**	**4**	1,8	1,8	0,9
■[2]	[3]	■[2]	**22**	**30**	**4**	2,2	2,2	1,3

Dimension table (continued) · Dimensions in mm

Type			Designation			Mass		
G	GR	SD	d_x	D_x	b[1]	G ≈g	GR ≈g	SD ≈g
■[2]	[3]	[4]	**24**	**32**	**4**	2,5	2,5	–
■[2]	[3]	■[2]	**25**	**32**	**4**	2,3	2,3	1,3
■[2]	[4]	■[2]	**25**	**33**	**4**	2,5	–	1,3
■[2]	[3]	■[2]	**25**	**35**	**4**	2,6	2,6	1,9
■[2]	[4]	■[2]	**26**	**34**	**4**	2,6	–	1,4
■[2]	[3]	■[2]	**28**	**35**	**4**	2,4	2,4	1,3
■[2]	[3]	[4]	**28**	**37**	**4**	3,1	3,1	–
■[2]	[4]	[4]	**29**	**38**	**4**	3,2	–	–
■[2]	[3]	■[2]	**30**	**37**	**4**	2,7	2,7	1,3
■[2]	[3]	■[2]	**30**	**40**	**4**	3,6	3,6	2,1
■[2]	[4]	■[2]	**32**	**42**	**4**	3,7	–	2,4
■[2]	[4]	[4]	**32**	**45**	**4**	5,1	–	–
■[2]	[3]	■[2]	**35**	**42**	**4**	3	4	1,5
■[2]	[4]	■[2]	**35**	**45**	**4**	4,1	4,1	2,5
■[2]	[4]	■[2]	**37**	**47**	**4**	4	–	2,7
■[2]	[4]	■[2]	**38**	**48**	**4**	4,4	–	2,8
■[2]	[4]	■[2]	**40**	**47**	**4**	3,3	–	1,7
■[2]	[3]	■[2]	**40**	**50**	**4**	4,6	4,6	2,9
■[2]	[3]	■[2]	**40**	**52**	**5**	4,8	4,8	4,5
■[2]	[3]	■[2]	**42**	**52**	**4**	4,7	4,7	3
■[2]	[4]	[4]	**43**	**53**	**4**	4,8	–	–
■[2]	[3]	■[2]	**45**	**52**	**4**	3,8	3,8	1,9
■[2]	[3]	■[2]	**45**	**55**	**4**	5,2	5,2	3,2
■[2]	[3]	■[2]	**50**	**58**	**4**	4,5	4,5	2,4
■[2]	[3]	■[2]	**50**	**62**	**5**	10,4	10,4	5,5
■[2]	[3]	–	**55**	**63**	**5**	7,1	7,1	–
■[2]	[3]	–	**70**	**78**	**5**	9	9	–
■[2]	[4]	–	**80**	**90**	**5**	13,8	–	–

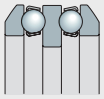
Special designs, available by agreement.

1) $\overline{\text{Width tolerance}}$ +0,1/–0,2.

2) **■ = standard range.**

3) Please enquire on availability.

4) Available by agreement for economically viable batch sizes.



191 582

191 575

191 563

191 561

191 572

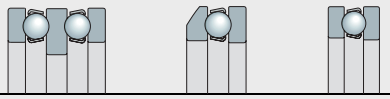
191 557

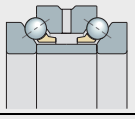
191 569

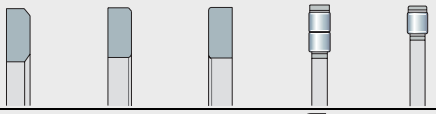
191 578

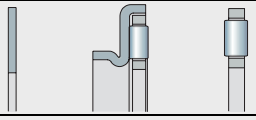
191 583

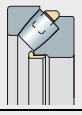
191 585

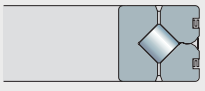

191 595
Axial deep groove ball bearings

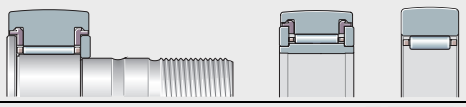

191 581
Axial angular contact ball bearings

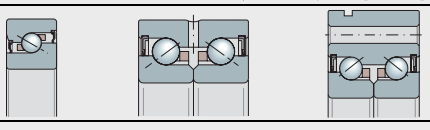

191 596
Axial cylindrical roller bearings

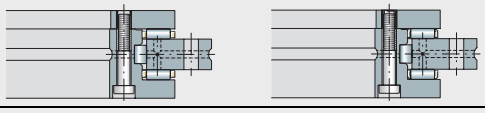

191 579
Axial needle roller and
cage assemblies

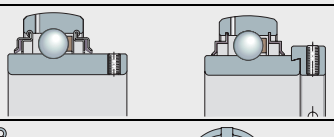

191 559
Axial spherical roller bearings

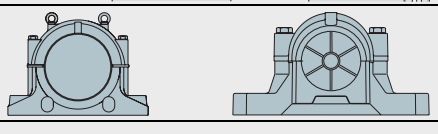

191 577
Crossed roller bearings

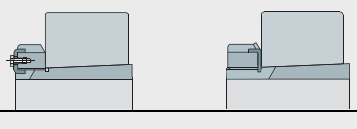

191 576
Track rollers


191 564
Bearings for screw drives


191 597
High precision bearings for
combined loads

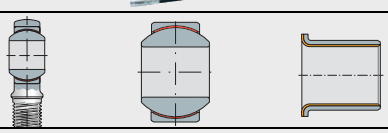

191 573
Insert bearings, housing units,
idler sprocket units, idler pulley units

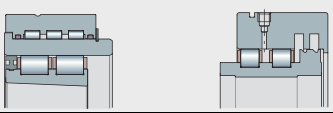

191 558
Bearing housings


191 570
Fasteners and retainers

00014A13
Rolling elements

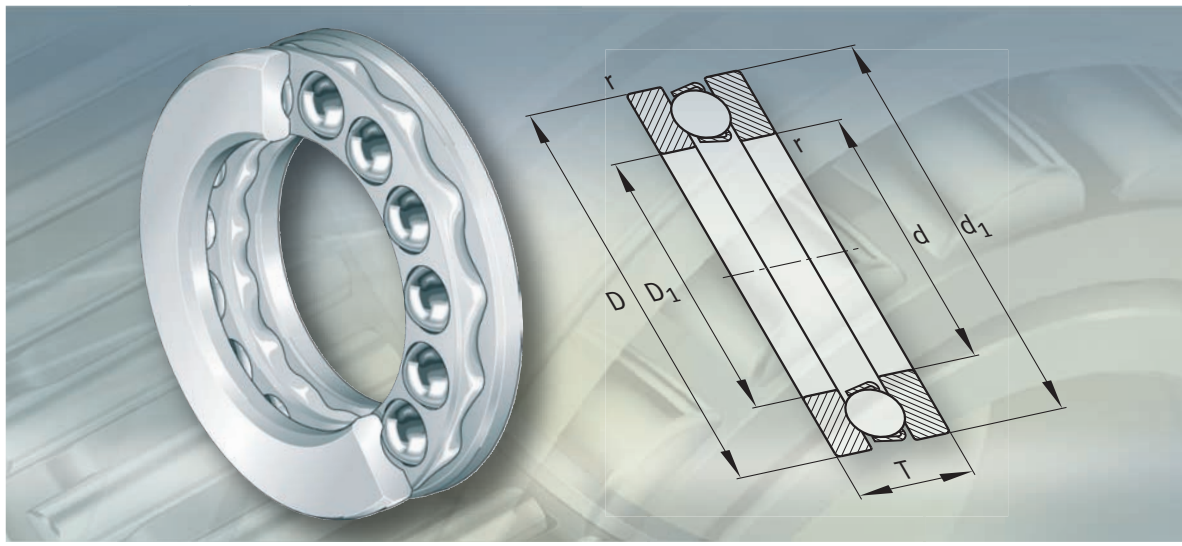
191 598
Arcanol rolling bearing greases


191 584
Other products


191 599
Market sectors

Appendix

FAG



Axial deep groove ball bearings

Axial deep groove ball bearings

		Page
Product overview	Axial deep groove ball bearings	816
Features	Single direction bearings	817
	Double direction bearings	817
	Operating temperature	817
	Cages	818
	Suffixes	818
Design and safety guidelines	Equivalent dynamic bearing load	818
	Equivalent static bearing load	818
	Minimum axial load	819
	Speeds	819
	Design of bearing arrangements	819
Accuracy		819
Dimension tables	Axial deep groove ball bearings, single direction	820
	Axial deep groove ball bearings, double direction	836

Single direction

With flat housing locating washer

511, 512, 513, 514

With spherical housing locating washer
With and without seating washer

532, 533

532 + U2, 533 + U3

Double direction

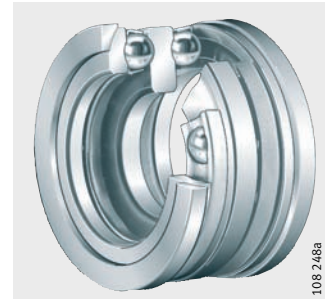
With flat housing locating washers

522, 523

With spherical housing locating washers
With and without seating washers

542, 543

542 + U2, 543 + U3



Axial deep groove ball bearings

Features

Axial deep groove ball bearings comprise shaft locating washers, housing locating washers and ball and cage assemblies.
The bearings are not self-retaining; the ball and cage assembly and bearing washers can therefore be fitted separately.

In addition to the series with flat washers, series are also available with spherical housing locating washers for the compensation of static angular misalignment. These designs are normally used in conjunction with seating washers.

Axial deep groove ball bearings are available in single and double direction designs. Both designs can support high axial forces but cannot be subjected to radial loads.

Single direction bearings

Single direction axial deep groove ball bearings can support axial forces in one direction.

Bearings of series 511, 512, 513 and 514 have a flat housing locating washer. They do not permit angular misalignment or skewing between the shaft and housing.

Angular adjustment facility

Bearings of series 532 and 533 have a spherical housing locating washer. With an appropriate housing design and in conjunction with seating washers U2 and U3, they allow angular adjustment and can therefore compensate static misalignments between the shaft and housing.

Double direction bearings

Double direction axial deep groove ball bearings can support axial forces in both directions.

Bearings of series 522 and 523 have two flat housing locating washers and do not allow angular adjustment.

Angular adjustment facility

Bearings of series 542 and 543 have spherical housing locating washers. With an appropriate housing design and in conjunction with seating washers U2 and U3, they allow angular adjustment and can therefore compensate static misalignments between the shaft and housing.

Operating temperature

Axial deep groove ball bearings can be used at operating temperatures from –30 °C to +150 °C, restricted by the lubricant.

Cages

Bearings with sheet steel cages do not have a cage suffix. Solid brass window cages are indicated by the suffix MP, see table Available designs.

The cage design as a function of the bore code is shown in table Cage and bore code.

Cage and bore code

Series	Sheet steel cage	Solid brass cage
	Bore code	
511	up to 28	from 30
512	up to 28	from 30
513	up to 20	from 22
514	up to 11	from 12
522	up to 28	from 30
523	up to 20	from 22
532	up to 28	from 30
533	up to 20	from 22
542	all	–
543	up to 20	22

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
MP	Solid brass window cage, ball-guided	Standard
P5	Higher accuracy to tolerance class P5	Special design, available by agreement
P6	Higher accuracy to tolerance class P6	

Design and safety guidelines

Axial deep groove ball bearings can support axial forces only.

Equivalent dynamic bearing load

In this case:

$$P = F_a$$

P N
Equivalent dynamic bearing load

F_a N
Axial dynamic bearing load.

Equivalent static bearing load

In this case:

$$P_0 = F_{0a}$$

P_0 N
Equivalent static bearing load

F_{0a} N
Axial static bearing load.

Minimum axial load

At higher speeds, detrimental sliding movements can occur between the rolling elements and the raceways due to centrifugal forces and gyroscopic moments. In order to avoid this, the bearings must be subjected to a minimum load $F_{a\,min}$. This can be achieved by means of preloading, for example using springs.

The minimum load factor A is given in the dimension tables. For n_{max}, the maximum operating speed must be used.

$$F_{a\,min} = 1000 \cdot A \cdot \left(\frac{n_{max}}{1000} \right)^2$$

$F_{a\,min}$ N
Minimum axial load

A –
Minimum load factor, see dimension table

n_{max} min^{-1}
Maximum operating speed.

Speeds

ISO 15 312 does not give thermal reference speeds for these bearings.

The dimension tables only state the limiting speeds n_G. These values are for oil lubrication and must not be exceeded.

Design of bearing arrangements

Shaft and housing tolerances

For single direction bearings the shaft tolerance should be j6, for double direction bearings the shaft tolerance should be k6.

The tolerance of the locating bore is dependent on the running accuracy to be achieved. For normal running accuracy the tolerance should be in the tolerance zone E8, for high running accuracy it should be in the tolerance zone H6.

Adjacent parts

The shoulders on the adjacent construction (shaft and housing) must be sufficiently high that the shaft and housing locating washers are supported over at least half their height.

The abutment shoulders should be rigid, flat and perpendicular to the axis of rotation.

The maximum dimensions for the radii r_a and the diameters of the abutment surfaces d_a, D_a are indicated in the dimension tables.

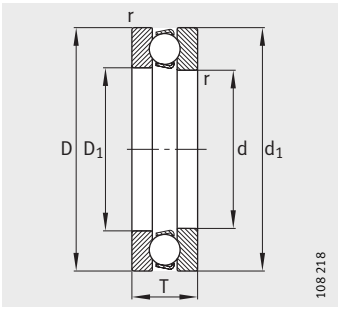
Accuracy

The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620-3.

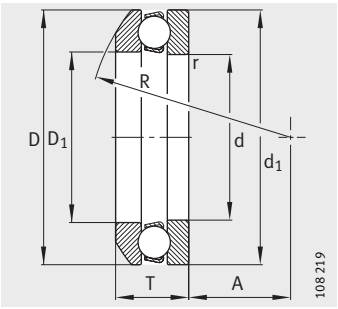
The main dimensions for single direction bearings and seating washers conform to ISO 104/DIN 711 and for double direction bearings to DIN 715.

Axial deep groove ball bearings

Single direction



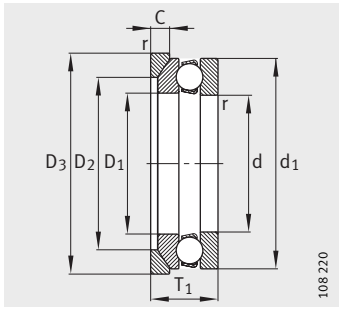
511, 512, 513, 514



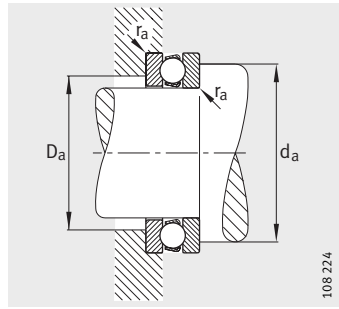
532, 533
Spherical housing locating washer

Dimension table · Dimensions in mm

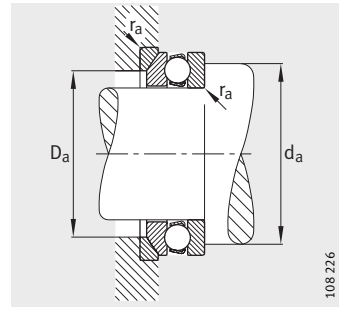
Designation		Mass m		Dimensions								
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T	D_1	d_1	r min.	R	A	D_2
51100	–	0,018	–	**10**	24	9	11	24	0,3	–	–	–
51200	–	0,029	–	**10**	26	11	12	26	0,6	–	–	–
53200	–	0,028	–	**10**	26	11,6	12	26	0,6	22	8,5	–
53200	**U200**	0,028	0,01	**10**	26	11,6	12	26	0,6	22	8,5	18
51101	–	0,021	–	**12**	26	9	13	26	0,3	–	–	–
51201	–	0,032	–	**12**	28	11	14	28	0,6	–	–	–
53201	–	0,03	–	**12**	28	11,4	14	28	0,6	25	11,5	–
53201	**U201**	0,03	0,012	**12**	28	11,4	14	28	0,6	25	11,5	20
51102	–	0,024	–	**15**	28	9	16	28	0,3	–	–	–
51202	–	0,043	–	**15**	32	12	17	32	0,6	–	–	–
53202	–	0,046	–	**15**	32	13,3	17	32	0,6	28	12	–
53202	**U202**	0,046	0,014	**15**	32	13,3	17	32	0,6	28	12	24
51103	–	0,024	–	**17**	30	9	18	30	0,3	–	–	–
51203	–	0,05	–	**17**	35	12	19	35	0,6	–	–	–
53203	–	0,052	–	**17**	35	13,2	19	35	0,6	32	16	–
53203	**U203**	0,052	0,015	**17**	35	13,2	19	35	0,6	32	16	26
51104	–	0,037	–	**20**	35	10	21	35	0,3	–	–	–
51204	–	0,082	–	**20**	40	14	22	40	0,6	–	–	–
53204	–	0,081	–	**20**	40	14,7	22	40	0,6	36	18	–
53204	**U204**	0,081	0,021	**20**	40	14,7	22	40	0,6	36	18	30
51105	–	0,055	–	**25**	42	11	26	42	0,6	–	–	–
51205	–	0,114	–	**25**	47	15	27	47	0,6	–	–	–
53205	–	0,121	–	**25**	47	16,7	27	47	0,6	40	19	–
53205	**U205**	0,121	0,032	**25**	47	16,7	27	47	0,6	40	19	36
51305	–	0,154	–	**25**	52	18	27	52	1	–	–	–
53305	–	0,203	–	**25**	52	19,8	27	52	1	45	21	–
53305	**U305**	0,203	0,044	**25**	52	19,8	27	52	1	45	21	38
51405	–	0,295	–	**25**	60	24	27	60	1	–	–	–



532, 533
Spherical housing locating washer, seating washer U2, U3



Mounting dimensions

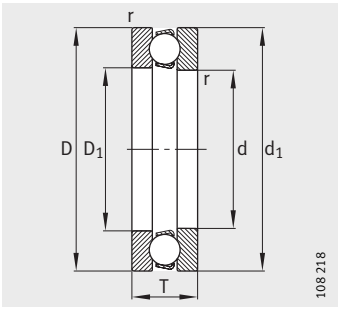


Mounting dimensions

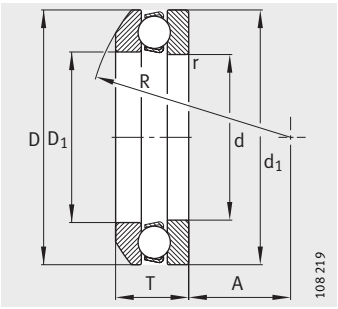
			Mounting dimensions			Basic load ratings		Fatigue limit load	Minimum load factor	Limiting speed
D_3	C	T_1	d_a	D_a	r_a	dyn. C_a	stat. C_{0a}	C_{ua}	A	n_G
			min.	max.	max.	N	N	N		min^{-1}
–	–	–	18	16	0,3	10 000	14 000	620	0,001	13 000
–	–	–	20	16	0,6	12 700	17 000	760	0,002	11 000
–	–	–	20	18	0,6	12 700	17 000	760	0,002	11 000
28	3,5	13	20	18	0,6	12 700	17 000	760	0,002	11 000
–	–	–	20	18	0,3	10 400	15 300	690	0,001	13 000
–	–	–	22	18	0,6	13 200	19 000	840	0,002	10 000
–	–	–	22	20	0,6	13 200	19 000	840	0,002	10 000
30	3,5	13	22	20	0,6	13 200	19 000	840	0,002	10 000
–	–	–	23	20	0,3	10 600	16 600	750	0,002	12 000
–	–	–	25	22	0,6	16 600	25 000	1 100	0,004	9 000
–	–	–	25	24	0,6	16 600	25 000	1 100	0,004	9 000
35	4	15	25	24	0,6	16 600	25 000	1 100	0,004	9 000
–	–	–	25	22	0,3	11 400	19 600	870	0,002	11 000
–	–	–	28	24	0,6	17 300	27 500	1 210	0,004	8 500
–	–	–	28	26	0,6	17 300	27 500	1 210	0,004	8 500
38	4	15	28	26	0,6	17 300	27 500	1 210	0,004	8 500
–	–	–	29	26	0,3	15 000	26 500	1 180	0,004	9 500
–	–	–	32	28	0,6	22 400	37 500	1 660	0,01	7 500
–	–	–	32	30	0,6	22 400	37 500	1 660	0,01	7 500
42	5	17	32	30	0,6	22 400	37 500	1 660	0,01	7 500
–	–	–	35	32	0,6	18 000	35 500	1 570	0,006	9 000
–	–	–	38	34	0,6	28 000	50 000	2 220	0,01	6 700
–	–	–	38	36	0,6	28 000	50 000	2 220	0,013	6 700
50	5,5	19	38	36	0,6	28 000	50 000	2 220	0,013	6 700
–	–	–	41	36	1	34 500	55 000	2 450	0,019	5 300
–	–	–	41	38	1	34 500	55 000	2 450	0,019	5 300
55	6	22	41	38	1	34 500	55 000	2 450	0,019	5 300
–	–	–	46	39	1	45 500	67 000	2 950	0,032	4 500

Axial deep groove ball bearings

Single direction



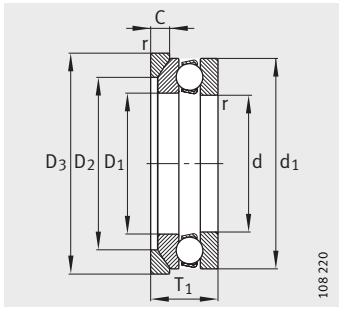
511, 512, 513, 514



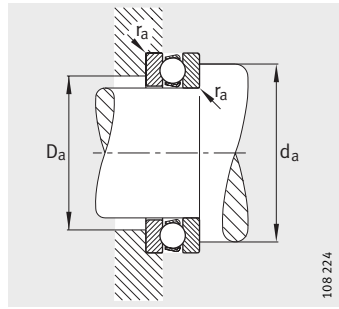
532, 533
Spherical housing locating washer

Dimension table (continued) · Dimensions in mm

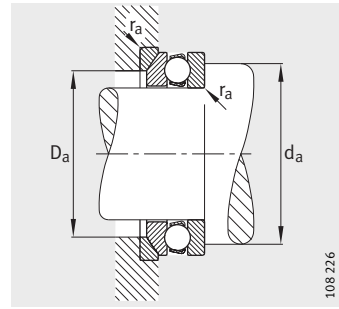
Designation		Mass m		Dimensions								
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T	D_1	d_1	r min.	R	A	D_2
51106	–	0,063	–	**30**	47	11	32	47	0,6	–	–	–
51206	–	0,136	–	**30**	52	16	32	52	0,6	–	–	–
53206	–	0,147	–	**30**	52	17,8	32	52	0,6	45	22	–
53206	**U206**	0,147	0,038	**30**	52	17,8	32	52	0,6	45	22	42
51306	–	0,244	–	**30**	60	21	32	60	1	–	–	–
53306	–	0,303	–	**30**	60	22,6	32	60	1	50	22	–
53306	**U306**	0,303	0,056	**30**	60	22,6	32	60	1	50	22	45
51406	–	0,49	–	**30**	70	28	32	70	1	–	–	–
51107	–	0,08	–	**35**	52	12	37	52	0,6	–	–	–
51207	–	0,198	–	**35**	62	18	37	62	1	–	–	–
53207	–	0,265	–	**35**	62	19,9	37	62	1	50	24	–
53207	**U207**	0,265	0,057	**35**	62	19,9	37	62	1	50	24	48
51307	–	0,351	–	**35**	68	24	37	68	1	–	–	–
53307	–	0,437	–	**35**	68	25,6	37	68	1	56	24	–
53307	**U307**	0,437	0,083	**35**	68	25,6	37	68	1	56	24	52
51407	–	0,709	–	**35**	80	32	37	80	1,1	–	–	–
51108	–	0,114	–	**40**	60	13	42	60	0,6	–	–	–
51208	–	0,257	–	**40**	68	19	42	68	1	–	–	–
53208	–	0,259	–	**40**	68	20,3	42	68	1	56	28,5	–
53208	**U208**	0,259	0,071	**40**	68	20,3	42	68	1	56	28,5	55
51308	–	0,536	–	**40**	78	26	42	78	1	–	–	–
53308	–	0,561	–	**40**	78	28,5	42	78	1	64	28	–
53308	**U308**	0,561	0,12	**40**	78	28,5	42	78	1	64	28	60
51408	–	1,03	–	**40**	90	36	42	90	1,1	–	–	–
51109	–	0,087	–	**45**	65	14	47	65	0,6	–	–	–
51209	–	0,279	–	**45**	73	20	47	73	1	–	–	–
53209	–	0,278	–	**45**	73	21,3	47	73	1	56	26	–
53209	**U209**	0,278	0,088	**45**	73	21,3	47	73	1	56	26	60
51309	–	0,612	–	**45**	85	28	47	85	1	–	–	–
53309	–	0,783	–	**45**	85	30,1	47	85	1	64	25	–
53309	**U309**	0,783	0,173	**45**	85	30,1	47	85	1	64	25	65
51409	–	1,36	–	**45**	100	39	47	100	1,1	–	–	–



532, 533
Spherical housing locating washer, seating washer U2, U3



Mounting dimensions

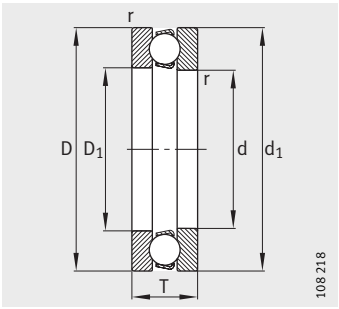


Mounting dimensions

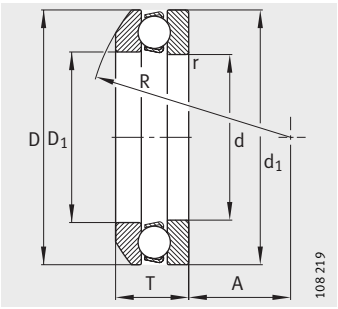
			Mounting dimensions			Basic load ratings		Fatigue limit load	Minimum load factor	Limiting speed
D_3	C	T_1	d_a	D_a	r_a	dyn. C_a	stat. C_{0a}	C_{ua}	A	n_G
			min.	max.	max.	N	N	N		min^{-1}
–	–	–	40	37	0,6	19 000	40 000	1 770	0,009	8 000
–	–	–	43	39	0,6	25 000	46 500	2 040	0,01	6 300
–	–	–	43	42	0,6	25 000	46 500	2 040	0,01	6 300
55	5,5	20	43	42	0,6	25 000	46 500	2 040	0,01	6 300
–	–	–	48	42	1	38 000	65 500	2 850	0,028	5 000
–	–	–	48	45	1	38 000	65 500	2 850	0,028	5 000
62	7	25	48	45	1	38 000	65 500	2 850	0,028	5 000
–	–	–	54	46	1	69 500	112 000	5 000	0,075	3 800
–	–	–	45	42	0,6	20 000	46 500	2 060	0,011	7 500
–	–	–	51	46	1	35 500	67 000	3 000	0,028	5 300
–	–	–	51	48	1	35 500	67 000	3 000	0,028	5 300
65	7	22	51	48	1	35 500	67 000	3 000	0,028	5 300
–	–	–	55	48	1	50 000	88 000	3 900	0,05	4 500
–	–	–	55	52	1	50 000	88 000	3 900	0,05	4 500
72	7,5	28	55	52	1	50 000	88 000	3 900	0,05	4 500
–	–	–	62	53	1	76 500	127 000	5 600	0,11	3 600
–	–	–	52	48	0,6	27 000	63 000	2 750	0,02	6 300
–	–	–	57	51	1	46 500	98 000	4 300	0,05	4 800
–	–	–	57	55	1	46 500	98 000	4 300	0,05	4 800
72	7	23	57	55	1	46 500	98 000	4 300	0,05	4 800
–	–	–	63	55	1	61 000	112 000	5 000	0,08	4 000
–	–	–	63	60	1	61 000	112 000	5 000	0,08	4 000
82	8,5	31	63	60	1	61 000	112 000	5 000	0,08	4 000
–	–	–	70	60	1	96 500	170 000	7 500	0,18	3 400
–	–	–	57	53	0,6	28 000	69 500	3 050	0,024	6 000
–	–	–	62	56	1	39 000	80 000	3 550	0,043	4 800
–	–	–	62	60	1	39 000	80 000	3 550	0,043	4 800
78	7,5	24	62	60	1	39 000	80 000	3 550	0,043	4 800
–	–	–	69	61	1	75 000	140 000	6 300	0,12	3 600
–	–	–	69	65	1	75 000	140 000	6 300	0,12	3 600
90	10	33	69	65	1	75 000	140 000	6 300	0,12	3 600
–	–	–	78	67	1	122 000	220 000	9 800	0,3	3 000

Axial deep groove ball bearings

Single direction



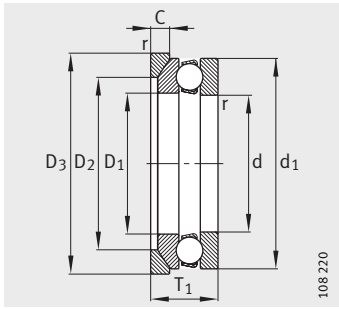
511, 512, 513, 514



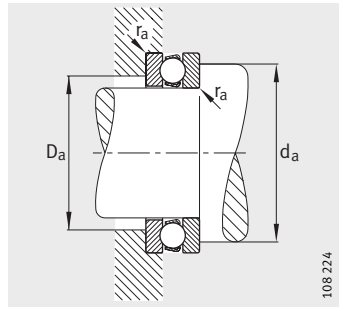
532, 533
Spherical housing locating washer

Dimension table (continued) · Dimensions in mm

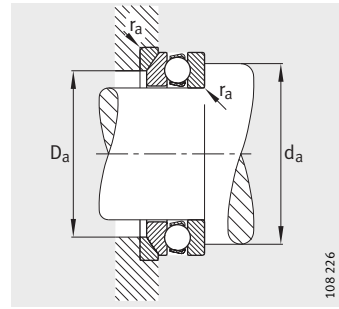
Designation		Mass m		Dimensions								
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T	D_1	d_1	r min.	R	A	D_2
51110	–	0,151	–	**50**	70	14	52	70	0,6	–	–	–
51210	–	0,346	–	**50**	78	22	52	78	1	–	–	–
53210	–	0,341	–	**50**	78	23,5	52	78	1	64	32,5	–
53210	**U210**	0,341	0,098	**50**	78	23,5	52	78	1	64	32,5	62
51310	–	0,932	–	**50**	95	31	52	95	1,1	–	–	–
53310	–	0,97	–	**50**	95	34,3	52	95	1,1	72	28	–
53310	**U310**	0,97	0,225	**50**	95	34,3	52	95	1,1	72	28	72
51410	–	1,81	–	**50**	110	43	52	110	1,5	–	–	–
51111	–	0,208	–	**55**	78	16	57	78	0,6	–	–	–
51211	–	0,382	–	**55**	90	25	57	90	1	–	–	–
53211	–	0,609	–	**55**	90	27,3	57	90	1	72	35	–
53211	**U211**	0,609	0,152	**55**	90	27,3	57	90	1	72	35	72
51311	–	1,3	–	**55**	105	35	57	105	1,1	–	–	–
53311	–	1,38	–	**55**	105	39,3	57	105	1,1	80	30	–
53311	**U311**	1,38	0,277	**55**	105	39,3	57	105	1,1	80	30	80
51411	–	2,83	–	**55**	120	48	57	120	1,5	–	–	–
51112	–	0,278	–	**60**	85	17	62	85	1	–	–	–
51212	–	0,649	–	**60**	95	26	62	95	1	–	–	–
53212	–	0,655	–	**60**	95	28	62	95	1	72	32,5	–
53212	**U212**	0,655	0,165	**60**	95	28	62	95	1	72	32,5	78
51312	–	1,36	–	**60**	110	35	62	110	1,1	–	–	–
53312	–	1,41	–	**60**	110	38,3	62	110	1,1	90	41	–
53312	**U312**	1,41	0,31	**60**	110	38,3	62	110	1,1	90	41	85
51412-MP	–	3,51	–	**60**	130	51	62	130	1,5	–	–	–
51113	–	0,3	–	**65**	90	18	67	90	1	–	–	–
51213	–	0,684	–	**65**	100	27	67	100	1	–	–	–
53213	–	0,855	–	**65**	100	28,7	67	100	1	80	40	–
53213	**U213**	0,855	0,184	**65**	100	28,7	67	100	1	80	40	82
51313	–	1,39	–	**65**	115	36	67	115	1,1	–	–	–
53313	–	1,78	–	**65**	115	39,4	67	115	1,1	90	38,5	–
53313	**U313**	1,78	0,338	**65**	115	39,4	67	115	1,1	90	38,5	90
51413-MP	–	4,47	–	**65**	140	56	68	140	2	–	–	–



532, 533
Spherical housing locating washer, seating washer U2, U3



Mounting dimensions

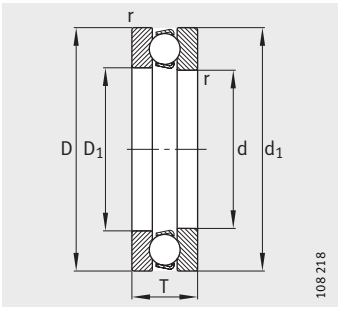


Mounting dimensions

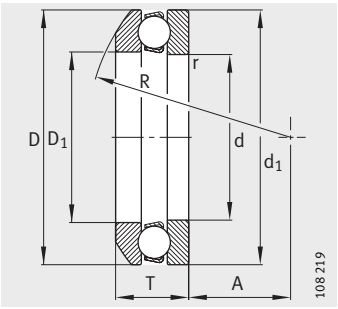
			Mounting dimensions			Basic load ratings		Fatigue limit load	Minimum load factor	Limiting speed
D_3	C	T_1	d_a	D_a	r_a	dyn. C_a	stat. C_{0a}	C_{ua}	A	n_G
			min.	max.	max.	N	N	N		min^{-1}
–	–	–	62	58	0,6	29 000	75 000	3 300	0,03	5 600
–	–	–	67	61	1	50 000	106 000	4 700	0,07	4 300
–	–	–	67	62	1	50 000	106 000	4 700	0,07	4 300
82	7,5	26	67	62	1	50 000	106 000	4 700	0,07	4 300
–	–	–	77	68	1	86 500	170 000	7 500	0,18	3 400
–	–	–	77	72	1	86 500	170 000	7 500	0,18	3 400
100	11	37	77	72	1	86 500	170 000	7 500	0,18	3 400
–	–	–	86	74	1,5	137 000	255 000	11 400	0,4	2 800
–	–	–	69	64	0,6	30 500	75 000	3 300	0,036	5 300
–	–	–	76	69	1	61 000	134 000	6 100	0,11	3 800
–	–	–	76	72	1	61 000	134 000	6 100	0,11	3 800
95	9	30	76	72	1	61 000	134 000	6 100	0,11	3 800
–	–	–	85	75	1	102 000	208 000	9 000	0,26	3 200
–	–	–	85	80	1	102 000	208 000	9 000	0,26	3 200
110	11,5	42	85	80	1	102 000	208 000	9 000	0,26	3 200
–	–	–	94	81	1,5	180 000	360 000	19 000	0,67	2 600
–	–	–	75	70	1	41 500	112 000	5 000	0,063	4 800
–	–	–	81	74	1	62 000	140 000	6 200	0,12	3 800
–	–	–	81	78	1	62 000	140 000	6 200	0,12	3 800
100	9	31	81	78	1	62 000	140 000	6 200	0,12	3 800
–	–	–	90	80	1	100 000	208 000	9 000	0,28	3 200
–	–	–	90	85	1	100 000	208 000	9 000	0,28	3 200
115	11,5	42	90	85	1	100 000	208 000	9 000	0,28	3 200
–	–	–	102	88	1,5	200 000	400 000	21 300	1	2 200
–	–	–	80	75	1	38 000	100 000	4 400	0,063	4 500
–	–	–	86	79	1	64 000	150 000	6 600	0,14	3 600
–	–	–	86	82	1	64 000	150 000	6 600	0,14	3 600
105	9	32	86	82	1	64 000	150 000	6 600	0,14	3 600
–	–	–	95	85	1	106 000	220 000	9 700	0,32	3 000
–	–	–	95	90	1	106 000	220 000	9 700	0,32	3 000
120	12,5	43	95	90	1	106 000	220 000	9 700	0,32	3 000
–	–	–	110	95	2	216 000	450 000	23 500	1,1	2 000

Axial deep groove ball bearings

Single direction



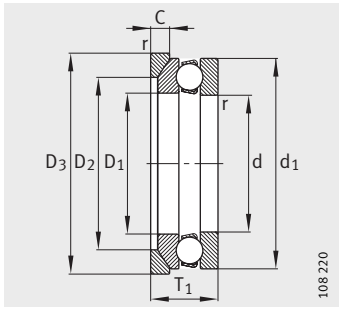
511, 512, 513, 514



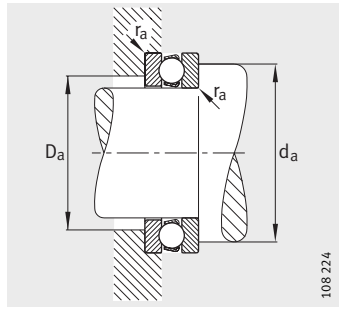
532, 533
Spherical housing locating washer

Dimension table (continued) · Dimensions in mm

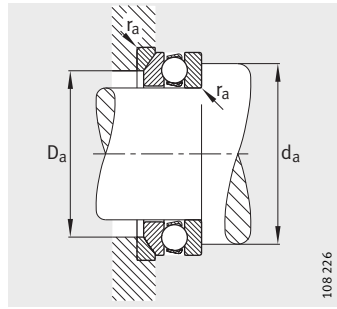
Designation		Mass m		Dimensions								
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T	D_1	d_1	r min.	R	A	D_2
51114	–	0,352	–	**70**	95	18	72	95	1	–	–	–
51214	–	0,727	–	**70**	105	27	72	105	1	–	–	–
53214	–	0,903	–	**70**	105	28,8	72	105	1	80	38	–
53214	**U214**	0,903	0,187	**70**	105	28,8	72	105	1	80	38	88
51314	–	1,9	–	**70**	125	40	72	125	1,1	–	–	–
53314	–	2,09	–	**70**	125	44,2	72	125	1,1	100	43	–
53314	**U314**	2,09	0,408	**70**	125	44,2	72	125	1,1	100	43	98
51414-MP	–	5,49	–	**70**	150	60	73	150	2	–	–	–
51115	–	0,365	–	**75**	100	19	77	100	1	–	–	–
51215	–	0,819	–	**75**	110	27	77	110	1	–	–	–
53215	–	1,01	–	**75**	110	28,3	77	110	1	90	49	–
53215	**U215**	1,01	0,21	**75**	110	28,3	77	110	1	90	49	92
51315	–	2,59	–	**75**	135	44	77	135	1,5	–	–	–
53315	–	3,19	–	**75**	135	48,1	77	135	1,5	100	37	–
53315	**U315**	3,19	0,544	**75**	135	48,1	77	135	1,5	100	37	105
51415-MP	–	6,82	–	**75**	160	65	78	160	2	–	–	–
51116	–	0,384	–	**80**	105	19	82	105	1	–	–	–
51216	–	0,908	–	**80**	115	28	82	115	1	–	–	–
53216	–	0,903	–	**80**	115	29,5	82	115	1	90	46	–
53216	**U216**	0,903	0,218	**80**	115	29,5	82	115	1	90	46	98
51316	–	2,69	–	**80**	140	44	82	140	1,5	–	–	–
53316	–	2,75	–	**80**	140	47,6	82	140	1,5	112	50	–
53316	**U316**	2,75	0,57	**80**	140	47,6	82	140	1,5	112	50	110
51416-MP	–	7,95	–	**80**	170	68	83	170	2,1	–	–	–
51117	–	0,404	–	**85**	110	19	87	110	1	–	–	–
51217	–	1,21	–	**85**	125	31	88	125	1	–	–	–
53217	–	1,22	–	**85**	125	33,1	88	125	1	100	52	–
53217	**U217**	1,22	0,29	**85**	125	33,1	88	125	1	100	52	105
51317	–	3,48	–	**85**	150	49	88	150	1,5	–	–	–
53317	–	3,51	–	**85**	150	53,1	88	150	1,5	112	43	–
53317	**U317**	3,51	0,803	**85**	150	53,1	88	150	1,5	112	43	115
51417-MP	–	9,3	–	**85**	180	72	88	177	2,1	–	–	–



532, 533
Spherical housing locating washer, seating washer U2, U3



Mounting dimensions

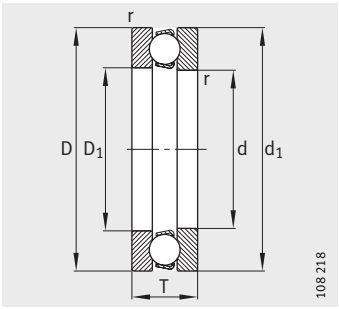


Mounting dimensions

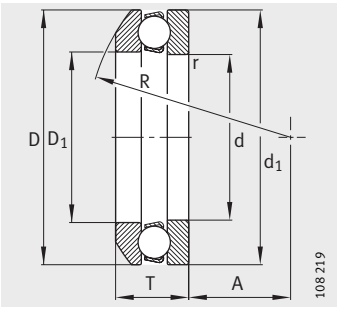
			Mounting dimensions			Basic load ratings		Fatigue limit load	Minimum load factor	Limiting speed
D_3	C	T_1	d_a	D_a	r_a	dyn. C_a	stat. C_{0a}	C_{ua}	A	n_G
			min.	max.	max.	N	N	N		min^{-1}
–	–	–	85	80	1	40 000	110 000	4 850	0,075	4 300
–	–	–	91	84	1	65 500	160 000	7 000	0,16	3 600
–	–	–	91	88	1	65 500	160 000	7 000	0,16	3 600
110	9	32	91	88	1	65 500	160 000	7 000	0,16	3 600
–	–	–	103	92	1	134 000	290 000	12 900	0,5	2 800
–	–	–	103	98	1	134 000	290 000	12 900	0,5	2 800
130	13	48	103	98	1	134 000	290 000	12 900	0,5	2 800
–	–	–	118	102	2	236 000	500 000	25 500	1,4	1 900
–	–	–	90	85	1	44 000	122 000	5 500	0,095	4 000
–	–	–	96	89	1	67 000	170 000	7 500	0,18	3 400
–	–	–	96	92	1	67 000	170 000	7 500	0,18	3 400
115	9,5	32	96	92	1	67 000	170 000	7 500	0,18	3 400
–	–	–	111	99	1,5	163 000	360 000	15 400	0,75	2 400
–	–	–	111	105	1,5	163 000	360 000	15 400	0,75	2 400
140	15	52	111	105	1,5	163 000	360 000	15 400	0,75	2 400
–	–	–	126	109	2	250 000	560 000	27 000	1,8	1 800
–	–	–	95	90	1	45 000	129 000	5 700	0,1	4 000
–	–	–	101	94	1	75 000	190 000	8 500	0,22	3 400
–	–	–	101	98	1	75 000	190 000	8 500	0,22	3 400
120	10	33	101	98	1	75 000	190 000	8 500	0,22	3 400
–	–	–	116	104	1,5	160 000	360 000	15 100	0,8	2 400
–	–	–	116	110	1,5	160 000	360 000	15 100	0,8	2 400
145	15	52	116	110	1,5	160 000	360 000	15 100	0,8	2 400
–	–	–	134	116	2,1	270 000	620 000	29 000	2,2	1 700
–	–	–	100	95	1	45 500	134 000	6 000	0,11	3 800
–	–	–	109	101	1	98 000	250 000	10 900	0,38	3 000
–	–	–	109	105	1	98 000	250 000	10 900	0,38	3 000
130	11	37	109	105	1	98 000	250 000	10 900	0,38	3 000
–	–	–	124	111	1,5	186 000	415 000	16 700	1,1	2 200
–	–	–	124	115	1,5	186 000	415 000	16 700	1,1	2 200
155	17,5	58	124	115	1,5	186 000	415 000	16 700	1,1	2 200
–	–	–	142	123	2,1	290 000	680 000	32 000	2,8	1 700

Axial deep groove ball bearings

Single direction



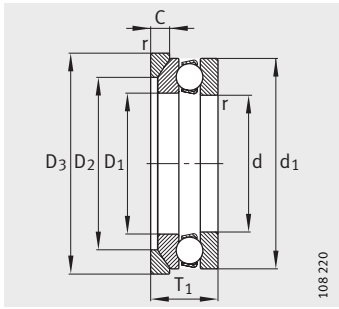
511, 512, 513, 514



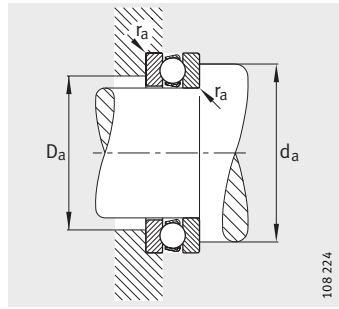
532, 533
Spherical housing locating washer

Dimension table (continued) · Dimensions in mm

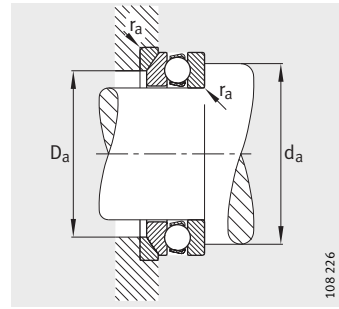
Designation		Mass m		Dimensions								
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T	D_1	d_1	r min.	R	A	D_2
51118	–	0,617	–	**90**	120	22	92	120	1	–	–	–
51218	–	1,66	–	**90**	135	35	93	135	1,1	–	–	–
53218	–	1,7	–	**90**	135	38,5	93	135	1,1	100	45	–
53218	**U218**	1,7	0,425	**90**	135	38,5	93	135	1,1	100	45	110
51318	–	3,75	–	**90**	155	50	93	155	1,5	–	–	–
53318	–	3,81	–	**90**	155	54,6	93	155	1,5	112	40	–
53318	**U318**	3,81	0,83	**90**	155	54,6	93	155	1,5	112	40	120
51418-MP	–	11,1	–	**90**	190	77	93	187	2,1	–	–	–
51120	–	1,26	–	**100**	135	25	102	135	1	–	–	–
51220	–	2,21	–	**100**	150	38	103	150	1,1	–	–	–
53220	–	2,23	–	**100**	150	40,9	103	150	1,1	112	52	–
53220	**U220**	2,23	0,507	**100**	150	40,9	103	150	1,1	112	52	125
51320	–	4,94	–	**100**	170	55	103	170	1,5	–	–	–
53320	–	4,99	–	**100**	170	59,2	103	170	1,5	125	46	–
53320	**U320**	4,99	0,95	**100**	170	59,2	103	170	1,5	125	46	135
51420-MP	–	14,8	–	**100**	210	85	103	205	3	–	–	–
51122	–	1,45	–	**110**	145	25	112	145	1	–	–	–
51222	–	2,28	–	**110**	160	38	113	160	1,1	–	–	–
53222	–	2,24	–	**110**	160	40,2	113	160	1,1	125	65	–
53222	**U222**	2,24	0,56	**110**	160	40,2	113	160	1,1	125	65	135
51322-MP	–	7,85	–	**110**	190	63	113	187	2	–	–	–
53322-MP	–	7,85	–	**110**	190	67,2	113	187	2	140	51	–
53322-MP	**U322**	7,85	1,28	**110**	190	67,2	113	187	2	140	51	150
51422-MP	–	19,9	–	**110**	230	95	113	225	3	–	–	–
51124	–	1,54	–	**120**	155	25	122	155	1	–	–	–
51224	–	2,66	–	**120**	170	39	123	170	1,1	–	–	–
53224	–	2,58	–	**120**	170	40,8	123	170	1,1	125	61	–
53224	**U224**	2,58	0,65	**120**	170	40,8	123	170	1,1	125	61	145
51324-MP	–	9,3	–	**120**	210	70	123	205	2,1	–	–	–
53324-MP	–	9,18	–	**120**	210	74,1	123	205	2,1	160	63	–
53324-MP	**U324**	9,18	2,02	**120**	210	74,1	123	205	2,1	160	63	165
51424-MP	–	25,1	–	**120**	250	102	123	245	4	–	–	–



532, 533
Spherical housing locating washer, seating washer U2, U3



Mounting dimensions

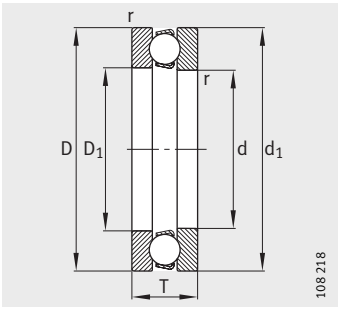


Mounting dimensions

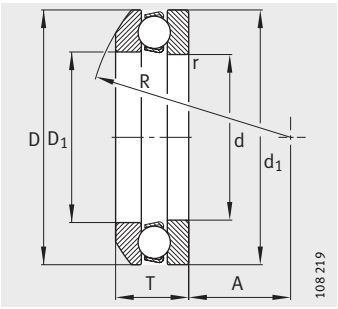
			Mounting dimensions			Basic load ratings		Fatigue limit load	Minimum load factor	Limiting speed
D_3	C	T_1	d_a	D_a	r_a	dyn. C_a	stat. C_{0a}	C_{ua}	A	n_G
			min.	max.	max.	N	N	N		min^{-1}
–	–	–	108	102	1	45 500	140 000	6 100	0,13	3 800
–	–	–	117	108	1	118 000	300 000	12 300	0,53	2 800
–	–	–	117	110	1	118 000	300 000	12 300	0,53	2 800
140	13,5	42	117	110	1	118 000	300 000	12 300	0,53	2 800
–	–	–	129	116	1,5	193 000	455 000	17 700	1,2	2 000
–	–	–	129	120	1,5	193 000	455 000	17 700	1,2	2 000
160	18	59	129	120	1,5	193 000	455 000	17 700	1,2	2 000
–	–	–	150	130	2,1	305 000	750 000	34 000	3,4	1 600
–	–	–	121	114	1	85 000	270 000	13 000	0,36	3 200
–	–	–	130	120	1	127 000	325 000	14 800	0,67	2 600
–	–	–	130	125	1	122 000	320 000	14 400	0,67	2 600
155	14	45	130	125	1	122 000	320 000	14 400	0,67	2 600
–	–	–	142	128	1,5	240 000	585 000	21 900	1,9	1 900
–	–	–	142	135	1,5	240 000	585 000	21 900	1,9	1 900
175	18	64	142	135	1,5	240 000	585 000	21 900	1,9	1 900
–	–	–	166	144	2,5	365 000	965 000	41 000	5,3	1 500
–	–	–	131	124	1	86 500	290 000	13 400	0,43	3 200
–	–	–	140	130	1	134 000	365 000	16 000	0,85	2 400
–	–	–	140	135	1	134 000	365 000	16 000	0,85	2 400
165	14	45	140	135	1	134 000	365 000	16 000	0,85	2 400
–	–	–	158	142	2	280 000	750 000	27 000	3	1 700
–	–	–	158	150	2	280 000	750 000	27 000	3	1 700
195	20,5	72	158	150	2	280 000	750 000	27 000	3	1 700
–	–	–	182	158	2,5	415 000	1 140 000	46 500	7,5	1 300
–	–	–	141	134	1	90 000	310 000	13 900	0,48	3 000
–	–	–	150	140	1	134 000	390 000	14 200	0,95	2 200
–	–	–	150	145	1	134 000	390 000	14 200	0,95	2 200
175	15	46	150	145	1	134 000	390 000	14 200	0,95	2 200
–	–	–	174	156	2,1	325 000	915 000	31 500	4,5	1 600
–	–	–	174	165	2,1	325 000	915 000	31 500	4,5	1 600
220	22	80	174	165	2,1	325 000	915 000	31 500	4,5	1 600
–	–	–	198	172	3	425 000	1 220 000	47 500	9	1 200

Axial deep groove ball bearings

Single direction



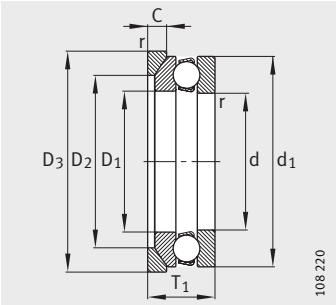
511, 512, 513



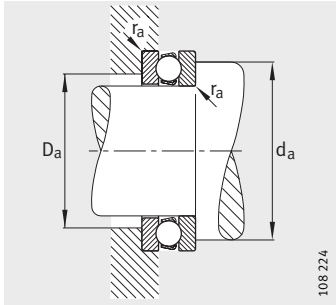
532, 533
Spherical housing locating washer

Dimension table (continued) · Dimensions in mm

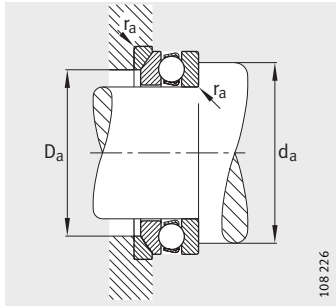
Designation		Mass m		Dimensions								
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T	D_1	d_1	r min.	R	A	D_2
51126	–	2,28	–	**130**	170	30	132	170	1	–	–	–
51226	–	3,96	–	**130**	190	45	133	187	1,5	–	–	–
53226	–	3,9	–	**130**	190	47,9	133	187	1,5	140	67	–
53226	**U226**	3,9	0,9	**130**	190	47,9	133	187	1,5	140	67	160
51326-MP	–	13	–	**130**	225	75	134	220	2,1	–	–	–
51128	–	2,51	–	**140**	180	31	142	178	1	–	–	–
51228	–	4,3	–	**140**	200	46	143	197	1,5	–	–	–
53228	–	4,25	–	**140**	200	48,6	143	197	1,5	160	87	–
53228	**U228**	4,25	1,22	**140**	200	48,6	143	197	1,5	160	87	170
51328-MP	–	15,6	–	**140**	240	80	144	235	2,1	–	–	–
51130-MP	–	2,17	–	**150**	190	31	152	188	1	–	–	–
51230-MP	–	6,08	–	**150**	215	50	153	212	1,5	–	–	–
53230-MP	–	5,95	–	**150**	215	53,3	153	212	1,5	160	79	–
53230-MP	**U230**	5,95	1,69	**150**	215	53,3	153	212	1,5	160	79	180
51330-MP	–	16,2	–	**150**	250	80	154	245	2,1	–	–	–
53330-MP	–	12,8	–	**150**	250	83,7	154	245	2,1	200	89,5	–
53330-MP	**U330**	12,8	3,1	**150**	250	83,7	154	245	2,1	200	89,5	200
51132-MP	–	2,29	–	**160**	200	31	162	198	1	–	–	–
51232-MP	–	6,53	–	**160**	225	51	163	222	1,5	–	–	–
53232-MP	–	6,45	–	**160**	225	54,7	163	222	1,5	160	74	–
53232-MP	**U232**	6,45	1,81	**160**	225	54,7	163	222	1,5	160	74	190
51332-MP	–	21,2	–	**160**	270	87	164	265	3	–	–	–
51134-MP	–	3,08	–	**170**	215	34	172	213	1,1	–	–	–
51234-MP	–	8,12	–	**170**	240	55	173	237	1,5	–	–	–
53234-MP	–	7,91	–	**170**	240	58,7	173	237	1,5	180	91	–
53234-MP	**U234**	7,91	2,14	**170**	240	58,7	173	237	1,5	180	91	200
51334-MP	–	22,2	–	**170**	280	87	174	275	3	–	–	–



532, 533
Spherical housing locating washer, seating washer U2, U3



Mounting dimensions

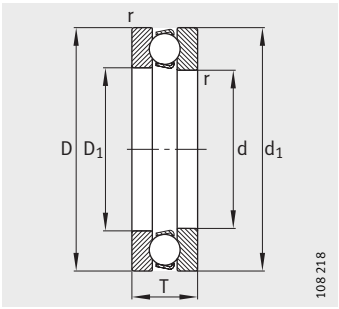


Mounting dimensions

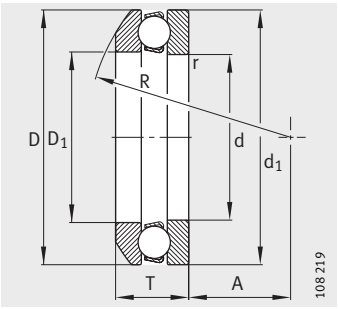
			Mounting dimensions			Basic load ratings		Fatigue limit load	Minimum load factor	Limiting speed
D_3	C	T_1	d_a min.	D_a max.	r_a max.	dyn. C_a N	stat. C_{0a} N	C_{ua} N	A	n_G min^{-1}
–	–	–	154	146	1	112 000	390 000	17 200	0,75	2 800
–	–	–	166	154	1,5	183 000	540 000	18 900	1,7	1 900
–	–	–	166	160	1,5	183 000	540 000	18 900	1,7	1 900
195	17	53	166	160	1,5	183 000	540 000	18 900	1,7	1 900
–	–	–	187	168	2,1	360 000	1 060 000	35 000	6	1 500
–	–	–	164	156	1	112 000	400 000	16 900	0,85	2 600
–	–	–	176	164	1,5	190 000	570 000	19 200	1,9	1 900
–	–	–	176	170	1,5	190 000	570 000	19 200	1,9	1 900
210	17	55	176	170	1,5	190 000	570 000	19 200	1,9	1 900
–	–	–	200	180	2,1	405 000	1 250 000	40 000	8	1 400
–	–	–	174	166	1	110 000	400 000	16 700	0,9	2 400
–	–	–	189	176	1,5	236 000	735 000	24 200	2,8	1 800
–	–	–	189	180	1,5	236 000	735 000	24 200	2,8	1 800
225	20,5	60	189	180	1,5	236 000	735 000	24 200	2,8	1 800
–	–	–	210	190	2,1	415 000	1 340 000	41 500	9,5	1 400
–	–	–	210	200	2,1	415 000	1 340 000	41 500	9,5	1 400
260	26	92	210	200	2,1	415 000	1 340 000	41 500	9,5	1 400
–	–	–	184	176	1	112 000	430 000	17 200	1	2 200
–	–	–	199	186	1,5	240 000	765 000	24 700	3,2	1 700
–	–	–	199	190	1,5	240 000	765 000	24 700	3,2	1 700
235	21	61	199	190	1,5	240 000	765 000	24 700	3,2	1 700
–	–	–	226	204	2,5	465 000	1 560 000	47 000	13	1 200
–	–	–	197	188	1	132 000	500 000	19 400	1,4	2 000
–	–	–	212	198	1,5	285 000	930 000	28 500	4,5	1 600
–	–	–	212	200	1,5	285 000	930 000	28 500	4,5	1 600
250	21,5	65	212	200	1,5	285 000	930 000	28 500	4,5	1 600
–	–	–	236	214	2,5	465 000	1 560 000	46 000	13	1 200

Axial deep groove ball bearings

Single direction



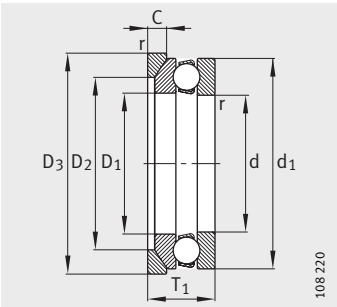
511, 512, 513



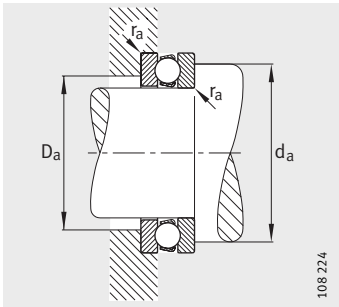
532
Spherical housing
locating washer

Dimension table (continued) · Dimensions in mm

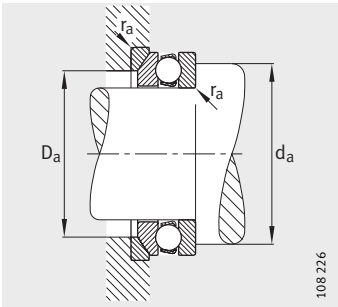
Designation		Mass m		Dimensions								
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T	D_1	d_1	r min.	R	A	D_2
51136-MP	–	3,06	–	**180**	225	34	183	222	1,1	–	–	–
51236-MP	–	8,56	–	**180**	250	56	183	245	1,5	–	–	–
53236-MP	–	8,19	–	**180**	250	58,2	183	245	1,5	200	112	–
53236-MP	**U236**	8,19	1,25	**180**	250	58,2	183	245	1,5	200	112	210
51336-MP	–	24,8	–	**180**	300	95	184	295	3	–	–	–
51138-MP	–	3,94	–	**190**	240	37	193	237	1,1	–	–	–
51238-MP	–	11,6	–	**190**	270	62	194	265	2	–	–	–
53238-MP	–	11,5	–	**190**	270	65,7	195	265	2	200	98	–
53238-MP	**U238**	11,5	2,65	**190**	270	65,7	195	265	2	200	98	230
51338-MP	–	31,9	–	**190**	320	105	195	315	4	–	–	–
51140-MP	–	4,12	–	**200**	250	37	203	247	1,1	–	–	–
51240-MP	–	12	–	**200**	280	62	204	275	2	–	–	–
51340-MP	–	40,9	–	**200**	340	110	205	335	4	–	–	–
51144-MP	–	4,54	–	**220**	270	37	223	267	1,1	–	–	–
51244-MP	–	13,1	–	**220**	300	63	224	295	2	–	–	–
51148-MP	–	7,41	–	**240**	300	45	243	297	1,5	–	–	–
51248-MP	–	22,9	–	**240**	340	78	244	335	2,1	–	–	–
51152-MP	–	7,89	–	**260**	320	45	263	317	1,5	–	–	–
51252-MP	–	24,8	–	**260**	360	79	264	355	2,1	–	–	–
51156-MP	–	12	–	**280**	350	53	283	347	1,5	–	–	–
51256-MP	–	23,7	–	**280**	380	80	284	375	2,1	–	–	–
51160-MP	–	17,1	–	**300**	380	62	304	376	2	–	–	–
51260-MP	–	41,8	–	**300**	420	95	304	415	3	–	–	–
51164-MP	–	18,5	–	**320**	400	63	324	396	2	–	–	–
51264-MP	–	44,6	–	**320**	440	95	325	435	3	–	–	–



532
Spherical housing locating washer, seating washer U2



Mounting dimensions

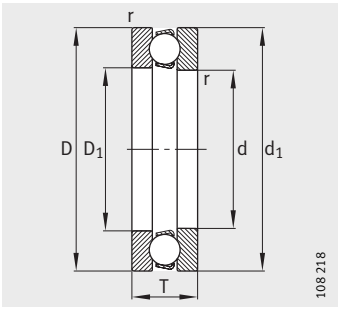


Mounting dimensions

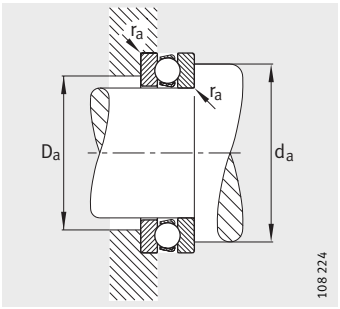
			Mounting dimensions			Basic load ratings		Fatigue limit load	Minimum load factor	Limiting speed
D_3	C	T_1	d_a	D_a	r_a	dyn. C_a	stat. C_{0a}	C_{ua}	A	n_G
			min.	max.	max.	N	N	N		min^{-1}
–	–	–	207	198	1	134 000	530 000	20 100	1,5	2 000
–	–	–	222	208	1,5	305 000	1 040 000	31 500	5,3	1 600
–	–	–	222	210	1,5	305 000	1 040 000	31 500	5,3	1 600
260	21,5	66	222	210	1,5	305 000	1 040 000	31 500	5,3	1 600
–	–	–	252	228	2,5	520 000	1 830 000	52 000	18	1 100
–	–	–	220	210	1	170 000	655 000	23 200	2,4	1 800
–	–	–	238	222	2	335 000	1 160 000	34 500	7	1 500
–	–	–	238	230	2	335 000	1 160 000	34 500	7	1 500
280	23	73	238	230	2	335 000	1 160 000	34 500	7	1 500
–	–	–	268	242	3	600 000	2 200 000	61 000	26	1 000
–	–	–	230	220	1	170 000	655 000	22 700	2,4	1 800
–	–	–	248	232	2	340 000	1 220 000	35 000	8	1 400
–	–	–	284	256	3	620 000	2 400 000	65 000	30	950
–	–	–	250	240	1	176 000	735 000	24 500	3	1 700
–	–	–	268	252	2	355 000	1 340 000	36 500	9,5	1 300
–	–	–	276	264	1,5	232 000	965 000	31 000	5	1 600
–	–	–	300	280	2,1	465 000	1 860 000	48 000	18	1 100
–	–	–	296	284	1,5	236 000	1 020 000	31 500	5,6	1 500
–	–	–	320	300	2,1	490 000	2 040 000	52 000	22	1 000
–	–	–	322	308	1,5	315 000	1 340 000	40 500	10	1 300
–	–	–	340	320	2,1	490 000	2 160 000	53 000	24	950
–	–	–	348	332	2	365 000	1 600 000	46 000	14	1 200
–	–	–	372	348	2,5	585 000	2 700 000	63 000	38	850
–	–	–	368	352	2	375 000	1 700 000	47 500	16	1 100
–	–	–	392	368	2,5	600 000	2 800 000	64 000	43	850

Axial deep groove ball bearings

Single direction



511, 512



Mounting dimensions

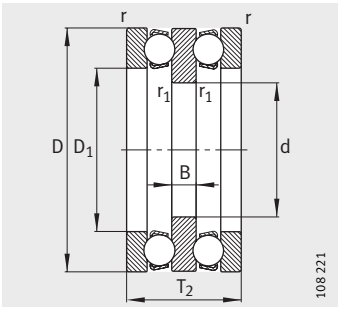
Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions					
	m	d	D	T	D_1	d_1	r
	≈kg						min.
51168-MP	19,9	**340**	420	64	344	416	2
51268-MP	47,6	**340**	460	96	345	455	3
51172-MP	21,5	**360**	440	65	364	436	2
51272-MP	70,4	**360**	500	110	365	495	4
51176-MP	22,4	**380**	460	65	384	456	2
51180-MP	23,5	**400**	480	65	404	476	2
51184-MP	24,4	**420**	500	65	424	495	2
51192-MP	37,2	**460**	560	80	464	555	2,1
511/500-MP	44,9	**500**	600	80	505	595	2,1
511/530-MP	55,9	**530**	640	85	535	635	3
511/560-MP	58,8	**560**	670	85	565	665	3

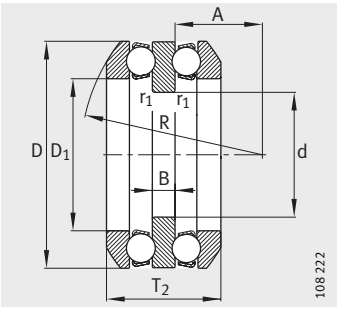
Mounting dimensions			Basic load ratings		Fatigue limit load	Minimum load factor	Limiting speed
d_a	D_a	r_a	dyn. C_a	stat. C_{0a}	C_{ua}	A	n_G
min.	max.	max.	N	N	N		min^{-1}
388	372	2	380 000	1 800 000	49 000	18	1 000
412	388	2,5	620 000	3 050 000	67 000	50	800
408	392	2	405 000	2 000 000	45 000	22	1 000
444	416	3	720 000	3 650 000	79 000	70	700
428	412	2	430 000	2 240 000	48 500	24	950
448	432	2	440 000	2 320 000	49 500	28	900
468	452	2	440 000	2 450 000	51 000	30	900
520	500	2,1	530 000	3 100 000	61 000	50	800
560	540	2,1	550 000	3 350 000	63 000	56	750
596	574	2,5	620 000	3 900 000	73 000	80	670
626	604	2,5	630 000	4 150 000	74 000	85	670

Axial deep groove ball bearings

Double direction



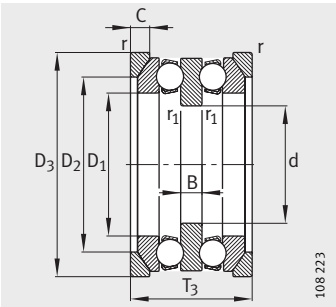
522, 523



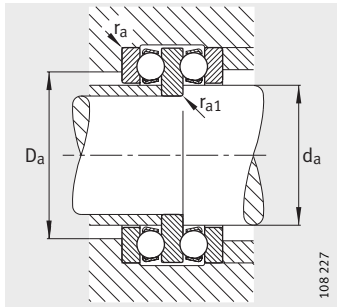
542, 543
Spherical housing locating washers

Dimension table · Dimensions in mm

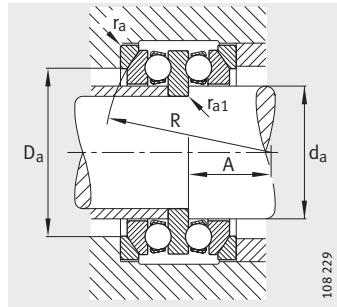
Designation		Mass m		Dimensions							
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T_2	D_1	B	r min.	r_1 min.	R
52202	–	0,076	–	**10**	32	22	17	5	0,6	0,3	–
52204	–	0,145	–	**15**	40	26	22	6	0,6	0,3	–
52205	–	0,215	–	**20**	47	28	27	7	0,6	0,3	–
54205	–	0,221	–	**20**	47	31,4	27	7	0,6	0,3	40
54205	**U205**	0,221	0,032	**20**	47	31,4	27	7	0,6	0,3	40
52305	–	0,291	–	**20**	52	34	27	8	1	0,3	–
54305	–	0,303	–	**20**	52	37,6	27	8	1	0,3	45
54305	**U305**	0,303	0,044	**20**	52	37,6	27	8	1	0,3	45
52206	–	0,236	–	**25**	52	29	32	7	0,6	0,3	–
54206	–	0,269	–	**25**	52	32,6	32	7	0,6	0,3	45
54206	**U206**	0,269	0,038	**25**	52	32,6	32	7	0,6	0,3	45
52306	–	0,435	–	**25**	60	38	32	9	1	0,3	–
54306	–	0,553	–	**25**	60	41,2	32	9	1	0,3	50
54306	**U306**	0,553	0,056	**25**	60	41,2	32	9	1	0,3	50
52207	–	0,371	–	**30**	62	34	37	8	1	0,3	–
54207	–	0,749	–	**30**	62	37,8	37	8	1	0,3	50
54207	**U207**	0,749	0,057	**30**	62	37,8	37	8	1	0,3	50
52307	–	0,63	–	**30**	68	44	37	10	1	0,3	–
54307	–	0,802	–	**30**	68	47,2	37	10	1	0,3	56
54307	**U307**	0,802	0,083	**30**	68	47,2	37	10	1	0,3	56
52208	–	0,509	–	**30**	68	36	42	9	1	0,6	–
54208	–	0,513	–	**30**	68	38,6	42	9	1	0,6	56
54208	**U208**	0,513	0,071	**30**	68	38,6	42	9	1	0,6	56
52308	–	1,02	–	**30**	78	49	42	12	1	0,6	–
52209	–	0,539	–	**35**	73	37	47	9	1	0,6	–
54209	–	0,537	–	**35**	73	39,6	47	9	1	0,6	56
54209	**U209**	0,537	0,088	**35**	73	39,6	47	9	1	0,6	56
52309	–	1,15	–	**35**	85	52	47	12	1	0,6	–
54309	–	2,15	–	**35**	85	56,2	47	12	1	0,6	64
54309	**U309**	2,15	0,173	**35**	85	56,2	47	12	1	0,6	64



542, 543
Spherical housing locating washers, seating washers U2, U3



Mounting dimensions

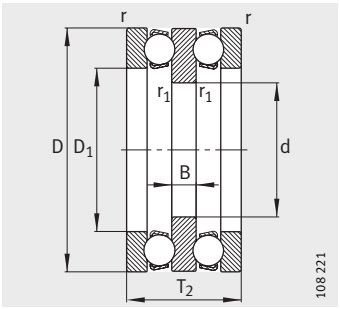


Mounting dimensions

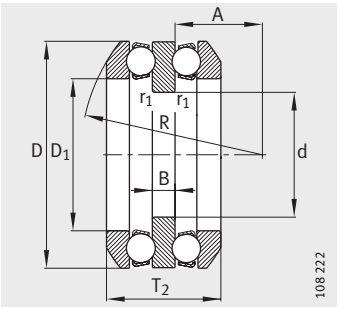
					Mounting dimensions				Basic load ratings		Fatigue limit load	Minimum load factor	Limiting speed
A	D_2	D_3	C	T_3	d_a	D_a max.	r_a max.	r_{a1} max.	dyn. C_a N	stat. C_{0a} N	C_{ua} N	A	n_G min^{-1}
–	–	–	–	–	15	22	0,6	0,3	16 600	25 000	1 100	0,003	9 000
–	–	–	–	–	20	28	0,6	0,3	22 400	37 500	1 660	0,01	7 500
–	–	–	–	–	25	34	0,6	0,3	28 000	50 000	2 220	0,013	6 700
16,5	–	–	–	–	25	36	0,6	0,3	28 000	50 000	2 220	0,013	6 700
16,5	36	50	5,5	36	25	36	0,6	0,3	28 000	50 000	2 220	0,013	6 700
–	–	–	–	–	25	36	1	0,3	34 500	55 000	2 450	0,019	5 300
18	–	–	–	–	25	38	1	0,3	34 500	55 000	2 450	0,019	5 300
18	38	55	6	42	25	38	1	0,3	34 500	55 000	2 450	0,019	5 300
–	–	–	–	–	30	39	0,6	0,3	25 000	46 500	2 040	0,01	6 300
20	–	–	–	–	30	42	0,6	0,3	25 000	46 500	2 040	0,01	6 300
20	42	55	5,5	37	30	42	0,6	0,3	25 000	46 500	2 040	0,01	6 300
–	–	–	–	–	30	42	1	0,3	38 000	65 500	2 850	0,028	5 000
19,5	–	–	–	–	30	45	1	0,3	38 000	65 500	2 850	0,028	5 000
19,5	45	62	7	46	30	45	1	0,3	38 000	65 500	2 850	0,028	5 000
–	–	–	–	–	35	46	1	0,3	35 500	67 000	3 000	0,028	5 300
21	–	–	–	–	35	48	1	0,3	35 500	67 000	3 000	0,028	5 300
21	48	65	7	42	35	48	1	0,3	35 500	67 000	3 000	0,028	5 300
–	–	–	–	–	35	48	1	0,3	50 000	88 000	3 900	0,05	4 500
21	–	–	–	–	35	52	1	0,3	50 000	88 000	3 900	0,05	4 500
21	52	72	7,5	52	35	52	1	0,3	50 000	88 000	3 900	0,05	4 500
–	–	–	–	–	40	51	1	0,6	46 500	98 000	4 300	0,05	4 800
25	–	–	–	–	40	55	1	0,6	46 500	98 000	4 300	0,05	4 800
25	55	72	7	44	40	55	1	0,6	46 500	98 000	4 300	0,05	4 800
–	–	–	–	–	40	55	1	0,6	61 000	112 000	5 000	0,08	4 000
–	–	–	–	–	45	56	1	0,6	39 000	80 000	3 550	0,043	4 800
23	–	–	–	–	45	60	1	0,6	39 000	80 000	3 550	0,043	4 800
23	60	78	7,5	45	45	60	1	0,6	39 000	80 000	3 550	0,043	4 800
–	–	–	–	–	45	61	1	0,6	75 000	140 000	6 300	0,12	3 600
21	–	–	–	–	45	65	1	0,6	75 000	140 000	6 300	0,12	3 600
21	65	90	10	62	45	65	1	0,6	75 000	140 000	6 300	0,12	3 600

Axial deep groove ball bearings

Double direction



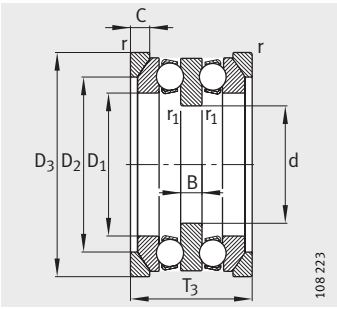
522, 523



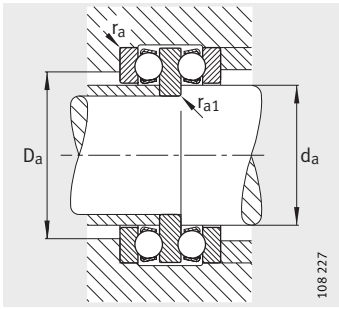
542, 543
Spherical housing locating washers

Dimension table (continued) · Dimensions in mm

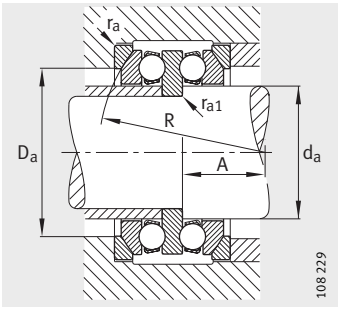
Designation		Mass m		Dimensions							
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T_2	D_1	B	r min.	r_1 min.	R
52210	–	0,635	–	**40**	78	39	52	9	1	0,6	–
54210	–	0,625	–	**40**	78	42	52	9	1	0,6	64
54210	**U210**	0,625	0,098	**40**	78	42	52	9	1	0,6	64
52310	–	1,76	–	**40**	95	58	52	14	1,1	0,6	–
54310	–	1,84	–	**40**	95	64,6	52	14	1,1	0,6	72
54310	**U310**	1,84	0,225	**40**	95	64,6	52	14	1,1	0,6	72
52211	–	0,571	–	**45**	90	45	57	10	1	0,6	–
54211	–	1,02	–	**45**	90	49,6	57	10	1	0,6	72
54211	**U211**	1,02	0,152	**45**	90	49,6	57	10	1	0,6	72
52311	–	2,37	–	**45**	105	64	57	15	1,1	0,6	–
54311	–	2,53	–	**45**	105	72,6	57	15	1,1	0,6	80
54311	**U311**	2,53	0,277	**45**	105	72,6	57	15	1,1	0,6	80
52212	–	1,12	–	**50**	95	46	62	10	1	0,6	–
54212	–	1,17	–	**50**	95	50	62	10	1	0,6	72
54212	**U212**	1,17	0,165	**50**	95	50	62	10	1	0,6	72
52312	–	2,49	–	**50**	110	64	62	15	1,1	0,6	–
54312	–	2,59	–	**50**	110	70,6	62	15	1,1	0,6	90
54312	**U312**	2,59	0,31	**50**	110	70,6	62	15	1,1	0,6	90
52213	–	1,19	–	**55**	100	47	67	10	1	0,6	–
52313	–	2,5	–	**55**	115	65	67	15	1,1	0,6	–
52214	–	1,3	–	**55**	105	47	72	10	1	1	–
52314	–	3,55	–	**55**	125	72	72	16	1,1	1	–
54314	–	3,77	–	**55**	125	80,4	72	16	1,1	1	100
54314	**U314**	3,77	0,408	**55**	125	80,4	72	16	1,1	1	100
52215	–	1,48	–	**60**	110	47	77	10	1	1	–
54215	–	1,87	–	**60**	110	49,6	77	10	1	1	90
54215	**U215**	1,87	0,21	**60**	110	49,6	77	10	1	1	90
52315	–	4,72	–	**60**	135	79	77	18	1,5	1	–
54315	–	5,92	–	**60**	135	87,2	77	18	1,5	1	100
54315	**U315**	5,92	0,544	**60**	135	87,2	77	18	1,5	1	100
52216	–	1,55	–	**65**	115	48	82	10	1	1	–
54216	–	1,6	–	**65**	115	51	82	10	1	1	90
54216	**U216**	1,6	0,218	**65**	115	51	82	10	1	1	90
52316	–	4,82	–	**65**	140	79	82	18	1,5	1	–
54316	–	4,93	–	**65**	140	86,2	82	18	1,5	1	112
54316	**U316**	4,93	0,57	**65**	140	86,2	82	18	1,5	1	112



542, 543
Spherical housing locating washers, seating washers U2, U3



Mounting dimensions

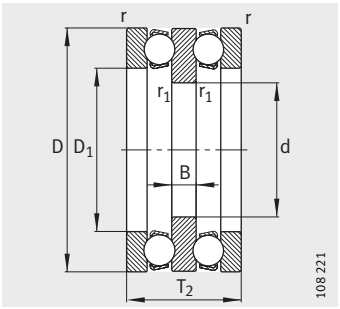


Mounting dimensions

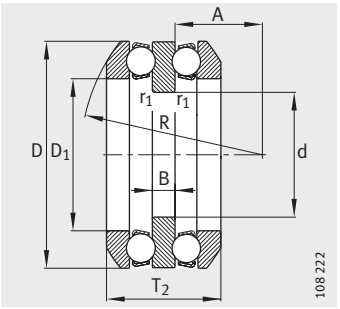
					Mounting dimensions				Basic load ratings		Fatigue limit load	Minimum load factor	Limiting speed
A	D_2	D_3	C	T_3	d_a	D_a max.	r_a max.	r_{a1} max.	dyn. C_a N	stat. C_{0a} N	C_{ua} N	A	n_G min^{-1}
–	–	–	–	–	50	61	1	0,6	50 000	106 000	4 700	0,07	4 300
30,5	–	–	–	–	50	62	1	0,6	50 000	106 000	4 700	0,07	4 300
30,5	62	82	7,5	47	50	62	1	0,6	50 000	106 000	4 700	0,07	4 300
–	–	–	–	–	50	68	1	0,6	86 500	170 000	7 500	0,18	3 400
23	–	–	–	–	50	72	1	0,6	86 500	170 000	7 500	0,18	3 400
23	72	100	11	70	50	72	1	0,6	86 500	170 000	7 500	0,18	3 400
–	–	–	–	–	55	69	1	0,6	61 000	134 000	6 100	0,11	3 800
32,5	–	–	–	–	55	72	1	0,6	61 000	134 000	6 100	0,11	3 800
32,5	72	95	9	55	55	72	1	0,6	61 000	134 000	6 100	0,11	3 800
–	–	–	–	–	55	75	1	0,6	102 000	208 000	9 000	0,26	3 200
25,5	–	–	–	–	55	80	1	0,6	102 000	208 000	9 000	0,26	3 200
25,5	80	110	11,5	78	55	80	1	0,6	102 000	208 000	9 000	0,26	3 200
–	–	–	–	–	60	74	1	0,6	62 000	140 000	6 200	0,12	3 800
30,5	–	–	–	–	60	78	1	0,6	62 000	140 000	6 200	0,12	3 800
30,5	78	100	9	56	60	78	1	0,6	62 000	140 000	6 200	0,12	3 800
–	–	–	–	–	60	80	1	0,6	100 000	208 000	9 000	0,28	3 200
36,5	–	–	–	–	60	85	1	0,6	100 000	208 000	9 000	0,28	3 200
36,5	85	115	11,5	78	60	85	1	0,6	100 000	208 000	9 000	0,28	3 200
–	–	–	–	–	65	79	1	0,6	64 000	150 000	6 600	0,14	3 600
–	–	–	–	–	65	85	1	0,6	106 000	220 000	9 700	0,32	3 000
–	–	–	–	–	70	84	1	1	65 500	160 000	7 000	0,16	3 600
–	–	–	–	–	70	92	1	1	134 000	290 000	12 900	0,5	2 800
39	–	–	–	–	70	98	1	1	134 000	290 000	12 900	0,5	2 800
39	98	130	13	88	70	98	1	1	134 000	290 000	12 900	0,5	2 800
–	–	–	–	–	75	89	1	1	67 000	170 000	7 500	0,18	3 400
47,5	–	–	–	–	75	92	1	1	67 000	170 000	7 500	0,18	3 400
47,5	92	115	9,5	57	75	92	1	1	67 000	170 000	7 500	0,18	3 400
–	–	–	–	–	75	99	1,5	1	163 000	360 000	15 400	0,75	2 400
32,5	–	–	–	–	75	105	1,5	1	163 000	360 000	15 400	0,75	2 400
32,5	105	140	15	95	75	105	1,5	1	163 000	360 000	15 400	0,75	2 400
–	–	–	–	–	80	94	1	1	75 000	190 000	8 500	0,22	3 400
45	–	–	–	–	80	98	1	1	75 000	190 000	8 500	0,22	3 400
45	98	120	10	58	80	98	1	1	75 000	190 000	8 500	0,22	3 400
–	–	–	–	–	80	104	1,5	1	160 000	360 000	15 100	0,8	2 400
45,5	–	–	–	–	80	110	1,5	1	160 000	360 000	15 100	0,8	2 400
45,5	110	145	15	95	80	110	1,5	1	160 000	360 000	15 100	0,8	2 400

Axial deep groove ball bearings

Double direction



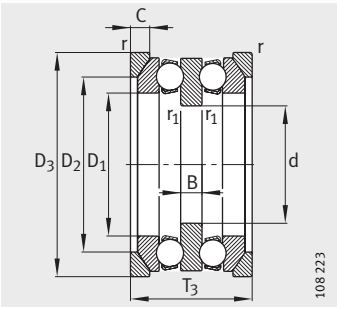
522, 523



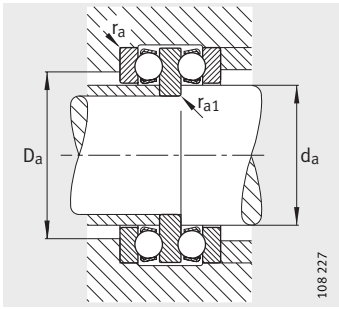
542, 543
Spherical housing locating washers

Dimension table (continued) · Dimensions in mm

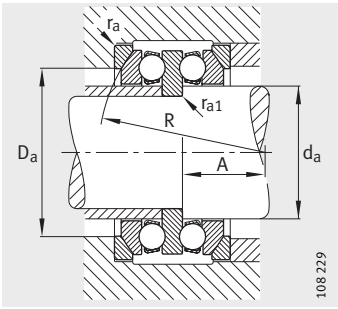
Designation		Mass m		Dimensions							
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T_2	D_1	B	r min.	r_1 min.	R
52217	–	2,23	–	**70**	125	55	88	12	1	1	–
54217	–	2,25	–	**70**	125	59,2	88	12	1	1	100
54217	**U217**	2,25	0,29	**70**	125	59,2	88	12	1	1	100
52317	–	6,21	–	**70**	150	87	88	19	1,5	1	–
54317	–	6,27	–	**70**	150	95,2	88	19	1,5	1	112
54317	**U317**	6,27	0,803	**70**	150	95,2	88	19	1,5	1	112
52218	–	3,05	–	**75**	135	62	93	14	1,1	1	–
54218	–	3,11	–	**75**	135	69	93	14	1,1	1	100
54218	**U218**	3,11	0,425	**75**	135	69	93	14	1,1	1	100
52318	–	6,62	–	**75**	155	88	93	19	1,5	1	–
54318	–	6,74	–	**75**	155	97,2	93	19	1,5	1	112
54318	**U318**	6,74	0,83	**75**	155	97,2	93	19	1,5	1	112
52220	–	3,83	–	**85**	150	67	103	15	1,1	1	–
54220	–	3,87	–	**85**	150	72,8	103	15	1,1	1	112
54220	**U220**	3,87	0,507	**85**	150	72,8	103	15	1,1	1	112
52320	–	8,71	–	**85**	170	97	103	21	1,5	1	–
54320	–	8,81	–	**85**	170	105,4	103	21	1,5	1	125
54320	**U320**	8,81	0,95	**85**	170	105,4	103	21	1,5	1	125
52222	–	4,06	–	**95**	160	67	113	15	1,1	1	–
52322-MP	–	14	–	**95**	190	110	113	24	2	1	–
54322-MP	–	14	–	**95**	190	118,4	113	24	2	1	140
54322-MP	**U322**	14	1,28	**95**	190	118,4	113	24	2	1	140
52224	–	4,82	–	**100**	170	68	123	15	1,1	1,1	–
52324-MP	–	16,8	–	**100**	210	123	123	27	2,1	1,1	–
52226	–	7,26	–	**110**	190	80	133	18	1,5	1,1	–
52326-MP	–	22	–	**110**	225	130	134	30	2,1	1,1	–
52228	–	7,78	–	**120**	200	81	143	18	1,5	1,1	–
52328-MP	–	28,3	–	**120**	240	140	144	31	2,1	1,1	–
52230-MP	–	10,7	–	**130**	215	89	153	20	1,5	1,1	–
52330-MP	–	29,4	–	**130**	250	140	154	31	2,1	1,1	–
52232-MP	–	12,2	–	**140**	225	90	163	20	1,5	1,1	–
52234-MP	–	14	–	**150**	240	97	173	21	1,5	1,1	–



542, 543
Spherical housing locating washers, seating washers U2, U3



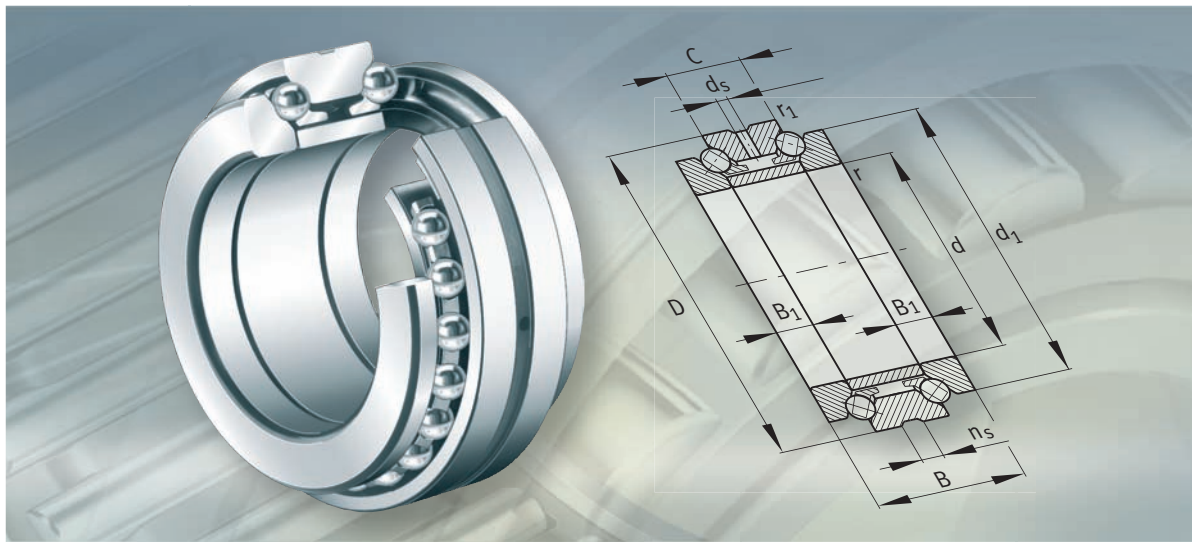
Mounting dimensions



Mounting dimensions

					Mounting dimensions				Basic load ratings		Fatigue limit load	Minimum load factor	Limiting speed
A	D_2	D_3	C	T_3	d_a	D_a max.	r_a max.	r_{a1} max.	dyn. C_a N	stat. C_{0a} N	C_{ua} N	A	n_G min^{-1}
–	–	–	–	–	85	101	1	1	98 000	250 000	10 900	0,38	3 000
49,5	–	–	–	–	85	105	1	1	98 000	250 000	10 900	0,38	3 000
49,5	105	130	11	67	85	105	1	1	98 000	250 000	10 900	0,38	3 000
–	–	–	–	–	85	111	1,5	1	186 000	415 000	16 700	1,1	2 200
39	–	–	–	–	85	115	1,5	1	186 000	415 000	16 700	1,1	2 200
39	115	155	17,5	105	85	115	1,5	1	186 000	415 000	16 700	1,1	2 200
–	–	–	–	–	90	108	1	1	118 000	300 000	12 300	0,53	2 800
42	–	–	–	–	90	110	1	1	118 000	300 000	12 300	0,53	2 800
42	110	140	13,5	76	90	110	1	1	118 000	300 000	12 300	0,53	2 800
–	–	–	–	–	90	116	1,5	1	193 000	455 000	17 700	1,2	2 000
36,5	–	–	–	–	90	120	1,5	1	193 000	455 000	17 700	1,2	2 000
36,5	120	160	18	106	90	120	1,5	1	193 000	455 000	17 700	1,2	2 000
–	–	–	–	–	100	120	1	1	122 000	320 000	14 400	0,67	2 600
49	–	–	–	–	100	125	1	1	122 000	320 000	14 400	0,67	2 600
49	125	155	14	81	100	125	1	1	122 000	320 000	14 400	0,67	2 600
–	–	–	–	–	100	128	1,5	1	240 000	585 000	21 900	1,9	1 900
42	–	–	–	–	100	135	1,5	1	240 000	585 000	21 900	1,9	1 900
42	135	175	18	115	100	135	1,5	1	240 000	585 000	21 900	1,9	1 900
–	–	–	–	–	110	130	1	1	134 000	365 000	16 000	0,85	2 400
–	–	–	–	–	110	142	2	1	280 000	750 000	27 000	3	1 700
47	–	–	–	–	110	150	2	1	280 000	750 000	27 000	3	1 700
47	150	195	20,5	128	110	150	2	1	280 000	750 000	27 000	3	1 700
–	–	–	–	–	120	140	1	1	134 000	390 000	14 200	0,95	2 200
–	–	–	–	–	120	156	2,1	1	325 000	915 000	31 500	4,5	1 600
–	–	–	–	–	130	154	1,5	1	183 000	540 000	18 900	1,7	1 900
–	–	–	–	–	130	168	2,1	1	360 000	1 060 000	35 000	6	1 500
–	–	–	–	–	140	164	1,5	1	190 000	570 000	19 200	1,9	1 900
–	–	–	–	–	140	180	2,1	1	405 000	1 250 000	40 000	8	1 400
–	–	–	–	–	150	176	1,5	1	236 000	735 000	24 200	2,8	1 800
–	–	–	–	–	150	190	2,1	1	415 000	1 340 000	41 500	9,5	1 400
–	–	–	–	–	160	186	1,5	1	240 000	765 000	24 700	3,2	1 700
–	–	–	–	–	170	198	1,5	1	285 000	930 000	28 500	4,5	1 600

FAG



Axial angular contact ball bearings

Axial angular contact ball bearings

		Page
Product overview	Axial angular contact ball bearings	844
Features	Operating temperature	845
	Cages	845
	Suffixes	846
Design and safety guidelines	Operating life	846
	Equivalent static bearing load	847
	Static load safety factor	847
	Speeds	847
	Preload	847
	Design of bearing arrangements	848
Accuracy		848
Dimension tables	Axial angular contact ball bearings, double direction	850

Double direction

2344, 2347

Axial angular contact ball bearings

Features

Double direction axial angular contact ball bearings are precision bearings without self-retention and with restricted tolerances to class SP. They comprise solid shaft locating washers, a spacer ring, a housing locating washer and ball and cage assemblies with solid brass cages. The bearing parts are matched to each other and can be fitted separately, but must not be interchanged with parts from bearings of the same size.

A detailed description of axial angular contact ball bearings (calculation, lubrication, rigidity, machining tolerances of bearing seats) is given in Catalogue AC 41 130, Super Precision Bearings.

High axial load carrying capacity

The contact angle is 60°. As a result, these highly rigid axial angular contact ball bearings can support high axial forces in both directions.

The double direction precision bearings are therefore particularly suitable for precision spindle bearing arrangements in machine tools. In this case, the axial angular contact ball bearing is combined with a double row cylindrical roller bearing with a tapered bore, which supports the radial forces.

Two designs

Axial angular contact ball bearings are available in two designs. Series 2344 can be fitted on the small diameter of the shaft taper and series 2347 on the large diameter.

These series have the same nominal outside diameter as cylindrical roller bearings NN30..-AS-K. However, the outside diameter tolerance is designed to give a loose fit when the seats of the axial angular contact ball bearing and the cylindrical roller bearing are machined together.

Sealing

Axial angular contact ball bearings are of an open design.

Lubrication

The bearings can be lubricated with oil or grease.
Higher speeds can be achieved with oil lubrication.
In order to allow oil to flow between the two rows of balls, the housing locating washer has a lubrication groove and lubrication holes.

At high speeds, overlubrication of the radial bearing can be prevented if the installation space is separated between the axial angular contact ball bearing and the cylindrical roller bearing.

Operating temperature

Axial angular contact ball bearings can be used at operating temperatures from –30 °C to +150 °C, restricted by the lubricant.

Cages

Each row of rolling elements has a ball-guided solid brass cage. The cage is indicated by the suffix M and, together with the lubrication, has a considerable influence on the speed suitability of the bearing.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
M	Solid brass cage, ball-guided	Standard
SP	Restricted tolerance class SP	
UP	Restricted tolerance class UP	Special design, available by agreement

Design and safety guidelines

Operating life

High precision bearings must guide machine parts with high precision and support forces at very high speeds.
They are selected predominantly from the perspectives of:

- accuracy
- rigidity
- running behaviour.

In order that they can fulfil these tasks for as long as possible, the bearings must run without wear. The precondition for this is the creation of a load-bearing hydrodynamic lubricant film at the contact points of the rolling contact partners. Under these conditions, rolling bearings will achieve their fatigue life in a large number of applications. If the design is appropriate to the fatigue life, the operating life of the bearing is normally restricted by the lubricant operating life.

The decisive factors for the operating life from the perspective of load are the Hertzian pressures occurring at the contacts and the bearing kinematics. For high performance assemblies, individual design with the aid of special calculation programs is therefore advisable.

Since failure as a result of fatigue plays no part in practice in the case of high precision bearings, calculation of the rating life L_{10} in accordance with DIN ISO 281 is not suitable as a means of determining the operating life.

Equivalent static bearing load

Axial angular contact ball bearings, installed adjacent to a cylindrical roller bearing, support axial forces only:

$$P_0 = F_{0a}$$

P_0 N
Equivalent static bearing load

F_{0a} N
Axial static bearing load.

Static load safety factor

In order to achieve sufficiently smooth running of the bearings, a static load safety factor $S_0 \geqq 2{,}5$ is required:

$$S_0 = \frac{C_{0a}}{P_0}$$

S_0 –
Static load safety factor

C_{0a} N
Basic static load rating, see dimension tables

P_0 N
Equivalent static bearing load.

Speeds

Double direction axial angular contact ball bearings are suitable for high speeds. Under certain circumstances, however, the high values may not be achieved if the cylindrical roller bearing arranged adjacent to the axial angular contact ball bearing is preloaded.

The limiting speeds n_G given in the dimension tables are valid for lubrication with grease or for minimal quantity lubrication with oil and must not be exceeded.

Preload

The preload is determined by the spacer ring arranged between the two shaft locating washers.

Design of bearing arrangements

Shaft and housing tolerances

Guide values for the machining tolerances of the bearing seats: see Catalogue AC 41 130, Super Precision Bearings.

Mounting dimensions

The maximum dimensions for the radii r_a and the diameters of the abutment surfaces d_a, D_a are indicated in the dimension tables.

Accuracy

The dimensional and geometrical tolerances correspond to tolerance class SP.

Tolerances for shaft locating washer

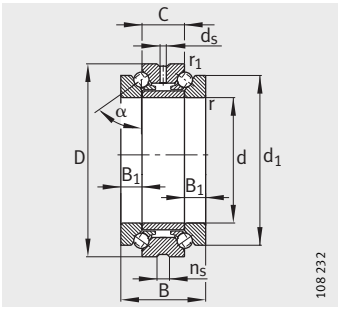
Bore		Bore deviation		Variation	Wall thickness variation	Width deviation	
d mm		Δ_{dmp} µm		V_{dp} µm	S_i µm	Δ_{Hs} µm	
over	incl.						
18	30	0	−8	6	3	+50	−150
30	50	0	−10	8	3	+75	−200
50	80	0	−12	9	4	+100	−250
80	120	0	−15	11	4	+125	−300
120	180	0	−18	14	5	+150	−350
180	250	0	−22	17	5	+175	−400
250	315	0	−25	19	7	+200	−450
315	400	0	−30	22	7	+250	−600
400	500	0	−35	26	9	+300	−750

Tolerances for housing locating washer

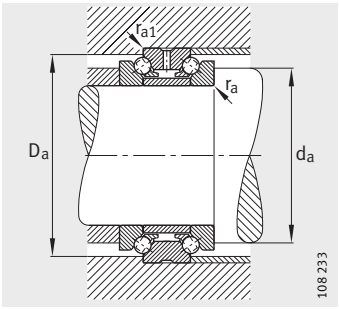
Outside diameter		Outside diameter deviation		Variation	Wall thickness variation
D mm		Δ_{Dmp} µm		V_{Dp} µm	S_e µm
over	incl.				
50	80	−24	−43	6	The wall thickness variation S_e for the housing locating washer is identical to S_i for the shaft locating washer.
80	120	−28	−50	8	
120	180	−33	−58	9	
180	250	−37	−66	10	
250	315	−41	−73	12	
315	400	−46	−82	13	
400	500	−50	−90	15	
500	630	−55	−99	16	

Axial angular contact ball bearings

Double direction



2344, 2347
Contact angle α = 60°



Mounting dimensions

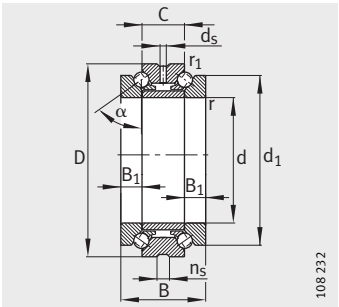
Dimension table · Dimensions in mm

Designation	Mass	Dimensions							
	m	d	D	B	C	d_1	B_1	r	r_1
	≈kg							min.	min.
234406-M-SP	0,297	**30**	55	32	16	47	8	1	0,15
234706-M-SP	0,232	**32**	55	32	16	47	8	1	0,15
234407-M-SP	0,318	**35**	62	34	17	53	8,5	1	0,15
234707-M-SP	0,302	**37**	62	34	17	53	8,5	1	0,15
234408-M-SP	0,39	**40**	68	36	18	58,5	9	1	0,15
234708-M-SP	0,371	**42**	68	36	18	58,5	9	1	0,15
234409-M-SP	0,486	**45**	75	38	19	65	9,5	1	0,15
234709-M-SP	0,472	**47**	75	38	19	65	9,5	1	0,15
234410-M-SP	0,485	**50**	80	38	19	70	9,5	1	0,15
234710-M-SP	0,408	**52**	80	38	19	70	9,5	1	0,15
234411-M-SP	0,944	**55**	90	44	22	78	11	1,1	0,3
234711-M-SP	0,884	**57**	90	44	22	78	11	1,1	0,3
234412-M-SP	0,884	**60**	95	44	22	83	11	1,1	0,3
234712-M-SP	0,852	**62**	95	44	22	83	11	1,1	0,3
234413-M-SP	0,898	**65**	100	44	22	88	11	1,1	0,3
234713-M-SP	0,862	**67**	100	44	22	88	11	1,1	0,3
234414-M-SP	1,22	**70**	110	48	24	97	12	1,1	0,3
234714-M-SP	1,16	**73**	110	48	24	97	12	1,1	0,3
234415-M-SP	1,22	**75**	115	48	24	102	12	1,1	0,3
234715-M-SP	1,22	**78**	115	48	24	102	12	1,1	0,3
234416-M-SP	1,79	**80**	125	54	27	110	13,5	1,1	0,3
234716-M-SP	1,69	**83**	125	54	27	110	13,5	1,1	0,3
234417-M-SP	1,85	**85**	130	54	27	115	13,5	1,1	0,3
234717-M-SP	1,77	**88**	130	54	27	115	13,5	1,1	0,3
234418-M-SP	2,45	**90**	140	60	30	123	15	1,5	0,3
234718-M-SP	2,35	**93**	140	60	30	123	15	1,5	0,3
234419-M-SP	2,55	**95**	145	60	30	128	15	1,5	0,3
234719-M-SP	2,45	**98**	145	60	30	128	15	1,5	0,3
234420-M-SP	2,66	**100**	150	60	30	133	15	1,5	0,3
234720-M-SP	2,54	**103**	150	60	30	133	15	1,5	0,3
234421-M-SP	3,41	**105**	160	66	33	142	16,5	2	0,6
234721-M-SP	3,24	**109**	160	66	33	142	16,5	2	0,6

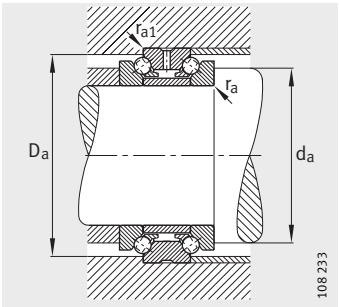
		Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speeds	
d_s	n_s	d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_a N	stat. C_{0a} N	C_{ua} N	n_G grease min^{-1}	n_G oil min^{-1}
3,2	4,8	40,5	50,5	1	0,15	15 300	36 000	3 250	11 000	16 000
3,2	4,8	40,5	50,5	1	0,15	15 300	36 000	3 250	11 000	16 000
3,2	4,8	46,5	57	1	0,15	18 900	47 000	4 250	9 500	14 000
3,2	4,8	46,5	57	1	0,15	18 900	47 000	4 250	9 500	14 000
3,2	4,8	51,5	63,5	1	0,15	22 900	59 000	5 300	8 500	12 000
3,2	4,8	51,5	63,5	1	0,15	22 900	59 000	5 300	8 500	12 000
3,2	4,8	57,5	70	1	0,15	25 000	67 000	6 000	7 500	10 000
3,2	4,8	57,5	70	1	0,15	25 000	67 000	6 000	7 500	10 000
3,2	4,8	62,5	75	1	0,15	26 000	72 000	6 500	7 000	9 500
3,2	4,8	62,5	75	1	0,15	26 000	72 000	6 500	7 000	9 500
3,2	6,5	69	84,5	1	0,3	36 500	99 000	8 900	6 300	8 500
3,2	6,5	69	84,5	1	0,3	36 500	99 000	8 900	6 300	8 500
3,2	6,5	74	89,5	1	0,3	36 000	98 000	8 900	6 000	8 000
3,2	6,5	74	89,5	1	0,3	36 000	98 000	8 900	6 000	8 000
3,2	6,5	79	94,5	1	0,3	38 500	111 000	10 000	5 600	7 500
3,2	6,5	79	94,5	1	0,3	38 500	111 000	10 000	5 600	7 500
3,2	6,5	86,5	103,5	1	0,3	46 000	134 000	12 100	5 300	7 000
3,2	6,5	86,5	103,5	1	0,3	46 000	134 000	12 100	5 300	7 000
3,2	6,5	91,5	108,5	1	0,3	47 500	144 000	12 900	5 000	6 700
3,2	6,5	91,5	108,5	1	0,3	47 500	144 000	12 900	5 000	6 700
3,2	6,5	98,5	117	1	0,3	56 000	175 000	15 500	4 500	6 000
3,2	6,5	98,5	117	1	0,3	56 000	175 000	15 500	4 500	6 000
4,8	9,5	103,5	122	1	0,3	57 000	181 000	15 600	4 500	6 000
4,8	9,5	103,5	122	1	0,3	57 000	181 000	15 600	4 500	6 000
4,8	9,5	110,5	130,5	1,5	0,3	66 000	213 000	17 700	4 000	5 300
4,8	9,5	110,5	130,5	1,5	0,3	66 000	213 000	17 700	4 000	5 300
4,8	9,5	115,5	135,5	1,5	0,3	66 000	219 000	17 900	4 000	5 300
4,8	9,5	115,5	135,5	1,5	0,3	66 000	219 000	17 900	4 000	5 300
4,8	9,5	120,5	140,5	1,5	0,3	67 000	226 000	18 100	3 800	5 000
4,8	9,5	120,5	140,5	1,5	0,3	67 000	226 000	18 100	3 800	5 000
4,8	9,5	128	150	2	0,6	74 000	250 000	19 500	3 600	4 800
4,8	9,5	128	150	2	0,6	74 000	250 000	19 500	3 600	4 800

Axial angular contact ball bearings

Double direction



2344, 2347
Contact angle α = 60°



Mounting dimensions

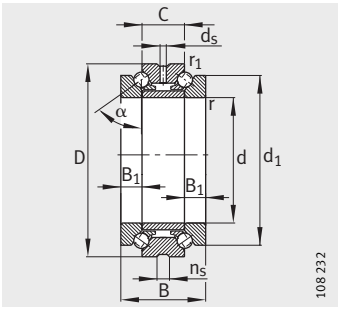
Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions							
	m	d	D	B	C	d_1	B_1	r	r_1
	≈kg							min.	min.
234422-M-SP	4,75	**110**	170	72	36	150	18	2	0,6
234722-M-SP	4,51	**114**	170	72	36	150	18	2	0,6
234424-M-SP	4,72	**120**	180	72	36	160	18	2	0,6
234724-M-SP	4,46	**124**	180	72	36	160	18	2	0,6
234426-M-SP	6,86	**130**	200	84	42	177	21	2	0,6
234726-M-SP	6,52	**135**	200	84	42	177	21	2	0,6
234428-M-SP	8,78	**140**	210	84	42	187	21	2,1	0,6
234728-M-SP	8,07	**145**	210	84	42	187	21	2,1	0,6
234430-M-SP	9,21	**150**	225	90	45	200	22,5	2,1	0,6
234730-M-SP	8,79	**155**	225	90	45	200	22,5	2,1	0,6
234432-M-SP	11,1	**160**	240	96	48	212	24	2,1	0,6
234732-M-SP	10,7	**165**	240	96	48	212	24	2,1	0,6
234434-M-SP	15,3	**170**	260	108	54	230	27	2,1	0,6
234734-M-SP	14,6	**176**	260	108	54	230	27	2,1	0,6
234436-M-SP	20,5	**180**	280	120	60	248	30	2,1	0,6
234736-M-SP	19,6	**187**	280	120	60	248	30	2,1	0,6
234438-M-SP	24,1	**190**	290	120	60	258	30	2,1	0,6
234738-M-SP	21,2	**197**	290	120	60	258	30	2,1	0,6
234440-M-SP	30,9	**200**	310	132	66	274	33	2,1	0,6
234740-M-SP	28,6	**207**	310	132	66	274	33	2,1	0,6
234444-M-SP	36,9	**220**	340	144	72	304	36	3	1,1
234744-M-SP	35,3	**228**	340	144	72	304	36	3	1,1
234448-M-SP	38,9	**240**	360	144	72	322	36	3	1,1
234748-M-SP	37,2	**248**	360	144	72	322	36	3	1,1
234452-M-SP	56,5	**260**	400	164	82	354	41	4	1,5
234752-M-SP	54,1	**269**	400	164	82	354	41	4	1,5
234456-M-SP	57,1	**280**	420	164	82	374	41	4	1,5
234756-M-SP	54,5	**289**	420	164	82	374	41	4	1,5
234460-M-SP	90,7	**300**	460	190	95	406	47,5	4	1,5
234760-M-SP	86,5	**310**	460	190	95	406	47,5	4	1,5
234464-M-SP	90,3	**320**	480	190	95	426	47,5	4	1,5
234764-M-SP	86,5	**330**	480	190	95	426	47,5	4	1,5

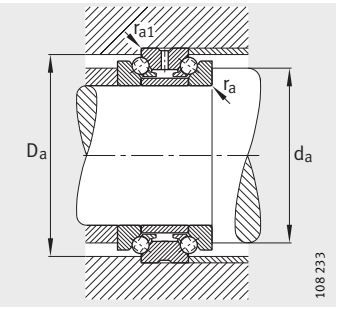
		Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speeds	
d_s	n_s	d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_a N	stat. C_{0a} N	C_{ua} N	n_G grease min^{-1}	n_G oil min^{-1}
4,8	9,5	134,5	160	2	0,6	98 000	325 000	24 400	3 400	4 500
4,8	9,5	134,5	160	2	0,6	98 000	325 000	24 400	3 400	4 500
4,8	9,5	144,5	170	2	0,6	101 000	345 000	25 000	3 200	4 300
4,8	9,5	144,5	170	2	0,6	101 000	345 000	25 000	3 200	4 300
6,3	12,2	159	188	2	0,6	128 000	440 000	30 500	2 800	3 800
6,3	12,2	159	188	2	0,6	128 000	440 000	30 500	2 800	3 800
6,3	12,2	169	198	2,1	0,6	132 000	470 000	31 500	2 600	3 600
6,3	12,2	169	198	2,1	0,6	132 000	470 000	31 500	2 600	3 600
8	15	181	211,5	2,1	0,6	142 000	520 000	34 000	2 600	3 600
8	15	181	211,5	2,1	0,6	142 000	520 000	34 000	2 600	3 600
8	15	192,5	226	2,1	0,6	168 000	600 000	38 000	2 400	3 400
8	15	192,5	226	2,1	0,6	168 000	600 000	38 000	2 400	3 400
8	15	206,5	245	2,1	0,6	207 000	740 000	45 500	2 200	3 200
8	15	206,5	245	2,1	0,6	207 000	740 000	45 500	2 200	3 200
8	15	221	263	2,1	0,6	235 000	840 000	49 500	2 000	3 000
8	15	221	263	2,1	0,6	235 000	840 000	49 500	2 000	3 000
8	15	231	273	2,1	0,6	244 000	900 000	52 000	1 900	2 800
8	15	231	273	2,1	0,6	244 000	900 000	52 000	1 900	2 800
8	15	245	291,5	2,1	0,6	285 000	1 060 000	59 000	1 800	2 600
8	15	245	291,5	2,1	0,6	285 000	1 060 000	59 000	1 800	2 600
9,5	17,7	269	318	2,5	1	340 000	1 330 000	71 000	1 600	2 200
9,5	17,7	269	318	2,5	1	340 000	1 330 000	71 000	1 600	2 200
9,5	17,7	289	338	2,5	1	350 000	1 420 000	73 000	1 500	2 000
9,5	17,7	289	338	2,5	1	350 000	1 420 000	73 000	1 500	2 000
9,5	17,7	317,5	374,5	3	1,5	400 000	1 680 000	83 000	1 400	1 900
9,5	17,7	317,5	374,5	3	1,5	400 000	1 680 000	83 000	1 400	1 900
9,5	17,7	337,5	394,5	3	1,5	415 000	1 790 000	86 000	1 300	1 800
9,5	17,7	337,5	394,5	3	1,5	415 000	1 790 000	86 000	1 300	1 800
9,5	17,7	366	428,5	3	1,5	480 000	2 170 000	99 000	1 200	1 700
9,5	17,7	366	428,5	3	1,5	480 000	2 170 000	99 000	1 200	1 700
9,5	17,7	386	448,5	3	1,5	495 000	2 310 000	103 000	1 200	1 700
9,5	17,7	386	448,5	3	1,5	495 000	2 310 000	103 000	1 200	1 700

Axial angular contact ball bearings

Double direction



2344, 2347
Contact angle α = 60°

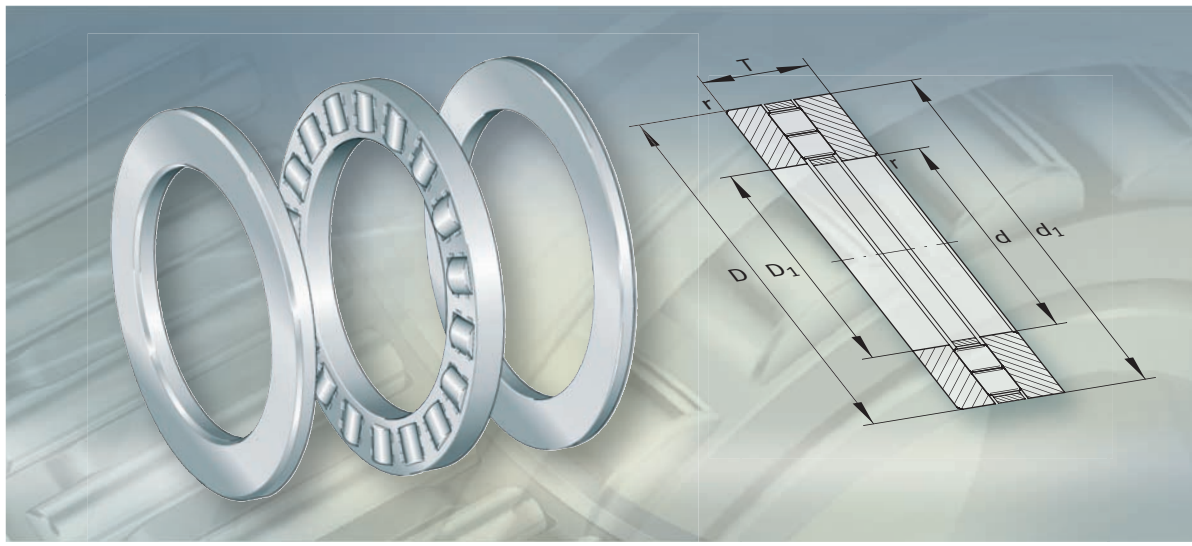


Mounting dimensions

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions							
	m	d	D	B	C	d_1	B_1	r	r_1
	≈kg							min.	min.
234468-M-SP	122	**340**	520	212	106	459	53	4	1,5
234768-M-SP	117	**350**	520	212	106	459	53	4	1,5
234472-M-SP	128	**360**	540	212	106	479	53	4	1,5
234772-M-SP	123	**370**	540	212	106	479	53	4	1,5
234476-M-SP	133	**380**	560	212	106	499	53	4	1,5
234776-M-SP	128	**390**	560	212	106	499	53	4	1,5
234480-M-SP	198	**400**	600	236	118	532	59	5	2
234780-M-SP	187	**410**	600	236	118	532	59	5	2

		Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speeds	
d_s	n_s	d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_a N	stat. C_{0a} N	C_{ua} N	n_G grease min^{-1}	n_G oil min^{-1}
9,5	17,7	413	485,5	3	1,5	580 000	2 850 000	124 000	1 100	1 600
9,5	17,7	413	485,5	3	1,5	580 000	2 850 000	124 000	1 100	1 600
9,5	17,7	433	505,5	3	1,5	590 000	2 950 000	125 000	1 000	1 500
9,5	17,7	433	505,5	3	1,5	590 000	2 950 000	125 000	1 000	1 500
9,5	17,7	453	525,5	3	1,5	610 000	3 150 000	130 000	1 000	1 500
9,5	17,7	453	525,5	3	1,5	610 000	3 150 000	130 000	1 000	1 500
9,5	17,7	480	561,5	4	2	680 000	3 650 000	147 000	900	1 300
9,5	17,7	480	561,5	4	2	680 000	3 650 000	147 000	900	1 300



Axial cylindrical roller bearings
Axial cylindrical roller and cage assemblies
Axial bearing washers

Axial cylindrical roller bearings, roller and cage assemblies, bearing washers

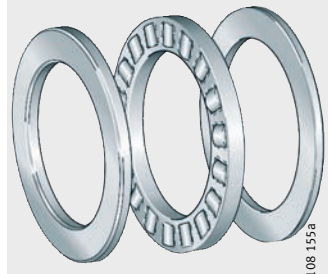
		Page
Product overview	Axial cylindrical roller bearings, axial cylindrical roller and cage assemblies, axial bearing washers	858
Features	Axial cylindrical roller bearings	859
	Axial cylindrical roller and cage assemblies	859
	Axial bearing washers	859
	Operating temperature	860
	Suffixes	860
Design and safety guidelines	Design of adjacent parts	860
	Tolerances for shafts and housing bores	861
	Limiting speed	861
	Minimum axial load	861
	Orientation of washers	862
Accuracy		862
Dimension tables	Axial cylindrical roller bearings, axial cylindrical roller and cage assemblies, axial bearing washers	864

Axial cylindrical roller bearings, roller and cage assemblies, axial bearing washers

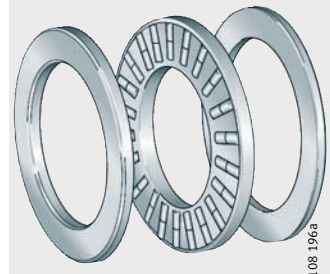
Axial cylindrical roller bearings

Single row or double row

811, 812



893, 894



Axial cylindrical roller and cage assemblies

Single row or double row

K811, K812

K893, K894

Axial bearing washers

Housing locating washers

Shaft locating washers

GS811, GS812, GS893, GS894

WS811, WS812, WS893, WS894

Bearing washer

LS

Axial cylindrical roller bearings, roller and cage assemblies, axial bearing washers

Features

Axial cylindrical roller bearings

Axial cylindrical roller bearings comprise axial cylindrical roller and cage assemblies K, housing locating washers GS and shaft locating washers WS.
The bearings have very low axial section height, high load capacity, high rigidity and can support axial forces in one direction.

Bearings 811, 812 are single row bearings and conform to DIN 722/ISO 104, bearings 893, 894 are double row bearings and conform to DIN 616/ISO 104.

The cages are made from plastic or brass.

Axial cylindrical roller and cage assemblies

The cage assemblies comprise axial cages and one or two rows of cylindrical rollers.
The diameter series 1, 2, 3, 4 correspond to DIN 616/ISO 104.

The cages are made from plastic or brass and are guided as standard on the shaft.

The cage assemblies have very low axial section height and high load carrying capacity. They can support axial forces in one direction. Radial forces must be supported by separate means.

Axial cage assemblies are combined with shaft or housing locating washers or are integrated directly in the adjacent construction.
If they are used without axial bearing washers, the raceway must be produced as a rolling bearing raceway.

Axial bearing washers

Housing locating washers

Housing locating washers are centred on the housing and must be used if the adjacent construction cannot be used as a running surface. The bore diameter, outside diameter and running surface are precision machined.
The diameter series 1, 2, 3, 4 correspond to DIN 616/ISO 104.

Shaft locating washers

Shaft locating washers are centred on the shaft and must be used if the adjacent construction cannot be used as a running surface. The bore diameter, outside diameter and running surface are precision machined.
The diameter series 1, 2, 3, 4 correspond to DIN 616/ISO 104.

Bearing washers

Bearing washers can be used as housing or shaft locating washers; they are used in applications where precise centring is not required. The bore and outside surface are turned, the running surface is ground.

Bearing washers can be used with axial cylindrical roller and cage assemblies K811 and axial needle roller and cage assemblies AXK.

Operating temperature

Axial cylindrical roller bearings and axial cylindrical roller and cage assemblies can be used at operating temperatures from –20 °C to +120 °C.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
M[1)]	Brass cage	Standard
TV[1)]	Plastic cage made from glass fibre reinforced polyamide 66	
P5	High dimensional and geometrical accuracy	Special design[2)], available by agreement

1) Depending on series and size.

2) For axial bearing washers GS, WS.

Design and safety guidelines

Design of adjacent parts

Axial bearing washers must always be fully supported on their entire abutment surface.

The abutment shoulders should be rigid, flat and perpendicular to the axis of rotation.

The radial cage guidance surfaces must be precision machined and wear-resistant (R_z4 ($R_a0{,}8$)).

If axial cylindrical roller and cage assemblies run directly on the adjacent construction, the running surfaces must be produced as rolling bearing raceways.

The surface hardness of the raceway must be 670 HV + 170 HV, the hardening depth CHD or SHD must be sufficiently large.

Tolerances for shafts and housing bores

Tolerances for shafts and housing bores: see table.

Shaft and housing bore tolerances

Bearing component		Tolerance for	
		Shaft	Bore
K811, K812, K893, K894	Guided on shaft	h8	–
GS811, GS812, GS893, GS894	–	–	H9
WS811, WS812, WS893, WS894	–	h8	–
LS	As housing locating washer	Clear of shaft	H9
	As shaft locating washer	h8	Clear of housing

Limiting speed

The limiting speeds n_G given in the product tables are valid for oil lubrication.
With grease lubrication, the permissible value is 25% of the value given in the table.

Minimum axial load

A minimum axial load $F_{a\,min}$ according to the formula must be applied.

$$F_{a\,min} = 0{,}0005 \cdot C_{0a} + k_a \left(\frac{C_{0a} \cdot n}{10^8} \right)^2$$

$F_{a\,min}$ N
Minimum axial load

k_a –
Factor for determining the minimum load, see table

C_{0a} N
Basic static load rating

n min^{-1}
Speed.

Factor k_a

Series	Factor k_a
K811	1,4
K812	0,9
K893	0,7
K894	0,5

Orientation of washers

The axial bearing washers must be fitted with the raceway side facing the rolling elements.

On housing locating washers, the raceway side is indicated by the smaller chamfer on the outside diameter.

On shaft locating washers, the raceway side is indicated by the smaller chamfer on the bore diameter.

Accuracy

The dimensional and geometrical tolerances of axial bearing washers GS and WS are in accordance with tolerance class PN to DIN 620.

Tolerances for the bore and outside diameter as well as the width of the bearing components are shown in the table and *Figure 1*.

Tolerances for bearing components

Bearing component	Tolerance for					
	Bore diameter		Outside diameter		Width	
K811, K812, K893, K894	D_{c1}	E11[1)]	D_c	a13[1)]	D_w	to DIN 5 402-1
GS811, GS812, GS893, GS894	D_1	–	D	to DIN 620	B	h11
WS811, WS812, WS893, WS894	d	to DIN 620	d_1	–	B	h11
LS	d	E12[1)]	D	a12[1)]	B	h11

1) Deviation from mean diameter.

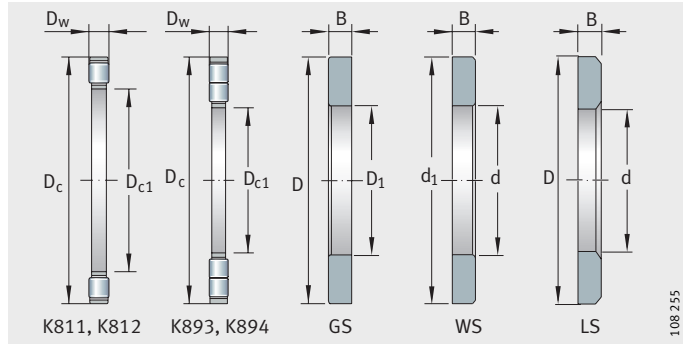
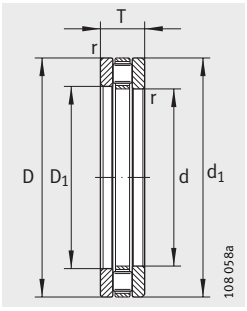
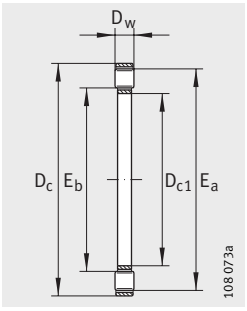


Figure 1
Bearing components

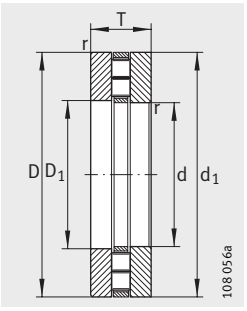
Axial cylindrical roller bearings
Axial cylindrical roller and cage assemblies
Axial bearing washers



811, 812



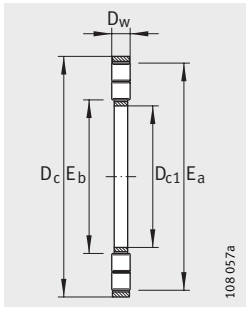
K811, K812



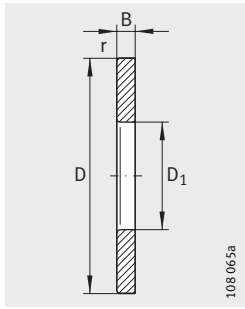
893, 894

Dimension table · Dimensions in mm

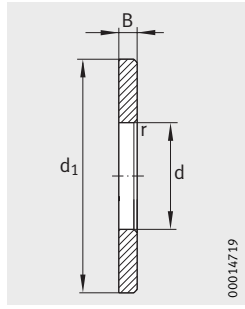
Axial cylindrical roller bearings					Axial cylindrical roller and cage assemblies		Axial bearing washers			
Complete bearings				Mass m	Designation	Mass m	Housing locating washer	Shaft locating washer	Bearing washer	Mass m
Designation				≈kg		≈kg	Designation	Designation	Designation	≈kg
81102-TV	–	–	–	0,024	**K81102-TV**	0,006	**GS81102**	**WS81102**	**LS1528**	0,008
81103-TV	–	–	–	0,027	**K81103-TV**	0,009	**GS81103**	**WS81103**	**LS1730**	0,009
81104-TV	–	–	–	0,037	**K81104-TV**	0,013	**GS81104**	**WS81104**	**LS2035**	0,012
81105-TV	–	–	–	0,053	**K81105-TV**	0,015	**GS81105**	**WS81105**	**LS2542**	0,019
81106-TV	–	–	–	0,057	**K81106-TV**	0,017	**GS81106**	**WS81106**	**LS3047**	0,02
–	**81206-TV**	–	–	0,123	**K81206-TV**	0,033	**GS81206**	**WS81206**	–	0,045
–	–	**89306-TV**	–	0,24	**K89306-TV**	0,04	**GS89306**	**WS89306**	–	0,095
81107-TV	–	–	–	0,073	**K81107-TV**	0,019	**GS81107**	**WS81107**	**LS3552**	0,027
–	**81207-TV**	–	–	0,195	**K81207-TV**	0,043	**GS81207**	**WS81207**	–	0,076
–	–	**89307-TV**	–	0,34	**K89307-TV**	0,053	**GS89307**	**WS89307**	–	0,134
81108-TV	–	–	–	0,105	**K81108-TV**	0,031	**GS81108**	**WS81108**	**LS4060**	0,037
–	**81208-TV**	–	–	0,249	**K81208-TV**	0,081	**GS81208**	**WS81208**	–	0,084
–	–	**89308-TV**	–	0,484	**K89308-TV**	0,098	**GS89308**	**WS89308**	–	0,193
81109-TV	–	–	–	0,13	**K81109-TV**	0,035	**GS81109**	**WS81109**	**LS4565**	0,047
–	**81209-TV**	–	–	0,287	**K81209-TV**	0,085	**GS81209**	**WS81209**	–	0,101
–	–	**89309-TV**	–	0,615	**K89309-TV**	0,121	**GS89309**	**WS89309**	–	0,247
81110-TV	–	–	–	0,14	**K81110-TV**	0,038	**GS81110**	**WS81110**	**LS5070**	0,051
–	**81210-TV**	–	–	0,356	**K81210-TV**	0,098	**GS81210**	**WS81210**	–	0,129
–	–	**89310-TV**	–	0,887	**K89310-TV**	0,175	**GS89310**	**WS89310**	–	0,356
81111-TV	–	–	–	0,218	**K81111-TV**	0,045	**GS81111**	**WS81111**	**LS5578**	0,082
–	**81211-TV**	–	–	0,568	**K81211-TV**	0,166	**GS81211**	**WS81211**	–	0,201
–	–	**89311-TV**	–	1,18	**K89311-TV**	0,195	**GS89311**	**WS89311**	–	0,485
81112-TV	–	–	–	0,266	**K81112-TV**	0,082	**GS81112**	**WS81112**	**LS6085**	0,092
–	**81212-TV**	–	–	0,642	**K81212-TV**	0,176	**GS81212**	**WS81212**	–	0,233
–	–	**89312-TV**	–	1,26	**K89312-TV**	0,21	**GS89312**	**WS89312**	–	0,517
–	–	–	**89412-TV**	2,818	**K89412-TV**	0,538	**GS89412**	**WS89412**	–	1,115



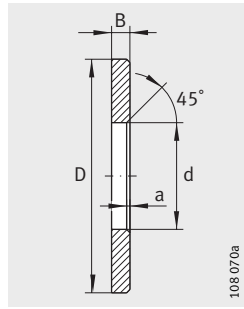
K893, K894



GS811, GS812,
GS893, GS894



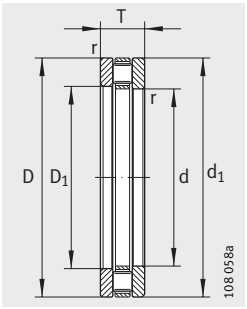
WS811, WS812,
WS893, WS894



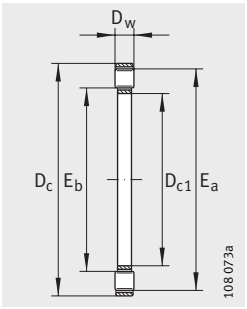
LS

Dimensions								Raceway dimensions		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
D_{c1} d	D_1	D_c D	d_1	T	D_w	B	a r	E_b	E_a	dyn. C_a	stat. C_{0a}	C_{ua}	n_G	n_B
							min.			N	N	N	min^{-1}	min^{-1}
15	16	28	28	9	3,5	2,75	0,3	16	27	14 400	28 500	4 000	13 600	6 300
17	18	30	30	9	3,5	2,75	0,3	18	29	15 900	33 500	4 650	12 400	5 400
20	21	35	35	10	4,5	2,75	0,3	21	34	24 900	53 000	7 300	10 500	4 300
25	26	42	42	11	5	3	0,6	26	41	33 500	76 000	7 100	8 600	3 500
30	32	47	47	11	5	3	0,6	31	46	35 500	86 000	8 000	7 500	3 050
30	32	52	52	16	7,5	4,25	0,6	31	50	64 000	141 000	14 100	7 100	2 650
30	32	60	60	18	5,5	6,25	1	33	59	69 000	197 000	18 900	6 400	2 600
35	37	52	52	12	5	3,5	0,6	36	51	39 000	101 000	9 500	6 600	2 600
35	37	62	62	18	7,5	5,25	1	39	58	80 000	199 000	20 000	5 900	2 320
35	37	68	68	20	6	7	1	38	67	80 000	237 000	23 200	5 600	2 390
40	42	60	60	13	6	3,5	0,6	42	58	56 000	148 000	14 500	5 800	2 190
40	42	68	68	19	9	5	1	43	66	107 000	265 000	23 300	5 200	1 860
40	42	78	78	22	7	7,5	1	44	77	122 000	385 000	39 000	4 800	1 780
45	47	65	65	14	6	4	0,6	47	63	59 000	163 000	16 000	5 300	1 970
45	47	73	73	20	9	5,5	1	48	70	105 000	265 000	23 300	4 850	1 820
45	47	85	85	24	7,5	8,25	1	49	83	139 000	445 000	44 500	4 400	1 620
50	52	70	70	14	6	4	0,6	52	68	61 000	177 000	17 400	4 800	1 810
50	52	78	78	22	9	6,5	1	53	75	117 000	315 000	27 500	4 450	1 550
50	52	95	95	27	8	9,5	1,1	56	92	167 000	560 000	58 000	3 950	1 460
55	57	78	78	16	6	5	0,6	57	77	90 000	300 000	31 000	4 300	1 330
55	57	90	90	25	11	7	1	59	85	154 000	405 000	38 500	4 000	1 510
55	57	105	105	30	9	10,5	1,1	61	103	184 000	600 000	52 000	3 600	1 490
60	62	85	85	17	7,5	4,75	1	62	82	103 000	315 000	32 000	4 000	1 360
60	62	95	95	26	11	7,5	1	64	91	172 000	480 000	45 500	3 700	1 300
60	62	110	110	30	9	10,5	1,1	66	108	196 000	670 000	58 000	3 350	1 350
60	62	130	130	42	14	14	1,5	65	126	390 000	1 220 000	121 000	3 000	1 080

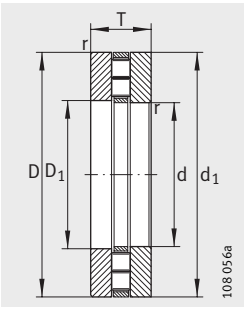
Axial cylindrical roller bearings
Axial cylindrical roller and cage assemblies
Axial bearing washers



811, 812



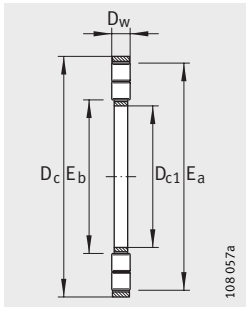
K811, K812



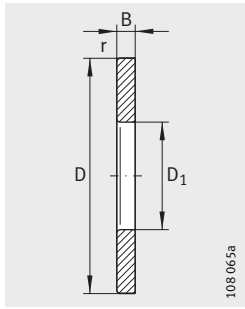
893, 894

Dimension table (continued) · Dimensions in mm

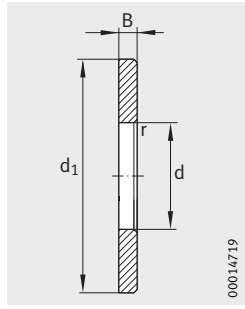
Axial cylindrical roller bearings					Axial cylindrical roller and cage assemblies		Axial bearing washers			
Complete bearings				Mass m	Designation	Mass m	Housing locating washer	Shaft locating washer	Bearing washer	Mass m
Designation				≈kg		≈kg	Designation	Designation	Designation	≈kg
81113-TV	–	–	–	0,31	**K81113-TV**	0,09	**GS81113**	**WS81113**	**LS6590**	0,11
–	**81213-TV**	–	–	0,721	**K81213-TV**	0,185	**GS81213**	**WS81213**	–	0,268
–	–	**89313-TV**	–	1,33	**K89313-TV**	0,21	**GS89313**	**WS89313**	–	0,535
–	–	–	**89413-TV**	3,52	**K89413-TV**	0,72	**GS89413**	**WS89413**	–	1,4
81114-TV	–	–	–	0,332	**K81114-TV**	0,092	**GS81114**	**WS81114**	**LS7095**	0,12
–	**81214-TV**	–	–	0,768	**K81214-TV**	0,212	**GS81214**	**WS81214**	–	0,278
–	–	**89314-TV**	–	1,82	**K89314-TV**	0,29	**GS89314**	**WS89314**	–	0,8
–	–	–	**89414-TV**	4,18	**K89414-TV**	0,76	**GS89414**	**WS89414**	–	1,73
81115-TV	–	–	–	0,393	**K81115-TV**	0,096	**GS81115**	**WS81115**	**LS75100**	0,136
–	**81215-TV**	–	–	0,8	**K81215-TV**	0,195	**GS81215**	**WS81215**	–	0,293
–	–	**89315-TV**	–	2,23	**K89315-TV**	0,375	**GS89315**	**WS89315**	–	0,97
–	–	–	**89415-M**	5,96	**K89415-M**	1,78	**GS89415**	**WS89415**	–	2,09
81116-TV	–	–	–	0,4	**K81116-TV**	0,095	**GS81116**	**WS81116**	**LS80105**	0,144
–	**81216-TV**	–	–	0,9	**K81216-TV**	0,234	**GS81216**	**WS81216**	–	0,333
–	–	**89316-TV**	–	2,37	**K89316-TV**	0,42	**GS89316**	**WS89316**	–	1,02
–	–	–	**89416-M**	7,04	**K89416-M**	2,04	**GS89416**	**WS89416**	–	2,5
81117-TV	–	–	–	0,42	**K81117-TV**	0,118	**GS81117**	**WS81117**	**LS85110**	0,151
–	**81217-TV**	–	–	1,26	**K81217-TV**	0,28	**GS81217**	**WS81217**	–	0,49
–	–	**89317-M**	–	3,39	**K89317-M**	0,93	**GS89317**	**WS89317**	–	1,23
–	–	–	**89417-M**	8,65	**K89417-M**	2,71	**GS89417**	**WS89417**	–	2,97
81118-TV	–	–	–	0,62	**K81118-TV**	0,15	**GS81118**	**WS81118**	**LS90120**	0,225
–	**81218-TV**	–	–	1,77	**K81218-TV**	0,54	**GS81218**	**WS81218**	–	0,614
–	–	**89318-M**	–	3,63	**K89318-M**	0,97	**GS89318**	**WS89318**	–	1,33
–	–	–	**89418-M**	9,94	**K89418-M**	3,04	**GS89418**	**WS89418**	–	3,45
81120-TV	–	–	–	0,95	**K81120-TV**	0,25	**GS81120**	**WS81120**	**LS100135**	0,35
–	**81220-TV**	–	–	2,2	**K81220-TV**	0,6	**GS81220**	**WS81220**	–	0,8
–	–	**89320-M**	–	4,56	**K89320-M**	1,18	**GS89320**	**WS89320**	–	1,69
–	–	–	**89420-M**	13,4	**K89420-M**	3,92	**GS89420**	**WS89420**	–	4,75



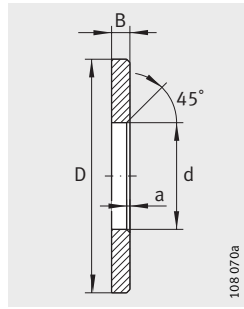
K893, K894



GS811, GS812,
GS893, GS894



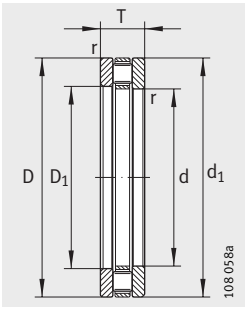
WS811, WS812,
WS893, WS894



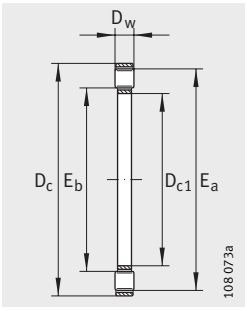
LS

Dimensions								Raceway dimensions		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
D_{c1} d	D_1	D_c D	d_1	T	D_w	B	a r	E_b	E_a	dyn. C_a	stat. C_{0a}	C_{ua}	n_G	n_B
							min.			N	N	N	min^{-1}	min^{-1}
65	67	90	90	18	7,5	5,25	1	67	87	107 000	340 000	34 000	3 700	1 260
65	67	100	100	27	11	8	1	69	96	177 000	500 000	48 000	3 450	1 240
65	67	115	115	30	9	10,5	1,1	71	113	194 000	670 000	58 000	3 200	1 330
65	68	140	140	45	15	15	2	70	135	445 000	1 410 000	139 000	2 800	1 000
70	72	95	95	18	7,5	5,25	1	72	92	111 000	365 000	36 500	3 500	1 170
70	72	105	105	27	11	8	1	74	102	187 000	550 000	53 000	3 250	1 130
70	72	125	125	34	10	12	1,1	76	123	239 000	830 000	74 000	2 950	1 200
70	73	150	150	48	16	16	2	76	147	475 000	1 500 000	148 000	2 650	1 000
75	77	100	100	19	7,5	5,75	1	78	97	107 000	350 000	35 500	3 300	1 190
75	77	110	110	27	11	8	1	79	106	172 000	500 000	48 000	3 100	1 210
75	77	135	135	36	11	12,5	1,5	81	132	285 000	1 010 000	92 000	2 750	1 080
75	78	160	160	51	17	17	2	82	156	500 000	1 580 000	150 000	2 400	1 000
80	82	105	105	19	7,5	5,75	1	83	102	106 000	350 000	35 500	3 100	1 170
80	82	115	115	28	11	8,5	1	84	112	201 000	630 000	60 000	2 900	990
80	82	140	140	36	11	12,5	1,5	86	137	305 000	1 110 000	100 000	2 600	990
80	83	170	170	54	18	18	2,1	88	165	560 000	1 770 000	169 000	2 260	950
85	87	110	110	19	7,5	5,75	1	87	108	112 000	385 000	39 000	2 950	1 070
85	88	125	125	31	12	9,5	1	90	119	217 000	660 000	64 000	2 750	1 060
85	88	150	150	39	12	13,5	1,5	93	146	325 000	1 140 000	104 000	2 400	1 030
85	88	180	180	58	19	19,5	2,1	93	175	620 000	1 980 000	188 000	2 130	900
90	92	120	120	22	9	6,5	1	93	117	141 000	465 000	40 000	2 750	1 070
90	93	135	135	35	14	10,5	1,1	95	129	290 000	890 000	88 000	2 550	910
90	93	155	155	39	12	13,5	1,5	98	151	335 000	1 200 000	108 000	2 310	980
90	93	190	190	60	20	20	2,1	99	185	680 000	2 200 000	207 000	2 010	850
100	102	135	135	25	11	7	1	104	131	199 000	650 000	59 000	2 460	920
100	103	150	150	38	15	11,5	1,1	107	142	340 000	1 080 000	104 000	2 300	840
100	103	170	170	42	13	14,5	1,5	109	166	380 000	1 400 000	122 000	2 090	910
100	103	210	210	67	22	22,5	3	111	205	850 000	2 850 000	265 000	1 810	720

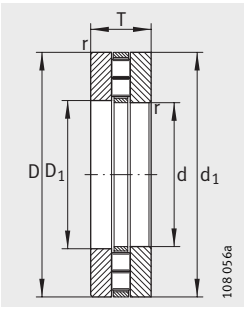
Axial cylindrical roller bearings
Axial cylindrical roller and cage assemblies
Axial bearing washers



811, 812



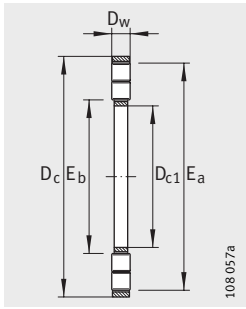
K811, K812



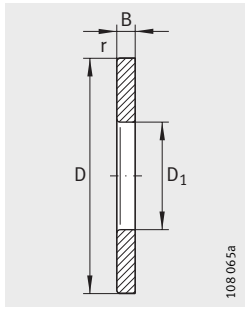
893, 894

Dimension table (continued) · Dimensions in mm

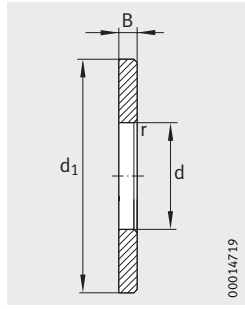
Axial cylindrical roller bearings					Axial cylindrical roller and cage assemblies		Axial bearing washers			
Complete bearings				Mass m	Designation	Mass m	Housing locating washer	Shaft locating washer	Bearing washer	Mass m
Designation				≈kg		≈kg	Designation	Designation	Designation	≈kg
81122-TV	–	–	–	1,04	**K81122-TV**	0,27	**GS81122**	**WS81122**	**LS110145**	0,385
–	**81222-TV**	–	–	2,29	**K81222-TV**	0,53	**GS81222**	**WS81222**	–	0,88
–	–	**89322-M**	–	6,7	**K89322-M**	1,83	**GS89322**	**WS89322**	–	2,44
–	–	–	**89422-M**	17,4	**K89422-M**	5,11	**GS89422**	**WS89422**	–	6,15
81124-TV	–	–	–	1,12	**K81124-TV**	0,29	**GS81124**	**WS81124**	**LS120155**	0,415
–	**81224-TV**	–	–	2,54	**K81224-TV**	0,58	**GS81224**	**WS81224**	–	0,98
–	–	**89324-M**	–	9,44	**K89324-M**	2,64	**GS89324**	**WS89324**	–	3,4
–	–	–	**89424-M**	21,9	**K89424-M**	6,37	**GS89424**	**WS89424**	–	7,7
81126-TV	–	–	–	1,67	**K81126-TV**	0,38	**GS81126**	**WS81126**	**LS130170**	0,643
–	**81226-TV**	–	–	3,98	**K81226-TV**	0,92	**GS81226**	**WS81226**	–	1,53
–	–	**89326-M**	–	11,2	**K89326-M**	2,09	**GS89326**	**WS89326**	–	4,045
–	–	–	**89426-M**	27,1	**K89426-M**	7,96	**GS89426**	**WS89426**	–	9,5
81128-TV	–	–	–	1,9	**K81128-TV**	0,4	**GS81128**	**WS81128**	**LS140180**	0,749
–	**81228-M**	–	–	5,07	**K81228-M**	1,8	**GS81228**	**WS81228**	–	1,635
–	–	**89328-M**	–	13,2	**K89328-M**	2,57	**GS89328**	**WS89328**	–	4,8
–	–	–	**89428-M**	29,8	**K89428-M**	8,53	**GS89428**	**WS89428**	–	10,6
81130-TV	–	–	–	2,2	**K81130-TV**	0,43	**GS81130**	**WS81130**	**LS150190**	0,796
–	**81230-M**	–	–	7,17	**K81230-M**	2,81	**GS81230**	**WS81230**	–	2,18
–	–	**89330-M**	–	13,9	**K89330-M**	3,75	**GS89330**	**WS89330**	–	5,06
–	–	–	**89430-M**	35,4	**K89430-M**	10,4	**GS89430**	**WS89430**	–	12,5
81132-TV	–	–	–	2,12	**K81132-TV**	0,44	**GS81132**	**WS81132**	**LS160200**	0,842
–	**81232-M**	–	–	7,6	**K81232-M**	3,01	**GS81232**	**WS81232**	–	2,3
–	–	–	**89432-M**	42	**K89432-M**	12,4	**GS89432**	**WS89432**	–	14,8
81134-TV	–	–	–	2,41	**K81134-TV**	0,66	**GS81134**	**WS81134**	–	1,1
–	**81234-M**	–	–	9,3	**K81234-M**	3,5	**GS81234**	**WS81234**	–	2,9
–	–	–	**89434-M**	51,9	**K89434-M**	14,9	**GS89434**	**WS89434**	–	18,5



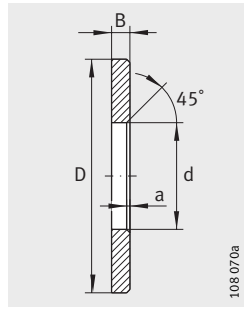
K893, K894



GS811, GS812,
GS893, GS894



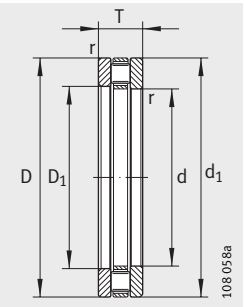
WS811, WS812,
WS893, WS894



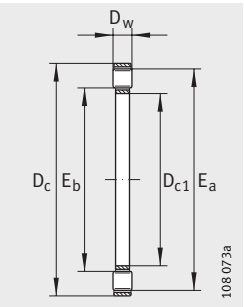
LS

Dimensions								Raceway dimensions		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
D_{c1} d	D_1	D_c D	d_1	T	D_w	B	a r	E_b	E_a	dyn. C_a	stat. C_{0a}	C_{ua}	n_G	n_B
							min.			N	N	N	min^{-1}	min^{-1}
110	112	145	145	25	11	7	1	114	141	207 000	700 000	62 000	2 260	850
110	113	160	160	38	15	11,5	1,1	117	152	325 000	1 030 000	98 000	2 130	860
110	113	190	190	48	15	16,5	2	120	185	500 000	1 870 000	166 000	1 890	790
110	113	230	230	73	24	24,5	3	121	223	1 000 000	3 400 000	315 000	1 660	640
120	122	155	155	25	11	7	1	124	151	214 000	760 000	65 000	2 100	780
120	123	170	170	39	15	12	1,1	127	162	340 000	1 120 000	104 000	1 990	790
120	123	210	210	54	17	18,5	2,1	132	205	640 000	2 420 000	210 000	1 710	690
120	123	250	250	78	26	26	4	133	243	1 160 000	4 000 000	370 000	1 520	580
130	132	170	170	30	12	9	1	135	165	250 000	900 000	79 000	1 930	760
130	133	190	187	45	19	13	1,5	137	181	480 000	1 520 000	143 000	1 800	710
130	134	225	225	58	18	20	2,1	141	219	710 000	2 700 000	237 000	1 590	650
130	134	270	270	85	28	28,5	4	145	263	1 330 000	4 600 000	405 000	1 400	530
140	142	180	178	31	12	9,5	1	145	175	260 000	960 000	83 000	1 800	710
140	143	200	197	46	19	13,5	1,5	151	195	455 000	1 450 000	133 000	1 700	730
140	144	240	240	60	19	20,5	2,1	152	234	820 000	3 200 000	275 000	1 490	570
140	144	280	280	85	28	28,5	4	155	273	1 380 000	4 950 000	430 000	1 340	490
150	152	190	188	31	12	9,5	1	155	185	270 000	1 020 000	86 000	1 700	660
150	153	215	212	50	21	14,5	1,5	162	210	590 000	1 940 000	175 000	1 540	650
150	154	250	250	60	19	20,5	2,1	162	244	840 000	3 350 000	285 000	1 410	510
150	154	300	300	90	30	30	4	167	293	1 570 000	5 700 000	495 000	1 240	445
160	162	200	198	31	12	9,5	1	165	195	260 000	990 000	82 000	1 600	670
160	163	225	222	51	21	15	1,5	171	219	600 000	2 030 000	181 000	1 470	610
160	164	320	320	95	32	31,5	5	179	313	1 780 000	6 500 000	560 000	1 160	410
170	172	215	213	34	14	10	1,1	176	209	360 000	1 380 000	116 000	1 500	570
170	173	240	237	55	22	16,5	1,5	184	233	680 000	2 340 000	207 000	1 370	600
170	174	340	340	103	34	34,5	5	191	333	1 990 000	7 400 000	640 000	1 090	375

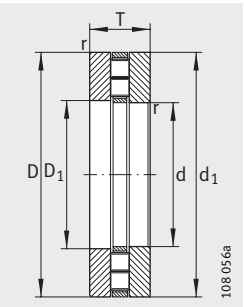
Axial cylindrical roller bearings
Axial cylindrical roller and cage assemblies
Axial bearing washers



811, 812



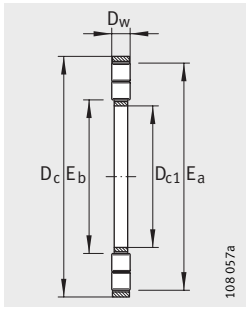
K811, K812



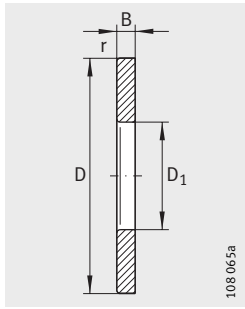
893, 894

Dimension table (continued) · Dimensions in mm

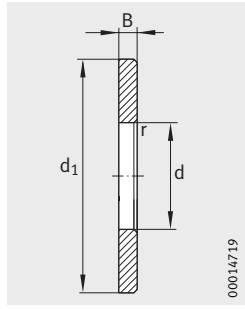
Axial cylindrical roller bearings				Axial cylindrical roller and cage assemblies		Axial bearing washers		
Complete bearings			Mass m	Designation	Mass m	Housing locating washer	Shaft locating washer	Mass m
Designation			≈kg		≈kg	Designation	Designation	≈kg
81136-M	–	–	3,3	**K81136-M**	1,46	**GS81136**	**WS81136**	1,12
–	**81236-M**	–	9,9	**K81236-M**	3,67	**GS81236**	**WS81236**	3,13
–	–	**89436-M**	60	**K89436-M**	17,6	**GS89436**	**WS89436**	21,3
81138-M	–	–	4,74	**K81138-M**	1,84	**GS81138**	**WS81138**	1,45
–	**81238-M**	–	12,8	**K81238-M**	5,17	**GS81238**	**WS81238**	3,835
–	–	**89438-M**	72,1	**K89438-M**	20,9	**GS89438**	**WS89438**	25,6
81140-M	–	–	4,95	**K81140-M**	1,93	**GS81140**	**WS81140**	1,51
–	**81240-M**	–	14,2	**K81240-M**	5,4	**GS81240**	**WS81240**	4,41
–	–	**89440-M**	82,6	**K89440-M**	24	**GS89440**	**WS89440**	29,3
81144-M	–	–	5,22	**K81144-M**	2,04	**GS81144**	**WS81144**	1,59
–	**81244-M**	–	15,3	**K81244-M**	5,8	**GS81244**	**WS81244**	4,75
–	–	**89444-M**	90,1	**K89444-M**	25,7	**GS89444**	**WS89444**	32,2
81148-M	–	–	8,45	**K81148-M**	3,32	**GS81148**	**WS81148**	2,57
–	**81248-M**	–	26,2	**K81248-M**	9,94	**GS81248**	**WS81248**	8,15
–	–	**89448-M**	95,9	**K89448-M**	27,3	**GS89448**	**WS89448**	34,3
81152-M	–	–	9,08	**K81152-M**	3,55	**GS81152**	**WS81152**	2,765
–	**81252-M**	–	28,6	**K81252-M**	10,8	**GS81252**	**WS81252**	8,9
–	–	**89452-M**	125	**K89452-M**	36,8	**GS89452**	**WS89452**	44,25
81156-M	–	–	12,6	**K81156-M**	5,31	**GS81156**	**WS81156**	3,65
–	**81256-M**	–	31	**K81256-M**	11,5	**GS81256**	**WS81256**	9,75
–	–	**89456-M**	159	**K89456-M**	47,5	**GS89456**	**WS89456**	55,6
81160-M	–	–	19,4	**K81160-M**	7,6	**GS81160**	**WS81160**	5,92
–	**81260-M**	–	48,25	**K81260-M**	17,8	**GS81260**	**WS81260**	15,2
–	–	**89460-M**	170	**K89460-M**	49,8	**GS89460**	**WS89460**	60,15
81164-M	–	–	20,7	**K81164-M**	8,04	**GS81164**	**WS81164**	6,35
–	–	**89464-M**	203	**K89464-M**	80,3	**GS89464**	**WS89464**	61,5



K893, K894

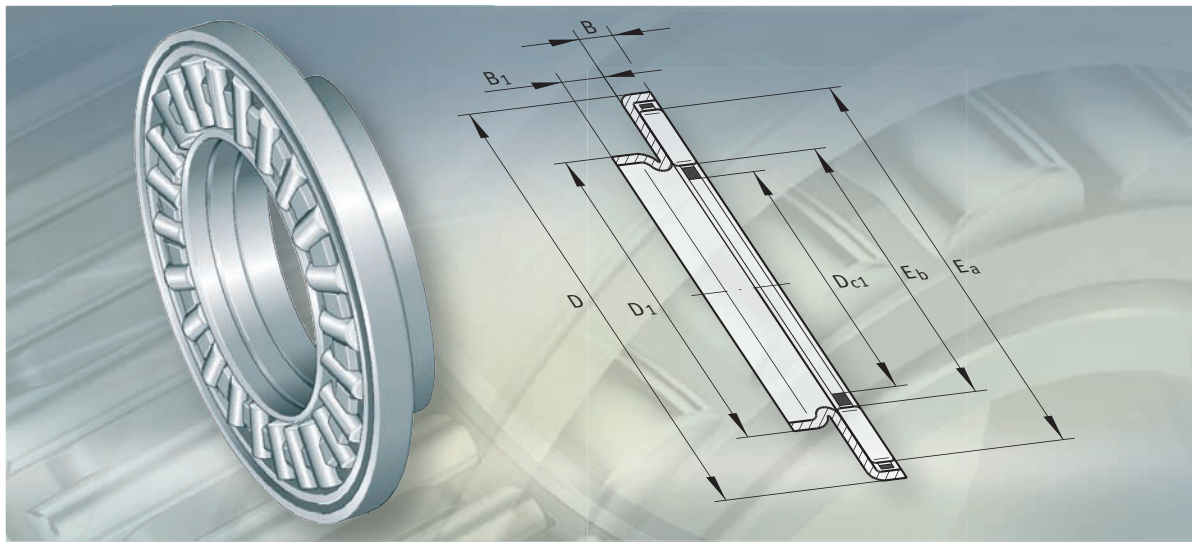


GS811, GS812,
GS893, GS894



WS811, WS812,
WS893, WS894

Dimensions								Raceway dimensions		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
D_{c1} d	D_1	D_c D	d_1	T	D_w	B	r	E_b	E_a	dyn. C_a	stat. C_{0a}	C_{ua}	n_G	n_B
							min.			N	N	N	min^{-1}	min^{-1}
180	183	225	222	34	14	10	1,1	186	220	340 000	1 300 000	107 000	1 420	590
180	183	250	247	56	22	17	1,5	194	243	690 000	2 440 000	213 000	1 310	580
180	184	360	360	109	36	36,5	5	200	351	2 210 000	8 200 000	690 000	1 040	360
190	193	240	237	37	15	11	1,1	198	234	385 000	1 500 000	123 000	1 330	570
190	194	270	267	62	26	18	2	205	263	880 000	3 000 000	270 000	1 220	530
190	195	380	380	115	38	38,5	5	212	371	2 450 000	9 200 000	770 000	990	330
200	203	250	247	37	15	11	1,1	208	244	390 000	1 550 000	125 000	1 270	530
200	204	280	277	62	26	18	2	215	273	900 000	3 150 000	280 000	1 170	485
200	205	400	400	122	40	41	5	224	391	2 700 000	10 200 000	840 000	940	315
220	223	270	267	37	15	11	1,1	228	264	420 000	1 730 000	137 000	1 170	470
220	224	300	297	63	26	18,5	2	236	294	940 000	3 450 000	295 000	1 080	435
220	225	420	420	122	40	41	6	244	411	2 900 000	11 500 000	940 000	870	270
240	243	300	297	45	18	13,5	1,5	253	294	600 000	2 500 000	199 000	1 050	440
240	244	340	335	78	32	23	2,1	263	333	1 370 000	5 000 000	425 000	960	395
240	245	440	440	122	40	41	6	264	431	3 000 000	12 200 000	980 000	830	250
260	263	320	317	45	18	13,5	1,5	272	314	620 000	2 650 000	205 000	980	390
260	264	360	355	79	32	23,5	2,1	281	351	1 440 000	5 400 000	455 000	910	355
260	265	480	480	132	44	44	6	286	468	3 600 000	14 700 000	1 150 000	760	224
280	283	350	347	53	22	15,5	1,5	294	344	860 000	3 650 000	285 000	900	345
280	284	380	375	80	32	24	2,1	301	371	1 460 000	5 600 000	465 000	850	335
280	285	520	520	145	48	48,5	6	309	508	4 200 000	17 600 000	1 360 000	700	199
300	304	380	376	62	25	18,5	2	316	372	1 060 000	4 500 000	355 000	840	330
300	304	420	415	95	38	28,5	3	329	412	1 930 000	7 300 000	600 000	780	305
300	305	540	540	145	48	48,5	6	329	528	4 350 000	18 500 000	1 420 000	670	188
320	324	400	396	63	25	19	2	336	392	1 100 000	4 750 000	370 000	790	290
320	325	580	575	155	68	43,5	7,5	343	566	5 500 000	19 900 000	1 430 000	630	185



Axial needle roller and cage assemblies
Axial bearing washers
Axial needle roller bearings

Axial needle roller and cage assemblies, washers, axial needle roller bearings

		Page
Product overview	Axial needle roller and cage assemblies, axial bearing washers, axial needle roller bearings	874
Features	Axial needle roller and cage assemblies	875
	Axial bearing washers	875
	Axial needle roller bearings	875
	Operating temperature	875
	Cages	875
	Suffixes	875
	Other products	875
Design and safety guidelines	Running surfaces	876
	Tolerances for shafts and housing bores	876
	Speeds	876
	Minimum axial load	877
	Orientation of washers	877
Accuracy	Tolerances of bearing components	877
Dimension tables	Axial needle roller and cage assemblies, axial bearing washers	878
	Axial needle roller bearings with centring spigot	880

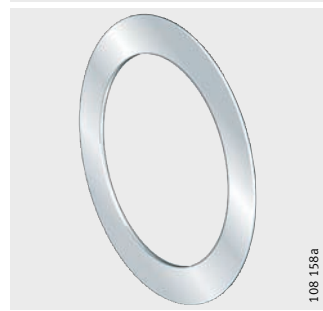
Axial needle roller and cage assemblies, washers, axial needle roller bearings

Axial needle roller and cage assemblies

AXK

Axial bearing washers

AS



Axial needle roller bearings

With centring spigot

AXW

Other products

AX

Axial needle roller and cage assemblies, washers, axial needle roller bearings

Features

Axial needle roller and cage assemblies

Axial needle roller and cage assemblies AXK correspond to DIN 5 405-2. They comprise plastic or metal axial cages with integral needle rollers and have a very low axial section height.

The cage assemblies can support high axial forces in one direction. Radial loads must be supported by separate means.

Axial needle roller and cage assemblies require hardened and ground running surfaces as a raceway.

Axial bearing washers

Axial bearing washers AS are punched, through hardened, polished and suitable for use as shaft or housing locating washers. They correspond to DIN 5 405-3 and are suitable for use with axial needle roller and cage assemblies AXK.

These washers are suitable for use where the adjacent machine part is unhardened but is sufficiently rigid and geometrically accurate.

Axial needle roller bearings

Axial needle roller bearings AXW are units comprising axial needle roller and cage assemblies AXK and axial bearing washers with centring spigot. They can be combined with drawn cup needle roller bearings and machined needle roller bearings.

The running surface for the needle roller and cage assembly must be hardened and ground.

Operating temperature

Needle roller and cage assemblies and needle roller bearings with plastic cage are suitable for operating temperatures from –20 °C to +120 °C.

Cages

Case assemblies with a plastic cage have the suffix TV.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
TV	Plastic cage made from glass fibre reinforced polyamide 66	Standard
RR	Corrosion-resistant design, with Corrotect® coating	Special design, available by agreement

Other products

Axial needle roller bearings are available in a special range with two raceways in various sizes. Please contact us for further information.

Design and safety guidelines

Axial bearing washers AS must always be fully supported on their entire abutment surface.

The abutment shoulders should be rigid, flat and perpendicular to the axis of rotation.

Running surfaces

Radial cage running surfaces should be precision machined and resistant to wear, $R_a0{,}8$ (R_z4).

Raceways for axial needle roller and cage assemblies should be precision machined and resistant to wear:

- raceway hardness 58 HRC to 64 HRC
- hardening depth SHD $\geqq 140 \cdot D_W/R_{p0,2}$
  - Rht, hardening depth in mm
  - D_W, rolling element diameter in mm
  - $R_{p0,2}$, proof stress in N/mm^2
- roughness $R_a0{,}2$ (R_z1)
- raceway dimensions E_a and E_b according to the dimension table must be observed
- runout tolerances to ISO tolerance grade IT 5, for special requirements IT 4, in relation to the inside diameter of the cage assemblies (D_{c1}).

Tolerances for shafts and housing bores

If axial needle roller bearings AXW are combined with drawn cup needle roller bearings or machined needle roller bearings, the same tolerances must be selected for the housing bore on the centring spigot as for the radial bearings.

Housing bore and shaft tolerances

Bearing component		Shaft tolerance	Bore tolerance
AXK	Guided on shaft	h8	–
AS	As housing locating washer	Clear of shaft	H9
	As shaft locating washer	h8	Clear of housing

Speeds

The limiting speeds n_G given in the dimension tables for AXK and AXW are valid for oil lubrication.

With grease lubrication, the permissible value is 25% of the value given in the table. Higher speeds may be possible by agreement.

Minimum axial load

A minimum axial load $F_{a\,min}$ according to the formula must be applied.

$$F_{a\,min} = 0{,}0005 \cdot C_{0a} + k_a \left(\frac{C_{0a} \cdot n}{10^8} \right)^2$$

$F_{a\,min}$ N
Minimum axial load

k_a –
Factor for determining the minimum load; $k_a = 3$

C_{0a} N
Basic static load rating, axial

n min^{-1}
Speed.

Orientation of washers

Axial bearing washers AS are suitable as raceways on both sides.

Accuracy

Tolerances for bearing components

Tolerances for bearing components: see table and *Figure 1*.

The diameter sort tolerance of the needle rollers in the axial needle roller and cage assembly AXK is 2 µm.

Axial bearing washers AS match themselves to the accuracy of the mating surface. They are flat under a minimum concentric load of 200 N.

Tolerances

Series	Bore		Outside diameter		Height	
		Tolerance		Tolerance		Tolerance
AXK	D_{c1}	E12	D_c	c13	D_W	–0,01 mm
AXW	D_{c1}	E12	–	–	B	–0,2 mm
AS	d	E13	D	e13	B_1	±0,05 mm

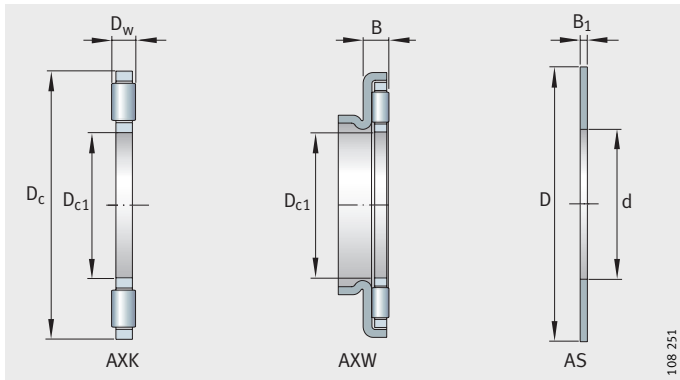
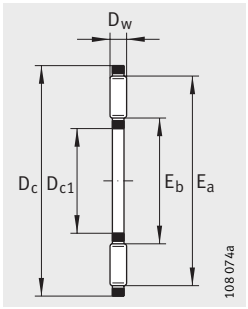
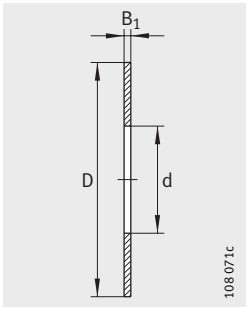


Figure 1
Bearing components

Axial needle roller and cage assemblies Axial bearing washers



AXK



AS

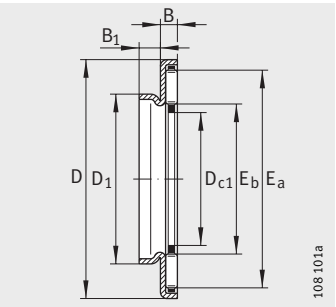
Dimension table · Dimensions in mm

Axial needle roller and cage assemblies		Axial bearing washers		Dimensions			
Designation	Mass m ≈g	Designation	Mass m ≈g	D_{c1}/d	D_c/D	D_w	B_1
AXK0414-TV	0,7	**AS0414**	1	**4**	14	2	1
AXK0515-TV	0,8	**AS0515**	1	**5**	15	2	1
AXK0619-TV	1	**AS0619**	2	**6**	19	2	1
AXK0821-TV	2	**AS0821**	2	**8**	21	2	1
AXK1024	3	**AS1024**	3	**10**	24	2	1
AXK1226	3	**AS1226**	3	**12**	26	2	1
AXK1528	4	**AS1528**	3	**15**	28	2	1
AXK1730	4	**AS1730**	4	**17**	30	2	1
AXK2035	5	**AS2035**	5	**20**	35	2	1
AXK2542	7	**AS2542**	7	**25**	42	2	1
AXK3047	8	**AS3047**	8	**30**	47	2	1
AXK3552	10	**AS3552**	9	**35**	52	2	1
AXK4060	16	**AS4060**	12	**40**	60	3	1
AXK4565	18	**AS4565**	13	**45**	65	3	1
AXK5070	20	**AS5070**	14	**50**	70	3	1
AXK5578	28	**AS5578**	18	**55**	78	3	1
AXK6085	33	**AS6085**	22	**60**	85	3	1
AXK6590	35	**AS6590**	24	**65**	90	3	1
AXK7095	60	**AS7095**	25	**70**	95	4	1
AXK75100	61	**AS75100**	27	**75**	100	4	1
AXK80105	63	**AS80105**	28	**80**	105	4	1
AXK85110	67	**AS85110**	29	**85**	110	4	1
AXK90120	86	**AS90120**	39	**90**	120	4	1
AXK100135	104	**AS100135**	50	**100**	135	4	1
AXK110145	122	**AS110145**	55	**110**	145	4	1
AXK120155	131	**AS120155**	59	**120**	155	4	1
AXK130170	205	**AS130170**	65	**130**	170	5	1
AXK140180	219	**AS140180**	79	**140**	180	5	1
AXK150190	232	**AS150190**	84	**150**	190	5	1
AXK160200	246	**AS160200**	89	**160**	200	5	1

Raceway dimensions		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
E_b	E_a	dyn. C_a N	stat. C_{0a} N	C_{ua} N	n_G min^{-1}	n_B min^{-1}
5	13	4 400	8 000	940	21 500	14 900
6	14	4 750	9 200	1 070	20 600	13 000
7	18	6 800	15 500	1 580	18 900	10 800
9	20	7 800	19 400	1 970	17 800	8 800
12	23	9 200	25 500	2 500	16 900	7 400
14	25	9 900	29 000	2 850	15 200	6 500
17	27	11 300	36 000	3 600	13 200	5 100
19	29	11 900	39 500	3 950	12 100	4 600
22	34	13 100	46 500	4 750	10 500	4 350
29	41	14 700	58 000	5 900	8 400	3 850
34	46	16 300	70 000	7 100	7 300	3 200
39	51	17 800	81 000	8 300	6 500	2 800
45	58	28 000	114 000	11 800	5 600	2 440
50	63	30 000	128 000	13 300	5 100	2 170
55	68	32 000	143 000	14 800	4 700	1 950
60	76	38 000	186 000	20 300	4 250	1 780
65	83	44 500	234 000	26 500	3 900	1 590
70	88	46 500	255 000	28 500	3 650	1 470
74	93	54 000	255 000	26 500	3 450	1 430
79	98	55 000	265 000	28 000	3 250	1 350
84	103	56 000	280 000	29 500	3 100	1 280
89	108	58 000	290 000	30 500	2 950	1 220
94	118	73 000	405 000	44 500	2 700	1 120
105	133	91 000	560 000	58 000	2 420	980
115	143	97 000	620 000	63 000	2 230	890
125	153	102 000	680 000	68 000	2 070	810
136	167	133 000	840 000	75 000	1 900	760
146	177	138 000	900 000	79 000	1 780	710
156	187	143 000	960 000	82 000	1 680	660
166	197	148 000	1 020 000	86 000	1 590	620

Axial needle roller bearings

With centring spigot



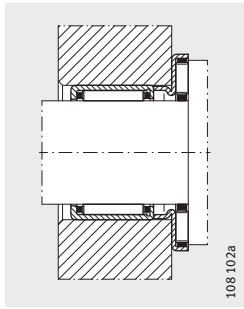
AXW

Dimension table · Dimensions in mm

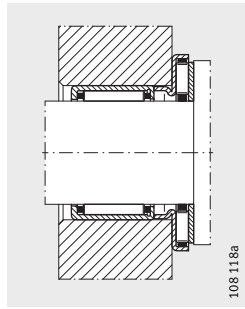
Designation	Mass	Dimensions					Raceway dimensions		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
	m	D_{c1}	D_1	D	B	B_1	E_b	E_a	dyn. C_a	stat. C_{0a}	C_{ua}	n_G	n_B
	≈g								N	N	N	min^{-1}	min^{-1}
AXW10	8,3	**10**	14	27	3,2	3	12	23	9 200	25 500	2 500	16 900	8 300
AXW12	9,1	**12**	16	29	3,2	3	14	25	9 900	29 000	2 850	15 200	7 300
AXW15	10	**15**	21	31	3,2	3,5	17	27	11 300	36 000	3 600	13 200	5 800
AXW17	11	**17**	23	33	3,2	3,5	19	29	11 900	39 500	3 950	12 100	5 300
AXW20	14	**20**	26	38	3,2	3,5	22	34	13 100	46 500	4 750	10 500	4 900
AXW25	20	**25**	32	45	3,2	4	29	41	14 700	58 000	5 900	8400	4 250
AXW30	22	**30**	37	50	3,2	4	34	46	16 300	70 000	7 100	7 300	3 600
AXW35	27	**35**	42	55	3,2	4	39	51	17 800	81 000	8 300	6 500	3 100
AXW40	39	**40**	47	63	4,2	4	45	58	28 000	114 000	11 800	5 600	2 700
AXW45	43	**45**	52	68	4,2	4	50	63	30 000	128 000	13 300	5 100	2 400
AXW50	49	**50**	58	73	4,2	4,5	55	68	32 000	143 000	14 800	4 700	2 160

[1] Dimensions for axial bearing washers AS, for drawn cup needle roller bearings with open ends, drawn cup needle roller bearings with closed end and needle roller bearings: see corresponding product section.

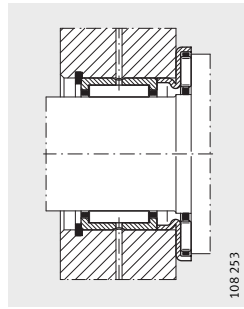
Combination with radial needle roller bearings



AXW with HK



AXW with AS and HK



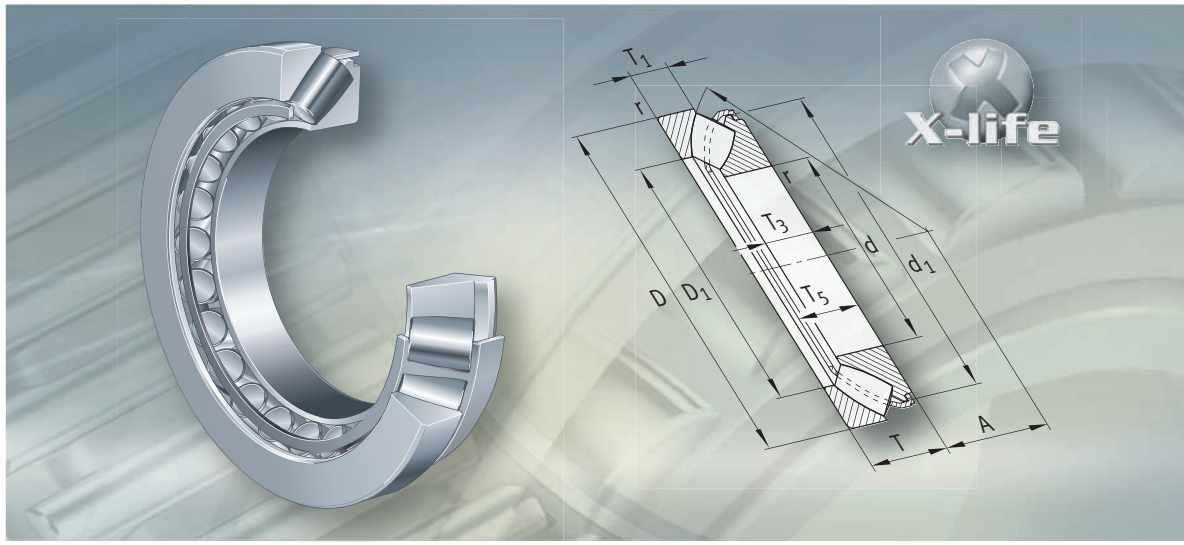
AXW with NK, NKS, RNA49, RNA69

Combination with drawn cup needle roller bearings with open ends, drawn cup needle roller bearings with closed end and with needle roller bearings

Designation

AS Axial bearing washer[1)]	HK Drawn cup needle roller bearing with open ends[1)]	HK..-RS Drawn cup needle roller bearing with open ends[1)]	BK Drawn cup needle roller bearings with closed end[1)]	NK, NKS, RNA49, RNA69 Needle roller bearings[1)]	NKI, NKIS, NA49, NA69 Needle roller bearings[1)]
AS1024	HK1010, HK1012	–	BK1010, BK1012	NK7/10-TV	–
–	HK1015	–	BK1015	NK7/12-TV	–
AS1226	HK1210	–	BK1210	NK9/12-TV	NKI6/12-TV
–	–	–	–	NK9/16-TV	NKI6/16-TV
AS1528	HK1512, HK1516	HK1514-RS	BK1512, BK1516	–	–
–	HK1522-ZW	–	–	–	–
AS1730	HK1712	–	–	NK15/16, NK15/20	–
AS2035	HK2012, HK2016	HK2018-RS	BK2016	NK18/16, NK18/20	–
–	HK2020	–	BK2020	–	–
–	HK2030-ZW	–	–	–	–
AS2542	HK2512, HK2516	HK2518-RS	–	NK24/16, NK24/20	NKI20/16
–	HK2520, HK2526	–	BK2520, BK2526	NKS20	NKI20/20
–	HK2538-ZW	–	BK2538-ZW	–	–
AS3047	HK3012, HK3016	HK3018-RS	BK3012, BK3016	NK28/20, NK28/30	NA4904
–	HK3020, HK3026	–	BK3020, BK3026	NKS 24	NA6904
–	HK3038-ZW	–	BK3038-ZW	RNA4904, RNA6904	–
AS3552	HK3512, HK3516	HK3518-RS	–	NK32/20-TV, NK32/30	NKIS20, NA4905
–	HK3520	–	BK3520	NKS28	NA6905
–	–	–	–	RNA4905, RNA6905	NKI28/20-TV, NKI28/30
AS4060	HK4012, HK4016	HK4018-RS	–	NK37/20, NK37/30	NKIS25, NA4906
–	HK4020	–	BK4020	NKS32	NA6906
–	–	–	–	RNA4906, RNA6906	NKI32/20
–	–	–	–	–	NKI32/30
AS4565	HK4516, HK4520	HK4518-RS	BK4520	NK42/20, NK42/30	NKIS30
–	–	–	–	NKS37	NA49/32
–	–	–	–	RNA49/32, RNA69/32-ZW	NA69/32-ZW
AS5070	HK5020, HK5025	HK5022-RS	–	NKS43	NKIS35

FAG



Axial spherical roller bearings

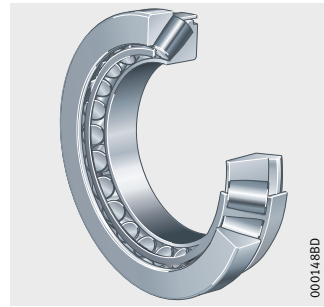
Axial spherical roller bearings

		Page
Product overview	Axial spherical roller bearings	884
Features	X-life	885
	Axial and radial load capacity	885
	Compensation of angular misalignments	885
	Sealing	886
	Lubrication	886
	Operating temperature	886
	Cages	886
	Suffixes	886
Design and safety guidelines	Equivalent dynamic bearing load	887
	Equivalent static bearing load	887
	Static load safety factor	887
	Minimum axial load	888
	Speeds	888
	Design of bearing arrangements	889
Accuracy		889
Dimension tables	Axial spherical roller bearings	890

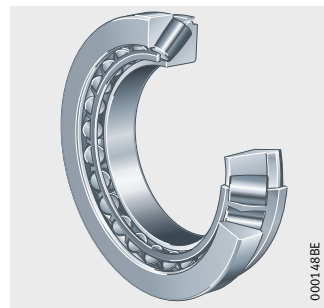
Increased capacity design

With sheet metal cage

293..-E1, 294..-E1

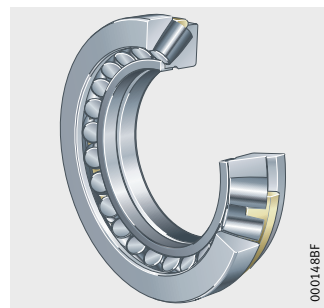


293..-E, 294..-E



With solid cage

292..-E, 293..-E, 294..-E



Axial spherical roller bearings

Features

Axial spherical roller bearings are single row, self-aligning roller bearings. They comprise solid shaft and housing locating washers and asymmetrical barrel rollers with cages. The cage holds together the roller and cage assembly and the shaft locating washer.
The bearings can be dismantled. As a result, the bearing components can be fitted separately.

X-life

Axial spherical roller bearings of the series 293..-E1 and 294..-E1 are of X-life quality. These bearings are indicated in the dimension tables.

The bearings have an internal construction that gives increased basic load ratings as well as a precise contact geometry between the guidance rib and the end of the roller for improved kinematics. Friction and wear are reduced as a result of optimum lubricant film formation and a new cage design with improved guidance of the rollers and lubricant. Optimised osculation conditions give more uniform distribution of pressure between the rollers and raceways.

Due to the increased axial load carrying capacity and reduced bearing temperature under the same operating conditions, the rating life is significantly improved.

Axial and radial load capacity

Axial spherical roller bearings can support very high axial loads and allow relatively high speeds. Since the raceways are inclined relative to the bearing axis, the bearings can also support radial loads, see Radial load, page 887.

Compensation of angular misalignments

Axial spherical roller bearings can be swivelled about their central position by a few degrees, see table. As a result, they permit skewing between the housing and shaft locating washer and can thus compensate misalignments, shaft deflections and housing deformations.

The adjustment angles given in the table are permissible under the following conditions:

- P or $P_0 \leqq 0{,}05 \cdot C_{0a}$
- the angular deviation is constant (static angular misalignment)
- the rotating component is the shaft locating washer.

The lower values are valid for large bearings.

Permissible skewing

Series	Permissible skewing[1)]
292..-E	1° to 1,5°
293..-E1(-E)	1,5° to 2,5°
294..-E1(-E)	2° to 3°

[1)] If the rotating component is the housing locating washer or the shaft locating washer undergoes tumbling motion, the angular adjustment facility is smaller.

Sealing

Axial spherical roller bearings are not sealed.

Lubrication

The bearings are not greased. They are generally lubricated using oil. In some cases, lubrication with greases containing EP additives is also possible. Adequate supply to the contact points between the rollers and guidance rib is best achieved if the bearings are completely filled with grease.

Operating temperature

Axial spherical roller bearings can be used at operating temperatures from –30 °C to +200 °C, restricted by the lubricant.

Cages

The standard cages for axial spherical roller bearings are shown in the table.

Bearings with the suffix MB have a solid brass cage that is guided on the shaft locating washer. The other bearings have sheet steel cages and do not have a cage suffix.

Cage and bore code

Series	Sheet steel cage Bore code	Solid brass cage
292..-E	–	All
293..-E1	All	–
294..-E1	All	–
293..-E	up to 64	from 68
294..-E	up to 68	from 72

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
E, E1	Increased capacity design	Standard
MB	Solid brass cage	

Design and safety guidelines

Equivalent dynamic bearing load

For bearings under dynamic loading, the following applies:

$$P = F_a + 1{,}2 \cdot F_r$$

P N
Equivalent dynamic bearing load for combined load

F_a N
Axial dynamic bearing load

F_r N
Radial dynamic bearing load.

Radial load

The radial bearing load must not exceed 55% of the axial load:
$F_r \leqq 0{,}55 \cdot F_a$.

Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0a} + 2{,}7 \cdot F_{0r}$$

P_0 N
Equivalent static bearing load for combined load

F_{0a} N
Axial static bearing load

F_{0r} N
Radial static bearing load.

Radial load

The radial bearing load must not exceed 55% of the axial load:
$F_{0r} \leqq 0{,}55 \cdot F_{0a}$.

Static load safety factor

For the static load safety factor S_0, the following values must be observed:

Static load safety factor

Static load safety factor S_0	Conditions
$S_0 \geqq 8$	Axial support by the abutment shoulders in accordance with the bearing tables (d_a and D_a)
$S_0 \geqq 6$	Full axial support of the housing and shaft locating washers by the entire mating surface, dimensions D_1 and d_1, see dimension tables
$S_0 \geqq 4$	Full axial support, dimensions D_1 and d_1, see dimension tables, together with good radial support of the housing locating washer (housing tolerance K7)

Minimum axial load

A minimum axial load $F_{a\,min}$ according to the formula must be applied:

$$F_{a\,min} = 0{,}0005 \cdot C_{0a} + k_a \left(\frac{C_{0a} \cdot n}{10^8} \right)^2$$

$F_{a\,min}$ N
Minimum axial load

C_{0a} N
Basic static load rating

k_a –
Factor for determining the minimum load, see table

n min^{-1}
Maximum speed.

Factor k_a

Series	Factor k_a
292..-E	0,6
293..-E1(-E)	0,9
294..-E1(-E)	0,7

Speeds

The limiting speeds n_G given in the dimension tables must not be exceeded. The values are for oil lubrication.

The reference speeds n_B were calculated according to ISO 15 312.

Design of bearing arrangements

Shaft and housing tolerances

The tolerances for the shaft and locating bore must be selected in accordance with the table.

Shaft and housing tolerances

Adjacent part	Load type	Operating conditions	Tolerance
Shaft	Combined load	Point load for shaft locating washer	j6
		Circumferential load for shaft locating washer, shaft diameter up to 200 mm	j6 (k6)
		Circumferential load for shaft locating washer, shaft diameter from 200 mm	k6 (m6)
Housing	Axial load	Normal load	E8
		High load	G7
	Combined load	Point load for housing locating washer	H7
		Circumf. load for housing locating washer	K7

Adjacent parts

The runout tolerances of the abutment shoulders should be to IT5 or better. The abutment shoulders should be rigid, flat and perpendicular to the axis of rotation.

A recess of diameter $D_{b\ min}$ must be provided above the housing locating washer in the housing bore, see dimension tables. Otherwise, the rollers will foul the housing when the shaft swivels.

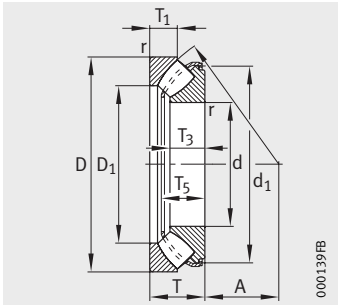
Due to the new internal construction of the E1 design, attention must be paid to the mounting dimensions. This also applies to the design of the spacer sleeve on the shaft locating washer (dimensions d_b, d_{b1}).

Accuracy

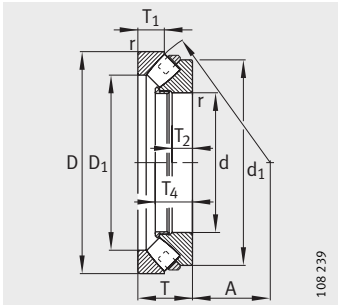
The main dimensions of the bearings conform to ISO 104 and DIN 728. The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620-3.

The section height tolerance for axial spherical roller bearings of the E1 design is restricted by up to 70% compared with the standard.

Axial spherical roller bearings



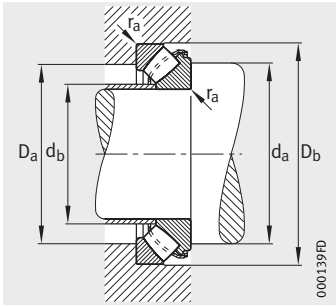
293..-E1, 294..-E1



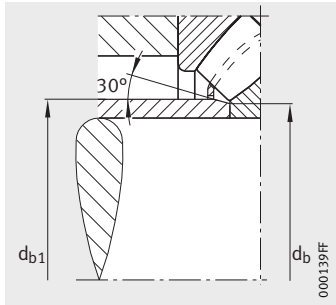
292..-E-MB

Dimension table · Dimensions in mm

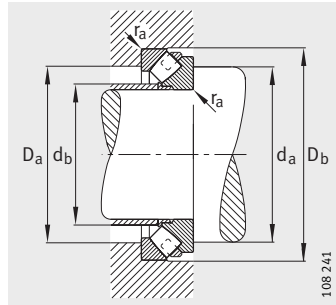
Designation	X-life	Mass	Dimensions											
			d	D	T	D_1	d_1	r	T_1	T_2	T_3	T_4	T_5	A
		≈kg						min.					≈	
29412-E1	**XL**	2,5	**60**	130	42	85,5	116,5	1,5	21	–	27	–	37,5	38
29413-E1	**XL**	3,1	**65**	140	45	91,5	125,2	2	22	–	29,5	–	40,5	42
29414-E1	**XL**	3,8	**70**	150	48	99	133,8	2	23,8	–	31	–	42,5	44,8
29415-E1	**XL**	4,6	**75**	160	51	105,5	142,3	2	24,5	–	33,5	–	46	47
29416-E1	**XL**	5,5	**80**	170	54	112,5	150,9	2,1	26,5	–	35	–	48,5	50
29317-E1	**XL**	2,7	**85**	150	39	109,5	138,5	1,5	20	–	24,5	–	34,5	50
29417-E1	**XL**	6,5	**85**	180	58	121	159,3	2,1	28	–	37	–	51	54
29318-E1	**XL**	2,8	**90**	155	39	115	142,3	1,5	19,5	–	24,5	–	34,5	52
29418-E1	**XL**	7,5	**90**	190	60	127,5	167,7	2,1	28,5	–	39	–	54	56
29320-E1	**XL**	3,6	**100**	170	42	127,5	156	1,5	20,5	–	26,2	–	37,5	58
29420-E1	**XL**	10,1	**100**	210	67	141,5	184,5	3	32	–	43	–	59,5	62
29322-E1	**XL**	5,2	**110**	190	48	140	175,6	2	24,8	–	30,3	–	42	64
29422-E1	**XL**	12,8	**110**	230	73	155,5	201,9	3	34,7	–	47	–	64,5	69
29324-E1	**XL**	7,2	**120**	210	54	154	192,6	2,1	27	–	34	–	48	70
29424-E1	**XL**	15,9	**120**	250	78	171	218,4	4	36,5	–	50,5	–	70	74
29326-E1	**XL**	8,8	**130**	225	58	165,5	207,9	2,1	30,1	–	36,7	–	50,5	76
29426-E1	**XL**	21	**130**	270	85	184,5	240	4	40,9	–	54	–	75	81
29328-E1	**XL**	10,3	**140**	240	60	177	220,6	2,1	30	–	38,5	–	53,5	82
29428-E1	**XL**	22,1	**140**	280	85	194,5	251,1	4	41	–	54	–	74,5	86
29330-E1	**XL**	10,5	**150**	250	60	190	228,4	2,1	28	–	38	–	54,5	87
29430-E1	**XL**	27,2	**150**	300	90	207,5	267,4	4	43,4	–	58	–	80,5	92
29332-E1	**XL**	14	**160**	270	67	203	248	3	33	–	42	–	59,5	92
29432-E1	**XL**	32,1	**160**	320	95	223,5	283,5	5	45,5	–	60,5	–	84,5	99
29334-E1	**XL**	14,2	**170**	280	67	215	255,7	3	30,5	–	42,2	–	60,5	96
29434-E1	**XL**	39,6	**170**	340	103	236	305	5	50	–	65,5	–	89,5	104
29336-E1	**XL**	18,4	**180**	300	73	227	274,5	3	35,5	–	46	–	64,5	103
29436-E1	**XL**	47,6	**180**	360	109	250	315,5	5	53	–	69,5	–	96	110
29338-E1	**XL**	22,3	**190**	320	78	243,5	290,1	4	36	–	49	–	70	110
29438-E	–	54,9	**190**	380	115	268	340	5	55	41	73	–	94	117
29240-E-MB	–	8,15	**200**	280	48	236	265	2	24	17	29	45	–	108
29340-E1	**XL**	27,3	**200**	340	85	257	308,8	4	40	–	53,5	–	75,5	116
29440-E	–	64,7	**200**	400	122	282	360	5	59	44	77	–	99	122



Mounting dimensions
293..-E1, 294..-E1



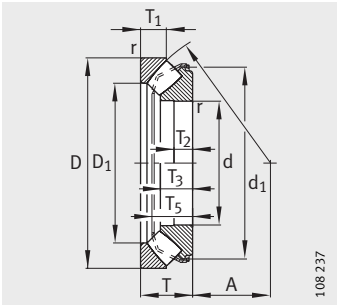
Mounting dimensions
293..-E1, 294..-E1



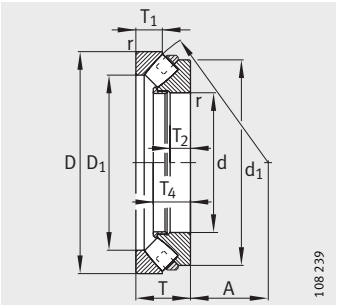
Mounting dimensions
292..-E-MB

Mounting dimensions						Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	D_b	d_b	d_{b1}	r_a	dyn. C_a	stat. C_{0a}	C_{ua}	n_G	n_B
min.	max.	min.	max.	max.	max.	N	N	N	min^{-1}	min^{-1}
95	107	133	67	–	1,5	420 000	970 000	116 000	6 000	2 750
100	115	143	72	–	2	495 000	1 160 000	137 000	5 300	2 550
110	124	153	78,5	–	2	550 000	1 290 000	151 000	5 000	2 420
115	132	163	82,5	–	2	650 000	1 540 000	176 000	4 800	2 230
125	141	173	88	–	2	720 000	1 720 000	196 000	4 500	2 120
120	129	153	92	–	1,5	420 000	1 110 000	146 000	4 800	2 270
130	150	183	94	–	2	800 000	1 910 000	220 000	4 000	2 010
125	135	158	97	–	1,5	420 000	1 130 000	152 000	4 800	2 160
135	158	193	99,5	–	2	880 000	2 130 000	241 000	4 000	1 910
135	148	173	107	–	1,5	495 000	1 340 000	181 000	4 300	1 970
150	175	214	110,5	–	2,5	1 060 000	2 600 000	285 000	3 400	1 740
150	165	193	120	–	2	620 000	1 760 000	217 000	3 600	1 850
165	192	234	121	129	2,5	1 260 000	3 150 000	345 000	3 000	1 600
165	182	213	129	–	2	800 000	2 210 000	270 000	3 400	1 710
180	210	254	132	142	3	1 460 000	3 700 000	390 000	2 800	1 470
180	195	228	139	143	2	900 000	2 600 000	300 000	3 000	1 590
195	227	275	143	153	3	1 700 000	4 350 000	450 000	2 600	1 360
190	208	244	149	154	2	1 010 000	2 900 000	340 000	2 800	1 500
205	237	285	154	162	3	1 710 000	4 500 000	495 000	2 600	1 300
195	220	254	159	163	2	1 020 000	2 900 000	360 000	2 600	1 410
220	253	306	164	175	3	2 000 000	5 300 000	560 000	2 200	1 190
215	236	274	170	176	2,5	1 220 000	3 550 000	420 000	2 600	1 330
235	271	326	176	189	4	2 240 000	6 000 000	630 000	2 200	1 090
220	247	284	180	188	2,5	1 220 000	3 500 000	435 000	2 400	1 260
250	288	346	186	199	4	2 550 000	6 900 000	700 000	2 000	1 030
235	263	304	190	195	2,5	1 460 000	4 300 000	495 000	2 200	1 170
265	305	366	197	210	4	2 850 000	7 700 000	770 000	1 800	940
250	281	325	201	211	3	1 680 000	4 850 000	580 000	2 200	1 090
275	322	386	214	–	4	2 320 000	7 500 000	470 000	1 200	970
235	258	284	211	–	2	655 000	2 650 000	152 000	2 000	1 260
265	298	348	213	224	3	1 900 000	5 600 000	640 000	2 000	1 030
290	338	406	225	–	4	2 550 000	8 500 000	510 000	1 100	920

Axial spherical roller bearings



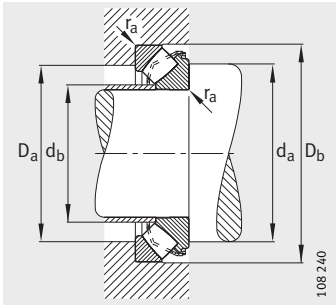
293..-E, 294..-E



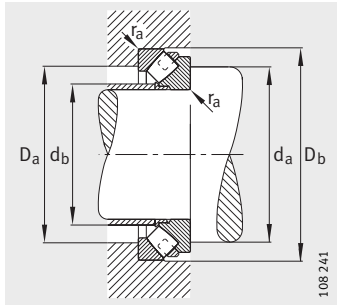
292..-E-MB, 293..-E-MB, 294..-E-MB

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions											
		d	D	T	D_1	d_1	r	T_1	T_2	T_3	T_4	T_5	A
	≈kg						min.						
29244-E-MB	9,18	**220**	300	48	254	285	2	24	17	30	35	–	117
29344-E	29,9	**220**	360	85	279	330	4	41	31	53	–	71	125
29444-E	67,4	**220**	420	122	303	375	6	58	44	76,5	–	99	132
29248-E-MB	16,1	**240**	340	60	282	320	2,1	30	22	38	44	–	130
29348-E	32,5	**240**	380	85	299	350	4	41	31	53	–	71	135
29448-E	73,5	**240**	440	122	321	400	6	59	44	78	–	99	142
29252-E-MB	17	**260**	360	60	302	340	2,1	30	22	38	44	–	139
29352-E	45,2	**260**	420	95	327	385	5	45	34	61	–	79	148
29452-E	93,6	**260**	480	132	353	435	6	64	48	83	–	107	154
29256-E-MB	19,2	**280**	380	60	322	360	2,1	30	22	38	44	–	150
29356-E	48,8	**280**	440	95	346	405	5	46	34	61	–	79	158
29456-E	121	**280**	520	145	380	470	6	68	52	92	–	118	166
29260-E-MB	28,6	**300**	420	73	353	395	3	38	26	44	51	–	162
29360-E	66,4	**300**	480	109	378	440	5	50	39	69	–	90	168
29460-E	129	**300**	540	145	398	490	6	70	52	93	–	118	175
29264-E-MB	30,3	**320**	440	73	372	415	3	38	26	44,5	51	–	172
29364-E	71	**320**	500	109	396	465	5	53	39	68	–	90	180
29464-E	158	**320**	580	155	432	525	7,5	75	56	97	–	126	191
29268-E-MB	32	**340**	460	73	391	435	3	37	26	45	52	–	183
29368-E-MB	98,9	**340**	540	122	426	500	5	59	44	75	–	–	192
29468-E	200	**340**	620	170	458	560	7,5	82	61	106	–	138	201
29272-E-MB	46,5	**360**	500	85	423	475	4	44	31	51	59	–	194
29372-E-MB	103	**360**	560	122	446	520	5	59	44	75	86	–	202
29472-E-MB	219	**360**	640	170	475	580	7,5	82	61	108	121	–	210
29276-E-MB	48,4	**380**	520	85	440	490	4	42	31	53	81	–	202
29376-E-MB	132	**380**	600	132	474	555	6	63	48	83	94	–	216
29476-E-MB	248	**380**	670	175	500	610	7,5	85	63	111	124	–	230
29280-E-MB	51,2	**400**	540	85	460	510	4	42	31	53,5	62	–	212
29380-E-MB	137	**400**	620	132	493	575	6	64	48	83	94	–	225
29480-E-MB	294	**400**	710	185	530	645	7,5	89	67	117	131	–	236
29284-E-MB	73,4	**420**	580	95	489	550	5	46	34	60,5	70	–	225
29384-E-MB	157	**420**	650	140	520	600	6	68	50	85	97	–	235
29484-E-MB	305	**420**	730	185	550	665	7,5	89	67	117	132	–	244



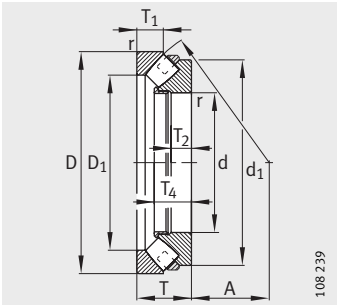
Mounting dimensions
293..-E, 294..-E



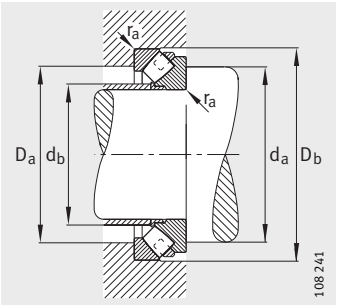
Mounting dimensions
292..-E-MB, 293..-E-MB,
294..-E-MB

Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	D_b	d_b	r_a	dyn. C_a	stat. C_{0a}	C_{ua}	n_G	n_B
min.	max.	min.	max.	max.	N	N	N	min^{-1}	min^{-1}
260	277	304	229	2	720 000	3 150 000	173 000	2 000	1 130
285	316	368	235	3	1 560 000	5 600 000	335 000	1 400	980
310	360	428	243	5	2 600 000	8 500 000	520 000	1 100	860
285	311	344	251	2,1	1 040 000	4 500 000	249 000	1 700	1 040
300	337	390	256	3	1 630 000	6 100 000	355 000	1 400	890
330	381	448	265	5	2 700 000	9 500 000	570 000	1 100	790
305	331	365	272	2,1	1 060 000	4 750 000	260 000	1 700	960
330	372	430	277	4	2 040 000	7 650 000	445 000	1 200	810
360	419	488	291	5	3 100 000	11 000 000	650 000	1 000	730
325	351	385	291	2,1	1 120 000	5 100 000	270 000	1 500	890
350	394	450	298	4	2 120 000	8 300 000	470 000	1 200	750
390	446	530	310	5	3 650 000	12 900 000	750 000	900	670
355	386	426	317	2,5	1 430 000	6 550 000	345 000	1 400	830
380	429	490	320	4	2 550 000	9 650 000	540 000	1 100	700
410	471	550	326	5	3 900 000	14 000 000	810 000	900	620
375	406	450	336	2,5	1 500 000	6 950 000	360 000	1 300	770
400	449	510	340	4	2 650 000	10 600 000	580 000	1 100	660
435	507	590	354	6	4 300 000	15 600 000	890 000	800	590
395	427	470	353	2,5	1 560 000	7 350 000	385 000	1 300	730
430	484	550	364	4	3 250 000	12 900 000	700 000	950	600
465	541	630	373	6	5 200 000	19 000 000	1 070 000	750	530
420	461	510	380	3	1 900 000	8 800 000	455 000	1 200	700
450	504	572	384	4	3 350 000	13 400 000	720 000	900	570
485	560	650	391	6	5 400 000	20 400 000	1 130 000	750	495
440	480	530	395	3	2 080 000	9 650 000	495 000	1 100	650
480	538	612	404	5	3 900 000	16 000 000	860 000	850	530
510	587	682	415	6	5 850 000	22 400 000	1 220 000	700	465
460	500	550	415	3	2 120 000	10 200 000	510 000	1 100	610
500	557	634	424	5	4 000 000	16 600 000	880 000	850	510
540	622	722	441	6	6 400 000	25 000 000	1 330 000	670	440
490	534	590	437	4	2 650 000	12 500 000	620 000	1 000	580
525	585	664	447	5	4 300 000	18 000 000	940 000	800	475
560	643	742	455	6	6 700 000	26 000 000	1 390 000	630	420

Axial spherical roller bearings



292..-E-MB, 293..-E-MB, 294..-E-MB

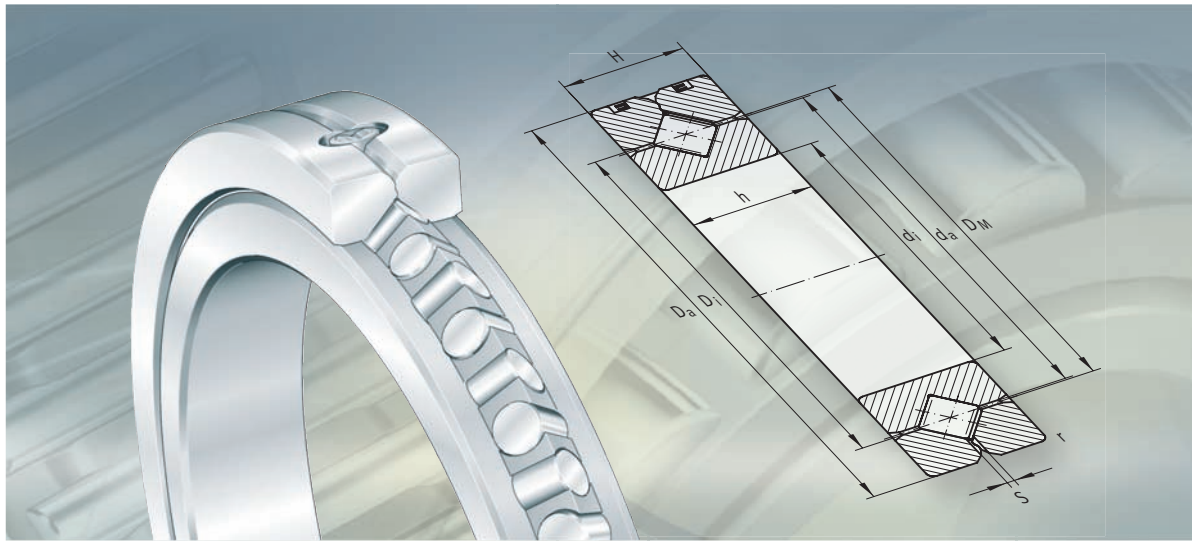


Mounting dimensions
292..-E-MB, 293..-E-MB, 294..-E-MB

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions										
		d	D	T	D_1	d_1	r	T_1	T_2	T_3	T_4	A
	≈kg						min.					
29288-E-MB	74	**440**	600	95	506	570	5	49	34	61	70	235
29388-E-MB	176	**440**	680	145	548	630	6	70	52	87	100	245
29488-E-MB	393	**440**	780	206	585	710	9,5	100	74	128	144	260
29292-E-MB	76,3	**460**	620	95	528	590	5	46	34	61	70	245
29392-E-MB	203	**460**	710	150	567	660	6	72	54	94,5	108	257
29492-E-MB	407	**460**	800	206	605	730	9,5	100	74	128	144	272
29296-E-MB	90,9	**480**	650	103	556	620	5	55	37	62	71	259
29396-E-MB	208	**480**	730	150	587	675	6	72	54	94	107	270
29496-E-MB	511	**480**	850	224	630	770	9,5	108	81	142	159	280
292/500-E-MB	93,5	**500**	670	103	574	640	5	55	37	63	72	268
293/500-E-MB	216	**500**	750	150	610	700	6	74	54	92	105	280
294/500-E-MB	525	**500**	870	224	654	790	9,5	107	81	142	160	290
292/530-E-MB	110	**530**	710	109	612	675	5	57	39	64	74	288
293/530-E-MB	266	**530**	800	160	646	745	7,5	76	58	101,5	116	295
294/530-E-MB	621	**530**	920	236	690	840	9,5	114	85	150,5	169	309
292/560-E-MB	131	**560**	750	115	642	715	5	60	41	71	111	302
294/560-E-MB	733	**560**	980	250	729	890	12	120	90	163	182	328
292/600-E-MB	154	**600**	800	122	688	760	5	65	44	71,5	82	321
294/600-E-MB	839	**600**	1 030	258	782	940	12	127	93	162	182	347
292/630-E-MB	195	**630**	850	132	724	805	6	67	48	82	94	338
294/630-E-MB	1 030	**630**	1 090	280	820	995	12	136	101	176,5	198	365
292/670-E-MB	228	**670**	900	140	773	855	6	74	50	81	93	364
294/710-E-MB	1 420	**710**	1 220	308	916	1 115	15	150	111	198	221	415
292/750-E-MB	299	**750**	1 000	150	861	955	6	81	54	88	100	406
293/750-E-MB	716	**750**	1 120	224	909	1 045	9,5	108	81	140	159	415
292/800-E-MB	341	**800**	1 060	155	915	1 010	7,5	81	56	96	110	426
293/800-E-MB	801	**800**	1 180	230	961	1 100	9,5	112	83	145,5	165	440
293/850-E-MB	933	**850**	1 250	243	1 021	1 165	12	118	87	152	173	468

Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d_a	D_a	D_b	d_b	r_a	dyn. C_a	stat. C_{0a}	C_{ua}	n_G	n_B
min.	max.	min.	max.	max.	N	N	N	min^{-1}	min^{-1}
510	554	610	458	4	2 650 000	13 400 000	660 000	1 000	550
548	614	695	470	5	4 550 000	19 000 000	990 000	750	460
595	684	794	486	8	7 650 000	30 000 000	1 570 000	600	395
530	575	632	477	4	2 700 000	13 400 000	660 000	950	530
575	638	726	487	5	5 000 000	21 200 000	1 120 000	700	440
615	704	815	502	8	7 800 000	31 000 000	1 620 000	600	380
555	603	662	508	4	2 800 000	14 600 000	700 000	900	510
593	660	746	507	5	5 200 000	22 400 000	1 160 000	700	410
645	744	865	521	8	9 300 000	36 500 000	1 920 000	530	350
575	622	682	527	4	2 900 000	15 300 000	740 000	900	490
615	683	768	532	5	5 100 000	22 800 000	1 160 000	700	400
670	765	886	542	8	9 300 000	37 500 000	1 930 000	530	340
611	661	722	560	4	3 100 000	16 300 000	770 000	850	465
650	724	818	561	6	6 000 000	26 500 000	1 350 000	630	375
700	810	937	573	8	10 200 000	41 500 000	2 160 000	500	320
645	697	762	586	4	3 650 000	19 300 000	910 000	800	435
750	860	997	606	10	11 800 000	49 000 000	2 480 000	480	290
690	744	814	633	4	3 800 000	20 400 000	960 000	750	410
800	900	1 055	653	10	12 200 000	52 000 000	2 600 000	450	275
730	789	864	657	5	4 800 000	25 500 000	1 180 000	670	375
840	960	1 115	681	10	14 000 000	58 500 000	2 850 000	430	260
775	836	915	710	5	4 900 000	26 000 000	1 190 000	630	365
925	1 073	1 250	768	12	17 300 000	75 000 000	3 600 000	400	224
863	930	1 017	798	5	5 600 000	32 000 000	1 410 000	600	325
915	1 015	1 142	795	8	10 800 000	51 000 000	2 420 000	450	255
918	987	1 078	837	6	6 550 000	37 500 000	1 640 000	530	295
970	1 070	1 202	842	8	11 800 000	57 000 000	2 700 000	450	232
1 028	1 137	1 273	896	10	12 900 000	64 000 000	2 900 000	430	215



Crossed roller bearings

Crossed roller bearings

		Page
Product overview	Crossed roller bearings	898
Features	For axial, radial and moment loads	899
	Circumferential speed	900
	Sealing	900
	Lubrication	900
	Operating temperature	900
	Suffixes	900
Design and safety guidelines	Static load carrying capacity	900
	Checking the static load carrying capacity	901
	Application factors	904
	Safety factors	904
	Dynamic load carrying capacity	904
	Determining the basic rating life	905
	Static load carrying capacity of fixing screws	907
	Checking the static load carrying capacity of the screws	908
	Checking the dynamic load carrying capacity of the screws	908
	Shaft and housing tolerances	909
	Location using clamping rings	910
	Fixing screws	912
	Securing of screws	912
	Fitting of crossed roller bearings	914
	Checking the function	916
Accuracy		916
Dimension tables	Crossed roller bearings	918

Dimension series 18

SX

Crossed roller bearings

Features

Crossed roller bearings SX are bearings for high precision applications, whose dimensions conform to ISO dimension series 18 to DIN 616. They comprise outer rings, inner rings, rolling elements and plastic spacers. The outer ring is split and is held together by three retaining rings.

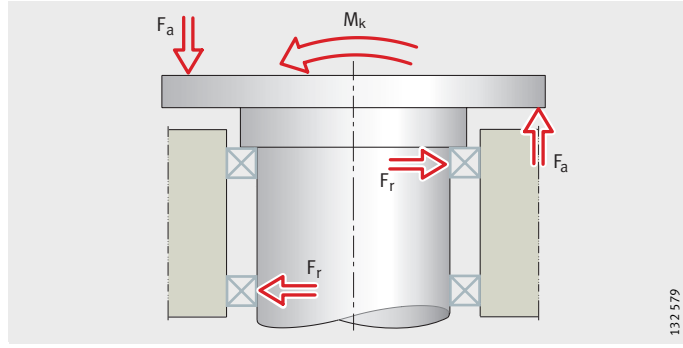
Crossed roller bearings are very rigid, have high running accuracy and are supplied with normal clearance, low clearance or preload. Preloaded bearings have the suffix VSP.

The bearing outer rings are easily fixed to the adjacent construction using clamping rings.

Crossed roller bearings are also available in a corrosion-resistant version with the special coating Corrotect®.

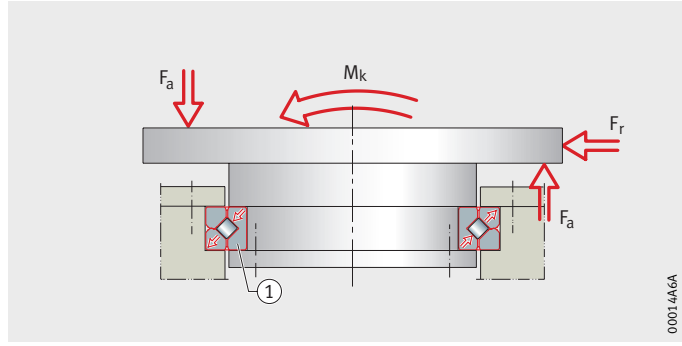
For axial, radial and moment loads

Due to the X arrangement of the cylindrical rollers, these bearings can support axial forces from both directions as well as radial forces, tilting moment loads and any combination of loads by means of a single bearing position. As a result, designs involving two bearing positions can be reduced to a single bearing position, *Figure 1* and *Figure 2*.



F_a = axial dynamic bearing load
F_r = radial dynamic bearing load
M_k = dynamic tilting moment load

Figure 1
Bearing arrangement
with two bearing positions



① Crossed roller bearing SX

Figure 2
Bearing arrangement
with one crossed roller bearing

Circumferential speed

The circumferential speed is dependent on the bearing (normal clearance or preloaded) and on the lubrication (grease or oil), see table.

Circumferential speed

Normal clearance	Preload	Circumferential speed
Oil lubrication	–	up to 8 m/s ($n \cdot D_M = 152\,800$)
Grease lubrication	–	up to 4 m/s ($n \cdot D_M = 76\,400$)
–	Oil lubrication	up to 4 m/s ($n \cdot D_M = 76\,400$)
–	Grease lubrication	up to 2 m/s ($n \cdot D_M = 38\,200$)

Sealing

The bearings are of an open design. The sealing arrangement can be designed anywhere within the adjacent construction.

Lubrication

SX bearings do not have an oil-based preservative but are greased; they can be lubricated using oil, see also publication KSX.

For grease lubrication, a high quality lithium soap grease DIN 51825–KP2N–20 is suitable, for example Arcanol LOAD150 or LOAD220.

For oil lubrication, oils of type CLP to DIN 51517 or HLP to DIN 51524 of viscosity classes ISO-VG 10 to 100 have proved effective.

Operating temperature

Crossed roller bearings are suitable for operating temperatures from –30 °C to +80 °C.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
RR	Corrosion-resistant design, with Corrotect® coating	Special design, available by agreement
RLO	Low clearance	Standard
VSP	Preloaded	

Design and safety guidelines

Static load carrying capacity

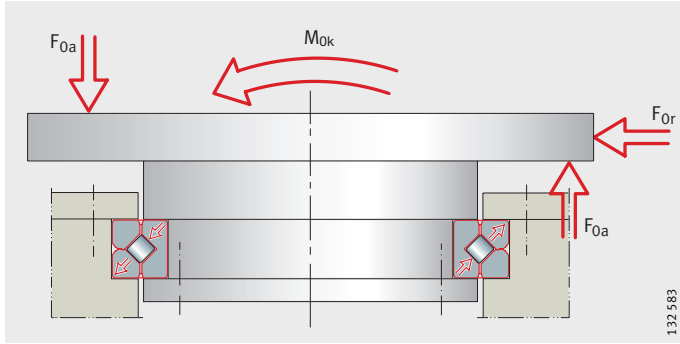
Crossed roller bearings that undergo rotary motion only infrequently, undergo slow swivel motion, rotate only slowly or are subjected to load while stationary are dimensioned on the basis of their static load carrying capacity.

The size of a statically loaded bearing can therefore be checked in approximate terms using the basic static load ratings C_0 and the static limiting load diagrams.

Checking the static load carrying capacity

It can be checked in approximate terms if the load arrangement is present and all the requirements relating to clamping rings, location, fitting and lubrication are fulfilled, *Figure 3*.

Where load arrangements are more complex or the conditions are not fulfilled, please contact us.



F_{0a} = axial static bearing load
F_{0r} = radial static bearing load
M_{0k} = static tilting moment load

Figure 3
Load arrangement

In order to check the static load carrying capacity, the following equivalent static operating values must be determined:

- the equivalent static bearing load F_{0q}
- the equivalent static tilting moment load M_{0q}.

Checking is possible for applications with or without radial load.

Determining the equivalent static bearing load without radial load

If only axial and tilting moment loads are present, the following apply:

$$F_{0q} \triangleq F_{0a} \cdot f_A \cdot f_S$$

$$M_{0q} \triangleq M_{0k} \cdot f_A \cdot f_S$$

F_{0q} kN
Equivalent axial bearing load (static)
F_{0a} kN
Axial static bearing load
f_A –
Application factor, see table, page 904
f_S –
Factor for additional safety, see Safety factors, page 904
M_{0q} kNm
Equivalent tilting moment load (static)
M_{0k} kNm
Static tilting moment load.

The values F_{0q} and M_{0q} are used to determine the load point in the static limiting load diagram Raceway, see dimension tables.

In addition to the raceway, the dimensioning of the fixing screws must also be checked.

The static limiting load diagrams for the raceway and the fixing screws are indicated in the dimension tables.

The load point must be below the raceway curve.

Determining the equivalent static bearing load with radial load

Radial loads can only be taken into consideration if the radial load F_{0r} is smaller than the basic static radial load rating C_{0r}, according to dimension table.

The equivalent static bearing load with radial load is determined as follows:

- Calculate the parameter for load eccentricity ϵ using the formula
- Determine the static radial load factor f_{0r}. To do this:
  - determine the ratio F_{0r}/F_{0a} in *Figure 4* or *Figure 5*, page 903
  - based on the ratio F_{0r}/F_{0a} and ϵ, determine the static radial load factor f_{0r} from *Figure 4* or *Figure 5*, page 903
- Determine the application factor f_A, see table, page 904, and the safety factor f_S if necessary
- Calculate the equivalent axial bearing load F_{0q} and equivalent tilting moment load M_{0q} according to the formulae
- Based on the values F_{0q} and M_{0q}, determine the load point in the static limiting load diagram Raceway, see dimension tables.

The load point must be below the raceway curve.

$$\epsilon = \frac{2000 \cdot M_{0k}}{F_{0a} \cdot D_M}$$

$$F_{0q} = F_{0a} \cdot f_A \cdot f_S \cdot f_{0r}$$

$$M_{0q} = M_{0k} \cdot f_A \cdot f_S \cdot f_{0r}$$

ϵ –
Load eccentricity parameter

M_{0k} kNm
Static tilting moment load

F_{0a} kN
Axial static bearing load

D_M mm
Rolling element pitch circle diameter, see dimension table

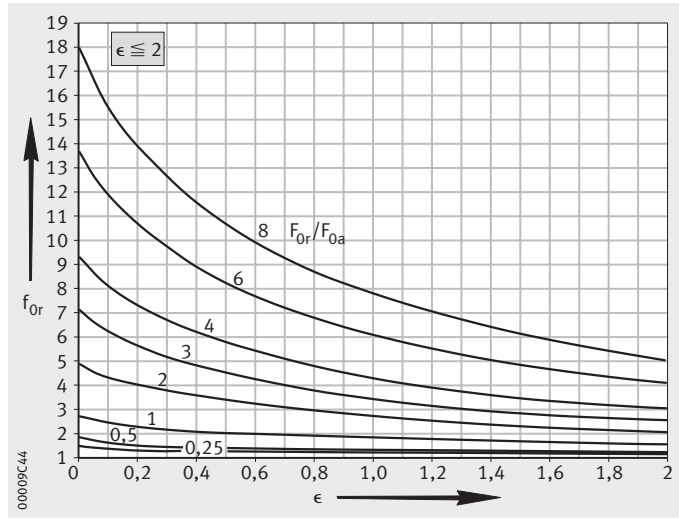
F_{0q} kN
Equivalent bearing load (static)

f_A –
Application factor, see table, page 904

f_S –
Factor for additional safety, see Safety factors, page 904

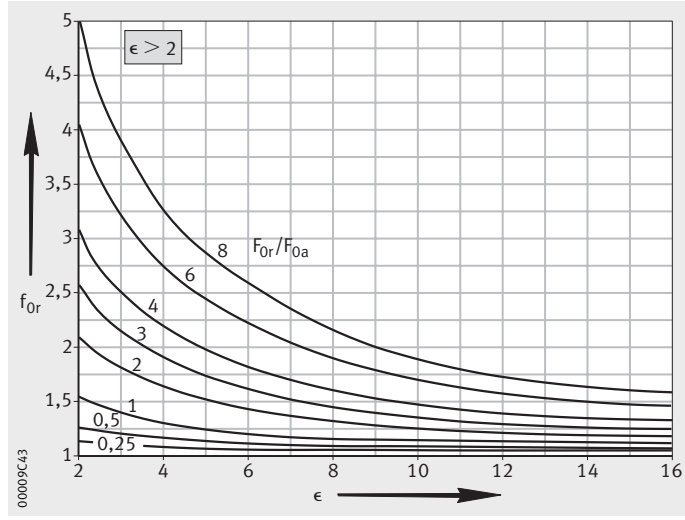
f_{0r} –
Static radial load factor, *Figure 4* or *Figure 5*, page 903

M_{0q} kNm
Equivalent tilting moment load (static).



f_{0r} = static radial load factor
ϵ = load eccentricity parameter; $\epsilon \leqq 2$

Figure 4
Static radial load factor



f_{0r} = static radial load factor
ϵ = load eccentricity parameter; $\epsilon > 2$

Figure 5
Static radial load factor

Application factors

The application factors f_A in the table are empirical values. They take account of the most important requirements, for example the type and severity of operation, rigidity or running accuracy. If the precise requirements of an application are known, the values may be altered accordingly.

Application factors < 1 must not be used.

A large proportion of applications can be statically calculated using the factor 1, for example in the case of bearings for gearboxes and rotary tables.

In addition to static calculation, the rating life should also always be checked, see Dynamic load carrying capacity.

Application factors f_A

Application	Operating and requirement criteria	Application factor f_A
Robots	Rigidity	1,25
Antennae	Accuracy	1,5
Machine tools	Accuracy	1,5
Measuring equipment	Smooth running	2
Medical equipment	Smooth running	1,5

Safety factors

The factor for additional safety is $f_S = 1$.

It is not normally necessary to factor in any additional safety in calculation.

In special cases, such as approval specifications, internal specifications, requirements stipulated by inspection bodies etc., the appropriate safety factors must be applied.

Dynamic load carrying capacity

Dynamically loaded crossed roller bearings, i.e. bearings that undergo predominantly rotary motion, are dimensioned in accordance with their dynamic load carrying capacity.

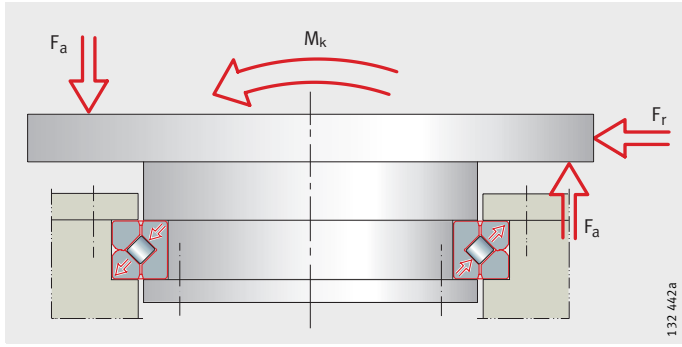
The size of a dynamically loaded bearing can therefore be checked in approximate terms using the basic dynamic load ratings C and the basic rating life L or L_h.

Determining the basic rating life

The life formulae for L and L_h are only valid:

- with a load arrangement in accordance with *Figure 6*
- if all the requirements are fulfilled in relation to location (the bearing rings must be rigid or firmly connected to the adjacent construction), fitting, lubrication and sealing
- if the load and speed can be regarded as constant during operation. If the load and speed are not constant, equivalent operating values can be determined that will result in the same fatigue conditions as the actual loads, see Equivalent operating values, page 51
- if the load ratio is $F_r/F_a \leqq 8$.

For more complex load arrangements, a ratio $F_r/F_a > 8$ or if the stated conditions are not fulfilled, please contact us.



F_a = axial dynamic bearing load
F_r = radial dynamic bearing load
M_k = dynamic tilting moment load

Figure 6
Load arrangement

Determining the rating life for bearings subjected to combined loads

For bearings subjected to combined loads, bearings with axial, radial and tilting moment loads, the rating life L and L_h is determined as follows:

- Calculate the parameter for load eccentricity ϵ, see formula page 906
- Determine the ratio of the radial dynamic bearing load F_r to the axial dynamic bearing load F_a (F_r/F_a)
- Based on the values for ϵ and the ratio F_r/F_a, determine the dynamic load factor k_F, *Figure 7*, page 907
- Calculate the equivalent dynamic axial bearing load $P_{axial} = k_F \cdot F_a$, see formula page 906
- Enter the equivalent dynamic axial bearing load P_{axial} and the basic dynamic axial load rating C_a in the rating life formulae for L or L_h and calculate the rating life, see formula page 906

  If swivel operation is present, enter the calculated operating speed n according to the formula in the rating life formula L_h, see formula page 906.

Determining the basic rating life for bearings subjected to radial loads only

For slewing rings subjected to radial loads only, the following values are entered in the rating life formulae L and L_h:

- instead of the equivalent dynamic axial bearing load P_{axial}, the equivalent dynamic radial bearing load P_{radial} (i.e. F_r)
  - $P_{radial} = F_r$
- the basic dynamic radial load rating C_r.

$$\epsilon = \frac{2000 \cdot M_k}{F_a \cdot D_M}$$

$$P_{axial} = k_F \cdot F_a$$

$$L_{10} = \left(\frac{C_a}{P_{axial}} \right)^p \text{ or } L_{10} = \left(\frac{C_r}{P_{radial}} \right)^p$$

$$L_{10h} = \frac{16666}{n} \cdot \left(\frac{C_a}{P_{axial}} \right)^p \text{ or } L_{10h} = \frac{16666}{n} \cdot \left(\frac{C_r}{P_{radial}} \right)^p$$

$$n = n_{osc} \cdot \frac{\gamma}{90°}$$

ϵ –
Load eccentricity parameter

M_k kNm
Dynamic tilting moment load

F_a kN
Axial dynamic bearing load

D_M mm
Rolling element pitch circle diameter, see dimension table

P_{axial} kN
Equivalent dynamic axial bearing load.
For bearings subjected to radial load only, enter P_{radial}

k_F –
Dynamic load factor, *Figure 7*, page 907

L_{10} 10^6 revolutions
Basic rating life in millions of revolutions

C_a, C_r kN
Basic dynamic axial or radial load rating, see dimension table.
For bearings subjected to radial load only, enter C_r

p –
Life exponent for crossed roller bearings: p = 10/3

L_{10h} h
Basic rating life in operating hours

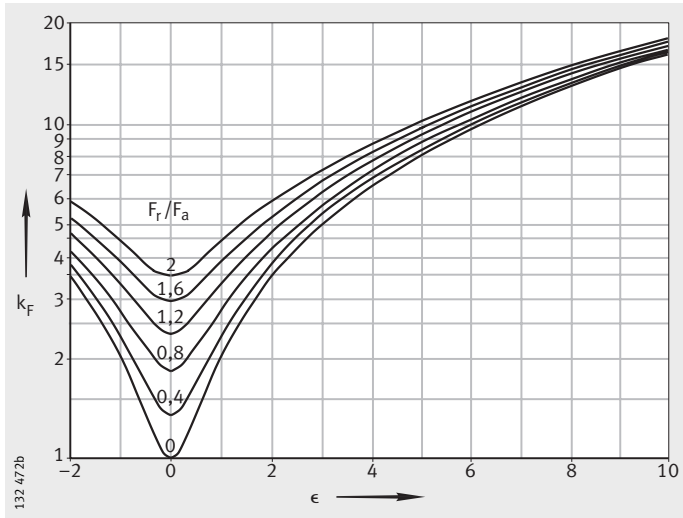
n min^{-1}
Operating speed

n_{osc} min^{-1}
Frequency of to and fro movement

γ °
Half of swivel angle

P_{radial} kN
Equivalent dynamic radial bearing load

F_r kN
Radial dynamic bearing load.



k_F = dynamic load factor
ϵ = load eccentricity parameter

Figure 7
Dynamic load factor

Load carrying capacity of fixing screws

In addition to the raceway, the load carrying capacity of the fixing screws must also be checked. This is based on the information in the section Checking the static load carrying capacity, page 901.

The load carrying capacity of the fixing screws can be checked if the following conditions are fulfilled:

- the criteria in the section Checking the static load carrying capacity, page 901
- the screws are tightened as specified using a torque wrench
  - screw tightening factor $\alpha_A = 1,6$, tightening torques, see tables, page 912 and page 913
- the permissible contact pressure is not exceeded
- screws of the recommended size, quantity and grade are used.

Indicator of load carrying capacity

The load carrying capacity of the screws is described by:

- the curves in the limiting load diagrams for fixing screws in the dimension tables
- the maximum permissible radial load $F_{r\,per}$ (friction locking).

The screw curves are shown in the static limiting load diagrams for fixing screws. The curves are based on screws of grade 10.9, tightened to 90% of their proof stress including the torsion content.

If screws of grade 8.8 or 12.9 are used, the equivalent static loads F_{0q} and M_{0q}, see Static load carrying capacity, page 901, must be converted using the following factors:

- grade 8.8 ($F_{0q}\times 1,65$, $M_{0q}\times 1,65$)
- grade 12.9 ($F_{0q}\times 0,8$, $M_{0q}\times 0,8$).

Checking the static load carrying capacity of the screws

The static load carrying capacity of the screw is limited by its proof stress.

For applications with and without radial load

The equivalent static bearing loads F_{0q} and M_{0q} must be determined.

The values for F_{0q} and M_{0q} are then used to determined the load point in the static limiting load diagram Fixing screws. Diagrams, see page 918 and page 920.

The load point must be below the appropriate screw curve.

Radial load and static load carrying capacity of the screws

If radial loads occur in uncentred bearing rings, the screw connections must prevent displacement of the bearing rings on the adjacent construction.

In order to check this:

- multiply the radial bearing load by an application factor f_A, see table, page 904
- compare the values determined with the maximum permissible radial load $F_{r\ per}$.

The maximum permissible radial load $F_{r\ per}$ on the fixing screws is dependent on their friction locking and not on the radial load carrying capacity of the bearing.

If the radial load on the bearing is higher than the friction locking of the fixing screws or very high radial loads are present ($F_r/F_a > 4$), please contact us.

Checking the dynamic load carrying capacity of the screws

The dynamic load carrying capacity of the screws corresponds to the fatigue strength of the screw.

Dynamic load carrying capacity

Based on the dynamic loads present, the equivalent loads F_{0q} and M_{0q} are determined.

Instead of the application factor f_A, the operating load must always be increased by the following factor:

- grade 8.8 (factor 1,8)
  grade 10.9 (factor 1,6)
  grade 12.9 (factor 1,5).

The load carrying capacity must then be checked in the static limiting load diagram Fixing screws, see dimension table.

The load point must be below the appropriate screw curve.

Shaft and housing tolerances

For normal applications, sufficient tolerances are K7 for the housing and h7 for the shaft, see tables.

In precision applications, the bearing seat in the housing should be designed to tolerance K6 and the bearing seat on the shaft to h6, see tables.

Fitting tolerances for the shaft

Nominal dimension range		Nominal deviations			
>	≦	h6		h7	
mm	mm	upper µm	lower µm	upper µm	lower µm
65	80	0	−19	0	−30
80	100	0	−22	0	−35
100	120	0	−22	0	−35
120	140	0	−25	0	−40
140	160	0	−25	0	−40
160	180	0	−25	0	−40
180	200	0	−29	0	−46
200	225	0	−29	0	−46
225	250	0	−29	0	−46
250	280	0	−32	0	−52
280	315	0	−32	0	−52
315	355	0	−36	0	−57
355	400	0	−36	0	−57
400	450	0	−40	0	−63
450	500	0	−40	0	−63

Fitting tolerances for the housing bore

Nominal dimension range		Nominal deviations			
>	≦	K6		K7	
mm	mm	upper µm	lower µm	upper µm	lower µm
80	100	+4	−18	+10	−25
100	120	+4	−18	+10	−25
120	140	+4	−21	+12	−28
140	160	+4	−21	+12	−28
160	180	+4	−21	+12	−28
180	200	+5	−24	+13	−33
200	225	+5	−24	+13	−33
225	250	+5	−24	+13	−33
250	280	+5	−27	+16	−36
280	315	+5	−27	+16	−36
315	355	+7	−29	+17	−40
355	400	+7	−29	+17	−40
400	450	+8	−32	+18	−45
450	500	+8	−32	+18	−45
500	560	0	−44	0	−70
560	630	0	−44	0	−70

Location using clamping rings

For location of crossed roller bearings SX, clamping rings have proved effective, *Figure 8*, page 911.

Bearing rings must always be rigidly and uniformly supported over their entire circumference and width.

The thickness of the clamping rings and mounting flanges must not be less than the minimum thickness.

Counterbores to DIN 74, type J, for screws to DIN 6 912 are permissible. For deeper counterbores, the thickness of the clamping ring s must be increased by the additional counterbore depth.

Mounting dimensions: see table, page 911 and *Figure 8*, page 911. Minimum strength of clamping rings: see Minimum strength of clamping rings.

Bearing seat depth

In order that the clamping rings retain the bearing securely, the bearing seat depth t must be in accordance with the specification, see table, page 911 and *Figure 8*, page 911.

The depth of the bearing seat influences the bearing clearance and the rotational resistance.

Preloaded bearings (suffix VSP) have a considerably higher rotational resistance.

If particular requirements for rotational resistance apply, the depth t must be produced to match the relevant height of the bearing ring. It has proved effective to tolerance the depth t to deviations that are the same as or further restricted compared to the dimension h in the dimension tables. For safety, internal tests should in any case be carried out.

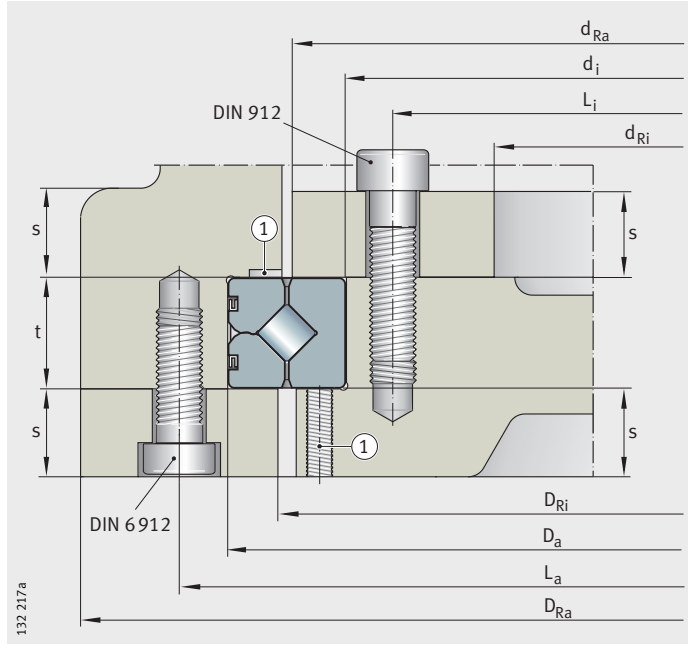
Minimum strength of clamping rings

For screws of grade 10.9, the minimum strength under the screw heads or nuts must be 500 N/mm^2. Seating washers are not necessary for these screws.

For fixing screws of grade 12.9, the minimum strength must be not less than 850 N/mm^2, otherwise quenched and tempered seating washers under the screw heads or quenched and tempered nuts must be used.

Mounting dimensions

Designation	Mounting dimensions									
	d_i h7 (h6)	D_a K7 (K6)	t	s min.	d_{RA}	d_{Ri}	D_{Ri}	D_{Ra}	L_i max.	L_a min.
SX011814	70	90	$10^{-0,005}_{-0,015}$	8	78	42	82	118	60	100
SX011818	90	115	$13^{-0,005}_{-0,020}$	10	100	61	104	144	80	125
SX011820	100	125	$13^{-0,005}_{-0,020}$	10	110	71	114	154	90	135
SX011824	120	150	$16^{-0,005}_{-0,025}$	12	132	84	138	186	108	162
SX011828	140	175	$18^{-0,005}_{-0,030}$	14	154	94	160	221	124	191
SX011832	160	200	$20^{-0,02}_{-0,05}$	15	177	111	183	249	144	216
SX011836	180	225	$22^{-0,02}_{-0,05}$	17	199	121	205	284	160	245
SX011840	200	250	$24^{-0,02}_{-0,06}$	18	221	139	229	311	180	270
SX011848	240	300	$28^{-0,02}_{-0,06}$	21	269	166	274	374	216	324
SX011860	300	380	$38^{-0,04}_{-0,10}$	29	335	201	345	479	268	412
SX011868	340	420	$38^{-0,04}_{-0,10}$	29	375	241	385	519	308	452
SX011880	400	500	$46^{-0,04}_{-0,10}$	35	445	275	455	625	360	540
SX0118/500	500	620	$56^{-0,04}_{-0,10}$	42	554	350	566	700	452	668



① Slots, threaded extraction holes or similar for dismantling purposes

Figure 8
Clamping rings, bearing seat depth, mounting dimensions

Fixing screws

For location of the bearing rings or clamping rings, screws of grade 10.9 are suitable, see table.

Any deviations from the recommended size, grade and quantity of screws will considerably reduce the load carrying capacity and operating life of the bearings.

For screws of grade 12.9, the minimum strength of the clamping rings must be achieved or quenched and tempered seating washers must be used.

Fixing screws

Crossed roller bearing	Fixing screws Grade 10.9		Tightening torque
	Size	Quantity	M_A Nm
SX011814	M5	18	7
SX011818	M5	24	7
SX011820	M5	24	7
SX011824	M6	24	11,7
SX011828	M8	24	27,8
SX011832	M8	24	27,8
SX011836	M10	24	55,6
SX011840	M10	24	55,6
SX011848	M12	24	98,4
SX011860	M16	24	247
SX011868	M16	24	247
SX011880	M20	24	481
SX0118/500	M24	24	831

Securing of screws

Normally, the screws are adequately secured by the correct preload. If regular shock loads or vibrations occur, however, additional securing of the screws may be necessary.

Not every method of securing screws is suitable for crossed roller bearings.

Never use spring washers or split washers.

General information on securing of screws is given in DIN 25 201, and securing by means of adhesive in particular is described in DIN 25 203, issued 1992.

If these are to be used, please consult the relevant companies.

Tightening torques M_A for the torque-controlled tightening of socket headless screws

Fixing screw	Clamping cross-section A_s mm²	Core cross-section A_{d3} mm²	Tightening torque M_A [1] in Nm for grade 8.8	10.9	12.9
M4	8,78	7,75	2,25	3,31	3,87
M5	14,2	12,7	4,61	6,77	7,92
M6	20,1	17,9	7,8	11,5	13,4
M8	36,6	32,8	19,1	28	32,8
M10	58	52,3	38	55,8	65,3
M12	84,3	76,2	66,5	97,7	114
M14	115	105	107	156	183
M16	157	144	168	246	288
M18	192	175	229	336	394
M20	245	225	327	481	562
M22	303	282	450	661	773
M24	353	324	565	830	972

[1] $\overline{M_A}$ according to VDI Guideline 2 230 (July 1986) for $\mu_K = 0{,}08$ and $\mu_G = 0{,}12$.

Assembly preload forces F_M for the torque-controlled tightening of socket headless screws

Fixing screw	Clamping cross-section A_s mm²	Core cross-section A_{d3} mm²	Assembly preload force F_M [1] in kN for grade 8.8	10.9	12.9
M4	8,78	7,75	4,05	5,95	6,96
M5	14,2	12,7	6,63	9,74	11,4
M6	20,1	17,9	9,36	13,7	16,1
M8	36,6	32,8	17,2	25,2	29,5
M10	58	52,3	27,3	40,2	47
M12	84,3	76,2	39,9	58,5	68,5
M14	115	105	54,7	80,4	94,1
M16	157	144	75,3	111	129
M18	192	175	91,6	134	157
M20	245	225	118	173	202
M22	303	282	147	216	253
M24	353	324	169	249	291

[1] $\overline{F_M}$ according to VDI Guideline 2 230 (July 1986) for $\mu_G = 0{,}12$.

Fitting of crossed roller bearings

The bores and edges of the adjacent components must be free from burrs. The support surfaces for the bearing rings must be clean.

The bearing seating and locating surfaces for the bearing rings on the adjacent construction must be lightly oiled or greased.

Lightly oil the thread of the fixing screws in order to prevent varying friction factors (do not oil or grease screws that will be secured by means of adhesive).

Ensure that all adjacent components and lubrication ducts are free from cleaning agents, solvents and washing emulsions.
The bearing seating surfaces can rust or the raceway system can become contaminated.

Apply assembly forces only to the bearing ring to be fitted;
never direct forces through the rolling elements or seals.
Avoid direct blows on the bearing rings in all cases.

Locate the bearing rings consecutively and without application of any external load.

The outer ring is split and is held together by three retaining rings ①, *Figure 9*, page 915 . Never apply tensile loads to the retaining rings.

Locating the external bearing ring

Fitting of the ring, *Figure 9*:

- Insert or press the bearing ② into the external adjacent construction ③ with the outer ring first
- Position the external clamping ring ④
- Insert the fixing screws ⑤ in the clamping ring and tighten in steps up to the specified tightening torque M_A
  - tighten the screws in a crosswise sequence in order to prevent unacceptable fluctuations in the screw tensioning forces
  - tightening torques M_A for fixing screws, see tables, page 913.

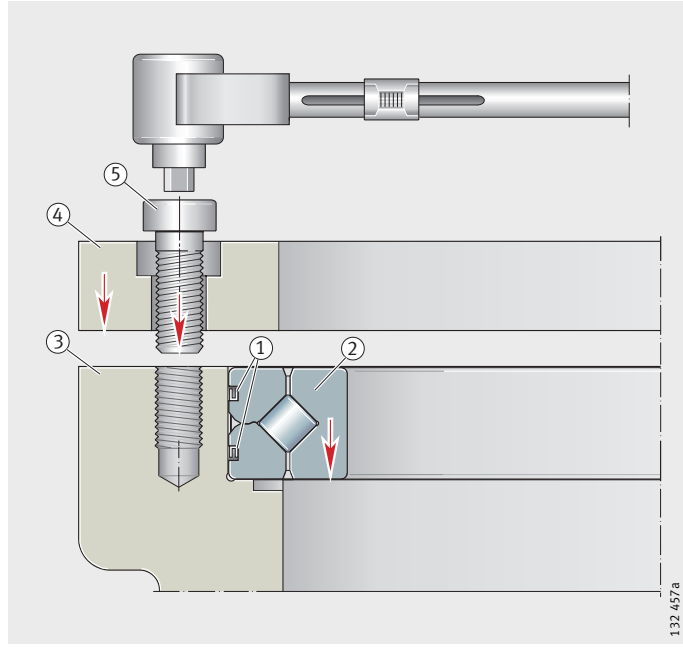


Figure 9
Locating the external bearing ring

Locating the internal bearing ring

Fitting of the ring, *Figure 10*:

- Insert the bearing ② into the internal adjacent construction ⑥
- Position the internal clamping ring ⑦
- Insert the fixing screws ⑧ in the clamping ring and tighten in steps up to the specified tightening torque M_A
  – tighten the screws in a crosswise sequence in order to prevent unacceptable fluctuations in the screw tensioning forces.

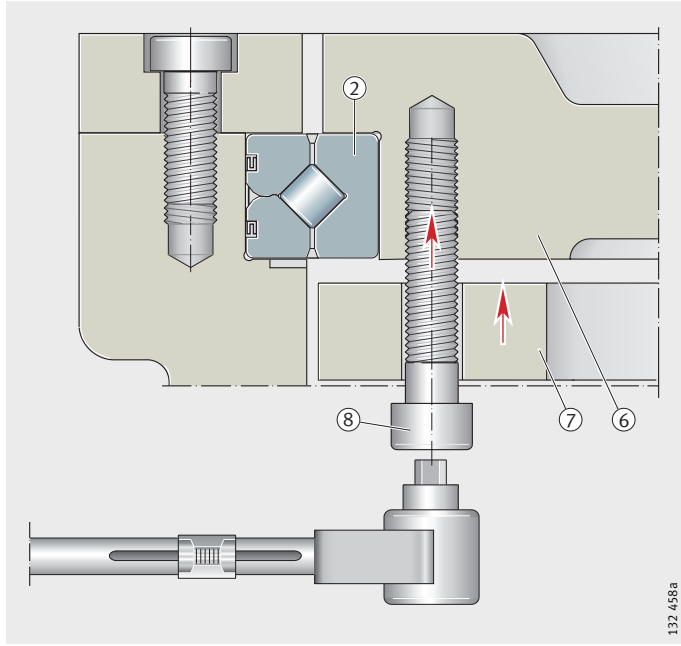


Figure 10
Locating the internal bearing ring

Checking operation

Once assembly is complete, the operation of the fitted crossed roller bearing must be checked.

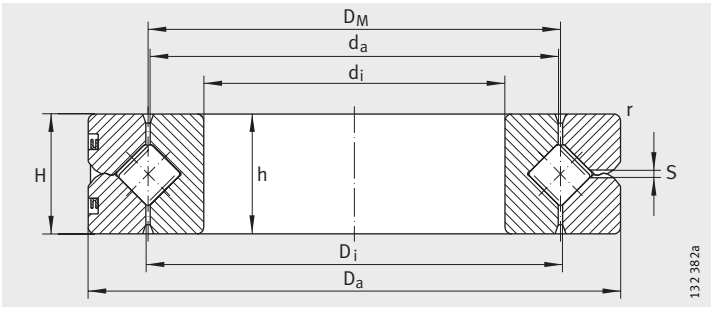
If the bearing runs irregularly or roughly, or the temperature in the bearing shows an unusual increase, dismantle and check the bearing and reassemble the bearing in accordance with the fitting guidelines described.

Accuracy

The dimensional and geometrical tolerances are based on DIN 620-2 and DIN 620-3 and are within the range P6 to P5.

The main dimensions conform to DIN 616, dimension series 18.

Crossed roller bearings



SX

Dimension table · Dimensions in mm

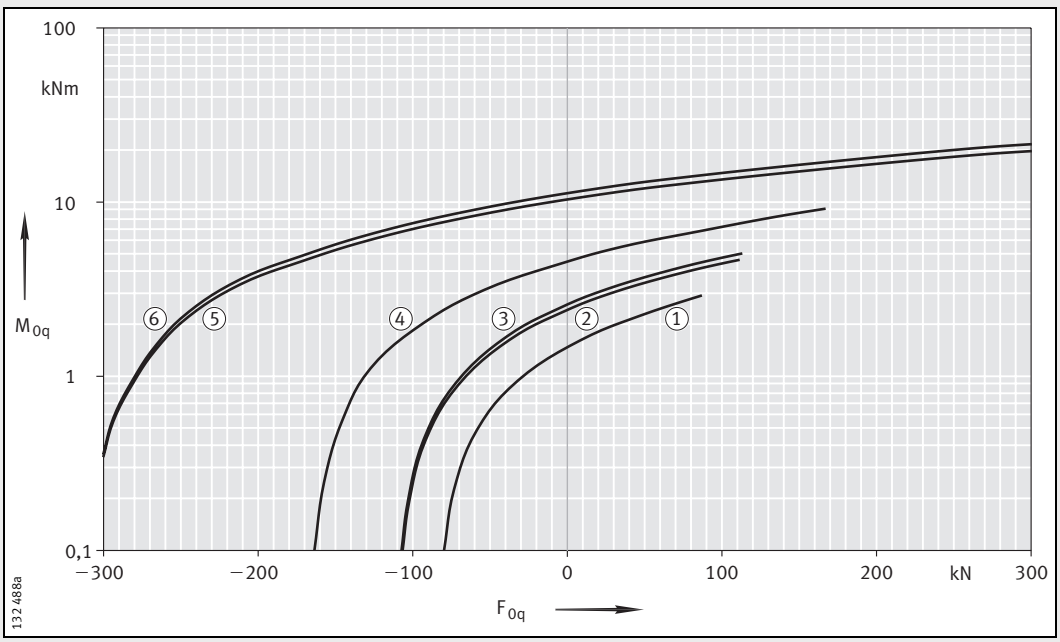
Designation	Position[1]	Mass	Dimensions									Running accuracy	
		m	D_M	d_i	D_a	H[2]	h[2]	d_a	D_i	r	S[3]	radial	axial
		≈kg		K6	h6		E8			min.			
SX011814	①	0,3	80	$\mathbf{70}^{+0,004}_{-0,015}$	$90_{-0,022}$	10±0,10	$10_{-0,01}$	79,5	80,5	0,6	1,2	0,010	0,010
SX011818	②	0,4	102	$\mathbf{90}^{+0,004}_{-0,018}$	$115_{-0,022}$	13±0,12	$13_{-0,01}$	101,5	102,5	1	1,2	0,010	0,010
SX011820	③	0,5	112	$\mathbf{100}^{+0,004}_{-0,018}$	$125_{-0,025}$	13±0,12	$13_{-0,01}$	111,5	112,5	1	1,2	0,010	0,010
SX011824	④	0,8	135	$\mathbf{120}^{+0,004}_{-0,018}$	$150_{-0,025}$	16±0,12	$16_{-0,01}$	134,4	135,5	1	1,5	0,010	0,010
SX011828	⑤	1,1	157	$\mathbf{140}^{+0,004}_{-0,021}$	$175_{-0,025}$	18±0,12	$18_{-0,01}$	156,3	157,7	1,1	1,5	0,015	0,010
SX011832	⑥	1,7	180	$\mathbf{160}^{+0,004}_{-0,021}$	$200_{-0,029}$	20±0,12	$20_{-0,025}$	179,2	180,8	1,1	1,5	0,015	0,010

1) Curve in the static limiting load load diagram for the raceway and fixing screws.

2) H: section height of bearing,
h: height of individual ring.

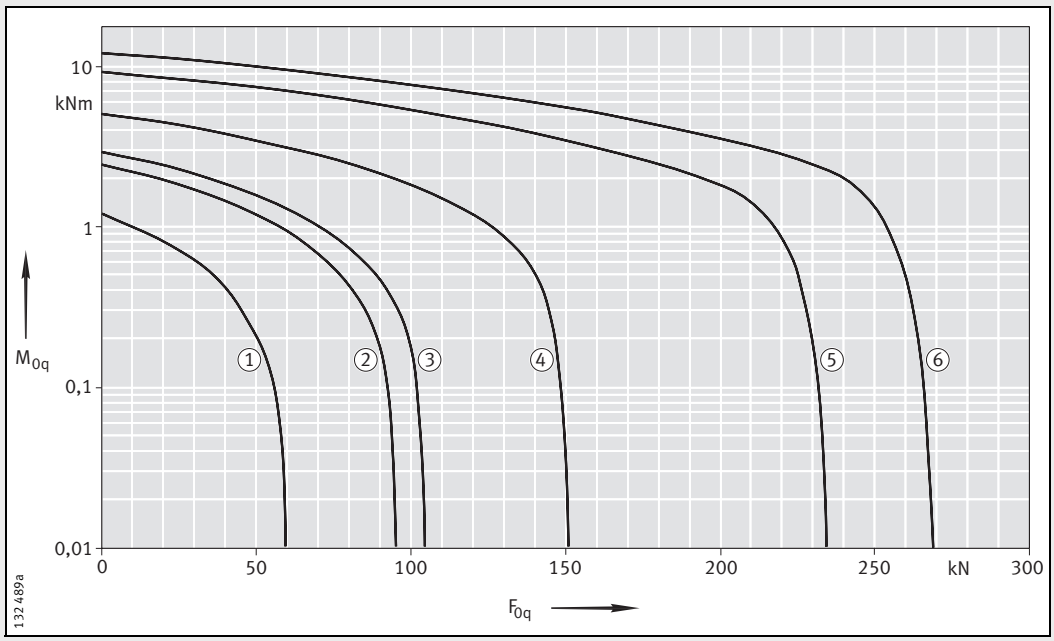
3) Lubrication hole: 3 holes spaced evenly about the circumference.

4) Basic load ratings, radial: for radial loads only.



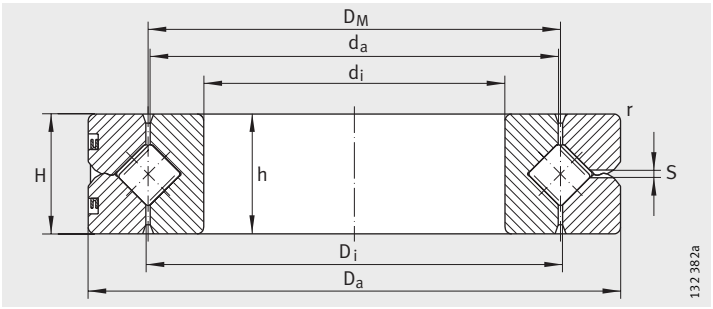
Static limiting load diagram for fixing screws – compressive load

Normal clearance				Low clearance RLO		Preload VSP		Basic load ratings				Limiting speeds				Dimensions identical to ISO dimension series 18
Radial clearance		Axial tilting clearance		Radial clearance	Preload			axial		radial[4)]		With normal clearance		With preload		
								dyn. C_a	stat. C_{0a}	dyn. C_r	stat. C_{0r}	n_G oil	n_G grease	n_G oil	n_G grease	
min.	max.	min.	max.	max.	max.	min.	max.	kN	kN	kN	kN	min^{-1}	min^{-1}	min^{-1}	min^{-1}	
0,003	0,015	0,006	0,03	0,003	0,006	0,003	0,015	15,4	51	11	20,4	1 910	955	955	475	618 14
0,003	0,015	0,006	0,03	0,003	0,006	0,003	0,015	25,5	91	18,3	36,5	1 500	750	750	375	618 18
0,005	0,020	0,010	0,04	0,004	0,008	0,005	0,020	27	102	19,4	40,5	1 360	680	680	340	818 20
0,005	0,020	0,010	0,04	0,004	0,008	0,005	0,020	38	146	27	59	1 130	565	565	280	618 24
0,005	0,020	0,010	0,04	0,004	0,008	0,005	0,020	63	240	45	96	975	485	485	240	618 28
0,005	0,020	0,010	0,04	0,004	0,008	0,005	0,020	68	275	48,5	111	850	425	425	210	618 32



Static limiting load diagram for raceway – compressive load

Crossed roller bearings



SX

Dimension table (continued) · Dimensions in mm

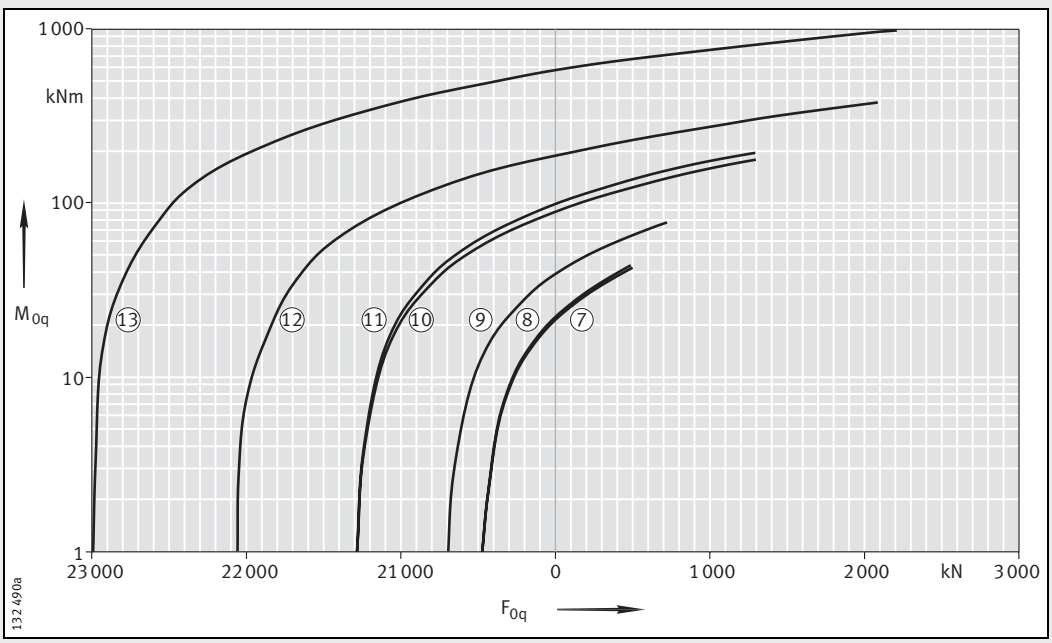
Designation	Position[1]	Mass	Dimensions									Running accuracy	
		m	D_M	d_i	D_a	H[2]	h[2]	d_a	D_i	r	S[3]	radial	axial
		≈kg		K6	h6		E8			min.			
SX011836	⑦	2,3	202	$\mathbf{180}^{+0,004}_{-0,021}$	$225_{-0,029}$	$22\pm0,13$	$22_{-0,025}$	201,2	202,8	1,1	2	0,015	0,010
SX011840	⑧	3,1	225	$\mathbf{200}^{+0,004}_{-0,024}$	$250_{-0,029}$	$24\pm0,13$	$24_{-0,025}$	224,2	225,8	1,5	2	0,015	0,010
SX011848	⑨	5,3	270	$\mathbf{240}^{+0,005}_{-0,024}$	$300_{-0,032}$	$28\pm0,13$	$28_{-0,025}$	269,2	270,8	2	2	0,020	0,010
SX011860	⑩	12	340	$\mathbf{300}^{+0,005}_{-0,027}$	$380_{-0,036}$	$38\pm0,14$	$38_{-0,05}$	339,2	340,8	2,1	2,5	0,020	0,010
SX011868	⑪	13,5	380	$\mathbf{340}^{+0,007}_{-0,029}$	$420_{-0,040}$	$38\pm0,14$	$38_{-0,05}$	379,2	380,8	2,1	2,5	0,025	0,010
SX011880	⑫	24	450	$\mathbf{400}^{+0,007}_{-0,029}$	$500_{-0,040}$	$46\pm0,15$	$46_{-0,05}$	449	451	2,1	2,5	0,030	0,010
SX0118/500	⑬	44	560	$\mathbf{500}^{+0,008}_{-0,032}$	$620_{-0,044}$	$56\pm0,16$	$56_{-0,05}$	558,8	561,2	3	2,5	0,040	0,010

1) Curve in the static limiting load load diagram for the raceway and fixing screws.

2) H: section height of bearing,
h: height of individual ring.

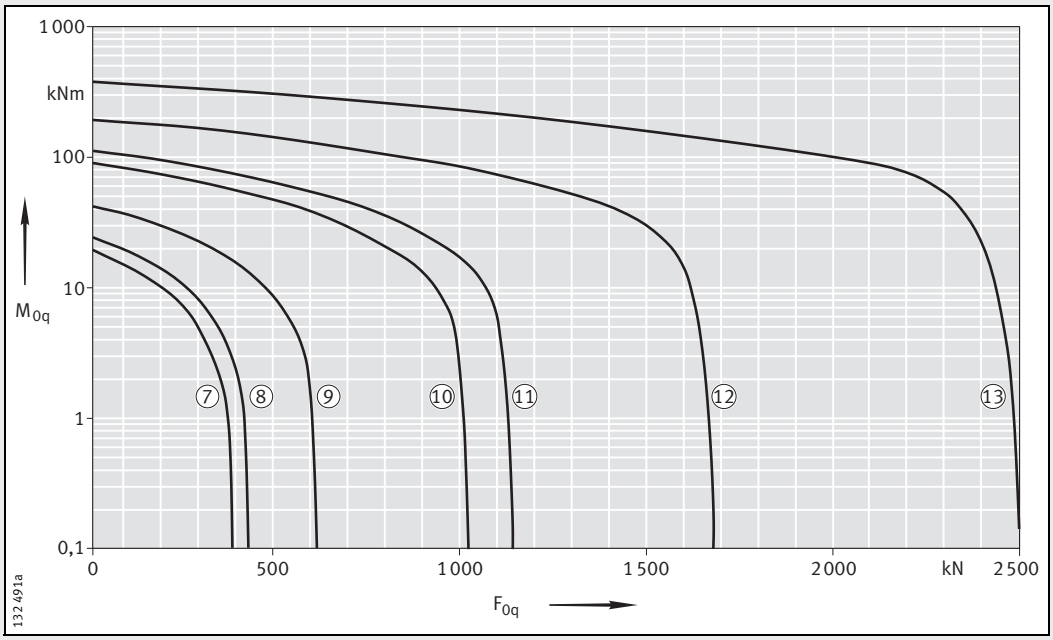
3) Lubrication hole: 3 holes spaced evenly about the circumference.

4) Basic load ratings, radial: for radial loads only.

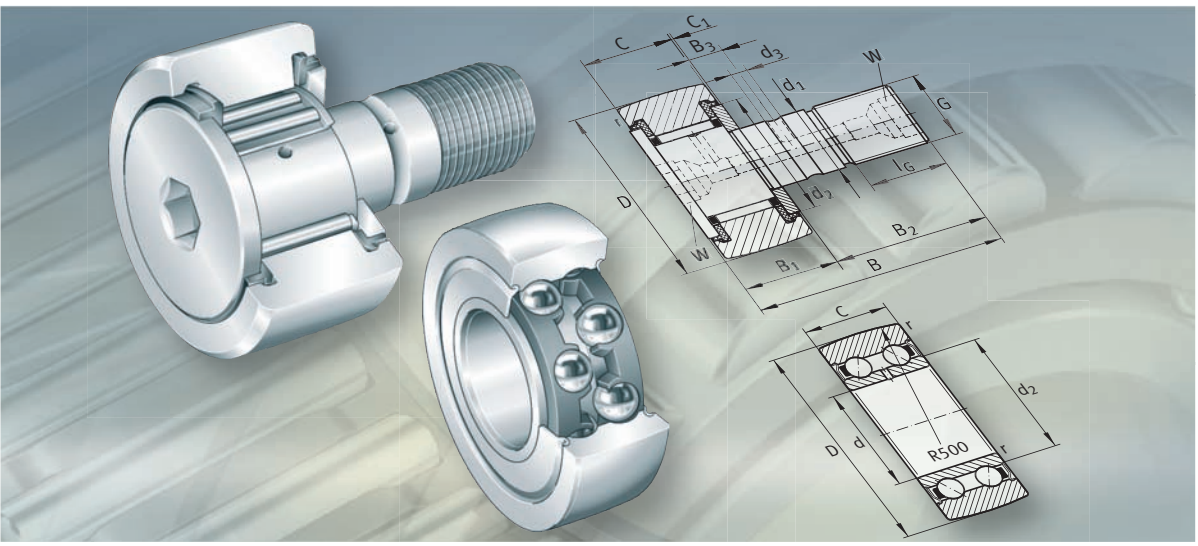


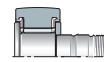
Static limiting load diagram for fixing screws – compressive load

Normal clearance				Low clearance RLO		Preload VSP		Basic load ratings				Limiting speeds				Dimensions identical to ISO dimension series 18
Radial clearance		Axial tilting clearance		Radial clearance	Preload			axial		radial[4)]		With normal clearance		With preload		
								dyn. C_a	stat. C_{0a}	dyn. C_r	stat. C_{0r}	n_G oil	n_G grease	n_G oil	n_G grease	
min.	max.	min.	max.	max.	max.	min.	max.	kN	kN	kN	kN	min^{-1}	min^{-1}	min^{-1}	min^{-1}	
0,005	0,025	0,010	0,05	0,005	0,010	0,005	0,025	96	380	69	153	755	375	375	185	618 36
0,005	0,025	0,010	0,05	0,005	0,010	0,005	0,025	102	425	72	170	680	340	340	170	618 40
0,010	0,030	0,020	0,06	0,005	0,010	0,005	0,025	148	640	105	255	565	280	280	140	618 48
0,010	0,040	0,020	0,08	0,005	0,010	0,005	0,025	243	1 07	173	425	450	225	225	110	618 60
0,010	0,040	0,020	0,08	0,005	0,010	0,005	0,025	260	1 22	185	485	400	200	200	100	618 68
0,010	0,050	0,020	0,10	0,005	0,010	0,005	0,025	385	1 80	275	720	340	170	170	85	618 80
0,015	0,060	0,030	0,12	0,006	0,012	0,005	0,030	560	2 75	395	1 100	275	135	135	65	618/500



Static limiting load diagram for raceway – compressive load





Track rollers

Yoke type track rollers
Stud type track rollers
Ball bearing track rollers

Track rollers

Yoke type track rollers

926

Yoke type track rollers are ready-to-fit needle and cylindrical roller bearings with a particularly thick-walled outer ring and are used in applications such as cam gears, bed ways, conveying equipment and linear guidance systems. In addition to high radial loads, they can also support axial loads which are due, for example, to slight misalignment defects, skewed running or brief contact running impacts.

Yoke type track rollers are available with and without axial guidance of the outer ring and in both sealed and open versions.

The outside surface of the outer rings is crowned and corresponds in the majority of designs to the optimised INA profile. These bearings have lower Hertzian pressure, reduced edge load under tilting and reduced wear of the mating track, giving a longer operating life of the mating track.

Yoke type track rollers are mounted on a shaft or stud and are supplied with or without an inner ring.

Stud type track rollers

926

Stud type track rollers correspond in their design to yoke type track rollers with axial guidance but, in place of the inner ring, they have a heavy-section roller stud. The stud has a fixing thread and, in most cases, a hexagonal socket on both ends. It is also available with a shrink-fitted eccentric collar. Due to the eccentric collar, the outside surface of the outer ring can be adjusted to match the mating track on the adjacent construction.

Stud type track rollers are available with labyrinth, gap or contact seals.

The outside surface of the outer rings is crowned and corresponds in the majority of designs to the optimised INA profile.

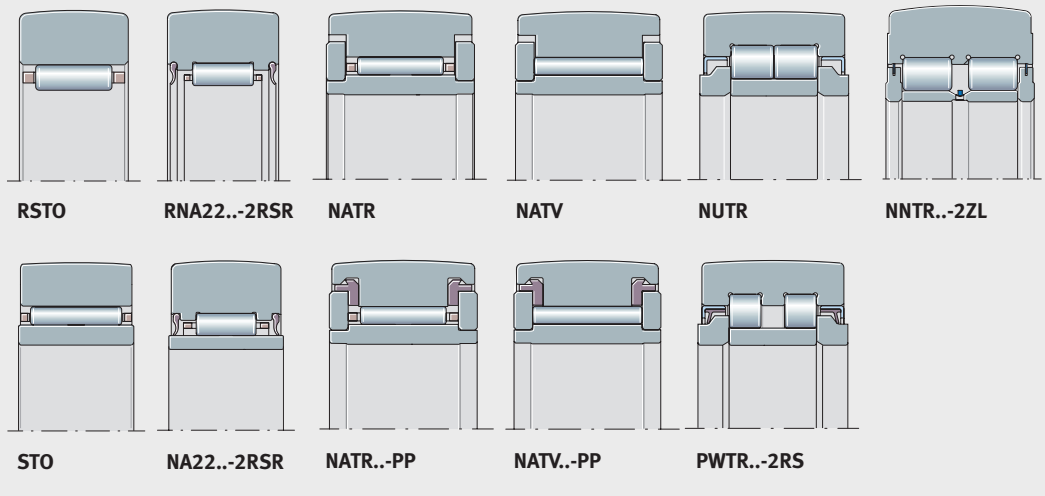
Ball bearing track rollers

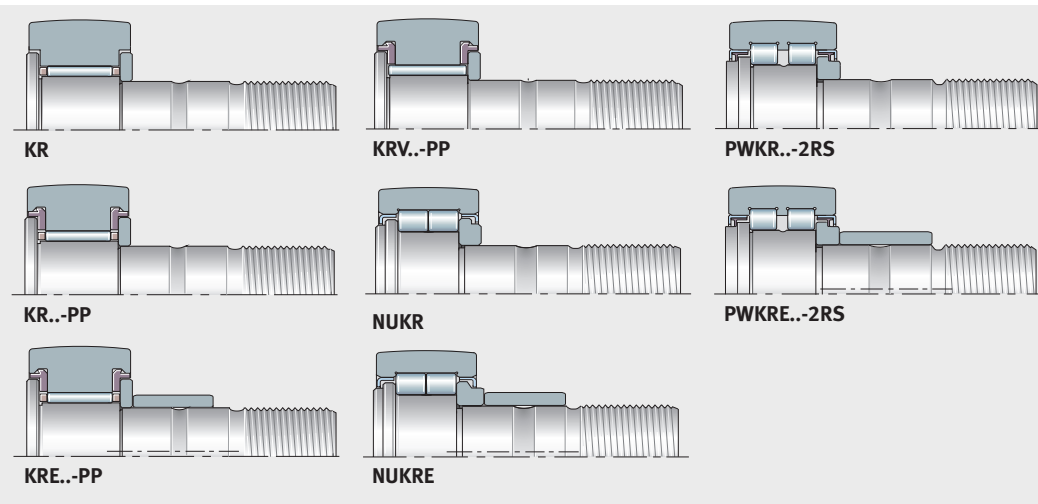
984

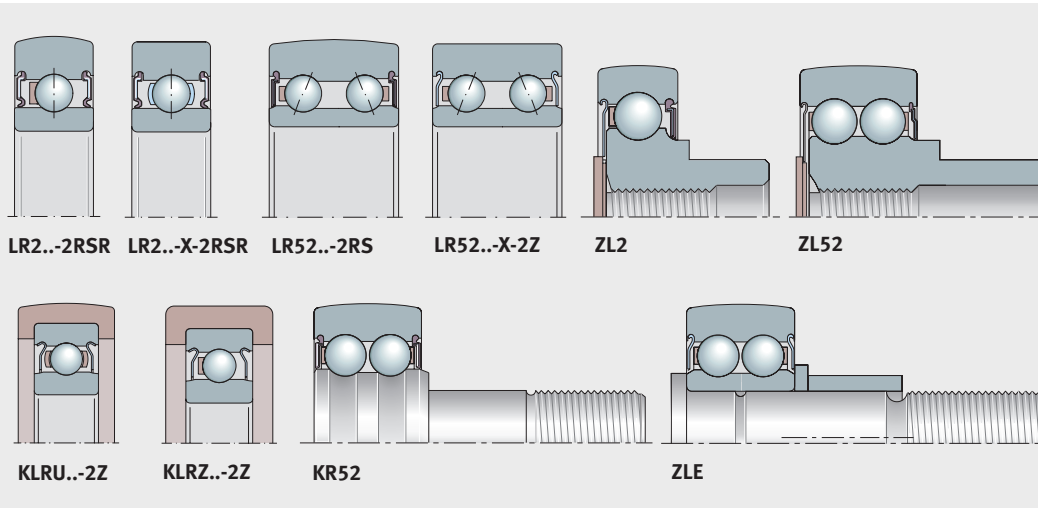
Ball bearing track rollers correspond in their design to deep groove or angular contact ball bearings but have thick-walled outer rings with a crowned outside surface. They can support high radial forces as well as axial forces in both directions. The bearings are sealed.

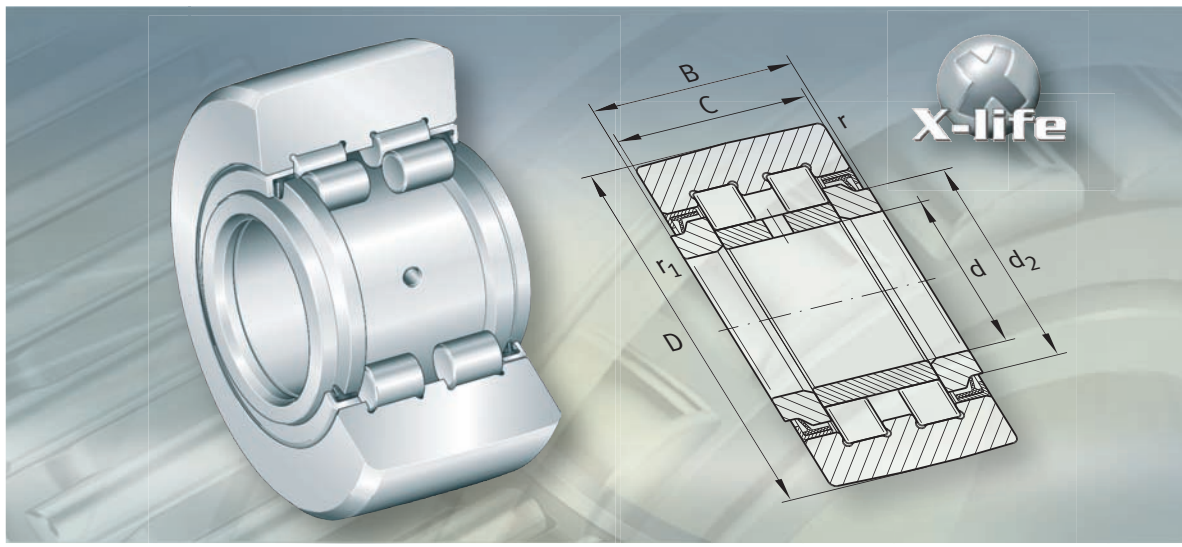
Ball bearing track rollers are available with and without a stud and with a plastic tyre.

Track rollers without a stud are mounted on a shaft or stud.
Track rollers with a plastic tyre are used if the bearings are required to run with particularly low noise.


RSTO
RNA22..-2RSR
NATR
NATV
NUTR
NNTR..-2ZL
STO
NA22..-2RSR
NATR..-PP
NATV..-PP
PWTR..-2RS
109 306


KR
KRV..-PP
PWKR..-2RS
KR..-PP
NUKR
PWKRE..-2RS
KRE..-PP
NUKRE
00013B54


LR2..-2RSR
LR2..-X-2RSR
LR52..-2RS
LR52..-X-2Z
ZL2
ZL52
KLRU..-2Z
KLRZ..-2Z
KR52
ZLE
00013B55



Yoke type track rollers
Stud type track rollers

Yoke type track rollers, stud type track rollers

		Page
Product overview	Yoke type track rollers	930
Features	X-life	932
	Outside surface profile of the outer ring	932
	Yoke type track rollers without inner ring	933
	Yoke type track rollers with inner ring	933
	Operating temperature	935
	Suffixes	935
Product overview	Stud type track rollers	936
Features	X-life	938
	Outside surface profile of the outer ring	938
	Stud type track rollers without eccentric collar	939
	Stud type track rollers with eccentric collar	940
	Operating temperature	941
	Suffixes	941

Yoke type track rollers, stud type track rollers

		Page
Design and safety guidelines	Optimised INA profile	942
	Installation as yoke or stud type track roller	944
	Permissible radial load under dynamic loading	944
	Permissible radial load under static loading	944
	Load carrying capacity and life	944
	Operating life	946
	Static load safety factor	946
	Minimum load	946
	Skewed running	947
	Tilting	947
	Speeds	948
	Frictional torque	948
	Displacement resistance	949
	Two contact zones in track rollers	950
	Central lubrication adapter for stud type track rollers	951
	Adjacent construction for yoke type track rollers	955
	Adjacent construction for stud type track rollers	957
	Design of mating track	958
	Fitting	964
	Anti-corrosion protection by Corrotect® coating	970
Accuracy	Radial internal clearance	971

Dimension tables

Page

Yoke type track rollers, without axial guidance, open 972

Yoke type track rollers, without axial guidance, sealed 973

Yoke type track rollers, with axial guidance, gap seal or axial plain washer 974

Yoke type track rollers, with axial guidance, sealed 975

Needle roller stud type track rollers, with axial guidance, open or sealed 978

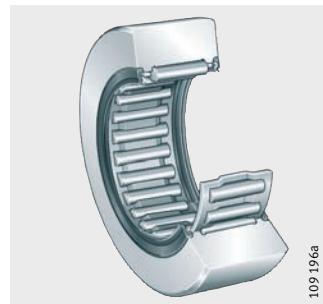
Cylindrical roller stud type track rollers, with axial guidance 982

Without axial guidance
Without inner ring

RSTO

Lip seals

RNA22..-2RSR

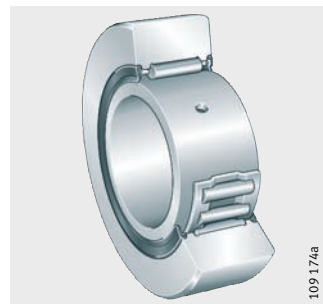


With inner ring

STO

Lip seals

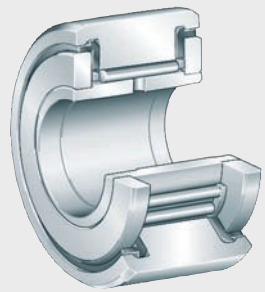
NA22..-2RSR



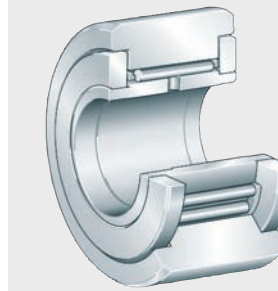
With axial guidance
With cage

Plastic axial plain washers or gap seals

NATR..-PP



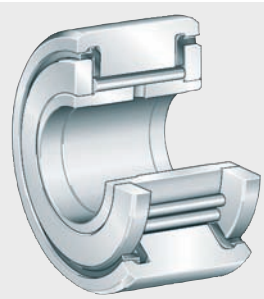
NATR



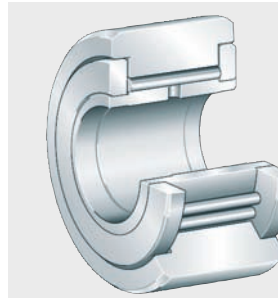
Full complement needle roller set

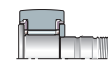
Plastic axial plain washers or gap seals

NATV..-PP



NATV





Full complement cylindrical roller set

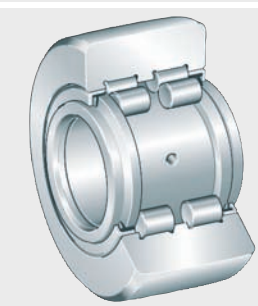
Labyrinth seals

NUTR

Full complement cylindrical roller set, with central rib

Protected lip seals or sealing shields with lamellar ring

PWTR..-2RS



NNTR..-2ZL

Yoke type track rollers

Features

Yoke type track rollers are single or double row units mounted on shafts or studs. They comprise thick-walled outer rings with a profiled outside surface and needle roller and cage assemblies or full complement needle roller or cylindrical roller sets.

Yoke type track rollers can support high radial loads as well as axial loads arising from slight misalignment and skewed running; they are suitable for applications such as cam gears, bed ways and conveying equipment.

The bearings are available with and without an inner ring and in both sealed and open versions.

X-life

Series PWTR is supplied as an X-life design.
Due to a modified material and the optimised raceway geometry of the outer rings, the basic rating life has been increased by up to 30%.

The static and dynamic load carrying capacity has also been increased. At the same time, the stress placed on the mating track has been reduced as a result of the optimised lateral surface profile and its improved surface quality.

Due to these measures, highly robust bearing arrangements with an extended operating life can be achieved.

Outside surface profile of the outer ring

Yoke type track rollers with a crowned outside surface are predominantly used in practice since they are often inclined in relation to the mating track and edge stresses must be avoided.

The radius of curvature of the outside surface is R = 500 mm.
In the case of NNTR..-2ZL, the radius is indicated in the dimension table.

The series NATR..-PP, NATV..-PP, NUTR and PWTR..-2RS have an outside surface with the optimised INA profile.

In yoke type track rollers with this curvature profile (*Figure 1*, page 942 to *Figure 5*, page 943):

- the Hertzian pressure is lower
- edge loading under tilting is lower
- wear of the mating track is reduced
- the operating life of the mating track is extended.

Yoke type track rollers without inner ring

Yoke type track rollers RSTO and RNA22..-2RSR do not have an inner ring. They are particularly compact but require a hardened and ground raceway on the shaft or stud.

Series RSTO is not self-retaining. This means that the outer ring and the needle roller and cage assembly can be fitted independently of each other.

With cage, axial guidance of outer ring

In RSTO and RNA22..-2RSR, the rolling elements are guided by a cage. These designs do not have axial guidance of the outer ring. Axial guidance of the outer ring and needle roller and cage assembly must be provided in the adjacent component; see section Adjacent construction for yoke type track rollers, page 955.

Sealing

RSTO is not sealed, series RNA22..-2RSR has lip seals on both sides.

Lubrication

The bearings are greased with a lithium complex soap grease to GA08.

Yoke type track rollers with inner ring

These yoke type track rollers are used if the shaft or stud does not have a hardened and ground raceway.

STO is not self-retaining. This means that the outer ring, needle roller and cage assembly and inner ring can be fitted independently of each other.

With cage, with full complement needle roller or cylindrical roller set

The series STO, NA22..-2RSR, NATR and NATR..-PP have a cage. The series NATV and NATV..-PP have a full complement needle roller set, while yoke type track rollers NUTR, PWTR..-2RS and NNTR..-2ZL have a full complement cylindrical roller set.

Bearings without a cage have the largest possible number of rolling elements and therefore have particularly high load carrying capacity. Due to the kinematic conditions, however, the speeds achievable with these bearings are somewhat lower than those achievable with the cage-guided yoke type track rollers.

Axial guidance of outer ring

STO and NA22..-2RSR do not have axial guidance of the outer ring. This must be provided in the adjacent construction; see section Adjacent construction for yoke type track rollers, page 955.

In NATR and NATV, axial guidance is provided by contact washers and axial plain washers. In NUTR, the outer ring is guided by the rolling elements, in PWTR..-2RS and NNTR..-2ZL it is guided by the central rib and the rolling elements.

Anti-corrosion protection

Yoke type track rollers PWTR..-2RS-RR are protected against corrosion by the special coating Corrotect®.
For a description of the coating, see page 970.

Sealing

The seals used in yoke type track rollers are shown in the following table Seals.

Seals

Yoke type track roller	
Series	Seal
STO	Open
NA22..-2RSR	Lip seal
PWTR..-2RS	Protected lip seals on both sides
NATR..-PP NATV..-PP	Three-stage sealing by plastic axial plain washers
NATR NATV	Gap seal
NUTR	Labyrinth seal
NNTR..-2ZL	Sealing shield with lamellar rings

Three-stage seal

In the three-stage concept, there is a gap seal between the plastic axial plain washer and the outer ring and a labyrinth seal between the formed seal lip and the undercut in the outer ring.

The disc spring shape of the axial plain washers gives a preloaded contact seal as the third stage. It also provides axial sliding contact between the outer ring and contact washers, thus reducing wear and grease consumption.

Lubrication

The bearings are greased using a lithium complex soap grease to GA08 and can be lubricated via the inner ring.
Relubrication can be carried out using Arcanol LOAD150.

Operating temperature

Yoke type track rollers can be used at temperatures from –30 °C to +140 °C. In sealed bearings (suffix 2RS and 2RSR) and bearings with a plastic cage (suffix TV), the temperature range is restricted to between –30 °C and +120 °C.

Note the information on the operating temperature range in Technical Principles, Lubrication.

Yoke type track rollers NATR..-PP and NATV..-PP are suitable for operating temperatures from –30 °C to +100 °C, restricted by the grease and the seal material.

Suffixes

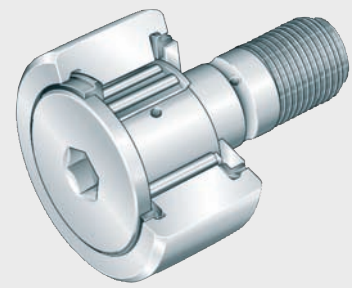
Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
PP	Plastic axial plain washer with formed seal lip on both sides of the yoke type track roller, giving a three-stage seal	Standard
RR	Protected against corrosion by Corrotect® special coating	
TV	Plastic cage	
2RS	Protected lip seal on both sides of the yoke type track roller	
2RSR	Radial contact lip seal on both sides of the yoke type track roller	
2ZL	Sealing shield with lamellar rings on both sides of the track roller	

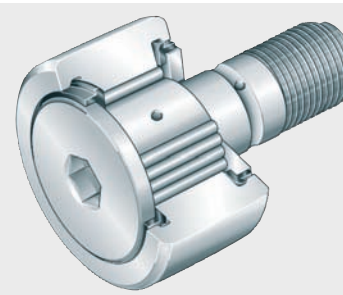
Without eccentric collar
With cage
Plastic axial plain washers or gap seals

KR..-PP, KR



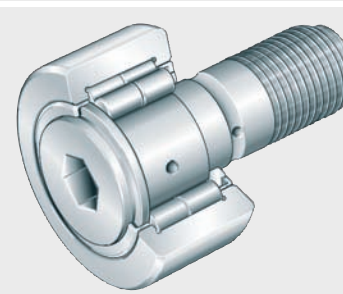
Full complement needle roller set
Plastic axial plain washers

KRV..-PP



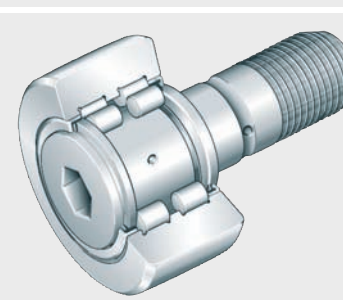
Full complement cylindrical roller set
Labyrinth seals

NUKR



Full complement cylindrical roller set, with central rib
Protected lip seals

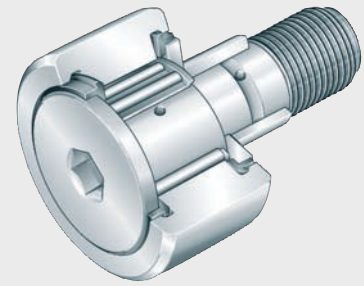
PWKR..-2RS



With eccentric collar
With cage

Plastic axial plain washers

KRE..-PP

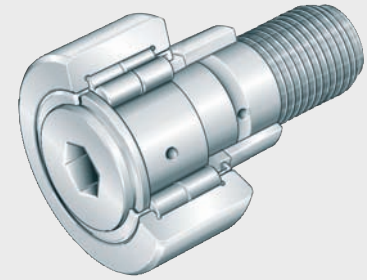


110 191a

Full complement cylindrical roller set

Labyrinth seals

NUKRE

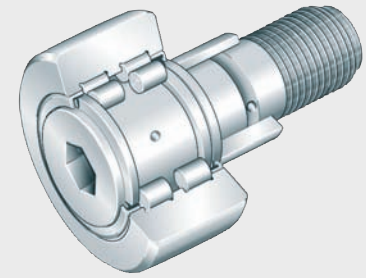


110 242

Full complement cylindrical roller set, with central rib

Protected lip seals

PWKRE..-2RS



110 123a

Stud type track rollers

Features

Stud type track rollers are similar in their construction to single and double row yoke type track rollers, except that the raceway is formed by a heavy-section roller stud with a fixing thread and lubrication hole.

Due to the thick-walled outer ring with profiled outside surface and the rolling element set, they can support high radial loads as well as axial loads arising from slight misalignment and skewed running; they are suitable for applications such as cam gears, bed ways and conveying equipment.

X-life

The series PWKR(E) are supplied in an X-life design.
Due to a modified material and the optimised raceway geometry of the outer rings, the basic rating life has been increased by up to 30%.

The static and dynamic load carrying capacity has also been increased. At the same time, the stress placed on the mating track has been reduced as a result of the optimised lateral surface profile and its improved surface quality.

Due to these measures, highly robust bearing arrangements with an extended operating life can be achieved.

Outside surface profile of the outer ring

Stud type track rollers with a crowned outside surface are predominantly used since they are often inclined in relation to the mating track and edge stresses must be avoided.

In series KR, the radius of curvature is R = 500 mm.
The series KR..-PP, KRE..-PP, KRV..-PP, NUKR, NUKRE, PWKR..-2RS and PWKRE..-2RS have an outside surface with the optimised INA profile.

In stud type track rollers with this curvature profile (*Figure 1*, page 942 to *Figure 5*, page 943):

- the Hertzian pressure is lower
- edge loading under tilting is lower
- wear of the mating track is reduced
- the operating life of the mating track is extended.

Stud type track rollers are available in several designs as well as with or without an eccentric collar.

Stud type track rollers without eccentric collar

Stud type track rollers without an eccentric collar do not have a defined adjustment facility in relation to the mating track on the adjacent construction.
Stud type track rollers with eccentric collar: see page 940.

With cage, with full complement needle roller or cylindrical roller set

KR, KR..-PP have a cage, while the design KRV..-PP has a full complement needle roller set.
The series NUKR and PWKR..-2RS have a full complement cylindrical roller set.

Stud type track rollers without a cage have the largest possible number of rolling elements and therefore have particularly high load carrying capacity. Due to the kinematic conditions, however, the speeds achievable with these bearings are somewhat lower than those achievable with the cage-guided stud type track rollers.

Axial guidance of outer ring

In KR, KR..-PP and KRV..-PP, axial guidance is provided by the contact flange and contact washers.

The outer rings of series NUKR and PWKR..-2RS are guided by the rolling elements and ribs.

Anti-corrosion protection

PWKR..-2RS-RR are protected against corrosion by the special coating Corrotect®. For a description of the coating, see page 970.

Sealing

Stud type track rollers are sealed on both sides. Series KR has gap seals, KR..-PP has a three-stage seal comprising plastic axial plain washers with formed seal lips on both sides of the bearing, NUKR has labyrinth seals and PWKR..-2RS has protected lip seals.

The three-stage PP seal is described on page 934.

Lubrication

The bearings are greased using a lithium complex soap grease to GA08 and can be lubricated via the roller stud. Relubrication can be carried out using Arcanol LOAD150.

Stud type track rollers

Stud type track rollers with eccentric collar

Designs with an eccentric collar can be adjusted by means of a hexagonal socket on the flanged or threaded side of the roller stud. The outer ring outside surface can thus be adjusted against the mating track; as a result, less accurate manufacturing tolerances on the adjacent construction can be tolerated.
Furthermore, this gives improved load distribution when using several stud type track rollers and also allows preloaded linear systems to be easily realised.

The highest point of the eccentric collar is indicated on the roller stud side, the eccentricity e is stated in the dimension tables.
This is also the location of the radial relubrication holes which should lie in the unloaded zone of the rolling contact.

With cage or full complement cylindrical roller set

KRE..-PP has a cage, NUKRE and PWKRE..-2RS have a full complement cylindrical roller set.

Bearings without a cage have the largest possible number of rolling elements and therefore have particularly high load carrying capacity. Due to the kinematic conditions, however, the speeds achievable with these bearings are somewhat lower than those achievable with the cage-guided stud type track rollers.

Axial guidance of outer ring

In the series KRE..-PP, axial guidance is provided by the contact rib and contact washers. The outer rings of series NUKRE and PWKRE..-2RS are axially guided by the rolling elements and ribs.

Sealing

The stud type track rollers are sealed on both sides.
KRE..-PP has a three-stage seal comprising plastic axial plain washers with formed lips on both sides of the bearing,
NUKRE has labyrinth seals and PWKRE..-2RS has protected lip seals.

For a description of the three-stage PP seal, see page 934.

Lubrication

The bearings are greased using a lithium complex soap grease to GA08 and can be lubricated via the roller stud.
Relubrication can be carried out using Arcanol LOAD150.

The eccentric collar covers the radial lubrication hole in the shank. Relubrication must therefore be carried out via the end faces.

Operating temperature

Stud type track rollers can be used at temperatures from –30 °C to +140 °C.
In sealed bearings (suffix 2RS), the temperature range is restricted to between –30 °C and +120 °C.

Note the information on the operating temperature range in Technical Principles, Lubrication.

Stud type track rollers KR..-PP, KRV..-PP and KRE..-PP are suitable for operating temperatures from –30 °C to +100 °C, restricted by the grease and seal material.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
PP	Plastic axial plain washer with formed seal lip on both sides of the stud type track roller, giving a three-stage seal	Standard
RR	Protected against corrosion by Corrotect® special coating	
SK	Hexagonal socket only on the flange-side end face, no relubrication facility	
2RS	Protected lip seal on both sides of the stud type track roller	

Design and safety guidelines

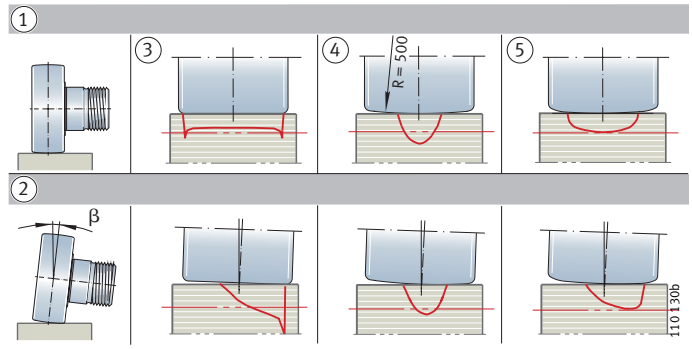
Optimised INA profile

The advantages of the optimised INA profile are:

- lower Hertzian pressure under tilting, *Figure 1* and *Figure 2*
- higher basic rating life of the outer ring and mating track, *Figure 3*
- reduced wear between the outer ring outside surface and the mating track, *Figure 4* and *Figure 5*, page 943
- increased rigidity at the outer ring contact, *Figure 6*, page 943.

Hertzian pressure curve

Comparison: Cylindrical profile/profile R = 500 mm with optimised INA profile ($C_{rw}/P_r = 5$), *Figure 1*.

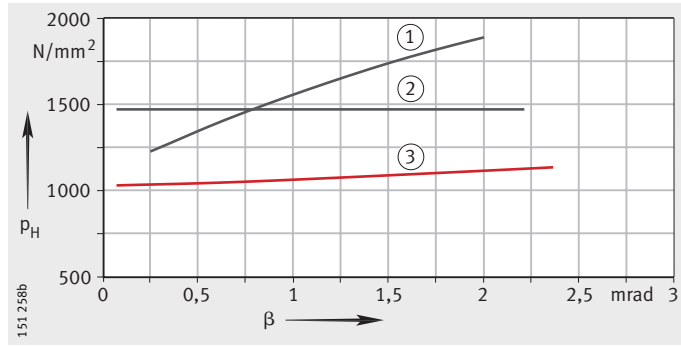


① Untilted running, β = 0 mrad
② Tilted running, β= 3 mrad
③ Cylindrical profile
④ Profile R = 500
⑤ Optimised INA profile

Figure 1
Hertzian pressure curve

Max. Hertzian pressure

Stud type track roller NUKR80, $F_r = 13\,800$ N ($C_{rw}/P_r = 5$), *Figure 2*.

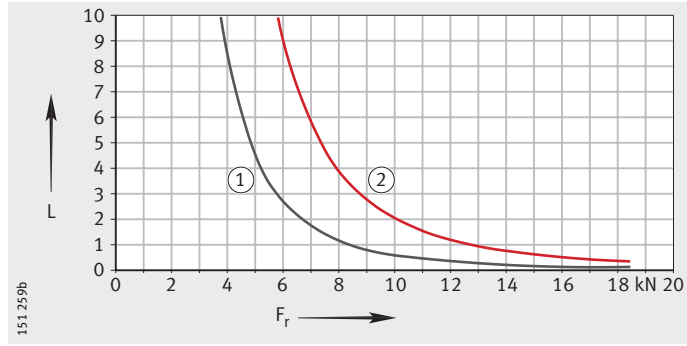


① Cylindrical profile
② Profile R = 500
③ Optimised INA profile
p_H = maximum Hertzian pressure
β = tilt angle

Figure 2
Max. Hertzian pressure

Basic rating life of the mating track

Yoke type track roller NUTR15, mating track made from 42CrMo4V, hardness 350 HV, *Figure 3*.

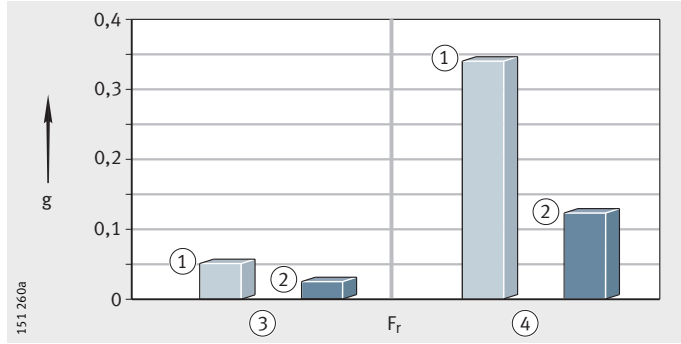


① Crowned outer ring, R = 500
② Optimised INA profile
L = basic rating life [millions of overrolling motions]
F_r = radial load

Figure 3
Basic rating life of the mating track

Wear of mating track

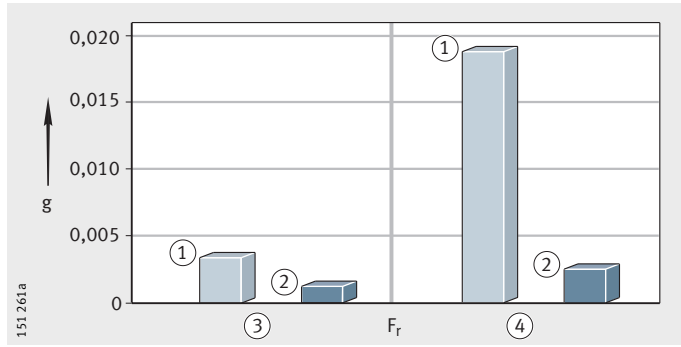
Mating track made from GGG–50.
Mean value from several test runs after 360 000 overrolling motions, *Figure 4*.



① Outer ring with R = 500
② Optimised INA profile
③ Low load F_r
④ High load F_r
g = wear
F_r = radial load

Figure 4
Wear of mating track

Mating track made from 58CrV4.
Mean value from several test runs after 8 000 000 overrolling motions, *Figure 5*.

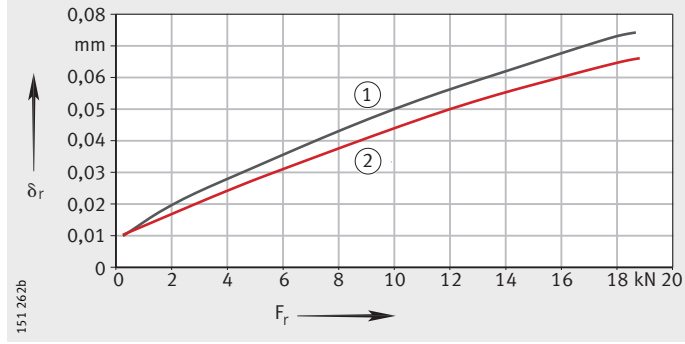


① Outer ring with R = 500
② Optimised INA profile
③ Low load F_r
④ High load F_r
g = wear
F_r = radial load

Figure 5
Wear of mating track

Rigidity in outer ring contact

Yoke type track roller NUTR15.
Radial deflection of the outer ring and rolling element set, *Figure 6*.



① Crowned outer ring, R = 500
② Optimised INA profile
δ_r = radial deflection
F_r = radial load

Figure 6
Rigidity in outer ring contact

Yoke type track rollers
Stud type track rollers

Installation as yoke or stud type track roller

The thick-walled outer rings can support high radial loads. If these track rollers are used on a flat mating track, the outer rings undergo elastic deformation. Compared to rolling bearings supported in a housing bore, track rollers have the following characteristics:

- modified load distribution in the bearing.
  This is taken into consideration by means of the basic load ratings $C_{r\,w}$ and $C_{0r\,w}$ that are the decisive factors used in life calculation.
- bending stresses in the outer ring.
  These are taken into consideration by the permissible radial loads $F_{r\,per}$ and $F_{0r\,per}$. The bending stresses must not exceed the permissible strength values of the material.

Permissible radial load under dynamic loading

For rotating bearings under dynamic load, the effective dynamic load rating $C_{r\,w}$ is used. $C_{r\,w}$ is used to calculate the basic rating life.

The permissible dynamic radial load $F_{r\,per}$ must not be exceeded. If a value for $F_{r\,per}$ is not given, the effective dynamic load rating $C_{r\,w}$ is used as a substitute. The radial load acting on the bearing must not exceed this value.

If the basic static load rating $C_{0r\,w}$ is lower than the basic dynamic load rating $C_{r\,w}$, then $C_{0r\,w}$ applies.

Permissible radial load under static loading

For bearings under static load, either stationary or with only infrequent rotary motion, the effective static load rating $C_{0r\,w}$ applies. $C_{0r\,w}$ is used to calculate the static load safety factor S_0.

The permissible static radial load $F_{0r\,per}$ must not be exceeded. If a value for $F_{0r\,per}$ is not given, the effective static load rating $C_{0r\,w}$ is used as a substitute. The radial load acting on the bearing must not exceed this value.

In addition to the permissible radial load on the bearing, the permissible radial load on the mating track must also be observed, see section Design of mating track, page 958.

Load carrying capacity and life

The methods for calculating the rating life are:

- the basic rating life to DIN ISO 281
- the adjusted basic rating life to DIN ISO 281
- the expanded calculation of the adjusted reference life to DIN ISO 281-4.

These methods are described in the section Load carrying capacity and life, page 40. For yoke type track rollers, stud type track rollers and ball bearing track rollers, the following values must be substituted:

- C_r, $C_{0r} = C_{r\,w}$, $C_{0r\,w}$
  Effective dynamic or static load rating
- $C_{ur} = C_{ur\,w}$
  Fatigue limit load as track roller according to the dimension tables.

Other formulae for calculating the rating life, see page 945.

Other formulae for determining the basic rating life

$$L_s = 0{,}0314 \cdot D \cdot \left(\frac{C_{rw}}{P_r} \right)^p$$

or

$$L_h = 26{,}18 \cdot \frac{D}{H \cdot n_{osc}} \cdot \left(\frac{C_{rw}}{P_r} \right)^p$$

or

$$L_h = 52{,}36 \cdot \frac{D}{\bar{v}} \cdot \left(\frac{C_{rw}}{P_r} \right)^p$$

L_s 10^5 m
Basic rating life in 10^5 m

L_h h
Basic rating life in operating hours

C_{rw} N
Effective dynamic load rating.
C_{rw} is that load of constant magnitude and direction which a sufficiently large group of apparently identical track rollers can endure for a basic rating life of one million revolutions

P_r N
Equivalent dynamic load (radial load)

p –
Life exponent:
p = 3 for yoke and stud type track rollers based on balls
p = $^{10}/_{3}$ for yoke and stud type track rollers based on needle or cylindrical rollers

n min^{-1}
Operating speed

D mm
Outside diameter of track roller

H m
Single stroke length for reciprocating motion

n_{osc} min^{-1}
Number of return strokes per minute

$\bar{v}$ m/min
Mean travel velocity.

Operating life

The operating life is the life actually achieved by a rolling bearing. This can deviate significantly from the calculated basic rating life.

This may be due to wear and/or fatigue as a result of:

- deviating operating conditions
- misalignment between the track roller and mating track
- insufficient or excessive operating clearance
- contamination of the track roller
- inadequate lubrication
- excessive operating temperature
- oscillating bearing motion with very small swivel angles, leading to false brinelling
- wear between the outer ring outside surface and the mating track
- high vibration and false brinelling
- very high shock loads, static overloading
- prior damage during installation.

Due to the variety of installation and operating conditions, it is not possible to precisely predetermine the operating life. The most reliable way of arriving at a close estimate is by comparison with similar applications.

Static load safety factor

The parameter for the static load is the static load safety factor S_0. It indicates the security against impermissible permanent deformation of the bearing:

$$S_0 = \frac{C_{0r\,w}}{F_{0r}}$$

S_0 –
Static load safety factor

$C_{0r\,w}$ N
Effective radial static load rating, see dimension tables

F_{0r} N
Maximum static radial load on track roller.

Track rollers are regarded as highly loaded at a static load safety factor $S_0 < 8$.

Static load safety factors $S_0 < 1$ cause plastic deformation of the rolling elements and the raceways, which can impair smooth running. This is only permissible for bearings with small rotary motions or in secondary applications.

For a static load safety factor $S_0 < 2$, please contact us.

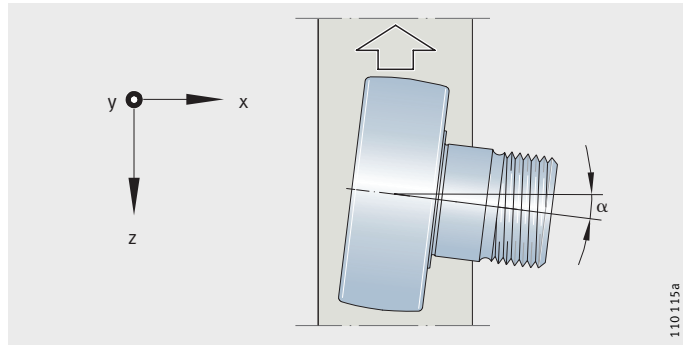
Minimum load

In order to ensure that the outer ring is driven and no slippage occurs or the track roller does not lift from the mating track, track rollers must be subjected to a minimum load in dynamic operation. In general, the minimum load is calculated using the ratio $C_{0r\,w}/F_r < 60$.

Skewed running

Skewed running leads to additional axial load on the rolling bearing and axial slippage in the rolling contact between the outer ring and mating track, *Figure 7*. Depending on the skewed running angle α and the lubrication, wear can occur in these cases.

A complete loss of adhesive friction between the outer ring and raceway, with correspondingly severe wear, is to be expected with a skewed running angle $\alpha \geqq 1{,}4 \cdot 10^{-4} \cdot p_H$ (°) or $\alpha \geqq 2{,}5 \cdot 10^{-3} \cdot p_H$ (mrad).



α = skewed running angle

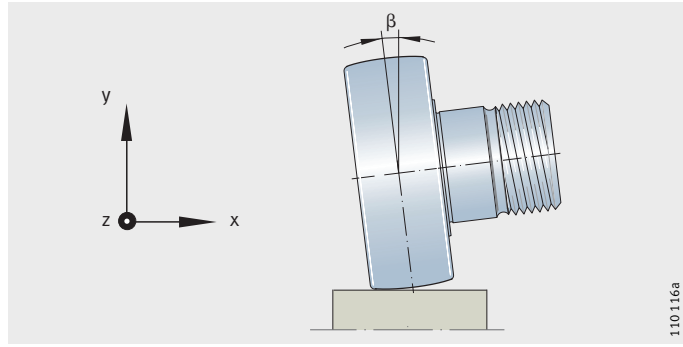
Figure 7
Skewed running

Tilting

If tilting occurs during running, increased edge stresses occur, especially in track rollers with cylindrical outer rings.

Track rollers with a crowned outer ring are less sensitive to tilting and should therefore be used in preference.

In practice, track rollers with a cylindrical outside surface and a tilting angle of $\beta > 0{,}1°$ (1,7 mrad) and track rollers with a crowned outside surface and a tilting angle of $\beta > 0{,}25°$ (4,4 mrad) have proved susceptible to damage, *Figure 8*.



β = tilting angle

Figure 8
Tilting

Speeds

The maximum permissible speed for track rollers is essentially determined by the permissible operating temperature of the rolling bearings.

The temperature thus depends on the type of bearing, the load, the lubrication conditions and the cooling conditions.

Speed during continuous operation

The speeds $n_{D\,G}$ in the dimension tables are guide values. They were determined for:

- grease lubrication
- loads during continuous operation of $< 0{,}05 \cdot C_{0r\,w}$
- skewed running angles of $\alpha < 0{,}03°$ ($< 0{,}5$ mrad)
- an ambient temperature of +20 °C
- outer ring temperatures of +70 °C
- lubricated mating tracks and
- no external axial load.

The speeds must be reduced under the following conditions:

- loads $> 0{,}05 \cdot C_{0r\,w}$
- additional axial forces (skewed running)
- insufficient heat dissipation.

Higher speeds can be achieved with intermittent operation and oil impulse lubrication.

Speed with lip seals

The speed of track rollers with lip seals is additionally restricted by the permissible sliding speed at the seal lip.

Frictional torque

The frictional torque M_R of a track roller is dependent on many influencing factors such as load, speed and track roller type, as well as the lubrication conditions and seal friction. Due to the wide range of these influencing factors, the frictional torque can only be calculated in approximate terms.

For track rollers without contact seals, the frictional torque can be calculated under normal operating conditions and moderate speed range using the following formula:

$$M_R = f \cdot F_r \cdot \frac{d_M}{2}$$

M_R Nmm
Frictional torque of track roller

f –
Coefficient of friction, see table, page 949

F_r N
Radial load

d_M mm
Mean bearing diameter of track roller (d + D)/2.

The values in the table Coefficient of friction f are valid for track rollers under radial load and without seals.

If sealed track rollers are used, higher values must be expected.

Additional axial forces, such as those occurring under large skewed running angles, can lead to a substantial increase in the values, especially in the case of track rollers based on needle rollers. Track rollers based on balls can support axial loads without a significant change in friction.

Coefficient of friction f

Type of track roller	Factor f
Ball bearing, single row	0,0015 to 0,002
Ball bearing, double row	0,002 to 0,003
Cylindrical roller bearing, full complement	0,002 to 0,003
Needle roller bearing, with cage	0,003 to 0,004
Needle roller bearing, full complement	0,005 to 0,007

Displacement resistance

When a track roller rolls on a track, it must overcome not only the friction within the bearing but also the rolling friction between the outer ring and the track.

The displacement resistance F_v is determined according to the following formula:

$$F_v = \frac{2 \cdot (f_R \cdot F_r + M_R)}{D}$$

F_v N
Displacement resistance

f_R mm
Coefficient of rolling friction for tracks made from hardened steel:
f_R = 0,05 mm

F_r N
Radial load

M_R Nmm
Frictional torque of track roller

D mm
Outside diameter of track roller.

Yoke type track rollers
Stud type track rollers

Two contact zones in track rollers

For track rollers, two contact zones must be lubricated and considered separately:

- the rolling elements and the rolling element raceway
- the outside surface of the track roller and the mating track.

The contact zone between the rolling elements and the rolling element raceway is covered in the section Technical Principles, Lubrication.

Lubrication of the bearing

Yoke and stud type track rollers based on ball bearings are greased using a lithium soap grease with a mineral oil base to GA13.

For yoke and stud type track rollers based on needle and cylindrical rollers, a lithium complex soap grease with a mineral oil base and EP additives to GA08 is used. Greases for initial greasing are listed in the section Lubrication, page 76.

Arcanol rolling bearing greases for relubrication

Arcanol grease	Designation to DIN 51825	Type of grease	Track roller
LOAD150	KP2N–20	Lithium soap grease with mineral oil base	Yoke and stud type track rollers based on rollers
LOAD220	KP2N–20	Lithium-calcium soap grease with mineral oil base	Yoke and stud type track rollers based on rollers
MULTI3	KP3K–30	Lithium soap grease with mineral oil base	Yoke and stud type track rollers based on balls

Lubrication of the mating track

For lubrication of the mating track, all lubricants suitable for rolling bearing lubrication may be used.
However, there are applications in which the mating track must not be lubricated.

If the contact point cannot be lubricated, wear must be expected, especially under high loads and at high speeds.

Oil lubrication

For oil lubrication, oils of type CLP to DIN 51517 are recommended.

Grease lubrication

For grease lubrication, lithium soap greases to DIN 51825 should be used. Relubrication intervals can only be determined under operating conditions.

Relubrication must be carried out at the latest when fretting corrosion first occurs; it can be identified by a reddish discolouration of the mating track or the outer ring.

Solid lubricants, anti-friction coatings

These substances are suitable for lubrication. At high traverse or rotational speeds, however, they provide effective lubrication for a significantly shorter period than oil or grease lubrication.

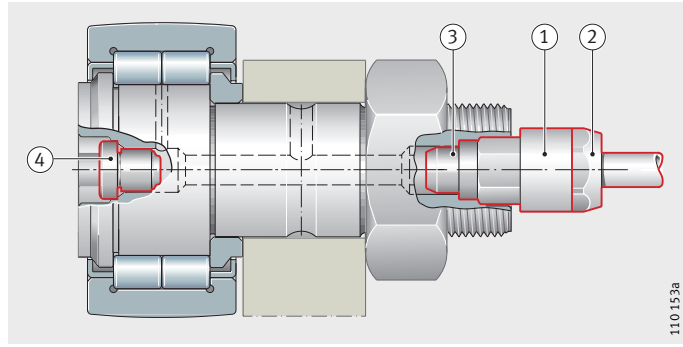
Central lubrication adapter for stud type track rollers

If a central lubrication system is to be used, a patented central lubrication adapter can be used to connect the standard roller stud of stud type track rollers with hexagonal sockets on both sides, *Figure 9*. This comprises a connection adapter with a hexagonal end and a rapid-fit connection cartridge.

The connection adapter is connected to the roller stud on one end of the stud type track roller by replacing the funnel type lubrication nipple with the fitting cylinder. The hexagonal end prevents rotation of the adapter. The other end of the stud type track roller is closed off by means of the funnel type lubrication nipple, *Figure 9*.

The connection adapter has a M10×1 internal thread.
This is used for screw mounting and sealing of the rapid-fit connection cartridge. The cartridge gives firm retention and sealing of the plastic tube. It is therefore no longer necessary to screw the pipe and adapter on to each other.

For dimensions of the adapters, see table and *Figure 10*, page 952.



① Connection adapter with M10×1 internal thread
② Rapid-fit connection cartridge
③ Fitting cylinder
④ Funnel type lubrication nipple

Figure 9
Central lubrication adapter and funnel type lubrication nipple

Dimensions of adapter

Central lubrication adapter Designation	W	L	l_1 max.	l_2	l_3 approx.	For polyamide pipe DIN 73 378 $d_1 \times s_{nom}$ [1)]
AP8	8	27	16	22	4	4×0,75
AP10	10	27	15	22	5	4×0,75
AP14	14	25	8	20	6	4×0,75

1) Hard PA pipes should preferably be used.
Note the operating limits according to DIN 73 378 and manufacturer's guidance.
Maximum excess pressure for pipes made from PA 11/12 at +23 °C: 31 bar to 62 bar.
Maximum excess pressure when using other screw-in connectors: 80 bar.

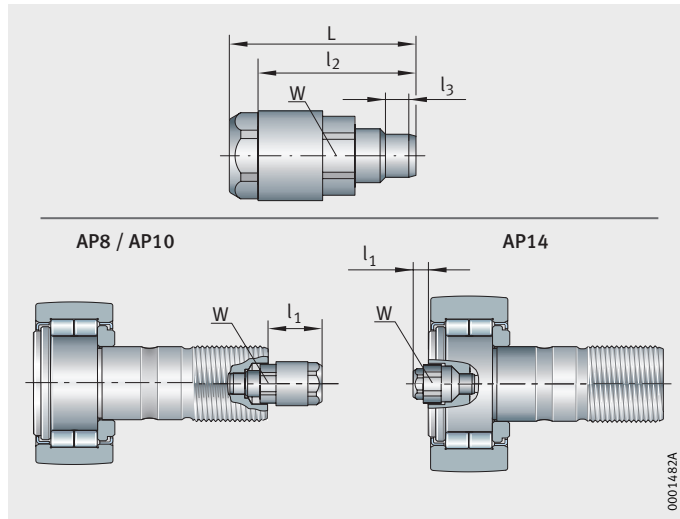


Figure 10
Dimensions of central lubrication adapters

Simplified calculation of relubrication intervals

The table Allocation to stud type track rollers shows the relubrication quantity for central lubrication using flowable grease and its conversion to the number of relubrication impulses for conventional metering nipple sizes.

The data are valid for a lithium soap flowable grease with EP additives and mineral oil base of classes ISO-VG 100 to ISO-VG 220 and NLGI classes 00 or 000.

Allocation to stud type track rollers

Series[1]	Outside diameter D mm	Central lubrication adapter Designation	Relubrication quantity g[2]	Relubrication impulses for metering nipple of size 30 mm^3	50 mm^3
NUKR, NUKRE	35 and 40	AP8	1,1	40	24
	47 and 52	AP10	2,4	89	53
	62 to 90	AP14	7,3	271	163
KR, KRE	35 and 40	AP8	1,2	44	27
	47 and 52	AP10	1,6	60	36
	62 to 90	AP14	6	222	133
KRV, KRVE	35 and 40	AP8	0,7	26	16
	47 and 52	AP10	1	37	22
	62 to 90	AP14	3,2	120	72

1) For stud type track rollers with hexagonal socket on both sides.

2) Relubrication quantity and relubrication intervals for central lubrication using flowable grease for the majority of applications.
The quantity required to fill the feed lines must also be taken into consideration.

Relubrication periods

The approximate relubrication periods for single shift operation and the majority of load cases are shown in the table Relubrication period for calculating the relubrication intervals. The data are valid for single shift operation; the relubrication quantity and relubrication intervals are valid for the majority of applications. They are based on approximate calculation of the relubrication interval t_{fR}; relubrication interval: see section Lubrication, page 76.

Within these periods, the number of relubrication impulses derived from the table Allocation to stud type track rollers, page 953, should be evenly distributed.

Relubrication period for calculating the relubrication intervals

Load ratio C_{0rw}/P_r	Maximum operating speed n_{max} in % of n_{DG}			
	10	25	50	100
$5 > C_{0rw}/P_r \geqq 3$	$^1/_2$ yearly	–	–	–
$10 > C_{0rw}/P_r \geqq 5$	yearly	4 months	monthly	–
$C_{0rw}/P_r \geqq 10$	yearly	8 months	2 months	14 days

Periods in single shift operation

Months	Weeks	Working days	Working hours
$^1/_2$	2	10	80
1	4	20	160
2	8	40	320
4	16	80	640
6	24	120	960
8	32	160	1 280
12	48	240	1 920

Fitting of central lubrication adapter

The stud type track roller must be mounted before fitting the adapter. The unused relubrication hole in the roller stud must be closed off using the funnel type lubrication nipple supplied.

Only the lubrication nipples supplied should be used.

The central lubrication adapter should preferably be pressed in using a manual lever press under low, uniform pressure or carefully driven into the unused hexagonal socket of the roller stud by means of light blows with a plastic hammer; pay attention to the press-in depth l_3 and the position of the hexagon, *Figure 10* and table Dimensions of adapter, page 952.

The plastic pipe must be cut off straight across and inserted into the cartridge until it stops.

Only use polyamide pipe to DIN 73 378. Check the seating of the pipe. Note maximum pressures, maximum temperatures and minimum bending radius. The maximum pipe length up to the distributor is 1 m.

Adjacent construction for yoke type track rollers

For yoke type track rollers without an inner ring, the rolling element raceway on the shaft or stud must be hardened and ground, see table.
The surface hardness must be 670 HV + 170 HV and the hardening depth CHD or SHD must be sufficiently large.

Tolerances and surface for the shaft or stud raceway

Diameter tolerance of shafts or studs		Roughness	Roundness	Parallelism
Without inner ring	With inner ring	max.	max.	max.
k5	g6 (with point load)	R_a0,4 (R_z2)	25% of diameter tolerance	50% of diameter tolerance

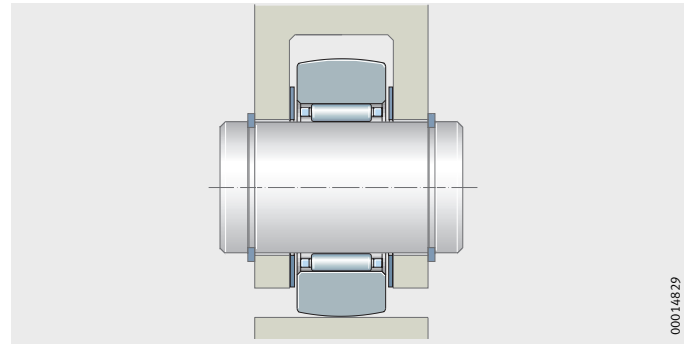
Location of yoke type track rollers without axial guidance

For yoke type track rollers without axial guidance, the outer ring and needle roller and cage assembly must be laterally guided, *Figure 11*.

The axial contact surfaces for the outer rings must be precision machined (R_a2 recommended), wear-resistant and lubricated.

Yoke type track rollers without axial guidance are not self-retaining.

The outer ring and the needle roller and cage assembly are matched to each other and must not be interchanged during fitting with components from other bearings of the same size.
The inner rings are matched to the enveloping circle tolerance F6 and can be interchanged within their accuracy class (used in different combinations).



RSTO

Figure 11
Lateral guidance of outer ring and needle roller and cage assembly

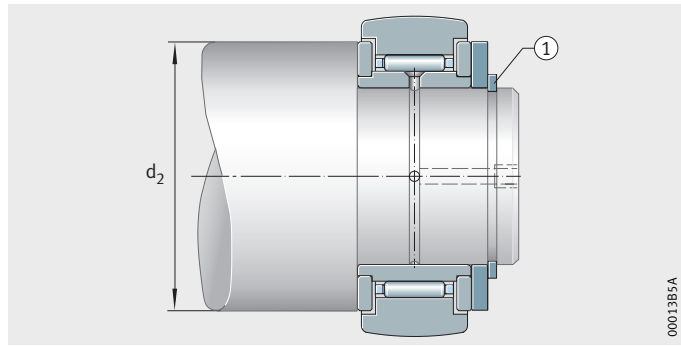
Location of yoke type track rollers with axial guidance

Yoke type track rollers with axial guidance must be axially clamped in place.

The thrust washers must be axially supported if axial loads occur. The dimension d_2 in the dimension tables must be observed, *Figure 12*.

Yoke type track rollers NATR and NATV can be located using conventional fasteners such as snap rings, *Figure 12*.

NATR



① Snap ring
d_2 = abutment diameter

Figure 12
Location by snap ring

For NNTR..-2ZL, NUTR, PWTR..-2RS, the inner ring and thrust rib must be axially located, *Figure 13*.

PWTR..-2RS

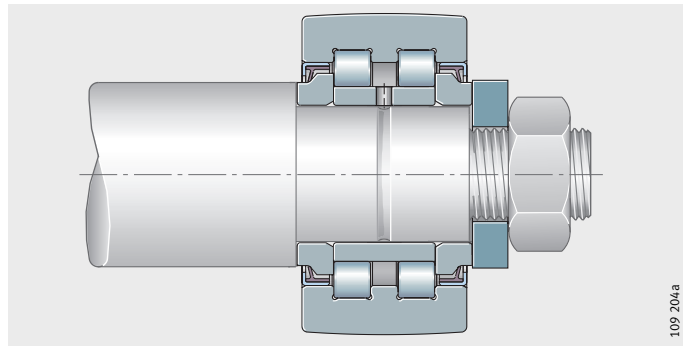


Figure 13
Clamping of
inner rings and thrust washers

Adjacent construction for stud type track rollers

The bore tolerance H7 produces a clearance fit since the stud tolerance is h7 without an eccentric collar and h9 with an eccentric collar.

The locating surfaces for stud type track rollers must be flat, perpendicular and of sufficient height. The strength of the nut locating surface must be sufficiently high. The dimension must not be less than the dimension d_2 in the dimension tables.

The entry chamfer on the locating bore must not be more than 0,5×45°.

Axial location

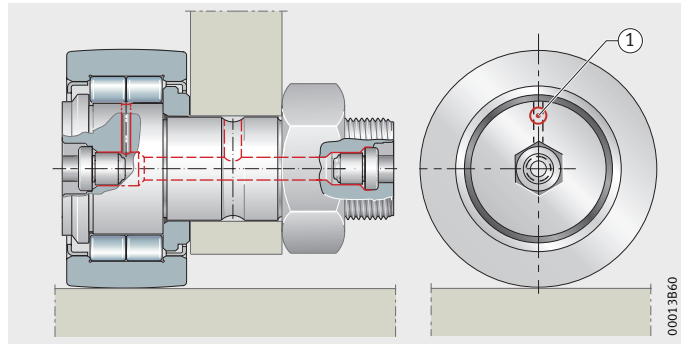
Stud type track rollers must be axially secured using a hexagonal nut. The nuts of grade 8 to ISO 4 032 (M6, M8), ISO 8 673, are not included in the delivery and must be ordered separately.

If heavy vibration occurs, the stud type track rollers can be located using self-locking nuts to DIN 985 or special locking washers.

For self-locking nuts, a higher tightening torque must be observed; the advice given by the nut manufacturer must be followed.

Position of lubrication hole

The position of the radial lubrication hole is indicated on the flanged side of the roller stud, *Figure 14*. This must not be positioned in the loaded zone.



NUKR

① Marking

Figure 14
Position of lubrication hole

Design of mating track

In the design of the mating track (material and strength, heat treatment, surface), the Hertzian pressure p_H must be taken into consideration. This is dependent on the load, the contact geometry (point contact or line contact) and the modulus of elasticity of the materials.

Nomogram

The Hertzian pressure can be read from the nomogram, *Figure 16*, page 959, or calculated.
The nomogram is valid for mating tracks made from steel.
For other materials, the correction factor k must be taken into consideration, see table Correction factor k, page 960.

Other conditions:

- Point contact
- Radius of curvature R = 500; for R > 500, see page 960
- Mating track flat in the direction of the track roller axis
- Signs according to *Figure 15*.

Example

- Stud type track roller NUKR35 with optimised INA profile, D = 35 mm
- Outer ring width C = 18 mm
- Radial load F_r = 2 500 N
- Cam plate, radius r_L = 80 mm.

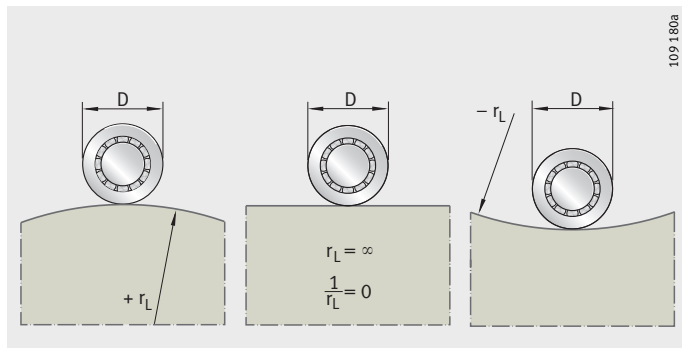
Curvature sum

$$\frac{1}{r_L}+\frac{2}{D}=\frac{1}{80}+\frac{2}{35}=0{,}07\ \text{mm}^{-1}$$

p_{H500} = 1 250 N/mm²

$$p_{H\,\text{opt. INA profile}} \approx 1250\ \text{N/mm}^2 \cdot k_{pH}$$

= 1 250 N/mm² · 0,85
= 1 063 N/mm²
(1 025 N/mm² from calculation program BEARINX®), k_{PH} see page 960.



D = outside diameter of track roller
r_L = raceway radius

Figure 15
Raceway radii and signs

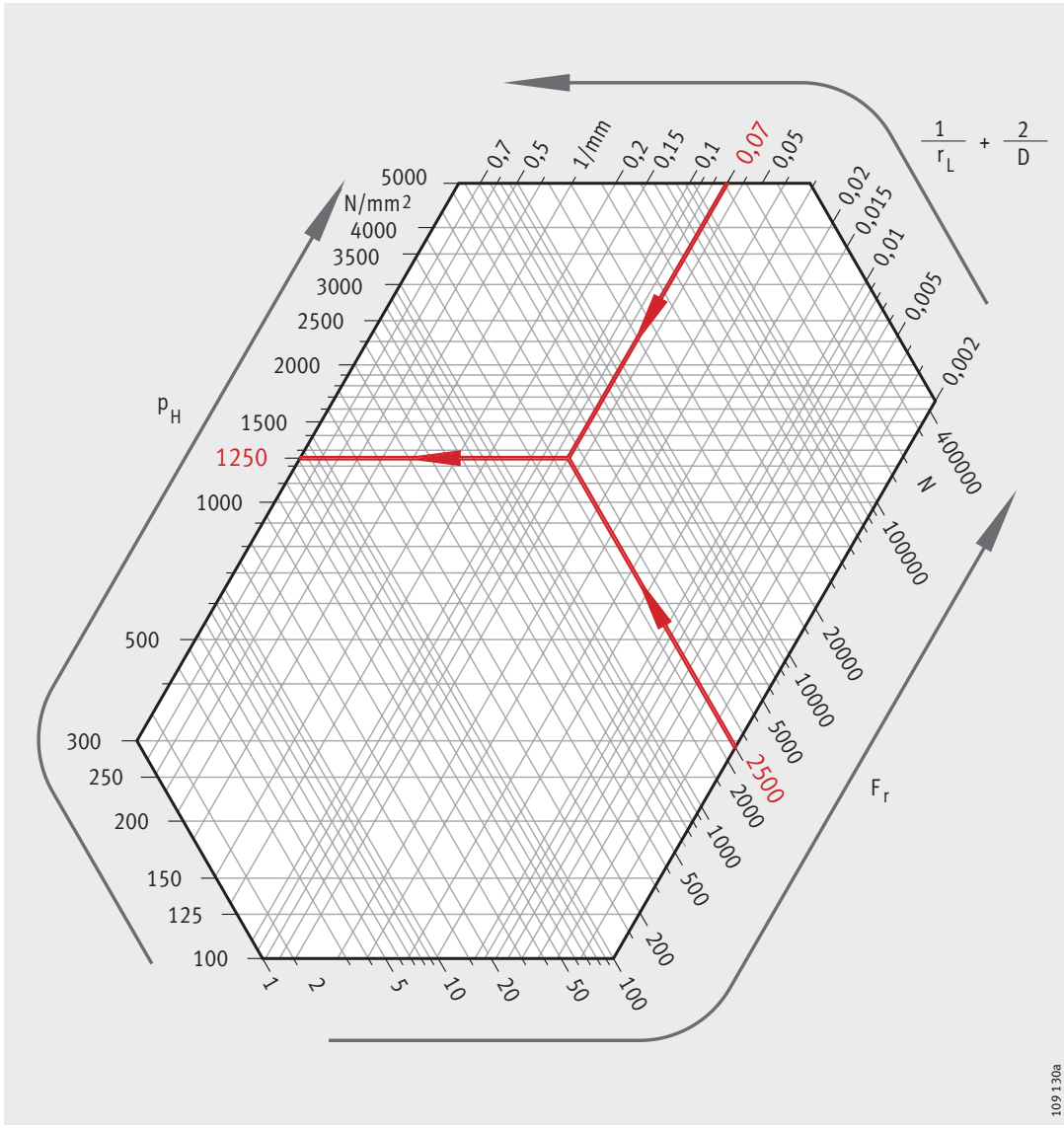


Figure 16
Nomogram for determining the Hertzian pressure; calculation example (red)

Track rollers with optimised INA profile

For the optimised INA profile, the following calculation provides sufficiently precise values, k_{pH} see table:

$$p_{H\,opt.\,INA\,profile} \approx k_{pH} \cdot p_{H500}$$

Pressure factor k_{pH}

Outer ring width C mm	Pressure factor k_{pH}
10 incl. 15	1
over 15 incl. 20	0,85
over 20 incl. 30	0,83
over 30 incl. 35	0,8

Radius of curvature R > 500

For R > 500 mm, the following applies:

$$p_{HR} = p_{H500} \cdot \left(\frac{500}{R}\right)^{0,185}$$

Materials for mating track

The mating track is subjected to high load during overrolling. This produces high Hertzian contact pressures. The strength and surface hardness of the material must be matched to this load.

For raceways subjected to high loads, through hardened steels, case hardened steels and steels for flame or induction hardening are recommended. For raceways subjected to low loads, construction steels and cast steel or cast iron materials can be used, see table.

$$p_H = k \cdot p_H\,(\text{steel/steel})$$

Correction factor k

Material	Material no.	Correction factor for mating track with	
		Point contact	Line contact
GG-20	0.6020	0,74	0,8
GG-30	0.6030	0,81	0,85
GG-40	–	0,85	0,88
GGG-40	0.7040	0,92	0,94
GGG-60	0.7060	0,94	0,96
GGG-80	0.7080	0,96	0,97

Guide values for permissible Hertzian pressure

The table Materials and guide values for permissible Hertzian pressure gives a selection of materials with the associated values. The values were determined on steel test specimens; loadings of 10^7 were achieved.

On a similar basis to the calculation of the load carrying capacity of rolling bearings, this gives:

- $p_{H\ stat}$ for predominantly static load
- $p_{H\ dyn}$ for predominantly dynamic load.

Materials and guide values for permissible Hertzian pressure

Material		Material no.	Hertzian pressure		Proof stress of material
			$p_{H\ stat}$ N/mm²	$p_{H\ dyn}$ N/mm²	$R_{p0,2}$ N/mm²
Cast iron	GG-15	0.6015	850	340	120
	GG-20	0.6020	1 050	420	150
	GG-25	0.6025	1 200	480	190
	GG-30	0.6030	1 350	540	220
	GG-35	0.6035	1 450	580	250
	GG-40	–	1 500	600	280
Spheroidal graphite cast iron	GGG-40	0.7040	1 000	490	250
	GGG-50	0.7050	1 150	560	320
	GGG-60	0.7060	1 400	680	380
	GGG-70	0.7070	1 550	750	440
	GGG-80	0.7080	1 650	800	500
Cast steel	GS-38	1.0420	780	380	200
	GS-45	1.0446	920	450	230
	GS-52	1.0552	1 050	510	260
	GS-60	1.0558	1 250	600	300
	GS-62	–	1 300	630	350
	GS-70	–	1 450	700	420
Construction steel	St 37-2	1.0037	690	340	235
	St 44–2	1.0044	860	420	275
	St 52-3	1.0570	980	480	355
Quenched and tempered steel	C 45 V	1.0503	1 400	670	500
	Cf 53 V	1.1213	1 450	710	520
	Cf 56 V	–	1 550	760	550
	C 60 V	1.0601	1 600	780	580
	46 Cr 2 V	1.7006	1 750	850	650
	42 CrMo 4 V	1.7225	2 000	980	900
	50 CrV 4 V	1.8159	2 000	980	900
Hardened steel	100 Cr 6 H	1.3505	4 000	1 500	1 900
	16 MnCr 5 E	1.7131	4 000	1 500	770
	Cf 53 Hl	1.1213	4 000	1 500	730
	Cf 56 Hl	–	4 000	1 500	760

Hardenable materials

The following materials with a purity level corresponding to that of alloyed construction steels may be used:

- through hardening steels to ISO 683-17 such as 100Cr6. In special cases, surface hardening is possible.
- case hardening steels to ISO 683-17 such as 17MnCr5 or EN 10 084 such as 16MnCr5. In addition to the hardenability, the core strength must also be taken into consideration. For case hardening, a fine grained hardening structure and a case hardening depth CHD according to the formula below is necessary.
- steels for flame or induction hardening to ISO 683-17 such as Cf54 or DIN 17 212 such as Cf53. For flame or induction hardening, only the parts of the machine component used as raceways must be hardened. The material should be quenched and tempered before hardening. The surface hardening depth SHD is determined using the formula below.

Heat treatment of the mating track

The following apply for hardened mating tracks:

- a surface hardness of 670 HV + 170 HV
- CHD, SHD according to the formulae, page 962
  - in accordance with DIN 50 190, the depth of the hardened surface zone at which there is still a hardness of 550 HV
- hardness curves according to *Figure 17* and *Figure 18*, page 963
- a hardening depth of ≧ 0,3 mm.

The formulae are based on the hardness curves normally achieved with skilled heat treatment.

Case hardening:

$$CHD \geqq 2{,}73 \cdot 10^{-5} \cdot \frac{p_H}{\left(\frac{1}{r_L} + \frac{2}{D}\right)}$$

Flame and induction hardening:

$$SHD \geqq 10^{-5} \cdot \frac{\left(4{,}4 \cdot \frac{{p_H}^2}{R_{p0,2}} - 3{,}5 \cdot p_H\right)}{\left(\frac{1}{r_L} + \frac{2}{D}\right)}$$

p_H N/mm²
Max. Hertzian pressure

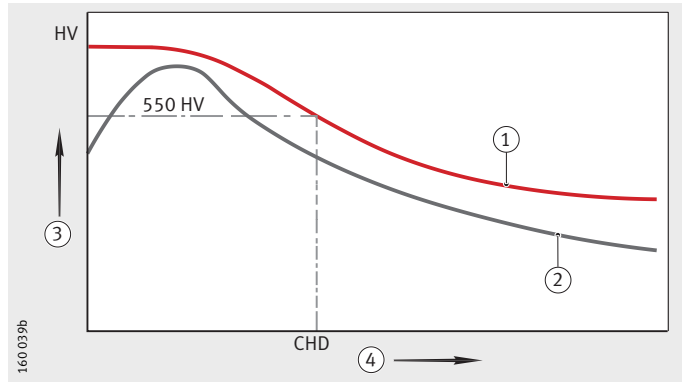
CHD mm
Case hardening depth

SHD mm
Surface hardening depth

D mm
Outside diameter of track roller

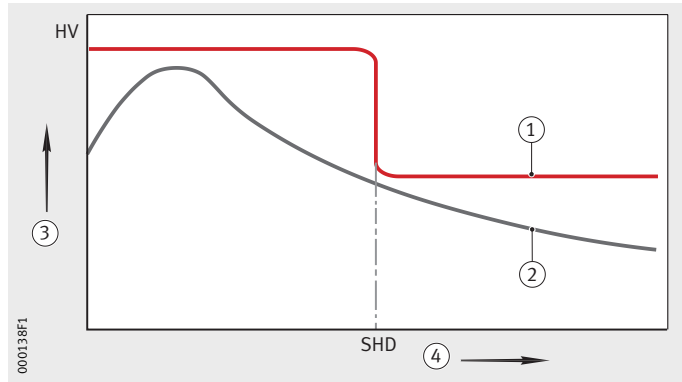
$R_{p0,2}$ N/mm²
Proof stress of mating track material, see table, page 961

r_L mm
Radius of mating track –
the raceway must be flat in the direction of the track roller axis, *Figure 15*, page 958.



① Case hardening
② Required hardness
③ Hardness
④ Distance from surface
CHD = case hardening depth with hardness 550 HV

Figure 17
Case hardening depth CHD, hardness curve



① Flame or induction hardening
② Required hardness
③ Hardness
④ Distance from surface
SHD = surface hardening depth

Figure 18
Surface hardening depth SHD, hardness curve

INA guideways as mating tracks

These guideways are ready-to-fit units from the INA linear range.

They are to the appropriate grade Q20 for yoke and stud type track rollers and correspond to the dimensions of standard profiles:

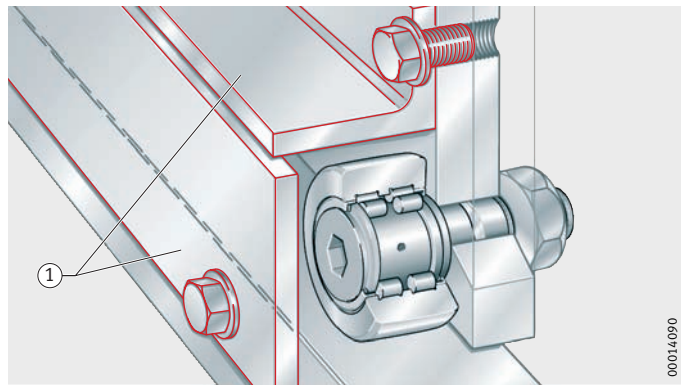
- parallelism 20 μm/m
- surface quality R_a0,8
- hardness 58 HRC to 62 HRC
- angular misalignment between the raceways max. 1 mrad (1 μm/mm)
- deviations of the guideway cross-section +0,015/+0,05
- length tolerance of the individual guideway +1 mm/m.

Enquiries

Schaeffler KG
Linear Technology Division
66406 Homburg (Saar), Germany
Internet www.schaeffler.com
E-mail info.linear@schaeffler.com
Telephone 0180 5003872
Fax 0180 5003873

Protection of mating track

The mating track must be protected against contamination. Where necessary, covers and wipers preferably made from felt should be placed ahead of the track roller, *Figure 19*.



① Covers

Figure 19
Protection of mating track against contamination

Fitting

Track rollers are precision machine elements. These products must be very carefully handled before and during fitting. Their trouble-free operation depends largely on the care taken during fitting.

The products must be protected against dust, contaminants and moisture. Contaminants have a detrimental influence on the running and operating life of rolling bearings.

Do not cool the bearings excessively. Moisture due to condensation can lead to corrosion in the bearings and bearing seats.

Yoke type track rollers RSTO and STO are not self-retaining.
The outer ring and the needle roller and cage assembly are matched to each other and must not be interchanged during fitting with components from other bearings of the same size.

The assembly area must be kept clean and free from dust.

Check the seat of the axis for dimensional and geometrical accuracy and cleanliness.

Lightly oil the bearing ring seating surfaces or rub with solid lubricant.

After fitting, the bearings must be supplied with lubricant.
Finally, check the correct functioning of the bearing arrangement.

Fitting tools

Depending on the application, the following are suitable:

- induction heaters;
  note the manufacturer's guidance on grease and seals
- heating cupboard; heating up to +80 °C
- mechanical or hydraulic presses;
  use fitting sleeves that cover the whole circumference of the bearing ring end faces
- hammer and fitting sleeves;
  blows should only be applied concentrically to the sleeve.

Fitting forces must never be directed through the rolling elements.
Direct blows on the bearing rings must be avoided.
Ensure that the seals are not damaged during fitting.

Guidelines for dismantling

Dismantling should be taken into consideration in the original design of the bearing position.

If the bearing is to be reused:

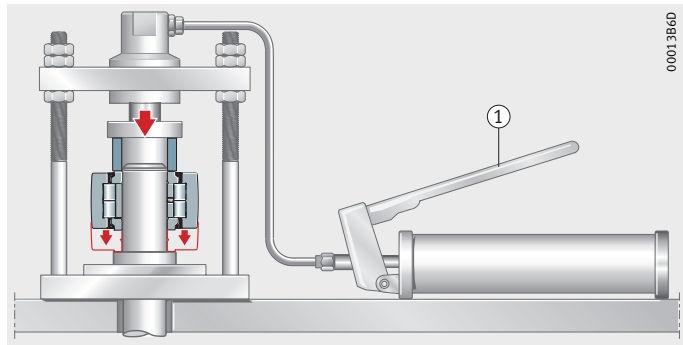
- do not apply direct blows to the bearing rings
- do not apply dismantling forces through the rolling elements
- carefully clean the bearings after dismantling
- do not use a concentrated or "hard" flame.

Fitting and dismantling of yoke type track rollers (needle and cylindrical roller types)

If the tolerances are unfavourable, the yoke type track roller should be pressed onto the shaft or stud using a press, *Figure 20*.
The inner ring must be fitted such that the pressing-in force is distributed uniformly on the end face of the inner ring.

Lubrication hole

The bearings should be fitted such that the lubrication holes are positioned in the unloaded zone. For yoke type track rollers PWTR and NNTR, there is no need for defined positioning of the lubrication hole.



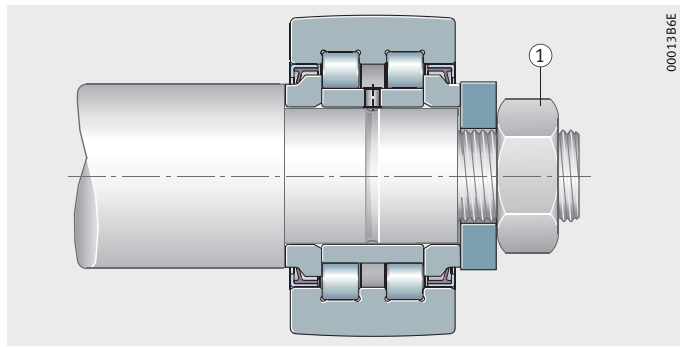
NUTR

① Fitting press

Figure 20
Fitting of yoke type track roller using a fitting press

Axial location

Yoke type track rollers NUTR, PWTR and NNTR must be axially clamped in place, *Figure 21*.



PWTR..-2RS

① Hexagon nut

Figure 21
Axial location

Fitting and dismantling of stud type track rollers (needle and cylindrical roller types)

Stud type track rollers should be fitted using a press if possible (similar to *Figure 20*, page 966).

Blows on the flange of the roller stud must be avoided.

The position of the radial lubrication hole is indicated on the flanged side of the roller stud. It must not be positioned in the loaded zone, *Figure 14*, page 957.

Drive fit lubrication nipples for stud type track rollers

Stud type track rollers are supplied with loose drive fit lubrication nipples that must be pressed in correctly before fitting the bearings, *Figure 22*.

For lubrication of stud type track rollers using the central lubrication adapter, *Figure 24*, page 969.

Only the lubrication nipples supplied may be used, see table.

If relubrication is to be carried out via the locating bore, the axial lubrication holes in the stud type track roller must be closed off using the lubrication nipples before fitting, *Figure 22*.

KR..-PP

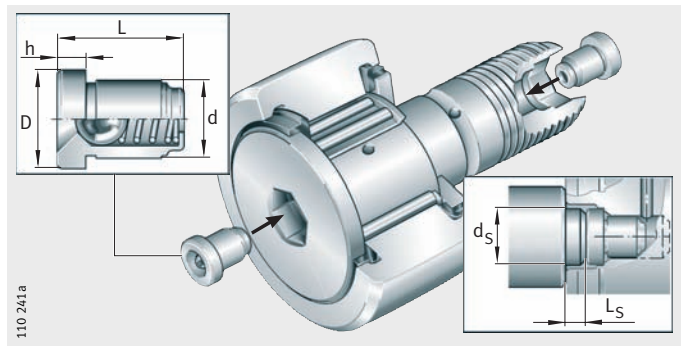


Figure 22
Stud type track roller with drive fit lubrication nipple and dimensions for pressing mandrel

Drive fit lubrication nipples

Lubrication nipple	Dimensions in mm						Suitable for outside diameter D
	D	d	L	h	d_s ±0,1	L_s	
NIPA1	6	4	6	1,5[1)]	–	–	16 and 19
NIPA1×4,5	4,7	4	4,5	1	4,5	5	22 to 32
NIPA2×7,5	7,5	6	7,5	2	7,5	6	35 to 52
NIPA3×9,5	10	8	9,5	3	10	9	62 to 90

1) Projection of lubrication nipple, see dimension tables.

Axial location of stud type track rollers

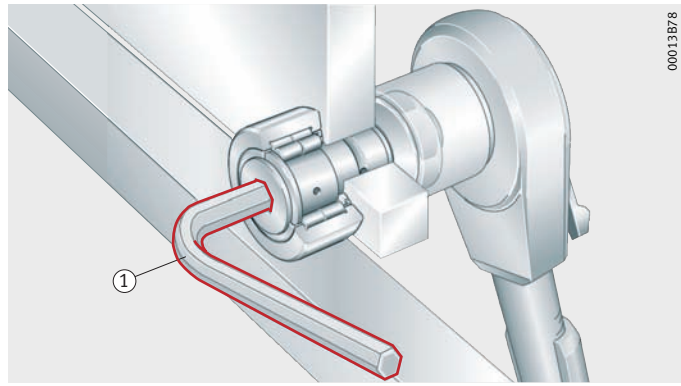
Stud type track rollers must be axially secured using a hexagon nut.

The slot or hexagonal socket on the ends of the roller stud can be used to hold the bearing by means of a key while tightening the fixing nut and to adjust the eccentric collar, *Figure 23*.

If heavy vibration occurs, self-locking nuts to DIN 985 or special locking washers can be used.

The tightening torque for the fixing nuts stated in the dimension tables must be observed. It is only in this way that the permissible radial load can be ensured.
If this cannot be adhered to, an interference fit is required.

For self-locking nuts, the higher tightening torque must be observed; the advice given by the nut manufacturer must be followed.



① Allen key

Figure 23
Holding the bearing using an Allen key

Stud type track rollers with eccentric collar

The highest point on the eccentric collar is indicated on the roller stud side, *Figure 14*, page 957.

Initial operation and relubrication

Stud type track rollers have a lubrication hole for relubrication:

- on the flange side of the roller stud
- on the thread-side end face, from an outside diameter of 22 mm
- on the shank of the roller stud from an outside diameter of 30 mm with an additional lubrication groove.

Stud type track rollers with an eccentric collar cannot be relubricated via the stud. The eccentric collar covers the lubrication hole.

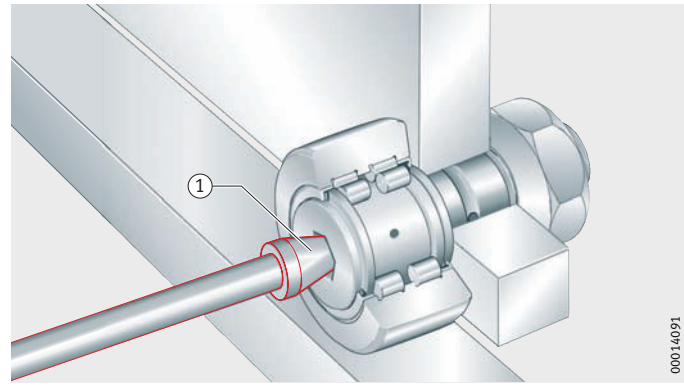
For lubrication, only grease guns with needle point nozzles may be used that have an opening angle ≦ 60°, *Figure 24*.

Before initial operation, the lubrication holes and feed pipes must be filled with grease in order to ensure protection against corrosion; lubrication can be carried out at the same time.

Lubrication will be more difficult if a rolling element is located over the radial lubrication hole. Relubrication should therefore be carried out with the bearing still warm from operation and rotating if safe to do so, before the bearing comes to rest if safe to do so and before extended breaks in operation.

The grease used for relubrication must be the same as that used for initial greasing. If this is not possible, the miscibility and compatibility of the greases should be checked, see page 950.

Relubrication should continue until a fresh collar of grease appears at the seal gaps. The old grease must be able to leave the bearing unhindered.



① Needle point nozzle, opening angle ≦ 60°

Figure 24
Relubrication using a grease gun

Anti-corrosion protection by Corrotect® coating

Track rollers are often subjected to aggressive media. In such applications, corrosion protection is therefore a decisive factor in achieving a long operating life of the bearings.

In principle, corrosion-resistant steels may be used for track rollers. In many applications, however, the special coating Corrotect® is more cost-effective. For a comprehensive description of the coating, see section Anti-corrosion protection, page 119.

Corrotect®

Corrotect® is an extremely thin, electroplated surface coating with a thickness of 0,5 µm to 3 µm.

The coating is effective against moisture, contaminated water, salt spray and weakly alkaline and weakly acidic cleaning agents.

Yoke type track rollers PWTR and stud type track rollers PWKR with the suffix RR have the CR(VI)-free Corrotect® coating as standard. Other yoke and stud type track rollers with Corrotect® coating are treated as special designs.

Figure 25 shows an uncoated and a coated stud type track roller after the salt spray test.

Fitting of coated track rollers

In order to reduce the press-in force required, the surface should be lightly greased; the tolerances are increased by the thickness of the coating.

Before track rollers with the Corrotect® coating are fitted, compatibility with the media should always be checked.

Figure 25
Uncoated and coated stud type track roller after salt spray test

Accuracy

The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620, for KR(E) and KRV to ISO 7 063.

The following deviations from DIN 620 apply:

- the diameter tolerance of the profiled outside surface 0/–0,05 mm
- for NNTR, the diameter tolerance to h10
- for NATR, NATV, NUTR, PWTR..-2RS, the tolerance of the width B to h12
- for NATR, NATV, the roundness of the inner ring
- for stud type track rollers, the tolerance of the shank diameter h7 and the eccentric collar diameter h9.

For PWTR..-2RS-RR and PWKR..-2RS-RR , the tolerances are increased by the thickness of the Corrotect® special coating.

Radial internal clearance

The radial internal bearing clearance corresponds approximately to class C2 and in the case of STO and NA22..-2RSR to class CN in accordance with DIN 620-4.

Radial internal clearance

Bore d mm		Radial internal clearance							
		C2 µm		CN µm		C3 µm		C4 µm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	24	0	25	20	45	35	60	50	75
24	30	0	25	20	45	35	60	50	75
30	40	5	30	25	50	45	70	60	85
40	50	5	35	30	60	50	80	70	100
50	65	10	40	40	70	60	90	80	110
65	80	10	45	40	75	65	100	90	125
80	100	15	50	50	85	75	110	105	140
100	120	15	55	50	90	85	125	125	165
120	140	15	60	60	105	100	145	145	190

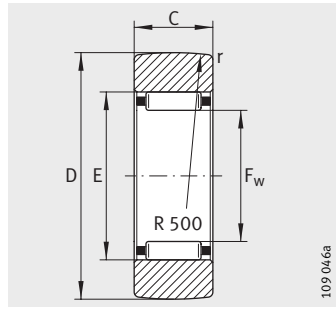
Enveloping circle

For RSTO and RNA22..-2RSR, the needle roller enveloping circle F_w is in the tolerance zone F6.

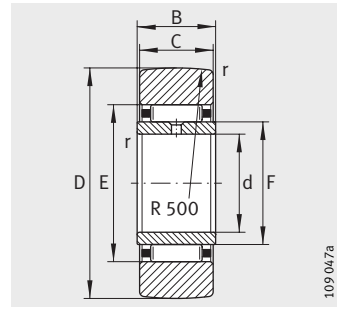
The enveloping circle is the inner inscribed circle of the needle rollers in clearance-free contact with the adjacent construction.

Yoke type track rollers

Without axial guidance
Open



RSTO



STO

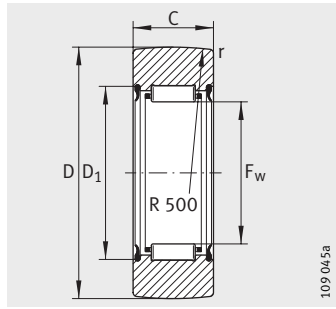
Dimension table · Dimensions in mm

Without inner ring Desig-nation	Mass m ≈g	With inner ring Desig-nation	Mass m ≈g	Dimensions D	d	C	B	$F^{1)}$ F_w	E	r min.	Basic load ratings dyn. $C_{r\,w}$ N	stat. $C_{0r\,w}$ N	Fatigue limit load $C_{ur\,w}$ N	Speed $n_{D\,G}$ min^{-1}
RSTO5-TV	8,5	–	–	**16**	–	7,8	–	7	10	0,3	2 550	2 600	330	16 000
RSTO6-TV	12,5	**STO6-TV**	17	**19**	6	9,8	10	10	13	0,3	3 750	4 550	650	10 000
RSTO8-TV	21	**STO8-TV**	26	**24**	8	9,8	10	12	15	0,3	4 200	5 500	780	8 000
RSTO10	42	**STO10**	49	**30**	10	11,8	12	14	20	0,3	8 400	9 300	1 370	5 500
RSTO12	49	**STO12**	57	**32**	12	11,8	12	16	22	0,3	9 000	10 300	1 530	4 500
RSTO15	50	**STO15**	63	**35**	15	11,8	12	20	26	0,3	9 100	10 900	1 640	3 300
RSTO17	88	**STO17**	107	**40**	17	15,8	16	22	29	0,3	14 200	17 900	2 550	2 800
RSTO20	130	**STO20**	152	**47**	20	15,8	16	25	32	0,3	16 100	21 700	3 050	2 400
RSTO25	150	**STO25**	177	**52**	25	15,8	16	30	37	0,3	16 400	23 200	3 300	1 800
RSTO30	255	**STO30**	308	**62**	30	19,8	20	38	46	0,6	23 100	35 000	4 700	1 300
RSTO35	375	**STO35**	441	**72**	35	19,8	20	42	50	0,6	25 000	40 500	5 400	1 100
RSTO40	420	**STO40**	530	**80**	40	19,8	20	50	58	1	23 700	39 500	5 900	850
RSTO45	453	**STO45**	576	**85**	45	19,8	20	55	63	1	25 000	43 500	5 900	750
RSTO50	481	**STO50**	617	**90**	50	19,8	20	60	68	1	25 500	46 000	6 300	650

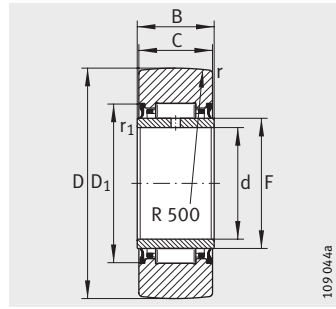
1) F = raceway diameter of the inner ring.
F_w = needle roller enveloping circle in tolerance zone F6.

Yoke type track rollers

Without axial guidance
Sealed



RNA22..-2RSR



NA22..-2RSR

Dimension table · Dimensions in mm

Without inner ring Designation	Mass	Dimensions					Basic load ratings		Fatigue limit load	Speed
	m	D	C	F_w [1]	D_1	r	dyn. $C_{r\,w}$	stat. $C_{0r\,w}$	$C_{ur\,w}$	$n_{D\,G}$
	≈g				min.	min.	N	N	N	min^{-1}
RNA22/6-2RSR	18	**19**	11,8	10	16	0,3	3 900	3 700	485	9 000
RNA22/8-2RSR	29	**24**	11,8	12	18	0,3	4 800	4 300	630	7 000
RNA2200-2RSR	52	**30**	13,8	14	20	0,6	7 000	6 900	1 090	5 500
RNA2201-2RSR	57	**32**	13,8	16	22	0,6	7 500	8 300	1 270	4 700
RNA2202-2RSR	60	**35**	13,8	20	26	0,6	7 600	9 800	1 370	3 400
RNA2203-2RSR	94	**40**	15,8	22	28	1	9 900	14 000	1 840	3 000
RNA2204-2RSR	152	**47**	17,8	25	33	1	14 000	19 100	2 650	2 300
RNA2205-2RSR	179	**52**	17,8	30	38	1	14 400	20 800	2 900	1 800
RNA2206-2RSR	284	**62**	19,8	35	43	1	17 100	26 000	3 550	1 400
RNA2207-2RSR	432	**72**	22,7	42	50	1,1	21 500	36 000	5 200	1 100
RNA2208-2RSR	530	**80**	22,7	48	57	1,1	26 000	41 000	5 300	850

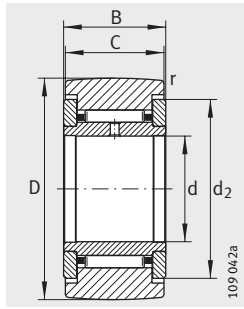
Dimension table · Dimensions in mm

With inner ring Designation	Mass	Dimensions								Basic load ratings		Fatigue limit load	Speed
	m	D	d	C	B	F [1]	D_1	r	r_1	dyn. $C_{r\,w}$	stat. $C_{0r\,w}$	$C_{ur\,w}$	$n_{D\,G}$
	≈g						min.	min.	min.	N	N	N	min^{-1}
NA22/6-2RSR	22	**19**	6	11,8	12	10	16	0,3	0,3	3 900	3 700	485	9 000
NA22/8-2RSR	34	**24**	8	11,8	12	12	18	0,3	0,3	4 800	4 300	630	7 000
NA2200-2RSR	60	**30**	10	13,8	14	14	20	0,6	0,3	7 000	6 900	1 090	5 500
NA2201-2RSR	67	**32**	12	13,8	14	16	22	0,6	0,3	7 500	8 300	1 270	4 700
NA2202-2RSR	75	**35**	15	13,8	14	20	26	0,6	0,3	7 600	9 800	1 370	3 400
NA2203-2RSR	112	**40**	17	15,8	16	22	28	1	0,3	9 900	14 000	1 840	3 000
NA2204-2RSR	177	**47**	20	17,8	18	25	33	1	0,3	14 000	19 100	2 650	2 300
NA2205-2RSR	209	**52**	25	17,8	18	30	38	1	0,3	14 400	20 800	2 900	1 800
NA2206-2RSR	324	**62**	30	19,8	20	35	43	1	0,3	17 100	26 000	3 550	1 400
NA2207-2RSR	505	**72**	35	22,7	23	42	50	1,1	0,6	21 500	36 000	5 200	1 100
NA2208-2RSR	628	**80**	40	22,7	23	48	57	1,1	0,6	26 000	41 000	5 300	850
NA2210-2RSR	690	**90**	50	22,7	23	58	68	1,1	0,6	26 000	43 000	5 600	650

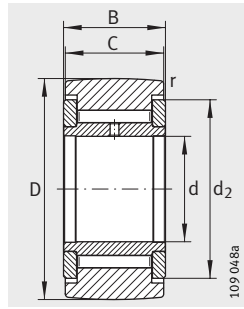
[1] F = raceway diameter of the inner ring.
F_w = needle roller enveloping circle in tolerance zone F6.

Yoke type track rollers

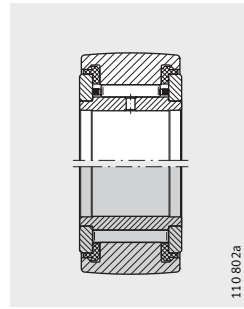
With axial guidance
Gap seals or axial plain washers



NATR
(R = 500 mm)



NATV
(R = 500 mm)



NATR..-PP (optimised
NATV..-PP INA profile)

Dimension table · Dimensions in mm

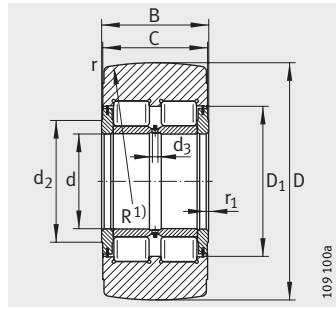
Designation[1]	Mass	Designation[2]	Mass	Dimensions						Basic load ratings		Fatigue limit load	Speed
	m		m	D	d	B	C	d_2	r	dyn. C_{rw}	stat. C_{0rw}	C_{urw}	n_{DG}
	≈g		≈g						min.	N	N	N	min^{-1}
NATR5	14	**NATR5-PP**	14	**16**	5	12	11	12,5	0,15	3 150	3 350	450	14 000
NATV5	15	**NATV5-PP**	15	**16**	5	12	11	12,5	0,15	4 900	6 600	950	3 800
NATR6	20	**NATR6-PP**	19	**19**	6	12	11	15	0,15	3 500	4 000	540	11 000
NATV6	21	**NATV6-PP**	21	**19**	6	12	11	15	0,15	5 400	8 000	1 170	3 100
NATR8	41	**NATR8-PP**	38	**24**	8	15	14	19	0,3	5 500	6 600	930	7 500
NATV8	42	**NATV8-PP**	41	**24**	8	15	14	19	0,3	7 800	11 600	1 590	2 500
NATR10	64	**NATR10-PP**	61	**30**	10	15	14	23	0,6	6 800	8 600	1 220	5 500
NATV10	65	**NATV10-PP**	64	**30**	10	15	14	23	0,6	9 500	14 900	2 050	2 100
NATR12	71	**NATR12-PP**	66	**32**	12	15	14	25	0,6	7 000	9 000	1 290	4 500
NATV12	72	**NATV12-PP**	69	**32**	12	15	14	25	0,6	9 700	15 700	2 170	1 800
NATR15	104	**NATR15-PP**	95	**35**	15	19	18	27,6	0,6	9 700	14 300	1 830	3 600
NATV15	109	**NATV15-PP**	101	**35**	15	19	18	27,6	0,6	12 600	23 100	3 200	1 600
NATR17	144	**NATR17-PP**	139	**40**	17	21	20	31,5	1	10 900	15 800	2 090	2 900
NATV17	152	**NATV17-PP**	147	**40**	17	21	20	31,5	1	14 700	26 500	3 500	1 400
NATR20	246	**NATR20-PP**	236	**47**	20	25	24	36,5	1	15 400	26 000	3 400	2 400
NATV20	254	**NATV20-PP**	245	**47**	20	25	24	36,5	1	20 300	42 000	5 900	1 300
NATR25	275	**NATR25-PP**	271	**52**	25	25	24	41,5	1	15 300	27 000	3 550	1 800
NATV25	285	**NATV25-PP**	281	**52**	25	25	24	41,5	1	20 200	44 000	6 200	1 000
NATR30	470	**NATR30-PP**	444	**62**	30	29	28	51	1	23 200	39 000	5 200	1 300
NATV30	481	**NATV30-PP**	468	**62**	30	29	28	51	1	30 000	62 000	8 800	850
–	–	**NATR35-PP**	547	**72**	35	29	28	58	1,1	24 800	44 500	5 900	1 000
–	–	**NATV35-PP**	630	**72**	35	29	28	58	1,1	32 500	71 000	10 100	750
–	–	**NATR40-PP**	795	**80**	40	32	30	66	1,1	32 000	58 000	8 300	850
–	–	**NATV40-PP**	832	**80**	40	32	30	66	1,1	40 000	88 000	13 000	650
–	–	**NATR50-PP**	867	**90**	50	32	30	76	1,1	31 000	59 000	8 400	650
–	–	**NATV50-PP**	969	**90**	50	32	30	76	1,1	39 000	92 000	13 600	550

1) Bearings with gap seals and radius of curvature of R = 500 mm.

2) Bearings with plastic axial plain washers and optimised INA profile.
Permissible operating temperature: –30 °C to +100 °C (continuous operation).

Yoke type track rollers

With axial guidance
Sealed



NNTR..-2ZL

Dimension table · Dimensions in mm

Designation[1]	Mass	Dimensions						Mounting dimensions			Number of lubrication holes
	m	D	d	B	C	r	r_1	d_2	D_1	d_3	
	≈kg	h10				min.	min.				
NNTR50X130X65-2ZL	5,2	**130**	50	65	63	3	2	63	80	3	3
NNTR55X140X70-2ZL	6,4	**140**	55	70	68	3	2	73	91	4	3
NNTR60X150X75-2ZL	7,8	**150**	60	75	73	3	2	78	97	4	3
NNTR65X160X75-2ZL	8,8	**160**	65	75	73	3	2	82	103	5	3
NNTR70X180X85-2ZL	13	**180**	70	85	83	3	2	92	115	5	3
NNTR80X200X90-2ZL	16,8	**200**	80	90	88	4	2	102	127	5	3
NNTR90X220X100-2ZL	22,5	**220**	90	100	98	4	2,5	119	146	5	3
NNTR100X240X105-2ZL	28	**240**	100	105	103	4	2,5	132	160	6	6
NNTR110X260X115-2ZL	35,6	**260**	110	115	113	4	2,5	143	174	6	6
NNTR120X290X135-2ZL	52,8	**290**	120	135	133	4	3	155	191	8	6
NNTR130X310X146-2ZL	65,2	**310**	130	146	144	5	3	165	204	8	6

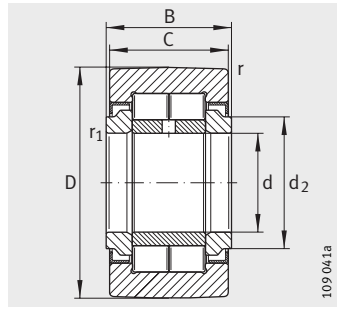
Dimension table (continued)

Designation[1]	Basic load ratings				Fatigue limit load	Speed
	dyn. $C_{r\,w}$	stat. $C_{0r\,w}$	dyn. $F_{r\,per}$	stat. $F_{0r\,per}$	$C_{ur\,w}$	$n_{D\,G}$
	N	N	N	N	N	min^{-1}
NNTR50X130X65-2ZL	193 000	265 000	265 000	265 000	37 000	1 100
NNTR55X140X70-2ZL	226 000	315 000	280 000	315 000	44 500	850
NNTR60X150X75-2ZL	255 000	365 000	330 000	365 000	53 000	800
NNTR65X160X75-2ZL	280 000	395 000	350 000	395 000	56 000	700
NNTR70X180X85-2ZL	355 000	510 000	465 000	510 000	75 000	600
NNTR80X200X90-2ZL	415 000	610 000	550 000	610 000	87 000	500
NNTR90X220X100-2ZL	500 000	750 000	600 000	750 000	104 000	400
NNTR100X240X105-2ZL	560 000	870 000	710 000	870 000	118 000	340
NNTR110X260X115-2ZL	670 000	1 050 000	820 000	1 050 000	143 000	300
NNTR120X290X135-2ZL	880 000	1 400 000	1 110 000	1 400 000	187 000	260
NNTR130X310X146-2ZL	1 010 000	1 630 000	1 280 000	1 630 000	216 000	240

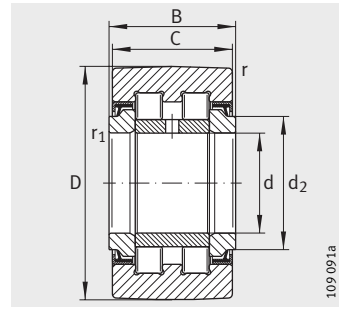
[1] Radius of curvature R = 10 000 for NNTR50X130X65-2ZL to NNTR110X260X115-2ZL
R = 15 000 for NNTR120X290X135-2ZL and NNTR130X310X146-2ZL.

Yoke type track rollers

With axial guidance
Sealed



NUTR
(optimised INA profile)



PWTR..-2RS
(optimised INA profile)

Dimension table · Dimensions in mm

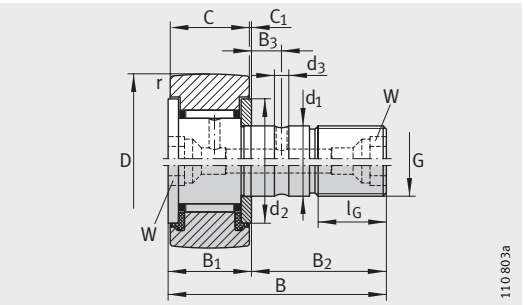
Designation		Mass	Dimensions							Basic load ratings				Fatigue limit load	Speed
	X-life	m ≈g	D	d	B	C	d_2	r min.	r_1 min.	dyn. $C_{r\,w}$ N	stat. $C_{0r\,w}$ N	dyn. $F_{r\,per}$ N	stat. $F_{0r\,per}$ N	$C_{ur\,w}$ N	$n_{D\,G}$ min^{-1}
NUTR15	–	99	**35**	15	19	18	20	0,6	0,3	15 300	18 700	8 500	16 800	2 430	6 500
PWTR15-2RS	**XL**	99	**35**	15	19	18	20	0,6	0,3	12 600	14 600	10 700	14 600	1 760	6 000
NUTR17	–	147	**40**	17	21	20	22	1	0,5	18 700	24 900	13 000	24 900	3 150	5 500
PWTR17-2RS	**XL**	147	**40**	17	21	20	22	1	0,5	14 300	17 900	16 500	17 900	2 160	5 000
NUTR1542	–	158	**42**	15	19	18	20	0,6	0,3	18 300	24 300	24 300	24 300	3 100	6 500
PWTR1542-2RS	**XL**	158	**42**	15	19	18	20	0,6	0,3	14 700	16 200	16 200	16 200	2 140	6 000
NUTR1747	–	220	**47**	17	21	20	22	1	0,5	21 600	30 500	30 500	30 500	3 850	5 500
PWTR1747-2RS	**XL**	220	**47**	17	21	20	22	1	0,5	15 900	18 400	18 400	18 400	2 440	5 000
NUTR20	–	245	**47**	20	25	24	27	1	0,5	28 500	37 500	16 200	32 500	4 850	4 200
PWTR20-2RS	**XL**	245	**47**	20	25	24	27	1	0,5	24 500	30 500	20 700	30 500	3 750	3 800
NUTR2052	–	321	**52**	20	25	24	27	1	0,5	32 000	44 000	38 000	44 000	5 700	4 200
PWTR2052-2RS	**XL**	321	**52**	20	25	24	27	1	0,5	27 000	35 000	31 000	35 000	4 250	3 800
NUTR25	–	281	**52**	25	25	24	31	1	0,5	29 000	40 500	17 100	34 000	5 300	4 200
PWTR25-2RS	**XL**	281	**52**	25	25	24	31	1	0,5	25 000	33 000	21 800	33 000	4 100	3 800
NUTR2562	–	450	**62**	25	25	24	31	1	0,5	35 500	54 000	54 000	54 000	6 900	4 200
PWTR2562-2RS	**XL**	450	**62**	25	25	24	31	1	0,5	30 000	42 500	42 500	42 500	5 200	3 800
NUTR30	–	465	**62**	30	29	28	38	1	0,5	40 000	55 000	23 400	46 000	7 300	2 600
PWTR30-2RS	**XL**	465	**62**	30	29	28	38	1	0,5	35 000	45 500	29 000	45 500	5 800	2 200

Dimension table (continued) · Dimensions in mm

Designation		Mass	Dimensions							Basic load ratings				Fatigue limit load	Speed
	X-life	m ≈g	D	d	B	C	d_2	r min.	r_1 min.	dyn. $C_{r\,w}$ N	stat. $C_{0r\,w}$ N	dyn. $F_{r\,per}$ N	stat. $F_{0r\,per}$ N	$C_{ur\,w}$ N	$n_{D\,G}$ min^{-1}
NUTR3072	–	697	**72**	30	29	28	38	1	0,5	48 000	70 000	68 000	70 000	9 200	2 600
PWTR3072-2RS	**XL**	697	**72**	30	29	28	38	1	0,5	41 000	56 000	54 000	56 000	7 200	2 200
NUTR35	–	630	**72**	35	29	28	44	1,1	0,6	45 000	65 000	31 500	63 000	8 700	2 100
PWTR35-2RS	**XL**	630	**72**	35	29	28	44	1,1	0,6	38 500	54 000	39 000	54 000	6 900	1 800
NUTR3580	–	836	**80**	35	29	28	44	1,1	0,6	51 000	78 000	76 000	78 000	10 300	2 100
PWTR3580-2RS	**XL**	836	**80**	35	29	28	44	1,1	0,6	43 500	63 000	59 000	63 000	8 100	1 800
NUTR40	–	816	**80**	40	32	30	50,5	1,1	0,6	56 000	80 000	31 000	60 000	11 000	1 600
PWTR40-2RS	**XL**	816	**80**	40	32	30	50,5	1,1	0,6	45 000	61 000	39 500	61 000	7 900	1 500
NUTR45	–	883	**85**	45	32	30	55,2	1,1	0,6	56 000	83 000	32 000	62 000	11 500	1 400
PWTR45-2RS	**XL**	883	**85**	45	32	30	55,2	1,1	0,6	45 500	63 000	41 000	63 000	8 200	1 300
NUTR4090	–	1 129	**90**	40	32	30	50,5	1,1	0,6	66 000	101 000	84 000	101 000	13 900	1 600
PWTR4090-2RS	**XL**	1 129	**90**	40	32	30	50,5	1,1	0,6	52 000	75 000	67 000	75 000	9 600	1 500
NUTR50	–	950	**90**	50	32	30	59,8	1,1	0,6	56 000	86 000	32 500	63 000	11 900	1 300
PWTR50-2RS	**XL**	950	**90**	50	32	30	59,8	1,1	0,6	46 000	66 000	42 000	66 000	8 500	1 100
NUTR45100	–	1 396	**100**	45	32	30	55,2	1,1	0,6	72 000	115 000	106 000	115 000	15 800	1 400
PWTR45100-2RS	**XL**	1 396	**100**	45	32	30	55,2	1,1	0,6	56 000	85 000	85 000	85 000	10 900	1 300
NUTR50110	–	1 690	**110**	50	32	30	59,8	1,1	0,6	76 000	128 000	128 000	128 000	17 600	1 300
PWTR50110-2RS	**XL**	1 690	**110**	50	32	30	59,8	1,1	0,6	59 000	94 000	94 000	94 000	12 100	1 100

Needle roller stud type track rollers

With axial guidance
Open or sealed

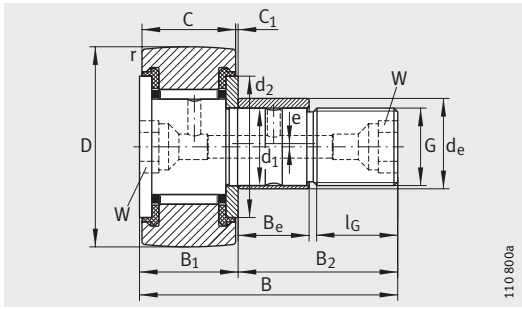


from D = 22 mm KR (R = 500 mm)
KR..-PP (optimised INA profile)

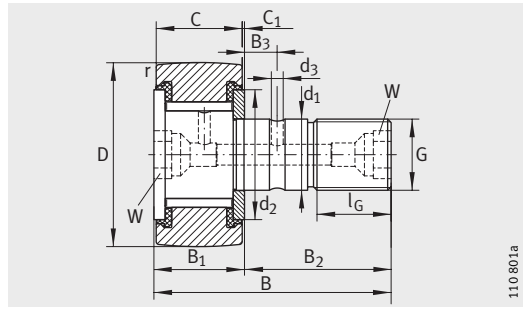
Dimension table · Dimensions in mm

Designation	Mass	With eccentric collar Designation	Mass	Dimensions										
	m		m	D	d_1	B	B_1	B_2	B_3	C	C_1	r	d_2	d_3
	≈g		≈g		h7		max.					min.		
KR16[3]	19	–	–	**16**	6	28	12,2	16	–	11	0,6	0,15	12,5	–
KR16-PP[3]	18	**KRE16-PP**[3]	20	**16**	6	28	12,2	16	–	11	0,6	0,15	12,5	–
KR16-SK-PP[4]	19	–	–	**16**	6	28	12,2	16	–	11	0,6	0,15	12,5	–
KRV16-PP[3]	19	–	–	**16**	6	28	12,2	16	–	11	0,6	0,15	12,5	–
KR19[3]	29	–	–	**19**	8	32	12,2	20	–	11	0,6	0,15	15	–
KR19-PP[3]	29	**KRE19-PP**[3]	32	**19**	8	32	12,2	20	–	11	0,6	0,15	15	–
KR19-SK-PP[4]	29	–	–	**19**	8	32	12,2	20	–	11	0,6	0,15	15	–
KRV19-PP[3]	31	–	–	**19**	8	32	12,2	20	–	11	0,6	0,15	15	–
KR22	45	–	–	**22**	10	36	13,2	23	–	12	0,6	0,3	17,5	–
KR22-PP	43	**KRE22-PP**	47	**22**	10	36	13,2	23	–	12	0,6	0,3	17,5	–
KRV22-PP	45	–	–	**22**	10	36	13,2	23	–	12	0,6	0,3	17,5	–
KR26	59	–	–	**26**	10	36	13,2	23	–	12	0,6	0,3	17,5	–
KR26-PP	57	**KRE26-PP**	62	**26**	10	36	13,2	23	–	12	0,6	0,3	17,5	–
KRV26-PP	59	–	–	**26**	10	36	13,2	23	–	12	0,6	0,3	17,5	–
KR30	92	–	–	**30**	12	40	15,2	25	6	14	0,6	0,6	23	3
KR30-PP	88	**KRE30-PP**	93	**30**	12	40	15,2	25	6	14	0,6	0,6	23	3
KRV30-PP	91	–	–	**30**	12	40	15,2	25	6	14	0,6	0,6	23	3
KR32	103	–	–	**32**	12	40	15,2	25	6	14	0,6	0,6	23	3
KR32-PP	98	**KRE32-PP**	104	**32**	12	40	15,2	25	6	14	0,6	0,6	23	3
KRV32-PP	101	–	–	**32**	12	40	15,2	25	6	14	0,6	0,6	23	3

1) Drive fit lubrication nipples are supplied loose. Only these lubrication nipples should be used.
2) Nominal dimension for hexagonal socket.
3) Relubrication hole only on the flange-side end face with slot for countertensioning during fitting.
4) Hexagonal socket only on the flange-side end face. No relubrication facility.

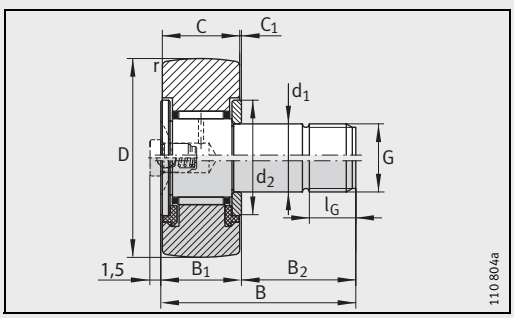


from D = 22 mm KRE..-PP (optimised INA profile)

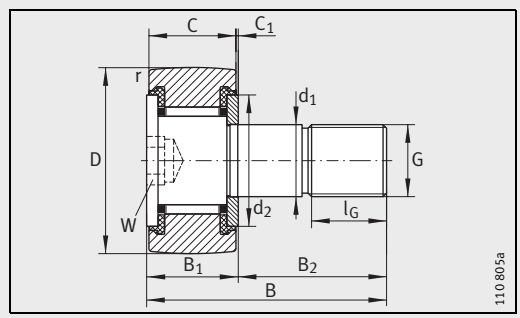


from D = 22 mm KRV..-PP (optimised INA profile)

G	l_G	W[2]	Eccentric collar			Drive fit lubrication nipple[1]	Nut tightening torque	Basic load ratings		Fatigue limit load	Speed
			d_e h9	B_e	e		M_A Nm	dyn. C_{rw} N	stat. C_{0rw} N	C_{urw} N	n_{DG} min^{-1}
M6(X1)	8	–	–	–	–	NIPA1	3	3 150	3 350	450	14 000
M6(X1)	8	–	9	7	0,5	NIPA1	3	3 150	3 350	450	14 000
M6(X1)	8	4	–	–	–	–	3	3 150	3 350	450	14 000
M6(X1)	8	–	–	–	–	NIPA1	3	4 900	6 600	950	3 800
M8(X1,25)	10	–	–	–	–	NIPA1	8	3 500	4 000	540	11 000
M8(X1,25)	10	–	11	9	0,5	NIPA1	8	3 500	4 000	540	11 000
M8(X1,25)	10	4	–	–	–	–	8	3 500	4 000	540	11 000
M8(X1,25)	10	–	–	–	–	NIPA1	8	5 400	8 000	1 170	3 100
M10X1	12	5	–	–	–	NIPA1X4,5	15	4 550	5 300	730	8 000
M10X1	12	5	13	10	0,5	NIPA1X4,5	15	4 550	5 300	730	8 000
M10X1	12	5	–	–	–	NIPA1X4,5	15	6 200	9 200	1 210	2 600
M10X1	12	5	–	–	–	NIPA1X4,5	15	5 100	6 400	840	8 000
M10X1	12	5	13	10	0,5	NIPA1X4,5	15	5 100	6 400	840	8 000
M10X1	12	5	–	–	–	NIPA1X4,5	15	7 300	11 500	1 500	2 600
M12X1,5	13	6	–	–	–	NIPA1X4,5	22	6 800	8 600	1 220	5 500
M12X1,5	13	6	15	11	0,5	NIPA1X4,5	22	6 800	8 600	1 220	5 500
M12X1,5	13	6	–	–	–	NIPA1X4,5	22	9 500	14 900	2 050	2 100
M12X1,5	13	6	–	–	–	NIPA1X4,5	22	7 100	9 200	1 290	5 500
M12X1,5	13	6	15	11	0,5	NIPA1X4,5	22	7 100	9 200	1 290	5 500
M12X1,5	13	6	–	–	–	NIPA1X4,5	22	10 000	16 100	2 200	2 100



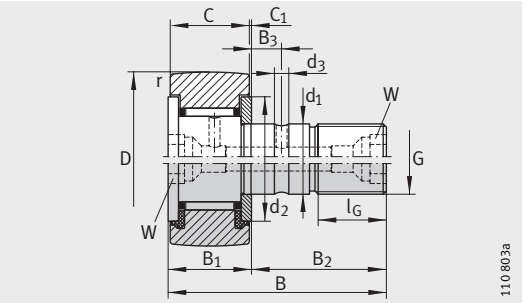
KR16, KR19
KR16-PP, KR19-PP (KRV16-PP, KRV19-PP)



KR16-SK-PP, KR19-SK-PP

Needle roller stud type track rollers

With axial guidance
Open or sealed



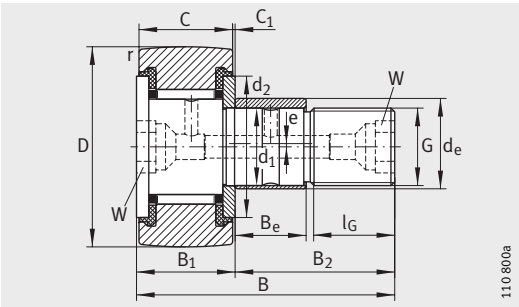
KR (R = 500 mm)
KR..-PP (optimised INA profile)

Dimension table (continued) · Dimensions in mm

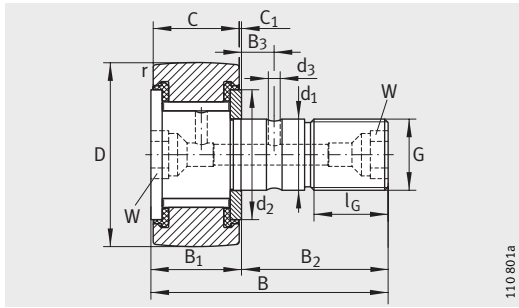
Designation	Mass	With eccentric collar Designation	Mass	Dimensions										
	m		m	D	d_1	B	B_1	B_2	B_3	C	C_1	r	d_2	d_3
	≈g		≈g		h7		max.					min.		
KR35	173	–	–	**35**	16	52	19,6	32,5	8	18	0,8	0,6	27,6	3
KR35-PP	164	**KRE35-PP**	177	**35**	16	52	19,6	32,5	8	18	0,8	0,6	27,6	3
KRV35-PP	166	–	–	**35**	16	52	19,6	32,5	8	18	0,8	0,6	27,6	3
KR40	247	–	–	**40**	18	58	21,6	36,5	8	20	0,8	1	31,5	3
KR40-PP	239	**KRE40-PP**	255	**40**	18	58	21,6	36,5	8	20	0,8	1	31,5	3
KRV40-PP	247	–	–	**40**	18	58	21,6	36,5	8	20	0,8	1	31,5	3
KR47-PP	381	**KRE47-PP**	400	**47**	20	66	25,6	40,5	9	24	0,8	1	36,5	4
KRV47-PP	390	–	–	**47**	20	66	25,6	40,5	9	24	0,8	1	36,5	4
KR52-PP	454	**KRE52-PP**	473	**52**	20	66	25,6	40,5	9	24	0,8	1	36,5	4
KRV52-PP	463	–	–	**52**	20	66	25,6	40,5	9	24	0,8	1	36,5	4
KR62-PP	770	**KRE62-PP**	798	**62**	24	80	30,6	49,5	11	29	0,8	1	44	4
KRV62-PP	787	–	–	**62**	24	80	30,6	49,5	11	29	0,8	1	44	4
KR72-PP	1 010	**KRE72-PP**	1 038	**72**	24	80	30,6	49,5	11	29	0,8	1,1	44	4
KRV72-PP	1 027	–	–	**72**	24	80	30,6	49,5	11	29	0,8	1,1	44	4
KR80-PP	1 608	**KRE80-PP**	1 665	**80**	30	100	37	63	15	35	1	1,1	53	4
KRV80-PP	1 636	–	–	**80**	30	100	37	63	15	35	1	1,1	53	4
KR90-PP	1 975	**KRE90-PP**	2 032	**90**	30	100	37	63	15	35	1	1,1	53	4
KRV90-PP	2 003	–	–	**90**	30	100	37	63	15	35	1	1,1	53	4

1) Drive fit lubrication nipples are supplied loose. Only these lubrication nipples should be used.

2) Nominal dimension for hexagonal socket.
Suitable central lubrication adapter for connection to a central lubrication system, see page 951.



KRE..-PP (optimised INA profile)

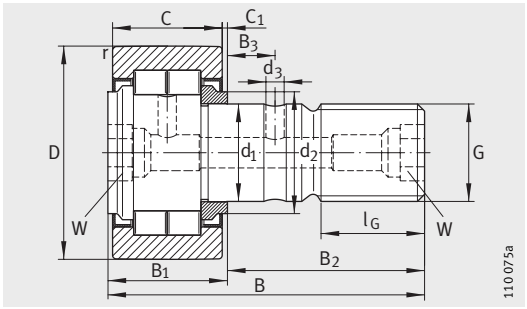


KRV..-PP (optimised INA profile)

G	l_G	W[2]	Eccentric collar			Drive fit lubrication nipple[1]	Nut tightening torque	Basic load ratings		Fatigue limit load	Speed
			d_e h9	B_e	e		M_A Nm	dyn. C_{rw} N	stat. C_{0rw} N	C_{urw} N	n_{DG} min^{-1}
M16X1,5	17	8	–	–	–	NIPA2X7,5	58	9 700	14 300	1 830	3 600
M16X1,5	17	8	20	14	1	NIPA2X7,5	58	9 700	14 300	1 830	3 600
M16X1,5	17	8	–	–	–	NIPA2X7,5	58	12 600	23 100	3 200	1 600
M18X1,5	19	8	–	–	–	NIPA2X7,5	87	10 900	15 800	2 090	2 900
M18X1,5	19	8	22	16	1	NIPA2X7,5	87	10 900	15 800	2 090	2 900
M18X1,5	19	8	–	–	–	NIPA2X7,5	87	14 700	26 500	3 500	1 400
M20X1,5	21	10	24	18	1	NIPA2X7,5	120	15 400	26 000	3 400	2 400
M20X1,5	21	10	–	–	–	NIPA2X7,5	120	20 300	42 000	5 900	1 300
M20X1,5	21	10	24	18	1	NIPA2X7,5	120	16 600	29 000	3 800	2 400
M20X1,5	21	10	–	–	–	NIPA2X7,5	120	22 300	48 000	6 700	1 300
M24X1,5	25	14	28	22	1	NIPA3X9,5	220	26 000	48 000	6 800	1 900
M24X1,5	25	14	–	–	–	NIPA3X9,5	220	33 500	75 000	11 200	1 100
M24X1,5	25	14	28	22	1	NIPA3X9,5	220	28 000	53 000	7 200	1 900
M24X1,5	25	14	–	–	–	NIPA3X9,5	220	36 500	85 000	12 600	1 100
M30X1,5	32	14	35	29	1,5	NIPA3X9,5	450	38 500	77 000	11 000	1 300
M30X1,5	32	14	–	–	–	NIPA3X9,5	450	48 500	117 000	17 400	850
M30X1,5	32	14	35	29	1,5	NIPA3X9,5	450	40 500	83 000	11 700	1 300
M30X1,5	32	14	–	–	–	NIPA3X9,5	450	52 000	129 000	19 000	850

Cylindrical roller stud type track rollers

With axial guidance



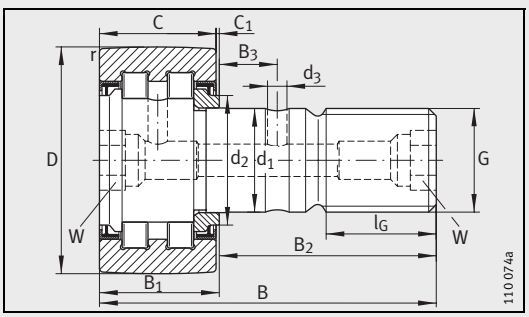
NUKR (optimised INA profile)

Dimension table · Dimensions in mm

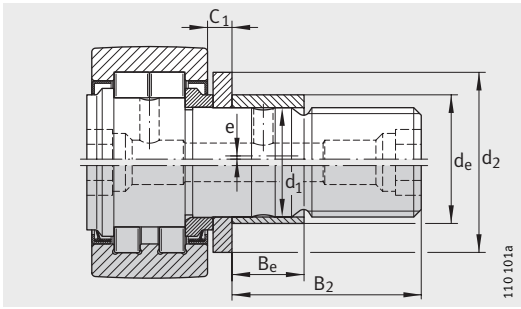
Without eccentric collar Designation	Mass m ≈g	With eccentric collar Designation	Mass m ≈g	X-life	Dimensions D	d_1 h7	B	B_1 max.	B_2	B_3	C	C_1	r min.	d_2	d_3
NUKR35	164	–	–	–	**35**	16	52	19,6	32,5	7,8	18	0,8	0,6	20	3
–	–	**NUKRE35**	177	–	**35**	16	52	22,6	29,5	–	18	3,8	0,6	27,6	–
PWKR35-2RS	164	–	–	**XL**	**35**	16	52	19,6	32,5	7,8	18	0,8	0,6	20	3
–	–	**PWKRE35-2RS**	177	**XL**	**35**	16	52	22,6	29,5	–	18	3,8	0,6	27,6	–
NUKR40	242	–	–	–	**40**	18	58	21,6	36,5	8	20	0,8	1	22	3
–	–	**NUKRE40**	258	–	**40**	18	58	24,6	33,5	–	20	3,8	1	30	–
PWKR40-2RS	242	–	–	**XL**	**40**	18	58	21,6	36,5	8	20	0,8	1	22	3
–	–	**PWKRE40-2RS**	258	**XL**	**40**	18	58	24,6	33,5	–	20	3,8	1	30	–
NUKR47	380	**NUKRE47**	400	–	**47**	20	66	25,6	40,5	9	24	0,8	1	27	4
PWKR47-2RS	380	**PWKRE47-2RS**	400	**XL**	**47**	20	66	25,6	40,5	9	24	0,8	1	27	4
NUKR52	450	**NUKRE52**	470	–	**52**	20	66	25,6	40,5	9	24	0,8	1	31	4
PWKR52-2RS	450	**PWKRE52-2RS**	470	**XL**	**52**	20	66	25,6	40,5	9	24	0,8	1	31	4
NUKR62	795	**NUKRE62**	824	–	**62**	24	80	30,6	49,5	11	28	1,3	1	38	4
PWKR62-2RS	795	**PWKRE62-2RS**	824	**XL**	**62**	24	80	30,6	49,5	11	28	1,3	1	38	4
NUKR72	1 020	**NUKRE72**	1 050	–	**72**	24	80	30,6	49,5	11	28	1,3	1,1	44	4
PWKR72-2RS	1 020	**PWKRE72-2RS**	1 050	**XL**	**72**	24	80	30,6	49,5	11	28	1,3	1,1	44	4
NUKR80	1 600	**NUKRE80**	1 670	–	**80**	30	100	37	63	15	35	1	1,1	47	4
PWKR80-2RS	1 600	**PWKRE80-2RS**	1 670	**XL**	**80**	30	100	37	63	15	35	1	1,1	47	4
NUKR90	1 960	**NUKRE90**	2 020	–	**90**	30	100	37	63	15	35	1	1,1	47	4
PWKR90-2RS	1 960	**PWKRE90-2RS**	2 020	**XL**	**90**	30	100	37	63	15	35	1	1,1	47	4

[1] Drive fit lubrication nipples are supplied loose. Only these lubrication nipples should be used.

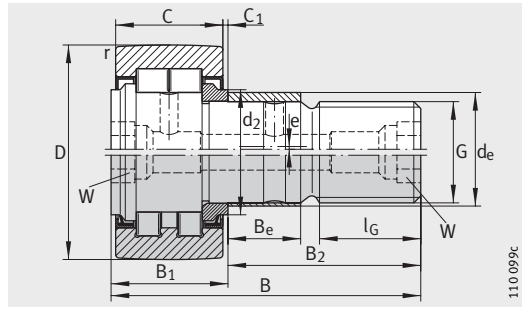
[2] Nominal dimension for hexagonal socket.
Suitable central lubrication adapter for connection to a central lubrication system, see page 951.



PWKR..-2RS (optimised INA profile)

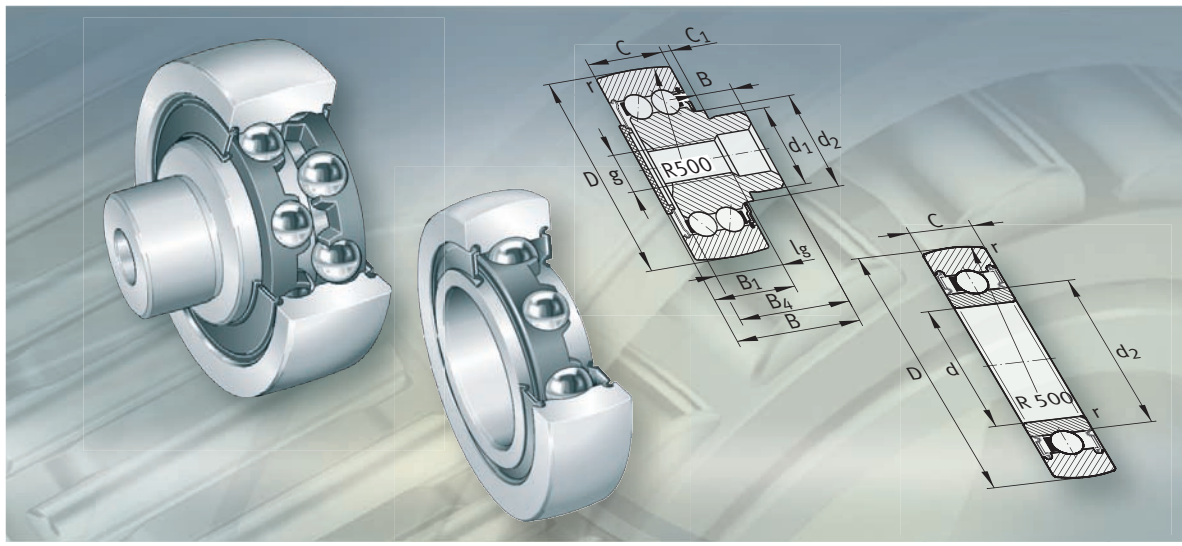


NUKRE35/NUKRE40
PWKRE35-2RS/PWKRE40-2RS
(optimised INA profile)



NUKRE
PWKRE..-2RS
(optimised INA profile)

						Drive fit lubrication nipple[1]	Nut tightening torque	Basic load ratings				Fatigue limit load	Speed
G	l_G	W[2]	Eccentric collar				M_A	dyn.	stat.	dyn.	stat.	$C_{ur\,w}$	$n_{D\,G}$
			d_e h9	B_e	e		Nm	$C_{r\,w}$ N	$C_{0r\,w}$ N	$F_{r\,per}$ N	$F_{0r\,per}$ N	N	min^{-1}
M16X1,5	17	8	–	–	–	NIPA2X7,5	58	15 300	18 700	8 500	16 800	2 430	6 500
M16X1,5	17	8	20	12	1	NIPA2X7,5	58	15 300	18 700	8 500	16 800	2 430	6 500
M16X1,5	17	8	–	–	–	NIPA2X7,5	58	12 600	14 600	10 700	14 600	1 760	6 000
M16X1,5	17	8	20	12	1	NIPA2X7,5	58	12 600	14 600	10 700	14 600	1 760	6 000
M18X1,5	19	8	–	–	–	NIPA2X7,5	87	18 700	24 900	13 000	24 900	3 150	5 500
M18X1,5	19	8	22	14	1	NIPA2X7,5	87	18 700	24 900	13 000	24 900	3 150	5 500
M18X1,5	19	8	–	–	–	NIPA2X7,5	87	14 300	17 900	16 500	17 900	2 160	5 000
M18X1,5	19	8	22	14	1	NIPA2X7,5	87	14 300	17 900	16 500	17 900	2 160	5 000
M20X1,5	21	10	24	18	1	NIPA2X7,5	120	28 500	37 500	16 200	32 500	4 850	4 200
M20X1,5	21	10	24	18	1	NIPA2X7,5	120	24 500	30 500	20 700	30 500	3 750	3 800
M20X1,5	21	10	24	18	1	NIPA2X7,5	120	29 000	40 500	17 100	34 000	5 300	4 200
M20X1,5	21	10	24	18	1	NIPA2X7,5	120	25 000	33 000	21 800	33 000	4 100	3 800
M24X1,5	25	14	28	22	1	NIPA3X9,5	220	40 000	55 000	23 400	46 000	7 300	2 600
M24X1,5	25	14	28	22	1	NIPA3X9,5	220	35 000	45 500	29 000	45 500	5 800	2 200
M24X1,5	25	14	28	22	1	NIPA3X9,5	220	45 000	65 000	31 500	63 000	8 700	2 600
M24X1,5	25	14	28	22	1	NIPA3X9,5	220	38 500	54 000	39 000	54 000	6 900	2 200
M30X1,5	32	14	35	29	1,5	NIPA3X9,5	450	69 000	104 000	47 500	95 000	14 100	1 800
M30X1,5	32	14	35	29	1,5	NIPA3X9,5	450	56 000	79 000	60 000	79 000	10 600	1 800
M30X1,5	32	14	35	29	1,5	NIPA3X9,5	450	78 000	123 000	76 000	123 000	16 700	1 800
M30X1,5	32	14	35	29	1,5	NIPA3X9,5	450	62 000	92 000	92 000	92 000	12 200	1 800



Ball bearing track rollers

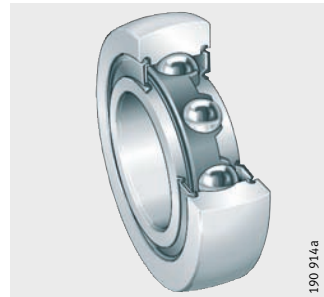
Ball bearing track rollers

		Page
Product overview	Ball bearing track rollers	986
Features	Outside surface profile of the outer ring	988
	Yoke type track rollers	988
	Stud type track rollers	988
	Track rollers with plastic outer tyre	989
	Operating temperature	990
	Suffixes	990
	Other products	990
Design and safety guidelines	Adjacent construction for yoke type track rollers	991
	Adjacent construction for stud type track rollers	991
	Fitting	992
Accuracy	Radial internal clearance	993
Dimension tables	Yoke type track rollers, single row, sealed	994
	Yoke type track rollers, double row, sealed	995
	Stud type track rollers, sealed	998
	Stud type track rollers, with eccentric collar, sealed	1000
	Track rollers with plastic outer tyre, sealed	1002

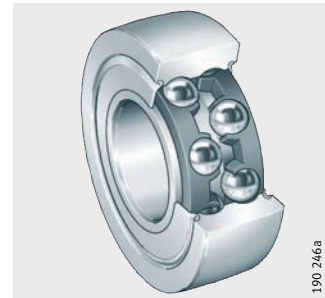
Yoke type track rollers

Single row and double row
Lip seals or
sealing shields

LR6, LR60, LR2



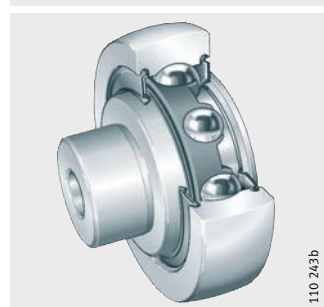
LR50, LR52, LR53



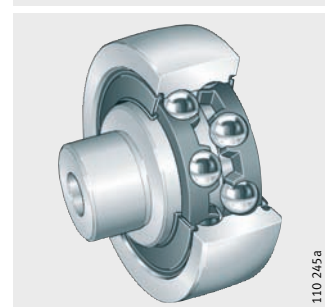
Stud type track rollers

Single row and double row
Lip seals or
sealing shield and cover

ZL2..-DRS

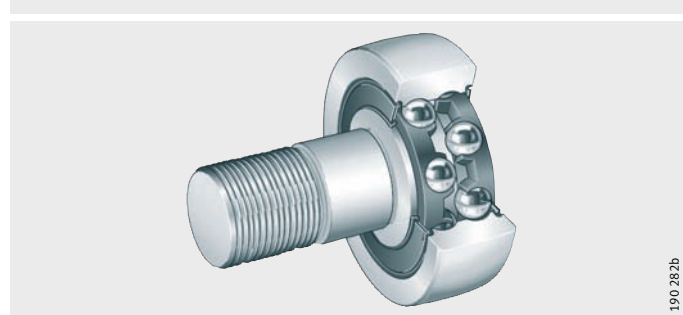


ZL52..-DRS



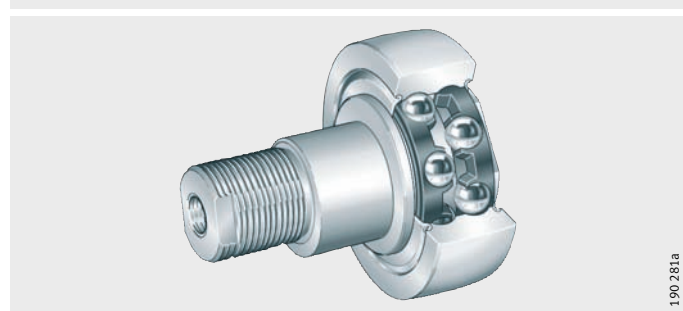
Lip seals

KR52..-2RS



With eccentric collar
Sealing shields

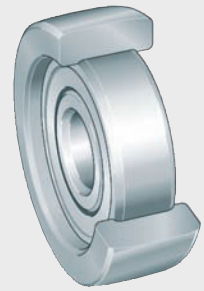
ZLE52..-2Z



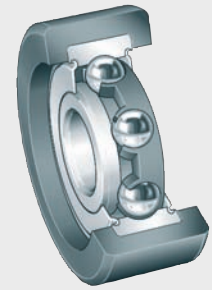
Track rollers with plastic outer tyre

Cylindrical or crowned outside surface
Lip seals or sealing shields

KLRU



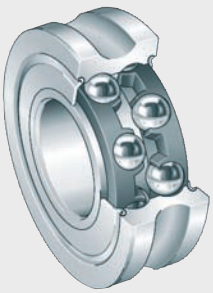
KLRZ



Other products

Track rollers with profiled outer ring

LFR5



Ball bearing track rollers

Features

Ball bearing track rollers are self-retaining, single or double row ball bearings with particularly thick-walled outer rings. In addition to high radial forces, these bearings can also support axial forces in both directions.

The outer rings have a crowned or cylindrical outside surface. Designs with a crowned outside surface are used where they are inclined in relation to the mating track and edge stresses must be avoided.

Ball bearing track rollers are available with an inner ring, with a stud and with a plastic tyre on the outer ring.

Outside surface profile of the outer ring

Yoke type track rollers with a crowned outside surface and stud type track rollers have a radius of curvature of R = 500 mm.

Yoke type track rollers with a cylindrical outside surface have the suffix X.

Yoke type track rollers

Yoke type track rollers have outer rings with a crowned or cylindrical outside surface, inner rings and ball and cage assemblies with plastic cages. They are similar in construction to deep groove or angular contact ball bearings and are mounted on shafts or studs.

Yoke type track rollers LR6, LR60 and LR2 are single row units, LR50, LR52 and LR53 are double row units.

Anti-corrosion protection

Where an increased level of anti-corrosion protection is required, ball bearing track rollers are available by agreement and as a special design with the special coating Corrotect®, see Anti-corrosion protection by Corrotect® coating, page 970.

Sealing

Yoke type track rollers with the suffix 2RSR have lip seals on both sides. In some sizes, RS seals are fitted for reasons of space.

Double row yoke type track rollers with the suffix 2Z have sealing shields on both sides, bearings with the suffix 2RS have lip seals on both sides.

Lubrication

The yoke type track rollers are greased using a lithium soap grease to GA13. Double row yoke type track rollers can in some cases be relubricated via the inner ring.

Stud type track rollers

Stud type track rollers have outer rings with a crowned outside surface, heavy-section roller studs and ball and cage assemblies with plastic cages. The stud type track rollers are available with and without an eccentric collar.

For ease of fitting, the roller stud has a thread or a threaded bore. For countertensioning during fitting, there is a slot, hexagonal socket or a flat area on the external thread.

Track rollers ZL2 are single row units, ZL52, ZLE52 and KR52 are double row units.

Without eccentric collar

Stud type track rollers without an eccentric collar are suitable for applications where a defined requirement for adjustment in relation to the mating track on the adjacent construction is not required.

With eccentric collar

Stud type track rollers ZLE52 have an eccentric collar. The eccentric collar can be used to set the outside surface of the outer ring clearance-free against the mating track. This gives optimum geometrical locking between the track roller and mating track. Furthermore, larger manufacturing tolerances can be tolerated in the adjacent construction. In addition, more uniform load distribution is achieved when using more than one stud type track roller.

For countertensioning during fitting, this series has flat areas on both sides of the roller stud.

Sealing

Stud type track rollers ZL2 and ZL52 have lip seals on the stud side and the suffix DRS.
The opposite side can be sealed using the plastic cover supplied.

Series KR52 is sealed on both sides by lip seals and has the suffix 2RS.

Stud type track rollers ZLE52 have sealing shields on both sides and the suffix 2Z.

Lubrication

The stud type track rollers are greased using a lithium soap grease to GA13; ZLE52 can be lubricated via the roller stud.

Track rollers with plastic outer tyre

Track rollers KLRU and KLRZ comprise single row deep groove ball bearings with a shrink-fitted polyamide outer ring (PA). Polyamide can tolerate higher specific contact pressures than elastomer and is relatively resistant to abrasion.

These track rollers are mounted on shafts or studs and are used where low loads are present and the bearings are required to run particularly quietly.

Outside surface profile of the outer ring

Track rollers KLRU have an outer ring with a crowned outside surface. The radius of curvature is indicated in the dimension table.

Series KLRZ has a cylindrical outside surface.

Maximum radial load

The maximum radial load is determined by the permissible contact pressure; $F_{r\,per}$ must not be exceeded.

Sealing

The track rollers have gap seals on both sides (suffix 2Z) or lip seals (suffix 2RSR).

Lubrication

They are greased using a lithium soap grease to GA13 and cannot be relubricated.

Operating temperature

Track rollers are suitable for temperatures from –20 °C to +120 °C, restricted by the grease, cage material and sealing ring material. The information on the operating temperature range in the section Lubrication, page 76, must be observed.

Track rollers with plastic tyre KLRU and KLRZ are suitable for operating temperatures from –20 °C to +80 °C, restricted by the grease, cage material, sealing ring material and the plastic tyre.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
DRS	Lip seal on the stud side	Standard
RR	Protected against corrosion by Corrotect® special coating	Special design, available by agreement
X	Cylindrical outside surface	Standard
2RS	Lip seals on both sides, giving axial sealing action	
2RSR	Lip seals on both sides, giving radial sealing action	
2Z	Sealing shields on both sides	

Other products

Schaeffler also supplies profiled track rollers LFR5 in which the outer ring has a gothic arch profile.

These profiled track rollers are preferably used with a shaft or circular section mating track.

Enquiries

Schaeffler KG
Linear Technology Division
66406 Homburg (Saar), Germany
Internet www.schaeffler.com
E-mail info.linear@schaeffler.com
Tele- 0180 5003872
Fax 0180 5003873

Design and safety guidelines

For reliable and problem-free operation of track rollers, it is essential that attention is paid to the following items:

- Installation as yoke or stud type track roller, see page 944
- Permissible radial load under dynamic or static loading, see page 944
- Load carrying capacity and life, see page 944
- Operating life, see page 946
- Minimum load, see page 946
- Skewed running and tilting, see page 947
- Speeds, see page 948
- Lubrication, see page 950.

Adjacent construction for yoke type track rollers

The abutment surfaces for the bearings must be flat and perpendicular. Due to the contact pressure occurring, they must not be less than the dimension d_2, see dimension table.

Yoke type track rollers LR can be axially clamped or located by means of conventional fasteners such as snap rings.

Shaft tolerances

In general, yoke type track rollers have point load on the inner ring. In order to ensure adequate support and to avoid fretting corrosion as far as possible, the shaft should be in the tolerance zone h6.

Adjacent construction for stud type track rollers

The abutment surfaces for the track rollers must be flat and perpendicular. Due to the contact pressure occurring, they must not be less than the dimension d_2, see dimension table.

The lead chamfer on the locating bore must not be more than 0,5×45°.

Stud type track rollers ZL and KR must be axially clamped.

The nut contact surface must have sufficently high strength and the tightening torque M_A for the fixing nut must be observed, see dimension table. The roller stud can only transmit the permissible radial load if the correct tightening torque is applied.

If the tightening torque cannot be adhered to, an interference fit is required.

Bore tolerance

Suitable stud and bore tolerances, see table.

Stud and bore tolerances

Track roller Series	Tolerance	
	Stud	Bore (recommended)
ZL2	r6	H7
ZL52	r6	
KR52	h7	
ZLE52	h9	

Fitting

Yoke type track rollers

If the tolerances are unfavourable, the yoke type track roller should be pressed onto the shaft or stud using a press, *Figure 1*.

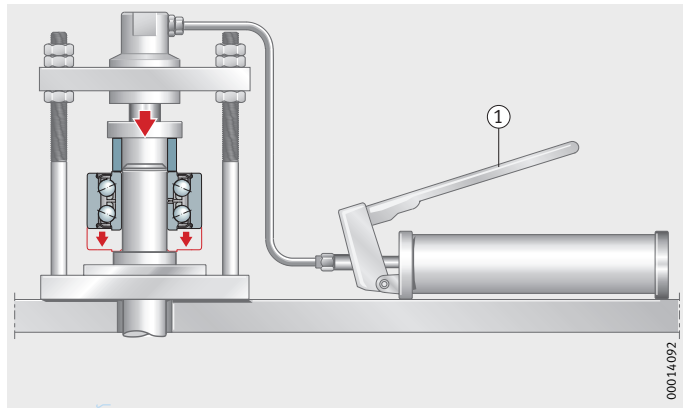
The inner ring must be fitted such that the pressing-in force is distributed uniformly on the end face of the inner ring.

Fitting forces must never be directed through the rolling elements.

Ensure that the seals are not damaged.

The yoke type track rollers must be secured axially.

LR50, LR52, LR53



① Fitting press

Figure 1
Fitting of the yoke type track roller using a fitting press

Stud type track rollers

Stud type track rollers are fitted and dismantled by methods to those used for yoke type track rollers, *Figure 2*.

The tightening torques given in the dimension tables must be observed. It is only in this way that the permissible radial load can be ensured.

Screws and nuts of grade 8.8 or better must be used.

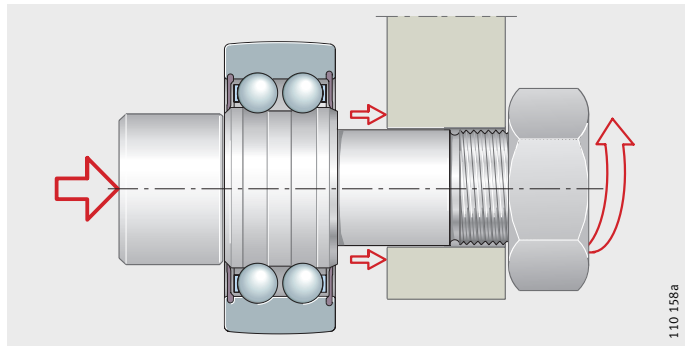


Figure 2
Fitting of stud type track roller

Accuracy

The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620.

In a deviation from DIN 620, the diameter tolerance of the profiled outside surface is 0/–0,05 mm.

Stud tolerance for stud type track rollers and bore tolerances, see tables, page 991.

Radial internal clearance

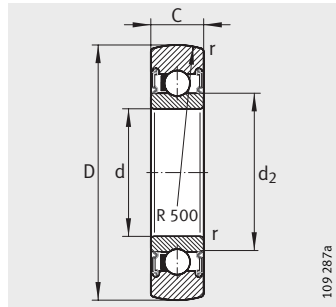
The radial internal clearance corresponds to class CN in accordance with DIN 620-4.

Radial internal clearance

Bore		Radial internal clearance									
d mm		C2 µm		CN µm		C3 µm		C4 µm		C5 µm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
2,5	10	0	7	2	13	8	23	14	29	20	37
10	18	0	9	3	18	11	25	18	33	25	45
18	24	0	10	5	20	13	28	20	36	28	48
24	30	1	11	5	20	13	28	23	41	30	53
30	40	1	11	6	20	15	33	28	46	40	64
40	50	1	11	6	23	18	36	30	51	45	73
50	65	1	15	8	28	23	43	38	61	55	90

Yoke type track rollers

Single row
Sealed



LR6..-2RSR, LR2..-2RSR, LR2..-X-2RSR[1)]

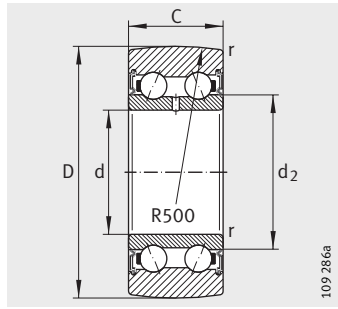
Dimension table · Dimensions in mm

Designation	Mass	Dimensions					Basic load ratings		Fatigue limit load	Speed
	m	D	d	C	d_2	r	dyn. $C_{r\,w}$	stat. $C_{0r\,w}$	$C_{ur\,w}$	$n_{D\,G}$
	≈g					min.	N	N	N	min^{-1}
LR604-2RSR	10	**13**	4	4	6,1	0,2	870	350	18,1	24 000
LR605-2RSR	10	**16**	5	5	7,5	0,2	1 220	510	25,5	23 000
LR606-2RSR	10	**19**	6	6	8,7	0,3	1 840	790	39,5	22 000
LR607-2RSR	10	**22**	7	6	9	0,3	2 120	880	42,5	20 000
LR608-2RSR	20	**24**	8	7	10	0,3	2 750	1 240	63	19 000
LR6000-2RSR	20	**28**	10	8	14,6	0,3	4 550	2 500	128	16 000
LR6001-2RSR	30	**30**	12	8	16,6	0,3	4 750	2 800	144	15 000
LR200-2RS	50	**32**	10	9	16,6	0,6	4 850	2 310	117	13 000
LR200-X-2RS[1)]	50	**32**	10	9	16,6	0,6	4 850	2 310	117	13 000
LR201-2RSR	50	**35**	12	10	18,3	0,6	5 600	2 750	137	12 000
LR201-X-2RSR[1)]	50	**35**	12	10	18,3	0,6	5 600	2 750	137	12 000
LR202-2RSR	70	**40**	15	11	21	0,6	6 600	3 350	170	11 000
LR202-X-2RSR[1)]	70	**40**	15	11	21	0,6	6 600	3 350	170	11 000
LR203-2RSR	110	**47**	17	12	24	0,6	8 500	4 450	223	9 000
LR203-X-2RSR[1)]	110	**47**	17	12	24	0,6	8 500	4 450	223	9 000
LR204-2RSR	150	**52**	20	14	29	1	10 600	5 700	295	8 000
LR204-X-2RSR[1)]	150	**52**	20	14	29	1	10 600	5 700	295	8 000
LR205-2RSR	230	**62**	25	15	33,5	1	12 500	7 100	360	7 000
LR205-X-2RSR[1)]	230	**62**	25	15	33,5	1	12 500	7 100	360	7 000
LR206-2RS	330	**72**	30	16	37,4	1	16 600	9 700	500	5 500
LR206-X-2RS[1)]	330	**72**	30	16	37,4	1	16 600	9 700	500	5 500
LR207-2RS	400	**80**	35	17	42,4	1,1	20 400	12 100	640	4 500
LR207-X-2RS[1)]	400	**80**	35	17	42,4	1,1	20 400	12 100	640	4 500
LR209-2RS	500	**90**	45	19	53,2	1,1	22 400	13 700	730	3 600
LR209-X-2RS[1)]	500	**90**	45	19	53,2	1,1	22 400	13 700	730	3 600

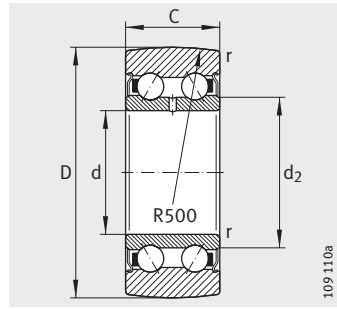
[1)] Track roller with cylindrical outside surface.

Yoke type track rollers

Double row
Sealed



LR50..-2RSR



LR52..-2Z,
LR52..-X-2Z[1)]

Dimension table · Dimensions in mm

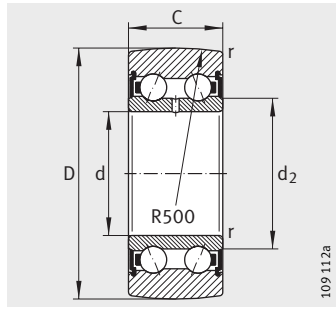
Designation	Mass	Dimensions					Basic load ratings		Fatigue limit load	Speed
	m	D	d	C	d_2	r	dyn. $C_{r\,w}$	stat. $C_{0r\,w}$	$C_{ur\,w}$	$n_{D\,G}$
	≈g					min.	N	N	N	min^{-1}
LR50/5-2RSR	10	**17**	5	7	8,2	0,2	1 690	940	48,5	12 000
LR50/6-2RSR	20	**19**	6	9	9,3	0,3	2 700	1 370	66	11 000
LR50/7-2RSR	20	**22**	7	10	10,5	0,3	3 300	1 700	81	10 000
LR50/8-2RSR[2)]	30	**24**	8	11	10,5	0,3	4 300	2 390	119	10 000
LR5000-2RS	30	**28**	10	12	13,5	0,3	4 750	2 850	145	9 000
LR5001-2RS	30	**30**	12	12	15,5	0,3	5 100	3 100	161	8 500
LR5200-2Z	70	**32**	10	14	15,4	0,6	6 800	4 100	208	11 000
LR5200-X-2Z[1)]	70	**32**	10	14	15,4	0,6	6 800	4 100	208	11 000
LR5200-2RS	70	**32**	10	14	15,4	0,6	6 800	4 100	208	8 000
LR5002-2RS	50	**35**	15	13	20,4	0,3	6 500	4 150	217	7 000
LR5201-2Z	80	**35**	12	15,9	17,1	0,6	8 700	5 200	260	10 000
LR5201-X-2Z[1)]	80	**35**	12	15,9	17,1	0,6	8 700	5 200	260	10 000
LR5201-2RS	80	**35**	12	15,9	17,1	0,6	8 700	5 200	260	7 500
LR5003-2RS	70	**40**	17	14	21,6	0,3	7 800	5 300	270	6 000
LR5202-2Z	110	**40**	15	15,9	20	0,6	10 000	6 300	320	10 000
LR5202-X-2Z[1)]	110	**40**	15	15,9	20	0,6	10 000	6 300	320	10 000
LR5202-2RS	110	**40**	15	15,9	20	0,6	10 000	6 300	320	7 000

1) Track roller with cylindrical outside surface.

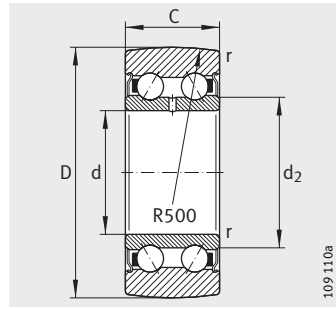
2) Without lubrication hole.

Yoke type track rollers

Double row
Sealed



LR50..-2RS, LR52..-2RS, LR53..-2RS



LR52..-2Z, LR53..-2Z, LR52..-X-2Z[1)]

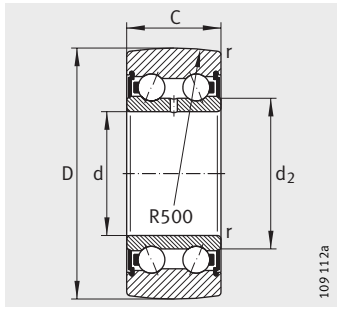
Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions					Basic load ratings		Fatigue limit load	Speed
	m	D	d	C	d_2	r	dyn. $C_{r\,w}$	stat. $C_{0r\,w}$	$C_{ur\,w}$	$n_{D\,G}$
	≈g					min.	N	N	N	min^{-1}
LR5004-2RS	120	**47**	20	16	25,2	0,6	11 700	7 700	400	5 500
LR5203-2Z	170	**47**	17	17,5	22,5	0,6	12 800	8 400	420	7 500
LR5203-X-2Z[1)]	170	**47**	17	17,5	22,5	0,6	12 800	8 400	420	7 500
LR5203-2RS	170	**47**	17	17,5	22,5	0,6	12 800	8 400	420	5 500
LR5005-2RS	150	**52**	25	16	29,8	0,6	11 800	8 200	440	4 700
LR5204-2Z	230	**52**	20	20,6	26,5	1	16 100	10 700	550	7 000
LR5204-X-2Z[1)]	230	**52**	20	20,6	26,5	1	16 100	10 700	550	7 000
LR5204-2RS	230	**52**	20	20,6	26,5	1	16 100	10 700	550	5 000
LR5303-2RS	210	**52**	17	22,2	23,5	1	17 500	11 300	560	4 700
LR5006-2RS	250	**62**	30	19	35,5	1	16 100	11 900	630	4 000
LR5205-2Z	340	**62**	25	20,6	30,3	1	18 800	13 200	670	6 500
LR5205-X-2Z[1)]	340	**62**	25	20,6	30,3	1	18 800	13 200	670	6 500
LR5205-2RS	340	**62**	25	20,6	30,3	1	18 800	13 200	670	4 500
LR5304-2Z	340	**62**	20	22,2	29	1,1	21 500	14 800	740	6 500
LR5304-2RS	340	**62**	20	22,2	29	1,1	21 500	14 800	740	4 500
LR5007-2RS	300	**68**	35	20	41,7	1	17 800	13 300	720	4 300

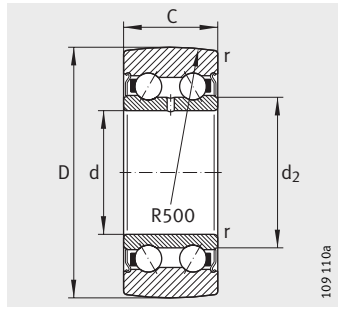
[1)] Track roller with cylindrical outside surface.

Yoke type track rollers

Double row
Sealed



LR52..-2RS, LR53..-2RS



LR52..-2Z, LR53..-2Z,
LR52..-X-2Z[1)]

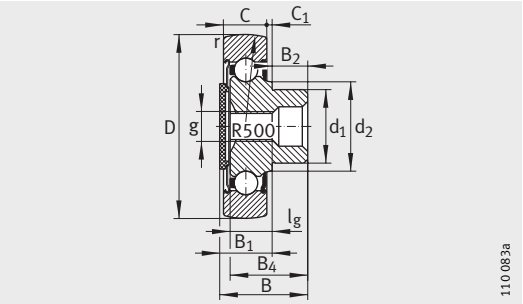
Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions					Basic load ratings			Fatigue limit load	Speed
	m	D	d	C	d_2	r	dyn. $C_{r\,w}$	stat. $C_{0r\,w}$	$F_{r\,per}$	$C_{ur\,w}$	$n_{D\,G}$
	≈g					min.	N	N	N	N	min^{-1}
LR5206-2Z	510	**72**	30	23,8	37,4	1	25 000	18 000	–	930	5 000
LR5206-X-2Z[1)]	510	**72**	30	23,8	37,4	1	25 000	18 000	–	930	5 000
LR5206-2RS	510	**72**	30	23,8	37,4	1	25 000	18 000	–	930	3 500
LR5305-2Z	500	**72**	25	25,4	34,4	1,1	28 000	19 900	–	1 000	5 500
LR5305-2RS	500	**72**	25	25,4	34,4	1,1	28 000	19 900	–	1 000	3 900
LR5207-2Z	660	**80**	35	27	42,4	1,1	31 000	22 800	–	1 200	3 900
LR5207-X-2Z[1)]	660	**80**	35	27	42,4	1,1	31 000	22 800	–	1 200	3 900
LR5207-2RS	660	**80**	35	27	42,4	1,1	31 000	22 800	–	1 200	2 800
LR5306-2Z	670	**80**	30	30,2	41,4	1,1	35 500	25 500	–	1 330	4 300
LR5306-2RS	670	**80**	30	30,2	41,4	1,1	35 500	25 500	–	1 330	3 100
LR5208-2Z	750	**85**	40	30,2	48,4	1,1	35 000	26 000	21 100	1 360	3 500
LR5208-X-2Z[1)]	750	**85**	40	30,2	48,4	1,1	35 000	26 000	21 100	1 360	3 500
LR5208-2RS	750	**85**	40	30,2	48,4	1,1	35 000	26 000	21 100	1 360	2 500
LR5307-2Z	970	**90**	35	34,9	47,7	1,5	44 000	32 500	–	1 670	3 600
LR5307-2RS	970	**90**	35	34,9	47,7	1,5	44 000	32 500	–	1 670	2 500
LR5308-2Z	1 200	**100**	40	36,5	52,4	1,5	54 000	40 500	–	2 100	3 300
LR5308-2RS	1 200	**100**	40	36,5	52,4	1,5	54 000	40 500	–	2 100	2 300

[1)] Track roller with cylindrical outside surface.

Stud type track rollers

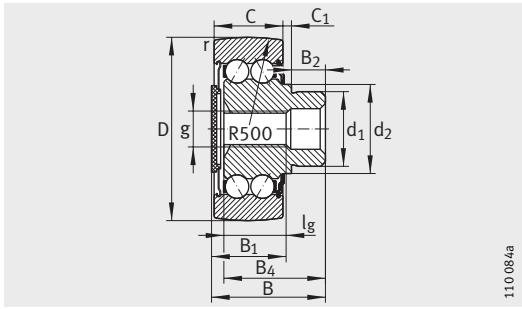
Sealed



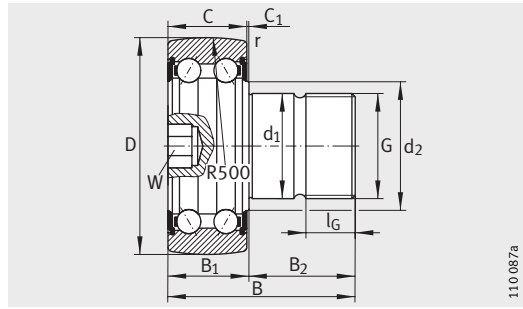
ZL2..-DRS

Dimension table · Dimensions in mm

Designation	Mass	Dimensions										
	m	D	d_1	B	B_1	B_2	B_4	C	C_1	d_2	r	G
	≈g				max.						min.	
ZL5201-DRS	90	**35**	14	33,2	19,5	14	31	15,9	2,6	17,1	0,6	–
KR5201-2RS	120	**35**	12	49,2	17	32,5	–	15,9	0,8	17,1	0,6	M12X1,5
ZL202-DRS	80	**40**	16	23,8	14	10	21,5	11	2	20	0,6	–
ZL5202-DRS	120	**40**	16	36,2	20,5	16	34	15,9	3,5	20	0,6	–
KR5202-2RS	190	**40**	16	53,2	17	36,5	–	15,9	0,8	20	0,6	M16X1,5
ZL203-DRS	120	**47**	18	26,5	14,5	12	24,5	12	2	22,9	0,6	–
ZL5203-DRS	190	**47**	18	39,5	21,5	18	37,5	17,5	3,5	22,9	0,6	–
KR5203-2RS	290	**47**	18	58,8	18,5	40,5	–	17,5	0,8	22,9	0,6	M18X1,5
ZL204-DRS	170	**52**	20	30,7	17	14	28,5	14	2	26,8	1	–
ZL5204-DRS	250	**52**	20	45,3	25,5	20	43	20,6	4	26,8	1	–
KR5204-2RS	380	**52**	20	63,6	22,5	41,5	–	20,6	1,5	26,8	1	M20X1,5
ZL205-DRS	250	**62**	25	33,8	18	16	31	15	2	30,3	1	–
ZL5205-DRS	380	**62**	25	50,4	25,5	25	47,5	20,6	4	30,3	1	–
KR5205-2RS	580	**62**	24	70,9	21,5	49,5	–	20,6	0,8	30,3	1	M24X1,5
ZL5206-DRS	550	**72**	30	59	29	30	56,5	23,8	4,5	37,3	1	–
KR5206-2RS	800	**72**	24	74,1	25	49,5	–	23,8	0,8	37,3	1	M24X1,5
ZL5207-DRS	710	**80**	35	69,2	33,5	36	66,5	27	5,5	42,4	1,1	–
KR5207-2RS	1 200	**80**	30	91	28	63	–	27	1	42,4	1,1	M30X1,5



ZL52..-DRS

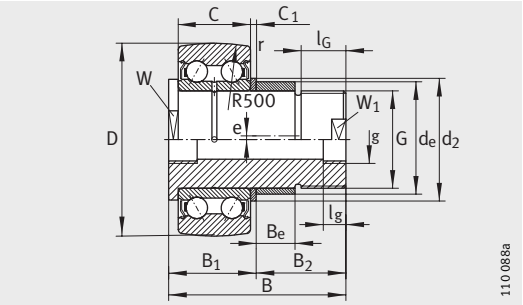


KR52..-2RS

				Tightening torque	Basic load ratings		Fatigue limit load	Speed
l_G	g	l_g	W	M_A	dyn. C_{rw}	stat. C_{0rw}	C_{urw}	n_{DG}
				Nm	N	N	N	min^{-1}
–	M8	14	–	–	8 700	5 200	260	7 500
17	–	–	6	45	8 700	5 200	260	7 500
–	M8	15	–	–	6 600	3 350	170	8 500
–	M8	15	–	–	10 000	6 300	320	7 000
19	–	–	8	70	10 000	6 300	320	7 000
–	M8	16	–	–	8 500	4 450	223	6 500
–	M8	15	–	–	12 800	8 400	420	5 500
21	–	–	8	115	12 800	8 400	420	5 500
–	M10	18	–	–	10 600	5 700	295	6 000
–	M10	18	–	–	16 100	10 700	550	5 000
21	–	–	10	160	16 100	10 700	550	5 000
–	M10	19	–	–	12 500	7 100	360	5 500
–	M10	18	–	–	18 800	13 200	670	4 500
25	–	–	10	290	18 800	13 200	670	4 500
–	M16	20	–	–	25 000	18 000	930	3 500
25	–	–	10	290	25 000	18 000	930	3 500
–	M16	20	–	–	31 000	22 800	1 200	2 800
32	–	–	12	600	31 000	22 800	1 200	2 800

Stud type track rollers

With eccentric collar
Sealed



ZLE52..-2Z

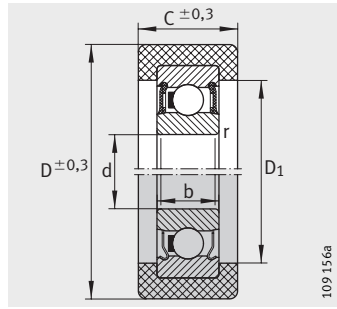
Dimension table · Dimensions in mm

Designation	Mass	Dimensions										
	m	D	d_e	B	B_1	B_2	C	C_1	d_2	r	W	W_1
	≈g				max.					min.		
ZLE5201-2Z	250	**35**	18	65,5	20,5	45	15,9	2	25	0,6	15	9
ZLE5202-2Z	350	**40**	22	66,5	21,5	45	15,9	2,5	27	0,6	17	10
ZLE5204-2Z	460	**52**	24	76	26	50	20,6	2,5	30	1	22	17
ZLE5205-2Z	640	**62**	24	88	32	56	20,6	8	30	1	22	17
ZLE5207-2Z	1 300	**80**	35	99	35	64	27	3	45	1,1	40	27

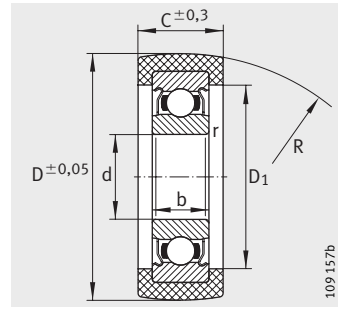
						Tightening torque	Basic load ratings		Fatigue limit load	Speed
e	B_e	g	l_g	G	l_G min.	M_A Nm	dyn. $C_{r\,w}$ N	stat. $C_{0r\,w}$ N	$C_{ur\,w}$ N	$n_{D\,G}$ min^{-1}
1	18	M6	6	M12X1,5	24	30	8 700	5 200	260	10 000
1	16	M8X1	8	M14	25	40	10 000	6 300	320	10 000
1	18	M8X1	8	M20X1,5	29	150	16 100	10 700	550	7 000
1	25	M8X1	8	M20X1,5	28	150	18 800	13 200	670	6 500
1,5	29	M8X1	8	M30X1,5	32	540	31 000	22 800	1 200	3 900

Track rollers

With plastic outer tyre
Sealed



KLRZ..-2RSR
KLRZ..-2Z

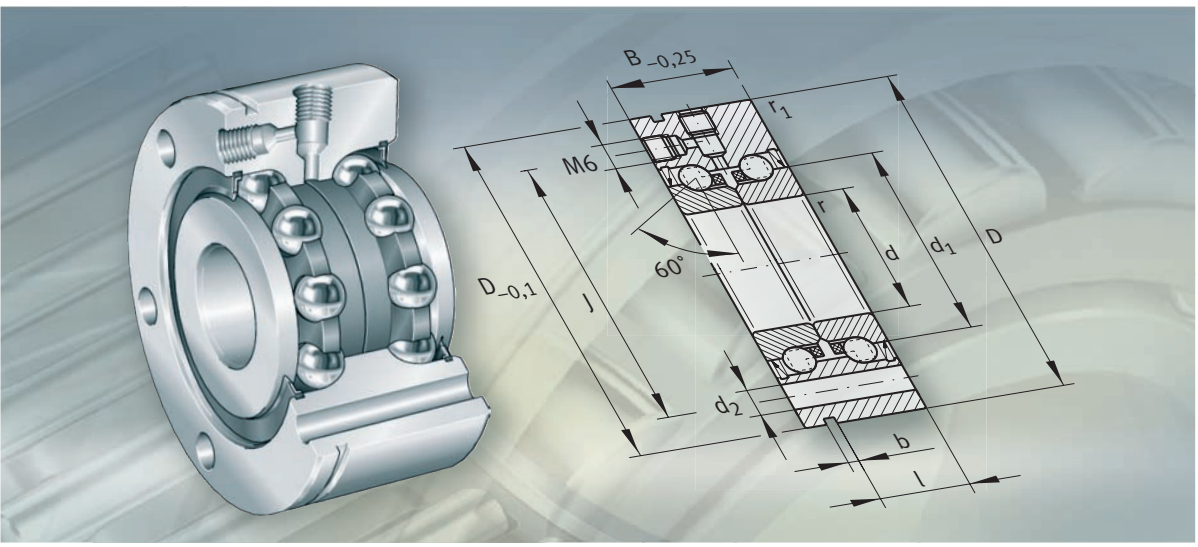


KLRU..-2Z

Dimension table · Dimensions in mm

Designation	Mass	Dimensions							Basic load ratings of track roller[1]	Deep groove ball bearing fitted	Basic load ratings of deep groove ball bearing	
	m	D	d	C	b	D_1	R	r	$F_{r\,per}$		dyn. C_r	stat. C_{0r}
	≈g							min.	N		N	N
KLRU08X28X11-2Z	16	**27,5**	8	11	7	20	500	0,3	250	608-2Z	3 200	1 250
KLRZ10X30X10-2Z	50	**30**	10	10	8	24	–	0,3	250	6000-2Z	4 600	1 970
KLRU12X35X12-2Z	30	**34,8**	12	12	8	26	300	0,3	340	6001-2Z	5 100	2 370
KLRZ12X41X16-2RSR	50	**41**	12	16	10	29,5	–	0,6	500	6201-2RSR	7 100	3 100
KLRU12X47X20-2Z	45	**46,8**	12	20	10	28,5	300	0,6	500	6201-2Z	7 100	3 100
KLRU15X47X20-2Z	50	**46,8**	15	20	11	31,5	300	0,6	500	6202-2Z	7 700	3 500

[1] Valid for installation as track roller.
The values apply for operating temperatures up to max. +40 °C.



Bearings for screw drives

Axial angular contact ball bearings
Needle roller/axial cylindrical roller bearings
Seal carrier assemblies
Precision locknuts

Bearings for screw drives

Matrix for preselection of bearings **1008**

The application-oriented matrix allows rapid preselection of the suitable bearing.

Axial angular contact ball bearings **1010**

Axial angular contact ball bearings are precision bearings for screw drives. Depending on the series, they can support radial forces as well as axial forces from one or both sides. The inner ring is matched to the ball and cage assemblies and the outer ring. As a result, the bearings can be set to a defined axial preload. Contact seals protect the rolling element system against contamination and moisture. For higher speeds, gap seals can be used.

The bearings are available with and without fixing holes in the outer ring. Bearings with holes are screw mounted directly on the adjacent construction. This solution is particularly economical since there is no need for the locating bore otherwise required or for the bearing cover with the associated matching work.

For many applications, a bearing arrangement of lower precision is often sufficient. For this purpose, bearings with less stringent tolerances are available.

Needle roller/ axial cylindrical roller bearings **1064**

These bearings are double direction precision axial cylindrical roller bearings with a radial bearing component. The inner ring, outer ring and cylindrical roller and cage assemblies are matched to each other such that they can be set to a defined axial preload using a precision locknut.

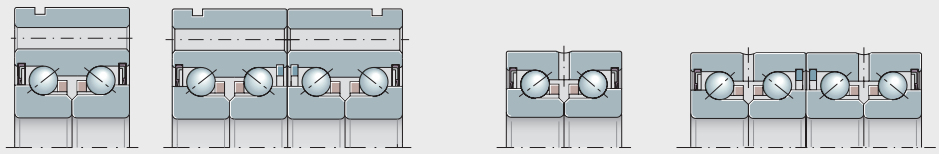
The bearings are available with and without fixing holes in the outer ring. Bearings with holes are screw mounted directly on the adjacent construction. The large contact surface and the small pitch of the holes allows a connnection to the adjacent construction that is extremely rigid and with low tendency to settling. The bearing cover that would otherwise be required to hold the bearing, and the matching work required, can therefore be dispensed with.

If the axial abutment of the shaft locating washer is not sufficient or a seal raceway is required, bearings with a stepped, extended shaft locating washer on one side are suitable.

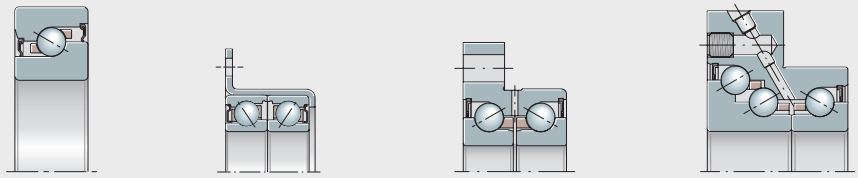
Seal carrier assemblies Precision locknuts **1092**

Seal carrier assemblies DRS are complete sealing sets that are screw mounted on the outer ring of needle roller/axial cylindrical roller bearings ZARF(L). They are precisely centred in this position and seal the bearings against external influences.

The precision locknuts AM, ZM, ZMA for axial or radial locking are used to set bearings for screw drives to a defined axial preload. They are also used where high axial forces must be supported and high runout accuracy and rigidity are required.

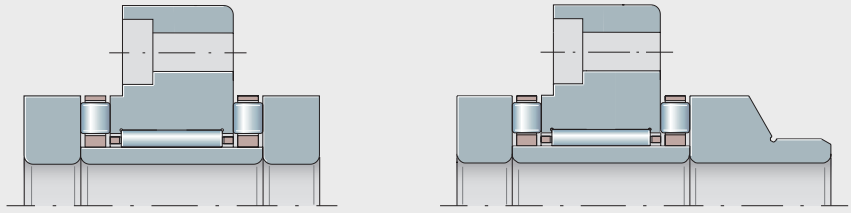


ZKLF ZKLF..-2RS-2AP ZKLN ZKLN..-2RS-2AP

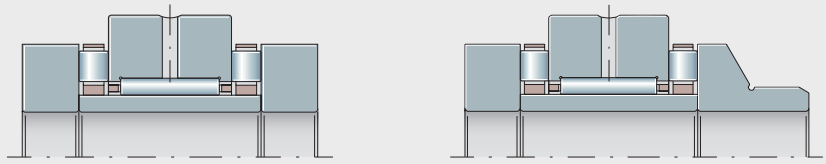


7602, 7603, BSB ZKLR ZKLFA DKLFA

107 558a

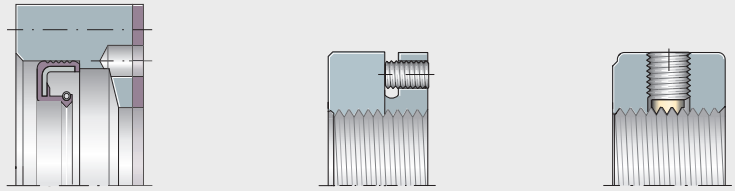


ZARF ZARF..-L



ZARN ZARN..-L

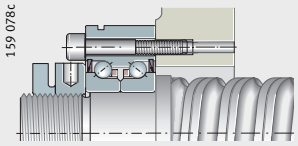
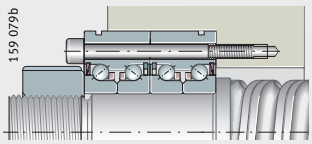
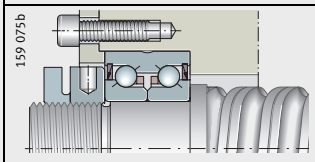
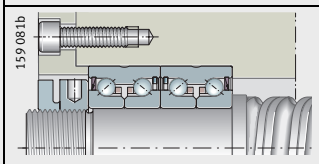
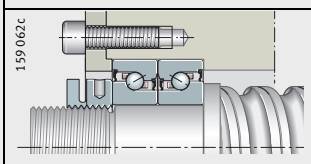
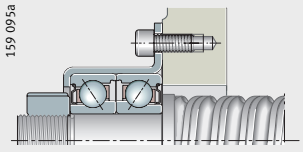
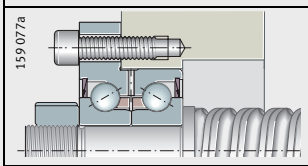
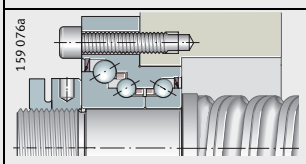
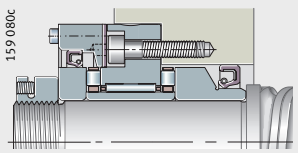
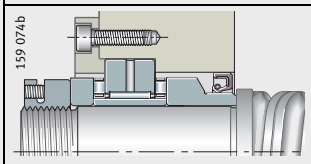
107 559



DRS AM ZM, ZMA

107 560

Matrix for preselection of bearings

Application	Series	
For standard applications	 159 078c	**ZKLF..-2Z** **ZKLF..-2RS** **ZKLF..-2RS-PE**
	 159 079b	**ZKLF..-2RS-2AP**
	 159 075b	**ZKLN..-2Z** **ZKLN..-2RS** **ZKLN..-2RS-PE**
	 159 081b	**ZKLN..-2RS-2AP**
	 159 062c	**7602** **7602-2RS** **7603** **7603-2RS** **BSB** **BSB-2RS**
For special applications	 159 095a	**ZKLR..-2Z** **ZKLR..-2RS**
	 159 077a	**ZKLFA..-2Z** **ZKLFA..-2RS**
	 159 076a	**DKLFA..-2RS**
For applications requiring very high accuracy and rigidity	 159 080c	**ZARF (L)**
	 159 074b	**ZARN (L)**

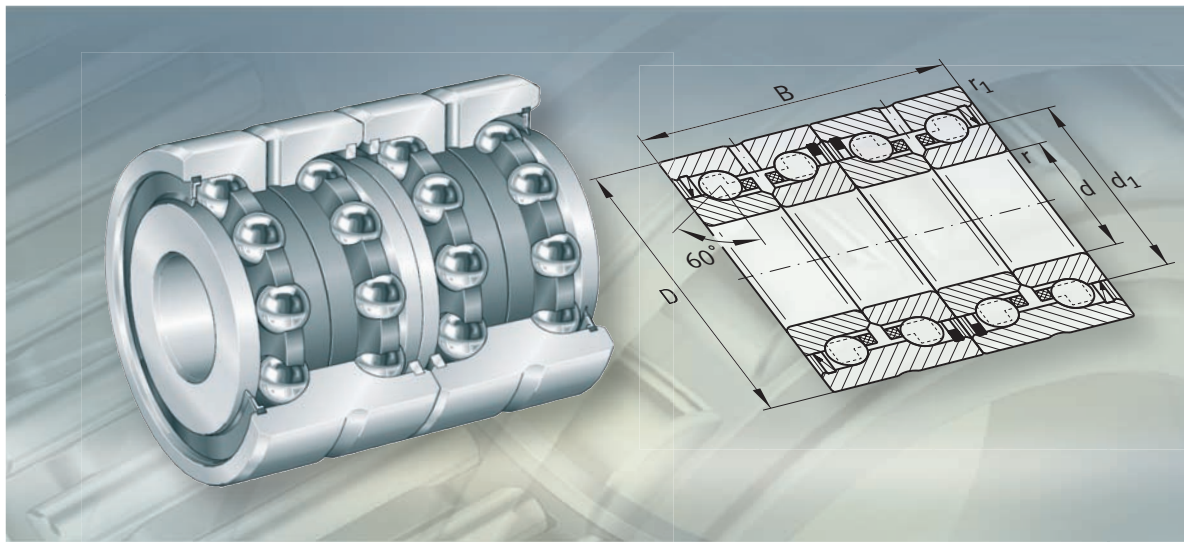
Definition of symbols

+++	very good
++	good
+	satisfactory
–	sufficient

Attention!

This selection matrix is a general overview for preliminary assessment of whether bearings can be considered for the required purpose. For the specific application, the data in the product sections and the technical principles must always be taken into consideration.

Features	Characteristics					
	High runout accuracy	High speeds and low friction	High rigidity and load carrying capacity	Work on adjacent construction and mounting	Low lubricant consumption	For description, see page
– Outer ring for flange mounting – Gap seals or contact seals on both sides – Greased, with relubrication facility – Most economical type of screw drive bearing arrangement	++ ++ +	+++ ++ ++	+ + +	+++ +++ +++	++ ++ ++	**1014**
– As ZKLF, but in matched pair – Significantly higher load carrying capacity and rigidity than ZKLF	++	++	++	++	++	**1015**
– Gap seals or contact seals on both sides – Greased, with relubrication facility – Easier to fit than single row bearings, e.g. for plummer block housings	++ ++ +	+++ ++ ++	+ + +	+ + +	++ ++ ++	**1016**
– As ZKLN, but in matched pair – Significantly higher load carrying capacity and rigidity than ZKLN	++	++	++	+	++	**1017**
– Open or sealed on both sides – Highly suitable for mounting in pairs to form wide range of contact angle combinations	++ ++ ++ ++ ++ ++	+++ ++ +++ ++ +++ ++	+ + + + + +	– – – – – –	++ ++ ++ ++ ++ ++	**1018**
– Particularly economical alternative to solutions with individual ball bearings – Gap seals or contact seals on both sides – Simple to fit – For applications with comparatively low loads, but high positional accuracy	+ +	+++ ++	– –	+++ +++	++ ++	**1019**
– Outer ring for flange mounting – Stepped outer ring with flattened areas on both sides – Gap seals or contact seals on both sides	++ ++	+++ ++	+ +	+++ +++	++ ++	**1020**
– Higher load capacity on one side – Outer ring for flange mounting – Sealed on both sides – For vertical axes – For locating/locating bearing arrangements	+	++	++	+++	++	**1021**
– Outer ring for flange mounting – Very high accuracy, rigidity and load carrying capacity – Bearing prepared for sealing	+++	+	+++	+	–	**1067**
– Very high accuracy, rigidity and load carrying capacity – Bearing prepared for sealing	+++	+	+++	–	–	**1068**



Axial angular contact ball bearings

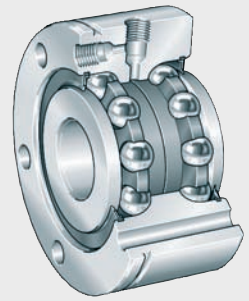
Axial angular contact ball bearings

		Page
Product overview	Axial angular contact ball bearings	1012
Features	Double row, for screw mounting	1014
	Double row, not for screw mounting	1016
	Single row, for matching in pairs	1018
	Angular contact ball bearing unit, for screw mounting	1019
	Double row, with flange, for screw mounting	1020
	Triple row, with flange, for screw mounting	1021
	Operating temperature	1022
	Cages	1022
	Suffixes	1022
Design and safety guidelines	Basic rating life	1023
	Static load safety factor	1024
	Maximum radial load on screw connections for ZKLF	1030
	Permissible static axial load for ZKLF	1031
	Design of adjacent construction	1031
	Speeds	1031
	Friction	1032
	Lubrication	1033
	Mounting guidelines	1034
Dimension tables	Axial angular contact ball bearings	
	for screw mounting	1038
	for screw mounting, less stringent tolerances	1040
	for screw mounting, matched pair	1042
	not for screw mounting	1044
	not for screw mounting, less stringent tolerances	1048
	not for screw mounting, matched pair	1050
	single direction	1052
	single direction, sealed	1056
	Angular contact ball bearing units, for screw mounting	1058
	Double row axial angular contact ball bearings with flange, for screw mounting	1060
	Triple row axial angular contact ball bearings with flange, for screw mounting	1062

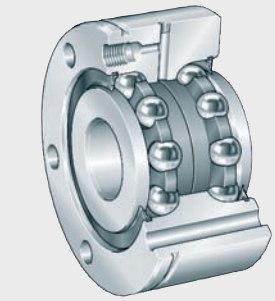
Double row, for screw mounting

Lip seals or gap seals

ZKLF..-2RS, ZKLF..-2Z

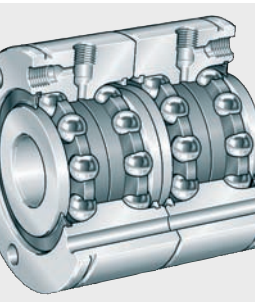


ZKLF..-2RS-PE



Matched pair

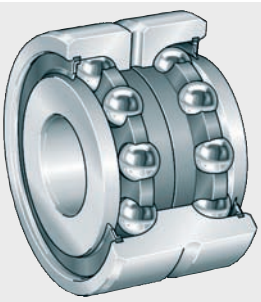
ZKLF..-2RS-2AP



Double row, not for screw mounting

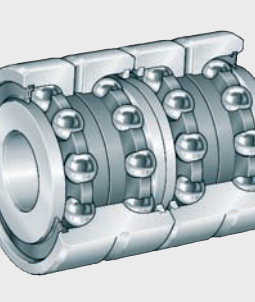
Lip seals or gap seals

ZKLN..-2RS, ZKLN..-2Z, ZKLN..-2RS-PE



Matched pair

ZKLN..-2RS-2AP



Single row, for matching in pairs

With or without lip seals

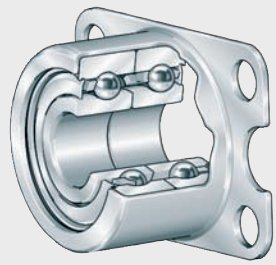
7602, 7603, BSB

7602..-2RS, 7603..-2RS, BSB..-2RS

Angular contact ball bearing unit, for screw mounting

Lip seals or gap seals

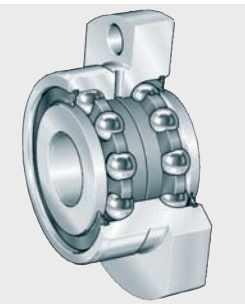
ZKLR..-2RS, ZKLR..-2Z



Double or triple row, flange with flattened areas, for screw mounting

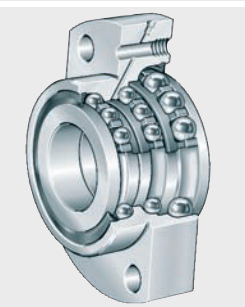
Double row
Lip seals or gap seals

ZKLFA..-2RS, ZKLFA..-2Z



Triple row
Lip seals

DKLFA..-2RS



Axial angular contact ball bearings

Features

Screw drive bearing arrangements are subjected to requirements that often cannot be optimally fulfilled by the design construction of conventional bearings.

For the design of bearing arrangements for the highly dynamic operating conditions in screw drives that have high accuracy, high load carrying capacity, high rigidity, low friction, are easy to fit and maintenance-free or low-maintenance, there is a wide range of INA and FAG axial angular contact ball bearings. With this product range, solutions can be found to all the technical and economic demands placed on the bearing arrangements of screw drives.

Single row and multi-row designs

Axial angular contact ball bearings are available as single, double or triple row ready-to-fit units. They are self-retaining and comprise thick-walled, geometrically stable outer rings, ball and cage assemblies and one-piece or two-piece inner rings. In several series, the outer ring has through holes for simple flange mounting to the adjacent construction.

The bearing rings are matched to each other such that a defined preload is achieved when the rings are clamped in place using a precision locknut.

Radial and axial load carrying capacity

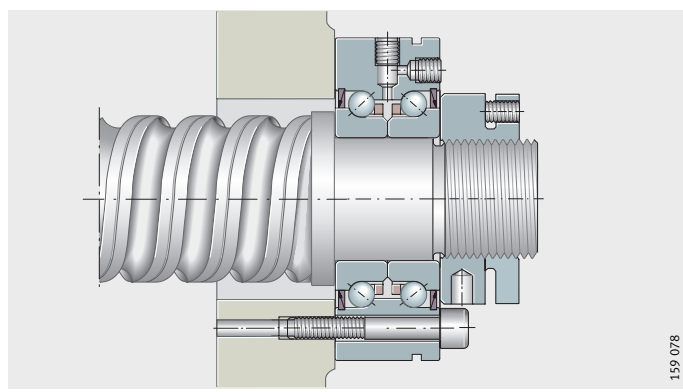
Due to the contact angle of 60°, the bearings can support not only radial forces but high axial forces as well.

Double row, for screw mounting

Axial angular contact ball bearings ZKLF are screw mounted directly on the adjacent construction or in a radial locating bore, *Figure 1* and *Figure 2*, page 1015. The cover that would otherwise be required and the associated matching work can therefore be dispensed with.

In order to aid removal of the bearings from a locating bore, the outer ring has a circumferential extraction slot.

Relubrication is facilitated by radial and axial threaded connectors with detachable grub screws.



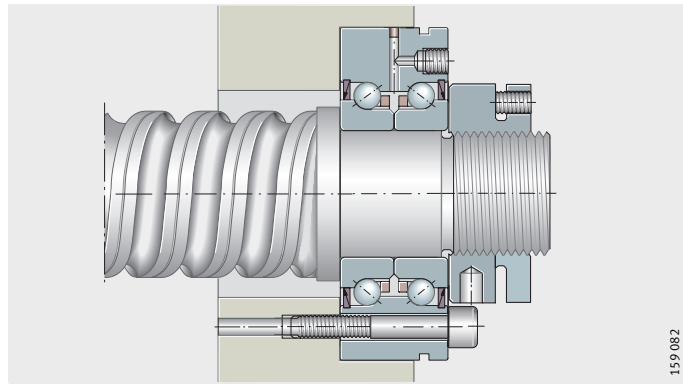
ZKLF..-2RS
ZKLF..-2Z

Figure 1
Outer ring screw mounted on flat adjacent construction, preloaded using locknut

With less stringent tolerances

Axial angular contact ball bearings ZKLF..-2RS-PE correspond to series ZKLF but have a runout tolerance within P5 to DIN 620, less stringent diameter tolerances and the suffix PE.
They are used where a lower positional accuracy is acceptable. As a result, the adjacent construction does not need to be as accurate with these bearings.

Relubrication is facilitated by an axial threaded connector. The radial lubrication duct is firmly closed off.



ZKLF..-2RS-PE

Figure 2
Outer ring screw mounted in bore, preloaded using locknut

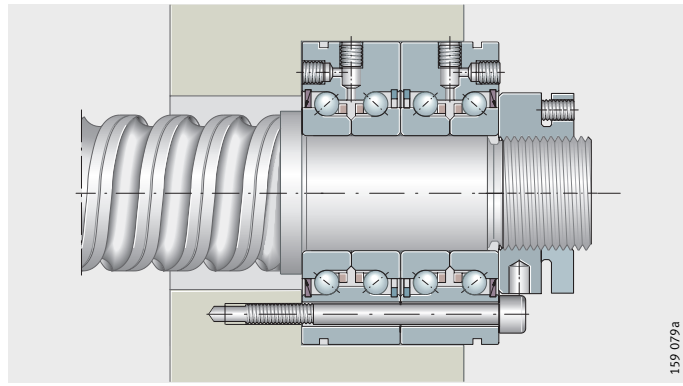
Heavy series

Axial angular contact ball bearings ZKLF..-2RS and ZKLF..-2Z are also available in a heavy series. For the same shaft diameter, they have a larger cross-section and thus higher basic load ratings.

Matched pairs

Bearings of series ZKLF..-2RS-2AP comprise a matched pair of bearings ZKLF..-2RS, *Figure 3*. The individual bearings are matched to each other.

Matched bearings have an arrow marking on the outside surface of the outer rings. When the bearings are arranged correctly, the lip seals face outwards. During fitting, the hole pattern of the two bearings must match, not the marking.



ZKLF..-2RS-2AP

Figure 3
Matched pair, outer ring screw mounted in bore, preloaded using locknut

Seals

Bearings with the suffix 2RS have lip seals and highly effective sealing.

Bearings with the suffix 2Z are sealed using gap seals and are suitable for higher speeds.

Lubrication

The bearings are greased using a lithium soap grease to GA28 and can be lubricated via the lubrication connectors in the outer ring. For the majority of applications, the initial greasing is sufficient for the whole bearing operating life.

Double row, not for screw mounting

Axial angular contact ball bearings ZKLN are mounted in a housing bore, *Figure 4*. The bearing outer ring is axially located by a cover.

ZKLN..-2RS
ZKLN..-2Z

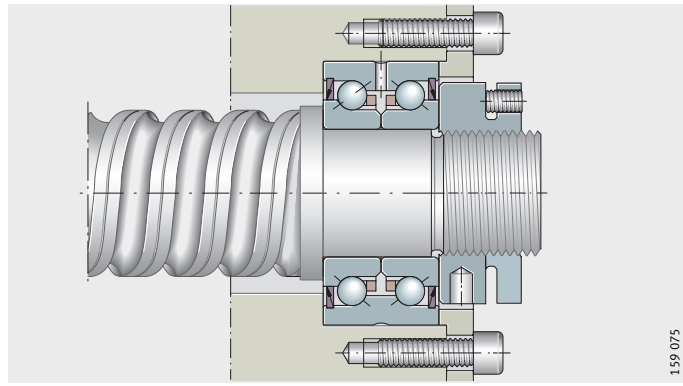


Figure 4
Outer ring located using cover, preloaded using locknut

With less stringent tolerances

Axial angular contact ball bearings ZKLN..-2RS-PE correspond to series ZKLN but have a runout tolerance within P5 to DIN 620, less stringent diameter tolerances and the suffix PE.
They are used where a lower positional accuracy is acceptable. As a result, the adjacent construction does not need to be as accurate with these bearings.

Heavy series

Axial angular contact ball bearings ZKLN..-2RS and ZKLN..-2Z are also available in a heavy series. For the same shaft diameter, they have a larger cross-section and thus higher basic load ratings.

Matched pairs

Bearings of series ZKLN..-2RS-2AP comprise a matched pair of bearings ZKLN..-2RS, *Figure 5*. The individual bearings are matched to each other.

Matched bearings have an arrow marking on the outside surface of the outer rings. When the bearings are arranged correctly, the lip seals face outwards.

The bearing outer rings are axially clamped by a cover, *Figure 5*.

ZKLN..-2RS-2AP

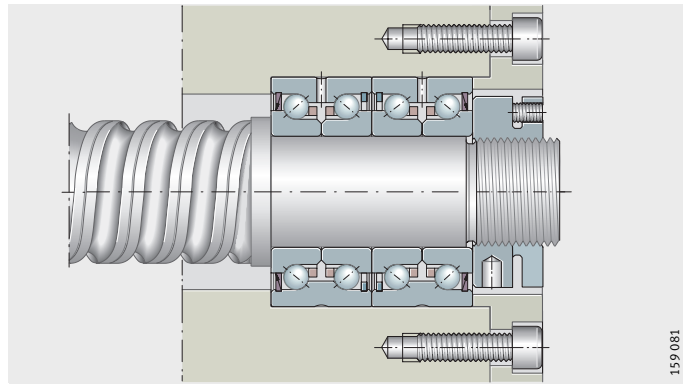


Figure 5
Matched pair,
outer rings located using cover,
preloaded using locknut

Seals

Bearings with the suffix 2RS have lip seals and highly effective sealing.

Bearings with the suffix 2Z are sealed using gap seals and are suitable for higher speeds.

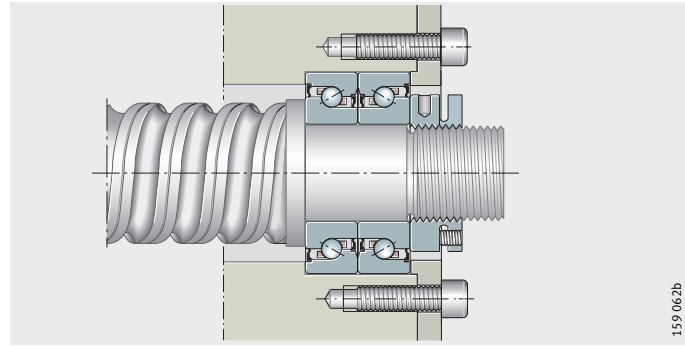
Lubrication

The bearings are greased using a lithium soap grease to GA28 and can be lubricated via a lubrication slot and lubrication holes in the outer ring. For the majority of applications, the initial greasing is sufficient for the whole bearing operating life.

Single row, for matching in pairs

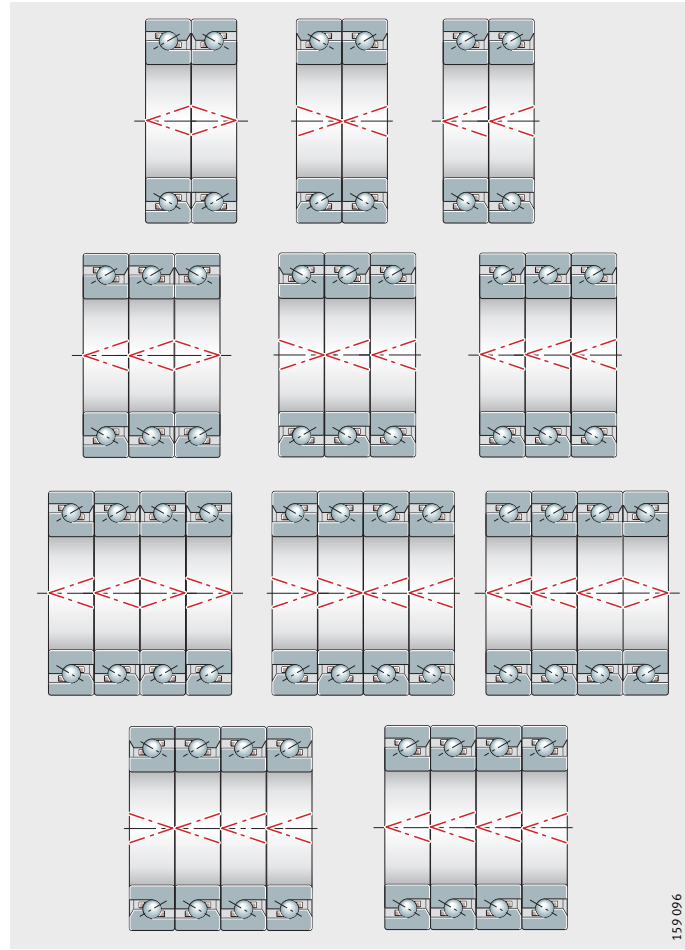
Bearings 7602, 7603 and BSB are designed as universal bearings, *Figure 6* and *Figure 7*.

They can be combined in a wide range of sets for different requirements, *Figure 7*.



7602..-2RS, 7603..-2RS, BSB..-2RS

Figure 6
Single row axial angular contact ball bearings, two-bearing set in O arrangement



7602, 7603, BSB

Figure 7
Set combinations

Seals

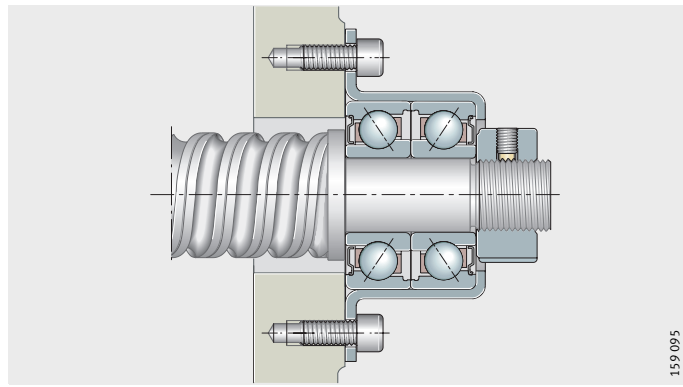
Single row axial angular contact ball bearings for matching are bearings of the open basic design. However, some sizes are fitted with seals.

Lubrication

Single row axial angular contact ball bearings of the open basic design are not supplied greased. The designs fitted with seals are greased for life with Arcanol L55.

Angular contact ball bearing unit, for screw mounting

Angular contact ball bearing units ZKLR are low-cost bearings and therefore particularly economical. They comprise a deep drawn sheet steel housing with an integral matched pair of angular contact ball bearings in an X arrangement, *Figure 8*. The housing has a Corrotect® coating and is thus protected against rust.
The ball bearings are sealed on both sides by lip seals or gap seals. The bearing assembly is preloaded clearance-free.



ZKLR..-2RS
ZKLR..-2Z

Figure 8
Angular contact ball bearing unit

Particularly easy to fit

The units are particularly easy to fit.
They:

- are directly flange mounted, for example on the milled face of the adjacent construction. This eliminates the need for precise, costly fits and additional flange covers for seating and axial location of the bearings
- require no additional parts for location of the bearings in the housing
- reduce errors in fitting due to the smaller number of components compared to conventional solutions
- are self-aligning by means of the screw drive nut during fitting. This effectively eliminates any warping due to misalignment of the bearing seats
- have a defined preload. It is not necessary to preload the bearing during fitting as is usually the case with screw drive bearing arrangements
- require only clearance-free axial location on the threaded spindle.

Seals

Bearings with the suffix 2RS have lip seals and highly effective sealing. Bearings with the suffix 2Z are sealed using gap seals and are suitable for higher speeds.

Lubrication

The bearings are greased using a lithium soap grease to DIN 51825–K2N–40.

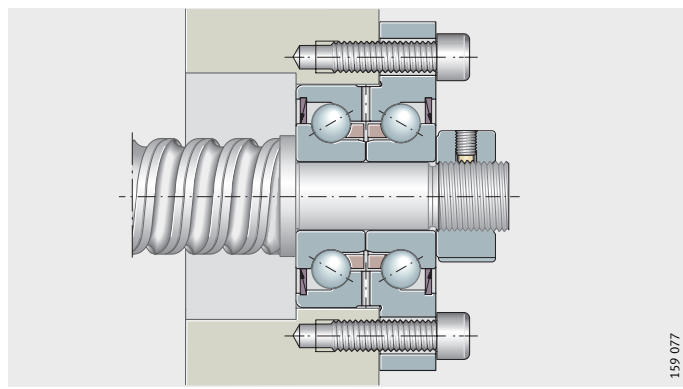
Operating limits

The units are highly suitable, due to their dimensions and design, for space-saving and simple bearing arrangements in highly dynamic screw drives, for example:

- in inspection and measuring equipment
- in small machine tools
- in medical and laboratory equipment
- in precision engineering and electronic components manufacture
- where complete units will give a simpler bearing arrangement.

Double row, with flange, for screw mounting

Series ZKLFA has a stepped outer ring. It can therefore be screw mounted easily on the adjacent construction, *Figure 9*.
The flange has flattened areas on both sides, so the radial design envelope in the adjacent construction can be kept very small.



ZKLFA..-2RS
ZKLFA..-2Z

Figure 9
Outer ring screw mounted on adjacent construction, preloaded using locknut

Seals

Bearings with the suffix 2RS have lip seals and highly effective sealing. Bearings with the suffix 2Z are sealed using gap seals and are suitable for higher speeds.

Lubrication

The bearings are greased using a lithium soap grease to GA28 and can be lubricated via a lubrication groove and lubrication holes in the outer ring. For the majority of applications, the initial greasing is sufficient for the whole bearing operating life.

Triple row, with flange, for screw mounting

Axial angular contact ball bearings DKLFA..-2RS have, in addition to two rows of balls with a contact angle of 60° in an O arrangement, an extra row of balls, *Figure 10*. Due to this additional row, the bearings can support higher axial loads in one direction.

Due to the stepped outer ring, the bearings can be easily flange mounted on the adjacent construction. The flange has flattened areas on both sides. As a result, it requires only a small design envelope in the adjacent construction.

DKLFA..-2RS

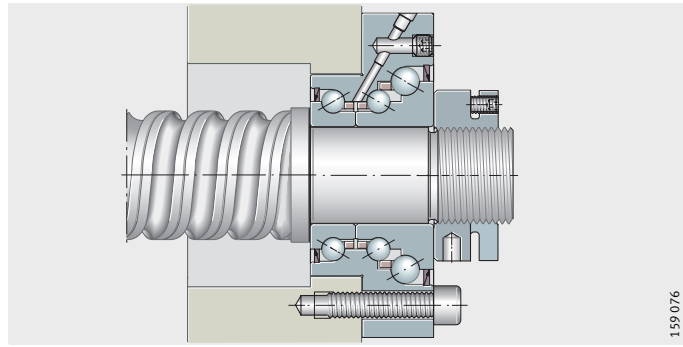


Figure 10
Outer ring screw mounted on adjacent construction, preloaded using locknut

In order to make full use of the load carrying capacity of bearings DKLFA..-2RS, their design requires that they are subjected to continuous load in the main load direction. They are therefore used mainly in screw drives with a locating/locating bearing arrangement and tensioned spindles or in vertically arranged screw drive bearing arrangements.

For design of the bearing arrangement, please contact us.

Seals

Triple row axial angular contact ball bearings have lip seals on both sides.

Lubrication

The bearings are greased using a lithium soap grease to GA28. If necessary, lubrication can be carried out via a threaded connector for central lubrication systems on the flange side.

For calculation of relubrication intervals based on a stated load spectrum (speed, load, operating duration, environmental conditions), please contact us.

Operating temperature

Sealed axial angular contact ball bearings are suitable for operating temperatures from –30 °C to +120 °C, restricted by the grease, the seal material and the plastic cages in the ball and cage assemblies.

The operating temperature influences the dynamic bearing characteristics. The values given in the dimension table are based on a room temperature of +20 °C.

Cages

The axial angular contact ball bearings have plastic cages. The cage design is not indicated in the suffix.

In series 7602, 7603 and BSB, the polyamide cages are indicated by the suffix TVP or T.

Suffixes

Suffixes for the available designs: see table.

Available designs

Suffix	Description	Design
PE	Less stringent bearing design	Standard
T, TVP	Polyamide cage, guided by balls	
2AP	Axial angular contact ball bearings, matched pair (ZKLN, ZKLF)	
2RS	Contact seals on both sides	
2Z	Gap seals on both sides	

Design and safety guidelines

Basic rating life

The decisive factors in determining the bearing size are the basic rating life, the static load safety factor and the axial limiting load. The basic rating life L and L_h are calculated as follows:

$$L_{10} = \left(\frac{C}{P}\right)^p$$

$$L_{10h} = \frac{16\,666}{n} \cdot \left(\frac{C}{P}\right)^p$$

L_{10} 10^6 revolutions
Basic rating life in millions of revolutions

L_{10h} h
Basic rating life in operating hours

C_r, C_a N
Basic dynamic radial or axial load rating according to dimension table
C_r is valid for a contact angle $\alpha \leqq 45°$, C_a is valid for a contact angle $\alpha > 45°$

P N
Equivalent dynamic bearing load

p –
Life exponent p = 3

n min^{-1}
Operating speed.

Resultant and equivalent bearing load P for ZKLR

Bearing unit Designation	Factor P
ZKLR0624-2Z	$P = 140 + 0{,}13\ F_a^{1,4} + 0{,}003 \cdot F_r^{1,9}$
ZKLR0828-2Z	$P = 210 + 0{,}28\ F_a^{1,27} + 0{,}002 \cdot F_r^{1,9}$
ZKLR1035-2Z	$P = 240 + 0{,}47\ F_a^{1,17} + 0{,}0015 \cdot F_r^{1,9}$
ZKLR1244-2RS	$P = 580 + 0{,}046\ F_a^{1,3} + 0{,}076 \cdot F_r^{1,28}$
ZKLR1547-2RS	$P = 540 + 0{,}011\ F_a^{1,5} + 0{,}022 \cdot F_r^{1,45}$
ZKLR2060-2RS	$P = 960 + 0{,}0082\ F_a^{1,5} + 0{,}017 \cdot F_r^{1,45}$

Static limiting load diagrams for ZKLR

The easy-to-use static limiting load diagrams allow quick verification of the bearing size of series ZKLR, as a function of the axial and radial operating load, *Figure 21* to *Figure 23*, page 1029.
The decisive requirement is that the intersection between the axial and radial load must be below the limit line.

Example: If the operating loads F_a and F_r are below the limit line, the bearing size is suitable for the application,
see example *Figure 23*, page 1029.

Resultant and equivalent bearing load P for ZKLN, ZKLF, ZKLFA, DKLFA, BSB, 7602, 7603

The bearings are axially preloaded to a defined value if the recommended precision locknuts are used and the correct nut tightening torque is applied. The resultant axial bearing load $F_{a\,res}$ is determined from the axial operating load F_{aB} and taking account of the axial preload according to *Figure 11*, page 1025, to *Figure 15*, page 1026. For 7602, 7603 and BSB, the $F_{a\,res}$ diagrams are based on two-bearing sets in an O or X arrangement, see page 1018. For calculation of other set combinations, please contact us.

A load in excess of the limit value will lead to the rolling element row without load lifting off the raceway. As a result, higher wear will occur under rapid acceleration. For extreme moment loads and statically overdefined systems (locating/locating bearing arrangements), please contact us. The calculation program BEARINX® can give a precise design in this case.

Axial and radial operating loads

Under purely axial load, $P = F_{a\,res}$. If additional radial operating loads are present, P must be calculated as follows:

$$P = X \cdot F_r + Y \cdot F_{a\,res}$$

The values X and Y are given in the following table.

Factors X and Y

Load ratio	Factor	
	X	Y
$\frac{F_{a\,res}}{F_r} \leqq 2{,}17$	1,9	0,55
$\frac{F_{a\,res}}{F_r} > 2{,}17$	0,92	1

Load varying in steps

In this case, P and n are calculated as follows (q = time portion %):

$$P = \sqrt[p]{\frac{q_1 \cdot n_1 \cdot P_1^{\,p} + \ldots + q_z \cdot n_z \cdot P_z^{\,p}}{q_1 \cdot n_1 + \ldots + q_z \cdot n_z}}$$

$$n = \frac{q_1 \cdot n_1 + \ldots + q_z \cdot n_z}{100}$$

Static load safety factor

The static load safety factor S_0 indicates the security against impermissible permanent deformations in the bearing:

$$S_0 = \frac{C_0}{P_0}$$

S_0 –
Static load safety factor

C_{0r}, C_{0a} N
Basic static radial or axial load rating according to dimension table
C_{0r} is valid for a contact angle $\alpha \leqq 45°$, C_{0a} is valid for a contact angle $\alpha > 45°$

P_0 N
Maximum static load of bearing.

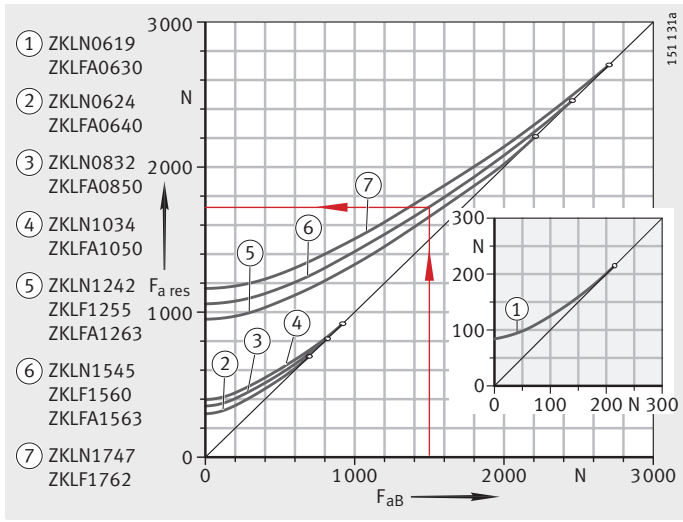
In machine tools, S_0 should be $\geqq 4$.

Resultant bearing load $F_{a\,res}$

Example (red lines)
Bearing ZKLN1545
Axial operating load $F_{aB} = 1500$ N
$F_{a\,res} \approx 1750$ N
Loading by operating load and preload

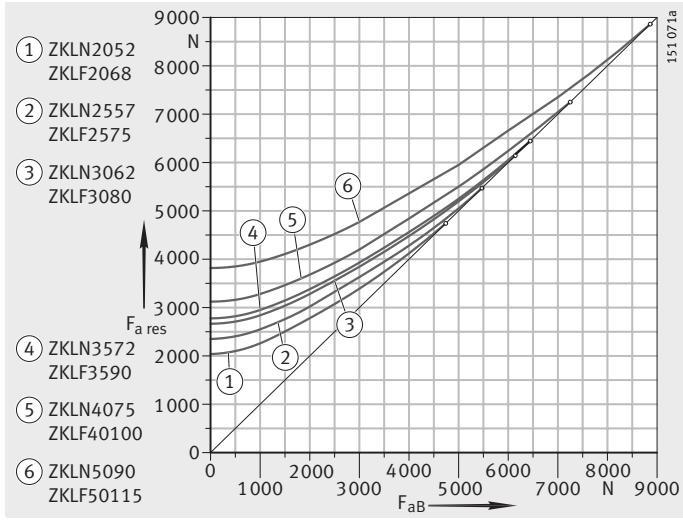
F_{aB} = operating load
$F_{a\,res}$ = resultant bearing load
° = limit value

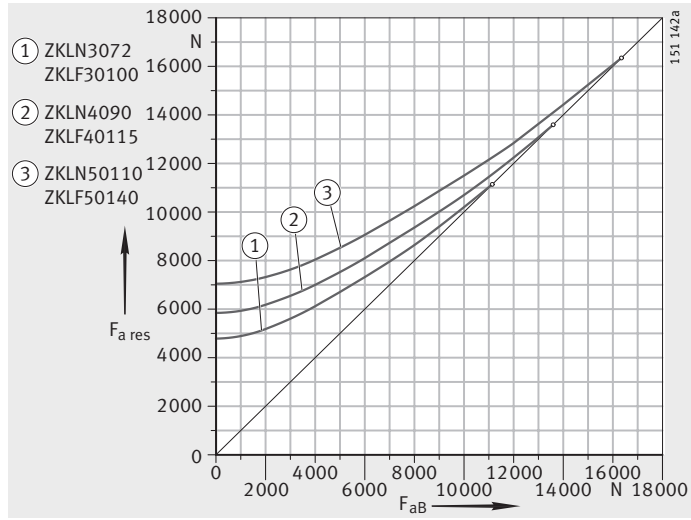
Figure 11
Resultant bearing load
ZKLN, ZKLF and ZKLFA,
up to d = 17 mm



F_{aB} = operating load
$F_{a\,res}$ = resultant bearing load
° = limit value

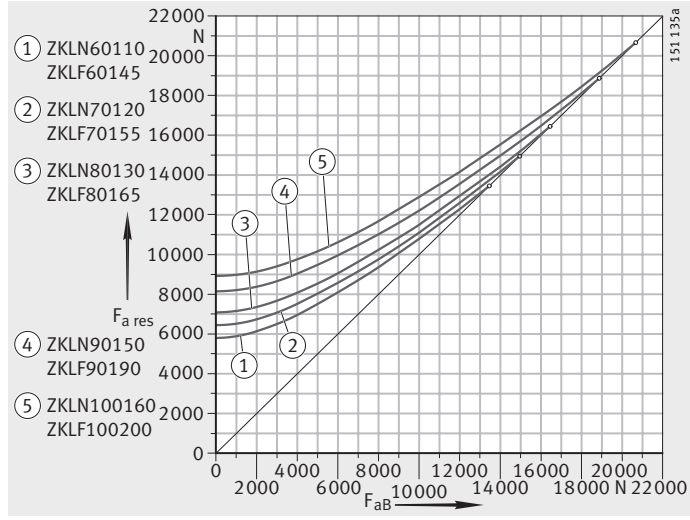
Figure 12
Resultant bearing load
ZKLN, ZKLF,
from d = 20 mm to 50 mm





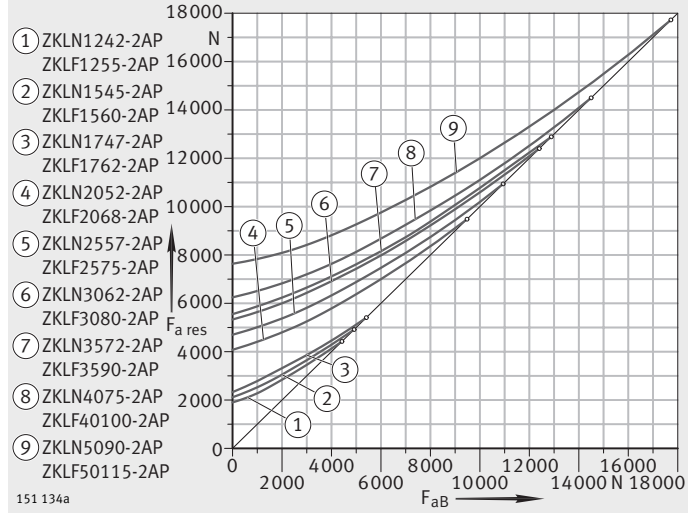
F_{aB} = operating load
$F_{a\,res}$ = resultant bearing load
° = limit value

Figure 13
Resultant bearing load
ZKLN, ZKLF, heavy series



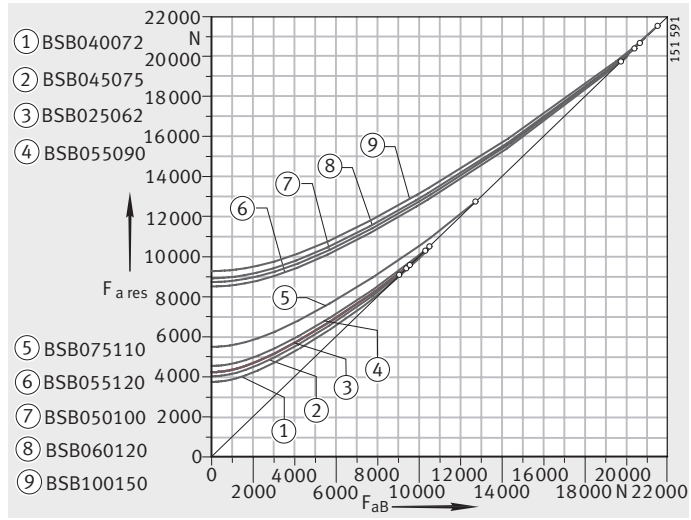
F_{aB} = operating load
$F_{a\,res}$ = resultant bearing load
° = limit value

Figure 14
Resultant bearing load
ZKLN, ZKLF, from d = 60 mm



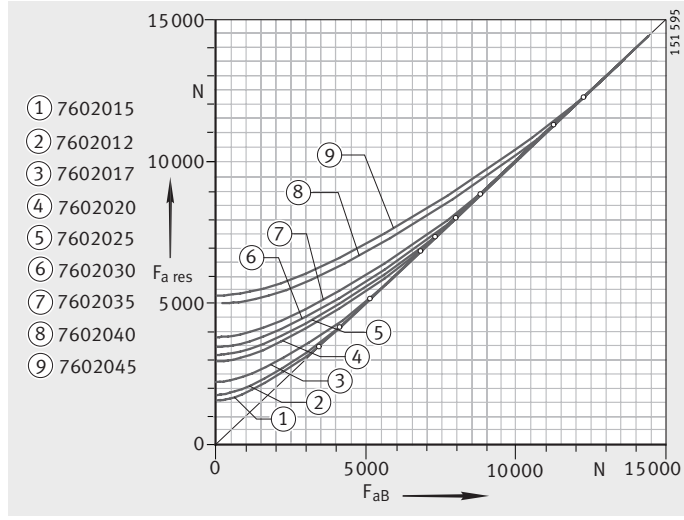
F_{aB} = operating load
$F_{a\,res}$ = resultant bearing load
° = limit value

Figure 15
Resultant bearing load
ZKLN..-2AP and ZKLF..-2AP



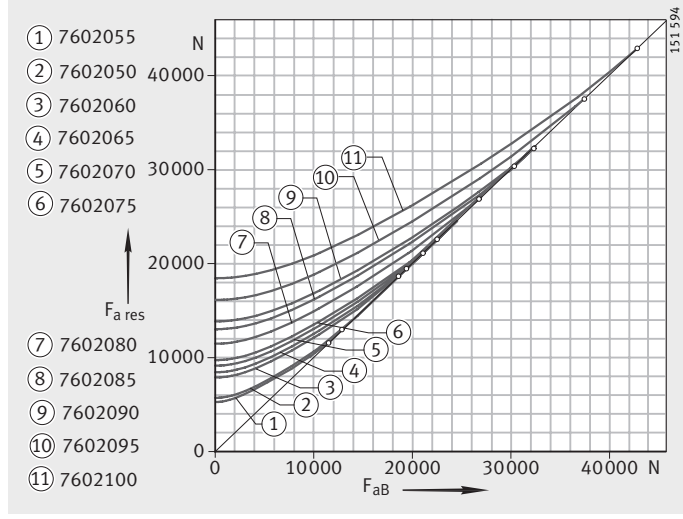
F_{aB} = operating load
$F_{a\,res}$ = resultant bearing load
° = limit value

Figure 16
Resultant bearing load
BSB



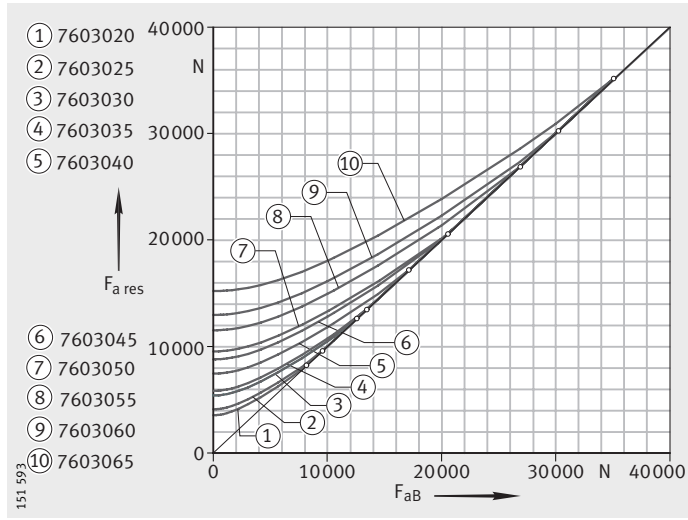
F_{aB} = operating load
$F_{a\,res}$ = resultant bearing load
° = limit value

Figure 17
Resultant bearing load
7602012 to 7602045



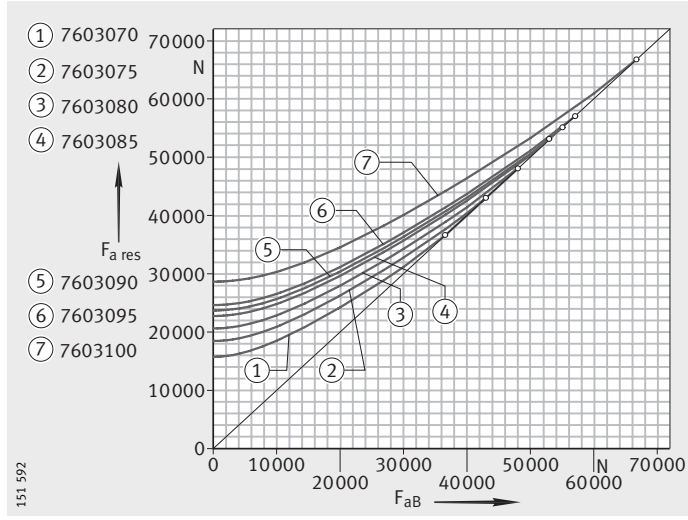
F_{aB} = operating load
$F_{a\,res}$ = resultant bearing load
° = limit value

Figure 18
Resultant bearing load
7602050 to 7602100



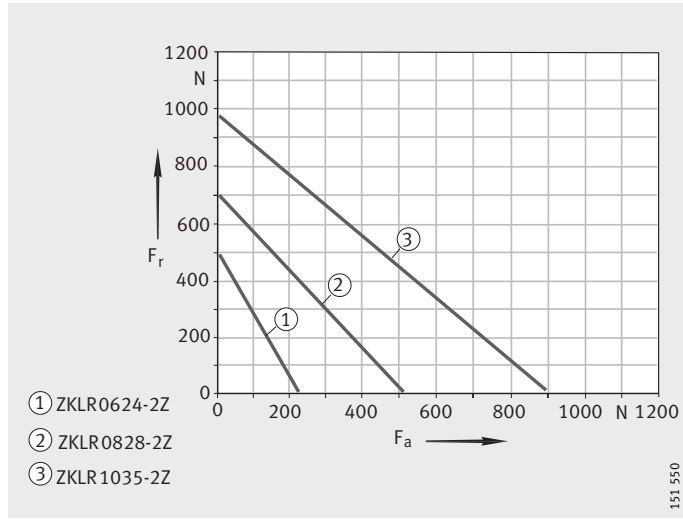
F_{aB} = operating load
$F_{a\,res}$ = resultant bearing load
° = limit value

Figure 19
Resultant bearing load
7603020 to 7603065



F_{aB} = operating load
$F_{a\,res}$ = resultant bearing load
° = limit value

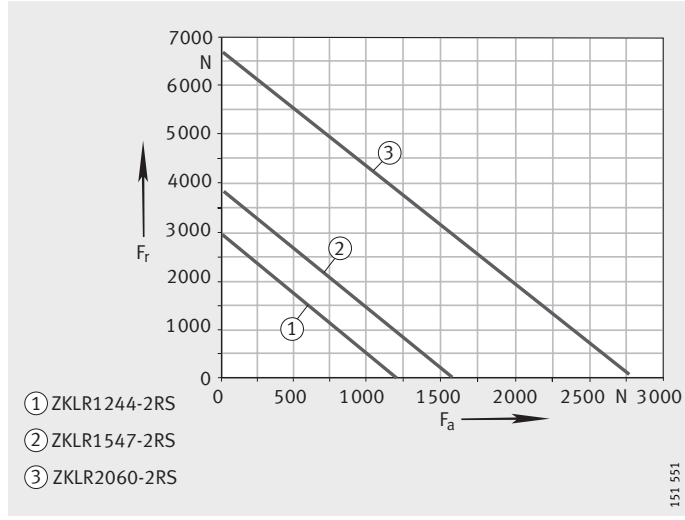
Figure 20
Resultant bearing load
7603070 to 7603100



① ZKLR0624-2Z
② ZKLR0828-2Z
③ ZKLR1035-2Z

F_a = axial load
F_r = radial load

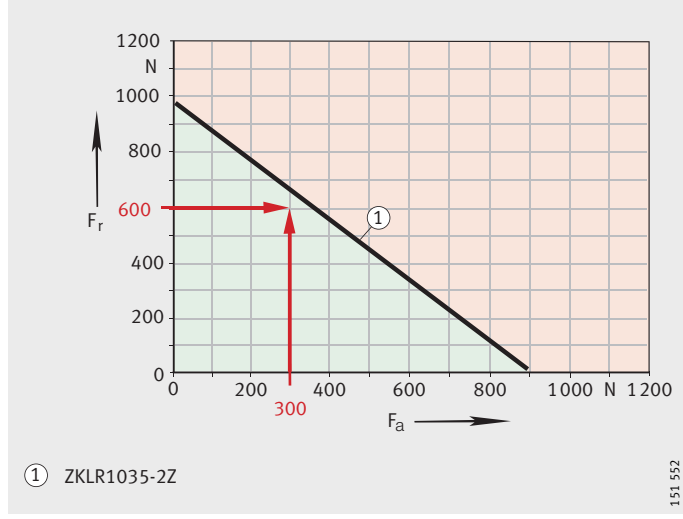
Figure 21
Static limiting load diagrams
ZKLR



① ZKLR1244-2RS
② ZKLR1547-2RS
③ ZKLR2060-2RS

F_a = axial load
F_r = radial load

Figure 22
Static limiting load diagrams
ZKLR



① ZKLR1035-2Z

F_a = 300 N
F_r = 600 N
Bearing is suitable in static terms since the intersection F_a/F_r is below the limit line

Figure 23
Static limiting load diagram –
example ZKLR1035-2Z

Maximum radial load on screw connections for ZKLF

If bearings of series ZKLF are screw mounted on a flat adjacent construction, the maximum radial load that can be supported by the screw connections must be taken into consideration.

If the screws used are as stated in the dimension tables to DIN EN ISO 4 762, the maximum radial load that can be supported before the outer ring moves, in the case of dry components, is restricted to $\approx 0{,}1 \times C_{0a}$. If the outer ring is additionally bonded in place using, for example, Loctite 638, the maximum radial load that can be supported increases to approx. $\approx 0{,}5 \times C_{0a}$.

If the maximum radial loads that can be supported (without any axial load content) are considered in relation to the rolling element set, it can be seen that:

- With a static load safety factor of $S_0 \geqq 4$ as required for machine tools, the load that can be supported by the screw connections of the outer ring is in any case greater than the radial load as restricted by the rolling element set.

This means that (at least in theory) radial loads can be supported that, in relation to the rolling element set, will lead to a static load safety factor of $S_0 \leqq 1$ (incipient plastic deformation of rolling elements), if the outer ring is additionally bonded in place.

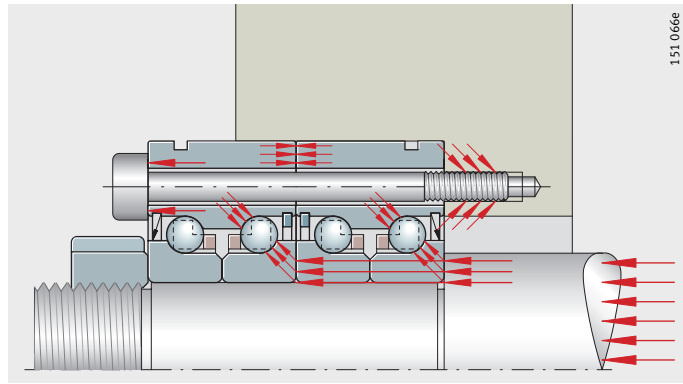
This means that, under normal design criteria and with the decisive static load safety factor for the corresponding areas of application (e.g. $S_0 = 4$ for machine tools), the rolling element set is always the decisive criterion.

Permissible static axial load for ZKLF

For bearings of series ZKLF, the permissible static axial load in the direction of the screw connections, *Figure 24*, is:

$$P_{0\,per} \leqq \frac{C_{0a}}{2}$$

The basic static axial load rating C_{0a} is stated in the dimension tables.



ZKLF

Figure 24
Static axial load in the direction of the screw connections

Design of adjacent construction

The adjacent construction (the shaft and housing) must be designed in accordance with the data in the dimension tables.

The abutment diameters for the shaft and housing shoulders d_a and D_a must be in accordance with the dimension tables.

D_a and d_a are recommended minimum abutment diameters. If these values are not used, the rib diameter d_1 according to the dimension table must be observed.

Matched bearings

In matched bearing pairs of series ZKLN and ZKLF, the depth of the housing bore must be defined such that the outer ring of the outermost bearing is radially supported to at least $^1/_4$ of its width.

Speeds

The limiting speeds n_G given in the dimension tables are based on the following conditions:

- bearing preloaded, no external operating load
- operating duration 25%
- max. equilibrium temperature +50 °C.

Under favourable environmental influences, a bearing with gap seals (suffix 2Z) can be used instead of contact seals. The limiting speed of these bearings is approximately twice that of axial angular contact ball bearings with contact seals.

Friction

In most applications, preloading of bearings by means of the locknut tightening torque gives sufficiently accurate setting values. The reference here is the tightening torque M_A according to the dimension table in conjunction with an INA precision locknut.

The frictional torque M_{RL} given in the dimension tables is a guide value. The frictional torques are based, for bearings of series ZKLN, ZKLF, ZKLFA, DKLFA, 7602..-2RS, 7603..-2RS, BSB..-2RS and ZKLR on grease lubrication, measured at a speed of n = 5 min^{-1}.

For unsealed bearings of series 7602, 7603 and BSB, the frictional torque M_{RL} is based on lightly oiled raceways.

For dimensioning of the drive, the starting frictional torque and the frictional torque at high speeds of 2 to 3×M_{RL} must be taken into consideration.

Seal friction

In axial angular contact ball bearings with contact seals (suffix 2RS), the extent of seal friction must not be neglected. Sealing influences the limiting speeds.

Frictional energy

The frictional energy N_R of the bearings can be calculated as follows:

$$N_R = \frac{M_{RL} \cdot n}{9{,}55}$$

N_R	Frictional energy	W
M_{RL}	Bearing frictional torque	Nm
n	Operating speed.	min^{-1}

In any analysis of the thermal balance, the various operating speeds n_i and their corresponding time portions q_i must be taken into consideration.

Lubrication

Bearings for screw drives can be lubricated with grease or oil. In machine tools, however, the mean bearing temperature should not exceed +50 °C. If this is the case, a lubrication method without heat dissipation such as grease lubrication or oil impulse lubrication can be selected.

For higher bearing temperatures and open bearings, recirculating oil lubrication should be used.

Grease lubrication

Bearings with a relubrication facility of series ZKLN, ZKLF, ZKLFA and DKLFA are greased with a lithium soap grease to GA28 and are preferably run with grease lubrication. In most cases, the initial greasing is sufficient for the whole operating life of the bearing.

Under certain application conditions, relubrication may be necessary. In this case, Arcanol MULTITOP is suitable. The initial greasing is compatible with greases with a mineral oil base.

For checking by calculation of the grease operating life or relubrication interval, please contact us.

Relubrication interval

The relubrication intervals cannot be determined precisely in advance. They are essentially dependent on the operating conditions and the environmental influences such as temperature, contamination, dust, water, etc.

Bearings must always be relubricated:

- before and after long stoppage periods
- in conditions of high humidity
- within the defined lubrication intervals as stated in the technical proposal letter.

For the following conditions, please contact us:

- if the bearings are stationary
- if vibration is present
- if very small oscillating movements occur.

Relubrication quantity

If bearings of series ZKLN, ZKLF, ZKLFA and DKLFA must be relubricated due to the application conditions, please contact us regarding the relubrication quantities.

Oil lubrication

Other lubrication methods such as oil impulse lubrication or recirculating oil lubrication are also possible. For oil lubrication, good results have been obtained with oils CLP to DIN 51 517 and HLP to DIN 51 524 of ISO-VG 32 to ISO-VG 100.

If oil impulse lubrication is intended for series ZKLN and ZKLF, gap seals are advantageous. They prevent contamination entering the bearing and allow oil to leave the bearing. This prevents overlubrication.

Mounting guidelines

Bearings should only be fitted and dismantled in accordance with the Fitting and Maintenance Manual TPI 100. This TPI is available upon request.

During fitting of bearings, mounting forces should be applied only to the bearing ring to be fitted. Mounting forces must never be directed through the rolling elements or sealing rings.

The characteristics of the bearings are only valid when used in combination with INA precision locknuts and the associated tightening torques given in the dimension tables.

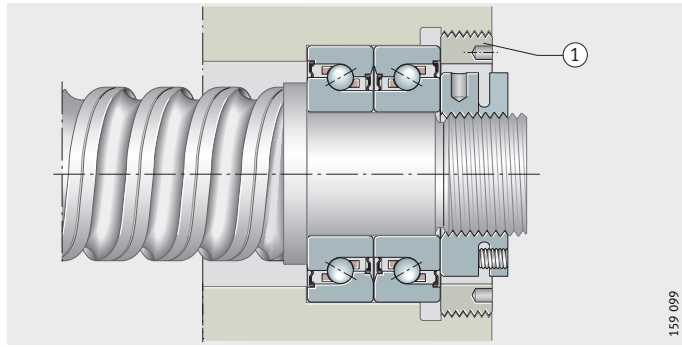
Axial angular contact ball bearings are self-retaining and the individual bearing components are matched to each other. The inner rings must not removed from the bearing during fitting and dismantling. If individual bearing components are removed from the bearing, please contact us before carrying out any reassembly.

Location of outer ring using ring nut for ZKLN, 7602, 7603, BSB

Axial angular contact ball bearings ZKLN, 7602, 7603 and BSB must be located clearance-free in the housing and on the shaft and must be axially preloaded during fitting. The axial preload force must be distributed evenly over the circumference in order to avoid deformation of the raceways.

Outer rings are axially tensioned to the preload force given in the dimension table by means of a ring nut (not supplied), *Figure 25*. Secure the ring nut against loosening (using, for example, Loctite 638).

Ring nuts with a runout of max. 5 µm apply the preload force evenly over the bearing rings and should therefore be used in preference to location by means of a cover.



ZKLN, 7602, 7603, BSB

① Ring nut

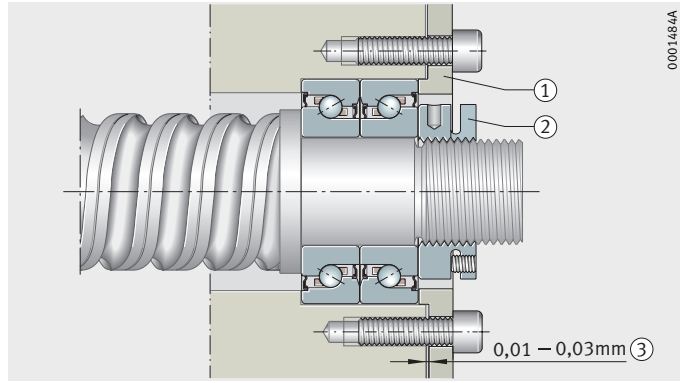
Figure 25
Two-bearing set in O arrangement, locknut, ring nut

Location of outer ring using a cover

Clamping of the outer rings using a cover and cap screws leads to deformation of the raceways, *Figure 26*. In order to minimise the deformation and achieve the calculated life:

- the cover should be designed with adequate rigidity
- the number of fixing screws should be selected in accordance with the load but at least four should be used
- the screws should be tightened in a cross-wise sequence in four stages (finger tight, 40%, 70%, 100% of M_A).

Observe the axial preload force in the dimension table.
If other values are used, this will influence the bearing preload, bearing friction and heat generation in the bearing position.



ZKLN, 7602, 7603, BSB

① Cover
② Locknut
③ Gap before tightening of the cover fixing screws

Figure 26
Two-bearing set in O arrangement, locknut, cover

Location of inner ring using locknut

Axial angular contact ball bearings must be axially preloaded during fitting by means of a precision locknut.

When preloading the bearings by means of the bearing inner rings using the recommended precision locknut, the tightening torques given in the dimension tables must be observed. The tightening torques for the individual bearing sizes are only valid for the INA precision locknuts listed.

The preload force for series DKLFA is determined specifically on the basis of the operating conditions (load spectrum). Please contact us.

In order to counteract settling, it is recommended that the locknut should initially be tightened to twice the tightening torque M_A and then relieved of load again. It should only then be tightened again to the stated tightening torque M_A. Finally, the precision locknut should be secured against rotation by the torque-controlled tightening of the grub screws.

The characteristics of the bearings are only valid if the preload forces specified in the dimension tables are observed. The tightening torques for INA precision locknuts required for this purpose are also given in the dimension tables.

If other suitable locknuts are used, the manufacturer's guidance on calculation of the necessary tightening torque should be observed.

Only locknuts with a minimum runout accuracy of the end face to the thread of 5 µm should be used.

Fixing screws

The fixing screws for the outer ring must be tightened in a crosswise sequence. They may be loaded up to 70% of their proof stress.

If the bearing outer ring is supported by an additional housing cover, it must be ensured that the fixing screws are sufficiently well dimensioned.

Fitting of angular contact ball bearing units

Angular contact ball bearing units ZKLR require no additional preload after fitting. They can often therefore be located on the spindle simply by means of clearance-free clamping.

The type of axial location depends on the load to be supported.

The adjacent construction can be a milled flat face or, if necessary, even an unmachined screw mounting surface without radial centring.

Fitting

Locate the bearing unit using a locknut ① or clearance-free clamping on the threaded spindle ②, *Figure 27*.

Screw mount the bearing unit on the adjacent construction; tighten the screws only finger tight ③.

Move the screw drive nut ④ towards the bearing unit (the position of the screw drive is the datum for the linear guidance system, the nut serves as a functional element for alignment). The bearing will align itself to the optimum radial position (due to the constraining forces exerted by the datum).

Screw the bearing unit to the adjacent construction using the tightening torque specified in the assembly drawing ⑤.

ZKLR

① Locknut
② Threaded spindle
③ Tightening of fixing screws finger tight
④ Screw drive nut
⑤ Tightening of fixing screws

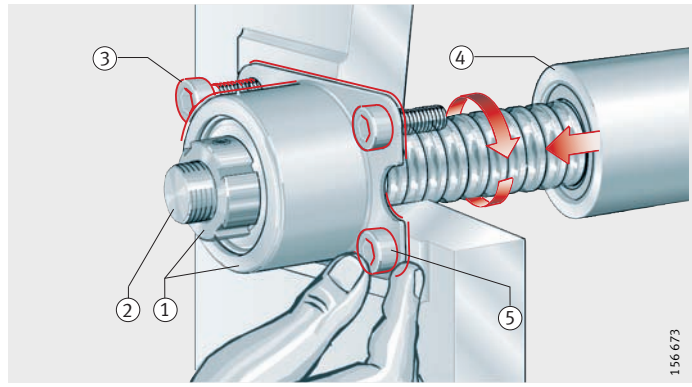
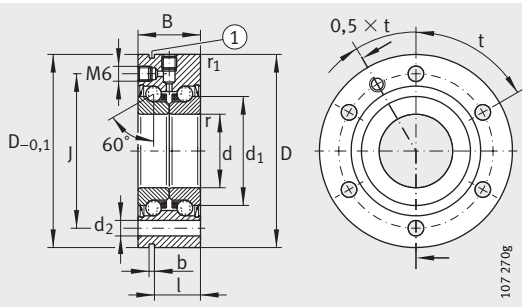


Figure 27
Fitting of bearing unit

Axial angular contact ball bearings

For screw mounting

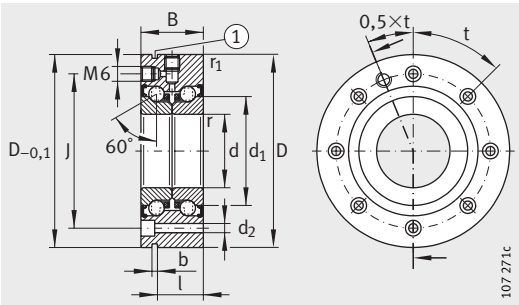


ZKLF..-2RS, ZKLF..-2Z (d ≦ 50 mm)
① Extraction slot

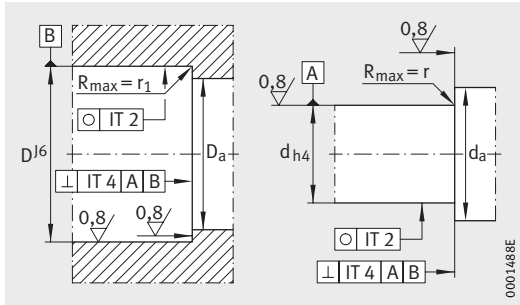
Dimension table · Dimensions in mm

Designation	Mass	Dimensions										Mounting dimensions		Fixing screws[1] DIN 912-10.9	
	m	d	D	B	d_1	r	r_1	J	d_2	b	l	D_a	d_a		
	≈kg			–0,25		min.	min.					max.	min.	Size	Quantity
ZKLF1255-2RS	0,37	**12**$_{-0,005}$	55$_{-0,01}$	25	25	0,3	0,6	42	6,8	3	17	33	16	M6	3
ZKLF1255-2Z	0,37	**12**$_{-0,005}$	55$_{-0,01}$	25	25	0,3	0,6	42	6,8	3	17	33	16	M6	3
ZKLF1560-2RS	0,43	**15**$_{-0,005}$	60$_{-0,01}$	25	28	0,3	0,6	46	6,8	3	17	35	20	M6	3
ZKLF1560-2Z	0,43	**15**$_{-0,005}$	60$_{-0,01}$	25	28	0,3	0,6	46	6,8	3	17	35	20	M6	3
ZKLF1762-2RS	0,45	**17**$_{-0,005}$	62$_{-0,01}$	25	30	0,3	0,6	48	6,8	3	17	37	23	M6	3
ZKLF1762-2Z	0,45	**17**$_{-0,005}$	62$_{-0,01}$	25	30	0,3	0,6	48	6,8	3	17	37	23	M6	3
ZKLF2068-2RS	0,61	**20**$_{-0,005}$	68$_{-0,01}$	28	34,5	0,3	0,6	53	6,8	3	19	43	25	M6	4
ZKLF2068-2Z	0,61	**20**$_{-0,005}$	68$_{-0,01}$	28	34,5	0,3	0,6	53	6,8	3	19	43	25	M6	4
ZKLF2575-2RS	0,72	**25**$_{-0,005}$	75$_{-0,01}$	28	40,5	0,3	0,6	58	6,8	3	19	48	32	M6	4
ZKLF2575-2Z	0,72	**25**$_{-0,005}$	75$_{-0,01}$	28	40,5	0,3	0,6	58	6,8	3	19	48	32	M6	4
ZKLF3080-2RS	0,78	**30**$_{-0,005}$	80$_{-0,01}$	28	45,5	0,3	0,6	63	6,8	3	19	53	40	M6	6
ZKLF3080-2Z	0,78	**30**$_{-0,005}$	80$_{-0,01}$	28	45,5	0,3	0,6	63	6,8	3	19	53	40	M6	6
ZKLF30100-2RS[3]	1,63	**30**$_{-0,005}$	100$_{-0,01}$	38	51	0,3	0,6	80	8,8	3	30	64	47	M8	8
ZKLF30100-2Z	1,63	**30**$_{-0,005}$	100$_{-0,01}$	38	51	0,3	0,6	80	8,8	3	30	64	47	M8	8
ZKLF3590-2RS	1,13	**35**$_{-0,005}$	90$_{-0,01}$	34	52	0,3	0,6	75	8,8	3	25	62	45	M8	4
ZKLF3590-2Z	1,13	**35**$_{-0,005}$	90$_{-0,01}$	34	52	0,3	0,6	75	8,8	3	25	62	45	M8	4
ZKLF40100-2RS	1,46	**40**$_{-0,005}$	100$_{-0,01}$	34	58	0,3	0,6	80	8,8	3	25	67	50	M8	4
ZKLF40100-2Z	1,46	**40**$_{-0,005}$	100$_{-0,01}$	34	58	0,3	0,6	80	8,8	3	25	67	50	M8	4
ZKLF40115-2RS[3]	2,2	**40**$_{-0,005}$	115$_{-0,01}$	46	65	0,6	0,6	94	8,8	3	36	80	56	M8	12
ZKLF40115-2Z[3]	2,2	**40**$_{-0,005}$	115$_{-0,01}$	46	65	0,6	0,6	94	8,8	3	36	80	56	M8	12
ZKLF50115-2RS	1,86	**50**$_{-0,005}$	115$_{-0,01}$	34	72	0,3	0,6	94	8,8	3	25	82	63	M8	6
ZKLF50115-2Z	1,86	**50**$_{-0,005}$	115$_{-0,01}$	34	72	0,3	0,6	94	8,8	3	25	82	63	M8	6
ZKLF50140-2RS[3]	4,7	**50**$_{-0,005}$	140$_{-0,01}$	54	80	0,6	0,6	113	11	3	45	98	63	M10	12
ZKLF50140-2Z[3]	4,7	**50**$_{-0,005}$	140$_{-0,01}$	54	80	0,6	0,6	113	11	3	45	98	63	M10	12
ZKLF60145-2Z	4,3	**60**$_{-0,008}$	145$_{-0,015}$	45	85	0,6	0,6	120	8,8	3	35	100	82	M8	8
ZKLF70155-2Z	4,9	**70**$_{-0,008}$	155$_{-0,015}$	45	85	0,6	0,6	130	8,8	3	35	110	92	M8	8
ZKLF80165-2Z	5,3	**80**$_{-0,008}$	165$_{-0,015}$	45	105	0,6	0,6	140	8,8	3	35	120	102	M8	8
ZKLF90190-2Z	8,7	**90**$_{-0,008}$	190$_{-0,015}$	55	120	0,6	0,6	165	11	3	45	138	116	M10	8
ZKLF100200-2Z	9,3	**100**$_{-0,008}$	200$_{-0,015}$	55	132	0,6	0,6	175	11	3	45	150	128	M10	8

1) Tightening torque of fixing screws according to manufacturer's data. Screws are not included in delivery.
2) Mass moment of inertia for rotating inner ring.
3) Heavy series.
4) Only valid in conjunction with INA precision locknuts.
5) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



ZKLF..-2Z, (60 mm ≦ d ≦ 100 mm)
① Extraction slot

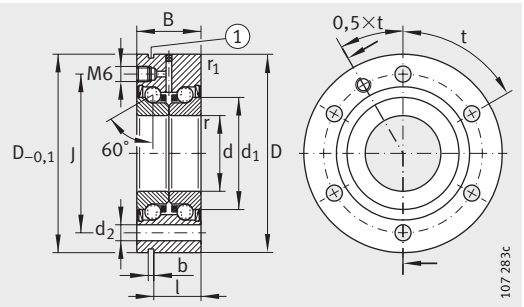


Design of adjacent construction

Pitch	Basic load ratings axial		Limiting speed	Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia[2]	Axial run-out[5]	Recommended INA locknut; to be ordered separately			
t	dyn. C_a	stat. C_{0a}	n_G grease	M_{RL}	c_{aL}	c_{kL}	M_m		Designation		Tightening torque[4]	Axial preload force
Quantity Xt	N	N	min^{-1}	Nm	N/µm	Nm/mrad	kg · cm^2	µm			M_A Nm	N
3X120°	16900	24700	3800	0,16	375	50	0,068	2	**ZM12**	–	8	5038
3X120°	16900	24700	7600	0,08	375	50	0,068	2	**ZM12**	–	8	5038
3X120°	17900	28000	3500	0,2	400	65	0,102	2	**ZM15**	**AM15**	10	5484
3X120°	17900	28000	7000	0,1	400	65	0,102	2	**ZM15**	**AM15**	10	5484
3X120°	18800	31000	3300	0,24	450	80	0,132	2	**ZM17**	**AM17**	15	7157
3X120°	18800	31000	6600	0,12	450	80	0,132	2	**ZM17**	**AM17**	15	7157
4X 90°	26000	47000	3000	0,3	650	140	0,273	2	**ZM20**	**AM20**	18	9079
4X 90°	26000	47000	5400	0,15	650	140	0,273	2	**ZM20**	**AM20**	18	9079
4X 90°	27500	55000	2600	0,4	750	200	0,486	2	**ZM25**	**AM25**	25	9410
4X 90°	27500	55000	4700	0,2	750	200	0,486	2	**ZM25**	**AM25**	25	9410
6X 60°	29000	64000	2200	0,5	850	300	0,73	2,5	**ZM30**	**AM30**	32	10451
6X 60°	29000	64000	4300	0,25	850	300	0,73	2,5	**ZM30**	**AM30**	32	10451
8X 45°	59000	108000	2100	0,8	950	400	1,91	2,5	**ZMA30/52**	**AM30**	65	19509
8X 45°	59000	108000	4000	0,4	950	400	1,91	2,5	**ZMA30/52**	**AM30**	65	19509
4X 90°	41000	89000	2000	0,6	900	400	1,51	2,5	**ZM35**	**AM35/58**	40	10770
4X 90°	41000	89000	3800	0,3	900	400	1,51	2,5	**ZM35**	**AM35/58**	40	10770
4X 90°	43000	101000	1800	0,7	1000	550	2,26	2,5	**ZM40**	**AM40**	55	13412
4X 90°	43000	101000	3300	0,35	1000	550	2,26	2,5	**ZM40**	**AM40**	55	13412
12X 30°	72000	149000	1600	1,3	1200	750	5,5	2,5	**ZMA40/62**	**AM40**	110	25185
12X 30°	72000	149000	3100	0,65	1200	750	5,5	2,5	**ZMA40/62**	**AM40**	110	25815
6X 60°	46500	126000	1500	0,9	1250	1000	5,24	2,5	**ZM50**	**AM50**	85	17009
6X 60°	46500	126000	3000	0,45	1250	1000	5,24	2,5	**ZM50**	**AM50**	85	17009
12X 30°	113000	250000	1200	2,6	1400	1500	15,2	2,5	**ZMA50/75**	**AM50**	150	29436
12X 30°	113000	250000	2500	1,3	1400	1500	15,2	2,5	**ZMA50/75**	**AM50**	150	29436
8X 45°	84000	214000	3000	1	1300	1650	13,7	3	**ZMA60/98**	**AM60**	100	17893
8X 45°	88000	241000	2800	1,2	1450	2250	19,8	3	**ZMA70/110**	**AM70**	130	19717
8X 45°	91000	265000	2700	1,4	1600	3000	27,6	3	**ZMA80/120**	**AM80**	160	20604
8X 45°	135000	395000	2300	2,3	1700	4400	59,9	3	**ZMA90/130**	**AM90**	200	25198
8X 45°	140000	435000	2150	2,6	1900	5800	85,3	3	**ZMA100/140**	**AM100**	250	28760

Axial angular contact ball bearings

For screw mounting
Less stringent tolerances



ZKLF..-2RS-PE
① Extraction slot

Dimension table · Dimensions in mm

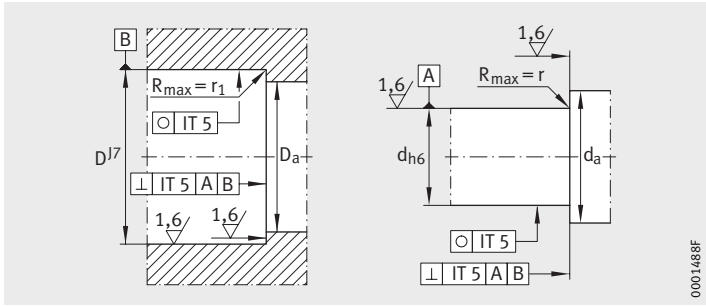
Designation	Mass	Dimensions										Mounting dimensions		Fixing screws[1] DIN 912-10.9	
	m	d	D	B	d_1	r	r_1	J	d_2	b	l	D_a	d_a	Size	Quantity
	≈kg	–0,01		–0,25		min.	min.					max.	min.		
ZKLF1255-2RS-PE	0,37	**12**	$55_{-0,013}$	25	25	0,3	0,6	42	6,8	3	17	33	16	M6	3
ZKLF1560-2RS-PE	0,43	**15**	$60_{-0,013}$	25	28	0,3	0,6	46	6,8	3	17	35	20	M6	3
ZKLF1762-2RS-PE	0,45	**17**	$62_{-0,013}$	25	30	0,3	0,6	48	6,8	3	17	37	23	M6	3
ZKLF2068-2RS-PE	0,61	**20**	$68_{-0,013}$	28	34,5	0,3	0,6	53	6,8	3	19	43	25	M6	4
ZKLF2575-2RS-PE	0,72	**25**	$75_{-0,013}$	28	40,5	0,3	0,6	58	6,8	3	19	48	32	M6	4
ZKLF3080-2RS-PE	0,78	**30**	$80_{-0,013}$	28	45,5	0,3	0,6	63	6,8	3	19	53	40	M6	6
ZKLF3590-2RS-PE	1,13	**35**	$90_{-0,015}$	34	52	0,3	0,6	75	8,8	3	25	62	45	M8	4
ZKLF40100-2RS-PE	1,46	**40**	$100_{-0,015}$	34	58	0,3	0,6	80	8,8	3	25	67	50	M8	4
ZKLF50115-2RS-PE	1,86	**50**	$115_{-0,015}$	34	72	0,3	0,6	94	8,8	3	25	82	63	M8	6

1) Tightening torque of fixing screws according to manufacturer's data.
Screws are not included in the delivery.

2) Mass moment of inertia for rotating inner ring.

3) Only valid in conjunction with INA precision locknuts.

4) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.

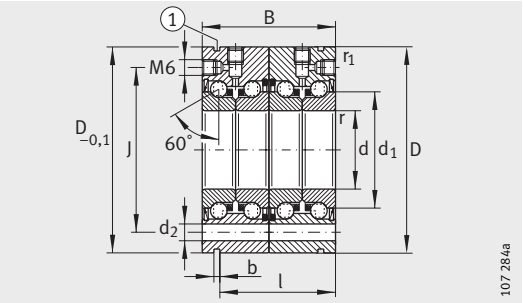


Design of adjacent construction

Pitch	Basic load ratings axial		Limiting speed	Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia[2]	Axial runout[4]	Recommended INA locknut; to be ordered separately		
t	dyn. C_a	stat. C_{0a}	n_G grease	M_{RL}	c_{aL}	c_{kL}	M_m		Designation	Tightening torque[3] M_A	Axial preload force
Quantity X t	N	N	min^{-1}	Nm	N/µm	Nm/mrad	kg · cm^2	µm		Nm	N
3X120°	16 900	24 700	3 800	0,16	375	50	0,068	5	**ZM12** –	8	5 038
3X120°	17 900	28 000	3 500	0,2	400	65	0,102	5	**ZM15 AM15**	10	5 484
3X120°	18 800	31 000	3 300	0,24	450	80	0,132	5	**ZM17 AM17**	15	7 157
4X 90°	26 000	47 000	3 000	0,3	650	140	0,273	5	**ZM20 AM20**	18	9 079
4X 90°	27 500	55 000	2 600	0,4	750	200	0,486	5	**ZM25 AM25**	25	9 410
6X 60°	29 000	64 000	2 200	0,5	850	300	0,73	5	**ZM30 AM30**	32	10 451
4X 90°	41 000	89 000	2 000	0,6	900	400	1,51	5	**ZM35 AM35/58**	40	10 770
4X 90°	43 000	101 000	1 800	0,7	1 000	550	2,26	5	**ZM40 AM40**	55	13 412
6X 60°	46 500	126 000	1 500	0,9	1 250	1 000	5,24	5	**ZM50 AM50**	85	17 009

Axial angular contact ball bearings

For screw mounting
Matched pair



ZKLF..-2RS-2AP
① Extraction slot

Dimension table · Dimensions in mm

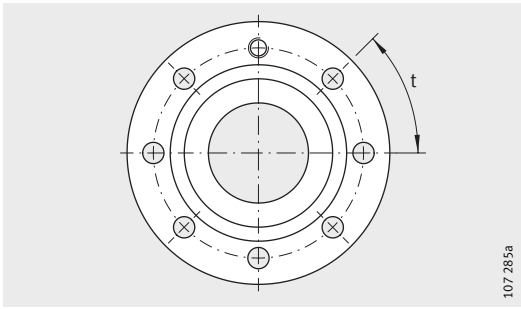
Designation	Mass	Dimensions										Mounting dimensions		Fixing screws[1] DIN 912-10.9	
	m	d	D	B	d_1	r	r_1	J	d_2	l	b	D_a	d_a	Size	Quantity
	≈kg	−0,005	−0,010	−0,50		min.	min.					max.	min.		
ZKLF1762-2RS-2AP	0,9	**17**	62	50	30	0,3	0,6	48	6,8	42	3	37	23	M6X60	5
ZKLF2068-2RS-2AP	1,22	**20**	68	56	34,5	0,3	0,6	53	6,8	47	3	43	25	M6X70	7
ZKLF2575-2RS-2AP	1,44	**25**	75	56	40,5	0,3	0,6	58	6,8	47	3	48	32	M6X70	7
ZKLF3080-2RS-2AP	1,56	**30**	80	56	45,5	0,3	0,6	63	6,8	47	3	53	40	M6X70	11
ZKLF3590-2RS-2AP	2,26	**35**	90	68	52	0,3	0,6	75	8,8	59	3	62	45	M8X80	7
ZKLF40100-2RS-2AP	2,92	**40**	100	68	58	0,3	0,6	80	8,8	59	3	67	50	M8X80	7
ZKLF50115-2RS-2AP	3,72	**50**	115	68	72	0,3	0,6	94	8,8	59	3	82	63	M8X80	11

1) Tightening torque of fixing screws according to manufacturer's data.
Screws are not included in the delivery.

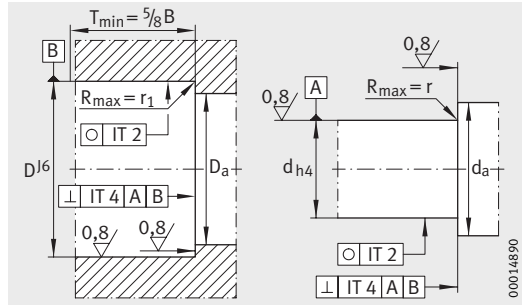
2) Mass moment of inertia for rotating inner ring.

3) Only valid in conjunction with INA precision locknuts.

4) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



Hole pattern

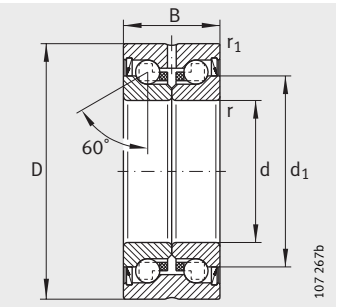


Design of adjacent construction

Pitch	Basic load ratings axial		Limiting speed	Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia[2]	Axial run-out[4]	Recommended INA locknut; to be ordered separately			
t	dyn. C_a	stat. C_{0a}	n_G grease	M_{RL}	c_{aL}	c_{kL}	M_m		Designation		Tightening torque[3]	Axial preload force
Quantity Xt	N	N	min^{-1}	Nm	N/µm	Nm/mrad	kg · cm^2	µm			M_A Nm	N
6X60°	30 500	62 000	3 300	0,36	800	200	0,264	2	**ZM17**	**AM17**	15	7 157
8X45°	42 000	94 000	3 000	0,45	1 150	320	0,564	2	**ZMA20/38**	**AM20**	18	9 079
8X45°	44 500	111 000	2 600	0,6	1 300	450	0,972	2	**ZMA25/45**	**AM25**	25	9 410
12X30°	47 500	127 000	2 200	0,75	1 500	620	1,46	2,5	**ZMA30/52**	**AM30**	32	10 451
8X45°	66 000	177 000	2 000	0,9	1 600	900	3,02	2,5	**ZMA35/58**	**AM35/58**	40	10 770
8X45°	70 000	202 000	1 800	1,05	1 750	1 200	4,52	2,5	**ZMA40/62**	**AM40**	55	13 412
12X30°	76 000	250 000	1 500	1,35	2 200	2 250	10,48	2,5	**ZMA50/75**	**AM50**	85	17 009

Axial angular contact ball bearings

Not for screw mounting



ZKLN..-2RS
ZKLN..-2Z

Dimension table · Dimensions in mm

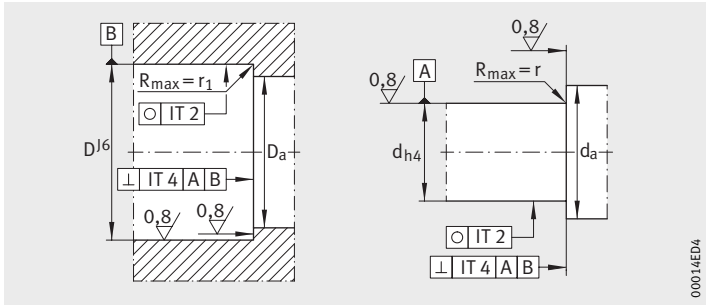
Designation	Mass	Dimensions						Mounting dimensions		Basic load ratings axial	
	m	d	D	B	d_1	r	r_1	D_a	d_a	dyn. C_a	stat. C_{0a}
	≈kg	–0,005	–0,010	–0,25		min.	min.	max.	min.	N	N
ZKLN0619-2Z	0,02	$6^{+0,002}_{-0,003}$	19	12	12	0,3	0,3	16	9	4 900	6 100
ZKLN0624-2RS	0,03	$6^{+0,002}_{-0,003}$	24	15	14	0,3	0,6	19	9	6 900	8 500
ZKLN0624-2Z	0,03	$6^{+0,002}_{-0,003}$	24	15	14	0,3	0,6	19	9	6 900	8 500
ZKLN0832-2RS	0,09	**8**	32	20	19	0,3	0,6	26	11	12 500	16 300
ZKLN0832-2Z	0,09	**8**	32	20	19	0,3	0,6	26	11	12 500	16 300
ZKLN1034-2RS	0,1	**10**	34	20	21	0,3	0,6	28	14	13 400	18 800
ZKLN1034-2Z	0,1	**10**	34	20	21	0,3	0,6	28	14	13 400	18 800
ZKLN1242-2RS	0,2	**12**	42	25	25	0,3	0,6	33	16	16 900	24 700
ZKLN1242-2Z	0,2	**12**	42	25	25	0,3	0,6	33	16	16 900	24 700
ZKLN1545-2RS	0,21	**15**	45	25	28	0,3	0,6	35	20	17 900	28 000
ZKLN1545-2Z	0,21	**15**	45	25	28	0,3	0,6	35	20	17 900	28 000
ZKLN1747-2RS	0,22	**17**	47	25	30	0,3	0,6	37	23	18 800	31 000
ZKLN1747-2Z	0,22	**17**	47	25	30	0,3	0,6	37	23	18 800	31 000
ZKLN2052-2RS	0,31	**20**	52	28	34,5	0,3	0,6	43	25	26 000	47 000
ZKLN2052-2Z	0,31	**20**	52	28	34,5	0,3	0,6	43	26	26 000	47 000
ZKLN2557-2RS	0,34	**25**	57	28	40,5	0,3	0,6	48	32	27 500	55 000
ZKLN2557-2Z	0,34	**25**	57	28	40,5	0,3	0,6	48	32	27 500	55 000
ZKLN3062-2RS	0,39	**30**	62	28	45,5	0,3	0,6	53	40	29 000	64 000
ZKLN3062-2Z	0,39	**30**	62	28	45,5	0,3	0,6	53	40	29 000	64 000
ZKLN3072-2RS[2)]	0,72	**30**	72	38	51	0,3	0,6	64	47	59 000	108 000
ZKLN3072-2Z[2)]	0,72	**30**	72	38	51	0,3	0,6	64	47	59 000	108 000
ZKLN3572-2RS	0,51	**35**	72	34	52	0,3	0,6	62	45	41 000	89 000
ZKLN3572-2Z	0,51	**35**	72	34	52	0,3	0,6	62	45	41 000	89 000

1) Mass moment of inertia for rotating inner ring.

2) Heavy series.

3) Only valid in conjunction with INA precision locknuts.

4) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.

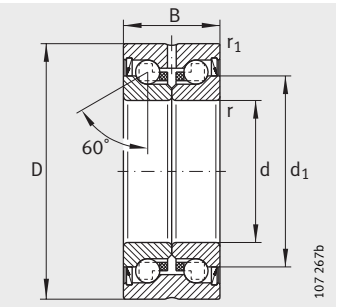


Design of adjacent construction

Limiting speed	Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia[1]	Axial runout[4]	Recommended INA locknut; to be ordered separately			
						Designation		Tightening torque[3]	Axial preload force
n_G grease	M_{RL}	c_{aL}	c_{kL}	M_m				M_A	
min^{-1}	Nm	N/µm	Nm/mrad	kg · cm^2	µm			Nm	N
14 000	0,01	150	4	0,0019	2	**ZM06**	–	1	916
6 800	0,04	200	8	0,0044	2	**ZM06**	–	2	2 404
12 000	0,02	200	8	0,0044	2	**ZM06**	–	2	2 404
5 100	0,08	250	20	0,02	2	**ZM08**	–	4	2 216
9 500	0,04	250	20	0,02	2	**ZM08**	–	4	2 216
4 600	0,12	325	25	0,029	2	**ZM10**	–	6	4 891
8 600	0,06	325	25	0,029	2	**ZM10**	–	6	4 891
3 800	0,16	375	50	0,068	2	**ZM12**	–	8	5 038
7 600	0,08	375	50	0,068	2	**ZM12**	–	8	5 038
3 500	0,2	400	65	0,102	2	**ZM15**	**AM15**	10	5 484
7 000	0,1	400	65	0,102	2	**ZM15**	**AM15**	10	5 484
3 300	0,24	450	80	0,132	2	**ZM17**	**AM17**	15	7 157
6 600	0,12	450	80	0,132	2	**ZM17**	**AM17**	15	7 157
3 000	0,3	650	140	0,273	2	**ZM20**	**AM20**	18	9 079
5 400	0,15	650	140	0,273	2	**ZM20**	**AM20**	18	9 079
2 600	0,4	750	200	0,486	2	**ZM25**	**AM25**	25	9 410
4 700	0,2	750	200	0,486	2	**ZM25**	**AM25**	25	9 410
2 200	0,5	850	300	0,73	2,5	**ZM30**	**AM30**	32	10 451
4 300	0,25	850	300	0,73	2,5	**ZM30**	**AM30**	32	10 451
2 100	0,8	950	400	1,91	2,5	**ZMA30/52**	**AM30**	65	19 509
4 000	0,4	950	400	1,91	2,5	**ZMA30/52**	**AM30**	65	19 509
2 000	0,6	900	400	1,51	2,5	**ZM35**	**AM35/58**	40	10 770
3 800	0,3	900	400	1,51	2,5	**ZM35**	**AM35/58**	40	10 770

Axial angular contact ball bearings

Not for screw mounting



ZKLN..-2RS
ZKLN..-2Z

Dimension table (continued) · Dimensions in mm

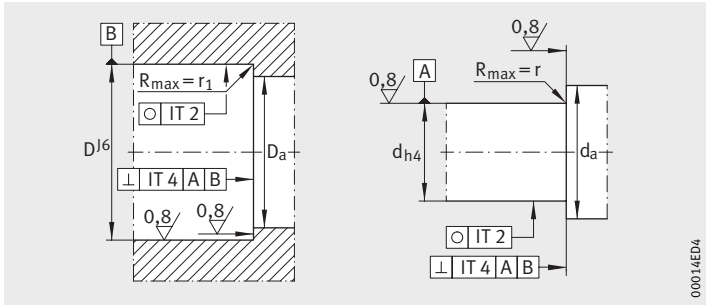
Designation	Mass	Dimensions						Mounting dimensions		Basic load ratings axial	
	m	d	D	B	d_1	r	r_1	D_a	d_a	dyn. C_a	stat. C_{0a}
	≈kg			–0,25		min.	min.	max.	min.	N	N
ZKLN4075-2RS	0,61	**40**$_{-0,005}$	75$_{-0,01}$	34	58	0,3	0,6	67	50	43 000	101 000
ZKLN4075-2Z	0,61	**40**$_{-0,005}$	75$_{-0,01}$	34	58	0,3	0,6	67	50	43 000	101 000
ZKLN4090-2RS[2]	0,95	**40**$_{-0,005}$	90$_{-0,01}$	46	65	0,6	0,6	80	56	72 000	149 000
ZKLN4090-2Z[2]	0,95	**40**$_{-0,005}$	90$_{-0,01}$	46	65	0,6	0,6	80	56	72 000	149 000
ZKLN5090-2RS	0,88	**50**$_{-0,005}$	90$_{-0,01}$	34	72	0,3	0,6	82	63	46 500	126 000
ZKLN5090-2Z	0,88	**50**$_{-0,005}$	90$_{-0,01}$	34	72	0,3	0,6	82	63	46 500	126 000
ZKLN50110-2RS[2]	2,5	**50**$_{-0,005}$	110$_{-0,01}$	54	80	0,6	0,6	98	63	113 000	250 000
ZKLN50110-2Z[2]	2,5	**50**$_{-0,005}$	110$_{-0,01}$	54	80	0,6	0,6	98	63	113 000	250 000
ZKLN60110-2Z	2,2	**60**$_{-0,008}$	110$_{-0,015}$	45	85	0,6	0,6	100	82	84 000	214 000
ZKLN70120-2Z	2,4	**70**$_{-0,008}$	120$_{-0,015}$	45	95	0,6	0,6	110	92	88 000	241 000
ZKLN80130-2Z	2,7	**80**$_{-0,008}$	130$_{-0,015}$	45	105	0,6	0,6	120	102	91 000	265 000
ZKLN90150-2Z	4,5	**90**$_{-0,008}$	150$_{-0,015}$	55	120	0,6	0,6	138	116	135 000	395 000
ZKLN100160-2Z	4,9	**100**$_{-0,008}$	160$_{-0,015}$	55	132	0,6	0,6	150	128	140 000	435 000

1) Mass moment of inertia for rotating inner ring.

2) Heavy series.

3) Only valid in conjunction with INA precision locknuts.

4) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.

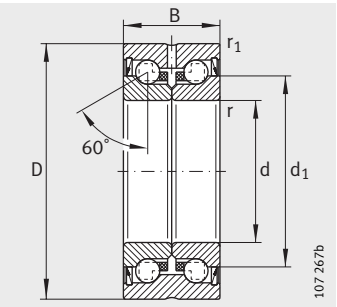


Design of adjacent construction

Limiting speed	Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia[1]	Axial runout[4]	Recommended INA locknut; to be ordered separately			
						Designation		Tightening torque[3]	Axial preload force
n_G grease	M_{RL}	c_{aL}	c_{kL}	M_m				M_A	
min^{-1}	Nm	N/µm	Nm/mrad	kg · cm^2	µm			Nm	N
1 800	0,7	1 000	550	2,26	2,5	**ZM40**	**AM40**	55	13 412
3 300	0,35	1 000	550	2,26	2,5	**ZM40**	**AM40**	55	13 412
1 600	1,3	1 200	750	5,5	2,5	**ZMA40/62**	**AM40**	110	25 185
3 100	0,65	1 200	750	5,5	2,5	**ZMA40/62**	**AM40**	110	25 185
1 500	0,9	1 250	1 000	5,24	2,5	**ZM50**	**AM50**	85	17 009
3 000	0,45	1 250	1 000	5,24	2,5	**ZM50**	**AM50**	85	17 009
1 200	2,6	1 400	1 500	15,2	2,5	**ZMA50/75**	**AM50**	150	29 436
2 500	1,3	1 400	1 500	15,2	2,5	**ZMA50/75**	**AM50**	150	29 436
3 000	1	1 300	1 650	13,7	3	**ZMA60/98**	**AM60**	100	17 893
2 800	1,2	1 450	2 250	19,8	3	**ZMA70/110**	**AM70**	130	19 171
2 700	1,4	1 600	3 000	27,6	3	**ZMA80/120**	**AM80**	160	20 604
2 300	2,3	1 700	4 400	59,9	3	**ZMA90/130**	**AM90**	200	25 198
2 150	2,6	1 900	5 800	85,3	3	**ZMA100/140**	**AM100**	250	28 760

Axial angular contact ball bearings

Not for screw mounting
Less stringent tolerances



ZKLN..-2RS-PE

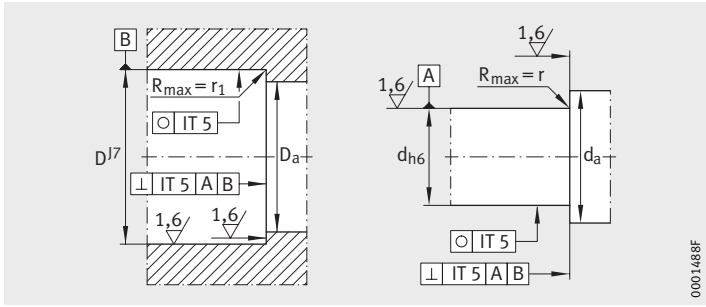
Dimension table · Dimensions in mm

Designation	Mass	Dimensions						Mounting dimensions		Basic load ratings axial	
	m	d	D	B	d_1	r	r_1	D_a	d_a	dyn. C_a	stat. C_{0a}
	≈kg			–0,25		min.	min.	max.	min.	N	N
ZKLN0624-2RS-PE	0,03	**6** $^{+0,003}_{-0,005}$	$24_{-0,01}$	15	14	0,3	0,6	19	9	6 900	8 500
ZKLN1034-2RS-PE	0,1	**10**$_{-0,008}$	$34_{-0,011}$	20	21	0,3	0,6	28	14	13 400	18 800
ZKLN1242-2RS-PE	0,2	**12**$_{-0,01}$	$42_{-0,011}$	25	25	0,3	0,6	33	16	16 900	24 700
ZKLN1545-2RS-PE	0,21	**15**$_{-0,01}$	$45_{-0,011}$	25	28	0,3	0,6	35	20	17 900	28 000
ZKLN1747-2RS-PE	0,22	**17**$_{-0,01}$	$47_{-0,011}$	25	30	0,3	0,6	37	23	18 800	31 000
ZKLN2052-2RS-PE	0,31	**20**$_{-0,01}$	$52_{-0,013}$	28	34,5	0,3	0,6	43	25	26 000	47 000
ZKLN2557-2RS-PE	0,34	**25**$_{-0,01}$	$57_{-0,013}$	28	40,5	0,3	0,6	48	32	27 500	55 000
ZKLN3062-2RS-PE	0,39	**30**$_{-0,01}$	$62_{-0,013}$	28	45,5	0,3	0,6	53	40	29 000	64 000
ZKLN3572-2RS-PE	0,51	**35**$_{-0,01}$	$72_{-0,013}$	34	52	0,3	0,6	62	45	41 000	89 000
ZKLN5090-2RS-PE	0,88	**50**$_{-0,01}$	$90_{-0,015}$	34	72	0,3	0,6	82	63	46 500	126 000

1) Mass moment of inertia for rotating inner ring.

2) Only valid in conjunction with INA precision locknuts.

3) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.

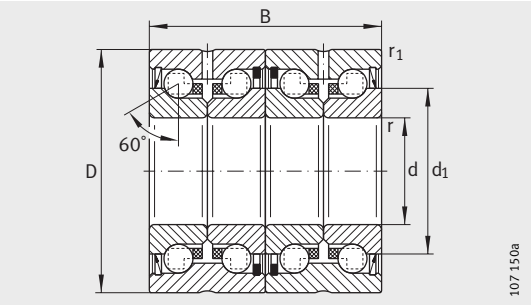


Design of adjacent construction

Limiting speed	Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia[1]	Axial runout[3]	Recommended INA locknut; to be ordered separately			
						Designation		Tightening torque[2]	Axial preload force
n_G grease	M_{RL}	c_{aL}	c_{kL}	M_m				M_A	
min^{-1}	Nm	N/µm	Nm/mrad	$kg \cdot cm^2$	µm			Nm	N
6 800	0,04	200	8	0,0044	5	**ZM06**	–	2	2 404
4 600	0,12	325	25	0,029	5	**ZM10**	–	6	4 891
3 800	0,16	375	50	0,068	5	**ZM12**	–	8	5 038
3 500	0,2	400	65	0,102	5	**ZM15**	**AM15**	10	5 484
3 300	0,24	450	80	0,132	5	**ZM17**	**AM17**	15	7 157
3 000	0,3	650	140	0,273	5	**ZM20**	**AM20**	18	9 079
2 600	0,4	750	200	0,486	5	**ZM25**	**AM25**	25	9 410
2 200	0,5	850	300	0,73	5	**ZM30**	**AM30**	32	10 451
2 000	0,6	900	400	1,51	5	**ZM35**	**AM35/38**	40	10 770
1 500	0,9	1 250	1 000	5,24	5	**ZM50**	**AM50**	85	17 009

Axial angular contact ball bearings

Not for screw mounting
Matched pair



ZKLN..-2RS-2AP

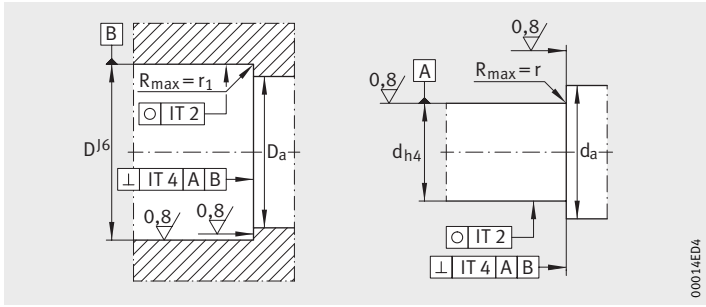
Dimension table · Dimensions in mm

Designation	Mass	Dimensions						Mounting dimensions		Basic load ratings axial	
	m	d	D	B	d_1	r	r_1	D_a	d_a	dyn. C_a	stat. C_{0a}
	≈kg	–0,005	–0,01	–0,5		min.	min.	max.	min.	N	N
ZKLN1747-2RS-2AP	0,44	**17**	47	50	30	0,3	0,6	37	23	30 500	62 000
ZKLN2052-2RS-2AP	0,62	**20**	52	56	34,5	0,3	0,6	43	25	42 000	94 000
ZKLN2557-2RS-2AP	0,68	**25**	57	56	40,5	0,3	0,6	48	32	44 500	111 000
ZKLN3062-2RS-2AP	0,78	**30**	62	56	45,5	0,3	0,6	53	40	47 500	127 000
ZKLN3572-2RS-2AP	1,02	**35**	72	68	52	0,3	0,6	62	45	66 000	177 000
ZKLN4075-2RS-2AP	1,22	**40**	75	68	58	0,3	0,6	67	50	70 000	202 000
ZKLN5090-2RS-2AP	1,76	**50**	90	68	72	0,3	0,6	82	63	76 000	250 000

1) Mass moment of inertia for rotating inner ring.

2) Only valid in conjunction with INA precision locknuts.

3) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.

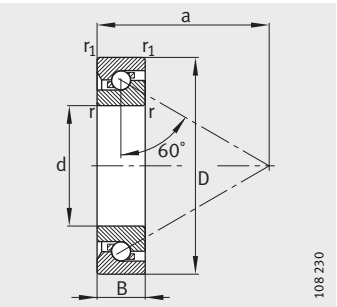


Design of adjacent construction

Limiting speed	Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia[1]	Axial runout[3]	Recommended INA locknut; to be ordered separately			
						Designation		Tightening torque[2]	Axial preload force
n_G grease	M_{RL}	c_{aL}	c_{kL}	M_m				M_A	
min^{-1}	Nm	N/µm	Nm/mrad	$kg \cdot cm^2$	µm			Nm	N
3 300	0,36	800	200	0,264	2	**ZM17**	**AM17**	15	7 157
3 000	0,45	1 150	320	0,546	2	**ZMA20/38**	**AM20**	18	9 079
2 600	0,6	1 300	450	0,972	2	**ZMA25/45**	**AM25**	25	9 410
2 200	0,75	1 500	620	1,46	2,5	**ZMA30/52**	**AM30**	32	10 451
2 000	0,9	1 600	900	3,02	2,5	**ZMA35/58**	**AM35/58**	40	10 770
1 800	1,05	1 750	1 200	4,52	2,5	**ZMA40/62**	**AM40**	55	13 412
1 500	1,35	2 200	2 250	10,48	2,5	**ZMA50/75**	**AM50**	85	17 009

Axial angular contact ball bearings

Single direction



7602, 7603, BSB

Dimension table · Dimensions in mm

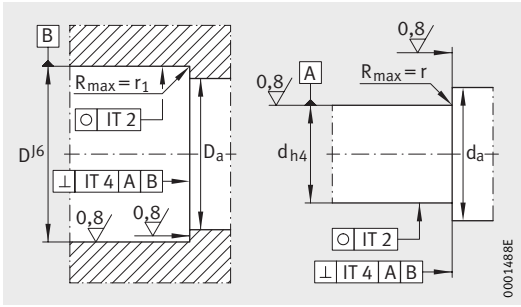
Designation	Mass	Dimensions					Mounting dimensions		Basic load ratings axial	
	m	d	D	B	r, r_1	a	D_a H12	d_a h12	dyn. C_a	stat. C_{0a}
	≈kg				min.	≈			N	N
7602012-TVP	0,042	**12**$_{-0,004}$	32$_{-0,006}$	10$_{-0,08}$	0,6	24	27	17	12 200	20 700
7602015-TVP	0,052	**15**$_{-0,004}$	36$_{-0,006}$	11$_{-0,08}$	0,6	27,5	30	20,5	13 100	24 700
7602017-TVP	0,074	**17**$_{-0,004}$	40$_{-0,006}$	12$_{-0,08}$	0,6	31	34,5	23	17 200	32 500
7602020-TVP	0,139	**20**$_{-0,005}$	47$_{-0,006}$	14$_{-0,12}$	1	36	39,5	27,5	19 100	38 000
BSB020047-T	0,13	**20**$_{-0,005}$	47$_{-0,006}$	15$_{-0,12}$	1	36,5	39,5	27,5	20 800	43 000
7603020-TVP	0,17	**20**$_{-0,005}$	52$_{-0,007}$	15$_{-0,12}$	1,1	39,5	43,5	30,5	25 500	53 000
7602025-TVP	0,147	**25**$_{-0,005}$	52$_{-0,007}$	15$_{-0,12}$	1	41	45	32	23 200	50 000
BSB025062-T	0,24	**25**$_{-0,005}$	62$_{-0,007}$	15$_{-0,12}$	1	46,5	52	38	29 500	68 000
7603025-TVP	0,275	**25**$_{-0,005}$	62$_{-0,007}$	17$_{-0,12}$	1,1	47,5	52	38	29 500	68 000
BSB030062-T	0,22	**30**$_{-0,005}$	62$_{-0,007}$	15$_{-0,12}$	1	47,5	52,5	39,5	27 500	66 000
7602030-TVP	0,232	**30**$_{-0,005}$	62$_{-0,007}$	16$_{-0,12}$	1	48	52,5	39,5	27 500	66 000
7603030-TVP	0,409	**30**$_{-0,005}$	72$_{-0,007}$	19$_{-0,12}$	1,1	55,5	61	45	36 500	89 000
BSB035072-T	0,3	**35**$_{-0,006}$	72$_{-0,007}$	15$_{-0,12}$	1	54	60,5	46,5	31 500	81 000
7602035-TVP	0,339	**35**$_{-0,006}$	72$_{-0,007}$	17$_{-0,12}$	1,1	55	60,5	46,5	31 500	81 000
7603035-TVP	0,546	**35**$_{-0,006}$	80$_{-0,007}$	21$_{-0,12}$	1,5	61,5	67	51	38 000	100 000
BSB040072-T	0,26	**40**$_{-0,006}$	72$_{-0,007}$	15$_{-0,12}$	1	56	62,5	49	29 500	82 000
7602040-TVP	0,418	**40**$_{-0,006}$	80$_{-0,007}$	18$_{-0,12}$	1,1	62,5	69,5	53,5	39 000	106 000
BSB040090-T	0,65	**40**$_{-0,006}$	90$_{-0,008}$	20$_{-0,12}$	1,5	67	75,5	56,5	52 000	138 000
7603040-TVP	0,751	**40**$_{-0,006}$	90$_{-0,008}$	23$_{-0,12}$	1,5	68,5	75,5	56,5	52 000	138 000
BSB045075-T	0,26	**45**$_{-0,006}$	75$_{-0,007}$	15$_{-0,12}$	1	59,5	68	52	30 000	85 000
7602045-TVP	0,488	**45**$_{-0,006}$	85$_{-0,008}$	19$_{-0,12}$	1,1	66	73	57	39 500	111 000
BSB045100-T	0,81	**45**$_{-0,006}$	100$_{-0,008}$	20$_{-0,12}$	1,5	75	85,5	64,5	62 000	172 000
7603045-TVP	0,992	**45**$_{-0,006}$	100$_{-0,008}$	25$_{-0,12}$	1,5	77,5	85,5	64,5	62 000	172 000
7602050-TVP	0,557	**50**$_{-0,006}$	90$_{-0,008}$	20$_{-0,12}$	1,1	71,5	79	63	41 000	122 000
BSB050100-T	0,75	**50**$_{-0,006}$	100$_{-0,008}$	20$_{-0,12}$	1,5	75	85,5	64,5	62 000	172 000
7603050-TVP	1,29	**50**$_{-0,006}$	110$_{-0,008}$	27$_{-0,12}$	2	85,5	94	72	72 000	203 000
BSB055090-T	0,38	**55**$_{-0,007}$	90$_{-0,008}$	15$_{-0,15}$	1,0	70,5	80	65	33 500	98 000
7602055-TVP	0,74	**55**$_{-0,007}$	100$_{-0,008}$	21$_{-0,15}$	1,5	77,5	85,5	69,5	42 000	132 000
BSB055120-T	1,2	**55**$_{-0,007}$	120$_{-0,008}$	20$_{-0,15}$	2,0	86	97,5	77	63 000	188 000
7603055-TVP	1,67	**55**$_{-0,007}$	120$_{-0,008}$	29$_{-0,15}$	2	91,5	101	77	85 000	255 000

1) Valid for matched pair of bearings in O or X arrangement.

2) Valid for individual bearing with stated preload force, bearing lightly oiled.

3) Only valid in conjunction with INA precision locknuts.

4) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.

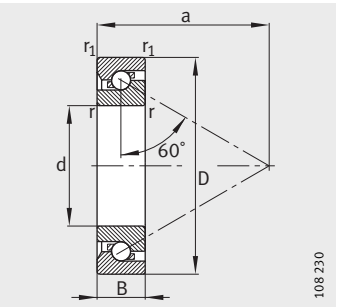


Design of adjacent construction

Limiting speed	Bearing frictional torque[2]	Rigidity[1] axial	Axial runout[4]	Recommended INA locknut; to be ordered separately			
				Designation		Tightening torque[3]	Axial preload force
n_G grease	M_{RL}	c_{aL}				M_A	
min^{-1}	Nm	N/µm	µm			Nm	N
8 000	0,015	476	2	**ZM12**	**AM12**	8	6 110
6 700	0,02	516	2	**ZM15**	**AM15**	10	5 740
6 000	0,03	596	2	**ZM17**	**AM17**	15	8 060
5 000	0,05	703	2	**ZM20**	**AM20**	18	8 490
5 600	0,05	703	2	**ZM20**	**AM20**	18	8 490
4 500	0,06	787	2	**ZM20**	**AM20**	25	11 600
4 500	0,065	772	2	**ZM25**	**AM25**	25	9 430
4 300	0,085	917	2	**ZM25**	**AM25**	40	14 480
3 800	0,085	917	2	**ZM25**	**AM25**	40	14 480
4 200	0,085	893	2	**ZM30**	**AM30**	32	10 240
3 800	0,085	893	2	**ZM30**	**AM30**	32	10 240
3 200	0,13	1 073	2	**ZM30**	**AM30**	55	16 180
3 700	0,115	1 020	2	**ZM35**	**AM35**	40	11 310
3 200	0,115	1 020	2	**ZM35**	**AM35**	40	11 310
3 000	0,17	1 192	2	**ZM35**	**AM35**	65	17 380
3 500	0,115	1 016	2	**ZM40**	**AM40**	40	10 190
2 800	0,17	1 190	2	**ZM40**	**AM40**	55	13 330
3 100	0,225	1 292	2	**ZM40**	**AM40**	110	25 120
2 600	0,225	1 292	2	**ZM40**	**AM40**	110	25 120
3 300	0,13	1 072	2	**ZM45**	**AM45**	50	11 140
2 600	0,19	1 247	2	**ZM45**	**AM45**	65	14 410
2 700	0,3	1 473	2	**ZM45**	**AM45**	120	25 160
2 200	0,3	1 473	2	**ZM45**	**AM45**	120	25 160
2 400	0,23	1 360	2	**ZM50**	**AM50**	85	16 810
2 700	0,33	1 473	2	**ZM50**	**AM50**	120	23 770
2 000	0,36	1 601	2	**ZM50**	**AM50**	150	28 930
2 800	0,19	1 246	3	**ZM55**	**AM55**	60	12 040
2 200	0,25	1 394	3	**ZM55**	**AM55**	85	15 060
2 400	0,36	1 553	3	**ZM55**	**AM55**	110	20 070
1 900	0,46	1 723	3	**ZM55**	**AM55**	130	24 120

Axial angular contact ball bearings

Single direction



7602, 7603, BSB

Dimension table (continued) · Dimensions in mm

Designation[4]	Mass	Dimensions					Mounting dimensions	
	m	d	D	B	r, r_1	a	D_a H12	d_a h12
	≈kg				min.	≈		
7602060-TVP	0,94	**60**$_{-0,007}$	110$_{-0,008}$	22$_{-0,15}$	1,5	86	96	77
BSB060120-T	1,1	**60**$_{-0,007}$	120$_{-0,009}$	22$_{-0,15}$	1,5	88	100,5	79,5
7603060-TVP	2,08	**60**$_{-0,007}$	130$_{-0,009}$	31$_{-0,15}$	2,1	98	107,5	82,5
7602065-TVP	1,19	**65**$_{-0,007}$	120$_{-0,009}$	23$_{-0,15}$	1,5	92,5	103	84
7603065-TVP	2,58	**65**$_{-0,007}$	140$_{-0,009}$	33$_{-0,15}$	2,1	107,5	118,5	91,5
7602070-TVP	1,3	**70**$_{-0,007}$	125$_{-0,009}$	24$_{-0,15}$	1,5	96,5	108	87
7603070-TVP	3,16	**70**$_{-0,007}$	150$_{-0,009}$	35$_{-0,15}$	2,1	113	124,5	95,5
BSB075110-T	0,47	**75**$_{-0,007}$	110$_{-0,008}$	15$_{-0,15}$	1,5	87,5	99,5	85
7602075-TVP	1,42	**75**$_{-0,007}$	130$_{-0,009}$	25$_{-0,15}$	1,5	102,5	114,5	93,5
7603075-TVP	3,74	**75**$_{-0,007}$	160$_{-0,01}$	37$_{-0,15}$	2,1	123	135,5	105,5
7602080-TVP	1,72	**80**$_{-0,007}$	140$_{-0,009}$	26$_{-0,15}$	2	109	122	100
7603080-TVP	4,5	**80**$_{-0,007}$	170$_{-0,01}$	39$_{-0,15}$	2,1	129,5	143	111
7602085-TVP	2,17	**85**$_{-0,008}$	150$_{-0,009}$	28$_{-0,2}$	2	117	131	107
7603085-TVP	5,24	**85**$_{-0,008}$	180$_{-0,01}$	41$_{-0,2}$	3	136	151	116
7602090-TVP	2,67	**90**$_{-0,008}$	160$_{-0,01}$	30$_{-0,2}$	2	124	138,5	113,5
7603090-TVP	6,18	**90**$_{-0,008}$	190$_{-0,011}$	43$_{-0,2}$	3	142,5	157,5	122,5
7602095-TVP	3,25	**95**$_{-0,008}$	170$_{-0,01}$	32$_{-0,2}$	2,1	131	146,5	119,5
7603095-TVP	7,22	**95**$_{-0,008}$	200$_{-0,011}$	45$_{-0,2}$	3	150	165	130
BSB100150-T	1,4	**100**$_{-0,008}$	150$_{-0,009}$	22,5$_{-0,2}$	2	119,5	135	114,5
7602100-TVP	3,9	**100**$_{-0,008}$	180$_{-0,01}$	34$_{-0,2}$	2,1	138	154,5	125,5
7603100-TVP	8,78	**100**$_{-0,008}$	215$_{-0,011}$	47$_{-0,2}$	3	161	178	140

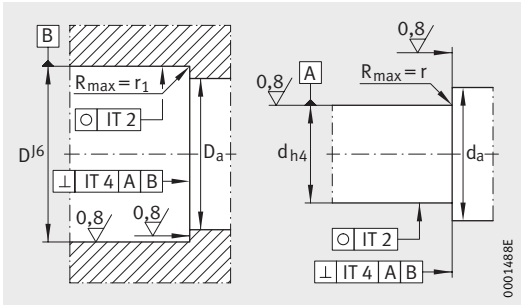
1) Valid for matched pair of bearings in O or X arrangement.

2) Valid for individual bearing with stated preload force, bearing lightly oiled.

3) Only valid in conjunction with INA precision locknuts.

4) Available by agreement.

5) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.

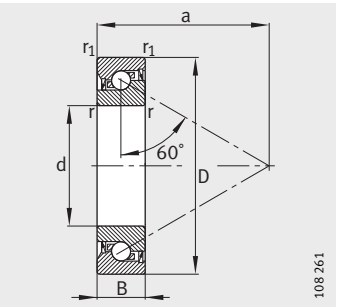


Design of adjacent construction

Basic load ratings axial		Limiting speed	Bearing frictional torque[2]	Rigidity[1] axial	Axial runout[5]	Recommended INA locknut; to be ordered separately			
dyn. C_a	stat. C_{0a}	n_G grease	M_{RL}	c_{aL}		Designation		Tightening torque[3] M_A	Axial preload force
N	N	min^{-1}	Nm	N/µm	µm			Nm	N
58 000	183 000	2 000	0,35	1 623	3	**ZM60**	**AM60**	100	17 410
64 000	196 000	2 300	0,38	1 623	3	**ZM60**	**AM60**	120	20 020
92 000	270 000	1 800	0,54	1 840	3	**ZM60**	**AM60**	150	25 840
60 000	197 000	1 800	0,41	1 753	3	**ZM65**	**AM65**	110	17 680
106 000	330 000	1 600	0,7	2 052	3	**ZM65**	**AM65**	150	25 290
68 000	220 000	1 800	0,44	1 753	3	**ZM70**	**AM70**	115	17 300
117 000	360 000	1 600	0,76	2 108	3	**ZM70**	**AM70**	180	27 640
37 000	133 000	2 300	0,29	1 534	3	**ZM75**	**AM75**	140	18 560
70 000	236 000	1 600	0,48	1 888	3	**ZM75**	**AM75**	160	22 820
132 000	425 000	1 400	0,92	2 335	3	**ZM75**	**AM75**	200	29 360
81 000	275 000	1 500	0,6	2 047	3	**ZM80**	**AM80**	160	21 620
144 000	465 000	1 400	1,1	2 466	3	**ZM80**	**AM80**	220	31 020
95 000	340 000	1 400	0,76	2 209	3	**ZM85**	**AM85**	250	30 460
169 000	550 000	1 300	1,25	2 539	3	**ZM85**	**AM85**	280	36 310
102 000	365 000	1 400	0,79	2 275	3	**ZM90**	**AM90**	250	29 160
172 000	580 000	1 200	1,3	2 654	3	**ZM90**	**AM90**	300	37 360
116 000	410 000	1 300	0,95	2 435	3	–	–	–	31 700
175 000	600 000	1 200	1,45	2 770	3	–	–	–	38 280
73 000	265 000	1 800	0,6	2 052	3	**ZM100**	**AM100**	200	21 190
128 000	465 000	1 200	1,1	2 594	3	**ZM100**	**AM100**	255	29 150
201 000	700 000	1 100	1,7	2 965	3	**ZM100**	**AM100**	305	36 330

Axial angular contact ball bearings

Single direction
Sealed



7602..-2RS, 7603..-2RS,
BSB..-2RS

Dimension table · Dimensions in mm

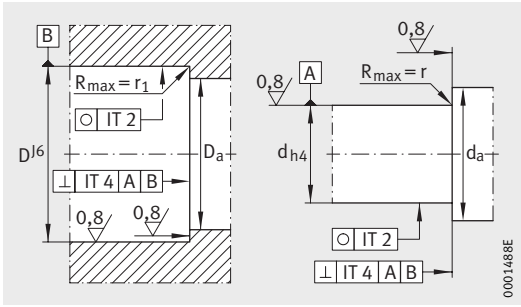
Designation	Mass	Dimensions					Mounting dimensions	
	m	d	D	B	r, r_1	a	D_a H12	d_a h12
	≈kg				min.	≈		
7602012-2RS-TVP	0,042	**12**$_{-0,004}$	32$_{-0,006}$	10$_{-0,08}$	0,6	24	27	17
7602015-2RS-TVP	0,052	**15**$_{-0,004}$	35$_{-0,006}$	11$_{-0,08}$	0,6	27,5	30	20,5
7602020-2RS-TVP	0,12	**20**$_{-0,005}$	47$_{-0,006}$	14$_{-0,12}$	1	36	39,5	27,5
7603020-2RS-TVP	0,17	**20**$_{-0,005}$	52$_{-0,007}$	15$_{-0,12}$	1,1	36,5	43,5	30,5
7602025-2RS-TVP	0,15	**25**$_{-0,005}$	52$_{-0,007}$	15$_{-0,12}$	1	41	45	32
BSB025062-2RS-T	0,24	**25**$_{-0,005}$	62$_{-0,007}$	15$_{-0,12}$	1	46,5	52	38
7603025-2RS-TVP	0,27	**25**$_{-0,005}$	62$_{-0,007}$	17$_{-0,12}$	1,1	47,5	52	38
BSB030062-2RS-T	0,22	**30**$_{-0,005}$	62$_{-0,007}$	15$_{-0,12}$	1	47,5	52,5	39,5
7602030-2RS-TVP	0,23	**30**$_{-0,005}$	62$_{-0,007}$	16$_{-0,12}$	1	48	52,5	39,5
BSB035072-2RS-T	0,3	**35**$_{-0,006}$	72$_{-0,007}$	15$_{-0,12}$	1	54	60,5	46,5
BSB040072-2RS-T	0,26	**40**$_{-0,006}$	72$_{-0,007}$	15$_{-0,12}$	1	56	62,5	49

1) Valid for matched pair of bearings in O or X arrangement.

2) Valid for individual bearing with stated preload force, bearing lightly oiled.

3) Only valid in conjunction with INA precision locknuts.

4) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.

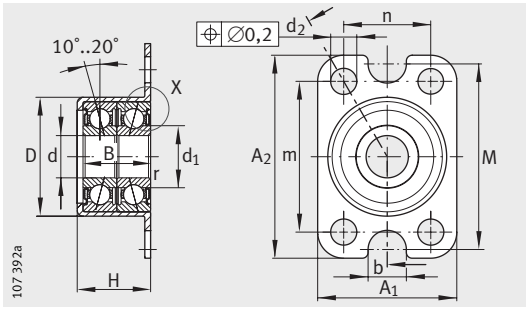


Design of adjacent construction

Basic load ratings axial		Limiting speed	Bearing frictional torque[2]	Rigidity[1] axial	Axial runout[4]	Recommended INA locknut; to be ordered separately			
dyn. C_a	stat. C_{0a}	n_G grease	M_{RL}	c_{aL}		Designation		Tightening torque[3] M_A	Axial preload force
N	N	min^{-1}	Nm	N/µm	µm			Nm	N
12 200	20 700	8 000	0,018	476	2	**ZM12**	**AM12**	8	6 110
13 100	24 700	6 700	0,024	516	2	**ZM15**	**AM15**	10	5 740
19 100	38 000	5 000	0,06	703	2	**ZM20**	**AM20**	18	8 490
25 500	53 000	4 500	0,07	787	2	**ZM20**	**AM20**	18	11 600
23 200	50 000	3 800	0,08	772	2	**ZM25**	**AM25**	25	9 430
29 500	68 000	4 300	0,1	917	2	**ZM25**	**AM25**	40	14 480
29 500	68 000	3 800	0,1	917	2	**ZM25**	**AM25**	40	14 480
27 500	66 000	4 200	0,1	893	2	**ZM30**	**AM30**	32	10 240
27 500	66 000	3 800	0,1	893	2	**ZM30**	**AM30**	32	10 240
31 500	81 000	3 700	0,14	1 020	2	**ZM35**	**AM35**	40	11 310
29 500	82 000	3 500	0,14	1 016	2	**ZM40**	**AM40**	40	10 190

Angular contact ball bearing units

For screw mounting



ZKLR0624-2Z, ZKLR0828-2Z

Dimension table · Dimensions in mm

Designation	Mass	Dimensions													
	m	d	A_1	A_2	D	B	d_1	r	d_2	b	m	n	M	H	d_a
	≈kg				+0,03 −0,01	−0,25		min.						−0,5	
ZKLR0624-2Z	0,023	**6**$_{-0,008}$	24	35	20,5	12	10,4	0,3	4,5	6,6	26	15	32	13	8
ZKLR0828-2Z	0,03	**8**$_{-0,008}$	28	35	23,9	14	11,8	0,3	4,5	6,6	26	20	35	15,5	10,4
ZKLR1035-2Z	0,05	**10**$_{-0,008}$	35	35	28,14	16	14,7	0,3	4,5	–	26	26	–	17,5	12,4
ZKLR1244-2RS	0,12	**12**$_{-0,007}$	44	50	35,45	20	16,6	0,3	6,6	–	38	32	–	22	14
ZKLR1547-2RS	0,14	**15**$_{-0,007}$	47	51	38,45	22	18	0,3	6,6	–	39	35	–	24	17,5
ZKLR2060-2RS	0,3	**20**$_{-0,008}$	60	60	50,45	28	24,4	0,3	6,6	–	47	47	–	30	24

1) Tightening torque for the fixing screws as recommended by the manufacturer. Screws must be ordered separately.

2) Mass moment of inertia for rotating inner ring.

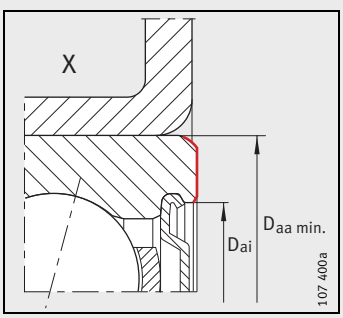
3) The locknut is only used to axially locate the bearing unit. It has no influence on the bearing preload.

4) Stated geometrical tolerances only required in diameter area between D_{ai} and D_{aa}.

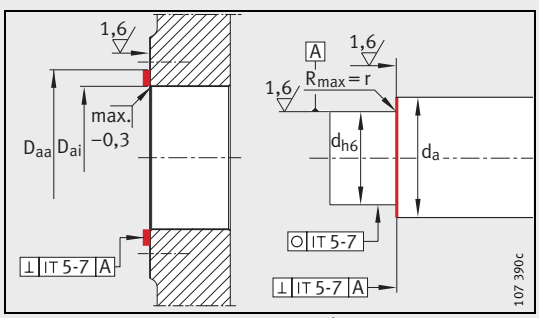
5) Only valid in conjunction with INA precision locknuts.

6) Statistically determined mean values from measurements on the complete bearing.

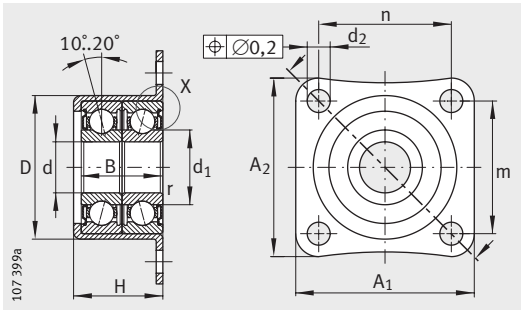
7) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



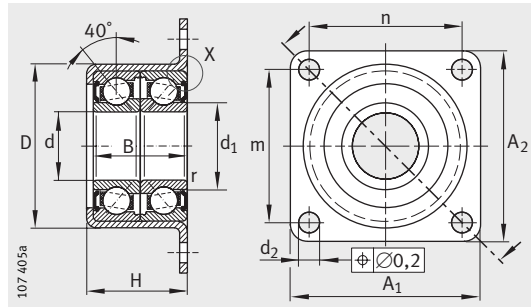
Axial abutment area of outer ring



Design of adjacent construction[4]



ZKLR1035-2Z

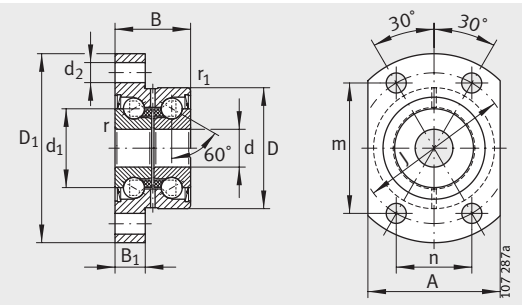


ZKLR1244-2RS, ZKLR1547-2RS, ZKLR2060-2RS

		Fixing screws DIN 912[1]		Basic load ratings				Limiting speed	Bearing frictional torque	Rigidity axial[6]	Mass moment of inertia[2]	Axial runout[7]	Recommended INA locknut; to be ordered separately[3]	
				radial		axial							Designation	Tightening torque[5]
D_{ai}	D_{aa}			dyn. C_r	stat. C_{0r}	dyn. C_a	stat. C_{0a}	n_G grease	M_{RL}	c_{aL}	M_m			M_A
	min.	Size	Quantity	N	N	N	N	min^{-1}	Nm	N/µm	kg · cm^2	µm		Nm
16	19	M4 M6	4 2	3 850	1 870	1 340	1 250	7 300	0,04	17	0,0014	7	**ZM06**	2
18	22	M4 M6	4 2	4 900	2 280	1 810	1 520	6 200	0,08	20	0,0028	7	**ZM08**	4
22	26	M4	4	7 400	3 600	2 550	2 420	5 100	0,12	26	0,0075	7	**ZM10**	6
27	32	M6	4	13 600	8 500	13 200	17 900	3 700	0,16	170	0,0102	7	**ZM12**	8
29	35	M6	4	16 700	10 700	16 400	22 400	3 400	0,2	200	0,0178	7	**ZM15**	10
39	47	M6	4	28 000	19 100	27 500	40 000	2 800	0,3	250	0,263	8	**ZM20**	18

Double row axial angular contact ball bearings with flange

For screw mounting



ZKLFA..-2RS, ZKLFA..-2Z

Dimension table · Dimensions in mm

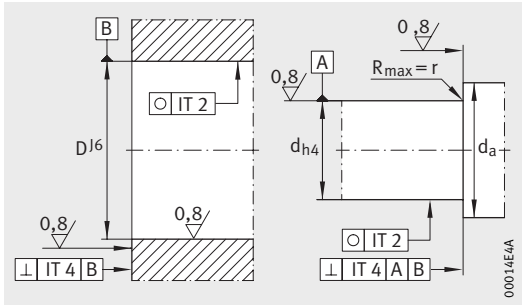
Designation	Mass	Dimensions													Mounting dimensions	
	m	d	D	B	d_1	D_1	r	r_1	B_1	d_2	m	J	n	A	d_a	
	≈kg	–0,005	–0,01	–0,25			min.	min.							min.	max.
ZKLFA0630-2Z	0,05	**6**	19	12	12	30	0,3	0,3	5	3,5	21	24	12	22	9	15
ZKLFA0640-2RS	0,08	**6**	24	15	14	40	0,3	0,6	6	4,5	27,5	32	16	27	9	18
ZKLFA0640-2Z	0,08	**6**	24	15	14	40	0,3	0,6	6	4,5	27,5	32	16	27	9	18
ZKLFA0850-2RS	0,17	**8**	32	20	19	50	0,3	0,6	8	5,5	34,5	40	20	35	11	25
ZKLFA0850-2Z	0,17	**8**	32	20	19	50	0,3	0,6	8	5,5	34,5	40	20	35	11	25
ZKLFA1050-2RS	0,18	**10**	32	20	21	50	0,3	0,6	8	5,5	34,5	40	20	35	14	27
ZKLFA1050-2Z	0,18	**10**	32	20	21	50	0,3	0,6	8	5,5	34,5	40	20	35	14	27
ZKLFA1263-2RS	0,3	**12**	42	25	25	63	0,3	0,6	10	6,8	46	53	26,5	45	16	31
ZKLFA1263-2Z	0,3	**12**	42	25	25	63	0,3	0,6	10	6,8	46	53	26,5	45	16	31
ZKLFA1563-2RS	0,31	**15**	42	25	28	63	0,3	0,6	10	6,8	46	53	26,5	45	20	34
ZKLFA1563-2Z	0,31	**15**	42	25	28	63	0,3	0,6	10	6,8	46	53	26,5	45	20	34

1) Tightening torque for the fixing screws as recommended by the manufacturer. Screws must be ordered separately.

2) Mass moment of inertia for rotating inner ring.

3) Only valid in conjunction with INA precision locknuts.

4) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.

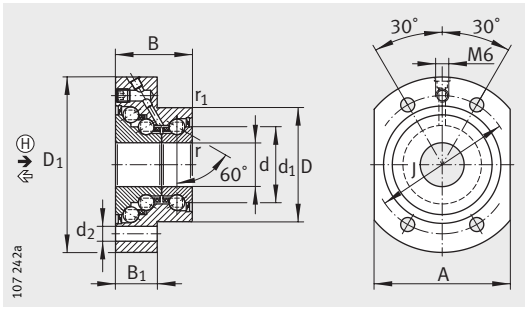


Design of adjacent construction

Fixing screws[1] DIN 912-10.9		Basic load ratings axial		Limiting speed	Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia[2]	Axial runout[4]	Recommended INA locknut; to be ordered separately		
		dyn. C_a	stat. C_{0a}	n_G grease	M_{RL}	c_{aL}	c_{kL}	M_m		Designation	Tightening torque[3]	Axial preload force
Size	Quantity	N	N	min^{-1}	Nm	N/µm	Nm/mrad	kg · cm^2	µm		M_A Nm	N
M3	4	4 900	6 100	14 000	0,01	150	4	0,0019	2	**ZM06** –	2	916
M4	4	6 900	8 500	6 800	0,04	200	8	0,0044	2	**ZM06** –	2	2 404
M4	4	6 900	8 500	12 000	0,02	200	8	0,0044	2	**ZM06** –	2	2 404
M5	4	12 500	16 300	5 100	0,08	250	20	0,02	2	**ZM08** –	4	2 216
M5	4	12 500	16 300	9 500	0,04	250	20	0,02	2	**ZM08** –	4	2 216
M5	4	13 400	18 800	4 600	0,12	325	25	0,029	2	**ZM10** –	6	4 891
M5	4	13 400	18 800	8 600	0,06	325	25	0,029	2	**ZM10** –	6	4 891
M6	4	16 900	24 700	3 800	0,16	375	50	0,068	2	**ZM12** –	8	5 038
M6	4	16 900	24 700	7 600	0,08	375	50	0,068	2	**ZM12** –	8	5 038
M6	4	17 900	28 000	3 500	0,2	400	65	0,102	2	**ZM15** **AM15**	10	5 484
M6	4	17 900	28 000	7 000	0,1	400	65	0,102	2	**ZM15** **AM15**	10	5 484

Triple row axial angular contact ball bearings with flange

For screw mounting



DKLFA..-2RS (d ≦ 20 mm)

Attention!

The bearings require continuous load in the main load direction Ⓗ.

Dimension table · Dimensions in mm

Designation	Mass	Dimensions											Mounting dimensions	
	m	d	D	B	d_1	D_1	r	r_1	B_1	d_2	J	A	d_a	
	≈kg	–0,010	–0,013	–0,25			min.	min.					min.	max.
DKLFA1575-2RS	0,53	**15**	45	32	28	75	0,3	0,6	18	6,8	58	55	20	35
DKLFA2080-2RS	0,7	**20**	52	35	34,5	80	0,3	0,6	19	6,8	63	62	25	43
DKLFA2590-2RS	0,9	**25**	57	38	40,5	90	0,3	0,6	22	8,8	75	70	32	48
DKLFA30100-2RS	1	**30**	62	38	45,5	100	0,3	0,6	22	8,8	80	72	40	53
DKLFA30110-2RS[3]	2,5	**30**	75	56	51	110	0,3	0,6	35	8,8	95	85	47	64
DKLFA40115-2RS	1,5	**40**	72	42	58	115	0,3	0,6	23	8,8	94	90	50	67
DKLFA40140-2RS[3]	4,2	**40**	90	60	65	140	0,3	0,6	35	11	118	110	56	80

1) Tightening torque for the fixing screws as recommended by the manufacturer. Screws must be ordered separately.

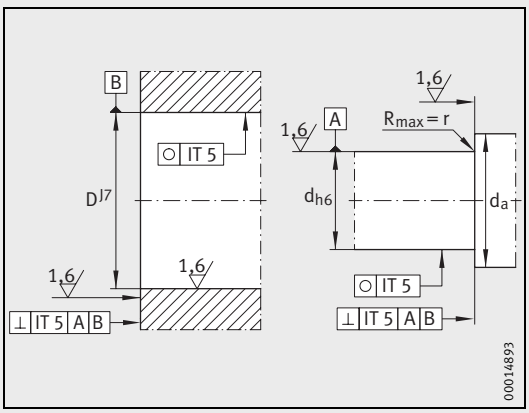
2) Mass moment of inertia for rotating inner ring.

3) Heavy series.

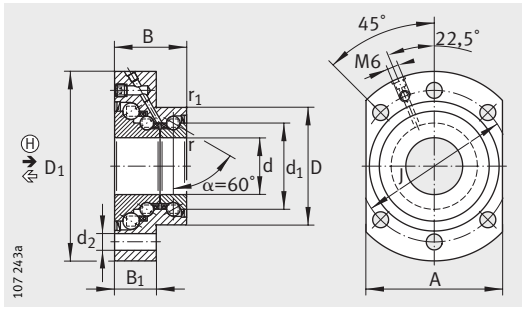
4) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.

INA locknuts (accessories)

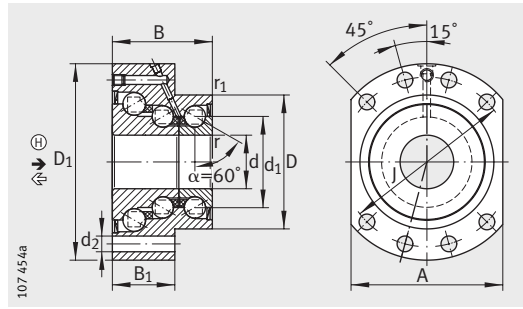
Triple row angular contact ball bearing Designation	Recommended INA locknut; to be ordered separately Designation		
	①		②
DKLFA1575-2RS	**AM15**	**ZMA15/33**	**ZM17**
DKLFA2080-2RS	**AM20**	**ZMA20/38**	**ZM25**
DKLFA2590-2RS	**AM25**	**ZMA25/45**	**AM30**
DKLFA30100-2RS	**AM30**	**ZMA30/52**	**ZM35**
DKLFA30110-2RS	**AM30/65**	–	**ZM35**
DKLFA40115-2RS	**AM40**	**ZMA40/62**	**ZM45**
DKLFA40140-2RS	**AM40/85**	–	**ZM45**



Design of adjacent construction

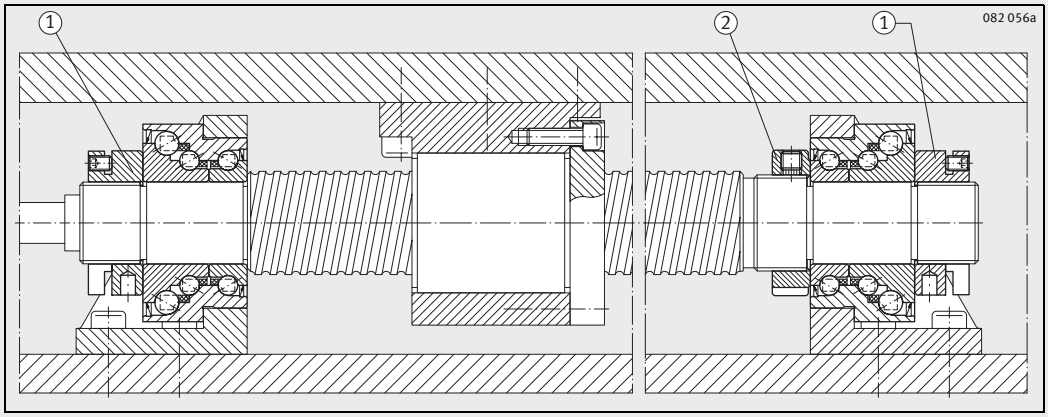


DKLFA..-2RS (d ≧ 25 mm)

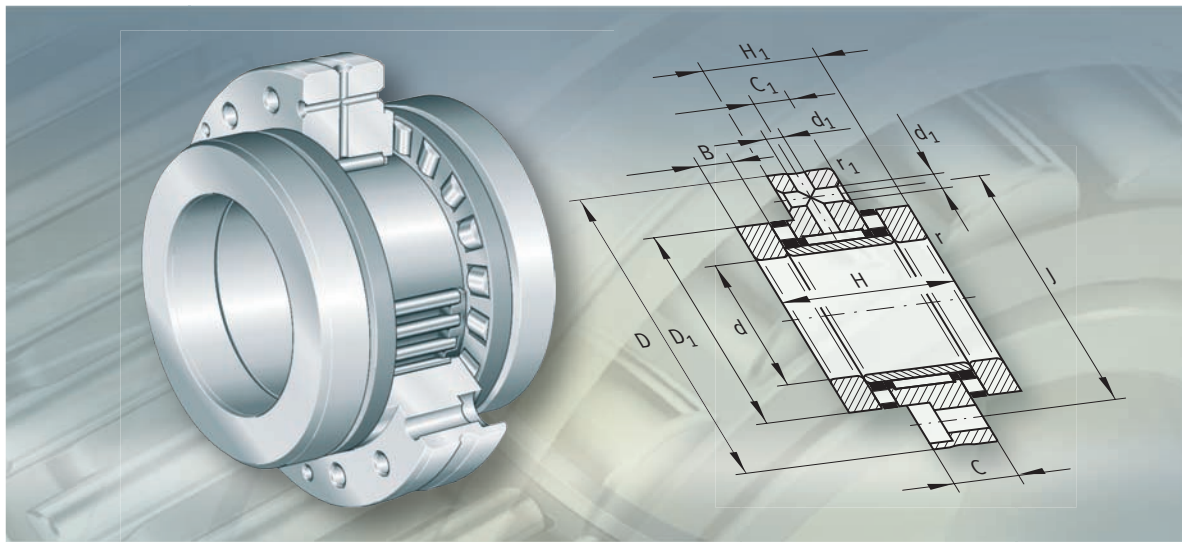


DKLFA..-2RS
Heavy series

Fixing screws[1] DIN 912-10.9		Basic load ratings				Limiting speed	Bearing frictional torque	Rigidity	Rigidity	Tilting rigidity	Mass moment of inertia[2]	Axial run-out[4]
		axial ⇦		axial Ⓗ ➔				axial ⇦	axial ➔			
		dyn. C_a	stat. C_{0a}	dyn. C_a	stat. C_{0a}	n_G grease	M_{RL}	c_{aL}	c_{aL}	c_{kL}	M_m	
Size	Quantity	N	N	N	N	min^{-1}	Nm	N/μm	N/μm	Nm/mrad	kg · cm^2	μm
M6	4	17 900	28 000	37 000	83 000	2 600	0,35	500	950	140	0,278	5
M6	4	26 000	47 000	44 500	110 000	2 200	0,45	750	1 100	260	0,553	5
M8	6	27 500	55 000	52 000	144 000	2 000	0,6	850	1 200	370	1,12	5
M8	6	29 000	64 000	55 000	165 000	1 800	0,75	900	1 400	500	1,7	5
M8	8	59 000	108 000	106 000	257 000	1 600	1,5	1 300	1 600	650	3,23	5
M8	6	43 000	101 000	73 000	227 000	1 500	1	1 100	1 700	1 000	4,23	5
M10	8	72 000	149 000	126 000	363 000	1 200	2,5	1 800	2 000	1 370	9,32	5



Ball screw drive spindle with locating bearing arrangement on both sides
Numbers in circles: see table INA locknuts (accessories), page 1062



Needle roller/
axial cylindrical roller bearings

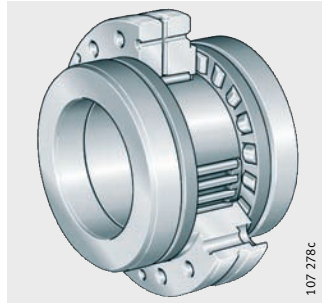
Needle roller/ axial cylindrical roller bearings

		Page
Product overview	Needle roller/axial cylindrical roller bearings	1066
Features	Bearings for screw mounting	1067
	Bearings not for screw mounting	1068
	Operating temperature	1068
	Suffixes	1068
Design and safety guidelines	Basic rating life	1069
	Resultant and equivalent bearing load	1069
	Static load safety factor	1069
	Design of adjacent construction	1071
	Speeds	1071
	Friction	1072
	Lubrication	1072
	Mounting guidelines	1074
Accuracy		1075
Dimension tables	Needle roller/axial cylindrical roller bearings, light series, for screw mounting	1076
	Needle roller/axial cylindrical roller bearings, heavy series, for screw mounting	1080
	Needle roller/axial cylindrical roller bearings, light series, not for screw mounting	1084
	Needle roller/axial cylindrical roller bearings, heavy series, not for screw mounting	1088

Needle roller/ axial cylindrical roller bearings

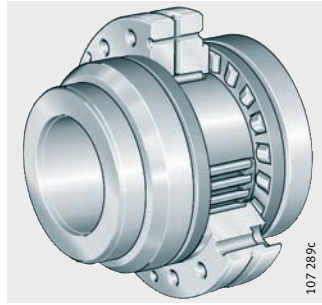
For screw mounting

ZARF



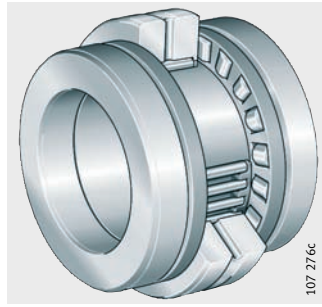
With extended shaft locating washer

ZARF..-L



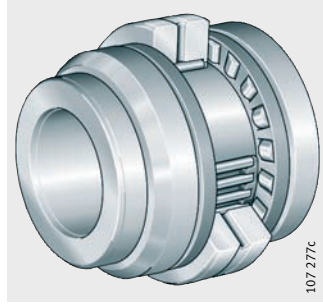
Not for screw mounting

ZARN



With extended shaft locating washer

ZARN..-L



Needle roller/
axial cylindrical roller bearings

Features

Needle roller/axial cylindrical roller bearings comprise an outer ring with radial and axial raceways, shaft locating washers, an inner ring, a radial needle roller and cage assembly and axial cylindrical roller and cage assemblies. The bearings are available in versions for screw mounting and not for screw mounting.

Radial and axial load carrying capacity

In addition to radial forces, the bearings can also support axial forces from both directions and tilting moments.

Preload and internal clearance

The outer ring, inner ring and axial cages are matched to each other such that the bearing is axially clearance-free after preloading by means of an INA precision locknut.
The radial internal clearance is C2 according to DIN 620.

Bearings for screw mounting

Needle roller/axial cylindrical roller bearings ZARF(L) have holes in the outer ring. These are used for screw mounting directly on the adjacent construction or in a radial locating bore, *Figure 1*.

Due to screw mounting of the outer ring, the cover that would otherwise be required and the matching work can therefore be dspensed with. The bearings are preloaded against the shaft shoulder by means of a precision locknut AM or ZM(A).

With seal carrier assembly

In the interests of a simpler design, a seal carrier assembly DRS, *Figure 1*, ①, is recommended. The seal carrier assembly is centred on the outer ring and seals the bearing against outside influences.

ZARF..-L

① Seal carrier asembly DRS
② Locknut
③ Stepped shaft locating washer
④ Sealing ring

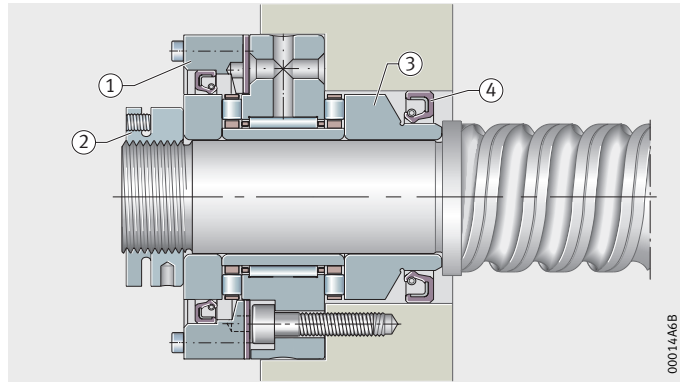


Figure 1
Stepped shaft locating washer with sealing ring

With extended shaft locating washer

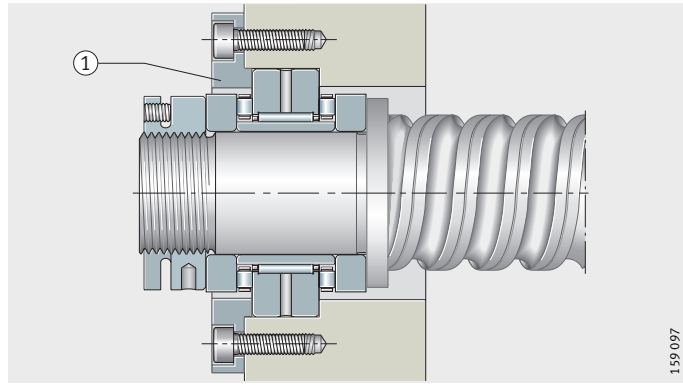
ZARF..-L has an extended and stepped shaft locating washer, *Figure 1*. These series are used in preference where the shaft locating washers are not adequately supported axially by the shaft shoulder or the bearing unit cannot be sealed on the outside surface of the normal shaft locating washer due to space conditions in the adjacent construction.

Heavy series

ZARF(L) is also available in a heavy series. This series has a larger cross-section for the same shaft diameter and therefore higher basic load ratings.

Bearings not for screw mounting

Bearings ZARN(L) are mounted in a housing bore and the outer ring is located using a cover, *Figure 2*. They are preloaded against the shaft shoulder by means of a precision locknut AM or ZM(A).



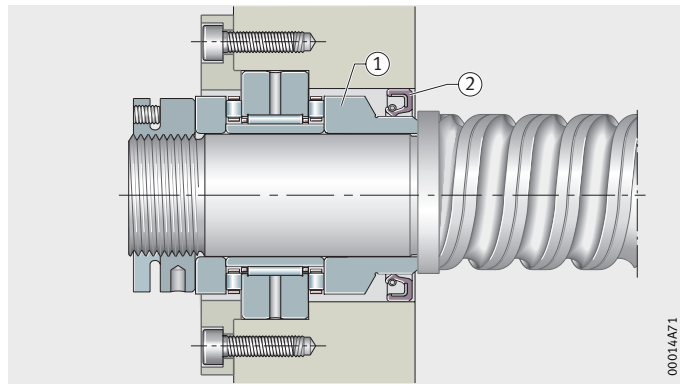
ZARN

① Cover

Figure 2
Bearing outer ring located using cover

With extended shaft locating washer

ZARN..-L has an extended and stepped shaft locating washer, *Figure 3*.
This series is used in preference where the shaft locating washer is not adequately supported axially by the shaft shoulder or the bearing unit cannot be sealed on the outside surface of the normal shaft locating washer due to space conditions in the adjacent construction.



ZARN..-L

① Stepped shaft locating washer
② Sealing ring

Figure 3
Stepped shaft locating washer with sealing ring

Heavy series

ZARN(L) is also available in a heavy series.
This series has a larger cross-section for the same shaft diameter and therefore higher basic load ratings.

Operating temperature

The bearings are suitable for temperatures from –30 °C to +120 °C.

Suffixes

Suffixes for the available designs: see table.

Available designs

Suffix	Description	Design
L	Extended, stepped shaft locating washer	Standard
TV	Cages made from glass fibre reinforced polyamide 66	

Design and safety guidelines

Basic rating life

The decisive factors in determining the bearing size are the basic rating life, the static load safety factor and the axial limiting load. The basic rating life L and L_h are calculated as follows:

$$L_{10} = \left(\frac{C}{P}\right)^p$$

$$L_{10h} = \frac{16\,666}{n} \cdot \left(\frac{C}{P}\right)^p$$

C_r, C_a N
Basic dynamic radial or axial load rating according to dimension table

p –
Life exponent p = 10/3.

Resultant and equivalent bearing load

The resultant axial bearing load $F_{a\,res}$ is determined from the axial operating load F_{aB} and taking account of the axial preload, *Figure 4*, page 1070, to *Figure 6*, page 1070.

Under purely axial load, $P = F_{a\,res}$. If additional radial operating loads are present, these must be calculated separately using the radial basic load ratings. The limit values up to which the axial load can be supported without clearance are shown, *Figure 4*, page 1070, to *Figure 6*, page 1070.

A load in excess of the limit value will lead to the rolling element row without load lifting off the raceway. As a result, higher wear will occur under rapid acceleration. For extreme moment loads and statically overdefined systems (locating/locating bearing arrangements), please contact us. The calculation program BEARINX® can give a precise design in this case.

Load varying in steps

In this case, P and n are calculated as follows (q = time portion %):

$$P = \sqrt[p]{\frac{q_1 \cdot n_1 \cdot P_1^{\,p} + \ldots + q_z \cdot n_z \cdot P_z^{\,p}}{q_1 \cdot n_1 + \ldots + q_z \cdot n_z}}$$

$$n = \frac{q_1 \cdot n_1 + \ldots + q_z \cdot n_z}{100}$$

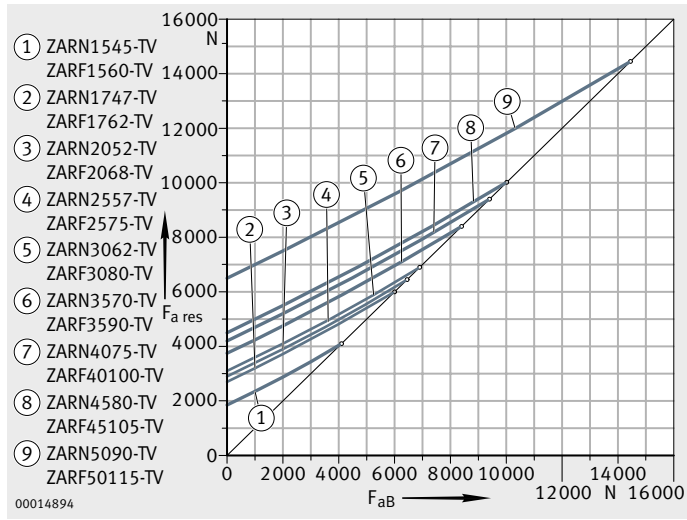
Static load safety factor

The static load safety factor S_0 is calculated according to (see also page 1024):

$$S_0 = \frac{C_0}{P_0}$$

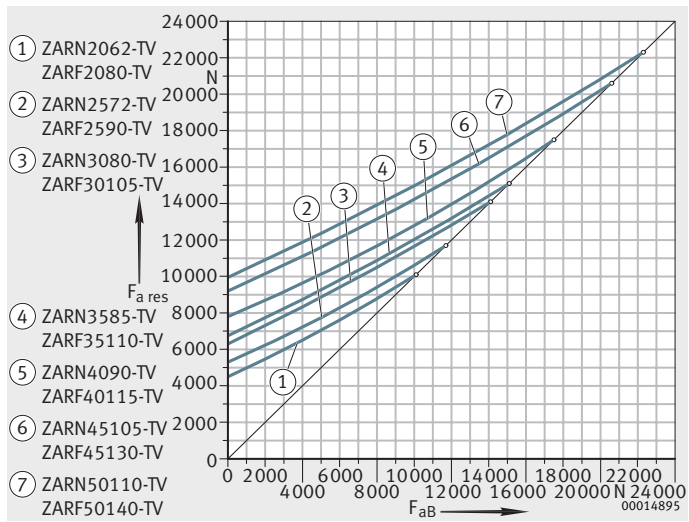
In machine tools, S_0 should be $\geqq 4$.

Resultant bearing load $F_{a\,res}$



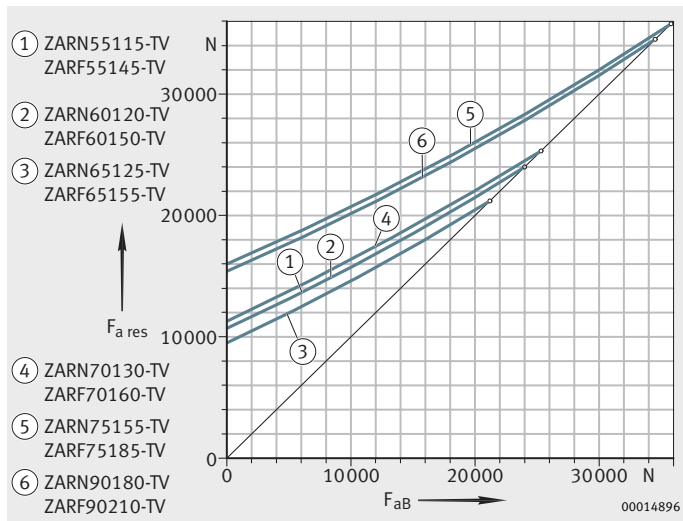
F_{aB} = operating load
$F_{a\,res}$ = resultant bearing load
° = limit value

Figure 4
Resultant bearing load
ZARN, ZARF, light series



F_{aB} = operating load
$F_{a\,res}$ = resultant bearing load
° = limit value

Figure 5
Resultant bearing load
ZARN, ZARF,
heavy series up to d = 50 mm



F_{aB} = operating load
$F_{a\,res}$ = resultant bearing load
° = limit value

Figure 6
Resultant bearing load
ZARN, ZARF,
heavy series from d = 55 mm

Design of adjacent construction

The adjacent construction (the shaft and housing) must be designed in accordance with the data in the dimension tables.

The abutment diameters for the shaft and housing shoulders d_a and D_a must be in accordance with the dimension tables.

The permissible contact pressure for the adjacent construction must be observed.

Examples of possible lubricant feeds: see *Figure 7* and *Figure 8*, page 1073.

Sealing of the bearing position

The bearings are sealed, *Figure 1*, page 1067:

- in the direction of the spindle by a rotary shaft seal on the outside surface machined free from spiral marks of the extended shaft locating washer (ZARN...L, ZARF...L)
- in the direction of the drive by the seal carrier assembly DRS.

Speeds

The limiting speeds n_G given in the dimension tables are based on the following conditions:

- bearing preloaded, no external operating load
- operating duration 25%
- max. equilibrium temperature +50 °C.

The limiting speeds n_G are valid for oil lubrication with adequate cooling.

Friction

In most applications, preloading of bearings by means of the locknut tightening torque gives sufficiently accurate setting values. The reference here is the tightening torque M_A according to the dimension tables in conjunction with an INA precision locknut.

The frictional torque M_{RL} given in the dimension tables is a guide value. It is based on lightly oiled bearings, measured at a speed of $n = 5\ min^{-1}$.

For dimensioning of the drive, the starting frictional torque and the frictional torque at high speeds of 2 to $3 \times M_{RL}$ must be taken into consideration.

Frictional torque and bearing preload

For applications in which the frictional torque is decisive (for example temperature development, frictional torque compensation between different bearing positions, etc.), it is recommended that the bearing preload should be set in accordance with the bearing frictional torque M_{RL}.

Frictional energy

The frictional energy N_R of the bearings can be calculated as follows:

$$N_R = \frac{M_{RL} \cdot n}{9{,}55}$$

N_R W
Frictional energy

M_{RL} Nm
Bearing frictional torque

n min^{-1}
Operating speed.

In any analysis of the thermal balance, the various operating speeds n_i and their corresponding time portions q_i must be taken into consideration.

Lubrication

Needle roller/axial cylindrical roller bearings can be relubricated via the outer ring. They are supplied with oil-based or dry preservative and should preferably be lubricated with oil.

Good results have been obtained with oils CLP to DIN 51 517 and HLP to DIN 51 524 of ISO-VG 32 to ISO-VG 100.

Relubrication for grease lubrication

Relubrication should be carried out with the bearing rotating and still warm from operation in order to achieve good replacement and distribution of grease.

The relubrication interval and quantity can only be determined under operating conditions since it is not possible to calculate all the influences in advance. Relubrication: see INA Fitting and Maintenance Manual TPI 100.

Where a vertical axis of rotation is used in conjunction with automatic lubrication systems, the lubrication impulse should be selected such that the supply to the upper axial bearing is sufficient.

Lubricant feed

Examples of lubricant feeds for ZARF(L) are shown in *Figure 7*, *Figure 8*.

Before initial operation, it must be ensured that all raceways are adequately supplied with lubricant.

ZARF..-L

① Oil inlet
② Oil outlet
③ Rotary shaft seal
④ Cover
⑤ Seal carrier assembly

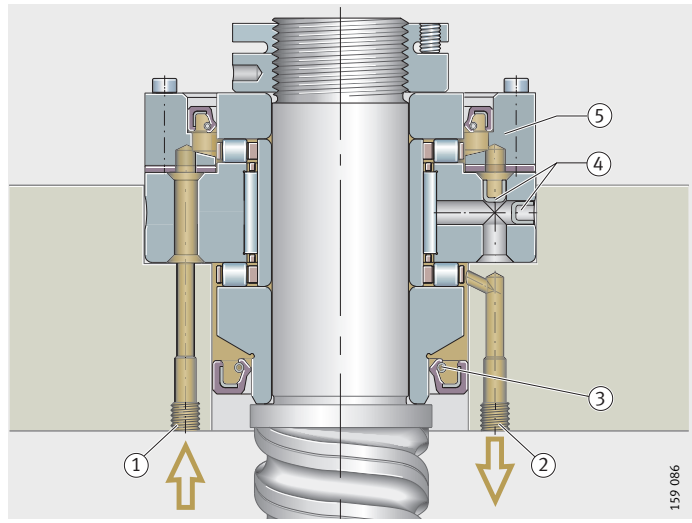


Figure 7
Lubricant feed for vertical mounting position

ZARF..-L

① Oil inlet
② Oil outlet
③ Rotary shaft seal
④ Cover
⑤ Seal carrier assembly

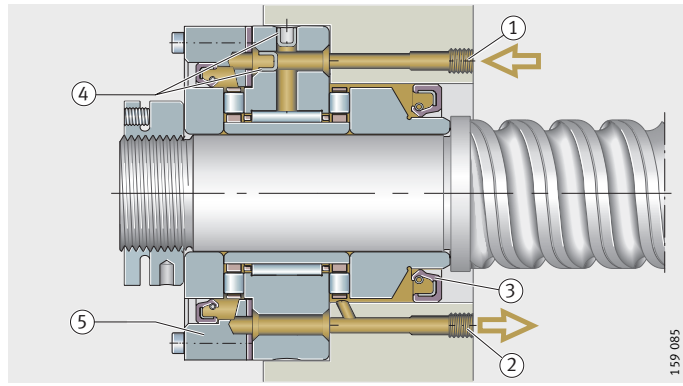


Figure 8
Lubricant feed for horizontal mounting position

Mounting guidelines

Bearings should only be fitted and dismantled in accordance with INA Fitting and Maintenance Manual TPI 100.
This TPI is available upon request.

During fitting of bearings, mounting forces should be applied only to the bearing ring to be fitted. Mounting forces must never be directed through the rolling elements.

The characteristics of the bearings are only valid when used in combination with INA precision locknuts and the associated tightening torques given in the dimension tables.

ZARN and ZARF are not self-retaining. The individual bearing components are matched to each other. The individual parts of different bearings must not be interchanged during fitting.

Setting the axial preload

The preload in the axial component of ZARF(L) bearings is decisive for the function. It must therefore be set with sufficient accuracy.

Since direct force measurement of these values in fitting is not cost-effective, the axial preload is set indirectly using the following methods:

- either by means of the tightening torque M_A of the precision locknut. The frictional torque may deviate from the value given in the dimension table
- or by means of the bearing frictional torque M_{RL}.

Preloading by locknut

Needle roller/axial cylindrical roller bearings must be axially preloaded during fitting by means of a precision locknut.

When preloading the bearing unit by means of the bearing inner rings using the recommended precision locknut, the tightening torques given in the dimension tables must be observed or the preload must be set using the bearing frictional torque given in the dimension tables. The tightening torques given for the individual bearing sizes are only valid for the INA precision locknuts listed.

In order to counteract settling, it is recommended that the locknut should initially be tightened to twice the tightening torque M_A and then relieved of load again. It should only then be tightened again to the stated tightening torque M_A. Finally, the precision locknut should be secured against rotation by the torque-controlled tightening of the set screws.

Fixing screws

The fixing screws for the outer ring must be tightened in a crosswise sequence. They may be loaded up to 70% of their proof stress.

If the bearing outer ring is supported by an additional housing cover, it must be ensured that the fixing screws are sufficiently well dimensioned.

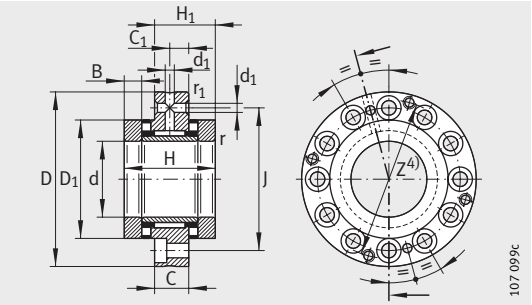
Accuracy

Dimensional and geometrical accuracy (DIN 620):

- axial P4
- radial P6.

Needle roller/ axial cylindrical roller bearings

Light series
For screw mounting



ZARF

Dimension table · Dimensions in mm

Designation	Mass	Dimensions																
	m	d	D	H	H_1	H_2	H_3	C	C_1	D_1	D_2	D_3	B	B_1	B_2	r	r_1	d_1	J
	≈kg															min.	min.		
ZARF1560-TV	0,42	**15**	60	40	26	–	–	14	8	35	–	–	7,5	–	–	0,3	0,6	3,2	46
ZARF1560-L-TV	0,45	**15**	60	–	–	53	39	14	8	35	24	34	7,5	20,5	11	0,3	0,6	3,2	46
ZARF1762-TV	0,49	**17**	62	43	27,5	–	–	14	8	38	–	–	9	–	–	0,3	0,6	3,2	48
ZARF1762-L-TV	0,52	**17**	62	–	–	57	41,5	14	8	38	28	38	9	23	11	0,3	0,6	3,2	48
ZARF2068-TV	0,56	**20**	68	46	29	–	–	14	8	42	–	–	10	–	–	0,3	0,6	3,2	53
ZARF2068-L-TV	0,61	**20**	68	–	–	60	43	14	8	42	30	40	10	24	11	0,3	0,6	3,2	53
ZARF2575-TV	0,78	**25**	75	50	33	–	–	18	10	47	–	–	10	–	–	0,3	0,6	3,2	58
ZARF2575-L-TV	0,84	**25**	75	–	–	65	48	18	10	47	36	45	10	25	11	0,3	0,6	3,2	58
ZARF3080-TV	0,85	**30**	80	50	33	–	–	18	10	52	–	–	10	–	–	0,3	0,6	3,2	63
ZARF3080-L-TV	0,9	**30**	80	–	–	65	48	18	10	52	40	50	10	25	11	0,3	0,6	3,2	63

1) If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.

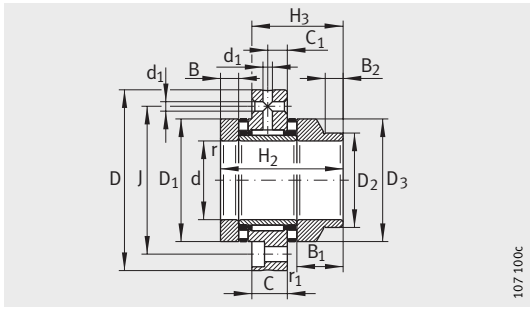
2) Tightening torque of fixing screws according to manufacturer's data.
Screws are not included in the delivery.

3) Mass moment of inertia for rotating inner ring.

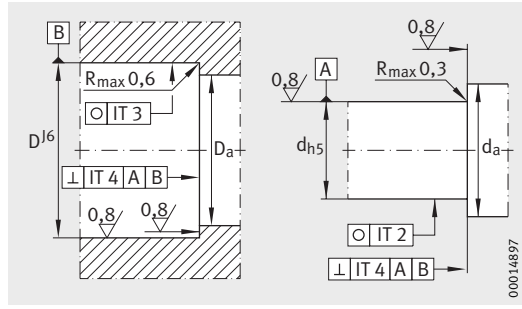
4) Mounting dimension for seal carrier assembly DRS.
Seal carrier assemblies: see page 1095 and page 1101.

5) Only valid in conjunction with INA precision locknuts.

6) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



ZARF..-L



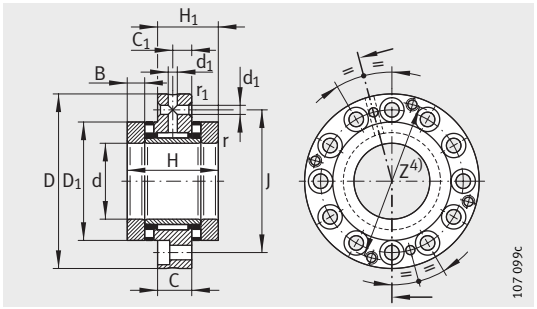
Design of adjacent construction

Mounting dimensions[1]		Basic load ratings				Limiting speeds		Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia[3]	Axial runout[6]
		axial		radial								
D_a	d_a	dyn. C_a	stat. C_{0a}	dyn. C_r	stat. C_{0r}	n_G oil	n_G grease	M_{RL}	c_{aL}	c_{kL}	M_m	
max.	min.	N	N	N	N	min^{-1}	min^{-1}	Nm	N/µm	Nm/mrad	kg · cm^2	µm
36	28	24 900	53 000	13 000	17 500	8 500	2 200	0,35	1 400	110	0,24	1
36	22	24 900	53 000	13 000	17 500	8 500	2 200	0,35	1 400	110	0,274	1
39	28	26 000	57 000	14 000	19 900	7 800	2 100	0,4	1 600	160	0,373	1
39	26	26 000	57 000	14 000	19 900	7 800	2 100	0,4	1 600	160	0,464	1
43	33	33 500	76 000	14 900	22 400	7 000	2 000	0,5	1 800	230	0,615	1
43	28	33 500	76 000	14 900	22 400	7 000	2 000	0,5	1 800	230	0,683	1
48	39	35 500	86 000	22 600	36 000	6 000	1 900	0,55	1 900	350	0,989	1
48	34	35 500	86 000	22 600	36 000	6 000	1 900	0,55	1 900	350	1,15	1
53	44	39 000	101 000	24 300	41 500	5 500	1 800	0,65	2 200	520	1,46	1
53	38	39 000	101 000	24 300	41 500	5 500	1 800	0,65	2 200	520	1,7	1

Designation	Recommended INA locknut; to be ordered separately				Rotary shaft seal to DIN 3 760; to be ordered separately	Fixing screws[2] DIN 912-10.9	
	Designation		Tightening torque[5] M_A Nm	Axial preload force N		Size	Quantity
ZARF1560-TV	**ZMA15/33**	**AM15**	10	6 506	–	M6	6
ZARF1560-L-TV	**ZMA15/33**	**AM15**	10	6 506	24X35X7	M6	6
ZARF1762-TV	**ZM17**	**AM17**	12	7 078	–	M6	6
ZARF1762-L-TV	**ZM17**	**AM17**	12	7 078	28X40X7	M6	6
ZARF2068-TV	**ZMA20/38**	**AM20**	18	9 376	–	M6	8
ZARF2068-L-TV	**ZMA20/38**	**AM20**	18	9 376	30X42X7	M6	8
ZARF2575-TV	**ZMA25/45**	**AM25**	25	10 470	–	M6	8
ZARF2575-L-TV	**ZMA25/45**	**AM25**	25	10 470	36X47X7	M6	8
ZARF3080-TV	**ZMA30/52**	**AM30**	32	11 091	–	M6	12
ZARF3080-L-TV	**ZMA30/52**	**AM30**	32	11 091	40X52X7	M6	12

Needle roller/ axial cylindrical roller bearings

Light series
For screw mounting



ZARF

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions																
	m	d	D	H	H_1	H_2	H_3	C	C_1	D_1	D_2	D_3	B	B_1	B_2	r	r_1	d_1	J
	≈kg															min.	min.		
ZARF3590-TV	1,12	**35**	90	54	35	–	–	18	10	60	–	–	11	–	–	0,3	0,6	3,2	73
ZARF3590-L-TV	1,25	**35**	90	–	–	70	51	18	10	60	45	58	11	27	12	0,3	0,6	3,2	73
ZARF40100-TV	1,35	**40**	100	54	35	–	–	18	10	65	–	–	11	–	–	0,3	0,6	3,2	80
ZARF40100-L-TV	1,45	**40**	100	–	–	70	51	18	10	65	50	63	11	27	12	0,3	0,6	3,2	80
ZARF45105-TV	1,7	**45**	105	60	40	–	–	22,5	12,5	70	–	–	11,5	–	–	0,3	0,6	6	85
ZARF45105-L-TV	1,85	**45**	105	–	–	75	55	22,5	12,5	70	56	68	11,5	26,5	12	0,3	0,6	6	85
ZARF50115-TV	2,1	**50**	115	60	40	–	–	22,5	12,5	78	–	–	11,5	–	–	0,3	0,6	6	94
ZARF50115-L-TV	2,45	**50**	115	–	–	78	58	22,5	12,5	78	60	78	11,5	29,5	12	0,3	0,6	6	94

1) If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.

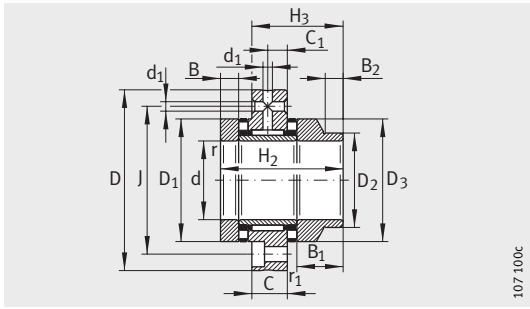
2) Tightening torque of fixing screws according to manufacturer's data.
Screws are not included in the delivery.

3) Mass moment of inertia for rotating inner ring.

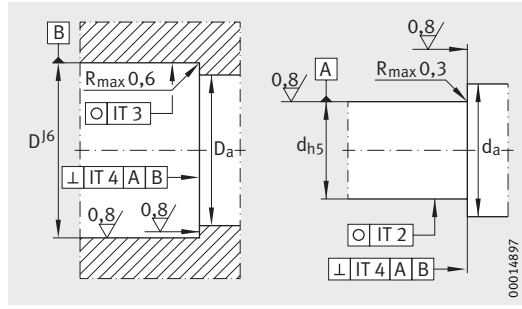
4) Mounting dimension for seal carrier assembly DRS.
Seal carrier assemblies: see page 1095 and page 1101.

5) Only valid in conjunction with INA precision locknuts.

6) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



ZARF..-L



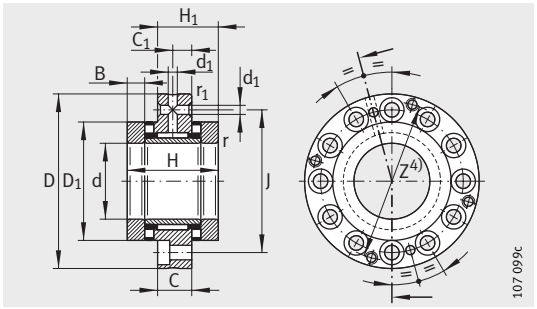
Design of adjacent construction

Mounting dimensions[1]		Basic load ratings				Limiting speeds		Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia[3]	Axial runout[6]
		axial		radial								
D_a	d_a	dyn. C_a	stat. C_{0a}	dyn. C_r	stat. C_{0r}	n_G oil	n_G grease	M_{RL}	c_{aL}	c_{kL}	M_m	
max.	min.	N	N	N	N	min^{-1}	min^{-1}	Nm	N/µm	Nm/mrad	kg · cm^2	µm
61	50	56 000	148 000	26 000	47 000	4 800	1 700	0,9	2 600	740	2,8	1
61	43	56 000	148 000	26 000	47 000	4 800	1 700	0,9	2 600	740	3,21	1
66	55	59 000	163 000	27 500	53 000	4 400	1 600	1	2 800	1 030	3,78	1
66	48	59 000	163 000	27 500	53 000	4 400	1 600	1	2 800	1 030	4,35	1
71	60	61 000	177 000	38 000	74 000	4 000	1 500	1,2	3 000	1 340	5,33	1
71	54	61 000	177 000	38 000	74 000	4 000	1 500	1,2	3 000	1 340	6,03	1
79	67	90 000	300 000	40 000	82 000	3 600	1 200	2,2	4 800	2 470	8,42	1
79	58	90 000	300 000	40 000	82 000	3 600	1 200	2,2	4 800	2 470	10,46	1

Designation	Recommended INA locknut; to be ordered separately				Rotary shaft seal to DIN 3 760; to be ordered separately	Fixing screws[2] DIN 912-10.9	
	Designation		Tightening torque[5]	Axial preload force		Size	Quantity
			M_A Nm	N			
ZARF3590-TV	**ZMA35/58**	**AM35/58**	42	12 486	–	M6	12
ZARF3590-L-TV	**ZMA35/58**	**AM35/58**	42	12 486	45X60X8	M6	12
ZARF40100-TV	**ZMA40/62**	**AM40**	55	14 240	–	M8	8
ZARF40100-L-TV	**ZMA40/62**	**AM40**	55	14 240	50X65X8	M8	8
ZARF45105-TV	**ZMA45/68**	**AM45**	65	15 765	–	M8	8
ZARF45105-L-TV	**ZMA45/68**	**AM45**	65	15 765	56X70X8	M8	8
ZARF50115-TV	**ZMA50/75**	**AM50**	85	18 410	–	M8	12
ZARF50115-L-TV	**ZMA50/75**	**AM50**	85	18 410	60X80X8	M8	12

Needle roller/ axial cylindrical roller bearings

Heavy series
For screw mounting



ZARF

Dimension table · Dimensions in mm

Designation	Mass	Dimensions															
	m	d	D	H	H_1	H_2	H_3	C	C_1	D_1	D_2	D_3	B	B_1	B_2	r	r_1
	≈kg															min.	min.
ZARF2080-TV	1,1	**20**	80	60	38	–	–	18	10	52	–	–	12,5	–	–	0,3	0,6
ZARF2080-L-TV	1,22	**20**	80	–	–	75	53	18	10	52	40	50	12,5	27,5	11	0,3	0,6
ZARF2590-TV	1,6	**25**	90	60	38	–	–	18	10	62	–	–	12,5	–	–	0,3	0,6
ZARF2590-L-TV	1,75	**25**	90	–	–	75	53	18	10	62	48	60	12,5	27,5	11	0,3	0,6
ZARF30105-TV	1,95	**30**	105	66	41	–	–	18	10	68	–	–	14	–	–	0,3	0,6
ZARF30105-L-TV	2,15	**30**	105	–	–	82	57	18	10	68	52	66	14	30	12	0,3	0,6
ZARF35110-TV	1,6	**35**	110	66	41	–	–	18	10	73	–	–	14	–	–	0,3	0,6
ZARF35110-L-TV	1,85	**35**	110	–	–	82	57	18	10	73	60	73	14	30	12	0,3	0,6
ZARF40115-TV	2,7	**40**	115	75	47,5	–	–	22,5	12,5	78	–	–	16	–	–	0,3	0,6
ZARF40115-L-TV	3	**40**	115	–	–	93	65,5	22,5	12,5	78	60	78	16	34	12	0,3	0,6
ZARF45130-TV	3,9	**45**	130	82	51	–	–	22,5	12,5	90	–	–	17,5	–	–	0,3	0,6
ZARF45130-L-TV	4,3	**45**	130	–	–	103	72	22,5	12,5	90	70	88	17,5	38,5	14	0,3	0,6

1) If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.

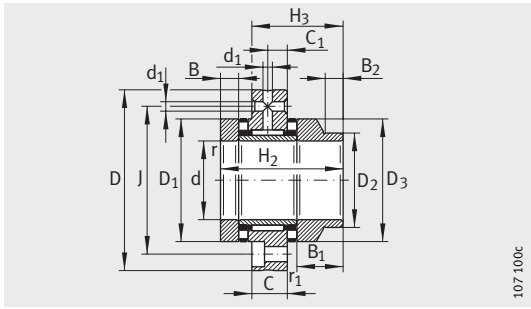
2) Tightening torque of fixing screws according to manufacturer's data.
Screws are not included in the delivery.

3) Mass moment of inertia for rotating inner ring.

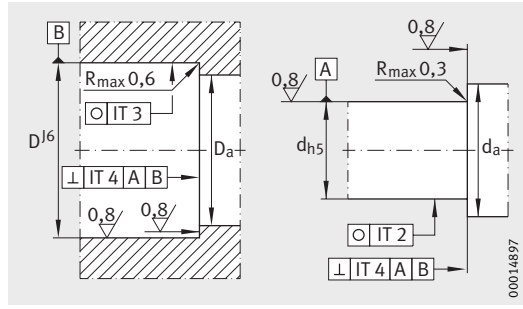
4) Mounting dimension for seal carrier assembly DRS.
Seal carrier assemblies: see page 1095 and page 1101.

5) Only valid in conjunction with INA precision locknuts.

6) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



ZARF..-L



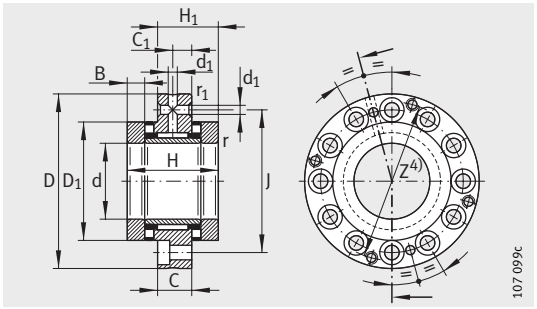
Design of adjacent construction

		Mounting dimensions[1]		Basic load ratings				Limiting speeds		Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia[3]	Axial runout[6]
				axial		radial								
d_1	J	D_a	d_a	dyn. C_a	stat. C_{0a}	dyn. C_r	stat. C_{0r}	n_G oil	n_G grease	M_{RL}	c_{aL}	c_{kL}	M_m	
		max.	min.	N	N	N	N	min^{-1}	min^{-1}	Nm	N/μm	Nm/mrad	kg · cm^2	μm
3,2	63	53	38	64 000	141 000	22 600	36 000	6 000	1 500	1,3	2 300	400	1,98	1
3,2	63	53	38	64 000	141 000	22 600	36 000	6 000	1 500	1,3	2 300	400	2,27	1
3,2	73	63	45	80 000	199 000	24 300	41 500	4 900	1 400	1,6	3 000	800	3,88	1
3,2	73	63	45	80 000	199 000	24 300	41 500	4 900	1 400	1,6	3 000	800	4,51	1
3,2	85	69	52	107 000	265 000	26 000	47 000	4 400	1 300	2,1	3 300	1 100	6,53	1
3,2	85	69	50	107 000	265 000	26 000	47 000	4 400	1 300	2,1	3 300	1 100	7,43	1
3,2	88	74	60	105 000	265 000	27 500	53 000	4 000	1 250	2,3	2 500	1 300	8,47	1
3,2	88	74	58	105 000	265 000	27 500	53 000	4 000	1 250	2,3	3 500	1 300	10,4	1
6	94	79	65	117 000	315 000	38 000	74 000	3 700	1 200	2,5	3 800	1 800	13,3	1
6	94	79	58	117 000	315 000	38 000	74 000	3 700	1 200	2,5	3 800	1 800	15,5	1
6	105	91	70	154 000	405 000	40 000	82 000	3 300	1 150	3,5	4 000	2 100	23,7	1
6	105	91	68	154 000	405 000	40 000	82 000	3 300	1 150	3,5	4 000	2 100	28,1	1

Designation	Recommended INA locknut; to be ordered separately				Rotary shaft seal to DIN 3 760; to be ordered separately	Fixing screws[2] DIN 912-10.9	
	Designation		Tightening torque[5] M_A Nm	Axial preload force N		Size	Quantity
ZARF2080-TV	**ZMA20/52**	**AM20**	38	18 448	–	M6	12
ZARF2080-L-TV	**ZMA20/52**	**AM20**	38	18 448	40X52X7	M6	12
ZARF2590-TV	**ZMA25/58**	**AM25**	55	20 790	–	M6	12
ZARF2590-L-TV	**ZMA25/58**	**AM25**	55	20 790	48X62X8	M6	12
ZARF30105-TV	**ZMA30/65**	**AM30**	75	24 287	–	M8	12
ZARF30105-L-TV	**ZMA30/65**	**AM30**	75	24 287	52X68X8	M8	12
ZARF35110-TV	**ZMA35/70**	**AM35**	100	27 480	–	M8	12
ZARF35110-L-TV	**ZMA35/70**	**AM35**	100	27 480	60X75X8	M8	12
ZARF40115-TV	**ZMA40/75**	**AM40**	120	29 834	–	M8	12
ZARF40115-L-TV	**ZMA40/75**	**AM40**	120	29 834	60X80X8	M8	12
ZARF45130-TV	**ZMA45/85**	**AM45**	150	33 549	–	M8	12
ZARF45130-L-TV	**ZMA45/85**	**AM45**	150	33 549	70X90X10	M8	12

Needle roller/ axial cylindrical roller bearings

Heavy series
For screw mounting



ZARF

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions																	
	m	d	D	H	H_1	H_2	H_3	C	C_1	D_1	D_2	D_3	B	B_1	B_2	r	r_1	d_1	J
	≈kg															min.	min.		
ZARF50140-TV	4,2	**50**	140	82	51	–	–	22,5	12,5	95	–	–	17,5	–	–	0,3	0,6	6	113
ZARF50140-L-TV	4,65	**50**	140	–	–	103	72	22,5	12,5	95	75	93	17,5	38,5	14	0,3	0,6	6	113
ZARF55145-TV	4,5	**55**	145	82	51	–	–	22,5	12,5	100	–	–	17,5	–	–	0,3	0,6	6	118
ZARF55145-L-TV	5	**55**	145	–	–	103	72	22,5	12,5	100	80	98	17,5	38,5	14	0,3	0,6	6	118
ZARF60150-TV	4,7	**60**	150	82	51	–	–	22,5	12,5	105	–	–	17,5	–	–	0,3	0,6	6	123
ZARF60150-L-TV	5,35	**60**	150	–	–	103	72	22,5	12,5	105	90	105	17,5	38,5	16	0,3	0,6	6	123
ZARF65155-TV	5,1	**65**	155	82	51	–	–	22,5	12,5	110	–	–	17,5	–	–	0,3	0,6	6	128
ZARF65155-L-TV	5,7	**65**	155	–	–	103	72	22,5	12,5	110	90	108	17,5	38,5	16	0,3	0,6	6	128
ZARF70160-TV	5,2	**70**	160	82	51	–	–	22,5	12,5	115	–	–	17,5	–	–	0,3	0,6	6	133
ZARF70160-L-TV	5,95	**70**	160	–	–	103	72	22,5	12,5	115	100	115	17,5	38,5	16	0,3	0,6	6	133
ZARF75185-TV	9,4	**75**	185	100	62	–	–	27	15	135	–	–	21	–	–	0,3	1	6	155
ZARF75185-L-TV	10,6	**75**	185	–	–	125	87	27	15	135	115	135	21	46	16	0,3	1	6	155
ZARF90210-TV	13,7	**90**	210	110	69,5	–	–	32	17,5	160	–	–	22,5	–	–	0,3	1	8	180
ZARF90210-L-TV	15,1	**90**	210	–	–	135	94,5	32	17,5	160	130	158	22,5	47,5	16	0,3	1	8	180

1) If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.

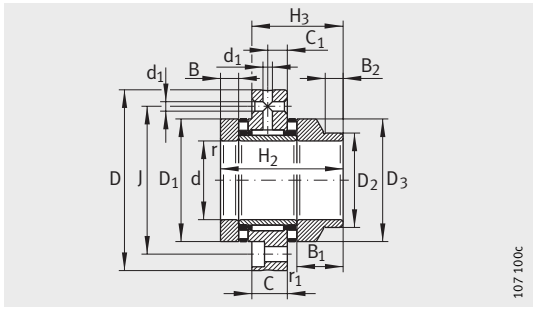
2) Tightening torque of fixing screws according to manufacturer's data.
Screws are not included in the delivery.

3) Mass moment of inertia for rotating inner ring.

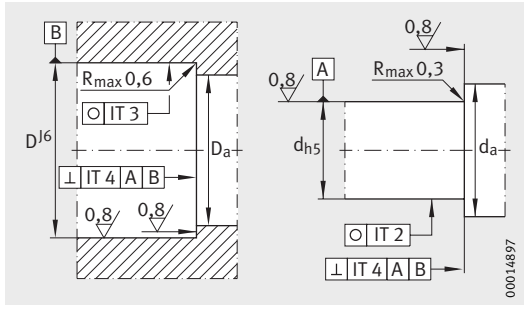
4) Mounting dimension for seal carrier assembly DRS.
Seal carrier assemblies: see page 1095 and page 1101.

5) Only valid in conjunction with INA precision locknuts.

6) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



ZARF..-L



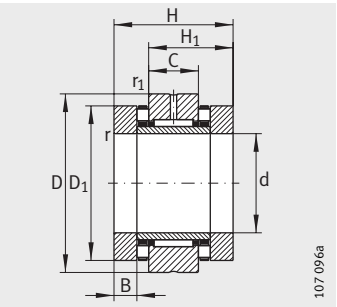
Design of adjacent construction

Mounting dimensions[1]		Basic load ratings				Limiting speeds		Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia[3]	Axial runout[6]
		axial		radial								
D_a	d_a	dyn. C_a	stat. C_{0a}	dyn. C_r	stat. C_{0r}	n_G oil	n_G grease	M_{RL}	c_{aL}	c_{kL}	M_m	
max.	min.	N	N	N	N	min^{-1}	min^{-1}	Nm	N/µm	Nm/ mrad	kg · cm^2	µm
96	75	172 000	480 000	42 000	90 000	3 100	1 100	3,8	4 600	2 900	29,8	1
96	73	172 000	480 000	42 000	90 000	3 100	1 100	3,8	4 600	2 900	35,3	1
101	85	177 000	500 000	44 000	98 000	2 900	1 000	4	4 900	3 600	36,1	1
101	78	177 000	500 000	44 000	98 000	2 900	1 000	4	4 900	3 600	43	1
106	90	187 000	550 000	44 500	92 000	2 700	950	4,2	5 300	4 300	43,8	1
106	88	187 000	550 000	44 500	92 000	2 700	950	4,2	5 300	4 300	54,5	1
111	97	172 000	500 000	54 000	104 000	2 600	900	4	4 800	4 000	51	1
111	88	172 000	500 000	54 000	104 000	2 600	900	4	4 800	4 000	60,1	1
116	100	201 000	630 000	56 000	119 000	2 400	800	4,8	5 800	6 000	62,2	1
116	98	201 000	630 000	56 000	119 000	2 400	800	4,8	5 800	6 000	77,3	1
136	113	290 000	890 000	72 000	132 000	2 100	700	8	6 600	8 500	149	2
136	110	290 000	890 000	72 000	132 000	2 100	700	8	6 600	8 500	188	2
161	130	325 000	1 030 000	98 000	210 000	1 800	700	10,5	7 700	14 500	312	2
161	125	325 000	1 030 000	98 000	210 000	1 800	700	10,5	7 700	14 500	372	2

Designation	Recommended INA locknut; to be ordered separately				Rotary shaft seal to DIN 3 760; to be ordered separately	Fixing screws[2] DIN 912-10.9	
	Designation		Tightening torque[5] M_A Nm	Axial preload force N		Size	Quantity
ZARF50140-TV	**ZMA50/92**	**AM50**	180	37 109	–	M10	12
ZARF50140-L-TV	**ZMA50/92**	**AM50**	180	37 109	75X95X10	M10	12
ZARF55145-TV	**ZMA55/98**	**AM55**	220	40 772	–	M10	12
ZARF55145-L-TV	**ZMA55/98**	**AM55**	220	40 772	80X100X10	M10	12
ZARF60150-TV	**ZMA60/98**	**AM60**	250	42 190	–	M10	12
ZARF60150-L-TV	**ZMA60/98**	**AM60**	250	42 190	90X110X12	M10	12
ZARF65155-TV	**ZMA65/105**	**AM65**	270	41 778	–	M10	12
ZARF65155-L-TV	**ZMA65/105**	**AM65**	270	41 778	90X110X12	M10	12
ZARF70160-TV	**ZMA70/110**	**AM70**	330	47 692	–	M10	12
ZARF70160-L-TV	**ZMA70/110**	**AM70**	330	47 692	100X120X12	M10	12
ZARF75185-TV	**ZMA75/125**	**AM75**	580	76 339	–	M12	12
ZARF75185-L-TV	**ZMA75/125**	**AM75**	580	76 339	115X140X12	M12	12
ZARF90210-TV	**ZMA90/155**	**AM90**	960	102 468	–	M12	16
ZARF90210-L-TV	**ZMA90/155**	**AM90**	960	102 468	130X160X12	M12	16

Needle roller/
axial cylindrical roller bearings

Light series
Not for screw mounting



ZARN

Dimension table · Dimensions in mm

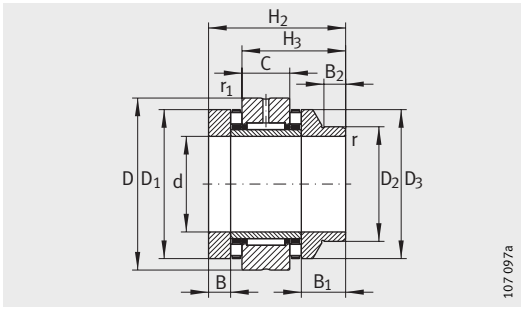
Designation	Mass	Dimensions														
	m	d	D	H	H_1	H_2	H_3	C	D_1	D_2	D_3	B	B_1	B_2	r	r_1
	≈kg														min.	min.
ZARN1545-TV	0,34	**15**	45	40	28	–	–	16	35	–	–	7,5	–	–	0,3	0,6
ZARN1545-L-TV	0,37	**15**	45	–	–	53	41	16	35	24	34	7,5	20,5	11	0,3	0,6
ZARN1747-TV	0,37	**17**	47	43	29,5	–	–	16	38	–	–	9	–	–	0,3	0,6
ZARN1747-L-TV	0,41	**17**	47	–	–	57	43,5	16	38	28	38	9	23	11	0,3	0,6
ZARN2052-TV	0,41	**20**	52	46	31	–	–	16	42	–	–	10	–	–	0,3	0,6
ZARN2052-L-TV	0,46	**20**	52	–	–	60	45	16	42	30	40	10	24	11	0,3	0,6
ZARN2557-TV	0,53	**25**	57	50	35	–	–	20	47	–	–	10	–	–	0,3	0,6
ZARN2557-L-TV	0,59	**25**	57	–	–	65	50	20	47	36	45	10	25	11	0,3	0,6
ZARN3062-TV	0,6	**30**	62	50	35	–	–	20	52	–	–	10	–	–	0,3	0,6
ZARN3062-L-TV	0,75	**30**	62	–	–	65	50	20	52	40	50	10	25	11	0,3	0,6

[1] If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.

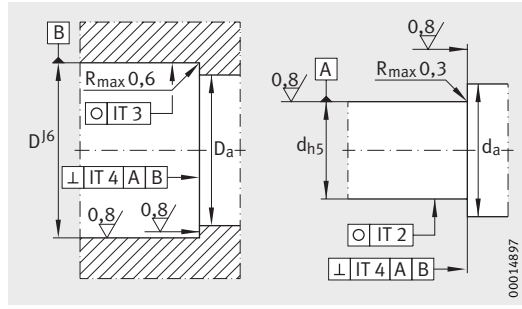
[2] Mass moment of inertia for rotating inner ring.

[3] Only valid in conjunction with INA precision locknuts.

[4] The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



ZARN..-L



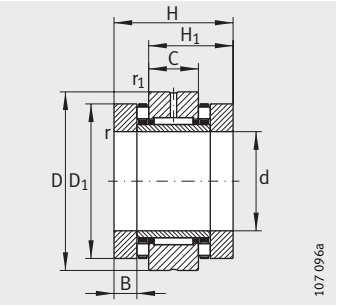
Design of adjacent construction

Mounting dimensions[1]		Basic load ratings				Limiting speeds		Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia[2]	Axial runout[4]
		axial		radial								
D_a	d_a	dyn. C_a	stat. C_{0a}	dyn. C_r	stat. C_{0r}	n_G oil	n_G grease	M_{RL}	c_{aL}	c_{kL}	M_m	
max.	min.	N	N	N	N	min^{-1}	min^{-1}	Nm	N/µm	Nm/mrad	kg · cm^2	µm
36	28	24 900	53 000	13 000	17 500	8 500	2 200	0,35	1 400	110	0,24	1
36	22	24 900	53 000	13 000	17 500	8 500	2 200	0,35	1 400	110	0,274	1
39	28	26 000	57 000	14 000	19 900	7 800	2 100	0,4	1 600	160	0,373	1
39	26	26 000	57 000	14 000	19 900	7 800	2 100	0,4	1 600	160	0,464	1
43	33	33 500	76 000	14 900	22 400	7 000	2 000	0,5	1 800	230	0,615	1
43	28	33 500	76 000	14 900	22 400	7 000	2 000	0,5	1 800	230	0,683	1
48	39	35 500	86 000	22 600	36 000	6 000	1 900	0,55	1 900	350	0,989	1
48	34	35 500	86 000	22 600	36 000	6 000	1 900	0,55	1 900	350	1,15	1
53	44	39 000	101 000	24 300	41 500	5 500	1 800	0,65	2 200	520	1,46	1
53	38	39 000	101 000	24 300	41 500	5 500	1 800	0,65	2 200	520	1,7	1

Designation	Recommended INA locknut; to be ordered separately				Rotary shaft seal to DIN 3 760; to be ordered separately
	Designation		Tightening torque[3] M_A Nm	Axial preload force N	
ZARN1545-TV	**ZMA15/33**	**AM15**	10	6 506	–
ZARN1545-L-TV	**ZMA15/33**	**AM15**	10	6 506	24X35X7
ZARN1747-TV	**ZM17**	**AM17**	12	7 078	–
ZARN1747-L-TV	**ZM17**	**AM17**	12	7 078	28X40X7
ZARN2052-TV	**ZMA20/38**	**AM20**	18	9 376	–
ZARN2052-L-TV	**ZMA20/38**	**AM20**	18	9 376	30X42X7
ZARN2557-TV	**ZMA25/45**	**AM25**	25	10 470	–
ZARN2557-L-TV	**ZMA25/45**	**AM25**	25	10 470	36X47X7
ZARN3062-TV	**ZMA30/52**	**AM30**	32	11 091	–
ZARN3062-L-TV	**ZMA30/52**	**AM30**	32	11 091	40X52X7

Needle roller/
axial cylindrical roller bearings

Light series
Not for screw mounting



ZARN

Dimension table (continued) · Dimensions in mm

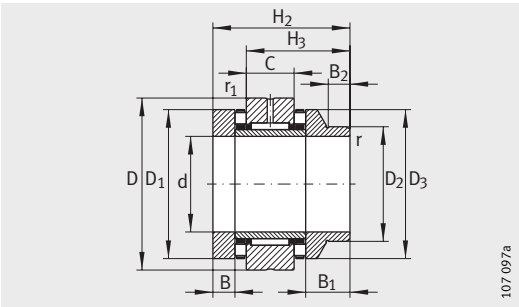
Designation	Mass	Dimensions														
	m	d	D	H	H_1	H_2	H_3	C	D_1	D_2	D_3	B	B_1	B_2	r	r_1
	≈kg														min.	min.
ZARN3570-TV	0,8	**35**	70	54	37	–	–	20	60	–	–	11	–	–	0,3	0,6
ZARN3570-L-TV	0,93	**35**	70	–	–	70	53	20	60	45	58	11	27	12	0,3	0,6
ZARN4075-TV	0,9	**40**	75	54	37	–	–	20	65	–	–	11	–	–	0,3	0,6
ZARN4075-L-TV	1	**40**	75	–	–	70	53	20	65	50	63	11	27	12	0,3	0,6
ZARN4580-TV	1,12	**45**	80	60	42,5	–	–	25	70	–	–	11,5	–	–	0,3	0,6
ZARN4580-L-TV	1,27	**45**	80	–	–	75	57,5	25	70	56	68	11,5	26,5	12	0,3	0,6
ZARN5090-TV	1,43	**50**	90	60	42,5	–	–	25	78	–	–	11,5	–	–	0,3	0,6
ZARN5090-L-TV	1,78	**50**	90	–	–	78	60,5	25	78	60	78	11,5	29,5	12	0,3	0,6

1) If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.

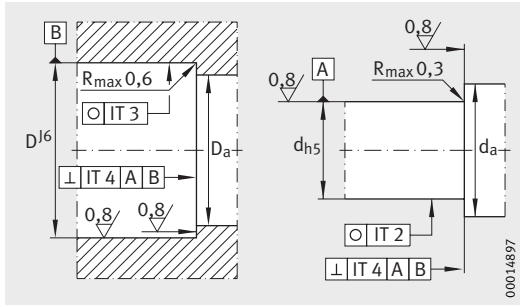
2) Mass moment of inertia for rotating inner ring.

3) Only valid in conjunction with INA precision locknuts.

4) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



ZARN..-L



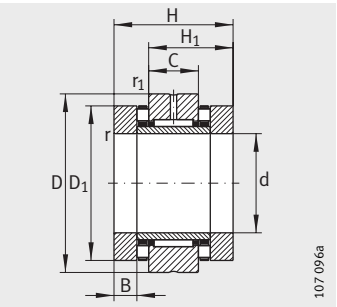
Design of adjacent construction

Mounting dimensions[1]		Basic load ratings				Limiting speeds		Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia[2]	Axial runout[4]
		axial		radial								
D_a	d_a	dyn. C_a	stat. C_{0a}	dyn. C_r	stat. C_{0r}	n_G oil	n_G grease	M_{RL}	c_{aL}	c_{kL}	M_m	
max.	min.	N	N	N	N	min^{-1}	min^{-1}	Nm	N/µm	Nm/mrad	kg · cm^2	µm
61	50	56 000	148 000	26 000	47 000	4 800	1 700	0,9	2 600	740	2,8	1
61	43	56 000	148 000	26 000	47 000	4 800	1 700	0,9	2 600	740	3,21	1
66	55	59 000	163 000	27 500	53 000	4 400	1 600	1	2 800	1 030	3,78	1
66	48	59 000	163 000	27 500	53 000	4 400	1 600	1	2 800	1 030	4,35	1
71	60	61 000	177 000	38 000	74 000	4 000	1 500	1,2	3 000	1 340	5,33	1
71	54	61 000	177 000	38 000	74 000	4 000	1 500	1,2	3 000	1 340	6,03	1
79	67	90 000	300 000	40 000	82 000	3 600	1 200	2,2	4 800	2 470	8,42	1
79	58	90 000	300 000	40 000	82 000	3 600	1 200	2,2	4 800	2 470	10,46	1

Designation	Recommended INA locknut; to be ordered separately				Rotary shaft seal to DIN 3 760; to be ordered separately
	Designation		Tightening torque[3] M_A Nm	Axial preload force N	
ZARN3570-TV	**ZMA35/58**	**AM35/58**	42	12 486	–
ZARN3570-L-TV	**ZMA35/58**	**AM35/58**	42	12 486	45X60X8
ZARN4075-TV	**ZMA40/62**	**AM40**	55	14 240	–
ZARN4075-L-TV	**ZMA40/62**	**AM40**	55	14 240	50X65X8
ZARN4580-TV	**ZMA45/68**	**AM45**	65	15 765	–
ZARN4580-L-TV	**ZMA45/68**	**AM45**	65	15 765	56X70X8
ZARN5090-TV	**ZMA50/75**	**AM50**	85	18 410	–
ZARN5090-L-TV	**ZMA50/75**	**AM50**	85	18 410	60X80X8

Needle roller/
axial cylindrical roller bearings

Heavy series
Not for screw mounting



ZARN

Dimension table · Dimensions in mm

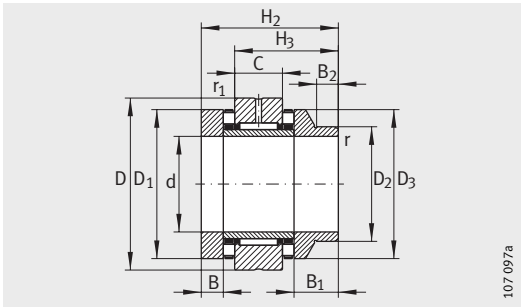
Designation	Mass	Dimensions														
	m	d	D	H	H_1	H_2	H_3	C	D_1	D_2	D_3	B	B_1	B_2	r	r_1
	≈kg														min.	min.
ZARN2062-TV	0,87	**20**	62	60	40	–	–	20	52	–	–	12,5	–	–	0,3	0,6
ZARN2062-L-TV	0,99	**20**	62	–	–	75	55	20	52	40	50	12,5	27,5	11	0,3	0,6
ZARN2572-TV	1,17	**25**	72	60	40	–	–	20	62	–	–	12,5	–	–	0,3	0,6
ZARN2572-L-TV	1,32	**25**	72	–	–	75	55	20	62	48	60	12,5	27,5	11	0,3	0,6
ZARN3080-TV	1,5	**30**	80	66	43	–	–	20	68	–	–	14	–	–	0,3	0,6
ZARN3080-L-TV	1,7	**30**	80	–	–	82	59	20	68	52	66	14	30	12	0,3	0,6
ZARN3585-TV	1,65	**35**	85	66	43	–	–	20	73	–	–	14	–	–	0,3	0,6
ZARN3585-L-TV	1,8	**35**	85	–	–	82	59	20	73	60	73	14	30	12	0,3	0,6
ZARN4090-TV	2,09	**40**	90	75	50	–	–	25	78	–	–	16	–	–	0,3	0,6
ZARN4090-L-TV	2,39	**40**	90	–	–	93	68	25	78	60	78	16	34	12	0,3	0,6
ZARN45105-TV	3,02	**45**	105	82	53,5	–	–	25	90	–	–	17,5	–	–	0,3	0,6
ZARN45105-L-TV	3,42	**45**	105	–	–	103	74,5	25	90	70	88	17,5	38,5	14	0,3	0,6
ZARN50110-TV	3,3	**50**	110	82	53,5	–	–	25	95	–	–	17,5	–	–	0,3	0,6
ZARN50110-L-TV	3,75	**50**	110	–	–	103	74,5	25	95	75	93	17,5	38,5	14	0,3	0,6

1) If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.

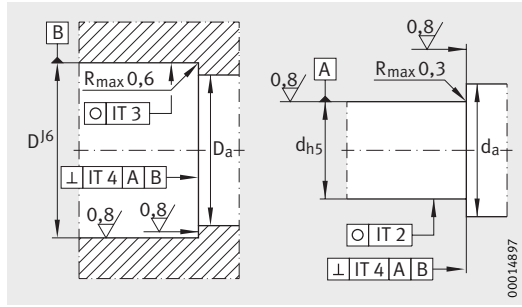
2) Mass moment of inertia for rotating inner ring.

3) Only valid in conjunction with INA precision locknuts.

4) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



ZARN..-L



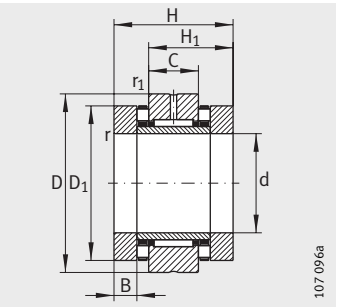
Design of adjacent construction

Mounting dimensions[1]		Basic load ratings				Limiting speeds		Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia[2]	Axial runout[4]
		axial		radial								
D_a	d_a	dyn. C_a	stat. C_{0a}	dyn. C_r	stat. C_{0r}	n_G oil	n_G grease	M_{RL}	c_{aL}	c_{kL}	M_m	
max.	min.	N	N	N	N	min^{-1}	min^{-1}	Nm	N/µm	Nm/mrad	kg · cm^2	µm
53	38	64 000	141 000	22 600	36 000	6 000	1 500	1,3	2 300	400	1,98	1
53	38	64 000	141 000	22 600	36 000	6 000	1 500	1,3	2 300	400	2,27	1
63	45	80 000	199 000	24 300	41 500	4 900	1 400	1,6	3 000	800	3,88	1
63	45	80 000	199 000	24 300	41 500	4 900	1 400	1,6	3 000	800	4,51	1
69	52	107 000	265 000	26 000	47 000	4 400	1 300	2,1	3 300	1 100	6,53	1
69	50	107 000	265 000	26 000	47 000	4 400	1 300	2,1	3 300	1 100	7,43	1
74	60	105 000	265 000	27 500	53 000	4 000	1 250	2,3	3 500	1 300	8,47	1
74	58	105 000	265 000	27 500	53 000	4 000	1 250	2,3	3 500	1 300	10,4	1
79	65	117 000	315 000	38 000	74 000	3 700	1 200	2,5	3 800	1 800	13,3	1
79	58	117 000	315 000	38 000	74 000	3 700	1 200	2,5	3 800	1 800	15,5	1
91	70	154 000	405 000	40 000	82 000	3 300	1 150	3,5	4 000	2 100	23,7	1
91	68	154 000	405 000	40 000	82 000	3 300	1 150	3,5	4 000	2 100	28,1	1
96	75	172 000	480 000	42 000	90 000	3 100	1 100	3,8	4 600	2 900	29,8	1
96	73	172 000	480 000	42 000	90 000	3 100	1 100	3,8	4 600	2 900	35,3	1

Designation	Recommended INA locknut; to be ordered separately				Rotary shaft seal to DIN 3 760; to be ordered separately
	Designation		Tightening torque[3] M_A Nm	Axial preload force N	
ZARN2062-TV	**ZMA20/52**	**AM20**	38	18 448	–
ZARN2062-L-TV	**ZMA20/52**	**AM20**	38	18 448	40X52X7
ZARN2572-TV	**ZMA25/58**	**AM25**	55	20 790	–
ZARN2572-L-TV	**ZMA25/58**	**AM25**	55	20 790	48X62X8
ZARN3080-TV	**ZMA30/65**	**AM30**	75	24 287	–
ZARN3080-L-TV	**ZMA30/65**	**AM30**	75	24 287	52X68X8
ZARN3585-TV	**ZMA35/70**	**AM35**	100	27 480	–
ZARN3585-L-TV	**ZMA35/70**	**AM35**	100	27 480	60X75X8
ZARN4090-TV	**ZMA40/75**	**AM40**	120	29 834	–
ZARN4090-L-TV	**ZMA40/75**	**AM40**	120	29 834	60X80X8
ZARN45105-TV	**ZMA45/85**	**AM45**	150	33 549	–
ZARN45105-L-TV	**ZMA45/85**	**AM45**	150	33 549	70X90X10
ZARN50110-TV	**ZMA50/92**	**AM50**	180	37 109	–
ZARN50110-L-TV	**ZMA50/92**	**AM50**	180	37 109	75X95X10

Needle roller/ axial cylindrical roller bearings

Heavy series
Not for screw mounting



ZARN

Dimension table (continued) · Dimensions in mm

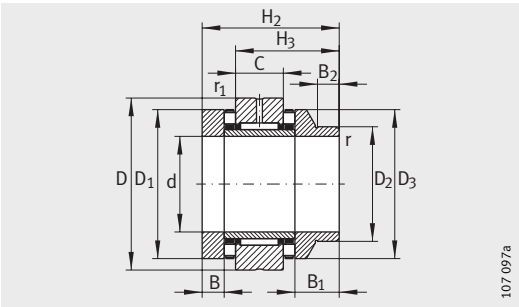
Designation	Mass	Dimensions														
	m	d	D	H	H_1	H_2	H_3	C	D_1	D_2	D_3	B	B_1	B_2	r	r_1
	≈kg														min.	min.
ZARN55115-TV	3,5	**55**	115	82	53,5	–	–	25	100	–	–	17,5	–	–	0,3	0,6
ZARN55115-L-TV	4	**55**	115	–	–	103	74,5	25	100	80	98	17,5	38,5	14	0,3	0,6
ZARN60120-TV	3,7	**60**	120	82	53,5	–	–	25	105	–	–	17,5	–	–	0,3	0,6
ZARN60120-L-TV	4,85	**60**	120	–	–	103	74,5	25	105	90	105	17,5	38,5	16	0,3	0,6
ZARN65125-TV	4	**65**	125	82	53,5	–	–	25	110	–	–	17,5	–	–	0,3	0,6
ZARN65125-L-TV	4,6	**65**	125	–	–	103	74,5	25	110	90	108	17,5	38,5	16	0,3	0,6
ZARN70130-TV	4,1	**70**	130	82	53,5	–	–	25	115	–	–	17,5	–	–	0,3	0,6
ZARN70130-L-TV	4,85	**70**	130	–	–	103	74,5	25	115	100	115	17,5	38,5	16	0,3	0,6
ZARN75155-TV	7,9	**75**	155	100	65	–	–	30	135	–	–	21	–	–	0,3	1
ZARN75155-L-TV	9,1	**75**	155	–	–	125	90	30	135	115	135	21	46	16	0,3	1
ZARN90180-TV	11,8	**90**	180	110	72,5	–	–	35	160	–	–	22,5	–	–	0,3	1
ZARN90180-L-TV	13,2	**90**	180	–	–	135	97,5	35	160	130	158	22,5	47,5	16	0,3	1

[1] If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.

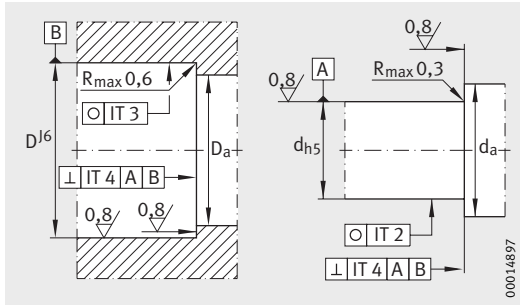
[2] Mass moment of inertia for rotating inner ring.

[3] Only valid in conjunction with INA precision locknuts.

[4] The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



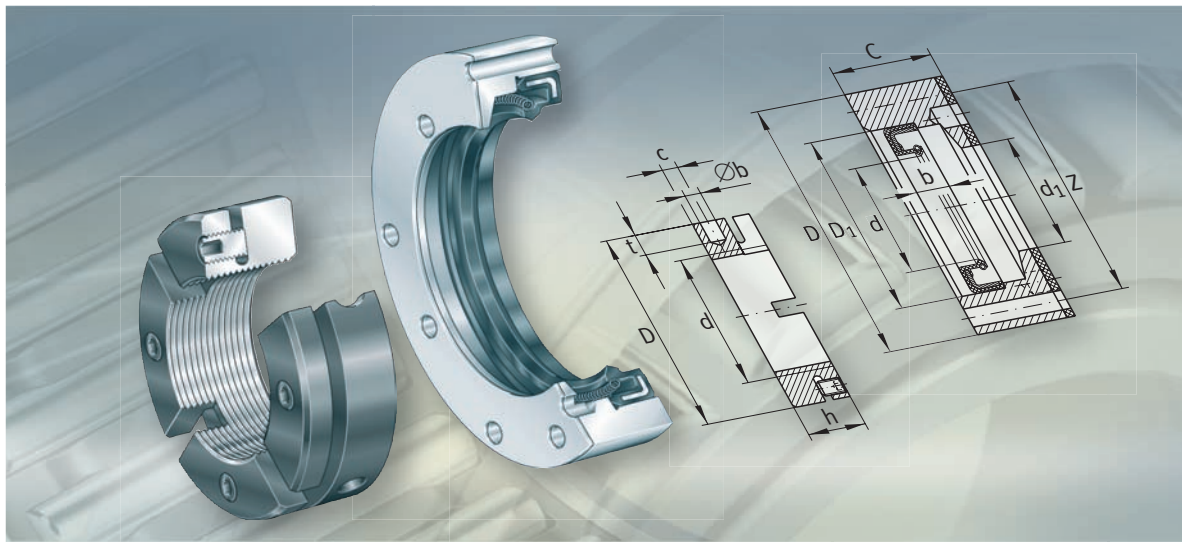
ZARN..-L



Design of adjacent construction

Mounting dimensions[1]		Basic load ratings				Limiting speeds		Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia[2]	Axial runout[4]
		axial		radial								
D_a	d_a	dyn. C_a	stat. C_{0a}	dyn. C_r	stat. C_{0r}	n_G oil	n_G grease	M_{RL}	c_{aL}	c_{kL}	M_m	
max.	min.	N	N	N	N	min^{-1}	min^{-1}	Nm	N/µm	Nm/mrad	kg · cm^2	µm
101	85	177 000	500 000	44 000	98 000	2 900	1 000	4	4 900	3 600	36,1	1
101	78	177 000	500 000	44 000	98 000	2 900	1 000	4	4 900	3 600	43	1
106	90	187 000	550 000	44 500	92 000	2 700	950	4,2	5 300	4 300	43,8	1
106	88	187 000	550 000	44 500	92 000	2 700	950	4,2	5 300	4 300	54,5	1
111	97	172 000	500 000	54 000	104 000	2 600	900	4	4 800	4 000	51	1
111	88	172 000	500 000	54 000	104 000	2 600	900	4	4 800	4 000	60,1	1
116	100	201 000	630 000	56 000	119 000	2 400	800	4,8	5 800	6 000	62,2	1
116	98	201 000	630 000	56 000	119 000	2 400	800	4,8	5 800	6 000	77,3	1
136	113	290 000	890 000	72 000	132 000	2 100	700	8	6 600	8 500	149	2
136	110	290 000	890 000	72 000	132 000	2 100	700	8	6 600	8 500	188	2
161	130	325 000	1 030 000	98 000	210 000	1 800	700	10,5	7 700	14 500	312	2
161	125	325 000	1 030 000	98 000	210 000	1 800	700	10,5	7 700	14 500	372	2

Designation	Recommended INA locknut; to be ordered separately				Rotary shaft seal to DIN 3 760; to be ordered separately
	Designation		Tightening torque[3] M_A Nm	Axial preload force N	
ZARN55115-TV	**ZMA55/98**	**AM55**	220	40 772	–
ZARN55115-L-TV	**ZMA55/98**	**AM55**	220	40 772	80X100X10
ZARN60120-TV	**ZMA60/98**	**AM60**	250	42 190	–
ZARN60120-L-TV	**ZMA60/98**	**AM60**	250	42 190	90X110X12
ZARN65125-TV	**ZMA65/105**	**AM65**	270	41 778	–
ZARN65125-L-TV	**ZMA65/105**	**AM65**	270	41 778	90X110X12
ZARN70130-TV	**ZMA70/110**	**AM70**	330	47 692	–
ZARN70130-L-TV	**ZMA70/110**	**AM70**	330	47 692	100X120X12
ZARN75155-TV	**ZMA75/125**	**AM75**	580	76 339	–
ZARN75155-L-TV	**ZMA75/125**	**AM75**	580	76 339	115X140X12
ZARN90180-TV	**ZMA90/155**	**AM90**	960	102 246	–
ZARN90180-L-TV	**ZMA90/155**	**AM90**	960	102 246	130X160X12



Seal carrier assemblies
Precision locknuts

Seal carrier assemblies
Precision locknuts

		Page
Product overview	Seal carrier assemblies, precision locknuts	1094
Features	Seal carrier assemblies	1095
	Operating temperature	1095
	Precision locknuts	1096
Design and safety guidelines	Breakaway torque	1098
	Ultimate axial load	1098
	Fitting and dismantling	1098
Accuracy		1100
Dimension tables	Seal carrier assemblies DRS	1101
	Precision locknuts AM	1102
	Adapters AMS	1103
	Precision locknuts ZM, ZMA	1104

Product overview

Seal carrier assemblies
Precision locknuts

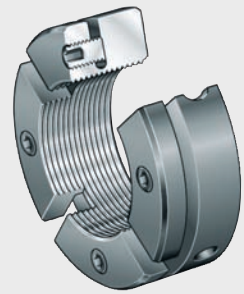
Seal carrier assemblies

DRS

Precision locknuts

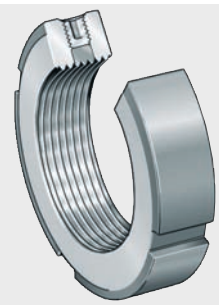
For axial locking

AM



For radial locking

ZM, ZMA



Seal carrier assemblies
Precision locknuts

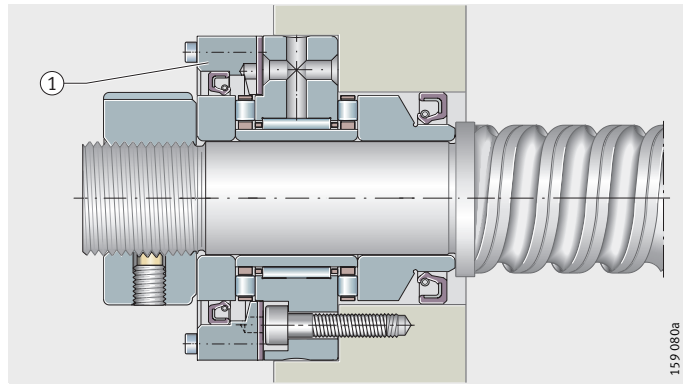
Features

Seal carrier assemblies

Seal carrier assemblies DRS are screw mounted to the outer ring of needle roller/axial cylindrical roller bearings ZARF(L) and precisely centred in this position, *Figure 1*, ①. They seal the bearings against outside influences.

The sealing elements are supplied as a complete kit and comprise a seal carrier with an integral rotary shaft seal, a gasket and hexagonal socket cap screws for fixing the carrier to the central washer of the bearing.

DRS
ZMA
ZARF..-L



① Seal carrier asembly DRS

Figure 1
Needle roller/
axial cylindrical roller bearing,
seal carrier assembly, locknut

Operating temperature

Seal carrier assemblies are suitable for operating temperatures from –30 °C to +120 °C, restricted by the seal material.

Seal carrier assemblies
Precision locknuts

Precision locknuts

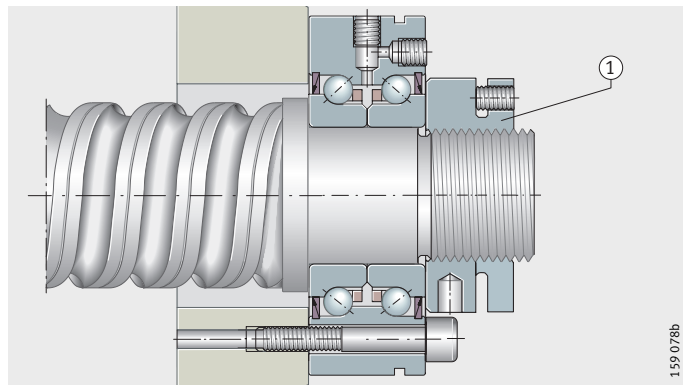
Precision locknuts are used where high axial forces must be supported and high runout accuracy and rigidity are required, *Figure 2*, ①, *Figure 3*, page 1097, ①.

The thread and the axial face of the locknut in contact with the rolling bearing are produced in a single clamping operation. This allows very high runout accuracy to be achieved.

Locknuts are available in the designs AM, ZM and ZMA. If handled correctly, they can be reused several times.

Axial locking by segments

Locknuts of series AM are divided into several segments for applying the locking forces. When the hexagonal socket grub screws are tightened, the segments are elastically deformed. As a result, the thread flanks of the segments are pressed against the flanks of the shaft thread and give a high frictional force that acts to prevent loosening of the nut. The runout of the nut is not affected by this method of locking.



AM
ZKLF..-2RS

① Precision locknut AM

Figure 2
Axial angular contact ball bearings

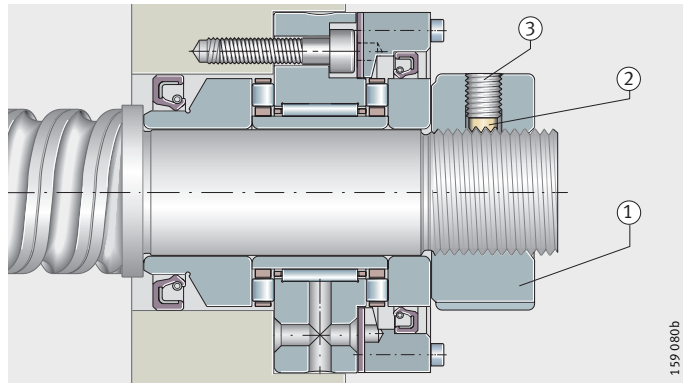
Locking by radial locking pegs

Locknuts ZM and ZMA are secured against rotation by means of two radially acting locking pegs, *Figure 3*, ①.
ZMA is the heavy series.

The locking pegs are manufactured together with the internal thread of the locknut. They mesh in the thread of the shaft without affecting the runout or damaging the thread, *Figure 3*, ②.

The locking pegs are secured by grub screws with a hexagonal socket arranged concentrically over the locking pegs, *Figure 3*, ③.

DRS
ZMA
ZARF..-L



① Precision locknut ZMA
② Locking peg
③ Grub screw

Figure 3
Needle roller/
axial cylindrical roller bearings

Seal carrier assemblies
Precision locknuts

Design and safety guidelines

Shaft threads for the precision locknuts must be precision machined, see table.

Recommended shaft thread

Shaft thread	
Tolerance class “medium”	Tolerance class “fine”
6g DIN 13 T21-24	4h DIN 13 T21-24

The journal thread must support the locknut over its whole width.

Breakaway torque

The breakaway torques M_L given in the dimension tables are based on a locknut tightened against a rigid shaft shoulder to the reference tightening torque M_{AL} and secured.

Ultimate axial load

The axial ultimate loads F_{aB} are valid for a journal thread with a tolerance 6g or better and a minimum strength of 700 N/mm^2.

For dynamic loading, the permissible value can be taken as 75% of the ultimate load F_{aB}.

Fitting and dismantling

For the fitting and dismantling of bearings and precision locknuts, the information in Fitting and Maintenance Manual TPI 100 must be observed.

Locknuts must be fully screwed onto the shaft thread.

Precision locknuts with axial locking

Locknuts AM can be tightened using a hook wrench to DIN 1810B that engages in four, six or eight holes around the circumference.

The grub screws are then tightened in a crosswise sequence to the specified tightening torque M_m using an Allen key. Dismantling is carried out by uniformly loosening the grub screws of all segments in order to prevent a single segment being left tensioned.

Tightening by means of just one segment is not permissible. For tightening, an adapter of series AMS can be used that ensures uniform loading of all segments. The adapter AMS must be ordered separately, see dimension table, page 1103.

For tightening using the adapter AMS, a hook wrench to DIN 1810A or to DIN 1810B can be used.

If precision locknuts AM are fitted using the adapter AMS, a maximum tightening torque of twice the value given in the dimension table for the bearing is permissible.

Segments can be axially deformed if the grub screws are not tightened uniformly in a crosswise sequence or the locknut AM is not fully screwed onto the shaft thread. The specified tightening torque M_m according to the dimension table must be observed.

Seal carrier assemblies
Precision locknuts

Precision locknuts with radial locking

Locknuts ZM and ZMA can be tightened using a hook wrench to DIN 1810A that engages in one of the four slots around the circumference.

The two grub screws are then tightened alternately to the specified tightening torque M_m using an Allen key; for M_m, see dimension tables for the bearings.

For dismantling, the two grub screws are first loosened and the locking pegs loosened by light impacts with a plastic hammer on the outside surface of the locknut (in the vicinity of the screw holes).

The locknut can then be easily unscrewed without damaging the journal thread.

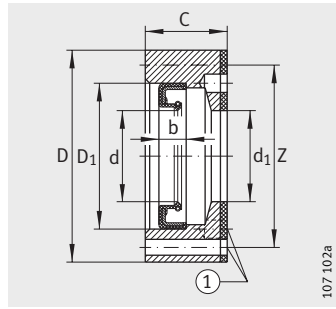
Accuracy

Accuracy of precision locknuts, see table.

Runout/thread

Axial runout Thread/axial face µm	Metric ISO thread “fine”
5	5H, DIN 13 T21-24

Seal carrier assemblies



DRS[1)]
① 4 holes, offset by 90°

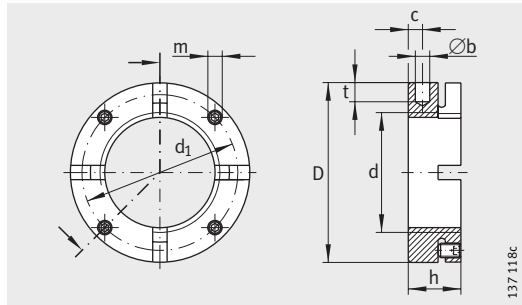
Dimension table · Dimensions in mm

Designation	Mass	Dimensions				Rotary shaft seal				Corresponding bearing in standard or L design
	m	D	C	d_1	Z[2)]	d	D_1	b	Socket head screws DIN 912	
	≈kg								4 each	Designation
DRS1560	0,16	60	14	35	52,4	35	45	7	M3X20	**ZARF1560-TV**
DRS1762	0,18	62	15,5	38	54,4	38	47	7	M3X25	**ZARF1762-TV**
DRS2068	0,11	68	17	42	60,4	42	55	8	M3X25	**ZARF2068-TV**
DRS2080	0,2	80	22	52	73,4	52	68	8	M3X30	**ZARF2080-TV**
DRS2575	0,16	75	17	47	67,4	47	62	6	M3X25	**ZARF2575-TV**
DRS2590	0,3	90	22	62	81	62	75	10	M3X30	**ZARF2590-TV**
DRS3080	0,15	80	17	52	73,4	52	68	8	M3X25	**ZARF3080-TV**
DRS30105	0,35	105	25	68	95	68	85	10	M4X35	**ZARF30105-TV**
DRS3590	0,15	90	19	60	80	60	72	8	M4X25	**ZARF3590-TV**
DRS35110	0,3	110	25	73	101	73	95	10	M3X30	**ZARF35110-TV**
DRS40100	0,25	100	19	65	90	65	80	8	M4X30	**ZARF40100-TV**
DRS40115	0,5	115	27,5	78	106	78	100	10	M3X35	**ZARF40115-TV**
DRS45105	0,3	105	20	70	95	70	85	8	M4X30	**ZARF45105-TV**
DRS45130	0,7	130	31	90	120	90	110	12	M4X40	**ZARF45130-TV**
DRS50115	0,2	115	20	78	106	78	100	10	M3X30	**ZARF50115-TV**
DRS50140	0,8	140	30	95	127,5	95	115	13	M5X40	**ZARF50140-TV**
DRS55145	0,9	145	30	100	132,5	100	120	12	M5X40	**ZARF55145-TV**
DRS60150	0,9	150	30	105	137,5	105	125	12	M5X40	**ZARF60150-TV**
DRS65155	1	155	30	110	142,5	110	130	12	M5X40	**ZARF65155-TV**
DRS70160	1	160	30	115	147,5	115	135	13	M5X40	**ZARF70160-TV**
DRS75185	1,8	185	36	135	172,5	135	160	15	M5X50	**ZARF75185-TV**
DRS90210	2,7	210	38	160	194	160	180	15	M5X50	**ZARF90210-TV**

1) The seal carrier assembly is supplied as a kit comprising:
– seal carrier
– rotary shaft seal
– flange seal
– socket head screws.

2) Four holes offset by 90°.

Precision locknuts



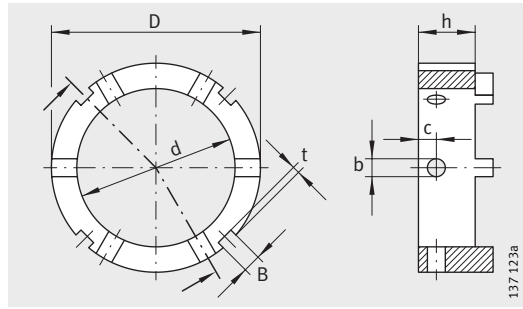
AM15 to AM40 with 4 segments
AM45 to AM90 with 6 segments
AM100 to AM130 with 8 segments

Dimension table · Dimensions in mm

Designation	Nut thread	Mass	Dimensions							Grub screw	Locknut[1]			
										Tightening torque	Axial rupture load	Breakaway torque	Reference tightening torque	Mass moment of inertia
		m	D	h	b	t	d_1	c	m	M_m	F_{aB}	M_L at	M_{AL}	M_M
	d	≈kg			H11					Nm	N	Nm	Nm	kg · cm^2
AM15	**M15X1**	0,06	30	18	4	5	24	5	M5	3	100 000	20	10	0,09
AM17	**M17X1**	0,07	32	18	4	5	26	5	M5	3	120 000	25	15	0,11
AM20	**M20X1**	0,13	38	18	4	6	31	5	M6	5	145 000	45	18	0,23
AM25	**M25X1,5**	0,16	45	20	5	6	38	6	M6	5	205 000	60	25	0,49
AM30	**M30X1,5**	0,20	52	20	5	7	45	6	M6	5	250 000	70	32	0,86
AM30/65	**M30X1,5**	0,50	65	30	6	8	45	6	M6	5	400 000	70	32	2,8
AM35/58	**M35X1,5**	0,23	58	20	5	7	51	6	M6	5	280 000	90	40	1,3
AM35	**M35X1,5**	0,33	65	22	6	8	58	6	M6	5	330 000	100	40	2,4
AM40	**M40X1,5**	0,30	65	22	6	8	58	6	M6	5	350 000	120	55	2,3
AM40/85	**M40X1,5**	0,75	85	32	6	8	58	6	M6	5	570 000	120	55	7,6
AM45	**M45X1,5**	0,34	70	22	6	8	63	6	M6	5	360 000	220	65	2,9
AM50	**M50X1,5**	0,43	75	25	6	8	68	8	M6	5	450 000	280	85	4,3
AM55	**M55X2**	0,60	85	26	6	8	75	8	M8	15	520 000	320	95	7,7
AM60	**M60X2**	0,65	90	26	6	8	80	8	M8	15	550 000	365	100	9,4
AM65	**M65X2**	0,83	100	26	8	10	88	8	M8	15	560 000	400	120	14,6
AM70	**M70X2**	0,79	100	28	8	10	90	9	M8	15	650 000	450	130	14,7
AM75	**M75X2**	1,23	115	30	8	10	102	10	M10	20	750 000	610	150	29
AM80	**M80X2**	0,93	110	30	8	10	98	10	M10	20	670 000	770	160	21,3
AM85	**M85X2**	0,97	115	30	8	10	102	10	M10	20	690 000	930	180	24,8
AM90	**M90X2**	1,53	130	32	8	10	118	13	M10	20	900 000	1 100	200	48
AM100	**M100X2**	1,12	130	30	8	10	118	10	M10	20	740 000	1 200	250	38
AM110	**M110X2**	1,22	140	30	8	10	128	10	M10	20	770 000	1 300	250	48
AM120	**M120X2**	1,56	155	30	8	10	142	10	M10	20	880 000	1 450	250	75
AM130	**M130X2**	1,67	165	30	8	10	152	10	M10	20	900 000	1 600	250	92

[1] Caution!
If precision locknuts AM are fitted using the adapter AMS,
a maximum tightening torque of twice the value given in the dimension table for the bearing is permissible.

Adapters

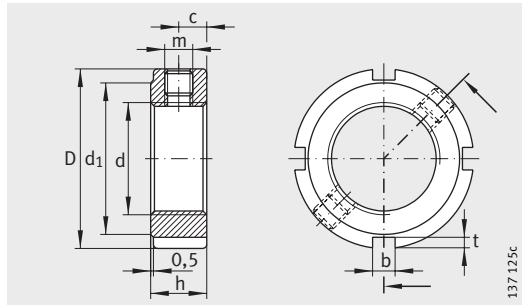


AMS

Dimension table · Dimensions in mm

Designation	Mass	Dimensions							For precision locknuts
	m ≈kg	D	h	d	b H11	c	B	t	
AMS20	0,047	32	14	22	4	5	4	2	**AM15, AM17, AM20**
AMS30	0,093	45	15	35	5	5	5	2	**AM25, AM30, AM35/58, AM30/65**
AMS40	0,217	65	16	45	6	6	6	2,5	**AM35, AM40**
AMS50	0,245	70	19	53	6	6	6	2,5	**AM45, AM50**
AMS60	0,37	85	20	65	6	6	7	3	**AM55, AM60**
AMS70	0,615	98	25	75	8	10	8	3,5	**AM65, AM70**
AMS80	0,755	110	25	85	8	10	8	3,5	**AM75, AM80, AM85**
AMS90	1,215	130	25	95	8	10	10	4	**AM90**
AMS110	0,74	130	25	110	8	10	10	4	**AM100, AM110**
AMS130	1,485	155	25	130	8	10	12	5	**AM120, AM130**

Precision locknuts



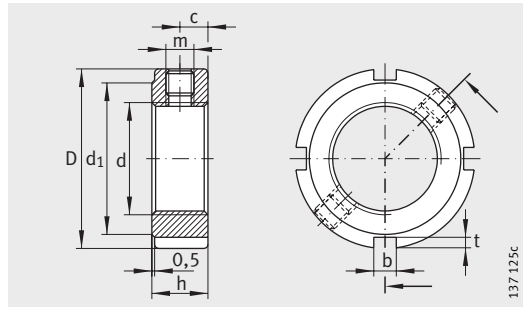
ZM, ZMA

Dimension table · Dimensions in mm

Designation	Thread	Mass	Dimensions							Grub screw	Locknut			
										Tightening torque	Axial rupture load	Breakaway torque	Reference tightening torque	Mass moment of inertia
		m	D	h	b	t	d_1	c	m	M_m	F_{aB}	M_L at	M_{AL}	M_M
		≈kg								Nm	N	Nm	Nm	kg · cm^2
ZM06	**M6X0,5**	0,01	16	8	3	2	11	4	M4	1	17 000	20	2	0,004
ZM08[1]	**M8X0,75**	0,01	16	8	3	2	11	4	M4	1	23 000	25	4	0,004
ZM10[1]	**M10X1**	0,01	18	8	3	2	14	4	M4	1	31 000	30	6	0,006
ZM12	**M12X1**	0,015	22	8	3	2	18	4	M4	1	38 000	30	8	0,013
ZM15	**M15X1**	0,018	25	8	3	2	21	4	M4	1	50 000	30	10	0,021
ZMA15/33	**M15X1**	0,08	33	16	4	2	28	8	M5	3	106 000	30	10	0,14
ZM17	**M17X1**	0,028	28	10	4	2	23	5	M5	3	57 000	30	15	0,401
ZM20	**M20X1**	0,035	32	10	4	2	27	5	M5	3	69 000	40	18	0,068
ZMA20/38	**M20X1**	0,12	38	20	5	2	33	10	M5	3	174 000	40	18	0,297
ZMA20/52	**M20X1**	0,32	52	25	5	2	47	12,5	M5	3	218 000	40	18	1,38
ZM25	**M25X1,5**	0,055	38	12	5	2	33	6	M6	5	90 000	60	25	0,157
ZMA25/45	**M25X1,5**	0,16	45	20	5	2	40	10	M6	5	211 000	60	25	0,572
ZMA25/58	**M25X1,5**	0,43	58	28	6	2,5	52	14	M6	5	305 000	60	25	2,36
ZM30	**M30X1,5**	0,075	45	12	5	2	40	6	M6	5	112 000	70	32	0,304
ZMA30/52	**M30X1,5**	0,22	52	22	5	2	47	11	M6	5	270 000	70	32	1,1
ZMA30/65	**M30X1,5**	0,55	65	30	6	2,5	59	15	M6	5	390 000	70	32	3,94
ZM35	**M35X1,5**	0,099	52	12	5	2	47	6	M6	5	134 000	80	40	0,537
ZMA35/58	**M35X1,5**	0,26	58	22	6	2,5	52	11	M6	5	300 000	80	40	1,66
ZMA35/70	**M35X1,5**	0,61	70	30	6	2,5	64	15	M6	5	460 000	80	40	5,2
ZM40	**M40X1,5**	0,14	58	14	6	2,5	52	7	M6	5	157 000	95	55	0,945
ZMA40/62	**M40X1,5**	0,27	62	22	6	2,5	56	11	M8	15	310 000	95	55	2,07
ZMA40/75	**M40X1,5**	0,67	75	30	6	2,5	69	15	M8	15	520 000	95	55	6,72
ZM45	**M45X1,5**	0,17	65	14	6	2,5	59	7	M6	5	181 000	110	65	1,48
ZMA45/68	**M45X1,5**	0,35	68	24	6	2,5	62	12	M8	15	360 000	110	65	3,2
ZMA45/85	**M45X1,5**	0,92	85	32	7	3	78	16	M8	15	630 000	110	65	11,9
ZM50	**M50X1,5**	0,19	70	14	6	2,5	64	7	M6	5	205 000	130	85	1,92
ZMA50/75	**M50X1,5**	0,43	75	25	6	2,5	68	12,5	M8	15	415 000	130	85	4,89
ZMA50/92	**M50X1,5**	1,06	92	32	8	3,5	84	16	M8	15	680 000	130	85	16,1
ZM55	**M55X2**	0,23	75	16	7	3	68	8	M6	5	229 000	150	95	2,77
ZMA55/98	**M55X2**	1,17	98	32	8	3,5	90	16	M8	15	620 000	150	95	20,5

[1] When clamped, the grub screw protrudes by approx. 0,5 mm.

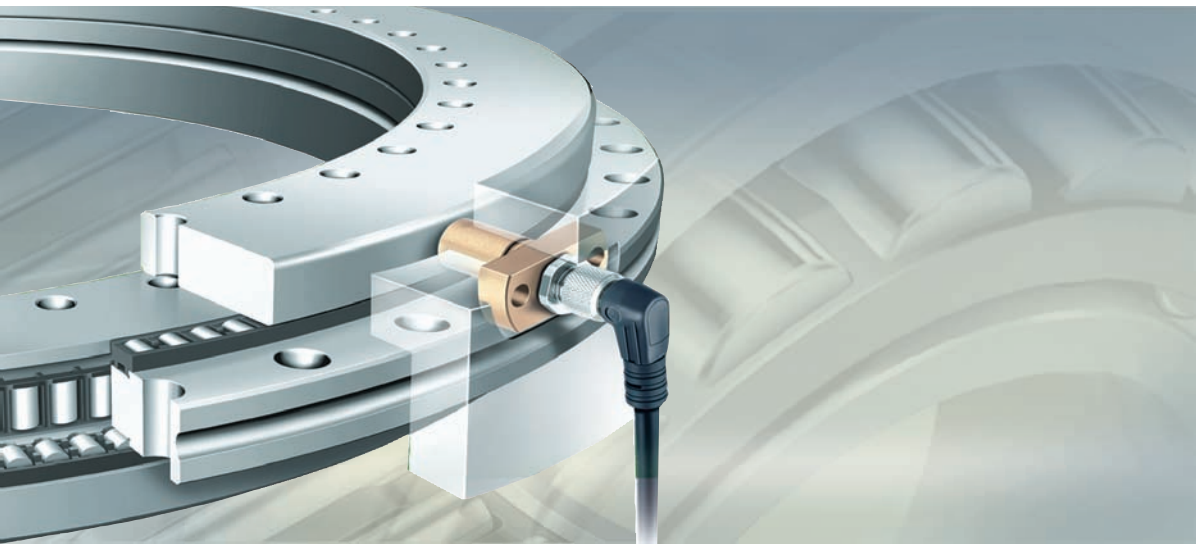
Precision locknuts



ZM, ZMA

Dimension table (continued) · Dimensions in mm

Designation	Thread	Mass	Dimensions							Grub screw	Locknut			
										Tightening torque	Axial rupture load	Breakaway torque	Reference tightening torque	Mass moment of inertia
		m	D	h	b	t	d_1	c	m	M_m	F_{aB}	M_L at	M_{AL}	M_M
		≈kg								Nm	N	Nm	Nm	kg · cm^2
ZM60	**M60X2**	0,25	80	16	7	3	73	8	M6	5	255 000	180	100	3,45
ZMA60/98	**M60X2**	1,07	98	32	8	3,5	90	16	M8	15	680 000	180	100	19,6
ZM65	**M65X2**	0,27	85	16	7	3	78	8	M6	5	280 000	200	120	4,24
ZMA65/105	**M65X2**	1,21	105	32	8	3,5	97	16	M8	15	750 000	200	120	25,6
ZM70	**M70X2**	0,36	92	18	8	3,5	85	9	M8	15	305 000	220	130	6,61
ZMA70/110	**M70X2**	1,4	110	35	8	3,5	102	17,5	M8	15	810 000	220	130	33
ZM75	**M75X2**	0,4	98	18	8	3,5	90	9	M8	15	331 000	260	150	8,41
ZMA75/125	**M75X2**	2,11	125	38	8	3,5	117	19	M8	15	880 000	260	150	62,2
ZM80	**M80X2**	0,46	105	18	8	3,5	95	9	M8	15	355 000	285	160	11,2
ZMA80/120	**M80X2**	1,33	120	35	8	4	105	17,5	M8	15	810 000	285	160	44,6
ZM85	**M85X2**	0,49	110	18	8	3,5	102	9	M8	15	385 000	320	190	13,1
ZM90	**M90X2**	0,7	120	20	10	4	108	10	M8	15	410 000	360	200	21,8
ZMA90/130	**M90X2**	2,01	130	38	10	4	120	19	M8	15	910 000	360	200	64,1
ZMA90/155	**M90X2**	3,36	155	38	10	4	146	19	M8	15	1 080 000	360	200	150
ZM100	**M100X2**	0,77	130	20	10	4	120	10	M8	15	465 000	425	250	28,6
ZMA100/140	**M100X2**	2,23	140	38	12	5	128	19	M10	20	940 000	425	250	82,8
ZM105	**M105X2**	1,05	140	22	12	5	126	11	M10	20	495 000	475	300	44,5
ZM110	**M110X2**	1,09	145	22	12	5	133	11	M10	20	520 000	510	350	50,1
ZM115	**M115X2**	1,13	150	22	12	5	137	11	M10	20	550 000	550	400	56,2
ZM120	**M120X2**	1,28	155	24	12	5	138	12	M10	20	580 000	600	450	68,4
ZM125	**M125X2**	1,33	160	24	12	5	148	12	M10	20	610 000	640	500	76,1
ZM130	**M130X2**	1,36	165	24	12	5	149	12	M10	20	630 000	700	550	84,3
ZM140	**M140X2**	1,85	180	26	14	6	160	13	M12	38	690 000	800	600	133
ZM150	**M150X2**	2,24	195	26	14	6	171	13	M12	38	750 000	900	650	188



High precision bearings for combined loads

Axial/radial bearings
Axial angular contact ball bearings
Axial/radial bearings
with integral angular measuring system

High precision bearings for combined loads

Axial/radial bearings

1110

Axial/radial bearings are double direction axial bearings for screw mounting, with a radial guidance bearing. These ready-to-fit, pregreased units are very rigid, have high load carrying capacity and run with particularly high accuracy. They can support radial forces, axial forces from both directions and tilting moments free from clearance. The bearings are available in several series.

For applications with low speeds and small operating durations, such as indexing tables and swivel type milling heads, the most suitable bearing is generally series YRT.

Where comparatively lower friction and higher speeds are required, RTC bearings can be used. For higher requirements in accuracy, these bearings are also available with restricted axial runout accuracy.

For the bearing arrangements of direct drive axes, there is series YRT_{Speed}. Due to their high limiting speeds and very low, uniform frictional torque across the whole speed range, these bearings are particularly suitable for combination with torque motors.

Axial angular contact ball bearings

1110

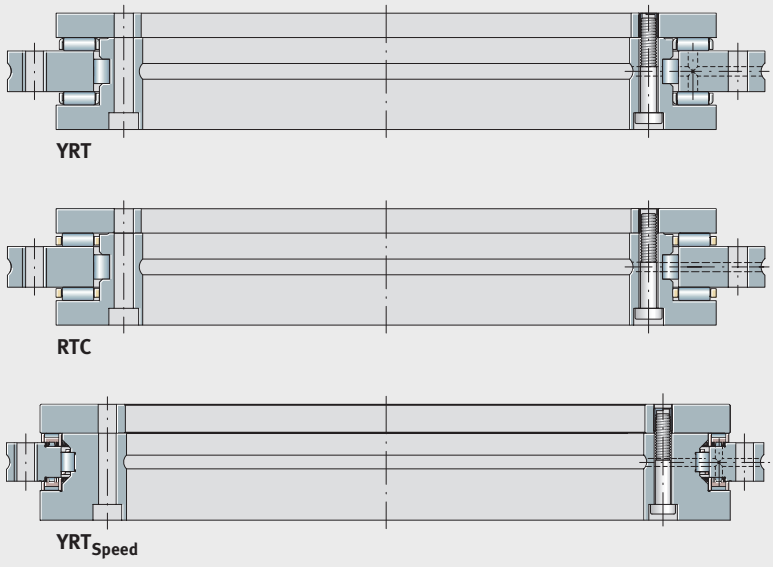
Axial angular contact ball bearings ZKLDF are low-friction, ready-to-fit, pregreased bearing units with high accuracy for very high speeds, high axial and radial loads and high demands on tilting rigidity.

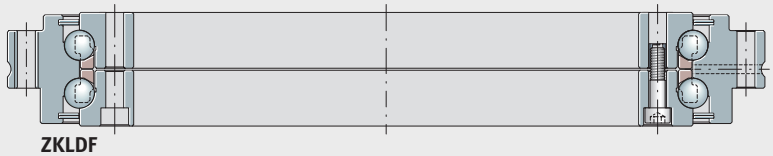
Axial angular contact ball bearings are particularly suitable for precision applications involving combined loads. Their preferred areas of use are bearing arrangements in rotary tables, milling, grinding and honing heads as well as measurement and testing equipment.

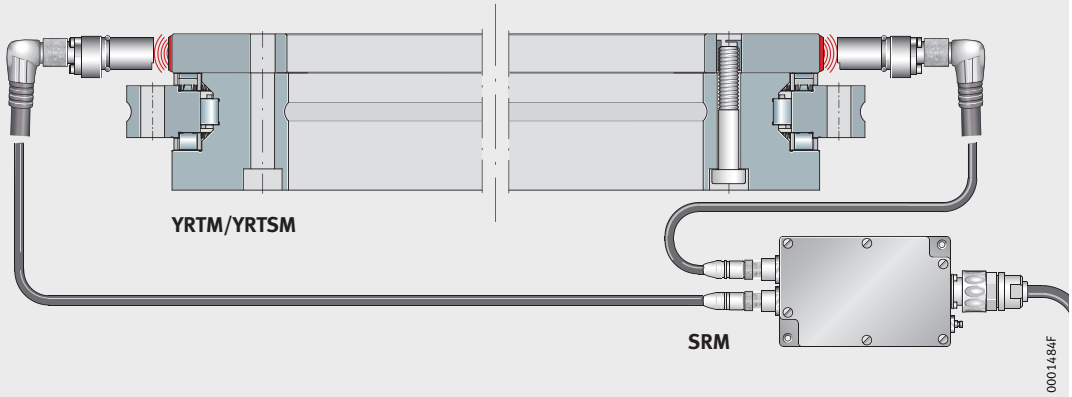
Axial/radial bearings with integral angular measuring system

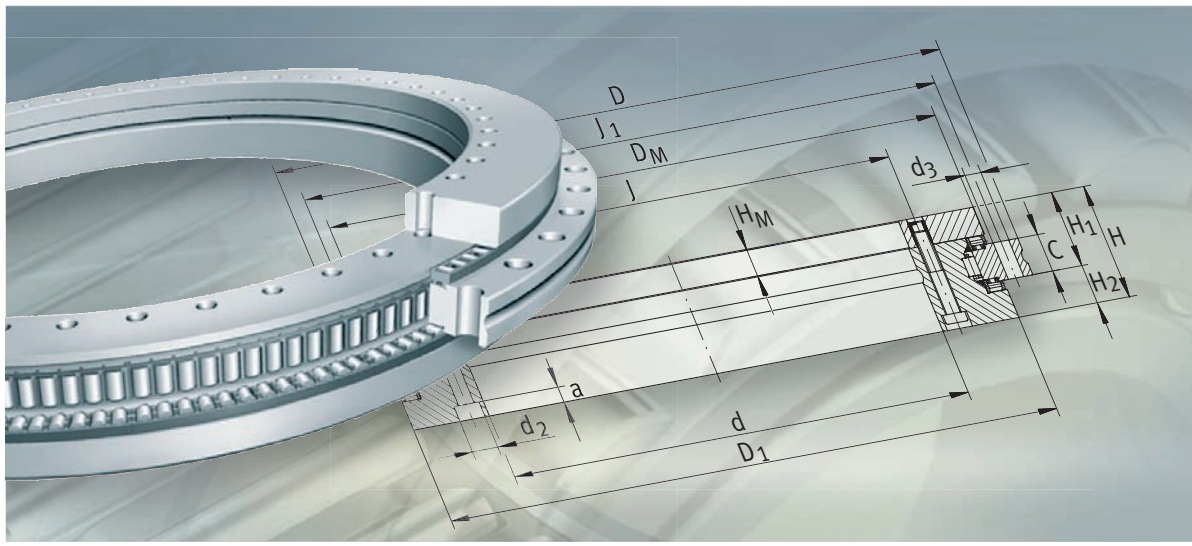
1144

Axial/radial bearings with integral measuring system YRTM and YRTSM correspond in mechanical terms to series YRT and YRTS but are additionally fitted with an angular measuring system. The measuring system can measure angles to an accuracy of a few angular seconds by non-contact, magneto-resistive means.


YRT
RTC
YRT Speed
00014884


ZKLDF
107 585


YRTM/YRTSM
SRM
0001484F



Axial/radial bearings
Axial angular contact ball bearings

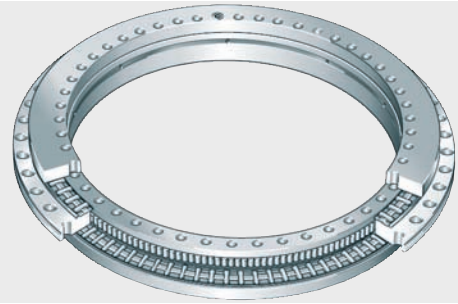
Axial/radial bearings
Axial angular contact ball bearings

		Page
Product overview	Axial/radial bearings, axial angular contact ball bearings	1112
Features	Areas of application	1114
	Axial/radial bearings	1115
	Axial angular contact ball bearings	1115
	Operating temperature	1115
	Suffixes	1115
Design and safety guidelines	Basic rating life	1116
	Static load safety factor	1116
	Static limiting load diagrams	1116
	Limiting speeds	1120
	Bearing preload	1120
	Frictional torque	1121
	Lubrication	1122
	Design of adjacent construction	1123
	Fits	1124
	L-section ring without support ring/with support ring	1128
	Fitting	1130
Accuracy		1131
Rigidity	Static rigidity	1133
Special designs		1133
Dimension tables	Axial/radial bearings, double direction, YRT	1134
	Axial/radial bearings, double direction, RTC	1138
	Axial/radial bearings, double direction, YRT_{Speed}	1140
	Axial angular contact ball bearings, double direction, ZKLDF	1142

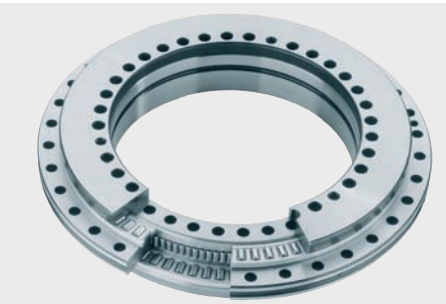
Axial/radial bearings
Axial angular contact ball bearings

Axial/radial bearings

YRT



RTC

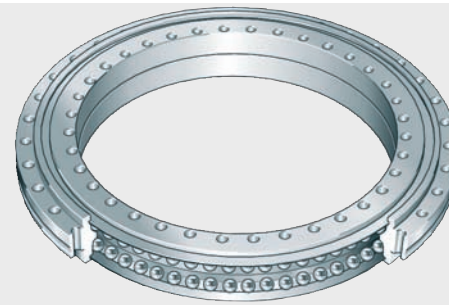


For higher speeds

YRT_{Speed}

Axial angular contact ball bearings

ZKLDF



Axial/radial bearings
Axial angular contact ball bearings

Features

Axial/radial bearings YRT, RTC and YRT_{Speed} and axial angular contact ball bearings ZKLDF are ready-to-fit high precision bearings for high precision applications with combined loads.
They can support radial loads, axial loads from both sides and tilting moments without clearance and are particularly suitable for bearing arrangements with high requirements for running accuracy, such as rotary tables, face plates, milling heads and reversible clamps.

Due to the fixing holes in the bearing rings, the units are very easy to fit.

The bearings are radially and axially preloaded after fitting.

The mounting dimensions of all series are identical.

With angular measuring system

Axial/radial bearings are also available with an angular measuring system. The measuring system can measure angles to an accuracy of a few angular seconds by non-contact, magneto-resistive means, see section Axial/radial bearings with integral angular measuring system, page 1144.

Axial/radial bearings
Axial angular contact ball bearings

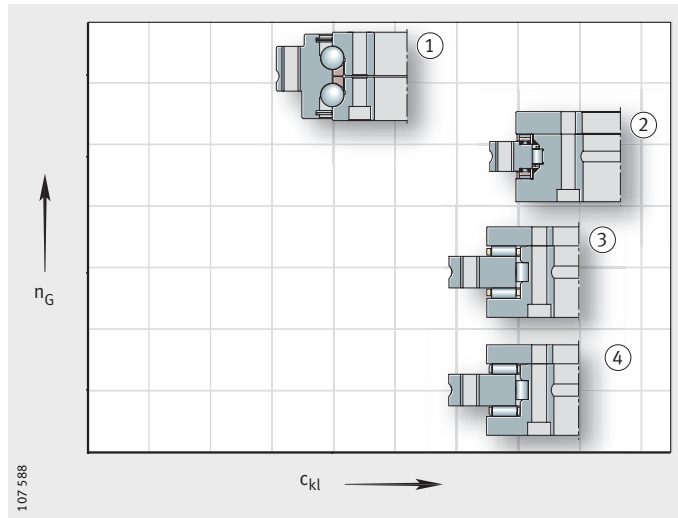
Areas of application

For standard applications with low speeds and small operating durations, such as indexing tables and swivel type milling heads, the most suitable bearing is generally series YRT, *Figure 1*. These bearings are available in two axial and radial runout accuracies.

Where comparatively lower friction and higher speeds are required, RTC bearings can be used, *Figure 1*. For higher requirements in accuracy, these bearings are also available with restricted axial runout accuracy.

For the bearing arrangements of direct drive axes, there is the series YRT_{Speed}. Due to their high limiting speeds and very low, uniform frictional torque across the whole speed range, these bearings are particularly suitable for combination with torque motors, *Figure 1*.

Axial angular contact ball bearings ZKLDF are particularly suitable for high speed applications with long operating duration, *Figure 1*. They are characterised by high tilting rigidity, low friction and low lubricant consumption.



① ZKLDF
② YRT_{Speed}
③ RTC
④ YRT
n_G = limiting speed
c_{kl} = tilting rigidity

Figure 1
Speed and tilting rigidity

Axial/radial bearings

Axial/radial bearings YRT, RTC and YRT_{Speed} have an axial component and a radial component.

The axial component comprises an axial needle roller or cylindrical roller and cage assembly, an outer ring, L-section ring and shaft locating washer and is axially preloaded after fitting.
The radial component is a full complement (YRT, RTC) or cage-guided, preloaded cylindrical roller set. The outer ring, L-section ring and shaft locating washer have fixing holes.

The unit is located by means of retaining screws for transport and safe handling.

Sealing

Axial/radial bearings are supplied without seals.

Lubrication

Bearings of series YRT and YRT_{Speed} are greased using a lithium complex soap grease to GA08 and can be lubricated via the outer ring and L-section ring.
Arcanol LOAD150 is suitable for relubrication.

Bearings of series RTC are greased with Arcanol MULTITOP.

Axial angular contact ball bearings

Axial angular contact ball bearings ZKLDF comprise a single-piece outer ring, a two-piece inner ring and two ball and cage assemblies with a contact angle of 60°. The outer ring and inner ring have fixing holes for screw mounting of the bearing on the adjacent construction.

The unit is located by means of retaining screws for transport and safe handling.

Sealing

Axial angular contact ball bearings have sealing shields on both sides.

Lubrication

The bearings are greased with a barium complex soap grease to DIN 51825–KPE2K–30 and can be lubricated via the outer ring.

Operating temperature

Axial/radial bearings and axial angular contact ball bearings are suitable for operating temperatures from –30 °C to +120 °C.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
H_1 ...	Reduced tolerance on mounting dimension H_1 (postscript: H_1 with tolerance ± ...) Restricted tolerance value, see table, page 1131	Special design, available by agreement
H_2 ...	Reduced tolerance on mounting dimension H_2 (postscript: H_2 with tolerance ± ...) Restricted tolerance value, see table, page 1131	
–	Axial and radial runout tolerances restricted by 50% (additional text: axial/radial runout 50%)	

Design and safety guidelines

Basic rating life

The load carrying capacity and life must be checked for the radial and axial bearing component.

Please contact us in relation to checking of the basic rating life. The speed, load and operating duration must be given.

Static load safety factor

The static load safety factor S_0 indicates the security against impermissible permanent deformations in the bearing:

$$S_0 = \frac{C_{0r}}{F_{0r}} \text{ or } \frac{C_{0a}}{F_{0a}}$$

S_0 –
Static load safety factor

C_{0r}, C_{0a} N
Basic static load rating according to dimension tables

F_{0r}, F_{0a} N
Equivalent static load on the radial or axial bearing.

In machine tools and similar areas of application, S_0 should be > 4.

Static limiting load diagrams

The static limiting load diagrams can be used:

- for rapid checking of the selected bearing size under predominantly static load
- for calculation of the tilting moment M_k that can be supported by the bearing in addition to the axial load.

The limiting load diagrams are based on a rolling element set with a static load safety factor $S_0 \geqq 4$, as well as the screw and bearing ring strength.

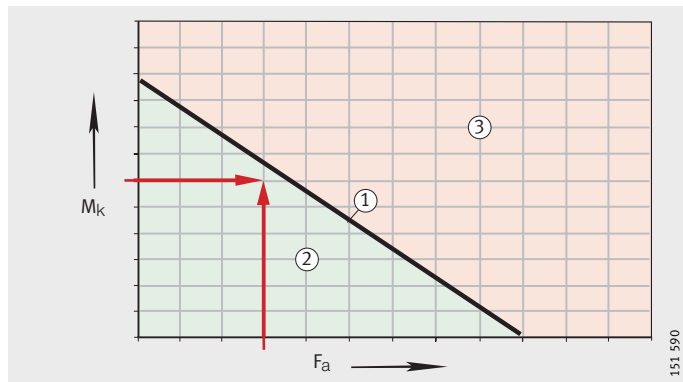
The static limiting load must not be exceeded when dimensioning the bearing arrangement. Example: see *Figure 2*.

Axial/radial bearings

The static limiting load diagrams for YRT, YRTS and RTC are shown in *Figure 3*, page 1117 to *Figure 9*, page 1119.

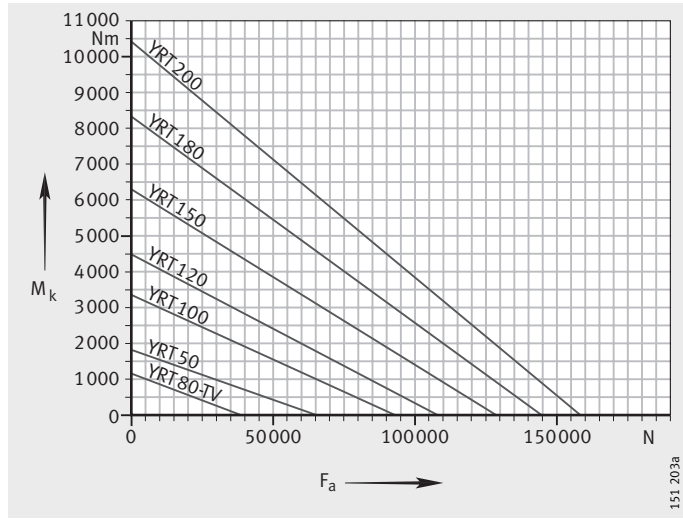
Axial angular contact ball bearings

The static limiting load diagrams for the series ZKLDF are shown in *Figure 10* and *Figure 11*, page 1119.



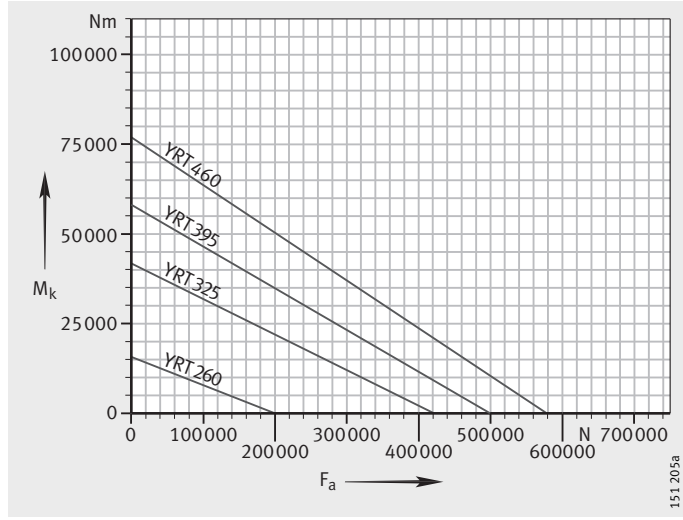
① Bearing, size
② Permissible range
③ Impermissible range
M_k = maximum tilting moment
F_a = axial load

Figure 2
Static limiting load diagram (example)



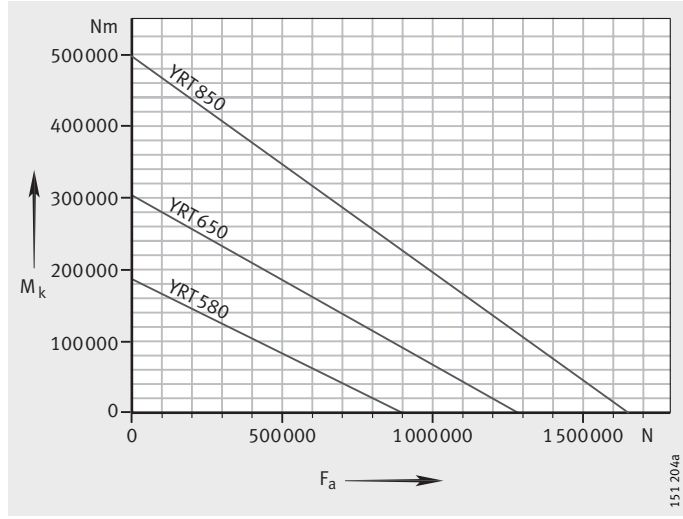
M_k = maximum tilting moment
F_a = axial load

Figure 3
Static limiting load diagram
YRT50 to YRT200



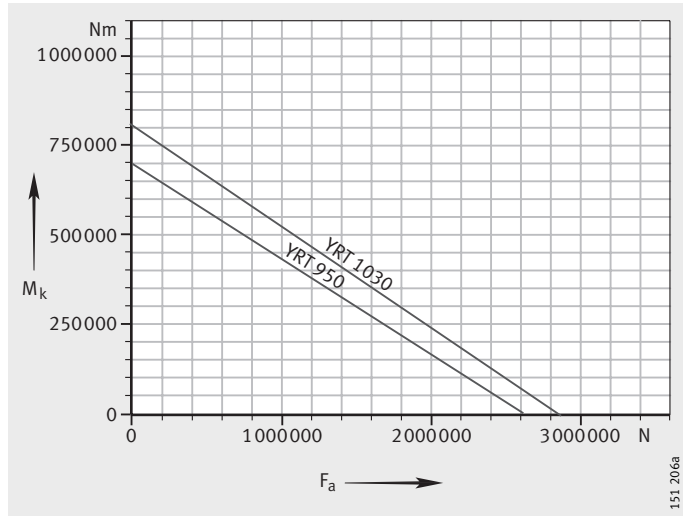
M_k = maximum tilting moment
F_a = axial load

Figure 4
Static limiting load diagram
YRT260 to YRT460



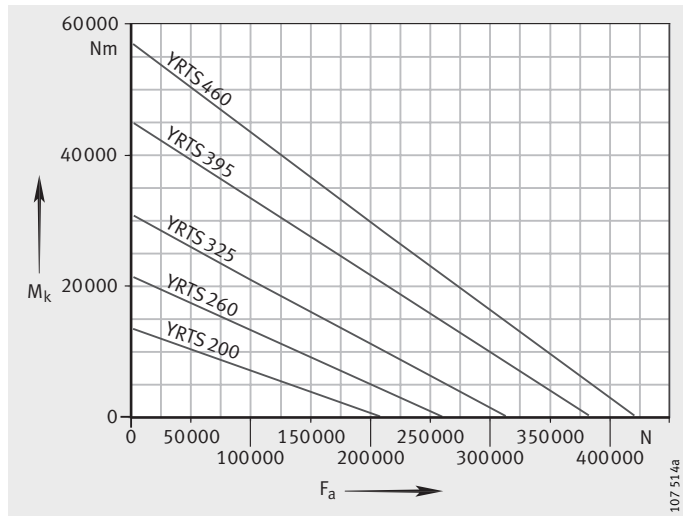
M_k = maximum tilting moment
F_a = axial load

Figure 5
Static limiting load diagram
YRT580 to YRT850



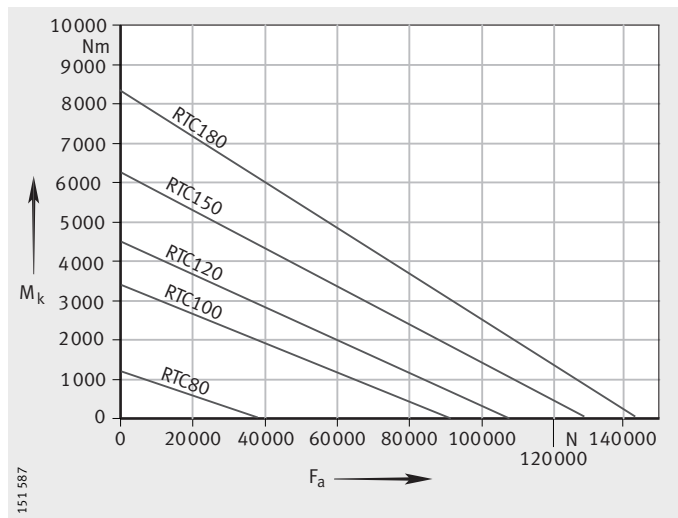
M_k = maximum tilting moment
F_a = axial load

Figure 6
Static limiting load diagram
YRT950 and YRT1030



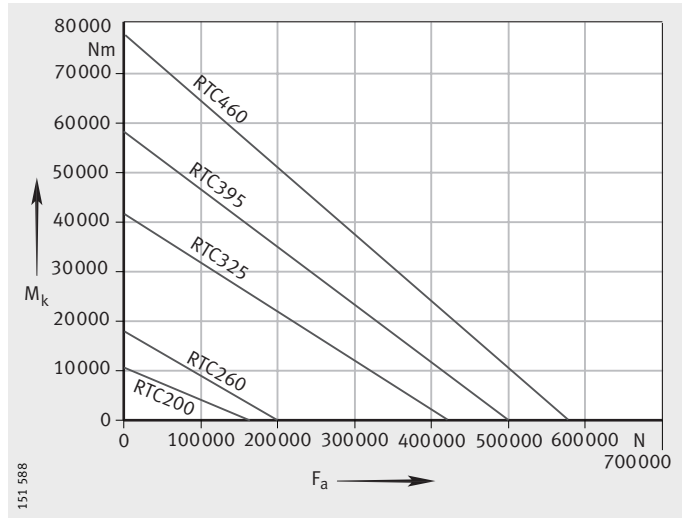
M_k = maximum tilting moment
F_a = axial load

Figure 7
Static limiting load diagram
$YRT_{Speed}200$ to $YRT_{Speed}460$



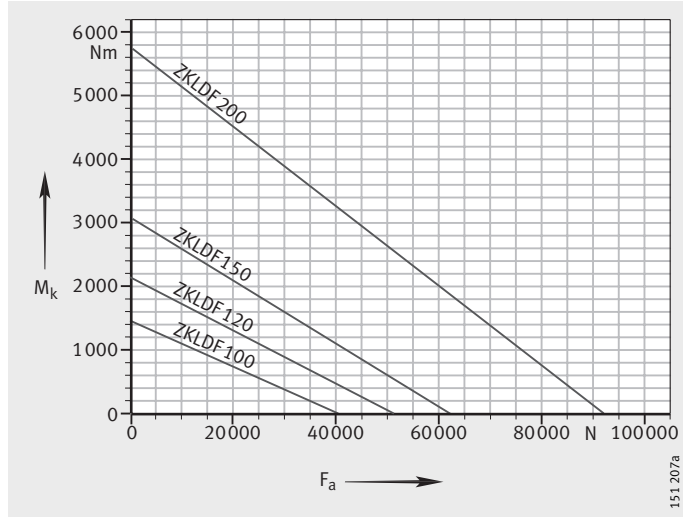
M_k = maximum tilting moment
F_a = axial load

Figure 8
Static limiting load diagram
RTC80 to RTC180



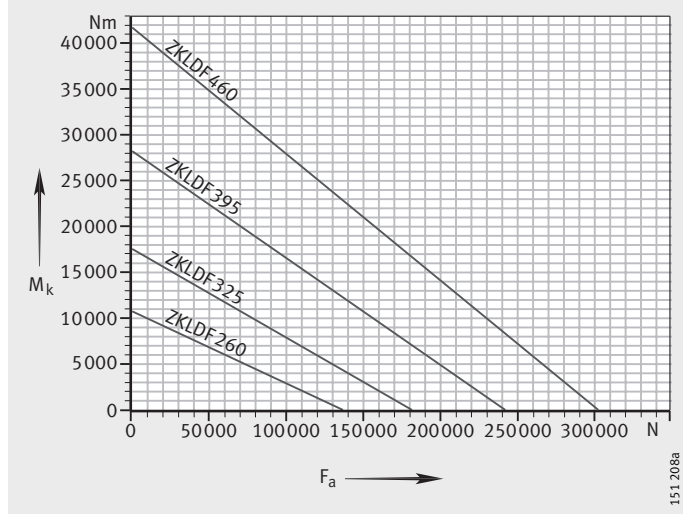
M_k = maximum tilting moment
F_a = axial load

Figure 9
Static limiting load diagram
RTC200 to RTC460



M_k = maximum tilting moment
F_a = axial load

Figure 10
Static limiting load diagram
ZKLDF100 to ZKLDF200



M_k = maximum tilting moment
F_a = axial load

Figure 11
Static limiting load diagram
ZKLDF260 to ZKLDF460

Axial/radial bearings
Axial angular contact ball bearings

Limiting speeds

The bearings allow the limiting speeds n_G given in the dimension tables. The operating temperatures occurring are heavily dependent on the environmental conditions. Calculation is possible by means of a thermal balance analysis based on frictional torque data.

If the environmental conditions differ from the specifications in relation to adjacent construction tolerances, lubrication, ambient temperature, heat dissipation or from the normal operating conditions for machine tools, checking must be carried out again. Please contact us.

Bearing preload

Once the bearings have been fitted and fully screw mounted, they are radially and axially clearance-free and preloaded.

Temperature differences

Temperature differences between the shaft and housing influence the radial bearing preload and thus the operating behaviour of the bearing arrangement.

If the shaft temperature is higher than the housing temperature, the radial preload will increase proportionally, so there will be an increase in the rolling element load, bearing friction and bearing temperature.

If the shaft temperature is lower than the housing temperature, the radial preload will decrease proportionally, so the rigidity will decrease to the point of bearing clearance and wear will increase.

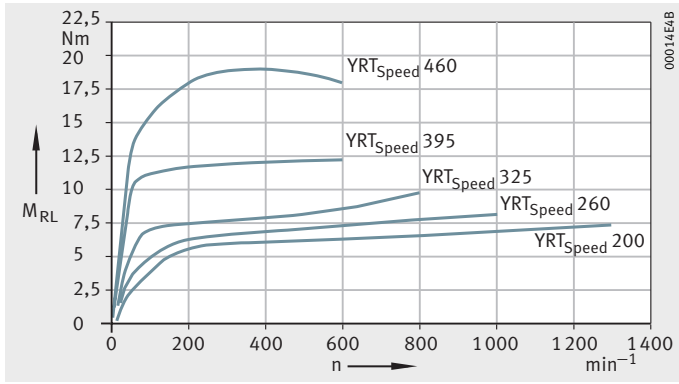
Frictional torque

The bearing frictional torque M_{RL} is influenced primarily by the viscosity and quantity of the lubricant and the bearing preload:

- The lubricant viscosity and quantity are dependent on the lubricant grade and operating temperature.
- The bearing preload is dependent on the mounting fits, the geometrical accuracy of the adjacent parts, the temperature difference between the inner and outer ring, the screw tightening torque and the mounting situation (bearing inner ring axially supported on one or both sides).

The frictional torques M_{RL} in the dimension tables are statistically determined guide values for bearings with grease lubrication (measurement speed n_{const} = 5 min^{-1}). *Figure 12* shows measured frictional torques for mounting with an unsupported L-section ring for YRT_{Speed}.

Deviations from the tightening torque of the fixing screws will have a detrimental effect on the preload and the frictional torque.



M_{RL} = frictional torque
n = speed

Figure 12
Frictional torques as guide values for YRT_{Speed}, statistically determined values from series of measurements

Frictional energy and dimensioning of the drive

For YRT and RTC bearings, it must be taken into consideration that the frictional torque can increase by a factor of 2 to 2,5 with increasing speed.

For ZKLDF bearings, it must be taken into consideration that the starting frictional torque can be 1,5 times higher than the values M_{RL} in the dimension tables.

Lubrication

Axial/radial bearings YRT, RTC and YRT_{Speed} can be relubricated via the L-section ring and outer ring.

Axial angular contact ball bearings ZKLDF can be relubricated via the outer ring.

The initial greasing is compatible with lubricating oils having a mineral oil base.

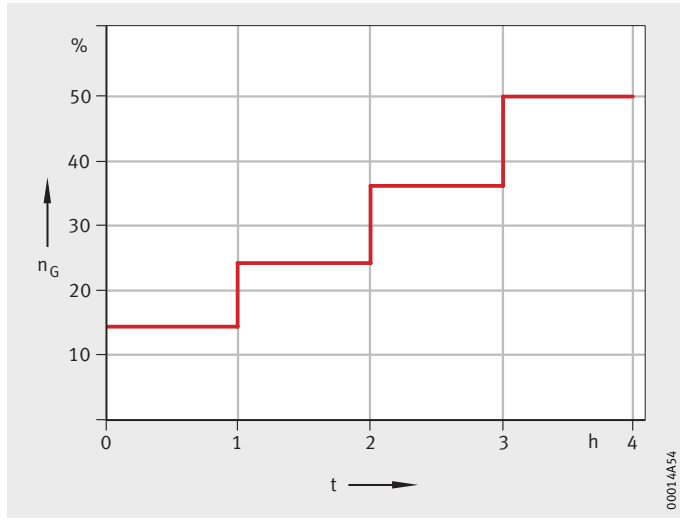
For calculation of the relubrication quantities and intervals based on a stated load spectrum (speed, load, operating duration) and the environmental conditions, please contact us.

Overlubrication

If the bearing is overlubricated, the bearing frictional torque and the temperature will increase.

In order to achieve the original frictional torque again, the running-in cycle in accordance with *Figure 13* should be carried out.

Further information on lubrication in the section Lubrication, page 76, must be observed.



n_G = limiting speed according to dimension tables
t = time

Figure 13
Running-in cycle after overlubrication

Grease Application Group GA08

Designation	Classification	Type of grease	Operating temperature °C	NLGI class	Speed parameter $n \cdot d_M$ $min^{-1} \cdot mm$	ISO VG class (base oil)[1)]
GA08	Grease for line contact	Lithium complex soap, mineral oil	–30 to +140	2 to 3	500 000	150 to 320

1) Dependent on bearing type.

Design of adjacent construction

YRT, RTC, YRT_{Speed} and ZKLDF have almost the same mounting dimensions.

Geometrical defects in the screw mounting surfaces and fits will influence the running accuracy, preload and running characteristics of the bearing arrangement. The accuracy of the adjacent surfaces must therefore be matched to the overall accuracy requirement of the subassembly. The tolerances of the adjacent surfaces must lie within the running tolerance of the bearing.

The adjacent construction should be produced in accordance with *Figure 14* and the tolerances must be in accordance with the tables starting page 1126. Any deviations will influence the bearing frictional torque, running accuracy and running characteristics.

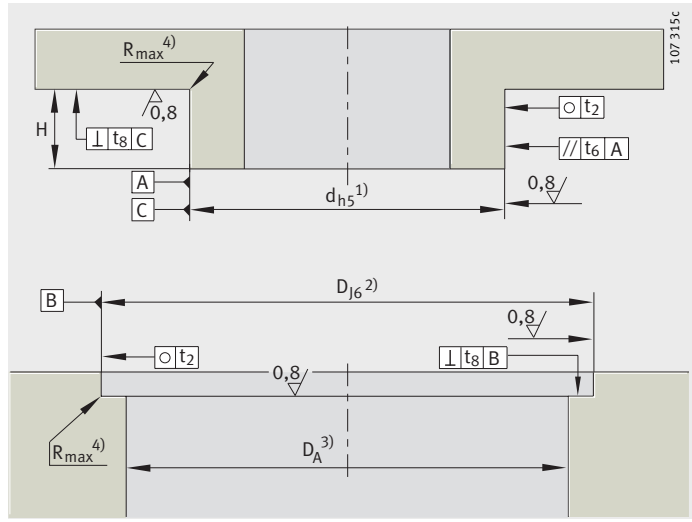


Figure 14
Requirements for the adjacent construction, YRT, RTC, YRT_{Speed}, ZKLDF

Legend to *Figure 14*

1) Support over whole bearing height.
It must be ensured that the means of support has adequate rigidity.

2) A precise fit is only necessary if radial support due to the load or a precise bearing position is required.

3) Note the bearing diameter D_1 according to the dimension tables.
Ensure that there is sufficient distance between the rotating bearing rings and the adjacent construction.

4) For values, see table Maximum corner radii of fit surfaces, page 1127.

Fits

The selection of fits leads to transition fits which means that, depending on the actual dimensional position of the bearing diameter and mounting dimensions, clearance fits or interference fits can arise.

The fit influences, for example, the running accuracy of the bearing and its dynamic characteristics.

An excessively tight fit will increase the radial bearing preload. As a result:

- there is an increase in bearing friction and heat generation in the bearing as well as the load on the raceway system and wear
- there will be a decrease in the achievable speed and the bearing operating life.

For very high running accuracy, the aim should be to achieve as close as possible to a fit clearance 0.

For easier matching of the adjacent construction to the actual bearing dimensions, each bearing of series RTC and YRT_{Speed} is supplied with a measurement record (this is supplied by agreement for other series).

Recommended fits for shafts

The shaft should be produced to tolerance zone h5 and for series YRT_{Speed} in accordance with the table, page 1127.

If there are special requirements, the fit clearance must be further restricted within the tolerance zone h5:

- Requirements for running accuracy:
  For maximum running accuracy and with a rotating bearing inner ring, the aim should be to achieve as close as possible to a fit clearance 0. The fit clearance may otherwise increase the bearing runout. With normal requirements for running accuracy or a stationary bearing inner ring, the shaft should be produced to h5.
- Requirements for dynamic characteristics:
  - For swivel type operation ($n \times d < 35\,000\ min^{-1} \cdot mm$, operating duration ED $< 10\%$) the shaft should be produced to h5
  - For higher speeds and longer operating duration 0,01 mm, the fit clearance must not be exceeded.
    For series YRT_{Speed}, the fit clearance must not exceed 0,005 mm.

For series ZKLDF, the fit clearance should be based on the inner ring with the smallest bore dimension.

Recommended fits for housings

The housing should be produced to tolerance zone J6 and for series YRT_{Speed} according to the table Recommended fits, page 1127.

If there are special requirements, the fit clearance must be further restricted within the tolerance zone J6:

- Requirements for running accuracy:
  For maximum running accuracy and with a rotating bearing outer ring, the aim should be to achieve as close as possible to a fit clearance 0.
  With a static bearing outer ring, a clearance fit or a design without radial centring should be selected.
- Requirements for dynamic characteristics:
  - For predominantly swivel type operation ($n \times d < 35\,000\ min^{-1} \cdot mm$, operating duration ED $< 10\%$) and a rotating bearing outer ring, the housing fit should be produced to tolerance zone J6
  - For higher speed and operating duration, the bearing outer ring should not be radially centred or the housing fit should be produced as a clearance fit with at least 0,02 mm clearance. This reduces the increase in preload when heat is generated in the bearing position.

Fit selection depending on the screw connection of the bearing rings

If the bearing outer ring is screw mounted on the static component, a fit seating is not required or a fit seating in accordance with the table Recommended fits for adjacent construction, page 1127, can be produced. If the values in the table are used, this will give a transition fit with a tendency towards clearance fit.
This generally allows easy fitting.

If the bearing inner ring is screw mounted on the static component, it should nevertheless for functional reasons be supported by the shaft over the whole bearing height. The shaft dimensions should then be selected in accordance with the tables from page 1126. If these values in the table are used, this will give a transition fit with a tendency towards clearance fit.

Geometrical and positional accuracy of the adjacent construction

The values given in the following tables for geometrical and positional accuracy of the adjacent construction have proved effective in practice and are adequate for the majority of applications.

The geometrical tolerances influence the axial and radial runout accuracy of the subassembly as well as the bearing frictional torque and the running characteristics.

Geometrical and positional accuracy for shafts with YRT, RTC, ZKLDF

Nominal shaft diameter d mm		Deviation d	Roundness Parallelism Perpendicularity t_2, t_6, t_8
over	incl.	for tolerance zone h5 µm	µm
50	80	$^{0}_{-13}$	3
80	120	$^{0}_{-15}$	4
120	150	$^{0}_{-18}$	5
150	180	$^{0}_{-18}$	5
180	250	$^{0}_{-20}$	7
250	315	$^{0}_{-23}$	8
315	400	$^{0}_{-25}$	9
400	500	$^{0}_{-27}$	10
500	630	$^{0}_{-28}$	11
630	800	$^{0}_{-32}$	12
800	1 000	$^{0}_{-36}$	14

Geometrical and positional accuracy for housings with YRT, RTC, ZKLDF

Nominal housing bore diameter D mm		Deviation D	Roundness Perpendicularity t_2, t_8
over	incl.	for tolerance zone J6 µm	µm
120	150	$^{+18}_{-7}$	5
150	180	$^{+18}_{-7}$	5
180	250	$^{+22}_{-7}$	7
250	315	$^{+25}_{-7}$	8
315	400	$^{+29}_{-7}$	9
400	500	$^{+33}_{-7}$	10
500	630	$^{+34}_{-7}$	11
630	800	$^{+38}_{-8}$	12
800	1 000	$^{+44}_{-12}$	14
1 000	1 250	$^{+52}_{-14}$	16

Recommended fits for shaft and housing bore with YRT_{Speed}

Axial/radial bearing	Shaft diameter d mm	Housing bore D mm
$YRT_{Speed}200$	$200^{-0,01}_{-0,024}$	$300^{+0,011}_{-0,005}$
$YRT_{Speed}260$	$260^{-0,013}_{-0,029}$	$385^{+0,013}_{-0,005}$
$YRT_{Speed}325$	$325^{-0,018}_{-0,036}$	$450^{+0,015}_{-0,005}$
$YRT_{Speed}395$	$395^{-0,018}_{-0,036}$	$525^{+0,017}_{-0,005}$
$YRT_{Speed}460$	$460^{-0,018}_{-0,038}$	$600^{+0,017}_{-0,005}$

Geometrical and positional accuracy for shafts with YRT_{Speed}

Axial/radial bearing	Roundness t_2 µm	Parallelism t_6 µm	Perpendicularity t_8 µm
$YRT_{Speed}200$	6	5	5
$YRT_{Speed}260$ to $YRT_{Speed}460$	8	5	7

Geometrical and positional accuracy for housings with YRT_{Speed}

Axial/radial bearing	Roundness t_2 µm	Perpendicularity t_8 µm
$YRT_{Speed}200$ to $YRT_{Speed}460$	6	8

Maximum corner radii of fit surfaces with YRT, RTC, YRT_{Speed}, ZKLDF

Bore diameter d mm	Maximum corner radius R_{max} mm
50 incl. 150	0,1
over 150 incl. 460	0,3
over 460 incl. 950	1

Mounting dimensions H_1, H_2

If the height variation must be as small as possible, the H_1 dimensional tolerance must conform to the tables page 1131, page 1132 and *Figure 15*.

The mounting dimension H_2 defines the position of any worm wheel used, *Figure 15* and *Figure 16*, page 1129, L-section ring with support ring.

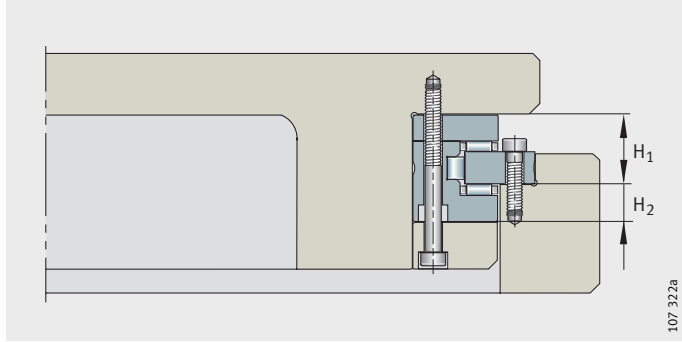


Figure 15
Mounting dimension H_1, H_2

L-section ring without support ring or with support ring

The L-section ring of bearings YRT and RTC can be mounted unsupported or supported over its whole surface, *Figure 16*. If the L-section ring is supported, the tilting rigidity is higher. The support ring (for example a worm wheel) is not included in the delivery.

Depending on the application, series YRT and RTC require bearings with a different preload match in order to achieve the same preload forces in the axial bearing.

For series YRT_{Speed} and ZKLDF, there is only one preload match. The increase in rigidity and frictional torque in YRT_{Speed} bearings is slight and can normally be ignored.

In bearings of series ZKLDF, the rigidity and frictional torque are not influenced by the support ring.

L-section ring without support ring

For the case “L-section ring without support ring”, the bearing designation is:

- YRT <bore diameter> or
  RTC <bore diameter>.

L-section ring with support ring

For the case "L-section ring with support ring", the bearing designation is:

- YRT <bore diameter> **VSP**
- RTC <bore diameter> **T52EB**.

For RTC with an additionally restricted axial runout, the bearing designation is:

- RTC <bore diameter> **T52EA**.

For bearing arrangements with a supported L-section ring, only bearings with the suffix VSP, EB or T52EA can be ordered.

If the normal design is mounted with a supported L-section ring, there will be a considerable increase in the bearing frictional torque.

The support ring should be at least twice as high as the shaft locating washer of the bearing.

YRT
RTC

YRT..VSP
RTC..T52EB
RTC..T52EA

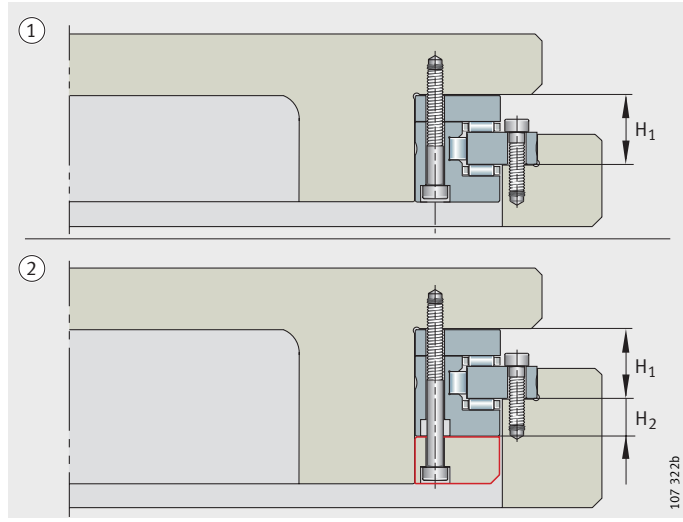


Figure 16
① L-section ring without support ring,
② L-section ring with support ring
for YRT, RTC

Fitting

Retaining screws secure the bearing components during transport. For easier centring of the bearing, the screws should be loosened before fitting and either secured again or removed after fitting.

Tighten the fixing screws in crosswise sequence using a torque wrench in three stages to the specified tightening torque M_A, while rotating the bearing ZKLDF, *Figure 17*:

- Stage 1: 40% of M_A
- Stage 2: 70% of M_A
- Stage 3: 100% of M_A.

Observe the correct grade of the fixing screws.

Mounting forces must only be applied to the bearing ring to be fitted, never through the rolling elements.

Bearing components must not be separated or interchanged during fitting and dismantling.

If the bearing is unusually difficult to move, loosen the fixing screws and tighten them again in steps in a crosswise sequence. This will eliminate any distortion.

Bearings should only be fitted in accordance with TPI 103, Fitting and Maintenance Manual.

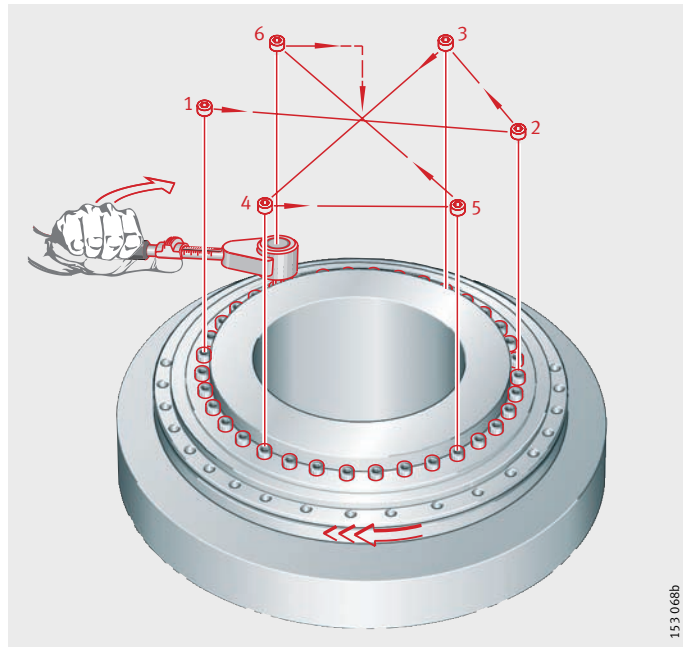


Figure 17
Tightening of fixing screws

Accuracy

The dimensional tolerances are derived from tolerance class P5. The diameter tolerances stated are mean values in accordance with ISO 1132.

The running tolerances correspond to P4 in accordance with DIN 620, see table.

The axial and radial runout accuracy is influenced by:

- the running accuracy of the bearing
- the geometrical accuracy of the adjacent surfaces
- the fit between the rotating bearing ring and adjacent component.

For very high running accuracy, the aim should be to achieve as close as possible to a fit clearance 0.

The bearing bore in the series YRT, RTC and YRT_{Speed} may be slightly conical when delivered. This is typical of the bearing design and is a result of the radial bearing preload forces.
The bearing will regain its ideal geometry when fitted.

Dimensional tolerances, mounting dimensions, axial and radial runout for YRT, ZKLDF

Dimensional tolerances[1]				Mounting dimension					Axial and radial runout[2]	
Bore		Outside diameter				Restricted[3]		Restricted[3]	Normal	Restricted[3]
d	Δ_{ds}	D	Δ_{Ds}	H_1	Δ_{H1s}	Δ_{H1s}	H_2	Δ_{H2s}		
mm	mm	mm	mm	mm	mm	mm	mm	mm	µm	µm
50	–0,008	126	–0,011	20	±0,125	±0,025	10	±0,02	2	1
80	–0,009	146	–0,011	23,35	±0,15	±0,025	11,7	±0,02	3	1,5
100	–0,01	185	–0,015	25	±0,175	±0,025	13	±0,02	3	1,5
120	–0,01	210	–0,015	26	±0,175	±0,025	14	±0,02	3	1,5
150	–0,013	240	–0,015	26	±0,175	±0,03	14	±0,02	3	1,5
180	–0,013	280	–0,018	29	±0,175	±0,03	14	±0,025	4	2
200	–0,015	300	–0,018	30	±0,175	±0,03	15	±0,025	4	2
260	–0,018	385	–0,02	36,5	±0,2	±0,04	18,5	±0,025	6	3
325	–0,023	450	–0,023	40	±0,2	±0,05	20	±0,025	6	3
395	–0,023	525	–0,028	42,5	±0,2	±0,05	22,5	±0,025	6	3
460	–0,023	600	–0,028	46	±0,225	±0,06	24	±0,03	6	3
580	–0,025	750	–0,035	60	±0,25	±0,075	30	±0,03	10	5[4]
650	–0,038	870	–0,05	78	±0,25	±0,1	44	±0,03	10	5[4]
850	–0,05	1 095	–0,063	80,5	±0,3	±0,12	43,5	±0,03	12	6[4]
950	–0,05	1 200	–0,063	86	±0,3	±0,12	46	±0,03	12	6[4]
1 030	–0,063	1 300	–0,08	92,5	±0,3	±0,15	52,5	±0,03	12	6[4]

1) The diameter tolerances stated are mean values (DIN 620).

2) For rotating inner and outer ring, measured on fitted bearing, with ideal adjacent construction.

3) Special design, YRT only.

4) By agreement only for rotating outer ring.

Dimensional tolerances, mounting dimensions, axial and radial runout for RTC

Dimensional tolerances						Mounting dimension		Axial and radial runout[1]	Axial runout[1]
Bore		Outside diameter		Bearing height				Normal	Restricted
d	Δ_{ds}	D	Δ_{Ds}	H	Δ_{Hs}	H_1	Δ_{H1s}		
mm	mm	mm	mm	mm	mm	mm	mm	µm	µm
80	−0,009	146	−0,011	35	+0,025 −0,15	23,35	±0,025	3	1,5
100	−0,01	185	−0,015	38	+0,025 −0,15	25	±0,025	3	1,5
120	−0,01	210	−0,015	40	+0,025 −0,15	26	±0,025	3	1,5
150	−0,013	240	−0,015	40	+0,03 −0,175	26	±0,03	3	1,5
180	−0,013	280	−0,018	43	+0,03 −0,175	29	±0,03	4	2
200	−0,015	300	−0,018	45	+0,03 −0,2	30	±0,03	4	2
260	−0,018	385	−0,020	55	+0,04 −0,25	36,5	±0,04	5	3
325	−0,023	450	−0,023	60	+0,05 −0,3	40	±0,05	5	3
395	−0,023	525	−0,028	65	+0,05 −0,3	42,5	±0,05	5	3
460	−0,027	600	−0,028	70	+0,06 −0,35	46	±0,06	6	3

[1] For rotating inner and outer ring, measured on fitted bearing, with ideal adjacent construction.

Dimensional tolerances, mounting dimensions, axial and radial runout for YRT_{Speed}

Dimensional tolerances				Mounting dimension			Axial and radial runout[1]
Bore		Outside diameter					
d	Δ_{ds}	D	Δ_{Ds}	H_1	Δ_{H1s}	H_2	
mm	mm	mm	mm	mm	mm	mm	µm
200	−0,015	300	−0,018	30	+0,04 −0,06	15	4
260	−0,018	385	−0,02	36,5	+0,05 −0,07	18,5	6
325	−0,023	450	−0,023	40	+0,06 −0,07	20	6
395	−0,023	525	−0,028	42,5	+0,06 −0,07	22,5	6
460	−0,023	600	−0,028	46	+0,07 −0,08	24	6

[1] For rotating inner and outer ring, measured on fitted bearing, with ideal adjacent construction.

Rigidity

Static rigidity

The overall rigidity of a bearing position is a description of the magnitude of the displacement of the rotational axis from its ideal position under load. The static rigidity thus has a direct influence on the accuracy of the machining results.

The dimension tables give the rigidity values for the complete bearing position, see page 1134 to page 1143.
These take account of the deflection of the rolling element set as well as the deformation of the bearing rings and the screw connections.

The values for the rolling element sets are calculated rigidity values and are for information purposes only. They facilitate comparison with other bearing types, since rolling bearing catalogues generally only give the higher rigidity values for the rolling element set.

Special designs

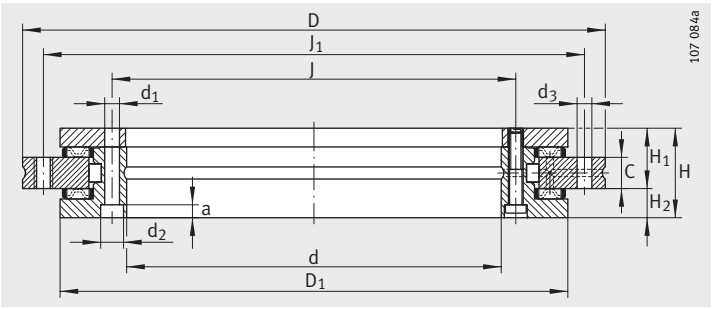
Available by agreement:
For YRT, axial and radial runout tolerance restricted by 50%.
Additional text: axial and radial runout 50%.

For RTC, axial runout tolerance restricted by 50%.
Additional text: axial runout 50%.

For YRT, closer tolerance on mounting dimension H_1 and H_2.
Additional text: H_1 with tolerance $\pm$ ..., H_2 with tolerance $\pm$ ...
For restricted tolerance value, see table, page 1131.

Axial/radial bearings

Double direction



YRT

Dimension table · Dimensions in mm

Designation	Mass	Dimensions									Fixing holes					
											Inner ring				Outer ring	
	m	d	D	H	H_1	H_2	C	D_1	J	J_1	d_1	d_2	a	Quantity[4]	d_3	Quantity[4]
	≈kg							max.								
YRT50	1,6	**50**	126	30	20	10	10	105	63	116	5,6	–	–	10	5,6	12
YRT80-TV[5)7)]	2,4	**80**	146	35	23,35	11,65	12	130	92	138	5,6	10	4	10	4,6	12
YRT100[5)]	4,1	**100**	185	38	25	13	12	161	112	170	5,6	10	5,4	16	5,6	15
YRT120	5,3	**120**	210	40	26	14	12	185	135	195	7	11	6,2	22	7	21
YRT150	6,2	**150**	240	40	26	14	12	214	165	225	7	11	6,2	34	7	33
YRT180	7,7	**180**	280	43	29	14	15	244	194	260	7	11	6,2	46	7	45
YRT200	9,7	**200**	300	45	30	15	15	274	215	285	7	11	6,2	46	7	45
YRT260	18,3	**260**	385	55	36,5	18,5	18	345	280	365	9,3	15	8,2	34	9,3	33

1) Including retaining screws or threaded extraction holes.

2) Tightening torque for screws to DIN 912, grade 10.9.

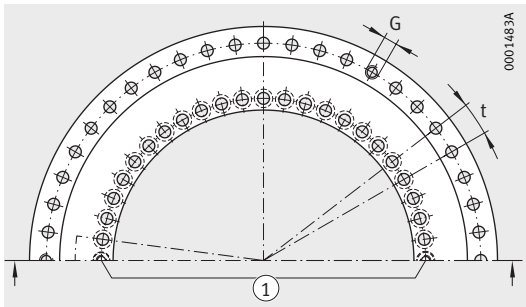
3) Rigidity values taking account of the rolling element set, the deformation of the bearing rings and the screw connections. For explanations, see page 1133.

4) Attention! For fixing holes in the adjacent construction. Observe the pitch of the bearing holes.

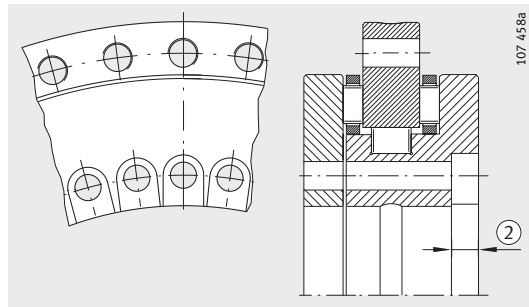
5) Screw counterbores in the L-section ring open to the bearing bore, see figure, page 1135. The bearing inside diameter is unsupported in the area ②.

6) For high operating durations or continuous operation, please contact us.

7) Cages made from glass fibre reinforced polyamide 66.



Hole pattern
① Two retaining screws



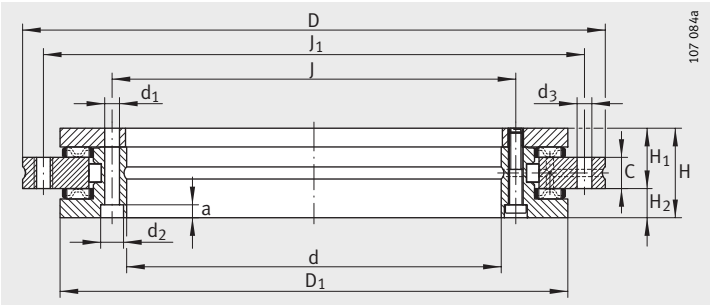
For YRT80-TV and YRT100:
② Screw counterbores open[5)]

Pitch t[1)]	Threaded extraction hole		Screw tightening torque	Basic load ratings				Limiting speed[6)]	Bearing frictional torque
				axial		radial			
QuantityXt	G	Quantity	M_A[2)]	dyn. C_a	stat. C_{0a}	dyn. C_r	stat. C_{0r}	n_G	M_{RL}
			Nm	N	N	N	N	min^{-1}	Nm
12X30°	–	–	8,5	56 000	280 000	28 500	49 500	440	2,5
12X30°	–	–	8,5/4,5	38 000	158 000	44 000	98 000	350	3
18X20°	M5	3	8,5	73 000	370 000	52 000	108 000	280	3
24X15°	M8	3	14	80 000	445 000	70 000	148 000	230	7
36X10°	M8	3	14	85 000	510 000	77 000	179 000	210	13
48X 7,5°	M8	3	14	92 000	580 000	83 000	209 000	190	14
48X 7,5°	M8	3	14	98 000	650 000	89 000	236 000	170	15
36X10°	M12	3	34	109 000	810 000	102 000	310 000	130	25

Designation	Rigidity					
	of bearing position[3)]			of rolling element set		
	axial	radial	Tilting rigidity	axial	radial	Tilting rigidity
	c_{aL}	c_{rL}	c_{kL}	c_{aL}	c_{rL}	c_{kL}
	kN/µm	kN/µm	kNm/mrad	kN/µm	kN/µm	kNm/mrad
YRT50	1,3	1,1	1,25	6,2	1,5	5,9
YRT80-TV[5)7)]	1,6	1,8	2,5	4	2,6	6,3
YRT100[5)]	2	2	5	6,8	2,4	15
YRT120	2,1	2,2	7	7,8	3,8	24
YRT150	2,3	2,6	11	8,7	4,6	38
YRT180	2,6	3	17	9,9	5,3	57
YRT200	3	3,5	23	11,2	6,2	80
YRT260	3,5	4,5	45	13,7	8,1	155

Axial/radial bearings

Double direction



YRT

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions									Fixing holes					
											Inner ring				Outer ring	
	m	d	D	H	H_1	H_2	C	D_1	J	J_1	d_1	d_2	a	Quantity[4]	d_3	Quantity[4]
	≈kg							max.								
YRT325[5]	25	**325**	450	60	40	20	20	415	342	430	9,3	15	8,2	34	9,3	33
YRT395	33	**395**	525	65	42,5	22,5	20	486	415	505	9,3	15	8,2	46	9,3	45
YRT460	45	**460**	600	70	46	24	22	560	482	580	9,3	15	8,2	46	9,3	45
YRT580	89	**580**	750	90	60	30	30	700	610	720	11,4	18	11	46	11,4	42
YRT650	170	**650**	870	122	78	44	34	800	680	830	14	20	13	46	14	42
YRT850	253	**850**	1 095	124	80,5	43,5	37	1 018	890	1 055	18	26	17	58	18	54
YRT950[7]	312	950	1 200	132	86	46	40	1 130	990	1 160	18	26	17	58	18	54
YRT1030	375	**1 030**	1 300	145	92,5	–	40	1 215	1 075	1 255	18	26	17	70	18	66

1) Including retaining screws or threaded extraction holes.

2) Tightening torque for screws to DIN 912, grade 10.9.

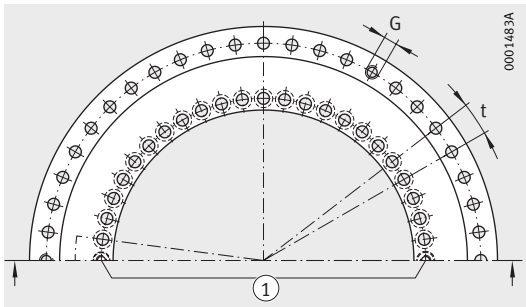
3) Rigidity values taking account of the rolling element set, the deformation of the bearing rings and the screw connections. For explanations, see page 1133.

4) Attention! For fixing holes in the adjacent construction. Observe the pitch of the bearing holes.

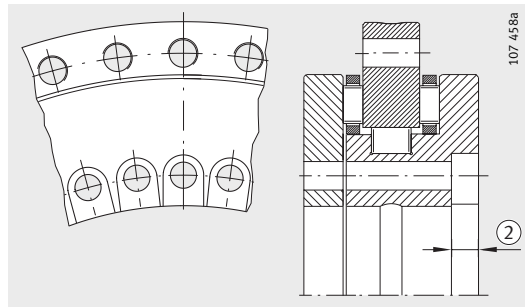
5) Screw counterbores in the L-section ring open to the bearing bore. The bearing inside diameter is unsupported in the area ②.

6) For high operating durations or continuous operation, please contact us.

7) Available by agreement only.



Hole pattern
① Two retaining screws



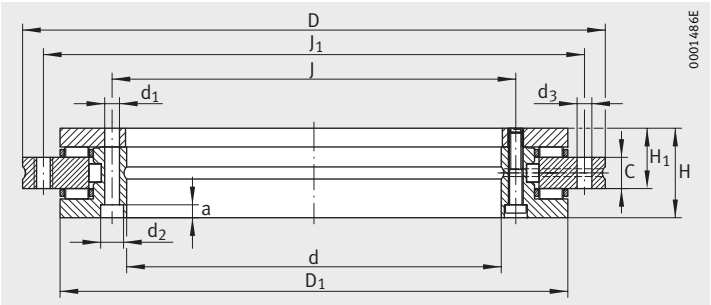
For YRT325:
② Screw counterbores open[5)]

Pitch t[1)]	Threaded extraction hole		Screw tightening torque	Basic load ratings				Limiting speed[6)]	Bearing frictional torque
				axial		radial			
QuantityXt	G	Quantity	M_A[2)]	dyn. C_a	stat. C_{0a}	dyn. C_r	stat. C_{0r}	n_G	M_{RL}
			Nm	N	N	N	N	min^{-1}	Nm
36X10°	M12	3	34	186 000	1 710 000	134 000	415 000	110	48
48X 7,5°	M12	3	34	202 000	2 010 000	133 000	435 000	90	55
48X 7,5°	M12	3	34	217 000	2 300 000	187 000	650 000	80	70
48X 7,5°	M12	6	68	390 000	3 600 000	211 000	820 000	60	140
48X 7,5°	M12	6	116	495 000	5 200 000	415 000	1 500 000	55	200
60X 6°	M12	6	284	560 000	6 600 000	475 000	1 970 000	40	300
60X 6°	M16	6	284	1 040 000	10 300 000	600 000	2 450 000	40	600
72X 5°	M16	6	284	1 080 000	11 000 000	620 000	2 650 000	35	800

Designation	Rigidity					
	of bearing position[3)]			of rolling element set		
	axial	radial	Tilting rigidity	axial	radial	Tilting rigidity
	c_{aL}	c_{rL}	c_{kL}	c_{aL}	c_{rL}	c_{kL}
	kN/µm	kN/µm	kNm/mrad	kN/µm	kN/µm	kNm/mrad
YRT325[5)]	4,3	5	80	26,1	9,4	422
YRT395	4,9	6	130	30,3	11,3	684
YRT460	5,7	7	200	33,5	13,9	1 049
YRT580	6,9	9	380	42,1	17,4	2 062
YRT650	7,6	10	550	58,3	13,7	3 669
YRT850	9,3	13	1 100	73,4	20,2	7 587
YRT950[7)]	10,4	14	1 500	74,5	16,4	9 692
YRT1030	11,2	16	1 900	79,7	18,8	12 025

Axial/radial bearings

Double direction



RTC

Dimension table · Dimensions in mm

Designation	Mass	Dimensions[7]								Fixing holes					
										Inner ring				Outer ring	
	m	d	D	H	H_1	C	D_1	J	J_1	d_1	d_2	a	Quantity[4]	d_3	Quantity[4]
	≈kg						max.								
RTC80[5]	2	**80**	146	35	23,35	12	130	92	138	5,6	10	5,7	12	4,6	12
RTC100[5]	4	**100**	185	38	25	12	161	112	170	5,6	10	5,7	15	5,6	18
RTC120	5	**120**	210	40	26	12	185	135	195	7	11	7	21	7	24
RTC150	5,8	**150**	240	40	26	12	214	165	225	7	11	7	33	7	36
RTC180	8	**180**	280	43	29	15	244	194	260	7	11	7	45	7	48
RTC200	9,3	**200**	300	45	30	15	274	215	285	7	11	7	45	4	48
RTC260	18	**260**	385	55	36,5	18	345	280	365	9,3	15	9,3	33	9,3	36
RTC325[5]	25	**325**	450	60	40	20	415	342	430	9,3	15	9,3	33	9,3	36
RTC395	33	**395**	525	65	42,5	20	486	415	505	9,3	15	9,3	45	9,3	48
RTC460	48	**460**	600	70	46	22	560	482	580	9,3	15	9,3	45	9,3	48

1) Including retaining screws or threaded extraction holes.

2) Tightening torque for screws to DIN 912, grade 10.9.

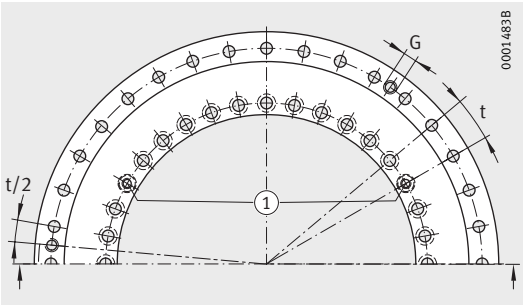
3) Rigidity values taking account of the rolling element set, the deformation of the bearing rings and the screw connections. For explanations, see page 1133.

4) Attention! For fixing holes in the adjacent construction. Observe the pitch of the bearing holes.

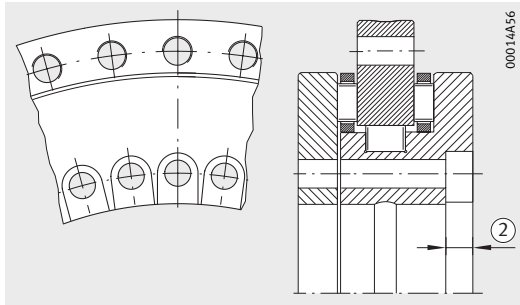
5) Screw counterbores in the L-section ring open to the bearing bore. The bearing inside diameter is unsupported in the area ②.

6) For high operating durations or continuous operation, please contact us.

7) Sizes d > 460 mm available by agreement.



Hole pattern
① Three retaining screws



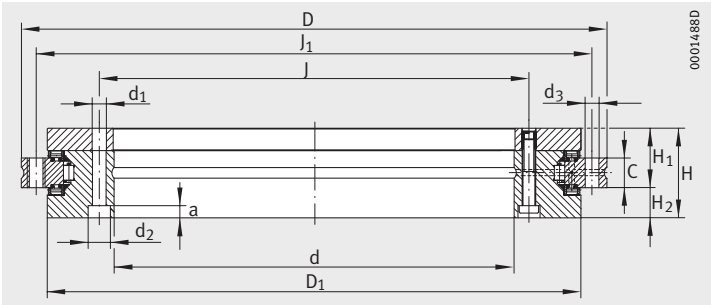
For RTC80, RTC100 and RTC325:
② Screw counterbores open[5)]

Pitch t[1)]	Threaded extraction hole		Screw tightening torque	Basic load ratings				Limiting speed[6)]	Bearing frictional torque
				axial		radial			
QuantityXt	G	Quantity	M_A[2)]	dyn. C_a	stat. C_{0a}	dyn. C_r	stat. C_{0r}	n_G	M_{RL}
			Nm	N	N	N	N	min^{-1}	Nm
12X30°	–	–	8,5	56 000	255 000	42 500	100 000	530	1
18X20°	M5	3	8,5	76 500	415 000	47 500	120 000	430	4
24X15°	M6	3	14	102 000	540 000	52 000	143 000	340	5
36X10°	M6	3	14	112 000	630 000	56 000	170 000	320	7
48X 7,5°	M6	3	14	118 000	710 000	69 500	200 000	280	9
48X 7,5°	M6	3	14	120 000	765 000	81 500	220 000	260	11
36X10°	M8	3	34	160 000	1 060 000	93 000	290 000	200	16
36X10°	M8	3	34	275 000	1 930 000	120 000	345 000	170	27
48X 7,5°	M8	3	34	300 000	2 280 000	186 000	655 000	140	42
48X 7,5°	M8	3	34	355 000	2 800 000	200 000	765 000	120	55

Designation	Rigidity					
	of bearing position[3)]			of rolling element set		
	axial	radial	Tilting rigidity	axial	radial	Tilting rigidity
	c_{aL}	c_{rL}	c_{kL}	c_{aL}	c_{rL}	c_{kL}
	kN/µm	kN/µm	kNm/mrad	kN/µm	kN/µm	kNm/mrad
RTC80[5)]	0,71	1,8	1,6	5,6	2,1	9
RTC100[5)]	1,2	2	5	9,1	3,5	21
RTC120	1,3	2,2	7	9,1	5,7	29
RTC150	1,5	2,6	11	10,6	7,1	45
RTC180	1,7	3	17	11,6	6,3	67
RTC200	1,8	3,5	23	12,2	5,8	88
RTC260	2,1	4,5	45	17,4	7,5	201
RTC325[5)]	2,8	5	80	25	6,5	429
RTC395	3,4	6	130	28,9	11,9	698
RTC460	3,9	7	200	32,6	13,7	1 020

Axial/radial bearings

Double direction



YRT_{Speed}

Dimension table · Dimensions in mm

Designation	Mass	Dimensions									Fixing holes					
											Inner ring				Outer ring	
	m	d	D	H	H_1	H_2	C	D_1	J	J_1	d_1	d_2	a	Quantity[3]	d_3	Quantity[3]
	≈kg															
YRTS200	9,7	**200**$_{-0,015}$	300$_{-0,018}$	45	30	15	15	274	215	285	7	11	6,2	46	7	45
YRTS260	18,3	**260**$_{-0,018}$	385$_{-0,02}$	55	36,5	18,5	18	345	280	365	9,3	15	8,2	34	9,3	33
YRTS325[5]	25	**325**$_{-0,023}$	450$_{-0,023}$	60	40	20	20	415	342	430	9,3	15	8,2[5]	34	9,3	33
YRTS395	33	**395**$_{-0,023}$	525$_{-0,028}$	65	42,5	22,5	20	486	415	505	9,3	15	8,2	46	9,3	45
YRTS460	45	**460**$_{-0,023}$	600$_{-0,023}$	70	46	24	22	560	482	580	9,3	15	8,2	46	9,3	45

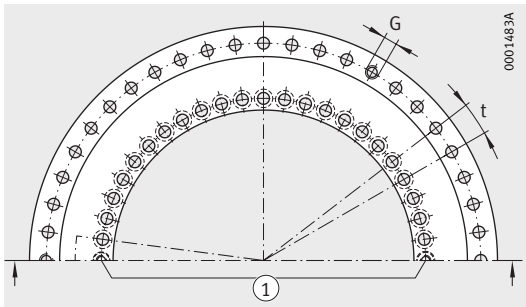
1) Including retaining screws or threaded extraction holes.

2) For screws to DIN 912, grade 10.9.

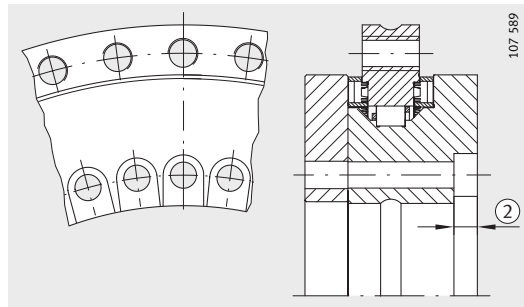
3) Attention!
For fixing holes in the adjacent construction.
Observe the pitch of the bearing holes.

4) Rigidity values taking account of the rolling element set, deformation of the bearing rings and the screw connections.
For explanations, see page 1133.

5) Screw counterbores in the L-section ring open to the bearing bore.
The bearing inside diameter is unsupported in the area ②.



Hole pattern
① Two retaining screws



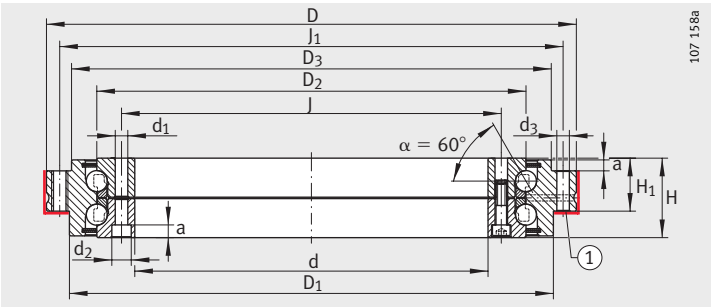
For YRTS325:
② Screw counterbores open[5)]

Pitch t[1)]	Threaded extraction hole		Screw tightening torque	Basic load ratings				Limiting speed	Mass moment of inertia for rotating	
				axial		radial			inner ring IR	outer ring AU
QuantityXt	G	Quantity	M_A[2)]	dyn. C_a	stat. C_{0a}	dyn. C_r	stat. C_{0r}	n_G	M_M	
			Nm	N	N	N	N	min^{-1}	$kg \cdot cm^2$	$kg \cdot cm^2$
48X 7,5°	M8	3	14	155 000	840 000	94 000	226 000	1 160	667	435
36X10°	M12	3	34	173 000	1 050 000	110 000	305 000	910	2 074	1 422
36X10°	M12	3	34	191 000	1 260 000	109 000	320 000	760	4 506	2 489
48X 7,5°	M12	3	34	214 000	1 540 000	121 000	390 000	650	8 352	4 254
48X 7,5°	M12	3	34	221 000	1 690 000	168 000	570 000	560	15 738	7 379

Designation	Rigidity					
	of bearing position[4)]			of rolling element set		
	axial	radial	Tilting rigidity	axial	radial	Tilting rigidity
	c_{aL}	c_{rL}	c_{kL}	c_{aL}	c_{rL}	c_{kL}
	kN/µm	kN/µm	kNm/mrad	kN/µm	kN/µm	kNm/mrad
YRTS200	4	1,2	29	13,6	3,9	101
YRTS260	5,4	1,6	67	16,8	5,8	201
YRTS325[5)]	6,6	1,8	115	19,9	7,1	350
YRTS395	7,8	2	195	23,4	8,7	582
YRTS460	8,9	1,8	280	25,4	9,5	843

Axial angular contact ball bearings

Double direction



ZKLDF
① Contact surface/centring diameter

Dimension table · Dimensions in mm

Designation	Mass	Dimensions[6]										Inner ring		
	m	d	D	H	H_1	D_1	D_2	D_3	J	J_1	a	Fixing screws		
												d_1	d_2	Quantity[4]
	≈kg													
ZKLDF100[5]	4,5	**100**	185	38	25	161	136	158	112	170	5,4	5,6	10	16
ZKLDF120	6	**120**	210	40	26	185	159	181	135	195	6,2	7	11	22
ZKLDF150	7,5	**150**	240	40	26	214	188	211	165	225	6,2	7	11	34
ZKLDF200	11	**200**	300	45	30	274	243	271	215	285	6,2	7	11	46
ZKLDF260	22	**260**	385	55	36,5	345	313	348	280	365	8,2	9,3	15	34
ZKLDF325[5]	28	**325**	450	60	40	415	380	413	342	430	8,2	9,3	15	34
ZKLDF395	39	**395**	525	5	42,5	486	450	488	415	505	8,2	9,3	15	46
ZKLDF460	50	**460**	600	70	46	560	520	563	482	580	8,2	9,3	15	46

1) Including retaining screws or threaded extraction holes.

2) Tightening torque for screws to DIN 912, grade 10.9.

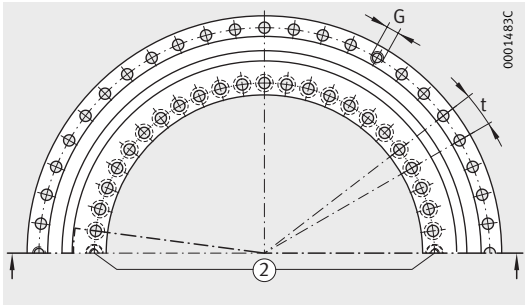
3) Rigidity values taking account of the rolling element set, deformation of the bearing rings and the screw connections. For explanations, see page 1133.

4) Attention! For fixing holes in the adjacent construction. Observe the pitch of the bearing holes.

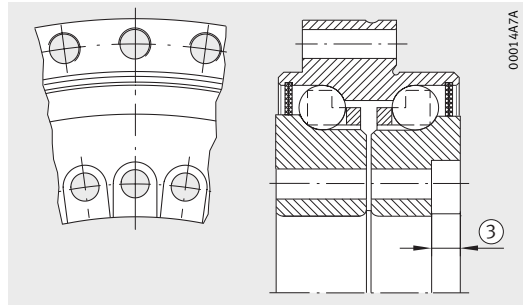
5) Screw counterbores in the L-section ring open to the bearing bore. The bearing inside diameter is unsupported in the area ③.

6) Sizes d > 460 mm available by agreement.

7) Valid for matched adjacent construction.



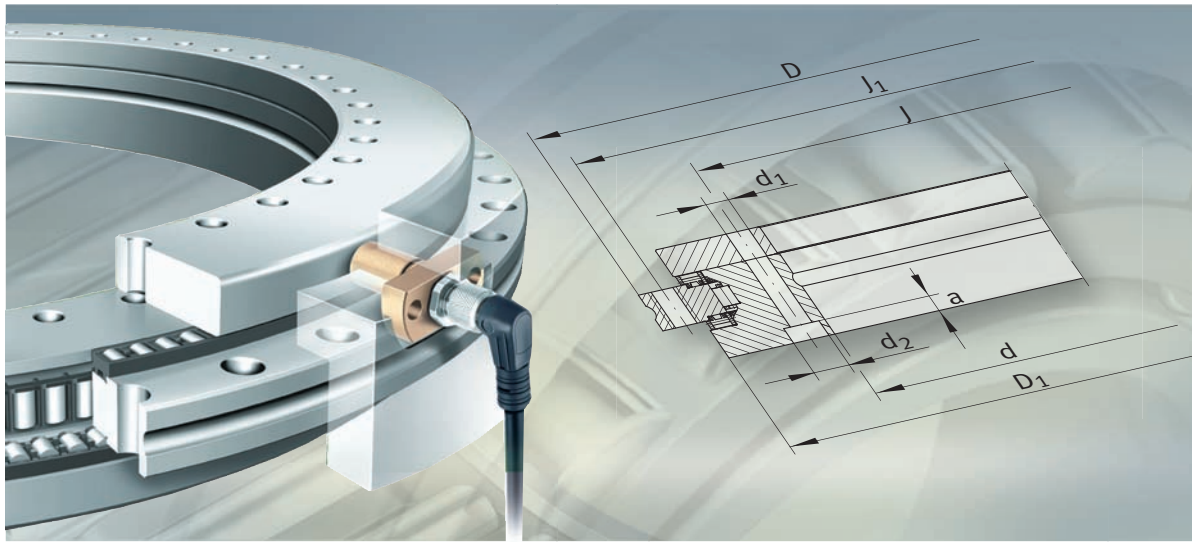
Hole pattern
② Two retaining screws



For ZKLDF100, ZKLDF325:
③ Screw counterbores open[5)]

Outer ring				Pitch t[1)]	Screw tightening torque	Basic load ratings		Limiting speed[7)]	Bearing frictional torque
Fixing screws		Threaded extraction hole				axial			
d_3	Quantity[4)]	G	Quantity	QuantityXt	M_A[2)]	dyn. C_a	stat. C_{0a}	n_G	M_{RL}
					Nm	N	N	min^{-1}	Nm
5,6	15	M5	3	18X20°	8,5	71 000	265 000	2 800	1,6
7	21	M8	3	24X15°	14	76 000	315 000	2 400	2
7	33	M8	3	36X10°	14	81 000	380 000	2 000	3
7	45	M8	3	48X 7,5°	14	121 000	610 000	1 600	4,5
9,3	33	M12	3	36X10°	34	162 000	920 000	1 200	7,5
9,3	33	M12	3	36X10°	34	172 000	1 110 000	1 000	11
9,3	45	M12	3	48X 7,5°	34	241 000	1 580 000	800	16
9,3	45	M12	3	48X 7,5°	34	255 000	1 860 000	700	21

Designation	Rigidity					
	of bearing position[3)]			of rolling element set		
	axial	radial	Tilting rigidity	axial	radial	Tilting rigidity
	c_{aL}	c_{rL}	c_{kL}	c_{aL}	c_{rL}	c_{kL}
	kN/µm	kN/µm	kNm/mrad	kN/µm	kN/µm	kNm/mrad
ZKLDF100[5)]	1,2	0,35	3,6	2,2	0,35	5
ZKLDF120	1,5	0,4	5,5	2,5	0,4	8
ZKLDF150	1,7	0,4	7,8	2,9	0,4	12
ZKLDF200	2,5	0,6	17,5	3,7	0,6	26
ZKLDF260	3,2	0,7	40	4,7	0,7	54
ZKLDF325[5)]	4	0,8	60	5,4	0,8	90
ZKLDF395	4,5	0,9	100	6,3	0,9	148
ZKLDF460[6)]	5,3	1,1	175	7,1	1,1	223



Axial/radial bearings
with integral angular measuring system

Axial/radial bearings with integral angular measuring system

		Page
Product overview	Axial/radial bearings with integral measuring system	1146
Features	Advantages of the angular measuring system	1148
	Axial/radial bearings with integral measuring system	1149
	Measuring heads with magneto-resistive sensors	1150
	Electronic evaluation system	1150
	Cables for signal transmission	1151
	Measurement accuracy	1152
	Further information	1153

Axial/radial bearings with integral angular measuring system

Axial/radial bearings

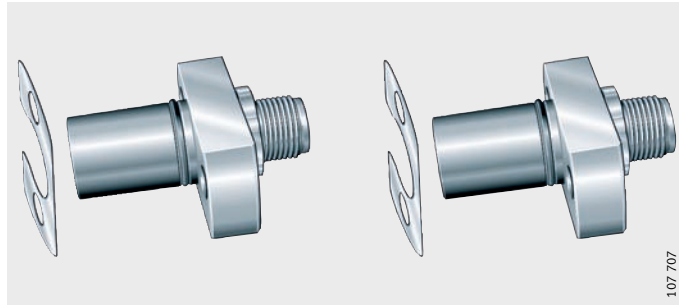
With magnetic dimensional scale

YRTM, YRTSM

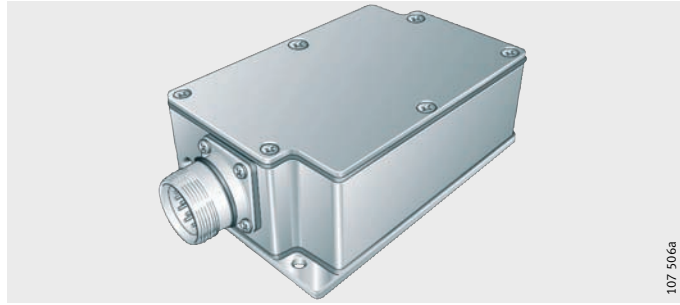
Electronic measuring system

Measuring heads with shims

SRM



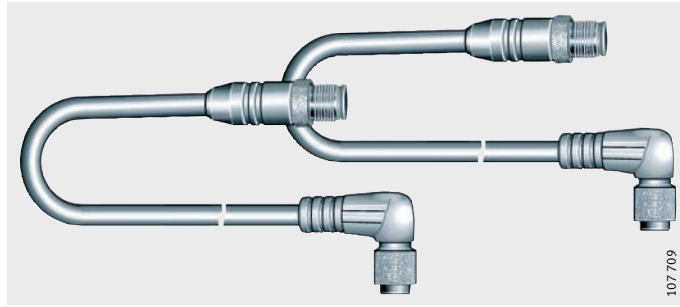
Electronic evaluation system



Connection cables

For connecting measuring heads to electronic measuring system

SRMC



Axial/radial bearings with integral angular measuring system

Features

Axial/radial bearings with integral measuring system comprise:

- an axial/radial bearing YRTM or YRTSM with a dimensional scale, an SRM electronic measuring system and signal leads SRMC. The electronic measuring system SRM comprises two measuring heads, two stacks of shims and an electronic evaluation system. The signal leads for connecting the measuring heads to the electronic evaluation system can be ordered individually in various designs. The electronic measuring system MEKO/U will continue to be available but should no longer be used for new designs.

Bearings of series YRTM or YRTSM correspond in mechanical terms to axial/radial bearings YRT or YRTS but are additionally fitted with a magnetic dimensional scale. The measuring system can measure angles to an accuracy of a few angular seconds by non-contact, magneto-resistive means.

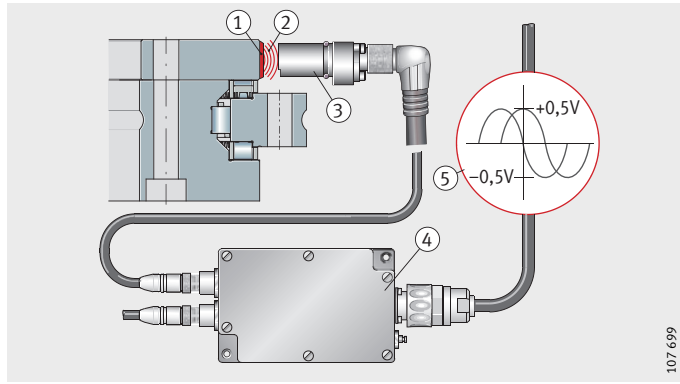
For the mechanical part of axial/radial bearings YRTM or YRTSM, please refer to the information from page 1113 to page 1133.

Axial/radial bearings with integral angular measuring system

Advantages of the angular measuring system

The measuring system, *Figure 1*:

- allows, due to the rigid connection to the adjacent construction, very good control characteristics (control stability and dynamics) and is therefore particularly suitable for axes with torque motor drive
- offers a high maximum speed of up to 16,5 m/s
- operates by non-contact means and is therefore not subject to wear
- carries out measurement irrespective of tilting and position
- has automatically self-adjusting electronics
- has a self-centring function
- is unaffected by lubricants
- is easy to fit, the measuring heads are easily adjustable, there is no need for alignment of the bearing and a separate measuring system
- requires no additional parts
  - the dimensional scale and measuring heads are integrated in the bearing and adjacent construction respectively
  - the resulting space saved can be used for the machining area of the machine
- does not give any problems relating to supply cables. The cables can be laid within the adjacent construction directly through the large bearing bore
- gives savings on design envelope size and costs due to the compact, integrated design requiring fewer components.



① Magnetic scale
② Magnetic field lines
③ Measuring head with magneto-resistive sensor
④ Electronic evaluation system
⑤ Analogue signals at output

Figure 1
Measurement principle

Axial/radial bearings with integral angular measuring system

Dimensional scale

The dimensional scale is applied without seams or joins to the outside diameter of the shaft locating washer. Magnetic poles are present as angle references, *Figure 2* on the magnetisable, electroplated coating at a pitch of 250 µm.

The angular position is measured incrementally, i. e. by counting the individual increments. For a fixed datum point for the angular position after the machine is switched on, an additional reference mark is therefore also required.

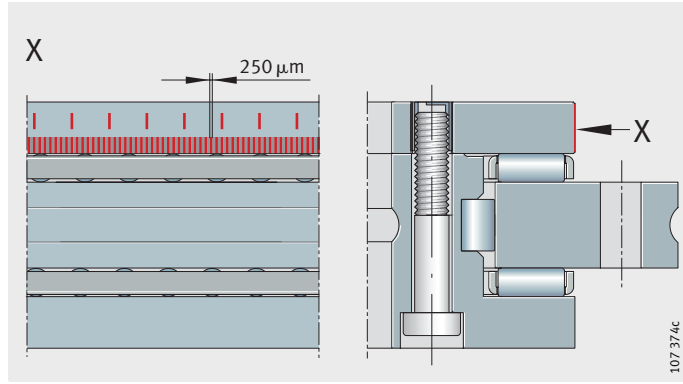


Figure 2
Dimensional scale

Reference marks

The system has pitch-coded reference marks in order to quickly create the absolute datum point. Every 15°, reference marks are applied with defined different pitches, so that the absolute datum point is achieved by passing over two adjacent reference marks (maximum 30°).

Measuring heads with magneto-resistive sensors

The measuring heads are colour coded:

- the silver measuring head (white) scans the incremental track
- the gold measuring head (yellow) scans the incremental track and the reference marks.

The two measuring heads are designed for optimum use of space. They are fixed in a slot in the adjacent construction by means of two fixing screws.

MR effect

The small magnetic fields are detected as a result of the magneto-resistive effect (MR effect). Compared with magnetic heads, the MR sensors allow static measurement of magnetic fields, i. e. electrical signals are derived without movement, in contrast to magnetic heads.

The resistance layer of the MR sensors is designed such that the resistance changes when a magnetic field is perpendicular to the current flow.

When the magnetic pitch moves past the MR sensor, two sine wave signals with a phase offset of 90° are generated with a period length of 500 μm.

O rings for sealing

The measuring heads have O rings to seal against the egress of oil and the ingress of fluids such as cooling lubricants.

Electronic evaluation system

The electronic evaluation system operates with the aid of a digital signal processor (DSP).

The input signals are digitised by an analogue/digital converter. The high performance processor (DSP) automatically compares the sensor signals and calculates the effective angular value from the sensor signals by means of vector addition. Correction is carried out, for example, on the offset of the analogue signals.
A digital/analogue converter generates synthetic analogue signals as a 1 V_{SS} value.

The electronic evaluation system can be positioned at any location or within the adjacent construction. It is connected to the controller by means of a conventional 12-pin extension cable.

The lead for transmitting the voltage signals from the electronic evaluation system to the electronic post-processor can be up to 100 m long.

Cables for signal transmission

The signal cables for connecting the measuring heads to the electronic evaluation system are available in the lengths 1 m, 2 m and 3 m, see table.

The connection side for the electronic evaluation system has a straight plug. The connection side to the measuring head is suitable for straight plugs or 90° elbow plugs.

In the case of the elbow plug, the cable outlet direction is defined in relation to the mounting position of the measuring heads.

Advantages

The cables are suitable for use in machinery and plant for chip-forming machining:

- the cables and plugs are shielded
- the cable sheathing is made from polyurethane (PUR), halogen-free and flame-resistant
- the signal cables are free from halogens, silicones and PVC as well as resistant to microbes and hydrolysis
- the cables are resistant to oils, greases and cooling lubricants, see TPI 154, Integral angular measuring system
- the cables are suitable for dynamic use in flexible trunking (it must be ensured that they are laid correctly).

Bending cycles

When laid in flexible trunking, the cables can achieve ≧ 2 million bending cycles under the following test conditions:

- bending radius 65 mm (10×D)
- acceleration 5 m/s^2
- travel speed 200 m/min
- travel distance 5 m, horizontally.

Plug connectors

INA plug connectors are robust and designed for use in industrial environments. When connected, they conform to protection grade IP 65 (EN 60 529).

The large sheathed areas of the plugs ensure effective shielding.

Connection cables

Plug design	Cable length m	Ordering designation
Straight plugs on both ends	1	**SRMC 1-S**
	2	**SRMC 2-S**
	3	**SRMC 3-S**
Straight plug and 90° elbow plug	1	**SRMC 1-A**
	2	**SRMC 2-A**
	3	**SRMC 3-A**

Axial/radial bearings with integral angular measuring system

Measurement accuracy

The more accurate the angular measurement, the more accurately a rotary axis can be positioned. The accuracy of angular measurement is essentially determined by:

① the quality of the dimensional scale
② the quality of scanning
③ the quality of the electronic evaluation system
④ the eccentricity of the dimensional scale to the bearing raceway system
⑤ the runout deviation of the bearing arrangement
⑥ the elasticity of the measuring system shaft and its linkage to the shaft to be measured
⑦ the elasticity of the stator shaft and shaft coupling.

For the measuring system YRTM, only points ① to ③ are relevant.

The eccentricity in point ④ is completely eliminated by the diametrically opposed arrangement of the MR sensors.

Points ⑤ to ⑦ play only a very minor role in the INA measuring system.

Positional deviations

Positional deviations within a revolution are the absolute measurement errors over one revolution of the system (measured at +20 °C ambient temperature):

- YRTM150 ≦ ±6″
- YRTM180 ≦ ±5″
- YRT(S)M200, YRT(S)M260, YRT(S)M325, YRT(S)M395, YRT(S)M460 ≦ ±3″.

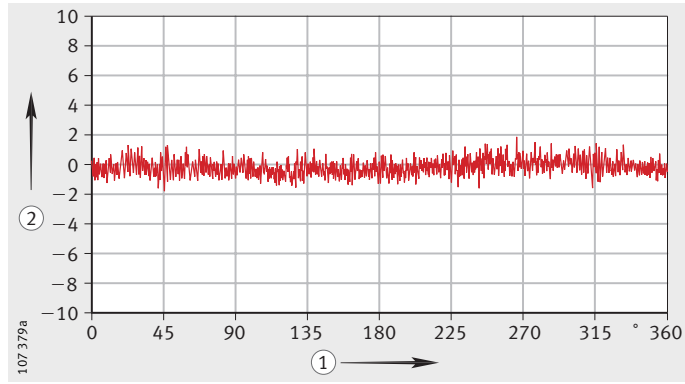
Since the dimensional scale is directly connected, i.e. without any compensation elements, with the rolling bearing, deflections in the bearing raceway system due to machining forces could affect the measurement result. This effect is eliminated by the diametrically opposed arrangement of the measuring heads in the electronic evaluation system.

Measurement record

Each INA measuring system is supplied with an accuracy measurement record, *Figure 3*.

The accuracy is measured on the coded washer of the YRTM or YRTSM bearing when the coding is applied and is documented.

The measurement trace shows the pitch error of the coding.

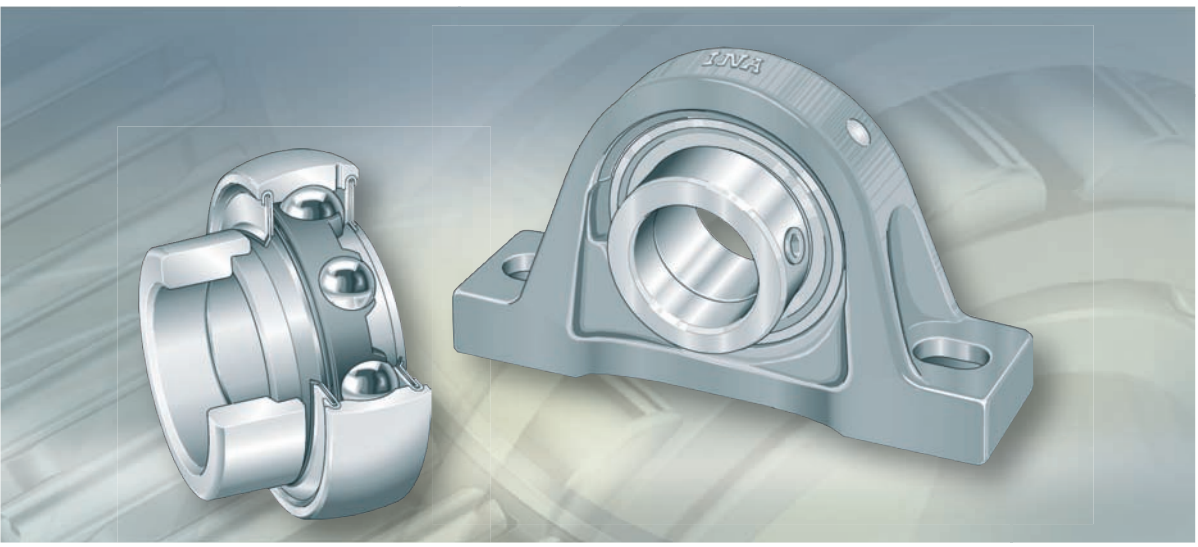


① Measurement travel in degrees
② Deviation in angular seconds

Figure 3
Excerpt from a measurement trace, example:
YRTM 395 – S.Nr. 03/09/004

Further information

Comprehensive information on axial/radial bearings with an integral measuring system is given in TPI 120, High precision bearings for combined loads. This publication is available on request.



Radial insert ball bearings
Housing units

Radial insert ball bearings
Housing units

Radial insert ball bearings **1158**

INA radial insert ball bearings are ready-to-fit rolling bearings for the design of particularly economical bearing arrangements. These robust machine elements are available in numerous designs that differ essentially in the outside surface of the outer ring, the method of location on the shaft and the sealing arrangement.

Radial insert ball bearings with a spherical outer ring, fitted in housings with a concave bore, can compensate for static misalignment of the shaft. They can be relubricated if necessary and are particularly easy to fit due to the special location methods. Operation even under difficult operating conditions is ensured by seals of a three-piece design that are matched to the application.

The classic areas of application for these bearings include the agricultural, construction and mining sector, conveying equipment, textile, paper and woodworking machinery as well as machines for the filling, timber and packaging industries.

Housing units **1212**

With cast iron housings
With sheet steel housings

Housing units comprise INA cast iron or sheet steel housings with a concave bore in which INA radial insert ball bearings are mounted. These units are matched to each other and are available as plummer block, flanged and take-up housing units. A wide range of housing designs offers the right solution for any specific application. The areas of application of the units correspond to those of the insert bearings.

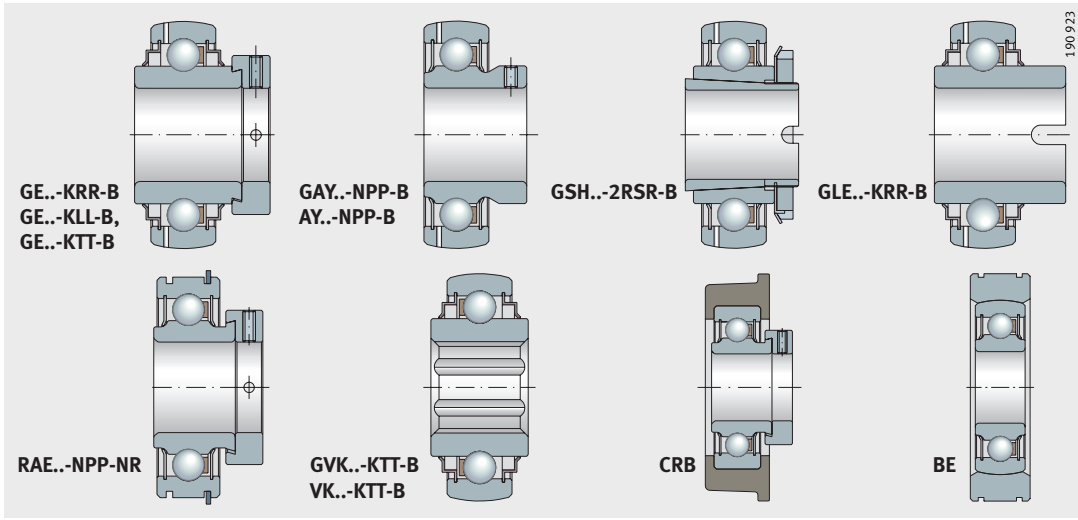
Cast iron housings are single-piece units that can support high loads. Sheet steel housings are two-piece units and are used where the priority is not the load carrying capacity of the housing but the low mass of the unit.

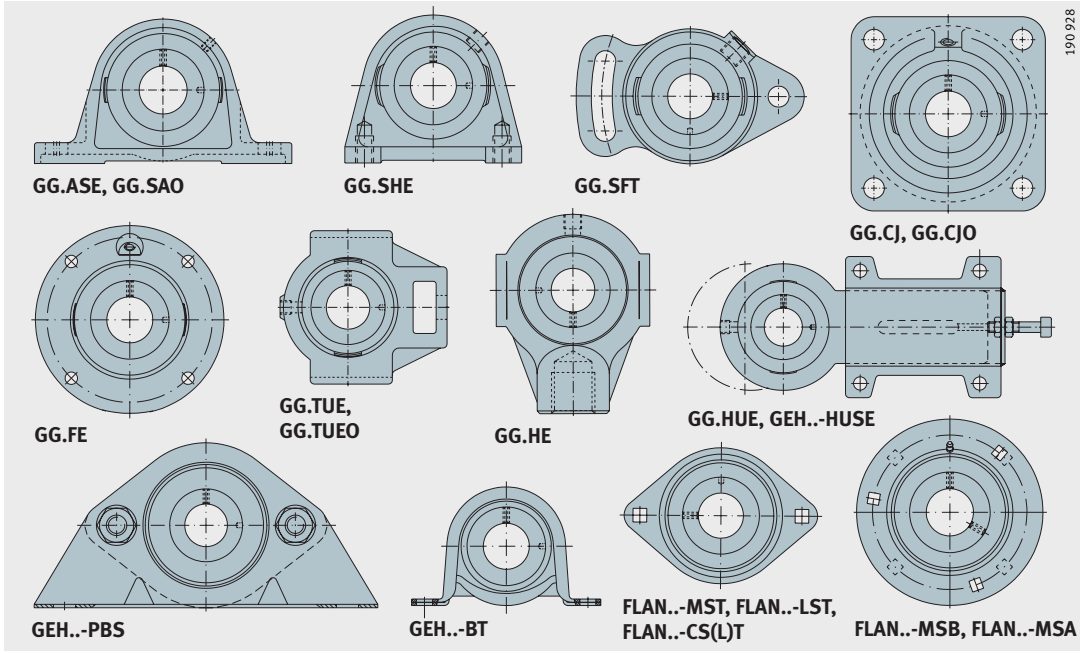
Depending on the series, INA take-up housing units have integral fixing eyes with holes, slots and guide surfaces. They can therefore be moved in an axial direction or swivelled in a radial direction.

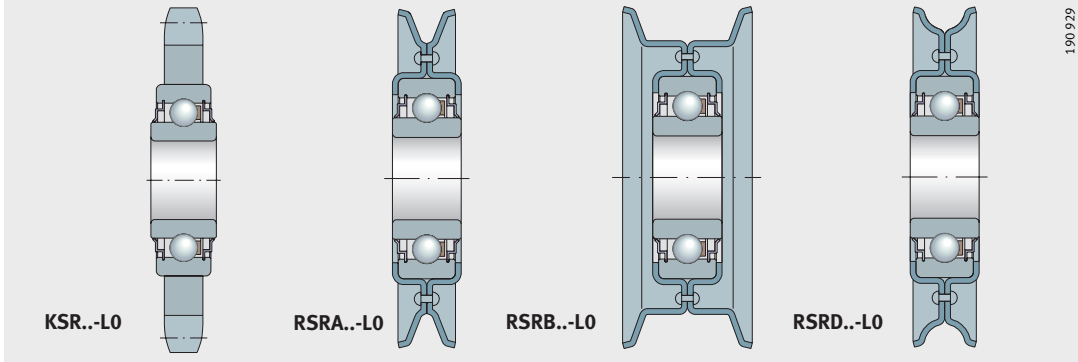
Roller chain idler sprocket units
Idler pulley units **1310**

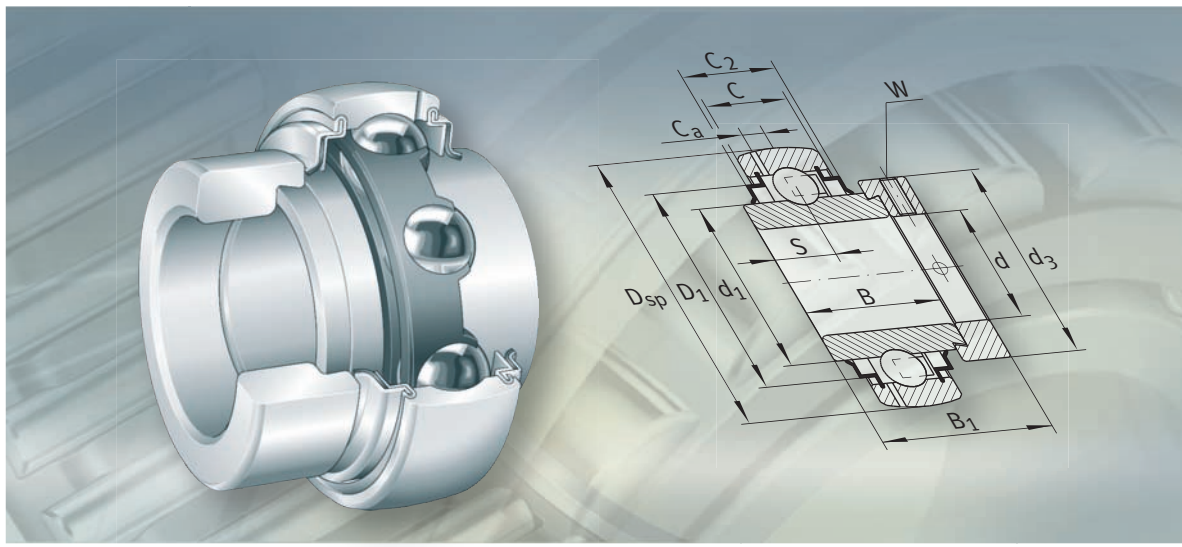
Roller chain idler sprocket units are guidance and return units for roller bush chains and roller chains. They can compensate for chain stretch resulting from operation and give smoother running under high loads and speeds.

Idler pulley units are tensioning systems for belt drives and idler pulleys. They are suitable for vee, flat or round belts as well as for steel and hemp cables. Idler pulley units increase the wrap angle, compensate for belt stretch resulting from operation, allow shorter centre distances and reduce belt wear.


190 923
GE..-KRR-B
GE..-KLL-B,
GE..-KTT-B
GAY..-NPP-B
AY..-NPP-B
GSH..-2RSR-B
GLE..-KRR-B
RAE..-NPP-NR
GVK..-KTT-B
VK..-KTT-B
CRB
BE


190 928
GG.ASE, GG.SAO
GG.SHE
GG.SFT
GG.CJ, GG.CJO
GG.FE
GG.TUE,
GG.TUEO
GG.HE
GG.HUE, GEH..-HUSE
GEH..-PBS
GEH..-BT
FLAN..-MST, FLAN..-LST,
FLAN..-CS(L)T
FLAN..-MSB, FLAN..-MSA


190 929
KSR..-L0
RSRA..-L0
RSRB..-L0
RSRD..-L0



Radial insert ball bearings

Radial insert ball bearings

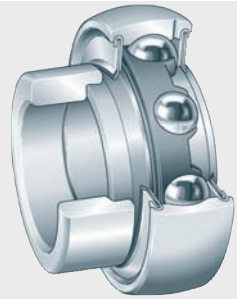
		Page
Product overview	Radial insert ball bearings	1160
Features	Radial insert ball bearings	1165
	Radial insert ball bearings with eccentric locking collar	1167
	Radial insert ball bearings with grub screws in inner ring	1168
	Radial insert ball bearings with integral adapter sleeve	1169
	Radial insert ball bearings with drive slot	1170
	Self-aligning deep groove ball bearings	1171
	Deep groove ball bearings with extended inner ring	1172
	Radial insert ball bearings with steel aligning ring	1173
	Radial insert ball bearings with eccentric locking collar, cylindrical outer ring and slots in outer ring	1174
	Radial insert ball bearings with rubber interliner	1175
	Suffixes	1176
	Sealing	1177
	Features of radial insert ball bearings, comparison of series	1178
Design and safety guidelines	Compensation of misalignments	1180
	Axial load carrying capacity of radial insert ball bearings	1181
	Speed limits for radial insert ball bearings, guide values	1182
	Shaft tolerances for radial insert ball bearings, recommendations	1182
Accuracy	Standard tolerances of radial insert ball bearings	1183
	Radial internal clearance of radial insert ball bearings	1183
Dimension tables	Radial insert ball bearings with spherical outer ring	1184
	Radial insert ball bearings with grub screws in inner ring	1192
	Radial insert ball bearings with integral adapter sleeve	1196
	Radial insert ball bearings with drive slot	1197
	Radial insert ball bearings with eccentric locking collar, cylindrical outer ring	1198
	Inch size radial insert ball bearings, spherical or cylindrical outer ring	1200
	Radial insert ball bearings with rubber interliner	1204
	Radial insert ball bearings with steel aligning ring	1206
	Deep groove ball bearings with extended inner ring	1207
	Self-aligning deep groove ball bearings with square or hexagonal bore	1208
	Self-aligning deep groove ball bearings with bore for fit	1210

With eccentric locking collar

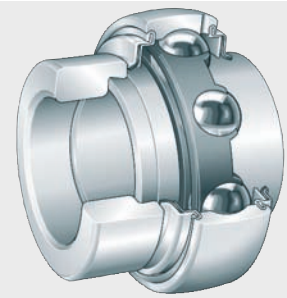
With spherical outer ring

Features: see page 1167

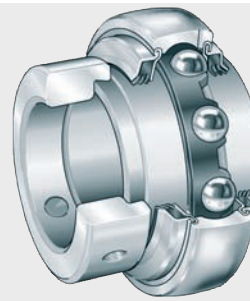
GRAE..-NPP-B, RAE..-NPP-B, RALE..-NPP-B



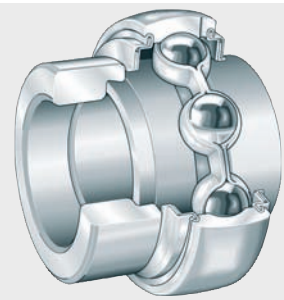
GE..-KRR-B, GNE..-KRR-B, E..-KRR-B, NE..-KRR-B



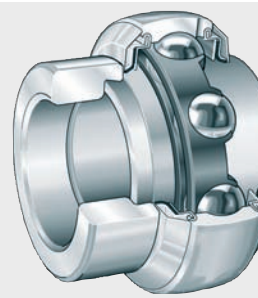
GE..-KTT-B



GE..-KLL-B



GE..-KRR-B-2C

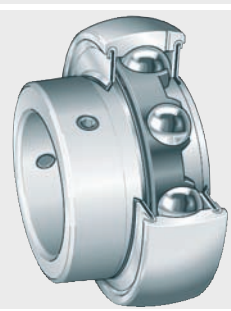


With grub screws in inner ring

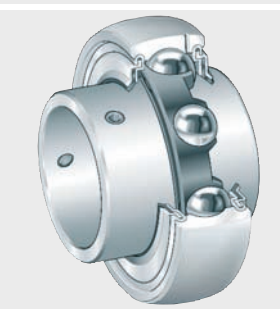
With spherical outer ring

Features: see page 1168

GAY..-NPP-B, AY..-NPP-B



GYE..-KRR-B

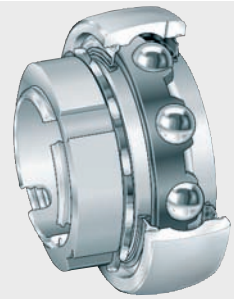


With integral adapter sleeve

With spherical outer ring

Features: see page 1169

GSH..-2RSR-B

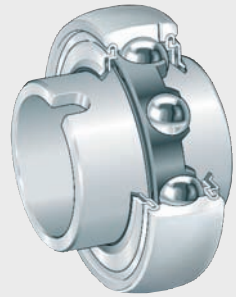


With drive slot

With spherical outer ring

Features: see page 1170

GLE..-KRR-B



Self-aligning deep groove ball bearings

With spherical outer ring
With fit

Features: see page 1171

2..-NPP-B

With spherical outer ring
With square or hexagonal bore

Features: see page 1171

GVK..-KTT-B-AS2/V, VK..-KTT-B

SK..-KRR-B

Deep groove ball bearings with extended inner ring

With cylindrical outer ring

Features: see page 1172

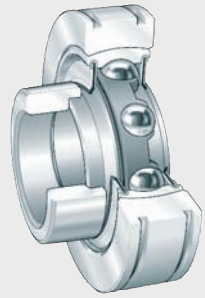
2..-KRR, 2..-KRR-AH

With steel aligning ring

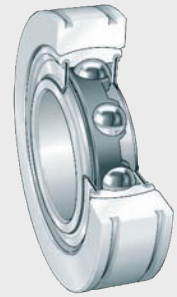
With cylindrical outer ring

Features: see page 1173

PE



BE

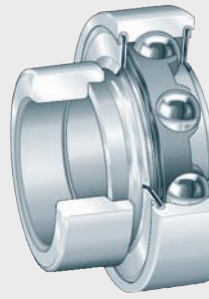


With eccentric locking collar

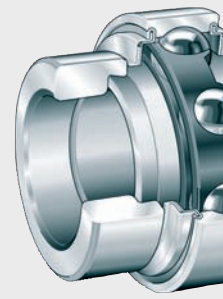
With cylindrical outer ring

Features: see page 1167

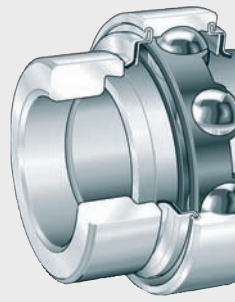
RAE..-NPP, RALE..-NPP



E..-KLL



E..-KRR

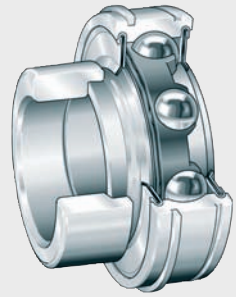


With eccentric locking collar

With cylindrical outer ring
One snap ring in outer ring

Features: see page 1174

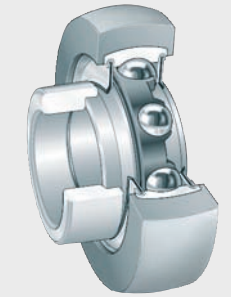
RAE..-NPP-NR



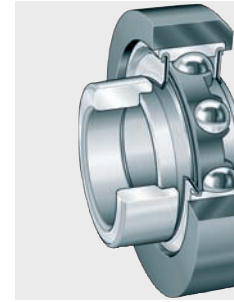
With rubber interliner

Features: see page 1175

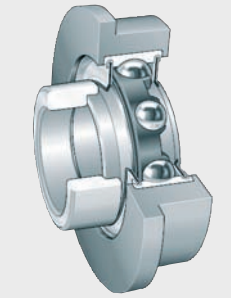
RABRA, RABRB



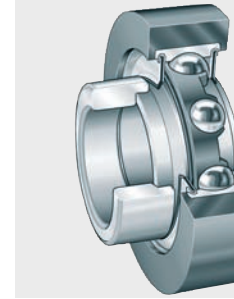
RCRA, RCRB



CRB



RCSMA, RCSMB

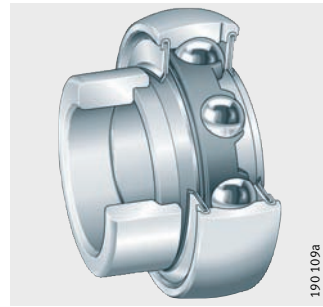


Inch size radial insert ball bearings

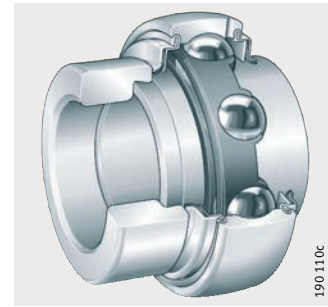
With spherical or cylindrical outer ring

Features: see page 1167 and page 1168

GRA..-NPP-B-AS2/V, RA..-NPP-B

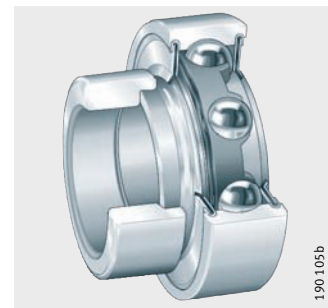


G..-KRR-B-AS2/V



GY..-KRR-B-AS2/V

RA..-NPP, RAL..-NPP



Radial insert ball bearings

Features

Radial insert ball bearings are single row, ready-to-fit units comprising a solid outer ring, an inner ring extended on one or both sides, cages made from plastic or sheet steel and seals of type P, R, L or T. Bearings with an inner ring extended on both sides undergo less tilting of the inner ring and therefore run more smoothly.

The outer ring has a spherical or cylindrical outside surface. In combination with an INA housing matched to the design, bearings with a spherical outer ring can compensate for misalignment of the shaft, see Compensation of static misalignments, page 1180.

With only a few exceptions, radial insert ball bearings can be relubricated. For this purpose, they have two lubrication holes in one plane of the outer ring offset by 180°.

Radial insert ball bearings are particularly easy to fit and are suitable for drawn shafts of grade h6 up to h9. They are located on the shaft by means of eccentric locking collars, grub screws in the inner ring, adapter sleeves, drive slots or fit.

The table, page 1178, presents the features of the series in detail. Please take these into consideration.

Inch size designs

Some series with eccentric locking collar or grub screws in the inner ring are also available with inch size bore dimensions, see dimension tables, page 1200 to page 1202.
For further inch size bearings and bearing units, see TPI 127, Radial insert ball bearings/housing units in inch sizes.

Corrosion-resistant radial insert ball bearings

For corrosion-resistant bearing arrangements and for applications in the food and drinks industry, there are Corrotect®-coated bearings with the suffix FA125 and bearings of a corrosion-resistant design. Corrosion-resistant radial insert ball bearings are suitable where moisture, contaminated water, salt spray mist or weakly alkaline and weakly acidic cleaning agents are present, see also TPI 64, Corrosion-resistant products.

Radial insert ball bearings

Corrotect® coating

The special INA coating Corrotect® is an economical alternative to conventional corrosion-resistant radial insert ball bearings. The coating thickness is between 2 μm and 5 μm.

Advantages of the Corrotect® coating

- Anti-rust protection on all sides, including the machined surfaces of chamfers and radii
- Long term prevention of rust penetration beneath seals
- Small bright spots are protected against corrosion by the cathodic protection mechanism
- Anti-corrosion protection allows a significantly longer operating life compared to uncoated parts
- Uncoated bearings and housings are fully interchangeable with the coated versions of the same design
- Bearings and housings made from corrosion-resistant rolling bearing steel are often no longer required.

For further information on Corrotect® see also section Corrotect® coating, page 119.

Radial insert ball bearings for high and low temperatures

At high temperatures, rolling bearings expand in volume due to a change in the material microstructure. Depending on the location of the heat source, there may also be a significant temperature difference between the inner and outer ring.

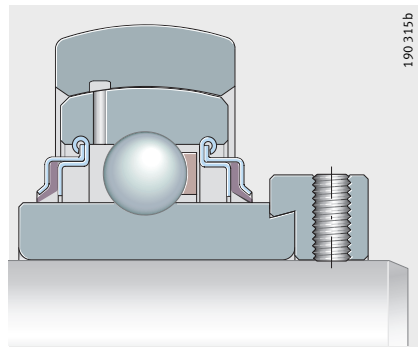
The radial insert ball bearings have cages made from metal or a high temperature plastic, increased radial internal clearance, lubricants with improved thermal resistance and special seals.

These bearings have the suffix FA164 or FA101, see table, page 1176 and table, page 1179. An extended temperature range can be covered by using the series GLE..-KRR-B and GE..-KLL-B, see table, page 1179.

Radial insert ball bearings with eccentric locking collar

These “classic” INA radial insert ball bearings are located on the shaft by means of a locking collar, *Figure 1*. They are particularly suitable for bearing arrangements with a constant direction of rotation or, under low speed and load, for an alternating direction of rotation.

The locking collar is preferably tightened in the direction of rotation and secured by means of a grub screw. This location method prevents damage to the shaft and can be easily loosened again.



GE..-KRR-B

Figure 1
Location using eccentric locking collar

Sealing

The radial insert ball bearings are fitted with P, R, L or T type seals. In series GE..-KRR-B-2C, the R seals are fitted with Corrotect®-coated flinger shields to protect against mechanical damage.

Lubrication

With the exception of a few series, sealed bearings can be relubricated.

Anti-corrosion protection

Several series are also available in a corrosion-resistant design. These bearings have the suffix FA125.

The inner rings up to d = 60 mm, as well as locking collars in general, have a Corrotect® coating and are thus protected against fretting corrosion; the exception is the series RALE..-NPP(-B).

Radial insert ball bearings for high and low temperatures

The series for high or expanded temperature ranges have the suffix FA164 or FA101, see table, page 1179.

Cylindrical outer ring

In addition to the bearings with a spherical outer ring, there are also the following series with a cylindrical outer ring: RAE..-NPP, RALE..-NPP, E..-KRR and E..-KLL.

Inch size designs

The series GRA..-NPP-B-AS2/V, RA..-NPP-B, G..-KRR-B-AS2/V, RA..-NPP, RAL..-NPP have an inch size bore diameter, see dimension table, page 1200.

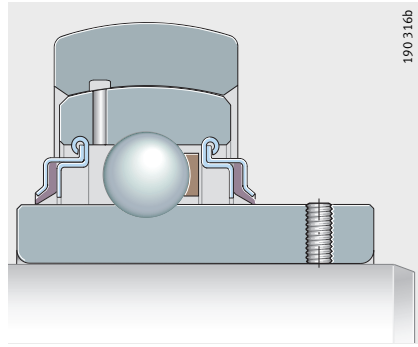
Tightening torques

Tightening torques for metric and inch size grub screws, see table, page 1234.

Radial insert ball bearings with grub screws in inner ring

In these radial insert ball bearings, the inner ring is located on the shaft by means of two grub screws offset by 120°, *Figure 2*. This location method is suitable for bearing arrangements with a constant direction of rotation or, under low speed and load, for an alternating direction of rotation.

The grub screws are self-retaining and have a fine pitch thread with cup point for secure location of the bearings.



GYE..-KRR-B

Figure 2
Location using grub screws in the inner ring

Sealing

The radial insert ball bearings are fitted on both sides with P or R type seals.

Lubrication

With the exception of series AY..-NPP-B, the bearings can be relubricated.

Anti-corrosion protection

These bearings have the suffix VA. In this design, the bearing rings and rolling elements are made from high alloy, corrosion-resistant rolling bearing steel with an increased chromium molybdenum content and the steel cages are made from corrosion-resistant steel. The bearings are sealed on both sides with RSR seals and have additional flinger shields made from corrosion-resistant steel, see also TPI 64, Corrosion-resistant products.

Radial insert ball bearings for high temperatures

The radial insert ball bearings for high temperatures have the suffix FA164, see table, page 1179.

Inch size designs

In the case of series GY..-KRR-B-AS2/V, the bore is an inch size bore, see dimension table, page 1200.

Tightening torques

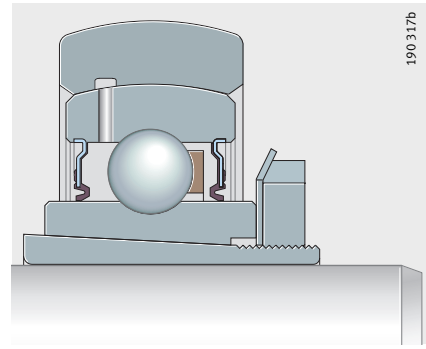
Tightening torques for metric and imperial grub screws, see table, page 1234.

Radial insert ball bearings with integral adapter sleeve

In this series, the inner ring is located on the shaft by an adapter sleeve with a locknut and a tab washer, *Figure 3*.

The adapter sleeve and locknut give concentric, force locking location of the bearing inner ring on the shaft. As a result, the speeds that can be achieved are the same as with deep groove ball bearings. These bearings also give quieter running than normal radial insert ball bearings. The adapter sleeve, locknut and tab washer are all zinc-coated.

Due to the integral adapter sleeve, the bearings have the same radial dimensions and basic load ratings as radial insert ball bearings with an eccentric locking collar or with grub screws in the inner ring and are interchangeable with these bearings.



GSH..-2RSR-B

Figure 3
Location using adapter sleeve and locknut

Sealing

Radial insert ball bearings with integral adapter sleeve are sealed by means of RSR seals.

Lubrication

The bearings can be relubricated.

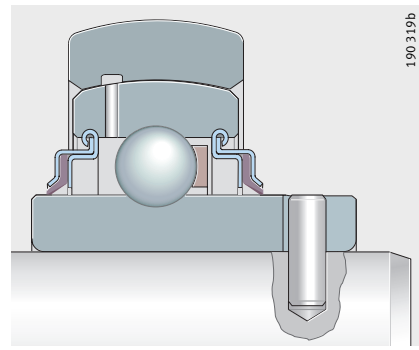
Hook wrenches and tightening torques

See table, page 1236.

Radial insert ball bearings with drive slot

Radial insert ball bearings with a drive slot in the inner ring are non-locating bearings with good high temperature characteristics, *Figure 4*. Non-locating bearings are used at low speeds and loads to compensate for thermal elongation of the shaft.

Due to the slot, they are easy to locate in a radial direction. Rotation is prevented by a drive pin on the shaft or a set collar with a pin. The non-locating bearings are suitable for drawn shafts up to grade h7.



GLE..-KRR-B

Figure 4
Location using drive slot

Anti-corrosion protection

Inner rings up to a bore diameter 60 mm have a Corrotect® coating and are thus protected against fretting corrosion.

Sealing

Radial insert ball bearings with a drive slot have R type seals with Teflon seal lips.

Lubrication

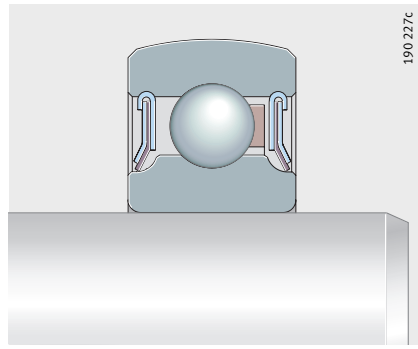
The bearings can be relubricated.

Self-aligning deep groove ball bearings

Self-aligning deep groove ball bearings area available with a cylindrical bore for a fit seat, *Figure 5* or with a reamed square or hexagonal bore, *Figure 6*.

With fit

Bearings with a fit on the shaft allow speeds equivalent to those of standard ball bearings, are suitable for bearing arrangements with an alternating direction of rotation and offer smooth running.



2..-NPP-B

Figure 5
Self-aligning deep groove ball bearings

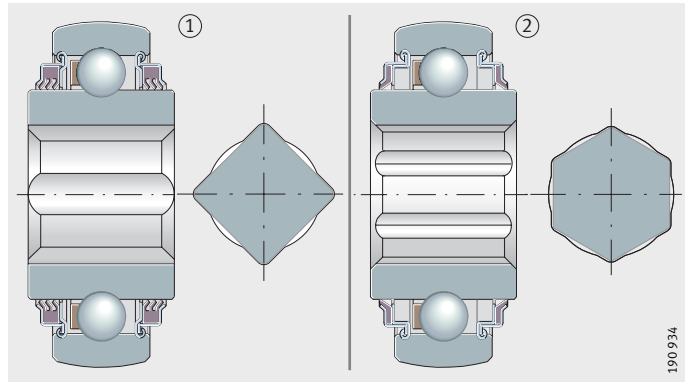
Sealing

The bearings are sealed on both sides using P type seals with a vulcanised seal lip or three-piece designs.

For self-aligning deep groove ball bearings with a fit seat, the fit data for ball bearings apply.

With square or hexagonal bore

Bearings with a profiled bore are used where shafts must transmit very high torques and this is only possible using square or hexagonal shafts, *Figure 6*. Rotation is prevented by the geometrical locking effect.



VK..-KTT-B
SK..-KRR-B

Figure 6
① Square bore
② Hexagonal bore

Anti-corrosion protection

The bearings have a Corrotect® coating.

Sealing

Self-aligning deep groove ball bearings are sealed using R or T type seals.

Lubrication

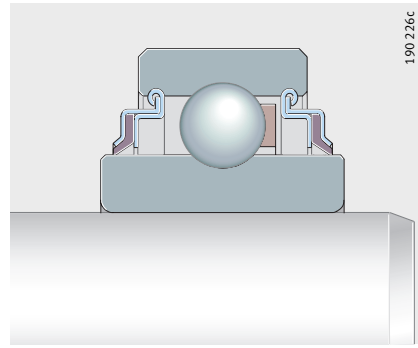
The bearings are greased to their maximum, some designs can be relubricated.

Deep groove ball bearings with extended inner ring

These bearings have a cylindrical outer ring and are fitted in cylindrical bores, *Figure 7*. The inner ring is extended on both sides and is located on the shaft using a location fit. Due to the extended inner ring, additional axial spacer rings are not required.

The concentric seat allows speeds equivalent to those of standard ball bearings, while the load can be either constant or alternating. Smooth running is also achieved.

The tolerance of the inner ring bore corresponds to tolerance class PN in accordance with DIN 620.



2..-KRR
2..-KRR-AH

Figure 7
Deep groove ball bearings with extended inner ring

Sealing

The bearings are sealed on both sides using R type seals.

Lubrication

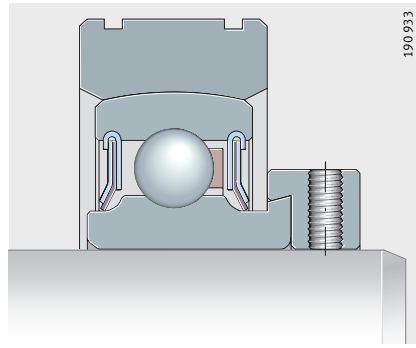
The sheet steel washers extended outwards and angled downwards form a large grease reservoir.

Radial insert ball bearings with steel aligning ring

These bearings are based on radial insert ball bearings with an eccentric locking collar or on self-aligning deep groove ball bearings, but additionally have an axially split outer ring as an aligning ring, *Figure 8*. They are mounted in cylindrical bores and can compensate for static misalignment of the shaft up to ±5°.

Due to the annular slots in the outer ring to DIN 616, they are highly suitable for sheet metal constructions. In this case, they are axially located using snap rings to DIN 5 417.

In series PE, the inner ring is located on the shaft using a locking collar, in series BE by a location fit.



PE

Figure 8
Radial insert ball bearings with steel aligning ring

Anti-corrosion protection

The aligning ring has a Corrotect® coating and is thus protected against fretting corrosion. In series PE, the inner ring and locking collar are also coated.

Sealing

The bearings are sealed on both sides using P type seals.

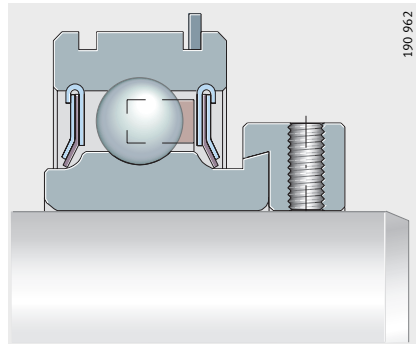
Lubrication

Radial insert ball bearings with an aligning ring cannot be relubricated.

The fit tolerances of the aligning rings are those of the deep groove ball bearings. Select the fit for the shaft and housing such that the outer ring of the insert bearing can undergo self-alignment.

Radial insert ball bearings with eccentric locking collar, cylindrical outer ring and slots in outer ring

The basic design of series RAE..-NPP-NR is a radial insert ball bearing with an eccentric locking collar and an inner ring extended on one side, *Figure 9*. The outer ring has a cylindrical outside surface and two slots to DIN 616. The bearings are fitted in cylindrical bores and axially located by easy-to-fit snap rings. The bearing is supplied with one snap ring to DIN 5 417 already fitted.



RAE..-NPP-NR

Figure 9
Radial insert ball bearings with cylindrical outer ring and two slots in outer ring

Sealing

The bearings are sealed on both sides using P type seals.

Lubrication

The radial insert ball bearings are greased and cannot be relubricated.

Radial insert ball bearings with rubber interliner

These radial insert ball bearings are located on the shaft using an eccentric locking collar. The outer ring is encased in a thick-walled NBR interliner, *Figure 10*.

The interliner absorbs vibrations and shocks and thus gives damping of running noises.

The interliners have a spherical or cylindrical outside surface.

For roll bearing arrangements, one series has a locating shoulder on the rubber ring.

CRB

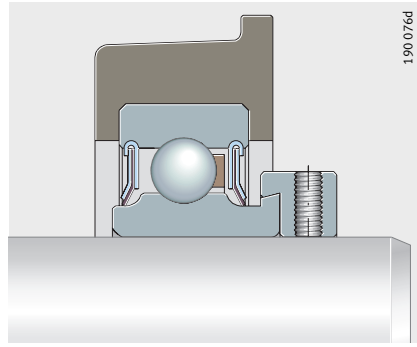


Figure 10
Radial insert ball bearings with rubber interliner

Anti-corrosion protection

The inner ring and locking collar have a Corrotect® coating and are thus protected against fretting corrosion; the exception is the series with radial insert ball bearings RALE..-NPP(-B).

Sealing

The radial insert ball bearings are sealed on both sides using P type seals.

Lubrication

Bearings with rubber interliners cannot be lubricated.

Note the tube and housing diameters for radial insert ball bearings with rubber interliner:

- CRB, tube inside diameter D –0,6 to 1,6
- RABR, RCR, RCSM, housing diameter D –0,25 to –0,35.

Suffixes

Suffixes for available designs: see table.

Available designs

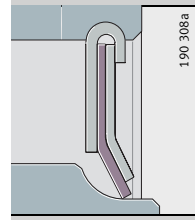
Suffix	Description	Design
AS2/V	Bearing outer ring with 2 lubrication holes in offset planes	Standard
B	Bearing with spherical outer ring	
2C	Flinger shields on both sides	
FA101	High and low temperature design –40 °C to +180 °C	
FA106	Bearing subjected to special noise testing	
FA107	Bearing with lubrication holes on the locating side	
FA125.5	With Corrotect® coating, protected against corrosion	
FA164	High temperature design up to +250 °C	
KRR	Lip seals on both sides (R type seal)	
KLL	Labyrinth seals on both sides (L type seal)	
KTT	Triple lip seals on both sides (T type seal)	
NR	Slot and snap ring for radial insert ball bearings with cylindrical outer ring	
NPP	Lip seals on both sides (P type seal)	
OSE	Bearing without locking element (eccentric locking collar)	
2RSR	Lip seals on both sides (vulcanised)	
VA	Corrosion-resistant design made from high alloy rolling bearing steel	

Sealing

Seals for radial insert ball bearings are of a three-piece design. This concept offers, due to the rigidly rolled-in sheet steel washer, optimum seating in the bearing as well as concentric alignment of the seal lip to the inner ring.

Seal types

P seal

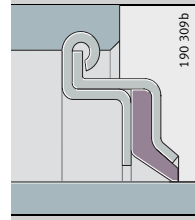


Two zinc-coated sheet steel washers with intermediate NBR part, seal lip axially preloaded.

In order to protect the seal lip from mechanical damage, the outer sheet steel washer extends a considerable distance down towards the bearing inner ring.

Used in narrow radial insert ball bearings with inner ring extended on one side.

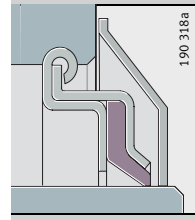
R seal



Two zinc-coated sheet steel washers extended outwards and angled downwards with intermediate NBR part and radially preloaded seal lip.
Better protection against mechanical damage.

Substantial grease reservoir due to the space between the extended and angled sheet steel washers.
Used in radial insert ball bearings with inner ring extended on both sides.

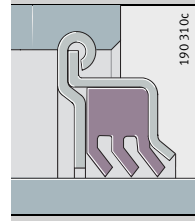
R seal with flinger shield



As R seal, but with outer flinger shield with anti-corrosion protection.

Additional sealing action without restriction on speed and with additional protection against mechanical damage.

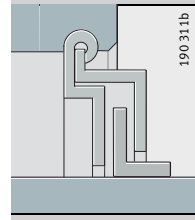
T seal



Two zinc-coated sheet steel washers with intermediate NBR part and three radially preloaded seal lips for heavily contaminated conditions.
For better protection of the seal lip against mechanical damage, the outer sheet steel washer is angled outwards.

Lower speeds due to higher friction.

L seal (labyrinth seal)

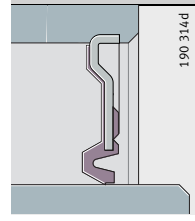


Two zinc-coated sheet steel washers extended outwards in the outer ring with a zinc-coated intermediate sheet steel L-section ring pressed onto the inner ring.

Substantial grease reservoir due to the space between the extended and angled sheet steel washers.

Used in radial insert ball bearings with inner ring extended on both sides. For increased temperatures and lower friction.

RSR seal



Single-piece, zinc-coated sheet steel washer with moulded, radially preloaded NBR seal lip.

Used in radial insert ball bearings with integral adapter sleeve.

Features of radial insert ball bearings, comparison of series

Series	For shaft diameters from ... to ...	Compensation of misalignment	Internal clearance
GRAE..-NPP-B	12 mm – 60 mm	yes	C3
GRAE..-NPP-B-FA125.5	20 mm – 60 mm		
GRA..-NPP-B-AS2/V	$^5/_8$ inch – $1^3/_4$ inch		
RAE..-NPP-B	12 mm – 50 mm		
RA..-NPP-B	$^3/_4$ inch – $1^1/_2$ inch		
RALE..-NPP-B	20 mm – 30 mm		
GE..-KRR-B	17 mm – 120 mm		
GE..-KRR-B-FA125.5	20 mm – 50 mm		
GE..-KRR-B-FA164	20 mm – 70 mm, 80 mm – 90 mm		C5
GE..-KRR-B-FA101	20 mm – 75 mm		C4
G..-KRR-B-AS2/V	$^{15}/_{16}$ inch – $2^{15}/_{16}$ inch		C3
GE..-KRR-B-2C	25 mm – 40 mm		
E..-KRR-B	25 mm – 40 mm		
GNE..-KRR-B	30 mm – 100 mm		
GE..-KTT-B	20 mm – 80 mm		
GE..-KLL-B	20 mm – 50 mm		C5
GYE..-KRR-B	12 mm – 90 mm	yes	C3
GY..-KRR-B-AS2/V	$^3/_4$ inch – 2 inch		
GYE..-KRR-B-VA	12 mm – 50 mm		
GAY..-NPP-B	12 mm – 60 mm		
GAY..-NPP-B-FA164	12 mm, 15 mm		C5
AY..-NPP-B	12 mm – 30 mm		C3
GSH..-2RSR-B	20 mm – 50 mm	yes	C4
GLE..-KRR-B	20 mm – 70 mm	yes	C4
2..-NPP-B	12 mm – 50 mm	yes	CN
GVK..-KTT-B-AS2/V	25,4 mm – 39,6875 mm	yes	C3
VK..-KTT-B	25,4 mm		
SK..-KRR-B	17 mm – 31,8 mm	yes	C3
RABRA	30 mm	yes	C3
RABRB	12 mm – 50 mm		
PE	20 mm – 40 mm		
BE	20 mm – 40 mm	yes	CN
RAE..-NPP	12 mm – 60 mm	no	C3
RA..-NPP	$^5/_8$ inch – $1^1/_2$ inch		
RALE..-NPP	20 mm – 30 mm		
RAL..-NPP	$^3/_4$ inch		
RAE..-NPP-NR	20 mm – 40 mm		
E..-KRR	20 mm – 70 mm		
E..-KLL	20 mm – 50 mm		
RCRA	20 mm		
RCRB	25 mm		
CRB	20 mm – 35 mm		
RCSMA	30 mm		
RCSMB	15 mm – 25 mm		
2..-KRR(-AH)	13 mm – 60 mm	no	CN

Location	Sealing	Cage material	Greasing[1]	Relubrication facility	Temperature[2] °C	Comments	Dimension table
Eccentric locking collar	P	PA66	GA13	yes	−20 to +120		1184
			GA47			Anti-corrosion protection	1184
			GA13				1200
				no			1184
							1200
						Light series	1184
	R			yes			1184
			GA47			Anti-corrosion protection	1184
		Steel	GA11		+150 to +250	Teflon® seal lip	1184
		PAES	L069		−40 to +180	Teflon® seal lip	1184
		PA66	GA13		−20 to +120		1200
						Flinger shields	1184
				no			1184
				yes		Heavy series	1186
	T						1184
	L	Steel	L069		−40 to +180		1184
Grub screws	R	PA66	GA13	yes	−20 to +120		1192
							1200
	RSR	Corrosion-resistant steel	FM222		−35 to +100	Anti-corrosion protection, flinger shields	1192
	P	PA66	GA13		−20 to +120		1192
		Steel	GA11		+150 to +250	Teflon® seal lip	1192
		PA66	GA13	no	−20 to +120		1192
Adapter sleeve	RSR	PA66	GA13	yes	−20 to +120		1196
Drive slot	R	PAES	L069	yes	−40 to +180	Teflon® seal lip	1197
Fit	P	PA66	GA13	no	−20 to +120		1210
Square bore	T	PA66	GA13	yes	−20 to +120	Anti-corrosion protection, maximum grease filling	1208
				no			1208
Hexagonal bore	R	PA66	GA13	no	−20 to +120	Anti-corrosion protection, maximum grease filling	1208
Eccentric locking collar	P	PA66	GA13	no	−20 to +85	Light series	1204
							1204
					−20 to +120	Annular slots in aligning ring	1206
Fit	P	PA66	GA13	no	−20 to +120	Annular slots in aligning ring	1206
Eccentric locking collar	P	PA66	GA13	no	−20 to +120		1198
							1200
							1198
							1200
						Two slots, one snap ring	1198
	R						1198
	L						1198
	P				−20 to +85	Light series, lead chamfer	1204
						Lead chamfer	1204
						Abutment shoulder	1204
						Light series	1204
							1204
Fit	R	PA66	GA13	no	−20 to +120		1207

[1] Precise information on greasing is given in the section Lubrication from page 76.

[2] Attention! Recommended operating temperature. If temperatures exceed +100 °C, relubrication must be carried out regularly.

Design and safety guidelines
Compensation of static misalignments

Bearings with a spherical outer ring, fitted in housings with a concave bore, can compensate for static misalignment of the shaft, *Figure 11*:

- if relubrication is carried out, up to ±2,5°
- if relubrication is not carried out, up to ±5°.

The units must not be used to support swivelling or tumbling motion.

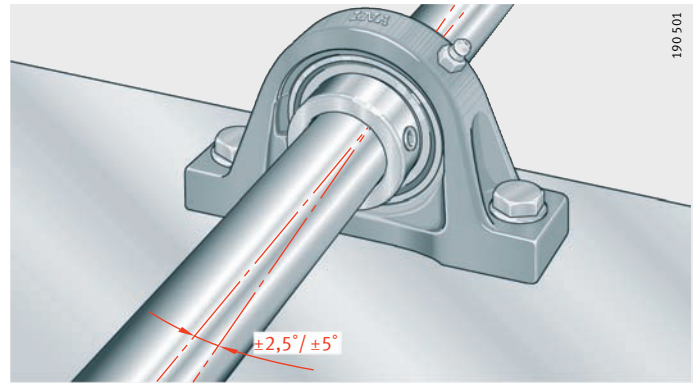


Figure 11
Compensation of static shaft misalignment

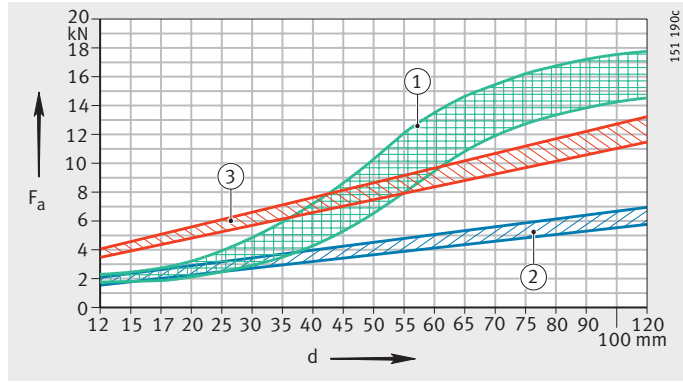
Axial load carrying capacity of radial insert ball bearings

The axial load carrying capacity F_a of radial insert ball bearings depends essentially on how they are located on the shaft. The load carrying capacity of the location method is shown in *Figure 12*.

The precondition for this is that:

- the shaft design complies with the data in *Figure 12*
- the bearings are located using the specified tightening torque M_A.

For very high axial loads, the forces should be directed through a shoulder on the shaft. If the bearing is subjected to its maximum permissible axial load, please contact us.



① Locking collar and adapter sleeve
② Grub screw and hard, ground shafts
③ Grub screw and soft shaft
d = bearing bore diameter
F_a = axial load carrying capacity of location method

Figure 12
Axial load carrying capacity of location method

Speed limits for radial insert ball bearings, guide values

The speed limits are dependent on the load, the clearance between the bearing bore and shaft and the friction of the seals in bearings with contact seals.

Figure 13 gives guide values for the permissible speeds.
For load ratios $C_r/P > 13$, the speeds can be increased.
For $C_r/P < 5$, location by means of a fit is recommended, see section Conditions of rotation, page 147.
For both types of applications, please contact us.

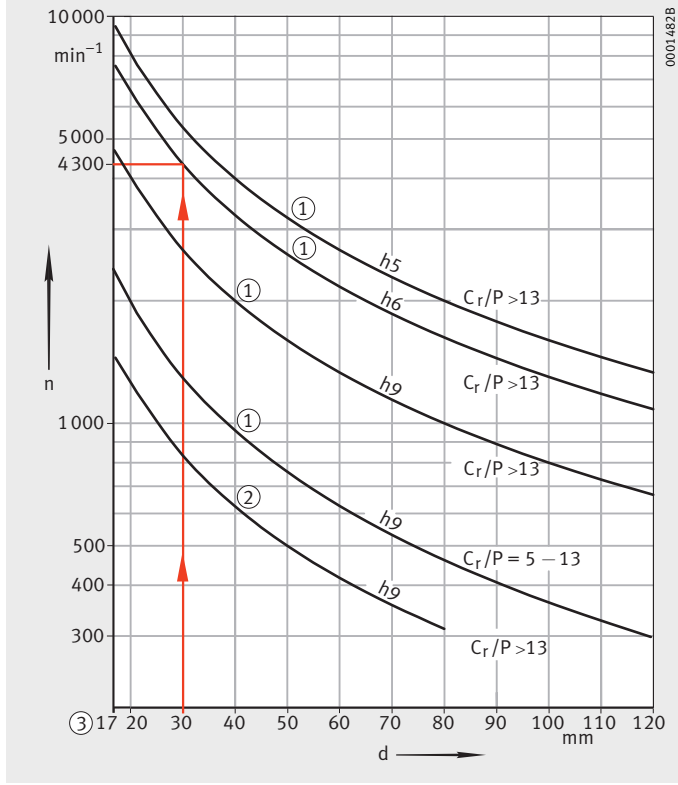
Example of permissible speed calculation

Given:

- Shaft tolerance — h6
- Radial insert ball bearing — GRAE30-NPP-B
- Basic dynamic load rating C_r — 19 500 N
- Load P — 1 300 N
- Sealing — P seals.

Required:

- Load ratio $C_r/P = 19\,500\ N/1\,300\ N$ — $C_r/P > 13$
- Permissible speed — $n \approx 4\,300\ min^{-1}$, *Figure 13*.



① For radial insert ball bearings with L, P, R seals
② For radial insert ball bearings with T seals
③ Ball set identical for d = 12 mm, 15 mm and 17 mm
d = bearing bore diameter
n = permissible speed

Figure 13
Permissible speeds for radial insert ball bearings

Shaft tolerances for radial insert ball bearings, recommendations

The permissible shaft tolerance is dependent on the speed and load. Tolerances up to h9 are possible.

Conventional drawn shafts will suffice for most applications.

Accuracy

Standard tolerances of radial insert ball bearings

The outside diameter of the bearings corresponds to tolerance class PN to DIN 620-2. The inner ring bore has a plus tolerance to facilitate mounting of the bearing.

Normal tolerances of bearings, see table.

Tolerances of radial insert ball bearings

Inner ring				Outer ring			
Nominal dimension d mm		Bore[1] µm		Nominal dimension D mm		Outside diameter[2] µm	
over	incl.	min.	max.	over	incl.	max.	min.
12	18	0	+18	30	50	0	–11
18	24	0	+18	50	80	0	–13
24	30	0	+18	80	120	0	–15
30	40	0	+18	120	150	0	–18
40	50	0	+18	150	180	0	–25
50	60	0	+18	180	250	0	–30
60	90	0	+25	–	–	–	–
90	120	0	+30	–	–	–	–

[1] This corresponds to the arithmetic mean value derived from the largest and smallest diameters (measured using a two-point measuring device).

[2] In the case of sealed bearings, the largest and smallest values of the outside diameter can deviate from the mean value by approximately 0,03 mm.

Radial internal clearance of radial insert ball bearings

The radial internal clearance is given in the table.

For most series, the radial clearance is C3 and is thus larger than for normal deep groove ball bearings.

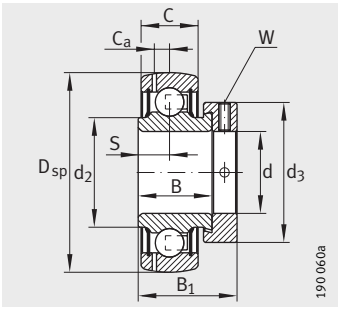
The larger internal clearance allows better support of angular misalignment and shaft deflection. Overview of all series and the corresponding internal clearance: see page 1178.

Radial internal clearance

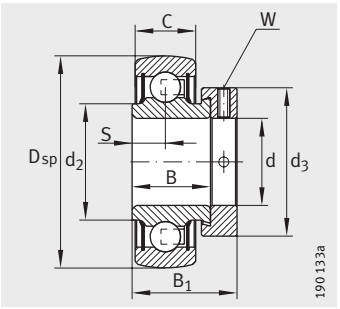
Bore		Radial internal clearance							
d mm		CN µm		C3 µm		C4 µm		C5 µm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
2,5	10	2	13	8	23	14	29	20	37
10	18	3	18	11	25	18	33	25	45
18	24	5	20	13	28	20	36	28	48
24	30	5	20	13	28	23	41	30	53
30	40	6	20	15	33	28	46	40	64
40	50	6	23	18	36	30	51	45	73
50	65	8	28	23	43	38	61	55	90
65	80	10	30	25	51	46	71	65	105
80	100	12	36	30	58	53	84	75	120
100	120	15	41	36	66	61	97	90	140
120	140	18	48	41	81	71	114	105	160
140	160	18	53	46	91	81	130	120	180

Radial insert ball bearings with eccentric locking collar

Spherical outer ring



GRAE..-NPP-B



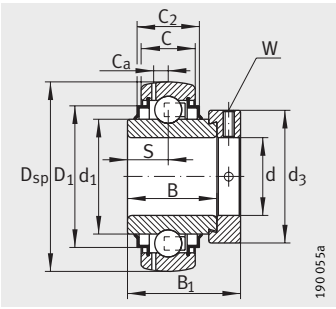
RAE..-NPP-B, RALE..-NPP-B

Dimension table · Dimensions in mm

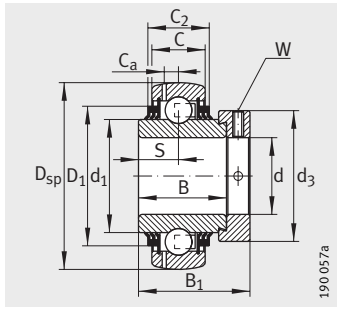
Designation[1]	Mass	Dimensions					
	m	d	D_{sp}	C	C_2	B	S
	≈kg						
GRAE12-NPP-B	0,13	**12**	40	12	–	19	6,5
RAE12-NPP-B	0,13	**12**	40	12	–	19	6,5
GRAE15-NPP-B	0,11	**15**	40	12	–	19	6,5
RAE15-NPP-B	0,12	**15**	40	12	–	19	6,5
GRAE17-NPP-B	0,1	**17**	40	12	–	19	6,5
RAE17-NPP-B	0,1	**17**	40	12	–	19	6,5
GE17-KRR-B	0,2	**17**	40	12	16,6	27,8	13,9
GRAE20-NPP-B	0,16	**20**	47	14	–	21,4	7,5
GRAE20-NPP-B-FA125.5	0,16	**20**	47	14	–	21,4	7,5
RAE20-NPP-B	0,16	**20**	47	14	–	21,4	7,5
RALE20-NPP-B	0,1	**20**	42	12	–	16,7	6
GE20-KRR-B	0,19	**20**	47	14	16,6	34,1	17,1
GE20-KRR-B-FA125.5	0,2	**20**	47	14	16,6	34,1	17,1
GE20-KRR-B-FA164	0,2	**20**	47	14	16,6	34,1	17,1
GE20-KTT-B	0,19	**20**	47	14	16,6	34,1	17,1
GE20-KLL-B	0,2	**20**	47	14	16,6	34,1	17,1
GRAE25-NPP-B	0,19	**25**	52	15	–	21,4	7,5
GRAE25-NPP-B-FA125.5	0,19	**25**	52	15	–	21,4	7,5
RAE25-NPP-B	0,19	**25**	52	15	–	21,4	7,5
RALE25-NPP-B	0,12	**25**	47	12	–	17,5	6
E25-KRR-B	0,24	**25**	52	15	16,7	34,9	17,5
GE25-KRR-B	0,25	**25**	52	15	16,7	34,9	17,5
GE25-KRR-B-FA125.5	0,25	**25**	52	15	16,7	34,9	17,5
GE25-KRR-B-FA164	0,25	**25**	52	15	16,7	34,9	17,5
GE25-KRR-B-FA101	0,24	**25**	52	15	16,7	34,9	17,5
GE25-KTT-B	0,24	**25**	52	15	20,2	34,9	17,5
GE25-KRR-B-2C	0,26	**25**	52	15	24,6	34,9	17,5
GE25-KLL-B	0,25	**25**	52	15	20,2	34,9	17,5

[1] Permissible speeds of radial insert ball bearings: see page 1182.

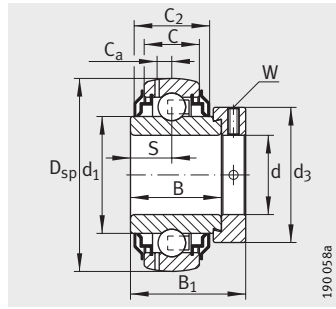
[2] Reference bearings for determining the equivalent bearing load: see page 204.



GE..-KRR-B, E..-KRR-B, GE..-KLL-B



GE..-KTT-B

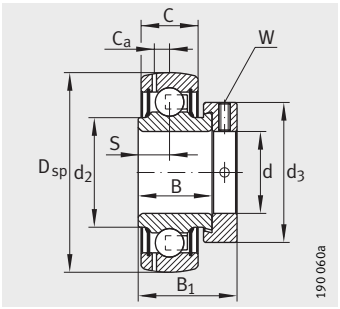


GE..-KRR-B-2C

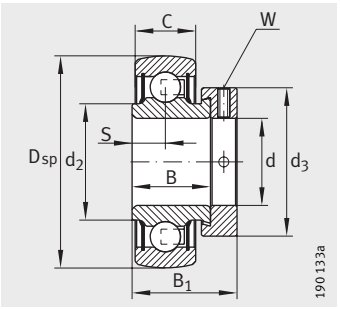
							Basic load ratings		Reference bearing[2]
d_1	d_2	D_1	C_a	B_1	d_3 max.	W	dyn. C_r N	stat. C_{0r} N	
–	23	–	3,4	28,6	28	3	9 800	4 750	6203
–	23	–	–	28,6	28	3	9 800	4 750	6203
–	23	–	3,4	28,6	28	3	9 800	4 750	6203
–	23	–	–	28,6	28	3	9 800	4 750	6203
–	23	–	3,4	28,6	28	3	9 800	4 750	6203
–	23	–	–	28,6	28	3	9 800	4 750	6203
23,9	–	31,6	3,4	37,4	28	3	9 800	4 750	6203
–	26,9	–	4	31	33	3	12 800	6 600	6204
–	26,9	–	4	31	33	3	12 800	6 600	6204
–	26,9	–	–	31	33	3	12 800	6 600	6204
–	25,4	–	–	24,5	30	2,5	9 400	5 000	6004
27,6	–	37,4	4	43,7	33	3	12 800	6 600	6204
27,6	–	37,4	4	43,7	33	3	12 800	6 600	6204
27,6	–	37,4	4	43,7	33	3	12 800	6 600	6204
27,6	–	37,4	4	43,7	33	3	12 800	6 600	6204
27,6	–	37,4	4	43,7	33	3	12 800	6 600	6204
–	30,5	–	3,9	31	37,5	3	14 000	7 800	6205
–	30,5	–	3,9	31	37,5	3	14 000	7 800	6205
–	30,5	–	–	31	37,5	3	14 000	7 800	6205
–	30	–	–	25,5	36	2,5	10 100	5 900	6005
33,8	–	42,5	–	44,5	37,5	3	14 000	7 800	6205
33,8	–	42,5	3,9	44,5	37,5	3	14 000	7 800	6205
33,8	–	42,5	3,9	44,5	37,5	3	14 000	7 800	6205
33,8	–	42,5	3,9	44,5	37,5	3	14 000	7 800	6205
33,8	–	42,5	3,9	44,5	37,5	3	14 000	7 800	6205
33,8	–	42,5	3,9	44,5	37,5	3	14 000	7 800	6205
33,8	–	–	3,9	44,5	37,5	3	14 000	7 800	6205
33,8	–	42,5	3,9	44,5	37,5	3	14 000	7 800	6205

Radial insert ball bearings with eccentric locking collar

Spherical outer ring



GRAE..-NPP-B



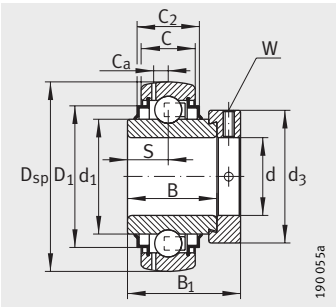
RAE..-NPP-B, RALE..-NPP-B

Dimension table (continued) · Dimensions in mm

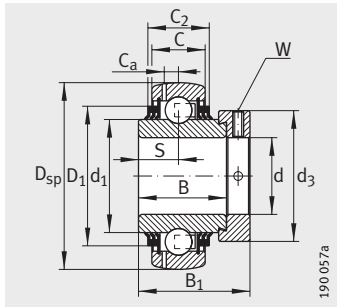
Designation[1]	Mass	Dimensions					
	m	d	D_{sp}	C	C_2	B	S
	≈kg						
GRAE30-NPP-B	0,32	**30**	62	18	–	23,8	9
GRAE30-NPP-B-FA125.5	0,32	**30**	62	18	–	23,8	9
RAE30-NPP-B	0,32	**30**	62	18	–	23,8	9
RALE30-NPP-B	0,18	**30**	55	13	–	18,5	6,5
E30-KRR-B	0,39	**30**	62	18	20,7	36,5	18,3
GE30-KRR-B	0,39	**30**	62	18	20,7	36,5	18,3
GE30-KRR-B-FA125.5	0,38	**30**	62	18	20,7	36,5	18,3
GE30-KRR-B-FA164	0,39	**30**	62	18	20,7	36,5	18,3
GE30-KRR-B-FA101	0,38	**30**	62	18	20,7	36,5	18,3
GNE30-KRR-B	0,63	**30**	72	20	24	36,6	17,5
GE30-KTT-B	0,38	**30**	62	18	20,7	36,5	18,3
GE30-KRR-B-2C	0,41	**30**	62	18	27,2	36,5	18,3
GE30-KLL-B	0,39	**30**	62	18	20,6	36,5	18,3
GRAE35-NPP-B	0,47	**35**	72	19	–	25,4	9,5
GRAE35-NPP-B-FA125.5	0,48	**35**	72	19	–	25,4	9,5
RAE35-NPP-B	0,47	**35**	72	19	–	25,4	9,5
E35-KRR-B	0,55	**35**	72	19	22,5	37,7	18,8
GE35-KRR-B	0,55	**35**	72	19	22,5	37,7	18,8
GE35-KRR-B-FA125.5	0,55	**35**	72	19	22,5	37,7	18,8
GE35-KRR-B-FA164	0,55	**35**	72	19	22,5	37,7	18,8
GNE35-KRR-B	0,74	**35**	80	22	25	38,1	18,3
GE35-KTT-B	0,56	**35**	72	19	22,5	37,7	18,8
GE35-KRR-B-2C	0,58	**35**	72	19	29,2	37,7	18,8
GE35-KLL-B	0,56	**35**	72	19	25,4	37,7	18,8

[1] Permissible speeds of radial insert ball bearings: see page 1182.

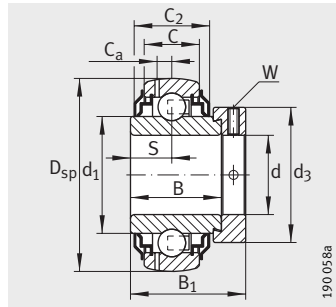
[2] Reference bearings for determining the equivalent bearing load: see page 204.



GE..-KRR-B, GNE..-KRR-B,
E..-KRR-B, GE..-KLL-B



GE..-KTT-B

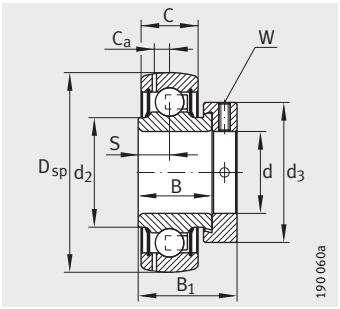


GE..-KRR-B-2C

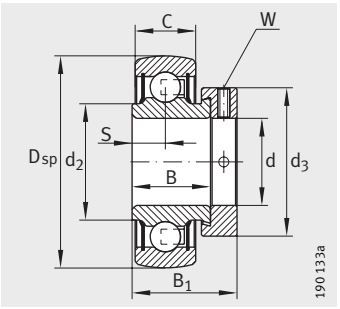
							Basic load ratings		Reference bearing[2)]
d_1	d_2	D_1	C_a	B_1	d_3 max.	W	dyn. C_r N	stat. C_{0r} N	
–	37,4	–	4,7	35,8	44	4	19 500	11 300	6206
–	37,4	–	4,7	35,8	44	4	19 500	11 300	6206
–	37,4	–	–	35,8	44	4	19 500	11 300	6206
–	35,7	–	–	26,5	42,5	2,5	13 200	8 300	6206
40,2	–	52	–	48,5	44	4	19 500	11 300	6206
40,2	–	52	4,7	48,5	44	4	19 500	11 300	6206
40,2	–	52	4,7	48,5	44	4	19 500	11 300	6206
40,2	–	52	4,7	48,5	44	4	19 500	11 300	6206
40,2	–	52	4,7	48,5	44	4	19 500	11 300	6206
44	–	60,2	6,2	50,2	51	5	29 500	16 700	6306
40,2	–	52	4,7	48,5	44	4	19 500	11 300	6206
40,2	–	–	4,7	48,5	44	4	19 500	11 300	6206
40,2	–	52	4,7	48,5	44	4	19 500	11 300	6206
–	44,6	–	5,6	39	51	5	25 500	15 300	6207
–	44,6	–	5,6	39	51	5	25 500	15 300	6207
–	44,6	–	–	39	51	5	25 500	15 300	6207
46,8	–	60,3	–	51,3	51	5	25 500	15 300	6207
46,8	–	60,3	5,6	51,3	51	5	25 500	15 300	6207
46,8	–	60,3	5,6	51,3	51	5	25 500	15 300	6207
46,8	–	60,3	5,6	51,3	51	5	25 500	15 300	6207
48	–	66,6	6,9	51,6	55	5	36 500	20 900	6307
46,8	–	60,3	5,6	51,3	51	5	25 500	15 300	6207
46,8	–	–	5,6	51,3	51	5	25 500	15 300	6207
46,8	–	60,3	5,6	51,3	51	5	25 500	15 300	6207

Radial insert ball bearings with eccentric locking collar

Spherical outer ring



GRAE..-NPP-B



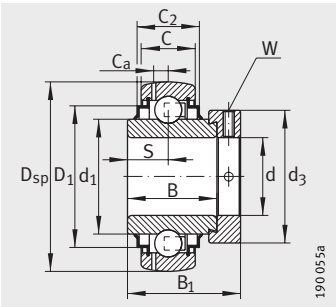
RAE..-NPP-B

Dimension table (continued) · Dimensions in mm

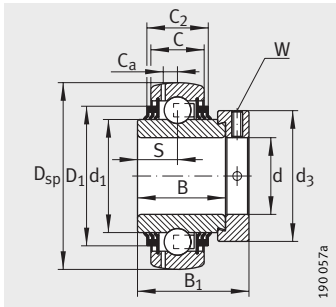
Designation[1]	Mass	Dimensions					
	m	d	D_{sp}	C	C_2	B	S
	≈kg						
GRAE40-NPP-B	0,62	**40**	80	21	–	30,2	11
GRAE40-NPP-B-FA125.5	0,62	**40**	80	21	–	30,2	11
RAE40-NPP-B	0,63	**40**	80	21	–	30,2	11
E40-KRR-B	0,73	**40**	80	21	23,5	42,9	21,4
GE40-KRR-B	0,73	**40**	80	21	23,5	42,9	21,4
GE40-KRR-B-FA125.5	0,74	**40**	80	21	23,5	42,9	21,4
GE40-KRR-B-FA164	0,75	**40**	80	21	23,5	42,9	21,4
GE40-KRR-B-FA101	0,74	**40**	80	21	23,5	42,9	21,4
GNE40-KRR-B	1,02	**40**	90	23	26	41	18
GE40-KTT-B	0,75	**40**	80	21	28,1	42,9	21,4
GE40-KRR-B-2C	0,78	**40**	80	21	31,9	42,9	21,4
GE40-KLL-B	0,75	**40**	80	21	28,1	42,9	21,4
GRAE45-NPP-B	0,7	**45**	85	22	–	30,2	11
GRAE45-NPP-B-FA125.5	0,69	**45**	85	22	–	30,2	11
GE45-KRR-B	0,83	**45**	85	22	26,4	42,9	21,4
GE45-KRR-B-FA125.5	0,83	**45**	85	22	26,4	42,9	21,4
GE45-KTT-B	0,83	**45**	85	22	26,4	42,9	21,4
GE45-KLL-B	0,84	**45**	85	22	26,4	42,9	21,4
GRAE50-NPP-B	0,77	**50**	90	22	–	30,2	11
GRAE50-NPP-B-FA125.5	0,77	**50**	90	22	–	30,2	11
RAE50-NPP-B	0,77	**50**	90	22	–	30,2	11
GE50-KRR-B	0,99	**50**	90	22	26,4	49,2	24,6
GE50-KRR-B-FA125.5	0,99	**50**	90	22	26,4	49,2	24,6
GE50-KRR-B-FA164	0,99	**50**	90	22	26,4	49,2	24,6
GE50-KRR-B-FA101	0,99	**50**	90	22	26,4	49,2	24,6
GNE50-KRR-B	1,82	**50**	110	29	31	49,2	24,6
GE50-KTT-B	0,98	**50**	90	22	26,4	49,2	24,6
GE50-KLL-B	1	**50**	90	22	26,4	49,2	24,6
GRAE55-NPP-B	1,06	**55**	100	25	–	32,5	12
GE55-KRR-B	1,37	**55**	100	25	29	55,5	27,8
GE55-KTT-B	1,37	**55**	100	25	29	55,5	27,8

[1] Permissible speeds of radial insert ball bearings: see page 1182.

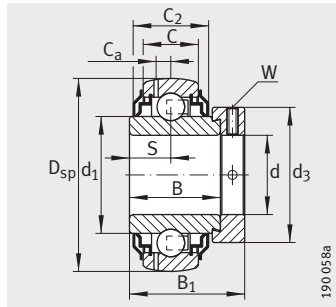
[2] Reference bearings for determining the equivalent bearing load: see page 204.



GE..-KRR-B, GNE..-KRR-B,
E..-KRR-B, GE..-KLL-B



GE..-KTT-B

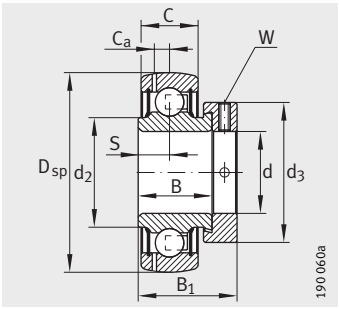


GE..-KRR-B-2C

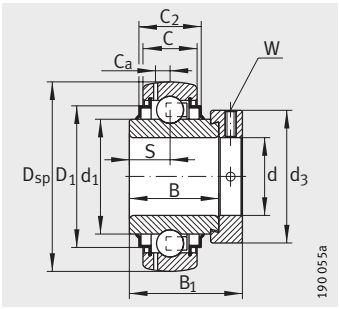
							Basic load ratings		Reference bearing[2)]
d_1	d_2	D_1	C_a	B_1	d_3 max.	W	dyn. C_r N	stat. C_{0r} N	
–	49,4	–	6,4	43,8	58	5	32 500	19 800	6208
–	49,4	–	6,4	43,8	58	5	32 500	19 800	6208
–	49,4	–	–	43,8	58	5	32 500	19 800	6208
52,3	–	68,3	–	56,5	58	5	32 500	19 800	6208
52,3	–	68,3	6,4	56,5	58	5	32 500	19 800	6208
52,3	–	68,3	6,4	56,5	58	5	32 500	19 800	6208
52,3	–	68,3	6,4	56,5	58	5	32 500	19 800	6208
52,3	–	68,3	6,4	56,5	58	5	32 500	19 800	6208
53,8	–	74,5	7,5	54,6	63	5	44 500	26 000	6308
52,3	–	68,3	6,4	56,5	58	5	32 500	19 800	6208
52,3	–	–	6,4	56,5	58	5	32 500	19 800	6208
52,3	–	68,3	6,4	56,5	58	5	32 500	19 800	6208
–	54,3	–	6,4	43,8	63	5	32 500	20 400	6209
–	54,3	–	6,4	43,8	63	5	32 500	20 400	6209
57,9	–	72,3	6,4	56,5	63	5	32 500	20 400	6209
57,9	–	72,3	6,4	56,5	63	5	32 500	20 400	6209
57,9	–	72,3	6,4	56,5	63	5	32 500	20 400	6209
57,9	–	72,3	6,4	56,5	63	5	32 500	20 400	6209
–	59,4	–	6,9	43,8	69	5	35 000	23 200	6210
–	59,4	–	6,9	43,8	69	5	35 000	23 200	6210
–	59,4	–	–	43,8	69	5	35 000	23 200	6210
62,8	–	77,3	6,9	62,8	69	5	35 000	23 200	6210
62,8	–	77,3	6,9	62,8	69	5	35 000	23 200	6210
62,8	–	77,3	6,9	62,8	69	5	35 000	23 200	6210
62,8	–	77,3	6,9	62,8	69	5	35 000	23 200	6210
68,8	–	92,7	8,7	66,75	75,8	5	62 000	38 000	6310
62,8	–	77,3	6,9	62,8	69	5	35 000	23 200	6210
62,8	–	77,3	6,9	62,8	69	5	35 000	23 200	6210
–	66	–	7	48,4	76	5	43 500	29 000	6211
69,8	–	85,9	7	71,4	76	5	43 500	29 000	6211
69,8	–	85,9	7	71,4	76	5	43 500	29 000	6211

Radial insert ball bearings with eccentric locking collar

Spherical outer ring



GRAE..-NPP-B



GE..-KRR-B, GNE..-KRR-B

Dimension table (continued) · Dimensions in mm

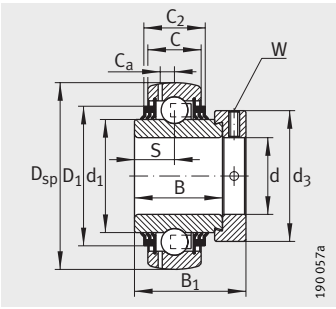
Designation[1]	Mass	Dimensions					
	m	d	D_{sp}	C	C_2	B	S
	≈kg						
GRAE60-NPP-B	1,4	**60**	110	24	–	37,1	13,5
GRAE60-NPP-B-FA125.5	1,4	**60**	110	24	–	37,1	13,5
GE60-KRR-B	1,8	**60**	110	24	29	61,9	31
GE60-KRR-B-FA164	1,8	**60**	110	24	29	61,9	31
GE60-KRR-B-FA101	1,8	**60**	110	24	29	61,9	31
GNE60-KRR-B	2,97	**60**	130	33	37,2	52	23
GE60-KTT-B	1,8	**60**	110	24	29	61,9	31
GE65-214-KRR-B[3]	2,71	**65**	125	28	32	48,5	21,5
GE65-214-KRR-B-FA164[3]	2,71	**65**	125	28	32	48,5	21,5
GE65-214-KTT-B[3]	2,71	**65**	125	28	32	48,5	21,5
GE70-KRR-B	2,15	**70**	125	28	32	48,5	21,5
GE70-KRR-B-FA164	2,15	**70**	125	28	32	48,5	21,5
GE70-KRR-B-FA101	2,15	**70**	125	28	32	48,5	21,5
GNE70-KRR-B	3,81	**70**	150	37	41	58	26
GE70-KTT-B	2,15	**70**	125	28	32	48,5	21,5
GE75-KRR-B	2,14	**75**	130	28	30,5	49,5	21,5
GE75-KRR-B-FA101	2,14	**75**	130	28	30,5	49,5	21,5
GE75-KTT-B	2,14	**75**	130	28	30,5	49,5	21,5
GE80-KRR-B	2,79	**80**	140	30	38	53,2	23,4
GE80-KRR-B-AH01-FA164	2,95	**80**	140	30	38	53,2	23,4
GNE80-KRR-B[4]	7,1	**80**	170	41	51	73	34
GE80-KTT-B	2,79	**80**	140	30	38	53,2	23,4
GE90-KRR-B[4]	3,56	**90**	160	32	35	52	23
GE90-KRR-B-FA164[4]	3,68	**90**	160	32	35	52	23
GNE90-KRR-B[4]	8,07	**90**	190	45	52,6	77,5	35,5
GE100-KRR-B[4]	5	**100**	180	36	39	57,5	25,5
GNE100-KRR-B[4]	11,41	**100**	215	49	59,4	86	39,5
GE120-KRR-B[4]	7,49	**120**	215	40	45	63,5	28,5

1) Permissible speeds of radial insert ball bearings: see page 1182.

2) Reference bearings for determining the equivalent bearing load: see page 204.

3) Different ball set 6214.

4) Lubrication groove in outer ring.

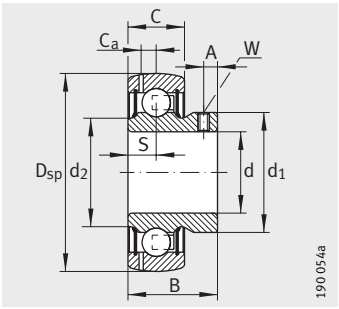


GE..-KTT-B

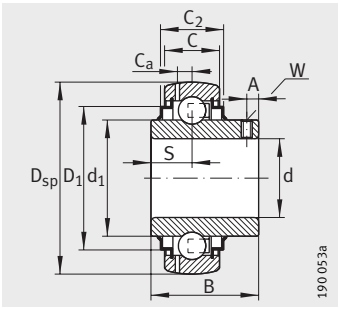
							Basic load ratings		Reference bearing[2)]
d_1	d_2	D_1	C_a	B_1	d_3 max.	W	dyn. C_r N	stat. C_{0r} N	
–	72	–	7,2	53,1	84	5	52 000	36 000	6212
–	72	–	7,2	53,1	84	5	52 000	36 000	6212
76,5	–	94,5	7,2	77,9	84	5	52 000	36 000	6212
76,5	–	94,5	7,2	77,9	84	5	52 000	36 000	6212
76,5	–	94,5	7,2	77,9	84	5	52 000	36 000	6212
79,4	–	109	11,2	68	89	5	82 000	52 000	6312
76,5	–	94,5	7,2	77,9	84	5	52 000	36 000	6212
85,2	–	109	8,9	66	96	6	62 000	44 000	6214
85,2	–	109	8,9	66	96	6	62 000	44 000	6214
85,2	–	109	8,9	66	96	6	62 000	44 000	6214
85,2	–	109	8,9	66	96	6	62 000	44 000	6214
85,2	–	109	8,9	66	96	6	62 000	44 000	6214
85,2	–	109	8,9	66	96	6	62 000	44 000	6214
92,2	–	127	12	75,5	102	6	104 000	68 000	6314
85,2	–	109	8,9	66	96	6	62 000	44 000	6214
90	–	113	8,5	67	100	6	62 000	44 500	6214
90	–	113	8,5	67	100	6	62 000	44 500	6214
90	–	113	8,5	67	100	6	62 000	44 500	6214
97	–	120	8,8	70,7	108	6	72 000	54 000	6216
97	–	120	8,8	70,7	108	6	72 000	54 000	6216
109	–	142,8	13,2	93,6	108	6	123 000	87 000	6316
97	–	120	8,8	70,7	108	6	72 000	54 000	6216
109,4	–	138	10	69,5	118	6	96 000	72 000	6218
109,4	–	138	10	69,5	118	6	96 000	72 000	6218
122,2	–	161,3	14,3	101	132	6	143 000	107 000	6318
122,2	–	155,5	11,2	75	132	6	122 000	93 000	6220
137,1	–	182,8	16,7	109,4	145	6	174 000	140 000	6320
146,4	–	186,5	12,8	81	152	6	155 000	131 000	6224

Radial insert ball bearings with grub screws in inner ring

Spherical outer ring



GAY..-NPP-B, AY..-NPP-B



GYE..-KRR-B

Dimension table · Dimensions in mm

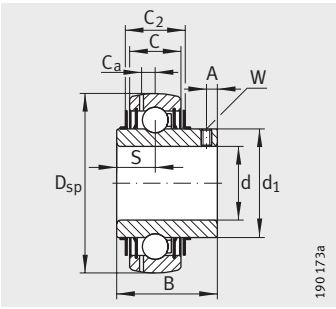
Designation[1]	Mass	Dimensions					
	m	d	D_{sp}	C	C_2	B	S
	≈kg						
GAY12-NPP-B	0,1	**12**	40	12	–	22	6
GAY12-NPP-B-FA164	0,1	**12**	40	12	–	22	6
AY12-NPP-B	0,1	**12**	40	12	–	22	6
GYE12-KRR-B	0,11	**12**	40	12	16,6	27,4	11,5
GYE12-KRR-B-VA	0,11	**12**	40	12	12,6	25	9,6
GAY15-NPP-B	0,09	**15**	40	12	–	22	6
GAY15-NPP-B-FA164	0,09	**15**	40	12	–	22	6
AY15-NPP-B	0,09	**15**	40	12	–	22	6
GYE15-KRR-B	0,1	**15**	40	12	16,6	27,4	11,5
GYE15-KRR-B-VA	0,1	**15**	40	12	12,6	25	9,6
GYE16-KRR-B	0,09	**16**	40	12	16,6	27,4	11,5
GAY17-NPP-B	0,08	**17**	40	12	–	22	6
AY17-NPP-B	0,08	**17**	40	12	–	22	6
GYE17-KRR-B	0,09	**17**	40	12	16,6	27,4	11,5
GYE17-KRR-B-VA	0,08	**17**	40	12	12,6	25	9,6
GAY20-NPP-B	0,13	**20**	47	14	–	25	7
AY20-NPP-B	0,13	**20**	47	14	–	25	7
GYE20-KRR-B	0,14	**20**	47	14	16,6	31	12,7
GYE20-KRR-B-VA[3)4)]	0,15	**20**	47	16	16,6	31	12,7
GAY25-NPP-B	0,16	**25**	52	15	–	27	7,5
AY25-NPP-B	0,16	**25**	52	15	–	27	7,5
GYE25-KRR-B	0,19	**25**	52	15	16,7	34,1	14,3
GYE25-KRR-B-VA[3)4)]	0,21	**25**	52	17	17,6	34,1	14,3
GAY30-NPP-B	0,26	**30**	62	18	–	30	9
AY30-NPP-B	0,25	**30**	62	18	–	30	9
GYE30-KRR-B	0,31	**30**	62	18	20,7	38,1	15,9
GYE30-KRR-B-VA[3)4)]	0,3	**30**	62	19	19,6	38,1	15,9
GAY35-NPP-B	0,41	**35**	72	19	–	35	9,5
GYE35-KRR-B	0,46	**35**	72	19	22,5	42,9	17,5
GYE35-KRR-B-VA[3)4)]	0,5	**35**	72	20	20,6	42,9	17,5

1) Permissible speeds of radial insert ball bearings: see page 1182.

2) Reference bearings for determining the equivalent bearing load: see page 204.

3) Lubrication groove in outer ring.

4) Optionally available in FA107.

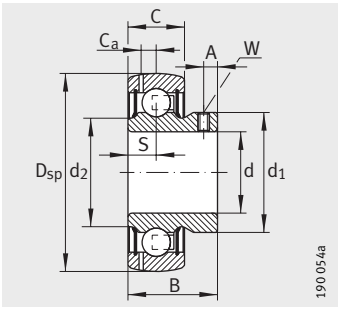


GYE..-KRR-B-VA

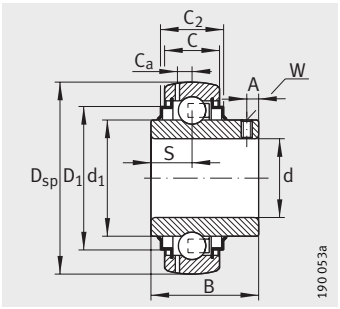
						Basic load ratings		Reference bearing[2)]
d_1	d_2	D_1	C_a	A	W	dyn. C_r N	stat. C_{0r} N	
23,9	22,9	–	3,4	4	2,5	9 800	4 750	6203
23,9	22,9	–	3,4	4	2,5	9 800	4 750	6203
23,9	22,9	–	–	4	2,5	9 800	4 750	6203
23,9	–	31,6	3,4	4	2,5	9 800	4 750	6203
23,9	–	–	3,4	4	2,5	9 800	4 750	6203
23,9	22,9	–	3,4	4	2,5	9 800	4 750	6203
23,9	22,9	–	3,4	4	2,5	9 800	4 750	6203
23,9	22,9	–	–	4	2,5	9 800	4 750	6203
23,9	–	31,6	3,4	4	2,5	9 800	4 750	6203
23,9	–	–	3,4	4	2,5	9 800	4 750	6203
23,9	–	31,6	3,4	4	2,5	9 800	4 750	6203
23,9	22,9	–	3,4	4	2,5	9 800	4 750	6203
23,9	22,9	–	–	4	2,5	9 800	4 750	6203
23,9	–	31,6	3,4	4	2,5	9 800	4 750	6203
23,9	–	–	3,4	4	2,5	9 800	4 750	6203
28,3	26,7	–	4	4,5	2,5	12 800	6 600	6204
28,3	26,7	–	–	4,5	2,5	12 800	6 600	6204
27,6	–	37,4	4	4,5	2,5	12 800	6 600	6204
29,05	–	–	4	5	2,5	12 800	6 600	6204
33,5	30,4	–	3,9	5	2,5	14 000	7 800	6205
33,5	30,4	–	–	5	2,5	14 000	7 800	6205
33,8	–	42,5	3,9	5	2,5	14 000	7 800	6205
34,03	–	–	4,15	5	2,5	14 000	7 800	6205
39,4	37,3	–	4,7	5,8	3	19 500	11 300	6206
39,4	37,3	–	–	5,8	3	19 500	11 300	6206
40,2	–	52	4,7	5,8	3	19 500	11 300	6206
40,31	–	–	5	6	3	19 500	11 300	6206
46,9	44,5	–	5,6	6	3	25 500	15 300	6207
46,8	–	60,3	5,6	6	3	25 500	15 300	6207
47,4	–	–	5,7	6,5	3	25 500	15 300	6207

Radial insert ball bearings with grub screws in inner ring

Spherical outer ring



GAY..-NPP-B



GYE..-KRR-B

Dimension table (continued) · Dimensions in mm

Designation[1]	Mass	Dimensions					
	m	d	D_{sp}	C	C_2	B	S
	≈kg						
GAY40-NPP-B	0,53	**40**	80	21	–	39,5	10,5
GYE40-KRR-B	0,62	**40**	80	21	23,5	49,2	19
GYE40-KRR-B-VA[5)6)]	0,6	**40**	80	21	21,6	49,2	19
GAY45-NPP-B	0,6	**45**	85	22	–	41,5	11
GYE45-KRR-B	0,71	**45**	85	22	26,4	49,2	19
GYE45-210-KRR-B[3)]	0,8	**45**	90	22	26,4	51,6	19
GYE45-KRR-B-VA[5)6)]	0,66	**45**	85	22	22,6	49,2	19
GAY50-NPP-B	0,67	**50**	90	22	–	43	11
GYE50-KRR-B	0,79	**50**	90	22	26,4	51,6	19
GYE50-KRR-B-VA[5)6)]	0,78	**50**	90	23	23,6	51,6	19
GYE55-KRR-B	1,08	**55**	100	25	29	55,6	22,2
GAY60-NPP-B	1,17	**60**	110	24	–	47	13
GYE60-KRR-B	1,46	**60**	110	24	29	65,1	25,4
GYE65-214-KRR-B[4)]	2,25	**65**	125	28	32	74,6	30,2
GYE70-KRR-B	1,95	**70**	125	28	32	74,6	30,2
GYE75-KRR-B	2,07	**75**	130	28	30,5	77,8	33,3
GYE80-KRR-B	2,7	**80**	140	30	38	82,6	33,3
GYE90-KRR-B[5)]	3,93	**90**	160	32	35	96	39,7

1) Permissible speeds of radial insert ball bearings: see page 1182.

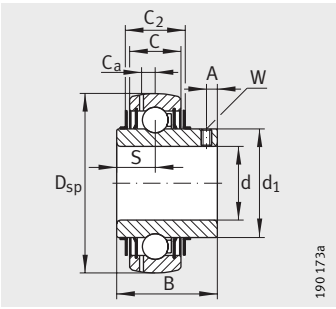
2) Reference bearings for determining the equivalent bearing load: see page 204.

3) Different ball set 6210.

4) Different ball set 6214.

5) Lubrication groove in outer ring.

6) Optionally available in FA107.

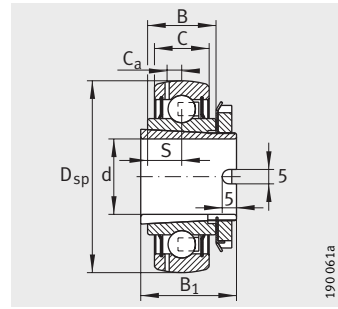


GYE..-KRR-B-VA

						Basic load ratings		Reference bearing[2]
d_1	d_2	D_1	C_a	A	W	dyn. C_r N	stat. C_{0r} N	
52,4	49,3	–	6,4	8	4	32 500	19 800	6208
52,3	–	68,3	6,4	8	4	32 500	19 800	6208
52,83	–	–	5,9	8	4	32 500	19 800	6208
57	54,3	–	6,4	8	4	32 500	20 400	6209
57	–	72,3	6,4	8	4	32 500	20 400	6209
62,9	–	77,3	6,9	8,5	4	35 000	23 200	6210
57,3	–	–	6,5	8	4	32 500	20 400	6209
62	59,3	–	6,9	9	4	35 000	23 200	6210
62,8	–	77,3	6,9	8,5	4	35 000	23 200	6210
62,92	–	–	6,5	9	5	35 000	23 200	6210
69,8	–	85,9	7	9	4	43 500	29 000	6211
76	73,6	–	7,2	10	5	52 000	36 000	6212
76,5	–	94,5	7,2	10,1	5	52 000	36 000	6212
85,2	–	109	8,9	12,1	5	62 000	44 000	6214
85,2	–	109	8,9	12	5	62 000	44 000	6214
90	–	113	8,5	12,7	5	62 000	44 500	6215
97	–	120	8,8	12	5	72 000	54 000	6216
109,4	–	138	10	12	6	96 000	72 000	6216

Radial insert ball bearings with integral adapter sleeve

Spherical outer ring



GSH..-2RSR-B

Dimension table · Dimensions in mm

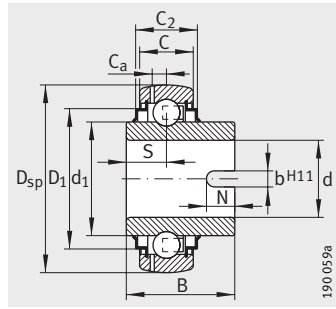
Designation	Mass	Dimensions							Limiting speed[1]	Basic load ratings		Reference bearing[2]
	m	d	D_{sp}	C	B	S	C_a	B_1	n_G grease	dyn. C_r	stat. C_{0r}	
	≈kg								min^{-1}	N	N	
GSH20-2RSR-B	0,14	**20**	47	14	15	7,5	4	28	10 000	12 700	6 600	6204
GSH25-2RSR-B	0,17	**25**	52	15	15	7,5	3,9	28	8 000	13 600	7 800	6205
GSH30-2RSR-B	0,27	**30**	62	18	18	9	4,7	32	6 600	18 900	11 300	6206
GSH35-2RSR-B	0,43	**35**	72	19	19	9,5	5,8	34	5 700	24 900	15 300	6207
GSH40-2RSR-B	0,54	**40**	80	21	22	11	6,4	38	5 000	29 500	19 800	6208
GSH50-2RSR-B	0,64	**50**	90	22	22	11	6,5	40	4 000	33 000	19 900	6210

1) Mainly for shaft fits h6 to h9.

2) Reference bearings for determining the equivalent bearing load: see page 204.

Radial insert ball bearings with drive slot

Non-locating bearings
Spherical outer ring



GLE..-KRR-B

Dimension table · Dimensions in mm

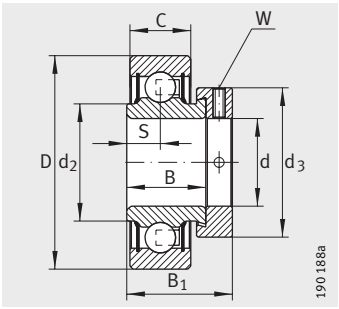
Designation[1]	Mass	Dimensions											Basic load ratings		Reference bearing[2]
	m	d	D_{sp}	C	C_2	B	S	d_1	D_1	C_a	N	b	dyn. C_r	stat. C_{0r}	
	≈kg												N	N	
GLE20-KRR-B	0,15	**20**	47	14	16,6	34,1	15,6	27,6	37,4	4	7	7	12 800	6 600	6204
GLE25-KRR-B	0,19	**25**	52	15	16,7	34,9	14,7	33,8	42,5	3,9	8	7	14 000	7 800	6205
GLE30-KRR-B	0,3	**30**	62	18	20,7	36,5	14,5	40,2	52	4,7	8	7	19 500	11 300	6206
GLE35-KRR-B	0,43	**35**	72	19	22,5	37,7	15,7	46,8	60,3	5,6	8	7	25 500	15 300	6207
GLE40-KRR-B	0,57	**40**	80	21	23,5	42,9	15,9	52,3	68,3	6,4	9	7	32 500	19 800	6208
GLE45-KRR-B	0,66	**45**	85	22	26,4	42,9	17,4	57,9	72,3	6,4	9	7	32 500	20 400	6209
GLE50-KRR-B	0,76	**50**	90	22	26,4	49,2	19	62,8	77,3	6,9	10	7	35 000	23 200	6210
GLE60-KRR-B	1,46	**60**	110	24	29	61,9	24,6	76,5	95,9	7,2	12	9	52 000	36 000	6212
GLE70-KRR-B	1,9	**70**	125	28	32	68,2	27	85,2	109	8,9	12	9	62 000	44 000	6214

1) Permissible speeds of radial insert ball bearings: see page 1182.

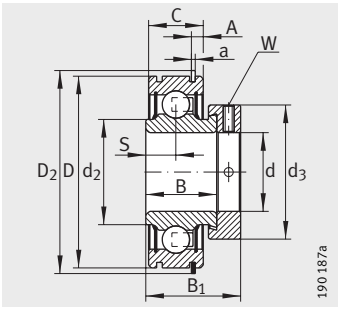
2) Reference bearings for determining the equivalent bearing load: see page 204.

Radial insert ball bearings with eccentric locking collar

Cylindrical outer ring



RAE..-NPP, RALE..-NPP



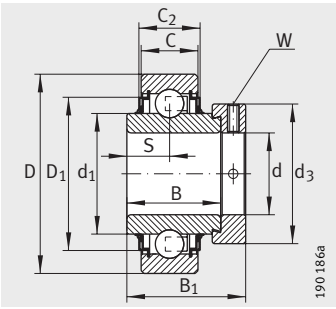
RAE..-NPP-NR

Dimension table · Dimensions in mm

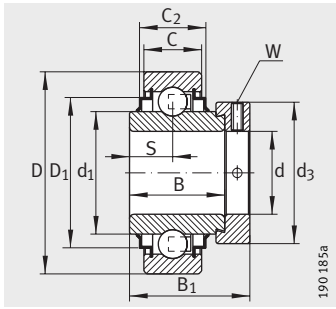
Designation[1]	Mass	Dimensions						
	m	d	D	D_2	C	C_2	A	a
	≈kg							
RAE12-NPP-FA106	0,13	**12**	40	–	12	–	–	–
RAE15-NPP-FA106	0,12	**15**	40	–	12	–	–	–
RAE17-NPP-FA106	0,11	**17**	40	–	12	–	–	–
RAE20-NPP-FA106	0,17	**20**	47	–	14	–	–	–
RAE20-NPP-NR	0,17	**20**	47	52,7	14	–	$3,58_{-0,25}$	1,12
RALE20-NPP-FA106	0,1	**20**	42	–	12	–	–	–
E20-KLL	0,2	**20**	47	–	14	16,6	–	–
E20-KRR	0,2	**20**	47	–	14	16,6	–	–
RAE25-NPP-FA106	0,2	**25**	52	–	15	–	–	–
RAE25-NPP-NR	0,2	**25**	52	57,9	15	–	$3,58_{-0,25}$	1,12
RALE25-NPP	0,13	**25**	47	–	12	–	–	–
E25-KLL	0,25	**25**	52	–	15	20,2	–	–
E25-KRR	0,25	**25**	52	–	15	16,7	–	–
RAE30-NPP-FA106	0,33	**30**	62	–	18	–	–	–
RAE30-NPP-NR	0,33	**30**	62	67,7	18	–	$4,98_{-0,3}$	1,7
RALE30-NPP-FA106	0,18	**30**	55	–	13	–	–	–
E30-KLL	0,39	**30**	62	–	18	20,6	–	–
E30-KRR	0,4	**30**	62	–	18	20,7	–	–
RAE35-NPP-FA106	0,49	**35**	72	–	19	–	–	–
RAE35-NPP-NR	0,48	**35**	72	78,6	19	–	$4,98_{-0,3}$	1,7
E35-KLL	0,56	**35**	72	–	19	25,4	–	–
E35-KRR	0,57	**35**	72	–	19	21,7	–	–
RAE40-NPP-FA106	0,64	**40**	80	–	21	–	–	–
RAE40-NPP-NR	0,64	**40**	80	86,6	21	–	$4,98_{-0,3}$	1,7
E40-KLL	0,76	**40**	80	–	21	28,1	–	–
E40-KRR	0,75	**40**	80	–	21	23,5	–	–
RAE45-NPP-FA106	0,72	**45**	85	–	22	–	–	–
E45-KLL	0,85	**45**	85	–	22	26,4	–	–
E45-KRR	0,85	**45**	85	–	22	26,4	–	–
RAE50-NPP-FA106	0,79	**50**	90	–	22	–	–	–
E50-KLL	1	**50**	90	–	22	26,4	–	–
E50-KRR	1	**50**	90	–	22	26,4	–	–
RAE60-NPP	1,43	**60**	110	–	24	–	–	–
E60-KRR	1,82	**60**	110	–	24	29	–	–
E70-KRR	2,45	**70**	125	–	28	32	–	–

[1] Permissible speeds of radial insert ball bearings: see page 1182.

[2] Reference bearings for determining the equivalent bearing load: see page 204.



E..-KLL

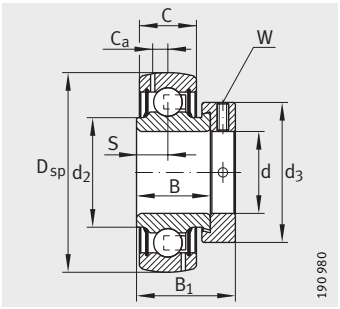


E..-KRR

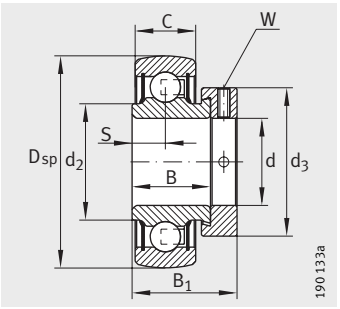
								Basic load ratings		Reference bearing[2]
B	S	d_1	d_2	D_1	B_1	d_3 max.	W	dyn. C_r N	stat. C_{0r} N	
19	6,5	–	23	–	28,6	28	3	9 800	4 750	6203
19	6,5	–	23	–	28,6	28	3	9 800	4 750	6203
19	6,5	–	23	–	28,6	28	3	9 800	4 750	6203
21,4	7,5	–	26,9	–	31	33	3	12 800	6 600	6204
21,4	7,5	–	26,9	–	31	33	3	12 800	6 600	6204
16,7	6	–	25,4	–	24,5	30	2,5	9 400	5 000	6004
34,1	17,1	27,6	–	37,4	43,7	33	3	12 800	6 600	6204
34,1	17,1	27,6	–	37,4	43,7	33	3	12 800	6 600	6204
21,4	7,5	–	30,5	–	31	37,5	3	14 000	7 800	6205
21,4	7,5	–	30,5	–	31	37,5	3	14 000	7 800	6205
17,5	6	–	30	–	25,5	36	2,5	10 100	5 900	6005
34,9	17,5	33,8	–	42,5	44,5	37,5	3	14 000	7 800	6205
34,9	17,5	33,8	–	42,5	44,5	37,5	3	14 000	7 800	6205
23,8	9	–	37,4	–	35,8	44	4	19 500	11 300	6206
23,8	9	–	37,4	–	35,8	44	4	19 500	11 300	6206
18,5	6,5	–	35,7	–	26,5	42,5	2,5	13 200	8 300	6006
36,5	18,3	40,2	–	52	48,5	44	4	19 500	11 300	6206
36,5	18,3	40,2	–	52	48,5	44	4	19 500	11 300	6206
25,4	9,5	–	44,6	–	39	51	5	25 500	15 300	6207
25,4	9,5	–	44,6	–	39	51	5	25 500	15 300	6207
37,7	18,8	46,8	–	60,3	51,3	51	5	25 500	15 300	6207
37,7	18,8	46,8	–	60,3	51,3	51	5	25 500	15 300	6207
30,2	11	–	49,4	–	43,8	58	5	32 500	19 800	6208
30,2	11	–	49,4	–	43,8	58	5	32 500	19 800	6208
42,9	21,4	52,3	–	68,3	56,5	58	5	32 500	19 800	6208
42,9	21,4	52,3	–	68,3	56,5	58	5	32 500	19 800	6208
30,2	11	–	54,5	–	43,8	63	5	32 500	20 400	6209
42,9	21,4	57,9	–	72,3	56,5	63	5	32 500	20 400	6209
42,9	21,4	57,9	–	72,3	56,5	63	5	32 500	20 400	6209
30,2	11	–	59,4	–	43,8	69	5	35 000	23 200	6210
49,2	24,6	62,8	–	77,3	62,8	69	5	35 000	23 200	6210
49,2	24,6	62,8	–	77,3	62,8	69	5	35 000	23 200	6210
37,1	13,5	–	72	–	53,1	84	5	52 000	36 000	6212
61,9	31	76,5	–	94,5	77,9	84	5	52 000	36 000	6212
48,5	21,5	85,2	–	109	66	96	6	62 000	44 000	6214

Inch size radial insert ball bearings

Spherical or
cylindrical outer ring



GRA..-NPP-B-AS2/V



RA..-NPP-B

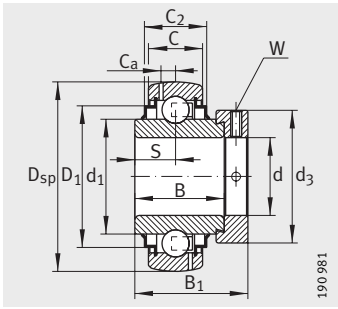
Dimension table · Dimensions in mm

Shaft diameter d		Designation[1]	Mass	Dimensions						
			m	D_{sp}	D	B	B_1	C	C_a	C_2
inch	mm		≈kg							
$^5/_8$	**15,8750**	**GRA010-NPP-B-AS2/V**	0,12	40	–	19	28,6	12	3,4	–
		RA010-NPP	0,12	–	40	19	28,6	12	–	–
$^3/_4$	**19,0500**	**GRA012-NPP-B-AS2/V**	0,16	47	–	21,4	31	14	3,4	–
		GY1012-KRR-B-AS2/V	0,17	47	–	31	–	14	3,4	16,6
		RAL012-NPP	0,09	–	42	16,7	24,6	12	–	–
		RA012-NPP	0,16	–	47	21,4	31	14	–	–
$^7/_8$	**22,2250**	**GRA014-NPP-B-AS2/V**	0,19	52	–	21,4	31	15	3,9	–
		RA014-NPP	0,19	–	52	21,4	31	15	–	–
$^{15}/_{16}$	**23,8125**	**G1015-KRR-B-AS2/V**	0,25	52	–	34,9	44,5	15	3,9	16,7
1	**25,4000**	**GRA100-NPP-B-AS2/V**	0,19	52	–	21,4	31	15	3,9	–
		G1100-KRR-B-AS2/V	0,25	52	–	34,9	44,5	15	3,9	16,7
		GY1100-KRR-B-AS2/V	0,2	52	–	34,1	–	15	3,9	16,7
		RA100-NPP	0,19	–	52	21,4	31	15	–	–
		RA100-NPP-B	0,19	52	–	21,4	31	15	–	–
$1^1/_{16}$	**26,9875**	**RA101-NPP**	0,31	–	62	23,8	35,8	18	–	–
$1^1/_8$	**28,5750**	**GRA102-NPP-B-AS2/V**	0,31	62	–	23,8	35,8	18	4,7	–
		G1102-KRR-B-AS2/V	0,38	62	–	36,5	48,5	18	4,7	20,7
		RA102-NPP	0,31	–	62	23,8	35,8	18	–	–
$1^3/_{16}$	**30,1625**	**GRA103-NPP-B-AS2/V**	0,31	62	–	23,8	35,8	18	4,7	–
		G1103-KRR-B-AS2/V	0,38	62	–	36,5	48,5	18	4,7	20,7
		RA103-NPP	0,31	–	62	23,8	35,8	18	–	–
$1^1/_4$	**31,7500**	**GRA104-206-NPP-B-AS2/V**	0,31	62	–	23,8	35,8	18	4,7	–
		G1104-206-KRR-B-AS2/V	0,38	62	–	36,5	48,5	18	4,7	20,7
		GY1104-206-KRR-B-AS2/V	0,33	62	–	38,1	–	18	4,7	20,7
		GRA104-NPP-B-AS2/V	0,48	72	–	25,4	39	19	5,6	–
		G1104-KRR-B-AS2/V	0,55	72	–	37,7	51,3	19	5,6	22,5
		GY1104-KRR-B-AS2/V	0,49	72	–	42,9	–	19	5,6	22,5
		RA104-NPP-B	0,48	72	–	25,4	39	19	–	–
		RA104-NPP	0,48	–	72	25,4	39	19	–	–
		RA104-206-NPP-B	0,31	62	–	23,8	35,8	18	–	–
		RA104-206-NPP	0,31	–	62	23,8	35,8	18	–	9

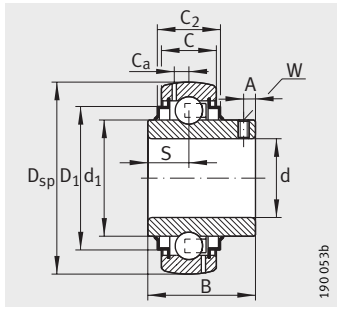
For further inch size bearings, see TPI 127, Radial insert ball bearings/housing units in inch sizes.

[1] Permissible speeds of radial insert ball bearings: see page 1182.

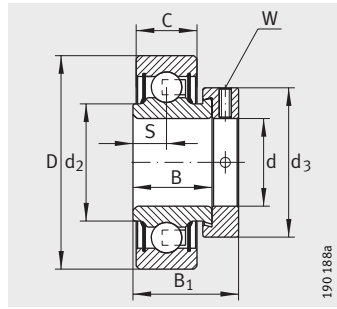
[2] Reference bearings for determining the equivalent bearing load: see page 204.



G..-KRR-B-AS2/V



GY..-KRR-B-AS2/V

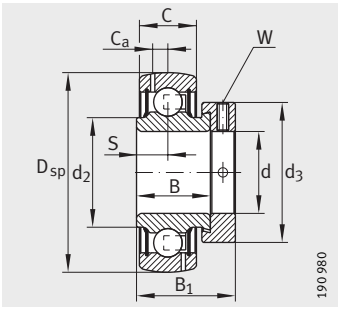


RA..-NPP, RAL..-NPP

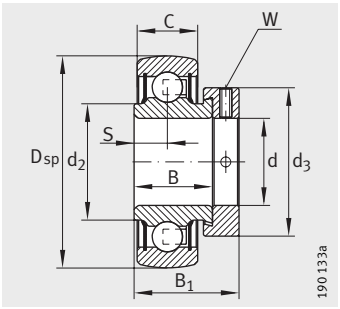
							Basic load ratings		Reference bearing[2)]	Shaft diameter d	
S	d_1	d_2	D_1	d_3 max.	A	W ″	dyn. C_r N	stat. C_{0r} N		inch	mm
6,5	–	23	–	28	–	$^1/_8$	9 800	4 750	6203	**$^5/_8$**	**15,8750**
6,5	–	23	–	28	–	$^1/_8$	9 800	4 750	6203		
7,5	–	26,9	–	33	–	$^1/_8$	12 800	6 600	6204	**$^3/_4$**	**19,0500**
12,7	27,6	–	37,4	–	4,5	$^3/_{32}$	12 800	6 600	6204		
6	–	25,4	–	30	–	$^1/_8$	9 400	5 000	6004		
7,5	–	26,9	–	33	–	$^1/_8$	12 800	6 600	6204		
7,5	–	30,5	–	37,5	–	$^1/_8$	14 000	7 800	6205	**$^7/_8$**	**22,2250**
7,5	–	30,5	–	37,5	–	$^1/_8$	14 000	7 800	6205		
17,5	33,8	–	42,5	37,5	–	$^1/_8$	14 000	7 800	6205	**$^{15}/_{16}$**	**23,8125**
7,5	–	30,5	–	37,5	–	$^1/_8$	14 000	7 800	6205	**1**	**25,4000**
17,5	33,8	–	42,5	37,5	–	$^1/_8$	14 000	7 800	6205		
14,3	33,8	–	42,5	–	5	$^3/_{32}$	14 000	7 800	6205		
7,5	–	30,5	–	37,5	–	$^1/_8$	14 000	7 800	6205		
7,5	–	30,5	–	37,5	–	$^1/_8$	14 000	7 800	6205		
9	–	37,4	–	44	–	$^5/_{32}$	19 500	11 300	6206	**$1^1/_{16}$**	**26,9875**
9	–	37,4	–	44	–	$^5/_{32}$	19 500	11 300	6206	**$1^1/_8$**	**28,5750**
18,3	40,2	–	52	44	–	$^5/_{32}$	19 500	11 300	6206		
9	–	37,4	–	44	–	$^5/_{32}$	19 500	11 300	6206		
9	–	37,4	–	44	–	$^5/_{32}$	19 500	11 300	6206	**$1^3/_{16}$**	**30,1625**
18,3	40,2	–	52	44	–	$^5/_{32}$	19 500	11 300	6206		
9	–	37,4	–	44	–	$^5/_{32}$	19 500	11 300	6206		
9	–	37,4	–	44	–	$^5/_{32}$	19 500	11 300	6206	**$1^1/_4$**	**31,7500**
18,3	40,2	–	52	44	–	$^5/_{32}$	19 500	11 300	6206		
15,9	40,2	–	52	–	5	$^1/_8$	19 500	11 300	6206		
9,5	–	44,6	–	51	–	$^3/_{16}$	25 500	15 300	6207		
18,8	46,8	–	60,3	51	–	$^3/_{16}$	25 500	15 300	6207		
17,5	46,8	–	60,3	–	6	$^1/_8$	25 500	15 300	6207		
9,5	–	44,6	–	51	–	$^3/_{16}$	25 500	15 300	6207		
9,5	–	44,6	–	51	–	$^3/_{16}$	25 500	15 300	6207		
9	–	37,4	–	44	–	$^5/_{32}$	19 500	11 300	6206		
9	–	37,4	–	44	–	$^5/_{32}$	19 500	11 300	6206		

Inch size radial insert ball bearings

Spherical or
cylindrical outer ring



GRA..-NPP-B-AS2/V



RA..-NPP-B

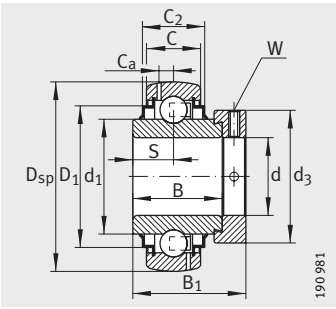
Dimension table (continued) · Dimensions in mm

Shaft diameter d		Designation[1]	Mass m	Dimensions						
				D_{sp}	D	B	B_1	C	C_a	C_2
inch	mm		≈kg							
$1^3/_8$	34,9250	**GRA106-NPP-B-AS2/V**	0,48	72	–	25,4	39	19	5,6	–
		G1106-KRR-B-AS2/V	0,55	72	–	37,7	51,3	19	5,6	22,5
$1^7/_{16}$	36,5125	**GRA107-NPP-B-AS2/V**	0,48	72	–	25,4	39	19	5,6	–
		G1107-KRR-B-AS2/V	0,55	72	–	37,7	51,3	19	5,6	22,5
		RA107-NPP	0,48	–	72	25,4	39	19	–	–
$1^1/_2$	38,1000	**GRA108-NPP-B-AS2/V**	0,62	80	–	30,2	43,8	21	6,4	–
		G1108-KRR-B-AS2/V	0,74	80	–	42,9	56,5	21	6,4	23,5
		GY1108-KRR-B-AS2/V	0,65	80	–	49,2	–	21	6,4	23,5
		RA108-NPP-B	0,62	80	–	30,2	43,8	21	–	–
		RA108-NPP	0,62	–	80	30,2	43,8	21	–	–
$1^5/_8$	41,2750	**G1110-KRR-B-AS2/V**	0,81	85	–	42,9	56,5	22	6,4	26,4
$1^{11}/_{16}$	42,8625	**G1111-KRR-B-AS2/V**	0,81	85	–	42,9	56,5	22	6,4	26,4
$1^3/_4$	44,4500	**GRA112-NPP-B-AS2/V**	0,69	85	–	30,2	43,8	22	6,4	–
		G1112-KRR-B-AS2/V	0,81	85	–	42,9	56,5	22	6,4	26,4
		GY1112-KRR-B-AS2/V	0,7	85	–	49,2	–	22	6,4	26,4
$1^{15}/_{16}$	49,2125	**G1115-KRR-B-AS2/V**	1	90	–	49,2	62,8	22	6,9	26,4
2	50,8000	**G1200-KRR-B-AS2/V**	1,42	100	–	55,5	71,4	25	7	29
		GY1200-KRR-B-AS2/V	1,1	100	–	55,6	–	25	7	29
$2^3/_{16}$	55,5625	**G1203-KRR-B-AS2/V**	1,42	100	–	55,5	71,4	25	7	29
$2^7/_{16}$	61,9125	**G1207-KRR-B-AS2/V**	1,84	110	–	61,9	77,9	24	7,2	29
$2^{15}/_{16}$	74,6125	**G1215-KRR-B-AS2/V**	2,65	130	–	49,5	67	28	8,5	30,5
		GY1215-KRR-B-AS2/V	1,97	130	–	77,8	–	28	8,5	31,5

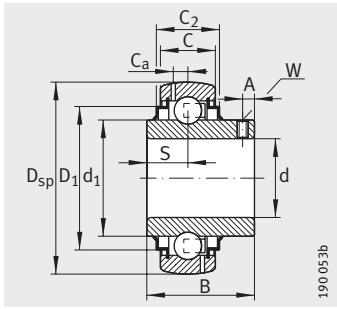
For further inch size bearings and bearing units, see TPI 127, Radial insert ball bearings/housing units in inch sizes.

1) Permissible speeds of radial insert ball bearings: see page 1182.

2) Reference bearings for determining the equivalent bearing load: see page 204.



G..-KRR-B-AS2/V

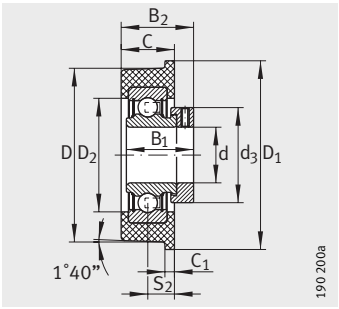


GY..-KRR-B-AS2/V

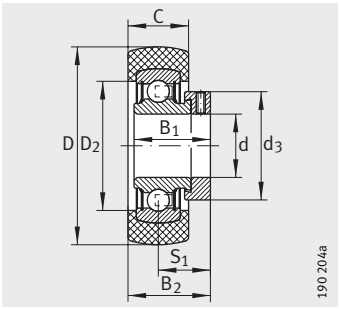
							Basic load ratings		Reference bearing[2)]	Shaft diameter d	
S	d_1	d_2	D_1	d_3 max.	A	W	dyn. C_r N	stat. C_{0r} N		inch	mm
9,5	–	44,6	–	51	–	$^3/_8$	25 500	15 300	6207	**$1^3/_8$**	**34,9250**
18,8	46,8	–	60,3	51	–	$^3/_{16}$	25 500	15 300	6207		
9,5	–	44,6	–	51	–	$^3/_{16}$	25 500	15 300	6207	**$1^7/_{16}$**	**36,5125**
18,8	46,8	–	60,3	51	–	$^3/_{16}$	25 500	15 300	6207		
9,5	–	44,6	–	51	–	$^3/_{16}$	25 500	15 300	6207		
11	–	49,4	–	58	–	$^3/_{16}$	32 500	19 800	6208	**$1^1/_2$**	**38,1000**
21,4	52,3	–	68,3	58	–	$^3/_{16}$	32 500	19 800	6208		
19	52,3	–	68,3	–	8	$^5/_{32}$	32 500	19 800	6208		
11	–	49,4	–	58	–	$^3/_{16}$	32 500	19 800	6208		
11	–	49,4	–	58	–	$^3/_{16}$	32 500	19 800	6208		
21,4	57,9	–	72,3	63	–	$^3/_{16}$	32 500	20 400	6209	**$1^5/_8$**	**41,2750**
21,4	57,9	–	72,3	63	–	$^3/_{16}$	32 500	20 400	6209	**$1^{11}/_{16}$**	**42,8625**
11	–	54,5	–	63	–	$^3/_{16}$	32 500	20 400	6209	**$1^3/_4$**	**44,4500**
21,4	57,9	–	72,3	63	–	$^3/_{16}$	32 500	20 400	6209		
19	57,9	–	72,3	–	8	$^5/_{32}$	32 500	20 400	6209		
24,6	62,8	–	77,3	69	–	$^3/_{16}$	35 000	23 200	6210	**$1^{15}/_{16}$**	**49,2125**
27,8	69,8	–	85,9	76	–	$^3/_{16}$	43 500	29 000	6211	**2**	**50,8000**
22,2	69,8	–	85,9	–	9	$^5/_{32}$	43 500	29 000	6211		
27,8	69,8	–	85,9	76	–	$^3/_{16}$	43 500	29 000	6211	**$2^3/_{16}$**	**55,5625**
31	76,5	–	94,5	84	–	$^3/_{16}$	52 000	36 000	6212	**$2^7/_{16}$**	**61,9125**
21,5	90	–	113	100	–	$^1/_4$	62 000	44 500	6215	**$2^{15}/_{16}$**	**74,6125**
33,4	90	–	113	–	12,7	$^3/_{16}$	62 000	44 500	6215		

Radial insert ball bearings with rubber interliner

Spherical or cylindrical outside surface of rubber interliner



CRB



RABRA, RABRB

Dimension table · Dimensions in mm

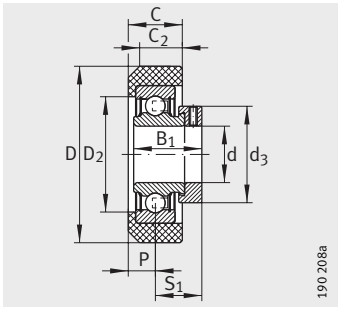
Designation		Mass	Dimensions					
Unit[1]	Radial insert ball bearing[2]	m ≈kg	d	D	D_1	C	C_2	C_1
RABRB12/47-FA106	RAE12-NPP-B-FA106	0,15	**12**	47,3	–	17,6	–	–
RCSMB15/65-FA106	RAE15-NPP-FA106	0,18	**15**	65,1	–	25,4	–	–
RABRB15/47-FA106	RAE15-NPP-B-FA106	0,15	**15**	47,3	–	18	–	–
RCSMB17/65-FA106	RAE17-NPP-FA106	0,18	**17**	65,1	–	25,4	–	–
CRB20/83	RAE20-NPP	0,3	**20**	83,6	87,4	25,4	–	4,8
CRB20/76	RAE20-NPP	0,3	**20**	77,5	80	25,4	–	5
RCSMB20/65-FA106	RAE20-NPP-FA106	0,22	**20**	65,1	–	25,4	–	–
RCRA20/46-FA106	RALE20-NPP-FA106	0,14	**20**	46	–	18,3	16	–
RABRB20/52-FA106	RAE20-NPP-B-FA106	0,2	**20**	52,3	–	17,6	–	–
CRB25/83	RAE25-NPP	0,32	**25**	83,6	87,4	25,4	–	4,8
CRB25/70	RAE25-NPP	0,32	**25**	71,5	76	25	–	5
CRB25/72	RAE25-NPP	0,32	**25**	73	80	25	–	5
RCSMB25/65-FA106	RAE25-NPP-FA106	0,24	**25**	65,1	–	25,4	–	–
RCRB25/57-FA106	RAE25-NPP-FA106	0,21	**25**	57,3	–	19,8	17,5	–
RABRB25/62-FA106	RAE25-NPP-B-FA106	0,24	**25**	62,2	–	20,8	–	–
CRB30/83	RAE30-NPP	0,41	**30**	83,6	87,4	28	–	4,8
CRB30/92	RAE30-NPP	0,41	**30**	93	98	28	–	5
RCSMA30/65-FA106	RALE30-NPP-FA106	0,32	**30**	65,1	–	25,4	–	–
RABRA30/62-FA106	RALE30-NPP-B-FA106	0,3	**30**	62,2	–	20,8	–	–
RABRB30/72-FA106	RAE30-NPP-B-FA106	0,38	**30**	72,2	–	23	–	–
CRB35/110	RAE35-NPP	0,56	**35**	112,3	120	30	–	5
RABRB35/80-FA106	RAE35-NPP-B-FA106	0,57	**35**	80,2	–	24	–	–
RABRB40/85-FA106	RAE40-NPP-B-FA106	0,73	**40**	85	–	27	–	–
RABRB50/100-FA106	RAE50-NPP-B-FA106	0,92	**50**	100,2	–	30	–	–

1) Operating temperature from –20 °C to +85 °C.

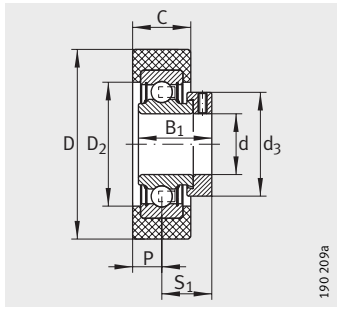
2) Permissible speeds of radial insert ball bearings: see page 1182.

3) Reference bearings for determining the equivalent bearing load: see page 204.

4) Also available by agreement in NBR80.



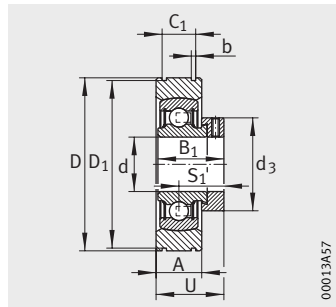
RCRA, RCRB



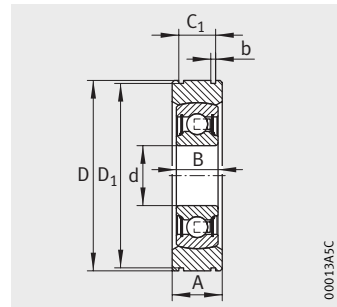
RCSMA, RCSMB

							Rubber ring		Basic load ratings		Reference bearing[3]
S_1	D_2	B_1	P	d_3 max.	S_2	B_2	Hardness Shore A °	Load carrying capacity C_G N	dyn. C_r N	stat. C_{0r} N	
22,1	33,5	28,6	–	28	–	30,9	70	840	9 800	4 750	6203
22,1	35	28,6	12,7	28	–	–	70	900	9 800	4 750	6203
22,1	33,5	28,6	–	28	–	31,1	70	840	9 800	4 750	6203
22,1	35	28,6	12,7	28	–	–	70	900	9 800	4 750	6203
–	40	31	–	33	12,7	36,2	80	750	12 800	6 600	6204
–	40	31	–	33	12,5	36	80	750	12 800	6 600	6204
23,5	40	31	12,7	33	–	–	70	1 200	12 800	6 600	6204
18,6	35	24,5	10	30	–	–	70	900	9 400	5 000	6004
23,5	39	31	–	33	–	32,3	70	1 160	12 800	6 600	6204
–	46	31	–	37,5	12,7	36,2	80	1 000	14 000	7 800	6205
–	46	31	–	37,5	12,5	36	80	1 000	14 000	7 800	6205
–	46	31	–	37,5	12,5	36	80	1 000	14 000	7 800	6205
23,5	46	31	12,7	37,5	–	–	70	1 400	14 000	7 800	6205
23,5	44,5	31	9,8	37,5	–	–	70	1 400	14 000	7 800	6205
23,5	44,5	31	–	37,5	–	33,9	70[4]	1 390	14 000	7 800	6205
–	56	35,8	–	44	14	40,7	80	1 400	19 500	11 300	6206
–	56	35,8	–	44	14	40,7	80	1 400	19 500	11 300	6206
20	47,6	26,5	15	42,5	–	–	70	1 400	13 200	8 300	6006
20	47	26,5	–	42,5	–	30,4	70	1 390	13 200	8 300	6006
26,7	54	35,8	–	44	–	38,2	70[4]	1 980	19 500	11 300	6206
–	64	39	–	51	15	44,4	80	1 500	25 500	15 300	6207
29,4	62	39	–	51	–	41,4	70	2 700	25 500	15 300	6207
32,7	70	43,8	–	58	–	46,3	70[4]	3 500	32 500	19 800	6208
32,7	80	43,8	–	69	–	47,7	70[4]	4 100	35 000	23 200	6210

Radial insert ball bearings with steel aligning ring



PE



BE

Dimension table · Dimensions in mm

Designation	Mass	Dimensions											Basic load ratings		Reference bearing[5]
Unit	m	d	D[3]	A	C_1[4]	b[4]	D_1[4]	B	B_1	S_1	d_3	U	dyn. C_r	stat. C_{0r}	
	≈kg				+0,2	+0,3	−0,5				max.		N	N	
PE20[1]	0,24	**20**	55	16	11,2	1,35	52,6	–	31	23,5	33	31,5	12 800	6 600	6204
BE20[2]	0,19	**20**	55	16	11,2	1,35	52,6	14	–	–	–	–	12 800	6 600	6204
PE25[1]	0,31	**25**	62	17	11,2	1,9	59,6	–	31	23,5	37,5	32	14 000	7 800	6205
BE25[2]	0,25	**25**	62	17	11,2	1,9	59,6	15	–	–	–	–	14 000	7 800	6205
PE30[1]	0,48	**30**	72	21	14,4	1,9	68,8	–	35,8	26,7	44	37,2	19 500	11 300	6206
BE30[2]	0,37	**30**	72	21	14,4	1,9	68,8	16	–	–	–	–	19 500	11 300	6206
PE35[1]	0,64	**35**	80	21	14,4	1,9	76,8	–	39	29,4	51	40	25 500	15 300	6207
BE35[2]	0,45	**35**	80	21	14,4	1,9	76,8	17	–	–	–	–	25 500	15 300	6207
PE40[1]	0,88	**40**	90	25	15,4	2,7	86,8	–	43,8	32,7	58	45,2	32 500	19 800	6208
BE40[2]	0,63	**40**	90	25	15,4	2,7	86,8	18	–	–	–	–	32 500	19 800	6208

1) Permissible speeds of radial insert ball bearings RAE..NPP-B: see page 1182.

2) Permissible speeds of self-aligning deep groove ball bearings 2..NPP-B: see page 1210.

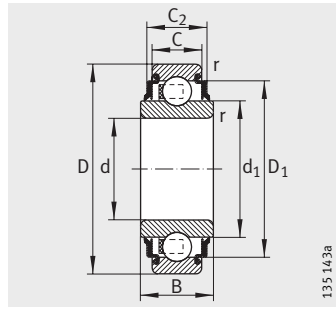
3) Before splitting, dimension D corresponds to tolerance class PN according to DIN 620-2.

4) Annular slot tolerances to DIN 616 (for snap rings to DIN 5 417).

5) Reference bearings for determining the equivalent bearing load: see page 204.

Deep groove ball bearings with extended inner ring

Cylindrical outer ring



2..-KRR, 2..-KRR-AH..

Dimension table · Dimensions in mm

Designation	Mass	Dimensions								Limiting speed	Basic load ratings		Reference bearing[5]
	m	d	D	C	C_2	d_1	D_1	B	r_{min}	n_G grease	dyn. C_r	stat. C_{0r}	
	≈kg									min^{-1}	N	N	
203-KRR-AH05[4]	0,09	**13**[2]	40	12	12	24,2	30,6	18,3	0,6	13 000	9 800	4 750	6203
202-KRR	0,05	**15**	35	11	11	21,5	28,8	14,4	0,6	14 600	7 600	3 700	6202
203-KRR-AH02	0,07	**16,2**[3]	40	12	12	24,2	32,6	18,3	0,6	13 000	9 800	4 750	6203
203-KRR	0,07	**17**	40	12	12	24,2	32,9	18,3	0,6	13 000	9 800	4 750	6203
204-KRR	0,12	**20**	47	14	14	28,7	38,7	17,7	1	11 000	12 800	6 600	6204
205-KRR	0,16	**25**	52	15	16,7	33,8	42,6	21	1	8 800	14 000	7 800	6205
206-KRR	0,24	**30**	62	16	19,6	40,2	52	24	1	7 300	19 500	11 300	6206
207-KRR-AH03[1]	0,35	**35**	72	17	19,7	46,8	60,3	25	2	6 300	25 500	15 300	6207
208-KRR-AH04[1]	0,48	**38,892**	80	21	21,2	52,3	68,2	27,5	1	5 500	32 500	19 800	6208
208-KRR	0,44	**40**	80	18	20,5	52,3	68,2	27	1,1	5 500	32 500	19 800	6208
209-KRR	0,53	**45**	85	19	26,4	57,9	72,3	30	1,1	4 900	32 500	20 400	6209
210-KRR	0,58	**50**	90	20	24	62,8	77,6	30	1,1	4 400	35 000	23 200	6210
211-KRR	0,85	**55**	100	21	27,5	69,8	85,9	36	1,5	4 000	43 500	29 000	6211
212-KRR	1,1	**60**	110	22	30	76,5	94,7	36	1,5	3 700	52 000	36 000	6212

1) With steel cage.

2) $d^{+0,08}_{-0,05}$.

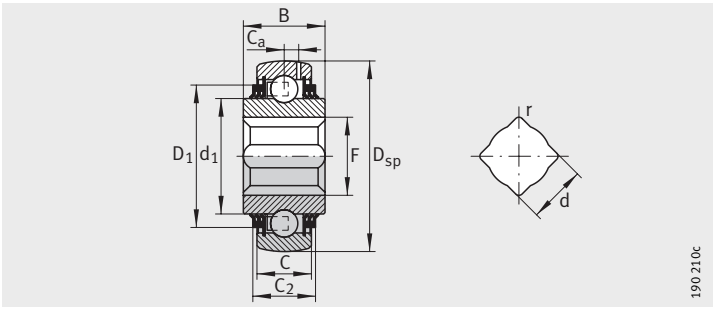
3) $d^{+0,1}$. Bore diameter is designed for M16 screws.

4) Greased with L114 (GA47).

5) Reference bearings for determining the equivalent bearing load: see page 204.

Self-aligning deep groove ball bearings

Spherical outer ring
Square or hexagonal bore

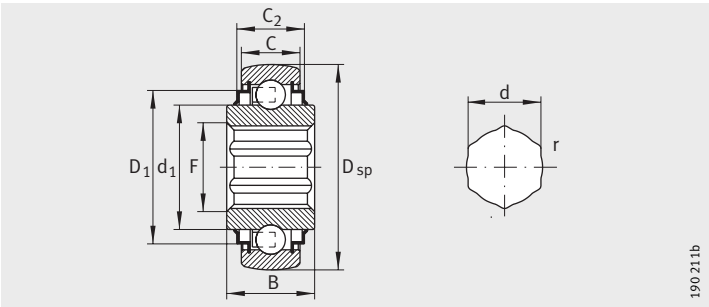


GVK..-KTT-B(-AH..)-AS2/V, VK..-KTT-B(-AH..)

Dimension table · Dimensions in mm

Width across flats of shaft d		Designation	Mass	Dimensions					
			m	d	d	D_{sp}	C	C_2	d_1
inch	mm		≈kg		Deviation				
–	**17,0000**	**SKE17-204-KRR-B**	0,12	17,0000	$^{+0,15}_{+0,05}$	47	14	–	28,7
7/8	**22,2250**	**SK014-205-KRR-B**	0,2	22,2250	$^{+0,15}_{+0,05}$	52	15	16,7	33,8
1	**25,4000**	**GVK100-208-KTT-B-AS2/V**	0,74	25,4000	$^{+0,9}_{+0,6}$	80	21	28,1	52,3
		VK100-208-KTT-B-AH10	0,72	25,4000	$^{+0,9}_{+0,6}$	80	18	25,3	52,3
		SK100-206-KRR-B-AH11	0,32	25,4000	$^{+0,15}_{+0,03}$	62	16	18,7	40,2
1 1/8	**28,5750**	**GVK102-208-KTT-B-AH10-AS2/V**	0,68	28,5750	$^{+0,9}_{+0,6}$	80	18	25,3	52,3
		SK102-207-KRR-B-AH10	0,45	28,5750	$^{+0,175}_{+0,03}$	72	17	20,5	46,8
1 1/4	**31,7500**	**GVK104-209-KTT-B-AS2/V**	0,71	31,7500	$^{+0,9}_{+0,6}$	85	22	27,4	57,9
		SK104-207-KRR-B-AH12	0,45	31,7500	$^{+0,2}_{+0,1}$	72	17	20,5	46,8
1 9/16	**39,6875**	**GVK109-211-KTT-B-AS2/V**	1,25	39,6875	$^{+1,1}_{+0,8}$	100	25	29	69,8

1) Reference bearings for determining the equivalent bearing load: see page 204.

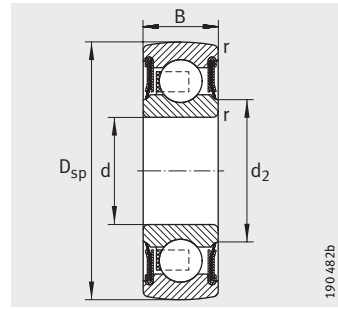


SK..-KRR-B(-AH)

					Limiting speed	Basic load ratings		Reference bearing[1)]	Width across flats of shaft	
F	D_1	C_a	B	r	n_G grease	dyn. C_r	stat. C_{0r}		d	
					min^{-1}	N	N		inch	mm
20,2	–	–	17,7	0,13	900	12 800	6 600	6204	–	**17,0000**
26,2	42,6	–	25,4	0,13	900	14 000	7 800	6205	**7/8**	**22,2250**
35,4	68,3	6,4	36,5	2,5	500	32 500	19 800	6208	**1**	**25,4000**
35,4	68,3	–	36,5	2,5	500	32 500	19 800	6208		
30,5	52	–	24	0,13	800	19 500	11 300	6206		
41,3	68,3	5,8	36,5	2,5	500	32 500	19 800	6208	**1 1/8**	**28,5750**
38	60,3	–	37,7	0,25	800	25 500	15 300	6207		
44,3	72,3	6,4	36,5	2,5	500	32 500	20 400	6209	**1 1/4**	**31,7500**
38	60,3	–	25	0,12	800	25 500	15 300	6207		
55,2	85,9	7,1	36	2,5	450	43 500	29 000	6214	**1 9/16**	**39,6875**

Self-aligning deep groove ball bearings

Spherical outer ring
Bore for fit



2..-NPP-B

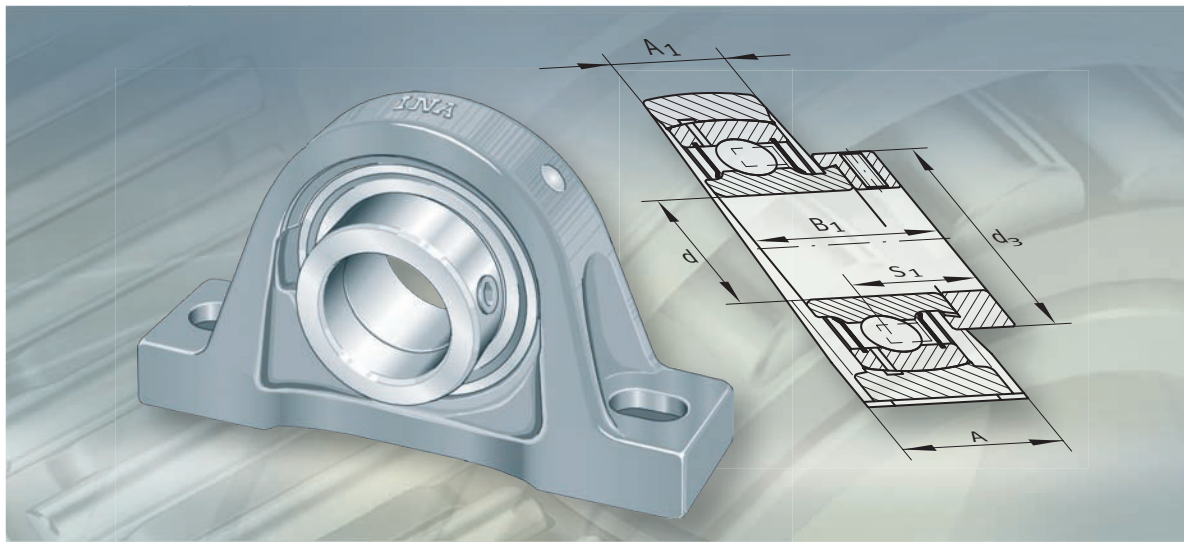
Dimension table · Dimensions in mm

Designation	Mass	Dimensions					Limiting speed	Basic load ratings		Reference bearing[3]
	m	d	D_{sp}	B	d_2	r_{min}	n_G grease	dyn. C_r	stat. C_{0r}	
	≈kg						min^{-1}	N	N	
201-NPP-B[1]	0,04	**12**	32	10	17,1	0,6	18 300	6 800	3 050	6201
203-NPP-B[2]	0,06	**17**	40	12	22,5	0,6	13 000	9 800	4 750	6203
204-NPP-B[2]	0,11	**20**	47	14	26,5	1	11 000	12 800	6 600	6204
205-NPP-B[2]	0,13	**25**	52	15	30,3	1	8 800	14 000	7 800	6205
206-NPP-B[1]	0,2	**30**	62	16	37,4	1	7 300	19 500	11 300	6206
207-NPP-B[1]	0,29	**35**	72	17	42,4	1	6 300	25 500	15 300	6207
208-NPP-B[1]	0,37	**40**	80	18	48,4	1,1	5 500	32 500	19 800	6208
209-NPP-B[1]	0,41	**45**	85	19	53,2	1,1	4 900	32 500	20 400	6209
210-NPP-B[2]	0,46	**50**	90	20	58,2	1,1	4 400	35 000	23 200	6210

[1] One-piece seal with vulcanised seal lip.

[2] Three-piece P seal.

[3] Reference bearings for determining the equivalent bearing load: see page 204.



Housing units

Housing units

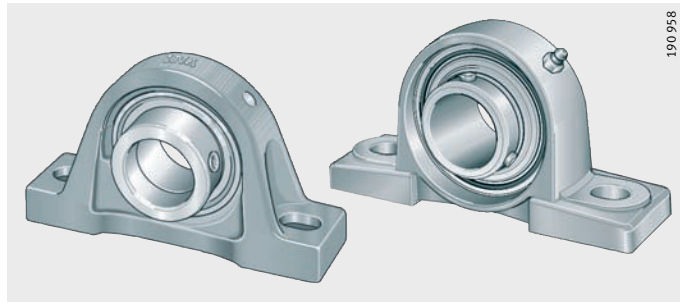
		Page
Product overview	Housing units	1214
Features	Housing units with cast iron housing	1218
	Housing units with sheet steel housing	1221
	Possible combinations of insert bearings and housings	1222
	Other products	1222
	Suffixes	1222
	Possible combinations – radial insert ball bearings with cast iron housings	1224
	Possible combinations – radial insert ball bearings with sheet steel housings	1226
Design and safety guidelines	Compensation of misalignments	1228
	Load carrying capacity of housings	1229
	Load carrying capacity and speed limits of radial insert ball bearings	1230
	Design of adjacent construction	1230
	Bearing end caps	1231
Fitting and dismantling	Delivered condition	1232
	Storage and storage period	1232
	Removal from packaging	1232
	Guidelines for fitting	1232
	Fitting of coated components	1232
	Fitting of cast iron units – plummer block and flanged housing units	1233
	Fitting of cast iron units – radial insert ball bearings with integral adapter sleeve	1235
	Fitting of bearing end caps	1238
	Fitting of sheet steel units with eccentric locking collar and grub screws in the inner ring	1239
Accuracy	Cast iron housings	1241
	Sheet steel housings	1241
Dimension tables	Plummer block housing units (cast iron housings)	1242
	Flanged housing units (cast iron housings)	1256
	Take-up housing units (cast iron housings, sheet steel housings)	1288
	Plummer block housing units (sheet steel housings)	1298
	Flanged housing units (sheet steel housings)	1300

Plummer block housing units

Cast iron housings with long base

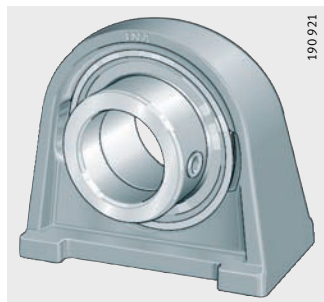
Combinations of bearings and housings, see page 1224

PASE, PASEY, RASE, RASEL, RASEA, RASEY, TASE, LASE, RSAO, RASEY..-JIS



Cast iron housings with short base

PSHE, PSHEY, RSHE, RSHEY, TSHE

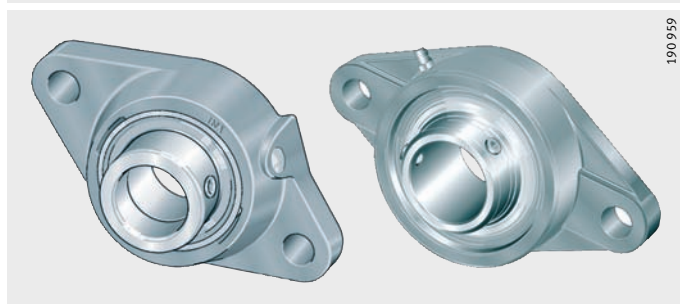


Two-bolt flanged housing units

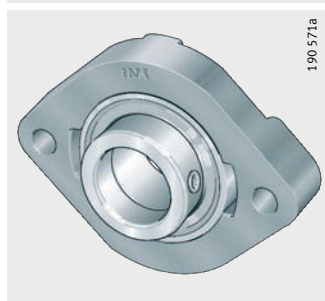
Cast iron housings

Combinations of bearings and housings, see page 1224

PCJT, PCJTY, RCJTZ, RCJT, RCJTA, RCJTY, PCFT, TCJT, LCJT, RCJTY..-JIS



FLCTE, FLCTEY, GLCTE

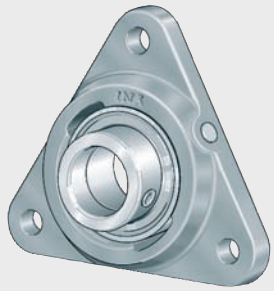


Three-bolt flanged housing units

Cast iron housings

Combinations of bearings and housings, see page 1224

PCFTR

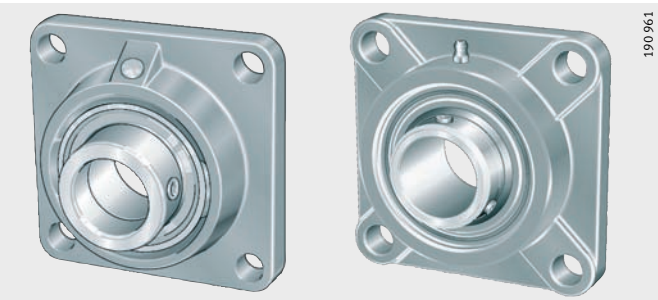


Four-bolt flanged housing units

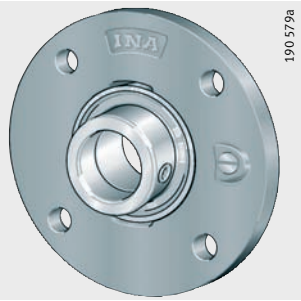
Cast iron housings

Combinations of bearings and housings, see page 1224

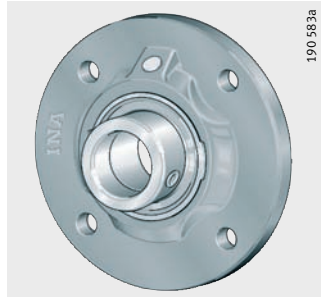
PCJ, PCJY, RCJ, RCJY, RCJL, RCJO, TCJ, PCF, RCJY..-JIS



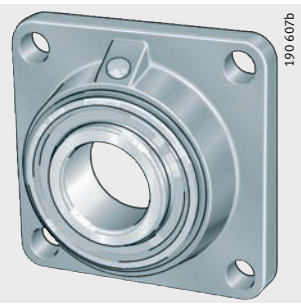
PME, PMEY, RME, RMEY, RMEO, TME



RFE, TFE



PCCJ

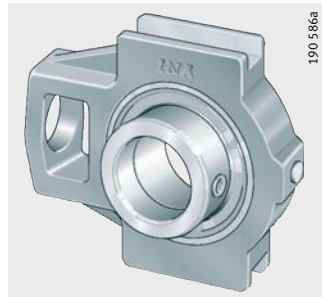


Take-up housing units

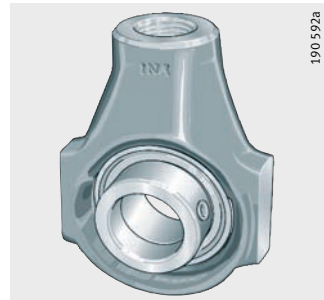
Cast iron housings

Combinations of bearings and housings, see page 1225

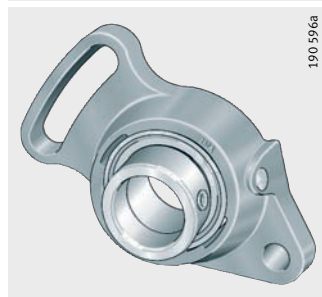
PTUE, PTUEY, RTUE, RTUEY, RTUEO, TTUE



PHE, PHEY, RHE, THE

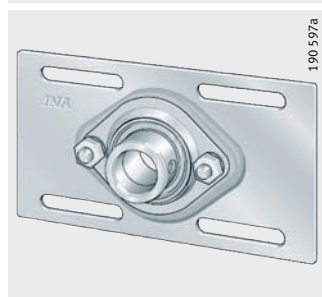


PSFT



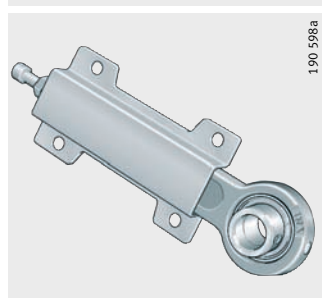
Sheet steel housings

MSTU



Cast iron housings, sheet steel housings

PHUSE

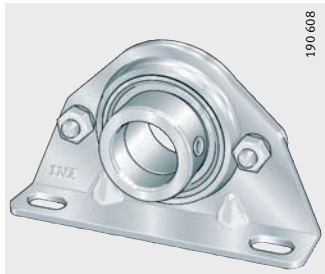


Plummer block housing units

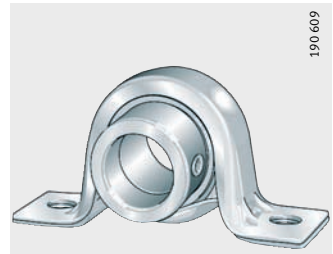
Sheet steel housings

Combinations of bearings and housings, see page 1226

PBS



PB, PBY, RPB

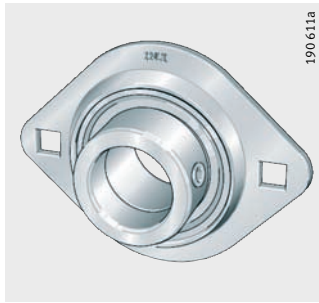


Two-bolt and three-bolt flanged housing units

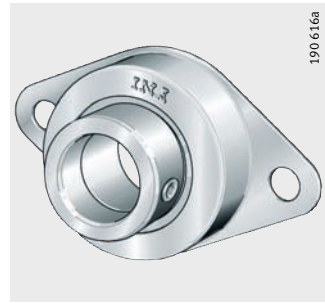
Sheet steel housings

Combinations of bearings and housings, see page 1226

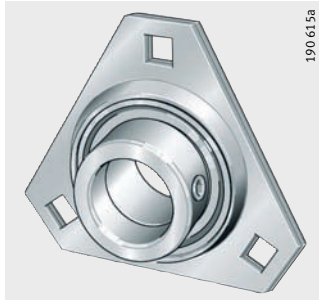
RAT, RATY, RALT, PCSLT



RCSMF



RATR, RALTR, RRTR, RATRY



RA, RAY, RRY, GRA, GRRY

Housing units

Features

INA housing units are available as plummer block, flanged and take-up housing units in numerous different designs. The units are ready-to-fit and comprise INA cast iron or sheet steel housings in which INA radial insert ball bearings are fitted. In order to ensure function and reliability under all operating conditions, the bearings and housings are matched to each other.

Due to the spherical outside surface of the bearing outer ring and the concave housing bore, housing units can compensate for static angular misalignment of the shaft, see Compensation of misalignments, page 1228.

The units are used predominantly as locating bearings, but are also suitable as non-locating bearings under low loads and speeds.

The housings are screw mounted on the adjacent construction. Less stringent tolerances are sufficient for the screw mounting surfaces, see Design of adjacent construction, page 1230.

Housing units with cast iron housing

Cast iron housings are single-piece units with high load carrying capacity, see Load carrying capacity of housings, page 1229. For relubrication of radial insert ball bearings, the housing bore has a lubrication groove and the housing has a lubrication hole for conventional taper type lubrication nipples to DIN 71412. In the delivered condition, the hole in the housing is closed off by a plastic plug. Cast iron units are available as plummer block and flanged housing units.

Plummer block housing units

Plummer block housing units have a long or a short base, *Figure 1*. Housings with a long base are screw mounted to the adjacent construction by means of slots, housings with a short base by blind threaded holes.

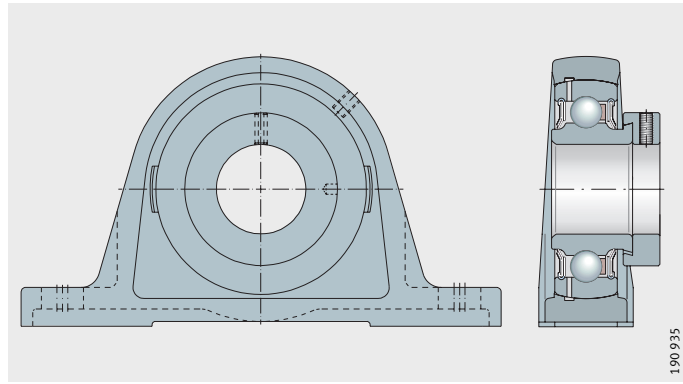
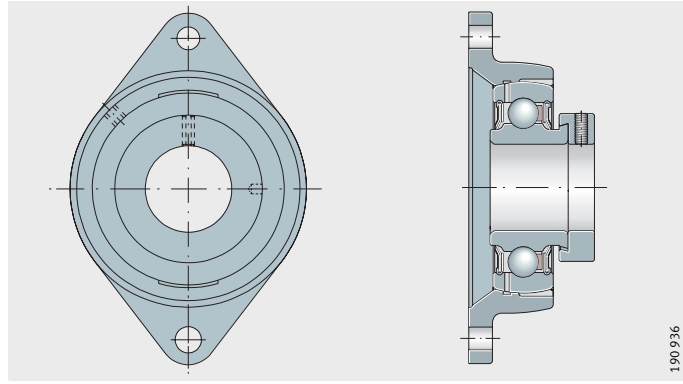


Figure 1
Plummer block housing unit, cast iron housing, with long base

Flanged housing units

Flanged housing units are available as two-bolt, three-bolt and four-bolt units, *Figure 2*. The housings are oval, triangular, square or round in shape. The housings have through holes for location purposes. Some series also have a centring spigot. The centring spigot is mounted in a turned recess in the machine structure. This gives concentric alignment of the housings and relieves the fixing screws of any radial forces.

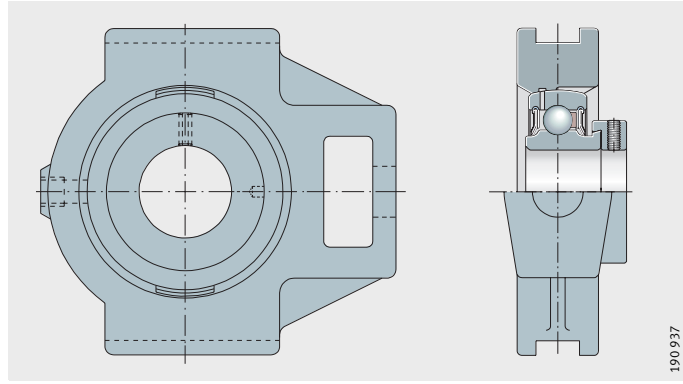


PCJT

Figure 2
Flanged housing unit – cast iron housing

Take-up housing units

Take-up housing units have facilities for sliding or swivel motion, *Figure 3*.
They are used where shafts must undergo substantial displacement travel.



PTUE

Figure 3
Take-up housing unit, cast iron housing

Housing units

Housing materials

The material used for the cast iron housings is cast iron EN-GJL-200/250 to DIN EN 1561. Housings are also available by agreement in spheroidal graphite cast iron EN-GJS-400/500 to DIN EN 1563.

Bearing end caps

In order to cover the exposed ends of rotating shafts, cast iron housings with the suffix N can be fitted with bearing end caps.

Corrosion-resistant units

Corrosion-resistant units are available as plummer block and flanged housing units. The housings and insert bearings are coated with Corrotect® and have the suffix FA125.

The units are used if moisture, contaminated water, salt spray mist, weakly alkaline or weakly acidic cleaning agents are present.

Units for high and low temperatures

These units are available as plummer block and flanged housing units. The housings correspond to the cast iron housings described above. The high temperature variant FA164 includes a tapered lubrication nipple to DIN 71412 screwed into the housing.

Units for high temperatures have the suffix FA164 and units for the extended temperature range have the suffix FA101, see table, page 1222, and table, page 1178.

Housing units with sheet steel housing

Sheet steel housings are two-piece units made from pressed deep drawn sheet steel and in some cases have a Corrotect® coating. The series GRA and GRRY can be relubricated via a lubrication nipple. The units are available as plummer block and flanged housing units, *Figure 4* and *Figure 5*.

Units with sheet steel housings are suitable for moderate loads and lightweight constructions.

Plummer block and flanged housing units with rubber interliner

In addition to the normal plummer block and flanged housing units, there is also a design with a rubber interliner on the bearing outer ring. This interliner absorbs shocks and vibrations and thus gives damping of running noises.

PB

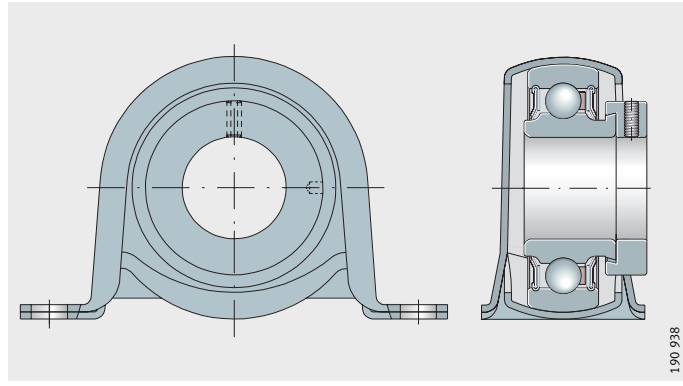


Figure 4
Plummer block housing unit, sheet steel housing

GRA

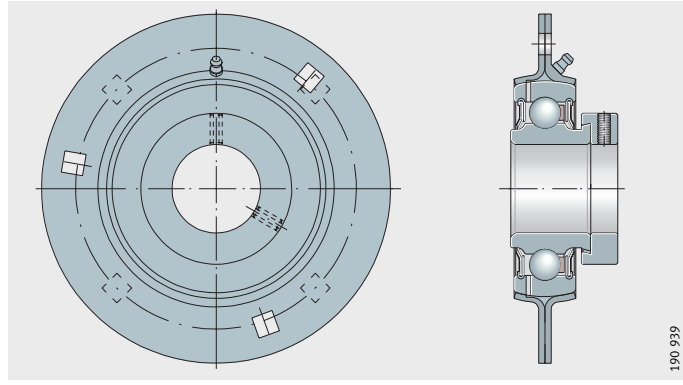


Figure 5
Flanged housing unit, sheet steel housing

Corrosion-resistant units

The two-piece sheet steel flanged units have the suffix VA and are also available with a relubrication facility.

They are used if moisture, contaminated water, salt spray mist, weakly alkaline or weakly acidic cleaning agents are present.

Possible combinations of insert bearings and housings

Possible combinations of radial insert ball bearings with cast iron housings and radial insert ball bearings with sheet steel housings, see table, page 1224 and table, page 1226.

Other products

In addition to the comprehensive catalogue range, we also supply housing units for special applications.
Examples include:

- corrosion-resistant flanged housing units with two-piece housings
  - a polypropylene flanged element combined with a corrosion-resistant alloy steel flanged element
- units with plastic housings combined with radial insert ball bearings made from corrosion-resistant steel or with Corrotect®-coated bearings
- other designs are available with special greases, seals and inch dimensions, see also TPI 127, Radial insert ball bearings/housing units in inch sizes.
  Please contact us as necessary.

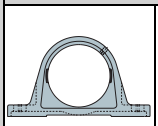
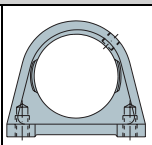
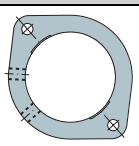
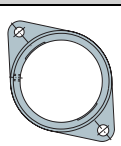
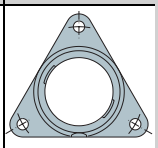
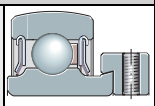
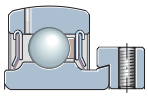
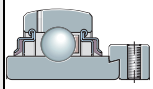
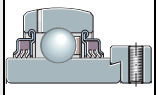
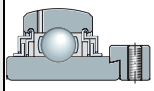
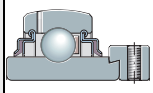
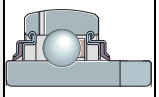
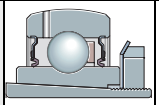
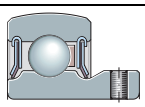
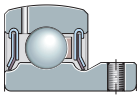
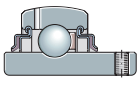
Suffixes

Suffixes for the available housing unit designs: see table.

Available designs

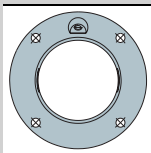
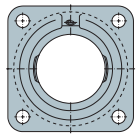
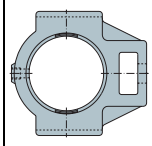
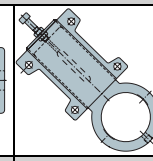
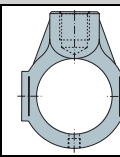
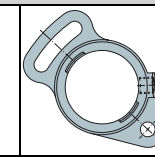
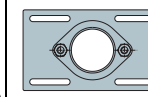
Suffix	Description	Design
2C	Radial insert ball bearing with flinger shields on both sides	Standard
FA101	High and low temperature design –40 °C to +180 °C	
FA106	Bearing subjected to special noise testing	
FA107	Bearing with lubrication holes on the locating side	
FA125	With Corrotect® coating	
FA164	High temperature design up to +250 °C	
N	Cast iron housing with undercut slot for end caps	
OSE	Bearing without clamping element	
JIS	Housing dimensions according to JIS B 1559	

Housing units

Possible combinations – radial insert ball bearings with cast iron housings		Housings				
		Plummer block housings		Two-bolt flanged housings		Three-bolt flanged housings
						
		GG.ASE	**GG.SHE**	**GG.LCTE**[2]	**GG.CJT**	**GG.CFTR**
		GG.SAO[1]		**GG.GLCTE**	**GG.CFT**	
					GG.CJTZ	
RAE..-NPP-B d = 12 to 50 mm				**FLCTE**[2] page 1256		
GRAE..-NPP-B d = 12 to 60 mm		**PASE** page 1242	**PSHE** page 1252	**GLCTE** page 1256	**PCJT** page 1258 **PCFT** page 1258	**PCFTR** page 1268
GE..-KRR-B d = 17 to 120 mm		**RASE** page 1242	**RSHE** page 1252		**RCJT** page 1258 **RCJTZ** page 1266	Available by agreement only
GE..-KTT-B d = 20 to 80 mm		**TASE** page 1242	**TSHE** page 1252		**TCJT** page 1258	Available by agreement only
GE..-KLL-B d = 20 to 50 mm		**LASE** page 1242	Available by agreement only		**LCJT** page 1258	Available by agreement only
GNE..-KRR-B[1] d = 30 to 100 mm		**RSAO** page 1244				
GLE..-KRR-B d = 20 to 70 mm		**RASEL** page 1242	Available by agreement only		Available by agreement only	Available by agreement only
GSH..-2RSR-B d = 20 to 50 mm		**RASEA** page 1242	Available by agreement only		**RCJTA** page 1258	Available by agreement only
AY..-NPP-B d = 12 to 30 mm				**FLCTEY**[2] page 1256		
GAY..-NPP-B d = 12 to 60 mm		**PASEY** page 1242	**PSHEY** page 1252	**FLCTEY**[2] page 1256	**PCJTY** page 1258	Available by agreement only
GYE..-KRR-B d = 12 to 90 mm		**RASEY** page 1242	**RSHEY** page 1252		**RCJTY** page 1258	Available by agreement only

Catalogue range, for dimension tables see pages indicated. Other dimensions and combinations available by agreement.

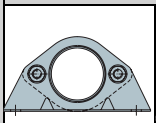
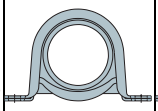
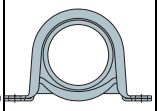
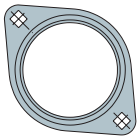
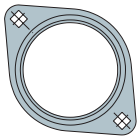
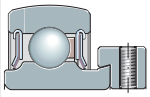
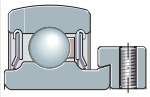
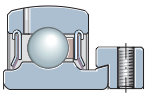
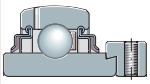
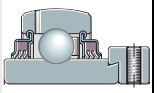
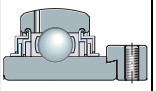
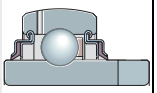
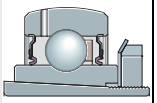
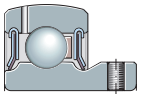
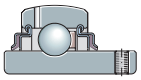
Combinations not possible or not advisable.

	Four-bolt flanged housings	Four-bolt flanged housings	Take-up housings				
							
	GG.ME	**GG.CJ**	**GG.TUE**	**GG.HUE** **GEH..-HUSE**	**GG.HE**	**GG.SFT**	**GEH..-MSTU**
	GG.MEO[1]	**GG.CJO**[1]	**GG.TUEO**[1]				
	GG.FE	**GG.CF**					
							MSTU page 1296
	PME page 1278	**PCJ** page 1270 **PCF** page 1270	**PTUE** page 1288	**PHUSE** page 1294	**PHE** page 1292	**PSFT** page 1296	
	RME page 1278 **RFE** page 1284	**RCJ** page 1270	**RTUE** page 1288	Available by agreement only	**RHE** page 1292	Available by agreement only	Available by agreement only
	TME page 1278 **TFE** page 1284	**TCJ** page 1270	**TTUE** page 1288	Available by agreement only	**THE** page 1292	Available by agreement only	Available by agreement only
	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only
	RMEO page 1278	**RCJO** page 1272	**RTUEO** page 1290				
	Available by agreement only	**RCJL** page 1272	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only
	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only
							Available by agreement only
	PMEY page 1278	**PCJY** page 1270	**PTUEY** page 1288	Available by agreement only	**PHEY** page 1292	Available by agreement only	
	RMEY page 1278	**RCJY** page 1270	**RTUEY** page 1288	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only

[1] Heavy series.

[2] Without lubrication hole.

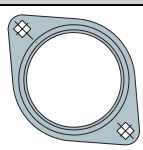
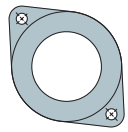
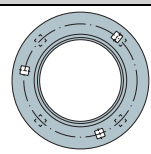
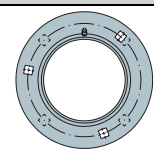
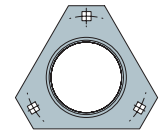
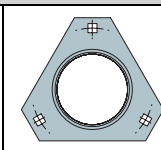
Housing units

Possible combinations – radial insert ball bearings with sheet steel housings		Housings				
		Plummer block housings			Two-bolt flanged housings	
						
		GEH..--PBS	**GEH..--BT**	**GEH..-BT** **GRG..-RABR**	**FLAN..-LST** (2 pieces)	**FLAN..-MST** (2 pieces)
RALE..-NPP(-B) d = 20 to 30 mm				**RPB** page 1298	**RALT** page 1300	
RAE..-NPP(-B) d = 12 to 40 mm		**PBS** page 1298	**PB** page 1298	**RPB** page 1298		**RAT** page 1300
GRAE..-NPP-B d = 20 to 60 mm						
GE..-KRR-B d = 17 to 60 mm		Housing and bearing to be ordered separately	Housing and bearing to be ordered separately	Housing and bearing to be ordered sepa-rately		Housing and bearing to be ordered separately
GE..-KTT-B d = 20 to 60 mm		Housing and bearing to be ordered separately	Housing and bearing to be ordered separately			Housing and bearing to be ordered separately
GE..-KLL-B d = 20 to 50 mm		Housing and bearing to be ordered separately	Housing and bearing to be ordered separately			Housing and bearing to be ordered separately
GLE..-KRR-B d = 20 to 60 mm		Housing and bearing to be ordered separately	Housing and bearing to be ordered separately			Housing and bearing to be ordered separately
GSH..-2RSR-B d = 20 to 50 mm		Housing and bearing to be ordered separately	Housing and bearing to be ordered separately			Housing and bearing to be ordered separately
(G)AY..-NPP-B d = 12 to 60 mm		Housing and bearing to be ordered separately	**PBY** page 1298			**RATY** page 1300
GYE..-KRR-B d = 12 to 60 mm		Housing and bearing to be ordered separately	Housing and bearing to be ordered separately			Housing and bearing to be ordered separately

Catalogue range, for dimension tables see pages indicated.

Other dimensions and combinations available by agreement.

Combinations not possible or not advisable.

			Three-bolt flanged housings			
						
	FLAN..-CSLT **FLAN..-CST**	**FLAN..-RCSMF** **GRG..-RCSM**	**FLAN..-MSB** (2 pieces)	**FLAN..-MSA** **FLAN..-MSB**	**FLAN..-LSTR** (2 pieces)	**FLAN..-MSTR** (2 pieces)
	PCSLT page 1300	**RCSMF** page 1302 d = 30 mm			**RALTR** page 1304	
		RCSMF page 1302	**RA** page 1306			**RATR** page 1304
			RA page 1306	**GRA** page 1306		
			Housing and bearing to be ordered separately	Housing and bearing to be ordered separately		**RRTR** page 1304
			Housing and bearing to be ordered separately	Housing and bearing to be ordered separately		Housing and bearing to be ordered separately
			Housing and bearing to be ordered separately	Housing and bearing to be ordered separately		Housing and bearing to be ordered separately
			Housing and bearing to be ordered separately	Housing and bearing to be ordered separately		Housing and bearing to be ordered separately
			Housing and bearing to be ordered separately	Housing and bearing to be ordered separately		Housing and bearing to be ordered separately
			RAY page 1306			**RATRY** page 1304
			RRY page 1306	**GRRY** page 1306		Housing and bearing to be ordered separately

Design and safety guidelines

INA radial insert ball bearings and INA housings are matched to each other and, as a unit, give particularly robust and economical bearing arrangements.

Compensation of misalignments

Units with a spherical bearing outer ring and concave housing bore can compensate for static misalignment of the shaft, *Figure 6*:

- if relubrication is carried out, up to ±2,5°
- if relubrication is not carried out, up to ±5°.

The units must not be used to support swivelling or tumbling motion.

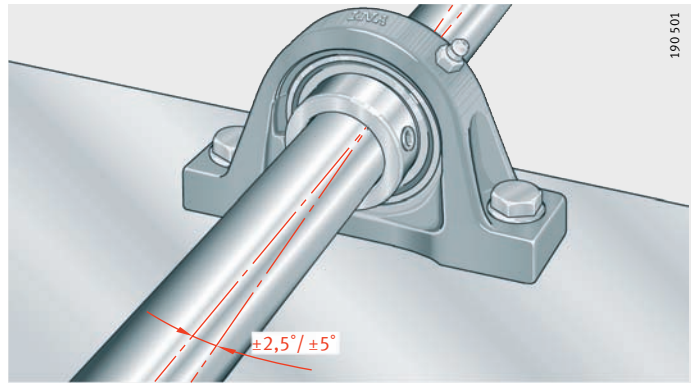


Figure 6
Compensation of static shaft misalignment

Load carrying capacity of housings

Due to their versatile characteristics, INA housing units can be easily used in almost all industrial sectors.

If bearing arrangements are planned for equipment in which a malfunction could be hazardous to persons or an unplanned stoppage of the machine could cause major disruption, it is essential that you consult us before proceeding with the design.

Cast iron housings, radial load carrying capacity

Cast iron housings can support the same radial loads as the insert bearings fitted. The static load carrying capacity of radial insert ball bearings C_{0r} is stated in the dimension tables.

For shock loads, appropriate safety factors must be applied. In this case, please contact us.

In the case of TUE and TUEO, the maximum radial tensile loading is only $0{,}25 \times C_{0r}$ (higher loads by agreement only).

Axial load carrying capacity

The axial load carrying capacity of cast iron housings is restricted to $0{,}50 \times C_{0r}$.

Sheet steel housings, radial load carrying capacity

Sheet steel housings are suitable for moderate loads.

The permissible radial load carrying capacity $C_{0r\,G}$ of sheet steel housings is given in the dimension tables.

Axial load carrying capacity

Permissible axial load carrying capacity of sheet steel housings, see table.

Permissible axial load carrying capacity

Units with sheet steel housings	Permissible axial load carrying capacity[1)]
MSTU	$0{,}20 \times C_{0r\,G}$
PHUSE	$0{,}25 \times C_{0r\,G}$
PB, PBY, RPB	$0{,}33 \times C_{0r\,G}$
PBS	$0{,}20 \times C_{0r\,G}$
RALTR, RATR, RATRY, RRTR	$0{,}50 \times C_{0r\,G}$
PCSLT, RAT, RATY, RALT	$0{,}50 \times C_{0r\,G}$
RCSMF	$0{,}33 \times C_{0r\,G}$
RA, RAY, GRA, RRY, GRRY	$0{,}50 \times C_{0r\,G}$

1) $C_{0r\,G}$ is the permissible radial load carrying capacity of the sheet steel housing according to the dimension table.

Load carrying capacity and speed limits of radial insert ball bearings

In the design of housing units, attention must be paid to the load carrying capacity and speed limits of the radial insert ball bearings fitted:

- axial load carrying capacity, see page 1181
- speed limits, see page 1182
- dimension table, see page 1242.

Design of adjacent construction

The permissible shaft tolerance is dependent on the speed, load and the insert bearing fitted.
Shafts in the tolerance zone h6 up to h9 can be used.
Conventional drawn shafts will suffice for most applications.

Screw mounting surfaces

Recommendations for the screw mounting surfaces:

- roughness of the screw mounting surface max. R_a12,5 (R_z63)
- geometrical tolerance 0,04/100 concave, spherical not permissible.

Fixing screws

The screw connection should be designed according to VDI 2230; friction value $\mu = 0{,}14$. Screws of grade 8.8 or better can be used. For fixing, hexagonal socket head screws to DIN EN ISO 4 762 should be used. The screws should be secured by at least a washer to DIN EN ISO 7 089/7 090 or additionally with a lock washer to DIN 128 or a conical spring washer to DIN 6 796.

The screws are not included in the delivery.

Bearing end caps

The ends of shafts can be covered using bearing end caps made from styrene-acrylnitrile copolymer (SAN), see table and *Figure 7*.
The caps are suitable for temperatures from –20 °C to +80 °C.
They guard against injury due to rotating shafts and also protect the bearings against contamination.

For location of the caps, housings with the suffix N have an annular slot on the side with the locating slot.
Fitting of the caps is described on page 1238.

The series for which end caps are supplied are indicated in the dimension tables. Bearing end caps are accessories and must always be ordered separately.

End caps

Bearing end caps Designation	Dimensions			
	d	D	L	E max.
KASK04	20	48	36	30
KASK05	25	54	38	30
KASK06	30	63	44	35
KASK07	35	73	47	39
KASK08	40	82	51	42
KASK10	50	92	56	46
KASK12	60	112	65	55

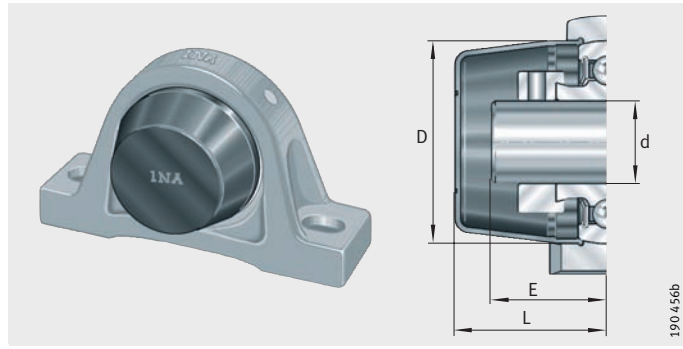


Figure 7
Housing unit with bearing end cap

Fitting and dismantling

Radial insert ball bearings must be handled with care before and during assembly. Their trouble-free operation is also dependent on the care taken in fitting.

Delivered condition

The housings have a coating of anthracite grey primer (≈RAL 7016).

The radial insert ball bearings are greased; for information on the grease used, see the Features section for the specific bearing, page 1178.

Storage and storage period

The units should be stored:

- in dry, clean rooms with the temperature as constant as possible
- at a relative humidity of max. 65%.

The storage period of radial insert ball bearings is limited by the storage life of the grease, see section Lubrication, page 76.

Removal from packaging

Perspiration causes corrosion. Hands must be kept clean and dry.

Bearings should not be removed from their original packaging until immediately before assembly.

Guidelines for fitting

If the cast iron housing and bearing are not supplied by INA as a ready-to-fit unit but are instead combined by the customer, the following guidelines should be followed:

- if the fit is too loose, grease can escape between the housing and bearing and will not therefore reach the bearing during relubrication
- if the fit is too tight, the bearing outer ring cannot align itself within the housing bore.

The assembly area should be as dry and clean as possible.

First, screw mount the housing on the adjacent construction, then locate the bearing inner ring on the shaft.
If this sequence is applied, the bearing aligns itself to the shaft in such a way that no stresses occur.

Provide the fitting tools and fixing screws.

Clean the shaft and remove any burrs.

Inspect the bearing seating surfaces on the shaft.

Keep bearing seating surfaces clean, dry and free of grease.

The specified tolerances must be observed.

Fitting forces must never be directed through the rolling elements.

Blows should never be applied directly to the bearing rings and seals.

Fitting of coated components

Before fitting, the compatibility of Corrotect®-coated products with the media should be checked.

The tolerances are increased by the thickness of the coating.

In order to reduce the forces involved in pressing-in, the surface of the parts should be lightly greased or a mounting paste used.

Fitting of cast iron units Plummer block and flanged housing units

Push the housing unit onto the shaft and align it with the fixing holes in the adjacent construction, *Figure 8*.

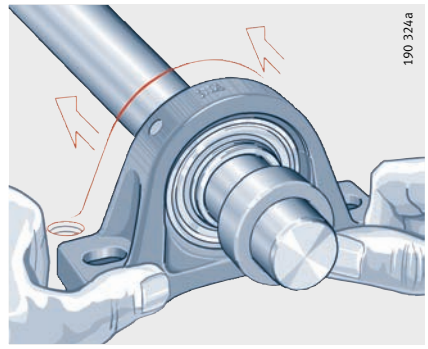


Figure 8
Pushing the unit onto the shaft

Screw the housing to the adjacent construction using the fixing screws, *Figure 9*.

If the shaft is to be supported by several housing units, tighten the screws finger tight at first, align the shaft and then tighten the screws securely.

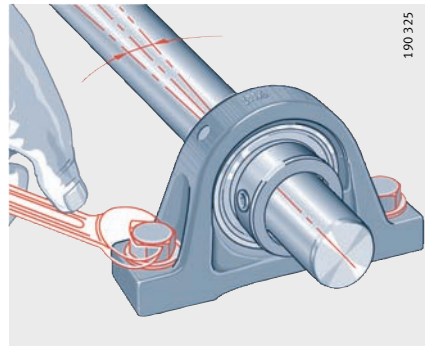


Figure 9
Screw mounting the housing finger tight

Slide the eccentric locking collar onto the collar seat on the bearing inner ring and rotate by hand, preferably in the direction of shaft rotation, *Figure 10*.

Using a drift and hammer, tension the eccentric locking collar by means of one or two strong blows, *Figure 10*.

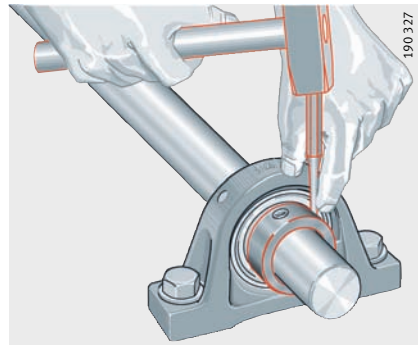


Figure 10
Tensioning the eccentric locking collar

For location using a locking collar, tighten the grub screw by means of a torque wrench, *Figure 11*.

For location using grub screws in the inner ring, tighten both grub screws by means of a torque wrench.

Observe the tightening torque M_A according to the table.

Tightening torques for inch size grub screws: see TPI 127, Radial insert ball bearings/housing units in inch sizes.

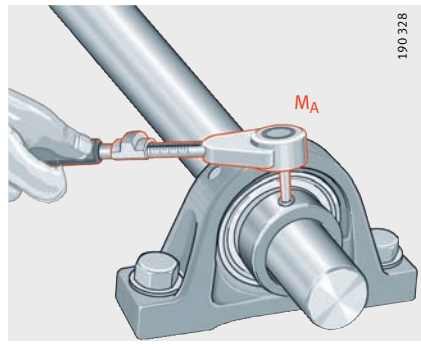


Figure 11
Tightening the grub screw in the eccentric locking collar or inner ring

Dismantling

For bearings with an eccentric locking collar, undo the grub screw and rotate the locking collar in the opposite direction to the direction of shaft rotation.

For bearings with grub screws in the inner ring, undo both grub screws.

Unbolt the housing.

Tightening torques for metric grub screws

Width across flats A/F mm	Thread	Tightening torques[1)] M_A Nm
2,5	M5	3,6
3	M6×0,75	6
4	M8×1	14
5	M10×1,25	26
6	M12, M12×1,25[2)]	42

1) The tightening torques are valid for original INA grub screws only.

2) GYE90-KRR-B.

Fitting of cast iron units Radial insert ball bearings with integral adapter sleeve

The bearing seats on the shaft and outside surface of the adapter must be dry and free of grease.

Push the housing unit onto the shaft and align it with the fixing holes in the adjacent construction, *Figure 12*.

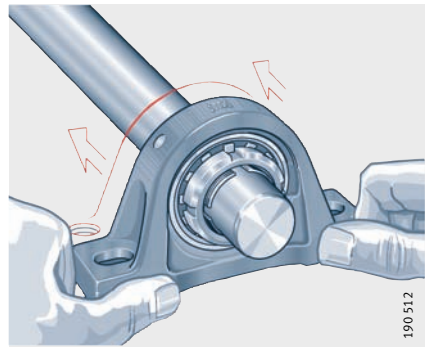


Figure 12
Pushing the unit onto the shaft

Screw the housing to the adjacent construction using the fixing screws, *Figure 13*. If the shaft is to be supported by several housing units, tighten the screws finger tight at first, align the shaft and then tighten the screws securely.

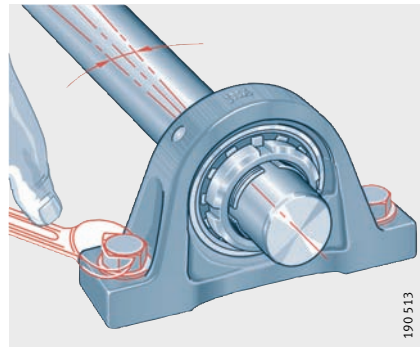


Figure 13
Screw mounting
the housing finger tight

Tighten the locknut using 2 hook wrenches of type A to DIN 1810; during tightening, the adapter sleeve must be held in place using a second hook wrench, *Figure 14*. Wrenches for tightening and holding, see table.

Do not exceed the maximum tightening torque M_A given in the table, otherwise the operating clearance in the bearing will become too small. Driving the locknut up will slightly displace the bearing in an axial direction.

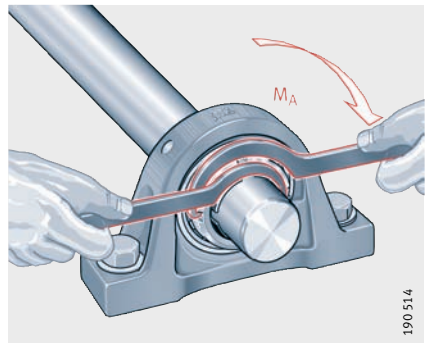


Figure 14
Tightening of locknut

Hook wrenches and tightening torques

Shaft diameter	Hook wrench, type A, to DIN 1810		Tightening torque Locknut	
d mm	For tightening locknut	For holding adapter sleeve	$M_{A\,min}$ Nm	$M_{A\,max}$ Nm
20	A 30–32 (HN 4)	A 25–28 (HN 2)	13	17
25	A 40–42 (HN 5)	A 30–32 (HN 3)	22	28
30	A 45–50 (HN 6)	A 34–36 (HN 4)	33	40
35	A 52–55 (HN 7)	A 40–42 (HN 5)	47	56
40	A 58–62 (HN 8)	A 45–50 (HN 6)	70	80
50	A 68–75 (HN 10)	A 52–55 (HN 7)	90	105

Bend the tab on the tab washer into a groove in the locknut to secure the nut against loosening, *Figure 15*.

Ensure that the seal in the bearing is not damaged when bending the locking tab over.

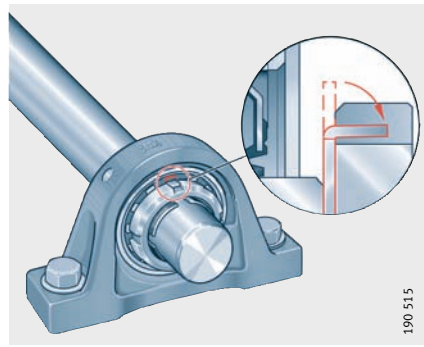


Figure 15
Securing of locknut

Dismantling

Bend back the tab on the tab washer and undo the locknut by a few turns. Place the impact cap in front of the locknut and drive the adapter sleeve off the shaft seat using hammer blows. Unbolt the housing.

Fitting of bearing end caps

Description of bearing end caps: see Bearing end caps, page 1231.

Bearing end caps should only be fitted or dismantled while the shaft is stationary. There is a serious danger of injury if the shaft is rotating.

Position the tabs of the end cap in the locating slots, observing the position of the INA logo, *Figure 16*.

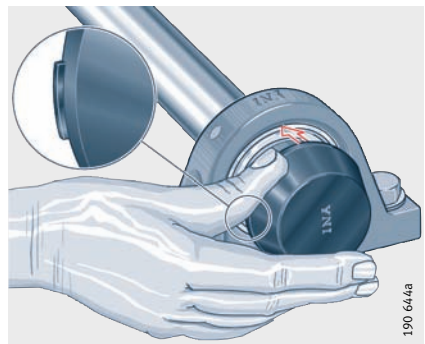


Figure 16
Positioning the cap

Rotate the end cap clockwise by 90°, observing the position of the INA logo, *Figure 17*. Check that the end cap is securely located in the housing.

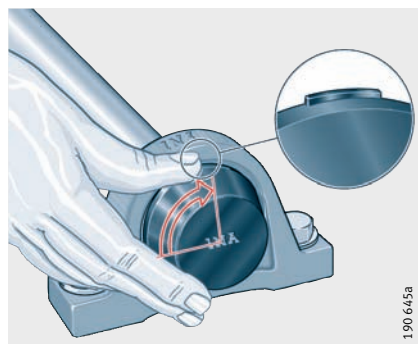


Figure 17
Locking the cap in place

Dismantling

Loosen the end cap by rotating it anticlockwise (90°), observing the position of the INA logo, *Figure 18*.

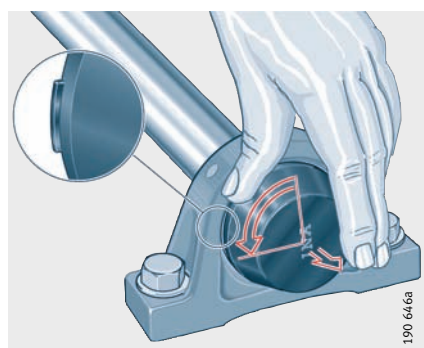


Figure 18
Removing the cap

Fitting of sheet steel units with eccentric locking collar and grub screws in the inner ring

With two-piece housings, the housing and radial insert ball bearing should be assembled first.

Push the housing unit onto the shaft and align it with the fixing holes in the adjacent construction, *Figure 19*.

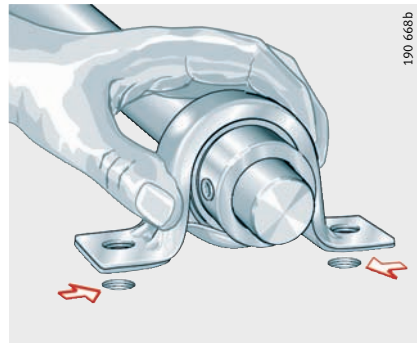


Figure 19
Pushing the unit onto the shaft

Screw the housing to the adjacent construction using the fixing screws, *Figure 20*. If the shaft is to be supported by several housing units, tighten the screws finger tight at first, align the shaft and then tighten the screws securely.

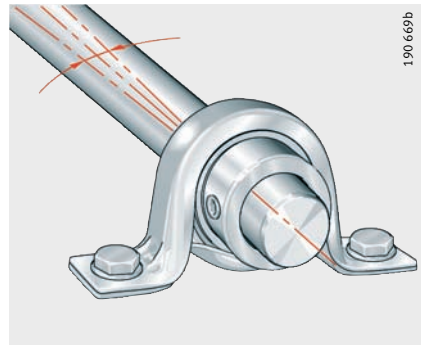


Figure 20
Screw mounting
the housing finger tight

Slide the eccentric locking collar onto the collar seat on the bearing inner ring and rotate by hand, preferably in the direction of shaft rotation.

Using a drift and hammer, tension the eccentric locking collar by means of one or two strong blows, *Figure 21*.

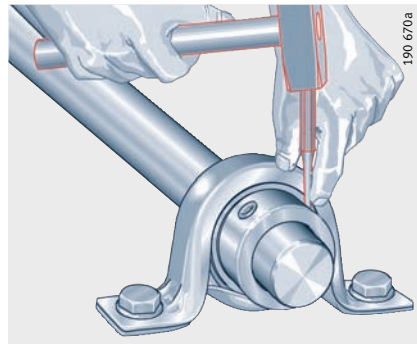


Figure 21
Tensioning the eccentric locking collar

For location using a locking collar, tighten the grub screw by means of a torque wrench, *Figure 22*.

For location using grub screws in the inner ring, tighten both grub screws by means of a torque wrench.

Observe the tightening torque M_A according to the table, page 1234.

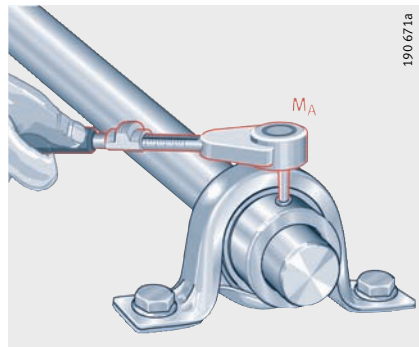


Figure 22
Tightening the grub screw in the eccentric locking collar or inner ring

Dismantling

For bearings with an eccentric locking collar, undo the grub screw and rotate the locking collar in the opposite direction to the direction of shaft rotation.

For bearings with grub screws in the inner ring, undo both grub screws.

Unbolt the housing.

Accuracy

The cast iron and sheet steel housings correspond predominantly to DIN 626-2 and ISO 3 228, insofar as they are described therein.

Cast iron housing series with the suffix -JIS are designed in accordance with the “Japanese Industry Standard” JIS B 1559.

Accuracy of fitted radial insert ball bearings: see page 1183.

Cast iron housings

The dimensional tolerances for the machined surfaces of the cast iron housings are ±0,25 mm.

The dimensional tolerances for unmachined as well as machined to unmachined cast surfaces correspond to GTB 14 DIN 1680-2.

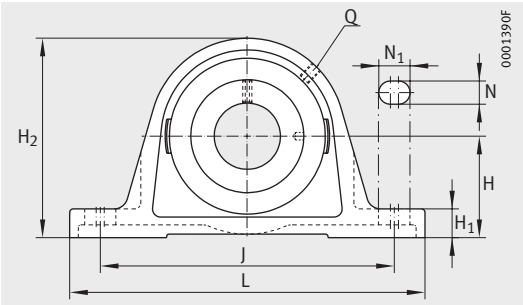
For the JIS design, the dimensional tolerances correspond to ISO 8 062/CT10.

Sheet steel housings

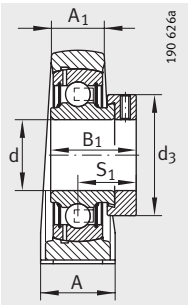
The dimensional tolerances for the sheet steel housings correspond to DIN 6930. For location of sheet steel housings with square bores, the use of mushroom head bolts with a square neck (DIN 603) or a short square neck (DIN 11 015) is recommended.

Plummer block housing units

Cast iron housings
With long base



PASE (-FA125), RASE (-FA125, -FA164), TASE, LASE, PASEY, RASEY (-JIS), RASEA, RASEL



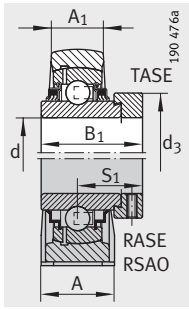
PASE

Dimension table · Dimensions in mm

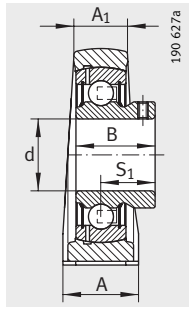
Designation			Mass	Dimensions					
Unit	Housing	Radial insert ball bearing	m ≈kg	d	H	J	L	A	A_1
PASE12	GG.ASE03	GRAE12-NPP-B	0,46	**12**	30,2	95	125	30	18
PASEY12	GG.ASE03	GAY12-NPP-B	0,44	**12**	30,2	95	125	30	18
RASEY12	GG.ASE03	GYE12-KRR-B	0,45	**12**	30,2	95	125	30	18
PASE15	GG.ASE03	GRAE15-NPP-B	0,46	**15**	30,2	95	125	30	18
PASEY15	GG.ASE03	GAY15-NPP-B	0,43	**15**	30,2	95	125	30	18
RASEY15	GG.ASE03	GYE15-KRR-B	0,45	**15**	30,2	95	125	30	18
RASEY16	GG.ASE03	GYE16-KRR-B	0,45	**16**	30,2	95	125	30	18
PASE17	GG.ASE03	GRAE17-NPP-B	0,46	**17**	30,2	95	125	30	18
RASE17	GG.ASE03	GE17-KRR-B	0,5	**17**	30,2	95	125	30	18
PASEY17	GG.ASE03	GAY17-NPP-B	0,42	**17**	30,2	95	125	30	18
RASEY17	GG.ASE03	GYE17-KRR-B	0,45	**17**	30,2	95	125	30	18
PASE20-N	GG.ASE04-E-N	GRAE20-NPP-B	0,6	**20**	33,3	97	130	32	19
PASE20-N-FA125	GG.ASE04-E-N-FA125.1	GRAE20-NPP-B-FA125.5	0,55	**20**	33,3	97	130	32	19
RASE20-N	GG.ASE04-E-N	GE20-KRR-B	0,63	**20**	33,3	97	130	32	19
RASE20-N-FA125	GG.ASE04-E-N-FA125.1	GE20-KRR-B-FA125.5	0,59	**20**	33,3	97	130	32	19
RASE20-FA164[1)]	GG.ASE04-E-N	GE20-KRR-B-FA164	0,64	**20**	33,3	97	130	32	19
TASE20-N	GG.ASE04-E-N	GE20-KTT-B	0,63	**20**	33,3	97	130	32	19
LASE20-N	GG.ASE04-E-N	GE20-KLL-B	0,63	**20**	33,3	97	130	32	19
PASEY20-N	GG.ASE04-E-N	GAY20-NPP-B	0,56	**20**	33,3	97	130	32	19
RASEY20-N	GG.ASE04-E-N	GYE20-KRR-B	0,58	**20**	33,3	97	130	32	19
RASEY20-JIS	GG.P204	GYE20-KRR-B-FA107	0,63	**20**	33,3	95	127	38	22
RASEA20-N	GG.ASE04-E-N	GSH20-2RSR-B	0,51	**20**	33,3	97	130	32	19
RASEL20-N	GG.ASE04-E-N	GLE20-KRR-B	0,58	**20**	33,3	97	130	32	19
PASE25-N	GG.ASE05-N	GRAE25-NPP-B	0,7	**25**	36,5	103	130	36	21
PASE25-N-FA125	GG.ASE05-N-FA125.1	GRAE25-NPP-B-FA125.5	0,7	**25**	36,5	103	130	36	21
RASE25-N	GG.ASE05-N	GE25-KRR-B	0,75	**25**	36,5	103	130	36	21
RASE25-N-FA125	GG.ASE05-N-FA125.1	GE25-KRR-B-FA125.5	0,75	**25**	36,5	103	130	36	21
RASE25-FA164[1)]	GG.ASE05-N	GE25-KRR-B-FA164	0,75	**25**	36,5	103	130	36	21
TASE25-N	GG.ASE05-N	GE25-KTT-B	0,75	**25**	36,5	103	130	36	21
LASE25-N	GG.ASE05-N	GE25-KLL-B	0,76	**25**	36,5	103	130	36	21
PASEY25-N	GG.ASE05-N	GAY25-NPP-B	0,61	**25**	36,5	103	130	36	21
RASEY25-N	GG.ASE05-N	GYE25-KRR-B	0,7	**25**	36,5	103	130	36	21
RASEY25-JIS	GG.P205	GYE25-KRR-B-FA107	0,79	**25**	36,5	105	140	38	23
RASEA25-N	GG.ASE05-N	GSH25-2RSR-B	0,6	**25**	36,5	103	130	36	21
RASEL25-N	GG.ASE05-N	GLE25-KRR-B	0,7	**25**	36,5	103	130	36	21

1) With lubrication nipple DIN 71412-AR 1/8.

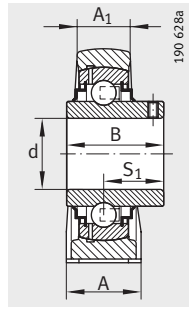
2) To be ordered separately.



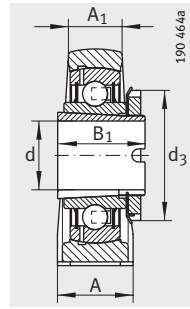
RASE, TASE, LASE



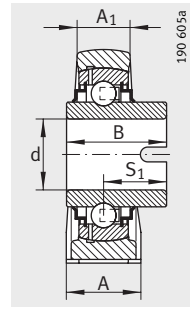
PASEY



RASEY (-JIS)



RASEA

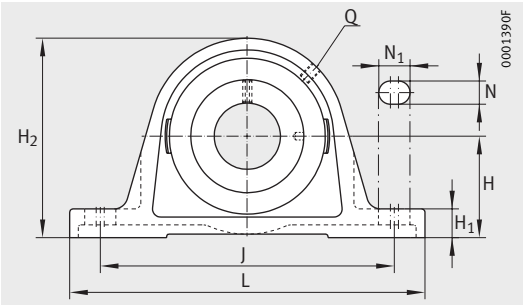


RASEL

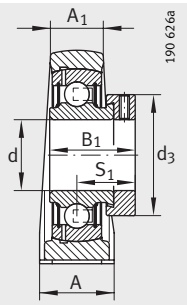
									Basic load ratings		End cap[2]
H_1	H_2	N	N_1	B	B_1	S_1	Q	d_3 max.	dyn. C_r N	stat. C_{0r} N	
10	57	11	19	–	28,6	22,1	M6	28	9 800	4 750	–
10	57	11	19	22	–	16	M6	–	9 800	4 750	–
10	57	11	19	27,4	–	15,9	M6	–	9 800	4 750	–
10	57	11	19	–	28,6	22,1	M6	28	9 800	4 750	–
10	57	11	19	22	–	16	M6	–	9 800	4 750	–
10	57	11	19	27,4	–	15,9	M6	–	9 800	4 750	–
10	57	11	19	27,4	–	15,9	M6	–	9 800	4 750	–
10	57	11	19	–	28,6	22,1	M6	28	9 800	4 750	–
10	57	11	19	–	37,4	23,4	M6	28	9 800	4 750	–
10	57	11	19	22	–	16	M6	–	9 800	4 750	–
10	57	11	19	27,4	–	15,9	M6	–	9 800	4 750	–
14,5	64	11	19	–	31	23,5	$R_p1/8$	33	12 800	6 600	KASK04
14,5	64	11	19	–	31	23,5	$R_p1/8$	33	12 800	6 600	KASK04
14,5	64	11	19	–	43,7	26,6	$R_p1/8$	33	12 800	6 600	KASK04
14,5	64	11	19	–	43,7	26,6	$R_p1/8$	33	12 800	6 600	KASK04
14,5	64	11	19	–	43,7	26,6	$R_p1/8$	33	12 800	6 600	–
14,5	64	11	19	–	43,7	26,6	$R_p1/8$	33	12 800	6 600	KASK04
14,5	64	11	19	–	43,7	26,6	$R_p1/8$	33	12 800	6 600	KASK04
14,5	64	11	19	25	–	18	$R_p1/8$	33	12 800	6 600	KASK04
14,5	64	11	19	31	–	18,3	$R_p1/8$	–	12 800	6 600	KASK04
14	65	13	19	31	–	18,3	M6	–	12 800	6 600	–
14,5	64	11	19	–	28	–	$R_p1/8$	32	12 700	6 600	KASK04
14,5	64	11	19	34,1	–	18,5	$R_p1/8$	–	12 800	6 600	KASK04
14,5	70	11	19	–	31	23,5	$R_p1/8$	37,5	14 000	7 800	KASK05
14,5	70	11	19	–	31	23,5	$R_p1/8$	37,5	14 000	7 800	KASK05
14,5	70	11	19	–	44,5	27	$R_p1/8$	37,5	14 000	7 800	KASK05
14,5	70	11	19	–	44,5	27	$R_p1/8$	37,5	14 000	7 800	KASK05
14,5	70	11	19	–	44,5	27	$R_p1/8$	37,5	14 000	7 800	–
14,5	70	11	19	–	44,5	27	$R_p1/8$	37,5	14 000	7 800	KASK05
14,5	70	11	19	–	44,5	27	$R_p1/8$	37,5	14 000	7 800	KASK05
14,5	70	11	19	27	–	19,5	$R_p1/8$	–	14 000	7 800	KASK05
14,5	70	11	19	34,1	–	19,6	$R_p1/8$	–	14 000	7 800	KASK05
15	71	13	19	34,1	–	19,8	M6	–	14 000	7 800	–
14,5	70	11	19	–	28	–	$R_p1/8$	38	13 600	7 800	KASK05
14,5	70	11	19	34,9	–	20,2	$R_p1/8$	–	14 000	7 800	KASK05

Plummer block housing units

Cast iron housings
With long base



PASE (-FA125), RASE (-FA125, -FA164), TASE, LASE, RSAO, PASEY, RASEY (-JIS), RASEA, RASEL



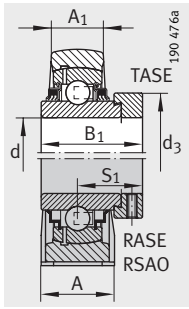
PASE

Dimension table (continued) · Dimensions in mm

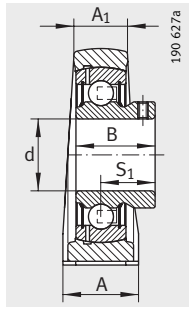
Designation			Mass	Dimensions					
Unit	Housing	Radial insert ball bearing	m ≈kg	d	H	J	L	A	A_1
PASE30-N	GG.ASE06-N	GRAE30-NPP-B	1,13	**30**	42,9	118	158	40	25
PASE30-N-FA125	GG.ASE06-N-FA125.1	GRAE30-NPP-B-FA125.5	1,11	**30**	42,9	118	158	40	25
RASE30-N	GG.ASE06-N	GE30-KRR-B	1,11	**30**	42,9	118	158	40	25
RASE30-N-FA125	GG.ASE06-N-FA125.1	GE30-KRR-B-FA125.5	1,18	**30**	42,9	118	158	40	25
RASE30-FA164[1)]	GG.ASE06-N	GE30-KRR-B-FA164	1,21	**30**	42,9	118	158	40	25
TASE30-N	GG.ASE06-N	GE30-KTT-B	1,2	**30**	42,9	118	158	40	25
LASE30-N	GG.ASE06-N	GE30-KLL-B	1,2	**30**	42,9	118	158	40	25
RSAO30	GG.SAO06	GNE30-KRR-B	1,8	**30**	50	140	180	50	28
PASEY30-N	GG.ASE06-N	GAY30-NPP-B	1,07	**30**	42,9	118	158	40	25
RASEY30-N	GG.ASE06-N	GYE30-KRR-B	1,13	**30**	42,9	118	158	40	25
RASEY30-JIS	GG.P206	GYE30-KRR-B-FA107	1,3	**30**	42,9	121	165	48	26
RASEA30-N	GG.ASE06-N	GSH30-2RSR-B	1	**30**	42,9	118	158	40	25
RASEL30-N	GG.ASE06-N	GLE30-KRR-B	1,1	**30**	42,9	118	158	40	25
PASE35-N	GG.ASE06-N	GRAE35-NPP-B	1,57	**35**	47,6	126	163	45	27
PASE35-N-FA125	GG.ASE07-N-FA125.1	GRAE35-NPP-B-FA125.5	1,53	**35**	47,6	126	163	45	27
RASE35-N	GG.ASE07-N	GE35-KRR-B	1,65	**35**	47,6	126	163	45	27
RASE35-N-FA125	GG.ASE07-N-FA125.1	GE35-KRR-B-FA125.5	1,6	**35**	47,6	126	163	45	27
RASE35-FA164[1)]	GG.ASE07-N	GE35-KRR-B-FA164	1,62	**35**	47,6	126	163	45	27
TASE35-N	GG.ASE07-N	GE35-KTT-B	1,65	**35**	47,6	126	163	45	27
LASE35-N	GG.ASE07-N	GE35-KLL-B	1,6	**35**	47,6	126	163	45	27
RSAO35	GG.SAO07	GNE35-KRR-B	2,75	**35**	56	160	210	56	30
PASEY35-N	GG.ASE07-N	GAY35-NPP-B	1,45	**35**	47,6	126	163	45	27
RASEY35-N	GG.ASE07-N	GYE35-KRR-B	1,55	**35**	47,6	126	163	45	27
RASEY35-JIS	GG.P207	GYE35-KRR-B-FA107	1,41	**35**	47,6	127	167	48	27
RASEA35-N	GG.ASE07-N	GSH35-2RSR-B	1,48	**35**	47,6	126	163	45	27

1) With lubrication nipple DIN 71412-AR 1/8.

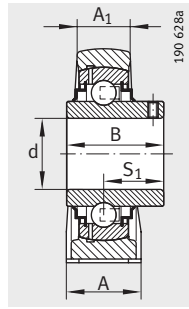
2) To be ordered separately.



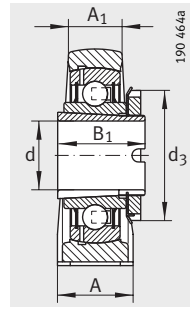
RASE, RSAO, TASE, LASE



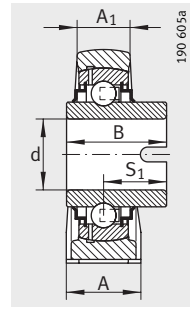
PASEY



RASEY (-JIS)



RASEA

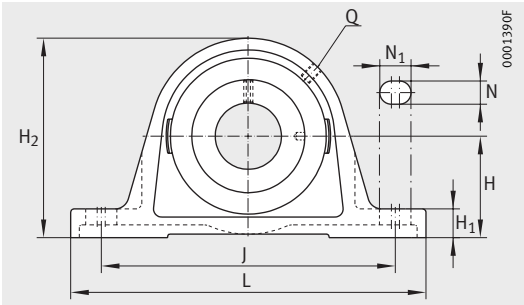


RASEL

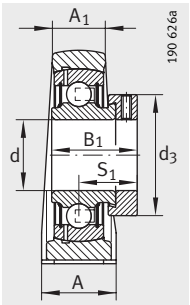
									Basic load ratings		End cap[2)]
H_1	H_2	N	N_1	B	B_1	S_1	Q	d_3 max.	dyn. C_r N	stat. C_{0r} N	
17	82	14	22	–	35,8	26,8	$R_p1/8$	44	19 500	11 300	KASK06
17	82	14	22	–	35,8	26,8	$R_p1/8$	44	19 500	11 300	KASK06
17	82	14	22	–	48,5	30,2	$R_p1/8$	44	19 500	11 300	KASK06
17	82	14	22	–	48,5	30,2	$R_p1/8$	44	19 500	11 300	KASK06
17	82	14	22	–	48,5	30,2	$R_p1/8$	44	19 500	11 300	–
17	82	14	22	–	48,5	30,2	$R_p1/8$	44	19 500	11 300	KASK06
17	82	14	22	–	48,5	30,2	$R_p1/8$	44	19 500	11 300	KASK06
18	95	17,5	20,5	–	50	32,5	$R_p1/8$	51	29 500	16 700	–
17	82	14	22	30	–	21	$R_p1/8$	–	19 500	11 300	KASK06
17	82	14	22	38,1	–	22,2	$R_p1/8$	–	19 500	11 300	KASK06
17	83	17	21	38,1	–	22,2	M6	–	19 500	11 300	–
17	82	14	22	–	32	–	$R_p1/8$	45	18 900	11 300	KASK06
17	82	14	22	36,5	–	22	$R_p1/8$	–	19 500	11 300	KASK06
19	93	14	21	–	39	29,5	$R_p1/8$	51	25 500	15 300	KASK07
19	93	14	21	–	39	29,5	$R_p1/8$	51	25 500	15 300	KASK07
19	93	14	21	–	51,3	32,5	$R_p1/8$	51	25 500	15 300	KASK07
19	93	14	21	–	51,3	32,5	$R_p1/8$	51	25 500	15 300	KASK07
19	93	14	21	–	51,3	32,5	$R_p1/8$	51	25 500	15 300	–
19	93	14	21	–	51,3	32,5	$R_p1/8$	51	25 500	15 300	KASK07
19	93	14	21	–	51,3	32,5	$R_p1/8$	51	25 500	15 300	KASK07
20	106	17,5	25,5	–	51,6	33,4	$R_p1/8$	55	36 500	20 900	–
19	93	14	21	34,95	–	25,45	$R_p1/8$	–	25 500	15 300	KASK07
19	93	14	21	42,9	–	25,4	$R_p1/8$	–	25 500	15 300	KASK07
18	93	17	21	42,9	–	25,4	M6	–	25 500	15 300	–
19	93	14	21	–	34	–	$R_p1/8$	52	24 900	15 300	KASK07

Plummer block housing units

Cast iron housings
With long base



PASE (-FA125), RASE (-FA125, -FA164), TASE, LASE, RSAO, PASEY, RASEY (-JIS), RASEA, RASEL



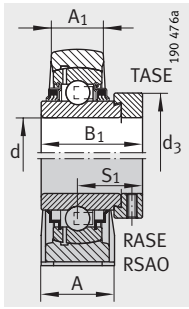
PASE

Dimension table (continued) · Dimensions in mm

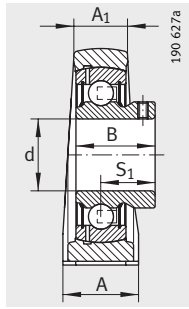
Designation			Mass	Dimensions					
Unit	Housing	Radial insert ball bearing	m ≈kg	d	H	J	L	A	A_1
PASE40-N	GG.ASE/AK08-N	GRAE40-NPP-B	1,84	**40**	49,2	138	179	48	30
PASE40-N-FA125	GG.ASE/AK08-N-FA125.1	GRAE40-NPP-B-FA125.5	1,84	**40**	49,2	138	179	48	30
RASE40-N	GG.ASE/AK08-N	GE40-KRR-B	1,95	**40**	49,2	138	179	48	30
RASE40-N-FA125	GG.ASE/AK08-N-FA125.1	GE40-KRR-B-FA125.5	1,95	**40**	49,2	138	179	48	30
RASE40-FA164[1)]	GG.ASE/AK08-N	GE40-KRR-B-FA164	1,97	**40**	49,2	138	179	48	30
TASE40-N	GG.ASE/AK08-N	GE40-KTT-B	1,96	**40**	49,2	138	179	48	30
LASE40-N	GG.ASE/AK08-N	GE40-KLL-B	1,97	**40**	49,2	138	179	48	30
RSAO40	GG.SAO08	GNE40-KRR-B	3,18	**40**	60	170	220	60	31
PASEY40-N	GG.ASE/AK08-N	GAY40-NPP-B	1,75	**40**	49,2	138	179	48	30
RASEY40-N	GG.ASE/AK08-N	GYE40-KRR-B	1,84	**40**	49,2	138	179	48	30
RASEY40-JIS	GG.P208	GYE40-KRR-B-FA107	1,68	**40**	49,2	137	184	54	30
RASEA40-N	GG.ASE/AK08-N	GSH40-2RSR-B	1,71	**40**	49,2	138	179	48	30
RASEL40-N	GG.ASE/AK08-N	GLE40-KRR-B	1,79	**40**	49,2	138	179	48	30
PASE45	GG.ASE09	GRAE45-NPP-B	2,15	**45**	54	150	192	48	32
PASE45-FA125	GG.ASE09-FA125.1	GRAE45-NPP-B-FA125.5	2,12	**45**	54	150	192	48	32
RASE45	GG.ASE09	GE45-KRR-B	2,28	**45**	54	150	192	48	32
RASE45-FA125	GG.ASE09-FA125.1	GE45-KRR-B-FA125.5	2,21	**45**	54	150	192	48	32
TASE45	GG.ASE09	GE45-KTT-B	2,28	**45**	54	150	192	48	32
LASE45	GG.ASE09	GE45-KLL-B	2,3	**45**	54	150	192	48	32
PASEY45	GG.ASE09	GAY45-NPP-B	2,06	**45**	54	150	192	48	32
RASEY45	GG.ASE09	GYE45-KRR-B	2,16	**45**	54	150	192	48	32
RASEY45-JIS	GG.P209	GYE45-KRR-B-FA107	2,07	**45**	54	146	190	54	30
RASEL45	GG.ASE09	GLE45-KRR-B	2,1	**45**	54	150	192	48	32
PASE50-N	GG.ASE10-N	GRAE50-NPP-B	2,59	**50**	57,2	158	200	54	34
PASE50-N-FA125	GG.ASE10-N-FA125.1	GRAE50-NPP-B-FA125.5	2,47	**50**	57,2	158	200	54	34
RASE50-N	GG.ASE10-N	GE50-KRR-B	2,8	**50**	57,2	158	200	54	34
RASE50-N-FA125	GG.ASE10-N-FA125.1	GE50-KRR-B-FA125.5	2,7	**50**	57,2	158	200	54	34
RASE50-FA164[1)]	GG.ASE10-N	GE50-KRR-B-FA164	2,82	**50**	57,2	158	200	54	34
TASE50-N	GG.ASE10-N	GE50-KTT-B	2,8	**50**	57,2	158	200	54	34
LASE50-N	GG.ASE10-N	GE50-KLL-B	2,82	**50**	57,2	158	200	54	34

1) With lubrication nipple DIN 71412-AR 1/8.

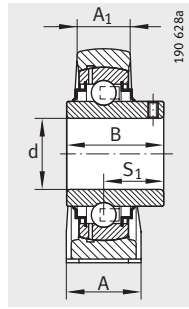
2) To be ordered separately.



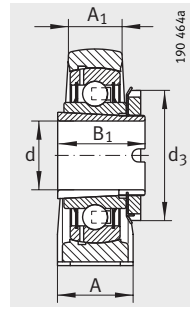
RASE, RSAO, TASE, LASE



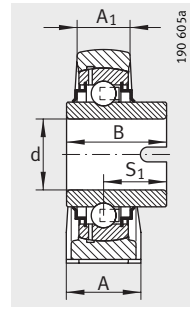
PASEY



RASEY (-JIS)



RASEA

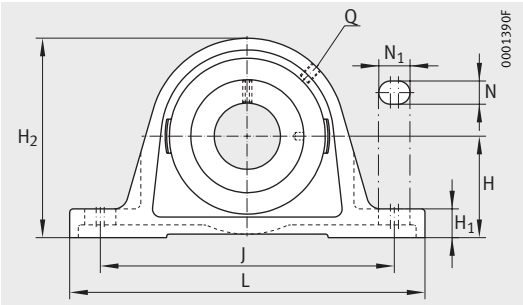


RASEL

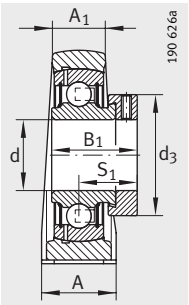
									Basic load ratings		End cap[2]
H_1	H_2	N	N_1	B	B_1	S_1	Q	d_3 max.	dyn. C_r N	stat. C_{0r} N	
19	99	14	26	–	43,8	32,8	$R_p1/8$	58	32 500	19 800	KASK08
19	99	14	26	–	43,8	32,8	$R_p1/8$	58	32 500	19 800	KASK08
19	99	14	26	–	56,5	35,1	$R_p1/8$	58	32 500	19 800	KASK08
19	99	14	26	–	56,5	35,1	$R_p1/8$	58	32 500	19 800	KASK08
19	99	14	26	–	56,5	35,1	$R_p1/8$	58	32 500	19 800	–
19	99	14	26	–	56,5	35,1	$R_p1/8$	58	32 500	19 800	KASK08
19	99	14	26	–	56,5	35,1	$R_p1/8$	58	32 500	19 800	KASK08
22	116	17,5	27,5	–	54,6	36,6	$R_p1/8$	63	44 500	26 000	–
19	99	14	26	39,45	–	28,95	$R_p1/8$	–	32 500	19 800	KASK08
19	99	14	26	49,2	–	30,2	$R_p1/8$	–	32 500	19 800	KASK08
18	98	17	21	49,2	–	30,2	M6	–	32 500	19 800	–
19	99	14	26	–	38	–	$R_p1/8$	58	29 500	19 800	KASK08
19	99	14	26	42,9	–	27	$R_p1/8$	–	32 500	19 800	KASK08
21,5	107	14	29	–	43,8	32,8	$R_p1/8$	63	32 500	20 400	–
21,5	107	14	29	–	43,8	32,8	$R_p1/8$	63	32 500	20 400	–
21,5	107	14	29	–	56,5	35,1	$R_p1/8$	63	32 500	20 400	–
21,5	107	14	29	–	56,5	35,1	$R_p1/8$	63	32 500	20 400	–
21,5	107	14	29	–	56,5	35,1	$R_p1/8$	63	32 500	20 400	–
21,5	107	14	29	–	56,5	35,1	$R_p1/8$	63	32 500	20 400	–
21,5	107	14	29	41,5	–	30,5	$R_p1/8$	–	32 500	20 400	–
21,5	107	14	29	49,2	–	30,2	$R_p1/8$	–	32 500	20 400	–
20	106	17	21	49,2	–	30,2	M6	–	32 500	20 400	–
21,5	107	14	29	42,9	–	25,5	$R_p1/8$	–	32 500	20 400	–
21,5	115	18	23	–	43,8	32,8	$R_p1/8$	69	35 000	23 200	KASK10
21,5	115	18	23	–	43,8	32,8	$R_p1/8$	69	35 000	23 200	KASK10
21,5	115	18	23	–	62,8	38,2	$R_p1/8$	69	35 000	23 200	KASK10
21,5	115	18	23	–	62,8	38,2	$R_p1/8$	69	35 000	23 200	KASK10
21,5	115	18	23	–	62,8	38,2	$R_p1/8$	69	35 000	23 200	–
21,5	115	18	23	–	62,8	38,2	$R_p1/8$	69	35 000	23 200	KASK10
21,5	115	18	23	–	62,8	38,2	$R_p1/8$	69	35 000	23 200	KASK10

Plummer block housing units

Cast iron housings
With long base



PASE (-FA125), RASE (-FA164), TASE, RSAO, PASEY, RASEY (-JIS), RASEA, RASEL



PASE

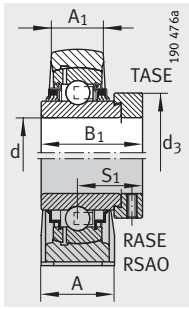
Dimension table (continued) · Dimensions in mm

Designation			Mass	Dimensions					
Unit	Housing	Radial insert ball bearing	m ≈kg	d	H	J	L	A	A_1
RSAO50	GG.SAO10	GNE50-KRR-B	6,1	**50**	75	212	275	75	39
PASEY50-N	GG.ASE10-N	GAY50-NPP-B	2,49	**50**	57,2	158	200	54	34
RASEY50-N	GG.ASE10-N	GYE50-KRR-B	2,6	**50**	57,2	158	200	54	34
RASEY50-JIS	GG.P210	GYE50-KRR-B-FA107	2,57	**50**	57,2	159	206	60	32
RASEA50-N	GG.ASE10-N	GSH50-2RSR-B	2,09	**50**	57,2	158	200	54	34
RASEL50-N	GG.ASE10-N	GLE50-KRR-B	2,6	**50**	57,2	158	200	54	34
PASE55	GG.ASE11	GRAE55-NPP-B	2,79	**55**	63,5	176	222	60	35
RASE55	GG.ASE11	GE55-KRR-B	3,4	**55**	63,5	176	222	60	35
TASE55	GG.ASE11	GE55-KTT-B	3,51	**55**	63,5	176	222	60	35
RASEY55-JIS	GG.P211	GYE55-KRR-B-FA107	3,47	**55**	63,5	171	219	60	34
RASEY55	GG.ASE11	GYE55-KRR-B	3,22	**55**	63,5	176	222	60	35
PASE60-N	GG.ASE12-N	GRAE60-NPP-B	4,35	**60**	69,9	190	240	60	42
PASE60-N-FA125	GG.ASE12-N-FA125.1	GRAE60-NPP-B-FA125.5	4,35	**60**	69,9	190	240	60	42
RASE60-N	GG.ASE12-N	GE60-KRR-B	4,79	**60**	69,9	190	240	60	42
RASE60-FA164[1)]	GG.ASE12-N	GE60-KRR-B-FA164	4,79	**60**	69,9	190	240	60	42
TASE60-N	GG.ASE12-N	GE60-KTT-B	4,77	**60**	69,9	190	240	60	42
RSAO60	GG.SAO12	GNE60-KRR-B	9	**60**	85	250	330	85	46
PASEY60-N	GG.ASE12-N	GAY60-NPP-B	4,15	**60**	69,9	190	240	60	42
RASEY60-N	GG.ASE12-N	GYE60-KRR-B	4,27	**60**	69,9	190	240	60	42
RASEY60-JIS	GG.P212	GYE60-KRR-B-FA107	4,53	**60**	69,8	184	241	70	36
RASEL60-N	GG.ASE12-N	GLE60-KRR-B	4,43	**60**	69,9	190	240	60	42
RASE65-214[3)]	GG.ASE14	GE65-214-KRR-B	6,41	**65**	79,4	203	260	65	44
TASE65-214[3)]	GG.ASE14	GE65-214-KTT-B	6,41	**65**	79,4	203	260	65	44
RASEY65-214[3)]	GG.ASE14	GYE65-214-KRR-B	5,95	**65**	79,4	203	260	65	44
RASE70	GG.ASE14	GE70-KRR-B	6,15	**70**	79,4	203	260	65	44
RASE70-FA164[1)]	GG.ASE14	GE70-KRR-B-FA164	6,15	**70**	79,4	203	260	65	44
TASE70	GG.ASE14	GE70-KTT-B	6,09	**70**	79,4	203	260	65	44
RSAO70	GG.ASE14	GNE70-KRR-B	11	**70**	95	282	360	90	54
RASEY70	GG.ASE14	GYE70-KRR-B	5,93	**70**	79,4	203	260	65	44
RASEL70	GG.ASE14	GLE70-KRR-B	5,87	**70**	79,4	203	260	65	44
RASE75	GG.ASE15	GE75-KRR-B	6,58	**75**	82,5	210	265	66	48
RASE75-FA164[1)]	GG.ASE15	GE75-KRR-B-FA164	7,65	**75**	82,5	210	265	66	48
TASE75	GG.ASE15	GE75-KTT-B	7,65	**75**	82,5	210	265	66	48
RASEY75	GG.ASE15	GYE75-KRR-B	6,51	**75**	82,5	210	265	66	48

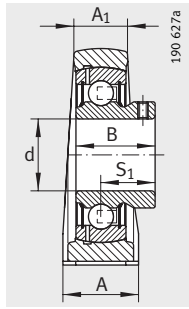
1) With lubrication nipple DIN 71412-AR 1/8.

2) To be ordered separately.

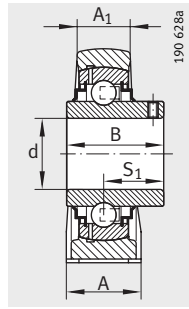
3) Alternative ball set 6214.



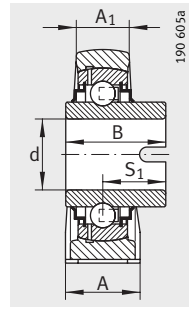
RASE, RSAO, TASE



PASEY



RASEY (-JIS)

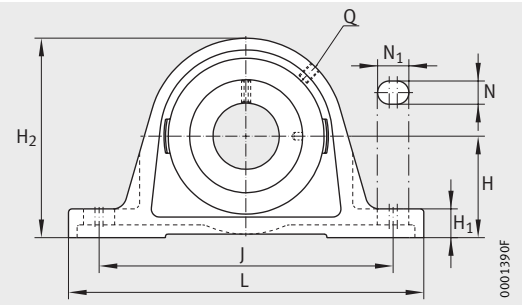


RASEL

									Basic load ratings		End cap[2]
H_1	H_2	N	N_1	B	B_1	S_1	Q	d_3 max.	dyn. C_r N	stat. C_{0r} N	
27	143	20	35	–	66,8	42,1	$R_p1/8$	75,8	62 000	38 000	–
21,5	115	18	23	43	–	32	$R_p1/8$	–	35 000	23 200	KASK10
21,5	115	18	23	51,6	–	32,6	$R_p1/8$	–	35 000	23 200	KASK10
21	114	20	25	51,6	–	32,6	M6	–	35 000	23 200	–
21,5	115	18	23	–	40	–	$R_p1/8$	70	33 000	19 900	KASK10
21,5	115	18	23	49,2	–	30,2	$R_p1/8$	–	35 000	23 200	KASK10
22,5	124,5	18	30	–	48,4	36,4	$R_p1/8$	76	43 500	29 000	–
22,5	124,5	18	30	–	71,4	43,6	$R_p1/8$	76	43 500	29 000	–
22,5	124,5	18	30	–	71,4	43,6	$R_p1/8$	76	43 500	29 000	–
23	126	20	25	55,6	–	33,4	M6	–	43 500	29 000	–
22,5	124,5	18	30	55,6	–	33,4	$R_p1/8$	–	43 500	29 000	–
25	140	18	28	–	53,1	39,6	$R_p1/8$	84	52 000	36 000	KASK12
25	140	18	28	–	53,1	39,6	$R_p1/8$	84	52 000	36 000	KASK12
25	140	18	28	–	77,9	46,8	$R_p1/8$	84	52 000	36 000	KASK12
25	140	18	28	–	77,9	46,8	$R_p1/8$	84	52 000	36 000	–
25	140	18	28	–	77,9	46,8	$R_p1/8$	84	52 000	36 000	KASK12
32	165	25	38	–	68,4	45,4	$R_p1/8$	89	82 000	52 000	–
25	140	18	28	47	–	34	$R_p1/8$	–	52 000	36 000	KASK12
25	140	18	28	65,1	–	39,7	$R_p1/8$	–	52 000	36 000	KASK12
25	138	20	25	65,1	–	39,7	M6	–	52 000	36 000	–
25	140	18	28	61,9	–	37,3	$R_p1/8$	–	52 000	36 000	KASK12
27,5	156	22	28	–	66	44,6	$R_p1/8$	96	62 000	44 000	–
27,5	156	22	28	–	66	44,6	$R_p1/8$	96	62 000	44 000	–
27,5	156	22	28	74,6	–	44,4	$R_p1/8$	–	62 000	44 000	–
27,5	156	22	28	–	66	44,6	$R_p1/8$	96	62 000	44 000	–
27,5	156	22	28	–	66	44,6	$R_p1/8$	96	62 000	44 000	–
27,5	156	22	28	–	66	44,6	$R_p1/8$	96	62 000	44 000	–
35	187	27	42	–	75,5	49,4	$R_p1/8$	102	104 000	68 000	–
27,5	156	22	28	74,6	–	44,4	$R_p1/8$	–	62 000	44 000	–
27,5	156	22	28	68,2	–	41,2	$R_p1/8$	–	62 000	44 000	–
27,5	164	22	30	–	67	45,6	$R_p1/8$	100	62 000	44 500	–
27,5	164	22	30	–	67	45,6	$R_p1/8$	100	62 000	44 500	–
27,5	164	22	30	–	67	45,6	$R_p1/8$	100	62 000	44 500	–
27,5	164	22	30	77,8	–	44,5	$R_p1/8$	–	62 000	44 500	–

Plummer block housing units

Cast iron housings
With long base

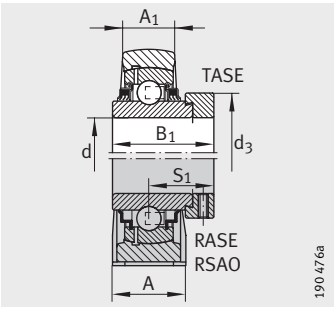


RASE (-FA164), TASE, RSAO, RASEY

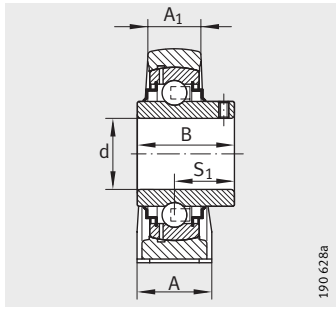
Dimension table (continued) · Dimensions in mm

Designation			Mass	Dimensions			
Unit	Housing	Radial insert ball bearing	m ≈kg	d	H	J	L
RASE80	GG.ASE16	GE80-KRR-B	8,65	**80**	89	232	290
RASE80-AH01-FA164[1)]	GG.ASE16	GE80-KRR-B-AH01-FA164	8,65	**80**	89	232	290
TASE80	GG.ASE16	GE80-KTT-B	8,49	**80**	89	232	290
RSAO80	GG.SAO16	GNE80-KRR-B	22,5	**80**	116	315	390
RASEY80	GG.ASE16	GYE80-KRR-B	8,41	**80**	89	232	290
RASE90	GG.ASE18	GE90-KRR-B	12,12	**90**	101,6	268	330
RASE90-FA164[1)]	GG.ASE18	GE90-KRR-B-FA164	12,12	**90**	101,6	268	330
RSAO90	GG.SAO18	GNE90-KRR-B	29,5	**90**	130	340	410
RASEY90	GG.ASE18	GYE90-KRR-B	12,6	**90**	101,6	268	330
RASE100	GG.ASE20	GE100-KRR-B	15,85	**100**	115	308	380
RSAO100	GG.SAO20	GNE100-KRR-B	41	**100**	145	375	440
RASE120	GG.ASE24	GE120-KRR-B	26,52	**120**	135	358	440

[1)] With lubrication nipple DIN 71412-AR 1/8.



RASE, RSAO, TASE

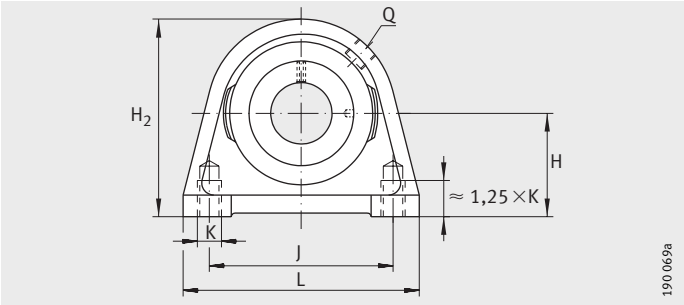


RASEY

											Basic load ratings	
A	A_1	H_1	H_2	N	N_1	B	B_1	S_1	Q	d_3 max.	dyn. C_r N	stat. C_{0r} N
78	55	30	175	26	34	–	70,7	47,6	$R_p1/8$	108	72 000	54 000
78	55	30	175	26	34	–	70,7	47,6	$R_p1/8$	108	72 000	54 000
78	55	30	175	26	34	–	71	47,6	$R_p1/8$	108	72 000	54 000
110	76	50	226	25,5	44,5	–	93,6	59,7	$R_p1/8$	118	123 000	87 000
78	55	30	175	26	35	82,6	–	49,3	$R_p1/8$	–	72 000	54 000
85	55	35	200	27	35	–	69,6	46,6	$R_p1/8$	118	96 000	72 000
85	55	35	200	27	35	–	69,6	46,6	$R_p1/8$	118	96 000	72 000
120	84	57	250	28	54	–	101	65,5	$R_p1/8$	132	143 000	107 000
85	55	35	200	27	35	96	–	56,3	$R_p1/8$	–	96 000	72 000
95	62	40	225	30	38	–	75	49,5	$R_p1/8$	132	122 000	93 000
130	94	65	280	32	47	–	109,5	70	$R_p1/8$	145	174 000	140 000
105	70	45	265	33	41	–	81	52,5	$R_p1/8$	152	155 000	131 000

Plummer block housing units

Cast iron housings
With short base

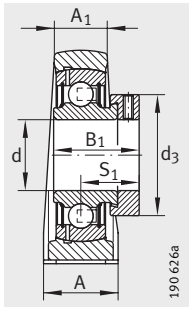


PSHE, RSHE, TSHE, PSHEY, RSHEY

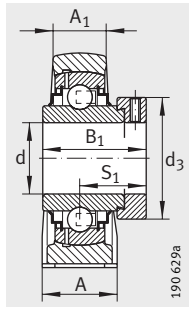
Dimension table · Dimensions in mm

Designation			Mass	Dimensions			
Unit	Housing	Radial insert ball bearing	m ≈kg	d	H	A	A_1
PSHE12	GG.SHE03	GRAE12-NPP-B	0,44	**12**	30,2	30	18
PSHEY12	GG.SHE03	GAY12-NPP-B	0,42	**12**	30,2	30	18
PSHE15	GG.SHE03	GRAE15-NPP-B	0,44	**15**	30,2	30	18
PSHEY15	GG.SHE03	GAY15-NPP-B	0,41	**15**	30,2	30	18
RSHEY15	GG.SHE03	GYE15-KRR-B	0,42	**15**	30,2	30	18
PSHE17	GG.SHE03	GRAE17-NPP-B	0,44	**17**	30,2	30	18
RSHE17	GG.SHE03	GE17-KRR-B	0,48	**17**	30,2	30	18
PSHEY17	GG.SHE03	GAY17-NPP-B	0,4	**17**	30,2	30	18
RSHEY17	GG.SHE03	GYE17-KRR-B	0,41	**17**	30,2	30	18
PSHE20-N	GG.SHE04-N	GRAE20-NPP-B	0,46	**20**	33,3	32	19
RSHE20-N	GG.SHE04-N	GE20-KRR-B	0,49	**20**	33,3	32	19
TSHE20-N	GG.SHE04-N	GE20-KTT-B	0,49	**20**	33,3	32	19
PSHEY20-N	GG.SHE04-N	GAY20-NPP-B	0,42	**20**	33,3	32	19
RSHEY20-N	GG.SHE04-N	GYE20-KRR-B	0,43	**20**	33,3	32	19
PSHE25-N	GG.SHE05-E-N	GRAE25-NPP-B	0,54	**25**	36,5	36	21
RSHE25-N	GG.SHE05-E-N	GE25-KRR-B	0,6	**25**	36,5	36	21
TSHE25-N	GG.SHE05-E-N	GE25-KTT-B	0,66	**25**	36,5	36	21
PSHEY25-N	GG.SHE05-E-N	GAY25-NPP-B	0,57	**25**	36,5	36	21
RSHEY25-N	GG.SHE05-E-N	GYE25-KRR-B	0,54	**25**	36,5	36	21
PSHE30-N	GG.SHE06-E-N	GRAE30-NPP-B	0,94	**30**	42,9	40	25
RSHE30-N	GG.SHE06-E-N	GE30-KRR-B	1,01	**30**	42,9	40	25
TSHE30-N	GG.SHE06-E-N	GE30-KTT-B	1,01	**30**	42,9	40	25
PSHEY30-N	GG.SHE06-E-N	GAY30-NPP-B	0,88	**30**	42,9	40	25
RSHEY30-N	GG.SHE06-E-N	GYE30-KRR-B	0,94	**30**	42,9	40	25
PSHE35-N	GG.SHE07-E-N	GRAE35-NPP-B	1,26	**35**	47,6	45	27
RSHE35-N	GG.SHE07-E-N	GE35-KRR-B	1,34	**35**	47,6	45	27
TSHE35-N	GG.SHE07-E-N	GE35-KTT-B	1,34	**35**	47,6	45	27
PSHEY35-N	GG.SHE07-E-N	GAY35-NPP-B	1,19	**35**	47,6	45	27
RSHEY35-N	GG.SHE07-E-N	GYE35-KRR-B	1,25	**35**	47,6	45	27

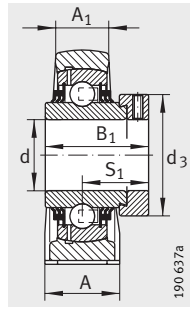
[1] To be ordered separately.



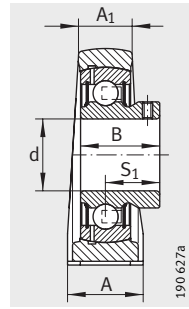
PSHE



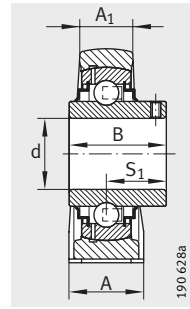
RSHE



TSHE



PSHEY

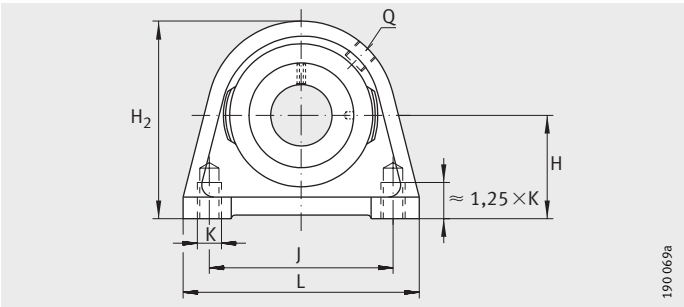


RSHEY

									Basic load ratings		End cap[1)]
H_2	K	B	B_1	J	S_1	Q	d_3 max.	L	dyn. C_r N	stat. C_{0r} N	
57	M8	–	28,6	47	22,1	M6	28	63	9 800	4 750	–
57	M8	22	–	47	16	M6	–	63	9 800	4 750	–
57	M8	–	28,6	47	22,1	M6	28	63	9 800	4 750	–
57	M8	22	–	47	16	M6	–	63	9 800	4 750	–
57	M8	27,4	–	47	15,9	M6	–	63	9 800	4 750	–
57	M8	–	28,6	47	22,1	M6	28	63	9 800	4 750	–
57	M8	–	37,4	47	23,4	M6	28	63	9 800	4 750	–
57	M8	22	–	47	16	M6	–	63	9 800	4 750	–
57	M8	27,4	–	47	15,9	M6	–	63	9 800	4 750	–
64	M8	–	31	50,8	23,5	$R_p1/8$	33	65	12 800	6 600	KASK04
64	M8	–	43,7	50,8	26,6	$R_p1/8$	33	65	12 800	6 600	KASK04
64	M8	–	43,7	50,8	26,6	$R_p1/8$	33	65	12 800	6 600	KASK04
64	M8	25	–	50,8	18	$R_p1/8$	–	65	12 800	6 600	KASK04
64	M8	31	–	50,8	18,3	$R_p1/8$	–	65	12 800	6 600	KASK04
70	M10	–	31	50,8	23,5	$R_p1/8$	37,5	70	14 000	7 800	KASK05
70	M10	–	44,5	50,8	27	$R_p1/8$	37,5	70	14 000	7 800	KASK05
70	M10	–	44,5	50,8	27	$R_p1/8$	37,5	70	14 000	7 800	KASK05
70	M10	27	–	50,8	19,5	$R_p1/8$	–	70	14 000	7 800	KASK05
70	M10	34,1	–	50,8	19,8	$R_p1/8$	–	70	14 000	7 800	KASK05
82	M10	–	35,8	76,2	26,8	$R_p1/8$	44	98	19 500	11 300	KASK06
82	M10	–	48,5	76,2	30,2	$R_p1/8$	44	98	19 500	11 300	KASK06
82	M10	–	48,5	76,2	30,2	$R_p1/8$	44	98	19 500	11 300	KASK06
82	M10	30	–	76,2	21	$R_p1/8$	–	98	19 500	11 300	KASK06
82	M10	38,1	–	76,2	22,2	$R_p1/8$	–	98	19 500	11 300	KASK06
93	M10	–	39	82,6	29,5	$R_p1/8$	51	103	25 500	15 300	KASK07
93	M10	–	51,3	82,6	32,5	$R_p1/8$	51	103	25 500	15 300	KASK07
93	M10	–	51,3	82,6	32,5	$R_p1/8$	51	103	25 500	15 300	KASK07
93	M10	35	–	82,6	25,5	$R_p1/8$	–	103	25 500	15 300	KASK07
93	M10	42,9	–	82,6	25,4	$R_p1/8$	–	103	25 500	15 300	KASK07

Plummer block housing units

Cast iron housings
With short base

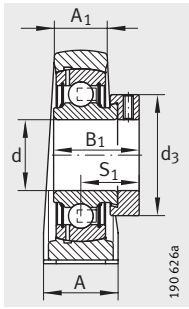


PSHE, RSHE, TSHE, PSHEY, RSHEY

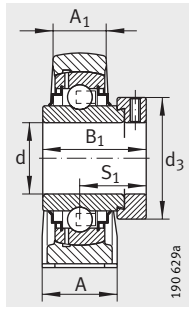
Dimension table (continued) · Dimensions in mm

Designation			Mass	Dimensions			
Unit	Housing	Radial insert ball bearing	m ≈kg	d	H	A	A_1
PSHE40-N	GG.SHE08-E-N	GRAE40-NPP-B	1,84	**40**	49,2	48	30
RSHE40-N	GG.SHE08-E-N	GE40-KRR-B	1,96	**40**	49,2	48	30
TSHE40-N	GG.SHE08-E-N	GE40-KTT-B	1,66	**40**	49,2	48	30
PSHEY40-N	GG.SHE08-E-N	GAY40-NPP-B	1,73	**40**	49,2	48	30
RSHEY40-N	GG.SHE08-E-N	GYE40-KRR-B	1,53	**40**	49,2	48	30
PSHE45	GG.SHE09	GRAE45-NPP-B	2,14	**45**	54	48	32
RSHE45	GG.SHE09	GE45-KRR-B	2,26	**45**	54	48	32
TSHE45	GG.SHE09	GE45-KTT-B	2,31	**45**	54	48	32
PSHEY45	GG.SHE09	GAY45-NPP-B	1,91	**45**	54	48	32
RSHEY45	GG.SHE09	GYE45-KRR-B	2,15	**45**	54	48	32
PSHE50-N	GG.SHE10-E-N	GRAE50-NPP-B	2,79	**50**	57,2	54	34
RSHE50-N	GG.SHE10-E-N	GE50-KRR-B	3,02	**50**	57,2	54	34
TSHE50-N	GG.SHE10-E-N	GE50-KTT-B	2,47	**50**	57,2	54	34
PSHEY50-N	GG.SHE10-E-N	GAY50-NPP-B	2,64	**50**	57,2	54	34
RSHEY50-N	GG.SHE10-E-N	GYE50-KRR-B	2,82	**50**	57,2	54	34
PSHE55	GG.SHE11	GRAE55-NPP-B	2,91	**55**	64	60	35
RSHE55	GG.SHE11	GE55-KRR-B	3,52	**55**	64	60	35
TSHE55	GG.SHE11	GE55-KTT-B	3,59	**55**	64	60	35
RSHEY55	GG.SHE11	GYE55-KRR-B	3,29	**55**	64	60	35
PSHE60-N	GG.SHE12-N	GRAE60-NPP-B	4,1	**60**	69,9	60	42
RSHE60-N	GG.SHE12-N	GE60-KRR-B	4,54	**60**	69,9	60	42
TSHE60-N	GG.SHE12-N	GE60-KTT-B	4,22	**60**	69,9	60	42
PSHEY60-N	GG.SHE12-N	GAY60-NPP-B	3,6	**60**	69,9	60	42
RSHEY60-N	GG.SHE12-N	GYE60-KRR-B	3,9	**60**	69,9	60	42

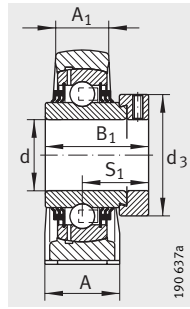
[1] To be ordered separately.



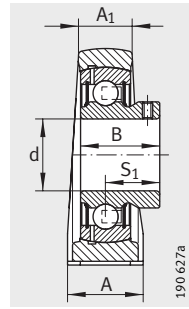
PSHE



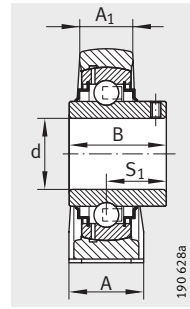
RSHE



TSHE



PSHEY

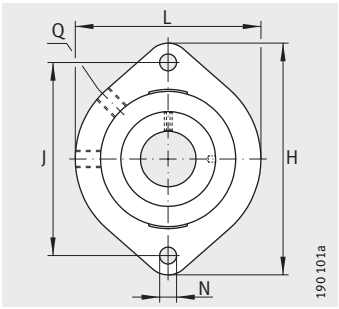


RSHEY

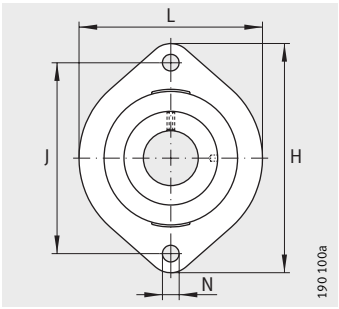
									Basic load ratings		End cap[1)]
H_2	K	B	B_1	J	S_1	Q	d_3 max.	L	dyn. C_r N	stat. C_{0r} N	
99	M12	–	43,8	88,9	32,7	$R_p1/8$	58	116	32 500	19 800	KASK08
99	M12	–	56,5	88,9	35,1	$R_p1/8$	58	116	32 500	19 800	KASK08
99	M12	–	56,5	88,9	35,1	$R_p1/8$	58	116	32 500	19 800	KASK08
99	M12	39,5	–	88,9	29	$R_p1/8$	–	116	32 500	19 800	KASK08
99	M12	49,2	–	88,9	30,2	$R_p1/8$	–	116	32 500	19 800	KASK08
107	M12	–	43,8	95,3	32,7	$R_p1/8$	63	120	32 500	20 400	–
107	M12	–	56,5	95,3	34,9	$R_p1/8$	63	120	32 500	20 400	–
107	M12	–	56,5	95,3	34,9	$R_p1/8$	63	120	32 500	20 400	–
107	M12	41,5	–	95,3	30,5	$R_p1/8$	–	120	32 500	20 400	–
107	M12	49,2	–	95,3	30,5	$R_p1/8$	–	120	32 500	20 400	–
115	M16	–	43,8	101,6	32,7	$R_p1/8$	69	135	35 000	23 200	KASK10
115	M16	–	62,8	101,6	38,2	$R_p1/8$	69	135	35 000	23 200	KASK10
115	M16	–	62,8	101,6	38,2	$R_p1/8$	69	135	35 000	23 200	KASK10
115	M16	43	–	101,6	32	$R_p1/8$	–	135	35 000	23 200	KASK10
115	M16	51,6	–	101,6	32,6	$R_p1/8$	–	135	35 000	23 200	KASK10
125	M16	–	48,4	118	36,4	$R_p1/8$	76	150	43 500	29 000	–
125	M16	–	71,4	118	43,6	$R_p1/8$	76	150	43 500	29 000	–
125	M16	–	71,4	118	43,6	$R_p1/8$	76	150	43 500	29 000	–
125	M16	55,6		118	33,4	$R_p1/8$	–	150	43 500	29 000	–
140	M16	–	53,1	118	39,6	$R_p1/8$	84	150	52 000	36 000	KASK12
140	M16	–	77,9	118	46,9	$R_p1/8$	84	150	52 000	36 000	KASK12
140	M16	–	77,9	118	46,9	$R_p1/8$	84	150	52 000	36 000	KASK12
140	M16	47	–	118	34	$R_p1/8$	–	150	52 000	36 000	KASK12
140	M16	65,1	–	118	39,7	$R_p1/8$	–	150	52 000	36 000	KASK12

Two-bolt flanged housing units

Cast iron housings



GLCTE



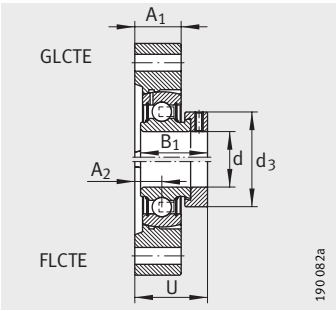
FLCTE, FLCTEY

Dimension table · Dimensions in mm

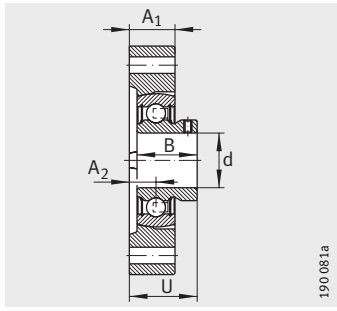
Designation			Mass	Dimensions			
Unit	Housing	Radial insert ball bearing	m ≈kg	d	L	H	A_1
FLCTE12	GG.LCTE03	RAE12-NPP-B	0,3	**12**	58,7	81	15
GLCTE12[2]	GG.GLCTE03	GRAE12-NPP-B	0,3	**12**	58,7	81	15
FLCTEY12	GG.LCTE03	AY12-NPP-B	0,28	**12**	58,7	81	15
FLCTE15	GG.LCTE03	RAE15-NPP-B	0,3	**15**	58,7	81	15
GLCTE15[2]	GG.GLCTE03	GRAE15-NPP-B	0,3	**15**	58,7	81	15
FLCTEY15	GG.LCTE03	AY15-NPP-B	0,27	**15**	58,7	81	15
FLCTE17	GG.LCTE03	RAE17-NPP-B	0,3	**17**	58,7	81	15
GLCTE17[2]	GG.GLCTE03	GRAE17-NPP-B	0,3	**17**	58,7	81	15
FLCTEY17	GG.LCTE03	AY17-NPP-B	0,26	**17**	58,7	81	15
FLCTE20	GG.LCTE04-E	RAE20-NPP-B	0,39	**20**	66,5	90,5	17
GLCTE20[1]	GG.GLCTE04-E	GRAE20-NPP-B	0,39	**20**	66,5	90,5	17
FLCTEY20	GG.LCTE04-E	AY20-NPP-B	0,36	**20**	66,5	90,5	17
FLCTE25	GG.LCTE05-E	RAE25-NPP-B	0,47	**25**	71	97	17,5
GLCTE25[1]	GG.GLCTE05-E	GRAE25-NPP-B	0,47	**25**	71	97	17,5
FLCTEY25	GG.LCTE05-E	AY25-NPP-B	0,44	**25**	71	97	17,5
FLCTE30	GG.LCTE06-E	RAE30-NPP-B	0,76	**30**	84	112,5	20,5
GLCTE30[1]	GG.GLCTE06-E	GRAE30-NPP-B	0,76	**30**	84	112,5	20,5
FLCTEY30	GG.LCTE06-E	AY30-NPP-B	0,7	**30**	84	112,5	20,5
FLCTE35	GG.LCTE07	RAE35-NPP-B	1,02	**35**	94	126	22
GLCTE35[2]	GG.GLCTE07	GRAE35-NPP-B	1,02	**35**	94	126	22
FLCTEY35	GG.LCTE07	GAY35-NPP-B	0,93	**35**	94	126	22
FLCTE40	GG.LCTE08	RAE40-NPP-B	1,27	**40**	100	150	24
GLCTE40[2]	GG.GLCTE08	GRAE40-NPP-B	1,27	**40**	100	150	24
FLCTEY40	GG.LCTE08	GAY40-NPP-B	1,18	**40**	100	150	24

[1] Lubrication hole 45°.

[2] Lubrication hole 90°.



GLCTE, FLCTE

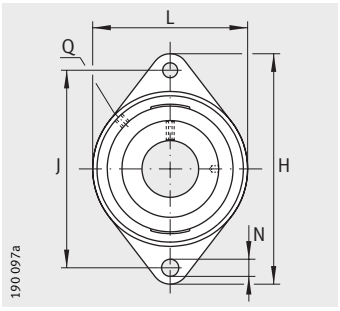


FLCTEY

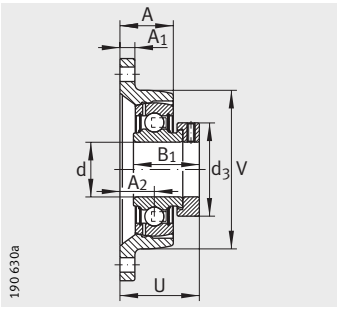
								Basic load ratings	
N	B	B_1	J	A_2	Q	d_3 max.	U	dyn. C_r N	stat. C_{0r} N
6,6	–	28,6	63,5	8,4	–	28	30,5	9 800	4 750
6,6	–	28,6	63,5	8,4	M6[2)]	28	30,5	9 800	4 750
6,6	22	–	63,5	8,4	–	–	24,4	9 800	4 750
6,6	–	28,6	63,5	8,4	–	28	30,5	9 800	4 750
6,6	–	28,6	63,5	8,4	M6[2)]	28	30,5	9 800	4 750
6,6	22	–	63,5	8,4	–	–	24,4	9 800	4 750
6,6	–	28,6	63,5	8,4	–	28	30,5	9 800	4 750
6,6	–	28,6	63,5	8,4	M6[2)]	28	30,5	9 800	4 750
6,6	22	–	63,5	8,4	–	–	24,4	9 800	4 750
9	–	31	71,4	9,5	–	33	33	12 800	6 600
9	–	31	71,4	9,5	M6[1)]	33	33	12 800	6 600
9	25	–	71,4	9,5	–	–	27	12 800	6 600
9	–	31	76,2	9,9	–	37,5	33,4	14 000	7 800
9	–	31	76,2	9,9	M6[1)]	37,5	33,4	14 000	7 800
9	27	–	76,2	9,9	–	–	29,4	14 000	7 800
11,5	–	35,8	90,5	11,4	–	44	38,1	19 500	11 300
11,5	–	35,8	90,5	11,4	$R_p1/8$[1)]	44	38,1	19 500	11 300
11,5	30	–	90,5	11,4	–	–	32,4	19 500	11 300
11,5	–	39	100	12,4	–	51	41,8	25 500	15 300
11,5	–	39	100	12,4	$R_p1/8$[2)]	51	41,8	25 500	15 300
11,5	35	–	100	12,4	–	–	37,9	25 500	15 300
14	–	43,8	119	13,5	–	58	46,3	32 500	19 800
14	–	43,8	119	13,5	$R_p1/8$[2)]	58	46,3	32 500	19 800
14	39,5	–	119	13,5	–	–	42,5	32 500	19 800

Two-bolt flanged housing units

Cast iron housings



PCFT, PCJT (-FA125), PCJTY, RCJT (-FA125), TCJT, LCJT, RCJTA, RCJTY (-JIS)

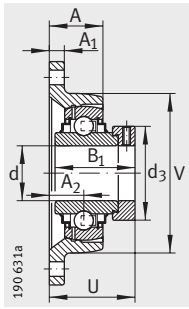


PCFT, PCJT

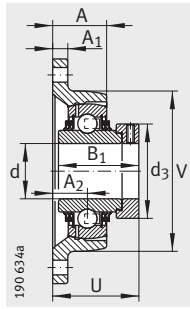
Dimension table · Dimensions in mm

Designation			Mass	Dimensions				
Unit	Housing	Radial insert ball bearing	m ≈kg	d	L	H	A_1	N
PCFT12	GG.CFT03	GRAE12-NPP-B	0,39	**12**	57	99	9,5	11,5
PCJT12	GG.CJT03	GRAE12-NPP-B	0,37	**12**	57	99	9,5	11,5
PCJTY12	GG.CJT03	GAY12-NPP-B	0,35	**12**	57	99	9,5	11,5
RCJTY12	GG.CJT03	GYE12-KRR-B	0,36	**12**	57	99	9,5	11,5
PCFT15	GG.CFT03	GRAE15-NPP-B	0,39	**15**	57	99	9,5	11,5
PCJT15	GG.CFT03	GRAE15-NPP-B	0,37	**15**	57	99	9,5	11,5
PCJTY15	GG.CFT03	GAY15-NPP-B	0,34	**15**	57	99	9,5	11,5
RCJTY15	GG.CFT03	GYE15-KRR-B	0,35	**15**	57	99	9,5	11,5
RCJTY16	GG.CJT03	GYE16-KRR-B	0,34	**16**	57	99	9,5	11,5
PCFT17	GG.CFT03	GRAE17-NPP-B	0,39	**17**	57	99	9,5	11,5
PCJT17	GG.CJT03	GRAE17-NPP-B	0,37	**17**	57	99	9,5	11,5
RCJT17	GG.CJT03	GE17-KRR-B	0,41	**17**	57	99	9,5	11,5
PCJTY17	GG.CJT03	GAY17-NPP-B	0,33	**17**	57	99	9,5	11,5
RCJTY17	GG.CJT03	GYE17-KRR-B	0,34	**17**	57	99	9,5	11,5
PCFT20	GG.CFT04	GRAE20-NPP-B	0,40	**20**	61	112	10	11,5
PCJT20-N	GG.CJT04-N	GRAE20-NPP-B	0,48	**20**	61	112	10	11,5
PCJT20-N-FA125	GG.CJT04-N-FA125.1	GRAE20-NPP-B-FA125.5	0,48	**20**	61	112	10	11,5
RCJT20-N	GG.CJT04-N	GE20-KRR-B	0,52	**20**	61	112	10	11,5
RCJT20-N-FA125	GG.CJT04-N-FA125.1	GE20-KRR-B-FA125.5	0,52	**20**	61	112	10	11,5
TCJT20-N	GG.CJT04-N	GE20-KTT-B	0,48	**20**	61	112	10	11,5
LCJT20-N	GG.CJT04-N	GE20-KLL-B	0,52	**20**	61	112	10	11,5
RCJTA20-N	GG.CJT04-N	GSH20-2RSR-B	0,52	**20**	61	112	10	11,5
PCJTY20-N	GG.CJT04-N	GAY20-NPP-B	0,41	**20**	61	112	10	11,5
RCJTY20-N	GG.CJT04-N	GYE20-KRR-B	0,42	**20**	61	112	10	11,5
RCJTY20-JIS	GG.FL204	GYE20-KRR-B-FA107	0,42	**20**	60	113	12	12
PCFT25	GG.CFT05	GRAE25-NPP-B	0,52	**25**	70	124	11	11,5
PCJT25-N	GG.CJT05-N	GRAE25-NPP-B	0,58	**25**	70	124	11	11,5
PCJT25-N-FA125	GG.CJT05-N-FA125.1	GRAE25-NPP-B-FA125.5	0,56	**25**	70	124	11	11,5
RCJT25-N	GG.CJT05-N	GE25-KRR-B	0,62	**25**	70	124	11	11,5
RCJT25-N-FA125	GG.CJT05-N-FA125.1	GE25-KRR-B-FA125.5	0,62	**25**	70	124	11	11,5
TCJT25-N	GG.CJT05-N	GE25-KTT-B	0,64	**25**	70	124	11	11,5
LCJT25-N	GG.CJT05-N	GE25-KLL-B	0,62	**25**	70	124	11	11,5
RCJTA25-N	GG.CJT05-N	GSH25-2RSR-B	0,54	**25**	70	124	11	11,5
PCJTY25-N	GG.CJT05-N	GAY25-NPP-B	0,48	**25**	70	124	11	11,5
RCJTY25-N	GG.CJT05-N	GYE25-KRR-B	0,57	**25**	70	124	11	11,5
RCJTY25-JIS	GG.FL205	GYE25-KRR-B-FA107	0,61	**25**	68	130	14	16

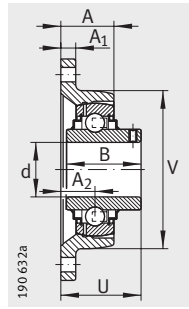
[1] To be ordered separately.



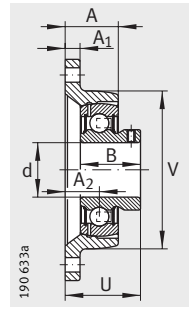
RCJT, LCJT



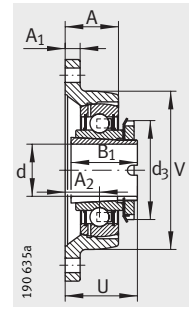
TCJT



RCJTY



PCJTY

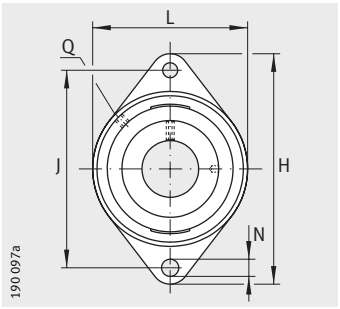


RCJTA

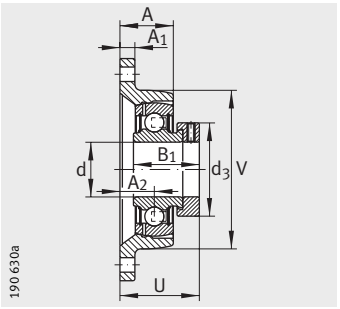
									Basic load ratings		End cap[1]
B	B_1	J	A_2	Q	d_3 max.	A	U	V	dyn. C_r N	stat. C_{0r} N	
–	28,6	76,5	10	M6	28	18	32,1	57	9 800	4 750	–
–	28,6	76,5	17	M6	28	25	39,1	57	9 800	4 750	–
22	–	76,5	17	M6	–	25	33	57	9 800	4 750	–
27,4	–	76,5	17	M6	–	25	32,9	57	9 800	4 750	–
–	28,6	76,5	10	M6	28	18	32,1	57	9 800	4 750	–
–	28,6	76,5	17	M6	28	25	39,1	57	9 800	4 750	–
22	–	76,5	17	M6	–	25	33	57	9 800	4 750	–
27,4	–	76,5	17	M6	–	25	32,9	57	9 800	4 750	–
27,4	–	76,5	17	M6	–	25	32,9	57	9 800	4 750	–
–	28,6	76,5	10	M6	28	18	32,1	57	9 800	4 750	–
–	28,6	76,5	17	M6	28	25	39,1	57	9 800	4 750	–
–	37,4	76,5	17	M6	28	25	40,4	57	9 800	4 750	–
22	–	76,5	17	M6	–	25	33	57	9 800	4 750	–
27,4	–	76,5	17	M6	–	25	32,9	57	9 800	4 750	–
–	31	90	10,5	$R_p1/8$	33	17,5	34	61	12 800	6 600	–
–	31	90	19	$R_p1/8$	33	28	42,5	61	12 800	6 600	KASK04
–	31	90	19	$R_p1/8$	33	28	42,5	61	12 800	6 600	KASK04
–	43,7	90	19	$R_p1/8$	33	28	45,6	61	12 800	6 600	KASK04
–	43,7	90	19	$R_p1/8$	33	28	45,6	61	12 800	6 600	KASK04
–	43,7	90	19	$R_p1/8$	33	28	45,6	61	12 800	6 600	KASK04
–	43,7	90	19	$R_p1/8$	33	28	45,6	61	12 800	6 600	KASK04
–	28	90	19	$R_p1/8$	32	28	42,5	61	12 700	6 600	KASK04
25	–	90	19	$R_p1/8$	–	28	37	61	12 800	6 600	KASK04
31	–	90	19	$R_p1/8$	–	28	37,3	61	12 800	6 600	KASK04
31	–	90	15	M6	–	25,5	33,3	–	12 800	6 600	–
–	31	99	12,5	$R_p1/8$	37,5	20	36	70	14 000	7 800	–
–	31	99	19	$R_p1/8$	37,5	26,5	42,5	70	14 000	7 800	KASK05
–	31	99	19	$R_p1/8$	37,5	26,5	42,5	70	14 000	7 800	KASK05
–	44,5	99	19	$R_p1/8$	37,5	26,5	46	70	14 000	7 800	KASK05
–	44,5	99	19	$R_p1/8$	37,5	26,5	46	70	14 000	7 800	KASK05
–	44,5	99	19	$R_p1/8$	37,5	26,5	46	70	14 000	7 800	KASK05
–	44,5	99	19	$R_p1/8$	37,5	26,5	46	70	14 000	7 800	KASK05
–	28	99	19	$R_p1/8$	38	26,5	42,5	70	13 600	7 800	KASK05
27	–	99	19	$R_p1/8$	–	26,5	38,5	70	14 000	7 800	KASK05
34,1	–	99	19	$R_p1/8$	–	26,5	38,8	70	14 000	7 800	KASK05
34,1	–	99	16	M6	–	27	35,8	–	14 000	7 800	–

Two-bolt flanged housing units

Cast iron housings



PCFT, PCJT (-FA125), PCJTY, RCJT (-FA125, -FA164), TCJT, LCJT, RCJTA, RCJTY (-JIS)



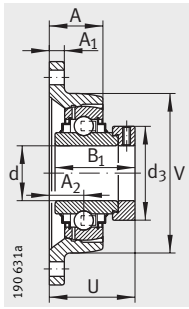
PCFT, PCJT

Dimension table (continued) · Dimensions in mm

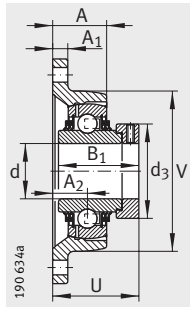
Designation			Mass	Dimensions				
Unit	Housing	Radial insert ball bearing	m ≈kg	d	L	H	A_1	N
PCFT30	GG.CFT06	GRAE30-NPP-B	0,77	**30**	80	142	12	11,5
PCJT30-N	GG.CJT06-N	GRAE30-NPP-B	0,81	**30**	80	142	12	11,5
PCJT30-N-FA125	GG.CJT06-N-FA125.1	GRAE30-NPP-B-FA125.5	0,81	**30**	80	142	12	11,5
RCJT30-N	GG.CJT06-N	GE30-KRR-B	0,88	**30**	80	142	12	11,5
RCJT30-N-FA125	GG.CJT06-N-FA125.1	GE30-KRR-B-FA125.5	0,88	**30**	80	142	12	11,5
RCJT30-FA164[2]	GG.CJT06-N	GE30-KRR-B-FA164	0,88	**30**	80	142	12	11,5
TCJT30-N	GG.CJT06-N	GE30-KTT-B	0,9	**30**	80	142	12	11,5
LCJT30-N	GG.CJT06-N	GE30-KLL-B	0,9	**30**	80	142	12	11,5
RCJTA30-N	GG.CJT06-N	GSH30-2RSR-B	0,77	**30**	80	142	12	11,5
PCJTY30-N	GG.CJT06-N	GAY30-NPP-B	0,77	**30**	80	142	12	11,5
RCJTY30-N	GG.CJT06-N	GYE30-KRR-B	0,88	**30**	80	142	12	11,5
RCJTY30-JIS	GG.FL206	GYE30-KRR-B-FA107	0,91	**30**	80	148	14	16
PCFT35	GG.CFT07	GRAE35-NPP-B	1,08	**35**	92	155	12,5	14
PCJT35-N	GG.CJT07-N	GRAE35-NPP-B	1,13	**35**	92	155	12,5	14
PCJT35-N-FA125	GG.CJT07-N-FA125.1	GRAE35-NPP-B-FA125.5	1,13	**35**	92	155	12,5	14
RCJT35-N	GG.CJT07-N	GE35-KRR-B	1,19	**35**	92	155	12,5	14
RCJT35-N-FA125	GG.CJT07-N-FA125.1	GE35-KRR-B-FA125.5	1,19	**35**	92	155	12,5	14
RCJT35-FA164[2]	GG.CJT07-N	GE35-KRR-B-FA164	1,19	**35**	92	155	12,5	14
TCJT35-N	GG.CJT07-N	GE35-KTT-B	1,21	**35**	92	155	12,5	14
LCJT35-N	GG.CJT07-N	GE35-KLL-B	1,22	**35**	92	155	12,5	14
RCJTA35-N	GG.CJT07-N	GSH35-2RSR-B	1,06	**35**	92	155	12,5	14
PCJTY35-N	GG.CJT07-N	GAY35-NPP-B	1,05	**35**	92	155	12,5	14
RCJTY35-N	GG.CJT07-N	GYE35-KRR-B	1,13	**35**	92	155	12,5	14
RCJTY35-JIS	GG.FL207	GYE35-KRR-B-FA107	1,19	**35**	90	161	16	16
PCFT40	GG.CFT08	GRAE40-NPP-B	1,42	**40**	105	172	13	14
PCJT40-N	GG.CJT08-N	GRAE40-NPP-B	1,54	**40**	105	172	13	14
PCJT40-N-FA125	GG.CJT08-N-FA125.1	GRAE40-NPP-B-FA125.5	1,54	**40**	105	172	13	14
RCJT40-N	GG.CJT08-N	GE40-KRR-B	1,66	**40**	105	172	13	14
RCJT40-N-FA125	GG.CJT08-N-FA125.1	GE40-KRR-B-FA125.5	1,66	**40**	105	172	13	14
RCJT40-FA164[2]	GG.CJT08-N	GE40-KRR-B-FA164	1,66	**40**	105	172	13	14

[1] With lubrication nipple DIN 71412-AR 1/8.

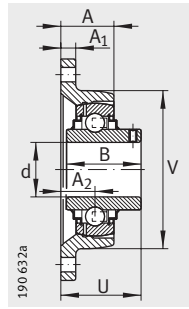
[2] To be ordered separately.



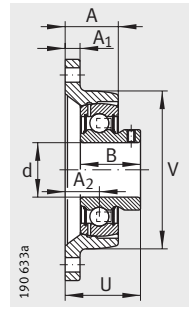
RCJT, LCJT



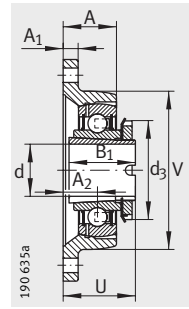
TCJT



RCJTY (-JIS)



PCJTY

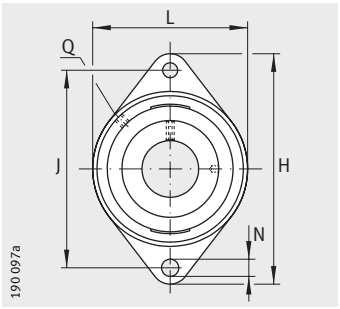


RCJTA

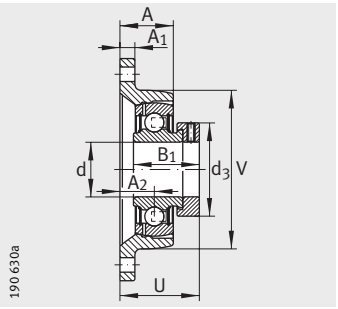
									Basic load ratings		End cap[1)]
B	B_1	J	A_2	Q	d_3 max.	A	U	V	dyn. C_r N	stat. C_{0r} N	
–	35,8	116,5	13,3	R_p1/8	44	22,3	40	80	19 500	11 300	–
–	35,8	116,5	20	R_p1/8	44	29	46,7	80	19 500	11 300	KASK06
–	35,8	116,5	20	R_p1/8	44	29	46,7	80	19 500	11 300	KASK06
–	48,5	116,5	20	R_p1/8	44	29	50,2	80	19 500	11 300	KASK06
–	48,5	116,5	20	R_p1/8	44	29	50,2	80	19 500	11 300	KASK06
–	48,5	116,5	20	R_p1/8	44	29	50,2	80	19 500	11 300	–
–	48,5	116,5	20	R_p1/8	44	29	50,2	80	19 500	11 300	KASK06
–	48,5	116,5	20	R_p1/8	44	29	50,2	80	19 500	11 300	KASK06
–	32	116,5	20	R_p1/8	45	29	44	80	18 900	11 300	KASK06
30	–	116,5	20	R_p1/8	–	29	41	80	19 500	11 300	KASK06
38,1	–	116,5	20	R_p1/8	–	29	42,2	80	19 500	11 300	KASK06
38,1	–	117	18	M6	–	31	40,2	–	19 500	11 300	–
–	39	130	15,5	R_p1/8	51	25	44,9	92	25 500	15 300	–
–	39	130	21	R_p1/8	51	30,5	50,5	92	25 500	15 300	KASK07
–	39	130	21	R_p1/8	51	30,5	50,5	92	25 500	15 300	KASK07
–	51,3	130	21	R_p1/8	51	30,5	53,5	92	25 500	15 300	KASK07
–	51,3	130	21	R_p1/8	51	30,5	53,5	92	25 500	15 300	KASK07
–	51,3	130	21	R_p1/8	51	30,5	53,5	92	25 500	15 300	–
–	51,3	130	21	R_p1/8	51	30,5	53,5	92	25 500	15 300	KASK07
–	51,3	130	21	R_p1/8	51	30,5	53,5	92	25 500	15 300	KASK07
–	34	130	21	R_p1/8	52	30,5	46	92	24 900	15 300	KASK07
34,95	–	130	21	R_p1/8	–	30,5	46,45	92	25 500	15 300	KASK07
42,9	–	130	21	R_p1/8	–	30,5	46,4	92	25 500	15 300	KASK07
42,9	–	130	19	M6	–	34	44,4	–	25 500	15 300	–
–	43,8	143,5	18,3	R_p1/8	58	28,8	51	105	32 500	19 800	–
–	43,8	143,5	24	R_p1/8	58	34,5	56,7	105	32 500	19 800	KASK08
–	43,8	143,5	24	R_p1/8	58	34,5	56,7	105	32 500	19 800	KASK08
–	56,5	143,5	24	R_p1/8	58	34,5	59,1	105	32 500	19 800	KASK08
–	56,5	143,5	24	R_p1/8	58	34,5	59,1	105	32 500	19 800	KASK08
–	56,5	143,5	24	R_p1/8	58	34,5	59,1	105	32 500	19 800	–

Two-bolt flanged housing units

Cast iron housings



PCFT, PCJT (-FA125), PCJTY, RCJT (-FA125, -FA164), TCJT, LCJT, RCJTA, RCJTY (-JIS)



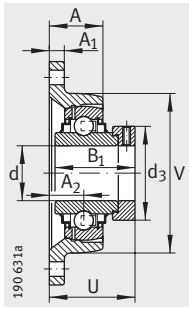
PCFT, PCJT

Dimension table (continued) · Dimensions in mm

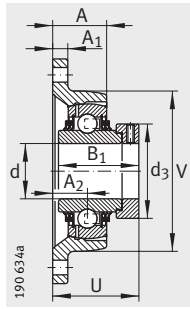
Designation			Mass	Dimensions				
Unit	Housing	Radial insert ball bearing	m ≈kg	d	L	H	A_1	N
TCJT40-N	GG.CJT08-N	GE40-KTT-B	1,7	**40**	105	172	13	14
LCJT40-N	GG.CJT08-N	GE40-KLL-B	1,66	**40**	105	172	13	14
PCJTY40-N	GG.CJT08-N	GAY40-NPP-B	1,48	**40**	105	172	13	14
RCJTA40-N	GG.CJT08-N	GSH40-2RSR-B	1,46	**40**	105	172	13	14
RCJTY40-N	GG.CJT08-N	GYE40-KRR-B	1,57	**40**	105	172	13	14
RCJTY40-JIS	GG.FL208	GYE40-KRR-B-FA107	1,51	**40**	100	175	16	16
PCFT45	GG.CFT09	GRAE45-NPP-B	1,59	**45**	111	180	13	14
PCJT45	GG.CJT09	GRAE45-NPP-B	1,69	**45**	111	180	13	14
RCJT45	GG.CJT09	GE45-KRR-B	1,81	**45**	111	180	13	14
TCJT45	GG.CJT09	GE45-KTT-B	1,92	**45**	111	180	13	14
LCJT45	GG.CJT09	GE45-KLL-B	1,81	**45**	111	180	13	14
PCJTY45	GG.CJT09	GAY45-NPP-B	1,69	**45**	111	180	13	14
RCJTY45	GG.CJT09	GYE45-KRR-B	1,7	**45**	111	180	13	14
RCJTY45-JIS	GG.FL209	GYE45-KRR-B-FA107	1,94	**45**	108	188	18	19
PCFT50	GG.CFT10	GRAE50-NPP-B	1,82	**50**	116	190	13	14
PCJT50-N	GG.CJT10-N	GRAE50-NPP-B	1,97	**50**	116	190	13	18
PCJT50-N-FA125	GG.CJT10-N-FA125.1	GRAE50-NPP-B-FA125.5	1,97	**50**	116	190	13	18
RCJT50-N	GG.CJT10-N	GE50-KRR-B	2,2	**50**	116	190	13	18
RCJT50-N-FA125	GG.CJT10-N-FA125.1	GE50-KRR-B-FA125.5	2,2	**50**	116	190	13	18
RCJT50-FA164[1)]	GG.CJT10-N	GE50-KRR-B-FA164	2,2	**50**	116	190	13	18
TCJT50-N	GG.CJT10-N	GE50-KTT-B	2,19	**50**	116	190	13	18
LCJT50-N	GG.CJT10-N	GE50-KLL-B	2,21	**50**	116	190	13	18
PCJTY50-N	GG.CJT10-N	GAY50-NPP-B	1,82	**50**	116	190	13	18
RCJTY50-N	GG.CJT10-N	GYE50-KRR-B	2	**50**	116	190	13	18
RCJTY50-JIS	GG.FL210	GYE50-KRR-B-FA107	2,21	**50**	115	197	18	19
PCJT55	GG.CJT11	GRAE55-NPP-B	2,31	**55**	134	222	15	18
RCJT55	GG.CJT11	GE55-KRR-B	2,92	**55**	134	222	15	18
TCJT55	GG.CJT11	GE55-KTT-B	3,15	**55**	134	222	15	18
RCJTY55	GG.CJT11	GYE55-KRR-B	2,86	**55**	134	222	15	18
RCJTY55-JIS	GG.FL211	GYE55-KRR-B-FA107	2,83	**55**	130	224	20	19

1) With lubrication nipple DIN 71412-AR 1/8.

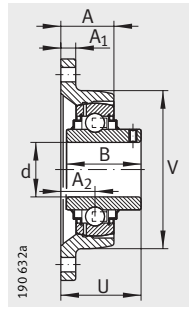
2) To be ordered separately.



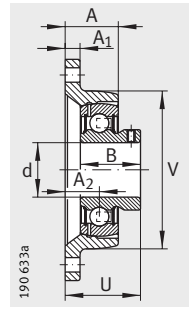
RCJT, LCJT



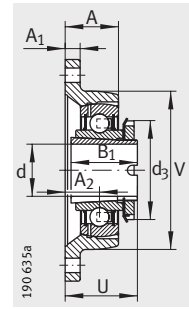
TCJT



RCJTY (-JIS)



PCJTY

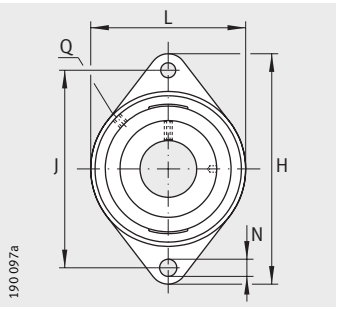


RCJTA

									Basic load ratings		End cap[2]
B	B_1	J	A_2	Q	d_3 max.	A	U	V	dyn. C_r N	stat. C_{0r} N	
–	56,5	143,5	24	R_p1/8	58	34,5	59,1	105	32 500	19 800	KASK08
–	56,5	143,5	24	R_p1/8	58	34,5	59,1	105	32 500	19 800	KASK08
39,45	–	143,5	24	R_p1/8	–	34,5	52,95	105	32 500	19 800	KASK08
–	38	143,5	24	R_p1/8	58	34,5	51	105	29 500	19 800	KASK08
49,2	–	143,5	24	R_p1/8	–	34,5	54,2	105	32 500	19 800	KASK08
49,2	–	144	21	M6	–	36	51,2	–	32 500	19 800	–
–	43,8	148,5	19,2	R_p1/8	63	30,2	51,9	111	32 500	20 400	–
–	43,8	148,5	24	R_p1/8	63	35	56,7	111	32 500	20 400	–
–	56,5	148,5	24	R_p1/8	63	35	59,1	111	32 500	20 400	–
–	56,5	148,5	24	R_p1/8	63	35	59,1	111	32 500	20 400	–
–	56,5	148,5	24	R_p1/8	63	35	59,1	111	32 500	20 400	–
41,5	–	148,5	24	R_p1/8	–	35	54,5	111	32 500	20 400	–
49,2	–	148,5	24	R_p1/8	–	35	54,2	111	32 500	20 400	–
49,2	–	148	22	M6	–	38	52,2	–	32 500	20 400	–
–	43,8	157	19,2	R_p1/8	69	30,2	51,9	116	35 000	23 200	–
–	43,8	157	28	R_p1/8	69	39	60,7	116	35 000	23 200	KASK10
–	43,8	157	28	R_p1/8	69	39	60,7	116	35 000	23 200	KASK10
–	62,8	157	28	R_p1/8	69	39	66,2	116	35 000	23 200	KASK10
–	62,8	157	28	R_p1/8	69	39	66,2	116	35 000	23 200	KASK10
–	62,8	157	28	R_p1/8	69	39	66,2	116	35 000	23 200	–
–	62,8	157	28	R_p1/8	69	39	66,2	116	35 000	23 200	KASK10
–	62,8	157	28	R_p1/8	69	39	66,2	116	35 000	23 200	KASK10
43	–	157	28	R_p1/8	–	39	60	116	35 000	23 200	KASK10
51,6	–	157	28	R_p1/8	–	39	60,6	116	35 000	23 200	KASK10
51,6	–	157	22	M6	–	40	54,6	–	35 000	23 200	–
–	48,4	184	31	R_p1/8	76	43,5	67,4	134	43 500	29 000	–
–	71,4	184	31	R_p1/8	76	43,5	74,6	134	43 500	29 000	–
–	71,4	184	31	R_p1/8	76	43,5	74,6	134	43 500	29 000	–
55,6	–	184	31	R_p1/8	–	43,5	64,4	134	43 500	29 000	–
55,6	–	184	25	M6	–	43	58,4	–	43 500	29 000	–

Two-bolt flanged housing units

Cast iron housings



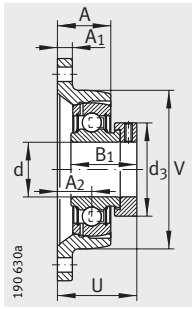
PCJT (-FA125), PCJTY, RCJT, TCJT, RCJTY (-JIS)

Dimension table (continued) · Dimensions in mm

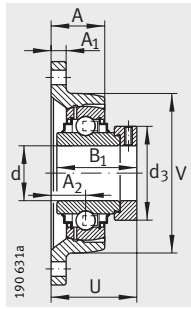
Designation			Mass	Dimensions				
Unit	Housing	Radial insert ball bearing	m ≈kg	d	L	H	A_1	N
PCJT60-N	GG.CJT12-N	GRAE60-NPP-B	3,25	**60**	138	238	16	18
PCJT60-N-FA125	GG.CJT12-N-FA125.1	GRAE60-NPP-B-FA125.5	3,25	**60**	138	238	16	18
RCJT60-N	GG.CJT12-N	GE60-KRR-B	3,69	**60**	138	238	16	18
PCJTY60-N	GG.CJT12-N	GAY60-NPP-B	2,92	**60**	138	238	16	18
RCJTY60-N	GG.CJT12-N	GYE60-KRR-B	3,46	**60**	138	238	16	18
RCJTY60-JIS	GG.FL212	GYE60-KRR-B-FA107	3,88	**60**	140	250	20	23
RCJT65-214[2)]	GG.CJT13/14	GE65-214-KRR-B	6,41	**65**	160	258	18	21
TCJT65-214[2)]	GG.CJT13/14	GE65-214-KTT-B	6,41	**65**	160	258	18	21
RCJTY65-214[2)]	GG.CJT13/14	GYE65-214-KRR-B	5,95	**65**	160	258	18	21
RCJT70	GG.CJT13/14	GE70-KRR-B	6,15	**70**	160	258	18	21
RCJTY70	GG.CJT13/14	GYE70-KRR-B	5,65	**70**	160	258	18	21
RCJT75	GG.CJT15	GE75-KRR-B	6	**75**	160	258	18	21
TCJT75	GG.CJT15	GE75-KTT-B	6	**75**	160	258	18	21
RCJTY75	GG.CJT15	GYE75-KRR-B	5,53	**75**	160	258	18	21

1) To be ordered separately.

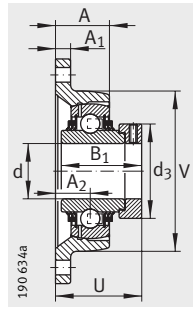
2) Different ball set 6214.



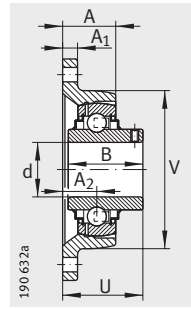
PCJT



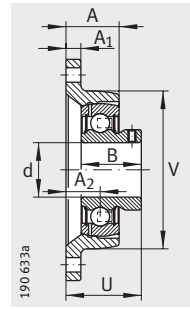
RCJT



TCJT



RCJTY

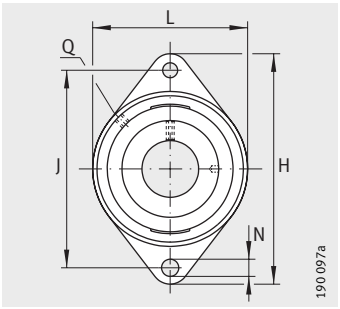


PCJTY

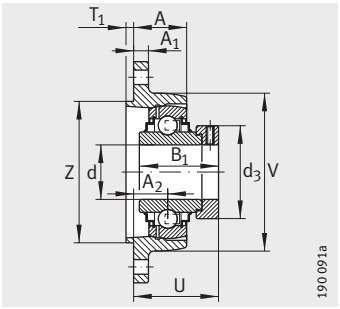
									Basic load ratings		End cap[1)]
B	B_1	J	A_2	Q	d_3 max.	A	U	V	dyn. C_r N	stat. C_{0r} N	
–	53,1	202	34	$R_p1/8$	84	46	73,6	138	52 000	36 000	KASK12
–	53,1	202	34	$R_p1/8$	84	46	73,6	138	52 000	36 000	KASK12
–	77,9	202	34	$R_p1/8$	84	46	80,8	138	52 000	36 000	KASK12
47	–	202	34	$R_p1/8$	–	46	68	138	52 000	36 000	KASK12
65,1	–	202	34	$R_p1/8$	–	46	73,7	138	52 000	36 000	KASK12
65,1	–	202	29	M6	–	48	68,7	–	52 000	36 000	–
–	66	216	38	$R_p1/8$	96	57	82,6	160	62 000	44 000	–
–	66	216	38	$R_p1/8$	96	57	82,6	160	62 000	44 000	–
74,6	–	216	38	$R_p1/8$	–	57	82,4	160	62 000	44 000	–
–	66	216	38	$R_p1/8$	96	57	82,6	160	62 000	44 000	–
74,6	–	216	38	$R_p1/8$	–	57	82,4	160	62 000	44 000	–
–	67	216	38	$R_p1/8$	100	57	83,6	160	62 000	44 500	–
–	67	216	38	$R_p1/8$	100	57	83,6	160	62 000	44 500	–
77,8	–	216	38	$R_p1/8$	–	57	82,5	160	62 000	44 500	–

Two-bolt flanged housing units with centring spigot

Cast iron housings



RCJTZ



RCJTZ

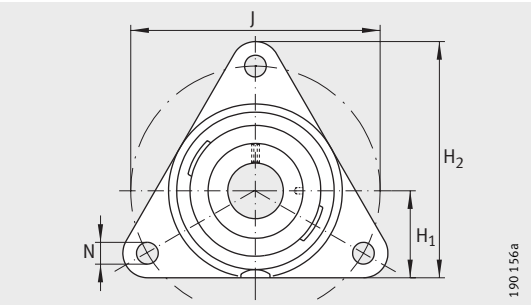
Dimension table · Dimensions in mm

Designation			Mass	Dimensions				
Unit	Housing	Radial insert ball bearing	m ≈kg	d	L	H	A_1	N
RCJTZ20	GG.CJTZ04	GE20-KRR-B	0,53	**20**	60,5	112,5	10	11,5
RCJTZ25	GG.CJTZ05	GE25-KRR-B	0,64	**25**	70	124	12	11,5
RCJTZ30	GG.CJTZ06	GE30-KRR-B	0,9	**30**	83	142	12	11,5
RCJTZ35	GG.CJTZ07	GE35-KRR-B	1,22	**35**	94	155	12,5	14
RCJTZ40	GG.CJTZ08	GE40-KRR-B	1,6	**40**	105	172	13	14
RCJTZ45	GG.CJTZ09	GE45-KRR-B	1,86	**45**	111	180	13	14
RCJTZ50	GG.CJTZ10	GE50-KRR-B	2,21	**50**	116	190	13	14
RCJTZ60	GG.CJTZ12	GE60-KRR-B	3,74	**60**	138	238	16	18

										Basic load ratings	
B_1	J	A_2	Q	d_3 max.	A	T_1	U	V	Z h8	dyn. C_r N	stat. C_{0r} N
43,7	90	19	R_p1/8	33	31,7	3,5	45,6	60,5	55	12 800	6 500
44,5	99	19	R_p1/8	37,5	26,5	3,5	45,9	70	60	14 000	7 800
48,5	116,5	17	R_p1/8	44	26	3	47,1	83	80	19 500	11 300
51,3	130	17	R_p1/8	51	26,5	4	49,3	94	90	25 500	15 300
56,5	143,5	20	R_p1/8	58	30,5	4	54,9	105	100	32 500	19 800
56,5	148,5	20	R_p1/8	63	31	4	54,9	111	105	32 500	20 400
62,8	157	24	R_p1/8	69	35	4	62,1	116	105	35 000	23 200
77,9	202	30	R_p1/8	84	42	4	76,8	138	130	52 000	36 000

Three-bolt flanged housing units

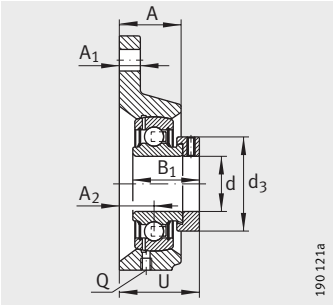
Cast iron housings



PCFTR

Dimension table · Dimensions in mm

Designation			Mass	Dimensions			
Unit	Housing	Radial insert ball bearing	m ≈kg	d	H_2	H_1	A_1
PCFTR12	GG.CFTR03	GRAE12-NPP-B	0,4	**12**	81	31	11
PCFTR15	GG.CFTR03	GRAE15-NPP-B	0,4	**15**	81	31	11
PCFTR17	GG.CFTR03	GRAE17-NPP-B	0,4	**17**	81	31	11
PCFTR20	GG.CFTR04	GRAE20-NPP-B	0,56	**20**	92	35	11
PCFTR25	GG.CFTR05	GRAE25-NPP-B	0,71	**25**	97	36	12
PCFTR30	GG.CFTR06	GRAE30-NPP-B	0,99	**30**	117	44	12
PCFTR35	GG.CFTR07	GRAE35-NPP-B	1,34	**35**	128	48	14
PCFTR40	GG.CFTR08	GRAE40-NPP-B	1,83	**40**	137	51	16
PCFTR45	GG.CFTR09	GRAE45-NPP-B	2	**45**	150	55	16
PCFTR50	GG.CFTR10	GRAE50-NPP-B	2,15	**50**	150	55	16

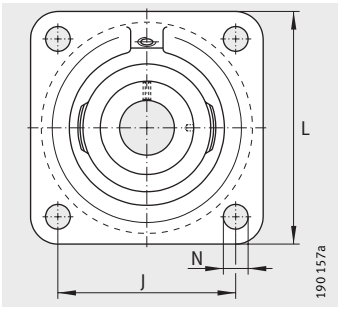


PCFTR

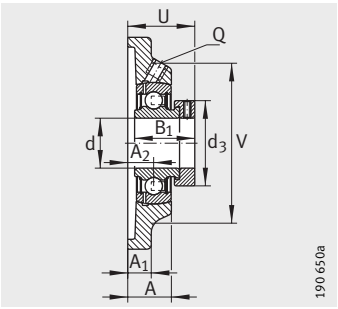
								Basic load ratings	
N	B_1	J	A_2	Q	d_3 max.	A	U	dyn. C_r N	stat. C_{0r} N
11,5	28,6	76,1	10	M6	28	20	32,1	9 800	4 750
11,5	28,6	76,1	10	M6	28	20	32,1	9 800	4 750
11,5	28,6	76,1	10	M6	28	20	32,1	9 800	4 750
11,5	31	89,5	10,5	R_p1/8	33	20	34	12 800	6 600
11,5	31	96	12,5	R_p1/8	37,5	22	36	14 000	7 800
11,5	35,8	116	13,3	R_p1/8	44	24	40	19 500	11 300
14	39	129,7	15,6	R_p1/8	51	27	45,1	25 500	15 300
14	43,8	140	18,3	R_p1/8	58	30	51	32 500	19 800
14	43,8	160	19,2	R_p1/8	63	33	51,9	32 500	20 400
14	43,8	160	19,2	R_p1/8	69	33	51,9	35 000	23 200

Four-bolt flanged housing units

Cast iron housings



PCF, PCJ (-FA125),
RCJ (-FA125, -FA164), TCJ, PCJY,
RCJY, RCJY..-JIS



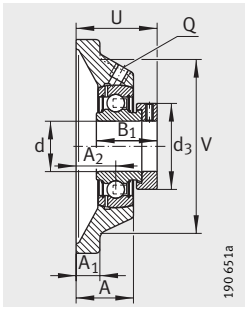
PCF

Dimension table · Dimensions in mm

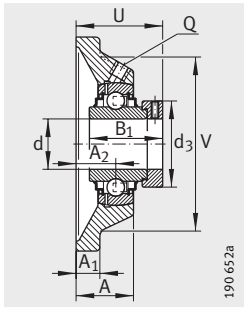
Designation			Mass	Dimensions			
Unit	Housing	Radial insert ball bearing	m ≈kg	d	L	A_1	N
PCJ12	GG.CJ03	GRAE12-NPP-B	0,52	**12**	76	9,5	11,5
PCJY12	GG.CJ03	GAY12-NPP-B	0,5	**12**	76	9,5	11,5
RCJY12	GG.CJ03	GYE12-KRR-B	0,51	**12**	76	9,5	11,5
PCJ15	GG.CJ03	GRAE15-NPP-B	0,52	**15**	76	9,5	11,5
PCJY15	GG.CJ03	GAY15-NPP-B	0,49	**15**	76	9,5	11,5
RCJY15	GG.CJ03	GYE15-KRR-B	0,51	**15**	76	9,5	11,5
RCJY16	GG.CJ03	GYE16-KRR-B	0,51	**16**	76	9,5	11,5
PCJ17	GG.CJ03	GRAE17-NPP-B	0,52	**17**	76	9,5	11,5
RCJ17	GG.CJ03	GE17-KRR-B	0,56	**17**	76	9,5	11,5
PCJY17	GG.CJ03	GAY17-NPP-B	0,48	**17**	76	9,5	11,5
RCJY17	GG.CJ03	GYE17-KRR-B	0,51	**17**	76	9,5	11,5
PCF20	GG.CF04	GRAE20-NPP-B	0,55	**20**	86	10	11,5
PCJ20-N	GG.CJ04-N	GRAE20-NPP-B	0,6	**20**	86	10	11,5
PCJ20-N-FA125	GG.CJ04-N-FA125.1	GRAE20-NPP-B-FA125.5	0,6	**20**	86	10	11,5
RCJ20-N	GG.CJ04-N	GE20-KRR-B	0,65	**20**	86	10	11,5
RCJ20-N-FA125	GG.CJ04-N-FA125.1	GE20-KRR-B-FA125.5	0,65	**20**	86	10	11,5
TCJ20-N	GG.CJ04-N	GE20-KTT-B	0,65	**20**	86	10	11,5
PCJY20-N	GG.CJ04-N	GAY20-NPP-B	0,56	**20**	86	10	11,5
RCJY20-N	GG.CJ04-N	GYE20-KRR-B	0,62	**20**	86	10	11,5
RCJY20-JIS	GG.F204	GYE20-KRR-B-FA107	0,6	**20**	86	12	12
PCF25	GG.CF05	GRAE25-NPP-B	0,71	**25**	95	11	11,5
PCJ25-N	GG.CJ05-N	GRAE25-NPP-B	0,76	**25**	95	11	11,5
PCJ25-N-FA125	GG.CJ05-N-FA125.1	GRAE25-NPP-B-FA125.5	0,76	**25**	95	11	11,5
RCJ25-N	GG.CJ05-N	GE25-KRR-B	0,82	**25**	95	11	11,5
RCJ25-N-FA125	GG.CJ05-N-FA125.1	GE25-KRR-B-FA125.5	0,82	**25**	95	11	11,5
RCJ25-FA164[1)]	GG.CJ05-N	GE25-KRR-B-FA164	0,82	**25**	95	11	11,5
TCJ25-N	GG.CJ05-N	GE25-KTT-B	0,81	**25**	95	11	11,5
PCJY25-N	GG.CJ05-N	GAY25-NPP-B	0,72	**25**	95	11	11,5
RCJY25-N	GG.CJ05-N	GYE25-KRR-B	0,77	**25**	95	11	11,5
RCJY25-JIS	GG.F205	GYE25-KRR-B-FA107	0,76	**25**	95	14	12

1) With lubrication nipple DIN 71412-AR 1/8.

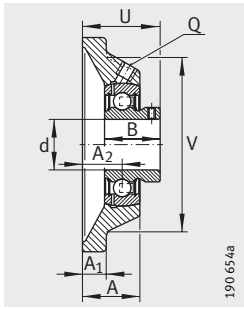
2) To be ordered separately.



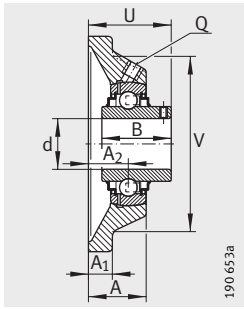
PCJ (-FA125)



RCJ (-FA125, -FA164), TCJ



PCJY

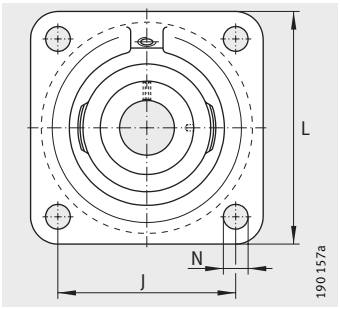


RCJY (-JIS)

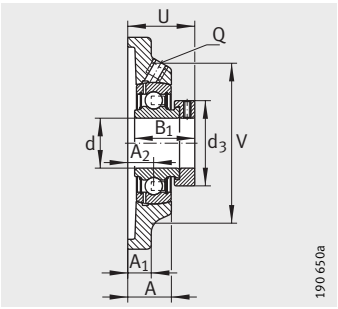
									Basic load ratings		End cap[2]
B	B_1	J	A_2	Q	d_3 max.	A	U	V	dyn. C_r N	stat. C_{0r} N	
–	28,6	54	17	M6	28	27	39,1	58	9 800	4 750	–
22	–	54	17	M6	–	27	33	58	9 800	4 750	–
27,4	–	54	17	M6	–	27	32,9	58	9 800	4 750	–
–	28,6	54	17	M6	28	27	39,1	58	9 800	4 750	–
22	–	54	17	M6	–	27	33	58	9 800	4 750	–
27,4	–	54	17	M6	–	27	32,9	58	9 800	4 750	–
27,4	–	54	17	M6	–	27	32,9	58	9 800	4 750	–
–	28,6	54	17	M6	28	27	39,1	58	9 800	4 750	–
–	37,4	54	17	M6	28	27	40,4	58	9 800	4 750	–
22	–	54	17	M6	–	27	33	58	9 800	4 750	–
27,4	–	54	17	M6	–	27	32,9	58	9 800	4 750	–
–	31	63,5	10,5	R_p1/8	33	20	34	68	12 800	6 600	–
–	31	63,5	19	R_p1/8	33	29	42,5	68	12 800	6 600	KASK04
–	31	63,5	19	R_p1/8	33	29	42,5	68	12 800	6 600	KASK04
–	43,7	63,5	19	R_p1/8	33	29	45,6	68	12 800	6 600	KASK04
–	43,7	63,5	19	R_p1/8	33	29	45,6	68	12 800	6 600	KASK04
–	43,7	63,5	19	R_p1/8	33	29	45,6	68	12 800	6 600	KASK04
25	–	63,5	19	R_p1/8	–	29	37	68	12 800	6 600	KASK04
31	–	63,5	19	R_p1/8	–	29	37,3	68	12 800	6 600	KASK04
31	–	64	15	M6	–	25,5	33,3	–	12 800	6 600	–
–	31	70	12,5	R_p1/8	37,5	22	36	74	14 000	7 800	–
–	31	70	19	R_p1/8	37,5	29	42,5	74	14 000	7 800	KASK05
–	31	70	19	R_p1/8	37,5	29	42,5	74	14 000	7 800	KASK05
–	44,5	70	19	R_p1/8	37,5	29	46	74	14 000	7 800	KASK05
–	44,5	70	19	R_p1/8	37,5	29	46	74	14 000	7 800	KASK05
–	44,5	70	19	R_p1/8	37,5	29	46	74	14 000	7 800	–
–	44,5	70	19	R_p1/8	37,5	29	46	74	14 000	7 800	KASK05
27	–	70	19	R_p1/8	–	29	38,5	74	14 000	7 800	KASK05
34,1	–	70	19	R_p1/8	–	29	38,8	74	14 000	7 800	KASK05
34,1	–	70	16	M6	–	27	35,8	–	14 000	7 800	–

Four-bolt flanged housing units

Cast iron housings



PCF, PCJ (-FA125),
RCJ (-FA125, -FA164), RCJO,
TCJ, PCJY, RCJY, RCJY (-JIS), RCJL



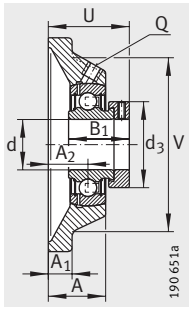
PCF

Dimension table (continued) · Dimensions in mm

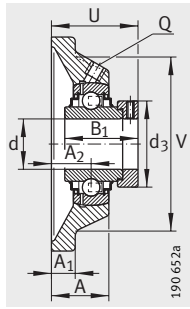
Designation			Mass	Dimensions			
Unit	Housing	Radial insert ball bearing	m ≈kg	d	L	A_1	N
PCF30	GG.CF06	GRAE30-NPP-B	1,01	**30**	108	12	11,5
PCJ30-N	GG.CJ06-N	GRAE30-NPP-B	1,11	**30**	108	12	11,5
PCJ30-N-FA125	GG.CJ06-N-FA125.1	GRAE30-NPP-B-FA125.5	1,11	**30**	108	12	11,5
RCJ30-N	GG.CJ06-N	GE30-KRR-B	1,16	**30**	108	12	11,5
RCJ30-N-FA125	GG.CJ06-N-FA125.1	GE30-KRR-B-FA125.5	1,17	**30**	108	12	11,5
TCJ30-N	GG.CJ06-N	GE30-KTT-B	1,17	**30**	108	12	11,5
RCJL30-N	GG.CJ06-N	GLE30-KRR-B	1,08	**30**	108	12	11,5
RCJO30	GG.CJO06	GNE30-KRR-B	1,75	**30**	125	15	14,5
PCJY30-N	GG.CJ06-N	GAY30-NPP-B	1,03	**30**	108	12	11,5
RCJY30-N	GG.CJ06-N	GYE30-KRR-B	1,1	**30**	108	12	11,5
RCJY30-JIS	GG.F206	GYE30-KRR-B-FA107	1,17	**30**	108	14	12
PCF35	GG.CF07	GRAE35-NPP-B	1,31	**35**	118	12,5	14
PCJ35-N	GG.CJ07-N	GRAE35-NPP-B	1,46	**35**	118	12,5	14
PCJ35-N-FA125	GG.CJ07-N-FA125.1	GRAE35-NPP-B-FA125.5	1,46	**35**	118	12,5	14
RCJ35-N	GG.CJ07-N	GE35-KRR-B	1,47	**35**	118	12,5	14
RCJ35-N-FA125	GG.CJ07-N-FA125.1	GE35-KRR-B-FA125.5	1,47	**35**	118	12,5	14
RCJ35-FA164[1)]	GG.CJ07-N	GE35-KRR-B-FA164	1,47	**35**	118	12,5	14
TCJ35-N	GG.CJ07-N	GE35-KTT-B	1,54	**35**	118	12,5	14
RCJL35-N	GG.CJ07-N	GLE35-KRR-B	1,41	**35**	118	12,5	14
RCJO35	GG.CJO07	GNE35-KRR-B	2,55	**35**	135	16	19
PCJY35-N	GG.CJ07-N	GAY35-NPP-B	1,38	**35**	118	12,5	14
RCJY35-N	GG.CJ07-N	GYE35-KRR-B	1,44	**35**	118	12,5	14
RCJY35-JIS	GG.F207	GYE35-KRR-B-FA107	1,47	**35**	117	16	14
PCF40	GG.CF08	GRAE40-NPP-B	1,72	**40**	130	13	14
PCJ40-N	GG.CJ08-N	GRAE40-NPP-B	1,89	**40**	130	13	14
PCJ40-N-FA125	GG.CJ08-N-FA125.1	GRAE40-NPP-B-FA125.5	1,9	**40**	130	13	14
RCJ40-N	GG.CJ08-N	GE40-KRR-B	2,02	**40**	130	13	14
RCJ40-N-FA125	GG.CJ08-N-FA125.1	GE40-KRR-B-FA125.5	2,02	**40**	130	13	14
RCJ40-FA164[1)]	GG.CJ08-N	GE40-KRR-B-FA164	2,02	**40**	130	13	14
TCJ40-N	GG.CJ08-N	GE40-KTT-B	2,02	**40**	130	13	14
RCJL40-N	GG.CJ08-N	GLE40-KRR-B	1,84	**40**	130	13	14
RCJO40	GG.CJO08	GNE40-KRR-B	3,1	**40**	150	17	19
PCJY40-N	GG.CJ08-N	GAY40-NPP-B	1,81	**40**	130	13	14
RCJY40-N	GG.CJ08-N	GYE40-KRR-B	1,93	**40**	130	13	14
RCJY40-JIS	GG.F208	GYE40-KRR-B-FA107	1,91	**40**	130	16	16

1) With lubrication nipple DIN 71412-AR 1/8.

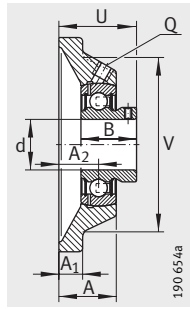
2) To be ordered separately.



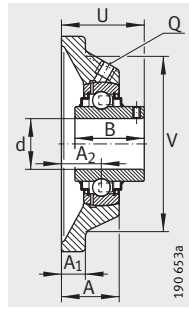
PCJ (-N-FA125)



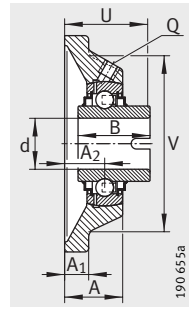
RCJ (-N-FA125, -FA164), RCJO, TCJ



PCJY



RCJY (-JIS)

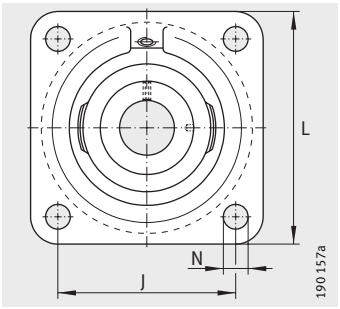


RCJL

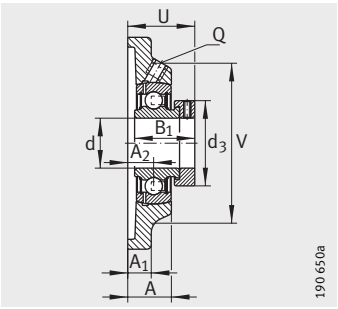
									Basic load ratings		End cap[2]
B	B_1	J	A_2	Q	d_3 max.	A	U	V	dyn. C_r N	stat. C_{0r} N	
–	35,8	82,5	13,3	R_p1/8	44	22,3	40	85	19 500	11 300	–
–	35,8	82,5	20	R_p1/8	44	29	46,8	85	19 500	11 300	KASK06
–	35,8	82,5	20	R_p1/8	44	29	46,8	85	19 500	11 300	KASK06
–	48,5	82,5	20	R_p1/8	44	29	50,2	85	19 500	11 300	KASK06
–	48,5	82,5	20	R_p1/8	44	29	50,2	85	19 500	11 300	KASK06
–	48,5	82,5	20	R_p1/8	44	29	50,2	85	19 500	11 300	KASK06
36,5	–	82,5	20	R_p1/8	–	29	42	85	19 500	11 300	KASK06
–	50	95	20,6	R_p1/8	51	30,6	53,1	98	29 500	16 700	–
30	–	82,5	20	R_p1/8	–	29	41	85	19 500	11 300	KASK06
38,1	–	82,5	20	R_p1/8	–	29	42,2	85	19 500	11 300	KASK06
38,1	–	83	18	M6	–	31	40,2	–	19 500	11 300	–
–	39	92	15,5	R_p1/8	51	25	45	100	25 500	15 300	–
–	39	92	21	R_p1/8	51	30,5	50,5	100	25 500	15 300	KASK07
–	39	92	21	R_p1/8	51	30,5	50,5	100	25 500	15 300	KASK07
–	51,3	92	21	R_p1/8	51	30,5	53,5	100	25 500	15 300	KASK07
–	51,3	92	21	R_p1/8	51	30,5	53,5	100	25 500	15 300	KASK07
–	51,3	92	21	R_p1/8	51	30,5	53,5	100	25 500	15 300	–
–	51,3	92	21	R_p1/8	51	30,5	53,5	100	25 500	15 300	KASK07
37,7	–	92	21	R_p1/8	–	30,5	43	100	25 500	15 300	KASK07
–	51,6	100	20	R_p1/8	55	31	53,4	104	36 500	20 900	–
34,95	–	92	21	R_p1/8	–	30,5	46,45	100	25 500	15 300	KASK07
42,9	–	92	21	R_p1/8	–	30,5	46,4	100	25 500	15 300	KASK07
42,9	–	92	19	M6	–	34	44,4	–	25 500	15 300	–
–	43,8	101,5	18,3	R_p1/8	58	28,8	51	110	32 500	19 800	–
–	43,8	101,5	24	R_p1/8	58	34,5	56,8	110	32 500	19 800	KASK08
–	43,8	101,5	24	R_p1/8	58	34,5	56,8	110	32 500	19 800	KASK08
–	56,5	101,5	24	R_p1/8	58	34,5	59,1	110	32 500	19 800	KASK08
–	56,5	101,5	24	R_p1/8	58	34,5	59,1	110	32 500	19 800	KASK08
–	56,5	101,5	24	R_p1/8	58	34,5	59,1	110	32 500	19 800	–
–	56,5	101,5	24	R_p1/8	58	34,5	59,1	110	32 500	19 800	KASK08
42,9	–	101,5	24	R_p1/8	–	34,5	51	110	32 500	19 800	KASK08
–	54,6	112	23	R_p1/8	63	34,5	59,6	121	44 500	26 000	–
39,45	–	101,5	24	R_p1/8	–	34,5	52,95	110	32 500	19 800	KASK08
49,2	–	101,5	24	R_p1/8	–	34,5	54,2	110	32 500	19 800	KASK08
49,2	–	102	21	M6	–	36	51,2	–	32 500	19 800	–

Four-bolt flanged housing units

Cast iron housings



PCF, PCJ (-N-FA125, -FA125), RCJ (-N-FA125, -FA125, -FA164), RCJO, TCJ, PCJY, RCJY (-JIS), RCJL



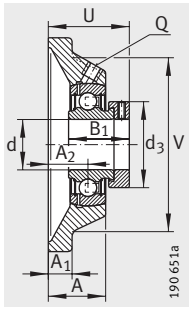
PCF

Dimension table (continued) · Dimensions in mm

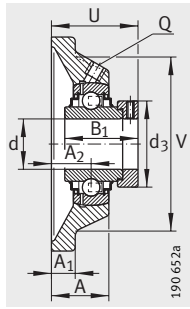
Designation			Mass	Dimensions			
Unit	Housing	Radial insert ball bearing	m ≈kg	d	L	A_1	N
PCF45	GG.CF09	GRAE45-NPP-B	1,99	**45**	137	13	14
PCJ45	GG.CJ09	GRAE45-NPP-B	2,22	**45**	137	13	14
PCJ45-FA125	GG.CJ09-FA125.1	GRAE45-NPP-B-FA125.5	2,22	**45**	137	13	14
RCJ45	GG.CJ09	GE45-KRR-B	2,26	**45**	137	13	14
RCJ45-FA125	GG.CJ09-FA125.1	GE45-KRR-B-FA125.5	2,26	**45**	137	13	14
TCJ45	GG.CJ09	GE45-KTT-B	2,37	**45**	137	13	14
PCJY45	GG.CJ09	GAY45-NPP-B	2	**45**	137	13	14
RCJY45	GG.CJ09	GYE45-KRR-B	2,15	**45**	137	13	14
RCJY45-JIS	GG.F209	GYE45-KRR-B-FA107	2,28	**45**	137	18	16
PCF50	GG.CF10	GRAE50-NPP-B	2,2	**50**	143	13	14
PCJ50-N	GG.CJ10-N	GRAE50-NPP-B	2,3	**50**	143	13	18
PCJ50-N-FA125	GG.CJ10-N-FA125.1	GRAE50-NPP-B-FA125.5	2,3	**50**	143	13	18
RCJ50-N	GG.CJ10-N	GE50-KRR-B	2,53	**50**	143	13	18
RCJ50-N-FA125	GG.CJ10-N-FA125.1	GE50-KRR-B-FA125.5	2,53	**50**	143	13	18
RCJ50-FA164[1)]	GG.CJ10-N	GE50-KRR-B-FA164	2,53	**50**	143	13	18
TCJ50-N	GG.CJ10-N	GE50-KTT-B	2,53	**50**	143	13	18
RCJL50-N	GG.CJ10-N	GLE50-KRR-B	2,29	**50**	143	13	18
RCJO50	GG.CJO10	GNE50-KRR-B	4,9	**50**	175	19	23
PCJY50-N	GG.CJ10-N	GAY50-NPP-B	2,2	**50**	143	13	18
RCJY50-N	GG.CJ10-N	GYE50-KRR-B	2,33	**50**	143	13	18
RCJY50-JIS	GG.F210	GYE50-KRR-B-FA107	2,54	**50**	143	18	16
PCJ55	GG.CJ11	GRAE55-NPP-B	2,91	**55**	162	15	18
RCJ55	GG.CJ11	GE55-KRR-B	3,52	**55**	162	15	18
TCJ55	GG.CJ11	GE55-KTT-B	3,57	**55**	162	15	18
RCJY55	GG.CJ11	GYE55-KRR-B	3,41	**55**	162	15	18
RCJY55-JIS	GG.F211	GYE55-KRR-B-FA107	3,3	**55**	162	20	19
PCJ60-N	GG.CJ12-N	GRAE60-NPP-B	4,1	**60**	175	16	18
RCJ60-N	GG.CJ12-N	GE60-KRR-B	4,21	**60**	175	16	18
RCJ60-FA164[1)]	GG.CJ12-N	GE60-KRR-B-FA164	4,26	**60**	175	16	18
TCJ60-N	GG.CJ12-N	GE60-KTT-B	4,21	**60**	175	16	18
RCJL60-N	GG.CJ12-N	GLE60-KRR-B	4,22	**60**	175	16	18
RCJO60	GG.CJO12	GNE60-KRR-B	6,8	**60**	195	22	23
PCJY60-N	GG.CJ12-N	GAY60-NPP-B	3,59	**60**	175	16	18
RCJY60-N	GG.CJ12-N	GYE60-KRR-B	4,22	**60**	175	16	18
RCJY60-JIS	GG.F212	GYE60-KRR-B-FA107	4,22	**60**	175	20	19

1) With lubrication nipple DIN 71412-AR 1/8.

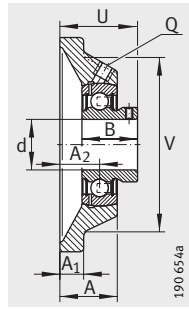
2) To be ordered separately.



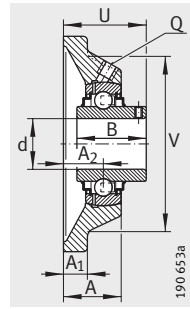
PCJ (-N-FA125, -FA125)



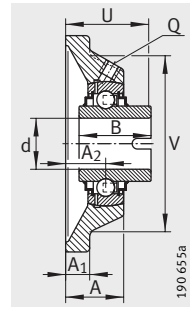
RCJ (-N-FA125, -FA125, -FA164), RCJO, TCJ



PCJY



RCJY (-JIS)

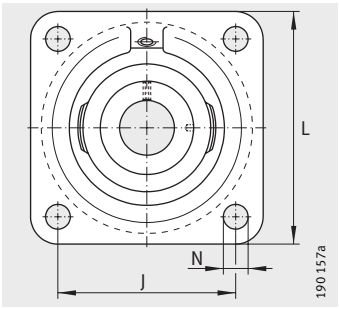


RCJL

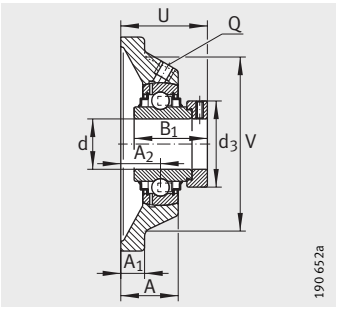
									Basic load ratings		End cap[2]
B	B_1	J	A_2	Q	d_3 max.	A	U	V	dyn. C_r N	stat. C_{0r} N	
–	43,8	105	19,2	R_p1/8	63	30,2	51,9	116	32 500	20 400	–
–	43,8	105	24	R_p1/8	63	35	56,7	116	32 500	20 400	–
–	43,8	105	24	R_p1/8	63	35	56,7	116	32 500	20 400	–
–	56,5	105	24	R_p1/8	63	35	59,1	116	32 500	20 400	–
–	56,5	105	24	R_p1/8	63	35	59,1	116	32 500	20 400	–
–	56,5	105	24	R_p1/8	63	35	59,1	116	32 500	20 400	–
41,5	–	105	24	R_p1/8	–	35	54,5	116	32 500	20 400	–
49,2	–	105	24	R_p1/8	–	35	54,2	116	32 500	20 400	–
49,2	–	105	22	M6	–	38	52,2	–	32 500	20 400	–
–	43,8	111	19,2	R_p1/8	69	30,2	51,4	125	35 000	23 200	–
–	43,8	111	28	R_p1/8	69	39	60,8	125	35 000	23 200	KASK10
–	43,8	111	28	R_p1/8	69	39	60,8	125	35 000	23 200	KASK10
–	62,8	111	28	R_p1/8	69	39	66,1	125	35 000	23 200	KASK10
–	62,8	111	28	R_p1/8	69	39	66,1	125	35 000	23 200	KASK10
–	62,8	111	28	R_p1/8	69	39	66,1	125	35 000	23 200	–
–	62,8	111	28	R_p1/8	69	39	66,1	125	35 000	23 200	KASK10
49,2	–	111	28	R_p1/8	–	39	58,2	125	35 000	23 200	KASK10
–	66,8	132	28	R_p1/8	75,8	42,5	70,1	144	62 000	38 000	–
43	–	111	28	R_p1/8	–	39	60	125	35 000	23 200	KASK10
51,6	–	111	28	R_p1/8	–	39	60,6	125	35 000	23 200	KASK10
51,6	–	111	22	M6	–	40	54,6	–	35 000	23 200	–
–	48,4	130	31	R_p1/8	76	43,5	67,4	140	43 500	29 000	–
–	71,4	130	31	R_p1/8	76	43,5	74,6	140	43 500	29 000	–
–	71,4	130	31	R_p1/8	76	43,5	74,6	140	43 500	29 000	–
55,6	–	130	31	R_p1/8	–	43,5	64,4	140	43 500	29 000	–
55,6	–	130	25	M6	–	43	58,4	–	43 500	29 000	–
–	53,1	143	34	R_p1/8	84	46	73,6	150	52 000	36 000	KASK12
–	77,9	143	34	R_p1/8	84	46	80,9	150	52 000	36 000	KASK12
–	77,9	143	34	R_p1/8	84	46	80,9	150	52 000	36 000	–
–	77,9	143	34	R_p1/8	84	46	80,9	150	52 000	36 000	KASK12
61,9	–	143	34	R_p1/8	–	46	71,3	150	52 000	36 000	KASK12
–	68,4	150	33	R_p1/8	89	49,5	78,4	170	82 000	52 000	–
47	–	143	34	R_p1/8	–	46	68	150	52 000	36 000	KASK12
65,1	–	143	34	R_p1/8	–	46	73,7	150	52 000	36 000	KASK12
65,1	–	143	29	M6	–	48	68,7	–	52 000	36 000	–

Four-bolt flanged housing units

Cast iron housings



RCJ (-FA164), RCJO, TCJ, RCJL, RCJY



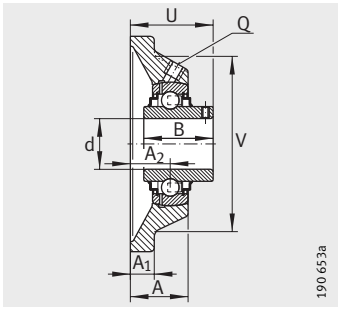
RCJ (-FA164), RCJO, TCJ

Dimension table (continued) · Dimensions in mm

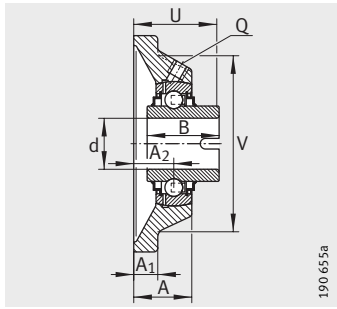
Designation			Mass	Dimensions			
Unit	Housing	Radial insert ball bearing	m ≈kg	d	L	A_1	N
RCJ65-214[2]	GG.CJ14	GE65-214-KRR-B	6,11	**65**	188	18	18
RCJ65-214-FA164[1)2)]	GG.CJ14	GE65-214-KRR-B-FA164	6,11	**65**	188	18	18
TCJ65-214[2]	GG.CJ14	GE65-214-KTT-B	6,11	**65**	188	18	18
RCJY65-214[2]	GG.CJ14	GYE65-214-KRR-B	5,65	**65**	188	18	18
RCJ70	GG.CJ14	GE70-KRR-B	5,85	**70**	188	18	18
TCJ70	GG.CJ14	GE70-KTT-B	5,85	**70**	188	18	18
RCJL70	GG.CJ14	GLE70-KRR-B	5,65	**70**	188	18	18
RCJO70	GG.CJO14	GNE70-KRR-B	10	**70**	226	25	25
RCJY70	GG.CJ14	GYE70-KRR-B	5,35	**70**	188	18	18
RCJ75	GG.CJ15	GE75-KRR-B	6,5	**75**	197	20	23
TCJ75	GG.CJ15	GE75-KTT-B	6,5	**75**	197	20	23
RCJY75	GG.CJ15	GYE75-KRR-B	6,04	**75**	197	20	23
RCJ80	GG.CJ16	GE80-KRR-B	6,85	**80**	197	20	23
TCJ80	GG.CJ16	GE80-KTT-B	6,85	**80**	197	20	23
RCJO80	GG.CJO16	GNE80-KRR-B	17,15	**80**	250	25	28
RCJY80	GG.CJ16	GYE80-KRR-B	6,82	**80**	197	20	23
RCJ90	GG.CJ18	GE90-KRR-B	9	**90**	235	22	23
RCJO90	GG.CJO18	GNE90-KRR-B	21,6	**90**	280	28,5	28
RCJY90	GG.CJ18	GYE90-KRR-B	9,48	**90**	235	22	23
RCJ100	GG.CJ20	GE100-KRR-B	12,25	**100**	265	25	27
RCJO100	GG.CJO20	GNE100-KRR-B	33,6	**100**	310	32	32
RCJ120	GG.CJ24	GE120-KRR-B	18	**120**	305	28	30

1) With lubrication nipple DIN 71412-AR 1/8.

2) Different ball set 6214.



RCJY

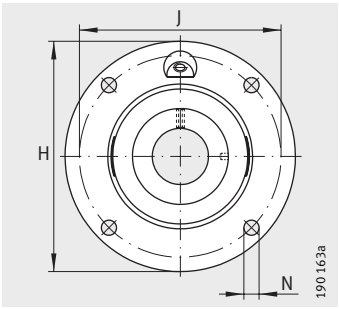


RCJL

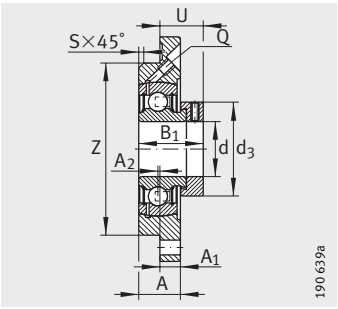
									Basic load ratings	
B	B_1	J	A_2	Q	d_3 max.	A	U	V	dyn. C_r N	stat. C_{0r} N
–	66	150	38	$R_p1/8$	96	52	82,6	165	62 000	44 000
–	66	150	38	$R_p1/8$	96	52	82,6	165	62 000	44 000
–	66	150	38	$R_p1/8$	96	52	82,6	165	62 000	44 000
74,6	–	150	38	$R_p1/8$	–	52	82,4	165	62 000	44 000
–	66	150	38	$R_p1/8$	96	52	82,6	165	62 000	44 000
–	66	150	38	$R_p1/8$	96	52	82,6	165	62 000	44 000
68,2	–	150	38	$R_p1/8$	–	52	79,2	165	62 000	44 000
–	75,4	178	36	$R_p1/8$	102	54,5	85,4	196	104 000	68 000
74,6	–	150	38	$R_p1/8$	–	52	82,4	165	62 000	44 000
–	67	153	41,3	$R_p1/8$	100	55,8	86,9	170	62 000	44 500
–	67	153	41,3	$R_p1/8$	100	55,8	86,9	170	62 000	44 500
77,8	–	153	41,3	$R_p1/8$	–	55,8	85,8	170	62 000	44 500
–	70,7	153	41,3	$R_p1/8$	108	55,8	88,9	180	72 000	54 000
–	70,7	153	41,3	$R_p1/8$	108	55,8	88,9	180	72 000	54 000
–	93,6	196	50	$R_p1/8$	118	80	109,7	210	123 000	87 000
82,6	–	153	41,3	$R_p1/8$	–	55,8	90,6	180	72 000	54 000
–	69,5	187	23,8	$R_p1/8$	118	39,8	70,3	200	96 000	72 000
–	101	216	48,5	$R_p1/8$	132	85	114	230	143 000	107 000
96	–	187	23,8	$R_p1/8$	–	39,8	80,1	200	96 000	72 000
–	75	210	28	$R_p1/8$	132	46	77,5	230	122 000	93 000
–	109,5	242	55	$R_p1/8$	145	97	125	268	174 000	140 000
–	81	240	31	$R_p1/8$	152	51	83	270	155 000	131 000

Four-bolt flanged housing units with centring spigot

Cast iron housings



PME, RME, RMEO, TME, PMEY, RMEY

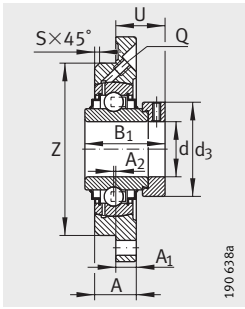


PME

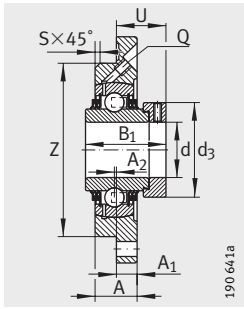
Dimension table · Dimensions in mm

Designation			Mass	Dimensions			
Unit	Housing	Radial insert ball bearing	m ≈kg	d	H	A_1	N
PME20-N	GG.ME04-N	GRAE20-NPP-B	0,53	**20**	100	8	9
RME20-N	GG.ME04-N	GE20-KRR-B	0,57	**20**	100	8	9
TME20-N	GG.ME04-N	GE20-KTT-B	0,56	**20**	100	8	9
PMEY20-N	GG.ME04-N	GAY20-NPP-B	0,5	**20**	100	8	9
RMEY20-N	GG.ME04-N	GYE20-KRR-B	0,54	**20**	100	8	9
PME25-N	GG.ME05-N	GRAE25-NPP-B	0,73	**25**	115	9	9
RME25-N	GG.ME05-N	GE25-KRR-B	0,8	**25**	115	9	9
TME25-N	GG.ME05-N	GE25-KTT-B	0,8	**25**	115	9	9
PMEY25-N	GG.ME05-N	GAY25-NPP-B	0,7	**25**	115	9	9
RMEY25-N	GG.ME05-N	GYE25-KRR-B	0,75	**25**	115	9	9
PME30-N	GG.ME06-N	GRAE30-NPP-B	0,97	**30**	125	9,5	11,5
RME30-N	GG.ME06-N	GE30-KRR-B	1,04	**30**	125	9,5	11,5
TME30-N	GG.ME06-N	GE30-KTT-B	1,05	**30**	125	9,5	11,5
PMEY30-N	GG.ME06-N	GAY30-NPP-B	0,9	**30**	125	9,5	11,5
RMEY30-N	GG.ME06-N	GYE30-KRR-B	0,99	**30**	125	9,5	11,5
PME35-N	GG.ME07-N	GRAE35-NPP-B	1,22	**35**	135	10	11,5
RME35-N	GG.ME07-N	GE35-KRR-B	1,34	**35**	135	10	11,5
TME35-N	GG.ME07-N	GE35-KTT-B	1,35	**35**	135	10	11,5
RMEO35	GG.MEO07	GNE35-KRR-B	2,4	**35**	174	16	19
PMEY35-N	GG.ME07-N	GAY35-NPP-B	1,15	**35**	135	10	11,5
RMEY35-N	GG.ME07-N	GYE35-KRR-B	1,28	**35**	135	10	11,5
PME40-N	GG.ME08-N	GRAE40-NPP-B	1,62	**40**	145	11,5	11,5
RME40-N	GG.ME08-N	GE40-KRR-B	1,74	**40**	145	11,5	11,5
TME40-N	GG.ME08-N	GE40-KTT-B	1,77	**40**	145	11,5	11,5
RMEO40	GG.MEO08	GNE40-KRR-B	3,4	**40**	194	17	19
PMEY40-N	GG.ME08-N	GAY40-NPP-B	1,51	**40**	145	11,5	11,5
RMEY40-N	GG.ME08-N	GYE40-KRR-B	1,65	**40**	145	11,5	11,5
PME45	GG.ME09	GRAE45-NPP-B	1,93	**45**	155	12	14
RME45	GG.ME09	GE45-KRR-B	2,05	**45**	155	12	14
TME45	GG.ME09	GE45-KTT-B	2,1	**45**	155	12	14
PMEY45	GG.ME09	GAY45-NPP-B	1,77	**45**	155	12	14
RMEY45	GG.ME09	GYE45-KRR-B	1,94	**45**	155	12	14

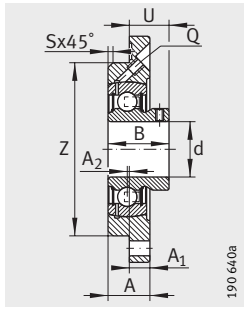
1) To be ordered separately.



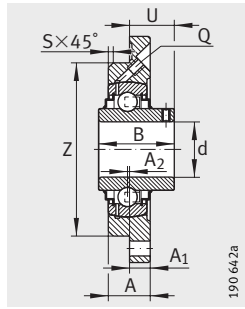
RME, RMEO



TME



PMEY

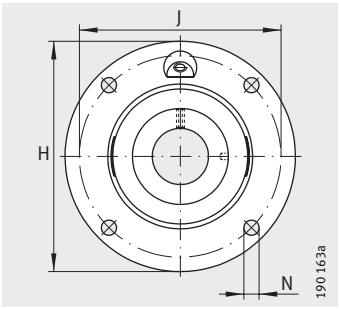


RMEY

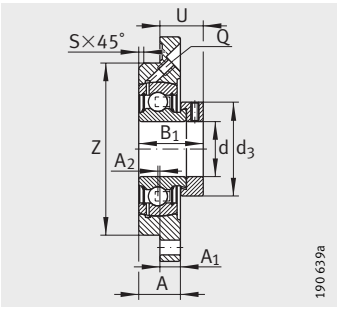
										Basic load ratings		End cap[1]
B	B_1	J	A_2	Q	d_3 max.	S	A	U	Z h8	dyn. C_r N	stat. C_{0r} N	
–	31	78	2	M6	33	2	17	21,5	62	12 800	6 600	KASK04
–	43,7	78	2	M6	33	2	17	24,6	62	12 800	6 600	KASK04
–	43,7	78	2	M6	33	2	17	24,6	62	12 800	6 600	KASK04
25	–	78	2	M6	–	2	17	16	62	12 800	6 600	KASK04
31	–	78	2	M6	–	2	17	16,3	62	12 800	6 600	KASK04
–	31	90	2,5	M6	37,5	2	19	21	70	14 000	7 800	KASK05
–	44,5	90	2,5	M6	37,5	2	19	24,4	70	14 000	7 800	KASK05
–	44,5	90	2,5	M6	37,5	2	19	24,4	70	14 000	7 800	KASK05
27	–	90	2,5	M6	–	2	19	17	70	14 000	7 800	KASK05
34,1	–	90	2,5	M6	–	2	19	17,3	70	14 000	7 800	KASK05
–	35,8	100	2	M6	44	2	20,5	24,7	80	19 500	11 300	KASK06
–	48,5	100	2	M6	44	2	20,5	28,1	80	19 500	11 300	KASK06
–	48,5	100	2	M6	44	2	20,5	28,1	80	19 500	11 300	KASK06
30	–	100	2	M6	–	2	20,5	19	80	19 500	11 300	KASK06
38,1	–	100	2	M6	–	2	20,5	20,2	80	19 500	11 300	KASK06
–	39	110	1	M6	51	2	20,5	28,5	90	25 500	15 300	KASK07
–	51,3	110	1	M6	51	2	20,5	31,3	90	25 500	15 300	KASK07
–	51,3	110	1	M6	51	2	20,5	31,3	90	25 500	15 300	KASK07
–	51,6	141	–2	M6	55	2	25	25,4	100	36 500	20 900	–
34,95	–	110	1	M6	–	2	20,5	24,45	90	25 500	15 300	KASK07
42,9	–	110	1	M6	–	2	20,5	24,4	90	25 500	15 300	KASK07
–	43,8	120	1	M6	58	2	23	31,7	100	32 500	19 800	KASK08
–	56,5	120	1	M6	58	2	23	33,9	100	32 500	19 800	KASK08
–	56,5	120	1	M6	58	2	23	33,9	100	32 500	19 800	KASK08
–	54,6	158	–2,5	M6	63	2	27	39,1	115	44 500	26 000	–
39,5	–	120	1	M6	–	2	23	28	100	32 500	19 800	KASK08
49,2	–	120	1	M6	–	2	23	29,2	100	32 500	19 800	KASK08
–	43,8	130	2	M6	63	2	25	30,7	105	32 500	20 400	–
–	56,5	130	2	M6	63	2	25	32,9	105	32 500	20 400	–
–	56,5	130	2	M6	63	2	25	32,9	105	32 500	20 400	–
41,5	–	130	2	M6	–	2	25	28,5	105	32 500	20 400	–
49,2	–	130	2	M6	–	2	25	28,2	105	32 500	20 400	–

Four-bolt flanged housing units with centring spigot

Cast iron housings



PME, RME, RMEO, TME, PMEY, RMEY



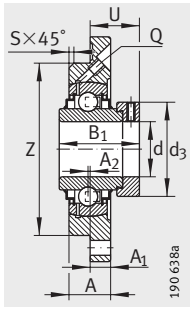
PME

Dimension table (continued) · Dimensions in mm

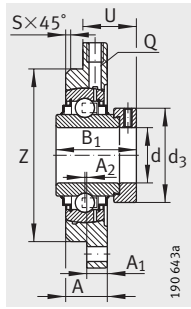
Designation			Mass	Dimensions			
Unit	Housing	Radial insert ball bearing	m ≈kg	d	H	A_1	N
PME50-N	GG.ME10-N	GRAE50-NPP-B	2,13	**50**	165	13	14
RME50-N	GG.ME10-N	GE50-KRR-B	2,53	**50**	165	13	14
TME50-N	GG.ME10-N	GE50-KTT-B	2,59	**50**	165	13	14
RMEO50	GG.MEO10	GNE50-KRR-B	4,6	**50**	230	19	23
PMEY50-N	GG.ME10-N	GAY50-NPP-B	2,03	**50**	165	13	14
RMEY50-N	GG.ME10-N	GYE50-KRR-B	2,16	**50**	165	13	14
PME55	GG.ME11	GRAE55-NPP-B	2,76	**55**	185	15	18
RME55	GG.ME11	GE55-KRR-B	3,37	**55**	185	15	18
TME55	GG.ME11	GE55-KTT-B	3,38	**55**	185	15	18
RMEY55	GG.ME11	GYE55-KRR-B	3,05	**55**	185	15	18
PME60-N	GG.ME12-N	GRAE60-NPP-B	3,65	**60**	195	16	18
RME60-N	GG.ME12-N	GE60-KRR-B	4,04	**60**	195	16	18
TME60-N	GG.ME12-N	GE60-KTT-B	4,04	**60**	195	16	18
RMEO60	GG.MEO12	GNE60-KRR-B	6	**60**	256	22	23
PMEY60-N	GG.ME12-N	GAY60-NPP-B	3,41	**60**	195	16	18
RMEY60-N	GG.ME12-N	GYE60-KRR-B	3,71	**60**	195	16	18
RME65-214[2)]	GG.ME14	GE65-214-KRR-B	5,81	**65**	215	18	18
TME65-214[2)]	GG.ME14	GE65-214-KTT-B	5,81	**65**	215	18	18
RMEY65-214[2)]	GG.ME14	GYE65-214-KRR-B	5,35	**65**	215	18	18
RME70	GG.ME14	GE70-KRR-B	5,55	**70**	215	18	18
TME70	GG.ME14	GE70-KTT-B	5,03	**70**	215	18	18
RMEO70	GG.MEO14	GNE70-KRR-B	9	**70**	300	25	25
RMEY70	GG.ME14	GYE70-KRR-B	5,29	**70**	215	18	18
RME75	GG.ME15	GE75-2RSR-B	5,65	**75**	220	18	18
TME75	GG.ME15	GE75-KTT-B	5,76	**75**	220	18	18
RMEY75	GG.ME15	GYE75-KRR-B	5,19	**75**	220	18	18
RME80	GG.ME16	GE80-KRR-B	5,75	**80**	220	18	18
TME80	GG.ME16	GE80-KTT-B	5,51	**80**	220	18	18
RMEO80	GG.MEO16	GNE80-KRR-B-FA107	12,7	**80**	275	22	22
RMEY80	GG.ME16	GYE80-KRR-B	5,43	**80**	220	18	18

1) To be ordered separately.

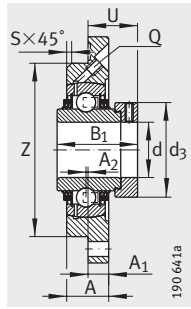
2) Different ball set 6214.



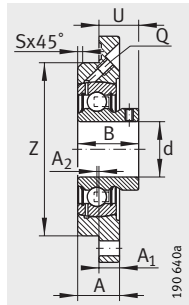
RME, RMEO
(up to d = 70 mm)



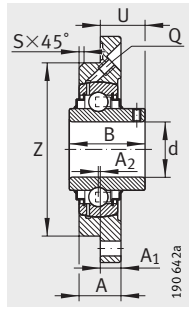
RMEO
(from d = 80 mm)



TME



PMEY

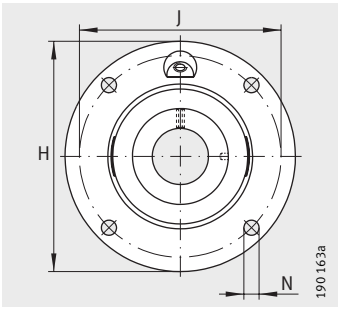


RMEY

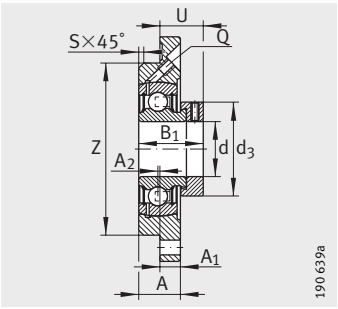
										Basic load ratings		End cap[1]
B	B_1	J	A_2	Q	d_3 max.	S	A	U	Z h8	dyn. C_r N	stat. C_{0r} N	
–	43,8	135	1	M8X1	69	3	25	31,8	110	35 000	23 200	KASK10
–	62,8	135	1	M8X1	69	3	25	37,1	110	35 000	23 200	KASK10
–	62,8	135	1	M8X1	69	3	25	37,1	110	35 000	23 200	KASK10
–	66,8	187	–2,5	R_p1/8	75,8	2	31	44,6	140	62 000	38 000	–
43	–	135	1	M8X1	–	3	25	31	110	35 000	23 200	KASK10
51,6	–	135	1	M8X1	–	3	25	31,6	110	35 000	23 200	KASK10
–	48,4	150	–	M6	76	3	27,5	36,4	125	43 500	29 000	–
–	71,4	150	–	M6	76	3	27,5	43,6	125	43 500	29 000	–
–	71,4	150	–	M6	76	3	27,5	43,6	125	43 500	29 000	–
55,6	–	150	–	M6	–	3	27,5	33,4	125	43 500	29 000	–
–	53,1	160	1	R_p1/8	84	3	29	38,6	135	52 000	36 000	KASK12
–	77,9	160	1	R_p1/8	84	3	29	45,9	135	52 000	36 000	KASK12
–	77,9	160	1	R_p1/8	84	3	29	45,9	135	52 000	36 000	KASK12
–	68,4	212	–2,5	R_p1/8	89	3	36	47,9	160	82 000	52 000	–
47	–	160	1	R_p1/8	–	3	29	33	135	52 000	36 000	KASK12
65,1	–	160	1	R_p1/8	–	3	29	38,7	135	52 000	36 000	KASK12
–	66	177	–	R_p1/8	96	6	32	44,5	150	62 000	44 000	–
–	66	177	–	R_p1/8	96	6	32	44,5	150	62 000	44 000	–
74,6	–	177	–	R_p1/8	–	6	32	44,4	150	62 000	44 000	–
–	66	177	–	R_p1/8	96	6	32	44,5	150	62 000	44 000	–
–	66	177	–	R_p1/8	96	6	32	44,5	150	62 000	44 000	–
–	75,5	252	–0,5	R_p1/8	102	4	43	49,9	185	104 000	68 000	–
74,6	–	177	–	R_p1/8	–	6	32	44,4	150	62 000	44 000	–
–	67	184	–	R_p1/8	100	6	32	45,6	160	62 000	44 500	–
–	67	184	–	R_p1/8	100	6	32	45,6	160	62 000	44 500	–
77,8	–	184	–	R_p1/8	–	6	32	44,5	160	62 000	44 500	–
–	70,7	184	–2	R_p1/8	108	6	31	49,3	160	72 000	54 000	–
–	70,7	184	–2	R_p1/8	108	6	31	49,3	160	72 000	54 000	–
–	93,6	235	3	R_p1/8	118	6	50	56,7	200	123 000	87 000	–
82,6	–	184	–2	R_p1/8	–	6	31	51,3	160	72 000	54 000	–

Four-bolt flanged housing units with centring spigot

Cast iron housings



PME, RME, RMEO, TME, PMEY, RMEY

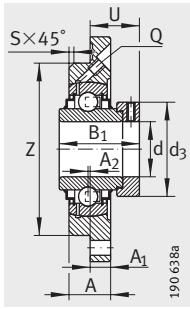


PME

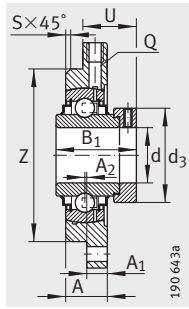
Dimension table (continued) · Dimensions in mm

Designation			Mass	Dimensions			
Unit	Housing	Radial insert ball bearing	m ≈kg	d	H	A_1	N
RME90	GG.ME18	GE90-KRR-B	8,5	**90**	265	20	23
RMEO90	GG.MEO18	GNE90-KRR-B-FA107	12,7	**90**	300	22	22
RMEY90	GG.ME18	GYE90-KRR-B	8,86	**90**	265	20	23
RME100	GG.ME20	GE100-KRR-B	11,45	**100**	295	22	23
RMEO100	GG.MEO20	GNE100-KRR-B-FA107	22,3	**100**	340	27	26
RME120	GG.ME24	GE120-KRR-B	17,43	**120**	350	24	27

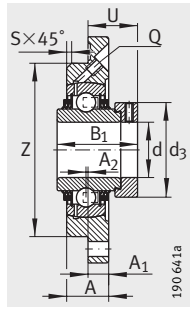
[1] To be ordered separately.



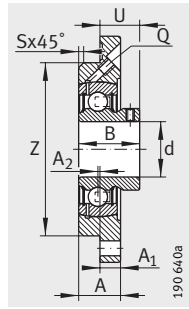
RME, RMEO
(up to d = 70 mm)



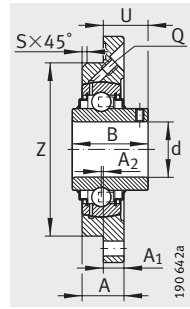
RMEO
(from d = 80 mm)



TME



PMEY

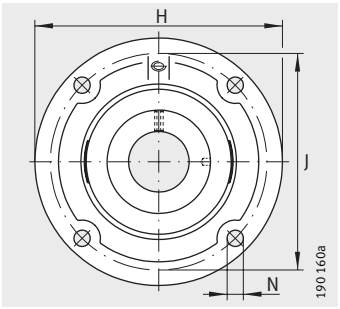


RMEY

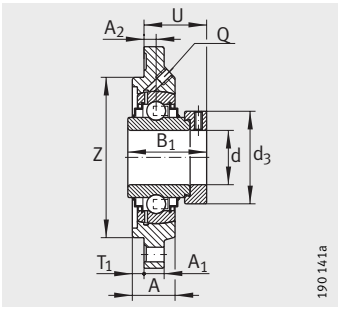
										Basic load ratings		End cap[1]
B	B_1	J	A_2	Q	d_3 max.	S	A	U	Z h8	dyn. C_r N	stat. C_{0r} N	
–	69,5	220	–4	R_p1/8	118	3	32	50,5	190	96 000	72 000	–
–	101	260	3	R_p1/8	132	6	50	62,5	220	143 000	107 000	–
96	–	220	–4	R_p1/8	–	3	32	60,3	190	96 000	72 000	–
–	75	245	–4	R_p1/8	132	3	36	53,4	210	122 000	93 000	–
–	109,4	295	1,5	R_p1/8	145	8	57	68,5	250	174 000	140 000	–
–	81	295	–4	R_p1/8	152	3	40	56,5	250	155 000	131 000	–

Four-bolt flanged housing units with centring spigot

Cast iron housings



RFE, TFE

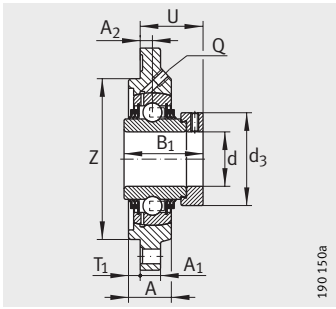


RFE

Dimension table · Dimensions in mm

Designation			Mass	Dimensions				
Unit	Housing	Radial insert ball bearing	m ≈kg	d	H	A_1	N	B_1
RFE25	GG.FE05	GE25-KRR-B	0,8	**25**	115	9	9	44,5
TFE25	GG.FE05	GE25-KTT-B	0,8	**25**	115	9	9	44,5
RFE30	GG.FE06	GE30-KRR-B	1,08	**30**	127	9,5	9	48,5
TFE30	GG.FE06	GE30-KTT-B	1,08	**30**	127	9,5	9	48,5
RFE35	GG.FE07	GE35-KRR-B	1,3	**35**	135	10	11,5	51,3
TFE35	GG.FE07	GE35-KTT-B	1,3	**35**	135	10	11,5	51,3
RFE40	GG.FE08	GE40-KRR-B	1,72	**40**	145	11,5	11,5	56,5
TFE40	GG.FE08	GE40-KTT-B	1,72	**40**	145	11,5	11,5	56,5
RFE45	GG.FE09	GE45-KRR-B	2,06	**45**	155	12	14	56,5
RFE50-N[1)]	GG.FE10-N	GE50-KRR-B	2,48	**50**	165	13	14	62,8
TFE50-N[1)]	GG.FE10-N	GE50-KTT-B	2,48	**50**	165	13	14	62,8
RFE60	GG.FE12	GE60-KRR-B	3,99	**60**	195	16	14	77,9
TFE60	GG.FE12	GE60-KTT-B	3,99	**60**	195	16	14	77,9

1) End cap KASK10 to be ordered separately.

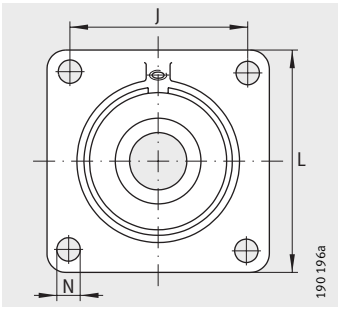


TFE

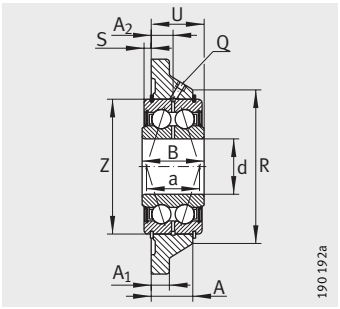
								Basic load ratings	
J	A_2	Q	d_3 max.	A	T_1	U	Z h8	dyn. C_r N	stat. C_{0r} N
92	9,5	R_p1/8	37,5	22	3	36,4	75	14 000	7 800
92	9,5	R_p1/8	37,5	22	3	36,4	75	14 000	7 800
105	10,5	R_p1/8	44	22,5	3	40,6	85	19 500	11 300
105	10,5	R_p1/8	44	22,5	3	40,6	85	19 500	11 300
110	9	R_p1/8	51	22,5	4	41,3	90	25 500	15 300
110	9	R_p1/8	51	22,5	4	41,3	90	25 500	15 300
120	11,5	R_p1/8	58	26	4	46,4	100	32 500	19 800
120	11,5	R_p1/8	58	26	4	46,4	100	32 500	19 800
130	11,5	R_p1/8	63	26,5	4	46,4	105	32 500	20 400
136	12,5	R_p1/8	69	27,5	4	50,6	115	35 000	23 200
136	12,5	R_p1/8	69	27,5	4	50,6	115	35 000	23 200
165	17	R_p1/8	84	33	4	63,8	140	52 000	36 000
165	17	R_p1/8	84	33	4	63,8	140	52 000	36 000

Four-bolt flanged housing units

Cast iron housings
With double row angular contact ball bearing



PCCJ



PCCJ

Dimension table · Dimensions in mm

Designation			Mass	Dimensions					
Unit	Housing	Double row angular contact ball bearing[2]	m ≈kg	d	L	A_1	N	B	J
PCCJ25	GG.CCJ05	G5205-2RS-N	0,79	**25**	95	12	11,5	30	70
PCCJ30	GG.CCJ06	G5206-2RS-N	1,12	**30**	108	12	11,5	34	82,5
PCCJ35	GG.CCJ07	G5207-2RS-N	1,48	**35**	118	14	14	36	92
PCCJ40	GG.CCJ08	G5208-2RS-N	1,8	**40**	130	14	14	38	101,5

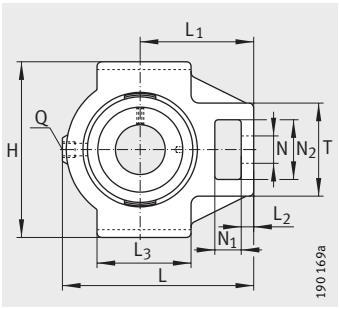
1) Tolerance PN of bearing outside diameter to DIN 620-2.

2) For general guidelines on double row angular contact ball bearings, see page 280.

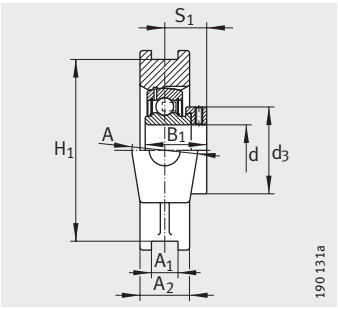
								Basic load ratings	
A_2	Q	R max.	S	A	U	$Z^{1)}$ h5	a	dyn. C_r N	stat. C_{0r} N
11,7	M6	64	2,4	22,1	26,7	52	24	21 600	14 900
13	M6	76	3,2	24	29,7	62	28,9	30 000	21 400
14	M6	88	3	26	31,7	72	33,8	39 500	29 000
15	M6	98	3,2	28	33,7	80	38,8	50 000	38 000

Take-up housing units

Cast iron housings



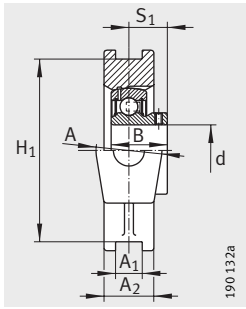
PTUE, RTUE, TTUE, PTUEY, RTUEY



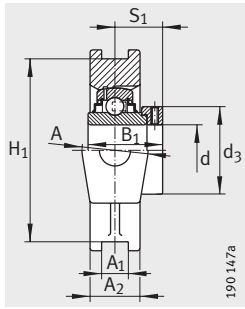
PTUE

Dimension table · Dimensions in mm

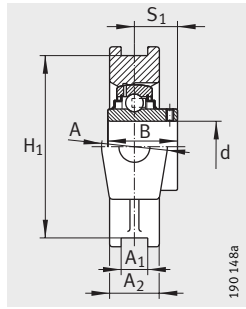
Designation			Mass	Dimensions						
Unit	Housing	Radial insert ball bearing	m ≈kg	d	A	A_1 H13	A_2	L	L_1	L_2
PTUE20	GG.TUE04	GRAE20-NPP-B	0,83	**20**	37	12	25	94,5	60	9
RTUE20	GG.TUE04	GE20-KRR-B	0,9	**20**	37	12	25	94,5	60	9
PTUEY20	GG.TUE04	GAY20-NPP-B	0,8	**20**	37	12	25	94,5	60	9
RTUEY20	GG.TUE04	GYE20-KRR-B	0,84	**20**	37	12	25	94,5	60	9
PTUE25	GG.TUE05	GRAE25-NPP-B	0,85	**25**	37	12	25	98,5	62	10
RTUE25	GG.TUE05	GE25-KRR-B	0,91	**25**	37	12	25	98,5	62	10
TTUE25	GG.TUE05	GE25-KTT-B	0,91	**25**	37	12	25	98,5	62	10
PTUEY25	GG.TUE05	GAY25-NPP-B	0,82	**25**	37	12	25	98,5	62	10
RTUEY25	GG.TUE05	GYE25-KRR-B	0,86	**25**	37	12	25	98,5	62	10
PTUE30	GG.TUE06	GRAE30-NPP-B	1,19	**30**	37	12	25	114,5	70	10
RTUE30	GG.TUE06	GE30-KRR-B	1,24	**30**	37	12	25	114,5	70	10
TTUE30	GG.TUE06	GE30-KTT-B	1,25	**30**	37	12	25	114,5	70	10
PTUEY30	GG.TUE06	GAY30-NPP-B	1,11	**30**	37	12	25	114,5	70	10
RTUEY30	GG.TUE06	GYE30-KRR-B	1,19	**30**	37	12	25	114,5	70	10
PTUE35	GG.TUE07	GRAE35-NPP-B	1,65	**35**	40	12	30	131,5	80	13
RTUE35	GG.TUE07	GE35-KRR-B	1,8	**35**	40	12	30	131,5	80	13
TTUE35	GG.TUE07	GE35-KTT-B	1,73	**35**	40	12	30	131,5	80	13
PTUEY35	GG.TUE07	GAY35-NPP-B	1,64	**35**	40	12	30	131,5	80	13
RTUEY35	GG.TUE07	GYE35-KRR-B	1,74	**35**	40	12	30	131,5	80	13
PTUE40	GG.TUE08	GRAE40-NPP-B	2,43	**40**	50	16	35	141	88	16
RTUE40	GG.TUE08	GE40-KRR-B	2,52	**40**	50	16	35	141	88	16
TTUE40	GG.TUE08	GE40-KTT-B	2,55	**40**	50	16	35	141	88	16
RTUEY40	GG.TUE08	GYE40-KRR-B	2,43	**40**	50	16	35	141	88	16
PTUE45	GG.TUE09	GRAE45-NPP-B	2,32	**45**	50	16	35	141	88	16
RTUE45	GG.TUE09	GE45-KRR-B	2,61	**45**	50	16	35	141	88	16
TTUE45	GG.TUE09	GE45-KTT-B	2,45	**45**	50	16	35	141	88	16
PTUE50	GG.TUE10	GRAE50-NPP-B	2,42	**50**	50	16	35	148	90	16
RTUE50	GG.TUE10	GE50-KRR-B	2,57	**50**	50	16	35	148	90	16
TTUE50	GG.TUE10	GE50-KTT-B	2,56	**50**	50	16	35	148	90	16
PTUEY50	GG.TUE10	GAY50-NPP-B	2,25	**50**	50	16	35	148	90	16
RTUEY50	GG.TUE10	GYE50-KRR-B	2,38	**50**	50	16	35	148	90	16
PTUE55	GG.TUE11	GRAE55-NPP-B	3,99	**55**	60	22	42	169	104	17
RTUE55	GG.TUE11	GE55-KRR-B	4,6	**55**	60	22	42	169	104	17
TTUE55	GG.TUE11	GE55-KTT-B	4,72	**55**	60	22	42	169	104	17



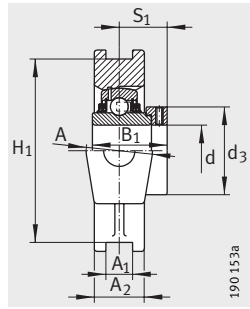
PTUEY



RTUE



RTUEY

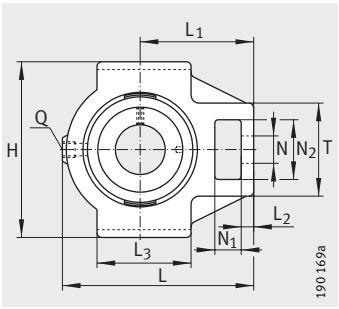


TTUE

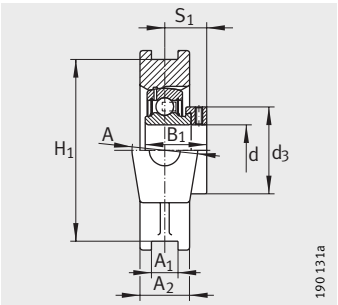
												Basic load ratings	
N	N_1	N_2	B	B_1	H	H_1 ±0,15	S_1	Q	T	L_3	d_3 max.	dyn. C_r N	stat. C_{0r} N
19	18	32	–	31	90	76	23,5	$R_p1/8$	51	50	33	12 800	6 600
19	18	32	–	43,7	90	76	26,6	$R_p1/8$	51	50	33	12 800	6 600
19	18	32	25	–	90	76	18	$R_p1/8$	51	50	–	12 800	6 600
19	18	32	31	–	90	76	18,3	$R_p1/8$	51	50	–	12 800	6 600
19	18	32	–	31	90	76	23,5	$R_p1/8$	51	50	37,5	14 000	7 800
19	18	32	–	44,5	90	76	27	$R_p1/8$	51	50	37,5	14 000	7 800
19	18	32	–	44,5	90	76	27	$R_p1/8$	51	50	37,5	14 000	7 800
19	18	32	27	–	90	76	19,5	$R_p1/8$	51	50	–	14 000	7 800
19	18	32	34,1	–	90	76	19,8	$R_p1/8$	51	50	–	14 000	7 800
22	18	36,5	–	35,8	102	89	26,7	$R_p1/8$	56	57	44	19 500	11 300
22	18	36,5	–	48,5	102	89	30,2	$R_p1/8$	56	57	44	19 500	11 300
22	18	36,5	–	48,5	102	89	30,2	$R_p1/8$	56	57	44	19 500	11 300
22	18	36,5	30	–	102	89	21	$R_p1/8$	56	57	–	19 500	11 300
22	18	36,5	38,1	–	102	89	22,2	$R_p1/8$	56	57	–	19 500	11 300
22	18	36,5	–	39	102	89	29,4	$R_p1/8$	64	63	51	25 500	15 300
22	18	36,5	–	51,3	102	89	32,5	$R_p1/8$	64	63	51	25 500	15 300
22	18	36,5	–	51,3	102	89	32,5	$R_p1/8$	64	63	51	25 500	15 300
22	18	36,5	35	–	102	89	25,5	$R_p1/8$	64	63	–	25 500	15 300
22	18	36,5	42,9	–	102	89	25,4	$R_p1/8$	64	63	–	25 500	15 300
29	20	49	–	43,8	115	102	32,8	$R_p1/8$	82	82	58	32 500	19 800
29	20	49	–	56,5	115	102	35,1	$R_p1/8$	82	82	58	32 500	19 800
29	20	49	–	56,5	115	102	35,1	$R_p1/8$	82	82	58	32 500	19 800
29	20	49	49,2	–	115	102	30,2	$R_p1/8$	82	82	–	32 500	19 800
29	20	49	–	43,8	115	102	32,8	$R_p1/8$	82	82	63	32 500	20 400
29	20	49	–	56,5	115	102	35,1	$R_p1/8$	82	82	63	32 500	20 400
29	20	49	–	56,5	115	102	35,1	$R_p1/8$	82	82	63	32 500	20 400
29	20	49	–	43,8	115	102	32,7	$R_p1/8$	83	85	69	35 000	23 200
29	20	49	–	62,8	115	102	38,2	$R_p1/8$	83	85	69	35 000	23 200
29	20	49	–	62,8	115	102	38,2	$R_p1/8$	83	85	69	35 000	23 200
29	20	49	43	–	115	102	32	$R_p1/8$	83	85	–	35 000	23 200
29	20	49	51,6	–	115	102	32,6	$R_p1/8$	83	85	–	35 000	23 200
35	26	63,5	–	48,4	145	130	36,4	$R_p1/8$	102	95	76	43 500	29 000
35	26	63,5	–	71,4	145	130	43,6	$R_p1/8$	102	95	76	43 500	29 000
35	26	63,5	–	71,4	145	130	43,6	$R_p1/8$	102	95	76	43 500	29 000

Take-up housing units

Cast iron housings



PTUE, RTUE, TTUE, RTUEO, PTUEY, RTUEY



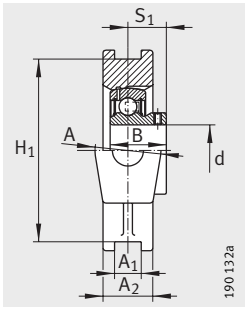
PTUE

Dimension table (continued) · Dimensions in mm

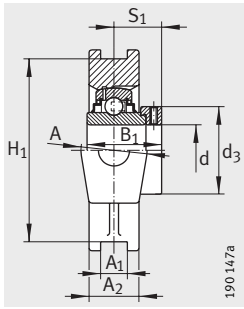
Designation			Mass	Dimensions						
Unit	Housing	Radial insert ball bearing	m ≈kg	d	A	A_1 H13	A_2	L	L_1	L_2
PTUE60	GG.TUE12	GRAE60-NPP-B	4,21	**60**	60	22	44	186	118	19
RTUE60	GG.TUE12	GE60-KRR-B	4,77	**60**	60	22	44	186	118	19
TTUE60	GG.TUE12	GE60-KTT-B	4,76	**60**	60	22	44	186	118	19
PTUEY60	GG.TUE12	GAY60-NPP-B	4,14	**60**	60	22	44	186	118	19
RTUEY60	GG.TUE12	GYE60-KRR-B	4,44	**60**	60	22	44	186	118	19
RTUE65-214[2]	GG.TUE13/14	GE65-214-KRR-B	7,46	**65**	70	25	50	214	135	20
RTUEY65-214[2]	GG.TUE13/14	GYE65-214-KRR-B	7	**65**	70	25	50	214	135	20
RTUE70	GG.TUE13/14	GE70-KRR-B	6,82	**70**	70	25	50	214	135	20
TTUE70	GG.TUE13/14	GE70-KTT-B	6,85	**70**	70	25	50	214	135	20
RTUEY70	GG.TUE13/14	GYE70-KRR-B	6,69	**70**	70	25	50	214	135	20
RTUE75	GG.TUE15	GE75-KRR-B	6,44	**75**	70	25	50	214	135	20
TTUE75	GG.TUE15	GE75-KTT-B	7,13	**75**	70	25	50	214	135	20
RTUEY75	GG.TUE15	GYE75-KRR-B	6,38	**75**	70	25	50	214	135	20
RTUE80	GG.TUE16	GE80-KRR-B	8,4	**80**	70	28	50	230	140	20
TTUE80	GG.TUE16	GE80-KTT-B	7,7	**80**	70	28	50	230	140	20
RTUEO80	GG.TUEO16	GNE80-KRR-B	17,25	**80**	102	30	60	282	174	28
RTUEY80	GG.TUE16	GYE80-KRR-B	7,63	**80**	70	28	50	230	140	20
RTUE90	GG.TUE18	GE90-KRR-B	11,87	**90**	80	28	55	275	170	30
RTUEO90	GG.TUEO18	GNE90-KRR-B	22,9	**90**	110	32	66	312	192	30
RTUE100	GG.TUE20	GE100-KRR-B	14,55	**100**	90	28	60	295	180	30
RTUE120	GG.TUE24	GE120-KRR-B	23,89	**120**	100	32	70	345	210	35

1) $\overline{\text{Tolerance}}_{-0,6}^{0}$.

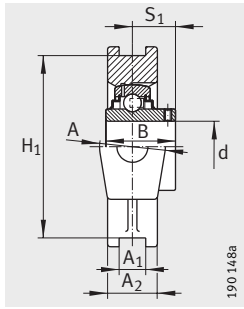
2) Different ball set 6214.



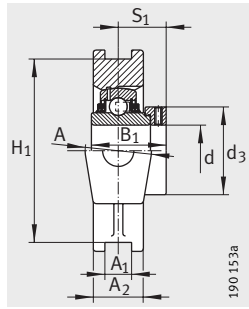
PTUEY



RTUE, RTUEO



RTUEY

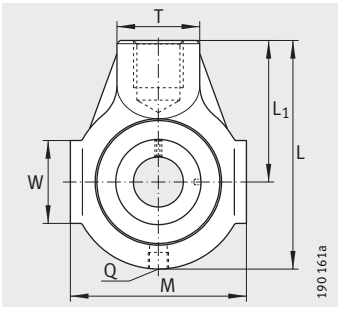


TTUE

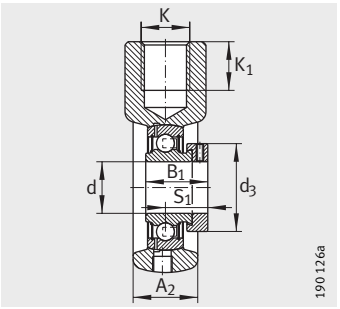
												Basic load ratings	
N	N_1	N_2	B	B_1	H	H_1	S_1	Q	T	L_3	d_3 max.	dyn. C_r N	stat. C_{0r} N
35	32	63,5	–	53,1	146	130±0,15	39,6	$R_p1/8$	102	100	84	52 000	36 000
35	32	63,5	–	77,9	146	130±0,15	46,9	$R_p1/8$	102	100	84	52 000	36 000
35	32	63,5	–	77,9	146	130±0,15	46,9	$R_p1/8$	102	100	84	52 000	36 000
35	32	63,5	47	–	146	130±0,15	34	$R_p1/8$	102	100	–	52 000	36 000
35	32	63,5	65,1	–	146	130±0,15	39,7	$R_p1/8$	102	100	–	52 000	36 000
41	35	70	–	66	166	151±0,25	44,5	$R_p1/8$	110	120	96	62 000	44 000
41	35	70	74,6	–	166	151±0,25	44,4	$R_p1/8$	110	120	–	62 000	44 000
41	35	70	–	66	166	151±0,25	44,5	$R_p1/8$	110	120	96	62 000	44 000
41	35	70	–	66	166	151±0,25	44,5	$R_p1/8$	110	120	96	62 000	44 000
41	35	70	74,6	–	166	151±0,25	44,4	$R_p1/8$	110	120	–	62 000	44 000
41	35	70	–	67	166	151±0,25	45,5	$R_p1/8$	110	120	100	62 000	44 500
41	35	70	–	67	166	151±0,25	45,5	$R_p1/8$	110	120	100	62 000	44 500
41	35	70	77,8	–	166	151±0,25	44,5	$R_p1/8$	110	120	–	62 000	44 500
41	35	70	–	70,7	184	165±0,25	47,6	$R_p1/8$	110	120	108	72 000	54 000
41	35	70	–	70,7	184	165±0,25	47,6	$R_p1/8$	110	120	108	72 000	54 000
53	42	98	–	93,7	230	204[1)]	59,7	$R_p1/8$	150	150	118	123 000	87 000
41	35	70	82,6	–	184	165±0,25	49,3	$R_p1/8$	110	120	–	72 000	54 000
47	40	80	–	69,5	215	190±0,25	46,5	$R_p1/8$	130	140	118	96 000	72 000
57	46	106	–	101	255	228[1)]	65,5	$R_p1/8$	160	165	132	143 000	107 000
47	40	80	–	75	240	215±0,25	49,5	$R_p1/8$	130	160	132	122 000	93 000
55	45	95	–	81	285	255±0,25	52,5	$R_p1/8$	150	190	152	155 000	131 000

Take-up housing units

Cast iron housings



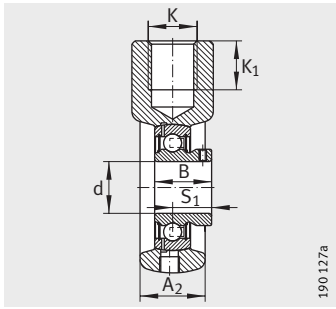
PHE, PHEY, RHE, THE



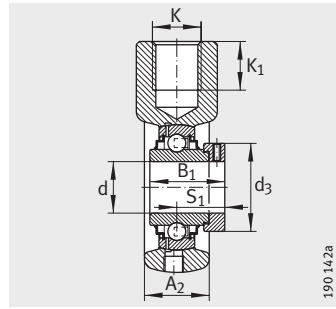
PHE

Dimension table · Dimensions in mm

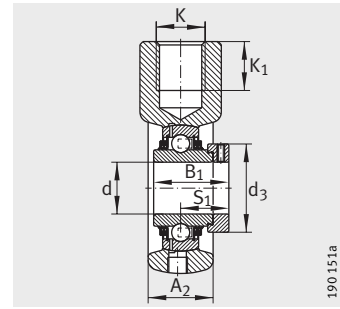
Designation			Mass	Dimensions					
Unit	Housing	Radial insert ball bearing	m ≈kg	d	L	A_2	L_1	K	K_1
PHE20	GG.HE04	GRAE20-NPP-B	0,54	**20**	91	25	58	M16	21
PHEY20	GG.HE04	GAY20-NPP-B	0,51	**20**	91	25	58	M16	21
RHE20	GG.HE04	GE20-KRR-B	0,58	**20**	91	25	58	M16	21
PHE25	GG.HE05	GRAE25-NPP-B	0,71	**25**	99	28	64	M20	22
PHEY25	GG.HE05	GAY25-NPP-B	0,68	**25**	99	28	64	M20	22
RHE25	GG.HE05	GE25-KRR-B	0,77	**25**	99	28	64	M20	22
THE25	GG.HE05	GE25-KTT-B	0,75	**25**	99	28	64	M20	22
PHE30	GG.HE06	GRAE30-NPP-B	1,09	**30**	114	32	72	M24	24
PHEY30	GG.HE06	GAY30-NPP-B	1,03	**30**	114	32	72	M24	24
RHE30	GG.HE06	GE30-KRR-B	1,16	**30**	114	32	72	M24	24
THE30	GG.HE06	GE30-KTT-B	1,17	**30**	114	32	72	M24	24
PHE35	GG.HE07	GRAE35-NPP-B	1,32	**35**	122	32	76	M24	24
PHEY35	GG.HE07	GAY35-NPP-B	1,23	**35**	122	32	76	M24	24
RHE35	GG.HE07	GE35-KRR-B	1,39	**35**	122	32	76	M24	24
THE35	GG.HE07	GE35-KTT-B	1,35	**35**	122	32	76	M24	24
PHE40	GG.HE08	GRAE40-NPP-B	1,65	**40**	135	36	85	M24	24
PHEY40	GG.HE08	GAY40-NPP-B	1,5	**40**	135	36	85	M24	24
RHE40	GG.HE08	GE40-KRR-B	1,77	**40**	135	36	85	M24	24
THE40	GG.HE08	GE40-KTT-B	1,8	**40**	135	36	85	M24	24
PHE45	GG.HE09	GRAE45-NPP-B	1,89	**45**	145	40	90	M24	24
PHEY45	GG.HE09	GAY45-NPP-B	1,91	**45**	145	40	90	M24	24
RHE45	GG.HE09	GE45-KRR-B	2,01	**45**	145	40	90	M24	24
THE45	GG.HE09	GE45-KTT-B	2,13	**45**	145	40	90	M24	24
PHE50	GG.HE10	GRAE50-NPP-B	1,92	**50**	145	40	90	M24	24
RHE50	GG.HE10	GE50-KRR-B	2,15	**50**	145	40	90	M24	24
THE50	GG.HE10	GE50-KTT-B	2,08	**50**	145	40	90	M24	24



PHEY



RHE

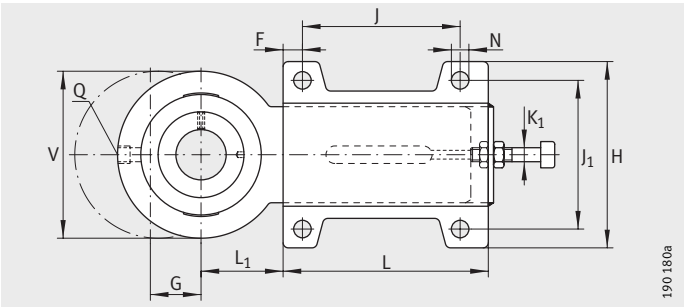


THE

								Basic load ratings	
B	B_1	M	S_1	Q	d_3 max.	T	W	dyn. C_r N	stat. C_{0r} N
–	31	65	23,5	$R_p1/8$	33	30	38	12 800	6 600
25	–	65	18	$R_p1/8$	–	30	38	12 800	6 600
–	43,7	65	26,6	$R_p1/8$	33	30	38	12 800	6 600
–	31	70	23,5	$R_p1/8$	37,5	35	38	14 000	7 800
27	–	70	19,5	$R_p1/8$	–	35	38	14 000	7 800
–	44,5	70	27	$R_p1/8$	37,5	35	38	14 000	7 800
–	44,5	70	27	$R_p1/8$	37,5	35	38	14 000	7 800
–	35,8	85	26,7	$R_p1/8$	44	40	40	19 500	11 300
30	–	85	21	$R_p1/8$	–	40	40	19 500	11 300
–	48,5	85	30,2	$R_p1/8$	44	40	40	19 500	11 300
–	48,5	85	30,2	$R_p1/8$	44	40	40	19 500	11 300
–	39	90	29,4	$R_p1/8$	51	40	49	25 500	15 300
35	–	90	25,5	$R_p1/8$	–	40	49	25 500	15 300
–	51,3	90	32,5	$R_p1/8$	51	40	49	25 500	15 300
–	51,3	90	32,5	$R_p1/8$	51	40	49	25 500	15 300
–	43,8	100	32,7	$R_p1/8$	58	40	45	32 500	19 800
39,5	–	100	29	$R_p1/8$	–	40	45	32 500	19 800
–	56,5	100	35,1	$R_p1/8$	58	40	45	32 500	19 800
–	56,5	100	35,1	$R_p1/8$	58	40	45	32 500	19 800
–	43,7	110	32,7	$R_p1/8$	63	40	45	32 500	20 400
41,5	–	110	30,5	$R_p1/8$	–	40	45	32 500	20 400
–	56,5	110	35,1	$R_p1/8$	63	40	45	32 500	20 400
–	56,5	110	35,1	$R_p1/8$	63	40	45	32 500	20 400
–	43,8	110	32,7	$R_p1/8$	69	40	46	35 000	23 200
–	62,8	110	38,2	$R_p1/8$	69	40	46	35 000	23 200
–	62,8	110	38,2	$R_p1/8$	69	40	46	35 000	23 200

Take-up housing units

Cast iron housings

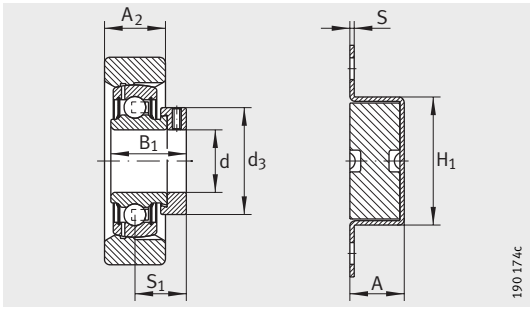


PHUSE

Dimension table · Dimensions in mm

Designation		Mass	Dimensions								
Unit	Radial insert ball bearing	m ≈kg	d	L	A_2	S	F	G	L_1	N	K_1
PHUSE25	GRAE25-NPP-B	2,07	**25**	187	22	4	20	65	50	11,5	M12
PHUSE30	GRAE30-NPP-B	2,22	**30**	187	22	4	20	65	50	11,5	M12
PHUSE35	GRAE35-NPP-B	2,46	**35**	187	22	4	20	65	50	11,5	M12
PHUSE40	GRAE40-NPP-B	4,89	**40**	256	30	4	20	80	60	14	M16
PHUSE50-N[1)]	GRAE50-NPP-B	5,25	**50**	256	30	4	20	80	60	14	M16

1) End cap KASK10 to be ordered separately.

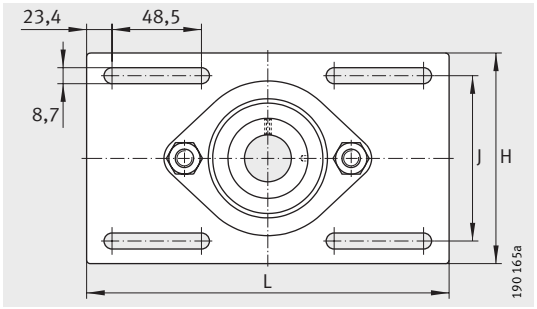


PHUSE

										Load carrying capacity of housing	Basic load ratings	
B_1	J	J_1	S_1	Q	d_3 max.	A	V	H	H_1	$C_{0r\,G}$ N	dyn. C_r N	stat. C_{0r} N
31	140	80	23,5	$R_p1/8$	37,5	28	78	103	52	7 800	14 000	7 800
35,8	140	80	26,7	$R_p1/8$	44	28	88	103	52	11 300	19 500	11 300
39	140	80	29,4	$R_p1/8$	51	28	98	103	52	15 300	25 500	15 300
43,8	180	100	32,7	$R_p1/8$	58	36	108	130	60	19 800	32 500	19 800
43,8	180	100	32,7	$R_p1/8$	69	36	120	130	60	23 200	35 000	23 200

Take-up housing units

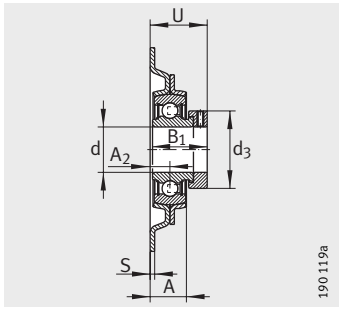
Cast iron housings
Sheet steel housings



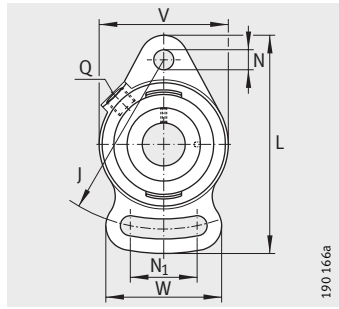
MSTU

Dimension table · Dimensions in mm

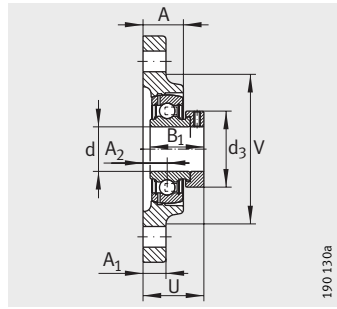
Designation			Mass	Dimensions						
Unit	Housing	Radial insert ball bearing	m ≈kg	d	H	A_1	L	S	N	N_1
PSFT20	GG.SFT04	GRAE20-NPP-B	0,41	**20**	–	10	112	–	11,5	30
MSTU25	GEH52-MSTU	RAE25-NPP-B	0,58	**25**	104,8	–	203,2	2	–	–
PSFT25	GG.SFT05	GRAE25-NPP-B	0,52	**25**	–	11	124	–	11,5	37,5
MSTU30	GEH62-MSTU	RAE30-NPP-B	0,84	**30**	114,3	–	203,2	2,5	–	–
PSFT30	GG.SFT06	GRAE30-NPP-B	0,77	**30**	–	12	142	–	11,5	40
PSFT35	GG.SFT07	GRAE35-NPP-B	1,1	**35**	–	12,5	155	–	14	45



MSTU



PSFT

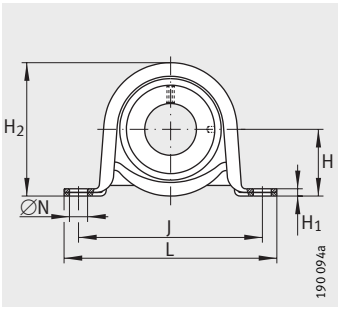


PSFT

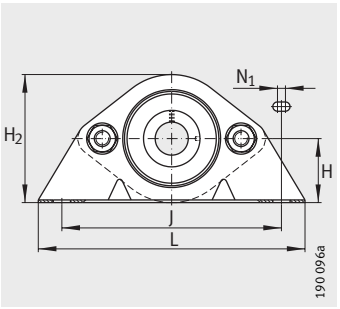
									Load carrying capacity of housing	Basic load ratings	
B_1	J	A_2	Q	d_3 max.	A	U	V	W	$C_{0r\,G}$ N	dyn. C_r N	stat. C_{0r} N
31	90	10,5	$R_p1/8$	33	18	34	61	52	–	12 800	6 600
31	80,2	10,3	–	37,5	19	33,8	–	–	3 900	14 000	7 800
31	99	12,5	$R_p1/8$	37,5	20	36	70	63	–	14 000	7 800
35,8	89,2	12,1	–	44	21,1	37,8	–	–	3 900	19 500	11 300
35,8	117	13	$R_p1/8$	44	22	39,7	80	65	–	19 500	11 300
39	128	15	$R_p1/8$	51	25	44,5	90	75	–	25 500	15 300

Plummer block housing units

Sheet steel housings



PB, PBY, RPB

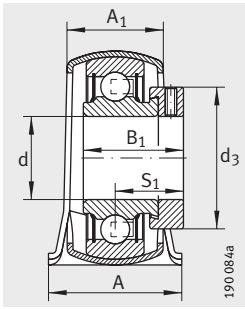


PBS

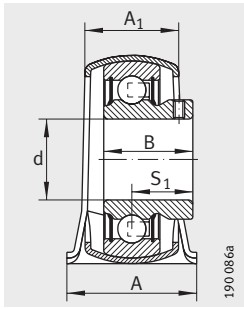
Dimension table · Dimensions in mm

Unit	Housing[1]	Rubber interliner	Radial insert ball bearing	Mass	Dimensions					
				m	d	H	A	A_1	H_1	H_2
				≈kg						
PB12	GEH40-BT	–	RAE12-NPP-B	0,17	**12**	22,2	25,4	18,4	2,6	43,2
PBY12	GEH40-BT	–	AY12-NPP-B	0,15	**12**	22,2	25,4	18,4	2,6	43,2
RPB12	GEH47-BT	GRG.RABR40/47	RAE12-NPP-B	0,23	**12**	25,4	31,8	22,3	3,3	50,1
PBS12	GEH40-PBS	–	RAE12-NPP-B	0,32	**12**	30,2	32,5	14,2	2,6	59,6
PB15	GEH40-BT	–	RAE15-NPP-B	0,17	**15**	22,2	25,4	18,4	2,6	43,2
PBY15	GEH40-BT	–	AY15-NPP-B	0,15	**15**	22,2	25,4	18,4	2,6	43,2
RPB15	GEH47-BT	GRG.RABR40/47	RAE15-NPP-B	0,23	**15**	25,4	31,8	22,3	3,3	50,1
PBS15	GEH40-PBS	–	RAE15-NPP-B	0,32	**15**	30,2	32,5	14,2	2,6	59,6
PB17	GEH40-BT	–	RAE17-NPP-B	0,17	**17**	22,2	25,4	18,4	2,6	43,2
PBY17	GEH40-BT	–	AY17-NPP-B	0,15	**17**	22,2	25,4	18,4	2,6	43,2
RPB17	GEH47-BT	GRG.RABR40/47	RAE17-NPP-B	0,23	**17**	25,4	31,8	22,3	3,3	50,1
PBS17	GEH40-PBS	–	RAE17-NPP-B	0,32	**17**	30,2	32,5	14,2	2,6	59,6
PB20	GEH47-BT	–	RAE20-NPP-B	0,27	**20**	25,4	31,8	22,3	3,3	50,1
PBY20	GEH47-BT	–	AY20-NPP-B	0,22	**20**	25,4	31,8	22,3	3,3	50,1
RPB20	GEH52-BT	GRG.RABR47/52-AH01	RAE20-NPP-B	0,28	**20**	28,6	31,8	23,5	4	56,5
PBS20	GEH47-PBS	–	RAE20-NPP-B	0,45	**20**	33,6	33	15,8	3	66,8
PB25	GEH52-BT	–	RAE25-NPP-B	0,3	**25**	28,6	31,8	23,5	4	56,5
PBY25	GEH52-BT	–	AY25-NPP-B	0,26	**25**	28,6	31,8	23,5	4	56,5
RPB25	GEH62-BT	GRG.RABR52/62-AH01	RAE25-NPP-B	0,38	**25**	33,3	38	26,5	4	66,1
PBS25	GEH52-BT	–	RAE25-NPP-B	0,49	**25**	36,5	34,1	17,4	3,4	72
PB30	GEH62-BT	–	RAE30-NPP-B	0,5	**30**	33,3	38	26,5	4	66,1
PBY30	GEH62-BT	–	AY30-NPP-B	0,4	**30**	33,3	38	26,5	4	66,1
RPB30	GEH62-BT	GRG.RABR55/62	RALE30-NPP-B	0,45	**30**	33,3	38	26,5	4	66,1
PBS30	GEH62-PBS	–	RAE30-NPP-B	0,79	**30**	42,9	38,9	17,4	3,4	85
PBS35	GEH72-PBS	–	RAE35-NPP-B	1,05	**35**	47,6	46,1	22,2	4	94,4
PBS40	GEH80-PBS	–	RAE40-NPP-B	1,33	**40**	55	53,5	23	4	106

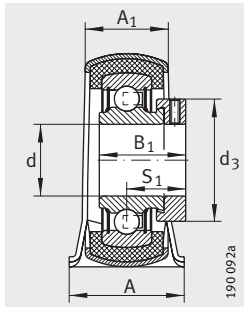
[1] Housing with Corrotect® coating.



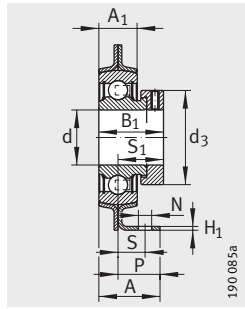
PB



PBY



RPB

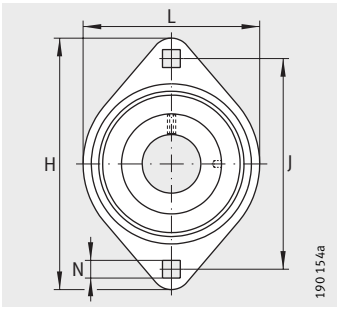


PBS

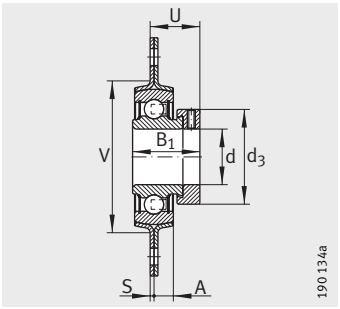
										Load carrying capacity of housing	Basic load ratings	
N	N_1	B	B_1	J	S_1	P	S	d_3 max.	L	$C_{0r\,G}$ N	dyn. C_r N	stat. C_{0r} N
9,5	–	–	28,6	68	22,1	–	–	28	85,7	1 350	9 800	4 750
9,5	–	22	–	68	16	–	–	–	85,7	1 350	9 800	4 750
9,5	–	–	28,6	76	22,1	–	–	28	98,7	900	9 800	4 750
10,5	5,6	–	28,6	92	22,1	25,4	15	28	123,8	2 700	9 800	4 750
9,5	–	–	28,6	68	22,1	–	–	28	85,7	1 350	9 800	4 750
9,5	–	22	–	68	16	–	–	–	85,7	1 350	9 800	4 750
9,5	–	–	28,6	76	22,1	–	–	28	98,4	900	9 800	4 750
10,5	5,6	–	28,6	92	22,1	25,4	15	28	123,8	2 700	9 800	4 750
9,5	–	–	28,6	68	22,1	–	–	28	85,7	1 350	9 800	4 750
9,5	–	22	–	68	16	–	–	–	85,7	1 350	9 800	4 750
9,5	–	–	28,6	76	22,1	–	–	28	98,4	900	9 800	4 750
10,5	5,6	–	28,6	92	22,1	25,4	15	28	123,8	2 700	9 800	4 750
9,5	–	–	31	76	23,5	–	–	33	98,4	1 600	12 800	6 600
9,5	–	25	–	76	18	–	–	–	98,4	1 600	12 800	6 600
11,5	–	–	31	86	23,5	–	–	33	108	1 100	12 800	6 600
10,5	5,6	–	31	97	23,5	25,4	15	33	127	3 200	12 800	6 600
11,5	–	–	31	86	23,5	–	–	37,5	108	1 800	14 000	7 800
11,5	–	27	–	86	19,5	–	–	–	108	1 800	14 000	7 800
11,5	–	–	31	95	23,5	–	–	37,5	117,5	1 400	14 000	7 800
10,5	9,5	–	31	95,5	23,5	25,4	14,3	37,5	133,5	3 600	14 000	7 800
11,5	–	–	35,8	95	26,7	–	–	44	117,5	2 700	19 500	11 300
11,5	–	30	–	95	21	–	–	–	117,5	2 700	19 500	11 300
11,5	–	–	26,5	95	20	–	–	42,5	117,5	1 400	13 200	8 300
13,5	8	–	35,8	119	26,7	30,2	16	44	159	3 600	19 500	11 300
13,5	8	–	39	127	29,4	35	20,7	51	165	4 100	25 500	15 300
13,5	8	–	43,8	136,5	32,7	40	25	58	180	4 500	32 500	19 800

Two-bolt flanged housing units

Sheet steel housings



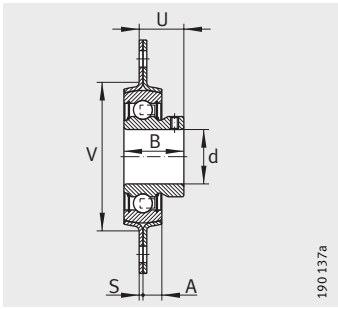
RAT, RATY, RALT, PCSLT



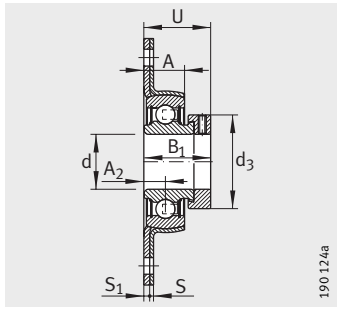
RAT, RALT

Dimension table · Dimensions in mm

Designation			Mass	Dimensions		
Unit	Housing	Radial insert ball bearing	m ≈kg	d	L	H
RAT12	FLAN40-MST (2 pieces)	RAE12-NPP-B	0,19	**12**	58,7	81
RATY12	FLAN40-MST (2 pieces)	AY12-NPP-B	0,14	**12**	58,7	81
RAT15	FLAN40-MST (2 pieces)	RAE15-NPP-B	0,19	**15**	58,7	81
RATY15	FLAN40-MST (2 pieces)	AY15-NPP-B	0,13	**15**	58,7	81
RAT17	FLAN40-MST (2 pieces)	RAE17-NPP-B	0,19	**17**	58,7	81
RATY17	FLAN40-MST (2 pieces)	AY17-NPP-B	0,12	**17**	58,7	81
RALT20-FA125.8	FLAN42-LST-FA125 (2 pieces)	RALE20-NPP-B	0,21	**20**	58,7	81
PCSLT20	FLAN42-CSLT-FA125/FLAN42-CST-FA125 (1 piece each)	RALE20-NPP-B	0,22	**20**	66	90,5
RAT20	FLAN47-MST (2 pieces)	RAE20-NPP-B	0,27	**20**	66	90,5
RATY20	FLAN47-MST (2 pieces)	AY20-NPP-B	0,22	**20**	66	90,5
RALT25	FLAN47-LST (2 pieces)	RALE25-NPP-B	0,22	**25**	71	95,2
PCSLT25	FLAN47-CSLT-FA125/FLAN47-CST-FA125 (1 piece each)	RALE25-NPP-B	0,25	**25**	71	95,2
RAT25	FLAN52-MST (2 pieces)	RAE25-NPP-B	0,34	**25**	71	95,2
RATY25	FLAN52-MST (2 pieces)	AY25-NPP-B	0,26	**25**	71	95,2
PCSLT30	FLAN55-CSLT-FA125/FLAN55-CST-FA125 (1 piece each)	RALE30-NPP-B	0,3	**30**	84	112,5
RAT30	FLAN62-MST (2 pieces)	RAE30-NPP-B	0,49	**30**	84	112,7
RATY30	FLAN62-MST (2 pieces)	AY30-NPP-B	0,41	**30**	84	112,7
RAT35	FLAN72-MST (2 pieces)	RAE35-NPP-B	0,72	**35**	93,7	123
RATY35	FLAN72-MST (2 pieces)	GAY35-NPP-B	0,56	**35**	93,7	123
RAT40	FLAN80-MST (2 pieces)	RAE40-NPP-B	0,98	**40**	100	151
RATY40	FLAN80-MST (2 pieces)	GAY40-NPP-B	0,85	**40**	100	151



RATY

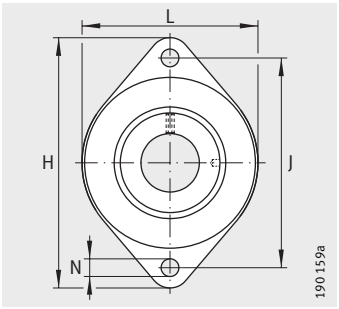


PCSLT

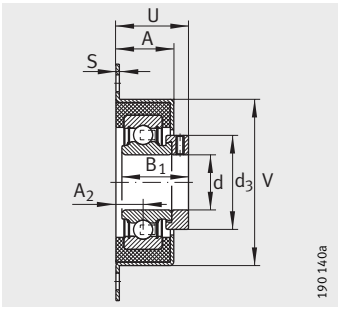
											Load carrying capacity of housing	Basic load ratings	
S	S_1	N	B	B_1	J	A_2	d_3 max.	A	U	V	$C_{0r\,G}$ N	dyn. C_r N	stat. C_{0r} N
2	–	7,1	–	28,6	63,5	–	28	7	24	48	2 700	9 800	4 750
2	–	7,1	22	–	63,5	–	–	7	18	48	2 700	9 800	4 750
2	–	7,1	–	28,6	63,5	–	28	7	24	48	2 700	9 800	4 750
2	–	7,1	22	–	63,5	–	–	7	18	48	2 700	9 800	4 750
2	–	7,1	–	28,6	63,5	–	28	7	24	48	2 700	9 800	4 750
2	–	7,1	22	–	63,5	–	–	7	18	48	2 700	9 800	4 750
2	–	7,1	–	24,6	63,5	–	30	7	20,6	48	2 700	9 400	5 000
2	3	8,7	–	24,6	71,4	7,5	30	14	26,1	–	4 200	9 400	5 000
2	–	8,7	–	31	71,5	–	33	8	25,5	55	3 200	12 800	6 600
2	–	8,7	25	–	71,5	–	–	8	20	55	3 200	12 800	6 600
2	–	8,7	–	25,4	76	–	36	7,1	21,4	55	3 000	10 100	5 900
2	3	8,7	–	25,4	76,2	8,5	36	16	28	–	4 500	10 100	5 900
2	–	8,7	–	31	76,2	–	37,5	8,7	25,5	60	3 650	14 000	7 800
2	–	8,7	27	–	76,2	–	–	8,7	21,5	60	3 650	14 000	7 800
2,5	3,5	11,5	–	26,5	90,5	9	42,5	16	29	–	6 000	13 200	8 300
2,5	–	10,5	–	35,7	90,5	–	44	8,7	29,2	71	5 000	19 500	11 300
2,5	–	10,5	30	–	90,5	–	–	8,7	23,5	71	5 000	19 500	11 300
2,5	–	10,5	–	38,9	100	–	51	10,5	31,5	81	6 300	25 500	15 300
2,5	–	10,5	35	–	100	–	–	10,5	28	81	6 300	25 500	15 300
3,5	–	13,5	–	43,8	119	–	58	11,5	36,2	90	7 000	32 500	19 800
3,5	–	13,5	39,5	–	119	–	–	11,5	32,5	90	7 000	32 500	19 800

Two-bolt flanged housing units

Sheet steel housings with rubber interliner



RCSMF



RCSMF

Dimension table · Dimensions in mm

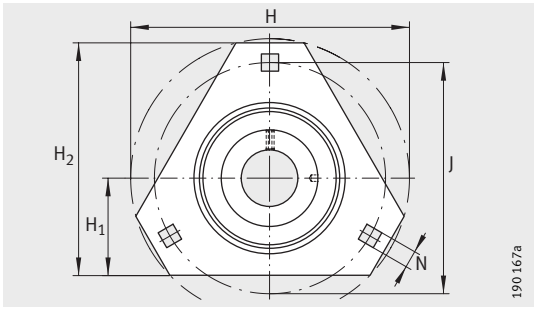
Designation				Mass	Dimensions				
Unit	Housing[1)]	Rubber interliner	Radial insert ball bearing	m ≈kg	d	L	H	S	N
RCSMF12	FLAN65-RCSMF-FA125	GRG.RCSM40/65	RAE12-NPP-FA106	0,27	**12**	70	114	1,5	10,5
RCSMF15	FLAN65-RCSMF-FA125	GRG.RCSM40/65	RAE15-NPP-FA106	0,27	**15**	70	114	1,5	10,5
RCSMF17	FLAN65-RCSMF-FA125	GRG.RCSM40/65	RAE17-NPP-FA106	0,27	**17**	70	114	1,5	10,5
RCSMF20	FLAN65-RCSMF-FA125	GRG.RCSM47/65	RAE20-NPP-FA106	0,32	**20**	70	114	1,5	10,5
RCSMF25	FLAN65-RCSMF-FA125	GRG.RCSM52/65	RAE25-NPP-FA106	0,33	**25**	70	114	1,5	10,5
RCSMF30	FLAN65-RCSMF-FA125	GRG.RCSM55/65	RALE30-NPP-FA106	0,32	**30**	70	114	1,5	10,5

1) Housing with Corrotect® coating.

							Load carrying capacity of housing	Basic load ratings	
B_1	J	A_2	d_3 max.	A	U	V	$C_{0r\,G}$ N	dyn. C_r N	stat. C_{0r} N
28,6	92	12,7	28	27	34,8	68	900	9 800	4 750
28,6	92	12,7	28	27	34,8	68	900	9 800	4 750
28,6	92	12,7	28	27	34,8	68	900	9 800	4 750
31	92	12,7	33	27	36,2	68	1 100	12 800	6 600
31	92	12,7	37,5	27	36,2	68	1 400	14 000	7 800
26,5	92	15	42,5	27	35	68	1 400	13 200	8 300

Three-bolt flanged housing units

Sheet steel housings

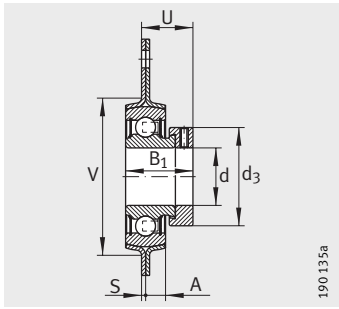


RATR, RALTR, RRTR, RATRY

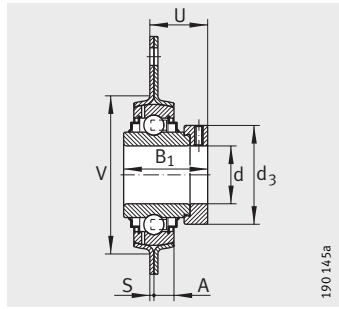
Dimension table · Dimensions in mm

Designation			Mass	Dimensions				
Unit	Housing	Radial insert ball bearing	m ≈kg	d	H_2	H	H_1	S_1
RALTR20	FLAN42-LSTR (2 pieces)	RALE20-NPP-B	0,21	**20**	76,2	90,5	33,3	2
RATR20	FLAN47-MSTR (2 pieces)	RAE20-NPP-B	0,28	**20**	76,2	90,5	33,3	2
RRTR20	FLAN47-MSTR (2 pieces)	GE20-KRR-B	0,32	**20**	76,2	90,5	33,3	2
RALTR25[1)]	**FLAN47-LSTR** (2 pieces)	**RALE25-NPP-B**	0,23	**25**	80,5	95,3	34,9	2
RATR25	FLAN52-MSTR (2 pieces)	RAE25-NPP-B	0,32	**25**	80,5	95,3	34,9	2
RRTR25[1)]	**FLAN52-MSTR** (2 pieces)	**E25-KRR-B**	0,37	**25**	80,5	95,3	34,9	2
RATR30	FLAN62-MSTR (2 pieces)	RAE30-NPP-B	0,43	**30**	93	112,7	38,1	2,5
RATRY30	FLAN62-MSTR (2 pieces)	AY30-NPP-B	0,41	**30**	93	112,7	38,1	2,5
RRTR30[1)]	**FLAN62-MSTR** (2 pieces)	**E30-KRR-B**	0,5	**30**	93	112,7	38,1	2,5
RATR35	FLAN72-MSTR (2 pieces)	RAE35-NPP-B	0,56	**35**	105,6	122	44,5	2,5
RATRY35	FLAN72-MSTR (2 pieces)	GAY35-NPP-B	0,47	**35**	105,6	122	44,5	2,5
RRTR35	FLAN72-MSTR (2 pieces)	E35-KRR-B	0,63	**35**	105,6	122	44,5	2,5

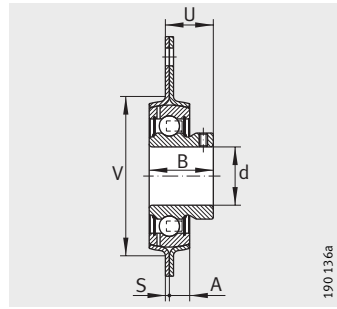
1) Housing and radial insert ball bearing must be ordered separately.



RATR, RALTR



RRTR

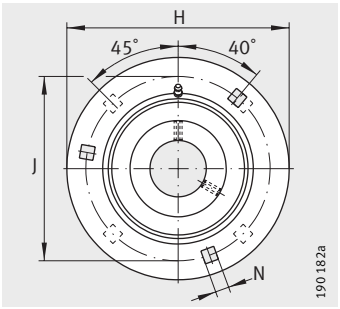


RATRY

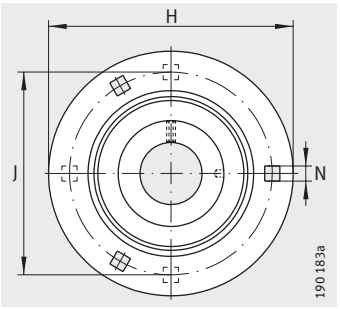
								Load carrying capacity of housing	Basic load ratings	
N	B	B_1	J	d_3 max.	A	U	V	$C_{0r\,G}$ N	dyn. C_r N	stat. C_{0r} N
8,7	–	24,5	71,5	30	7,2	20,6	49	2 600	9 400	5 000
8,7	–	31	71,5	33	8	25,5	55	3 200	12 800	6 600
8,7	–	43,7	71,5	33	8	28,6	55	3 200	12 800	6 600
8,7	–	25,5	76	36	7,2	21,4	54	3 000	10 100	5 900
8,7	–	31	76	37,5	8,7	25,5	60	3 650	14 000	7 800
8,7	–	44,5	76	37,5	8,7	28,9	60	3 650	14 000	7 800
10,5	–	35,7	90,5	44	8,7	29,2	71	5 000	19 500	11 300
10,5	30	–	90,5	–	8,7	23,5	71	5 000	19 500	11 300
10,5	–	48,5	90,5	44	8,7	32,6	71	5 000	19 500	11 300
10,5	–	39	100	51	9,5	31,9	81	6 400	25 500	15 300
10,5	35	–	100	–	9,5	28	81	6 400	25 500	15 300
10,5	–	51,3	100	51	9,5	34,8	81	6 400	25 500	15 300

Three-bolt and four-bolt flanged housing units

Sheet steel housings



GRA, GRRY..-VA



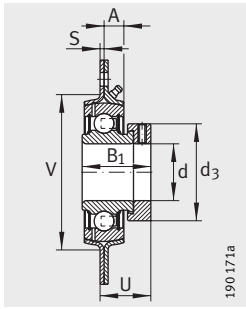
RA, RAY, RRY..-VA

Dimension table · Dimensions in mm

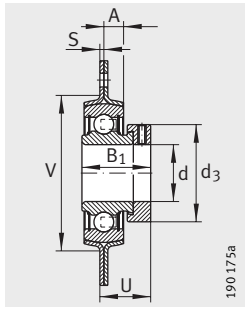
Designation			Mass	Dimensions	
Unit	Housing	Radial insert ball bearing	m ≈kg	d	H
RA12[1]	**FLAN40-MSB** (2 pieces)	**RAE12-NPP-B**	0,23	**12**	81
RAY12[1]	**FLAN40-MSB** (2 pieces)	**AY12-NPP-B**	0,17	**12**	81
RRY12-VA[1]	**FLAN40-MSB-VA** (2 pieces)	**GYE12-KRR-B-VA**	0,21	**12**	81
RA15	FLAN40-MSB (2 pieces)	RAE15-NPP-B	0,23	**15**	81
RAY15	FLAN40-MSB (2 pieces)	AY15-NPP-B	0,16	**15**	81
RRY15-VA[1]	**FLAN40-MSB-VA** (2 pieces)	**GYE15-KRR-B-VA**	0,2	**15**	81
RA17	FLAN40-MSB (2 pieces)	RAE17-NPP-B	0,23	**17**	81
RAY17[1]	**FLAN40-MSB** (2 pieces)	**AY17-NPP-B**	0,15	**17**	81
RRY17-VA[1]	**FLAN40-MSB-VA** (2 pieces)	**GYE17-KRR-B-VA**	0,19	**17**	81
RA20	FLAN47-MSB (2 pieces)	RAE20-NPP-B	0,32	**20**	90,5
RAY20	FLAN47-MSB (2 pieces)	AY20-NPP-B	0,3	**20**	90,5
GRA20[2]	FLAN47-MSB/FLAN47-MSA (1 piece each)	GRAE20-NPP-B	0,32	**20**	90,5
GRRY20-VA[2]	FLAN47-MSB-VA/FLAN47-MSA-VA (1 piece each)	GYE20-KRR-B-VA	0,34	**20**	90,5
RRY20-VA	FLAN47-MSB-VA (2 pieces)	GYE20-KRR-B-VA	0,34	**20**	90,5
RA25	FLAN52-MSB (2 pieces)	RAE25-NPP-B	0,37	**25**	95
RAY25	FLAN52-MSB (2 pieces)	AY25-NPP-B	0,34	**25**	95
GRA25[2]	FLAN52-MSB/FLAN52-MSA (1 piece each)	GRAE25-NPP-B	0,37	**25**	95
GRRY25-VA[2]	FLAN52-MSB-VA/FLAN52-MSA-VA (1 piece each)	GYE25-KRR-B-VA	0,38	**25**	95
RRY25-VA	FLAN52-MSB-VA (2 pieces)	GYE25-KRR-B-VA	0,38	**25**	95
RA30	FLAN62-MSB (2 pieces)	RAE30-NPP-B	0,61	**30**	112,7
RAY30	FLAN62-MSB (2 pieces)	AY30-NPP-B	0,45	**30**	112,7
GRA30[2]	FLAN62-MSB/FLAN62-MSA (1 piece each)	GRAE30-NPP-B	0,61	**30**	112,7
GRRY30-VA[2]	FLAN62-MSB-VA/FLAN62-MSA-VA (1 piece each)	GYE30-KRR-B-VA	0,63	**30**	112,7
RRY30-VA	FLAN62-MSB-VA (2 pieces)	GYE30-KRR-B-VA	0,63	**30**	112,7
RA35	FLAN72-MSB (2 pieces)	RAE35-NPP-B	0,82	**35**	122
RAY35	FLAN72-MSB (2 pieces)	GAY35-NPP-B	0,78	**35**	122
GRA35[2]	FLAN72-MSB/FLAN72-MSA (1 piece each)	GRAE35-NPP-B	0,82	**35**	122

[1] Housing and radial insert ball bearing must be ordered separately.

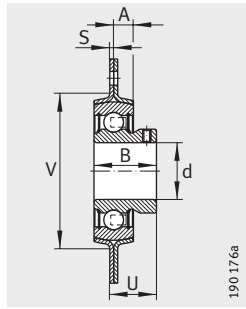
[2] Units with relubrication facility.



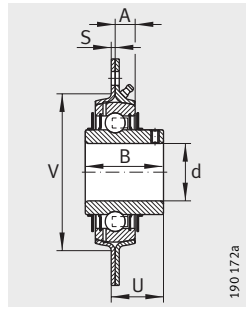
GRA



RA



RAY

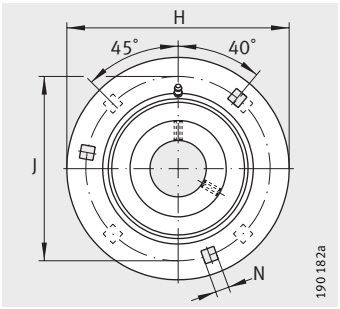


GRRY..-VA, RRY..-VA

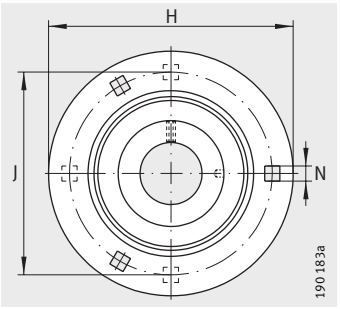
									Number of screw mounting holes	Load carrying capacity of housing	Basic load ratings	
S	N	B	B_1	J	d_3 max.	A	U	V	n	$C_{0r\,G}$ N	dyn. C_r N	stat. C_{0r} N
2	7,1	–	28,6	63,5	28	7	24	48	3	2 700	9 800	4 750
2	7,1	22	–	63,5	–	7	18	48	3	2 700	9 800	4 750
2	7,1	25	–	63,5	–	7	17,4	48	3	2 700	9 800	4 750
2	7,1	–	28,6	63,5	28	7	24	48	3	2 700	9 800	4 750
2	7,1	22	–	63,5	–	7	18	48	3	2 700	9 800	4 750
2	7,1	25	–	63,5	–	7	17,4	48	3	2 700	9 800	4 750
2	7,1	–	28,6	63,5	28	7	24	48	3	2 700	9 800	4 750
2	7,1	22	–	63,5	–	7	18	48	3	2 700	9 800	4 750
2	7,1	25	–	63,5	–	7	17,4	48	3	2 700	9 800	4 750
2	8,7	–	31	71,5	33	8	25,5	55	3	3 200	12 800	6 600
2	8,7	25	–	71,5	–	8	20	55	3	3 200	12 800	6 600
2	8,7	–	31	71,5	33	8	25,5	55	3	3 200	12 800	6 600
2	8,7	31	–	71,5	–	8	20,3	55	3	3 200	12 800	6 600
2	8,7	31	–	71,5	–	8	20,3	55	3	3 200	12 800	6 600
2	8,7	–	31	76	37,5	8,7	25,5	60	3	3 650	14 000	7 800
2	8,7	27	–	76	–	8,7	21,5	60	3	3 650	14 000	7 800
2	8,7	–	31	76	37,5	8,7	25,5	60	3	3 650	14 000	7 800
2	8,7	34	–	76	–	8,7	21,7	60	3	3 650	14 000	7 800
2	8,7	34	–	76	–	8,7	21,7	60	3	3 650	14 000	7 800
2,5	10,5	–	35,8	90,5	44	8,7	29,2	71	3	5 000	19 500	11 300
2,5	10,5	30	–	90,5	–	8,7	23,5	71	3	5 000	19 500	11 300
2,5	10,5	–	35,8	90,5	44	8,7	29,2	71	3	5 000	19 500	11 300
2,5	10,5	38,1	–	90,5	–	9	24,7	71	3	5 000	19 500	11 300
2,5	10,5	38,1	–	90,5	–	9	24,7	71	3	5 000	19 500	11 300
2,5	10,5	–	39	100	51	9,5	31,9	81	3	6 400	25 500	15 300
2,5	10,5	35	–	100	–	9,5	28	81	3	6 400	25 500	15 300
2,5	10,5	–	39	100	51	9,5	32	81	3	6 400	25 500	15 300

Three-bolt and four-bolt flanged housing units

Sheet steel housings



GRA

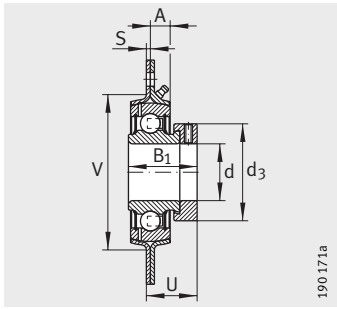


RA, RAY

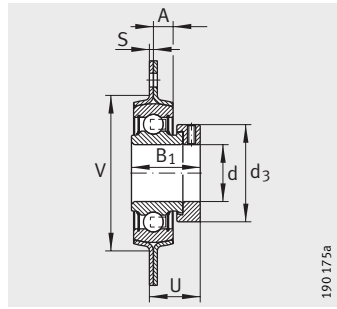
Dimension table (continued) · Dimensions in mm

Designation			Mass	Dimensions	
Unit	Housing	Radial insert ball bearing	m ≈kg	d	H
RA40	FLAN80-MSB (2 pieces)	RAE40-NPP-B	1,36	**40**	147,5
RAY40[1)]	**FLAN80-MSB** (2 pieces)	**GAY40-NPP-B**	1,25	**40**	147,5
GRA40	FLAN80-MSB/FLAN80-MSA (1 piece each)	GRAE40-NPP-B	1,36	**40**	147,5
RA45	FLAN85-MSB (2 pieces)	GRAE45-NPP-B	1,41	**45**	149,2
GRA45	FLAN85-MSB/FLAN85-MSA (1 piece each)	GRAE45-NPP-B	1,41	**45**	149,2
RA50	FLAN90-MSB (2 pieces)	GRAE50-NPP-B	1,68	**50**	155,5
RAY50[1)]	**FLAN90-MSB** (2 pieces)	**GAY50-NPP-B**	1,68	**50**	155,5
GRA50	FLAN90-MSB/FLAN90-MSA (1 piece each)	GRAE50-NPP-B	1,68	**50**	155,5
RA55[1)]	**FLAN100-MSB** (2 pieces)	**GRAE55-NPP-B**	1,39	**55**	167
RA60[1)]	**FLAN110-MSB** (2 pieces)	**GRAE60-NPP-B**	2,54	**60**	176
RAY60[1)]	**FLAN110-MSB** (2 pieces)	**GAY60-NPP-B**	2,13	**60**	176

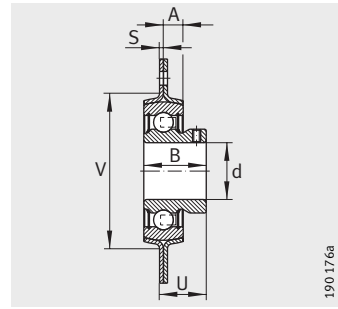
1) Housing and radial insert ball bearing must be ordered separately.



GRA

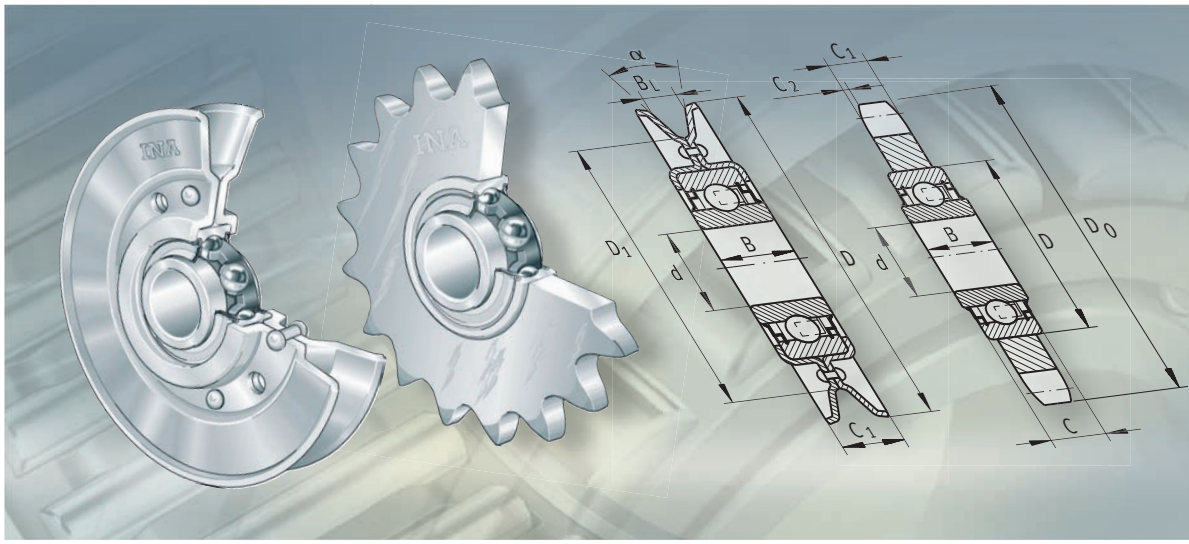


RA



RAY

									Number of screw mounting holes	Load carrying capacity of housing	Basic load ratings	
S	N	B	B_1	J	d_3 max.	A	U	V	n	$C_{0r\,G}$ N	dyn. C_r N	stat. C_{0r} N
3,5	13,5	–	43,8	119	58	10,3	36,2	90	4	7 700	32 500	19 800
3,5	13,5	39,5	–	119	–	10,3	32,5	90	4	7 700	32 500	19 800
3,5	13,5	–	43,8	119	58	10,3	36,2	90	4	7 700	32 500	19 800
3,5	13,5	–	43,8	120,5	63	11,1	36,2	95	4	7 700	32 500	20 400
3,5	13,5	–	43,8	120,5	63	11,1	36,2	95	4	7 700	32 500	20 400
4	13,5	–	43,8	127	69	11,1	36,7	100	4	8 600	35 000	23 200
4	13,5	43	–	127	–	11,1	36	100	4	8 600	35 000	23 200
4	13,5	–	43,8	127	69	11,1	36,7	100	4	8 600	35 000	23 200
4	13,5	–	48,4	138	76	12,5	40,4	110	4	9 500	43 500	29 000
4	13,5	–	53,1	148	84	12	43,6	120	4	11 200	52 000	36 000
4	13,5	47	–	148	–	12	38	120	4	11 200	52 000	36 000



Roller chain idler sprocket units
Idler pulley units

Roller chain idler sprocket units
Idler pulley units

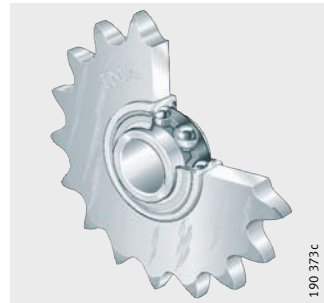
		Page
Product overview	Roller chain idler sprocket units, idler pulley units	1312
Features	Roller chain idler sprocket units	1313
	Idler pulley units	1313
	Operating temperature	1313
Design and safety guidelines	Roller chain idler sprocket units	1314
	Material codes	1314
	Idler pulley units	1315
Accuracy		1315
Dimension tables	Roller chain idler sprocket units	1316
	Idler pulley units	1318

Roller chain idler sprocket units
Idler pulley units

Roller chain idler sprocket units

Sprocket made from steel or sintered iron

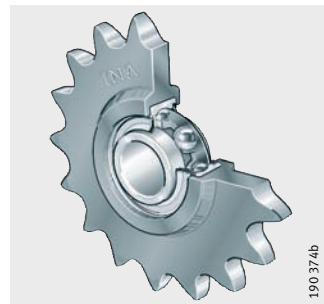
KSR..-L0



KSR..-B0

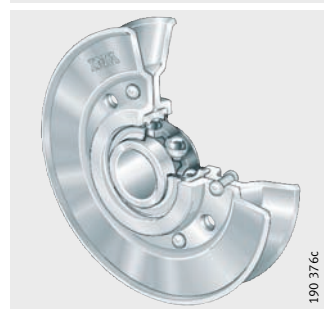
Sprocket made from plastic

KSR..-L0..-22

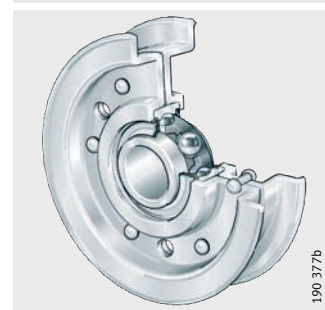


Idler pulley units

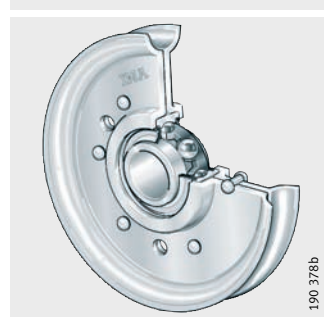
RSRA..-L0, RSRA..-K0



RSRB..-L0



RSRD..-L0



Roller chain idler sprocket units
Idler pulley units

Features

Roller chain idler sprocket units

INA roller chain idler sprocket units are guidance and return units for roller bush chains and roller chains. They can compensate for chain stretch resulting from operation and give smoother system running under high loads and speeds.

The ready-to-fit units comprise sprockets and deep groove ball bearings or radial insert ball bearings. The sprockets are made from high strength steel, sintered iron or plastic (polyamide). Sprockets made from plastic give particularly smooth running and generate very little noise. Since the inner ring of the deep groove ball bearing is extended on both sides, no additional spacer rings are required.

In series KSR..-B0, the inner ring is located on the shaft by means of a locking collar. The bearing bore of this series has a plus tolerance. As a result, unmachined shafts up to ISO tolerance h9 can be used under moderate loads and speeds.

Sealing

The deep groove ball bearings are sealed on both sides.

Lubrication

They are greased using a lithium soap grease to GA13 and are maintenance-free.

Idler pulley units

Idler pulley units are tensioning systems for belt drives and idler units. They:

- increase the wrap angle in belt drives and can therefore support higher power levels or allow smaller units to be used
- compensate for belt stretch resulting from operation
- allow shorter centre distances
- reduce the wear on the belt drive.

The ready-to-fit units comprise deep drawn, profiled sheet steel pulley halves riveted together and deep groove ball bearings. Pulleys of larger diameters are additionally welded together. A lead chamfer on the pulley profile prevents damage to the belt. Due to the sheet steel construction, the additional rotating masses and the out of balance masses generated are low.

Type A is suitable for vee belts, type B for flat, vee and round belts, type D for round belts, steel cables and hemp ropes.

Sealing

The deep groove ball bearings are sealed on both sides.

Lubrication

They are greased using a lithium soap grease to GA13 and are maintenance-free.

Operating temperature

Roller chain idler sprocket units with steel or sintered iron sprockets are suitable for operating temperatures from –20 °C to +120 °C.

Roller chain idler sprocket units with plastic sprockets are suitable for operating temperatures from –20 °C to +80 °C.

Idler pulley units are suitable for operating temperatures from –20 °C to +120 °C, limited by the grease and seal material.

Roller chain idler sprocket units
Idler pulley units

Design and safety guidelines Roller chain idler sprocket units

Roller chain idler sprocket units should always be mounted on the slack side of the chain, *Figure 1*.

The wrap angle on the idler sprocket unit should be selected such that at least three teeth are engaged simultaneously.

For grease lubrication, a grease with good adhesion characteristics should be used.

Roller chain idler sprocket units of bore d = 16 mm are toleranced so that they can be fitted using fixing screws M16.

The minimum press-out force of the deep groove ball bearings is 700 N. This value must not be exceeded during operation.

The preload on the slack side should not be less than 1% of the tractive force on the taut side.

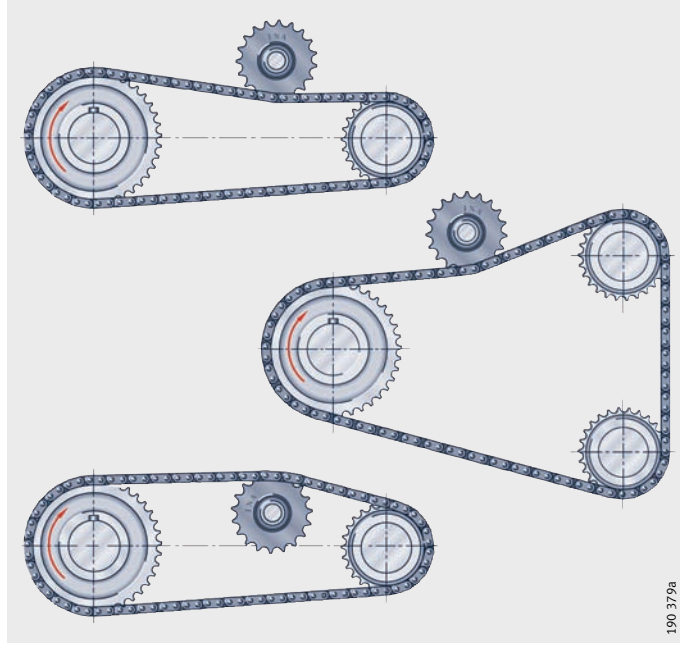


Figure 1
Arrangement on slack side of chain drive

Material codes

The materials used for the sprockets are classified by means of material codes, see table.

Classification of materials

Code	Material		Hardness
08	Sintered iron	C 10	HB 50±10
09	Sintered iron	D 39	HB 105±15
15	Steel	St 52	–
16	Steel	C 45	HRC 50±5 Tooth flanks hardened
22	Plastic	PA	–

Idler pulley units

Idler pulley units should only be positioned on the slack side of the drive, *Figure 2*.

For normal loads, a light fit for the inner ring combined with axial clamping is sufficient.

If idler pulley units with a flat profile are to be used for tensioning via the back of a vee belt, check the suitability of the vee belt for this arrangement.

The permissible belt speed of 40 m/s must not be exceeded.

Check the permissible belt tension and operating life of the ball bearing for each individual application.

Preload force

The following is an approximate guide value for the preload force S_v between the shafts:

- for flat belts
  $S_v = 2$ to $3 \times F_u$ (circumferential force)
- for vee belts
  $S_v = 1{,}7$ to $2{,}5 \times F_u$ (circumferential force).

Checking belt tension

Measure the speed ratio without load at low speed. Then measure the speed ratio at operating speed and under operating load.
If the difference in speed due to slippage is $> 2\%$, retension the belt.

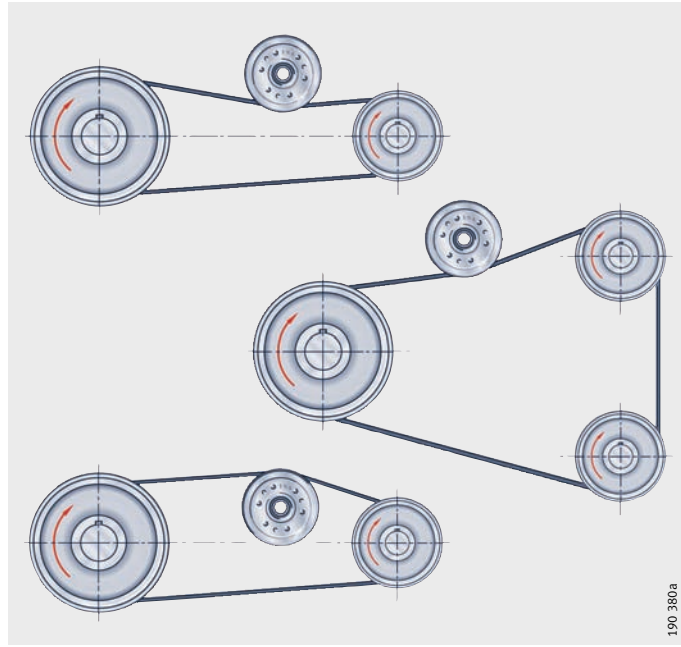
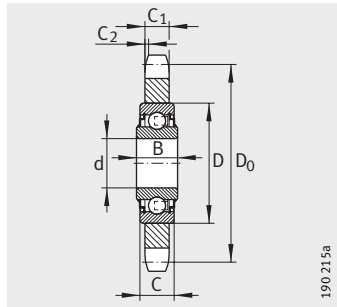


Figure 2
Arrangement on slack side of belt drive

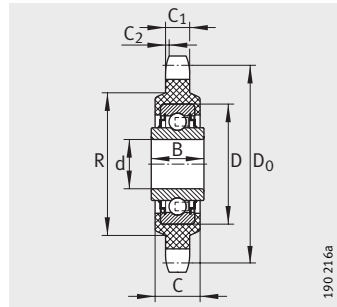
Accuracy

In the case of idler pulley units for vee belts, the groove angles are slightly larger due to the small wrap than recommended according to DIN 2 211 and DIN 2 217.

Roller chain idler sprocket units



KSR..-L0



KSR..-L0..-22

Dimension table · Dimensions in mm

Tooth set		Designation[3)5)]	Mass	Dimensions									For chain to	
p[1)]	z[2)]		m	d[4)]	C_1	D_0	D_k	$C_{2\,min}$	D	B	C	R	DIN 8187	DIN 8188
"			≈kg											
3/8	**20**	**KSR16-L0-06-10-20-08**	0,14	**16,2**	5,2	60,9	65	0,8	40	18,3	12	–	*	–
1/2	**16**	**KSR16-L0-08-10-16-08**	0,16	**16,2**	7	65,1	70,5	1,1	40	18,3	12	–	*	–
		KSR16-L0-08-10-16-15	0,14	**16,2**	7	65,1	70,5	1,1	40	18,3	12	–	*	*
		KSR16-L0-08-10-16-22	0,1	**16,2**	7	65,1	70,5	1,1	40	18,3	18,1	48	*	*
	18	**KSR16-L0-08-10-18-08**	0,21	**16,2**	7	73,1	78,6	1,1	40	18,3	12	–	*	–
		KSR16-L0-08-10-18-09	0,21	**16,2**	7	73,1	78,6	1,1	40	18,3	12	–	*	*
		KSR16-L0-08-10-18-16	0,21	**16,2**	7	73,1	78,6	1,1	40	18,3	12	–	*	*
5/8	**14**	**KSR16-L0-10-10-14-08**	0,21	**16,2**	8,7	71,3	78	1,3	40	18,3	12	–	*	*
	17	**KSR16-L0-10-10-17-08**	0,32	**16,2**	8,7	86,4	93,1	1,3	40	18,3	12	–	*	*
		KSR16-L0-10-10-17-09	0,32	**16,2**	8,7	86,4	93,1	1,3	40	18,3	12	–	*	*
		KSR16-L0-10-10-17-22	0,26	**16,2**	8,7	86,4	93,1	1,3	40	18,3	18	48	*	*
3/4	**13**	**KSR16-L0-12-10-13-08**	0,33	**16,2**	10,5	79,6	87	1,5	40	18,3	12	–	*	*
		KSR16-L0-12-10-13-16	0,33	**16,2**	10,5	79,6	87	1,5	40	18,3	12	–	*	*
	15	**KSR16-L0-12-10-15-08**	0,42	**16,2**	10,5	91,6	99,2	1,5	40	18,3	12	–	*	*
		KSR16-L0-12-10-15-09	0,42	**16,2**	10,5	91,6	99,2	1,5	40	18,3	12	–	*	–
		KSR16-L0-12-10-15-22	0,36	**16,2**	10,5	91,6	99,2	1,5	40	18,3	18	48	*	*
	17	**KSR16-L0-12-10-17-15**	0,58	**16,2**	10,5	103,7	111,4	1,5	40	18,3	12	–	*	*
		KSR16-L0-12-10-17-16	0,58	**16,2**	10,5	103,7	111,4	1,5	40	18,3	12	–	*	*
1	**12**	**KSR20-L0-16-10-12-15**	0,7	**20**	15,3	98,1	107,6	2	47	17,7	14	–	*	*
		KSR20-L0-16-10-12-16	0,7	**20**	15,3	98,1	107,6	2	47	17,7	14	–	*	–
1 1/4	**9**	**KSR25-L0-20-10-09-16**	0,8	**25**	17,6	92,8	103	2,5	52	21	15	–	*	*
	13	**KSR25-L0-20-10-13-15**	1,6	**25**	17,6	132,7	144	2,5	52	21	15	–	*	*

1) p = pitch.

2) z = number of teeth.

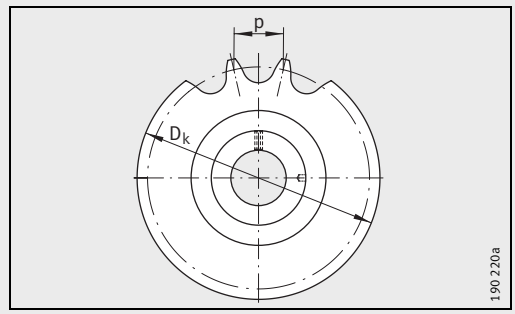
3) Material codes, see section Material codes, page 1314.

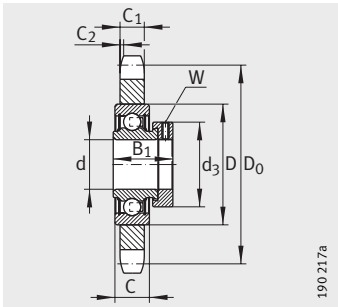
4) Tolerance of bore d: see table.

5) Composition of designation: see example, page 1317, footnote[4)].

Bore tolerance

Series	Bore d mm	Tolerance mm
KSR..-L0	16,2	0 +0,1
	20 – 25	0 –0,01





KSR..-B0

Dimension table · Dimensions in mm

Tooth set		Designation[3) 4)]	Mass	Dimensions									W	For chain to	
p[1)] ″	z[2)]		m ≈kg	d $^{0}_{+0,018}$	C_1	D_0	D_k	$C_{2\,min}$	D	B_1	C	d_3 max.		DIN 8187	DIN 8188
$^3/_8$	**20**	**KSR15-B0-06-10-20-08**	0,18	**15**	5,2	60,9	65	0,8	40	28,6	12	28	3	*	–
$^1/_2$	**16**	**KSR15-B0-08-10-16-08**	0,21	**15**	7	65,1	70,5	1,1	40	28,6	12	28	3	*	–
	18	**KSR20-B0-08-10-18-08**	0,32	**20**	7	73,1	78,6	1,1	47	31	14	33	3	*	*
		KSR20-B0-08-10-18-15	0,32	**20**	7	73,1	78,6	1,1	47	31	14	33	3	*	*
	19	**KSR25-B0-08-10-19-08**	0,29	**25**	7	77,1	82,5	1,1	52	31	15	37,3	3	*	*
$^5/_8$	**14**	**KSR15-B0-10-10-14-08**	0,26	**15**	8,7	71,3	78	1,3	40	28,3	12	28	3	*	*
	17	**KSR20-B0-10-10-17-15**	0,41	**20**	8,7	86,3	93,1	1,3	47	31	14	33	3	*	*
$^3/_4$	**13**	**KSR15-B0-12-10-13-08**	0,4	**15**	10,5	79,6	87	1,5	40	28,6	12	28	3	*	*
	15	**KSR20-B0-12-10-15-16**	0,47	**20**	10,5	91,6	99,2	1,5	47	31	14	33	3	*	*
1	**10**	**KSR20-B0-16-10-10-15**	0,5	**20**	15,3	82,3	89,4	2	47	31	14	33	3	*	–
	15	**KSR30-B0-16-10-15-15**	1,34	**30**	15,3	122,2	131	2	62	35,7	18	44	4	*	–

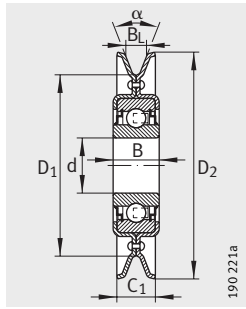
1) p = pitch.

2) z = number of teeth.

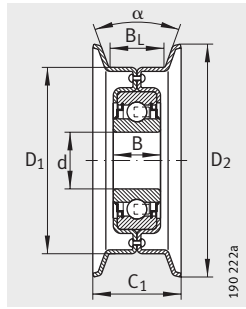
3) Material codes: see page 1314.

4) Composition of designation taking example of
roller chain idler sprocket unit KSR15-B0-06-10-20-08
KSR Roller chain idler sprocket unit
15 Bearing bore diameter
B0 Radial insert ball bearing with eccentric locking collar, series RAE..-NPP
06 Sprocket pitch in 1/16″, code
10 Chain code (width index or relevant standard)
20 Number of teeth
08 Material code (sintered iron).

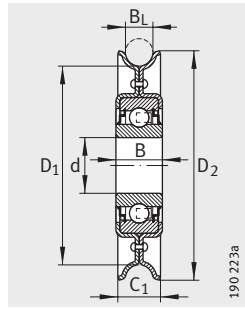
Idler pulley units



RSRA..-L0, RSRA..-K0
Type A



RSRB..-L0
Type B



RSRD..-L0
Type D

Dimension table · Dimensions in mm

Type	Designation	Mass	Dimensions						Angle	Vee belt size to DIN 2 215 (ISO 1 081, ISO 4 183, ISO 4 184) and DIN 7 753,Part 1 (ISO 4 184)	Basic load ratings[2]	
		m	d[1]	D_1	D_2	B	C_1	B_L	α		dyn. C_r	stat. C_{0r}
		≈kg							°		N	N
A	**RSRA15-90-L0**	0,24	**15**	61,6	90	14,4	20	12,4	32	8, 10, (12,5)	7 600	3 700
	RSRA17-102-K0-AH01	0,42	**17**	70,8	102	12	22,2	12,7	34	8, 10, (12,5)	9 800	4 750
	RSRA13-129-L0-L114[3]	0,56	**13**	73,7	129	18,3	32	22,1	32	13, 17, 20, 22	9 800	4 750
	RSRA16-129-L0	0,54	**16**	73,7	129	18,3	32	22,1	32	13, 17, 20, 22	9 800	4 750
	RSRA16-186-L0	1,11	**16**	130,8	186	18,3	32	22,1	32	13, 17, 20, 22	9 800	4 750
B	**RSRB15-92-L0**	0,31	**15**	76,2	92	14,4	31	22,2	10	–	7 600	3 700
	RSRB13-117-L0	0,5	**13**	101	117	18,3	36	25,4	10	–	9 800	4 750
	RSRB16-117-L0	0,48	**16**	101	117	18,3	36	25,4	10	–	9 800	4 750
	RSRB13-159-L0	0,8	**13**	139,7	159	18,3	36,5	25,4	10	–	9 800	4 750
	RSRB16-159-L0	0,78	**16**	139,7	159	18,3	36,5	25,4	10	–	9 800	4 750
	RSRB16-222-L0	1,45	**16**	203	222	18,3	50	38	10	–	9 800	4 750
D	**RSRD25-150-L0**	0,83	**25**	133	154	21	24	17	–	–	14 000	7 800

1) Tolerance of bore d: see table.

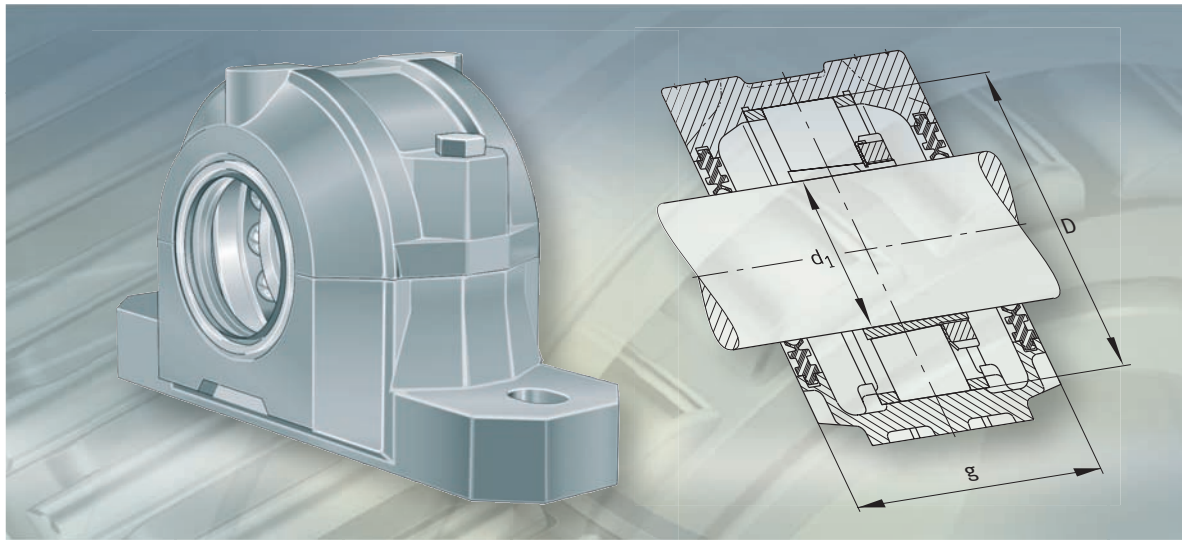
2) Basic load rating of bearing.

3) The bearing is greased with L114 (GA47).

Bore tolerance

Bore d	Tolerance
mm	mm
13	+0,08 –0,05
15	0 –0,08
16	+0,26 +0,13
17	0 –0,008
25	0 –0,01

FAG



Bearing housings

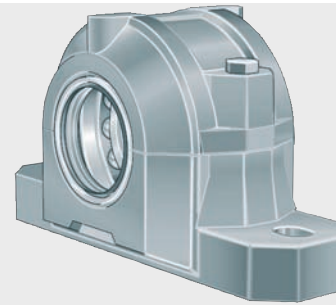
Bearing housings

		Page
Product overview	Bearing housings	1322
Features	Housing materials and outer surfaces	1324
	Locating and non-locating bearings	1324
	Sealing	1324
Split and unsplit plummer block housings	Split plummer block housings SNV	1326
	Split plummer block housings S30	1334
	Split plummer block housings SD31	1337
	Split plummer block housings LOE for oil lubrication	1340
	Unsplit plummer block housings VR3	1342
	Unsplit plummer block housings BND	1345
Flanged housings	Flanged housings F112	1351
	Flanged housings F5	1352
Design and safety guidelines	Load carrying capacity of split plummer block housings	1354
	Load carrying capacity of unsplit plummer block housings	1358
	Tightening torques	1360
Accessories	Grease valves, locating rings	1361
	Seals	1362
	Covers	1363
Dimension tables	Plummer block housings, SNV, split, for bearings with tapered bore and adapter sleeve	1364
	cylindrical bore	1400
	Plummer block housings, S30, split, for spherical roller bearings with tapered bore and adapter sleeve	1412
	Plummer block housings, SD31, split, for spherical roller bearings with tapered bore and adapter sleeve	1418
	Plummer block housings, LOE, split, for spherical roller bearings with cylindrical bore	1422
	tapered bore and adapter sleeve	1426
	Plummer block units, VRE3, unsplit, with bearings and shaft	1430
	Plummer block housings, BND, unsplit, for spherical roller bearings	1438
	Flanged housings, F112, unsplit, for self-aligning ball bearings with extended inner ring	1444
	Flanged housings, F5, unsplit, for bearings with tapered bore and adapter sleeve	1446

Plummer block housings

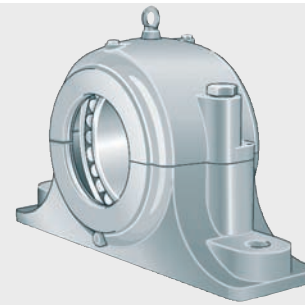
Split

SNV



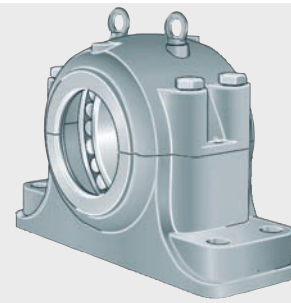
214 017a

S30



214 018a

SD31



214 019a

For oil lubrication

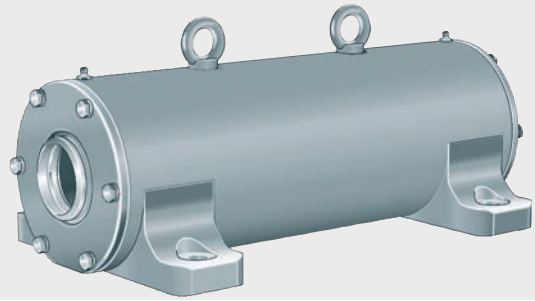
LOE

214 016b

Plummer block housings

Unsplit

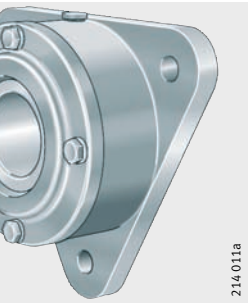
VR3



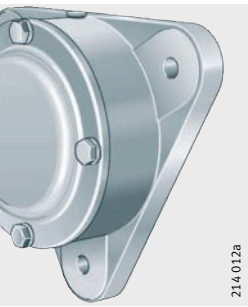
BND

Flanged housings

F112



F5 (F505 to F513)



F5 (F515 to F522)

Bearing housings

Features

FAG housings and the associated bearings form bearing units that have proven successful in machinery, plant and equipment. It is only possible, however, to show here a small selection of the numerous sizes and designs (for an overview of the FAG series housings, see publication TI WL 90-30). For other housings or housing designs, please consult Schaeffler Group Industrial.

Housing materials and outer surfaces

The bearing housings are predominantly made from flake graphite cast iron. We can supply housings made from cast steel or spheroidal graphite cast iron by agreement. Since the bearings are generally lubricated with grease and the initial grease filling lasts for a long period, most housings do not have relubrication holes. However, there are cast-on bosses or marks present so that lubrication holes can be made if necessary. If relubrication is carried out, it must be ensured that excess grease is allowed to escape.

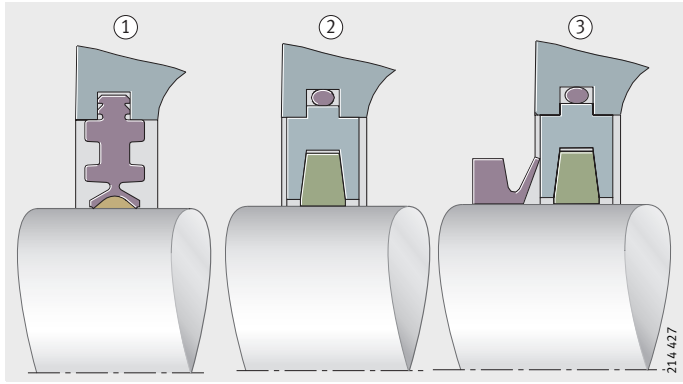
All outer surfaces of the housings and housing parts not machined by chip-forming methods have a universal paint coating (colour RAL 7031, bluish grey). The coating can be finished using all synthetic resin, polyurethane, acrylic, epoxy resin, chlorinated rubber, nitrocellulose and acid-hardening hammer tone finishes. The anti-corrosion protection on the inner and outer surfaces machined by chip-forming methods can be easily removed.

Locating and non-locating bearings

The bearing seats in the housing are generally machined such that the bearings are movable and can thus function as non-locating bearings. Locating bearing arrangements can be achieved by the insertion of locating rings if these are listed in the tables. Locating rings must be ordered separately. Housings without locating rings are supplied in a non-locating or locating bearing design.

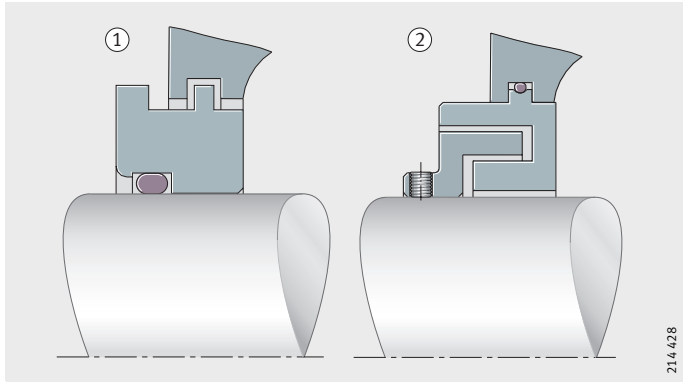
Sealing

Bearing housings can be sealed, depending on the operating conditions, by the use of contact seals, non-contact seals or combinations thereof, *Figure 1* to *Figure 3*, page 1325.



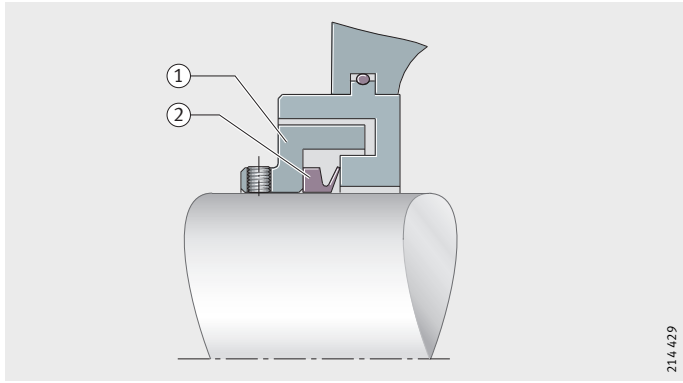
① Double lip seal
② Felt seal
③ Felt seal and V ring

Figure 1
Examples of contact seals



① Radial labyrinth
② Axial labyrinth

Figure 2
Examples of non-contact seals



Taconite seal, comprising
① Labyrinth
② V ring

Figure 3
Example of combined seals

Split and unsplit plummer block housings

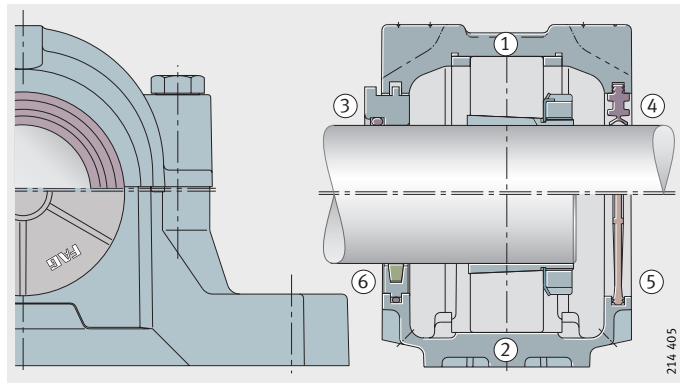
Split and unsplit plummer block housings are generally intended for bearing arrangements with self-aligning ball bearings, barrel roller bearings and spherical roller bearings.

In split plummer block housings, the removable upper section of the housing is centred on the lower section by dowel pins, allowing easier fitting and maintenance. The upper sections must not be interchanged with each other.

In the case of split housings, the tolerance data for bearing seats are only valid for the delivered condition, i. e. before the screws connecting the upper and lower sections are loosened.

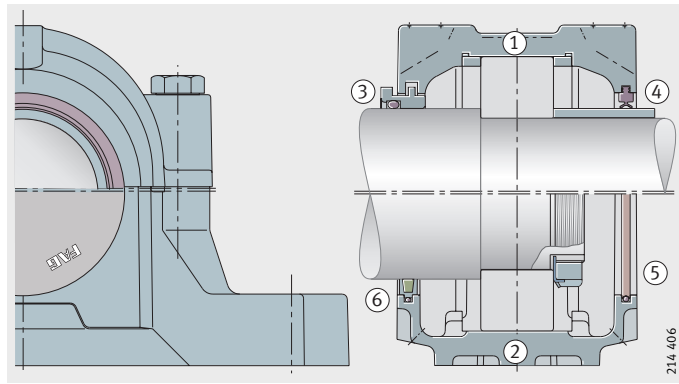
Split plummer block housings SNV

Housings SNV are designed in accordance with a modular concept. This allows the fitting of rolling bearings of various diameter and width series.



① Locating bearing
② Non-locating bearing
③ TSV, ④ DH, ⑤ DKV, ⑥ FSV

Figure 4
Housing SNV for bearings with tapered bore and adapter sleeve



① Locating bearing
② Non-locating bearing
③ TSV, ④ DH, ⑤ DKVT, ⑥ FSV

Figure 5
Housing SNV for bearings with cylindrical bore

The housing SNV160 can accommodate three different self-aligning bearing types from 20 bearing series, namely self-aligning ball bearings, barrel roller bearings and spherical roller bearings if the named bearings have an outside diameter of 160 mm. Housings SNV can also accommodate deep groove ball bearings and split spherical roller bearings.

Bearings from different diameter series with the same outside diameter have different bore diameters.

The method of locating the bearing on the shaft is also significant:

- direct seating or location using an adapter sleeve results in different shaft diameters.

In housings SNV, this gives different sizes of gap between the shaft and housing bore, depending on the bearing fitted. This gap is taken up by the seal.

The dimension tables indicate the suitable seals and covers for the bearings listed. If the housing bore allows a different bearing to be used, the seals must be selected as appropriate.

In size SNV215 and larger, the housings have an eye bolt that must not be subjected to a load greater than the mass of the housing including the bearing.

The essential advantages of housings SNV are as follows:

- Simplified stockholding due to the modular concept, with one housing size suitable for various shaft diameters
- High load carrying capacity, see table, page 1355
- Depending on the operating conditions, double lip seals, V ring seals, labyrinth seals, felt seals or combined seals may be used. Special seals are available by agreement
- Locating bearings are located centrally by means of two locating rings of identical width
- Flat end faces on the housing base allow abutment against stops if high forces do not act on the mounting face in a purely vertical direction
- Holes can be made at marked points on the housing for: lubrication and monitoring systems, fixing screws, parallel or tapered pins.

Dimensions, material

The dimensions of housings SNV correspond to ISO 113/II and, with the exception of the width, also to DIN 736 to DIN 739. The housings are interchangeable with the existing housings SN(E).

The housings SNV listed in the tables are made from flake graphite cast iron (suffix L). Housings made from spheroidal graphite cast iron (suffix D) are available by agreement.

Bearing seat and fitting of bearings

The bearing seat in the housing SNV is machined to H7. The bearings can be displaced and thus function as non-locating bearings. Locating bearing arrangements are achieved by inserting one locating ring (FRM) on each side of the bearing; the bearing is thus seated in the centre of the housing.

Housings SNV can accommodate rolling bearings that are seated directly on a stepped shaft or on an adapter sleeve.

Seals and covers

Seals and covers can be accommodated in the rectangular-section annular slots on both sides of housings SNV. The seals must be ordered separately. They are principally suitable for grease lubrication.

The standard seal for housings SNV is the double lip seal DH. Other types available upon request are V ring seals DHV, labyrinth seals TSV, felt seals FSV, combined seals TCV and special seals.

Double lip seal DH

The double lip seal DH made from nitrile butadiene rubber (NBR) is suitable for circumferential speeds up to 13 m/s. For continuous operation, a maximum circumferential speed of 6 m/s is recommended. The two-part seal can be easily inserted in the annular slots in the housing (pay attention to the position of the joint). The seal lips slide on the rotating shaft. The outer seal lip prevents ingress of contamination into the bearing arrangement. This effect is supported by the grease fed into the space between the seal lips at assembly. The inner lip prevents the egress of lubricant from the housing. The double lip seal allows shaft misalignment of up to 0,5° in both directions. It is suitable for temperatures from –40 °C to +100 °C. The contact area on the shaft for the seal lips should have a roughness to class N8 (DIN ISO 1302).

V ring seal DHV

In V ring seals DHV made from NBR, the seal lip is in axial contact with the sliding surface. The seal allows misalignment of up to 0,5° in both directions and is suitable, if grease lubrication is used, for a circumferential speed up to 12 m/s (at $>$ 8 m/s, axial location is necessary).

Labyrinth rings TSV

Labyrinth rings of series TSV are suitable for higher circumferential speeds since they are of a non-contact type. The O ring pressed between the labyrinth ring and the shaft ensures that the labyrinth ring does not slip despite the loose fit. The O ring made from fluoro rubber (Viton®) is suitable for temperatures up to +200 °C. The labyrinth seal allows shaft misalignment of up to 0,5° in both directions. If necessary, the labyrinth can be relubricated.

Felt seals FSV

FAG felt seals FSV are suitable for grease lubrication and temperatures up to +100 °C (by agreement, aramid packing is available for high temperatures). The adapter holding the inserted, oil-impregnated felt strip is secured against rotation by an O ring in the housing slot. Felt seals are suitable for circumferential speeds up to 5 m/s and, after running-in, up to 15 m/s.
The permissible shaft misalignment is 0,5° in both directions.

Covers DKV

If housings SNV are to be closed off on one side, the covers DKV must be ordered specially. The plastic covers are suitable for long term operating temperatures up to +120 °C.
Covers DKVT for higher temperatures are available by agreement.

Grease lubrication

In many applications, bearings can be operated with lifetime lubrication, i.e. the grease quantity introduced at assembly is sufficient for the entire bearing rating life when contact seals are used (for example DH, FSV). The bearings are filled completely with grease while the housing cavities are filled to 60%. Grease quantity for initial filling, see table, page 1330.

For bearing operating temperatures $<$ +100 °C, bearing loads P/C $<$ 0,3 and a bearing-specific speed parameter $k_a \cdot n \cdot d_M < 700\,000\ min^{-1} \cdot mm$, the most suitable rolling bearing grease is Arcanol MULTITOP, a lithium soap grease to NLGI class 2 with particularly effective EP additives, see also TPI 168, Arcanol rolling bearing greases.

For a speed parameter $n \cdot d_M < 50\,000\ min^{-1} \cdot mm$ and a non-contact seal (e.g. TSV), where the grease should also perform a sealing function, the housing and seal cavities should be filled to approx. 100%.

If the achievable fatigue limit life of the bearing is significantly longer than the grease operating life, the existing grease must be removed and replaced by fresh grease.

If the grease change intervals for particular applications are too short, relubrication is recommended. The lubricant can be introduced into the housing from the side or, in the case of bearings with a lubrication slot and lubrication holes, through the centre.

If relubrication is carried out from the side, the housing cavities on the side with the lubrication nipple should be filled to approx. 100% with grease so that the relubrication grease can act immediately on the bearing. Depending on the seal selected and the application, the housing can be fitted at marked locations with devices for the inlet and outlet of lubricant.

Housings ordered using the suffix G944A* have a lubrication nipple and grease outlet hole. Position and dimensions of the holes and the lubrication nipple, *Figure 6*, page 1331.

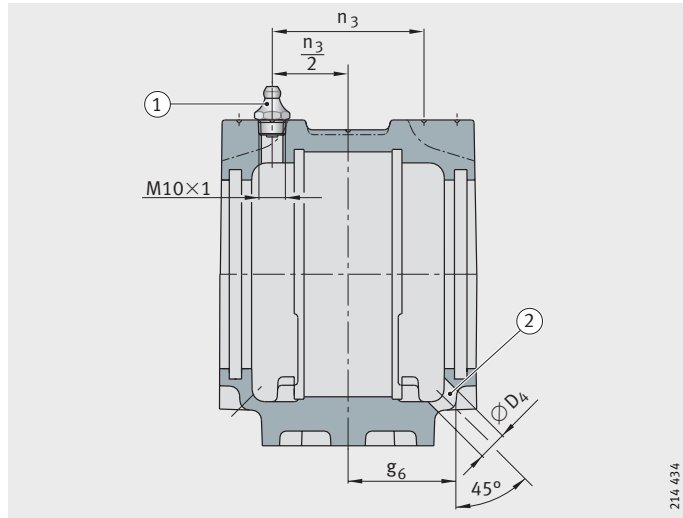
In housings with a grease outlet hole or non-contact seal, the bearing cannot be overlubricated. If the temperature reaches a higher level during relubrication due to the churning energy of the grease, it will return to its initial value after several hours of running once the excess grease has escaped. In the interests of the environment, controlled metering of lubricant is recommended.

Due to their favourable flow behaviour, greases of consistency class 2, e.g. Arcanol MULTITOP and MULTI2, are more suitable for relubrication than greases of higher consistency classes.

Recommended grease quantity

The quantities stated are valid for the initial filling of SNV housings. The bearings are thus filled completely with grease while the housing cavities are filled to 60%.

Housing	Grease quantity Initial filling ≈g
SNV052	30
SNV062	45
SNV072	65
SNV080	80
SNV085	105
SNV090	130
SNV100	180
SNV110	210
SNV120	270
SNV125	290
SNV130	330
SNV140	440
SNV150	500
SNV160	650
SNV170	700
SNV180	900
SNV190	950
SNV200	1 200
SNV215	1 400
SNV230	1 600
SNV240	1 700
SNV250	2 000
SNV260	2 000
SNV270	2 500
SNV280	2 600
SNV290	3 000
SNV300	3 100
SNV320	3 700
SNV340	4 500



① Lubrication nipple (example)
② Outlet hole

Figure 6
Recommended dimensions for lubrication nipple connector hole and grease outlet hole

Recommended dimensions for lubrication nipple connector hole and grease outlet hole

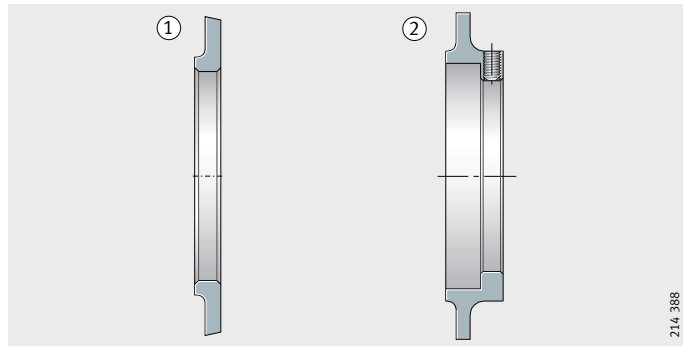
Housing	Connector for lubrication nipple	Grease outlet hole	
	$\frac{n_3}{2}$	D_4	g_6
	mm	mm	mm
SNV052	19	10	27,5
SNV062	21	10	30
SNV072	23	10	33
SNV080	26	10	36
SNV085	23,5	10	34,5
SNV090	29	10	41,5
SNV100	31	15	44
SNV110	33,5	15	46
SNV120	35,5	15	49
SNV125	28,5	10	41
SNV130	38	15	51,5
SNV140	40,5	15	57,5
SNV150	42,5	15	60
SNV160	45	15	62,5
SNV170	46,5	20	64
SNV180	49,5	20	69
SNV190	49,5	20	68,5
SNV200	55,5	20	77,5
SNV215	58,5	20	80
SNV230	61	20	83
SNV240	60	20	81,5
SNV250	65,5	20	89
SNV260	62,5	20	84
SNV270	71,5	20	96,5
SNV280	68	20	92,5
SNV290	76	20	102,5
SNV300	73	20	99,5
SNV320	77	20	104,5
SNV340	81	20	109,5

Housings SNV for grease relubrication (suffix G944A*, available by agreement) have a lubrication nipple and an outlet hole of the dimensions given in the table, see table, page 1331. Example: design G944AA with tapered lubrication nipple to DIN 71412-A M10×1.

Grease valves RSV

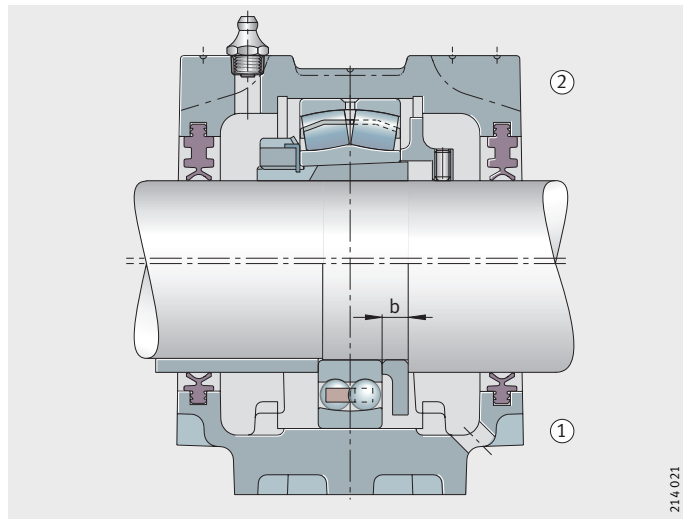
For operation at high speeds, for example in fan bearing arrangements, we can by agreement supply grease valves RSV, *Figure 7* and *Figure 8*.

The grease valves for housings SNV of design G944A* must be ordered separately. For bearings located by means of adapter sleeves, grease valves RSV5 or RSV6 should be used, for bearings with a cylindrical bore, RSV2 or RSV3 should be used.



① RSV2, RSV3
② RSV5, RSV6

Figure 7
Grease valves RSV



① RSV2, RSV3
② RSV5, RSV6
b = valve width

Figure 8
Grease valves RSV, mounting position

Dimensions of grease valves RSV

Grease valve	Width b mm
RSV205 to RSV211	8
RSV212 to RSV218	10
RSV219 to RSV222	13
RSV224 to RSV232	15
RSV305 to RSV308	8
RSV309 to RSV313	10
RSV314 to RSV316	13
RSV317 to RSV322	15
RSV324 to RSV332	16

Oil lubrication

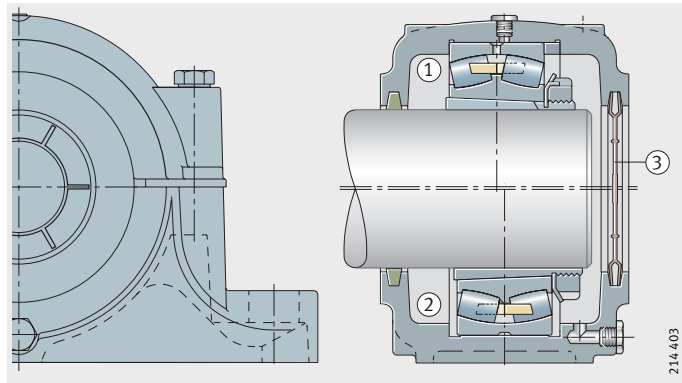
Housings SNV are designed such that they are suitable for both oil bath and recirculating oil lubrication. The housings have a large internal cavity with oil collector pockets in the lower section as well as connector facilities for oil inlet, oil outlet, oil level sensors and temperature sensors. When using oil bath lubrication, a minimum oil level must be ensured. If the FAG double lip seal is used, a certain amount of oil leakage must be expected, which is unavoidable with seals that are split and not spring-loaded. In order to limit oil leakage to a small quantity, the shaft in the double lip contact areas should be as follows: hardness min. 55 HRC, ground free from spiral marks with R_a = 0,2 µm up to max. 0,5 µm.

The parting line between the upper and lower sections of the housing must be sealed with a thin layer of a commercial sealant (with permanent elasticity).

Please note that the housing must be ventilated if oil bath lubrication is used (for example, the inlet hole can be closed off using a ventilation plug).

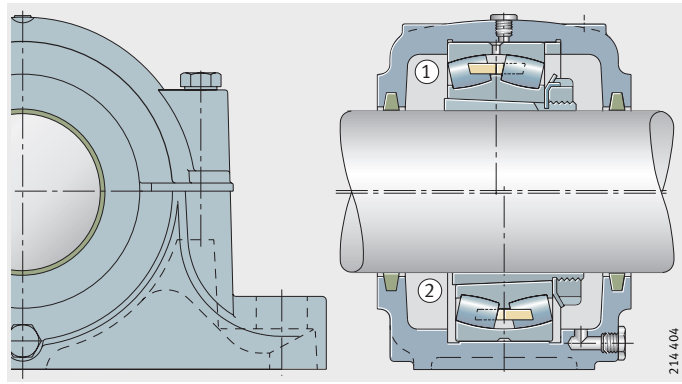
Split plummer block housings S30

Split plummer block housings for spherical roller bearings 230..-K with tapered bore and adapter sleeve, *Figure 9* to *Figure 12*, page 1335.



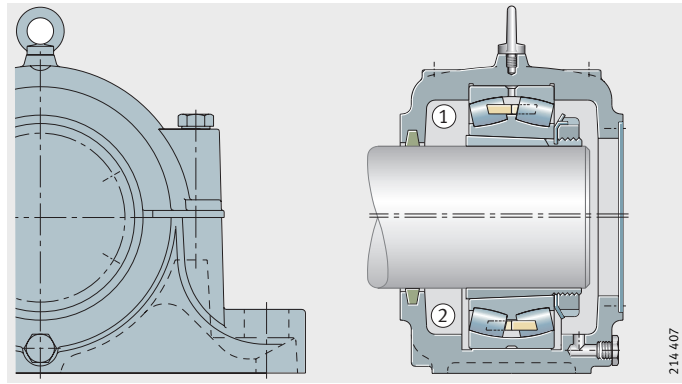
① Locating bearing
② Non-locating bearing
③ Cover DK

Figure 9
Plummer block housing S30 up to and including size S3040 with cover DK



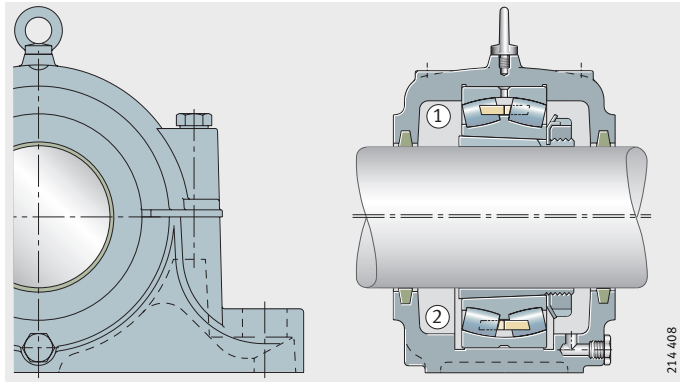
① Locating bearing
② Non-locating bearing

Figure 10
Plummer block housing S30 up to and including size S3040 without cover DK



① Locating bearing (AF)
② Non-locating bearing (AL)

Figure 11
Plummer block housing S30 from size S3044, design A



① Locating bearing (BF)
② Non-locating bearing (BL)

Figure 12
Plummer block housing S30 from size S3044, design B

Plummer block housings of series S30 for spherical roller bearings of series 230..-K with tapered bore and adapter sleeve

The smaller housings including S3040 are non-locating bearing housings; locating bearing arrangements can be achieved by inserting a locating ring. Locating rings must be ordered separately. Housings closed on one side up to size S3040 have a polyamide cover inserted in the slot instead of the felt strip. This cover must be ordered separately.

The larger housings from S3044 are produced as non-locating bearing housings or as locating bearing housings. When ordering housings closed on one side, design A must be indicated in the order. The cover is made from steel. Housings of design B are intended for continuous shafts.

The housings are sealed using felt strips. Felt seals allow shaft misalignment of up to 0,5° in both directions.

Housings of series S30 can be relubricated via a lubrication connector in the centre of the housing. In size S3034 and larger, the housings have an eye bolt that must not be subjected to a load greater than the mass of the housing including the bearing.

The housing material is flake graphite cast iron (suffix L). Housings made from spheroidal graphite cast iron (suffix D) are available by agreement.

Load carrying capacity: see also Load carrying capacity of split plummer block housings, page 1356.

The maximum axial load carrying capacity is 35% of $F_{180°}$.

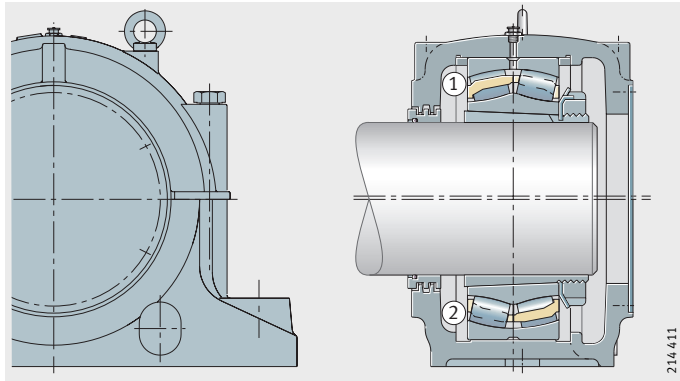
Recommended grease quantity

The quantities stated are valid for the initial filling of S30 housings. The bearings are thus filled completely with grease while the housing cavities are filled to 60% .

Housing	Grease quantity Initial filling ≈g
S3024	390
S3026	560
S3028	630
S3030	730
S3032	970
S3034	1 100
S3036	1 300
S3038	1 300
S3040	2 000
S3044	2 700
S3048	2 700
S3052	3 700
S3056	4 200
S3060	5 200
S3064	5 500
S3068	6 800
S3072	7 200
S3076	8 600
S3080	10 400
S3084	12 000
S3088	13 200
S3092	14 600
S3096	15 100

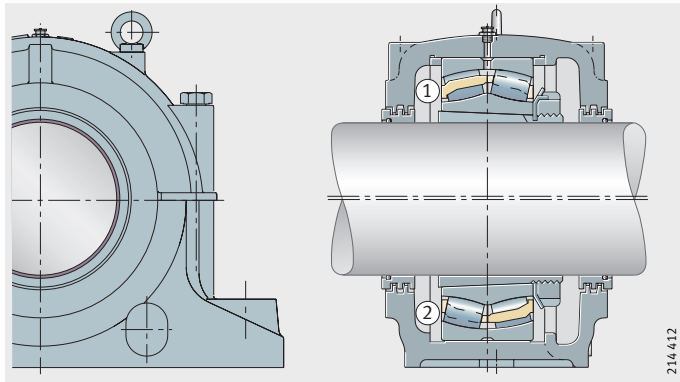
Split plummer block housings SD31

Split plummer block housings for spherical roller bearings 231..-K with tapered bore and adapter sleeve, *Figure 13* to *Figure 16*, page 1338.



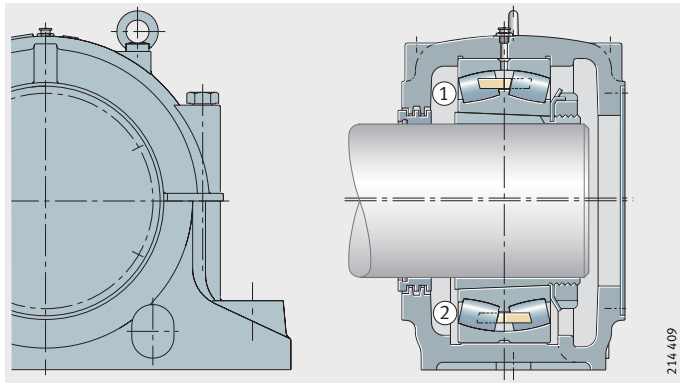
① Locating bearing
② Non-locating bearing

Figure 13
Plummer block housing SD31 up to and including size SD3140, design A



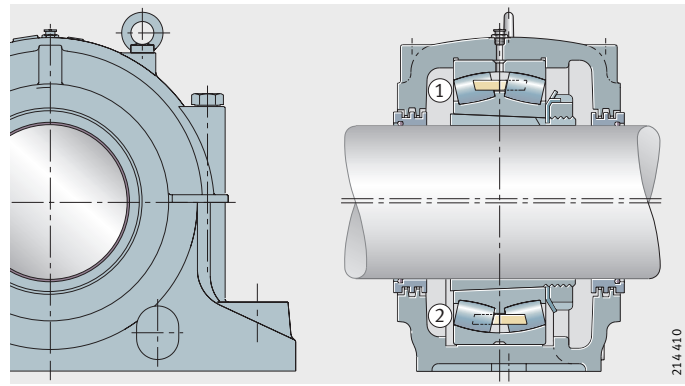
① Locating bearing
② Non-locating bearing

Figure 14
Plummer block housing SD31 up to and including size SD3140, design B



① Locating bearing (AF)
② Non-locating bearing (AL)

Figure 15
Plummer block housing SD31 from size S3144, design A



① Locating bearing (BF)
② Non-locating bearing (BL)

Figure 16
Plummer block housing SD31 from size SD3144, design B

Plummer block housings of series SD31 for spherical roller bearings of series 231..-K with tapered bore and adapter sleeve

These housings are intended for bearing arrangements subjected to heavy loads. The bearings are located on the shaft by means of adapter sleeves.

From SD3144, the housings are supplied as a locating bearing design or non-locating bearing design. Smaller housings initially give non-locating bearing arrangements. Locating bearing arrangements can be achieved by the insertion of locating rings on both sides of the bearing. Locating rings must be ordered separately.

The housings are intended for grease lubrication and can be relubricated via a lubrication nipple.

For the holes required for oil lubrication, the upper and lower section of the housings have cast-on bosses.

The seal is a three-section labyrinth. Labyrinth seals allow shaft misalignment of up to 0,25° in both directions. Housings closed on one side (design A) are supplied with a steel cover.

The eye bolts in the upper section of the housing must not be subjected to a load greater than the mass of the housing including the bearing.

The housing material is flake graphite cast iron (suffix L). Housings made from spheroidal graphite cast iron (suffix D) are available by agreement.

See also Load carrying capacity of split plummer block housings and table, page 1357.

The maximum axial load carrying capacity is $^{2}/_{3}$ of $F_{180°}$.

Recommended grease quantity

The quantities stated are valid for the initial filling of SD31 housings. The bearings are thus filled completely with grease while the housing cavities are filled to 60% .

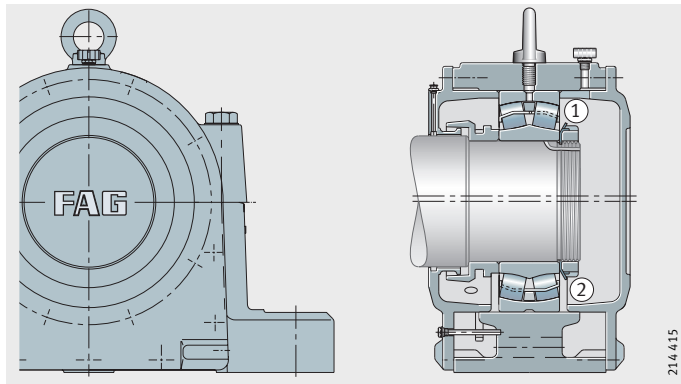
Housing	Grease quantity Initial filling ≈g
SD3134	1 700
SD3136	2 100
SD3138	2 800
SD3140	3 600
SD3144	4 200
SD3148	5 200
SD3152	6 700
SD3156	7 000
SD3160	10 000
SD3164	12 000
SD3168	18 000
SD3172	18 000
SD3176	23 000
SD3180	23 000
SD3184	32 000
SD3188	32 000
SD3192	40 000
SD3196	40 000

Split plummer block housings LOE for oil lubrication

Split plummer block housings LOE are designed for oil lubrication.

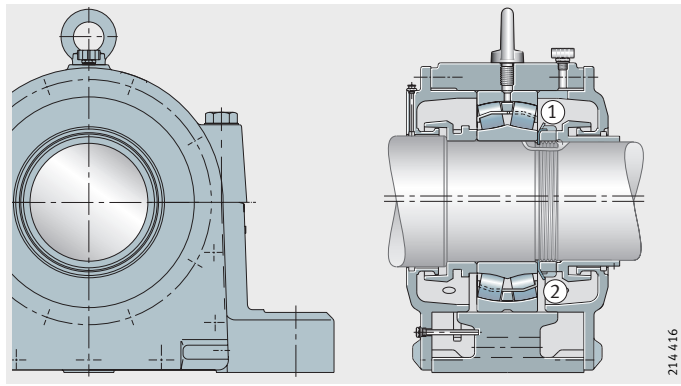
Plummer block housings LOE2 and LOE3 are fitted with spherical roller bearings with a cylindrical bore of series 222 and 223, *Figure 17* and *Figure 18*.

The bearings are located on the shaft using an interference fit and axially secured by means of a locknut.



① Locating bearing (AF)
② Non-locating bearing (AL)

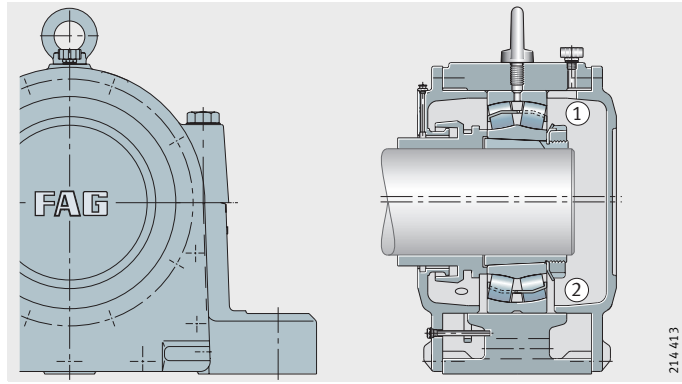
Figure 17
Plummer block housings LOE2, LOE3, design A



① Locating bearing (BF)
② Non-locating bearing (BL)

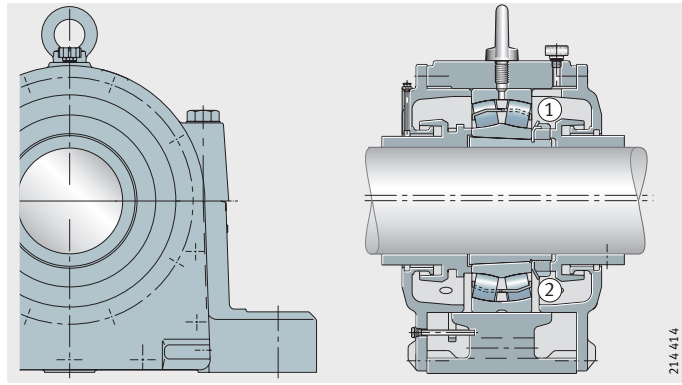
Figure 18
Plummer block housings LOE2, LOE3, design B

LOE plummer block housings LOE5 and LOE6 are intended for spherical roller bearings with tapered bore and adapter sleeve location, *Figure 19* and *Figure 20*.



① Locating bearing (AF)
② Non-locating bearing (AL)

Figure 19
Plummer block housings LOE5, LOE6, design A



① Locating bearing (BF)
② Non-locating bearing (BL)

Figure 20
Plummer block housings LOE5, LOE6, design B

The housing is split, the labyrinth covers are unsplit.
The seal comprises two labyrinth rings. Labyrinth seals allow shaft misalignment of up to 0,25° in both directions.
The grease chamber in the cover labyrinth can be relubricated.
The housing base has four extended slots.

Plummer block housings of series LOE are suitable for high-speed bearing arrangements and are designed for oil lubrication. The oil is supplied to the rolling bearing from the oil sump in the lower section of the housing by a ring oiler. An angled oil level indicator is screwed to one cover.

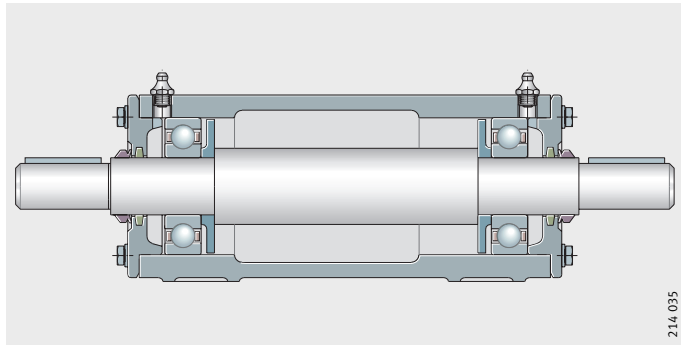
Housings of series LOU for recirculating oil lubrication are available by agreement.

The eye bolt in the upper section of the housing must not be subjected to a load greater than the mass of the housing including the bearing.

The housing material is flake graphite cast iron (suffix L).

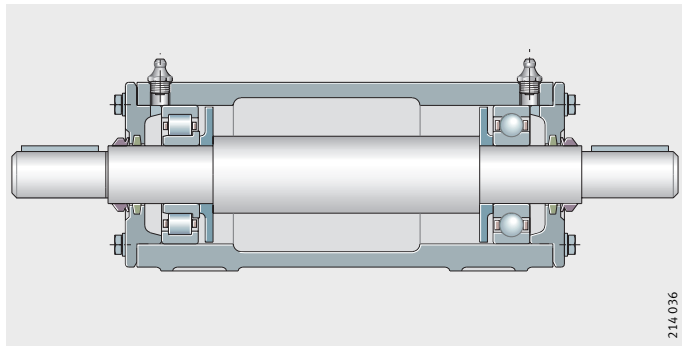
Unsplit plummer block housings VR3

Plummer block housings VR3 are fitted with rolling bearings with a cylindrical bore, *Figure 21* to *Figure 26*, page 1343.
The variants of these housings are available completely assembled and greased as bearing units VRE3.



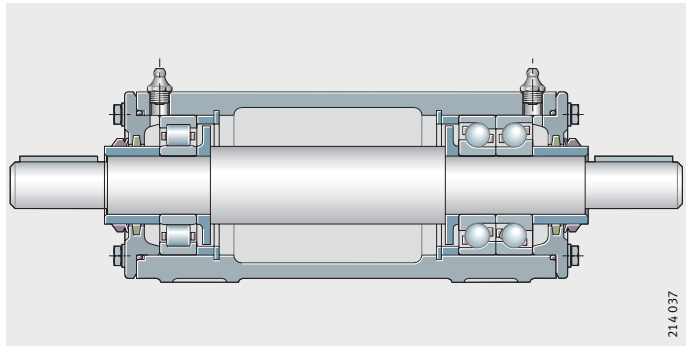
Housing VR3..-A
2 deep groove ball bearings
in floating arrangement
Shaft VRW3..-A

Figure 21
Unit VRE3..-A



Housing VR3..-A
1 deep groove ball bearing and
1 cylindrical roller bearing NJ
in floating arrangement
Shaft VRW3..-A

Figure 22
Unit VRE3..-B



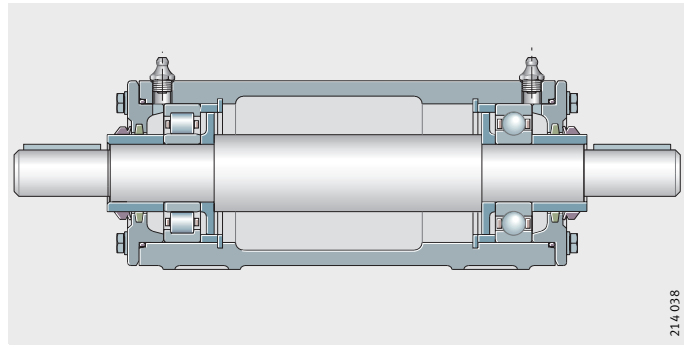
Housing VR3..-C
Locating/non-locating bearing
arrangement with
1 cylindrical roller bearing NU and
2 angular contact ball bearings
in O arrangement
Shaft VRW3..-C

Figure 23
Unit VRE3..-C

In size VR(E)310 and larger, the housings have two eye bolts that must not be subjected to a load greater than the mass of the housing including the bearing and shaft.
After mounting, the eye bolts can be replaced by the hexagon head bolts with seals included in the packaging.

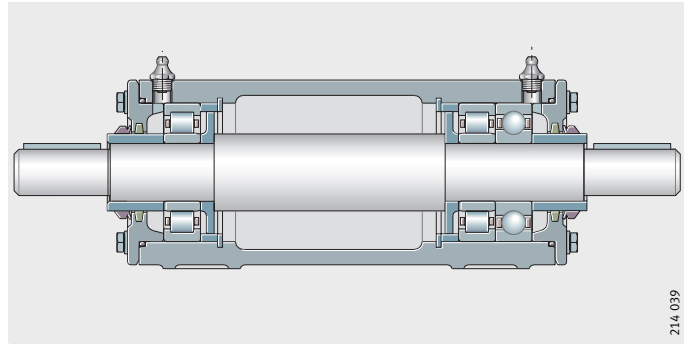
Housing VR3..-D
Locating/non-locating bearing arrangement with
1 cylindrical roller bearing NU and
1 deep groove ball bearing
Shaft VRW3..-D

Figure 24
Unit VRE3..-D



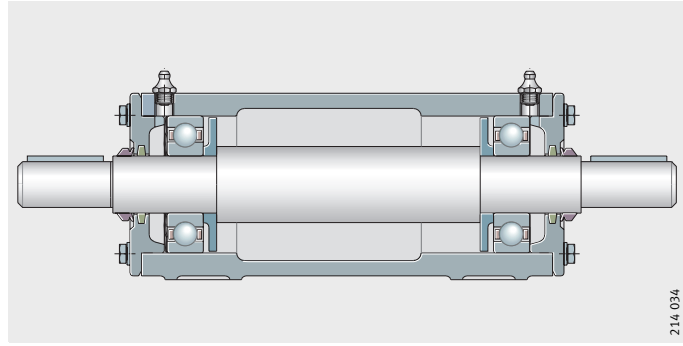
Housing VR3..-E
Locating/non-locating bearing arrangement with
1 cylindrical roller bearing NU,
1 cylindrical roller bearing NU and
1 deep groove ball bearing
Shaft VRW3..-C

Figure 25
Unit VRE3..-E



Housing VR3..-F
2 deep groove ball bearings in floating arrangement, axially adjusted by spring between outer ring and housing cover
Shaft VRW3..-F

Figure 26
Unit VRE3..-F



These unsplit housings, developed for fan applications, contain two bearing positions. They are used where a precise and easy-to-fit bearing arrangement is required, for example in:

- conveying equipment
- test rigs
- materials processing machinery
- belt drives
- laboratory equipment
- textile machinery
- feeder mechanisms.

Bearing housings

All variants of housings VR3 are available completely assembled and greased as bearing units VRE3. They can be integrated directly in existing machinery without substantial preparation.
The shaft diameter range extends from 25 mm to 120 mm.

Advantages of bearing units VRE3:

- Easy to fit
- Low maintenance requirements
- Effective, low-friction sealing against dust and moisture (max. permissible operating temperature +100 °C)
- Bearing arrangement contained in single-piece housing, therefore requiring no time-consuming alignment work
- High tilting moments supported by two bearings with optimum spacing
- Six designs allow matching to different load conditions.

In addition to complete bearing units VRE3, the following are also available:

- housings VR3 with covers, grease valves, lubrication nipples, seals, locating elements and, if necessary, a spring washer
- shafts VRW with fasteners
- rolling bearings.

Areas of application of designs

Design A is suitable for predominantly radial load and high speed. It can support axial loads in both directions (not alternating).

Design B is suitable for high radial load on one side.
It can only support axial forces in one direction.

Design C is suitable for high radial load on one side.
It can support high axial forces in both directions.

Design D is suitable for axial loads in both directions.

Design E is suitable for high radial loads on both sides and axial loads in both directions.

Design F is suitable for predominantly radial load and high speed. It can support axial load in one direction (facing away from the spring).

Marking

A cast-on boss on the housing body indicates:

- in design B, the position of the cylindrical roller bearing
- in designs C, D and E, the position of the non-locating bearing
- in design F, the position of the ondular washer.

On the shaft VRW3..-F, the position of the ondular washer is also marked.

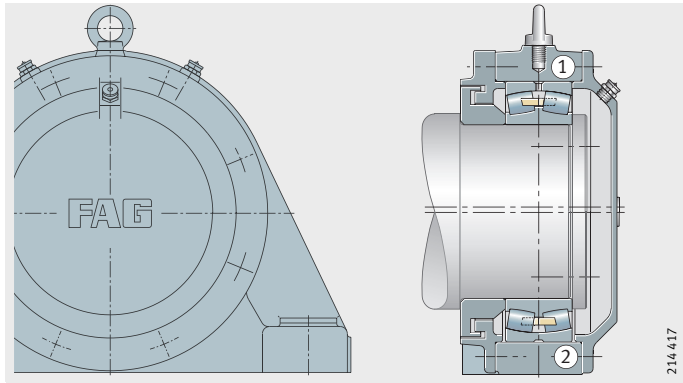
The housing is made from flake graphite cast iron, the shaft is made from steel.

Further information

Further information on lubrication and sealing, fitting and maintenance of VRE units is given in publication WL 90121, FAG Bearing Units for Fans, Series VRE3.

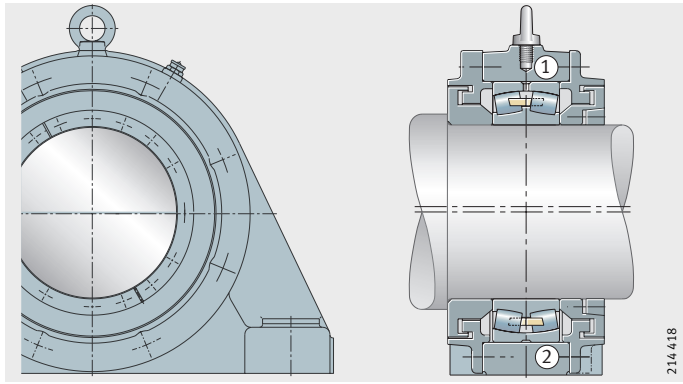
Unsplit plummer block housings BND

Unsplit FAG housings of series BND are combined with FAG spherical roller bearings, seals and grease filling to form bearing units for very high demands, *Figure 27* to *Figure 38*, page 1348.



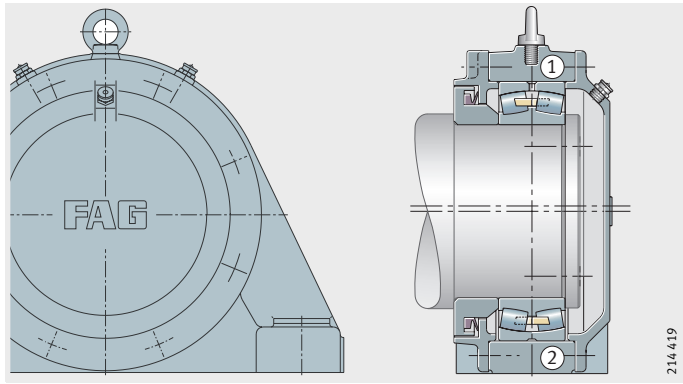
① Locating bearing BND..-Z-Y-AF-S
② Non-locating bearing BND..-Z-Y-AL-S

Figure 27
Plummer block housing BND
for bearings with cylindrical bore
(labyrinth seal), design A



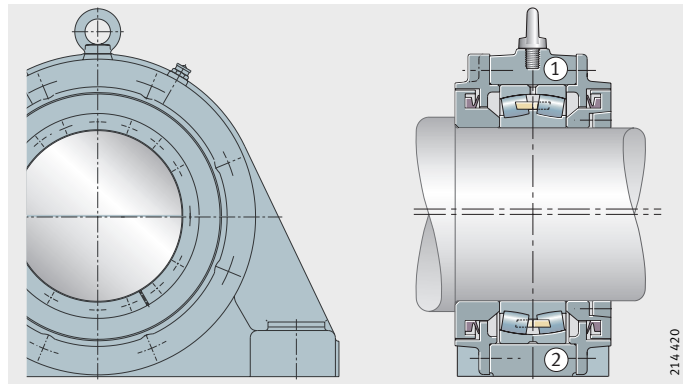
① Locating bearing BND..-Z-Y-BF-S
② Non-locating bearing BND..-Z-Y-BL-S

Figure 28
Plummer block housing BND
for bearings with cylindrical bore
(labyrinth seal), design B



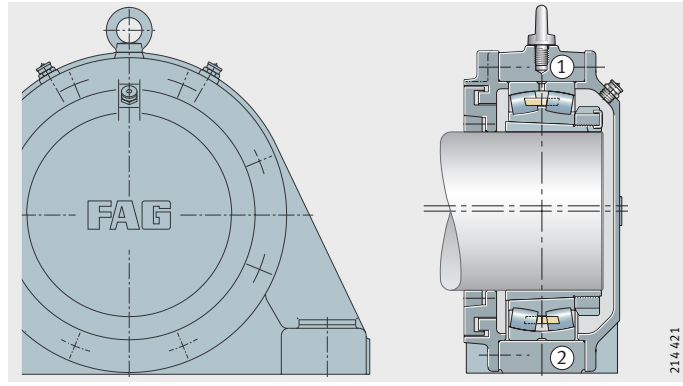
① Locating bearing BND..-Z-T-AF-S
② Non-locating bearing BND..-Z-T-AL-S

Figure 29
Plummer block housing BND
for bearings with cylindrical bore
(Taconite seal), design A



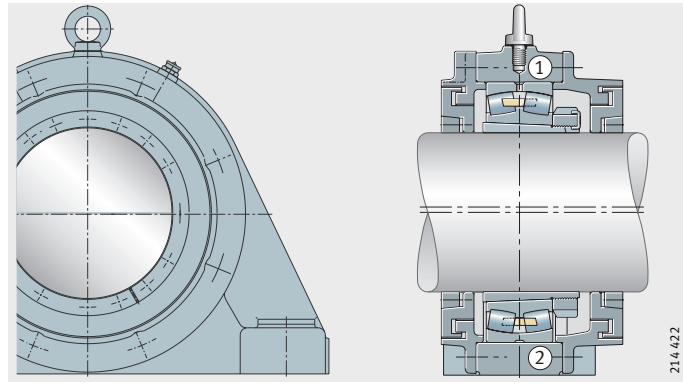
① Locating bearing BND..-Z-T-BF-S
② Non-locating bearing BND..-Z-T-BL-S

Figure 30
Plummer block housing BND
for bearings with cylindrical bore
(Taconite seal), design B



① Locating bearing BND..-H-W-Y-AF-S
② Non-locating bearing BND..-H-W-Y-AL-S

Figure 31
Plummer block housing BND
for bearings with tapered bore
and adapter sleeve
(labyrinth seal), design A

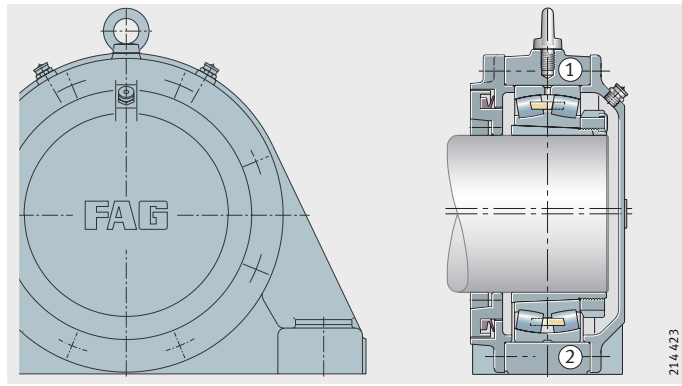


① Locating bearing BND..-H-W-Y-BF-S
② Non-locating bearing BND..-H-W-Y-BL-S

Figure 32
Plummer block housing BND
for bearings with tapered bore
and adapter sleeve
(labyrinth seal), design B

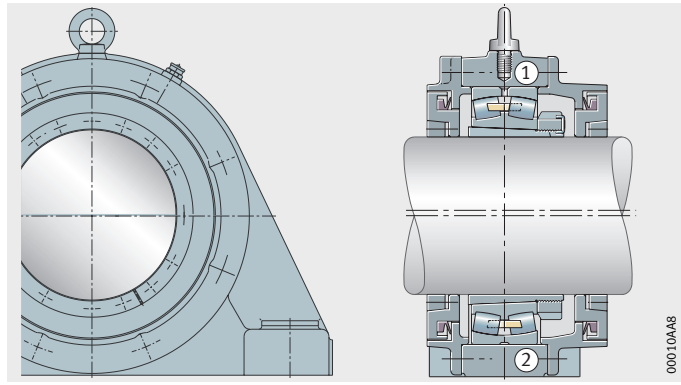
① Locating bearing BND..-H-W-T-AF-S
② Non-locating bearing BND..-H-W-T-AL-S

Figure 33
Plummer block housing BND
for bearings with tapered bore
and adapter sleeve
(Taconite seal), design A



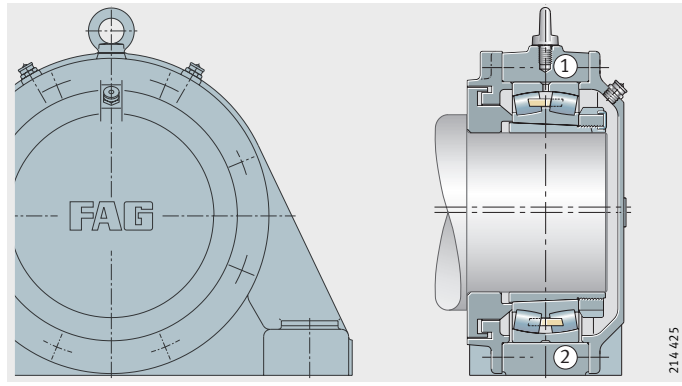
① Locating bearing BND..-H-W-T-BF-S
② Non-locating bearing BND..-H-W-T-BL-S

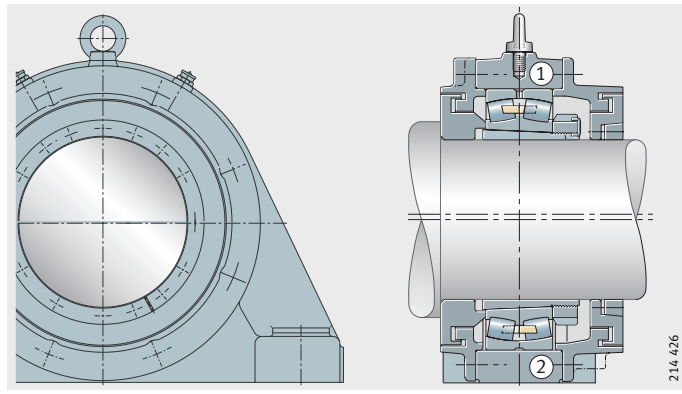
Figure 34
Plummer block housing BND
for bearings with tapered bore
and adapter sleeve
(Taconite seal), design B



① Locating bearing BND..-H-C-Y-AF-S
② Non-locating bearing BND..-H-C-Y-AL-S

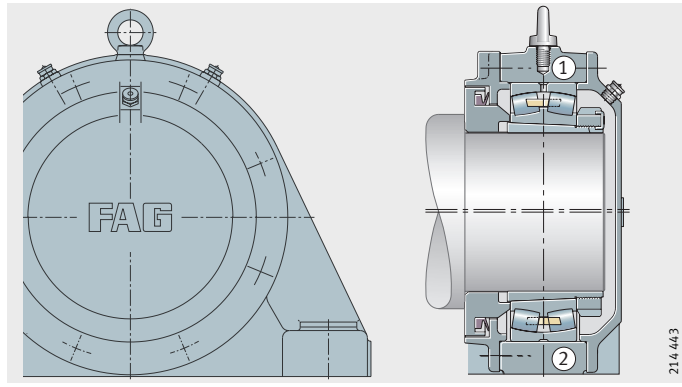
Figure 35
Plummer block housing BND
for bearings with tapered bore
and adapter sleeve and for shaft
with abutment shoulder
(labyrinth seal), design A





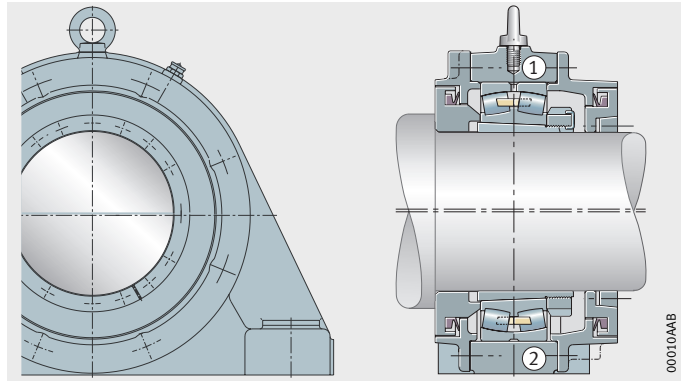
① Locating bearing BND..-H-C-Y-BF-S
② Non-locating bearing BND..-H-C-Y-BL-S

Figure 36
Plummer block housing BND for bearings with tapered bore and adapter sleeve and for shaft with abutment shoulder (labyrinth seal), design B



① Locating bearing BND..-H-C-T-AF-S
② Non-locating bearing BND..-H-C-T-AL-S

Figure 37
Plummer block housing BND for bearings with tapered bore and adapter sleeve and for shaft with abutment shoulder (Taconite seal), design A



① Locating bearing BND..-H-C-T-BF-S
② Non-locating bearing BND..-H-C-T-BL-S

Figure 38
Plummer block housing BND for bearings with tapered bore and adapter sleeve and for shaft with abutment shoulder (Taconite seal), design B

Unsplit housings of series BND, originally developed for belt conveyors, can also be used advantageously in materials processing, for example in hard crushers, sugar cane mill drives and rotor shafts in wind turbines.

The dimensions of housings BND are matched to spherical roller bearings of series 222, 230, 231 and 232.

In housings BND of design A for the bearing arrangements of shaft ends, one side is closed by a cover.
Design B is intended for continuous shafts.

The housing body, labyrinth rings and cover are unsplit.
The labyrinth rings are located by means of split tapered rings made from laminated fabric material. The labyrinth gaps are dimensioned so that the shafts can undergo deflection of approx. 0,5° in both directions without the labyrinths touching the bore.

Material

The standard material for the housing bodies is cast steel (suffix S). If required, housing bodies made from spheroidal graphite cast iron (suffix D) are available.

Bearing seat and fitting of bearings

The bearing seat in the housing is machined to H7. The housings are supplied as a locating bearing design or non-locating bearing design. In the locating bearing, the bearing is clamped between the housing covers. In the non-locating bearing, the bearing can align itself axially, since the covers have shorter centring collars.

Housings BND can accommodate rolling bearings with a cylindrical bore that are seated directly on a stepped shaft. For these bearings, we recommend machining the shaft to m6. Shaft seats for bearings with a tapered bore seated on adapter sleeves should be machined to h8.

Seals

Plummer block housings BND are sealed on one side (design A) or on both sides (design B) by labyrinths (suffix Y). If required, Taconite seals (suffix T) are available with a V ring integrated in the labyrinth (these must be provided with a separate relubrication facility).

Load carrying capacity

Guide values for the rupture load of housings BND:
see table, page 1358. When determining the permissible load, a safety factor 6 should be applied to the housing rupture load.

Housings BND should not be subjected to an axial load greater than 20% of the housing rupture load $F_{180°}$. For load directions between 55° and 120° and axial load, we recommend that the housings should be secured in the load direction by means of stops or dowels.

The eye bolts in the upper section of the housing must not be subjected to a load greater than the mass of the housing including the bearing.

Lubrication

Housings BND are designed for grease lubrication.
Suitable lubricants are lithium soap greases of consistency 2 and 3, for example the rolling bearing grease MULTI3 for low loads and MULTITOP and LOAD400 for high and very high loads.
The housings have button head lubrication nipples with a head diameter standardised to DIN 3 404 of 22 mm.
The grease is fed uniformly to both rows of rollers via the circumferential slot and three lubrication holes in the outer ring of the spherical roller bearings.

In initial lubrication, the cavities in the bearing, the housing and the labyrinths are completely filled with grease.
Recommended grease quantities, see table.

The relubrication intervals should be matched to the environmental conditions. The bearings should be relubricated after an interval of no more than four weeks.

For relubrication, we recommend approx. 10% of the grease used for initial filling. For machinery operating in highly contaminated environments, relubrication should be carried out daily with small quantities.

The quantities stated are valid for the initial filling of BND housings. The bearings and housing cavities are thus filled completely.

Recommended grease quantity

Bearing bore	Grease quantity for initial filling	
	BND31, BND22, BND32	BND30
mm	≈g	≈g
65	700	–
75	800	–
90	900	–
100	950	–
110	1 000	–
120	1 100	500
130	1 250	600
140	1 400	700
150	1 700	800
160	1 900	900
170	2 200	1 000
180	2 500	1 200
190	3 000	1 300
200	3 600	1 600
220	4 200	1 900
240	5 000	2 100
260	6 000	2 500
280	7 000	3 000
300	8 000	3 500
320	9 000	4 100
340	10 500	4 800
360	12 000	5 500
380	13 000	6 200
400	14 500	7 000
420	16 000	8 000

Flanged housings
Flanged housings F112

These housings are fitted with self-aligning ball bearings with an extended inner ring of series 112, *Figure 39*.

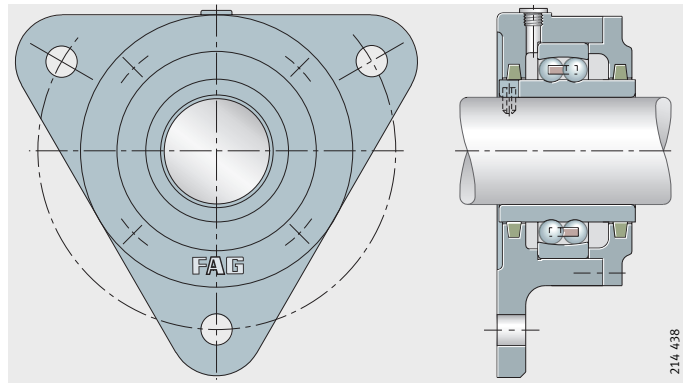


Figure 39
Flanged housing
for self-aligning ball bearings
with extended inner ring

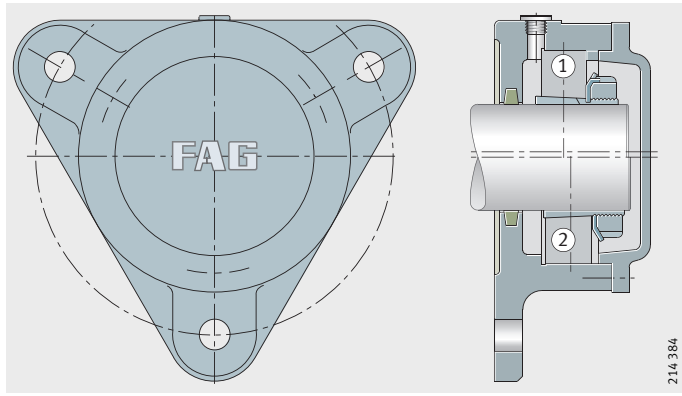
The flanged housings have covers made from flake graphite cast iron and felt seals. Felt seals allow shaft misalignment of up to 0,5° in both directions.

All flanged housings have a threaded hole M10×1 that is closed off by a plastic plug until relubrication is to be carried out.

The housing material is flake graphite cast iron.

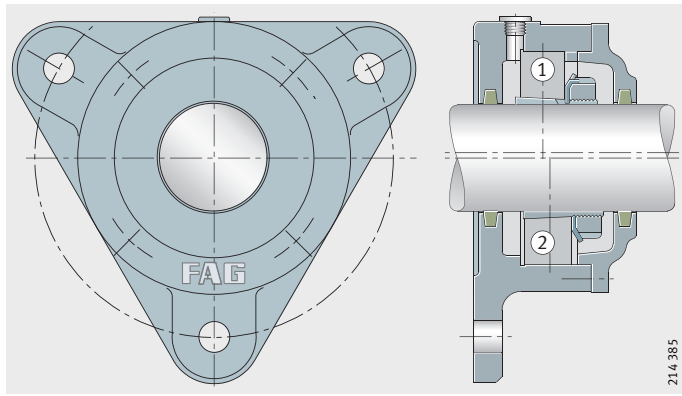
Flanged housings F5

Flanged housings for bearings with a tapered bore and adapter sleeve, *Figure 40* to *Figure 43*, page 1353.



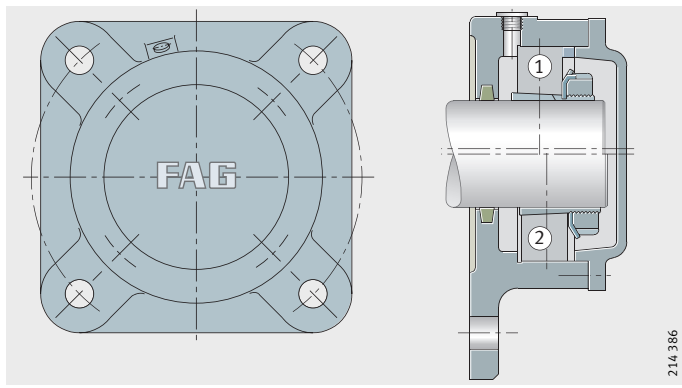
① Locating bearing (A, WA)
② Non-locating bearing (A, WA)

Figure 40
Flanged housing
for bearings with tapered bore and adapter sleeve F505, F506, F508, design A



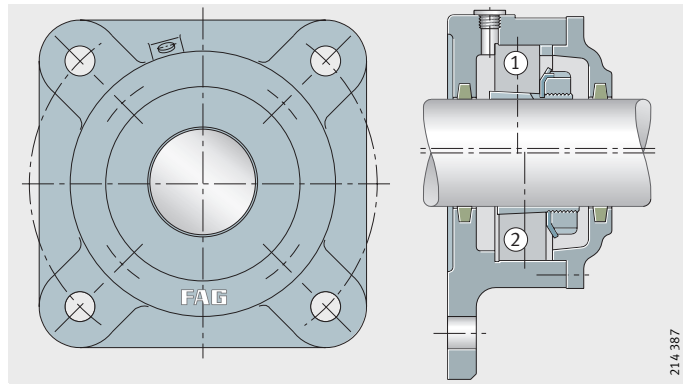
① Locating bearing (B, WB)
② Non-locating bearing (B, WB)

Figure 41
Flanged housing
for bearings with tapered bore and adapter sleeve F507, F509 to F513, design B



① Locating bearing (A, WA)
② Non-locating bearing (A, WA)

Figure 42
Flanged housing
for bearings with tapered bore and adapter sleeve F515 to F522, design A



① Locating bearing (B, WB)
② Non-locating bearing (B, WB)

Figure 43
Flanged housing
for bearings with tapered bore and
adapter sleeve F515 to F522,
design B

These flanged housings are suitable for self-aligning ball bearings, barrel roller bearings and spherical roller bearings with a tapered bore that are located on the shaft using adapter sleeves.
The housings are available with one side closed off (design A) or – for continuous shafts – open on both sides (design B).
Felt strips are used for sealing. Felt seals allow shaft misalignment of up to 0,5° in both directions.

The housings are designed as non-locating bearing housings. Locating bearing arrangements can be achieved by the insertion of locating rings. The number of rings required is indicated in the tables. Two rings are inserted on both sides of the bearing, a single ring is inserted on the side with the adapter sleeve nut. Locating rings must be ordered separately.

The housing material is flake graphite cast iron (suffix L).

Design and safety guidelines

Load carrying capacity of split plummer block housings

The permissible load on the housing is dependent on the strength of the housing and connecting screws, the load carrying capacity of the bearing and on the load direction. Guide values for the rupture load of the housings and the maximum load carrying capacity of the screws connecting the upper and lower sections of the housing are given on the following pages.

When determining the permissible load, safety factors must be applied. For general machine building, a safety factor 6 relative to the housing rupture load is normally applied.

The values in the tables apply if the mounting surface of the mating parts is in accordance with DIN ISO 2 768-H. A precondition for supporting loads is that the housing base surface is completely and rigidly supported.

Housings SNV and SD31 must not be subjected to more than $^{2}/_{3}$ of the housing rupture load $F_{180°}$, housings S30 must not be subjected to more than 35% of $F_{180°}$. For load directions between 55° and 120° and axial load, we recommend that the housings should be secured in the load direction by means of stops or dowels.

The eye bolts in the upper section of the housing must not be subjected to a load greater than the mass of the housing including the bearing.

Housings SNV

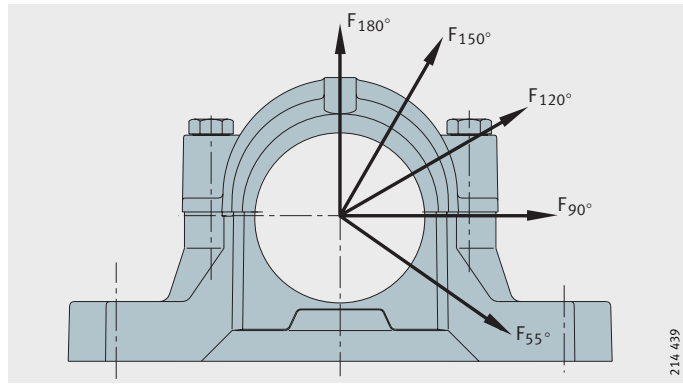


Figure 44
Guide values for the rupture load of housings SNV and the maximum load carrying capacity of the connecting screws (for tightening torques, see also page 1360)

Housing Designation	Housing rupture load in load direction F Housing made from flake graphite cast iron					Connecting screws			
						Thread to DIN 13	Maximum load carrying capacity of both screws with contact between parting surfaces in load direction		
	55°	90°	120°	150°	180°	Grade 8.8	120°	150°	180°
	kN						kN		
SNV052	160	95	70	60	80	M10	60	35	30
SNV062	170	100	80	65	85	M10	60	35	30
SNV072	190	110	85	80	95	M10	60	35	30
SNV080	210	130	95	85	105	M10	60	35	30
SNV085	225	140	100	90	120	M10	60	35	30
SNV090	265	160	120	105	130	M10	60	35	30
SNV100	280	170	125	120	140	M12	80	45	40
SNV110	300	180	130	125	150	M12	80	45	40
SNV120	335	200	150	130	170	M12	80	45	40
SNV125	335	200	150	130	170	M12	80	45	40
SNV130	400	250	180	150	200	M12	80	45	40
SNV140	425	265	190	170	210	M12	80	45	40
SNV150	475	280	200	180	235	M12	80	45	40
SNV160	530	335	250	210	265	M16	180	100	90
SNV170	560	355	265	225	280	M16	180	100	90
SNV180	630	375	280	250	300	M20	260	150	130
SNV190	630	375	280	250	300	M20	260	150	130
SNV200	670	400	315	280	335	M20	260	150	130
SNV215	800	450	355	315	400	M20	260	150	130
SNV230	900	530	400	355	450	M24	360	210	180
SNV240	1 000	600	450	400	500	M24	360	210	180
SNV250	1 060	630	475	425	530	M24	360	210	180
SNV260	1 180	710	530	475	600	M24	360	210	180
SNV270	1 180	710	530	475	600	M24	360	210	180
SNV280	1 320	750	600	530	630	M24	360	210	180
SNV290	1 400	850	630	560	710	M24	360	210	180
SNV300	1 500	900	670	600	750	M24	360	210	180
SNV320	1 700	1 000	750	670	850	M24	360	210	180
SNV340	1 900	1 120	850	750	950	M30	640	370	320

Housings made from spheroidal graphite cast iron (suffix D) have a housing rupture load 1,6 times higher than that of housings made from flake graphite cast iron.

Housings S30

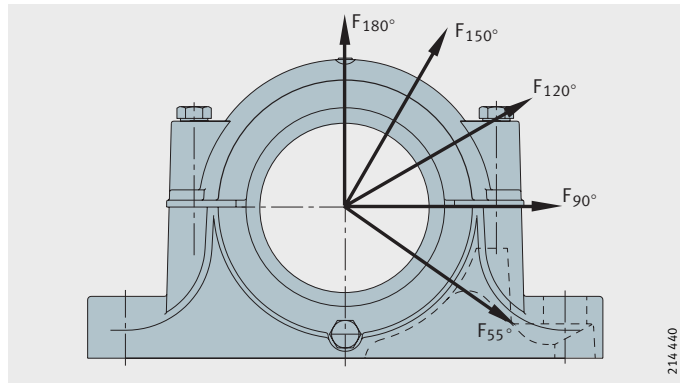


Figure 45
Guide values for the rupture load of housings S30 and the maximum load carrying capacity of the connecting screws (for tightening torques, see also page 1360)

Housing Designation	Housing rupture load in load direction F Housing made from flake graphite cast iron					Connecting screws			
						Thread to DIN 13	Maximum load carrying capacity of both screws with contact between parting surfaces in load direction		
	55°	90°	120°	150°	180°	Grade 8.8	120°	150°	180°
	kN						kN		
S3024	540	320	245	215	270	M20	260	150	130
S3026	620	370	280	250	310	M20	260	150	130
S3028	700	420	315	280	350	M20	260	150	130
S3030	780	470	350	310	390	M20	260	150	130
S3032	860	520	390	345	430	M20	260	150	130
S3034	1 000	600	450	400	500	M24	360	210	180
S3036	1 160	700	520	465	580	M24	360	210	180
S3038	1 300	780	585	520	650	M24	360	210	180
S3040	1 500	890	665	590	740	M24	360	210	180
S3044	1 700	1 020	765	680	850	M30	640	370	320
S3048	1 900	1 130	845	750	940	M30	640	370	320
S3052	2 200	1 320	990	880	1 100	M36	800	460	400
S3056	2 500	1 500	1 120	1 000	1 300	M36	800	460	400
S3060	2 700	1 620	1 215	1 080	1 350	M36	800	460	400
S3064	2 900	1 740	1 305	1 160	1 450	M36	800	460	400
S3068	3 200	1 920	1 440	1 280	1 600	M36	800	460	400
S3072	3 500	2 100	1 575	1 400	1 750	M36	800	460	400
S3076	3 900	2 340	1 755	1 560	1 950	M36	800	460	400
S3080	4 300	2 580	1 935	1 720	2 150	M36	800	460	400
S3084	4 900	2 940	2 205	1 960	2 450	M36	800	460	400
S3088	5 300	3 180	2 385	2 120	2 650	M36	800	460	400
S3092	6 100	3 660	2 745	2 440	3 050	M48	1 340	770	670
S3096	7 000	4 200	3 150	2 800	3 500	M48	1 340	770	670

Housings made from spheroidal graphite cast iron (suffix D) have a housing rupture load 1,6 times higher than that of housings made from flake graphite cast iron.

Housings SD31

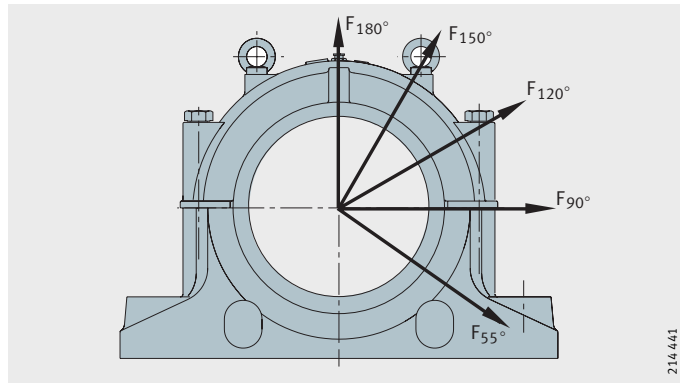


Figure 46
Guide values for the rupture load of housings SD31 and the maximum load carrying capacity of the connecting screws(for tightening torques, see also page 1360)

Housing Designation	Housing rupture load in load direction F Housing made from flake graphite cast iron					Connecting screws			
						Thread to DIN 13	Maximum load carrying capacity of the four screws with contact between parting surfaces in load direction		
	55°	90°	120°	150°	180°	Grade 8.8	120°	150°	180°
	kN						kN		
SD3134	2 600	1 100	1 000	940	1 050	M20	520	300	260
SD3136	2 750	1 200	1 050	1 000	1 100	M20	520	300	260
SD3138	3 000	1 350	1 150	1 100	1 200	M20	520	300	260
SD3140	4 000	1 700	1 450	1 400	1 600	M24	720	420	360
SD3144	4 250	1 900	1 600	1 500	1 700	M24	720	420	360
SD3148	4 600	2 300	1 800	1 600	1 850	M24	720	420	360
SD3152	5 500	2 550	2 150	2 050	2 200	M30	1 280	740	640
SD3156	6 600	3 100	2 400	2 250	2 650	M30	1 280	740	640
SD3160	7 750	3 400	2 900	2 800	3 100	M30	1 280	740	640
SD3164	8 100	3 650	3 100	3 000	3 250	M30	1 280	740	640
SD3168	8 850	4 000	3 200	3 100	3 550	M30	1 280	740	640
SD3172	9 750	4 500	3 350	3 250	3 900	M30	1 280	740	640
SD3176	10 300	4 800	3 400	3 300	4 150	M30	1 280	740	640
SD3180	10 700	5 000	3 500	3 400	4 300	M36	1 600	920	800
SD3184	12 000	5 800	4 000	3 750	4 800	M36	1 600	920	800
SD3188	12 400	5 950	4 450	3 950	4 950	M36	1 600	920	800
SD3192	13 300	6 350	4 750	4 250	5 300	M36	1 600	920	800
SD3196	14 300	6 850	5 150	4 550	5 700	M42	2 060	1 180	1 030

Housings made from spheroidal graphite cast iron (suffix D) have a housing rupture load 1,6 times higher than that of housings made from flake graphite cast iron.

Load carrying capacity of unsplit plummer block housings

The permissible load on the housing is dependent on the strength of the housing, the load carrying capacity of the bearing and on the load direction. Guide values for the rupture load of housings, see table.

When determining the permissible load, safety factors must be applied. For general machine building, a safety factor 6 relative to the housing rupture load is normally applied.

The values in the table apply if the mounting surface of the mating parts is in accordance with DIN ISO 2 768-H. A precondition for supporting loads is that the housing base surface is completely and rigidly supported.

Housings BND

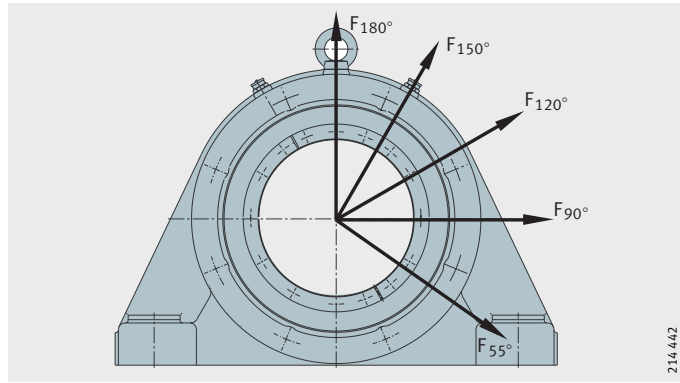


Figure 47
Guide values for the rupture load of housings BND made from cast steel and spheroidal graphite cast iron

Housing Designation				Housing rupture load in load direction F				
				55°	90°	120°	150°	180°
				kN				
BND2213	–	–	–	665	530	440	350	440
BND2215	–	–	–	880	705	580	465	580
BND2218	–	–	–	1 125	900	745	595	745
BND2220	BND3024	–	–	1 325	1 070	1 020	815	1 020
–	–	BND3122	–	1 900	1 530	1 685	1 345	1 685
BND2222	BND3026	–	–	1 580	1 275	1 120	920	1 120
–	–	BND3124	BND3222	1 875	1 500	1 685	1 345	1 685
BND2224	BND3028	–	–	1 785	1 430	1 225	1 020	1 225
–	–	BND3126	BND3224	2 020	1 610	1 735	1 385	1 735
BND2226	BND3030	–	–	2 040	1 630	2 140	1 735	2 140
–	BND3032	–	–	2 295	1 835	2 245	1 835	2 245
–	–	BND3128	BND3226	2 295	1 835	1 735	1 385	1 735
BND2228	BND3034	–	–	2 755	2 195	2 245	1 835	2 245
–	–	BND3130	BND3228	2 755	2 195	1 785	1 430	1 785
BND2230	BND3036	–	–	3 060	2 450	2 245	1 835	2 245
–	–	BND3132	BND3230	3 110	2 500	1 835	1 470	1 835
BND2232	BND3038	–	–	3 365	2 705	2 450	1 940	2 450
–	–	BND3134	BND3232	3 570	2 855	1 940	1 550	1 940
BND2234	BND3040	–	–	3 925	3 110	3 060	2 450	3 060
–	–	BND3136	BND3234	4 285	3 415	2 040	1 630	2 040
BND2236	–	–	–	4 435	3 570	3 470	2 755	3 470

Housing Designation				Housing rupture load in load direction F				
				55°	90°	120°	150°	180°
				kN				
BND2238	BND3044	–	–	4 435	3 570	3 470	2 755	3 470
–	–	BND3138	BND3236	4 590	3 725	2 140	1 715	2 140
–	–	BND3140	BND3238	5 610	4 540	2 295	1 835	2 295
BND2240	BND3048	–	–	5 050	4 030	4 895	3 875	4 895
–	–	BND3144	BND3240	6 120	4 935	2 550	2 040	2 550
BND2244	BND3052	–	–	5 660	4 540	5 000	3 980	5 000
–	BND3056	–	–	6 580	5 255	6 120	4 895	6 120
–	–	BND3148	BND3244	6 835	5 510	3 060	2 450	3 060
BND2248	BND3060	–	–	7 295	5 815	6 325	5 100	6 325
–	–	BND3152	BND3248	7 650	6 170	3 570	2 855	3 570
BND2252	BND3064	–	–	8 000	6 425	6 835	5 400	6 835
–	–	BND3156	BND3252	9 385	7 550	4 180	3 365	4 180
BND2256	BND3068	–	–	8 825	7 040	6 835	5 400	6 835
–	–	BND3160	BND3256	10 200	8 260	4 490	3 570	4 490
BND2260	BND3072	–	–	9 640	7 700	8 160	6 530	8 160
–	BND3076	–	–	10 810	8 670	8 365	8 770	8 365
–	–	BND3164	BND3260	11 935	9 535	5 100	4 080	5 100
BND2264	BND3080	–	–	12 035	9 690	9 080	7 240	9 080
–	–	BND3168	BND3264	14 280	11 375	5 815	4 590	5 815
BND2268	BND3084	–	–	13 360	10 760	9 280	7 345	9 280
–	–	BND3172	–	14 485	11 630	6 630	5 300	6 630
BND2272	–	–	–	15 700	12 570	10 370	8 325	10 370
–	–	BND3176	BND3268	16 320	13 055	6 630	5 300	6 630
BND2276	–	–	–	16 600	13 280	10 960	8 800	10 960
–	–	BND3180	BND3272	17 850	14 280	7 345	5 815	7 345
BND2280	–	–	–	19 750	15 800	13 030	10 470	13 030
–	–	–	BND3276	18 870	15 050	8 160	6 530	8 160
–	–	BND3184	–	19 380	15 600	8 160	6 530	8 160
BND2284	–	–	–	21 540	17 240	14 220	11 420	14 220
–	–	–	BND3280	22 440	17 950	9 280	7 445	9 280
–	–	–	BND3284	24 480	19 380	10 710	8 570	10 710

Tightening torques

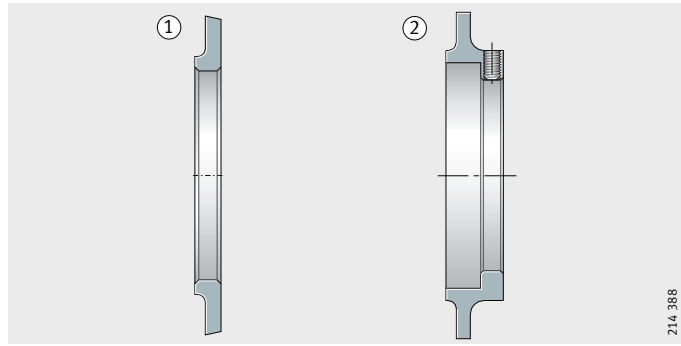
The tightening torques in the following table are maximum values for metric coarse-pitch threads to DIN 13-13 and head contact dimensions to DIN 912, 931, 933, 934, 6 912, 7 984 and 7 990.

They are valid with 90% utilisation of the yield stress of the screw material 8.8 and a friction factor of 0,14. We recommend that the screws should be tightened to 70% of these values. Housings are not supplied together with screws for the housing base.

Maximum tightening torques for screws with metric thread to DIN 13-13

Nominal screw size	Tightening torque Nm
M6	10,4
M8	25
M10	51
M12	87
M16	215
M20	430
M24	740
M30	1 450
M36	2 600
M42	4 000
M45	4 950
M48	6 000
M56	9 650
M64	14 400

Accessories
Grease valves



① RSV2, RSV3
② RSV5, RSV6

Figure 48
Grease valves RSV

Locating rings

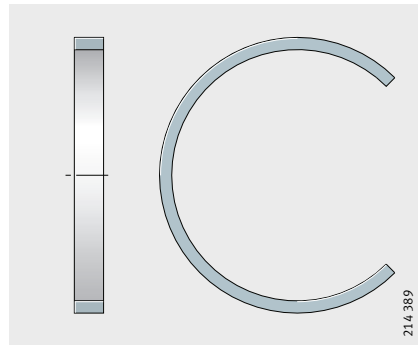


Figure 49
Locating ring FRM

Seals

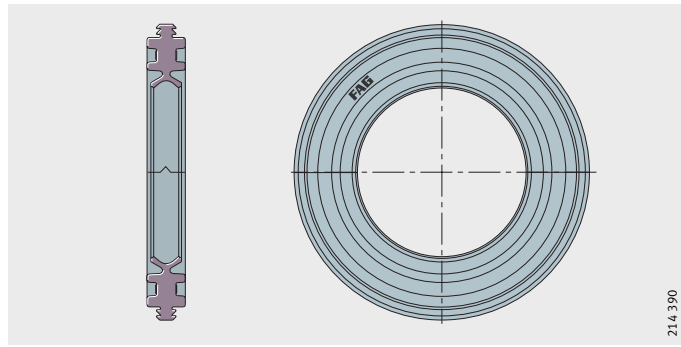
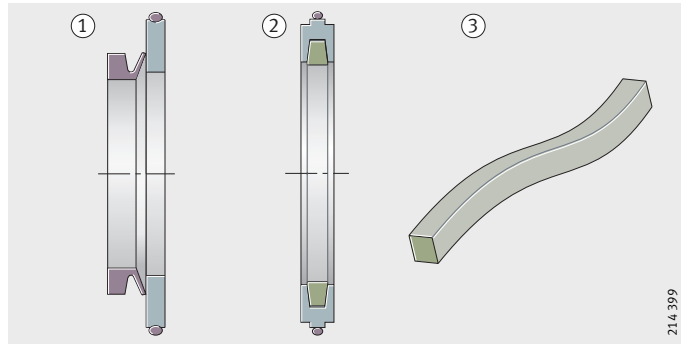
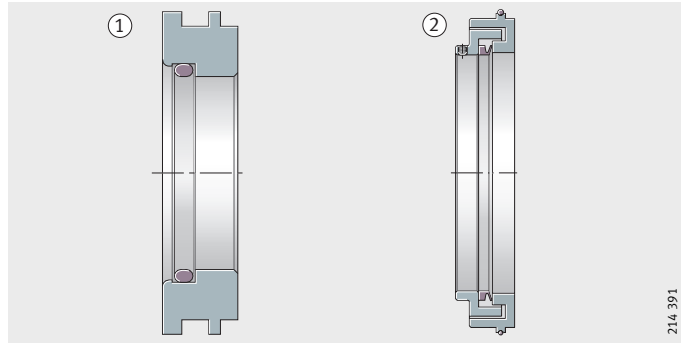


Figure 50
Double lip seal DH



① V ring seal DHV
② Felt seal FSV
③ Felt strip FJST

Figure 51
Seals DHV, FSV and FJST



① TSV
② TCV

Figure 52
Seals TSV and TCV

Covers

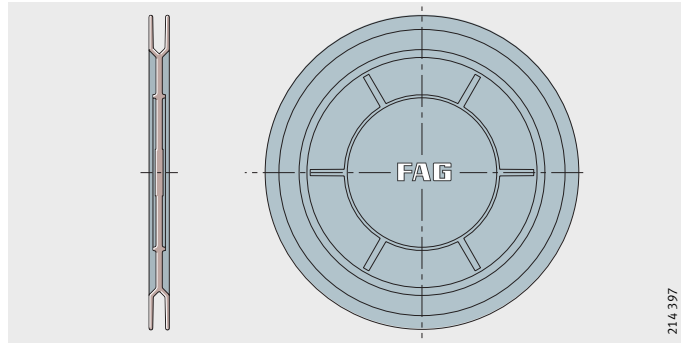
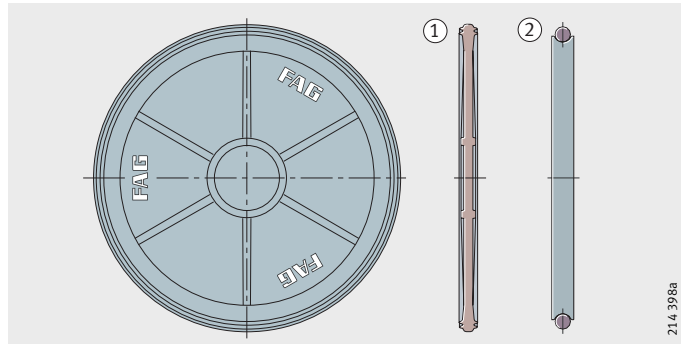


Figure 53
Cover DK

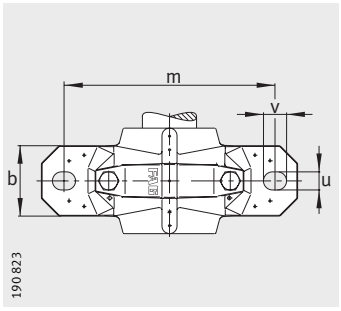


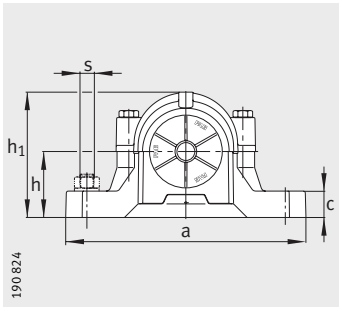
① Cover DKV
② Cover DKVT

Figure 54
Covers DKV and DKVT

Plummer block housings

SNV, split
For bearings with tapered bore
and adapter sleeve



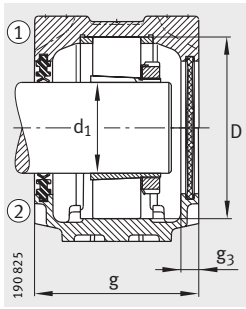


① Locating bearing
② Non-locating bearing

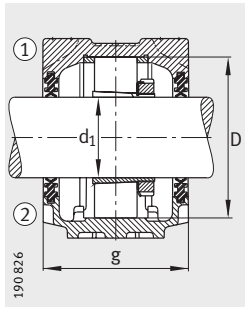
Dimension table · Dimensions in mm

Designation

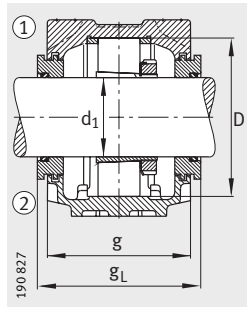
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV052-L	1205-K-TVH-C3	H205X012	FRM52/6	DH505X012	TSV505X012	FSV505X012	DHV505X012	–
SNV052-L	20205-K-T-VPC3	H205X012	FRM52/6	DH505X012	TSV505X012	FSV505X012	DHV505X012	–
SNV052-L	2205-K-TVH-C3	H305X012	FRM52/4,5	DH505X012	TSV505X012	FSV505X012	DHV505X012	–
SNV052-L	22205-E1-K	H305X012	FRM52/4,5	DH505X012	TSV505X012	FSV505X012	DHV505X012	–
SNV062-L	1305-K-TVH-C3	H305X012	FRM62/6,5	DH605X012	TSV605X012	FSV605X012	DHV605X012	–
SNV062-L	2305-K-TVH-C3	H2305X012	FRM62/3	DH605X012	TSV605X012	FSV605X012	DHV605X012	–
SNV052-L	1205-K-TVH-C3	H205	FRM52/6	DH505	TSV505	FSV505	DHV505	–
SNV052-L	20205-K-T-VPC3	H205	FRM52/6	DH505	TSV505	FSV505	DHV505	–
SNV052-L	2205-K-TVH-C3	H305	FRM52/4,5	DH505	TSV505	FSV505	DHV505	–
SNV052-L	22205-E1-K	H305	FRM52/4,5	DH505	TSV505	FSV505	DHV505	–
SNV062-L	1305-K-TVH-C3	H305	FRM62/6,5	DH605	TSV605	FSV605	DHV605	–
SNV062-L	2305-K-TVH-C3	H2305	FRM62/3	DH605	TSV605	FSV605	DHV605	–
SNV052-L	1205-K-TVH-C3	H205X013	FRM52/6	DH505	TSV505X013	FSV505	DHV505	–
SNV052-L	20205-K-T-VPC3	H205X013	FRM52/6	DH505	TSV505X013	FSV505	DHV505	–
SNV052-L	2205-K-TVH-C3	H305X013	FRM52/4,5	DH505	TSV505X013	FSV505	DHV505	–
SNV052-L	22205-E1-K	H305X013	FRM52/4,5	DH505	TSV505X013	FSV505	DHV505	–
SNV062-L	1206-K-TVH-C3	H206X014	FRM62/7	DH506X014	TSV506X014	FSV506X014	DHV506X014	–
SNV062-L	20206-K-T-VPC3	H206X014	FRM62/7	DH506X014	TSV506X014	FSV506X014	DHV506X014	–
SNV062-L	2206-K-TVH-C3	H306X014	FRM62/5	DH506X014	TSV506X014	FSV506X014	DHV506X014	–
SNV062-L	22206-E1-K	H306X014	FRM62/5	DH506X014	TSV506X014	FSV506X014	DHV506X014	–
SNV072-L	1306-K-TVH-C3	H306X014	FRM72/7	DH606X014	TSV606X014	FSV606X014	DHV606X014	TCV606X014
SNV072-L	2306-K-TVH-C3	H2306X014	FRM72/3	DH606X014	TSV606X014	FSV606X014	DHV606X014	TCV606X014
SNV062-L	1206-K-TVH-C3	H206X015	FRM62/7	DH506X014	TSV506X015	FSV506X015	DHV506X015	–
SNV062-L	20206-K-T-VPC3	H206X015	FRM62/7	DH506X014	TSV506X015	FSV506X015	DHV506X015	–
SNV062-L	2206-K-TVH-C3	H306X015	FRM62/5	DH506X014	TSV506X015	FSV506X015	DHV506X015	–
SNV062-L	22206-E1-K	H306X015	FRM62/5	DH506X014	TSV506X015	FSV506X015	DHV506X015	–
SNV072-L	1306-K-TVH-C3	H306X015	FRM72/7	DH606X014	TSV606X015	FSV606X015	DHV606X015	TCV606X015
SNV072-L	2306-K-TVH-C3	H2306X015	FRM72/3	DH606X014	TSV606X015	FSV606X015	DHV606X015	TCV606X015



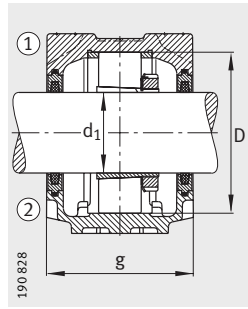
Double lip seal DH
Cover DKV



Double lip seal DH



Labyrinth ring TSV

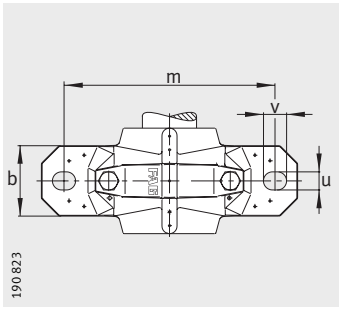


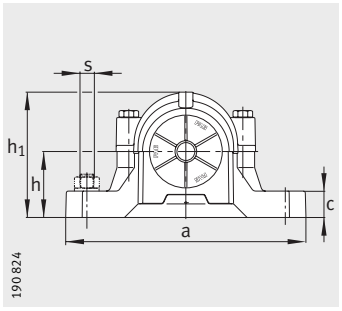
Felt seal FSV

	Mass m	Dimensions																	
Cover	Housing	d_1		a	g	h_1	b	c	D	g_L	g_V	g_T	g_3	h	m	u	v	s	
	≈kg	mm	inch															mm	inch
DKV052	1,3	**19,05**	$^3/_4$	165	70	75	46	19	52	83	76	–	10,5	40	130	15	20	M12	$^1/_2$
DKV052	1,3	**19,05**	$^3/_4$	165	70	75	46	19	52	83	76	–	10,5	40	130	15	20	M12	$^1/_2$
DKV052	1,3	**19,05**	$^3/_4$	165	70	75	46	19	52	83	76	–	10,5	40	130	15	20	M12	$^1/_2$
DKV052	1,3	**19,05**	$^3/_4$	165	70	75	46	19	52	83	76	–	10,5	40	130	15	20	M12	$^1/_2$
DKV062	1,9	**19,05**	$^3/_4$	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	$^1/_2$
DKV062	1,9	**19,05**	$^3/_4$	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	$^1/_2$
DKV052	1,3	**20**	–	165	70	75	46	19	52	83	76	–	10,5	40	130	15	20	M12	$^1/_2$
DKV052	1,3	**20**	–	165	70	75	46	19	52	83	76	–	10,5	40	130	15	20	M12	$^1/_2$
DKV052	1,3	**20**	–	165	70	75	46	19	52	83	76	–	10,5	40	130	15	20	M12	$^1/_2$
DKV052	1,3	**20**	–	165	70	75	46	19	52	83	76	–	10,5	40	130	15	20	M12	$^1/_2$
DKV062	1,9	**20**	–	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	$^1/_2$
DKV062	1,9	**20**	–	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	$^1/_2$
DKV052	1,3	**20,638**	$^{13}/_{16}$	165	70	75	46	19	52	83	76	–	10,5	40	130	15	20	M12	$^1/_2$
DKV052	1,3	**20,638**	$^{13}/_{16}$	165	70	75	46	19	52	83	76	–	10,5	40	130	15	20	M12	$^1/_2$
DKV052	1,3	**20,638**	$^{13}/_{16}$	165	70	75	46	19	52	83	76	–	10,5	40	130	15	20	M12	$^1/_2$
DKV052	1,3	**20,638**	$^{13}/_{16}$	165	70	75	46	19	52	83	76	–	10,5	40	130	15	20	M12	$^1/_2$
DKV062	1,9	**22,225**	$^7/_8$	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	$^1/_2$
DKV062	1,9	**22,225**	$^7/_8$	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	$^1/_2$
DKV062	1,9	**22,225**	$^7/_8$	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	$^1/_2$
DKV062	1,9	**22,225**	$^7/_8$	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	$^1/_2$
DKV072	2	**22,225**	$^7/_8$	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	$^1/_2$
DKV072	2	**22,225**	$^7/_8$	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	$^1/_2$
DKV062	1,9	**23,813**	$^{15}/_{16}$	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	$^1/_2$
DKV062	1,9	**23,813**	$^{15}/_{16}$	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	$^1/_2$
DKV062	1,9	**23,813**	$^{15}/_{16}$	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	$^1/_2$
DKV062	1,9	**23,813**	$^{15}/_{16}$	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	$^1/_2$
DKV072	2	**23,813**	$^{15}/_{16}$	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	$^1/_2$
DKV072	2	**23,813**	$^{15}/_{16}$	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	$^1/_2$

Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve



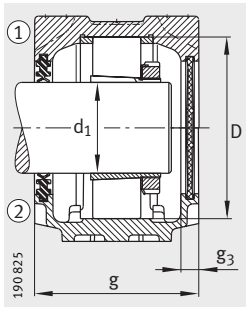


① Locating bearing
② Non-locating bearing

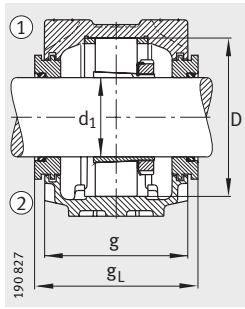
Dimension table (continued) · Dimensions in mm

Designation

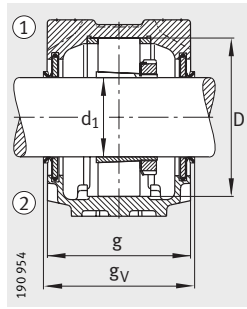
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV062-L	1206-K-TVH-C3	H206	FRM62/7	DH506	TSV506	FSV506	DHV506	–
SNV062-L	20206-K-T-VPC3	H206	FRM62/7	DH506	TSV506	FSV506	DHV506	–
SNV062-L	2206-K-TVH-C3	H306	FRM62/5	DH506	TSV506	FSV506	DHV506	–
SNV062-L	22206-E1-K	H306	FRM62/5	DH506	TSV506	FSV506	DHV506	–
SNV072-L	1306-K-TVH-C3	H306	FRM72/7	DH606	TSV606	FSV606	DHV606	TCV606
SNV072-L	2306-K-TVH-C3	H2306	FRM72/3	DH606	TSV606	FSV606	DHV606	TCV606
SNV062-L	1206-K-TVH-C3	H206X100	FRM62/7	DH506	TSV506X100	FSV506	DHV506	–
SNV062-L	20206-K-T-VPC3	H206X100	FRM62/7	DH506	TSV506X100	FSV506	DHV506	–
SNV062-L	2206-K-TVH-C3	H306X100	FRM62/5	DH506	TSV506X100	FSV506	DHV506	–
SNV062-L	22206-E1-K	H306X100	FRM62/5	DH506	TSV506X100	FSV506	DHV506	–
SNV072-L	1306-K-TVH-C3	H306X100	FRM72/7	DH606	TSV606X100	FSV606	DHV606	TCV606
SNV072-L	2306-K-TVH-C3	H2306X100	FRM72/3	DH606	TSV606X100	FSV606	DHV606	TCV606
SNV072-L	1207-K-TVH-C3	H207X102	FRM72/8	DH507X102	TSV507X102	FSV507X102	DHV507X102	–
SNV072-L	20207-K-T-VPC3	H207X102	FRM72/8	DH507X102	TSV507X102	FSV507X102	DHV507X102	–
SNV072-L	2207-K-TVH-C3	H307X102	FRM72/5	DH507X102	TSV507X102	FSV507X102	DHV507X102	–
SNV072-L	22207-E1-K	H307X102	FRM72/5	DH507X102	TSV507X102	FSV507X102	DHV507X102	–
SNV080-L	1307-K-TVH-C3	H307X102	FRM80/9	DH607X102	TSV607X102	FSV607X102	DHV607X102	TCV607X102
SNV080-L	21307-E1-K-TVPB	H307X102	FRM80/9	DH607X102	TSV607X102	FSV607X102	DHV607X102	TCV607X102
SNV080-L	2307-K-TVH-C3	H2307X102	FRM80/4	DH607X102	TSV607X102	FSV607X102	DHV607X102	TCV607X102
SNV072-L	1207-K-TVH-C3	H207	FRM72/8	DH507	TSV507	FSV507	DHV507	–
SNV072-L	20207-K-T-VPC3	H207	FRM72/8	DH507	TSV507	FSV507	DHV507	–
SNV072-L	2207-K-TVH-C3	H307	FRM72/5	DH507	TSV507	FSV507	DHV507	–
SNV072-L	22207-E1-K	H307	FRM72/5	DH507	TSV507	FSV507	DHV507	–
SNV080-L	1307-K-TVH-C3	H307	FRM80/9	DH607	TSV607	FSV607	DHV607	TCV607
SNV080-L	21307-E1-K-TVPB	H307	FRM80/9	DH607	TSV607	FSV607	DHV607	TCV607
SNV080-L	2307-K-TVH-C3	H2307	FRM80/4	DH607	TSV607	FSV607	DHV607	TCV607
SNV072-L	1207-K-TVH-C3	H207X103	FRM72/8	DH507	TSV507	FSV507	DHV507	–
SNV072-L	20207-K-T-VPC3	H207X103	FRM72/8	DH507	TSV507	FSV507	DHV507	–
SNV072-L	2207-K-TVH-C3	H307X103	FRM72/5	DH507	TSV507	FSV507	DHV507	–
SNV072-L	22207-E1-K	H307X103	FRM72/5	DH507	TSV507	FSV507	DHV507	–
SNV080-L	1307-K-TVH-C3	H307X103	FRM80/9	DH607	TSV607	FSV607	DHV607	TCV607
SNV080-L	21307-E1-K-TVPB	H307X103	FRM80/9	DH607	TSV607	FSV607	DHV607	TCV607
SNV080-L	2307-K-TVH-C3	H2307X103	FRM80/4	DH607	TSV607	FSV607	DHV607	TCV607



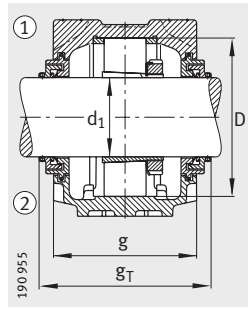
Double lip seal DH
Cover DKV



Labyrinth ring TSV



V ring seal DHV

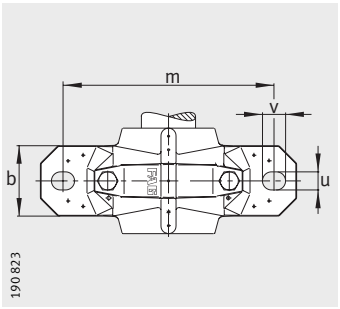


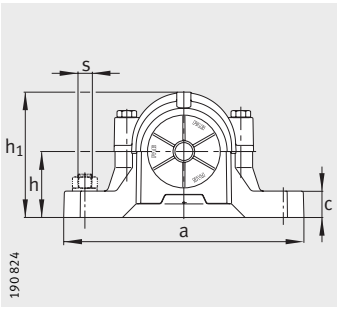
Taconite seal TCV

	Mass m	Dimensions																
Cover	Housing	d_1		a	g	h_1	b	c	D	g_L	g_V	g_T	g_3	h	m	u	v	s	
	≈kg	mm	inch															mm	inch
DKV062	1,9	**25**	–	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	1/2
DKV062	1,9	**25**	–	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	1/2
DKV062	1,9	**25**	–	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	1/2
DKV062	1,9	**25**	–	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	1/2
DKV072	2	**25**	–	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	1/2
DKV072	2	**25**	–	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	1/2
DKV062	1,9	**25,4**	**1**	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	1/2
DKV062	1,9	**25,4**	**1**	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	1/2
DKV062	1,9	**25,4**	**1**	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	1/2
DKV062	1,9	**25,4**	**1**	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	1/2
DKV072	2	**25,4**	**1**	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	1/2
DKV072	2	**25,4**	**1**	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	1/2
DKV072	2	**28,575**	**1 1/8**	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2
DKV072	2	**28,575**	**1 1/8**	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2
DKV072	2	**28,575**	**1 1/8**	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2
DKV072	2	**28,575**	**1 1/8**	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2
DKV080	2,9	**28,575**	**1 1/8**	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2
DKV080	2,9	**28,575**	**1 1/8**	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2
DKV080	2,9	**28,575**	**1 1/8**	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2
DKV072	2	**30**	–	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2
DKV072	2	**30**	–	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2
DKV072	2	**30**	–	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2
DKV072	2	**30**	–	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2
DKV080	2,9	**30**	–	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2
DKV080	2,9	**30**	–	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2
DKV080	2,9	**30**	–	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2
DKV072	2	**30,163**	**1 3/16**	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2
DKV072	2	**30,163**	**1 3/16**	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2
DKV072	2	**30,163**	**1 3/16**	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2
DKV072	2	**30,163**	**1 3/16**	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2
DKV080	2,9	**30,163**	**1 3/16**	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2
DKV080	2,9	**30,163**	**1 3/16**	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2
DKV080	2,9	**30,163**	**1 3/16**	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2

Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve



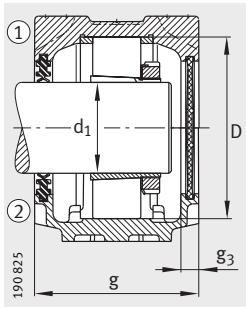


① Locating bearing
② Non-locating bearing

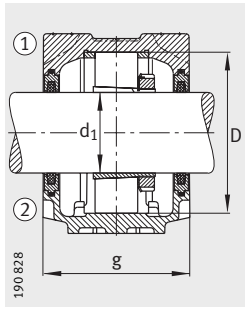
Dimension table (continued) · Dimensions in mm

Designation

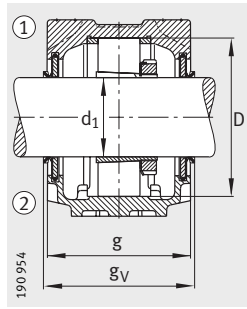
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV080-L	1208-K-TV-C3	H208X104	FRM80/10,5	DH508X104	TSV508X104	FSV508X104	DHV508X104	TCV508X104
SNV080-L	20208-K-T-VPC3	H208X104	FRM80/10,5	DH508X104	TSV508X104	FSV508X104	DHV508X104	TCV508X104
SNV080-L	2208-K-TVH-C3	H308X104	FRM80/8	DH508X104	TSV508X104	FSV508X104	DHV508X104	TCV508X104
SNV080-L	22208-E1-K	H308X104	FRM80/8	DH508X104	TSV508X104	FSV508X104	DHV508X104	TCV508X104
SNV090-L	1308-K-TVH-C3	H308X104	FRM90/9	DH608X104	TSV608X104	FSV608X104	DHV608X104	TCV608X104
SNV090-L	21308-E1-K	H308X104	FRM90/9	DH608X104	TSV608X104	FSV608X104	DHV608X104	TCV608X104
SNV090-L	2308-K-TVH-C3	H2308X104	FRM90/4	DH608X104	TSV608X104	FSV608X104	DHV608X104	TCV608X104
SNV090-L	22308-E1-K	H2308X104	FRM90/4	DH608X104	TSV608X104	FSV608X104	DHV608X104	TCV608X104
SNV080-L	1208-K-TVH-C3	H208X105	FRM80/10,5	DH508X104	TSV508X105	FSV508X105	DHV508X105	TCV508X105
SNV080-L	20208-K-T-VPC3	H208X105	FRM80/10,5	DH508X104	TSV508X105	FSV508X105	DHV508X105	TCV508X105
SNV080-L	2208-K-TVH-C3	H308X105	FRM80/8	DH508X104	TSV508X105	FSV508X105	DHV508X105	TCV508X105
SNV080-L	22208-E1-K	H308X105	FRM80/8	DH508X104	TSV508X105	FSV508X105	DHV508X105	TCV508X105
SNV090-L	1308-K-TVH-C3	H308X105	FRM90/9	DH608X104	TSV608X105	FSV608X105	DHV608X105	TCV608X105
SNV090-L	21308-E1-K	H308X105	FRM90/9	DH608X104	TSV608X105	FSV608X105	DHV608X105	TCV608X105
SNV090-L	2308-K-TVH-C3	H2308X105	FRM90/4	DH608X104	TSV608X105	FSV608X105	DHV608X105	TCV608X105
SNV090-L	22308-E1-K	H2308X105	FRM90/4	DH608X104	TSV608X105	FSV608X105	DHV608X105	TCV608X105
SNV080-L	1208-K-TVH-C3	H208X106	FRM80/10,5	DH508	TSV508	FSV508	DHV508	TCV508
SNV080-L	20208-K-T-VPC3	H208X106	FRM80/10,5	DH508	TSV508	FSV508	DHV508	TCV508
SNV080-L	2208-K-TVH-C3	H308X106	FRM80/8	DH508	TSV508	FSV508	DHV508	TCV508
SNV080-L	22208-E1-K	H308X106	FRM80/8	DH508	TSV508	FSV508	DHV508	TCV508
SNV090-L	1308-K-TVH-C3	H308X106	FRM90/9	DH608	TSV608	FSV608	DHV608	TCV608
SNV090-L	21308-E1-K	H308X106	FRM90/9	DH608	TSV608	FSV608	DHV608	TCV608
SNV090-L	2308-K-TVH-C3	H2308X106	FRM90/4	DH608	TSV608	FSV608	DHV608	TCV608
SNV090-L	22308-E1-K	H2308X106	FRM90/4	DH608	TSV608	FSV608	DHV608	TCV608
SNV080-L	1208-K-TVH-C3	H208	FRM80/10,5	DH508	TSV508	FSV508	DHV508	TCV508
SNV080-L	20208-K-T-VPC3	H208	FRM80/10,5	DH508	TSV508	FSV508	DHV508	TCV508
SNV080-L	2208-K-TVH-C3	H308	FRM80/8	DH508	TSV508	FSV508	DHV508	TCV508
SNV080-L	22208-E1-K	H308	FRM80/8	DH508	TSV508	FSV508	DHV508	TCV508
SNV090-L	1308-K-TVH-C3	H308	FRM90/9	DH608	TSV608	FSV608	DHV608	TCV608
SNV090-L	21308-E1-K	H308	FRM90/9	DH608	TSV608	FSV608	DHV608	TCV608
SNV090-L	2308-K-TVH-C3	H2308	FRM90/4	DH608	TSV608	FSV608	DHV608	TCV608
SNV090-L	22308-E1-K	H2308	FRM90/4	DH608	TSV608	FSV608	DHV608	TCV608



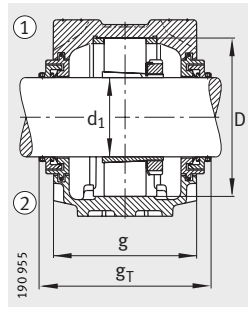
Double lip seal DH
Cover DKV



Felt seal FSV



V ring seal DHV

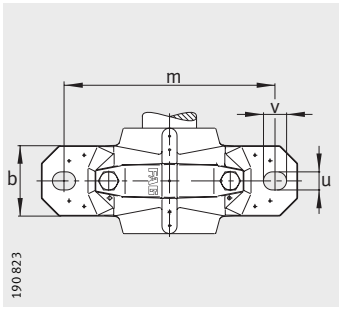


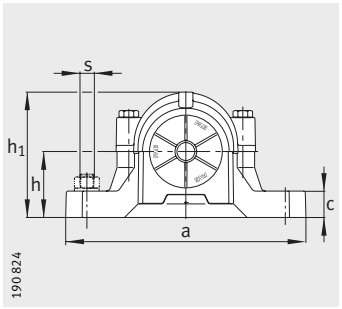
Taconite seal TCV

	Mass m	Dimensions																	
Cover	Housing	d_1		a	g	h_1	b	c	D	g_L	g_V	g_T	g_3	h	m	u	v	s	
	≈kg	mm	inch															mm	inch
DKV080	2,9	**31,75**	**$1^1/_4$**	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	$^1/_2$
DKV080	2,9	**31,75**	**$1^1/_4$**	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	$^1/_2$
DKV080	2,9	**31,75**	**$1^1/_4$**	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	$^1/_2$
DKV080	2,9	**31,75**	**$1^1/_4$**	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**31,75**	**$1^1/_4$**	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**31,75**	**$1^1/_4$**	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**31,75**	**$1^1/_4$**	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**31,75**	**$1^1/_4$**	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	$^1/_2$
DKV080	2,9	**33,338**	**$1^5/_{16}$**	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	$^1/_2$
DKV080	2,9	**33,338**	**$1^5/_{16}$**	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	$^1/_2$
DKV080	2,9	**33,338**	**$1^5/_{16}$**	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	$^1/_2$
DKV080	2,9	**33,338**	**$1^5/_{16}$**	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**33,338**	**$1^5/_{16}$**	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**33,338**	**$1^5/_{16}$**	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**33,338**	**$1^5/_{16}$**	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**33,338**	**$1^5/_{16}$**	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	$^1/_2$
DKV080	2,9	**34,925**	**$1^3/_8$**	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	$^1/_2$
DKV080	2,9	**34,925**	**$1^3/_8$**	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	$^1/_2$
DKV080	2,9	**34,925**	**$1^3/_8$**	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	$^1/_2$
DKV080	2,9	**34,925**	**$1^3/_8$**	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**34,925**	**$1^3/_8$**	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**34,925**	**$1^3/_8$**	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**34,925**	**$1^3/_8$**	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**34,925**	**$1^3/_8$**	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	$^1/_2$
DKV080	2,9	**35**	–	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	$^1/_2$
DKV080	2,9	**35**	–	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	$^1/_2$
DKV080	2,9	**35**	–	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	$^1/_2$
DKV080	2,9	**35**	–	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**35**	–	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**35**	–	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**35**	–	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**35**	–	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	$^1/_2$

Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve



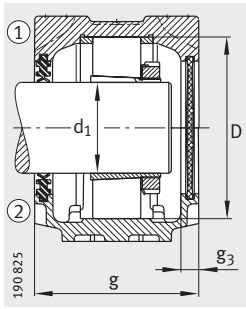


① Locating bearing
② Non-locating bearing

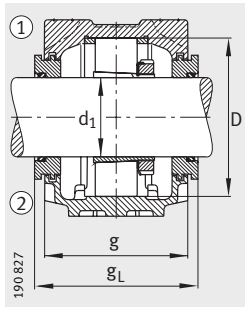
Dimension table (continued) · Dimensions in mm

Designation

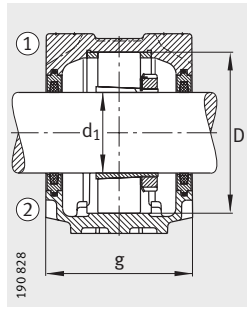
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV085-L	1209-K-TVH-C3	H209X107	FRM85/6	DH509X107	TSV509X107	FSV509X107	DHV509X107	TCV509X107
SNV085-L	20209-K-T-VPC3	H209X107	FRM85/6	DH509X107	TSV509X107	FSV509X107	DHV509X107	TCV509X107
SNV085-L	2209-K-TVH-C3	H309X107	FRM85/4	DH509X107	TSV509X107	FSV509X107	DHV509X107	TCV509X107
SNV085-L	22209-E1-K	H309X107	FRM85/4	DH509X107	TSV509X107	FSV509X107	DHV509X107	TCV509X107
SNV100-L	1309-K-TVH-C3	H309X107	FRM100/9,5	DH609X107	TSV609X107	FSV609X107	DHV609X107	TCV609X107
SNV100-L	21309-E1-K	H309X107	FRM100/9,5	DH609X107	TSV609X107	FSV609X107	DHV609X107	TCV609X107
SNV100-L	2309-K-TVH-C3	H2309X107	FRM100/4	DH609X107	TSV609X107	FSV609X107	DHV609X107	TCV609X107
SNV100-L	22309-E1-K	H2309X107	FRM100/4	DH609X107	TSV609X107	FSV609X107	DHV609X107	TCV609X107
SNV085-L	1209-K-TVH-C3	H209X108	FRM85/6	DH509X107	TSV509X108	FSV509X108	DHV509X108	TCV509X108
SNV085-L	20209-K-T-VPC3	H209X108	FRM85/6	DH509X107	TSV509X108	FSV509X108	DHV509X108	TCV509X108
SNV085-L	2209-K-TVH-C3	H309X108	FRM85/4	DH509X107	TSV509X108	FSV509X108	DHV509X108	TCV509X108
SNV085-L	22209-E1-K	H309X108	FRM85/4	DH509X107	TSV509X108	FSV509X108	DHV509X108	TCV509X108
SNV100-L	1309-K-TVH-C3	H309X108	FRM100/9,5	DH609X107	TSV609X108	FSV609X108	DHV609X108	TCV609X108
SNV100-L	21309-E1-K	H309X108	FRM100/9,5	DH609X107	TSV609X108	FSV609X108	DHV609X108	TCV609X108
SNV100-L	2309-K-TVH-C3	H2309X108	FRM100/4	DH609X107	TSV609X108	FSV609X108	DHV609X108	TCV609X108
SNV100-L	22309-E1-K	H2309X108	FRM100/4	DH609X107	TSV609X108	FSV609X108	DHV609X108	TCV609X108
SNV100-L	1309-K-TVH-C3	H309X109	FRM100/9,5	DH609	TSV609	FSV609	DHV609	TCV609
SNV100-L	21309-E1-K	H309X109	FRM100/9,5	DH609	TSV609	FSV609	DHV609	TCV609
SNV100-L	2309-K-TVH-C3	H2309X109	FRM100/4	DH609	TSV609	FSV609	DHV609	TCV609
SNV100-L	22309-E1-K	H2309X109	FRM100/4	DH609	TSV609	FSV609	DHV609	TCV609
SNV085-L	1209-K-TVH-C3	H209	FRM85/6	DH509	TSV509	FSV509	DHV509	TCV509
SNV085-L	20209-K-T-VPC3	H209	FRM85/6	DH509	TSV509	FSV509	DHV509	TCV509
SNV085-L	2209-K-TVH-C3	H309	FRM85/4	DH509	TSV509	FSV509	DHV509	TCV509
SNV085-L	22209-E1-K	H309	FRM85/4	DH509	TSV509	FSV509	DHV509	TCV509
SNV100-L	1309-K-TVH-C3	H309	FRM100/9,5	DH609	TSV609	FSV609	DHV609	TCV609
SNV100-L	21309-E1-K	H309	FRM100/9,5	DH609	TSV609	FSV609	DHV609	TCV609
SNV100-L	2309-K-TVH-C3	H2309	FRM100/4	DH609	TSV609	FSV609	DHV609	TCV609
SNV100-L	22309-E1-K	H2309	FRM100/4	DH609	TSV609	FSV609	DHV609	TCV609
SNV090-L	1210-K-TVH-C3	H210X110	FRM90/10,5	DH510X110	TSV510X110	FSV510X110	DHV510X110	TCV510X110
SNV090-L	20210-K-T-VPC3	H210X110	FRM90/10,5	DH510X110	TSV510X110	FSV510X110	DHV510X110	TCV510X110
SNV090-L	2210-K-TVH-C3	H310X110	FRM90/9	DH510X110	TSV510X110	FSV510X110	DHV510X110	TCV510X110
SNV090-L	22210-E1-K	H310X110	FRM90/9	DH510X110	TSV510X110	FSV510X110	DHV510X110	TCV510X110
SNV110-L	1310-K-TVH-C3	H310X110	FRM110/10,5	DH610X110	TSV610X110	FSV610X110	DHV610X110	TCV610X110
SNV110-L	21310-E1-K	H310X110	FRM110/10,5	DH610X110	TSV610X110	FSV610X110	DHV610X110	TCV610X110
SNV110-L	2310-K-TVH-C3	H2310X110	FRM110/4	DH610X110	TSV610X110	FSV610X110	DHV610X110	TCV610X110
SNV110-L	22310-E1-K	H2310X110	FRM110/4	DH610X110	TSV610X110	FSV610X110	DHV610X110	TCV610X110



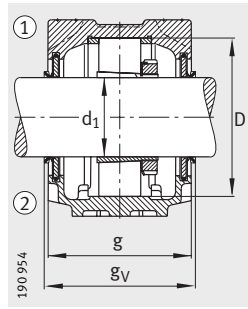
Double lip seal DH
Cover DKV



Labyrinth ring TSV



Felt seal FSV

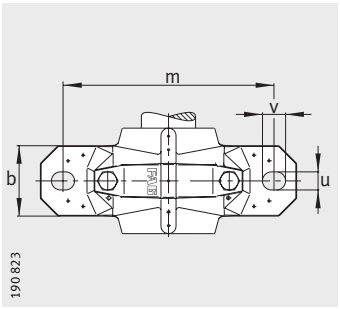


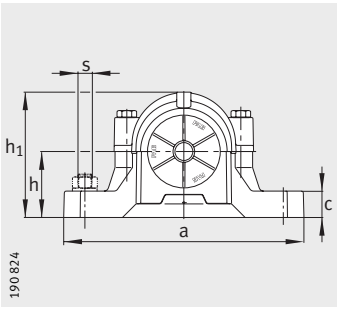
V ring seal DHV

	Mass m	Dimensions																	
Cover	Housing	d_1		a	g	h_1	b	c	D	g_L	g_V	g_T	g_3	h	m	u	v	s	
	≈kg	mm	inch															mm	inch
DKV085	2,8	**36,513**	**1 7/16**	205	87	114	60	25	85	101	91	123	12,5	60	170	15	20	M12	1/2
DKV085	2,8	**36,513**	**1 7/16**	205	87	114	60	25	85	101	91	123	12,5	60	170	15	20	M12	1/2
DKV085	2,8	**36,513**	**1 7/16**	205	87	114	60	25	85	101	91	123	12,5	60	170	15	20	M12	1/2
DKV085	2,8	**36,513**	**1 7/16**	205	87	114	60	25	85	101	91	123	12,5	60	170	15	20	M12	1/2
DKV100	4,3	**36,513**	**1 7/16**	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5/8
DKV100	4,3	**36,513**	**1 7/16**	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5/8
DKV100	4,3	**36,513**	**1 7/16**	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5/8
DKV100	4,3	**36,513**	**1 7/16**	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5/8
DKV085	2,8	**38,1**	**1 1/2**	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1/2
DKV085	2,8	**38,1**	**1 1/2**	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1/2
DKV085	2,8	**38,1**	**1 1/2**	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1/2
DKV085	2,8	**38,1**	**1 1/2**	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1/2
DKV100	4,3	**38,1**	**1 1/2**	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	**38,1**	**1 1/2**	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	**38,1**	**1 1/2**	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	**38,1**	**1 1/2**	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	**39,688**	**1 9/16**	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5/8
DKV100	4,3	**39,688**	**1 9/16**	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5/8
DKV100	4,3	**39,688**	**1 9/16**	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5/8
DKV100	4,3	**39,688**	**1 9/16**	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5/8
DKV085	2,8	**40**	–	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1/2
DKV085	2,8	**40**	–	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1/2
DKV085	2,8	**40**	–	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1/2
DKV085	2,8	**40**	–	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1/2
DKV100	4,3	**40**	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	**40**	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	**40**	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	**40**	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV090	3,1	**41,275**	**1 5/8**	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2
DKV090	3,1	**41,275**	**1 5/8**	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2
DKV090	3,1	**41,275**	**1 5/8**	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2
DKV090	3,1	**41,275**	**1 5/8**	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2
DKV110	4,9	**41,275**	**1 5/8**	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	**41,275**	**1 5/8**	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	**41,275**	**1 5/8**	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	**41,275**	**1 5/8**	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8

Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve



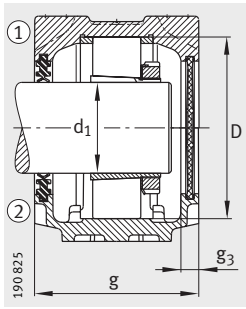


① Locating bearing
② Non-locating bearing

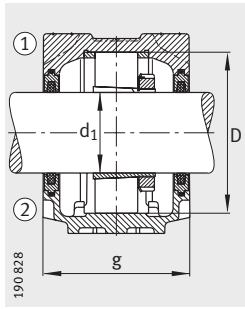
Dimension table (continued) · Dimensions in mm

Designation

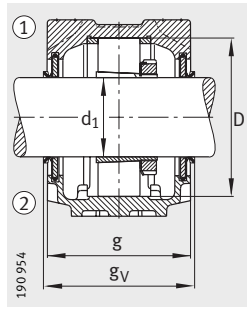
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV090-L	1210-K-TVH-C3	H210X111	FRM90/10,5	DH510X110	TSV510X111	FSV510X111	DHV510X111	TCV510X111
SNV090-L	20210-K-T-VPC3	H210X111	FRM90/10,5	DH510X110	TSV510X111	FSV510X111	DHV510X111	TCV510X111
SNV090-L	2210-K-TVH-C3	H310X111	FRM90/9	DH510X110	TSV510X111	FSV510X111	DHV510X111	TCV510X111
SNV090-L	22210-E1-K	H310X111	FRM90/9	DH510X110	TSV510X111	FSV510X111	DHV510X111	TCV510X111
SNV110-L	1310-K-TVH-C3	H310X111	FRM110/10,5	DH610X110	TSV610X111	FSV610X111	DHV610X111	TCV610X111
SNV110-L	21310-E1-K	H310X111	FRM110/10,5	DH610X110	TSV610X111	FSV610X111	DHV610X111	TCV610X111
SNV110-L	2310-K-TVH-C3	H2310X111	FRM110/4	DH610X110	TSV610X111	FSV610X111	DHV610X111	TCV610X111
SNV110-L	22310-E1-K	H2310X111	FRM110/4	DH610X110	TSV610X111	FSV610X111	DHV610X111	TCV610X111
SNV090-L	1210-K-TVH-C3	H210X112	FRM90/10,5	DH510	TSV510X112	FSV510	DHV510	TCV510
SNV090-L	20210-K-T-VPC3	H210X112	FRM90/10,5	DH510	TSV510X112	FSV510	DHV510	TCV510
SNV090-L	2210-K-TVH-C3	H310X112	FRM90/9	DH510	TSV510X112	FSV510	DHV510	TCV510
SNV090-L	22210-E1-K	H310X112	FRM90/9	DH510	TSV510X112	FSV510	DHV510	TCV510
SNV110-L	1310-K-TVH-C3	H310X112	FRM110/10,5	DH610	TSV610X112	FSV610	DHV610	TCV610
SNV110-L	21310-E1-K	H310X112	FRM110/10,5	DH610	TSV610X112	FSV610	DHV610	TCV610
SNV110-L	2310-K-TVH-C3	H2310X112	FRM110/4	DH610	TSV610X112	FSV610	DHV610	TCV610
SNV110-L	22310-E1-K	H2310X112	FRM110/4	DH610	TSV610X112	FSV610	DHV610	TCV610
SNV090-L	1210-K-TVH-C3	H210	FRM90/10,5	DH510	TSV510	FSV510	DHV510	TCV510
SNV090-L	20210-K-T-VPC3	H210	FRM90/10,5	DH510	TSV510	FSV510	DHV510	TCV510
SNV090-L	2210-K-TVH-C3	H310	FRM90/9	DH510	TSV510	FSV510	DHV510	TCV510
SNV090-L	22210-E1-K	H310	FRM90/9	DH510	TSV510	FSV510	DHV510	TCV510
SNV110-L	1310-K-TVH-C3	H310	FRM110/10,5	DH610	TSV610	FSV610	DHV610	TCV610
SNV110-L	21310-E1-K	H310	FRM110/10,5	DH610	TSV610	FSV610	DHV610	TCV610
SNV110-L	2310-K-TVH-C3	H2310	FRM110/4	DH610	TSV610	FSV610	DHV610	TCV610
SNV110-L	22310-E1-K	H2310	FRM110/4	DH610	TSV610	FSV610	DHV610	TCV610
SNV100-L	1211-K-TVH-C3	H211X114	FRM100/11,5	DH511X114	TSV511X114	FSV511X114	DHV511X114	TCV511X114
SNV100-L	20211-K-T-VPC3	H211X114	FRM100/11,5	DH511X114	TSV511X114	FSV511X114	DHV511X114	TCV511X114
SNV100-L	2211-K-TVH-C3	H311X114	FRM100/9,5	DH511X114	TSV511X114	FSV511X114	DHV511X114	TCV511X114
SNV100-L	22211-E1-K	H311X114	FRM100/9,5	DH511X114	TSV511X114	FSV511X114	DHV511X114	TCV511X114
SNV120-L	1311-K-TVH-C3	H311X114	FRM120/11	DH611X114	TSV611X114	FSV611X114	DHV611X114	TCV611X114
SNV120-L	20311-K-T-VPC3	H311X114	FRM120/11	DH611X114	TSV611X114	FSV611X114	DHV611X114	TCV611X114
SNV120-L	21311-E1-K	H311X114	FRM120/11	DH611X114	TSV611X114	FSV611X114	DHV611X114	TCV611X114
SNV120-L	2311-K-TVH-C3	H2311X114	FRM120/4	DH611X114	TSV611X114	FSV611X114	DHV611X114	TCV611X114
SNV120-L	22311-E1-K	H2311X114	FRM120/4	DH611X114	TSV611X114	FSV611X114	DHV611X114	TCV611X114



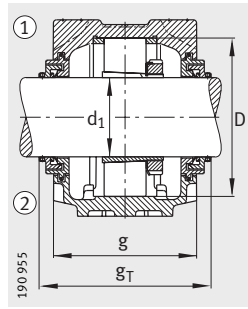
Double lip seal DH
Cover DKV



Felt seal FSV



V ring seal DHV

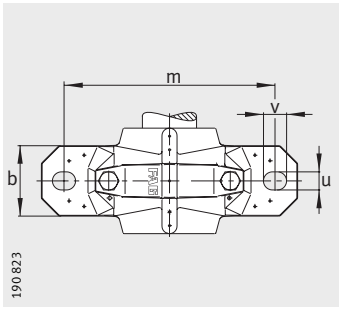


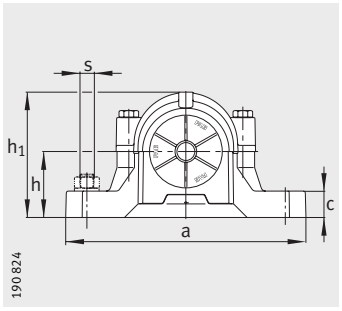
Taconite seal TCV

	Mass m	Dimensions																	
Cover	Housing	d_1		a	g	h_1	b	c	D	g_L	g_V	g_T	g_3	h	m	u	v	s	
	≈kg	mm	inch															mm	inch
DKV090	3,1	**42,863**	**$1^{11}/_{16}$**	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**42,863**	**$1^{11}/_{16}$**	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**42,863**	**$1^{11}/_{16}$**	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**42,863**	**$1^{11}/_{16}$**	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	$^1/_2$
DKV110	4,9	**42,863**	**$1^{11}/_{16}$**	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	$^5/_8$
DKV110	4,9	**42,863**	**$1^{11}/_{16}$**	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	$^5/_8$
DKV110	4,9	**42,863**	**$1^{11}/_{16}$**	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	$^5/_8$
DKV110	4,9	**42,863**	**$1^{11}/_{16}$**	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	$^5/_8$
DKV090	3,1	**44,45**	**$1^3/_4$**	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**44,45**	**$1^3/_4$**	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**44,45**	**$1^3/_4$**	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**44,45**	**$1^3/_4$**	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	$^1/_2$
DKV110	4,9	**44,45**	**$1^3/_4$**	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	$^5/_8$
DKV110	4,9	**44,45**	**$1^3/_4$**	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	$^5/_8$
DKV110	4,9	**44,45**	**$1^3/_4$**	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	$^5/_8$
DKV110	4,9	**44,45**	**$1^3/_4$**	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	$^5/_8$
DKV090	3,1	**45**	–	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**45**	–	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**45**	–	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	$^1/_2$
DKV090	3,1	**45**	–	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	$^1/_2$
DKV110	4,9	**45**	–	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	$^5/_8$
DKV110	4,9	**45**	–	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	$^5/_8$
DKV110	4,9	**45**	–	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	$^5/_8$
DKV110	4,9	**45**	–	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	$^5/_8$
DKV100	4,3	**47,625**	**$1^7/_8$**	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	$^5/_8$
DKV100	4,3	**47,625**	**$1^7/_8$**	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	$^5/_8$
DKV100	4,3	**47,625**	**$1^7/_8$**	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	$^5/_8$
DKV100	4,3	**47,625**	**$1^7/_8$**	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	$^5/_8$
DKV120	6,1	**47,625**	**$1^7/_8$**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**47,625**	**$1^7/_8$**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**47,625**	**$1^7/_8$**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**47,625**	**$1^7/_8$**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**47,625**	**$1^7/_8$**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$

Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve



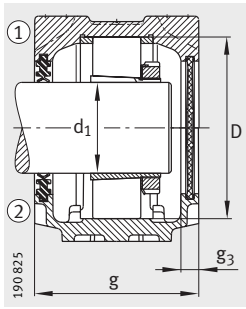


① Locating bearing
② Non-locating bearing

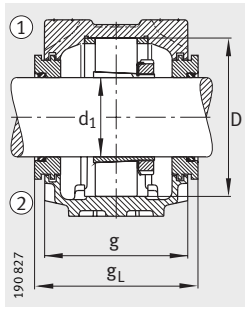
Dimension table (continued) · Dimensions in mm

Designation

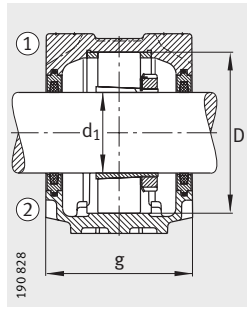
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV100-L	1211-K-TVH-C3	H211X115	FRM100/11,5	DH511	TSV511X115	FSV511X115	DHV511X115	TCV511X115
SNV100-L	20211-K-T-VPC3	H211X115	FRM100/11,5	DH511	TSV511X115	FSV511X115	DHV511X115	TCV511X115
SNV100-L	2211-K-TVH-C3	H311X115	FRM100/9,5	DH511	TSV511X115	FSV511X115	DHV511X115	TCV511X115
SNV100-L	22211-E1-K	H311X115	FRM100/9,5	DH511	TSV511X115	FSV511X115	DHV511X115	TCV511X115
SNV120-L	1311-K-TVH-C3	H311X115	FRM120/11	DH611	TSV611X115	FSV611X115	DHV611X115	TCV611X115
SNV120-L	20311-K-T-VPC3	H311X115	FRM120/11	DH611	TSV611X115	FSV611X115	DHV611X115	TCV611X115
SNV120-L	21311-E1-K	H311X115	FRM120/11	DH611	TSV611X115	FSV611X115	DHV611X115	TCV611X115
SNV120-L	2311-K-TVH-C3	H2311X115	FRM120/4	DH611	TSV611X115	FSV611X115	DHV611X115	TCV611X115
SNV120-L	22311-E1-K	H2311X115	FRM120/4	DH611	TSV611X115	FSV611X115	DHV611X115	TCV611X115
SNV100-L	1211-K-TVH-C3	H211	FRM100/11,5	DH511	TSV511	FSV511	DHV511	TCV511
SNV100-L	20211-K-T-VPC3	H211	FRM100/11,5	DH511	TSV511	FSV511	DHV511	TCV511
SNV100-L	2211-K-TVH-C3	H311	FRM100/9,5	DH511	TSV511	FSV511	DHV511	TCV511
SNV100-L	22211-E1-K	H311	FRM100/9,5	DH511	TSV511	FSV511	DHV511	TCV511
SNV120-L	1311-K-TVH-C3	H311	FRM120/11	DH611	TSV611	FSV611	DHV611	TCV611
SNV120-L	20311-K-T-VPC3	H311	FRM120/11	DH611	TSV611	FSV611	DHV611	TCV611
SNV120-L	21311-E1-K	H311	FRM120/11	DH611	TSV611	FSV611	DHV611	TCV611
SNV120-L	2311-K-TVH-C3	H2311	FRM120/4	DH611	TSV611	FSV611	DHV611	TCV611
SNV120-L	22311-E1-K	H2311	FRM120/4	DH611	TSV611	FSV611	DHV611	TCV611
SNV100-L	1211-K-TVH-C3	H211X200	FRM100/11,5	DH511	TSV511X200	FSV511	DHV511	TCV511X200
SNV100-L	20211-K-T-VPC3	H211X200	FRM100/11,5	DH511	TSV511X200	FSV511	DHV511	TCV511X200
SNV100-L	2211-K-TVH-C3	H311X200	FRM100/9,5	DH511	TSV511X200	FSV511	DHV511	TCV511X200
SNV100-L	22211-E1-K	H311X200	FRM100/9,5	DH511	TSV511X200	FSV511	DHV511	TCV511X200
SNV120-L	1311-K-TVH-C3	H311X200	FRM120/11	DH611	TSV611X200	FSV611	DHV611	TCV611X200
SNV120-L	20311-K-T-VPC3	H311X200	FRM120/11	DH611	TSV611X200	FSV611	DHV611	TCV611X200
SNV120-L	21311-E1-K	H311X200	FRM120/11	DH611	TSV611X200	FSV611	DHV611	TCV611X200
SNV120-L	2311-K-TVH-C3	H2311X200	FRM120/4	DH611	TSV611X200	FSV611	DHV611	TCV611X200
SNV120-L	22311-E1-K	H2311X200	FRM120/4	DH611	TSV611X200	FSV611	DHV611	TCV611X200



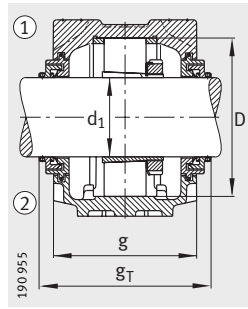
Double lip seal DH
Cover DKV



Labyrinth ring TSV



Felt seal FSV

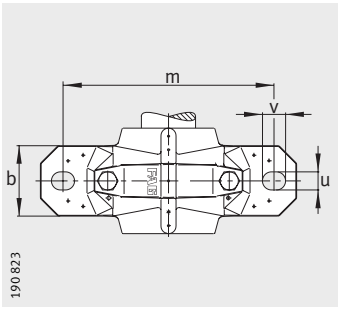


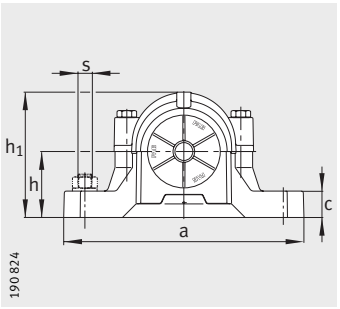
Taconite seal TCV

	Mass m	Dimensions																	
Cover	Housing	d_1		a	g	h_1	b	c	D	g_L	g_V	g_T	g_3	h	m	u	v	s	
	≈kg	mm	inch															mm	inch
DKV100	4,3	**49,213**	**$1^{15}/_{16}$**	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	$^5/_8$
DKV100	4,3	**49,213**	**$1^{15}/_{16}$**	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	$^5/_8$
DKV100	4,3	**49,213**	**$1^{15}/_{16}$**	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	$^5/_8$
DKV100	4,3	**49,213**	**$1^{15}/_{16}$**	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	$^5/_8$
DKV120	6,1	**49,213**	**$1^{15}/_{16}$**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**49,213**	**$1^{15}/_{16}$**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**49,213**	**$1^{15}/_{16}$**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**49,213**	**$1^{15}/_{16}$**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**49,213**	**$1^{15}/_{16}$**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV100	4,3	**50**	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	$^5/_8$
DKV100	4,3	**50**	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	$^5/_8$
DKV100	4,3	**50**	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	$^5/_8$
DKV100	4,3	**50**	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	$^5/_8$
DKV120	6,1	**50**	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**50**	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**50**	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**50**	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**50**	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV100	4,3	**50,8**	**2**	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	$^5/_8$
DKV100	4,3	**50,8**	**2**	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	$^5/_8$
DKV100	4,3	**50,8**	**2**	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	$^5/_8$
DKV100	4,3	**50,8**	**2**	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	$^5/_8$
DKV120	6,1	**50,8**	**2**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**50,8**	**2**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**50,8**	**2**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**50,8**	**2**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**50,8**	**2**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$

Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve



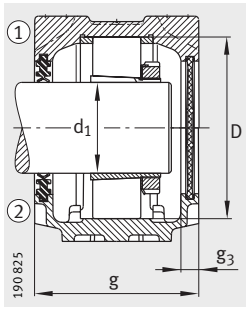


① Locating bearing
② Non-locating bearing

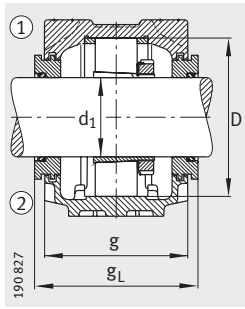
Dimension table (continued) · Dimensions in mm

Designation

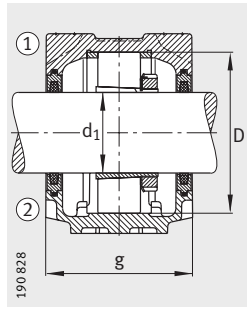
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV110-L	1212-K-TVH-C3	H212X202	FRM110/13	DH512	TSV512X202	FSV512X202	DHV512	TCV512X202
SNV110-L	20212-K-T-VPC3	H212X202	FRM110/13	DH512	TSV512X202	FSV512X202	DHV512	TCV512X202
SNV110-L	2212-K-TVH-C3	H312X202	FRM110/10	DH512	TSV512X202	FSV512X202	DHV512	TCV512X202
SNV110-L	22212-E1-K	H312X202	FRM110/10	DH512	TSV512X202	FSV512X202	DHV512	TCV512X202
SNV130-L	1312-K-TVH-C3	H312X202	FRM130/12,5	DH612	TSV612X202	FSV612X202	DHV612	TCV612X202
SNV130-L	20312-K-T-VPC3	H312X202	FRM130/12,5	DH612	TSV612X202	FSV612X202	DHV612	TCV612X202
SNV130-L	21312-E1-K	H312X202	FRM130/12,5	DH612	TSV612X202	FSV612X202	DHV612	TCV612X202
SNV130-L	2312-K-TVH-C3	H2312X202	FRM130/5	DH612	TSV612X202	FSV612X202	DHV612	TCV612X202
SNV130-L	22312-E1-K	H2312X202	FRM130/5	DH612	TSV612X202	FSV612X202	DHV612	TCV612X202
SNV110-L	1212-K-TVH-C3	H212	FRM110/13	DH512	TSV512	FSV512	DHV512	TCV512
SNV110-L	20212-K-T-VPC3	H212	FRM110/13	DH512	TSV512	FSV512	DHV512	TCV512
SNV110-L	2212-K-TVH-C3	H312	FRM110/10	DH512	TSV512	FSV512	DHV512	TCV512
SNV110-L	22212-E1-K	H312	FRM110/10	DH512	TSV512	FSV512	DHV512	TCV512
SNV130-L	1312-K-TVH-C3	H312	FRM130/12,5	DH612	TSV612	FSV612	DHV612	TCV612
SNV130-L	20312-K-T-VPC3	H312	FRM130/12,5	DH612	TSV612	FSV612	DHV612	TCV612
SNV130-L	21312-E1-K	H312	FRM130/12,5	DH612	TSV612	FSV612	DHV612	TCV612
SNV130-L	2312-K-TVH-C3	H2312	FRM130/5	DH612	TSV612	FSV612	DHV612	TCV612
SNV130-L	22312-E1-K	H2312	FRM130/5	DH612	TSV612	FSV612	DHV612	TCV612
SNV120-L	1213-K-TVH-C3	H213X203	FRM120/14	DH513X203	TSV513X203	FSV513X203	DHV513X203	TCV513X203
SNV120-L	20213-K-T-VPC3	H213X203	FRM120/14	DH513X203	TSV513X203	FSV513X203	DHV513X203	TCV513X203
SNV120-L	2213-K-TVH-C3	H313X203	FRM120/10	DH513X203	TSV513X203	FSV513X203	DHV513X203	TCV513X203
SNV120-L	22213-E1-K	H313X203	FRM120/10	DH513X203	TSV513X203	FSV513X203	DHV513X203	TCV513X203
SNV140-L	1313-K-TVH-C3	H313X203	FRM140/12,5	DH613X203	TSV613X203	FSV613X203	DHV613X203	TCV613X203
SNV140-L	20313-K-MB-C3	H313X203	FRM140/12,5	DH613X203	TSV613X203	FSV613X203	DHV613X203	TCV613X203
SNV140-L	21313-E1-K	H313X203	FRM140/12,5	DH613X203	TSV613X203	FSV613X203	DHV613X203	TCV613X203
SNV140-L	2313-K-TVH-C3	H2313X203	FRM140/5	DH613X203	TSV613X203	FSV613X203	DHV613X203	TCV613X203
SNV140-L	22313-E1-K	H2313X203	FRM140/5	DH613X203	TSV613X203	FSV613X203	DHV613X203	TCV613X203
SNV120-L	1213-K-TVH-C3	H213X204	FRM120/14	DH513X203	TSV513X204	FSV513X204	DHV513X204	TCV513X204
SNV120-L	20213-K-T-VPC3	H213X204	FRM120/14	DH513X203	TSV513X204	FSV513X204	DHV513X204	TCV513X204
SNV120-L	2213-K-TVH-C3	H313X204	FRM120/10	DH513X203	TSV513X204	FSV513X204	DHV513X204	TCV513X204
SNV120-L	22213-E1-K	H313X204	FRM120/10	DH513X203	TSV513X204	FSV513X204	DHV513X204	TCV513X204
SNV140-L	1313-K-TVH-C3	H313X204	FRM140/12,5	DH613X203	TSV613X204	FSV613X204	DHV613X204	TCV613X204
SNV140-L	20313-K-MB-C3	H313X204	FRM140/12,5	DH613X203	TSV613X204	FSV613X204	DHV613X204	TCV613X204
SNV140-L	21313-E1-K	H313X204	FRM140/12,5	DH613X203	TSV613X204	FSV613X204	DHV613X204	TCV613X204
SNV140-L	2313-K-TVH-C3	H2313X204	FRM140/5	DH613X203	TSV613X204	FSV613X204	DHV613X204	TCV613X204
SNV140-L	22313-E1-K	H2313X204	FRM140/5	DH613X203	TSV613X204	FSV613X204	DHV613X204	TCV613X204



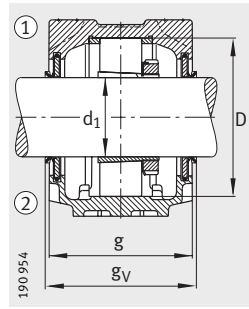
Double lip seal DH
Cover DKV



Labyrinth ring TSV



Felt seal FSV

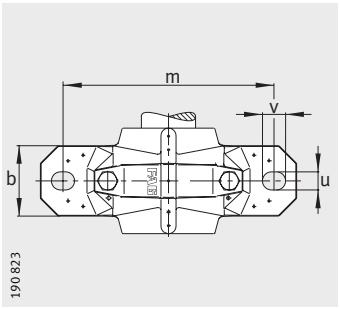


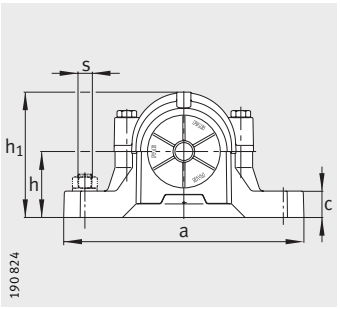
V ring seal DHV

	Mass m	Dimensions																	
Cover	Housing	d_1		a	g	h_1	b	c	D	g_L	g_V	g_T	g_3	h	m	u	v	s	
	≈kg	mm	inch															mm	inch
DKV110	4,9	**53,975**	**$2^1/_8$**	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	$^5/_8$
DKV110	4,9	**53,975**	**$2^1/_8$**	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	$^5/_8$
DKV110	4,9	**53,975**	**$2^1/_8$**	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	$^5/_8$
DKV110	4,9	**53,975**	**$2^1/_8$**	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	$^5/_8$
DKV130	6,8	**53,975**	**$2^1/_8$**	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	$^5/_8$
DKV130	6,8	**53,975**	**$2^1/_8$**	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	$^5/_8$
DKV130	6,8	**53,975**	**$2^1/_8$**	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	$^5/_8$
DKV130	6,8	**53,975**	**$2^1/_8$**	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	$^5/_8$
DKV130	6,8	**53,975**	**$2^1/_8$**	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	$^5/_8$
DKV110	4,9	**55**	–	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	$^5/_8$
DKV110	4,9	**55**	–	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	$^5/_8$
DKV110	4,9	**55**	–	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	$^5/_8$
DKV110	4,9	**55**	–	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	$^5/_8$
DKV130	6,8	**55**	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	$^5/_8$
DKV130	6,8	**55**	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	$^5/_8$
DKV130	6,8	**55**	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	$^5/_8$
DKV130	6,8	**55**	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	$^5/_8$
DKV130	6,8	**55**	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**55,563**	**$2^3/_{16}$**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**55,563**	**$2^3/_{16}$**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**55,563**	**$2^3/_{16}$**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**55,563**	**$2^3/_{16}$**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV140	9,3	**55,563**	**$2^3/_{16}$**	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	$^3/_4$
DKV140	9,3	**55,563**	**$2^3/_{16}$**	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	$^3/_4$
DKV140	9,3	**55,563**	**$2^3/_{16}$**	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	$^3/_4$
DKV140	9,3	**55,563**	**$2^3/_{16}$**	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	$^3/_4$
DKV140	9,3	**55,563**	**$2^3/_{16}$**	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	$^3/_4$
DKV120	6,1	**57,15**	**$2^1/_4$**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**57,15**	**$2^1/_4$**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**57,15**	**$2^1/_4$**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV120	6,1	**57,15**	**$2^1/_4$**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	$^5/_8$
DKV140	9,3	**57,15**	**$2^1/_4$**	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	$^3/_4$
DKV140	9,3	**57,15**	**$2^1/_4$**	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	$^3/_4$
DKV140	9,3	**57,15**	**$2^1/_4$**	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	$^3/_4$
DKV140	9,3	**57,15**	**$2^1/_4$**	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	$^3/_4$
DKV140	9,3	**57,15**	**$2^1/_4$**	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	$^3/_4$

Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve



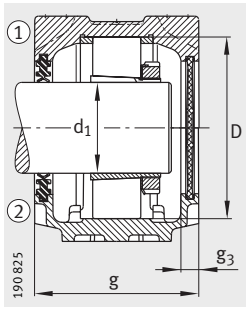


① Locating bearing
② Non-locating bearing

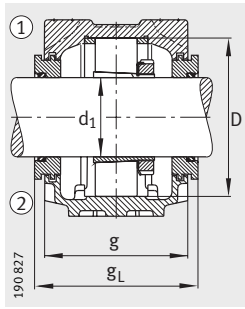
Dimension table (continued) · Dimensions in mm

Designation

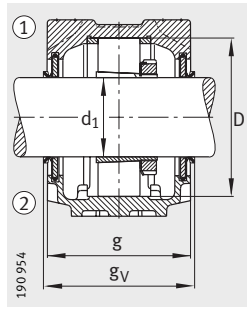
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV120-L	1213-K-TVH-C3	H213	FRM120/14	DH513	TSV513	FSV513	DHV513	TCV513
SNV120-L	20213-K-T-VPC3	H213	FRM120/14	DH513	TSV513	FSV513	DHV513	TCV513
SNV120-L	2213-K-TVH-C3	H313	FRM120/10	DH513	TSV513	FSV513	DHV513	TCV513
SNV120-L	22213-E1-K	H313	FRM120/10	DH513	TSV513	FSV513	DHV513	TCV513
SNV140-L	1313-K-TVH-C3	H313	FRM140/12,5	DH613	TSV613	FSV613	DHV613	TCV613
SNV140-L	20313-K-MB-C3	H313	FRM140/12,5	DH613	TSV613	FSV613	DHV613	TCV613
SNV140-L	21313-E1-K	H313	FRM140/12,5	DH613	TSV613	FSV613	DHV613	TCV613
SNV140-L	2313-K-TVH-C3	H2313	FRM140/5	DH613	TSV613	FSV613	DHV613	TCV613
SNV140-L	22313-E1-K	H2313	FRM140/5	DH613	TSV613	FSV613	DHV613	TCV613
SNV120-L	1213-K-TVH-C3	H213X206	FRM120/14	DH513	TSV513	FSV513	DHV513	TCV513
SNV120-L	20213-K-T-VPC3	H213X206	FRM120/14	DH513	TSV513	FSV513	DHV513	TCV513
SNV120-L	2213-K-TVH-C3	H313X206	FRM120/10	DH513	TSV513	FSV513	DHV513	TCV513
SNV120-L	22213-E1-K	H313X206	FRM120/10	DH513	TSV513	FSV513	DHV513	TCV513
SNV140-L	1313-K-TVH-C3	H313X206	FRM140/12,5	DH613	TSV613	FSV613	DHV613	TCV613
SNV140-L	20313-K-MB-C3	H313X206	FRM140/12,5	DH613	TSV613	FSV613	DHV613	TCV613
SNV140-L	21313-E1-K	H313X206	FRM140/12,5	DH613	TSV613	FSV613	DHV613	TCV613
SNV140-L	2313-K-TVH-C3	H2313X206	FRM140/5	DH613	TSV613	FSV613	DHV613	TCV613
SNV140-L	22313-E1-K	H2313X206	FRM140/5	DH613	TSV613	FSV613	DHV613	TCV613
SNV130-L	1215-K-TVH-C3	H215X207	FRM130/15,5	DH515X207	TSV515X207	FSV515X207	DHV515X207	TCV515X207
SNV130-L	20215-K-T-VPC3	H215X207	FRM130/15,5	DH515X207	TSV515X207	FSV515X207	DHV515X207	TCV515X207
SNV130-L	2215-K-TVH-C3	H315X207	FRM130/12,5	DH515X207	TSV515X207	FSV515X207	DHV515X207	TCV515X207
SNV130-L	22215-E1-K	H315X207	FRM130/12,5	DH515X207	TSV515X207	FSV515X207	DHV515X207	TCV515X207
SNV160-L	1315-K-M-C3	H315X207	FRM160/14	DH615X207	TSV615X207	FSV615X207	DHV615X207	TCV615X207
SNV160-L	21315-E-1K	H315X207	FRM160/14	DH615X207	TSV615X207	FSV615X207	DHV615X207	TCV615X207
SNV160-L	2315-K-M-C3	H2315X207	FRM160/5	DH615X207	TSV615X207	FSV615X207	DHV615X207	TCV615X207
SNV160-L	22315-E1-K	H2315X207	FRM160/5	DH615X207	TSV615X207	FSV615X207	DHV615X207	TCV615X207
SNV130-L	1215-K-TVH-C3	H215X208	FRM130/15,5	DH515X207	TSV515X208	FSV515X208	DHV515X208	TCV515X208
SNV130-L	20215-K-T-VPC3	H215X208	FRM130/15,5	DH515X207	TSV515X208	FSV515X208	DHV515X208	TCV515X208
SNV130-L	2215-K-TVH-C3	H315X208	FRM130/12,5	DH515X207	TSV515X208	FSV515X208	DHV515X208	TCV515X208
SNV130-L	22215-E1-K	H315X208	FRM130/12,5	DH515X207	TSV515X208	FSV515X208	DHV515X208	TCV515X208
SNV160-L	1315-K-M-C3	H315X208	FRM160/14	DH615X207	TSV615X208	FSV615X208	DHV615X208	TCV615X208
SNV160-L	21315-E1-K	H315X208	FRM160/14	DH615X207	TSV615X208	FSV615X208	DHV615X208	TCV615X208
SNV160-L	2315-K-M-C3	H2315X208	FRM160/5	DH615X207	TSV615X208	FSV615X208	DHV615X208	TCV615X208
SNV160-L	22315-E1-K	H2315X208	FRM160/5	DH615X207	TSV615X208	FSV615X208	DHV615X208	TCV615X208



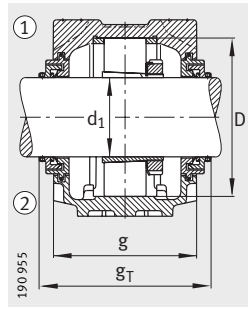
Double lip seal DH
Cover DKV



Labyrinth ring TSV



V ring seal DHV

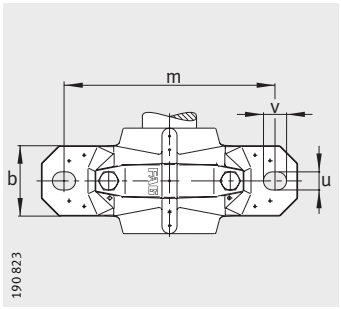


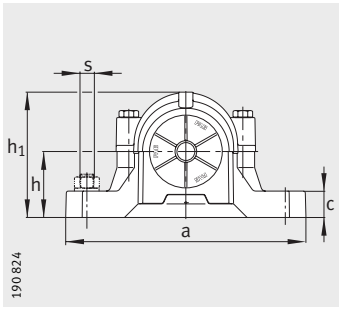
Taconite seal TCV

	Mass m	Dimensions																	
Cover	Housing	d_1		a	g	h_1	b	c	D	g_L	g_V	g_T	g_3	h	m	u	v	s	
	≈kg	mm	inch															mm	inch
DKV120	6,1	**60**	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	**60**	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	**60**	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	**60**	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV140	9,3	**60**	–	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	**60**	–	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	**60**	–	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	**60**	–	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	**60**	–	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV120	6,1	**60,325**	**2 3/8**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	**60,325**	**2 3/8**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	**60,325**	**2 3/8**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	**60,325**	**2 3/8**	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV140	9,3	**60,325**	**2 3/8**	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	**60,325**	**2 3/8**	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	**60,325**	**2 3/8**	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	**60,325**	**2 3/8**	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	**60,325**	**2 3/8**	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV130	6,8	**61,913**	**2 7/16**	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	**61,913**	**2 7/16**	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	**61,913**	**2 7/16**	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	**61,913**	**2 7/16**	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV160	12,8	**61,913**	**2 7/16**	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	**61,913**	**2 7/16**	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	**61,913**	**2 7/16**	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	**61,913**	**2 7/16**	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV130	6,8	**63,5**	**2 1/2**	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	**63,5**	**2 1/2**	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	**63,5**	**2 1/2**	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	**63,5**	**2 1/2**	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV160	12,8	**63,5**	**2 1/2**	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	**63,5**	**2 1/2**	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	**63,5**	**2 1/2**	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	**63,5**	**2 1/2**	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4

Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve



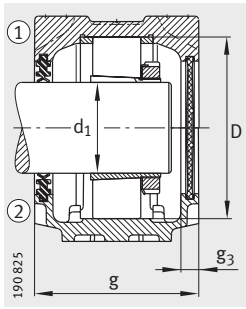


① Locating bearing
② Non-locating bearing

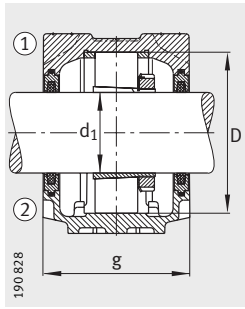
Dimension table (continued) · Dimensions in mm

Designation

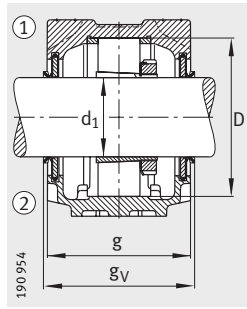
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV130-L	1215-K-TVH-C3	H215	FRM130/15,5	DH515	TSV515	FSV515	DHV515	TCV515
SNV130-L	20215-K-T-VPC3	H215	FRM130/15,5	DH515	TSV515	FSV515	DHV515	TCV515
SNV130-L	2215-K-TVH-C3	H315	FRM130/12,5	DH515	TSV515	FSV515	DHV515	TCV515
SNV130-L	22215-E1-K	H315	FRM130/12,5	DH515	TSV515	FSV515	DHV515	TCV515
SNV160-L	1315-K-M-C3	H315	FRM160/14	DH615	TSV615	FSV615	DHV615	TCV615
SNV160-L	21315-E1-K	H315	FRM160/14	DH615	TSV615	FSV615	DHV615	TCV615
SNV160-L	2315-K-M-C3	H2315	FRM160/5	DH615	TSV615	FSV615	DHV615	TCV615
SNV160-L	22315-E1-K	H2315	FRM160/5	DH615	TSV615	FSV615	DHV615	TCV615
SNV130-L	1215-K-TVH-C3	H215X210	FRM130/15,5	DH515	TSV515X210	FSV515X210	DHV515X210	TCV515X210
SNV130-L	20215-K-T-VPC3	H215X210	FRM130/15,5	DH515	TSV515X210	FSV515X210	DHV515X210	TCV515X210
SNV130-L	2215-K-TVH-C3	H315X210	FRM130/12,5	DH515	TSV515X210	FSV515X210	DHV515X210	TCV515X210
SNV130-L	22215-E1-K	H315X210	FRM130/12,5	DH515	TSV515X210	FSV515X210	DHV515X210	TCV515X210
SNV160-L	1315-K-M-C3	H315X210	FRM160/14	DH615	TSV615X210	FSV615X210	DHV615X210	TCV615X210
SNV160-L	21315-E1-K	H315X210	FRM160/14	DH615	TSV615X210	FSV615X210	DHV615X210	TCV615X210
SNV160-L	2315-K-M-C3	H2315X210	FRM160/5	DH615	TSV615X210	FSV615X210	DHV615X210	TCV615X210
SNV160-L	22315-E1-K	H2315X210	FRM160/5	DH615	TSV615X210	FSV615X210	DHV615X210	TCV615X210
SNV140-L	1216-K-TVH-C3	H216X211	FRM140/16	DH516X211	TSV516X211	FSV516X211	DHV516X211	TCV516X211
SNV140-L	20216-K-T-VPC3	H216X211	FRM140/16	DH516X211	TSV516X211	FSV516X211	DHV516X211	TCV516X211
SNV140-L	2216-K-TVH-C3	H316X211	FRM140/12,5	DH516X211	TSV516X211	FSV516X211	DHV516X211	TCV516X211
SNV140-L	22216-E1-K	H316X211	FRM140/12,5	DH516X211	TSV516X211	FSV516X211	DHV516X211	TCV516X211
SNV170-L	1316-K-M-C3	H316X211	FRM170/14,5	DH616X211	TSV616X211	FSV616X211	DHV616X211	TCV616X211
SNV170-L	21316-E1-K	H316X211	FRM170/14,5	DH616X211	TSV616X211	FSV616X211	DHV616X211	TCV616X211
SNV170-L	2316-K-M-C3	H2316X211	FRM170/5	DH616X211	TSV616X211	FSV616X211	DHV616X211	TCV616X211
SNV170-L	22316-E1-K	H2316X211	FRM170/5	DH616X211	TSV616X211	FSV616X211	DHV616X211	TCV616X211
SNV140-L	1216-K-TVH-C3	H216X212	FRM140/16	DH516	TSV516	FSV516	DHV516	TCV516
SNV140-L	20216-K-T-VPC3	H216X212	FRM140/16	DH516	TSV516	FSV516	DHV516	TCV516
SNV140-L	2216-K-TVH-C3	H316X212	FRM140/12,5	DH516	TSV516	FSV516	DHV516	TCV516
SNV140-L	22216-E1-K	H316X212	FRM140/12,5	DH516	TSV516	FSV516	DHV516	TCV516
SNV170-L	1316-K-M-C3	H316X212	FRM170/14,5	DH616	TSV616	FSV616	DHV616	TCV616
SNV170-L	21316-E1-K	H316X212	FRM170/14,5	DH616	TSV616	FSV616	DHV616	TCV616
SNV170-L	2316-K-M-C3	H2316X212	FRM170/5	DH616	TSV616	FSV616	DHV616	TCV616
SNV170-L	22316-E1-K	H2316X212	FRM170/5	DH616	TSV616	FSV616	DHV616	TCV616



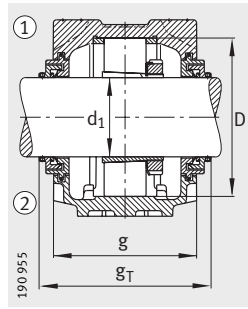
Double lip seal DH
Cover DKV



Felt seal FSV



V ring seal DHV

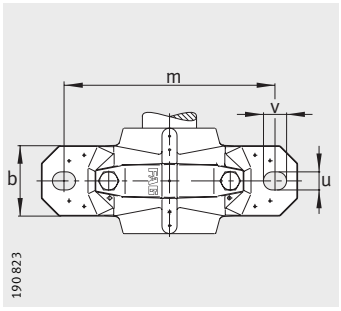


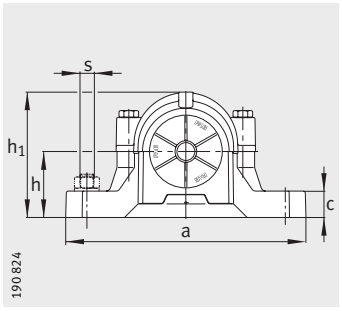
Taconite seal TCV

	Mass m	Dimensions																	
Cover	Housing	d_1		a	g	h_1	b	c	D	g_L	g_V	g_T	g_3	h	m	u	v	s	
	≈kg	mm	inch															mm	inch
DKV130	6,8	**65**	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	**65**	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	**65**	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	**65**	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV160	12,8	**65**	–	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	**65**	–	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	**65**	–	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	**65**	–	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV130	6,8	**66,675**	**2 5/8**	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	**66,675**	**2 5/8**	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	**66,675**	**2 5/8**	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	**66,675**	**2 5/8**	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV160	12,8	**66,675**	**2 5/8**	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	**66,675**	**2 5/8**	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	**66,675**	**2 5/8**	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	**66,675**	**2 5/8**	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV140	9,3	**68,263**	**2 11/16**	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	**68,263**	**2 11/16**	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	**68,263**	**2 11/16**	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	**68,263**	**2 11/16**	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV170	14,4	**68,263**	**2 11/16**	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	**68,263**	**2 11/16**	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	**68,263**	**2 11/16**	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	**68,263**	**2 11/16**	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV140	9,3	**69,85**	**2 3/4**	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	**69,85**	**2 3/4**	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	**69,85**	**2 3/4**	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	**69,85**	**2 3/4**	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV170	14,4	**69,85**	**2 3/4**	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	**69,85**	**2 3/4**	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	**69,85**	**2 3/4**	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	**69,85**	**2 3/4**	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4

Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve



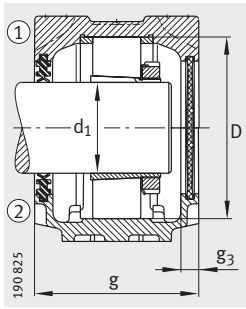


① Locating bearing
② Non-locating bearing

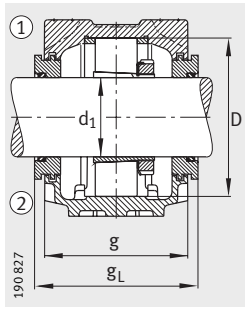
Dimension table (continued) · Dimensions in mm

Designation

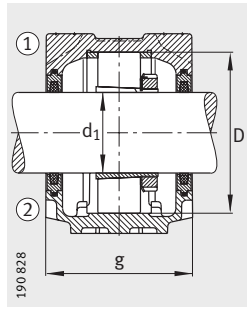
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV140-L	1216-K-TVH-C3	H216	FRM140/16	DH516	TSV516	FSV516	DHV516	TCV516
SNV140-L	20216-K-T-VPC3	H216	FRM140/16	DH516	TSV516	FSV516	DHV516	TCV516
SNV140-L	2216-K-TVH-C3	H316	FRM140/12,5	DH516	TSV516	FSV516	DHV516	TCV516
SNV140-L	22216-E1-K	H316	FRM140/12,5	DH516	TSV516	FSV516	DHV516	TCV516
SNV170-L	1316-K-M-C3	H316	FRM170/14,5	DH616	TSV616	FSV616	DHV616	TCV616
SNV170-L	21316-E1-K	H316	FRM170/14,5	DH616	TSV616	FSV616	DHV616	TCV616
SNV170-L	2316-K-M-C3	H2316	FRM170/5	DH616	TSV616	FSV616	DHV616	TCV616
SNV170-L	22316-E1-K	H2316	FRM170/5	DH616	TSV616	FSV616	DHV616	TCV616
SNV140-L	1216-K-TVH-C3	H216X214	FRM140/16	DH516X214	TSV516X214	FSV516X214	DHV516X214	TCV516X214
SNV140-L	20216-K-T-VPC3	H216X214	FRM140/16	DH516X214	TSV516X214	FSV516X214	DHV516X214	TCV516X214
SNV140-L	2216-K-TVH-C3	H316X214	FRM140/12,5	DH516X214	TSV516X214	FSV516X214	DHV516X214	TCV516X214
SNV140-L	22216-E1-K	H316X214	FRM140/12,5	DH516X214	TSV516X214	FSV516X214	DHV516X214	TCV516X214
SNV170-L	1316-K-M-C3	H316X214	FRM170/14,5	DH616X214	TSV616X214	FSV616X214	DHV616X214	TCV616X214
SNV170-L	21316-E1-K	H316X214	FRM170/14,5	DH616X214	TSV616X214	FSV616X214	DHV616X214	TCV616X214
SNV170-L	2316-K-M-C3	H2316X214	FRM170/5	DH616X214	TSV616X214	FSV616X214	DHV616X214	TCV616X214
SNV170-L	22316-E1-K	H2316X214	FRM170/5	DH616X214	TSV616X214	FSV616X214	DHV616X214	TCV616X214
SNV150-L	1217-K-TVH-C3	H217X215	FRM150/16,5	DH517	TSV517	FSV517	DHV517	TCV517
SNV150-L	20217-K-MB-C3	H217X215	FRM150/16,5	DH517	TSV517	FSV517	DHV517	TCV517
SNV150-L	2217-K-M-C3	H317X215	FRM150/12,5	DH517	TSV517	FSV517	DHV517	TCV517
SNV150-L	22217-E1-K	H317X215	FRM150/12,5	DH517	TSV517	FSV517	DHV517	TCV517
SNV180-L	1317-K-M-C3	H317X215	FRM180/14,5	DH617	TSV617	FSV617	DHV617	TCV617
SNV180-L	21317-E1-K	H317X215	FRM180/14,5	DH617	TSV617	FSV617	DHV617	TCV617
SNV180-L	2317-K-M-C3	H2317X215	FRM180/5	DH617	TSV617	FSV617	DHV617	TCV617
SNV180-L	22317-E1-K	H2317X215	FRM180/5	DH617	TSV617	FSV617	DHV617	TCV617



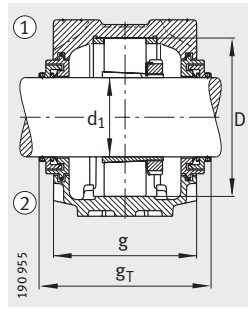
Double lip seal DH
Cover DKV



Labyrinth ring TSV



Felt seal FSV

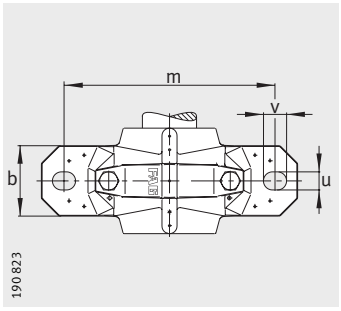


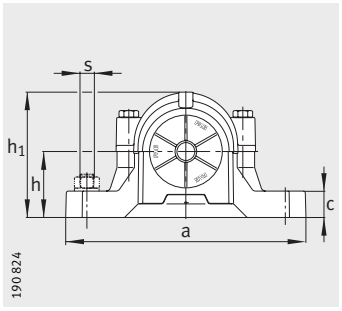
Taconite seal TCV

	Mass m	Dimensions																	
Cover	Housing	d_1		a	g	h_1	b	c	D	g_L	g_V	g_T	g_3	h	m	u	v	s	
	≈kg	mm	inch															mm	inch
DKV140	9,3	**70**	–	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	$^3/_4$
DKV140	9,3	**70**	–	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	$^3/_4$
DKV140	9,3	**70**	–	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	$^3/_4$
DKV140	9,3	**70**	–	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	$^3/_4$
DKV170	14,4	**70**	–	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	$^3/_4$
DKV170	14,4	**70**	–	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	$^3/_4$
DKV170	14,4	**70**	–	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	$^3/_4$
DKV170	14,4	**70**	–	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	$^3/_4$
DKV140	9,3	**73,025**	**$2^7/_8$**	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	$^3/_4$
DKV140	9,3	**73,025**	**$2^7/_8$**	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	$^3/_4$
DKV140	9,3	**73,025**	**$2^7/_8$**	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	$^3/_4$
DKV140	9,3	**73,025**	**$2^7/_8$**	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	$^3/_4$
DKV170	14,4	**73,025**	**$2^7/_8$**	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	$^3/_4$
DKV170	14,4	**73,025**	**$2^7/_8$**	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	$^3/_4$
DKV170	14,4	**73,025**	**$2^7/_8$**	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	$^3/_4$
DKV170	14,4	**73,025**	**$2^7/_8$**	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	$^3/_4$
DKV150	9,9	**74,613**	**$2^{15}/_{16}$**	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	$^3/_4$
DKV150	9,9	**74,613**	**$2^{15}/_{16}$**	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	$^3/_4$
DKV150	9,9	**74,613**	**$2^{15}/_{16}$**	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	$^3/_4$
DKV150	9,9	**74,613**	**$2^{15}/_{16}$**	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	$^3/_4$
DKV180	17	**74,613**	**$2^{15}/_{16}$**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV180	17	**74,613**	**$2^{15}/_{16}$**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV180	17	**74,613**	**$2^{15}/_{16}$**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV180	17	**74,613**	**$2^{15}/_{16}$**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$

Plummer block housings

SNV, split
For bearings with tapered bore
and adapter sleeve



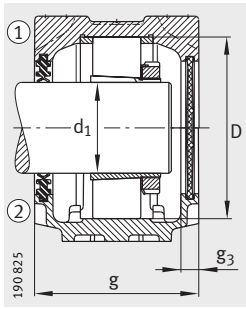


① Locating bearing
② Non-locating bearing

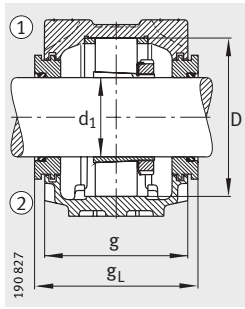
Dimension table (continued) · Dimensions in mm

Designation

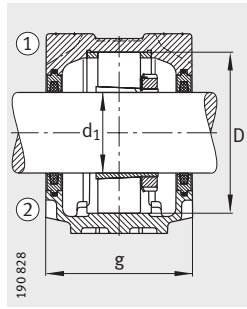
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV150-L	1217-K-TVH-C3	H217	FRM150/16,5	DH517	TSV517	FSV517	DHV517	TCV517
SNV150-L	20217-K-MB-C3	H217	FRM150/16,5	DH517	TSV517	FSV517	DHV517	TCV517
SNV150-L	2217-K-M-C3	H317	FRM150/12,5	DH517	TSV517	FSV517	DHV517	TCV517
SNV150-L	22217-E1-K	H317	FRM150/12,5	DH517	TSV517	FSV517	DHV517	TCV517
SNV180-L	1317-K-M-C3	H317	FRM180/14,5	DH617	TSV617	FSV617	DHV617	TCV617
SNV180-L	21317-E1-K	H317	FRM180/14,5	DH617	TSV617	FSV617	DHV617	TCV617
SNV180-L	2317-K-M-C3	H2317	FRM180/5	DH617	TSV617	FSV617	DHV617	TCV617
SNV180-L	22317-E1-K	H2317	FRM180/5	DH617	TSV617	FSV617	DHV617	TCV617
SNV150-L	1217-K-TVH-C3	H217X300	FRM150/16,5	DH517	TSV517X300	FSV517X300	DHV517X300	TCV517X300
SNV150-L	20217-K-MB-C3	H217X300	FRM150/16,5	DH517	TSV517X300	FSV517X300	DHV517X300	TCV517X300
SNV150-L	2217-K-M-C3	H317X300	FRM150/12,5	DH517	TSV517X300	FSV517X300	DHV517X300	TCV517X300
SNV150-L	22217-E1-K	H317X300	FRM150/12,5	DH517	TSV517X300	FSV517X300	DHV517X300	TCV517X300
SNV180-L	1317-K-M-C3	H317X300	FRM180/14,5	DH617	TSV617X300	FSV617X300	DHV617X300	TCV617X300
SNV180-L	21317-E1-K	H317X300	FRM180/14,5	DH617	TSV617X300	FSV617X300	DHV617X300	TCV617X300
SNV180-L	2317-K-M-C3	H2317X300	FRM180/5	DH617	TSV617X300	FSV617X300	DHV617X300	TCV617X300
SNV180-L	22317-E1-K	H2317X300	FRM180/5	DH617	TSV617X300	FSV617X300	DHV617X300	TCV617X300
SNV160-L	1218-K-TVH-C3	H218X302	FRM160/17,5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
SNV160-L	20218-K-MB-C3	H218X302	FRM160/17,5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
SNV160-L	2218-K-TVH-C3	H318X302	FRM160/12,5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
SNV160-L	22218-E1-K	H318X302	FRM160/12,5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
SNV160-L	23218-E1-K-TVPB	H2318X302	FRM160/6,3	DH518	TSV518X302	FSV518	DHV518	TCV518X302
SNV190-L	1318-K-M-C3	H318X302	FRM190/15,5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
SNV190-L	20318-K-MB-C3	H318X302	FRM190/15,5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
SNV190-L	21318-E1-K	H318X302	FRM190/15,5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
SNV190-L	2318-K-M-C3	H2318X302	FRM190/5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
SNV190-L	22318-E1-K	H2318X302	FRM190/5	DH518	TSV518X302	FSV518	DHV518	TCV518X302



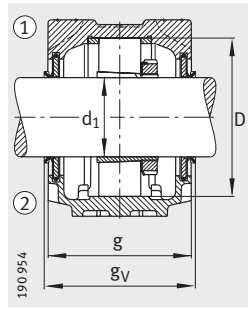
Double lip seal DH
Cover DKV



Labyrinth ring TSV



Felt seal FSV

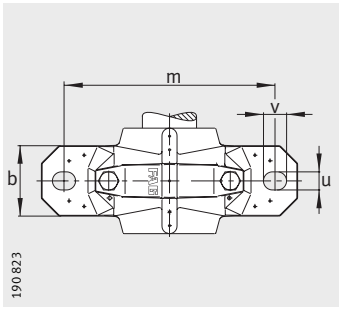


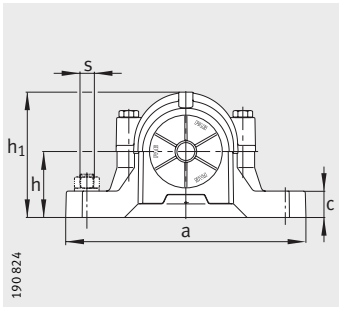
V ring seal DHV

	Mass m	Dimensions																	
Cover	Housing	d_1		a	g	h_1	b	c	D	g_L	g_V	g_T	g_3	h	m	u	v	s	
	≈kg	mm	inch															mm	inch
DKV150	9,9	**75**	–	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	$^3/_4$
DKV150	9,9	**75**	–	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	$^3/_4$
DKV150	9,9	**75**	–	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	$^3/_4$
DKV150	9,9	**75**	–	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	$^3/_4$
DKV180	17	**75**	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV180	17	**75**	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV180	17	**75**	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV180	17	**75**	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV150	9,9	**76,2**	**3**	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	$^3/_4$
DKV150	9,9	**76,2**	**3**	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	$^3/_4$
DKV150	9,9	**76,2**	**3**	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	$^3/_4$
DKV150	9,9	**76,2**	**3**	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	$^3/_4$
DKV180	17	**76,2**	**3**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV180	17	**76,2**	**3**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV180	17	**76,2**	**3**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV180	17	**76,2**	**3**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV160	12,8	**79,375**	**$3^1/_8$**	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	$^3/_4$
DKV160	12,8	**79,375**	**$3^1/_8$**	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	$^3/_4$
DKV160	12,8	**79,375**	**$3^1/_8$**	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	$^3/_4$
DKV160	12,8	**79,375**	**$3^1/_8$**	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	$^3/_4$
DKV160	12,8	**79,375**	**$3^1/_8$**	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	$^3/_4$
DKV160	22	**79,375**	**$3^1/_8$**	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	$^7/_8$
DKV160	22	**79,375**	**$3^1/_8$**	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	$^7/_8$
DKV160	22	**79,375**	**$3^1/_8$**	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	$^7/_8$
DKV160	22	**79,375**	**$3^1/_8$**	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	$^7/_8$
DKV160	22	**79,375**	**$3^1/_8$**	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	$^7/_8$

Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve



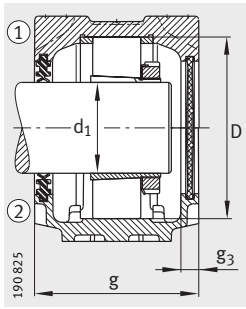


① Locating bearing
② Non-locating bearing

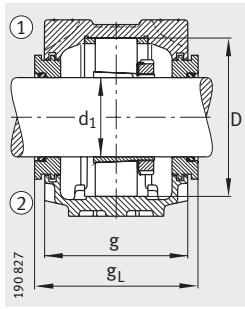
Dimension table (continued) · Dimensions in mm

Designation

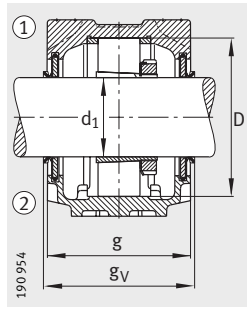
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV160-L	1218-K-TVH-C3	H218	FRM160/17,5	DH518	TSV518	FSV518	DHV518	TCV518
SNV160-L	20218-K-MB-C3	H218	FRM160/17,5	DH518	TSV518	FSV518	DHV518	TCV518
SNV160-L	2218-K-TVH-C3	H318	FRM160/12,5	DH518	TSV518	FSV518	DHV518	TCV518
SNV160-L	22218-E1-K	H318	FRM160/12,5	DH518	TSV518	FSV518	DHV518	TCV518
SNV160-L	23218-E1-K-TVPB	H2318	FRM160/6,3	DH518	TSV518	FSV518	DHV518	TCV518
SNV190-L	1318-K-M-C3	H318	FRM190/15,5	DH518	TSV518	FSV518	DHV518	TCV518
SNV190-L	20318-K-MB-C3	H318	FRM190/15,5	DH518	TSV518	FSV518	DHV518	TCV518
SNV190-L	21318-E1-K	H318	FRM190/15,5	DH518	TSV518	FSV518	DHV518	TCV518
SNV190-L	2318-K-M-C3	H2318	FRM190/5	DH518	TSV518	FSV518	DHV518	TCV518
SNV190-L	22318-E1-K	H2318	FRM190/5	DH518	TSV518	FSV518	DHV518	TCV518
SNV160-L	1218-K-TVH-C3	H218X303	FRM160/17,5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
SNV160-L	20218-K-MB-C3	H218X303	FRM160/17,5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
SNV160-L	2218-K-TVH-C3	H318X303	FRM160/12,5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
SNV160-L	22218-E1-K	H318X303	FRM160/12,5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
SNV160-L	23218-E1-K-TVPB	H2318X303	FRM160/6,3	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
SNV190-L	1318-K-M-C3	H318X303	FRM190/15,5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
SNV190-L	20318-K-MB-C3	H318X303	FRM190/15,5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
SNV190-L	21318-E1-K	H318X303	FRM190/15,5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
SNV190-L	2318-K-M-C3	H2318X303	FRM190/5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
SNV190-L	22318-E1-K	H2318X303	FRM190/5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
SNV160-L	1218-K-TVH-C3	H218X304	FRM160/17,5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
SNV160-L	20218-K-MB-C3	H218X304	FRM160/17,5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
SNV160-L	2218-K-TVH-C3	H318X304	FRM160/12,5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
SNV160-L	22218-E1-K	H318X304	FRM160/12,5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
SNV160-L	23218-E1-K-TVPB	H2318X304	FRM160/6,3	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
SNV190-L	1318-K-M-C3	H318X304	FRM190/15,5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
SNV190-L	20318-K-MB-C3	H318X304	FRM190/15,5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
SNV190-L	21318-E1-K	H318X304	FRM190/15,5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
SNV190-L	2318-K-M-C3	H2318X304	FRM190/5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
SNV190-L	22318-E1-K	H2318X304	FRM190/5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304



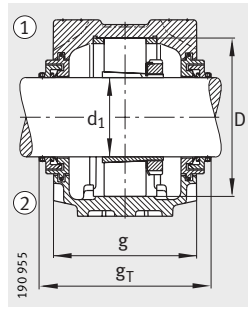
Double lip seal DH
Cover DKV



Labyrinth ring TSV



V ring seal DHV

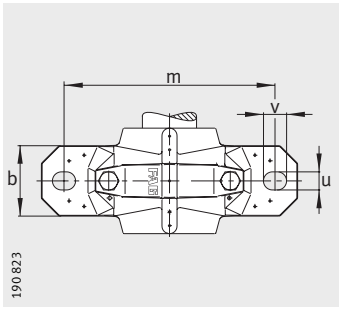


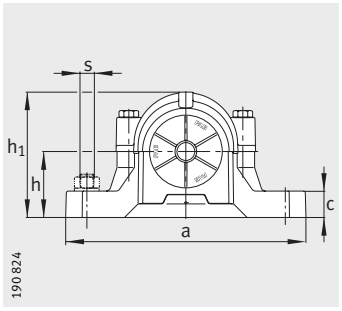
Taconite seal TCV

	Mass m	Dimensions																	
Cover	Housing	d_1		a	g	h_1	b	c	D	g_L	g_V	g_T	g_3	h	m	u	v	s	
	≈kg	mm	inch															mm	inch
DKV160	12,8	**80**	–	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	$^3/_4$
DKV160	12,8	**80**	–	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	$^3/_4$
DKV160	12,8	**80**	–	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	$^3/_4$
DKV160	12,8	**80**	–	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	$^3/_4$
DKV160	12,8	**80**	–	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	$^3/_4$
DKV160	22	**80**	–	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	$^7/_8$
DKV160	22	**80**	–	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	$^7/_8$
DKV160	22	**80**	–	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	$^7/_8$
DKV160	22	**80**	–	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	$^7/_8$
DKV160	22	**80**	–	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	$^7/_8$
DKV160	12,8	**80,963**	**$^3/_{16}$**	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	$^3/_4$
DKV160	12,8	**80,963**	**$^3/_{16}$**	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	$^3/_4$
DKV160	12,8	**80,963**	**$^3/_{16}$**	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	$^3/_4$
DKV160	12,8	**80,963**	**$^3/_{16}$**	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	$^3/_4$
DKV160	12,8	**80,963**	**$^3/_{16}$**	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	$^3/_4$
DKV160	22	**80,963**	**$^3/_{16}$**	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	$^7/_8$
DKV160	22	**80,963**	**$^3/_{16}$**	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	$^7/_8$
DKV160	22	**80,963**	**$^3/_{16}$**	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	$^7/_8$
DKV160	22	**80,963**	**$^3/_{16}$**	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	$^7/_8$
DKV160	22	**80,963**	**$^3/_{16}$**	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	$^7/_8$
DKV160	12,8	**82,55**	**$^1/_4$**	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	$^3/_4$
DKV160	12,8	**82,55**	**$^1/_4$**	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	$^3/_4$
DKV160	12,8	**82,55**	**$^1/_4$**	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	$^3/_4$
DKV160	12,8	**82,55**	**$^1/_4$**	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	$^3/_4$
DKV160	12,8	**82,55**	**$^1/_4$**	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	$^3/_4$
DKV160	22	**82,55**	**$^1/_4$**	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	$^7/_8$
DKV160	22	**82,55**	**$^1/_4$**	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	$^7/_8$
DKV160	22	**82,55**	**$^1/_4$**	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	$^7/_8$
DKV160	22	**82,55**	**$^1/_4$**	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	$^7/_8$
DKV160	22	**82,55**	**$^1/_4$**	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	$^7/_8$

Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve





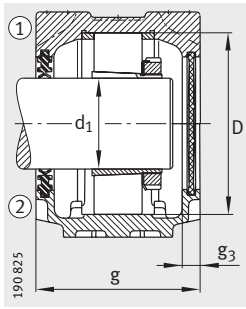
① Locating bearing
② Non-locating bearing

Dimension table (continued) · Dimensions in mm

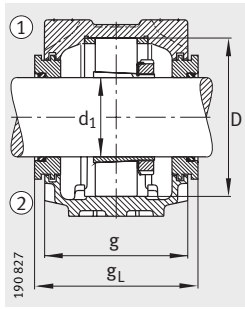
Designation

Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV170-L	1219-K-M-C3	H219	FRM170/18	DH519	TSV519	FSV519	DHV519	TCV519
SNV170-L	2219-K-M-C3	H319	FRM170/12,5	DH519	TSV519	FSV519	DHV519	TCV519
SNV170-L	22219-E1-K	H319	FRM170/12,5	DH519	TSV519	FSV519	DHV519	TCV519
SNV200-L	1319-K-M-C3	H319	FRM200/17,5	DH619	TSV619	FSV619	DHV619	TCV619
SNV200-L	21319-E1-K-TVPB	H319	FRM200/17,5	DH619	TSV619	FSV619	DHV619	TCV619
SNV200-L	2319-K-M-C3	H2319	FRM200/6,5	DH619	TSV619	FSV619	DHV619	TCV619
SNV200-L	22319-E1-K	H2319	FRM200/6,5	DH619	TSV619	FSV619	DHV619	TCV619
SNV170-L	1219-K-M-C3	H219X306	FRM170/18	DH519	TSV519X306	FSV519	DHV519	TCV519X306
SNV170-L	2219-K-M-C3	H319X306	FRM170/12,5	DH519	TSV519X306	FSV519	DHV519	TCV519X306
SNV170-L	22219-E1-K	H319X306	FRM170/12,5	DH519	TSV519X306	FSV519	DHV519	TCV519X306
SNV200-L	1319-K-M-C3	H319X306	FRM200/17,5	DH619	TSV619X306	FSV619	DHV619	TCV619X306
SNV200-L	21319-E1-K-TVPB	H319X306	FRM200/17,5	DH619	TSV619X306	FSV619	DHV619	TCV619X306
SNV200-L	2319-K-M-C3	H2319X306	FRM200/6,5	DH619	TSV619X306	FSV619	DHV619	TCV619X306
SNV200-L	22319-E1-K	H2319X306	FRM200/6,5	DH619	TSV619X306	FSV619	DHV619	TCV619X306
SNV180-L	1220-K-M-C3	H220X307	FRM180/18	DH520X307	TSV520X307	FSV520X307	DHV520X307	TCV520X307
SNV180-L	20220-K-MB-C3	H220X307	FRM180/18	DH520X307	TSV520X307	FSV520X307	DHV520X307	TCV520X307
SNV180-L	2220-K-M-C3	H320X307	FRM180/12	DH520X307	TSV520X307	FSV520X307	DHV520X307	TCV520X307
SNV180-L	22220-E1-K	H320X307	FRM180/12	DH520X307	TSV520X307	FSV520X307	DHV520X307	TCV520X307
SNV180-L	23220-E1-K-TVPB	H2320X307	FRM180/4,85	DH520X307	TSV520X307	FSV520X307	DHV520X307	TCV520X307
SNV215-L[1)]	1320-K-M-C3	H320X307	FRM215/19,5	DH620X307	TSV620X307	FSV620X307	DHV620X307	TCV620X307
SNV215-L[1)]	20320-K-MB-C3	H320X307	FRM215/19,5	DH620X307	TSV620X307	FSV620X307	DHV620X307	TCV620X307
SNV215-L[1)]	21320-E1-K-TVPB	H320X307	FRM215/19,5	DH620X307	TSV620X307	FSV620X307	DHV620X307	TCV620X307
SNV215-L[1)]	2320-K-M-C3	H2320X307	FRM215/6,5	DH620X307	TSV620X307	FSV620X307	DHV620X307	TCV620X307
SNV215-L[1)]	22320-E1-K	H2320X307	FRM215/6,5	DH620X307	TSV620X307	FSV620X307	DHV620X307	TCV620X307
SNV180-L	1220-K-M-C3	H220X308	FRM180/18	DH520X308	TSV520X308	FSV520X308	DHV520X308	TCV520X308
SNV180-L	20220-K-MB-C3	H220X308	FRM180/18	DH520X308	TSV520X308	FSV520X308	DHV520X308	TCV520X308
SNV180-L	2220-K-M-C3	H320X308	FRM180/12	DH520X308	TSV520X308	FSV520X308	DHV520X308	TCV520X308
SNV180-L	22220-E1-K	H320X308	FRM180/12	DH520X308	TSV520X308	FSV520X308	DHV520X308	TCV520X308
SNV180-L	23220-E1-K-TVPB	H2320X308	FRM180/4,85	DH520X308	TSV520X308	FSV520X308	DHV520X308	TCV520X308
SNV215-L[1)]	1320-K-M-C3	H320X308	FRM215/19,5	DH620	TSV620X308	FSV620X308	DHV620	TCV620X308
SNV215-L[1)]	20320-K-MB-C3	H320X308	FRM215/19,5	DH620	TSV620X308	FSV620X308	DHV620	TCV620X308
SNV215-L[1)]	21320-E1-K-TVPB	H320X308	FRM215/19,5	DH620	TSV620X308	FSV620X308	DHV620	TCV620X308
SNV215-L[1)]	2320-K-M-C3	H2320X308	FRM215/6,5	DH620	TSV620X308	FSV620X308	DHV620	TCV620X308
SNV215-L[1)]	22320-E1-K	H2320X308	FRM215/6,5	DH620	TSV620X308	FSV620X308	DHV620	TCV620X308

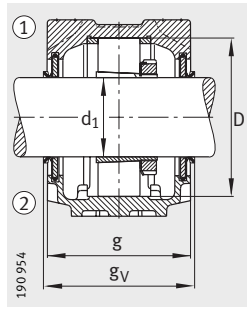
[1)] Housing with ring bolt.



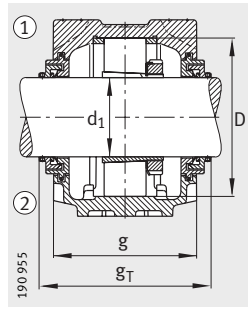
Double lip seal DH
Cover DKV



Labyrinth ring TSV



V ring seal DHV

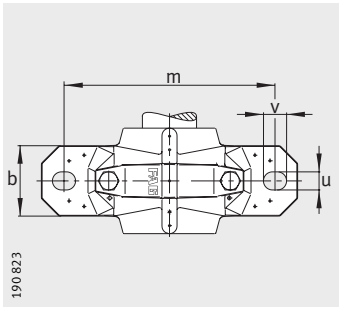


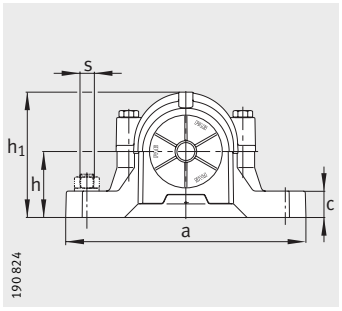
Taconite seal TCV

Cover	Mass m	Dimensions																	
	Housing	d_1		a	g	h_1	b	c	D	g_L	g_V	g_T	g_3	h	m	u	v	s	
	≈kg	mm	inch															mm	inch
DKV170	14,4	**85**	–	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	**85**	–	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	**85**	–	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV200	21	**85**	–	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	**85**	–	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	**85**	–	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	**85**	–	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8
DKV170	14,4	**85,725**	**3 3/8**	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	**85,725**	**3 3/8**	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	**85,725**	**3 3/8**	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV200	21	**85,725**	**3 3/8**	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	**85,725**	**3 3/8**	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	**85,725**	**3 3/8**	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	**85,725**	**3 3/8**	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8
DKV180	17	**87,313**	**3 7/16**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	**87,313**	**3 7/16**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	**87,313**	**3 7/16**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	**87,313**	**3 7/16**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	**87,313**	**3 7/16**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV215	24,5	**87,313**	**3 7/16**	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	**87,313**	**3 7/16**	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	**87,313**	**3 7/16**	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	**87,313**	**3 7/16**	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	**87,313**	**3 7/16**	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV180	17	**88,9**	**3 1/2**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	**88,9**	**3 1/2**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	**88,9**	**3 1/2**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	**88,9**	**3 1/2**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	**88,9**	**3 1/2**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV215	24,5	**88,9**	**3 1/2**	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	**88,9**	**3 1/2**	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	**88,9**	**3 1/2**	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	**88,9**	**3 1/2**	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	**88,9**	**3 1/2**	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8

Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve





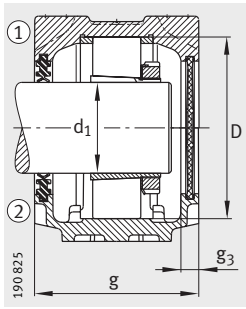
① Locating bearing
② Non-locating bearing

Dimension table (continued) · Dimensions in mm

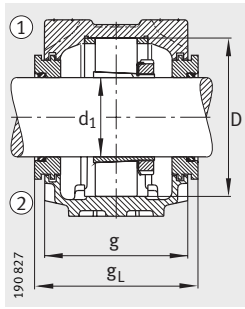
Designation

Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV180-L	1220-K-M-C3	H220	FRM180/18	DH520	TSV520	FSV520	DHV520	TCV520
SNV180-L	20220-K-MB-C3	H220	FRM180/18	DH520	TSV520	FSV520	DHV520	TCV520
SNV180-L	2220-K-M-C3	H320	FRM180/12	DH520	TSV520	FSV520	DHV520	TCV520
SNV180-L	22220-E1-K	H320	FRM180/12	DH520	TSV520	FSV520	DHV520	TCV520
SNV180-L	23220-E1-K-TVPB	H2320	FRM180/4,85	DH520	TSV520	FSV520	DHV520	TCV520
SNV215-L[1)]	1320-K-M-C3	H320	FRM215/19,5	DH620	TSV620	FSV620	DHV620	TCV620
SNV215-L[1)]	20320-K-MB-C3	H320	FRM215/19,5	DH620	TSV620	FSV620	DHV620	TCV620
SNV215-L[1)]	21320-E1-K-TVPB	H320	FRM215/19,5	DH620	TSV620	FSV620	DHV620	TCV620
SNV215-L[1)]	2320-K-M-C3	H2320	FRM215/6,5	DH620	TSV620	FSV620	DHV620	TCV620
SNV215-L[1)]	22320-E1-K	H2320	FRM215/6,5	DH620	TSV620	FSV620	DHV620	TCV620
SNV180-L	1220-K-M-C3	H220X310	FRM180/18	DH520X310	TSV520X310	FSV520X310	DHV520X310	TCV520X310
SNV180-L	20220-K-MB-C3	H220X310	FRM180/18	DH520X310	TSV520X310	FSV520X310	DHV520X310	TCV520X310
SNV180-L	2220-K-M-C3	H320X310	FRM180/12	DH520X310	TSV520X310	FSV520X310	DHV520X310	TCV520X310
SNV180-L	22220-E1-K	H320X310	FRM180/12	DH520X310	TSV520X310	FSV520X310	DHV520X310	TCV520X310
SNV180-L	23220-E1-K-TVPB	H2320X310	FRM180/4,85	DH520X310	TSV520X310	FSV520X310	DHV520X310	TCV520X310
SNV215-L[1)]	1320-K-M-C3	H320X310	FRM215/19,5	DH620X310	TSV620X310	FSV620X310	DHV620X310	TCV620X310
SNV215-L[1)]	20320-K-MB-C3	H320X310	FRM215/19,5	DH620X310	TSV620X310	FSV620X310	DHV620X310	TCV620X310
SNV215-L[1)]	21320-E1-K-TVPB	H320X310	FRM215/19,5	DH620X310	TSV620X310	FSV620X310	DHV620X310	TCV620X310
SNV215-L[1)]	2320-K-M-C3	H2320X310	FRM215/6,5	DH620X310	TSV620X310	FSV620X310	DHV620X310	TCV620X310
SNV215-L[1)]	22320-E1-K	H2320X310	FRM215/6,5	DH620X310	TSV620X310	FSV620X310	DHV620X310	TCV620X310
SNV180-L	1220-K-M-C3	H220X311	FRM180/18	DH520X310	TSV520X311	FSV520X311	DHV520X311	TCV520X311
SNV180-L	20220-K-MB-C3	H220X311	FRM180/18	DH520X310	TSV520X311	FSV520X311	DHV520X311	TCV520X311
SNV180-L	2220-K-M-C3	H320X311	FRM180/12	DH520X310	TSV520X311	FSV520X311	DHV520X311	TCV520X311
SNV180-L	22220-E1-K	H320X311	FRM180/12	DH520X310	TSV520X311	FSV520X311	DHV520X311	TCV520X311
SNV180-L	23220-E1-K-TVPB	H2320X311	FRM180/4,85	DH520X310	TSV520X311	FSV520X311	DHV520X311	TCV520X311
SNV215-L[1)]	1320-K-M-C3	H320X311	FRM215/19,5	DH620X310	TSV620X311	FSV620X311	DHV620X311	TCV620X311
SNV215-L[1)]	20320-K-MB-C3	H320X311	FRM215/19,5	DH620X310	TSV620X311	FSV620X311	DHV620X311	TCV620X311
SNV215-L[1)]	21320-E1-K-TVPB	H320X311	FRM215/19,5	DH620X310	TSV620X311	FSV620X311	DHV620X311	TCV620X311
SNV215-L[1)]	2320-K-M-C3	H2320X311	FRM215/6,5	DH620X310	TSV620X311	FSV620X311	DHV620X311	TCV620X311
SNV215-L[1)]	22320-E1-K	H2320X311	FRM215/6,5	DH620X310	TSV620X311	FSV620X311	DHV620X311	TCV620X311

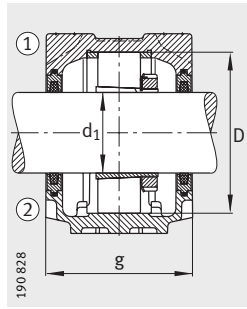
[1)] Housing with ring bolt.



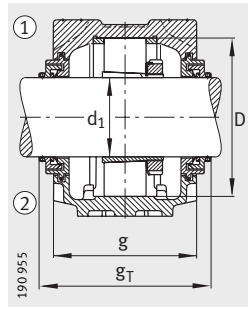
Double lip seal DH
Cover DKV



Labyrinth ring TSV



Felt seal FSV

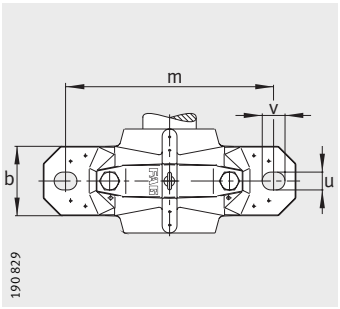


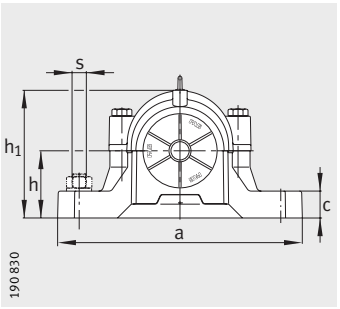
Taconite seal TCV

	Mass m	Dimensions																	
Cover	Housing	d_1		a	g	h_1	b	c	D	g_L	g_V	g_T	g_3	h	m	u	v	s	
	≈kg	mm	inch															mm	inch
DKV180	17	**90**	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV180	17	**90**	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV180	17	**90**	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV180	17	**90**	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV180	17	**90**	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV215	24,5	**90**	–	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	$^7/_8$
DKV215	24,5	**90**	–	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	$^7/_8$
DKV215	24,5	**90**	–	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	$^7/_8$
DKV215	24,5	**90**	–	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	$^7/_8$
DKV215	24,5	**90**	–	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	$^7/_8$
DKV180	17	**92,075**	**$3^5/_8$**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV180	17	**92,075**	**$3^5/_8$**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV180	17	**92,075**	**$3^5/_8$**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV180	17	**92,075**	**$3^5/_8$**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV180	17	**92,075**	**$3^5/_8$**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV215	24,5	**92,075**	**$3^5/_8$**	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	$^7/_8$
DKV215	24,5	**92,075**	**$3^5/_8$**	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	$^7/_8$
DKV215	24,5	**92,075**	**$3^5/_8$**	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	$^7/_8$
DKV215	24,5	**92,075**	**$3^5/_8$**	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	$^7/_8$
DKV215	24,5	**92,075**	**$3^5/_8$**	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	$^7/_8$
DKV180	17	**93,663**	**$3^{11}/_{16}$**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV180	17	**93,663**	**$3^{11}/_{16}$**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV180	17	**93,663**	**$3^{11}/_{16}$**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV180	17	**93,663**	**$3^{11}/_{16}$**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV180	17	**93,663**	**$3^{11}/_{16}$**	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	$^7/_8$
DKV215	24,5	**93,663**	**$3^{11}/_{16}$**	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	$^7/_8$
DKV215	24,5	**93,663**	**$3^{11}/_{16}$**	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	$^7/_8$
DKV215	24,5	**93,663**	**$3^{11}/_{16}$**	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	$^7/_8$
DKV215	24,5	**93,663**	**$3^{11}/_{16}$**	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	$^7/_8$
DKV215	24,5	**93,663**	**$3^{11}/_{16}$**	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	$^7/_8$

Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve





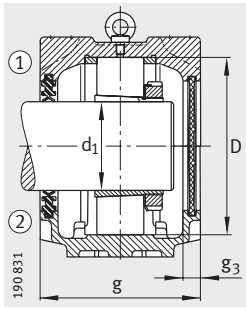
① Locating bearing
② Non-locating bearing

Dimension table (continued) · Dimensions in mm

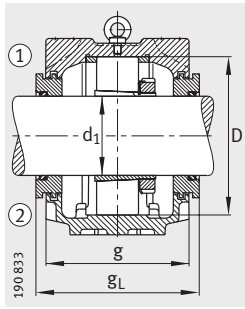
Designation

Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV200-L[1]	1222-K-M-C3	H222X312	FRM200/21	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV200-L[1]	20222-K-MB-C3	H222X312	FRM200/21	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV200-L[1]	22222-E1-K	H322X312	FRM200/13,5	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV200-L[1]	23222-E1-K-TVPB	H2322X312	FRM200/5,1	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV240-L	1322-K-M-C3	H322X312	FRM240/20	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV240-L	21322-E1-K-TVPB	H322X312	FRM240/20	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV240-L	2322-K-M-C3	H2322X312	FRM240/5	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV240-L	22322-E1-K	H2322X312	FRM240/5	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV200-L[1]	1222-K-M-C3	H222X314	FRM200/21	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV200-L[1]	20222-K-MB-C3	H222X314	FRM200/21	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV200-L[1]	2222-K-M-C3	H322X314	FRM200/13,5	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV200-L[1]	22222-E1-K	H322X314	FRM200/13,5	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV200-L[1]	23222-E1-K-TVPB	H2322X314	FRM200/5,1	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV240-L	1322-K-M-C3	H322X314	FRM240/20	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV240-L	21322-E1-K-TVPB	H322X314	FRM240/20	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV240-L	2322-K-M-C3	H2322X314	FRM240/5	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV240-L	22322-E1-K	H2322X314	FRM240/5	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV200-L[1]	1222-K-M-C3	H222	FRM200/21	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L[1]	20222-K-MB-C3	H222	FRM200/21	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L[1]	2222-K-M-C3	H322	FRM200/13,5	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L[1]	22222-E1-K	H322	FRM200/13,5	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L[1]	23222-E1-K-TVPB	H2322	FRM200/5,1	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	1322-K-M-C3	H322	FRM240/20	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	21322-E1-K-TVPB	H322	FRM240/20	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	2322-K-M-C3	H2322	FRM240/5	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	22322-E1-K	H2322	FRM240/5	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L[1]	1222-K-M-C3	H222X315	FRM200/21	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L[1]	20222-K-MB-C3	H222X315	FRM200/21	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L[1]	2222-K-M-C3	H322X315	FRM200/13,5	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L[1]	22222-E1-K	H322X315	FRM200/13,5	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L[1]	23222-E1-K-TVPB	H2322X315	FRM200/5,1	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	1322-K-M-C3	H322X315	FRM240/20	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	21322-E1-K-TVPB	H322X315	FRM240/20	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	2322-K-M-C3	H2322X315	FRM240/5	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	22322-E1-K	H2322X315	FRM240/5	DH522	TSV522	FSV522	DHV522	TCV522

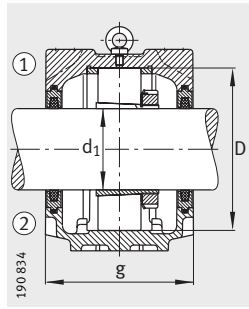
[1] Housing without ring bolt.



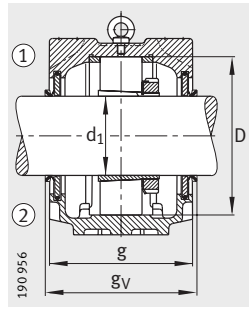
Double lip seal DH
Cover DKV



Labyrinth ring TSV



Felt seal FSV

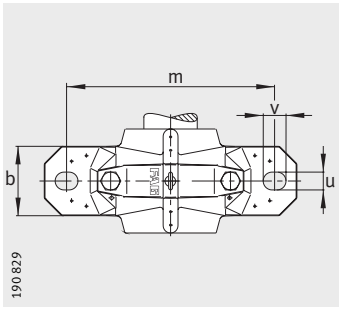


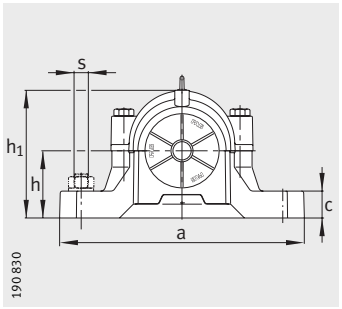
V ring seal DHV

	Mass m	Dimensions																	
Cover	Housing	d_1		a	g	h_1	b	c	D	g_L	g_V	g_T	g_3	h	m	u	v	s	
	≈kg	mm	inch															mm	inch
DKV200	21	**95,25**	**$3^3/_4$**	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	21	**95,25**	**$3^3/_4$**	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	21	**95,25**	**$3^3/_4$**	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	21	**95,25**	**$3^3/_4$**	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	32	**95,25**	**$3^3/_4$**	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	**95,25**	**$3^3/_4$**	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	**95,25**	**$3^3/_4$**	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	**95,25**	**$3^3/_4$**	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	21	**98,425**	**$3^7/_8$**	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	21	**98,425**	**$3^7/_8$**	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	21	**98,425**	**$3^7/_8$**	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	21	**98,425**	**$3^7/_8$**	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	21	**98,425**	**$3^7/_8$**	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	32	**98,425**	**$3^7/_8$**	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	**98,425**	**$3^7/_8$**	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	**98,425**	**$3^7/_8$**	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	**98,425**	**$3^7/_8$**	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	21	**100**	–	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	21	**100**	–	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	21	**100**	–	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	21	**100**	–	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	21	**100**	–	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	32	**100**	–	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	**100**	–	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	**100**	–	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	**100**	–	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	21	**100,013**	**$3^{15}/_{16}$**	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	21	**100,013**	**$3^{15}/_{16}$**	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	21	**100,013**	**$3^{15}/_{16}$**	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	21	**100,013**	**$3^{15}/_{16}$**	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	21	**100,013**	**$3^{15}/_{16}$**	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	32	**100,013**	**$3^{15}/_{16}$**	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	**100,013**	**$3^{15}/_{16}$**	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	**100,013**	**$3^{15}/_{16}$**	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	**100,013**	**$3^{15}/_{16}$**	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1

Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve





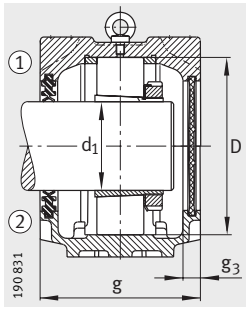
① Locating bearing
② Non-locating bearing

Dimension table (continued) · Dimensions in mm

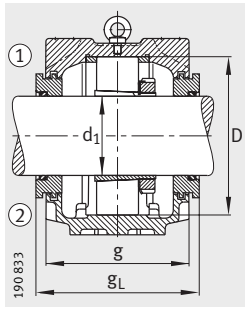
Designation

Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV200-L[1]	1222-K-M-C3	H222X400	FRM200/21	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
SNV200-L[1]	20222-K-MB-C3	H222X400	FRM200/21	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
SNV200-L[1]	2222-K-M-C3	H322X400	FRM200/13,5	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
SNV200-L[1]	22222-E1-K	H322X400	FRM200/13,5	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
SNV200-L[1]	23222-E1-K-TVPB	H2322X400	FRM200/5,1	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
SNV240-L	1322-K-M-C3	H322X400	FRM240/20	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
SNV240-L	21322-E1-K-TVPB	H322X400	FRM240/20	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
SNV240-L	2322-K-M-C3	H2322X400	FRM240/5	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
SNV240-L	22322-E1-K	H2322X400	FRM240/5	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
SNV215-L	20224-K-MB-C3	H3024X403	FRM215/23	DH524X403	TSV524X403	FSV524X403	DHV524X403	TCV524X403
SNV215-L	22224-E1-K	H3124X403	FRM215/14	DH524X403	TSV524X403	FSV524X403	DHV524X403	TCV524X403
SNV215-L	23224-E1-K-TVPB	H2324X403	FRM215/5	DH524X403	TSV524X403	FSV524X403	DHV524X403	TCV524X403
SNV260-L	22324-E1-K	H2324X403	FRM260/5	DH524X403	TSV524X403	FSV524X403	DHV524X403	TCV524X403
SNV215-L	20224-K-MB-C3	H3024X404	FRM215/23	DH524X403	TSV524X404	FSV524X404	DHV524X404	TCV524X404
SNV215-L	22224-E1-K	H3124X404	FRM215/14	DH524X403	TSV524X404	FSV524X404	DHV524X404	TCV524X404
SNV215-L	23224-E1-K-TVPB	H2324X404	FRM215/5	DH524X403	TSV524X404	FSV524X404	DHV524X404	TCV524X404
SNV260-L	22324-E1-K	H2324X404	FRM260/5	DH524X403	TSV524X404	FSV524X404	DHV524X404	TCV524X404
SNV215-L	20224-K-MB-C3	H3024	FRM215/23	DH524	TSV524	FSV524	DHV524	TCV524
SNV215-L	22224-E1-K	H3124	FRM215/14	DH524	TSV524	FSV524	DHV524	TCV524
SNV215-L	23224-E1-K-TVPB	H2324	FRM215/5	DH524	TSV524	FSV524	DHV524	TCV524
SNV260-L	22324-E1-K	H2324	FRM260/5	DH524	TSV524	FSV524	DHV524	TCV524
SNV230-L	20226-K-MB-C3	H3026X407	FRM230/25	DH526X407	TSV526X407	FSV526X407	DHV526X407	TCV526X407
SNV230-L	22226-E1-K	H3126X407	FRM230/13	DH526X407	TSV526X407	FSV526X407	DHV526X407	TCV526X407
SNV230-L	23226-E1-K-TVPB	H2326X407	FRM230/5	DH526X407	TSV526X407	FSV526X407	DHV526X407	TCV526X407
SNV280-L	22326-E1-K	H2326X407	FRM280/5	DH526X407	TSV526X407	FSV526X407	DHV526X407	TCV526X407
SNV230-L	20226-K-MB-C3	H3026X408	FRM230/25	DH526	TSV526X408	FSV526	DHV526	TCV526
SNV230-L	22226-E1-K	H3126X408	FRM230/13	DH526	TSV526X408	FSV526	DHV526	TCV526
SNV230-L	23226-E1-K-TVPB	H2326X408	FRM230/5	DH526	TSV526X408	FSV526	DHV526	TCV526
SNV280-L	22326-E1-K	H2326X408	FRM280/5	DH526	TSV526X408	FSV526	DHV526	TCV526

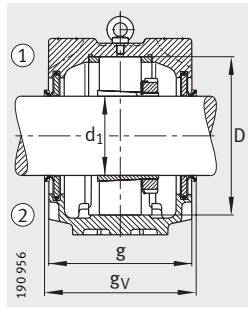
[1] Housing without ring bolt.



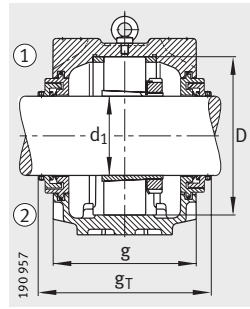
Double lip seal DH
Cover DKV



Labyrinth ring TSV



V ring seal DHV

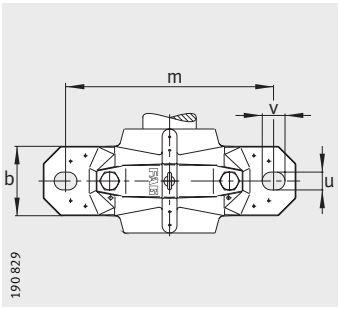


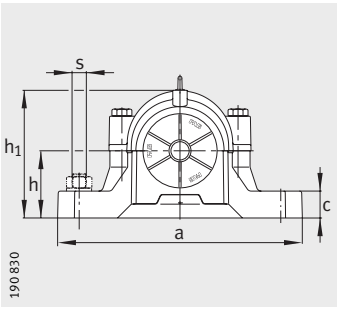
Taconite seal TCV

	Mass m	Dimensions																	
Cover	Housing	d_1		a	g	h_1	b	c	D	g_L	g_V	g_T	g_3	h	m	u	v	s	
	≈kg	mm	inch															mm	inch
DKV200	21	**101,6**	**4**	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	21	**101,6**	**4**	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	21	**101,6**	**4**	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	21	**101,6**	**4**	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	21	**101,6**	**4**	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	$^7/_8$
DKV200	32	**101,6**	**4**	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	**101,6**	**4**	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	**101,6**	**4**	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	**101,6**	**4**	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV215	24,5	**106,363**	**$4^3/_{16}$**	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	$^7/_8$
DKV215	24,5	**106,363**	**$4^3/_{16}$**	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	$^7/_8$
DKV215	24,5	**106,363**	**$4^3/_{16}$**	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	$^7/_8$
DKV215	48	**106,363**	**$4^3/_{16}$**	530	190	321	160	60	260	208,3	199	235	18	160	450	35	42	M30	$1^1/_4$
DKV215	24,5	**107,95**	**$4^1/_4$**	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	$^7/_8$
DKV215	24,5	**107,95**	**$4^1/_4$**	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	$^7/_8$
DKV215	24,5	**107,95**	**$4^1/_4$**	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	$^7/_8$
DKV215	48	**107,95**	**$4^1/_4$**	530	190	321	160	60	260	208,3	199	235	18	160	450	35	42	M30	$1^1/_4$
DKV215	24,5	**110**	–	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	$^7/_8$
DKV215	24,5	**110**	–	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	$^7/_8$
DKV215	24,5	**110**	–	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	$^7/_8$
DKV215	48	**110**	–	530	190	321	160	60	260	208,3	199	235	18	160	450	35	42	M30	$1^1/_4$
DKV230	30	**112,713**	**$4^7/_{16}$**	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	**112,713**	**$4^7/_{16}$**	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	**112,713**	**$4^7/_{16}$**	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	55	**112,713**	**$4^7/_{16}$**	550	205	344	160	60	280	223,3	214	250	18	170	470	35	42	M30	$1^1/_4$
DKV230	30	**114,3**	**$4^1/_2$**	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	**114,3**	**$4^1/_2$**	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	**114,3**	**$4^1/_2$**	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	55	**114,3**	**$4^1/_2$**	550	205	344	160	60	280	223,3	214	250	18	170	470	35	42	M30	$1^1/_4$

Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve



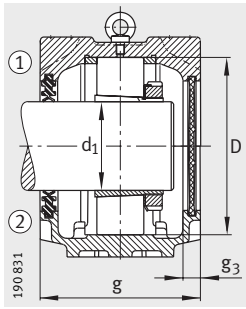


① Locating bearing
② Non-locating bearing

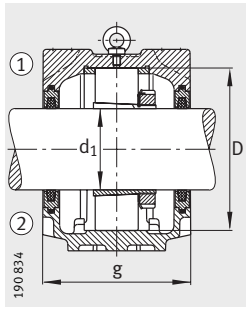
Dimension table (continued) · Dimensions in mm

Designation

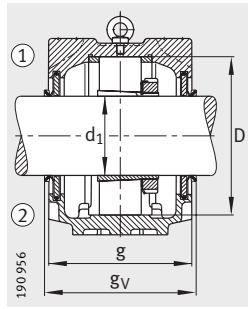
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV230-L	20226-K-MB-C3	H3026	FRM230/25	DH526	TSV526	FSV526	DHV526	TCV526
SNV230-L	22226-E1-K	H3126	FRM230/13	DH526	TSV526	FSV526	DHV526	TCV526
SNV230-L	23226-E1-K-TVPB	H2326	FRM230/5	DH526	TSV526	FSV526	DHV526	TCV526
SNV280-L	22326-E1-K	H2326	FRM280/5	DH526	TSV526	FSV526	DHV526	TCV526
SNV230-L	20226-K-MB-C3	H3026X412	FRM230/25	DH526X412	TSV526X412	FSV526X412	DHV526X412	TCV526X412
SNV230-L	22226-E1-K	H3126X412	FRM230/13	DH526X412	TSV526X412	FSV526X412	DHV526X412	TCV526X412
SNV230-L	23226-E1-K-TVPB	H2326X412	FRM230/5	DH526X412	TSV526X412	FSV526X412	DHV526X412	TCV526X412
SNV280-L	22326-E1-K	H2326X412	FRM280/5	DH526X412	TSV526X412	FSV526X412	DHV526X412	TCV526X412
SNV250-L	20228-K-MB-C3	H3028	FRM250/28	DH528	TSV528	FSV528	DHV528	TCV528
SNV250-L	22228-E1-K	H3128	FRM250/15	DH528	TSV528	FSV528	DHV528	TCV528
SNV250-L	23228-E1-K-TVPB	H2328	FRM250/5	DH528	TSV528	FSV528	DHV528	TCV528
SNV300-L	22328-E1-K	H2328	FRM300/5	DH528	TSV528	FSV528	DHV528	TCV528
SNV250-L	20228-K-MB-C3	H3028X415	FRM250/28	DH528	TSV528X415	FSV528	DHV528	TCV528X415
SNV250-L	22228-E1-K	H3128X415	FRM250/15	DH528	TSV528X415	FSV528	DHV528	TCV528X415
SNV250-L	23228-E1-K-TVPB	H2328X415	FRM250/5	DH528	TSV528X415	FSV528	DHV528	TCV528X415
SNV300-L	22328-E1-K	H2328X415	FRM300/5	DH528	TSV528X415	FSV528	DHV528	TCV528X415
SNV250-L	20228-K-MB-C3	H3028X500	FRM250/28	DH528	TSV528X500	FSV528X500	DHV528X500	TCV528X500
SNV250-L	22228-E1-K	H3128X500	FRM250/15	DH528	TSV528X500	FSV528X500	DHV528X500	TCV528X500
SNV250-L	23228-E1-K-TVPB	H2328X500	FRM250/5	DH528	TSV528X500	FSV528X500	DHV528X500	TCV528X500
SNV300-L	22328-E1-K	H2328X500	FRM300/5	DH528	TSV528X500	FSV528X500	DHV528X500	TCV528X500
SNV270-L	20230-K-MB-C3	H3030X503	FRM270/30,5	DH530X503	TSV530X503	FSV530X503	DHV530X503	TCV530X503
SNV270-L	22230-E1-K	H3130X503	FRM270/16,5	DH530X503	TSV530X503	FSV530X503	DHV530X503	TCV530X503
SNV270-L	23230-E1-K-TVPB	H2330X503	FRM270/5	DH530X503	TSV530X503	FSV530X503	DHV530X503	TCV530X503
SNV320-L	22330-E1-K	H2330X503	FRM320/5	DH530X503	TSV530X503	FSV530X503	DHV530X503	TCV530X503
SNV270-L	20230-K-MB-C3	H3030X504	FRM270/30,5	DH530X504	TSV530X504	FSV530X504	DHV530X504	TCV530X504
SNV270-L	22230-E1-K	H3130X504	FRM270/16,5	DH530X504	TSV530X504	FSV530X504	DHV530X504	TCV530X504
SNV270-L	23230-E1-K-TVPB	H2330X504	FRM270/5	DH530X504	TSV530X504	FSV530X504	DHV530X504	TCV530X504
SNV320-L	22330-E1-K	H2330X504	FRM320/5	DH530X504	TSV530X504	FSV530X504	DHV530X504	TCV530X504



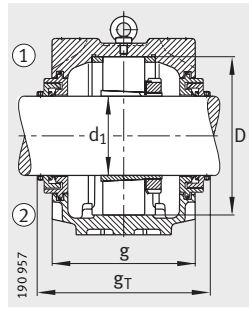
Double lip seal DH
Cover DKV



Felt seal FSV



V ring seal DHV

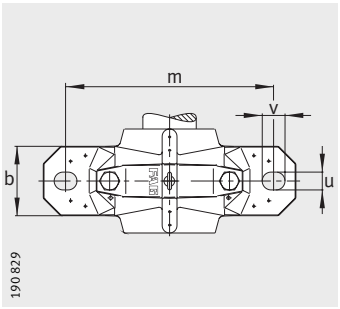


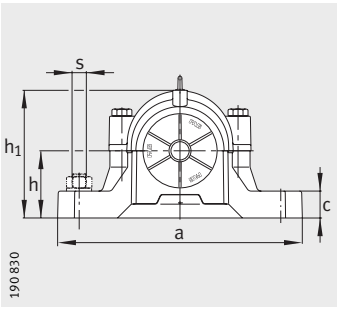
Taconite seal TCV

Cover	Mass m	Dimensions																	
	Housing	d_1		a	g	h_1	b	c	D	g_L	g_V	g_T	g_3	h	m	u	v	s	
	≈kg	mm	inch															mm	inch
DKV230	30	**115**	–	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	**115**	–	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	**115**	–	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	55	**115**	–	550	205	344	160	60	280	223,3	214	250	18	170	470	35	42	M30	$1^1/_4$
DKV230	30	**120,65**	$\mathbf{4^3/_4}$	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	**120,65**	$\mathbf{4^3/_4}$	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	**120,65**	$\mathbf{4^3/_4}$	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	55	**120,65**	$\mathbf{4^3/_4}$	550	205	344	160	60	280	223,3	214	250	18	170	470	35	42	M30	$1^1/_4$
DKV250	38	**125**	–	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	$1^1/_4$
DKV250	38	**125**	–	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	$1^1/_4$
DKV250	38	**125**	–	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	$1^1/_4$
DKV250	70	**125**	–	620	215	366	170	65	300	233,3	224	260	18	180	520	35	42	M30	$1^1/_4$
DKV250	38	**125,413**	$\mathbf{4^{15}/_{16}}$	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	$1^1/_4$
DKV250	38	**125,413**	$\mathbf{4^{15}/_{16}}$	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	$1^1/_4$
DKV250	38	**125,413**	$\mathbf{4^{15}/_{16}}$	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	$1^1/_4$
DKV250	70	**125,413**	$\mathbf{4^{15}/_{16}}$	620	215	366	170	65	300	233,3	224	260	18	180	520	35	42	M30	$1^1/_4$
DKV250	38	**127**	**5**	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	$1^1/_4$
DKV250	38	**127**	**5**	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	$1^1/_4$
DKV250	38	**127**	**5**	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	$1^1/_4$
DKV250	70	**127**	**5**	620	215	366	170	65	300	233,3	224	260	18	180	520	35	42	M30	$1^1/_4$
DKV270	45,5	**131,763**	$\mathbf{5^3/_{16}}$	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	$1^1/_4$
DKV270	45,5	**131,763**	$\mathbf{5^3/_{16}}$	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	$1^1/_4$
DKV270	45,5	**131,763**	$\mathbf{5^3/_{16}}$	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	$1^1/_4$
DKV270	95	**131,763**	$\mathbf{5^3/_{16}}$	650	225	386	180	65	320	243,3	234	270	18	190	560	35	42	M30	$1^1/_4$
DKV270	45,5	**133,35**	$\mathbf{5^1/_4}$	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	$1^1/_4$
DKV270	45,5	**133,35**	$\mathbf{5^1/_4}$	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	$1^1/_4$
DKV270	45,5	**133,35**	$\mathbf{5^1/_4}$	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	$1^1/_4$
DKV270	95	**133,35**	$\mathbf{5^1/_4}$	650	225	386	180	65	320	243,3	234	270	18	190	560	35	42	M30	$1^1/_4$

Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve



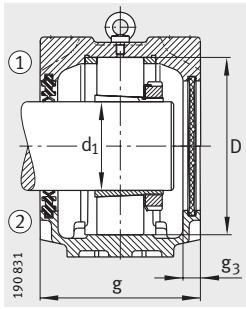


① Locating bearing
② Non-locating bearing

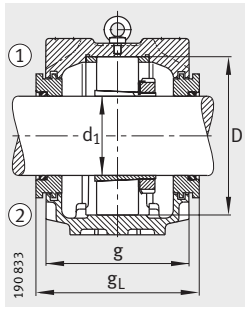
Dimension table (continued) · Dimensions in mm

Designation

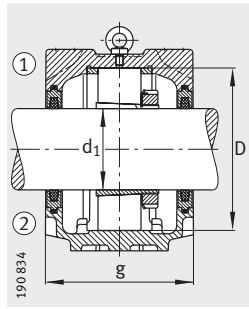
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV270-L	20230-K-MB-C3	H3030	FRM270/30,5	DH530	TSV530	FSV530	DHV530	TCV530
SNV270-L	22230-E1-K	H3130	FRM270/16,5	DH530	TSV530	FSV530	DHV530	TCV530
SNV270-L	23230-E1-K-TVPB	H2330	FRM270/5	DH530	TSV530	FSV530	DHV530	TCV530
SNV320-L	22330-E1-K	H2330	FRM320/5	DH530	TSV530	FSV530	DHV530	TCV530
SNV290-L	20232-K-MB-C3	H3032X507	FRM290/33	DH532X507	TSV532X507	FSV532X507	DHV532X507	TCV532X507
SNV290-L	22232-E1-K	H3132X507	FRM290/17	DH532X507	TSV532X507	FSV532X507	DHV532X507	TCV532X507
SNV290-L	23232-E1-K-TVPB	H2332X507	FRM290/5	DH532X507	TSV532X507	FSV532X507	DHV532X507	TCV532X507
SNV340-L	22332-K-MB	H2332X507	FRM340/5	DH532X507	TSV532X507	FSV532X507	DHV532X507	TCV532X507
SNV290-L	20232-K-MB-C3	H3032X508	FRM290/33	DH532	TSV532	FSV532	DHV532	TCV532
SNV290-L	22232-E1-K	H3132X508	FRM290/17	DH532	TSV532	FSV532	DHV532	TCV532
SNV290-L	23232-E1-K-TVPB	H2332X508	FRM290/5	DH532	TSV532	FSV532	DHV532	TCV532
SNV340-L	22332-K-MB	H2332X508	FRM340/5	DH532	TSV532	FSV532	DHV532	TCV532
SNV290-L	20232-K-MB-C3	H3032	FRM290/33	DH532	TSV532	FSV532	DHV532	TCV532
SNV290-L	22232-E1-K	H3132	FRM290/17	DH532	TSV532	FSV532	DHV532	TCV532
SNV290-L	23232-E1-K-TVPB	H2332	FRM290/5	DH532	TSV532	FSV532	DHV532	TCV532
SNV340-L	22332-K-MB	H2332	FRM340/5	DH532	TSV532	FSV532	DHV532	TCV532



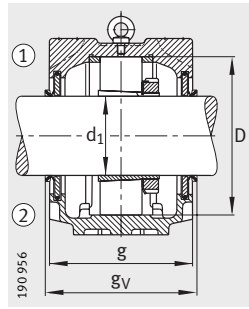
Double lip seal DH
Cover DKV



Labyrinth ring TSV



Felt seal FSV

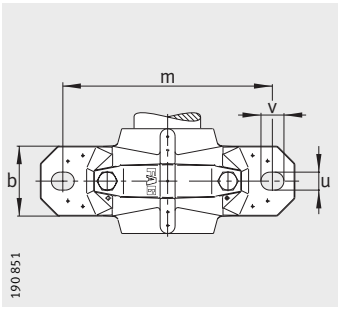


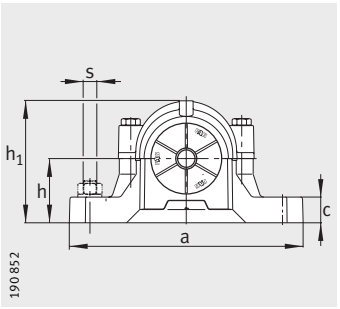
V ring seal DHV

	Mass m	Dimensions																	
Cover	Housing	d_1		a	g	h_1	b	c	D	g_L	g_V	g_T	g_3	h	m	u	v	s	
	≈kg	mm	inch															mm	inch
DKV270	45,5	**135**	–	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	$1^1/_4$
DKV270	45,5	**135**	–	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	$1^1/_4$
DKV270	45,5	**135**	–	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	$1^1/_4$
DKV270	95	**135**	–	650	225	386	180	65	320	243,3	234	270	18	190	560	35	42	M30	$1^1/_4$
DKV290	53,8	**138,113**	$\mathbf{5^7/_{16}}$	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	$1^1/_4$
DKV290	53,8	**138,113**	$\mathbf{5^7/_{16}}$	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	$1^1/_4$
DKV290	53,8	**138,113**	$\mathbf{5^7/_{16}}$	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	$1^1/_4$
DKV290	115	**138,113**	$\mathbf{5^7/_{16}}$	680	235	406	190	70	340	253,3	244	298	18	200	580	42	50	M36	$1^1/_2$
DKV290	53,8	**139,7**	$\mathbf{5^1/_2}$	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	$1^1/_4$
DKV290	53,8	**139,7**	$\mathbf{5^1/_2}$	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	$1^1/_4$
DKV290	53,8	**139,7**	$\mathbf{5^1/_2}$	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	$1^1/_4$
DKV290	115	**139,7**	$\mathbf{5^1/_2}$	680	235	406	190	70	340	253,3	244	298	18	200	580	42	50	M36	$1^1/_2$
DKV290	53,8	**140**	–	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	$1^1/_4$
DKV290	53,8	**140**	–	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	$1^1/_4$
DKV290	53,8	**140**	–	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	$1^1/_4$
DKV290	115	**140**	–	680	235	406	190	70	340	253,3	244	298	18	200	580	42	50	M36	$1^1/_2$

Plummer block housings

SNV, split
For bearings with cylindrical bore

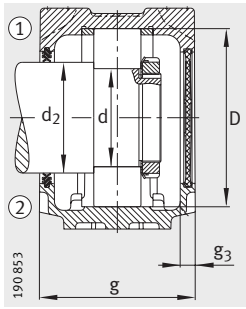




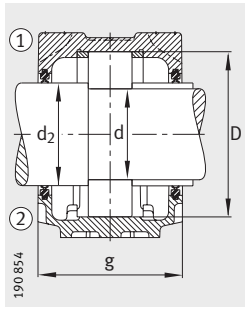
① Locating bearing
② Non-locating bearing

Dimension table · Dimensions in mm

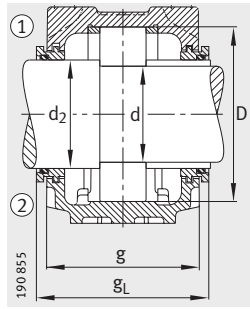
Designation										Mass m
Housing	Bearing	Lock-nut	Tab washer	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Cover	Hous-ing ≈kg
SNV052-L	1304-TVH	KM4	MB4	FRM52/6	DH304	TSV304	–	DHV304	DKV052	1,3
SNV052-L	20304-TVP	KM4	MB4	FRM52/6	DH304	TSV304	–	DHV304	DKV052	1,3
SNV052-L	21304-E1-TVPB	KM4	MB4	FRM52/6	DH304	TSV304	–	DHV304	DKV052	1,3
SNV052-L	2304-TVH	KM4	MB4	FRM52/3	DH304	TSV304	–	DHV304	DKV052	1,3
SNV052-L	1205-TVH	KM5	MB5	FRM52/6	DH205	TSV205	–	–	DKV052	1,3
SNV052-L	20205-TVP	KM5	MB5	FRM52/6	DH205	TSV205	–	–	DKV052	1,3
SNV052-L	2205-TVH	KM5	MB5	FRM52/4,5	DH205	TSV205	–	–	DKV052	1,3
SNV052-L	22205-E1	KM5	MB5	FRM52/4,5	DH205	TSV205	–	–	DKV052	1,3
SNV062-L	1305-TVH	KM5	MB5	FRM62/6,5	DH305	TSV305	FSV305	DHV305	DKV062	1,9
SNV062-L	20305-TVP	KM5	MB5	FRM62/6,5	DH305	TSV305	FSV305	DHV305	DKV062	1,9
SNV062-L	21305-E1-TVPB	KM5	MB5	FRM62/6,5	DH305	TSV305	FSV305	DHV305	DKV062	1,9
SNV062-L	2305-TVH	KM5	MB5	FRM62/3	DH305	TSV305	FSV305	DHV305	DKV062	1,9
SNV062-L	1206-TVH	KM6	MB6	FRM62/7	DH206	TSV206	–	–	DKV062	1,9
SNV062-L	20206-TVP	KM6	MB6	FRM62/7	DH206	TSV206	–	–	DKV062	1,9
SNV062-L	2206-TVH	KM6	MB6	FRM62/5	DH206	TSV206	–	–	DKV062	1,9
SNV062-L	22206-E1	KM6	MB6	FRM62/5	DH206	TSV206	–	–	DKV062	1,9
SNV072-L	1306-TVH	KM6	MB6	FRM72/7	DH306	TSV306	FSV306	DHV306	DKV072	2
SNV072-L	20306-TVP	KM6	MB6	FRM72/7	DH306	TSV306	FSV306	DHV306	DKV072	2
SNV072-L	21306-E1-TVPB	KM6	MB6	FRM72/7	DH306	TSV306	FSV306	DHV306	DKV072	2
SNV072-L	2306-TVH	KM6	MB6	FRM72/3	DH306	TSV306	FSV306	DHV306	DKV072	2
SNV072-L	1207-TVH	KM7	MB7	FRM72/8	DH207	TSV207	–	–	DKV072	2
SNV072-L	20207-TVP	KM7	MB7	FRM72/8	DH207	TSV207	–	–	DKV072	2
SNV072-L	2207-TVH	KM7	MB7	FRM72/5	DH207	TSV207	–	–	DKV072	2
SNV072-L	22207-E1	KM7	MB7	FRM72/5	DH207	TSV207	–	–	DKV072	2
SNV080-L	1307-TVH	KM7	MB7	FRM80/9	DH307	TSV307	FSV307	DHV307	DKV080	2,9
SNV080-L	20307-TVP	KM7	MB7	FRM80/9	DH307	TSV307	FSV307	DHV307	DKV080	2,9
SNV080-L	21307-E1-TVPB	KM7	MB7	FRM80/9	DH307	TSV307	FSV307	DHV307	DKV080	2,9
SNV080-L	2307-TVH	KM7	MB7	FRM80/4	DH307	TSV307	FSV307	DHV307	DKV080	2,9



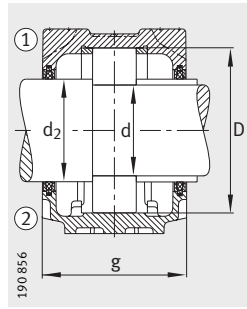
Double lip seal DH
Cover DKV



Double lip seal DH



Labyrinth ring TSV



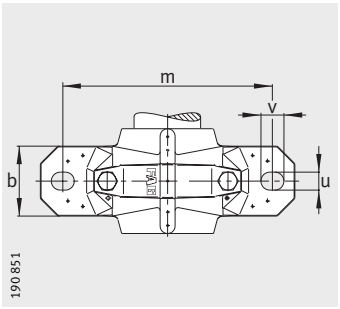
Felt seal FSV

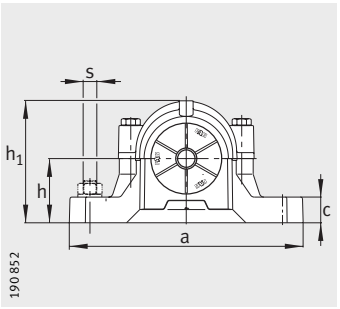
Dimensions

d	a	g	h_1	d_2	b	c	D	g_L	g_V	g_3	h	m	u	v	s	
															mm	inch
20	165	70	75	25	46	19	52	95	76	10,5	40	130	15	20	M12	$^1/_2$
20	165	70	75	25	46	19	52	95	76	10,5	40	130	15	20	M12	$^1/_2$
20	165	70	75	25	46	19	52	95	76	10,5	40	130	15	20	M12	$^1/_2$
20	165	70	75	25	46	19	52	95	76	10,5	40	130	15	20	M12	$^1/_2$
25	165	70	75	30	46	19	52	95	–	10,5	40	130	15	20	M12	$^1/_2$
25	165	70	75	30	46	19	52	95	–	10,5	40	130	15	20	M12	$^1/_2$
25	165	70	75	30	46	19	52	95	–	10,5	40	130	15	20	M12	$^1/_2$
25	165	70	75	30	46	19	52	95	–	10,5	40	130	15	20	M12	$^1/_2$
25	185	75	91	30	52	22	62	100	81	10,5	50	150	15	20	M12	$^1/_2$
25	185	75	91	30	52	22	62	100	81	10,5	50	150	15	20	M12	$^1/_2$
25	185	75	91	30	52	22	62	100	81	10,5	50	150	15	20	M12	$^1/_2$
25	185	75	91	30	52	22	62	100	81	10,5	50	150	15	20	M12	$^1/_2$
30	185	75	91	35	52	22	62	100	–	10,5	50	150	15	20	M12	$^1/_2$
30	185	75	91	35	52	22	62	100	–	10,5	50	150	15	20	M12	$^1/_2$
30	185	75	91	35	52	22	62	100	–	10,5	50	150	15	20	M12	$^1/_2$
30	185	75	91	35	52	22	62	100	–	10,5	50	150	15	20	M12	$^1/_2$
30	185	80	97	35	52	22	72	93	86	10,5	50	150	15	20	M12	$^1/_2$
30	185	80	97	35	52	22	72	93	86	10,5	50	150	15	20	M12	$^1/_2$
30	185	80	97	35	52	22	72	93	86	10,5	50	150	15	20	M12	$^1/_2$
30	185	80	97	35	52	22	72	93	86	10,5	50	150	15	20	M12	$^1/_2$
35	185	80	97	45	52	22	72	107	–	10,5	50	150	15	20	M12	$^1/_2$
35	185	80	97	45	52	22	72	107	–	10,5	50	150	15	20	M12	$^1/_2$
35	185	80	97	45	52	22	72	107	–	10,5	50	150	15	20	M12	$^1/_2$
35	185	80	97	45	52	22	72	107	–	10,5	50	150	15	20	M12	$^1/_2$
35	205	85	112	45	60	25	80	98	93	10,5	60	170	15	20	M12	$^1/_2$
35	205	85	112	45	60	25	80	98	93	10,5	60	170	15	20	M12	$^1/_2$
35	205	85	112	45	60	25	80	98	93	10,5	60	170	15	20	M12	$^1/_2$
35	205	85	112	45	60	25	80	98	93	10,5	60	170	15	20	M12	$^1/_2$

Plummer block housings

SNV, split
For bearings with cylindrical bore

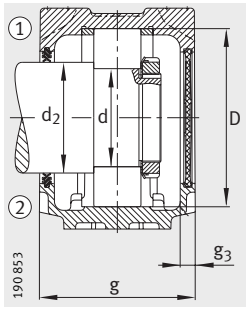




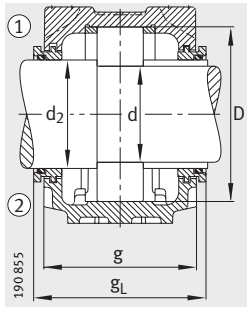
① Locating bearing
② Non-locating bearing

Dimension table (continued) · Dimensions in mm

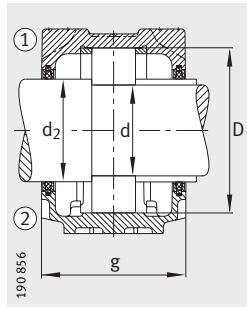
Designation										Mass m
Housing	Bearing	Lock-nut	Tab washer	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Cover	Hous-ing ≈kg
SNV080-L	1208-TVH	KM8	MB8	FRM80/10,5	DH208	TSV208	FSV208	DHV208	DKV080	2,9
SNV080-L	20208-TVP	KM8	MB8	FRM80/10,5	DH208	TSV208	FSV208	DHV208	DKV080	2,9
SNV080-L	2208-TVH	KM8	MB8	FRM80/8	DH208	TSV208	FSV208	DHV208	DKV080	2,9
SNV080-L	22208-E1	KM8	MB8	FRM80/8	DH208	TSV208	FSV208	DHV208	DKV080	2,9
SNV090-L	1308-TVH	KM8	MB8	FRM90/9	DH308	TSV308	FSV308	DHV308	DKV090	3,1
SNV090-L	20308-TVP	KM8	MB8	FRM90/9	DH308	TSV308	FSV308	DHV308	DKV090	3,1
SNV090-L	21308-E1	KM8	MB8	FRM90/9	DH308	TSV308	FSV308	DHV308	DKV090	3,1
SNV090-L	2308-TVH	KM8	MB8	FRM90/4	DH308	TSV308	FSV308	DHV308	DKV090	3,1
SNV090-L	22308-E1	KM8	MB8	FRM90/4	DH308	TSV308	FSV308	DHV308	DKV090	3,1
SNV085-L	1209-TVH	KM9	MB9	FRM85/6	DH209	TSV209	FSV209	DHV209	DKV085	2,8
SNV085-L	20209-TVP	KM9	MB9	FRM85/6	DH209	TSV209	FSV209	DHV209	DKV085	2,8
SNV085-L	2209-TVH	KM9	MB9	FRM85/4	DH209	TSV209	FSV209	DHV209	DKV085	2,8
SNV085-L	22209-E1	KM9	MB9	FRM85/4	DH209	TSV209	FSV209	DHV209	DKV085	2,8
SNV100-L	1309-TVH	KM9	MB9	FRM100/9,5	DH309	TSV309	FSV309	DHV309	DKV100	4,3
SNV100-L	20309-TVP	KM9	MB9	FRM100/9,5	DH309	TSV309	FSV309	DHV309	DKV100	4,3
SNV100-L	21309-E1	KM9	MB9	FRM100/9,5	DH309	TSV309	FSV309	DHV309	DKV100	4,3
SNV100-L	2309-TVH	KM9	MB9	FRM100/4	DH309	TSV309	FSV309	DHV309	DKV100	4,3
SNV100-L	22309-E1	KM9	MB9	FRM100/4	DH309	TSV309	FSV309	DHV309	DKV100	4,3
SNV090-L	1210-TVH	KM10	MB10	FRM90/10,5	DH210	TSV210	FSV210	DHV210	DKV090	3,1
SNV090-L	20210-TVP	KM10	MB10	FRM90/10,5	DH210	TSV210	FSV210	DHV210	DKV090	3,1
SNV090-L	2210-TVH	KM10	MB10	FRM90/9	DH210	TSV210	FSV210	DHV210	DKV090	3,1
SNV090-L	22210-E1	KM10	MB10	FRM90/9	DH210	TSV210	FSV210	DHV210	DKV090	3,1
SNV110-L	1310-TVH	KM10	MB10	FRM110/10,5	DH310	TSV310	FSV310	DHV310	DKV110	4,9
SNV110-L	20310-TVP	KM10	MB10	FRM110/10,5	DH310	TSV310	FSV310	DHV310	DKV110	4,9
SNV110-L	21310-E1	KM10	MB10	FRM110/10,5	DH310	TSV310	FSV310	DHV310	DKV110	4,9
SNV110-L	2310-TVH	KM10	MB10	FRM110/4	DH310	TSV310	FSV310	DHV310	DKV110	4,9
SNV110-L	22310-E1	KM10	MB10	FRM110/4	DH310	TSV310	FSV310	DHV310	DKV110	4,9
SNV100-L	1211-TVH	KM11	MB11	FRM100/11,5	DH211	TSV211	FSV211	DHV211	DKV100	4,3
SNV100-L	20211-TVP	KM11	MB11	FRM100/11,5	DH211	TSV211	FSV211	DHV211	DKV100	4,3
SNV100-L	2211-TVH	KM11	MB11	FRM100/9,5	DH211	TSV211	FSV211	DHV211	DKV100	4,3
SNV100-L	22211-E1	KM11	MB11	FRM100/9,5	DH211	TSV211	FSV211	DHV211	DKV100	4,3
SNV120-L	1311-TVH	KM11	MB11	FRM120/11	DH311	TSV311	FSV311	DHV311	DKV120	6,1
SNV120-L	20311-TVP	KM11	MB11	FRM120/11	DH311	TSV311	FSV311	DHV311	DKV120	6,1
SNV120-L	21311-E1	KM11	MB11	FRM120/11	DH311	TSV311	FSV311	DHV311	DKV120	6,1
SNV120-L	2311-TVH	KM11	MB11	FRM120/4	DH311	TSV311	FSV311	DHV311	DKV120	6,1
SNV120-L	22311-E1	KM11	MB11	FRM120/4	DH311	TSV311	FSV311	DHV311	DKV120	6,1



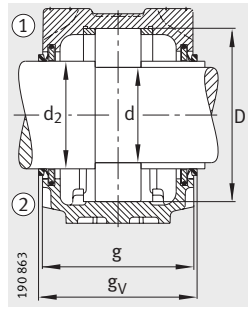
Double lip seal DH
Cover DKV



Labyrinth ring TSV



Felt seal FSV



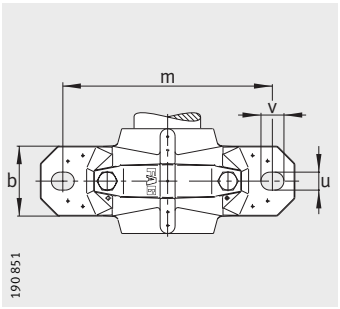
V ring seal DHV

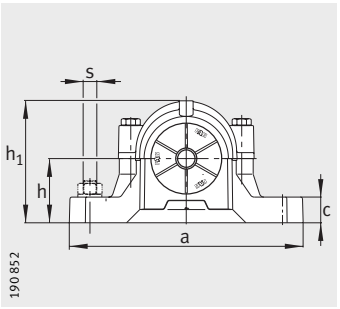
Dimensions

d	a	g	h_1	d_2	b	c	D	g_L	g_V	g_3	h	m	u	v	s	
															mm	inch
40	205	85	112	50	60	25	80	98	93	10,5	60	170	15	20	M12	$^1/_2$
40	205	85	112	50	60	25	80	98	93	10,5	60	170	15	20	M12	$^1/_2$
40	205	85	112	50	60	25	80	98	93	10,5	60	170	15	20	M12	$^1/_2$
40	205	85	112	50	60	25	80	98	93	10,5	60	170	15	20	M12	$^1/_2$
40	205	100	117	50	60	25	90	114	106	12,5	60	170	15	20	M12	$^1/_2$
40	205	100	117	50	60	25	90	114	106	12,5	60	170	15	20	M12	$^1/_2$
40	205	100	117	50	60	25	90	114	106	12,5	60	170	15	20	M12	$^1/_2$
40	205	100	117	50	60	25	90	114	106	12,5	60	170	15	20	M12	$^1/_2$
40	205	100	117	50	60	25	90	114	106	12,5	60	170	15	20	M12	$^1/_2$
45	205	87	114	55	60	25	85	101	93	12,5	60	170	15	20	M12	$^1/_2$
45	205	87	114	55	60	25	85	101	93	12,5	60	170	15	20	M12	$^1/_2$
45	205	87	114	55	60	25	85	101	93	12,5	60	170	15	20	M12	$^1/_2$
45	205	87	114	55	60	25	85	101	93	12,5	60	170	15	20	M12	$^1/_2$
45	255	105	133	55	70	28	100	119	111	12,5	70	210	18	23	M16	$^5/_8$
45	255	105	133	55	70	28	100	119	111	12,5	70	210	18	23	M16	$^5/_8$
45	255	105	133	55	70	28	100	119	111	12,5	70	210	18	23	M16	$^5/_8$
45	255	105	133	55	70	28	100	119	111	12,5	70	210	18	23	M16	$^5/_8$
45	255	105	133	55	70	28	100	119	111	12,5	70	210	18	23	M16	$^5/_8$
50	205	100	117	60	60	25	90	114	106	12,5	60	170	15	20	M12	$^1/_2$
50	205	100	117	60	60	25	90	114	106	12,5	60	170	15	20	M12	$^1/_2$
50	205	100	117	60	60	25	90	114	106	12,5	60	170	15	20	M12	$^1/_2$
50	205	100	117	60	60	25	90	114	106	12,5	60	170	15	20	M12	$^1/_2$
50	255	110	139	60	70	30	110	124	116	12,5	70	210	18	23	M16	$^5/_8$
50	255	110	139	60	70	30	110	124	116	12,5	70	210	18	23	M16	$^5/_8$
50	255	110	139	60	70	30	110	124	116	12,5	70	210	18	23	M16	$^5/_8$
50	255	110	139	60	70	30	110	124	116	12,5	70	210	18	23	M16	$^5/_8$
50	255	110	139	60	70	30	110	124	116	12,5	70	210	18	23	M16	$^5/_8$
55	255	105	133	65	70	28	100	119	111	12,5	70	210	18	23	M16	$^5/_8$
55	255	105	133	65	70	28	100	119	111	12,5	70	210	18	23	M16	$^5/_8$
55	255	105	133	65	70	28	100	119	111	12,5	70	210	18	23	M16	$^5/_8$
55	255	105	133	65	70	28	100	119	111	12,5	70	210	18	23	M16	$^5/_8$
55	275	115	155	65	80	30	120	129	121	12,5	80	230	18	23	M16	$^5/_8$
55	275	115	155	65	80	30	120	129	121	12,5	80	230	18	23	M16	$^5/_8$
55	275	115	155	65	80	30	120	129	121	12,5	80	230	18	23	M16	$^5/_8$
55	275	115	155	65	80	30	120	129	121	12,5	80	230	18	23	M16	$^5/_8$
55	275	115	155	65	80	30	120	129	121	12,5	80	230	18	23	M16	$^5/_8$

Plummer block housings

SNV, split
For bearings with cylindrical bore

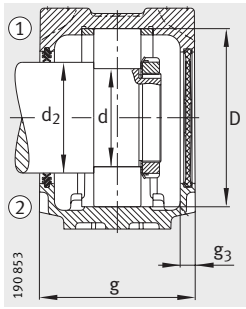




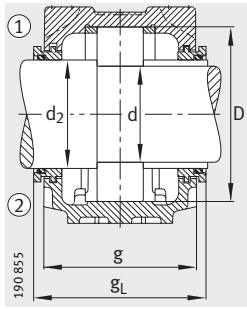
① Locating bearing
② Non-locating bearing

Dimension table (continued) · Dimensions in mm

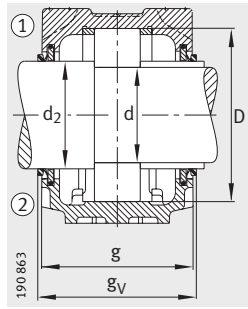
Designation											Mass m
Housing	Bearing	Lock-nut	Tab washer	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal	Cover	Hous-ing ≈kg
SNV110-L	1212-TVH	KM12	MB12	FRM110/13	DH212	TSV212	FSV212	DHV212	–	DKV110	4,9
SNV110-L	20212-TVP	KM12	MB12	FRM110/13	DH212	TSV212	FSV212	DHV212	–	DKV110	4,9
SNV110-L	2212-TVH	KM12	MB12	FRM110/10	DH212	TSV212	FSV212	DHV212	–	DKV110	4,9
SNV110-L	22212-E1	KM12	MB12	FRM110/10	DH212	TSV212	FSV212	DHV212	–	DKV110	4,9
SNV130-L	1312-TVH	KM12	MB12	FRM130/12,5	DH312	TSV312	FSV312	DHV312	TCV312	DKV130	6,8
SNV130-L	20312-TVP	KM12	MB12	FRM130/12,5	DH312	TSV312	FSV312	DHV312	TCV312	DKV130	6,8
SNV130-L	21312-E1	KM12	MB12	FRM130/12,5	DH312	TSV312	FSV312	DHV312	TCV312	DKV130	6,8
SNV130-L	2312-TVH	KM12	MB12	FRM130/5	DH312	TSV312	FSV312	DHV312	TCV312	DKV130	6,8
SNV130-L	22312-E1	KM12	MB12	FRM130/5	DH312	TSV312	FSV312	DHV312	TCV312	DKV130	6,8
SNV120-L	1213-TVH	KM13	MB13	FRM120/14	DH213	TSV213	FSV213	DHV213	–	DKV120	6,1
SNV120-L	20213-TVP	KM13	MB13	FRM120/14	DH213	TSV213	FSV213	DHV213	–	DKV120	6,1
SNV120-L	2213-TVH	KM13	MB13	FRM120/10	DH213	TSV213	FSV213	DHV213	–	DKV120	6,1
SNV120-L	22213-E1	KM13	MB13	FRM120/10	DH213	TSV213	FSV213	DHV213	–	DKV120	6,1
SNV140-L	1313-TVH	KM13	MB13	FRM140/12,5	DH313	TSV313	FSV313	DHV313	TCV313	DKV140	9,3
SNV140-L	20313-MB	KM13	MB13	FRM140/12,5	DH313	TSV313	FSV313	DHV313	TCV313	DKV140	9,3
SNV140-L	21313-E1	KM13	MB13	FRM140/12,5	DH313	TSV313	FSV313	DHV313	TCV313	DKV140	9,3
SNV140-L	2313-TVH	KM13	MB13	FRM140/5	DH313	TSV313	FSV313	DHV313	TCV313	DKV140	9,3
SNV140-L	22313-E1	KM13	MB13	FRM140/5	DH313	TSV313	FSV313	DHV313	TCV313	DKV140	9,3
SNV125-L	1214-TVH	KM14	MB14	FRM125/7,5	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	6,5
SNV125-L	20214-TVP	KM14	MB14	FRM125/7,5	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	6,5
SNV125-L	2214-M	KM14	MB14	FRM125/4	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	6,5
SNV125-L	22214-E1	KM14	MB14	FRM125/4	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	6,5
SNV150-L	1314-M	KM14	MB14	FRM150/13	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	9,9
SNV150-L	20314-MB	KM14	MB14	FRM150/13	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	9,9
SNV150-L	21314-E1	KM14	MB14	FRM150/13	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	9,9
SNV150-L	2314-M	KM14	MB14	FRM150/5	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	9,9
SNV150-L	22314-E1	KM14	MB14	FRM150/5	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	9,9
SNV130-L	1215-TVH	KM15	MB15	FRM130/15,5	DH215	TSV215	FSV215	DHV215	–	DKV130	6,8
SNV130-L	20215-TVP	KM15	MB15	FRM130/15,5	DH215	TSV215	FSV215	DHV215	–	DKV130	6,8
SNV130-L	2215-TVH	KM15	MB15	FRM130/12,5	DH215	TSV215	FSV215	DHV215	–	DKV130	6,8
SNV130-L	22215-E1	KM15	MB15	FRM130/12,5	DH215	TSV215	FSV215	DHV215	–	DKV130	6,8
SNV160-L	1315-M	KM15	MB15	FRM160/14	DH315	TSV315	FSV315	DHV315	TCV315	DKV160	12,8
SNV160-L	20315-MB	KM15	MB15	FRM160/14	DH315	TSV315	FSV315	DHV315	TCV315	DKV160	12,8
SNV160-L	21315-E1	KM15	MB15	FRM160/14	DH315	TSV315	FSV315	DHV315	TCV315	DKV160	12,8
SNV160-L	2315-M	KM15	MB15	FRM160/5	DH315	TSV315	FSV315	DHV315	TCV315	DKV160	12,8
SNV160-L	22315-E1	KM15	MB15	FRM160/5	DH315	TSV315	FSV315	DHV315	TCV315	DKV160	12,8



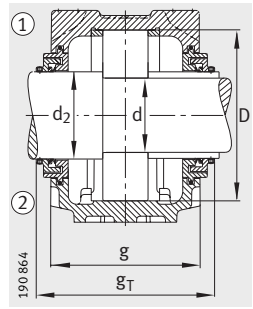
Double lip seal DH
Cover DKV



Labyrinth ring TSV



V ring seal DHV



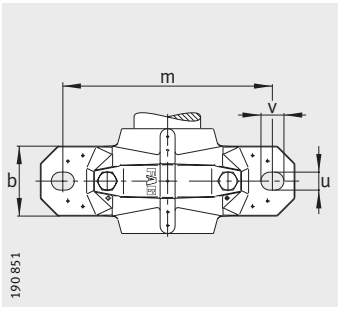
Taconite seal TCV

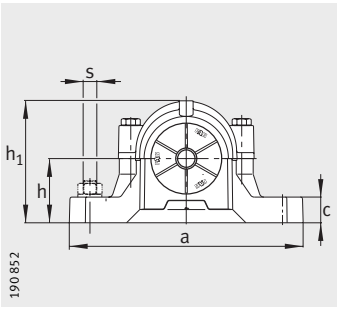
Dimensions

d	a	g	h_1	d_2	b	c	D	g_L	g_V	g_T	g_3	h	m	u	v	s	
																mm	inch
60	255	110	139	70	70	30	110	124	120	–	12,5	70	210	18	23	M16	5/8
60	255	110	139	70	70	30	110	124	120	–	12,5	70	210	18	23	M16	5/8
60	255	110	139	70	70	30	110	124	120	–	12,5	70	210	18	23	M16	5/8
60	255	110	139	70	70	30	110	124	120	–	12,5	70	210	18	23	M16	5/8
60	280	120	161	70	80	30	130	134	130	158	12,5	80	230	18	23	M16	5/8
60	280	120	161	70	80	30	130	134	130	158	12,5	80	230	18	23	M16	5/8
60	280	120	161	70	80	30	130	134	130	158	12,5	80	230	18	23	M16	5/8
60	280	120	161	70	80	30	130	134	130	158	12,5	80	230	18	23	M16	5/8
60	280	120	161	70	80	30	130	134	130	158	12,5	80	230	18	23	M16	5/8
65	275	115	155	75	80	30	120	129	125	–	12,5	80	230	18	23	M16	5/8
65	275	115	155	75	80	30	120	129	125	–	12,5	80	230	18	23	M16	5/8
65	275	115	155	75	80	30	120	129	125	–	12,5	80	230	18	23	M16	5/8
65	275	115	155	75	80	30	120	129	125	–	12,5	80	230	18	23	M16	5/8
65	315	135	183	75	90	32	140	150,3	142,5	175,5	15	95	260	22	27	M20	3/4
65	315	135	183	75	90	32	140	150,3	142,5	175,5	15	95	260	22	27	M20	3/4
65	315	135	183	75	90	32	140	150,3	142,5	175,5	15	95	260	22	27	M20	3/4
65	315	135	183	75	90	32	140	150,3	142,5	175,5	15	95	260	22	27	M20	3/4
65	315	135	183	75	90	32	140	150,3	142,5	175,5	15	95	260	22	27	M20	3/4
70	275	105	158	80	80	30	125	120,3	110	143	15	80	230	18	23	M16	5/8
70	275	105	158	80	80	30	125	120,3	110	143	15	80	230	18	23	M16	5/8
70	275	105	158	80	80	30	125	120,3	110	143	15	80	230	18	23	M16	5/8
70	275	105	158	80	80	30	125	120,3	110	143	15	80	230	18	23	M16	5/8
70	320	140	189	80	90	32	150	155,3	147,5	180,5	15	95	260	22	27	M20	3/4
70	320	140	189	80	90	32	150	155,3	147,5	180,5	15	95	260	22	27	M20	3/4
70	320	140	189	80	90	32	150	155,3	147,5	180,5	15	95	260	22	27	M20	3/4
70	320	140	189	80	90	32	150	155,3	147,5	180,5	15	95	260	22	27	M20	3/4
70	320	140	189	80	90	32	150	155,3	147,5	180,5	15	95	260	22	27	M20	3/4
75	280	120	161	85	80	30	130	134	130	–	12,5	80	230	18	23	M16	5/8
75	280	120	161	85	80	30	130	134	130	–	12,5	80	230	18	23	M16	5/8
75	280	120	161	85	80	30	130	134	130	–	12,5	80	230	18	23	M16	5/8
75	280	120	161	85	80	30	130	134	130	–	12,5	80	230	18	23	M16	5/8
75	345	145	201	85	100	35	160	160,3	152,5	185,5	15	100	290	22	27	M20	3/4
75	345	145	201	85	100	35	160	160,3	152,5	185,5	15	100	290	22	27	M20	3/4
75	345	145	201	85	100	35	160	160,3	152,5	185,5	15	100	290	22	27	M20	3/4
75	345	145	201	85	100	35	160	160,3	152,5	185,5	15	100	290	22	27	M20	3/4
75	345	145	201	85	100	35	160	160,3	152,5	185,5	15	100	290	22	27	M20	3/4

Plummer block housings

SNV, split
For bearings with cylindrical bore

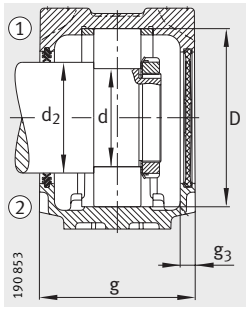




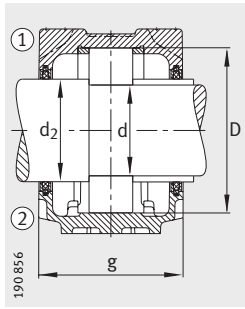
① Locating bearing
② Non-locating bearing

Dimension table (continued) · Dimensions in mm

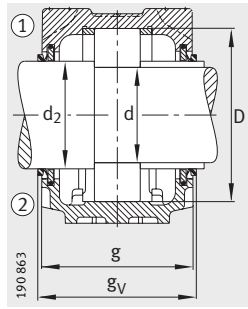
Designation											Mass m
Housing	Bearing	Lock-nut	Tab washer	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal	Cover	Hous-ing ≈kg
SNV140-L	1216-TVH	KM16	MB16	FRM140/16	DH216	TSV216	FSV216	DHV216	–	DKV140	9,3
SNV140-L	20216-TVP	KM16	MB16	FRM140/16	DH216	TSV216	FSV216	DHV216	–	DKV140	9,3
SNV140-L	2216-TVH	KM16	MB16	FRM140/12,5	DH216	TSV216	FSV216	DHV216	–	DKV140	9,3
SNV140-L	22216-E1	KM16	MB16	FRM140/12,5	DH216	TSV216	FSV216	DHV216	–	DKV140	9,3
SNV170-L	1316-M	KM16	MB16	FRM170/14,5	DH316	TSV316	FSV316	DHV316	TCV316	DKV170	14,4
SNV170-L	20316-MB	KM16	MB16	FRM170/14,5	DH316	TSV316	FSV316	DHV316	TCV316	DKV170	14,4
SNV170-L	21316-E1	KM16	MB16	FRM170/14,5	DH316	TSV316	FSV316	DHV316	TCV316	DKV170	14,4
SNV170-L	2316-M	KM16	MB16	FRM170/5	DH316	TSV316	FSV316	DHV316	TCV316	DKV170	14,4
SNV170-L	22316-E1	KM16	MB16	FRM170/5	DH316	TSV316	FSV316	DHV316	TCV316	DKV170	14,4
SNV150-L	1217-TVH	KM17	MB17	FRM150/16,5	DH217	TSV217	FSV217	DHV217	–	DKV150	9,9
SNV150-L	20217-MB	KM17	MB17	FRM150/16,5	DH217	TSV217	FSV217	DHV217	–	DKV150	9,9
SNV150-L	2217-M	KM17	MB17	FRM150/12,5	DH217	TSV217	FSV217	DHV217	–	DKV150	9,9
SNV150-L	22217-E1	KM17	MB17	FRM150/12,5	DH217	TSV217	FSV217	DHV217	–	DKV150	9,9
SNV180-L	1317-M	KM17	MB17	FRM180/14,5	DH317	TSV317	FSV317	DHV317	TCV317	DKV180	17
SNV180-L	20317-MB	KM17	MB17	FRM180/14,5	DH317	TSV317	FSV317	DHV317	TCV317	DKV180	17
SNV180-L	21317-E1	KM17	MB17	FRM180/14,5	DH317	TSV317	FSV317	DHV317	TCV317	DKV180	17
SNV180-L	2317-M	KM17	MB17	FRM180/5	DH317	TSV317	FSV317	DHV317	TCV317	DKV180	17
SNV180-L	22317-E1	KM17	MB17	FRM180/5	DH317	TSV317	FSV317	DHV317	TCV317	DKV180	17
SNV160-L	1218-TVH	KM18	MB18	FRM160/17,5	DH218	TSV218	FSV218	DHV218	–	DKV160	12,8
SNV160-L	20218-MB	KM18	MB18	FRM160/17,5	DH218	TSV218	FSV218	DHV218	–	DKV160	12,8
SNV160-L	2218-TVH	KM18	MB18	FRM160/12,5	DH218	TSV218	FSV218	DHV218	–	DKV160	12,8
SNV160-L	22218-E1	KM18	MB18	FRM160/12,5	DH218	TSV218	FSV218	DHV218	–	DKV160	12,8
SNV160-L	23218-E1	KM18	MB18	FRM160/6,3	DH218	TSV218	FSV218	DHV218	–	DKV160	12,8
SNV190-L	1318-M	KM18	MB18	FRM190/15,5	DH318	TSV318	FSV318	DHV318	–	DKV160	22
SNV190-L	20318-MB	KM18	MB18	FRM190/15,5	DH318	TSV318	FSV318	DHV318	–	DKV160	22
SNV190-L	21318-E1	KM18	MB18	FRM190/15,5	DH318	TSV318	FSV318	DHV318	–	DKV160	22
SNV190-L	2318-M	KM18	MB18	FRM190/5	DH318	TSV318	FSV318	DHV318	–	DKV160	22
SNV190-L	22318-E1	KM18	MB18	FRM190/5	DH318	TSV318	FSV318	DHV318	–	DKV160	22



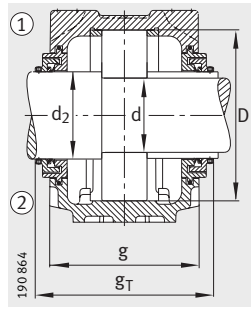
Double lip seal DH
Cover DKV



Felt seal FSV



V ring seal DHV



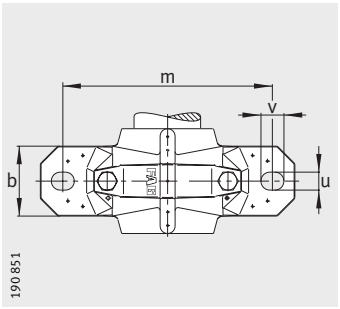
Taconite seal TCV

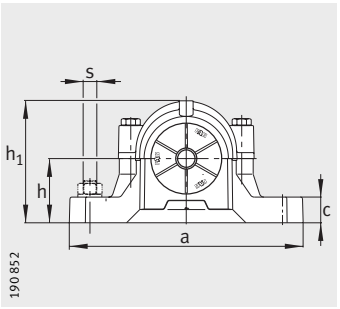
Dimensions

d	a	g	h_1	d_2	b	c	D	g_L	g_V	g_T	g_3	h	m	u	v	s	
																mm	inch
80	315	135	183	90	90	32	140	150,3	142,5	–	15	95	260	22	27	M20	3/4
80	315	135	183	90	90	32	140	150,3	142,5	–	15	95	260	22	27	M20	3/4
80	315	135	183	90	90	32	140	150,3	142,5	–	15	95	260	22	27	M20	3/4
80	315	135	183	90	90	32	140	150,3	142,5	–	15	95	260	22	27	M20	3/4
80	345	150	219	90	100	35	170	167,3	157,5	192,5	16	112	290	22	27	M20	3/4
80	345	150	219	90	100	35	170	167,3	157,5	192,5	16	112	290	22	27	M20	3/4
80	345	150	219	90	100	35	170	167,3	157,5	192,5	16	112	290	22	27	M20	3/4
80	345	150	219	90	100	35	170	167,3	157,5	192,5	16	112	290	22	27	M20	3/4
80	345	150	219	90	100	35	170	167,3	157,5	192,5	16	112	290	22	27	M20	3/4
85	320	140	189	95	90	32	150	155,3	137,5	–	15	95	260	22	27	M20	3/4
85	320	140	189	95	90	32	150	155,3	137,5	–	15	95	260	22	27	M20	3/4
85	320	140	189	95	90	32	150	155,3	137,5	–	15	95	260	22	27	M20	3/4
85	320	140	189	95	90	32	150	155,3	137,5	–	15	95	260	22	27	M20	3/4
85	380	160	223	95	110	40	180	177,3	167,5	202,5	16	112	320	26	32	M24	7/8
85	380	160	223	95	110	40	180	177,3	167,5	202,5	16	112	320	26	32	M24	7/8
85	380	160	223	95	110	40	180	177,3	167,5	202,5	16	112	320	26	32	M24	7/8
85	380	160	223	95	110	40	180	177,3	167,5	202,5	16	112	320	26	32	M24	7/8
85	380	160	223	95	110	40	180	177,3	167,5	202,5	16	112	320	26	32	M24	7/8
90	345	145	201	100	100	35	160	160,3	152,5	–	15	100	290	22	27	M20	3/4
90	345	145	201	100	100	35	160	160,3	152,5	–	15	100	290	22	27	M20	3/4
90	345	145	201	100	100	35	160	160,3	152,5	–	15	100	290	22	27	M20	3/4
90	345	145	201	100	100	35	160	160,3	152,5	–	15	100	290	22	27	M20	3/4
90	345	145	201	100	100	35	160	160,3	152,5	–	15	100	290	22	27	M20	3/4
90	380	155	229	105	110	40	190	170,3	162,5	–	15	112	320	26	32	M24	7/8
90	380	155	229	105	110	40	190	170,3	162,5	–	15	112	320	26	32	M24	7/8
90	380	155	229	105	110	40	190	170,3	162,5	–	15	112	320	26	32	M24	7/8
90	380	155	229	105	110	40	190	170,3	162,5	–	15	112	320	26	32	M24	7/8
90	380	155	229	105	110	40	190	170,3	162,5	–	15	112	320	26	32	M24	7/8

Plummer block housings

SNV, split
For bearings with cylindrical bore



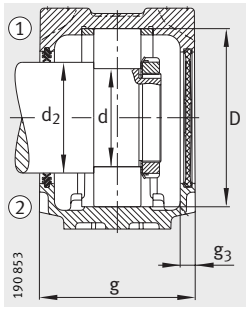


① Locating bearing
② Non-locating bearing

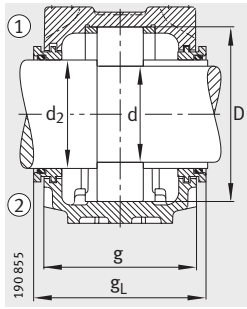
Dimension table (continued) · Dimensions in mm

Designation											Mass m
Housing	Bearing	Lock-nut	Tab washer	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taco-nite seal	Cover	Hous-ing ≈kg
SNV170-L	1219-M	KM19	MB19	FRM170/18	DH219	TSV219	FSV219	DHV219	–	DKV170	14,4
SNV170-L	20219-MB	KM19	MB19	FRM170/18	DH219	TSV219	FSV219	DHV219	–	DKV170	14,4
SNV170-L	2219-M	KM19	MB19	FRM170/12,5	DH219	TSV219	FSV219	DHV219	–	DKV170	14,4
SNV170-L	22219-E1	KM19	MB19	FRM170/12,5	DH219	TSV219	FSV219	DHV219	–	DKV170	14,4
SNV200-L	1319-M	KM19	MB19	FRM200/17,5	DH319	TSV319	FSV319	DHV319	TCV319	DKV200	21
SNV200-L	20319-MB	KM19	MB19	FRM200/17,5	DH319	TSV319	FSV319	DHV319	TCV319	DKV200	21
SNV200-L	21319-E1-TVPB	KM19	MB19	FRM200/17,5	DH319	TSV319	FSV319	DHV319	TCV319	DKV200	21
SNV200-L	2319-M	KM19	MB19	FRM200/6,5	DH319	TSV319	FSV319	DHV319	TCV319	DKV200	21
SNV200-L	22319-E1	KM19	MB19	FRM200/6,5	DH319	TSV319	FSV319	DHV319	TCV319	DKV200	21
SNV180-L	1220-M	KM20	MB20	FRM180/18	DH220	TSV220	FSV220	DHV220	–	DKV180	17
SNV180-L	20220-MB	KM20	MB20	FRM180/18	DH220	TSV220	FSV220	DHV220	–	DKV180	17
SNV180-L	2220-M	KM20	MB20	FRM180/12	DH220	TSV220	FSV220	DHV220	–	DKV180	17
SNV180-L	22220-E1	KM20	MB20	FRM180/12	DH220	TSV220	FSV220	DHV220	–	DKV180	17
SNV180-L	23220-E1-TVPB	KM20	MB20	FRM180/4,85	DH220	TSV220	FSV220	DHV220	–	DKV180	17
SNV215-L[1)]	1320-M	KM20	MB20	FRM215/19,5	DH320	TSV320	FSV320	DHV320	TCV320	DKV215	24,5
SNV215-L[1)]	20320-MB	KM20	MB20	FRM215/19,5	DH320	TSV320	FSV320	DHV320	TCV320	DKV215	24,5
SNV215-L[1)]	21320-E1-TVPB	KM20	MB20	FRM215/19,5	DH320	TSV320	FSV320	DHV320	TCV320	DKV215	24,5
SNV215-L[1)]	2320-M	KM20	MB20	FRM215/6,5	DH320	TSV320	FSV320	DHV320	TCV320	DKV215	24,5
SNV215-L[1)]	22320-E1	KM20	MB20	FRM215/6,5	DH320	TSV320	FSV320	DHV320	TCV320	DKV215	24,5
SNV200-L	1222-M	KM22	MB22	FRM200/21	DH222	TSV222	FSV222	DHV222	–	DKV200	21
SNV200-L	20222-MB	KM22	MB22	FRM200/21	DH222	TSV222	FSV222	DHV222	–	DKV200	21
SNV200-L	2222-M	KM22	MB22	FRM200/13,5	DH222	TSV222	FSV222	DHV222	–	DKV200	21
SNV200-L	22222-E1	KM22	MB22	FRM200/13,5	DH222	TSV222	FSV222	DHV222	–	DKV200	21
SNV200-L	23222-E1-TVPB	KM22	MB22	FRM200/5,1	DH222	TSV222	FSV222	DHV222	–	DKV200	21
SNV240-L[1)]	1322-M	KM22	MB22	FRM240/20	DH222	TSV222	FSV222	DHV222	–	DKV200	32
SNV240-L[1)]	20322-MB	KM22	MB22	FRM240/20	DH222	TSV222	FSV222	DHV222	–	DKV200	32
SNV240-L[1)]	21322-E1-TVPB	KM22	MB22	FRM240/20	DH222	TSV222	FSV222	DHV222	–	DKV200	32
SNV240-L[1)]	2322-M	KM22	MB22	FRM240/5	DH222	TSV222	FSV222	DHV222	–	DKV200	32
SNV240-L[1)]	22322-E1	KM22	MB22	FRM240/5	DH222	TSV222	FSV222	DHV222	–	DKV200	32

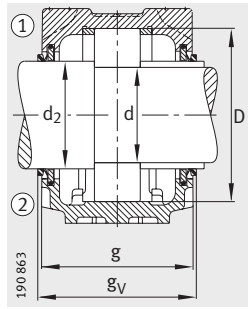
[1)] Housing with ring bolt.



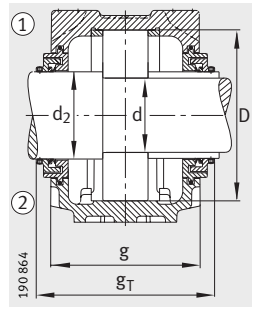
Double lip seal DH
Cover DKV



Labyrinth ring TSV



V ring seal DHV



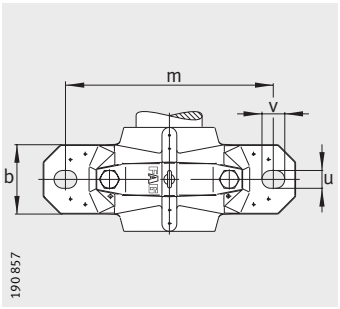
Taconite seal TCV

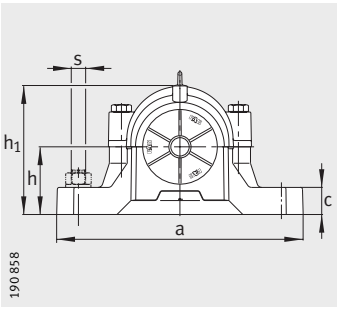
Dimensions

d	a	g	h_1	d_2	b	c	D	g_L	g_V	g_T	g_3	h	m	u	v	s	
																mm	inch
95	345	150	219	110	100	35	170	167,3	160,5	–	16	112	290	22	27	M20	3/4
95	345	150	219	110	100	35	170	167,3	160,5	–	16	112	290	22	27	M20	3/4
95	345	150	219	110	100	35	170	167,3	160,5	–	16	112	290	22	27	M20	3/4
95	345	150	219	110	100	35	170	167,3	160,5	–	16	112	290	22	27	M20	3/4
95	410	175	248	110	120	45	200	192,3	185,5	217,5	16	125	350	26	32	M24	7/8
95	410	175	248	110	120	45	200	192,3	185,5	217,5	16	125	350	26	32	M24	7/8
95	410	175	248	110	120	45	200	192,3	185,5	217,5	16	125	350	26	32	M24	7/8
95	410	175	248	110	120	45	200	192,3	185,5	217,5	16	125	350	26	32	M24	7/8
95	410	175	248	110	120	45	200	192,3	185,5	217,5	16	125	350	26	32	M24	7/8
100	380	160	223	115	110	40	180	177,3	170,5	–	16	112	320	26	32	M24	7/8
100	380	160	223	115	110	40	180	177,3	170,5	–	16	112	320	26	32	M24	7/8
100	380	160	223	115	110	40	180	177,3	170,5	–	16	112	320	26	32	M24	7/8
100	380	160	223	115	110	40	180	177,3	170,5	–	16	112	320	26	32	M24	7/8
100	380	160	223	115	110	40	180	177,3	170,5	–	16	112	320	26	32	M24	7/8
100	410	180	271	115	120	45	215	197,3	190,5	226,5	16	140	350	26	32	M24	7/8
100	410	180	271	115	120	45	215	197,3	190,5	226,5	16	140	350	26	32	M24	7/8
100	410	180	271	115	120	45	215	197,3	190,5	226,5	16	140	350	26	32	M24	7/8
100	410	180	271	115	120	45	215	197,3	190,5	226,5	16	140	350	26	32	M24	7/8
100	410	180	271	115	120	45	215	197,3	190,5	226,5	16	140	350	26	32	M24	7/8
110	410	175	248	125	120	45	200	195,3	185,5	–	16	125	350	26	32	M24	7/8
110	410	175	248	125	120	45	200	195,3	185,5	–	16	125	350	26	32	M24	7/8
110	410	175	248	125	120	45	200	195,3	185,5	–	16	125	350	26	32	M24	7/8
110	410	175	248	125	120	45	200	195,3	185,5	–	16	125	350	26	32	M24	7/8
110	410	175	248	125	120	45	200	195,3	185,5	–	16	125	350	26	32	M24	7/8
110	450	185	298	125	130	50	240	203,3	193,5	–	18	150	390	28	35	M24	1
110	450	185	298	125	130	50	240	203,3	193,5	–	18	150	390	28	35	M24	1
110	450	185	298	125	130	50	240	203,3	193,5	–	18	150	390	28	35	M24	1
110	450	185	298	125	130	50	240	203,3	193,5	–	18	150	390	28	35	M24	1
110	450	185	298	125	130	50	240	203,3	193,5	–	18	150	390	28	35	M24	1

Plummer block housings

SNV, split
For bearings with cylindrical bore

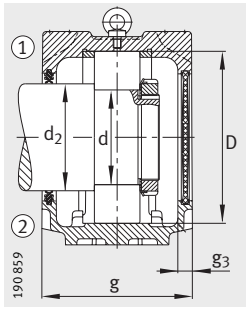




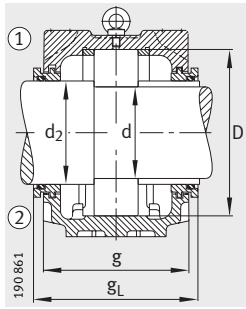
① Locating bearing
② Non-locating bearing

Dimension table (continued) · Dimensions in mm

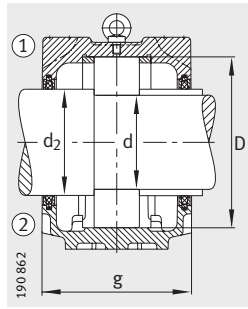
Designation										Mass m
Housing	Bearing	Lock-nut	Tab washer	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Cover	Hous-ing ≈kg
SNV215-L	20224-MB	KM24	MB24	FRM215/23	DH224	TSV224	FSV224	DHV224	DKV215	24,5
SNV215-L	22224-E1	KM24	MB24	FRM215/14	DH224	TSV224	FSV224	DHV224	DKV215	24,5
SNV215-L	23224-E1-TVPB	KM24	MB24	FRM215/5	DH224	TSV224	FSV224	DHV224	DKV215	24,5
SNV260-L	20324-MB	KM24	MB24	FRM260/20,5	DH224	TSV224	FSV224	DHV224	DKV215	48
SNV260-L	22324-E1	KM24	MB24	FRM260/5	DH224	TSV224	FSV224	DHV224	DKV215	48
SNV230-L	20226-MB	KM26	MB26	FRM230/25	DH226	TSV226	FSV226	DHV226	DKV230	30
SNV230-L	22226-E1	KM26	MB26	FRM230/13	DH226	TSV226	FSV226	DHV226	DKV230	30
SNV230-L	23226-E1-TVPB	KM26	MB26	FRM230/5	DH226	TSV226	FSV226	DHV226	DKV230	30
SNV280-L	20326-MB	KM26	MB26	FRM280/22,5	DH326	TSV326	FSV326	DHV326	DKV230	55
SNV280-L	22326-E1	KM26	MB26	FRM280/5	DH326	TSV326	FSV326	DHV326	DKV230	55
SNV250-L	20228-MB	KM28	MB28	FRM250/28	DH228	TSV228	FSV228	DHV228	DKV250	38
SNV250-L	22228-E1	KM28	MB28	FRM250/15	DH228	TSV228	FSV228	DHV228	DKV250	38
SNV250-L	23228-E1-TVPB	KM28	MB28	FRM250/5	DH228	TSV228	FSV228	DHV228	DKV250	38
SNV300-L	20328-MB	KM28	MB28	FRM300/25	DH328	TSV328	FSV328	DHV328	DKV250	70
SNV300-L	22328-E1	KM28	MB28	FRM300/5	DH328	TSV328	FSV328	DHV328	DKV250	70
SNV270-L	20230-MB	KM30	MB30	FRM270/30,5	DH230	TSV230	FSV230	DHV230	DKV270	45,5
SNV270-L	22230-E1	KM30	MB30	FRM270/16,5	DH230	TSV230	FSV230	DHV230	DKV270	45,5
SNV270-L	23230-E1-TVPB	KM30	MB30	FRM270/5	DH230	TSV230	FSV230	DHV230	DKV270	45,5
SNV320-L	20330-MB	KM30	MB30	FRM320/26,5	DH330	TSV330	FSV330	DHV330	DKV270	95
SNV320-L	22330-E1	KM30	MB30	FRM320/5	DH330	TSV330	FSV330	DHV330	DKV270	95
SNV290-L	20232-MB	KM32	MB32	FRM290/33	DH232	TSV232	FSV232	DHV232	DKV290	53,8
SNV290-L	22232-E1	KM32	MB32	FRM290/17	DH232	TSV232	FSV232	DHV232	DKV290	53,8
SNV290-L	23232-E1-TVPB	KM32	MB32	FRM290/5	DH232	TSV232	FSV232	DHV232	DKV290	53,8
SNV340-L	22332-MB	KM32	MB32	FRM340/5	DH332	TSV332	FSV332	DHV332	DKV290	115



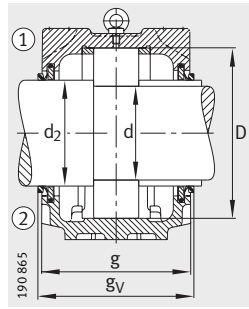
Double lip seal DH
Cover DKV



Labyrinth ring TSV



Felt seal FSV



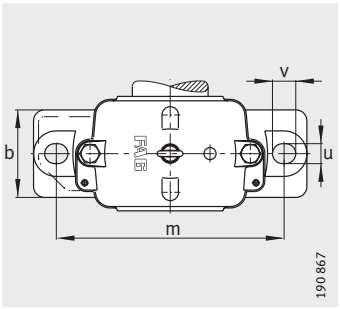
V ring seal DHV

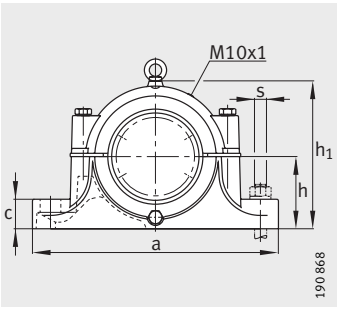
Dimensions

d	a	g	h_1	d_2	b	c	D	g_L	g_V	g_3	h	m	u	v	s	
															mm	inch
120	410	180	271	135	120	45	215	200,3	190,5	16	140	350	26	32	M24	$^7/_8$
120	410	180	271	135	120	45	215	200,3	190,5	16	140	350	26	32	M24	$^7/_8$
120	410	180	271	135	120	45	215	200,3	190,5	16	140	350	26	32	M24	$^7/_8$
120	530	190	321	135	160	60	260	208,3	198,5	18	160	450	35	42	M30	$1^1/_4$
120	530	190	321	135	160	60	260	208,3	198,5	18	160	450	35	42	M30	$1^1/_4$
130	445	190	291	145	130	50	230	208,3	198,5	18	150	380	28	35	M24	1
130	445	190	291	145	130	50	230	208,3	198,5	18	150	380	28	35	M24	1
130	445	190	291	145	130	50	230	208,3	198,5	18	150	380	28	35	M24	1
130	550	205	344	150	160	60	280	223,3	213,5	18	170	470	35	42	M30	$1^1/_4$
130	550	205	344	150	160	60	280	223,3	213,5	18	170	470	35	42	M30	$1^1/_4$
140	500	200	304	155	150	50	250	218,3	211,5	18	150	420	35	42	M30	$1^1/_4$
140	500	200	304	155	150	50	250	218,3	211,5	18	150	420	35	42	M30	$1^1/_4$
140	500	200	304	155	150	50	250	218,3	211,5	18	150	420	35	42	M30	$1^1/_4$
140	620	215	366	160	170	65	300	233,3	226,5	18	180	520	35	42	M30	$1^1/_4$
140	620	215	366	160	170	65	300	233,3	226,5	18	180	520	35	42	M30	$1^1/_4$
150	530	215	328	165	160	60	270	233,3	228,5	18	160	450	35	42	M30	$1^1/_4$
150	530	215	328	165	160	60	270	233,3	228,5	18	160	450	35	42	M30	$1^1/_4$
150	530	215	328	165	160	60	270	233,3	228,5	18	160	450	35	42	M30	$1^1/_4$
150	650	225	386	170	180	65	320	243,3	236,5	18	190	560	35	42	M30	$1^1/_4$
150	650	225	386	170	180	65	320	243,3	236,5	18	190	560	35	42	M30	$1^1/_4$
160	550	225	351	175	160	60	290	243,3	236,5	18	170	470	35	42	M30	$1^1/_4$
160	550	225	351	175	160	60	290	243,3	236,5	18	170	470	35	42	M30	$1^1/_4$
160	550	225	351	175	160	60	290	243,3	236,5	18	170	470	35	42	M30	$1^1/_4$
160	680	235	406	180	190	70	340	253,3	246,5	18	200	580	42	50	M36	$1^1/_2$

Plummer block housings

S30, split
For spherical roller bearings with tapered bore and adapter sleeve



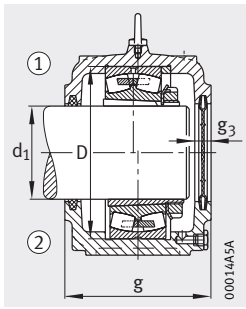


① Locating bearing
② Non-locating bearing

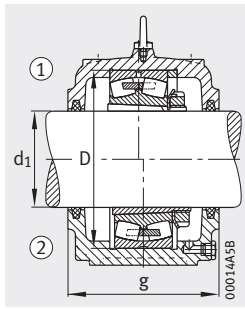
Dimension table · Dimensions in mm

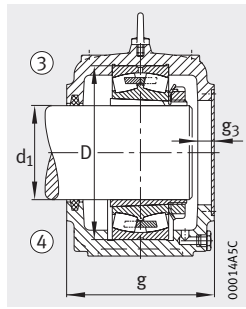
Designation					Felt strips		Mass m
Housing	Bearing	Adapter sleeve	Locating ring	Cover	aXbXl mm	Pieces	Housing ≈kg
S3024-H-N-FZ-AB-L[1)]	23024-E1-K-TVPB	H3024	FRM180/10	DK127-135	10X8,5X195	2/4	16,5
S3026-H-N-FZ-AB-L[1)]	23026-E1-K-TVPB	H3026	FRM200/10	DK127-135	10X8,5X200	2/4	19,3
S3028-H-N-FZ-AB-L[1)]	23028-E1-K-TVPB	H3028	FRM210/10	DK147-155	14X11X225	2/4	24,6
S3030-H-N-FZ-AB-L[1)]	23030-E1-K-TVPB	H3030	FRM225/10	DK156-163	14X11X240	2/4	29
S3032-H-N-FZ-AB-L[1)]	23032-E1-K-TVPB	H3032	FRM240/10	DK166-182	14X11X250	2/4	37
S3034-H-N-FZ-AB-L	23034-E1-K-TVPB	H3034	FRM260/10	DK166-182	16X12X270	2/4	45
S3036-H-N-FZ-AB-L	23036-E1-K-TVPB	H3036	FRM280/10	DK185-197	16X12X285	2/4	65
S3038-H-N-FZ-AB-L	23038-E1-K-TVPB	H3038	FRM290/10	DK200-212	16X12X300	2/4	67
S3040-H-N-FZ-AB-L	23040-E1-K-TVPB	H3040	FRM310/10	DK200-212	16X12X315	2/4	72
S3044-H-N-FZ-AF-L	23044-K-MB	H3044X	–	–	16X12X350	2	98
S3044-H-N-FZ-AL-L	23044-K-MB	H3044X	–	–	16X12X350	2	98
S3044-H-N-FZ-BF-L	23044-K-MB	H3044X	–	–	16X12X350	4	98
S3044-H-N-FZ-BL-L	23044-K-MB	H3044X	–	–	16X12X350	4	98
S3048-H-N-FZ-AF-L	23048-K-MB	H3048	–	–	16X12X380	2	110
S3048-H-N-FZ-AL-L	23048-K-MB	H3048	–	–	16X12X380	2	110
S3048-H-N-FZ-BF-L	23048-K-MB	H3048	–	–	16X12X380	4	110
S3048-H-N-FZ-BL-L	23048-K-MB	H3048	–	–	16X12X380	4	110
S3052-H-N-FZ-AF-L	23052-K-MB	H3052X	–	–	16X12X410	2	148
S3052-H-N-FZ-AL-L	23052-K-MB	H3052X	–	–	16X12X410	2	148
S3052-H-N-FZ-BF-L	23052-K-MB	H3052X	–	–	16X12X410	4	148
S3052-H-N-FZ-BL-L	23052-K-MB	H3052X	–	–	16X12X410	4	148
S3056-H-N-FZ-AF-L	23056-B-K-MB	H3056	–	–	16X12X445	2	165
S3056-H-N-FZ-AL-L	23056-B-K-MB	H3056	–	–	16X12X445	2	165
S3056-H-N-FZ-BF-L	23056-B-K-MB	H3056	–	–	16X12X445	4	165
S3056-H-N-FZ-BL-L	23056-B-K-MB	H3056	–	–	16X12X445	4	165

[1)] Housing without eye bolt.

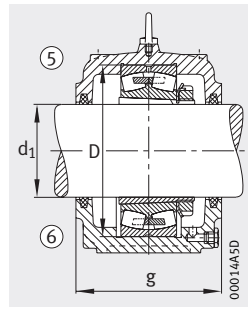


Cover DK,
locating bearings up to and including size S3040
with locating ring





Design A
③ Locating bearing AF
④ Non-locating brg. AL



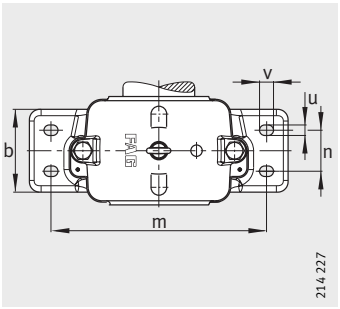
Design B
⑤ Locating bearing BF
⑥ Non-locating brg. BL

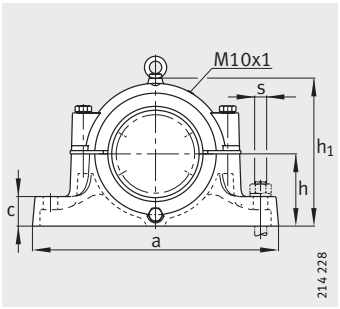
Dimensions

d_1	a	g	h_1	b	c	D	g_3	h	m	u	v	s	
												mm	inch
110	390	150	215	110	40	180	18	112	320	30	36	M24	1
115	420	160	239	120	45	200	18	125	350	30	36	M24	1
125	420	170	259	120	45	210	21	140	350	30	36	M24	1
135	460	175	278	130	45	225	21	150	380	30	36	M24	1
140	470	190	288	130	50	240	21	150	390	30	36	M24	1
150	540	200	320	160	55	260	25	160	450	36	48	M30	$1^1/_8$
160	560	210	340	160	55	280	25	170	470	36	48	M30	$1^1/_8$
170	560	210	353	160	55	290	25	170	470	36	48	M30	$1^1/_8$
180	615	235	373	170	60	310	25	180	515	36	48	M30	$1^1/_8$
200	690	255	408	190	70	340	25	200	580	42	50	M36	$1^3/_8$
200	690	255	408	190	70	340	25	200	580	42	50	M36	$1^3/_8$
200	690	255	408	190	70	340	–	200	580	42	50	M36	$1^3/_8$
200	690	255	408	190	70	340	–	200	580	42	50	M36	$1^3/_8$
220	720	265	433	200	75	360	30	210	610	42	50	M36	$1^3/_8$
220	720	265	433	200	75	360	30	210	610	42	50	M36	$1^3/_8$
220	720	265	433	200	75	360	–	210	610	42	50	M36	$1^3/_8$
220	720	265	433	200	75	360	–	210	610	42	50	M36	$1^3/_8$
240	820	285	485	220	80	400	30	240	680	52	70	M45	$1^3/_4$
240	820	285	485	220	80	400	30	240	680	52	70	M45	$1^3/_4$
240	820	285	485	220	80	400	–	240	680	52	70	M45	$1^3/_4$
240	820	285	485	220	80	400	–	240	680	52	70	M45	$1^3/_4$
260	860	295	505	230	80	420	30	250	720	52	70	M45	$1^3/_4$
260	860	295	505	230	80	420	30	250	720	52	70	M45	$1^3/_4$
260	860	295	505	230	80	420	–	250	720	52	70	M45	$1^3/_4$
260	860	295	505	230	80	420	–	250	720	52	70	M45	$1^3/_4$

Plummer block housings

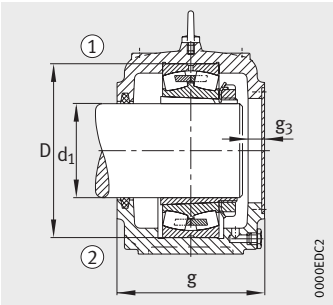
S30, split
For spherical roller bearings
with tapered bore
and adapter sleeve



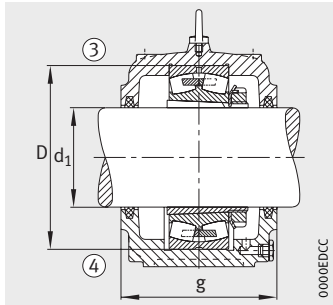


Dimension table (continued) · Dimensions in mm

Designation			Felt strips		Mass m
Housing	Bearing	Adapter sleeve	aXbXl mm	Pieces	Housing ≈kg
S3060-H-N-FZ-AF-L	23060-K-MB	H3060	16X12X470	2	205
S3060-H-N-FZ-AL-L	23060-K-MB	H3060	16X12X470	2	205
S3060-H-N-FZ-BF-L	23060-K-MB	H3060	16X12X470	4	205
S3060-H-N-FZ-BL-L	23060-K-MB	H3060	16X12X470	4	205
S3064-H-N-FZ-AF-L	23064-K-MB	H3064-HG	16X12X505	2	235
S3064-H-N-FZ-AL-L	23064-K-MB	H3064-HG	16X12X505	2	235
S3064-H-N-FZ-BF-L	23064-K-MB	H3064-HG	16X12X505	4	235
S3064-H-N-FZ-BL-L	23064-K-MB	H3064-HG	16X12X505	4	235
S3068-H-N-FZ-AF-L	23068-K-MB	H3068-HG	16X12X535	2	280
S3068-H-N-FZ-AL-L	23068-K-MB	H3068-HG	16X12X535	2	280
S3068-H-N-FZ-BF-L	23068-K-MB	H3068-HG	16X12X535	4	280
S3068-H-N-FZ-BL-L	23068-K-MB	H3068-HG	16X12X535	4	280
S3072-H-N-FZ-AF-L	23072-K-MB	H3072-HG	16X12X565	2	340
S3072-H-N-FZ-AL-L	23072-K-MB	H3072-HG	16X12X565	2	340
S3072-H-N-FZ-BF-L	23072-K-MB	H3072-HG	16X12X565	4	340
S3072-H-N-FZ-BL-L	23072-K-MB	H3072-HG	16X12X565	4	340
S3076-H-N-FZ-AF-L	23076-B-K-MB	H3076-HG	16X12X600	2	400
S3076-H-N-FZ-AL-L	23076-B-K-MB	H3076-HG	16X12X600	2	400
S3076-H-N-FZ-BF-L	23076-B-K-MB	H3076-HG	16X12X600	4	400
S3076-H-N-FZ-BL-L	23076-B-K-MB	H3076-HG	16X12X600	4	400
S3080-H-N-FZ-AF-L	23080-K-MB	H3080-HG	16X12X630	2	460
S3080-H-N-FZ-AL-L	23080-K-MB	H3080-HG	16X12X630	2	460
S3080-H-N-FZ-BF-L	23080-K-MB	H3080-HG	16X12X630	4	460
S3080-H-N-FZ-BL-L	23080-K-MB	H3080-HG	16X12X630	4	460
S3084-H-N-FZ-AF-L	23084-B-K-MB	H3084X-HG	16X12X660	2	500
S3084-H-N-FZ-AL-L	23084-B-K-MB	H3084X-HG	16X12X660	2	500
S3084-H-N-FZ-BF-L	23084-B-K-MB	H3084X-HG	16X12X660	4	500
S3084-H-N-FZ-BL-L	23084-B-K-MB	H3084X-HG	16X12X660	4	500



Design A
① Locating bearing AF
② Non-locating bearing AL



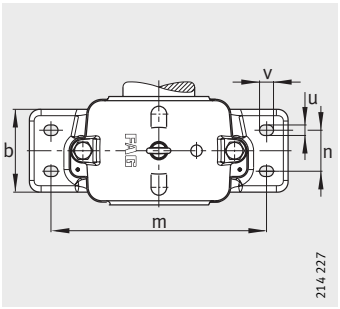
Design B
③ Locating bearing BF
④ Non-locating bearing BL

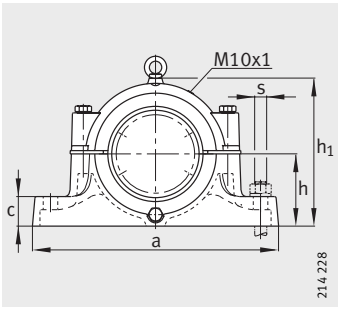
Dimensions

d_1	a	g	h_1	b	c	D	g_3	h	m	n	u	v	s	
													mm	inch
280	920	320	565	260	90	460	30	280	780	130	42	50	M36	$1\,^3/_8$
280	920	320	565	260	90	460	30	280	780	130	42	50	M36	$1\,^3/_8$
280	920	320	565	260	90	460	–	280	780	130	42	50	M36	$1\,^3/_8$
280	920	320	565	260	90	460	–	280	780	130	42	50	M36	$1\,^3/_8$
300	940	320	570	260	90	480	30	280	800	130	42	50	M36	$1\,^3/_8$
300	940	320	570	260	90	480	30	280	800	130	42	50	M36	$1\,^3/_8$
300	940	320	570	260	90	480	–	280	800	130	42	50	M36	$1\,^3/_8$
300	940	320	570	260	90	480	–	280	800	130	42	50	M36	$1\,^3/_8$
320	1 000	340	615	280	95	520	30	300	860	140	42	50	M36	$1\,^3/_8$
320	1 000	340	615	280	95	520	30	300	860	140	42	50	M36	$1\,^3/_8$
320	1 000	340	615	280	95	520	–	300	860	140	42	50	M36	$1\,^3/_8$
320	1 000	340	615	280	95	520	–	300	860	140	42	50	M36	$1\,^3/_8$
340	1 060	345	655	280	95	540	30	320	900	140	42	50	M36	$1\,^3/_8$
340	1 060	345	655	280	95	540	30	320	900	140	42	50	M36	$1\,^3/_8$
340	1 060	345	655	280	95	540	–	320	900	140	42	50	M36	$1\,^3/_8$
340	1 060	345	655	280	95	540	–	320	900	140	42	50	M36	$1\,^3/_8$
360	1 060	380	675	280	100	560	30	330	900	140	42	50	M36	$1\,^3/_8$
360	1 060	380	675	280	100	560	30	330	900	140	42	50	M36	$1\,^3/_8$
360	1 060	380	675	280	100	560	–	330	900	140	42	50	M36	$1\,^3/_8$
360	1 060	380	675	280	100	560	–	330	900	140	42	50	M36	$1\,^3/_8$
380	1 100	400	715	325	120	600	30	350	950	160	42	50	M36	$1\,^3/_8$
380	1 100	400	715	325	120	600	30	350	950	160	42	50	M36	$1\,^3/_8$
380	1 100	400	715	325	120	600	–	350	950	160	42	50	M36	$1\,^3/_8$
380	1 100	400	715	325	120	600	–	350	950	160	42	50	M36	$1\,^3/_8$
400	1 160	430	750	340	120	620	30	375	980	170	42	50	M36	$1\,^3/_8$
400	1 160	430	750	340	120	620	30	375	980	170	42	50	M36	$1\,^3/_8$
400	1 160	430	750	340	120	620	–	375	980	170	42	50	M36	$1\,^3/_8$
400	1 160	430	750	340	120	620	–	375	980	170	42	50	M36	$1\,^3/_8$

Plummer block housings

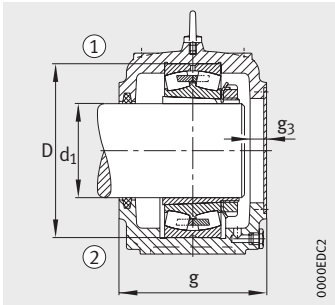
S30, split
For spherical roller bearings
with tapered bore
and adapter sleeve



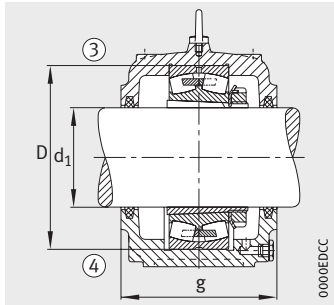


Dimension table (continued) · Dimensions in mm

Designation			Felt strips		Mass m
Housing	Bearing	Adapter sleeve	aXbXl mm	Pieces	Housing ≈kg
S3088-H-N-FZ-AF-L	23088-K-MB	H3088-HG	16X12X675	2	600
S3088-H-N-FZ-AL-L	23088-K-MB	H3088-HG	16X12X675	2	600
S3088-H-N-FZ-BF-L	23088-K-MB	H3088-HG	16X12X675	4	600
S3088-H-N-FZ-BL-L	23088-K-MB	H3088-HG	16X12X675	4	600
S3092-H-N-FZ-AF-L	23092-B-K-MB	H3092-HG	16X12X710	2	700
S3092-H-N-FZ-AL-L	23092-B-K-MB	H3092-HG	16X12X710	2	700
S3092-H-N-FZ-BF-L	23092-B-K-MB	H3092-HG	16X12X710	4	700
S3092-H-N-FZ-BL-L	23092-B-K-MB	H3092-HG	16X12X710	4	700
S3096-H-N-FZ-AF-L	23096-K-MB	H3096-HG	16X12X740	2	800
S3096-H-N-FZ-AL-L	23096-K-MB	H3096-HG	16X12X740	2	800
S3096-H-N-FZ-BF-L	23096-K-MB	H3096-HG	16X12X740	4	800
S3096-H-N-FZ-BL-L	23096-K-MB	H3096-HG	16X12X740	4	800



Design A
① Locating bearing AF
② Non-locating bearing AL



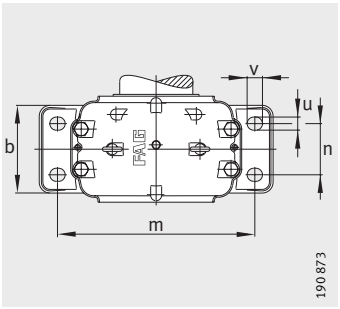
Design B
③ Locating bearing BF
④ Non-locating bearing BL

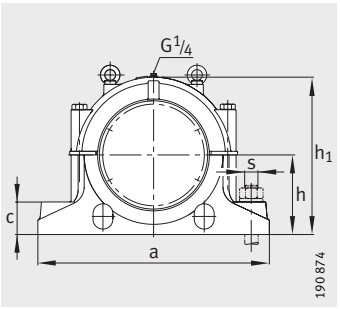
Dimensions

d_1	a	g	h_1	b	c	D	g_3	h	m	n	u	v	s	
													mm	inch
410	1 200	430	780	340	125	650	30	390	1 020	170	42	50	M36	$1^3/_8$
410	1 200	430	780	340	125	650	30	390	1 020	170	42	50	M36	$1^3/_8$
410	1 200	430	780	340	125	650	–	390	1 020	170	42	50	M36	$1^3/_8$
410	1 200	430	780	340	125	650	–	390	1 020	170	42	50	M36	$1^3/_8$
430	1 260	440	805	360	130	680	30	400	1 080	180	56	75	M48	$1^7/_8$
430	1 260	440	805	360	130	680	30	400	1 080	180	56	75	M48	$1^7/_8$
430	1 260	440	805	360	130	680	–	400	1 080	180	56	75	M48	$1^7/_8$
430	1 260	440	805	360	130	680	–	400	1 080	180	56	75	M48	$1^7/_8$
450	1 380	440	825	380	190	700	30	410	1 180	190	56	75	M48	$1^7/_8$
450	1 380	440	825	380	190	700	30	410	1 180	190	56	75	M48	$1^7/_8$
450	1 380	440	825	380	190	700	–	410	1 180	190	56	75	M48	$1^7/_8$
450	1 380	440	825	380	190	700	–	410	1 180	190	56	75	M48	$1^7/_8$

Plummer block housings

SD31, split
For spherical roller bearings
with tapered bore
and adapter sleeve

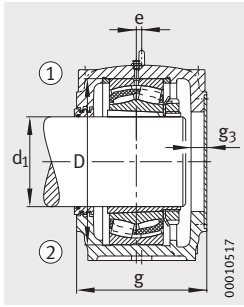




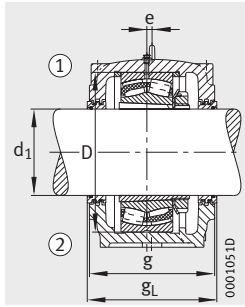
① Locating bearing
② Non-locating bearing

Dimension table · Dimensions in mm

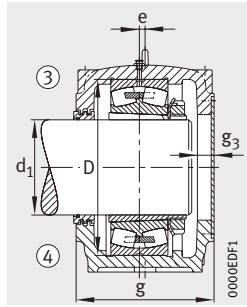
Designation							Mass m
Housing	Bearing	Adapter sleeve	Locating ring		Labyrinth ring with round cord		Housing
				Pieces		Pieces	≈kg
SD3134-H-TS-A-L	23134-E1-K-TVPB	H3134	FRM280/10	2	TS34	1	70
SD3134-H-TS-B-L	23134-E1-K-TVPB	H3134	FRM280/10	2	TS34	2	70
SD3136-H-TS-A-L	23136-E1-K-TVPB	H3136	FRM300/10	2	TS36	1	78
SD3136-H-TS-B-L	23136-E1-K-TVPB	H3136	FRM300/10	2	TS36	2	78
SD3138-H-TS-A-L	23138-E1-K-TVPB	H3138	FRM320/10	2	TS38	1	95
SD3138-H-TS-B-L	23138-E1-K-TVPB	H3138	FRM320/10	2	TS38	2	95
SD3140-H-TS-A-L	23140-B-K-MB	H3140	FRM340/10	2	TS40	1	120
SD3140-H-TS-B-L	23140-B-K-MB	H3140	FRM340/10	2	TS40	2	120
SD3144-H-TS-AF-L	23144-B-K-MB	H3144X	–	–	TS44	1	135
SD3144-H-TS-AL-L	23144-B-K-MB	H3144X	–	–	TS44	1	135
SD3144-H-TS-BF-L	23144-B-K-MB	H3144X	–	–	TS44	2	135
SD3144-H-TS-BL-L	23144-B-K-MB	H3144X	–	–	TS44	2	135
SD3148-H-TS-AF-L	23148-B-K-MB	H3148X	–	–	TS48	1	175
SD3148-H-TS-AL-L	23148-B-K-MB	H3148X	–	–	TS48	1	175
SD3148-H-TS-BF-L	23148-B-K-MB	H3148X	–	–	TS48	2	175
SD3148-H-TS-BL-L	23148-B-K-MB	H3148X	–	–	TS48	2	175
SD3152-H-TS-AF-L	23152-K-MB	H3152X	–	–	TS52	1	210
SD3152-H-TS-AL-L	23152-K-MB	H3152X	–	–	TS52	1	210
SD3152-H-TS-BF-L	23152-K-MB	H3152X	–	–	TS52	2	210
SD3152-H-TS-BL-L	23152-K-MB	H3152X	–	–	TS52	2	210
SD3156-H-TS-AF-L	23156-B-K-MB	H3156X	–	–	TS56	1	240
SD3156-H-TS-AL-L	23156-B-K-MB	H3156X	–	–	TS56	1	240
SD3156-H-TS-BF-L	23156-B-K-MB	H3156X	–	–	TS56	2	240
SD3156-H-TS-BL-L	23156-B-K-MB	H3156X	–	–	TS56	2	240
SD3160-H-TS-AF-L	23160-B-K-MB	H3160-HG	–	–	TS60	1	290
SD3160-H-TS-AL-L	23160-B-K-MB	H3160-HG	–	–	TS60	1	290
SD3160-H-TS-BF-L	23160-B-K-MB	H3160-HG	–	–	TS60	2	290
SD3160-H-TS-BL-L	23160-B-K-MB	H3160-HG	–	–	TS60	2	290
SD3164-H-TS-AF-L	23164-K-MB	H3164-HG	–	–	TS64	1	330
SD3164-H-TS-AL-L	23164-K-MB	H3164-HG	–	–	TS64	1	330
SD3164-H-TS-BF-L	23164-K-MB	H3164-HG	–	–	TS64	2	330
SD3164-H-TS-BL-L	23164-K-MB	H3164-HG	–	–	TS64	2	330



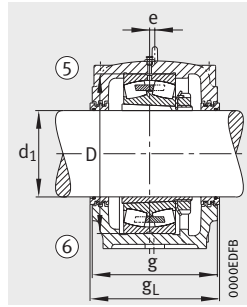
Design A (TS-A)



Design B (TS-B)



Design A
③ Loc. bearing TS-AF
④ Non-loc. brg. TS-AL



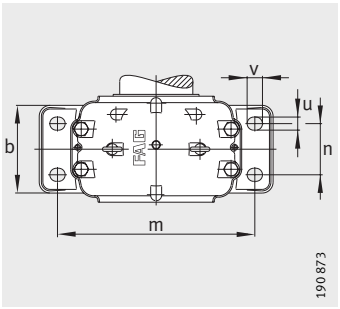
Design B
⑤ Locating TS-BF
⑥ Non-loc. brg. TS-BL

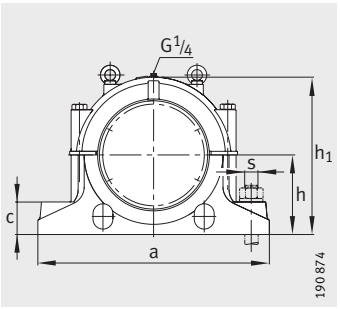
Dimensions

d_1	a	g	h_1	b	c	D	e	g_L	g_3	h	m	n	u	v	s	
															mm	inch
150	510	230	335	180	70	280	14	–	35	170	430	100	30	36	M24	1
150	510	230	335	180	70	280	14	240	–	170	430	100	30	36	M24	1
160	530	240	355	190	75	300	15	–	35	180	450	110	30	36	M24	1
160	530	240	355	190	75	300	15	250	–	180	450	110	30	36	M24	1
170	560	260	375	210	80	320	10	–	35	190	480	120	30	36	M24	1
170	560	260	375	210	80	320	10	270	–	190	480	120	30	36	M24	1
180	610	280	410	230	85	340	10	–	35	210	510	130	36	42	M30	$1^1/_8$
180	610	280	410	230	85	340	10	290	–	210	510	130	36	42	M30	$1^1/_8$
200	640	290	435	240	90	370	12	–	35	220	540	140	36	42	M30	$1^1/_8$
200	640	290	435	240	90	370	12	–	35	220	540	140	36	42	M30	$1^1/_8$
200	640	290	435	240	90	370	12	300	–	220	540	140	36	42	M30	$1^1/_8$
200	640	290	435	240	90	370	12	300	–	220	540	140	36	42	M30	$1^1/_8$
220	700	310	475	260	95	400	12	–	35	240	600	150	36	42	M30	$1^1/_8$
220	700	310	475	260	95	400	12	–	35	240	600	150	36	42	M30	$1^1/_8$
220	700	310	475	260	95	400	12	320	–	240	600	150	36	42	M30	$1^1/_8$
220	700	310	475	260	95	400	12	320	–	240	600	150	36	42	M30	$1^1/_8$
240	770	320	515	280	100	440	13	–	35	260	650	160	42	52	M36	$1^3/_8$
240	770	320	515	280	100	440	13	–	35	260	650	160	42	52	M36	$1^3/_8$
240	770	320	515	280	100	440	13	330	–	260	650	160	42	52	M36	$1^3/_8$
240	770	320	515	280	100	440	13	330	–	260	650	160	42	52	M36	$1^3/_8$
260	790	320	550	280	105	460	16	–	35	280	670	160	42	52	M36	$1^3/_8$
260	790	320	550	280	105	460	16	–	35	280	670	160	42	52	M36	$1^3/_8$
260	790	320	550	280	105	460	16	330	–	280	670	160	42	52	M36	$1^3/_8$
260	790	320	550	280	105	460	16	330	–	280	670	160	42	52	M36	$1^3/_8$
280	830	350	590	310	110	500	22	–	35	300	710	190	42	52	M36	$1^3/_8$
280	830	350	590	310	110	500	22	–	35	300	710	190	42	52	M36	$1^3/_8$
280	830	350	590	310	110	500	22	360	–	300	710	190	42	52	M36	$1^3/_8$
280	830	350	590	310	110	500	22	360	–	300	710	190	42	52	M36	$1^3/_8$
300	880	370	630	330	115	540	23	–	35	320	750	200	42	52	M36	$1^3/_8$
300	880	370	630	330	115	540	23	–	35	320	750	200	42	52	M36	$1^3/_8$
300	880	370	630	330	115	540	23	380	–	320	750	200	42	52	M36	$1^3/_8$
300	880	370	630	330	115	540	23	380	–	320	750	200	42	52	M36	$1^3/_8$

Plummer block housings

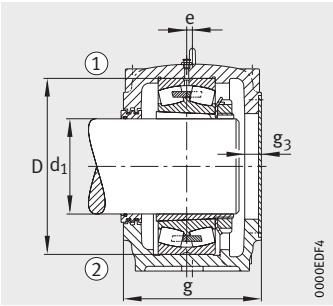
SD31, split
For spherical roller bearings with tapered bore and adapter sleeve



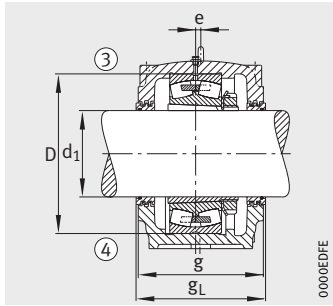


Dimension table (continued) · Dimensions in mm

Designation					Mass m
Housing	Bearing	Adapter sleeve	Labyrinth ring with round cord		Housing
				Pieces	≈kg
SD3168-H-TS-AF-L	23168-B-K-MB	H3168-HG	TS68	1	380
SD3168-H-TS-AL-L	23168-B-K-MB	H3168-HG	TS68	1	380
SD3168-H-TS-BF-L	23168-B-K-MB	H3168-HG	TS68	2	380
SD3168-H-TS-BL-L	23168-B-K-MB	H3168-HG	TS68	2	380
SD3172-H-TS-AF-L	23172-K-MB	H3172-HG	TS72	1	420
SD3172-H-TS-AL-L	23172-K-MB	H3172-HG	TS72	1	420
SD3172-H-TS-BF-L	23172-K-MB	H3172-HG	TS72	2	420
SD3172-H-TS-BL-L	23172-K-MB	H3172-HG	TS72	2	420
SD3176-H-TS-AF-L	23176-K-MB	H3176-HG	TS76	1	490
SD3176-H-TS-AL-L	23176-K-MB	H3176-HG	TS76	1	490
SD3176-H-TS-BF-L	23176-K-MB	H3176-HG	TS76	2	490
SD3176-H-TS-BL-L	23176-K-MB	H3176-HG	TS76	2	490
SD3180-H-TS-AF-L	23180-B-K-MB	H3180-HG	TS80	1	570
SD3180-H-TS-AL-L	23180-B-K-MB	H3180-HG	TS80	1	570
SD3180-H-TS-BF-L	23180-B-K-MB	H3180-HG	TS80	2	570
SD3180-H-TS-BL-L	23180-B-K-MB	H3180-HG	TS80	2	570
SD3184-H-TS-AF-L	23184-K-MB	H3184-HG	TS84	1	610
SD3184-H-TS-AL-L	23184-K-MB	H3184-HG	TS84	1	610
SD3184-H-TS-BF-L	23184-K-MB	H3184-HG	TS84	2	610
SD3184-H-TS-BL-L	23184-K-MB	H3184-HG	TS84	2	610
SD3188-H-TS-AF-L	23188-K-MB	H3188-HG	TS88	1	770
SD3188-H-TS-AL-L	23188-K-MB	H3188-HG	TS88	1	770
SD3188-H-TS-BF-L	23188-K-MB	H3188-HG	TS88	2	770
SD3188-H-TS-BL-L	23188-K-MB	H3188-HG	TS88	2	770
SD3192-H-TS-AF-L	23192-K-MB	H3192-HG	TS92	1	830
SD3192-H-TS-AL-L	23192-K-MB	H3192-HG	TS92	1	830
SD3192-H-TS-BF-L	23192-K-MB	H3192-HG	TS92	2	830
SD3192-H-TS-BL-L	23192-K-MB	H3192-HG	TS92	2	830
SD3196-H-TS-AF-L	23196-K-MB	H3196-HG	TS96	1	930
SD3196-H-TS-AL-L	23196-K-MB	H3196-HG	TS96	1	930
SD3196-H-TS-BF-L	23196-K-MB	H3196-HG	TS96	2	930
SD3196-H-TS-BL-L	23196-K-MB	H3196-HG	TS96	2	930



Design A
① Locating bearing TS-AF
② Non-locating bearing TS-AL



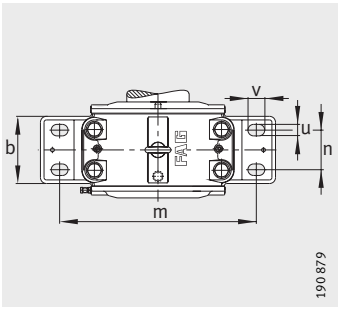
Design B
③ Locating bearing TS-BF
④ Non-locating bearing TS-BL

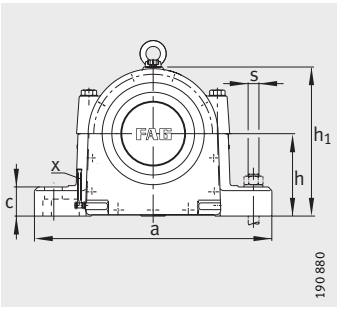
Dimensions

d_1	a	g	h_1	b	c	D	e	g_L	g_3	h	m	n	u	v	s	
															mm	inch
320	950	400	675	360	120	580	24	–	35	340	810	220	42	52	M36	$1^3/_8$
320	950	400	675	360	120	580	24	–	35	340	810	220	42	52	M36	$1^3/_8$
320	950	400	675	360	120	580	24	410	–	340	810	220	42	52	M36	$1^3/_8$
320	950	400	675	360	120	580	24	410	–	340	810	220	42	52	M36	$1^3/_8$
340	1 000	400	695	360	120	600	30	–	35	350	840	220	42	52	M36	$1^3/_8$
340	1 000	400	695	360	120	600	30	–	35	350	840	220	42	52	M36	$1^3/_8$
340	1 000	400	695	360	120	600	30	410	–	350	840	220	42	52	M36	$1^3/_8$
340	1 000	400	695	360	120	600	30	410	–	350	840	220	42	52	M36	$1^3/_8$
360	1 040	400	715	360	120	620	30	–	35	360	870	220	42	52	M36	$1^3/_8$
360	1 040	400	715	360	120	620	30	–	35	360	870	220	42	52	M36	$1^3/_8$
360	1 040	400	715	360	120	620	30	410	–	360	870	220	42	52	M36	$1^3/_8$
360	1 040	400	715	360	120	620	30	410	–	360	870	220	42	52	M36	$1^3/_8$
380	1 120	430	755	390	125	650	30	–	35	380	950	240	48	60	M42	$1^5/_8$
380	1 120	430	755	390	125	650	30	–	35	380	950	240	48	60	M42	$1^5/_8$
380	1 120	430	755	390	125	650	30	440	–	380	950	240	48	60	M42	$1^5/_8$
380	1 120	430	755	390	125	650	30	440	–	380	950	240	48	60	M42	$1^5/_8$
400	1 170	460	810	420	130	700	35	–	35	410	1 000	260	48	60	M42	$1^5/_8$
400	1 170	460	810	420	130	700	35	–	35	410	1 000	260	48	60	M42	$1^5/_8$
400	1 170	460	810	420	130	700	35	470	–	410	1 000	260	48	60	M42	$1^5/_8$
400	1 170	460	810	420	130	700	35	470	–	410	1 000	260	48	60	M42	$1^5/_8$
410	1 220	460	835	430	135	720	35	–	35	420	1 030	260	48	60	M42	$1^5/_8$
410	1 220	460	835	430	135	720	35	–	35	420	1 030	260	48	60	M42	$1^5/_8$
410	1 220	460	835	430	135	720	35	470	–	420	1 030	260	48	60	M42	$1^5/_8$
410	1 220	460	835	430	135	720	35	470	–	420	1 030	260	48	60	M42	$1^5/_8$
430	1 280	470	875	440	145	760	35	–	35	440	1 070	260	48	60	M42	$1^5/_8$
430	1 280	470	875	440	145	760	35	–	35	440	1 070	260	48	60	M42	$1^5/_8$
430	1 280	470	875	440	145	760	35	480	–	440	1 070	260	48	60	M42	$1^5/_8$
430	1 280	470	875	440	145	760	35	480	–	440	1 070	260	48	60	M42	$1^5/_8$
450	1 330	470	920	440	155	790	45	–	35	460	1 110	260	66	80	M56	$2^1/_4$
450	1 330	470	920	440	155	790	45	–	35	460	1 110	260	66	80	M56	$2^1/_4$
450	1 330	470	920	440	155	790	45	480	–	460	1 110	260	66	80	M56	$2^1/_4$
450	1 330	470	920	440	155	790	45	480	–	460	1 110	260	66	80	M56	$2^1/_4$

Plummer block housings

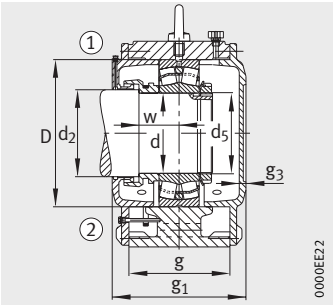
LOE, split
For spherical roller bearings with cylindrical bore



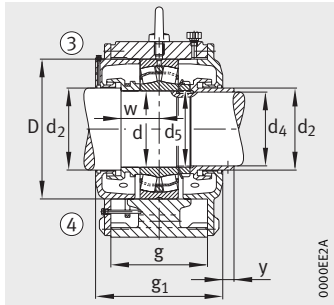


Dimension table · Dimensions in mm

Designation					Oil quantity	Oil level	Mass m
Housing		Bearing	Shaft nut	Tab washer	Initial filling	Height	Housing
Locating bearing	Non-locating bearing					x	
					l	mm	≈kg
LOE310-N-AF-L	**LOE310-N-AL-L**	22310-E1	KM10	MB10	0,9	50– 65	30
LOE310-N-BF-L	**LOE310-N-BL-L**	22310-E1	KM10	MB10	0,9	50– 65	30
LOE312-N-AF-L	**LOE312-N-AL-L**	22312-E1	KM12	MB12	1	50– 65	35
LOE312-N-BF-L	**LOE312-N-BL-L**	22312-E1	KM12	MB12	1	50– 65	35
LOE314-N-AF-L	**LOE314-N-AL-L**	22314-E1	KM14	MB14	1,4	50– 65	45
LOE314-N-BF-L	**LOE314-N-BL-L**	22314-E1	KM14	MB14	1,4	50– 65	45
LOE316-N-AF-L	**LOE316-N-AL-L**	22316-E1	KM16	MB16	1,6	55– 70	60
LOE316-N-BF-L	**LOE316-N-BL-L**	22316-E1	KM16	MB16	1,6	55– 70	60
LOE217-N-AF-L	**LOE217-N-AL-L**	22217-E1	KM17	MB17	1,4	50– 65	45
LOE217-N-BF-L	**LOE217-N-BL-L**	22217-E1	KM17	MB17	1,4	50– 65	45
LOE218-N-AF-L	**LOE218-N-AL-L**	22218-E1	KM18	MB18	1,5	45– 60	47
LOE218-N-BF-L	**LOE218-N-BL-L**	22218-E1	KM18	MB18	1,5	45– 60	47
LOE318-N-AF-L	**LOE318-N-AL-L**	22318-E1	KM18	MB18	2,3	65– 85	73
LOE318-N-BF-L	**LOE318-N-BL-L**	22318-E1	KM18	MB18	2,3	65– 85	73
LOE219-N-AF-L	**LOE219-N-AL-L**	22219-E1	KM19	MB19	1,6	55– 70	60
LOE219-N-BF-L	**LOE219-N-BL-L**	22219-E1	KM19	MB19	1,6	55– 70	60
LOE220-N-AF-L	**LOE220-N-AL-L**	22220-E1	KM20	MB20	1,7	50– 65	67
LOE220-N-BF-L	**LOE220-N-BL-L**	22220-E1	KM20	MB20	1,7	50– 65	67
LOE320-N-AF-L	**LOE320-N-AL-L**	22320-E1	KM20	MB20	2,4	55– 75	81
LOE320-N-BF-L	**LOE320-N-BL-L**	22320-E1	KM20	MB20	2,4	55– 75	81
LOE222-N-AF-L	**LOE222-N-AL-L**	22222-E1	KM22	MB22	2,1	50– 70	74
LOE222-N-BF-L	**LOE222-N-BL-L**	22222-E1	KM22	MB22	2,1	50– 70	74
LOE322-N-AF-L	**LOE322-N-AL-L**	22322-E1	KM22	MB22	2,4	45– 65	100
LOE322-N-BF-L	**LOE322-N-BL-L**	22322-E1	KM22	MB22	2,4	45– 65	100
LOE224-N-AF-L	**LOE224-N-AL-L**	22224-E1	KM24	MB24	2,3	50– 70	80
LOE224-N-BF-L	**LOE224-N-BL-L**	22224-E1	KM24	MB24	2,3	50– 70	80
LOE324-N-AF-L	**LOE324-N-AL-L**	22324-E1	KM24	MB24	4,2	65– 90	130
LOE324-N-BF-L	**LOE324-N-BL-L**	22324-E1	KM24	MB24	4,2	65– 90	130
LOE226-N-AF-L	**LOE226-N-AL-L**	22226-E1	KM26	MB26	2,3	55– 75	93
LOE226-N-BF-L	**LOE226-N-BL-L**	22226-E1	KM26	MB26	2,3	55– 75	93
LOE326-N-AF-L	**LOE326-N-AL-L**	22326-E1	KM26	MB26	3,7	75–105	142
LOE326-N-BF-L	**LOE326-N-BL-L**	22326-E1	KM26	MB26	3,7	75–105	142



Design A
① Locating bearing AF
② Non-locating bearing AL



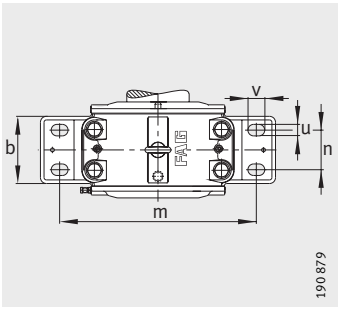
Design B
③ Locating bearing BF
④ Non-locating bearing BL

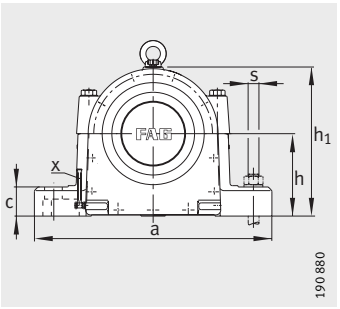
Dimensions

d	a	g_1	h_1	d_2	d_4	d_5	w	b	c	D	g	g_3	h	m	n	u	v	s	y
50	350	210	205	55	–	M50X2	52	125	40	110	135	18	115	290	75	20	30	M16	–
50	350	210	205	55	47	M50X2	52	125	40	110	135	–	115	290	75	20	30	M16	15
60	370	220	220	65	–	M60X2	55	130	45	130	140	18	125	310	80	20	30	M16	–
60	370	220	220	65	57	M60X2	55	130	45	130	140	–	125	310	80	20	30	M16	15
70	410	225	240	75	–	M70X2	62	150	48	150	160	18	135	340	80	25	35	M20	–
70	410	225	240	75	67	M70X2	62	150	48	150	160	–	135	340	80	25	35	M20	15
80	490	250	270	85	–	M80X2	67	160	50	170	170	18	150	400	80	30	45	M24	–
80	490	250	270	85	77	M80X2	67	160	50	170	170	–	150	400	80	30	45	M24	15
85	410	225	240	90	–	M85X2	62	150	48	150	160	18	135	340	80	25	35	M20	–
85	410	225	240	90	82	M85X2	62	150	48	150	160	–	135	340	80	25	35	M20	15
90	410	225	245	95	–	M90X2	61	150	48	160	160	17,5	135	340	80	25	35	M20	–
90	410	225	245	95	87	M90X2	61	150	48	160	160	–	135	340	80	25	35	M20	15
90	500	250	305	95	–	M90X2	72	165	55	190	175	18	175	420	80	30	45	M24	–
90	500	250	305	95	87	M90X2	72	165	55	190	175	–	175	420	80	30	45	M24	15
95	490	250	270	100	–	M95X2	67	160	50	170	170	18	150	400	80	30	45	M24	–
95	490	250	270	100	92	M95X2	67	160	50	170	170	–	150	400	80	30	45	M24	15
100	490	250	270	110	–	M100X2	60	160	50	180	170	20	150	400	80	30	45	M24	–
100	490	250	270	110	97	M100X2	60	160	50	180	170	–	150	400	80	30	45	M24	15
100	550	250	320	106	–	M100X2	72	165	55	215	175	18	175	440	80	36	50	M30	–
100	550	250	320	106	97	M100X2	72	165	55	215	175	–	175	440	80	36	50	M30	15
110	510	250	300	116	–	M110X2	70	165	50	200	175	18	165	420	80	30	45	M24	–
110	510	250	300	116	107	M110X2	70	165	50	200	175	–	165	420	80	30	45	M24	15
110	570	270	335	120	–	M110X2	77	180	65	240	190	20	180	460	95	36	50	M30	–
110	570	270	335	120	107	M110X2	77	180	65	240	190	–	180	460	95	36	50	M30	15
120	550	250	320	126	–	M120X2	72	165	55	215	175	18	175	440	80	36	50	M30	–
120	550	250	320	126	117	M120X2	72	165	55	215	175	–	175	440	80	36	50	M30	15
120	660	300	390	126	–	M120X2	90	200	75	260	210	18	220	530	110	42	60	M36	–
120	660	300	390	126	117	M120X2	90	200	75	260	210	–	220	530	110	42	60	M36	15
130	570	260	345	136	–	M130X2	77	175	65	230	185	18	190	460	90	36	50	M30	–
130	570	260	345	136	127	M130X2	77	175	65	230	185	–	190	460	90	36	50	M30	15
130	660	315	420	140	–	M130X2	86	200	80	280	220	18	235	530	110	42	60	M36	–
130	660	315	420	140	127	M130X2	86	200	80	280	220	–	235	530	110	42	60	M36	15

Plummer block housings

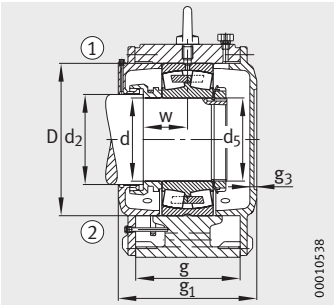
LOE, split
For spherical roller bearings with cylindrical bore



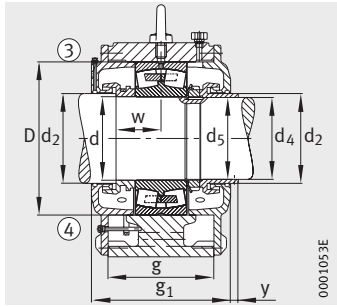


Dimension table (continued) · Dimensions in mm

Designation					Oil quantity	Oil level	Mass m
Housing		Bearing	Shaft nut	Tab washer	Initial filling	Height	Housing
Locating bearing	Non-locating bearing					x	
					l	mm	≈kg
LOE228-N-AF-L	**LOE228-N-AL-L**	22228-E1	KM28	MB28	3,7	55– 70	100
LOE228-N-BF-L	**LOE228-N-BL-L**	22228-E1	KM28	MB28	3,7	55– 70	100
LOE328-N-AF-L	**LOE328-N-AL-L**	22328-E1	KM28	MB28	6,7	80–110	170
LOE328-N-BF-L	**LOE328-N-BL-L**	22328-E1	KM28	MB28	6,7	80–110	170
LOE230-N-AF-L	**LOE230-N-AL-L**	22230-E1	KM30	MB30	4,2	65– 90	125
LOE230-N-BF-L	**LOE230-N-BL-L**	22230-E1	KM30	MB30	4,2	65– 90	125
LOE330-N-AF-L	**LOE330-N-AL-L**	22330-E1	KM30	MB30	6,2	75–110	200
LOE330-N-BF-L	**LOE330-N-BL-L**	22330-E1	KM30	MB30	6,2	75–110	200
LOE232-N-AF-L	**LOE232-N-AL-L**	22232-E1	KM32	MB32	4,7	60– 80	136
LOE232-N-BF-L	**LOE232-N-BL-L**	22232-E1	KM32	MB32	4,7	60– 80	136
LOE332-N-AF-L	**LOE332-N-AL-L**	22332-MB	KM32	MB32	7	80–105	240
LOE332-N-BF-L	**LOE332-N-BL-L**	22332-MB	KM32	MB32	7	80–105	240
LOE234-N-AF-L	**LOE234-N-AL-L**	22234-E1	KM34	MB34	6	90–105	160
LOE234-N-BF-L	**LOE234-N-BL-L**	22234-E1	KM34	MB34	6	90–105	160
LOE334-N-AF-L	**LOE334-N-AL-L**	22334-MB	KM34	MB34	7,2	80–105	270
LOE334-N-BF-L	**LOE334-N-BL-L**	22334-MB	KM34	MB34	7,2	80–105	270
LOE236-N-AF-L	**LOE236-N-AL-L**	22236-E1	KM36	MB36	6	75–110	200
LOE236-N-BF-L	**LOE236-N-BL-L**	22236-E1	KM36	MB36	6	75–110	200
LOE336-N-AF-L	**LOE336-N-AL-L**	22336-MB	KM36	MB36	7,4	80–105	330
LOE336-N-BF-L	**LOE336-N-BL-L**	22336-MB	KM36	MB36	7,4	80–105	330
LOE238-N-AF-L	**LOE238-N-AL-L**	22238-MB	KM38	MB38	7,2	70–100	230
LOE238-N-BF-L	**LOE238-N-BL-L**	22238-MB	KM38	MB38	7,2	70–100	230
LOE240-N-AF-L	**LOE240-N-AL-L**	22240-B-MB	KM40	MB40	7,2	75–100	250
LOE240-N-BF-L	**LOE240-N-BL-L**	22240-B-MB	KM40	MB40	7,2	75–100	250
LOE244-N-AF-L	**LOE244-N-AL-L**	22244-B-MB	HM44T	MB44	8,2	80–110	310
LOE244-N-BF-L	**LOE244-N-BL-L**	22244-B-MB	HM44T	MB44	8,2	80–110	310
LOE248-N-AF-L	**LOE248-N-AL-L**	22248-B-MB	HM48T	MB48	8,4	100–125	385
LOE248-N-BF-L	**LOE248-N-BL-L**	22248-B-MB	HM48T	MB48	8,4	100–125	385



Design A
① Locating bearing AF
② Non-locating bearing AL



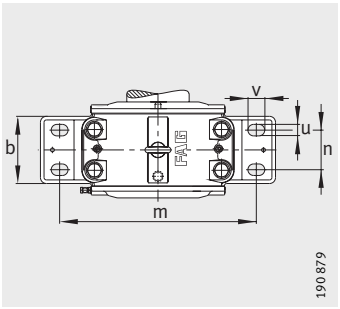
Design B
③ Locating bearing BF
④ Non-locating bearing BL

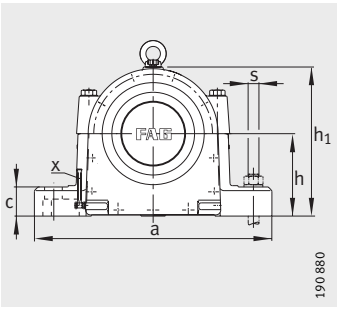
Dimensions

d	a	g_1	h_1	d_2	d_4	d_5	w	b	c	D	g	g_3	h	m	n	u	v	s	y
140	570	260	355	150	–	M140X2	73	175	65	250	180	18	190	460	100	36	50	M30	–
140	570	260	355	150	137	M140X2	73	175	65	250	180	–	190	460	100	36	50	M30	22
140	710	325	450	146	–	M140X2	95	220	85	300	230	19,5	260	580	125	42	60	M36	–
140	710	325	450	146	137	M140X2	95	220	85	300	230	–	260	580	125	42	60	M36	15
150	660	275	395	156	–	M150X2	82	190	70	270	200	18	220	530	100	42	60	M36	–
150	660	275	395	156	147	M150X2	82	190	70	270	200	–	220	530	100	42	60	M36	15
150	760	335	465	160	–	M150X2	95	200	85	320	240	18	265	630	125	42	60	M36	–
150	760	335	465	160	147	M150X2	95	200	85	320	240	–	265	630	125	42	60	M36	15
160	660	290	400	170	–	M160X3	80	200	70	290	210	20	220	530	110	42	60	M36	–
160	660	290	400	170	155	M160X3	80	200	70	290	210	–	220	530	110	42	60	M36	22
160	820	350	485	166	–	M160X3	100	240	90	340	250	20	270	670	130	48	70	M42	–
160	820	350	485	166	155	M160X3	100	240	90	340	250	–	270	670	130	48	70	M42	15
170	710	300	460	176	–	M170X3	90	200	85	310	210	18	260	580	110	42	60	M36	–
170	710	300	460	176	165	M170X3	90	200	85	310	210	–	260	580	110	42	60	M36	15
170	830	350	510	180	–	M170X3	105	240	90	360	255	18	280	670	130	48	70	M42	–
170	830	350	510	180	165	M170X3	105	240	90	360	255	–	280	670	130	48	70	M42	15
180	710	300	465	190	–	M180X3	90	200	85	320	210	20	260	580	110	42	60	M36	–
180	710	300	465	190	175	M180X3	90	200	85	320	210	–	260	580	110	42	60	M36	22
180	840	360	530	190	–	M180X3	108	240	90	380	260	20	290	680	130	48	70	M42	–
180	840	360	530	190	175	M180X3	108	240	90	380	260	–	290	680	130	48	70	M42	15
190	820	350	485	196	–	M190X3	95	240	90	340	250	20	270	670	130	48	70	M42	–
190	820	350	485	196	185	M190X3	95	240	90	340	250	–	270	670	130	48	70	M42	15
200	830	344	510	210	–	M200X3	100	240	90	360	260	20	280	670	130	48	70	M42	–
200	830	344	510	210	195	M200X3	100	240	90	360	260	–	280	670	130	48	70	M42	15
220	880	380	565	230	–	Tr220X4	108	240	105	400	280	20	310	720	130	48	70	M42	–
220	880	380	565	230	212	Tr220X4	108	240	105	400	280	–	310	720	130	48	70	M42	15
240	980	400	615	260	–	Tr240X4	120	280	120	440	300	20	340	820	165	48	70	M42	–
240	980	400	615	260	235	Tr240X4	120	280	120	440	300	–	340	820	165	48	70	M42	22

Plummer block housings

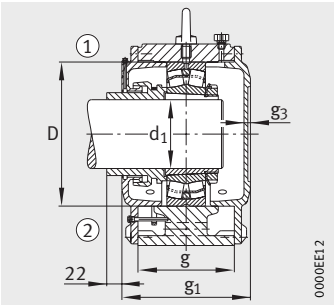
LOE, split
For spherical roller bearings
with tapered bore
and adapter sleeve



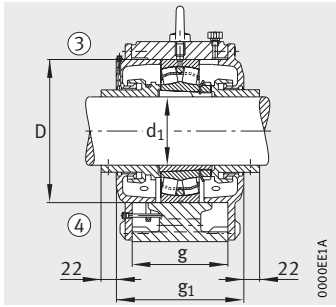


Dimension table · Dimensions in mm

Designation				Oil quantity	Oil level	Mass m
Housing		Bearing	Adapter sleeve	Initial filling	Height x	Housing
Locating bearing	Non-locating bearing			l	mm	≈kg
LOE614-N-AF-L	**LOE614-N-AL-L**	22314-E1-K	H2314	1,4	50– 65	45
LOE614-N-BF-L	**LOE614-N-BL-L**	22314-E1-K	H2314	1,4	50– 65	45
LOE616-N-AF-L	**LOE616-N-AL-L**	22316-E1-K	H2316	1,6	55– 70	60
LOE616-N-BF-L	**LOE616-N-BL-L**	22316-E1-K	H2316	1,6	55– 70	60
LOE517-N-AF-L	**LOE517-N-AL-L**	22217-E1-K	H317	1,4	50– 65	45
LOE517-N-BF-L	**LOE517-N-BL-L**	22217-E1-K	H317	1,4	50– 65	45
LOE518-N-AF-L	**LOE518-N-AL-L**	22218-E1-K	H318	1,5	45– 60	47
LOE518-N-BF-L	**LOE518-N-BL-L**	22218-E1-K	H318	1,5	45– 60	47
LOE618-N-AF-L	**LOE618-N-AL-L**	22318-E1-K	H2318	2,3	65– 85	73
LOE618-N-BF-L	**LOE618-N-BL-L**	22318-E1-K	H2318	2,3	65– 85	73
LOE519-N-AF-L	**LOE519-N-AL-L**	22219-E1-K	H319	1,6	55– 70	60
LOE519-N-BF-L	**LOE519-N-BL-L**	22219-E1-K	H319	1,6	55– 70	60
LOE520-N-AF-L	**LOE520-N-AL-L**	22220-E1-K	H320	1,7	50– 65	67
LOE520-N-BF-L	**LOE520-N-BL-L**	22220-E1-K	H320	1,7	50– 65	67
LOE620-N-AF-L	**LOE620-N-AL-L**	22320-E1-K	H2320	2,4	55– 75	81
LOE620-N-BF-L	**LOE620-N-BL-L**	22320-E1-K	H2320	2,4	55– 75	81
LOE522-N-AF-L	**LOE522-N-AL-L**	22222-E1-K	H322	2,1	50– 70	74
LOE522-N-BF-L	**LOE522-N-BL-L**	22222-E1-K	H322	2,1	50– 70	74
LOE622-N-AF-L	**LOE622-N-AL-L**	22322-E1-K	H2322	2,4	45– 65	100
LOE622-N-BF-L	**LOE622-N-BL-L**	22322-E1-K	H2322	2,4	45– 65	100
LOE524-N-AF-L	**LOE524-N-AL-L**	22224-E1-K	H3124	2,3	50– 70	80
LOE524-N-BF-L	**LOE524-N-BL-L**	22224-E1-K	H3124	2,3	50– 70	80
LOE624-N-AF-L	**LOE624-N-AL-L**	22324-E1-K	H2324	4,2	65– 90	130
LOE624-N-BF-L	**LOE624-N-BL-L**	22324-E1-K	H2324	4,2	65– 90	130
LOE526-N-AF-L	**LOE526-N-AL-L**	22226-E1-K	H3126	2,3	55– 75	93
LOE526-N-BF-L	**LOE526-N-BL-L**	22226-E1-K	H3126	2,3	55– 75	93
LOE626-N-AF-L	**LOE626-N-AL-L**	22326-E1-K	H2326	3,7	75–105	142
LOE626-N-BF-L	**LOE626-N-BL-L**	22326-E1-K	H2326	3,7	75–105	142
LOE528-N-AF-L	**LOE528-N-AL-L**	22228-E1-K	H3128	3,7	55– 75	100
LOE528-N-BF-L	**LOE528-N-BL-L**	22228-E1-K	H3128	3,7	55– 75	100
LOE628-N-AF-L	**LOE628-N-AL-L**	22328-E1-K	H2328	6,7	80–110	170
LOE628-N-BF-L	**LOE628-N-BL-L**	22328-E1-K	H2328	6,7	80–110	170



Design A
① Locating bearing AF
② Non-locating bearing AL



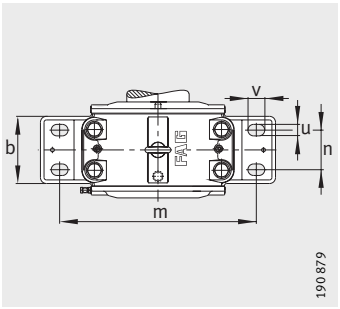
Design B
③ Locating bearing BF
④ Non-locating bearing BL

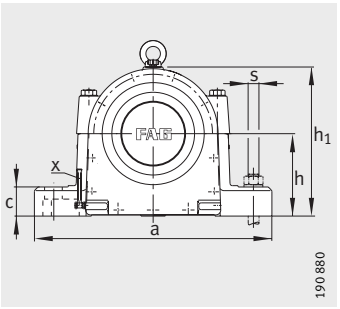
Dimensions

d_1	a	g_1	h_1	b	c	D	g	g_3	h	m	n	u	v	s
60	410	225	240	150	48	150	160	18	135	340	80	25	35	M20
60	410	225	240	150	48	150	160	–	135	340	80	25	35	M20
70	490	250	270	160	50	170	170	18	150	400	80	30	45	M24
70	490	250	270	160	50	170	170	–	150	400	80	30	45	M24
75	410	225	240	150	48	150	160	18	135	340	80	25	35	M20
75	410	225	240	150	48	150	160	–	135	340	80	25	35	M20
80	410	225	245	150	48	160	160	17,5	135	340	80	25	35	M20
80	410	225	245	150	48	160	160	–	135	340	80	25	35	M20
80	500	250	305	165	55	190	175	18	175	420	80	30	45	M24
80	500	250	305	165	55	190	175	–	175	420	80	30	45	M24
85	490	250	270	160	50	170	170	18	150	400	80	30	45	M24
85	490	250	270	160	50	170	170	–	150	400	80	30	45	M24
90	490	250	270	160	50	180	170	20	150	400	80	30	45	M24
90	490	250	270	160	50	180	170	–	150	400	80	30	45	M24
90	550	250	320	165	55	215	175	18	175	440	80	36	50	M30
90	550	250	320	165	55	215	175	–	175	440	80	36	50	M30
100	510	250	300	165	50	200	175	18	165	420	80	30	45	M24
100	510	250	300	165	50	200	175	–	165	420	80	30	45	M24
100	570	270	335	180	65	240	190	20	180	460	95	36	50	M30
100	570	270	335	180	65	240	190	–	180	460	95	36	50	M30
110	550	250	320	165	55	215	175	18	175	440	80	36	50	M30
110	550	250	320	165	55	215	175	–	175	440	80	36	50	M30
110	660	300	390	200	75	260	210	18	220	530	110	42	60	M36
110	660	300	390	200	75	260	210	–	220	530	110	42	60	M36
115	570	260	345	175	65	230	185	18	190	460	90	36	50	M30
115	570	260	345	175	65	230	185	–	190	460	90	36	50	M30
115	660	315	420	200	80	280	220	18	235	530	110	42	60	M36
115	660	315	420	200	80	280	220	–	235	530	110	42	60	M36
125	570	260	355	175	65	250	180	18	190	460	100	36	50	M30
125	570	260	355	175	65	250	180	–	190	460	100	36	50	M30
125	710	325	450	220	85	300	230	19,5	260	580	125	42	60	M36
125	710	325	450	220	85	300	230	–	260	580	125	42	60	M36

Plummer block housings

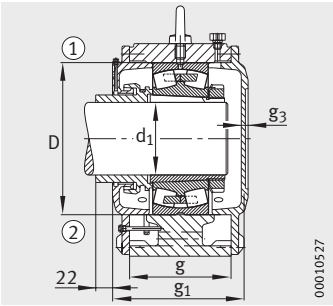
LOE, split
For spherical roller bearings
with tapered bore
and adapter sleeve



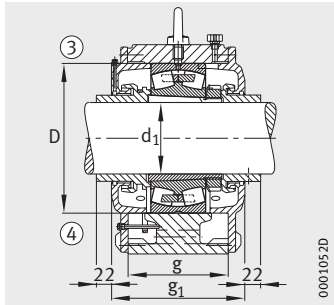


Dimension table (continued) · Dimensions in mm

Designation				Oil quantity	Oil level	Mass m
Housing		Bearing	Adapter sleeve	Initial filling	Height x	Housing
Locating bearing	Non-locating bearing			l	mm	≈kg
LOE530-N-AF-L	**LOE530-N-AL-L**	22230-E1-K	H3130	4,2	65– 90	125
LOE530-N-BF-L	**LOE530-N-BL-L**	22230-E1-K	H3130	4,2	65– 90	125
LOE630-N-AF-L	**LOE630-N-AL-L**	22330-E1-K	H2330	6,2	75–110	200
LOE630-N-BF-L	**LOE630-N-BL-L**	22330-E1-K	H2330	6,2	75–110	200
LOE532-N-AF-L	**LOE532-N-AL-L**	22232-E1-K	H3132	4,7	60– 80	135
LOE532-N-BF-L	**LOE532-N-BL-L**	22232-E1-K	H3132	4,7	60– 80	135
LOE632-N-AF-L	**LOE632-N-AL-L**	22332-K-MB	H2332	7	80–105	240
LOE632-N-BF-L	**LOE632-N-BL-L**	22332-K-MB	H2332	7	80–105	240
LOE534-N-AF-L	**LOE534-N-AL-L**	22234-E1-K	H3134	6	90–105	160
LOE534-N-BF-L	**LOE534-N-BL-L**	22234-E1-K	H3134	6	80–105	160
LOE634-N-AF-L	**LOE634-N-AL-L**	22334-K-MB	H2334	7,2	80–105	270
LOE634-N-BF-L	**LOE634-N-BL-L**	22334-K-MB	H2334	7,2	80–105	270
LOE536-N-AF-L	**LOE536-N-AL-L**	22236-E1-K	H3136	6	75–110	200
LOE536-N-BF-L	**LOE536-N-BL-L**	22236-E1-K	H3136	6	75–110	200
LOE636-N-AF-L	**LOE636-N-AL-L**	22336-K-MB	H2336	7,4	80–105	330
LOE636-N-BF-L	**LOE636-N-BL-L**	22336-K-MB	H2336	7,4	80–105	330
LOE538-N-AF-L	**LOE538-N-AL-L**	22238-K-MB	H3138	7,2	70–100	230
LOE538-N-BF-L	**LOE538-N-BL-L**	22238-K-MB	H3138	7,2	70–100	230
LOE540-N-AF-L	**LOE540-N-AL-L**	22240-B-K-MB	H3140	7,2	75–100	250
LOE540-N-BF-L	**LOE540-N-BL-L**	22240-B-K-MB	H3140	7,2	75–100	250
LOE544-N-AF-L	**LOE544-N-AL-L**	22244-B-K-MB	H3144X	8,2	80–110	310
LOE544-N-BF-L	**LOE544-N-BL-L**	22244-B-K-MB	H3144X	8,2	80–110	310
LOE548-N-AF-L	**LOE548-N-AL-L**	22248-B-K-MB	H3148X	8,4	100–120	385
LOE548-N-BF-L	**LOE548-N-BL-L**	22248-B-K-MB	H3148X	8,4	100–120	385



Design A
① Locating bearing AF
② Non-locating bearing AL



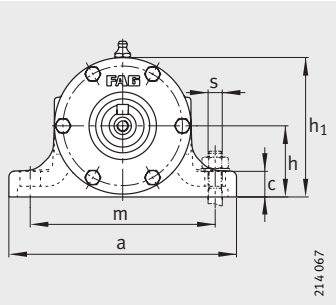
Design B
③ Locating bearing BF
④ Non-locating bearing BL

Dimensions

d_1	a	g_1	h_1	b	c	D	g	g_3	h	m	n	u	v	s
135	660	275	395	190	70	270	200	18	220	530	100	42	60	M36
135	660	275	395	190	70	270	200	–	220	530	100	42	60	M36
135	760	335	465	200	85	320	240	18	265	630	125	42	60	M36
135	760	335	465	200	85	320	240	–	265	630	125	42	60	M36
140	660	290	400	200	70	290	210	20	220	530	110	42	60	M36
140	660	290	400	200	70	290	210	–	220	530	110	42	60	M36
140	820	350	485	240	90	340	250	20	270	670	130	48	70	M42
140	820	350	485	240	90	340	250	–	270	670	130	48	70	M42
150	710	300	460	200	85	310	210	18	260	580	110	42	60	M36
150	710	300	460	200	85	310	210	–	260	580	110	42	60	M36
150	830	350	510	240	90	360	255	18	280	670	130	48	70	M42
150	830	350	510	240	90	360	255	–	280	670	130	48	70	M42
160	710	300	465	200	85	320	210	20	260	580	110	42	60	M36
160	710	300	465	200	85	320	210	–	260	580	110	42	60	M36
160	840	360	530	240	90	380	260	20	290	680	130	48	70	M42
160	840	360	530	240	90	380	260	–	290	680	130	48	70	M42
170	820	350	485	240	90	340	250	20	270	670	130	48	70	M42
170	820	350	485	240	90	340	250	–	270	670	130	48	70	M42
180	830	344	510	240	90	360	260	20	280	670	130	48	70	M42
180	830	344	510	240	90	360	260	–	280	670	130	48	70	M42
200	880	380	565	240	105	400	280	20	310	720	130	48	70	M42
200	880	380	565	240	105	400	280	–	310	720	130	48	70	M42
220	980	400	625	280	120	440	300	20	340	820	165	48	70	M42
220	980	400	625	280	120	440	300	–	340	820	165	48	70	M42

Plummer block housing units

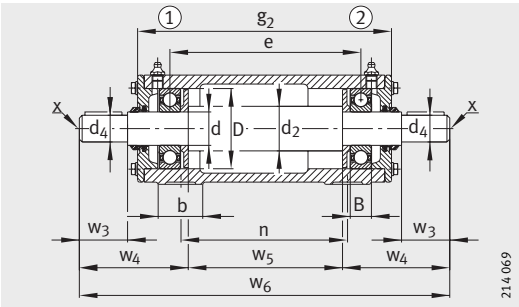
VRE3, unsplit
With bearings and shaft



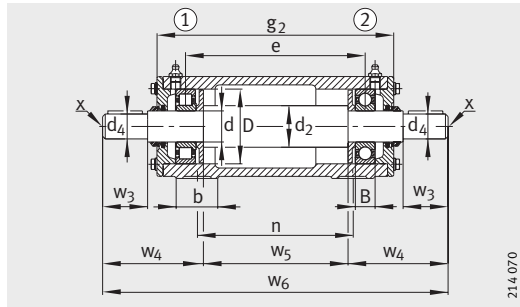
Cross-sections of
designs C, D, page 1433,
designs E, F, page 1435

Dimension table · Dimensions in mm

Designation					Mass m		Dimensions		
Bearing unit	Bearing ①	Bearing ②	Housing	Shaft Complete	Housing ≈kg	Unit ≈kg	d	D	B
VRE305-A	6305-C3	6305-C3	VR305-A	VRW305-A	5	7	**25**	62	17
VRE305-B	NJ305-E-TVP2	6305-C3	VR305-A	VRW305-A	5	7	**25**	62	17
VRE305-C	NU305-E-TVP2-C3	2X7305-B-TVP-UA	VR305-C	VRW305-C	5,2	7,4	**25**	62	17
VRE305-D	NU305-E-TVP2-C3	6305-C3	VR305-D	VRW305-D	5,2	7,2	**25**	62	17
VRE305-E	NU305-E-TVP2-C3	NU305-E-TVP2-C3 + 6305-C3	VR305-E	VRW305-C	5,2	7,5	**25**	62	17
VRE305-F	6305-C3	6305-C3	VR305-F	VRW305-F	5	7	**25**	62	17
VRE306-A	6306-C3	6306-C3	VR306-A	VRW306-A	5,8	9	**30**	72	19
VRE306-B	NJ306-E-TVP2	6306-C3	VR306-A	VRW306-A	5,8	9	**30**	72	19
VRE306-C	NU306-E-TVP2-C3	2X7306-B-TVP-UA	VR306-C	VRW306-C	6	9,4	**30**	72	19
VRE306-D	NU306-E-TVP2-C3	6306-C3	VR306-D	VRW306-D	6	9,2	**30**	72	19
VRE306-E	NU306-E-TVP2-C3	NU306-E-TVP2-C3 + 6306-C3	VR306-E	VRW306-C	6	9,4	**30**	72	19
VRE306-F	6306-C3	6306-C3	VR306-F	VRW306-F	5,8	9	**30**	72	19
VRE307-A	6307-C3	6307-C3	VR307-A	VRW307-A	8,5	13	**35**	80	21
VRE307-B	NJ307-E-TVP2	6307-C3	VR307-A	VRW307-A	8,5	13	**35**	80	21
VRE307-C	NU307-E-TVP2-C3	2X7307-B-TVP-UA	VR307-C	VRW307-C	8,8	13,6	**35**	80	21
VRE307-D	NU307-E-TVP2-C3	6307-C3	VR307-D	VRW307-D	8,8	13,3	**35**	80	21
VRE307-E	NU307-E-TVP2-C3	NU307-E-TVP2-C3 + 6307-C3	VR307-E	VRW307-C	8,8	13,6	**35**	80	21
VRE307-F	6307-C3	6307-C3	VR307-F	VRW307-F	8,5	13	**35**	80	21
VRE308-A	6308-C3	6308-C3	VR308-A	VRW308-A	10,9	18	**40**	90	23
VRE308-B	NJ308-E-TVP2	6308-C3	VR308-A	VRW308-A	10,9	18	**40**	90	23
VRE308-C	NU308-E-TVP2-C3	2X7308-B-TVP-UA	VR308-C	VRW308-C	11,7	19,1	**40**	90	23
VRE308-D	NU308-E-TVP2-C3	6308-C3	VR308-D	VRW308-D	11,7	18,8	**40**	90	23
VRE308-E	NU308-E-TVP2-C3	NU308-E-TVP2-C3 + 6308-C3	VR308-E	VRW308-C	11,7	19,2	**40**	90	23
VRE308-F	6308-C3	6308-C3	VR308-F	VRW308-F	10,9	18	**40**	90	23
VRE309-A	6309-C3	6309-C3	VR309-A	VRW309-A	14,9	24,3	**45**	100	25
VRE309-B	NJ309-E-TVP2	6309-C3	VR309-A	VRW309-A	14,9	24,4	**45**	100	25
VRE309-C	NU309-E-TVP2-C3	2X7309-B-TVP-UA	VR309-C	VRW309-C	15,3	25,3	**45**	100	25
VRE309-D	NU309-E-TVP2-C3	6309-C3	VR309-D	VRW309-D	15,3	24,8	**45**	100	25
VRE309-E	NU309-E-TVP2-C3	NU309-E-TVP2-C3 + 6309-C3	VR309-E	VRW309-C	15,3	25,3	**45**	100	25
VRE309-F	6309-C3	6309-C3	VR309-F	VRW309-F	14,9	24,2	**45**	100	25



VRE3..-A

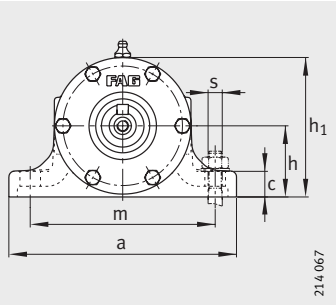


VRE..-B

a	g_2	h_1	d_2	d_4	w_2	w_3	w_4	w_5	w_6	w_7	e	b	n	m	c	h	s
155	198	87	35	19	–	40	90,5	117	298	–	148	35	135	120	16	45	M12
155	198	87	35	19	–	40	90,5	117	298	–	149	35	135	120	16	45	M12
155	198	87	35	19	40	42	90	101	298	107	140,5	35	135	120	16	45	M12
155	198	87	35	19	40	42	90	118	298	–	149	35	135	120	16	45	M12
155	198	87	35	19	40	42	90	101	298	107	132	35	135	120	16	45	M12
155	198	87	35	19	–	40	91,25	116,25	298	90,5	147,25	35	135	120	16	45	M12
160	225	98	40	24	–	50	102,5	140	345	–	173	40	150	130	18	50	M12
160	225	98	40	24	–	50	102,5	140	345	–	174	40	150	130	18	50	M12
160	225	98	40	24	50	52	104	122	349	123	164,5	40	150	130	18	50	M12
160	225	98	40	24	50	52	104	141	349	–	174	40	150	130	18	50	M12
160	225	98	40	24	50	52	104	122	349	123	155	40	150	130	18	50	M12
160	225	98	40	24	–	50	103,25	139,25	345	102,5	172,25	40	150	130	18	50	M12
190	255	113	45	28	–	60	117,5	160	395	–	197	45	175	150	18	60	M12
190	255	113	45	28	–	60	117,5	160	395	–	198	45	175	150	18	60	M12
190	255	113	45	28	60	62	119	140	399	140	187,5	45	175	150	18	60	M12
190	255	113	45	28	60	62	119	161	399	–	198	45	175	150	18	60	M12
190	255	113	45	28	60	62	119	140	399	140	177	45	175	150	18	60	M12
190	255	113	45	28		60	118,5	159	395	117,5	196	45	175	150	18	60	M12
190	317	118	50	32	–	80	143,5	214	501	–	257	52	225	150	20	60	M12
190	317	118	50	32	–	80	143,5	214	501	–	258	52	225	150	20	60	M12
190	317	118	50	32	80	82	143	192	501	166	246,5	52	225	150	20	60	M12
190	317	118	50	32	80	82	143	215	501	–	258	52	225	150	20	60	M12
190	317	118	50	32	80	82	143	192	501	166	235	52	225	150	20	60	M12
190	317	118	50	32	–	80	144,5	213	501	143,5	256	52	225	150	20	60	M12
210	343	135	55	38	–	80	145,5	236	527	–	281	52	250	170	22	70	M12
210	343	135	55	38	–	80	145,5	236	527	–	282	52	250	170	22	70	M12
210	343	135	55	38	80	82	145	212	527	170	269,5	52	250	170	22	70	M12
210	343	135	55	38	80	82	145	237	527	–	282	52	250	170	22	70	M12
210	343	135	55	38	80	82	145	212	527	170	257	52	250	170	22	70	M12
210	343	135	55	38	–	80	146,5	235	527	145,5	280	52	250	170	22	70	M12

Plummer block housing units

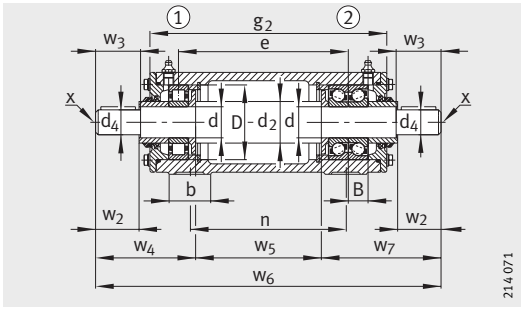
VRE3, unsplit
With bearings and shaft



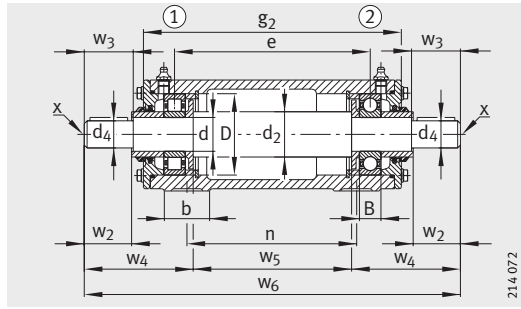
Cross-sections of designs A, B, page 1431, designs E, F, page 1435

Dimension table (continued) · Dimensions in mm

Designation					Mass m		Dimensions		
Bearing unit	Bearing ①	Bearing ②	Housing	Shaft Complete	Housing ≈kg	Unit ≈kg	d	D	B
VRE310-A	6310-C3	6310-C3	VR310-A	VRW310-A	17,3	30,3	**50**	110	27
VRE310-B	NJ310-E-TVP2	6310-C3	VR310-A	VRW310-A	17,3	30,3	**50**	110	27
VRE310-C	NU310-E-TVP2-C3	2X7310-B-TVP-UA	VR310-C	VRW310-C	17,9	31,7	**50**	110	27
VRE310-D	NU310E-TVP2-C3	6310-C3	VR310-D	VRW310-D	17,9	30,9	**50**	110	27
VRE310-E	NU310-E-TVP2-C3	NU310-E-TVP2-C3 + 6310-C3	VR310-E	VRW310-C	17,9	31,8	**50**	110	27
VRE310-F	6310-C3	6310-C3	VR310-F	VRW310-F	17,3	30,3	**50**	110	27
VRE311-A	6311-C3	6311-C3	VR311-A	VRW311-A	22	38,6	**55**	120	29
VRE311-B	NJ311-E-TVP2	6311-C3	VR311-A	VRW311-A	22	38,7	**55**	120	29
VRE311-C	NU311-E-TVP2-C3	2X7311-B-TVP-UA	VR311-C	VRW311-C	22,5	40,2	**55**	120	29
VRE311-D	NU311-E-TVP2-C3	6311-C3	VR311-D	VRW311-D	22,5	39,2	**55**	120	29
VRE311-E	NU311-E-TVP2-C3	NU311-E-TVP2-C3 + 6311-C3	VR311-E	VRW311-C	22,5	40,2	**55**	120	29
VRE311-F	6311-C3	6311-C3	VR311-F	VRW311-F	22	38,6	**55**	120	29
VRE312-A	6312-C3	6312-C3	VR312-A	VRW312-A	30,7	51,2	**60**	130	31
VRE312-B	NJ312-E-TVP2	6312-C3	VR312-A	VRW312-A	30,7	51,4	**60**	130	31
VRE312-C	NU312-E-TVP2-C3	2X7312-B-TVP-UA	VR312-C	VRW312-C	31,7	53,8	**60**	130	31
VRE312-D	NU312-E-TVP2-C3	6312-C3	VR312-D	VRW312-D	31,7	52,4	**60**	130	31
VRE312-E	NU312-E-TVP2-C3	NU312-E-TVP2-C3 + 6312-C3	VR312-E	VRW312-C	31,7	53,7	**60**	130	31
VRE312-F	6312-C3	6312-C3	VR312-F	VRW312-F	30,7	51,1	**60**	130	31
VRE313-A	6313-C3	6313-C3	VR313-A	VRW313-A	32,8	58	**65**	140	33
VRE313-B	NJ313-E-TVP2	6313-C3	VR313-A	VRW313-A	32,8	58,2	**65**	140	33
VRE313-C	NU313-E-TVP2-C3	2X7313-B-TVP-UA	VR313-C	VRW313-C	33,8	60,8	**65**	140	33
VRE313-D	NU313-E-TVP2-C3	6313-C3	VR313-D	VRW313-D	33,8	59,3	**65**	140	33
VRE313-E	NU313-E-TVP2-C3	NU313-E-TVP2-C3 + 6313-C3	VR313-E	VRW313-C	33,8	60,8	**65**	140	33
VRE313-F	6313-C3	6313-C3	VR313-F	VRW313-F	32,8	58	**65**	140	33
VRE314-A	6314-C3	6314-C3	VR314-A	VRW314-A	35	66,9	**70**	150	35
VRE314-B	NJ314-E-TVP2	6314-C3	VR314-A	VRW314-A	35	67,1	**70**	150	35
VRE314-C	NU314-E-TVP2-C3	2X7314-B-TVP-UA	VR314-C	VRW314-C	36	70,4	**70**	150	35
VRE314-D	NU314-E-TVP2-C3	6314-C3	VR314-D	VRW314-D	36	68	**70**	150	35
VRE314-E	NU314-E-TVP2-C3	NU314-E-TVP2-C3 + 6314-C3	VR314-E	VRW314-C	36	70,6	**70**	150	35
VRE314-F	6314-C3	6314-C3	VR314-F	VRW314-F	35	66,8	**70**	150	35



VRE3..-C

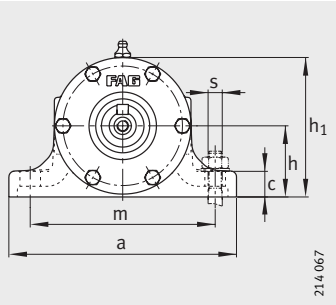


VRE3..-D

a	g_2	h_1	d_2	d_4	w_2	w_3	w_4	w_5	w_6	w_7	e	b	n	m	c	h	s
210	381	138	60	42	–	110	179,5	266	625	–	313	60	275	170	25	70	M12
210	381	138	60	42	–	110	179,5	266	625	–	314	60	275	170	25	70	M12
210	381	138	60	42	110	112	179	240	625	206	300,5	60	275	170	25	70	M12
210	381	138	60	42	110	112	179	267	625	–	314	60	275	170	25	70	M12
210	381	138	60	42	110	112	179	240	625	206	287	60	275	170	25	70	M12
210	381	138	60	42	–	110	180,5	265	625	179,5	312	60	275	170	25	70	M12
260	407	158	65	48	–	110	181,5	288	651	–	337	60	300	210	25	80	M16
260	407	158	65	48	–	110	181,5	288	651	–	338	60	300	210	25	80	M16
260	407	158	65	48	110	112	181	260	651	210	323,5	60	300	210	25	80	M16
260	407	158	65	48	110	112	181	289	651	–	338	60	300	210	25	80	M16
260	407	158	65	48	110	112	181	260	651	210	309	60	300	210	25	80	M16
260	407	158	65	48	–	110	182,5	287	651	181,5	336	60	300	210	25	80	M16
260	457	162	70	48	–	110	183,5	334	701	–	385	70	340	210	25	80	M16
260	457	162	70	48	–	110	183,5	334	701	–	386	70	340	210	25	80	M16
260	457	162	70	48	110	112	185,5	304	706	216,5	370,5	70	340	210	25	80	M16
260	457	162	70	48	110	112	185,5	335	706	–	386	70	340	210	25	80	M16
260	457	162	70	48	110	112	185,5	304	706	216,5	355	70	340	210	25	80	M16
260	457	162	70	48	–	110	184,5	333	701	183,5	384	70	340	210	25	80	M16
290	480	183	75	55	–	110	187,5	349	724	–	404	70	360	230	25	95	M16
290	480	183	75	55	–	110	187,5	349	724	–	405	70	360	230	25	95	M16
290	480	183	75	55	110	112	189,5	317	729	222,5	388,5	70	360	230	25	95	M16
290	480	183	75	55	110	112	189,5	350	729	–	405	70	360	230	25	95	M16
290	480	183	75	55	110	112	189,5	317	729	222,5	372	70	360	230	25	95	M16
290	480	183	75	55	–	110	189	347,5	724	187,5	402,5	70	360	230	25	95	M16
290	500	188	80	60	–	140	223	365	811	–	422	70	380	230	25	95	M16
290	500	188	80	60	–	140	223	365	811	–	423	70	380	230	25	95	M16
290	500	188	80	60	140	143	222,5	331	811	257,5	405,5	70	380	230	25	95	M16
290	500	188	80	60	140	143	222,5	366	811	–	423	70	380	230	25	95	M16
290	500	188	80	60	140	143	222,5	331	811	257,5	388	70	380	230	25	95	M16
290	500	188	80	60	–	140	224,5	363,5	811	223	420,5	70	380	230	25	95	M16

Plummer block housing units

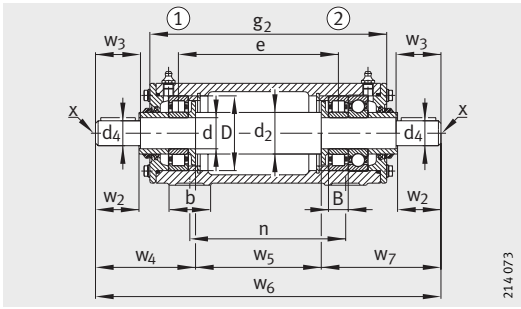
VRE3, unsplit
With bearings and shaft



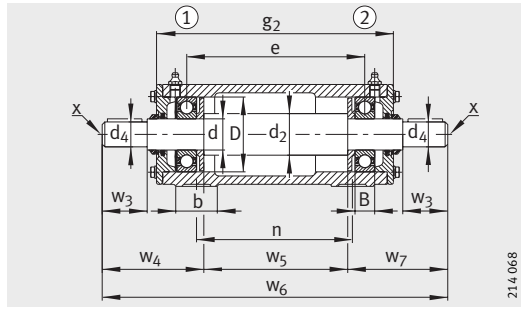
Cross-sections of
designs A, B, page 1431,
designs C, D, page 1433

Dimension table (continued) · Dimensions in mm

Designation					Mass m		Dimensions		
Bearing unit	Bearing ①	Bearing ②	Housing	Shaft Complete	Housing ≈kg	Unit ≈kg	d	D	B
VRE315-A	6315-C3	6315-C3	VR315-A	VRW315-A	44,8	84,8	**75**	160	37
VRE315-B	NJ315-E-TVP2	6315-C3	VR315-A	VRW315-A	44,8	85	**75**	160	37
VRE315-C	NU315-E-TVP2-C3	2X7315-B-TVP-UA	VR315-C	VRW315-C	46,4	89,3	**75**	160	37
VRE315-D	NU315-E-TVP2-C3	6315-C3	VR315-D	VRW315-D	46,4	86,4	**75**	160	37
VRE315-E	NU315-E-TVP2-C3	NU315-E-TVP2-C3 + 6315-C3	VR315-E	VRW315-C	46,4	89,4	**75**	160	37
VRE315-F	6315-C3	6315-C3	VR315-F	VRW315-F	44,8	84,8	**75**	160	37
VRE316-A	6316-C3	6316-C3	VR316-A	VRW316-A	44	90,8	**80**	170	39
VRE316-B	NJ316-E-TVP2	6316-C3	VR316-A	VRW316-A	44	91	**80**	170	39
VRE316-C	NU316-E-TVP2-C3	2X7316-B-TVP-UA	VR316-C	VRW316-C	45	96,2	**80**	170	39
VRE316-D	NU316-E-TVP2-C3	6316-C3	VR316-D	VRW316-D	45	91,9	**80**	170	39
VRE316-E	NU316-E-TVP2-C3	NU316-E-TVP2-C3 + 6316-C3	VR316-E	VRW316-C	45	95,3	**80**	170	39
VRE316-F	6316-C3	6316-C3	VR316-F	VRW316-F	44	90,8	**80**	170	39
VRE317-A	6317-C3	6317-C3	VR317-A	VRW317-A	59,2	114	**85**	180	41
VRE317-B	NJ317-E-TVP2	6317-C3	VR317-A	VRW317-A	59,2	115	**85**	180	41
VRE317-C	NU317-E-TVP2-C3	2X7317-B-TVP-UA	VR317-C	VRW317-C	60	120	**85**	180	41
VRE317-D	NU317-E-TVP2-C3	6317-C3	VR317-D	VRW317-D	60	115	**85**	180	41
VRE317-E	NU317-E-TVP2-C3	NU317-E-TVP2-C3 + 6317-C3	VR317-E	VRW317-C	60	120	**85**	180	41
VRE318-A	6318-C3	6318-C3	VR318-A	VRW318-A	62	128	**90**	190	43
VRE318-B	NJ318-E-TVP2	6318-C3	VR318-A	VRW318-A	62	128	**90**	190	43
VRE318-C	NU318-E-TVP2-C3	2X7318-B-TVP-UA	VR318-C	VRW318-C	63	134	**90**	190	43
VRE318-D	NU318-E-TVP2-C3	6318-C3	VR318-D	VRW318-D	63	129	**90**	190	43
VRE318-E	NU318-E-TVP2-C3	NU318-E-TVP2-C3 + 6318-C3	VR318-E	VRW318-C	63	134	**90**	190	43
VRE319-A	6319-C3	6319-C3	VR319-A	VRW319-A	84,1	156	**95**	200	45
VRE319-B	NJ319-E-TVP2	6319-C3	VR319-A	VRW319-A	84,1	157	**95**	200	45
VRE319-C	NU319-E-TVP2-C3	2X7319-B-TVP-UA	VR319-C	VRW319-C	86	164	**95**	200	45
VRE319-D	NU319-E-TVP2-C3	6319-C3	VR319-D	VRW319-D	86	158	**95**	200	45
VRE319-E	NU319-E-TVP2-C3	NU319-E-TVP2-C3 + 6319-C3	VR319-E	VRW319-C	86	164	**95**	200	45
VRE320-A	6320-C3	6320-C3	VR320-A	VRW320-A	90	177	**100**	215	47
VRE320-B	NJ320-E-TVP2	6320-C3	VR320-A	VRW320-A	90	177	**100**	215	47
VRE320-C	NU320-E-TVP2-C3	2X7320-B-TVP-UA	VR320-C	VRW320-C	92	186	**100**	215	47
VRE320-D	NU320-E-TVP2-C3	6320-C3	VR320-D	VRW320-D	92	179	**100**	215	47
VRE320-E	NU320-E-TVP2-C3	NU320-E-TVP2-C3 + 6320-C3	VR320-E	VRW320-C	92	186	**100**	215	47



VRE3..-E

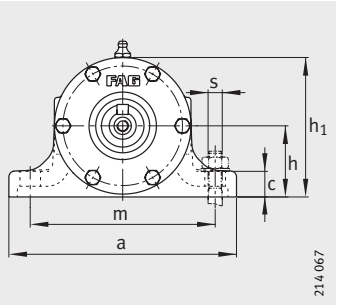


VRE3..-F

a	g_2	h_1	d_2	d_4	w_2	w_3	w_4	w_5	w_6	w_7	e	b	n	m	c	h	s
320	530	198	90	65	–	140	226	389	841	–	450	80	400	260	30	100	M16
320	530	198	90	65	–	140	226	389	841	–	451	80	400	260	30	100	M16
320	530	198	90	65	140	143	225,5	353	841	262,5	432,5	80	400	260	30	100	M16
320	530	198	90	65	140	143	225,5	390	841	–	451	80	400	260	30	100	M16
320	530	198	90	65	140	143	225,5	353	841	262,5	414	80	400	260	30	100	M16
320	530	198	90	65	–	140	227,5	387,5	841	226	448,5	80	400	260	30	100	M16
320	550	217	95	70	–	140	228	405	861	–	468	80	420	260	30	112	M16
320	550	217	95	70	–	140	228	405	861	–	469	80	420	260	30	112	M16
320	550	217	95	70	140	143	227,5	367	861	266,5	449,5	80	420	260	30	112	M16
320	550	217	95	70	140	143	227,5	406	861	–	469	80	420	260	30	112	M16
320	550	217	95	70	140	143	227,5	367	861	266,5	430	80	420	260	30	112	M16
320	550	217	95	70	–	140	229,5	403,5	861	228	466,5	80	420	260	30	112	M16
350	570	222	100	75	–	140	230	421	881	–	486	80	440	290	30	112	M16
350	570	222	100	75	–	140	230	421	881	–	487	80	440	290	30	112	M16
350	570	222	100	75	140	143	229,5	381	881	270,5	466,5	80	440	290	30	112	M16
350	570	222	100	75	140	143	229,5	422	881	–	487	80	440	290	30	112	M16
350	570	222	100	75	140	143	229,5	381	881	270,5	446	80	440	290	30	112	M16
350	600	227	105	80	–	170	263	445	971	–	510	85	460	290	30	112	M16
350	600	227	105	80	–	170	263	445	971	–	511	85	460	290	30	112	M16
350	600	227	105	80	170	173	264,5	403	975	307,5	489,5	85	460	290	30	112	M16
350	600	227	105	80	170	173	264,5	446	975	–	511	85	460	290	30	112	M16
350	600	227	105	80	170	173	264,5	403	975	307,5	468	85	460	290	30	112	M16
400	633	248	110	85	–	170	267,5	469	1 004	–	540	90	480	320	35	125	M20
400	633	248	110	85	–	170	267,5	469	1 004	–	541	90	480	320	35	125	M20
400	633	248	110	85	170	173	269	425	1 008	314	518,5	90	480	320	35	125	M20
400	633	248	110	85	170	173	269	470	1 008	–	541	90	480	320	35	125	M20
400	633	248	110	85	170	173	269	425	1 008	314	496	90	480	320	35	125	M20
400	665	260	120	90	–	170	268	500	1 036	–	570	95	500	320	40	130	M20
400	665	260	120	90	–	170	268	500	1 036	–	571	95	500	320	40	130	M20
400	665	260	120	90	170	173	269,5	454	1 040	316,5	547,5	95	500	320	40	130	M20
400	665	260	120	90	170	173	269,5	501	1 040	–	571	95	500	320	40	130	M20
400	665	260	120	90	170	173	269,5	454	1 040	316,5	524	95	500	320	40	130	M20

Plummer block housing units

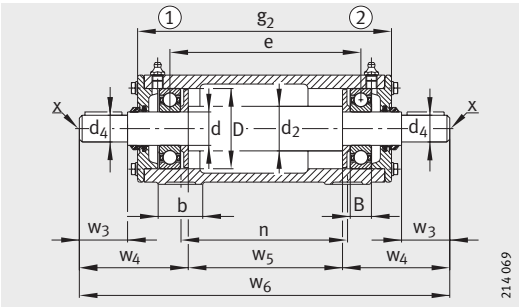
VRE3, unsplit
With bearings and shaft



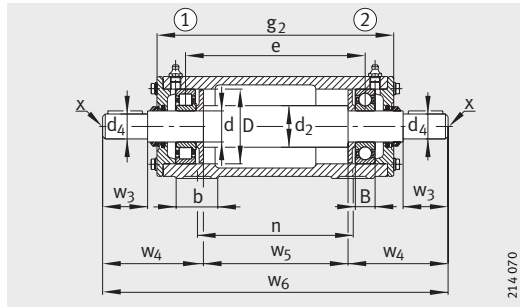
Cross-sections of designs C, D, page 1433, design E, page 1435

Dimension table (continued) · Dimensions in mm

Designation					Mass m		Dimensions		
Bearing unit	Bearing ①	Bearing ②	Housing	Shaft Complete	Housing ≈kg	Unit ≈kg	d	D	B
VRE322-A	6322-C3	6322-C3	VR322-A	VRW322-A	130	226	**110**	240	50
VRE322-B	NJ322-E-TVP2	6322-C3	VR322-A	VRW322-A	130	226	**110**	240	50
VRE322-C	NU322-E-TVP2-C3	2X7322-B-TVP-UA	VR322-C	VRW322-C	132	238	**110**	240	50
VRE322-D	NU322-E-TVP2-C3	6322-C3	VR322-D	VRW322-D	132	228	**110**	240	50
VRE322-E	NU322-E-TVP2-C3	NU322-E-TVP2-C3 + 6322-C3	VR322-E	VRW322-C	132	238	**110**	240	50
VRE324-A	6324-C3	6324-C3	VR324-A	VRW324-A	170	276	**120**	260	55
VRE324-B	NJ324-E-TVP2	6324-C3	VR324-A	VRW324-A	170	277	**120**	260	55
VRE324-C	NU324-E-TVP2-C3	2X7324-B-TVP-UA	VR324-C	VRW324-C	172	294	**120**	260	55
VRE324-D	NU324-E-TVP2-C3	6324-C3	VR324-D	VRW324-D	172	278	**120**	260	55
VRE324-E	NU324-E-TVP2-C3	NU324-E-TVP2-C3 + 6324-C3	VR324-E	VRW324-C	172	291	**120**	260	55



VRE3..-A

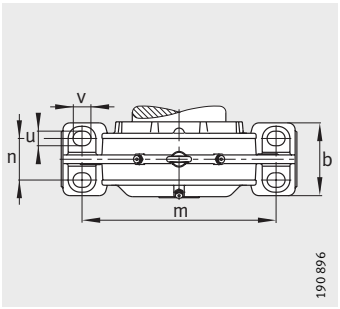


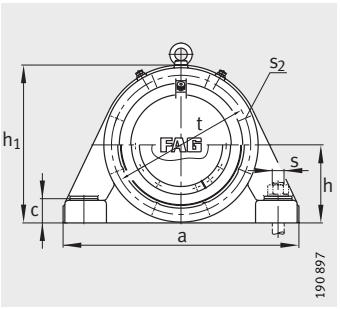
VRE3..-B

a	g_2	h_1	d_2	d_4	w_2	w_3	w_4	w_5	w_6	w_7	e	b	n	m	c	h	s
450	678	295	130	100	–	210	313	507	1 133	–	580	95	520	380	40	150	M24
450	678	295	130	100	–	210	313	507	1 133	–	581	95	520	380	40	150	M24
450	678	295	130	100	210	213	312,5	458	1 133	362,5	556	95	520	380	40	150	M24
450	678	295	130	100	210	213	312,5	508	1 133	–	581	95	520	380	40	150	M24
450	678	295	130	100	210	213	312,5	458	1 133	362,5	531	95	520	380	40	150	M24
500	705	320	140	110	–	210	318	524	1 160	–	602	100	540	410	40	160	M24
500	705	320	140	110	–	210	318	524	1 160	–	603	100	540	410	40	160	M24
500	705	320	140	110	210	213	317,5	470	1 160	372,5	575,5	100	540	410	40	160	M24
500	705	320	140	110	210	213	317,5	525	1 160	–	603	100	540	410	40	160	M24
500	705	320	140	110	210	213	317,5	470	1 160	372,5	548	100	540	410	40	160	M24

Plummer block housings

BND, unsplit
For spherical roller bearings



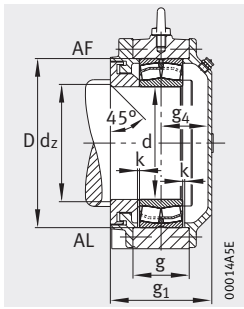


Cross-section of BND housings for bearings with tapered bore:
see page 1441 to page 1443

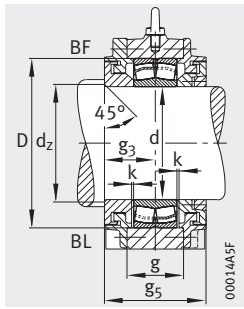
Dimension table · Dimensions in mm

Designation[1]			Mass m	Dimensions									
Housing	Bearing	Adapter sleeve	Housing ≈kg	d	d_1	a	g_1	h_1	b	c	D	d_c min.	d_z min.
BND2213	22213-	H313	23	**65**	60	235	100	155	70	22	120	66	71
BND2215	22215-	H315	15	**75**	65	285	105	180	85	35	130	71	81
BND2218	22218-	H318	28	**90**	80	370	104	220	110	38	160	88	98
BND2220	22220-	H320	30	**100**	90	400	141	255	120	40	180	98	108
BND2222	22222-	H322	50	**110**	100	440	149,2	280	130	42	200	108	118
BND3122	23122-	H3122	40	**110**	100	400	146	263	140	40	180	108	118
BND3222	23222-	H2322	35	**110**	100	440	166	280	130	42	200	108	118
BND2224	22224-	H3124	58	**120**	110	470	143	300	140	42	215	118	128
BND3024	23024-	H3024	20	**120**	110	370	126	230	110	35	180	118	128
BND3124	23124-	H3124	50	**120**	110	410	160	280	150	40	200	118	128
BND3224	23224-	H2324	40	**120**	110	470	161	300	140	42	215	118	128
BND2226	22226-	H3126	65	**130**	115	500	172	315	150	45	230	127	142
BND3026	23026-	H3026	30	**130**	115	410	133	260	120	38	200	123	138
BND3126	23126-	H3126	55	**130**	115	430	165	295	150	40	210	123	138
BND3226	23226-	H2326	50	**130**	115	500	188	315	150	45	230	127	142
BND2228	22228-	H3128	70	**140**	125	530	166	345	160	50	250	137	152
BND3028	23028-	H3028	35	**140**	125	430	136	275	130	40	210	133	148
BND3128	23128-	H3128	60	**140**	125	470	170	315	160	45	225	133	148
BND3228	23228-	H2328	65	**140**	125	530	186	345	160	50	250	137	152
BND2230	22230-	H3130	85	**150**	135	550	177	365	170	54	270	147	162
BND3030	23030-	H3030	40	**150**	135	455	149	290	140	42	225	143	158
BND3130	23130-	H3130	70	**150**	135	580	186	345	200	60	250	143	158
BND3230	23230-	H2330	75	**150**	135	550	200	365	170	54	270	147	162
BND2232	22232-	H3132	100	**160**	140	600	189	385	180	58	290	152	172
BND3032	23032-	H3032	45	**160**	140	480	156	310	150	45	240	148	168
BND3132	23132-	H3132	80	**160**	140	540	200	360	200	55	270	148	168
BND3232	23232-	H2332	90	**160**	140	600	213	385	180	58	290	152	172
BND2234	22234-	H3134	105	**170**	150	640	216	405	200	62	310	166	186
BND3034	23034-	H3034	70	**170**	150	510	166	330	160	50	260	158	178
BND3134	23134-	H3134	100	**170**	150	570	215	380	200	55	280	158	178
BND3234	23234-	H2334	120	**170**	150	640	240	405	200	62	310	166	186

[1] Ordering example:
Housing BND3030-Z-Y-BL-S (see also page 1345), bearing 23030-E1-TVPB (see bearing tables).

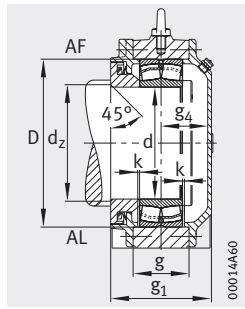


Design A

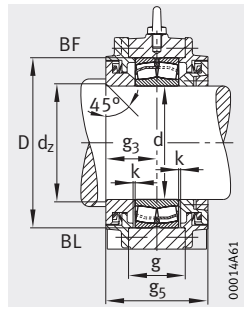


Design B

Housings with labyrinth seal
for bearings with cylindrical bore



Design A



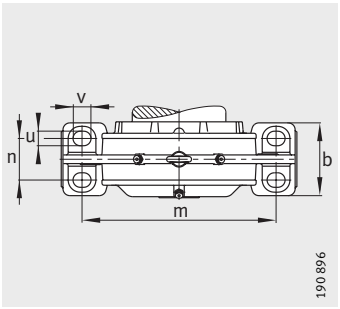
Design B

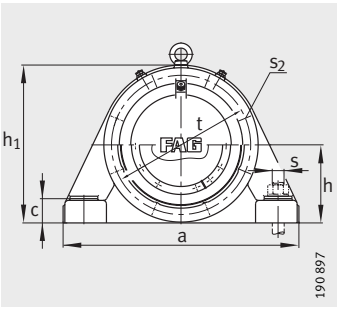
Housings with Taconite seal
for bearings with cylindrical bore

g	g_2	g_3	g_4 min.	g_5	h	k	m	n	u	v	s	t	s_2	s_2 Quantity
44	120	55	39	110	80	2	185	40	15	20	M10	135	M6	6
45	125	55	44	110	90	2	225	45	20	28	M16	155	M6	6
55	123	53	45	106	110	2	290	60	23	32	M20	185	M8	6
65	168	78	57	156	130	2,5	320	65	30	35	M24	205	M8	6
73	172	82,6	60	165,2	140	2,5	350	70	30	35	M24	230	M12	6
80	171	78	62	156	130	2,5	300	80	25	35	M20	215	M12	8
89,8	194	91	68	182	140	2,5	350	70	30	35	M24	230	M12	6
77	168	74	61	148	150	2,5	370	75	30	35	M24	245	M12	6
60	146	63	57	126	115	2,5	300	60	25	35	M20	205	M8	8
85	180	80	74	160	140	2,5	330	80	25	35	M20	235	M12	8
95	186	83	70	166	150	2,5	370	75	30	35	M24	245	M12	6
84	202	95	69	190	160	3	400	85	30	35	M24	260	M12	6
70	156	68	59	136	130	2	340	60	25	35	M20	225	M10	8
90	190	85	72	170	145	3	350	80	25	35	M20	245	M12	8
100	218	103	77	206	160	3	400	85	30	35	M24	260	M12	6
88	196	88	70	176	170	3	430	85	30	35	M24	285	M16	6
70	156	68	61	136	140	3	360	70	30	35	M24	240	M10	8
95	190	85	77	170	155	3	380	85	25	35	M20	270	M12	8
108	216	98	80	196	170	3	430	85	30	35	M24	285	M16	6
97	202	93,5	76	187	180	3	450	90	36	45	M30	305	M16	6
80	176	78	64	156	145	2	370	80	30	35	M24	250	M12	8
102	206	93	85	186	170	2	450	110	30	35	M24	285	M12	8
120	225	105	87	210	180	3	450	90	36	45	M30	305	M16	6
106	226	103	78	206	190	3	490	105	36	45	M30	330	M16	6
85	181	78	71	156	155	3	390	90	30	35	M24	265	M12	8
110	230	105	87	210	180	3	430	110	30	35	M24	310	M16	6
130	250	115	90	230	190	3	490	105	36	45	M30	330	M16	6
111	256	118	88	236	200	3	525	110	36	45	M30	350	M16	8
90	191	83	75	166	165	2	420	95	36	45	M30	285	M12	8
120	250	115	90	230	190	3	470	110	36	45	M30	330	M12	8
135	280	130	100	260	200	3	525	110	36	45	M30	350	M16	8

Plummer block housings

BND, unsplit
For spherical roller bearings



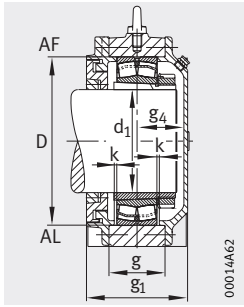


Cross-section of BND housings for bearings with cylindrical bore: see page 1439

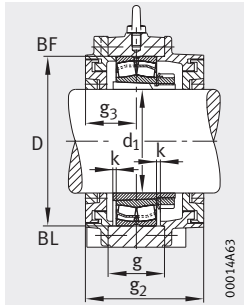
Dimension table (continued) · Dimensions in mm

Designation[1]			Mass m	Dimensions									
Housing	Bearing	Adapter sleeve	Housing ≈kg	d	d_1	a	g_1	h_1	b	c	D	d_c min.	d_z min.
BND2236	22236-	H3136	130	**180**	160	680	214	425	210	65	320	176	196
BND3036	23036-	H3036	70	**180**	160	540	176	360	170	52	280	168	188
BND3136	23136-	H3136	110	**180**	160	600	220	395	200	58	300	172	192
BND3236	23236-	H2336	140	**180**	160	680	240	425	210	65	320	176	196
BND2238	22238-	H3138	170	**190**	170	710	222	455	220	85	340	186	206
BND3038	23038-	H3038	80	**190**	170	570	181	370	180	55	290	178	198
BND3138	23138-	H3138	125	**190**	170	680	232	425	210	65	320	182	202
BND3238	23228-	H2338	170	**190**	170	710	250	455	220	85	340	186	206
BND2240	22240-	H3140	185	**200**	180	780	230	475	240	75	360	196	216
BND3040	23040-	H3040	95	**200**	180	600	196	400	190	60	310	188	208
BND3140	23140-	H3140	170	**200**	180	710	242	455	220	85	340	192	212
BND3240	23240-	H2340	205	**200**	180	780	260	475	240	75	360	196	216
BND2244	22244-	H3144X	290	**220**	200	890	264	550	250	80	400	216	236
BND3044	23044-	H3044X	100	**220**	200	640	206	430	200	65	340	212	232
BND3144	23144-	H3144X	190	**220**	200	780	252	475	240	75	370	216	236
BND3244	23244-	H2344X	240	**220**	200	850	279	525	250	80	400	216	236
BND2248	22248-	H3148X	315	**240**	220	900	268	585	250	90	440	236	256
BND3048	23048-	H3048	130	**240**	220	680	216	455	210	70	360	232	252
BND3148	23148-	H3148X	280	**240**	220	890	284	550	250	80	400	236	256
BND3248	23248-	H2348X	330	**240**	220	900	308	585	250	90	440	236	256
BND2252	22252-	H3152X	370	**260**	240	960	286	625	290	95	480	260	280
BND3052	23052-	H3052X	160	**260**	240	720	226	500	220	75	400	256	276
BND3152	23152-	H3152X	310	**260**	240	900	292	585	250	90	440	256	276
BND3252	23252-	H2352X	380	**260**	240	960	330	625	290	95	480	260	280
BND2256	22256-	H3156X	420	**280**	260	1 000	297	645	300	100	500	280	300
BND3056	23056-	H3056	180	**280**	260	760	236	520	240	80	420	276	296
BND3156	23156-	H3156X	335	**280**	260	900	294	585	250	90	460	280	300
BND3256	23256-	H2356X	490	**280**	260	1 000	343	645	300	100	500	280	300

[1] Ordering example:
Housing BND3040-H-W-T-BL-S (see also page 1346), bearing 23040-E1-K-TVPB (see bearing tables), adapter sleeve H3040-HG (see dimension tables).

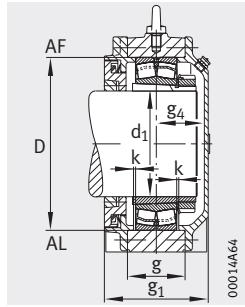


Design A

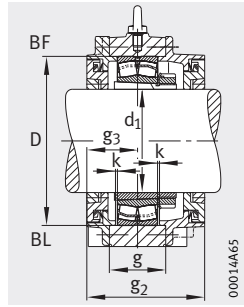


Design B

Housings with labyrinth seal
for bearings with tapered bore



Design A



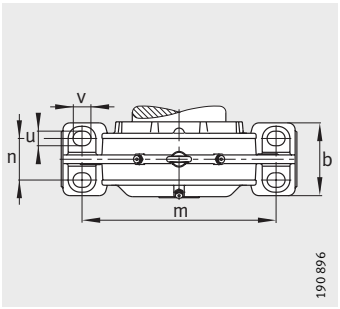
Design B

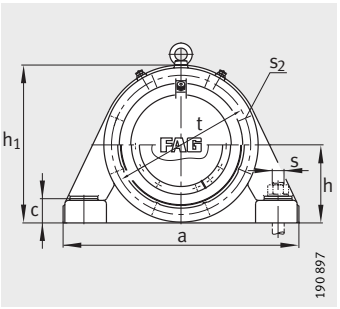
Housings with Taconite seal
for bearings with tapered bore

g	g_2	g_3	g_4 min.	g_5	h	k	m	n	u	v	s	t	s_2	s_2 Quantity
112	248	114	92	228	210	3	550	120	36	45	M30	370	M16	8
100	201	88	80	176	180	3	450	100	36	45	M30	310	M12	8
125	250	115	95	230	200	3	490	105	36	45	M30	350	M16	8
138	274	127	105	254	210	3	550	120	36	45	M30	370	M16	8
115	258	114	98	228	220	3	560	120	42	52	M36	380	M16	8
105	211	93	80	186	185	3	480	105	36	45	M30	325	M12	8
130	266	123	98	246	210	3	550	120	36	45	M30	370	M16	8
143	286	128	112	256	220	3	560	120	42	52	M36	380	M16	8
128	269	123	99	246	235	4	640	140	42	52	M36	420	M16	8
110	226	98	90	196	200	3	510	110	36	45	M30	340	M16	8
135	278	124	108	248	220	3	560	120	42	52	M36	380	M16	8
158	299	138	114	276	235	4	640	140	42	52	M36	420	M16	8
140	314	142	112	284	270	4	720	140	42	52	M36	455	M20	8
115	241	103	95	206	215	3	540	115	42	52	M36	375	M16	8
150	291	134	110	268	235	4	640	140	42	52	M36	420	M16	8
175	329	147	122	294	260	4	700	140	42	52	M36	445	M20	8
150	311	138	120	276	290	4	750	140	42	52	M36	510	M20	8
120	251	108	100	216	225	4	560	120	42	52	M36	400	M16	8
160	334	152	122	304	270	4	720	140	42	52	M36	455	M20	8
190	351	158	140	316	290	4	750	140	42	52	M36	510	M20	8
161	326	148	126	296	310	3	800	160	42	52	M36	535	M20	8
130	261	113	103	226	250	4	600	130	42	52	M36	440	M16	8
174	335	150	132	300	290	4	750	140	42	52	M36	510	M20	8
205	370	170	148	340	310	3	800	160	42	52	M36	535	M20	8
160	354	157	128	314	320	4	840	170	42	52	M36	555	M24	8
135	281	118	108	236	260	4	630	140	42	52	M36	460	M16	8
176	337	151	133	302	290	4	750	140	42	52	M36	510	M20	8
206	400	180	151	360	320	4	840	170	42	52	M36	555	M24	8

Plummer block housings

BND, unsplit
For spherical roller bearings



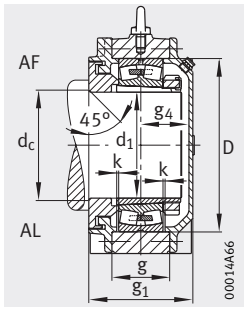


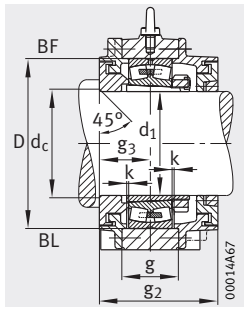
Cross-section of BND housings for bearings with cylindrical bore: see page 1439

Dimension table (continued) · Dimensions in mm

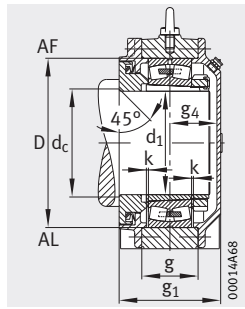
Designation[1]			Mass m	Dimensions									
Housing	Bearing	Adapter sleeve	Housing ≈kg	d	d_1	a	g_1	h_1	b	c	D	d_c min.	d_z min.
BND2260	22260-	H3160	485	**300**	280	1 100	317	695	330	105	540	300	320
BND3060	23060-	H3060	220	**300**	280	820	261	570	250	85	460	296	316
BND3160	23160-	H3160	400	**300**	280	1 000	327	645	300	100	500	300	320
BND3260	23260-	H3260	570	**300**	280	1 100	369	705	330	105	540	300	320
BND2264	22264-	H3164	600	**320**	300	1 150	333	745	360	115	580	320	340
BND3064	23064-	H3064	250	**320**	300	860	266	590	260	90	480	316	336
BND3164	23164-	H3164	500	**320**	300	1 150	359	700	300	100	540	320	340
BND3264	23264-	H3264	665	**320**	300	1 150	391	745	360	115	580	320	340
BND2268	22268-	H3168	635	**340**	320	1 200	375	790	380	125	620	344	364
BND3068	23068-	H3068	300	**340**	320	900	276	630	270	95	520	340	360
BND3168	23168-	H3168	520	**340**	320	1 150	373	745	360	115	580	340	360
BND3268	23268-	H3268	755	**340**	320	1 200	434	790	380	125	620	344	364
BND2272	22272-	H3172	690	**360**	340	1 280	375	820	400	130	650	364	384
BND3072	23072-	H3072	330	**360**	340	960	290	660	280	100	540	360	380
BND3172	23172-	H3172	600	**360**	340	1 200	400	760	370	115	600	360	380
BND3272	23272-	H3272	950	**360**	340	1 280	437	820	400	130	650	364	384
BND2276	22276-	H3176	900	**380**	360	1 350	433	865	405	135	680	384	404
BND3076	23076-	H3076	360	**380**	360	1 000	294	680	300	105	560	380	400
BND3176	23176-	H3176	720	**380**	360	1 200	404	790	380	125	620	380	400
BND3276	23276-	H3276	1 100	**380**	360	1 350	489	860	405	135	680	384	404
BND2280	22280-	H3180	940	**400**	380	1 430	433	900	450	145	720	404	424
BND3080	23080-	H3080	400	**400**	380	1 060	310	720	320	110	600	400	420
BND3180	23180-	H3180	750	**400**	380	1 280	405	820	400	130	650	404	424
BND3280	23280-	H3280	1 205	**400**	380	1 430	504	900	450	145	720	404	424
BND2284	22284-	H3184	1 055	**420**	400	1 500	433	950	470	150	760	430	450
BND3084	23084-	H3084	435	**420**	400	1 100	310	755	340	115	620	420	440
BND3184	23184-	H3184	950	**420**	400	1 350	440	900	420	135	700	424	444
BND3284	23284-	H3284	1 310	**420**	400	1 500	510	950	470	150	760	430	450

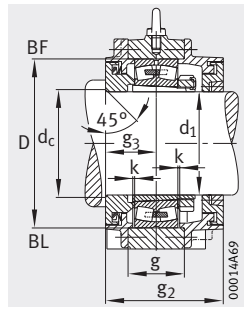
[1] Ordering example:
Housing BND3276-H-C-T-BL-S (see also page 1348), bearing 23276-B-K-MB (see bearing tables), adapter sleeve H3276-HG (see dimension tables).





Design A Design B
Housings with labyrinth seal for bearings
with tapered bore, shaft with abutment shoulder



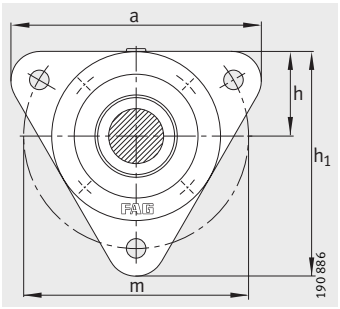


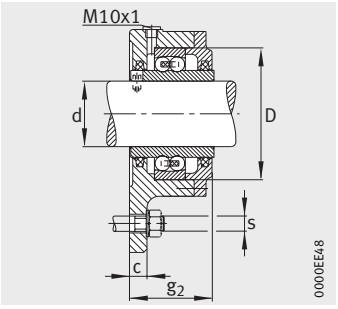
Design A Design B
Housings with Taconite seal for bearings
with tapered bore, shaft with abutment shoulder

g	g_3	g_2	g_4 min.	g_5	h	k	m	n	u	v	s	t	s_2	s_2 Quantity
178	156	352	149	312	350	4	920	180	56	75	M48	600	M24	8
140	128	296	121	256	285	4	690	150	42	52	M36	510	M16	8
190	172	384	143	344	320	4	840	170	42	52	M36	555	M24	8
230	182	404	175	364	350	4	920	180	56	75	M48	600	M24	8
180	163	381	158	326	370	5	960	200	56	75	M48	640	M24	8
150	133	311	123	266	295	4	730	160	42	52	M36	530	M16	8
210	186	412	161	372	350	4	940	160	42	52	M36	590	M24	8
238	192	439	187	384	370	5	960	200	56	75	M48	640	M24	8
201	187,5	430	176	375	390	5	990	200	64	85	M56	680	M30	8
160	133	311	132	266	315	5	770	170	42	52	M36	565	M20	8
220	183	421	178	366	370	5	960	200	56	75	M48	640	M24	8
260	217	489	205	434	390	5	990	200	64	85	M56	680	M30	8
205	185	435	178	370	410	5	1 040	210	72	90	M64	710	M30	8
170	140	325	138	280	330	5	820	180	42	52	M36	590	M20	8
225	200	450	188	400	380	4	1 000	200	56	75	M48	650	M24	8
267	216	497	209	432	410	5	1 040	210	72	90	M64	710	M30	8
230	203	470	218	406	425	5	1 100	225	72	90	M64	745	M30	8
160	142	329	141	284	340	7	840	190	56	75	M48	610	M20	8
230	202	459	190	404	390	5	1 000	200	64	85	M56	680	M30	8
295	232	529	244	464	425	5	1 100	225	72	90	M64	745	M30	8
229	216,5	498	202	433	450	5	1 160	240	72	90	M64	790	M30	8
175	150	355	145	300	360	7	900	200	56	75	M48	650	M20	8
235	200	465	193	400	410	5	1 040	210	72	90	M64	710	M30	8
300	252	569	237	504	450	5	1 160	240	72	90	M64	790	M30	8
238	216,5	498	202	433	470	5	1 220	255	72	90	M64	835	M30	8
180	150	350	149	300	375	7	940	210	56	75	M48	670	M20	8
260	210	510	215	420	450	7	1 100	210	64	85	M56	760	M30	8
315	255	575	240	510	470	5	1 220	255	72	90	M64	835	M30	8

Flanged housings

F112, unsplit
For self-aligning
ball bearings with
extended inner ring





Dimension table · Dimensions in mm

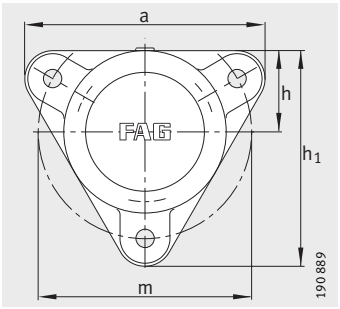
Designation				Mass m
Housing	Bearing	Felt strips		Housing
		aXbXl	Pieces	≈kg
F11204	11204-TVH	5X4X108	2	0,9
F11205	11205-TVH	5X4X120	2	1,1
F11206	11206-TVH	5X4X145	2	1,5
F11207	11207-TVH	5X4X165	2	1,9
F11208	11208-TVH	5X4X185	2	2,3
F11209	11209-TVH	5X4X197	2	3,3
F11210	11210-TVH	5X4X213	2	3,6

Dimensions

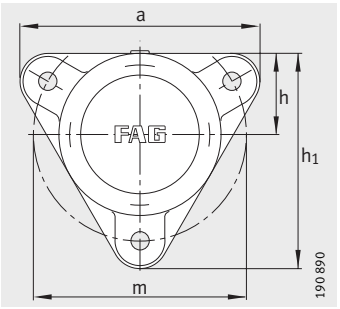
d	a	g_2	h_1	c	D	h	m	s	
								mm	inch
20	105	42	92	10	47	35	90	M10	$^3/_8$
25	110	46	100	10	52	38	96	M10	$^3/_8$
30	130	49	117	12	62	44	116	M10	$^3/_8$
35	145	54	129,5	12	72	48,5	130	M12	$^1/_2$
40	160	60	143	12	80	54	140	M12	$^1/_2$
45	180	62,5	160	15	85	60	160	M12	$^1/_2$
50	180	62,5	160	15	90	60	160	M12	$^1/_2$

Flanged housings

F5, unsplit
For bearings with
tapered bore
and adapter sleeve



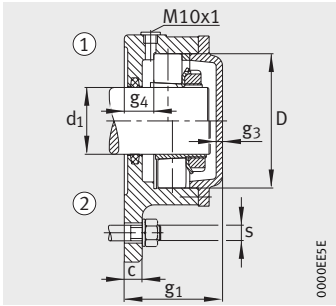
F505, F506, F508



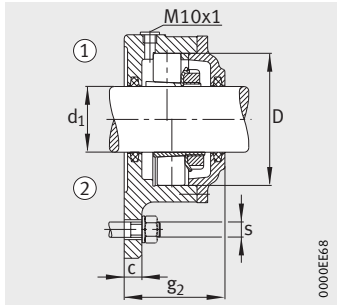
F507, F509 to F513

Dimension table · Dimensions in mm

Designation								Mass m
Housing	Bearing		Adapter sleeve	Locating ring		Felt strips		Housing
					Pieces	aXbXl	Pieces	≈kg
F505-A-L	1205-K-TVH-C3	20205-K-TVP-C3	H205	FE52/2	1	5X4X90	1	1,2
F505-B-L	1205-K-TVH-C3	20205-K-TVP-C3	H205	FE52/2	1	5X4X90	2	1,2
F505-WA-L	2205-K-TVH-C3	22205-E1-K	H305	FE52/2	1	5X4X90	1	1,2
F505-WB-L	2205-K-TVH-C3	22205-E1-K	H305	FE52/2	1	5X4X90	2	1,2
F506-A-L	1206-K-TVH-C3	20206-K-TVP-C3	H206	FE62/2	1	6X5X115	1	1,6
F506-B-L	1206-K-TVH-C3	20206-K-TVP-C3	H206	FE62/2	1	6X5X115	2	1,6
F506-WA-L	2206-K-TVH-C3	22206-E1-K	H306	FE62/2	1	6X5X115	1	1,6
F506-WB-L	2206-K-TVH-C3	22206-E1-K	H306	FE62/2	1	6X5X115	2	1,6
F507-A-L	1207-K-TVH-C3	20207-K-TVP-C3	H207	FE72/2	1	6X5X130	1	2
F507-B-L	1207-K-TVH-C3	20207-K-TVP-C3	H207	FE72/2	1	6X5X130	2	2
F507-WA-L	2207-K-TVH-C3	22207-E1-K	H307	FE72/2	1	6X5X130	1	2
F507-WB-L	2207-K-TVH-C3	22207-E1-K	H307	FE72/2	1	6X5X130	2	2
F508-A-L	1208-K-TVH-C3	20208-K-TVP-C3	H208	FE80/2	1	6X5X145	1	2,5
F508-B-L	1208-K-TVH-C3	20208-K-TVP-C3	H208	FE80/2	1	6X5X145	2	2,5
F508-WA-L	2208-K-TVH-C3	22208-E1-K	H308	FE80/2	1	6X5X145	1	2,5
F508-WB-L	2208-K-TVH-C3	22208-E1-K	H308	FE80/2	1	6X5X145	2	2,5
F509-A-L	1209-K-TVH-C3	20209-K-TVP-C3	H209	FE85/2	1	6X5X160	1	3,6
F509-B-L	1209-K-TVH-C3	20209-K-TVP-C3	H209	FE85/2	1	6X5X160	2	3,6
F509-WA-L	2209-K-TVH-C3	22209-E1-K	H309	FE85/2	1	6X5X160	1	3,6
F509-WB-L	2209-K-TVH-C3	22209-E1-K	H309	FE85/2	1	6X5X160	2	3,6
F510-A-L	1210-K-TVH-C3	20210-K-TVP-C3	H210	FE90/2	1	6X5X175	1	3,8
F510-B-L	1210-K-TVH-C3	20210-K-TVP-C3	H210	FE90/2	1	6X5X175	2	3,8
F510-WA-L	2210-K-TVH-C3	22210-E1-K	H310	FE90/2	1	6X5X175	1	3,8
F510-WB-L	2210-K-TVH-C3	22210-E1-K	H310	FE90/2	1	6X5X175	2	3,8
F511-A-L	1211-K-TVH-C3	20211-K-TVP-C3	H211	FE100/2	1	8X6,5X200	1	4,1
F511-B-L	1211-K-TVH-C3	20211-K-TVP-C3	H211	FE100/2	1	8X6,5X200	2	4,1
F511-WA-L	2211-K-TVH-C3	22211-E1-K	H311	FE100/2	1	8X6,5X200	1	4,1
F511-WB-L	2211-K-TVH-C3	22211-E1-K	H311	FE100/2	1	8X6,5X200	2	4,1
F512-A-L	1212-K-TVH-C3	20212-K-TVP-C3	H212	FE110/2	1	8X6,5X215	1	4,6
F512-B-L	1212-K-TVH-C3	20212-K-TVP-C3	H212	FE110/2	1	8X6,5X215	2	4,6
F512-WA-L	2212-K-TVH-C3	22212-E1-K	H312	FE110/2	1	8X6,5X215	1	4,6
F512-WB-L	2212-K-TVH-C3	22212-E1-K	H312	FE110/2	1	8X6,5X215	2	4,6
F513-A-L	1213-K-TVH-C3	20213-K-TVP-C3	H213	FE120/2	1	8X6,5X230	1	5,4
F513-B-L	1213-K-TVH-C3	20213-K-TVP-C3	H213	FE120/2	1	8X6,5X230	2	5,4
F513-WA-L	2213-K-TVH-C3	22213-E1-K	H313	FE120/2	1	8X6,5X230	1	5,4
F513-WB-L	2213-K-TVH-C3	22213-E1-K	H313	FE120/2	1	8X6,5X230	2	5,4



Design A
① Locating bearing
② Non-locating bearing



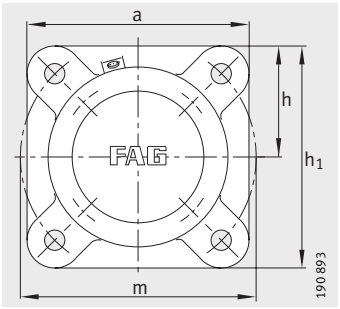
Design B
① Locating bearing
② Non-locating bearing

Dimensions

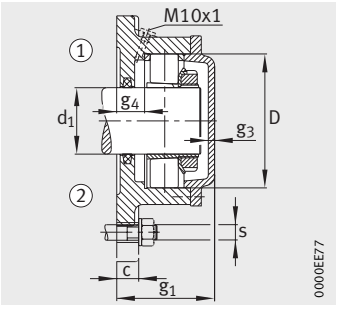
d_1	a	g_2	h_1	c	D	g_1	g_3	g_4	h	m	s	
											mm	inch
20	110	–	100	10	52	50	4	16	38	96	M10	$^3/_8$
20	110	55	100	10	52	–	–	16	38	96	M10	$^3/_8$
20	110	–	100	10	52	50	4	14,5	38	96	M10	$^3/_8$
20	110	55	100	10	52	–	–	14,5	38	96	M10	$^3/_8$
25	130	–	117	12	62	55	4	18	44	116	M10	$^3/_8$
25	130	57	117	12	62	–	–	18	44	116	M10	$^3/_8$
25	130	–	117	12	62	55	4	16	44	116	M10	$^3/_8$
25	130	57	117	12	62	–	–	16	44	116	M10	$^3/_8$
30	145	–	130	12	72	57	5	17	48,5	130	M12	$^1/_2$
30	145	60	130	12	72	–	–	17	48,5	130	M12	$^1/_2$
30	145	–	130	12	72	63	5	17	48,5	130	M12	$^1/_2$
30	145	66	130	12	72	–	–	17	48,5	130	M12	$^1/_2$
35	160	–	143	12	80	65	5	22	54	140	M12	$^1/_2$
35	160	66	143	12	80	–	–	22	54	140	M12	$^1/_2$
35	160	–	143	12	80	70	5	22	54	140	M12	$^1/_2$
35	160	71	143	12	80	–	–	22	54	140	M12	$^1/_2$
40	180	–	160	15	85	65	5	22	60	160	M12	$^1/_2$
40	180	70	160	15	85	–	–	22	60	160	M12	$^1/_2$
40	180	–	160	15	85	69	5	22	60	160	M12	$^1/_2$
40	180	74	160	15	85	–	–	22	60	160	M12	$^1/_2$
45	180	–	160	15	90	65	5	20	60	160	M12	$^1/_2$
45	180	70	160	15	90	–	–	20	60	160	M12	$^1/_2$
45	180	–	160	15	90	71	5	23	60	160	M12	$^1/_2$
45	180	76	160	15	90	–	–	23	60	160	M12	$^1/_2$
50	190	–	170	16	100	71	6	23	65	170	M12	$^1/_2$
50	190	76	170	16	100	–	–	23	65	170	M12	$^1/_2$
50	190	–	170	16	100	77	6	25	65	170	M12	$^1/_2$
50	190	82	170	16	100	–	–	25	65	170	M12	$^1/_2$
55	206	–	185	16	110	73	6	24	70	180	M12	$^1/_2$
55	206	78	185	16	110	–	–	24	70	180	M12	$^1/_2$
55	206	–	185	16	110	79	6	24	70	180	M12	$^1/_2$
55	206	84	185	16	110	–	–	24	70	180	M12	$^1/_2$
60	219	–	198	16	120	75	6	24	75	190	M12	$^1/_2$
60	219	79	198	16	120	–	–	24	75	190	M12	$^1/_2$
60	219	–	198	16	120	83	6	24	75	190	M12	$^1/_2$
60	219	87	198	16	120	–	–	24	75	190	M12	$^1/_2$

Flanged housings

F5, unsplit
For bearings with
tapered bore
and adapter sleeve



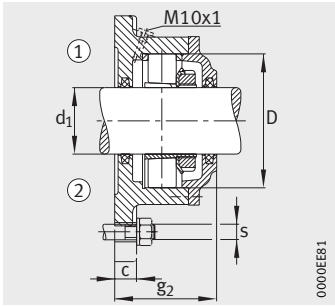
F515 to F522



Design A
① Locating bearing
② Non-locating bearing

Dimension table (continued) · Dimensions in mm

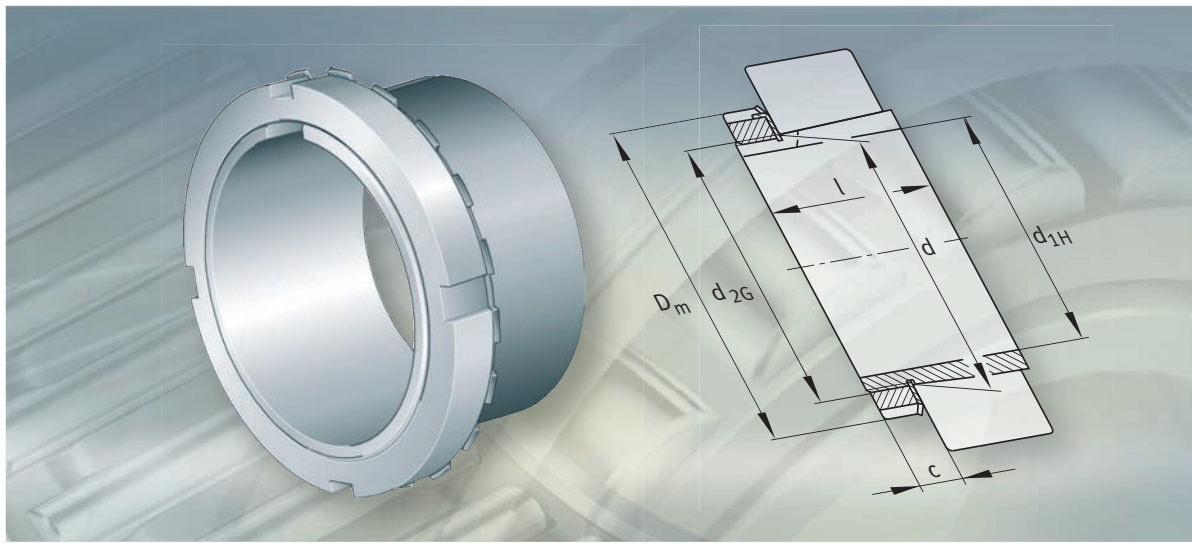
Designation								Mass m
Housing	Bearing		Adapter sleeve	Locating ring		Felt strips		Housing
					Pieces	aXbXl	Pieces	≈kg
F515-A-L	1215-K-TVH-C3	20215-K-TVP-C3	H215	FRM130/8	2	8X6,5X245	1	9,5
F515-A-L	2215-K-TVH-C3	22215-E1-K	H315	FRM130/10	1	8X6,5X245	1	9,5
F515-B-L	1215-K-TVH-C3	20215-K-TVP-C3	H215	FRM130/8	2	8X6,5X245	2	9,5
F515-B-L	2215-K-TVH-C3	22215-E1-K	H315	FRM130/10	1	8X6,5X245	2	9,5
F516-A-L	1216-K-TVH-C3	20216-K-TVP-C3	H216	FRM140/8,5	2	9X7,5X270	1	10
F516-A-L	2216-K-TVH-C3	22216-E1-K	H316	FRM140/10	1	9X7,5X270	1	10
F516-B-L	1216-K-TVH-C3	20216-K-TVP-C3	H216	FRM140/8,5	2	9X7,5X270	2	10
F516-B-L	2216-K-TVH-C3	22216-E1-K	H316	FRM140/10	1	9X7,5X270	2	10
F517-A-L	1217-K-TVH-C3	20217-K-MB-C3	H217	FRM150/9	2	9X7,5X285	1	12
F517-A-L	2217-K-M-C3	22217-E1-K	H317	FRM150/10	1	9X7,5X285	1	12
F517-B-L	1217-K-TVH-C3	20217-K-MB-C3	H217	FRM150/9	2	9X7,5X285	2	12
F517-B-L	2217-K-M-C3	22217-E1-K	H317	FRM150/10	1	9X7,5X285	2	12
F518-A-L	1218-K-TVH-C3	20218-K-MB-C3	H218	FRM160/10	2	9X7,5X300	1	13
F518-A-L	2218-K-TVH-C3	22218-E1-K	H318	FRM160/10	1	9X7,5X300	1	13
F518-B-L	1218-K-TVH-C3	20218-K-MB-C3	H218	FRM160/10	2	9X7,5X300	2	13
F518-B-L	2218-K-TVH-C3	22218-E1-K	H318	FRM160/10	1	9X7,5X300	2	13
F520-A-L	1220-K-M-C3	20220-K-MB-C3	H220	FRM180/10 + FRM180/12	1 1	10X8,5X335	1	18
F520-A-L	2220-K-M-C3	22220-E1-K	H320	FRM180/10	1	10X8,5X335	1	18
F520-B-L	1220-K-M-C3	20220-K-MB-C3	H220	FRM180/10 + FRM180/12	1 1	10X8,5X335	2	18
F520-B-L	2220-K-M-C3	22220-E1-K	H320	FRM180/10	1	10X8,5X335	2	18
F522-A-L	1222-K-M-C3	20222-K-MB-C3	H222	FRM200/13,5	2	12X10X375	1	22
F522-B-L	1222-K-M-C3	20222-K-MB-C3	H222	FRM200/13,5	2	12X10X375	2	22
F522-WA-L	2222-K-M-C3	22222-E1-K	H322	FRM200/10	1	12X10X375	1	22
F522-WB-L	2222-K-M-C3	22222-E1-K	H322	FRM200/10	1	12X10X375	2	22



Design B
① Locating bearing
② Non-locating bearing

Dimensions

d_1	a	g_2	h_1	c	D	g_1	g_3	g_4	h	m	s	
											mm	inch
65	190	–	190	25	130	97	6	30	95	215	M16	$^5/_8$
65	190	–	190	25	130	97	6	30	95	215	M16	$^5/_8$
65	190	104	190	25	130	–	–	30	95	215	M16	$^5/_8$
65	190	104	190	25	130	–	–	30	95	215	M16	$^5/_8$
70	196	–	196	25	140	101	6	32	98	215	M16	$^5/_8$
70	196	–	196	25	140	101	6	32	98	215	M16	$^5/_8$
70	196	110	196	25	140	–	–	32	98	215	M16	$^5/_8$
70	196	110	196	25	140	–	–	32	98	215	M16	$^5/_8$
75	210	–	210	25	150	106	7	31	105	240	M16	$^5/_8$
75	210	–	210	25	150	106	7	31	105	240	M16	$^5/_8$
75	210	114	210	25	150	–	–	31	105	240	M16	$^5/_8$
75	210	114	210	25	150	–	–	31	105	240	M16	$^5/_8$
80	210	–	210	25	160	110	7	29	105	240	M16	$^5/_8$
80	210	–	210	25	160	110	7	29	105	240	M16	$^5/_8$
80	210	118	210	25	160	–	–	29	105	240	M16	$^5/_8$
80	210	118	210	25	160	–	–	29	105	240	M16	$^5/_8$
90	250	–	250	30	180	119	8	29	125	280	M20	$^3/_4$
90	250	–	250	30	180	119	8	29	125	280	M20	$^3/_4$
90	250	127	250	30	180	–	–	29	125	280	M20	$^3/_4$
90	250	127	250	30	180	–	–	29	125	280	M20	$^3/_4$
100	270		270	30	200	128	8	30	135	310	M20	$^3/_4$
100	270	137	270	30	200	–	–	30	135	310	M20	$^3/_4$
100	270		270	30	200	128	8	30	135	310	M20	$^3/_4$
100	270	137	270	30	200	–	–	30	135	310	M20	$^3/_4$



Fasteners and retainers

Adapter sleeves
Withdrawal sleeves
Locknuts
Shaft nuts
Tab washers
Retaining brackets

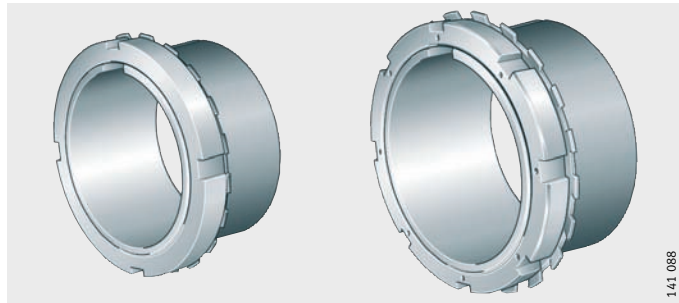
Fasteners and retainers

		Page
Product overview	Fasteners and retainers	1452
Features	Adapter sleeves	1453
	Withdrawal sleeves	1454
	Locknuts	1454
	Shaft nuts	1455
	Tab washers	1456
	Retaining brackets	1456
	Suffixes	1456
Design and safety guidelines	Shaft tolerances	1457
Accuracy	Adapter sleeves	1457
	Withdrawal sleeves	1457
	Locknuts and shaft nuts	1457
Dimension tables	Adapter sleeves	1458
	Withdrawal sleeves	1472
	Locknuts	1496
	Shaft nuts	1500
	Tab washers	1502
	Retaining brackets	1504

Adapter sleeves

With nut and retainer
Taper 1:12 or 1:30

H2, H3, H23, H30, H31, H32, H33, H39, H240, H241



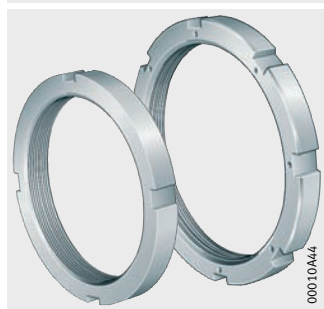
Withdrawal sleeves

Taper 1:12 or 1:30

AH2, AH(X)3, AH22, AH(X)23, AH(X)30, AH(X)31, AH(X)32, AH33, AH39, AH240, AH241

Locknuts
Shaft nuts

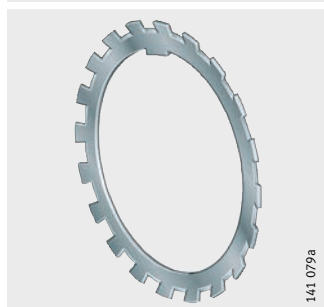
KM, KML, HM, HM30, HM31



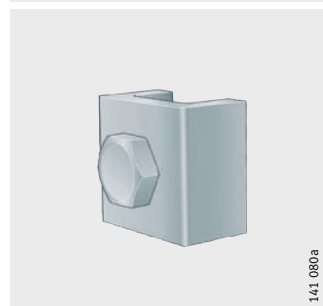
HMZ, HMZ30

Tab washers
Retaining brackets with screw

MB, MBL



MS30, MS31



Fasteners and retainers

Features

The location of bearings with a tapered bore on cylindrical shaft studs can be carried out using easy-to-fit, reliable adapter and withdrawal sleeves.

Locknuts or shaft nuts can be used to locate bearings on shafts or adapter sleeves. Gradual loosening of nuts can be prevented using tab washers or retaining brackets. Shaft nuts are secured by means of force locking.

Adapter sleeves

For smooth and stepped shafts

Adapter sleeves are suitable where bearings with a tapered bore are to be located on cylindrical shafts. They do not need to be secured on the shaft by any additional means. The bearings can be positioned at any point on smooth shafts.

If adapter sleeves are used with a support ring on stepped shafts, the bearings can be axially located to high accuracy.
In addition, this gives simpler dismounting of the bearings.

Adapter sleeves comprise slotted adapter sleeves, locknuts and tab washers. For larger sizes, retaining brackets are used instead of tab washers.

The tensile strength of the material is at least 430 N/mm^2.
The outside surface of the sleeves has a taper of 1:12,
in series H240 and H241 the taper is 1:30.

The dimension tables describe adapter sleeves for metric shafts. Sleeves for inch size shafts are available by agreement.

For hydraulic method

Fitting and dismantling of large bearings requires high mounting forces and is made easier by using the hydraulic method. There are adapter sleeves with oil slots on the tapered outside surface and a pump connector on the thread side. These adapter sleeves have the suffix HG. The dimension tables describe the threads for the pump connector.

Withdrawal sleeves

Withdrawal sleeves are suitable where bearings with a tapered bore are to be located on cylindrical shafts. The tapered sleeve is pressed into the bearing bore until the required reduction in radial internal clearance is achieved. The bearing is abutted, for example, against a shoulder on the shaft.

Retainers are not included in the delivery.

The tensile strength of the material is at least 430 N/mm^2.

The outside surface of the slotted steel sleeves has a taper of 1:12, in series AH240 and AH241 the taper is 1:30.

For hydraulic method

Fitting and dismantling of large bearings requires high mounting forces and is made easier by using the hydraulic method.
There are withdrawal sleeves with oil slots on the tapered outside surface and two pump connectors offset to each other by 90°.
These withdrawal sleeves have the suffix H. The dimension tables give the mounting dimensions for the pump connector.

Locknuts

Locknuts can be used to locate bearings on shafts or adapter sleeves. They also give easier mounting of bearings with a tapered shaft seat and the fitting and dismantling of bearings on withdrawal sleeves.

The locknuts are made from steel and the tensile strength of the material is at least 350 N/mm^2.

They have four or eight evenly spaced slots on the circumference, into which hook wrenches or striking-face wrenches can be fitted.

By agreement, locknuts of series HM30..-H and HM31..-H with threaded holes for mounting screws are available.

Precision locknuts are described in the section Bearings for screw drives.

Shaft nuts

Shaft nuts HMZ allow precise and secure axial location of bearings on cylindrical and tapered shafts or on adapter sleeves.

The shaft nuts are made from steel and the tensile strength is at least 350 N/mm^2.

HMZ nuts are interchangeable with conventional locknuts HM and KM. They are secured, however, not by means of washers or brackets but by force locking. Four or eight axial clamping screws allow uniform clamping on the circumference, *Figure 1*.

For screw mounting on the shaft thread, the circumference of the nut has four or eight threaded blind holes into which the threaded rod also supplied is screwed. There is no need either for slots on the outside diameter of the nut or for any retainers. Since the shaft does not have a retaining slot, it has higher strength and is more economical to manufacture.

Shaft nuts HMZ are described in TPI WL 91-8.

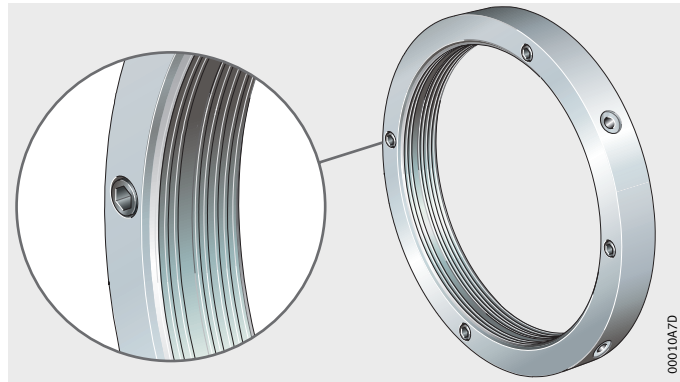


Figure 1
Clamping screws for generating a force locking connection between the nut and shaft thread

Tab washers

Tab washers MB and MBL are simple, reliable elements for securing smaller locknuts (nuts of series KM and KML).

They have an inner tab and several outer tabs evenly spaced around the circumference. The inner tab grips in the slot on the adapter sleeve or shaft, one of the outer tabs is bent into a slot in the nut for location.

The washers are made from steel and the tensile strength of the material is at least 300 N/mm^2.

Retaining brackets

Retaining brackets of series MS are fixed to the locknut using a hexagonal screw. They engage in a slot in the nut and in the adapter sleeve or shaft.

The fixing screw has a self-locking thread up to M16, for sizes from M20 a standardised hexagonal screw with a retainer is used.

Retaining brackets are used with locknuts of series HM30 and HM31.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
H	Hydraulic withdrawal sleeve	Standard
HG	Hydraulic adapter sleeve	

Design and safety guidelines

Shaft tolerances

Adapter and withdrawal sleeves adapt themselves to the shaft. Larger diameter tolerances are therefore permissible for shafts than in the case of a direct cylindrical seat for a bearing on the shaft.

For general applications, bearing seats toleranced to h9 are sufficient.

The geometrical tolerances must be tighter than the diameter tolerances since the geometrical accuracy affects the running accuracy of the bearing arrangement. The cylindricity tolerance of the bearing seat should be within IT5/2 or IT6/2.

Accuracy

Adapter sleeves

The dimensions and material conform to DIN 5 415/ISO 2 982-1.

The bore tolerance of the adapter sleeves, before splitting, for a taper 1:12 is in tolerance zone JS9, for a taper 1:30 in tolerance zone JS7.

Up to M200, the thread is a metric precision thread with a tolerance grade 6g to DIN/ISO 965-3, over M200 trapezoidal threads are used.

Withdrawal sleeves

The dimensions and material conform to DIN 5 416/ISO 2 982-1.

The bore tolerance of the withdrawal sleeves before splitting for a taper 1:12 is in tolerance zone JS9, for a taper 1:30 in tolerance zone JS7.

Up to M200, the thread is a metric precision thread with a tolerance grade 6g to DIN/ISO 965-3, over M200 trapezoidal threads are used.

Designs with a modified thread d_{2G} have the suffix G.

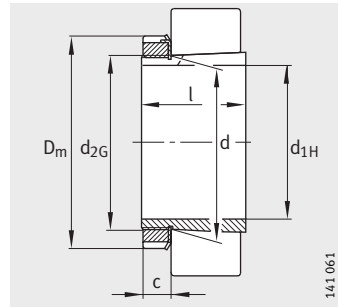
Locknuts and shaft nuts

The dimensions and material conform to DIN 981/ISO 2 982-2. Deviations are indicated in the dimension tables.

Up to a thread diameter 200 mm, the thread is a metric precision thread, larger locknuts and shaft nuts have trapezoidal threads.

Adapter sleeves

With nut and retainer



Taper 1:12
(taper 1:30 for H240, H241)
Tab washer MB

Dimension table · Dimensions in mm

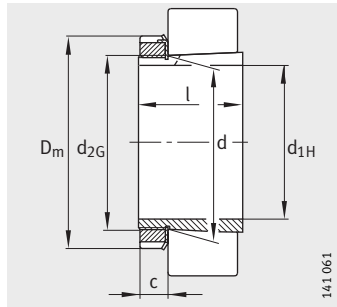
Designation			Mass	Dimensions					
Adapter sleeve Complete	Nut	Retainer	m ≈kg	d_{1H}	d	D_m ≈	l	c ≈	d_{2G}
H203	KM3	MB3	0,03	**14**	17	28	21	6	M17X1
H204	KM4	MB4	0,04	**17**	20	32	24	7	M20X1
H304	KM4	MB4	0,04	**17**	20	32	28	7	M20X1
H2304	KM4	MB4	0,05	**17**	20	32	31	7	M20X1
H205	KM5	MB5	0,07	**20**	25	38	26	9	M25X1,5
H305	KM5	MB5	0,07	**20**	25	38	29	9	M25X1,5
H2305	KM5	MB5	0,09	**20**	25	38	35	9	M25X1,5
H206	KM6	MB6	0,1	**25**	30	45	27	9	M30X1,5
H306	KM6	MB6	0,11	**25**	30	45	31	9	M30X1,5
H2306	KM6	MB6	0,13	**25**	30	45	38	9	M30X1,5
H207	KM7	MB7	0,12	**30**	35	52	29	10	M35X1,5
H307	KM7	MB7	0,14	**30**	35	52	35	10	M35X1,5
H2307	KM7	MB7	0,16	**30**	35	52	43	10	M35X1,5
H208	KM8	MB8	0,18	**35**	40	58	31	11	M40X1,5
H308	KM8	MB8	0,19	**35**	40	58	36	11	M40X1,5
H2308	KM8	MB8	0,23	**35**	40	58	46	11	M40X1,5
H3308	KM8	MB8	0,24	**35**	40	58	50	11	M40X1,5
H209	KM9	MB9	0,22	**40**	45	65	33	12	M45X1,5
H309	KM9	MB9	0,25	**40**	45	65	39	12	M45X1,5
H2309	KM9	MB9	0,29	**40**	45	65	50	12	M45X1,5
H3309	KM9	MB9	0,31	**40**	45	65	54	12	M45X1,5
H210	KM10	MB10	0,27	**45**	50	70	35	13	M50X1,5
H310	KM10	MB10	0,3	**45**	50	70	42	13	M50X1,5
H2310	KM10	MB10	0,36	**45**	50	70	55	13	M50X1,5
H3310	KM10	MB10	0,39	**45**	50	70	60	13	M50X1,5
H211	KM11	MB11	0,31	**50**	55	75	37	13	M55X2
H311	KM11	MB11	0,35	**50**	55	75	45	13	M55X2
H2311	KM11	MB11	0,42	**50**	55	75	59	13	M55X2
H3311	KM11	MB11	0,46	**50**	55	75	65	13	M55X2
H212	KM12	MB12	0,35	**55**	60	80	38	13	M60X2
H312	KM12	MB12	0,4	**55**	60	80	47	13	M60X2
H2312	KM12	MB12	0,49	**55**	60	80	62	13	M60X2
H3312	KM12	MB12	0,54	**55**	60	80	70	13	M60X2

Dimension table (continued) · Dimensions in mm

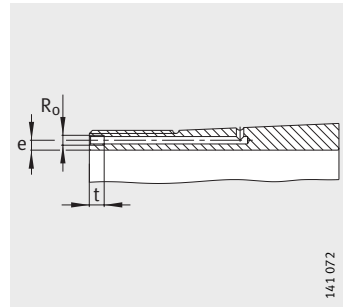
Designation			Mass	Dimensions					
Adapter sleeve Complete	Nut	Retainer	m ≈kg	d_{1H}	d	D_m ≈	l	c ≈	d_{2G}
H213	KM13	MB13	0,4	**60**	65	85	40	14	M65X2
H313	KM13	MB13	0,46	**60**	65	85	50	14	M65X2
H2313	KM13	MB13	0,56	**60**	65	85	65	14	M65X2
H3313	KM13	MB13	0,63	**60**	65	85	75	14	M65X2
H214	KM14	MB14	0,63	**60**	70	92	41	14	M70X2
H314	KM14	MB14	0,74	**60**	70	92	52	14	M70X2
H2314	KM14	MB14	0,92	**60**	70	92	68	14	M70X2
H3314	KM14	MB14	1,08	**60**	70	92	81	14	M70X2
H215	KM15	MB15	0,71	**65**	75	98	43	15	M75X2
H315	KM15	MB15	0,84	**65**	75	98	55	15	M75X2
H2315	KM15	MB15	1,06	**65**	75	98	73	15	M75X2
H3315	KM15	MB15	1,25	**65**	75	98	87	15	M75X2
H216	KM16	MB16	0,89	**70**	80	105	46	17	M80X2
H316	KM16	MB16	1,04	**70**	80	105	59	17	M80X2
H2316	KM16	MB16	1,3	**70**	80	105	78	17	M80X2
H3316	KM16	MB16	1,46	**70**	80	105	89	17	M80X2
H217	KM17	MB17	1,03	**75**	85	110	50	18	M85X2
H317	KM17	MB17	1,19	**75**	85	110	63	18	M85X2
H2317	KM17	MB17	1,47	**75**	85	110	82	18	M85X2
H3317	KM17	MB17	1,68	**75**	85	110	95	18	M85X2
H218	KM18	MB18	1,21	**80**	90	120	52	18	M90X2
H318	KM18	MB18	1,39	**80**	90	120	65	18	M90X2
H2318	KM18	MB18	1,71	**80**	90	120	86	18	M90X2
H3318	KM18	MB18	1,87	**80**	90	120	95	18	M90X2
H219	KM19	MB19	1,39	**85**	95	125	55	19	M95X2
H319	KM19	MB19	1,58	**85**	95	125	68	19	M95X2
H2319	KM19	MB19	1,95	**85**	95	125	90	19	M95X2
H3319	KM19	MB19	2,16	**85**	95	125	101	19	M95X2
H220	KM20	MB20	1,52	**90**	100	130	58	20	M100X2
H320	KM20	MB20	1,73	**90**	100	130	71	20	M100X2
H3120	KM20	MB20	1,81	**90**	100	130	76	20	M100X2
H24020	KM20	MB20	1,77	**90**	100	130	80	20	M100X2
H24120	KM20	MB20	1,97	**90**	100	130	94	20	M100X2
H2320	KM20	MB20	2,2	**90**	100	130	97	20	M100X2
H3320	KM20	MB20	2,38	**90**	100	130	106	20	M100X2

Adapter sleeves

With nut and retainer



Taper 1:12
(taper 1:30 for H240, H241)
Tab washer MB, MBL



Hydraulic adapter sleeve
(suffix HG)
Mounting dimensions

Dimension table (continued) · Dimensions in mm

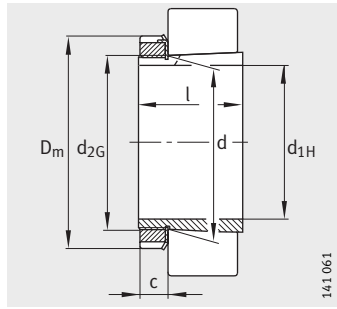
Designation			Mass	Dimensions					
Adapter sleeve Complete	Nut	Retainer	m ≈kg	d_{1H}	d	D_m ≈	l	c ≈	d_{2G}
H221	KM21	MB21	1,74	**95**	105	140	60	20	M105X2
H321	KM21	MB21	1,97	**95**	105	140	74	20	M105X2
H3121	KM21	MB21	2,09	**95**	105	140	80	20	M105X2
H2321	KM21	MB21	2,5	**95**	105	140	101	20	M105X2
H3321	KM21	MB21	2,71	**95**	105	140	111	20	M105X2
H222	KM22	MB22	1,95	**100**	110	145	63	21	M110X2
H322	KM22	MB22	2,21	**100**	110	145	77	21	M110X2
H3122	KM22	MB22	2,28	**100**	110	145	81	21	M110X2
H24022	KM22	MB22	2,3	**100**	110	145	90	21	M110X2
H24122	KM22	MB22	2,45	**100**	110	145	99	21	M110X2
H2322	KM22	MB22	2,78	**100**	110	145	105	21	M110X2
H3322	KM22	MB22	3,06	**100**	110	145	117	21	M110X2
H3924	KML24	MBL24	1,78	**110**	120	145	60	22	M120X2
H3024	KML24	MBL24	2,01	**110**	120	145	72	22	M120X2
H24024	KML24	MBL24	2,24	**110**	120	145	91	22	M120X2
H3124	KM24	MB24	2,67	**110**	120	155	88	22	M120X2
H24124	KM24	MB24	2,92	**110**	120	155	111	22	M120X2
H2324	KM24	MB24	3,24	**110**	120	155	112	22	M120X2
H3324	KM24	MB24	3,77	**110**	120	155	132	22	M120X2
H3926	KML26	MBL26	2,53	**115**	130	155	65	23	M130X2
H3026	KML26	MBL26	2,96	**115**	130	155	80	23	M130X2
H24026	KML26	MBL26	3,4	**115**	130	155	102	23	M130X2
H3126	KM26	MB26	3,72	**115**	130	165	92	23	M130X2
H24126	KM26	MB26	4,08	**115**	130	165	113	23	M130X2
H2326	KM26	MB26	4,69	**115**	130	165	121	23	M130X2
H3326	KM26	MB26	5,35	**115**	130	165	139	23	M130X2
H3928	KML28	MBL28	2,81	**125**	140	165	66	24	M140X2
H3028	KML28	MBL28	3,3	**125**	140	165	82	24	M140X2
H24028	KML28	MBL28	3,75	**125**	140	165	103	24	M140X2
H3128	KM28	MB28	4,4	**125**	140	180	97	24	M140X2
H24128	KM28	MB28	4,81	**125**	140	180	119	24	M140X2
H2328	KM28	MB28	5,66	**125**	140	180	131	24	M140X2
H3328	KM28	MB28	6,32	**125**	140	180	147	24	M140X2

Dimension table (continued) · Dimensions in mm

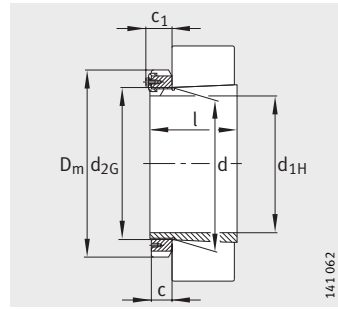
Designation			Mass	Dimensions						Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer	m ≈kg	d_{1H}	d	D_m ≈	l	c ≈	d_{2G}	R_0	e	t
H3930	KML30	MBL30	3,64	**135**	150	180	76	26	M150X2	–	–	–
H3030	KML30	MBL30	4,02	**135**	150	180	87	26	M150X2	–	–	–
H24030	KML30	MBL30	4,61	**135**	150	180	112	26	M150X2	–	–	–
H3130	KM30	MB30	5,6	**135**	150	195	111	26	M150X2	–	–	–
H24130	KM30	MB30	6,1	**135**	150	195	137	26	M150X2	–	–	–
H2330	KM30	MB30	6,76	**135**	150	195	139	26	M150X2	–	–	–
H3330	KM30	MB30	7,66	**135**	150	195	159	26	M150X2	–	–	–
H3932	KML32	MBL32	4,75	**140**	160	190	78	28	M160X3	–	–	–
H3932-HG	KML32	MBL32	4,75	**140**	160	190	78	28	M160X3	M6	4,2	7
H3032	KML32	MBL32	5,44	**140**	160	190	93	28	M160X3	–	–	–
H3032-HG	KML32	MBL32	5,44	**140**	160	190	93	28	M160X3	M6	4,2	7
H24032	KML32	MBL32	6,27	**140**	160	190	118	28	M160X3	–	–	–
H24032-HG	KML32	MBL32	6,27	**140**	160	190	118	28	M160X3	M6	4,2	7
H3132	KM32	MB32	7,81	**140**	160	210	119	28	M160X3	–	–	–
H3132-HG	KM32	MB32	7,81	**140**	160	210	119	28	M160X3	M6	4,2	7
H2332	KM32	MB32	9,32	**140**	160	210	147	28	M160X3	–	–	–
H2332-HG	KM32	MB32	9,32	**140**	160	210	147	28	M160X3	M6	4,2	7
H24132	KM32	MB32	8,66	**140**	160	210	148	28	M160X3	–	–	–
H24132-HG	KM32	MB32	8,66	**140**	160	210	148	28	M160X3	M6	4,2	7
H3332	KM32	MB32	10,7	**140**	160	210	170	28	M160X3	–	–	–
H3332-HG	KM32	MB32	10,7	**140**	160	210	170	28	M160X3	M6	4,2	7
H3934	KML34	MBL34	5,16	**150**	170	200	79	29	M170X3	–	–	–
H3934-HG	KML34	MBL34	5,16	**150**	170	200	79	29	M170X3	M6	4,2	7
H3034	KML34	MBL34	6,25	**150**	170	200	101	29	M170X3	–	–	–
H3034-HG	KML34	MBL34	6,25	**150**	170	200	101	29	M170X3	M6	4,2	7
H24034	KML34	MBL34	7,28	**150**	170	200	130	29	M170X3	–	–	–
H24034-HG	KML34	MBL34	7,28	**150**	170	200	130	29	M170X3	M6	4,2	7
H3134	KM34	MB34	8,52	**150**	170	220	122	29	M170X3	–	–	–
H3134-HG	KM34	MB34	8,52	**150**	170	220	122	29	M170X3	M6	4,2	7
H24134	KM34	MB34	9,32	**150**	170	220	149	29	M170X3	–	–	–
H24134-HG	KM34	MB34	9,32	**150**	170	220	149	29	M170X3	M6	4,2	7
H2334	KM34	MB34	10,4	**150**	170	220	154	29	M170X3	–	–	–
H2334-HG	KM34	MB34	10,4	**150**	170	220	154	29	M170X3	M6	4,2	7
H3334	KM34	MB34	11,7	**150**	170	220	175	29	M170X3	–	–	–
H3334-HG	KM34	MB34	11,7	**150**	170	220	175	29	M170X3	M6	4,2	7

Adapter sleeves

With nut and retainer



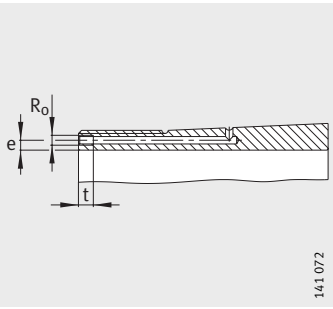
Taper 1:12
(taper 1:30 for H240, H241)
Tab washer MB, MBL



Taper 1:12
(taper 1:30 for H240)
Retaining bracket MS30

Dimension table (continued) · Dimensions in mm

Designation			Mass	Dimensions						Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer	m ≈kg	d_{1H}	d	D_m ≈	l	c ≈	d_{2G}	R_0	e	t
H3936	KML36	MBL36	6,01	**160**	180	210	87	30	M180X3	–	–	–
H3936-HG	KML36	MBL36	6,01	**160**	180	210	87	30	M180X3	M6	4,2	7
H3036	KML36	MBL36	7,18	**160**	180	210	109	30	M180X3	–	–	–
H3036-HG	KML36	MBL36	7,18	**160**	180	210	109	30	M180X3	M6	4,2	7
H24036	KML36	MBL36	8,33	**160**	180	210	140	30	M180X3	–	–	–
H24036-HG	KML36	MBL36	8,33	**160**	180	210	140	30	M180X3	M6	4,2	7
H3136	KM36	MB36	9,67	**160**	180	230	131	30	M180X3	–	–	–
H3136-HG	KM36	MB36	9,67	**160**	180	230	131	30	M180X3	M6	4,2	7
H24136	KM36	MB36	10,5	**160**	180	230	159	30	M180X3	–	–	–
H24136-HG	KM36	MB36	10,5	**160**	180	230	159	30	M180X3	M6	4,2	7
H2336	KM36	MB36	11,6	**160**	180	230	161	30	M180X3	–	–	–
H2336-HG	KM36	MB36	11,6	**160**	180	230	161	30	M180X3	M6	4,2	7
H3336	KM36	MB36	13,3	**160**	180	230	186	30	M180X3	–	–	–
H3336-HG	KM36	MB36	13,3	**160**	180	230	186	30	M180X3	M6	4,2	7
H3938	KML38	MBL38	6,49	**170**	190	220	89	31	M190X3	–	–	–
H3938-HG	KML38	MBL38	6,49	**170**	190	220	89	31	M190X3	M6	4,2	7
H3038	KML38	MBL38	7,8	**170**	190	220	112	31	M190X3	–	–	–
H3038-HG	KML38	MBL38	7,8	**170**	190	220	112	31	M190X3	M6	4,2	7
H24038	KML38	MBL38	9	**170**	190	220	143	31	M190X3	–	–	–
H24038-HG	KML38	MBL38	9	**170**	190	220	143	31	M190X3	M6	4,2	7
H3138	KM38	MB38	11	**170**	190	240	141	31	M190X3	–	–	–
H3138-HG	KM38	MB38	11	**170**	190	240	141	31	M190X3	M6	4,2	7
H2338	KM38	MB38	12,9	**170**	190	240	169	31	M190X3	–	–	–
H2338-HG	KM38	MB38	12,9	**170**	190	240	169	31	M190X3	M6	4,2	7
H24138	KM38	MB38	11,9	**170**	190	240	172	31	M190X3	–	–	–
H24138-HG	KM38	MB38	11,9	**170**	190	240	172	31	M190X3	M6	4,2	7
H3338	KM38	MB38	14,7	**170**	190	240	193	31	M190X3	–	–	–
H3338-HG	KM38	MB38	14,7	**170**	190	240	193	31	M190X3	M6	4,2	7



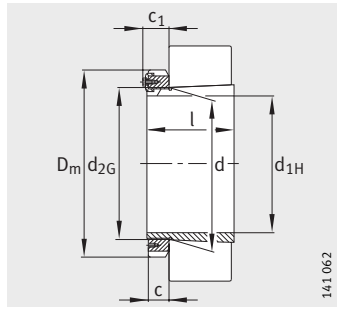
Hydraulic adapter sleeve
Suffix HG
Mounting dimensions

Dimension table (continued) · Dimensions in mm

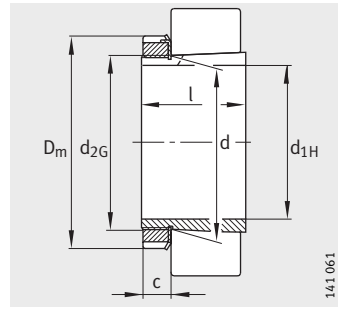
Designation			Mass	Dimensions							Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer	m ≈kg	d_{1H}	d	D_m	l	c ≈	c_1 ≈	d_{2G}	R_0	e	t
H3940	KML40	MBL40	8,14	**180**	200	240	98	32	–	M200X3	–	–	–
H3940-HG	KML40	MBL40	8,14	**180**	200	240	98	32	–	M200X3	M6	4,2	7
H3040	KML40	MBL40	9,5	**180**	200	240	120	32	–	M200X3	–	–	–
H3040-HG	KML40	MBL40	9,5	**180**	200	240	120	32	–	M200X3	M6	4,2	7
H24040	KML40	MBL40	10,8	**180**	200	240	153	32	–	M200X3	–	–	–
H24040-HG	KML40	MBL40	10,8	**180**	200	240	153	32	–	M200X3	M6	4,2	7
H3140	KM40	MB40	12,3	**180**	200	250	150	32	–	M200X3	–	–	–
H3140-HG	KM40	MB40	12,3	**180**	200	250	150	32	–	M200X3	M6	4,2	7
H2340	KM40	MB40	14,2	**180**	200	250	176	32	–	M200X3	–	–	–
H2340-HG	KM40	MB40	14,2	**180**	200	250	176	32	–	M200X3	M6	4,2	7
H24140	KM40	MB40	13,4	**180**	200	250	185	32	–	M200X3	–	–	–
H24140-HG	KM40	MB40	13,4	**180**	200	250	185	32	–	M200X3	M6	4,2	7
H3340	KM40	MB40	16,4	**180**	200	250	204	32	–	M200X3	–	–	–
H3340-HG	KM40	MB40	16,4	**180**	200	250	204	32	–	M200X3	M6	4,2	7
H3944	HM3044	MS3044	8,45	**200**	220	260	96	30	40	Tr220X4	–	–	–
H3944-HG	HM3044	MS3044	8,45	**200**	220	260	96	30	40	Tr220X4	M6	4,2	7
H3044X	HM3044	MS3044	10,5	**200**	220	260	126	30	40	Tr220X4	–	–	–
H3044X-HG	HM3044	MS3044	10,5	**200**	220	260	126	30	40	Tr220X4	M6	4,2	7
H24044	HM3044	MS3044	12,1	**200**	220	260	162	30	40	Tr220X4	–	–	–
H24044-HG	HM3044	MS3044	12,1	**200**	220	260	162	30	40	Tr220X4	M6	4,2	7
H3144X	HM44T	MB44	15,7	**200**	220	280	161	35	–	Tr220X4	–	–	–
H3144X-HG	HM44T	MB44	15,7	**200**	220	280	161	35	–	Tr220X4	M6	4,2	7
H2344X	HM44T	MB44	17,8	**200**	220	280	186	35	–	Tr220X4	–	–	–
H2344X-HG	HM44T	MB44	17,8	**200**	220	280	186	35	–	Tr220X4	M6	4,2	7
H24144	HM44T	MB44	17,1	**200**	220	280	199	35	–	Tr220X4	–	–	–
H24144-HG	HM44T	MB44	17,1	**200**	220	280	199	35	–	Tr220X4	M6	4,2	7
H3344	HM44T	MB44	21,1	**200**	220	280	223	35	–	Tr220X4	–	–	–
H3344-HG	HM44T	MB44	21,1	**200**	220	280	223	35	–	Tr220X4	M6	4,2	7

Adapter sleeves

With nut and retainer



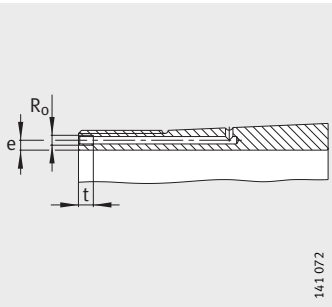
Taper 1:12
(taper 1:30 for H240, H241)
Retaining bracket MS30, MS31



Taper 1:12
(taper 1:30 for H241)
Tab washer MB

Dimension table (continued) · Dimensions in mm

Designation			Mass	Dimensions							Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer	m ≈kg	d_{1H}	d	D_m	l	c ≈	c_1 ≈	d_{2G}	R_0	e	t
H3948	HM3048	MS3048	11,3	**220**	240	290	101	34	45	Tr240X4	–	–	–
H3948-HG	HM3048	MS3048	11,3	**220**	240	290	101	34	45	Tr240X4	M6	4,2	7
H3048	HM3048	MS3048	13,8	**220**	240	290	133	34	45	Tr240X4	–	–	–
H3048-HG	HM3048	MS3048	13,8	**220**	240	290	133	34	45	Tr240X4	M6	4,2	7
H24048	HM3048	MS3048	15,3	**220**	240	290	167	34	45	Tr240X4	–	–	–
H24048-HG	HM3048	MS3048	15,3	**220**	240	290	167	34	45	Tr240X4	M6	4,2	7
H3148X	HM48T	MB48	18,4	**220**	240	300	172	37	–	Tr240X4	–	–	–
H3148X-HG	HM48T	MB48	18,4	**220**	240	300	172	37	–	Tr240X4	M6	4,2	7
H2348X	HM48T	MB48	20,9	**220**	240	300	199	37	–	Tr240X4	–	–	–
H2348X-HG	HM48T	MB48	20,9	**220**	240	300	199	37	–	Tr240X4	M6	4,2	7
H24148	HM48T	MB48	19,9	**220**	240	300	212	37	–	Tr240X4	–	–	–
H24148-HG	HM48T	MB48	19,9	**220**	240	300	212	37	–	Tr240X4	M6	4,2	7
H3348	HM48T	MB48	25,1	**220**	240	300	240	37	–	Tr240X4	–	–	–
H3348-HG	HM48T	MB48	25,1	**220**	240	300	240	37	–	Tr240X4	M6	4,2	7
H3952	HM3052	MS3048	13,6	**240**	260	310	116	34	45	Tr260X4	–	–	–
H3952-HG	HM3052	MS3048	13,6	**240**	260	310	116	34	45	Tr260X4	M6	4,2	7
H3052X	HM3052	MS3048	16	**240**	260	310	145	34	45	Tr260X4	–	–	–
H3052X-HG	HM3052	MS3048	16	**240**	260	310	145	34	45	Tr260X4	M6	4,2	7
H24052	HM3052	MS3048	18,4	**240**	260	310	190	34	45	Tr260X4	–	–	–
H24052-HG	HM3052	MS3048	18,4	**240**	260	310	190	34	45	Tr260X4	M6	4,2	7
H3152X	HM52T	MB52	23,5	**240**	260	330	190	38	–	Tr260X4	–	–	–
H3152X-HG	HM52T	MB52	23,5	**240**	260	330	190	38	–	Tr260X4	M6	4,2	7
H2352X	HM52T	MB52	25,7	**240**	260	330	211	38	–	Tr260X4	–	–	–
H2352X-HG	HM52T	MB52	25,7	**240**	260	330	211	38	–	Tr260X4	M6	4,2	7
H24152	HM52T	MB52	25,2	**240**	260	330	235	38	–	Tr260X4	–	–	–
H24152-HG	HM52T	MB52	25,2	**240**	260	330	235	38	–	Tr260X4	M6	4,2	7
H3352	HM52T	MB52	30,5	**240**	260	330	253	38	–	Tr260X4	–	–	–
H3352-HG	HM52T	MB52	30,5	**240**	260	330	253	38	–	Tr260X4	M6	4,2	7



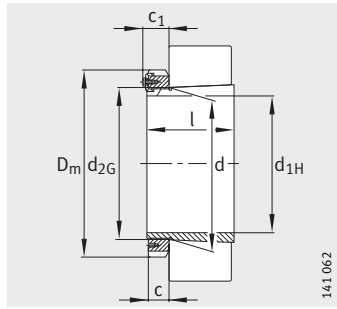
Hydraulic adapter sleeve
(suffix HG)
Mounting dimensions

Dimension table (continued) · Dimensions in mm

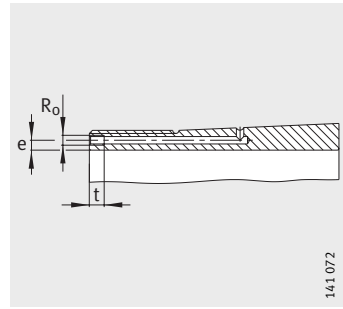
Designation			Mass	Dimensions							Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer	m ≈kg	d_{1H}	d	D_m	l	c ≈	c_1 ≈	d_{2G}	R_0	e	t
H3956	HM3056	MS3056	15,6	**260**	280	330	121	38	49	Tr280X4	–	–	–
H3956-HG	HM3056	MS3056	15,6	**260**	280	330	121	38	49	Tr280X4	M6	4,2	7
H3056	HM3056	MS3056	18,5	**260**	280	330	152	38	49	Tr280X4	–	–	–
H3056-HG	HM3056	MS3056	18,5	**260**	280	330	152	38	49	Tr280X4	M6	4,2	7
H24056	HM3056	MS3056	20,9	**260**	280	330	195	38	49	Tr280X4	–	–	–
H24056-HG	HM3056	MS3056	20,9	**260**	280	330	195	38	49	Tr280X4	M6	4,2	7
H3156X	HM56T	MB56	26,4	**260**	280	350	195	39	–	Tr280X4	–	–	–
H3156X-HG	HM56T	MB56	26,4	**260**	280	350	195	39	–	Tr280X4	M6	4,2	7
H2356X	HM56T	MB56	29,8	**260**	280	350	224	39	–	Tr280X4	–	–	–
H2356X-HG	HM56T	MB56	29,8	**260**	280	350	224	39	–	Tr280X4	M6	4,2	7
H24156	HM56T	MB56	28	**260**	280	350	238	39	–	Tr280X4	–	–	–
H24156-HG	HM56T	MB56	28	**260**	280	350	238	39	–	Tr280X4	M6	4,2	7
H3356	HM56T	MB56	36	**260**	280	350	273	39	–	Tr280X4	–	–	–
H3356-HG	HM56T	MB56	36	**260**	280	350	273	39	–	Tr280X4	M6	4,2	7
H3960	HM3060	MS3060	20,9	**280**	300	360	140	42	53	Tr300X4	–	–	–
H3960-HG	HM3060	MS3060	20,9	**280**	300	360	140	42	53	Tr300X4	M6	4,2	7
H3060	HM3060	MS3060	23,8	**280**	300	360	168	42	53	Tr300X4	–	–	–
H3060-HG	HM3060	MS3060	23,8	**280**	300	360	168	42	53	Tr300X4	M6	4,2	7
H24060	HM3060	MS3060	26,9	**280**	300	360	220	42	53	Tr300X4	–	–	–
H24060-HG	HM3060	MS3060	26,9	**280**	300	360	220	42	53	Tr300X4	M6	4,2	7
H3160	HM3160	MS3160	30,6	**280**	300	380	208	40	53	Tr300X4	–	–	–
H3160-HG	HM3160	MS3160	30,6	**280**	300	380	208	40	53	Tr300X4	M6	4,2	7
H3260	HM3160	MS3160	34,7	**280**	300	380	240	40	53	Tr300X4	–	–	–
H3260-HG	HM3160	MS3160	34,7	**280**	300	380	240	40	53	Tr300X4	M6	4,2	7
H24160	HM3160	MS3160	32,7	**280**	300	380	258	40	53	Tr300X4	–	–	–
H24160-HG	HM3160	MS3160	32,7	**280**	300	380	258	40	53	Tr300X4	M6	4,2	7
H3360	HM3160	MS3160	40,8	**280**	300	380	284	40	53	Tr300X4	–	–	–
H3360-HG	HM3160	MS3160	40,8	**280**	300	380	284	40	53	Tr300X4	M6	4,2	7
H3964-HG	HM3064	MS3064	22	**300**	320	380	140	42	56	Tr320X5	M6	3,5	7
H3064-HG	HM3064	MS3064	25,4	**300**	320	380	171	42	56	Tr320X5	M6	3,5	7
H24064-HG	HM3064	MS3064	28,4	**300**	320	380	220	42	56	Tr320X5	M6	3,5	7
H3164-HG	HM3164	MS3164	35,4	**300**	320	400	226	42	56	Tr320X5	M6	3,5	7
H3264-HG	HM3164	MS3164	40	**300**	320	400	258	42	56	Tr320X5	M6	3,5	7
H24164-HG	HM3164	MS3164	37,4	**300**	320	400	278	42	56	Tr320X5	M6	3,5	7
H3364-HG	HM3164	MS3164	47,8	**300**	320	400	308	42	56	Tr320X5	M6	3,5	7

Adapter sleeves

With nut and retainer



Taper 1:12
(taper 1:30 for H240, H241)



Hydraulic adapter sleeve
Mounting dimensions

Dimension table (continued) · Dimensions in mm

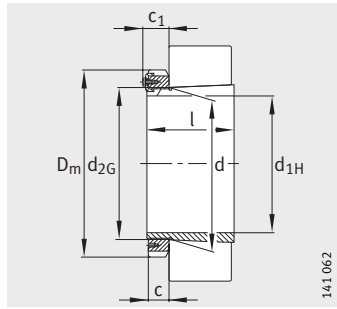
Designation			Mass	Dimensions							Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer	m ≈kg	d_{1H}	d	D_m	l	c ≈	c_1 ≈	d_{2G}	R_0	e	t
H3968-HG	HM3068	MS3064	24,8	**320**	340	400	144	45	57	Tr340X5	M6	3,5	7
H3068-HG	HM3068	MS3064	30	**320**	340	400	187	45	57	Tr340X5	M6	3,5	7
H24068-HG	HM3068	MS3064	33,8	**320**	340	400	244	45	57	Tr340X5	M6	3,5	7
H3168-HG	HM3168	MS3168	50,1	**320**	340	440	254	55	70	Tr340X5	M6	3,5	7
H3268-HG	HM3168	MS3168	55,4	**320**	340	440	288	55	70	Tr340X5	M6	3,5	7
H24168-HG	HM3168	MS3168	53	**320**	340	440	317	55	70	Tr340X5	M6	3,5	7
H3368-HG	HM3168	MS3168	63,6	**320**	340	440	336	55	70	Tr340X5	M6	3,5	7
H3972-HG	HM3072	MS3072	25,9	**340**	360	420	144	45	57	Tr360X5	M6	3,5	7
H3072-HG	HM3072	MS3072	31,6	**340**	360	420	188	45	57	Tr360X5	M6	3,5	7
H24072-HG	HM3072	MS3072	35,5	**340**	360	420	244	45	57	Tr360X5	M6	3,5	7
H3172-HG	HM3172	MS3168	54,3	**340**	360	460	259	58	73	Tr360X5	M6	3,5	7
H3272-HG	HM3172	MS3168	61	**340**	360	460	299	58	73	Tr360X5	M6	3,5	7
H24172-HG	HM3172	MS3168	57,1	**340**	360	460	321	58	73	Tr360X5	M6	3,5	7
H3372-HG	HM3172	MS3168	71,8	**340**	360	460	357	58	73	Tr360X5	M6	3,5	7
H3976-HG	HM3076	MS3076	32,1	**360**	380	450	164	48	62	Tr380X5	M6	3,5	7
H3076-HG	HM3076	MS3076	36,2	**360**	380	450	193	48	62	Tr380X5	M6	3,5	7
H24076-HG	HM3076	MS3076	40,1	**360**	380	450	248	48	62	Tr380X5	M6	3,5	7
H3176-HG	HM3176	MS3176	62,4	**360**	380	490	264	60	75	Tr380X5	M6	3,5	7
H3276-HG	HM3176	MS3176	70,7	**360**	380	490	310	60	75	Tr380X5	M6	3,5	7
H24176-HG	HM3176	MS3176	64,9	**360**	380	490	323	60	75	Tr380X5	M6	3,5	7
H3376-HG	HM3176	MS3176	82,8	**360**	380	490	370	60	75	Tr380X5	M6	3,5	7
H3980-HG	HM3080	MS3076	35,4	**380**	400	470	168	52	66	Tr400X5	M6	3,5	7
H3080-HG	HM3080	MS3076	41,7	**380**	400	470	210	52	66	Tr400X5	M6	3,5	7
H24080-HG	HM3080	MS3076	46,4	**380**	400	470	272	52	66	Tr400X5	M6	3,5	7
H3180-HG	HM3180	MS3180	71,3	**380**	400	520	272	62	81	Tr400X5	M6	3,5	7
H3280-HG	HM3180	MS3180	82,1	**380**	400	520	328	62	81	Tr400X5	M6	3,5	7
H24180-HG	HM3180	MS3180	73,8	**380**	400	520	332	62	81	Tr400X5	M6	3,5	7
H3380-HG	HM3180	MS3180	93,4	**380**	400	520	380	62	81	Tr400X5	M6	3,5	7
H3984-HG	HM3084	MS3084	36,9	**400**	420	490	168	52	66	Tr420X5	M6	3,5	7
H3084X-HG	HM3084	MS3084	43,8	**400**	420	490	212	52	66	Tr420X5	M6	3,5	7
H24084-HG	HM3084	MS3084	48,6	**400**	420	490	274	52	66	Tr420X5	M6	3,5	7
H3184-HG	HM3184	MS3180	85,1	**400**	420	540	304	70	89	Tr420X5	M6	3,5	7
H3284-HG	HM3184	MS3180	95,3	**400**	420	540	352	70	89	Tr420X5	M6	3,5	7
H24184-HG	HM3184	MS3180	87,8	**400**	420	540	372	70	89	Tr420X5	M6	3,5	7
H3384-HG	HM3184	MS3180	105	**400**	420	540	395	70	89	Tr420X5	M6	3,5	7

Dimension table (continued) · Dimensions in mm

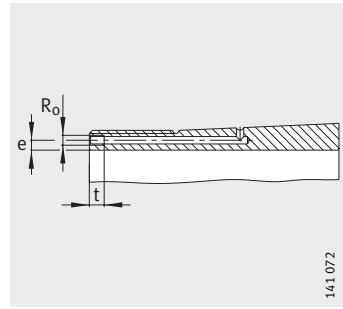
Designation			Mass	Dimensions							Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer	m ≈kg	d_{1H}	d	D_m	l	c ≈	c_1 ≈	d_{2G}	R_0	e	t
H3988-HG	HM3088	MS3088	59	**410**	440	520	189	60	75	Tr440X5	M8	6,5	12
H3088-HG	HM3088	MS3088	67,7	**410**	440	520	228	60	75	Tr440X5	M8	6,5	12
H24088-HG	HM3088	MS3088	76,4	**410**	440	520	294	60	75	Tr440X5	M8	6,5	12
H3188-HG	HM3188	MS3188	105	**410**	440	560	307	70	89	Tr440X5	M8	6,5	12
H3288-HG	HM3188	MS3188	120	**410**	440	560	361	70	89	Tr440X5	M8	6,5	12
H24188-HG	HM3188	MS3188	111	**410**	440	560	372	70	89	Tr440X5	M8	6,5	12
H3388-HG	HM3188	MS3188	140	**410**	440	560	426	70	89	Tr440X5	M8	6,5	12
H3992-HG	HM3092	MS3088	61,4	**430**	460	540	189	60	75	Tr460X5	M8	6,5	12
H3092-HG	HM3092	MS3088	71,8	**430**	460	540	234	60	75	Tr460X5	M8	6,5	12
H24092-HG	HM3092	MS3088	80,8	**430**	460	540	300	60	75	Tr460X5	M8	6,5	12
H3192-HG	HM3192	MS3188	118	**430**	460	580	326	75	94	Tr460X5	M8	6,5	12
H3292-HG	HM3192	MS3188	134	**430**	460	580	382	75	94	Tr460X5	M8	6,5	12
H24192-HG	HM3192	MS3188	124	**430**	460	580	398	75	94	Tr460X5	M8	6,5	12
H3392-HG	HM3192	MS3188	157	**430**	460	580	451	75	94	Tr460X5	M8	6,5	12
H3996-HG	HM3096	MS3096	66,8	**450**	480	560	200	60	75	Tr480X5	M8	6,5	12
H3096-HG	HM3096	MS3096	75,9	**450**	480	560	237	60	75	Tr480X5	M8	6,5	12
H24096-HG	HM3096	MS3096	84,7	**450**	480	560	301	60	75	Tr480X5	M8	6,5	12
H3196-HG	HM3196	MS3196	135	**450**	480	620	335	75	94	Tr480X5	M8	6,5	12
H3296-HG	HM3196	MS3196	155	**450**	480	620	397	75	94	Tr480X5	M8	6,5	12
H24196-HG	HM3196	MS3196	142	**450**	480	620	408	75	94	Tr480X5	M8	6,5	12
H3396-HG	HM3196	MS3196	177	**450**	480	620	462	75	94	Tr480X5	M8	6,5	12
H39/500-HG	HM30/500	MS3096	75,2	**470**	500	580	208	68	83	Tr500X5	M8	6,5	12
H30/500-HG	HM30/500	MS3096	85,2	**470**	500	580	247	68	83	Tr500X5	M8	6,5	12
H240/500-HG	HM30/500	MS3096	93,8	**470**	500	580	309	68	83	Tr500X5	M8	6,5	12
H31/500-HG	HM31/500	MS31/500	145	**470**	500	630	356	80	99	Tr500X5	M8	6,5	12
H32/500-HG	HM31/500	MS31/500	170	**470**	500	630	428	80	99	Tr500X5	M8	6,5	12
H241/500-HG	HM31/500	MS31/500	151	**470**	500	630	430	80	99	Tr500X5	M8	6,5	12
H33/500-HG	HM31/500	MS31/500	189	**470**	500	630	480	80	99	Tr500X5	M8	6,5	12
H39/530-HG	HM30/530	MS30/530	89	**500**	530	630	216	68	89	Tr530X6	M8	6	12
H30/530-HG	HM30/530	MS30/530	103	**500**	530	630	265	68	89	Tr530X6	M8	6	12
H240/530-HG	HM30/530	MS30/530	115	**500**	530	630	343	68	89	Tr530X6	M8	6	12
H31/530-HG	HM31/530	MS31/530	161	**500**	530	670	364	80	102	Tr530X6	M8	6	12
H241/530-HG	HM31/530	MS31/530	167	**500**	530	670	440	80	102	Tr530X6	M8	6	12
H32/530-HG	HM31/530	MS31/530	192	**500**	530	670	447	80	102	Tr530X6	M8	6	12
H33/530-HG	HM31/530	MS31/530	215	**500**	530	670	504	80	102	Tr530X5	M8	6	12

Adapter sleeves

With nut and retainer



Taper 1:12
(taper 1:30 for H240, H241)



Hydraulic adapter sleeve
Mounting dimensions

Dimension table (continued) · Dimensions in mm

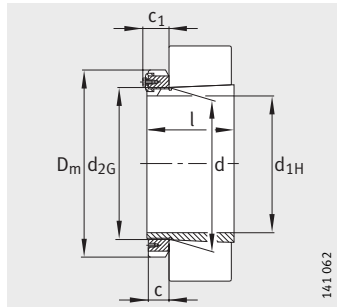
Designation			Mass	Dimensions							Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer	m ≈kg	d_{1H}	d	D_m	l	c ≈	c_1 ≈	d_{2G}	R_0	e	t
H39/560-HG	HM30/560	MS30/560	95,6	**530**	560	650	227	75	96	Tr560X6	M8	6	12
H30/560-HG	HM30/560	MS30/560	112	**530**	560	650	282	75	96	Tr560X6	M8	6	12
H240/560-HG	HM30/560	MS30/560	124	**530**	560	650	358	75	96	Tr560X6	M8	6	12
H31/560-HG	HM31/560	MS31/560	184	**530**	560	710	377	85	107	Tr560X6	M8	6	12
H32/560-HG	HM31/560	MS31/560	218	**530**	560	710	462	85	107	Tr560X6	M8	6	12
H241/560-HG	HM31/560	MS31/560	195	**530**	560	710	468	85	107	Tr560X6	M8	6	12
H33/560-HG	HM31/560	MS31/560	250	**530**	560	710	535	85	107	Tr560X6	M8	6	12
H39/600-HG	HM30/600	MS30/530	129	**560**	600	700	239	75	96	Tr600X6	G1/8	8	12
H30/600-HG	HM30/600	MS30/530	149	**560**	600	700	289	75	96	Tr600X6	G1/8	8	12
H240/600-HG	HM30/600	MS30/530	171	**560**	600	700	377	75	96	Tr600X6	G1/8	8	12
H31/600-HG	HM31/600	MS31/560	234	**560**	600	750	399	85	107	Tr600X6	G1/8	8	12
H32/600-HG	HM31/600	MS31/560	279	**560**	600	750	487	85	107	Tr600X6	G1/8	8	12
H241/600-HG	HM31/600	MS31/560	249	**560**	600	750	490	85	107	Tr600X6	G1/8	8	12
H33/600-HG	HM31/600	MS31/560	320	**560**	600	750	561	85	107	Tr600X6	G1/8	8	12
H39/630-HG	HM30/630	MS30/630	123	**600**	630	730	254	75	96	Tr630X6	M8	6	12
H30/630-HG	HM30/630	MS30/630	139	**600**	630	730	301	75	96	Tr630X6	M8	6	12
H240/630-HG	HM30/630	MS30/630	157	**600**	630	730	395	75	96	Tr630X6	M8	6	12
H31/630-HG	HM31/630	MS31/630	251	**600**	630	800	424	95	117	Tr630X6	M8	6	12
H32/630-HG	HM31/630	MS31/630	297	**600**	630	800	521	95	117	Tr630X6	M8	6	12
H241/630-HG	HM31/630	MS31/630	263	**600**	630	800	525	95	117	Tr630X6	M8	6	12
H33/630-HG	HM31/630	MS31/630	338	**600**	630	800	597	95	117	Tr630X6	M8	6	12
H39/670-HG	HM30/670	MS30/670	166	**630**	670	780	264	80	101	Tr670X6	G1/8	8	12
H30/670-HG	HM30/670	MS30/670	194	**630**	670	780	324	80	101	Tr670X6	G1/8	8	12
H240/670-HG	HM30/670	MS30/670	218	**630**	670	780	418	80	101	Tr670X6	G1/8	8	12
H31/670-HG	HM31/670	MS31/670	341	**630**	670	850	456	106	128	Tr670X6	G1/8	8	12
H241/670-HG	HM31/670	MS31/670	355	**630**	670	850	548	106	128	Tr670X6	G1/8	8	12
H32/670-HG	HM31/670	MS31/670	402	**630**	670	850	558	106	128	Tr670X6	G1/8	8	12
H33/670-HG	HM31/670	MS31/670	453	**630**	670	850	635	106	128	Tr670X6	G1/8	8	12
H39/710-HG	HM30/710	MS30/710	200	**670**	710	830	286	90	111	Tr710X7	G1/8	8	12
H30/710-HG	HM30/710	MS30/710	228	**670**	710	830	342	90	111	Tr710X7	G1/8	8	12
H240/710-HG	HM30/710	MS30/710	254	**670**	710	830	438	90	111	Tr710X7	G1/8	8	12
H31/710-HG	HM31/710	MS31/710	376	**670**	710	900	467	106	131	Tr710X7	G1/8	8	12
H32/710-HG	HM31/710	MS31/710	444	**670**	710	900	572	106	131	Tr710X7	G1/8	8	12
H241/710-HG	HM31/710	MS31/710	397	**670**	710	900	577	106	131	Tr710X7	G1/8	8	12
H33/710-HG	HM31/710	MS31/710	501	**670**	710	900	652	106	131	Tr710X7	G1/8	8	12

Dimension table (continued) · Dimensions in mm

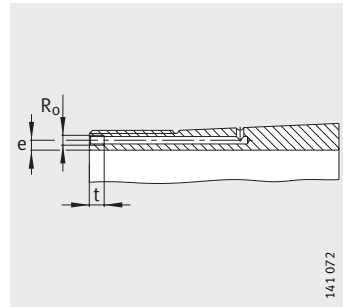
Designation			Mass	Dimensions							Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer	m ≈kg	d_{1H}	d	D_m	l	c ≈	c_1 ≈	d_{2G}	R_0	e	t
H39/750-HG	HM30/750	MS30/750	213	**710**	750	870	291	90	111	Tr750X7	G1/8	8	12
H30/750-HG	HM30/750	MS30/750	248	**710**	750	870	356	90	111	Tr750X7	G1/8	8	12
H240/750-HG	HM30/750	MS30/750	278	**710**	750	870	460	90	111	Tr750X7	G1/8	8	12
H31/750-HG	HM31/750	MS31/750	432	**710**	750	950	493	112	137	Tr750X7	G1/8	8	12
H32/750-HG	HM31/750	MS31/750	508	**710**	750	950	603	112	137	Tr750X7	G1/8	8	12
H241/750-HG	HM31/750	MS31/750	461	**710**	750	950	622	112	137	Tr750X7	G1/8	8	12
H33/750-HG	HM31/750	MS31/750	574	**710**	750	950	688	112	137	Tr750X7	G1/8	8	12
H39/800-HG	HM30/800	MS30/750	263	**750**	800	920	303	90	111	Tr800X7	G1/8	10	12
H30/800-HG	HM30/800	MS30/750	305	**750**	800	920	366	90	111	Tr800X7	G1/8	10	12
H240/800-HG	HM30/800	MS30/750	349	**750**	800	920	475	90	111	Tr800X7	G1/8	10	12
H31/800-HG	HM31/800	MS31/750	515	**750**	800	1 000	505	112	137	Tr800X7	G1/8	10	12
H32/800-HG	HM31/800	MS31/750	611	**750**	800	1 000	618	112	137	Tr800X7	G1/8	10	12
H241/800-HG	HM31/800	MS31/750	552	**750**	800	1 000	627	112	137	Tr800X7	G1/8	10	12
H33/800-HG	HM31/800	MS31/750	716	**750**	800	1 000	730	112	137	Tr800X7	G1/8	10	12
H39/850-HG	HM30/850	MS30/850	292	**800**	850	980	308	90	115	Tr850X7	G1/8	10	12
H30/850-HG	HM30/850	MS30/850	344	**800**	850	980	380	90	115	Tr850X7	G1/8	10	12
H240/850-HG	HM30/850	MS30/850	393	**800**	850	980	495	90	115	Tr850X7	G1/8	10	12
H31/850-HG	HM31/850	MS31/850	590	**800**	850	1 060	536	118	143	Tr850X7	G1/8	10	12
H32/850-HG	HM31/850	MS31/850	696	**800**	850	1 060	651	118	143	Tr850X7	G1/8	10	12
H241/850-HG	HM31/850	MS31/850	624	**800**	850	1 060	658	118	143	Tr850X7	G1/8	10	12
H33/850-HG	HM31/850	MS31/850	814	**800**	850	1 060	766	118	143	Tr850X7	G1/8	10	12
H39/900-HG	HM30/900	MS30/850	335	**850**	900	1 030	326	100	122	Tr900X7	G1/8	10	12
H30/900-HG	HM30/900	MS30/850	392	**850**	900	1 030	400	100	122	Tr900X7	G1/8	10	12
H240/900-HG	HM30/900	MS30/850	446	**850**	900	1 030	520	100	122	Tr900X7	G1/8	10	12
H31/900-HG	HM31/900	MS31/900	674	**850**	900	1 120	557	125	150	Tr900X7	G1/8	10	12
H32/900-HG	HM31/900	MS31/900	775	**850**	900	1 120	660	125	150	Tr900X7	G1/8	10	12
H241/900-HG	HM31/900	MS31/900	712	**850**	900	1 120	685	125	150	Tr900X7	G1/8	10	12
H33/900-HG	HM31/900	MS31/900	923	**850**	900	1 120	795	125	150	Tr900X7	G1/8	10	12
H39/950-HG	HM30/950	MS30/950	369	**900**	950	1 080	344	100	122	Tr950X8	G1/8	10	12
H30/950-HG	HM30/950	MS30/950	432	**900**	950	1 080	420	100	122	Tr950X8	G1/8	10	12
H240/950-HG	HM30/950	MS30/950	499	**900**	950	1 080	557	100	122	Tr950X8	G1/8	10	12
H31/950-HG	HM31/950	MS31/950	738	**900**	950	1 170	583	125	150	Tr950X8	G1/8	10	12
H32/950-HG	HM31/950	MS31/950	835	**900**	950	1 170	675	125	150	Tr950X8	G1/8	10	12
H241/950-HG	HM31/950	MS31/950	776	**900**	950	1 170	715	125	150	Tr950X8	G1/8	10	12
H33/950-HG	HM31/950	MS31/950	1 000	**900**	950	1 170	815	125	150	Tr950X8	G1/8	10	12

Adapter sleeves

With nut and retainer



Taper 1:12
(taper 1:30 for H240, H241)



Hydraulic adapter sleeve
Mounting dimensions

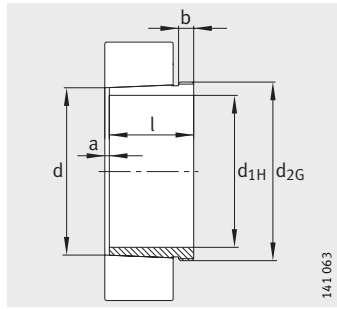
Dimension table (continued) · Dimensions in mm

Designation			Mass	Dimensions							Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer	m ≈kg	d_{1H}	d	D_m	l	c ≈	c_1 ≈	d_{2G}	R_0	e	t
H39/1000-HG	HM30/1000	MS30/1000	410	**950**	1 000	1 140	358	100	122	Tr1000X8	G1/8	10	12
H30/1000-HG	HM30/1000	MS30/1000	474	**950**	1 000	1 140	430	100	122	Tr1000X8	G1/8	10	12
H240/1000-HG	HM30/1000	MS30/1000	539	**950**	1 000	1 140	562	100	122	Tr1000X8	G1/8	10	12
H31/1000-HG	HM31/1000	MS31/1000	840	**950**	1 000	1 240	609	125	150	Tr1000X8	G1/8	10	12
H32/1000-HG	HM31/1000	MS31/1000	952	**950**	1 000	1 240	707	125	150	Tr1000X8	G1/8	10	12
H241/1000-HG	HM31/1000	MS31/1000	886	**950**	1 000	1 240	755	125	150	Tr1000X8	G1/8	10	12
H33/1000-HG	HM31/1000	MS31/1000	1 144	**950**	1 000	1 240	857	125	150	Tr1000X8	G1/8	10	12
H39/1060-HG	HM30/1060	MS30/1000	493	**1 000**	1 060	1 200	372	100	122	Tr1060X8	G1/4	12	15
H30/1060-HG	HM30/1060	MS30/1000	574	**1 000**	1 060	1 200	447	100	122	Tr1060X8	G1/4	12	15
H240/1060-HG	HM30/1060	MS30/1000	665	**1 000**	1 060	1 200	588	100	122	Tr1060X8	G1/4	12	15
H31/1060-HG	HM31/1060	MS31/1000	985	**1 000**	1 060	1 300	622	125	150	Tr1060X8	G1/4	12	15
H241/1060-HG	HM31/1060	MS31/1000	1 056	**1 000**	1 060	1 300	775	125	150	Tr1060X8	G1/4	12	15
H39/1120-HG	HM30/1120	MS30/1000	521	**1 060**	1 120	1 260	372	100	122	Tr1120X8	G1/4	12	15
H30/1120-HG	HM30/1120	MS30/1000	631	**1 060**	1 120	1 260	467	100	122	Tr1120X8	G1/4	12	15
H240/1120-HG	HM30/1120	MS30/1000	728	**1 060**	1 120	1 260	612	100	122	Tr1120X8	G1/4	12	15
H31/1120-HG	HM31/1120	MS31/1000	1 060	**1 060**	1 120	1 360	622	125	150	Tr1120X8	G1/4	12	15
H241/1120-HG	HM31/1120	MS31/1000	1 168	**1 060**	1 120	1 360	805	125	150	Tr1120X8	G1/4	13	15
H39/1180-HG	HM30/1180	MS30/1000	576	**1 120**	1 180	1 320	394	100	122	Tr1180X8	G1/4	12	15
H30/1180-HG	HM30/1180	MS30/1000	682	**1 120**	1 180	1 320	479	100	122	Tr1180X8	G1/4	12	15
H240/1180-HG	HM30/1180	MS30/1000	782	**1 120**	1 180	1 320	625	100	122	Tr1180X8	G1/4	12	15
H31/1180-HG	HM31/1180	MS31/1000	1 163	**1 120**	1 180	1 420	647	125	150	Tr1180X8	G1/4	12	15
H241/1180-HG	HM31/1180	MS31/1000	1 287	**1 120**	1 180	1 420	845	125	150	Tr1180X8	G1/4	13	15
H39/1250-HG	HM30/1250	MS30/1000	708	**1 180**	1 250	1 390	407	110	132	Tr1250X8	G1/4	14	15
H30/1250-HG	HM30/1250	MS30/1000	858	**1 180**	1 250	1 390	509	110	132	Tr1250X8	G1/4	15	15
H240/1250-HG	HM30/1250	MS30/1000	988	**1 180**	1 250	1 390	660	110	132	Tr1250X8	G1/4	14	15
H31/1250-HG	HM31/1250	MS31/1000	1 377	**1 180**	1 250	1 490	677	125	150	Tr1250X8	G1/4	14	15
H241/1250-HG	HM31/1250	MS31/1000	1 542	**1 180**	1 250	1 490	885	125	150	Tr1250X8	G1/4	14	15
H39/1320-HG	HM30/1320	MS30/1000	781	**1 250**	1 320	1 460	430	110	132	Tr1320X8	G1/4	14	15
H30/1320-HG	HM30/1320	MS30/1000	946	**1 250**	1 320	1 460	534	110	132	Tr1320X8	G1/4	15	15
H240/1320-HG	HM30/1320	MS30/1000	1 085	**1 250**	1 320	1 460	690	110	132	Tr1320X8	G1/4	14	15
H31/1320-HG	HM31/1320	MS31/1000	1 515	**1 250**	1 320	1 560	710	125	150	Tr1320X8	G1/4	14	15
H241/1320-HG	HM31/1320	MS31/1000	1 703	**1 250**	1 320	1 560	935	125	150	Tr1320X8	G1/4	14	15

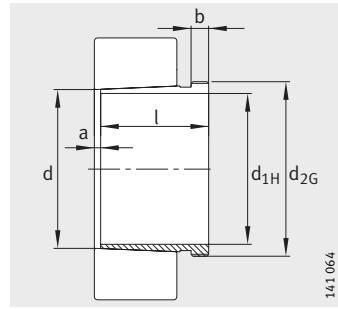
Dimension table (continued) · Dimensions in mm

Designation			Mass	Dimensions							Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer	m ≈kg	d_{1H}	d	D_m	l	c ≈	c_1 ≈	d_{2G}	R_0	e	t
H39/1400-HG	HM30/1400	MS30/1000	924	**1 320**	1 400	1 540	445	110	132	Tr1400X8	G1/4	15	15
H30/1400-HG	HM30/1400	MS30/1000	1 113	**1 320**	1 400	1 540	546	110	132	Tr1400X8	G1/4	15	15
H240/1400-HG	HM30/1400	MS30/1000	1 287	**1 320**	1 400	1 540	705	110	132	Tr1400X8	G1/4	14	15
H31/1400-HG	HM31/1400	MS31/1000	1 792	**1 320**	1 400	1 640	735	130	155	Tr1400X8	G1/4	15	15
H241/1400-HG	HM31/1400	MS31/1000	2 030	**1 320**	1 400	1 640	965	130	155	Tr1400X8	G1/4	15	15
H39/1500-HG	HM30/1500	MS30/1500	1 210	**1 400**	1 500	1 650	465	110	132	Tr1500X8	G1/4	15	15
H30/1500-HG	HM30/1500	MS30/1500	1 534	**1 400**	1 500	1 650	600	110	132	Tr1500X8	G1/4	15	15
H240/1500-HG	HM30/1500	MS30/1500	1 791	**1 400**	1 500	1 650	775	110	132	Tr1500X8	G1/4	14	15
H31/1500-HG	HM31/1500	MS31/1000	2 227	**1 400**	1 500	1 740	755	130	155	Tr1500X8	G1/4	15	15
H241/1500-HG	HM31/1500	MS31/1000	2 564	**1 400**	1 500	1 740	990	130	155	Tr1500X8	G1/4	15	15
H39/1600-HG	MU-195 077A	MS30/850	2 481	**1 500**	1 600	1 730	465	100	112	Tr1600X8	G1/4	15	15
H39/1700-HG	MU-195 078A	MS30/850	2 619	**1 600**	1 700	1 830	475	100	112	Tr1700X8	G1/4	15	15

Withdrawal sleeves



Taper 1:12



AH240, AH241
Taper 1:30

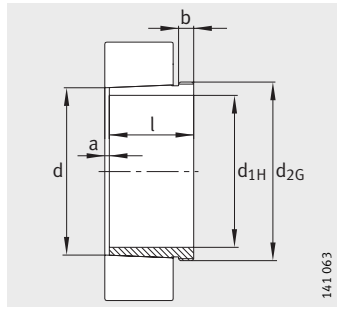
Dimension table · Dimensions in mm

Designation	Mass	Dimensions					
	m	d_{1H}	d	l	a	b	d_{2G}
	≈kg				≈		
AH208	0,08	**35**	40	25	2	6	M45X1,5
AH308	0,09	**35**	40	29	3	6	M45X1,5
AH2308	0,13	**35**	40	40	3	7	M45X1,5
AH3308	0,15	**35**	40	44	3	7	M45X1,5
AH209	0,09	**40**	45	26	3	6	M50X1,5
AH309	0,11	**40**	45	31	3	6	M50X1,5
AH2309	0,17	**40**	45	44	3	7	M50X1,5
AH3309	0,18	**40**	45	47	3	7	M50X1,5
AH210	0,12	**45**	50	28	3	7	M55X2
AHX310	0,14	**45**	50	35	3	7	M55X2
AHX2310	0,22	**45**	50	50	3	9	M55X2
AH3310	0,24	**45**	50	54	3	9	M55X2
AH211	0,13	**50**	55	29	3	7	M60X2
AHX311	0,17	**50**	55	37	3	7	M60X2
AHX2311	0,26	**50**	55	54	3	10	M60X2
AH3311	0,3	**50**	55	60	3	10	M60X2
AH212	0,16	**55**	60	32	3	8	M65X2
AHX312	0,2	**55**	60	40	3	8	M65X2
AHX2312	0,32	**55**	60	58	3	11	M65X2
AH3312	0,41	**55**	60	65	3	11	M70X2
AH213	0,21	**60**	65	32,5	3,5	8	M75X2
AH213G	0,18	**60**	65	32,5	3,5	8	M70X2
AH313	0,27	**60**	65	42	3	8	M75X2
AH313G	0,23	**60**	65	42	3	8	M70X2
AH2313	0,42	**60**	65	61	3	12	M75X2
AH2313G	0,36	**60**	65	61	3	12	M70X2
AH3313	0,49	**60**	65	71	3	12	M75X2
AH214	0,23	**65**	70	33,5	3,5	8	M80X2
AH214G	0,2	**65**	70	33,5	3,5	8	M75X2
AH314	0,29	**65**	70	43	4	8	M80X2
AH314G	0,26	**65**	70	43	4	8	M75X2
AHX2314	0,47	**65**	70	64	4	12	M80X2
AHX2314G	0,42	**65**	70	64	4	12	M75X2
AH3314	0,57	**65**	70	76	4	12	M80X2

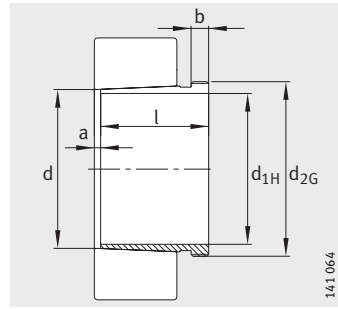
Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions					
	m	d_{1H}	d	l	a	b	d_{2G}
	≈kg				≈		
AH215	0,26	**70**	75	34,5	3,5	8	M85X2
AH215G	0,22	**70**	75	34,5	3,5	8	M80X2
AH315	0,33	**70**	75	45	4	8	M85X2
AH315G	0,29	**70**	75	45	4	8	M80X2
AHX2315	0,54	**70**	75	68	4	12	M85X2
AHX2315G	0,48	**70**	75	68	4	12	M80X2
AH3315	0,66	**70**	75	81	4	12	M85X2
AH216	0,28	**75**	80	35,5	3,5	8	M90X2
AH316	0,38	**75**	80	48	4	8	M90X2
AHX2316	0,61	**75**	80	71	4	12	M90X2
AH3316	0,71	**75**	80	81	4	12	M90X2
AH217	0,33	**80**	85	38,5	3,5	9	M95X2
AHX317	0,44	**80**	85	52	4	9	M95X2
AH3217	0,52	**80**	85	60	4	10	M95X2
AHX2317	0,68	**80**	85	74	4	13	M95X2
AH3317	0,81	**80**	85	86	4	13	M95X2
AH218	0,36	**85**	90	40	4	9	M100X2
AHX318	0,48	**85**	90	53	4	9	M100X2
AHX3218	0,58	**85**	90	63	4	10	M100X2
AHX2318	0,78	**85**	90	79	4	14	M100X2
AH3318	0,88	**85**	90	87	4	14	M100X2
AH219	0,42	**90**	95	43	4	10	M105X2
AHX319	0,55	**90**	95	57	4	10	M105X2
AHX3219	0,67	**90**	95	67	4	11	M105X2
AHX2319	0,91	**90**	95	85	4	16	M105X2
AH3319	1,03	**90**	95	94	4	16	M105X2
AH220	0,46	**95**	100	45	4	10	M110X2
AHX320	0,6	**95**	100	59	4	10	M110X2
AH24020	0,5	**95**	100	62	9	12	M105X2
AHX3120	0,67	**95**	100	64	4	11	M110X2
AHX3220	0,78	**95**	100	73	4	11	M110X2
AH24120	0,63	**95**	100	78	9	13	M105X2
AHX2320	1,03	**95**	100	90	4	16	M110X2
AH3320	1,16	**95**	100	99	4	16	M110X2

Withdrawal sleeves



Taper 1:12



AH240, AH241
Taper 1:30

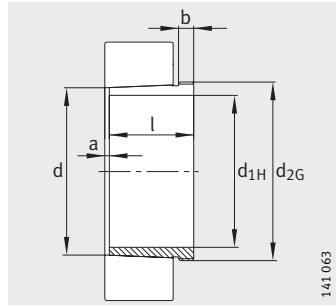
Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions					
	m	d_{1H}	d	l	a	b	d_{2G}
	≈kg				≈		
AH222	0,57	**105**	110	50	4	11	M120X2
AHX322	0,73	**105**	110	63	4	12	M120X2
AHX3122	0,79	**105**	110	68	4	11	M120X2
AH24022	0,65	**105**	110	73	9	13	M115X2
AH24122	0,73	**105**	110	82	9	13	M115X2
AHX3222A	0,98	**105**	110	82	4	11	M120X2
AHX2322	1,38	**105**	110	98	4	16	M125X2
AHX2322G	1,26	**105**	110	98	4	16	M120X2
AH3322	1,54	**105**	110	108	4	16	M125X2
AH224	0,67	**115**	120	53	4	12	M130X2
AHX3024	0,77	**115**	120	60	4	13	M130X2
AHX324	0,89	**115**	120	69	4	13	M130X2
AH24024	0,71	**115**	120	73	9	13	M125X2
AHX3124	0,97	**115**	120	75	4	12	M130X2
AHX3224A	1,22	**115**	120	90	4	13	M130X2
AH24124	1,02	**115**	120	93	9	13	M130X2
AHX2324	1,64	**115**	120	105	4	17	M135X2
AHX2324G	1,5	**115**	120	105	4	17	M130X2
AH3324	1,99	**115**	120	123	4	17	M135X2
AH226	0,72	**125**	130	53	4	12	M140X2
AHX3026	0,94	**125**	130	67	4	14	M140X2
AHX326	1,05	**125**	130	74	4	14	M140X2
AHX3126	1,1	**125**	130	78	4	12	M140X2
AH24026	0,89	**125**	130	83	10	14	M135X2
AH24126	1,13	**125**	130	94	10	14	M140X2
AHX3226	1,61	**125**	130	98	4	15	M145X2
AHX3226G	1,48	**125**	130	98	4	15	M140X2
AHX2326	2	**125**	130	115	4	19	M145X2
AHX2326G	1,84	**125**	130	115	4	19	M140X2
AH3326	2,36	**125**	130	131	4	19	M145X2

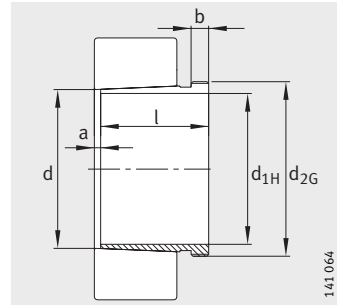
Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions					
	m	d_{1H}	d	l	a	b	d_{2G}
	≈kg				≈		
AH228	0,83	**135**	140	56	5	13	M150X2
AHX3028	1,03	**135**	140	68	5	14	M150X2
AHX328	1,18	**135**	140	77	5	14	M150X2
AH24028	0,96	**135**	140	83	10	14	M145X2
AHX3128	1,29	**135**	140	83	5	14	M150X2
AH24128	1,29	**135**	140	99	10	14	M150X2
AHX3228	1,86	**135**	140	104	5	15	M155X3
AHX3228G	1,72	**135**	140	104	5	15	M150X2
AHX2328	2,4	**135**	140	125	5	20	M155X3
AHX2328G	2,21	**135**	140	125	5	20	M150X2
AH3328	2,72	**135**	140	138	5	20	M155X3
AH230	0,97	**145**	150	60	5	14	M160X3
AHX3030	1,18	**145**	150	72	5	15	M160X3
AHX330	1,54	**145**	150	83	5	15	M165X3
AHX330G	1,39	**145**	150	83	5	15	M160X3
AH24030	1,12	**145**	150	90	11	15	M155X3
AHX3130	1,81	**145**	150	96	5	15	M165X3
AHX3130G	1,66	**145**	150	96	5	15	M160X3
AHX3230	2,25	**145**	150	114	5	17	M165X3
AHX3230G	2,09	**145**	150	114	5	17	M160X3
AH24130	1,63	**145**	150	115	11	15	M160X3
AHX2330	2,88	**145**	150	135	5	24	M165X3
AHX2330G	2,64	**145**	150	135	5	24	M160X3
AH3330	3,36	**145**	150	152	5	24	M165X3

Withdrawal sleeves



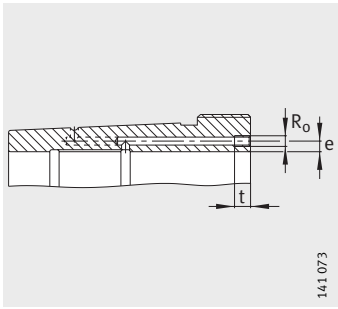
Taper 1:12



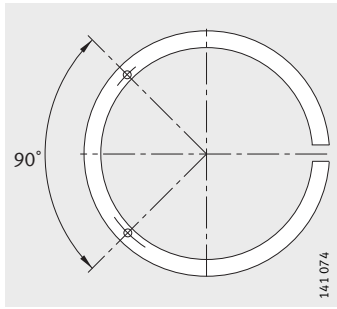
AH240, AH241
Taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						Mounting dimensions		
	m	d_{1H}	d	l	a	b	d_{2G}	R_0	e	t
	≈kg				≈					
AH232	1,71	**150**	160	64	5	15	M170X3	–	–	–
AH3032	2,09	**150**	160	77	5	16	M170X3	–	–	–
AH3032-H	2,09	**150**	160	77	5	16	M170X3	M6	4,2	7
AH332	2,76	**150**	160	88	5	16	M180X3	–	–	–
AH332G	2,42	**150**	160	88	5	16	M170X3	–	–	–
AH24032	2,31	**150**	160	95	11	15	M170X3	–	–	–
AH3132A	2,9	**150**	160	103	5	16	M170X3	–	–	–
AH3132A-H	2,9	**150**	160	103	5	16	M170X3	M6	4,5	7
AH24132	3,04	**150**	160	124	11	15	M170X3	–	–	–
AH3232	4,08	**150**	160	124	6	20	M180X3	–	–	–
AH3232G	3,65	**150**	160	124	6	20	M170X3	–	–	–
AH3232G-H	3,65	**150**	160	124	6	20	M170X3	M6	4,5	7
AH3232-H	4,08	**150**	160	124	6	20	M180X3	M6	4,5	7
AH2332	4,77	**150**	160	140	6	24	M180X3	–	–	–
AH2332G	4,26	**150**	160	140	6	24	M170X3	–	–	–
AH2332G-H	4,26	**150**	160	140	6	24	M170X3	M6	4,5	7
AH2332-H	4,77	**150**	160	140	6	24	M180X3	M6	4,5	7
AH3332	5,58	**150**	160	160	6	24	M180X3	–	–	–
AH3332-H	5,58	**150**	160	160	6	24	M180X3	M6	4,5	7



Hydraulic withdrawal sleeve
(suffix H)
Mounting dimensions

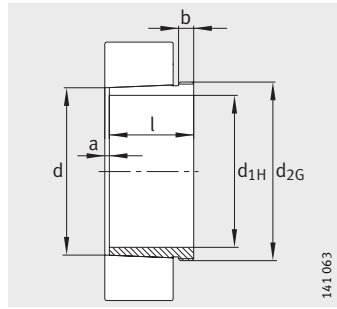


Pump connectors for
hydraulic withdrawal sleeve

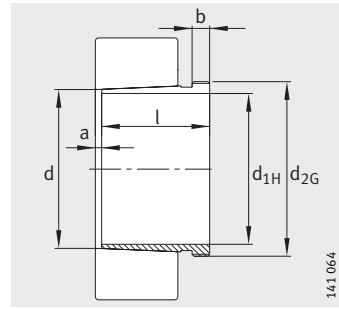
Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						Mounting dimensions		
	m ≈kg	d_{1H}	d	l	a ≈	b	d_{2G}	R_0	e	t
AH3934A	1,65	**160**	170	59	5	13	M180X3	–	–	–
AH234	1,98	**160**	170	69	5	16	M180X3	–	–	–
AH3034	2,48	**160**	170	85	5	17	M180X3	–	–	–
AH3034-H	2,48	**160**	170	85	5	17	M180X3	M6	4,2	7
AH334	3,13	**160**	170	93	5	17	M190X3	–	–	–
AH334G	2,75	**160**	170	93	5	17	M180X3	–	–	–
AH3134A	3,12	**160**	170	104	5	16	M180X3	–	–	–
AH3134A-H	3,12	**160**	170	104	5	16	M180X3	M6	4,5	7
AH24034	2,76	**160**	170	106	11	16	M180X3	–	–	–
AH24134	3,27	**160**	170	125	11	16	M180X3	–	–	–
AH3234	4,83	**160**	170	134	6	24	M190X3	–	–	–
AH3234G	4,29	**160**	170	134	6	24	M180X3	–	–	–
AH3234G-H	4,29	**160**	170	134	6	24	M180X3	M6	4,5	7
AH3234-H	4,83	**160**	170	134	6	24	M190X3	M6	4,5	7
AH2334	5,32	**160**	170	146	6	24	M190X3	–	–	–
AH2334G	4,78	**160**	170	146	6	24	M180X3	–	–	–
AH2334G-H	4,78	**160**	170	146	6	24	M180X3	M6	4,5	7
AH2334-H	5,32	**160**	170	146	6	24	M190X3	M6	4,5	7
AH3334	6,11	**160**	170	164	6	24	M190X3	–	–	–
AH3334-H	6,11	**160**	170	164	6	24	M190X3	M6	4,5	7

Withdrawal sleeves



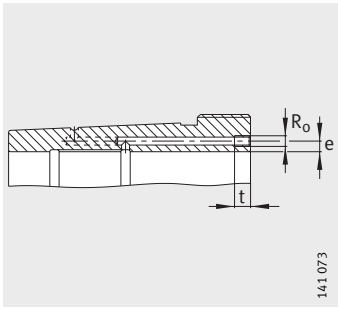
Taper 1:12



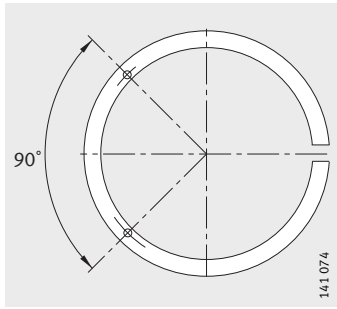
AH240, AH241
Taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						Mounting dimensions		
	m ≈kg	d_{1H}	d	l	a ≈	b	d_{2G}	R_0	e	t
AH3936	1,96	**170**	180	66	5	13	M190X3	–	–	–
AH236	2,1	**170**	180	69	5	16	M190X3	–	–	–
AH3036	2,87	**170**	180	92	6	17	M190X3	–	–	–
AH3036-H	2,87	**170**	180	92	6	17	M190X3	M6	4,2	7
AH2236G	3,35	**170**	180	105	5	17	M190X3	–	–	–
AH2236G-H	3,28	**170**	180	105	5	17	M190X3	M6	4,5	7
AH2236-H	3,68	**170**	180	105	5	17	M200X3	M6	4,5	7
AH3236	5,39	**170**	180	140	6	25	M200X3	–	–	–
AH24036	3,21	**170**	180	116	11	16	M190X3	–	–	–
AH3136A	3,79	**170**	180	116	6	19	M190X3	–	–	–
AH3136A-H	3,79	**170**	180	116	6	19	M190X3	M6	4,5	7
AH24136	3,74	**170**	180	134	11	16	M190X3	–	–	–
AH2236	3,76	**170**	180	105	5	17	M200X3	–	–	–
AH3236G	4,8	**170**	180	140	6	25	M190X3	–	–	–
AH3236G-H	4,8	**170**	180	140	6	25	M190X3	M6	4,5	7
AH3236-H	5,39	**170**	180	140	6	25	M200X3	M6	4,5	7
AH2336	6,04	**170**	180	154	6	26	M200X3	–	–	–
AH2336G	5,42	**170**	180	154	6	26	M190X3	–	–	–
AH2336G-H	5,42	**170**	180	154	6	26	M190X3	M6	4,5	7
AH2336-H	6,04	**170**	180	154	6	26	M200X3	M6	4,5	7
AH3336	7,1	**170**	180	176	6	26	M200X3	–	–	–
AH3336-H	7,1	**170**	180	176	6	26	M200X3	M6	4,5	7



Hydraulic withdrawal sleeve
(suffix H)
Mounting dimensions

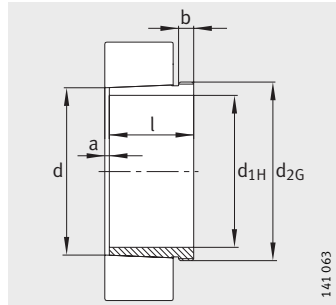


Pump connectors for
hydraulic withdrawal sleeve

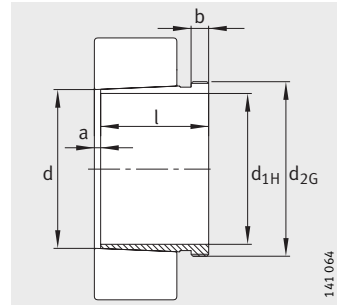
Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						Mounting dimensions		
	m ≈kg	d_{1H}	d	l	a ≈	b	d_{2G}	R_0	e	t
AH3938	2,07	**180**	190	66	5	13	M200X3	–	–	–
AH238	2,57	**180**	190	73	5	17	Tr205X4	–	–	–
AH238G	2,36	**180**	190	73	5	17	M200X3	–	–	–
AH3038	3,42	**180**	190	96	6	18	Tr205X4	–	–	–
AH3038G	3,19	**180**	190	96	6	18	M200X3	–	–	–
AH3038G-H	3,19	**180**	190	96	6	18	M200X3	M6	4,2	7
AH3038-H	3,42	**180**	190	96	6	18	Tr205X4	M6	4,2	7
AH2238	4,28	**180**	190	112	5	18	Tr210X4	–	–	–
AH2238G	3,83	**180**	190	112	5	18	M200X3	–	–	–
AH2238G-H	3,75	**180**	190	112	5	18	M200X3	M6	4,5	7
AH2238-H	4,19	**180**	190	112	5	18	Tr210X4	M6	4,5	7
AH24038	3,48	**180**	190	118	13	18	M200X3	–	–	–
AH3138	4,89	**180**	190	125	6	20	Tr210X4	–	–	–
AH3138G	4,39	**180**	190	125	6	20	M200X3	–	–	–
AH3138G-H	4,39	**180**	190	125	6	20	M200X3	M6	4,5	7
AH3138-H	4,89	**180**	190	125	6	20	Tr210X4	M6	4,5	7
AH3238	5,92	**180**	190	145	7	25	Tr210X4	–	–	–
AH3238G	5,3	**180**	190	145	7	25	M200X3	–	–	–
AH3238G-H	5,3	**180**	190	145	7	25	M200X3	M6	4,5	7
AH3238-H	5,92	**180**	190	145	7	25	Tr210X4	M6	4,5	7
AH24138	4,37	**180**	190	146	13	18	M200X3	–	–	–
AH2338	6,67	**180**	190	160	7	26	Tr210X4	–	–	–
AH2338G	6,02	**180**	190	160	7	26	M200X3	–	–	–
AH2338G-H	6,02	**180**	190	160	7	26	M200X3	M6	4,5	7
AH2338-H	6,67	**180**	190	160	7	26	Tr210X4	M6	4,5	7
AH3338	7,76	**180**	190	181	7	26	Tr210X4	–	–	–
AH3338-H	7,76	**180**	190	181	7	26	Tr210X4	M6	4,5	7

Withdrawal sleeves



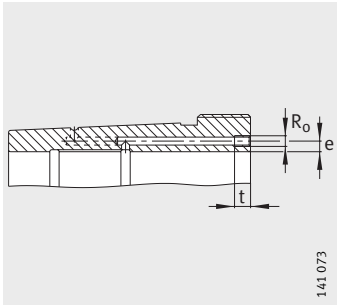
Taper 1:12



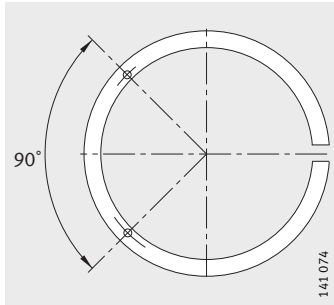
AH240, AH241
Taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						Mounting dimensions		
	m	d_{1H}	d	l	a	b	d_{2G}	R_0	e	t
	≈kg				≈					
AH240	2,88	**190**	200	77	5	18	Tr215X4	–	–	–
AH240G	2,43	**190**	200	77	5	18	Tr210X4	–	–	–
AH3940	2,62	**190**	200	77	6	16	Tr210X4	–	–	–
AH3040	3,86	**190**	200	102	6	19	Tr215X4	–	–	–
AH3040G	3,62	**190**	200	102	6	19	Tr210X4	–	–	–
AH3040G-H	3,62	**190**	200	102	6	19	Tr210X4	M6	4,2	7
AH3040-H	3,86	**190**	200	102	6	19	Tr215X4	M6	4,2	7
AH2240	4,8	**190**	200	118	5	19	Tr220X4	–	–	–
AH2240-H	4,7	**190**	200	118	5	19	Tr220X4	M6	4,5	7
AH24040	3,96	**190**	200	127	13	18	Tr210X4	–	–	–
AH3140	5,6	**190**	200	134	6	21	Tr220X4	–	–	–
AH3140-H	5,6	**190**	200	134	6	21	Tr220X4	M6	4,5	7
AH3240	6,61	**190**	200	153	7	24	Tr220X4	–	–	–
AH3240-H	6,61	**190**	200	153	7	24	Tr220X4	M6	4,5	7
AH24140	5,02	**190**	200	158	13	18	Tr210X4	–	–	–
AH2340	7,64	**190**	200	170	7	30	Tr220X4	–	–	–
AH2340-H	7,64	**190**	200	170	7	30	Tr220X4	M6	4,5	7
AH3340	9,04	**190**	200	195	7	30	Tr220X4	–	–	–
AH3340-H	9,04	**190**	200	195	7	30	Tr220X4	M6	4,5	7



Hydraulic withdrawal sleeve
(suffix H)
Mounting dimensions

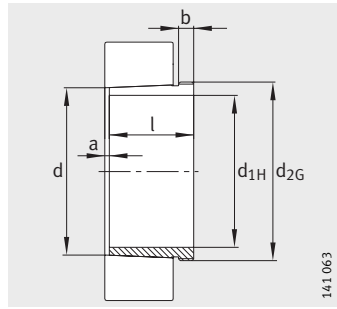


Pump connectors for
hydraulic withdrawal sleeve

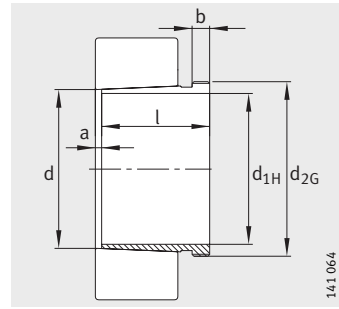
Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						Mounting dimensions		
	m ≈kg	d_{1H}	d	l	a ≈	b	d_{2G}	R_0	e	t
AH3944	4,81	**200**	220	77	6	16	Tr230X4	–	–	–
AH3944-H	4,81	**200**	220	77	6	16	Tr230X4	M8	7,5	12
AH244	5,62	**200**	220	85	6	18	Tr235X4	–	–	–
AH244G	5,36	**200**	220	85	6	18	Tr230X4	–	–	–
AH3044	7,47	**200**	220	111	6	20	Tr235X4	–	–	–
AH3044G	7,18	**200**	220	111	6	20	Tr230X4	–	–	–
AH3044G-H	7,18	**200**	220	111	6	20	Tr230X4	G1/8	6,5	12
AH3044-H	7,47	**200**	220	111	6	20	Tr235X4	G1/8	8,5	12
AH2244	9,17	**200**	220	130	6	20	Tr240X4	–	–	–
AH2244-H	8,99	**200**	220	130	6	20	Tr240X4	G1/8	8,5	12
AH24044	8,22	**200**	220	138	14	18	Tr230X4	–	–	–
AH24044-H	8,22	**200**	220	138	14	18	Tr230X4	M6	8	7
AH3144	10,4	**200**	220	145	6	23	Tr240X4	–	–	–
AH3144-H	10,4	**200**	220	145	6	23	Tr240X4	G1/8	8,5	12
AH24144	10,3	**200**	220	170	14	20	Tr230X4	–	–	–
AH24144-H	10,3	**200**	220	170	14	20	Tr230X4	M6	8	7
AH2344	13,6	**200**	220	181	8	30	Tr240X4	–	–	–
AH2344-H	13,6	**200**	220	181	8	30	Tr240X4	G1/8	8,5	12
AH3344	16,2	**200**	220	210	8	30	Tr240X4	–	–	–
AH3344-H	16,2	**200**	220	210	8	30	Tr240X4	G1/8	8,5	12

Withdrawal sleeves



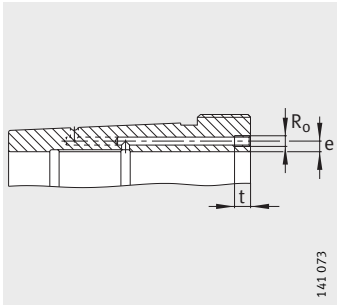
Taper 1:12



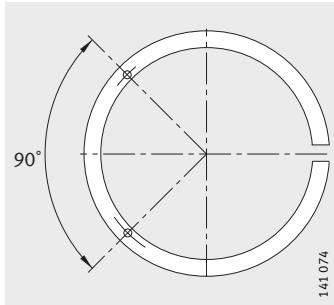
AH240, AH241
Taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						Mounting dimensions		
	m	d_{1H}	d	l	a	b	d_{2G}	R_0	e	t
	≈kg				≈					
AH3948	5,26	**220**	240	77	6	16	Tr250X4	–	–	–
AH3948-H	5,26	**220**	240	77	6	16	Tr250X4	M8	7,5	12
AH248	7,41	**220**	240	96	6	22	Tr260X4	–	–	–
AH3048	8,92	**220**	240	116	7	21	Tr260X4	–	–	–
AH3048-H	8,92	**220**	240	116	7	21	Tr260X4	G1/8	8,5	12
AH24048	9,03	**220**	240	138	15	20	Tr250X4	–	–	–
AH24048-H	9,03	**220**	240	138	15	20	Tr250X4	M6	8	7
AH2248	11,3	**220**	240	144	6	21	Tr260X4	–	–	–
AH2248-H	11,0	**220**	240	144	6	21	Tr260X4	G1/8	8,5	12
AH3148	12,3	**220**	240	154	7	25	Tr260X4	–	–	–
AH3148-H	12,3	**220**	240	154	7	25	Tr260X4	G1/8	8,5	12
AH24148	12,6	**220**	240	180	15	20	Tr260X4	–	–	–
AH24148-H	12,6	**220**	240	180	15	20	Tr260X4	G1/8	8,5	12
AH2348	15,6	**220**	240	189	8	30	Tr260X4	–	–	–
AH2348-H	15,6	**220**	240	189	8	30	Tr260X4	G1/8	8,5	12
AH3348	19,3	**220**	240	225	8	30	Tr260X4	–	–	–
AH3348-H	19,3	**220**	240	225	8	30	Tr260X4	G1/8	8,5	12



Hydraulic withdrawal sleeve
(suffix H)
Mounting dimensions

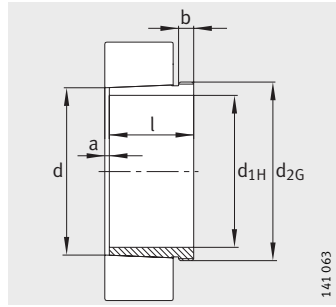


Pump connectors for
hydraulic withdrawal sleeve

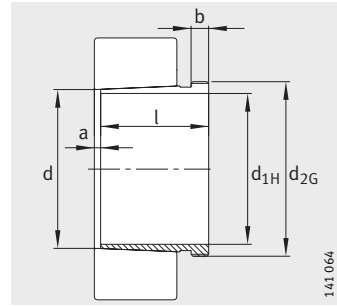
Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						Mounting dimensions		
	m ≈kg	d_{1H}	d	l	a ≈	b	d_{2G}	R_0	e	t
AH3952	7,39	**240**	260	94	6	18	Tr275X4	–	–	–
AH3952G	7,7	**240**	260	94	6	18	Tr280X4	–	–	–
AH3952G-H	7,7	**240**	260	94	6	18	Tr280X4	M8	7,5	12
AH3952-H	7,39	**240**	260	94	6	18	Tr275X4	M8	7,5	12
AH252	8,83	**240**	260	105	6	23	Tr280X4	–	–	–
AH3052	10,8	**240**	260	128	7	23	Tr280X4	–	–	–
AH3052-H	10,8	**240**	260	128	7	23	Tr280X4	G1/8	8,5	12
AH2252	14,1	**240**	260	155	6	23	Tr290X4	–	–	–
AH2252G	13,3	**240**	260	155	6	23	Tr280X4	–	–	–
AH2252G-H	13,1	**240**	260	155	6	23	Tr280X4	G1/8	8,5	12
AH2252-H	13,8	**240**	260	155	6	23	Tr290X4	G1/8	8,5	12
AH24052	11,6	**240**	260	162	16	20	Tr270X4	–	–	–
AH24052G	12,3	**240**	260	162	16	20	Tr280X4	–	–	–
AH24052G-H	12,3	**240**	260	162	16	20	Tr280X4	M6	8	7
AH24052-H	11,6	**240**	260	162	16	20	Tr270X4	M6	8	7
AH3152	16	**240**	260	172	7	26	Tr290X4	–	–	–
AH3152G	15,1	**240**	260	172	7	26	Tr280X4	–	–	–
AH3152G-H	15,1	**240**	260	172	7	26	Tr280X4	G1/8	7	12
AH3152-H	16	**240**	260	172	7	26	Tr290X4	G1/8	7	12
AH24152	15,5	**240**	260	202	16	22	Tr280X4	–	–	–
AH24152-H	15,5	**240**	260	202	16	22	Tr280X4	G1/8	8,5	12
AH2352	19,7	**240**	260	205	8	30	Tr290X4	–	–	–
AH2352G	18,7	**240**	260	205	8	30	Tr280X4	–	–	–
AH2352G-H	18,7	**240**	260	205	8	30	Tr280X4	G1/8	8,5	12
AH2352-H	19,7	**240**	260	205	8	30	Tr290X4	G1/8	8,5	12
AH3352	23,2	**240**	260	236	8	30	Tr290X4	–	–	–
AH3352-H	23,2	**240**	260	236	8	30	Tr290X4	G1/8	8,5	12

Withdrawal sleeves



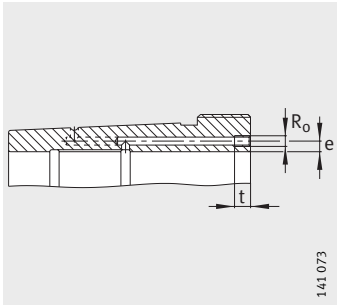
Taper 1:12



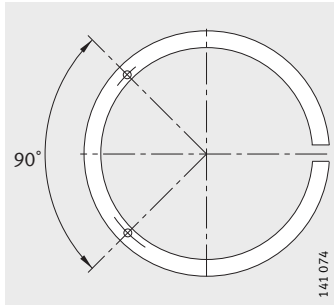
AH240, AH241
Taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						Mounting dimensions		
	m ≈kg	d_{1H}	d	l	a ≈	b	d_{2G}	R_0	e	t
AH3956	7,98	**260**	280	94	6	18	Tr295X4	–	–	–
AH3956G	8,3	**260**	280	94	6	18	Tr300X4	–	–	–
AH3956G-H	8,3	**260**	280	94	6	18	Tr300X4	M8	7,5	12
AH3956-H	7,98	**260**	280	94	6	18	Tr295X4	M8	7,5	12
AH256	9,52	**260**	280	105	8	23	Tr300X4	–	–	–
AH3056	12	**260**	280	131	8	24	Tr300X4	–	–	–
AH3056-H	12	**260**	280	131	8	24	Tr300X4	G1/8	8,5	12
AH2256	15,3	**260**	280	155	8	24	Tr310X4	–	–	–
AH2256G	14,4	**260**	280	155	8	24	Tr300X4	–	–	–
AH2256G-H	14,1	**260**	280	155	8	24	Tr300X4	G1/8	8,5	12
AH2256-H	15	**260**	280	155	8	24	Tr310X4	G1/8	8,5	12
AH24056	12,6	**260**	280	162	17	22	Tr290X4	–	–	–
AH24056G	13,4	**260**	280	162	17	22	Tr300X4	–	–	–
AH24056G-H	13,4	**260**	280	162	17	22	Tr300X4	M6	8	7
AH24056-H	12,6	**260**	280	162	17	22	Tr290X4	M6	8	7
AH3156	17,7	**260**	280	175	8	28	Tr310X4	–	–	–
AH3156G	16,7	**260**	280	175	8	28	Tr300X4	–	–	–
AH3156G-H	16,7	**260**	280	175	8	28	Tr300X4	G1/8	8,5	12
AH3156-H	17,7	**260**	280	175	8	28	Tr310X4	G1/8	8,5	12
AH24156	16,7	**260**	280	202	17	22	Tr300X4	–	–	–
AH24156-H	16,7	**260**	280	202	17	22	Tr300X4	G1/8	8,5	12
AH2356	22,1	**260**	280	212	8	30	Tr310X4	–	–	–
AH2356G	20,9	**260**	280	212	8	30	Tr300X4	–	–	–
AH2356G-H	20,9	**260**	280	212	8	30	Tr300X4	G1/8	8,5	12
AH2356-H	22,1	**260**	280	212	8	30	Tr310X4	G1/8	8,5	12
AH3356	27,4	**260**	280	254	8	30	Tr310X4	–	–	–
AH3356-H	27,4	**260**	280	254	8	30	Tr310X4	G1/8	8,5	12



Hydraulic withdrawal sleeve
(suffix H)
Mounting dimensions

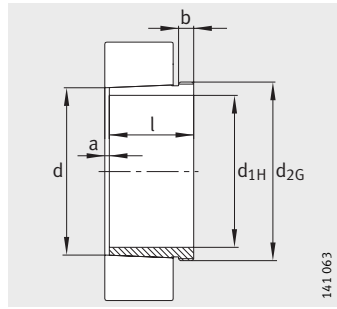


Pump connectors for
hydraulic withdrawal sleeve

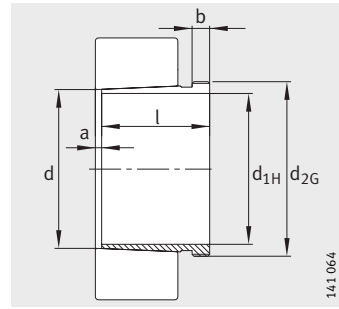
Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						Mounting dimensions		
	m	d_{1H}	d	l	a	b	d_{2G}	R_0	e	t
	≈kg				≈					
AH3960	10,4	**280**	300	112	7	21	Tr315X5	–	–	–
AH3960G	10,8	**280**	300	112	7	21	Tr320X5	–	–	–
AH3960G-H	10,8	**280**	300	112	7	21	Tr320X5	M8	7,5	12
AH3960-H	10,4	**280**	300	112	7	21	Tr315X5	M8	7,5	12
AH3060	14,4	**280**	300	145	8	26	Tr320X5	–	–	–
AH3060-H	14,4	**280**	300	145	8	26	Tr320X5	G1/8	8,5	12
AH2260	18,3	**280**	300	170	8	26	Tr330X5	–	–	–
AH2260G	17,2	**280**	300	170	8	26	Tr320X5	–	–	–
AH2260G-H	16,9	**280**	300	170	8	26	Tr320X5	G1/8	8,5	12
AH2260-H	17,9	**280**	300	170	8	26	Tr330X5	G1/8	8,5	12
AH24060	15,5	**280**	300	184	18	24	Tr310X4	–	–	–
AH24060G	16,4	**280**	300	184	18	24	Tr320X5	–	–	–
AH24060G-H	16,4	**280**	300	184	18	24	Tr320X5	M6	8	7
AH24060-H	15,5	**280**	300	184	18	24	Tr310X4	M6	8	7
AH3160	21,2	**280**	300	192	8	30	Tr330X5	–	–	–
AH3160G	20	**280**	300	192	8	30	Tr320X5	–	–	–
AH3160G-H	20	**280**	300	192	8	30	Tr320X5	G1/8	8,5	12
AH3160-H	21,2	**280**	300	192	8	30	Tr330X5	G1/8	8,5	12
AH24160	20,1	**280**	300	224	18	24	Tr320X5	–	–	–
AH24160-H	20,1	**280**	300	224	18	24	Tr320X5	G1/8	8,5	12
AH3260	26	**280**	300	228	8	34	Tr330X5	–	–	–
AH3260G	24,6	**280**	300	228	8	34	Tr320X5	–	–	–
AH3260G-H	24,6	**280**	300	228	8	34	Tr320X5	G1/8	8,5	12
AH3260-H	26	**280**	300	228	8	34	Tr330X5	G1/8	8,5	12
AH3360	31,8	**280**	300	270	8	34	Tr330X5	–	–	–
AH3360-H	31,8	**280**	300	270	8	34	Tr330X5	G1/8	8,5	12

Withdrawal sleeves



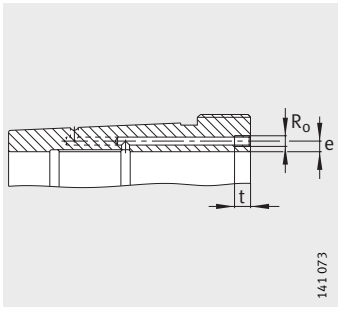
Taper 1:12



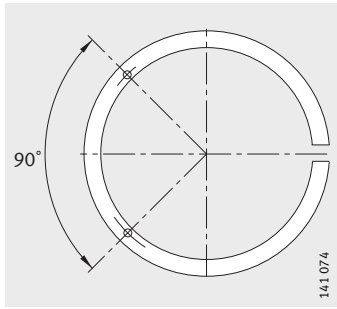
AH240, AH241
Taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						Mounting dimensions		
	m ≈kg	d_{1H}	d	l	a ≈	b	d_{2G}	R_0	e	t
AH3964G-H	11,5	**300**	320	112	7	21	Tr340X5	M8	7,5	12
AH3964-H	11,1	**300**	320	112	7	21	Tr335X5	M8	7,5	12
AH3064G-H	15,9	**300**	320	149	8	27	Tr340X5	G1/8	8,5	12
AH3064-H	16,5	**300**	320	149	8	27	Tr345X5	G1/8	8,5	12
AH2264G-H	19,3	**300**	320	180	10	27	Tr340X5	G1/8	8,5	12
AH2264-H	20,4	**300**	320	180	10	27	Tr350X5	G1/8	8,5	12
AH24064G-H	17,5	**300**	320	184	18	24	Tr340X5	M6	8	7
AH24064-H	16,6	**300**	320	184	18	24	Tr330X5	M6	8	7
AH3164G-H	23,6	**300**	320	209	8	31	Tr340X5	G1/8	8,5	12
AH3164-H	24,9	**300**	320	209	8	31	Tr350X5	G1/8	8,5	12
AH24164-H	23,4	**300**	320	242	18	24	Tr340X5	G1/8	8,5	12
AH3264G-H	28,9	**300**	320	246	8	36	Tr340X5	G1/8	8,5	12
AH3264-H	30,4	**300**	320	246	8	36	Tr350X5	G1/8	8,5	12
AH3364-H	37,9	**300**	320	294	8	36	Tr350X5	G1/8	8,5	12
AH3968G-H	12,3	**320**	340	112	7	21	Tr360X5	M8	7,5	12
AH3968-H	11,8	**320**	340	112	7	21	Tr355X5	M8	7,5	12
AH3068G-H	18,6	**320**	340	162	9	28	Tr360X5	G1/8	8,5	12
AH3068-H	19,2	**320**	340	162	9	28	Tr365X5	G1/8	8,5	12
AH24068-H	21,1	**320**	340	206	19	26	Tr360X5	G1/8	8,5	12
AH3168G-H	27,5	**320**	340	225	9	33	Tr360X5	G1/8	8,5	12
AH3168-H	28,9	**320**	340	225	9	33	Tr370X5	G1/8	8,5	12
AH3268G-H	33,6	**320**	340	264	9	38	Tr360X5	G1/8	8,5	12
AH3268-H	35,3	**320**	340	264	9	38	Tr370X5	G1/8	8,5	12
AH24168-H	28	**320**	340	269	19	26	Tr360X5	G1/8	8,5	12
AH3368-H	43,1	**320**	340	310	9	38	Tr370X5	G1/8	8,5	12



Hydraulic withdrawal sleeve
(suffix H)
Mounting dimensions

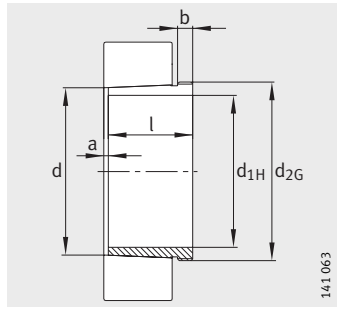


Pump connectors for
hydraulic withdrawal sleeve

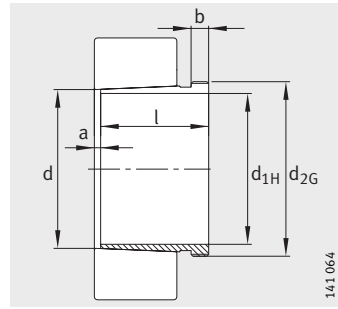
Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						Mounting dimensions		
	m ≈kg	d_{1H}	d	l	a ≈	b	d_{2G}	R_0	e	t
AH3972G-H	13	**340**	360	112	7	21	Tr380X5	M8	7,5	12
AH3972-H	12,5	**340**	360	112	7	21	Tr375X5	M8	7,5	12
AH3072G-H	20,5	**340**	360	167	9	30	Tr380X5	G1/8	8,5	12
AH3072-H	21,2	**340**	360	167	9	30	Tr385X5	G1/8	8,5	12
AH24072-H	22,3	**340**	360	206	20	26	Tr380X5	G1/8	8,5	12
AH3172G-H	29,8	**340**	360	229	9	35	Tr380X5	G1/8	8,5	12
AH3172-H	33,1	**340**	360	229	9	35	Tr400X5	G1/8	8,5	12
AH24172-H	29,7	**340**	360	269	20	26	Tr380X5	G1/8	8,5	12
AH3272G-H	37,3	**340**	360	274	9	40	Tr380X5	G1/8	8,5	12
AH3272-H	41,1	**340**	360	274	9	40	Tr400X5	G1/8	8,5	12
AH3372-H	51,5	**340**	360	330	9	40	Tr400X5	G1/8	8,5	12
AH3976G-H	16,1	**360**	380	130	8	22	Tr400X5	M8	7,5	12
AH3976-H	15,6	**360**	380	130	8	22	Tr395X5	M8	7,5	12
AH3076G-H	22,1	**360**	380	170	10	31	Tr400X5	G1/8	8,5	12
AH3076-H	23,6	**360**	380	170	10	31	Tr410X5	G1/8	8,5	12
AH24076-H	24	**360**	380	208	20	28	Tr400X5	G1/8	8,5	12
AH3176G-H	32	**360**	380	232	10	36	Tr400X5	G1/8	8,5	12
AH3176-H	35,6	**360**	380	232	10	36	Tr420X5	G1/8	8,5	12
AH24176-H	31,8	**360**	380	271	20	28	Tr400X5	G1/8	8,5	12
AH3276G-H	41,3	**360**	380	284	10	42	Tr400X5	G1/8	8,5	12
AH3276-H	45,5	**360**	380	284	10	42	Tr420X5	G1/8	8,5	12
AH3376-H	57,1	**360**	380	342	10	42	Tr420X5	G1/8	8,5	12
AH3980G-H	17	**380**	400	130	8	22	Tr420X5	M8	7,5	12
AH3980-H	16,4	**380**	400	130	8	22	Tr415X5	M8	7,5	12
AH3080G-H	25,4	**380**	400	183	10	33	Tr420X5	G1/8	8,5	12
AH3080-H	27,1	**380**	400	183	10	33	Tr430X5	G1/8	8,5	12
AH24080-H	27,8	**380**	400	228	20	28	Tr420X5	G1/8	8,5	12
AH3180G-H	35,1	**380**	400	240	10	38	Tr420X5	G1/8	8,5	12
AH3180-H	39,1	**380**	400	240	10	38	Tr440X5	G1/8	8,5	12
AH24180-H	34,4	**380**	400	278	20	28	Tr420X5	G1/8	8,5	12
AH3280G-H	47,1	**380**	400	302	10	44	Tr420X5	G1/8	8,5	12
AH3280-H	51,7	**380**	400	302	10	44	Tr440X5	G1/8	8,5	12
AH3380-H	62,5	**380**	400	352	10	44	Tr440X5	G1/8	8,5	12

Withdrawal sleeves



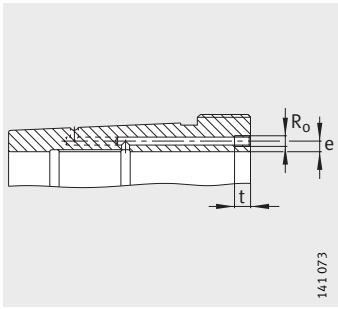
Taper 1:12



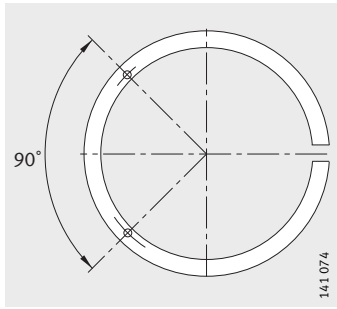
AH240, AH241
Taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						Mounting dimensions		
	m ≈kg	d_{1H}	d	l	a ≈	b	d_{2G}	R_0	e	t
AH3984G-H	17,8	**400**	420	130	8	22	Tr440X5	M8	7,5	12
AH3984-H	17,3	**400**	420	130	8	22	Tr435X5	M8	7,5	12
AH3084G-H	27,2	**400**	420	186	10	34	Tr440X5	G1/8	8,5	12
AH3084-H	29,1	**400**	420	186	10	34	Tr450X5	G1/8	8,5	12
AH24084-H	29,6	**400**	420	230	22	30	Tr440X5	G1/8	8,5	12
AH3184G-H	42	**400**	420	266	10	40	Tr440X5	G1/8	8,5	12
AH3184-H	46,4	**400**	420	266	10	40	Tr460X5	G1/8	8,5	12
AH24184-H	41	**400**	420	310	22	30	Tr440X5	G1/8	8,5	12
AH3284G-H	53,6	**400**	420	321	10	46	Tr440X5	G1/8	8,5	12
AH3284-H	58,6	**400**	420	321	10	46	Tr460X5	G1/8	8,5	12
AH3384-H	67,9	**400**	420	361	10	46	Tr460X5	G1/8	8,5	12
AH3988-H	21,2	**420**	440	145	8	25	Tr460X5	G1/8	8,5	12
AHX3088G-H	30	**420**	440	194	11	35	Tr460X5	G1/8	8,5	12
AHX3088-H	31,9	**420**	440	194	11	35	Tr470X5	G1/8	8,5	12
AH24088-H	32,8	**420**	440	242	22	30	Tr460X5	G1/8	8,5	12
AHX3188G-H	44,9	**420**	440	270	11	42	Tr460X5	G1/8	8,5	12
AHX3188-H	49,7	**420**	440	270	11	42	Tr480X5	G1/8	8,5	12
AH24188-H	42,9	**420**	440	310	22	30	Tr460X5	G1/8	8,5	12
AHX3288G-H	58,2	**420**	440	330	11	48	Tr460X5	G1/8	8,5	12
AHX3288-H	63,7	**420**	440	330	11	48	Tr480X5	G1/8	8,5	12
AH3388-H	79,6	**420**	440	393	11	48	Tr480X5	G1/8	8,5	12
AH3992-H	22,2	**440**	460	145	8	25	Tr480X5	G1/8	8,5	12
AHX3092G-H	32,9	**440**	460	202	11	37	Tr480X5	G1/8	8,5	12
AHX3092-H	35,1	**440**	460	202	11	37	Tr490X5	G1/8	8,5	12
AH24092-H	35,6	**440**	460	250	23	32	Tr480X5	G1/8	8,5	12
AHX3192G-H	50,3	**440**	460	285	11	43	Tr480X5	G1/8	8,5	12
AHX3192-H	58	**440**	460	285	11	43	Tr510X6	G1/8	8,5	12
AH24192-H	48,7	**440**	460	332	23	32	Tr480X5	G1/8	8,5	12
AHX3292G-H	65,6	**440**	460	349	11	50	Tr480X5	G1/8	8,5	12
AHX3292-H	74,6	**440**	460	349	11	50	Tr510X6	G1/8	8,5	12
AH3392-H	92,6	**440**	460	415	11	50	Tr510X6	G1/8	8,5	12



Hydraulic withdrawal sleeve
Mounting dimensions

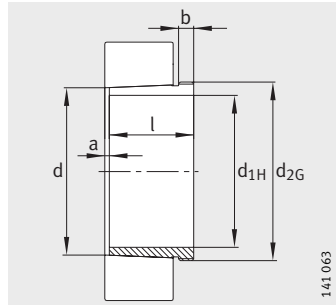


Pump connectors for
hydraulic withdrawal sleeve

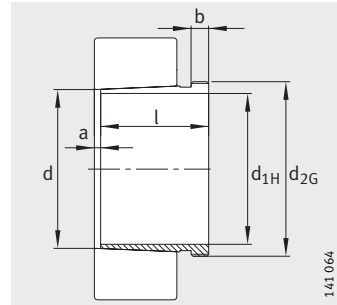
Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						Mounting dimensions		
	m	d_{1H}	d	l	a	b	d_{2G}	R_0	e	t
	≈kg				≈					
AH3996-H	25,7	**460**	480	158	9	28	Tr500X5	G1/8	8,5	12
AHX3096G-H	35	**460**	480	205	12	38	Tr500X5	G1/8	8,5	12
AHX3096-H	39,7	**460**	480	205	12	38	Tr520X6	G1/8	8,5	12
AH24096-H	37,2	**460**	480	250	23	32	Tr500X5	G1/8	8,5	12
AHX3196G-H	54,8	**460**	480	295	12	45	Tr500X5	G1/8	8,5	12
AHX3196-H	63,3	**460**	480	295	12	45	Tr530X6	G1/8	8,5	12
AH24196G-H	52,2	**460**	480	340	23	32	Tr500X5	G1/8	8,5	12
AH24196-H	52,9	**460**	480	343	25	35	Tr500X5	G1/8	8,5	12
AHX3296G-H	72,4	**460**	480	364	12	52	Tr500X5	G1/8	8,5	12
AHX3296-H	82,2	**460**	480	364	12	52	Tr530X6	G1/8	8,5	12
AH3396-H	100	**460**	480	427	12	52	Tr530X6	G1/8	8,5	12
AH39/500G-H	29,8	**480**	500	162	10	32	Tr530X6	G1/8	8,5	12
AH39/500-H	27,7	**480**	500	162	10	32	Tr520X6	G1/8	8,5	12
AHX30/500G-H	39,9	**480**	500	209	12	40	Tr530X6	G1/8	8,5	12
AHX30/500-H	42,5	**480**	500	209	12	40	Tr540X6	G1/8	8,5	12
AH240/500G-H	41,7	**480**	500	253	23	35	Tr530X6	G1/8	8,5	12
AH240/500-H	39,5	**480**	500	253	23	35	Tr520X6	G1/8	8,5	12
AHX31/500G-H	64,7	**480**	500	313	12	47	Tr530X6	G1/8	8,5	12
AHX31/500-H	70,9	**480**	500	313	12	47	Tr550X6	G1/8	8,5	12
AH241/500G-H	60,5	**480**	500	360	23	35	Tr530X6	G1/8	8,5	12
AH241/500-H	58,8	**480**	500	362	25	37	Tr520X6	G1/8	8,5	12
AHX32/500G-H	87,3	**480**	500	393	12	54	Tr530X6	G1/8	8,5	12
AHX32/500-H	94,4	**480**	500	393	12	54	Tr550X6	G1/8	8,5	12
AH33/500-H	110	**480**	500	442	12	54	Tr550X6	G1/8	8,5	12
AH39/530G-H	45,6	**500**	530	175	10	37	Tr560X6	G1/4	10	15
AH39/530-H	43,1	**500**	530	175	10	37	Tr550X6	G1/4	10	15
AH30/530A-H	61,7	**500**	530	230	12	45	Tr560X6	G1/4	10	15
AH240/530G-H	67,5	**500**	530	285	24	35	Tr560X6	G1/4	8,5	15
AH240/530-H	66,8	**500**	530	290	25	40	Tr550X6	G1/4	8,5	15
AH31/530A-H	92,3	**500**	530	325	12	53	Tr560X6	G1/4	10	15
AH241/530G-H	89	**500**	530	370	24	35	Tr560X6	G1/4	10	15
AH241/530-H	88,2	**500**	530	375	25	40	Tr550X6	G1/4	10	15
AH32/530AG-H	124	**500**	530	412	12	57	Tr560X6	G1/4	10	15
AH32/530-A-H	132	**500**	530	412	12	57	Tr580X6	G1/4	10	15
AH33/530-H	155	**500**	530	469	12	57	Tr580X6	G1/4	10	15

Withdrawal sleeves



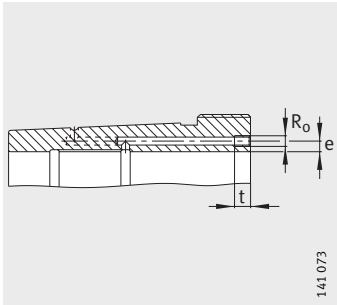
Taper 1:12



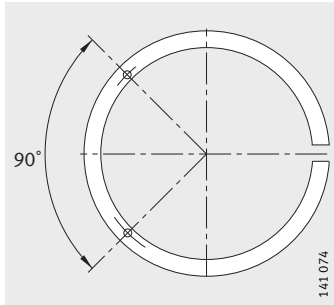
AH240, AH241
Taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						Mounting dimensions		
	m ≈kg	d_{1H}	d	l	a ≈	b	d_{2G}	R_0	e	t
AH39/560G-H	52,3	**530**	560	180	10	37	Tr600X6	G1/4	12	15
AH39/560-H	47	**530**	560	180	10	37	Tr580X6	G1/4	12	15
AH30/560AG-H	71,6	**530**	560	240	12	45	Tr600X6	G1/4	12	15
AH30/560A-H	68,4	**530**	560	240	12	45	Tr590X6	G1/4	12	15
AH240/560G-H	77,5	**530**	560	296	24	38	Tr600X6	G1/4	8,5	15
AH240/560-H	72,7	**530**	560	298	25	40	Tr580X6	G1/4	8,5	15
AH31/560AG-H	105	**530**	560	335	12	55	Tr600X6	G1/4	12	15
AH31/560A-H	101	**530**	560	335	12	55	Tr590X6	G1/4	12	15
AH241/560G-H	104	**530**	560	393	24	38	Tr600X6	G1/4	12	15
AH241/560-H	101	**530**	560	400	28	45	Tr580X6	G1/4	12	15
AH32/560AG-H	139	**530**	560	422	12	57	Tr600X6	G1/4	12	15
AH32/560A-H	144	**530**	560	422	12	57	Tr610X6	G1/4	12	15
AH33/560-H	166	**530**	560	475	12	57	Tr610X6	G1/4	12	15
AH39/600G-H	57	**570**	600	192	10	38	Tr630X6	G1/4	12	15
AH39/600-H	55,6	**570**	600	192	10	38	Tr625X6	G1/4	12	15
AH30/600A-H	75	**570**	600	245	14	45	Tr630X6	G1/4	12	15
AH240/600G-H	84,1	**570**	600	310	26	38	Tr630X6	G1/4	8,5	15
AH240/600-H	85,4	**570**	600	317	30	45	Tr625X6	G1/4	8,5	15
AH31/600A-H	116	**570**	600	355	14	55	Tr630X6	G1/4	12	15
AH241/600G-H	114	**570**	600	413	26	38	Tr630X6	G1/4	12	15
AH241/600-H	118	**570**	600	425	30	50	Tr625X6	G1/4	12	15
AH32/600AG-H	155	**570**	600	445	14	57	Tr630X6	G1/4	12	15
AH32/600A-H	164	**570**	600	445	14	57	Tr650X6	G1/4	12	15
AH33/600-H	200	**570**	600	519	14	57	Tr650X6	G1/4	12	15



Hydraulic withdrawal sleeve
(suffix H)
Mounting dimensions

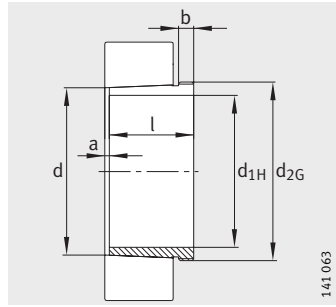


Pump connectors for
hydraulic withdrawal sleeve

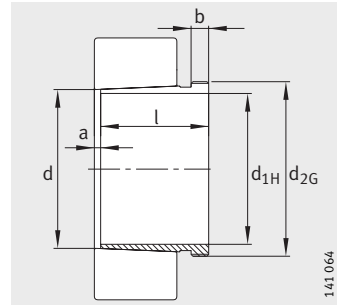
Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						Mounting dimensions		
	m ≈kg	d_{1H}	d	l	a ≈	b	d_{2G}	R_0	e	t
AH39/630G-H	69,4	**600**	630	210	12	40	Tr670X6	G1/4	12	15
AH39/630-H	64,5	**600**	630	210	12	40	Tr655X6	G1/4	12	15
AH30/630A-H	87,3	**600**	630	258	14	46	Tr670X6	G1/4	12	15
AH240/630G-H	97,9	**600**	630	330	26	40	Tr670X6	G1/4	8,5	15
AH240/630-H	95,1	**600**	630	335	30	45	Tr655X6	G1/4	8,5	15
AH31/630A-H	136	**600**	630	375	14	60	Tr670X6	G1/4	12	15
AH241/630G-H	133	**600**	630	440	26	40	Tr670X6	G1/4	12	15
AH241/630-H	132	**600**	630	450	30	50	Tr655X6	G1/4	12	15
AH32/630AG-H	183	**600**	630	475	14	63	Tr670X6	G1/4	12	15
AH32/630A-H	188	**600**	630	475	14	63	Tr680X6	G1/4	12	15
AH33/630-H	227	**600**	630	550	14	62	Tr680X6	G1/4	12	15
AH39/670G-H	92,9	**630**	670	216	12	41	Tr710X7	G1/4	12	15
AH39/670-H	87,7	**630**	670	216	12	41	Tr695X6	G1/4	12	15
AH30/670A-H	124	**630**	670	280	14	50	Tr710X7	G1/4	12	15
AH240/670G-H	137	**630**	670	348	26	40	Tr710X7	G1/4	8,5	15
AH240/670-H	137	**630**	670	358	30	50	Tr695X6	G1/4	8,5	15
AH31/670A-H	185	**630**	670	395	14	60	Tr710X7	G1/4	12	15
AH241/670G-H	180	**630**	670	452	26	40	Tr710X7	G1/4	12	15
AH241/670-H	183	**630**	670	467	30	55	Tr695X6	G1/4	12	15
AH32/670AG-H	247	**630**	670	500	14	63	Tr710X7	G1/4	12	15
AH32/670A-H	252	**630**	670	500	14	63	Tr720X7	G1/4	12	15
AH33/670-H	303	**630**	670	577	14	62	Tr720X7	G1/4	12	15
AH39/710G-H	105	**670**	710	228	12	43	Tr750X7	G1/4	15	15
AH39/710-H	101	**670**	710	228	12	43	Tr740X7	G1/4	15	15
AH30/710A-H	135	**670**	710	286	16	50	Tr750X7	G1/4	15	15
AH240/710G-H	152	**670**	710	360	26	45	Tr750X7	G1/4	8,5	15
AH240/710-H	151	**670**	710	365	33	50	Tr740X7	G1/4	8,5	15
AH31/710A-H	202	**670**	710	405	16	60	Tr750X7	G1/4	15	15
AH241/710G-H	207	**670**	710	483	26	45	Tr750X7	G1/4	15	15
AH241/710-H	209	**670**	710	493	33	55	Tr740X7	G1/4	15	15
AH32/710AG-H	272	**670**	710	515	16	65	Tr750X7	G1/4	15	15
AH32/710A-H	278	**670**	710	515	16	65	Tr760X7	G1/4	15	15
AH33/710-H	334	**670**	710	595	16	65	Tr760X7	G1/4	15	15

Withdrawal sleeves



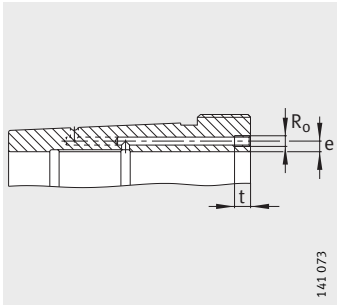
Taper 1:12



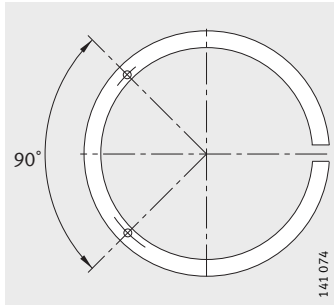
AH240, AH241
Taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						Mounting dimensions		
	m ≈kg	d_{1H}	d	l	a ≈	b	d_{2G}	R_0	e	t
AH39/750G-H	118	**710**	750	234	12	44	Tr800X7	G1/4	15	15
AH39/750-H	110	**710**	750	234	12	44	Tr780X7	G1/4	15	15
AH30/750A-H	155	**710**	750	300	16	50	Tr800X7	G1/4	15	15
AH240/750G-H	174	**710**	750	380	28	45	Tr800X7	G1/4	8,5	15
AH240/750-H	169	**710**	750	385	35	50	Tr780X7	G1/4	8,5	15
AH31/750A-H	232	**710**	750	425	16	60	Tr800X7	G1/4	15	15
AH241/750G-H	241	**710**	750	520	28	45	Tr800X7	G1/4	15	15
AH241/750-H	239	**710**	750	530	35	55	Tr780X7	G1/4	15	15
AH32/750A-H	312	**710**	750	540	16	65	Tr800X7	G1/4	15	15
AH33/750-H	377	**710**	750	625	16	65	Tr800X7	G1/4	15	15
AH39/800G-H	155	**750**	800	245	12	45	Tr850X7	G1/4	15	15
AH39/800-H	146	**750**	800	245	12	45	Tr830X7	G1/4	15	15
AH30/800A-H	198	**750**	800	308	18	50	Tr850X7	G1/4	15	15
AH240/800G-H	232	**750**	800	395	28	50	Tr850X7	G1/4	15	15
AH240/800-H	221	**750**	800	395	40	50	Tr830X7	G1/4	15	15
AH31/800A-H	297	**750**	800	438	18	63	Tr850X7	G1/4	15	15
AH241/800G-H	311	**750**	800	525	28	50	Tr850X7	G1/4	15	15
AH241/800-H	304	**750**	800	530	40	55	Tr830X7	G1/4	15	15
AH32/800AG-H	391	**750**	800	550	18	62	Tr850X7	G1/4	15	15
AH32/800A-H	396	**750**	800	555	18	67	Tr850X7	G1/4	15	15
AH33/800-H	500	**750**	800	667	18	67	Tr850X7	G1/4	15	15
AH39/850G-H	176	**800**	850	258	12	50	Tr900X7	G1/4	15	15
AH39/850-H	165	**800**	850	258	12	50	Tr880X7	G1/4	15	15
AH30/850A-H	224	**800**	850	325	18	53	Tr900X7	G1/4	15	15
AH240/850G-H	259	**800**	850	415	30	50	Tr900X7	G1/4	15	15
AH240/850-H	250	**800**	850	418	40	53	Tr880X7	G1/4	15	15
AH31/850A-H	336	**800**	850	462	18	63	Tr900X7	G1/4	15	15
AH241/850G-H	358	**800**	850	560	40	60	Tr900X7	G1/4	15	15
AH241/850-H	345	**800**	850	560	40	60	Tr880X7	G1/4	15	15
AH32/850A-H	450	**800**	850	585	18	70	Tr900X7	G1/4	15	15
AH33/850-H	567	**800**	850	700	18	70	Tr900X7	G1/4	15	15



Hydraulic withdrawal sleeve
(suffix H)
Mounting dimensions

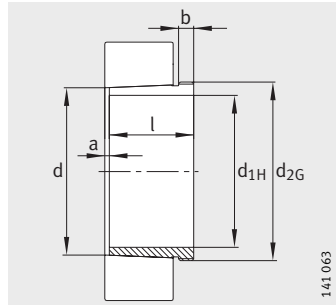


Pump connectors for
hydraulic withdrawal sleeve

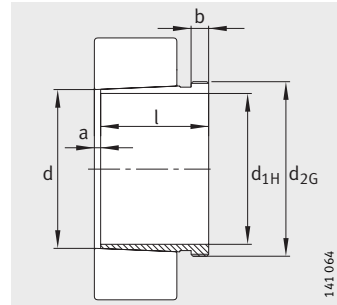
Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						Mounting dimensions		
	m	d_{1H}	d	l	a	b	d_{2G}	R_0	e	t
	≈kg				≈					
AH39/900G-H	192	**850**	900	265	12	51	Tr950X8	G1/4	15	15
AH39/900-H	180	**850**	900	265	12	51	Tr930X8	G1/4	15	15
AH30/900A-H	246	**850**	900	335	20	55	Tr950X8	G1/4	15	15
AH240/900G-H	287	**850**	900	430	45	55	Tr950X8	G1/4	15	15
AH240/900-H	274	**850**	900	430	45	55	Tr930X8	G1/4	15	15
AH31/900A-H	368	**850**	900	475	20	63	Tr950X8	G1/4	15	15
AH241/900G-H	390	**850**	900	575	45	60	Tr950X8	G1/4	15	15
AH241/900-H	376	**850**	900	575	45	60	Tr930X8	G1/4	15	15
AH32/900A-H	476	**850**	900	585	20	70	Tr950X8	G1/4	15	15
AH33/900-H	623	**850**	900	720	20	70	Tr950X8	G1/4	15	15
AH39/950G-H	216	**900**	950	282	15	51	Tr1000X8	G1/4	15	15
AH39/950-H	203	**900**	950	282	15	51	Tr980X8	G1/4	15	15
AH30/950A-H	277	**900**	950	355	20	55	Tr1000X8	G1/4	15	15
AH240/950G-H	329	**900**	950	467	45	55	Tr1000X8	G1/4	15	15
AH240/950-H	316	**900**	950	467	45	55	Tr980X8	G1/4	15	15
AH31/950A-H	414	**900**	950	500	20	63	Tr1000X8	G1/4	15	15
AH32/950A-H	519	**900**	950	600	20	70	Tr1000X8	G1/4	15	15
AH241/950G-H	435	**900**	950	605	45	60	Tr1000X8	G1/4	15	15
AH241/950-H	421	**900**	950	605	45	60	Tr980X8	G1/4	15	15
AH33/950-H	683	**900**	950	740	20	70	Tr1000X8	G1/4	15	15
AH39/1000G-H	246	**950**	1 000	296	15	52	Tr1060X8	G1/4	15	15
AH39/1000-H	229	**950**	1 000	296	15	52	Tr1035X8	G1/4	15	15
AH30/1 000A-H	309	**950**	1 000	365	22	57	Tr1060X8	G1/4	15	15
AH240/1000G-H	357	**950**	1 000	469	50	57	Tr1060X8	G1/4	15	15
AH240/1000-H	339	**950**	1 000	469	50	57	Tr1035X8	G1/4	15	15
AH31/1 000A-H	471	**950**	1 000	525	22	63	Tr1060X8	G1/4	15	15
AH32/1000A-H	591	**950**	1 000	630	22	70	Tr1060X8	G1/4	15	15
AH241/1000-H	502	**950**	1 000	645	50	65	Tr1060X8	G1/4	15	15
AH33/1000-H	781	**950**	1 000	780	22	70	Tr1060X8	G1/4	15	15
AH39/1060G-H	312	**1 000**	1 060	310	15	52	Tr1120X8	G1/4	15	15
AH39/1060-H	294	**1 000**	1 060	310	15	52	Tr1095X8	G1/4	15	15
AH30/1 060A-H	396	**1 000**	1 060	385	22	60	Tr1120X8	G1/4	15	15
AH240/1060G-H	465	**1 000**	1 060	498	50	60	Tr1120X8	G1/4	15	15
AH240/1060-H	445	**1 000**	1 060	498	50	60	Tr1095X8	G1/4	15	15
AH31/1060A-H	583	**1 000**	1 060	540	22	65	Tr1120X8	G1/4	15	15
AH241/1060-H	632	**1 000**	1 060	665	50	65	Tr1120X8	G1/4	15	15

Withdrawal sleeves



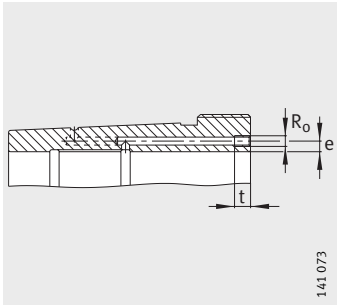
Taper 1:12



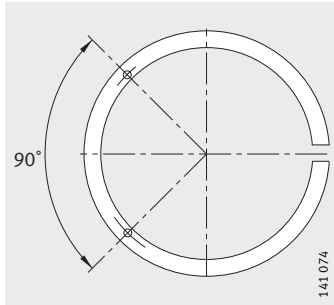
AH240, AH241
Taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						Mounting dimensions		
	m	d_{1H}	d	l	a	b	d_{2G}	R_0	e	t
	≈kg				≈					
AH30/1 120A-H	451	**1 060**	1 120	410	22	65	Tr1180X8	G1/4	15	15
AH240/1120G-H	524	**1 060**	1 120	527	50	65	Tr1180X8	G1/4	15	15
AH240/1120-H	501	**1 060**	1 120	527	50	65	Tr1155X8	G1/4	15	15
AH241/1120-H	717	**1 060**	1 120	705	50	75	Tr1180X8	G1/4	15	15
AH39/1120G-H	289	**1 070**	1 120	310	15	52	Tr1180X8	G1/4	15	15
AH39/1120-H	271	**1 070**	1 120	310	15	52	Tr1155X8	G1/4	15	15
AH30/1 180A-H	498	**1 120**	1 180	420	22	65	Tr1250X8	G1/4	15	15
AH240/1180G-H	577	**1 120**	1 180	540	50	65	Tr1250X8	G1/4	15	15
AH240/1180-H	543	**1 120**	1 180	540	50	65	Tr1215X8	G1/4	15	15
AH241/1180-H	824	**1 120**	1 180	750	50	80	Tr1250X8	G1/4	15	15
AH39/1180G-H	336	**1 130**	1 180	330	15	55	Tr1250X8	G1/4	15	15
AH39/1180-H	307	**1 130**	1 180	330	15	55	Tr1215X8	G1/4	15	15
AH30/1 250A-H	629	**1 180**	1 250	445	22	70	Tr1320X8	G1/4	15	15
AH240/1250G-H	733	**1 180**	1 250	570	50	70	Tr1320X8	G1/4	15	15
AH240/1250-H	694	**1 180**	1 250	570	50	70	Tr1285X8	G1/4	15	15
AH241/1250-H	1 048	**1 180**	1 250	795	50	85	Tr1320X8	G1/4	15	15
AH39/1250G-H	367	**1 200**	1 250	340	18	55	Tr1320X8	G1/4	15	15
AH39/1250-H	336	**1 200**	1 250	340	18	55	Tr1285X8	G1/4	15	15



Hydraulic withdrawal sleeve
(suffix H)
Mounting dimensions

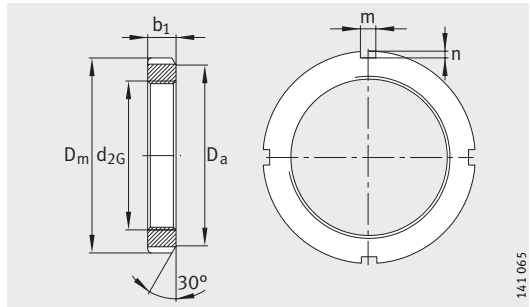


Pump connectors for
hydraulic withdrawal sleeve

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions						Mounting dimensions		
	m	d_{1H}	d	l	a	b	d_{2G}	R_0	e	t
	≈kg				≈					
AH30/1 320A-H	718	**1 250**	1 320	470	22	70	Tr1400X8	G1/4	15	15
AH240/1320G-H	828	**1 250**	1 320	600	50	70	Tr1400X8	G1/4	15	15
AH240/1320-H	775	**1 250**	1 320	600	50	70	Tr1355X8	G1/4	15	15
AH241/1320-H	1 194	**1 250**	1 320	840	50	90	Tr1400X8	G1/4	15	15
AH39/1320G-H	421	**1 270**	1 320	360	18	55	Tr1400X8	G1/4	15	15
AH39/1320-H	379	**1 270**	1 320	360	18	55	Tr1355X8	G1/4	15	15
AH30/1 400A-H	902	**1 320**	1 400	487	22	75	Tr1500X8	G1/4	15	15
AH240/1400G-H	1 026	**1 320**	1 400	615	50	70	Tr1500X8	G1/4	15	15
AH240/1400-H	944	**1 320**	1 400	615	50	70	Tr1435X8	G1/4	15	15
AH241/1400-H	1 496	**1 320**	1 400	870	50	95	Tr1500X8	G1/4	15	15
AH39/1400G-H	499	**1 350**	1 400	380	20	60	Tr1500X8	G1/4	15	15
AH39/1400-H	429	**1 350**	1 400	380	20	60	Tr1435X8	G1/4	15	15
AH30/1500A-H	1 257	**1 400**	1 500	537	22	75	Tr1600X8	G1/4	15	15
AH241/1500-H	1 961	**1 400**	1 500	895	50	95	Tr1600X8	G1/4	15	15
AH39/1500G-H	563	**1 450**	1 500	400	20	60	Tr1600X8	G1/4	15	15
AH39/1500-H	494	**1 450**	1 500	400	20	60	Tr1540X8	G1/4	15	15

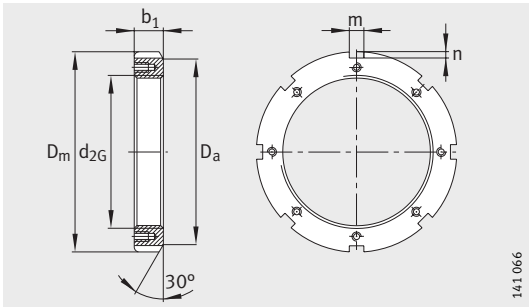
Locknuts



KM, KML, HM..T

Dimension table · Dimensions in mm

Designation		Mass	Dimensions			Mounting dimensions		
Nut	Suitable retainer	m ≈kg	d_{2G}	D_m	b_1	D_a	m	n
KM0	MB0	0,005	**M10X0,75**	18	4	13,5	3	2
KM1	MB1	0,007	**M12X1**	22	4	17	3	2
KM2	MB2	0,01	**M15X1**	25	5	21	4	2
KM3	MB3	0,02	**M17X1**	28	5	24	4	2
KM4	MB4	0,019	**M20X1**	32	6	26	4	2
KM5	MB5	0,025	**M25X1,5**	38	7	32	5	2
KM6	MB6	0,043	**M30X1,5**	45	7	38	5	2
KM7	MB7	0,07	**M35X1,5**	52	8	44	5	2
KM8	MB8	0,085	**M40X1,5**	58	9	50	6	2,5
KM9	MB9	0,119	**M45X1,5**	65	10	56	6	2,5
KM10	MB10	0,148	**M50X1,5**	70	11	61	6	2,5
KM11	MB11	0,158	**M55X2**	75	11	67	7	3
KM12	MB12	0,18	**M60X2**	80	11	73	7	3
KM13	MB13	0,22	**M65X2**	85	12	79	7	3
KM14	MB14	0,26	**M70X2**	92	12	85	8	3,5
KM15	MB15	0,3	**M75X2**	98	13	90	8	3,5
KM16	MB16	0,4	**M80X2**	105	15	95	8	3,5
KM17	MB17	0,46	**M85X2**	110	16	102	8	3,5
KM18	MB18	0,6	**M90X2**	120	16	108	10	4
KM19	MB19	0,658	**M95X2**	125	17	113	10	4
KM20	MB20	0,73	**M100X2**	130	18	120	10	4
KM21	MB21	0,87	**M105X2**	140	18	126	12	5
KM22	MB22	0,965	**M110X2**	145	19	133	12	5
KM23	MB23	1,01	**M115X2**	150	19	137	12	5
KML24	MBL24	0,79	**M120X2**	145	20	135	12	5
KM24	MB24	1,08	**M120X2**	155	20	138	12	5
KM25	MB25	1,22	**M125X2**	160	21	148	12	5
KML26	MBL26	0,9	**M130X2**	155	21	145	12	5
KM26	MB26	1,24	**M130X2**	165	21	149	12	5
KM27	MB27	1,55	**M135X2**	175	22	160	14	6
KML28	MBL28	1,01	**M140X2**	165	22	155	12	5
KM28	MB28	1,56	**M140X2**	180	22	160	14	6
KM29	MB29	2,05	**M145X2**	190	24	171	14	6

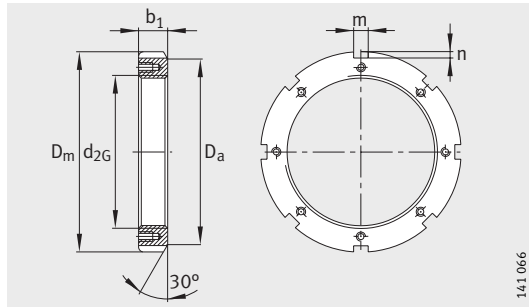


HM30, HM31

Dimension table (continued) · Dimensions in mm

Designation		Mass	Dimensions			Mounting dimensions		
Nut	Suitable retainer	m ≈kg	d_{2G}	D_m	b_1	D_a	m	n
KML30	MBL30	1,44	**M150X2**	180	24	170	14	5
KM30	MB30	2,06	**M150X2**	195	24	171	14	6
KM31	MB31	2,27	**M155X3**	200	25	182	16	7
KML32	MBL32	1,62	**M160X3**	190	25	180	14	5
KM32	MB32	2,52	**M160X3**	210	25	182	16	7
KM33	MB33	2,7	**M165X3**	210	26	193	16	7
KML34	MBL34	1,72	**M170X3**	200	26	190	16	5
KM34	MB34	2,8	**M170X3**	220	26	193	16	7
KML36	MBL36	1,96	**M180X3**	210	27	200	16	5
KM36	MB36	3,04	**M180X3**	230	27	203	18	8
KML38	MBL38	2,13	**M190X3**	220	28	210	16	5
KM38	MB38	3,34	**M190X3**	240	28	214	18	8
KML40	MBL40	2,9	**M200X3**	240	29	220	18	8
KM40	MB40	3,69	**M200X3**	250	29	226	18	8
HM3044	MS3044	3,21	**Tr220X4**	260	30	242	20	9
HM44T	MB44	5,3	**Tr220X4**	280	32	250	20	10
HM3144	MS3144	4,93	**Tr220X4**	280	32	250	20	10
HM3048	MS3048	5,12	**Tr240X4**	290	34	270	20	10
HM48T	MB48	6,15	**Tr240X4**	300	34	270	20	10
HM3148	MS3144	5,75	**Tr240X4**	300	34	270	20	10
HM3052	MS3048	5,54	**Tr260X4**	310	34	290	20	10
HM52T	MB52	8,05	**Tr260X4**	330	35	300	24	12
HM3152	MS3152	7,43	**Tr260X4**	330	36	300	24	12
HM3056	MS3056	6,61	**Tr280X4**	330	38	310	24	10
HM56T	MB56	8,9	**Tr280X4**	350	36	320	24	12
HM3156	MS3152	8,26	**Tr280X4**	350	38	320	24	12
HM3060	MS3060	9,48	**Tr300X4**	360	42	336	24	12
HM3160	MS3160	11,4	**Tr300X4**	380	40	340	24	12
HM3064	MS3064	10,1	**Tr320X5**	380	42	356	24	12
HM3164	MS3164	12,8	**Tr320X5**	400	42	360	24	12
HM3068	MS3064	11,5	**Tr340X5**	400	45	376	24	12
HM3168	MS3168	23	**Tr340X5**	440	55	400	28	15
HM3072	MS3072	11,9	**Tr360X5**	420	45	394	28	13
HM3172	MS3168	25,7	**Tr360X5**	460	58	420	28	15
HM3076	MS3076	15,9	**Tr380X5**	450	48	422	28	14
HM3176	MS3176	30	**Tr380X5**	490	60	440	32	18

Locknuts



HM30, HM31

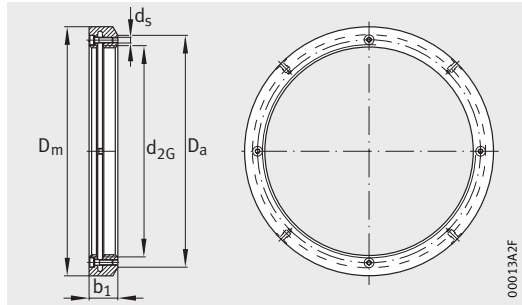
Dimension table (continued) · Dimensions in mm

Designation		Mass	Dimensions			Mounting dimensions		
Nut	Suitable retainer	m ≈kg	d_{2G}	D_m	b_1	D_a	m	n
HM3080	MS3076	18,2	**Tr400X5**	470	52	442	28	14
HM3180	MS3180	35,7	**Tr400X5**	520	62	460	32	18
HM3084	MS3084	18,9	**Tr420X5**	490	52	462	32	14
HM3184	MS3180	43,4	**Tr420X5**	540	70	490	32	18
HM3088	MS3088	26,5	**Tr440X5**	520	60	490	32	15
HM3188	MS3188	44,3	**Tr440X5**	560	70	510	36	20
HM3092	MS3088	27,7	**Tr460X5**	540	60	510	32	15
HM3192	MS3188	53,8	**Tr460X5**	580	75	540	36	20
HM3096	MS3096	28,7	**Tr480X5**	560	60	530	36	15
HM3196	MS3196	62,2	**Tr480X5**	620	75	560	36	20
HM30/500	MS3096	34	**Tr500X5**	580	68	550	36	15
HM31/500	MS31/500	62,1	**Tr500X5**	630	80	580	40	23
HM30/530	MS30/530	44,7	**Tr530X6**	630	68	590	40	20
HM31/530	MS31/530	71,2	**Tr530X6**	670	80	610	40	23
HM30/560	MS30/560	46,2	**Tr560X6**	650	75	610	40	20
HM31/560	MS31/560	85,6	**Tr560X6**	710	85	650	45	25
HM30/600	MS30/530	55,9	**Tr600X6**	700	75	660	40	20
HM31/600	MS31/560	91,7	**Tr600X6**	750	85	690	45	25
HM30/630	MS30/630	58,3	**Tr630X6**	730	75	690	45	20
HM31/630	MS31/630	122	**Tr630X6**	800	95	730	50	28
HM30/670	MS30/670	73,8	**Tr670X6**	780	80	740	45	20
HM31/670	MS31/670	156	**Tr670X6**	850	106	775	50	28
HM30/710	MS30/710	94,8	**Tr710X7**	830	90	780	50	25
HM31/710	MS31/710	173	**Tr710X7**	900	106	825	55	30
HM30/750	MS30/750	99,5	**Tr750X7**	870	90	820	55	25
HM31/750	MS31/750	202	**Tr750X7**	950	112	875	60	34
HM30/800	MS30/750	106	**Tr800X7**	920	90	870	55	25
HM31/800	MS31/750	215	**Tr800X7**	1 000	112	925	60	34
HM30/850	MS30/850	113	**Tr850X7**	980	90	925	60	25
HM31/850	MS31/850	246	**Tr850X7**	1 060	118	975	70	38
HM30/900	MS30/850	135	**Tr900X7**	1 030	100	975	60	25
HM31/900	MS31/900	293	**Tr900X7**	1 120	125	1 030	70	38
HM30/950	MS30/950	143	**Tr950X8**	1 080	100	1 025	60	25
HM31/950	MS31/950	310	**Tr950X8**	1 170	125	1 080	70	38

Dimension table (continued) · Dimensions in mm

Designation		Mass	Dimensions			Mounting dimensions		
Nut	Suitable retainer	m ≈kg	d_{2G}	D_m	b_1	D_a	m	n
HM30/1000	MS30/1000	165	**Tr1000X8**	1 140	100	1 085	60	25
HM31/1000	MS31/1000	361	**Tr1000X8**	1 240	125	1 140	70	38
HM30/1060	MS30/1000	175	**Tr1060X8**	1 200	100	1 145	60	25
HM31/1060	MS31/1000	386	**Tr1060X8**	1 300	125	1 210	70	38
HM30/1120	MS30/1000	185	**Tr1120X8**	1 260	100	1 205	60	25
HM31/1120	MS31/1000	427	**Tr1120X8**	1 360	125	1 270	70	38
HM30/1180	MS30/1000	196	**Tr1180X8**	1 320	100	1 265	60	25
HM31/1180	MS31/1000	459	**Tr1180X8**	1 420	125	1 330	70	38
HM30/1250	MS30/1000	233	**Tr1250X8**	1 390	110	1 335	60	25
HM31/1250	MS31/1000	485	**Tr1250X8**	1 490	125	1 400	70	38
HM30/1320	MS30/1000	245	**Tr1320X8**	1 460	110	1 405	60	25
HM31/1320	MS31/1000	511	**Tr1320X8**	1 560	125	1 470	70	38
HM30/1400	MS30/1000	259	**Tr1400X8**	1 540	110	1 485	60	25
HM31/1400	MS31/1000	562	**Tr1400X8**	1 640	130	1 550	70	38
HM30/1500	MS30/1500	297	**Tr1500X8**	1 650	110	1 595	60	25
HM31/1500	MS31/1000	601	**Tr1500X8**	1 740	130	1 650	70	38

Shaft nuts



HMZ, HMZ30

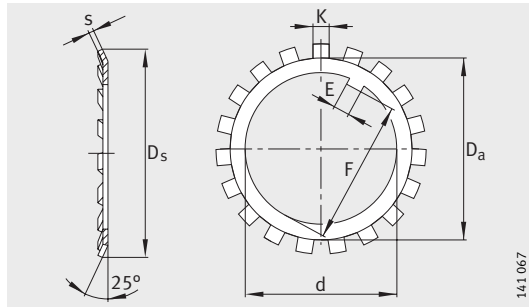
Dimension table · Dimensions in mm

Designation	Mass	Dimensions					Clamping screw	Tightening torque per clamping screw
	m ≈kg	d_{2G}	D_m	b_1	D_a	d_s	Quantity	M_{aL} Nm
HMZ18	0,6	**M90x2**	120	16	108	M5	4	6
HMZ19	0,7	**M95x2**	125	17	113	M5	4	6
HMZ20	0,8	**M100x2**	130	18	120	M6	4	11
HMZ21	0,9	**M105x2**	140	18	126	M6	4	11
HMZ22	1	**M110x2**	145	19	133	M6	4	11
HMZ23	1,1	**M115x2**	150	19	137	M6	4	11
HMZ24	1,1	**M120x2**	155	20	138	M6	4	11
HMZ25	1,3	**M125x2**	160	21	148	M6	4	11
HMZ26	1,3	**M130x2**	165	21	149	M6	4	11
HMZ27	1,6	**M135x2**	175	22	160	M6	4	11
HMZ28	1,6	**M140x2**	180	22	160	M6	4	11
HMZ29	2,2	**M145x2**	190	24	171	M6	4	11
HMZ30	2,2	**M150x2**	195	24	171	M6	4	11
HMZ31	2,4	**M155x3**	200	25	182	M6	4	11
HMZ32	2,6	**M160x3**	210	25	182	M6	4	11
HMZ33	2,8	**M165x3**	210	26	193	M8	4	27
HMZ34	2,9	**M170x3**	220	26	193	M8	4	27
HMZ36	3,2	**M180x3**	230	27	203	M8	4	27
HMZ38	3,5	**M190x3**	240	28	214	M8	4	27
HMZ40	3,9	**M200x3**	250	29	226	M8	4	27
HMZ3044	3,4	**Tr220x4**	260	30	242	M8	4	27
HMZ3048	5,4	**Tr240x4**	290	34	270	M10	4	54
HMZ3052	5,8	**Tr260x4**	310	34	290	M10	4	54
HMZ3056	6,9	**Tr280x4**	330	38	310	M10	4	54
HMZ3060	10	**Tr300x4**	360	42	336	M10	4	54
HMZ3064	10,6	**Tr320x5**	380	42	356	M10	4	54
HMZ3068	12,1	**Tr340x5**	400	45	376	M12	4	93
HMZ3072	12,5	**Tr360x5**	420	45	394	M12	4	93
HMZ3076	16,7	**Tr380x5**	450	48	422	M12	4	93
HMZ3080	19,1	**Tr400x5**	470	52	442	M16	4	230
HMZ3084	19,8	**Tr420x5**	490	52	462	M16	4	230
HMZ3088	27,8	**Tr440x5**	520	60	490	M16	4	230
HMZ3092	29,1	**Tr460x5**	540	60	510	M16	4	230
HMZ3096	30,1	**Tr480x5**	560	60	530	M16	4	230
HMZ30/500	35,7	**Tr500x5**	580	68	550	M20	4	464

Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions					Clamping screw	Tightening torque per clamping screw
	m	d_{2G}	D_m	b_1	D_a	d_s	Quantity	M_{aL}
	≈kg							Nm
HMZ30/530	46,9	**Tr530x6**	630	68	590	M20	4	464
HMZ30/560	48,5	**Tr560x6**	650	75	610	M20	4	464
HMZ30/600	58,7	**Tr600x6**	700	75	660	M20	4	464
HMZ30/630	61,2	**Tr630x6**	730	75	690	M20	4	464
HMZ30/670	77,5	**Tr670x6**	780	80	740	M20	4	464
HMZ30/710	99,5	**Tr710x7**	830	90	780	M20	4	464
HMZ30/750	105	**Tr750x7**	870	90	820	M20	4	464
HMZ30/800	111	**Tr800x7**	920	90	870	M20	4	464
HMZ30/850	119	**Tr850x7**	980	90	925	M20	4	464
HMZ30/900	142	**Tr900x7**	1 030	100	975	M24	8	798
HMZ30/950	150	**Tr950x8**	1 080	100	1 025	M24	8	798
HMZ30/1000	173	**Tr1000x8**	1 140	100	1 085	M24	8	798
HMZ30/1060	184	**Tr1060x8**	1 200	100	1 145	M24	8	798
HMZ30/1120	194	**Tr1120x8**	1 260	100	1 205	M24	8	798
HMZ30/1180	206	**Tr1180x8**	1 320	100	1 265	M24	8	798
HMZ30/1250	245	**Tr1250x8**	1 390	110	1 335	M24	8	798
HMZ30/1320	257	**Tr1320x8**	1 460	110	1 405	M24	8	798
HMZ30/1400	272	**Tr1400x8**	1 540	110	1 485	M24	8	798
HMZ30/1500	312	**Tr1500x8**	1 650	110	1 595	M24	8	798

Tab washers



MB, MBL

Dimension table · Dimensions in mm

Designation	Mass	Dimensions			Mounting dimensions			
	m 100 piece ≈kg	d	D_s ≈	s	D_a	E[1)]	F	K
MB0	0,13	**10**	21	1	13,5	3	8,5	3
MB1	0,192	**12**	25	1	17	3	10,5	3
MB2	0,253	**15**	28	1	21	4	13,5	4
MB3	0,313	**17**	32	1	24	4	15,5	4
MB4	0,35	**20**	36	1	26	4	18,5	4
MB5	0,64	**25**	42	1,25	32	5	23	5
MB6	0,78	**30**	49	1,25	38	5	27,5	5
MB7	1,04	**35**	57	1,04	44	6	32,5	5
MB8	1,23	**40**	62	1,25	50	6	37,5	6
MB9	1,52	**45**	69	1,25	56	6	42,5	6
MB10	1,6	**50**	74	1,25	61	6	47,5	6
MB11	1,96	**55**	81	1	67	8	52,5	7
MB12	2,53	**60**	86	1	73	8	57,5	7
MB13	2,9	**65**	92	1	79	8	62,5	7
MB14	3,34	**70**	98	1	85	8	66,5	8
MB15	3,6	**75**	104	1	90	8	71,5	8
MB16	4,64	**80**	112	1,8	95	10	76,5	8
MB17	5,24	**85**	119	1,8	102	10	81,5	8
MB18	6,23	**90**	126	1,8	108	10	86,5	10
MB19	6,7	**95**	133	1,8	113	10	91,5	10
MB20	7,65	**100**	142	1,8	120	12	96,5	10
MB21	8,26	**105**	145	1,75	126	12	100,5	12
MB22	9,4	**110**	154	1,75	133	12	105,5	12
MB23	10,8	**115**	159	2	137	12	110,5	12
MBL24	7,7	**120**	151	2	135	14	115	12
MB24	10,5	**120**	164	2	138	14	115	12
MB25	11,8	**125**	170	2	148	14	120	12
MBL26	8,7	**130**	161	2	145	14	125	12
MB26	11,3	**130**	175	2	149	14	125	12
MB27	14,4	**135**	185	2	160	14	130	14

[1)] The dimension E can be used as a minimum dimension for the slot width in shafts.

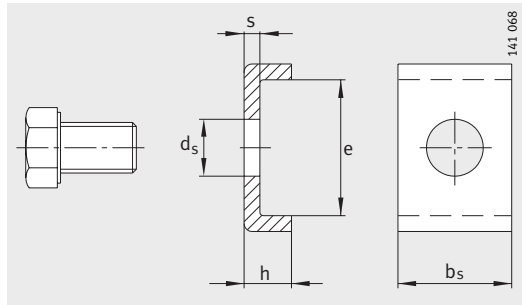
Dimension table (continued) · Dimensions in mm

Designation	Mass	Dimensions			Mounting dimensions			
	m 100 piece ≈kg	d	D_s ≈	s	D_a	E[1)]	F	K
MBL28	10,9	**140**	171	2	155	16	135	12
MB28	14,2	**140**	192	2	160	16	135	14
MB29	16,8	**145**	202	2	171	16	140	14
MBL30	11,3	**150**	188	2	170	16	145	14
MB30	15,5	**150**	205	2	171	16	145	14
MB31	20,9	**155**	212	2,5	182	16	147,5	16
MBL32	16,2	**160**	199	2,5	180	18	154	14
MB32	22,2	**160**	217	2,5	182	18	154	16
MB33	24,1	**165**	222	2,5	193	18	157,5	16
MBL34	17	**170**	211	2,5	190	18	164	16
MB34	24,7	**170**	232	2,5	193	18	164	16
MBL36	18	**180**	221	2,5	200	20	174	16
MB36	26,8	**180**	242	2,5	203	20	174	18
MBL38	20,5	**190**	231	2,5	210	20	184	16
MB38	27,8	**190**	252	2,5	214	20	184	18
MBL40	21,4	**200**	248	2,5	222	20	194	18
MB40	29,3	**200**	262	2,5	226	20	194	18
MB44	40	**220**	292	3	250	24	213	20
MB48	40	**240**	312	3	270	24	233	20
MB52	60	**260**	342	3	300	28	253	24
MB56	62	**280**	362	3	320	28	273	24

1) The dimension E can be used as a minimum dimension for the slot width in shafts.

Retaining brackets

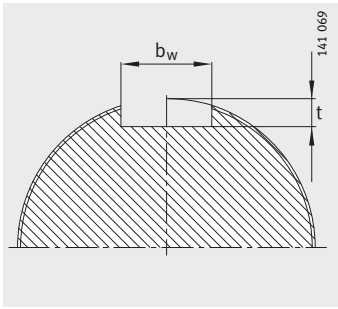
With hexagon head cap screw



Dimension table · Dimensions in mm

Designation		Tightening torque	Mass	Dimensions					Mounting dimensions Shaft slot	
Retaining bracket Complete	Hexagon head cap screw[1)]	Nm	m ≈kg	s	b_s	h	d_s	e	b_w	t
MS3044	M6X10	10	0,026	4	20	12	7	13,5	22	9
MS3144	M8X16	25	0,038	4	20	12	9	22,5	22	9
MS3048	M8X16	25	0,035	4	20	12	9	17,5	22	9
MS3152	M10X20	51	0,056	4	24	12	11	25,5	26	9
MS3056	M8X16	25	0,04	4	24	12	9	17,5	26	9
MS3060	M8X16	25	0,043	4	24	12	9	20,5	26	9
MS3160	M10X20	51	0,059	4	24	12	12	30,5	26	9
MS3064	M8X16	25	0,057	5	24	15	9	21	26	10
MS3164	M10X20	51	0,074	5	24	15	12	31	26	10
MS3168	M12X22	87	0,115	5	28	15	14	38	30	10
MS3072	M8X16	25	0,064	5	28	15	9	20	30	10
MS3076	M10X20	51	0,076	5	28	15	12	24	30	10
MS3176	M12X22	87	0,115	5	32	15	14	40	34	10
MS3180	M16X25	215	0,154	5	32	15	18	45	34	10
MS3084	M10X20	51	0,085	5	32	15	12	24	34	10
MS3088	M12X22	87	0,1	5	32	15	14	28	34	10
MS3188	M16X25	215	0,163	5	36	15	18	43	38	10
MS3096	M12X22	87	0,109	5	36	15	14	28	38	12
MS3196	M16X25	215	0,177	5	36	15	18	53	38	12
MS31/500	M16X25	215	0,178	5	40	15	18	45	42	12

[1)] Up to thread M16: self-retaining screw.

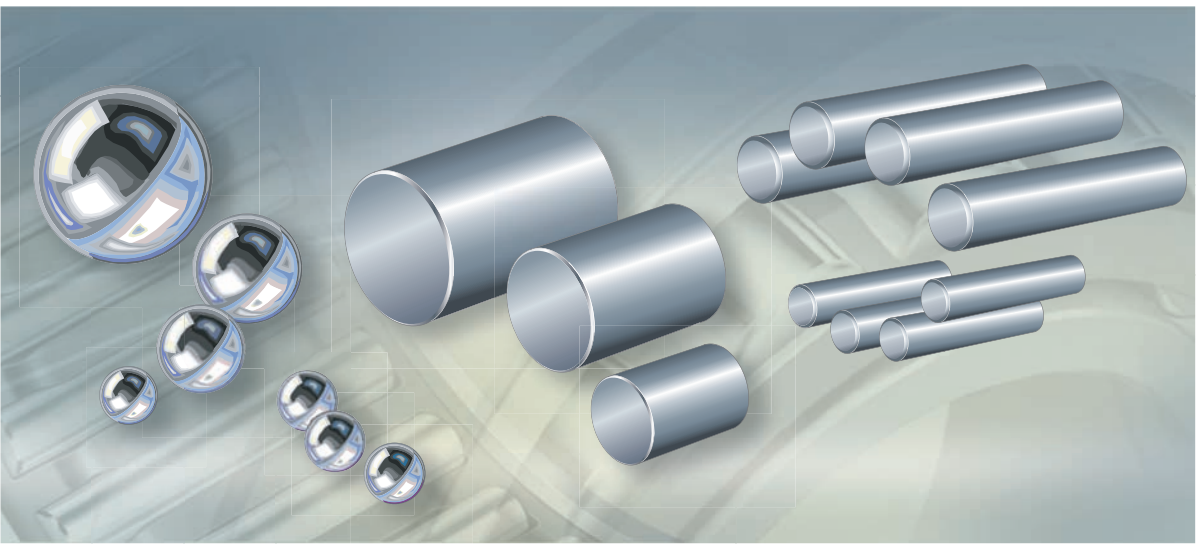


Shaft

Dimension table (continued) · Dimensions in mm

Designation		Tightening torque	Mass	Dimensions					Mounting dimensions Shaft slot	
Retaining bracket Complete	Hexagon head cap screw[1)]	Nm	m ≈kg	s	b_s	h	d_s	e	b_w	t
MS30/530	M16X25	215	0,223	7	40	21	18	34	42	14
MS31/530	M20X40	430	0,347	7	40	21	22	51	42	14
MS30/560	M16X25	215	0,212	7	40	21	18	29	42	14
MS31/560	M20X40	430	0,38	7	45	21	22	54	47	14
MS30/630	M16X25	215	0,244	7	45	21	18	34	47	14
MS31/630	M20X40	430	0,426	7	50	21	22	61	52	14
MS30/670	M16X25	215	0,257	7	45	21	18	39	47	14
MS31/670	M20X40	430	0,439	7	50	21	22	66	52	15
MS30/710	M16X25	215	0,279	7	50	21	18	39	52	15
MS31/710	M24X45	740	0,58	7	55	21	26	69	57	15
MS30/750	M16X25	215	0,301	7	55	21	18	39	57	15
MS31/750	M24X45	740	0,614	7	60	21	26	70	62	15
MS30/850	M20X40	430	0,426	7	60	21	22	44	62	15
MS31/850	M24X45	740	0,679	7	70	21	26	71	72	16
MS31/900	M24X45	740	0,698	7	70	21	26	76	72	16
MS30/950	M20X40	430	0,433	7	60	21	22	46	62	16
MS31/950	M24X45	740	0,706	7	70	21	26	78	72	16
MS30/1000	M20X40	430	0,449	7	60	21	22	51	62	16
MS31/1000	M24X45	740	0,744	7	70	21	26	88	72	16
MS30/1500	M20X40	430	0,466	7	60	21	22	56	62	16

1) Up to thread M16: self-retaining screw.
Up to thread M20: standardised hexagon head cap screw with retainer.



Rolling elements

Steel balls
Cylindrical rollers
Needle rollers

Rolling elements

Steel balls **1510**

Balls conform to DIN 5 401-1/ISO 3 290.
They are made from through hardened rolling bearing steel and have a surface hardness of at least 740 HV 10.

Steel balls are used where moderate to high speeds occur and moderate to high axial forces and radial forces must be supported.

Cylindrical rollers **1518**

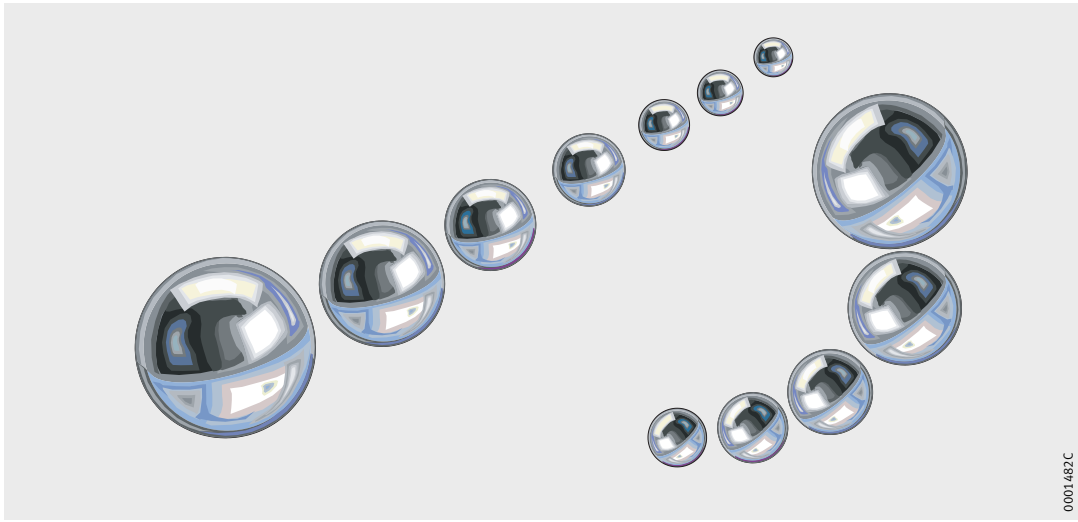
Cylindrical rollers conform to DIN 5 402-1.
They are made from through hardened rolling bearing steel and have a surface hardness of at least 670 HV.
The rollers are designed with profiled ends and a cylindrical portion.

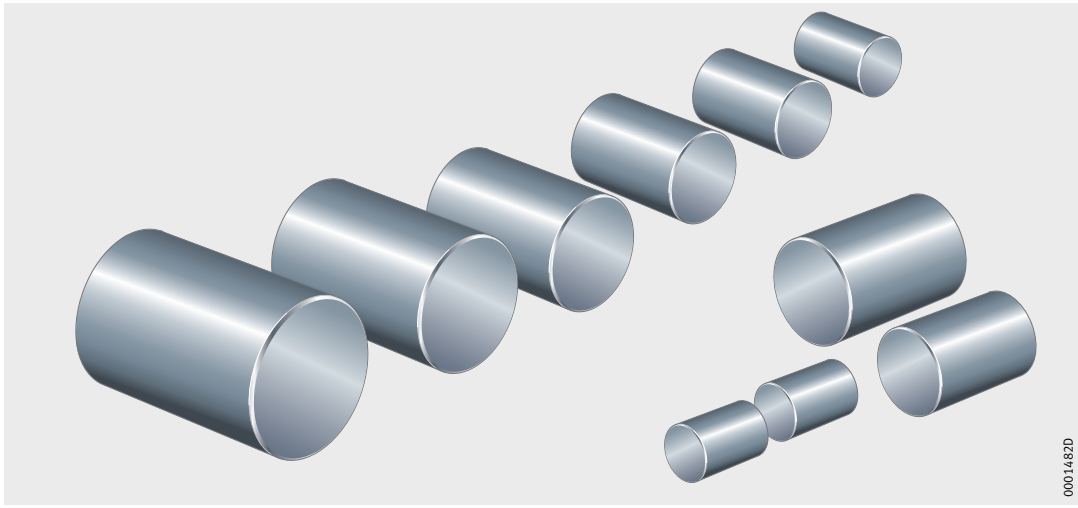
Cylindrical rollers are used where bearing arrangements are subjected to very high loads.

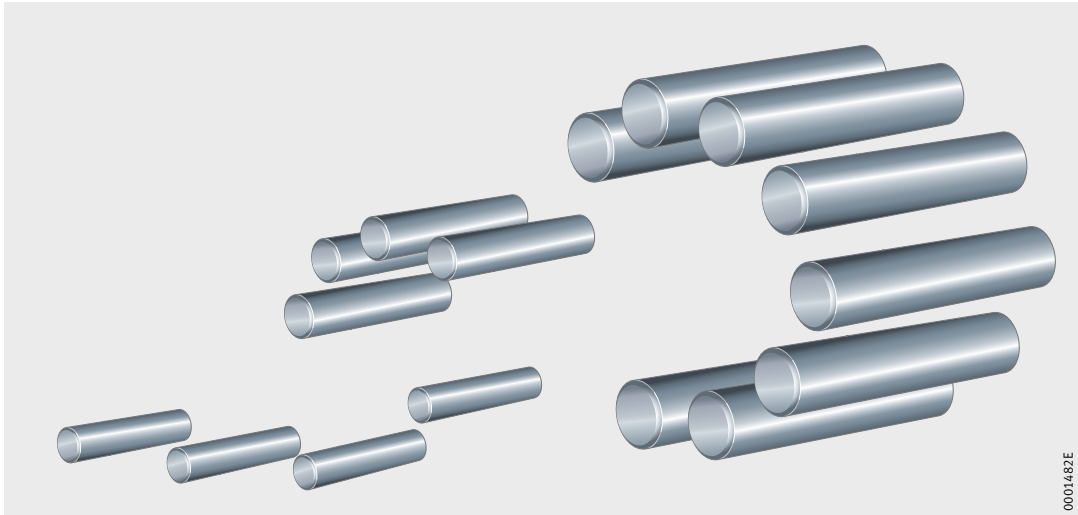
Needle rollers **1528**

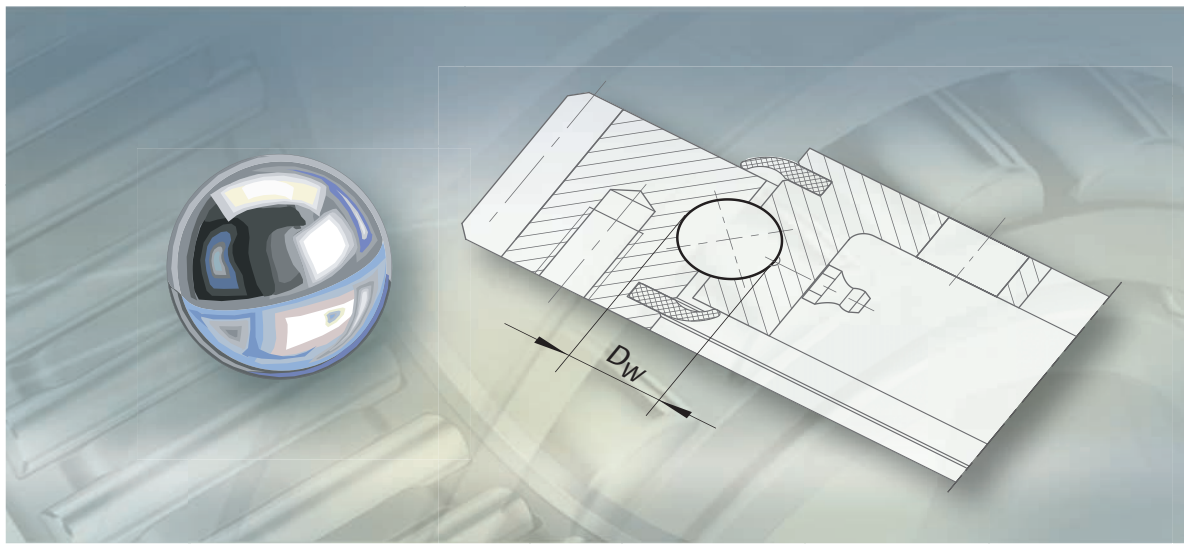
Needle rollers conform to DIN 5 402-3/ISO 3 096, type B with flat end faces.
They are made from through hardened rolling bearing steel, have a surface hardness of at least 670 HV and are designed with profiled ends.

Needle rollers are used where the radial design envelope is restricted and the loads are lower than those in bearing arrangements with cylindrical rollers.


0001482C


0001482D


0001482E



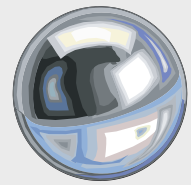
Steel balls

Steel balls

		Page
Product overview	Steel balls	1512
Features	Classes and sorts	1513
	Applications	1514
	Suffixes	1514
Accuracy		1515
Dimension tables	Steel balls	1516

Steel balls

KUG



00010A57

Steel balls

Features

Steel balls are the basic elements of ball bearings. They are made from through hardened rolling bearing steel in accordance with DIN 17 230 and have a hardness of at least 740 HV 10.
The dimensions and tolerances conform to DIN 5 401/ISO 3 290.

Classes and sorts

The balls are available in the grades G5, G10, G16, G20, G28, G40. The largest and smallest deviation and the geometrical tolerance are defined as a function of the diameter.
The suffixes correspond to the class designations.

Balls manufactured under identical conditions (batches) are sorted within a class into ball sorts with a very small diameter tolerance according to the mean batch diameter D_{wmL}.

Each sort is packed separately and the mean deviation is marked on the packaging.

One pack contains balls of one sort only.

In a delivery of balls of the same nominal dimension and class comprising several packs, the sort may differ from one pack to another.

Preferred sort range in grades G10 to G40: +6 to –6.

Designation of sorts

The sort designation is printed on the packaging:

- N for zero
- P for a positive value (stating the value)
- M for a negative value (stating the value).

Balls of only one sort should be used in one bearing arrangement.

Mass

The mass in the dimension tables is calculated on the basis of $\rho = 7{,}85$ kg/dm^3 (DIN 5 401).

Special designs

Balls are available by agreement in other sizes and made from other materials, such as special steels and ceramic.

Steel balls

Applications

Balls are used:

- in rolling bearings where moderate to high speeds occur and moderate to high axial forces and radial forces must be supported, for example in deep groove ball bearings, slewing rings, rotor bearings and linear guidance systems
- in the automotive industry, in machine building, in the electrical, DIY and household appliances industries as well as in toys and games
- in constant velocity joints and as valve balls.

Suffixes

Suffixes for available grades: see table.

Available designs

Suffix	Description	Design
G5	Grade G5	Standard
G10	Grade G10	
G16	Grade G16	
G20	Grade G20	
G28	Grade G28	
G40	Grade G40	
–	Made from special steels or ceramic	Special design, available by agreement

Accuracy

The dimensional and geometrical tolerances conform to DIN 5 401/ISO 3 290.

Grades and tolerances

Grade	Diameter	Ball tolerance in batch	
		Dimensional and geometrical tolerance	Roughness
	D_w mm	V_{Dws}; t_{Dws} µm	R_a µm
	incl.	max.	DIN max.
G5	12,7	0,13	0,014
G10	25,4	0,25	0,02
G16	38,1	0,4	0,025
G20	50,8	0,5	0,032
G28	50,8	0,7	0,05
G40	100	1	0,06

Grades, tolerances, sort limits

Grade	Tolerance		Sort limit	
	of one batch	Sort interval	µm	
	V_{DwL} µm	l_G µm		
	max.		lower	upper
G5	0,25	1	−5	+5
G10	0,5	1	−9	+9
G16	0,8	1	−10	+10
G20	1	1	−10	+10
G28	1,4	1	−12	+12
G40	2	2	−16	+16

D_w mm
Nominal ball diameter

V_{Dws} µm
Variation of ball diameter;
difference between the largest and smallest individual diameter D_{ws} of one ball

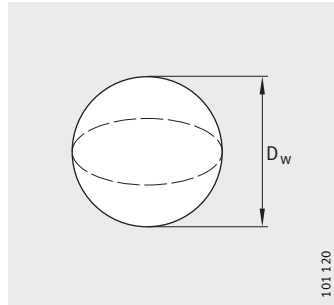
t_{Dws} µm
Deviation from spherical form

R_a µm
Mean roughness value to DIN 4 768

V_{DwL} µm
Variation of ball diameters in one batch;
difference between the largest and smallest mean diameter D_{wm} in one batch (G3)

l_G µm
Sort interval;
the amount into which the permissible deviation of the balls is uniformly divided.

Steel balls



KUG

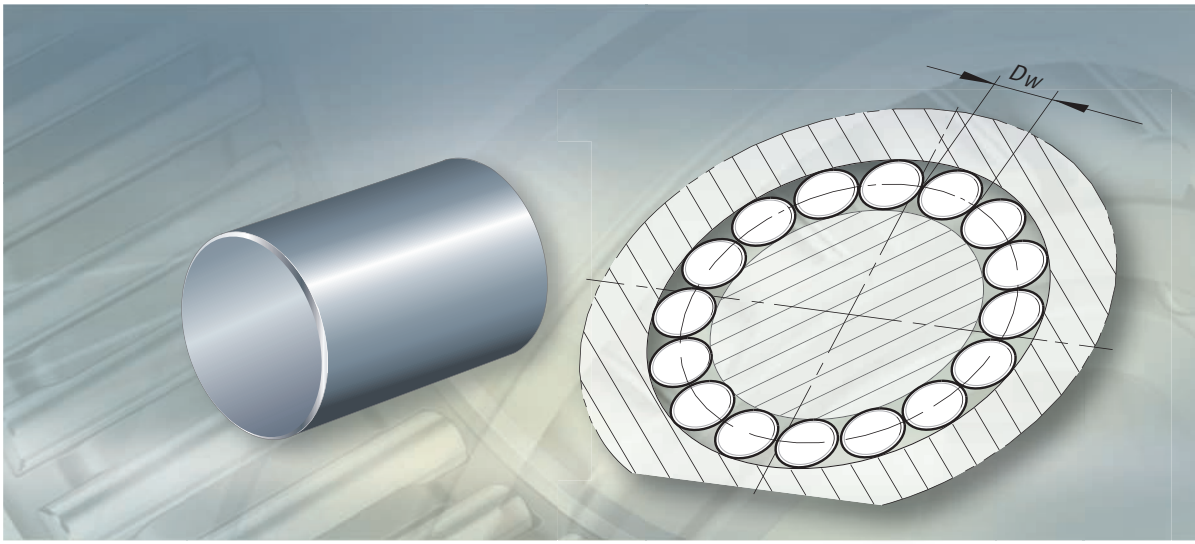
Dimension table · Dimensions in mm and inch

Designation	Mass[1)] m ≈kg	Dimensions D_w mm	inch
KUG-2	0,033	**2**	–
KUG-2,381	0,055	**2,381**	$^3/_{32}$
KUG-2,5	0,064	**2,5**	–
KUG-2,778	0,088	**2,778**	$^7/_{32}$
KUG-2,778	0,088	**2,778**	–
KUG-3	0,111	**3**	–
KUG-3,175	0,132	**3,175**	$^1/_8$
KUG-3,5	0,176	**3,5**	–
KUG-3,969	0,257	**3,969**	$^5/_{32}$
KUG-4	0,263	**4**	–
KUG-4,5	0,375	**4,5**	–
KUG-4,762	0,444	**4,762**	$^3/_{16}$
KUG-5	0,514	**5**	–
KUG-5,5	0,684	**5**	–
KUG-5,556	0,705	**5,556**	$^7/_{32}$
KUG-5,953	0,867	**5,953**	$^{15}/_{64}$
KUG-6	0,888	**6**	–
KUG-6,35	1,05	**6,350**	$^1/_4$
KUG-6,5	1,13	**6,5**	–
KUG-6,747	1,26	**6,747**	$^{17}/_{64}$
KUG-7	1,41	**7**	–
KUG-7,144	1,5	**7,144**	$^9/_{32}$
KUG-7,5	1,73	**7,5**	–
KUG-7,938	2,06	**7,938**	$^5/_{16}$
KUG-8	2,1	**8**	–
KUG-8,731	2,74	**8,731**	$^{11}/_{32}$
KUG-9	3	**9**	–
KUG-9,525	3,55	**9,525**	$^3/_8$

1) In each case for 1000 pieces.

Dimension table (continued) · Dimensions in mm and inch

Designation	Mass[1)] m ≈kg	Dimensions D_w mm	inch
KUG-10	4,11	**10**	–
KUG-10,319	4,52	**10,319**	$^{13}/_{32}$
KUG-10,5	4,76	**10,5**	–
KUG-11	5,47	**11**	–
KUG-11,112	5,64	**11,112**	$^7/_{16}$
KUG-11,5	6,25	**11,5**	–
KUG-11,906	6,94	**11,906**	$^{15}/_{32}$
KUG-12	7,1	**12**	–
KUG-12,5	8,03	**12,5**	–
KUG-12,7	8,42	**12,7**	$^1/_2$
KUG-13	9,03	**13**	–
KUG-13,494	10,1	**13,494**	$^{17}/_{32}$
KUG-14	11,3	**14**	–
KUG-14,288	12	**14,288**	$^9/_{16}$
KUG-15,081	14,1	**15,081**	$^{19}/_{32}$
KUG-15,875	16,4	**15,875**	$^5/_8$
KUG-16	16,8	**16**	–
KUG-16,669	19	**16,669**	$^{21}/_{32}$
KUG-17,462	21,9	**17,462**	$^{11}/_{16}$
KUG-17,691	22,8	**17,691**	–
KUG-18	24	**18**	–
KUG-18,256	25	**18,256**	$^{23}/_{32}$
KUG-19,05	28,4	**19,05**	$^3/_4$
KUG-19,844	32,1	**19,844**	$^{25}/_{32}$
KUG-20	32,9	**20**	–
KUG-20,638	36,1	**20,638**	$^{13}/_{16}$
KUG-21,431	40,5	**21,431**	$^{27}/_{32}$
KUG-22,225	45,1	**22,225**	$^7/_8$
KUG-23	50	**23**	–



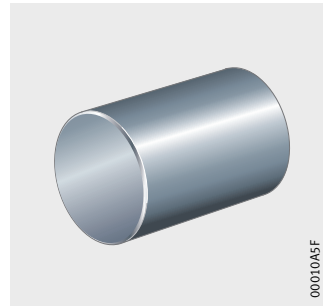
Cylindrical rollers

Cylindrical rollers

		Page
Product overview	Cylindrical rollers	1520
Features	Sorts	1521
	Applications	1521
Accuracy		1522
Dimension tables	Cylindrical rollers	1524

Cylindrical rollers

ZRB



Cylindrical rollers

Features

Cylindrical rollers are the basic elements of cylindrical roller bearings. They are made from through hardened rolling bearing steel in accordance with ISO 683-17 and have a hardness of at least 670 HV. The dimensions and tolerances conform to DIN 5 402-1.

Depending on the application, the profile has either a standard or logarithmic curve. The profile, in conjunction with the profiling of the raceways, prevents edge stresses.

Sorts

Cylindrical rollers are divided into sorts with very small diameter and length tolerances. Each sort is packed separately and the mean deviation is marked on the packaging.

One pack contains cylindrical rollers of one sort only.
In a delivery comprising several packs, the sort may differ from one pack to another.

Designation of sorts

The sort designation is printed on the packaging:

- 0 for zero
- + for a positive value (stating the value)
- – for a negative value (stating the value).

Cylindrical rollers of only one sort should be used in one bearing arrangement.

Mass

The mass in the dimension tables is calculated on the basis of DIN 5 402.

Special designs

Cylindrical rollers are available by agreement in other diameters and in grade G1.

Applications

Cylindrical rollers are used:

- where bearing arrangements are subjected to very high loads
- in the automotive industry as well as in machine and gearbox building
- in linear guidance systems.

Accuracy

The standard grade conforms to GN to DIN 5 402-1.

Chamfer dimensions of cylindrical rollers

Diameter D_w mm		Chamfer dimension		
		$r_{1\,min}$, $r_{2\,min}$ [1] mm	$r_{1\,max}$ mm	$r_{2\,max}$ mm
over	incl.			
–	4	0,2	0,4	0,7
4	8	0,2	0,6	0,7
8	12	0,3	0,7	1
12	16	0,4	0,8	1,2
16	20	0,4	1	1,2
20	26	0,8	1,1	1,3
26	34	0,6	1,4	1,4
34	42	0,7	1,7	1,7
42	56	0,9	2,1	2,1
56	64	1,2	2,4	2,4
64	75	1,4	2,6	2,6
75	80	1,8	3,2	3,2

[1] See dimension table, page 1524.

Length tolerance of cylindrical rollers

Length L_w mm		Deviation		Sort interval l_G µm	Mean deviations Sort range and sort classifications µm					Variation of roller length of one sort L_{WA} µm
		upper µm	lower µm							
over	incl.									max.
–	48	+10	–22	6	+6	0	–6	–12	–18	8
48	–	+15	–35	10	+10	0	–10	–20	–30	10

Diameter tolerances of cylindrical rollers

Diameter D_w mm		Diameter tolerance of one sort V_{DwA} µm	Roundness tolerance t_{Dw} µm	Sort interval l_G µm
over	incl.	max.	max.	
–	13,99	2	1	1
13,99	26	2	1	1
26	48	3	1,2	1,5
48	75	3	2	1,5
75	100	5	2,5	2,5

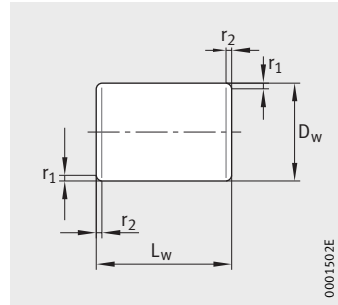
Diameter tolerances of cylindrical rollers continued

Diameter D_w mm		Mean value of individual preferred sorts µm			
over	incl.				
–	13,99	–	–	–	–
13,99	26	+4	+3	+2	+1
26	48	–	+4,5	+3	+1,5
48	75	–	+4,5	+3	+1,5
75	100	–	–	+5	+2,5

Diameter tolerances of cylindrical rollers continued

Diameter D_w mm		Mean value of individual preferred sorts µm						
over	incl.							
–	13,99	0	–1	–2	–3	–4	–5	–6
13,99	26	0	–1	–2	–3	–4	–	–
26	48	0	–1,5	–3	–4,5	–	–	–
48	75	0	–1,5	–3	–4,5	–	–	–
75	100	0	–2,5	–5	–	–	–	–

Cylindrical rollers



ZRB

Dimension table · Dimensions in mm

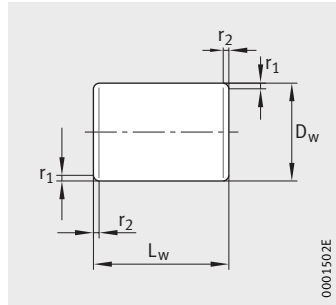
Designation	Mass[1]	Dimensions	
	m	D_w	L_w
	≈kg		
ZRB3X5	0,272	**3**	5
ZRB4X4	0,394	**4**	4
ZRB4X6	0,58	**4**	6
ZRB4X8	0,78	**4**	8
ZRB5X5	0,75	**5**	5
ZRB5X7	1,08	**5**	7
ZRB5X8	1,21	**5**	8
ZRB5X10	1,52	**5**	10
ZRB5,5X5,5	1	**5,5**	5,5
ZRB5,5X6	1,10	**5,5**	6
ZRB5,5X8	1,46	**5,5**	8
ZRB5,5X9	1,65	**5,5**	9
ZRB6X6	1,3	**6**	6
ZRB6X8	1,78	**6**	8
ZRB6X9	2	**6**	9
ZRB6X10	2,22	**6**	10
ZRB6X12	2,61	**6**	12
ZRB6,5X6,5	1,66	**6,5**	6,5
ZRB6,5X7	1,79	**6,5**	7
ZRB6,5X9	2,3	**6,5**	9
ZRB6,5X10	2,56	**6,5**	10
ZRB7X7	2,06	**7**	7
ZRB7X10	2,96	**7**	10
ZRB7X12	3,62	**7**	12
ZRB7X14	4,17	**7**	14
ZRB7,5X7,5	2,54	**7,5**	7,5
ZRB7,5X9	3,12	**7,5**	9
ZRB7,5X11	3,74	**7,5**	11
ZRB8X8	3,08	**8**	8
ZRB8X9	3,47	**8**	9
ZRB8X12	4,65	**8**	12
ZRB8X14	5,52	**8**	14

1) In each case for 1000 pieces.

Dimension table (continued) · Dimensions in mm

Designation	Mass[1]	Dimensions	
	m	D_w	L_w
	≈kg		
ZRB9X9	4,4	**9**	9
ZRB9X10	5	**9**	10
ZRB9X13	6,3	**9**	13
ZRB9X14	6,8	**9**	14
ZRB10X10	6	**10**	10
ZRB10X11	6,8	**10**	11
ZRB10X14	8,5	**10**	14
ZRB10X16	9,7	**10**	16
ZRB11X11	8,1	**11**	11
ZRB11X12	8,9	**11**	12
ZRB11X15	11	**11**	15
ZRB11X18	13,4	**11**	18
ZRB12X12	10,4	**12**	12
ZRB12X14	12,3	**12**	14
ZRB12X17	14,9	**12**	17
ZRB12X18	15,7	**12**	18
ZRB12X21	18,3	**12**	21
ZRB13X13	13,6	**13**	13
ZRB13X18	18,8	**13**	18
ZRB13X20	20,4	**13**	20
ZRB14X14	16,6	**14**	14
ZRB14X15	17,8	**14**	15
ZRB14X20	23,8	**14**	20
ZRB14X22	26,2	**14**	22
ZRB15X15	20,4	**15**	15
ZRB15X16	21,8	**15**	16
ZRB15X17	23,1	**15**	17
ZRB15X22	30	**15**	22
ZRB15X24	32,7	**15**	24
ZRB16X16	24,8	**16**	16
ZRB16X17	26,8	**16**	17
ZRB16X24	37,3	**16**	24
ZRB16X27	42	**16**	27
ZRB17X17	29,7	**17**	17
ZRB17X24	42	**17**	24

Cylindrical rollers



ZRB

Dimension table (continued) · Dimensions in mm

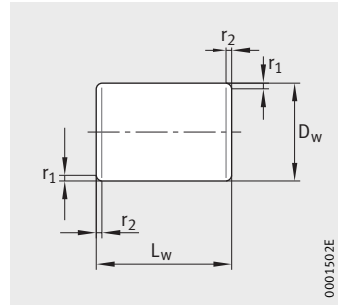
Designation	Mass[1]	Dimensions	
	m	D_w	L_w
	≈kg		
ZRB18X18	35,7	**18**	18
ZRB18X19	37,7	**18**	19
ZRB18X26	51	**18**	26
ZRB18X30	59,5	**18**	30
ZRB19X19	41,6	**19**	19
ZRB19X20	43,7	**19**	20
ZRB19X28	61	**19**	28
ZRB19X32	70	**19**	32
ZRB20X20	48,5	**20**	20
ZRB20X35	85	**20**	35
ZRB20X40	97	**20**	40
ZRB21X21	56	**21**	21
ZRB21X22	59	**21**	22
ZRB21X30	80	**21**	30
ZRB21X32	85	**21**	32
ZRB22X22	64	**22**	22
ZRB22X24	72	**22**	24
ZRB22X34	100	**22**	34
ZRB23X23	74	**23**	23
ZRB23X24	77	**23**	24
ZRB23X32	103	**23**	32
ZRB23X34	112	**23**	34
ZRB23X36	116	**23**	36
ZRB24X24	84	**24**	24
ZRB24X26	91	**24**	26
ZRB24X36	126	**24**	36
ZRB24X38	133	**24**	38
ZRB25X25	95	**25**	25
ZRB25X27	103	**25**	27
ZRB25X30	114	**25**	30
ZRB25X36	137	**25**	36
ZRB25X40	152	**25**	40
ZRB25X52	198	**25**	52

[1] In each case for 1 000 pieces.

Dimension table (continued) · Dimensions in mm

Designation	Mass[1]	Dimensions	
	m	D_w	L_w
	≈kg		
ZRB26X26	107	**26**	26
ZRB26X28	116	**26**	28
ZRB26X40	164	**26**	40
ZRB27X48	212	**27**	48
ZRB28X28	133	**28**	28
ZRB28X30	143	**28**	30
ZRB28X40	190	**28**	40
ZRB28X44	210	**28**	44
ZRB30X30	163	**30**	30
ZRB30X34	185	**30**	34
ZRB30X48	262	**30**	48
ZRB30X64	348	**30**	64
ZRB32X32	199	**32**	32
ZRB32X40	249	**32**	40
ZRB32X52	324	**32**	52
ZRB34X34	239	**34**	34
ZRB34X55	387	**34**	55
ZRB34X75	527	**34**	75
ZRB36X36	283	**36**	36
ZRB36X58	457	**36**	58
ZRB38X38	333	**38**	38
ZRB38X42	368	**38**	42
ZRB38X60	526	**38**	60
ZRB38X62	550	**38**	62
ZRB40X40	389	**40**	40
ZRB40X65	630	**40**	65
ZRB40X70	678	**40**	70
ZRB40X87	843	**40**	87
ZRB42X42	450	**42**	42
ZRB42X70	750	**42**	70
ZRB42X75	804	**42**	75
ZRB42X80	857	**42**	80
ZRB42X82	878	**42**	82
ZRB42X84	900	**42**	84

Cylindrical rollers



ZRB

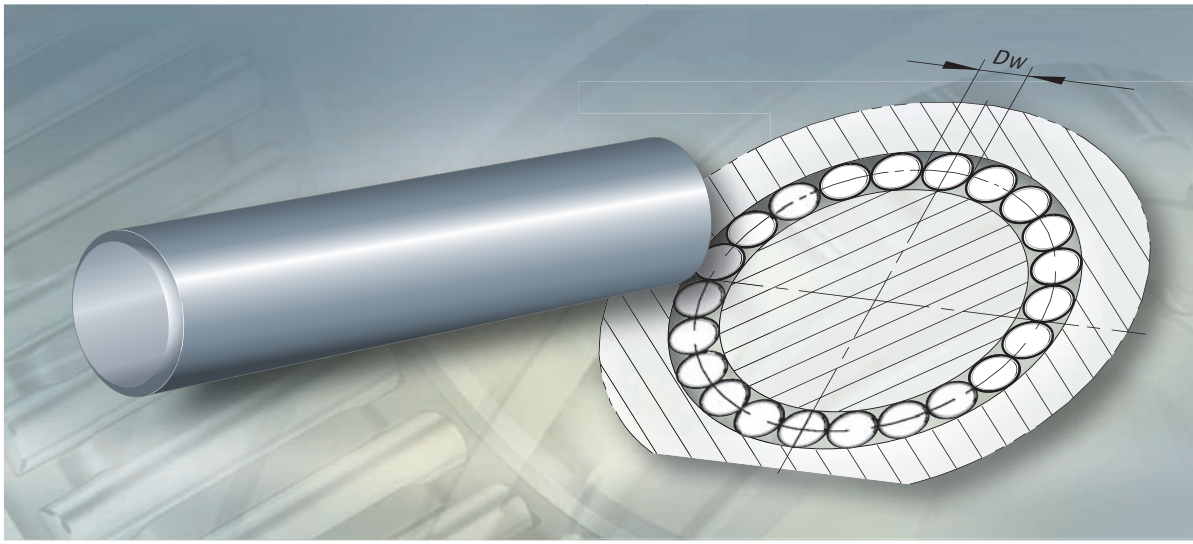
Dimension table (continued) · Dimensions in mm

Designation	Mass[1]	Dimensions	
	m ≈kg	D_w	L_w
ZRB45X45	553	**45**	45
ZRB45X65	799	**45**	65
ZRB45X70	860	**45**	70
ZRB45X75	922	**45**	75
ZRB45X98	1 200	**45**	98
ZRB48X48	670	**48**	48
ZRB48X65	907	**48**	65
ZRB48X75	1 050	**48**	75
ZRB48X80	1 120	**48**	80
ZRB50X50	759	**50**	50
ZRB50X75	1 140	**50**	75
ZRB50X85	1 290	**50**	85
ZRB50X88	1 330	**50**	88
ZRB50X100	1 520	**50**	100
ZRB50X110	1 670	**50**	110
ZRB52X52	853	**52**	52
ZRB52X90	1 480	**52**	90
ZRB54X54	956	**54**	54
ZRB54X80	1 420	**54**	80
ZRB54X85	1 500	**54**	85
ZRB54X90	1 590	**54**	90
ZRB54X95	1 680	**54**	95
ZRB54X120	2 130	**54**	120
ZRB56X56	1 070	**56**	56
ZRB56X70	1 340	**56**	70
ZRB56X90	1 720	**56**	90
ZRB56X112	2 140	**56**	112
ZRB58X100	2 040	**58**	100
ZRB60X60	1 310	**60**	60
ZRB60X90	1 970	**60**	90
ZRB60X95	2 070	**60**	95
ZRB60X100	2 180	**60**	100
ZRB62X62	1 450	**62**	62
ZRB62X80	1 870	**62**	80

[1] In each case for 1000 pieces.

Dimension table (continued) · Dimensions in mm

Designation	Mass[1]	Dimensions	
	m ≈kg	D_w	L_w
ZRB64X64	1 590	**64**	64
ZRB64X70	1 740	**64**	70
ZRB64X75	1 860	**64**	75
ZRB64X100	2 480	**64**	100
ZRB64X105	2 610	**64**	105
ZRB64X128	3 180	**64**	128
ZRB64X135	3 350	**64**	135
ZRB68X68	1 900	**68**	68
ZRB68X75	2 100	**68**	75
ZRB68X110	3 070	**68**	110
ZRB70X70	2 080	**70**	70
ZRB70X110	3 270	**70**	110
ZRB72X100	3 150	**72**	100
ZRB75X75	2 560	**75**	75
ZRB75X80	2 730	**75**	80
ZRB75X110	3 750	**75**	110
ZRB75X115	3 930	**75**	115
ZRB75X120	4 100	**75**	120
ZRB75X125	4 270	**75**	125
ZRB75X155	5 290	**75**	155
ZRB80X80	3 110	**80**	80
ZRB80X85	3 300	**80**	85
ZRB80X90	3 500	**80**	90
ZRB80X115	4 470	**80**	115
ZRB80X120	4 670	**80**	120
ZRB80X130	5 050	**80**	130
ZRB80X160	6 220	**80**	160



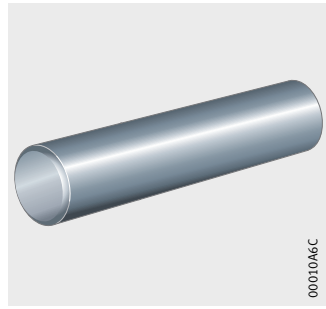
Needle rollers

Needle rollers

		Page
Product overview	Needle rollers	1530
Features	Sorts	1531
	Applications	1531
Accuracy		1531
Dimension tables	Needle rollers	1532

Needle rollers

NRB



Needle rollers

Features

Needle rollers are the basic elements of needle roller bearings. They are made from through hardened rolling bearing steel 100Cr6 to DIN 17 230, have a hardness of at least 670 HV and conform to DIN 5 402-3/ISO 3 096-B with flat end faces.

The ends of the needle rollers are profiled. Due to this profiling, the outside surfaces have a curved transition to the end faces. This reduces the edge stresses at the ends of the rolling elements.

Needle rollers are available in the diameter range from 1 mm to 6 mm, in lengths from 2 mm to 43,8 mm and in grade G2.

Sorts

Needle rollers are divided into sorts with very small diameter tolerances. Each sort is packed separately and the mean deviation is marked on the packaging.

One pack contains needle rollers of one sort only. In a delivery comprising several packs, the sort may differ from one pack to another.

Needle rollers of only one sort should be used in one bearing arrangement.

Special designs are available by agreement.

Applications

Needle rollers are used:

- for full complement needle roller arrangements
- in the automotive industry, in the electrical, toys and games, DIY and household appliances industries as well as in machine building.

Accuracy

The dimensional and geometrical accuracy conforms to DIN 5 402-3/ISO 3 096.

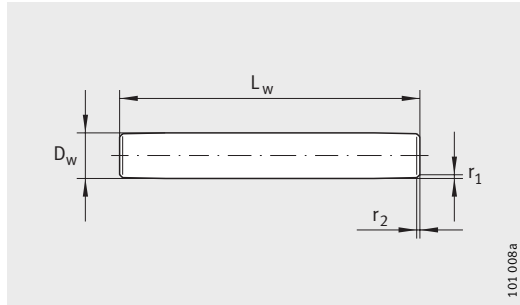
Dimensional and geometrical accuracy, sorts, roughness

Grade	Deviations and tolerances for diameter D_w [1]							Length tolerance
	Deviation µm	Tolerance of one sort µm max.	Sorts [2] µm			Roundness t_{Dw} µm max.	Roughness R_a µm max.	
G2	0 – 10	2	**0 –2**	**–1 –3**	**–2 –4**	1	0,1	h13
			–3 –5	**–4 –6**	**–5 –7**			
			–6 –8	–7 –9	–8 –10			

[1] The tolerance values apply at the centre of the needle rollers.

[2] Preferred sorts are printed bold.

Needle rollers



NRB

Dimension table · Dimensions in mm

Designation	Mass[1]	Dimensions				
	m	D_w	L_w	r_1 r_2[2]	r_1	r_2[2]
	≈kg			min.	max.	max.
NRB1X7,8-G2	0,048	**1**	7,8	0,1	0,4	0,6
NRB1,5X5,8-G2	0,081	**1,5**	5,8	0,1	0,4	0,6
NRB1,5X6,8-G2	0,094	**1,5**	6,8	0,1	0,4	0,6
NRB1,5X7,8-G2	0,108	**1,5**	7,8	0,1	0,4	0,6
NRB1,5X9,8-G2	0,136	**1,5**	9,8	0,1	0,4	0,6
NRB1,5X11,8-G2	0,164	**1,5**	11,8	0,1	0,4	0,6
NRB1,5X13,8-G2	0,191	**1,5**	13,8	0,1	0,4	0,6
NRB2X6,3-G2	0,16	**2**	6,3	0,2	0,6	0,8
NRB2X7,8-G2	0,19	**2**	7,8	0,2	0,6	0,8
NRB2X9,8-G2	0,24	**2**	9,8	0,2	0,6	0,8
NRB2X11,8-G2	0,29	**2**	11,8	0,2	0,6	0,8
NRB2X13,8-G2	0,34	**2**	13,8	0,2	0,6	0,8
NRB2X15,8-G2	0,39	**2**	15,8	0,2	0,6	0,8
NRB2X17,8-G2	0,44	**2**	17,8	0,2	0,6	0,8
NRB2X19,8-G2	0,49	**2**	19,8	0,2	0,6	0,8
NRB2X21,8-G2	0,54	**2**	21,8	0,2	0,6	0,8
NRB2,5X7,8-G2	0,3	**2,5**	7,8	0,2	0,6	0,8
NRB2,5X9,8-G2	0,38	**2,5**	9,8	0,2	0,6	0,8
NRB2,5X11,8-G2	0,45	**2,5**	11,8	0,2	0,6	0,8
NRB2,5X13,8-G2	0,53	**2,5**	13,8	0,2	0,6	0,8
NRB2,5X15,8-G2	0,61	**2,5**	15,8	0,2	0,6	0,8
NRB2,5X17,8-G2	0,69	**2,5**	17,8	0,2	0,6	0,8
NRB2,5X19,8-G2	0,76	**2,5**	19,8	0,2	0,6	0,8
NRB2,5X21,8-G2	0,84	**2,5**	21,8	0,2	0,6	0,8
NRB2,5X23,8-G2	0,92	**2,5**	23,8	0,2	0,6	0,8
NRB3X9,8-G2	0,54	**3**	9,8	0,2	0,6	0,8
NRB3X11,8-G2	0,65	**3**	11,8	0,2	0,6	0,8
NRB3X13,8-G2	0,77	**3**	13,8	0,2	0,6	0,8
NRB3X15,8-G2	0,88	**3**	15,8	0,2	0,6	0,8
NRB3X17,8-G2	0,99	**3**	17,8	0,2	0,6	0,8
NRB3X19,8-G2	1,1	**3**	19,8	0,2	0,6	0,8
NRB3X21,8-G2	1,21	**3**	21,8	0,2	0,6	0,8
NRB3X23,8-G2	1,32	**3**	23,8	0,2	0,6	0,8

1) In each case for 1000 pieces.

2) Mean values;
the transition to the profiled outside surface can only be estimated.

Dimension table (continued) · Dimensions in mm

Designation	Mass[1]	Dimensions				
	m	D_w	L_w	r_1 r_2[2]	r_1	r_2[2]
	≈kg			min.	max.	max.
NRB3,5X11,8-G2	0,89	**3,5**	11,8	0,3	0,8	1
NRB3,5X13,8-G2	1,04	**3,5**	13,8	0,3	0,8	1
NRB3,5X15,8-G2	1,19	**3,5**	15,8	0,3	0,8	1
NRB3,5X17,8-G2	1,34	**3,5**	17,8	0,3	0,8	1
NRB3,5X19,8-G2	1,5	**3,5**	19,8	0,3	0,8	1
NRB3,5X21,8-G2	1,65	**3,5**	21,8	0,3	0,8	1
NRB3,5X29,8-G2	2,25	**3,5**	29,8	0,3	0,8	1
NRB3,5X34,8-G2	2,63	**3,5**	34,8	0,3	0,8	1
NRB4X11,8-G2	1,16	**4**	11,8	0,3	0,8	1
NRB4X13,8-G2	1,36	**4**	13,8	0,3	0,8	1
NRB4X15,8-G2	1,56	**4**	15,8	0,3	0,8	1
NRB4X17,8-G2	1,76	**4**	17,8	0,3	0,8	1
NRB4X19,8-G2	1,95	**4**	19,8	0,3	0,8	1
NRB4X21,8-G2	2,15	**4**	21,8	0,3	0,8	1
NRB4X23,8-G2	2,35	**4**	23,8	0,3	0,8	1
NRB4X25,8-G2	2,55	**4**	25,8	0,3	0,8	1
NRB4X27,8-G2	2,74	**4**	27,8	0,3	0,8	1
NRB4X29,8-G2	2,94	**4**	29,8	0,3	0,8	1
NRB4X34,8-G2	3,43	**4**	34,8	0,3	0,8	1
NRB4X39,8-G2	3,93	**4**	39,8	0,3	0,8	1
NRB5X15,8-G2	2,44	**5**	15,8	0,3	0,8	1
NRB5X19,8-G2	3,05	**5**	19,8	0,3	0,8	1
NRB5X21,8-G2	3,36	**5**	21,8	0,3	0,8	1
NRB5X23,8-G2	3,67	**5**	23,8	0,3	0,8	1
NRB5X25,8-G2	3,98	**5**	25,8	0,3	0,8	1
NRB5X27,8-G2	4,28	**5**	27,8	0,3	0,8	1
NRB5X29,8-G2	4,59	**5**	29,8	0,3	0,8	1
NRB5X34,8-G2	5,36	**5**	34,8	0,3	0,8	1
NRB5X39,8-G2	6,13	**5**	39,8	0,3	0,8	1
NRB6X17,8-G2	3,95	**6**	17,8	0,3	0,8	1

FAG

Arcanol rolling bearing greases

Arcanol rolling bearing greases

		Page
Product overview	Arcanol rolling bearing greases	1536
Features	Containers	1537
	Arcanol greases	1538

Arcanol rolling bearing greases

Arcanol rolling bearing greases

Features

Schaeffler Group Industrial developed the range of Arcanol rolling bearing greases from a large number of lubricants. These greases offer very good preconditions for favourable running behaviour of bearings and a long life and high operational reliability of the bearing arrangement.

The areas of application of Arcanol greases were determined under widely differing operating conditions and with rolling bearings of all types by means of modern testing methods and testing systems.

Finely graduated range

The range is graduated such that almost all areas of application can be covered to an optimum extent using these rolling bearing greases.

Variants for automatic or manual grease lubrication

For grease lubrication, we supply the automatic lubricators COMPACT, CHAMPION und CONCEPT6, filled with Arcanol greases from FAG.

For manual lubrication, we supply a grease gun, comprising a manual grease gun ARCA-GREASE-GUN and the matching armoured tube ARCA-GREASE-GUN.HOSE.

Containers

Arcanol rolling bearing greases are available in tubes, cartridges, cans, buckets, hobbocks and drums. The following table shows which grease grades are supplied in which containers.

Grease container sizes

Arcanol grease[1)]	Tube			Car-tridge	Can	Bucket		Hobbock		Drum
	20 g	70 g	250 g	400 g	1 kg	5 kg	10 kg	25 kg	50 kg	180 kg
MULTITOP	–	–	●	●	●	●	●	●	–	●
MULTI2	●	–	●	●	●	●	●	●	–	●
MULTI3	–	–	●	●	●	●	●	●	–	●
LOAD150	–	–	–	●	●	–	●	–	–	–
LOAD220	–	–	–	–	●	–	●	●	–	●
LOAD400	–	–	–	●	●	●	●	●	●	●
LOAD1000	–	–	–	–	–	●	–	●	–	●
TEMP90	●	–	–	●	●	●	–	●	–	●
TEMP110	–	–	–	●	●	–	–	–	●	–
TEMP120	–	–	–	–	●	●	–	●	–	–
TEMP200	–	●	–	–	●	–	–	–	–	–
SPEED2,6	–	–	●	–	●	–	–	●	–	–
VIB3	–	–	–	●	●	●	–	●	●	–
BIO2	–	–	–	●	●	–	●	●	–	●
FOOD2	–	–	–	●	●	–	●	●	–	●

1) Other container sizes by agreement.

Arcanol rolling bearing greases

Arcanol greases

The chemical/physical characteristics of the greases, their principal characteristics and application examples are shown in the table. Ordering examples for the greases are listed below.

Arcanol rolling bearing greases

Designation	Designation to DIN 51825	Thickener	Base oil viscosity at +40 °C mm^2/s	Consistency NLGI class
MULTITOP	KP2N–40	Lithium soap	≧ ISO VG 68	2
MULTI2	KP2K–30	Lithium soap	≧ ISO VG 68	2
MULTI3	KP3K–30	Lithium soap	≧ ISO VG 68	3
LOAD150	KP2N–20	Lithium complex	≧ ISO VG 150	2
LOAD220	KP2N–20	Mixed thickener	ISO VG 220	1 to 2
LOAD400	KP2N–20	Mixed thickener	≧ 400	2
LOAD1000	KP2N–20	Mixed thickener	ISO VG 1000	2
TEMP90	KP2N–30	Mixed thickener	≧ ISO VG 100	2
TEMP110	KPE2P–40	Lithium complex	≧ ISO VG 68	2 to 3
TEMP120	KPHC2R–30	Polycarbamide	ISO VG 460	2
TEMP200	KFK2U–30	PTFE	ISO VG 220 to ISO VG 460	2
SPEED2,6	KE3K–30	Polycarbamide	≧ ISO VG 22	2 to 3
VIB3	KP3N–30	Lithium complex	≧ ISO VG 150	3
BIO2	KPE2K–30	Mixed thickener	≧ ISO VG 68	2
FOOD2	KPF2K–30	Aluminium complex	≧ ISO VG 100	1 to 2

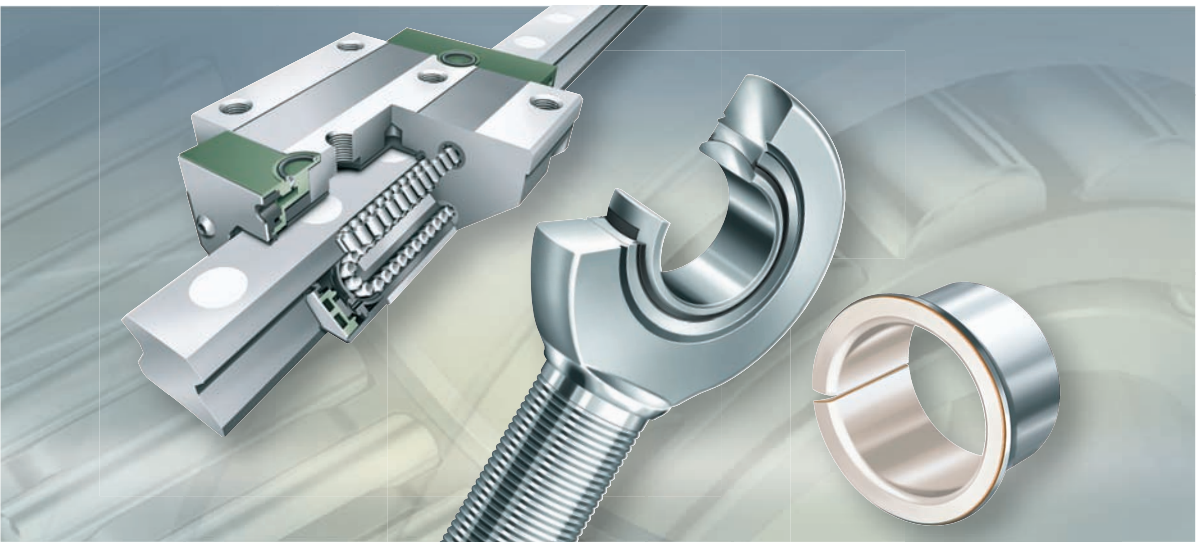
Ordering examples

- ARCANOL-MULTITOP-5KG
- ARCANOL-MULTI2-20G
- ARCANOL-MULTI3-25KG
- ARCANOL-LOAD150-10KG
- ARCANOL-LOAD220-1KG
- ARCANOL-LOAD400-400G
- ARCANOL-LOAD1000-5KG

Operating temperature °C	Continuous limit temperature °C	Principal characteristics	Application examples
–40 +140	+80	Universal grease for ball and roller bearings at increased speeds, high loads, low and high temperatures	Rolling mills, construction machinery, automotive, spinning and grinding spindles
–30 +120	+75	Universal grease for ball bearings D ≦ 62 mm	Small electric motors, agricultural and construction machinery, household appliances
–30 +120	+75	Universal grease for ball bearings D > 62 mm	Large electric motors, agricultural and construction machinery, fans
–20 +140	+90	Special grease for ball, roller and needle roller bearings, linear guidance systems at high loads, wide speed range, swivel motion	Machine tools
–20 +140	+80	Special grease for ball and roller bearings at high loads, wide speed range, high humidity	Rolling mill plant, rail vehicles
–20 +140	+80	Special grease for ball and roller bearings at very high loads, moderate temperature, low speed	Mining machinery, construction machinery, wind turbines
–20 +140	+80	Special grease for ball and roller bearings at very high loads, moderate temperature, low speed	Mining machinery, construction machinery preferably under shock load and in large bearings
–30 +140	+90	Special grease for ball and roller bearings at high temperature, high loads	Couplings, electric motors, automotive
–40 +160	+110	Special grease for ball and roller bearings at high temperature, high speeds	Electric motors, automotive
–30 +180	+120	Special grease for ball and roller bearings at high temperature, high loads	Continuous casting plant
–30 +250	+200	Special grease for ball and roller bearings at very high temperature, for chemically aggressive environments	Track rollers in baking machinery, piston pins in compressors, kiln trucks, chemical plant
–30 +120	+80	Special grease for ball bearings at very high speed, low temperature	Machine tools, instruments
–30 +150	+90	Special grease for ball and roller bearings at high temperature, high loads, oscillating motion	Blade adjusters in wind turbine rotors, packaging machinery, rail vehicles
–30 +120	+80	Special grease for ball and roller bearings	In environmentally hazardous applications
–30 +120	+70	Special grease for ball and roller bearings	In applications with food contact; H1 to USDA

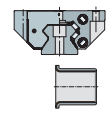
Ordering examples – continued

- ARCANOL-TEMP90-180KG
- ARCANOL-TEMP110-400G
- ARCANOL-TEMP120-25KG
- ARCANOL-TEMP200-70G
- ARCANOL-SPEED2,6-250G
- ARCANOL-VIB3-25KG
- ARCANOL-BIO2-1KG
- ARCANOL-FOOD2-10KG



Other products

Slewing rings
Thin section bearings
Permaglide® plain bearings
ELGES spherical plain bearings, plain bushes, rod ends
Linear guidance systems
Equipment and services for
the mounting and maintenance of rolling bearings

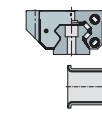


Slewing rings

Four point contact bearings
Crossed roller bearings

Slewing rings

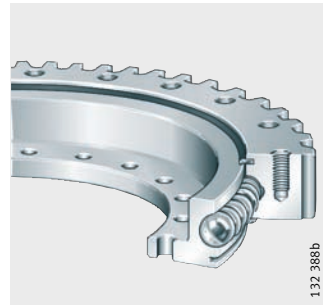
		Page
Product overview	Slewing rings	1544
Features	Four point contact bearings	1545
	Crossed roller bearings	1545



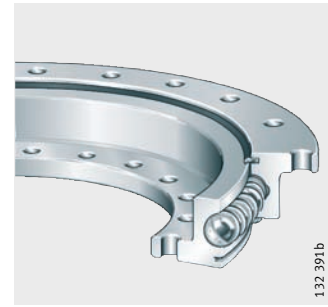
Four point contact bearings

Light series 20

VLA20

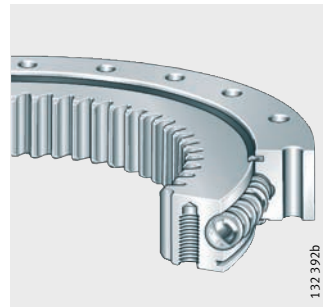


VLU20

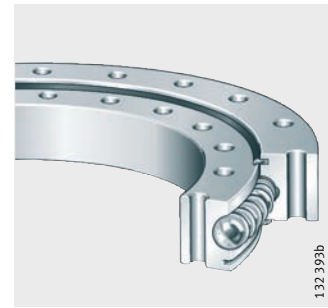


Standard series 20, 25

VSI20, VSI25



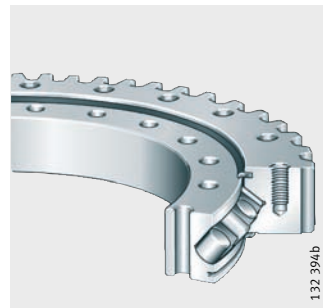
VSU20, VSU25



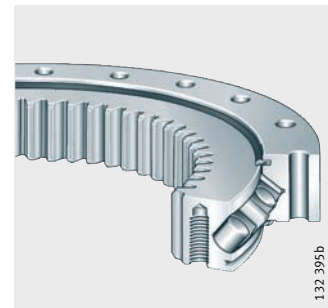
Crossed roller bearings

Standard series 14

XSA14



XSI14



XSU14

Slewing rings

Features

INA slewing rings are known worldwide as premium products in the field of rolling bearing technology. These machine elements have proved themselves many times over; they have high load carrying capacity, a versatile range of applications and are highly cost-effective. Due to their design, a single bearing can reliably support radial, axial and tilting moment loads. It is therefore possible in many cases to replace bearing arrangements comprising a combination of radial and axial bearings by a single bearing. This reduces, in some cases considerably, the costs and work required in the design of the adjacent construction and the fitting of bearings.

Slewing rings are sealed on both sides, lubricated with a high quality grease, can be relubricated via lubrication nipples and are particularly easy to fit. The bearing rings are supplied without gear teeth or, in order to achieve simple drive solutions, are available with external or internal gear teeth.

INA slewing rings are designed as four point contact bearings and crossed roller bearings.

Four point contact bearings

Four point contact bearings are available with external teeth, internal teeth or without teeth as well as in the light series 20 and the standard series 20 and 25.

These slewing rings without preload are robust and proven under very demanding operation; they place only slight demands on the flatness and perpendicularity of the adjacent construction.

They are suitable for applications with low requirements for accuracy and rigidity of the bearing arrangement, for example in simple metalworking machines, wind turbines and construction machinery.

Crossed roller bearings

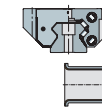
Crossed roller bearings are available with external teeth, internal teeth and without teeth in the standard series 14 as well as in the series XA, XI, XU.

These preloaded slewing rings can support higher loads than four point contact bearings. They have proved themselves particularly where bearings are subjected to high radial forces and moderate axial and tilting moment loads.

They are suitable for applications with uniform running free from stick-slip, low rotational resistance and high requirements for axial and radial runout accuracy and rigidity, for example in robots, handling systems and machine tools.

Catalogue: Slewing rings

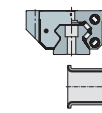
The standard range is described comprehensively in Catalogue 404 and the CD and online versions of ***medias***® *professional*.



Thin section bearings

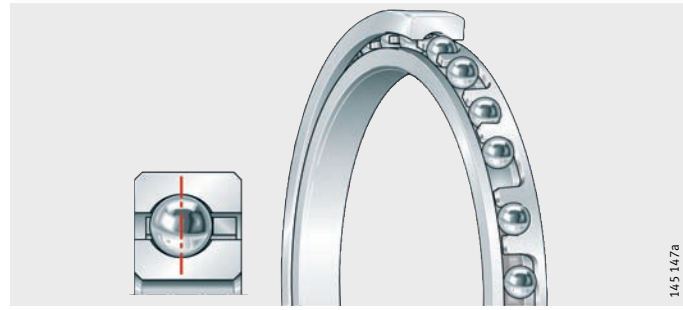
Thin section bearings

		Page
Product overview	Thin section bearings	1548
Features	Deep groove ball bearings, four point contact bearings, angular contact ball bearings	1549



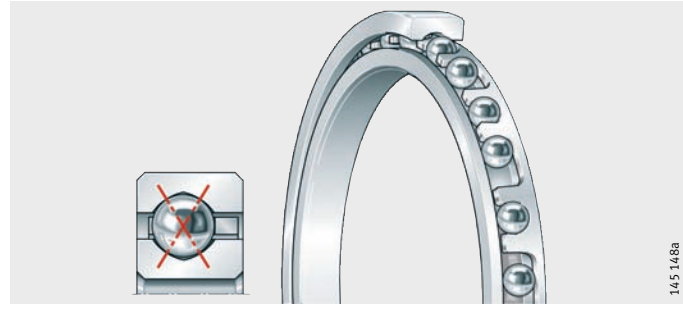
Deep groove ball bearings

Type C



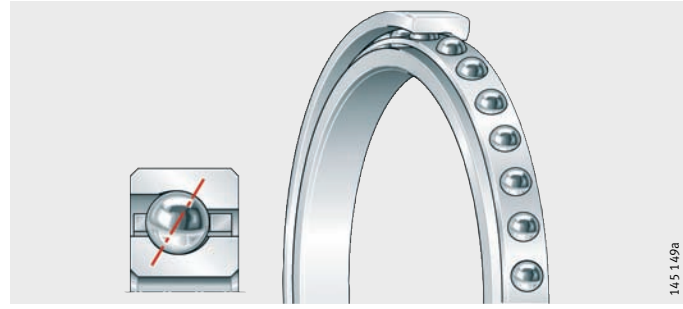
Four point contact bearings

Type X



Angular contact ball bearings

Type E



Thin section bearings

Features

Thin section bearings are high precision products with very little running noise and high load carrying capacity. These bearings are available in three different designs with extremely small, predominantly square cross-sections. Within each series, the cross-section remains constant even in the case of larger shaft and housing bore diameters. The bearings are therefore also described as Constant Section (CS) bearings. This feature distinguishes thin section bearings from the conventional bearings that are described in standardised ISO series.

In this way, a larger cross-section can be selected in a graduated way and thus a bearing with high load carrying capacity can be used without the need to increase the shaft diameter. Thin section bearings can thus be used to achieve extremely light and compact designs.

Deep groove ball bearings, four point contact bearings, angular contact ball bearings

Thin section bearings are available as deep groove ball bearings (C), four point contact bearings (X) and as angular contact ball bearings (E). Each of these designs is available in various series. The series correspond to the cross-section sizes.
The balls are matched to the series.

Deep groove ball bearings can support axial loads in both directions as well as radial loads; under axial load, a contact angle $\alpha > 0°$ is adopted.

Four point contact bearings can support axial loads in both directions as well as radial loads; they thus act as double row angular contact ball bearings.

Angular contact ball bearings can be filled with an optimised number of balls and have a contact angle of 30°. They can support considerably higher radial loads than deep groove ball bearings or four point contact bearings and can support axial loads in one direction. For particular requirements, angular contact ball bearings are also available as matched pairs of bearings. These combinations then have significantly higher rigidity and load carrying capacity than individual bearing solutions.

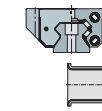
Thin section bearings are available in designs that are either open or sealed on both sides. The seals are made from synthetic rubber (NBR) with a steel insert.

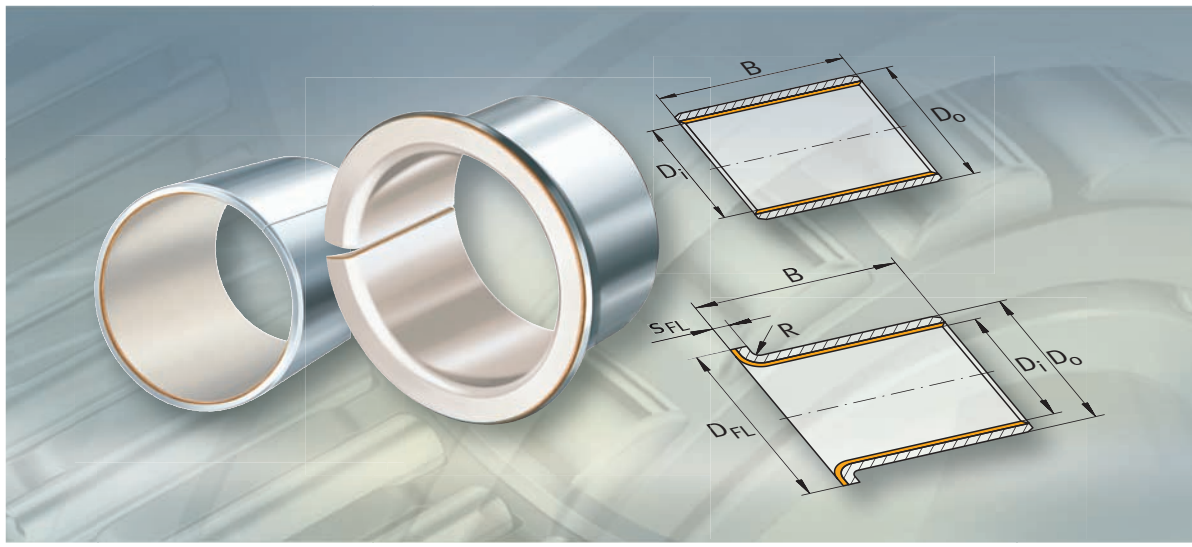
Sealed bearings are greased. For extreme operating conditions, special lubricants are available. Cages are made from brass or plastic.

In addition to the standard tolerance class PL1, classes PL3 and PL6 are also available (with increasingly tighter tolerances).

Catalogue: Thin section bearings

The standard range is described comprehensively in Catalogue 575.



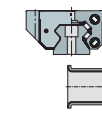


Permaglide® plain bearings

Maintenance-free plain bearing material P1
Low-maintenance plain bearing material P2
Bushes
Flanged bushes
Thrust washers
Strips

Permaglide® plain bearings

		Page
Product overview	Permaglide® plain bearings	1552
Features	Maintenance-free Permaglide® plain bearing material P1	1553
	Low-maintenance Permaglide® plain bearing material P2	1556
	Special designs, linear plain bearings	1559



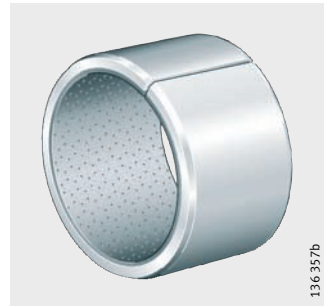
Permaglide® is a registered trademark
and product of KS Gleitlager GmbH, St. Leon-Rot.

Product overview Permaglide® plain bearings

Bushes

P1 maintenance-free
P2 low-maintenance

PAP..-P10, PAP..-P11, PAP..-P14, PAPZ..-P10

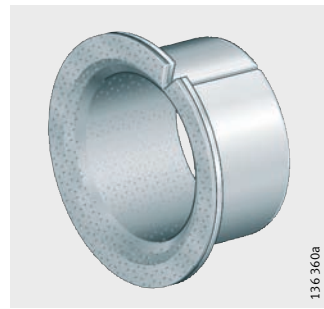


PAP..-P20

Flanged bushes

P1 maintenance-free

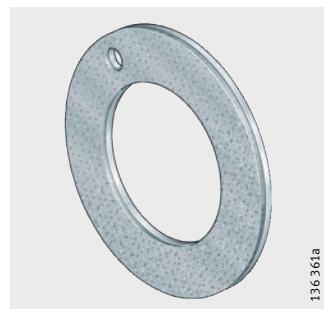
PAF..-P10, PAF..-P11, PAF..-P14



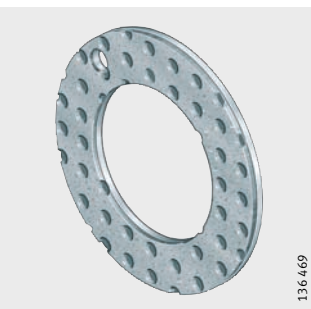
Thrust washers

P1 maintenance-free
P2 low-maintenance

PAW..-P10, PAW..-P14



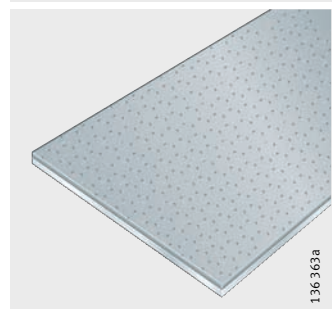
PAW..-P20



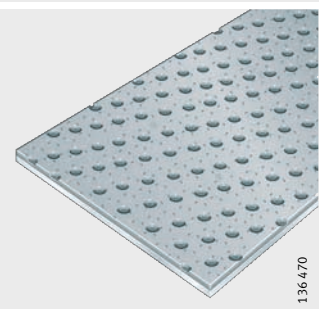
Strips

P1 maintenance-free
P2 low-maintenance

PAS..-P10, PAS..-P11, PAS..-P14



PAS..-P20



Permaglide® plain bearings

Features

Permaglide® plain bearings are bearings for very small radial or axial design envelopes. These products are available as bushes, flanged bushes, thrust washers and strips and in two material groups. The bushes are available in metric sizes and in inch sizes.

Bushes, washers and strips are made from the maintenance-free Permaglide® P1 or the low-maintenance P2.

Flanged bushes are made from maintenance-free Permaglide® P1.

Some P1 and P2 materials contain lead (Pb). Materials containing lead should not be allowed to come into contact with foodstuffs or pharmaceutical products.

Product catalogue

The complete Permaglide® standard range is described comprehensively in Catalogue 706 and the CD and online versions of ***medias***® *professional*.

Maintenance-free Permaglide® plain bearing material P1

Permaglide® P1 is maintenance-free and suitable for dry running. It can be used for rotary and oscillating motion as well as for short stroke linear motion.

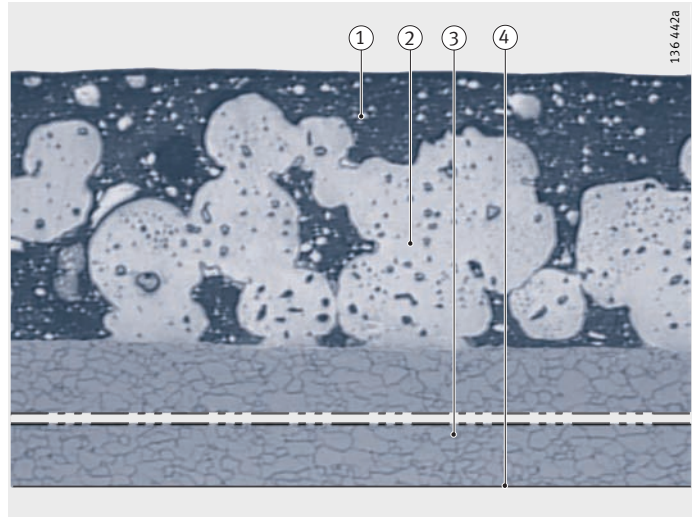
The low-wear material has good sliding characteristics, a low coefficient of friction and high resistance to chemicals. It does not absorb water (highly resistant to swelling), does not tend to weld to metal and is also suitable for hydrodynamic operation.

The maintenance-free Permaglide® materials are available in the variants P10, P11 and P14.

In addition, P141 is available by agreement, see Special designs, page 1554.

Permaglide® P10

The variant P10 has a steel backing, *Figure 1*.



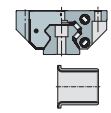
① Running-in layer: polytetrafluorethylene (PTFE) and lead (Pb), 0,01 mm to 0,03 mm thick

② Sliding layer: porous bronze layer, filled with PTFE/Pb, 0,2 mm to 0,35 mm thick

③ Steel backing

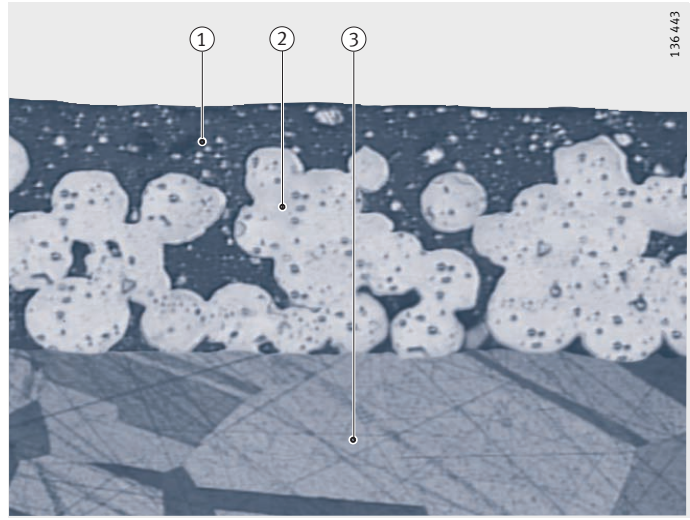
④ Surface protection for steel backing, end faces and butt joint faces: tin, ≈ 0,002 mm thick

Figure 1
Permaglide® P10



Permaglide® P11

In P11 the backing is made from bronze, *Figure 2*. Plain bearings made from this material have high corrosion resistance and thermal conductivity and are antimagnetic.

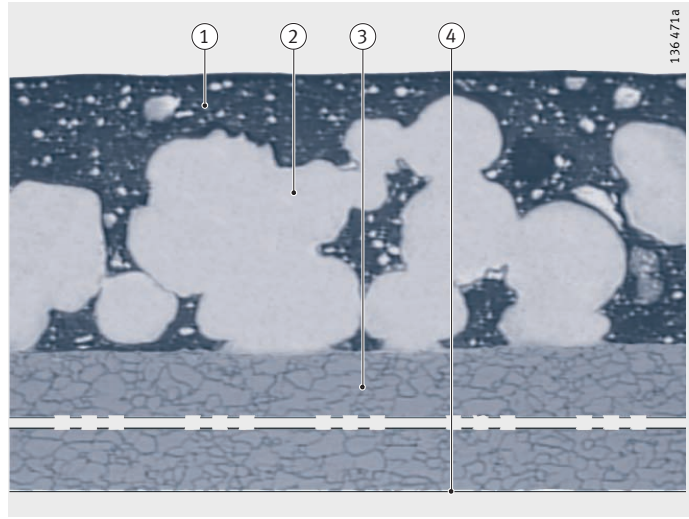


① Running-in layer: polytetrafluorethylene (PTFE) and lead (Pb), 0,01 mm to 0,03 mm thick
② Sliding layer: porous bronze layer, filled with PTFE/Pb, 0,2 mm to 0,35 mm thick
③ Bronze backing

Figure 2
Permaglide® P11

Permaglide® P14

P14 has a steel backing but is free from lead, *Figure 3*.



① Running-in layer: polytetrafluorethylene (PTFE) and zinc sulphide (ZnS), 0,01 mm to 0,03 mm thick
② Sliding layer: porous bronze layer, filled with PTFE/ZnS, 0,2 mm to 0,35 mm thick
③ Steel backing
④ Surface protection for steel backing, end faces and butt joint faces: tin, ≈ 0,002 mm thick

Figure 3
Permaglide® P14

Special designs

Available by agreement and as a special design is the lead-free Permaglide® P141. This material is similar in structure to P14 but has wear-inhibiting additives.

The running-in layer and sliding layer are resistant to swelling and the temperature range extends from –60 °C to +260 °C.

Furthermore, all maintenance-free P1 materials (except for P11) can also be supplied with increased anti-corrosion protection.

Technical data

For the important mechanical and physical characteristics of the maintenance-free P1 plain bearing materials, see table.

Data

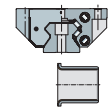
Characteristics				
Maximum pv value for dry running	Continuous operation	pv	1,8	$N/mm^2 \cdot m/s$
	For short periods		3,6	$N/mm^2 \cdot m/s$
Permissible specific bearing load	Static	p_{max}	250	N/mm^2
	Very low sliding speed		140	N/mm^2
	Rotating, oscillating		56	N/mm^2
Permissible sliding speed	Dry running	v_{max}	2	m/s
	Hydrodynamic operation		>2	m/s
Permissible operating temperature	–	ϑ	–200 to +280	°C
Coefficient of thermal expansion	Steel backing	α_{St}	$11 \cdot 10^{-6}$	K^{-1}
	Bronze backing	α_{Bz}	$17 \cdot 10^{-6}$	K^{-1}
Coefficient of thermal conductivity	Steel backing	λ_{St}	>42	$W (m \cdot K)^{-1}$
	Bronze backing	λ_{Bz}	>70	$W (m \cdot K)^{-1}$
Relative electrical resistance after running-in		$R_{rel\ min}$	$> 1\ \Omega \cdot cm^2$	

Available designs

For the available standard dimension ranges for bushes, washers and strips with P1 material, see table.

Product and size range

Plain bearings made from P1 material	Designation	For shafts with the following dimensions
Bushes	PAP..-P10	2 mm to 300 mm
	PAPZ..-P10	$^3/_{16}$″ to 2″
	PAP..-P11	4 mm to 100 mm
	PAP..-P14	2 mm to 300 mm
Flanged bushes	PAF..-P10	6 mm to 40 mm
	PAF..-P11	6 mm to 40 mm
	PAF..-P14	6 mm to 40 mm
Thrust washers	PAW..-P10	10 mm to 62 mm
	PAW..-P11	Available by agreement
	PAW..-P14	10 mm to 62 mm
Strips	PAS..-P10	Length 500 mm, width from 180 mm to 250 mm, thickness from 0,5 mm to 3,06 mm
	PAS..-P11	Length 500 mm, width from 160 mm to 180 mm, thickness from 1 mm to 2,5 mm
	PAS..-P14	Length 500 mm, width from 180 mm to 250 mm, thickness from 0,5 mm to 3,06 mm



Low-maintenance Permaglide® plain bearing material P2

Permaglide® P2 is a low-maintenance, low-wear material with good damping characteristics and long relubrication intervals. It can be used for rotary and oscillating motion, has good resistance to edge loading and is highly resistant to shock loads.

Low-maintenance Permaglide® materials are available in the variants P20, P21, P22, P23 and P25.

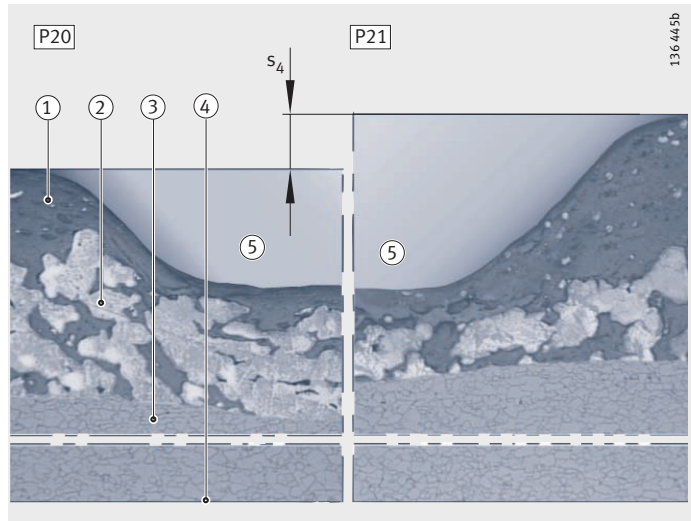
P21, P22, P23 and P25 are available by agreement.

Permaglide® P20

The variant P20 is ready-to-fit and has lubrication pockets, *Figure 4*.

Permaglide® P21

This material has lubrication pockets and a machining allowance, *Figure 5*. The sliding layer is approximately 0,15 mm thicker than in P20 and can therefore be machined subsequently by swarf-forming methods. Misalignment inaccuracies can therefore be compensated or internal clearances with tighter tolerances can be achieved.



① Sliding layer: polyvinylidenefluoride (PVDF), polytetrafluorethylene (PTFE) and lead (Pb), 0,05 mm to 0,1 mm thick
② Bronze intermediate layer: 0,2 mm to 0,35 mm thick
③ Steel backing
④ Surface protection: tin, approx. 0,002 mm thick
⑤ P20 and P21 with lubrication pockets
P21 with machining allowance s_4 of approx. 0,15 mm

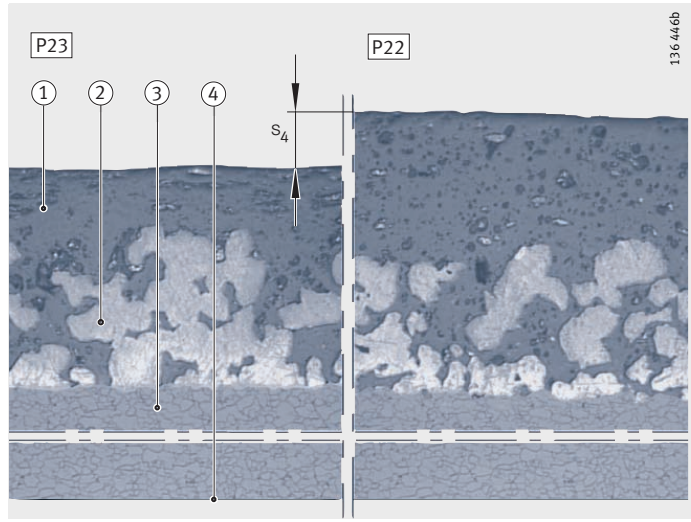
Figure 4
Permaglide® P20, P21

Permaglide® P22

P22 does not have lubrication pockets but does have a machining allowance, *Figure 5*. The sliding layer is approximately 0,15 mm thicker than in P20 and can therefore be machined subsequently by swarf-forming methods. Misalignment inaccuracies can therefore be compensated or internal clearances with tighter tolerances can be achieved.

Permaglide® P23

The variant P23 is ready-to-fit and does not have lubrication pockets, *Figure 5*.



① Sliding layer: polyvinylidenefluoride (PVDF), polytetrafluorethylene (PTFE) and lead (Pb), 0,05 mm to 0,1 mm thick
② Bronze intermediate layer: 0,2 mm to 0,35 mm thick
③ Steel backing
④ Surface protection: tin, approx. 0,002 mm thick
P22 and P23 without lubrication pockets
P22 with machining allowance s_4 of approx. 0,15 mm

Figure 5
Permaglide® P23, P22

Special designs

Available by agreement and as a special design is Permaglide® P25. This material is ready-to-fit, has lubrication pockets and is highly resistant to corrosion due to the bronze backing.

Furthermore, all low-maintenance P2 materials (except for P25) can also be supplied with increased anti-corrosion protection.

Technical data

For the important mechanical and physical characteristics of the low-maintenance P2 plain bearing materials, see table.

Data

Characteristics				
Maximum pv value		pv	3	$N/mm^2 \cdot m/s$
Permissible specific bearing load	Static	p_{max}	250	N/mm^2
	Very low sliding speed		140	N/mm^2
	Rotating, oscillating		70	N/mm^2
Permissible sliding speed	–	v_{max}	3	m/s
	Hydrodynamic operation		>3	m/s
Permissible operating temperature	Continuous operation	ϑ	–40 to +110	°C
	For short periods	ϑ_{max}	+140	°C
Coefficient of thermal expansion	Steel backing	α_{St}	$11 \cdot 10^{-6}$	K^{-1}
Coefficient of thermal conductivity	Steel backing	λ_{St}	<4	$W\ (m \cdot K)^{-1}$
Coefficient of friction		μ	0,02 to 0,2	

Available designs

For the available standard dimension ranges for bushes, washers and strips with P2 material, see table.

Product and size range

Plain bearings made from P2 material	Designation	For shafts with the following dimensions
Bushes	PAP..-P20	8 mm to 100 mm
Thrust washers	PAW..-P20	12 mm to 52 mm
Strips	PAS..-P20	Length 500 mm, width from 180 mm to 250 mm, thickness from 0,99 mm to 2,46 mm

Special designs, linear plain bearings

In addition to the catalogue range, there are numerous special designs, *Figure 7*, page 1560:

- made from any Permaglide® plain bearing material
- with different dimensions from the catalogue products
- as combined components ①, ②
  - pressed into rings
  - with plastic moulded parts
- in different shapes ⑦, ⑭
  - bushes with windows and holes ③, ⑤
  - bushes with stamped oil grooves ④, ⑥
  - stamped components ⑬, ⑮, ⑯
  - ball cups ⑩, ⑪, ⑫
  - bearing shells ⑰, ⑱
- with the sliding layer on the outside ⑧, ⑨
- with different butt joint geometries ⑨.

The picture shows a small selection of special components already produced.

Special designs can be made in the following sizes:

- outside diameter of the bush between 3 mm and 305 mm (in special cases up to 800 mm)
- strip widths up to 250 mm
- thicknesses from 0,5 mm to 3,06 mm.

The feasibility of special designs should be checked as early as possible. This applies to the geometry and also to the costs.

Permaglide® linear plain bearings

Permaglide® linear plain bearings PAB comprise an outer ring into which are pressed Permaglide® bushes PAP..-P20, *Figure 6*, ①. The variant PABO has a segment cut out for supported shafts.

Permaglide® linear plain bearing units PAGH and PAGBA comprise a housing into which is pressed a Permaglide® linear plain bearing PAB or PABO, *Figure 6*, ②.

Product catalogue

Comprehensive information on Permaglide® linear plain bearings is given in Catalogue WF 1, Shaft Guidance Systems as well as in ***medias***® *professional*.

① Permaglide®
linear plain bearing PAB..-PP-AS
② Permaglide®
linear plain bearing unit
PAGBAO..-PP-AS

Figure 6
Permaglide® linear plain bearings

Permaglide® plain bearings – special designs

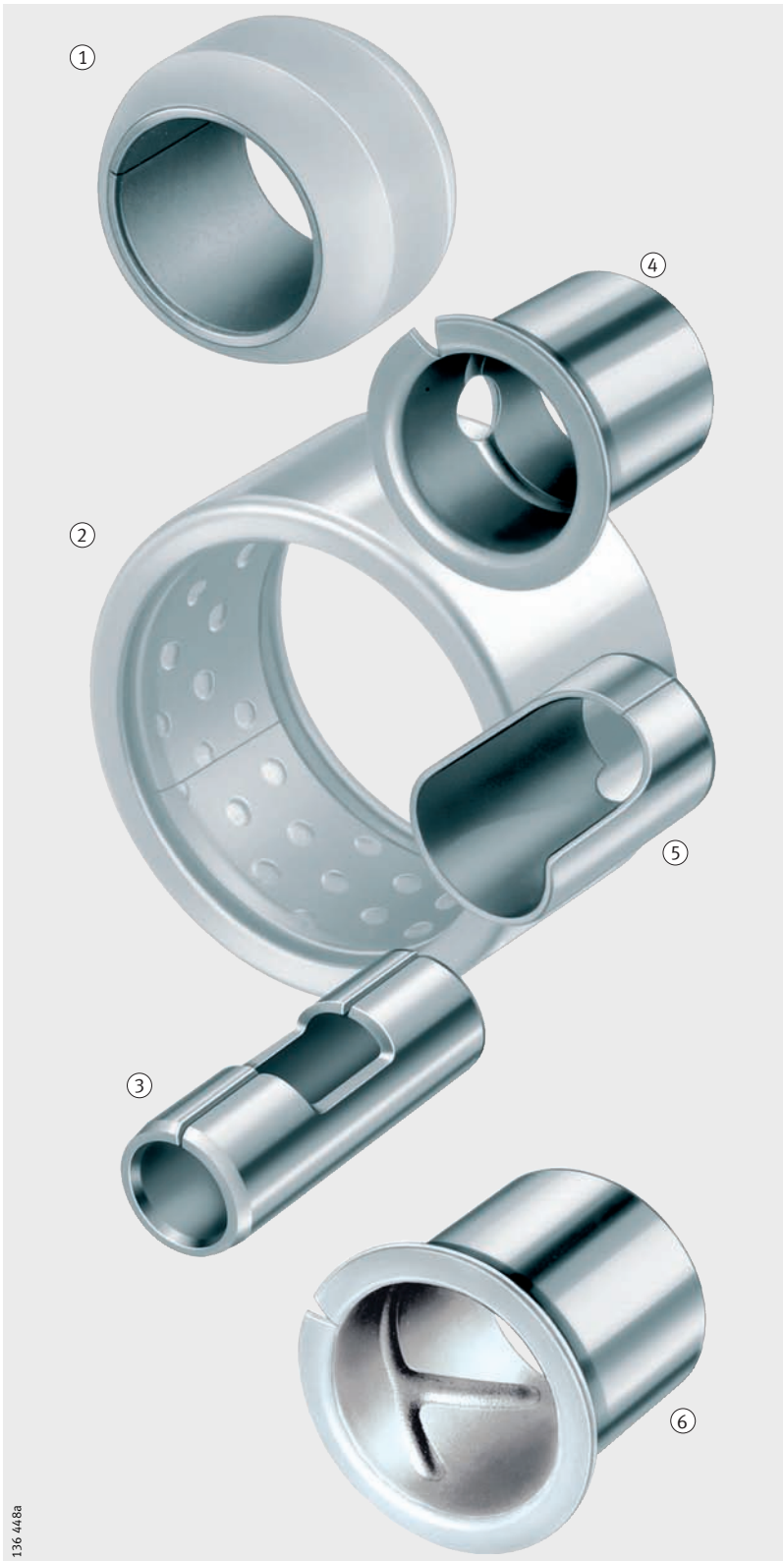
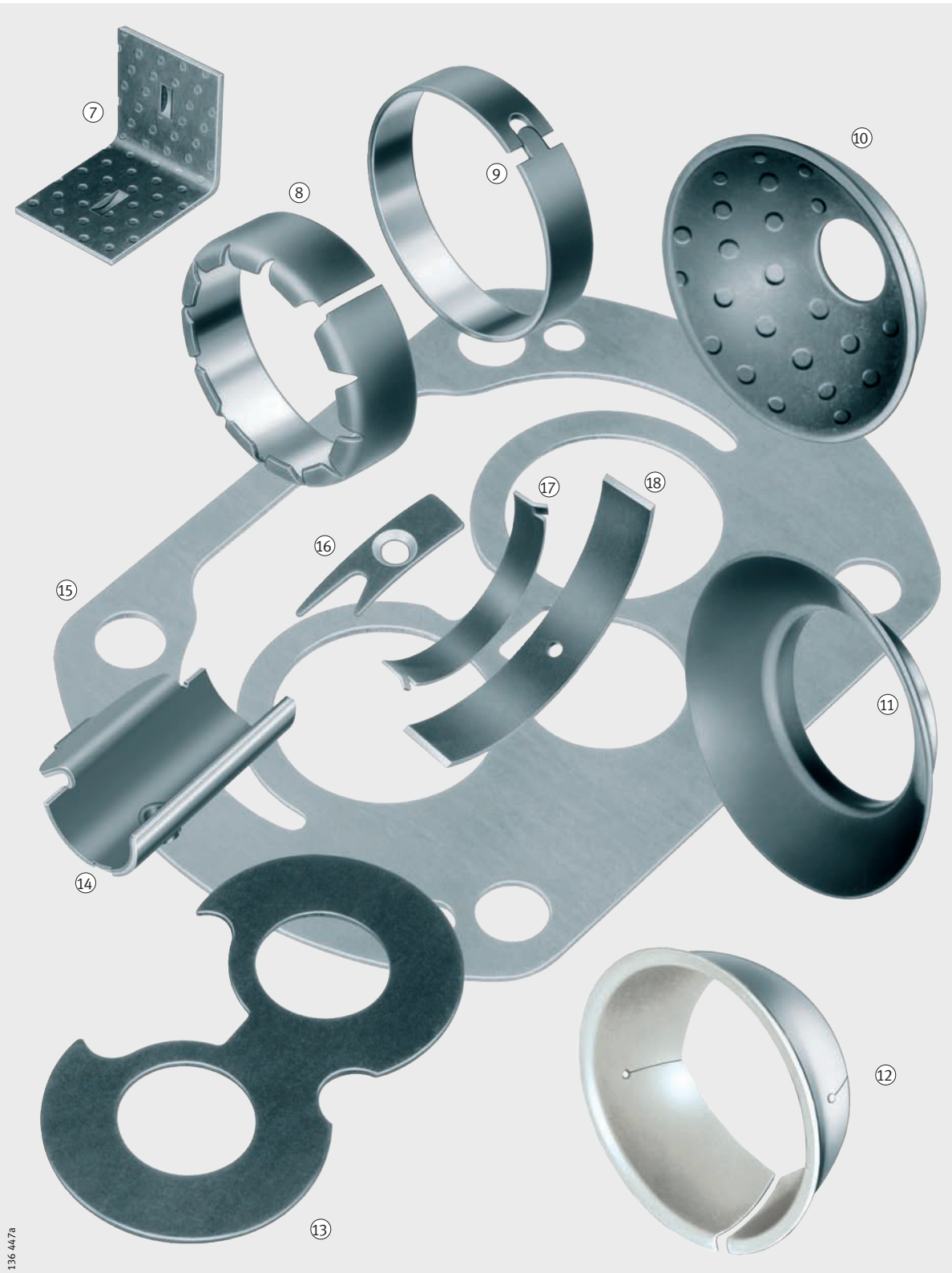
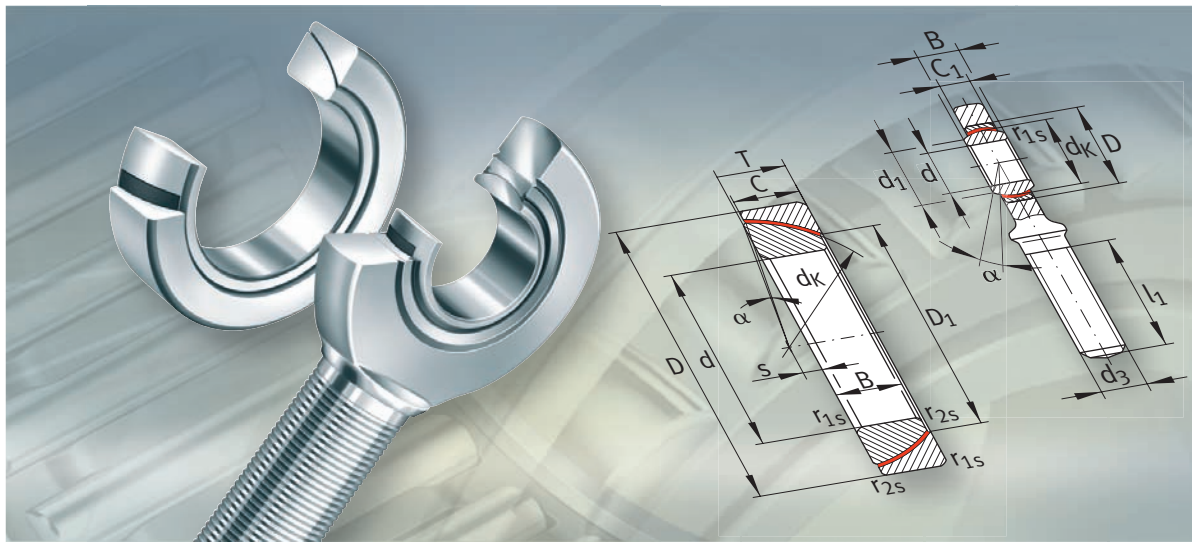


Figure 7
Special designs
of Permaglide® plain bearings

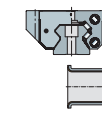

7
8
9
10
11
12
13
14
15
16
17
18
136 447a



ELGES
spherical plain bearings, plain bushes, rod ends

ELGES spherical plain bearings, plain bushes, rod ends

		Page
Product overview	Maintenance-free spherical plain bearings, cylindrical plain bushes	1564
Features	Sliding layers	1565
	Radial spherical plain bearings X-life radial large spherical plain bearings	1567
	Angular contact spherical plain bearings	1567
	Axial spherical plain bearings X-life axial large spherical plain bearings	1567
	Cylindrical plain bushes	1567
Product overview	Spherical plain bearings requiring maintenance	1568
Features	Radial spherical plain bearings	1569
	Angular contact spherical plain bearings	1569
	Axial spherical plain bearings	1569
Product overview	Maintenance-free rod ends	1570
Features	Rod ends with internal thread	1571
	Rod ends with external thread	1571
Product overview	Rod ends requiring maintenance	1572
Features	Rod ends with internal thread	1573
	Rod ends with external thread	1573
Product overview	Hydraulic rod ends	1574
Features	Hydraulic rod ends with thread clamping	1575
	Hydraulic rod ends with welding face	1575

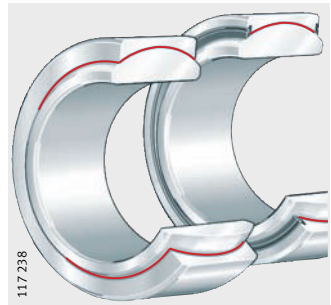


Maintenance-free spherical plain bearings, cylindrical plain bushes

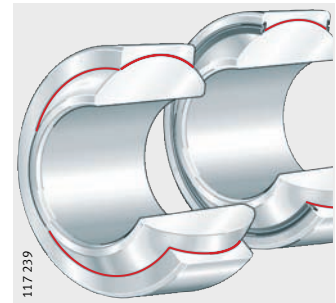
Radial spherical plain bearings

Open or with lip seals on both sides

GE..-UK, GE..-UK-2RS



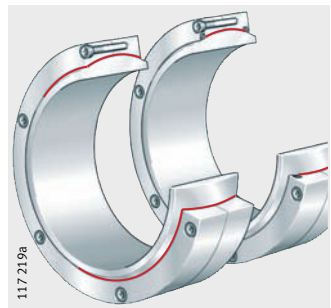
GE..-FW, GE..-FW-2RS



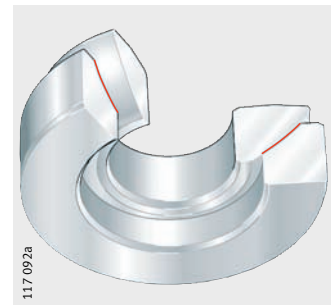
X-life radial and axial large spherical plain bearings

Open or with lip seals on both sides

GE..-DW, GE..-DW-2RS2



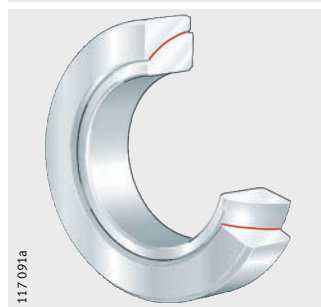
GE..-AW



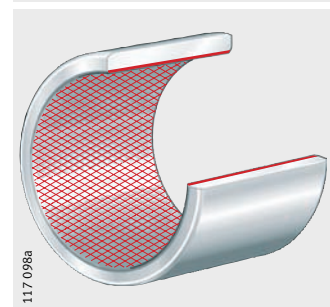
Angular contact spherical plain bearings, cylindrical plain bushes

Open

GE..-SW



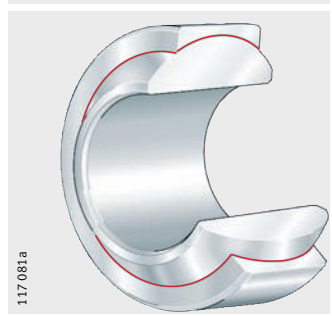
ZGB



Radial spherical plain bearings

Dimension series K, open

GE..-PW



Maintenance-free spherical plain bearings, cylindrical plain bushes

Features

Maintenance-free spherical plain bearings are used where:

- there are particular requirements on bearing life under maintenance-free operation
- for reasons of lubrication, bearings with a metallic sliding contact surface are not suitable, e.g. under unilateral load.

Spherical plain bearings allow spatial adjustment movements and, depending on the bearing type, are preferably used to support radial, combined or axial loads.

Product catalogue

The complete range is described in detail in Catalogue 238 (HG1 with effect from 05/09) and on the CD and online versions of ***medias***® *professional*.

Sliding layers

Maintenance-free spherical plain bearings have special sliding layers based on PTFE (polytetrafluorethylene).

In descending order of performance, these are:

- ELGOGLIDE® – the highest performance sliding layer, *Figure 1*
- PTFE composite, *Figure 2*, page 1566
- PTFE-bronze film, *Figure 3*, page 1566.

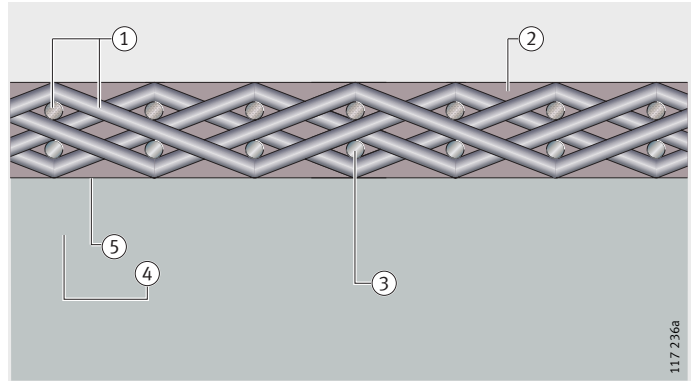
These materials form the slideway of the outer ring or the housing locating washer. They transmit the forces occurring and provide lubrication – the bearings must not be lubricated in any other way.

ELGOGLIDE®

The sliding layer comprises 0,5 mm thick ELGOGLIDE®, is embedded in synthetic resin and attached by a high strength bond to the support body, *Figure 1*.

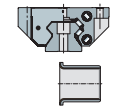
The flow behaviour of the sliding layer is, in combination with the support body, almost negligible even under very high load.

The adhesive bond is resistant to moisture and does not undergo swelling.



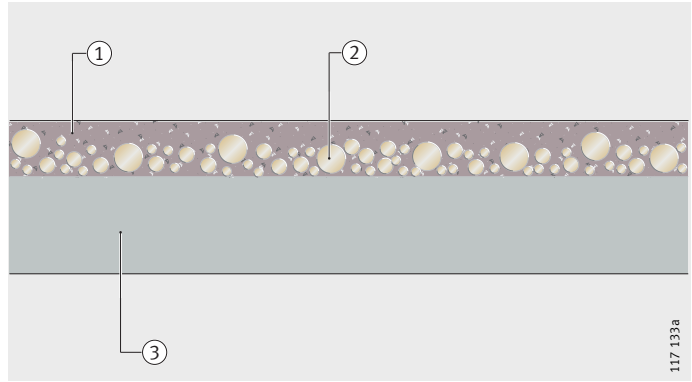
① PTFE fabric, comprising Teflon® and supporting fibres
② Resin matrix
③ Supporting fibres
④ Steel substrate
⑤ Adhesive bond

Figure 1
ELGOGLIDE®, cross-section



PTFE composite

PTFE composite comprises sheet steel with bronze attached by sintering and embedded PTFE compound, *Figure 2*.

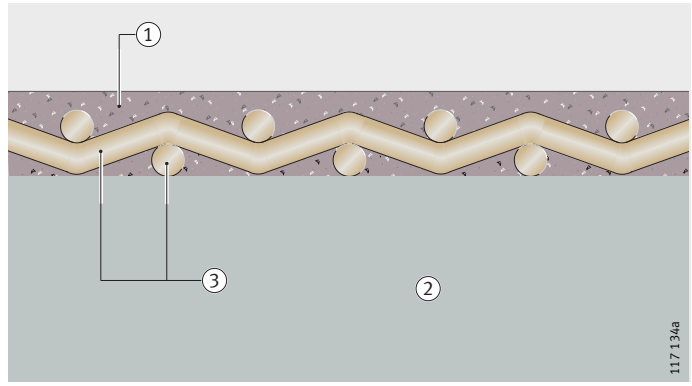


① PTFE compound
② Sintered bronze
③ Sheet steel

Figure 2
PTFE composite, cross-section

PTFE-bronze film

PTFE-bronze film (metal lattice material) is made from high strength bronze and acts as a stabiliser for the sintered PTFE compound, *Figure 3*.



① PTFE compound
② Substrate
③ Bronze

Figure 3
PTFE-bronze film, cross-section

Radial spherical plain bearings X-life radial large spherical plain bearings

Radial spherical plain bearings comprise inner and outer rings with maintenance-free sliding layers made from ELGOGLIDE®, PTFE composite or PTFE-bronze film.

Sealed spherical plain bearings are protected by lip seals against contamination and water spray.
These bearings have the suffix 2RS or 2RS2.

Radial large spherical plain bearings from d = 320 mm are X-life bearings.

Series, sliding layer, standard

Series	Sliding layer	Standard DIN ISO 12 240-1	Shaft diameter	
			from mm	to mm
GE..-UK	Composite	Dimension series E	6	30
GE..-UK-2RS	ELGOGLIDE®	Dimension series E	17	300
GE..-FW	Composite	Dimension series G	6	25
GE..-FW-2RS	ELGOGLIDE®	Dimension series G	30	280
GE..-DW	ELGOGLIDE®	Dimension series C	320	1 000
GE..-DW-2RS2	ELGOGLIDE®	Dimension series C	320	1 000
GE..-PW	PTFE-bronze film	Dimension series K	5	30

Angular contact spherical plain bearings

Angular contact spherical plain bearings comprise inner and outer rings with ELGOGLIDE®. In addition to radial forces, they can also support axial forces and are suitable for alternating dynamic loads.

Series, sliding layer, standard

Series	Sliding layer	Standard	Shaft diameter	
			from mm	to mm
GE..-SW	ELGOGLIDE®	DIN ISO 12 240-2	25	200

Axial spherical plain bearings X-life axial large spherical plain bearings

Axial spherical plain bearings comprise shaft locating and housing locating washers with ELGOGLIDE®. They are preferably used to support axial forces and are suitable as support or base bearings.

Axial large spherical plain bearings from d = 220 mm are X-life bearings.

Series, sliding layer, standard

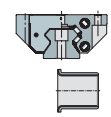
Series	Sliding layer	Standard	Shaft diameter	
			from mm	to mm
GE..-AW	ELGOGLIDE®	DIN ISO 12 240-3	10	360

Cylindrical plain bushes

Cylindrical plain bushes comprise a steel support body with ELGOGLIDE®. They allow not only swivel movements but also axial movements and can support higher forces than conventional plain bearings.

Series, sliding layer, standard

Series	Sliding layer	Standard	Shaft diameter	
			from mm	to mm
ZGB	ELGOGLIDE®	DIN ISO 4 379[1)]	30	200



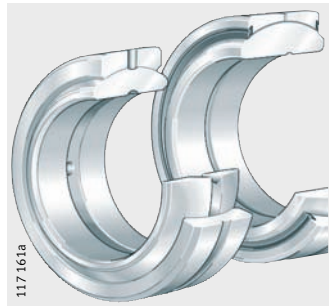
1) Main dimensions only.

Spherical plain bearings requiring maintenance

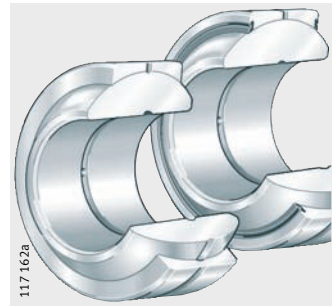
Radial spherical plain bearings

Open or with lip seals on both sides

GE..-DO, GE..-DO-2RS

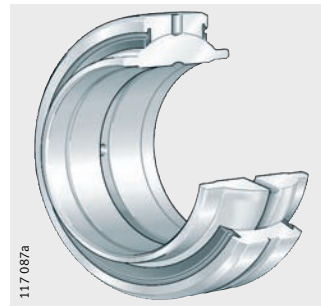


GE..-FO, GE..-FO-2RS



GE..-LO

GE..-HO-2RS



Open, inch dimensions or dimension series K

GE..-ZO

GE..-PB

Angular contact spherical plain bearings, axial spherical plain bearings

Open

GE..-SX

GE..-AX

Spherical plain bearings requiring maintenance

Features

Radial spherical plain bearings

Radial spherical plain bearings comprise inner and outer rings with steel/steel or steel/bronze sliding contact surfaces and are lubricated via the inner and outer ring. They can support radial forces, transmit motion and loads with low moment levels and thus keep bending stresses away from the adjacent structure.

The bearings are particularly suitable for alternating loads with impact and shock type stresses and support axial loads in both directions.

Sealed spherical plain bearings are protected against contamination and water spray by lip seals and have the suffix 2RS.

Series, sliding contact surface, standard

Series	Sliding contact surface	Standard DIN ISO 12 240-1	Shaft diameter	
			from mm	to mm
GE..-DO	Steel/steel	Dimension series E	6	200
GE..-DO-2RS	Steel/steel	Dimension series E	17	300
GE..-DO	Steel/steel	Dimension series C	320	1 000
GE..-FO	Steel/steel	Dimension series G	6	12
GE..-FO-2RS	Steel/steel	Dimension series G	15	280
GE..-LO	Steel/steel	Dimension series W	12	320
GE..-HO-2RS	Steel/steel	–	20	80
GE..-ZO	Steel/steel	–	19,05	76,2
GE..-PB	Steel/bronze	Dimension series K	5	30

Angular contact spherical plain bearings

Angular contact spherical plain bearings GE..-SX correspond to DIN ISO 12 240-2 and comprise inner and outer rings with steel/steel sliding contact surfaces.

In addition to radial forces, they can also support axial forces, are suitable for alternating dynamic loads and are used, for example, as an alternative to tapered roller bearings 320X to DIN 720 where loads in conjunction with small swivel angles would damage rolling bearings.

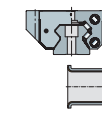
Angular contact spherical plain bearings transmit motion and loads with low moment levels and thus keep bending stresses away from the adjacent structure.

Axial spherical plain bearings

Axial spherical plain bearings GE..-AX correspond to DIN ISO 12 240-3 and comprise shaft and housing locating washers with steel/steel sliding contact surfaces.

They can support axial forces and transmit support forces with low moment levels into the adjacent construction; in order to support radial forces, they can be combined with radial spherical plain bearings of dimension series E to DIN ISO 12 240-1.

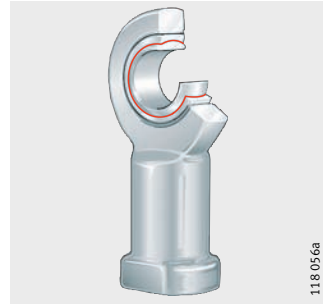
The bearings are lubricated via the housing locating washer.



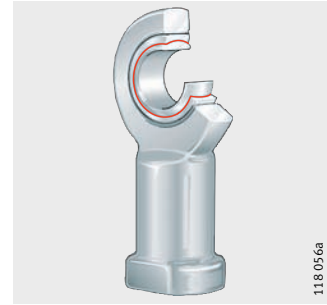
With internal thread

Open or
with lip seals on both sides

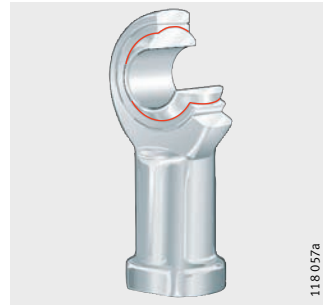
GIR..-UK, GIR..-UK-2RS



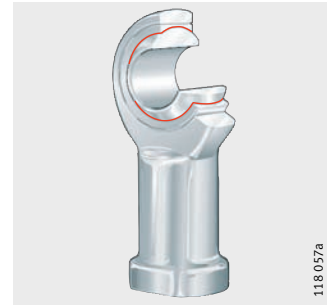
GIL..-UK, GIL..-UK-2RS



GIKR..-PW, GIKPR..-PW



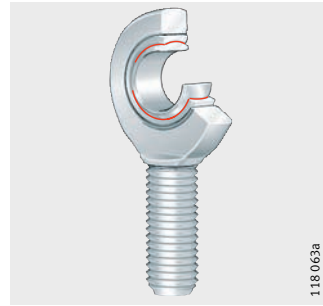
GIKL..-PW



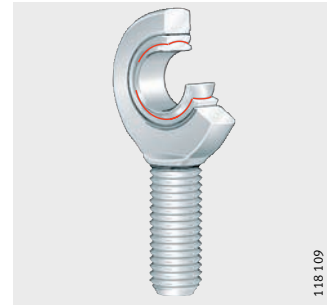
With external thread

Open or
with lip seals on both sides

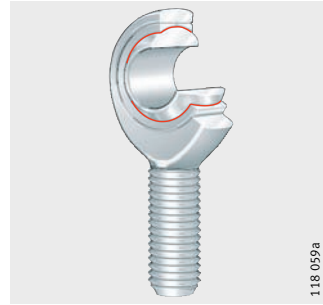
GAR..-UK, GAR..-UK-2RS



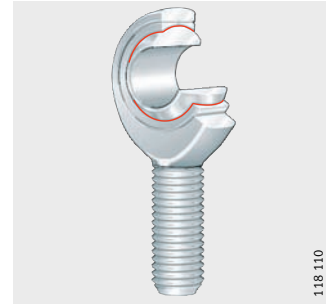
GAL..-UK, GAL..-UK-2RS



GAKR..-PW



GAKL..-PW



Maintenance-free rod ends

Features

Maintenance-free rod ends comprise a housing with integral shank and a maintenance-free spherical plain bearing. The integral shank has an internal or external thread. The spherical plain bearing is firmly seated and located in the housing. The housings and shanks are protected against corrosion by zinc plating.

The rod ends can support radial loads in a tensile or compressive direction. They are suitable for slow movements with small to moderate swivel angles, for unilateral load and under certain conditions for alternating loads (suitable for alternating loads with GE..-UK-2RS).

Sealed rod ends have lip seals on both sides and are thus protected against contamination and water spray.
This variant has the suffix 2RS.

Rod ends to DIN ISO 12 240-4, dimension series E contain radial spherical plain bearings GE..-UK or GE..-UK-2RS with sliding contact surfaces comprising hard chromium/PTFE composite or hard chromium/ELGOGLIDE® and a right hand or left hand internal or external thread. The thin-walled design of the eye housing allows compact adjacent constructions.

Rod ends to DIN ISO 12 240-4, dimension series K contain radial spherical plain bearings GE..-PW with sliding contact surfaces comprising steel/PTFE-bronze film and a right hand or left hand internal or external thread.

Rod ends with internal thread

Rod ends with an internal thread, see table.

Series, thread type, standard

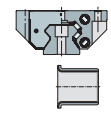
Series	Thread type	Standard DIN ISO 12 240-4	Shaft diameter	
			from mm	to mm
GIR..-UK	Right hand thread	Dimension series E, type F	6	30
GIL..-UK	Left hand thread	Dimension series E, type F	6	30
GIR..-UK-2RS	Right hand thread	Dimension series E, type F	35	80
GIL..-UK-2RS	Left hand thread	Dimension series E, type F	35	80
GIKR..-PW	Right hand thread	Dimension series K, type F	5	30
GIKL..-PW	Left hand thread	Dimension series K, type F	5	30
GIKPR..-PW	Right hand thread	Dimension series K, type F	5	30

Rod ends with external thread

Rod ends with an external thread, see table.

Series, thread type, standard

Series	Thread type	Standard DIN ISO 12 240-4	Shaft diameter	
			from mm	to mm
GAR..-UK	Right hand thread	Dimension series E, type M	6	30
GAL..-UK	Left hand thread	Dimension series E, type M	6	30
GAR..-UK-2RS	Right hand thread	Dimension series E, type M	35	80
GAL..-UK-2RS	Left hand thread	Dimension series E, type M	35	80
GAKR..-PW	Right hand thread	Dimension series K, type M	5	30
GAKL..-PW	Left hand thread	Dimension series K, type M	5	30



With internal thread

Open or
lip seals on both sides

GIR..-DO, GIR..-DO-2RS

GIL..-DO, GIL..-DO-2RS

GIKR..-PB

GIKL..-PB

With external thread

Open or
lip seals on both sides

GAR..-DO, GAR..-DO-2RS

GAL..-DO, GAL..-DO-2RS

GAKR..-PB

GAKL..-PB

Rod ends requiring maintenance

Features

These rod ends comprise a housing with integral shank and a spherical plain bearing requiring maintenance. The shank has an internal or external thread, the spherical plain bearing is firmly seated and located in the housing.

The rod ends can support radial forces in a tensile or compressive direction, transmit movements and forces at low moment levels and are suitable for alternating loads and, under certain conditions, unilateral loads.

Protection against corrosion is provided by zinc plating, the thin-walled design of the eye housing allows compact adjacent constructions.

Sealed rod ends are protected against contamination and water spray by lip seals. These bearings have the suffix 2RS.

Rod ends to DIN ISO 12 240-4, dimension series E contain radial spherical plain bearings GE..-DO or GE..-DO-2RS with steel/steel sliding contact surfaces, a right or left hand internal or external thread and tapered lubrication nipples to DIN 71 412. They can be relubricated via the lubrication nipple or the housing bore.

Rod ends to DIN ISO 12 240-4-dimension series K have a right or left hand internal or external thread and funnel type lubrication nipples to DIN 3 405 on the rod end eye housing.

Rod ends with internal thread

Dimension series E, type F has a steel/steel sliding contact surface, while dimension series K, type F has a steel/bronze sliding contact surface.

Series, thread type, standard

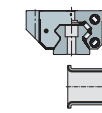
Series	Thread type	Standard DIN ISO 12 240-4	Shaft diameter	
			from mm	to mm
GIR..-DO	Right hand thread	Dimension series E, type F	6	30
GIL..-DO	Left hand thread	Dimension series E, type F	6	30
GIR..-DO-2RS	Right hand thread	Dimension series E, type F	35	80
GIL..-DO-2RS	Left hand thread	Dimension series E, type F	35	80
GIKR..-PB	Right hand thread	Dimension series K, type F	5	30
GIKL..-PB	Left hand thread	Dimension series K, type F	5	30

Rod ends with external thread

Dimension series E, type M has a steel/steel sliding contact surface, while dimension series K, type M has a steel/bronze sliding contact surface.

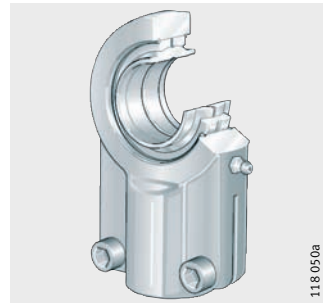
Series, thread type, standard

Series	Thread type	Standard DIN ISO 12 240-4	Shaft diameter	
			from mm	to mm
GAR..-DO	Right hand thread	Dimension series E, type M	6	30
GAL..-DO	Left hand thread	Dimension series E, type M	6	30
GAR..-DO-2RS	Right hand thread	Dimension series E, type M	35	80
GAL..-DO-2RS	Left hand thread	Dimension series E, type M	35	80
GAKR..-PB	Right hand thread	Dimension series K, type M	5	30
GAKL..-PB	Left hand thread	Dimension series K, type M	5	30

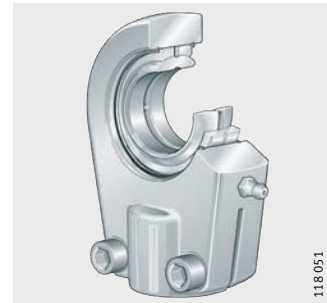


Hydraulic rod ends

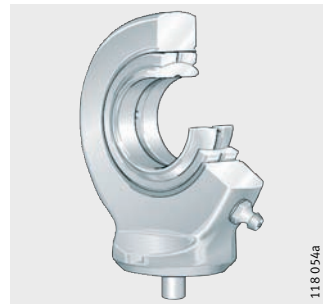
GIHNRK..-LO



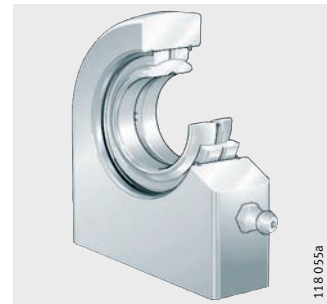
GIHRK..-DO



GK..-DO



GF..-DO



Hydraulic rod ends

Features

Hydraulic rod ends are fitted with radial spherical plain bearings GE..-LO or GE..-DO. They have steel/steel sliding contact surfaces, can support radial forces in a tensile or compressive direction, transmit movements and forces at low moment levels and are suitable for alternating loads.

The shanks can be screw mounted using a thread in the shank or welded in place by means of circular or rectangular welding faces.

Rod ends with a circular welding face have a 45° weld chamfer and a centring facility by means of a concentric locating pin. They are particularly suitable for piston rods. Hydraulic rod ends with a rectangular cross-section are particularly suitable for cylinder bases.

The rod ends are slotted on both sides up to d ≦ 50 mm and on one side from d > 50 mm; they can be relubricated via tapered lubrication nipples.

Hydraulic rod ends with thread clamping

Rod ends GIHNRK..-LO conform to DIN 24 338, ISO 6 982 for standard hydraulic cylinders to CETOP recommendation RP 58 H, DIN 24 333, DIN 24 336, ISO/DIS 6 020 I and ISO/DIS 6 022.

The spherical plain bearings are located in the housing by retaining rings. The thread clamping facility comprises two hexagonal socket head screws to DIN EN ISO 4 762.

Rod ends GIHRK..-DO are particularly suitable for hydraulic cylinders. They have very small linkage distances while allowing maximum stroke utilisation. These rod ends are also available with maintenance-free spherical plain bearings GE..-UK-2RS and GE..-FW-2RS.

Series, thread type, standard

Series	Thread type	Standard	Shaft diameter	
			from mm	to mm
GIHNRK..-LO	Right hand thread	DIN ISO 6 982	12	200
GIHRK..-DO	Right hand thread	–	20	120
GIHLK..-DO	Left hand thread	–	20	120

Hydraulic rod ends with welding face

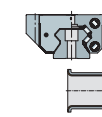
GK..-DO is designed in accordance with DIN ISO 12 240-4, dimension series E, type S with a circular welding face, a centring pin on the shank base and 45° welding chamfer. They are suitable for fixing to piston rod ends and cylinder bases.

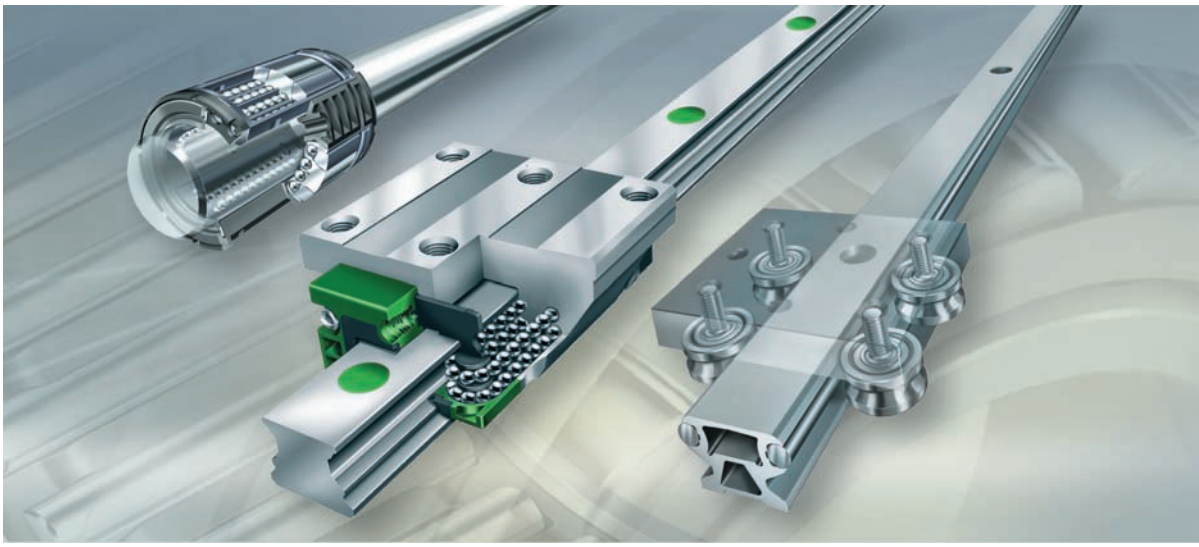
The spherical plain bearings are located in the housing by staking on both sides.

GF..-DO is available in a heavy-duty design with a rectangular welding face. The spherical plain bearings are located in the housing by retaining rings and can be dismantled. These rod ends are suitable for fixing to hydraulic cylinder bases.

Series, welding face, standard

Series	Welding face	Standard DIN ISO 12 240-4	Shaft diameter	
			from mm	to mm
GK..-DO	Circular	Dimension series E, type S	10	80
GF..-DO	Rectangular	–	20	120



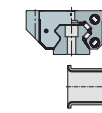


Linear guidance systems

Monorail guidance systems
Shaft and track roller guidance systems
Flat cage and recirculating roller guidance systems
Miniature guidance systems
Driven linear units

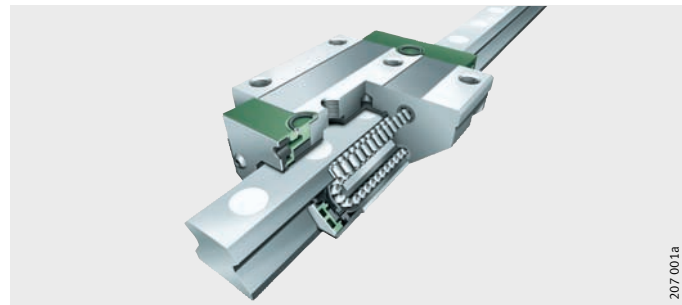
Linear guidance systems

		Page
Product overview	Monorail guidance systems	1578
Features	Linear recirculating roller bearing and guideway assemblies	1579
	Six-row linear recirculating ball bearing and guideway assemblies	1580
	Four-row linear recirculating ball bearing and guideway assemblies	1580
	Two-row linear recirculating ball bearing and guideway assemblies	1580
Product overview	Shaft and track roller guidance systems	1582
Features	Shaft guidance systems	1583
	Track roller guidance systems	1583
Product overview	Flat cage and recirculating roller guidance systems	1584
Features	Flat cage guidance systems	1585
	Linear recirculating roller guidance systems	1585
Product overview	Miniature guidance systems	1586
Features	Two-row miniature linear recirculating ball bearing and guideway assemblies	1587
	Four-row miniature linear recirculating ball bearing and guideway assemblies	1587
	Miniature carriage units	1587
	Miniature linear guidance sets	1587
Product overview	Driven linear units	1588
Features	Linear actuators	1589
	Linear tables	1589



Linear recirculating roller bearing and guideway assemblies

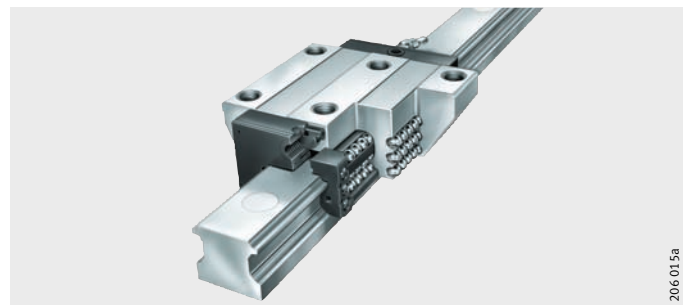
RUE



Linear recirculating ball bearing and guideway assemblies

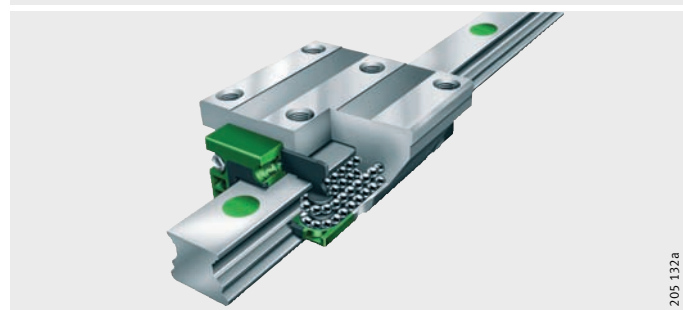
Six-row

KUSE



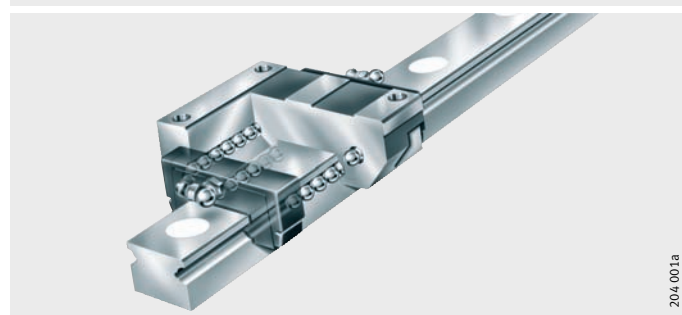
Four-row

KUVE



Two-row

KUE



Monorail guidance systems

Features

Monorail guidance systems from the Schaeffler Group are compact linear guidance systems based on roller or balls and have high rigidity and high load carrying capacity. These guidance systems can support forces from all directions, except for the direction of motion, and moments about all axes.

They are available in various accuracy and preload classes and are therefore also suitable for applications with high guidance and positioning requirements.

Monorail guidance systems are based on a modular concept, i. e. guideways can be combined with all carriage types within each size. This gives more economical stockholding, simpler fitting and more rapid spare parts procurement.

In order to reduce maintenance intervals and maintenance costs, monorail guidance systems have a lubricant reservoir. Sealing of the carriages on all sides protects the rolling element systems against contamination even under critical operating conditions.

Product catalogue

The complete standard range of monorail guidance systems is described in detail in Catalogue PF 1, Monorail Guidance Systems and on the CD and online versions of ***medias***® *professional*.

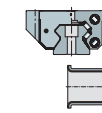
Linear recirculating roller bearing and guideway assemblies

Linear recirculating roller bearing and guideway assemblies RUE are, due to the cylindrical rollers, the monorail guidance systems with the highest load carrying capacity and rigidity available from the Schaeffler Group. They comprise at least one carriage with a full complement roller system, a guideway, integral elastic wipers on the end faces of the carriage, sealing strips on the upper and lower sides of the carriage and closing plugs to close off the fixing holes in the guideway.

The carriage and guideway of a linear recirculating roller bearing and guideway assembly are matched to each other due to their closely toleranced preload. It may be possible, after consultation, to use carriages and guideways in different combinations.

Linear recirculating roller bearing and guideway assemblies are suitable for accelerations up to 100 m/s^2, speeds up to 180 m/min and operating temperatures from –10 °C to +100 °C. They are used in applications with long unrestricted strokes, high and very high loads and high to very high rigidity.

The units are also available in a variant with optimised noise characteristics and in X-life quality.



Six-row linear recirculating ball bearing and guideway assemblies

Six-row linear recirculating ball bearing and guideway assemblies KUSE are the guidance systems based on balls with the highest load carrying capacity and rigidity. They comprise at least one carriage with a full complement ball system, a guideway, integral elastic wipers on the end faces of the carriage, sealing strips on the lower side of the carriage and plastic closing plugs.

Linear recirculating ball bearing and guideway assemblies KUSE are suitable for accelerations up to 150 m/s^2, speeds up to 300 m/min and operating temperatures from –10 °C to +100 °C.
They are used in applications with long unrestricted strokes, high and very high loads and high to very high rigidity.

Four-row linear recirculating ball bearing and guideway assemblies

Four-row linear recirculating ball bearing and guideway assemblies KUVE are the most versatile and most extensively developed range of monorail guidance systems available from the Schaeffler Group. These units comprise at least one carriage with a full complement ball system, a guideway, integral elastic wipers on the end faces of the carriage, sealing strips on the upper and lower sides of the carriage and plastic closing plugs.

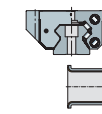
Linear recirculating ball bearing and guideway assemblies KUVE are suitable for accelerations up to 150 m/s^2, speeds up to 300 m/min and operating temperatures from –10 °C to +100 °C.
They are used in applications with long unrestricted strokes, high loads, high rigidity and low friction.

The units are also available in a variant with optimised noise characteristics and in X-life quality.

Two-row linear recirculating ball bearing and guideway assemblies

Two-row linear recirculating ball bearing and guideway assemblies KUE are the economical alternative where guidance systems with moderate load capacity are required. The units comprise at least one carriage with a full complement ball system, a guideway, integral elastic wipers on the end faces of the carriage, sealing strips on the lower side of the carriage and plastic closing plugs.

Linear recirculating ball bearing and guideway assemblies KUE are suitable for accelerations up to 150 m/s^2, speeds up to 180 m/min and operating temperatures from –10 °C to +100 °C.
They are used for long unrestricted strokes, moderate loads, moderate rigidity and low friction.

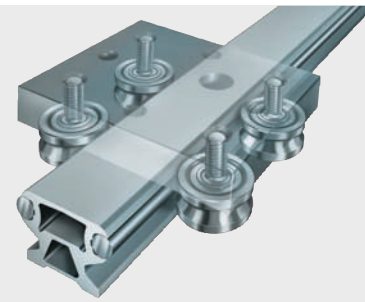


Shaft guidance systems

WF

Track roller guidance systems

LF



Features

Shaft guidance systems

Shaft guidance systems from the Schaeffler Group are linear guidance systems based on ball bearings or plain bearings for various areas of use and applications. Linear ball bearings are available as a light range, compact range and machined range. The mating tracks may be in the form of solid shafts, hollow shafts or supported shaft and support rail units.

The range is rounded off by a large selection of linear ball bearing and housing units and linear plain bearing units. In this case, the linear ball bearings or linear plain bearings are already mounted in ready-to-fit housings.

A large number of shafts (with and without machined features), shaft and support rail units and a versatile range of accessories allow a wide spectrum of applications.

Track roller guidance systems

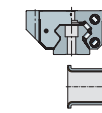
Track roller guidance systems from the Schaeffler Group are linear guidance systems that can be configured on a modular basis for an extremely wide variety of applications. Due to their lightweight construction, they are highly suitable for use in handling systems. They are characterised in particular by quiet running, high traverse speeds, long travel distances and the modular concept.

Track roller guidance systems comprise one or more carriages made from aluminium, profiled track rollers and a straight or curved guideway. The carriages are available as hollow section carriages, open carriages, compact carriages and bogie carriages for curved, oval and circular guidance systems.

The guideways are made from aluminium with rolled-in raceway shafts made from rolling bearing steel. The guideways are available in numerous different designs, including a solid profile guideway, hollow section guideway, flat guideway, guideway with slot etc. They are selected as appropriate to the intended purpose of the track roller guidance system.

Product catalogues

The standard range is described in detail in the catalogues LF 1, Track Roller Guidance Systems, WF 1, Shaft Guidance Systems and on the CD and online versions of ***medias***® *professional*.



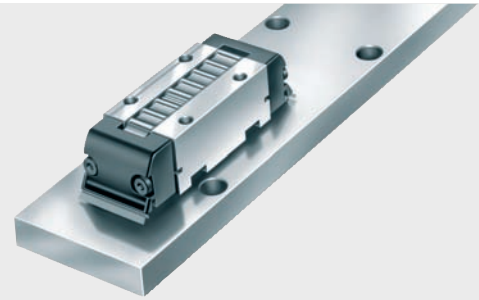
Flat cage and recirculating roller guidance systems

Flat cage guidance systems

M/V, ML/V, MVZ, J/S

Linear recirculating roller guidance systems

RUS, RUS..-KS, PR, RUSW



Flat cage and recirculating roller guidance systems

Features

Flat cage guidance systems

Where linear locating or non-locating bearings with extremely high load carrying capacity, very smooth running and low, uniform friction are required for limited stroke lengths, flat cage guidance systems are used. These guidance systems comprise a guideway arrangement separated by needle or cylindrical roller flat cages. The guidance systems have particularly high rigidity, high accuracy and low friction and require significantly less space than other linear guidance systems.

Linear recirculating roller guidance systems

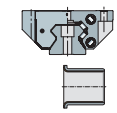
Linear recirculating roller guidance systems comprise a bearing arrangement system for linear motion with unlimited stroke. Since the guidance elements have a versatile range of possible arrangements, linear recirculating roller guidance systems are suitable for numerous applications in general machine building, especially for linear guidance systems in machine tools where high guidance and positioning accuracies are required over long traverse distances.

The range of recirculating guidance systems is complemented by:

- adjusting gibs for precise setting of preload
- setting devices for measuring the deformation of the adjacent construction where preload forces must be supported
- adapters for easy fitting of linear recirculating roller bearings in 45° arrangements.

Product catalogue

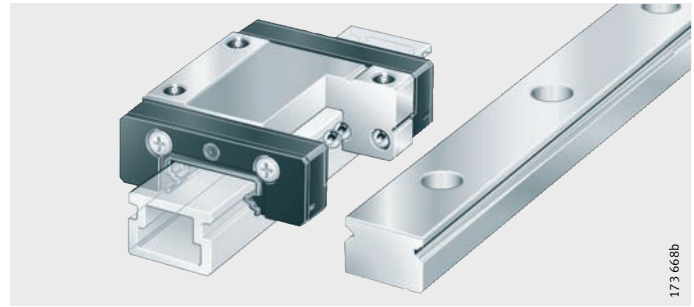
The standard range is described in detail in Catalogue FR 1, Flat Cage Guidance Systems and Linear Recirculating Roller Guidance Systems and on the CD and online versions of ***medias***® *professional*.



Miniature linear recirculating ball bearing and guideway assemblies

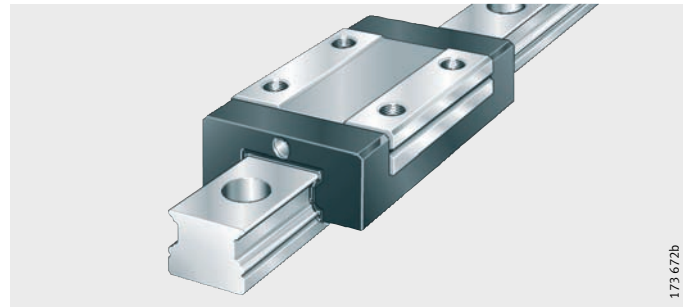
Two-row

KWEM, TKDM



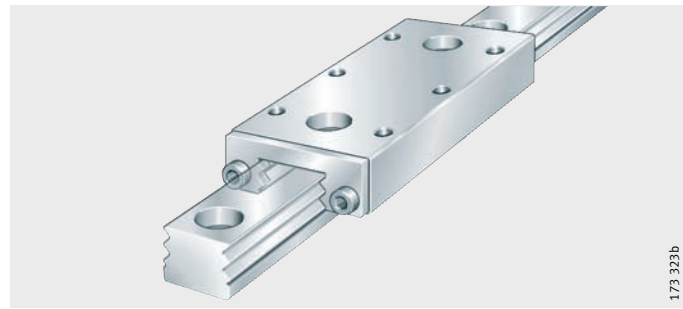
Four-row

KUME..-C



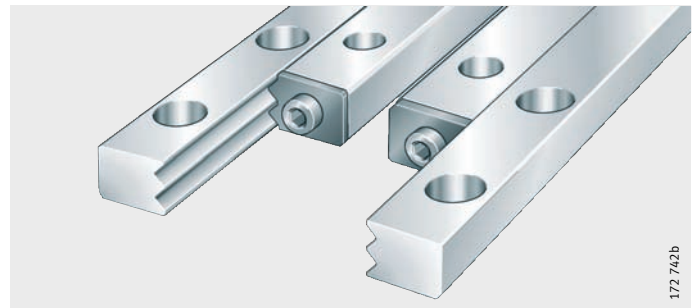
Miniature carriage units

RMWE..-VA



Miniature linear guidance sets

RWS



Miniature guidance systems

Features

Miniature guidance systems from the Schaeffler Group are not standard linear guidance systems that have simply been reduced in size but have been specially developed for very small design envelopes. Due to their compact design, they can often be used to replace bearing arrangements that require significantly more space. The guidance systems are preloaded linear locating bearings for limited and unlimited stroke lengths.

Two-row miniature linear recirculating ball bearing and guideway assemblies

These units have moderate load carrying capacity and moderate to high moment load carrying capacity. Due to their modular concept, guideways and carriages can be interchanged within each interchangeability and accuracy class. This simplifies the fitting of guidance systems, gives easier spare parts procurement and allows very economical stockholding. The saddle plates and guideways are corrosion-resistant. Seals on the end faces of the carriages protect the rolling element system against contamination.
The carriages are greased and can be relubricated.
The guideways and carriages are also available in a wide version.

Information on the units is given in TPI 163, Corrosion-resistant Miniature Linear Recirculating Ball Bearing and Guideway Assemblies.

Four-row miniature linear recirculating ball bearing and guideway assemblies

Four-row miniature linear recirculating ball bearing and guideway assemblies are ready-to-fit guidance systems for unlimited stroke lengths. They have high to very high load carrying capacity and rigidity. Due to the lubricant reservoir, the relubrication intervals can be extended. The saddle plates and guideways are corrosion-resistant. Seals on the end faces of the carriages protect the rolling element system against contamination. The carriages are greased and can be relubricated.

Information on the units is given in TPI 163, Corrosion-resistant Miniature Linear Recirculating Ball Bearing and Guideway Assemblies.

Miniature carriage units

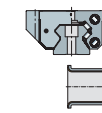
Miniature carriage units with cylindrical roller flat cages are corrosion-resistant, ready-to-fit cage guidance systems for limited stroke lengths. They have a high load carrying capacity, high rigidity and high accuracy whilst requiring very little space.

Information on the units is given in TPI 160, Corrosion-resistant Miniature Carriage Units.

Miniature linear guidance sets

Miniature linear guidance sets with cylindrical roller flat cages are corrosion-resistant, ready-to-fit locating bearings for limited stroke lengths and are preloaded during fitting. These linear guidance systems have high load carrying capacity, high rigidity and high accuracy while requiring very little space. Since the layout of the guidance system can be varied, the elements can be easily matched to predetermined adjacent constructions. The sets are particularly suitable for short stroke lengths, low-friction and oscillating motion and high loads with very high rigidity.

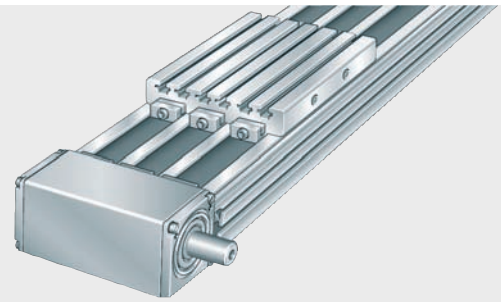
Information on the sets is given in TPI 162, Miniature Linear Guidance Sets.



Linear actuators

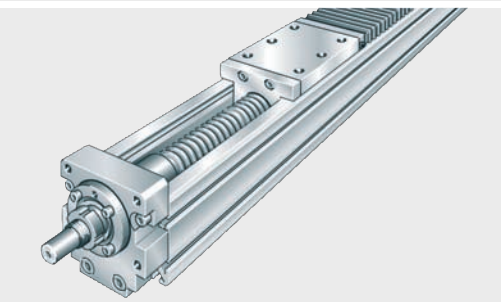
with linear recirculating ball bearing and guideway assemblies and toothed belt drive

MKU..-ZR



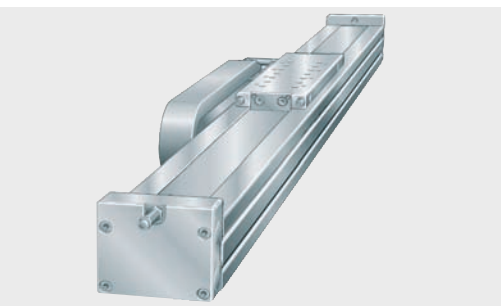
with linear recirculating ball bearing and guideway assemblies and ball screw drive

MKU..-KGT



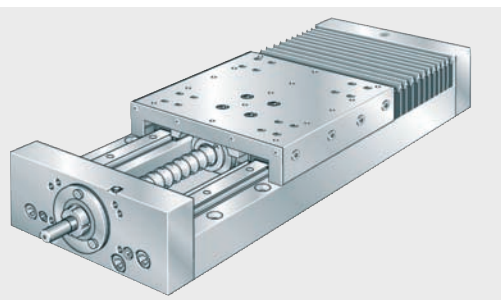
with linear recirculating ball bearing and guideway assemblies and direct drive

MKUVS42LM



Linear tables with and without drive

LT



Driven linear units

Features

Rapid progress in the automation of production and assembly processes has pushed forward the development of complete, driven assemblies. These comprise a high precision guidance system, a rigid support rail, a wear-free drive unit and a user-friendly controller.

Linear actuators

Linear actuators from the Schaeffler Group are integrated modular systems containing all the components required for operation. The linear actuators are guided by linear recirculating ball bearing and guideway assemblies of series KUE, KUVE or KUSE, by track roller guidance systems LF or plain guidance systems. The drive function is carried out by a ball screw drive, toothed belt or direct drive.

Linear tables

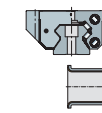
Linear tables from the Schaeffler Group are used to move larger masses in one or more axes. Due to the large distances between support points, linear tables are also capable of supporting high torques. The guidance systems used are linear ball bearings or linear recirculating ball bearing and guideway assemblies.

Linear tables are available without a drive mechanism, with a ball screw drive, with a trapezoidal lead screw drive or a direct drive.

The INA range of driven linear units is complemented by suitable controllers, motors and gearboxes that are matched to each other for optimum performance.

Product catalogue

Detailed information on these units is given in Catalogue AL 1, Driven Linear Units, information on units with direct drives is given in MAI 105, Linear Actuator with Linear Recirculating Ball Bearing and Guideway Assembly and Direct Drive.



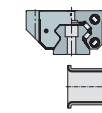
FAG

F’IS –
Equipment and services for mounting and maintenance of rolling bearings

F'IS – Equipment and services for mounting and maintenance of rolling bearings

Equipment and services

	Page
F'IS – Expertise in maintenance	1592
The F'IS range	1592
Products for mounting and repair	1593
Products for lubrication	1595
Products for alignment	1595
Products for condition monitoring	1596
Products for maintenance management	1596
Mounting service	1597
Reconditioning of rolling bearings	1597
Lubrication as a service	1598
Alignment service	1598
Condition Monitoring	1598
Maintenance management	1599
Training	1600



F'IS – Equipment and services for mounting and maintenance of rolling bearings

Equipment and services

F'IS – Expertise in maintenance

Since the integration of FAG into the Schaeffler Group, F'IS has undertaken service tasks for the whole Group.
F'IS (FAG Industrial Services) is the specialist contact for the maintenance of rotating components. The aim is to help customers save on maintenance costs, optimise plant availability and avoid unforeseen machine downtime. The services are provided irrespective of the brand of the machine components used.

In order to provide the skilled and rapid supply of F'IS products, services and training to customers worldwide, F'IS has specialist centres around the world. All F'IS employees worldwide undergo a comprehensive training programme and are audited regularly. This ensures that F'IS services throughout the world comply with a uniformly high standard of quality. Since each customer has a different set of requirements, F'IS offers concepts individually tailored to the customer.

The F'IS range

F'IS has implemented continuous expansion of its range over the years and offers products, services and training in the following five areas:

- mounting and repair
- lubrication
- alignment
- condition monitoring
- maintenance management.

For a detailed overview, see publication WL 80250.

Products for mounting and repair

Products for mechanical mounting and dismounting

For the mechanical mounting and dismounting of small and medium sized rolling bearings, F'IS offers mounting tool sets, various wrenches and mechanical extractors. Hydraulic extractors are used where higher extraction forces are required.

- Mounting tool sets
- Adapters
- Hook and pin wrenches
- Mechanical extractors
- Hydraulic extractors, *Figure 1*
- Three-section extraction plates.

Figure 1
Dismounting of a bearing using a hydraulic extractor

F'IS – Equipment and services for mounting and maintenance of rolling bearings

Products for hydraulic mounting and dismounting

In order to give easier mounting and dismounting of bearings with a tapered bore, hydraulic nuts are often used. Pressure generation devices available include oil injectors, hand pump sets and high pressure pumps. Selection is aided by the computer program MOUNTING MANAGER.

There is a comprehensive range of accessories, such as manometers, adapters and reduction nipples, high pressure hoses and sleeve connectors.

- Hydraulic nuts
- Oil injectors
- Hand pump sets
- High pressure pumps
- Hydraulic systems and units
- Connectors, accessories.

Products for thermal mounting and dismounting

Rapid and energy-efficient heating of rolling bearings can be achieved with induction heating devices. F'IS has table top equipment including equipment for mobile use and particularly effective standalone equipment.

- Electric heating plates
- Induction heating devices
- Heating rings, heat conducting paste
- Electric induction heating devices.

Products for measurement and inspection

- Feeler gauges
- Taper gauges
- Snap gauges
- Enveloping circle gauges.

Accessories for mounting and dismounting

- Transport and mounting tools
- Gloves
- Mounting paste
- Anti-corrosion oil.

Products for lubrication

Lubricants

- Arcanol rolling bearing greases, *Figure 2*.

Lubrication systems

- Motion Guard SELECT Manager
  (software for selection of greases and lubrication systems)
- Motion Guard COMPACT
- Motion Guard CHAMPION
- Motion Guard CONCEPT6
- Metering devices
- Grease gun.

Figure 2
Lubricants and lubrication systems

Products for alignment

Belt and chain drives

- Belt pulley alignment device Top-Laser SMARTY2
- Belt tension measuring device Top-Laser TRUMMY2.

Shaft couplings and alignment accessories

- Shaft alignment device Top-Laser INLINE, *Figure 3*
- Shims Top-Laser SHIM.

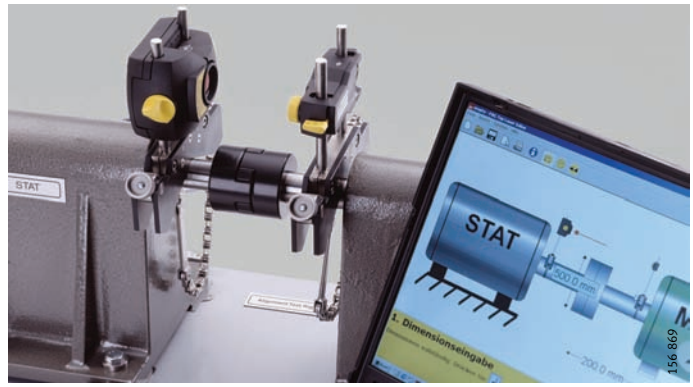


Figure 3
Shaft alignment device
Top-Laser INLINE

Products for condition monitoring

Monitoring of operating condition

- Temperature measuring devices
- Digital hand tachometer
- Sonar device.

Vibration diagnosis

- Detector series, *Figure 4*
- EasyCheck series
- DTECT X1
- WiPro
- VibroCheck
- ProCheck.

Figure 4
Condition monitoring

Products for maintenance management

- CMMS Interface.

Mounting service

The F'IS Mounting Team offers mounting services for rolling bearings across market sectors, *Figure 5*. We have extensive experience, for example in railways, mining, steel and aluminium, wind power and paper.

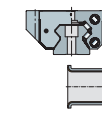
Figure 5
Mounting of a large rolling bearing

Reconditioning of rolling bearings

During the maintenance of machinery and plant, many rolling bearings are taken out of service and replaced by new ones as a precaution. This exaggerated safety-consciousness blocks any appreciation of the potential cost savings.
The fact is: reconditioned bearings generally give the same performance as new ones.

The reconditioning of rolling bearings and rolling bearing units is one of the core competences of F'IS and is offered at several certified locations worldwide. Our services for rolling bearings of all types apply irrespective of manufacturer and are not restricted to Schaeffler Group products.

F'IS is able to recondition and modify rolling bearings with an outside diameter of up to 4 250 mm. It is thus an expert partner for customers from a very wide range of industrial sectors such as general and special machine building, steelmaking, pulp and paper production, wind power, shipbuilding, private and public railways, mining etc.



F'IS – Equipment and services for mounting and maintenance of rolling bearings

Lubrication as a service

In more than half of all cases, inadequate lubrication is the cause of unplanned machine downtime. The use of suitable greases makes it possible to significantly extend the life of rotating machine parts.

F'IS services include the selection and installation of lubricants and lubrication systems, the lubrication of bearing positions, the preparation of lubrication and maintenance plans, lubrication point management, lubrication consultancy and lubricant investigations and tests.

Alignment service

Incorrect alignment of belts and shafts are among the most common causes of unplanned machine downtime.

In addition to detailed analysis of causes, the F'IS service includes alignment of belts and shafts on pumps, ventilators, compressors, electrical machinery etc. as well as the detection and correction of positional deviations in belts and shafts using F'IS vibration and laser measurement devices.

Condition Monitoring

The malfunction-free and optimised operation of complex machinery and plant can only be achieved by means of condition-based maintenance. The key method used by F'IS in condition-based maintenance is vibration diagnosis, *Figure 6*. This method makes it possible to detect incipient damage in machinery at a very early stage.

Above all, vibration diagnosis helps to avoid unplanned downtime and expensive secondary damage, increase productivity and improve plant availability.

Figure 6
Vibration diagnosis as a service

Maintenance management

Maintenance consultancy

Maintenance consultancy by F'IS helps to achieve better cost transparency and more effective design of maintenance arrangements, *Figure 7*. The F'IS team moves beyond classical consultancy and places the emphasis on technical perspectives.

IPS systems

In the field of maintenance planning and control systems (IPS systems), F'IS experts apply their sound technical knowledge to offer analysis of customer-specific requirements independent of the manufacturer. On this basis, the F'IS team achieves an IPS system optimised and tailor-made for the customer. The F'IS service covers both complete solutions in the form of IPS implementation and individual modules.

Figure 7
Maintenance consultancy

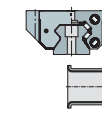
Training

F'IS offers, in relation to the product and service range, both standard training and customer-specific training, *Figure 8*.

The individual training units are based on a modular concept with the result that customers can compile their own customised training course on the basis of these training components.

The training courses are offered both at Schaeffler Group locations and also on site at our customers. The current training offer including dates for the standard training courses can be found at www.fis-services.de in the section Training.

Figure 8
Training



Market sectors

Production Machinery
Power Transmission and Railway
Heavy Industry
Consumer Products

Market sectors

		Page
Production Machinery	Bearings for machine tools	1604
	Bearings for printing machinery	1605
	Bearings for textile machinery	1607
	Bearings for the food and packaging industry	1609
	Bearings for woodworking machinery	1609
Power Transmission and Railway	Bearings for rail vehicles	1610
	Bearings for power transmission	1612
	Bearing arrangements in construction machinery	1613
	Bearing arrangements in industrial conveying trucks	1613
	Bearing arrangements in wind turbines	1614
Heavy Industry	Bearing arrangements for the steel industry	1615
	Bearing arrangements for the paper industry	1618
	Bearing arrangements in deep and surface mining	1621
	Bearings for materials processing	1623
	Bearing arrangements and components in the fluid technology sector	1626
	Bearing arrangements in the air handling sector	1628
Consumer Products		1630

Market sectors

Schaeffler Group Industrial develops, manufactures and supplies ball bearings, roller bearings, bearing units, housings and accessories worldwide for almost all machinery, plant, vehicles and equipment. We also provide a comprehensive range of services for advice, maintenance and fitting.

Our customers come from the areas of Production Machinery, Power Transmission and Railway, Heavy Industry and Consumer Products.

Production Machinery

High performance production machinery is a precondition for, and a driving force of, technical progress.

High precision bearings set standards both in their main application sector in machine tools and also in equipment for the textile industry, in printing machinery, woodworking machinery and machines for the food industry. They fulfil very high requirements for reliability, high running accuracy and high speeds. Comprehensive information is given in Catalogue AC 41130, Super Precision Bearings.

Bearings for machine tools

Hybrid spindle bearings with steel rings and ceramic balls are finding increasing usage due to their particular speed capacity, robust characteristics and reliability as well as their significantly longer operating life. For very high requirements in terms of load carrying capacity and speed capacity, special X-life ultra bearings with rings made from high performance steel and ceramic balls have been developed.

Single and double row cylindrical roller bearings of high precision design are ideal for use as non-locating bearings, since they allow length compensation without constraining forces between the rollers and raceways. They give bearing arrangements with high radial rigidity, high load carrying capacity and high accuracy.

Double direction axial angular contact ball bearings of series 2344 are used as particularly rigid axial bearings when cylindrical roller bearings of series NN30 support the radial forces.

Bearings for printing machinery

Printing machinery bearings are used in the bearing arrangements of the main cylinders in sheetfed and webfed printing machines, *Figure 1*, page 1606. Due to their load carrying capacity, rigidity, accuracy and precise adjustability, they provide excellent support for the central requirement in printing machinery, namely the highest possible print quality.

The bearings are specially designed in close partnership between printing machinery manufacturers and our Application Engineering functions. As a result, the bearings are precisely matched to the requirements of the customer. This matching of design to the specific machine concept is particularly important, since exceeding requirements is a drain on resources and failing to meet requirements impairs performance. Finding the optimum solution, however, is not always easy. Due to its considerable experience in the development, design and manufacture of bearings, Schaeffler Group Industrial has the know-how necessary to always offer the best solution for an application in this complex bearing sector. Furthermore, it is able to do so in both technical and economic terms.

Market sectors

Due to the wide range of requirements, standardisation of printing machinery bearings is only possible to a limited extent. The range therefore comprises a large number of types and sizes.

In addition to the classic multi-row, high precision cylindrical roller bearings NN, NNU, N4N, N4U, use is also made of non-locating bearing units without and with eccentric geometries, locating bearing units, polygon bearings, linear bearing units, rotary bearing units and tapered roller bearing units. Bearings are available with and without seals. The bearing seat for the cylindrical stud can be of a cylindrical or tapered design.

INA printing machinery bearings are cost-effective bearing arrangement systems that can be used to achieve the demands of the print industry for high productivity, low maintenance costs and excellent print quality.

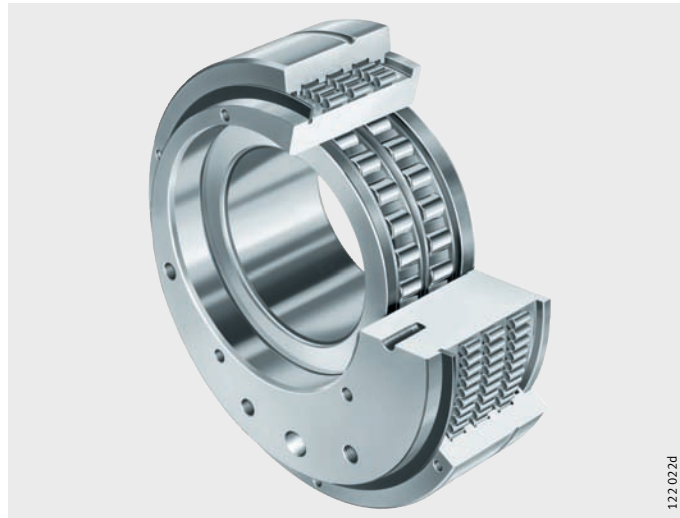


Figure 1
Printing machine bearing unit with eccentric outer ring
Non-locating bearing

Special publications

Publication LFD	High precision bearings for printing machinery
Publication PDM	Bearings solutions for printing machinery.

Bearings for textile machinery

Whether they are used for spinning or weaving, finishing or processing, modern textile machines are highly automated and must run with high material throughput and without malfunctions, right around the clock. There is no question that the right bearing components play a crucial role here. “Right” in this context means low friction, high accuracy, clearance-free, easy to fit, low maintenance, long service life, low noise and reliable.

In order to fulfil these requirements, Schaeffler Group Industrial has a comprehensive range of precision products for the reliable and cost-effective support of rotary and linear motion in textile machinery. We also have a range of system components that are precisely matched as complete systems to the specific application. Every one of these solutions has been achieved with the aid of years of experience in product development and the design of bearing arrangements.

Tape tension pulleys for gripper drives in weaving machines are renowned for their long life, *Figure 2*. These pulleys can be easily lubricated and have a very low moment of inertia. As a result, they run up to operating speed very quickly. In addition, the pulleys carry out up to 600 alternating rotary movements per minute in continuous operation with very low energy consumption. This gives a considerable increase in the productivity and cost-efficiency of the machine while achieving a uniformly high fabric quality.

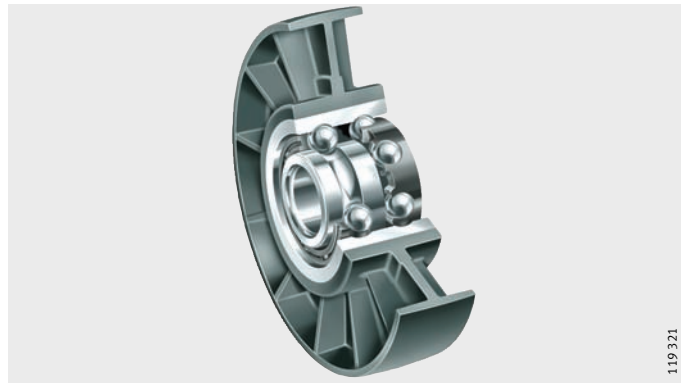


Figure 2
Energy-saving tape tension pulley for the gripper drive

We also have ready-to-fit tension pulleys with reduced running noise, *Figure 3*. Due to design measures, for example, the imbalance of these components has been reduced by 50%. As a result, it is no longer necessary to balance the pulleys separately.

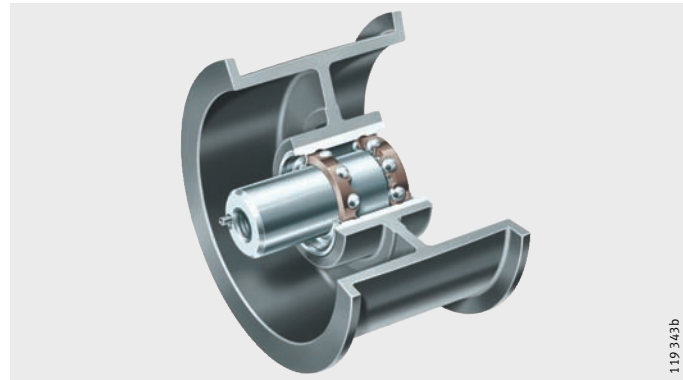


Figure 3
Tape tension pulley with optimised noise characteristics for twisting machines

Such ready-to-fit units are used in single and multi-head embroidery machines and are simply screw mounted on the adjacent construction. This eliminates the matching of individual components to each other and reduces errors involved in mounting. This solution also gives a simplified adjacent construction since the gearbox that was previously required can be completely eliminated.

The system comprises a lever, eccentric, connecting rod and the corresponding bearing units. The assembly converts the rotary motion of the drive shaft into the stroke motion for the embroidery operation. Due to the smooth-running, high accuracy running of the bearings, the unit can achieve more than 1 000 strokes per minute. Highly effective seals ensure long life and low maintenance requirements.

Special publications Publication TMB Rolling bearings for textile machinery.

Bearing for the food and packaging industry

Food production must proceed economically and with high efficiency. In general, the processes run fully automatically and often take place under extreme operating conditions. This requires a high degree of security and reliability. High quality machine components designed for continuous performance are an indispensable element here.
Our contribution in this field:
robust bearings with anti-corrosion protection, effective sealing and in many cases lubricated for life, for reliable round-the-clock operation. Modern materials and surface coatings, which we are continually working to develop further, give our bearing arrangements the necessary advantages in rating life.

Figure 4
Open and sealed deep groove ball bearings

In the case of insert bearings, track rollers, slewing rings or the entire range of linear motion products, catalogue products or specifically designed units, the focus of our development efforts on all these Schaeffler Group products is the benefit to the customer:
reducing the presence of interfaces by functional integration, compact construction, freedom from maintenance,
reliable operating life, effective matching of components and subsystems to each other.

Special publications

Publication PVP Bearing arrangements in food and packaging machinery.

Bearings for woodworking machinery

In many cases, deep groove ball bearings are adequate for the high speeds and relatively low loads in bearing arrangements for wood shapers. Very high speeds, however, normally require the use of spindle bearings.

Power Transmission and Railway

People and goods are being moved from one place to another with increasing speed and over increasing distances. Motors and transmissions must operate with increasing efficiency. In power transmission, construction machinery and railway engineering, therefore, high demands are being placed on the quality and life of rolling bearings.

Bearings for rail vehicles

In mainline and local trains, the dominant requirements are for higher speeds and smoother running. Bearings and housings for wheelsets, transmissions and motors are selected by the Application Engineering specialists so that they are ideally matched to the customer requirements, *Figure 5*.

Wheelset bearings are subjected to extreme loads and must fulfil very high safety requirements.

For wheelsets, cylindrical roller bearings with smooth running, low friction and high speed suitability are frequently used in specially developed wheelset bearing housings.

Wheelset bearings with spherical roller bearings are available for rigid housings connected to the vehicle or bogie.

Tapered roller bearing units TAROL are suitable for high running speeds and high axial loads. The ready-to-fit units can be mounted in a single operation, are sealed, lubricated and have a specially adjusted axial internal clearance. They are supplied in metric sizes (UIC range) or to the AAR specification in inch sizes.

Increasingly, wheelset bearing units with integrated sensors (for speed, temperature, direction of rotation etc.) are being used.

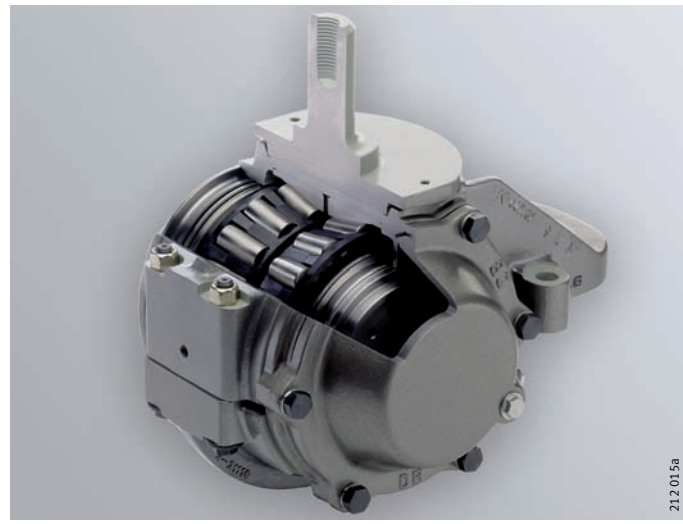


Figure 5
Tapered roller bearing unit for passenger train carriages

In hydrodynamic and mechanical railway transmissions with oil lubrication, radial bearings of practically all types are used to guide the pinion shafts, intermediate shafts and ring gear shafts.

In the axle suspension drive, which is normally lubricated by grease, cylindrical roller bearings, tapered roller bearings or spherical roller bearings are used.

For large gear bearing arrangements (gear hub), tapered roller bearings in an O arrangement matched by means of intermediate rings are predominantly used.

In the bearing positions of the traction motors, cylindrical roller bearings and deep groove ball bearings have proved successful.

For rail vehicles, there are also support and guide rollers, bearings in ancillary equipment, wheelset bearings with adapters, current-insulated deep groove ball bearings and cylindrical roller bearings to DIN/ISO dimensions, special Arcanol rolling bearing greases and mounting tools.

Special publications

WL 07174	Expertise in bearing technology and service for rail vehicles
TPI 158	Products for railway applications.

Bearings for power transmission

Modern gearboxes transmit high power levels within a small space. This requires careful selection of rolling bearings with high performance capacity. In addition to load carrying capacity, appropriate design of the adjacent parts, lubrication and sealing is a precondition for reliable and cost-effective bearing arrangements. In order to take account of these influences, it is particularly advantageous to use the expanded life calculation method.

Depending on the gearbox design and tooth set type, almost all types of rolling bearings are used in power transmission.

The input shafts of cylindrical gear units are often supported by spherical roller bearings or tapered roller bearings, *Figure 6*. For particularly high speeds, combinations of cylindrical roller bearings supporting radial loads and four point contact bearings under axial load are suitable. For intermediate and output shafts, spherical roller bearings in a floating arrangement are often selected.

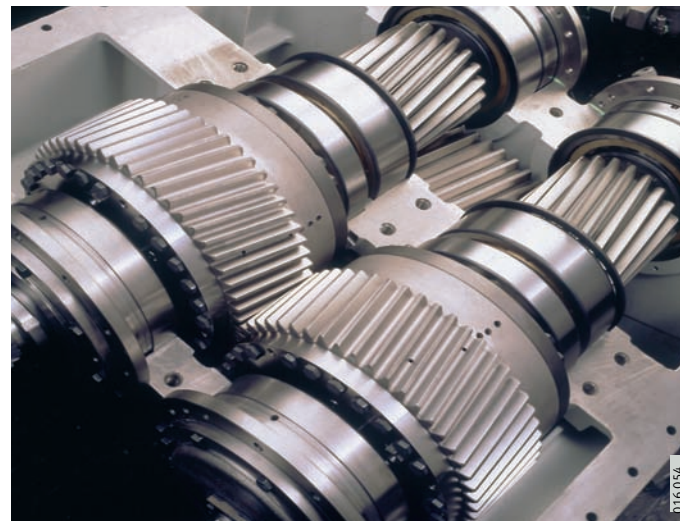


Figure 6
Rolling bearings in a cylindrical gear unit

Special publications

PKI — Expertise for bearing arrangements in industrial gearboxes.

In bevel gear pairs, a narrow axial guidance is often required in order to ensure tooth mesh. A solution here is to use axially adjusted or matched tapered roller bearings or angular contact ball bearings.

The high axial forces in the worm shaft of worm gear units can be transmitted using matched or adjusted tapered roller bearings. For worm gear shafts, adjustability and narrow axial guidance of the tooth set are required. Deep groove ball bearings or adjusted tapered roller bearings are often used.

In order to support planet gears in planetary gearboxes, single or multiple row cylindrical roller bearings are used, with spherical roller bearings being fitted in special cases. Thicker planet gear studs can be achieved with direct bearing arrangements. The rolling elements then run directly on the planet gear stud. The hardness curve and surface quality of the raceway must be produced to particular specifications in order to ensure the load carrying capacity and operating life of the planet gear bearing arrangement.

Bearing arrangements in construction machinery

Among the wide range of rolling bearing arrangements in construction machinery, the excitation shaft bearing arrangement in vibratory equipment deserves particular mention.

Road rollers, plate compactors, vibratory motors, vibratory piledrivers or vibrator frames work with mechanical vibrations. The exciter shafts and their eccentrically mounted weights run at high speeds. Deep groove ball bearings (for small vibratory equipment), spherical roller bearings and cylindrical roller bearings (N, NU design) have proved successful here.
In order to compensate for misalignments and shaft deflections, the rollers and inner ring raceways of the cylindrical roller bearings have a logarithmic transverse profile. This allows tilting of up to 4 angular minutes without impairing the life. For greater tilting, the transverse profile can be adapted.

Special publications

PLB Expertise for bearing arrangements in construction machinery.

Bearing arrangements in industrial conveying trucks

Examples of special bearing designs can be found in fork lift trucks. Sensor bearings combine proven rolling bearing technology and modern sensor technology for drive, control and monitoring. This ready-to-fit system solution offers numerous cost and performance advantages.

Bearing arrangements in wind turbines

Wind turbines can now generate power levels of more than 3 MW. The bearings must be able to support moderate to high loads, oscillation and vibration. Low friction standard rolling bearings are normally suitable here. The bearings are mounted in standard or special housings. For particular cases, special rolling bearings can also be used.

Rolling bearings for wind turbines must in many cases fulfil high quality requirements involving the presentation of appropriate evidence (German Lloyd certification guidelines).

The rotor bearing arrangement can be in the form of a shaft or hub bearing arrangement, *Figure 7*. Locating/non-locating bearing arrangements with spherical, cylindrical or tapered roller bearings have proved successful.

In the hub bearing arrangement, two tapered roller bearings are adjusted against each other. An alternative solution comprises a matched pair of tapered roller bearings as a locating bearing and a cylindrical roller bearing as a non-locating bearing.

For single bearing designs, support of forces and moments is combined in a multiple-row rolling bearing.

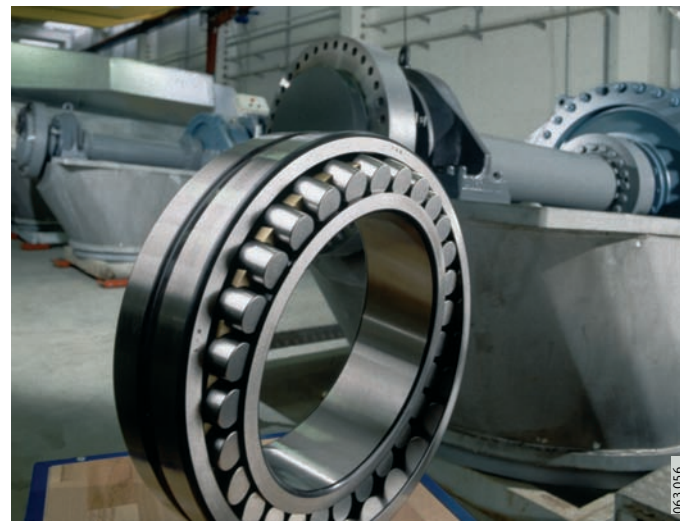


Figure 7
Self-aligning
FAG spherical roller bearings
for rotor bearing arrangements

Small swivel movements in the adjustment of the rotor blade as well as high loads and tilting moments are normally supported by four point contact bearings.

As tower bearings, four point contact bearings support the high weights and wind forces.

In wind turbine gearboxes, all types of rolling bearings normally found in gearbox construction are used.

Special publications

WL 01206 Expertise in bearing technology and service for wind energy installations.

Heavy Industry

The difficult operating and environmental conditions in all areas of heavy industry require rolling bearings that are proven even in critical applications. This applies to mining, crude oil and natural gas gathering, materials processing, the steel industry, the paper industry and conveying equipment.

Bearing arrangements for the steel industry

The bearing arrangements in steelworks and rolling mills are generally subjected to very high loads and in many cases also to high temperatures and heavy contamination. In addition to standard rolling bearings, bearings specially designed for these conditions are required.

The rolling bearings for converters must support not only heavy weights but also severe shocks. Large spherical roller bearings of split or unsplit design fulfil these requirements.

The swivel arms of the turret in continuous casting plants are supported in large rolling bearings. Axial spherical roller bearings are often used to support the weights involved, with cylindrical roller bearings to support the tilting moment.

At the inner support point of driven guide rollers, split roller bearings are used. In order to protect the bearings from the high slab temperatures as well as scale and coolant water, the housings are cooled using water. The seals comprise lamellar sealing rings and labyrinth seals.

For the support of non-driven guide rollers and the outer support of driven guide rollers, unsplit bearings are used.

Sealed spherical roller bearings reduce the consumption of lubricant and thus the environmental impact, *Figure 8*.

Figure 8
Sealed spherical roller bearing for strand guide rollers

Market sectors

In order to support the high radial forces in rolling mills, cylindrical roller bearings with two or four rows are often selected, together with axial bearings in the form of deep groove ball bearings, angular contact ball bearings, double row tapered roller bearings, axial tapered roller bearings or axial spherical roller bearings. If tapered roller bearings with two or four rows are used as radial bearings, an additional axial bearing is not normally necessary.

Spherical roller bearings are common as roll bearings where high axial guidance accuracy is not required and speeds are low.

Sealed multi-row tapered roller bearings for work rolls reduce the consumption of lubricant and thus the environmental impact, *Figure 9*.

Axial tapered roller bearings for pressure spindles ensure low adjustment forces due to their low friction.

Figure 9
Sealed four row tapered roller bearing for work rolls

Single row cylindrical roller bearings as well as single and double row angular contact ball bearings are found predominantly in high speed rolling mills for wire and fine iron production lines.

The drive shafts in heavy duty rolling mills have a considerable mass. They were previously normally supported in plain bearings. Now, wear and lubricant requirements are considerably reduced due to the use of special cylindrical roller bearings of split design.

Spherical roller bearings are frequently used in gearboxes for rolling mills. In newer designs, the shafts are supported in double row cylindrical roller bearings as non-locating bearings and in double row tapered roller bearings as locating bearings. This bearing arrangement gives particularly accurate radial and axial guidance of the shafts.

Split cylindrical roller bearings are frequently used in the crankshafts of cold pilger machines.

For the bearing arrangement of work rolls in cold pilger machines, spherical roller bearings with a tapered bore and a special internal construction are used that are matched to the particular load conditions in these machines.

The roll bearing arrangement of cluster type cold rolling mills must ensure high surface quality and uniform thickness of the rolled strips. Multi-row cylindrical roller bearings or tapered roller bearings fulfil these requirements as back-up rollers.

Special publications

TPI 148	Rolling bearing arrangements for converters
TPI 157	Split cylindrical roller bearings for the bearing arrangements of rolling mill drive shafts
WL 17114	Sealed FAG spherical roller bearings
WL 17115	Bearings and Service – Productivity and Reliability for Metal Production
WL 17200	FAG rolling bearings in rolling mills
WL 41140	FAG rolling bearings for rolling mills.

Bearing arrangements for the paper industry

Modern large paper machines contain a large number of rolling bearings of various types and sizes. Very high operational reliability is demanded of all bearings in order to prevent expensive downtime. In many cases, monitoring is carried out using the FAG Diagnostic Service, *Figure 10*.

Attention must also be paid to ensuring ease of mounting. There are also special requirements depending on the type of paper machinery and the subassemblies involved. In the wet end section, the emphasis is on preventing corrosion, while the bearings in the dry section must also be designed for high temperatures.

For suction box rolls in the wet end section, spherical roller bearings with a conical or cylindrical bore and increased running accuracy are normally used.

Spherical roller bearings with lubrication holes in the inner ring are used if the outer ring rotates.

For very high speeds, spherical roller bearings with increased running accuracy and increased internal clearance are installed.

Figure 10
Condition-based rolling bearing monitoring using FAG VibroCheck

An angular adjustment facility and high load carrying capacity are required in central press rolls, so spherical roller bearings are used, *Figure 11*. Sophisticated labyrinth seals are required in the wet section in order to avoid ingress of water spray.

In anti-deflection rolls, the roll sleeve rotates about the stationary roll axis. The roll sleeve is guided by spherical roller bearings, which may have special features including increased running accuracy, increased internal clearance and lubrication holes in the inner ring.

For driven rolls, three-ring bearings are sometimes used.
The axis is supported in the bearing inner ring.
The rotating intermediate ring connects the drive to the roll sleeve.

Figure 11
Spherical roller bearings E1 of X-life quality. With superior load carrying capacity, reduced operating temperature and very long operating life

The operating conditions in the dry section are characterised by high temperature and thermal expansion of the dryer roll. Spherical roller bearings are normally used as locating bearings. Up to a working width of approx. 5 m, spherical roller bearings are also used as non-locating bearings; these can be displaced axially in the housing in response to changes in the length of the dryer roll. For larger working widths, preference is given to self-aligning double row cylindrical roller bearings in normal plummer block housings, *Figure 12*. The spherical roller bearings have an increased internal clearance to C4, the cylindrical roller bearings have a radial internal clearance to C5.

For guide rollers in the dry section too, significant changes in length due to high ambient temperatures must be taken into consideration. The bearings are connected to the oil loop of the dryer rolls.

Calender thermo rolls in the end section are normally fitted with spherical roller bearings. Due to the high temperature, they have increased internal clearance and in some cases a conical bore. Heat is dissipated by means of high oil flow quantities. In large, high speed machines, the bearing inner rings with a conical bore are mounted directly on the tapered roll journals in order to achieve smooth running. The spherical roller bearings normally used have the increased radial internal clearance C3.

In spreader rolls running at high speeds, the use of hybrid deep groove ball bearings with steel rings and ceramic balls has proved effective. Since these bearings have only half the usual number of balls, the risk of slippage is reduced.

Figure 12
Self-aligning
double row cylindrical roller bearing

Special publications

WL 13103	Rolling bearing arrangements for the paper industry
Publication PPL	Optimum paper production
TPI 147	Self-Aligning FAG Cylindrical Roller Bearings: The Ideal Non-Locating Bearing Concept
TPI WL 13-3	PD housings for dryer rolls in paper machinery
TPI WL 13-4	Hybrid deep groove ball bearings for expander rollers.

Bearing arrangements in deep and surface mining

The machines used in deep and surface mining perform extremely arduous work.

The high load carrying capacity of the drill head bearing arrangement in tunnel-driving machines is ensured by cylindrical roller bearings and spherical roller bearings. The mass and tilting forces resulting from the offset drilling pressure are supported by single or double row radial cylindrical roller bearings or spherical roller bearings. The drilling pressure is supported by axial roller bearings.

In larger, compact machines, the drill head bearing arrangement is a ready-to-fit unit. It comprises either a double row tapered roller bearing or a three-ring axial/radial cylindrical roller bearing in which the crown gear can be integrated, *Figure 13*. The bearing unit can withstand all load combinations of axial force, radial force and tilting moment.

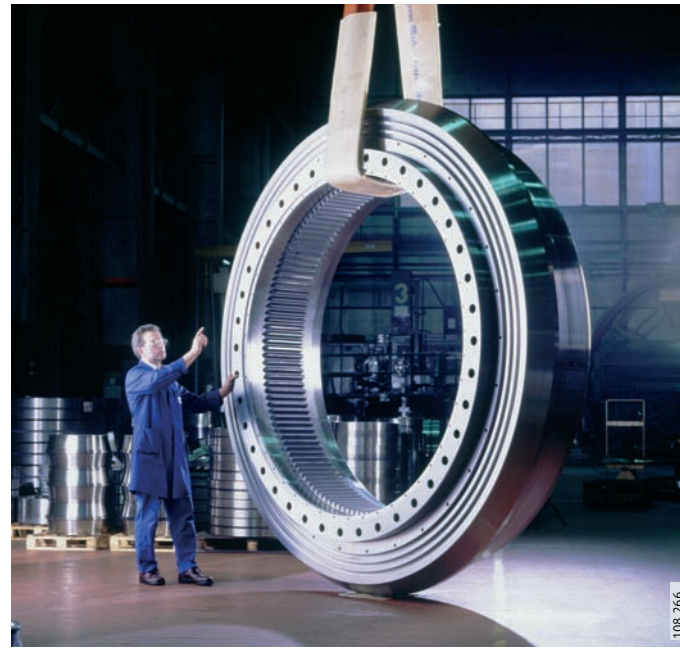


Figure 13
Axial/radial cylindrical roller bearing with integrated crown gear

The forces acting on the drive pinions of tunnel-driving machines are securely supported by one spherical roller bearing and one cylindrical roller bearing.

In conveying and lifting equipment, the main requirement is for standardised rolling bearings of all types, sizes and designs. Some applications require large or split bearings.

The bucket wheel in bucket wheel excavators is supported by large spherical roller bearings (unsplit in the original equipment version, split in the replacement bearing version), *Figure 14*. These bearings support high loads and compensate, without constraining forces, the substantial misalignments that result from the large spacing between the locating and non-locating bearings.

Other demands placed on the bearing arrangement include:

- handling large fluctuations in operating temperature
- long life
- sealing against slurry, moisture, contamination and sand
- simple maintenance as well as low time and cost outlay in mounting and dismantling.

Figure 14
Split spherical roller bearing

For gearbox bearing arrangements and for the bearing arrangement between the main gear and the hollow shaft flange, split cylindrical roller bearings are best suited due to the difficulty of access for bearing replacement.

One of many different drums in a belt installation is the drive drum. Spherical roller bearings allow compensation without constraining forces of the misalignments resulting from shaft deflections and deformation of the supporting structure; these can fulfil the requirement for high operational reliabiity with low maintenance outlay. Specially developed housings are available for all bearing sizes.

The support rollers, connected either rigidly or in a jointed arrangement with each other, are normally fitted with deep groove ball bearings that are standardised, sealed and lubricated for life. Externally mounted seals prevent contamination entering the bearing arrangement.

Special publications

WL 21107	Heavy-Duty Rolling and Plain Bearings for Mining, Processing, On- and Offshore Technology
WL 43165	Split FAG spherical roller bearings
WL 90118	Split FAG plummer block housings of series SNV.

Bearings for materials processing

Extreme operating and environmental conditions require robust bearing arrangements in crushers and mills, sieving and sorting machines as well as cylindrical rotary kilns, pelletising and sintering plants. Substantial shaft deflections and misalignments of the bearing positions must be compensated. High demands are made on the lubrication and sealing of the bearings.

Due to the high forces and harsh operation in crushers, spherical and cylindrical roller bearings are normally used.

In jaw crushers, also known as crosshead or double toggle crushers, spherical roller bearings support the crushing forces, the mass of the flywheels and the peripheral force of the drive via an eccentric shaft.

In gyratory or cone type crushers, the high radial forces are transmitted by two cylindrical roller bearings (outer bearings) and a spherical roller bearing (central bearing). The axial weight is normally supported by an axial cylindrical roller bearing. Crusher cone and crusher shaft bearing arrangements with single and double row radial and axial cylindrical roller bearings or with large special tapered roller bearings are also in use.

Figure 15
Large spherical roller bearings for tube mills

For the rotating striking trains of single and twin shaft hammer crushers, spherical roller bearings are suitable due to the harsh operation and shaft deflection.

Heavy weights and shock type loads are characteristic of tube mills and also of hammer mills, impact crushers, rigid hammer crushers and impact wheel mills. Spherical roller bearings in specially developed housings are suitable for these requirements, *Figure 15*, page 1623. In roller grinding mills, the pressing, tilting and axial forces acting on the mill roller induce high radial and axial loads. These can be supported by a cylindrical roller bearing in combination with a spherical roller bearing or a tapered roller bearing unit in an X arrangement. In other roller grinding mills, each mill roller is supported by two tapered roller bearings mounted in an O arrangement.

Preferred bearing types for roller presses are spherical roller bearings and multi-row cylindrical roller bearings.

In order to support the particularly high shock type loads and radial accelerations of the exciter shaft in linear and free vibrators as well as eccentric screens, spherical roller bearings of series 223..-E1 and 223..-A of special designs are used, *Figure 16*.
These bearings are characterised by cages guided on the outer ring, restricted tolerances and increased radial internal clearance.

For special cases, spherical roller bearings of series 223..-E1A and 233..-A are also used.

Figure 16
Spherical roller bearings for oscillating stresses

The high combined loads at low speeds are supported in the radial track rollers of cylindrical rotary kilns by spherical roller bearings of series 241; they are located in split RLE or RLZ plummer block housings. In axial track rollers, tapered roller bearings in an O arrangement have proven successful.

For the bearing arrangement of the pinion drive shaft, spherical roller bearings in specially developed RA plummer block housings have proven successful.

The particular operating conditions in sintering and pelletising plant are best met by spherical roller bearings with a tapered bore on withdrawal sleeves. The bearings are mounted in split RA or SGB plummer block housings. Sealed double row cylindrical roller bearings can be considered for the bearing arrangements of pressure rollers, tapered roller bearings can be considered for the track wheels.

Special publications

WL 21100	FAG special spherical roller bearings for vibratory machinery
WL 21105	Rolling Bearings in Grinding Mills
WL 21106	Secure handling of severe vibration · Special spherical roller bearings in vibrating screens
WL 21107	Heavy-Duty Rolling and Plain Bearings for Mining, Processing, On- and Offshore Technology.

Bearing arrangements and components in the fluid technology sector

Bearing arrangements and components for hydraulic drives and fluid pumps are subject to high requirements for functional security and cost-efficiency. These requirements are fulfilled predominantly using customer-specific developments but also in some cases with highly developed standard bearings and components.

High torque motors are used, for example, in industry, in agricultural equipment, rolling mills, paper machinery and conveying equipment. They generate extremely high torques at low speeds. A decisive contribution to low starting friction, jolt-free and reliable operation is made by special cylindrical roller bearings and further components such as high precision locknuts. In addition to bearings with coated rolling elements, inner rings machined free from spiral marks are used to provide an optimum sliding surface for sealing rings.

In construction machinery, hydraulic power is an indispensable source of energy for earthmoving and transport. Hydraulic cylinders with maintenance-free spherical plain bearings from ELGES have sliding areas with ELGOGLIDE® coating. The dry plain bearings with low friction and high load carrying capacity are suitable for oscillating motion under high load. The bearings require very little space and are particularly environmentally-friendly. In axial piston pumps of a swash plate design, axial roller bearings support the high forces of the pistons acting in the direction of stroke.
The high imbalance forces and radial forces are supported by double row cylindrical roller bearings with optimised speed characteristics. Swash plate pumps with an adjustable cradle are used to allow precise control of excavators or road making machinery.
Full complement or nearly full complement cylindrical roller bearings allow precise adjustment of the volume flow, even at high pressures.

Gear pumps convey coolants, transport foodstuffs and keep hydraulic systems moving. Permaglide® plain bearings or high quality needle roller bearings ensure that gears move with practically no losses. In most cases, the medium being conveyed is also used as the lubricant for the bearings. If fluids with poor lubrication ability are to be conveyed, plain bearings are increasingly replaced by needle roller bearings. In this way, higher speeds and a longer operating life of the gear pumps can be achieved.

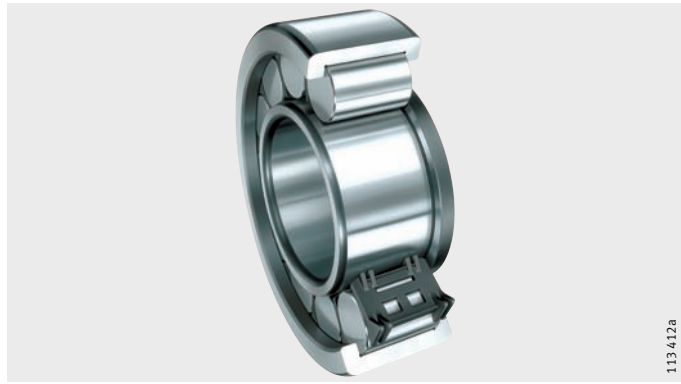


Figure 17
Cylindrical roller bearings with spacers for low friction

Hydrostatic gearboxes give stepless transmission of the drive force in tractors, ride-on lawnmowers and similar machines. Their reliable function is ensured by means of rolling and plain bearings as well as INA precision components such as hollow pistons, valves and fine blanked parts.

Fluid pumps facilitate the supply of water for the purposes of drinking, extinguishing, heating and cooling, the conveying of aggressive or abrasive media and the disposal of, for example, contaminated and waste water. Economical plain and rolling bearings ensure smooth running over the long term.
Depending on the speed and load, ball bearings, cylindrical roller or spherical roller bearings or plain bearings are fitted. Rolling and plain bearings help to ensure that valves and shut-off systems function reliably after long periods of stoppage.

In various types of pumps, very high requirements are fulfilled using X-life bearings.

Special publications

Publication PHP	Bearing Supports and Components for Hydraulic Drives and Pumps
Publication PFS	Fine Blanking and Systems Engineering
TPI 16	Steel sealing rings DRG
TPI 92	Axial swash plate ball bearings
TPI 128	Sealing rings
Catalogue 238	Spherical plain bearings, plain bushes, rod ends
Catalogue 706	Permaglide® plain bearings.

Bearing arrangements in the air handling sector

Bearing arrangements for compressors, fans and centrifuges must fulfil high requirements in relation to functional reliability and cost-efficiency. In many cases standard bearings are suitable, in some cases special bearings are required.

In order to minimise gap losses in compressors, the rolling bearing arrangement must have narrow guidance clearance.
Some compressors run at very high speeds, so particular attention must be paid to the speed capacity of the bearings. Predominantly, four point contact bearings, cylindrical roller bearings and angular contact ball bearings are used.

For bearing arrangements in smaller fans, we offer special bearing units VRE3, *Figure 18*. Depending on the load conditions, six bearing arrangement variants are available. The tubular form, unsplit plummer block housings are fitted with deep groove ball bearings, matched angular contact ball bearings and cylindrical roller bearings.

Figure 18
Plummer block housing unit VRE3 for fans

In large fans and blowers, bearings with proven success include spherical roller bearings or self-aligning ball bearings in plummer block housings SNV, LOE or LOU. Grease or oil lubrication is used according to the operating conditions.

Separators and decanters are centrifuges that can be used to separate solid materials from liquids or mixtures of liquids with simultaneous centrifuging of solids. Separation methods are used, for example, in the food and drinks industry, in chemical engineering and in environmental protection. The design of the bearing arrangement must often take account of vibrations, external temperatures and special lubrication requirements. Selection of suitable bearings is made considerably easier by use of the calculation software BEARINX®.

In many cases, it is possible to use cost-effective standard bearings such as angular contact ball bearings and cylindrical roller bearings with sheet steel cages. Through the use of BEARINX® for design work, it is possible to achieve a high level of functional reliability even taking account even of extreme operating conditions.

Special publications

WL 22101 Bearing technology for compressors, fans and centrifuges.

Consumer Products

Rolling bearings are present almost everywhere in our environment: at home, at work and in leisure. In most cases, however, the bearings are simply not noticed.

Rolling bearings in electrical devices are found in household appliances, in communications equipment and in DIY tools as well as in sports equipment and medical technology.

In household appliances, the requirement is normally for operation with little noise and little vibration. In order that the bearings achieve high cost-efficiency and reliability, there is a focus on long operating life and low maintenance requirements. For small devices, simple, sealed deep groove ball bearings lubricated for life are generally preferred in order to meet these requirements.

In order to avoid damage through passage of current, current-insulated bearings are available, *Figure 19*. In such deep groove ball bearings, cylindrical roller bearings and tapered roller bearings of variant J20.., an oxide ceramic coating is applied to the outside surface and end faces of the outer ring.

Alternatively, hybrid bearings with ceramic rolling elements can be used. Hybrid deep groove ball bearings (prefix HC) with silicon nitride balls are available by agreement.

In order to detect the speed and direction of rotation in electrical devices, deep groove ball bearings with an integral sensor are available.

INA/FAG rolling bearings have also proven themselves in modern sports equipment. In motorcycles, waterjets and bob skis, their speed capacity and quiet running are particularly significant.

Low bearing friction is important where the sportsman works using muscle power, for example in bicycles and inline skates.

Figure 19
Current-insulated rolling bearings

Special publications

TPI WL 43-1189	Current-insulated rolling bearings prevent damage due to the passage of electrical current
TI WL 43-1206	FAG deep groove ball bearings with integral sensor
TI WL 43-1210	FAG hybrid deep groove ball bearings.

Addresses

Algeria

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Andorra

Schaeffler France
44-48, rue Louveau - B.P. 91
92323 Châtillon
France
Tel. +(33) 1/40 92 16 16
Fax +(33) 1/40 92 87 57
info.fr@schaeffler.com

Angola

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Antigua and Barbuda

Rodamientos FAG, S.A. de C.V.
11511 Interchange Circle South
Miramar, FL 33025
USA
Tel. +(1) 954-7 44 34 44
Fax +(1) 954-7 44 34 76
reinhart_h@us.fag.com

Argentina

Schaeffler Argentina
Av. Alvarez Jonte 1938
C1416EXR Buenos Aires
Argentina
Tel. +(54) 11 / 40 16 15 00
Fax +(54) 11 / 45 82 33 20
info-ar@schaeffler.com

Armenia

Schaeffler KG Representative Office
Ukraine
Jilyanskayastr. 75
Bussines Center «Iceberg»
01032 Kiew
Ukraine
Tel. +(380) 44 593 02 81
Fax +(380) 44 593 02 83
info@schaeffler.kiev.ua

Australia

Schaeffler Australia Pty Ltd
Unit 3, 47 Steel Place
Morningside, QLD 4170
Australia
Tel. +(61) 7 / 3399 9161
Fax +(61) 7 / 3399 9351
robert.panovsky@schaeffler.com

Schaeffler Australia Pty Ltd
Suite 14, Level 3
74 Doncaster Road
North Balwyn, VIC 3104
Australia
Tel. +(61) 3 / 9859-8020
Fax +(61) 3 / 9859-8767
Milos.Grujic@schaeffler.com

Schaeffler Australia Pty Limited
Suite 5, 3rd Floor
78 Mill Point Road
South Perth, WA 6151
Australia
Tel. +(61) 8 9368 4622
Fax +(61) 8 9367 2049
Jeff.Gordon@schaeffler.com

Schaeffler Australia Pty Ltd.
Level 1, Bldg 8, Forest Central Business Park
49 Frenchs Forest Road
Frenchs Forst, NSW 2086
Australia
Tel. +(61) 2 8977 1000
Fax +(61) 2 9452 4242
info.au@schaeffler.com

Austria

Schaeffler Austria GmbH
Ferdinand-Pölzl-Straße 2
2560 Berndorf-St. Veit
Austria
Tel. +43 2672 202-0
Fax +43 2672 202-1003
info.at@schaeffler.com

Azerbaijan

Schaeffler Representative Office Russia
Leningradskiy Prospekt 37A
Korp. 14
125167 Moscow
Russia
Tel. +(7) 495 / 7 37 76 60
Fax +(7) 495 / 7 37 76 53
info.ru@schaeffler.com

Bahamas

Rodamientos FAG, S.A. de C.V.
FAG Dominica
11511 Interchange Circle South
Miramar, FL 33025
USA
Tel. +(1) 954-7 44 34 44
Fax +(1) 954-7 44 34 76
reinhart_h@us.fag.com

Bahrain

Schaeffler KG
Region EMEA (Naher Osten)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-35 27
Fax +(49) 97 21 / 91-33 47
Josef.Reiher@schaeffler.com

Bangladesh

Schaeffler KG
Region EMEA (Ost Asien)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-48 03
Fax +(49) 97 21 / 91-33 47
Werner.Mauder@schaeffler.com

Barbados

Rodamientos FAG, S.A. de C.V.
FAG Dominica
11511 Interchange Circle South
Miramar, FL 33025
USA
Tel. +(1) 954-7 44 34 44
Fax +(1) 954-7 44 34 76
reinhart_h@us.fag.com

Belarus

Schaeffler KG Repräsentanz Weißrußland
4-yj Zagorodnyi per. - 58-B
220079 Minsk
Belarus
Tel. +(375) 17-204 11 49
Fax +(375) 17-210 24 18
fagminsk@mail.bn.by

Belgium

Schaeffler Belgium S.P.R.L./B.V.B.A.
Avenue du Commerce, 38
1420 Braine L'Alleud
Belgium
Tel. +(32) 2 / 3 89 13 89
Fax +(32) 2 / 3 89 13 99
ina@be.ina.com

Belize

Rodamientos FAG, S.A. de C.V.
FAG Dominica
11511 Interchange Circle South
Miramar, FL 33025
USA
Tel. +(1) 954-7 44 34 44
Fax +(1) 954-7 44 34 76
reinhart_h@us.fag.com

Benin

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Bhutan

Schaeffler KG
Region EMEA (Ost Asien)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-48 03
Fax +(49) 97 21 / 91-33 47
Werner.Mauder@schaeffler.com

Addresses

Bolivia

Schaeffler Brasil Ltda.
Av. Independência, 3500-A
Bairro Éden
18087-101 Sorocaba, SP
Brazil
Tel. +(55) 15 / 33 35 15 00
Tel. +(55) 15 / 33 35 15 01
Fax +(55) 15 / 33 35 19 60
Fax +(55) 15 / 33 35 19 96
info.br@schaeffler.com

Bosnia-Herzegovina

Schaeffler Hrvatska d.o.o.
Ogrizovićeva 28b
Zagreb10000
Croatia
Tel. +(385) 1 37 01 943
Fax +(385) 1 37 64 473
info.hr@schaeffler.com

Botswana

Schaeffler South Africa (Pty) Ltd
1 End Street Ext. Corner Heidelberg Road
2000 Johannesburg
South Africa
Tel. +(27) 11 225 30 00
Fax +(27) 11 334 17 55
info.co.za@schaeffler.com

Brazil

Schaeffler Brasil Ltda.
Av. das Nações Unidas, 21612
04795-000 São Paulo, SP
Brazil
Tel. +(55) 11 3491 8622
Fax +(55) 11 3491 8626
industria@fag.com.br

Schaeffler Brasil Ltda.
Av. Independência, 3500-A
Bairro Éden
18087-101 Sorocaba, SP
Brazil
Tel. +(55) 15 / 33 35 15 00
Fax +(55) 15 / 33 35 19 60
info.br@schaeffler.com

Bulgaria

Schaeffler Bulgaria OOD
Dondukov-Blvd. No 62 Eing. A,
6. Etage, App. 10
BG-1504 Sofia
Tel. +359 2 946 3900
+359 2 943 4008
Fax +359 2 946 3886
+359 2 943 4134
info.bg@schaeffler.com

Burkina Faso

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Burundi

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Canada

Schaeffler Canada Inc.
Canada Montréal
100 Alexis Nihon Suite 390
Montréal, QC H4M 2NB
Canada
Tel. +(1) 514-748-5111
Tel. +(1) 800-361-5841 Toll Free
Fax +(1) 514-748-6111
info.ca@schaeffler.com

Schaeffler Canada Inc.
Canada Delta
1111 Cliveden Avenue
Delta, BC V3M 6G9
Canada
Tel. +(1) 800-665-1441 Toll Free
Tel. +(1) (604) 540-4950
Fax +(1) (604) 540-7888
info.ca@schaeffler.com

Schaeffler Canada Inc.
Canada Leduc
#106, 7611 Sparrow Drive
Leduc, AB T9E 0H3
Canada
Tel. +(1) 800-663-9006 Toll Free
Tel. +(1) 780-980-3016
Fax +(1) 780-980-3037
info.ca@schaeffler.com

Schaeffler Canada Inc.
Canada Oakville
2871 Plymouth Drive
Oakville, ON L6H 5S5
Canada
Tel. +(1) 905 / 8 29 27 50
Tel. +(1) 800-263-4397 Toll Free
Fax +(1) 905 / 8 29 25 63
info.ca@schaeffler.com

Central African Republic

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Chad

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Chile

Schaeffler Chile Ltda.
Av. Hdo. de Aguirre No. 268 of. 201
Providencia
Santiago
Chile
Tel. +(56) 2 / 477-5000
Fax +(56) 2 / 435-9079
sabine.heijboer@schaeffler.com

China

Schaeffler Trading (Shanghai) Co., Ltd.
Wuhan Office
Room 3015,
New World International Trade Center
No 568 Jianshe Avenue, Jianghan District
430022 Wuhan
China
Tel. +(86) 27/8526 7335
Fax +(86) 27/8526 7339
info.cn-wuhan@schaeffler.com

Schaeffler Trading (Shanghai) Co., Ltd.
Chengdu Office
Room 2510, CCB Sichuan Building
88 Tidu Street
610016 Chengdu
China
Tel. +(86) 28-8676-6718
Fax +(86) 28 8676-6728
info.cn-chengdu@schaeffler.com

Schaeffler Trading (Shanghai) Co., Ltd.
Dalian Office
Room 0408, MORI Building
No.147 Zhongshan Road, Xigang District
116011 Dalian
China
Tel. +(86) 411 83681011
Fax +(86) 411 83681012
info.cn-dalian@schaeffler.com

Schaeffler Trading (Shanghai) Co., Ltd.
Tianjin Office
Room 2502, The Exchange Tower One
No. 189 Nanjing Road, Heping District
300051 Tianjin
China
Tel. +(86) 22 83192388
Fax +(86) 22 83192386
info.cn-tianjin@schaeffler.com

Schaeffler Trading (Shanghai) Co., Ltd.
Xi‘an Office
Room 1202, HIBC
No 33 Keji Road, Hi-tech Zone, Xi‘an City
710075 Xi‘an
China
Tel. +(86) 29 88337696-99
Fax +(86) 29 88337707
info.cn-xian@schaeffler.com

Schaeffler Trading (Shanghai) Co., Ltd.
Chongqing Office
24D Tongjuyuanjin
No 9 North Jianxin Road, Jiangbei District
400020 Chongqing
China
Tel. +(86) 23 67755514/74
Fax +(86) 23 67755524
info.cn-chongging@schaeffler.com

Schaeffler Trading (Shanghai) Co., Ltd.
Taiyuan Office
Room 1209, 12th Floor, Shanxi
International Trade Center West Tower
No 69 Fuxi Street
030002 Taiyuan
China
Tel. +(86) 351 8689260
Fax +(86) 351 8689261
info.cn-taiyuan@schaeffler.com

Schaeffler Trading (Shanghai) Co., Ltd.
Jinan Office
Room 430, CITIC Plaza
No.150 Luoyuan Avenue
250011 Ji'nan
China
Tel. +(86) 531 8518 0435
Fax +(86) 531 8518 0438
info.cn-jinan@schaeffler.com

Schaeffler Trading (Shanghai) Co., Ltd.
Nanjing Office
1208 Room,
12F No.98 South Zhongshan Road
TianAn International Mansion
210008 Nanjing
China
Tel. +(86) 25 8312 3070
Fax +(86) 25 8312 3072
info.cn-nanjing@schaeffler.com

Schaeffler Trading (Shanghai) Co., Ltd.
Guangzhou Office
Room 1601-2,
Goldlion Digital Network Centre
No. 138 East Tiyu Road
510620 Guangzhou
China
Tel. +(86) 20 3878 1467
Fax +(86) 20 8761 0032
info.cn-quangzhou@schaeffler.com

Schaeffler Trading (Shanghai) Co., Ltd.
Shenyang Office
Unit H/I 14 Floor,
Huaxin International Tower
No.219 Qingnian Avenue, Shenhe District
110016 Shenyang
China
Tel. +(86) 24 / 23962633
Fax +(86) 24 / 23962533
info.ch-shenyang@schaeffler.com

Schaeffler Trading (Shanghai) Co., Ltd.
Shanghai Office
No. 1 Antuo Road
(west side of Anhong Road)
Anting, Jiading District
201804 Shanghai
China
Tel. +86 21 3957 6500
Fax +86 21 3959 3205
info.cn-shanghai@Schaeffler.com

Schaeffler Trading (Shanghai) Co., Ltd.
Beijing Branch
Room 708-711, Scitech Tower No.22
Jianguomenwai Avenue
100004 Beijing
China
Tel. +86 10 / 65 15 0288
Fax +86 10 6512 3433
info.cn-beijing@Schaeffler.com

Schaeffler Trading (Shanghai) Co., Ltd.
No. 1 Antuo Road
Anting, Jiading District
201804 Shanghai
China
Tel. +86 21 3957 6000
Fax +86 21 3957 6100
christian.bessler@schaeffler.com

Schaeffler Hong Kong Company Limited
Unit 2501, 25/Floor, Tower Two,
Lippo Centre No 89 Queensway
Hong Kong
China
Tel. +852 2371 2680
Fax +852 2371 2680
sales_hk@cn.fag.com

Schaeffler (China) Co., Ltd. - Plant 1
18 Chaoyang RoadJiangsu Province
215400 Taicang
China
Tel. +86 512 / 5395 7700
Fax +86 512 / 5357 4064
info-cn@schaeffler.com

Colombia

FAG Interamericana AG -
Área Colombia-Ecuador
Calle 93 B - No. 11A-44
Oficina 201
Bogotá
Colombia
Tel. +(57) 1 / 6 21 09 99
Fax +(57) 1 / 2 57 24 60
fagintkalozdi@coldecon.net.co

FAG Interamericana AG - Delegación II
Av. 2Norte - No. 23A-11 - Oficina 208 -
Edificio Unimed
Cali
Colombia
Tel. +(57) 2 / 667 98 52
Fax +(57) 2 / 661 64 20
fagintgonzalez@coldecon.net.co

Costa Rica

Rodamientos FAG, S.A. de C.V.
FAG Dominica
11511 Interchange Circle South
Miramar, FL 33025
USA
Tel. +(1) 954-7 44 34 44
Fax +(1) 954-7 44 34 76
reinhart_h@us.fag.com

Croatia

Schaeffler Hrvatska d.o.o.
Ogrizovićeva 28b
10000 Zagreb
Croatia
Tel. +(385) 1 37 01 943
Fax +(385) 1 37 64 473
info.hr@schaeffler.com

Cuba

Rodamientos FAG S.A. de C.V.
Paseo de la Reforma 383 -
Despacho 701 y 702
Colonia Cuauhtemoc
DF 06500 Mexico D.F.
Mexico
Tel. +(52) 55-52 08 12 08
Fax +(52) 55 52 08 08 36
Pubanz_t@us.fag.com

Czech Republic

Schaeffler CZ s r.o.
Průběžná 74a
100 00 Praha 10
Czech Republic
Tel. +420 267 298 111
Fax +420 267 298 110
info.cz@schaeffler.com

Denmark

Schaeffler Danmark ApS
Jens Baggesens Vej 90P
8200 Århus N
Denmark
Tel. +(45) 70 15 44 44
Fax +(45) 70 15 22 02
info.dk@schaeffler.com

Djibouti

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Dominica

Rodamientos FAG, S.A. de C.V.
11511 Interchange Circle South
Miramar, FL 33025
USA
Tel. +(1) 954-7 44 34 44
Fax +(1) 954-7 44 34 76
reinhart_h@us.fag.com

Ecuador

FAG Interamericana AG - Area Colombia-Ecuador
Calle 93 B - No. 11A-44
Oficina 201
Bogotá
Colombia
Tel. +(57) 1 / 6 21 09 99
Fax +(57) 1 / 2 57 24 60
coldecon.net.co

Egypt

Delegation Office Schaeffler KG
Obour Buildings-Salah Salem St.-No.25 -
Floor 18-Flat 4
11811 Nasr City Cairo
Egypt
Tel. +(20) 24 01 24 32
Tel. +(20) 22 61 26 37
Fax +(20) 22 61 26 37
Fax +(20) 24 01 24 32
schaeffleregypt@link.net

El Salvador

Rodamientos FAG, S.A. de C.V.
11511 Interchange Circle South
Miramar, FL 33025
USA
Tel. +(1) 954-7 44 34 44
Fax +(1) 954-7 44 34 76
reinhart_h@us.fag.com

Addresses

Equatorial Guinea

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Eritrea

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Estonia

Schaeffler KG Repräsentanz Baltikum
K.Ulmana gatve 119
2167 Riga
Latvia
Tel. +(371) 7 06 37 95
Fax +(371) 7 06 37 96
info.lv@schaeffler.com

Ethiopia

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Fiji

Schaeffler New Zealand
(Unit R, Cain Commercial Centre)
20 Cain Road
1135 Penrose
New Zealand
Tel. +(64) 9 583 1280
Fax +(64) 9 583 1288
sales.nz@schaeffler.com

Finland

Schaeffler Finland Oy
Lautamiehentie 3
02770 Espoo
Finland
Tel. +(358) 207 / 36 6204
Fax +(358) 207 36 6205
info.fi@schaeffler.com

France

Schaeffler France SAS
44-48, rue Louveau - B.P. 91
92323 Châtillon
France
Tel. +(33) 1/40 92 16 16
Fax +(33) 1/40 92 87 57
info.fr@schaeffler.com

Schaeffler France
93, route de Bitche, BP 30186
67506 Haguenau
France
Tel. +(33) 3 88 63 40 40
Fax +(33) 3 88 63 40 41
info.fr@schaeffler.com

Gabon

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Gambia

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Georgia

Schaeffler Russland GmbH
Leningradsky Prospekt 47, Str. 3
125167 Moscow
Russia
Tel. +(7) 495 / 7 37 76 60
Fax +(7) 495 / 7 37 76 53
info.ru@schaeffler.com

Germany

Schaeffler KG
Industriestraße 1-3
91074 Herzogenaurach
Germany
Tel. +(49) 91 32 / 82 0
Fax +(49) 91 32 / 82 49 50
info.de@schaeffler.com

Schaeffler KG
Georg-Schäfer-Str. 30
97421 Schweinfurt
Germany
Tel. +(49) (9721) 91-0
Fax +(49) (9721) 91-3435
faginfo@schaeffler.com

Schaeffler KG -
Geschäftsbereich Lineartechnik
Berliner Straße 134
66424 Homburg (Saar)
Germany
Tel. +49 68 41 / 7 01-0
Fax +49 68 41 / 7 01-2625
info.linear@schaeffler.com

FAG Aerospace GmbH & Co. KG
Georg-Schäfer-Str. 30
97421 Schweinfurt
Germany
Tel. +49 (0 97 21) 91-33 72
astrid.hofmann@schaeffler.com

Ghana

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Great Britain

Schaeffler (UK) Ltd
Forge Lane, Minworth
Sutton Coldfield, WMD B76 1AP
Great Britain
Tel. +(44) 121 3 51 38 33
Fax +(44) 121 3 51 76 86
info.uk@schaeffler.com

The Barden Corporation (UK) Limited
Plymbridge Road, Estover
Plymouth, PL6 7LH
Great Britain
Tel. +(44) 1752 73 55 55
Fax +(44) 1752 73 34 81
sales@barden.co.uk

Guatemala

Rodamientos FAG S.A. de C.V.
Paseo de la Reforma 383 -
Despacho 701 y 702
Colonia Cuauhtemoc
DF 06500 Mexico D.F.
Mexico
Tel. +(52) 55-52 08 12 08
Fax +(52) 55 52 08 08 36
Pubanz_t@us.fag.com

Guinea

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Guinea-Bissau

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Guyana

Schaeffler Brasil Ltda.
Av. Independência, 3500-A
Bairro Éden
18087-101 Sorocaba, SP
Brazil
Tel. +(55) 15 / 33 35 15 00
Fax +(55) 15 / 33 35 19 60
info.br@schaeffler.com

Haiti

Rodamientos FAG, S.A. de C.V.
11511 Interchange Circle South
Miramar, FL 33025
USA
Tel. +(1) 954-7 44 34 44
Fax +(1) 954-7 44 34 76
reinhart_h@us.fag.com

Honduras

Rodamientos FAG, S.A. de C.V.
11511 Interchange Circle South
Miramar, FL 33025
USA
Tel. +(1) 954-7 44 34 44
Fax +(1) 954-7 44 34 76
reinhart_h@us.fag.com

Hungary

Schaeffler Magyarország Ipari Kft.
Neuman János út 1/B fsz.
1117 Budapest
Hungary
Tel. +(36) 1 / 4 81 30 50
Fax +(36) 1 / 4 81 30 53
budapest@schaeffler.com

Iceland

Schaeffler KG
Georg-Schäfer-Str. 30
97421 Schweinfurt
Germany
Tel. +49 (9721) 91-0
Fax +49 (9721) 91-3435
faginfo@schaeffler.com

India

FAG Bearings India Limited
B-1504, Statesman House, 148,
Barakhamba Road
New Dehli, 110 001
India
Tel. +(91) 11 237382-77/-78/-76
Fax +(91) 11 51521478
purim@fag.co.in

INA Bearings India Pvt. Ltd.
A-322Ansal Chamber-1, 3,
Bhikaji Cama Place
New Dehli, 110066
India
Tel. +(91) 11 26712413
Fax +(91) 11 26712412
inadelhi@vsnl.net

FAG Bearings India Limited
ManejaVadodara
390 013 India
India
Tel. +(91) 265 26426-51/-52/-53/-54
Fax +(91) 265 2 63 88-04/-10
mathurr@fag.co.in

FAG Bearings India Limited
Nariman Bhavan, 8th Floor, 227, Back-
bay Reclamation Nariman Point
Mumbai, 400 021
India
Tel. +(91) 22 - 2022 144/ -166/ -362
Fax +(91) 22 - 2027022
muralik@fag.co.in

FAG Bearings India Limited
103 - Akshay Complex -
Dhole Patil Road
Pune, 411 011
India
Tel. +(91) 20 26122272
Tel. +(91) 20 560228-18/-19
Fax +(91) 20 - 6122229
dilip.tupe@schaeffler.com

FAG Bearings India Limited
18, Gr. Floor, Wst View 77,
R.V. Road, Basavanagudi
Bangalore, 560 004
India
Tel. +(91) 80 26575120
Fax +(91) 80 26574866
gummakis@fag.co.in

INA Bearings India Pvt. Ltd.
200, 3rd Main 6th Cross, Mico Layout
Bangalore, 560076
India
Tel. +(91) 80 2668 5516
Fax +(91) 80 2668 9986
ina.bangalore@vsnl.com

FAG Bearings India Limited
710, 7th Floor, Phase II
Spencer Plaza
769 - Anna Salai
Chennai, 600 002
India
Tel. +(91) 44 28 4935-82/-83/-84/-85
Fax +(91) 44 28497577
pattabhi@fag.co.in

FAG Bearings India Limited
Jasmine Towers, 5th Floor
Room No. 502B, 31
Shakespeare Sarani
Kolkata, 700 017
India
Tel. +(91) 33 22 8900-26/-27/-96
Tel. +(91) 33 22 8332 27
Fax +(91) 33 22 89 00 97
nambiarp@fag.co.in

INA Bearings India Pvt. Ltd.
31,Shakespeare Sarani
Jasmine Tower
room No 502B, 5th floor
Kolkata, 700017
India
Tel. +(91) 33 22833226
Fax +(91) 33 22890097
inakolkata@vsnl.net

Iran

FAG Coordination Office Teheran
No 43/4 Soleiman Khater Ave
Malayeri Pour Cross Rd, 7th of Tir Square
15797 Teheran
Iran
Tel. +(98) 21- 883 63 51
Fax +(98) 21- 830 88 13
fagiran@safineh.net

Iraq

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Israel

Schaeffler KG
Region EMEA (Naher Osten)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-35 27
Fax +(49) 97 21 / 91-33 47
Josef.Reiher@schaeffler.com

Italy

Schaeffler Italia S.r.l.
Strada Provinciale 229 Km 17
Momo28015
Italy
Tel. +(39) 3 21 / 92 92 11
Fax +(39) 3 21 / 92 93 00
info.it@schaeffler.com

WPB Water Pump Bearing GmbH & Co. KG
Strada Provinciale 229 Km 17
Momo28015
Italy
Tel. +(39) 03 21 / 92 85 03
Fax +(39) 03 21/ 92 89 00
infowpb.it@schaeffler.com

Ivory Coast

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Japan

Schaeffler Japan Co., Ltd.
LIVMO Rising Building 3-19-1
Shinyokohama, Kohoku-ku
Yokohama 222-0033
Japan
Tel. +(81) 45 / 476 5900
Fax +(81) 45 / 476 5920
info.jp@schaeffler.com

Korea

Schaeffler Korea Corporation -
Baegu Branch
Shindongyeong Bldg., 17-1
Bukseongno 1-ga Jung-gu
Daegu, 100-864
Korea
Tel. +(82) 53 - 256-4068
Fax +(82) 53 - 253-5229

Schaeffler Korea Corporation -
Seoul Branch
A-501, 1258, Guro-dong, Guro-gu
Seoul, 152-721
Korea
Tel. +(82) 2 2625-8572
Fax +(82) 2 2611-6075

Schaeffler Korea Corporation -
Gwangju Branch (Daejeon Office)
479-3, Songchon-dong, Daedeok-gu
Daejeon, 306-813
Korea
Tel. +(82) 42 -623-3765
Fax +(82) 42 - 623-3766

Schaeffler Ansan Corporation
1054-2 Shingil-dongAnsan-shi
Kyonggi-do, 425-020
Korea
Tel. +(82) 31 / 4 90 69 11
Fax +(82) 31 / 4 94 38 88
info.kr@schaeffler.com

Schaeffler Korea Corporation –
Gwangju Branch
1571, Unam-dong
Buk-guGwangju, 500-859
Korea
Tel. +82 62-523-4471
Fax +82 62-523-4903

Addresses

Schaeffler Korea Corporation –
Busan Branch
577-7, Gwaebeop-dong
Sasang-guBusan, 617-809
Korea
Tel. +82 51 - 328-9386
Fax +82 51 - 324-0382

Schaeffler Korea Corporation –
Busan Branch (Changwon Office)
452-9, Nae-dong, Changwon-si
Gyeongsangnam-do, 641-050
Korea
Tel. +82 55 - 280-8691
Fax +82 55 - 266-7055

Schaeffler Korea Corporation
Samsung Fire-Marine Insurance Bldg.,
11-12F#87, Euljiro-1ga
Jung-guSeoul, 100-191
Korea
Tel. +82 2-311-3000
Fax +82 2-311-3060
heonkyeong.lee@schaeffler.com

Latvia

Schaeffler KG Repräsentanz Baltikum
K.Ulmana gatve 119
2167 Riga
Latvia
Tel. +(371) 7 06 37 95
Fax +(371) 7 06 37 96
info.lv@schaeffler.com

Lesotho

Schaeffler South Africa (Pty.) Ltd.
1 End Street Ext. Corner Heidelberg Road
2000 Johannesburg
South Africa
Tel. +(27) 11 225 3000
Fax +(27) 11 334 1755
info.co.za@schaeffler.com

Liberia

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Libya

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Lithuania

Schaeffler KG Repräsentanz
K.Ulmana gatve 119
2167 Riga
Latvia
Tel. +(371) 7 06 37 95
Fax +(371) 7 06 37 96
info.lv@schaeffler.com

Luxembourg

Schaeffler Belgium S.P.R.L./B.V.B.A.
Avenue du Commerce, 38
1420 Braine L'Alleud
Belgium
Tel. +(32) 2 / 3 89 13 89
Fax +(32) 2 / 3 89 13 99
info.be@schaeffler.com

Macedonia

Schaeffler KG
Region Mazedonien
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-32 73
Fax +(49) 97 21 / 91-39 48
Anita.Buehner@schaeffler.com

Madagascar

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Malawi

Schaeffler South Africa (Pty.) Ltd.
1 End Street Ext. Corner Heidelberg Road
2000 Johannesburg
South Africa
Tel. +(27) 11 225 3000
Fax +(27) 11 334 1755
info.co.za@schaeffler.com

Malaysia

Schaeffler Bearings (Malaysia) Sdn. Bhd.
Wisma Fiamma - 5th Floor -
Right Wing Lot 44653
Jalan 7A / 62A, Bandur Menjalara
52200 Kuala Lumpur
Malaysia
Tel. +(60) 3-6275 0620
Fax +(60) 3-6275 0481
marketing_my@schaeffler.com

Maldives

Schaeffler KG
Region EMEA (Ost Asien)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-48 03
Fax +(49) 97 21 / 91-33 47
Werner.Mauder@schaeffler.com

Mali

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Malta

Schaeffler KG
Region EMEA (Naher Osten)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-35 27
Fax +(49) 97 21 / 91-33 47
Josef.Reiher@schaeffler.com

Marshall-Islands

Schaeffler KG
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Mauritania

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Mauritius

Schaeffler South Africa (Pty.) Ltd.
1 End Street Ext. Corner Heidelberg Road
2000 Johannesburg
South Africa
Tel. +(27) 11 334 16 42
Fax +(27) 11 334 21 13
info.co.za@schaeffler.com

Mexico

INA Mexico, S.A. de C.V.
Henry Ford No. 141Col. Bondojito Del.
Gustavo A. Madero
Mexico D.F. 07850
Mexico
Tel. +(52) 55 / 50 62 60 85
Fax +(52) 55 / 5739 5850
mx@schaeffler.com

Rodamientos FAG S.A. de C.V.
Henry Ford No. 141Col. Bondojito Del.
Gustavo A. Madero
Mexico D.F. 07850
Mexico
Tel. +(52) 50 62 60 85
Fax +(52) 5739 5850

Micronesia

Schaeffler New Zealand
(Unit R, Cain Commercial Centre)
20 Cain Road
1135 Penrose
New Zealand
Tel. +(64) 9 583 1280
Fax +(64) 9 583 1288
sales.nz@schaeffler.com

Moldavia

Schaeffler KG Representative
Office Ukraine
Jilyanskayastr. 75, 5-er Stock
Bussines Center «Iceberg»
01032 Kiew
Ukraine
Tel. +(380) 44-593-02-81
Fax +(380) 44-593-02-83
info@schaeffler.kiev.ua

Monaco

Schaeffler France SAS
44-48, rue Louveau - B.P. 91
92323 Châtillon
France
Tel. +(33) 1/40 92 16 16
Fax +(33) 1/40 92 87 57
info.fr@schaeffler.com

Mongolia

Schaeffler Hong Kong Company Limited
Unit 2501, 25/Floor,
Tower Two, Lippo Centre
No 89 Queensway
Hong Kong
China
Tel. +(852) 2371/2680
Fax +(852) 2371/2112
sales_hk@cn.fag.com

Morocco

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Mozambique

Schaeffler South Africa (Pty.) Ltd.
1 End Street Ext. Corner Heidelberg Road
2000 Johannesburg
South Africa
Tel. +(27) 11 225 3000
Fax +(27) 11 334 1755
info.co.za@schaeffler.com

Namibia

Schaeffler South Africa (Pty.) Ltd.
1 End Street Ext. Corner Heidelberg Road
2000 Johannesburg
South Africa
Tel. +(27) 11 225 3000
Fax +(27) 11 334 1755
info.co.za@schaeffler.com

Nauru

Schaeffler New Zealand
(Unit R, Cain Commercial Centre)
20 Cain Road
1135 Penrose
New Zealand
Tel. +(64) 9 583 1280
Fax +(64) 9 583 1288
sales.nz@schaeffler.com

Nepal

Schaeffler KG
Region EMEA (Ost Asien)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-48 03
Fax +(49) 97 21 / 91-33 47
Werner.Mauder@schaeffler.com

Netherlands

Schaeffler Nederland B.V.
Gildeweg 31
3771 NB Barneveld
Netherlands
Tel. +(31) 342 / 40 30 00
Fax +(31) 342 / 40 32 80
info.nl@schaeffler.com

New Zealand

Schaeffler New Zealand
(Unit R, Cain Commercial Centre)
20 Cain Road
1135 Penrose
New Zealand
Tel. +(64) 9 583 1280
Fax +(64) 9 583 1288
sales.nz@schaeffler.com

Nicaragua

Rodamientos FAG, S.A. de C.V.
11511 Interchange Circle South
Miramar, FL 33025
USA
Tel. +(1) 954-7 44 34 44
Fax +(1) 954-7 44 34 76
reinhart_h@us.fag.com

Niger

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Nigeria

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Norway

Schaeffler Norge AS
Nils Hansens vei 2
0667 Oslo
Norway
Tel. +(47) 23 24 93 30
Fax +(47) 23 24 93 31
info.no@schaeffler.com

Oman

Schaeffler KG
Region EMEA (Naher Osten)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-35 27
Fax +(49) 97 21 / 91-33 47
Josef.Reiher@schaeffler.com

Palau

Schaeffler New Zealand
(Unit R, Cain Commercial Centre)
20 Cain Road
1135 Penrose
New Zealand
Tel. +(64) 9 583 1280
Fax +(64) 9 583 1288
sales.nz@schaeffler.com

Panama

Rodamientos FAG, S.A. de C.V.
11511 Interchange Circle South
Miramar, FL 33025
USA
Tel. +(1) 954-7 44 34 44
Fax +(1) 954-7 44 34 76
reinhart_h@us.fag.com

Papua-New Guinea

Schaeffler Australia Pty Ltd
Level 1, Bldg 8
Forest Central Business Park
49 Frenchs Forest Road
Frenchs Forest, NSW 2086
Australia
Tel. +(61) 2-89 77 10 00
Fax +(61) 2-94 52 42 42
info.au@schaeffler.com

Paraguay

Schaeffler Brasil Ltda.
Av. Independência, 3500-A
Bairro Éden
18087-101 Sorocaba, SP
Brazil
Tel. +(55) 15 / 33 35 15 00
Fax +(55) 15 / 33 35 19 60
info.br@schaeffler.com

Peru

Schaeffler Brasil Ltda.
Av. Independência, 3500-A
Bairro Éden
18087-101 Sorocaba, SP
Brazil
Tel. +(55) 15 / 33 35 15 00
Fax +(55) 15 / 33 35 19 60
info.br@schaeffler.com

Philippines

Schaeffler (Singapore) Pte. Ltd.
Philippines Representative Office
2nd/Flr. King's Court Building 2
2129 Chino Roces Avenue
1230 Makati City
Philippines
Tel. +(63) 2 759 3585
Fax +(63) 2 759 3586
brian.davis@ph.fag.com

Addresses

Poland

Schaeffler Polska Sp. z.o.o.
Budynek E
ul. Szyszkowa 35/37
02-285 Warszawa
Poland
Tel. +(48) 22 / 8 78 41 20
Fax +(48) 22 / 8 78 41 22
info.pl@schaeffler.com

Portugal

INA Rolamentos Lda.
Arrábida Lake Towers
Rua Daciano Baptista Marques Torre C,
181, 2º piso
4400-617 Vila Nova de Gaia
Portugal
Tel. +(351) 22 / 5 32 08 00
Fax +(351) 22 / 5 32 08 60
info.pt@schaeffler.com

Romania

S.C. Schaeffler Romania S.R.L.
Aleea Schaeffler Nr.
507055 Cristian/Brasov
Romania
Tel. +(40) 268 505808
Fax +(40) 268 505848
info.ro@schaeffler.com

Russia

Schaeffler Russland GmbH
Leningradsky Prospekt 47, Str. 3
125167 Moscow
Russia
Tel. +7 495 / 7 37 76 60
Fax +7 495 / 7 37 76 53
info.ru@schaeffler.com

Schaeffler Russland GmbH
Ul. Tjuschina 4, Office 23
191119 St. Petersburg
Russia
Tel. +7 812 / 325 22 92
Fax +7 812 / 325 22 93
info@schaeffler.spb.ru

Schaeffler Russland GmbH
ul. 1 Maya 91/1
350901 Krasnodar
Russia
Tel. +7 918 / 142 96 73
Fax +7 918 / 142 96 73

Schaeffler Russland GmbH
ul. Marshala Zhukova 35, Floor 4, Office 5
445051 Togliatti
Russia
Tel. +7 8482 / 93 13 22
Fax +7 8482 / 93 13 22

Schaeffler Russland GmbH
ul. Truda 84, Office 408,
Business centre “Petrovskiy”
454091 Chelyabinsk
Russia
Tel. +7 351 / 247 52 60
Fax +7 351 / 247 52 60

Schaeffler Russland GmbH
ul. Yadrintseva 53/1, Office 909
630090 Novosibirsk
Russia
Tel. +7 383 / 218 83 60
Fax +7 383 / 218 83 59

Rwanda

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Samoa

Schaeffler New Zealand
(Unit R, Cain Commercial Centre)
20 Cain Road
1135 Penrose
New Zealand
Tel. +(64) 9 583 1280
Fax +(64) 9 583 1288
sales.nz@schaeffler.com

São Tomé and Príncipe

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Saudi Arabia

Schaeffler KG
Region EMEA (Naher Osten)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-35 27
Fax +(49) 97 21 / 91-33 47
Josef.Reiher@schaeffler.com

Senegal

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Serbia

Schaeffler KG Repräsentanz Serbien
Branka Krsmanovica 12
11118 Beograd
Serbia
Tel. +(381) 11 308 87 82
Fax +(381) 11 308 87 75
fagbgdyu@sezampro.yu

Seychelles

Schaeffler South Africa (Pty.) Ltd.
1 End Street Ext. Corner Heidelberg Road
2000 Johannesburg
South Africa
Tel. +(27) 11 225 3000
Fax +(27) 11 334 17 55
info.co.za@schaeffler.com

Sierra Leone

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Singapore

Schaeffler (Singapore) Pte. Ltd.
151 Lorong Chuan, #06-01
New Tech Park, Lobby A
556741 Singapore
Singapore
Tel. +(65) 6540 8600
Fax +(65) 6540 8668
info.sg@schaeffler.com

Slovak Republic

Schaeffler Slovensko, spol. s.r.o.
Ulica Dr. G. Schaefflera 1
02401 Kysucké Nové Mesto
Slovak Republic
Tel. +(421) 41 / 4 20 59 11
Fax +(421) 41 / 4 20 59 18
info.sk@schaeffler.com

Schaeffler Slovensko, spol.s.r.o.
Nevädzova 5
821 01 Bratislava
Slovak Republic
Tel. +(421) 2 43 294 260
Fax +(421) 2 48 287 820
fag@fag.sk

Slovenia

Schaeffler Slovenija d.o.o.
Glavni trg 17/b
2000 Maribor
Slovenia
Tel. +(386) 2 / 22 82-070
Fax +(386) 2 / 22 82 075
info.si@schaeffler.com

Solomon Islands

Schaeffler New Zealand
(Unit R, Cain Commercial Centre)
20 Cain Road
1135 Penrose
New Zealand
Tel. +(64) 9 583 1280
Fax +(64) 9 583 1288
sales.nz@schaeffler.com

Somalia

Schaeffler South Africa (Pty.) Ltd.
1 End Street Ext. Corner Heidelberg Road
2000 Johannesburg
South Africa
Tel. +(27) 11 225 3000
Fax +(27) 11 334 1755
info.co.za@schaeffler.com

South Africa

Schaeffler South Africa (Pty.) Ltd.
1 End Street Ext. Corner Heidelberg Road
2000 Johannesburg
South Africa
Tel. +(27) 11 225 3000
Fax +(27) 11 334 1755
info.co.za@schaeffler.com

Schaeffler South Africa (Pty.) Ltd.
58-64 Burman Road
Deal Party Estate
6012 Port Elizabeth
South Africa
Tel. +(27) 41 / 5 01 28 00
Fax +(27) 41 / 5 81 04 38
info.co.za@schaeffler.com

Spain

Schaeffler Iberia, s.l.
Polígono Ind. Pont Reixat
08960 Sant Just Desvern
Spain
Tel. +(34) 93 / 4 80 34 10
Fax +(34) 93 / 3 72 92 50
info.es@schaeffler.com

Sri Lanka

Schaeffler KG
Region EMEA (Ost Asien)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-48 03
Fax +(49) 97 21 / 91-33 47
Werner.Mauder@schaeffler.com

St. Kitts and Nevis

Rodamientos FAG, S.A. de C.V.
11511 Interchange Circle South
Miramar, FL 33025
USA
Tel. +(1) 954-7 44 34 44
Fax +(1) 954-7 44 34 76
reinhart_h@us.fag.com

St. Lucia

Rodamientos FAG, S.A. de C.V.
11511 Interchange Circle South
Miramar, FL 33025
USA
Tel. +(1) 954-7 44 34 44
Fax +(1) 954-7 44 34 76
reinhart_h@us.fag.com

St. Vincent and the Grenadines

Rodamientos FAG, S.A. de C.V.
11511 Interchange Circle South
Miramar, FL 33025
USA
Tel. +(1) 954-7 44 34 44
Fax +(1) 954-7 44 34 76
reinhart_h@us.fag.com

Sudan

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Surinam

Schaeffler Brasil Ltda.
Av. Independência, 3500-A
Bairro Éden
18087-101 Sorocaba, SP
Brazil
Tel. +(55) 15 / 33 35 15 00
Fax +(55) 15 / 33 35 19 60
info.br@schaeffler.com

Swaziland

Schaeffler South Africa (Pty.) Ltd.
1 End Street Ext. Corner Heidelberg Road
2000 Johannesburg
South Africa
Tel. +(27) 11 225 3000
Fax +(27) 11 334 1755
info.co.za@schaeffler.com

Sweden

Schaeffler Sverige AB
Charles gata 10
195 61 Arlandastad
Sweden
Tel. +(46) 8 / 59 51 09 00
Fax +(46) 8 / 59 51 09 60
info.se@schaeffler.com

Switzerland

HYDREL GmbH
Badstrasse 14
8590 Romanshorn
Switzerland
Tel. +(41) 71 / 4 66 66 66
Fax +(41) 71 / 4 66 63 33
info.ch@schaeffler.com

Taiwan

Schaeffler Taiwan Co Ltd
105 Rm H, 8F
No. 168, Dun Hua N. Road
Taipei
Taiwan
Tel. +(886) 2 / 2175-1928
Fax +(886) 2 / 2545-2828
info.tw@schaeffler.com

Tadzhikistan

Schaeffler Russland GmbH
Leningradsky Prospekt 47, Str. 3
Bld. 14, 10. floor
125167 Moscow
Russia
Tel. +(7) 495 / 7 37 76 60
Fax +(7) 495 / 7 37 76 53
info.ru@schaeffler.com

Tanzania

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Thailand

Schaeffler (Thailand) Co., Ltd.
388 Exchange Tower, 34th Floor
Sukhumvit Road, Klongtoey
Bangkok, 10110
Thailand
Tel. +(66) 2697 0000
Fax +(66) 2697 0001
info.th@schaeffler.com

Schaeffler (Thailand) Co., Ltd.
215 Moo 6 Chiang Mai-Hangdong Rd.
Maehia, Mueng Chiang Mai
Chiang Mai, 50100
Thailand
Tel. +66 53 807-653-5
Fax +66 53 807-656

Togo

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Tonga

Schaeffler New Zealand
(Unit R, Cain Commercial Centre)
20 Cain Road
1135 Penrose
New Zealand
Tel. +(64) 9 583 1280
Fax +(64) 9 583 1288
sales.nz@schaeffler.com

Trinidad and Tobago

Rodamientos FAG S.A. de C.V.
Paseo de la Reforma 383 -
Despacho 701 y 702
Colonia Cuauhtemoc
DF 06500 Mexico D.F.
Mexico
Tel. +(52) 55-52 08 12 08
Fax +(52) 55 52 08 08 36
Pubanz_t@us.fag.com

Tunisia

FAG AFRIQUE DU NORD
66 Avenue de Carthage
1000 Tunis
Tunisia
Tel. +(216) 1 / 34 14 48
Fax +(216) 1 / 33 67 04
fagafriquedunord@socoopec.com.tn

Addresses

Turkey

Schaeffler Rulmanlari Ticaret Limited Sirketi
Aydin Sokak Dagli Apt. 4/4
1. Levent
Istanbul34340
Turkey
Tel. +(90) 212 / 2 79 27 41
Fax +(90) 212 / 2 81 66 45
info.tr@schaeffler.com

Schaeffler KG FAG Delegation Turkey
AYDIN SOK 4 DAGLI APT. D : 4
1. LEVENT
34340 Istanbul
Turkey
Tel. +(90) 212 / 280 77 98
Fax +(90) 212 / 280 94 45
fagturk@schaeffler.com

Turkmenistan

Schaeffler Russland GmbH
Leningradsky Prospekt 47, Str. 3
125167 Moscow
Russia
Tel. +(7) 495 / 7 37 76 60
Fax +(7) 495 / 7 37 76 53
info.ru@schaeffler.com

Tuvalu

Schaeffler New Zealand
(Unit R, Cain Commercial Centre)
20 Cain Road
1135 Penrose
New Zealand
Tel. +(64) 9 583 1280
Fax +(64) 9 583 1288
sales.nz@schaeffler.com

Uganda

Schaeffler KG
FAG Region EMEA (Afrika + Irak)
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
Tel. +(49) 97 21 / 91-30 85
Fax +(49) 97 21 / 91-33 47
Erich.Banz@schaeffler.com

Ukraine

Schaeffler KG
Representative Office Ukraine
Jilyanskayastr. 75, 5-er Stock
Bussines Center «Iceberg»
01032 Kiew
Ukraine
Tel. +(380) 44-593-02-81
Fax +(380) 44-593-02-83
info@schaeffler.kiev.ua

UAE United Arab Emirates

Schaeffler Middle East FZE
Jebel Ali Free Zone
Warehouse / Offices BE 06
Southside
Dubai UAE
UAE United Arab Emirates
Tel. +971 48 86 06 60
Fax +971 48 86 06 61
ousama.abukhader@ae.luk-as.com

Samir Odeh & Sons
Airport Road
P.O. Box 12991
Dubai
UAE United Arab Emirates
Tel. +971 42 82 17 62
Fax +971 42 82 17 78
info@sosgroup.ae

Uruguay

Schaeffler Brasil Ltda.
Av. Independência, 3500-A
Bairro Éden
18087-101 Sorocaba, SP
Brazil
Tel. +(55) 15 / 33 35 15 00
Fax +(55) 15 / 33 35 19 60
info.br@schaeffler.com

USA

Schaeffler Group USA Inc.
200 Park Avenue - P.O. Box 1933
Danbury, CT 06813-1933
USA
Tel. +(1) (203) 790 54 74
Fax +(1) (203) 830 81 71
Diana.DiBartolomeo@schaeffler.com

Schaeffler Group Automotive
1750 East Big Beaver Road
Troy, MI 48083
USA
Tel. +(1) (248) 528 9080
Fax +(1) (248) 528 4961
richard.neilson@schaeffler.com

Schaeffler Group USA Inc.
308 Springhill Farm Road
Fort Mill, SC 29715
USA
Tel. +(1) 803 / 548-8500
Fax +(1) 803 / 548-8599
info.us@schaeffler.com

Schaeffler Group USA Inc.
5370 Wegman Drive
Valley City, OH 44280-9700
USA
Tel. +(1) 800 / 274 5001
Fax +(1) 330 / 273 3522
inquiry@luk-as.com

The Barden Corporation
200 Park Avenue
P.O. Box 2449
Danbury, CT 06813-2449
USA
Tel. +(1) (0203) 744 22 11
Fax +(1) (0203) 744 37 56
Diana.DiBartolomeo@schaeffler.com

Uzbekistan

Schaeffler Russland GmbH
Leningradsky Prospekt 47, Str. 3
125167 Moscow
Russia
Tel. +(7) 495 / 7 37 76 60
Fax +(7) 495 / 7 37 76 53
info.ru@schaeffler.com

Vanuatu

Schaeffler New Zealand
(Unit R, Cain Commercial Centre)
20 Cain Road
1135 Penrose
New Zealand
Tel. +(64) 9 583 1280
Fax +(64) 9 583 1288
sales.nz@schaeffler.com

Venezuela

Schaeffler Venezuela
Torre BOD, Piso 14, Oficina 14-1
Urbanización San José de Tarbes
Valencia
Venezuela
Tel. +(58) 58 241 825 4747
Fax +(58) 58 241 825 9705
christian.ommundsen@schaeffler.com

Vietnam

Schaeffler Vietnam Co., Ltd
221 Khanh Hoi St., Dist.4
Ho Chi Minh City
Vietnam
Tel. +(84) 8 943 2860
Fax +(84) 8 943 2861
info.vn@schaeffler.com

Schaeffler Vietnam Co., Ltd
VCCI building, 3th floor, unit 319
No.9 Dao Duy Anh street – Dong Da Dist
Ha Noi
Vietnam
Tel. +(84) 4 5771790
Fax +(84) 4 5771792

Zambia

Schaeffler South Africa (Pty.) Ltd.
1 End Street Ext. Corner Heidelberg Road
2000 Johannesburg
South Africa
Tel. +(27) 11 225 3000
Fax +(27) 11 334 1755
info.co.za@schaeffler.com

Zimbabwe

Schaeffler South Africa (Pty.) Ltd.
1 End Street Ext. Corner Heidelberg Road
2000 Johannesburg
South Africa
Tel. +(27) 11 225 3000
Fax +(27) 11 334 1755
info.co.za@schaeffler.com

Schaeffler KG

Industriestraße 1 – 3
91074 Herzogenaurach (Germany)
Internet www.ina.com
E-mail info@schaeffler.com

In Germany:
Phone 0180 5003872
Fax 0180 5003873

From Other Countries:
Phone +49 9132 82-0
Fax +49 9132 82-4950

Schaeffler KG

Georg-Schäfer-Straße 30
97421 Schweinfurt (Germany)
Internet www.fag.com
E-mail FAGinfo@schaeffler.com

In Germany:
Phone 0180 5003872
Fax 0180 5003873

From Other Countries:
Phone +49 9721 91-0
Fax +49 9721 91-3435

MATNR 029679141-0000 / HR1 / GB-D / 20081225 / Printed in Germany by Mohn media