Koyo®

JTEKT
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Ball & Roller Bearings

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JTEKT CORPORATION

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Koyo®

BALL & ROLLER BEARINGS

Koyo

Publication of Rolling Bearing Catalog

Today's technology-based society, in order to utilize the earth's limited resources effectively and protect the environment, must strive to develop new technologies and alternate energy sources, and in that connection it continues to pursue new targets in various fields. To achieve such targets, technically advanced and highly functional rolling bearings with significantly greater compactness, lighter weight, longer life and lower friction as well as higher reliability during use in special environments are sought.

This new-edition catalog is based on the results of wide-ranging technical studies and extensive R&D efforts and will enable the reader to select the optimal bearing for each application.

JTEKT is confident that you will find this new catalog useful in the selection and use of rolling bearings. JTEKT is grateful for your patronage and look forward to continuing to serve you in the future.

★The contents of this catalog are subject to change without prior notice. Every possible effort has been made to ensure that the data herein is correct; however, JTEKT cannot assume responsibility for any errors or omissions.

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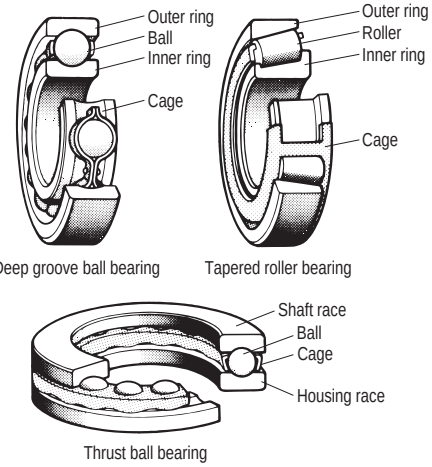
1. Rolling bearing structures and types

1-1 Structure

Rolling bearings (bearings hereinafter) normally comprise bearing rings, rolling elements and a cage. (see Fig. 1-1)

Rolling elements are arranged between inner and outer rings with a cage, which retains the rolling elements in correct relative position, so they do not touch one another. With this structure, a smooth rolling motion is realized during operation.

Bearings are classified as follows, by the number of rows of rolling elements : single-row, double-row, or multi-row (triple- or four-row) bearings.



Note) In thrust bearings inner and outer rings and also called “shaft race” and “housing race” respectively. The race indicates the washer specified in JIS.

Fig. 1-1 Bearing structure

1) Bearing rings

The path of the rolling elements is called the raceway; and, the section of the bearing rings where the elements roll is called the raceway surface. In the case of ball bearings, since grooves are provided for the balls, they are also referred to as raceway grooves.

The inner ring is normally engaged with a shaft; and, the outer ring with a housing.

2) Rolling element

Rolling elements may be either balls or rollers. Many types of bearings with various shapes of rollers are available.

- Ball
- Cylindrical roller ($L_W \leqq 3\ D_W$)*
- Long cylindrical roller ($3D_W \leqq L_W \leqq 10D_W$, $D_W > 6$ mm)*
- Needle roller ($3D_W \leqq L_W \leqq 10D_W$, $D_W \leqq 6$ mm)*
- Tapered roller (tapered trapezoid)
- Convex roller (barrel shape)

* (L_W : roller length (mm)
D_W : roller diameter (mm))

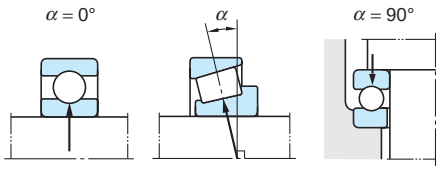
3) Cage

The cage guides the rolling elements along the bearing rings, retaining the rolling elements in correct relative position. There are various types of cages including pressed, machined, molded, and pin type cages.

Due to lower friction resistance than that found in full complement roller and ball bearings, bearings with a cage are more suitable for use under high speed rotation.

1-2 Type

The contact angle (α) is the angle formed by the direction of the load applied to the bearing rings and rolling elements, and a plan perpendicular to the shaft center, when the bearing is loaded.



Bearings are classified into two types in accordance with the contact angle (α).

· Radial bearings ($0° \leqq \alpha \leqq 45°$)
... designed to accommodate mainly radial load.
· Thrust bearings ($45° < \alpha \leqq 90°$)
... designed to accommodate mainly axial load.

Rolling bearings are classified in Fig. 1-2, and characteristics of each bearing type are described in Tables 1-1 to 1-13.

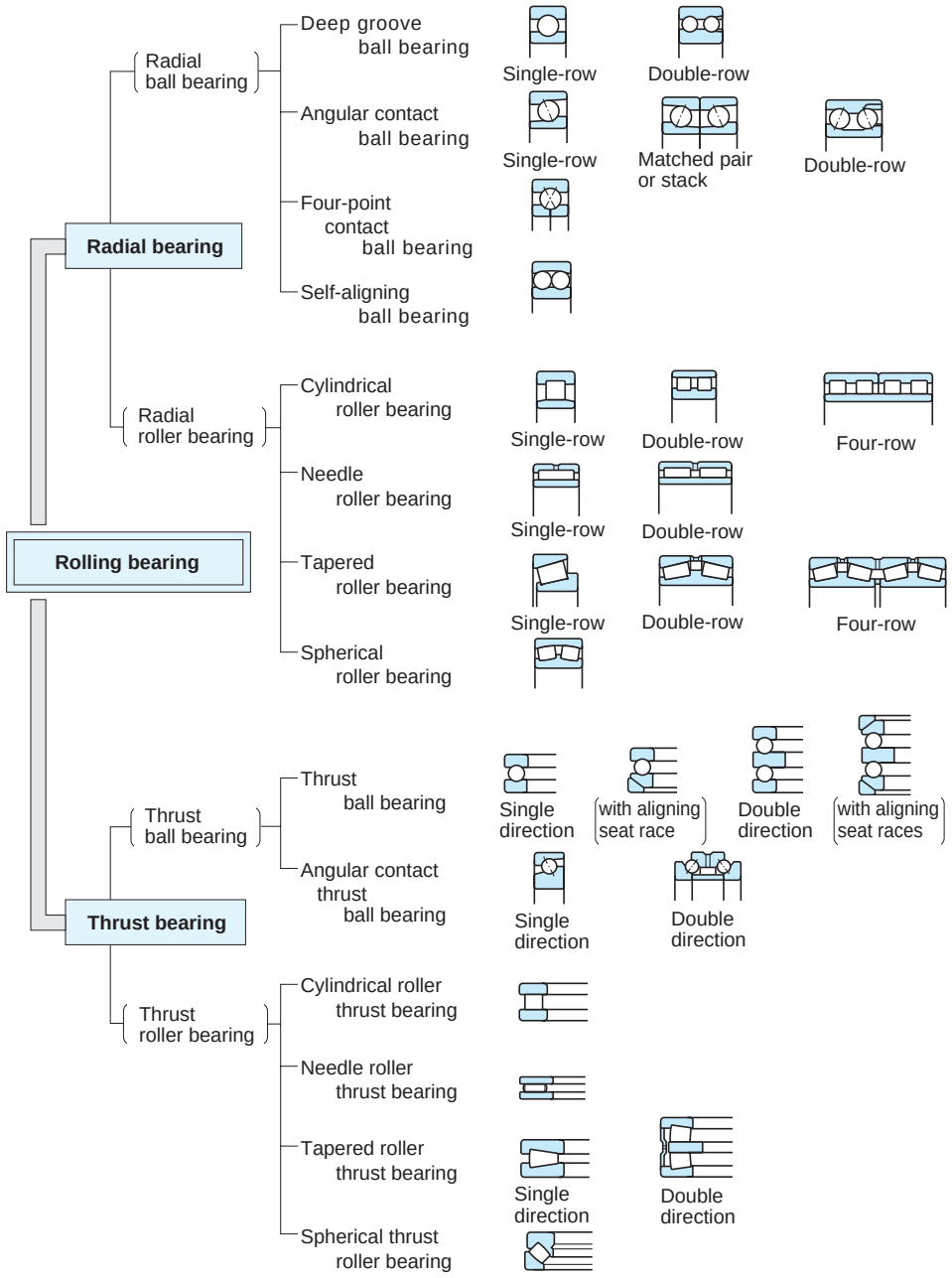
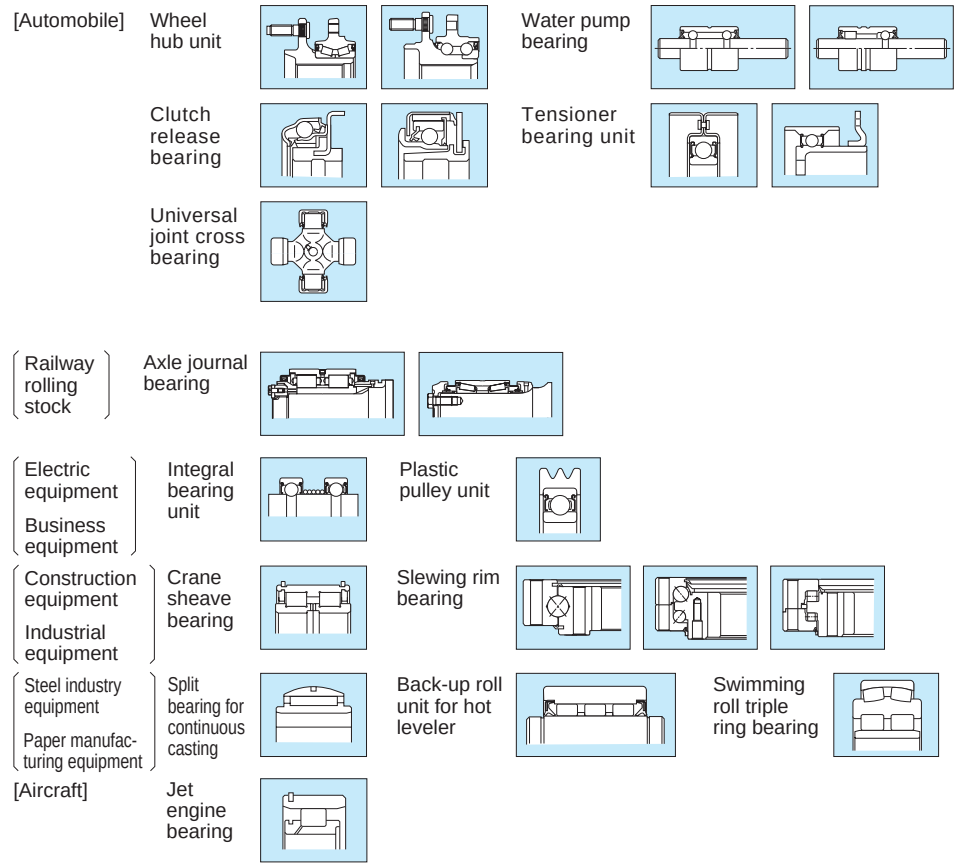


Fig. 1-2(1) Rolling bearings

Bearings classified by use



Others

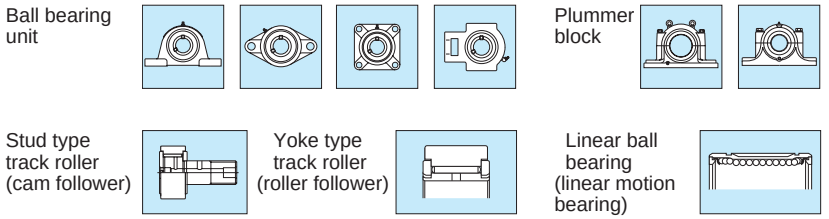
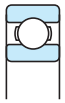
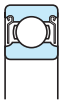
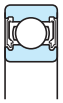
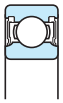
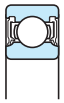
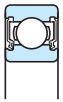
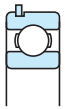


Fig. 1-2(2) Rolling bearings

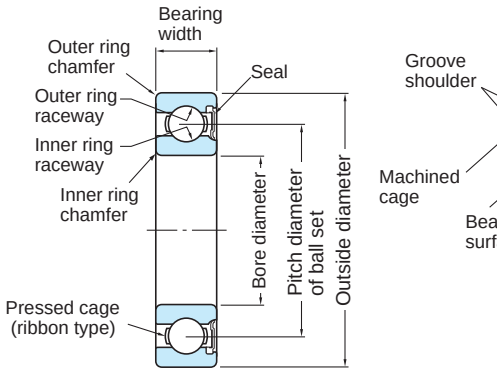
Table 1-1 Deep groove ball bearings

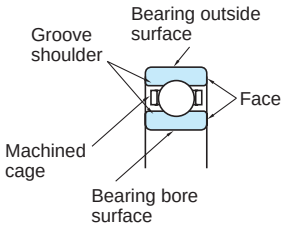
Single-row								Double-row
Open type	Shielded type	Non-contact sealed type	Contact sealed type		Extremely light contact sealed type	With locating snap ring	Flanged type	
							 Suitable for extra-small or miniature bearing	
	ZZ	2RU	2RS	2RK	2RD	NR		
680, 690, 600, 620, 630, (ML) ···Extra-small, miniature bearing								4200
6700, 6800, 6900, 16000, 6000, 6200, 6300, 6400								4300

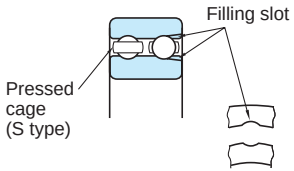
- The most popular types among rolling bearings, widely used in a variety of industries.
- Radial load and axial load in both directions can be accommodated.
- Suitable for operation at high speed, with low noise and low vibration.
- Sealed bearings employing steel shields or rubber seals are filled with the appropriate volume of grease when manufactured.
- Bearings with a flange or locating snap ring attached on the outer ring are easily mounted in housings for simple positioning of housing location.

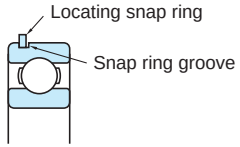
[Recommended cages] Pressed cage (ribbon type, snap type ··· single-row, S type ··· double-row), copper alloy or phenolic resin machined cage, synthetic resin molded cage

[Main applications] Automobile : front and rear wheels, transmissions, electric devices
Electric equipment : standard motors, electric appliances for domestic use
Others : measuring instruments, internal combustion engines, construction equipment, railway rolling stock, cargo transport equipment, agricultural equipment, equipment for other industrial uses





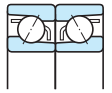
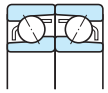
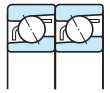




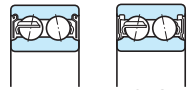
Bearing size (Reference) Unit : mm

Connotation	Bore diameter	Outside diameter
Miniature	–	Under 9
Extra-small	Under 10	9 or more
Small size	10 or more	80 or less
Medium size	–	80 – 180
Large size	–	180 – 800
Extra-large size	–	Over 800

Table 1-2 Angular contact ball bearings

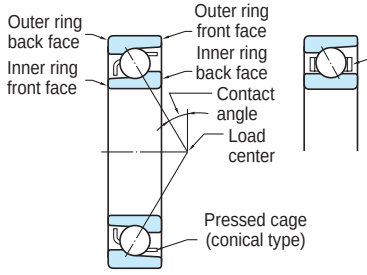
Single-row			Matched pair			Double-row	
		For high-speed use	Back-to-back arrangement	Face-to-face arrangement	Tandem arrangement		
 With pressed cage	 With machined cage	 HAR	 DB	 DF	 DT	 (With filling slot)	
7000, 7200, 7300, 7400 ····· Contact angle 30°						3200	5200
7000B, 7200B, 7300B, 7400B ····· 40°						3300	5300
7900C, 7000C, 7200C, 7300C ····· 15°						Contact angle 32°	Contact angle 24°
HAR900C, HAR000C							

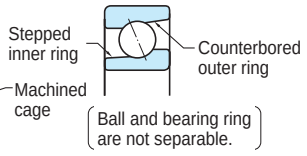
- Bearing rings and balls possess their own contact angle which is normally 15°, 30° or 40°.
  - Larger contact angle ····· higher resistance against axial load
  - Smaller contact angle ··· more advantageous for high-speed rotation
- Single-row bearings can accommodate radial load and axial load in one direction.
- DB and DF matched pair bearings and double-row bearings can accommodate radial load and axial load in both directions.
  DT matched pair bearings are used for applications where axial load in one direction is too large for one bearing to accept.
- HAR type high speed bearings were designed to contain more balls than standard bearings by minimizing the ball diameter, to offer improved performance in machine tools.
- Angular contact ball bearings are used for high accuracy and high-speed operation.
- Axial load in both directions and radial load can be accommodated by adapting a structure pairing two single-row angular contact ball bearings back to back.
- For bearings with no filling slot, the sealed type is available.

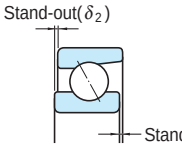

ZZ (Shielded) 2RS (Sealed)

[Recommended cages] Pressed cage (conical type ··· single-row : S type, snap type ··· double-row), copper alloy or phenolic resin machined cage, synthetic resin molded cage

[Main applications] Single-row : machine tool spindles, high frequency motors, gas turbines, centrifugal separators, front wheels of small size automobiles, differential pinion shafts
Double-row : hydraulic pumps, roots blowers, air-compressors, transmissions, fuel injection pumps, printing equipment





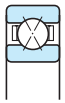
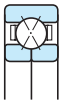
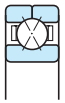


Contact angles (Reference)

Contact angle	Supplementary code
15°	C
20°	CA
25°	AC
30°	A (Omitted)
35°	E
40°	B

"G type" bearings are processed (with flush ground) such that the stand-out turns out to be $\delta_1 = \delta_2$.
The matched pair DB, DF, and DT, or stack are available.

Table 1-3 Four-point contact ball bearings

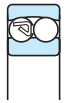
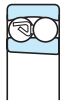
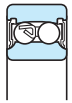
One-piece type	Two-piece inner ring	Two-piece outer ring
		
—	6200BI 6300BI	(6200BO) (6300BO)

- Radial load and axial load in both directions can be accommodated.
- A four-point contact ball bearing can substitute for a face-to-face or back-to-back arrangement of angular contact ball bearings.
- Suitable for use under pure axial load or combined radial and axial load with heavy axial load.
- This type of bearing possesses a contact angle (α) determined in accordance with the axial load direction. This means that the bearing ring and balls contact each other at two points on the lines forming the contact angle.

[Recommended cage] Copper alloy machined cage

[Main applications]
Motorcycle : Transmission, driveshaft pinion-side
Automobile : Steering, transmission

Table 1-4 Self-aligning ball bearings

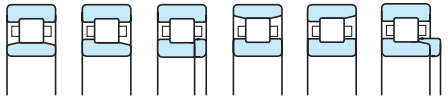
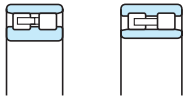
Cylindrical bore	Tapered bore	Sealed
		
	K (Taper 1 : 12)	2RS
120, 130 1200, 1300 2200, 2300	11200, 11300··· extended inner ring type	2200 2RS 2300 2RS

- Spherical outer ring raceway allows self-alignment, accommodating shaft or housing deflection and misaligned mounting conditions.
- Tapered bore design can be mounted readily using an adapter.

Pressed cage — staggered type···12, 13, 22...2RS, 23...2RS
snap type ·····22, 23

Power transmission shaft of wood working and spinning machines, plummer blocks

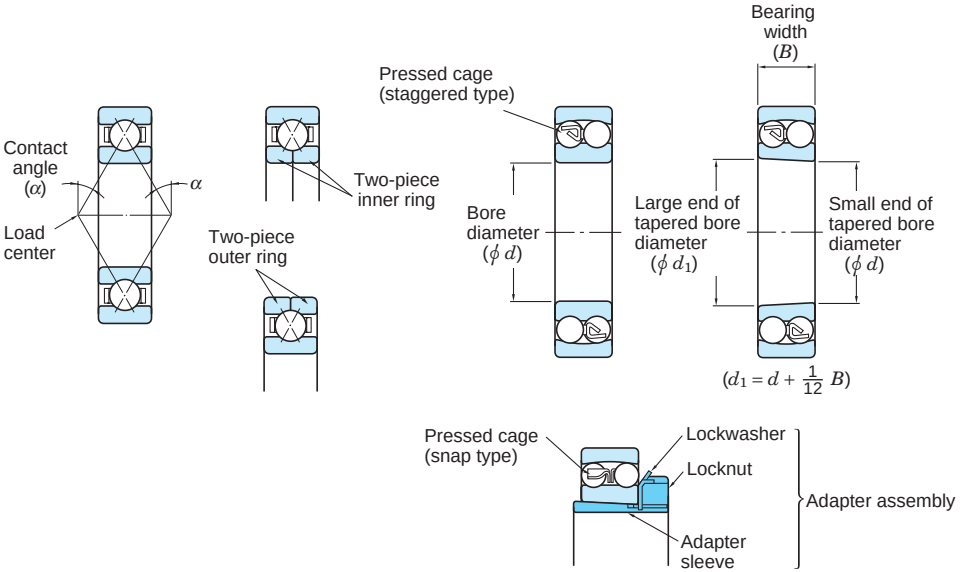
Table 1-5 Cylindrical roller bearings

Single-row						Double-row		Four-row
								
NU	NJ	NUP	N	NF	NH	NN	NNU	Mainly use on rolling mill roll neck
NU1000, NU200 (R), NU300 (R), NU400 NU2200 (R), NU2300 (R) NU3200, NU3300						Cylindrical bore: NNU4900, NN3000 Tapered bore: NNU4900K, NN3000K		(FC) , (4CR)

- Since the design allowing linear contact of cylindrical rollers with the raceway provides strong resistance to radial load, this type is suitable for use under heavy radial load and impact load, as well as at high speed.
- N and NU types are ideal for use on the free side: they are movable in the shaft direction in response to changes in bearing position relative to the shaft or housing, which are caused by heat expansion of the shaft or improper mounting.
- NJ and NF types can accommodate axial load in one direction; and NH and NUP types can accommodate partial axial load in both directions.
- With separable inner and outer ring, this type ensures easy mounting.
- Due to their high rigidity, NNU and NN types are widely used in machine tool spindles.

[Recommended cages] Pressed cage (Z type), copper alloy machined cage, pin type cage, synthetic resin molded cage

[Main applications] Large and medium size motors, traction motors, generators, internal combustion engines, gas turbines, machine tool spindles, speed reducers, cargo transport equipment, and other industrial equipment



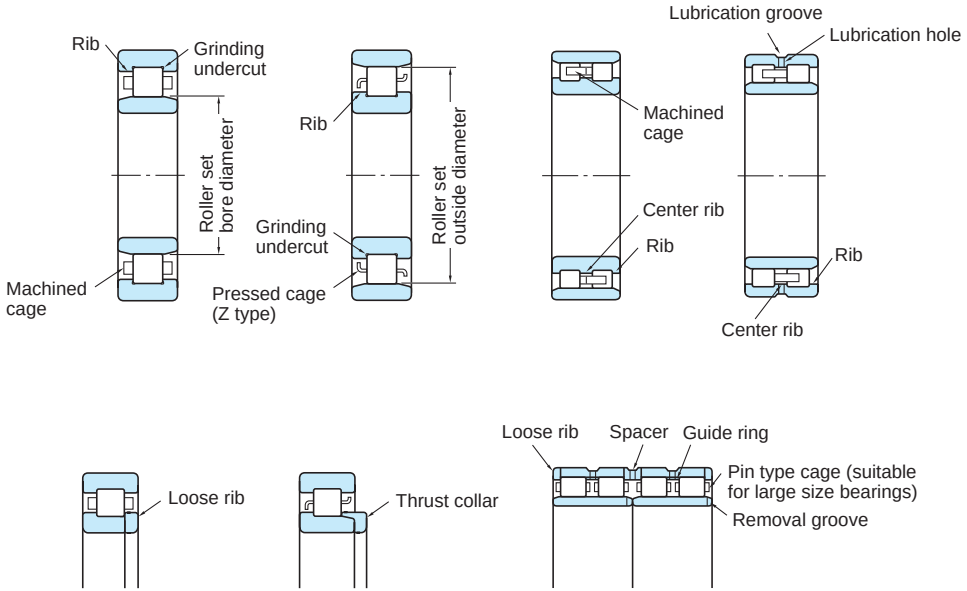
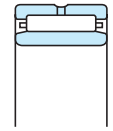
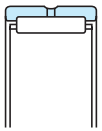
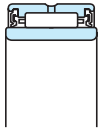
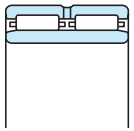
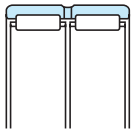


Table 1-6 Machined ring needle roller bearings

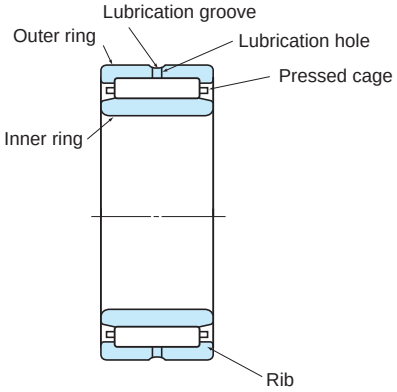
Single-row			Double-row	
 With inner ring	 Without inner ring	 Sealed	 With inner ring	 Without inner ring
NA4800 NA4900 NA6900 (NKJ, NKJS)	RNA4800 RNA4900 RNA6900 (NK, NKS, HJ)	NA49002RS – (HJ.2RS)	NA6900 (d ≧ 32)	RNA6900 (Fw ≧ 40)

- In spite of their basic structure, which is the same as that of NU type cylindrical roller bearings, bearings with minimum ring sections offer space savings and greater resistance to radial load, by using needle rollers.
- Bearings with no inner rings function using heat treated and ground shafts as their raceway surface.

[Recommended cage] Pressed cage

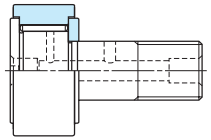
[Main applications] Automobile engines, transmissions, pumps, power shovel wheel drums, hoists, overhead traveling cranes, compressors

(Reference) Many needle roller bearings other than those with machined ring are available.
For details, refer to the pages for the needle roller bearing specification tables and the dedicated "Needle Roller Bearings" catalog (CAT No. B2020E), published separately.




Needle roller and cage assemblies


Drawn cup needle roller bearings


Stud type track roller (cam follower)

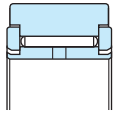
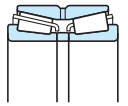
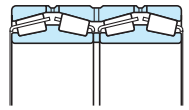

Yoke type track roller (roller follower)

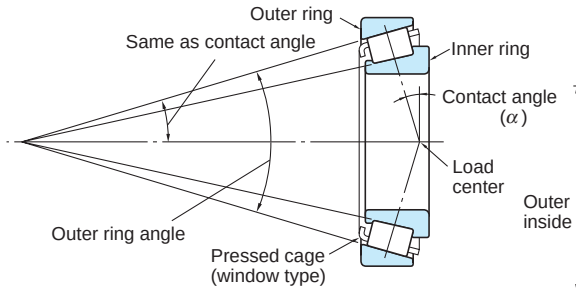
Table 1-7 Tapered roller bearings

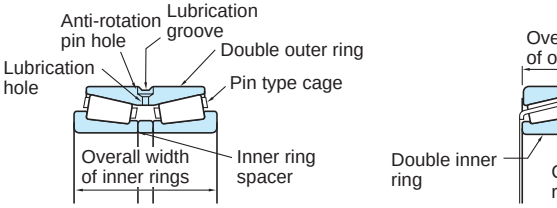
Single-row		Double-row		Four-row
	 Flanged type	 TDO type	 TDI type	 Mainly used on rolling mill roll necks
(Standard contact angle) 32900JR 32000JR 33000JR 33100JR	(Inter mediate contact angle) 30200JR 32200JR 33200JR 30300JR 32300JR	(Steep contact angle) 30200CR 32200CR 30300CR 32300CR	30300DJ 30300DJR 31300JR	46200 46200A 46300 46300A (46T)	45200 45300 (45T)	37200 47200 47300 (47T) (4TR)

- Tapered rollers assembled in the bearings are guided by the inner ring back face rib.
- The raceway surfaces of inner ring and outer ring and the rolling contact surface of rollers are designed so that the respective apexes converge at a point on the bearing center line.
- Single-row bearings can accommodate radial load and axial load in one direction, and double-row bearings can accommodate radial load and axial load in both directions.
- This type of bearing is suitable for use under heavy load or impact load.
- Bearings are classified into standard, intermediate and steep types, in accordance with their contact angle (α).
  The larger the contact angle is, the greater the bearing resistance to axial load.
- Since outer ring and inner ring assembly can be separated from each other, mounting is easy.
- Bearings designated by the suffix "J" and "JR" are interchangeable internationally.
- Items sized in inches are still widely used.

[Recommended cages] Pressed cage, synthetic resin molded cage, pin type cage

[Main applications] Automobile : front and rear wheels, transmissions, differential pinion
Others : machine tool spindles, construction equipment, large size agricultural equipment, railway rolling stock speed reduction gears, rolling mill roll necks and speed reducers, etc





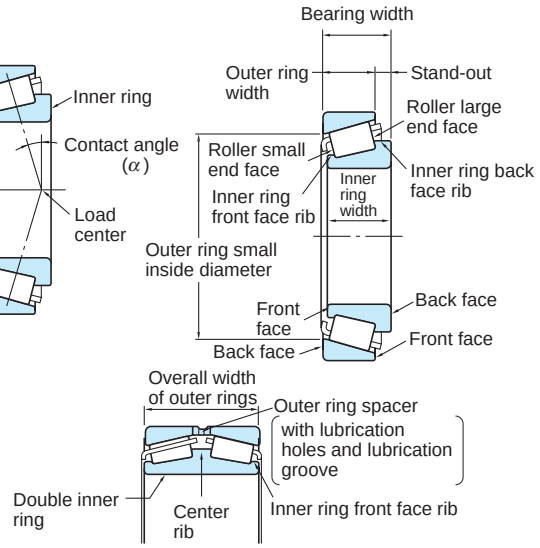
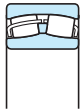
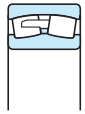


Table 1-8 Spherical roller bearings

Cylindrical bore			Tapered bore
Convex asymmetrical roller type	Convex symmetrical roller type		
			
R, RR	RZ	RHA	K or K30
23900R, 23000R (RZ, RHA), 23100R (RZ, RHA), 22200R (RZ, RHA), 21300R (RZ) 24000R (RZ, RHA), 24100R (RZ, RHA), 23200R (RZ, RHA), 22300R (RZ, RHA)			

- Spherical roller bearings comprising barrel-shaped convex rollers, double-row inner ring and outer ring are classified into three types : R(RR), RZ and RHA, according to their internal structure.
- With the bearing designed such that the circular arc center of the outer ring raceway matches with the bearing center, the bearing is self-aligning, insensitive to errors of alignment of the shaft relative to the housing, and to shaft bending.
- This type can accommodate radial load and axial load in both directions, which makes it especially suitable for applications in which heavy load or impact load is applied.
- The tapered bore type can be easily mounted/dismounted by using an adapter or withdrawal sleeve.
  There are two types of tapered bores (tapered ratio) :
  - 1 : 30 (supplementary code K30) ··· Suitable for series 240 and 241.
  - 1 : 12 (supplementary code K) ··· Suitable for series other than 240 and 241.
- Lubrication holes, a lubrication groove and anti-rotation pin hole can be provided on the outer ring. Lubrication holes and a lubrication groove can be provided on the inner ring, too.

[Recommended cages] Copper alloy machined cage, pressed cage

[Main applications] Paper manufacturing equipment, speed reducers, railway rolling stock axle journals, rolling mill pinion stands, table rollers, crushers, shaker screens, printing equipment, wood working equipment, speed reducers for various industrial uses, plummer blocks

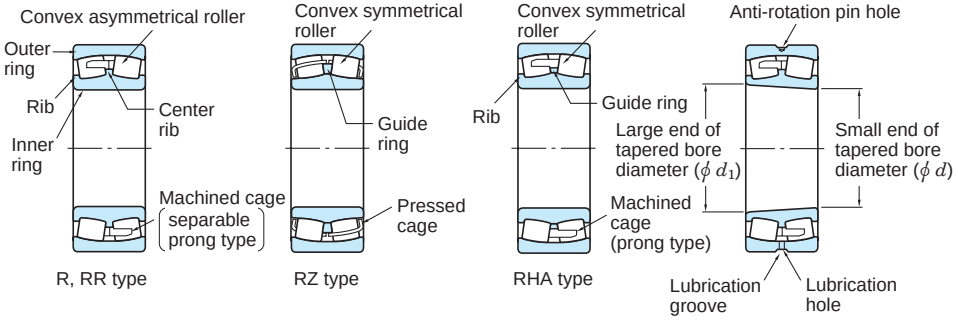
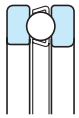
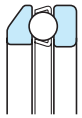
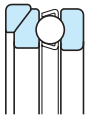
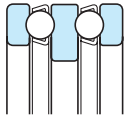
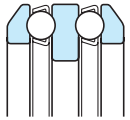
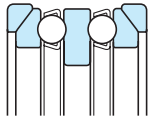


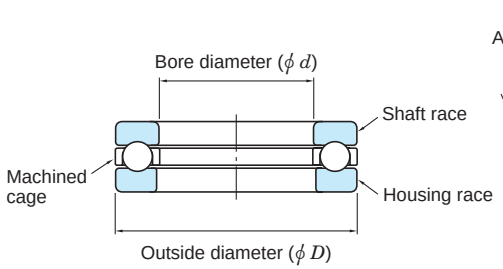
Table 1-9 Thrust ball bearings

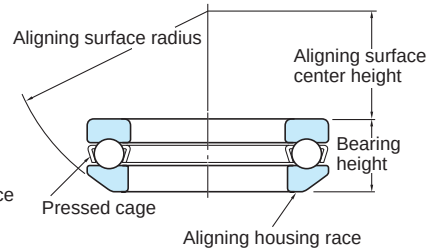
Single direction			Double direction		
With flat back faces	With spherical back face	With aligning seat race	With flat back faces	With spherical back faces	With aligning seat races
					
51100	–	–	–	–	–
51200	53200	53200U	52200	54200	54200U
51300	53300	53300U	52300	54300	54300U
51400	53400	53400U	52400	54400	54400U

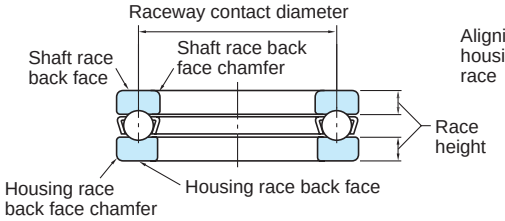
- This type of bearing comprises washer-shaped rings with raceway groove and ball and cage assembly.
- Races to be mounted on shafts are called shaft races (or inner rings); and, races to be mounted into housings are housing races (or outer rings).
  Central races of double direction bearings are mounted on the shafts.
- Single direction bearings accommodate axial load in one direction, and double direction bearings accommodate axial load in both directions. (Both of these bearings cannot accommodate radial loads.)
- Since bearings with a spherical back face are self- aligning, it helps to compensate for mounting errors.

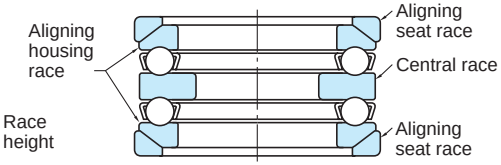
[Recommended cages] Pressed cage, copper alloy or phenolic resin machined cage, synthetic resin molded cage

[Main applications] Automobile king pins, machine tool spindles



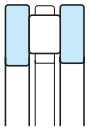






[Remark] The race indicates the washer specified in JIS.

Table 1-10 Cylindrical roller thrust bearings

Single direction

(811, 812, NTHA)
■ This type of bearing comprises washer-shaped rings (shaft and housing race) and cylindrical roller and cage assembly. Crowned cylindrical rollers produce uniform pressure distribution on roller/raceway contact surface. ■ Axial load can be accommodated in one direction. ■ Great axial load resistance and high axial rigidity are provided.
[Recommended cages] Copper alloy machined cage
[Main applications] Oil excavators, iron and steel equipment

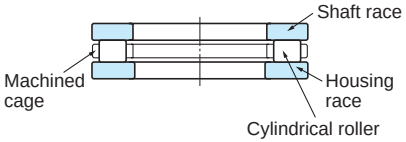
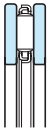
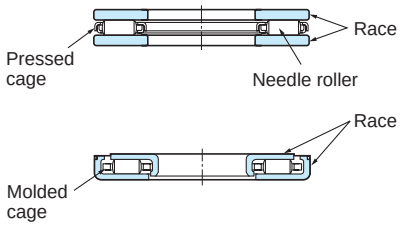


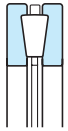
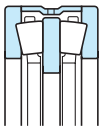
Table 1-11 Needle roller thrust bearings

Separable	Non-separable
	
(AXK, FNT, NTA)	(FNTKF)
■ The separable type, comprising needle roller and cage thrust assembly and a race, can be matched with a pressed thin race (AS) or machined thick race (LS, WS.811, GS.811). ■ The non-separable type comprises needle roller and cage thrust assembly and a precision pressed race. ■ Axial load can be accommodated in one direction. ■ Due to the very small installation space required, this type contributes greatly to size reduction of application equipment. ■ In many cases, needle roller and cage thrust assembly function by using the mounting surface of the application equipment, including shafts and housings, as its raceway surface.	
Pressed cage, synthetic resin molded cage	
Transmissions for automobiles, cultivators and machine tools	



[Remark] The race indicates the thrust washer or washer specified in JIS.

Table 1-12 Tapered roller thrust bearings

Single direction	Double direction
	
(T) (THR)	(2THR)
■ This type of bearing comprises tapered rollers (with spherical large end), which are uniformly guided by ribs of the shaft and housing races. ■ Both shaft and housing races and rollers have tapered surfaces whose apexes converge at a point on the bearing axis. ■ Single direction bearings can accommodate axial load in one direction; and, double direction bearings can accommodate axial load in both directions. ■ Double direction bearings are to be mounted such that their central race is placed on the shaft shoulder. Since this type is treated with a clearance fit, the central race must be fixed with a sleeve, etc.	
[Recommended cages] Copper alloy machined cage	
[Main applications] Single direction : crane hooks, oil excavator swivels Double direction : rolling mill roll necks	

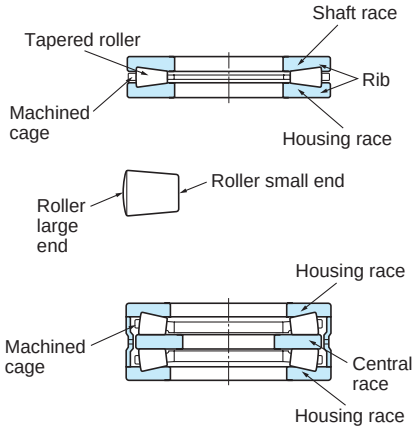
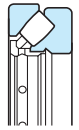
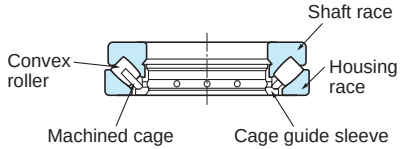


Table 1-13 Spherical thrust roller bearings


29200 29300 29400
■ This type of bearing, comprising barrel-shaped convex rollers arranged at an angle with the axis, is self-aligning due to spherical housing race raceway; therefore, shaft inclination can be compensated for to a certain degree. ■ Great axial load resistance is provided. This type can accommodate a small amount of radial load as well as heavy axial load. ■ Normally, oil lubrication is employed.
Copper alloy machined cage
Hydroelectric generators, vertical motors, propeller shafts for ships, screw down speed reducers, jib cranes, coal mills, pushing machines, molding machines



2. Outline of bearing selection

Currently, as bearing design has become diversified, their application range is being increasingly extended. In order to select the most suitable bearings for an application, it is necessary to conduct a comprehensive study on both bearings and the equipment in which the bearings will be installed, including operating conditions, the performance required of the bearings, specifications of the other components to be installed along with the bearings, marketability, and cost performance, etc.

In selecting bearings, since the shaft diameter is usually determined beforehand, the prospective bearing type is chosen based upon installation space, intended arrangement, and according to the bore diameter required.

Next, from the bearing specifications are determined the service life required when compared to that of the equipment in which it is used, along with a calculation of the actual service life from operational loads.

Internal specifications including bearing accuracy, internal clearance, cage, and lubricant are also selected, depending on the application.

For reference, general selection procedure and operating conditions are described in Fig. 2-1. There is no need to follow a specific order, since the goal is to select the right bearing to achieve optimum performance.

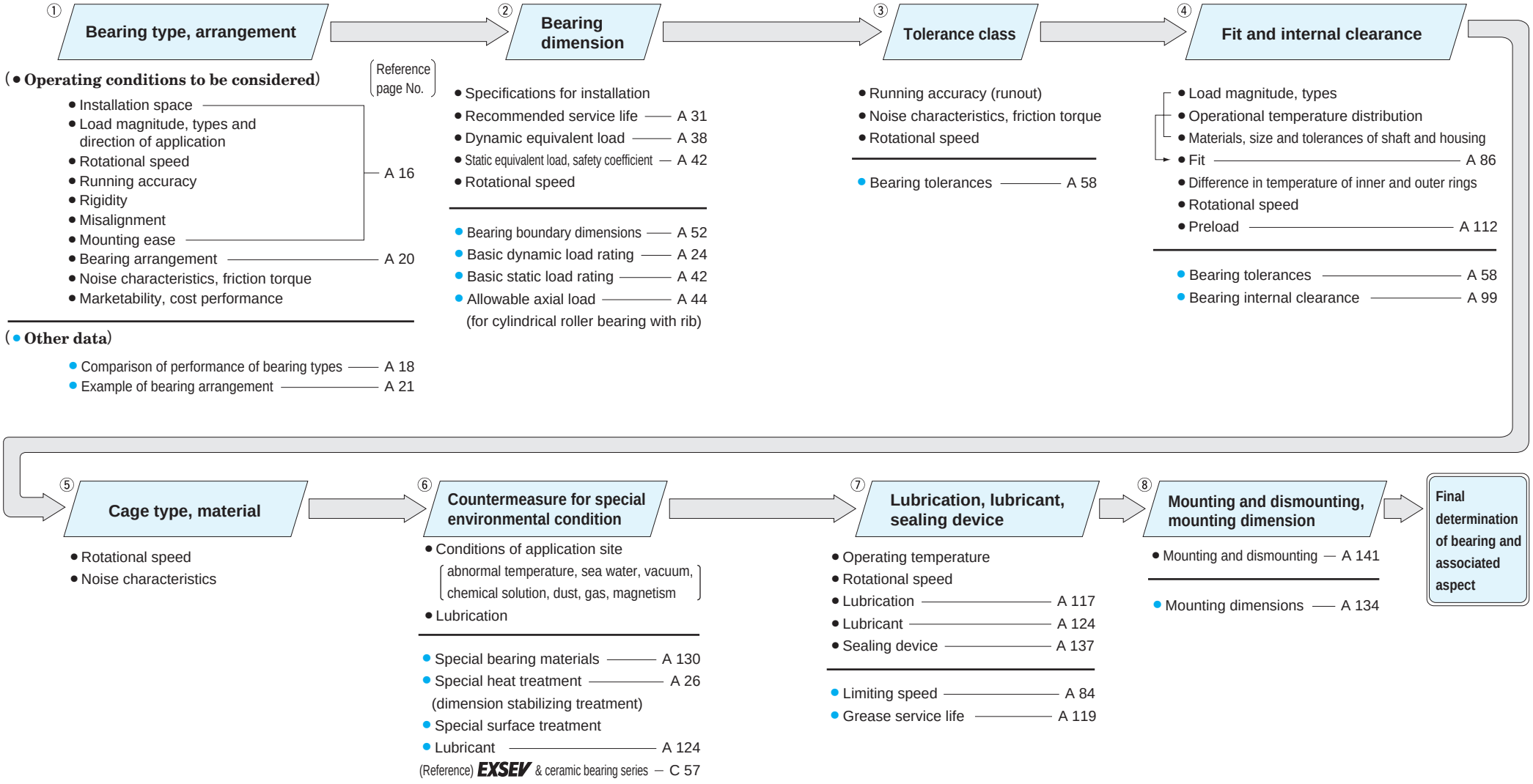


Fig. 2-1(1) Bearing selection procedure

Fig. 2-1(2) Bearing selection procedure

3. Selection of bearing type

In selecting bearings, the most important thing is to fully understand the operating conditions of the bearings.

The main factors to be considered are listed in Table 3-1, while bearing types are listed in Table 3-2.

Table 3-1 (1) Selection of bearing type

Items to be considered		Selection method	Reference page No.
1) Installation space	Bearing can be installed in target equipment	• When a shaft is designed, its rigidity and strength are considered essential; therefore, the shaft diameter, i.e., bore diameter, is determined at start. For rolling bearings, since wide variety with different dimensions are available, the most suitable bearing type should be selected. (Fig. 3-1)	A 52
2) Load	Load magnitude, type and direction which applied (Load resistance of bearing is specified in terms of the basic load rating, and its value is specified in the bearing specification table.)	• Since various types of load are applied to bearings, load magnitude, types (radial or axial) and direction of application (both directions or single direction in the case of axial load), as well as vibration and impact must be considered in order to select the proper bearing. • The following is the general order for radial resistance ; (deep groove ball bearings < angular contact ball bearings < cylindrical roller bearings < tapered roller bearings < spherical roller bearings)	A 18 (Table 3-2) A 87
3) Rotational speed	Response to rotational speed of equipment in which bearings will be installed (The limiting speed for bearing is expressed as allowable speed, and this value is specified in the bearing specification table.)	• Since the allowable speed differs greatly depend-ing not only upon bearing type but on bearing size, cage, accuracy, load and lubrication, all factors must be considered in selecting bearings. • In general, the following bearings are the most widely used for high speed operation. (deep groove ball bearings, angular contact ball bearings, cylindrical roller bearings)	A 18 (Table 3-2) A 84
4) Running accuracy	Accurate rotation delivering required performance (Dimension accuracy and running accuracy of bearings are provided by JIS, etc.)	• Performance required differs depending on equipment in which bearings are installed : for instance, machine tool spindles require high running accuracy, gas turbines require high speed rotation, and control equipment requires low friction. In such cases, bearings of tolerance class 5 or higher are required. • The following are the most widely used bearings. (deep groove ball bearings, angular contact ball bearings, cylindrical roller bearings)	A 18 (Table 3-2) A 58
5) Rigidity	Rigidity that delivers the bearing performance required (When load is applied to a bearing, elastic deformation occurs at the point where its rolling elements contact the raceway surface. The higher the rigidity that bearings possess, the better they control elastic deformation.)	• In machine tool spindles and automobile final drives, bearing rigidity as well as rigidity of equipment itself must be enhanced. • Elastic deformation occurs less in roller bearings than in ball bearings. • Rigidity can be enhanced by providing preload. This method is suitable for use with angular contact ball bearings and tapered roller bearings.	A 18 (Table 3-2) A 112

Table 3-1 (2) Selection of bearing type

Items to be considered		Selection method	Reference page No.
6) Misalignment (aligning capability)	Operating conditions which cause misalignment (shaft deflection caused by load, inaccuracy of shaft and housing, mounting errors) can affect bearing performance (Allowable misalignment (in angle) for each bearing type is described in the section before the bearing specification table, to facilitate determination of the self-aligning capability of bearings.)	• Internal load caused by excessive misalignment damages bearings. Bearings designed to absorb such misalignment should be selected. • The higher the self-aligning capability that bearings possess, the larger the angular misalignment that can be absorbed. The following is the general order of bearings when comparing allowable angular misalignment : (cylindrical roller bearings < tapered roller bearings < deep groove ball bearings, angular contact ball bearings < spherical roller bearings, self-aligning ball bearings	A 18 (Table 3-2)
7) Mounting and dismounting	Methods and frequency of mounting and dismounting required for periodic inspection	• Cylindrical roller bearings, needle roller bearings and tapered roller bearings, with separable inner and outer rings, are recommended for applications in which mounting and dismounting is conducted frequently. • Use of sleeve eases the mounting of self-aligning ball bearings and spherical roller bearings with tapered bore.	A 18 (Table 3-2)

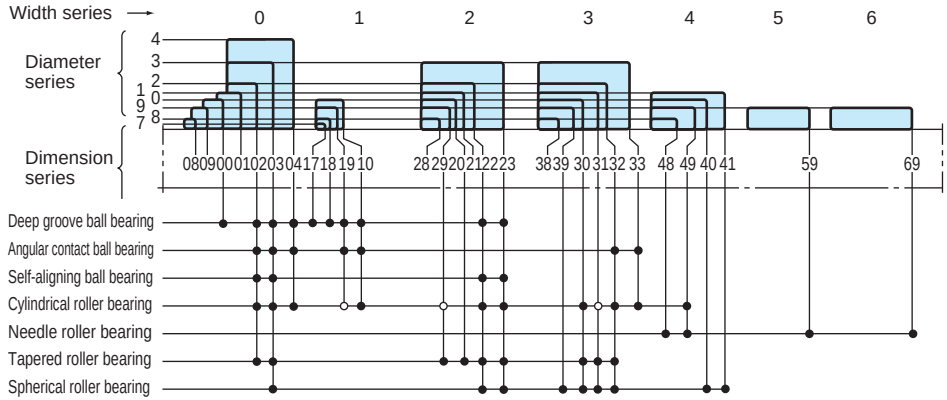


Fig. 3-1 Radial bearing dimension series

Table 3-2 Performance comparison of bearing type

		Deep groove ball bearing	Angular contact ball bearing: Single-row	Angular contact ball bearing: Matched pair or stack	Angular contact ball bearing: Double-row	Four-point contact ball bearing	Self-aligning ball bearing	Cylindrical roller bearing: NU · N	Cylindrical roller bearing: NJ · NF	Cylindrical roller bearing: NUP · NH	Cylindrical roller bearing: NN · NNU	Needle roller bearing (machined ring type)	Tapered roller bearing: Single-row	Tapered roller bearing: Double-row, four-row	Spherical roller bearing	Thrust ball bearing: With flat back faces	Thrust ball bearing: With aligning seat race	Double direction angular contact thrust ball bearing	Cylindrical roller thrust bearing	Needle roller thrust bearing	Tapered roller thrust bearing	Spherical thrust roller bearing	Reference page No.
Load resistance	Radial load	○	○	◎	◎	○	○	◎	◎	◎	◎	◎	◎	◎	◎	×	×	×	×	×	×	△	—
	Axial load	○ ↔	◎ ←	◎ ↔ *	◎ ↔ *	◎ ↔	△ ↔	×	△ ←	△ ↔	×	×	◎ ←	◎ ↔	△ ↔	○ ← *	○ ← *	◎ ↔	◎ ←	◎ ←	◎ ←	◎ ←	◎ ←	—
	Combined load radial and axial	○	○	◎	◎	○	△	×	△	△	×	×	◎	◎	△	×	×	×	×	×	×	×	△	—
	Vibration or impact load	△	△	△	△	△	△	◎	◎	◎	◎	○	◎	◎	◎	△	△	△	○	○	◎	◎	—
High speed adaptability		◎	◎	◎	○	◎	△	◎	◎	◎	◎	○	○	○	○	△	△	○	△	△	△	△	A16 A84
High accuracy		◎	◎	◎		◎		◎			◎		○			○		◎					A16, 58 A117
Low noise level/low torque		◎						○															A16
Rigidity				○		○		○	○	○	◎	○	○	◎				○	◎	◎	◎		A16
Misalignment		○	△	×	×	×	◎	△	△	△	△	△	△	△	◎	×	◎	×	×	×	×	◎	A17 Description before specification table
Inner and outer ring separability		×	×	×	×	■ *	×	■	■	■	■	■	■	■	×	■	■	■	■	■ *	■	■	—
Arrangement	Fixed side	■ ↔	■ ←	■ ↔	■ ↔ *	■ ↔	■ ↔	×	■ ←	■ ↔	×	×	■ ←	■ ↔	■ ↔								A20
	Free side	□		□	□	□	□	■	□	□	■	■		□	□								A20
Remarks			A pair of bearings mounted facing each other.	*DT arrangement is effective for one direction only.	*Filling slot type is effective for one direction only.	*Non-separable type is also available.							A pair of bearings mounted facing each other.			*Double direction bearings are effective for both directions.				*Non-separable type is also available.			—
Reference page No.		A4 B4	A5 B54			A6 —	A6 B124	A7 B138				A8 B362	A9 B184		A10 B290	A11 B336		— —	A12 B448	A12 B444	A13 —	A13 B354	—

◎ Excellent ○ Good △ Fair × Unacceptable ↔ Both directions ← One direction only ■ Acceptable □ Acceptable, but shaft shrinkage must be compensated for.

4. Selection of bearing arrangement

As bearing operational conditions vary depending on devices in which bearings are mounted, different performances are demanded of bearings. Normally, two or more bearings are used on one shaft.

In many cases, in order to locate shaft positions in the axial direction, one bearing is mounted on the fixed side first, then the other bearing is mounted on the free side.

Table 4-1 Bearings on fixed and free sides

	Features	Recommended bearing type	Example No.
Fixed side bearing	● This bearing determines shaft axial position. ● This bearing can accommodate both radial and axial loads. ● Since axial load in both directions is imposed on this bearing, strength must be considered in selecting the bearing for this side.	Deep groove ball bearing Matched pair or stack angular contact ball bearing Double-row angular contact ball bearing Self-aligning ball bearing Cylindrical roller bearing with rib (NUP and NH types) Double-row tapered roller bearing Spherical roller bearing	Examples 1–11
Free side bearing	● This bearing is employed to compensate for expansion or shrinkage caused by operating temperature change and to allow ajustment of bearing position. ● Bearings which accommodate radial load only and whose inner and outer rings are separable are recommended as free side bearings. ● In general, if non-separable bearings are used on free side, clearance fit is provided between outer ring and housing to compensate for shaft movement through bearings. In some cases, clearance fit between shaft and inner ring is utilized.	● Separable types Cylindrical roller bearing (NU and N types) Needle roller bearing (NA type, etc.) ● Non-separable types Deep groove ball bearing Matched pair angular contact ball bearing (Back-to-back arrangement) Double-row angular contact ball bearing Self-aligning ball bearing Double-row tapered roller bearing (TDO type) Spherical roller bearing	
When fixed and free sides are not distinguished	● When bearing intervals are short and shaft shrinkage does not greatly affect bearing operation, a pair of angular contact ball bearings or tapered roller bearings is used in paired mounting to accommodate axial load. ● After mounting, the axial clearance is adjusted using nuts or shims.	Deep groove ball bearing Angular contact ball bearing Self-aligning ball bearing Cylindrical roller bearing (NJ and NF types) Tapered roller bearing Spherical roller bearing	Examples 12–16
Bearings for vertical shafts	● Bearings which can accommodate both radial and axial loads should be used on fixed side. Heavy axial load can be accommodated using thrust bearings together with radial bearings. ● Bearings which can accommodate radial load only are used on free side, compensating for shaft movement.	● Fixed side Matched pair angular contact ball bearing (Back-to-back arrangement) Double-row tapered roller bearing (TDO type) Thrust bearing + radial bearing	Examples 17 and 18

Table 4-2 (1) Example bearing arrangements

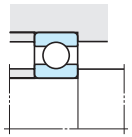
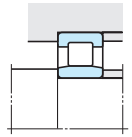
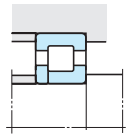
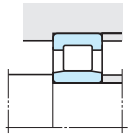
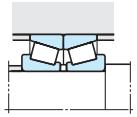
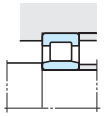
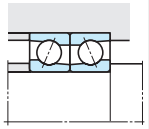
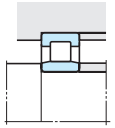
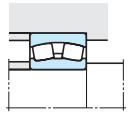
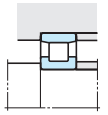
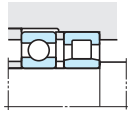
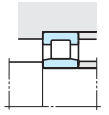
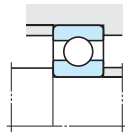
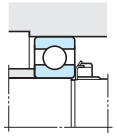
Example	Bearing arrangement		Recommended application	Application example
	Fixed side	Free side		
Ex. 1			○ Suitable for high-speed operation; used for various types of applications. ○ Not recommended for applications that have center displacement between bearings or shaft deflection.	Medium size motors, air blowers
Ex. 2			○ More suitable than Ex. 1 for operation under heavy load or impact load. Suitable also for high-speed operation. ○ Due to separability, suitable for applications requiring interference of both inner and outer rings. ○ Not recommended for applications that have center displacement between bearings or shaft deflection.	Traction motors for railway rolling stock
Ex. 3			○ Recommended for applications under heavier or greater impact load than those in Ex. 2. ○ This arrangement requires high rigidity from fixed side bearings mounted back to back, with preload provided. ○ Shaft and housing of accurate dimensions should be selected and mounted properly.	Steel manufacturing table rollers, lathe spindles
Ex. 4			○ This is recommended for operation at high speed or axial load lighter than in Ex. 3. ○ This is recommended for applications requiring interference of both inner and outer rings. ○ Some applications use double-row angular contact ball bearings on fixed side instead of matched pair angular contact ball bearings.	Motors
Ex. 5			○ This is recommended for operations under relatively small axial load. ○ This is recommended for applications requiring interference of both inner and outer rings.	Paper manufacturing calender rollers, diesel locomotive axle journals
Ex. 6			○ This is recommended for operations at high speed and heavy radial load, as well as normal axial load. ○ When deep groove ball bearings are used, clearance must be provided between outside diameter and housing, to prevent application of radial load.	Diesel locomotive transmissions
Ex. 7			○ This arrangement is most widely employed. ○ This arrangement can accommodate partial axial load as well as radial load.	Pumps, automobile transmissions

Table 4-2 (2) Example bearing arrangements

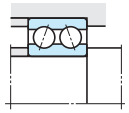
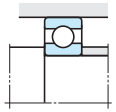
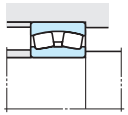
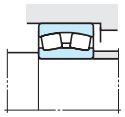
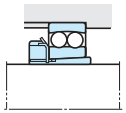
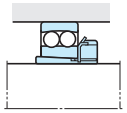
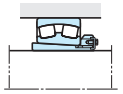
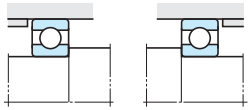
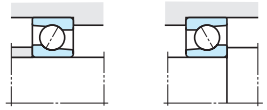
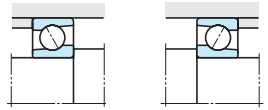
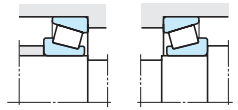
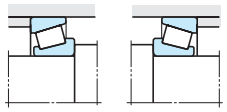
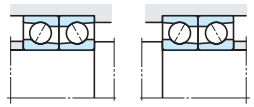
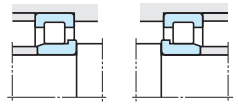
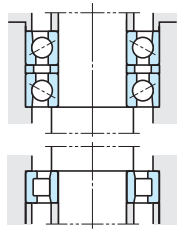
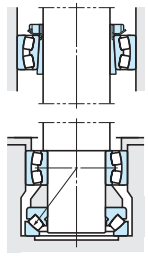
Example	Bearing arrangement		Recommended application	Application example
	Fixed side	Free side		
Ex. 8			○ This is recommended for operations with relatively heavy axial load in both directions. ○ Some applications use matched pair angular contact ball bearings on fixed side instead of double-row angular contact ball bearings.	Worm gear speed reducers
Ex. 9			○ This is the optimum arrangement for applications with possible mounting errors or shaft deflection. ○ Bearings in this arrangement can accommodate partial axial load, as well as heavy radial load.	Steel manufacturing table roller speed reducers, overhead crane wheels
Ex. 10			○ This is optimum arrangement for applications with possible mounting errors or shaft deflection. ○ Ease of mounting and dismounting, ensured by use of adaptor, makes this arrangement suitable for long shafts which are neither stepped nor threaded. ○ This arrangement is not recommended for applications requiring axial load capability.	General industrial equipment counter shafts
Ex. 11			○ This is the optimum arrangement for applications with possible mounting errors or shaft deflection. ○ This is recommended for operations under impact load or radial load heavier than that in Ex. 10. ○ This arrangement can accommodate partial axial load as well as radial load.	Steel manufacturing table rollers
Arrangement in which fixed and free sides are not distinguished			**Recommended application**	**Application example**
Ex. 12			○ This arrangement is most popular when applied to small equipment operating under light load. ○ When used with light preloading, thickness-adjusted shim or spring is mounted on one side of outer ring.	Small motors, small speed reducers, small pumps
Ex. 13	 Back-to-back  Face-to-face		○ This is suitable for applications in which rigidity is enhanced by preloading. This is frequently employed in applications requiring high speed operation under relatively large axial load. ○ Back-to-back arrangement is suitable for applications in which moment load affects operation. ○ When preloading is required, care should be taken in preload adjustment.	Machine tool spindles

Table 4-2 (3) Example bearing arrangements

Example	Arrangement in which fixed and free sides are not distinguished	Recommended application	Application example
Ex. 14	 Back-to-back  Face-to-face	○ This is recommended for operation under impact load or axial load heavier than in Ex. 13. ○ This is suitable for applications in which rigidity is enhanced by preloading. ○ Back-to-back arrangement is suitable for applications in which moment load affects operation. ○ When interference is required between inner ring and shaft, face-to-face arrangement simplifies mounting. This arrangement is effective for applications in which mounting error is possible. ○ When preloading is required, care should be taken in preload adjustment.	Speed reducers, automobile wheels
Ex. 15		○ This is recommended for applications requiring high speed and high accuracy of rotation under light load. ○ This is suitable for applications in which rigidity is enhanced by preloading. ○ Tandem arrangement and face-to-face arrangement are possible, as is back-to-back arrangement.	Machine tool spindles
Ex. 16		○ This arrangement provides resistance against heavy radial and impact loads. ○ This is applicable when both inner and outer rings require interference. ○ Care should be taken not to reduce axial internal clearance a critical amount during operation.	Construction equipment final drive
Application to vertical shafts		**Recommended application**	**Application example**
Ex. 17	 Fixed side Free side	○ This arrangement, using matched pair angular contact ball bearings on the fixed side and cylindrical roller bearings on the free side, is suitable for high speed operation.	Vertical motors, vertical pumps
Ex. 18	 Free side Fixed side	○ This is recommended for operation at low speed and heavy load, in which axial load is heavier than radial load. ○ Due to self-aligning capability, this is suitable for applications in which shaft runout or deflection occurs.	Crane center shafts, vertical pumps

5. Selection of bearing dimensions

5-1 Bearing service life

When bearings rotate under load, material flakes from the surfaces of inner and outer rings or rolling elements by fatigue arising from repeated contact stress (ref. A 152).

This phenomenon is called flaking.

The total number of bearing rotations until flaking occurs is regarded as the bearing "(fatigue) service life".

"(Fatigue) service life" differs greatly depending upon bearing structures, dimensions, materials, and processing methods.

Since this phenomenon results from fatigue distribution in bearing materials themselves, differences in bearing service life should be statistically considered.

When a group of identical bearings are rotated under the same conditions, the total number of revolutions until 90 % of the bearings are left without flaking (i.e. a service life of 90 % reliability) is defined as the basic rating life. In operation at a constant speed, the basic rating life can be expressed in terms of time.

In actual operation, a bearing fails not only because of fatigue, but other factors as well, such as wear, seizure, creeping, fretting, brinelling, cracking etc (ref. A 152, 16. Examples of bearing failures).

These bearing failures can be minimized by selecting the proper mounting method and lubricant, as well as the bearing most suitable for the application.

5-2 Calculation of service life

5-2-1 Basic dynamic load rating C

The basic dynamic load rating is either pure radial (for radial bearings) or central axial load (for thrust bearings) of constant magnitude in a constant direction, under which the basic rating life of 1 million revolutions can be obtained, when the inner ring rotates while the outer ring is stationary, or vice versa. The basic dynamic load rating, which represents the capacity of a bearing under rolling fatigue, is specified as the basic dynamic radial load rating (C_r) for radial bearings, and basic dynamic axial load rating (C_a) for thrust bearings. These load ratings are listed in the specification table.

These values are prescribed by ISO 281/1990, and are subject to change by conformance to the latest ISO standards.

5-2-2 Basic rating life L_{10}

The basic rating life L_{10} is a service life of 90 % reliability when used under normal usage conditions for bearings of high manufacturing quality where the inside of the bearing is of a standard design made from bearing steel materials specified in JIS or equivalent materials.

The relationship between the basic dynamic load rating, dynamic equivalent load, and basic rating life of a bearing can be expressed using equation (5-1). This life calculation equation does not apply to bearings that are affected by factors such as plastic deformation of the contact surfaces of raceways and rolling elements due to extremely high load conditions (when P exceeds either the basic static load rating C_0 (refer to p. A 42) or 0.5C) or, conversely, to bearings that are affected by factors such as the contact surfaces of raceways and rolling elements slipping due to extremely low load conditions.

If conditions like these may be encountered, consult with JTEKT.

It is convenient to express the basic rating life in terms of time, using equation (5-2), when a bearing is used for operation at a constant speed; and, in terms of traveling distance (km), using equation (5-3), when a bearing is used in railway rolling stock or automobiles.

(Total revolutions) $$L_{10} = \left(\frac{C}{P}\right)^p \quad \cdots\cdots (5\text{-}1)$$

(Time) $$L_{10h} = \frac{10^6}{60n}\left(\frac{C}{P}\right)^p \quad \cdots\cdots (5\text{-}2)$$

(Running distance) $$L_{10s} = \pi D L_{10} \quad \cdots\cdots (5\text{-}3)$$

where :

L_{10}	: basic rating life	10^6 revolutions
L_{10h}	: basic rating life	h
L_{10s}	: basic rating life	km
P	: dynamic equivalent load	N
	·····(refer to p. A 38.)	
C	: basic dynamic load rating	N
n	: rotational speed	$\min^{-1}$
p	: for ball bearings····· $p = 3$	
	for roller bearings····· $p = 10/3$	
D	: wheel or tire diameter	mm

Accordingly, where the dynamic equivalent load is P, and rotational speed is n, equation (5-4) can be used to calculate the basic dynamic load rating C; the bearing size most suitable for a specified purpose can then be selected, referring to the bearing specification table.

The recommended bearing service life differs depending on the machines with which the bearing is used, as shown in Table 5-5, p. A 31.

$$C = P\left(L_{10h}\times\frac{60n}{10^6}\right)^{1/p} \quad \cdots\cdots (5\text{-}4)$$

[Reference]

The equations using a service life coefficient (f_h) and rotational speed coefficient (f_n) respectively, based on equation (5-2), are as follows :

$$L_{10h} = 500 f_h^p \quad \cdots\cdots (5\text{-}5)$$

Coefficient of service life :

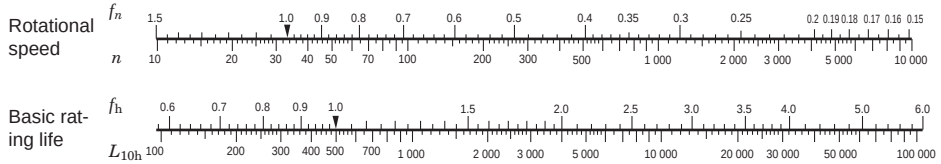
$$f_h = f_n\frac{C}{P} \quad \cdots\cdots (5\text{-}6)$$

Coefficient of rotational speed :

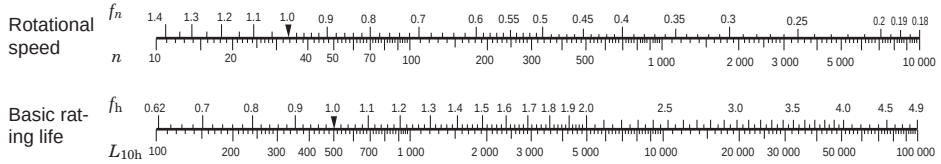
$$f_n = \left(\frac{10^6}{500\times 60n}\right)^{1/p} = (0.03n)^{-1/p} \quad \cdots\cdots (5\text{-}7)$$

For reference, the values of f_n, f_h, and L_{10h} can be easily obtained by employing the nomograph attached to this catalog, as an abbreviated method.

[Ball bearing]



[Roller bearing]



[Reference] Rotational speed (n) and its coefficients (f_n), and service life coefficient (f_h) and basic rating life (L_{10h})

5-2-3 Correction of basic dynamic load rating for high temperature use and dimension stabilizing treatment

In high temperature operation, bearing material hardness deteriorates, as material compositions are altered. As a result, the basic dynamic load rating is diminished. Once altered, material composition is not recovered, even if operating temperatures return to normal.

Therefore, for bearings used in high temperature operation, the basic dynamic load rating should be corrected by multiplying the basic dynamic load rating values specified in the bearing specification table by the temperature coefficient values in Table 5-1.

Table 5-1 Temperature coefficient values

Bearing temperature, °C	125	150	175	200	250
Temperature coefficient	1	1	0.95	0.90	0.75

Since normal heat treatment is not effective in maintaining the original bearing size in extended operation at 120 °C or higher, dimension stabilizing treatment is necessary. Dimension stabilizing treatment codes and their effective temperature ranges are described in Table 5-2.

Since dimension stabilizing treatment diminishes material hardness, the basic dynamic load rating may be reduced for some types of bearings.

Table 5-2 Dimension stabilizing treatment

Dimension stabilizing treatment code	Effective temperature range
S0	Over 100°C, up to 150°C
S1	150°C 200°C
S2	200°C 250°C

5-2-4 Modified rating life L_{nm}

The life of rolling bearings was standardized as a basic rating life in the 1960s, but in actual applications, sometimes the actual life and the basic rating life have been quite different due to the lubrication status and the influence of the usage environment. To make the calculated life closer to the actual life, a corrected rating life has been considered since the 1980s. In this corrected rating life, bearing characteristic factor a_2 (a correction factor for the case in which the characteristics related to the life are changed due to the bearing materials, manufacturing process, and design) and usage condition factor a_3 (a correction factor that takes into account usage conditions that have a direct influence on the bearing life, such as the lubrication) or factor a_{23} formed from the interdependence of these two factors, are considered with the basic rating life. These factors were handled differently by each bearing manufacturer, but they have been standardized as a modified rating life in **ISO 281** in 2007. In 2013, **JIS B 1518** (dynamic load ratings and rating life) was amended to conform to the **ISO**.

The basic rating life (L_{10}) shown in equation (5-1) is the (fatigue) life with a dependability of 90 % under normal usage conditions for rolling bearings that have standard factors such as internal design, materials, and manufacturing quality. **JIS B 1518**:2013 specifies a calculation method based on **ISO 281**:2007. To calculate accurate bearing life under a variety of operating conditions, it is necessary to consider elements such as the effect of changes in factors that can be anticipated when using different reliabilities and system approaches, and interactions between factors. Therefore, the specified calculation method considers additional stress due to the lubrication status, lubricant contamination, and fatigue load limit C_u (refer to p. A 29) on the inside of the bearing. The life that uses this life modification factor a_{ISO}, which considers the above factors, is called modified rating life L_{nm} and is calculated with the following equation (5-8).

$$L_{nm} = a_1 a_{ISO} L_{10} \quad \cdots\cdots (5\text{-}8)$$

In this equation,

L_{nm} : Modified rating life 10^6 rotations
(This rating life has been modified for one of or a combination of the following: reliability of 90 % or higher, fatigue load limit, special bearing characteristics, lubrication contamination, and special operating conditions.)

L_{10} : Basic rating life (reliability: 90 %) 10^6 rotations

a_1 : Life modification factor for reliability ····· refer to section (1)

a_{ISO} : Life modification factor ····· refer to section (2)

[Remark]
When bearing dimensions are to be selected given L_{nm} greater than 90 % in reliability, the strength of shaft and housing must be considered.

(1) Life modification factor for reliability a_1

The term “reliability” is defined as “for a group of apparently identical rolling bearings, operating under the same conditions, the percentage of the group that is expected to attain or exceed a specified life” in **ISO 281**:2007. Values of a_1 used to calculate a modified rating life with a reliability of 90 % or higher (a failure probability of 10 % or less) are shown in Table 5-3.

Table 5-3 Life modification factor for reliability a_1

Reliability, %	L_{nm}	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	$L_{0.06m}$	0.080
99.95	$L_{0.05m}$	0.077

(Citation from **JIS B 1518**:2013)

(2) Life modification factor a_{ISO}

a) System approach

The various influences on bearing life are dependent on each other. The system approach of calculating the modified life has been evaluated as a practical method for determining life modification factor a_{ISO} (ref. Fig. 5-1). Life modification factor a_{ISO} is calculated with the following equation. A diagram is available for each bearing type (radial ball bearings, radial roller bearings, thrust ball bearings, and thrust roller bearings). (Each diagram (Figs. 5-2 to 5-5) is a citation from **JIS B 1518**:2013.)

Note that in practical use, this is set so that life modification factor $a_{ISO} \leqq 50$.

$$a_{ISO} = f\left(\frac{e_c C_u}{P},\ \kappa\right) \quad \cdots\cdots (5\text{-}9)$$

Bearing	Application
Type	rotational speed, load, sealing performance
Bearing number (bearing dimensions)	usage temperature, kinematic viscosity of lubricating oil
C, C_0	lubricating method, contamination particles

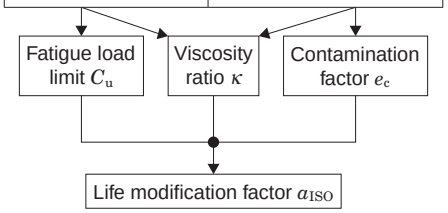


Fig. 5-1 System approach

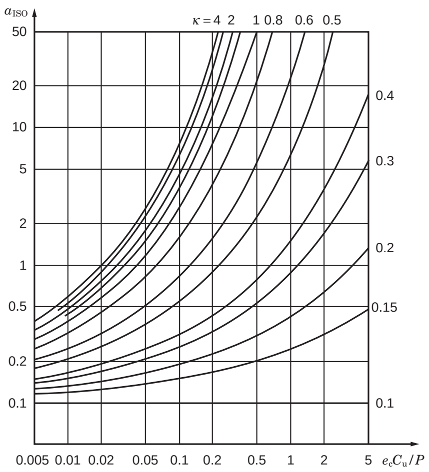


Fig. 5-2 Life modification factor a_{ISO} (Radial ball bearings)

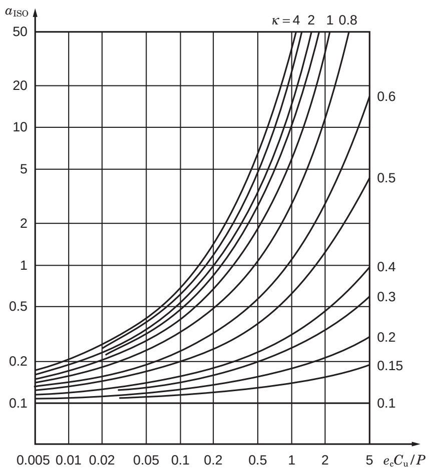


Fig. 5-3 Life modification factor a_{ISO} (Radial roller bearings)

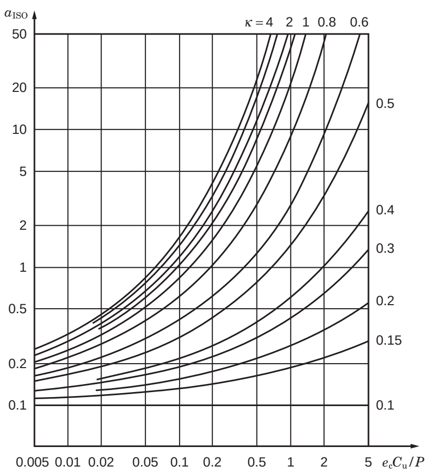


Fig. 5-4 Life modification factor a_{ISO} (Thrust ball bearings)

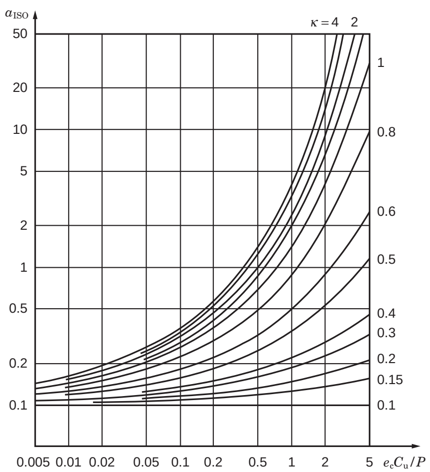


Fig. 5-5 Life modification factor a_{ISO} (Thrust roller bearings)

(Figs. 5-2 to 5-5 Citation from **JIS B 1518**:2013)

b) Fatigue load limit C_u

For regulated steel materials or alloy steel that has equivalent quality, the fatigue life is unlimited so long as the load condition does not exceed a certain value and so long as the lubrication conditions, lubrication cleanliness class, and other operating conditions are favorable. For general high-quality materials and bearings with high manufacturing quality, the fatigue stress limit is reached at a contact stress of approximately 1.5 GPa between the raceway and rolling elements. If one or both of the material quality and manufacturing quality are low, the fatigue stress limit will also be low.

The term "fatigue load limit" C_u is defined as "bearing load under which the fatigue stress limit is just reached in the most heavily loaded raceway contact" in **ISO 281**:2007. and is affected by factors such as the bearing type, size, and material.

For details on the fatigue load limits of special bearings and other bearings not listed in this catalog, contact JTEKT.

c) Contamination factor e_c

If solid particles in the contaminated lubricant are caught between the raceway and the rolling elements, indentations may form on one or both of the raceway and the rolling elements. These indentations will lead to localized increases in stress, which will decrease the life. This decrease in life attributable to the contamination of the lubricant can be calculated from the contamination level as contamination factor e_c.

D_{pw} shown in this table is the pitch diameter of ball/roller set, which is expressed simply as $D_{pw} = (D + d)/2$. (D: Outside diameter, d: Bore diameter)

For information such as details on special lubricating conditions or detailed investigations, contact JTEKT.

Table 5-4 Values of contamination factor e_c

Contamination level	e_c	
	$D_{pw} < 100$ mm	$D_{pw} \geqq 100$ mm
Extremely high cleanliness: The size of the particles is approximately equal to the thickness of the lubricant oil film, this is found in laboratory-level environments.	1	1
High cleanliness: The oil has been filtered by an extremely fine filter, this is found with standard grease-packed bearings and sealed bearings.	0.8 to 0.6	0.9 to 0.8
Standard cleanliness: The oil has been filtered by a fine filter, this is found with standard grease-packed bearings and shielded bearings.	0.6 to 0.5	0.8 to 0.6
Minimal contamination: The lubricant is slightly contaminated.	0.5 to 0.3	0.6 to 0.4
Normal contamination: This is found when no seal is used and a coarse filter is used in an environment in which wear debris and particles from the surrounding area penetrate into the lubricant.	0.3 to 0.1	0.4 to 0.2
High contamination: This is found when the surrounding environment is considerably contaminated and the bearing sealing is insufficient.	0.1 to 0	0.1 to 0
Extremely high contamination	0	0

(Table 5-4 Citation from **JIS B 1518**:2013)

d) Viscosity ratio κ

The lubricant forms an oil film on the roller contact surface, which separates the raceway and the rolling elements. The status of the lubricant oil film is expressed by viscosity ratio κ, the actual kinematic viscosity at the operating temperature ν divided by the reference kinematic viscosity ν_1 as shown in the following equation.

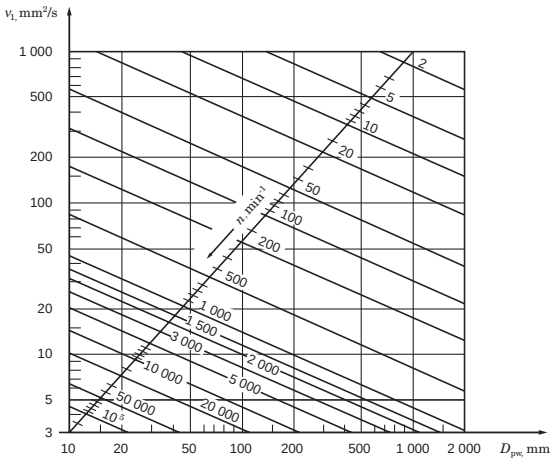
A κ greater than 4, equal to 4, or less than 0.1 is not applicable.

For details on lubricants such as grease and lubricants with extreme pressure additives, contact JTEKT.

$$\kappa = \frac{\nu}{\nu_1} \quad \cdots\cdots (5\text{-}10)$$

ν : Actual kinematic viscosity at the operating temperature; the viscosity of the lubricant at the operating temperature (refer to Fig. 12-3, p. A129)

ν_1 : Reference kinematic viscosity; determined according to the speed and pitch diameter of ball/roller set D_{pw} of the bearing (ref. Fig. 5-6)



(Fig. 5-6 Citation from **JIS B 1518**:2013)

Fig. 5-6 Reference kinematic viscosity ν_1

5-2-5 Service life of bearing system comprising two or more bearings

Even for systems which comprise two or more bearings, if one bearing is damaged, the entire system malfunctions.

Where all bearings used in an application are regarded as one system, the service life of the bearing system can be calculated using the following equation,

$$\frac{1}{L^e} = \frac{1}{L_1{}^e} + \frac{1}{L_2{}^e} + \frac{1}{L_3{}^e} + \cdots\cdots\cdots\cdots \quad (5\text{-}11)$$

where :

L : rating life of system

L_1 , L_2 , L_3 $\cdots\cdots$: rating life of each bearing

e : constant

e = 10/9$\cdots\cdots$ball bearing

e = 9/8$\cdots\cdots$roller bearing

The mean value is for a system using both ball and roller bearings.

[Example]

When a shaft is supported by two roller bearings whose service lives are 50 000 hours and 30 000 hours respectively, the rating life of the bearing system supporting this shaft is calculated as follows, using equation (5-11) :

$$\frac{1}{L^{9/8}} = \frac{1}{50\,000^{9/8}} + \frac{1}{30\,000^{9/8}}$$

$$L \fallingdotseq 20\,000 \text{ h}$$

The equation suggests that the rating life of these bearings as a system becomes shorter than that of the bearing with the shorter life.

This fact is very important in estimating bearing service life for applications using two or more bearings.

5-2-6 Applications and recommended bearing service life

Since longer service life does not always contribute to economical operation, the most suitable service life for each application and operating conditions should be determined.

For reference, Table 5-5 describes recommended service life in accordance with the application, as empirically determined.

Table 5-5 Recommended bearing service life (reference)

Operating condition	Application	Recommended service life (h)
Short or intermittent operation	Household electric appliance, electric tools, agricultural equipment, heavy cargo hoisting equipment	4 000 – 8 000
Not extended duration, but stable operation required	Household air conditioner motors, construction equipment, conveyers, elevators	8 000 – 12 000
Intermittent but extended operation	Rolling mill roll necks, small motors, cranes	8 000 – 12 000
	Motors used in factories, general gears	12 000 – 20 000
	Machine tools, shaker screens, crushers	20 000 – 30 000
	Compressors, pumps, gears for essential use	40 000 – 60 000
Daily operation more than 8 hr. or continuous extended operation	Escalators	12 000 – 20 000
	Centrifugal separators, air conditioners, air blowers, woodworking equipment, passenger coach axle journals	20 000 – 30 000
	Large motors, mine hoists, locomotive axle journals, railway rolling stock traction motors	40 000 – 60 000
	Paper manufacturing equipment	100 000 – 200 000
24 hr. operation (no failure allowed)	Water supply facilities, power stations, mine water discharge facilities	100 000 – 200 000

5-3 Calculation of loads

Loads affecting bearings includes force exerted by the weight of the object the bearings support, transmission force of devices such as gears and belts, loads generated in equipment during operation etc.

Seldom can these kinds of load be determined by simple calculation, because the load is not always constant.

In many cases, the load fluctuates, and it is difficult to determine the frequency and magnitude of the fluctuation.

Therefore, loads are normally obtained by multiplying theoretical values with various coefficients obtained empirically.

5-3-1 Load coefficient

Even if radial and axial loads are obtained through general dynamic calculation, the actual load becomes greater than the calculated value due to vibration and impact during operation.

In many cases, the load is obtained by multiplying theoretical values by the load coefficient.

Table 5-6 Values of load coefficient f_w

Operating condition	Application example	f_w
Operation with little vibration or impact	Motors Machine tools Measuring instrument	1.0 – 1.2
Normal operation (slight impact)	Railway rolling stock Automobiles Paper manufacturing equipment Air blowers Compressors Agricultural equipment	1.2 – 2.0
Operation with severe vibration or impact	Rolling mills Crushers Construction equipment Shaker screens	2.0 – 3.0

$$F = f_w \cdot F_c \quad \cdots\cdots (5\text{-}12)$$

where :

F : measured load N

F_c : calculated load N

f_w : load coefficient (ref. Table 5-6)

5-3-2 Load generated through belt or chain transmission

In the case of belt transmission, the theoretical value of the load affecting the pulley shafts can be determined by obtaining the effective transmission force of the belt.

For actual operation, the load is obtained by multiplying this effective transmission force by the load coefficient (f_w) considering vibration and impact generated during operation, and the belt coefficient (f_b) considering belt tension.

In the case of chain transmission, the load is determined using a coefficient equivalent to the belt coefficient.

This equation (5-13) is as follows ;

$$F_b = \frac{2M}{D_p} \cdot f_w \cdot f_b = \frac{19.1\times10^6 W}{D_p n} \cdot f_w \cdot f_b \quad \cdots\cdots (5\text{-}13)$$

where :

F_b : estimated load affecting pulley shaft or sprocket shaft N

M : torque affecting pulley or sprocket mN · m

W : transmission force kW

D_p : pitch circle diameter of pulley or sprocket mm

n : rotational speed min^{-1}

f_w : load coefficient (ref. Table 5-6)

f_b : belt coefficient (ref. Table 5-7)

Table 5-7 Values of belt coefficient f_b

Belt type	f_b
Timing belt (with teeth)	1.3 – 2.0
V-belt	2.0 – 2.5
Flat belt (with tension pulley)	2.5 – 3.0
Flat belt	4.0 – 5.0
Chain	1.2 – 1.5

5-3-3 Load generated under gear transmission

(1) Loads affecting gear and gear coefficient

In the case of gear transmission, loads transmitted by gearing are theoretically classified into three types: tangential load (K_t), radial load (K_r) and axial load (K_a).

Those loads can be calculated dynamically (using equations ⓐ, ⓑ and ⓒ, described in section (2)).

To determine the actual gear loads, these theoretical loads must be multiplied by coefficients considering vibration and impact during operation (f_w) (ref. Table 5-6) and the gear coefficient (f_g) (ref. Table 5-8) considering the finish treatment of gears.

Table 5-8 Values of gear coefficient f_g

Gear type	f_g
Precision gears (both pitch error and tooth shape error less than 0.02 mm)	1.0 – 1.1
Normal gears (both pitch error and tooth shape error less than 0.1 mm)	1.1 – 1.3

(2) Calculation of load on gears

ⓐ Tangential load (tangential force) K_t

(Spur gears, helical gears, double-helical gears, straight bevel gears, spiral bevel gears)

$$K_t = \frac{2M}{D_p} = \frac{19.1\times10^6\ W}{D_p n} \quad \cdots\cdots (5\text{-}14)$$

ⓐ~ⓒ where :

K_t	: gear tangential load	N
K_r	: gear radial load	N
K_a	: gear axial load	N
M	: torque affecting gears	mN · m
D_p	: gear pitch circle diameter	mm
W	: transmitting force	kW
n	: rotational speed	min^{-1}
α	: gear pressure angle	deg
β	: gear helix (spiral) angle	deg
δ	: bevel gear pitch angle	deg

		ⓑ Radial load (separating force) K_r	ⓒ Axial load (axial force) K_a
Spur gears		$K_r = K_t \tan\alpha$ ····· (5-15)	0
Helical gears		$K_r = K_t \frac{\tan\alpha}{\cos\beta}$ ····· (5-16)	$K_a = K_t \tan\beta$ ····· (5-22)
Double-helical gears		$K_r = K_t \frac{\tan\alpha}{\cos\beta}$ ····· (5-17)	0
Straight[1] bevel gears	Drive side	$K_{r1} = K_t \tan\alpha \cos\delta_1$ ····· (5-18)	$K_{a1} = K_t \tan\alpha \sin\delta_1$ ····· (5-23)
	Driven side	$K_{r2} = K_t \tan\alpha \cos\delta_2$ ····· (5-19)	$K_{a2} = K_t \tan\alpha \sin\delta_2$ ····· (5-24)
Spiral[1),2)] bevel gears	Drive side	$K_{r1} = \frac{K_t}{\cos\beta}\left(\tan\alpha \cos\delta_1 \pm \sin\beta \sin\delta_1\right)$ ····· (5-20)	$K_{a1} = \frac{K_t}{\cos\beta}\left(\tan\alpha \sin\delta_1 \mp \sin\beta \cos\delta_1\right)$ ····· (5-25)
	Driven side	$K_{r2} = \frac{K_t}{\cos\beta}\left(\tan\alpha \cos\delta_2 \mp \sin\beta \sin\delta_2\right)$ ····· (5-21)	$K_{a2} = \frac{K_t}{\cos\beta}\left(\tan\alpha \sin\delta_2 \pm \sin\beta \cos\delta_2\right)$ ····· (5-26)

[Notes] 1) Codes with subscript 1 and 2 shown in equations are respectively applicable to drive side gears and driven side gears.

2) Symbols (+) and (–) denote the following ;

Symbols in upper row : clockwise rotation accompanied by right-handed spiral or counterclockwise rotation with left-handed spiral

Symbols in lower row : counterclockwise rotation with right-handed spiral or clockwise rotation with left-handed spiral

[Remark] Rotating directions are described as viewed at the back of the apex of the pitch angle.

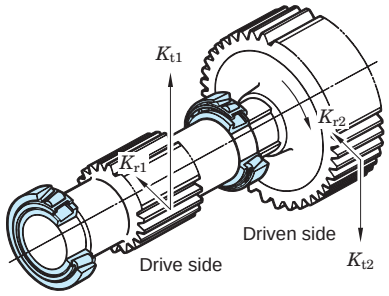


Fig. 5-7 Load on spur gears

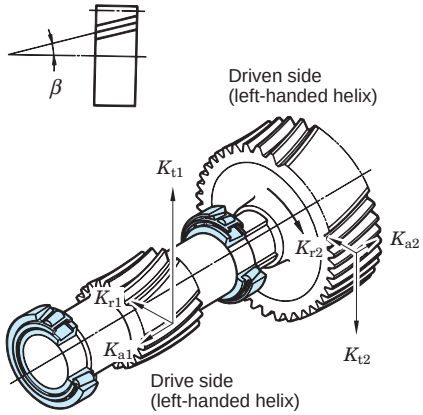


Fig. 5-8 Load on helical gears

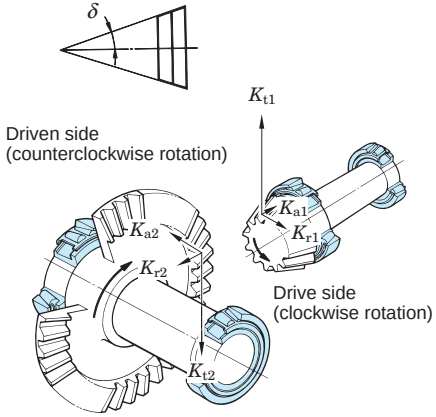


Fig. 5-9 Load on straight bevel gears

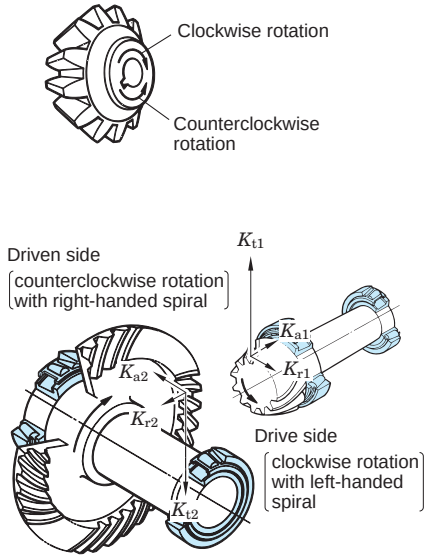


Fig. 5-10 Load on spiral bevel gears

5-3-4 Load distribution on bearings

The load distribution affecting bearings can be calculated as follows: first, radial force components are calculated, then, the sum of vectors of the components is obtained in accordance with the load direction.

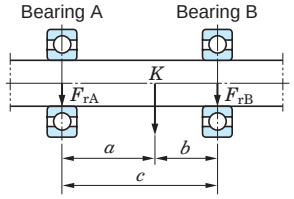
Calculation examples of radial load distribution are described in the following section.

[Remark]

Bearings shown in Exs. 3 to 5 are affected by components of axial force when these bearings accommodate radial load, and axial load (K_a) which is transferred externally, i.e. from gears.

For calculation of the axial load in this case, refer to page A 38.

Example 1 Fundamental calculation (1)

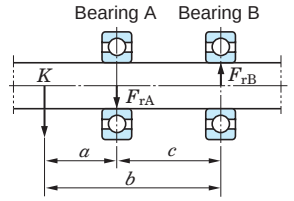


$$F_{rA} = \frac{b}{c}K$$

$$F_{rB} = \frac{a}{c}K$$

..... (5-27)

Example 2 Fundamental calculation (2)

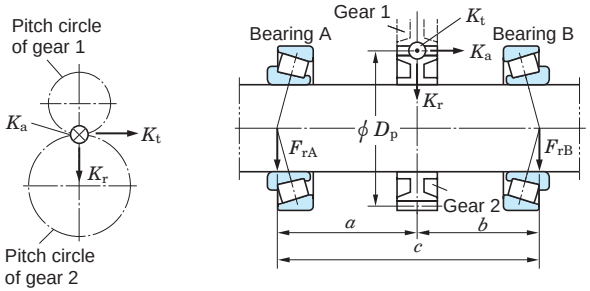


$$F_{rA} = \frac{b}{c}K$$

$$F_{rB} = \frac{a}{c}K$$

..... (5-28)

Example 3 Gear load distribution (1)

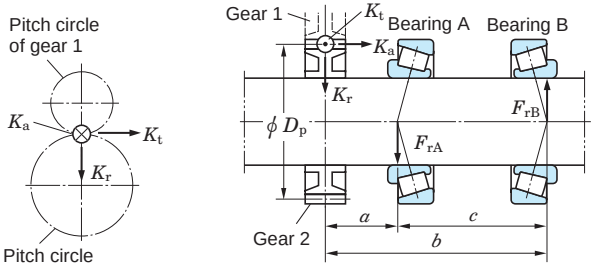


$$F_{rA} = \sqrt{\left(\frac{b}{c}K_t\right)^2 + \left(\frac{b}{c}K_r - \frac{D_p}{2c}K_a\right)^2}$$

$$F_{rB} = \sqrt{\left(\frac{a}{c}K_t\right)^2 + \left(\frac{a}{c}K_r + \frac{D_p}{2c}K_a\right)^2}$$

..... (5-29)

Example 4 Gear load distribution (2)



$$F_{rA} = \sqrt{\left(\frac{b}{c}K_t\right)^2 + \left(\frac{b}{c}K_r - \frac{D_p}{2c}K_a\right)^2}$$

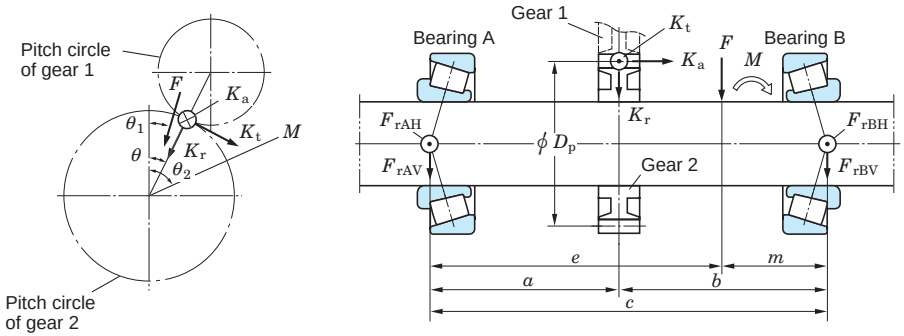
$$F_{rB} = \sqrt{\left(\frac{a}{c}K_t\right)^2 + \left(\frac{a}{c}K_r - \frac{D_p}{2c}K_a\right)^2}$$

..... (5-30)

Description of signs in Examples 1 to 5

F_{rA}: radial load on bearing A	N	D_p: gear pitch circle diameter	mm
F_{rB}: radial load on bearing B	N	⊙: denotes load direction (upward perpendicular to paper surface)	
K: shaft load	N		
K_t, K_r, K_a: gear load (ref. A 34)	N	⊗: denotes load direction (downward perpendicular to paper surface)	

Example 5 Simultaneous application of gear load and other load



Gears 1 and 2 are engaged with each other at angle θ. External load F, moment M, are applied to these gears at angles θ_1 and θ_2.

- Perpendicular radial component force (upward and downward along diagram)

$$F_{rAV} = \frac{b}{c}(K_r\cos\theta + K_t\sin\theta) - \frac{D_p}{2c}K_a\cos\theta + \frac{m}{c}F\cos\theta_1 - \frac{M}{c}\cos\theta_2$$

$$F_{rBV} = \frac{a}{c}(K_r\cos\theta + K_t\sin\theta) + \frac{D_p}{2c}K_a\cos\theta + \frac{e}{c}F\cos\theta_1 + \frac{M}{c}\cos\theta_2$$

- Horizontal radial component force (upward and downward perpendicular to diagram)

$$F_{rAH} = \frac{b}{c}(K_r\sin\theta - K_t\cos\theta) - \frac{D_p}{2c}K_a\sin\theta + \frac{m}{c}F\sin\theta_1 - \frac{M}{c}\sin\theta_2$$

$$F_{rBH} = \frac{a}{c}(K_r\sin\theta - K_t\cos\theta) + \frac{D_p}{2c}K_a\sin\theta + \frac{e}{c}F\sin\theta_1 + \frac{M}{c}\sin\theta_2$$

■ Combined radial force

$$F_{rA} = \sqrt{F_{rAV}{}^2 + F_{rAH}{}^2}$$

$$F_{rB} = \sqrt{F_{rBV}{}^2 + F_{rBH}{}^2}$$

..... (5-31)

When θ, F, and M are zero, the same result as in Ex. 3 is obtained

5-4 Dynamic equivalent load

Bearings are used under various operating conditions; however, in most cases, bearings receive radial and axial load combined, while the load magnitude fluctuates during operation.

Therefore, it is impossible to directly compare the actual load and basic dynamic load rating.

The two are compared by replacing the loads applied to the shaft center with one of a constant magnitude and in a specific direction, that yields the same bearing service life as under actual load and rotational speed.

This theoretical load is referred to as the dynamic equivalent load (P).

5-4-1 Calculation of dynamic equivalent load

Dynamic equivalent loads for radial bearings and thrust bearings ($\alpha \neq 90°$) which receive a combined load of a constant magnitude in a specific direction can be calculated using the following equation,

$$P = XF_r + YF_a \quad \cdots\cdots (5\text{-}32)$$

where :

P : dynamic equivalent load N

(for radial bearings, P_r : dynamic equivalent radial load; for thrust bearings, P_a : dynamic equivalent axial load)

F_r : radial load N

F_a : axial load N

X : radial load factor

Y : axial load factor

(values of X and Y are listed in the bearing specification table.)

■ When $F_a/F_r \leqq e$ for single-row radial bearings, it is taken that $X = 1$, and $Y = 0$. Hence, the dynamic equivalent load rating is $P_r = F_r$.

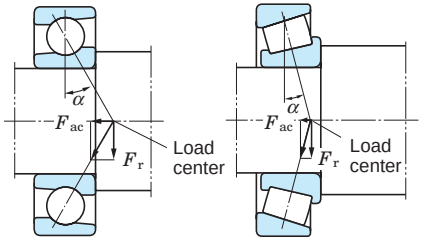
(Values of e, which designates the limit of F_a/F_r, are listed in the bearing specification table.)

■ For single-row angular contact ball bearings and tapered roller bearings, axial component forces (F_{ac}) are generated as shown in Fig. 5-11, therefore a pair of bearings is arranged face-to-face or back-to-back.

The axial component force can be calculated using the following equation.

$$F_{ac} = \frac{F_r}{2Y} \quad \cdots\cdots (5\text{-}33)$$

Table 5-9 describes the calculation of the dynamic equivalent load when radial loads and external axial loads (K_a) are applied to bearings.



(Load center position is listed in the bearing specification table.)

Fig. 5-11 Axial component force

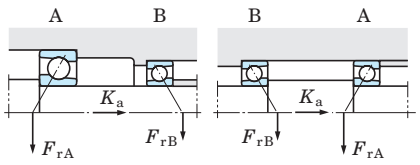
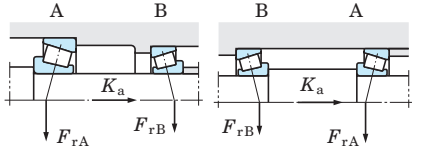
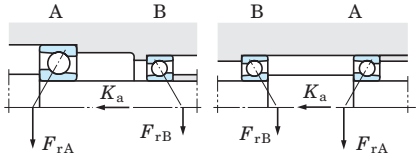
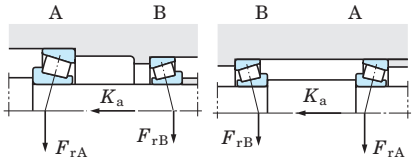
■ For thrust ball bearings with contact angle $\alpha = 90°$, to which an axial load is applied, $P_a = F_a$.

■ The dynamic equivalent load of spherical thrust roller bearing can be calculated using the following equation.

$$P_a = F_a + 1.2F_r \quad \cdots\cdots (5\text{-}34)$$

where : $F_r/F_a \leqq 0.55$

Table 5-9 Dynamic equivalent load calculation : when a pair of single-row angular contact ball bearings or tapered roller bearings is arranged face-to-face or back-to-back.

Paired mounting		Loading condition	Bearing	Axial load	Dynamic equivalent load
Back-to-back arrangement	Face-to-face arrangement				
		$\frac{F_{rB}}{2Y_B} + K_a \geqq \frac{F_{rA}}{2Y_A}$	Bearing A	$\frac{F_{rB}}{2Y_B} + K_a$	$P_A = XF_{rA} + Y_A\left(\frac{F_{rB}}{2Y_B} + K_a\right)$ $P_A = F_{rA}$, where $P_A < F_{rA}$
			Bearing B	–	$P_B = F_{rB}$
		$\frac{F_{rB}}{2Y_B} + K_a < \frac{F_{rA}}{2Y_A}$	Bearing A	–	$P_A = F_{rA}$
			Bearing B	$\frac{F_{rA}}{2Y_A} - K_a$	$P_B = XF_{rB} + Y_B\left(\frac{F_{rA}}{2Y_A} - K_a\right)$ $P_B = F_{rB}$, where $P_B < F_{rB}$
		$\frac{F_{rB}}{2Y_B} \leqq \frac{F_{rA}}{2Y_A} + K_a$	Bearing A	–	$P_A = F_{rA}$
			Bearing B	$\frac{F_{rA}}{2Y_A} + K_a$	$P_B = XF_{rB} + Y_B\left(\frac{F_{rA}}{2Y_A} + K_a\right)$ $P_B = F_{rB}$, where $P_B < F_{rB}$
		$\frac{F_{rB}}{2Y_B} > \frac{F_{rA}}{2Y_A} + K_a$	Bearing A	$\frac{F_{rB}}{2Y_B} - K_a$	$P_A = XF_{rA} + Y_A\left(\frac{F_{rB}}{2Y_B} - K_a\right)$ $P_A = F_{rA}$, where $P_A < F_{rA}$
			Bearing B	–	$P_B = F_{rB}$

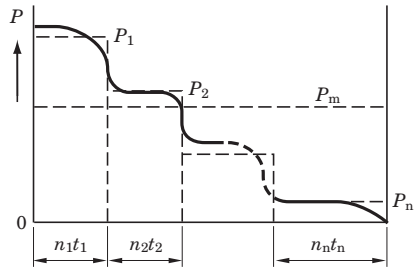
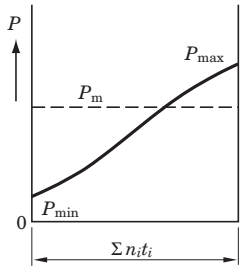
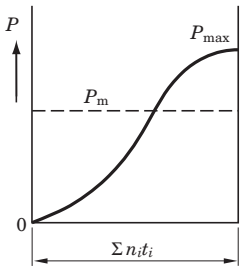
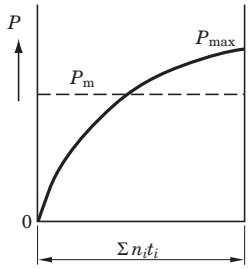
[Remarks] 1. These equations can be used when internal clearance and preload during operation are zero.
2. Radial load is treated as positive in the calculation, if it is applied in a direction opposite that shown in Fig. in Table 5-9.

5-4-2 Mean dynamic equivalent load

When load magnitude or direction varies, it is necessary to calculate the mean dynamic equivalent load, which provides the same length of bearing service life as that under the actual load fluctuation.

The mean dynamic equivalent load (P_m) under different load fluctuations is described using Graphs (1) to (4).

As shown in Graph (5), the mean dynamic equivalent load under stationary and rotating load applied simultaneously, can be obtained using equation (5-39).

(1) Staged fluctuation	(2) Stageless fluctuation	(3) Fluctuation forming sine curve	(4) Fluctuation forming sine curve (upper half of sine curve)
			
$P_m = \sqrt[p]{\dfrac{P_1{}^p n_1t_1 + P_2{}^p n_2t_2 + \cdots\cdots + P_n{}^p n_nt_n}{n_1t_1 + n_2t_2 + \cdots\cdots + n_nt_n}}$ ····· (5-35)	$P_m = \dfrac{P_{min} + 2P_{max}}{3}$ ····· (5-36)	$P_m = 0.68\,P_{max}$ ····· (5-37)	$P_m = 0.75\,P_{max}$ ····· (5-38)

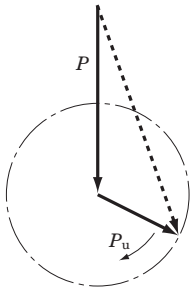
Symbols for Graphs (1) to (4)

P_m	: mean dynamic equivalent load	N
P_1	: dynamic equivalent load applied for t_1 hours at rotational speed n_1	N
P_2	: dynamic equivalent load applied for t_2 hours at rotational speed n_2	N
⋮	⋮	⋮
P_n	: dynamic equivalent load applied for t_n hours at rotational speed n_n	N
P_{min}	: minimum dynamic equivalent load	N
P_{max}	: maximum dynamic equivalent load	N
Σn_it_i	: total rotation in (t_1 to t_i) hours	
p	: for ball bearings, $p = 3$ for roller bearings, $p = 10/3$	

[Reference] Mean rotational speed n_m can be calculated using the following equation :

$$n_m = \frac{n_1t_1 + n_2t_2 + \cdots\cdots + n_nt_n}{t_1 + t_2 + \cdots\cdots + t_n}$$

(5) Stationary load and rotating load acting simultaneously



$$P_m = f_m(P + P_u) \quad \cdots\cdots (5\text{-}39)$$

where :

P_m	: mean dynamic equivalent load	N
f_m	: coefficient (refer. Fig. 5-12)	
P	: stationary load	N
P_u	: rotating load	N

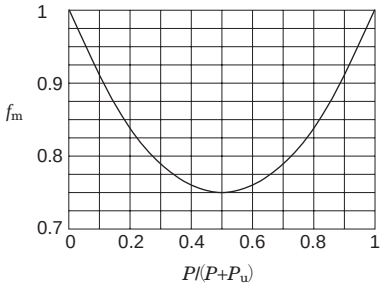


Fig. 5-12 Coefficient f_m

5-5 Basic static load rating and static equivalent load

5-5-1 Basic static load rating

Excessive static load or impact load even at very low rotation causes partial permanent deformation of the rolling element and raceway contacting surfaces. This permanent deformation increases with the load; if it exceeds a certain limit, smooth rotation will be hindered.

The basic static load rating is the static load which responds to the calculated contact stress shown below, at the contact center between the raceway and rolling elements which receive the maximum load.

- Self-aligning ball bearings ··· 4 600 MPa
- Other ball bearings ····· 4 200 MPa
- Roller bearings ····· 4 000 MPa

The total extent of contact stress-caused permanent deformation on surfaces of rolling elements and raceway will be approximately 0.000 1 times greater than the rolling element diameter.

The basic static load rating for radial bearings is specified as the basic static radial load rating, and for thrust bearings, as the basic static axial load rating. These load ratings are listed in the bearing specification table, using C_{0r} and C_{0a} respectively.

These values are prescribed by ISO 78/1987 and are subject to change by conformance to the latest ISO standards.

5-5-2 Static equivalent load

The static equivalent load is a theoretical load calculated such that, during rotation at very low speed or when bearings are stationary, the same contact stress as that imposed under actual loading condition is generated at the contact center between raceway and rolling element to which the maximum load is applied.

For radial bearings, radial load passing through the bearing center is used for the calculation; for thrust bearings, axial load in a direction along the bearing axis is used.

The static equivalent load can be calculated using the following equations.

[Radial bearings]

···The greater value obtained by the following two equations is used.

$$P_{0r} = X_0 F_r + Y_0 F_a \quad \cdots\cdots (5\text{-}40)$$

$$P_{0r} = F_r \quad \cdots\cdots (5\text{-}41)$$

[Thrust bearings]

($\alpha \neq 90°$)

$$P_{0a} = X_0 F_r + F_a \quad \cdots\cdots (5\text{-}42)$$

[When $F_a < X_0 F_r$, the solution becomes less accurate.]

($\alpha = 90°$)

$$P_{0a} = F_a \quad \cdots\cdots (5\text{-}43)$$

where :

P_{0r} : static equivalent radial load N
P_{0a} : static equivalent axial load N
F_r : radial load N
F_a : axial load N
X_0 : static radial load factor
Y_0 : static axial load factor
(values of X_0 and Y_0 are listed in the bearing specification table.)

5-5-3 Safety coefficient

The allowable static equivalent load for a bearing is determined by the basic static load rating of the bearing; however, bearing service life, which is affected by permanent deformation, differs in accordance with the performance required of the bearing and operating conditions.

Therefore, a safety coefficient is designated, based on empirical data, so as to ensure safety in relation to basic static load rating.

$$f_s = \frac{C_0}{P_0} \quad \cdots\cdots (5\text{-}44)$$

where :

f_s : safety coefficient (ref. Table 5-10)
C_0 : basic static load rating N
P_0 : static equivalent load N

Table 5-10 Values of safety coefficient f_s

Operating condition		f_s (min.)	
		Ball bearing	Roller bearing
With bearing rotation	When high accuracy is required	2	3
	Normal operation	1	1.5
	When impact load is applied	1.5	3
Without bearing rotation (occasional oscillation)	Normal operation	0.5	1
	When impact load or uneven distribution load is applied	1	2

[Remark] For spherical thrust roller bearings, $f_s \geqq 4$.

5-6 Allowable axial load for cylindrical roller bearings

Bearings whose inner and outer rings comprise either a rib or loose rib can accommodate a certain magnitude of axial load, as well as radial load. In such cases, axial load capacity is controlled by the condition of rollers, load capacity of rib or loose rib, lubrication, rotational speed etc.

For certain special uses, a design is available to accommodate very heavy axial loads. In general, axial loads allowable for cylindrical roller bearings can be calculated using the following equation, which are based on empirical data.

$$F_{ap} = 9.8\, f_a \cdot f_b \cdot f_p \cdot d_m^2 \quad \cdots\cdots\cdots\cdots \text{(5-45)}$$

where :

F_{ap} : maximum allowable axial load N

f_a : coefficient determined from loading condition (Table 5-11)

f_b : coefficient determined from bearing diameter series (Table 5-12)

f_p : coefficient for rib surface pressure (Fig. 5-13)

d_m : mean value of bore diameter d and outside diameter D mm

$$\left(\frac{d+D}{2}\right)$$

Table 5-11 Values of coefficient determined from loading condition f_a

Loading condition	f_a
Continuous loading	1
Intermittent loading	2
Instantaneous loading	3

Table 5-12 Values of coefficient determined from bearing diameter series f_b

Diameter series	f_b
9	0.6
0	0.7
2	0.8
3	1.0
4	1.2

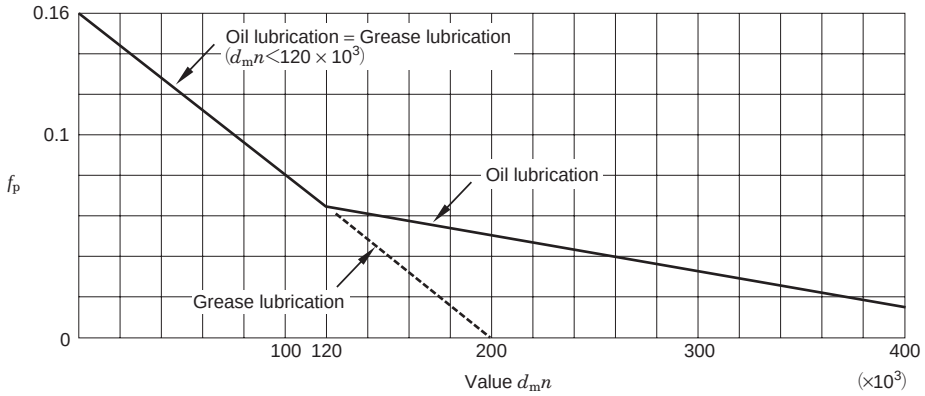
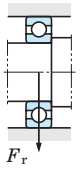


Fig. 5-13 Relationship between coefficient for rib surface pressure f_p and value $d_m n$ (n : rotational speed, $\min^{-1}$)

5-7 Applied calculation examples

[Example 1] Bearing service life (time) with 90 % reliability

(Conditions)
Deep groove ball bearing : 6308
Radial load $F_r = 3\,500$ N
Axial load not applied ($F_a = 0$)
Rotational speed $n = 800$ min^{-1}



① Basic dynamic load rating (C_r) is obtained from the bearing specification table.
$C_r = 50.9$ kN

② Dynamic equivalent radial load (P_r) is calculated using equation (5-32).
$P_r = F_r = 3\,500$ N

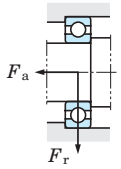
③ Bearing sevice life (L_{10h}) is calculated using equation (5-2).

$$L_{10h} = \frac{10^6}{60n}\left(\frac{C}{P}\right)^p$$

$$= \frac{10^6}{60 \times 800} \times \left(\frac{50.9 \times 10^3}{3\,500}\right)^3 \fallingdotseq \underline{64\,100 \text{ h}}$$

[Example 2] Bearing service life (time) with 96 % reliability

(Conditions)
Deep groove ball bearing : 6308
Radial load $F_r = 3\,500$ N
Axial load $F_a = 1\,000$ N
Rotational speed $n = 800$ min^{-1}



① From the bearing specification table ;
- Basic load rating (C_r , C_{0r}) f_0 factor is obtained.
  $C_r = 50.9$ kN
  $C_{0r} = 24.0$ kN
  $f_0 = 13.2$
- Values X and Y are obtained by comparing value e, calculated from value $f_0 F_a / C_{0r}$ via proportional interpolation, with value $f_0 F_a / F_r$.

$$\frac{f_0 F_a}{C_{0r}} = \frac{13.2 \times 1\,000}{24.0 \times 10^3} = 0.550$$

$$e = 0.22 + (0.26 - 0.22) \times \frac{(0.550 - 0.345)}{(0.689 - 0.345)}$$

$$= 0.24$$

$$\frac{F_a}{F_r} = \frac{1\,000}{3\,500} = 0.29 > e$$

The result is,

$$X = 0.56$$

$$Y = 1.99 - (1.99 - 1.71) \times \frac{(0.550 - 0.345)}{(0.689 - 0.345)}$$

$$= 1.82$$

② Dynamic equivalent load (P_r) is obtained using equation (5-32).

$$P_r = XF_r + YF_a$$

$$= (0.56 \times 3\,500) + (1.82 \times 1\,000) = 3\,780 \text{ N}$$

③ Service life with 90 % reliability (L_{10h}) is obtained using equation (5-2).

$$L_{10h} = \frac{10^6}{60n}\left(\frac{C}{P}\right)^p$$

$$= \frac{10^6}{60 \times 800} \times \left(\frac{50.9 \times 10^3}{3\,780}\right)^3 \fallingdotseq \underline{50\,900 \text{ h}}$$

[Example 3] Calculation of the a_{ISO} factor with the conditions in Example 2

(Conditions)
Oil lubrication
(Oil that has been filtered by a fine filter)
Operating temperature 70 °C
96 % reliability

④ Lubricating oil selection
From the bearing specification table, the pitch diameter $D_{pw} = (40 + 90)/2 = 65$ is obtained.
$d_{mn} = 65 \times 800 = 52\,000$. Therefore, select VG 68 from Table 12-8, p. A 129.

⑤ Calculating the a_{ISO} factor
The operating temperature is 70 °C, so according to Fig. 12-3, p. A 129, the viscosity when operating is $\nu = 20$ mm^2/s
According to Fig. A, $\nu_1 = 21.7$ mm^2/s

$$\kappa = \nu/\nu_1 = 20/21.7 = 0.92$$

The oil has been filtered by a fine filter, so Table 5-4 shows e_c is 0.5 to 0.6.
To stringently estimate the value, $e_c = 0.5$.

$$\frac{e_c \cdot C_u}{P} = \frac{0.5 \times 1\,850}{3\,780} = 0.24$$

Therefore, according to Fig. B

$$a_{ISO} = 7.7$$

⑥ Service life with 96 % reliability (L_{nm}) is obtained using equation (5-8).
According to Table 5-3, $a_1 = 0.55$.

$$L_{4m} = a_1 a_{ISO} L_{10} = 0.55 \times 7.7 \times 50\,900 \fallingdotseq 216\,000 \text{ h}$$

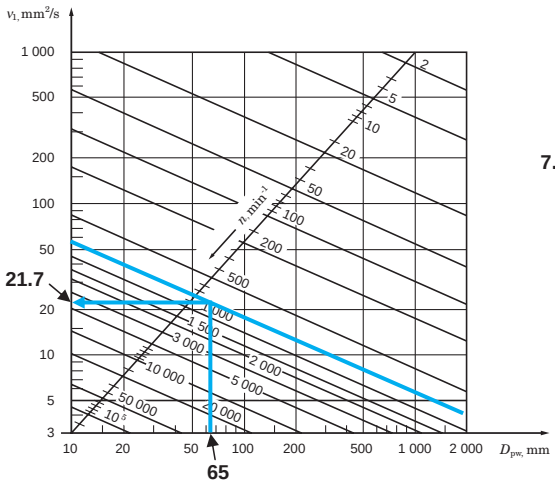


Fig. A

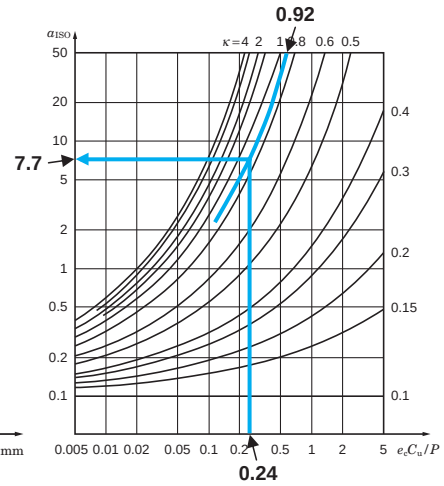
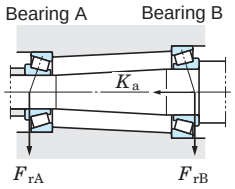


Fig. B

The a_{ISO} factor can also be calculated on our website.

[Example 4] Bearing service life (total revolution)

(Conditions)
Tapered roller bearing
Bearing A : 30207 JR
Bearing B : 30209 JR
Radial load $F_{rA} = 5\,200$ N
$F_{rB} = 6\,800$ N
Axial load $K_a = 1\,600$ N



① From the bearing specification table, the following specifications are obtained.

	Basic dynamic load rating (C_r)	e	$X^{1)}$	$Y^{1)}$
Bearing A	68.8 kN	0.37	0.4	1.60
Bearing B	83.9 kN	0.40	0.4	1.48

[Note] 1) Those values are used, where $F_a/F_r > e$.
Where $F_a/F_r \leqq e$, $X = 1$, $Y = 0$.

② Axial load applied to shafts must be calculated, considering the fact that component force in the axial direction is generated when radial load is applied to tapered roller bearings. (ref. equation 5-33, Table 5-9)

$$\frac{F_{rA}}{2\,Y_A} + K_a = \frac{5\,200}{2 \times 1.60} + 1\,600 = 3\,225 \text{ N}$$

$$\frac{F_{rB}}{2\,Y_B} = \frac{6\,800}{2 \times 1.48} = 2\,297 \text{ N}$$

Consequently, axial load $\frac{F_{rA}}{2\,Y_A} + K_a$ is applied to bearing B.

③ Dynamic equivalent load (P_r) is obtained from Table 5-9.

$$P_{rA} = F_{rA} = 5\,200 \text{ N}$$

$$P_{rB} = XF_{rB} + Y_B\left(\frac{F_{rA}}{2\,Y_A} + K_a\right)$$

$$= 0.4 \times 6\,800 + 1.48 \times 3\,225 = 7493 \text{N}$$

④ Each bearing service life (L_{10}) is calculated using equation (5-1).

$$L_{10A} = \left(\frac{C_{rA}}{P_{rA}}\right)^{10/3} = \left(\frac{68.8 \times 10^3}{5\,200}\right)^{10/3}$$

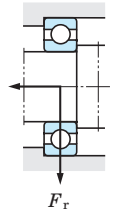
$$\fallingdotseq \underline{5\,480 \times 10^6 \text{ revolutions}}$$

$$L_{10B} = \left(\frac{C_{rB}}{P_{rB}}\right)^{10/3} = \left(\frac{83.9 \times 10^3}{7\,493}\right)^{10/3}$$

$$\fallingdotseq \underline{3\,140 \times 10^6 \text{ revolutions}}$$

[Example 5] Bearing size selection

(Conditions)
Deep groove ball bearing :
62 series
Required service life :
more than 10 000 h
Radial load $F_r = 2\,000$ N
Axial load $F_a = 300$ N
Rotational speed $n = 1\,600$ min^{-1}



① The dynamic equivalent load (P_r) is hypothetically calculated.
The resultant value, $F_a/F_r = 300/2\,000 = 0.15$, is smaller than any other values of e in the bearing specification table.
Hence, JTEKT can consider that $P_r = F_r = 2\,000$ N.

② The required basic dynamic load rating (C_r) is calculated according to equation (5-4).

$$C_r = P_r\left(L_{10h} \times \frac{60n}{10^6}\right)^{1/p}$$

$$= 2\,000 \times \left(10\,000 \times \frac{60 \times 1\,600}{10^6}\right)^{1/3}$$

$$= 19\,730 \text{ N}$$

③ Among those covered by the bearing specification table, the bearing of the 62 series with C_r exceeding 19 730 N is 6205 R, with bore diameter for 25 mm.

④ The dynamic equivalent load obtained at step ① is confirmed by obtaining value e for 6205 R.
Where C_{0r} of 6205 R is 9.3 kN, and f_0 is 12.8

$$f_0 F_a/C_{0r} = 12.8 \times 300/9\,300 = 0.413$$

Then, value e can be calculated using proportional interpolation.

$$e = 0.22 + (0.26 - 0.22) \times \frac{(0.413 - 0.345)}{(0.689 - 0.345)}$$

$$= 0.23$$

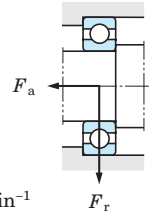
As a result, it can be confirmed that

$$F_a/F_r = 0.15 < e.$$

Hence, $P_r = F_r$.

[Example 6] Bearing size selection

(Conditions)
Deep groove ball bearing :
63 series
Required service life :
more than 15 000 h
Radial load $F_r = 4\,000$ N
Axial load $F_a = 2\,400$ N
Rotational speed $n = 1\,000$ min^{-1}



① The hypothetic dynamic equivalent load (P_r) is calculated :
Since $F_a/F_r = 2\,400/4\,000 = 0.6$ is much larger than the value e specified in the bearing specification table, it suggests that the axial load affects the dynamic equivalent load.
Hence, assuming that $X = 0.56$, $Y = 1.6$ (approximate mean value of Y), using equation (5-32),

$$P_r = XF_r + XF_a = 0.56 \times 4\,000 + 1.6 \times 2\,400$$

$$= 6\,080 \text{ N}$$

② Using equation (5-4), the required basic dynamic load rating (C_r) is :

$$C_r = P_r\left(L_{10h} \times \frac{60n}{10^6}\right)^{1/p}$$

$$= 6\,080 \times \left(15\,000 \times \frac{60 \times 1\,000}{10^6}\right)^{1/3}$$

$$= 58\,700 \text{ N}$$

③ From the bearing specification table, a 6309 with a bore diameter of 45 mm is selected as a 63 series bearing with C_r exceeding 58 700 N.

④ The dynamic equivalent load and basic rating life are confirmed, by calculating the value e for a 6309.
Values obtained using the proportional interpolation are :
where $f_0 F_a/C_{0r} = 13.3 \times 2\,400/29\,500 = 1.082$
$e = 0.283$, $Y = 1.54$.
Thus, $F_a/F_r = 0.6 > e$.
Using the resultant values, the dynamic equivalent load and basic rating life can be calculated as follows :

$$P_r = XF_r + YF_a$$

$$= 0.56 \times 4\,000 + 1.54 \times 2\,400 = 5\,940 \text{N}$$

$$L_{10h} = \frac{10^6}{60n}\left(\frac{C_r}{P_r}\right)^p$$

$$= \frac{10^6}{60 \times 1\,000} \times \left(\frac{61.1 \times 10^3}{5\,940}\right)^3 \fallingdotseq \underline{18\,100 \text{ h}}$$

⑤ The basic rating life of the 6308, using the same steps, is :
$L_{10h} \fallingdotseq 11\,500$ h, which does not satisfy the service life requirement.

[Example 7] Calculation of allowable axial load for cylindrical roller bearings

(Conditions)
Single-row cylindrical roller bearing : NUP 310
Rotational speed $n = 1\,500$ min^{-1}
Oil lubrication
Axial load is intermittently applied.

① Using the bearing specification table, the value d_m for the NUP 310 can be calculated as follows :

$$d_m = \frac{d+D}{2} = \frac{50+110}{2} = 80 \text{ mm}$$

② Each coefficient used in equation (5-45).
From values listed in Table 5-11, coefficient f_a related to intermittent load is : $f_a = 2$

From values listed in Table 5-12, coefficient f_b related to diameter series 3 is : $f_b = 1.0$

According to Fig. 5-13, coefficient f_p for allowable rib surface pressure, related to
$d_m n = 80 \times 1\,500 = 12 \times 10^4$, is : $f_p = 0.062$

③ Using equation (5-45), the allowable axial load F_{ap} is :

$$F_{ap} = 9.8\, f_a \cdot f_b \cdot f_p \cdot d_m{}^2$$

$$= 9.8 \times 2 \times 1.0 \times 0.062 \times 80^2$$

$$\fallingdotseq \underline{7\,780 \text{ N}}$$

[Example 8] Calculation of service life of spur gear shaft bearings

(Conditions)

Tapered roller bearing

Bearing A : 32309 JR

Bearing B : 32310 JR

Gear type : spur gear (normally machined)

Gear pressure angle $\alpha_1 = \alpha_2 = 20°$

Gear pitch circle diameter $D_{p1} = 360$ mm

$D_{p2} = 180$ mm

Transmission power $W = 150$ kW

Rotational speed $n = 1\,000$ min^{-1}

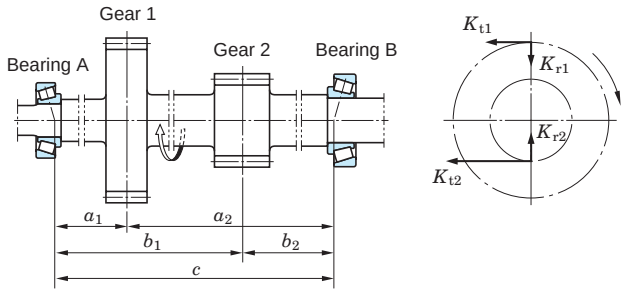
Operating condition: accompanied by impact

Installation locations

$a_1 = 95$ mm, $a_2 = 265$ mm,

$b_1 = 245$ mm, $b_2 = 115$ mm,

$c = 360$ mm



① Using equations (5-14) and (5-15), theoretical loads applied to gears (tangential load, K_t; radial load, K_r) are calculated.

[Gear 1]

$$K_{t1} = \frac{19.1\times10^6 W}{D_p n} = \frac{19.1\times10^6\times150}{360\times1\,000} = 7\,958 \text{ N}$$

$$K_{r1} = K_{t1}\tan\alpha_1 = 2\,896 \text{ N}$$

[Gear 2]

$$K_{t2} = \frac{19.1\times10^6\times150}{180\times1\,000} = 15\,917 \text{ N}$$

$$K_{r2} = K_{t2}\tan\alpha_2 = 5\,793 \text{ N}$$

② The radial load applied to the bearing is calculated, where the load coefficient is determined as $f_w = 1.5$ from Table 5-6, and the gear coefficient as $f_g = 1.2$ from Table 5-8.

[Bearing A]

- Load consisting of K_{t1} and K_{t2} is :

$$K_{tA} = f_w f_g\left(\frac{a_2}{c}K_{t1} + \frac{b_2}{c}K_{t2}\right) = 1.5\times1.2\times\left(\frac{265}{360}\times7\,958 + \frac{115}{360}\times15\,917\right) = 19\,697 \text{ N}$$

- Load consisting of K_{r1} and K_{r2} is :

$$K_{rA} = f_w f_g\left(\frac{a_2}{c}K_{r1} - \frac{b_2}{c}K_{r2}\right) = 1.5\times1.2\times\left(\frac{265}{360}\times2\,896 - \frac{115}{360}\times5\,793\right) = 506 \text{ N}$$

- Combining the loads of K_{tA} and K_{rA}, the radial load (F_{rA}) applied to bearing A can be calculated as follows :

$$F_{rA} = \sqrt{K_{tA}^2 + K_{rA}^2} = \sqrt{19\,697^2 + 506^2} = 19\,703 \text{ N}$$

[Bearing B]

- Load consisting of K_{t1} and K_{t2} is :

$$K_{tB} = f_w f_g\left(\frac{a_1}{c}K_{t1} + \frac{b_1}{c}K_{t2}\right) = 1.5\times1.2\times\left(\frac{95}{360}\times7\,958 + \frac{245}{360}\times15\,917\right) = 23\,278 \text{ N}$$

- Load consisting of K_{r1} and K_{r2} is :

$$K_{rB} = f_w f_g\left(\frac{a_1}{c}K_{r1} - \frac{b_1}{c}K_{r2}\right) = 1.5\times1.2\times\left(\frac{95}{360}\times2\,896 - \frac{245}{360}\times5\,793\right) = -5\,721 \text{ N}$$

- The radial load (F_{rB}) applied to bearing B can be calculated using the same steps as with bearing A.

$$F_{rB} = \sqrt{K_{tB}^2 + K_{rB}^2} = \sqrt{23\,278^2 + (-5\,721)^2} = 23\,971 \text{ N}$$

③ The following specifications can be obtained from the bearing specification table.

	Basic dynamic load rating (C_r)	e	X 1)	Y 1)
Bearing A	183 kN	0.35	0.4	1.74
Bearing B	221 kN			

[Note] 1) Those values are used, where $F_a/F_r > e$. Where $F_a/F_r \leqq e$, $X = 1$, $Y = 0$.

④ When an axial load is not applied externally, if the radial load is applied to the tapered roller bearing, an axial component force is generated.

Considering this fact, the axial load applied from the shaft and peripheral parts is to be calculated :

(Equation 5-33, Table 5-9)

$$\frac{F_{rB}}{2\,Y_B} = \frac{23\,971}{2\times1.74} > \frac{F_{rA}}{2\,Y_A} = \frac{19\,703}{2\times1.74}$$

According to the result, it is clear that the axial component force ($F_{rB}/2Y_B$) applied to bearing B is also applied to bearing A as an axial load applied from the shaft and peripheral parts.

⑤ Using the values listed in Table 5-9, the dynamic equivalent load is calculated, where $K_a = 0$:

$$P_{rA} = XF_{rA} + Y_A\frac{F_{rB}}{2\,Y_B} = 0.4\times19\,703\times1.74\times\frac{23\,971}{2\times1.74} = 19\,867 \text{ N}$$

$$P_{rB} = F_{rB} = 23\,971 \text{ N}$$

⑥ Using equation (5-2), the basic rating life of each bearing is calculated :

[Bearing A]

$$L_{10hA} = \frac{10^6}{60n}\left(\frac{C_{rA}}{P_A}\right)^p = \frac{10^6}{60\times1\,000}\times\left(\frac{183\times10^3}{19\,867}\right)^{10/3} \fallingdotseq \underline{27\,300 \text{ h}}$$

[Bearing B]

$$L_{10hB} = \frac{10^6}{60n}\left(\frac{C_{rB}}{P_B}\right)^p = \frac{10^6}{60\times1\,000}\times\left(\frac{221\times10^3}{23\,971}\right)^{10/3} \fallingdotseq \underline{27\,400 \text{ h}}$$

Reference

Using equation (5-11), the system service life (L_{10hS}) using a pair of bearings is :

$$L_{10hS} = \frac{1}{\left(\frac{1}{L_{10hA}{}^e} + \frac{1}{L_{10hB}{}^e}\right)^{1/e}} = \frac{1}{\left(\frac{1}{27\,300^{9/8}} + \frac{1}{27\,400^{9/8}}\right)^{8/9}} \fallingdotseq \underline{14\,800 \text{ h}}$$

6. Boundary dimensions and bearing numbers

6-1 Boundary dimensions

Bearing boundary dimensions are dimensions required for bearing installation with shaft or housing, and as described in Fig. 6-1, include the bore diameter, outside diameter, width, height, and chamfer dimension.

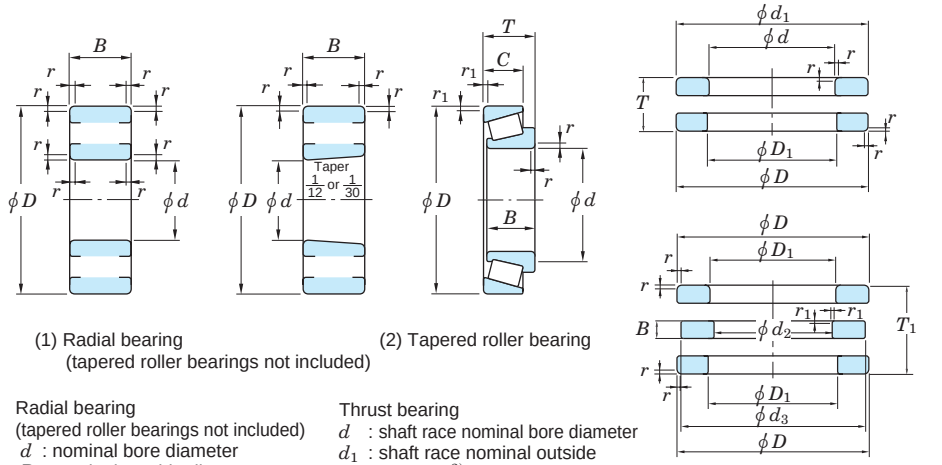
These dimensions are standardized by the International Organization for Standardization (ISO 15). JIS B 1512 "rolling bearing boundary dimensions" is based on ISO.

These boundary dimensions are provided, classified into radial bearings (tapered roller bearings are provided in other tables) and thrust bearings.

Boundary dimensions of each bearing are listed in Appendixes at the back of this catalog. In these boundary dimension tables, the outside diameter, width, height, and chamfer dimensions related to bearing bore diameter numbers and bore diameters are listed in diameter series and dimension series.

Reference

1) Diameter series is a series of nominal bearing outside diameters provided for respective ranges of bearing bore diameter; and, a dimension series includes width and height as well as diameters.
2) Tapered roller bearing boundary dimensions listed in the Appendixes are adapted to conventional dimension series (widths and diameters). Tapered roller bearing boundary dimensions provided in JIS B 1512-2000 are new dimension series based on ISO 355 (ref. descriptions before the bearing specification table); for reference, the bearing specification table covers numeric codes used in these dimension series.



Radial bearing
(tapered roller bearings not included)
d : nominal bore diameter
D : nominal outside diameter
B : nominal assembled bearing width
r : inner/outer ring chamfer dimension[1)]

Tapered roller bearing
d : nominal bore diameter
D : nominal outside diameter
T : nominal assembled bearing width
B : nominal inner ring width
C : nominal outer ring width
r : inner ring chamfer dimension[1)]
r_1 : outer ring chamfer dimension[1)]

Thrust bearing
d : shaft race nominal bore diameter
d_1 : shaft race nominal outside diameter[2)]
d_2 : central race nominal bore diameter
d_3 : central race nominal outside diameter[2)]
D : housing race nominal outside diameter
D_1 : housing race nominal bore diameter[1)]
T : single direction nominal bearing height
T_1 : double direction nominal bearing height
B : central race nominal height
r : shaft/housing race chamfer dimension[1)]
r_1 : central race chamfer dimension[1)]

[Notes]
1) The bearing specification table includes the minimum value.
2) The bearing specification table includes the maximum value.

Fig. 6-1 Bearing boundary dimensions

Cross-section dimensions of radial bearings and thrust bearings expressed in dimension series can be compared using Figs. 6-2 and 6-3.

In this way, many dimension series are provided; however, not all dimensions are practically adapted.

Some of them were merely prescribed, given expected future use.

6-2 Dimensions of snap ring grooves and locating snap rings

JIS B 1509 "rolling bearing -radial bearing with locating snap ring-dimensions and tolerances" conforms to the dimensions of snap ring groove for fitting locating snap ring on the outside surface of bearing and the dimensions and tolerances of locating snap ring.

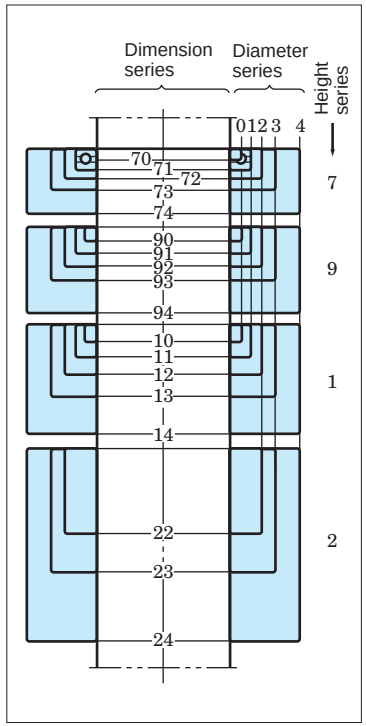


Fig. 6-3 Thrust bearing dimension series diagram (diameter series 5 omitted)

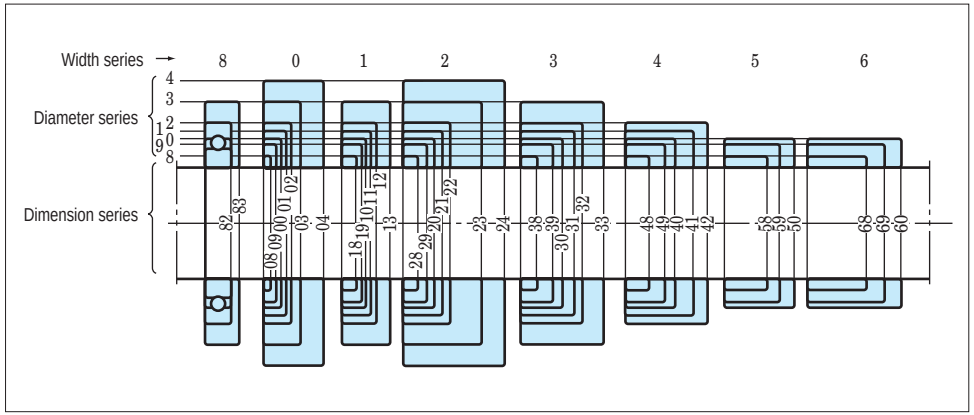


Fig. 6-2 Radial bearing dimension series diagram (diameter series 7 omitted)

6-3 Bearing number

A bearing number is composed of a basic number and a supplementary code, denoting bearing specifications including bearing type, boundary dimensions, running accuracy, and internal clearance.

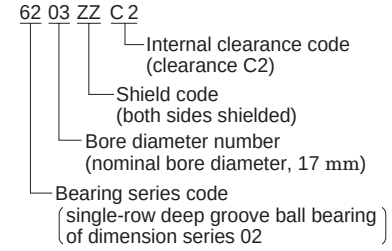
Bearing numbers of standard bearings corresponding to JIS B 1512 "rolling bearing boundary dimensions" are prescribed in JIS B 1513.

As well as these bearing numbers, JTEKT uses supplementary codes other than those provided by JIS.

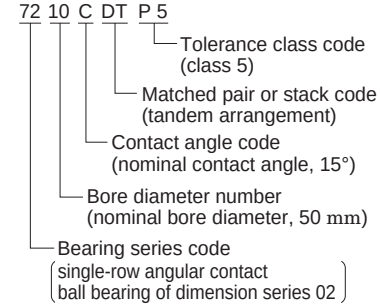
Among basic numbers, bearing series codes are listed in Table 6-1, and the composition of bearing numbers is described in Table 6-2, showing the order of arrangement of the parts.

[Examples of bearing numbers]

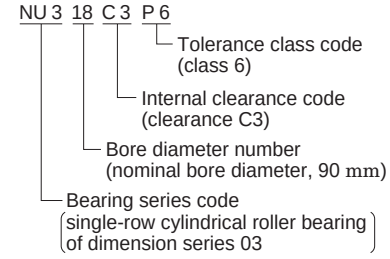
(Ex. 1)



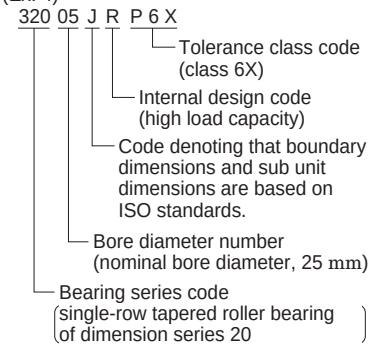
(Ex. 2)



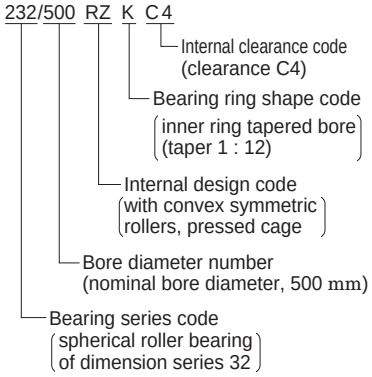
(Ex. 3)



(Ex. 4)



(Ex. 5)



(Ex. 6)

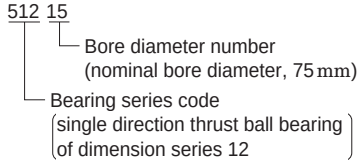


Table 6-1 Bearing series code

Bearing type	Bearing series code	Type code	Dimension series code: Width series[1]	Dimension series code: Diameter series
Single-row deep groove ball bearing	**67**	6	(1)	7
	68	6	(1)	8
	69	6	(1)	9
	160 [2]	6	(0)	0
	60	6	(1)	0
	62	6	(0)	2
	63	6	(0)	3
	64	6	(0)	4
Double-row deep groove ball bearing (with filling slot)	**42**	4	(2)	2
	43	4	(2)	3
Single-row angular contact ball bearing	**79**	7	(1)	9
	70	7	(1)	0
	72	7	(0)	2
	73	7	(0)	3
	74	7	(0)	4
Double-row angular contact ball bearing (with filling slot)	**32**	(0)	3	2
	33	(0)	3	3
Double-row angular contact ball bearing	**52**	5	(3)	2
	53	5	(3)	3
Self-aligning ball bearing	**12**	1	(0)	2
	22	2	(2)	2
	13	1	(0)	3
	23	2	(2)	3
	112 [2]	1	(0) [3]	2
	113 [2]	1	(0) [3]	3
Single-row cylindrical roller bearing	**NU 10**	NU [4]	1	0
	NU 2	NU [4]	(0)	2
	NU 22	NU [4]	2	2
	NU 32	NU [4]	3	2
	NU 3	NU [4]	(0)	3
	NU 23	NU [4]	2	3
	NU 4	NU [4]	(0)	4
Double-row cylindrical roller bearing	**NNU 49**	NNU	4	9
	NN 30	NN	3	0
Single-row needle roller bearing	**NA 48**	NA	4	8
	NA 49	NA	4	9
	NA 59	NA	5	9
Double-row needle roller bearing	**NA 69**	NA	6	9

Bearing type	Bearing series code	Type code	Dimension series code: Width series	Dimension series code: Diameter series
Tapered roller bearing	**329**	3	2	9
	320	3	2	0
	330	3	3	0
	331	3	3	1
	302	3	0	2
	322	3	2	2
	332	3	3	2
	303	3	0	3
	313	3	1	3
	323	3	2	3
Spherical roller bearing	**239**	2	3	9
	230	2	3	0
	240	2	4	0
	231	2	3	1
	241	2	4	1
	222	2	2	2
	232	2	3	2
	213 [2]	2	0	3
	223	2	2	3
Single direction thrust ball bearing	**511**	5	1	1
	512	5	1	2
	513	5	1	3
	514	5	1	4
Single direction thrust ball bearing with spherical back face	**532**	5	3	2
	533	5	3	3
	534	5	3	4
Double direction thrust ball bearing	**522**	5	2	2
	523	5	2	3
	524	5	2	4
Double direction thrust ball bearing with spherical back faces	**542**	5	4	2
	543	5	4	3
	544	5	4	4
Spherical thrust roller bearing	**292**	2	9	2
	293	2	9	3
	294	2	9	4

[Notes]
1) Width series codes in parentheses are omitted in bearing series codes.
2) These are bearing series codes customarily used.
3) Nominal outer ring width series (inner rings only are wide).
4) Besides NU type, NJ, NUP, N, NF, and NH are provided.

Table 6-2 Bearing number configuration

Order of arrengement	Basic number: Bearing series code	Basic number: Bore diameter No.	Basic number: Contact angle code	Supplementary code: Internal design code, cage guide code	Supplementary code: Shield/seal code	Supplementary code: Ring shape code, lubrication hole/groove code	Supplementary code: Material code, special treatment code	Supplementary code: Matched pair or stack code	Supplementary code: Internal clearance code, preload code	Supplementary code: Spacer code	Supplementary code: Cage material/ shape code	Supplementary code: Tolerance code	Supplementary code: Grease code

(Codes and descriptions)

Bearing series code

68	Deep groove ball bearing
69	⋮
60	⋮
⋮	⋮

(For standard bearing code, refer to Table 6-1)

Bore diameter No.

/0.6	0.6 mm (Bore diameter)
1	1
/1.5	1.5
⋮	⋮
9	9
00	10
01	12
02	15
03	17
04	20
/22	22
05	25
⋮	⋮
96	480
/500	500
/2500	2500

· Bore diameters (mm) of bearing in the bore diameter range 04 to 96 can be obtained by multiplying their bore diameter number by five.

Contact angle code

A	(omitted)	30°
AC		25°
B		40°
C		15°
CA		20°
E		35°
B	(omitted)	Less than 17°
C		20°
D		28° 30'
DJ		28° 48' 39"

Angular contact ball bearing

Tapered roller bearing

Internal design code

R	High load capacity (Deep groove ball bearing, cylindrical roller bearing, tapered roller bearing)
G	Equal stand-out is provided on both sides of the ring of angular contact ball bearing (In general, C2 clearance is used)
GST	Angular contact ball bearing described above with standard internal clearance provided
J	Tapered roller bearing, whose outer ring width, contact angle and outer ring small inside diameter conform to ISO standards
R	With convex asymmetric rollers and machined cage
RZ	With convex symmetric rollers and pressed cage
RHA	With convex symmetric rollers and one-piece machined cage
V	Full complement type ball or roller bearing (with no cage)

Spherical roller bearings

Shield/seal code

one side	both sides	
Z	ZZ	Fixed shield
ZX	ZZX	Removable shield
ZU	2ZU	Non-contact seal
RU	2RU	
RS	2RS	Contact seal
RK	2RK	
U	UU	
RD	2RD	Extremely light contact seal

Ring shape code, lubrication hole/groove code

K	Inner ring tapered bore provided (1 : 12)
K30	Inner ring tapered bore provided (1 : 30)
N	Snap ring groove on outer ring outside surface provided
NR	Snap ring groove and locating snap ring on outer ring outside surface provided

(Codes and descriptions)

NY	Creep prevention synthetic resin ring on outer ring outside surface provided
SG	Spiral groove on inner ring bore surface provided
W	Lubrication hole and lubrication groove on cylindrical roller bearing outer ring outside surface provided
W33	Lubrication hole and lubrication groove on spherical roller bearing outer ring outside surface provided

Material code, special treatment code

Code not given	High carbon chrome bearing steel
E	Case carburizing steel
F	
H	
Y	
ST	Stainless steel
SH	Special heat treatment
S0	Up to 150 °C
S1	Up to 200 °C
S2	Up to 250 °C

Dimension stabilizing treatment

Matched pair or stack code, cage guide code

DB	Back-to-back arrangement
DF	Face-to-face arrangement
DT	Tandem arrangement
PA	With outer ring guide cage (Ball bearing)
Q3	With roller guide cage (Roller bearing)

Angular contact ball bearing

Internal clearance code, preload code

C1	Smaller than C2
C2	Smaller than standard clearance
CN	Standard clearance
C3	Greater than standard clearance
C4	Greater than C3
C5	Greater than C4
M1 to M6	Radial internal clearance for extra-small/ miniature ball bearing
CD2	Smaller than standard clearance
CDN	Standard clearance
CD3	Greater than standard clearance

Radial internal clearance for radial bearing

Radial internal clearance for double-row angular contact ball bearing

CM	Radial internal clearance for electric motor bearing	Deep groove ball bearing
CT		Cylindrical roller bearing
NA	Non-interchangeable cylindrical roller bearing radial internal clearance (C1NA to C5NA)	

S	Slight preload
L	Light preload
M	Medium preload
H	Heavy preload

Preload for angular contact ball bearing

Spacer code Spacer width (mm) is affixed to the end of each code.

+	Inner and outer ring spacers provided	Deep groove ball bearing
/	Inner and outer ring spacers provided	Angular contact ball bearing
/P	Outer ring spacer provided	
/S	Inner ring spacer provided	
+DP	Inner and outer ring spacers provided	Cylindrical roller bearing, spherical roller bearing
+IDP	Inner ring spacer provided	
+ODP	Outer ring spacer provided	

Cage material/type code

/ /	Steel sheet	Pressed cage
YS	Stainless steel sheet	
FT	Phenol resin	Machined cage
FY	High-tensile brass casting	
FW	High-tensile brass casting (separable type)	
MG	Polyamide	(Molded cage)
FG		
FP	Carbon steel	(Pin type cage)

Tolerance code (JIS)

Omitted	Class 0
P6	Class 6
P6X	Class 6X
P5	Class 5
P4	Class 4
P2	Class 2

Grease code

A2	Alvania 2
AC	Andok C
B5	Beacon 325
SR	Multemp SRL

7. Bearing tolerances

7-1 Tolerances and tolerance classes for bearings

Bearing tolerances and permissible values for the boundary dimensions and running accuracy of bearings are specified.

These tolerances are prescribed in JIS B 1514-1, JIS B 1514-2, and JIS B 1514-3 (roller bearings - bearing tolerances part 1: radial bearings, part 2: thrust bearings, and part 3: permissible values for chamfer dimensions). (These JIS standards are based on ISO standards.)

Bearing tolerances are standardized by classifying bearings into the following six classes (accuracy in tolerances becomes higher in the order described): 0, 6X, 6, 5, 4 and 2.

Class 0 bearings offer adequate performance for general applications; and, bearings of class 5 or higher are required for demanding applications and operating conditions including those described in Table 7-1.

These tolerances follow ISO standards, but some countries use different names for them. Tolerances for each bearing class, and organizations concerning bearings are listed in Table 7-2.

■ Boundary dimension accuracy
(items on shaft and housing mounting dimensions)
- Tolerances for bore diameter, outside diameter, ring width, assembled bearing width
- Tolerances for set bore diameter and set outside diameter of rollers
- Tolerance limits for chamfer dimensions
- Permissible values for width variation
- Tolerance and permissible values for tapered bore

■ Running accuracy
(items on runout of rotating elements)
- Permissible values for radial and axial runout of inner and outer rings
- Permissible values for perpendicularity of inner ring face
- Permissible values for perpendicularity of outer ring outside surface
- Permissible values for thrust bearing raceway thickness

Accuracies for dimensions and running of each bearing type are listed in Tables 7-3 through 7-10; and, tolerances for tapered bore and limit values for chamfer dimensions of radial bearings are in Tables 7-11 and 7-12.

Table 7-1 High precision bearing applications

Required performance	Applications	Tolerance class
High accuracy in runout is required for rolling elements.	Acoustic / visual equipment spindles (VTR, tape recorders)	P 5, P 4
	Radar / parabola antenna slewing shafts	P 4
	Machine tool spindles	P 5, P 4, P 2, ABEC 9
	Computers, magnetic disc spindles	P 5, P 4, P 2, ABEC 9
	Aluminum foil roll necks	P 5
	Multi-stage mill backing bearings	P 4
High speed rotation	Dental spindles	P 2, ABMA 5P, ABMA 7P
	Superchargers	P 5, P 4
	Jet engine spindles and accessories	P 5, P 4
	Centrifugal separators	P 5, P 4
	LNG pumps	P 5
	Turbo molecular pump spindles and touch-down	P 5, P 4
	Machine tool spindles	P 5, P 4, P 2, ABEC 9
	Tension reels	P 5, P 4
Low friction or low friction variation is required.	Control equipment (synchronous motors, servomotors, gyro gimbals)	P 4, ABMA 7P
	Measuring instruments	P 5
	Machine tool spindles	P 5, P 4, P 2, ABEC 9

Table 7-2 Bearing type and tolerance class

Bearing type			Applied standards	Applied tolerance class						Tolerance table
Deep groove ball bearing			JIS B 1514-1	Class 0	–	Class 6	Class 5	Class 4	Class 2	Table 7-3
Angular contact ball bearing				Class 0	–	Class 6	Class 5	Class 4	Class 2	
Self-aligning ball bearing				Class 0	–	–	–	–	–	
Cylindrical roller bearing				Class 0	–	Class 6	Class 5	Class 4	Class 2	
Needle roller bearing (machined ring type)			JIS B 1536-1	Class 0	–	–	–	–	–	
Tapered roller bearing		Metric series (single-row)	JIS B 1514-1	Class 0	Class 6X	(Class 6)	Class 5	Class 4	Class 2	Table 7-5
		Metric series (double or four-row)	BAS 1002	Class 0	–	–	–	–	–	Table 7-6
		Inch series	ANSI/ABMA	Class 4	–	Class 2	Class 3	Class 0	Class 00	Table 7-7
		Metric series (J-series)		Class PK	–	Class PN	Class PC	Class PB	–	Table 7-8
Spherical roller bearing			JIS B 1514-1	Class 0	–	–	–	–	–	Table 7-3
Thrust ball bearing			JIS B 1514-2	Class 0	–	Class 6	Class 5	Class 4	–	Table 7-9
Spherical thrust roller bearing				Class 0	–	–	–	–	–	Table 7-10
Precision ball screw support bearing			JTEKT standards	–	–	–	Class P5Z	Class P4Z	–	–
Double direction angular contact thrust ball bearing				–	–	–	Equivalent to class 5	Equivalent to class 4	–	–
(Reference) Class comparison	ISO	Radial bearing	ISO 492	Normal Class	Class 6X	Class 6	Class 5	Class 4	Class 2	–
		Thrust bearing	ISO 199	Normal Class	–	Class 6	Class 5	Class 4	–	–
	DIN BS NF	Radial and thrust bearings	DIN 620 BS 6107 NF E 22-335	Normal Class	Class 6X	Class 6	Class 5	Class 4	Class 2	–
	ANSI ABMA	Radial bearing	ABMA std. 20	ABEC 1 RBEC 1	– –	ABEC 3 RBEC 3	ABEC 5 RBEC 5	ABEC 7 –	ABEC 9 –	–
		Instrument ball bearing	ABMA std. 12	–	–	Class 3P	Class 5P Class 5T	Class 7P Class 7T	Class 9P	Table 7-4
		Tapered roller bearing	ABMA std. 19	Class 4 Class K	– –	Class 2 Class N	Class 3 Class C	Class 0 Class B	Class 00 Class A	Table 7-7

(Reference) Standards and organizations concerned with bearings

JIS : Japanese Industrial Standard
BAS : The Japan Bearing Industrial Association Standard
ISO : International Organization for Standardization
ANSI : American National Standards Institute, Inc.
ABMA : American Bearing Manufactures Association
DIN : Deutsches Institut für Normung
BS : British Standards Institution
NF : Association Francaise de Normalisation

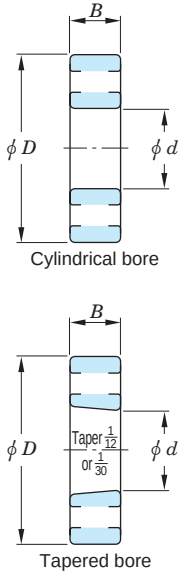
Table 7-3 (1) Radial bearing tolerances (tapered roller bearings excluded)

= JIS B 1514-1 =

(1) Inner ring (bore diameter)

Unit : μm

Nominal bore diameter d mm		Single plane mean bore diameter deviation Δ_{dmp}										Single bore diameter deviation Δ_{ds} 1)				Single plane bore diameter variation V_{dsp}																Mean bore diameter variation V_{dmp}					Nominal bore diameter d mm	
		class 0		class 6		class 5		class 4		class 2		class 4		class 2		Diameter series 7, 8, 9				Diameter series 0, 1				Diameter series 2, 3, 4				Dia. series 1)											
																class 0	class 6	class 5	class 4	class 0	class 6	class 5	class 4	class 0	class 6	class 5	class 4	class 2	class 0	class 6	class 5	class 4	class 2		
over	up to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	max.				max.				max.				max.					max.					over	up to
–	0.6	0	– 8	0	– 7	0	– 5	0	– 4	0	– 2.5	0	– 4	0	– 2.5	10	9	5	4	8	7	4	3	6	5	4	3	2.5	6	5	3	2	1.5	–	0.6
0.6	2.5	0	– 8	0	– 7	0	– 5	0	– 4	0	– 2.5	0	– 4	0	– 2.5	10	9	5	4	8	7	4	3	6	5	4	3	2.5	6	5	3	2	1.5	0.6	2.5
2.5	10	0	– 8	0	– 7	0	– 5	0	– 4	0	– 2.5	0	– 4	0	– 2.5	10	9	5	4	8	7	4	3	6	5	4	3	2.5	6	5	3	2	1.5	2.5	10
10	18	0	– 8	0	– 7	0	– 5	0	– 4	0	– 2.5	0	– 4	0	– 2.5	10	9	5	4	8	7	4	3	6	5	4	3	2.5	6	5	3	2	1.5	10	18
18	30	0	– 10	0	– 8	0	– 6	0	– 5	0	– 2.5	0	– 5	0	– 2.5	13	10	6	5	10	8	5	4	8	6	5	4	2.5	8	6	3	2.5	1.5	18	30
30	50	0	– 12	0	– 10	0	– 8	0	– 6	0	– 2.5	0	– 6	0	– 2.5	15	13	8	6	12	10	6	5	9	8	6	5	2.5	9	8	4	3	1.5	30	50
50	80	0	– 15	0	– 12	0	– 9	0	– 7	0	– 4	0	– 7	0	– 4	19	15	9	7	19	15	7	5	11	9	7	5	4	11	9	5	3.5	2	50	80
80	120	0	– 20	0	– 15	0	– 10	0	– 8	0	– 5	0	– 8	0	– 5	25	19	10	8	25	19	8	6	15	11	8	6	5	15	11	5	4	2.5	80	120
120	150	0	– 25	0	– 18	0	– 13	0	– 10	0	– 7	0	– 10	0	– 7	31	23	13	10	31	23	10	8	19	14	10	8	7	19	14	7	5	3.5	120	150
150	180	0	– 25	0	– 18	0	– 13	0	– 10	0	– 7	0	– 10	0	– 7	31	23	13	10	31	23	10	8	19	14	10	8	7	19	14	7	5	3.5	150	180
180	250	0	– 30	0	– 22	0	– 15	0	– 12	0	– 8	0	– 12	0	– 8	38	28	15	12	38	28	12	9	23	17	12	9	8	23	17	8	6	4	180	250
250	315	0	– 35	0	– 25	0	– 18	*0*	*– 15*	–	–	*0*	*– 15*	–	–	44	31	18	*15*	44	31	14	*11*	26	19	14	*11*	–	26	19	9	*8*	–	250	315
315	400	0	– 40	0	– 30	0	– 23	*0*	*– 18*	–	–	*0*	*– 18*	–	–	50	38	23	*18*	50	38	18	*14*	30	23	18	*14*	–	30	23	12	*9*	–	315	400
400	500	0	– 45	0	– 35	*0*	*– 28*	*0*	*– 23*	–	–	*0*	*– 23*	–	–	56	44	*28*	*23*	56	44	*21*	*17*	34	26	*21*	*17*	–	34	26	*14*	*12*	–	400	500
500	630	0	– 50	0	– 40	*0*	*– 35*	–	–	–	–	–	–	–	–	63	50	*35*	–	63	50	*26*	–	38	30	*26*	–	–	38	30	*18*	–	–	500	630
630	800	0	– 75	*0*	*– 50*	*0*	*– 45*	–	–	–	–	–	–	–	–	*94*	*63*	*45*	–	*94*	*63*	*34*	–	*56*	*38*	*34*	–	–	*56*	*38*	*23*	–	–	630	800
800	1 000	0	– 100	*0*	*– 60*	*0*	*– 60*	–	–	–	–	–	–	–	–	*125*	*75*	*60*	–	*125*	*75*	*45*	–	*75*	*45*	*45*	–	–	*75*	*45*	*30*	–	–	800	1 000
1 000	1 250	0	– 125	*0*	*– 75*	*0*	*– 75*	–	–	–	–	–	–	–	–	*156*	*94*	*75*	–	*156*	*94*	*56*	–	*94*	*56*	*56*	–	–	*94*	*56*	*38*	–	–	1 000	1 250
1 250	1 600	0	– 160	–	–	–	–	–	–	–	–	–	–	–	–	*200*	–	–	–	*200*	–	–	–	*120*	–	–	–	–	*120*	–	–	–	–	1 250	1 600
1 600	2 000	0	– 200	–	–	–	–	–	–	–	–	–	–	–	–	*250*	–	–	–	*250*	–	–	–	*150*	–	–	–	–	*150*	–	–	–	–	1 600	2 000



(2) Inner ring (running accuracy and width)

Unit : μm

Nominal bore diameter d mm		Radial runout of assembled bearing inner ring K_{ia}					S_d			S_{ia} 2)			Single inner ring width deviation Δ_{Bs}								Single inner ring width deviation Δ_{Bs} 3)								Inner ring width variation V_{Bs}					Nominal bore diameter d mm	
		class 0	class 6	class 5	class 4	class 2	class 5	class 4	class 2	class 5	class 4	class 2	class 0		class 6		class 5		class 4		class 2		class 0 4)		class 6 4)		class 5 4)		classes 4, 2		class 0	class 6	class 5	class 4	class 2		
over	up to	max.					max.			max.			upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	max.					over	up to
–	0.6	10	5	4	2.5	1.5	7	3	1.5	7	3	1.5	0	– 40	0	– 40	0	– 40	0	– 40	0	– 40	–	–	–	–	0	– 250	0	– 250	12	12	5	2.5	1.5	–	0.6
0.6	2.5	10	5	4	2.5	1.5	7	3	1.5	7	3	1.5	0	– 40	0	– 40	0	– 40	0	– 40	0	– 40	–	–	–	–	0	– 250	0	– 250	12	12	5	2.5	1.5	0.6	2.5
2.5	10	10	6	4	2.5	1.5	7	3	1.5	7	3	1.5	0	– 120	0	– 120	0	– 40	0	– 40	0	– 40	0	– 250	0	– 250	0	– 250	0	– 250	15	15	5	2.5	1.5	2.5	10
10	18	10	7	4	2.5	1.5	7	3	1.5	7	3	1.5	0	– 120	0	– 120	0	– 80	0	– 80	0	– 80	0	– 250	0	– 250	0	– 250	0	– 250	20	20	5	2.5	1.5	10	18
18	30	13	8	4	3	2.5	8	4	1.5	8	4	2.5	0	– 120	0	– 120	0	– 120	0	– 120	0	– 120	0	– 250	0	– 250	0	– 250	0	– 250	20	20	5	2.5	1.5	18	30
30	50	15	10	5	4	2.5	8	4	1.5	8	4	2.5	0	– 120	0	– 120	0	– 120	0	– 120	0	– 120	0	– 250	0	– 250	0	– 250	0	– 250	20	20	5	3	1.5	30	50
50	80	20	10	5	4	2.5	8	5	1.5	8	5	2.5	0	– 150	0	– 150	0	– 150	0	– 150	0	– 150	0	– 380	0	– 380	0	– 250	0	– 250	25	25	6	4	1.5	50	80
80	120	25	13	6	5	2.5	9	5	2.5	9	5	2.5	0	– 200	0	– 200	0	– 200	0	– 200	0	– 200	0	– 380	0	– 380	0	– 380	0	– 380	25	25	7	4	2.5	80	120
120	150	30	18	8	6	2.5	10	6	2.5	10	7	2.5	0	– 250	0	– 250	0	– 250	0	– 250	0	– 250	0	– 500	0	– 500	0	– 380	0	– 380	30	30	8	5	2.5	120	150
150	180	30	18	8	6	5	10	6	4	10	7	5	0	– 250	0	– 250	0	– 250	0	– 250	0	– 250	0	– 500	0	– 500	0	– 380	0	– 380	30	30	8	5	4	150	180
180	250	40	20	10	8	5	11	7	5	13	8	5	0	– 300	0	– 300	0	– 300	0	– 300	0	– 300	0	– 500	0	– 500	0	– 500	0	– 500	30	30	10	6	5	180	250
250	315	50	25	13	*10*	–	13	*8*	–	15	*9*	–	0	– 350	0	– 350	0	– 350	*0*	*– 350*	–	–	0	– 500	0	– 500	0	– 500	–	–	35	35	13	*8*	–	250	315
315	400	60	30	15	*13*	–	15	*9*	–	20	*12*	–	0	– 400	0	– 400	0	– 400	*0*	*– 400*	–	–	0	– 630	0	– 630	0	– 630	–	–	40	40	15	*9*	–	315	400
400	500	65	35	*20*	*15*	–	*18*	*11*	–	*25*	*15*	–	0	– 450	0	– 450	*0*	*– 450*	*0*	*– 450*	–	–	–	–	–	–	–	–	–	–	50	45	*18*	*11*	–	400	500
500	630	70	40	*25*	–	–	*25*	–	–	*30*	–	–	0	– 500	0	– 500	*0*	*– 500*	–	–	–	–	–	–	–	–	–	–	–	–	60	50	*20*	–	–	500	630
630	800	80	*50*	*30*	–	–	*30*	–	–	*35*	–	–	0	– 750	*0*	*– 750*	*0*	*– 750*	–	–	–	–	–	–	–	–	–	–	–	–	70	*60*	*23*	–	–	630	800
800	1 000	90	*60*	*40*	–	–	*40*	–	–	*45*	–	–	0	– 1 000	*0*	*– 1 000*	*0*	*– 1 000*	–	–	–	–	–	–	–	–	–	–	–	–	80	*60*	*35*	–	–	800	1 000
1 000	1 250	100	*70*	*50*	–	–	*50*	–	–	*60*	–	–	0	– 1 250	*0*	*– 1 250*	*0*	*– 1 250*	–	–	–	–	–	–	–	–	–	–	–	–	100	*60*	*45*	–	–	1 000	1 250
1 250	1 600	120	–	–	–	–	–	–	–	–	–	–	0	– 1 600	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	120	–	–	–	–	1 250	1 600
1 600	2 000	140	–	–	–	–	–	–	–	–	–	–	0	– 2 000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	140	–	–	–	–	1 600	2 000

S_d : perpendicularity of inner ring face with respect to the bore S_{ia} : axial runout of assembled bearing inner ring

[Notes] 1) These shall be applied to bearings of diameter series 0, 1, 2, 3 and 4.
2) These shall be applied to deep groove ball bearings and angular contact ball bearings.
3) These shall be appplied to individual bearing rings manufactured for matched pair or stack bearings.
4) Also applicable to the inner ring with tapered bore of $d \geqq 50$ mm.

[Remark] Values in Italics are prescribed in JTEKT standards.

Table 7-3 (2) Radial bearing tolerances (tapered roller bearings excluded)

(3) Outer ring (outside diameter)

Unit : μm

Nominal outside dia. D mm		Single plane mean outside diameter deviation Δ_{Dmp}										Single outside diameter deviation Δ_{Ds} 1)			
		class 0		class 6		class 5		class 4		class 2		class 4 5)		class 2	
over	up to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower
–	2.5	0	– 8	0	– 7	0	– 5	0	– 4	0	– 2.5	0	– 4	0	– 2.5
2.5	6	0	– 8	0	– 7	0	– 5	0	– 4	0	– 2.5	0	– 4	0	– 2.5
6	18	0	– 8	0	– 7	0	– 5	0	– 4	0	– 2.5	0	– 4	0	– 2.5
18	30	0	– 9	0	– 8	0	– 6	0	– 5	0	– 4	0	– 5	0	– 4
30	50	0	– 11	0	– 9	0	– 7	0	– 6	0	– 4	0	– 6	0	– 4
50	80	0	– 13	0	– 11	0	– 9	0	– 7	0	– 4	0	– 7	0	– 4
80	120	0	– 15	0	– 13	0	– 10	0	– 8	0	– 5	0	– 8	0	– 5
120	150	0	– 18	0	– 15	0	– 11	0	– 9	0	– 5	0	– 9	0	– 5
150	180	0	– 25	0	– 18	0	– 13	0	– 10	0	– 7	0	– 10	0	– 7
180	250	0	– 30	0	– 20	0	– 15	0	– 11	0	– 8	0	– 11	0	– 8
250	315	0	– 35	0	– 25	0	– 18	0	– 13	0	– 8	0	– 13	0	– 8
315	400	0	– 40	0	– 28	0	– 20	0	– 15	0	– 10	0	– 15	0	– 10
400	500	0	– 45	0	– 33	0	– 23	*0*	*– 17*	–	–	*0*	*– 17*	–	–
500	630	0	– 50	0	– 38	0	– 28	*0*	*– 20*	–	–	*0*	*– 20*	–	–
630	800	0	– 75	0	– 45	0	– 35	–	–	–	–	–	–	–	–
800	1 000	0	– 100	0	– 60	*0*	*– 50*	–	–	–	–	–	–	–	–
1 000	1 250	0	– 125	*0*	*– 75*	*0*	*– 63*	–	–	–	–	–	–	–	–
1 250	1 600	0	– 160	*0*	*– 90*	*0*	*– 80*	–	–	–	–	–	–	–	–
1 600	2 000	0	– 200	*0*	*– 120*	–	–	–	–	–	–	–	–	–	–
2 000	2 500	0	– 250	–	–	–	–	–	–	–	–	–	–	–	–

Nominal outside dia. D mm		Single plane outside diameter variation V_{Dsp}																Shielded/sealed type		Mean outside diameter variation V_{Dmp}					Nominal outside dia. D mm	
		Diameter series 7, 8, 9				Diameter series 0, 1				Diameter series 2, 3, 4				Dia. series 1)		Diameter series										
		class 0 2)		class 6 2)		class 5 5)		class 4 5)		class 0 2)		class 6 2)		class 5 5)		class 4 5)		class 2		2, 3, 4	0, 1, 2, 3, 4							
		class 0 2)		class 6 2)		class 5		class 4 5)		class 0 2)		class 6 2)		class 5 5)		class 4 5)		class 2		class 0 2)	class 6 2)	class 0 2)	class 6 2)	class 5	class 4	class 2		
over	up to	max.																							over	up to
–	2.5	10	9	6	5	3	2	1.5		8	7	4	3	6	5	4	3	2.5		10	9	6	5	3	2	1.5	–	2.5
2.5	6	10	9	6	5	3	2	1.5		8	7	4	3	6	5	4	3	2.5		10	9	6	5	3	2	1.5	2.5	6
6	18	10	9	6	5	3	2	1.5		8	7	4	3	6	5	4	3	2.5		10	9	6	5	3	2	1.5	6	18
18	30	12	10	7	6	3	2.5	2		9	8	5	4	7	6	5	4	4		12	10	7	6	3	2.5	2	18	30
30	50	14	11	7	6	4	3	2		11	9	5	5	8	7	5	5	4		16	13	8	7	4	3	2	30	50
50	80	16	14	9	7	5	3.5	2		13	11	7	5	10	8	7	5	4		20	16	10	8	5	3.5	2	50	80
80	120	19	16	10	8	5	4	2.5		19	16	8	6	11	10	8	6	5		26	20	11	10	5	4	2.5	80	120
120	150	23	19	11	9	5	5	2.5		23	19	8	7	14	11	8	7	5		30	25	14	11	6	5	2.5	120	150
150	180	31	23	13	10	7	5	3.5		31	23	10	8	19	14	10	8	7		38	30	19	14	7	5	3.5	150	180
180	250	38	25	15	11	8	6	4		38	25	11	8	23	15	11	8	8		–	–	23	15	8	6	4	180	250
250	315	44	31	18	13	8	7	4		44	31	14	10	26	19	14	10	8		–	–	26	19	9	7	4	250	315
315	400	50	35	20	15	10	8	5		50	35	15	11	30	21	15	11	10		–	–	30	21	10	8	5	315	400
400	500	56	41	23	17	–	–	–		56	41	17	*13*	34	25	17	*13*	–		–	–	34	25	12	*9*	–	400	500
500	630	63	48	28	*20*	–	–	–		63	48	21	*15*	38	29	21	*15*	–		–	–	38	29	14	*10*	–	500	630
630	800	94	56	35	–	–	–	–		94	56	26	–	55	34	26	–	–		–	–	55	34	18	–	–	630	800
800	1 000	125	75	*50*	–	–	–	–		125	75	*38*	–	75	45	*38*	–	–		–	–	75	45	*25*	–	–	800	1 000
1 000	1 250	*156*	*94*	*63*	–	–	–	–		*156*	*94*	*47*	–	*94*	*56*	*47*	–	–		–	–	*94*	*56*	*31*	–	–	1 000	1 250
1 250	1 600	*200*	*113*	*80*	–	–	–	–		*200*	*113*	*60*	–	*120*	*68*	*60*	–	–		–	–	*120*	*68*	*40*	–	–	1 250	1 600
1 600	2 000	*250*	*150*	–	–	–	–	–		*250*	*150*	–	–	*150*	*90*	–	–	–		–	–	*150*	*90*	–	–	–	1 600	2 000
2 000	2 500	*313*	–	–	–	–	–	–		*313*	–	–	–	*188*	–	–	–	–		–	–	*188*	–	–	–	–	2 000	2 500

(4) Outer ring (running accuracy and width)

Unit : μm

Nominal outside dia. D mm		Radial runout of assembled bearing outer ring K_{ea}					S_D 4)			S_{ea} 3) 4)			Δ_{Cs} 3)	Ring width variation V_{Cs} 3)			
		class 0	class 6	class 5	class 4	class 2	class 5	class 4	class 2	class 5	class 4	class 2	classes 0, 6, 5, 4, 2	classes 0, 6	class 5	class 4	class 2
over	up to	max.					max.			max.			upper lower	max.			
–	2.5	15	8	5	3	1.5	8	4	1.5	8	5	1.5			5	2.5	1.5
2.5	6	15	8	5	3	1.5	8	4	1.5	8	5	1.5			5	2.5	1.5
6	18	15	8	5	3	1.5	8	4	1.5	8	5	1.5			5	2.5	1.5
18	30	15	9	6	4	2.5	8	4	1.5	8	5	2.5			5	2.5	1.5
30	50	20	10	7	5	2.5	8	4	1.5	8	5	2.5			5	2.5	1.5
50	80	25	13	8	5	4	8	4	1.5	10	5	4			6	3	1.5
80	120	35	18	10	6	5	9	5	2.5	11	6	5			8	4	2.5
120	150	40	20	11	7	5	10	5	2.5	13	7	5			8	5	2.5
150	180	45	23	13	8	5	10	5	2.5	14	8	5			8	5	2.5
180	250	50	25	15	10	7	11	7	4	15	10	7			10	7	4
250	315	60	30	18	11	7	13	8	5	18	10	7			11	7	5
315	400	70	35	20	13	8	13	10	7	20	13	8			13	8	7
400	500	80	40	23	*15*	–	15	*12*	–	23	*15*	–			15	*9*	–
500	630	100	50	25	*18*	–	18	*13*	–	25	*18*	–			18	*11*	–
630	800	120	60	30	–	–	20	–	–	30	–	–			20	–	–
800	1 000	140	75	*40*	–	–	*23*	–	–	*40*	–	–			*23*	–	–
1 000	1 250	160	*85*	*45*	–	–	*30*	–	–	*45*	–	–			*30*	–	–
1 250	1 600	190	*95*	*60*	–	–	*45*	–	–	*60*	–	–			*45*	–	–
1 600	2 000	220	*110*	–	–	–	–	–	–	–	–	–			–	–	–
2 000	2 500	250	–	–	–	–	–	–	–	–	–	–			–	–	–

Shall conform to the tolerance Δ_{Bs} on d of the same bearing

Shall conform to the tolerance V_{Bs} on d of the same bearing

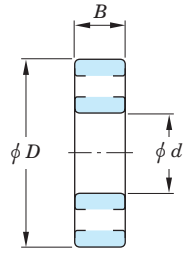
S_D : perpendicularity of outer ring outside surface with respect to the face
S_{ea} : axial runout of assembled bearing outer ring
Δ_{Cs} : deviation of a single outer ring width

[Notes]

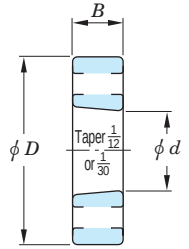
1) These shall be applied to bearings of diameter series 0, 1, 2, 3 and 4.
2) Shall be applied when locating snap ring is not fitted.
3) These shall be applied to deep groove ball bearings and angular contact ball bearings.
4) These shall not be applied to flanged bearings.
5) These shall not be applied to shielded bearings and sealed bearings.

[Remark]

Values in Italics are prescribed in JTEKT standards.



Cylindrical bore



Tapered bore

d : nominal bore diameter
D : nominal outside diameter
B : nominal assembled bearing width

(Refer.) Table 7-4 Tolerances for measuring instrument ball bearings (inch series)

= ANSI/ABMA standards = (reference)

(1) Inner ring and outer ring width

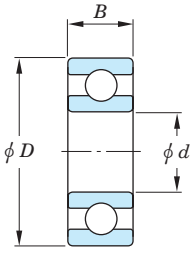
Unit : μm

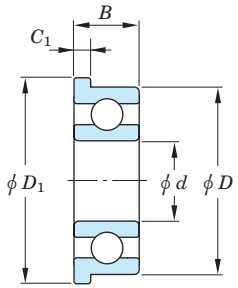
Nominal bore dia. d mm		Single plane mean bore diameter deviation Δ_{dmp}				Single bore diameter deviation Δ_{ds}				Single plane bore diameter variation V_{dsp}		Mean bore diameter variation V_{dmp}		Radial runout of assembled bearing inner ring K_{ia}			Axial runout of assembled bearing inner ring S_{ia}			Perpendicularity of inner ring face with respect to the bore S_d			Single inner or outer ring width deviation Δ_{Bs} , Δ_{Cs}		Inner or outer ring width variation V_{Bs} , V_{Cs}		
		classes 5P, 7P		class 9P		classes 5P, 7P		class 9P		classes 5P, 7P	class 9P	classes 5P, 7P	class 9P	class 5P	class 7P	class 9P	class 5P	class 7P	class 9P	class 5P	class 7P	class 9P	classes 5P, 7P, 9P		class 5P	class 7P	class 9P
over	up to	upper	lower	upper	lower	upper	lower	upper	lower	max.		max.		max.			max.			max.			upper	lower	max.		
–	10	0	– 5.1	0	– 2.5	0	– 5.1	0	– 2.5	2.5	1.3	2.5	1.3	3.8	2.5	1.3	7.6	2.5	1.3	7.6	2.5	1.3	0	– 25.4	5.1	2.5	1.3
10	18	0	– 5.1	0	– 2.5	0	– 5.1	0	– 2.5	2.5	1.3	2.5	1.3	3.8	2.5	1.3	7.6	2.5	1.3	7.6	2.5	1.3	0	– 25.4	5.1	2.5	1.3
18	30	0	– 5.1	0	– 2.5	0	– 5.1	0	– 2.5	2.5	1.3	2.5	1.3	3.8	3.8	2.5	7.6	3.8	1.3	7.6	3.8	1.3	0	– 25.4	5.1	2.5	1.3

(2) Outer ring

Unit : μm

Nominal outside dia. D mm		Single plane mean outside diameter deviation Δ_{Dmp}				Single outside diameter deviation Δ_{Ds}						Single plane outside diameter variation V_{Dsp}			Mean outside diameter variation V_{Dmp}			Radial runout of assembled bearing outer ring K_{ea}			Axial runout of assembled bearing outer ring S_{ea}			Perpendicularity of outer ring outside surface with respect to the face S_D			Single outer ring flange outside diameter deviation Δ_{D1s}		Single outer ring flange width deviation Δ_{C1s}	
		classes 5P, 7P		class 9P		classes 5P, 7P				class 9P		classes 5P, 7P		class 9P	classes 5P, 7P		class 9P	class 5P	class 7P	class 9P	class 5P	class 7P	class 9P	class 5P	class 7P	class 9P	classes 5P, 7P		classes 5P, 7P	
						Open type		Shielded/ sealed type		Open type		Open type	Shielded/ sealed type	Open type	Open type	Shielded/ sealed type	Open type													
over	up to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	max.			max.			max.			max.			max.			upper	lower	upper	lower
–	18	0	– 5.1	0	– 2.5	0	– 5.1	+ 1	– 6.1	0	– 2.5	2.5	5.1	1.3	2.5	5.1	1.3	5.1	3.8	1.3	7.6	5.1	1.3	7.6	3.8	1.3	0	– 25.4	0	– 50.8
18	30	0	– 5.1	0	– 3.8	0	– 5.1	+ 1	– 6.1	0	– 3.8	2.5	5.1	2	2.5	5.1	2	5.1	3.8	2.5	7.6	5.1	2.5	7.6	3.8	1.3	0	– 25.4	0	– 50.8
30	50	0	– 5.1	0	– 3.8	0	– 5.1	+ 1	– 6.1	0	– 3.8	2.5	5.1	2	2.5	5.1	2	5.1	5.1	2.5	7.6	5.1	2.5	7.6	3.8	1.3	0	– 25.4	0	– 50.8





d : nominal bore diameter
D : nominal outside diameter
B : nominal assembled bearing width
D_1 : nominal outer ring flange outside diameter
C_1 : nominal outer ring flange width

Table 7-5 (1) Tolerances for metric series tapered roller bearings

= JIS B 1514-1 =

(1) Inner ring

Unit : μm

Nominal bore diameter d mm		Single plane mean bore diameter deviation Δ_{dmp}								Single bore diameter deviation Δ_{ds}				Single plane bore diameter variation V_{dsp}						Mean bore diameter variation V_{dmp}					
		classes 0, 6X		classes 6, 5		class 4		class 2		class 4		class 2		classes 0, 6X	class 6	class 5	class 4	class 2		classes 0, 6X	class 6	class 5	class 4	class 2	
over	up to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	max.						max.					
–	10	0	– 12	0	– 7[1]	0	– 5	0	– 4	0	– 5	0	– 4	12	–	5	4	2.5		9	–	5	4	1.5	
10	18	0	– 12	0	– 7	0	– 5	0	– 4	0	– 5	0	– 4	12	7	5	4	2.5		9	5	5	4	1.5	
18	30	0	– 12	0	– 8	0	– 6	0	– 4	0	– 6	0	– 4	12	8	6	5	2.5		9	6	5	4	1.5	
30	50	0	– 12	0	– 10	0	– 8	0	– 5	0	– 8	0	– 5	12	10	8	6	3		9	8	5	5	2	
50	80	0	– 15	0	– 12	0	– 9	0	– 5	0	– 9	0	– 5	15	12	9	7	4		11	9	6	5	2	
80	120	0	– 20	0	– 15	0	– 10	0	– 6	0	– 10	0	– 6	20	15	11	8	5		15	11	8	5	2.5	
120	180	0	– 25	0	– 18	0	– 13	0	– 7	0	– 13	0	– 7	25	18	14	10	7		19	14	9	7	3.5	
180	250	0	– 30	0	– 22	0	– 15	0	– 8	0	– 15	0	– 8	30	22	17	11	7		23	16	11	8	4	
250	315	0	– 35	0	– 25[1]	0	– 18	0	– 8	0	– 18	0	– 8	35	*25*	19	12	8		26	*19*	13	9	5	
315	400	0	– 40	0	– 30[1]	–	–	–	–	–	–	–	–	40	*30*	23	–	–		30	*23*	15	–	–	
400	500	0	– 45	0	– 35[1]	–	–	–	–	–	–	–	–	45	*35*	28	–	–		34	*26*	17	–	–	
500	630	0	– 60	0	– 40[1]	–	–	–	–	–	–	–	–	60	*40*	35	–	–		40	*30*	20	–	–	
630	800	0	– 75	0	– 50[1]	–	–	–	–	–	–	–	–	75	*50*	45	–	–		45	*38*	25	–	–	
800	1 000	0	– 100	0	– 60[1]	–	–	–	–	–	–	–	–	100	*60*	60	–	–		55	*45*	30	–	–	

Nominal bore diameter d mm		Radial runout of assembled bearing inner ring K_{ia}						S_d			S_{ia}		Single inner ring width deviation Δ_{Bs}										Nominal bore diameter d mm	
		classes 0, 6X	class 6	class 5	class 4	class 2		class 5	class 4	class 2	class 4	class 2	class 0		class 6X		class 6		classes 5, 4		class 2			
over	up to	max.						max.			max.		upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	over	up to
–	10	15	–	5	3	2		7	3	1.5	3	2	0	– 120	0	– 50	–	–	0	– 200	0	– 200	–	10
10	18	15	7	5	3	2		7	3	1.5	3	2	0	– 120	0	– 50	0	– 120	0	– 200	0	– 200	10	18
18	30	18	8	5	3	2.5		8	4	1.5	4	2.5	0	– 120	0	– 50	0	– 120	0	– 200	0	– 200	18	30
30	50	20	10	6	4	2.5		8	4	2	4	2.5	0	– 120	0	– 50	0	– 120	0	– 240	0	– 240	30	50
50	80	25	10	7	4	3		8	5	2	4	3	0	– 150	0	– 50	0	– 150	0	– 300	0	– 300	50	80
80	120	30	13	8	5	3		9	5	2.5	5	3	0	– 200	0	– 50	0	– 200	0	– 400	0	– 400	80	120
120	180	35	18	11	6	4		10	6	3.5	7	4	0	– 250	0	– 50	0	– 250	0	– 500	0	– 500	120	180
180	250	50	20	13	8	5		11	7	5	8	5	0	– 300	0	– 50	0	– 300	0	– 600	0	– 600	180	250
250	315	60	*30*	13	9	6		13	8	5.5	9	6	0	– 350	0	– 50	*0*	*– 350*	0	– 700	0	– 700	250	315
315	400	70	*35*	15	–	–		15	–	–	–	–	0	– 400	0	– 50	*0*	*– 400*	0	– 800[2]	–	–	315	400
400	500	80	*40*	20	–	–		17	–	–	–	–	0	– 450	0	– 50	*0*	*– 450*	0	– 900[2]	–	–	400	500
500	630	90	*50*	25	–	–		20	–	–	–	–	0	– 500	–	–	*0*	*– 500*	0	– 1 100[2]	–	–	500	630
630	800	100	*60*	30	–	–		25	–	–	–	–	0	– 750	–	–	*0*	*– 750*	0	– 1 600[2]	–	–	630	800
800	1 000	115	*75*	37	–	–		30	–	–	–	–	0	– 1 000	–	–	*0*	*– 1 000*	0	– 2 000[2]	–	–	800	1 000

S_d : perpendicularity of inner ring face with respect to the bore
S_{ia} : axial runout of assembled bearing inner ring

(2-1) Outer ring

Unit : μm

Nominal outside diameter D mm		Single plane mean outside diameter deviation Δ_{Dmp}								Single outside diameter deviation Δ_{Ds}				Single plane outside diameter variation V_{Dsp}						Mean outside diameter variation V_{Dmp}					
		classes 0, 6X		classes 6, 5		class 4		class 2		class 4		class 2		classes 0, 6X	class 6	class 5	class 4	class 2		classes 0, 6X	class 6	class 5	class 4	class 2	
over	up to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	max.						max.					
–	18	0	– 12	0	– 8[1]	0	– 6	0	– 5	0	– 6	0	– 5	12	–	6	5	4		9	–	5	4	2.5	
18	30	0	– 12	0	– 8	0	– 6	0	– 5	0	– 6	0	– 5	12	8	6	5	4		9	6	5	4	2.5	
30	50	0	– 14	0	– 9	0	– 7	0	– 5	0	– 7	0	– 5	14	9	7	5	4		11	7	5	5	2.5	
50	80	0	– 16	0	– 11	0	– 9	0	– 6	0	– 9	0	– 6	16	11	8	7	4		12	8	6	5	2.5	
80	120	0	– 18	0	– 13	0	– 10	0	– 6	0	– 10	0	– 6	18	13	10	8	5		14	10	7	5	3	
120	150	0	– 20	0	– 15	0	– 11	0	– 7	0	– 11	0	– 7	20	15	11	8	5		15	11	8	6	3.5	
150	180	0	– 25	0	– 18	0	– 13	0	– 7	0	– 13	0	– 7	25	18	14	10	7		19	14	9	7	4	
180	250	0	– 30	0	– 20	0	– 15	0	– 8	0	– 15	0	– 8	30	20	15	11	8		23	15	10	8	5	
250	315	0	– 35	0	– 25	0	– 18	0	– 9	0	– 18	0	– 9	35	25	19	14	8		26	19	13	9	5	
315	400	0	– 40	0	– 28	0	– 20	0	– 10	0	– 20	0	– 10	40	28	22	15	10		30	21	14	10	6	
400	500	0	– 45	0	– 33[1]	–	–	–	–	–	–	–	–	45	*33*	26	–	–		34	*25*	17	–	–	
500	630	0	– 50	0	– 38[1]	–	–	–	–	–	–	–	–	60	*38*	30	–	–		38	*29*	20	–	–	
630	800	0	– 75	0	– 45[1]	–	–	–	–	–	–	–	–	80	*45*	38	–	–		55	*34*	25	–	–	
800	1 000	0	– 100	0	– 60[1]	–	–	–	–	–	–	–	–	100	*60*	50	–	–		75	*45*	30	–	–	
1 000	1 250	0	– 125	0	– 80[1]	–	–	–	–	–	–	–	–	130	*75*	65	–	–		90	*56*	38	–	–	
1 250	1 600	0	– 160	0	– 100[1]	–	–	–	–	–	–	–	–	170	*90*	90	–	–		100	*68*	50	–	–	

Nominal outside diameter D mm		Radial runout of assembled bearing outer ring K_{ea}						S_D[3]			S_{ea}[3]		Nominal outside diameter D mm	
		classes 0, 6X	class 6	class 5	class 4	class 2		class 5	class 4	class 2	class 4	class 2		
over	up to	max.						max.			max.		over	up to
–	18	18	–	6	4	2.5		8	4	1.5	5	2.5	–	18
18	30	18	9	6	4	2.5		8	4	1.5	5	2.5	18	30
30	50	20	10	7	5	2.5		8	4	2	5	2.5	30	50
50	80	25	13	8	5	4		8	4	2.5	5	4	50	80
80	120	35	18	10	6	5		9	5	3	6	5	80	120
120	150	40	20	11	7	5		10	5	3.5	7	5	120	150
150	180	45	23	13	8	5		10	5	4	8	5	150	180
180	250	50	25	15	10	7		11	7	5	10	7	180	250
250	315	60	30	18	11	7		13	8	6	10	7	250	315
315	400	70	35	20	13	8		13	10	7	13	8	315	400
400	500	80	*40*	24	–	–		17	–	–	–	–	400	500
500	630	100	*50*	30	–	–		20	–	–	–	–	500	630
630	800	120	*60*	36	–	–		25	–	–	–	–	630	800
800	1 000	140	*75*	43	–	–		30	–	–	–	–	800	1 000
1 000	1 250	160	*85*	52	–	–		38	–	–	–	–	1 000	1 250
1 250	1 600	180	*95*	62	–	–		50	–	–	–	–	1 250	1 600

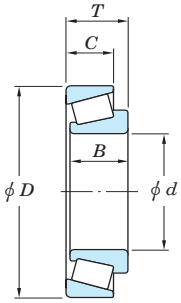
S_D : perpendicularity of outer ring outside surface with respect to the face
S_{ea} : axial runout of assembled bearing outer ring

(2-2) Outer ring

Unit : μm

Nominal bore diameter d mm		Single outer ring width deviation Δ_{Cs}			
		class 6X		classes 0, 6, 5, 4, 2	
over	up to	upper	lower	upper	lower
–	10	0	– 100		
10	18	0	– 100		
18	30	0	– 100		
30	50	0	– 100		
50	80	0	– 100		
80	120	0	– 100		
120	150	0	– 100		
150	180	0	– 100		
180	250	0	– 100		
250	315	0	– 100		
315	400	0	– 100		
400	500	0	– 100		
500	630	–	–		
630	800	–	–		
800	1 000	–	–		

Shall comform to the tolerance Δ_{Bs} on d of the same bearing



d : nominal bore diameter
D : nominal outside diameter
B : nominal inner ring width
C : nominal outer ring width
T : nominal assembled bearing width

[Notes] 1) Class 6 values are prescribed in JTEKT standards.
2) These shall be applied to bearings of tolerance class 5.
3) These shall not be applied to flanged bearings.
[Remark] Values in Italics are prescribed in JTEKT standards.

Table 7-5 (2) Tolerances for metric series tapered roller bearings

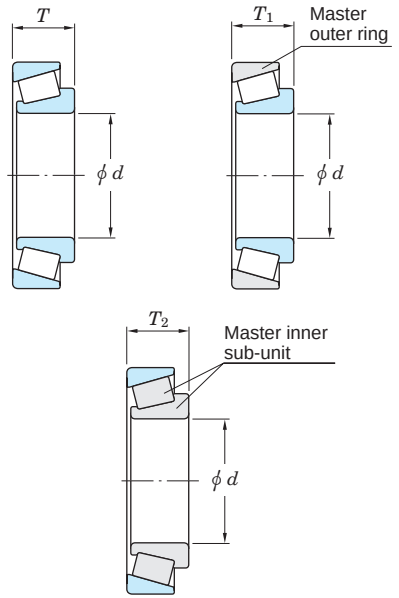
(3) Assembled bearing width and effective width

Unit : μm

Nominal bore diameter d mm		Actual bearing width deviation Δ_{Ts}										Actual effective inner sub-unit width deviation Δ_{T1s}							
		class 0		class 6X		class 6		classes 5, 4		class 2		class 0		class 6X		classes 5, 4		class 2	
over	up to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower
–	10	+ 200	0	+ 100	0	–	–	+ 200	– 200	+ 200	– 200	+ 100	0	+ 50	0	+ 100	– 100	+ 100	– 100
10	18	+ 200	0	+ 100	0	+ 200	0	+ 200	– 200	+ 200	– 200	+ 100	0	+ 50	0	+ 100	– 100	+ 100	– 100
18	30	+ 200	0	+ 100	0	+ 200	0	+ 200	– 200	+ 200	– 200	+ 100	0	+ 50	0	+ 100	– 100	+ 100	– 100
30	50	+ 200	0	+ 100	0	+ 200	0	+ 200	– 200	+ 200	– 200	+ 100	0	+ 50	0	+ 100	– 100	+ 100	– 100
50	80	+ 200	0	+ 100	0	+ 200	0	+ 200	– 200	+ 200	– 200	+ 100	0	+ 50	0	+ 100	– 100	+ 100	– 100
80	120	+ 200	– 200	+ 100	0	+ 200	– 200	+ 200	– 200	+ 200	– 200	+ 100	– 100	+ 50	0	+ 100	– 100	+ 100	– 100
120	180	+ 350	– 250	+ 150	0	+ 350	– 250	+ 350	– 250	+ 200	– 250	+ 150	– 150	+ 50	0	+ 150	– 150	+ 100	– 100
180	250	+ 350	– 250	+ 150	0	+ 350	– 250	+ 350	– 250	+ 200	– 300	+ 150	– 150	+ 50	0	+ 150	– 150	+ 100	– 150
250	315	+ 350	– 250	+ 200	0	*+ 350*	*– 250*	+ 350	– 250	+ 200	– 300	+ 150	– 150	+ 100	0	+ 150	– 150	+ 100	– 150
315	400	+ 400	– 400	+ 200	0	*+ 400*	*– 400*	+ 400	– 400 [1]	–	–	+ 200	– 200	+ 100	0	+ 200	– 200 [1]	–	–
400	500	+ 450	– 450	+ 200	0	*+ 400*	*– 400*	+ 450	– 450 [1]	–	–	+ 225	– 225	+ 100	0	+ 225	– 225 [1]	–	–
500	630	+ 500	– 500	–	–	*+ 500*	*– 500*	+ 500	– 500 [1]	–	–	–	–	–	–	–	–	–	–
630	800	+ 600	– 600	–	–	*+ 600*	*– 600*	+ 600	– 600 [1]	–	–	–	–	–	–	–	–	–	–
800	1 000	+ 750	– 750	–	–	*+ 750*	*– 750*	+ 750	– 750 [1]	–	–	–	–	–	–	–	–	–	–

Nominal bore diameter d mm		Actual effective outer ring width deviation Δ_{T2s}							
		class 0		class 6X		classes 5, 4		class 2	
over	up to	upper	lower	upper	lower	upper	lower	upper	lower
–	10	+ 100	0	+ 50	0	+ 100	– 100	+ 100	– 100
10	18	+ 100	0	+ 50	0	+ 100	– 100	+ 100	– 100
18	30	+ 100	0	+ 50	0	+ 100	– 100	+ 100	– 100
30	50	+ 100	0	+ 50	0	+ 100	– 100	+ 100	– 100
50	80	+ 100	0	+ 50	0	+ 100	– 100	+ 100	– 100
80	120	+ 100	– 100	+ 50	0	+ 100	– 100	+ 100	– 100
120	180	+ 200	– 100	+ 100	0	+ 200	– 100	+ 100	– 150
180	250	+ 200	– 100	+ 100	0	+ 200	– 100	+ 100	– 150
250	315	+ 200	– 100	+ 100	0	+ 200	– 100	+ 100	– 150
315	400	+ 200	– 200	+ 100	0	+ 200	– 200 [1]	–	–
400	500	+ 225	– 225	+ 100	0	+ 225	– 225 [1]	–	–
500	630	–	–	–	–	–	–	–	–
630	800	–	–	–	–	–	–	–	–
800	1 000	–	–	–	–	–	–	–	–

[Note] 1) These shall be applied to bearings of tolerance class 5.
[Remark] Values in Italics are prescribed in JTEKT standards.



d : nominal bore diameter
T : nominal assembled bearing width
T_1 : nominal effective width of inner sub-unit
T_2 : nominal effective width of outer ring

Table 7-6 Tolerances for metric series double-row and four-row tapered roller bearings (class 0)

= BAS 1002 =

(1) Inner ring, outer ring width and overall width

Unit : μm

Nominal bore diameter d mm		Single plane mean bore diameter deviation Δ_{dmp}		Single plane bore diameter variation V_{dsp}	Mean bore diameter variation V_{dmp}	K_{ia}	Single outer ring or inner ring width deviation Δ_{Bs}, Δ_{Cs}		Actual overall inner rings/ outer rings width deviation			
									Double-row Δ_{Ts}		Four-row Δ_{Ts}, Δ_{Ws}	
over	up to	upper	lower	max.	max.	max.	upper	lower	upper	lower	upper	lower
30	50	0	– 12	12	9	20	0	– 120	+ 240	– 240	–	–
50	80	0	– 15	15	11	25	0	– 150	+ 300	– 300	–	–
80	120	0	– 20	20	15	30	0	– 200	+ 400	– 400	+ 500	– 500
120	180	0	– 25	25	19	35	0	– 250	+ 500	– 500	+ 600	– 600
180	250	0	– 30	30	23	50	0	– 300	+ 600	– 600	+ 750	– 750
250	315	0	– 35	35	26	60	0	– 350	+ 700	– 700	+ 900	– 900
315	400	0	– 40	40	30	70	0	– 400	+ 800	– 800	+ 1 000	– 1 000
400	500	0	– 45	45	34	80	0	– 450	+ 900	– 900	+ 1 200	– 1 200
500	630	0	– 60	60	40	90	0	– 500	+ 1 000	– 1 000	+ 1 200	– 1 200
630	800	0	– 75	75	45	100	0	– 750	+ 1 500	– 1 500	–	–
800	1 000	0	– 100	100	55	115	0	– 1 000	+ 1 500	– 1 500	–	–

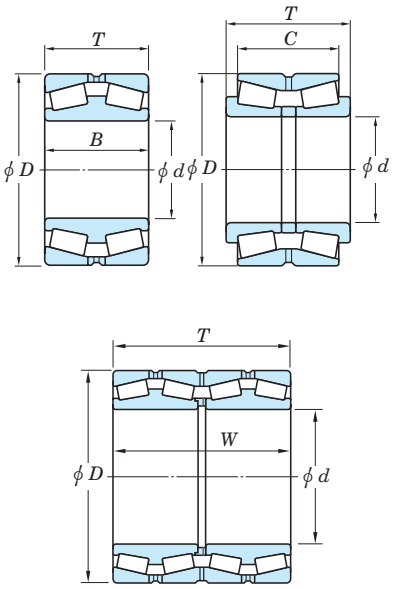
K_{ia} : radial runout of assembled bearing inner ring

(2) Outer ring

Unit : μm

Nominal outside diameter D mm		Single plane mean outside diameter deviation Δ_{Dmp}		Single plane outside diameter variation V_{Dsp}	Mean outside diameter variation V_{Dmp}	K_{ea}
over	up to	upper	lower	max.	max.	max.
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
500	630	0	– 50	60	38	100
630	800	0	– 75	80	55	120
800	1 000	0	– 100	100	75	140
1 000	1 250	0	– 125	130	90	160
1 250	1 600	0	– 160	170	100	180

K_{ea} : radial runout of assembled bearing outer ring



d : nominal bore diameter
D : nominal outside diameter
B : nominal double inner ring width
C : nominal double outer ring width
T, W : nominal overall width of outer rings (inner rings)

Table 7-7 Tolerances and permissible values for inch series tapered roller bearings

= ANSI/ABMA 19 =

(1) Inner ring

Unit : μm

Applied bearing type	Nominal bore diameter d, mm (1/25.4) over	up to	Deviation of a single bore diameter Δ_{ds} class 4 upper	class 4 lower	class 2 upper	class 2 lower	class 3 upper	class 3 lower	class 0 upper	class 0 lower	class 00 upper	class 00 lower
All types	–	**76.2** (3.0)	+ 13	0	+ 13	0	+ 13	0	+ 13	0	+ 8	0
	76.2 (3.0)	**266.7** (10.5)	+ 25	0	+ 25	0	+ 13	0	+ 13	0	+ 8	0
	266.7 (10.5)	**304.8** (12.0)	+ 25	0	+ 25	0	+ 13	0	+ 13	0	+ 8	0
	304.8 (12.0)	**609.6** (24.0)	+ 51	0	+ 51	0	+ 25	0	–	–	–	–
	609.6 (24.0)	**914.4** (36.0)	+ 76	0	–	–	+ 38	0	–	–	–	–
	914.4 (36.0)	**1 219.2** (48.0)	+ 102	0	–	–	+ 51	0	–	–	–	–
	1 219.2 (48.0)	–	+ 127	0	–	–	+ 76	0	–	–	–	–

(2) Outer ring

Unit : μm

Applied bearing type	Nominal outside diameter D, mm (1/25.4) over	up to	Deviation of a single outside diameter Δ_{Ds} class 4 upper	class 4 lower	class 2 upper	class 2 lower	class 3 upper	class 3 lower	class 0 upper	class 0 lower	class 00 upper	class 00 lower
All types	–	**266.7** (10.5)	+ 25	0	+ 25	0	+ 13	0	+ 13	0	+ 8	0
	266.7 (10.5)	**304.8** (12.0)	+ 25	0	+ 25	0	+ 13	0	+ 13	0	+ 8	0
	304.8 (12.0)	**609.6** (24.0)	+ 51	0	+ 51	0	+ 25	0	–	–	–	–
	609.6 (24.0)	**914.4** (36.0)	+ 76	0	+ 76	0	+ 38	0	–	–	–	–
	914.4 (36.0)	**1 219.2** (48.0)	+ 102	0	–	–	+ 51	0	–	–	–	–
	1 219.2 (48.0)	–	+ 127	0	–	–	+ 76	0	–	–	–	–

(3) Radial runout of assembled bearing inner ring/outer ring

Unit : μm

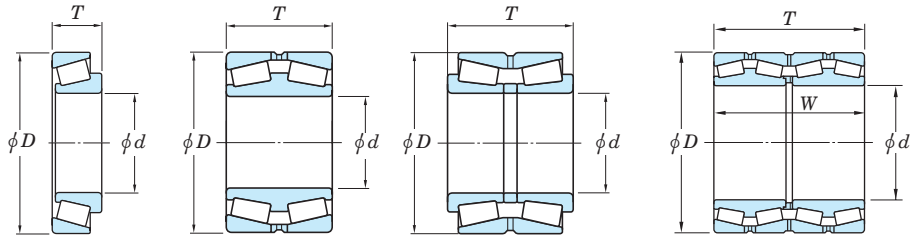
Applied bearing type	Nominal outside diameter D, mm (1/25.4) over	up to	Radial runout of inner ring/outer ring K_{ia}, K_{ea} class 4 max.	class 2 max.	class 3 max.	class 0 max.	class 00 max.
All types	–	**266.7** (10.5)	51	38	8	4	2
	266.7 (10.5)	**304.8** (12.0)	51	38	8	4	2
	304.8 (12.0)	**609.6** (24.0)	51	38	18	–	–
	609.6 (24.0)	**914.4** (36.0)	76	51	51	–	–
	914.4 (36.0)	**1 219.2** (48.0)	76	–	76	–	–
	1 219.2 (48.0)	–	76	–	76	–	–

(4) Assembled bearing width and overall width

Unit : μm

Applied bearing type	Nominal bore diameter d, mm (1/25.4) over	up to	Nominal outside diameter D, mm (1/25.4) over	up to	Deviation of the actual bearing width and overall width of inner rings/outer rings Δ_{Ts}, Δ_{Ws} class 4 upper	class 4 lower	class 2 upper	class 2 lower	class 3 upper	class 3 lower	classes 0,00 upper	classes 0,00 lower
Single-row	–	**101.6** (4.0)	–	–	+ 203	0	+ 203	0	+ 203	– 203	+ 203	– 203
	101.6 (4.0)	**266.7** (10.5)			+ 356	– 254	+ 203	0	+ 203	– 203	+ 203	– 203
	266.7 (10.5)	**304.8** (12.0)	–	–	+ 356	– 254	+ 203	0	+ 203	– 203	+ 203	– 203[1)]
	304.8 (12.0)	**609.6** (24.0)	–	**508.0** (20.0)	–	–	+ 381	– 381	+ 203	– 203	–	–
	304.8 (12.0)	**609.6** (24.0)	**508.0** (20.0)	–	–	–	+ 381	– 381	+ 381	– 381	–	–
	609.6 (24.0)		–	–	+ 381	– 381	–	–	+ 381	– 381	–	–
Double-row	–	**101.6** (4.0)	–	–	+ 406	0	+ 406	0	+ 406	– 406	+ 406	– 406
	101.6 (4.0)	**266.7** (10.5)	–	–	+ 711	– 508	+ 406	– 203	+ 406	– 406	+ 406	– 406
	266.7 (10.5)	**304.8** (12.0)	–	–	+ 711	– 508	+ 406	– 203	+ 406	– 406	+ 406	– 406[1)]
	304.8 (12.0)	**609.6** (24.0)	–	**508.0** (20.0)	–	–	+ 762	– 762	+ 406	– 406	–	–
	304.8 (12.0)	**609.6** (24.0)	**508.0** (20.0)	–	–	–	+ 762	– 762	+ 762	– 762	–	–
	609.6 (24.0)		–	–	+ 762	– 762	–	–	+ 762	– 762	–	–
Double-row (TNA type)	–	**127.0** (5.0)	–	–	–	–	+ 254	0	+ 254	0	–	–
	127.0 (5.0)		–	–	–	–	+ 762	0	+ 762	0	–	–
Four-row	Total dimensional range		–	–	+1 524	–1 524	+1 524	–1 524	+1 524	–1 524	+1 524	–1 524

[Note] 1) These shall be applied to bearings of class 0.



d : nominal bore diameter

D : nominal outside diameter

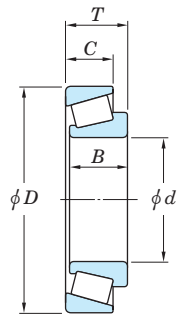
T, W : nominal assembled bearing width and nominal overall width of outer rings (inner rings)

Table 7-8 Tolerances for metric J series tapered roller bearings [1)]

(1) Bore diameter and width of inner ring and assembled bearing width

Unit : μm

Nominal bore diameter d mm		Deviation of a single bore diameter Δ_{ds}								Deviation of a single inner ring width Δ_{Bs}								Deviation of the actual bearing width Δ_{Ts}								Nominal bore diameter d mm	
		class PK		class PN		class PC		class PB		class PK		class PN		class PC		class PB		class PK		class PN		class PC		class PB			
over	up to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	over	up to
10	**18**	0	− 12	0	− 12	0	− 7	0	− 5	0	− 100	0	− 50	0	− 200	0	− 200	+ 200	0	+ 100	0	+ 200	− 200	+ 200	− 200	**10**	**18**
18	**30**	0	− 12	0	− 12	0	− 8	0	− 6	0	− 100	0	− 50	0	− 200	0	− 200	+ 200	0	+ 100	0	+ 200	− 200	+ 200	− 200	**18**	**30**
30	**50**	0	− 12	0	− 12	0	− 10	0	− 8	0	− 100	0	− 50	0	− 200	0	− 200	+ 200	0	+ 100	0	+ 200	− 200	+ 200	− 200	**30**	**50**
50	**80**	0	− 15	0	− 15	0	− 12	0	− 9	0	− 150	0	− 50	0	− 300	0	− 300	+ 200	0	+ 100	0	+ 200	− 200	+ 200	− 200	**50**	**80**
80	**120**	0	− 20	0	− 20	0	− 15	0	− 10	0	− 150	0	− 50	0	− 300	0	− 300	+ 200	− 200	+ 100	0	+ 200	− 200	+ 200	− 200	**80**	**120**
120	**180**	0	− 25	0	− 25	0	− 18	0	− 13	0	− 200	0	− 50	0	− 300	0	− 300	+ 350	− 250	+ 150	0	+ 350	− 250	+ 200	− 250	**120**	**180**
180	**250**	0	− 30	0	− 30	0	− 22	0	− 15	0	− 200	0	− 50	0	− 350	0	− 350	+ 350	− 250	+ 150	0	+ 350	− 250	+ 200	− 300	**180**	**250**
250	**315**	0	− 35	0	− 35	0	− 22	0	− 15	0	− 200	0	− 50	0	− 350	0	− 350	+ 350	− 250	+ 200	0	+ 350	− 300	+ 200	− 300	**250**	**315**



d : nominal bore diameter
D : nominal outside diameter
B : nominal inner ring width
C : nominal outer ring width
T : nominal assembled bearing width

(2) Outside diameter and width of outer ring and radial runout of assembled bearing inner ring/ outer ring

Unit : μm

Nominal outside diameter D mm		Deviation of a single outside diameter Δ_{Ds}								Deviation of a single outer ring width Δ_{Cs}								Radial runout of inner ring/outer ring K_{ia}, K_{ea}				Nominal outside diameter D mm	
		class PK		class PN		class PC		class PB		class PK		class PN		class PC		class PB		class PK	class PN	class PC	class PB		
over	up to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	max.	max.	max.	max.	over	up to
18	**30**	0	− 12	0	− 12	0	− 8	0	− 6	0	− 150	0	− 100	0	− 150	0	− 150	18	18	5	3	**18**	**30**
30	**50**	0	− 14	0	− 14	0	− 9	0	− 7	0	− 150	0	− 100	0	− 150	0	− 150	20	20	6	3	**30**	**50**
50	**80**	0	− 16	0	− 16	0	− 11	0	− 9	0	− 150	0	− 100	0	− 150	0	− 150	25	25	6	4	**50**	**80**
80	**120**	0	− 18	0	− 18	0	− 13	0	− 10	0	− 200	0	− 100	0	− 200	0	− 200	35	35	6	4	**80**	**120**
120	**150**	0	− 20	0	− 20	0	− 15	0	− 11	0	− 200	0	− 100	0	− 200	0	− 200	40	40	7	4	**120**	**150**
150	**180**	0	− 25	0	− 25	0	− 18	0	− 13	0	− 200	0	− 100	0	− 250	0	− 250	45	45	8	4	**150**	**180**
180	**250**	0	− 30	0	− 30	0	− 20	0	− 15	0	− 250	0	− 100	0	− 250	0	− 250	50	50	10	5	**180**	**250**
250	**315**	0	− 35	0	− 35	0	− 25	0	− 18	0	− 250	0	− 100	0	− 300	0	− 300	60	60	11	5	**250**	**315**
315	**400**	0	− 40	0	− 40	0	− 28	−	−	0	− 250	0	− 100	0	− 300	−	−	70	70	13	−	**315**	**400**

[Note] 1) Bearings with supplementary code “J” attached at the front of bearing number
Ex. JHM720249/JHM720210, and the like

Table 7-9 Tolerances for thrust ball bearings = JIS B 1514-2 =

(1) Shaft race and central race

Unit : μm

Nominal bore diameter of shaft or central race d or d_2, mm		Single plane mean bore diameter deviation Δ_{dmp} or Δ_{d2mp}				Single plane bore diameter variation V_{dsp} or V_{d2sp}		Race raceway to back face thickness variation S_i [1) 2)]			
		classes 0, 6, 5		class 4		classes 0, 6, 5	class 4	class 0	class 6	class 5	class 4
over	up to	upper	lower	upper	lower	max.		max.			
–	18	0	– 8	0	– 7	6	5	10	5	3	2
18	30	0	– 10	0	– 8	8	6	10	5	3	2
30	50	0	– 12	0	– 10	9	8	10	6	3	2
50	80	0	– 15	0	– 12	11	9	10	7	4	3
80	120	0	– 20	0	– 15	15	11	15	8	4	3
120	180	0	– 25	0	– 18	19	14	15	9	5	4
180	250	0	– 30	0	– 22	23	17	20	10	5	4
250	315	0	– 35	0	– 25	26	19	25	13	7	5
315	400	0	– 40	0	– 30	30	23	30	15	7	5
400	500	0	– 45	0	– 35	34	26	30	18	9	6
500	630	0	– 50	0	– 40	38	30	35	21	11	7
630	800	0	– 75	0	– 50	55	40	40	25	13	8
800	1 000	0	– 100	–	–	75	–	45	30	15	–
1 000	1 250	0	– 125	–	–	95	–	50	35	18	–

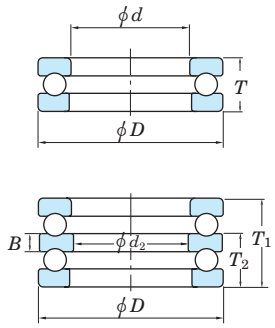
[Notes] 1) Double direction thrust ball bearings shall be included in d of single direction thrust ball bearings of the same diameter series and nominal outside diameter.
2) Applies only to thrust ball bearings and cylindrical roller thrust bearings with 90° contact angle.

(2) Housing race

Unit : μm

Nominal outside diameter D mm		Single plane mean outside diameter deviation Δ_{Dmp}				Single plane outside diameter variation V_{Dsp}		Race raceway to back face thickness variation S_e [1) 2)]
		classes 0, 6, 5		class 4		classes 0, 6, 5	class 4	classes 0, 6, 5, 4
over	up to	upper	lower	upper	lower	max.		max.
10	18	0	– 11	0	– 7	8	5	Shall conform to the tolerance S_i on d or d_2 of the same bearing
18	30	0	– 13	0	– 8	10	6	
30	50	0	– 16	0	– 9	12	7	
50	80	0	– 19	0	– 11	14	8	
80	120	0	– 22	0	– 13	17	10	
120	180	0	– 25	0	– 15	19	11	
180	250	0	– 30	0	– 20	23	15	
250	315	0	– 35	0	– 25	26	19	
315	400	0	– 40	0	– 28	30	21	
400	500	0	– 45	0	– 33	34	25	
500	630	0	– 50	0	– 38	38	29	
630	800	0	– 75	0	– 45	55	34	
800	1 000	0	– 100	0	– 60	75	45	
1 000	1 250	0	– 125	–	–	95	–	
1 250	1 600	0	– 160	–	–	120	–	

[Notes] 1) These shall be applied to race with flat back face only.
2) Applies only to thrust ball bearings and cylindrical roller thrust bearings with 90° contact angle.



d : shaft race nominal bore diameter
d_2 : central race nominal bore diameter
D : housing race nominal outside diameter
B : central race nominal height
T : nominal bearing height (single direction)
T_1, T_2 : nominal bearing height (double direction)

(3) Bearing height and central race height

Unit : μm

Nominal bore diameter d mm		Single direction		Double direction					
		Deviation of the actual bearing height Δ_{Ts}		Deviation of the actual bearing height Δ_{T1s} [1)]		Deviation of the actual bearing height Δ_{T2s} [1)]		Deviation of a single central race height B Δ_{Bs} [1)]	
		class 0		class 0		class 0		class 0	
over	up to	upper	lower	upper	lower	upper	lower	upper	lower
–	30	*0*	*– 75*	*+ 50*	*– 150*	*0*	*– 75*	*0*	*– 50*
30	50	*0*	*– 100*	*+ 75*	*– 200*	*0*	*– 100*	*0*	*– 75*
50	80	*0*	*– 125*	*+ 100*	*– 250*	*0*	*– 125*	*0*	*– 100*
80	120	*0*	*– 150*	*+ 125*	*– 300*	*0*	*– 150*	*0*	*– 125*
120	180	*0*	*– 175*	*+ 150*	*– 350*	*0*	*– 175*	*0*	*– 150*
180	250	*0*	*– 200*	*+ 175*	*– 400*	*0*	*– 200*	*0*	*– 175*
250	315	*0*	*– 225*	*+ 200*	*– 450*	*0*	*– 225*	*0*	*– 200*
315	400	*0*	*– 300*	*+ 250*	*– 600*	*0*	*– 300*	*0*	*– 250*

[Note] 1) Double direction thrust ball bearings shall be included in d of single direction thrust ball bearings of the same diameter series and nominal outside diameter.

[Remark] Values in Italics are prescribed in JTEKT standards.

Table 7-10 Tolerances for spherical thrust roller bearings (class 0) = JIS B 1514-2 =

(1) Shaft race

Unit : μm

Nominal bore diameter d mm		Single plane mean bore diameter deviation Δ_{dmp}		Single plane bore diameter variation V_{dsp}	Refer. S_d	Refer. Actual bearing height deviation Δ_{Ts}	
over	up to	upper	lower	max.	max.	upper	lower
50	80	0	– 15	11	*25*	*+ 150*	*– 150*
80	120	0	– 20	15	*25*	*+ 200*	*– 200*
120	180	0	– 25	19	*30*	*+ 250*	*– 250*
180	250	0	– 30	23	*30*	*+ 300*	*– 300*
250	315	0	– 35	26	*35*	*+ 350*	*– 350*
315	400	0	– 40	30	*40*	*+ 400*	*– 400*
400	500	0	– 45	34	*45*	*+ 450*	*– 450*

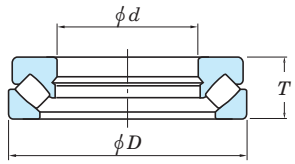
S_d : perpendicularity of inner ring face with respect to the bore

[Remark] Values in Italics are prescribed in JTEKT standards.

(2) Housing race

Unit : μm

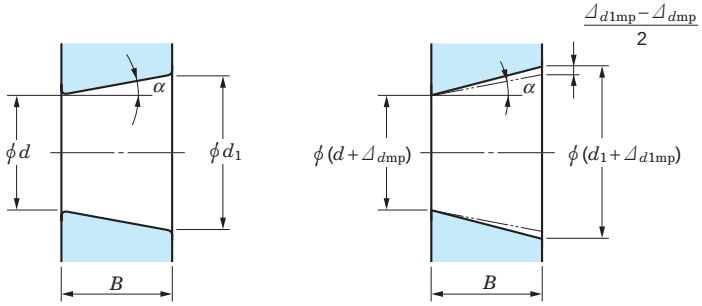
Nominal outside diameter D, mm		Single plane mean outside diameter deviation Δ_{Dmp}	
over	up to	upper	lower
120	180	0	– 25
180	250	0	– 30
250	315	0	– 35
315	400	0	– 40
400	500	0	– 45
500	630	0	– 50
630	800	0	– 75
800	1 000	0	– 100



d : shaft race nominal bore diameter
D : housing race nominal outside diameter
T : nominal bearing height

Table 7-11 Tolerances and permissible values for tapered bores of radial bearings

(class 0 ··· JIS B 1514-1)



Theoretical tapered bore

Tapered bore with single plane mean bore diameter deviation

(1) Basically tapered bore (taper 1:12) Unit : μm

Nominal bore diameter d, mm		Δ_{dmp}		$\Delta_{d1mp}-\Delta_{dmp}$		V_{dsp} [1]
over	up to	upper	lower	upper	lower	max.
–	10	+ 22	0	+ 15	0	9
10	18	+ 27	0	+ 18	0	11
18	30	+ 33	0	+ 21	0	13
30	50	+ 39	0	+ 25	0	16
50	80	+ 46	0	+ 30	0	19
80	120	+ 54	0	+ 35	0	22
120	180	+ 63	0	+ 40	0	40
180	250	+ 72	0	+ 46	0	46
250	315	+ 81	0	+ 52	0	52
315	400	+ 89	0	+ 57	0	57
400	500	+ 97	0	+ 63	0	63
500	630	+ 110	0	+ 70	0	70
630	800	+ 125	0	+ 80	0	–
800	1 000	+ 140	0	+ 90	0	–
1 000	1 250	+ 165	0	+ 105	0	–
1 250	1 600	+ 195	0	+ 125	0	–

(2) Basically tapered bore (taper 1:30) Unit : μm

Nominal bore diameter d, mm		Δ_{dmp}		$\Delta_{d1mp}-\Delta_{dmp}$		V_{dsp} [1]
over	up to	upper	lower	upper	lower	max.
–	50	+ 15	0	+ 30	0	19
50	80	+ 15	0	+ 30	0	19
80	120	+ 20	0	+ 35	0	22
120	180	+ 25	0	+ 40	0	40
180	250	+ 30	0	+ 46	0	46
250	315	+ 35	0	+ 52	0	52
315	400	+ 40	0	+ 57	0	57
400	500	+ 45	0	+ 63	0	63
500	630	+ 50	0	+ 70	0	70

[Note] 1) These shall be applied to all radial planes with tapered bore, not be applied to bearings of diameter series 7, 8.

[Remark] 1) Symbols of quantity d_1 : reference diameter at theoretical large end of tapered bore

$$d_1 = d + \frac{1}{12}B \text{ or } d_1 = d + \frac{1}{30}B$$

Δ_{dmp} : single plane mean bore diameter deviation at theoretical small end of tapered bore

Δ_{d1mp} : single plane mean bore diameter deviation at theoretical large end of tapered bore

V_{dsp} : single plane bore diameter variation (a tolerance for the diameter variation given by a maximum value applying in any radial plane of the bore)

B : nominal inner ring width

α : $\frac{1}{2}$ of nominal tapered angle of tapered bore

(tapered ratio 1/12)	(tapered ratio 1/30)
$\alpha = 2°23'9.4''$	$\alpha = 0°57'17.4''$
$= 2.385\ 94°$	$= 0.954\ 84°$
$= 0.041\ 643$ rad	$= 0.016\ 665$ rad

Table 7-12 Tolerances and permissible values for flanged radial ball bearings

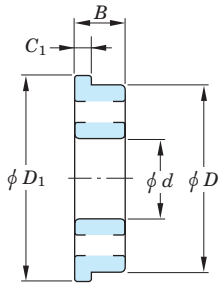
(1) Tolerances on flange outside diameters Unit : μm

Nominal outer ring flange outside diameter D_1 (mm)		Deviation of single outer ring flange outside diameter, Δ_{D1s}			
		Locating flange		Non-locating flange	
over	up to	upper	lower	upper	lower
–	6	0	– 36	+ 220	– 36
6	10	0	– 36	+ 220	– 36
10	18	0	– 43	+ 270	– 43
18	30	0	– 52	+ 330	– 52
30	50	0	– 62	+ 390	– 62
50	80	0	– 74	+ 460	– 74

(2) Tolerances and permissible values on flange widths and permissible values of running accuracies relating to flanges Unit : μm

Nominal outside diameter D (mm)		Deviation of single outer ring flange width Δ_{C1s} [1]	Variation of outer ring flange width V_{C1s} [1]				Perpendicularity of outer ring outside surface with respect to the flange back face S_{D1}						Axial runout of assembled bearing outer ring flange back face S_{ea1}				
							Deep groove ball bearings and angular contact ball bearings			Tapered roller bearings			Deep groove ball bearings and angular contact ball bearings			Tapered roller bearings	
		classes 0, 6, 5, 4, 2	classes 0, 6	class 5	class 4	class 2	class 5	class 4	class 2	class 5	class 4	class 2	class 5	class 4	class 2	class 4	class 2
over	up to	upper lower	max.				max.			max.			max.			max.	
–	2.5	Shall conform to the tolerance Δ_{Bs} on d of the same class and the bearing	Shall conform to the tolerance V_{Bs} on d of the same class and the bearing	5	2.5	1.5	8	4	1.5	8	4	1.5	11	7	3	7	4
2.5	6			5	2.5	1.5	8	4	1.5	8	4	1.5	11	7	3	7	4
6	18			5	2.5	1.5	8	4	1.5	8	4	1.5	11	7	3	7	4
18	30			5	2.5	1.5	8	4	1.5	8	4	1.5	11	7	4	7	4
30	50			5	2.5	1.5	8	4	1.5	8	4	2	11	7	4	7	4
50	80			6	3	1.5	8	4	1.5	8	4	2.5	14	7	6	7	6

[Note] 1) These shall be applied to groove ball bearings, i.e. deep groove ball bearing and angular contact ball bearing etc.



d : nominal bore diameter

D : nominal outside diameter

B : nominal assembled bearing width

D_1 : nominal outer ring flange outside diameter

C_1 : nominal outer ring flange width

Table 7-13 Permissible values for chamfer dimensions = JIS B 1514-3 =

(1) Radial bearing (tapered roller bearings excluded)

Unit : mm

$r_{\min}$ or $r_{1\min}$	Nominal bore diameter d mm		$r_{\max}$ or $r_{1\max}$	
	over	up to	Radial direction	Axial direction
0.05	–	–	0.1	0.2
0.08	–	–	0.16	0.3
0.1	–	–	0.2	0.4
0.15	–	–	0.3	0.6
0.2	–	–	0.5	0.8
0.3	–	40	0.6	1
	40	–	0.8	1
0.6	–	40	1	2
	40	–	1.3	2
1	–	50	1.5	3
	50	–	1.9	3
1.1	–	120	2	3.5
	120	–	2.5	4
1.5	–	120	2.3	4
	120	–	3	5
2	–	80	3	4.5
	80	220	3.5	5
	220	–	3.8	6
2.1	–	280	4	6.5
	280	–	4.5	7
2.5	–	100	3.8	6
	100	280	4.5	6
	280	–	5	7
3	–	280	5	8
	280	–	5.5	8
4	–	–	6.5	9
5	–	–	8	10
6	–	–	10	13
7.5	–	–	12.5	17
9.5	–	–	15	19
12	–	–	18	24
15	–	–	21	30
19	–	–	25	38

[Remarks]

1. Value of $r_{\max}$ or $r_{1\max}$ in the axial direction of bearings with nominal width lower than 2 mm shall be the same as the value in radial direction.
2. There shall be no specification for the accuracy of the shape of the chamfer surface, but its outline in the axial plane shall not be situated outside of the imaginary circle arc with a radius of $r_{\min}$ or $r_{1\min}$ which contacts the inner ring side face and bore, or the outer ring side face and outside surface.

(2) Radial bearings with locating snap ring (snap ring groove side) and cylindrical roller bearings (separete thrust collar and loose rib side)

Unit : mm

$r_{1\min}$	Nominal bore dia. or nominal outside dia. d or D		$r_{1\max}$	
	over	up to	Radial direction	Axial direction
0.2	–	–	0.5	0.5
0.3	–	40	0.6	0.8
	40	–	0.8	0.8
0.5	–	40	1	1.5
	40	–	1.3	1.5
0.6	–	40	1	1.5
	40	–	1.3	1.5
1	–	50	1.5	2.2
	50	–	1.9	2.2
1.1	–	120	2	2.7
	120	–	2.5	2.7
1.5	–	120	2.3	3.5
	120	–	3	3.5
2	–	80	3	4
	80	220	3.5	4
	220	–	3.8	4
2.1	–	280	4	4.5
	280	–	4.5	4.5
2.5	–	100	3.8	5
	100	280	4.5	5
	280	–	5	5
3	–	280	5	5.5
	280	–	5.5	5.5
4	–	–	6.5	6.5
5	–	–	8	8
6	–	–	10	10

[Remark] There shall be no specification for the accuracy of the shape of the chamfer surface, but its outline in the axial plane shall not be situated outside of the imaginary circle arc with a radius of $r_{1\min}$ which contacts the inner ring side face and bore, or the outer ring side face and outside surface.

(3) Cylindrical roller bearings (non-rib side) and angular contact ball bearings (front face side)

Unit : mm

$r_{1\min}$	Nominal bore dia. or nominal outside dia. d or D		$r_{1\max}$	
	over	up to	Radial direction	Axial direction
0.1	–	–	0.2	0.4
0.15	–	–	0.3	0.6
0.2	–	–	0.5	0.8
0.3	–	40	0.6	1
	40	–	0.8	1
0.6	–	40	1	2
	40	–	1.3	2
1	–	50	1.5	3
	50	–	1.9	3
1.1	–	120	2	3.5
	120	–	2.5	4
1.5	–	120	2.3	4
	120	–	3	5
2	–	80	3	4.5
	80	220	3.5	5
	220	–	3.8	6

[Remark] There shall be no specification for the accuracy of the shape of the chamfer surface, but its outline in the axial plane shall not be situated outside of the imaginary circle arc with a radius of $r_{1\min}$ which contacts the inner ring side face and bore, or the outer ring side face and outside surface.

(4) Metric series tapered roller bearing

Unit : mm

$r_{\min}$ or $r_{1\min}$	Nominal bore dia. or nominal outside dia.[1] d or D, mm		$r_{\max}$ or $r_{1\max}$	
	over	up to	Radial direction	Axial direction
0.3	–	40	0.7	1.4
	40	–	0.9	1.6
0.6	–	40	1.1	1.7
	40	–	1.3	2
1	–	50	1.6	2.5
	50	–	1.9	3
1.5	–	120	2.3	3
	120	250	2.8	3.5
	250	–	3.5	4
2	–	120	2.8	4
	120	250	3.5	4.5
	250	–	4	5
2.5	–	120	3.5	5
	120	250	4	5.5
	250	–	4.5	6
3	–	120	4	5.5
	120	250	4.5	6.5
	250	400	5	7
	400	–	5.5	7.5
4	–	120	5	7
	120	250	5.5	7.5
	250	400	6	8
	400	–	6.5	8.5
5	–	180	6.5	8
	180	–	7.5	9
6	–	180	7.5	10
	180	–	9	11
7.5	–	–	*12.5*	*17*
9.5	–	–	*15*	*19*

[Note] 1) Inner ring shall be included in division d, and outer ring, in division D.

[Remarks]

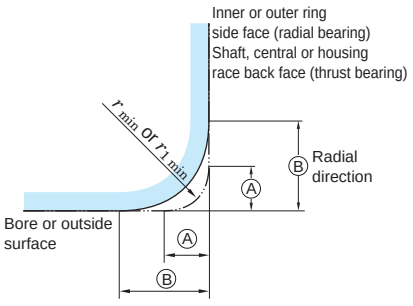
1. There shall be no specification for the accuracy of the shape of the chamfer surface, but its outline in the axial plane shall not be situated outside of the imaginary circle arc with a radius of $r_{\min}$ or $r_{1\min}$ which contacts the inner ring back face and bore, or the outer ring back face and outside surface.
2. Values in Italics are provided in JTEKT standards.

(5) Thrust bearing

Unit : mm

$r_{\min}$ or $r_{1\min}$	$r_{\max}$ or $r_{1\max}$ Radial and axial direction
0.05	0.1
0.08	0.16
0.1	0.2
0.15	0.3
0.2	0.5
0.3	0.8
0.6	1.5
1	2.2
1.1	2.7
1.5	3.5
2	4
2.1	4.5
3	5.5
4	6.5
5	8
6	10
7.5	12.5
9.5	15
12	18
15	21
19	25

[Remark] There shall be no specification for the accuracy of the shape of the chamfer surface, but its outline in the axial plane shall not be situated outside of the imaginary circle arc with a radius of $r_{\min}$ or $r_{1\min}$ which contacts with the shaft or central race back face and bore, or the housing race back face and outside surface.



(Ⓐ : $r_{\min}$ or $r_{1\min}$
Ⓑ : $r_{\max}$ or $r_{1\max}$)

7-2 Tolerance measuring method (reference)

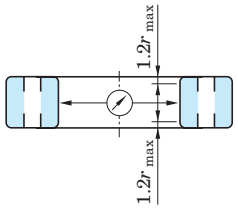
The details on measuring methods for bearings are prescribed in JIS B 1515-2.

This section outlines measuring methods for dimensional and running accuracy.

Dimensional accuracy (1)

Bore diameter (d) Cylindrical bore bearings

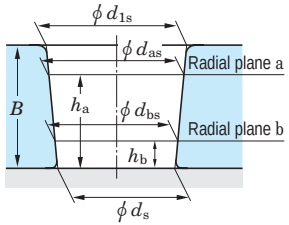
Obtain the maximum value ($d_{sp\,max}$) and the minimum value ($d_{sp\,min}$) of the bore diameter (d_s) acquired in a single radial plane.
Obtain the single plane mean bore diameter (d_{mp}) as the arithmetic mean value of the maximum value ($d_{sp\,max}$) and minimum values ($d_{sp\,min}$).



$$d_{mp} = \frac{d_{sp\,max} + d_{sp\,min}}{2}$$

Single plane mean bore diameter deviation ;
$\Delta_{dmp} = d_{mp} - d$
Bore diameter variation in a single plane ;
$V_{dsp} = d_{sp\,max} - d_{sp\,min}$
Mean bore diameter variation ;
$V_{dmp} = d_{mp\,max} - d_{mp\,min}$
Deviation of a single bore diameter ;
$\Delta_{ds} = d_s - d$

Bore diameter (d) Tapered bore bearings



Bore diameter at the theoretical small end and bore diameter at the theoretical large end ;

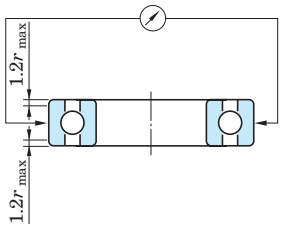
$$d_s = \frac{d_{bs} \cdot h_a - d_{as} \cdot h_b}{h_a - h_b}$$

$$d_{1s} = \frac{d_{as}\,(B - h_b) - d_{bs}\,(B - h_a)}{h_a - h_b}$$

Single plane mean bore diameter deviation at the theoretical small end ;
$\Delta_{dmp} = d_{mp} - d$
Deviation on taper ;
$(\Delta_{d1mp} - \Delta_{dmp}) = (d_{1mp} - d_1) - (d_{mp} - d)$
Bore diameter variation in a single plane ;
$V_{dsp} = d_{sp\,max} - d_{sp\,min}$

Outside diameter (D)

Obtain the single plane mean outside diameter (D_{mp}) as the arithmetical mean value of the maximum value ($D_{sp\,max}$) and the minimum value ($D_{sp\,min}$) of the outside diameters (D_s) acquired in a single radial plane.

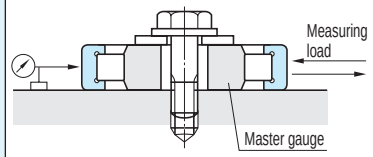


$$D_{mp} = \frac{D_{sp\,max} + D_{sp\,min}}{2}$$

Single plane mean outside diameter deviation ;
$\Delta_{Dmp} = D_{mp} - D$
Outside diameter variation in a single plane ;
$V_{Dsp} = D_{sp\,max} - D_{sp\,min}$
Mean outside diameter variation ;
$V_{Dmp} = D_{mp\,max} - D_{mp\,min}$
Deviation of a single outside diameter ;
$\Delta_{Ds} = D_s - D$

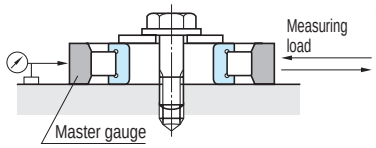
Dimensional accuracy (2)

Roller set bore diameter (F_w)



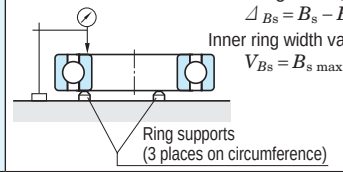
Deviation of the roller set bore diameter ;
$\Delta_{Fw} = (d_G + \delta_{1m}) - F_w$
Deviation of the minimum diameter of the roller set bore diameter ;
$\Delta_{Fw\,min} = (d_G + \delta_{1min}) - F_w$
(d_G) outside diameter of the master gauge
(δ_{1m}) arithmetical mean value of the amount of movement of the outer ring
(δ_{1min}) minimum value of the amount of movement of the outer ring

Roller set outside diameter (E_w)

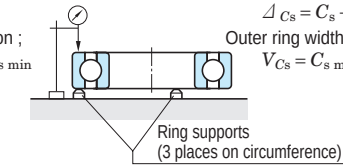


Deviation of the roller set outside diameter ;
$\Delta_{Ew} = (D_G + \delta_{2m}) - E_w$
(D_G) bore diameter of the master gauge
(δ_{2m}) arithmetical mean value of the amount of movement of the master gauge

Inner ring width (B) Outer ring width (C)

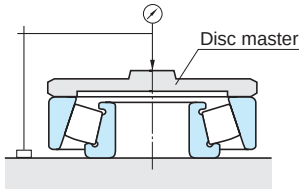


Deviation of a single inner ring width ;
$\Delta_{Bs} = B_s - B$
Inner ring width variation ;
$V_{Bs} = B_{s\,max} - B_{s\,min}$



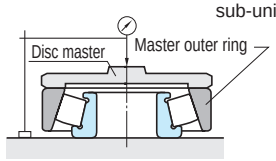
Deviation of a single outer ring width ;
$\Delta_{Cs} = C_s - C$
Outer ring width variation ;
$V_{Cs} = C_{s\,max} - C_{s\,min}$

Assembled bearing width of tapered roller bearing (T)

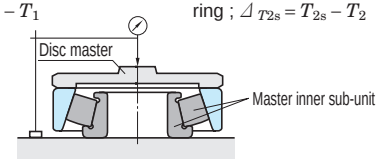


Deviation of the actual bearing width ; $\Delta_{Ts} = T_s - T$

Nominal effective width of tapered roller bearing (T_1, T_2)

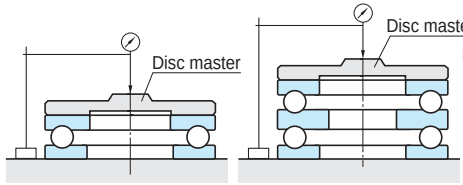


Deviation of the actual effective width of inner sub-unit ; $\Delta_{T1s} = T_{1s} - T_1$



Deviation of the actual effective width of outer ring ; $\Delta_{T2s} = T_{2s} - T_2$

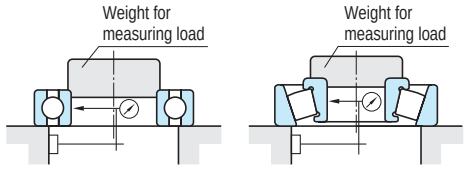
Nominal height of thrust ball bearing with flat back face (T, T_1)



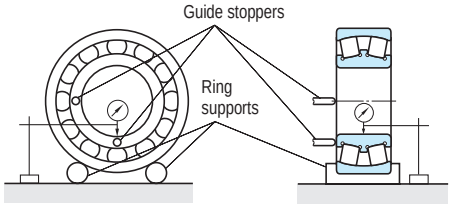
Deviation of the actual bearing height ;
$\Delta_{Ts} = T_s - T$ (single direction)
$\Delta_{T1s} = T_{1s} - T_1$ (double direction)

Running accuracy (1)

Radial runout of assembled bearing inner ring (K_{ia})

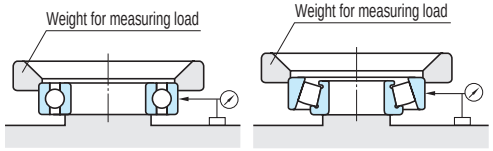


The radial runout of the inner ring (K_{ia}) shall be obtained as the difference between the maximum value and the minimum value of the readings of the measuring instrument, when the inner ring has been rotated through one rotation.

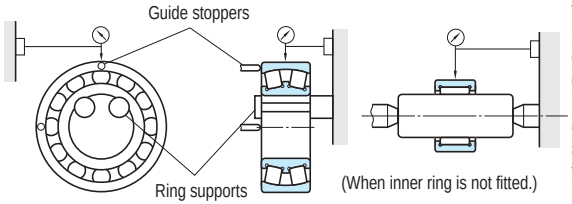


[Note]
The measurement of the radial runout of the inner ring of cylindrical roller bearings, machined ring needle roller bearings, self-aligning ball bearings and spherical roller bearings shall be carried out by fixing the outer ring with ring supports.

Radial runout of assembled bearing outer ring (K_{ea})

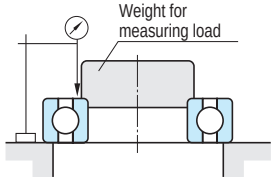


The measurement of outer ring runout (K_{ea}) shall be obtained as the difference between the maximum value and the minimum value of the readings of the measuring instrument, when the outer ring has been rotated through one rotation.



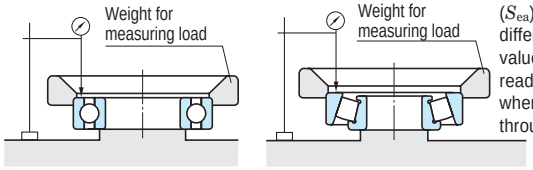
[Note]
The measurement of the radial runout of the outer ring of cylindrical roller bearings, machined ring needle roller bearings, self-aligning ball bearings and spherical roller bearings shall be carried out by fixing the inner ring with ring supports.

Axial runout of assembled bearing inner ring (S_{ia})



The axial runout of the inner ring (S_{ia}) shall be obtained as the difference between the maximum value and the minimum value of the readings of the measuring instrument, when the inner ring has been rotated through one rotation.

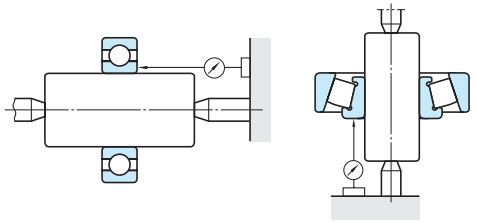
Axial runout of assembled bearing outer ring (S_{ea})



The axial runout of the outer ring (S_{ea}) shall be obtained as the difference between the maximum value and the minimum value of the readings of the measuring instrument, when the outer ring has been rotated through one rotation.

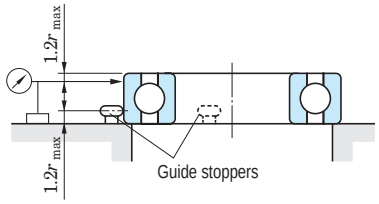
Running accuracy (2)

Perpendicularity of inner ring face with respect to the bore (S_d)



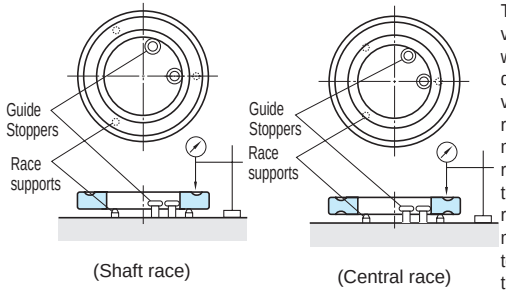
Perpendicularity of inner ring face (S_d) shall be obtained as the difference between the maximum value and the minimum value of the readings of the measuring instrument, when the inner ring has been rotated through one rotation with the tapered arbor.

Perpendicularity of outer ring outside surface with respect to the face (S_D)



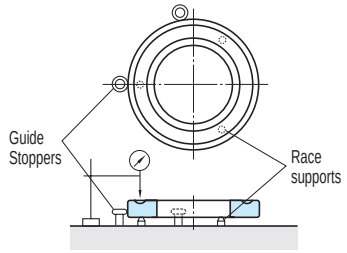
Perpendicularity of outer ring outside surface (S_D) shall be obtained as the difference between the maximum value and the minimum value of the readings of the measuring instrument, when the outer ring has been rotated through one rotation along the guide stopper.

Shaft/central race raceway to back face thickness variation of thrust ball bearing with flat back face (S_i)



The measurement of the thickness variation (S_i) of shaft race raceway track shall be obtained as the difference between the maximum value and the minimum value of the readings of the measuring instrument, when the shaft race has been rotated through one rotation along the guide stopper. For the central race, carry out the same measurement for the two raceway grooves to obtain the thickness variation of the raceway track (S_i).

Housing race raceway to back face thickness variation of thrust ball bearing with flat back face (S_e)



The measurement of the thickness variation (S_e) of housing race raceway track shall be obtained as the difference between the maximum value and the minimum value of the readings of the measuring instrument, when the housing race has been rotated through one rotation along the guide stopper.

8. Limiting speed

The rotational speed of a bearing is normally affected by friction heat generated in the bearing. If the heat exceeds a certain amount, seizure or other failures occur, thus causing rotation to be discontinued.

The limiting speed is the highest speed at which a bearing can continuously operate without generating such critical heat.

The limiting speed differs depending on various factors including bearing type, dimensions and their accuracy, lubrication, lubricant type and amount, shapes of cages and materials and load conditions, etc.

The limiting speed determined under grease lubrication and oil lubrication (oil bath) for each bearing type are listed in the bearing specification table.

These speeds are applied when bearings of standard design are rotated under normal load conditions (approximately, $C/P \geqq 16$*, $F_a/F_r \leqq 0.25$).

Each lubricant has superior performance in use, according to type.

Some are not suitable for high speed ; when bearing rotational speed exceeds 80 % of catalog specification, consult with JTEKT.

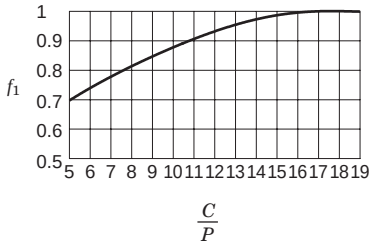


Fig. 8-1a Values of correction coefficient f_1 of load magnitude (Excludes K type bearings and railway rolling stock axle journals)

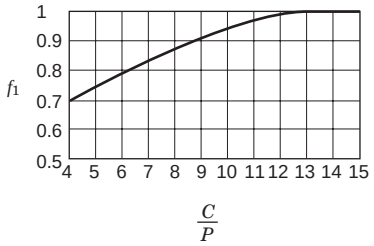


Fig. 8-1b Values of correction coefficient f_1 of load magnitude (K type bearings and railway rolling stock axle journals)

8-1 Correction of limiting speed

When the load condition is $C/P < 16$*, i.e. the dynamic equivalent load P exceeds approximately 6* % of basic dynamic load rating C, or when a combined load in which the axial load is greater than 25 % of radial load is applied, the limiting speed should be corrected by using equation (8-1) :

$$n_a = f_1 \cdot f_2 \cdot n \quad \cdots\cdots (8\text{-}1)$$

where :

n_a	: corrected limiting speed	$\min^{-1}$
f_1	: correction coefficient determined from the load magnitude (Fig. 8-1)	
f_2	: correction coefficient determined from combined load (Fig. 8-2)	
n	: limiting speed under normal load condition (values in the bearing specification table)	$\min^{-1}$
C	: basic dynamic load rating	N
P	: dynamic equivalent load	N
F_r	: radial load	N
F_a	: axial load	N

* 13 (8 %) for K type bearings and railway rolling stock axle journals

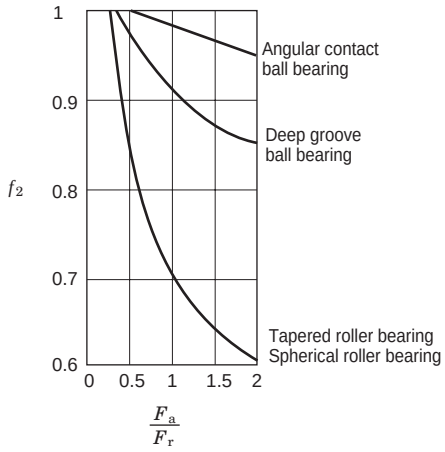


Fig. 8-2 Values of correction coefficient f_2 of combined load

8-2 Limiting speed for sealed ball bearings

The limiting speed of ball bearings with a contact seal (RS, RK type) are determined by the rubbing speed at which the seal contacts the inner ring. These allowable rubbing speeds differ depending on seal rubber materials; and, for ball bearings with the Koyo standard contact type seal (NBR), a rubbing speed of 15 m/s is utilized.

8-3 Considerations for high speed

When bearings are used for high speed, especially when the rotation speed approaches the limiting speed or exceeds it, the following should be considered :
(for further information on high speed, consult with JTEKT)

(1) Use of high precision bearings
(2) Study of proper internal clearance
  (Reduction in internal clearance caused by temperature increase should be considered.)
(3) Selection of proper cage type and materials
  (For high speed, copper alloy or phenolic resin machined cages are suitable. Synthetic resin molded cages for high speed are also available.)
(4) Selection of proper lubrication
  (Suitable lubrication for high speed should be selected jet lubrication, oil mist lubrication and oil air lubrication, etc.)

8-4 Frictional coefficient (reference)

The frictional moment of rolling bearings can be easily compared with that of plain bearings. The frictional moment of rolling bearings can be obtained from their bore diameter, using the following equation :

$$M = \mu P \frac{d}{2} \quad \cdots\cdots (8\text{-}2)$$

where :

M	: frictional moment	mN · m
μ	: frictional coefficient	
P	: load on the bearing	N
d	: nominal bore diameter	mm

The friction coefficient is greatly dependent on bearing type, bearing load, rotation speed and lubrication, etc.

Reference values for the friction coefficient during stable operation under normal operating conditions are listed in Table 8-1.

For plain bearings, the value is normally 0.01 to 0.02 ; but, for certain cases, it is 0.1 to 0.2.

Table 8-1 Friction coefficient μ

Bearing type	Friction coefficient μ
Deep groove ball bearing	0.001 0 – 0.001 5
Angular contact ball bearing	0.001 2 – 0.002 0
Self-aligning ball bearing	0.000 8 – 0.001 2
Cylindrical roller bearing	0.000 8 – 0.001 2
Full complement type needle roller bearing	0.002 5 – 0.003 5
Needle roller and cage assembly	0.002 0 – 0.003 0
Tapered roller bearing	0.001 7 – 0.002 5
Spherical roller bearing	0.002 0 – 0.002 5
Thrust ball bearing	0.001 0 – 0.001 5
Spherical thrust roller bearing	0.002 0 – 0.002 5

9. Bearing fits

9-1 Purpose of fit

The purpose of fit is to securely fix the inner or outer ring to the shaft or housing, to preclude detrimental circumferential sliding on the fitting surface.

Such detrimental sliding (referred to as "creep") will cause abnormal heat generation, wear of the fitting surface, infiltration of abrasion metal particles into the bearing, vibration, and many other harmful effects, which cause a deterioration of bearing functions.

Therefore, it is necessary to fix the bearing ring which is rotating under load to the shaft or housing with interference.

9-2 Tolerance and fit for shaft & housing

For metric series bearings, tolerances for the shaft diameter and housing bore diameter are standardized in JIS B 0401-1 and 0401-2 "ISO system of limits and fits - Part 1 and Part 2" (based on ISO 286; shown in Appendixes at the back of this catalogue). Bearing fits on the shaft and housing are determined based on the tolerances specified in the above standard.

Fig. 9-1 shows the relationship between tolerances for shaft and housing bore diameters and fits for bearings of class 0 tolerance.

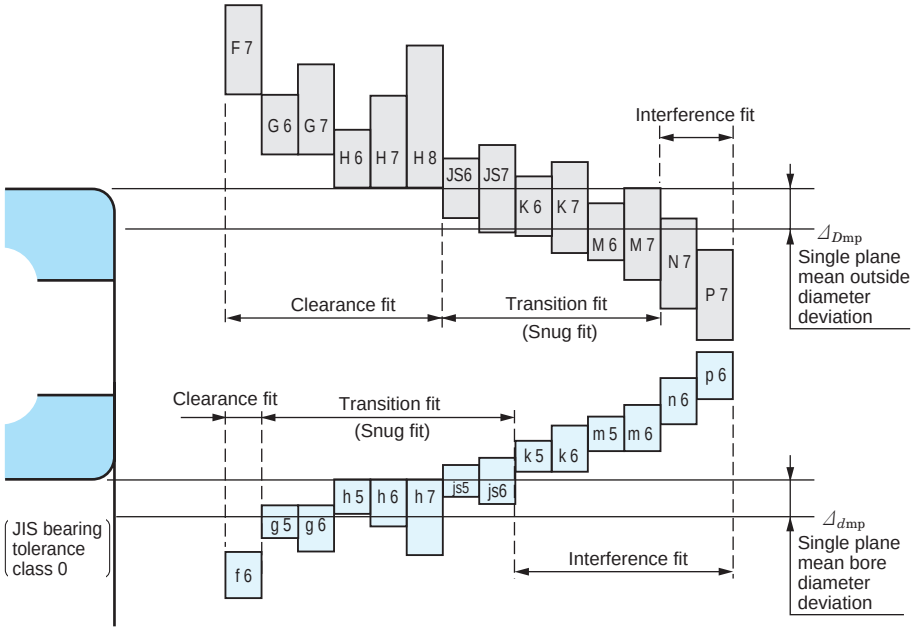


Fig. 9-1 Relationship between tolerances for shaft/housing bore diameters and fits (bearings of class 0 tolerance)

9-3 Fit selection

In selecting the proper fit, careful consideration should be given to bearing operating conditions.

Major specific considerations are :

- Load characteristics and magnitude
- Temperature distribution in operating
- Bearing internal clearance
- Surface finish, material and thickness of shaft and housing
- Mounting and dismounting methods
- Necessity to compensate for shaft thermal expansion at the fitting surface
- Bearing type and size

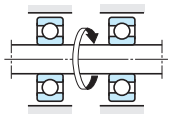
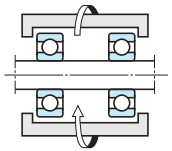
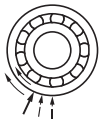
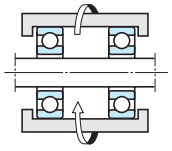
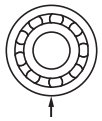
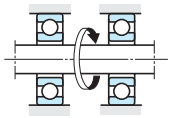
In view of these considerations, the following paragraphs explain the details of the important factors in fit selection.

1) Load characteristics

Load characteristics are classified into three types : rotating inner ring load; rotating outer ring load and indeterminate direction load.

Table 9-1 tabulates the relationship between these characteristics and fit.

Table 9-1 Load characteristics and fits

Rotation pattern	Direction of load	Loading conditions	Fit		Typical application
			Inner ring & shaft	Outer ring & housing	
 Inner ring : rotating Outer ring : stationary	 Stationary	Rotating inner ring load Stationary outer ring load	Interference fit necessary (k, m, n, p, r)	Clearance fit acceptable (F, G, H, JS)	Spur gear boxes, motors
 Inner ring : stationary Outer ring : rotating	 Rotating (with outer ring)				Greatly unbalanced wheels
 Inner ring : stationary Outer ring : rotating	 Stationary	Stationary inner ring load Rotating outer ring load	Clearance fit acceptable (f, g, h, js)	Interference fit necessary (K, M, N, P)	Running wheels & pulleys with stationary shaft
 Inner ring : rotating Outer ring : stationary	 Rotating (with inner ring)				Shaker screens (unbalanced vibration)
Indeterminate	Rotating or stationary	Indeterminate direction load	Interference fit	Interference fit	Cranks

2) Effect of load magnitude

When a radial load is applied, the inner ring will expand slightly. Since this expansion enlarges the circumference of the bore minutely, the initial interference is reduced.

The reduction can be calculated by the following equations :

[In the case of $F_r \leqq 0.25\ C_0$]

$$\Delta_{dF} = 0.08 \sqrt{\frac{d}{B} \cdot F_r} \times 10^{-3} \quad \cdots\cdots (9\text{-}1)$$

[In the case of $F_r > 0.25\ C_0$]

$$\Delta_{dF} = 0.02 \frac{F_r}{B} \times 10^{-3} \quad \cdots\cdots (9\text{-}2)$$

where:

Δ_{dF}	: reduction of inner ring interference	mm
d	: nominal bore diameter of bearing	mm
B	: nominal inner ring width	mm
F_r	: radial load	N
C_0	: basic static load rating	N

Consequently, when the radial load, exceeds the C_0 value by more than 25 %, greater interference is needed.

Much greater interference is needed, when impact loads are expected.

3) Effect of fitting surface roughness

The effective interference obtained after fitting differs from calculated interference due to plastic deformation of the ring fitting surface. When the inner ring is fitted, the effective interference, subject to the effect of the fitting surface finish, can be approximated by the following equations :

[In the case of a ground shaft]

$$\Delta_{deff} \fallingdotseq \frac{d}{d+2} \Delta_d \quad \cdots\cdots (9\text{-}3)$$

[In the case of a turned shaft]

$$\Delta_{deff} \fallingdotseq \frac{d}{d+3} \Delta_d \quad \cdots\cdots (9\text{-}4)$$

where:

Δ_{deff}	: effective interference	mm
Δ_d	: calculated interference	mm
d	: nominal bore diameter of bearing	mm

4) Effect of temperature

A bearing generally has an operating temperature, higher than the ambient temperature. When the inner ring operates under load, its temperature generally becomes higher than that of the shaft and the effective interference decreases due to the greater thermal expansion of the inner ring.

If the assumed temperature difference between the bearing inside and surrounding housing is Δ_t, the temperature difference at the fitting surfaces of the inner ring and shaft will be approximately (0.10 to 0.15) $\times \Delta_t$.

The reduction of interference (Δ_{dt}) due to temperature difference is then expressed as follows :

$$\Delta_{dt} = (0.10 \text{ to } 0.15)\ \Delta_t \cdot \alpha \cdot d \fallingdotseq 0.001\ 5\ \Delta_t \cdot d \times 10^{-3} \quad \cdots\cdots (9\text{-}5)$$

where:

Δ_{dt}	: reduction of interference due to temperature difference	mm
Δ_t	: temperature difference between the inside of the bearing and the surrounding housing	°C
α	: linear expansion coefficient of bearing steel ($\fallingdotseq 12.5 \times 10^{-6}$)	1/°C
d	: nominal bore diameter of bearing	mm

Consequently, when a bearing is higher in temperature than the shaft, greater interference is required.

However, a difference in temperature or in the coefficient of expansion may sometimes increase the interference between outer ring and housing. Therefore, when clearance is provided to accommodate shaft thermal expansion, care should be taken.

5) Maximum stress due to fit

When a bearing is fitted with interference, the bearing ring will expand or contract, generating internal stress.

Should this stress be excessive, the bearing ring may fracture.

The maximum bearing fitting-generated stress is determined by the equation in Table 9-2.

In general, to avoid fracture, it is best to adjust the maximum interference to less than 1/1 000 of the shaft diameter, or the maximum stress (σ), determined by the equation in Table 9-2, should be less than 120 MPa.

6) Other considerations

When a high degree of accuracy is required, the tolerance of the shaft and housing must be improved. Since the housing is generally less easy to machine precisely than the shaft, it is advisable to use a clearance fit on the outer ring.

With hollow shafts or thin section housings, greater than normal interference is needed.

With split housings, on the other hand, smaller interference with outer ring is needed.

When the housing is made of aluminum or other light metal alloy, relatively greater than normal interference is needed.

In such a case, consult with JTEKT.

Table 9-2 Maximum fitting-generated stress in bearings

Shaft & inner ring	Housing bore & outer ring
(In the case of hollow shaft) $\sigma = \frac{E}{2} \cdot \frac{\Delta_{deff}}{d} \cdot \frac{\left(1 - \frac{d_0^2}{d^2}\right)\left(1 + \frac{d^2}{D_i^2}\right)}{\left(1 - \frac{d_0^2}{D_i^2}\right)}$	(In the case of $D_h \neq \infty$) $\sigma = E \cdot \frac{\Delta_{Deff}}{D} \cdot \frac{\left(1 - \frac{D^2}{D_h^2}\right)}{\left(1 - \frac{D_e^2}{D_h^2}\right)}$
(In the case of solid shaft) $\sigma = \frac{E}{2} \cdot \frac{\Delta_{deff}}{d} \cdot \left(1 + \frac{d^2}{D_i^2}\right)$	(In the case of $D_h = \infty$) $\sigma = E \cdot \frac{\Delta_{Deff}}{D}$

where :

σ	: maximum stress	MPa	D_e	: raceway contact diameter of outer ring	mm
d	: nominal bore diameter (shaft diameter)	mm		ball bearing ····· $D_e \fallingdotseq 0.2\ (4D + d)$ roller bearing ··· $D_e \fallingdotseq 0.25\ (3D + d)$	
D_i	: raceway contact diameter of inner ring	mm	D	: nominal outside diameter (bore diameter of housing)	mm
	ball bearing ····· $D_i \fallingdotseq 0.2\ (D + 4d)$ roller bearing ··· $D_i \fallingdotseq 0.25\ (D + 3d)$		Δ_{Deff}	: effective interference of outer ring	mm
Δ_{deff}	: effective interference of inner ring	mm	D_h	: outside diameter of housing	mm
d_0	: bore diameter of hollow shaft	mm	E	: young's modulus	2.08×10^5 MPa

[Remark] The above equations are applicable when the shaft and housing are steel. When other materials are used, JTEKT should be consulted.

9-4 Recommended fits

As described in Section 9-3, the characteristics / magnitude of the bearing load, temperature, mounting / dismounting methods and other conditions must be considered to choose proper fits.

Past experience is also valuable.

Table 9-3 shows standard fits for the metric series bearings; Tables 9-4 to 9-8 tabulate the most typical and recommended fits for different bearings types.

Table 9-3 Standard fits for metric series bearings [1)]

(1) Fits for bore diameter [2)] **of radial bearings**

Class of bearing	Rotating inner ring load or indeterminate direction load							Stationary inner ring load	
	Class of shaft tolerance range								
Classes 0, 6X, 6	r 6	p 6	n 6	m 6 m 5	k 6 k 5	js 6 js 5	h 5	h 6 h 5	g 6 g 5	f 6
Class 5	–	–	–	m 5	k 4	js 4	h 4	h 5	–	–
Fit	Interference fit					Transition fit				Clearance fit

(2) Fits for outside diameter [2)] **of radial bearings**

Class of bearing	Stationary outer ring load				Indeterminate direction load or rotating outer ring load				
	Class of housing bore tolerance range								
Classes 0, 6X, 6	G 7	H 7 H 6	JS 7 JS 6	–	JS 7 JS 6	K 7 K 6	M 7 M 6	N 7 N 6	P 7
Class 5	–	H 5	JS 5	K 5	–	K 5	M 5	–	–
Fit	Clearance fit		Transition fit						Interference fit

(3) Fits for bore diameter [2)] **of thrust bearings**

Class of bearing	Central axial load (generally for thrust bearings)		Combined load (in the case of spherical thrust roller bearing)			
			Rotating shaft race load or indeterminate direction load			Stationary shaft race load
	Class of shaft tolerance range					
Classes 0, 6	js 6	h 6	n 6	m 6	k 6	js 6
Fit	Transition fit		Interference fit			Transition fit

(4) Fits for outside diameter [2)] **of thrust bearings**

Class of bearing	Central axial load (generally for thrust bearings)	Combined load (in the case of spherical thrust roller bearing)				
		Stationary housing race load or indeterminate direction load			Rotating housing race load	
	Class of housing bore tolerance range					
Classes 0, 6	–	H 8	G 7	H 7	JS 7	K 7	M 7
Fit	Clearance fit				Transition fit		

[Notes] 1) Bearings specified in JIS B 1512
2) Follow JIS B 1514-1 and 1514-2 for tolerance.

Table 9-4 (1) Recommended shaft fits for radial bearings (classes 0, 6X, 6)

Conditions [1)]		Ball bearing		Cylindrical roller bearing Tapered roller bearing		Spherical roller bearing		Class of shaft tolerance range	Remarks	Applications (for reference)
		Shaft diameter (mm)								
		over	up to	over	up to	over	up to			
Cylindrical bore bearing (classes 0, 6X, 6)										
Rotating inner ring load or indeterminate direction load	Light load or fluctuating load $\left(\frac{P_r}{C_r} \leqq 0.05\right)$	–	18	–	–	–	–	h 5	For applications requiring high accuracy, js 5,k 5 and m 5 should be used in place of js 6, k 6 and m 6.	Electric appliances, machine tools, pumps, blowers, carriers etc.
		18	100	–	40	–	–	js 6		
		100	200	40	140	–	–	k 6		
		–	–	140	200	–	–	m 6		
	Normal load $\left(0.05 < \frac{P_r}{C_r} \leqq 0.10\right)$	–	18	–	–	–	–	js 5	For single-row tapered roller bearings and angular contact ball bearings, k 5 and m 5 may be replaced by k 6 and m 6, because internal clearance reduction due to fit need not be considered.	Electric motors, turbines, internal combustion engines, wood-working machines etc.
		18	100	–	40	–	40	k 5		
		100	140	40	100	40	65	m 5		
		140	200	100	140	65	100	m 6		
		200	280	140	200	100	140	n 6		
		–	–	200	400	140	280	p 6		
		–	–	–	–	280	500	r 6		
	Heavy load or impact load $\left(\frac{P_r}{C_r} > 0.10\right)$	–	–	50	140	50	100	n 6	Bearings with larger internal clearance than standard are required.	Railway rolling stock axle journals, traction motors
		–	–	140	200	100	140	p 6		
		–	–	200	–	140	200	r 6		
Stationary inner ring load	Inner ring needs to move smoothly on shaft.	All shaft diameters						g 6	For applications requiring high accuracy, g 5 should be used. For large size bearing, f 6 may be used for easier movement.	Stationary shaft wheels
	Inner ring does not need to move smoothly on shaft.	All shaft diameters						h 6	For applications requiring high accuracy, h 5 should be used.	Tension pulleys, rope sheaves etc.
Central axial load only		All shaft diameters						js 6	–	–
Tapered bore bearing (class 0) (with adapter or withdrawal sleeve)										
All loads		All shaft diameters						h 9/IT 5 [2)]	For transmission shafts, h 10/IT 7 [2)] may be applied.	–

[Notes] 1) Light, normal, and heavy loads refer to those with dynamic equivalent radial loads (P_r) of 5 % or lower, over 5 % up to 10 % inclusive, and over 10 % respectively in relation to the basic dynamic radial load rating (C_r) of the bearing concerned.
2) IT 5 and IT 7 mean that shaft roundness tolerance, cylindricity tolerance, and other errors in terms of shape should be within the tolerance range of IT 5 and IT 7, respectively. For numerical values for standard tolerance grades IT 5 and IT 7, refer to supplementary table at end of this catalog.

[Remark] This table is applicable to solid steel shafts.

Table 9-4 (2) Recommended housing fits for radial bearings (classes 0, 6X, 6)

Conditions				Class of housing bore tolerance range	Remarks	Applications (for reference)
Housing	Load type etc.[1]		Outer ring axial displacement[2]			
One-piece or split type	Stationary outer ring load	All load types	Easily displaceable	H 7	G 7 may be applied when a large size bearing is used, or if the temperature difference is large between the outer ring and housing.	Ordinary bearing devices, railway rolling stock axle boxes, power transmission equipment etc.
		Light or normal load		H 8	–	
		High temperature at shaft and inner ring		G 7	F 7 may be applied when a large size bearing is used, or if the temperature difference is large between the outer ring and housing.	Drying cylinders etc.
One-piece type		Light or normal load, requiring high running accuracy	Not displaceable in principle	K 6	Mainly applied to roller bearings.	
			Displaceable	JS 6	Mainly applied to ball bearings.	
		Requiring low-noise rotation	Easily displaceable	H 6	–	
	Indeterminate direction load	Light or normal load	Normally displaceable	JS 7	For applications requiring high accuracy, JS 6 and K 6 should be used in place of JS 7 and K 7.	Electric motors, pumps, crankshaft main bearings etc.
		Normal or heavy load	Not displaceable in principle	K 7		
		High impact load	Not displaceable	M 7	–	Traction motors etc.
	Rotating outer ring load	Light or fluctuating load	Not displaceable	M 7	–	Conveyor rollers, ropeways, tension pulleys etc.
		Normal or heavy load		N 7	Mainly applied to ball bearings.	Wheel hubs with ball bearings etc.
		Thin section housing, heavy or high impact load		P 7	Mainly applied to roller bearings.	Wheel hubs with roller bearings, bearings for large end of connecting rods etc.

[Notes] 1) Loads are classified as stated in Note 1) to Table 9-4 (1).
2) Indicating distinction between applications of non-separable bearings permitting and not permitting axial displacement of the outer rings.

[Remarks] 1. This table is applicable to cast iron or steel housings.
2. If only central axial load is applied to the bearing, select such tolerance range class as to provide clearance in the radial direction for outer ring.

Table 9-5 (1) Recommended shaft fits for precision extra-small/miniature ball bearings ($d < 10$ mm)

Unit : μm

Load type		Bearing tolerance class	Single plane mean bore diameter deviation Δ_{dmp}		Shaft diameter dimensional tolerance		Fit[1]	Applications
			upper	lower	upper	lower		
Rotating inner ring load	Middle/high speed Light or normal load	ABMA 5P JIS class 5	0 0	– 5.1 – 5	+ 2.5	– 2.5	7.6T – 2.5L 7.5T – 2.5L	Gyro rotors, air cleaners, electric tools, encoders
		ABMA 7P JIS class 4	0 0	– 5.1 – 4	+ 2.5	– 2.5	7.6T – 2.5L 6.5T – 2.5L	
	Low speed Light load	ABMA 5P JIS class 5	0 0	– 5.1 – 5	– 2.5	– 7.5	2.6T – 7.5L 2.5T – 7.5L	Gyro gimbals, synchronizers, servomotors, floppy disc spindles
		ABMA 7P JIS class 4	0 0	– 5.1 – 4	– 2.5	– 7.5	2.6T – 7.5L 1.5T – 7.5L	
Rotating outer ring load	Low to high speed Light load	ABMA 5P JIS class 5	0 0	– 5.1 – 5	– 2.5	– 7.5	2.6T – 7.5L 2.5T – 7.5L	Pinch rolls, tape guide rollers, linear actuators
		ABMA 7P JIS class 4	0 0	– 5.1 – 4	– 2.5	– 7.5	2.6T – 7.5L 1.5T – 7.5L	

[Note] 1) Symbols T and L means interference and clearance respectively.

Table 9-5 (2) Recommended housing fits for precision extra-small/miniature ball bearings ($D \leqq 30$ mm)

Unit : μm

Load type		Bearing tolerance class	Single plane mean outside diameter deviation Δ_{Dmp}		Housing bore diameter dimensional tolerance		Fit[1]	Applications
			upper	lower	upper	lower		
Rotating inner ring load	Middle/high speed Light or normal load	ABMA 5P ABMA 7P	0	– 5.1	+ 5	0	0 – 10.1L	Gyro rotors, air cleaners, electric tools, encoders
		JIS class 5[2]	0 0	– 5 – 6	+ 5	0	0 – 10 L 0 – 11 L	
		JIS class 4[2]	0 0	– 4 – 5	+ 5	0	0 – 9 L 0 – 10 L	
	Low speed Light load	ABMA 5P ABMA 7P	0	– 5.1	+ 2.5	– 2.5	2.5T – 7.6L	Gyro gimbals, synchronizers, servomotors, floppy disc spindles
		JIS class 5[2]	0 0	– 5 – 6	+ 2.5	– 2.5	2.5T – 7.5L 2.5T – 8.5L	
		JIS class 4[2]	0 0	– 4 – 5	+ 2.5	– 2.5	2.5T – 6.5L 2.5T – 7.5L	
Rotating outer ring load	Low to high speed Light load	ABMA 5P ABMA 7P	0	– 5.1	+ 2.5	– 2.5	2.5T – 7.6L	Pinch rolls, tape guide rollers
		JIS class 5[2]	0 0	– 5 – 6	+ 2.5	– 2.5	2.5T – 7.5L 2.5T – 8.5L	
		JIS class 4[2]	0 0	– 4 – 5	+ 2.5	– 2.5	2.5T – 6.5L 2.5T – 7.5L	

[Notes] 1) Symbols T and L means interference and clearance respectively.
2) In the columns "single plane mean outside diameter deviation" and "fit" upper row values are applied in the case of $D \leqq 18$ mm, lower row values in the case of $18 < D \leqq 30$ mm.

Table 9-6 (1) Recommended shaft fits for metric J series tapered roller bearings

■ Bearing tolerance : class PK, class PN

Load type		Nominal bore diameter d mm over	up to	Class of shaft tolerance range	Remarks
Rotating inner ring load	Normal load	10	120	m 6	
		120	500	n 6	
	Heavy load Impact load High speed rotation	10	120	n 6	Generally, bearing internal clearance should be larger than standard.
		120	180	p 6	
		180	250	r 6	
		250	500	r 7	
Rotating outer ring load	Normal load without impact	80	315	h 6 or g 6	
	Heavy load Impact load High speed rotation	10	120	n 6	Generally, bearing internal clearance should be larger than standard.
		120	180	p 6	
		180	250	r 6	
		250	500	r 7	

■ Bearing tolerance : class PC, class PB

Load type		Nominal bore diameter d mm over	up to	Class of shaft tolerance range (bearing tolerance class) PC	PB	Remarks
Rotating inner ring load	Spindles of precision machine tools	10	315	k 5	k 5	
		315	500	k 5	–	
	Heavy load Impact load High speed rotation	10	18	m 6	m 5	Generally, bearing internal clearance should be larger than standard.
		18	50	m 5	m 5	
		50	80	n 5	n 5	
		80	120	n 5	n 4	
		120	180	p 4	p 4	
		180	250	r 4	r 4	
		250	315	r 5	r 4	
		315	500	r 5	–	
Rotating outer ring load	Spindles of precision machine tools	10	315	k 5	k 5	
		315	500	k 5	–	

Table 9-6 (2) Recommended housing fits for metric J series tapered roller bearings

■ Bearing tolerance : class PK, class PN

Load type		Nominal outside diameter D mm over	up to	Class of housing bore diameter tolerance range	Remarks
Rotating inner ring load	Used for free or fixed side	18	315	G 7	Outer ring is easily displaceable in axial direction.
		315	400	F 6	
	Position of outer ring is adjustable (in axial direction)	18	400	J 7	Outer ring is displaceable in axial direction.
	Position of outer ring is not adjustable (in axial direction)	18	400	P 7	Outer ring is fixed in axial direction.
Rotating outer ring load	Position of outer ring is not adjustable (in axial direction)	18	120	R 7	Outer ring is fixed in axial direction.
		120	180		
		180	400		

■ Bearing tolerance : class PC, class PB

Load type		Nominal outside diameter D mm over	up to	Class of housing bore diameter tolerance range (bearing tolerance class) PC	PB	Remarks
Rotating inner ring load	Used for free side	18	315	G 5	G 5	Outer ring is easily displaceable in axial direction.
		315	500	G 5	–	
	Used for fixed side	18	315	H 5	H 4	Outer ring is displaceable in axial direction.
		315	500	H 5	–	
	Position of outer ring is adjustable (in axial direction)	18	120	K 5	K 5	Outer ring is fixed in axial direction.
		120	180	JS 6	JS 6	
		180	250	JS 6	JS 5	
		250	315	K 5	JS 5	
		315	500	K 5	–	
	Position of outer ring is not adjustable (in axial direction)	18	315	N 5	M 5	
		315	500	N 5	–	
Rotating outer ring load	Position of outer ring is not adjustable (in axial direction)	18	250	N 6	N 5	Outer ring is fixed in axial direction.
		250	315	N 5	N 5	
		315	500	N 5	–	

Table 9-7 (1) Recommended shaft fits for inch series tapered roller bearings

■ Bearing tolerance : class 4, class 2

Load type		Nominal bore diameter d mm (1/25.4) over	up to	Deviation of a single bore diameter Δ_{ds}, μm upper	lower	Dimensional tolerance of shaft diameter μm upper	lower	Remarks
Rotating inner ring load	Normal load	–	76.2 (3.0)	+13	0	+ 38	+ 25	
		76.2 (3.0)	304.8 (12.0)	+25	0	+ 64	+ 38	
		304.8 (12.0)	609.6 (24.0)	+51	0	+127	+ 76	
		609.6 (24.0)	914.4 (36.0)	+76	0	+190	+114	
	Heavy load Impact load High speed rotation	–	76.2 (3.0)	+13	0	Should be such that average interference stands at $0.000\,5 \times d$ (mm)		Generally, bearing internal clearance should be larger than standard.
		76.2 (3.0)	304.8 (12.0)	+25	0			
		304.8 (12.0)	609.6 (24.0)	+51	0			
		609.6 (24.0)	914.4 (36.0)	+76	0			
Rotating outer ring load	Normal load without impact	–	76.2 (3.0)	+13	0	+ 13	0	
		76.2 (3.0)	304.8 (12.0)	+25	0	+ 25	0	
		304.8 (12.0)	609.6 (24.0)	+51	0	+ 51	0	
		609.6 (24.0)	914.4 (36.0)	+76	0	+ 76	0	
	Normal load without impact	–	76.2 (3.0)	+13	0	0	– 13	Inner ring is displaceable in axial direction.
		76.2 (3.0)	304.8 (12.0)	+25	0	0	– 25	
		304.8 (12.0)	609.6 (24.0)	+51	0	0	– 51	
		609.6 (24.0)	914.4 (36.0)	+76	0	0	– 76	
	Heavy load Impact load High speed rotation	–	76.2 (3.0)	+13	0	Should be such that average interference stands at $0.000\,5 \times d$ (mm)		Generally, bearing internal clearance should be larger than standard.
		76.2 (3.0)	304.8 (12.0)	+25	0			
		304.8 (12.0)	609.6 (24.0)	+51	0			
		609.6 (24.0)	914.4 (36.0)	+76	0			

■ Bearing tolerance : class 3, class 0[1)]

Load type		Nominal bore diameter d mm (1/25.4) over	up to	Deviation of a single bore diameter Δ_{ds}, μm upper	lower	Dimensional tolerance of shaft diameter μm upper	lower	Remarks
Rotating inner ring load	Spindles of precision machine tools	–	76.2 (3.0)	+13	0	+ 30	+ 18	
		76.2 (3.0)	304.8 (12.0)	+13	0	+ 30	+ 18	
		304.8 (12.0)	609.6 (24.0)	+25	0	+ 64	+ 38	
		609.6 (24.0)	914.4 (36.0)	+38	0	+102	+ 64	
	Heavy load Impact load High speed rotation	–	76.2 (3.0)	+13	0	Should be such that average interference stands at $0.000\,5 \times d$ (mm)		Generally, bearing internal clearance should be larger than standard.
		76.2 (3.0)	304.8 (12.0)	+13	0			
		304.8 (12.0)	609.6 (24.0)	+25	0			
		609.6 (24.0)	914.4 (36.0)	+38	0			
Rotating outer ring load	Spindles of precision machine tools	–	76.2 (3.0)	+13	0	+ 30	+ 18	
		76.2 (3.0)	304.8 (12.0)	+13	0	+ 30	+ 18	
		304.8 (12.0)	609.6 (24.0)	+25	0	+ 64	+ 38	
		609.6 (24.0)	914.4 (36.0)	+38	0	+102	+ 64	

[Note] 1) Class 0 bearing : $d \leqq 304.8$ mm

Table 9-7 (2) Recommended housing fits for inch series tapered roller bearings

■ Bearing tolerance : class 4, class 2

Load type		Nominal outside diameter D mm (1/25.4) over	up to	Deviation of a single outside diameter Δ_{Ds}, μm upper	lower	Dimensional tolerance of housing bore diameter μm upper	lower	Remarks
Rotating inner ring load	Used for free or fixed side.	–	76.2 (3.0)	+ 25	0	+ 76	+ 51	Outer ring is easily displaceable in axial direction.
		76.2 (3.0)	127.0 (5.0)	+ 25	0	+ 76	+ 51	
		127.0 (5.0)	304.8 (12.0)	+ 25	0	+ 76	+ 51	
		304.8 (12.0)	609.6 (24.0)	+ 51	0	+152	+102	
		609.6 (24.0)	914.4 (36.0)	+ 76	0	+229	+152	
	Position of outer ring is adjustable (in axial direction).	–	76.2 (3.0)	+ 25	0	+ 25	0	Outer ring is displaceable in axial direction.
		76.2 (3.0)	127.0 (5.0)	+ 25	0	+ 25	0	
		127.0 (5.0)	304.8 (12.0)	+ 25	0	+ 51	0	
		304.8 (12.0)	609.6 (24.0)	+ 51	0	+ 76	+ 25	
		609.6 (24.0)	914.4 (36.0)	+ 76	0	+127	+ 51	
	Position of outer ring is not adjustable (in axial direction).	–	76.2 (3.0)	+ 25	0	– 13	– 38	Outer ring is fixed in axial direction.
		76.2 (3.0)	127.0 (5.0)	+ 25	0	– 25	– 51	
		127.0 (5.0)	304.8 (12.0)	+ 25	0	– 25	– 51	
		304.8 (12.0)	609.6 (24.0)	+ 51	0	– 25	– 76	
		609.6 (24.0)	914.4 (36.0)	+ 76	0	– 25	–102	
Rotating outer ring load	Position of outer ring is not adjustable (in axial direction).	–	76.2 (3.0)	+ 25	0	– 13	– 38	Outer ring is fixed in axial direction.
		76.2 (3.0)	127.0 (5.0)	+ 25	0	– 25	– 51	
		127.0 (5.0)	304.8 (12.0)	+ 25	0	– 25	– 51	
		304.8 (12.0)	609.6 (24.0)	+ 51	0	– 25	– 76	
		609.6 (24.0)	914.4 (36.0)	+ 76	0	– 25	–102	

■ Bearing tolerance : class 3, class 0[1)]

Load type		Nominal outside diameter D mm (1/25.4) over	up to	Deviation of a single outside diameter Δ_{Ds}, μm upper	lower	Dimensional tolerance of housing bore diameter μm upper	lower	Remarks
Rotating inner ring load	Used for free side.	–	152.4 (6.0)	+ 13	0	+ 38	+ 25	Outer ring is easily displaceable in axial direction.
		152.4 (6.0)	304.8 (12.0)	+ 13	0	+ 38	+ 25	
		304.8 (12.0)	609.6 (24.0)	+ 25	0	+ 64	+ 38	
		609.6 (24.0)	914.4 (36.0)	+ 38	0	+ 89	+ 51	
	Used for fixed side.	–	152.4 (6.0)	+ 13	0	+ 25	+ 13	Outer ring is displaceable in axial direction.
		152.4 (6.0)	304.8 (12.0)	+ 13	0	+ 25	+ 13	
		304.8 (12.0)	609.6 (24.0)	+ 25	0	+ 51	+ 25	
		609.6 (24.0)	914.4 (36.0)	+ 38	0	+ 76	+ 38	
	Position of outer ring is adjustable (in axial direction).	–	152.4 (6.0)	+ 13	0	+ 13	0	Outer ring is fixed in axial direction.
		152.4 (6.0)	304.8 (12.0)	+ 13	0	+ 25	0	
		304.8 (12.0)	609.6 (24.0)	+ 25	0	+ 25	0	
		609.6 (24.0)	914.4 (36.0)	+ 38	0	+ 38	0	
	Position of outer ring is not adjustable (in axial direction).	–	152.4 (6.0)	+ 13	0	0	– 13	
		152.4 (6.0)	304.8 (12.0)	+ 13	0	0	– 25	
		304.8 (12.0)	609.6 (24.0)	+ 25	0	0	– 25	
		609.6 (24.0)	914.4 (36.0)	+ 38	0	0	– 38	
Rotating outer ring load	Position of outer ring is not adjustable (in axial direction).	–	152.4 (6.0)	+ 13	0	– 13	– 25	Outer ring is fixed in axial direction.
		152.4 (6.0)	304.8 (12.0)	+ 13	0	– 13	– 38	
		304.8 (12.0)	609.6 (24.0)	+ 25	0	– 13	– 38	
		609.6 (24.0)	914.4 (36.0)	+ 38	0	– 13	– 51	

[Note] 1) Class 0 bearing : $D \leqq 304.8$ mm

Table 9-8 (1) Recommended shaft fits for thrust bearings (classes 0, 6)

Load type		Shaft diameter, mm over	Shaft diameter, mm up to	Class of shaft tolerance range	Remarks
Central axial load (generally for thrust bearings)		All shaft diameters		js 6	h 6 may also be used.
Combined load spherical thrust roller bearing	Stationary shaft race load	All shaft diameters		js 6	–
	Rotating shaft race load or indeterminate direction load	– 200 400	200 400 –	k 6 m 6 n 6	js 6, k 6 and m 6 may be used in place of k 6, m 6 and n 6, respectively.

Table 9-8 (2) Recommended housing fits for thrust bearings (classes 0, 6)

Load type		Class of housing bore diameter tolerance range	Remarks
Central axial load (generally for thrust bearings)		–	Select such tolerance range class as provides clearance in the radial direction for housing race.
		H 8	In case of thrust ball bearings requiring high accuracy.
Combined load spherical thrust roller bearing	Stationary housing race load	H 7	–
	Indeterminate direction load or rotating housing race load	K 7	In case of application under normal operating conditions.
		M 7	In case of comparably large radial load.

[Remark] This table is applicable to cast iron or steel housings.

10. Bearing internal clearance

Bearing internal clearance is defined as the total distance either inner or outer ring can be moved when the other ring is fixed.

If movement is in the radial direction, it is called radial internal clearance; if in the axial direction, axial internal clearance. (Fig. 10-1)

Bearing performance depends greatly upon internal clearance during operation (also referred to as operating clearance); inappropriate clearance results in short rolling fatigue life and generation of heat, noise or vibration.

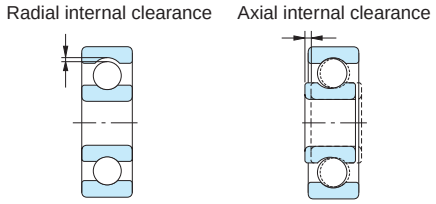


Fig. 10-1 Bearing internal clearance

In measuring internal clearance, a specified load is generally applied in order to obtain stable measurement values.

Consequently, measured clearance values will be larger than the original clearance by the amount of elastic deformation due to the load applied for measurement.

As far as roller bearings are concerned, however, the amount of elastic deformation is negligible.

Clearance prior to mounting is generally defined as the original clearance.

10-1 Selection of internal clearance

The term "residual clearance" is defined as the original clearance decreased owing to expansion or contraction of a raceway due to fitting, when the bearing is mounted in the shaft and housing.

The term "effective clearance" is defined as the residual clearance decreased owing to dimensional change arising from temperature differentials within the bearing.

The term "operating clearance" is defined as the internal clearance present while a bearing mounted in a machine is rotating under a certain load, or, the effective clearance increased due to elastic deformation arising from bearing loads.

As illustrated in Fig. 10-2, bearing fatigue life is longest when the operating clearance is slightly negative.

However, as the operating clearance becomes more negative, the fatigue life shortens remarkably.

Thus it is recommended that bearing internal clearance be selected such that the operating clearance is slightly positive.

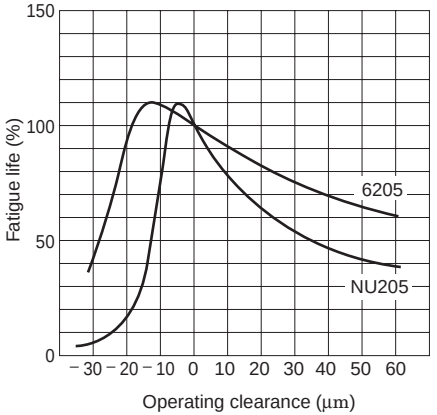


Fig. 10-2 Relationship between operating clearance and fatigue life

It is important to take specific operating conditions into consideration and select a clearance suitable for the conditions.

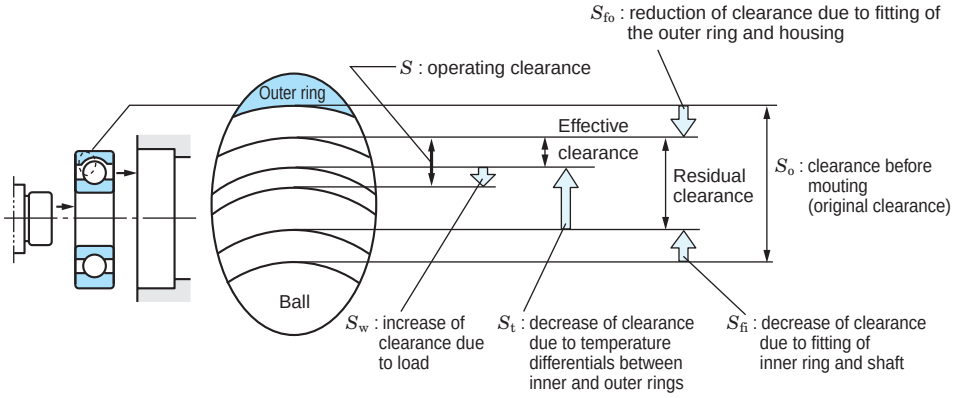
For example, when high rigidity is required, or when the noise must be minimized, the operating clearance must be reduced. On the other hand, when high operating temperature is expected, the operating clearance must be increased.

10-2 Operating clearance

Table 10-1 shows how to determine the operating clearance when the shaft and housing are made of steel.

Tables 10-2 to 10-10 show standard values for bearing internal clearance before mounting.
Table 10-11 shows examples of clearance selection excluding CN clearance.

Table 10-1 How to determine operating clearance



Operating clearance (S)	$S = S_o - (S_f + S_{t1} + S_{t2}) + S_w$ *	* S_w (increase of clearance due to load) is generally small, and thus may be ignored, although there is an equation for determining the value.
Decrease of clearance due to fitting (S_f)	(In the case of hollow shaft) $S_{fi} = \Delta_{deff} \frac{d}{D_i} \cdot \frac{\left(1 - \frac{d_0^2}{d^2}\right)}{\left(1 - \frac{d_0^2}{D_i^2}\right)}$ (In the case of solid shaft) $S_{fi} = \Delta_{deff} \frac{d}{D_i}$	(In the case of $D_h \neq \infty$) $S_{fo} = \Delta_{Deff} \frac{D_e}{D} \cdot \frac{\left(1 - \frac{D^2}{D_h^2}\right)}{\left(1 - \frac{D_e^2}{D_h^2}\right)}$ (In the case of $D_h = \infty$) $S_{fo} = \Delta_{Deff} \frac{D_e}{D}$
Decrease of clearance due to temperature differentials between inner and outer rings (S_{t1})	The amount of decrease varies depending on the state of housing; however, generally the amount can be approximated by the following equation on the assumption that the outer ring will not expand : $S_{t1} = \alpha (D_i \cdot t_i - D_e \cdot t_e)$	where : $D_e = D_i + 2D_w$ Consequently, $S_{t1} + S_{t2}$ will be determined by the following equation : $S_{t1} + S_{t2} = \alpha \cdot D_i \cdot t_1 + 2\ \alpha \cdot D_w \cdot t_2$ Temperature differential between the inner and outer rings, t_1, can be expressed as follows : $t_1 = t_i - t_e$ Temperature differential between the rolling element and outer ring, t_2, can be expressed as follows : $t_2 = t_w - t_e$
Decrease of clearance due to temperature rise of rolling element (S_{t2})	$S_{t2} = 2\ \alpha \cdot D_w \cdot t_w$	

In Table 10-1,

S	: operating clearance	mm	Δ_{Deff}	: effective interference of outer ring	mm
S_o	: clearance before mounting	mm	D_h	: outside diameter of housing	mm
S_f	: decrease of clearance due to fitting	mm	D_e	: outer ring raceway contact diameter	mm
S_{fi}	: expansion of inner ring raceway contact diameter	mm		(ball bearing ····· $D_e \fallingdotseq 0.2(4\ D + d)$ roller bearing ··· $D_e \fallingdotseq 0.25(3\ D + d)$)	
S_{fo}	: contraction of outer ring raceway contact diameter	mm	D	: nominal outside diameter	mm
S_{t1}	: decrease of clearance due to temperature differentials between inner and outer rings	mm	α	: linear expansion coefficient of bearing steel (12.5×10^{-6})	1/°C
S_{t2}	: decrease of clearance due to temperature rise of the rolling elements	mm	D_w	: average diameter of rolling elements	mm
S_w	: increase of clearance due to load	mm		(ball bearing ····· $D_w \fallingdotseq 0.3(D - d)$ roller bearing ··· $D_w \fallingdotseq 0.25(D - d)$)	
Δ_{deff}	: effective interference of inner ring	mm	t_i	: temperature rise of the inner ring	°C
d	: nominal bore diameter (shaft diameter)	mm	t_e	: temperature rise of the outer ring	°C
d_0	: bore diameter of hollow shaft	mm	t_w	: temperature rise of rolling elements	°C
D_i	: inner ring raceway contact diameter	mm			
	(ball bearing ····· $D_i \fallingdotseq 0.2(D + 4\ d)$ roller bearing ··· $D_i \fallingdotseq 0.25(D + 3\ d)$)				

■ Bearings are sometimes used with a non-steel shaft or housing.
In the automotive industry, a statistical method is often incorporated for selection of clearance.
In these cases, or when other special operating conditions are involved, JTEKT should be consulted.

Table 10-2 Radial internal clearance of deep groove ball bearings (cylindrical bore)

Unit : μm

Nominal bore diameter d, mm		Clearance									
		C 2		C N		C 3		C 4		C 5	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
2.5	6	0	7	2	13	8	23	*14*	*29*	*20*	*37*
6	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
65	80	1	15	10	30	25	51	46	71	65	105
80	100	1	18	12	36	30	58	53	84	75	120
100	120	2	20	15	41	36	66	61	97	90	140
120	140	2	23	18	48	41	81	71	114	105	160
140	160	2	23	18	53	46	91	81	130	120	180
160	180	2	25	20	61	53	102	91	147	135	200
180	200	2	30	25	71	63	117	107	163	150	230
200	225	2	35	25	85	75	140	125	195	175	265
225	250	2	40	30	95	85	160	145	225	205	300
250	280	2	45	35	105	90	170	155	245	225	340
280	315	2	55	40	115	100	190	175	270	245	370
315	355	3	60	45	125	110	210	195	300	275	410
355	400	3	70	55	145	130	240	225	340	315	460

[Remarks] 1. For measured clearance, the increase of radial internal clearance caused by the measurement load should be added to the values in the above table for correction. Amounts for correction are as shown below.
Of the amounts for clearance correction in the C 2 column, the smaller is applied to the minimum clearance, the larger to the maximum clearance.
2. Values in Italics are prescribed in JTEKT standards.

Nominal bore diameter d, mm		Measurement load	Amounts of clearance correction, μm				
			C 2	C N	C 3	C 4	C 5
over	up to	N					
2.5	18	24.5	3 – 4	4	4	4	4
18	50	49	4 – 5	5	6	6	6
50	280	147	6 – 8	8	9	9	9

Table 10-3 Radial internal clearance of extra-small/miniature ball bearings

Unit : μm

Clearance code	M 1		M 2		M 3		M 4		M 5		M 6	
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
Clearance	0	5	3	8	5	10	8	13	13	20	20	28

[Remark] For measured clearance, the following amounts should be added for correction.

Measurement load, N		Amounts of clearance correction, μm					
Extra-small ball bearing	Miniature ball bearing	M1	M2	M3	M4	M5	M6
2.3		1	1	1	1	1	1

(Extra-small ball bearing : 9 mm or larger in outside diameter and under 10 mm in bore diameter
Miniature ball bearing : under 9 mm in outside diameter)

Table 10-4 Axial internal clearance of matched pair angular contact ball bearings (measurement clearance) 1)

Unit : μm

Nominal bore diameter d, mm		Contact angle : 15°				Contact angle : 30°							
		C 2		C N		C 2		C N		C 3		C 4	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
–	10	13	33	33	53	3	14	10	30	30	50	50	70
10	18	15	35	35	55	3	16	10	30	30	50	50	70
18	24	20	40	45	65	3	20	20	40	40	60	60	80
24	30	20	40	45	65	3	20	20	40	40	60	60	80
30	40	20	40	45	65	3	20	25	45	45	65	70	90
40	50	20	40	50	70	3	20	30	50	50	70	75	95
50	65	30	55	65	90	9	27	35	60	60	85	90	115
65	80	30	55	70	95	10	28	40	65	70	95	110	135
80	100	35	60	85	110	10	30	50	75	80	105	130	155
100	120	40	65	100	125	12	37	65	90	100	125	150	175
120	140	45	75	110	140	15	40	75	105	120	150	180	210
140	160	45	75	125	155	15	40	80	110	130	160	210	240
160	180	50	80	140	170	15	45	95	125	140	170	235	265
180	200	50	80	160	190	20	50	110	140	170	200	275	305

Nominal bore diameter d, mm		Contact angle : 40°							
		C 2		C N		C 3		C 4	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.
–	10	2	10	6	18	16	30	26	40
10	18	2	12	7	21	18	32	28	44
18	24	2	12	12	26	20	40	30	50
24	30	2	14	12	26	20	40	40	60
30	40	2	14	12	26	25	45	45	65
40	50	2	14	12	30	30	50	50	70
50	65	5	17	17	35	35	60	60	85
65	80	6	18	18	40	40	65	70	95
80	100	6	20	20	45	55	80	85	110
100	120	6	25	25	50	60	85	100	125
120	140	7	30	30	60	75	105	125	155
140	160	7	30	35	65	85	115	140	170
160	180	7	31	45	75	100	130	155	185
180	200	7	37	60	90	110	140	170	200

[Note] 1) Including increase of clearance caused by measurement load.

Table 10-5 Radial internal clearance of double-row angular contact ball bearings

Unit : μm

Nominal bore diameter d, mm		Clearance					
		CD2		CDN		CD3	
over	up to	min.	max.	min.	max.	min.	max.
2.5	10	0	7	2	10	8	18
10	18	0	7	2	11	9	19
18	24	0	8	2	11	10	21
24	30	0	8	2	13	10	23
30	40	0	9	3	14	11	24
40	50	0	10	4	16	13	27
50	65	0	11	6	20	15	30
65	80	0	12	7	22	18	33
80	100	0	12	8	24	22	38
100	120	0	13	9	25	24	42
120	140	0	15	10	26	25	44
140	160	0	16	11	28	26	46
160	180	0	17	12	30	27	47
180	200	0	18	14	32	28	48

[Remark]
Regarding deep groove ball bearings and matched pair and double-row angular contact ball bearings, equations of the relationship between radial internal clearance and axial internal clearance are shown on page A 111.

Table 10-6 Radial internal clearance of self-aligning ball bearings

Unit : μm

Nominal bore diameter d, mm		Cylindrical bore bearing clearance										Tapered bore bearing clearance									
		C 2		C N		C 3		C 4		C 5		C 2		C N		C 3		C 4		C 5	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
2.5	6	1	8	5	15	10	20	15	25	21	33	–	–	–	–	–	–	–	–	–	–
6	10	2	9	6	17	12	25	19	33	27	42	–	–	–	–	–	–	–	–	–	–
10	14	2	10	6	19	13	26	21	35	30	48	–	–	–	–	–	–	–	–	–	–
14	18	3	12	8	21	15	28	23	37	32	50	–	–	–	–	–	–	–	–	–	–
18	24	4	14	10	23	17	30	25	39	34	52	7	17	13	26	20	33	28	42	37	55
24	30	5	16	11	24	19	35	29	46	40	58	9	20	15	28	23	39	33	50	44	62
30	40	6	18	13	29	23	40	34	53	46	66	12	24	19	35	29	46	40	59	52	72
40	50	6	19	14	31	25	44	37	57	50	71	14	27	22	39	33	52	45	65	58	79
50	65	7	21	16	36	30	50	45	69	62	88	18	32	27	47	41	61	56	80	73	99
65	80	8	24	18	40	35	60	54	83	76	108	23	39	35	57	50	75	69	98	91	123
80	100	9	27	22	48	42	70	64	96	89	124	29	47	42	68	62	90	84	116	109	144
100	120	10	31	25	56	50	83	75	114	105	145	35	56	50	81	75	108	100	139	130	170
120	140	10	38	30	68	60	100	90	135	125	175	40	68	60	98	90	130	120	165	155	205
140	160	15	44	35	80	70	120	110	161	150	210	45	74	65	110	100	150	140	191	180	240

Table 10-7 Radial internal clearance of electric motor bearings

1) Deep groove ball bearing

Unit : μm

Nominal bore diameter d, mm		Clearance	
		CM	
over	up to	min.	max.
10[1)]	18	4	11
18	30	5	12
30	50	9	17
50	80	12	22
80	120	18	30
120	160	24	38

[Note] 1) 10 mm is included.
[Remark] To adjust for change of clearance due to measuring load, use correction values shown in Table 10-2.

2) Cylindrical roller bearing

Unit : μm

Nominal bore diameter d, mm		Clearance			
		Interchangeability CT		Non-interchangeability CM	
over	up to	min.	max.	min.	max.
24	40	15	35	15	30
40	50	20	40	20	35
50	65	25	45	25	40
65	80	30	50	30	45
80	100	35	60	35	55
100	120	35	65	35	60
120	140	40	70	40	65
140	160	50	85	50	80
160	180	60	95	60	90
180	200	65	105	65	100

[Note] "Interchangeability" means interchangeable only among products (sub-units) of the same manufacturer ; not with others.

Table 10-8 Radial internal clearance of cylindrical roller bearings and machined ring needle roller bearings

(1) Cylindrical bore bearing

Unit : μm

Nominal bore diameter d, mm		Clearance									
		C 2		C N		C 3		C 4		C 5	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
–	10	0	25	20	45	35	60	50	75	–	–
10	24	0	25	20	45	35	60	50	75	65	90
24	30	0	25	20	45	35	60	50	75	70	95
30	40	5	30	25	50	45	70	60	85	80	105
40	50	5	35	30	60	50	80	70	100	95	125
50	65	10	40	40	70	60	90	80	110	110	140
65	80	10	45	40	75	65	100	90	125	130	165
80	100	15	50	50	85	75	110	105	140	155	190
100	120	15	55	50	90	85	125	125	165	180	220
120	140	15	60	60	105	100	145	145	190	200	245
140	160	20	70	70	120	115	165	165	215	225	275
160	180	25	75	75	125	120	170	170	220	250	300
180	200	35	90	90	145	140	195	195	250	275	330
200	225	45	105	105	165	160	220	220	280	305	365
225	250	45	110	110	175	170	235	235	300	330	395
250	280	55	125	125	195	190	260	260	330	370	440
280	315	55	130	130	205	200	275	275	350	410	485
315	355	65	145	145	225	225	305	305	385	455	535
355	400	100	190	190	280	280	370	370	460	510	600
400	450	110	210	210	310	310	410	410	510	565	665
450	500	110	220	220	330	330	440	440	550	625	735

(2) Tapered bore bearing

Unit : μm

Nominal bore diameter d, mm		Non-interchangeable clearance													
		C 9 NA[1)]		C 1 NA		C 2 NA		C N NA		C 3 NA		C 4 NA		C 5 NA	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
12	14	5	10	–	–	–	–	–	–	–	–	–	–	–	–
14	24	5	10	10	20	20	30	35	45	45	55	55	65	75	85
24	30	5	10	10	25	25	35	40	50	50	60	60	70	80	95
30	40	5	12	12	25	25	40	45	55	55	70	70	80	95	110
40	50	5	15	15	30	30	45	50	65	65	80	80	95	110	125
50	65	5	15	15	35	35	50	55	75	75	90	90	110	130	150
65	80	10	20	20	40	40	60	70	90	90	110	110	130	150	170
80	100	10	25	25	45	45	70	80	105	105	125	125	150	180	205
100	120	10	25	25	50	50	80	95	120	120	145	145	170	205	230
120	140	15	30	30	60	60	90	105	135	135	160	160	190	230	260
140	160	15	35	35	65	65	100	115	150	150	180	180	215	260	295
160	180	15	35	35	75	75	110	125	165	165	200	200	240	285	320
180	200	20	40	40	80	80	120	140	180	180	220	220	260	315	355
200	225	20	45	45	90	90	135	155	200	200	240	240	285	350	395
225	250	25	50	50	100	100	150	170	215	215	265	265	315	380	430
250	280	25	55	55	110	110	165	185	240	240	295	295	350	420	475
280	315	30	60	60	120	120	180	205	265	265	325	325	385	470	530
315	355	30	65	65	135	135	200	225	295	295	360	360	430	520	585
355	400	35	75	75	150	150	225	255	330	330	405	405	480	585	660
400	450	45	85	85	170	170	255	285	370	370	455	455	540	650	735
450	500	50	95	95	190	190	285	315	410	410	505	505	600	720	815

[Note] 1) Clearance C 9 NA is applied to tapered bore cylindrical roller bearings of JIS tolerance classes 5 and 4.

Table 10-9 Radial internal clearance of spherical roller bearings

(1) Cylindrical bore bearing

Unit : μm

Nominal bore diameter d, mm		Clearance									
		C 2		C N		C 3		C 4		C 5	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
14	18	10	20	20	35	35	45	45	60	60	75
18	24	10	20	20	35	35	45	45	60	60	75
24	30	15	25	25	40	40	55	55	75	75	95
30	40	15	30	30	45	45	60	60	80	80	100
40	50	20	35	35	55	55	75	75	100	100	125
50	65	20	40	40	65	65	90	90	120	120	150
65	80	30	50	50	80	80	110	110	145	145	180
80	100	35	60	60	100	100	135	135	180	180	225
100	120	40	75	75	120	120	160	160	210	210	260
120	140	50	95	95	145	145	190	190	240	240	300
140	160	60	110	110	170	170	220	220	280	280	350
160	180	65	120	120	180	180	240	240	310	310	390
180	200	70	130	130	200	200	260	260	340	340	430
200	225	80	140	140	220	220	290	290	380	380	470
225	250	90	150	150	240	240	320	320	420	420	520
250	280	100	170	170	260	260	350	350	460	460	570
280	315	110	190	190	280	280	370	370	500	500	630
315	355	120	200	200	310	310	410	410	550	550	690
355	400	130	220	220	340	340	450	450	600	600	750
400	450	140	240	240	370	370	500	500	660	660	820
450	500	140	260	260	410	410	550	550	720	720	900
500	560	150	280	280	440	440	600	600	780	780	1 000
560	630	170	310	310	480	480	650	650	850	850	1 100
630	710	190	350	350	530	530	700	700	920	920	1 190
710	800	210	390	390	580	580	770	770	1 010	1 010	1 300
800	900	230	430	430	650	650	860	860	1 120	1 120	1 440
900	1 000	260	480	480	710	710	930	930	1 220	1 220	1 570

(2) Tapered bore bearing

Unit : μm

Nominal bore diameter d, mm		Clearance									
		C 2		C N		C 3		C 4		C 5	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
18	24	15	25	25	35	35	45	45	60	60	75
24	30	20	30	30	40	40	55	55	75	75	95
30	40	25	35	35	50	50	65	65	85	85	105
40	50	30	45	45	60	60	80	80	100	100	130
50	65	40	55	55	75	75	95	95	120	120	160
65	80	50	70	70	95	95	120	120	150	150	200
80	100	55	80	80	110	110	140	140	180	180	230
100	120	65	100	100	135	135	170	170	220	220	280
120	140	80	120	120	160	160	200	200	260	260	330
140	160	90	130	130	180	180	230	230	300	300	380
160	180	100	140	140	200	200	260	260	340	340	430
180	200	110	160	160	220	220	290	290	370	370	470
200	225	120	180	180	250	250	320	320	410	410	520
225	250	140	200	200	270	270	350	350	450	450	570
250	280	150	220	220	300	300	390	390	490	490	620
280	315	170	240	240	330	330	430	430	540	540	680
315	355	190	270	270	360	360	470	470	590	590	740
355	400	210	300	300	400	400	520	520	650	650	820
400	450	230	330	330	440	440	570	570	720	720	910
450	500	260	370	370	490	490	630	630	790	790	1 000
500	560	290	410	410	540	540	680	680	870	870	1 100
560	630	320	460	460	600	600	760	760	980	980	1 230
630	710	350	510	510	670	670	850	850	1 090	1 090	1 360
710	800	390	570	570	750	750	960	960	1 220	1 220	1 500
800	900	440	640	640	840	840	1 070	1 070	1 370	1 370	1 690
900	1 000	490	710	710	930	930	1 190	1 190	1 520	1 520	1 860

Table 10-10 Radial internal clearance of double/four-row and matched pair tapered roller bearings (cylindrical bore)

Unit : μm

Nominal bore diameter d, mm		Clearance									
		C 1		C 2		C N		C 3		C 4	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
14	18	0	10	10	20	20	30	30	40	40	50
18	24	0	10	10	20	20	30	30	40	40	55
24	30	0	10	10	20	20	30	30	45	45	60
30	40	0	12	12	25	25	40	40	55	55	75
40	50	0	15	15	30	30	45	45	60	60	80
50	65	0	15	15	30	30	50	50	70	70	90
65	80	0	20	20	40	40	60	60	80	80	110
80	100	0	20	20	45	45	70	70	100	100	130
100	120	0	25	25	50	50	80	80	110	110	150
120	140	0	30	30	60	60	90	90	120	120	170
140	160	0	30	30	65	65	100	100	140	140	190
160	180	0	35	35	70	70	110	110	150	150	210
180	200	0	40	40	80	80	120	120	170	170	230
200	225	0	40	40	90	90	140	140	190	190	260
225	250	0	50	50	100	100	150	150	210	210	290
250	280	0	50	50	110	110	170	170	230	230	320
280	315	0	60	60	120	120	180	180	250	250	350
315	355	0	70	70	140	140	210	210	280	280	390
355	400	0	70	70	150	150	230	230	310	310	440
400	450	0	80	80	170	170	260	260	350	350	490
450	500	0	90	90	190	190	290	290	390	390	540
500	560	0	100	100	210	210	320	320	430	430	590
560	630	0	110	110	230	230	350	350	480	480	660
630	710	0	130	130	260	260	400	400	540	540	740
710	800	0	140	140	290	290	450	450	610	610	830
800	900	0	160	160	330	330	500	500	670	670	920

Table 10-11 Examples of non-standard clearance selection

Service conditions	Applications	Examples of clearance selection
In the case of heavy/impact load, large interference	Railway rolling stock axle journals	C 3
In the case of vibration/impact load, interference fit both for inner/outer rings	Shaker screens, railway rolling stock traction motors, tractor final reduction gears	C 3, C 4 C 4 C 4
When shaft deflection is large	Automobile rear wheels	C 5
When shaft and inner ring are heated	Dryers of paper making machines, table rollers of rolling mills	C 3, C 4 C 3
When clearance fit both for inner/outer rings	Roll necks of rolling mills	C 2
When noise/vibration during rotation is to be lowered	Micro-motors	C 1, C 2, CM
When clearance after mounting is to be adjusted in order to reduce shaft runout	Lathe spindles	C 9 NA, C 1 NA

[Reference] Relationship between radial internal clearance and axial internal clearance

[Deep groove ball bearing]

$$\Delta_a = \sqrt{\Delta_r (4m_o - \Delta_r)} \quad \cdots\cdots (10\text{-}1)$$

[Double-row angular contact ball bearing]

$$\Delta_a = 2\sqrt{m_o^2 - \left(m_o \cos\alpha - \frac{\Delta_r}{2}\right)^2} - 2m_o \sin\alpha \quad \cdots\cdots (10\text{-}2)$$

[Matched pair angular contact ball bearing]

$$\Delta_a = 2m_o \sin\alpha - 2\sqrt{m_o^2 - \left(m_o \cos\alpha + \frac{\Delta_r}{2}\right)^2} \quad \cdots\cdots (10\text{-}3)$$

[Double/four-row and matched pair tapered roller bearing]

$$\Delta_a = \Delta_r \cot\alpha \fallingdotseq \frac{1.5}{e}\Delta_r \quad \cdots\cdots (10\text{-}4)$$

where :

Δ_a : axial internal clearance mm

Δ_r : radial internal clearance mm

$m_o = r_e + r_i - D_w$

(r_e : outer ring raceway groove radius mm

r_i : inner ring raceway groove radius mm

D_w : ball diameter mm)

α : nominal contact angle

e : limit value of F_a/F_r (shown in the bearing specification table.)

11. Preload

Generally, bearings are operated with a certain amount of proper clearance allowed. For some applications, however, bearings are mounted with axial load of such magnitude that the clearance will be negative.

The axial load, referred to as "preload," is often applied to angular contact ball bearings and tapered roller bearings.

11-1 Purpose of preload

- To improve running accuracy by reducing runout of shaft, as well as to heighten position accuracy in radial and axial directions.
  (Bearings for machine tool spindles and measuring instruments)
- To improve gear engagement accuracy by increasing bearing rigidity.
  (Bearings for automobile final reduction gears)
- To reduce smearing by eliminating sliding in irregular rotation, self-rotation, and around-the-raceway revolution of rolling elements.
  (For high rotation-speed angular contact ball bearings)
- To minimize abnormal noise due to vibration or resonance.
  (For small electric motor bearings)
- To keep rolling elements in the right position relative to the raceway.
  (For thrust ball bearings and spherical thrust roller bearings used on horizontal shafts)

11-2 Method of preloading

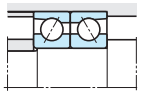
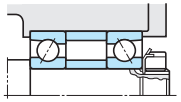
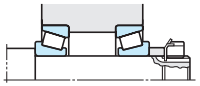
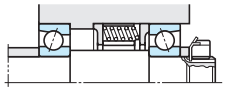
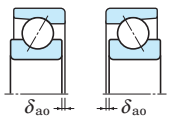
The preload can be done either by the position preloading or the constant pressure preloading; typical examples are given in Table 11-1.

(Comparison between position and constant pressure preloadings)

- With the same amount of preloading, the position preloading produces smaller displacement in the axial direction, and thus is liable to bring about higher rigidity.
- The constant pressure preloading produces stable preloading, or little fluctuation in the amount of preload, since the spring can absorb the load fluctuation and shaft expansion/contraction caused by temperature difference between the shaft and housing during operation.
- The position preloading can apply a larger preload.

Consequently, the position preloading is more suitable for applications requiring high rigidity, while the constant pressure preloading is more suitable for high rotational speed, vibration prevention in the axial direction, and thrust bearings used on horizontal shafts.

Table 11-1 Method of preloading

Position preloading			Constant pressure preloading
			
• Method using matched pair bearing with stand-out adjusted for preloading (see below). 	• Method using spacer with dimensions adjusted for preloading.	• Method using nut or bolt capable of adjusting preload in axial direction. (In this case, starting friction moment during adjustment should be measured so that proper preload will be applied.)	• Method using coil spring or diaphragm spring.

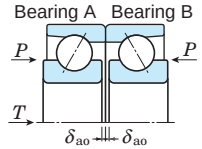
11-3 Preload and rigidity

For angular contact ball bearings and tapered roller bearings, the "back-to-back" arrangement is generally used to apply preload for higher rigidity.

This is because shaft rigidity is improved by the longer distance between load centers in the back-to-back arrangement.

Fig. 11-1 shows the relationship between preload given via position preloading and rigidity expressed by displacement in the axial direction of the back-to-back bearing.

P : amount of preload (load)
T : axial load from outside
T_A : axial load applied to Bearing A
T_B : axial load applied to Bearing B
δ_a : displacement of matched pair bearing
δ_{aA} : displacement of Bearing A
δ_{aB} : displacement of Bearing B
$2\delta_{ao}$: clearance between inner rings before preloading



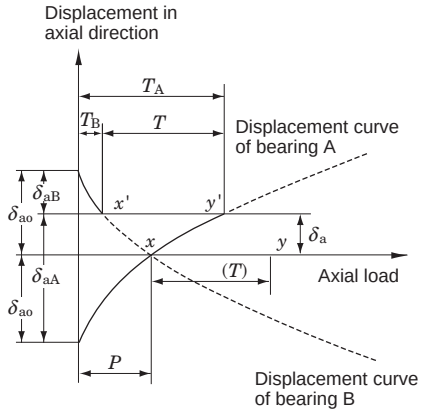


Fig. 11-1 Preloading diagram in position preloading

In Fig. 11-1, when preload P is applied (inner ring is tightened toward the axial direction), bearings A and B are displaced by δ_{ao} respectively, and the clearance between inner rings diminishes from $2\delta_{ao}$ to zero.

The displacement when axial load T is applied to these matched pair bearings from the outside can be determined as δ_a .

[For reference]
How to determine δ_a in Fig. 11-1
①Determine the displacement curve of bearing A.
②Determine the displacement curve of bearing B. ...Symmetrical curve in relation to horizontal axis intersecting vertical line of preload P at point x.
③With the load from outside defined as T, determine line segment $x-y$ on the horizontal line passing through point x.
Displace segment $x-y$ in parallel along the displacement curve of bearing B.
Determine point y' at which to intersect displacement curve of bearing A.
④δ_a can be determined as the distance between line segments $x'-y'$ and $x-y$.

Fig. 11-2 shows the relationship between preload and rigidity in the constant pressure preloading using the same matched pair bearings as in Fig. 11-1.

In this case, since the spring rigidity can be ignored, the matched pair bearing shows almost the same rigidity as a separate bearing with preload P applied in advance.

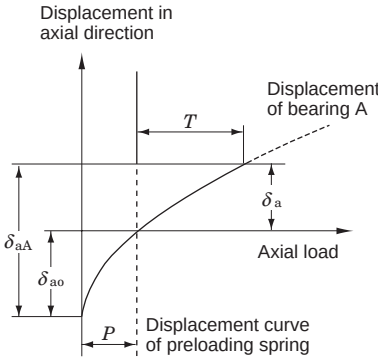


Fig. 11-2 Preloading diagram in constant pressure preloading

11-4 Amount of preload

The amount of preload should be determined, to avoid an adverse effect on bearing life, temperature rise, friction torque, or other performance characteristic, in view of the bearing application.

Decrease of preload due to wear-in, accuracy of the shaft and housing, mounting conditions, and lubrication should also be fully considered in determining preload.

11-4-1 Preload amount of matched pair angular contact ball bearings

Table 11-2 shows recommended preload for matched pair angular contact ball bearings of JIS class 5 or higher used for machine tool spindles or other higher precision applications.

JTEKT offers four types of standard preload: slight preload (S), light preload (L), medium preload (M), and heavy preload (H), so that preload can be selected properly and easily for various applications.

Generally, light or medium preload is recommended for grinder spindles, and medium or heavy preload for spindles of lathes and milling machines.

Table 11-3 shows recommended fits of high-precision matched pair angular contact ball bearings used with light or medium preload applied.

Table 11-3 Recommended fits for high-precision matched pair angular contact ball bearings with preload applied

(1) Dimensional tolerance of shaft Unit : μm

Shaft diameter mm		Inner ring rotation		Outer ring rotation
over	up to	Tolerance of shaft diameter	Interference between shaft and inner ring (matching adjustment)[1]	Tolerance of shaft diameter
6	10	−2 −6	0 – 2	0 −4
10	18	−2 −7	0 – 2	0 −5
18	30	−2 −8	0 – 2.5	0 −6
30	50	−2 −9	0 – 2.5	0 −7
50	80	−2 −10	0 – 3	0 −8
80	120	−2 −12	0 – 4	0 −10
120	180	−2 −14	0 – 5	0 −12

[Note] 1) Matching adjustment means to measure of bore diameter the bearing and match it to the measured shaft diameter.

(2) Dimensional tolerance of housing bore Unit : μm

Housing bore diameter mm		Inner ring rotation			Outer ring rotation
		Tolerance of housing bore diameter		Clearance[1] between housing and outer ring	Tolerance of housing bore diameter
over	up to	Fixed-side bearing	Free-side bearing		
18	30	± 4.5	+9 0	2 – 6	−6 −12
30	50	± 5.5	+11 0	2 – 6	−6 −13
50	80	± 6.5	+13 0	3 – 8	−8 −16
80	120	± 7.5	+15 0	3 – 9	−9 −19
120	180	± 9	+18 0	4 – 12	−11 −23
180	250	± 10	+20 0	5 – 15	−13 −27
250	315	± 11.5	+23 0	6 – 18	−16 −32

[Note] 1) Lower value is desirable for fixed side; higher value for free side.

Table 11-2 Standard preload of high-precision matched pair angular contact ball bearings

[S : slight preload, L : light preload, M : medium preload, H : heavy preload] Unit : N

Bore diameter No.	7900 C			7000			7000 C				7200			7200 C				ACT 000		ACT 000 B		Bore diameter No.
	S	L	M	L	M	H	S	L	M	H	L	M	H	S	L	M	H	L	M	L	M	
00	5	15	30	30	80	145	6	20	50	100	50	145	245	10	30	80	145	–	–	–	–	00
01	7	20	40	30	80	145	6	20	50	100	60	145	295	15	40	100	195	–	–	–	–	01
02	8	25	50	50	145	245	10	30	80	145	80	245	390	15	50	145	245	–	–	–	–	02
03	8	25	50	60	145	295	15	40	100	165	100	245	540	25	70	145	345	–	–	–	–	03
04	15	40	80	60	145	295	15	40	100	245	145	295	635	25	80	195	390	–	–	–	–	04
05	15	50	100	100	245	490	20	60	145	295	145	390	785	35	100	245	490	–	–	–	–	05
06	15	50	100	145	295	635	25	80	195	390	145	590	930	35	100	295	590	195	345	295	685	06
07	25	70	140	145	390	785	35	100	245	490	245	785	1 270	50	145	390	785	195	390	390	735	07
08	25	80	155	145	390	785	35	100	295	590	390	880	1 570	65	195	440	880	245	440	440	835	08
09	35	100	195	245	540	980	50	145	345	635	490	1 080	1 770	85	245	540	1 080	245	490	490	930	09
10	35	100	195	245	635	1 180	50	145	390	735	540	1 180	2 060	85	245	590	1 180	295	540	540	1 030	10
11	40	120	235	295	785	1 370	65	195	440	880	635	1 370	2 450	100	295	735	1 470	390	685	685	1 270	11
12	40	120	235	390	880	1 570	65	195	490	980	785	1 470	2 940	115	345	785	1 670	390	735	735	1 420	12
13	50	145	295	440	980	1 770	85	245	540	1 090	835	1 670	3 330	130	390	930	1 860	440	835	785	1 520	13
14	65	195	390	490	1 080	2 060	85	245	635	1 270	930	1 860	3 720	160	490	980	2 060	590	1 130	1 030	2 010	14
15	65	195	390	590	1 180	2 150	100	295	685	1 370	980	2 150	3 920	195	590	1 180	2 350	590	1 130	1 080	2 110	15
16	65	195	390	635	1 370	2 350	100	295	735	1 470	1 080	2 450	4 310	225	685	1 370	2 750	685	1 370	1 270	2 500	16
17	85	245	490	735	1 570	2 550	130	390	880	1 770	1 270	2 940	4 900	260	785	1 570	2 940	735	1 420	1 320	2 600	17
18	100	295	590	785	1 670	2 840	145	440	980	1 960	1 470	3 230	5 390	260	785	1 770	3 430	980	1 860	1 770	3 380	18
19	100	295	590	880	1 770	3 140	160	490	1 080	2 060	1 670	3 430	5 880	290	880	1 960	3 920	980	1 960	1 860	3 530	19
20	100	345	685	880	1 960	3 530	175	540	1 180	2 150	1 860	3 920	6 370	325	980	2 150	4 410	1 030	2 010	1 910	3 680	20
21	100	345	685	980	2 150	3 920	195	590	1 270	2 350	2 060	4 310	7 060	360	1 080	2 350	4 900	1 180	2 250	2 150	3 770	21
22	145	390	785	1 080	2 380	4 410	210	635	1 470	2 550	2 250	4 900	7 840	385	1 180	2 450	5 290	1 320	2 600	2 450	4 760	22
24	145	490	980	1 180	2 650	4 900	225	685	1 670	2 840	2 450	5 390	8 820	420	1 270	2 840	5 490	1 420	2 800	2 550	5 100	24
26	195	590	1 180	1 370	3 140	5 390	245	735	1 770	3 140	2 750	5 880	9 310	485	1 470	3 140	5 880	1 770	3 380	3 230	6 230	26
28	195	635	1 270	1 470	3 430	5 880	260	785	1 960	3 920	2 940	6 370	9 800	520	1 570	3 430	6 370	2 010	3 920	3 720	7 210	28
30	245	735	1 470	1 770	3 920	6 860	275	835	2 150	4 410	3 330	6 860	10 300	585	1 770	3 720	6 860	2 500	4 850	4 660	8 920	30
32	245	785	1 570	2 150	4 410	7 840	290	880	2 350	4 900	3 630	7 350	10 800	645	1 960	4 120	7 840	2 500	4 850	4 660	8 920	32
34	345	880	1 810	2 450	4 900	8 820	325	980	2 450	5 390	3 920	7 840	11 800	645	2 150	4 410	8 330	3 090	6 030	5 730	11 100	34

11-4-2 Amount of preload for thrust ball bearings

When a thrust ball bearing is rotated at high speed, balls slide on raceway due to centrifugal force and the gyro moment, which often causes the raceway to suffer from smearing or other defects.

To eliminate such sliding, it is necessary to mount the bearing without clearance, and apply an axial load (preload) larger than the minimum necessary axial load determined by the following equation.

When an axial load from the outside is lower than 0.001 3 C_{0a}, there is no adverse effect on the bearing, as long as lubrication is satisfactory.

Generally, deep groove and angular contact ball bearings are recommended for applications when a portion of rotation under axial load is present at high speed.

11-4-3 Amount of preload for spherical thrust roller bearings

Spherical thrust roller bearings sometimes suffer from scuffing, smearing, or other defects due to sliding which occurs between the roller and raceway surface in operation.

To eliminate such sliding, it is necessary to mount the bearing without clearance, and apply an axial load (preload) larger than the minimum necessary axial load.

Of the two values determined by the two equations below, the higher should be defined as the minimum necessary axial load.

- Thrust ball bearing (contact angle : 90°)

$$F_{a\,min} = 5.1 \left(\frac{n}{1\,000}\right)^2 \cdot \left(\frac{C_{0a}}{1\,000}\right)^2 \times 10^{-3} \quad \text{(11-1)}$$

- Spherical thrust roller bearing (the higher value determined by the two equations should be taken.)

$$F_{a\,min} = \frac{C_{0a}}{2\,000} \quad \text{(11-2)}$$

$$F_{a\,min} = 1.8F_r + 1.33 \left(\frac{n}{1\,000}\right)^2 \cdot \left(\frac{C_{0a}}{1\,000}\right)^2 \times 10^{-4} \quad \text{(11-3)}$$

---

where :

$F_{a\,min}$	: minimum necessary axial load	N
n	: rotational speed	min^{-1}
C_{0a}	: static axial load rating	N
F_r	: radial load	N

12. Bearing lubrication

12-1 Purpose and method of lubrication

Lubrication is one of the most important factors determining bearing performance. The suitability of the lubricant and lubrication method have a dominant influence on bearing life.

Functions of lubrication :

- To lubricate each part of the bearing, and to reduce friction and wear
- To carry away heat generated inside bearing due to friction and other causes
- To cover rolling contact surface with the proper oil film in order to prolong bearing fatigue life
- To prevent corrosion and contamination by dirt

Bearing lubrication is classified broadly into two categories: grease lubrication and oil lubrication. Table 12-1 makes a general comparison between the two.

Table 12-1 Comparison between grease and oil lubrication

Item	Grease	Oil
· Sealing device	Easy	Slightly complicated and special care required for maintenance
· Lubricating ability	Good	Excellent
· Rotation speed	Low/medium speed	Applicable at high speed as well
· Replacement of lubricant	Slightly troublesome	Easy
· Life of lubricant	Relatively short	Long
· Cooling effect	No cooling effect	Good (circulation is necessary)
· Filtration of dirt	Difficult	Easy

12-1-1 Grease lubrication

Grease lubrication is widely applied since there is no need for replenishment over a long period once grease is filled, and a relatively simple structure can suffice for the lubricant sealing device.

There are two methods of grease lubrication. One is the closed lubrication method, in which grease is filled in advance into shielded/sealed bearing; the other is the feeding method, in which the bearing and housing are filled with grease in proper quantities at first, and refilled at a regular interval via replenishment or replacement.

Devices with numerous grease inlets sometimes employ the centralized lubricating method, in which the inlets are connected via piping and supplied with grease collectively.

1) Amount of grease

In general, grease should fill approximately one-third to one-half the inside space, though this varies according to structure and inside space of housing.

It must be borne in mind that excessive grease will generate heat when churned, and will consequently alter, deteriorate, or soften.

When the bearing is operated at low speed, however, the inside space is sometimes filled with grease to two-thirds to full, in order to preclude infiltration of contaminants.

2) Replenishment/replacement of grease

The method of replenishing/replacing grease depends largely on the lubrication method. Whichever method may be utilized, care should be taken to use clean grease and to keep dirt or other foreign matter out of the housing.

In addition, it is desirable to refill with grease of the same brand as that filled at the start.

When grease is refilled, new grease must be injected inside bearing.

Fig. 12-1 gives one example of a feeding method.

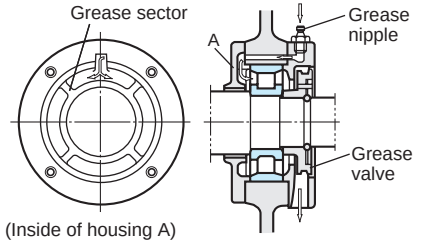


Fig. 12-1 Example of grease feeding method (using grease sector)

In the example, the inside of the housing is divided by grease sectors. Grease fills one sector, then flows into the bearing.

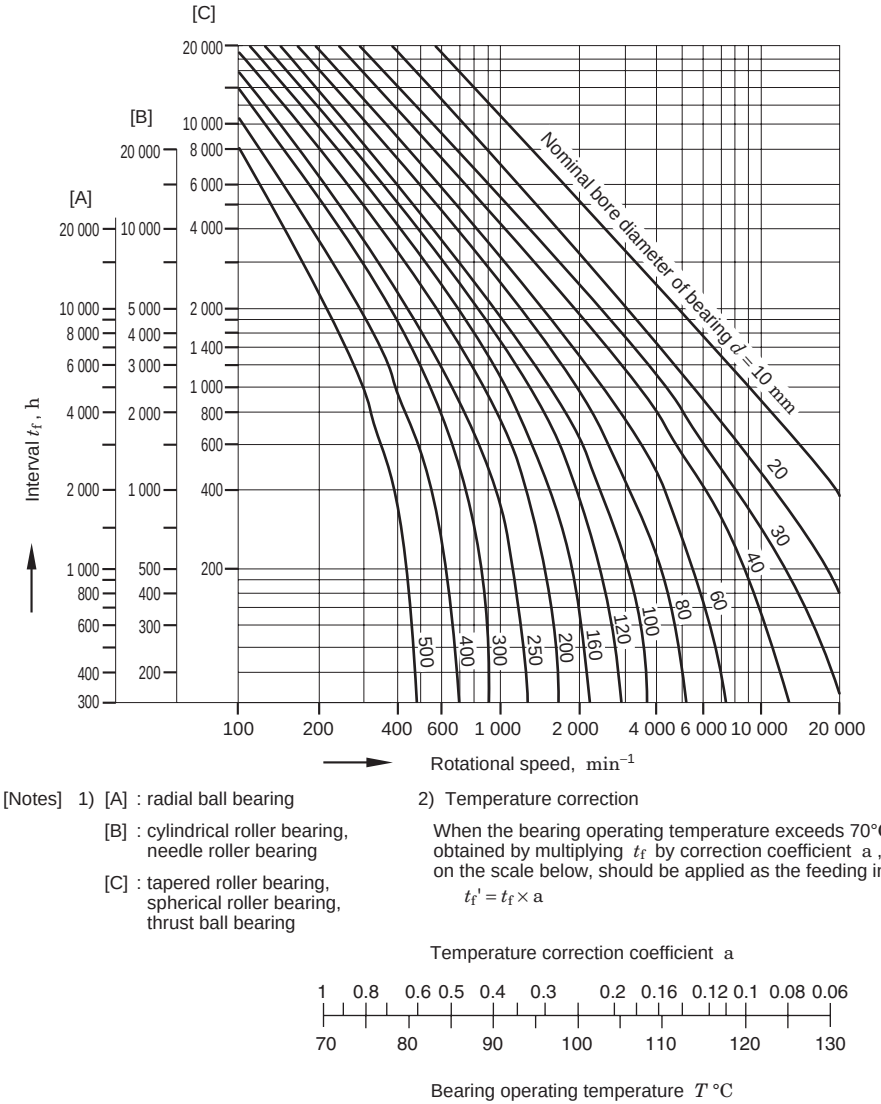
On the other hand, grease flowing back from the inside is forced out of the bearing by the centrifugal force of the grease valve.

When the grease valve is not used, it is necessary to enlarge the housing space on the discharge side to store old grease.

The housing is uncovered and the stored old grease is removed at regular intervals.

3) Grease feeding interval

In normal operation, grease life should be regarded roughly as shown in Fig. 12-2, and replenishment/replacement should be carried out accordingly.



[Notes] 1) [A] : radial ball bearing
[B] : cylindrical roller bearing, needle roller bearing
[C] : tapered roller bearing, spherical roller bearing, thrust ball bearing

2) Temperature correction

When the bearing operating temperature exceeds 70°C, t_f', obtained by multiplying t_f by correction coefficient a, found on the scale below, should be applied as the feeding interval.

$$t_f' = t_f \times a$$

Fig. 12-2 Grease feeding interval

4) Grease life in shielded/sealed ball bearing

Grease life can be estimated by the following equation when a single-row deep groove ball bearing is filled with grease and sealed with shields or seals.

$$\log L = 6.10 - 4.40 \times 10^{-6} d_m n - 3.125\left(\frac{P_r}{C_r} - 0.04\right) - (0.021 - 1.80 \times 10^{-8} d_m n)\, T \quad (12\text{-}1)$$

where :

L	: grease life	h
$d_m = \frac{D+d}{2}$	(D : outside diameter, d : bore diameter)	mm
n	: rotational speed	min^{-1}
P_r	: dynamic equivalent radial load	N
C_r	: basic dynamic radial load rating	N
T	: operating temperature of bearing	°C

The conditions for applying equation (12-1) are as follows :

a) Operating temperature of bearing : T °C

Applicable when $T \leqq 120$

(when $T < 50$, $T = 50$)

When $T > 120$, please contact with JTEKT.

b) Value of $d_m n$

Applicable when $d_m n \leqq 500 \times 10^3$

(when $d_m n < 125 \times 10^3$, $d_m n = 125 \times 10^3$)

When $d_m n > 500 \times 10^3$, please contact with JTEKT.

c) Load condition : $\frac{P_r}{C_r}$

Applicable when $\frac{P_r}{C_r} \leqq 0.16$

(when $\frac{P_r}{C_r} < 0.04$, $\frac{P_r}{C_r} = 0.04$)

When $\frac{P_r}{C_r} > 0.16$, please contact with JTEKT.

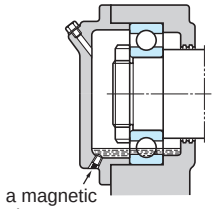
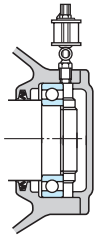
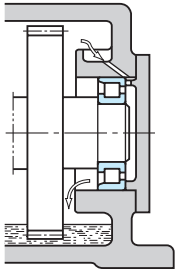
12-1-2 Oil lubrication

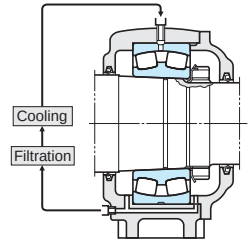
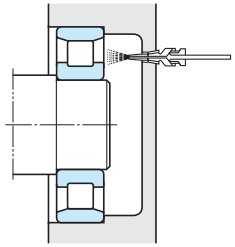
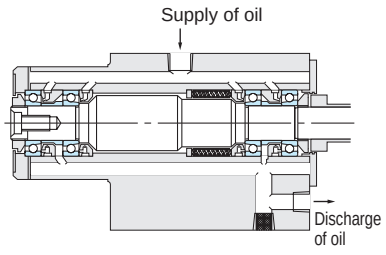
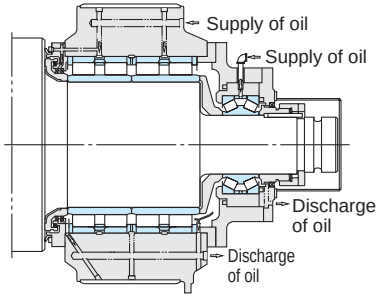
Oil lubrication is usable even at high speed rotation and somewhat high temperature, and is effective in reducing bearing vibration and noise.

Thus oil lubrication is used in many cases where grease lubrication does not work.

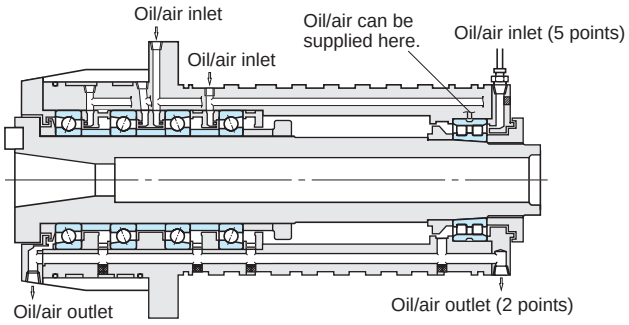
Table 12-2 shows major types and methods of oil lubrication.

Table 12-2 Type and method of oil lubrication

① **Oil bath**	• Simplest method of bearing immersion in oil for operation. • Suitable for low/medium speed. • Oil level gauge should be furnished to adjust the amount of oil. (In the case of horizontal shaft) About 50 % of the lowest rolling element should be immersed. (In the case of vertical shaft) About 70 to 80 % of the bearing should be immersed. • It is better to use a magnetic plug to prevent wear iron particles from dispersing in oil.	
② **Oil drip**	• Oil is dripped with an oiling device, and the inside of the housing is filled with oil mist by the action of rotating parts. This method has a cooling effect. • Applicable at relatively high speed and up to medium load. • In general, 5 to 6 drops of oil are utilized per minute. (It is difficult to adjust the dripping in 1mL/h or smaller amounts.) • It is necessary to prevent too much oil from being accumulated at the bottom of housing.	
③ **Oil splash**	• This type of lubrication method makes use of a gear or simple flinger attached to shaft in order to splash oil. This method can supply oil for bearings located away from the oil tank. • Usable up to relatively high speed. • It is necessary to keep oil level within a certain range. • It is better to use a magnetic plug to prevent wear iron particles from dispersing in oil. It is also advisable to set up a shield or baffle board to prevent contaminants from entering the bearing.	

④ **Forced oil circulation**	• This method employs a circulation-type oil supply system. Supplied oil lubricates inside of the bearing, is cooled and sent back to the tank through an oil escape pipe. The oil, after filtering and cooling, is pumped back. • Widely used at high speeds and high temperature conditions. • It is better to use an oil escape pipe approximately twice as thick as the oil supply pipe in order to prevent too much lubricant from gathering in housing. • Required amount of oil : see Remark 1.	
⑤ **Oil jet lubrication**	• This method uses a nozzle to jet oil at a constant pressure (0.1 to 0.5MPa), and is highly effective in cooling. • Suitable for high speed and heavy load. • Generally, the nozzle (diameter 0.5 to 2 mm) is located 5 to 10 mm from the side of a bearing. When a large amount of heat is generated, 2 to 4 nozzles should be used. • Since a large amount of oil is supplied in the jet lubrication method, old should be discharged with an oil pump to prevent excessive residual oil. • Required amount of oil : see Remark 1.	
⑥ **Oil mist lubrication (spray lubrication)**	• This method employs an oil mist generator to produce dry mist (air containing oil in the form of mist). The dry mist is continuously sent to the oil supplier, where the mist is turned into a wet mist (sticky oil drops) by a nozzle set up on the housing or bearing, and is then sprayed onto bearing. • Required amount of mist : see Remark 2. • This method provides and sustains the smallest amount of oil film necessary for lubrication, and has the advantages of preventing oil contamination, simplifying bearing maintenance, prolonging bearing fatigue life, reducing oil consumption etc. (Example of grinding machine)  (Example of rolling mill) 	

⑦ **Oil/air lubrication**	• A proportioning pump sends forth a small quantity of oil, which is mixed with compressed air by a mixing valve. The admixture is supplied continuously and stably to the bearing. • This method enables quantitative control of oil in extremely small amounts, always supplying new lubricating oil. It is thus suitable for machine tools and other applications requiring high speed. • Compressed air and lubricating oil are supplied to the spindle, increasing the internal pressure and helping prevent dirt, cutting-liquid, etc. from entering. As well, this method allows the lubricating oil to flow through a feeding pipe, minimizing atmospheric pollution. ■ JTEKT produces an oil/air lubricator and, air cleaner, as well as a spindle unit incorporating the oil/air lubrication system. Please refer to brochure "oil/air lubricator & air clean unit".



(Example of spindle unit incorporating oil/air lubrication system)

Remark 1 **Required oil supply in forced oil circulation ; oil jet lubrication methods**

$$G = \frac{1.88 \times 10^{-4} \mu \cdot d \cdot n \cdot P}{60\ c \cdot r \cdot \Delta T}$$

where :

G	: required oil supply	L/min
μ	: friction coefficient (see table at right)	
d	: nominal bore diameter	mm
n	: rotational speed	min^{-1}
P	: dynamic equivalent load of bearing	N
c	: specific heat of oil	1.88-2.09kJ/kg·K
r	: density of oil	$\mathrm{g/cm}^3$
ΔT	: temperature rise of oil	K

Values of friction coefficient μ

Bearing type	μ
Deep groove ball bearing	0.001 0 – 0.001 5
Angular contact ball bearing	0.001 2 – 0.002 0
Cylindrical roller bearing	0.000 8 – 0.001 2
Tapered roller bearing	0.001 7 – 0.002 5
Spherical roller bearing	0.002 0 – 0.002 5

The values obtained by the above equation show quantities of oil required to carry away all the generated heat, with heat release not taken into consideration.

In reality, the oil supplied is generally half to two-thirds of the calculated value.

Heat release varies widely according to the application and operating conditions.

To determine the optimum oil supply, it is advised to start operating with two-thirds of the calculated value, and then reduce the oil gradually while measuring the operating temperature of bearing, as well as the supplied and discharged oil.

Remark 2 **Notes on oil mist lubrication**

1) Required amount of mist
(mist pressure : 5 kPa)

(In the case of a bearing)	$Q = 0.11dR$
(In the case of two oil seals combined)	$Q = 0.028d_1$

where :

Q	: required amount of mist	L/min
d	: nominal bore diameter	mm
R	: number of rolling element rows	
d_1	: inside diameter of oil seal	mm

In the case of high speed ($d_m n \geqq 400 \times 10^3$), it is necessary to increase the amount of oil and heighten the mist pressure.

2) Piping diameter and design of lubrication hole/groove

When the flow rate of mist in piping exceeds 5 m/s, oil mist suddenly condenses into an oil liquid.

Consequently, the piping diameter and dimensions of the lubrication hole/groove in the housing should be designed to keep the flow rate of mist, obtained by the following equation, from exceeding 5 m/s.

$$V = \frac{0.167Q}{A} \leqq 5$$

where :

V	: flow rate of mist	m/s
Q	: amount of mist	L/min
A	: sectional area of piping or lubrication groove	cm^2

3) Mist oil

Oil used in oil mist lubrication should meet the following requirements.

- ability to turn into mist
- has high extreme pressure resistance
- good heat/oxidation stability
- rust-resistant
- unlikely to generate sludge
- superior demulsifier

Oil mist lubrication has a number of advantages for high speed rotation bearings. Its performance, however, is largely affected by surrounding structures and bearing operating conditions.

If contemplating the use of this method, please contact with JTEKT for advice based on JTEKT long experience with oil mist lubrication.

12-2 Lubricant

12-2-1 Grease

Grease is made by mixing and dispersing a solid of high oil-affinity (called a thickener) with lubricant oil (as a base), and transforming it into a semi-solid state.

As well, a variety of additives can be added to improve specific performance.

(1) Base oil

Mineral oil is usually used as the base oil for grease. When low temperature fluidity, high temperature stability, or other special performance is required, diester oil, silicon oil, polyglycolic oil, fluorinated oil, or other synthetic oil is often used.

Generally, grease with a low viscosity base oil is suitable for applications at low temperature or high rotation speed; grease with high viscosity base oils are suitable for applications at high temperature or under heavy load.

(2) Thickener

Most greases use a metallic soap base such as lithium, sodium, or calcium as thickeners. For some applications, however, non-soap base thickeners (inorganic substances such as bentone, silica gel, and organic substances such as urea compounds, fluorine compounds) are also used.

In general, the mechanical stability, bearing operating temperature range, water resistance, and other characteristics of grease are determined by the thickener.

(Lithium soap base grease)
Superior in heat resistance, water resistance and mechanical stability.

(Calcium soap base grease)
Superior in water resistance; inferior in heat resistance.

(Sodium soap base grease)
Superior in heat resistance; inferior in water resistance.

(Non-soap base grease)
Superior in heat resistance.

(3) Additives

Various additives are selectively used to serve the respective purposes of grease applications.

- Extreme pressure agents
  When bearings must tolerate heavy or impact loads.
- Oxidation inhibitors
  When grease is not refilled for a long period.
  Structure stabilizers, rust preventives, and corrosion inhibitors are also used.

(4) Consistency

Consistency, which indicates grease hardness, is expressed as a figure obtained, in accordance with ASTM (JIS), by multiplication by 10 the depth (in mm) to which the cone-shaped metallic plunger penetrates into the grease at 25°C by deadweight in 5 seconds. The softer the grease, the higher the figure.

Table 12-4 shows the relationships between the NLGI scales and ASTM (JIS) penetration indexes, service conditions of grease.
(NLGI : National Lubricating Grease Institute)

Table 12-4 Grease consistency

NLGI scale	ASTM (JIS) penetration index (25°C, 60 mixing operations)	Service conditions/ applications
0	355 – 385	For centralized lubricating
1	310 – 340	For centralized lubricating, at low temperature
2	265 – 295	For general use
3	220 – 250	For general use, at high temperature
4	175 – 205	For special applications

(5) Mixing of different greases

Since mixing of different greases changes their properties, greases of different brands should not be mixed.

If mixing cannot be avoided, greases containing the same thickener should be used. Even if the mixed greases contain the same thickener, however, mixing may still produce adverse effects, due to difference in additives or other factors.

Thus it is necessary to check the effects of a mixture in advance, through testing or other methods.

Table 12-3 Characteristics of respective greases

	Lithium grease			Calcium grease (cup grease)	Sodium grease (fiber grease)	Complex base grease		Non-soap base grease			
Thickener	Lithium soap			Calcium soap	Sodium soap	Lithium complex soap	Calcium complex soap	Bentone	Urea compounds	Fluorine compounds	Thickener
Base oil	Mineral oil	Synthetic oil (diester oil)	Synthetic oil (silicon oil)	Mineral oil	Mineral oil	Mineral oil	Mineral oil	Mineral oil	Mineral/ synthetic oil	Synthetic oil	Base oil
Dropping point (°C)	170 to 190	170 to 230	220 to 260	80 to 100	160 to 180	250 or higher	200 to 280	–	240 or higher	250 or higher	Dropping point (°C)
Operating temperature range (°C)	– 30 to + 120	– 50 to + 130	– 50 to + 180	– 10 to + 70	0 to + 110	– 30 to + 150	– 10 to + 130	– 10 to + 150	– 30 to + 150	– 40 to + 250	Operating temperature range (°C)
Rotation speed range	Medium to high	High	Low to medium	Low to medium	Low to high	Low to high	Low to medium	Medium to high	Low to high	Low to medium	Rotation speed range
Mechanical stability	Excellent	Good to excellent	Good	Fair to good	Good to excellent	Good to excellent	Good	Good	Good to excellent	Good	Mechanical stability
Water resistance	Good	Good	Good	Good	Bad	Good to excellent	Good	Good	Good to excellent	Good	Water resistance
Pressure resistance	Good	Fair	Bad to fair	Fair	Good to excellent	Good	Good	Good to excellent	Good to excellent	Good	Pressure resistance
Remarks	Most widely usable for various rolling bearings.	Superior low temperature and friction characteristics. Suitable for bearings for measuring instruments and extra-small ball bearings for small electric motors.	Superior high and low temperature characteristics.	Suitable for applications at low rotation speed and under light load. Not applicable at high temperature.	Liable to emulsify in the presence of water. Used at relatively high temperature.	Superior mechanical stability and heat resistance. Used at relatively high temperature.	Superior pressure resistance when extreme pressure agent is added. Used in bearings for rolling mills.	Suitable for applications at high temperature and under relatively heavy load.	Superior water resistance, oxidation stability, and heat stability. Suitable for applications at high temperature and high speed.	Superior chemical resistance and solvent resistance. Usable at up to 250 °C.	Remarks

Table 12-5 Typical examples of standard grease for JTEKT bearings

Grease name	Thickener	Base oil	Appearance	Consistency 60W		NLGI scale	Operating temperature range (°C)	Application examples	
				Unworked	Worked				
Alvania 2	Lithium	Mineral oil	Grayish brown	276	275	2	–10 – 100	Automobile	Steering column
Raremax AF-I	Urea	Mineral oil	Pale yellow, viscous	–	300	1 – 2[2)]	0 – 150		Wheel (hub unit)
FS841	Fluororesin	Fluorosilicone oil	White	–	290	2	–40 – 220		Fan coupling
Sunlight 2	Lithium	Mineral oil	Yellowish brown	–	280	2	–10 – 100		Universal joint (shell type), steering joint
Unirex N3	Lithium complex	Mineral oil	Green	–	235	3	–10 – 130		Clutch release
W191	Urea	PAO[1)], mineral oil	Pale yellow	247	275	2	–30 – 130		Water pump bearing
Darina 2	Microgel	Mineral oil	Amber	–	280	2	0 – 150	Steel production	Conveyor
Emalube L	Urea	Mineral oil	Light brown, viscous	–	350	0 – 1[2)]	–10 – 200		Continuous casting machine
Palmax RBG	Special lithium complex	Mineral oil	Yellow, viscous	–	300	1 – 2[2)]	–10 – 150		Rolling mill roll neck
4B grease	Carbon black	Ethyl oil	Black	–	260	2 – 3[2)]	–30 – 250	Extra-small/miniature ball bearings	Photocopier (high temperature/conductive), printer (high temperature/conductive)
KRYTOX GPL 226	Fluororesin	Fluorinated oil		–	280	2	0 – 250		Photocopier (high temperature), printer (high temperature)
Multemp PSNo.2	Lithium	Mineral oil, ester oil	Pinkish white, viscous	–	275	2	–40 – 100		Motor (for low temperatures)
KVC grease	Urea	PAO[1)], ester oil	Milkish pink	–	244	3	–30 – 150		Motor (for high temperatures), rotary encoder, fan motor (for high temperatures)
SR grease	Lithium	Ester oil	Light brown, viscous	–	250	3	–40 – 130	Extra-small/miniature ball bearings, automobile	Motor, stepping motor, fan motor Center bearing (for propeller shafts), steering column
KDL grease	Fluororesin (PTFE)	Fluorinated oil	White	–	260	2 – 3[2)]	–30 – 200	Semiconductor manufacturing equipment	For high temperatures, for clean environment, for vacuum environment
KHD	Lithium	PAO[1)]	White	–	199	4	–30 – 120		For room temperature, for atmosphere
Nerita 2858	Lithium	Mineral oil (XHVI)	Yellowish brown	–	279	2	–30 – 100	Railway rolling stock	Axle journal (ABU)
Arapen RB 320	Lithium, calcium	Mineral oil	Yellowish brown	–	315	1	–30 – 90		Axle journal (general)
Isoflex NBU 15	Barium complex	Ester oil	Beige	270	280	2	–40 – 100	Machine tool spindle	
Shell Cassida grease RLS2	Aluminum complex	PAO[1)]	Transparent	–	280	2	–20 – 100	For food machinery	
Alvania EP2	Lithium	Mineral oil	Brown	282	276	2	–10 – 80	Slewing rim, automobile	Universal joint, king pin thrust bearing
Alvania 3	Lithium	Mineral oil	Brown	240	225	3	–10 – 100	Agricultural machinery	

[Notes] 1) PAO: Polyalphaolefin oil
2) The value is within the range specified by the consistency numbers.

12-2-2 Lubricating oil

For lubrication, bearings usually employ highly refined mineral oils, which have superior oxidation stability, rust-preventive effect, and high film strength.

With bearing diversification, however, various synthetic oils have been put into use.

These synthetic oils contain various additives (oxidation inhibitors, rust preventives, antifoaming agents, etc.) to improve specific properties. Table 12-6 shows the characteristics of lubricating oils.

Mineral lubricating oils are classified by applications in JIS and MIL.

Table 12-6 Characteristics of lubricating oils

Type of lubricating oil	Highly refined mineral oil	Major synthetic oils				
		Diester oil	Silicon oil	Polyglycolic oil	Polyphenyl ether oil	Fluorinated oil
Operating temperature range (°C)	− 40 to + 220	− 55 to + 150	− 70 to + 350	− 30 to + 150	0 to + 330	− 20 to + 300
Lubricity	Excellent	Excellent	Fair	Good	Good	Excellent
Oxidation stability	Good	Good	Fair	Fair	Excellent	Excellent
Radioactivity resistance	Bad	Bad	Bad to fair	Bad	Excellent	−

[Selection of lubricating oil]

The most important criterion in selecting a lubricating oil is whether the oil provides proper viscosity at the bearing operating temperature.

Standard values of proper kinematic viscosity can be obtained through selection by bearing type according to Table 12-7 first, then through selection by bearing operating conditions according to Table 12-8.

When lubricating oil viscosity is too low, the oil film will be insufficient. On the other hand, when the viscosity is too high, heat will be generated due to viscous resistance.

In general, the heavier the load and the higher the operating temperature, the higher the lubricating oil viscosity should be ; whereas, the higher the rotation speed, the lower the viscosity should be.

Fig. 12-3 illustrates the relationship between lubricating oil viscosity and temperature.

Table 12-7 Proper kinematic viscosity by bearing type

Bearing type	Proper kinematic viscosity at operating temperature
Ball bearing Cylindrical roller bearing	13mm²/s or higher
Tapered roller bearing Spherical roller bearing	20mm²/s or higher
Spherical thrust roller bearing	32mm²/s or higher

Table 12-8 Proper kinematic viscosities by bearing operating conditions

Operating temperature	$d_m n$ value	Proper kinematic viscosity (expressed in the ISO viscosity grade or the SAE No.)	
		Light/normal load	Heavy/impact load
− 30 to 0°C	All rotation speeds	ISO VG 15, 22, 46 (Refrigerating machine oil)	—
0 to 60°C	300 000 or lower	ISO VG 46 (Bearing oil, Turbine oil)	ISO VG 68, SAE 30 (Bearing oil, Turbine oil)
	300 000 to 600 000	ISO VG 32 (Bearing oil, Turbine oil)	ISO VG 68 (Bearing oil, Turbine oil)
	600 000 or higher	ISO VG 7, 10, 22 (Bearing oil)	—
60 to 100°C	300 000 or lower	ISO VG 68 (Bearing oil)	ISO VG 68, 100, SAE 30 (Bearing oil)
	300 000 to 600 000	ISO VG 32, 46 (Bearing oil, Turbine oil)	ISO VG 68 (Bearing oil, Turbine oil)
	600 000 or higher	ISO VG 22, 32, 46 (Bearing oil, Turbine oil, Machine oil)	—
100 to 150°C	300 000 or lower	ISO VG 68, 100, SAE 30, 40 (Bearing oil)	ISO VG 100 to 460 (Bearing oil, Gear oil)
	300 000 to 600 000	ISO VG 68, SAE 30 (Bearing oil, Turbine oil)	ISO VG 68, 100, SAE 30, 40 (Bearing oil)

[Remarks] 1. $d_m n = \frac{D+d}{2} \times n \cdots \{D$: nominal outside diameter (mm), d : nominal bore diameter (mm), n : rotational speed $(\min^{-1})\}$

2. Refer to refrigerating machine oil (JIS K 2211), turbine oil (JIS K 2213), gear oil (JIS K 2219), machine oil (JIS K 2238) and bearing oil (JIS K 2239).
3. Please contact with JTEKT if the bearing operating temperature is under −30°C or over 150°C .

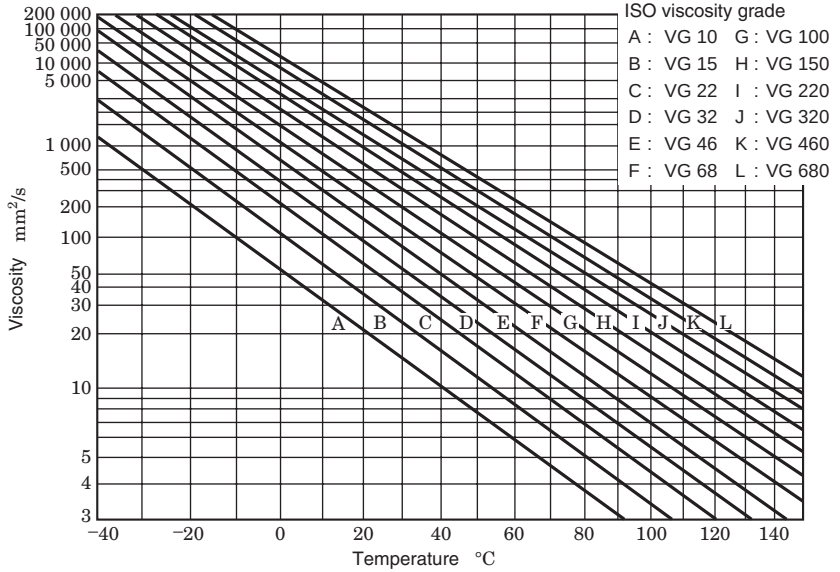


Fig. 12-3 Relationship between lubricating oil viscosity and temperature (viscosity index :100)

13. Bearing materials

Bearing materials include steel for bearing rings and rolling elements, as well as steel sheet, steel, copper alloy and synthetic resins for cages.

These bearing materials should possess the following characteristics :

1) High elasticity, durable under high partial contact stress. — Bearing rings
2) High strength against rolling contact fatigue due to large repetitive contact load. — Rolling elements
3) Strong hardness
4) High abrasion resistance — Bearing rings
5) High toughness against impact load — Rolling elements
6) Excellent dimensional stability — Cages

13-1 Bearing rings and rolling elements materials

1) High carbon chromium bearing steel

High carbon chromium bearing steel specified in JIS is used as a general material in bearing rings (inner rings, outer rings) and rolling elements (balls, rollers).

Their chemical composition classified by steel type is given in Table 13-1.

Among these steel types, SUJ 2 is generally used. SUJ 3, which contains additional Mn and Si, possesses high hardenability and is commonly used for thick section bearings.

SUJ 5 has increased hardenability, because it was developed by adding Mo to SUJ 3.

For small and medium size bearings, SUJ 2 and SUJ 3 are used, and for large size and extra-large size bearings with thick sections, SUJ 5 is widely used.

Generally, these materials are processed into the specified shape and then undergo hardening and annealing treatment until they attain a hardness of 57 to 64 HRC.

2) Case carburizing bearing steel (case hardened steel)

When a bearing receives heavy impact loads, the surface of the bearing should be hard and the inside soft.

Such materials should possess a proper amount of carbon, dense structure, and carburizing case depth on their surface, while having proper hardness and fine structure internally.

For this purpose, chromium steel and nickel-chromium-molybdenum steel are used as materials.

Typical steel materials are shown in Table 13-2.

3) Steel for Standard JTEKT Specification Bearings

In general terms, it is known that the non-metallic inclusions contained in materials are harmful to the rolling contact fatigue life.

At JTEKT, to reduce the amount of non-metallic inclusions, which are harmful to the fatigue life, we set the chemical compounds of the bearing steel in a proprietary manner. As a result, JTEKT standard bearings have a life that is approximately twice as long as the general bearings that are targeted by JIS B 1518 (and ISO 281).

Therefore, the basic dynamic load ratings of JTEKT standard bearings are 1.25 times the dynamic load ratings established in JIS B 1518 (and ISO 281).

This steel for standard JTEKT specification bearings is not applied to the special application bearings in this general catalog. If you require special application bearings with long lives, contact JTEKT.

Table 13-1 Chemical composition of high carbon chromium bearing steel

Standard	Code	Chemical composition (%)						
		C	Si	Mn	P	S	Cr	Mo
JIS G 4805	SUJ 2	0.95 – 1.10	0.15 – 0.35	Not more than 0.50	Not more than 0.025	Not more than 0.025	1.30 – 1.60	Not more than 0.08
	SUJ 3	0.95 – 1.10	0.40 – 0.70	0.90 – 1.15			0.90 – 1.20	Not more than 0.08
	SUJ 5	0.95 – 1.10	0.40 – 0.70	0.90 – 1.15			0.90 – 1.20	0.10 – 0.25
SAE J 404	52100	0.98 – 1.10	0.15 – 0.35	0.25 – 0.45	Not more than 0.025	Not more than 0.025	1.30 – 1.60	Not more than 0.06

[Remark] As for bearings which are induction hardened, carbon steel with a high carbon content of 0.55 to 0.65 % is used in addition to those listed in this table.

4) Other

For special applications, the special heat treatment shown below can be used according to various usage conditions.

[Extremely high reliability]

· SH bearings [1]
····· By using the heat treatment technology developed by JTEKT to perform special heat treatment on high carbon chromium bearing steel, we have improved the surface hardness of these products and provided them with compressive residual stress, which has led to high reliability especially in terms of resistance to foreign matter.

· KE bearings [2]
····· By using the heat treatment technology developed by JTEKT to perform special heat treatment on carburized bearing steel, we have improved the surface hardness of these products and adjusted their amount of residual austenite, which has led to high reliability especially in terms of resistance to foreign matter.

1) Acronym of Special Heat treatment
2) Acronym of Koyo EXTRA-LIFE Bearing

Table 13-2 Chemical composition of case carburizing bearing steel

Standard	Code	Chemical composition (%)							
		C	Si	Mn	P	S	Ni	Cr	Mo
JIS G 4053	SCr 415	0.13 – 0.18	0.15 – 0.35	0.60 – 0.85	Not more than 0.030	Not more than 0.030	–	0.90 – 1.20	–
	SCr 420	0.18 – 0.23	0.15 – 0.35	0.60 – 0.85			–	0.90 – 1.20	–
	SCM 420	0.18 – 0.23	0.15 – 0.35	0.60 – 0.85	Not more than 0.030	Not more than 0.030	–	0.90 – 1.20	0.15 – 0.30
	SNCM 220	0.17 – 0.23	0.15 – 0.35	0.60 – 0.90	Not more than 0.030	Not more than 0.030	0.40 – 0.70	0.40 – 0.65	0.15 – 0.30
	SNCM 420	0.17 – 0.23	0.15 – 0.35	0.40 – 0.70			1.60 – 2.00	0.40 – 0.65	0.15 – 0.30
	SNCM 815	0.12 – 0.18	0.15 – 0.35	0.30 – 0.60	Not more than 0.030	Not more than 0.030	4.00 – 4.50	0.70 – 1.00	0.15 – 0.30
SAE J 404	5120	0.17 – 0.22	0.15 – 0.35	0.70 – 0.90	Not more than 0.035	Not more than 0.040	–	0.70 – 0.90	–
	8620	0.18 – 0.23	0.15 – 0.35	0.70 – 0.90	Not more than 0.035	Not more than 0.040	0.40 – 0.70	0.40 – 0.60	0.15 – 0.25
	4320	0.17 – 0.22	0.15 – 0.30	0.45 – 0.65	Not more than 0.025	Not more than 0.025	1.65 – 2.00	0.40 – 0.60	0.20 – 0.30

13-2 Materials used for cages

Since the characteristics of materials used for cages greatly influence the performance and reliability of rolling bearings, the choice of materials is of great importance.

It is necessary to select cage materials in accordance with required shape, ease of lubrication, strength, and abrasion resistance.

Typical materials used for metallic cages are shown in Tables 13-3 and 13-4.

In addition, phenolic resin machined cages and other synthetic resin molded cages are often used.

Materials typically used for molded cages are polyacetal, polyamide (Nylon 6.6, Nylon 4.6), and polymer containing fluorine, which are strengthened with glass and carbon fibers.

Table 13-3 Chemical compositions of pressed cage steel sheet (A) and machined cage carbon steel (B)

	Standard	Code	Chemical composition (%)						
			C	Si	Mn	P	S	Ni	Cr
(A)	JIS G 3141	SPCC	Not more than 0.12	–	Not more than 0.50	Not more than 0.040	Not more than 0.045	–	–
	JIS G 3131	SPHC	Not more than 0.15	–	Not more than 0.60	Not more than 0.050	Not more than 0.050	–	–
	BAS 361	SPB 2	0.13 – 0.20	Not more than 0.04	0.25 – 0.60	Not more than 0.030	Not more than 0.030	–	–
	JIS G 4305	SUS 304	Not more than 0.08	Not more than 1.00	Not more than 2.00	Not more than 0.045	Not more than 0.030	8.00 – 10.50	18.00 – 20.00
(B)	JIS G 4051	S 25 C	0.22 – 0.28	0.15 – 0.35	0.30 – 0.60	Not more than 0.030	Not more than 0.035	–	–

Table 13-4 Chemical composition of high-tensile brass casting of machined cages (%)

Standard	Code	Cu	Zn	Mn	Fe	Al	Sn	Ni	Impurity	
									Pb	Si
JIS H 5120	CAC 301 (HBsC*)	55 – 60	33 – 42	0.1 – 1.5	0.5 – 1.5	0.5 – 1.5	Not more than 1.0	Not more than 1.0	Not more than 0.4	Not more than 0.1

* : Material with HBsC is used.

14. Shaft and housing design

In designing the shaft and housing, the following should be taken into consideration.

1) Shafts should be thick and short.
(in order to reduce distortion including bending)

2) Housings should possess sufficient rigidity.
(in order to reduce distortion caused by load)
[Note] · For light alloy housings, rigidity may be provided by inserting a steel bushing.

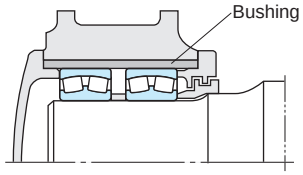


Fig. 14-1 Example of light alloy housing

3) The fitting surface of the shaft and housing should be finished in order to acquire the required accuracy and roughness.
The shoulder end-face should be finished in order to be perpendicular to the shaft center or housing bore surface. (refer to Table 14-1)

4) The fillet radius (r_a) should be smaller than chamfer dimension of the bearing.
(refer to Tables 14-2, 14-3)
[Notes] · Generally it should be finished so as to form a simple circular arc.
(refer to Fig. 14-2)
· When the shaft is given a ground finish, a recess may be provided.
(Fig. 14-3)

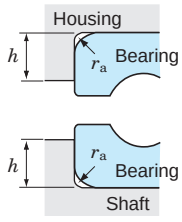


Fig. 14-2 Fillet radius

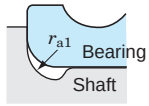


Fig. 14-3 Grinding undercut

5) The shoulder height (h) should be smaller than the outside diameter of inner ring and larger than bore diameter of outer ring so that the bearing is easily dismounted.
(refer to Fig. 14-2 and Table 14-2)

6) If the fillet radius must be larger than the bearing chamfer, or if the shaft/housing shoulder must be low/high, insert a spacer between the inner ring and shaft shoulder as shown in Fig. 14-4, or between the outer ring and the housing shoulder.

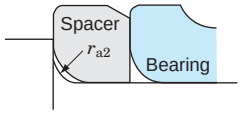


Fig. 14-4 Example of shaft with spacer

7) Screw threads and lock nuts should be completely perpendicular to shaft axis. It is desirable that the tightening direction of threads and lock nuts be opposite to the shaft rotating direction.

8) When split housings are used, the surfaces where the housings meet should be finished smoothly and provided with a recess at the inner ends of the surfaces that meet.

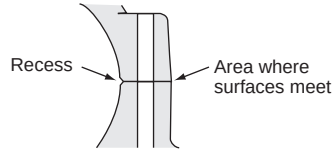


Fig. 14-5 Recesses on meeting surfaces

14-1 Accuracy and roughness of shafts and housings

The fitting surface of the shaft and housing may be finished by turning or fine boring when the bearing is used under general operating conditions. However, if the conditions require minimum vibration and noise, or if the bearing is used under severe operating conditions, a ground finish is required.

Recommended accuracy and roughness of shafts and housings under general conditions are given in Table 14-1.

Table 14-1 Recommended accuracy and roughness of shafts and housings

Item	Bearing class	Shaft	Housing bore
Roundness tolerance	classes 0, 6	IT 3 – IT 4	IT 4 – IT 5
	classes 5, 4	IT 2 – IT 3	IT 2 – IT 3
Cylindrical form tolerance	classes 0, 6	IT 3 – IT 4	IT 4 – IT 5
	classes 5, 4	IT 2 – IT 3	IT 2 – IT 3
Shoulder runout tolerance	classes 0, 6	IT 3	IT 3 – IT 4
	classes 5, 4	IT 3	IT 3
Roughness of fitting surfaces Ra	Small size bearings Large size bearings	0.8 a 1.6 a	1.6 a 3.2 a

[Remark] Refer to the figures listed in the attached table when the basic tolerance IT is required.

14-2 Mounting dimensions

Mounting dimensions mean the necessary dimensions to mount bearings on shafts or housings, which include the fillet radius or shoulder diameters.

Standard values are shown in Table 14-2. (The mounting related dimensions of each bearing are given in the bearing specification table.)

The grinding undercut dimensions for ground shafts are given in Table 14-3.

For thrust bearings, the mounting dimensions should be carefully determined such that bearing race will be perpendicular to the support and the supporting area will be wide enough.

For thrust ball bearings, the shaft shoulder diameter d_a should be larger than pitch diameter of ball set, while the shoulder diameter of housing D_a should be smaller than the pitch diameter of ball set. (Fig. 14-6)

For thrust roller bearings, the housing/shaft diameter D_a/d_a should cover the lengths of both rollers. (Fig. 14-7)

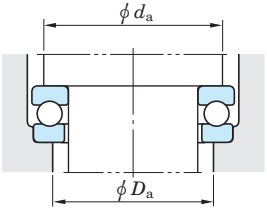


Fig. 14-6 Thrust ball bearings

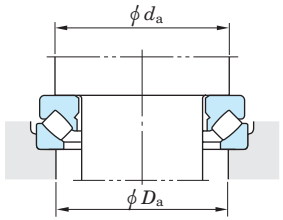
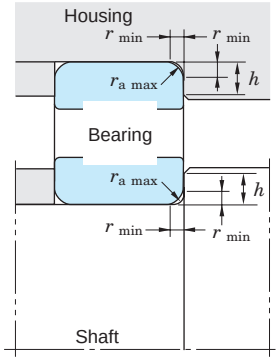


Fig. 14-7 Spherical thrust roller bearings

Table 14-2 Shaft/housing fillet radius and shoulder height of radial bearings

Unit : mm

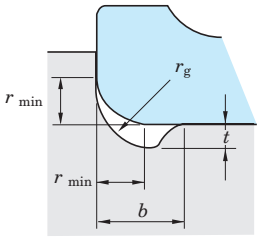


[Notes]
1) Shoulder heights greater than those specified in the Table are required to accommodate heavy axial loads.
2) Used when an axial load is small. These values are not recommended for tapered roller bearings, angular contact ball bearings, or spherical roller bearings.

[Remark]
Fillet radius can be applied to thrust bearings.

Chamfer dimension of inner ring or outer ring	Shaft and housing		
	Fillet radius	Shoulder height h min	
r min	$r_{a\ max}$	General [1] cases	Special [2] cases
0.05	0.05	0.3	0.3
0.08	0.08	0.3	0.3
0.1	0.1	0.4	0.4
0.15	0.15	0.6	0.6
0.2	0.2	0.8	0.8
0.3	0.3	1.25	1
0.5	0.5	1.75	1.5
0.6	0.6	2.25	2
0.8	0.8	2.75	2.5
1	1	2.75	2.5
1.1	1	3.5	3.25
1.5	1.5	4.25	4
2	2	5	4.5
2.1	2	6	5.5
2.5	2	6	5.5
3	2.5	7	6.5
4	3	9	8
5	4	11	10
6	5	14	12
7.5	6	18	16
9.5	8	22	20
12	10	27	24
15	12	32	29
19	15	42	38

Table 14-3 Grinding undercut dimensions for ground shafts



Unit : mm

Chamfer dimension of inner ring	Grinding undercut dimensions		
r min	t	r_g	b
1	0.2	1.3	2
1.1	0.3	1.5	2.4
1.5	0.4	2	3.2
2	0.5	2.5	4
2.1	0.5	2.5	4
3	0.5	3	4.7
4	0.5	4	5.9
5	0.6	5	7.4
6	0.6	6	8.6
7.5	0.6	7	10

14-3 Shaft design

When bearings are mounted on shafts, locating method should be carefully determined. Shaft design examples for cylindrical bore bearings are given in Table 14-4, and those for bearings with a tapered bore in Table 14-5.

Table 14-4 Mounting designs for cylindrical bore bearings

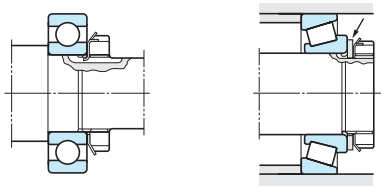
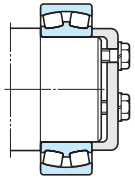
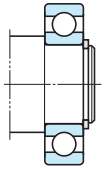
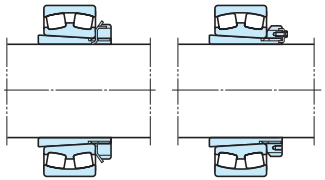
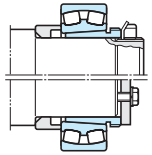
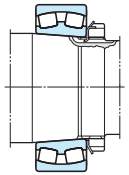
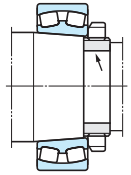
(a) Shaft locknut	(b) End plate	(c) Locating snap ring
		
Lockwashers are used to prevent loosening of locknuts. When tapered roller bearings or angular contact ball bearings are transition-fitted to shafts, plain washers several mm thick as shown above (at right) should be added and tightened with nut.	End of shaft should have bolt holes.	Used when the housing inside is limited, or to simplify shaft machining.

Table 14-5 Mounting designs for bearings with tapered bore

(d) Adapter assembly	(e) Withdrawal sleeve	(f) Shaft locknut	(g) Split ring
			
The simplest method for axial positioning is just to attach an adapter sleeve to the shaft and tighten the locknuts. To prevent locknut loosening, lock-washer (not more than 180 mm in shaft diameter) or lock plate (not less than 200 mm in shaft diameter) are used.	The locknut (above) or end plate (below) fixes the bearing with a withdrawal sleeve, which makes it easy to dismount the bearing.	The shaft is threaded in the same way as shown in Fig. (a). The bearing is located by tightening locknut.	A split ring with threaded outside diameter is inserted into groove on the tapered shaft. A key is often used to prevent the locknut and split ring from loosening.

14-4 Sealing devices

Sealing devices not only prevent foreign matter (dirt, water, metal powder) from entering, but prevent lubricant inside from leaking. If the sealing device fails to function satisfactorily, foreign matter or leakage will cause bearing damage as a result of malfunction or seizure.

Therefore, it is necessary to design or choose the most suitable sealing devices as well as to choose the proper lubricating measures according to operating conditions.

Sealing devices may be divided into non-contact and contact types according to their structure.

They should satisfy the following conditions :

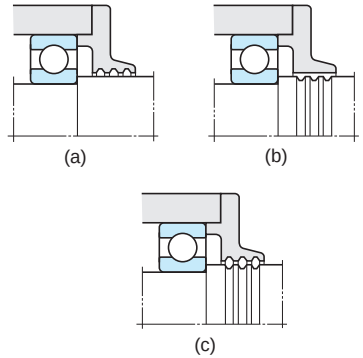
- Free from excessive friction (heat generation)
- Easy maintenance (especially ease of mounting and dismounting)
- As low cost as possible

14-4-1 Non-contact type sealing devices

A non-contact type sealing device, which includes oil groove, flinger (slinger), and labyrinth, eliminates friction because it does not have a contact point with the shaft.

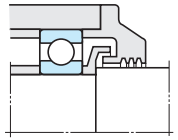
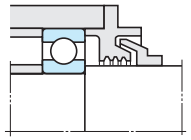
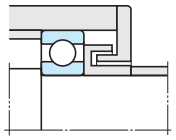
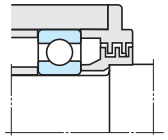
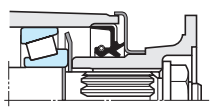
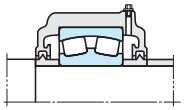
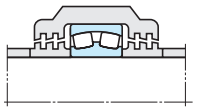
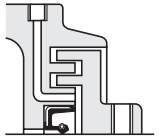
These devices utilize narrow clearance and centrifugal force and are especially suitable for operation at high rotation speed and high temperature.

Table 14-6 (1) Non-contact type sealing devices

(1) Oil groove


- This kind of seal having more than three grooves at the narrow clearance between the shaft and housing cover, is usually accompanied by other sealing devices except when it is used with grease lubrication at low rotation speed.
- Preventing entrance of contaminants can be improved by filling the groove with calcium grease (cup grease) having a consistency of 150 to 200.
- The clearance between the shaft and housing cover should be as narrow as possible. Recommended clearances are as follows.
  - Shaft diameter of less than 50mm ····· 0.25 – 0.4mm
  - Shaft diameter of over 50mm ····· 0.5 – 1 mm
- Recommended dimensions for the oil groove are as follows.
  - Width ····· 2 – 5mm
  - Depth ····· 4 – 5mm

Table 14-6 (2) Non-contact type sealing devices

(2) Flinger (slinger)	(3) Labyrinth
 (d) Flinger attached inside	 (e) Flinger attached outside	 (h) Axial labyrinth	 (i) Radial labyrinth
 (f) Cover type flinger	 (g) Oil thrower	 (j) Aligning labyrinth	 (k) Axial labyrinth with greasing feature
■ A flinger utilizes centrifugal force to splash away the oil and dirt. It produces an air stream which prevents oil leakage and dirt by a pumping action. In many cases, this device is used together with other sealing devices. ■ A flinger installed inside the housing (Fig. d) provides an inward pumping action, preventing lubricant leakage; and, when installed outside (Fig. e), the outward pumping action prevents lubricant contamination. ■ A cover type flinger (Fig. f) splashes away dirt and dust by centrifugal force. ■ The oil thrower, shown in (Fig. g), is a kind of flinger. An annular ridge on the shaft or a ring fitted onto the shaft utilizes centrifugal force to prevent the lubricant from flowing out.	■ A labyrinth provides clearance in the shape of engagements between the shaft and housing. It is the most suitable for prevention of lubricant leakage at high rotation speed. ■ Though an axial labyrinth, shown in (Fig. h), is popular because of its ease of mounting, the sealing effect is better in a radial labyrinth, shown in (Fig. i). ■ An aligning labyrinth (Fig. j) is used with self-aligning type bearings. ■ In the cases of (Fig. i) and (Fig. j), the housing or the housing cover should be split. ■ Recommended labyrinth clearances are given in the following table. ■ To improve sealing effect, fill the labyrinth clearance with grease, shown in (Fig. k).

Shaft diameter	Radial clearance	Axial clearance
50mm or less	0.25 – 0.4mm	1 – 2mm
Over 50mm	0.5 – 1 mm	3 – 5mm

14-4-2 Contact type sealing devices

This type provides a sealing effect by means of the contact of its end with the shaft and are manufactured from synthetic rubber, synthetic resin, or felt.

The synthetic rubber oil seal is most popular.

1) Oil seals

Many types and sizes of oil seals, as a finished part, have been standardized.

JTEKT produces various oil seals.

The names and functions of each oil seal part are shown in Fig. 14-8 and Table 14-7. Table 14-8 provides a representative example.

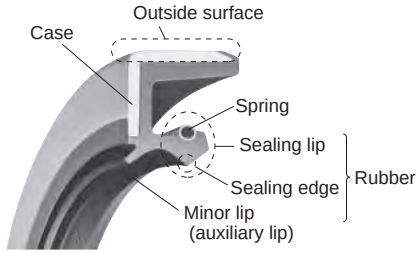


Fig. 14-8 Names of oil seal parts

Table 14-7 Complete list of oil seal part functions

Names	Functions
Sealing edge	Prevents fluid leakage by making contact with rotating shaft. (The contact surface of the sealing edge with the shaft should always filled with lubricant, so as to maintain an oil film therein.)
Sealing lip and spring	Provides proper pressure on the sealing edge to maintain stable contact. Spring provides proper pressure on the lip and maintains such pressure for a long time.
Outside surface	Fixes the oil seal to the housing and prevents fluid leakage through the fitting surface. (Comes encased in metal cased type or rubber covered type.)
Case	Strengthens seal.
Minor lip (auxiliary lip)	Prevents entry of contaminants. (In many cases, the space between the sealing lip and minor lip is filled with grease.)

Table 14-8 Typical oil seal types

With case				With inner case	Without case
Without spring		With spring			With spring
 HM (JIS GM) MH (JIS G)		 HMS (JIS SM) MHS (JIS S) CRS		 HMSH (JIS SA)	 MS
 HMA	MHA	 HMSA (JIS DM)	MHSA (JIS D) CRSA	 HMSAH (JIS DA)	–
● The oil seals shown in the lower row contain the minor lip (auxiliary lip). ● Special types of seals such as the mud resistance seal, pressure resistance seal and outer seal for rotating housings can be provided to serve under various operating conditions.					● By providing a slit on the oil seals, it is possible to attach them from other points than the shaft ends.

Oil seals without minor lips are mounted in different directions according to their operating conditions (shown in Fig. 14-9).

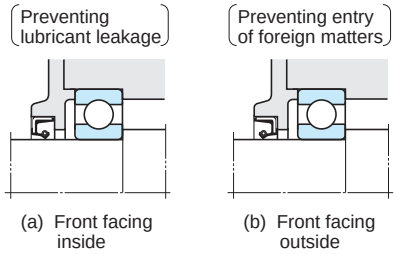


Fig. 14-9 Direction of sealing lips and their purpose

When the seal is used in a dirty operating environment, or penetration of water is expected, it is advisable to have two oil seals combined or to have the space between the two sealing lips be filled with grease. (shown in Fig. 14-10)

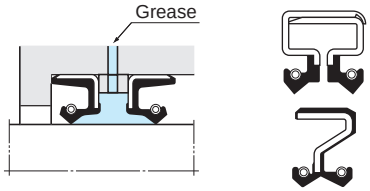


Fig. 14-10 Seals used in a dirty operating environment

Respective seal materials possess different properties. Accordingly, as shown in Table 14-9, allowable lip speed and operating temperature differ depending on the materials. Therefore, by selecting proper materials, oil seals can be used for sealing not only lubricants but also chemicals including alcohol, acids, alkali, etc.

Table 14-9 Allowable lip speed and operating temperature range of oil seals

Seal material	Allowable lip speed (m/s)	Operating temperature range (℃)
NBR	15	– 40 to + 120
Acrylic rubber	25	– 30 to + 150
Silicone rubber	32	– 50 to + 170
Fluoro rubber	32	– 20 to + 180

To ensure the maximum sealing effect of the oil seal, the shaft materials, surface roughness and hardness should be carefully chosen.

Table 14-10 shows the recommended shaft conditions.

Table 14-10 Recommended shaft conditions

Material	Machine structure steel, low alloy steel and stainless steel
Surface hardness	For low speed : harder than 30 HRC For high speed : harder than 50 HRC
Surface roughness (Ra)	0.2 – 0.6a A surface which is excessively rough may cause oil leakage or abrasion ; whereas an excessively fine surface may cause sealing lip seizure, preventing the oil film from forming. Surface must also be free of spiral grinding marks.

2) Felt seals and others

Although felt seals have been used conventionally, it is recommended to replace them with rubber oil seals because the use of felt seals are limited to the following conditions.

- Light dust protection
- Allowable lip speed : not higher than 5m/s

Contact type sealing devices include mechanical seals, O-rings and packings other than those described herein.

JTEKT manufactures various oil seals ranging from those illustrated in Table14-8 to special seals for automobiles, large seals for rolling mills, mud resistance seals, pressure resistance seals, outer seals for rotating housings and O-rings.

For details, refer to JTEKT separate catalog "Oil seals & O-rings" (CAT. NO. R2001E).

15. Handling of bearings

15-1 General instructions

Since rolling bearings are more precisely made than other machine parts, careful handling is absolutely necessary.

1) Keep bearings and the operating environment clean.
2) Handle carefully.
   Bearings can be cracked and brinelled easily by strong impact if handled roughly.
3) Handle using the proper tools.
4) Keep bearings well protected from rust.
   Do not handle bearings in high humidity.
   Operators should wear gloves in order not to soil bearings with perspiration from their hands.
5) Bearings should be handled by experienced or well trained operators.
6) Set bearing operation standards and follow them.
   - Storage of bearings
   - Cleaning of bearings and their adjoining parts.
   - Inspection of dimensions of adjoining parts and finish conditions
   - Mounting
   - Inspection after mounting
   - Dismounting
   - Maintenance and inspection (periodical inspection)
   - Replenishment of lubricants

15-2 Storage of bearings

In shipping bearings, since they are covered with proper anti-corrosion oil and are wrapped in antitarnish paper, the quality of the bearings is guaranteed as long as the wrapping paper is not damaged.

If bearings are to be stored for a long time, it is advisable that the bearings be stored on shelves set higher than 30 cm from the floor, at a humidity less than 65 %, and at a temperature around 20°C.

Avoid storage in places exposed directly to the sun's rays or placing boxes of bearings against cold walls.

15-3 Bearing mounting

15-3-1 Recommended preparation prior to mounting

1) Preparation of bearings

Wait until just before mounting before removing the bearings from their packaging to prevent contamination and rust.

Since the anti-corrosion oil covering bearings is a highly capable lubricant, the oil should not be cleaned off if the bearings are pre-lubricated, or when the bearings are used for normal operation. However, if the bearings are used in measuring instruments or at high rotation speed, the anti-corrosion oil should be removed using a clean detergent oil. After removal of the anti-corrosion oil, bearings should not be left for a long time because they rust easily.

2) Inspection of shafts and housings

Clean up the shaft and housing to check whether it has flaws or burrs as a result of machining.

Be very careful to completely remove lapping agents (SiC, Al_2O_3, etc.), casting sands, and chips from inside the housing.

Next, check that the dimensions, forms, and finish conditions of the shaft and the housing are accurate to those specified on the drawing.

The shaft diameter and housing bore diameter should be measured at the several points as shown in Figs. 15-1 and 15-2.

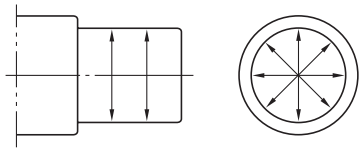


Fig. 15-1 Measuring points on shaft diameter

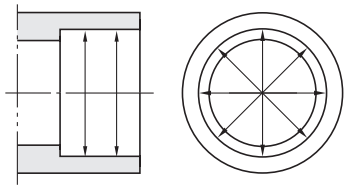


Fig. 15-2 Measuring points on housing bore diameter

Furthermore, fillet radius of shaft and housing, and the squareness of shoulders should be checked.

When using shaft and housing which have passed inspection, it is advisable to apply machine oil to each fitting surface just before mounting.

15-3-2 Bearing mounting

Mounting procedures depend on the type and fitting conditions of bearings.

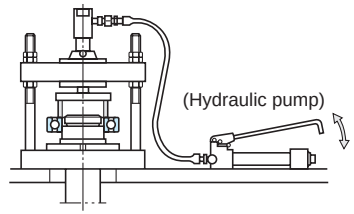
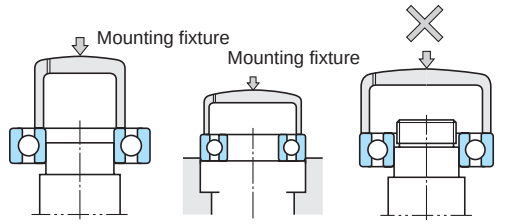
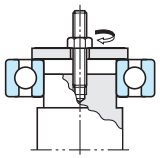
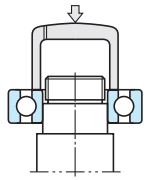
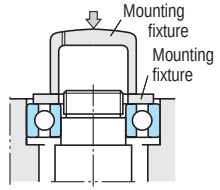
For general bearings in which the shaft rotates, an interference fit is applied to inner rings, while a clearance fit is applied to outer rings.

For bearings in which the outer rings rotate, an interference fit is applied to the outer rings.

Interference fitting is roughly classified as shown here. The detailed mounting processes are described in Tables 15-1 to 15-3.

- Interference fit of inner rings
  - Bearings with cylindrical bore
    - Press fit ··· Applied to small size bearings with restricted interference. (Table 15-1)
    - Shrink fit ··· Applied to bearings which allow heavy interference or to large size bearings. (Table 15-2)
  - Bearings with tapered bore
    - Mounting on tapered shafts ····· (Table 15-3)
    - Mounting using sleeves ····· (Table 15-3)
- Interference fit of outer rings
  - Press fit ··· Most widely used method (Table 15-1)
  - Cooling fit ··· Bearings are fit into housings by cooling them with dry ice, etc. In this method, proper rust-preventive treatment is required, since moisture in the atmosphere adheres to bearings.

Table 15-1 Press fit of bearings with cylindrical bores

Mounting methods	Descriptions
 (a) Using press fit (the most widely used method)	■ As shown in the Fig., a bearing should be mounted slowly with care, by using a fixture to apply force evenly to the bearing. When mounting the inner ring, apply pressure to the inner ring only. Similarly, in mounting the outer ring, press only the outer ring.  (Inner ring press fit) (Outer ring press fit) (Inner ring press fit)
 (b) Using bolts and nuts (screw hole should be provided at the shaft end)  (c) Using hammers (only when there is no alternative measure)	■ If interference is required on both the inner and outer ring of non-separable bearings, use two kinds of fixtures as shown in the Fig. and apply force carefully, as rolling elements are easily damaged. Be sure never to use a hammer in such cases.  Simultaneous press fit of inner ring and outer ring

Reference **Force is necessary to press fit or remove bearings.**

The force necessary to press fit or remove inner rings of bearings differs depending on the finish of shafts and how much interference the bearings allow.

The standard values can be obtained by using the following equations.

(Solid shafts)
$$K_a = 9.8\, f_k \cdot \Delta_{deff} \cdot B \left(1 - \frac{d^2}{D_i^2}\right) \times 10^3 \quad \cdots\cdots (15\text{-}1)$$

(Hollow shafts)
$$K_a = 9.8\, f_k \cdot \Delta_{deff} \cdot B \frac{\left(1 - \frac{d^2}{D_i^2}\right)\left(1 - \frac{d_0^2}{d^2}\right)}{\left(1 - \frac{d_0^2}{D_i^2}\right)} \times 10^3 \quad \cdots\cdots (15\text{-}2)$$

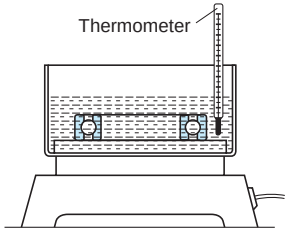
In equations (15-1) and (15-2),

K_a : force necessary for press fit or removal — N
Δ_{deff} : effective interference — mm
f_k : resistance coefficient (Coefficient taking into consideration friction between shafts and inner rings ··· refer to the table on the right)
B : nominal inner ring width — mm
d : nominal inner ring bore diameter — mm
D_i : average outside diameter of inner ring — mm
d_0 : hollow shaft bore diameter — mm

Value of resistance coefficient f_k

Conditions	f_k
· Press fitting bearings on to cylindrical shafts	4
· Removing bearings from cylindrical shafts	6
· Press fitting bearings on to tapered shafts or tapered sleeves	5.5
· Removing bearings from tapered shafts or tapered sleeves	4.5
· Press fitting tapered sleeves between shafts and bearings	10
· Removing tapered sleeves from the space between shafts and bearings	11

Table 15-2 Shrink fit of cylindrical bore bearings

Shrink fit	Descriptions
 (a) Heating in an oil bath  (b) Induction heater	■ This method, which expands bearings by heating them in oil, has the advantage of not applying too much force to bearings and taking only a short time.  [Notes] ● Oil temperature should not be higher than 100 °C, because bearings heated at higher than 120 °C lose hardness. ● Heating temperature can be determined from the bore diameter of a bearing and the interference by referring to Fig. 15-3. ● Use nets or a lifting device to prevent the bearing from resting directly on the bottom of the oil container. ● Since bearings shrink in the radial direction as well as the axial direction while cooling down, fix the inner ring and shaft shoulder tightly with the shaft nut before shrinking, so that no space is left between them. ■ Shrink fit proves to be clean and effective since, by this method, the ring can be provided with even heat in a short time using neither fire nor oil. When electricity is being conducted, the bearing itself generates heat by its electrical resistance, aided by the built-in exciting coil.

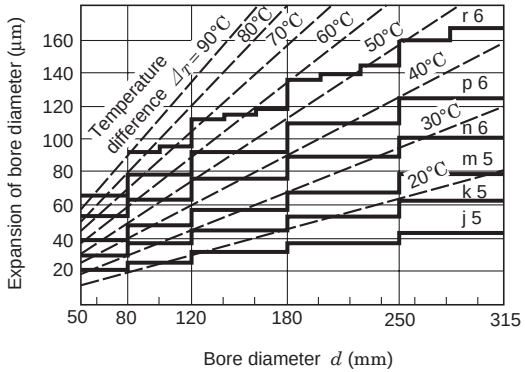


Fig. 15-3 Heating temperature and expansion of inner rings

[Remarks]

1. Thick solid lines show the maximum interference value between bearings (class 0) and shafts (r 6, p 6, n 6, m 5, k 5, j 5) at normal temperature.

2. Therefore, the heating temperature should be selected to gain a larger "expansion of the bore diameter" than the maximum interference values.
When fitting class 0 bearings having a 90 mm bore diameter to m 5 shafts, this figure shows that heating temperature should be 40 °C higher than room temperature to produce expansion larger than the maximum interference value of 48 μm.
However, taking cooling during mounting into consideration, the temperature should be set 20 to 30 °C higher than the temperature initially required.

Table 15-3 Mounting bearings with tapered bores

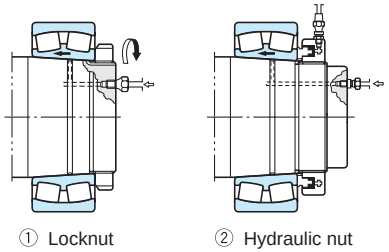
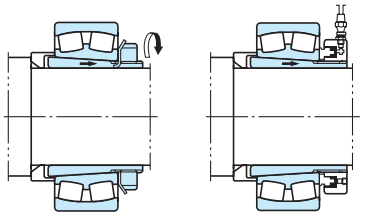
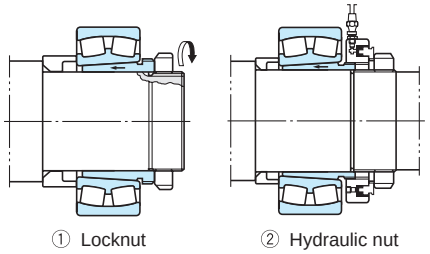
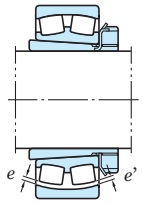
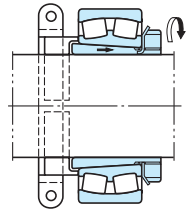
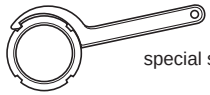
Mounting methods	Descriptions
 (a) Mounting on tapered shafts  (b) Mounting by use of an adapter sleeve  (c) Mounting by use of a withdrawal sleeve  (d) Measuring clearances	■ When mounting bearings directly on tapered shafts, provide oil holes and grooves on the shaft and inject high pressure oil into the space between the fitting surfaces (oil injection). Such oil injection can reduce tightening torque of locknut by lessening friction between the fitting surfaces. ■ When exact positioning is required in mounting a bearing on a shaft with no shoulder, use a clamp to help determine the position of the bearing.  Locating bearing by use of a clamp ■ When mounting bearings on shafts, locknuts are generally used. Special spanners are used to tighten them. Bearings can also be mounted using hydraulic nuts.  special spanner ■ When mounting tapered bore spherical roller bearings, the reduction in the radial internal clearance which gradually occurs during operation should be taken into consideration as well as the push-in depth described in Table 15-4. Clearance reduction can be measured by a thickness gage. First, stabilize the roller in the proper position and then insert the gage into the space between the rollers and the outer ring. Be careful that the clearance between both roller rows and the outer rings is roughly the same ($e \fallingdotseq e'$). Since the clearance may differ at different measuring points, take measurements at several positions. ■ When mounting self-aligning ball bearings, leave enough clearance to allow easy aligning of the outer ring.

Table 15-4 Mounting tapered bore spherical roller bearings

Nominal bore diameter d mm		Reduction of radial internal clearance μm		Axial displacement, mm				Minimum required residual clearance, μm		
				1/12 taper		1/30 taper		C N clearance	C 3 clearance	C 4 clearance
over	up to	min.	max.	min.	max.	min.	max.			
24	30	15	20	0.27	0.35	–	–	10	20	35
30	40	20	25	0.32	0.4	–	–	15	25	40
40	50	25	35	0.4	0.5	–	–	20	30	45
50	65	30	40	0.45	0.6	–	–	25	35	55
65	80	35	50	0.55	0.75	–	–	35	40	70
80	100	40	55	0.65	0.85	–	–	40	50	85
100	120	55	70	0.85	1.05	2.15	2.65	45	65	100
120	140	65	90	1.0	1.2	2.5	3.0	55	80	110
140	160	75	100	1.1	1.35	2.75	3.4	55	90	130
160	180	80	110	1.2	1.5	3.0	3.8	60	100	150
180	200	90	120	1.4	1.7	3.5	4.3	70	110	170
200	225	100	130	1.55	1.85	3.85	4.6	80	120	190
225	250	110	140	1.7	2.05	4.25	5.1	90	130	210
250	280	120	160	1.8	2.3	4.5	5.75	100	140	230
280	315	130	180	2.0	2.5	5.0	6.25	110	150	250
315	355	150	200	2.3	2.8	5.75	7.0	120	170	270
355	400	170	220	2.5	3.1	6.25	7.75	130	190	300
400	450	190	240	2.8	3.4	7.0	8.5	140	210	330
450	500	210	270	3.1	3.8	7.75	9.5	160	230	360
500	560	240	310	3.5	4.3	8.75	10.8	170	260	370
560	630	260	350	3.9	4.8	9.75	12.0	200	300	410
630	710	300	390	4.3	5.3	10.8	13.3	210	320	460
710	800	340	430	4.8	6.0	12.0	15.0	230	370	530
800	900	370	500	5.3	6.7	13.3	16.8	270	410	570
900	1000	410	550	5.9	7.4	14.8	18.5	300	450	640

[Remark] The values for reduction of radial internal clearance listed above are values obtained when mounting bearings with CN clearance on solid shafts. In mounting bearings with C 3 clearance, the maximum value listed above should be taken as the standard.

15-4 Test run

A trial operation is conducted to insure that the bearings are properly mounted.

In the case of compact machines, rotation may be checked by manual operation at first.

If no abnormalities, such as those described below, are observed, then further trial operation proceeds using a power source.

- Knocking ···
  due to flaws or insertion of foreign matter on rolling contact surfaces.
- Excessive torque (heavy) ···
  due to friction on sealing devices, too small clearances, and mounting errors.
- Uneven running torque ···
  due to improper mounting and mounting errors.

For machines too large to allow manual operation, idle running is performed by turning off the power source immediately after turning it on. Before starting power operation, it must be confirmed that bearings rotate smoothly without any abnormal vibration and noise.

Power operation should be started under no load and at low speed, then the speed is gradually increased until the designed speed is reached.

During power operation, check the noise, increase in temperature and vibration.

If any of the abnormalities listed in Tables 15-5 and 15-6 are found, operation must be stopped, and inspection for defects immediately conducted.

The bearings should be dismounted if necessary.

Table 15-5 Bearing noises, causes, and countermeasures

Noise types		Causes	Countermeasures
Cyclic	Flaw noise / Rust noise (similar to noise when punching a rivet) / Brinelling noise (Unclear siren-like noise)	Flaw on raceway Rust on raceway Brinelling on raceway	Improve mounting procedure, cleaning method and rust preventive method. Replace bearing.
	Flaking noise (similar to a large hammering noise)	Flaking on raceway	Replace bearing.
Not cyclic	Dirt noise (an irregular sandy noise.)	Insertion of foreign matter	Improve cleaning method, sealing device. Use clean lubricant. Replace bearing.
	Fitting noise (drumming or hammering noise)	Improper fitting or excessive bearing clearance	Review fitting and clearance conditions. Provide preload. Improve mounting accuracy.
	Flaw noise, rust noise, flaking noise	Flaws, rust and flaking on rolling elements	Replace bearing.
	Squeak noise (often heard in cylindrical roller bearings with grease lubrication, especially in winter or at low temperatures)	If noise is caused by improper lubrication, a proper lubricant should be selected. In general, however, serious damage will not be caused by an improper lubricant if used continuously.	
Others	Abnormally large metallic sound	Abnormal load Incorrect mounting Insufficient amount of or improper lubricant	Review fitting, clearance. Adjust preload. Improve accuracy in processing and mounting shafts and housings. Improve sealing device. Refill lubricant. Select proper lubricant.

Table 15-6 Causes and countermeasures for abnormal temperature rise

Causes	Countermeasures
Too much lubricant	Reduce lubricant amount. Use grease of lower consistency.
Insufficient lubricant	Refill lubricant.
Improper lubricant	Select proper lubricant.
Abnormal load	Review fitting and clearance conditions and adjust preload.
Improper mounting	Improve accuracy in processing and mounting shaft and housing.
(excessive friction)	Review fitting. Improve sealing device.

Normally, listening rods are employed for bearing noise inspections.

The instrument detecting abnormalities through sound vibration and the Diagnosis System utilizing acoustic emission for abnormality detection are also applicable.

In general, bearing temperature can be estimated from housing temperature, but the most accurate method is to measure the temperature of outer rings directly via lubrication holes.

Normally, bearing temperature begins to rise gradually when operation is just starting; and, unless the bearing has some abnormality, the temperature stabilizes within one or two hours.

Therefore, a rapid rise in temperature or unusually high temperature indicates some abnormality.

15-5 Bearing dismounting

After dismounting bearings, handling of the bearings and the various methods available for this should be considered.

If the bearing is to be disposed of, any simple method such as torch cutting can be employed. If the bearing is to be reused or checked for the causes of its failure, the same amount of care as in mounting should be taken in dismounting so as not to damage the bearing and other parts.

Since bearings with interference fits are easily damaged during dismounting, measures to prevent damage during dismounting must be incorporated into the design.

It is recommended that dismounting devices be designed and manufactured, if necessary.

It is useful for discovering the causes of failures when the conditions of bearings, including mounting direction and location, are recorded prior to dismounting.

Dismounting method

Tables 15-7 to 15-9 describe dismounting methods for interference fit bearings intended for reuse or for failure analysis.

The force necessary to remove bearings can be calculated using the equations given on page A 142.

Table 15-7 Dismounting of cylindrical bore bearings

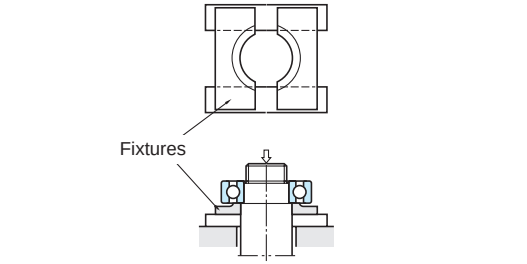
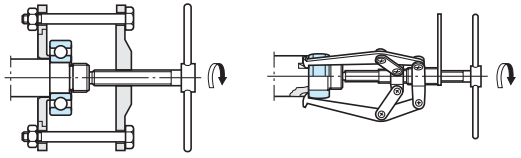
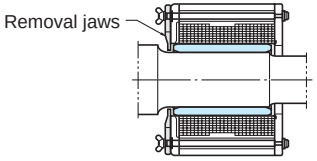
Inner ring dismounting methods	Descriptions
 (a) Dismounting by use of a press  (b) Dismounting by use of special tools (c) Dismounting by use of special tools  (d) Dismounting using induction heater	• Non-separable bearings should be treated carefully during dismounting so as to minimize external force, which affects their rolling elements. • The easiest way to remove bearings is by using a press as shown in Fig. (a). It is recommended that the fixture be prepared so that the inner ring can receive the removal force. • Figs. (b) and (c) show a dismounting method in which special tools are employed. In both cases, the jaws of the tool should firmly hold the side of the inner ring. • Fig. (d) shows an example of removal by use of an induction heater : this method can be adapted to both mounting and dismounting of the inner rings of NU and NJ type cylindrical roller bearings. The heater can be used for heating and expanding inner rings in a short time.

Table 15-8 Dismounting tapered bore bearings

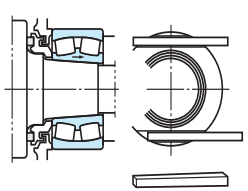
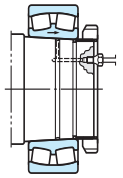
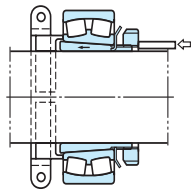
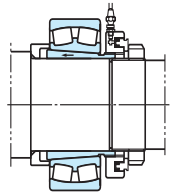
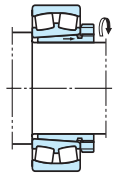
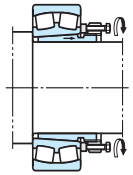
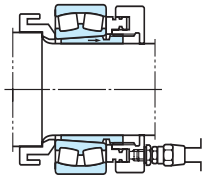
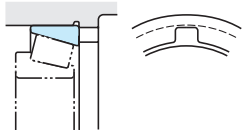
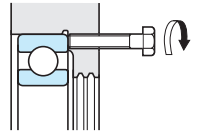
Inner ring dismounting methods	Descriptions
 (a) Dismounting by use of a wedge  (b) Dismounting by use of oil pressure  (c) Dismounting by use of clamps  (d) Dismounting by use of hydraulic nuts  (e) Dismounting by use of locknuts  (f) Dismounting by use of bolts  (g) Dismounting by use of hydraulic nuts	• Fig. (a) shows the dismounting of an inner ring by means of driving wedges into notches at the back of the labyrinth. Fig. (b) shows dismounting by means of feeding high pressure oil to the fitting surfaces. In both cases, it is recommended that a stopper (ex. shaft nuts) be provided to prevent bearings from suddenly dropping out. • For bearings with an adapter sleeve, the following two methods are suitable. As shown in Fig. (c), fix bearings with clamps, loosen locknuts, then hammer off the adapter sleeve. This method is mainly used for small size bearings. Fig. (d) shows the method using hydraulic nuts. • Small size bearings with withdrawal sleeves can be removed by tightening locknuts as shown in Fig. (e). For large size bearings, provide several bolt holes on locknuts as shown in Fig. (f), and tighten bolts. The bearings can then be removed as easily as small size bearings. • Fig. (g) shows the method using hydraulic nuts.

Table 15-9 Dismounting of outer rings

Outer ring dismounting methods	Description
 (a) Notchs for dismounting  (b) Bolt holes and bolts for dismounting	• To dismount outer rings with interference fits, it is recommended that notches or bolt holes be provided on the shoulder of the housings.

15-6 Maintenance and inspection of bearings

Periodic and thorough maintenance and inspection are indispensable to drawing full performance from bearings and lengthening their useful life.

Besides, prevention of accidents and down time by early detection of failures through maintenance and inspection greatly contributes to the enhancement of productivity and profitability.

15-6-1 Cleaning

Before dismounting a bearing for inspection, record the physical condition of the bearing, including taking photographs.

Cleaning should be done after checking the amount of remaining lubricant and collecting lubricant as a sample for examination.

- A dirty bearing should be cleaned using two cleaning processes, such as rough cleaning and finish cleaning.
  It is recommended that a net be set on the bottom of cleaning containers.
- In rough cleaning, use brushes to remove grease and dirt. Bearings should be handled carefully. Note that raceway surfaces may be damaged by foreign matter, if bearings are rotated in cleaning oil.
- During finish cleaning, clean bearings carefully by rotating them slowly in cleaning oil.

In general, neutral water-free light oil or kerosene is used to clean bearings, a warm alkali solution can also be used if necessary. In any case, it is essential to keep oil clean by filtering it prior to cleaning.

Apply anti-corrosion oil or rust preventive grease on bearings immediately after cleaning.

15-6-2 Inspection and analysis

Before determining that dismounted bearings will be reused, the accuracy of their dimensions and running, internal clearance, fitting surfaces, raceways, rolling contact surfaces, cages and seals must be carefully examined, so as to confirm that no abnormality is present.

It is desirable for skilled persons who have sufficient knowledge of bearings to make decisions on the reuse of bearings.

Criteria for reuse differs according to the performance and importance of machines and inspection frequency.

If the following defects are found, replace the bearing with a new one.

- Cracks and chips in bearing components
- Flaking on the raceway surfaces and the rolling contact surfaces
- Other failures of a serious degree described in the following section "16. Examples of bearing failures."

15-7 Methods of analyzing bearing failures

It is important for enhancing productivity and profitability, as well as for accident prevention that abnormalities in bearings are detected during operation.

Representative detection methods are described in the following section.

1) Noise checking

Since the detection of abnormalities in bearings from noises requires ample experience, sufficient training must be given to inspectors. Given this, it is recommended that specific persons be assigned to this work in order to gain this experience.

Attaching hearing aids or listening rods on housings is effective for detecting bearing noise.

2) Checking of operating temperature

Since this method utilizes change in operating temperature, its application is limited to relatively stable operations.

For detection, operating temperatures must be continuously recorded.

If abnormalities occur in bearings, operating temperature not only increase but also change irregularly.

It is recommended that this method be employed together with noise checking.

3) Lubricant checking

This method detects abnormalities from the foreign matter, including dirt and metallic powder, in lubricants collected as samples.

This method is recommended for inspection of bearings which cannot be checked by close visual inspection, and large size bearings.

16. Examples of bearing failures

Table 16-1 (1) Bearing failures, causes and countermeasures

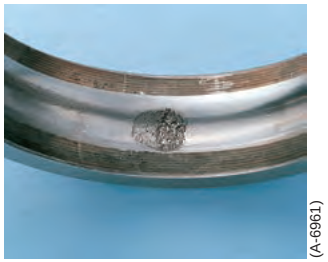
Failures	Characteristics	Damages	Causes	Countermeasures
1 Flaking	 (A-6961) Flaking is a phenomenon when material is removed in flakes from a surface layer of the bearing raceways or rolling elements due to rolling fatigue. This phenomenon is generally attributed to the approaching end of bearing service life. However, if flaking occurs at early stages of bearing service life, it is necessary to determine causes and adopt countermeasures.  (A-6476) [Reference] Pitting Pitting is another type of failure caused by rolling fatigue, in which minute holes of approx. 0.1 mm in depth are generated on the raceway surface.	Flaking occurring at an incipient stage	· Too small internal clearance · Improper or insufficient lubricant · Too much load · Rust	· Provide proper internal clearance. · Select proper lubricating method or lubricant.
		Flaking on one side of radial bearing raceway	· Extraordinarily large axial load	· Fitting between outer ring on the free side and housing should be changed to clearance fit.
		Symmetrical flaking along circumference of raceway	· Inaccurate housing roundness	· Correct processing accuracy of housing bore. (Especially for split housings, care should be taken to ensure processing accuracy.)
		Slanted flaking on the radial ball bearing raceway	· Improper mounting · Shaft deflection · Inaccuracy of the shaft and housing	· Correct centering. · Widen bearing internal clearance. · Correct squareness of shaft or housing shoulder.
		Flaking occurring near the edge of the raceway or rolling contact surface of roller bearings		
		Flaking on the raceway surface at the same interval as rolling element spacing	· Heavy impact load during mounting · A flaw of cylindrical roller bearings or tapered roller bearings caused when they are mounted. · Rust gathered while out of operation	· Improve mounting procedure. · Provide rust prevention treatment before long cessation of operation.
2 Cracking, chipping	 (A-6395)	Cracking in outer ring or inner ring	· Excessive interference · Excessive fillet on shaft or housing · Heavy impact load · Advanced flaking or seizure	· Select proper fit. · Adjust fillet on the shaft or in the housing to smaller than that of the bearing chamfer dimension. · Re-examine load conditions.
		Cracking on rolling elements	· Heavy impact load · Advanced flaking	· Improve mounting and handling procedure. · Re-examine load conditions.
		Cracking on the rib	· Impact on rib during mounting · Excessive axial impact load	· Improve mounting procedure. · Re-examine load conditions.
3 Brinelling, nicks	 (A-6617) (Brinelling) · Brinelling is a small surface indentation generated either on the raceway through plastic deformation at the contact point between the raceway and rolling elements, or on the rolling surfaces from insertion of foreign matter, when heavy load is applied while the bearing is stationary or rotating at a low rotation speed. · Nicks are those indentations produced directly by rough handling such as hammering.	Brinelling on the raceway or rolling contact surface	· Entry of foreign matter	· Clean bearing and its peripheral parts. · Improve sealing devices.
		Brinelling on the raceway surface at the same interval as the rolling element spacing	· Impact load during mounting · Excessive load applied while bearing is stationary	· Improve mounting procedure. · Improve machine handling.
		Nicks on the raceway or rolling contact surface	· Careless handling	· Improve mounting and handling procedure.

Table 16-1 (2) Bearing failures, causes and countermeasures

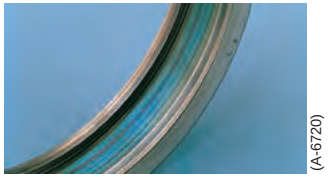
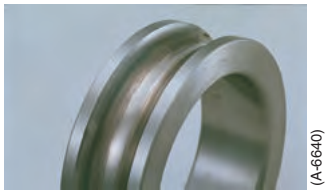
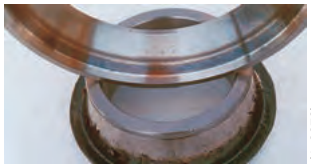
Failures	Characteristics	Damages	Causes	Countermeasures
4 Pear skin, discoloration	 (A-6720) (Discoloration) · Pear skin is a phenomenon in which minute brinell marks cover the entire rolling surface, caused by the insertion of foreign matter. This is characterized by loss of luster and a rolling surface that is rough in appearance. In extreme cases, this is accompanied by discoloration due to heat generation. · Discoloration is a phenomenon in which the surface color changes because of staining or heat generation during rotation. Color change caused by rust and corrosion is generally separate from this phenomenon.	Indentation similar to pear skin on the raceway and rolling contact surface.	· Entry of minute foreign matter	· Clean the bearing and its peripheral parts. · Improve sealing device.
		Discoloration of the raceway, surface rolling contact surface, rib face, and cage riding land.	· Too small bearing internal clearance · Improper or insufficient lubricant · Quality deterioration of lubricant due to aging, etc.	· Provide proper internal clearance. · Select proper lubricating method or lubricant.
5 Scratches, scuffing	 (A-6459) (Scuffing) · Scratches are relatively shallow marks generated by sliding contact, in the same direction as the sliding. This is not accompanied by apparent melting of material. · Scuffing refers to marks, the surface of which are partially melted due to higher contact pressure and therefore a greater heat effect. · Generally, scuffing may be regarded as a serious case of scratches.	Scratches on raceway or rolling contact surface	· Insufficient lubricant at initial operation · Careless handling	· Apply lubricant to the raceway and rolling contact surface when mounting. · Improve mounting procedure.
		Scuffing on rib face and roller end face	· Improper or insufficient lubricant · Improper mounting · Excessive axial load	· Select proper lubricating method or lubricant. · Correct centering of axial direction.
6 Smearing	 (A-6640) Smearing is a phenomenon in which a cluster of minute seizures cover the rolling contact surface. Since smearing is caused by high temperature due to friction, the surface of the material usually melts partially ; and, the smeared surfaces appear very rough in many cases.	Smearing on raceway or rolling contact surface	· Improper or insufficient lubricant · Slipping of the rolling elements (This occurs due to the break down of lubricant film when an abnormal self rotation causes slip of the rolling elements on the raceway.)	· Select proper lubricating method or lubricant. · Provide proper preload.
7 Rust, corrosion	 (A-7130) · Rust is a film of oxides, or hydroxides, or carbonates formed on a metal surface due to chemical reaction. · Corrosion is a phenomenon in which a metal surface is eroded by acid or alkali solutions through chemical reaction (electrochemical reaction such as chemical combination and battery formation) ; resulting in oxidation or dissolution. (It often occurs when sulfur or chloride contained in the lubricant additives is dissolved at high temperature.)	Rust partially or completely covering the bearing surface.	· Improper storage condition · Dew formation in atmosphere	· Improve bearing storage conditions. · Improve sealing devices. · Provide rust preventive treatment before long cessation of operation.
		Rust and corrosion at the same interval as rolling element spacing	· Contamination by water or corrosive matter	· Improve sealing devices.
8 Electric pitting	 (A-6652) When an electric current passes through a bearing while in operation, it can generate sparks between the raceway and rolling elements through a very thin oil film, resulting in melting of the surface metal in this area. This phenomenon appears to be pitting at first sight. (The resultant flaw is referred to as a pit.) When the pit is magnified, it appears as a hole like a crater, indicating that the material melted when it was sparking. In some cases, the rolling surface becomes corrugated by pitting.	Pitting or a corrugated surface failure on raceway and rolling contact surface (The bearings must be replaced, if the corrugated texture is found by scratching the surface with a fingernail or if pitting can be observed by visual inspection.)	· Sparks generated when electric current passes through bearings	· Providing a bypass which prevents current from passing through bearings. · Insulation of bearings.

Table 16-1 (3) Bearing failures, causes and countermeasures

Failures	Characteristics	Damages	Causes	Countermeasures
9 Wear	 (A-4719) Normally, wear of bearing is observed on sliding contact surfaces such as roller end faces and rib faces, cage pockets, the guide surface of cages and cage riding lands. Wear is not directly related to material fatigue. Wear caused by foreign matter and corrosion can affect not only sliding surfaces but rolling surfaces.	Wear on the contact surfaces (roller end faces, rib faces, cage pockets)	Improper or insufficient lubricant	· Select proper lubricating method or lubricant. · Improve sealing device. · Clean the bearing and its peripheral parts.
		Wear on raceways and rolling contact surfaces	· Entry of foreign matter · Improper or insufficient lubricant	
10 Fretting	 (A-6649) Fretting occurs to bearings which are subject to vibration while in stationary condition or which are exposed to minute vibration. It is characterized by rust-colored wear particles. Since fretting on the raceways often appears similar to brinelling, it is sometimes called "falsebrinelling".	Rust-colored wear particles generated on the fitting surface (fretting corrosion)	· Insufficient interference	· Provide greater interference · Apply lubricant to the fitting surface
		Brinelling on the raceway surface at the same interval as rolling element spacing (false brinelling)	· Vibration and oscillation when bearings are stationary.	· Improve fixing method of the shaft and housing. · Provide preload to bearing.
11 Creeping	 (A-6647) Creeping is a phenomenon in which bearing rings move relative to the shaft or housing during operation.	Wear, discoloration and scuffing, caused by slipping on the fitting surfaces	· Insufficient interference · Insufficient tightening of sleeve	· Provide greater interference. · Proper tightening of sleeve.
12 Damage to cages	 (A-6455) Since cages are made of low hardness materials, external pressure and contact with other parts can easily produce flaws and distortion. In some cases, these are aggravated and become chipping and cracks. Large chipping and cracks are often accompanied by deformation, which may reduce the accuracy of the cage itself and may hinder the smooth movement of rolling elements.	Flaws, distortion, chipping, cracking and excessive wear in cages. Loose or damaged rivets.	· Extraordinary vibration, impact, moment · Improper or insufficient lubricant · Improper mounting (misalignment) · Dents made during mounting	· Re-examine load conditions. · Select proper lubricating method or lubricant. · Minimize mounting deviation. · Re-examine cage types. · Improve mounting.
13 Seizure	 (A-6679) A phenomenon caused by abnormal heating in bearings.	Discoloration, distortion and melting together	· Too small internal clearance · Improper or insufficient lubricant · Excessive load · Aggravated by other bearing flaws	· Provide proper internal clearance. · Select proper lubricating method or lubricant. · Re-examine bearing type. · Earlier discovery of bearing flaws.

Bearing specification tables

Contents

Standard bearings

Special purpose bearings

Deep groove ball bearings

Deep groove ball bearings are available in a variety of sizes, and are the most popular of all rolling bearings. This type of bearing supports radial load and a certain degree of axial load in both directions simultaneously.

■ Shielded / sealed type
- Simplifies sealing structure of applications.
- Greasing is not necessary because bearings are pre-lubricated.
- Table 1 on the next page lists major shielded and sealed bearing types and compares their performance.

■ With locating snap ring
- Bearings with a locating snap ring can be fit to the housing easily, as the locating snap ring facilitates axial positioning.

■ Extra-small ball bearings and miniature ball bearings
- The open type is widely used. Also available are the shielded/sealed type and the flanged type; the latter is easily positioned in the axial direction.

Single-row deep groove ball bearings

Open type

Bore diameter **10** – **500** mm

Shielded/sealed type

Bore diameter **10** – **220** mm

With snap ring groove With locating snap ring

Bore diameter **10** – **130** mm

Extra-small ball bearings and miniature ball bearings

Bore diameter **1** – **9** mm

Flanged type

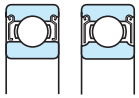
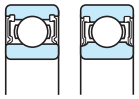
Bore diameter **1** – **9** mm

Double-row deep groove ball bearings

(with filling slot)

Bore diameter **10** – **75** mm

Table 1 Comparison of shielded and sealed bearing performance

Type / Characteristics	Shielded	Sealed			
	Non-contact type	Non-contact type	Contact type		Extremely light contact type
	ZZ type	2RU type	2RS type	2RK type	2RD type
	 (a) [1] (b)	 (c)	 (d) [2] (e)	 (f)	 (g)
Friction torque	Small	Small	Large	Large	Small
High speed performance	Good	Good	Limited because of contact		Good
Grease sealing property	Good	Better than ZZ type	Better than 2RU type for low-speed applications	Excellent	Excellent
Dirt resistance	Good	Better than ZZ type	Better than 2RU type	Excellent	Excellent
Water resistance	Economical	Better than ZZ type but inferior to 2RS, 2RK and 2RD types	Good	Excellent	Better than ZZ and 2RU types
Operating temperature [3]	– 30 to +110°C		– 30 to +100°C		– 30 to +110°C

[Notes] 1) Illustration (a) of the ZZ type shows the relatively small size bearing.
2) Illustration (d) of the 2RS type shows the relatively small size bearing.
3) The operating temperature range listed is for the standard type. It can be widened by using a different type of grease or sealing material. Consult with JTEKT for details.

■ Handling instructions

1) The shielded/sealed type deep groove ball bearing and the deep groove ball bearing with a locating snap ring are designed for use with the inner ring rotating.
Consult with JTEKT on use with the outer ring rotating.
2) When the axial load is large, make the shaft shoulder and housing shoulder larger than usual.
(Referring to the specification table, make the mounting dimension d_a larger and make D_a smaller.)

Boundary dimensions

The dimensions of standard series are as specified in JIS B 1512.
For extra-small and miniature ball bearings, special series (ML) are specified together with those described above.

Tolerances

As specified in JIS B 1514-1. (refer to Table 7-3 on pp. A 60 – A 63.)

Radial internal clearance

■ Deep groove ball bearings (except extra-small ball bearings and miniature ball bearings) ..... as specified in JIS B 1520 (refer to Table 10-2 on p. A 102.)
■ Extra-small ball bearings and miniature ball bearings
..... (refer to Table 10-3 on p. A 102.)
■ Deep groove ball bearings for motors ..... (refer to Table 10-6 on p. A 105.)

Recommended fits

■ Bearings of classes 0 and 6 ..... (refer to Table 9-4 on pp. A 91, 92.)
■ Precision extra-small ball bearings and miniature ball bearings
..... (refer to Table 9-5 on p. A 93.)

Standard cages

- Synthetic resin molded cage (supplementary code : FG, MG)
- Pressed cage (supplementary code : //)
- Copper alloy machined cage (supplementary code : FY)

[Remark]
For certain applications, stainless steel sheet pressed cages (YS) may also be used.

Application of standard cages

Bearing series	Molded cage	Pressed cage	Machined cage
68	683 – 689	–	–
69	693 – 699	–	–
60	603 – 609	–	–
62	623 – 629	–	–
63	633 – 639	–	–
67	–	6700 – 6706	–
68	–	6800 – 6838	6840 – 68/600
69	–	6900 – 6918	6920 – 6980
160	–	16001 – 16028	16030 – 16072
60	6000 – 6009	6010 – 6034	6036 – 6084
62	6200 – 6208	6209 – 6230	6232 – 6248
63	6300 – 6306	6307 – 6328	6330 – 6340
64	–	6403 – 6418	–
42	–	4200 – 4215	–
43	–	4302 – 4315	–

Allowable misalignment

0.002 3 – 0.003 4 rad (8' – 12')

Equivalent radial load (Single/double-row)

Dynamic equivalent radial load
$P_r = XF_r + YF_a$
(refer to the table on the right for values X and Y.)

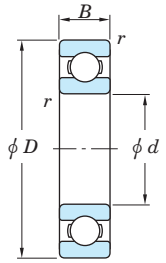
Static equivalent radial load
$P_{0r} = 0.6F_r + 0.5F_a$
(when the value of $P_{0r} < F_r$, $P_{0r} = F_r$)

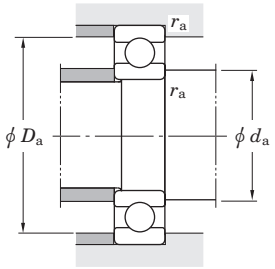
$\frac{if_0F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22				1.99
0.689	0.26				1.71
1.03	0.28				1.55
1.38	0.30				1.45
2.07	0.34				1.31
3.45	0.38				1.15
5.17	0.42				1.04
6.89	0.44				1.00

Factor f_0 is shown in the bearing dimension table.

Single-row deep groove ball bearings
open type

d 10 ~ (17) mm





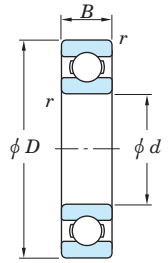
Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)			(Refer.) Mass (kg)
d	D	B	r min.	C_r	C_{0r}	C_u	f_0	Grease lub.	Oil lub.		d_a min.	D_a max.	r_a max.	
10	15	3	0.1	1.05	0.430	0.020	15.7	39 000	47 000	**6700**	10.8	14.2	0.1	0.002
	19	5	0.3	2.15	0.840	0.030	14.8	37 000	43 000	**6800**	12	17	0.3	0.005
	22	6	0.3	3.35	1.25	0.070	14.0	34 000	41 000	**6900**	12	20	0.3	0.010
	26	8	0.3	5.70	1.95	0.100	12.3	31 000	36 000	**6000**	12	24	0.3	0.019
	30	9	0.6	6.40	2.40	0.120	13.2	24 000	29 000	**6200**	14	26	0.6	0.032
	35	11	0.6	10.1	3.45	0.270	11.2	22 000	27 000	**6300**	14	31	0.6	0.053
12	18	4	0.2	1.15	0.530	0.023	16.2	34 000	41 000	**6701**	13.6	16.4	0.2	0.003
	21	5	0.3	2.40	1.05	0.040	15.3	33 000	39 000	**6801**	14	19	0.3	0.006
	24	6	0.3	3.60	1.45	0.080	14.5	31 000	36 000	**6901**	14	22	0.3	0.011
	28	7	0.3	6.40	2.40	0.120	13.2	27 000	32 000	**16001**	14	26	0.3	0.024
	28	8	0.3	6.40	2.40	0.120	13.2	27 000	32 000	**6001**	14	26	0.3	0.022
	32	10	0.6	8.50	3.05	0.240	12.3	22 000	27 000	**6201**	16	28	0.6	0.037
	37	12	1	12.1	4.20	0.420	11.1	20 000	25 000	**6301**	17	32	1	0.060
15	21	4	0.2	1.15	0.580	0.024	16.7	29 000	35 000	**6702**	16.6	19.4	0.2	0.004
	24	5	0.3	2.60	1.25	0.050	15.8	28 000	33 000	**6802**	17	22	0.3	0.007
	28	7	0.3	5.40	2.25	0.120	14.3	26 000	30 000	**6902**	17	26	0.3	0.017
	32	8	0.3	7.00	2.85	0.150	13.9	23 000	28 000	**16002**	17	30	0.3	0.025
	32	9	0.3	7.00	2.85	0.150	13.9	23 000	27 000	**6002**	17	30	0.3	0.030
	35	11	0.6	9.55	3.75	0.290	13.2	20 000	24 000	**6202**	19	31	0.6	0.045
	42	13	1	14.3	5.45	0.460	12.3	17 000	20 000	**6302**	20	37	1	0.082
17	23	4	0.2	1.25	0.660	0.027	16.9	27 000	32 000	**6703**	18.6	21.4	0.2	0.005
	26	5	0.3	3.30	1.55	0.060	15.7	26 000	30 000	**6803**	19	24	0.3	0.008
	30	7	0.3	5.75	2.55	0.130	14.7	23 000	28 000	**6903**	19	28	0.3	0.018
	35	8	0.3	7.50	3.25	0.170	14.4	21 000	25 000	**16003**	19	33	0.3	0.032
	35	10	0.3	7.50	3.25	0.170	14.4	21 000	25 000	**6003**	19	33	0.3	0.039
	40	12	0.6	12.0	4.80	0.370	13.2	17 000	21 000	**6203**	21	36	0.6	0.065
	47	14	1	17.0	6.65	0.550	12.4	15 000	18 000	**6303**	22	42	1	0.115
	47	14	1	19.6	7.60	0.680	12.0	15 000	18 000	**6303R**	22	42	1	0.121

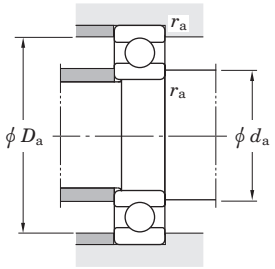
[Remark] Standard cage types used for the above bearings are described earlier in this section.

d (17) ~ 28 mm

Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)			(Refer.) Mass (kg)
d	D	B	r min.	C_r	C_{0r}	C_u	f_0	Grease lub.	Oil lub.		d_a min.	D_a max.	r_a max.	
17	62	17	1.1	25.9	9.85	0.920	11.6	13 000	15 000	**6403**	23.5	55.5	1	0.270
20	27	4	0.2	1.30	0.730	0.030	16.1	23 000	27 000	**6704**	21.6	25.4	0.2	0.006
	32	7	0.3	5.00	2.45	0.100	15.5	21 000	25 000	**6804**	22	30	0.3	0.018
	37	9	0.3	7.95	3.70	0.190	14.7	19 000	23 000	**6904**	22	35	0.3	0.036
	42	8	0.3	9.90	4.50	0.290	14.4	17 000	21 000	**16004**	22	40	0.3	0.050
	42	12	0.6	11.7	5.05	0.350	13.9	17 000	21 000	**6004**	24	38	0.6	0.069
	42	12	0.6	14.4	5.85	0.460	13.0	18 000	21 000	**6004R**	24	38	0.6	0.073
	47	14	1	16.0	6.65	0.510	13.2	15 000	17 000	**6204**	25	42	1	0.106
	47	14	1	19.6	7.60	0.680	12.0	15 000	18 000	**6204R**	25	42	1	0.114
	52	15	1.1	19.9	7.85	0.660	12.3	14 000	17 000	**6304**	26.5	45.5	1	0.144
	52	15	1.1	22.6	8.95	0.790	12.0	14 000	16 000	**6304R**	26.5	45.5	1	0.151
	72	19	1.1	38.7	15.2	1.50	11.1	11 000	13 000	**6404**	26.5	65.5	1	0.400
22	44	12	0.6	11.7	5.15	0.350	14.1	17 000	20 000	**60/22**	26	40	0.6	0.073
	50	14	1	16.0	6.65	0.510	13.2	15 000	17 000	**62/22**	27	45	1	0.118
	56	16	1.1	23.1	9.40	0.770	12.6	13 000	15 000	**63/22**	28.5	49.5	1	0.201
25	32	4	0.2	1.35	0.840	0.035	15.8	19 000	22 000	**6705**	26.6	30.4	0.2	0.006
	37	7	0.3	5.40	2.95	0.120	16.0	18 000	21 000	**6805**	27	35	0.3	0.022
	42	9	0.3	8.75	4.55	0.230	15.4	16 000	19 000	**6905**	27	40	0.3	0.041
	47	8	0.3	11.1	5.60	0.340	15.1	15 000	18 000	**16005**	27	45	0.3	0.060
	47	12	0.6	12.6	5.85	0.380	14.5	15 000	18 000	**6005**	29	43	0.6	0.080
	52	15	1	17.5	7.85	0.550	13.9	13 000	15 000	**6205**	30	47	1	0.128
	52	15	1	22.1	9.30	0.740	12.8	13 000	16 000	**6205R**	30	47	1	0.138
	62	17	1.1	25.7	11.3	0.860	13.2	11 000	13 000	**6305**	31.5	55.5	1	0.232
	62	17	1.1	32.7	13.4	1.20	11.9	11 000	14 000	**6305R**	31.5	55.5	1	0.255
	80	21	1.5	45.2	19.4	1.65	12.2	9 100	11 000	**6405**	33	72	1.5	0.530
28	52	12	0.6	15.6	7.40	0.480	14.5	14 000	16 000	**60/28**	32	48	0.6	0.097
	58	16	1	22.4	9.75	0.720	13.4	12 000	14 000	**62/28**	33	53	1	0.173
	68	18	1.1	29.4	13.1	0.990	13.3	10 000	12 000	**63/28**	34.5	61.5	1	0.328

Single-row deep groove ball bearings
open type
d 30 ~ (40) mm





Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)			(Refer.) Mass (kg)
d	D	B	r min.	C_r	C_{0r}	C_u	f_0	Grease lub.	Oil lub.		d_a min.	D_a max.	r_a max.	
30	37	4	0.2	1.45	0.950	0.040	15.7	16 000	19 000	**6706**	31.6	35.4	0.2	0.008
	42	7	0.3	5.65	3.40	0.140	16.4	15 000	18 000	**6806**	32	40	0.3	0.026
	47	9	0.3	9.05	5.00	0.260	15.8	14 000	17 000	**6906**	32	45	0.3	0.045
	55	9	0.3	14.1	7.35	0.440	15.2	13 000	15 000	**16006**	32	53	0.3	0.085
	55	13	1	16.5	8.25	0.530	14.7	13 000	15 000	**6006**	35	50	1	0.116
	62	16	1	24.3	11.3	0.800	13.9	11 000	13 000	**6206**	35	57	1	0.199
	62	16	1	29.2	12.8	1.00	13.0	11 000	13 000	**6206R**	35	57	1	0.212
	72	19	1.1	33.3	15.0	1.15	13.3	9 600	12 000	**6306**	36.5	65.5	1	0.346
	72	19	1.1	41.7	17.7	1.55	12.0	9 800	12 000	**6306R**	36.5	65.5	1	0.379
	90	23	1.5	54.2	23.9	2.05	12.3	8 100	9 700	**6406**	38	82	1.5	0.735
32	58	13	1	18.8	9.15	0.600	14.5	12 000	14 000	**60/32**	37	53	1	0.127
	65	17	1	29.4	13.1	0.990	13.3	10 000	12 000	**62/32**	37	60	1	0.228
	75	20	1.1	37.6	16.2	1.30	12.7	9 300	11 000	**63/32**	38.5	68.5	1	0.437
35	47	7	0.3	5.95	3.85	0.160	16.5	13 000	16 000	**6807**	37	45	0.3	0.030
	55	10	0.6	13.6	7.75	0.440	15.7	12 000	14 000	**6907**	39	51	0.6	0.073
	62	9	0.3	15.3	8.85	0.500	15.7	11 000	13 000	**16007**	37	60	0.3	0.110
	62	14	1	19.9	10.3	0.640	14.9	11 000	13 000	**6007**	40	58	1	0.155
	72	17	1.1	32.1	15.4	1.10	13.9	9 200	11 000	**6207**	41.5	65.5	1	0.288
	72	17	1.1	38.7	17.5	1.40	12.9	9 300	11 000	**6207R**	41.5	65.5	1	0.309
	80	21	1.5	41.7	19.3	1.45	13.2	8 500	10 000	**6307**	43	72	1.5	0.457
	80	21	1.5	50.0	21.7	1.90	12.1	8 700	10 000	**6307R**	43	72	1.5	0.494
	100	25	1.5	68.8	31.0	2.65	12.2	7 200	8 600	**6407**	43	92	1.5	0.952
40	52	7	0.3	6.15	4.20	0.180	16.3	12 000	14 000	**6808**	42	50	0.3	0.033
	62	12	0.6	17.1	9.95	0.570	15.6	11 000	13 000	**6908**	44	58	0.6	0.112
	68	9	0.3	15.8	9.65	0.530	16.0	9 800	12 000	**16008**	42	66	0.3	0.125
	68	15	1	20.9	11.5	0.690	15.2	10 000	12 000	**6008**	45	63	1	0.192
	80	18	1.1	36.4	17.8	1.25	14.0	8 300	10 000	**6208**	46.5	73.5	1	0.366
	90	23	1.5	50.9	24.0	1.85	13.2	7 700	9 200	**6308**	48	82	1.5	0.633

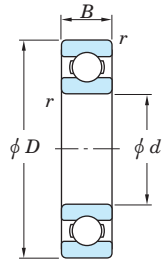
[Remark] Standard cage types used for the above bearings are described earlier in this section.

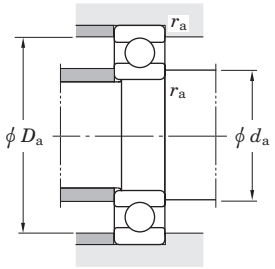
d (40) ~ (60) mm

Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)			(Refer.) Mass (kg)
d	D	B	r min.	C_r	C_{0r}	C_u	f_0	Grease lub.	Oil lub.		d_a min.	D_a max.	r_a max.	
40	110	27	2	79.6	36.6	3.15	12.3	6 600	7 900	**6408**	49	101	2	1.23
45	58	7	0.3	7.75	5.40	0.230	16.3	11 000	13 000	**6809**	47	56	0.3	0.040
	68	12	0.6	17.7	10.9	0.600	15.9	9 700	11 000	**6909**	49	64	0.6	0.132
	75	10	0.6	19.4	12.3	0.670	16.0	8 900	10 000	**16009**	49	71	0.6	0.170
	75	16	1	26.2	15.1	0.900	15.3	9 200	11 000	**6009**	50	70	1	0.245
	85	19	1.1	40.9	20.3	1.40	14.0	7 700	9 200	**6209**	51.5	78.5	1	0.407
	100	25	1.5	61.1	29.5	2.25	13.3	6 800	8 100	**6309**	53	92	1.5	0.833
	120	29	2	96.5	45.1	3.90	12.2	6 000	7 200	**6409**	54	111	2	1.53
50	65	7	0.3	8.20	6.10	0.260	16.1	9 600	11 000	**6810**	52	63	0.3	0.052
	72	12	0.6	18.2	11.7	0.640	16.1	9 000	11 000	**6910**	54	68	0.6	0.133
	80	10	0.6	20.0	13.3	0.710	16.2	8 200	9 700	**16010**	54	76	0.6	0.180
	80	16	1	27.3	16.6	0.960	15.6	8 400	9 900	**6010**	55	75	1	0.261
	90	20	1.1	43.9	23.3	1.55	14.4	7 100	8 500	**6210**	56.5	83.5	1	0.463
	90	20	1.1	50.5	25.5	1.80	13.9	7 100	8 600	**6210R**	56.5	83.5	1	0.487
	110	27	2	77.5	38.3	2.90	13.2	6 100	7 300	**6310**	59	101	2	1.07
	130	31	2.1	104	49.5	4.10	12.5	5 500	6 600	**6410**	61	119	2	1.88
55	72	9	0.3	11.0	8.10	0.420	16.2	8 700	10 000	**6811**	57	70	0.3	0.083
	80	13	1	20.8	14.1	0.760	16.2	8 100	9 600	**6911**	60	75	1	0.185
	90	11	0.6	24.2	16.3	0.880	16.2	7 400	8 800	**16011**	59	86	0.6	0.260
	90	18	1.1	35.3	21.2	1.25	15.3	7 600	8 900	**6011**	61.5	83.5	1	0.385
	100	21	1.5	54.2	29.4	1.95	14.4	6 300	7 600	**6211**	63	92	1.5	0.607
	120	29	2	89.5	45.0	3.45	13.2	5 600	6 700	**6311**	64	111	2	1.37
	140	33	2.1	126	62.3	5.35	12.2	5 000	6 000	**6411**	66	129	2	2.29
60	78	10	0.3	14.3	10.6	0.550	16.3	8 000	9 400	**6812**	62	76	0.3	0.104
	85	13	1	25.2	17.3	0.940	16.2	7 500	8 900	**6912**	65	80	1	0.192
	95	11	0.6	24.8	17.6	0.930	16.4	6 900	8 100	**16012**	64	91	0.6	0.280
	95	18	1.1	36.8	23.2	1.35	15.6	7 100	8 400	**6012**	66.5	88.5	1	0.415

Single-row deep groove ball bearings open type

d (60) ~ (80) mm





Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)			(Refer.) Mass (kg)
d	D	B	r min.	C_r	C_{0r}	C_u	f_0	Grease lub.	Oil lub.		d_a min.	D_a max.	r_a max.	
60	110	22	1.5	65.6	36.2	2.40	14.4	5 700	6 900	**6212**	68	102	1.5	0.783
	130	31	2.1	102	52.2	3.95	13.2	5 200	6 200	**6312**	71	119	2	1.70
	150	35	2.1	137	70.8	5.75	12.4	4 600	5 500	**6412**	71	139	2	2.77
65	85	10	0.6	14.9	11.5	0.590	16.2	7 300	8 600	**6813**	69	81	0.6	0.126
	90	13	1	21.7	16.1	0.830	16.6	7 100	8 400	**6913**	70	85	1	0.211
	100	11	0.6	21.4	16.0	0.830	16.5	6 600	7 800	**16013**	69	96	0.6	0.300
	100	18	1.1	38.1	25.2	1.40	15.8	6 600	7 800	**6013**	71.5	93.5	1	0.435
	120	23	1.5	71.5	40.1	2.65	14.4	5 400	6 400	**6213**	73	112	1.5	0.990
	140	33	2.1	116	59.9	4.50	13.2	4 800	5 800	**6313**	76	129	2	2.08
	160	37	2.1	148	79.2	6.20	12.4	4 300	5 200	**6413**	76	149	2	3.30
70	90	10	0.6	15.1	11.9	0.620	16.1	6 800	8 100	**6814**	74	86	0.6	0.134
	100	16	1	29.7	21.2	1.10	16.3	6 400	7 600	**6914**	75	95	1	0.342
	110	13	0.6	37.6	25.6	1.40	16.0	6 100	7 200	**16014**	74	106	0.6	0.433
	110	20	1.1	47.6	30.9	1.80	15.6	6 100	7 200	**6014**	76.5	103.5	1	0.602
	125	24	1.5	77.8	44.1	2.90	14.5	5 100	6 100	**6214**	78	117	1.5	1.07
	150	35	2.1	130	68.2	4.95	13.2	4 500	5 400	**6314**	81	139	2	2.52
	180	42	3	181	104	10.2	12.2	3 900	4 600	**6414**	83	167	2.5	4.83
75	95	10	0.6	15.7	12.9	0.660	16.0	6 400	7 600	**6815**	79	91	0.6	0.142
	105	16	1	30.5	22.6	1.20	16.5	6 100	7 200	**6915**	80	100	1	0.363
	115	13	0.6	34.4	25.3	1.35	16.4	5 700	6 700	**16015**	79	111	0.6	0.457
	115	20	1.1	49.4	33.5	1.90	15.8	5 700	6 800	**6015**	81.5	108.5	1	0.638
	130	25	1.5	84.3	48.3	3.10	14.5	4 800	5 800	**6215**	83	122	1.5	1.18
	160	37	2.1	142	77.2	5.40	13.2	4 200	5 000	**6315**	86	149	2	3.02
	190	45	3	192	115	10.9	12.3	3 600	4 400	**6415**	88	177	2.5	5.87
80	100	10	0.6	15.9	13.3	0.690	16.0	6 100	7 200	**6816**	84	96	0.6	0.150
	110	16	1	31.2	24.0	1.25	16.6	5 700	6 800	**6916**	85	105	1	0.382
	125	14	0.6	39.7	29.7	1.50	16.4	5 200	6 100	**16016**	84	121	0.6	0.597

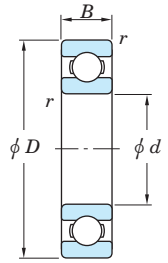
[Remark] Standard cage types used for the above bearings are described earlier in this section.

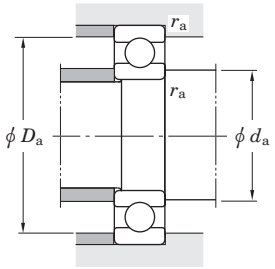
d (80) ~ (100) mm

Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)			(Refer.) Mass (kg)
d	D	B	r min.	C_r	C_{0r}	C_u	f_0	Grease lub.	Oil lub.		d_a min.	D_a max.	r_a max.	
80	125	22	1.1	59.5	39.8	2.25	15.6	5 300	6 300	**6016**	86.5	118.5	1	0.850
	140	26	2	90.9	53.0	3.25	14.6	4 500	5 400	**6216**	89	131	2	1.40
	170	39	2.1	154	86.7	5.85	13.3	3 900	4 700	**6316**	91	159	2	3.59
	200	48	3	205	125	11.5	12.3	3 400	4 100	**6416**	93	187	2.5	6.84
85	110	13	1	23.4	19.0	0.980	16.2	5 600	6 600	**6817**	90	105	1	0.266
	120	18	1.1	39.9	29.6	1.55	16.4	5 300	6 300	**6917**	91.5	113.5	1	0.535
	130	14	0.6	40.8	31.7	1.55	16.5	4 900	5 800	**16017**	89	126	0.6	0.626
	130	22	1.1	61.8	43.1	2.35	15.8	5 000	5 900	**6017**	91.5	123.5	1	0.890
	150	28	2	105	61.9	3.70	14.5	4 200	5 000	**6217**	94	141	2	1.79
	180	41	3	166	96.8	6.35	13.3	3 700	4 400	**6317**	98	167	2.5	4.23
	210	52	4	217	136	12.2	12.3	3 300	3 900	**6417**	101	194	3	8.07
90	115	13	1	23.8	19.7	1.00	16.1	5 300	6 300	**6818**	95	110	1	0.279
	125	18	1.1	41.0	31.6	1.60	16.5	5 100	6 000	**6918**	96.5	118.5	1	0.565
	140	16	1	49.9	37.0	1.85	16.3	4 700	5 600	**16018**	95	135	1	0.848
	140	24	1.5	72.8	49.7	2.65	15.6	4 700	5 600	**6018**	98	132	1.5	1.16
	160	30	2	120	71.5	4.20	14.5	3 900	4 700	**6218**	99	151	2	2.15
	190	43	3	178	107	8.80	13.3	3 500	4 200	**6318**	103	177	2.5	4.91
	225	54	4	230	149	12.7	12.5	3 100	3 700	**6418**	106	209	3	9.78
95	130	18	1.1	42.1	33.5	1.65	16.6	4 800	5 700	**6919**	101.5	123.5	1	0.705
	145	16	1	51.5	39.6	1.90	16.4	4 500	5 300	**16019**	100	140	1	0.885
	145	24	1.5	75.5	53.9	2.75	15.8	4 400	5 200	**6019**	103	137	1.5	1.21
	170	32	2.1	136	81.9	4.65	14.4	3 700	4 400	**6219**	106	159	2	2.62
	200	45	3	191	119	9.45	13.3	3 300	4 000	**6319**	108	187	2.5	5.67
100	125	13	1	24.5	21.2	1.05	16.0	4 800	5 700	**6820**	105	120	1	0.309
	140	20	1.1	56.2	41.9	2.05	16.2	4 500	5 300	**6920**	106.5	133.5	1	0.960
	150	16	1	53.0	42.1	1.95	16.5	4 300	5 100	**16020**	105	145	1	0.910
	150	24	1.5	75.2	54.2	2.70	15.9	4 300	5 100	**6020**	108	142	1.5	1.25

Single-row deep groove ball bearings open type

d (100) ~ (140) mm





Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)			(Refer.) Mass (kg)
d	D	B	r min.	C_r	C_{0r}	C_u	f_0	Grease lub.	Oil lub.		d_a min.	D_a max.	r_a max.	
100	180	34	2.1	153	93.1	5.15	14.4	3 500	4 200	**6220**	111	169	2	3.14
	215	47	3	216	141	10.9	13.2	3 000	3 600	**6320**	113	202	2.5	7.00
105	145	20	1.1	58.1	44.8	2.10	16.4	4 300	5 100	**6921**	111.5	138.5	1	1.00
	160	18	1	52.3	42.2	1.90	16.5	4 100	4 800	**16021**	110	155	1	1.20
	160	26	2	90.4	65.8	3.20	15.8	4 000	4 700	**6021**	114	151	2	1.59
	190	36	2.1	166	105	5.70	14.4	3 300	3 900	**6221**	116	179	2	3.70
	225	49	3	230	153	11.7	13.2	2 900	3 500	**6321**	118	212	2.5	8.05
110	140	16	1	35.1	30.7	1.40	16.1	4 300	5 100	**6822**	115	135	1	0.606
	150	20	1.1	59.9	47.8	2.20	16.4	4 100	4 900	**6922**	116.5	143.5	1	1.04
	170	19	1	71.8	56.7	2.55	16.3	3 800	4 500	**16022**	115	165	1	1.46
	170	28	2	103	73.0	3.55	15.6	3 800	4 500	**6022**	119	161	2	1.96
	200	38	2.1	180	117	6.20	14.4	3 100	3 700	**6222**	121	189	2	4.36
	240	50	3	257	180	13.3	13.2	2 700	3 200	**6322**	123	227	2.5	9.54
120	150	16	1	36.2	33.0	1.45	16.0	4 000	4 700	**6824**	125	145	1	0.655
	165	22	1.1	71.6	56.9	2.50	16.4	3 800	4 400	**6924**	126.5	158.5	1	1.41
	180	19	1	79.0	63.3	2.75	16.4	3 600	4 200	**16024**	125	175	1	1.80
	180	28	2	106	79.3	3.60	15.9	3 600	4 200	**6024**	129	171	2	2.07
	215	40	2.1	194	131	6.65	14.4	2 900	3 400	**6224**	131	204	2	5.15
	260	55	3	258	185	12.6	13.5	2 500	3 000	**6324**	133	247	2.5	12.5
130	165	18	1.1	46.1	41.2	1.75	16.1	3 600	4 300	**6826**	136.5	158.5	1	0.939
	180	24	1.5	86.9	67.4	3.00	16.3	3 400	4 100	**6926**	138	172	1.5	1.86
	200	22	1.1	89.1	74.8	3.05	11.2	3 000	3 600	**16026**	136.5	193.5	1	2.69
	200	33	2	133	101	4.45	15.8	3 200	3 800	**6026**	139	191	2	3.16
	230	40	3	209	146	9.15	14.5	2 700	3 200	**6226**	143	217	2.5	5.82
	280	58	4	287	214	14.1	13.6	2 300	2 700	**6326**	146	264	3	15.1
140	175	18	1.1	47.8	44.4	1.85	16.0	3 400	4 000	**6828**	146.5	168.5	1	1.00
	190	24	1.5	89.1	74.8	3.05	16.5	3 200	3 800	**6928**	148	182	1.5	1.98
	210	22	1.1	82.2	71.1	2.80	16.5	2 900	3 400	**16028**	146.5	203.5	1	2.86

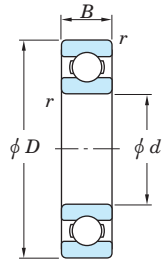
[Remark] Standard cage types used for the above bearings are described earlier in this section.

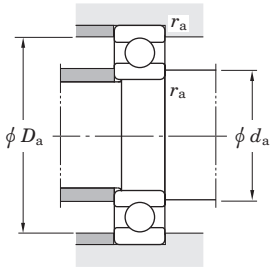
d (140) ~ (190) mm

Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)			(Refer.) Mass (kg)
d	D	B	r min.	C_r	C_{0r}	C_u	f_0	Grease lub.	Oil lub.		d_a min.	D_a max.	r_a max.	
140	210	33	2	137	109	4.55	15.9	3 000	3 600	**6028**	149	201	2	3.55
	250	42	3	208	150	8.65	14.8	2 400	2 900	**6228**	153	237	2.5	7.45
	300	62	4	316	246	15.6	13.6	2 100	2 500	**6328**	156	284	3	19.4
150	190	20	1.1	59.7	54.9	2.20	16.1	3 100	3 700	**6830**	156.5	183.5	1	1.40
	210	28	2	117	94.3	3.75	16.2	2 900	3 400	**6930**	159	201	2	3.05
	225	24	1.1	114	99.3	3.70	16.6	2 700	3 100	**16030**	156.5	218.5	1	3.58
	225	35	2.1	157	126	5.10	16.0	2 800	3 300	**6030**	161	214	2	4.22
	270	45	3	220	168	9.05	15.1	2 200	2 700	**6230**	163	257	2.5	9.41
	320	65	4	343	284	16.6	13.9	1 900	2 300	**6330**	166	304	3	26.2
160	200	20	1.1	60.5	56.9	2.20	16.1	2 900	3 400	**6832**	166.5	193.5	1	1.45
	220	28	2	120	101	3.85	16.4	2 700	3 200	**6932**	169	211	2	3.20
	240	25	1.5	124	108	3.95	16.5	2 600	3 100	**16032**	168	232	1.5	4.25
	240	38	2.1	171	135	5.30	15.9	2 600	3 000	**6032**	171	229	2	5.22
	290	48	3	231	186	9.45	15.4	2 100	2 500	**6232**	173	277	2.5	14.3
	340	68	4	347	286	16.4	13.9	1 800	2 200	**6332**	176	324	3	29.0
170	215	22	1.1	74.8	70.5	2.60	16.1	2 700	3 200	**6834**	176.5	208.5	1	1.90
	230	28	2	124	108	3.95	16.5	2 600	3 100	**6934**	179	221	2	3.35
	260	28	1.5	142	127	4.45	16.5	2 300	2 700	**16034**	178	252	1.5	5.75
	260	42	2.1	201	161	6.20	15.8	2 400	2 800	**6034**	181	249	2	6.80
	310	52	4	265	223	11.1	15.3	1 900	2 300	**6234**	186	294	3	17.5
	360	72	4	408	355	20.5	13.6	1 700	2 000	**6334**	186	344	3	38.6
180	225	22	1.1	75.8	73.1	2.65	16.1	2 600	3 000	**6836**	186.5	218.5	1	2.00
	250	33	2	153	129	4.70	16.3	2 400	2 800	**6936**	189	241	2	4.90
	280	31	2	169	148	5.15	16.4	2 100	2 500	**16036**	189	271	2	7.55
	280	46	2.1	227	194	7.15	15.8	2 200	2 600	**6036**	191	269	2	10.3
	320	52	4	284	241	12.0	15.1	1 800	2 200	**6236**	196	304	3	18.3
	380	75	4	443	407	22.1	13.9	1 600	1 900	**6336**	196	364	3	44.7
190	240	24	1.5	91.4	88.1	3.10	16.1	2 400	2 800	**6838**	198	232	1.5	2.60

Single-row deep groove ball bearings open type

d (190) ~ (260) mm





Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)			(Refer.) Mass
d	D	B	r min.	C_r	C_{0r}	C_u	f_0	Grease lub.	Oil lub.		d_a min.	D_a max.	r_a max.	(kg)
190	260	33	2	158	138	4.85	16.4	2 300	2 700	**6938**	199	251	2	5.20
	290	31	2	173	158	5.20	16.6	2 000	2 400	**16038**	199	281	2	7.85
	290	46	2.1	235	201	7.35	15.8	2 100	2 500	**6038**	201	279	2	10.8
	340	55	4	319	281	13.7	15.0	1 700	2 000	**6238**	206	324	3	23.0
	400	78	5	443	415	21.3	14.1	1 500	1 800	**6338**	210	380	4	51.5
200	250	24	1.5	97.6	93.6	3.20	16.1	2 300	2 700	**6840**	208	242	1.5	2.70
	280	38	2.1	196	168	5.80	16.2	2 100	2 500	**6940**	211	269	2	7.30
	310	34	2	201	180	5.95	16.4	1 900	2 300	**16040**	209	301	2	10.1
	310	51	2.1	272	243	11.3	15.6	1 900	2 300	**6040**	211	299	2	14.0
	360	58	4	336	311	14.4	15.2	1 600	1 900	**6240**	216	344	3	28.2
	420	80	5	513	506	25.5	14.0	1 300	1 600	**6340**	220	400	4	58.0
220	270	24	1.5	101	101	3.35	16.0	2 000	2 400	**6844**	228	262	1.5	3.00
	300	38	2.1	201	180	5.85	16.4	1 900	2 200	**6944**	231	289	2	7.90
	340	37	2.1	225	217	6.65	16.5	1 700	2 000	**16044**	231	329	2	13.2
	340	56	3	294	271	12.0	15.6	1 700	2 000	**6044**	233	327	2.5	18.3
	400	65	4	389	376	16.8	15.1	1 400	1 700	**6244**	236	384	3	37.0
	460	88	5	542	539	26.7	13.8	1 200	1 500	**6344**	240	440	4	71.6
240	300	28	2	135	135	4.25	16.1	1 800	2 100	**6848**	249	291	2	4.50
	320	38	2.1	205	192	5.95	16.5	1 700	2 000	**6948**	251	309	2	8.50
	360	37	2.1	230	228	6.75	16.5	1 600	1 800	**16048**	251	349	2	14.1
	360	56	3	305	296	12.3	15.9	1 600	1 900	**6048**	253	347	2.5	19.7
	440	72	4	424	431	18.2	15.2	1 200	1 500	**6248**	256	424	3	51.0
	500	95	5	587	624	28.2	14.2	1 100	1 300	**6348**	260	480	4	93.3
260	320	28	2	141	146	4.40	16.0	1 700	2 000	**6852**	269	311	2	4.80
	360	46	2.1	266	263	10.2	16.3	1 500	1 800	**6952**	271	349	2	14.4
	400	44	3	295	310	11.5	16.4	1 400	1 600	**16052**	273	387	2.5	21.6
	400	65	4	364	377	15.0	15.8	1 400	1 700	**6052**	276	384	3	29.3
	480	80	5	502	541	22.2	15.1	1 100	1 300	**6252**	280	460	4	68.2

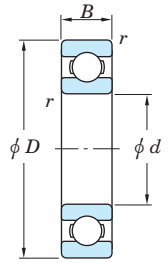
[Remark] Standard cage types used for the above bearings are described earlier in this section.

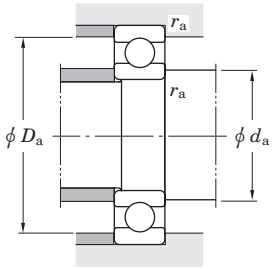
d (260) ~ (360) mm

Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)			(Refer.) Mass
d	D	B	r min.	C_r	C_{0r}	C_u	f_0	Grease lub.	Oil lub.		d_a min.	D_a max.	r_a max.	(kg)
260	540	102	6	663	741	32.4	14.2	990	1 200	**6352**	284	516	5	116
280	350	33	2	179	183	5.35	16.1	1 500	1 800	**6856**	289	341	2	7.40
	380	46	2.1	273	283	10.5	16.5	1 400	1 700	**6956**	291	369	2	15.1
	420	44	3	302	331	11.7	14.7	1 300	1 500	**16056**	293	407	2.5	22.9
	420	65	4	377	408	15.5	16.0	1 300	1 500	**6056**	296	404	3	31.0
	500	80	5	529	599	23.2	15.3	1 000	1 200	**6256**	300	480	4	71.8
	580	108	6	711	845	33.9	14.5	880	1 100	**6356**	304	556	5	145
300	380	38	2.1	224	230	6.45	16.2	1 400	1 600	**6860**	311	369	2	10.5
	420	56	3	345	377	13.7	16.2	1 300	1 500	**6960**	313	407	2.5	24.1
	460	50	4	355	405	14.0	16.4	1 100	1 400	**16060**	316	447	3	32.2
	460	74	4	444	482	18.4	15.6	1 200	1 400	**6060**	316	444	3	44.0
	540	85	5	551	663	23.5	15.6	880	1 100	**6260**	320	520	4	89.5
	620	109	7.5	741	886	35.0	14.4	810	970	**6360**	332	588	6	169
320	400	38	2.1	227	239	6.50	16.1	1 300	1 500	**6864**	331	389	2	11.0
	440	56	3	356	404	14.1	16.4	1 200	1 400	**6964**	333	427	2.5	25.5
	480	50	4	364	432	14.3	16.5	1 100	1 300	**16064**	336	467	3	33.9
	480	74	4	441	487	17.8	15.7	1 100	1 300	**6064**	336	464	3	46.0
	580	92	5	612	745	26.7	15.4	840	1 000	**6264**	340	560	4	113
	670	112	7.5	793	1 010	36.9	14.8	720	870	**6364**	352	638	6	207
340	420	38	2.1	231	249	6.60	16.1	1 200	1 400	**6868**	351	409	2	11.5
	460	56	3	352	407	13.7	16.5	1 100	1 300	**6968**	353	447	2.5	26.8
	520	57	4	419	512	16.8	16.4	980	1 200	**16068**	356	507	3	46.8
	520	82	5	552	661	23.7	15.6	980	1 200	**6068**	360	500	4	61.8
	620	92	6	639	817	27.7	15.6	760	910	**6268**	364	596	5	131
	710	118	7.5	880	1 160	41.7	14.7	660	790	**6368**	372	678	6	238
360	440	38	2.1	240	268	6.95	16.0	1 100	1 300	**6872**	371	429	2	12.0
	480	56	3	362	432	14.0	16.5	1 000	1 200	**6972**	373	467	2.5	28.2
	540	57	4	431	546	17.2	16.5	900	1 100	**16072**	376	527	3	49.0

Single-row deep groove ball bearings open type

d (360) ~ (500) mm





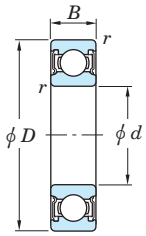
Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)			(Refer.) Mass (kg)
d	D	B	r min.	C_r	C_{0r}	C_u	f_0	Grease lub.	Oil lub.		d_a min.	D_a max.	r_a max.	
360	540	82	5	548	668	23.0	15.7	920	1 100	**6072**	380	520	4	64.7
	650	95	6	696	904	30.4	15.4	700	840	**6272**	384	626	5	144
380	480	46	2.1	305	359	8.95	16.2	980	1 200	**6876**	391	469	2	20.0
	520	65	4	440	552	17.6	16.4	920	1 100	**6976**	396	504	3	40.8
	560	82	5	572	725	24.1	15.9	860	1 000	**6076**	400	540	4	67.6
	680	95	6	730	990	31.9	15.6	650	780	**6276**	404	656	5	162
400	500	46	2.1	311	374	9.10	16.1	920	1 100	**6880**	411	489	2	20.5
	540	65	4	453	588	18.1	16.5	860	1 000	**6980**	416	524	3	42.7
	600	63	5	447	587	17.5	16.5	780	920	**16080**	420	580	4	65.0
	600	90	5	635	824	27.0	15.7	780	920	**6080**	420	580	4	87.7
	720	103	6	785	1 080	34.2	15.5	590	710	**6280**	424	696	5	197
420	520	46	2.1	316	389	9.25	16.1	860	1 000	**6884**	431	509	2	21.5
	560	65	4	449	588	17.7	16.5	810	950	**6984**	436	544	3	43.5
	620	63	5	459	617	18.0	16.4	740	870	**16084**	440	600	4	69.9
	620	90	5	663	894	28.3	15.8	740	870	**6084**	440	600	4	91.2
440	540	46	2.1	321	404	9.40	16.0	810	950	**6888**	451	529	2	22.5
	600	74	4	529	676	21.4	16.4	740	870	**6988**	456	584	3	61.3
	650	67	5	508	710	20.2	16.5	680	810	**16088**	460	630	4	81.7
460	580	56	3	393	517	11.7	16.2	740	870	**6892**	473	567	2.5	35.0
	620	74	4	509	711	20.3	16.5	690	820	**6992**	476	604	3	61.7
	680	71	5	539	767	21.4	16.5	630	750	**16092**	480	660	4	91.2
480	600	56	3	401	539	12.0	16.1	690	820	**6896**	493	587	2.5	36.5
	650	78	5	540	768	21.5	16.5	640	760	**6996**	500	630	4	72.5
	700	71	5	554	807	22.1	16.5	600	710	**16096**	500	680	4	98.5
500	620	56	3	409	561	12.2	16.1	650	770	**68/500**	513	607	2.5	37.5
	670	78	5	556	807	22.2	16.5	610	720	**69/500**	520	650	4	75.2

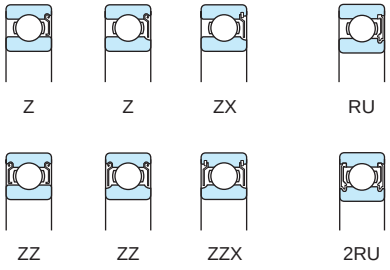
[Remark] Standard cage types used for the above bearings are described earlier in this section.

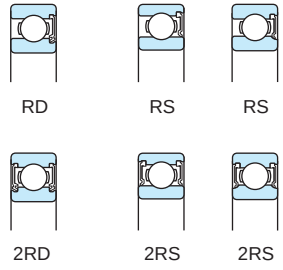
d (500) mm

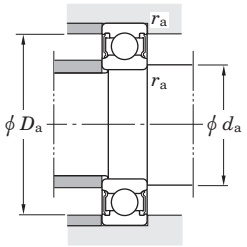
Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)			(Refer.) Mass (kg)
d	D	B	r min.	C_r	C_{0r}	C_u	f_0	Grease lub.	Oil lub.		d_a min.	D_a max.	r_a max.	
500	720	71	5	568	846	22.7	16.4	560	660	**160/500**	520	700	4	102
	720	100	6	749	1 100	31.3	16.0	570	670	**60/500**	524	696	5	128

Single-row deep groove ball bearings
shielded type
sealed type
d 10 ~ (20) mm





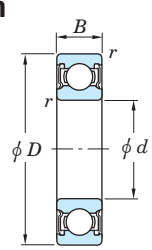


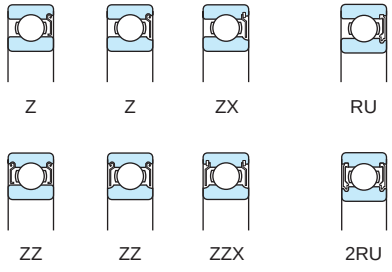


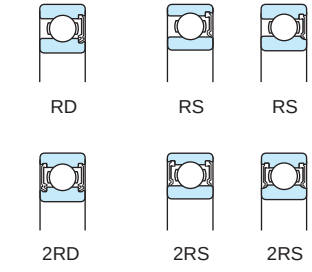
Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1}) Grease lub.			Oil lub.	Bearing No.				Mounting dimensions. (mm)				(Refer.) Mass
d	D	B	r min.	C_r	C_{0r}	C_u	f_0	Z, ZZ RU, 2RU	(RD, 2RD)	(RS, 2RS)	(Z)	Shielded	Non-contact sealed	Extremely light contact sealed	Contact sealed	d_a min.	d_a max.	D_a max.	r_a max.	Open type (kg)
10	19	5	0.3	2.15	0.840	0.030	14.8	37 000	—	22 000	43 000	**6800 ZZ**	**6800 2RU**	—	**6800 2RS**	12	12	17	0.3	0.005
	22	6	0.3	3.35	1.25	0.070	14.0	34 000	—	21 000	41 000	**6900 ZZ**	**6900 2RU**	—	**6900 2RS**	12	12.5	20	0.3	0.010
	26	8	0.3	5.70	1.95	0.100	12.3	31 000	28 000	19 000	36 000	**6000 ZZ**	**6000 2RU**	**6000 2RD**	**6000 2RS**	12	13	24	0.3	0.019
	30	9	0.6	6.40	2.40	0.120	13.2	24 000	22 000	16 000	29 000	**6200 ZZ**	**6200 2RU**	**6200 2RD**	**6200 2RS**	14	15	26	0.6	0.032
	35	11	0.6	10.1	3.45	0.270	11.2	22 000	20 000	16 000	27 000	**6300 ZZ**	**6300 2RU**	**6300 2RD**	**6300 2RS**	14	16	31	0.6	0.053
12	18	4	0.2	1.15	0.530	0.023	16.2	34 000	—	20 000	41 000	**6701 ZZX**	**6701 2RU**	—	**6701 2RS**	13.6	—	16.4	0.2	0.003
	21	5	0.3	2.40	1.05	0.040	15.3	33 000	30 000	20 000	39 000	**6801 ZZ**	**6801 2RU**	**6801 2RD**	**6801 2RS**	14	14	19	0.3	0.006
	24	6	0.3	3.60	1.45	0.080	14.5	31 000	28 000	18 000	36 000	**6901 ZZ**	**6901 2RU**	**6901 2RD**	**6901 2RS**	14	14	22	0.3	0.011
	28	8	0.3	6.40	2.40	0.120	13.2	27 000	24 000	17 000	32 000	**6001 ZZ**	**6001 2RU**	**6001 2RD**	**6001 2RS**	14	15	26	0.3	0.022
	32	10	0.6	8.50	3.05	0.240	12.3	22 000	20 000	15 000	27 000	**6201 ZZ**	**6201 2RU**	**6201 2RD**	**6201 2RS**	16	16.5	28	0.6	0.037
	37	12	1	12.1	4.20	0.420	11.1	20 000	18 000	15 000	25 000	**6301 ZZ**	**6301 2RU**	**6301 2RD**	**6301 2RS**	17	17.5	32	1	0.060
15	21	4	0.2	1.15	0.580	0.024	16.7	29 000	—	16 000	35 000	**6702 ZZX**	**6702 2RU**	—	**6702 2RS**	16.6	—	19.4	0.2	0.004
	24	5	0.3	2.60	1.25	0.050	15.8	28 000	—	16 000	33 000	**6802 ZZ**	**6802 2RU**	—	**6802 2RS**	17	17	22	0.3	0.007
	28	7	0.3	5.40	2.25	0.120	14.3	26 000	23 000	15 000	30 000	**6902 ZZ**	**6902 2RU**	**6902 2RD**	**6902 2RS**	17	18	26	0.3	0.017
	32	9	0.3	7.00	2.85	0.150	13.9	23 000	21 000	14 000	27 000	**6002 ZZ**	**6002 2RU**	**6002 2RD**	**6002 2RS**	17	18.5	30	0.3	0.030
	35	11	0.6	9.55	3.75	0.290	13.2	20 000	18 000	13 000	24 000	**6202 ZZ**	**6202 2RU**	**6202 2RD**	**6202 2RS**	19	19.5	31	0.6	0.045
	42	13	1	14.3	5.45	0.460	12.3	17 000	15 000	12 000	20 000	**6302 ZZ**	**6302 2RU**	**6302 2RD**	**6302 2RS**	20	21.5	37	1	0.082
17	23	4	0.2	1.25	0.660	0.027	16.9	27 000	—	15 000	32 000	**6703 ZZ**	**6703 2RU**	—	**6703 2RS**	18.6	—	21.4	0.2	0.005
	26	5	0.3	3.30	1.55	0.060	15.7	26 000	—	14 000	30 000	**6803 ZZ**	**6803 2RU**	—	**6803 2RS**	19	19	24	0.3	0.008
	30	7	0.3	5.75	2.55	0.130	14.7	23 000	21 000	13 000	28 000	**6903 ZZ**	**6903 2RU**	**6903 2RD**	**6903 2RS**	19	19.5	28	0.3	0.018
	35	10	0.3	7.50	3.25	0.170	14.4	21 000	19 000	12 000	25 000	**6003 ZZ**	**6003 2RU**	**6003 2RD**	**6003 2RS**	19	21	33	0.3	0.039
	40	12	0.6	12.0	4.80	0.370	13.2	17 000	15 000	12 000	21 000	**6203 ZZ**	**6203 2RU**	**6203 2RD**	**6203 2RS**	21	22	36	0.6	0.065
	47	14	1	17.0	6.65	0.550	12.4	15 000	14 000	10 000	18 000	**6303 ZZ**	**6303 2RU**	**6303 2RD**	**6303 2RS**	22	24.3	42	1	0.115
20	27	4	0.2	1.30	0.730	0.030	16.1	23 000	—	12 000	27 000	**6704 ZZ**	**6704 2RU**	—	**6704 2RS**	21.6	—	25.4	0.2	0.006
	32	7	0.3	5.00	2.45	0.100	15.5	21 000	—	12 000	25 000	**6804 ZZ**	**6804 2RU**	—	**6804 2RS**	22	22.5	30	0.3	0.018
	37	9	0.3	7.95	3.70	0.190	14.7	19 000	17 000	11 000	23 000	**6904 ZZ**	**6904 2RU**	**6904 2RD**	**6904 2RS**	22	23.5	35	0.3	0.036
	42	12	0.6	11.7	5.05	0.350	13.9	17 000	15 000	10 000	21 000	**6004 ZZ**	**6004 2RU**	**6004 2RD**	**6004 2RS**	24	25	38	0.6	0.069
	47	14	1	16.0	6.65	0.510	13.2	15 000	14 000	9 700	17 000	**6204 ZZ**	**6204 2RU**	**6204 2RD**	**6204 2RS**	25	26.5	42	1	0.106

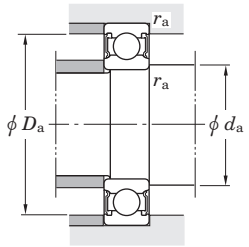
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Single-row deep groove ball bearings
shielded type
sealed type
d (20) ~ 35 mm





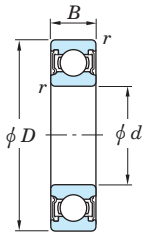


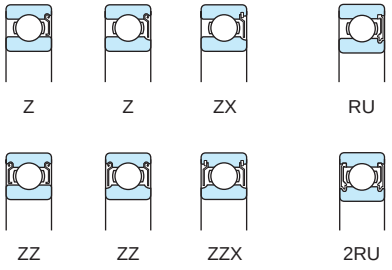


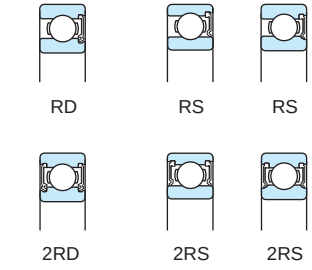
Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1}) Grease lub.			Oil lub.	Bearing No.				Mounting dimensions. (mm)				(Refer.) Mass
d	D	B	r min.	C_r	C_{0r}	C_u	f_0	Z, ZZ RU, 2RU	(RD, 2RD)	(RS, 2RS)	(Z)	Shielded	Non-contact sealed	Extremely light contact sealed	Contact sealed	d_a min.	d_a max.	D_a max.	r_a max.	Open type (kg)
20	52	15	1.1	19.9	7.85	0.660	12.3	14 000	13 000	9 500	17 000	**6304 ZZ**	**6304 2RU**	**6304 2RD**	**6304 2RS**	26.5	27	45.5	1	0.144
22	44	12	0.6	11.7	5.15	0.350	14.1	17 000	15 000	9 900	20 000	**60/22 ZZ**	**60/22 2RU**	**60/22 2RD**	**60/22 2RS**	26	26.5	40	0.6	0.073
	50	14	1	16.0	6.65	0.510	13.2	15 000	14 000	9 700	17 000	**62/22 ZZ**	**62/22 2RU**	**62/22 2RD**	**62/22 2RS**	27	27	45	1	0.118
	56	16	1.1	23.1	9.40	0.770	12.6	13 000	12 000	8 600	15 000	**63/22 ZZ**	**63/22 2RU**	**63/22 2RD**	**63/22 2RS**	28.5	29	49.5	1	0.201
25	32	4	0.2	1.35	0.840	0.035	15.8	19 000	—	10 000	22 000	**6705 ZZ**	**6705 2RU**	—	**6705 2RS**	26.6	—	30.4	0.2	0.006
	37	7	0.3	5.40	2.95	0.120	16.0	18 000	—	10 000	21 000	**6805 ZZ**	**6805 2RU**	—	**6805 2RS**	27	27.5	35	0.3	0.022
	42	9	0.3	8.75	4.55	0.230	15.4	16 000	14 000	9 300	19 000	**6905 ZZ**	**6905 2RU**	**6905 2RD**	**6905 2RS**	27	29	40	0.3	0.041
	47	12	0.6	12.6	5.85	0.380	14.5	15 000	14 000	9 000	18 000	**6005 ZZ**	**6005 2RU**	**6005 2RD**	**6005 2RS**	29	29.5	43	0.6	0.080
	52	15	1	17.5	7.85	0.550	13.9	13 000	12 000	8 400	15 000	**6205 ZZ**	**6205 2RU**	**6205 2RD**	**6205 2RS**	30	31.5	47	1	0.128
	62	17	1.1	25.7	11.3	0.860	13.2	11 000	9 900	7 500	13 000	**6305 ZZ**	**6305 2RU**	**6305 2RD**	**6305 2RS**	31.5	34	55.5	1	0.232
28	52	12	0.6	15.6	7.40	0.480	14.5	14 000	13 000	8 100	16 000	**60/28 ZZ**	**60/28 2RU**	**60/28 2RD**	**60/28 2RS1**	32	33	48	0.6	0.097
	58	16	1	22.4	9.75	0.720	13.4	12 000	11 000	7 600	14 000	**62/28 ZZ**	**62/28 2RU**	**62/28 2RD**	**62/28 2RS**	33	35	53	1	0.173
	68	18	1.1	29.4	13.1	0.990	13.3	10 000	9 000	6 900	12 000	**63/28 ZZ**	**63/28 2RU**	**63/28 2RD**	**63/28 2RS**	34.5	37.5	61.5	1	0.328
30	37	4	0.2	1.45	0.950	0.040	15.7	16 000	—	8 800	19 000	**6706 ZZ**	**6706 2RU**	—	**6706 2RS**	31.6	—	35.4	0.2	0.008
	42	7	0.3	5.65	3.40	0.140	16.4	15 000	—	8 600	18 000	**6806 ZZ**	**6806 2RU**	—	**6806 2RS**	32	32.5	40	0.3	0.026
	47	9	0.3	9.05	5.00	0.260	15.8	14 000	13 000	8 200	17 000	**6906 ZZ**	**6906 2RU**	**6906 2RD**	**6906 2RS**	32	33	45	0.3	0.045
	55	13	1	16.5	8.25	0.530	14.7	13 000	12 000	7 500	15 000	**6006 ZZ**	**6006 2RU**	**6006 2RD**	**6006 2RS**	35	36	50	1	0.116
	62	16	1	24.3	11.3	0.800	13.9	11 000	9 900	7 000	13 000	**6206 ZZ**	**6206 2RU**	**6206 2RD**	**6206 2RS**	35	37.5	57	1	0.199
	72	19	1.1	33.3	15.0	1.15	13.3	9 600	8 600	6 400	12 000	**6306 ZZ**	**6306 2RU**	**6306 2RD**	**6306 2RS**	36.5	40	65.5	1	0.346
32	58	13	1	18.8	9.15	0.600	14.5	12 000	11 000	7 200	14 000	**60/32 ZZ**	**60/32 2RU**	**60/32 2RD**	**60/32 2RS**	37	38	53	1	0.127
	65	17	1	29.4	13.1	0.990	13.3	10 000	9 000	6 900	12 000	**62/32 ZZ**	**62/32 2RU**	**62/32 2RD**	**62/32 2RS**	37	38.5	60	1	0.228
	75	20	1.1	37.6	16.2	1.30	12.7	9 300	8 400	6 400	11 000	**63/32 ZZ**	**63/32 2RU**	**63/32 2RD**	**63/32 2RS**	38.5	41	68.5	1	0.437
35	47	7	0.3	5.95	3.85	0.160	16.5	13 000	—	7 400	16 000	**6807 ZZ**	**6807 2RU**	—	**6807 2RS**	37	37.5	45	0.3	0.030
	55	10	0.6	13.6	7.75	0.440	15.7	12 000	11 000	6 800	14 000	**6907 ZZ**	**6907 2RU**	**6907 2RD**	**6907 2RS**	39	40	51	0.6	0.073
	62	14	1	19.9	10.3	0.640	14.9	11 000	9 900	6 500	13 000	**6007 ZZ**	**6007 2RU**	**6007 2RD**	**6007 2RS**	40	42	58	1	0.155
	72	17	1.1	32.1	15.4	1.10	13.9	9 200	8 300	6 000	11 000	**6207 ZZ**	**6207 2RU**	**6207 2RD**	**6207 2RS**	41.5	43.5	65.5	1	0.288
	80	21	1.5	41.7	19.3	1.45	13.2	8 500	7 700	5 700	10 000	**6307 ZZ**	**6307 2RU**	**6307 2RD**	**6307 2RS**	43	46	72	1.5	0.457

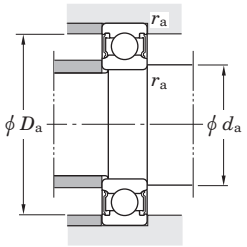
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Single-row deep groove ball bearings
shielded type
sealed type
d 40 ~ (65) mm





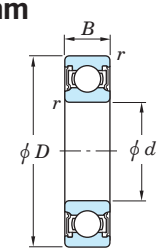


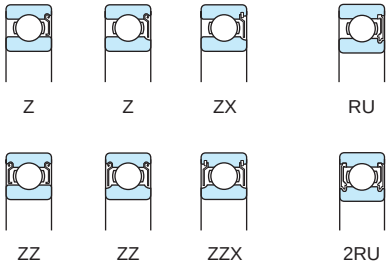


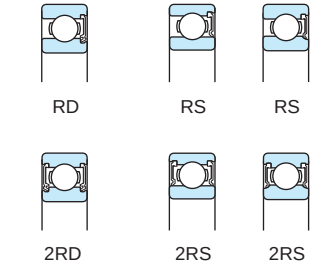
Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1}) Grease lub.			Oil lub.	Bearing No.				Mounting dimensions. (mm)				(Refer.) Mass
d	D	B	r min.	C_r	C_{0r}	C_u	f_0	Z, ZZ RU, 2RU	(RD, 2RD)	(RS, 2RS)	(Z)	Shielded	Non-contact sealed	Extremely light contact sealed	Contact sealed	d_a min.	d_a max.	D_a max.	r_a max.	Open type (kg)
40	52	7	0.3	6.15	4.20	0.180	16.3	12 000	11 000	6 700	14 000	**6808 ZZ**	**6808 2RU**	**6808 2RD**	**6808 2RS**	42	42	50	0.3	0.033
	62	12	0.6	17.1	9.95	0.570	15.6	11 000	9 900	6 100	13 000	**6908 ZZ**	**6908 2RU**	**6908 2RD**	**6908 2RS**	44	44.5	58	0.6	0.112
	68	15	1	20.9	11.5	0.690	15.2	10 000	9 000	5 800	12 000	**6008 ZZ**	**6008 2RU**	**6008 2RD**	**6008 2RS**	45	46.5	63	1	0.192
	80	18	1.1	36.4	17.8	1.25	14.0	8 300	7 500	5 400	10 000	**6208 ZZ**	**6208 2RU**	**6208 2RD**	**6208 2RS**	46.5	49	73.5	1	0.366
	90	23	1.5	50.9	24.0	1.85	13.2	7 700	6 900	5 100	9 200	**6308 ZZ**	**6308 2RU**	**6308 2RD**	**6308 2RS**	48	51.5	82	1.5	0.633
45	58	7	0.3	7.75	5.40	0.230	16.3	11 000	9 900	5 900	13 000	**6809 ZZ**	**6809 2RU**	**6809 2RD**	**6809 2RS**	47	47	56	0.3	0.040
	68	12	0.6	17.7	10.9	0.600	15.9	9 700	8 700	5 500	11 000	**6909 ZZ**	**6909 2RU**	**6909 2RD**	**6909 2RS**	49	50	64	0.6	0.132
	75	16	1	26.2	15.1	0.900	15.3	9 200	8 300	5 300	11 000	**6009 ZZ**	**6009 2RU**	**6009 2RD**	**6009 2RS**	50	51.5	70	1	0.245
	85	19	1.1	40.9	20.3	1.40	14.0	7 700	6 900	5 100	9 200	**6209 ZZ**	**6209 2RU**	**6209 2RD**	**6209 2RS**	51.5	53.5	78.5	1	0.407
	100	25	1.5	61.1	29.5	2.25	13.3	6 800	6 100	4 500	8 100	**6309 ZZ**	**6309 2RU**	**6309 2RD**	**6309 2RS**	53	59.5	92	1.5	0.833
50	65	7	0.3	8.20	6.10	0.260	16.1	9 600	8 600	5 200	11 000	**6810 ZZ**	**6810 2RU**	**6810 2RD**	**6810 2RS**	52	53	63	0.3	0.052
	72	12	0.6	18.2	11.7	0.640	16.1	9 000	—	5 000	11 000	**6910 ZZ**	**6910 2RU**	—	—	54	55.5	68	0.6	0.133
	80	16	1	27.3	16.6	0.960	15.6	8 400	7 600	4 800	9 900	**6010 ZZ**	**6010 2RU**	**6010 2RD**	**6010 2RS**	55	57	75	1	0.261
	90	20	1.1	43.9	23.3	1.55	14.4	7 100	6 400	4 600	8 500	**6210 ZZ**	**6210 2RU**	**6210 2RD**	**6210 2RS**	56.5	59	83.5	1	0.463
	110	27	2	77.5	38.3	2.90	13.2	6 100	5 500	4 100	7 300	**6310 ZZ**	**6310 2RU**	**6310 2RD**	**6310 2RS**	59	66.5	101	2	1.07
55	72	9	0.3	11.0	8.10	0.420	16.2	8 700	7 800	—	10 000	**6811 ZZ**	**6811 2RU**	**6811 2RD**	—	57	58.5	70	0.3	0.083
	80	13	1	20.8	14.1	0.760	16.2	8 100	7 300	4 500	9 600	**6911 ZZ**	**6911 2RU**	**6911 2RD**	**6911 2RS**	60	60.5	75	1	0.185
	90	18	1.1	35.3	21.2	1.25	15.3	7 600	6 800	4 300	8 900	**6011 ZZ**	**6011 2RU**	**6011 2RD**	**6011 2RS**	61.5	62	83.5	1	0.385
	100	21	1.5	54.2	29.4	1.95	14.4	6 300	5 700	4 100	7 600	**6211 ZZ**	**6211 2RU**	**6211 2RD**	**6211 2RS**	63	66	92	1.5	0.607
	120	29	2	89.5	45.0	3.45	13.2	5 600	—	3 700	6 700	**6311 ZZ**	**6311 2RU**	—	**6311 2RS**	64	74.5	111	2	1.37
60	78	10	0.3	14.3	10.6	0.550	16.3	8 000	7 200	—	9 400	**6812 ZZ**	**6812 2RU**	**6812 2RD**	—	62	63	76	0.3	0.104
	85	13	1	25.2	17.3	0.940	16.2	7 500	—	—	8 900	**6912 ZZ**	**6912 2RU**	—	—	65	66	80	1	0.192
	95	18	1.1	36.8	23.2	1.35	15.6	7 100	—	4 000	8 400	**6012 ZZ**	**6012 2RU**	—	**6012 2RS**	66.5	68.5	88.5	1	0.415
	110	22	1.5	65.6	36.2	2.40	14.4	5 700	5 100	3 700	6 900	**6212 ZZ**	**6212 2RU**	**6212 2RD**	**6212 2RS**	68	72.5	102	1.5	0.783
	130	31	2.1	102	52.2	3.95	13.2	5 200	—	3 500	6 200	**6312 ZZ**	**6312 2RU**	—	**6312 2RS**	71	80	119	2	1.70
65	85	10	0.6	14.9	11.5	0.590	16.2	7 300	6 600	—	8 600	**6813 ZZ**	**6813 2RU**	**6813 2RD**	—	69	69	81	0.6	0.126
	90	13	1	21.7	16.1	0.830	16.6	7 100	6 400	3 900	8 400	**6913 ZZ**	**6913 2RU**	**6913 2RD**	**6913 2RS**	70	71	85	1	0.211

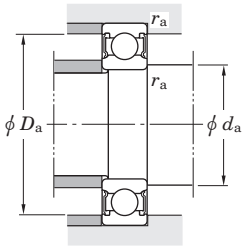
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Single-row deep groove ball bearings
shielded type
sealed type
d (65) ~ (90) mm





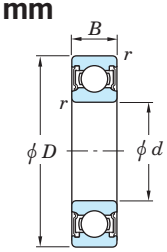


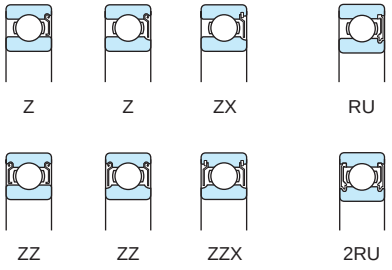


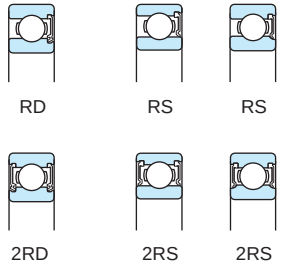
Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1}) Grease lub.			Oil lub.	Bearing No.				Mounting dimensions. (mm)				(Refer.) Mass
d	D	B	r min.	C_r	C_{0r}	C_u	f_0	Z, ZZ RU, 2RU	(RD, 2RD)	(RS, 2RS)	(Z)	Shielded	Non-contact sealed	Extremely light contact sealed	Contact sealed	d_a min.	d_a max.	D_a max.	r_a max.	Open type (kg)
65	100	18	1.1	38.1	25.2	1.40	15.8	6 600	—	3 700	7 800	**6013 ZZ**	**6013 2RU**	—	**6013 2RS**	71.5	74.5	93.5	1	0.435
	120	23	1.5	71.5	40.1	2.65	14.4	5 400	—	3 500	6 400	**6213 ZZ**	**6213 2RU**	—	**6213 2RS**	73	79	112	1.5	0.990
	140	33	2.1	116	59.9	4.50	13.2	4 800	—	3 200	5 800	**6313 ZZ**	**6313 2RU**	—	**6313 2RS**	76	86	129	2	2.08
70	90	10	0.6	15.1	11.9	0.620	16.1	6 800	6 100	—	8 100	**6814 ZZ**	**6814 2RU**	**6814 2RD**	—	74	74	86	0.6	0.134
	100	16	1	29.7	21.2	1.10	16.3	6 400	5 800	3 600	7 600	**6914 ZZ**	**6914 2RU**	**6914 2RD**	**6914 2RS**	75	76.5	95	1	0.342
	110	20	1.1	47.6	30.9	1.80	15.6	6 100	—	3 500	7 200	**6014 ZZ**	**6014 2RU**	—	**6014 2RS**	76.5	79.5	103.5	1	0.602
	125	24	1.5	77.8	44.1	2.90	14.5	5 100	—	3 300	6 100	**6214 ZZ**	**6214 2RU**	—	**6214 2RS**	78	84	117	1.5	1.07
	150	35	2.1	130	68.2	4.95	13.2	4 500	—	3 000	5 400	**6314 ZZ**	**6314 2RU**	—	**6314 2RS**	81	92	139	2	2.52
75	95	10	0.6	15.7	12.9	0.660	16.0	6 400	5 800	—	7 600	**6815 ZZ**	**6815 2RU**	**6815 2RD**	—	79	79	91	0.6	0.142
	105	16	1	30.5	22.6	1.20	16.5	6 100	—	—	7 200	**6915 ZZ**	**6915 2RU**	—	—	80	82.5	100	1	0.363
	115	20	1.1	49.4	33.5	1.90	15.8	5 700	—	3 300	6 800	**6015 ZZ**	**6015 2RU**	—	**6015 2RS**	81.5	84.5	108.5	1	0.638
	130	25	1.5	84.3	48.3	3.10	14.5	4 800	—	3 100	5 800	**6215 ZZ**	**6215 2RU**	—	**6215 2RS**	83	88.5	122	1.5	1.18
	160	37	2.1	142	77.2	5.40	13.2	4 200	—	2 800	5 000	**6315 ZZ**	**6315 2RU**	—	**6315 2RS**	86	97.5	149	2	3.02
80	100	10	0.6	15.9	13.3	0.690	16.0	6 100	5 500	—	7 200	**6816 ZZ**	**6816 2RU**	**6816 2RD**	—	84	84	96	0.6	0.150
	110	16	1	31.2	24.0	1.25	16.6	5 700	5 100	3 200	6 800	**6916 ZZ**	**6916 2RU**	**6916 2RD**	**6916 2RS**	85	86.5	105	1	0.382
	125	22	1.1	59.5	39.8	2.25	15.6	5 300	—	3 100	6 300	**6016 ZZ**	**6016 2RU**	—	**6016 2RS**	86.5	90	118.5	1	0.850
	140	26	2	90.9	53.0	3.25	14.6	4 500	—	2 900	5 400	**6216 ZZ**	**6216 2RU**	—	**6216 2RS**	89	93	131	2	1.40
	170	39	2.1	154	86.7	5.85	13.3	3 900	—	2 700	4 700	**6316 ZZ**	**6316 2RU**	—	**6316 2RS**	91	105	159	2	3.59
85	110	13	1	23.4	19.0	0.980	16.2	5 600	5 000	—	6 600	**6817 ZZ**	**6817 2RU**	**6817 2RD**	—	90	90.5	105	1	0.266
	120	18	1.1	39.9	29.6	1.55	16.4	5 300	4 800	3 000	6 300	**6917 ZZ**	**6917 2RU**	**6917 2RD**	**6917 2RS**	91.5	92.5	113.5	1	0.535
	130	22	1.1	61.8	43.1	2.35	15.8	5 000	—	2 900	5 900	**6017 ZZ**	**6017 2RU**	—	**6017 2RS**	91.5	96.5	123.5	1	0.890
	150	28	2	105	61.9	3.70	14.5	4 200	—	2 700	5 000	**6217 ZZ**	**6217 2RU**	—	**6217 2RS**	94	102	141	2	1.79
	180	41	3	166	96.8	6.35	13.3	3 700	—	2 500	4 400	**6317 ZZX**	**6317 2RU**	—	**6317 2RS**	98	111	167	2.5	4.23
90	115	13	1	23.8	19.7	1.00	16.1	5 300	4 800	—	6 300	**6818 ZZ**	**6818 2RU**	**6818 2RD**	—	95	95.5	110	1	0.279
	125	18	1.1	41.0	31.6	1.60	16.5	5 100	4 600	2 800	6 000	**6918 ZZ**	**6918 2RU**	**6918 2RD**	**6918 2RS**	96.5	97.5	118.5	1	0.565
	140	24	1.5	72.8	49.7	2.65	15.6	4 700	—	2 700	5 600	**6018 ZZ**	**6018 2RU**	—	**6018 2RS**	98	100.5	132	1.5	1.16
	160	30	2	120	71.5	4.20	14.5	3 900	—	2 600	4 700	**6218 ZZ**	**6218 2RU**	—	**6218 2RS**	99	108.5	151	2	2.15

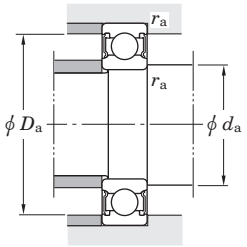
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Single-row deep groove ball bearings
shielded type
sealed type
d (90) ~ (130) mm





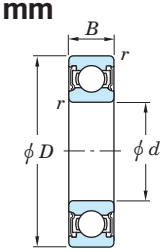


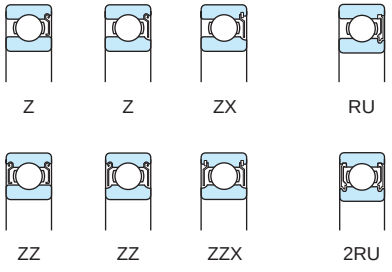


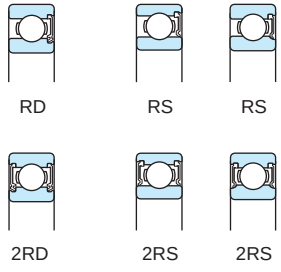
Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1}) Grease lub.			Oil lub.	Bearing No.				Mounting dimensions. (mm)				(Refer.) Mass
d	D	B	r min.	C_r	C_{0r}	C_u	f_0	Z, ZZ RU, 2RU	(RD, 2RD)	(RS, 2RS)	(Z)	Shielded	Non-contact sealed	Extremely light contact sealed	Contact sealed	d_a min.	d_a max.	D_a max.	r_a max.	Open type (kg)
90	190	43	3	178	107	8.80	13.3	3 500	—	2 400	4 200	**6318 ZZX**	**6318 2RU**	—	**6318 2RS**	103	117	177	2.5	4.91
95	130	18	1.1	42.1	33.5	1.65	16.6	4 800	4 300	2 700	5 700	**6919 ZZ**	**6919 2RU**	**6919 2RD**	**6919 2RS**	101.5	102	123.5	1	0.705
	145	24	1.5	75.5	53.9	2.75	15.8	4 400	—	2 500	5 200	**6019 ZZX**	**6019 2RU**	—	**6019 2RS**	103	107.5	137	1.5	1.21
	170	32	2.1	136	81.9	4.65	14.4	3 700	—	2 400	4 400	**6219 ZZX**	**6219 2RU**	—	**6219 2RS**	106	113	159	2	2.62
	200	45	3	191	119	9.45	13.3	3 300	—	2 200	4 000	**6319 ZZX**	**6319 2RU**	—	**6319 2RS**	108	122	187	2.5	5.67
100	125	13	1	24.5	21.2	1.05	16.0	4 800	4 300	—	5 700	**6820 ZZ**	**6820 2RU**	**6820 2RD**	—	105	105.5	120	1	0.309
	140	20	1.1	51.5	39.6	1.90	16.2	4 500	—	—	5 300	**6920-1 ZZ**	**6920-1 2RU**	—	—	106.5	110.5	133.5	1	0.960
	150	24	1.5	75.2	54.2	2.70	15.9	4 300	—	2 500	5 100	**6020 ZZ**	**6020 2RU**	—	**6020 2RS**	108	112	142	1.5	1.25
	180	34	2.1	153	93.1	5.15	14.4	3 500	—	2 300	4 200	**6220 ZZX**	**6220 2RU**	—	**6220 2RS**	111	122	169	2	3.14
	215	47	3	216	141	10.9	13.2	3 000	—	2 100	3 600	**6320 ZZX**	**6320 2RU**	—	**6320 2RS**	113	131	202	2.5	7.00
105	145	20	1.1	53.0	42.1	1.95	16.4	4 300	—	2 400	5 100	**6921-1 ZZ**	**6921-1 2RU**	—	**6921-1 2RS**	111.5	115	138.5	1	1.00
	160	26	2	90.4	65.8	3.20	15.8	4 000	—	2 300	4 700	**6021 ZZX**	**6021 2RU**	—	**6021 2RS**	114	119	151	2	1.59
	190	36	2.1	166	105	5.70	14.4	3 300	—	2 200	3 900	**6221 ZZX**	**6221 2RU**	—	**6221 2RS**	116	127	179	2	3.70
	225	49	3	230	153	11.7	13.2	2 900	—	2 000	3 500	**6321 ZZX**	**6321 2RU**	—	**6321 2RS**	118	136	212	2.5	8.05
110	140	16	1	35.1	30.7	1.40	16.1	4 300	3 900	—	5 100	**6822 ZZ**	**6822 2RU**	**6822 2RD**	—	115	116.5	135	1	0.606
	150	20	1.1	59.9	47.8	2.20	16.4	4 100	—	—	4 900	**6922 ZZ**	**6922 2RU**	—	—	116.5	119.5	143.5	1	1.04
	170	28	2	103	73.0	3.55	15.6	3 800	—	2 200	4 500	**6022 ZZX**	**6022 2RU**	—	**6022 2RS**	119	123	161	2	1.96
	200	38	2.1	180	117	6.20	14.4	3 100	—	2 000	3 700	**6222 ZZX**	**6222 2RU**	—	**6222 2RS**	121	136.5	189	2	4.36
	240	50	3	257	180	13.3	13.2	2 700	—	1 900	3 200	**6322 ZZX**	**6322 2RU**	—	**6322 2RS**	123	146.5	227	2.5	9.54
120	150	16	1	36.2	33.0	1.45	16.0	4 000	—	—	4 700	**6824 ZZ**	**6824 2RU**	—	—	125	128.5	145	1	0.655
	165	22	1.1	71.6	56.9	2.50	16.4	3 800	—	—	4 400	**6924 ZZ**	**6924 2RU**	—	—	126.5	131.5	158.5	1	1.41
	180	28	2	106	79.3	3.60	15.9	3 600	—	2 100	4 200	**6024 ZZX**	**6024 2RU**	—	**6024 2RS**	129	136	171	2	2.07
	215	40	2.1	194	131	6.65	14.4	2 900	—	1 900	3 400	**6224 ZZX**	**6224 2RU**	—	**6224 2RS**	131	144	204	2	5.15
	260	55	3	258	185	12.6	13.5	2 500	—	—	3 000	**6324 ZZX**	—	—	—	133	158	247	2.5	12.5
130	165	18	1.1	46.1	41.2	1.75	16.1	3 600	—	—	4 300	**6826 ZZ**	**6826 2RU**	—	—	136.5	139.5	158.5	1	0.939
	180	24	1.5	81.5	67.4	2.85	16.3	3 400	—	—	4 100	**6926-1 ZZ**	**6926-1 2RU**	—	—	138	144	172	1.5	1.86

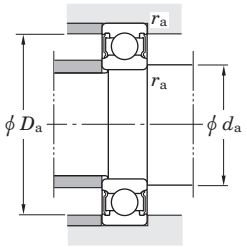
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Single-row deep groove ball bearings
shielded type
sealed type
d (130) ~ 220 mm







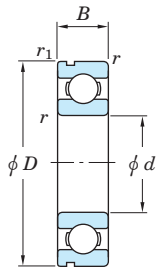


Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1}) Grease lub.			Oil lub.	Bearing No.				Mounting dimensions. (mm)				(Refer.) Mass
d	D	B	r min.	C_r	C_{0r}	C_u	f_0	Z, ZZ RU, 2RU	(RD, 2RD)	(RS, 2RS)	(Z)	Shielded	Non-contact sealed	Extremely light contact sealed	Contact sealed	d_a min.	d_a max.	D_a max.	r_a max.	Open type (kg)
130	200	33	2	133	101	4.45	15.8	3 200	—	1 900	3 800	**6026 ZZX**	**6026 2RU**	—	**6026 2RS**	139	146.5	191	2	3.16
	230	40	3	209	146	9.15	14.5	2 700	—	1 800	3 200	**6226 ZZX**	**6226 2RU**	—	**6226 2RS**	143	157	217	2.5	5.82
	280	58	4	287	214	14.1	13.6	2 300	—	—	2 700	**6326 ZZX**	—	—	—	146	171	264	3	15.1
140	175	18	1.1	47.8	44.4	1.85	16.0	3 400	3 100	—	4 000	**6828 ZZ**	—	**6828 2RD**	—	146.5	148	168.5	1	1.00
	190	24	1.5	83.3	71.6	2.90	16.5	3 200	—	—	3 800	**6928-1 ZZ**	**6928-1 2RU**	—	—	148	153	182	1.5	1.98
	210	33	2	137	109	4.55	15.9	3 000	—	1 800	3 600	**6028 ZZX**	**6028 2RU**	—	**6028 2RS**	149	158.5	201	2	3.55
	250	42	3	208	150	8.65	14.8	2 400	—	1 600	2 900	**6228 ZZX**	**6228 2RU**	—	**6228 2RS**	153	169	237	2.5	7.45
	300	62	4	316	246	15.6	13.6	2 100	—	—	2 500	**6328 ZZX**	—	—	—	156	184	284	3	19.4
150	210	28	2	117	94.3	3.75	16.2	2 900	—	1 700	3 400	**6930 ZZ**	**6930 2RU**	—	**6930 2RS**	159	165.5	201	2	3.05
	225	35	2.1	157	126	5.10	16.0	2 800	—	1 600	3 300	**6030 ZZX**	**6030 2RU**	—	**6030 2RS**	161	168.5	214	2	4.22
	270	45	3	220	168	9.05	15.1	2 200	—	—	2 700	**6230 ZZX**	—	—	—	163	183.5	257	2.5	9.41
160	200	20	1.1	60.5	56.9	2.20	16.1	2 900	2 600	—	3 400	**6832 ZZ**	—	**6832 2RD**	—	166.5	168.5	193.5	1	1.45
	240	38	2.1	171	135	5.30	15.9	2 600	—	1 500	3 000	**6032 ZZX**	**6032 2RU**	—	**6032 2RS**	171	178.5	229	2	5.22
	290	48	3	231	186	9.45	15.4	2 100	—	—	2 500	**6232 ZZX**	—	—	—	173	198	277	2.5	14.3
170	215	22	1.1	74.8	70.5	2.60	16.1	2 700	—	—	3 200	**6834 ZZ**	—	—	—	176.5	182.5	208.5	1	1.90
	260	42	2.1	201	161	6.20	15.8	2 400	—	—	2 800	**6034 ZZX**	**6034 2RU**	—	—	181	194	249	2	6.80
	310	52	4	265	223	11.1	15.3	1 900	—	—	2 300	**6234 ZZX**	—	—	—	186	210.5	294	3	17.5
180	225	22	1.1	75.8	73.1	2.65	16.1	2 600	2 300	—	3 000	**6836 ZZ**	—	**6836 2RD**	—	186.5	189.5	218.5	1	2.00
	280	46	2.1	227	194	7.15	15.8	2 200	—	—	2 600	**6036 ZZX**	**6036 2RU**	—	—	191	209.5	269	2	10.3
	320	52	4	264	226	10.8	15.1	1 800	—	—	2 200	**6236-1 ZZX**	—	—	—	196	220.5	304	3	18.3
190	240	24	1.5	91.4	88.1	3.10	16.1	2 400	—	—	2 800	**6838 ZZ**	—	—	—	198	202	232	1.5	2.60
	290	46	2.1	235	201	7.35	15.8	2 100	—	—	2 500	**6038 ZZX**	—	—	—	201	215	279	2	10.8
200	310	51	2.1	272	243	11.3	15.6	1 900	—	—	2 300	**6040 ZZX**	—	—	—	211	228	299	2	14.0
	360	58	4	314	293	13.1	15.2	1 600	—	—	1 900	**6240-1 ZZX**	—	—	—	216	250	344	3	28.2
220	340	56	3	294	271	12.0	15.6	1 700	—	—	2 000	**6044 ZZX**	—	—	—	233	251	327	2.5	18.3

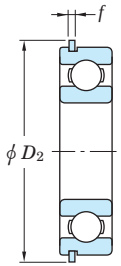
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Single-row deep groove ball bearings
snap ring groove type
locating snap ring type

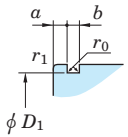
d 10 ~ (28) mm



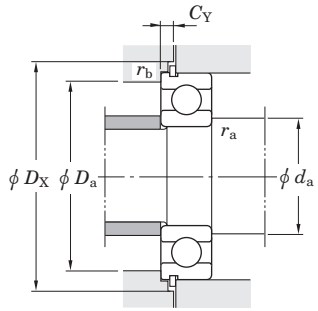
N
With snap ring groove



NR
With locating snap ring



Snap ring groove details



With locating snap ring and one shield

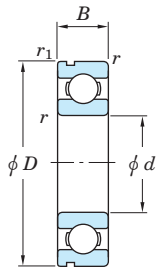
Boundary dimensions (mm)					Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1})		Bearing No.		Dimensions of snap ring groove (mm)				Dimensions of locating snap ring (mm)		Mounting dimensions (mm)							(Refer.) Mass	(Refer.) Bearing No.
d	D	B	r min.	r_1 min.	C_r	C_{0r}	C_u	f_0	Grease lub.	Oil lub.	With snap ring groove	With locating snap ring	D_1 max.	a max.	b ±0.15	r_0 max.	D_2 max.	f ±0.05	d_a min.	D_a max.	D_X min.	C_Y max.	r_a max.	r_b max.	(kg)	
10	22	6	0.3	0.3	3.35	1.25	0.070	14.0	34 000	41 000	**6900N**	**6900NR**	20.8	1.05	0.925 [1]	0.2	24.8	0.65	12	20	25.5	1.5	0.3	0.3	0.010	**6900N**
	30	9	0.6	0.3	6.40	2.40	0.120	13.2	24 000	29 000	**6200N**	**6200NR**	28.17	2.06	1.5	0.4	34.7	1.07	14	26	35.5	2.92	0.6	0.3	0.032	**6200N**
	35	11	0.6	0.5	10.1	3.45	0.270	11.2	22 000	27 000	**6300N**	**6300NR**	33.17	2.06	1.5	0.4	39.7	1.07	14	31	40.5	2.92	0.6	0.5	0.053	**6300N**
12	24	6	0.3	0.3	3.60	1.45	0.080	14.5	31 000	36 000	**6901N**	**6901NR**	22.8	1.05	0.925 [1]	0.2	26.8	0.65	14	22	27.5	1.5	0.3	0.3	0.011	**6901N**
	32	10	0.6	0.3	8.50	3.05	0.240	12.3	22 000	27 000	**6201N**	**6201NR**	30.15	2.06	1.5	0.4	36.7	1.07	16	28	37.5	2.92	0.6	0.3	0.037	**6201N**
	37	12	1	0.5	12.1	4.20	0.420	11.1	20 000	25 000	**6301N**	**6301NR**	34.77	2.06	1.5	0.4	41.3	1.07	17	32	42	2.92	1	0.5	0.060	**6301N**
15	28	7	0.3	0.3	5.40	2.25	0.120	14.3	26 000	30 000	**6902N**	**6902NR**	26.7	1.3	1.075 [1]	0.25	30.8	0.8	17	26	31.5	1.9	0.3	0.3	0.017	**6902N**
	35	11	0.6	0.5	9.55	3.75	0.290	13.2	20 000	24 000	**6202N**	**6202NR**	33.17	2.06	1.5	0.4	39.7	1.07	19	31	40.5	2.92	0.6	0.5	0.045	**6202N**
	42	13	1	0.5	14.3	5.45	0.460	12.3	17 000	20 000	**6302N**	**6302NR**	39.75	2.06	1.5	0.4	46.3	1.07	20	37	47	2.92	1	0.5	0.082	**6302N**
17	30	7	0.3	0.3	5.75	2.55	0.130	14.7	23 000	28 000	**6903N**	**6903NR**	28.7	1.3	1.075 [1]	0.25	32.8	0.8	19	28	33.5	1.9	0.3	0.3	0.018	**6903N**
	40	12	0.6	0.5	12.0	4.80	0.370	13.2	17 000	21 000	**6203N**	**6203NR**	38.1	2.06	1.5	0.4	44.6	1.07	21	36	45.5	2.92	0.6	0.5	0.065	**6203N**
	47	14	1	0.5	17.0	6.65	0.550	12.4	15 000	18 000	**6303N**	**6303NR**	44.6	2.46	1.5	0.4	52.7	1.07	22	42	53.5	3.33	1	0.5	0.115	**6303N**
20	32	7	0.3	0.3	5.00	2.45	0.100	15.5	21 000	25 000	**6804N**	**6804NR**	30.7	1.3	1.075 [1]	0.25	34.8	0.8	22	30	35.5	1.9	0.3	0.3	0.018	**6804N**
	37	9	0.3	0.3	7.95	3.70	0.190	14.7	19 000	23 000	**6904N**	**6904NR**	35.7	1.7	1.075 [1]	0.25	39.8	0.8	22	35	40.5	2.3	0.3	0.3	0.036	**6904N**
	42	12	0.6	0.5	11.7	5.05	0.350	13.9	17 000	21 000	**6004N**	**6004NR**	39.75	2.06	1.5	0.4	46.3	1.07	24	38	47	2.92	0.6	0.5	0.069	**6004N**
	47	14	1	0.5	16.0	6.65	0.510	13.2	15 000	17 000	**6204N**	**6204NR**	44.6	2.46	1.5	0.4	52.7	1.07	25	42	53.5	3.33	1	0.5	0.106	**6204N**
	52	15	1.1	0.5	19.9	7.85	0.660	12.3	14 000	17 000	**6304N**	**6304NR**	49.73	2.46	1.5	0.4	57.9	1.07	26.5	45.5	58.5	3.33	1	0.5	0.144	**6304N**
22	44	12	0.6	0.5	11.7	5.15	0.350	14.1	17 000	20 000	**60/22N**	**60/22NR**	41.75	2.06	1.5	0.4	48.3	1.07	26	40	49	2.92	0.6	0.5	0.073	**60/22N**
	50	14	1	0.5	16.0	6.65	0.510	13.2	15 000	17 000	**62/22N**	**62/22NR**	47.6	2.46	1.5	0.4	55.7	1.07	27	45	56.5	3.33	1	0.5	0.118	**62/22N**
	56	16	1.1	0.5	23.1	9.40	0.770	12.6	13 000	15 000	**63/22N**	**63/22NR**	53.6	2.46	1.5	0.4	61.7	1.07	28.5	49.5	62.5	3.33	1	0.5	0.201	**63/22N**
25	37	7	0.3	0.3	5.40	2.95	0.120	16.0	18 000	21 000	**6805N**	**6805NR**	35.7	1.3	1.075 [1]	0.25	39.8	0.8	27	35	40.5	1.9	0.3	0.3	0.022	**6805N**
	42	9	0.3	0.3	8.75	4.55	0.230	15.4	16 000	19 000	**6905N**	**6905NR**	40.7	1.7	1.075 [1]	0.25	44.8	0.8	27	40	45.5	2.3	0.3	0.3	0.041	**6905N**
	47	12	0.6	0.5	12.6	5.85	0.380	14.5	15 000	18 000	**6005N**	**6005NR**	44.6	2.06	1.5	0.4	52.7	1.07	29	43	53.5	2.92	0.6	0.5	0.080	**6005N**
	52	15	1	0.5	17.5	7.85	0.550	13.9	13 000	15 000	**6205N**	**6205NR**	49.73	2.46	1.5	0.4	57.9	1.07	30	47	58.5	3.33	1	0.5	0.128	**6205N**
	62	17	1.1	0.5	25.7	11.3	0.860	13.2	11 000	13 000	**6305N**	**6305NR**	59.61	3.28	2.05	0.6	67.7	1.65	31.5	55.5	68.5	4.67	1	0.5	0.232	**6305N**
28	52	12	0.6	0.5	15.6	7.40	0.480	14.5	14 000	16 000	**60/28N**	**60/28NR**	49.73	2.06	1.5	0.4	57.9	1.07	32	48	58.5	2.92	0.6	0.5	0.097	**60/28N**
	58	16	1	0.5	22.4	9.75	0.720	13.4	12 000	14 000	**62/28N**	**62/28NR**	55.6	2.46	1.5	0.4	63.7	1.07	33	53	64.5	3.33	1	0.5	0.173	**62/28N**

[Note] 1) The tolerance of the ring groove width is ±0.125.

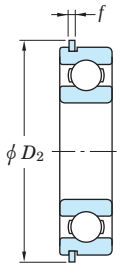
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Single-row deep groove ball bearings
snap ring groove type
locating snap ring type

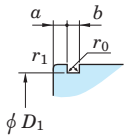
d (28) ~ (50) mm



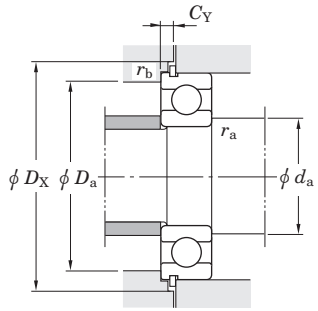
N
With snap ring groove



NR
With locating snap ring



Snap ring groove details



With locating snap ring and one shield

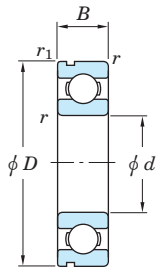
Boundary dimensions (mm)					Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1})		Bearing No.		Dimensions of snap ring groove (mm)				Dimensions of locating snap ring (mm)		Mounting dimensions (mm)							(Refer.) Mass	(Refer.) Bearing No.
d	D	B	r min.	r_1 min.	C_r	C_{0r}	C_u	f_0	Grease lub.	Oil lub.	With snap ring groove	With locating snap ring	D_1 max.	a max.	b ±0.15	r_0 max.	D_2 max.	f ±0.05	d_a min.	D_a max.	D_X min.	C_Y max.	r_a max.	r_b max.	(kg)	
28	68	18	1.1	0.5	29.4	13.1	0.990	13.3	10 000	12 000	**63/28N**	**63/28NR**	64.82	3.28	2.05	0.6	74.6	1.65	34.5	61.5	76	4.67	1	0.5	0.328	**63/28N**
30	42	7	0.3	0.3	5.65	3.40	0.140	16.4	15 000	18 000	**6806N**	**6806NR**	40.7	1.3	1.075 [1]	0.25	44.8	0.8	32	40	45.5	1.9	0.3	0.3	0.026	**6806N**
	47	9	0.3	0.3	9.05	5.00	0.260	15.8	14 000	17 000	**6906N**	**6906NR**	45.7	1.7	1.075 [1]	0.25	49.8	0.8	32	45	50.5	2.3	0.3	0.3	0.045	**6906N**
	55	13	1	0.5	16.5	8.25	0.530	14.7	13 000	15 000	**6006N**	**6006NR**	52.6	2.08	1.5	0.4	60.7	1.07	35	50	61.5	2.9	1	0.5	0.116	**6006N**
	62	16	1	0.5	24.3	11.3	0.800	13.9	11 000	13 000	**6206N**	**6206NR**	59.61	3.28	2.05	0.6	67.7	1.65	35	57	68.5	4.67	1	0.5	0.199	**6206N**
	72	19	1.1	0.5	33.3	15.0	1.15	13.3	9 600	12 000	**6306N**	**6306NR**	68.81	3.28	2.05	0.6	78.6	1.65	36.5	65.5	80	4.67	1	0.5	0.346	**6306N**
32	58	13	1	0.5	18.8	9.15	0.600	14.5	12 000	14 000	**60/32N**	**60/32NR**	55.6	2.08	1.5	0.4	63.7	1.07	37	53	64.5	2.9	1	0.5	0.127	**60/32N**
	65	17	1	0.5	29.4	13.1	0.990	13.3	10 000	12 000	**62/32N**	**62/32NR**	62.6	3.28	2.05	0.6	70.7	1.65	37	60	71.5	4.67	1	0.5	0.228	**62/32N**
	75	20	1.1	0.5	37.6	16.2	1.30	12.7	9 300	11 000	**63/32N**	**63/32NR**	71.83	3.28	2.05	0.6	81.6	1.65	38.5	68.5	83	4.67	1	0.5	0.437	**63/32N**
35	47	7	0.3	0.3	5.95	3.85	0.160	16.5	13 000	16 000	**6807N**	**6807NR**	45.7	1.3	1.075 [1]	0.25	49.8	0.8	37	45	50.5	1.9	0.3	0.3	0.030	**6807N**
	55	10	0.6	0.6	13.6	7.75	0.440	15.7	12 000	14 000	**6907N**	**6907NR**	53.7	1.7	1.075 [1]	0.25	57.8	0.8	39	51	58.5	2.3	0.6	0.6	0.073	**6907N**
	62	14	1	0.5	19.9	10.3	0.640	14.9	11 000	13 000	**6007N**	**6007NR**	59.61	2.08	2.05	0.6	67.7	1.65	40	58	68.5	3.48	1	0.5	0.155	**6007N**
	72	17	1.1	0.5	32.1	15.4	1.10	13.9	9 200	11 000	**6207N**	**6207NR**	68.81	3.28	2.05	0.6	78.6	1.65	41.5	65.5	80	4.67	1	0.5	0.288	**6207N**
	80	21	1.5	0.5	41.7	19.3	1.45	13.2	8 500	10 000	**6307N**	**6307NR**	76.81	3.28	2.05	0.6	86.6	1.65	43	72	88	4.67	1.5	0.5	0.457	**6307N**
40	52	7	0.3	0.3	6.15	4.20	0.180	16.3	12 000	14 000	**6808N**	**6808NR**	50.7	1.3	1.075 [1]	0.25	54.8	0.8	42	50	55.5	1.9	0.3	0.3	0.033	**6808N**
	62	12	0.6	0.6	17.1	9.95	0.570	15.6	11 000	13 000	**6908N**	**6908NR**	60.7	1.7	1.075 [1]	0.25	64.8	0.8	44	58	65.5	2.3	0.6	0.6	0.112	**6908N**
	68	15	1	0.5	20.9	11.5	0.690	15.2	10 000	12 000	**6008N**	**6008NR**	64.82	2.49	2.05	0.6	74.6	1.65	45	63	76	3.89	1	0.5	0.192	**6008N**
	80	18	1.1	0.5	36.4	17.8	1.25	14.0	8 300	10 000	**6208N**	**6208NR**	76.81	3.28	2.05	0.6	86.6	1.65	46.5	73.5	88	4.67	1	0.5	0.366	**6208N**
	90	23	1.5	0.5	50.9	24.0	1.85	13.2	7 700	9 200	**6308N**	**6308NR**	86.79	3.28	2.85	0.6	96.5	2.41	48	82	98	5.43	1.5	0.5	0.633	**6308N**
45	58	7	0.3	0.3	7.75	5.40	0.230	16.3	11 000	13 000	**6809N**	**6809NR**	56.7	1.3	1.075 [1]	0.25	60.8	0.8	47	56	61.5	1.9	0.3	0.3	0.040	**6809N**
	68	12	0.6	0.6	17.7	10.9	0.600	15.9	9 700	11 000	**6909N**	**6909NR**	66.7	1.7	1.075 [1]	0.25	70.8	0.8	49	64	72	2.3	0.6	0.6	0.132	**6909N**
	75	16	1	0.5	26.2	15.1	0.900	15.3	9 200	11 000	**6009N**	**6009NR**	71.83	2.49	2.05	0.6	81.6	1.65	50	70	83	3.89	1	0.5	0.245	**6009N**
	85	19	1.1	0.5	40.9	20.3	1.40	14.0	7 700	9 200	**6209N**	**6209NR**	81.81	3.28	2.05	0.6	91.6	1.65	51.5	78.5	93	4.67	1	0.5	0.407	**6209N**
	100	25	1.5	0.5	61.1	29.5	2.25	13.3	6 800	8 100	**6309N**	**6309NR**	96.8	3.28	2.85	0.6	106.5	2.41	53	92	108	5.43	1.5	0.5	0.833	**6309N**
50	65	7	0.3	0.3	8.20	6.10	0.260	16.1	9 600	11 000	**6810N**	**6810NR**	63.7	1.3	1.075 [1]	0.25	67.8	0.8	52	63	68.5	1.9	0.3	0.3	0.052	**6810N**
	72	12	0.6	0.6	18.2	11.7	0.640	16.1	9 000	11 000	**6910N**	**6910NR**	70.7	1.7	1.075 [1]	0.25	74.8	0.8	54	68	76	2.3	0.6	0.6	0.133	**6910N**
	80	16	1	0.5	27.3	16.6	0.960	15.6	8 400	9 900	**6010N**	**6010NR**	76.81	2.49	2.05	0.6	86.6	1.65	55	75	88	3.89	1	0.5	0.261	**6010N**

[Note] 1) The tolerance of the ring groove width is ±0.125.

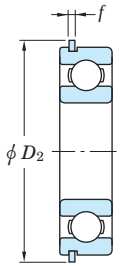
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Single-row deep groove ball bearings
snap ring groove type
locating snap ring type

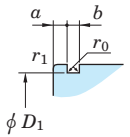
d (50) ~ 90 mm



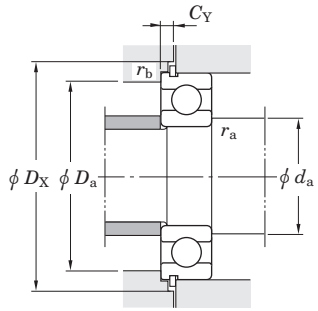
N
With snap ring groove



NR
With locating snap ring



Snap ring groove details



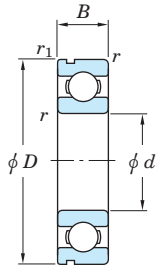
With locating snap ring and one shield

Boundary dimensions (mm)					Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1})		Bearing No.		Dimensions of snap ring groove (mm)				Dimensions of locating snap ring (mm)		Mounting dimensions (mm)						(Refer.) Mass	(Refer.) Bearing No.
d	D	B	r min.	r_1 min.	C_r	C_{0r}	C_u	f_0	Grease lub.	Oil lub.	With snap ring groove	With locating snap ring	D_1 max.	a max.	b ±0.15	r_0 max.	D_2 max.	f ±0.05	d_a min.	D_a max.	D_X min.	C_Y max.	r_a max.	r_b max.	(kg)	
50	90	20	1.1	0.5	43.9	23.3	1.55	14.4	7 100	8 500	**6210N**	**6210NR**	86.79	3.28	2.85	0.6	96.5	2.41	56.5	83.5	98	5.43	1	0.5	0.463	**6210N**
	110	27	2	0.5	77.5	38.3	2.90	13.2	6 100	7 300	**6310N**	**6310NR**	106.81	3.28	2.85	0.6	116.6	2.41	59	101	118	5.43	2	0.5	1.07	**6310N**
55	90	18	1.1	0.5	35.3	21.2	1.25	15.3	7 600	8 900	**6011N**	**6011NR**	86.79	2.87	2.85	0.6	96.5	2.41	61.5	83.5	98	5.03	1	0.5	0.385	**6011N**
	100	21	1.5	0.5	54.2	29.4	1.95	14.4	6 300	7 600	**6211N**	**6211NR**	96.8	3.28	2.85	0.6	106.5	2.41	63	92	108	5.43	1.5	0.5	0.607	**6211N**
	120	29	2	0.5	89.5	45.0	3.45	13.2	5 600	6 700	**6311N**	**6311NR**	115.21	4.06	3.25	0.6	129.7	2.77	64	111	131.5	6.58	2	0.5	1.37	**6311N**
60	95	18	1.1	0.5	36.8	23.2	1.35	15.6	7 100	8 400	**6012N**	**6012NR**	91.82	2.87	2.85	0.6	101.6	2.41	66.5	88.5	103	5.03	1	0.5	0.415	**6012N**
	110	22	1.5	0.5	65.6	36.2	2.40	14.4	5 700	6 900	**6212N**	**6212NR**	106.81	3.28	2.85	0.6	116.6	2.41	68	102	118	5.43	1.5	0.5	0.783	**6212N**
	130	31	2.1	0.5	102	52.2	3.95	13.2	5 200	6 200	**6312N**	**6312NR**	125.22	4.06	3.25	0.6	139.7	2.77	71	119	141.5	6.58	2	0.5	1.70	**6312N**
65	100	18	1.1	0.5	38.1	25.2	1.40	15.8	6 600	7 800	**6013N**	**6013NR**	96.8	2.87	2.85	0.6	106.5	2.41	71.5	93.5	108	5.03	1	0.5	0.435	**6013N**
	120	23	1.5	0.5	71.5	40.1	2.65	14.4	5 400	6 400	**6213N**	**6213NR**	115.21	4.06	3.25	0.6	129.7	2.77	73	112	131.5	6.58	1.5	0.5	0.990	**6213N**
	140	33	2.1	0.5	116	59.9	4.50	13.2	4 800	5 800	**6313N**	**6313NR**	135.23	4.9	3.25	0.6	149.7	2.77	76	129	152	7.37	2	0.5	2.08	**6313N**
70	110	20	1.1	0.5	47.6	30.9	1.80	15.6	6 100	7 200	**6014N**	**6014NR**	106.81	2.87	2.85	0.6	116.6	2.41	76.5	103.5	118	5.03	1	0.5	0.602	**6014N**
	125	24	1.5	0.5	77.8	44.1	2.90	14.5	5 100	6 100	**6214N**	**6214NR**	120.22	4.06	3.25	0.6	134.7	2.77	78	117	136.5	6.58	1.5	0.5	1.07	**6214N**
	150	35	2.1	0.5	130	68.2	4.95	13.2	4 500	5 400	**6314N**	**6314NR**	145.24	4.9	3.25	0.6	159.7	2.77	81	139	162	7.37	2	0.5	2.52	**6314N**
75	115	20	1.1	0.5	49.4	33.5	1.90	15.8	5 700	6 800	**6015N**	**6015NR**	111.81	2.87	2.85	0.6	121.6	2.41	81.5	108.5	123	5.03	1	0.5	0.638	**6015N**
	130	25	1.5	0.5	84.3	48.3	3.10	14.5	4 800	5 800	**6215N**	**6215NR**	125.22	4.06	3.25	0.6	139.7	2.77	83	122	141.5	6.58	1.5	0.5	1.18	**6215N**
	160	37	2.1	0.5	142	77.2	5.40	13.2	4 200	5 000	**6315N**	**6315NR**	155.22	4.9	3.25	0.6	169.7	2.77	86	149	172	7.37	2	0.5	3.02	**6315N**
80	125	22	1.1	0.5	59.5	39.8	2.25	15.6	5 300	6 300	**6016N**	**6016NR**	120.22	2.87	3.25	0.6	134.7	2.77	86.5	118.5	136.5	5.39	1	0.5	0.850	**6016N**
	140	26	2	0.5	90.9	53.0	3.25	14.6	4 500	5 400	**6216N**	**6216NR**	135.23	4.9	3.25	0.6	149.7	2.77	89	131	152	7.37	2	0.5	1.40	**6216N**
	170	39	2.1	0.5	154	86.7	5.85	13.3	3 900	4 700	**6316N**	**6316NR**	163.65	5.69	3.65	0.6	182.9	3.05	91	159	185	8.44	2	0.5	3.59	**6316N**
85	130	22	1.1	0.5	61.8	43.1	2.35	15.8	5 000	5 900	**6017N**	**6017NR**	125.22	2.87	3.25	0.6	139.7	2.77	91.5	123.5	141.5	5.39	1	0.5	0.890	**6017N**
	150	28	2	0.5	105	61.9	3.70	14.5	4 200	5 000	**6217N**	**6217NR**	145.24	4.9	3.25	0.6	159.7	2.77	94	141	162	7.37	2	0.5	1.79	**6217N**
	180	41	3	0.5	166	96.8	6.35	13.3	3 700	4 400	**6317N**	**6317NR**	173.66	5.69	3.65	0.6	192.9	3.05	98	167	195	8.44	2.5	0.5	4.23	**6317N**
90	140	24	1.5	0.5	72.8	49.7	2.65	15.6	4 700	5 600	**6018N**	**6018NR**	135.23	3.71	3.25	0.6	149.7	2.77	98	132	152	6.17	1.5	0.5	1.16	**6018N**
	160	30	2	0.5	120	71.5	4.20	14.5	3 900	4 700	**6218N**	**6218NR**	155.22	4.9	3.25	0.6	169.7	2.77	99	151	172	7.37	2	0.5	2.15	**6218N**
	190	43	3	0.5	178	107	8.80	13.3	3 500	4 200	**6318N**	**6318NR**	183.64	5.69	3.65	0.6	202.9	3.05	103	177	205	8.44	2.5	0.5	4.91	**6318N**

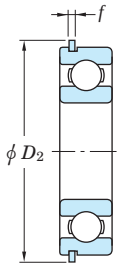
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Single-row deep groove ball bearings
snap ring groove type
locating snap ring type

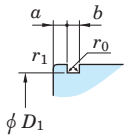
d 95 ~ 130 mm



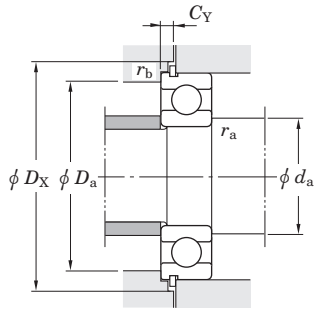
N
With snap ring groove



NR
With locating snap ring



Snap ring groove details

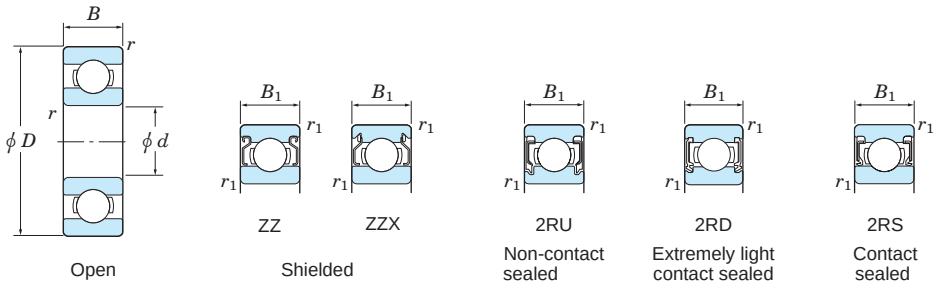


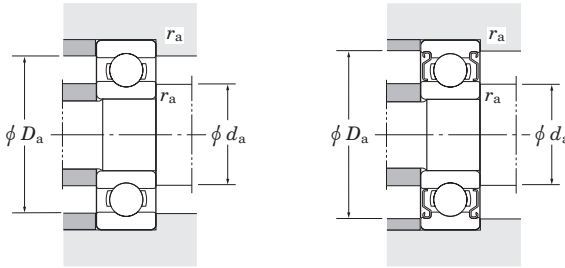
With locating snap ring and one shield

Boundary dimensions (mm)					Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1})		Bearing No.		Dimensions of snap ring groove (mm)				Dimensions of locating snap ring (mm)		Mounting dimensions (mm)							(Refer.) Mass	(Refer.) Bearing No.
d	D	B	r min.	r_1 min.	C_r	C_{0r}	C_u	f_0	Grease lub.	Oil lub.	With snap ring groove	With locating snap ring	D_1 max.	a max.	b ±0.15	r_0 max.	D_2 max.	f ±0.05	d_a min.	D_a max.	D_X min.	C_Y max.	r_a max.	r_b max.	(kg)	
95	145	24	1.5	0.5	75.5	53.9	2.75	15.8	4 400	5 200	**6019N**	**6019NR**	140.23	3.71	3.25	0.6	154.7	2.77	103	137	157	6.17	1.5	0.5	1.21	**6019N**
	170	32	2.1	0.5	136	81.9	4.65	14.4	3 700	4 400	**6219N**	**6219NR**	163.65	5.69	3.65	0.6	182.9	3.05	106	159	185	8.44	2	0.5	2.62	**6219N**
	200	45	3	0.5	191	119	9.45	13.3	3 300	4 000	**6319N**	**6319NR**	193.65	5.69	3.65	0.6	212.9	3.05	108	187	215	8.44	2.5	0.5	5.67	**6319N**
100	150	24	1.5	0.5	75.2	54.2	2.70	15.9	4 300	5 100	**6020N**	**6020NR**	145.24	3.71	3.25	0.6	159.7	2.77	108	142	162	6.17	1.5	0.5	1.25	**6020N**
	180	34	2.1	0.5	153	93.1	5.15	14.4	3 500	4 200	**6220N**	**6220NR**	173.66	5.69	3.65	0.6	192.9	3.05	111	169	195	8.44	2	0.5	3.14	**6220N**
105	160	26	2	0.5	90.4	65.8	3.20	15.8	4 000	4 700	**6021N**	**6021NR**	155.22	3.71	3.25	0.6	169.7	2.77	114	151	172	6.17	2	0.5	1.59	**6021N**
	190	36	2.1	0.5	166	105	5.70	14.4	3 300	3 900	**6221N**	**6221NR**	183.64	5.69	3.65	0.6	202.9	3.05	116	179	205	8.44	2	0.5	3.70	**6221N**
110	170	28	2	0.5	103	73.0	3.55	15.6	3 800	4 500	**6022N**	**6022NR**	163.65	3.71	3.65	0.6	182.9	3.05	119	161	185	6.45	2	0.5	1.96	**6022N**
	200	38	2.1	0.5	180	117	6.20	14.4	3 100	3 700	**6222N**	**6222NR**	193.65	5.69	3.65	0.6	212.9	3.05	121	189	215	8.44	2	0.5	4.36	**6222N**
120	180	28	2	0.5	106	79.3	3.60	15.9	3 600	4 200	**6024N**	**6024NR**	173.66	3.71	3.65	0.6	192.9	3.05	129	171	195	6.45	2	0.5	2.07	**6024N**
130	200	33	2	0.5	133	101	4.45	15.8	3 200	3 800	**6026N**	**6026NR**	193.65	5.69	3.65	0.6	212.9	3.05	139	191	215	8.44	2	0.5	3.16	**6026N**

[Remark] Standard cage types used for the above bearings are described earlier in this section.

d 1 ~ (4) mm

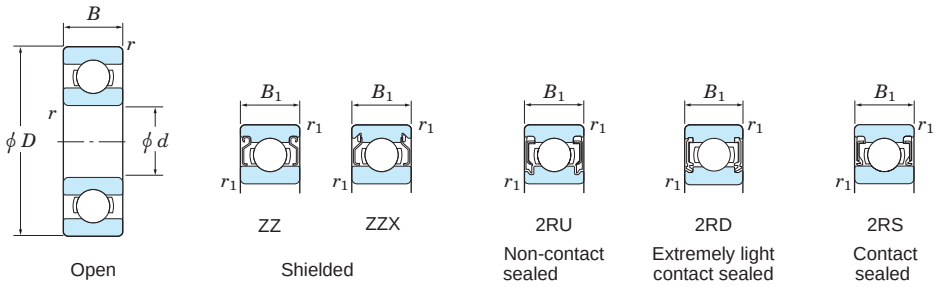




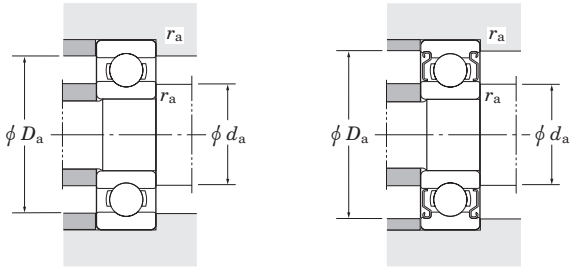
Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1}) Grease lub.			Oil lub.	Bearing No.					Mounting dimensions (mm)			(Refer.)
d	D	B	B_1	r 1) min.	r_1 1) min.	C_r	C_{0r}	C_u	f_0	Open ZZ, 2RU	(2RD)	(2RS)	Open Z	Open	Shielded	Non-contact sealed	Extremely light shielded	Contact sealed	d_a min.	D_a max.	r_a max.	Mass (g)
1	3	1	—	0.07	—	0.120	0.03	0.0007	11.6	130 000	—	—	150 000	**681**	—	—	—	—	1.6	2.4	0.05	0.03
	3	1.5	—	0.08	—	0.100	0.02	0.0006	12.8	130 000	—	—	150 000	**ML1003**	—	—	—	—	1.6	2.4	0.07	0.05
	4	1.6	—	0.1	—	0.170	0.04	0.001	11.4	120 000	—	—	140 000	**691**	—	—	—	—	1.8	3.2	0.1	0.1
1.2	4	1.8	—	0.08	—	0.140	0.03	0.0009	11.4	120 000	—	—	140 000	**ML1204**	—	—	—	—	1.8	3.4	0.07	0.1
1.5	4	1.2	2	0.1	0.1	0.140	0.03	0.0009	13.2	120 000	—	—	140 000	**68/1.5**	**W68/1.5 ZZ**	—	—	—	2.3	3.2	0.1	0.1
	5	2	2.6	0.15	0.15	0.300	0.07	0.002	13.3	110 000	—	—	130 000	**69/1.5**	**W69/1.5 ZZX**	—	—	—	2.7	3.8	0.15	0.1
	6	2.5	3	0.1	0.1	0.410	0.10	0.003	11.4	86 000	—	—	100 000	**ML1506**	**WML1506 ZZX**	—	—	—	2.3	5.2	0.1	0.3
2	5	1.5	2.3	0.1	0.1	0.210	0.05	0.001	13.3	98 000	—	—	110 000	**682**	**W682 ZZX**	—	—	—	2.8	4.4	0.1	0.1
	5	2	2.5	0.1	0.08	0.210	0.05	0.001	13.3	98 000	—	—	110 000	**ML2005**	**WML2005 ZZ**	—	—	—	2.6	4.2	0.07	0.1
	6	2.3	3	0.15	0.1	0.410	0.10	0.003	11.4	86 000	—	—	100 000	**692**	**W692 ZZ**	—	—	—	3.2	4.8	0.1	0.2
	6	2.5	3	0.1	0.1	0.410	0.10	0.003	11.4	86 000	—	—	100 000	**ML2006**	**WML2006 ZZX**	—	—	—	2.8	5.2	0.1	0.3
	7	2.5	3	0.15	0.15	0.480	0.13	0.003	12.6	67 000	—	—	79 000	**ML2007**	**WML2007 ZZX**	—	—	—	3.2	5.8	0.15	0.4
	7	2.8	3.5	0.15	0.15	0.480	0.13	0.003	12.6	67 000	—	—	79 000	**602**	**W602 ZZX**	—	—	—	3.2	5.8	0.15	0.5
2.5	6	1.8	2.6	0.1	0.1	0.240	0.06	0.002	14.3	75 000	—	—	89 000	**68/2.5**	**W68/2.5 ZZ**	—	—	—	3.3	5.2	0.1	0.2
	7	2.5	3.5	0.15	0.15	0.390	0.11	0.003	13.7	66 000	—	—	79 000	**69/2.5**	**W69/2.5 ZZ**	—	—	—	3.7	5.8	0.15	0.4
	8	2.5	—	0.1	—	0.540	0.15	0.004	13.4	63 000	—	—	75 000	**ML2508/1B**	—	—	—	—	3.3	7.2	0.1	0.6
	8	2.8	4	0.15	0.1	0.680	0.17	0.005	11.5	64 000	—	—	76 000	**ML2508**	**WML2508 ZZX**	—	—	—	3.7	6.8	0.1	0.6
3	6	2	2.5	0.08	0.05	0.240	0.06	0.002	14.3	75 000	—	—	89 000	**ML3006**	**WML3006 ZZ**	—	—	—	3.6	5.4	0.05	0.2
	7	2	3	(0.15)	(0.15)	0.390	0.11	0.003	13.7	66 000	—	—	79 000	**683**	**W683 ZZ**	—	—	—	4.2	5.8	0.1	0.3
	8	2.5	—	0.1	—	0.490	0.14	0.004	13.4	63 000	—	—	75 000	**ML3008**	—	—	—	—	3.8	7.2	0.1	0.5
	8	3	4	0.15	0.15	0.680	0.17	0.005	11.5	64 000	—	—	76 000	**693**	**W693 ZZ**	—	—	—	4.2	6.8	0.15	0.6
	9	3	5	0.15	0.15	0.540	0.16	0.004	14.0	60 000	—	—	72 000	**603**	**W603 ZZX**	—	—	—	4.2	7.8	0.15	0.9
	10	4	4	0.15	0.15	0.800	0.22	0.006	12.8	52 000	—	44 000	63 000	**623**	**623 ZZ**	—	—	**623 2RS**	4.2	8.8	0.15	1.6
	13	5	5	0.2	0.2	1.65	0.49	0.01	12.3	44 000	—	—	54 000	**633**	**633 ZZ**	—	—	—	4.6	11.4	0.2	3.0
4	7	2	2.5	0.08	0.05	0.320	0.11	0.003	15.1	64 000	—	—	76 000	**ML4007**	**WML4007 ZZ**	—	—	—	4.6	6.4	0.05	0.2
	8	2	3	0.1	0.08	0.490	0.14	0.004	14.6	61 000	—	—	73 000	**ML4008**	**WML4008 ZZ**	—	—	—	4.8	7.2	0.08	0.4
	9	2.5	4	(0.15)	(0.15)	0.800	0.23	0.006	12.8	59 000	—	—	70 000	**684**	**W684 ZZ**	—	—	—	5.2	7.8	0.1	0.6

[Note] 1) Numerical values in ( ) do not conform to JIS B 1521.

d (4) ~ (7) mm

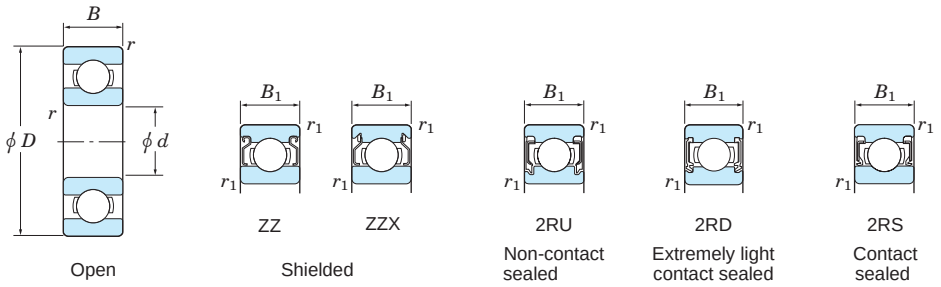


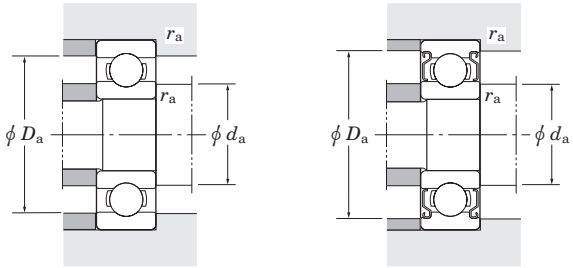
Open | Shielded | Non-contact sealed | Extremely light contact sealed | Contact sealed



Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1}) Grease lub.			Oil lub.	Bearing No.					Mounting dimensions (mm)			(Refer.) Mass
d	D	B	B_1	r min.	r_1 min.	C_r	C_{0r}	C_u	f_0	Open ZZ, 2RU	(2RD)	(2RS)	Open Z	Open	Shielded	Non-contact sealed	Extremely light shielded	Contact sealed	d_a min.	D_a max.	r_a max.	(g)
4	10	3	4	0.15	0.1	0.810	0.23	0.006	13.3	56 000	—	—	67 000	**ML4010**	**WML4010 ZZ**	—	—	—	5.2	8.8	0.1	1.0
	11	4	4	0.15	0.15	1.20	0.35	0.009	12.4	54 000	—	44 000	65 000	**694**	**694 ZZ**	**694 2RU**	—	**694 2RS**	5.2	9.8	0.15	1.8
	12	4	4	0.2	0.2	1.20	0.35	0.009	12.4	53 000	—	—	63 000	**604**	**604 ZZ**	—	—	—	5.6	10.4	0.2	2.1
	13	5	5	0.2	0.2	1.65	0.48	0.010	12.3	44 000	—	39 000	54 000	**624**	**624 ZZ**	**624 2RU**	—	**624 2RS**	5.6	11.4	0.2	2.9
	16	5	5	0.3	0.3	1.70	0.52	0.010	12.4	40 000	—	—	49 000	**634**	**634 ZZ**	—	—	—	6	14	0.3	5.3
5	8	2	2.5	0.08	0.05	0.270	0.09	0.002	15.7	59 000	—	—	70 000	**ML5008**	**WML5008 ZZ**	—	—	—	5.6	7.4	0.05	0.3
	9	2.5	3	0.1	0.08	0.540	0.17	0.004	15.3	56 000	—	—	67 000	**ML5009**	**WML5009 ZZ**	—	—	—	5.8	8.2	0.08	0.5
	10	3	4	0.1	0.1	0.540	0.17	0.005	14.8	55 000	—	—	65 000	**ML5010**	**WML5010 ZZ**	—	—	—	5.8	9	0.1	0.9
	11	3	5	0.15	0.15	0.890	0.28	0.007	12.8	53 000	—	—	63 000	**685**	**W685 ZZ**	—	—	—	6.2	9.8	0.15	1.0
	13	4	4	0.2	0.2	1.35	0.43	0.010	12.3	50 000	45 000	42 000	60 000	**695**	**695 ZZ**	**695 2RU**	**695 2RD**	**695 2RS**	6.6	11.4	0.2	2.2
	14	5	5	0.2	0.2	1.65	0.49	0.010	12.3	50 000	—	—	60 000	**605**	**605 ZZ**	—	—	—	6.6	12.4	0.2	3.5
	16	5	5	0.3	0.3	2.15	0.67	0.030	12.4	40 000	36 000	33 000	49 000	**625**	**625 ZZ**	**625 2RU**	—	**625 2RS**	7	14	0.3	5.0
	19	6	6	0.3	0.3	2.90	0.89	0.040	12.3	35 000	32 000	27 000	43 000	**635**	**635 ZZ**	**635 2RU**	—	**635 2RS**	7	17	0.3	8.5
6	10	2.5	3	0.1	0.08	0.620	0.22	0.006	15.7	53 000	—	—	63 000	**ML6010**	**WML6010 ZZ**	—	—	—	6.8	9.2	0.08	0.6
	12	3	4	0.15	0.1	0.890	0.29	0.008	14.5	49 000	—	37 000	59 000	**ML6012**	**WML6012 ZZ**	—	—	**WML6012 2RS**	7.2	10.8	0.1	1.3
	13	3.5	5	0.15	0.15	1.35	0.44	0.010	13.7	48 000	43 000	36 000	57 000	**686**	**W686 ZZ**	—	—	**W686 2RS**	7.2	11.8	0.15	1.8
	15	5	5	0.2	0.2	1.70	0.52	0.010	12.4	45 000	41 000	32 000	54 000	**696**	**696 ZZ**	**696 2RU**	**696 2RD**	**696 2RS**	7.6	13.4	0.2	3.9
	17	6	6	0.3	0.3	2.45	0.74	0.030	12.2	43 000	39 000	—	51 000	**606**	**606 ZZ**	**606 2RU**	**606 2RD**	—	8	15	0.3	5.8
	19	6	6	0.3	0.3	2.90	0.89	0.040	12.3	35 000	32 000	27 000	43 000	**626**	**626 ZZ**	**626 2RU**	**626 2RD**	**626 2RS**	8	17	0.3	8.1
	19	8	8	0.3	0.3	3.25	1.05	0.04	12.3	40 000	—	—	47 000	**ML6019**	**ML6019 ZZ**	—	—	—	7	18	0.3	9.0
	22	7	7	0.3	0.3	4.10	1.35	0.060	12.4	31 000	—	23 000	37 000	**636**	**636 ZZ**	—	—	**636 2RS**	8	20	0.3	13
7	11	2.5	3	0.1	0.08	0.540	0.23	0.006	16.1	49 000	—	—	59 000	**ML7011**	**WML7011 ZZX**	—	—	—	7.8	10.2	0.08	0.7
	13	3	4	0.15	0.15	0.680	0.28	0.007	14.9	47 000	—	—	55 000	**ML7013**	**WML7013 ZZ**	—	—	—	8.2	11.8	0.15	1.4
	14	3.5	5	0.15	0.15	1.45	0.51	0.010	14.2	45 000	—	—	54 000	**687**	**W687 ZZ**	—	—	—	8.2	12.8	0.15	2.0
	17	5	5	0.3	0.3	2.00	0.71	0.02	14.0	42 000	—	28 000	50 000	**697**	**697 ZZ**	—	—	**697 2RS**	9	15	0.3	5.3
	19	6	6	0.3	0.3	2.95	0.89	0.040	12.3	40 000	36 000	27 000	47 000	**607**	**607 ZZ**	**607 2RU**	**607 2RD**	**607 2RS**	9	17	0.3	7.6
	22	7	7	0.3	0.3	4.10	1.35	0.060	12.4	31 000	28 000	23 000	37 000	**627**	**627 ZZ**	**627 2RU**	**627 2RD**	**627 2RS**	9	20	0.3	13
	22	8	8	0.3	0.3	4.10	1.35	0.06	12.4	34 000	—	—	41 000	**ML7022**	**ML7022 ZZ**	—	—	—	9	20	0.3	14

d (7) ~ 9 mm



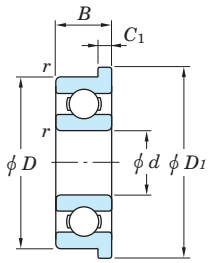


Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1}) Grease lub.			Oil lub.	Bearing No.					Mounting dimensions (mm)			(Refer.) Mass
d	D	B	B_1	r [1] min.	r_1 [1] min.	C_r	C_{0r}	C_u	f_0	Open ZZ, 2RU	(2RD)	(2RS)	Open Z	Open	Shielded	Non-contact sealed	Extremely light shielded	Contact sealed	d_a min.	D_a max.	r_a max.	(g)
7	26	9	9	0.3	0.3	5.65	1.95	0.100	12.3	26 000	—	—	32 000	**637**	**637 ZZ**	—	—	—	9	24	0.3	24
8	12	2.5	3.5	0.1	0.08	0.680	0.27	0.007	16.4	47 000	—	—	55 000	**ML8012**	**WML8012 ZZ**	—	—	—	8.8	11.2	0.08	0.8
	14	3.5	4	0.15	0.15	1.00	0.39	0.010	15.3	44 000	—	—	52 000	**ML8014**	**WML8014 ZZ**	—	—	—	9.2	12.8	0.15	1.8
	16	4	5	0.2	0.2	1.55	0.59	0.020	14.0	42 000	38 000	28 000	50 000	**688**	**W688 ZZ**	**W688 2RU**	**W688 2RD**	**W688 2RS**	9.6	14.4	0.2	3.2
	19	6	6	0.3	0.3	2.80	0.91	0.040	12.9	39 000	35 000	27 000	46 000	**698**	**698 ZZ**	—	**698 2RD**	**698 2RS**	10	17	0.3	7.2
	22	7	7	0.3	0.3	4.10	1.35	0.060	12.4	34 000	31 000	23 000	41 000	**608**	**608 ZZ**	**608 2RU**	**608 2RD**	**608 2RS**	10	20	0.3	12
	24	8	8	0.3	0.3	4.15	1.40	0.060	12.8	28 000	—	22 000	35 000	**628**	**628 ZZ**	**628 2RU**	—	**628 2RS**	10	22	0.3	18
	28	9	9	0.3	0.3	5.65	1.95	0.100	12.3	26 000	23 000	—	32 000	**638**	**638 ZZ**	—	**638 2RD**	—	10	26	0.3	29
9	17	4	5	0.2	0.2	1.65	0.66	0.020	14.9	39 000	35 000	—	46 000	**689**	**W689 ZZ**	**W689 2RU**	**W689 2RD**	—	10.6	15.4	0.2	3.5
	20	6	6	0.3	0.3	3.10	1.05	0.040	13.3	35 000	32 000	25 000	42 000	**699**	**699 ZZ**	—	**699 2RD**	**699 2RS**	11	18	0.3	7.5
	24	7	7	0.3	0.3	4.15	1.40	0.060	12.8	33 000	30 000	22 000	40 000	**609**	**609 ZZ**	**609 2RU**	**609 2RD**	**609 2RS**	11	22	0.3	15
	26	8	8	(0.6)	(0.6)	5.70	1.95	0.100	12.4	27 000	24 000	19 000	33 000	**629**	**629 ZZ**	**629 2RU**	**629 2RD**	**629 2RS**	12.1	22	0.3	20
	30	10	10	0.6	0.6	7.50	2.65	0.210	12.3	24 000	—	—	29 000	**639**	**639 ZZ**	—	—	—	13	26	0.6	35

[Note] 1) Numerical values in ( ) do not conform to JIS B 1521.

Extra-small ball bearings, miniature ball bearings
flanged type

d 1 ~ (4) mm



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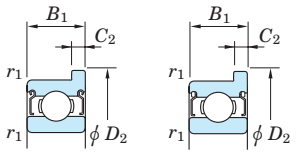
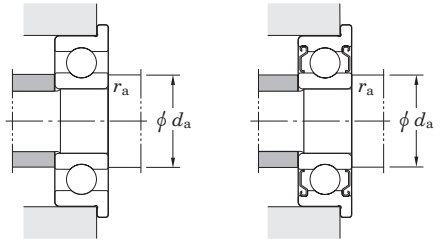


ZZ ZZX

Shielded

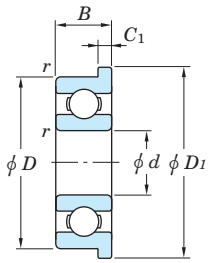


Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1}) Grease lub.	Oil lub.	Bearing No.		Dimensions of flange (mm)				Mounting dimensions (mm)		(Refer.) Mass
d	D	B	B_1	r [1] min.	r_1 [1] min.	C_r	C_{0r}	C_u	f_0	Open ZZ, ZZX	Open Z, ZX	Open	Shielded	D_1	D_2	C_1	C_2	d_a min.	r_a max.	(g)
1	3	1	—	0.07	—	0.120	0.03	0.0007	11.6	130 000	150 000	**F681**	—	3.8	—	0.3	—	1.6	0.05	0.03
	4	1.6	—	0.1	—	0.170	0.04	0.001	11.4	120 000	140 000	**F691**	—	5	—	0.5	—	1.8	0.1	0.1
1.5	4	1.2	2	0.1	0.1	0.140	0.03	0.0009	13.2	120 000	140 000	**F68/1.5**	**WF68/1.5 ZZ**	5	5	0.4	0.6	2.3	0.1	0.1
	5	2	2.6	0.15	0.15	0.300	0.07	0.002	12.9	110 000	120 000	**F69/1.5**	**WF69/1.5 ZZ**	6.5	6.5	0.6	0.8	2.7	0.15	0.2
	6	2.5	3	0.1	0.1	0.410	0.10	0.003	11.4	86 000	100 000	**MLF1506**	**WMLF1506 ZZ**	7.5	7.5	0.6	0.8	2.3	0.1	0.4
2	5	1.5	2.3	0.1	0.1	0.210	0.05	0.001	13.3	99 000	120 000	**F682**	**WF682 ZZ**	6.1	6.1	0.5	0.6	2.8	0.1	0.1
	5	2	2.5	0.1	0.08	0.210	0.05	0.001	12.9	99 000	120 000	**MLF2005**	**WMLF2005 ZZ**	6.2	6.2	0.6	0.6	2.8	0.07	0.2
	6	2.3	3	0.15	0.1	0.410	0.10	0.003	11.4	86 000	100 000	**F692**	**WF692 ZZ**	7.5	7.5	0.6	0.8	3.2	0.1	0.3
	6	2.5	3	0.1	0.1	0.410	0.10	0.003	11.4	86 000	100 000	**MLF2006**	**WMLF2006 ZZ**	7.2	7.2	0.6	0.6	2.8	0.1	0.4
	7	2.5	3	0.15	0.15	0.480	0.13	0.003	12.6	67 000	79 000	**MLF2007**	**WMLF2007 ZZ**	8.2	8.2	0.6	0.6	3.2	0.15	0.5
	7	2.8	3.5	0.15	0.15	0.480	0.13	0.003	12.6	67 000	79 000	**F602**	**WF602 ZZ**	8.5	8.5	0.7	0.9	3.2	0.15	0.6
2.5	6	1.8	2.6	0.1	0.1	0.260	0.07	0.002	14.3	69 000	82 000	**F68/2.5**	**WF68/2.5 ZZ**	7.1	7.1	0.5	0.8	3.3	0.1	0.2
	7	2.5	3.5	0.15	0.15	0.480	0.13	0.003	12.7	66 000	79 000	**F69/2.5**	**WF69/2.5 ZZX**	8.5	8.5	0.7	0.9	3.7	0.15	0.5
	8	2.5	—	0.1	—	0.680	0.17	0.005	11.7	63 000	75 000	**MLF2508/1B**	—	9.2	—	0.6	—	3.5	0.1	0.7
	8	2.8	4	0.15	0.1	0.680	0.17	0.005	11.5	63 000	75 000	**MLF2508**	**WMLF2508 ZZ**	9.5	9.5	0.7	0.9	3.7	0.1	0.7
3	6	2	2.5	0.08	0.05	0.260	0.07	0.002	14.3	69 000	82 000	**MLF3006**	**WMLF3006 ZZ**	7.2	7.2	0.6	0.6	3.6	0.05	0.2
	7	2	3	(0.15)	(0.15)	0.390	0.11	0.003	14.0	65 000	78 000	**F683**	**WF683 ZZ**	8.1	8.1	0.5	0.8	4.2	0.1	0.4
	8	2.5	—	0.1	—	0.490	0.14	0.004	13.4	61 000	72 000	**MLF3008**	—	9.2	—	0.6	—	4.0	0.1	0.6
	8	3	4	0.15	0.15	0.690	0.18	0.005	11.9	63 000	75 000	**F693**	**WF693 ZZ**	9.5	9.5	0.7	0.9	4.2	0.15	0.7
	9	3	5	0.15	0.15	0.710	0.19	0.005	12.4	60 000	72 000	**F603**	**WF603 ZZ**	10.5	10.5	0.7	1	4.2	0.15	1.0
	10	4	4	0.15	0.15	0.800	0.22	0.006	12.4	61 000	72 000	**F623**	**F623 ZZ**	11.5	11.5	1	1	4.2	0.15	1.8
4	7	2	2.5	0.08	0.05	0.320	0.11	0.003	15.1	63 000	75 000	**MLF4007**	**WMLF4007 ZZX**	8.2	8.2	0.6	0.6	4.6	0.05	0.3
	8	2	3	0.1	0.08	0.490	0.14	0.004	13.9	61 000	72 000	**MLF4008**	**WMLF4008 ZZ**	9.2	9.2	0.6	0.6	4.8	0.08	0.5
	9	2.5	4	(0.15)	(0.15)	0.800	0.23	0.006	12.8	59 000	70 000	**F684**	**WF684 ZZ**	10.3	10.3	0.6	1	5.2	0.1	0.7
	10	3	4	0.15	0.1	0.880	0.27	0.007	13.5	56 000	66 000	**MLF4010**	**WMLF4010 ZZ**	11.2	11.6	0.6	0.8	5.2	0.1	1.1
	11	4	4	0.15	0.15	1.20	0.35	0.009	12.4	54 000	65 000	**F694**	**F694 ZZ**	12.5	12.5	1	1	5.2	0.15	2.0
	12	4	4	0.2	0.2	1.20	0.35	0.009	12.4	54 000	65 000	**F604**	**F604 ZZ**	13.5	13.5	1	1	5.6	0.2	2.3

[Note] 1) Numerical values in ( ) do not conform to JIS B 1521.

Extra-small ball bearings, miniature ball bearings
flanged type

d (4) ~ 8 mm



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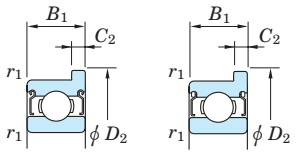
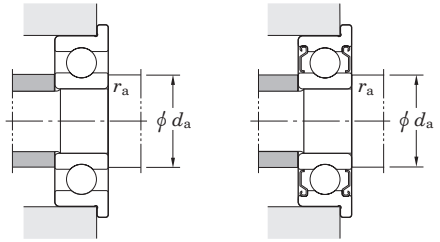


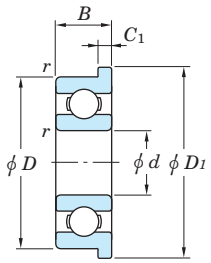
ZZ ZZX

Shielded

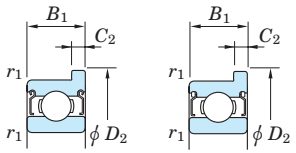


Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1}) Grease lub.	Oil lub.	Bearing No.		Dimensions of flange (mm)				Mounting dimensions (mm)		(Refer.) Mass
d	D	B	B_1	r min.	r_1 min.	C_r	C_{0r}	C_u	f_0	Open ZZ, ZZX	Open Z, ZX	Open	Shielded	D_1	D_2	C_1	C_2	d_a min.	r_a max.	(g)
4	13	5	5	0.2	0.2	0.010	0.48	1.65	12.2	50 000	60 000	**F624**	**F624 ZZ**	15	15	1	1	5.6	0.2	3.3
	16	5	5	0.3	0.3	0.010	0.52	1.70	13.0	47 000	55 000	**F634**	**F634 ZZ**	18	18	1	1	6	0.3	5.7
5	8	2	2.5	0.08	0.05	0.270	0.09	0.002	15.8	59 000	70 000	**MLF5008**	**WMLF5008 ZZX**	9.2	9.2	0.6	0.6	5.6	0.05	0.4
	9	2.5	3	0.1	0.08	0.540	0.17	0.004	14.6	57 000	67 000	**MLF5009**	**WMLF5009 ZZX**	10.2	10.2	0.6	0.6	5.8	0.08	0.6
	10	3	4	0.1	0.1	0.540	0.17	0.005	14.8	57 000	67 000	**MLF5010**	**WMLF5010 ZZ**	11.2	11.6	0.6	0.8	5.8	0.1	1.0
	11	3	5	0.15	0.15	0.890	0.28	0.007	14.0	53 000	63 000	**F685**	**WF685 ZZ**	12.5	12.5	0.8	1	6.2	0.15	1.1
	13	4	4	0.2	0.2	1.35	0.43	0.010	13.4	49 000	59 000	**F695**	**F695 ZZ**	15	15	1	1	6.6	0.2	2.5
	14	5	5	0.2	0.2	1.65	0.51	0.01	12.3	48 000	57 000	**F605**	**F605 ZZ**	16	16	1	1	6.6	0.2	3.9
	16	5	5	0.3	0.3	2.15	0.67	0.03	12.4	45 000	54 000	**F625**	**F625 ZZ**	18	18	1	1	7	0.3	5.4
	19	6	6	0.3	0.3	2.90	0.89	0.04	12.3	40 000	47 000	**F635**	**F635 ZZ**	22	22	1.5	1.5	7	0.3	9.7
6	10	2.5	3	0.1	0.08	0.620	0.22	0.006	15.2	53 000	63 000	**MLF6010**	**WMLF6010 ZZX**	11.2	11.2	0.6	0.6	6.8	0.08	0.7
	12	3	4	0.15	0.1	0.890	0.29	0.008	14.5	49 000	59 000	**MLF6012**	**WMLF6012 ZZ**	13.2	13.6	0.6	0.8	7.2	0.1	1.4
	13	3.5	5	0.15	0.15	1.35	0.44	0.010	13.7	48 000	57 000	**F686**	**WF686 ZZ**	15	15	1	1.1	7.2	0.15	2.1
	15	5	5	0.2	0.2	1.70	0.52	0.01	13.0	47 000	55 000	**F696**	**F696 ZZ**	17	17	1.2	1.2	7.6	0.2	4.3
	17	6	6	0.3	0.3	2.85	0.84	0.03	11.4	43 000	52 000	**F606**	**F606 ZZ**	19	19	1.2	1.2	8	0.3	6.3
	19	6	6	0.3	0.3	2.90	0.89	0.04	12.3	40 000	47 000	**F626**	**F626 ZZ**	22	22	1.5	1.5	8	0.3	9.2
	22	7	7	0.3	0.3	4.10	1.35	0.06	12.4	34 000	41 000	**F636**	**F636 ZZ**	25	25	1.5	1.5	8	0.3	14
7	11	2.5	3	0.1	0.08	0.570	0.20	0.005	15.6	49 000	59 000	**MLF7011**	**WMLF7011 ZZX**	12.2	12.2	0.6	0.6	7.8	0.08	0.8
	13	3	4	0.15	0.15	0.680	0.28	0.007	16.0	46 000	55 000	**MLF7013**	**WMLF7013 ZZ**	14.2	14.6	0.6	0.8	8.2	0.15	1.5
	14	3.5	5	0.15	0.15	1.45	0.51	0.010	14.2	45 000	54 000	**F687**	**WF687 ZZ**	16	16	1	1.1	8.2	0.15	2.4
	17	5	5	0.3	0.3	2.00	0.71	0.02	14.0	42 000	50 000	**F697**	**F697 ZZ**	19	19	1.2	1.2	9	0.3	5.8
	19	6	6	0.3	0.3	2.95	0.89	0.04	12.1	40 000	47 000	**F607**	**F607 ZZ**	22	22	1.5	1.5	9	0.3	8.7
	22	7	7	0.3	0.3	4.10	1.35	0.06	12.4	34 000	41 000	**F627**	**F627 ZZ**	25	25	1.5	1.5	9	0.3	14
8	12	2.5	3.5	0.1	0.08	0.680	0.27	0.007	15.9	47 000	55 000	**MLF8012**	**WMLF8012 ZZX**	13.2	13.6	0.6	0.8	8.8	0.08	0.9
	14	3.5	4	0.15	0.15	1.00	0.42	0.01	15.3	44 000	52 000	**MLF8014**	**WMLF8014 ZZ**	15.6	15.6	0.8	0.8	9.2	0.15	2.0
	16	4	5	0.2	0.2	1.55	0.59	0.020	14.8	42 000	50 000	**F688**	**WF688 ZZ**	18	18	1	1.1	9.6	0.2	3.6
	19	6	6	0.3	0.3	2.80	0.91	0.040	12.9	39 000	46 000	**F698**	**F698 ZZ**	22	22	1.5	1.5	10	0.3	8.3
	22	7	7	0.3	0.3	4.10	1.35	0.060	12.4	34 000	41 000	**F608**	**F608 ZZ**	25	25	1.5	1.5	10	0.3	13

d 9 mm

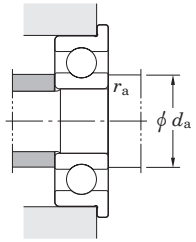


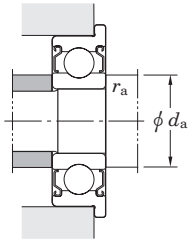
Open



ZZ ZZX

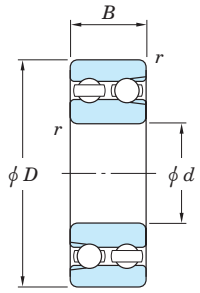
Shielded





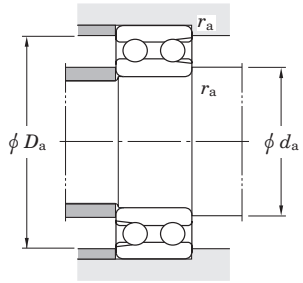
Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1}) Grease lub.	Oil lub.	Bearing No.		Dimensions of flange (mm)				Mounting dimensions (mm)		(Refer.) Mass
d	D	B	B_1	r min.	r_1 min.	C_r	C_{0r}	C_u	f_0	Open ZZ, ZZX	Open Z, ZX	Open	Shielded	D_1	D_2	C_1	C_2	d_a min.	r_a max.	(g)
9	17	4	5	0.2	0.2	1.65	0.66	0.020	15.1	39 000	46 000	**F689**	**WF689 ZZ**	19	19	1	1.1	10.6	0.2	3.9
	20	6	6	0.3	0.3	3.10	1.05	0.04	13.3	37 000	44 000	**F699**	**F699 ZZ**	23	23	1.5	1.5	11	0.3	8.7
	24	7	7	0.3	0.3	4.15	1.45	0.06	12.8	32 000	38 000	**F609**	**F609 ZZ**	27	27	1.5	1.5	11	0.3	16

d 10 ~ (60) mm



Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)			(Refer.) Mass (kg)
d	D	B	r min.	C_r	C_{0r}	C_u	f_0	Grease lub.	Oil lub.		d_a min.	D_a max.	r_a max.	
10	30	14	0.6	9.61	5.90	0.300	13.0	15 000	20 000	**4200**	14	26	0.6	0.057
12	32	14	0.6	9.71	6.15	0.320	13.6	14 000	18 000	**4201**	16	28	0.6	0.062
15	35	14	0.6	12.2	9.00	0.460	14.2	12 000	16 000	**4202**	19	31	0.6	0.071
	42	17	1	16.4	11.7	0.830	13.7	11 000	14 000	**4302**	20	37	1	0.123
17	40	16	0.6	14.6	10.4	0.710	14.1	11 000	14 000	**4203**	21	36	0.6	0.106
	47	19	1	20.6	15.0	1.05	13.7	9 400	13 000	**4303**	22	42	1	0.171
20	47	18	1	20.5	16.0	1.10	14.2	9 000	12 000	**4204**	25	42	1	0.165
	52	21	1.1	24.3	17.0	1.25	13.5	8 300	11 000	**4304**	26.5	45.5	1	0.227
25	52	18	1	20.4	16.9	1.05	15.0	7 500	9 900	**4205**	30	47	1	0.189
	62	24	1.1	32.9	25.7	1.75	14.1	6 700	9 000	**4305**	31.5	55.5	1	0.365
30	62	20	1	27.4	24.7	1.50	15.1	6 400	8 500	**4206**	35	57	1	0.298
	72	27	1.1	44.4	35.9	2.45	14.0	5 700	7 600	**4306**	36.5	65.5	1	0.542
35	72	23	1.1	33.0	30.7	1.85	15.2	5 600	7 400	**4207**	41.5	65.5	1	0.460
	80	31	1.5	50.7	41.8	2.85	14.1	5 200	7 000	**4307**	43	72	1.5	0.752
40	80	23	1.1	42.2	42.4	2.50	15.5	4 700	6 300	**4208**	46.5	73.5	1	0.558
	90	33	1.5	57.5	48.8	3.25	14.7	4 600	6 100	**4308**	48	82	1.5	1.01
45	85	23	1.1	39.8	43.9	2.45	15.8	4 600	6 100	**4209**	51.5	78.5	1	0.605
	100	36	1.5	72.0	62.4	4.20	14.3	4 100	5 500	**4309**	53	92	1.5	1.35
50	90	23	1.1	39.2	44.6	2.45	16.1	4 200	5 600	**4210**	56.5	83.5	1	0.651
	110	40	2	88.0	77.7	5.25	14.2	3 700	5 000	**4310**	59	101	2	1.80
55	100	25	1.5	46.5	54.1	2.95	16.1	3 800	5 000	**4211**	63	92	1.5	0.882
	120	43	2	105	94.4	6.40	14.2	3 400	4 600	**4311**	64	111	2	2.29
60	110	28	1.5	59.9	67.6	3.80	15.9	3 500	4 700	**4212**	68	102	1.5	1.20

d (60) ~ 75 mm



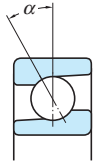
Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Factor	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)			(Refer.) Mass (kg)
d	D	B	r min.	C_r	C_{0r}	C_u	f_0	Grease lub.	Oil lub.		d_a min.	D_a max.	r_a max.	
60	130	46	2.1	124	113	7.70	14.1	3 100	4 200	**4312**	71	119	2	2.87
65	120	31	1.5	68.3	78.5	4.35	15.9	3 200	4 300	**4213**	73	112	1.5	1.59
	140	48	2.1	134	124	8.20	14.3	2 900	3 900	**4313**	76	129	2	3.46
70	125	31	1.5	77.7	89.8	5.05	15.8	3 100	4 100	**4214**	78	117	1.5	1.68
	150	51	2.1	144	136	8.55	14.4	2 700	3 600	**4314**	81	139	2	4.21
75	130	31	1.5	77.0	90.7	4.95	16.0	2 900	3 900	**4215**	83	122	1.5	1.77
	160	55	2.1	166	158	9.70	14.4	2 500	3 400	**4315**	86	149	2	5.15

Angular contact ball bearings

Angular contact ball bearings are suitable for applications which require high accuracy and good high-speed performance. This type of bearing is designed to carry a combined load.

■ Single-row angular contact ball bearings and matched pair angular contact ball bearings

Contact angle



- The standard contact angles are 15°, 30° and 40°. They are identified, respectively, by the supplementary codes "C", "A" (omitted) and "B". Bearings with a smaller contact angle are more suitable for applications involving high-speed rotation. Those with a larger contact angle feature superior axial load resistance.
- Angular contact ball bearings are often preloaded to enhance their rigidity and rotating performance. (refer to p. A 112.)
  For high-precision matched pair angular contact ball bearings of class 5 or higher, which are used in machine tools and other precision equipment, the standard preload is specified in three levels: slight (S), light (L), medium (M) and heavy (H). (refer to Table 11-2 on p. A 114.)
- When this type of bearing is loaded radially, an axial component of force is produced. In this case, two bearings are used together facing one another, or two or more bearings are matched and used. (refer to p. A 38.)
- Tables 1 and 2 list the different types of single-row and matched pair/stack angular contact ball bearings and describe their characteristics.

■ Double-row angular contact ball bearings

Consist of two single-row angular contact ball bearings matched back-to-back, with inner and outer rings integrated.
Table 3 shows major types and their characteristics.

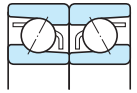
■ Four-point contact ball bearings

- Have a contact angle of 35° and an inner ring divided into two annular pieces. They are suitable for applications that involve either axial loading or combined loading, where the axial load makes up the major part of the load.
- Able to support both axial load and a certain degree of radial load. Each rolling element is in contact with each of the inner and outer rings at a single point, and both contact points lie on the contact angle line. The line runs to either the right or left depending on the direction of the axial load.

Single-row angular contact ball bearings

Bore diameter **10** – **380** mm

Matched pair angular contact ball bearings



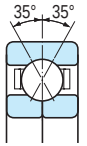
Bore diameter **10** – **380** mm

Double-row angular contact ball bearings

Bore diameter **10** – **110** mm

Four-point contact ball bearings

Bore diameter **20** – **110** mm



- Consult with JTEKT when using the four-point contact ball bearing because application conditions such as load magnitude should be examined carefully.

Table 1 Single-row angular contact ball bearings

Standard type

(with pressed cage)

(with machined cage)

- Single-row angular contact ball bearings accommodate radial load and axial load in one direction.
- Bearings with a machined cage are suitable for high-speed applications.

Reference **G-type bearing**

"G-type" bearings have a stand-out between the inner ring and outer ring on both sides that are equal in size. This arrangement is called "flush ground processing." These bearings can be matched in a variety of ways.

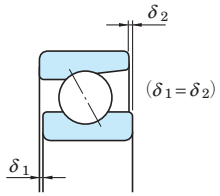
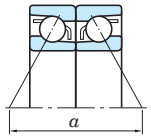
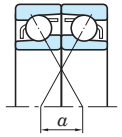
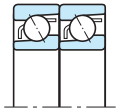
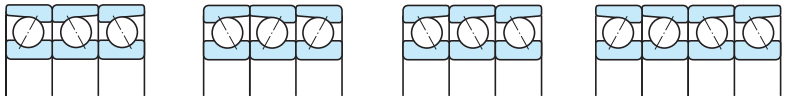


Table 2 Matched pair and stack angular contact ball bearings

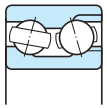
Back-to-back arrangement (DB)		• Carries radial load and axial load in both directions. • Suitable for applications involving moment loading because the distance between the load centers (a) is long. • As for the preloaded type, the clearance is pre-adjusted so that bearings will be preloaded the proper amount when the inner ring is fixed with a nut.
Face-to-face arrangement (DF)		• Carries radial load and axial load in both directions. • Has a smaller moment load accommodating capacity than the back-to-back arrangement, because the distance between the load centers (a) is shorter. • As for the preloaded type, the clearance is pre-adjusted so that bearings will be preloaded the proper amount when the outer rings are pressed together.
Tandem arrangement (DT)		• Carries radial load and axial load in one direction. • Suitable for applications which involve a high degree of axial loading.

Matched stack

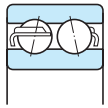


(DBD) (DFD) (DTD) (DBB)

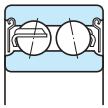
Table 3 Double-row angular contact ball bearings



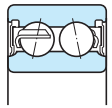
(with filling slot)
32, 33



(without filling slot)
52, 53



Shielded
52...ZZ, 53...ZZ



Sealed
52...2RS, 53...2RS

- Accommodates radial load and axial load in both directions. Also able to accommodate moment load. When installing bearings with filling slot (32 and 33 series), the raceway side without filling slot must accommodate main load.
- The 32 and 33 series are provided with a filling slot, while the 52 and 53 series are not.

  32 and 33 series : contact angle 32°
  52 and 53 series : contact angle 24°
- Inferior to single-row and matched pair angular contact ball bearings in terms of high-speed and high accuracy performance.
- Shielded or sealed 52 and 53 series bearings are also available.

Boundary dimensions	The dimensions of standard series are as specified in JIS B 1512.
Tolerances	· As specified in JIS B 1514-1. (refer to Table 7-3 on pp. A 60 – A 63.) · JTEKT has established "special tolerances" for bore diameter and outside diameter, as listed in the table to the right, to make it easy to produce high-precision matched stack bearings. Bearings which are produced based on these tolerances are identified by the supplementary code "K5."
Internal clearance	■ Matched pair bearing axial internal clearance.....(refer to Table 10-4 on p. A 103.) ■ Double-row bearing radial internal clearance.....(refer to Table 10-5 on p. A 104.)
Recommended fits	■ Classes 0 and 6 bearings.....(refer to Table 9-4 on pp. A 91, 92.) ■ Classes 5 and 4 bearings.....as listed in the table below. ■ Refer to Table 11-3 on page A 115 for the recommended fits of high-precision matched pair bearings (class 5 and class 4), which are used with light preload (L) or middle preload (M).

Special tolerances (K5) Unit : μm

Nominal bore diameter d (mm) over	up to	Single plane mean bore diameter (Δ_{dmp}) or single plane mean outside diameter deviation (Δ_{Dmp}) class 5 upper	class 5 lower	class 4 upper	class 4 lower
–	50	– 1	– 4	– 1	– 3
50	80	– 1	– 5	– 1	– 4
80	120	– 1	– 5	– 1	– 4

Fit		class 5 Tolerance class	class 4 Tolerance class
With shaft	Inner ring rotation	js 5	js 4
	Outer ring rotation	h 5	h 4
With housing	Fixed side	JS 6	JS 5
	Free side	H 6	H 5
	Outer ring rotation	M 5	M 4

Standard cages

- Pressed cage
  (supplementary code : //)
- Copper alloy machined cage
  (supplementary code : FY)

[Note] Machine tools are generally equipped with bearings that have a phenolic resin machined cage (FT). Bearings with a polyamide molded cage can also be used depending on the applications.
Four-point contact ball bearings usually use a copper alloy machined cage.

Application of standard cages

Bearing series	Pressed cage	Machined cage
79C	—	7900C – 7932C
79CPA	—	7900CPA – 7932CPA
70	—	7000 – 7040
70B	—	7000B – 7040B
70C	—	7000C – 7040C
70CPA	—	7000CPA – 7034CPA
72	7200 – 7220	7200 – 7240
72B	7200B – 7220B	7200B – 7240B
72C	7200C – 7220C	7200C – 7240C
72CPA	—	7200CPA – 7230CPA
73	7300 – 7320	7300 – 7340
73B	7303B – 7320B	7303B – 7340B
73C	7303C – 7320C	7303C – 7334C
74	7405 – 7409	7404 – 7418
74B	7405B – 7409B	7404B – 7418B
32	3200 – 3215	3216 – 3222
33	3302 – 3313	3314 – 3322
52	5203 – 5214	—
53	5304 – 5315	—

Allowable misalignment

Single-row.....0.000 6 rad (2') : Matched pair, double-row.....misalignment not allowed

Equivalent radial load

[Single-row and matched pair angular contact ball bearings]

Dynamic equivalent radial load

$$P_r = XF_r + YF_a$$

Contact angle	$if_0F_a^*/C_{0r}$	e	Single-row and tandem arrangement				Back-to-back and face-to-face arrangement			
			$F_a/F_r \leqq e$		$F_a/F_r > e$		$F_a/F_r \leqq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40				1.40		1.57		2.28
	0.714	0.43				1.30		1.46		2.11
	1.07	0.46				1.23		1.38		2.00
	1.43	0.47				1.19		1.34		1.93
	2.14	0.50				1.12		1.26		1.82
	3.57	0.55				1.02		1.14		1.66
	5.35	0.56				1.00		1.12		1.63
	7.14	0.56				1.00		1.12		1.63
30°	–	0.80	1	0	0.39	0.76	1	0.78	0.63	1.24
40°	–	1.14	1	0	0.35	0.57	1	0.55	0.57	0.93

* For i, use 2 for DB&DF and 1 for single&DT.
Factor f_0 is shown in the bearing dimention table.

[Note]
When two single-row angular contact ball bearings are used facing one another, an axial component of force is produced under radial load. In this case, refer to page A 38 for calculation of the dynamic equivalent radial load.

Static equivalent radial load

$$P_{0r} = X_0 F_r + Y_0 F_a$$

In reference to single-row and tandem arrangement bearings,

when $P_{0r} < F_r$, $P_{0r} = F_r$

Contact angle	Single-row and tandem arrangement		Back-to-back and face-to-face arrangement	
	X_0	Y_0	X_0	Y_0
15°	0.5	0.46	1	0.92
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

Equivalent radial load

[Double-row angular contact ball bearings]

Dynamic equivalent radial load

$$P_r = XF_r + YF_a$$

Contact angle	e	$F_a/F_r \leqq e$		$F_a/F_r > e$		(reference)
		X	Y	X	Y	
24°	0.66	1	0.95	0.68	1.45	52, 53 series
32°	0.86	1	0.73	0.62	1.17	32, 33 series

Static equivalent radial load

$$P_{0r} = X_0 F_r + Y_0 F_a$$

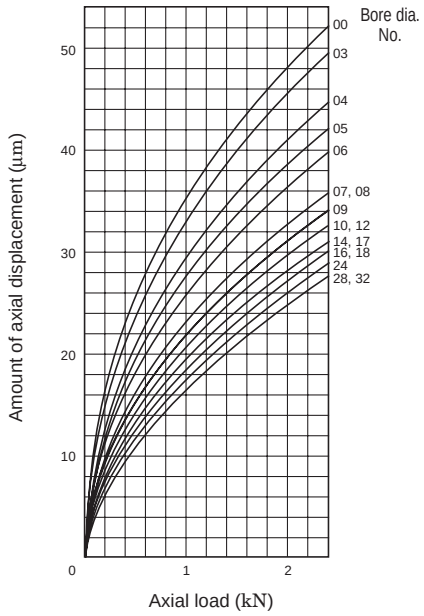
Contact angle	X_0	Y_0	(reference)
24°	1	0.78	52, 53 series
32°	1	0.63	32, 33 series

[Note] In angular contact ball bearings, slippage occurs between the balls and raceways under too small a load, causing smearing to develop.
Matched pair bearings may develop smearing when the ratio of the axial load to the radial load exceeds the value of e ($F_a / F_r > e$), as listed in the specification table. Consult with JTEKT when these bearings are used under the above conditions.

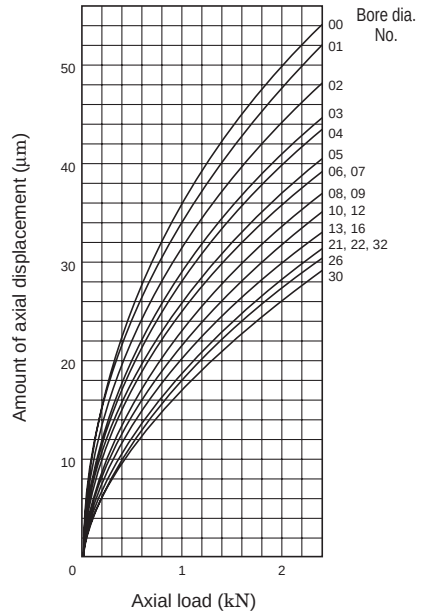
[Reference] Relationship between axial load and axial displacement

Diagrams (1) to (9) illustrate the relationship between axial load and axial displacement.

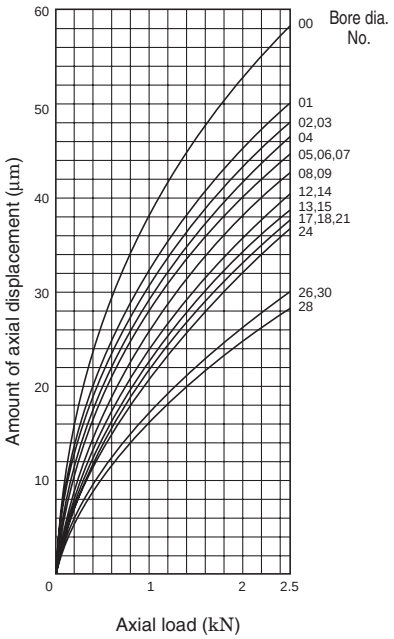
(1) 7900C (contact angle 15°)



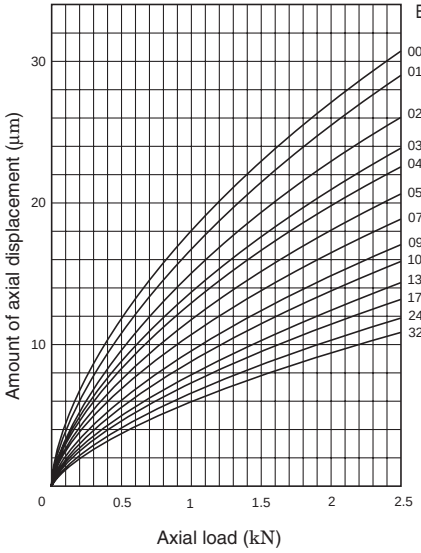
(2) 7000C (contact angle 15°)



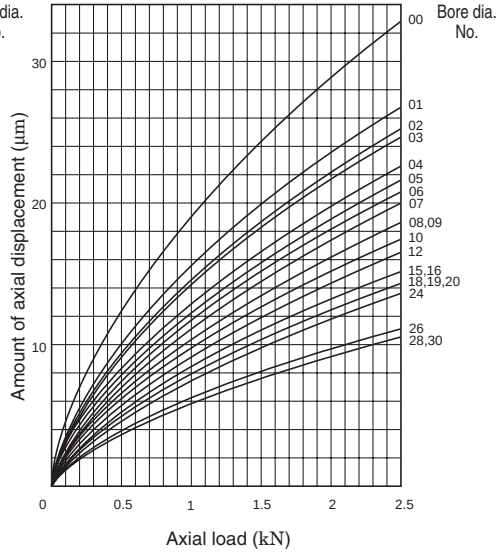
(3) 7200C (contact angle 15°)



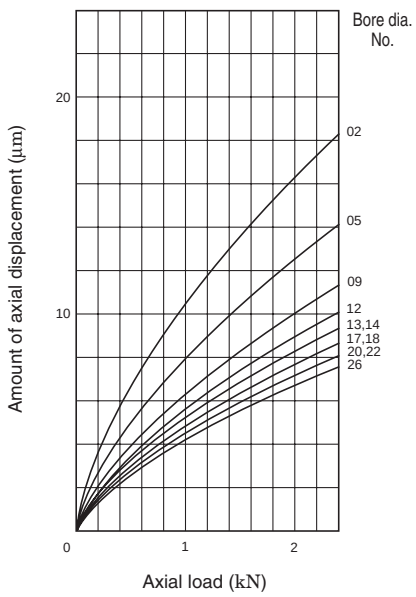
(4) 7000 (contact angle 30°)



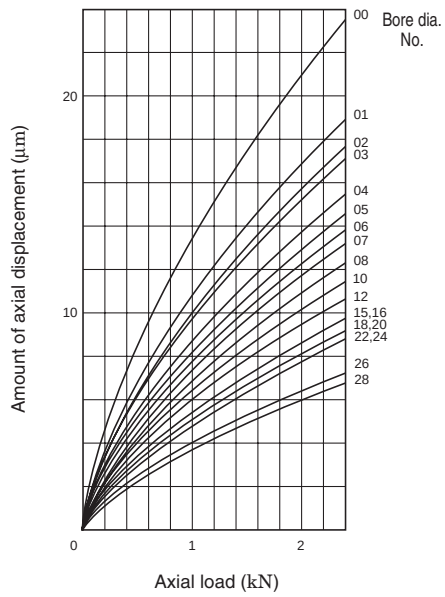
(5) 7200 (contact angle 30°)



(6) 7000B (contact angle 40°)

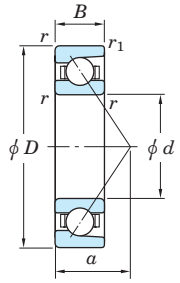


(7) 7200B (contact angle 40°)



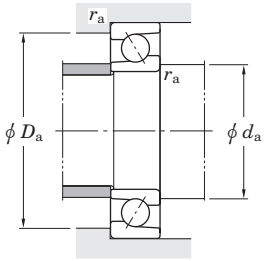
Single-row angular contact ball bearings

d 10 ~ (17) mm



With machined cage

With pressed cage



Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN)		Factor	Limiting speeds [1] (min^{-1})		Bearing No. [2]	Load center (mm)	Mounting dimensions (mm)			(Refer.) Mass (kg)
					With machined cage		With pressed cage		C_u										
d	D	B	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cage	With pressed cage	f_0	Grease lub.	Oil lub.		a	d_a min.	D_a max.	r_a max.	
10	22	6	0.3	0.15	3.75	1.50	—	—	0.060	—	14.2	52 000	69 000	**7900C**	5.1	12.5	19.5	0.3	0.008
	26	8	0.3	0.15	6.25	2.35	—	—	0.120	—	—	34 000	42 000	**7000**	9.1	12.5	23.5	0.3	0.021
	26	8	0.3	0.15	5.80	2.15	—	—	0.110	—	—	25 000	33 000	**7000B**	11.6	12.5	23.5	0.3	0.021
	26	8	0.3	0.15	6.60	2.45	—	—	0.130	—	12.5	47 000	62 000	**7000C**	6.4	12.5	23.5	0.3	0.021
	30	9	0.6	0.3	5.85	2.20	6.75	2.75	0.110	0.140	—	29 000	37 000	**7200**	10.4	14.5	25.5	0.6	0.031
	30	9	0.6	0.3	5.35	2.00	6.20	2.50	0.100	0.130	—	22 000	29 000	**7200B**	13.1	14.5	25.5	0.6	0.031
	30	9	0.6	0.3	6.25	2.35	7.25	2.95	0.120	0.150	13.4	40 000	54 000	**7200C**	7.2	14.5	25.5	0.6	0.031
	35	11	0.6	0.3	10.6	3.75	11.6	4.30	0.300	0.340	—	27 000	33 000	**7300**	12.0	14.5	30.5	0.6	0.054
12	24	6	0.3	0.15	4.00	1.70	—	—	0.070	—	14.7	48 000	62 000	**7901C**	5.4	14.5	21.5	0.3	0.010
	28	8	0.3	0.15	6.75	2.75	—	—	0.140	—	—	29 000	37 000	**7001**	9.9	14.5	25.5	0.3	0.024
	28	8	0.3	0.15	6.20	2.50	—	—	0.130	—	—	22 000	29 000	**7001B**	12.6	14.5	25.5	0.3	0.024
	28	8	0.3	0.15	7.25	2.95	—	—	0.150	—	13.4	40 000	54 000	**7001C**	6.7	14.5	25.5	0.3	0.024
	32	10	0.6	0.3	9.30	3.65	10.0	4.05	0.280	0.310	—	27 000	34 000	**7201**	11.4	16.5	27.5	0.6	0.038
	32	10	0.6	0.3	8.65	3.40	9.30	3.75	0.240	0.270	—	20 000	27 000	**7201B**	14.2	16.5	27.5	0.6	0.038
	32	10	0.6	0.3	9.90	3.85	10.6	4.30	0.300	0.330	12.5	38 000	50 000	**7201C**	7.9	16.5	27.5	0.6	0.038
	37	12	1	0.6	12.8	4.60	14.0	5.25	0.360	0.410	—	24 000	31 000	**7301**	13.1	17.5	31.5	1	0.065
15	28	7	0.3	0.15	5.95	2.65	—	—	0.110	—	14.5	39 000	52 000	**7902C**	6.4	17.5	25.5	0.3	0.015
	32	9	0.3	0.15	7.65	3.45	—	—	0.180	—	—	26 000	32 000	**7002**	11.3	17.5	29.5	0.3	0.035
	32	9	0.3	0.15	6.95	3.15	—	—	0.160	—	—	19 000	25 000	**7002B**	14.6	17.5	29.5	0.3	0.035
	32	9	0.3	0.15	8.25	3.70	—	—	0.190	—	14.1	35 000	47 000	**7002C**	7.6	17.5	29.5	0.3	0.035
	35	11	0.6	0.3	10.1	4.25	10.1	4.25	0.300	0.300	—	24 000	29 000	**7202**	12.9	19.5	30.5	0.6	0.048
	35	11	0.6	0.3	9.30	3.95	9.30	3.95	0.260	0.260	—	18 000	24 000	**7202B**	16.2	19.5	30.5	0.6	0.048
	35	11	0.6	0.3	10.8	4.55	10.8	4.55	0.340	0.340	13.3	33 000	43 000	**7202C**	8.9	19.5	30.5	0.6	0.048
	42	13	1	0.6	15.7	6.45	16.8	7.20	0.490	0.550	—	20 000	25 000	**7302**	15.0	20.5	36.5	1	0.088
17	30	7	0.3	0.15	6.25	2.95	—	—	0.120	—	14.9	36 000	47 000	**7903C**	6.7	19.5	27.5	0.3	0.016
	35	10	0.3	0.15	8.40	4.15	—	—	0.210	—	—	23 000	28 000	**7003**	12.7	19.5	32.5	0.3	0.045

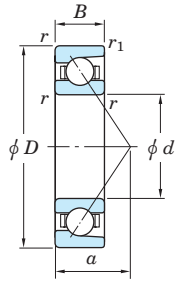
[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cage or molded cage.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.

[Remark] Standard cage types used for the above bearings are described earlier in this section.

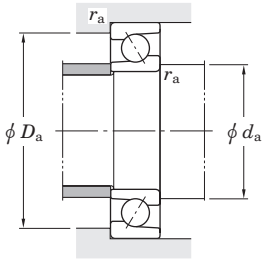
Single-row angular contact ball bearings

d (17) ~ (25) mm



With machined cage

With pressed cage



Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN)		Factor		Limiting speeds [1] (min^{-1})		Bearing No. [2]	Load center (mm)	Mounting dimensions (mm)			(Refer.) Mass (kg)
					With machined cage		With pressed cage		C_u											
d	D	B	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cage	With pressed cage	f_0		Grease lub.	Oil lub.		a	d_a min.	D_a max.	r_a max.	
17	35	10	0.3	0.15	7.60	3.75	—	—	0.190	—	—		17 000	23 000	**7003B**	16.1	19.5	32.5	0.3	0.045
	35	10	0.3	0.15	9.15	4.45	—	—	0.230	—	14.6		31 000	41 000	**7003C**	8.6	19.5	32.5	0.3	0.045
	40	12	0.6	0.3	12.7	5.50	12.7	5.50	0.380	0.380	—		21 000	26 000	**7203**	14.4	21.5	35.5	0.6	0.070
	40	12	0.6	0.3	11.7	5.05	11.7	5.05	0.330	0.330	—		16 000	21 000	**7203B**	18.2	21.5	35.5	0.6	0.070
	40	12	0.6	0.3	13.6	5.90	13.6	5.90	0.440	0.440	13.4		29 000	38 000	**7203C**	9.9	21.5	35.5	0.6	0.070
	47	14	1	0.6	18.7	7.90	20.0	8.75	0.590	0.660	—		18 000	23 000	**7303**	16.5	22.5	41.5	1	0.120
	47	14	1	0.6	17.3	7.30	18.5	8.10	0.510	0.570	—		14 000	18 000	**7303B**	20.8	22.5	41.5	1	0.120
	47	14	1	0.6	19.8	8.40	19.8	8.40	0.650	0.650	12.6		25 000	33 000	**7303C**	11.4	22.5	41.5	1	0.120
20	37	9	0.3	0.15	9.10	4.55	—	—	0.240	—	14.9		30 000	39 000	**7904C**	8.3	22.5	34.5	0.3	0.035
	42	12	0.6	0.3	12.9	6.10	—	—	0.390	—	—		19 000	24 000	**7004**	15.1	24.5	37.5	0.6	0.079
	42	12	0.6	0.3	11.7	5.55	—	—	0.340	—	—		14 000	19 000	**7004B**	19.2	24.5	37.5	0.6	0.079
	42	12	0.6	0.3	13.9	6.60	—	—	0.450	—	14.1		26 000	35 000	**7004C**	10.2	24.5	37.5	0.6	0.079
	47	14	1	0.6	18.1	8.40	19.2	9.15	0.580	0.640	—		17 000	22 000	**7204**	17.0	25.5	41.5	1	0.112
	47	14	1	0.6	16.6	7.70	17.6	8.40	0.500	0.550	—		13 000	17 000	**7204B**	21.5	25.5	41.5	1	0.112
	47	14	1	0.6	19.4	9.00	20.6	9.80	0.670	0.730	13.4		24 000	32 000	**7204C**	11.6	25.5	41.5	1	0.112
	52	15	1.1	0.6	21.8	9.40	23.4	10.4	0.710	0.790	—		17 000	21 000	**7304**	17.9	27	45	1	0.150
	52	15	1.1	0.6	20.2	8.70	21.7	9.65	0.610	0.680	—		13 000	17 000	**7304B**	22.6	27	45	1	0.150
	52	15	1.1	0.6	23.1	9.95	24.8	11.1	0.780	0.860	12.6		23 000	31 000	**7304C**	12.3	27	45	1	0.150
	72	19	1.1	0.6	44.5	19.1	—	—	1.50	—	—		9 600	13 000	**7404**	23.1	27	65	1	0.395
	72	19	1.1	0.6	41.9	17.9	—	—	1.40	—	—		8 500	12 000	**7404B**	29.2	27	65	1	0.395
25	42	9	0.3	0.15	10.2	5.45	—	—	0.300	—	15.5		25 000	33 000	**7905C**	9.1	27.5	39.5	0.3	0.041
	47	12	0.6	0.3	14.1	7.40	—	—	0.450	—	—		17 000	21 000	**7005**	16.4	29.5	42.5	0.6	0.091
	47	12	0.6	0.3	12.8	6.70	—	—	0.390	—	—		12 000	17 000	**7005B**	21.1	29.5	42.5	0.6	0.091
	47	12	0.6	0.3	15.4	8.00	—	—	0.510	—	14.7		23 000	30 000	**7005C**	10.8	29.5	42.5	0.6	0.091
	52	15	1	0.6	19.2	9.50	20.2	10.3	0.620	0.670	—		15 000	19 000	**7205**	18.8	30.5	46.5	1	0.135
	52	15	1	0.6	17.5	8.70	18.4	9.40	0.530	0.580	—		12 000	15 000	**7205B**	23.9	30.5	46.5	1	0.135

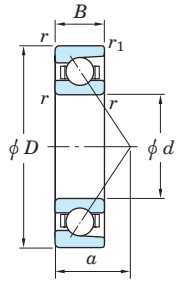
[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cage or molded cage.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.

[Remark] Standard cage types used for the above bearings are described earlier in this section.

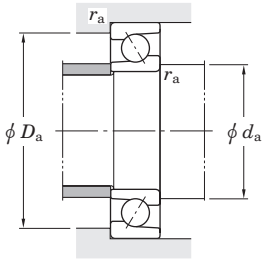
Single-row angular contact ball bearings

d (25) ~ (35) mm



With machined cage

With pressed cage



Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN)		Factor		Limiting speeds [1] (min^{-1})		Bearing No. [2]	Load center (mm)	Mounting dimensions (mm)			(Refer.) Mass (kg)
					With machined cage		With pressed cage		C_u											
d	D	B	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cage	With pressed cage	f_0		Grease lub.	Oil lub.		a	d_a min.	D_a max.	r_a max.	
25	52	15	1	0.6	20.7	10.2	21.9	11.1	0.710	0.770	14.0		21 000	28 000	**7205C**	12.7	30.5	46.5	1	0.135
	62	17	1.1	0.6	31.0	14.4	33.0	15.8	1.05	1.15	—		14 000	17 000	**7305**	21.1	32	55	1	0.243
	62	17	1.1	0.6	28.6	13.3	30.5	14.6	0.910	1.00	—		10 000	14 000	**7305B**	26.8	32	55	1	0.243
	62	17	1.1	0.6	33.0	15.3	35.1	16.8	1.20	1.30	12.8		19 000	25 000	**7305C**	14.3	32	55	1	0.243
	80	21	1.5	1	49.7	23.2	53.3	25.7	1.80	2.00	—		8 200	11 000	**7405**	26.4	33.5	71.5	1.5	0.527
	80	21	1.5	1	46.1	21.5	49.5	23.9	1.55	1.70	—		7 300	10 000	**7405B**	33.6	33.5	71.5	1.5	0.527
30	47	9	0.3	0.15	10.4	6.25	—	—	0.320	—	15.9		22 000	29 000	**7906C**	9.7	32.5	44.5	0.3	0.046
	55	13	1	0.6	18.2	10.1	—	—	0.610	—	—		14 000	18 000	**7006**	18.8	35.5	49.5	1	0.133
	55	13	1	0.6	16.4	9.20	—	—	0.530	—	—		11 000	14 000	**7006B**	24.3	35.5	49.5	1	0.133
	55	13	1	0.6	19.8	11.0	—	—	0.690	—	14.9		20 000	26 000	**7006C**	12.2	35.5	49.5	1	0.133
	62	16	1	0.6	26.7	13.7	28.1	14.8	0.890	0.970	—		13 000	16 000	**7206**	21.5	35.5	56.5	1	0.208
	62	16	1	0.6	24.3	12.5	25.6	13.6	0.770	0.840	—		9 600	13 000	**7206B**	27.6	35.5	56.5	1	0.208
	62	16	1	0.6	28.8	14.7	30.4	16.0	1.00	1.10	14.0		18 000	24 000	**7206C**	14.3	35.5	56.5	1	0.208
	72	19	1.1	0.6	37.6	18.9	39.9	20.6	1.30	1.45	—		12 000	14 000	**7306**	24.5	37	65	1	0.362
	72	19	1.1	0.6	34.5	17.4	36.6	19.0	1.15	1.25	—		8 700	12 000	**7306B**	31.3	37	65	1	0.362
	72	19	1.1	0.6	40.4	20.3	42.8	22.1	1.50	1.65	13.4		16 000	21 000	**7306C**	16.5	37	65	1	0.362
	90	23	1.5	1	59.5	28.4	63.9	31.6	2.20	2.45	—		7 300	9 700	**7406**	29.3	38.5	81.5	1.5	0.686
	90	23	1.5	1	55.2	26.4	59.3	29.3	1.90	2.10	—		6 500	8 900	**7406B**	37.3	38.5	81.5	1.5	0.686
35	55	10	0.6	0.3	15.7	9.70	—	—	0.550	—	15.7		19 000	25 000	**7907C**	11.0	39.5	50.5	0.6	0.074
	62	14	1	0.6	21.9	12.6	—	—	0.740	—	—		12 000	15 000	**7007**	21.2	40.5	56.5	1	0.170
	62	14	1	0.6	19.7	11.4	—	—	0.640	—	—		9 200	12 000	**7007B**	27.6	40.5	56.5	1	0.170
	62	14	1	0.6	23.9	13.7	—	—	0.840	—	15.0		17 000	22 000	**7007C**	13.5	40.5	56.5	1	0.170
	72	17	1.1	0.6	35.2	18.6	37.1	20.2	1.20	1.30	—		11 000	14 000	**7207**	24.2	42	65	1	0.295
	72	17	1.1	0.6	32.0	17.0	33.8	18.5	1.05	1.15	—		8 300	11 000	**7207B**	31.4	42	65	1	0.295
	72	17	1.1	0.6	38.0	20.1	40.1	21.7	1.40	1.50	14.0		15 000	20 000	**7207C**	15.8	42	65	1	0.295
	80	21	1.5	1	44.2	22.0	49.9	26.4	1.55	1.85	—		10 000	13 000	**7307**	27.4	43.5	71.5	1.5	0.475
	80	21	1.5	1	40.6	20.2	45.8	24.3	1.30	1.60	—		7 700	10 000	**7307B**	35.0	43.5	71.5	1.5	0.475

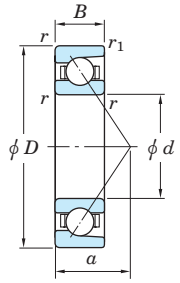
[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cage or molded cage.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.

[Remark] Standard cage types used for the above bearings are described earlier in this section.

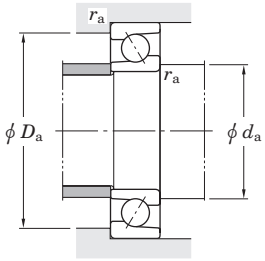
Single-row angular contact ball bearings

d (35) ~ 45 mm



With machined cage

With pressed cage



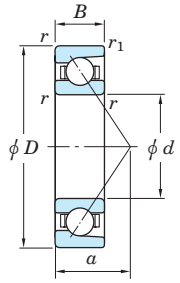
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN)		Factor		Limiting speeds [1] (min^{-1})		Bearing No. [2]	Load center (mm)	Mounting dimensions (mm)			(Refer.) Mass (kg)
					With machined cage		With pressed cage		C_u											
d	D	B	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cage	With pressed cage	f_0		Grease lub.	Oil lub.		a	d_a min.	D_a max.	r_a max.	
35	80	21	1.5	1	47.4	23.6	53.5	28.3	1.75	2.10	13.4		14 000	19 000	**7307C**	18.3	43.5	71.5	1.5	0.475
	100	25	1.5	1	75.6	37.0	81.1	41.1	2.85	3.20	—		6 500	8 600	**7407**	32.6	43.5	91.5	1.5	0.950
	100	25	1.5	1	70.2	34.3	75.3	38.1	2.45	2.75	—		5 700	7 900	**7407B**	41.7	43.5	91.5	1.5	0.950
40	62	12	0.6	0.3	19.7	12.4	—	—	0.710	—	15.7		17 000	22 000	**7908C**	12.8	44.5	57.5	0.6	0.107
	68	15	1	0.6	23.4	14.6	—	—	0.830	—	—		11 000	14 000	**7008**	23.2	45.5	62.5	1	0.210
	68	15	1	0.6	21.1	13.2	—	—	0.720	—	—		8 300	11 000	**7008B**	30.2	45.5	62.5	1	0.210
	68	15	1	0.6	25.7	15.9	—	—	0.940	—	15.4		15 000	20 000	**7008C**	14.8	45.5	62.5	1	0.210
	80	18	1.1	0.6	42.0	23.3	44.1	25.1	1.50	1.60	—		10 000	12 000	**7208**	26.3	47	73	1	0.382
	80	18	1.1	0.6	38.2	21.3	40.2	23.0	1.30	1.40	—		7 500	10 000	**7208B**	34.2	47	73	1	0.382
	80	18	1.1	0.6	45.4	25.2	47.7	27.1	1.70	1.85	14.2		14 000	18 000	**7208C**	17.0	47	73	1	0.382
	90	23	1.5	1	54.0	27.4	61.0	32.9	1.90	2.30	—		9 200	12 000	**7308**	30.3	48.5	81.5	1.5	0.657
	90	23	1.5	1	49.6	25.2	56.0	30.3	1.65	2.00	—		6 900	9 200	**7308B**	38.8	48.5	81.5	1.5	0.657
	90	23	1.5	1	57.9	29.4	65.4	35.3	2.20	2.65	13.4		13 000	17 000	**7308C**	20.2	48.5	81.5	1.5	0.657
	110	27	2	1	87.4	43.5	93.8	48.4	3.35	3.70	—		5 900	7 900	**7408**	35.5	50	100	2	1.23
	110	27	2	1	81.1	40.4	87.0	44.9	2.90	3.20	—		5 200	7 200	**7408B**	45.4	50	100	2	1.23
45	68	12	0.6	0.3	20.8	14.1	—	—	0.770	—	16.0		15 000	20 000	**7909C**	13.6	49.5	63.5	0.6	0.127
	75	16	1	0.6	27.8	17.7	—	—	1.00	—	—		10 000	12 000	**7009**	25.3	50.5	69.5	1	0.260
	75	16	1	0.6	25.0	16.0	—	—	0.870	—	—		7 500	10 000	**7009B**	33.2	50.5	69.5	1	0.260
	75	16	1	0.6	30.5	19.3	—	—	1.15	—	15.4		14 000	18 000	**7009C**	16.0	50.5	69.5	1	0.260
	85	19	1.1	0.6	47.2	26.6	49.6	28.6	1.70	1.85	—		9 400	12 000	**7209**	28.0	52	78	1	0.430
	85	19	1.1	0.6	42.9	24.3	45.1	26.1	1.50	1.60	—		7 000	9 400	**7209B**	36.4	52	78	1	0.430
	85	19	1.1	0.6	51.0	28.7	53.6	30.9	1.95	2.10	14.2		13 000	17 000	**7209C**	18.1	52	78	1	0.430
	100	25	1.5	1	68.9	37.1	73.1	40.4	2.55	2.80	—		8 200	10 000	**7309**	33.6	53.5	91.5	1.5	0.875
	100	25	1.5	1	63.2	34.1	67.0	37.2	2.20	2.40	—		6 200	8 200	**7309B**	43.1	53.5	91.5	1.5	0.875
	100	25	1.5	1	74.0	39.7	78.4	43.4	2.95	3.20	13.5		11 000	15 000	**7309C**	22.3	53.5	91.5	1.5	0.875
	120	29	2	1	106	53.8	114	59.8	4.20	4.65	—		5 400	7 100	**7409**	38.6	55	110	2	1.55
	120	29	2	1	98.7	50.0	106	55.5	3.60	4.00	—		4 800	6 600	**7409B**	49.5	55	110	2	1.55

[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cage or molded cage.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.

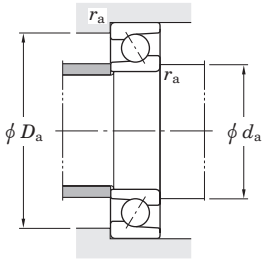
[Remark] Standard cage types used for the above bearings are described earlier in this section.

d 50 ~ (60) mm



With machined cage

With pressed cage



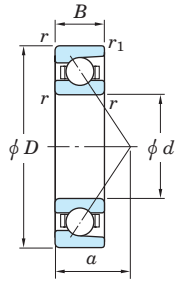
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN)		Factor		Limiting speeds [1] (min^{-1})		Bearing No. [2]	Load center (mm)	Mounting dimensions (mm)			(Refer.) Mass (kg)
					With machined cage		With pressed cage		C_u											
d	D	B	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cage	With pressed cage	f_0		Grease lub.	Oil lub.		a	d_a min.	D_a max.	r_a max.	
50	72	12	0.6	0.3	21.8	15.7	—	—	0.840	—	16.2		14 000	18 000	**7910C**	14.2	54.5	67.5	0.6	0.128
	80	16	1	0.6	29.5	20.1	—	—	1.10	—	—		9 200	11 000	**7010**	26.9	55.5	74.5	1	0.290
	80	16	1	0.6	26.5	18.1	—	—	0.960	—	—		6 900	9 200	**7010B**	35.3	55.5	74.5	1	0.290
	80	16	1	0.6	32.5	21.9	—	—	1.25	—	15.7		13 000	17 000	**7010C**	16.8	55.5	74.5	1	0.290
	90	20	1.1	0.6	49.2	29.4	51.6	31.5	1.80	1.95	—		8 500	11 000	**7210**	30.4	57	83	1	0.485
	90	20	1.1	0.6	44.6	26.7	46.7	28.6	1.55	1.70	—		6 400	8 500	**7210B**	39.6	57	83	1	0.485
	90	20	1.1	0.6	53.5	31.8	56.0	34.1	2.05	2.20	14.6		12 000	16 000	**7210C**	19.4	57	83	1	0.485
	110	27	2	1	87.6	48.1	92.9	52.5	3.35	3.65	—		7 300	9 100	**7310**	37.2	60	100	2	1.14
	110	27	2	1	80.5	44.3	85.3	48.3	2.90	3.15	—		5 500	7 300	**7310B**	47.9	60	100	2	1.14
	110	27	2	1	93.9	51.6	99.5	56.2	3.85	4.20	13.4		10 000	13 000	**7310C**	24.5	60	100	2	1.14
	130	31	2.1	1.1	122	65.3	—	—	4.90	—	—		4 900	6 600	**7410**	41.6	62	118	2	1.92
	130	31	2.1	1.1	113	60.4	—	—	4.20	—	—		4 400	6 000	**7410B**	53.5	62	118	2	1.92
55	80	13	1	0.6	24.6	18.5	—	—	0.980	—	16.3		13 000	17 000	**7911C**	15.5	60.5	74.5	1	0.178
	90	18	1.1	0.6	38.9	26.3	—	—	1.50	—	—		8 300	10 000	**7011**	29.9	62	83	1	0.420
	90	18	1.1	0.6	34.9	23.7	—	—	1.30	—	—		6 200	8 300	**7011B**	39.4	62	83	1	0.420
	90	18	1.1	0.6	42.6	28.6	—	—	1.65	—	15.5		11 000	15 000	**7011C**	18.7	62	83	1	0.420
	100	21	1.5	1	60.9	37.1	63.7	39.8	2.30	2.45	—		7 600	9 500	**7211**	33.3	63.5	91.5	1.5	0.635
	100	21	1.5	1	55.1	33.8	57.7	36.2	2.00	2.15	—		5 700	7 600	**7211B**	43.6	63.5	91.5	1.5	0.635
	100	21	1.5	1	66.1	40.2	69.2	43.1	2.60	2.80	14.6		11 000	14 000	**7211C**	21.1	63.5	91.5	1.5	0.635
	120	29	2	1	101	56.5	107	61.7	3.95	4.30	—		6 700	8 400	**7311**	40.2	65	110	2	1.45
	120	29	2	1	92.9	52.0	98.4	56.7	3.40	3.70	—		5 000	6 700	**7311B**	51.8	65	110	2	1.45
	120	29	2	1	108	60.6	115	66.1	4.50	4.90	13.4		9 300	12 000	**7311C**	26.4	65	110	2	1.45
	140	33	2.1	1.1	148	82.4	—	—	6.40	—	—		4 500	6 000	**7411**	45.0	67	128	2	2.36
	140	33	2.1	1.1	138	76.5	—	—	5.50	—	—		4 000	5 500	**7411B**	57.8	67	128	2	2.36
60	85	13	1	0.6	29.0	21.8	—	—	1.15	—	16.3		12 000	16 000	**7912C**	16.3	65.5	79.5	1	0.187
	95	18	1.1	0.6	39.9	28.1	—	—	1.55	—	—		7 700	9 700	**7012**	31.4	67	88	1	0.450
	95	18	1.1	0.6	35.7	25.3	—	—	1.35	—	—		5 800	7 700	**7012B**	41.5	67	88	1	0.450

[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cage or molded cage.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.

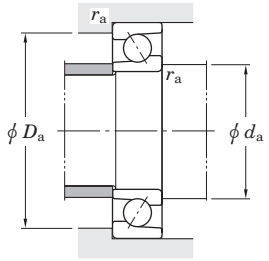
[Remark] Standard cage types used for the above bearings are described earlier in this section.

d (60) ~ (70) mm



With machined cage

With pressed cage



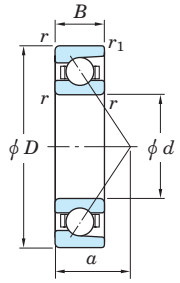
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN)		Factor	Limiting speeds [1] (min^{-1})		Bearing No. [2]	Load center (mm)	Mounting dimensions (mm)			(Refer.) Mass (kg)
					With machined cage		With pressed cage		C_u										
d	D	B	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cage	With pressed cage	f_0	Grease lub.	Oil lub.		a	d_a min.	D_a max.	r_a max.	
60	95	18	1.1	0.6	43.8	30.6	—	—	1.75	—	15.7	11 000	14 000	**7012C**	19.4	67	88	1	0.450
	110	22	1.5	1	73.7	45.7	77.1	49.0	2.85	3.05	—	6 900	8 600	**7212**	36.1	68.5	101.5	1.5	0.820
	110	22	1.5	1	66.8	41.6	69.9	44.6	2.45	2.60	—	5 100	6 900	**7212B**	47.5	68.5	101.5	1.5	0.820
	110	22	1.5	1	80.0	49.5	83.8	53.0	3.20	3.45	14.5	9 500	13 000	**7212C**	22.7	68.5	101.5	1.5	0.820
	130	31	2.1	1.1	116	65.6	123	71.6	4.55	5.00	—	6 200	7 700	**7312**	43.2	72	118	2	1.81
	130	31	2.1	1.1	106	60.3	113	65.8	3.95	4.30	—	4 600	6 200	**7312B**	55.8	72	118	2	1.81
	130	31	2.1	1.1	124	70.3	131	76.7	5.25	5.70	13.4	8 600	11 000	**7312C**	28.4	72	118	2	1.81
	150	35	2.1	1.1	161	93.6	—	—	6.85	—	—	4 100	5 500	**7412**	48.5	72	138	2	2.85
	150	35	2.1	1.1	149	86.7	—	—	5.90	—	—	3 700	5 100	**7412B**	62.6	72	138	2	2.85
65	90	13	1	0.6	25.9	21.2	—	—	1.10	—	16.5	11 000	15 000	**7913C**	16.9	70.5	84.5	1	0.205
	100	18	1.1	0.6	42.1	31.4	—	—	1.70	—	—	7 200	9 000	**7013**	33.0	72	93	1	0.470
	100	18	1.1	0.6	37.7	28.3	—	—	1.45	—	—	5 400	7 200	**7013B**	43.8	72	93	1	0.470
	100	18	1.1	0.6	46.3	34.3	—	—	1.90	—	15.9	10 000	13 000	**7013C**	20.1	72	93	1	0.470
	120	23	1.5	1	84.1	54.2	87.8	57.8	3.35	3.55	—	6 400	8 000	**7213**	38.2	73.5	111.5	1.5	1.02
	120	23	1.5	1	76.2	49.3	79.5	52.6	2.90	3.10	—	4 800	6 400	**7213B**	50.3	73.5	111.5	1.5	1.02
	120	23	1.5	1	91.4	58.7	95.4	62.6	3.80	4.05	14.6	8 900	12 000	**7213C**	23.9	73.5	111.5	1.5	1.02
	140	33	2.1	1.1	131	75.3	139	82.2	5.15	5.65	—	5 800	7 200	**7313**	46.3	77	128	2	2.22
	140	33	2.1	1.1	120	69.3	127	75.6	4.45	4.85	—	4 300	5 800	**7313B**	59.7	77	128	2	2.22
	140	33	2.1	1.1	140	80.7	149	88.1	5.90	6.45	13.4	8 000	11 000	**7313C**	30.3	77	128	2	2.22
	160	37	2.1	1.1	174	104	—	—	7.40	—	—	3 900	5 200	**7413**	51.4	77	148	2	3.41
	160	37	2.1	1.1	161	96.8	—	—	6.35	—	—	3 500	4 800	**7413B**	66.3	77	148	2	3.41
70	100	16	1	0.6	36.2	29.0	—	—	1.55	—	16.4	10 000	12 000	**7914C**	19.4	75.5	94.5	1	0.332
	110	20	1.1	0.6	53.3	39.4	—	—	2.15	—	—	6 600	8 300	**7014**	36.0	77	103	1	0.660
	110	20	1.1	0.6	47.8	35.5	—	—	1.90	—	—	5 000	6 600	**7014B**	47.8	77	103	1	0.660
	110	20	1.1	0.6	58.6	43.0	—	—	2.45	—	15.7	9 200	12 000	**7014C**	22.1	77	103	1	0.660
	125	24	1.5	1	87.3	55.6	95.4	63.5	3.40	3.90	—	6 100	7 600	**7214**	40.2	78.5	116.5	1.5	1.12
	125	24	1.5	1	79.0	50.6	86.4	57.8	2.95	3.40	—	4 600	6 100	**7214B**	52.9	78.5	116.5	1.5	1.12

[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cage or molded cage.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.

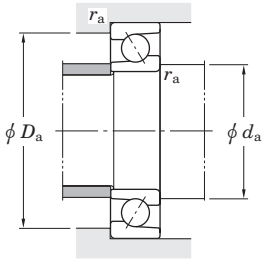
[Remark] Standard cage types used for the above bearings are described earlier in this section.

d (70) ~ (80) mm



With machined cage

With pressed cage



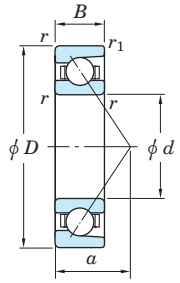
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN)		Factor		Limiting speeds [1] (min^{-1})		Bearing No. [2]	Load center (mm)	Mounting dimensions (mm)			(Refer.) Mass (kg)
					With machined cage		With pressed cage		C_u											
d	D	B	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cage	With pressed cage	f_0		Grease lub.	Oil lub.		a	d_a min.	D_a max.	r_a max.	
70	125	24	1.5	1	94.9	60.2	104	68.8	3.90	4.45	14.6		8 400	11 000	**7214C**	25.1	78.5	116.5	1.5	1.12
	150	35	2.1	1.1	147	85.8	156	93.6	5.70	6.20	—		5 400	6 700	**7314**	49.3	82	138	2	2.70
	150	35	2.1	1.1	135	78.9	143	86.0	4.90	5.35	—		4 000	5 400	**7314B**	63.7	82	138	2	2.70
	150	35	2.1	1.1	158	91.9	167	100	6.50	7.10	13.4		7 500	9 900	**7314C**	32.2	82	138	2	2.70
	180	42	3	1.1	187	115	—	—	5.30	—	—		3 500	4 600	**7414**	57.6	84	166	2.5	4.99
	180	42	3	1.1	185	119	—	—	5.45	—	—		3 100	4 300	**7414B**	74.2	84	166	2.5	4.99
75	105	16	1	0.6	36.7	30.5	—	—	1.60	—	16.5		9 300	12 000	**7915C**	20.1	80.5	99.5	1	0.350
	115	20	1.1	0.6	54.6	41.7	—	—	2.25	—	—		6 300	7 800	**7015**	37.4	82	108	1	0.690
	115	20	1.1	0.6	48.8	37.6	—	—	1.95	—	—		4 700	6 300	**7015B**	49.9	82	108	1	0.690
	115	20	1.1	0.6	60.1	45.6	—	—	2.55	—	15.9		8 700	11 000	**7015C**	22.7	82	108	1	0.690
	130	25	1.5	1	99.0	65.2	103	69.5	3.95	4.20	—		5 800	7 200	**7215**	42.1	83.5	121.5	1.5	1.23
	130	25	1.5	1	89.6	59.3	93.6	63.3	3.40	3.65	—		4 300	5 800	**7215B**	55.5	83.5	121.5	1.5	1.23
	130	25	1.5	1	108	70.6	112	75.3	4.50	4.80	14.6		8 000	11 000	**7215C**	26.2	83.5	121.5	1.5	1.23
	160	37	2.1	1.1	160	97.0	170	106	6.20	6.75	—		5 000	6 300	**7315**	52.4	87	148	2	3.15
	160	37	2.1	1.1	147	89.2	156	97.3	5.35	5.85	—		3 800	5 000	**7315B**	67.8	87	148	2	3.15
	160	37	2.1	1.1	172	104	182	113	7.10	7.75	13.4		7 000	9 200	**7315C**	34.2	87	148	2	3.15
	190	45	3	1.1	214	141	—	—	6.30	—	—		3 300	4 400	**7415**	61.3	89	176	2.5	5.90
	190	45	3	1.1	198	131	—	—	5.80	—	—		2 900	4 000	**7415B**	78.9	89	176	2.5	5.90
80	110	16	1	0.6	37.3	31.6	—	—	1.65	—	16.5		8 800	11 000	**7916C**	20.7	85.5	104.5	1	0.368
	125	22	1.1	0.6	66.7	50.6	—	—	2.75	—	—		5 800	7 200	**7016**	40.6	87	118	1	0.930
	125	22	1.1	0.6	59.8	45.7	—	—	2.40	—	—		4 300	5 800	**7016B**	54.0	87	118	1	0.930
	125	22	1.1	0.6	73.3	55.3	—	—	3.10	—	15.7		8 000	11 000	**7016C**	24.7	87	118	1	0.930
	140	26	2	1	107	71.5	111	76.2	4.10	4.40	—		5 400	6 700	**7216**	44.8	90	130	2	1.50
	140	26	2	1	96.4	65.0	101	69.3	3.55	3.80	—		4 000	5 400	**7216B**	59.2	90	130	2	1.50
	140	26	2	1	116	77.5	121	82.7	4.70	5.00	14.7		7 500	9 900	**7216C**	27.7	90	130	2	1.50
	170	39	2.1	1.1	174	109	184	119	6.75	7.35	—		4 700	5 900	**7316**	55.6	92	158	2	3.85
	170	39	2.1	1.1	159	100	169	109	5.80	6.35	—		3 500	4 700	**7316B**	71.9	92	158	2	3.85

[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cage or molded cage.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.

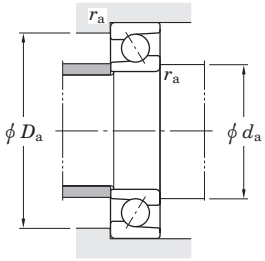
[Remark] Standard cage types used for the above bearings are described earlier in this section.

d (80) ~ 90 mm



With machined cage

With pressed cage



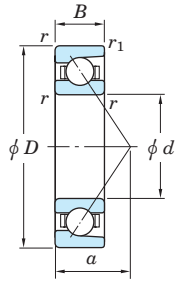
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN)		Factor	Limiting speeds [1] (min^{-1})		Bearing No. [2]	Load center (mm)	Mounting dimensions (mm)			(Refer.) Mass (kg)
					With machined cage		With pressed cage		C_u										
d	D	B	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	(With machined cage)	(With pressed cage)	f_0	Grease lub.	Oil lub.		a	d_a min.	D_a max.	r_a max.	
80	170	39	2.1	1.1	186	117	197	127	7.70	8.40	13.5	6 500	8 600	**7316C**	36.2	92	158	2	3.85
	200	48	3	1.1	241	166	—	—	7.20	—	—	3 100	4 100	**7416**	65.0	94	186	2.5	6.00
	200	48	3	1.1	223	154	—	—	6.65	—	—	2 700	3 800	**7416B**	83.6	94	186	2.5	6.00
85	120	18	1.1	0.6	48.6	40.6	—	—	2.10	—	16.5	8 100	11 000	**7917C**	22.7	92	113	1	0.523
	130	22	1.1	0.6	68.2	53.7	—	—	2.75	—	—	5 500	6 800	**7017**	42.3	92	123	1	0.970
	130	22	1.1	0.6	61.0	48.4	—	—	2.40	—	—	4 100	5 500	**7017B**	56.5	92	123	1	0.970
	130	22	1.1	0.6	75.1	58.7	—	—	3.15	—	15.9	7 600	10 000	**7017C**	25.5	92	123	1	0.970
	150	28	2	1	123	83.6	129	89.2	4.70	5.00	—	5 000	6 300	**7217**	47.9	95	140	2	1.87
	150	28	2	1	111	76.0	116	81.1	4.05	4.35	—	3 800	5 000	**7217B**	63.3	95	140	2	1.87
	150	28	2	1	134	90.6	140	96.6	5.35	5.70	14.7	7 000	9 200	**7217C**	29.7	95	140	2	1.87
	180	41	3	1.1	187	122	198	133	7.30	7.95	—	4 400	5 500	**7317**	58.8	99	166	2.5	4.53
	180	41	3	1.1	172	112	182	122	6.30	6.85	—	3 300	4 400	**7317B**	76.1	99	166	2.5	4.53
	180	41	3	1.1	201	130	213	142	8.35	9.10	13.5	6 100	8 100	**7317C**	38.3	99	166	2.5	4.53
	210	52	4	1.5	255	180	—	—	7.65	—	—	3 000	3 900	**7417**	68.7	103	192	3	8.54
	210	52	4	1.5	236	167	—	—	7.10	—	—	2 600	3 600	**7417B**	88.1	103	192	3	8.54
90	125	18	1.1	0.6	49.5	42.6	—	—	2.15	—	16.6	7 800	10 000	**7918C**	23.4	97	118	1	0.551
	140	24	1.5	1	81.5	63.3	—	—	3.25	—	—	5 100	6 400	**7018**	45.2	98.5	131.5	1.5	1.26
	140	24	1.5	1	73.0	57.1	—	—	2.80	—	—	3 900	5 100	**7018B**	60.2	98.5	131.5	1.5	1.26
	140	24	1.5	1	89.6	69.1	—	—	3.65	—	15.7	7 100	9 400	**7018C**	27.4	98.5	131.5	1.5	1.26
	160	30	2	1	141	96.7	147	103	5.30	5.65	—	4 700	5 900	**7218**	51.1	100	150	2	2.30
	160	30	2	1	128	88.0	133	93.8	4.60	4.90	—	3 500	4 700	**7218B**	67.4	100	150	2	2.30
	160	30	2	1	153	105	160	112	6.00	6.40	14.6	6 500	8 600	**7218C**	31.7	100	150	2	2.30
	190	43	3	1.1	201	135	213	147	5.90	6.40	—	4 200	5 200	**7318**	61.9	104	176	2.5	5.30
	190	43	3	1.1	184	124	195	135	5.40	5.90	—	3 100	4 200	**7318B**	80.2	104	176	2.5	5.30
	190	43	3	1.1	216	145	229	158	6.30	6.90	13.5	5 800	7 700	**7318C**	40.3	104	176	2.5	5.30
	225	54	4	1.5	270	196	—	—	8.10	—	—	2 800	3 700	**7418**	72.5	108	207	3	11.4
	225	54	4	1.5	250	182	—	—	7.50	—	—	2 500	3 400	**7418B**	93.1	108	207	3	11.4

[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cage or molded cage.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.

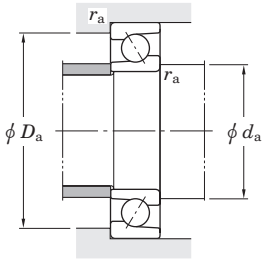
[Remark] Standard cage types used for the above bearings are described earlier in this section.

d 95 ~ (105) mm



With machined cage

With pressed cage



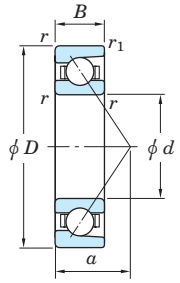
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN)		Factor	Limiting speeds [1] (min^{-1})		Bearing No. [2]	Load center (mm)	Mounting dimensions (mm)			(Refer.) Mass (kg)
					With machined cage		With pressed cage		C_u										
d	D	B	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cage	With pressed cage	f_0	Grease lub.	Oil lub.		a	d_a min.	D_a max.	r_a max.	
95	130	18	1.1	0.6	50.3	44.1	—	—	2.15	—	16.5	7 400	9 800	**7919C**	24.1	102	123	1	0.574
	145	24	1.5	1	83.3	67.1	—	—	3.25	—	—	4 800	6 000	**7019**	47.2	103.5	136.5	1.5	1.32
	145	24	1.5	1	74.5	60.5	—	—	2.85	—	—	3 600	4 800	**7019B**	63.2	103.5	136.5	1.5	1.32
	145	24	1.5	1	91.7	73.4	—	—	3.70	—	15.9	6 700	8 900	**7019C**	28.3	103.5	136.5	1.5	1.32
	170	32	2.1	1.1	153	103	160	111	5.50	5.90	—	4 400	5 500	**7219**	54.3	107	158	2	2.78
	170	32	2.1	1.1	138	94.0	145	101	4.80	5.10	—	3 300	4 400	**7219B**	71.6	107	158	2	2.78
	170	32	2.1	1.1	166	112	174	120	6.30	6.75	14.6	6 100	8 100	**7219C**	33.8	107	158	2	2.78
	200	45	3	1.1	215	149	228	162	6.35	6.90	—	4 000	4 900	**7319**	65.1	109	186	2.5	6.12
	200	45	3	1.1	197	137	209	149	5.80	6.35	—	3 000	4 000	**7319B**	84.4	109	186	2.5	6.12
	200	45	3	1.1	231	160	245	174	6.80	7.40	13.5	5 500	7 300	**7319C**	42.3	109	186	2.5	6.12
100	140	20	1.1	0.6	69.4	58.5	—	—	2.85	—	16.3	7 000	9 200	**7920C**	26.1	107	133	1	0.773
	150	24	1.5	1	85.5	70.6	—	—	3.35	—	—	4 700	5 900	**7020**	48.1	108.5	141.5	1.5	1.37
	150	24	1.5	1	76.5	63.6	—	—	2.95	—	—	3 500	4 700	**7020B**	64.4	108.5	141.5	1.5	1.37
	150	24	1.5	1	94.2	77.2	—	—	3.80	—	16.0	6 500	8 600	**7020C**	28.7	108.5	141.5	1.5	1.37
	180	34	2.1	1.1	171	117	180	126	6.10	6.50	—	4 100	5 200	**7220**	57.7	112	168	2	3.32
	180	34	2.1	1.1	155	107	163	115	5.25	5.65	—	3 100	4 200	**7220B**	76.2	112	168	2	3.32
	180	34	2.1	1.1	186	127	195	136	6.95	7.40	14.6	5 700	7 600	**7220C**	35.9	112	168	2	3.32
	215	47	3	1.1	229	161	259	194	6.60	7.95	—	3 600	4 600	**7320**	69.4	114	201	2.5	7.53
	215	47	3	1.1	210	148	238	178	6.10	7.30	—	2 700	3 600	**7320B**	90.2	114	201	2.5	7.53
	215	47	3	1.1	246	173	278	208	7.10	8.50	13.4	5 000	6 700	**7320C**	44.8	114	201	2.5	7.53
105	145	20	1.1	0.6	70.8	61.5	—	—	2.90	—	16.4	6 700	8 800	**7921C**	26.7	112	138	1	0.810
	160	26	2	1	99.7	81.9	—	—	3.80	—	—	4 400	5 500	**7021**	51.8	115	150	2	1.73
	160	26	2	1	89.2	73.8	—	—	3.30	—	—	3 300	4 400	**7021B**	68.6	115	150	2	1.73
	160	26	2	1	110	89.6	—	—	4.30	—	15.9	6 000	8 000	**7021C**	31.0	115	150	2	1.73
	190	36	2.1	1.1	187	132	—	—	6.70	—	—	3 900	4 900	**7221**	61.0	117	178	2	3.95
	190	36	2.1	1.1	169	121	—	—	5.80	—	—	2 900	3 900	**7221B**	80.5	117	178	2	3.95

[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cage or molded cage.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.

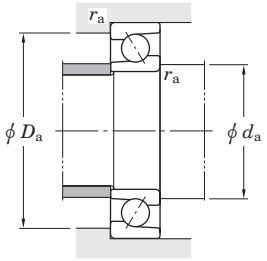
[Remark] Standard cage types used for the above bearings are described earlier in this section.

d (105) ~ (130) mm



With machined cage

With pressed cage



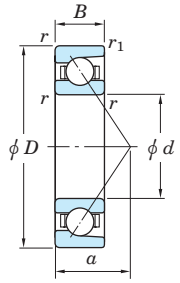
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN)		Factor	Limiting speeds [1] (min^{-1})		Bearing No. [2]	Load center (mm)	Mounting dimensions (mm)			(Refer.) Mass (kg)
					With machined cage		With pressed cage		C_u										
d	D	B	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cage	With pressed cage	f_0	Grease lub.	Oil lub.		a	d_a min.	D_a max.	r_a max.	
105	190	36	2.1	1.1	203	143	—	—	7.60	—	14.6	5 400	7 200	**7221C**	38.0	117	178	2	3.95
	225	49	3	1.1	260	193	—	—	7.75	—	—	3 500	4 400	**7321**	72.1	119	211	2.5	8.62
	225	49	3	1.1	238	177	—	—	7.15	—	—	2 600	3 500	**7321B**	93.7	119	211	2.5	8.62
	225	49	3	1.1	278	207	—	—	8.30	—	13.4	4 800	6 400	**7321C**	46.6	119	211	2.5	8.62
110	150	20	1.1	0.6	72.2	64.4	—	—	2.95	—	16.5	6 400	8 500	**7922C**	27.4	117	143	1	0.840
	170	28	2	1	115	92.8	—	—	4.30	—	—	4 200	5 200	**7022**	54.4	120	160	2	2.14
	170	28	2	1	103	83.7	—	—	3.75	—	—	3 100	4 200	**7022B**	72.7	120	160	2	2.14
	170	28	2	1	126	101	—	—	4.85	—	15.7	5 800	7 700	**7022C**	32.8	120	160	2	2.14
	200	38	2.1	1.1	202	148	—	—	7.30	—	—	3 700	4 600	**7222**	64.3	122	188	2	4.65
	200	38	2.1	1.1	183	135	—	—	6.35	—	—	2 800	3 700	**7222B**	84.9	122	188	2	4.65
	200	38	2.1	1.1	220	160	—	—	8.35	—	14.5	5 100	6 800	**7222C**	40.0	122	188	2	4.65
	240	50	3	1.1	290	226	—	—	8.75	—	—	3 200	4 000	**7322**	76.4	124	226	2.5	10.1
	240	50	3	1.1	266	208	—	—	8.05	—	—	2 400	3 200	**7322B**	99.6	124	226	2.5	10.1
	240	50	3	1.1	311	242	—	—	9.40	—	13.4	4 500	5 900	**7322C**	48.8	124	226	2.5	10.1
120	165	22	1.1	0.6	89.7	81.2	—	—	3.55	—	16.5	5 900	7 800	**7924C**	30.1	127	158	1	1.15
	180	28	2	1	121	103	—	—	4.50	—	—	3 900	4 900	**7024**	57.3	130	170	2	2.27
	180	28	2	1	108	93.0	—	—	3.95	—	—	2 900	3 900	**7024B**	76.9	130	170	2	2.27
	180	28	2	1	133	113	—	—	5.10	—	16.0	5 400	7 100	**7024C**	34.1	130	170	2	2.27
	215	40	2.1	1.1	218	166	—	—	7.85	—	—	3 400	4 300	**7224**	68.5	132	203	2	5.49
	215	40	2.1	1.1	197	151	—	—	6.80	—	—	2 600	3 400	**7224B**	90.3	132	203	2	5.49
	215	40	2.1	1.1	237	180	—	—	8.95	—	14.6	4 800	6 300	**7224C**	42.5	132	203	2	5.49
	260	55	3	1.1	308	252	—	—	9.45	—	—	3 000	3 700	**7324**	82.3	134	246	2.5	12.6
	260	55	3	1.1	282	231	—	—	8.65	—	—	2 200	3 000	**7324B**	107.2	134	246	2.5	12.6
	260	55	3	1.1	331	271	—	—	10.2	—	13.7	4 100	5 500	**7324C**	53.0	134	246	2.5	12.6
130	180	24	1.5	1	109	99.9	—	—	4.20	—	16.4	5 400	7 100	**7926C**	32.8	138.5	171.5	1.5	1.50
	200	33	2	1	147	125	—	—	5.25	—	—	3 500	4 400	**7026**	64.1	140	190	2	3.43

[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cage or molded cage.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.

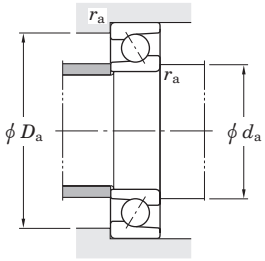
[Remark] Standard cage types used for the above bearings are described earlier in this section.

d (130) ~ (150) mm



With machined cage

With pressed cage



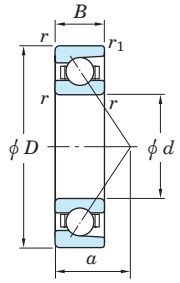
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN)		Factor		Limiting speeds [1] (min^{-1})		Bearing No. [2]	Load center (mm)	Mounting dimensions (mm)			(Refer.) Mass (kg)
					With machined cage		With pressed cage		C_u											
d	D	B	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cage	With pressed cage	f_0		Grease lub.	Oil lub.		a	d_a min.	D_a max.	r_a max.	
130	200	33	2	1	131	113	—	—	4.60	—	—		2 600	3 500	**7026B**	85.7	140	190	2	3.43
	200	33	2	1	161	137	—	—	5.95	—	15.9		4 800	6 400	**7026C**	38.6	140	190	2	3.43
	230	40	3	1.1	245	198	—	—	7.60	—	—		3 200	4 000	**7226**	72.0	144	216	2.5	6.21
	230	40	3	1.1	222	180	—	—	6.95	—	—		2 400	3 200	**7226B**	95.5	144	216	2.5	6.21
	230	40	3	1.1	266	214	—	—	8.25	—	14.7		4 400	5 800	**7226C**	44.1	144	216	2.5	6.21
	280	58	4	1.5	376	329	—	—	11.8	—	—		2 700	3 400	**7326**	88.8	148	262	3	15.4
	280	58	4	1.5	312	268	—	—	9.70	—	—		2 100	2 700	**7326B**	115.0	148	262	3	15.4
	280	58	4	1.5	368	314	—	—	11.3	—	13.7		3 800	5 000	**7326C**	56.5	148	262	3	15.4
140	190	24	1.5	1	110	105	—	—	4.20	—	16.6		5 100	6 700	**7928C**	34.1	148.5	181.5	1.5	1.59
	210	33	2	1	150	133	—	—	5.30	—	—		3 300	4 100	**7028**	67.0	150	200	2	3.64
	210	33	2	1	134	119	—	—	4.65	—	—		2 500	3 300	**7028B**	89.9	150	200	2	3.64
	210	33	2	1	165	145	—	—	6.00	—	16.0		4 500	6 000	**7028C**	39.9	150	200	2	3.64
	250	42	3	1.1	273	234	—	—	8.65	—	—		2 900	3 600	**7228**	77.3	154	236	2.5	7.76
	250	42	3	1.1	247	213	—	—	7.85	—	—		2 200	2 900	**7228B**	102.8	154	236	2.5	7.76
	250	42	3	1.1	297	254	—	—	9.40	—	14.8		4 000	5 300	**7228C**	47.1	154	236	2.5	7.76
	300	62	4	1.5	411	374	—	—	13.0	—	—		2 500	3 200	**7328**	94.5	158	282	3	18.8
	300	62	4	1.5	378	344	—	—	12.0	—	—		1 900	2 500	**7328B**	123.3	158	282	3	18.8
	300	62	4	1.5	441	401	—	—	14.0	—	13.4		3 500	4 600	**7328C**	60.5	158	282	3	18.8
150	210	28	2	1	148	132	—	—	5.45	—	16.3		4 700	6 200	**7930C**	38.1	160	200	2	2.47
	225	35	2.1	1.1	171	154	—	—	5.95	—	—		3 000	3 800	**7030**	72.1	162	213	2	4.43
	225	35	2.1	1.1	153	138	—	—	5.20	—	—		2 300	3 000	**7030B**	96.2	162	213	2	4.43
	225	35	2.1	1.1	188	169	—	—	6.70	—	16.1		4 200	5 500	**7030C**	42.8	162	213	2	4.43
	270	45	3	1.1	310	280	—	—	9.95	—	—		2 700	3 300	**7230**	83.1	164	256	2.5	9.75
	270	45	3	1.1	281	254	—	—	9.05	—	—		2 000	2 700	**7230B**	110.6	164	256	2.5	9.75
	270	45	3	1.1	338	303	—	—	10.8	—	14.7		3 700	4 900	**7230C**	50.6	164	256	2.5	9.75
	320	65	4	1.5	434	414	—	—	14.0	—	—		2 300	2 900	**7330**	100.3	168	302	3	22.4
	320	65	4	1.5	397	380	—	—	12.8	—	—		1 800	2 300	**7330B**	131.1	168	302	3	22.4

[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cage or molded cage.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.

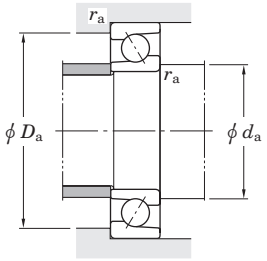
[Remark] Standard cage types used for the above bearings are described earlier in this section.

d (150) ~ (180) mm



With machined cage

With pressed cage



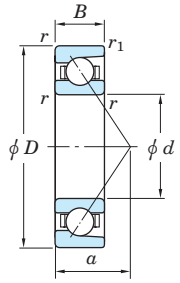
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN)		Factor	Limiting speeds [1] (min^{-1})		Bearing No. [2]	Load center (mm)	Mounting dimensions (mm)			(Refer.) Mass (kg)
					With machined cage		With pressed cage		C_u										
d	D	B	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cage	With pressed cage	f_0	Grease lub.	Oil lub.		a	d_a min.	D_a max.	r_a max.	
150	320	65	4	1.5	468	445	—	—	15.0	—	13.7	3 200	4 300	**7330C**	64.0	168	302	3	22.4
160	220	28	2	1	151	144	—	—	5.45	—	16.5	4 400	5 800	**7932C**	39.5	170	210	2	2.60
	240	38	2.1	1.1	194	176	—	—	6.65	—	—	2 800	3 500	**7032**	76.8	172	228	2	5.45
	240	38	2.1	1.1	173	158	—	—	5.80	—	—	2 100	2 800	**7032B**	102.9	172	228	2	5.45
	240	38	2.1	1.1	214	193	—	—	7.50	—	16.0	3 900	5 200	**7032C**	45.8	172	228	2	5.45
	290	48	3	1.1	288	263	—	—	9.05	—	—	2 500	3 100	**7232**	89.0	174	276	2.5	12.1
	290	48	3	1.1	297	279	—	—	9.60	—	—	1 800	2 500	**7232B**	118.4	174	276	2.5	12.1
	290	48	3	1.1	315	333	—	—	9.85	—	15.2	3 400	4 500	**7232C**	54.1	174	276	2.5	12.1
	340	68	4	1.5	456	455	—	—	14.9	—	—	2 200	2 700	**7332**	106.2	178	322	3	26.4
	340	68	4	1.5	415	416	—	—	13.6	—	—	1 600	2 200	**7332B**	138.9	178	322	3	26.4
	340	68	4	1.5	492	490	—	—	16.0	—	14.0	3 000	4 000	**7332C**	67.5	168.5	322	3	26.4
170	230	28	2	1	157	151	—	—	5.75	—	16.6	3 900	5 100	**7934C**	40.8	180	220	2	3.21
	260	42	2.1	1.1	232	214	—	—	7.90	—	—	2 600	3 200	**7034**	83.1	182	248	2	7.58
	260	42	2.1	1.1	208	193	—	—	6.90	—	—	1 900	2 600	**7034B**	111.2	182	248	2	7.77
	260	42	2.1	1.1	256	234	—	—	8.95	—	15.9	3 600	4 800	**7034C**	49.8	182	248	2	7.57
	310	52	4	1.5	340	331	—	—	11.0	—	—	2 300	2 800	**7234**	95.3	188	292	3	15.1
	310	52	4	1.5	306	300	—	—	10.0	—	—	1 700	2 300	**7234B**	126.7	188	292	3	15.1
	310	52	4	1.5	371	359	—	—	12.0	—	15.1	3 100	4 200	**7234C**	58.2	188	292	3	15.1
	360	72	4	1.5	486	485	—	—	15.4	—	—	2 000	2 500	**7334**	112.5	188	342	3	31.2
	360	72	4	1.5	444	444	—	—	14.1	—	—	1 500	2 000	**7334B**	147.2	188	342	3	31.2
	360	72	4	1.5	523	521	—	—	16.5	—	13.8	2 800	3 700	**7334C**	71.5	188	342	3	31.2
180	250	33	2	1	200	188	—	—	7.05	—	16.4	3 600	4 700	**7936C**	45.3	190	240	2	4.68
	280	46	2.1	1.1	265	253	—	—	9.15	—	—	2 400	3 000	**7036**	89.4	192	268	2	10.1
	280	46	2.1	1.1	237	228	—	—	7.95	—	—	1 800	2 400	**7036B**	119.5	192	268	2	10.2
	280	46	2.1	1.1	291	276	—	—	10.4	—	15.7	3 300	4 400	**7036C**	53.8	192	268	2	9.96
	320	52	4	1.5	367	362	—	—	11.8	—	—	2 200	2 700	**7236**	98.2	198	302	3	15.7

[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cage or molded cage.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.

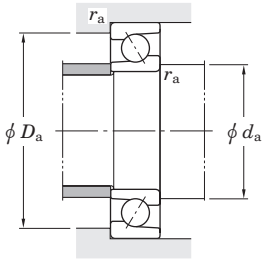
[Remark] Standard cage types used for the above bearings are described earlier in this section.

d (180) ~ (240) mm



With machined cage

With pressed cage



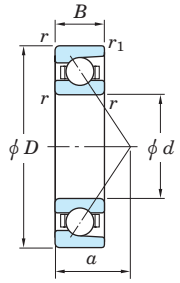
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN)		Factor	Limiting speeds [1] (min^{-1})		Bearing No. [2]	Load center (mm)	Mounting dimensions (mm)			(Refer.) Mass (kg)
					With machined cage		With pressed cage		C_u										
d	D	B	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	(With machined cage)	(With pressed cage)	f_0	Grease lub.	Oil lub.		a	d_a min.	D_a max.	r_a max.	
180	320	52	4	1.5	331	329	—	—	10.7	—	—	1 600	2 200	**7236B**	130.9	198	302	3	15.7
	320	52	4	1.5	400	393	—	—	12.8	—	14.9	3 000	4 000	**7236C**	59.5	198	302	3	15.7
	380	75	4	1.5	512	534	—	—	16.5	—	—	1 900	2 400	**7336**	118.3	198	362	3	40.0
	380	75	4	1.5	466	488	—	—	15.1	—	—	1 400	1 900	**7336B**	155.0	198	362	3	40.0
190	260	33	2	1	198	197	—	—	6.85	—	16.5	3 300	4 500	**7938C**	46.6	200	250	2	4.83
	290	46	2.1	1.1	271	268	—	—	9.35	—	—	2 300	2 800	**7038**	92.3	202	278	2	10.8
	290	46	2.1	1.1	243	241	—	—	8.15	—	—	1 700	2 300	**7038B**	123.7	202	278	2	10.8
	290	46	2.1	1.1	299	293	—	—	10.6	—	15.9	3 100	4 200	**7038C**	55.2	202	278	2	10.8
	340	55	4	1.5	379	390	—	—	12.4	—	—	2 000	2 500	**7238**	104.0	208	322	3	18.8
	340	55	4	1.5	341	353	—	—	11.2	—	—	1 500	2 000	**7238B**	138.7	208	322	3	18.8
	340	55	4	1.5	414	424	—	—	13.5	—	15.1	2 800	3 700	**7238C**	63.0	208	322	3	18.8
	400	78	5	2	563	598	—	—	18.0	—	—	1 800	2 200	**7338**	124.2	212	378	4	45.5
	400	78	5	2	514	548	—	—	16.5	—	—	1 300	1 800	**7338B**	162.8	212	378	4	45.5
200	280	38	2.1	1.1	256	255	—	—	8.70	—	16.3	3 100	4 100	**7940C**	51.2	212	268	2	6.85
	310	51	2.1	1.1	304	309	—	—	10.0	—	—	2 100	2 600	**7040**	99.1	212	298	2	12.7
	310	51	2.1	1.1	273	279	—	—	9.05	—	—	1 600	2 100	**7040B**	132.5	212	298	2	12.7
	310	51	2.1	1.1	335	338	—	—	10.9	—	15.7	2 900	3 900	**7040C**	59.7	212	298	2	12.7
	360	58	4	1.5	405	423	—	—	13.1	—	—	1 900	2 400	**7240**	109.8	218	342	3	22.4
	360	58	4	1.5	365	384	—	—	11.9	—	—	1 400	1 900	**7240B**	146.5	218	342	3	22.4
	360	58	4	1.5	442	460	—	—	14.2	—	15.1	2 600	3 500	**7240C**	66.5	218	342	3	22.4
	420	80	5	2	593	658	—	—	19.3	—	—	1 700	2 100	**7340**	129.5	222	398	4	52.0
	420	80	5	2	541	602	—	—	17.7	—	—	1 200	1 700	**7340B**	170.1	222	398	4	52.0
220	340	56	3	1.1	334	353	—	—	10.9	—	—	1 900	2 400	**7044**	108.9	234	326	2.5	18.5
	340	56	3	1.1	299	318	—	—	9.80	—	—	1 400	1 900	**7044B**	145.5	234	326	2.5	18.9
240	360	56	3	1.1	364	375	—	—	12.3	—	—	1 700	2 200	**7048**	114.6	254	346	2.5	19.7
	360	56	3	1.1	325	338	—	—	11.1	—	—	1 300	1 700	**7048B**	153.9	254	346	2.5	20.1

[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cage or molded cage.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.

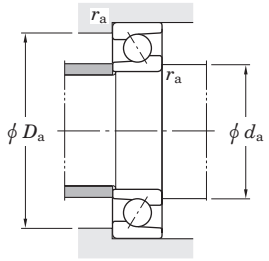
[Remark] Standard cage types used for the above bearings are described earlier in this section.

d (240) ~ 380 mm



With machined cage

With pressed cage



Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN)		Factor	Limiting speeds [1] (min^{-1})		Bearing No. [2]	Load center (mm)	Mounting dimensions (mm)			(Refer.) Mass (kg)
					With machined cage		With pressed cage		C_u										
d	D	B	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	(With machined cage)	(With pressed cage)	f_0	Grease lub.	Oil lub.		a	d_a min.	D_a max.	r_a max.	
240	440	72	4	1.5	504	595	—	—	16.7	—	—	1 500	1 800	**7248**	134.2	258	422	3	51.8
	440	72	4	1.5	453	539	—	—	15.1	—	—	1 100	1 500	**7248B**	178.6	258	422	3	52.8
260	400	65	4	1.5	407	478	—	—	13.6	—	—	1 500	1 900	**7052**	128.4	278	382	3	28.7
	400	65	4	1.5	364	431	—	—	12.2	—	—	1 100	1 500	**7052B**	171.0	278	382	3	29.3
280	420	65	4	1.5	415	507	—	—	14.0	—	—	1 400	1 800	**7056**	133.5	298	402	3	30.4
	420	65	4	1.5	384	453	—	—	13.1	—	—	1 100	1 400	**7056B**	179.3	298	402	3	31.0
300	460	74	4	1.5	533	680	—	—	18.0	—	—	1 300	1 600	**7060**	146.7	318	442	3	43.7
	460	74	4	1.5	478	613	—	—	16.3	—	—	960	1 300	**7060B**	196.4	318	442	3	44.9
320	480	74	4	1.5	546	722	—	—	18.6	—	—	1 200	1 500	**7064**	152.5	338	462	3	46.0
	480	74	4	1.5	489	651	—	—	16.8	—	—	890	1 200	**7064B**	204.8	338	462	3	47.2
340	520	82	5	2	628	861	—	—	21.4	—	—	1 100	1 300	**7068**	165.1	362	498	4	61.8
	520	82	5	2	563	777	—	—	19.4	—	—	800	1 100	**7068B**	221.4	362	498	4	63.3
360	540	82	5	2	644	913	—	—	22.2	—	—	1 000	1 300	**7072**	170.9	382	518	4	64.6
	540	82	5	2	577	824	—	—	20.1	—	—	750	1 000	**7072B**	229.8	382	518	4	66.2
380	560	82	5	2	660	966	—	—	23.0	—	—	940	1 200	**7076**	176.7	402	538	4	67.2
	560	82	5	2	590	870	—	—	20.7	—	—	700	940	**7076B**	238.2	402	538	4	69.1

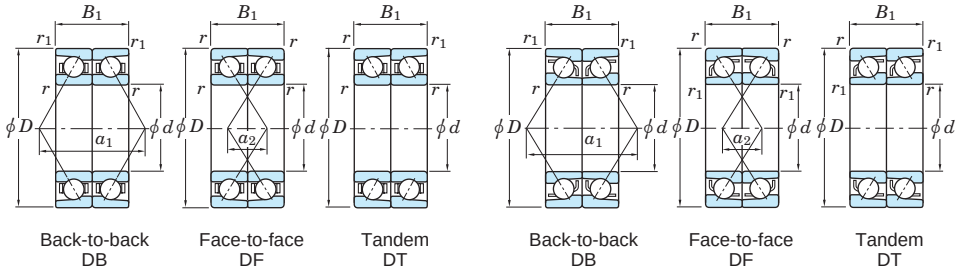
[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cage or molded cage.

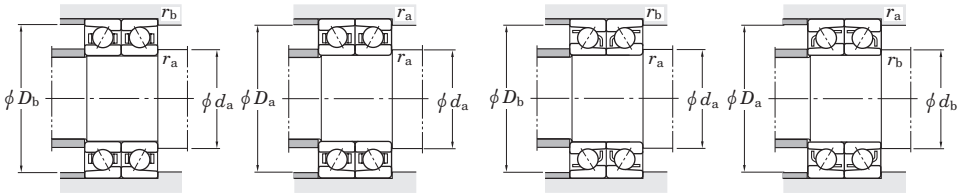
2) B or no indication after the bearing number indicates nominal contact angle of 15° and 30° respectively.

[Remark] Standard cage types used for the above bearings are described earlier in this section.

Angular contact ball bearings (matched pair)

d 10 ~ (17) mm



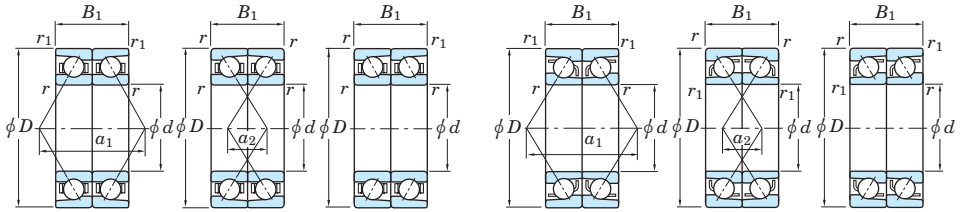


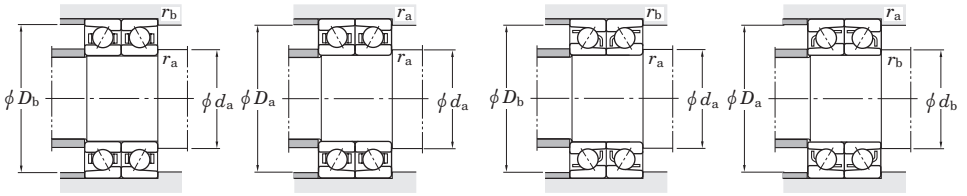
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN) C_u		Factor	Limiting speeds [1] (min^{-1})		Bearing No. [2]			Load center spread (mm)		Mounting dimensions (mm)						(Refer.) Mass (kg)
					With machined cages		With pressed cages																		
d	D	B_1	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cages	With pressed cages	f_0	Grease lub.	Oil lub.	Back-to-back DB	Face-to-face DF	Tandem DT	a_1	a_2	d_a min.	d_b min.	D_a max.	D_b max.	r_a max.	r_b max.	
10	22	12	0.3	0.15	6.10	3.05	—	—	0.120	—	14.2	42 000	55 000	**7900CDB**	**7900CDF**	**7900CDT**	10.3	1.7	12.5	—	19.5	20.8	0.3	0.15	0.016
	26	16	0.3	0.15	10.1	4.65	—	—	0.240	—	—	27 000	34 000	**7000DB**	**7000DF**	**7000DT**	18.2	2.2	12.5	—	23.5	24.8	0.3	0.15	0.042
	26	16	0.3	0.15	9.40	4.35	—	—	0.220	—	—	20 000	27 000	**7000BDB**	**7000BDF**	**7000BDT**	23.1	7.1	12.5	—	23.5	24.8	0.3	0.15	0.042
	26	16	0.3	0.15	10.7	4.95	—	—	0.250	—	12.5	37 000	50 000	**7000CDB**	**7000CDF**	**7000CDT**	12.7	3.3	12.5	—	23.5	24.8	0.3	0.15	0.042
	30	18	0.6	0.3	9.50	4.40	11.0	5.45	0.230	0.280	—	23 000	29 000	**7200DB**	**7200DF**	**7200DT**	20.8	2.8	14.5	12.5	25.5	27.5	0.6	0.3	0.062
	30	18	0.6	0.3	8.70	4.05	10.1	5.05	0.210	0.260	—	18 000	23 000	**7200BDB**	**7200BDF**	**7200BDT**	26.2	8.2	14.5	12.5	25.5	27.5	0.6	0.3	0.062
	30	18	0.6	0.3	10.2	4.70	11.8	5.85	0.240	0.300	13.4	32 000	43 000	**7200CDB**	**7200CDF**	**7200CDT**	14.5	3.5	14.5	12.5	25.5	27.5	0.6	0.3	0.062
	35	22	0.6	0.3	17.3	7.55	18.9	8.60	0.590	0.680	—	21 000	27 000	**7300DB**	**7300DF**	**7300DT**	24.0	2.0	14.5	12.5	30.5	32.5	0.6	0.3	0.108
12	24	12	0.3	0.15	6.45	3.45	—	—	0.140	—	14.7	37 000	49 000	**7901CDB**	**7901CDF**	**7901CDT**	10.8	1.2	14.5	—	21.5	22.8	0.3	0.15	0.020
	28	16	0.3	0.15	11.0	5.45	—	—	0.280	—	—	23 000	29 000	**7001DB**	**7001DF**	**7001DT**	19.9	3.9	14.5	—	25.5	26.8	0.3	0.15	0.048
	28	16	0.3	0.15	10.1	5.05	—	—	0.260	—	—	18 000	23 000	**7001BDB**	**7001BDF**	**7001BDT**	25.2	9.2	14.5	—	25.5	26.8	0.3	0.15	0.048
	28	16	0.3	0.15	11.8	5.85	—	—	0.300	—	13.4	32 000	43 000	**7001CDB**	**7001CDF**	**7001CDT**	13.5	2.5	14.5	—	25.5	26.8	0.3	0.15	0.048
	32	20	0.6	0.3	15.1	7.25	16.2	8.05	0.560	0.620	—	22 000	27 000	**7201DB**	**7201DF**	**7201DT**	22.7	2.7	16.5	14.5	27.5	29.5	0.6	0.3	0.076
	32	20	0.6	0.3	14.0	6.80	15.1	7.50	0.480	0.530	—	16 000	22 000	**7201BDB**	**7201BDF**	**7201BDT**	28.5	8.5	16.5	14.5	27.5	29.5	0.6	0.3	0.076
	32	20	0.6	0.3	16.0	7.70	17.2	8.55	0.600	0.670	12.5	30 000	40 000	**7201CDB**	**7201CDF**	**7201CDT**	15.9	4.1	16.5	14.5	27.5	29.5	0.6	0.3	0.076
	37	24	1	0.6	20.7	9.20	22.7	10.5	0.720	0.820	—	20 000	24 000	**7301DB**	**7301DF**	**7301DT**	26.2	2.2	17.5	16.5	31.5	32.5	1	0.6	0.130
15	28	14	0.3	0.15	9.65	5.30	—	—	0.210	—	14.5	31 000	41 000	**7902CDB**	**7902CDF**	**7902CDT**	12.8	1.2	17.5	—	25.5	26.8	0.3	0.15	0.030
	32	18	0.3	0.15	12.4	6.85	—	—	0.350	—	—	20 000	26 000	**7002DB**	**7002DF**	**7002DT**	22.6	4.6	17.5	—	29.5	30.8	0.3	0.15	0.070
	32	18	0.3	0.15	11.3	6.30	—	—	0.320	—	—	15 000	20 000	**7002BDB**	**7002BDF**	**7002BDT**	29.1	11.1	17.5	—	29.5	30.8	0.3	0.15	0.070
	32	18	0.3	0.15	13.4	7.40	—	—	0.380	—	14.1	28 000	37 000	**7002CDB**	**7002CDF**	**7002CDT**	15.3	2.7	17.5	—	29.5	30.8	0.3	0.15	0.070
	35	22	0.6	0.3	16.4	8.55	16.4	8.55	0.600	0.600	—	19 000	24 000	**7202DB**	**7202DF**	**7202DT**	25.7	3.7	19.5	17.5	30.5	32.5	0.6	0.3	0.096
	35	22	0.6	0.3	15.1	7.85	15.1	7.85	0.520	0.520	—	14 000	19 000	**7202BDB**	**7202BDF**	**7202BDT**	32.4	10.4	19.5	17.5	30.5	32.5	0.6	0.3	0.096
	35	22	0.6	0.3	17.6	9.15	17.6	9.15	0.680	0.680	13.3	26 000	35 000	**7202CDB**	**7202CDF**	**7202CDT**	17.8	4.2	19.5	17.5	30.5	32.5	0.6	0.3	0.096
	42	26	1	0.6	25.4	12.9	27.3	14.4	0.990	1.10	—	16 000	20 000	**7302DB**	**7302DF**	**7302DT**	30.0	4.0	20.5	19.5	36.5	37.5	1	0.6	0.176
17	30	14	0.3	0.15	10.1	5.90	—	—	0.240	—	14.9	28 000	38 000	**7903CDB**	**7903CDF**	**7903CDT**	13.4	0.6	19.5	—	27.5	28.8	0.3	0.15	0.032
	35	20	0.3	0.15	13.7	8.25	—	—	0.430	—	—	18 000	23 000	**7003DB**	**7003DF**	**7003DT**	25.3	5.3	19.5	—	32.5	33.8	0.3	0.15	0.090
	35	20	0.3	0.15	12.4	7.50	—	—	0.390	—	—	14 000	18 000	**7003BDB**	**7003BDF**	**7003BDT**	32.2	12.2	19.5	—	32.5	33.8	0.3	0.15	0.090

[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cages or molded cages.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.
[Remark] Standard cage types used for the above bearings are described earlier in this section.

d (17) ~ (25) mm





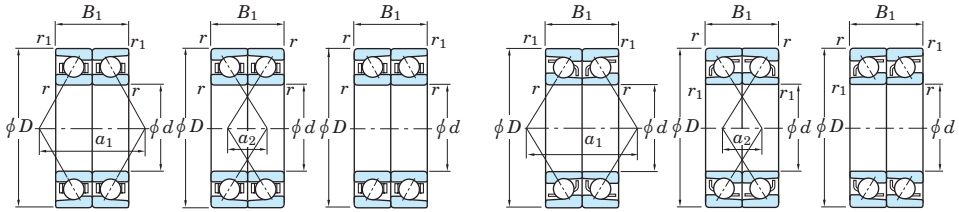
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN) C_u		Factor	Limiting speeds [1] (min^{-1})		Bearing No. [2]			Load center spread (mm)		Mounting dimensions (mm)					(Refer.) Mass (kg)
					With machined cages		With pressed cages																	
d	D	B_1	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cages	With pressed cages	f_0	Grease lub.	Oil lub.	Back-to-back DB	Face-to-face DF	Tandem DT	a_1	a_2	d_a min.	d_b min.	D_a max.	D_b max.	r_a max.	r_b max.	
17	35	20	0.3	0.15	14.8	8.95	—	—	0.460	—	14.6	25 000	33 000	**7003CDB**	**7003CDF**	**7003CDT**	17.1	2.9	19.5	—	32.5	33.8	0.3	0.15	0.090
	40	24	0.6	0.3	20.6	11.0	20.6	11.0	0.770	0.770	—	17 000	21 000	**7203DB**	**7203DF**	**7203DT**	28.8	4.8	21.5	19.5	35.5	37.5	0.6	0.3	0.140
	40	24	0.6	0.3	19.0	10.1	19.0	10.1	0.660	0.660	—	12 000	17 000	**7203BDB**	**7203BDF**	**7203BDT**	36.3	12.3	21.5	19.5	35.5	37.5	0.6	0.3	0.140
	40	24	0.6	0.3	22.1	11.8	22.1	11.8	0.880	0.880	13.4	23 000	30 000	**7203CDB**	**7203CDF**	**7203CDT**	19.8	4.2	21.5	19.5	35.5	37.5	0.6	0.3	0.140
	47	28	1	0.6	30.3	15.8	32.5	17.5	1.20	1.30	—	15 000	18 000	**7303DB**	**7303DF**	**7303DT**	33.1	5.1	22.5	21.5	41.5	42.5	1	0.6	0.240
	47	28	1	0.6	28.1	14.6	30.1	16.2	1.00	1.15	—	11 000	15 000	**7303BDB**	**7303BDF**	**7303BDT**	41.7	13.7	22.5	21.5	41.5	42.5	1	0.6	0.240
	47	28	1	0.6	32.2	16.8	32.2	16.8	1.30	1.30	12.6	20 000	27 000	**7303CDB**	**7303CDF**	**7303CDT**	22.8	5.2	22.5	21.5	41.5	42.5	1	0.6	0.240
20	37	18	0.3	0.15	14.8	9.15	—	—	0.470	—	14.9	24 000	31 000	**7904CDB**	**7904CDF**	**7904CDT**	16.6	1.4	22.5	—	34.5	35.8	0.3	0.15	0.070
	42	24	0.6	0.3	20.9	12.2	—	—	0.790	—	—	15 000	19 000	**7004DB**	**7004DF**	**7004DT**	30.2	6.2	24.5	—	37.5	39.5	0.6	0.3	0.158
	42	24	0.6	0.3	19.0	11.1	—	—	0.680	—	—	11 000	15 000	**7004BDB**	**7004BDF**	**7004BDT**	38.4	14.4	24.5	—	37.5	39.5	0.6	0.3	0.158
	42	24	0.6	0.3	22.6	13.2	—	—	0.900	—	14.1	21 000	28 000	**7004CDB**	**7004CDF**	**7004CDT**	20.4	3.6	24.5	—	37.5	39.5	0.6	0.3	0.158
	47	28	1	0.6	29.4	16.8	31.2	18.3	1.15	1.25	—	14 000	17 000	**7204DB**	**7204DF**	**7204DT**	33.9	5.9	25.5	24.5	41.5	42.5	1	0.6	0.224
	47	28	1	0.6	27.0	15.4	28.6	16.8	1.00	1.10	—	10 000	14 000	**7204BDB**	**7204BDF**	**7204BDT**	42.9	14.9	25.5	24.5	41.5	42.5	1	0.6	0.224
	47	28	1	0.6	31.5	18.0	33.4	19.6	1.35	1.45	13.4	19 000	26 000	**7204CDB**	**7204CDF**	**7204CDT**	23.2	4.8	25.5	24.5	41.5	42.5	1	0.6	0.224
	52	30	1.1	0.6	35.4	18.8	38.0	20.8	1.40	1.60	—	13 000	17 000	**7304DB**	**7304DF**	**7304DT**	35.8	5.8	27	24.5	45	47.5	1	0.6	0.300
	52	30	1.1	0.6	32.8	17.4	35.2	19.3	1.20	1.35	—	10 000	13 000	**7304BDB**	**7304BDF**	**7304BDT**	45.2	15.2	27	24.5	45	47.5	1	0.6	0.300
	52	30	1.1	0.6	37.6	19.9	40.3	22.2	1.55	1.75	12.6	18 000	24 000	**7304CDB**	**7304CDF**	**7304CDT**	24.6	5.4	27	24.5	45	47.5	1	0.6	0.300
	72	38	1.1	0.6	72.3	38.2	—	—	3.00	—	—	7 400	11 000	**7404DB**	**7404DF**	**7404DT**	46.1	8.1	27	—	65	67.5	1	0.6	0.790
	72	38	1.1	0.6	68.1	35.9	—	—	2.80	—	—	6 400	9 600	**7404BDB**	**7404BDF**	**7404BDT**	58.4	20.4	27	—	65	67.5	1	0.6	0.790
25	42	18	0.3	0.15	16.5	10.9	—	—	0.600	—	15.5	20 000	27 000	**7905CDB**	**7905CDF**	**7905CDT**	18.2	0.2	27.5	—	39.5	40.8	0.3	0.15	0.082
	47	24	0.6	0.3	22.9	14.8	—	—	0.900	—	—	13 000	17 000	**7005DB**	**7005DF**	**7005DT**	32.9	8.9	29.5	—	42.5	44.5	0.6	0.3	0.182
	47	24	0.6	0.3	20.7	13.4	—	—	0.780	—	—	10 000	13 000	**7005BDB**	**7005BDF**	**7005BDT**	42.3	18.3	29.5	—	42.5	44.5	0.6	0.3	0.182
	47	24	0.6	0.3	24.9	16.0	—	—	1.00	—	14.7	18 000	24 000	**7005CDB**	**7005CDF**	**7005CDT**	21.7	2.3	29.5	—	42.5	44.5	0.6	0.3	0.182
	52	30	1	0.6	31.2	19.0	32.9	20.6	1.25	1.35	—	12 000	15 000	**7205DB**	**7205DF**	**7205DT**	37.5	7.5	30.5	29.5	46.5	47.5	1	0.6	0.270
	52	30	1	0.6	28.4	17.4	29.9	18.8	1.05	1.15	—	9 200	12 000	**7205BDB**	**7205BDF**	**7205BDT**	47.7	17.7	30.5	29.5	46.5	47.5	1	0.6	0.270
	52	30	1	0.6	33.7	20.5	35.5	22.2	1.40	1.55	14.0	17 000	23 000	**7205CDB**	**7205CDF**	**7205CDT**	25.5	4.5	30.5	29.5	46.5	47.5	1	0.6	0.270
	62	34	1.1	0.6	50.3	28.8	53.6	31.6	2.10	2.35	—	11 000	14 000	**7305DB**	**7305DF**	**7305DT**	42.1	8.1	32	29.5	55	57.5	1	0.6	0.486

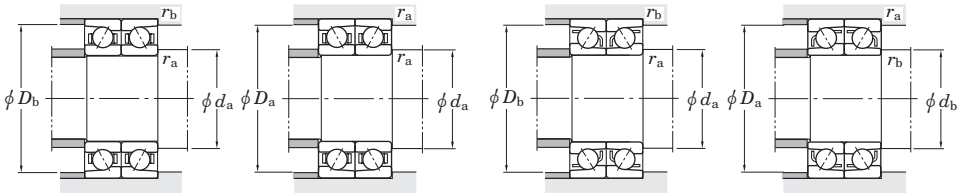
[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cages or molded cages.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Angular contact ball bearings (matched pair)

d (25) ~ (35) mm





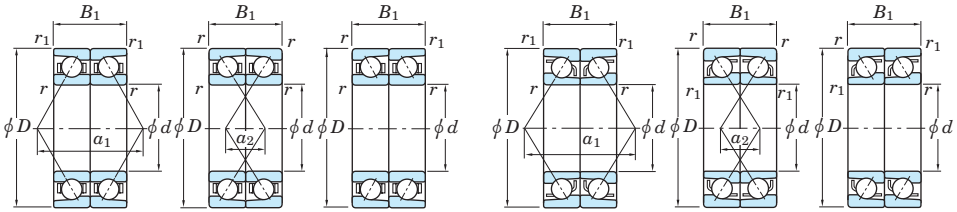
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN) C_u		Factor	Limiting speeds [1] (min^{-1})		Bearing No. [2]			Load center spread (mm)		Mounting dimensions (mm)						(Refer.) Mass (kg)
					With machined cages		With pressed cages																		
d	D	B_1	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cages	With pressed cages	f_0	Grease lub.	Oil lub.	Back-to-back DB	Face-to-face DF	Tandem DT	a_1	a_2	d_a min.	d_b min.	D_a max.	D_b max.	r_a max.	r_b max.	
25	62	34	1.1	0.6	46.5	26.6	49.5	29.2	1.85	2.00	—	8 300	11 000	**7305BDB**	**7305BDF**	**7305BDT**	53.5	19.5	32	29.5	55	57.5	1	0.6	0.486
	62	34	1.1	0.6	53.5	30.6	57.0	33.7	2.40	2.65	12.8	15 000	20 000	**7305CDB**	**7305CDF**	**7305CDT**	28.7	5.3	32	29.5	55	57.5	1	0.6	0.486
	80	42	1.5	1	80.7	46.3	86.6	51.5	3.60	4.00	—	6 400	9 100	**7405DB**	**7405DF**	**7405DT**	52.8	10.8	33.5	30.5	71.5	74.5	1.5	1	1.05
	80	42	1.5	1	74.9	43.0	80.4	47.8	3.10	3.40	—	5 500	8 200	**7405BDB**	**7405BDF**	**7405BDT**	67.2	25.2	33.5	30.5	71.5	74.5	1.5	1	1.05
30	47	18	0.3	0.15	16.8	12.5	—	—	0.650	—	15.9	18 000	23 000	**7906CDB**	**7906CDF**	**7906CDT**	19.3	1.3	32.5	—	44.5	45.8	0.3	0.15	0.092
	55	26	1	0.6	29.5	20.2	—	—	1.20	—	—	11 000	14 000	**7006DB**	**7006DF**	**7006DT**	37.5	11.5	35.5	—	49.5	50.5	1	0.6	0.266
	55	26	1	0.6	26.7	18.4	—	—	1.05	—	—	8 500	11 000	**7006BDB**	**7006BDF**	**7006BDT**	48.7	22.7	35.5	—	49.5	50.5	1	0.6	0.266
	55	26	1	0.6	32.2	22.0	—	—	1.40	—	14.9	16 000	21 000	**7006CDB**	**7006CDF**	**7006CDT**	24.4	1.6	35.5	—	49.5	50.5	1	0.6	0.266
	62	32	1	0.6	43.3	27.4	45.7	29.7	1.80	1.95	—	10 000	13 000	**7206DB**	**7206DF**	**7206DT**	43.0	11.0	35.5	34.5	56.5	57.5	1	0.6	0.416
	62	32	1	0.6	39.5	25.0	41.6	27.1	1.55	1.65	—	7 700	10 000	**7206BDB**	**7206BDF**	**7206BDT**	55.2	23.2	35.5	34.5	56.5	57.5	1	0.6	0.416
	62	32	1	0.6	46.8	29.5	49.4	32.0	2.05	2.20	14.0	14 000	19 000	**7206CDB**	**7206CDF**	**7206CDT**	28.5	3.5	35.5	34.5	56.5	57.5	1	0.6	0.416
	72	38	1.1	0.6	61.1	37.8	64.8	41.2	2.60	2.85	—	9 200	12 000	**7306DB**	**7306DF**	**7306DT**	49.0	11.0	37	34.5	65	67.5	1	0.6	0.724
	72	38	1.1	0.6	56.1	34.7	59.4	37.9	2.25	2.45	—	6 900	9 200	**7306BDB**	**7306BDF**	**7306BDT**	62.6	24.6	37	34.5	65	67.5	1	0.6	0.724
	72	38	1.1	0.6	65.6	40.5	69.5	44.2	3.00	3.25	13.4	13 000	17 000	**7306CDB**	**7306CDF**	**7306CDT**	32.9	5.1	37	34.5	65	67.5	1	0.6	0.724
	90	46	1.5	1	96.7	56.9	104	63.2	4.35	4.85	—	5 700	8 100	**7406DB**	**7406DF**	**7406DT**	58.5	12.5	38.5	35.5	81.5	84.5	1.5	1	1.37
	90	46	1.5	1	89.7	52.8	96.3	58.6	3.75	4.15	—	4 900	7 300	**7406BDB**	**7406BDF**	**7406BDT**	74.6	28.6	38.5	35.5	81.5	84.5	1.5	1	1.37
35	55	20	0.6	0.3	25.5	19.4	—	—	1.10	—	15.7	15 000	20 000	**7907CDB**	**7907CDF**	**7907CDT**	22.1	2.1	39.5	—	50.5	52.5	0.6	0.3	0.148
	62	28	1	0.6	35.5	25.2	—	—	1.50	—	—	9 800	12 000	**7007DB**	**7007DF**	**7007DT**	42.3	14.3	40.5	—	56.5	57.5	1	0.6	0.340
	62	28	1	0.6	32.0	22.8	—	—	1.30	—	—	7 300	9 800	**7007BDB**	**7007BDF**	**7007BDT**	55.1	27.1	40.5	—	56.5	57.5	1	0.6	0.340
	62	28	1	0.6	38.8	27.4	—	—	1.70	—	15.0	13 000	18 000	**7007CDB**	**7007CDF**	**7007CDT**	27.0	1.0	40.5	—	56.5	57.5	1	0.6	0.340
	72	34	1.1	0.6	57.1	37.3	60.3	40.4	2.45	2.65	—	8 800	11 000	**7207DB**	**7207DF**	**7207DT**	48.5	14.5	42	39.5	65	67.5	1	0.6	0.590
	72	34	1.1	0.6	52.1	34.1	54.9	36.9	2.10	2.25	—	6 600	8 800	**7207BDB**	**7207BDF**	**7207BDT**	62.7	28.7	42	39.5	65	67.5	1	0.6	0.590
	72	34	1.1	0.6	61.7	40.2	65.1	43.5	2.75	3.00	14.0	12 000	16 000	**7207CDB**	**7207CDF**	**7207CDT**	31.6	2.4	42	39.5	65	67.5	1	0.6	0.590
	80	42	1.5	1	71.8	44.0	81.1	52.8	3.05	3.65	—	8 200	10 000	**7307DB**	**7307DF**	**7307DT**	54.8	12.8	43.5	40.5	71.5	74.5	1.5	1	0.950
	80	42	1.5	1	65.9	40.5	74.4	48.6	2.65	3.15	—	6 200	8 200	**7307BDB**	**7307BDF**	**7307BDT**	70.1	28.1	43.5	40.5	71.5	74.5	1.5	1	0.950
	80	42	1.5	1	77.0	47.2	86.9	56.6	3.50	4.20	13.4	11 000	15 000	**7307CDB**	**7307CDF**	**7307CDT**	36.7	5.3	43.5	40.5	71.5	74.5	1.5	1	0.950
	100	50	1.5	1	123	73.9	132	82.1	5.70	6.35	—	5 000	7 200	**7407DB**	**7407DF**	**7407DT**	65.2	15.2	43.5	40.5	91.5	94.5	1.5	1	1.90

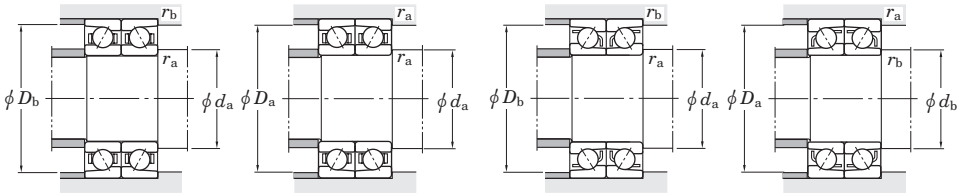
[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cages or molded cages.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Angular contact ball bearings (matched pair)

d (35) ~ (50) mm





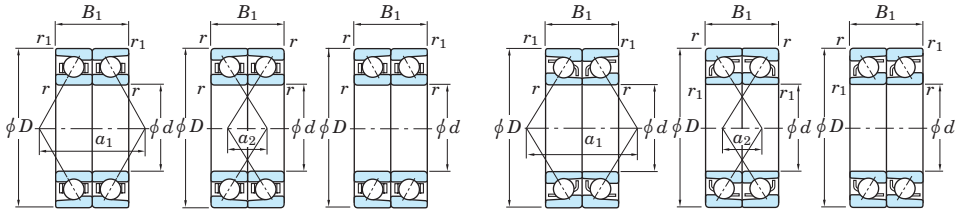
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN) C_u		Factor	Limiting speeds [1] (min^{-1})		Bearing No. [2]			Load center spread (mm)		Mounting dimensions (mm)					(Refer.) Mass (kg)
					With machined cages		With pressed cages																	
d	D	B_1	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cages	With pressed cages	f_0	Grease lub.	Oil lub.	Back-to-back DB	Face-to-face DF	Tandem DT	a_1	a_2	d_a min.	d_b min.	D_a max.	D_b max.	r_a max.	r_b max.	
35	100	50	1.5	1	114	68.6	122	76.2	4.90	5.45	—	4 300	6 500	**7407BDB**	**7407BDF**	**7407BDT**	83.3	33.3	43.5	40.5	91.5	94.5	1.5	1	1.90
40	62	24	0.6	0.3	32.0	24.9	—	—	1.40	—	15.7	13 000	18 000	**7908CDB**	**7908CDF**	**7908CDT**	25.7	1.7	44.5	—	57.5	59.5	0.6	0.3	0.214
	68	30	1	0.6	38.1	29.2	—	—	1.65	—	—	8 900	11 000	**7008DB**	**7008DF**	**7008DT**	46.3	16.3	45.5	—	62.5	63.5	1	0.6	0.420
	68	30	1	0.6	34.2	26.4	—	—	1.45	—	—	6 600	8 900	**7008BDB**	**7008BDF**	**7008BDT**	60.5	30.5	45.5	—	62.5	63.5	1	0.6	0.420
	68	30	1	0.6	41.7	31.8	—	—	1.90	—	15.4	12 000	16 000	**7008CDB**	**7008CDF**	**7008CDT**	29.5	0.5	45.5	—	62.5	63.5	1	0.6	0.420
	80	36	1.1	0.6	68.2	46.7	71.7	50.3	3.00	3.25	—	8 000	10 000	**7208DB**	**7208DF**	**7208DT**	52.7	16.7	47	44.5	73	75.5	1	0.6	0.764
	80	36	1.1	0.6	62.1	42.7	65.2	45.9	2.60	2.80	—	6 000	8 000	**7208BDB**	**7208BDF**	**7208BDT**	68.3	32.3	47	44.5	73	75.5	1	0.6	0.764
	80	36	1.1	0.6	73.8	50.4	77.6	54.3	3.45	3.70	14.2	11 000	15 000	**7208CDB**	**7208CDF**	**7208CDT**	34.1	1.9	47	44.5	73	75.5	1	0.6	0.764
	90	46	1.5	1	87.8	54.9	99.1	65.9	3.85	4.60	—	7 400	9 200	**7308DB**	**7308DF**	**7308DT**	60.5	14.5	48.5	45.5	81.5	84.5	1.5	1	1.31
	90	46	1.5	1	80.6	50.5	91.0	60.6	3.30	3.95	—	5 500	7 400	**7308BDB**	**7308BDF**	**7308BDT**	77.5	31.5	48.5	45.5	81.5	84.5	1.5	1	1.31
	90	46	1.5	1	94.1	58.8	106	70.5	4.40	5.25	13.4	10 000	14 000	**7308CDB**	**7308CDF**	**7308CDT**	40.4	5.6	48.5	45.5	81.5	84.5	1.5	1	1.31
	110	54	2	1	142	87.1	152	96.8	6.70	7.45	—	4 600	6 600	**7408DB**	**7408DF**	**7408DT**	70.9	16.9	50	45.5	100	104.5	2	1	2.46
	110	54	2	1	132	80.8	141	89.8	5.75	6.40	—	3 900	5 900	**7408BDB**	**7408BDF**	**7408BDT**	90.8	36.8	50	45.5	100	104.5	2	1	2.46
45	68	24	0.6	0.3	33.7	28.2	—	—	1.55	—	16.0	12 000	16 000	**7909CDB**	**7909CDF**	**7909CDT**	27.1	3.1	49.5	—	63.5	65.5	0.6	0.3	0.254
	75	32	1	0.6	45.2	35.4	—	—	2.00	—	—	8 000	10 000	**7009DB**	**7009DF**	**7009DT**	50.7	18.7	50.5	—	69.5	70.5	1	0.6	0.520
	75	32	1	0.6	40.6	32.0	—	—	1.75	—	—	6 000	8 000	**7009BDB**	**7009BDF**	**7009BDT**	66.3	34.3	50.5	—	69.5	70.5	1	0.6	0.520
	75	32	1	0.6	49.6	38.5	—	—	2.25	—	15.4	11 000	15 000	**7009CDB**	**7009CDF**	**7009CDT**	32.1	0.1	50.5	—	69.5	70.5	1	0.6	0.520
	85	38	1.1	0.6	76.6	53.2	80.5	57.2	3.40	3.70	—	7 500	9 400	**7209DB**	**7209DF**	**7209DT**	56.0	18.0	52	49.5	78	80.5	1	0.6	0.860
	85	38	1.1	0.6	69.7	48.6	73.2	52.3	2.95	3.20	—	5 600	7 500	**7209BDB**	**7209BDF**	**7209BDT**	72.8	34.8	52	49.5	78	80.5	1	0.6	0.860
	85	38	1.1	0.6	82.9	57.4	87.1	61.8	3.90	4.20	14.2	10 000	14 000	**7209CDB**	**7209CDF**	**7209CDT**	36.2	1.8	52	49.5	78	80.5	1	0.6	0.860
	100	50	1.5	1	112	74.2	119	80.9	5.15	5.60	—	6 600	8 200	**7309DB**	**7309DF**	**7309DT**	67.2	17.2	53.5	50.5	91.5	94.5	1.5	1	1.75
	100	50	1.5	1	103	68.2	109	74.3	4.40	4.85	—	4 900	6 600	**7309BDB**	**7309BDF**	**7309BDT**	86.3	36.3	53.5	50.5	91.5	94.5	1.5	1	1.75
	100	50	1.5	1	120	79.5	127	86.7	5.85	6.40	13.5	9 000	12 000	**7309CDB**	**7309CDF**	**7309CDT**	44.6	5.4	53.5	50.5	91.5	94.5	1.5	1	1.75
	120	58	2	1	173	108	185	120	8.35	9.30	—	4 200	6 000	**7409DB**	**7409DF**	**7409DT**	77.2	19.2	55	50.5	110	114.5	2	1	3.10
	120	58	2	1	160	100	172	111	7.20	8.00	—	3 600	5 400	**7409BDB**	**7409BDF**	**7409BDT**	99.1	41.1	55	50.5	110	114.5	2	1	3.10
50	72	24	0.6	0.3	35.4	31.4	—	—	1.70	—	16.2	11 000	15 000	**7910CDB**	**7910CDF**	**7910CDT**	28.3	4.3	54.5	—	67.5	69.5	0.6	0.3	0.256
	80	32	1	0.6	48.0	40.2	—	—	2.20	—	—	7 300	9 200	**7010DB**	**7010DF**	**7010DT**	53.8	21.8	55.5	—	74.5	75.5	1	0.6	0.580

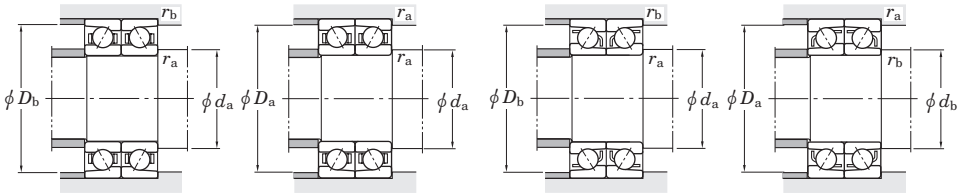
[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cages or molded cages.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Angular contact ball bearings (matched pair)

d (50) ~ (60) mm





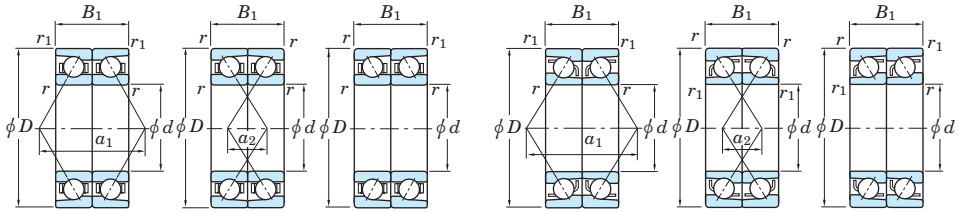
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN)		Factor	Limiting speeds [1] (min^{-1})		Bearing No. [2]			Load center spread (mm)		Mounting dimensions (mm)						(Refer.) Mass (kg)
					With machined cages		With pressed cages		C_u																
d	D	B_1	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cages	With pressed cages	f_0	Grease lub.	Oil lub.	Back-to-back DB	Face-to-face DF	Tandem DT	a_1	a_2	d_a min.	d_b min.	D_a max.	D_b max.	r_a max.	r_b max.	
50	80	32	1	0.6	43.1	36.2	—	—	1.90	—	—	5 500	7 400	**7010BDB**	**7010BDF**	**7010BDT**	70.5	38.5	55.5	—	74.5	75.5	1	0.6	0.580
	80	32	1	0.6	52.7	43.9	—	—	2.50	—	15.7	10 000	13 000	**7010CDB**	**7010CDF**	**7010CDT**	33.6	1.6	55.5	—	74.5	75.5	1	0.6	0.580
	90	40	1.1	0.6	80.0	58.7	83.8	62.9	3.60	3.85	—	6 800	8 500	**7210DB**	**7210DF**	**7210DT**	60.7	20.7	57	54.5	83	85.5	1	0.6	0.970
	90	40	1.1	0.6	72.5	53.5	75.9	57.3	3.15	3.35	—	5 100	6 800	**7210BDB**	**7210BDF**	**7210BDT**	79.2	39.2	57	54.5	83	85.5	1	0.6	0.970
	90	40	1.1	0.6	86.9	63.6	91.0	68.1	4.10	4.40	14.6	9 400	12 000	**7210CDB**	**7210CDF**	**7210CDT**	38.9	1.1	57	54.5	83	85.5	1	0.6	0.970
	110	54	2	1	142	96.3	151	105	6.70	7.35	—	5 800	7 300	**7310DB**	**7310DF**	**7310DT**	74.4	20.4	60	55.5	100	104.5	2	1	2.28
	110	54	2	1	131	88.6	138	96.6	5.80	6.30	—	4 400	5 800	**7310BDB**	**7310BDF**	**7310BDT**	95.8	41.8	60	55.5	100	104.5	2	1	2.28
	110	54	2	1	153	103	162	112	7.70	8.40	13.4	8 000	11 000	**7310CDB**	**7310CDF**	**7310CDT**	49.0	5.0	60	55.5	100	104.5	2	1	2.28
	130	62	2.1	1.1	198	131	—	—	9.85	—	—	3 800	5 500	**7410DB**	**7410DF**	**7410DT**	83.3	21.3	62	—	118	123	2	1	3.84
	130	62	2.1	1.1	183	121	—	—	8.45	—	—	3 300	4 900	**7410BDB**	**7410BDF**	**7410BDT**	106.9	44.9	62	—	118	123	2	1	3.84
55	80	26	1	0.6	40.0	37.0	—	—	1.95	—	16.3	10 000	14 000	**7911CDB**	**7911CDF**	**7911CDT**	31.1	5.1	60.5	—	74.5	75.5	1	0.6	0.356
	90	36	1.1	0.6	63.2	52.5	—	—	2.95	—	—	6 600	8 300	**7011DB**	**7011DF**	**7011DT**	59.9	23.9	62	—	83	85.5	1	0.6	0.840
	90	36	1.1	0.6	56.7	47.5	—	—	2.55	—	—	5 000	6 600	**7011BDB**	**7011BDF**	**7011BDT**	78.8	42.8	62	—	83	85.5	1	0.6	0.840
	90	36	1.1	0.6	69.3	57.3	—	—	3.35	—	15.5	9 100	12 000	**7011CDB**	**7011CDF**	**7011CDT**	37.4	1.4	62	—	83	85.5	1	0.6	0.840
	100	42	1.5	1	98.9	74.2	104	79.6	4.60	4.90	—	6 100	7 600	**7211DB**	**7211DF**	**7211DT**	66.6	24.6	63.5	60.5	91.5	94.5	1.5	1	1.27
	100	42	1.5	1	89.6	67.6	93.8	72.4	3.95	4.25	—	4 600	6 100	**7211BDB**	**7211BDF**	**7211BDT**	87.3	45.3	63.5	60.5	91.5	94.5	1.5	1	1.27
	100	42	1.5	1	107	80.4	112	86.1	5.20	5.60	14.6	8 400	11 000	**7211CDB**	**7211CDF**	**7211CDT**	42.2	0.2	63.5	60.5	91.5	94.5	1.5	1	1.27
	120	58	2	1	164	113	174	123	7.90	8.60	—	5 400	6 700	**7311DB**	**7311DF**	**7311DT**	80.4	22.4	65	60.5	110	114.5	2	1	2.90
	120	58	2	1	151	104	160	113	6.80	7.40	—	4 000	5 400	**7311BDB**	**7311BDF**	**7311BDT**	103.7	45.7	65	60.5	110	114.5	2	1	2.90
	120	58	2	1	176	121	187	132	9.00	9.85	13.4	7 400	9 800	**7311CDB**	**7311CDF**	**7311CDT**	52.9	5.1	65	60.5	110	114.5	2	1	2.90
	140	66	2.1	1.1	241	165	—	—	12.8	—	—	3 500	5 000	**7411DB**	**7411DF**	**7411DT**	89.9	23.9	67	—	128	133	2	1	4.72
	140	66	2.1	1.1	224	153	—	—	11.0	—	—	3 000	4 500	**7411BDB**	**7411BDF**	**7411BDT**	115.7	49.7	67	—	128	133	2	1	4.72
60	85	26	1	0.6	47.2	43.6	—	—	2.35	—	16.3	9 100	13 000	**7912CDB**	**7912CDF**	**7912CDT**	32.6	6.6	65.5	—	79.5	80.5	1	0.6	0.374
	95	36	1.1	0.6	64.8	56.1	—	—	3.10	—	—	6 200	7 700	**7012DB**	**7012DF**	**7012DT**	62.8	26.8	67	—	88	90.5	1	0.6	0.900
	95	36	1.1	0.6	58.1	50.7	—	—	2.70	—	—	4 600	6 200	**7012BDB**	**7012BDF**	**7012BDT**	83.0	47.0	67	—	88	90.5	1	0.6	0.900
	95	36	1.1	0.6	71.2	61.3	—	—	3.50	—	15.7	8 500	11 000	**7012CDB**	**7012CDF**	**7012CDT**	38.8	2.8	67	—	88	90.5	1	0.6	0.900
	110	44	1.5	1	120	91.5	125	98.0	5.65	6.05	—	5 500	6 900	**7212DB**	**7212DF**	**7212DT**	72.3	28.3	68.5	65.5	101.5	104.5	1.5	1	1.64

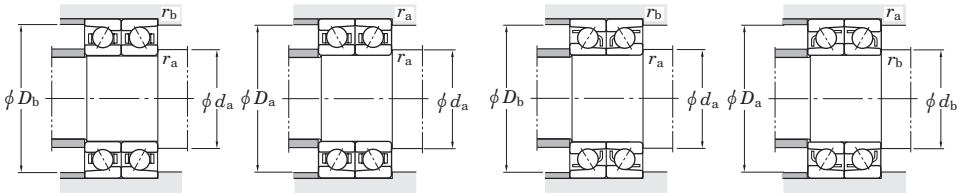
[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cages or molded cages.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Angular contact ball bearings (matched pair)

d (60) ~ (70) mm





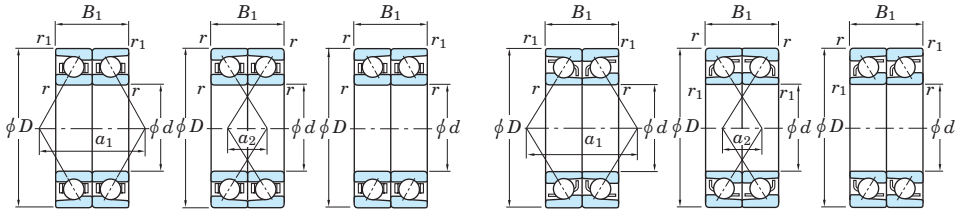
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN) C_u		Factor	Limiting speeds [1] (min^{-1})		Bearing No. [2]			Load center spread (mm)		Mounting dimensions (mm)					(Refer.) Mass (kg)
					With machined cages		With pressed cages																	
d	D	B_1	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cages	With pressed cages	f_0	Grease lub.	Oil lub.	Back-to-back DB	Face-to-face DF	Tandem DT	a_1	a_2	d_a min.	d_b min.	D_a max.	D_b max.	r_a max.	r_b max.	
60	110	44	1.5	1	108	83.3	114	89.2	4.90	5.25	—	4 100	5 500	**7212BDB**	**7212BDF**	**7212BDT**	95.0	51.0	68.5	65.5	101.5	104.5	1.5	1	1.64
	110	44	1.5	1	130	99.0	136	106	6.45	6.90	14.5	7 500	10 000	**7212CDB**	**7212CDF**	**7212CDT**	45.3	1.3	68.5	65.5	101.5	104.5	1.5	1	1.64
	130	62	2.1	1.1	188	131	199	143	9.15	10.0	—	5 000	6 200	**7312DB**	**7312DF**	**7312DT**	86.5	24.5	72	67	118	123	2	1	3.62
	130	62	2.1	1.1	172	121	183	132	7.90	8.60	—	3 700	5 000	**7312BDB**	**7312BDF**	**7312BDT**	111.6	49.6	72	67	118	123	2	1	3.62
	130	62	2.1	1.1	201	141	213	153	10.5	11.4	13.4	6 800	9 100	**7312CDB**	**7312CDF**	**7312CDT**	56.7	5.3	72	67	118	123	2	1	3.62
	150	70	2.1	1.1	262	187	—	—	13.7	—	—	3 200	4 600	**7412DB**	**7412DF**	**7412DT**	97.0	27.0	72	—	138	143	2	1	5.70
	150	70	2.1	1.1	243	173	—	—	11.8	—	—	2 800	4 100	**7412BDB**	**7412BDF**	**7412BDT**	125.1	55.1	72	—	138	143	2	1	5.70
65	90	26	1	0.6	42.2	42.3	—	—	2.20	—	16.5	8 600	12 000	**7913CDB**	**7913CDF**	**7913CDT**	33.8	7.8	70.5	—	84.5	85.5	1	0.6	0.410
	100	36	1.1	0.6	68.3	62.8	—	—	3.40	—	—	5 800	7 200	**7013DB**	**7013DF**	**7013DT**	65.9	29.9	72	—	93	95.5	1	0.6	0.940
	100	36	1.1	0.6	61.2	56.6	—	—	2.95	—	—	4 300	5 800	**7013BDB**	**7013BDF**	**7013BDT**	87.6	51.6	72	—	93	95.5	1	0.6	0.940
	100	36	1.1	0.6	75.2	68.7	—	—	3.85	—	15.9	7 900	11 000	**7013CDB**	**7013CDF**	**7013CDT**	40.2	4.2	72	—	93	95.5	1	0.6	0.940
	120	46	1.5	1	137	108	143	116	6.65	7.10	—	5 200	6 400	**7213DB**	**7213DF**	**7213DT**	76.4	30.4	73.5	70.5	111.5	114.5	1.5	1	2.04
	120	46	1.5	1	124	98.7	129	105	5.80	6.15	—	3 900	5 200	**7213BDB**	**7213BDF**	**7213BDT**	100.6	54.6	73.5	70.5	111.5	114.5	1.5	1	2.04
	120	46	1.5	1	148	117	155	125	7.60	8.10	14.6	7 100	9 400	**7213CDB**	**7213CDF**	**7213CDT**	47.8	1.8	73.5	70.5	111.5	114.5	1.5	1	2.04
	140	66	2.1	1.1	213	151	225	164	10.3	11.3	—	4 600	5 800	**7313DB**	**7313DF**	**7313DT**	92.5	26.5	77	72	128	133	2	1	4.44
	140	66	2.1	1.1	195	139	207	151	8.90	9.70	—	3 500	4 600	**7313BDB**	**7313BDF**	**7313BDT**	119.4	53.4	77	72	128	133	2	1	4.44
	140	66	2.1	1.1	228	161	242	176	11.8	12.9	13.4	6 300	8 500	**7313CDB**	**7313CDF**	**7313CDT**	60.6	5.4	77	72	128	133	2	1	4.44
	160	74	2.1	1.1	282	209	—	—	14.8	—	—	3 000	4 300	**7413DB**	**7413DF**	**7413DT**	102.9	28.9	77	—	148	153	2	1	6.82
	160	74	2.1	1.1	262	194	—	—	12.7	—	—	2 600	3 900	**7413BDB**	**7413BDF**	**7413BDT**	132.7	58.7	77	—	148	153	2	1	6.82
70	100	32	1	0.6	58.8	58.0	—	—	3.05	—	16.4	7 800	11 000	**7914CDB**	**7914CDF**	**7914CDT**	38.8	6.8	75.5	—	94.5	95.5	1	0.6	0.664
	110	40	1.1	0.6	86.7	78.7	—	—	4.30	—	—	5 300	6 600	**7014DB**	**7014DF**	**7014DT**	72.0	32.0	77	—	103	105.5	1	0.6	1.32
	110	40	1.1	0.6	77.7	71.1	—	—	3.75	—	—	4 000	5 300	**7014BDB**	**7014BDF**	**7014BDT**	95.5	55.5	77	—	103	105.5	1	0.6	1.32
	110	40	1.1	0.6	95.3	86.0	—	—	4.90	—	15.7	7 300	9 700	**7014CDB**	**7014CDF**	**7014CDT**	44.1	4.1	77	—	103	105.5	1	0.6	1.32
	125	48	1.5	1	142	111	155	127	6.85	7.80	—	4 900	6 100	**7214DB**	**7214DF**	**7214DT**	80.3	32.3	78.5	75.5	116.5	119.5	1.5	1	2.24
	125	48	1.5	1	128	101	140	116	5.90	6.75	—	3 700	4 900	**7214BDB**	**7214BDF**	**7214BDT**	105.8	57.8	78.5	75.5	116.5	119.5	1.5	1	2.24
	125	48	1.5	1	154	120	168	138	7.75	8.90	14.6	6 700	8 900	**7214CDB**	**7214CDF**	**7214CDT**	50.1	2.1	78.5	75.5	116.5	119.5	1.5	1	2.24
	150	70	2.1	1.1	239	172	253	187	11.4	12.4	—	4 300	5 400	**7314DB**	**7314DF**	**7314DT**	98.5	28.5	82	77	138	143	2	1	5.40

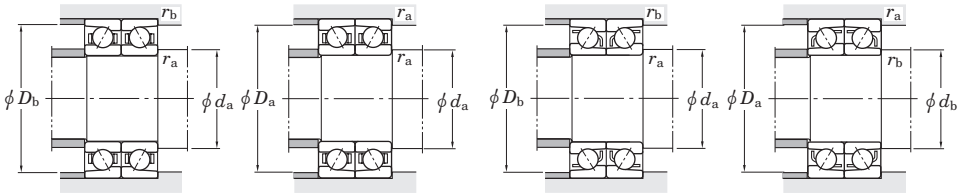
[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cages or molded cages.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Angular contact ball bearings (matched pair)

d (70) ~ (80) mm





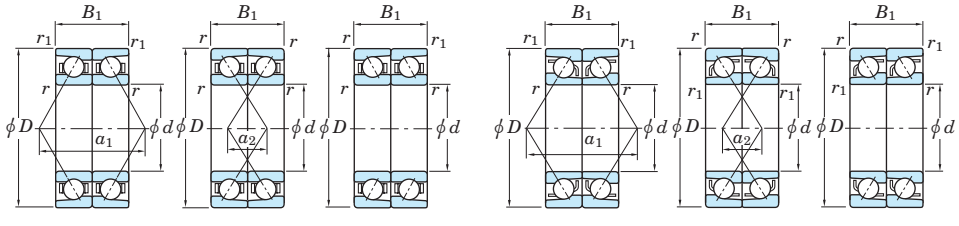
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN)		Factor	Limiting speeds [1] (min^{-1})		Bearing No. [2]			Load center spread (mm)		Mounting dimensions (mm)						(Refer.) Mass (kg)
					With machined cages		With pressed cages		C_u																
d	D	B_1	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cages	With pressed cages	f_0	Grease lub.	Oil lub.	Back-to-back DB	Face-to-face DF	Tandem DT	a_1	a_2	d_a min.	d_b min.	D_a max.	D_b max.	r_a max.	r_b max.	
70	150	70	2.1	1.1	219	158	232	172	9.80	10.7	—	3 200	4 300	**7314BDB**	**7314BDF**	**7314BDT**	127.3	57.3	82	77	138	143	2	1	5.40
	150	70	2.1	1.1	256	184	272	200	13.0	14.2	13.4	5 900	7 900	**7314CDB**	**7314CDF**	**7314CDT**	64.5	5.5	82	77	138	143	2	1	5.40
	180	84	3	1.1	303	230	—	—	10.6	—	—	2 700	3 900	**7414DB**	**7414DF**	**7414DT**	115.3	31.3	84	—	166	173	2.5	1	9.98
	180	84	3	1.1	301	237	—	—	10.9	—	—	2 300	3 500	**7414BDB**	**7414BDF**	**7414BDT**	148.4	64.4	84	—	166	173	2.5	1	9.98
75	105	32	1	0.6	59.7	60.9	—	—	3.15	—	16.5	7 400	9 800	**7915CDB**	**7915CDF**	**7915CDT**	40.1	8.1	80.5	—	99.5	100.5	1	0.6	0.700
	115	40	1.1	0.6	88.6	83.4	—	—	4.50	—	—	5 000	6 300	**7015DB**	**7015DF**	**7015DT**	74.9	34.9	82	—	108	110.5	1	0.6	1.38
	115	40	1.1	0.6	79.3	75.2	—	—	3.95	—	—	3 800	5 000	**7015BDB**	**7015BDF**	**7015BDT**	99.7	59.7	82	—	108	110.5	1	0.6	1.38
	115	40	1.1	0.6	97.6	91.3	—	—	5.10	—	15.9	6 900	9 200	**7015CDB**	**7015CDF**	**7015CDT**	45.5	5.5	82	—	108	110.5	1	0.6	1.38
	130	50	1.5	1	161	130	168	139	7.90	8.40	—	4 600	5 800	**7215DB**	**7215DF**	**7215DT**	84.2	34.2	83.5	80.5	121.5	124.5	1.5	1	2.46
	130	50	1.5	1	146	119	152	127	6.85	7.30	—	3 500	4 600	**7215BDB**	**7215BDF**	**7215BDT**	111.0	61.0	83.5	80.5	121.5	124.5	1.5	1	2.46
	130	50	1.5	1	175	141	183	151	8.95	9.55	14.6	6 400	8 500	**7215CDB**	**7215CDF**	**7215CDT**	52.5	2.5	83.5	80.5	121.5	124.5	1.5	1	2.46
	160	74	2.1	1.1	260	194	276	212	12.4	13.5	—	4 000	5 000	**7315DB**	**7315DF**	**7315DT**	104.9	30.9	87	82	148	153	2	1	6.30
	160	74	2.1	1.1	239	178	253	195	10.7	11.7	—	3 000	4 000	**7315BDB**	**7315BDF**	**7315BDT**	135.6	61.6	87	82	148	153	2	1	6.30
	160	74	2.1	1.1	279	208	296	227	14.2	15.5	13.4	5 500	7 400	**7315CDB**	**7315CDF**	**7315CDT**	68.5	5.5	87	82	148	153	2	1	6.30
	190	90	3	1.1	348	282	—	—	12.6	—	—	2 500	3 600	**7415DB**	**7415DF**	**7415DT**	122.7	32.7	89	—	176	183	2.5	1	11.8
	190	90	3	1.1	322	261	—	—	11.6	—	—	2 200	3 300	**7415BDB**	**7415BDF**	**7415BDT**	157.9	67.9	89	—	176	183	2.5	1	11.8
80	110	32	1	0.6	60.5	63.2	—	—	3.25	—	16.5	7 000	9 300	**7916CDB**	**7916CDF**	**7916CDT**	41.5	9.5	85.5	—	104.5	105.5	1	0.6	0.736
	125	44	1.1	0.6	108	101	—	—	5.50	—	—	4 600	5 800	**7016DB**	**7016DF**	**7016DT**	81.2	37.2	87	—	118	120.5	1	0.6	1.86
	125	44	1.1	0.6	97.1	91.3	—	—	4.75	—	—	3 500	4 600	**7016BDB**	**7016BDF**	**7016BDT**	108.0	64.0	87	—	118	120.5	1	0.6	1.86
	125	44	1.1	0.6	119	111	—	—	6.20	—	15.7	6 400	8 500	**7016CDB**	**7016CDF**	**7016CDT**	49.5	5.5	87	—	118	120.5	1	0.6	1.86
	140	52	2	1	173	143	181	152	8.25	8.80	—	4 300	5 400	**7216DB**	**7216DF**	**7216DT**	89.5	37.5	90	85.5	130	134.5	2	1	3.00
	140	52	2	1	157	130	163	139	7.15	7.60	—	3 200	4 300	**7216BDB**	**7216BDF**	**7216BDT**	118.3	66.3	90	85.5	130	134.5	2	1	3.00
	140	52	2	1	189	155	197	165	9.40	10.0	14.7	5 900	7 900	**7216CDB**	**7216CDF**	**7216CDT**	55.5	3.5	90	85.5	130	134.5	2	1	3.00
	170	78	2.1	1.1	282	218	299	238	13.5	14.7	—	3 800	4 700	**7316DB**	**7316DF**	**7316DT**	111.2	33.2	92	87	158	163	2	1	7.70
	170	78	2.1	1.1	259	200	274	218	11.6	12.7	—	2 800	3 800	**7316BDB**	**7316BDF**	**7316BDT**	143.9	65.9	92	87	158	163	2	1	7.70
	170	78	2.1	1.1	302	233	321	255	15.4	16.8	13.5	5 200	6 900	**7316CDB**	**7316CDF**	**7316CDT**	72.5	5.5	92	87	158	163	2	1	7.70
	200	96	3	1.1	391	332	—	—	14.4	—	—	2 400	3 400	**7416DB**	**7416DF**	**7416DT**	130.0	34.0	94	—	186	193	2.5	1	12.0

[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cages or molded cages.

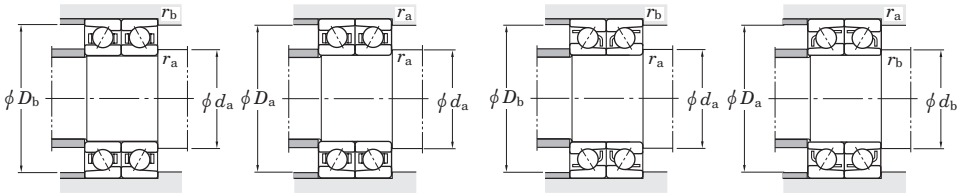
2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Angular contact ball bearings (matched pair)

d (80) ~ (95) mm



(With machined cages) (With pressed cages)



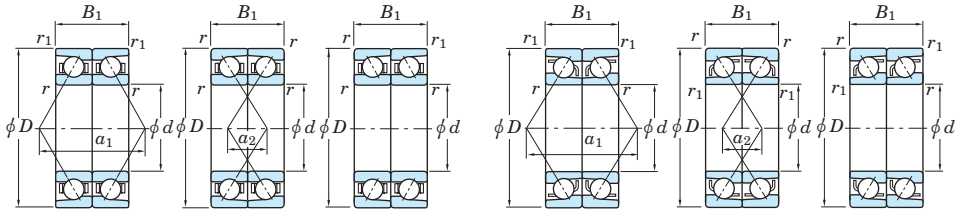
(With machined cages) (With pressed cages)

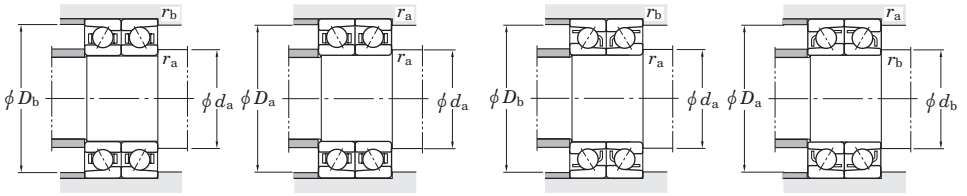
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN)		Factor	Limiting speeds [1] (min^{-1})		Bearing No. [2]			Load center spread (mm)		Mounting dimensions (mm)						(Refer.) Mass (kg)
					With machined cages		With pressed cages		C_u																
d	D	B_1	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cages	With pressed cages	f_0	Grease lub.	Oil lub.	Back-to-back DB	Face-to-face DF	Tandem DT	a_1	a_2	d_a min.	d_b min.	D_a max.	D_b max.	r_a max.	r_b max.	
80	200	96	3	1.1	363	307	—	—	13.3	—	—	2 100	3 100	**7416BDB**	**7416BDF**	**7416BDT**	167.2	71.2	94	—	186	193	2.5	1	12.0
85	120	36	1.1	0.6	79.0	81.3	—	—	4.20	—	16.5	6 500	8 600	**7917CDB**	**7917CDF**	**7917CDT**	45.5	9.5	92	—	113	115.5	1	0.6	1.05
	130	44	1.1	0.6	111	107	—	—	5.55	—	—	4 400	5 500	**7017DB**	**7017DF**	**7017DT**	84.7	40.7	92	—	123	125.5	1	0.6	1.94
	130	44	1.1	0.6	99.2	96.7	—	—	4.85	—	—	3 300	4 400	**7017BDB**	**7017BDF**	**7017BDT**	113.0	69.0	92	—	123	125.5	1	0.6	1.94
	130	44	1.1	0.6	122	117	—	—	6.30	—	15.9	6 000	8 000	**7017CDB**	**7017CDF**	**7017CDT**	51.1	7.1	92	—	123	125.5	1	0.6	1.94
	150	56	2	1	200	167	209	178	9.40	10.0	—	4 000	5 000	**7217DB**	**7217DF**	**7217DT**	95.9	39.9	95	90.5	140	144.5	2	1	3.74
	150	56	2	1	181	152	189	162	8.15	8.70	—	3 000	4 000	**7217BDB**	**7217BDF**	**7217BDT**	126.6	70.6	95	90.5	140	144.5	2	1	3.74
	150	56	2	1	218	181	227	193	10.7	11.4	14.7	5 500	7 400	**7217CDB**	**7217CDF**	**7217CDT**	59.5	3.5	95	90.5	140	144.5	2	1	3.74
	180	82	3	1.1	304	243	322	265	14.6	15.9	—	3 500	4 400	**7317DB**	**7317DF**	**7317DT**	117.5	35.5	99	92	166	173	2.5	1	9.06
	180	82	3	1.1	279	223	295	244	12.6	13.7	—	2 700	3 500	**7317BDB**	**7317BDF**	**7317BDT**	152.2	70.2	99	92	166	173	2.5	1	9.06
	180	82	3	1.1	326	261	346	284	16.7	18.2	13.5	4 900	6 500	**7317CDB**	**7317CDF**	**7317CDT**	76.5	5.5	99	92	166	173	2.5	1	9.06
	210	104	4	1.5	414	360	—	—	15.3	—	—	2 300	3 300	**7417DB**	**7417DF**	**7417DT**	137.5	33.5	103	—	192	201.5	3	1.5	17.1
	210	104	4	1.5	384	334	—	—	14.2	—	—	2 000	3 000	**7417BDB**	**7417BDF**	**7417BDT**	176.2	72.2	103	—	192	201.5	3	1.5	17.1
90	125	36	1.1	0.6	80.3	85.2	—	—	4.25	—	16.6	6 200	8 200	**7918CDB**	**7918CDF**	**7918CDT**	46.8	10.8	97	—	118	120.5	1	0.6	1.10
	140	48	1.5	1	132	127	—	—	6.45	—	—	4 100	5 100	**7018DB**	**7018DF**	**7018DT**	90.4	42.4	98.5	—	131.5	134.5	1.5	1	2.52
	140	48	1.5	1	119	114	—	—	5.60	—	—	3 100	4 100	**7018BDB**	**7018BDF**	**7018BDT**	120.5	72.5	98.5	—	131.5	134.5	1.5	1	2.52
	140	48	1.5	1	146	138	—	—	7.30	—	15.7	5 700	7 500	**7018CDB**	**7018CDF**	**7018CDT**	54.8	6.8	98.5	—	131.5	134.5	1.5	1	2.52
	160	60	2	1	229	193	239	206	10.6	11.3	—	3 800	4 700	**7218DB**	**7218DF**	**7218DT**	102.2	42.2	100	95.5	150	154.5	2	1	4.60
	160	60	2	1	207	176	217	188	9.15	9.80	—	2 800	3 800	**7218BDB**	**7218BDF**	**7218BDT**	134.9	74.9	100	95.5	150	154.5	2	1	4.60
	160	60	2	1	249	209	260	223	12.0	12.8	14.6	5 200	6 900	**7218CDB**	**7218CDF**	**7218CDT**	63.5	3.5	100	95.5	150	154.5	2	1	4.60
	190	86	3	1.1	327	270	346	294	11.8	12.8	—	3 300	4 200	**7318DB**	**7318DF**	**7318DT**	123.9	37.9	104	97	176	183	2.5	1	10.6
	190	86	3	1.1	300	248	317	270	10.8	11.8	—	2 500	3 300	**7318BDB**	**7318BDF**	**7318BDT**	160.5	74.5	104	97	176	183	2.5	1	10.6
	190	86	3	1.1	351	289	372	315	12.6	13.8	13.5	4 600	6 100	**7318CDB**	**7318CDF**	**7318CDT**	80.5	5.5	104	97	176	183	2.5	1	10.6
	225	108	4	1.5	439	393	—	—	16.2	—	—	2 100	3 100	**7418DB**	**7418DF**	**7418DT**	145.0	37.0	108	—	207	216.5	3	1.5	22.8
	225	108	4	1.5	406	364	—	—	15.0	—	—	1 800	2 800	**7418BDB**	**7418BDF**	**7418BDT**	186.2	78.2	108	—	207	216.5	3	1.5	22.8
95	130	36	1.1	0.6	81.6	88.3	—	—	4.30	—	16.5	5 900	7 900	**7919CDB**	**7919CDF**	**7919CDT**	48.1	12.1	102	—	123	125.5	1	0.6	1.15
	145	48	1.5	1	135	134	—	—	6.55	—	—	3 900	4 800	**7019DB**	**7019DF**	**7019DT**	94.5	46.5	103.5	—	136.5	139.5	1.5	1	2.64

[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cages or molded cages.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.
[Remark] Standard cage types used for the above bearings are described earlier in this section.

d (95) ~ (105) mm





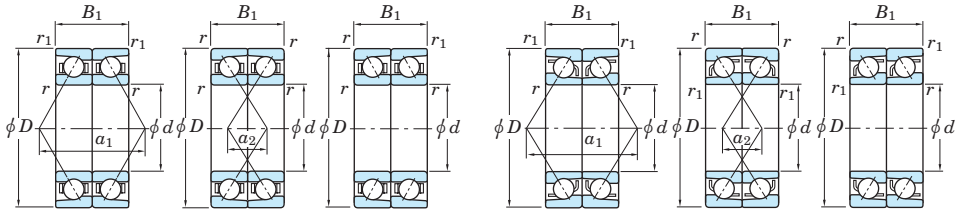
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN) C_u		Factor	Limiting speeds [1] (min^{-1})		Bearing No. [2]			Load center spread (mm)		Mounting dimensions (mm)						(Refer.) Mass (kg)
					With machined cages		With pressed cages																		
d	D	B_1	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cages	With pressed cages	f_0	Grease lub.	Oil lub.	Back-to-back DB	Face-to-face DF	Tandem DT	a_1	a_2	d_a min.	d_b min.	D_a max.	D_b max.	r_a max.	r_b max.	
95	145	48	1.5	1	121	121	—	—	5.70	—	—	2 900	3 900	**7019BDB**	**7019BDF**	**7019BDT**	126.4	78.4	103.5	—	136.5	139.5	1.5	1	2.64
	145	48	1.5	1	149	147	—	—	7.40	—	15.9	5 300	7 100	**7019CDB**	**7019CDF**	**7019CDT**	56.7	8.7	103.5	—	136.5	139.5	1.5	1	2.64
	170	64	2.1	1.1	248	207	260	221	11.0	11.8	—	3 500	4 400	**7219DB**	**7219DF**	**7219DT**	108.5	44.5	107	102	158	163	2	1	5.56
	170	64	2.1	1.1	224	188	235	201	9.55	10.2	—	2 700	3 500	**7219BDB**	**7219BDF**	**7219BDT**	143.2	79.2	107	102	158	163	2	1	5.56
	170	64	2.1	1.1	269	224	282	240	12.6	13.5	14.6	4 900	6 500	**7219CDB**	**7219CDF**	**7219CDT**	67.5	3.5	107	102	158	163	2	1	5.56
	200	90	3	1.1	350	298	371	325	12.7	13.8	—	3 200	4 000	**7319DB**	**7319DF**	**7319DT**	130.2	40.2	109	102	186	193	2.5	1	12.2
	200	90	3	1.1	321	273	340	298	11.6	12.7	—	2 400	3 200	**7319BDB**	**7319BDF**	**7319BDT**	168.8	78.8	109	102	186	193	2.5	1	12.2
	200	90	3	1.1	376	319	398	348	13.6	14.8	13.5	4 400	5 800	**7319CDB**	**7319CDF**	**7319CDT**	84.5	5.5	109	102	186	193	2.5	1	12.2
100	140	40	1.1	0.6	113	117	—	—	5.65	—	16.3	5 500	7 400	**7920CDB**	**7920CDF**	**7920CDT**	52.1	12.1	107	—	133	135.5	1	0.6	1.55
	150	48	1.5	1	139	141	—	—	6.75	—	—	3 800	4 700	**7020DB**	**7020DF**	**7020DT**	96.2	48.2	108.5	—	141.5	144.5	1.5	1	2.74
	150	48	1.5	1	124	127	—	—	5.90	—	—	2 800	3 800	**7020BDB**	**7020BDF**	**7020BDT**	128.9	80.9	108.5	—	141.5	144.5	1.5	1	2.74
	150	48	1.5	1	153	154	—	—	7.65	—	16.0	5 200	6 900	**7020CDB**	**7020CDF**	**7020CDT**	57.5	9.5	108.5	—	141.5	144.5	1.5	1	2.74
	180	68	2.1	1.1	279	235	292	252	12.2	13.0	—	3 300	4 100	**7220DB**	**7220DF**	**7220DT**	115.4	47.4	112	—	168	173	2	1	6.64
	180	68	2.1	1.1	252	214	264	229	10.5	11.3	—	2 500	3 300	**7220BDB**	**7220BDF**	**7220BDT**	152.3	84.3	112	—	168	173	2	1	6.64
	180	68	2.1	1.1	303	254	317	273	13.9	14.8	14.6	4 600	6 100	**7220CDB**	**7220CDF**	**7220CDT**	71.8	3.8	112	107	168	173	2	1	6.64
	215	94	3	1.1	373	323	421	387	13.2	15.9	—	2 900	3 600	**7320DB**	**7320DF**	**7320DT**	138.8	44.8	114	—	201	208	2.5	1	15.1
	215	94	3	1.1	342	297	386	356	12.2	14.6	—	2 200	2 900	**7320BDB**	**7320BDF**	**7320BDT**	180.4	86.4	114	—	201	208	2.5	1	15.1
	215	94	3	1.1	400	346	451	415	14.2	17.0	13.4	4 000	5 300	**7320CDB**	**7320CDF**	**7320CDT**	89.6	4.4	114	107	201	208	2.5	1	15.1
105	145	40	1.1	0.6	115	123	—	—	5.75	—	16.4	5 300	7 100	**7921CDB**	**7921CDF**	**7921CDT**	53.5	13.5	112	—	138	140.5	1	0.6	1.62
	160	52	2	1	162	164	—	—	7.60	—	—	3 500	4 400	**7021DB**	**7021DF**	**7021DT**	103.7	51.7	115	—	150	154.5	2	1	3.46
	160	52	2	1	145	148	—	—	6.65	—	—	2 600	3 500	**7021BDB**	**7021BDF**	**7021BDT**	137.2	85.2	115	—	150	154.5	2	1	3.46
	160	52	2	1	178	179	—	—	8.60	—	15.9	4 800	6 400	**7021CDB**	**7021CDF**	**7021CDT**	62.0	10.0	115	—	150	154.5	2	1	3.46
	190	72	2.1	1.1	303	265	—	—	13.4	—	—	3 100	3 900	**7221DB**	**7221DF**	**7221DT**	122.1	50.1	117	—	178	183	2	1	7.90
	190	72	2.1	1.1	275	241	—	—	11.6	—	—	2 300	3 100	**7221BDB**	**7221BDF**	**7221BDT**	161.0	89.0	117	—	178	183	2	1	7.90
	190	72	2.1	1.1	330	287	—	—	15.2	—	14.6	4 300	5 700	**7221CDB**	**7221CDF**	**7221CDT**	75.9	3.9	117	—	178	183	2	1	7.90
	225	98	3	1.1	422	386	—	—	15.5	—	—	2 800	3 500	**7321DB**	**7321DF**	**7321DT**	144.3	46.3	119	—	211	218	2.5	1	17.2
	225	98	3	1.1	387	355	—	—	14.3	—	—	2 100	2 800	**7321BDB**	**7321BDF**	**7321BDT**	187.5	89.5	119	—	211	218	2.5	1	17.2

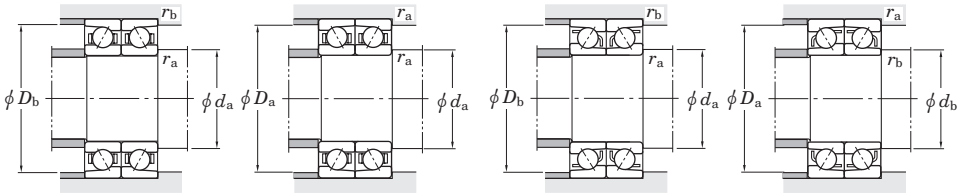
[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cages or molded cages.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Angular contact ball bearings (matched pair)

d (105) ~ (130) mm





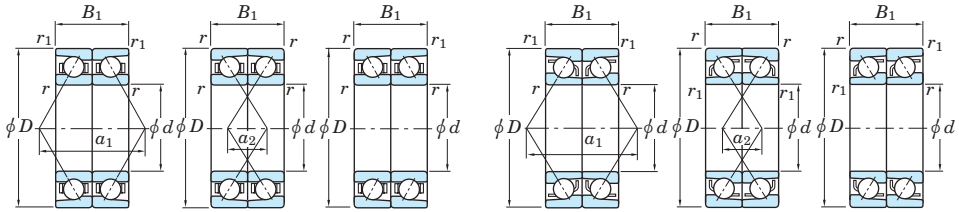
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN)		Factor	Limiting speeds [1] (min^{-1})		Bearing No. [2]			Load center spread (mm)		Mounting dimensions (mm)						(Refer.)
					With machined cages		With pressed cages		C_u																Mass
d	D	B_1	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cages	With pressed cages	f_0	Grease lub.	Oil lub.	Back-to-back DB	Face-to-face DF	Tandem DT	a_1	a_2	d_a min.	d_b min.	D_a max.	D_b max.	r_a max.	r_b max.	(kg)
105	225	98	3	1.1	452	413	—	—	16.6	—	13.4	3 900	5 100	**7321CDB**	**7321CDF**	**7321CDT**	93.2	4.8	119	—	211	218	2.5	1	17.2
110	150	40	1.1	0.6	117	129	—	—	5.85	—	16.5	5 100	6 800	**7922CDB**	**7922CDF**	**7922CDT**	54.8	14.8	117	—	143	145.5	1	0.6	1.68
	170	56	2	1	187	186	—	—	8.55	—	—	3 300	4 200	**7022DB**	**7022DF**	**7022DT**	108.9	52.9	120	—	160	164.5	2	1	4.28
	170	56	2	1	167	167	—	—	7.45	—	—	2 500	3 300	**7022BDB**	**7022BDF**	**7022BDT**	145.5	89.5	120	—	160	164.5	2	1	4.28
	170	56	2	1	205	203	—	—	9.70	—	15.7	4 600	6 100	**7022CDB**	**7022CDF**	**7022CDT**	65.5	9.5	120	—	160	164.5	2	1	4.28
	200	76	2.1	1.1	329	297	—	—	14.6	—	—	3 000	3 700	**7222DB**	**7222DF**	**7222DT**	128.7	52.7	122	—	188	193	2	1	9.30
	200	76	2.1	1.1	298	270	—	—	12.7	—	—	2 200	3 000	**7222BDB**	**7222BDF**	**7222BDT**	169.7	93.7	122	—	188	193	2	1	9.30
	200	76	2.1	1.1	357	321	—	—	16.7	—	14.5	4 100	5 400	**7222CDB**	**7222CDF**	**7222CDT**	80.1	4.1	122	—	188	193	2	1	9.30
	240	100	3	1.1	472	452	—	—	17.5	—	—	2 600	3 200	**7322DB**	**7322DF**	**7322DT**	152.7	52.7	124	—	226	233	2.5	1	20.2
	240	100	3	1.1	433	416	—	—	16.1	—	—	1 900	2 600	**7322BDB**	**7322BDF**	**7322BDT**	199.3	99.3	124	—	226	233	2.5	1	20.2
	240	100	3	1.1	505	484	—	—	18.8	—	13.4	3 500	4 700	**7322CDB**	**7322CDF**	**7322CDT**	97.7	2.3	124	—	226	233	2.5	1	20.2
120	165	44	1.1	0.6	146	162	—	—	7.10	—	16.5	4 700	6 200	**7924CDB**	**7924CDF**	**7924CDT**	60.2	16.2	127	—	158	160.5	1	0.6	2.30
	180	56	2	1	196	206	—	—	9.00	—	—	3 100	3 900	**7024DB**	**7024DF**	**7024DT**	114.6	58.6	130	—	170	174.5	2	1	4.54
	180	56	2	1	176	186	—	—	7.85	—	—	2 300	3 100	**7024BDB**	**7024BDF**	**7024BDT**	153.9	97.9	130	—	170	174.5	2	1	4.54
	180	56	2	1	216	226	—	—	10.2	—	16.0	4 300	5 700	**7024CDB**	**7024CDF**	**7024CDT**	68.2	12.2	130	—	170	174.5	2	1	4.54
	215	80	2.1	1.1	354	332	—	—	15.7	—	—	2 700	3 400	**7224DB**	**7224DF**	**7224DT**	137.0	57.0	132	—	203	208	2	1	11.0
	215	80	2.1	1.1	321	302	—	—	13.6	—	—	2 100	2 800	**7224BDB**	**7224BDF**	**7224BDT**	180.5	100.5	132	—	203	208	2	1	11.0
	215	80	2.1	1.1	385	359	—	—	17.9	—	14.6	3 800	5 000	**7224CDB**	**7224CDF**	**7224CDT**	85.0	5.0	132	—	203	208	2	1	11.0
	260	110	3	1.1	500	504	—	—	18.9	—	—	2 400	3 000	**7324DB**	**7324DF**	**7324DT**	164.7	54.7	134	—	246	253	2.5	1	25.2
	260	110	3	1.1	457	462	—	—	17.3	—	—	1 800	2 400	**7324BDB**	**7324BDF**	**7324BDT**	214.4	104.4	134	—	246	253	2.5	1	25.2
	260	110	3	1.1	538	542	—	—	20.3	—	13.7	3 300	4 400	**7324CDB**	**7324CDF**	**7324CDT**	105.9	4.1	134	—	246	253	2.5	1	25.2
130	180	48	1.5	1	177	200	—	—	8.45	—	16.4	4 300	5 700	**7926CDB**	**7926CDF**	**7926CDT**	65.5	17.5	138.5	—	171.5	174.5	1.5	1	3.00
	200	66	2	1	238	251	—	—	10.5	—	—	2 800	3 500	**7026DB**	**7026DF**	**7026DT**	128.3	62.3	140	—	190	194.5	2	1	6.86
	200	66	2	1	213	226	—	—	9.20	—	—	2 100	2 800	**7026BDB**	**7026BDF**	**7026BDT**	171.5	105.5	140	—	190	194.5	2	1	6.86
	200	66	2	1	262	274	—	—	11.9	—	15.9	3 900	5 100	**7026CDB**	**7026CDF**	**7026CDT**	77.2	11.2	140	—	190	194.5	2	1	6.86
	230	80	3	1.1	398	395	—	—	15.2	—	—	2 500	3 200	**7226DB**	**7226DF**	**7226DT**	143.9	63.9	144	—	216	223	2.5	1	12.4

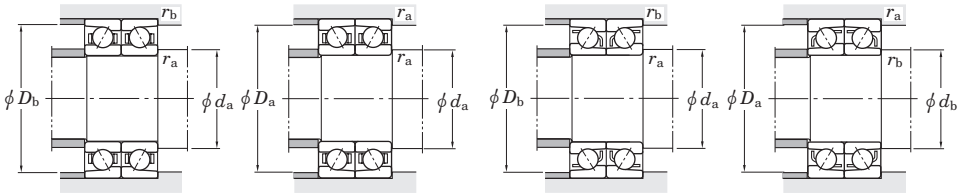
[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cages or molded cages.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Angular contact ball bearings (matched pair)

d (130) ~ (160) mm





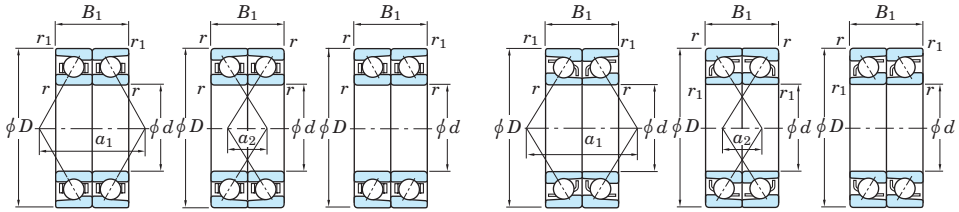
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN) C_u		Factor	Limiting speeds [1] (min^{-1})		Bearing No. [2]			Load center spread (mm)		Mounting dimensions (mm)						(Refer.) Mass (kg)
					With machined cages		With pressed cages																		
d	D	B_1	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cages	With pressed cages	f_0	Grease lub.	Oil lub.	Back-to-back DB	Face-to-face DF	Tandem DT	a_1	a_2	d_a min.	d_b min.	D_a max.	D_b max.	r_a max.	r_b max.	
130	230	80	3	1.1	360	360	—	—	13.9	—	—	1 900	2 500	**7226BDB**	**7226BDF**	**7226BDT**	191.0	111.0	144	—	216	223	2.5	1	12.4
	230	80	3	1.1	433	428	—	—	16.5	—	14.7	3 500	4 700	**7226CDB**	**7226CDF**	**7226CDT**	88.2	8.2	144	—	216	223	2.5	1	12.4
	280	116	4	1.5	611	659	—	—	23.7	—	—	2 200	2 700	**7326DB**	**7326DF**	**7326DT**	177.5	61.5	148	—	262	271.5	3	1.5	30.8
	280	116	4	1.5	507	536	—	—	19.4	—	—	1 600	2 200	**7326BDB**	**7326BDF**	**7326BDT**	230.0	114.0	148	—	262	271.5	3	1.5	30.8
	280	116	4	1.5	597	629	—	—	22.7	—	13.7	3 000	4 000	**7326CDB**	**7326CDF**	**7326CDT**	112.9	3.1	148	—	262	271.5	3	1.5	30.8
140	190	48	1.5	1	179	210	—	—	8.45	—	16.6	4 000	5 400	**7928CDB**	**7928CDF**	**7928CDT**	68.2	20.2	148.5	—	181.5	184.5	1.5	1	3.18
	210	66	2	1	243	265	—	—	10.6	—	—	2 600	3 300	**7028DB**	**7028DF**	**7028DT**	134.1	68.1	150	—	200	204.5	2	1	7.28
	210	66	2	1	217	237	—	—	9.25	—	—	2 000	2 600	**7028BDB**	**7028BDF**	**7028BDT**	179.8	113.8	150	—	200	204.5	2	1	7.28
	210	66	2	1	268	290	—	—	12.0	—	16.0	3 600	4 800	**7028CDB**	**7028CDF**	**7028CDT**	79.9	13.9	150	—	200	204.5	2	1	7.28
	250	84	3	1.1	443	468	—	—	17.3	—	—	2 300	2 900	**7228DB**	**7228DF**	**7228DT**	154.6	70.6	154	—	236	243	2.5	1	15.5
	250	84	3	1.1	401	426	—	—	15.7	—	—	1 700	2 300	**7228BDB**	**7228BDF**	**7228BDT**	205.6	121.6	154	—	236	243	2.5	1	15.5
	250	84	3	1.1	483	508	—	—	18.8	—	14.8	3 200	4 300	**7228CDB**	**7228CDF**	**7228CDT**	94.2	10.2	154	—	236	243	2.5	1	15.5
	300	124	4	1.5	668	748	—	—	26.1	—	—	2 000	2 500	**7328DB**	**7328DF**	**7328DT**	189.0	65.0	158	—	282	291.5	3	1.5	37.6
	300	124	4	1.5	613	688	—	—	24.0	—	—	1 500	2 000	**7328BDB**	**7328BDF**	**7328BDT**	246.6	122.6	158	—	282	291.5	3	1.5	37.6
	300	124	4	1.5	717	802	—	—	27.9	—	13.4	2 800	3 700	**7328CDB**	**7328CDF**	**7328CDT**	120.9	3.1	158	—	282	291.5	3	1.5	37.6
150	210	56	2	1	241	263	—	—	10.9	—	16.3	3 700	4 900	**7930CDB**	**7930CDF**	**7930CDT**	76.2	20.2	160	—	200	204.5	2	1	4.94
	225	70	2.1	1.1	278	308	—	—	11.9	—	—	2 400	3 000	**7030DB**	**7030DF**	**7030DT**	144.2	74.2	162	—	213	218	2	1	8.86
	225	70	2.1	1.1	249	275	—	—	10.4	—	—	1 800	2 400	**7030BDB**	**7030BDF**	**7030BDT**	192.3	122.3	162	—	213	218	2	1	8.86
	225	70	2.1	1.1	306	337	—	—	13.4	—	16.1	3 300	4 400	**7030CDB**	**7030CDF**	**7030CDT**	85.6	15.6	162	—	213	218	2	1	8.86
	270	90	3	1.1	504	560	—	—	19.9	—	—	2 100	2 700	**7230DB**	**7230DF**	**7230DT**	166.3	76.3	164	—	256	263	2.5	1	19.5
	270	90	3	1.1	456	509	—	—	18.1	—	—	1 600	2 100	**7230BDB**	**7230BDF**	**7230BDT**	221.2	131.2	164	—	256	263	2.5	1	19.5
	270	90	3	1.1	549	607	—	—	21.6	—	14.7	2 900	3 900	**7230CDB**	**7230CDF**	**7230CDT**	101.3	11.3	164	—	256	263	2.5	1	19.5
	320	130	4	1.5	706	829	—	—	27.9	—	—	1 900	2 300	**7330DB**	**7330DF**	**7330DT**	200.7	70.7	168	—	302	311.5	3	1.5	44.8
	320	130	4	1.5	645	760	—	—	25.6	—	—	1 400	1 900	**7330BDB**	**7330BDF**	**7330BDT**	262.2	132.2	168	—	302	311.5	3	1.5	44.8
	320	130	4	1.5	760	891	—	—	30.0	—	13.7	2 600	3 400	**7330CDB**	**7330CDF**	**7330CDT**	128.0	2.0	168	—	302	311.5	3	1.5	44.8
160	220	56	2	1	245	289	—	—	10.9	—	16.5	3 500	4 700	**7932CDB**	**7932CDF**	**7932CDT**	78.9	22.9	170	—	210	214.5	2	1	5.20

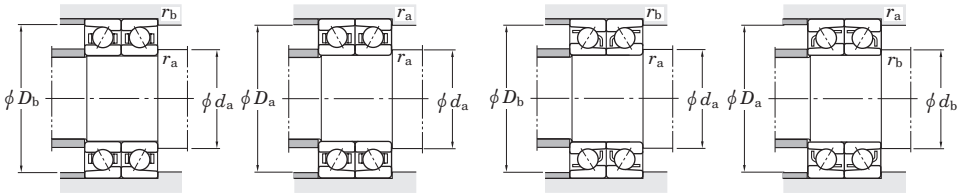
[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cages or molded cages.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Angular contact ball bearings (matched pair)

d (160) ~ (180) mm





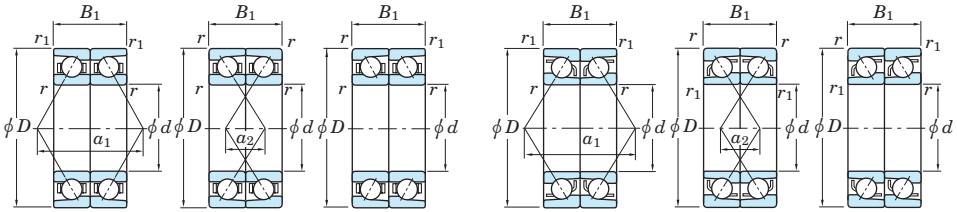
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN) C_u		Factor	Limiting speeds [1] (min^{-1})		Bearing No. [2]			Load center spread (mm)		Mounting dimensions (mm)						(Refer.) Mass (kg)
					With machined cages		With pressed cages																		
d	D	B_1	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cages	With pressed cages	f_0	Grease lub.	Oil lub.	Back-to-back DB	Face-to-face DF	Tandem DT	a_1	a_2	d_a min.	d_b min.	D_a max.	D_b max.	r_a max.	r_b max.	
160	240	76	2.1	1.1	315	353	—	—	13.3	—	—	2 300	2 800	**7032DB**	**7032DF**	**7032DT**	153.5	77.5	172	—	228	233	2	1	10.9
	240	76	2.1	1.1	282	316	—	—	11.6	—	—	1 700	2 300	**7032BDB**	**7032BDF**	**7032BDT**	205.8	129.8	172	—	228	233	2	1	10.9
	240	76	2.1	1.1	347	386	—	—	15.0	—	16.0	3 100	4 100	**7032CDB**	**7032CDF**	**7032CDT**	91.6	15.6	172	—	228	233	2	1	10.9
	290	96	3	1.1	468	525	—	—	18.1	—	—	2 000	2 500	**7232DB**	**7232DF**	**7232DT**	177.9	81.9	174	—	276	283	2.5	1	24.2
	290	96	3	1.1	482	557	—	—	19.2	—	—	1 500	2 000	**7232BDB**	**7232BDF**	**7232BDT**	236.8	140.8	174	—	276	283	2.5	1	24.2
	290	96	3	1.1	511	665	—	—	19.7	—	15.2	2 700	3 600	**7232CDB**	**7232CDF**	**7232CDT**	108.3	12.3	174	—	276	283	2.5	1	24.2
	340	136	4	1.5	741	909	—	—	29.7	—	—	1 700	2 200	**7332DB**	**7332DF**	**7332DT**	212.3	76.3	178	—	322	331.5	3	1.5	52.8
	340	136	4	1.5	675	831	—	—	27.2	—	—	1 300	1 700	**7332BDB**	**7332BDF**	**7332BDT**	277.8	141.8	178	—	322	331.5	3	1.5	52.8
	340	136	4	1.5	800	980	—	—	32.0	—	14.0	2 400	3 200	**7332CDB**	**7332CDF**	**7332CDT**	135.0	1.0	168.5	—	322	331.5	3	1.5	52.8
170	230	56	2	1	255	302	—	—	11.5	—	16.6	3 100	4 100	**7934CDB**	**7934CDF**	**7934CDT**	81.6	25.6	180	—	220	224.5	2	1	6.42
	260	84	2.1	1.1	377	429	—	—	15.8	—	—	2 100	2 600	**7034DB**	**7034DF**	**7034DT**	166.2	82.2	182	—	248	253	2	1	15.2
	260	84	2.1	1.1	338	386	—	—	13.8	—	—	1 600	2 100	**7034BDB**	**7034BDF**	**7034BDT**	222.4	138.4	182	—	248	253	2	1	15.5
	260	84	2.1	1.1	415	469	—	—	17.9	—	15.9	2 900	3 800	**7034CDB**	**7034CDF**	**7034CDT**	99.6	15.6	182	—	248	253	2	1	15.1
	310	104	4	1.5	552	661	—	—	22.0	—	—	1 800	2 300	**7234DB**	**7234DF**	**7234DT**	190.6	86.6	188	—	292	301.5	3	1.5	30.2
	310	104	4	1.5	497	600	—	—	20.0	—	—	1 400	1 800	**7234BDB**	**7234BDF**	**7234BDT**	253.4	149.4	188	—	292	301.5	3	1.5	30.2
	310	104	4	1.5	603	719	—	—	24.0	—	15.1	2 500	3 300	**7234CDB**	**7234CDF**	**7234CDT**	116.3	12.3	188	—	292	301.5	3	1.5	30.2
	360	144	4	1.5	789	969	—	—	30.7	—	—	1 600	2 000	**7334DB**	**7334DF**	**7334DT**	225.0	81.0	188	—	342	351.5	3	1.5	62.4
	360	144	4	1.5	721	888	—	—	28.2	—	—	1 200	1 600	**7334BDB**	**7334BDF**	**7334BDT**	294.4	150.4	188	—	342	351.5	3	1.5	62.4
	360	144	4	1.5	849	1 040	—	—	33.1	—	13.8	2 200	3 000	**7334CDB**	**7334CDF**	**7334CDT**	143.0	1.0	188	—	342	351.5	3	1.5	62.4
180	250	66	2	1	325	375	—	—	14.1	—	16.4	2 800	3 700	**7936CDB**	**7936CDF**	**7936CDT**	90.6	24.6	190	—	240	244.5	2	1	9.36
	280	92	2.1	1.1	430	506	—	—	18.3	—	—	1 900	2 400	**7036DB**	**7036DF**	**7036DT**	178.8	86.8	192	—	268	273	2	1	20.2
	280	92	2.1	1.1	385	457	—	—	15.9	—	—	1 400	1 900	**7036BDB**	**7036BDF**	**7036BDT**	239.0	147.0	192	—	268	273	2	1	20.4
	280	92	2.1	1.1	473	553	—	—	20.7	—	15.7	2 600	3 500	**7036CDB**	**7036CDF**	**7036CDT**	107.6	15.6	192	—	268	273	2	1	19.9
	320	104	4	1.5	596	724	—	—	23.7	—	—	1 700	2 200	**7236DB**	**7236DF**	**7236DT**	196.3	92.3	198	—	302	311.5	3	1.5	31.4
	320	104	4	1.5	538	657	—	—	21.5	—	—	1 300	1 700	**7236BDB**	**7236BDF**	**7236BDT**	261.8	157.8	198	—	302	311.5	3	1.5	31.4
	320	104	4	1.5	650	786	—	—	25.7	—	14.9	2 400	3 200	**7236CDB**	**7236CDF**	**7236CDT**	119.0	15.0	198	—	302	311.5	3	1.5	31.4
	380	150	4	1.5	831	1 070	—	—	33.0	—	—	1 500	1 900	**7336DB**	**7336DF**	**7336DT**	236.7	86.7	198	—	362	371.5	3	1.5	80.0

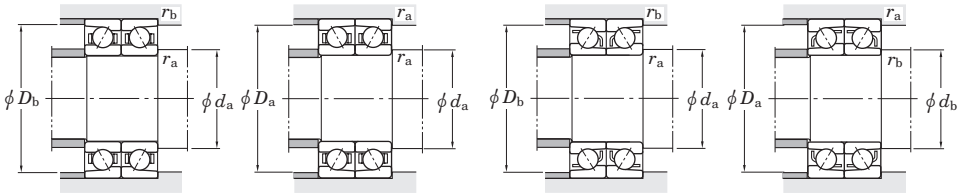
[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cages or molded cages.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Angular contact ball bearings (matched pair)

d (180) ~ 240 mm





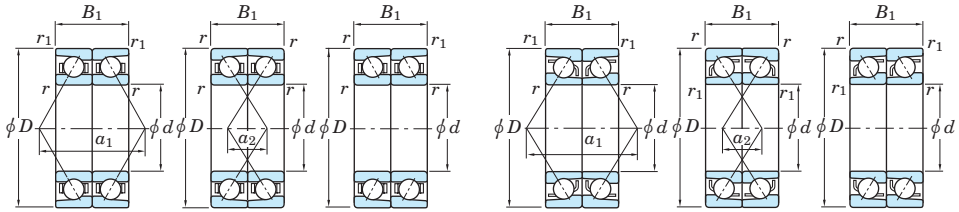
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN) C_u		Factor	Limiting speeds [1] (min^{-1})		Bearing No. [2]			Load center spread (mm)		Mounting dimensions (mm)						(Refer.) Mass (kg)
					With machined cages		With pressed cages																		
d	D	B_1	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cages	With pressed cages	f_0	Grease lub.	Oil lub.	Back-to-back DB	Face-to-face DF	Tandem DT	a_1	a_2	d_a min.	d_b min.	D_a max.	D_b max.	r_a max.	r_b max.	
180	380	150	4	1.5	757	976	—	—	30.1	—	—	1 100	1 500	**7336BDB**	**7336BDF**	**7336BDT**	309.9	159.9	198	—	362	371.5	3	1.5	80.0
190	260	66	2	1	322	394	—	—	13.7	—	16.5	2 700	3 600	**7938CDB**	**7938CDF**	**7938CDT**	93.3	27.3	200	—	250	254.5	2	1	9.66
	290	92	2.1	1.1	441	535	—	—	18.7	—	—	1 800	2 300	**7038DB**	**7038DF**	**7038DT**	184.6	92.6	202	—	278	283	2	1	21.6
	290	92	2.1	1.1	395	483	—	—	16.3	—	—	1 400	1 800	**7038BDB**	**7038BDF**	**7038BDT**	247.4	155.4	202	—	278	283	2	1	21.6
	290	92	2.1	1.1	485	585	—	—	21.1	—	15.9	2 500	3 300	**7038CDB**	**7038CDF**	**7038CDT**	110.3	18.3	202	—	278	283	2	1	21.6
	340	110	4	1.5	616	779	—	—	24.7	—	—	1 600	2 000	**7238DB**	**7238DF**	**7238DT**	208.0	98.0	208	—	322	331.5	3	1.5	37.6
	340	110	4	1.5	555	706	—	—	22.4	—	—	1 200	1 600	**7238BDB**	**7238BDF**	**7238BDT**	277.4	167.4	208	—	322	331.5	3	1.5	37.6
	340	110	4	1.5	673	848	—	—	26.9	—	15.1	2 200	3 000	**7238CDB**	**7238CDF**	**7238CDT**	126.0	16.0	208	—	322	331.5	3	1.5	37.6
	400	156	5	2	914	1 200	—	—	36.0	—	—	1 400	1 800	**7338DB**	**7338DF**	**7338DT**	248.3	92.3	212	—	378	390	4	2	91.0
	400	156	5	2	835	1 100	—	—	33.0	—	—	1 100	1 400	**7338BDB**	**7338BDF**	**7338BDT**	325.5	169.5	212	—	378	390	4	2	91.0
200	280	76	2.1	1.1	415	509	—	—	17.4	—	16.3	2 500	3 300	**7940CDB**	**7940CDF**	**7940CDT**	102.3	26.3	212	—	268	273	2	1	13.7
	310	102	2.1	1.1	495	618	—	—	20.0	—	—	1 700	2 100	**7040DB**	**7040DF**	**7040DT**	198.3	96.3	212	—	298	303	2	1	25.4
	310	102	2.1	1.1	443	558	—	—	18.1	—	—	1 300	1 700	**7040BDB**	**7040BDF**	**7040BDT**	265.0	163.0	212	—	298	303	2	1	25.4
	310	102	2.1	1.1	544	676	—	—	21.9	—	15.7	2 300	3 100	**7040CDB**	**7040CDF**	**7040CDT**	119.3	17.3	212	—	298	303	2	1	25.4
	360	116	4	1.5	658	847	—	—	26.2	—	—	1 500	1 900	**7240DB**	**7240DF**	**7240DT**	219.7	103.7	218	—	342	351.5	3	1.5	44.8
	360	116	4	1.5	593	768	—	—	23.7	—	—	1 100	1 500	**7240BDB**	**7240BDF**	**7240BDT**	292.9	176.9	218	—	342	351.5	3	1.5	44.8
	360	116	4	1.5	718	921	—	—	28.4	—	15.1	2 100	2 800	**7240CDB**	**7240CDF**	**7240CDT**	133.0	17.0	218	—	342	351.5	3	1.5	44.8
	420	160	5	2	964	1 320	—	—	38.6	—	—	1 300	1 700	**7340DB**	**7340DF**	**7340DT**	259.0	99.0	222	—	398	410	4	2	104
	420	160	5	2	878	1 200	—	—	35.3	—	—	1 000	1 300	**7340BDB**	**7340BDF**	**7340BDT**	340.1	180.1	222	—	398	410	4	2	104
220	340	112	3	1.1	543	705	—	—	21.8	—	—	1 500	1 900	**7044DB**	**7044DF**	—	217.8	105.8	234	—	326	333	2.5	1	37.0
	340	112	3	1.1	486	636	—	—	19.6	—	—	1 100	1 500	**7044BDB**	**7044BDF**	—	290.9	178.9	234	—	326	333	2.5	1	37.8
240	360	112	3	1.1	591	751	—	—	24.6	—	—	1 400	1 700	**7048DB**	**7048DF**	—	229.2	117.2	254	—	346	353	2.5	1	39.4
	360	112	3	1.1	528	677	—	—	22.2	—	—	1 000	1 400	**7048BDB**	**7048BDF**	—	307.7	195.7	254	—	346	353	2.5	1	40.2
	440	144	4	1.5	819	1 190	—	—	33.4	—	—	1 200	1 500	**7248DB**	**7248DF**	—	268.3	124.3	258	—	422	431.5	3	1.5	104
	440	144	4	1.5	736	1 080	—	—	30.2	—	—	890	1 200	**7248BDB**	**7248BDF**	—	357.3	213.3	258	—	422	431.5	3	1.5	106

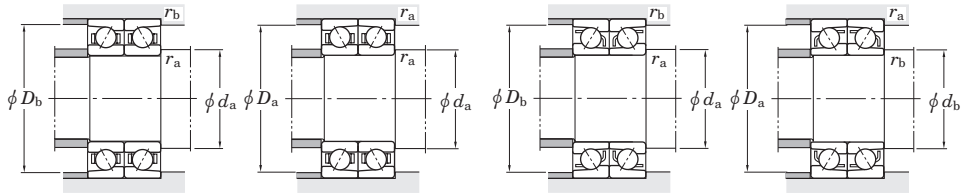
[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cages or molded cages.

2) B, C or no indication after the bearing number indicates nominal contact angle of 40°, 15° and 30° respectively.
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Angular contact ball bearings (matched pair)

d 260 ~ 380 mm





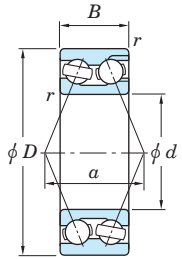
Boundary dimensions (mm)					Basic load ratings (kN)				Fatigue load limits (kN) C_u		Factor	Limiting speeds [1] (min^{-1})		Bearing No. [2]			Load center spread (mm)		Mounting dimensions (mm)						(Refer.) Mass (kg)
					With machined cages		With pressed cages																		
d	D	B_1	r min.	r_1 min.	C_r	C_{0r}	C_r	C_{0r}	With machined cages	With pressed cages	f_0	Grease lub.	Oil lub.	Back-to-back DB	Face-to-face DF	Tandem DT	a_1	a_2	d_a min.	d_b min.	D_a max.	D_b max.	r_a max.	r_b max.	
260	400	130	4	1.5	661	956	—	—	27.1	—	—	1 200	1 500	**7052DB**	**7052DF**	—	256.7	126.7	278	—	382	391.5	3	1.5	57.4
	400	130	4	1.5	592	862	—	—	24.4	—	—	910	1 200	**7052BDB**	**7052BDF**	—	341.9	211.9	278	—	382	391.5	3	1.5	58.6
280	420	130	4	1.5	675	1 010	—	—	27.9	—	—	1 100	1 400	**7056DB**	**7056DF**	—	267.1	137.1	298	—	402	411.5	3	1.5	60.8
	420	130	4	1.5	623	906	—	—	26.2	—	—	850	1 100	**7056BDB**	**7056BDF**	—	358.7	228.7	298	—	402	411.5	3	1.5	62.0
300	460	148	4	1.5	866	1 360	—	—	36.0	—	—	1 000	1 300	**7060DB**	**7060DF**	—	293.4	145.4	318	—	442	451.5	3	1.5	87.4
	460	148	4	1.5	776	1 230	—	—	32.5	—	—	770	1 000	**7060BDB**	**7060BDF**	—	392.9	244.9	318	—	442	451.5	3	1.5	89.8
320	480	148	4	1.5	887	1 440	—	—	37.3	—	—	950	1 200	**7064DB**	**7064DF**	—	304.9	156.9	338	—	462	471.5	3	1.5	92.0
	480	148	4	1.5	795	1 300	—	—	33.6	—	—	710	950	**7064BDB**	**7064BDF**	—	409.6	261.6	338	—	462	471.5	3	1.5	94.4
340	520	164	5	2	1 020	1 720	—	—	42.9	—	—	860	1 100	**7068DB**	**7068DF**	—	330.3	166.3	362	—	498	510	4	2	124
	520	164	5	2	914	1 550	—	—	38.7	—	—	640	860	**7068BDB**	**7068BDF**	—	442.8	278.8	362	—	498	510	4	2	127
360	540	164	5	2	1 050	1 830	—	—	44.5	—	—	800	1 000	**7072DB**	**7072DF**	—	341.8	177.8	382	—	518	530	4	2	129
	540	164	5	2	937	1 650	—	—	40.1	—	—	600	800	**7072BDB**	**7072BDF**	—	459.6	295.6	382	—	518	530	4	2	132
380	560	164	5	2	1 070	1 930	—	—	46.0	—	—	750	940	**7076DB**	**7076DF**	—	353.4	189.4	402	—	538	550	4	2	134
	560	164	5	2	959	1 740	—	—	41.5	—	—	560	750	**7076BDB**	**7076BDF**	—	476.4	312.4	402	—	538	550	4	2	138

[Notes] 1) Limiting speeds shown above are applicable to machined cage bearings.
Limiting speeds of pressed cage bearings should be kept to under 80% of this value.
For bearings with 15° contact angle, this figure is applied to the high precision bearings ranked higher than class 5, used with machined cages or molded cages.

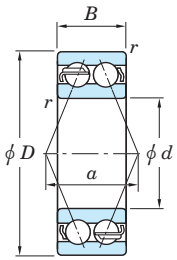
2) B or no indication after the bearing number indicates nominal contact angle of 40° and 30° respectively.

[Remark] Standard cage types used for the above bearings are described earlier in this section.

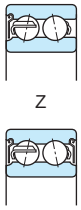
d 10 ~ (40) mm



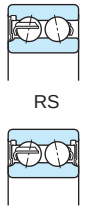
32, 33 series
(With filling slot)



Open

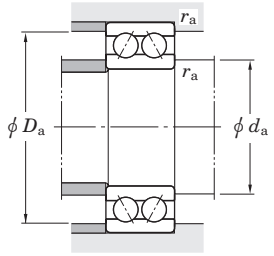


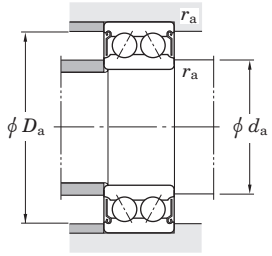
Shielded



Contact sealed

52, 53 series
(Without filling slot)



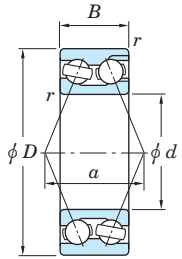


Boundary dimensions (mm)				Basic load ratings (kN) Open		Shielded/sealed		Fatigue load limits (kN) C_u		Limiting speeds (min^{-1}) Grease lub.		Oil lub.	Bearing No.			Load center spread (mm) Open	Mounting dimensions [1] (mm)				(Refer.) Mass (kg)
d	D	B	r min.	C_r	C_{0r}	C_r	C_{0r}	(Open)	(Shielded/sealed)	Open Z, ZZ	(RS, 2RS)	Open Z	Open	Shielded	Sealed	a	d_a min.	d_a max.	D_a max.	r_a max.	
10	30	14.3	0.6	9.15	5.35	—	—	0.280	—	15 000	—	20 000	**3200**	—	—	19.5	14.5	—	25.5	0.6	0.052
12	32	15.9	0.6	12.1	7.15	—	—	0.370	—	14 000	—	18 000	**3201**	—	—	21.7	16.5	—	27.5	0.6	0.063
15	35	15.9	0.6	12.1	7.45	—	—	0.390	—	12 000	—	16 000	**3202**	—	—	23.6	19.5	—	30.5	0.6	0.072
	42	19	1	19.0	11.9	—	—	0.610	—	10 000	—	14 000	**3302**	—	—	27.6	20.5	—	36.5	1	0.132
17	40	17.5	0.6	17.2	10.8	—	—	0.560	—	11 000	—	14 000	**3203**	—	—	26.6	21.5	—	35.5	0.6	0.100
	40	17.5	0.6	16.5	8.15	15.9	8.35	0.420	0.430	11 000	11 000	14 000	**5203**	**5203 ZZ**	**5203 2RS**	20.0	21.5	23.5	35.5	0.6	0.091
	47	22.2	1	23.0	17.1	—	—	0.760	—	9 400	—	13 000	**3303**	—	—	31.0	22.5	—	41.5	1	0.192
20	47	20.6	1	21.5	15.0	—	—	0.770	—	9 000	—	12 000	**3204**	—	—	31.5	25.5	—	41.5	1	0.170
	47	20.6	1	24.6	12.5	20.0	10.8	0.640	0.560	8 800	8 800	12 000	**5204**	**5204 ZZ**	**5204 2RS**	23.5	25.5	26.6	41.5	1	0.158
	52	22.2	1.1	26.0	18.4	—	—	0.950	—	8 200	—	11 000	**3304**	—	—	33.8	27	—	45	1	0.230
	52	22.2	1.1	30.9	15.0	24.7	12.8	0.780	0.660	8 300	8 300	11 000	**5304**	**5304 ZZ**	**5304 2RS**	25.9	27	28.3	45	1	0.230
25	52	20.6	1	23.7	18.2	—	—	0.940	—	7 800	—	10 000	**3205**	—	—	34.4	30.5	—	46.5	1	0.190
	52	20.6	1	26.7	14.8	23.6	13.8	0.760	0.710	7 700	7 700	10 000	**5205**	**5205 ZZ**	**5205 2RS**	26.1	30.5	32.3	46.5	1	0.190
	62	25.4	1.1	36.2	26.5	—	—	1.35	—	6 800	—	9 100	**3305**	—	—	40.5	32	—	55	1	0.369
	62	25.4	1.1	40.9	20.8	34.3	18.5	1.05	0.960	6 900	6 900	9 200	**5305**	**5305 ZZ**	**5305 2RS**	31.1	32	33.4	55	1	0.340
30	62	23.8	1	34.1	27.0	—	—	1.40	—	6 500	—	8 700	**3206**	—	—	40.7	35.5	—	56.5	1	0.320
	62	23.8	1	37.2	21.3	31.7	18.3	1.10	0.950	6 400	6 400	8 600	**5206**	**5206 ZZ**	**5206 2RS**	30.8	35.5	38.6	56.5	1	0.290
	72	30.2	1.1	47.7	36.1	—	—	1.85	—	5 800	—	7 800	**3306**	—	—	47.2	37	—	65	1	0.585
	72	30.2	1.1	51.2	28.5	42.9	25.2	1.45	1.30	5 800	5 800	7 700	**5306**	**5306 ZZ**	**5306 2RS**	36.2	37	41.3	65	1	0.510
35	72	27	1.1	46.0	37.5	—	—	1.95	—	5 600	—	7 500	**3207**	—	—	46.9	42	—	65	1	0.480
	72	27	1.1	49.0	29.0	39.7	24.6	1.50	1.25	5 500	5 500	7 300	**5207**	**5207 ZZ**	**5207 2RS**	36.1	42	43.9	65	1	0.430
	80	34.9	1.5	60.7	46.8	—	—	2.40	—	5 200	—	7 000	**3307**	—	—	53.4	43.5	—	71.5	1.5	0.816
	80	34.9	1.5	64.0	36.2	57.6	32.8	1.85	1.70	5 100	5 100	6 800	**5307**	**5307 ZZ**	**5307 2RS**	41.0	43.5	45.5	71.5	1.5	0.790
40	80	30.2	1.1	52.4	43.9	—	—	2.25	—	5 000	—	6 700	**3208**	—	—	52.6	47	—	73	1	0.650
	80	30.2	1.1	55.5	33.6	45.7	29.1	1.75	1.50	5 000	5 000	6 700	**5208**	**5208 ZZ**	**5208 2RS**	39.2	47	49.5	73	1	0.570

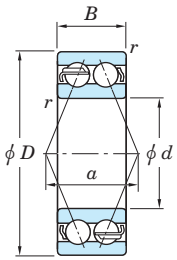
[Note] 1) The maximum value of d_a is applied to shielded and sealed type bearings.

[Remark] Standard cage types used for the above bearings are described earlier in this section.

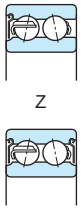
d (40) ~ 70 mm



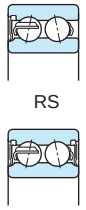
32, 33 series
(With filling slot)



Open

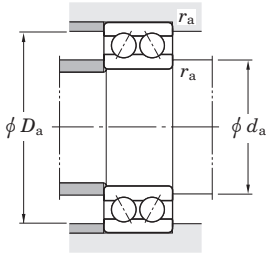


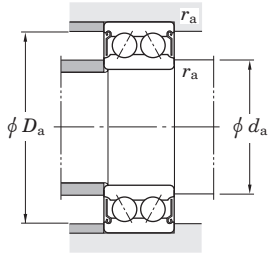
Shielded



Contact sealed

52, 53 series
(Without filling slot)



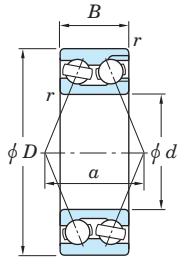


Boundary dimensions (mm)				Basic load ratings (kN) Open		Shielded/sealed		Fatigue load limits (kN) C_u		Limiting speeds (min^{-1}) Grease lub.		Oil lub.	Bearing No.			Load center spread (mm) Open	Mounting dimensions [1] (mm)				(Refer.) Mass
d	D	B	r min.	C_r	C_{0r}	C_r	C_{0r}	(Open)	(Shielded/sealed)	[Open Z, ZZ]	(RS, 2RS)	[Open Z]	Open	Shielded	Sealed	a	d_a min.	d_a max.	D_a max.	r_a max.	(kg)
40	90	36.5	1.5	67.6	53.8	—	—	2.80	—	4 600	—	6 100	**3308**	—	—	58.9	48.5	—	81.5	1.5	1.07
	90	36.5	1.5	78.3	45.4	64.3	37.8	2.35	1.95	4 600	4 600	6 100	**5308**	**5308 ZZ**	**5308 2RS**	44.9	48.5	52.1	81.5	1.5	1.05
45	85	30.2	1.1	56.8	51.4	—	—	2.65	—	4 600	—	6 100	**3209**	—	—	56.3	52	—	78	1	0.710
	85	30.2	1.1	62.3	38.4	52.1	33.9	2.00	1.75	4 600	4 600	6 100	**5209**	**5209 ZZ**	**5209 2RS**	42.2	52	55.3	78	1	0.620
	100	39.7	1.5	82.6	67.3	—	—	3.50	—	4 100	—	5 500	**3309**	—	—	65.6	53.5	—	91.5	1.5	1.42
	100	39.7	1.5	93.8	55.7	86.1	51.4	2.90	2.65	4 100	4 100	5 500	**5309**	**5309 ZZ**	**5309 2RS**	51.0	53.5	58.2	91.5	1.5	1.42
50	90	30.2	1.1	56.4	52.1	—	—	2.70	—	4 300	—	5 700	**3210**	—	—	58.8	57	—	83	1	0.760
	90	30.2	1.1	66.7	43.6	55.2	37.9	2.25	1.95	4 300	4 300	5 600	**5210**	**5210 ZZ**	**5210 2RS**	44.5	57	58.9	83	1	0.670
	110	44.4	2	108	88.6	—	—	4.60	—	3 800	—	5 000	**3310**	—	—	71.7	60	—	100	2	1.95
	110	44.4	2	111	67.0	102	62.2	3.45	3.20	3 600	3 600	4 800	**5310**	**5310 ZZ**	**5310 2RS**	56.6	60	64.4	100	2	1.93
55	100	33.3	1.5	63.6	60.2	—	—	3.10	—	3 900	—	5 100	**3211**	—	—	65.0	63.5	—	91.5	1.5	1.05
	100	33.3	1.5	82.3	55.2	66.1	44.7	2.85	2.30	3 800	3 800	5 100	**5211**	**5211 ZZ**	**5211 2RS**	50.2	63.5	66.2	91.5	1.5	0.960
	120	49.2	2	126	106	—	—	5.45	—	3 400	—	4 500	**3311**	—	—	79.3	65	—	110	2	2.53
	120	49.2	2	138	85.1	120	74.3	4.40	3.85	3 300	3 300	4 500	**5311**	**5311 ZZ**	**5311 2RS**	61.6	65	71.8	110	2	2.30
60	110	36.5	1.5	80.0	76.8	—	—	3.95	—	3 500	—	4 700	**3212**	—	—	71.3	68.5	—	101.5	1.5	1.40
	110	36.5	1.5	93.0	60.8	78.3	55.9	3.15	2.90	3 500	3 500	4 700	**5212**	**5212 ZZ**	**5212 2RS**	53.8	68.5	74.1	101.5	1.5	1.36
	130	54	2.1	156	132	—	—	6.85	—	3 100	—	4 200	**3312**	—	—	87.4	72	—	118	2	3.24
	130	54	2.1	157	98.7	138	87.1	5.10	4.50	3 100	3 100	4 100	**5312**	**5312 ZZ**	**5312 2RS**	67.2	72	79.2	118	2	3.16
65	120	38.1	1.5	95.5	97.4	—	—	5.05	—	3 200	—	4 300	**3213**	—	—	76.8	73.5	—	111.5	1.5	1.75
	120	38.1	1.5	109	75.3	86.5	63.1	3.90	3.25	3 200	3 200	4 300	**5213**	**5213 ZZ**	**5213 2RS**	58.8	73.5	79.0	111.5	1.5	1.66
	140	58.7	2.1	177	153	—	—	7.80	—	2 900	—	3 900	**3313**	—	—	92.7	77	—	128	2	4.08
	140	58.7	2.1	178	113	178	113	5.75	5.75	2 900	2 900	3 900	**5313**	**5313 ZZ**	**5313 2RS**	70.9	77	85.9	128	2	3.91
70	125	39.7	1.5	97.4	96.4	—	—	5.00	—	3 100	—	4 100	**3214**	—	—	80.7	78.5	—	116.5	1.5	1.92
	125	39.7	1.5	118	82.6	95.4	70.3	4.25	3.65	3 100	3 100	4 100	**5214**	**5214 ZZ**	**5214 2RS**	61.4	78.5	83.5	116.5	1.5	1.81
	150	63.5	2.1	188	160	—	—	7.90	—	2 700	—	3 600	**3314**	—	—	99.7	82	—	138	2	5.04
	150	63.5	2.1	200	129	200	129	6.35	6.35	2 700	2 700	3 600	**5314**	**5314 ZZ**	**5314 2RS**	76.0	82	92.9	138	2	4.89

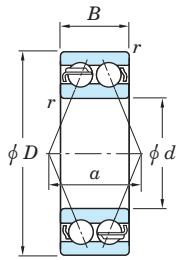
[Note] 1) The maximum value of d_a is applied to shielded and sealed type bearings.

[Remark] Standard cage types used for the above bearings are described earlier in this section.

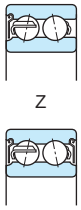
d 75 ~ 110 mm



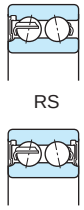
32, 33 series
(With filling slot)



Open

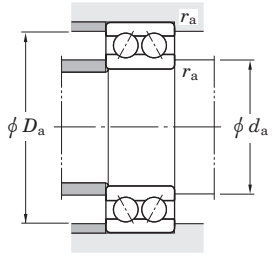


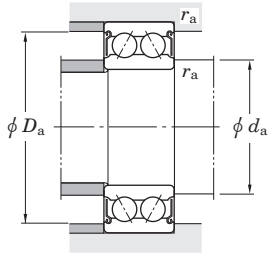
Shielded



Contact sealed

52, 53 series
(Without filling slot)





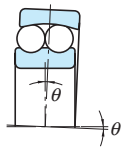
Boundary dimensions (mm)				Basic load ratings (kN) Open		Shielded/sealed		Fatigue load limits (kN) C_u		Limiting speeds (min^{-1}) Grease lub.		Oil lub.	Bearing No.			Load center spread (mm) Open	Mounting dimensions [1] (mm)				(Refer.) Mass (kg)
d	D	B	r min.	C_r	C_{0r}	C_r	C_{0r}	(Open)	(Shielded/sealed)	Open Z, ZZ	(RS, 2RS)	Open Z	Open	Shielded	Sealed	a	d_a min.	d_a max.	D_a max.	r_a max.	
75	130	41.3	1.5	116	120	—	—	6.15	—	2 900	—	3 900	**3215**	—	—	84.7	83.5	—	121.5	1.5	2.10
	160	68.3	2.1	211	189	—	—	9.00	—	2 500	—	3 300	**3315**	—	—	108.7	87	—	148	2	6.16
	160	68.3	2.1	218	147	218	147	6.95	6.95	2 500	2 500	3 300	**5315**	**5315 ZZ**	**5315 2RS**	81.5	87	99.6	148	2	5.97
80	140	44.4	2	122	121	—	—	5.95	—	2 700	—	3 600	**3216**	—	—	90.7	90	—	130	2	2.64
	170	68.3	2.1	230	213	—	—	9.85	—	2 400	—	3 100	**3316**	—	—	113.1	92	—	158	2	6.93
85	150	49.2	2	143	143	—	—	6.80	—	2 500	—	3 400	**3217**	—	—	98.4	95	—	140	2	3.39
	180	73	3	235	219	—	—	9.80	—	2 200	—	3 000	**3317**	—	—	118.8	99	—	166	2.5	8.30
90	160	52.4	2	165	167	—	—	7.70	—	2 400	—	3 100	**3218**	—	—	104.1	100	—	150	2	4.14
	190	73	3	256	242	—	—	10.6	—	2 100	—	2 800	**3318**	—	—	125.5	104	—	176	2.5	9.23
95	170	55.6	2.1	189	193	—	—	8.65	—	2 200	—	3 000	**3219**	—	—	110.6	107	—	158	2	5.00
	200	77.8	3	273	270	—	—	14.9	—	2 000	—	2 600	**3319**	—	—	132.2	109	—	186	2.5	10.9
100	180	60.3	2.1	215	221	—	—	9.65	—	2 100	—	2 800	**3220**	—	—	116.8	112	—	168	2	6.10
	215	82.6	3	312	324	—	—	17.4	—	1 800	—	2 500	**3320**	—	—	140.4	114	—	201	2.5	13.5
105	190	65.1	2.1	227	237	—	—	11.5	—	2 000	—	2 600	**3221**	—	—	124.2	117	—	178	2	7.37
	225	87.3	3	331	354	—	—	18.5	—	1 800	—	2 300	**3321**	—	—	148.1	119	—	211	2.5	15.6
110	200	69.8	2.1	251	263	—	—	10.9	—	1 900	—	2 500	**3222**	—	—	131.4	122	—	188	2	8.80
	240	92.1	3	352	388	—	—	15.1	—	1 600	—	2 200	**3322**	—	—	156.4	124	—	226	2.5	18.9

[Note] 1) The maximum value of d_a is applied to shielded and sealed type bearings.

[Remark] Standard cage types used for the above bearings are described earlier in this section.

Self-aligning ball bearings

Self-aligning ball bearings have a spherical outer ring raceway, the center of whose curvature meets that of the bearing itself, so that the inner ring, balls and cage continue to rotate, aligning themselves if they have become misaligned within design limits.



θ : Allowable aligning angle

This type of bearing is suitable when the displacement of the centers around which the shaft and housing rotate and shaft deflection are likely to occur.

Bearings with a tapered bore can easily be fit to the shaft with an adapter assembly.

Self-aligning ball bearings

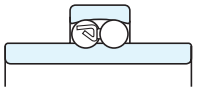
Cylindrical bore

Tapered bore

Bore diameter **10 – 90** mm

Sealed type

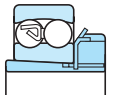
Bore diameter **10 – 55** mm



Extended inner ring type

Bore diameter **20 – 60** mm

Adapter assemblies



Bore diameter **17 – 80** mm

Boundary dimensions	The dimensions of standard series are as specified in JIS B 1512.
Tolerances	As specified in JIS B 1514-1, class 0. (refer to Table 7-3 on pp. A 60 – A 63.)
Radial internal clearance	As specified in JIS B 1520. (refer to Table 10-6 on p. A 105.)
Recommended fits	Refer to Table 9-4 on pp. A 91, 92.
Standard cages	● Staggered type pressed steel cage (application : all dimensional range of 12, 13, 112, 113, 22...2RS and 23...2RS series) ● Snap type pressed steel cage (application : all dimensional range of 22 series and those of No. 2300 thru 2316.)
Allowable aligning angle	· 12 and 22 series.....0.044 rad (2.5°) · 13 and 23 series.....0.052 rad (3°) · 22...2RS and 23...2RS series.....0.026 rad (1.5°)

Dynamic equivalent radial load

$P_r = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_1	0.65	Y_2

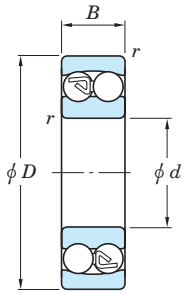
Static equivalent radial load

$P_{0r} = F_r + Y_0F_a$

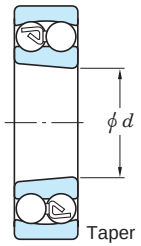
Refer to the bearing specification table for values of e, Y_1, Y_2 and Y_0.

Self-aligning ball bearings
open type

d 10 ~ (35) mm

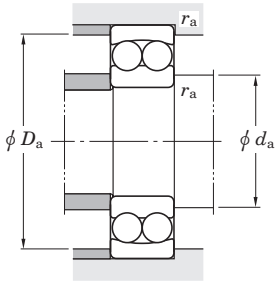


Cylindrical bore



Taper 1/12

Tapered bore

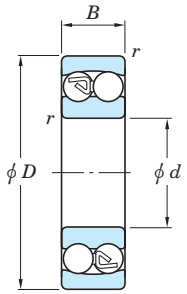


Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Mounting dimensions (mm)			Con-stant	Axial load factors			(Refer.) Mass (kg)	
d	D	B	r min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Cylindrical bore	Tapered bore	d_a min.	D_a max.	r_a max.	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
10	30	9	0.6	5.50	1.20	0.08	23 000	28 000	**1200**	—	14	26	0.6	0.33	1.92	2.97	2.01	0.034	—
	30	14	0.6	7.40	1.60	0.10	23 000	29 000	**2200**	—	14	26	0.6	0.59	1.07	1.65	1.12	0.047	—
12	32	10	0.6	5.60	1.25	0.08	21 000	26 000	**1201**	—	16	28	0.6	0.33	1.89	2.93	1.98	0.040	—
	32	14	0.6	7.65	1.75	0.11	21 000	26 000	**2201**	—	16	28	0.6	0.53	1.18	1.83	1.24	0.053	—
15	35	11	0.6	7.45	1.75	0.11	18 000	22 000	**1202**	—	19	31	0.6	0.33	1.90	2.95	2.00	0.049	—
	35	14	0.6	7.70	1.85	0.12	18 000	22 000	**2202**	—	19	31	0.6	0.50	1.27	1.97	1.33	0.060	—
	42	13	1	9.55	2.30	0.14	16 000	20 000	**1302**	—	20	37	1	0.34	1.86	2.88	1.95	0.094	—
	42	17	1	12.1	2.90	0.18	14 000	20 000	**2302**	—	20	37	1	0.50	1.27	1.96	1.33	0.114	—
17	40	12	0.6	7.90	2.05	0.13	16 000	20 000	**1203**	—	21	36	0.6	0.31	2.03	3.14	2.12	0.073	—
	40	16	0.6	9.80	2.40	0.15	16 000	20 000	**2203**	—	21	36	0.6	0.50	1.27	1.96	1.33	0.088	—
	47	14	1	12.5	3.20	0.20	14 000	17 000	**1303**	—	22	42	1	0.33	1.92	2.97	2.01	0.130	—
	47	19	1	14.5	3.60	0.23	13 000	18 000	**2303**	—	22	42	1	0.49	1.28	1.98	1.34	0.158	—
20	47	14	1	9.90	2.65	0.16	14 000	17 000	**1204**	**1204K**	25	42	1	0.29	2.16	3.35	2.27	0.120	0.118
	47	18	1	12.6	3.25	0.21	14 000	17 000	**2204**	**2204K**	25	42	1	0.48	1.31	2.02	1.37	0.140	0.136
	52	15	1.1	12.4	3.35	0.21	13 000	15 000	**1304**	**1304K**	26.5	45.5	1	0.30	2.12	3.28	2.22	0.163	0.161
	52	21	1.1	18.0	4.65	0.30	11 000	15 000	**2304**	**2304K**	26.5	45.5	1	0.49	1.29	2.00	1.35	0.209	0.205
25	52	15	1	12.1	3.30	0.21	12 000	14 000	**1205**	**1205K**	30	47	1	0.28	2.28	3.52	2.39	0.141	0.138
	52	18	1	12.6	3.50	0.22	12 000	15 000	**2205**	**2205K**	30	47	1	0.40	1.58	2.45	1.66	0.163	0.158
	62	17	1.1	18.0	5.05	0.32	9 900	12 000	**1305**	**1305K**	31.5	55.5	1	0.27	2.31	3.57	2.42	0.257	0.252
	62	24	1.1	24.5	6.55	0.42	9 400	13 000	**2305**	**2305K**	31.5	55.5	1	0.46	1.36	2.10	1.42	0.335	0.327
30	62	16	1	15.6	4.70	0.29	9 900	12 000	**1206**	**1206K**	35	57	1	0.25	2.55	3.94	2.67	0.220	0.216
	62	20	1	15.5	4.65	0.29	10 000	12 000	**2206**	**2206K**	35	57	1	0.35	1.79	2.77	1.87	0.260	0.254
	72	19	1.1	21.3	6.30	0.40	8 700	11 000	**1306**	**1306K**	36.5	65.5	1	0.26	2.40	3.72	2.52	0.387	0.381
	72	27	1.1	31.5	8.70	0.55	8 000	11 000	**2306**	**2306K**	36.5	65.5	1	0.44	1.44	2.23	1.51	0.500	0.489
35	72	17	1.1	15.8	5.15	0.32	8 500	10 000	**1207**	**1207K**	41.5	65.5	1	0.23	2.71	4.20	2.84	0.323	0.317

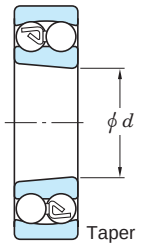
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Self-aligning ball bearings
open type

d (35) ~ 65 mm

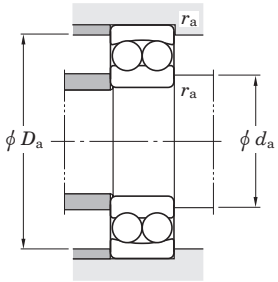


Cylindrical bore



Taper 1/12

Tapered bore

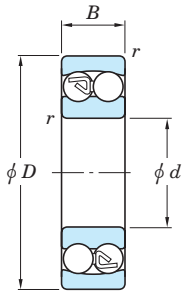


Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Mounting dimensions (mm)			Con-stant	Axial load factors			(Refer.) Mass (kg)	
d	D	B	r min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Cylindrical bore	Tapered bore	d_a min.	D_a max.	r_a max.	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
35	72	23	1.1	21.6	6.65	0.42	8 500	10 000	**2207**	**2207K**	41.5	65.5	1	0.37	1.71	2.65	1.79	0.403	0.396
	80	21	1.5	25.1	7.95	0.49	7 600	9 300	**1307**	**1307K**	43	72	1.5	0.25	2.48	3.84	2.60	0.510	0.502
	80	31	1.5	39.5	11.1	0.71	7 100	9 800	**2307**	**2307K**	43	72	1.5	0.45	1.39	2.15	1.46	0.675	0.657
40	80	18	1.1	19.2	6.50	0.41	7 500	9 200	**1208**	**1208K**	46.5	73.5	1	0.22	2.83	4.38	2.97	0.417	0.411
	80	23	1.1	22.4	7.35	0.46	7 600	9 300	**2208**	**2208K**	46.5	73.5	1	0.33	1.92	2.96	2.01	0.505	0.494
	90	23	1.5	29.6	9.80	0.61	6 900	8 400	**1308**	**1308K**	48	82	1.5	0.25	2.57	3.98	2.69	0.715	0.704
	90	33	1.5	44.9	13.4	0.85	6 200	8 600	**2308**	**2308K**	48	82	1.5	0.43	1.47	2.27	1.54	0.925	0.903
45	85	19	1.1	21.8	7.35	0.46	7 000	8 500	**1209**	**1209K**	51.5	78.5	1	0.21	2.94	4.56	3.09	0.465	0.459
	85	23	1.1	23.3	8.15	0.51	7 000	8 500	**2209**	**2209K**	51.5	78.5	1	0.30	2.09	3.23	2.19	0.545	0.533
	100	25	1.5	38.1	12.9	0.80	6 100	7 500	**1309**	**1309K**	53	92	1.5	0.25	2.56	3.95	2.68	0.957	0.942
	100	36	1.5	54.4	16.6	1.05	5 600	7 700	**2309**	**2309K**	53	92	1.5	0.42	1.51	2.33	1.58	1.23	1.20
50	90	20	1.1	22.7	8.10	0.51	6 500	7 900	**1210**	**1210K**	56.5	83.5	1	0.21	3.07	4.76	3.22	0.525	0.515
	90	23	1.1	23.3	8.50	0.53	6 500	7 900	**2210**	**2210K**	56.5	83.5	1	0.27	2.33	3.61	2.45	0.590	0.577
	110	27	2	43.4	14.2	0.89	5 600	6 800	**1310**	**1310K**	59	101	2	0.23	2.70	4.17	2.83	1.21	1.19
	110	40	2	64.6	20.1	1.25	5 100	7 000	**2310**	**2310K**	59	101	2	0.40	1.56	2.41	1.63	1.64	1.60
55	100	21	1.5	26.8	10.0	0.63	5 800	7 100	**1211**	**1211K**	63	92	1.5	0.20	3.19	4.94	3.34	0.705	0.693
	100	25	1.5	26.5	9.95	0.62	5 800	7 100	**2211**	**2211K**	63	92	1.5	0.27	2.35	3.64	2.47	0.810	0.792
	120	29	2	51.3	18.1	1.10	5 000	6 200	**1311**	**1311K**	64	111	2	0.23	2.70	4.18	2.83	1.58	1.56
	120	43	2	75.4	23.8	1.50	4 600	6 400	**2311**	**2311K**	64	111	2	0.41	1.53	2.37	1.60	2.10	2.05
60	110	22	1.5	30.2	11.6	0.73	5 200	6 400	**1212**	**1212K**	68	102	1.5	0.19	3.37	5.22	3.53	0.900	0.885
	110	28	1.5	34.1	12.5	0.80	5 300	6 500	**2212**	**2212K**	68	102	1.5	0.28	2.26	3.49	2.36	1.09	1.07
	130	31	2.1	57.1	20.8	1.30	4 500	5 500	**1312**	**1312K**	71	119	2	0.22	2.91	4.50	3.05	1.96	1.93
	130	46	2.1	87.3	28.1	1.80	4 200	5 800	**2312**	**2312K**	71	119	2	0.39	1.62	2.51	1.70	2.60	2.53
65	120	23	1.5	31.0	12.4	0.79	4 800	5 800	**1213**	**1213K**	73	112	1.5	0.17	3.67	5.68	3.84	1.15	1.13
	120	31	1.5	43.6	16.4	1.05	4 900	5 900	**2213**	**2213K**	73	112	1.5	0.28	2.24	3.47	2.35	1.46	1.43
	140	33	2.1	61.7	22.9	1.40	4 300	5 200	**1313**	**1313K**	76	129	2	0.23	2.73	4.23	2.86	2.45	2.41

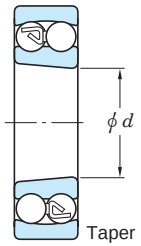
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Self-aligning ball bearings
open type

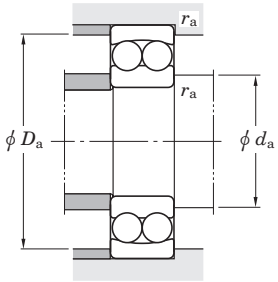
d 70 ~ 90 mm



Cylindrical bore



Tapered bore

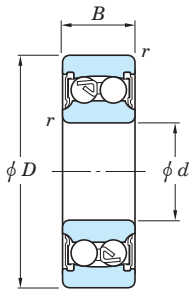


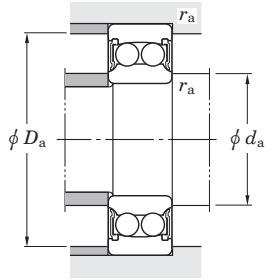
Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Mounting dimensions (mm)			Con-stant	Axial load factors			(Refer.) Mass (kg)	
d	D	B	r min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Cylindrical bore	Tapered bore	d_a min.	D_a max.	r_a max.	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
70	125	24	1.5	34.7	13.7	0.87	4 600	5 700	**1214**	—	78	117	1.5	0.18	3.48	5.38	3.64	1.26	—
	150	35	2.1	74.0	27.6	1.65	4 000	4 900	**1314**	—	81	139	2	0.22	2.84	4.40	2.98	2.99	—
75	130	25	1.5	38.8	15.5	0.97	4 300	5 300	**1215**	**1215K**	83	122	1.5	0.17	3.60	5.58	3.77	1.36	1.34
	160	37	2.1	78.9	29.9	1.70	4 000	4 900	**1315**	**1315K**	86	149	2	0.23	2.80	4.33	2.93	3.56	3.51
80	140	26	2	39.7	16.9	1.00	4 000	4 900	**1216**	**1216K**	89	131	2	0.16	3.90	6.03	4.08	1.67	1.64
	170	39	2.1	88.1	32.9	1.85	3 500	4 300	**1316**	**1316K**	91	159	2	0.22	2.90	4.49	3.04	4.18	4.12
85	150	28	2	49.2	20.5	1.20	3 800	4 600	**1217**	**1217K**	94	141	2	0.17	3.61	5.59	3.78	2.07	2.04
	180	41	3	97.3	37.8	2.05	3 300	4 000	**1317**	**1317K**	98	167	2.5	0.22	2.93	4.53	3.07	4.98	4.91
90	160	30	2	56.8	23.4	1.30	3 500	4 300	**1218**	**1218K**	99	151	2	0.17	3.69	5.70	3.86	2.52	2.48
	190	43	3	116	44.7	2.35	3 100	3 800	**1318**	**1318K**	103	177	2.5	0.22	2.81	4.35	2.94	5.80	5.71

[Remark] Standard cage types used for the above bearings are described earlier in this section.

Self-aligning ball bearings
sealed type

d 10 ~ 55 mm



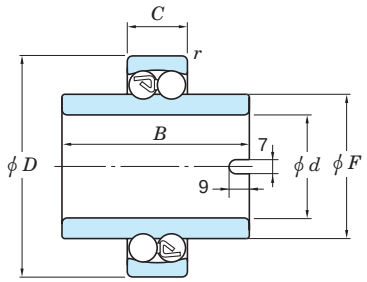


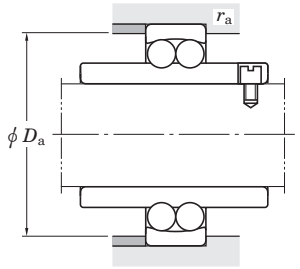
Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speed (min^{-1})	Bearing No.		Mounting dimensions (mm)				Constant	Axial load factors			(Refer.) Mass
d	D	B	r min.	C_r	C_{0r}	C_u	Grease lub.			d_a min.	d_a max.	D_a max.	r_a max.	e	Y_1	Y_2	Y_0	(kg)
10	30	14	0.6	5.50	1.20	0.08	15 000	**2200 2RS**		13.7	13.7	25	0.6	0.33	1.92	2.97	2.01	0.047
12	32	14	0.6	5.60	1.25	0.08	14 000	**2201 2RS**		15.2	15.2	27	0.6	0.33	1.89	2.93	1.98	0.053
15	35	14	0.6	7.45	1.75	0.11	12 000	**2202 2RS**		18.0	18.0	30	0.6	0.33	1.90	2.95	2.00	0.060
	42	17	1	9.55	2.30	0.14	11 000	**2302 2RS**		20.0	20.0	36	1	0.34	1.86	2.88	1.95	0.114
17	40	16	0.6	7.90	2.05	0.13	11 000	**2203 2RS**		20.2	20.2	35	0.6	0.31	2.03	3.14	2.12	0.088
	47	19	1	12.5	3.20	0.20	9 400	**2303 2RS**		22.1	22.1	41	1	0.33	1.92	2.97	2.01	0.158
20	47	18	1	9.90	2.65	0.16	9 100	**2204 2RS**		24.1	24.1	41	1	0.29	2.16	3.35	2.27	0.140
	52	21	1.1	12.4	3.35	0.21	8 300	**2304 2RS**		26.2	26.2	45	1	0.30	2.12	3.28	2.22	0.209
25	52	18	1	12.1	3.30	0.21	7 900	**2205 2RS**		29.4	29.4	46	1	0.28	2.28	3.52	2.39	0.163
	62	24	1.1	18.0	5.05	0.32	6 600	**2305 2RS**		32	33.9	55	1	0.27	2.31	3.57	2.42	0.335
30	62	20	1	15.6	4.70	0.29	6 600	**2206 2RS**		35.5	35.5	56	1	0.25	2.55	3.94	2.67	0.260
	72	27	1.1	21.3	6.30	0.40	5 800	**2306 2RS**		37	37.8	65	1	0.26	2.40	3.72	2.52	0.500
35	72	23	1.1	15.8	5.15	0.32	5 700	**2207 2RS**		40.9	40.9	65	1	0.23	2.71	4.20	2.84	0.403
	80	31	1.5	25.1	7.95	0.49	5 100	**2307 2RS**		43.5	45.0	71.5	1.5	0.25	2.48	3.84	2.60	0.675
40	80	23	1.1	19.2	6.50	0.41	5 000	**2208 2RS**		47	48.1	73	1	0.22	2.83	4.38	2.97	0.505
	90	33	1.5	29.6	9.80	0.61	4 600	**2308 2RS**		48.5	49.6	81.5	1.5	0.25	2.57	3.98	2.69	0.925
45	85	23	1.1	21.8	7.35	0.46	4 600	**2209 2RS**		52	52.4	78	1	0.21	2.94	4.56	3.09	0.545
	100	36	1.5	38.1	12.9	0.80	4 100	**2309 2RS**		53.5	56.6	91.5	1.5	0.25	2.56	3.95	2.68	1.23
50	90	23	1.1	22.7	8.10	0.51	4 300	**2210 2RS**		56.5	56.5	83	1	0.21	3.07	4.76	3.22	0.590
	110	40	2	43.4	14.2	0.89	3 700	**2310 2RS**		60	62.5	100	2	0.23	2.70	4.17	2.83	1.64
55	100	25	1.5	26.8	10.0	0.63	3 900	**2211 2RS**		63.5	63.5	91.5	1.5	0.20	3.19	4.94	3.34	0.810

[Remark] Standard cage types used for the above bearings are described earlier in this section.

Self-aligning ball bearings
extended inner ring type

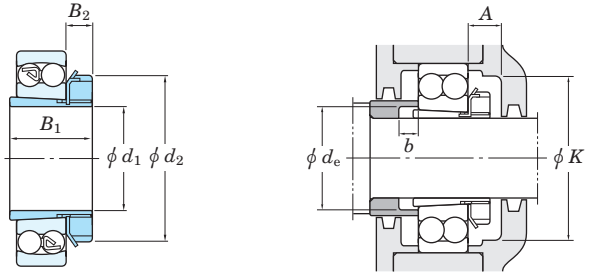
d 20 ~ 60 mm





Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Mounting dimensions (mm)		Constant	Axial load factors			(Refer.) Mass (kg)
d	D	B	C	F	r min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.			D_a max.	r_a max.	e	Y_1	Y_2	Y_0	
20	47	40	14	29.2	1	9.90	2.65	0.16	14 000	17 000	**11204**		42	1	0.29	2.16	3.35	2.27	0.191
	52	44	15	31.5	1.1	12.4	3.35	0.21	13 000	15 000	**11304**		45.5	1	0.30	2.12	3.28	2.22	0.266
25	52	44	15	33.3	1	12.1	3.30	0.21	12 000	14 000	**11205**		47	1	0.28	2.28	3.52	2.39	0.226
	62	48	17	38	1.1	18.0	5.05	0.32	9 900	12 000	**11305**		55.5	1	0.27	2.31	3.57	2.42	0.445
30	62	48	16	40.1	1	15.6	4.70	0.29	9 900	12 000	**11206**		57	1	0.25	2.55	3.94	2.67	0.360
	72	52	19	45	1.1	21.3	6.30	0.40	8 700	11 000	**11306**		65.5	1	0.26	2.40	3.72	2.52	0.614
35	72	52	17	47.7	1.1	15.8	5.15	0.32	8 500	10 000	**11207**		65.5	1	0.23	2.71	4.20	2.84	0.556
	80	56	21	51.7	1.5	25.1	7.95	0.49	7 600	9 300	**11307**		72	1.5	0.25	2.48	3.84	2.60	0.821
40	80	56	18	54	1.1	19.2	6.50	0.41	7 500	9 200	**11208**		73.5	1	0.22	2.83	4.38	2.97	0.733
	90	58	23	57.7	1.5	29.6	9.80	0.61	6 900	8 400	**11308**		82	1.5	0.25	2.57	3.98	2.69	1.09
45	85	58	19	57.7	1.1	21.8	7.35	0.46	7 000	8 500	**11209**		78.5	1	0.21	2.94	4.56	3.09	0.793
	100	60	25	63.9	1.5	38.1	12.9	0.80	6 100	7 500	**11309**		92	1.5	0.25	2.56	3.95	2.68	1.40
50	90	58	20	62.7	1.1	22.7	8.10	0.51	6 500	7 900	**11210**		83.5	1	0.21	3.07	4.76	3.22	0.875
	110	62	27	70.3	2	43.4	14.2	0.89	5 600	6 800	**11310**		102	2	0.23	2.70	4.17	2.83	1.74
55	100	60	21	70.3	1.5	26.8	10.0	0.63	5 800	7 100	**11211**		93.5	1.5	0.20	3.19	4.94	3.34	1.16
60	110	62	22	78	1.5	30.2	11.6	0.73	5 200	6 400	**11212**		103.5	1.5	0.19	3.37	5.22	3.53	1.52

d_1 17 ~ (45) mm



Boundary dimensions (mm) d_1	B_1	d_2	B_2	Brg. bore d (mm)	Designations Bearing + adapter ass'y	Mounting dimensions (mm) A min.	K min.	d_e min.	b min.	Mass Brg.+adapter ass'y (kg)	(Refer.) Adapter sleeve No.	Locknut No.
17	24	32	7	20	1204K+**H204X**	—	—	23	5	0.162	A204X	AN04
	28	32	7	20	2204K+**H304X**	—	—	24	5	0.185	A304X	AN04
	28	32	7	20	1304K+**H304X**	—	—	24	8	0.210	A304X	AN04
	31	32	7	20	2304K+**H2304X**	—	—	24	5	0.257	A2304X	AN04
20	26	38	8	25	1205K+**H205X**	15	45	28	5	0.218	A205X	AN05
	29	38	8	25	2205K+**H305X**	15	45	29	5	0.243	A305X	AN05
	29	38	8	25	1305K+**H305X**	15	45	29	6	0.337	A305X	AN05
	35	38	8	25	2305K+**H2305X**	15	45	29	5	0.424	A2305X	AN05
25	27	45	8	30	1206K+**H206X**	15	50	33	5	0.320	A206X	AN06
	31	45	8	30	2206K+**H306X**	15	50	34	5	0.368	A306X	AN06
	31	45	8	30	1306K+**H306X**	15	50	34	6	0.495	A306X	AN06
	38	45	8	30	2306K+**H2306X**	15	50	35	5	0.620	A2306X	AN06
30	29	52	9	35	1207K+**H207X**	17	58	38	5	0.462	A207X	AN07
	35	52	9	35	2207K+**H307X**	17	58	39	5	0.557	A307X	AN07
	35	52	9	35	1307K+**H307X**	17	58	39	7	0.663	A307X	AN07
	43	52	9	35	2307K+**H2307X**	17	58	40	5	0.843	A2307X	AN07
35	31	58	10	40	1208K+**H208X**	17	65	44	5	0.597	A208X	AN08
	36	58	10	40	2208K+**H308X**	17	65	44	5	0.696	A308X	AN08
	36	58	10	40	1308K+**H308X**	17	65	44	5	0.906	A308X	AN08
	46	58	10	40	2308K+**H2308X**	17	65	45	5	1.14	A2308X	AN08
40	33	65	11	45	1209K+**H209X**	17	72	49	5	0.701	A209X	AN09
	39	65	11	45	2209K+**H309X**	17	72	49	8	0.798	A309X	AN09
	39	65	11	45	1309K+**H309X**	17	72	49	5	1.21	A309X	AN09
	50	65	11	45	2309K+**H2309X**	17	72	50	5	1.51	A2309X	AN09
45	35	70	12	50	1210K+**H210X**	19	76	53	5	0.804	A210X	AN10
	42	70	12	50	2210K+**H310X**	19	76	54	10	0.896	A310X	AN10

d_1 (45) ~ 80 mm

Boundary dimensions (mm) d_1	B_1	d_2	B_2	Brg. bore d (mm)	Designations Bearing + adapter ass'y	Mounting dimensions (mm) A min.	K min.	d_e min.	b min.	Mass Brg.+adapter ass'y (kg)	(Refer.) Adapter sleeve No.	Locknut No.
45	42	70	12	50	1310K+**H310X**	19	76	54	5	1.51	A310X	AN10
	55	70	12	50	2310K+**H2310X**	19	76	56	5	1.98	A2310X	AN10
50	37	75	12	55	1211K+**H211X**	19	85	60	6	1.02	A211X	AN11
	45	75	12	55	2211K+**H311X**	19	85	60	11	1.16	A311X	AN11
	45	75	12	55	1311K+**H311X**	19	85	60	6	1.93	A311X	AN11
	59	75	12	55	2311K+**H2311X**	19	85	61	6	2.50	A2311X	AN11
55	38	80	13	60	1212K+**H212X**	20	90	61	5	1.25	A212X	AN12
	47	80	13	60	2212K+**H312X**	20	90	65	9	1.49	A312X	AN12
	47	80	13	60	1312K+**H312X**	20	90	65	5	2.35	A312X	AN12
	62	80	13	60	2312K+**H2312X**	20	90	66	5	3.04	A2312X	AN12
60	40	85	14	65	1213K+**H213X**	21	96	70	5	1.56	A213X	AN13
	50	85	14	65	2213K+**H313X**	21	96	70	8	1.92	A313X	AN13
	50	85	14	65	1313K+**H313X**	21	96	70	5	2.90	A313X	AN13
65	43	98	15	75	1215K+**H215X**	23	110	80	5	2.09	A215X	AN15
	55	98	15	75	1315K+**H315X**	23	110	80	5	4.40	A315X	AN15
70	46	105	17	80	1216K+**H216X**	25	120	85	5	2.57	A216X	AN16
	59	105	17	80	1316K+**H316X**	25	120	86	5	5.21	A316X	AN16
75	50	110	18	85	1217K+**H217X**	27	128	90	6	3.11	A217X	AN17
	63	110	18	85	1317K+**H317X**	27	128	91	6	6.15	A317X	AN17
80	52	120	18	90	1218K+**H218X**	28	139	95	6	3.75	A218X	AN18
	65	120	18	90	1318K+**H318X**	28	139	96	6	7.16	A318X	AN18

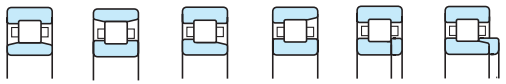
Cylindrical roller bearings

Cylindrical roller bearings feature high radial load capacity because the rollers and raceway are in linear contact. These bearings are suitable for applications that involve heavy radial and impact loading.

They are also appropriate for high-speed applications in that they can be machined very accurately due to their structure.

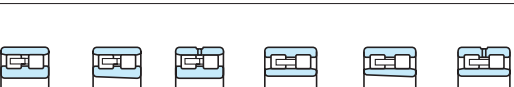
Having a separable inner ring or outer ring, these bearings can be mounted and dismounted easily.

Single-row cylindrical roller bearings



- The NU and N types exhibit their best performance when used as free side bearings since they adjust to the shaft's axial movement, to a certain extent, relative to the housing position.
- The NJ and NF types carry axial load in one direction, while the NUP and NH types can carry a certain degree of axial load in both directions.
- Type R cylindrical roller bearings feature enhanced load rating compared with standard series, though both have equal dimensions.
  This is because type R bearings have different internal design. They are identified by supplementary code "R".

Double-row cylindrical roller bearings



- Double-row cylindrical roller bearings come in two types : with a cylindrical bore, and with a tapered bore. As for those with a tapered bore, the specified amount of clearance can be obtained by adjusting the press-in distance. Some bearings have lubrication holes and lubrication grooves on the outer ring. They are identified by supplementary code "W".
- These bearings can accommodate high radial loads, and are often used on machine tool spindles.

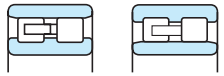
Single-row cylindrical roller bearings

Bore diameter **20** – **460** mm

Thrust collar

Bore diameter **20** – **320** mm

Double-row cylindrical roller bearings



Bore diameter **25** – **480** mm

Boundary dimensions

The dimensions of standard series are as specified in JIS B 1512.

Tolerances

As specified in JIS B 1514-1 (refer to Table 7-3 on pp. A 60 – A 63).

Tolerances of roller set bore diameter F_w and roller set outside diameter E_w of interchangeable bearings are as follows :

Unit : μm

Nominal bore diameter d (mm) over	up to	Δ_{Fw} Roller set bore diameter deviation upper	lower	Δ_{Ew} Roller set outside diameter deviation upper	lower
–	**20**	+ 10	0	0	– 10
20	**50**	+ 15	0	0	– 15
50	**120**	+ 20	0	0	– 20
120	**200**	+ 25	0	0	– 25
200	**250**	+ 30	0	0	– 30
250	**315**	+ 35	0	0	– 35
315	**400**	+ 40	0	0	– 40
400	**500**	+ 45	0	–	–

[Remark] Interchangeable bearings have an inner ring with rollers that can be matched with the outer ring, or an outer ring with rollers that can be matched with the inner ring, without affecting performance in the bearing that has the same bearing number in one category.

Tapered bore tolerance and allowable values of high precision double-row cylindrical roller bearings (classes 5 and 4) are provided in JTEKT standards (refer to Table 7-11 on p. A 76).

Radial internal clearance

· Cylindrical bore and tapered bore bearings
.....(refer to Table 10-8 on pp. A 106, 107.)
· Motor bearings.....(refer to Table 10-7 on p. A 105.)

Recommended fits

Refer to Table 9-4 on pp. A 91, 92.

Standard cages

■ For single-row cylindrical roller bearings :
· Pressed cage (supplementary code : //)
· Synthetic resin molded cage (supplementary code : FG)
· Copper alloy machined cage (supplementary code : FY)
→ For application range, refer to Table 1.
Copper alloy machined cages without rivets (LY) are also used for some special purposes.

■ For double-row cylindrical roller bearings :
· Prong type copper alloy machined cage (supplementary code : FY)
· Separable prong type copper alloy machined cage (supplementary code : FW)
.....for class 5 or higher precision bearings

Allowable misalignment

Allowable misalignment of single-row cylindrical roller bearings depends on bearing type and specification.
General values are as follows :
1) When P_r / C_r is approx. 8% under load of normal use
.....0.000 6 rad (2') – 0.000 9 rad (3')
2) When P_r / C_r is approx. 5% under load lighter than 1)
.....0.001 2 rad (4')
When very large allowable misalignment is required, consult with JTEKT.

Equivalent radial load

Dynamic equivalent radial load $P_r = F_r$
Static equivalent radial load $P_{0r} = F_r$

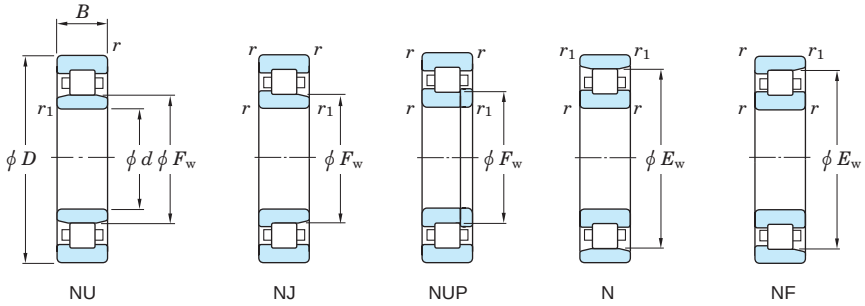
Allowable axial load

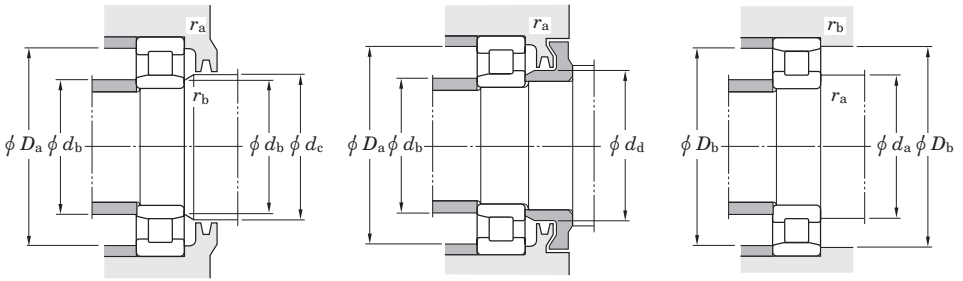
Cylindrical roller bearings with ribs, including loose rib and thrust collar, on both inner and outer rings accommodate axial load to a certain extent.
(NJ and NF types accommodate load applied in one direction : NUP and NH in both directions.)
For calculation of allowable axial load, refer to p. A 44.

Table 1 Application of standard cages

Bearing series	Pressed cage	Synthetic resin molded cage	Machined cage
NU, NUP 10	—	—	1005 – 1092
N, NF 2	204 – 220	—	204 – 264
NU, NJ, NUP 2	—	—	244 – 264
NU, NJ, NUP 2 R	—	204R – 213R	214R – 240R
NU, NJ, NUP 22	2204 – 2220	—	2204 – 2252
NU, NJ, NUP 22 R	2204R – 2220R	—	2204R – 2240R
NU 32	—	—	3206 – 3252
N, NF 3	304 – 320	—	304 – 348
NU, NJ, NUP 3	—	—	334 – 348
NU, NJ, NUP 3 R	—	304R – 314R	315R – 332R
NU, NJ, NUP 23	2304 – 2320	—	2304 – 2340
NU, NJ, NUP 23 R	2304R – 2320R	—	2304R – 2332R
NU 33	—	—	3306 – 3352
NU, NJ, NUP, NF 4	406 – 420	—	406 – 430

d 20 ~ (30) mm



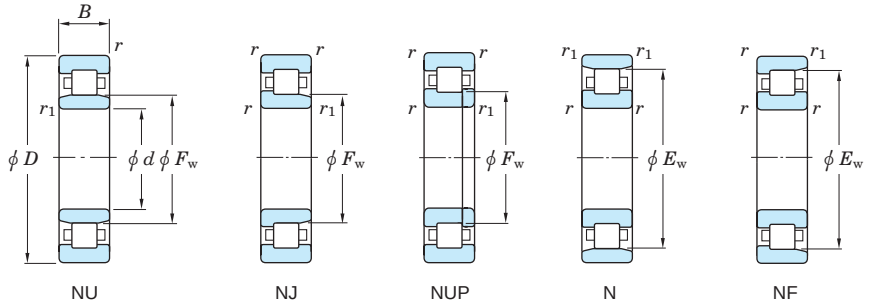


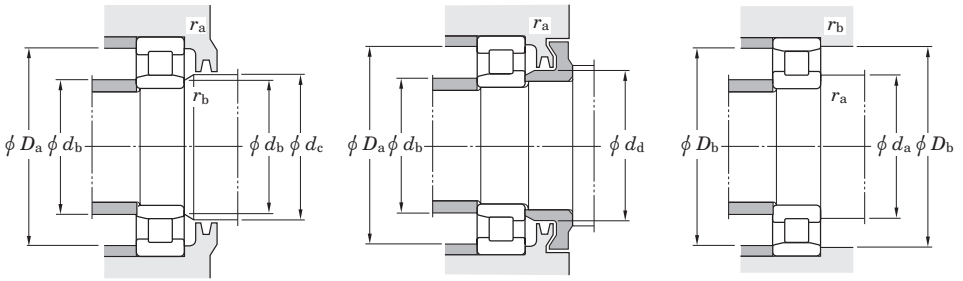
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.					Mounting dimensions (mm)										(Refer.) Mass
d	D	B	r min.	r_1 min.	F_w	E_w	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	NU	NJ	NUP	N	NF	d_a min.	d_b min.	d_b max.	d_c min.	d_d min.	D_a max.	D_b max.	D_b min.	r_a max.	r_b max.	NU (N) (kg)
20	47	14	1	0.6	—	40	19.3	12.7	1.45	15 000	18 000	—	—	—	**N204**	**NF204**	25	—	—	—	32	42	43	42	1	0.6	(0.108)
	47	14	1	0.6	26.5	—	32.2	22.6	3.05	15 000	18 000	**NU204R**	**NJ204R**	**NUP204R**	—	—	25	24	26	29	32	42	—	—	1	0.6	0.112
	47	18	1	0.6	27	—	27.8	18.4	2.70	13 000	18 000	**NU2204**	**NJ2204**	**NUP2204**	—	—	25	24	26	29	32	42	—	—	1	0.6	0.146
	47	18	1	0.6	26.5	—	38.3	28.3	3.60	13 000	18 000	**NU2204R**	**NJ2204R**	**NUP2204R**	—	—	25	24	26	29	32	42	—	—	1	0.6	0.146
	52	15	1.1	0.6	—	44.5	28.9	19.2	2.50	12 000	16 000	—	—	—	**N304**	**NF304**	26.5	—	—	—	33	45.5	48	45.5	1	0.6	(0.147)
	52	15	1.1	0.6	27.5	—	39.4	26.9	3.75	12 000	16 000	**NU304R**	**NJ304R**	**NUP304R**	—	—	26.5	24	27	30	33	45.5	—	—	1	0.6	0.153
	52	21	1.1	0.6	28.5	—	38.0	30.2	3.60	11 000	16 000	**NU2304**	**NJ2304**	**NUP2304**	—	—	26.5	24	27	30	33	45.5	—	—	1	0.6	0.212
	52	21	1.1	0.6	27.5	—	52.5	38.8	5.40	11 000	16 000	**NU2304R**	**NJ2304R**	**NUP2304R**	—	—	26.5	24	27	30	33	45.5	—	—	1	1	0.215
25	47	12	0.6	0.3	30.5	—	17.8	13.1	2.25	15 000	18 000	**NU1005**	—	**NUP1005**	—	—	29	27	30	32	—	43	—	—	0.6	0.3	0.084
	52	15	1	0.6	—	45	22.1	15.7	1.80	13 000	16 000	—	—	—	**N205**	**NF205**	30	—	—	—	37	47	48	47	1	0.6	(0.132)
	52	15	1	0.6	31.5	—	36.7	27.7	3.75	13 000	15 000	**NU205R**	**NJ205R**	**NUP205R**	—	—	30	29	31	34	37	47	—	—	1	0.6	0.138
	52	18	1	0.6	32	—	29.6	22.8	3.05	12 000	16 000	**NU2205**	**NJ2205**	**NUP2205**	—	—	30	29	31	34	37	47	—	—	1	0.6	0.163
	52	18	1	0.6	31.5	—	43.6	34.6	4.40	12 000	15 000	**NU2205R**	**NJ2205R**	**NUP2205R**	—	—	30	29	31	34	37	47	—	—	1	0.6	0.166
	62	17	1.1	1.1	—	53	36.6	25.2	3.45	10 000	14 000	—	—	—	**N305**	**NF305**	31.5	—	—	—	40	55.5	55.5	55	1	1	(0.235)
	62	17	1.1	1.1	34	—	51.9	37.4	4.85	10 000	14 000	**NU305R**	**NJ305R**	**NUP305R**	—	—	31.5	31.5	33	37	40	55.5	—	—	1	1	0.243
	62	24	1.1	1.1	35	—	53.4	40.9	5.70	9 100	14 000	**NU2305**	**NJ2305**	**NUP2305**	—	—	31.5	31.5	33	37	40	55.5	—	—	1	1	0.340
	62	24	1.1	1.1	34	—	71.2	56.1	7.50	9 100	14 000	**NU2305R**	**NJ2305R**	**NUP2305R**	—	—	31.5	31.5	33	37	40	55.5	—	—	1	1	0.350
30	55	13	1	0.6	36.5	—	23.4	18.4	2.05	13 000	15 000	**NU1006**	—	**NUP1006**	—	—	35	34	35	38	—	50	—	—	1	0.6	0.121
	62	16	1	0.6	—	53.5	31.1	21.5	2.95	11 000	13 000	—	—	—	**N206**	**NF206**	35	—	—	—	44	57	58	56	1	0.6	(0.206)
	62	16	1	0.6	37.5	—	48.9	37.4	5.25	11 000	13 000	**NU206R**	**NJ206R**	**NUP206R**	—	—	35	34	37	40	44	57	—	—	1	0.6	0.209
	62	20	1	0.6	38.5	—	41.0	33.1	4.20	9 800	13 000	**NU2206**	**NJ2206**	**NUP2206**	—	—	35	34	37	40	44	57	—	—	1	0.6	0.262
	62	20	1	0.6	37.5	—	61.2	49.8	6.80	9 700	13 000	**NU2206R**	**NJ2206R**	**NUP2206R**	—	—	35	34	37	40	44	57	—	—	1	0.6	0.262
	62	23.8	1	1	38.5	—	53.3	46.4	5.95	8 700	13 000	**NU3206**	—	—	—	—	35	35	37	40	—	57	—	—	1	0.6	0.343
	72	19	1.1	1.1	—	62	48.3	35.2	5.00	8 700	12 000	—	—	—	**N306**	**NF306**	36.5	—	—	—	48	65.5	65.5	64	1	1	(0.353)
	72	19	1.1	1.1	40.5	—	66.5	50.2	6.80	8 700	12 000	**NU306R**	**NJ306R**	**NUP306R**	—	—	36.5	36.5	40	44	48	65.5	—	—	1	1	0.361
	72	27	1.1	1.1	42	—	64.3	50.8	7.15	7 700	12 000	**NU2306**	**NJ2306**	**NUP2306**	—	—	36.5	36.5	40	44	48	65.5	—	—	1	1	0.500
	72	27	1.1	1.1	40.5	—	93.3	77.6	10.1	7 800	12 000	**NU2306R**	**NJ2306R**	**NUP2306R**	—	—	36.5	36.5	40	44	48	65.5	—	—	1	1	0.534

[Remarks] 1) Standard cage types used for the above bearings are shown in Table 1 earlier in this section. Please note that basic load ratings and limiting speeds shown above indicate the value applicable to machined cage. Consult JTEKT about bearings with pressed cage, since they may be different from bearings with machined cage in values above.

2) Bearing numbers of NU and NJ type bearings with mounted thrust collar (refer to specification table shown after this specification table) are NUJ and NH.

d (30) ~ (45) mm



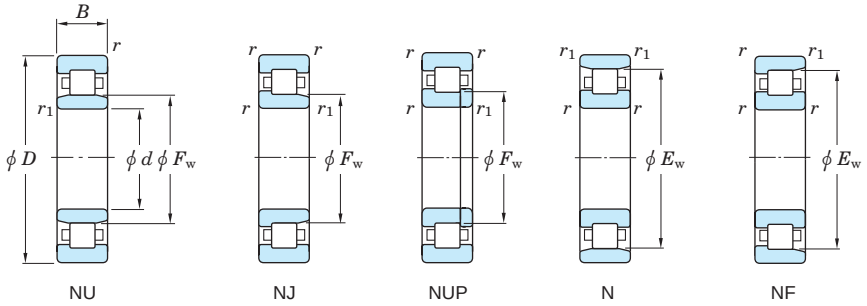


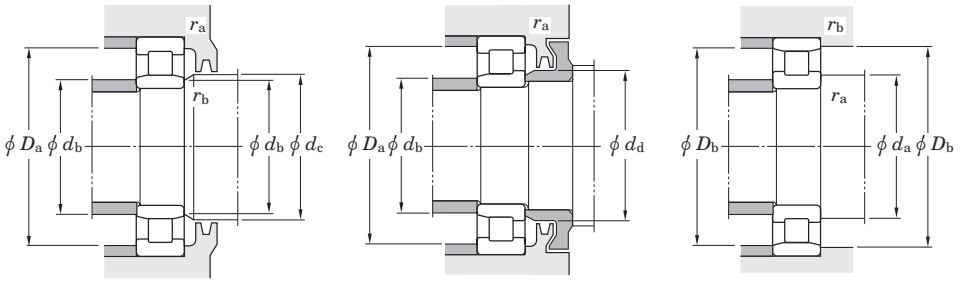
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.					Mounting dimensions (mm)										(Refer.) Mass
d	D	B	r min.	r_1 min.	F_w	E_w	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	NU	NJ	NUP	N	NF	d_a min.	d_b min.	d_b max.	d_c min.	d_d min.	D_a max.	D_b max.	D_b min.	r_a max.	r_b max.	NU (N) (kg)
30	72	30.2	1.1	1.1	42	—	86.4	74.3	9.95	7 700	12 000	**NU3306**	—	—	—	—	36.5	36.5	40	44	—	65.5	—	—	1	1	0.650
	90	23	1.5	1.5	45	73	78.3	55.0	7.95	7 600	10 000	**NU406**	**NJ406**	**NUP406**	**N406**	**NF406**	38	38	44	47	52	82	82	74	1.5	1.5	0.753
35	62	14	1	0.6	42	—	28.3	23.2	2.65	11 000	13 000	**NU1007**	—	**NUP1007**	—	—	40	39	41	44	—	57	—	—	1	0.5	0.182
	72	17	1.1	0.6	—	61.8	44.6	31.5	4.70	9 500	11 000	—	—	—	**N207**	**NF207**	41.5	—	—	—	50	65.5	68	64	1	0.6	(0.293)
	72	17	1.1	0.6	44	—	62.9	50.2	6.55	9 300	11 000	**NU207R**	**NJ207R**	**NUP207R**	—	—	41.5	39	43	46	50	65.5	—	—	1	0.6	0.306
	72	23	1.1	0.6	43.8	—	61.3	51.2	7.15	8 500	11 000	**NU2207**	**NJ2207**	**NUP2207**	—	—	41.5	39	43	46	50	65.5	—	—	1	0.6	0.402
	72	23	1.1	0.6	44	—	77.1	65.3	9.20	8 300	11 000	**NU2207R**	**NJ2207R**	**NUP2207R**	—	—	41.5	39	43	46	50	65.5	—	—	1	0.6	0.404
	72	27	1.1	1.1	43.8	—	68.5	59.1	7.90	7 600	11 000	**NU3207**	—	—	—	—	41.5	41.5	43	46	—	65.5	—	—	1	0.6	0.524
	80	21	1.5	1.1	—	68.2	62.0	46.9	6.20	7 900	10 000	—	—	—	**N307**	**NF307**	43	—	—	—	53	72	73.5	71	1.5	1	(0.477)
	80	21	1.5	1.1	46.2	—	83.3	65.4	9.35	7 700	10 000	**NU307R**	**NJ307R**	**NUP307R**	—	—	43	41.5	45	48	53	72	—	—	1.5	1	0.482
	80	31	1.5	1.1	46.2	—	75.5	65.7	7.95	7 000	10 000	**NU2307**	**NJ2307**	**NUP2307**	—	—	43	41.5	45	48	53	72	—	—	1.5	1	0.696
	80	31	1.5	1.1	46.2	—	116	101	15.0	6 900	10 000	**NU2307R**	**NJ2307R**	**NUP2307R**	—	—	43	41.5	45	48	53	72	—	—	1.5	1	0.729
	80	34.9	1.5	1.5	46.2	—	102	89.1	12.0	7 000	10 000	**NU3307**	—	—	—	—	43	43	45	48	—	72	—	—	1.5	1	0.908
	100	25	1.5	1.5	53	83	94.1	68.9	9.25	6 600	8 800	**NU407**	**NJ407**	**NUP407**	**N407**	**NF407**	43	43	52	55	61	92	92	84	1.5	1.5	1.02
40	68	15	1	0.6	47	—	31.2	25.7	3.10	10 000	12 000	**NU1008**	—	**NUP1008**	—	—	45	44	46	49	—	63	—	—	1	0.6	0.223
	80	18	1.1	1.1	—	70	54.7	42.9	6.15	8 300	10 000	—	—	—	**N208**	**NF208**	46.5	—	—	—	56	73.5	73.5	72	1	1	(0.374)
	80	18	1.1	1.1	49.5	—	69.6	55.4	7.35	8 300	9 900	**NU208R**	**NJ208R**	**NUP208R**	—	—	46.5	46.5	49	52	56	73.5	—	—	1	1	0.384
	80	23	1.1	1.1	50	—	72.8	62.0	8.75	7 500	10 000	**NU2208**	**NJ2208**	**NUP2208**	—	—	46.5	46.5	49	52	56	73.5	—	—	1	1	0.490
	80	23	1.1	1.1	49.5	—	90.5	77.6	10.3	7 400	9 900	**NU2208R**	**NJ2208R**	**NUP2208R**	—	—	46.5	46.5	49	52	56	73.5	—	—	1	1	0.490
	80	30.2	1.1	1.1	50	—	97.8	90.6	12.2	6 700	10 000	**NU3208**	—	—	—	—	46.5	46.5	49	52	—	73.5	—	—	1	1	0.711
	90	23	1.5	1.5	—	77.5	73.4	56.9	7.85	6 900	9 100	—	—	—	**N308**	**NF308**	48	—	—	—	60	82	82	80	1.5	1.5	(0.646)
	90	23	1.5	1.5	52	—	104	81.5	11.0	6 800	9 100	**NU308R**	**NJ308R**	**NUP308R**	—	—	48	48	51	55	60	82	—	—	1.5	1.5	0.664
	90	33	1.5	1.5	53.5	—	103	88.0	11.6	6 100	9 100	**NU2308**	**NJ2308**	**NUP2308**	—	—	48	48	51	55	60	82	—	—	1.5	1.5	0.956
	90	33	1.5	1.5	52	—	143	122	18.4	6 100	9 100	**NU2308R**	**NJ2308R**	**NUP2308R**	—	—	48	48	51	55	60	82	—	—	1.5	1.5	0.962
	90	36.5	1.5	1.5	53.5	—	130	119	17.6	6 100	9 100	**NU3308**	—	—	—	—	48	48	51	55	—	82	—	—	1.5	1.5	1.19
	110	27	2	2	58	92	120	89.1	12.6	6 000	8 000	**NU408**	**NJ408**	**NUP408**	**N408**	**NF408**	49	49	57	60	67	101	101	93	2	2	1.30
45	75	16	1	0.6	52.5	—	38.9	33.8	4.30	9 200	11 000	**NU1009**	—	**NUP1009**	—	—	50	49	52	54	—	70	—	—	1	0.6	0.289

[Remarks] 1) Standard cage types used for the above bearings are shown in Table 1 earlier in this section. Please note that basic load ratings and limiting speeds shown above indicate the value applicable to machined cage. Consult JTEKT about bearings with pressed cage, since they may be different from bearings with machined cage in values above.

2) Bearing numbers of NU and NJ type bearings with mounted thrust collar (refer to specification table shown after this specification table) are NUJ and NH.

d (45) ~ (55) mm



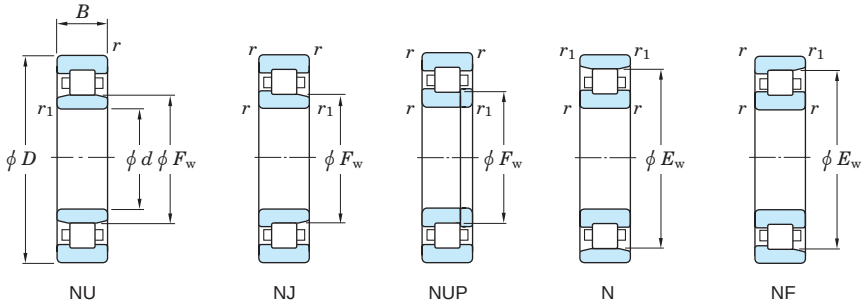


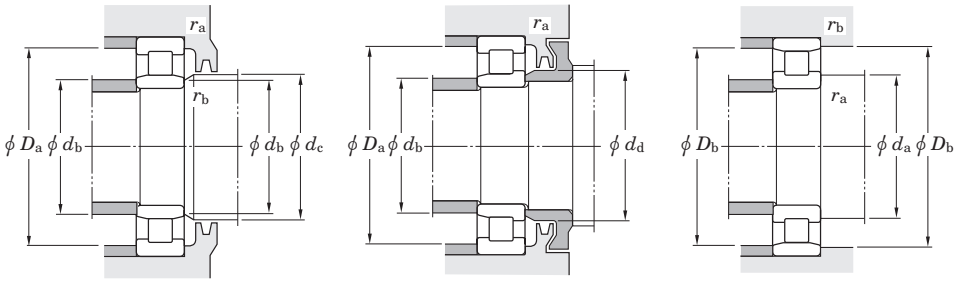
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.					Mounting dimensions (mm)										(Refer.) Mass
d	D	B	r min.	r_1 min.	F_w	E_w	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	NU	NJ	NUP	N	NF	d_a min.	d_b min.	d_b max.	d_c min.	d_d min.	D_a max.	D_b max.	D_b min.	r_a max.	r_b max.	NU (N) (kg)
45	85	19	1.1	1.1	—	75	57.6	46.9	6.70	7 700	9 200	—	—	—	**N209**	**NF209**	51.5	—	—	—	61	78.5	78.5	77	1	1	(0.427)
	85	19	1.1	1.1	54.5	—	78.9	66.4	9.05	7 600	9 200	**NU209R**	**NJ209R**	**NUP209R**	—	—	51.5	51.5	54	57	61	78.5	—	—	1	1	0.439
	85	23	1.1	1.1	55	—	76.6	67.8	9.60	6 900	9 200	**NU2209**	**NJ2209**	**NUP2209**	—	—	51.5	51.5	54	57	61	78.5	—	—	1	1	0.536
	85	23	1.1	1.1	54.5	—	95.1	84.6	11.2	6 900	9 200	**NU2209R**	**NJ2209R**	**NUP2209R**	—	—	51.5	51.5	54	57	61	78.5	—	—	1	1	0.536
	85	30.2	1.1	1.1	55	—	103	99.0	13.3	6 100	9 200	**NU3209**	—	—	—	—	51.5	51.5	54	57	—	78.5	—	—	1	1	0.770
	100	25	1.5	1.5	—	86.5	98.5	77.5	11.3	6 200	8 300	—	—	—	**N309**	**NF309**	53	—	—	—	66	92	92	89	1.5	1.5	(0.865)
	100	25	1.5	1.5	58.5	—	122	98.3	13.5	6 100	8 200	**NU309R**	**NJ309R**	**NUP309R**	—	—	53	53	57	60	66	92	—	—	1.5	1.5	0.909
	100	36	1.5	1.5	58.5	—	124	113	14.3	5 500	8 300	**NU2309**	**NJ2309**	**NUP2309**	—	—	53	53	57	60	66	92	—	—	1.5	1.5	1.25
	100	36	1.5	1.5	58.5	—	172	153	23.0	5 400	8 200	**NU2309R**	**NJ2309R**	**NUP2309R**	—	—	53	53	57	60	66	92	—	—	1.5	1.5	1.32
	100	39.7	1.5	1.5	58.5	—	164	149	22.6	5 500	8 300	**NU3309**	—	—	—	—	53	53	57	60	—	92	—	—	1.5	1.5	1.59
	120	29	2	2	64.5	100.5	134	112	13.8	5 400	7 200	**NU409**	**NJ409**	**NUP409**	**N409**	**NF409**	54	54	63	66	74	111	111	102	2	2	1.64
50	80	16	1	0.6	57.5	—	42.2	36.8	4.80	8 400	9 900	**NU1010**	—	**NUP1010**	—	—	55	54	57	59	—	75	—	—	1	0.6	0.306
	90	20	1.1	1.1	—	80.4	60.3	51.0	7.30	7 100	8 500	—	—	—	**N210**	**NF210**	56.5	—	—	—	67	83.5	83.5	82	1	1	(0.479)
	90	20	1.1	1.1	59.5	—	82.5	71.9	9.85	7 100	8 500	**NU210R**	**NJ210R**	**NUP210R**	—	—	56.5	56.5	58	62	67	83.5	—	—	1	1	0.497
	90	23	1.1	1.1	60.4	—	80.3	73.6	10.4	6 400	8 500	**NU2210**	**NJ2210**	**NUP2210**	—	—	56.5	56.5	58	62	67	83.5	—	—	1	1	0.580
	90	23	1.1	1.1	59.5	—	99.5	91.5	12.1	6 400	8 500	**NU2210R**	**NJ2210R**	**NUP2210R**	—	—	56.5	56.5	58	62	67	83.5	—	—	1	1	0.580
	90	30.2	1.1	1.1	60.4	—	108	108	14.5	5 700	8 500	**NU3210**	—	—	—	—	56.5	56.5	58	62	—	83.5	—	—	1	1	0.829
	110	27	2	2	—	95	109	93.4	11.7	5 600	7 500	—	—	—	**N310**	**NF310**	59	—	—	—	73	101	101	98	2	2	(1.15)
	110	27	2	2	65	—	138	113	16.0	5 500	7 400	**NU310R**	**NJ310R**	**NUP310R**	—	—	59	59	63	67	73	101	—	—	2	2	1.15
	110	40	2	2	65	—	151	142	20.1	5 000	7 500	**NU2310**	**NJ2310**	**NUP2310**	—	—	59	59	63	67	73	101	—	—	2	2	1.69
	110	40	2	2	65	—	203	187	28.6	4 900	7 400	**NU2310R**	**NJ2310R**	**NUP2310R**	—	—	59	59	63	67	73	101	—	—	2	2	1.76
	110	44.4	2	2	65	—	195	183	27.3	5 000	7 500	**NU3310**	—	—	—	—	59	59	63	67	—	101	—	—	2	2	2.14
	130	31	2.1	2.1	70.8	110.8	161	136	17.4	4 900	6 600	**NU410**	**NJ410**	**NUP410**	**N410**	**NF410**	61	61	69	73	81	119	119	112	2	2	2.01
55	90	18	1.1	1	64.5	—	47.1	43.8	5.75	7 600	8 900	**NU1011**	—	**NUP1011**	—	—	61.5	60	63	66	—	83.5	—	—	1	1	0.445
	100	21	1.5	1.1	—	88.5	72.5	62.3	8.30	6 400	7 700	—	—	—	**N211**	**NF211**	63	—	—	—	73	92	93.5	91	1.5	1	(0.633)
	100	21	1.5	1.1	66	—	108	98.7	14.2	6 400	7 700	**NU211R**	**NJ211R**	**NUP211R**	—	—	63	61.5	65	68	73	92	—	—	1.5	1	0.650
	100	25	1.5	1.1	66.5	—	94.2	87.2	11.6	5 800	7 700	**NU2211**	**NJ2211**	**NUP2211**	—	—	63	61.5	65	68	73	92	—	—	1.5	1	0.780

[Remarks] 1) Standard cage types used for the above bearings are shown in Table 1 earlier in this section. Please note that basic load ratings and limiting speeds shown above indicate the value applicable to machined cage. Consult JTEKT about bearings with pressed cage, since they may be different from bearings with machined cage in values above.

2) Bearing numbers of NU and NJ type bearings with mounted thrust collar (refer to specification table shown after this specification table) are NUJ and NH.

d (55) ~ (65) mm



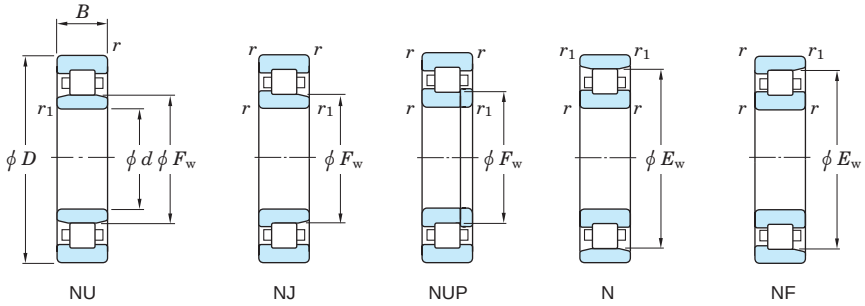


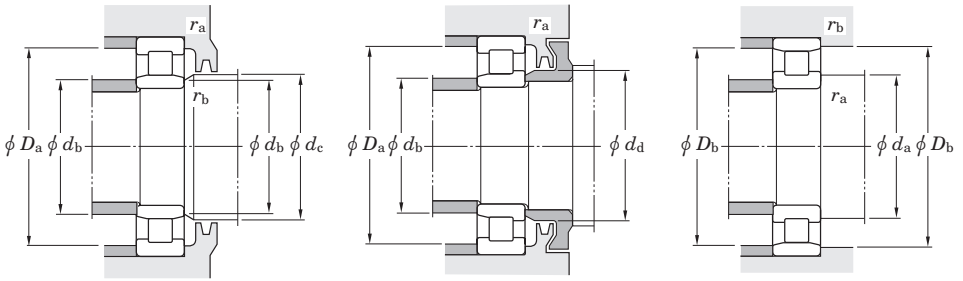
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.					Mounting dimensions (mm)										(Refer.) Mass
d	D	B	r min.	r_1 min.	F_w	E_w	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	NU	NJ	NUP	N	NF	d_a min.	d_b min.	d_b max.	d_c min.	d_d min.	D_a max.	D_b max.	D_b min.	r_a max.	r_b max.	NU (N) (kg)
55	100	25	1.5	1.1	66	—	127	122	16.9	5 800	7 700	**NU2211R**	**NJ2211R**	**NUP2211R**	—	—	63	61.5	65	68	73	92	—	—	1.5	1	0.806
	100	33.3	1.5	1.5	66.5	—	119	118	16.1	5 100	7 700	**NU3211**	—	—	—	—	63	63	65	68	—	92	—	—	1.5	1	1.14
	120	29	2	2	—	104.5	138	111	15.8	5 100	6 800	—	—	—	**N311**	**NF311**	64	—	—	—	80	111	111	107	2	2	(1.44)
	120	29	2	2	70.5	—	172	143	19.8	5 100	6 700	**NU311R**	**NJ311R**	**NUP311R**	—	—	64	64	69	72	80	111	—	—	2	2	1.50
	120	43	2	2	70.5	—	185	162	24.6	4 500	6 800	**NU2311**	**NJ2311**	**NUP2311**	—	—	64	64	69	72	80	111	—	—	2	2	2.10
	120	43	2	2	70.5	—	251	233	35.3	4 500	6 700	**NU2311R**	**NJ2311R**	**NUP2311R**	—	—	64	64	69	72	80	111	—	—	2	2	2.25
	120	49.2	2	2	70.5	—	235	220	32.8	4 500	6 800	**NU3311**	—	—	—	—	64	64	69	72	—	111	—	—	2	2	2.81
	140	33	2.1	2.1	77.2	117.2	174	138	19.6	4 600	6 100	**NU411**	**NJ411**	**NUP411**	**N411**	**NF411**	66	66	76	79	87	129	129	119	2	2	2.51
60	95	18	1.1	1	69.5	—	53.0	50.0	6.75	7 000	8 300	**NU1012**	—	**NUP1012**	—	—	66.5	65	68	71	—	88.5	—	—	1	1	0.477
	110	22	1.5	1.5	—	97.5	85.7	79.9	10.4	5 800	7 000	—	—	—	**N212**	**NF212**	68	—	—	—	80	102	102	100	1.5	1.5	(0.823)
	110	22	1.5	1.5	72	—	122	107	15.7	5 800	6 900	**NU212R**	**NJ212R**	**NUP212R**	—	—	68	68	71	75	80	102	—	—	1.5	1.5	0.830
	110	28	1.5	1.5	73.5	—	120	123	15.3	5 200	7 000	**NU2212**	**NJ2212**	**NUP2212**	—	—	68	68	71	75	80	102	—	—	1.5	1.5	1.07
	110	28	1.5	1.5	72	—	164	157	21.7	5 200	6 900	**NU2212R**	**NJ2212R**	**NUP2212R**	—	—	68	68	71	75	80	102	—	—	1.5	1.5	1.09
	110	36.5	1.5	1.5	73.5	—	160	167	24.7	4 700	7 000	**NU3212**	—	—	—	—	68	68	71	75	—	102	—	—	1.5	1.5	1.52
	130	31	2.1	2.1	—	113	155	126	17.3	4 700	6 300	—	—	—	**N312**	**NF312**	71	—	—	—	86	119	119	116	2	2	(1.83)
	130	31	2.1	2.1	77	—	187	157	22.1	4 600	6 200	**NU312R**	**NJ312R**	**NUP312R**	—	—	71	71	75	79	86	119	—	—	2	2	1.87
	130	46	2.1	2.1	77	—	211	188	29.4	4 200	6 300	**NU2312**	**NJ2312**	**NUP2312**	—	—	71	71	75	79	86	119	—	—	2	2	2.69
	130	46	2.1	2.1	77	—	278	262	39.6	4 100	6 200	**NU2312R**	**NJ2312R**	**NUP2312R**	—	—	71	71	75	79	86	119	—	—	2	2	2.81
	130	54	2.1	2.1	77	—	275	265	39.9	4 200	6 300	**NU3312**	—	—	—	—	71	71	75	79	—	119	—	—	2	2	3.61
	150	35	2.1	2.1	83	127	209	184	26.1	4 200	5 700	**NU412**	**NJ412**	**NUP412**	**N412**	**NF412**	71	71	82	85	94	139	139	128	2	2	3.02
65	100	18	1.1	1	74.5	—	54.4	52.9	7.15	6 600	7 800	**NU1013**	—	**NUP1013**	—	—	71.5	70	73	76	—	93.5	—	—	1	1	0.506
	120	23	1.5	1.5	—	105.6	105	94.4	13.5	5 400	6 400	—	—	—	**N213**	**NF213**	73	—	—	—	87	112	112	108	1.5	1.5	(1.05)
	120	23	1.5	1.5	78.5	—	134	119	16.1	5 300	6 400	**NU213R**	**NJ213R**	**NUP213R**	—	—	73	73	77	81	87	112	—	—	1.5	1.5	1.05
	120	31	1.5	1.5	79.6	—	150	149	20.6	4 800	6 400	**NU2213**	**NJ2213**	**NUP2213**	—	—	73	73	77	81	87	112	—	—	1.5	1.5	1.43
	120	31	1.5	1.5	78.5	—	186	181	27.7	4 800	6 400	**NU2213R**	**NJ2213R**	**NUP2213R**	—	—	73	73	77	81	87	112	—	—	1.5	1.5	1.45
	120	38.1	1.5	1.5	79.6	—	186	197	29.7	4 300	6 400	**NU3213**	—	—	—	—	73	73	77	81	—	112	—	—	1.5	1.5	1.90
	140	33	2.1	2.1	—	121.5	169	139	19.2	4 300	5 800	—	—	—	**N313**	**NF313**	76	—	—	—	93	129	129	125	2	2	(2.19)

[Remarks] 1) Standard cage types used for the above bearings are shown in Table 1 earlier in this section. Please note that basic load ratings and limiting speeds shown above indicate the value applicable to machined cage. Consult JTEKT about bearings with pressed cage, since they may be different from bearings with machined cage in values above.

2) Bearing numbers of NU and NJ type bearings with mounted thrust collar (refer to specification table shown after this specification table) are NUJ and NH.

d (65) ~ (75) mm



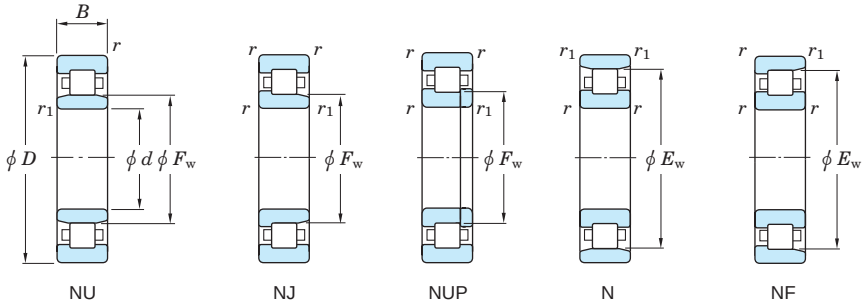


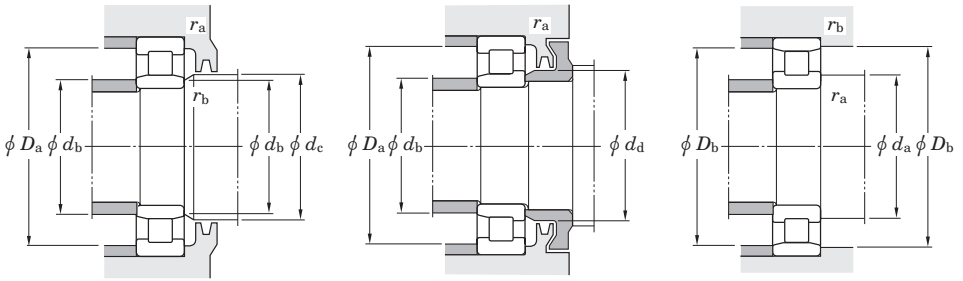
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.					Mounting dimensions (mm)										(Refer.) Mass
d	D	B	r min.	r_1 min.	F_w	E_w	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	NU	NJ	NUP	N	NF	d_a min.	d_b min.	d_b max.	d_c min.	d_d min.	D_a max.	D_b max.	D_b min.	r_a max.	r_b max.	NU (N) (kg)
65	140	33	2.1	2.1	82.5	—	226	191	29.8	4 300	5 700	**NU313R**	**NJ313R**	**NUP313R**	—	—	76	76	81	85	93	129	—	—	2	2	2.31
	140	48	2.1	2.1	83.5	—	235	212	32.9	3 900	5 800	**NU2313**	**NJ2313**	**NUP2313**	—	—	76	76	81	85	93	129	—	—	2	2	3.25
	140	48	2.1	2.1	82.5	—	310	287	43.3	3 800	5 700	**NU2313R**	**NJ2313R**	**NUP2313R**	—	—	76	76	81	85	93	129	—	—	2	2	3.36
	140	58.7	2.1	2.1	83.5	—	302	294	43.9	3 900	5 800	**NU3313**	—	—	—	—	76	76	81	85	—	129	—	—	2	2	4.53
	160	37	2.1	2.1	89.3	135.3	228	203	28.2	4 000	5 300	**NU413**	**NJ413**	**NUP413**	**N413**	**NF413**	76	76	88	91	100	149	149	137	2	2	3.58
70	110	20	1.1	1	80	—	72.9	70.4	10.1	6 100	7 200	**NU1014**	—	**NUP1014**	—	—	76.5	75	78	82	—	103.5	—	—	1	1	0.702
	125	24	1.5	1.5	—	110.5	104	95.2	13.6	5 100	6 100	—	—	—	**N214**	**NF214**	78	—	—	—	92	117	117	114	1.5	1.5	(1.15)
	125	24	1.5	1.5	83.5	—	148	137	19.0	5 000	6 000	**NU214R**	**NJ214R**	**NUP214R**	—	—	78	78	82	86	92	117	—	—	1.5	1.5	1.16
	125	31	1.5	1.5	84.5	—	149	151	20.8	4 600	6 100	**NU2214**	**NJ2214**	**NUP2214**	—	—	78	78	82	86	92	117	—	—	1.5	1.5	1.52
	125	31	1.5	1.5	83.5	—	194	194	29.8	4 500	6 000	**NU2214R**	**NJ2214R**	**NUP2214R**	—	—	78	78	82	86	92	117	—	—	1.5	1.5	1.53
	125	39.7	1.5	1.5	84.5	—	185	198	30.0	4 100	6 100	**NU3214**	—	—	—	—	78	78	82	86	—	117	—	—	1.5	1.5	2.09
	150	35	2.1	2.1	—	130	198	168	23.3	4 000	5 400	—	—	—	**N314**	**NF314**	81	—	—	—	100	139	139	134	2	2	(2.73)
	150	35	2.1	2.1	89	—	256	222	33.4	4 000	5 300	**NU314R**	**NJ314R**	**NUP314R**	—	—	81	81	87	92	100	139	—	—	2	2	2.81
	150	51	2.1	2.1	90	—	279	262	39.3	3 600	5 400	**NU2314**	**NJ2314**	**NUP2314**	—	—	81	81	87	92	100	139	—	—	2	2	3.97
	150	51	2.1	2.1	89	—	342	323	47.1	3 600	5 300	**NU2314R**	**NJ2314R**	**NUP2314R**	—	—	81	81	87	92	100	139	—	—	2	2	4.08
	150	63.5	2.1	2.1	90	—	354	356	51.5	3 600	5 400	**NU3314**	—	—	—	—	81	81	87	92	—	139	—	—	2	2	5.62
	180	42	3	3	100	152	285	257	35.2	3 500	4 700	**NU414**	**NJ414**	**NUP414**	**N414**	**NF414**	83	83	99	102	112	167	167	153	2.5	2.5	5.26
75	115	20	1.1	1	85	—	80.0	78.1	10.2	5 700	6 800	**NU1015**	—	**NUP1015**	—	—	81.5	80	83	87	—	108.5	—	—	1	1	0.735
	130	25	1.5	1.5	—	116.5	121	118	16.1	4 800	5 800	—	—	—	**N215**	**NF215**	83	—	—	—	96	122	122	120	1.5	1.5	(1.24)
	130	25	1.5	1.5	88.5	—	163	156	21.9	4 800	5 700	**NU215R**	**NJ215R**	**NUP215R**	—	—	83	83	87	90	96	122	—	—	1.5	1.5	1.29
	130	31	1.5	1.5	88.5	—	162	172	22.3	4 300	5 800	**NU2215**	**NJ2215**	**NUP2215**	—	—	83	83	87	90	96	122	—	—	1.5	1.5	1.57
	130	31	1.5	1.5	88.5	—	202	207	31.5	4 300	5 700	**NU2215R**	**NJ2215R**	**NUP2215R**	—	—	83	83	87	90	96	122	—	—	1.5	1.5	1.61
	130	41.3	1.5	1.5	88.5	—	210	226	34.1	3 900	5 800	**NU3215**	—	—	—	—	83	83	87	90	—	122	—	—	1.5	1.5	2.28
	160	37	2.1	2.1	—	139.5	224	205	28.4	3 800	5 000	—	—	—	**N315**	**NF315**	86	—	—	—	106	149	149	143	2	2	(3.19)
	160	37	2.1	2.1	95	—	300	263	39.9	3 700	5 000	**NU315R**	**NJ315R**	**NUP315R**	—	—	86	86	93	97	106	149	—	—	2	2	3.37
	160	55	2.1	2.1	95.5	—	323	327	43.4	3 400	5 000	**NU2315**	**NJ2315**	**NUP2315**	—	—	86	86	93	97	106	149	—	—	2	2	4.84
	160	55	2.1	2.1	95	—	412	395	57.3	3 300	5 000	**NU2315R**	**NJ2315R**	**NUP2315R**	—	—	86	86	93	97	106	149	—	—	2	2	5.00

[Remarks] 1) Standard cage types used for the above bearings are shown in Table 1 earlier in this section. Please note that basic load ratings and limiting speeds shown above indicate the value applicable to machined cage. Consult JTEKT about bearings with pressed cage, since they may be different from bearings with machined cage in values above.

2) Bearing numbers of NU and NJ type bearings with mounted thrust collar (refer to specification table shown after this specification table) are NUJ and NH.

d (75) ~ (90) mm



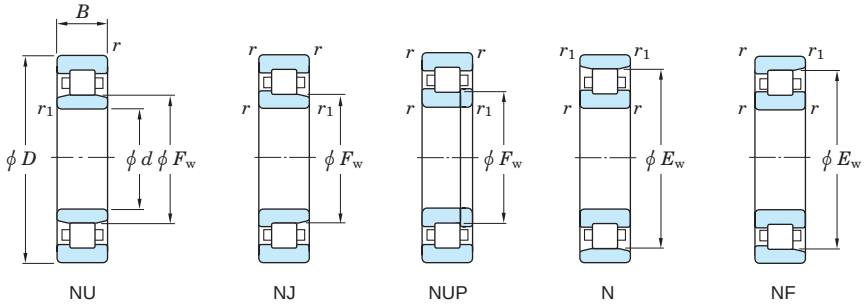


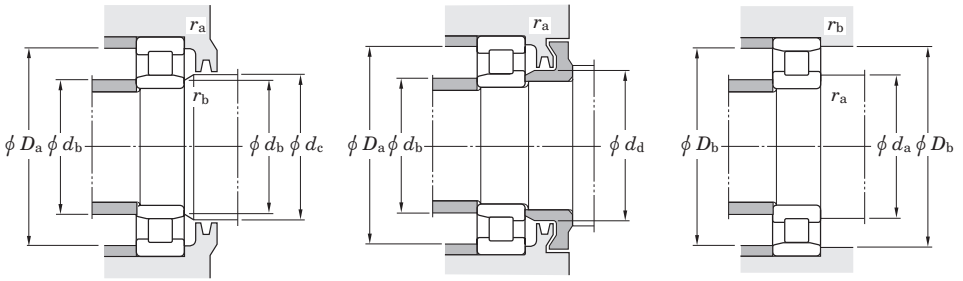
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min⁻¹)		Bearing No.					Mounting dimensions (mm)										(Refer.) Mass
d	D	B	r min.	r_1 min.	F_w	E_w	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	NU	NJ	NUP	N	NF	d_a min.	d_b min.	d_b max.	d_c min.	d_d min.	D_a max.	D_b max.	D_b min.	r_a max.	r_b max.	NU (N) (kg)
75	160	68.3	2.1	2.1	95.5	—	423	430	62.1	3 400	5 000	**NU3315**	—	—	—	—	86	86	93	97	—	149	—	—	2	2	6.86
	190	45	3	3	104.5	160.5	328	274	40.2	3 300	4 400	**NU415**	**NJ415**	**NUP415**	**N415**	**NF415**	88	88	103	107	118	177	177	162	2.5	2.5	6.25
80	125	22	1.1	1	91.5	—	87.2	86.4	11.5	5 300	6 300	**NU1016**	—	**NUP1016**	—	—	86.5	85	90	94	—	118.5	—	—	1	1	0.994
	140	26	2	2	—	125.3	133	122	16.2	4 500	5 400	—	—	—	**N216**	**NF216**	89	—	—	—	104	131	131	128	2	2	(1.51)
	140	26	2	2	95.3	—	174	167	23.0	4 400	5 300	**NU216R**	**NJ216R**	**NUP216R**	—	—	89	89	94	97	104	131	—	—	2	2	1.56
	140	33	2	2	95.3	—	184	186	27.8	4 000	5 400	**NU2216**	**NJ2216**	**NUP2216**	—	—	89	89	94	97	104	131	—	—	2	2	1.96
	140	33	2	2	95.3	—	233	243	35.8	4 000	5 300	**NU2216R**	**NJ2216R**	**NUP2216R**	—	—	89	89	94	97	104	131	—	—	2	2	2.03
	140	44.4	2	2	95.3	—	238	259	37.8	3 600	5 400	**NU3216**	—	—	—	—	89	89	94	97	—	131	—	—	2	2	2.87
	170	39	2.1	2.1	—	147	238	207	30.7	3 500	4 700	—	—	—	**N316**	**NF316**	91	—	—	—	114	159	159	151	2	2	(3.83)
	170	39	2.1	2.1	101	—	320	282	42.1	3 500	4 700	**NU316R**	**NJ316R**	**NUP316R**	—	—	91	91	99	105	114	159	—	—	2	2	4.00
	170	58	2.1	2.1	103	—	343	332	46.9	3 100	4 700	**NU2316**	**NJ2316**	**NUP2316**	—	—	91	91	99	105	114	159	—	—	2	2	5.83
	170	58	2.1	2.1	101	—	445	431	61.1	3 100	4 700	**NU2316R**	**NJ2316R**	**NUP2316R**	—	—	91	91	99	105	114	159	—	—	2	2	5.95
	170	68.3	2.1	2.1	103	—	423	436	61.9	3 100	4 700	**NU3316**	—	—	—	—	91	91	99	105	—	159	—	—	2	2	7.72
	200	48	3	3	110	170	374	315	45.2	3 100	4 200	**NU416**	**NJ416**	**NUP416**	**N416**	**NF416**	93	93	109	112	124	187	187	172	2.5	2.5	7.28
85	130	22	1.1	1	96.5	—	89.8	91.2	12.0	5 100	6 000	**NU1017**	—	**NUP1017**	—	—	91.5	90	95	99	—	123.5	—	—	1	1	1.04
	150	28	2	2	—	133.8	151	140	18.7	4 200	5 000	—	—	—	**N217**	**NF217**	94	—	—	—	110	141	141	137	2	2	(1.90)
	150	28	2	2	100.5	—	209	199	26.3	4 200	5 000	**NU217R**	**NJ217R**	**NUP217R**	—	—	94	94	99	104	110	141	—	—	2	2	1.94
	150	36	2	2	101.8	—	212	218	31.6	3 800	5 000	**NU2217**	**NJ2217**	**NUP2217**	—	—	94	94	99	104	110	141	—	—	2	2	2.50
	150	36	2	2	100.5	—	272	279	41.6	3 700	5 000	**NU2217R**	**NJ2217R**	**NUP2217R**	—	—	94	94	99	104	110	141	—	—	2	2	2.53
	150	49.2	2	2	101.8	—	269	296	42.1	3 300	5 000	**NU3217**	—	—	—	—	94	94	99	104	—	141	—	—	2	2	3.67
	180	41	3	3	—	156	281	247	35.6	3 300	4 500	—	—	—	**N317**	**NF317**	98	—	—	—	119	167	167	160	2.5	2.5	(4.52)
	180	41	3	3	108	—	364	330	48.3	3 300	4 400	**NU317R**	**NJ317R**	**NUP317R**	—	—	98	98	106	110	119	167	—	—	2.5	2.5	4.80
	180	60	3	3	108	—	394	382	54.2	3 000	4 500	**NU2317**	**NJ2317**	**NUP2317**	—	—	98	98	106	110	119	167	—	—	2.5	2.5	6.62
	180	60	3	3	108	—	491	485	67.7	2 900	4 400	**NU2317R**	**NJ2317R**	**NUP2317R**	—	—	98	98	106	110	119	167	—	—	2.5	2.5	6.98
	180	73	3	3	108	—	499	517	71.5	3 000	4 500	**NU3317**	—	—	—	—	98	98	106	110	—	167	—	—	2.5	2.5	9.23
	210	52	4	4	113	177	416	350	49.7	3 000	4 000	**NU417**	**NJ417**	**NUP417**	**N417**	**NF417**	101	101	111	115	128	194	194	179	3	3	8.68
90	140	24	1.5	1.1	103	—	106	109	14.6	4 700	5 600	**NU1018**	—	**NUP1018**	—	—	98	96.5	101	106	—	132	—	—	1.5	1	1.34

[Remarks] 1) Standard cage types used for the above bearings are shown in Table 1 earlier in this section. Please note that basic load ratings and limiting speeds shown above indicate the value applicable to machined cage. Consult JTEKT about bearings with pressed cage, since they may be different from bearings with machined cage in values above.

2) Bearing numbers of NU and NJ type bearings with mounted thrust collar (refer to specification table shown after this specification table) are NUJ and NH.

d (90) ~ (100) mm



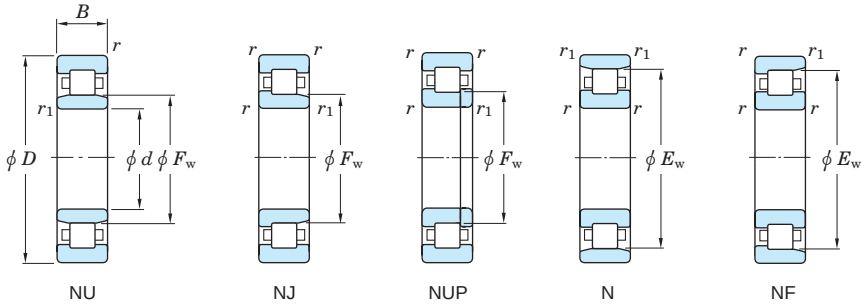


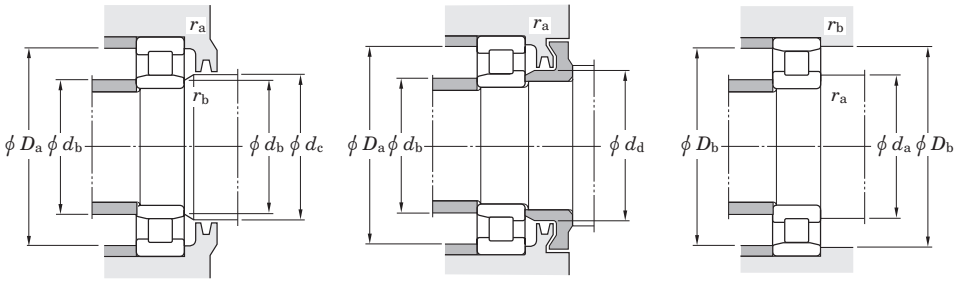
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.					Mounting dimensions (mm)										(Refer.) Mass
d	D	B	r min.	r_1 min.	F_w	E_w	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	NU	NJ	NUP	N	NF	d_a min.	d_b min.	d_b max.	d_c min.	d_d min.	D_a max.	D_b max.	D_b min.	r_a max.	r_b max.	NU (N) (kg)
90	160	30	2	2	—	143	190	178	22.9	3 900	4 700	—	—	—	**N218**	**NF218**	99	—	—	—	116	151	151	146	2	2	(2.32)
	160	30	2	2	107	—	227	217	28.7	3 900	4 700	**NU218R**	**NJ218R**	**NUP218R**	—	—	99	99	105	109	116	151	—	—	2	2	2.38
	160	40	2	2	107	—	259	265	38.9	3 500	4 700	**NU2218**	**NJ2218**	**NUP2218**	—	—	99	99	105	109	116	151	—	—	2	2	3.10
	160	40	2	2	107	—	302	314	45.8	3 500	4 700	**NU2218R**	**NJ2218R**	**NUP2218R**	—	—	99	99	105	109	116	151	—	—	2	2	3.21
	160	52.4	2	2	107	—	338	373	52.8	3 100	4 700	**NU3218**	—	—	—	—	99	99	105	109	—	151	—	—	2	2	4.49
	190	43	3	3	—	165	300	265	38.7	3 100	4 200	—	—	—	**N318**	**NF318**	103	—	—	—	127	177	177	169	2.5	2.5	(5.27)
	190	43	3	3	113.5	—	395	355	50.6	3 100	4 100	**NU318R**	**NJ318R**	**NUP318R**	—	—	103	103	111	117	127	177	—	—	2.5	2.5	5.47
	190	64	3	3	115	—	408	395	55.5	2 800	4 200	**NU2318**	**NJ2318**	**NUP2318**	—	—	103	103	111	117	127	177	—	—	2.5	2.5	7.90
	190	64	3	3	113.5	—	544	534	74.5	2 800	4 100	**NU2318R**	**NJ2318R**	**NUP2318R**	—	—	103	103	111	117	127	177	—	—	2.5	2.5	8.12
	190	73	3	3	115	—	535	559	75.6	2 800	4 200	**NU3318**	—	—	—	—	103	103	111	117	—	177	—	—	2.5	2.5	10.3
	225	54	4	4	123.5	191.5	468	400	55.1	2 800	3 700	**NU418**	**NJ418**	**NUP418**	**N418**	**NF418**	106	106	122	125	139	209	209	194	3	3	10.3
95	145	24	1.5	1.1	108	—	110	115	15.2	4 500	5 300	**NU1019**	—	**NUP1019**	—	—	103	101.5	106	111	—	137	—	—	1.5	1	1.40
	170	32	2.1	2.1	—	151.5	207	195	25.1	3 700	4 400	—	—	—	**N219**	**NF219**	106	—	—	—	123	159	159	155	2	2	(2.80)
	170	32	2.1	2.1	112.5	—	275	265	38.3	3 700	4 400	**NU219R**	**NJ219R**	**NUP219R**	—	—	106	106	111	116	123	159	—	—	2	2	2.92
	170	43	2.1	2.1	113.5	—	288	298	42.9	3 300	4 400	**NU2219**	**NJ2219**	**NUP2219**	—	—	106	106	111	116	123	159	—	—	2	2	3.85
	170	43	2.1	2.1	112.5	—	358	371	52.8	3 300	4 400	**NU2219R**	**NJ2219R**	**NUP2219R**	—	—	106	106	111	116	123	159	—	—	2	2	3.93
	170	55.6	2.1	2.1	113.5	—	371	412	57.2	3 000	4 400	**NU3219**	—	—	—	—	106	106	111	116	—	159	—	—	2	2	5.42
	200	45	3	3	—	173.5	323	311	41.3	3 000	4 000	—	—	—	**N319**	**NF319**	108	—	—	—	134	187	187	178	2.5	2.5	(6.10)
	200	45	3	3	121.5	—	418	387	54.3	2 900	3 900	**NU319R**	**NJ319R**	**NUP319R**	—	—	108	108	119	124	134	187	—	—	2.5	2.5	6.42
	200	67	3	3	121.5	—	465	496	62.6	2 600	4 000	**NU2319**	**NJ2319**	**NUP2319**	—	—	108	108	119	124	134	187	—	—	2.5	2.5	9.39
	200	77.8	3	3	121.5	—	609	654	86.8	2 600	4 000	**NU3319**	—	—	—	—	108	108	119	124	—	187	—	—	2.5	2.5	12.1
	240	55	4	4	133.5	201.5	502	444	60.1	2 600	3 400	**NU419**	**NJ419**	**NUP419**	**N419**	**NF419**	111	111	132	136	149	224	224	204	3	3	13.6
100	150	24	1.5	1.1	113	—	114	120	15.8	4 300	5 100	**NU1020**	—	**NUP1020**	—	—	108	106.5	111	116	—	142	—	—	1.5	1	1.46
	180	34	2.1	2.1	—	160	229	217	28.1	3 500	4 200	—	—	—	**N220**	**NF220**	111	—	—	—	130	169	169	164	2	2	(3.38)
	180	34	2.1	2.1	119	—	312	306	43.0	3 500	4 200	**NU220R**	**NJ220R**	**NUP220R**	—	—	111	111	117	122	130	169	—	—	2	2	3.52
	180	46	2.1	2.1	120	—	322	338	47.3	3 100	4 200	**NU2220**	**NJ2220**	**NUP2220**	—	—	111	111	117	122	130	169	—	—	2	2	4.67
	180	46	2.1	2.1	119	—	417	444	60.7	3 100	4 200	**NU2220R**	**NJ2220R**	**NUP2220R**	—	—	111	111	117	122	130	169	—	—	2	2	4.82

[Remarks] 1) Standard cage types used for the above bearings are shown in Table 1 earlier in this section. Please note that basic load ratings and limiting speeds shown above indicate the value applicable to machined cage. Consult JTEKT about bearings with pressed cage, since they may be different from bearings with machined cage in values above.

2) Bearing numbers of NU and NJ type bearings with mounted thrust collar (refer to specification table shown after this specification table) are NUJ and NH.

d (100) ~ (120) mm



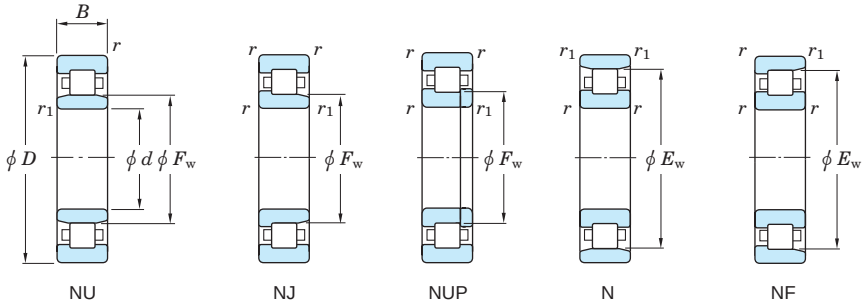


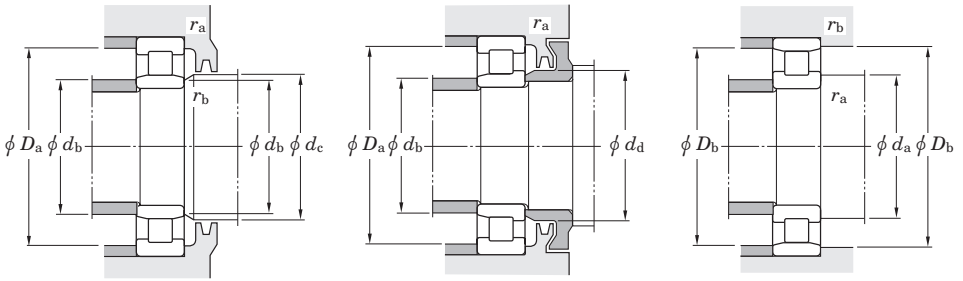
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.					Mounting dimensions (mm)										(Refer.) Mass
d	D	B	r min.	r_1 min.	F_w	E_w	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	NU	NJ	NUP	N	NF	d_a min.	d_b min.	d_b max.	d_c min.	d_d min.	D_a max.	D_b max.	D_b min.	r_a max.	r_b max.	NU (N) (kg)
100	180	60.3	2.1	2.1	120	—	409	459	61.9	2 800	4 200	**NU3220**	—	—	—	—	111	111	117	122	—	169	—	—	2	2	6.62
	215	47	3	3	—	185.5	373	337	47.2	2 800	3 700	—	—	—	**N320**	**NF320**	113	—	—	—	143	202	202	190	2.5	2.5	(7.59)
	215	47	3	3	127.5	—	474	424	58.7	2 700	3 600	**NU320R**	**NJ320R**	**NUP320R**	—	—	113	113	125	132	143	202	—	—	2.5	2.5	7.75
	215	73	3	3	129.5	—	513	548	68.4	2 500	3 700	**NU2320**	**NJ2320**	**NUP2320**	—	—	113	113	125	132	143	202	—	—	2.5	2.5	11.9
	215	73	3	3	127.5	—	713	717	94.7	2 400	3 600	**NU2320R**	**NJ2320R**	**NUP2320R**	—	—	113	113	125	132	143	202	—	—	2.5	2.5	12.1
	215	82.6	3	3	129.5	—	663	706	93.2	2 500	3 700	**NU3320**	—	—	—	—	113	113	125	132	—	202	—	—	2.5	2.5	15.0
	250	58	4	4	139	211	560	498	67.3	2 500	3 300	**NU420**	**NJ420**	**NUP420**	**N420**	**NF420**	116	116	137	141	156	234	234	213	3	3	14.0
105	160	26	2	1.1	119.5	—	136	149	19.6	4 100	4 800	**NU1021**	—	**NUP1021**	—	—	114	111.5	118	122	—	151	—	—	2	1	1.85
	190	36	2.1	2.1	—	168.8	251	241	34.1	3 300	3 900	—	—	—	**N221**	**NF221**	116	—	—	—	137	179	179	173	2	2	(4.44)
	190	65.1	2.1	2.1	126.8	—	431	482	64.3	2 600	3 900	**NU3221**	—	—	—	—	116	116	124	129	—	179	—	—	2	2	8.00
	225	49	3	3	—	195	426	417	53.1	2 600	3 500	—	—	—	**N321**	**NF321**	118	—	—	—	149	212	212	199	2.5	2.5	(8.68)
	225	77	3	3	135	—	711	750	97.3	2 300	3 500	**NU2321**	—	**NUP2321**	—	—	118	118	131	138	—	212	—	—	2.5	2.5	15.6
	225	87.3	3	3	135	—	799	871	113	2 300	3 500	**NU3321**	—	—	—	—	118	118	132	137	—	212	—	—	2.5	2.5	17.4
	260	60	4	4	144.5	220.5	581	510	67.6	2 400	3 100	**NU421**	**NJ421**	**NUP421**	**N421**	**NF421**	121	121	143	147	162	244	244	223	3	3	19.1
110	170	28	2	1.1	125	—	168	171	21.7	3 800	4 500	**NU1022**	—	**NUP1022**	—	—	119	116.5	124	128	—	161	—	—	2	1	2.31
	200	38	2.1	2.1	—	178.5	300	290	40.1	3 100	3 700	—	—	—	**N222**	**NF222**	121	—	—	—	144	189	189	182	2	2	(5.24)
	200	38	2.1	2.1	132.5	—	366	365	51.1	3 100	3 700	**NU222R**	**NJ222R**	**NUP222R**	—	—	121	121	130	135	144	189	—	—	2	2	4.90
	200	53	2.1	2.1	132.5	—	397	442	55.1	2 800	3 700	**NU2222**	**NJ2222**	**NUP2222**	—	—	121	121	130	135	144	189	—	—	2	2	6.93
	200	53	2.1	2.1	132.5	—	479	517	69.9	2 800	3 700	**NU2222R**	**NJ2222R**	**NUP2222R**	—	—	121	121	130	135	144	189	—	—	2	2	6.93
	200	69.8	2.1	2.1	132.5	—	533	607	80.6	2 500	3 700	**NU3222**	—	—	—	—	121	121	130	135	—	189	—	—	2	2	9.55
	240	50	3	3	—	207	475	467	58.4	2 500	3 300	—	—	—	**N322**	**NF322**	123	—	—	—	158	227	227	211	2.5	2.5	(10.4)
	240	50	3	3	143	—	564	525	70.0	2 400	3 200	**NU322R**	**NJ322R**	**NUP322R**	—	—	123	123	140	145	158	227	—	—	2.5	2.5	10.7
	240	80	3	3	143	—	755	789	102	2 200	3 300	**NU2322**	**NJ2322**	**NUP2322**	—	—	123	123	140	145	158	227	—	—	2.5	2.5	18.8
	240	80	3	3	143	—	843	880	112	2 200	3 200	**NU2322R**	**NJ2322R**	**NUP2322R**	—	—	123	123	140	145	158	227	—	—	2.5	2.5	18.8
	240	92.1	3	3	143	—	849	918	118	2 200	3 300	**NU3322**	—	—	—	—	123	123	140	145	—	227	—	—	2.5	2.5	21.1
	280	65	4	4	155	235	685	621	80.8	2 200	2 900	**NU422**	**NJ422**	**NUP422**	**N422**	**NF422**	126	126	153	157	173	264	264	237	3	3	19.9
120	180	28	2	1.1	135	—	173	181	22.6	3 500	4 200	**NU1024**	—	**NUP1024**	—	—	129	126.5	134	138	—	171	—	—	2	1	2.47

[Remarks] 1) Standard cage types used for the above bearings are shown in Table 1 earlier in this section. Please note that basic load ratings and limiting speeds shown above indicate the value applicable to machined cage. Consult JTEKT about bearings with pressed cage, since they may be different from bearings with machined cage in values above.

2) Bearing numbers of NU and NJ type bearings with mounted thrust collar (refer to specification table shown after this specification table) are NUJ and NH.

d (120) ~ (140) mm



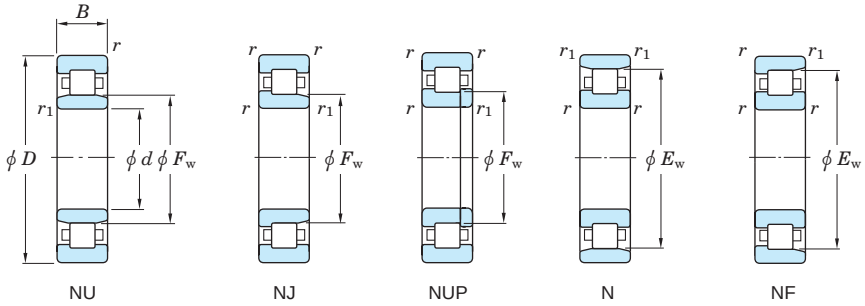


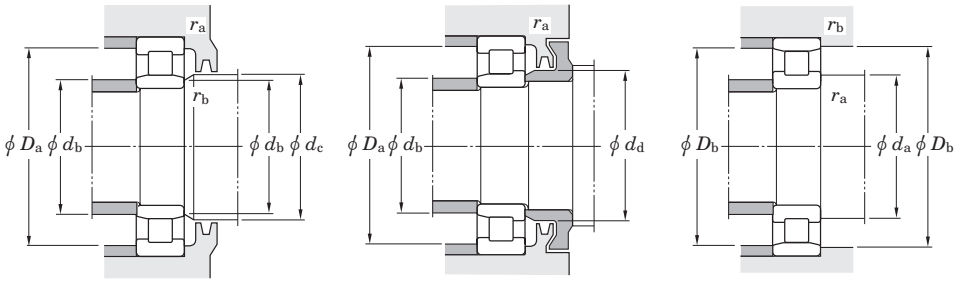
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.					Mounting dimensions (mm)										(Refer.) Mass
d	D	B	r min.	r_1 min.	F_w	E_w	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	NU	NJ	NUP	N	NF	d_a min.	d_b min.	d_b max.	d_c min.	d_d min.	D_a max.	D_b max.	D_b min.	r_a max.	r_b max.	NU (N) (kg)
120	215	40	2.1	2.1	—	191.5	325	318	42.9	2 900	3 400	—	—	—	**N224**	**NF224**	131	—	—	—	156	204	204	196	2	2	(6.31)
	215	40	2.1	2.1	143.5	—	419	421	57.6	2 800	3 400	**NU224R**	**NJ224R**	**NUP224R**	—	—	131	131	141	146	156	204	—	—	2	2	5.85
	215	58	2.1	2.1	143.5	—	434	492	61.2	2 600	3 400	**NU2224**	**NJ2224**	**NUP2224**	—	—	131	131	141	146	156	204	—	—	2	2	8.56
	215	58	2.1	2.1	143.5	—	565	619	80.9	2 600	3 400	**NU2224R**	**NJ2224R**	**NUP2224R**	—	—	131	131	141	146	156	204	—	—	2	2	8.56
	215	76	2.1	2.1	143.5	—	596	695	89.2	2 300	3 400	**NU3224**	—	—	—	—	131	131	141	146	—	204	—	—	2	2	11.9
	260	55	3	3	—	226	561	551	67.1	2 200	3 000	—	—	—	**N324**	**NF324**	133	—	—	—	171	247	247	230	2.5	2.5	(13.1)
	260	55	3	3	154	—	660	610	79.8	2 200	3 000	**NU324R**	**NJ324R**	**NUP324R**	—	—	133	133	151	156	171	247	—	—	2.5	2.5	13.4
	260	86	3	3	154	—	886	918	116	2 000	3 000	**NU2324**	**NJ2324**	**NUP2324**	—	—	133	133	151	156	171	247	—	—	2.5	2.5	23.1
	260	86	3	3	154	—	991	1 030	129	2 000	3 000	**NU2324R**	**NJ2324R**	**NUP2324R**	—	—	133	133	151	156	172	247	—	—	2.5	2.5	23.1
	260	106	3	3	154	—	1 030	1 120	139	2 000	3 000	**NU3324**	—	—	—	—	133	133	151	156	—	247	—	—	2.5	2.5	28.3
	310	72	5	5	170	260	841	770	98.7	1 900	2 600	**NU424**	**NJ424**	**NUP424**	**N424**	**NF424**	140	140	168	172	190	290	290	262	4	4	28.0
130	200	33	2	1.1	148	—	215	238	29.5	3 200	3 800	**NU1026**	—	**NUP1026**	—	—	139	136.5	146	151	—	191	—	—	2	1	3.77
	230	40	3	3	—	204	338	362	45.2	2 700	3 200	—	—	—	**N226**	**NF226**	143	—	—	—	168	217	217	208	2.5	2.5	(7.21)
	230	40	3	3	153.5	—	454	453	61.0	2 600	3 200	**NU226R**	**NJ226R**	**NUP226R**	—	—	143	143	151	158	168	217	—	—	2.5	2.5	6.60
	230	64	3	3	156	—	474	560	68.7	2 400	3 200	**NU2226**	**NJ2226**	**NUP2226**	—	—	143	143	151	158	168	217	—	—	2.5	2.5	11.2
	230	64	3	3	153.5	—	662	737	95.8	2 400	3 200	**NU2226R**	**NJ2226R**	**NUP2226R**	—	—	143	143	151	158	168	217	—	—	2.5	2.5	11.2
	230	80	3	3	156	—	689	857	107	2 100	3 200	**NU3226**	—	—	—	—	143	143	151	158	—	217	—	—	2.5	2.5	14.1
	280	58	4	4	—	243	699	667	85.7	2 100	2 700	—	—	—	**N326**	**NF326**	146	—	—	—	184	264	264	247	3	3	(16.4)
	280	58	4	4	167	—	771	736	94.1	2 000	2 700	**NU326R**	**NJ326R**	**NUP326R**	—	—	146	146	164	169	184	264	—	—	3	3	16.7
	280	93	4	4	167	—	1 050	1 130	138	1 800	2 700	**NU2326**	**NJ2326**	**NUP2326**	—	—	146	146	164	169	184	264	—	—	3	3	29.1
	280	93	4	4	167	—	1 150	1 230	150	1 800	2 700	**NU2326R**	**NJ2326R**	**NUP2326R**	—	—	146	146	164	169	186	264	—	—	3	3	29.1
	280	112	4	4	167	—	1 170	1 290	158	1 800	2 700	**NU3326**	—	—	—	—	146	146	164	169	—	264	—	—	3	3	34.6
	340	78	5	5	185	285	964	876	108	1 800	2 300	**NU426**	**NJ426**	**NUP426**	**N426**	**NF426**	150	150	183	187	208	320	320	287	4	4	36.1
140	210	33	2	1.1	158	—	220	250	30.5	3 000	3 600	**NU1028**	—	**NUP1028**	—	—	149	146.5	156	161	—	201	—	—	2	1	4.00
	250	42	3	3	—	221	406	421	55.5	2 400	2 900	—	—	—	**N228**	**NF228**	153	—	—	—	182	237	237	228	2.5	2.5	(8.78)
	250	42	3	3	169	—	491	514	67.5	2 400	2 900	**NU228R**	**NJ228R**	**NUP228R**	—	—	153	153	166	171	182	237	—	—	2.5	2.5	8.50
	250	68	3	3	169	—	583	671	84.3	2 200	2 900	**NU2228**	**NJ2228**	**NUP2228**	—	—	153	153	166	171	182	237	—	—	2.5	2.5	14.3
	250	68	3	3	169	—	716	835	106	2 200	2 900	**NU2228R**	**NJ2228R**	**NUP2228R**	—	—	153	153	166	171	182	237	—	—	2.5	2.5	14.3

[Remarks] 1) Standard cage types used for the above bearings are shown in Table 1 earlier in this section. Please note that basic load ratings and limiting speeds shown above indicate the value applicable to machined cage. Consult JTEKT about bearings with pressed cage, since they may be different from bearings with machined cage in values above.

2) Bearing numbers of NU and NJ type bearings with mounted thrust collar (refer to specification table shown after this specification table) are NUJ and NH.

d (140) ~ (160) mm



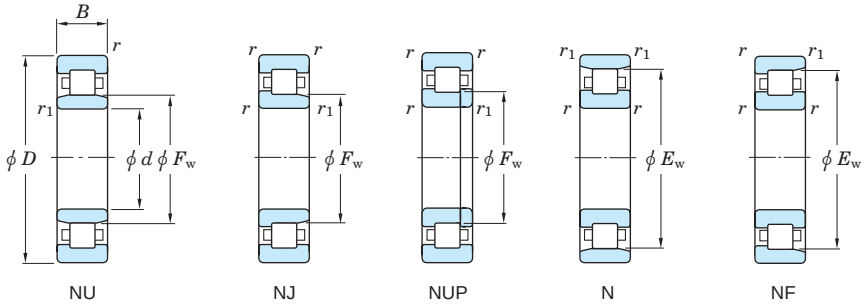


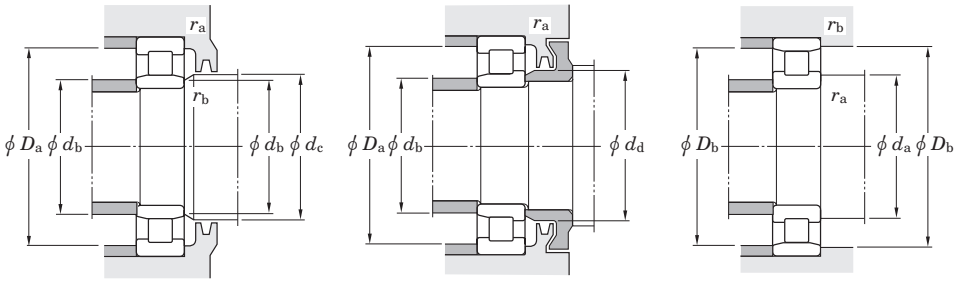
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.					Mounting dimensions (mm)										(Refer.) Mass
d	D	B	r min.	r_1 min.	F_w	E_w	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	NU	NJ	NUP	N	NF	d_a min.	d_b min.	d_b max.	d_c min.	d_d min.	D_a max.	D_b max.	D_b min.	r_a max.	r_b max.	NU (N) (kg)
140	250	88	3	3	169	—	757	939	114	1 900	2 900	**NU3228**	—	—	—	—	153	153	166	171	—	237	—	—	2.5	2.5	18.5
	300	62	4	4	—	260	771	746	93.8	1 900	2 500	—	—	—	**N328**	**NF328**	156	—	—	—	198	284	284	264	3	3	(21.8)
	300	62	4	4	180	—	829	797	99.4	1 900	2 500	**NU328R**	**NJ328R**	**NUP328R**	—	—	156	156	176	182	198	284	—	—	3	3	21.8
	300	102	4	4	180	—	1 150	1 250	150	1 700	2 500	**NU2328**	**NJ2328**	**NUP2328**	—	—	156	156	176	182	198	284	—	—	3	3	36.8
	300	102	4	4	180	—	1 270	1 380	167	1 700	2 500	**NU2328R**	**NJ2328R**	**NUP2328R**	—	—	156	156	176	182	200	284	—	—	3	3	36.8
	300	118	4	4	180	—	1 360	1 550	185	1 700	2 500	**NU3328**	—	—	—	—	156	156	176	182	—	284	—	—	3	3	41.5
	360	82	5	5	198	302	1 090	1 020	124	1 600	2 200	**NU428**	**NJ428**	**NUP428**	**N428**	**NF428**	160	160	195	200	222	340	340	304	4	4	46.8
150	225	35	2.1	1.5	169.5	—	252	281	32.8	2 800	3 300	**NU1030**	—	**NUP1030**	—	—	161	158	167	173	—	214	—	—	2	1.5	4.83
	270	45	3	3	—	238	468	492	63.4	2 200	2 700	—	—	—	**N230**	**NF230**	163	—	—	—	196	257	257	245	2.5	2.5	(11.1)
	270	45	3	3	182	—	560	594	75.8	2 200	2 600	**NU230R**	**NJ230R**	**NUP230R**	—	—	163	163	179	184	196	257	—	—	2.5	2.5	10.7
	270	73	3	3	182	—	683	800	99.7	2 000	2 700	**NU2230**	**NJ2230**	**NUP2230**	—	—	163	163	179	184	196	257	—	—	2.5	2.5	18.7
	270	73	3	3	182	—	828	982	120	2 000	2 600	**NU2230R**	**NJ2230R**	**NUP2230R**	—	—	163	163	179	184	196	257	—	—	2.5	2.5	18.7
	270	96	3	3	182	—	939	1 200	143	1 800	2 700	**NU3230**	—	—	—	—	163	163	179	184	—	257	—	—	2.5	2.5	23.7
	320	65	4	4	—	277	829	807	99.1	1 800	2 300	—	—	—	**N330**	**NF330**	166	—	—	—	213	304	304	281	3	3	(25.6)
	320	65	4	4	193	—	948	922	115	1 700	2 300	**NU330R**	**NJ330R**	**NUP330R**	—	—	166	166	190	195	213	304	—	—	3	3	27.0
	320	108	4	4	193	—	1 270	1 400	167	1 600	2 300	**NU2330**	**NJ2330**	**NUP2330**	—	—	166	166	190	195	213	304	—	—	3	3	44.7
	320	108	4	4	193	—	1 450	1 600	187	1 500	2 300	**NU2330R**	**NJ2330R**	**NUP2330R**	—	—	166	166	190	195	213	304	—	—	3	3	44.7
	320	128	4	4	193	—	1 610	1 890	217	1 600	2 300	**NU3330**	—	—	—	—	166	166	190	195	—	304	—	—	3	3	51.4
	380	85	5	5	213	317	1 160	1 120	134	1 500	2 000	**NU430**	**NJ430**	**NUP430**	**N430**	**NF430**	170	170	210	216	237	360	360	319	4	4	53.3
160	240	38	2.1	1.5	180	—	297	330	42.8	2 600	3 000	**NU1032**	—	**NUP1032**	—	—	171	168	178	184	—	229	—	—	2	1.5	5.93
	290	48	3	3	—	255	535	568	71.3	2 100	2 500	—	—	—	**N232**	**NF232**	173	—	—	—	210	277	277	262	2.5	2.5	(13.9)
	290	48	3	3	195	—	624	666	83.3	2 000	2 400	**NU232R**	**NJ232R**	**NUP232R**	—	—	173	173	192	197	210	277	—	—	2.5	2.5	14.8
	290	80	3	3	195	—	790	939	113	1 800	2 500	**NU2232**	**NJ2232**	**NUP2232**	—	—	173	173	192	197	210	277	—	—	2.5	2.5	23.6
	290	80	3	3	193	—	1 010	1 190	141	1 800	2 400	**NU2232R**	**NJ2232R**	**NUP2232R**	—	—	173	173	192	197	210	277	—	—	2.5	2.5	23.6
	290	104	3	3	195	—	1 070	1 390	163	1 600	2 500	**NU3232**	—	—	—	—	173	173	192	197	—	277	—	—	2.5	2.5	29.8
	340	68	4	4	—	292	872	876	106	1 600	2 200	—	—	—	**N332**	**NF332**	176	—	—	—	228	324	324	296	3	3	(30.2)
	340	68	4	4	204	—	1 070	1 050	128	1 600	2 100	**NU332R**	**NJ332R**	**NUP332R**	—	—	176	176	200	211	228	324	—	—	3	3	32.0

[Remarks] 1) Standard cage types used for the above bearings are shown in Table 1 earlier in this section. Please note that basic load ratings and limiting speeds shown above indicate the value applicable to machined cage. Consult JTEKT about bearings with pressed cage, since they may be different from bearings with machined cage in values above.

2) Bearing numbers of NU and NJ type bearings with mounted thrust collar (refer to specification table shown after this specification table) are NUJ and NH.

d (160) ~ (190) mm



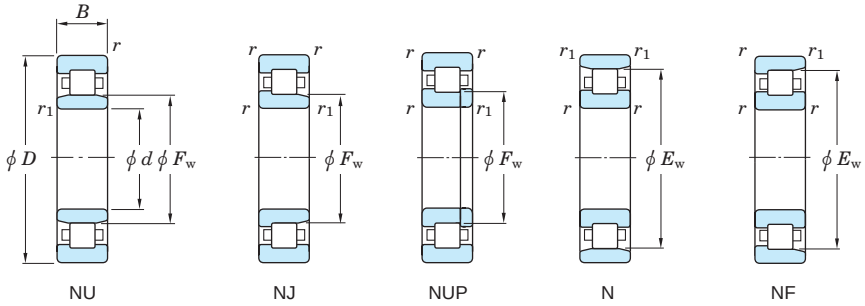


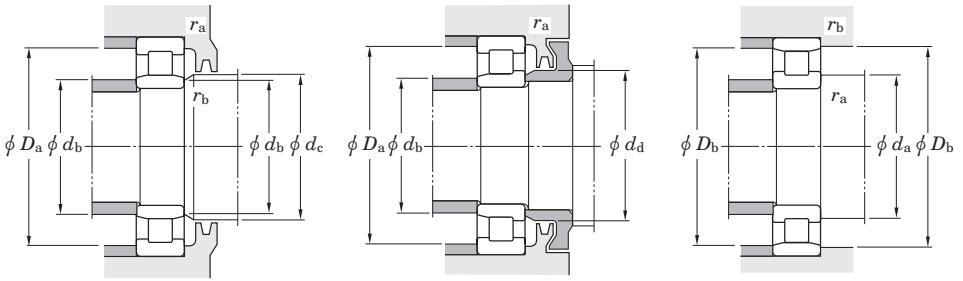
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.					Mounting dimensions (mm)										(Refer.) Mass
d	D	B	r min.	r_1 min.	F_w	E_w	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	NU	NJ	NUP	N	NF	d_a min.	d_b min.	d_b max.	d_c min.	d_d min.	D_a max.	D_b max.	D_b min.	r_a max.	r_b max.	NU (N) (kg)
160	340	114	4	4	208	—	1 340	1 520	178	1 400	2 200	**NU2332**	**NJ2332**	**NUP2332**	—	—	176	176	200	211	228	324	—	—	3	3	53.1
	340	114	4	4	204	—	1 640	1 820	212	1 400	2 100	**NU2332R**	**NJ2332R**	**NUP2332R**	—	—	176	176	200	211	228	324	—	—	3	3	53.1
	340	136	4	4	208	—	1 590	1 890	216	1 400	2 200	**NU3332**	—	—	—	—	176	176	200	211	—	324	—	—	3	3	61.5
170	260	42	2.1	2.1	193	—	347	400	50.5	2 400	2 800	**NU1034**	—	**NUP1034**	—	—	181	181	190	197	—	249	—	—	2	2	7.90
	310	52	4	4	—	272	596	637	78.4	1 900	2 300	—	—	—	**N234**	**NF234**	186	—	—	—	223	294	294	280	3	3	(17.2)
	310	52	4	4	207	—	754	802	98.7	1 900	2 200	**NU234R**	**NJ234R**	**NUP234R**	—	—	186	186	204	211	223	294	—	—	3	3	18.6
	310	86	4	4	208	—	896	1 080	127	1 700	2 300	**NU2234**	**NJ2234**	**NUP2234**	—	—	186	186	204	211	223	294	—	—	3	3	29.2
	310	86	4	4	205	—	1 210	1 410	166	1 700	2 200	**NU2234R**	**NJ2234R**	**NUP2234R**	—	—	186	186	204	211	223	294	—	—	3	3	29.2
	310	110	4	4	208	—	1 210	1 580	181	1 500	2 300	**NU3234**	—	—	—	—	186	186	204	211	—	294	—	—	3	3	36.2
	360	72	4	4	220	310	997	1 010	122	1 500	2 000	**NU334**	**NJ334**	**NUP334**	**N334**	**NF334**	186	186	216	223	241	344	344	314	3	3	38.6
	360	120	4	4	220	—	1 530	1 750	199	1 300	2 000	**NU2334**	**NJ2334**	**NUP2334**	—	—	186	186	216	223	241	344	—	—	3	3	62.6
	360	140	4	4	220	—	1 770	2 120	240	1 300	2 000	**NU3334**	—	—	—	—	186	186	216	223	—	344	—	—	3	3	70.8
180	280	46	2.1	2.1	205	—	447	503	63.2	2 200	2 600	**NU1036**	—	**NUP1036**	—	—	191	191	203	209	—	269	—	—	2	2	10.5
	320	52	4	4	—	282	618	677	82.2	1 800	2 200	—	—	—	**N236**	**NF236**	196	—	—	—	233	304	304	290	3	3	(18.0)
	320	52	4	4	217	—	783	852	104	1 800	2 100	**NU236R**	**NJ236R**	**NUP236R**	—	—	196	196	214	221	233	304	—	—	3	3	19.3
	320	86	4	4	218	—	929	1 140	133	1 600	2 200	**NU2236**	**NJ2236**	**NUP2236**	—	—	196	196	214	221	233	304	—	—	3	3	30.4
	320	86	4	4	215	—	1 260	1 510	175	1 600	2 100	**NU2236R**	**NJ2236R**	**NUP2236R**	—	—	196	196	214	221	233	304	—	—	3	3	30.4
	320	112	4	4	218	—	1 250	1 680	190	1 400	2 200	**NU3236**	—	—	—	—	196	196	214	221	—	304	—	—	3	3	38.4
	380	75	4	4	232	328	1 130	1 150	136	1 400	1 900	**NU336**	**NJ336**	**NUP336**	**N336**	**NF336**	196	196	227	235	255	364	364	332	3	3	42.6
	380	126	4	4	232	—	1 690	1 940	220	1 300	1 900	**NU2336**	**NJ2336**	**NUP2336**	—	—	196	196	227	235	255	364	—	—	3	3	73.0
	380	150	4	4	232	—	2 070	2 520	276	1 300	1 900	**NU3336**	—	—	—	—	196	196	227	235	—	364	—	—	3	3	84.4
190	290	46	2.1	2.1	215	—	460	530	65.7	2 100	2 500	**NU1038**	—	**NUP1038**	—	—	201	201	213	219	—	279	—	—	2	2	10.9
	340	55	4	4	—	299	694	768	91.3	1 700	2 000	—	—	—	**N238**	**NF238**	206	—	—	—	247	324	324	310	3	3	(21.5)
	340	55	4	4	230	—	869	954	114	1 700	2 000	**NU238R**	**NJ238R**	**NUP238R**	—	—	206	206	227	234	247	324	—	—	3	3	23.3
	340	92	4	4	231	—	1 040	1 290	146	1 500	2 000	**NU2238**	**NJ2238**	**NUP2238**	—	—	206	206	227	234	247	324	—	—	3	3	37.0
	340	92	4	4	228	—	1 380	1 670	189	1 500	2 000	**NU2238R**	**NJ2238R**	**NUP2238R**	—	—	206	206	227	234	247	324	—	—	3	3	37.0
	340	120	4	4	231	—	1 420	1 930	226	1 300	2 000	**NU3238**	—	—	—	—	206	206	227	234	—	324	—	—	3	3	46.8

[Remarks] 1) Standard cage types used for the above bearings are shown in Table 1 earlier in this section. Please note that basic load ratings and limiting speeds shown above indicate the value applicable to machined cage. Consult JTEKT about bearings with pressed cage, since they may be different from bearings with machined cage in values above.

2) Bearing numbers of NU and NJ type bearings with mounted thrust collar (refer to specification table shown after this specification table) are NUJ and NH.

d (190) ~ 240 mm

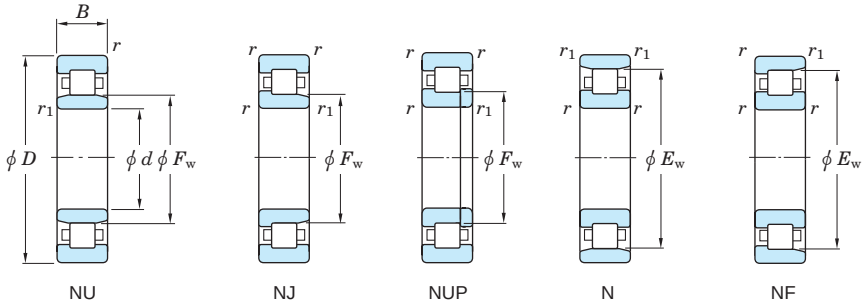


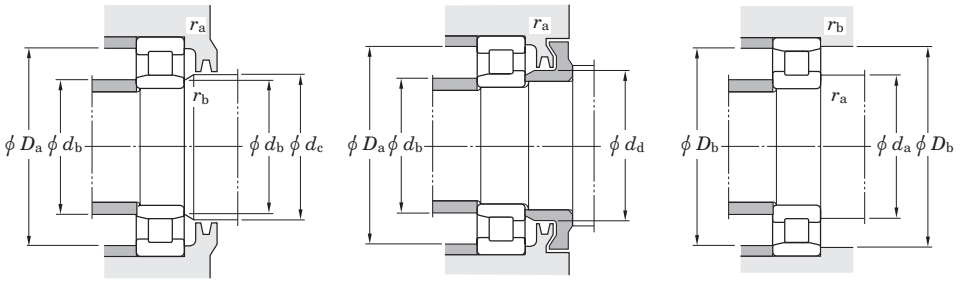


Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.					Mounting dimensions (mm)										(Refer.) Mass
d	D	B	r min.	r_1 min.	F_w	E_w	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	NU	NJ	NUP	N	NF	d_a min.	d_b min.	d_b max.	d_c min.	d_d min.	D_a max.	D_b max.	D_b min.	r_a max.	r_b max.	NU (N) (kg)
190	400	78	5	5	245	345	1 220	1 260	146	1 300	1 800	**NU338**	**NJ338**	**NUP338**	**N338**	**NF338**	210	210	240	248	268	380	380	349	4	4	49.9
	400	132	5	5	245	—	1 900	2 220	245	1 200	1 800	**NU2338**	**NJ2338**	**NUP2338**	—	—	210	210	240	248	268	380	—	—	4	4	84.7
	400	155	5	5	245	—	2 340	2 910	316	1 200	1 800	**NU3338**	—	—	—	—	210	210	240	248	—	380	—	—	4	4	96.5
200	310	51	2.1	2.1	229	—	487	582	71.0	1 900	2 300	**NU1040**	—	**NUP1040**	—	—	211	211	226	233	—	299	—	—	2	2	14.1
	360	58	4	4	—	316	775	865	102	1 600	1 900	—	—	—	**N240**	**NF240**	216	—	—	—	261	344	344	328	3	3	(25.7)
	360	58	4	4	243	—	958	1 060	124	1 600	1 900	**NU240R**	**NJ240R**	**NUP240R**	—	—	216	216	240	247	261	344	—	—	3	3	27.2
	360	98	4	4	244	—	1 190	1 490	169	1 400	1 900	**NU2240**	**NJ2240**	**NUP2240**	—	—	216	216	240	247	261	344	—	—	3	3	44.4
	360	98	4	4	241	—	1 530	1 870	211	1 400	1 900	**NU2240R**	**NJ2240R**	**NUP2240R**	—	—	216	216	240	247	261	344	—	—	3	3	44.4
	360	128	4	4	244	—	1 500	2 020	223	1 300	1 900	**NU3240**	—	—	—	—	216	216	240	247	—	344	—	—	3	3	56.2
	420	80	5	5	260	360	1 220	1 270	145	1 200	1 700	**NU340**	**NJ340**	**NUP340**	**N340**	**NF340**	220	220	254	263	283	400	400	364	4	4	56.2
	420	138	5	5	260	—	1 890	2 240	244	1 100	1 700	**NU2340**	**NJ2340**	**NUP2340**	—	—	220	220	254	263	283	400	—	—	4	4	97.4
	420	165	5	5	260	—	2 330	2 930	314	1 100	1 700	**NU3340**	—	—	—	—	220	220	250	258	—	400	—	—	4	4	113
220	340	56	3	3	250	—	637	748	88.1	1 700	2 000	**NU1044**	—	**NUP1044**	—	—	233	233	248	254	—	327	—	—	2.5	2.5	18.5
	400	65	4	4	270	350	949	1 080	123	1 400	1 700	**NU244**	**NJ244**	**NUP244**	**N244**	**NF244**	236	236	266	273	289	384	384	362	3	3	38.5
	400	108	4	4	270	—	1 420	1 810	196	1 200	1 700	**NU2244**	**NJ2244**	—	—	—	236	236	266	273	289	384	—	—	3	3	60.9
	400	144	4	4	270	—	2 040	2 880	319	1 100	1 700	**NU3244**	—	—	—	—	236	236	266	273	—	384	—	—	3	3	78.8
	460	88	5	5	284	396	1 490	1 570	176	1 100	1 500	**NU344**	**NJ344**	**NUP344**	**N344**	**NF344**	240	240	279	287	309	440	440	400	4	4	74.4
	460	145	5	5	284	—	2 260	2 690	287	990	1 500	**NU2344**	—	**NUP2344**	—	—	240	240	276	287	—	440	—	—	4	4	119
	460	180	5	5	284	—	2 660	3 300	347	990	1 500	**NU3344**	—	—	—	—	240	240	279	287	—	440	—	—	4	4	148
240	360	56	3	3	270	—	673	822	95.0	1 600	1 900	**NU1048**	—	**NUP1048**	—	—	253	253	268	275	—	347	—	—	2.5	2.5	20.1
	440	72	4	4	295	385	1 170	1 340	150	1 200	1 500	**NU248**	**NJ248**	**NUP248**	**N248**	**NF248**	256	256	293	298	316	424	424	397	3	3	52.1
	440	120	4	4	295	—	1 790	2 320	246	1 100	1 500	**NU2248**	**NJ2248**	—	—	—	256	256	293	298	316	424	—	—	3	3	82.5
	440	160	4	4	295	—	2 450	3 460	358	990	1 500	**NU3248**	—	—	—	—	256	256	293	298	—	424	—	—	3	3	107
	500	95	5	5	310	430	1 790	1 950	211	990	1 300	**NU348**	**NJ348**	**NUP348**	**N348**	**NF348**	260	260	305	313	337	480	480	434	4	4	94.6
	500	155	5	5	310	—	2 710	3 320	346	880	1 300	**NU2348**	—	**NUP2348**	—	—	260	260	303	313	—	480	—	—	4	4	152
	500	195	5	5	310	—	3 170	4 070	414	880	1 300	**NU3348**	—	—	—	—	260	260	305	313	—	480	—	—	4	4	189

[Remarks] 1) Standard cage types used for the above bearings are shown in Table 1 earlier in this section. Please note that basic load ratings and limiting speeds shown above indicate the value applicable to machined cage. Consult JTEKT about bearings with pressed cage, since they may be different from bearings with machined cage in values above.

2) Bearing numbers of NU and NJ type bearings with mounted thrust collar (refer to specification table shown after this specification table) are NUJ and NH.



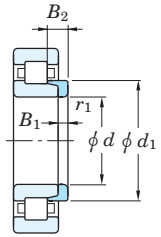


Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.					Mounting dimensions (mm)										(Refer.) Mass
d	D	B	r min.	r_1 min.	F_w	E_w	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	NU	NJ	NUP	N	NF	d_a min.	d_b min.	d_b max.	d_c min.	d_d min.	D_a max.	D_b max.	D_b min.	r_a max.	r_b max.	NU (N) (kg)
260	400	65	4	4	296	—	819	979	110	1 400	1 700	**NU1052**	—	**NUP1052**	—	—	276	276	292	300	—	384	—	—	3	3	29.2
	480	80	5	5	320	420	1 380	1 580	171	1 100	1 300	**NU252**	**NJ252**	**NUP252**	**N252**	**NF252**	280	280	318	323	343	460	460	432	4	4	69.0
	480	130	5	5	320	—	2 240	2 950	305	990	1 300	**NU2252**	**NJ2252**	—	—	—	280	280	318	323	343	460	—	—	4	4	107
	480	174	5	5	320	—	2 680	3 680	373	880	1 300	**NU3252**	—	—	—	—	280	280	318	323	—	460	—	—	4	4	139
	540	165	6	6	336	—	3 030	3 750	385	790	1 200	**NU2352**	—	**NUP2352**	—	—	284	284	327	339	—	516	—	—	5	5	185
	540	206	6	6	336	—	3 670	4 790	473	790	1 200	**NU3352**	—	—	—	—	284	284	330	339	—	516	—	—	5	5	232
280	420	65	4	4	316	—	841	1 030	114	1 300	1 500	**NU1056**	—	**NUP1056**	—	—	296	296	313	320	—	404	—	—	3	3	35.2
	500	80	5	5	340	440	1 430	1 680	179	1 000	1 200	**NU256**	**NJ256**	**NUP256**	**N256**	**NF256**	300	300	336	343	365	480	480	452	4	4	72.7
300	460	74	4	4	340	—	1 120	1 380	147	1 200	1 400	**NU1060**	—	**NUP1060**	—	—	316	316	337	344	—	444	—	—	3	3	44.1
	540	85	5	5	364	476	1 690	1 960	206	920	1 100	**NU260**	**NJ260**	**NUP260**	**N260**	**NF260**	320	320	361	368	392	520	520	487	4	4	90.7
320	480	74	4	4	360	—	1 150	1 450	152	1 100	1 300	**NU1064**	—	**NUP1064**	—	—	336	336	356	365	—	464	—	—	3	3	48.4
	580	92	5	5	390	510	1 920	2 270	232	840	1 000	**NU264**	**NJ264**	**NUP264**	**N264**	**NF264**	340	340	386	393	419	560	560	522	4	4	114
	670	112	7.5	7.5	425	—	2 460	2 880	287	650	870	**NU364**	—	—	—	—	352	352	419	428	—	638	638	575	6	6	199
340	520	82	5	5	385	—	1 370	1 750	183	980	1 200	**NU1068**	—	**NUP1068**	—	—	360	360	381	390	—	500	—	—	4	4	64.1
360	540	82	5	5	405	—	1 410	1 830	189	920	1 100	**NU1072**	—	**NUP1072**	—	—	380	380	401	410	—	520	—	—	4	4	67.1
380	560	82	5	5	425	—	1 440	1 920	195	860	1 000	**NU1076**	—	**NUP1076**	—	—	400	400	421	430	—	540	—	—	4	4	70.1
400	600	90	5	5	450	—	1 760	2 310	229	780	920	**NU1080**	—	**NUP1080**	—	—	420	420	446	455	—	580	—	—	4	4	91.0
420	620	90	5	5	470	—	1 750	2 320	228	730	860	**NU1084**	—	**NUP1084**	—	—	440	440	466	475	—	600	—	—	4	4	94.6
440	650	94	6	6	493	—	1 880	2 520	242	680	800	**NU1088**	—	**NUP1088**	—	—	464	464	489	498	—	626	—	—	5	5	109
460	680	100	6	6	516	—	2 000	2 730	259	630	750	**NU1092**	—	**NUP1092**	—	—	484	484	512	520	—	656	—	—	5	5	127

[Remarks] 1) Standard cage types used for the above bearings are shown in Table 1 earlier in this section. Please note that basic load ratings and limiting speeds shown above indicate the value applicable to machined cage. Consult JTEKT about bearings with pressed cage, since they may be different from bearings with machined cage in values above.

2) Bearing numbers of NU and NJ type bearings with mounted thrust collar (refer to specification table shown after this specification table) are NUJ and NH.

d 20 ~ (35) mm



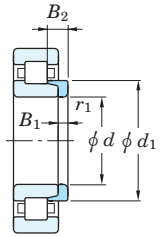
Thrust collar

Boundary dimensions (mm)					Thrust collar No.	(Refer.) Mass (kg)	Applicable bearing No.	
d	d_1	B_1	B_2	r_1 min.			NJ	NU
20	29.7	3	6.75	0.6	**HJ204**	0.012	NJ204	NU204
	29.8	3	5.5	0.6	**HJ204R**	0.011	NJ204R	NU204R
	30	3	7.5	0.6	**HJ2204**	0.012	NJ2204	NU2204
	29.8	3	6.5	0.6	**HJ2204R**	0.012	NJ2204R	NU2204R
	31.8	4	7.5	0.6	**HJ304**	0.017	NJ304	NU304
	31.4	4	6.5	0.6	**HJ304R**	0.017	NJ304R	NU304R
	31.8	4	8.5	0.6	**HJ2304**	0.020	NJ2304	NU2304
	31.4	4	7.5	0.6	**HJ2304R**	0.018	NJ2304R	NU2304R
25	34.7	3	7.25	0.6	**HJ205**	0.015	NJ205	NU205
	34.8	3	6	0.6	**HJ205R**	0.014	NJ205R	NU205R
	34.7	3	7.5	0.6	**HJ2205**	0.015	NJ2205	NU2205
	34.8	3	6.5	0.6	**HJ2205R**	0.014	NJ2205R	NU2205R
	39	4	8	1.1	**HJ305**	0.025	NJ305	NU305
	38.2	4	7	1.1	**HJ305R**	0.025	NJ305R	NU305R
	39	4	9	1.1	**HJ2305**	0.025	NJ2305	NU2305
	38.2	4	8	1.1	**HJ2305R**	0.026	NJ2305R	NU2305R
30	41.8	4	8.25	0.6	**HJ206**	0.025	NJ206	NU206
	41.4	4	7	0.6	**HJ206R**	0.025	NJ206R	NU206R
	41.8	4	8.5	0.6	**HJ2206**	0.025	NJ2206	NU2206
	41.4	4	7.5	0.6	**HJ2206R**	0.025	NJ2206R	NU2206R
	45.9	5	9.5	1.1	**HJ306**	0.039	NJ306	NU306
	45.1	5	8.5	1.1	**HJ306R**	0.042	NJ306R	NU306R
	45.9	5	11.5	1.1	**HJ2306**	0.039	NJ2306	NU2306
	45.1	5	9.5	1.1	**HJ2306R**	0.043	NJ2306R	NU2306R
	50.5	7	11.5	1.5	**HJ406**	0.080	NJ406	NU406
35	47.6	4	8	0.6	**HJ207**	0.030	NJ207	NU207
	48.2	4	7	0.6	**HJ207R**	0.033	NJ207R	NU207R
	47.6	4	8.5	0.6	**HJ2207**	0.030	NJ2207	NU2207

d (35) ~ (50) mm

Boundary dimensions (mm)					Thrust collar No.	(Refer.) Mass (kg)	Applicable bearing No.	
d	d_1	B_1	B_2	r_1 min.			NJ	NU
35	48.2	4	8.5	0.6	**HJ2207R**	0.035	NJ2207R	NU2207R
	50.8	6	11	1.1	**HJ307**	0.056	NJ307	NU307
	51.1	6	9.5	1.1	**HJ307R**	0.060	NJ307R	NU307R
	50.8	6	14	1.1	**HJ2307**	0.056	NJ2307	NU2307
	51.1	6	11	1.1	**HJ2307R**	0.062	NJ2307R	NU2307R
	59	8	13	1.5	**HJ407**	0.120	NJ407	NU407
40	54.2	5	9	1.1	**HJ208**	0.046	NJ208	NU208
	54.1	5	8.5	1.1	**HJ208R**	0.049	NJ208R	NU208R
	54.2	5	9.5	1.1	**HJ2208**	0.046	NJ2208	NU2208
	54.1	5	9	1.1	**HJ2208R**	0.050	NJ2208R	NU2208R
	58.4	7	12.5	1.5	**HJ308**	0.083	NJ308	NU308
	57.7	7	11	1.5	**HJ308R**	0.088	NJ308R	NU308R
	58.4	7	14.5	1.5	**HJ2308**	0.083	NJ2308	NU2308
	57.7	7	12.5	1.5	**HJ2308R**	0.091	NJ2308R	NU2308R
	64.8	8	13	2	**HJ408**	0.140	NJ408	NU408
45	59	5	9.5	1.1	**HJ209**	0.053	NJ209	NU209
	59.1	5	8.5	1.1	**HJ209R**	0.055	NJ209R	NU209R
	59	5	9.5	1.1	**HJ2209**	0.053	NJ2209	NU2209
	59.1	5	9	1.1	**HJ2209R**	0.055	NJ2209R	NU2209R
	64	7	12.5	1.5	**HJ309**	0.099	NJ309	NU309
	64.5	7	11.5	1.5	**HJ309R**	0.110	NJ309R	NU309R
	64	7	15	1.5	**HJ2309**	0.099	NJ2309	NU2309
	64.5	7	13	1.5	**HJ2309R**	0.113	NJ2309R	NU2309R
	71.8	8	13.5	2	**HJ409**	0.175	NJ409	NU409
50	64.6	5	10	1.1	**HJ210**	0.063	NJ210	NU210
	64.1	5	9	1.1	**HJ210R**	0.061	NJ210R	NU210R
	64.6	5	9.5	1.1	**HJ2210**	0.063	NJ2210	NU2210
	64.1	5	9	1.1	**HJ2210R**	0.061	NJ2210R	NU2210R
	71	8	14	2	**HJ310**	0.142	NJ310	NU310

d (50) ~ (65) mm



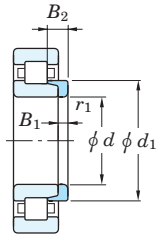
Thrust collar

Boundary dimensions (mm)					Thrust collar No.	(Refer.) Mass (kg)	Applicable bearing No.	
d	d_1	B_1	B_2	r_1 min.			NJ	NU
50	71.4	8	13	2	**HJ310R**	0.151	NJ310R	NU310R
	71	8	17	2	**HJ2310**	0.142	NJ2310	NU2310
	71.4	8	14.5	2	**HJ2310R**	0.155	NJ2310R	NU2310R
	78.8	9	14.5	2.1	**HJ410**	0.230	NJ410	NU410
55	70.8	6	11	1.1	**HJ211**	0.084	NJ211	NU211
	70.9	6	9.5	1.1	**HJ211R**	0.087	NJ211R	NU211R
	70.8	6	11	1.1	**HJ2211**	0.084	NJ2211	NU2211
	70.9	6	10	1.1	**HJ2211R**	0.088	NJ2211R	NU2211R
	77.2	9	15	2	**HJ311**	0.182	NJ311	NU311
	77.6	9	14	2	**HJ311R**	0.195	NJ311R	NU311R
	77.2	9	18.5	2	**HJ2311**	0.182	NJ2311	NU2311
	77.6	9	15.5	2	**HJ2311R**	0.200	NJ2311R	NU2311R
	85.2	10	16.5	2.1	**HJ411**	0.290	NJ411	NU411
60	78.4	6	11	1.5	**HJ212**	0.108	NJ212	NU212
	77.7	6	10	1.5	**HJ212R**	0.108	NJ212R	NU212R
	78.4	6	11	1.5	**HJ2212**	0.108	NJ2212	NU2212
	77.7	6	10	1.5	**HJ2212R**	0.108	NJ2212R	NU2212R
	84.2	9	15.5	2.1	**HJ312**	0.220	NJ312	NU312
	84.5	9	14.5	2.1	**HJ312R**	0.231	NJ312R	NU312R
	84.2	9	19	2.1	**HJ2312**	0.220	NJ2312	NU2312
	84.5	9	16	2.1	**HJ2312R**	0.237	NJ2312R	NU2312R
	91.8	10	16.5	2.1	**HJ412**	0.340	NJ412	NU412
65	84.8	6	11	1.5	**HJ213**	0.123	NJ213	NU213
	84.5	6	10	1.5	**HJ213R**	0.129	NJ213R	NU213R
	84.8	6	11.5	1.5	**HJ2213**	0.123	NJ2213	NU2213
	84.5	6	10.5	1.5	**HJ2213R**	0.131	NJ2213R	NU2213R
	91	10	17	2.1	**HJ313**	0.280	NJ313	NU313
	90.6	10	15.5	2.1	**HJ313R**	0.288	NJ313R	NU313R

d (65) ~ (80) mm

Boundary dimensions (mm)					Thrust collar No.	(Refer.) Mass (kg)	Applicable bearing No.	
d	d_1	B_1	B_2	r_1 min.			NJ	NU
65	91	10	20	2.1	**HJ2313**	0.280	NJ2313	NU2313
	90.6	10	18	2.1	**HJ2313R**	0.298	NJ2313R	NU2313R
	98.5	11	18	2.1	**HJ413**	0.420	NJ413	NU413
70	89.6	7	12.5	1.5	**HJ214**	0.150	NJ214	NU214
	89.5	7	11	1.5	**HJ214R**	0.157	NJ214R	NU214R
	89.6	7	12.5	1.5	**HJ2214**	0.150	NJ2214	NU2214
	89.5	7	11.5	1.5	**HJ2214R**	0.158	NJ2214R	NU2214R
	98	10	17.5	2.1	**HJ314**	0.330	NJ314	NU314
	97.5	10	15.5	2.1	**HJ314R**	0.330	NJ314R	NU314R
	98	10	20.5	2.1	**HJ2314**	0.330	NJ2314	NU2314
	97.5	10	18.5	2.1	**HJ2314R**	0.345	NJ2314R	NU2314R
	110.5	12	20	3	**HJ414**	0.605	NJ414	NU414
75	94	7	12.5	1.5	**HJ215**	0.156	NJ215	NU215
	94.5	7	11	1.5	**HJ215R**	0.166	NJ215R	NU215R
	94	7	12.5	1.5	**HJ2215**	0.156	NJ2215	NU2215
	94.5	7	11.5	1.5	**HJ2215R**	0.167	NJ2215R	NU2215R
	104.2	11	18.5	2.1	**HJ315**	0.400	NJ315	NU315
	104.2	11	16.5	2.1	**HJ315R**	0.410	NJ315R	NU315R
	104.2	11	21.5	2.1	**HJ2315**	0.400	NJ2315	NU2315
	104.2	11	19.5	2.1	**HJ2315R**	0.430	NJ2315R	NU2315R
	116	13	21.5	3	**HJ415**	0.710	NJ415	NU415
80	101.2	8	13.5	2	**HJ216**	0.207	NJ216	NU216
	101.6	8	12.5	2	**HJ216R**	0.222	NJ216R	NU216R
	101.2	8	13.5	2	**HJ2216**	0.207	NJ2216	NU2216
	101.6	8	12.5	2	**HJ2216R**	0.222	NJ2216R	NU2216R
	111.8	11	19.5	2.1	**HJ316**	0.470	NJ316	NU316
	110.6	11	17	2.1	**HJ316R**	0.460	NJ316R	NU316R
	111.8	11	23	2.1	**HJ2316**	0.470	NJ2316	NU2316
	110.6	11	20	2.1	**HJ2316R**	0.480	NJ2316R	NU2316R

d (80) ~ (100) mm



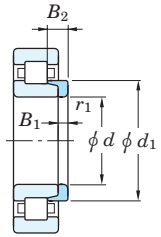
Thrust collar

Boundary dimensions (mm)					Thrust collar No.	(Refer.) Mass (kg)	Applicable bearing No.	
d	d_1	B_1	B_2	r_1 min.			NJ	NU
80	122	13	22	3	**HJ416**	0.780	NJ416	NU416
85	108.2	8	14	2	**HJ217**	0.250	NJ217	NU217
	107.6	8	12.5	2	**HJ217R**	0.250	NJ217R	NU217R
	108.2	8	14	2	**HJ2217**	0.250	NJ2217	NU2217
	107.6	8	13	2	**HJ2217R**	0.252	NJ2217R	NU2217R
	117.5	12	20.5	3	**HJ317**	0.560	NJ317	NU317
	117.9	12	18.5	3	**HJ317R**	0.575	NJ317R	NU317R
	117.5	12	24	3	**HJ2317**	0.560	NJ2317	NU2317
	117.9	12	22	3	**HJ2317R**	0.595	NJ2317R	NU2317R
	126	14	24	4	**HJ417**	0.880	NJ417	NU417
90	114.2	9	15	2	**HJ218**	0.305	NJ218	NU218
	114.4	9	14	2	**HJ218R**	0.320	NJ218R	NU218R
	114.2	9	16	2	**HJ2218**	0.305	NJ2218	NU2218
	114.4	9	15	2	**HJ2218R**	0.325	NJ2218R	NU2218R
	125	12	21	3	**HJ318**	0.630	NJ318	NU318
	124.2	12	18.5	3	**HJ318R**	0.630	NJ318R	NU318R
	125	12	26	3	**HJ2318**	0.630	NJ2318	NU2318
	124.2	12	22	3	**HJ2318R**	0.660	NJ2318R	NU2318R
	137	14	24	4	**HJ418**	1.05	NJ418	NU418
95	121	9	15.5	2.1	**HJ219**	0.352	NJ219	NU219
	120.6	9	14	2.1	**HJ219R**	0.355	NJ219R	NU219R
	121	9	16.5	2.1	**HJ2219**	0.352	NJ2219	NU2219
	120.6	9	15.5	2.1	**HJ2219R**	0.365	NJ2219R	NU2219R
	132	13	22.5	3	**HJ319**	0.760	NJ319	NU319
	132.2	13	20.5	3	**HJ319R**	0.785	NJ319R	NU319R
	132	13	26.5	3	**HJ2319**	0.760	NJ2319	NU2319
	147	15	25.5	4	**HJ419**	1.30	NJ419	NU419
100	128	10	17	2.1	**HJ220**	0.444	NJ220	NU220

d (100) ~ 120 mm

Boundary dimensions (mm)					Thrust collar No.	(Refer.) Mass (kg)	Applicable bearing No.	
d	d_1	B_1	B_2	r_1 min.			NJ	NU
100	127.5	10	15	2.1	**HJ220R**	0.435	NJ220R	NU220R
	128	10	18	2.1	**HJ2220**	0.444	NJ2220	NU2220
	127.5	10	16	2.1	**HJ2220R**	0.450	NJ2220R	NU2220R
	140.5	13	22.5	3	**HJ320**	0.895	NJ320	NU320
	139.6	13	20.5	3	**HJ320R**	0.890	NJ320R	NU320R
	140.5	13	27.5	3	**HJ2320**	0.895	NJ2320	NU2320
	139.6	13	23.5	3	**HJ2320R**	0.920	NJ2320R	NU2320R
	153.5	16	27	4	**HJ420**	1.50	NJ420	NU420
105	135	10	17.5	2.1	**HJ221**	0.505	NJ221	NU221
	147	13	22.5	3	**HJ321**	0.970	NJ321	NU321
	159.5	16	27	4	**HJ421**	1.65	NJ421	NU421
110	141.5	11	18.5	2.1	**HJ222**	0.615	NJ222	NU222
	141.7	11	17	2.1	**HJ222R**	0.620	NJ222R	NU222R
	141.5	11	20.5	2.1	**HJ2222**	0.615	NJ2222	NU2222
	141.7	11	19.5	2.1	**HJ2222R**	0.645	NJ2222R	NU2222R
	155.5	14	23	3	**HJ322**	1.17	NJ322	NU322
	155.8	14	22	3	**HJ322R**	1.21	NJ322R	NU322R
	155.5	14	28	3	**HJ2322**	1.17	NJ2322	NU2322
	155.8	14	26.5	3	**HJ2322R**	1.27	NJ2322R	NU2322R
	171	17	29.5	4	**HJ422**	2.10	NJ422	NU422
120	153	11	19	2.1	**HJ224**	0.715	NJ224	NU224
	153.4	11	17	2.1	**HJ224R**	0.710	NJ224R	NU224R
	153	11	22	2.1	**HJ2224**	0.715	NJ2224	NU2224
	153.4	11	20	2.1	**HJ2224R**	0.745	NJ2224R	NU2224R
	168.5	14	23.5	3	**HJ324**	1.40	NJ324	NU324
	168.6	14	22.5	3	**HJ324R**	1.41	NJ324R	NU324R
	168.5	14	28	3	**HJ2324**	1.40	NJ2324	NU2324
	168.6	14	26	3	**HJ2324R**	1.46	NJ2324R	NU2324R
	188	17	30.5	5	**HJ424**	2.60	NJ424	NU424

d 130 ~ (160) mm



Thrust collar

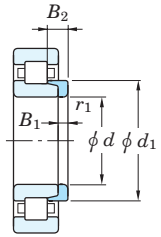
Boundary dimensions (mm)					Thrust collar No.	(Refer.) Mass (kg)	Applicable bearing No.	
d	d_1	B_1	B_2	r_1 min.			NJ	NU
130	165.5	11	19	3	**HJ226**	0.840	NJ226	NU226
	164.2	11	17	3	**HJ226R**	0.790	NJ226R	NU226R
	165.5	11	25	3	**HJ2226**	0.840	NJ2226	NU2226
	164.2	11	21	3	**HJ2226R**	0.840	NJ2226R	NU2226R
	182	14	24	4	**HJ326**	1.62	NJ326	NU326
	182.3	14	23	4	**HJ326R**	1.65	NJ326R	NU326R
	182	14	29.5	4	**HJ2326**	1.62	NJ2326	NU2326
	182.3	14	28	4	**HJ2326R**	1.73	NJ2326R	NU2326R
	205	18	32	5	**HJ426**	3.30	NJ426	NU426
140	179.5	11	19	3	**HJ228**	1.00	NJ228	NU228
	180	11	18	3	**HJ228R**	0.990	NJ228R	NU228R
	179.5	11	25	3	**HJ2228**	1.00	NJ2228	NU2228
	180	11	23	3	**HJ2228R**	1.07	NJ2228R	NU2228R
	196	15	26	4	**HJ328**	1.93	NJ328	NU328
	196	15	25	4	**HJ328R**	2.04	NJ328R	NU328R
	196	15	33.5	4	**HJ2328**	1.98	NJ2328	NU2328
	196	15	31	4	**HJ2328R**	2.14	NJ2328R	NU2328R
	219	18	33	5	**HJ428**	3.75	NJ428	NU428
150	193	12	20.5	3	**HJ230**	1.24	NJ230	NU230
	193.7	12	19.5	3	**HJ230R**	1.26	NJ230R	NU230R
	193	12	26.5	3	**HJ2230**	1.24	NJ2230	NU2230
	193.7	12	24.5	3	**HJ2230R**	1.35	NJ2230R	NU2230R
	210	15	26.5	4	**HJ330**	2.37	NJ330	NU330
	210	15	25	4	**HJ330R**	2.35	NJ330R	NU330R
	210	15	34	4	**HJ2330**	2.37	NJ2330	NU2330
	210	15	31.5	4	**HJ2330R**	2.48	NJ2330R	NU2330R
	234	20	36.5	5	**HJ430**	4.70	NJ430	NU430
160	207	12	21	3	**HJ232**	1.48	NJ232	NU232
	207.3	12	20	3	**HJ232R**	1.48	NJ232R	NU232R

d (160) ~ (200) mm

Boundary dimensions (mm)					Thrust collar No.	(Refer.) Mass (kg)	Applicable bearing No.	
d	d_1	B_1	B_2	r_1 min.			NJ	NU
160	205	12	28	3	**HJ2232**	1.48	NJ2232	NU2232
	206.1	12	24.5	3	**HJ2232R**	1.55	NJ2232R	NU2232R
	225	15	28	4	**HJ332**	2.75	NJ332	NU332
	222.1	15	25	4	**HJ332R**	2.59	NJ332R	NU332R
	225	15	37	4	**HJ2332**	2.75	NJ2332	NU2332
	222.1	15	32	4	**HJ2332R**	2.76	NJ2332R	NU2332R
170	220.5	12	22	4	**HJ234**	1.70	NJ234	NU234
	220.8	12	20	4	**HJ234R**	1.70	NJ234R	NU234R
	219	12	29	4	**HJ2234**	1.70	NJ2234	NU2234
	219.5	12	24	4	**HJ2234R**	1.79	NJ2234R	NU2234R
	238	16	29.5	4	**HJ334**	3.25	NJ334	NU334
	238	16	38.5	4	**HJ2334**	3.25	NJ2334	NU2334
180	230.5	12	22	4	**HJ236**	1.80	NJ236	NU236
	230.8	12	20	4	**HJ236R**	1.79	NJ236R	NU236R
	229	12	29	4	**HJ2236**	1.80	NJ2236	NU2236
	229.5	12	24	4	**HJ2236R**	1.88	NJ2236R	NU2236R
	252	17	30.5	4	**HJ336**	3.85	NJ336	NU336
	252	17	40	4	**HJ2336**	3.85	NJ2336	NU2336
190	244.5	13	23.5	4	**HJ238**	2.20	NJ238	NU238
	244.5	13	21.5	4	**HJ238R**	2.19	NJ238R	NU238R
	243	13	31.5	4	**HJ2238**	2.20	NJ2238	NU2238
	243.2	13	26.5	4	**HJ2238R**	2.31	NJ2238R	NU2238R
	265	18	32	5	**HJ338**	4.45	NJ338	NU338
	265	18	41.5	5	**HJ2338**	4.45	NJ2338	NU2338
200	258	14	25	4	**HJ240**	2.60	NJ240	NU240
	258.2	14	23	4	**HJ240R**	2.65	NJ240R	NU240R
	258	14	34	4	**HJ2240**	2.60	NJ2240	NU2240
	256.9	14	28	4	**HJ2240R**	2.78	NJ2240R	NU2240R
	280	18	33	5	**HJ340**	5.00	NJ340	NU340

Thrust collars for cylindrical roller bearings

d (200) ~ 320 mm

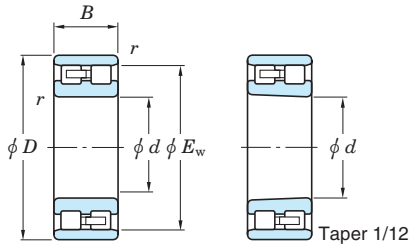


Thrust collar

Boundary dimensions (mm)					Thrust collar No.	(Refer.) Mass (kg)	Applicable bearing No.	
d	d_1	B_1	B_2	r_1 min.			NJ	NU
200	280	18	44.5	5	**HJ2340**	5.00	NJ2340	NU2340
220	286	15	27.5	4	**HJ244**	3.55	NJ244	NU244
	286	15	36.5	4	**HJ2244**	3.55	NJ2244	NU2244
	307	20	36	5	**HJ344**	7.05	NJ344	NU344
240	313	16	29.5	4	**HJ248**	4.65	NJ248	NU248
	313	16	38.5	4	**HJ2248**	4.65	NJ2248	NU2248
	335	22	39.5	5	**HJ348**	8.20	NJ348	NU348
260	340	18	33	5	**HJ252**	6.20	NJ252	NU252
	340	18	40.5	5	**HJ2252**	6.20	NJ2252	NU2252
280	360	18	33	5	**HJ256**	7.15	NJ256	NU256
300	387	20	34.5	5	**HJ260**	7.40	NJ260	NU260
320	415	21	37	5	**HJ264**	11.3	NJ264	NU264

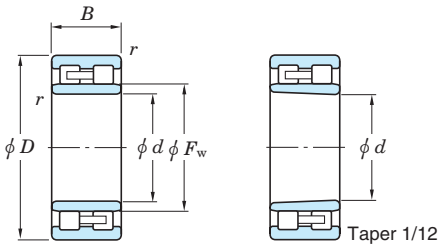
d 25 ~ (110) mm

NN

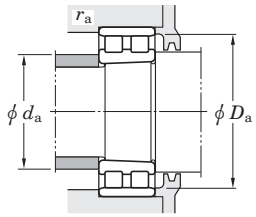


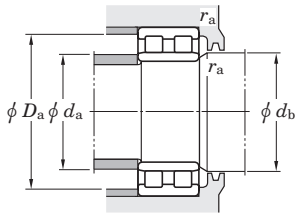
Cylindrical bore　Tapered bore

NNU



Cylindrical bore　Tapered bore



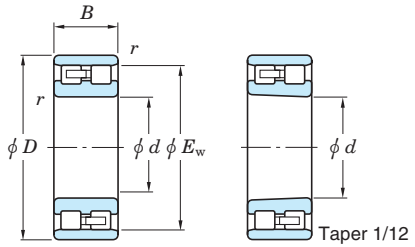


Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. NN		Bearing No. NNU		Mounting dimensions (mm)						(Refer.) Mass (kg)	
d	D	B	r min.	F_w	E_w	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Cylindrical bore	Tapered bore	Cylindrical bore	Tapered bore	d_a min.	d_a max.	d_b min.	D_a max.	D_a min.	r_a max.	Cylindrical bore	Tapered bore
25	47	16	0.6	—	41.3	32.2	30.0	5.20	14 000	17 000	**NN3005**	**NN3005K**	—	—	29	—	—	43	42	0.6	0.127	0.123
30	55	19	1	—	48.5	46.0	44.1	4.95	12 000	14 000	**NN3006**	**NN3006K**	—	—	35	—	—	50	49	1	0.198	0.192
35	62	20	1	—	55	49.1	50.0	5.65	10 000	12 000	**NN3007**	**NN3007K**	—	—	40	—	—	57	56	1	0.253	0.246
40	68	21	1	—	61	52.0	55.9	6.35	9 100	11 000	**NN3008**	**NN3008K**	—	—	45	—	—	63	62	1	0.307	0.298
45	75	23	1	—	67.5	67.1	71.9	8.75	8 300	9 900	**NN3009**	**NN3009K**	—	—	50	—	—	70	69	1	0.404	0.382
50	80	23	1	—	72.5	66.4	72.6	8.85	7 600	9 100	**NN3010**	**NN3010K**	—	—	55	—	—	75	74	1	0.429	0.415
55	90	26	1.1	—	81	89.6	101	13.2	6 800	8 200	**NN3011**	**NN3011K**	—	—	61.5	—	—	83.5	82	1	0.637	0.618
60	95	26	1.1	—	86.1	91.6	106	13.9	6 400	7 700	**NN3012**	**NN3012K**	—	—	66.5	—	—	88.5	87	1	0.685	0.664
65	100	26	1.1	—	91	93.6	111	14.6	6 000	7 200	**NN3013**	**NN3013K**	—	—	71.5	—	—	93.5	92	1	0.728	0.705
70	110	30	1.1	—	100	122	148	20.6	5 500	6 500	**NN3014**	**NN3014K**	—	—	76.5	—	—	103.5	101	1	1.04	1.02
75	115	30	1.1	—	105	124	155	21.5	5 200	6 200	**NN3015**	**NN3015K**	—	—	81.5	—	—	108.5	106	1	1.11	1.08
80	125	34	1.1	—	113	149	186	26.6	4 800	5 800	**NN3016**	**NN3016K**	—	—	86.5	—	—	118.5	114	1	1.55	1.50
85	130	34	1.1	—	118	152	194	27.3	4 600	5 500	**NN3017**	**NN3017K**	—	—	91.5	—	—	123.5	119	1	1.63	1.58
90	140	37	1.5	—	127	179	228	29.3	4 200	5 100	**NN3018**	**NN3018K**	—	—	98	—	—	132	129	1.5	2.07	2.01
95	145	37	1.5	—	132	188	246	31.3	4 100	4 900	**NN3019**	**NN3019K**	—	—	103	—	—	137	134	1.5	2.17	2.10
100	140	40	1.1	113	—	173	258	32.9	4 000	4 800	—	—	**NNU4920**	**NNU4920K**	106.5	111	115	133.5	—	1	1.95	1.87
	150	37	1.5	—	137	196	265	33.3	3 900	4 700	**NN3020**	**NN3020K**	—	—	108	—	—	142	139	1.5	2.28	2.21
105	145	40	1.1	118	—	196	306	40.2	3 900	4 600	—	—	**NNU4921**	**NNU4921K**	111.5	116	120	138.5	—	1	2.00	1.91
	160	41	2	—	146	247	322	42.5	3 700	4 400	**NN3021**	**NN3021K**	—	—	114	—	—	151	148	2	2.88	2.81
110	150	40	1.1	123	—	204	326	42.4	3 700	4 500	—	—	**NNU4922**	**NNU4922K**	116.5	121	125	143.5	—	1	2.10	2.01

Double-row cylindrical roller bearings

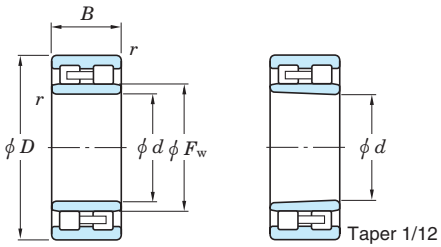
d (110) ~ (260) mm

NN

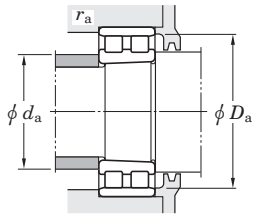


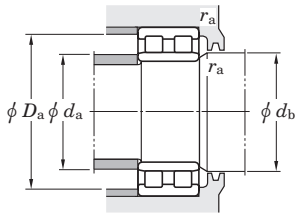
Cylindrical bore | Tapered bore

NNU



Cylindrical bore | Tapered bore



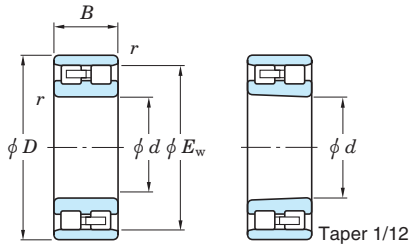


Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. NN		Bearing No. NNU		Mounting dimensions (mm)						(Refer.) Mass (kg)	
d	D	B	r min.	F_w	E_w	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Cylindrical bore	Tapered bore	Cylindrical bore	Tapered bore	d_a min.	d_a max.	d_b min.	D_a max.	D_a min.	r_a max.	Cylindrical bore	Tapered bore
110	170	45	2	—	155	278	361	47.9	3 500	4 200	**NN3022**	**NN3022K**	—	—	119	—	—	161	157	2	3.65	3.56
120	165	45	1.1	134.5	—	234	373	47.6	3 400	4 000	—	—	**NNU4924**	**NNU4924K**	126.5	132	137	158.5	—	1	2.90	2.77
	180	46	2	—	165	291	392	51.1	3 200	3 900	**NN3024**	**NN3024K**	—	—	129	—	—	171	167	2	4.00	3.87
130	180	50	1.5	146	—	269	428	50.2	3 100	3 700	—	—	**NNU4926**	**NNU4926K**	138	143.5	148	172	—	1.5	3.90	3.73
	200	52	2	—	182	356	476	57.7	2 900	3 500	**NN3026**	**NN3026K**	—	—	139	—	—	191	183	2	5.94	5.76
140	190	50	1.5	156	—	277	456	52.5	2 900	3 500	—	—	**NNU4928**	**NNU4928K**	148	153.5	158	182	—	1.5	4.15	3.97
	210	53	2	—	192	372	516	61.5	2 700	3 300	**NN3028**	**NN3028K**	—	—	149	—	—	201	194	2	6.41	6.21
150	210	60	2	168.5	—	430	692	80.7	2 600	3 100	—	—	**NNU4930**	**NNU4930K**	159	166	171	201	—	2	6.50	6.22
	225	56	2.1	—	206	418	587	70.1	2 500	3 000	**NN3030**	**NN3030K**	—	—	161	—	—	214	208	2	7.74	7.50
160	220	60	2	178.5	—	425	695	79.8	2 500	3 000	—	—	**NNU4932**	**NNU4932K**	169	176	182	211	—	2	6.95	6.65
	240	60	2.1	—	219	499	695	79.6	2 400	2 800	**NN3032**	**NN3032K**	—	—	171	—	—	229	221	2	9.38	9.08
170	230	60	2	188.5	—	451	763	86.4	2 300	2 800	—	—	**NNU4934**	**NNU4934K**	179	186	192	221	—	2	7.20	6.88
	260	67	2.1	—	236	592	824	105	2 200	2 600	**NN3034**	**NN3034K**	—	—	181	—	—	249	238	2	12.8	12.4
180	250	69	2	202	—	572	964	117	2 100	2 600	—	—	**NNU4936**	**NNU4936K**	189	199.5	205	241	—	2	10.5	10.1
	280	74	2.1	—	255	705	958	118	2 000	2 400	**NN3036**	**NN3036K**	—	—	191	—	—	269	257	2	16.8	16.3
190	260	69	2	210	—	581	996	119	2 000	2 400	—	—	**NNU4938**	**NNU4938K**	199	207	215	251	—	2	11.0	10.5
	290	75	2.1	—	265	752	1 020	128	1 900	2 300	**NN3038**	**NN3038K**	—	—	201	—	—	279	267	2	17.6	17.1
200	280	80	2.1	223	—	636	1 050	125	1 900	2 300	—	—	**NNU4940**	**NNU4940K**	211	219.5	228	269	—	2	15.4	14.7
	310	82	2.1	—	282	793	1 120	137	1 700	2 100	**NN3040**	**NN3040K**	—	—	211	—	—	299	285	2	22.5	21.8
220	300	80	2.1	244	—	701	1 220	145	1 700	2 000	—	—	**NNU4944**	**NNU4944K**	231	241	248	289	—	2	16.7	16.0
	340	90	3	—	310	944	1 370	163	1 600	1 900	**NN3044**	**NN3044K**	—	—	233	—	—	327	313	2.5	29.3	28.4
240	320	80	2.1	263	—	736	1 340	155	1 600	1 900	—	—	**NNU4948**	**NNU4948K**	251	260	269	309	—	2	18.0	17.2
	360	92	3	—	330	1 090	1 590	184	1 400	1 700	**NN3048**	**NN3048K**	—	—	253	—	—	347	333	2.5	32.8	31.8
260	360	100	2.1	287	—	1 180	2 050	228	1 400	1 700	—	—	**NNU4952**	**NNU4952K**	271	284	296	349	—	2	31.4	30.0

Double-row cylindrical roller bearings

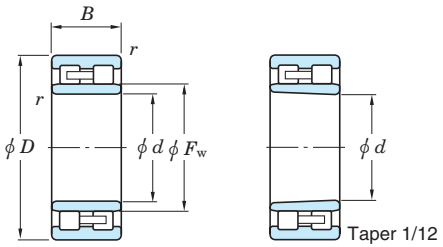
d (260) ~ 460 mm

NN

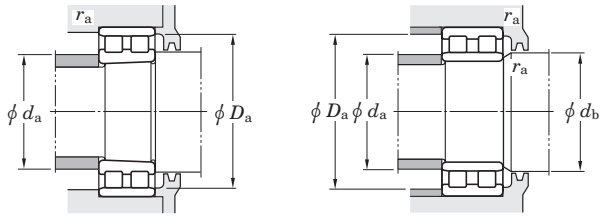


Cylindrical bore　Tapered bore

NNU



Cylindrical bore　Tapered bore



Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. NN		Bearing No. NNU		Mounting dimensions (mm)						(Refer.) Mass (kg)	
d	D	B	r min.	F_w	E_w	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Cylindrical bore	Tapered bore	Cylindrical bore	Tapered bore	d_a min.	d_a max.	d_b min.	D_a max.	D_a min.	r_a max.	Cylindrical bore	Tapered bore
260	400	104	4	—	364	1 290	1 830	204	1 300	1 500	**NN3052**	**NN3052K**	—	—	276	—	—	384	367	3	47.4	46.0
280	380	100	2.1	308	—	1 220	2 200	239	1 300	1 500	—	—	**NNU4956**	**NNU4956K**	291	305	316	369	—	2	33.1	31.6
	420	106	4	—	384	1 370	2 010	220	1 200	1 400	**NN3056**	**NN3056K**	—	—	296	—	—	404	387	3	51.2	49.6
300	420	118	3	339	—	1 470	2 720	285	1 100	1 300	—	—	**NNU4960**	**NNU4960K**	313	335	343	407	—	2.5	51.9	49.7
	460	118	4	—	418	1 610	2 460	266	1 100	1 300	**NN3060**	**NN3060K**	—	—	316	—	—	444	421	3	70.8	68.7
320	440	118	3	352	—	1 530	2 750	286	1 100	1 300	—	—	**NNU4964**	**NNU4964K**	333	348	363	427	—	2.5	53.7	51.4
	480	121	4	—	438	1 690	2 670	283	980	1 200	**NN3064**	**NN3064K**	—	—	336	—	—	464	442	3	76.4	74.0
340	460	118	3	372	—	1 580	2 930	301	990	1 200	—	—	**NNU4968**	**NNU4968K**	353	368	383	447	—	2.5	56.8	54.3
	520	133	5	—	473	2 090	3 090	345	880	1 100	**NN3068**	**NN3068K**	—	—	360	—	—	500	477	4	101	97.8
360	540	134	5	—	493	1 950	3 090	315	830	990	**NN3072**	**NN3072K**	—	—	380	—	—	520	497	4	107	104
380	560	135	5	—	510	2 050	3 350	337	780	940	**NN3076**	**NN3076K**	—	—	400	—	—	540	514	4	113	109
400	600	148	5	—	548	2 550	4 140	414	700	850	**NN3080**	**NN3080K**	—	—	420	—	—	580	552	4	146	141
420	620	150	5	—	570	2 900	4 570	449	670	800	**NN3084**	**NN3084K**	—	—	440	—	—	600	574	4	154	149
440	650	157	6	—	597	3 160	5 060	489	620	740	**NN3088**	**NN3088K**	—	—	464	—	—	626	602	5	177	171
460	680	163	6	—	627	3 390	5 480	521	570	690	**NN3092**	**NN3092K**	—	—	484	—	—	656	632	5	201	195

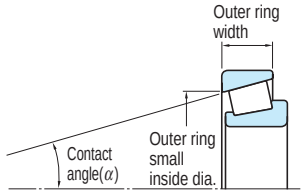
Tapered roller bearings

Tapered roller bearings are designed such that outer ring, inner ring and rollers have tapered surfaces whose apexes converge at a common point on the bearing axis. Along with metric series bearings, inch series bearings are also available.

This type of bearing is suitable for applications that involve heavy or impact loading.

Single-row tapered roller bearings

- Able to carry radial and axial load in one direction simultaneously.
  Because an axial component of force is produced when this type of bearing is loaded radially, two bearings are used together facing one another, or two or more bearings are matched and used.
- There are the standard, medium and steep type which are different in contact angle size.
  Medium-tapered metric series bearings are identified by the supplementary code "C" which is added as a suffix to bearing numbers.
- Bearings whose outer ring width, outer ring small inside diameter and contact angle are determined in accordance with ISO 355 specifications are identified by the supplementary code "J" as a suffix.
  Inner ring assemblies and the outer rings of such bearings are interchangeable with those of bearings produced abroad if the bearing numbers are the same.



ISO sub-unit specifications

[Note] When supplementary code "J" is added as a prefix (not a suffix) to bearing numbers (e.g. JHM720249/JHM720210), the bearings are not designed according to ISO 355.
Such bearings are called "J series metric tapered roller bearings," and are produced according to special tolerances.

Double-row tapered roller bearings

- These bearings are divided into the TDO type which has one double outer ring and two single-row inner rings, and the TDI type which has two single-row outer rings and one double inner ring. Both accommodate radial and axial loading in both directions.
  These two also carry moment loads, however, the TDO type is superior to the TDI type, because the distance between load centers (a) is longer in the TDO type.
- The spacer of the TDO type, or the TDI type, pre-adjusts the internal clearance to provide proper operating clearance after mounting.

Single-row tapered roller bearings

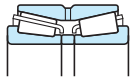
Metric series

Bore diameter **15** – **360** mm

Inch series
(including J series metric bearing)

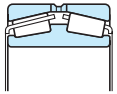
Bore diameter **9.525** – **292.100** mm

Double-row tapered roller bearings



TDO type

Bore diameter **25** – **500** mm



TDI type

Bore diameter **100** – **500** mm

Boundary dimensions

Metric single-row tapered roller bearings : as specified in JIS B 1512.

Reference JIS B 1512 specifies new dimension series which are based on ISO 355, as well as the conventional "3XX" dimension series. These new dimension series are as follows :

New dimension series

(1) Angle series

Angle series	Contact angle α over	up to
2	10°	13° 52'
3	13° 52'	15° 59'
4	15° 59'	18° 55'
5	18° 55'	23°
6	23°	27°
7	27°	30°

(2) Diameter series

Diameter series	$D/(d^{0.77})$ over	up to
B	3.40	3.80
C	3.80	4.40
D	4.40	4.70
E	4.70	5.00
F	5.00	5.60
G	5.60	7.00

(3) Width series

Width series	$T/\{(D-d)^{0.95}\}$ over	up to
B	0.50	0.68
C	0.68	0.80
D	0.80	0.88
E	0.88	1.00

[Remarks]
1. Combine these series symbols in the listed order to make the dimension series numbers. (ex. 2BC)
2. Bearing numbers consist of a dimension series number and a bore diameter which is added as a suffix. (ex. 2BC080 : bore diameter 80 mm)

Tolerances

· Metric series single-row tapered roller bearings as specified in JIS B 1514-1.
..... (refer to Table 7-5 on pp. A 66 – A 68.)
· Metric series double-row tapered roller bearings as specified in BAS 1002.
..... (refer to Table 7-6 on p. A 69.)
· Inch series tapered roller bearings as specified in ABMA Section 19.
..... (refer to Table 7-7 on pp. A 70, 71.)
· J series metric tapered roller bearings the tolerance is specified separately.
..... (refer to Table 7-8 on pp. A 72, 73.)

Internal clearance

Radial internal clearance of double-row, four-row and matched pair tapered roller bearings ..... (refer to Table 10-10 on p. A 110.)

Recommended fits

· Metric series tapered roller bearings (classes 0, 6X and 6)
..... (refer to Table 9-4 on pp. A 91, 92.)
· Inch series tapered roller bearings ..... (refer to Table 9-7 on pp. A 96, 97.)
· J series metric tapered roller bearings
..... (refer to Table 9-6 on pp. A 94, 95.)

Standard cage

Pressed cage (supplementary code : //)
(Some large size bearings have a pin type cage (FP) instead. They are listed separately in the bearing specification table.)

Allowable misalignment

Single-row tapered roller bearings : 0.000 9 rad (3')
(If the misalignment exceeds this angle size, JTEKT is ready to design special bearings to order.)

Equivalent radial load

■ Single-row tapered roller bearings

Dynamic equivalent radial load
$\left(\text{when } \frac{F_a}{F_r} \leqq e\right) \quad P_r = F_r$
$\left(\text{when } \frac{F_a}{F_r} > e\right) \quad P_r = 0.4F_r + Y_1 F_a$

Static equivalent radial load $P_{0r} = 0.5F_r + Y_0 F_a$
when $P_{0r} < F_r$, $P_{0r} = F_r$

[Note]
Refer to the bearing specification table for the values of axial load factors Y_1, Y_2, Y_3 and Y_0 and constant e.

■ Double-row or four-row tapered roller bearings

Dynamic equivalent radial load
$\left(\text{when } \frac{F_a}{F_r} \leqq e\right) \quad P_r = F_r + Y_2 F_a$
$\left(\text{when } \frac{F_a}{F_r} > e\right) \quad P_r = 0.67F_r + Y_3 F_a$

Static equivalent radial load $P_{0r} = F_r + Y_0 F_a$

[Remarks]
1. When two single-row tapered roller bearings are used together facing one another, an axial component of force is produced under radial load. In this case, refer to pp. A 38, 39 for calculation of the dynamic equivalent radial load.
2. When the load is too small, slippage occurs between the rollers and raceways, causing smearing to develop. This also occurs to matched pair bearings when the ratio of axial load to radial load exceeds the value e shown in the specification table ($F_a/F_r > e$). Consult with JTEKT on use of bearings under such conditions.

[Series No. index]

series No.	inner ring	pages	outer ring	pages
335	336	B237	332	B233,B235,
	339	B233		B237
	342	B237		
	344	B235		
	344A	B237		
355	350A	B237	354A	B237,B239,
	355	B239		B241
	355A	B239		
	358	B239		
	359A	B241		
	359S	B241		
365	365	B243	362A	B237,B241,
	365A	B237		B243,B245
	365S	B241		
	366	B243		
	368	B243		
	368A	B243		
	368S	B245		
	369A	B241		
	370A	B243		
375	375	B243	374	B243
385	385	B247	382	B247
	385AX	B243	382A	B241,B243,
	385X	B247		B247
	386A	B241		
	387	B247		
	387A	B247		
	387AS	B247		
	387S	B247		
	388A	B247		
	389	B247		
395	390A	B249	394A	B243,B249,
	392	B249		B251
	395	B249		
	395A	B251		
	395S	B251		
	396	B243		
	397	B249		
	399A	B251		
	399AS	B251		
415	418	B235	414	B235,B237
	419	B237		
	420	B237		
435	438	B239	432	B233
	449	B233	432A	B239
455	456	B245	453X	B241,B245,
(Continued)	462	B247		B247
	463	B241		
	466	B245		

series No.	inner ring	pages	outer ring	pages
455	467	B241		
	468	B245		
	469	B247		
475	477	B249	472	B249,B253
	482	B253	472A	B253
			472X	B253
495	495	B257	492A	B255,B257,
	495A	B255		B259
	495AX	B255	493	B255,B259
	496	B257		
	497	B259		
	497A	B259		
	498	B259		
525	525	B235	522	B235,B237,
	526	B237		B239,B241,
	527	B239		B243
	528	B241		
	529	B243		
	529X	B243		
535	535	B239	532A	B239
	537	B245	532X	B237,B245
	539	B245		
	539A	B245		
	543	B237		
555	557S	B245	552A	B245
565	565	B249	563	B249,B251,
	566	B253		B253,B256
	567	B253		
	567A	B253		
	568	B256		
	570	B251		
575R	575R	B255	572	B253,B255,
	575SR	B255		B257
	576R	B253	572X	B257
	577R	B255		
	580R	B257		
	581R	B257		
	582R	B257		
595	594A	B261	592A	B259
	596	B259	592XE	B261
615	615	B239	612	B239,B245,
	619	B245		B247
	621	B245		
	623	B247		
635	641	B251	633	B251
655	655	B253	652	B255
(Continued)	657	B255	653	B253,B255,
	659	B255		B257,B259
	661	B257		

series No.	inner ring	pages	outer ring	pages
655	663	B257		
	665	B259		
	665A	B259		
675	677	B259	672	B259,B261,
	679	B259		B263
	681	B261		
	681A	B261		
	683	B261		
	685	B261		
	687	B263		
745R	740R	B257	742	B253,B255,
	744R	B255		B257,B259
	745AR	B253		
	748SR	B255		
	749AR	B257		
	749R	B259		
	749SR	B259		
	750AR	B257		
755	756A	B257	752	B255,B257,
	757	B257		B259,B261
	758	B259		
	759	B259		
	760	B261		
	762	B255		
	766	B259		
775	778	B261	772	B261,B263
	780	B263		
	782	B263		
	786	B263		
	787	B263		
835R	835R	B253	832	B253,B259
	841R	B259		
855R	855R	B259	854	B259,B261,
	857R	B261		B263
	861R	B263		
	864R	B261		
935	936	B265	932	B263,B265
	938	B265		
	941	B263		
1200	1280	B227	1220	B227
1300	1380	B225	1328	B225
			1329	B225
1700	1755	B227	1729	B227
	1779	B227		
1900R	1986R	B227	1922	B229
	1988R	B229	1932	B227
A2000	A2037	B225	A2126	B225
	A2047	B225		
2500	2580	B231	2520	B231

series No.	inner ring	pages	outer ring	pages
2600	2682	B227	2631	B227,B229
	2684	B227		
	2687	B227		
	2688	B229		
	2689	B229		
	2690	B229		
2700R	2788R	B235	2720	B233
	2789R	B235	2729	B235
	2794R	B233	2735X	B233,B235
	2796R	B233		
2900	2984	B241	2924	B241
3100	3192	B229	3120	B229
	3198	B229		
3300	3382	B235	3320	B235
	3386	B235	3328	B235
3400	3478	B233	3420	B233,B235
	3479	B233		
	3490	B235		
3500R	3576R	B237	3520	B239
	3578R	B239	3525	B233,B237
	3581R	B233		
3700	3776	B239	3720	B239,B243
	3780	B243	3730	B243
			3732	B243
3800	3877	B237	3820	B233
	3878	B233	3821	B237
3900	3979	B247	3920	B247
	3984	B251	3925	B251
A4000	A4050	B225	A4138	B225
	A4059	B225		
4300	4375	B235	4335	B235,B237
	4388	B237		
	4395	B237		
4500	4580	B245	4535	B245
	4595	B245		
5500R	5566R	B247	5535	B245,B247,
	5578R	B245		B249,B251
	5583R	B249		
	5584R	B249		
	5595R	B251		
5700	5760	B255	5735	B255
6300	6379	B251	6320	B245,B249,
	6381	B245		B251
	6382	B249		
	6386	B251		
	6389	B251		
6400	6460	B255	6420	B255
	6461	B255		
	6461A	B255		

series No.	inner ring	pages	outer ring	pages
6500R	6580R	B259	6535	B259,B261
	6581XR	B261		
9100	9185	B251	9121	B251
02400	02473	B227	02420	B227,B229,
	02474	B229		B231
	02475	B231		
	02476	B231		
02800	02872	B229	02820	B229,B231,
	02875	B231		B233
	02876	B231		
	02877	B233		
	02878	B233		
03000	03062	B225	03162	B225
07000	07079	B225	07196	B225,B227
	07097	B227	07204	B227
	07098	B227		
	07100	B227		
	07100S	B227		
08000	08125	B231	08231	B231
09000	09062	B225	09195	B225
	09067	B225	09196	B225
	09078	B225		
11000R	11162R	B237	11300	B237
LM11700R	LM11749R	B225	LM11710	B225
LM11900	LM11949	B225	LM11910	B225
12000	12168	B239	12303	B239
	12175	B239		
12500	12580	B225	12520	B225
M12600	M12648	B225	M12610	B225
	M12649	B225		
LM12700	LM12749	B225	LM12711	B225
13600	13687	B235	13621	B235
13800	13889	B233,B235	13830	B233
			13836	B235
14000	14116	B231	14274	B231
	14117A	B229	14276	B229,B231
	14136A	B231		
15000	15100	B227	15243	B227
(Continued)	15101	B227	15245	B227,B229,
	15106	B229		B231
	15112	B229		
	15113	B229		
	15116	B229		
	15117	B229		
	15118	B231		
	15119	B231		
	15120	B231		
	15123	B231		
	15125	B231		

series No.	inner ring	pages	outer ring	pages
15000	15126	B231		
15500	15580	B229	15520	B229
	15590	B229	15523	B229
16000	16137	B233	16282	B235
	16150	B235	16283	B235
			16284	B233
17000	17098	B227	17244	B227,B229
	17118	B229		
	17119	B229		
17500R	17580R	B225	17520	B225
18000	18200	B243	18337	B243
18500	18587	B235	18520	B235,B237
	18590	B237		
18600	18685	B239	18620	B239,B241
	18690	B241		
18700	18790	B243	18724	B243
19000R	19150R	B235	19281	B235
			19283	B235
21000	21063	B225	21212	B225
L21500	L21549	B225	L21511	B225
23600	23690	B233	23620	B233
24700R	24780R	B237	24720	B237
25500	25572	B235	25520	B235,B239
	25577	B239	25526	B241
	25582	B239		
	25590	B241		
25800R	25877R	B233	25821	B233
	25880R	B233		
26000	26112	B229	26283	B229,B231
	26131	B231		
26800R	26877R	B233	26822	B233,B239
	26883R	B233		
	26884R	B239		
27600	27687	B257	27620	B257,B259
	27689	B257		
	27690	B259		
	27691	B259		
27800	27880	B235	27820	B235
	27881	B235		
28000	28137	B233	28300	B233,B235
	28150	B235	28317	B235
	28158	B235		
28500R	28579R	B243	28521	B243,B245
	28580R	B243		
	28584R	B245		
28600	28678	B243	28622	B243,B247
	28680	B247		
28900	28985	B249	28920	B249
			28921	B249

series No.	inner ring	pages	outer ring	pages
29500	29580	B249	29520	B249
	29585	B249	29521	B249
	29586	B249		
29600	29675	B253	29620	B253,B255
	29685	B253		
	29688	B255		
LM29700	LM29748	B235	LM29710	B235
	LM29749	B235	LM29711	B235
31500	31594	B233	31520	B233
33000	33225	B247	33462	B247,B251,
	33262	B251		B253
	33269	B251		
	33275	B253		
	33281	B253		
	33287	B253		
33800	33885	B239	33821	B239
	33889	B243	33822	B243,B245
	33895	B245		
34000	34274	B253	34478	B253,B255,
	34301	B255		B257
	34306	B257		
	34307	B257		
37000	37425	B263	37625	B263,B265
	37431	B265		
39500	39575	B245	39520	B245,B247,
	39580	B247		B249,B251
	39581	B247	39521	B251
	39585	B249		
	39586	B249		
	39590	B251		
41000	41125	B229	41286	B229
	41126	B229		
42600	42687	B255	42620	B255,B257
	42688	B255		
	42690	B257		
L44600R	L44640R	B227	L44610	B227
	L44643R	B227		
	L44649R	B227		
45200	45282	B241	45220	B241,B243
	45284	B243	45221	B247
	45291	B247		
46000	46162	B237	46368	B237,B239
	46175	B239		
	46176	B239		
47400R	47487R	B253	47420	B253
	47490R	B253	47423	B253
47600R	47678R	B255	47620	B255,B257
(Continued)	47680R	B255	47620A	B257
	47681R	B257		

series No.	inner ring	pages	outer ring	pages
47600R	47686R	B257		
47800R	47890R	B261	47820	B261
	47896R	B261		
48100	48190	B263	48120	B263
LM48500	LM48548	B231	LM48510	B231
48600	48684	B267	48620	B267
	48685	B267		
49000	49175	B239	49368	B239
49500	49576	B239	49520	B239,B243
	49585	B243		
52000	52375	B261	52618	B261,B263
	52393	B263		
	52400	B263		
	52401	B263		
56000R	56418R	B263	56650	B263
	56425R	B263	56662	B263
59000	59200	B243	59412	B243
64000R	64433R	B265	64700	B265
	64450R	B265		
65000	65200	B245	65500	B245,B247,
	65212	B245		B249
	65225	B247		
	65237	B249		
	65237A	B249		
65300	65390	B241	65320	B241
66000R	66212R	B245	66462	B245
66500	66584	B245	66520	B245,B247
	66589	B247		
LM67000	LM67048	B231	LM67010	B231
68000	68450	B265	68712	B265
	68462	B265		
	68463	B265		
L68100	L68149	B233	L68110	B233
			L68111	B233
71000	71412	B263	71750	B263,B265
	71425	B263		
	71450	B265		
	71453	B265		
	71455	B265		
LM72800	LM72849	B227	LM72810	B227
HM81600	HM81649	B225	HM81610	B225
M84200	M84249	B227	M84210	B227
M86600R	M86643R	B227	M86610	B227,B229
	M86647R	B229		
	M86649R	B229		
M88000	M88043	B231	M88010	B231
	M88046	B231		
	M88048	B231		

series No.	inner ring	pages	outer ring	pages
HM88500	HM88542	B231	HM88510	B231
	HM88547	B231	HM88512	B231
HM88600	HM88630	B227	HM88610	B227,B231,
	HM88648	B233		B233
	HM88649	B231		
HM89400	HM89443	B231	HM89410	B231
	HM89449	B233	HM89411	B233
98000	98316	B257	98788	B257,B259,
	98335	B259		B261,B263
	98350	B261		
	98400	B263		
L102800	L102849	B239	L102810	B239
LM102900	LM102949	B241	LM102910	B241
LM104900	LM104949	B243	LM104911	B243
HM212000	HM212046	B249	HM212010	B251
	HM212049	B251	HM212011	B249
L217800	L217849	B259	L217810	B259
HM218200	HM218248	B261	HM218210	B261
HH221400	HH221430	B255	HH221410	B255,B257,
	HH221431	B257		B261,B263
	HH221434	B261		
	HH221440	B261		
	HH221442	B261		
	HH221447	B263		
	HH221449	B263		
HH224300	HH224334	B261	HH224310	B261,B263,
	HH224335	B263		B265
	HH224340	B265		
	HH224346	B265		
	HH224349	B265		
HH228300	HH228340	B265	HH228310	B265
	HH228349	B265		
LM245800	LM245833	B267	LM245810	B267
	LM245846	B267		
	LM245848	B267		
M246900	M246942	B267	M246910	B267
M249700	M249732	B267	M249710	B267
	M249734	B267		
	M249749	B267		
L305600R	L305649R	B243	L305610	B243
L319200	L319249	B261	L319210	B261
LL319300	LL319349	B261	LL319310	B261
L327200	L327249	B267	L327210	B267
M349500	M349549	B267	M349510	B267
H414200	H414235	B249	H414210	B249,B251,
	H414242	B251		B253
	H414245	B251		
	H414249	B253		
L435000	L435049	B267	L435010	B267

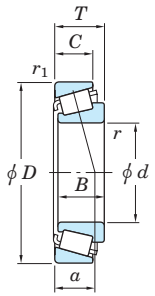
series No.	inner ring	pages	outer ring	pages
LM501300	LM501349	B237	LM501310	B237
			LM501311	B237
			LM501314	B237
LM503300R	LM503349R	B241	LM503310	B241
HH506300	HH506348	B241	HH506310	B241
HM516400	HM516448	B257	HM516410	B257
HM518400	HM518445	B259	HM518410	B259
L521900R	L521949R	B263	L521910	B263
LM522500	LM522546	B263	LM522510	B263,B265
	LM522548	B265		
	LM522549	B265		
L540000	L540049	B267	L540010	B267
L555200	L555249	B267	L555210	B267
LM603000	LM603049	B241	LM603011	B241
			LM603012	B241
			LM603014	B241
LM613400	LM613449	B253	LM613410	B253
HM617000	HM617049	B259	HM617010	B259
HM624700	HM624749	B265	HM624710	B265
LL713000	LL713049	B253	LL713010	B253
H715300	H715332	B249	H715311	B249,B251,
	H715340	B251		B253
	H715341	B251		
	H715343	B251		
	H715345	B253		
HM801300	HM801346	B235	HM801310	B235,B237
	HM801346X	B235		
	HM801349	B237		
M802000	M802048	B237	M802011	B237
HM803100	HM803145	B237	HM803110	B237,B239
	HM803146	B237		
	HM803149	B239		
M804000	M804049	B241	M804010	B241
HM804800	HM804840	B237	HM804810	B237,B239,
	HM804842	B239		B241
	HM804843	B239		
	HM804846	B241		
	HM804848	B241		
	HM804849	B241		
LM806600	LM806649	B245	LM806610	B245
HM807000	HM807035	B237	HM807010	B237,B239,
	HM807040	B239		B241,B245
	HM807044	B241		
	HM807046	B245		
	HM807049	B245		
HM813800	HM813840	B247	HM813810	B247,B249
(Continued)	HM813841	B249	HM813811	B249,B251,
	HM813841A	B249		B253
	HM813844	B251		

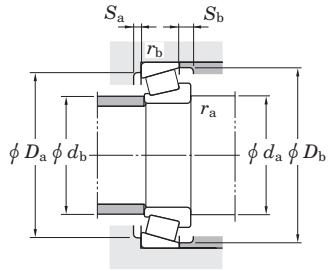
series No.	inner ring	pages	outer ring	pages
HM813800	HM813849	B253		
LM814800	LM814849	B257	LM814810	B257
HH926700	HH926744	B265	HH926710	B265

Metric J series

series No.	inner ring	pages	outer ring	pages
JL69300	JL69349	B233	JL69310	B233
JLM104900	JLM104948	B243	JLM104910	B243
JM205100	JM205149	B243	JM205110	B243
JM207000	JM207049	B247	JM207010	B247
JH211700	JH211749	B251	JH211710	B251
	JH211749A	B251		
JH217200	JH217249	B259	JH217210	B259
JH307700	JH307749	B247	JH307710	B247
JHM318400	JHM318448	B261	JHM318410	B261
JH415600	JH415647	B255	JH415610	B255
JLM506800	JLM506849	B245	JLM506810	B245
JLM508700	JLM508748	B247	JLM508710	B247
JM511900	JM511946	B249	JM511910	B249
JM515600	JM515649	B257	JM515610	B257
JHM516800	JHM516849	B259	JHM516810	B259
JHM522600	JHM522649	B265	JHM522610	B265
JHM534100	JHM534149	B267	JHM534110	B267
JM612900	JM612949	B253	JM612910	B253
JLM710900	JLM710949	B249	JLM710910	B249
JLM714100	JLM714149	B255	JLM714110	B255
JM714200	JM714249	B255	JM714210	B255
JM716600	JM716649	B259	JM716610	B259
JM718100	JM718149	B261	JM718110	B261
JM719100	JM719149	B261	JM719113	B261
JHM720200	JHM720249	B263	JHM720210	B263
JM720200	JM720249	B263	JM720210	B263
JM734400	JM734449	B267	JM734410	B267
JM736100	JM736149	B267	JM736110	B267
JM738200	JM738249	B267	JM738210	B267
JHM807000	JHM807045	B243	JHM807012	B243
JLM813000	JLM813049	B253	JLM813010	B253
JM822000	JM822049	B265	JM822010	B265
JHM840400	JHM840449	B267	JHM840410	B267

d 15 ~ 22 mm

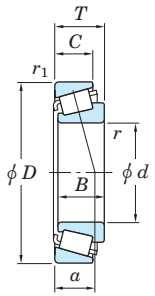


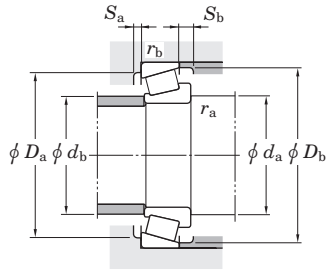


Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. [1]		Dimension series to ISO355	Load center (mm)	Mounting dimensions (mm)										Constant	Axial load factors		(Refer.) Mass
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.			(Refer.)	a	d_a min.	d_b max.	D_a max.	D_b min.	S_a min.	S_b min.	r_a max.	r_b max.	e	Y_1	Y_0	(kg)
15	35	11.75	11	10	0.6	0.6	19.8	14.5	2.00	12 000	16 000	**30202R**		—	8.3	19.5	20	30.5	33	2	1.7	0.6	0.6	0.32	1.88	1.04	0.054
	42	14.25	13	11	1	1	27.4	19.2	2.65	10 000	14 000	**30302JR**		2FB	10.0	20.5	22	36.5	35	2	3	1	1	0.29	2.11	1.16	0.098
17	40	13.25	12	11	1	1	26.0	20.7	2.85	10 000	14 000	**30203JR**		2DB	10.1	22.5	23	34.5	33	2	2	1	1	0.35	1.74	0.96	0.081
	40	17.25	16	14	1	1	34.3	27.5	3.85	10 000	14 000	**32203JR**		2DD	11.4	22.5	23	34.5	33	2	3	1	1	0.31	1.92	1.06	0.104
	47	15.25	14	12	1	1	34.2	24.5	3.45	9 200	12 000	**30303JR**		2FB	11.0	22.5	25	41.5	40	2	3	1	1	0.29	2.11	1.16	0.133
	47	15.25	14	12	1	1	34.2	24.5	3.45	9 200	12 000	**30303R**		—	10.5	22.5	25	41.5	40	2	3	1	1	0.28	2.11	1.16	0.127
	47	20.25	19	16	1	1	39.9	29.9	4.25	9 400	13 000	**32303**		—	12.4	22.5	25	41.5	39	2	4	1	1	0.28	2.11	1.16	0.170
	47	20.25	19	16	1	1	45.7	35.9	5.10	9 400	13 000	**32303JR**		2FD	12.2	22.5	25	41.5	39	2	4	1	1	0.29	2.11	1.16	0.176
20	42	15	15	12	0.6	0.6	34.1	31.5	4.35	9 700	13 000	**32004JR**		3CC	10.5	24.5	25	37.5	35	3	3	0.6	0.6	0.37	1.60	0.88	0.102
	47	15.25	14	12	1	1	34.2	25.5	3.75	9 000	12 000	**57008R**		—	12.9	25.5	26	41.5	37	2	3	1	1	0.52	1.16	0.64	0.125
	47	15.25	14	12	1	1	33.8	27.2	3.80	8 700	12 000	**30204JR**		2DB	11.8	25.5	27	41.5	39	2	3	1	1	0.35	1.74	0.96	0.127
	47	19.25	18	15	1	1	41.4	34.7	4.90	8 900	12 000	**32204JR**		2DD	12.5	25.5	27	41.5	39	2	4	1	1	0.33	1.81	1.00	0.159
	47	19.25	18	16	1	1	41.6	37.0	5.00	9 100	12 000	**32204XR**		—	15.3	25.5	25	41.5	35	2	3	1	1	0.55	1.10	0.60	0.170
	52	16.25	16	12	1.5	1.5	43.3	28.4	4.65	8 300	11 000	**30304AC**		—	13.5	28.5	28	43.5	42	4	4	1.5	1.5	0.55	1.10	0.60	0.170
	52	16.25	16	13	1.5	1.5	45.3	35.1	5.05	8 300	11 000	**30304AJR**		—	11.1	28.5	28	44	44	47	2	3	1.5	1.5	0.30	2.00	1.10	0.179
	52	22.25	21	18	1.5	1.5	52.3	44.9	6.05	8 600	12 000	**32304CR**		—	16.5	28.5	25	43.5	37	48	3	4	1.5	1.5	0.55	1.10	0.60	0.250
	52	22.25	21	18	1.5	1.5	56.5	46.7	6.70	8 400	11 000	**32304JR**		2FD	14.4	28.5	27	43.5	43	47	3	4	1.5	1.5	0.30	2.00	1.10	0.244
22	44	15	15	11.5	0.6	0.6	35.4	33.6	4.65	9 100	12 000	**320/22JR**		3CC	11.0	26.5	27	39.5	38	41	3	3.5	0.6	0.6	0.40	1.51	0.83	0.108
	47	17	17.5	13.5	1	1	40.9	35.9	5.05	8 700	12 000	**T2CC022**		2CC	11.3	27.5	28	41.5	40	44	4	3.5	1	1	0.33	1.79	0.99	0.138
	50	15.25	14	12	1	1	32.1	25.7	3.50	8 400	11 000	**302/22CR**		—	13.9	27.5	28	44.5	40	47	2	3	1	1	0.55	1.10	0.60	0.140
	50	15.25	14	12	1	1	36.5	30.9	4.30	8 100	11 000	**302/22R**		—	12.2	27.5	30	44.5	41	46	2	3	1	1	0.37	1.60	0.88	0.144
	50	19.25	18	15	1	1	43.8	39.1	5.35	8 400	11 000	**322/22CR**		—	15.5	27.5	28	44.5	38	47	2	4	1	1	0.55	1.10	0.60	0.170
	50	19.25	18	15	1	1	46.0	41.6	5.85	8 100	11 000	**322/22R**		—	14.0	27.5	29	44.5	41	46	2	4	1	1	0.37	1.60	0.88	0.178
	56	17.25	16	13	1.5	1.5	43.0	33.9	4.70	7 700	10 000	**303/22XR**		—	15.7	30.5	31	47.5	44	52	3	4	1.5	1.5	0.59	1.02	0.56	0.210
	56	17.25	16	14	1.5	1.5	52.2	41.1	5.95	7 500	10 000	**303/22R**		—	12.2	30.5	32	47.5	47	51	2	3	1.5	1.5	0.31	1.97	1.08	0.216
	56	22.25	21	17	1.5	1.5	60.4	50.6	7.00	8 000	11 000	**323/22CR**		—	16.9	30.5	28	47.5	41	52	3	5	1.5	1.5	0.55	1.10	0.60	0.290
	56	22.25	21	18	1.5	1.5	63.3	52.7	7.70	7 600	10 000	**323/22R**		—	14.6	30.5	31	47.5	46	51	3	4	1.5	1.5	0.31	1.97	1.08	0.273

[Note] 1) Please consult with JTEKT when using the bearings identified by suffix C. They are medium-tapered types especially designed for special purposes.

d 25 ~ (30) mm

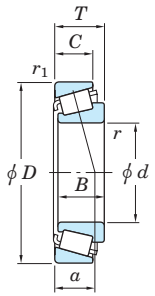


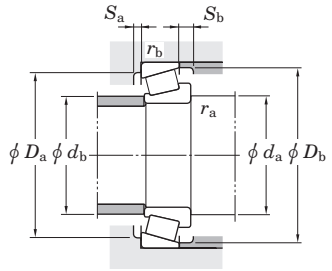


Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. [1]		Dimension series to ISO355 (Refer.)	Load center (mm)	Mounting dimensions (mm)									Constant	Axial load factors		(Refer.) Mass (kg)
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.				a	d_a min.	d_b max.	D_a max.	D_b min.	S_a min.	S_b min.	r_a max.	r_b max.	e	Y_1	Y_0	
25	47	15	15	11.5	0.6	0.6	37.8	37.7	5.20	8 300	11 000	**32005JR**		4CC	11.8	29.5	30	42.5	44	3	3.5	0.6	0.6	0.43	1.39	0.77	0.118
	47	17	17	14	0.6	0.6	42.0	42.3	5.95	8 300	11 000	**33005JR**		2CE	10.9	29.5	30	42.5	44	3	3	0.6	0.6	0.29	2.07	1.14	0.131
	52	16.25	15	12	1	1	38.0	32.4	4.45	7 900	11 000	**30205XR**		—	14.9	30.5	30	46.5	49	2	4	1	1	0.58	1.04	0.57	0.155
	52	16.25	15	13	1	1	39.3	33.7	4.75	7 800	10 000	**30205JR**		3CC	12.9	30.5	31	46.5	48	2	3	1	1	0.37	1.60	0.88	0.156
	52	19.25	18	16	1	1	45.5	43.2	5.90	7 900	11 000	**32205XR**		—	16.2	30.5	30	46.5	40	2	3	1	1	0.55	1.10	0.60	0.200
	52	19.25	18	16	1	1	49.7	44.8	6.35	7 900	11 000	**32205JR**		2CD	13.5	30.5	31	46.5	43	2	4	1	1	0.36	1.67	0.92	0.188
	52	22	22	18	1	1	61.1	58.5	8.25	7 900	10 000	**33205JR**		2DE	14.1	30.5	30	46.5	43	4	4	1	1	0.35	1.71	0.94	0.225
	62	18.25	17	13	1.5	1.5	49.7	42.5	5.80	5 700	8 000	**30305DJR**		7FB	20.4	33.5	34	53.5	47	3	5	1.5	1.5	0.83	0.73	0.40	0.269
	62	18.25	17	14	1.5	1.5	56.3	45.8	6.50	6 700	9 000	**TR0506R**		—	16.3	33.5	35	53.5	50	3	4	1.5	1.5	0.55	1.10	0.60	0.275
	62	18.25	17	15	1.5	1.5	60.3	46.9	6.90	6 800	9 000	**30305JR**		2FB	12.9	33.5	34	54	54	2	3	1.5	1.5	0.30	2.00	1.10	0.273
	62	25.25	24	19	1.5	1.5	71.6	65.8	9.20	7 000	9 300	**32305XR**		—	18.9	33.5	33	53.5	46	3	6	1.5	1.5	0.55	1.10	0.60	0.390
	62	25.25	24	20	1.5	1.5	76.6	64.1	9.50	6 900	9 100	**32305JR**		2FD	16.6	33.5	33	53.5	52	3	5	1.5	1.5	0.30	2.00	1.10	0.386
28	52	16	16	12	1	1	44.1	44.0	6.10	7 500	10 000	**320/28JR**		4CC	12.7	33.5	33	46.5	45	3	4	1	1	0.43	1.39	0.77	0.150
	58	17.25	16	13	1	1	48.5	41.7	5.85	7 000	9 300	**302/28CR**		—	16.0	33.5	34	52.5	47	2	4	1	1	0.55	1.10	0.60	0.205
	58	17.25	16	14	1	1	48.5	42.0	6.00	7 000	9 300	**302/28R**		—	13.4	33.5	35	52.5	49	2	3	1	1	0.37	1.60	0.88	0.209
	58	20.25	19	16	1	1	56.1	54.1	7.50	7 100	9 400	**322/28CR**		—	17.0	33.5	33	52.5	45	3	4	1	1	0.55	1.10	0.60	0.255
	58	20.25	19	16	1	1	61.5	55.2	7.95	6 900	9 100	**322/28R**		—	15.0	33.5	35	52.5	49	54.5	2	4	1	1	0.37	1.60	0.88	0.244
	58	24	24	19	1	1	71.9	69.5	10.0	7 000	9 300	**332/28JR**		2DE	15.4	33.5	34	52.5	49	55	4	5	1	1	0.34	1.77	0.97	0.302
	68	19.75	18	14	1.5	1.5	64.6	50.2	7.25	6 200	8 200	**303/28CR**		—	17.8	36.5	37	59.5	55	64	3	4.5	1.5	1.5	0.55	1.10	0.60	0.332
	68	19.75	18	16	1.5	1.5	66.9	54.0	8.00	6 100	8 200	**303/28R**		—	14.9	36.5	38	59.5	58	63	2	3.5	1.5	1.5	0.32	1.88	1.04	0.345
	68	25.75	24	20	1.5	1.5	83.2	72.9	10.5	6 300	8 500	**323/28CR**		—	20.5	36.5	35	59.5	51	64	3	5.5	1.5	1.5	0.55	1.10	0.60	0.480
	68	25.75	24	21	1.5	1.5	87.0	75.6	11.3	6 100	8 100	**323/28R**		—	17.6	36.5	38	59.5	57	63	3	4.5	1.5	1.5	0.32	1.88	1.04	0.469
30	55	17	17	13	1	1	47.9	48.0	6.75	7 000	9 400	**32006JR**		4CC	13.6	35.5	35	49.5	47	52	3	4	1	1	0.43	1.39	0.77	0.177
	55	20	20	16	1	1	54.1	55.2	7.90	7 000	9 400	**33006JR**		2CE	13.0	35.5	36	49.5	48	52	3	4	1	1	0.29	2.06	1.13	0.203
	62	17.25	16	13	1	1	52.9	45.1	6.35	6 500	8 700	**30206CR**		—	16.5	35.5	36	56.5	51	59	2	4	1	1	0.55	1.10	0.60	0.230
	62	17.25	16	14	1	1	51.8	44.8	6.45	6 500	8 700	**30206JR**		3DB	14.1	35.5	37	56.5	53	57	2	3	1	1	0.37	1.60	0.88	0.236
	62	21.25	20	16	1	1	64.6	59.0	8.30	6 600	8 900	**32206XR**		—	18.0	35.5	36	56.5	49	59	3	5	1	1	0.55	1.10	0.60	0.300
	62	21.25	20	17	1	1	63.3	57.9	8.40	6 500	8 700	**32206JR**		3DC	15.9	35.5	37	56.5	52	58	2	4	1	1	0.37	1.60	0.88	0.292

[Note] 1) Please consult with JTEKT when using the bearings identified by suffix C. They are medium-tapered types especially designed for special purposes.

d (30) ~ (35) mm



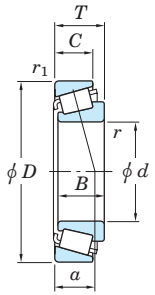


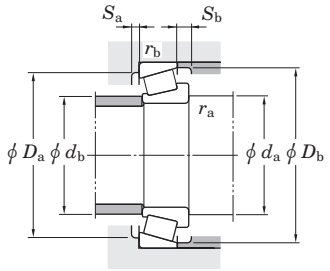
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. [1]	Dimension series to ISO355 (Refer.)	Load center (mm)	Mounting dimensions (mm)								Constant	Axial load factors		(Refer.) Mass
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.			a	d_a min.	d_b max.	D_a max.	D_b min.	S_a min.	S_b min.	r_a max.	r_b max.	e	Y_1	Y_0	(kg)
30	62	25	25	19.5	1	1	83.1	79.4	11.6	6 500	8 700	**33206JR**	2DE	16.3	35.5	36	56.5	59	5	5.5	1	1	0.34	1.76	0.97	0.359
	72	20.75	19	14	1.5	1.5	63.5	54.9	7.70	4 900	6 800	**30306DJR**	7FB	23.7	38.5	40	63.5	55	68	3	6.5	1.5	1.5	0.83	0.73	0.40	0.400
	72	20.75	19	16	1.5	1.5	71.2	55.6	8.10	5 900	7 900	**TRA0607R**	—	18.6	38.5	39	63.5	58	68	3	4.5	1.5	1.5	0.55	1.10	0.60	0.405
	72	20.75	19	16	1.5	1.5	74.4	60.1	9.00	5 800	7 700	**30306JR**	2FB	15.7	38.5	40	63.5	62	66	3	4.5	1.5	1.5	0.31	1.90	1.05	0.411
	72	28.75	27	23	1.5	1.5	100	93.8	13.4	6 000	8 000	**32306CR**	5FD	22.0	38.5	37	63.5	54	68	3	5.5	1.5	1.5	0.55	1.10	0.60	0.610
	72	28.75	27	23	1.5	1.5	103	91.6	13.8	5 900	7 900	**32306JR**	2FD	18.9	38.5	39	63.5	59	66	3	5.5	1.5	1.5	0.31	1.90	1.05	0.588
32	58	17	17	13	1	1	49.2	50.6	7.10	6 700	8 900	**320/32JR**	4CC	14.3	37.5	38	52.5	50	55	3	4	1	1	0.45	1.32	0.73	0.196
	65	18.25	17	14	1	1	59.3	51.5	7.35	6 200	8 300	**302/32CR**	—	17.2	37.5	38	59.5	53	62	3	4	1	1	0.55	1.10	0.60	0.275
	65	18.25	17	15	1	1	60.1	51.4	7.45	6 200	8 200	**302/32R**	—	14.9	37.5	39	59.5	55	61	3	3	1	1	0.37	1.60	0.88	0.266
	65	22.25	21	17	1	1	69.6	65.1	9.20	6 300	8 400	**322/32CR**	—	18.7	37.5	37	59.5	51	62	3	5	1	1	0.55	1.10	0.60	0.340
	65	22.25	21	18	1	1	64.5	57.7	8.45	6 200	8 200	**322/32**	—	16.3	37.5	40	59.5	55	61	2	4	1	1	0.37	1.60	0.88	0.330
	65	26	26	20.5	1	1	89.7	86.9	12.8	6 200	8 300	**332/32JR**	2DE	16.9	37.5	38	59.5	55	62	5	5.5	1	1	0.35	1.73	0.95	0.404
	75	21.75	20	16	1.5	1.5	79.4	66.3	9.70	5 600	7 400	**303/32CR**	—	19.7	40.5	42	66.5	60	70	3	5.5	1.5	1.5	0.55	1.10	0.60	0.465
	75	21.75	20	18	1.5	1.5	80.5	65.6	9.90	5 500	7 300	**303/32R**	—	16.0	40.5	43	66.5	64	70	3	3.5	1.5	1.5	0.32	1.88	1.04	0.461
	75	29.75	28	23	1.5	1.5	93.8	87.1	12.6	5 600	7 400	**TR0608A**	5FD	23.7	40.5	41	66.5	57	71	3	6.5	1.5	1.5	0.55	1.10	0.60	0.649
	75	29.75	28	25	1.5	1.5	112	101	15.3	5 600	7 400	**323/32R**	—	19.6	40.5	42	66.5	63	69	3	4.5	1.5	1.5	0.32	1.88	1.04	0.650
35	55	14	14	11.5	0.6	0.6	32.8	36.5	5.10	6 600	8 800	**32907JR-2**	2BD	10.9	39.5	40	50.5	49	52	2.5	2.5	0.6	0.6	0.29	2.06	1.13	0.120
	62	18	18	14	1	1	57.0	59.4	8.40	6 200	8 200	**32007JR**	4CC	15.1	40.5	40	56.5	54	59	4	4	1	1	0.45	1.32	0.73	0.231
	62	21	20	16	1	1	51.3	53.8	7.70	6 200	8 200	**33007**	—	14.8	40.5	41	56.5	55	59	3	4	1	1	0.33	1.80	0.99	0.250
	62	21	21	17	1	1	64.3	68.0	9.85	6 200	8 200	**33007JR**	2CE	14.2	40.5	41	56.5	55	59	3	4	1	1	0.31	1.97	1.08	0.263
	72	18.25	17	15	1.5	1.5	66.1	56.2	8.10	5 700	7 600	**30207CR**	—	17.9	43.5	43	63.5	59	68	3	3	1.5	1.5	0.55	1.10	0.60	0.350
	72	18.25	17	15	1.5	1.5	68.8	60.9	8.95	5 600	7 400	**30207JR**	3DB	15.3	43.5	44	63.5	62	67	3	3	1.5	1.5	0.37	1.60	0.88	0.344
	72	24.25	23	19	1.5	1.5	86.3	86.6	12.3	5 700	7 600	**32207-1R**	—	21.1	43.5	42	63.5	56	68	3	5	1.5	1.5	0.58	1.04	0.57	0.465
	72	24.25	23	19	1.5	1.5	86.9	82.4	12.2	5 600	7 500	**32207JR**	3DC	18.2	43.5	43	63.5	61	67	3	5	1.5	1.5	0.37	1.60	0.88	0.453
	72	28	28	22	1.5	1.5	110	107	15.8	5 700	7 500	**33207JR**	2DE	18.4	43.5	42	63.5	61	68	5	6	1.5	1.5	0.35	1.70	0.93	0.551
	80	22.75	21	15	2	1.5	78.7	69.1	9.85	4 300	6 000	**30307DJR**	7FB	26.8	45	44	70	66	76.5	3	7.5	2	1.5	0.83	0.73	0.40	0.536
	80	22.75	21	18	2	1.5	87.2	77.8	11.4	5 200	7 000	**30307XR**	—	20.5	45	45	70	63	74	3	4.5	2	1.5	0.55	1.10	0.60	0.560
	80	22.75	21	18	2	1.5	95.2	78.9	12.0	5 200	6 900	**30307JR-1**	2FB	16.9	45	45	70	70	74	3	4.5	2	1.5	0.31	1.90	1.05	0.527

[Note] 1) Please consult with JTEKT when using the bearings identified by suffix C. They are medium-tapered types especially designed for special purposes.

Single-row tapered roller bearings
metric series

d (35) ~ (45) mm

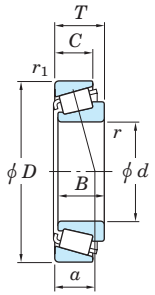


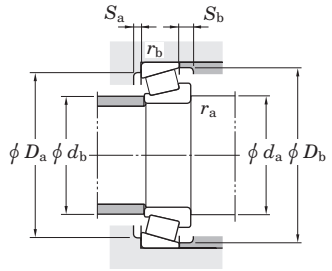


Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. [1]		Dimension series to ISO355 (Refer.)	Load center (mm)	Mounting dimensions (mm)									Constant	Axial load factors		(Refer.) Mass (kg)
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.				a	d_a min.	d_b max.	D_a max.	D_b min.	S_a min.	S_b min.	r_a max.	r_b max.	e	Y_1	Y_0	
35	80	32.75	31	25	2	1.5	121	123	18.0	5 200	7 000	**TR0708-1R**		—	23.8	45	44	70	60	75	3	7.5	2	1.5	0.47	1.27	0.70	0.830
	80	32.75	31	25	2	1.5	126	114	17.3	5 300	7 000	**32307JR**		2FE	20.6	45	44	70	66	74	3	7.5	2	1.5	0.31	1.90	1.05	0.776
40	62	15	15	12	0.6	0.6	42.1	48.5	6.90	5 900	7 800	**32908JR**		2BC	11.9	44.5	45	57.5	55	59	3	3	0.6	0.6	0.29	2.07	1.14	0.164
	68	19	19	14.5	1	1	67.2	71.4	10.3	5 600	7 400	**32008JR**		3CD	15.1	45.5	46	62.5	60	65	4	4.5	1	1	0.38	1.58	0.87	0.282
	68	22	22	18	1	1	75.9	84.6	12.4	5 500	7 400	**33008JR**		2BE	14.7	45.5	46	62.5	60	65	3	4	1	1	0.28	2.12	1.17	0.326
	75	26	26	20.5	1.5	1.5	103	108	16.1	5 200	6 900	**33108JR**		2CE	18.3	48.5	47	66.5	65	71	4	5.5	1.5	1.5	0.36	1.69	0.93	0.508
	80	19.75	18	15	1.5	1.5	76.6	67.4	9.90	5 000	6 700	**30208CR**		—	20.2	48.5	49	71.5	66	76	3	4.5	1.5	1.5	0.55	1.10	0.60	0.445
	80	19.75	18	16	1.5	1.5	78.4	69.2	10.3	5 000	6 700	**30208JR**		3DB	17.0	48.5	49	71.5	69	75	3	3.5	1.5	1.5	0.37	1.60	0.88	0.434
	80	24.75	23	19	1.5	1.5	98.0	93.1	13.7	5 000	6 700	**32208CR**		5DC	22.0	48.5	48	71.5	64	76	3	5.5	1.5	1.5	0.55	1.10	0.60	0.570
	80	24.75	23	19	1.5	1.5	97.0	90.8	13.6	5 000	6 600	**32208JR**		3DC	19.4	48.5	48	71.5	68	75	3	5.5	1.5	1.5	0.37	1.60	0.88	0.554
	80	32	32	25	1.5	1.5	135	139	20.8	5 000	6 700	**33208JR**		2DE	20.7	48.5	47	71.5	67	76	5	7	1.5	1.5	0.36	1.68	0.92	0.758
	85	33	32.5	28	2.5	2	143	143	21.6	4 800	6 400	**T2EE040**		2EE	21.9	52	48	75	70	80	5	5	2	2	0.34	1.74	0.96	0.900
	90	25.25	23	17	2	1.5	100	90.2	13.1	3 800	5 300	**30308DJR**		7FB	29.9	50	51	80	71	86.5	3	8	2	1.5	0.83	0.73	0.40	0.757
	90	25.25	23	20	2	1.5	109	98.5	14.8	4 600	6 100	**30308XR**		—	23.8	50	53	80	72	84	3	5	2	1.5	0.55	1.10	0.60	0.780
	90	25.25	23	20	2	1.5	113	101	15.5	4 500	6 100	**30308JR**		2FB	19.9	50	52	80	77	82	3	5	2	1.5	0.35	1.74	0.96	0.757
	90	35.25	33	26	2	1.5	140	138	20.2	4 700	6 200	**TR0809AR**		—	27.5	50	49	80	67	85	3	9	2	1.5	0.55	1.10	0.60	1.10
	90	35.25	33	27	2	1.5	145	139	21.3	4 600	6 200	**32308JR**		2FD	24.3	50	50	80	73	82	3	8	2	1.5	0.35	1.74	0.96	1.06
45	68	15	15	12	0.6	0.6	43.5	52.4	7.45	5 300	7 100	**32909JR**		2BC	12.5	49.5	50	63.5	61	64	3	3	0.6	0.6	0.32	1.88	1.04	0.190
	75	20	20	15.5	1	1	78.8	86.5	12.6	5 000	6 600	**32009JR**		3CC	16.5	50.5	51	69.5	67	72	4	4.5	1	1	0.39	1.53	0.84	0.354
	75	24	24	19	1	1	87.4	101	14.9	5 000	6 700	**33009JR**		2CE	16.4	50.5	51	69.5	67	71	4	5	1	1	0.29	2.04	1.12	0.416
	80	26	26	20.5	1.5	1.5	110	120	17.9	4 800	6 400	**33109JR**		3CE	19.4	53.5	52	71.5	69	76.5	4	5.5	1.5	1.5	0.38	1.57	0.86	0.563
	85	20.75	19	15	1.5	1.5	83.1	77.0	11.4	4 600	6 100	**30209XR**		—	21.1	53.5	54	76.5	71	80	4	5.5	1.5	1.5	0.55	1.10	0.60	0.500
	85	20.75	19	16	1.5	1.5	83.9	77.4	11.6	4 600	6 100	**30209JR**		3DB	18.9	53.5	54	76.5	74	80	3	4.5	1.5	1.5	0.40	1.48	0.81	0.502
	85	24.75	23	19	1.5	1.5	101	102	15.1	4 600	6 200	**32209CR**		—	23.0	53.5	53	76.5	69	81	3	5.5	1.5	1.5	0.55	1.10	0.60	0.625
	85	24.75	23	19	1.5	1.5	105	104	15.6	4 600	6 100	**32209JR-1**		3DC	20.3	53.5	53	76.5	73	81	3	5.5	1.5	1.5	0.40	1.48	0.81	0.597
	85	32	32	25	1.5	1.5	139	149	22.3	4 600	6 200	**33209JR**		3DE	21.8	53.5	52	76.5	72	81	5	7	1.5	1.5	0.39	1.56	0.86	0.818
	95	29	26.5	20	2.5	2.5	118	118	17.0	3 600	5 100	**T7FC045**		7FC	32.6	57	54	83	71	91	3	9	2	2	0.87	0.69	0.38	0.943
	95	36	35	30	2.5	2.5	175	177	27.2	4 300	5 700	**T2ED045**		2ED	23.8	57	55	83	80	89	6	6	2	2	0.32	1.86	1.02	1.20

[Note] 1) Please consult with JTEKT when using the bearings identified by suffix C. They are medium-tapered types especially designed for special purposes.

d (45) ~ (55) mm

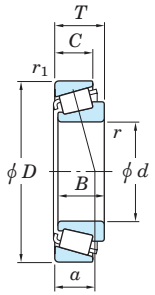


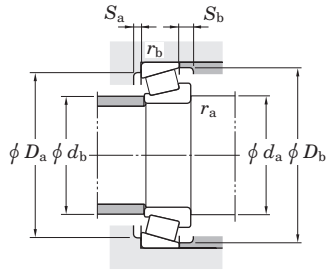


Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. [1]		Dimension series to ISO355 (Refer.)	Load center (mm)	Mounting dimensions (mm)								Constant	Axial load factors		(Refer.) Mass (kg)
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.				a	d_a min.	d_b max.	D_a max.	D_b min.	S_a min.	S_b min.	r_a max.	r_b max.	e	Y_1	Y_0	
45	100	27.25	25	18	2	1.5	119	107	15.8	3 400	4 700	**30309DJR**		7FB	32.9	55	56	90	79	96	3	9	2	1.5	0.83	0.73	0.40	0.973
	100	27.25	25	20	2	1.5	136	119	18.1	4 100	5 500	**30309CR**		—	25.7	55	57	90	81	94	4	7	2	1.5	0.55	1.10	0.60	1.00
	100	27.25	25	22	2	1.5	141	128	19.9	4 100	5 400	**30309JR**		2FB	21.3	55	59	90	86	93	3	5	2	1.5	0.35	1.74	0.96	1.01
	100	38.25	36	29	2	1.5	181	182	27.0	4 200	5 600	**32309CR**		—	30.3	55	56	90	76	95	4	9	2	1.5	0.55	1.10	0.60	1.45
	100	38.25	36	30	2	1.5	183	180	27.7	4 100	5 500	**32309JR**		2FD	26.8	55	56	90	82	93	3	8	2	1.5	0.35	1.74	0.96	1.43
50	72	15	15	12	0.6	0.6	45.0	56.3	8.00	4 900	6 600	**32910JR**		2BC	13.7	54.5	55	67.5	65	69	3	3	0.6	0.6	0.34	1.76	0.97	0.195
	80	20	20	15.5	1	1	82.7	94.5	13.8	4 600	6 100	**32010JR**		3CC	17.7	55.5	56	74.5	72	77	4	4.5	1	1	0.42	1.42	0.78	0.389
	80	24	24	19	1	1	91.8	110	16.3	4 600	6 100	**33010JR**		2CE	17.4	55.5	56	74.5	72	76	4	5	1	1	0.32	1.90	1.04	0.451
	85	26	26	20	1.5	1.5	112	127	18.9	4 400	5 900	**33110JR**		3CE	20.6	58.5	56	76.5	74	81.5	4	6	1.5	1.5	0.41	1.46	0.80	0.594
	90	21.75	20	16	1.5	1.5	96.7	95.8	14.3	4 300	5 700	**30210CR**		—	22.7	58.5	58	81.5	76	86	4	5.5	1.5	1.5	0.55	1.10	0.60	0.590
	90	21.75	20	17	1.5	1.5	95.6	91.7	13.8	4 300	5 700	**30210JR**		3DB	20.1	58.5	58	81.5	79	85	3	4.5	1.5	1.5	0.42	1.43	0.79	0.566
	90	24.75	23	19	1.5	1.5	106	113	16.7	4 300	5 700	**32210CR**		—	24.0	58.5	58	81.5	74	86	3	5.5	1.5	1.5	0.55	1.10	0.60	0.675
	90	24.75	23	19	1.5	1.5	106	105	15.9	4 300	5 700	**32210JR**		3DC	20.6	58.5	58	81.5	78	85	3	5.5	1.5	1.5	0.42	1.43	0.79	0.643
	90	32	32	24.5	1.5	1.5	150	167	25.0	4 300	5 700	**33210JR**		3DE	23.1	58.5	57	81.5	77	86.5	5	7.5	1.5	1.5	0.41	1.45	0.80	0.887
	100	36	35	30	2.5	2.5	196	196	30.2	4 100	5 400	**T2ED050**		2ED	24.5	62	58	88	84	94	6	6	2	2	0.34	1.75	0.96	1.28
	105	32	29	22	3	3	141	140	20.3	3 300	4 600	**T7FC050**		7FC	35.9	64	59	91	78	100	4	10	2.5	2.5	0.87	0.69	0.38	1.25
	110	29.25	27	19	2.5	2	144	133	19.8	3 100	4 300	**30310DJR**		7FB	35.0	62	62	98	87	105	3	10	2	2	0.83	0.73	0.40	1.25
	110	29.25	27	20	2.5	2	155	143	21.9	3 700	4 900	**30310CR**		—	27.5	62	64	98	90	103	4	9	2	2	0.55	1.10	0.60	1.25
	110	29.25	27	23	2.5	2	172	152	24.0	3 700	4 900	**30310JR**		2FB	22.9	62	65	98	95	102	3	6	2	2	0.35	1.74	0.96	1.32
	110	42.25	40	33	2.5	2	214	234	34.6	3 800	5 100	**32310CR**		5FD	33.4	62	61	98	81	103	4	9	2	2	0.55	1.10	0.60	2.00
	110	42.25	40	33	2.5	2	221	220	34.2	3 700	5 000	**32310JR**		2FD	29.4	62	62	98	90	102	3	9	2	2	0.35	1.74	0.96	1.89
55	80	17	17	14	1	1	55.8	73.3	10.6	4 400	5 900	**32911JR**		2BC	14.5	61	61	74	72	76	3	3	1	1	0.31	1.94	1.07	0.285
	90	23	23	17.5	1.5	1.5	106	121	18.2	4 100	5 500	**32011JR**		3CC	19.8	63.5	63	81.5	81	86	4	5.5	1.5	1.5	0.41	1.48	0.81	0.569
	90	27	27	21	1.5	1.5	121	149	22.6	4 100	5 400	**33011JR**		2CE	19.3	63.5	63	81.5	81	86	5	6	1.5	1.5	0.31	1.92	1.06	0.672
	95	30	30	23	1.5	1.5	145	161	24.6	4 000	5 300	**33111JR**		3CE	22.5	63.5	62	86.5	83	91	5	7	1.5	1.5	0.37	1.60	0.88	0.868
	100	22.75	21	17	2	1.5	112	108	16.2	3 900	5 200	**30211CR**		—	24.3	65	63	90	84	95	4	5.5	2	1.5	0.55	1.10	0.60	0.750
	100	22.75	21	18	2	1.5	118	113	17.3	3 900	5 200	**30211JR**		3DB	20.7	65	64	90	88	94	4	4.5	2	1.5	0.40	1.48	0.81	0.732
	100	26.75	25	21	2	1.5	134	135	20.4	3 900	5 200	**32211CR**		—	25.9	65	64	90	83	96	4	5.5	2	1.5	0.55	1.10	0.60	0.875

[Note] 1) Please consult with JTEKT when using the bearings identified by suffix C. They are medium-tapered types especially designed for special purposes.

d (55) ~ (65) mm



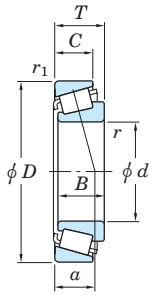


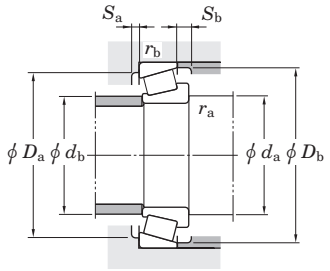
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. [1]		Dimension series to ISO355	Load center (mm)	Mounting dimensions (mm)									Constant	Axial load factors		(Refer.) Mass
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.			(Refer.)	a	d_a min.	d_b max.	D_a max.	D_b min.	S_a min.	S_b min.	r_a max.	r_b max.	e	Y_1	Y_0	(kg)
55	100	26.75	25	21	2	1.5	134	133	20.5	3 900	5 200	**32211JR-1**		3DC	23.0	65	63	90	87	95	4	5.5	2	1.5	0.40	1.48	0.81	0.863
	100	35	35	27	2	1.5	178	189	28.9	3 900	5 200	**33211JR**		3DE	25.3	65	62	90	85	96	6	8	2	1.5	0.40	1.50	0.83	1.18
	115	34	31	23.5	3	3	161	164	23.9	3 000	4 200	**T7FC055**		7FC	38.6	69	65	101	86	109	4	10.5	2.5	2.5	0.87	0.69	0.38	1.59
	120	31.5	29	21	2.5	2	161	148	22.3	2 900	4 000	**30311DJR**		7FB	38.4	67	68	108	94	113	4	10.5	2	2	0.83	0.73	0.40	1.59
	120	31.5	29	22	2.5	2	180	161	24.8	3 400	4 500	**30311CR**		—	29.8	67	70	108	97	112	4.5	9.5	2	2	0.55	1.10	0.60	1.58
	120	31.5	29	25	2.5	2	187	170	27.0	3 300	4 500	**30311JR**		2FB	25.5	67	71	108	104	111	4	6.5	2	2	0.35	1.74	0.96	1.65
	120	45.5	43	35	2.5	2	230	247	36.9	3 400	4 600	**32311C**		5FD	35.9	67	67	108	90	113	4	10	2	2	0.55	1.10	0.60	2.45
	120	45.5	43	35	2.5	2	214	203	31.8	3 400	4 500	**32311J**		2FD	32.4	67	68	108	99	111	4	10.5	2	2	0.35	1.74	0.96	2.24
	120	45.5	43	35	2.5	2	250	250	39.1	3 400	4 500	**32311JR**		2FD	32.4	67	68	108	99	111	4	10.5	2	2	0.35	1.74	0.96	2.38
60	85	17	17	14	1	1	57.6	78.2	11.3	4 100	5 500	**32912JR**		2BC	15.6	65.5	66	79.5	77	81	3	3	1	1	0.33	1.81	1.00	0.306
	95	23	23	17.5	1.5	1.5	108	127	19.0	3 900	5 200	**32012JR**		4CC	21.0	68.5	67	86.5	85	91	4	5.5	1.5	1.5	0.43	1.39	0.77	0.621
	95	27	27	21	1.5	1.5	127	162	24.5	3 900	5 200	**33012JR**		2CE	20.1	68.5	67	86.5	85	90	5	6	1.5	1.5	0.33	1.83	1.01	0.719
	100	30	30	23	1.5	1.5	149	170	25.9	3 700	5 000	**33112JR**		3CE	23.7	68.5	67	91.5	88	96	5	7	1.5	1.5	0.40	1.51	0.83	0.923
	110	23.75	22	17	2	1.5	127	123	18.8	3 500	4 700	**30212CR**		—	26.2	70	70	100	93	104	4	6.5	2	1.5	0.55	1.10	0.60	0.930
	110	23.75	22	19	2	1.5	133	127	19.7	3 500	4 700	**30212JR**		3EB	21.9	70	70	100	96	103	4	4.5	2	1.5	0.40	1.48	0.81	0.945
	110	29.75	28	22	2	1.5	160	164	25.1	3 600	4 700	**32212CR**		—	28.6	70	68	100	91	105	4	7.5	2	1.5	0.55	1.10	0.60	1.20
	110	29.75	28	24	2	1.5	164	167	25.9	3 500	4 700	**32212JR**		3EC	25.1	70	69	100	95	104	4	5.5	2	1.5	0.40	1.48	0.81	1.19
	110	38	38	29	2	1.5	217	239	36.6	3 600	4 700	**33212JR**		3EE	27.2	70	69	100	93	105	6	9	2	1.5	0.40	1.48	0.82	1.57
	115	39	38	31	4	2.5	198	227	34.0	3 400	4 600	**T5ED060**		5ED	32.4	78	70	103	92	110	5	8	3	2	0.53	1.13	0.62	1.81
	115	40	39	33	2.5	2.5	229	242	37.7	3 400	4 600	**T2EE060**		2EE	27.6	72	70	103	98	109	6	7	2	2	0.33	1.80	0.99	1.80
	125	37	33.5	26	3	3	191	194	28.8	2 800	3 900	**T7FC060**		7FC	40.8	74	71	111	94	119	4	11	2.5	2.5	0.82	0.73	0.40	2.03
	130	33.5	31	22	3	2.5	191	179	27.1	2 600	3 700	**30312DJR**		7FB	40.8	74	73	118	103	124	4	11.5	2.5	2	0.83	0.73	0.40	2.01
	130	33.5	31	23	3	2.5	211	196	30.5	3 100	4 200	**30312CR**		—	31.9	74	75	118	105	121	5	10.5	2.5	2	0.55	1.10	0.60	1.99
	130	33.5	31	26	3	2.5	217	201	31.9	3 100	4 100	**30312JR**		2FB	26.9	74	77	118	112	120	4	7.5	2.5	2	0.35	1.74	0.96	2.08
	130	48.5	46	37	3	2.5	286	310	41.4	3 200	4 300	**32312CR**		5FD	38.3	74	73	118	98	122	5	11	2.5	2	0.55	1.10	0.60	3.15
	130	48.5	46	37	3	2.5	277	275	38.6	3 100	4 200	**32312J**		2FD	32.3	74	74	118	107	120	4	11.5	2.5	2	0.35	1.74	0.96	2.87
	130	48.5	46	37	3	2.5	306	315	44.1	3 100	4 200	**32312JR**		2FD	32.3	74	74	118	107	120	4	11.5	2.5	2	0.35	1.74	0.96	2.99
65	90	17	17	14	1	1	59.2	83.1	12.0	3 900	5 200	**32913JR**		2BC	16.8	70.5	70	84.5	81	86	3	3	1	1	0.35	1.70	0.93	0.327

[Note] 1) Please consult with JTEKT when using the bearings identified by suffix C. They are medium-tapered types especially designed for special purposes.

Single-row tapered roller bearings
metric series

d (65) ~ (70) mm

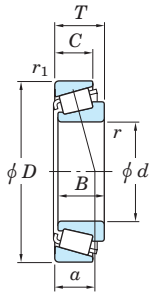


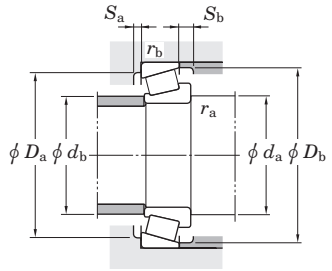


d	Boundary dimensions (mm) D	T	B	C	r min.	r1 min.	Basic load ratings (kN) Cr	C0r	Fatigue load limit (kN) Cu	Limiting speeds (min−1) Grease lub.	Oil lub.	Bearing No. [1]	Dimension series to ISO355 (Refer.)	Load center (mm) a	Mounting dimensions (mm) da min.	db max.	Da max.	Da min.	Db min.	Sa min.	Sb min.	ra max.	rb max.	Constant e	Axial load factors Y1	Y0	(Refer.) Mass (kg)
65	100	23	23	17.5	1.5	1.5	113	137	20.6	3 600	4 800	**32013JR**	4CC	22.5	73.5	72	91.5	90	97	4	5.5	1.5	1.5	0.46	1.31	0.72	0.664
	100	27	27	21	1.5	1.5	129	169	25.5	3 600	4 800	**33013JR**	2CE	21.1	73.5	72	91.5	89	96	5	6	1.5	1.5	0.35	1.72	0.95	0.762
	110	34	34	26.5	1.5	1.5	191	223	34.3	3 400	4 600	**33113JR**	3DE	25.9	73.5	73	101.5	96	106	6	7.5	1.5	1.5	0.39	1.55	0.85	1.33
	120	24.75	23	18	2	1.5	145	139	21.5	3 200	4 300	**30213CR**	—	28.1	75	77	110	102	114	4	6.5	2	1.5	0.55	1.10	0.60	1.15
	120	24.75	23	20	2	1.5	160	156	24.3	3 200	4 300	**30213JR**	3EB	24.2	75	77	110	106	113	4	4.5	2	1.5	0.40	1.48	0.81	1.18
	120	32.75	31	24	2	1.5	190	198	30.4	3 200	4 300	**32213CR**	—	31.3	75	75	110	99	114	4	8.5	2	1.5	0.55	1.10	0.60	1.55
	120	32.75	31	27	2	1.5	196	203	31.7	3 200	4 300	**32213JR**	3EC	26.6	75	76	110	104	115	4	5.5	2	1.5	0.40	1.48	0.81	1.58
	120	39	38	31	4	2.5	190	232	34.7	3 200	4 300	**T5ED065**	5ED	34.1	83	75	108	96	115	5	8	3	2	0.56	1.07	0.59	1.93
	120	41	41	32	2	1.5	250	277	43.0	3 200	4 300	**33213JR**	3EE	30.0	75	74	110	102	115	7	9	2	1.5	0.39	1.54	0.85	2.02
	130	37	33.5	26	3	3	186	211	31.2	2 600	3 600	**T7FC065**	7FC	44.4	79	78	116	98	124	4	11	2.5	2.5	0.87	0.69	0.38	2.17
	140	36	33	23	3	2.5	220	209	31.4	2 400	3 400	**30313DJR**	7GB	44.3	79	79	128	111	133	4	13	2.5	2	0.83	0.73	0.40	2.44
	140	36	33	25	3	2.5	241	227	35.1	2 900	3 900	**30313CR**	—	34.3	79	81	128	113	130	5	11	2.5	2	0.55	1.10	0.60	2.44
	140	36	33	28	3	2.5	255	239	37.6	2 800	3 800	**30313JR**	2GB	29.3	79	83	128	122	130	4	8	2.5	2	0.35	1.74	0.96	2.56
	140	51	48	39	3	2.5	322	361	49.0	2 900	3 900	**32313CR**	5GD	40.9	79	79	128	106	131	5	12	2.5	2	0.55	1.10	0.60	3.85
	140	51	48	39	3	2.5	313	312	43.4	2 900	3 900	**32313J**	2GD	34.7	79	80	128	117	130	4	12	2.5	2	0.35	1.74	0.96	3.49
	140	51	48	39	3	2.5	346	357	49.6	2 900	3 900	**32313JR**	2GD	34.7	79	80	128	117	130	4	12	2.5	2	0.35	1.74	0.96	3.64
70	100	20	20	16	1	1	89.0	115	17.2	3 500	4 700	**32914JR**	2BC	17.8	75.5	77	94.5	91	96	4	4	1	1	0.32	1.90	1.05	0.496
	110	25	25	19	1.5	1.5	136	163	24.8	3 300	4 400	**32014JR**	4CC	23.6	78.5	78	101.5	98	105	5	6	1.5	1.5	0.43	1.38	0.76	0.884
	110	31	31	25.5	1.5	1.5	168	208	32.3	3 300	4 400	**33014JR**	2CE	22.1	78.5	78	101.5	99	105	5	5.5	1.5	1.5	0.28	2.11	1.16	1.09
	120	37	37	29	2	1.5	227	266	41.2	3 100	4 200	**33114JR**	3DE	28.0	80	79	110	104	115	6	8	2	1.5	0.38	1.58	0.87	1.71
	125	26.25	24	19	2	1.5	158	158	24.5	3 000	4 000	**30214CR**	—	29.9	80	82	116.5	107	119	4	7	2	1.5	0.55	1.10	0.60	1.30
	125	26.25	24	21	2	1.5	173	173	27.1	3 100	4 100	**30214JR**	3EB	25.9	80	81	116.5	110	118	4	5	2	1.5	0.42	1.43	0.79	1.32
	125	33.25	31	24	2	1.5	197	212	32.6	3 100	4 100	**32214CR**	—	32.6	80	80	116.5	104	120	4	9.5	2	1.5	0.55	1.10	0.60	1.65
	125	33.25	31	27	2	1.5	212	225	35.2	3 100	4 100	**32214JR**	3EC	29.2	80	80	116.5	108	119	4	6	2	1.5	0.42	1.43	0.79	1.71
	125	41	41	32	2	1.5	258	294	45.5	3 100	4 100	**33214JR**	3EE	31.2	80	79	116.5	107	120	7	9	2	1.5	0.41	1.47	0.81	2.16
	130	43	42	35	3	2.5	291	319	50.0	3 000	4 000	**T2ED070**	2ED	30.2	84	81	118	111	123	1	1	2.5	2	0.33	1.80	0.99	2.48
	140	39	35.5	27	3	3	222	242	35.8	2 400	3 400	**T7FC070**	7FC	46.5	84	82	126	106	133	5	12	2.5	2.5	0.87	0.69	0.38	2.64
	140	52	51	43	5	3	330	382	51.6	2 900	3 800	**T4FE070**	4FE	37.7	92	82	126	111	133	7	9	4	2.5	0.45	1.34	0.74	3.69

[Note] 1) Please consult with JTEKT when using the bearings identified by suffix C. They are medium-tapered types especially designed for special purposes.

d (70) ~ (80) mm

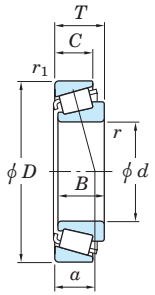


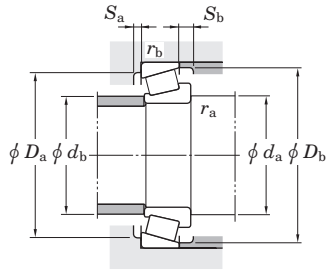


Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. [1]		Dimension series to ISO355 (Refer.)	Load center (mm)	Mounting dimensions (mm)								Constant	Axial load factors		(Refer.) Mass
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.				a	d_a min.	d_b max.	D_a max.	D_b min.	S_a min.	S_b min.	r_a max.	r_b max.	e	Y_1	Y_0	Mass (kg)
70	150	38	35	25	3	2.5	246	235	34.9	2 300	3 200	**30314DJR**		7GB	47.1	84	84	138	118	142	4	13	2.5	2	0.83	0.73	0.40	2.97
	150	38	35	30	3	2.5	280	256	36.0	2 700	3 600	**30314CR**		—	37.0	84	87	138	123	141	6	8	2.5	2	0.55	1.10	0.60	3.10
	150	38	35	30	3	2.5	288	273	42.2	2 600	3 500	**30314JR**		2GB	30.5	84	89	138	130	140	4	8	2.5	2	0.35	1.74	0.96	3.08
	150	54	51	42	3	2.5	321	315	44.1	2 700	3 600	**32314**		—	37.0	84	86	138	125	140	4	12	2.5	2	0.35	1.73	0.95	4.11
	150	54	51	42	3	2.5	371	391	51.4	2 700	3 600	**32314C**		5GD	44.4	84	84	138	115	142	5	12	2.5	2	0.55	1.10	0.60	4.50
	150	54	51	42	3	2.5	396	414	57.2	2 700	3 600	**32314JR**		2GD	37.4	84	86	138	125	140	4	12	2.5	2	0.35	1.74	0.96	4.50
75	105	20	20	16	1	1	92.2	123	18.4	3 300	4 400	**32915JR**		2BC	18.9	80.5	81	99.5	96	101	4	4	1	1	0.33	1.80	0.99	0.526
	115	25	25	19	1.5	1.5	139	169	25.8	3 100	4 200	**32015JR**		4CC	25.1	83.5	83	106.5	103	110	5	6	1.5	1.5	0.46	1.31	0.72	0.930
	115	31	31	25.5	1.5	1.5	177	225	35.0	3 200	4 200	**33015JR**		2CE	22.9	83.5	83	106.5	104	110	6	5.5	1.5	1.5	0.30	2.01	1.11	1.16
	125	37	37	29	2	1.5	234	280	43.4	3 000	4 000	**33115JR**		3DE	29.3	85	84	116.5	109	120	6	8	2	1.5	0.40	1.51	0.83	1.84
	130	27.25	25	20	2	1.5	171	178	27.4	2 900	3 800	**30215CR**		—	31.0	85	87	121.5	111	124	5	7	2	1.5	0.55	1.10	0.60	1.40
	130	27.25	25	22	2	1.5	178	181	28.2	2 900	3 900	**30215JR**		4DB	27.6	85	86	121.5	115	124	4	5	2	1.5	0.44	1.38	0.76	1.42
	130	33.25	31	24	2	1.5	204	225	34.5	2 900	3 900	**32215CR**		—	33.7	85	85	121.5	109	125	4	9	2	1.5	0.55	1.10	0.60	1.75
	130	33.25	31	27	2	1.5	218	234	36.4	2 900	3 900	**32215JR**		4DC	30.2	85	85	121.5	114	125	4	6	2	1.5	0.44	1.38	0.76	1.77
	130	41	41	31	2	1.5	266	310	47.7	2 900	3 900	**33215JR**		3EE	32.5	85	83	121.5	111	125	7	10	2	1.5	0.43	1.40	0.77	2.26
	150	42	38	29	3	3	240	270	39.0	2 200	3 100	**T7FC075**		7FC	50.6	89	89	136	114	143	5	13	2.5	2.5	0.87	0.69	0.38	3.24
	160	40	37	26	3	2.5	266	254	34.2	2 100	2 900	**30315DJR**		7GB	49.9	89	91	148	127	151	6	14	2.5	2	0.83	0.73	0.40	3.45
	160	40	37	26	3	2.5	277	266	36.9	2 100	2 900	**30315DR**		—	48.8	89	91	148	127	151	6	14	2.5	2	0.81	0.74	0.41	3.48
	160	40	37	31	3	2.5	310	296	42.1	2 500	3 400	**30315CR**		—	39.2	89	94	148	130	150	6	9	2.5	2	0.55	1.10	0.60	3.80
	160	40	37	31	3	2.5	325	311	44.9	2 500	3 300	**30315JR**		2GB	32.5	89	95	148	139	149	4	9	2.5	2	0.35	1.74	0.96	3.65
	160	40	37	31	3	2.5	313	298	43.3	2 500	3 300	**30315R**		—	31.9	89	95	148	139	149	4	9	2.5	2	0.35	1.73	0.95	3.52
	160	58	55	43	3	2.5	447	474	61.4	2 500	3 400	**32315CR**		—	46.6	89	90	148	125	154	6	15	2.5	2	0.55	1.10	0.60	5.50
	160	58	55	45	3	2.5	454	481	64.6	2 500	3 300	**32315JR**		2GD	40.0	89	91	148	133	149	4	13	2.5	2	0.35	1.74	0.96	5.41
	160	58	55	45	3	2.5	425	444	60.3	2 500	3 300	**32315R**		—	39.5	89	91	148	133	149	4	13	2.5	2	0.35	1.73	0.95	5.30
80	110	20	20	16	1	1	95.1	131	19.5	3 100	4 200	**32916JR**		2BC	20.1	85.5	86	104.5	101	106	4	4	1	1	0.35	1.71	0.94	0.556
	125	29	29	22	1.5	1.5	185	225	34.6	2 900	3 900	**32016JR**		3CC	26.7	88.5	89	116.5	112	120	6	7	1.5	1.5	0.42	1.42	0.78	1.32
	125	36	36	29.5	1.5	1.5	218	288	44.8	2 900	3 900	**33016JR**		2CE	25.1	88.5	90	116.5	112	119	6	6.5	1.5	1.5	0.28	2.16	1.19	1.63
	130	37	37	29	2	1.5	240	294	44.9	2 800	3 800	**33116JR**		3DE	30.5	90	89	121.5	114	126	6	8	2	1.5	0.42	1.44	0.79	1.93

[Note] 1) Please consult with JTEKT when using the bearings identified by suffix C. They are medium-tapered types especially designed for special purposes.

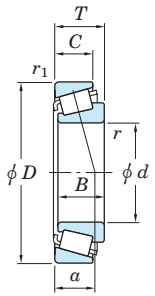
d (80) ~ (90) mm

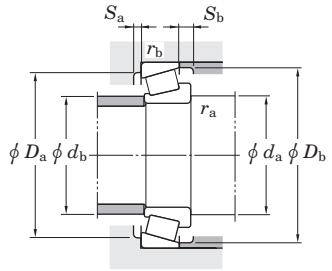




Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Dimension series to ISO355 (Refer.)	Load center (mm)	Mounting dimensions (mm)								Constant	Axial load factors		(Refer.) Mass
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.				a	d_a min.	d_b max.	D_a max.	D_b min.	S_a min.	S_b min.	r_a max.	r_b max.	e	Y_1	Y_0	Mass (kg)
80	140	28.25	26	22	2.5	2	202	202	31.2	2 700	3 600	**30216JR**		3EB	28.6	92	91	130	124	132	4	6	2	2	0.42	1.43	0.79	1.72
	140	35.25	33	28	2.5	2	253	271	41.5	2 700	3 600	**32216JR**		3EC	31.7	92	90	130	122	134	4	7	2	2	0.42	1.43	0.79	2.17
	140	46	46	35	2.5	2	313	371	56.1	2 700	3 600	**33216JR**		3EE	35.7	92	89	130	119	135	7	11	2	2	0.43	1.41	0.78	2.99
	145	46	45	38	3	2.5	333	381	52.0	2 600	3 500	**T2ED080**		2ED	32.7	94	92	133	125	137	7	8	2.5	2	0.32	1.88	1.03	3.20
	170	42.5	39	27	3	2.5	294	282	38.7	2 000	2 800	**30316DJR**		7GB	53.5	94	97	158	134	159	6	15.5	2.5	2	0.83	0.73	0.40	4.12
	170	42.5	39	33	3	2.5	368	355	49.9	2 300	3 100	**30316JR**		2GB	34.8	94	102	158	148	159	4	9.5	2.5	2	0.35	1.74	0.96	4.46
	170	42.5	39	33	3	2.5	345	330	47.1	2 300	3 100	**30316R**		—	33.9	94	102	158	148	159	4	9.5	2.5	2	0.35	1.73	0.95	4.26
	170	61.5	58	48	3	2.5	434	440	58.6	2 300	3 100	**32316J**		2GD	43.5	94	98	158	142	159	4	13.5	2.5	2	0.35	1.74	0.96	6.04
	170	61.5	58	48	3	2.5	480	503	67.0	2 300	3 100	**32316JR**		2GD	43.5	94	98	158	142	159	4	13.5	2.5	2	0.35	1.74	0.96	6.31
85	120	23	23	18	1.5	1.5	122	165	25.0	2 900	3 900	**32917JR**		2BC	21.2	93.5	93	111.5	109	115	5	5	1.5	1.5	0.33	1.83	1.01	0.794
	130	29	29	22	1.5	1.5	189	234	35.5	2 800	3 700	**32017JR**		4CC	28.0	93.5	94	121.5	117	125	6	7	1.5	1.5	0.44	1.36	0.75	1.38
	130	36	36	29.5	1.5	1.5	222	300	46.0	2 800	3 700	**33017JR**		2CE	26.3	93.5	94	121.5	118	125	6	6.5	1.5	1.5	0.29	2.06	1.13	1.72
	140	41	41	32	2.5	2	282	346	52.2	2 600	3 500	**33117JR**		3DE	33.2	97	95	130	122	135	7	9	2	2	0.41	1.48	0.81	2.43
	150	30.5	28	24	2.5	2	228	231	35.1	2 500	3 400	**30217JR**		3EB	30.4	97	97	140	132	141	5	6.5	2	2	0.42	1.43	0.79	2.17
	150	38.5	36	30	2.5	2	290	315	47.5	2 500	3 400	**32217JR**		3EC	34.2	97	96	140	130	142	5	8.5	2	2	0.42	1.43	0.79	2.80
	150	49	49	37	2.5	2	368	439	59.1	2 500	3 400	**33217JR**		3EE	37.1	97	95	140	128	144	7	12	2	2	0.42	1.43	0.79	3.63
	180	44.5	41	28	4	3	288	265	36.0	1 900	2 600	**30317D**		—	56.0	103	103	166	143	169	6	16.5	3	2.5	0.81	0.74	0.41	4.54
	180	44.5	41	28	4	3	328	317	42.6	1 900	2 600	**30317DJR**		7GB	56.3	103	103	166	143	169	6	16.5	3	2.5	0.83	0.73	0.40	4.81
	180	44.5	41	34	4	3	396	384	53.0	2 200	2 900	**30317JR**		2GB	36.0	103	107	166	156	167	5	10.5	3	2.5	0.35	1.74	0.96	5.15
	180	44.5	41	34	4	3	381	367	51.1	2 200	2 900	**30317R**		—	35.8	103	107	166	156	167	5	10.5	3	2.5	0.35	1.73	0.95	4.97
	180	63.5	60	49	4	3	549	587	77.6	2 200	3 000	**32317JR**		2GD	43.8	103	103	166	150	167	5	14.5	3	2.5	0.35	1.74	0.96	7.42
90	125	23	23	18	1.5	1.5	126	175	26.2	2 800	3 700	**32918JR**		2BC	22.3	98.5	97	116.5	114	120	5	5	1.5	1.5	0.34	1.75	0.96	0.834
	140	32	32	24	2	1.5	224	276	41.5	2 600	3 500	**32018JR**		3CC	29.8	100	100	131.5	125	134	6	8	2	1.5	0.42	1.42	0.78	1.80
	140	39	39	32.5	2	1.5	278	367	55.6	2 600	3 400	**33018JR**		2CE	27.1	100	100	131.5	127	135	7	6.5	2	1.5	0.27	2.23	1.23	2.22
	150	45	45	35	2.5	2	324	413	61.1	2 500	3 300	**33118JR**		3DE	35.4	102	100	140	130	144	7	10	2	2	0.40	1.51	0.83	3.13
	155	46	46	38	3	3	342	405	54.1	2 400	3 200	**T2ED090**		2ED	33.5	104	102	141	135	147	7	8	2.5	2.5	0.33	1.84	1.01	3.47
	160	32.5	30	26	2.5	2	255	261	39.0	2 400	3 200	**30218JR**		3FB	32.6	102	103	150	140	150	5	6.5	2	2	0.42	1.43	0.79	2.65
	160	42.5	40	34	2.5	2	329	362	53.7	2 400	3 200	**32218JR**		3FC	37.0	102	102	150	138	152	5	8.5	2	2	0.42	1.43	0.79	3.47

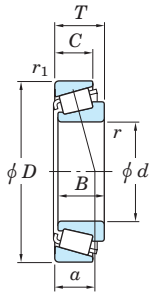
d (90) ~ (100) mm

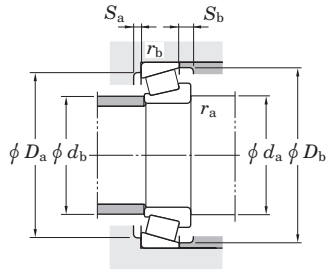




Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Dimension series to ISO355 (Refer.)	Load center (mm)	Mounting dimensions (mm)								Constant	Axial load factors		(Refer.) Mass
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.				a	d_a min.	d_b max.	D_a max.	D_b min.	S_a min.	S_b min.	r_a max.	r_b max.	e	Y_1	Y_0	Mass (kg)
90	160	55	55	42	2.5	2	430	527	68.3	2 400	3 200	**33218JR**		3FE	40.8	102	101	150	135	154	9	13	2	2	0.42	1.43	0.78	4.76
	190	46.5	43	30	4	3	359	350	46.2	1 700	2 400	**30318DJR**		7GB	59.6	108	109	176	151	179	6	16.5	3	2.5	0.83	0.73	0.40	5.57
	190	46.5	43	30	4	3	352	336	44.9	1 700	2 400	**30318DR**		—	59.1	108	109	176	151	179	6	16.5	3	2.5	0.81	0.74	0.41	5.60
	190	46.5	43	36	4	3	432	420	57.1	2 100	2 700	**30318JR**		2GB	38.1	108	113	176	165	177	5	10.5	3	2.5	0.35	1.74	0.96	6.04
	190	46.5	43	36	4	3	421	407	55.5	2 100	2 700	**30318R**		—	37.2	108	113	176	165	177	5	10.5	3	2.5	0.35	1.73	0.95	5.78
	190	67.5	64	53	4	3	577	614	78.7	2 100	2 800	**32318JR**		2GD	46.6	108	108	176	157	177	5	14.5	3	2.5	0.35	1.74	0.96	8.61
95	130	23	23	18	1.5	1.5	130	186	27.4	2 600	3 500	**32919JR**		2BC	23.5	103.5	102	121.5	119	125	5	5	1.5	1.5	0.36	1.68	0.92	0.876
	145	32	32	24	2	1.5	229	287	42.6	2 500	3 300	**32019JR**		4CC	31.2	105	105	136.5	130	140	6	8	2	1.5	0.44	1.36	0.75	1.88
	145	39	39	32.5	2	1.5	284	382	57.3	2 500	3 300	**33019JR**		2CE	27.8	105	104	136.5	131	139	7	6.5	2	1.5	0.28	2.16	1.19	2.31
	160	46	46	38	3	3	353	427	56.4	2 300	3 100	**T2ED095**		2ED	34.6	109	107	146	140	152	7	8	2.5	2.5	0.34	1.77	0.97	3.62
	160	49	49	38	2.5	2	381	473	62.5	2 300	3 100	**33119JR**		3EE	37.3	107	106	150	138	154	8	11	2	2	0.39	1.54	0.85	3.89
	170	34.5	32	27	3	2.5	289	299	44.0	2 200	3 000	**30219JR**		3FB	34.9	109	110	158	149	159	5	7.5	2.5	2	0.42	1.43	0.79	3.20
	170	45.5	43	37	3	2.5	389	439	64.1	2 200	3 000	**32219JR**		3FC	38.9	109	108	158	145	161	5	8.5	2.5	2	0.42	1.43	0.79	4.34
	170	58	58	44	3	2.5	468	582	74.0	2 200	2 900	**33219JR**		3FE	42.8	109	107	158	144	163	9	14	2.5	2	0.41	1.47	0.81	5.66
	200	49.5	45	32	4	3	398	391	50.4	1 700	2 300	**30319DJR**		7GB	62.7	113	113	186	157	187	6	17.5	3	2.5	0.83	0.73	0.40	6.68
	200	49.5	45	38	4	3	396	368	49.2	2 000	2 600	**30319**		—	39.8	113	118	186	172	186	5	11.5	3	2.5	0.35	1.73	0.95	6.32
	200	49.5	45	38	4	3	465	455	60.9	2 000	2 600	**30319JR**		2GB	40.8	113	118	186	172	186	5	11.5	3	2.5	0.35	1.74	0.96	6.96
	200	71.5	67	55	4	3	534	544	70.2	2 000	2 600	**32319**		—	49.1	113	115	186	166	186	5	16.5	3	2.5	0.35	1.73	0.95	9.35
	200	71.5	67	55	4	3	646	695	89.2	2 000	2 600	**32319JR**		2GD	49.8	113	115	186	166	186	5	16.5	3	2.5	0.35	1.74	0.96	10.1
100	140	25	25	20	1.5	1.5	158	217	32.0	2 400	3 300	**32920JR**		2CC	24.0	109	108	131	128	135	5	5	1.5	1.5	0.33	1.82	1.00	1.19
	145	24	22.5	17.5	3	3	146	167	24.6	2 400	3 200	**T4CB100**		4CB	29.9	112	109	133	132	140	4	6.5	2.5	2.5	0.47	1.27	0.70	1.12
	150	32	32	24	2	1.5	233	298	43.8	2 400	3 200	**32020JR**		4CC	32.6	110	109	141	134	144	6	8	2	1.5	0.46	1.31	0.72	1.95
	150	39	39	32.5	2	1.5	290	397	59.0	2 400	3 200	**33020JR**		2CE	28.6	110	108	141	135	143	7	6.5	2	1.5	0.29	2.09	1.15	2.40
	165	47	46	39	3	3	368	458	59.5	2 200	3 000	**T2EE100**		2EE	35.1	114	112	151	145	157	7	8	2.5	2.5	0.32	1.88	1.04	3.86
	165	52	52	40	2.5	2	408	523	67.4	2 200	3 000	**33120JR**		3EE	40.1	112	111	155	142	159	8	12	2	2	0.41	1.48	0.81	4.29
	180	37	34	29	3	2.5	323	338	49.1	2 100	2 800	**30220JR**		3FB	36.8	114	116	168	157	168	5	8	2.5	2	0.42	1.43	0.79	3.83
	180	49	46	39	3	2.5	435	495	63.9	2 100	2 800	**32220JR**		3FC	42.1	114	114	168	154	171	5	10	2.5	2	0.42	1.43	0.79	5.21
	180	63	63	48	3	2.5	540	680	85.8	2 100	2 800	**33220JR**		3FE	45.7	114	112	168	151	172	10	15	2.5	2	0.40	1.48	0.82	6.92

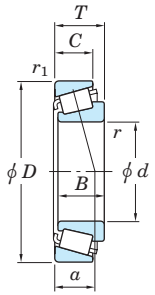
d (100) ~ (110) mm

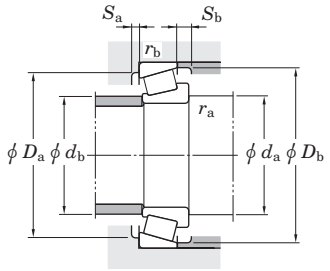




Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Dimension series to ISO355 (Refer.)	Load center (mm)	Mounting dimensions (mm)									Constant	Axial load factors		(Refer.) Mass
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.				a	d_a min.	d_b max.	D_a max.	D_b min.	S_a min.	S_b min.	r_a max.	r_b max.	e	Y_1	Y_0	Mass (kg)
100	215	51.5	47	34	4	3	397	374	48.5	1 500	2 100	**30320D**		—	65.9	118	121	201	183	204	5	17	3	2.5	0.81	0.74	0.41	8.02
	215	51.5	47	39	4	3	430	400	52.5	1 800	2 400	**30320**		—	41.4	118	127	201	184	200	6	12.5	3	2.5	0.35	1.73	0.95	7.76
	215	51.5	47	39	4	3	528	521	68.0	1 800	2 400	**30320JR**		2GB	42.7	118	127	201	184	200	6	12.5	3	2.5	0.35	1.74	0.96	8.49
	215	56.5	51	35	4	3	465	459	56.4	1 500	2 200	**31320JR**		7GB	67.7	118	120	201	183	202	6	17.5	3	2.5	0.83	0.73	0.40	8.72
	215	77.5	73	60	4	3	614	637	79.6	1 800	2 400	**32320**		—	52.6	118	123	201	177	200	8	17.5	3	2.5	0.35	1.73	0.95	12.2
	215	77.5	73	60	4	3	725	783	96.9	1 800	2 400	**32320JR**		2GD	53.9	118	123	201	177	200	8	17.5	3	2.5	0.35	1.74	0.96	13.0
105	145	25	25	20	1.5	1.5	160	224	32.6	2 400	3 100	**32921JR**		2CC	25.1	113.5	113	136.5	133	140	5	5	1.5	1.5	0.34	1.75	0.96	1.23
	160	35	35	26	2.5	2	270	344	49.9	2 200	3 000	**32021JR**		4DC	34.5	117	116	150	143	154	6	9	2	2	0.44	1.35	0.74	2.45
	160	43	43	34	2.5	2	335	461	67.4	2 200	3 000	**33021JR**		2DE	30.9	117	116	150	145	153	7	9	2	2	0.28	2.12	1.17	3.08
	175	56	56	44	2.5	2	453	607	76.0	2 100	2 800	**33121JR**		3EE	43.2	117	116	165	150	169	9	12	2	2	0.40	1.48	0.82	5.33
	190	39	36	30	3	2.5	360	380	52.3	2 000	2 600	**30221JR**		3FB	39.0	119	122	178	165	178	6	9	2.5	2	0.42	1.43	0.79	4.49
	190	53	50	43	3	2.5	490	567	73.0	2 000	2 700	**32221JR**		3FC	44.8	119	120	178	161	180	6	10	2.5	2	0.42	1.43	0.79	6.37
	190	68	68	52	3	2.5	622	790	97.4	2 000	2 600	**33221JR**		3FE	48.8	119	117	178	159	182	10	16	2.5	2	0.40	1.49	0.82	8.43
	225	53.5	49	36	4	3	423	396	50.1	1 400	2 000	**30321D**		—	69.1	123	127	211	193	209	6	17	3	2.5	0.81	0.74	0.41	8.76
	225	53.5	49	41	4	3	464	432	56.0	1 700	2 300	**30321**		—	43.1	123	132	211	193	209	7	12.5	3	2.5	0.35	1.73	0.95	8.74
	225	53.5	49	41	4	3	581	578	73.6	1 700	2 300	**30321JR**		2GB	44.1	123	132	211	193	209	7	12.5	3	2.5	0.35	1.74	0.96	9.73
	225	58	53	36	4	3	495	489	59.4	1 500	2 100	**31321JR**		7GB	70.3	123	126	211	193	211	6	18	3	2.5	0.83	0.73	0.40	9.72
	225	81.5	77	63	4	3	679	707	86.7	1 800	2 300	**32321**		—	55.7	123	128	211	185	209	8	18.5	3	2.5	0.35	1.73	0.95	13.9
	225	81.5	77	63	4	3	794	866	107	1 800	2 300	**32321JR**		2GD	56.1	123	128	211	185	209	8	18.5	3	2.5	0.35	1.74	0.96	14.9
110	150	25	25	20	1.5	1.5	162	231	33.3	2 300	3 000	**32922JR**		2CC	26.3	119	118	141	138	145	5	5	1.5	1.5	0.36	1.69	0.93	1.28
	160	27	25.5	19.5	3	3	183	225	32.3	2 200	2 900	**T4CB110**		4CB	31.8	124	120	146	145	154	5	7.5	2.5	2.5	0.44	1.36	0.75	1.63
	170	38	38	29	2.5	2	312	395	56.7	2 100	2 800	**32022JR**		4DC	36.1	122	122	160	152	163	7	9	2	2	0.43	1.39	0.77	3.12
	170	47	47	37	2.5	2	360	502	64.9	2 100	2 800	**33022JR**		2DE	33.4	122	123	160	152	161	7	10	2	2	0.29	2.09	1.15	3.81
	180	56	56	43	2.5	2	464	634	78.6	2 000	2 700	**33122JR**		3EE	44.5	122	121	170	155	174	9	13	2	2	0.42	1.43	0.79	5.52
	200	41	38	32	3	2.5	405	434	58.1	1 900	2 500	**30222JR**		3FB	40.8	124	129	188	174	188	6	9	2.5	2	0.42	1.43	0.79	5.33
	200	56	53	46	3	2.5	547	640	80.4	1 900	2 500	**32222JR**		3FC	46.7	124	126	188	170	190	6	10	2.5	2	0.42	1.43	0.79	7.45
	240	54.5	50	36	4	3	456	429	53.5	1 400	1 900	**30322D**		—	71.5	128	135	226	205	222	6	18	3	2.5	0.81	0.74	0.41	10.2
	240	54.5	50	42	4	3	509	475	60.5	1 600	2 100	**30322**		—	44.8	128	141	226	206	222	8	12.5	3	2.5	0.35	1.73	0.95	10.4

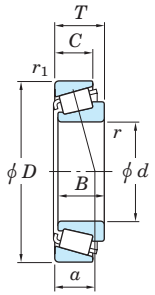
d (110) ~ 130 mm

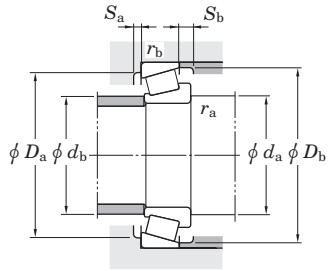




Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Dimension series to ISO355 (Refer.)	Load center (mm)	Mounting dimensions (mm)									Constant	Axial load factors		(Refer.) Mass
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.				a	d_a min.	d_b max.	D_a max.	D_b min.	S_a min.	S_b min.	r_a max.	r_b max.	e	Y_1	Y_0	(kg)
110	240	54.5	50	42	4	3	601	590	75.2	1 600	2 100	**30322JR**		2GB	46.3	128	141	226	206	222	8	12.5	3	2.5	0.35	1.74	0.96	11.4
	240	63	57	38	4	3	564	563	68.4	1 400	1 900	**31322JR**		7GB	76.2	128	135	226	205	224	6	21	3	2.5	0.83	0.73	0.40	12.2
	240	84.5	80	65	4	3	759	797	97.4	1 600	2 200	**32322**		—	57.3	128	137	226	198	222	9	19.5	3	2.5	0.35	1.73	0.95	16.6
	240	84.5	80	65	4	3	865	943	115	1 600	2 200	**32322JR**		2GD	59.3	128	137	226	198	222	9	19.5	3	2.5	0.35	1.74	0.96	17.8
120	165	29	29	23	1.5	1.5	215	298	42.5	2 100	2 700	**32924JR**		2CC	29.4	129	128	156	152	160	6	6	1.5	1.5	0.35	1.72	0.95	1.77
	170	27	25	19.5	3	3	206	262	37.0	2 000	2 700	**T4CB120**		4CB	34.6	134	130	156	155	164	4	7.5	2.5	2.5	0.47	1.27	0.70	1.76
	180	38	38	29	2.5	2	325	427	60.0	2 000	2 600	**32024JR**		4DC	38.8	132	131	170	161	173	7	9	2	2	0.46	1.31	0.72	3.34
	180	48	48	38	2.5	2	375	540	68.5	2 000	2 600	**33024JR**		2DE	36.2	132	132	170	160	171	6	10	2	2	0.31	1.97	1.08	4.16
	200	62	62	48	2.5	2	581	785	96.1	1 800	2 400	**33124JR**		3FE	47.8	132	133	190	172	192	9	14	2	2	0.40	1.51	0.83	7.73
	215	43.5	40	34	3	2.5	435	473	61.7	1 700	2 300	**30224JR**		4FB	44.2	134	140	203	187	203	6	9.5	2.5	2	0.44	1.38	0.76	6.36
	215	61.5	58	50	3	2.5	589	691	84.0	1 700	2 300	**32224JR**		4FD	51.6	134	136	203	181	204	7	11.5	2.5	2	0.44	1.38	0.76	9.04
	260	59.5	55	38	4	3	536	512	61.5	1 200	1 700	**30324D**		—	77.8	138	145	246	219	239	6	21	3	2.5	0.81	0.74	0.41	13.0
	260	59.5	55	46	4	3	631	611	76.9	1 500	2 000	**30324**		—	48.9	138	152	246	221	239	10	13.5	3	2.5	0.35	1.73	0.95	13.7
	260	59.5	55	46	4	3	712	714	89.9	1 500	2 000	**30324JR**		2GB	50.2	138	152	246	221	239	10	13.5	3	2.5	0.35	1.74	0.96	14.5
	260	68	62	42	4	3	657	665	77.8	1 300	1 800	**31324JR**		7GB	81.9	138	145	246	221	244	6	21	3	2.5	0.83	0.73	0.40	15.4
	260	90.5	86	69	4	3	1 000	1 110	131	1 500	2 000	**32324JR**		2GD	62.7	138	148	246	213	239	9	21.5	3	2.5	0.35	1.74	0.96	22.2
	260	90.5	86	69	4	3	997	1 110	132	1 500	2 000	**32324R**		—	61.1	138	148	246	213	239	9	21.5	3	2.5	0.35	1.73	0.95	21.8
130	180	32	32	25	2	1.5	251	368	51.2	1 900	2 500	**32926JR**		2CC	31.4	140	141	171	165	174	6	7	2	1.5	0.34	1.77	0.97	2.42
	185	29	27	21	3	3	230	282	39.2	1 800	2 500	**T4CB130**		4CB	37.8	144	141	171	170	179	5	8	2.5	2.5	0.47	1.27	0.70	2.22
	200	45	45	34	2.5	2	428	563	77.4	1 800	2 300	**32026JR**		4EC	42.9	142	144	190	178	192	8	11	2	2	0.43	1.38	0.76	5.04
	200	55	55	43	2.5	2	489	705	85.8	1 700	2 300	**33026JR**		2EE	42.5	142	143	190	178	192	8	12	2	2	0.34	1.76	0.97	6.19
	230	43.75	40	34	4	3	472	511	65.7	1 600	2 100	**30226JR**		4FB	46.2	148	152	216	203	218	7	9.5	3	2.5	0.44	1.38	0.76	7.24
	230	67.75	64	54	4	3	693	830	99.9	1 600	2 200	**32226JR**		4FD	56.0	148	146	216	193	219	7	13.5	3	2.5	0.44	1.38	0.76	11.5
	280	63.75	58	41	5	4	604	582	69.9	1 200	1 600	**30326D**		—	84.0	152	155	262	240	261	7	22	4	3	0.81	0.74	0.41	16.3
	280	63.75	58	49	5	4	823	834	102	1 400	1 800	**30326JR**		2GB	54.0	152	164	262	239	255	8	14.5	4	3	0.35	1.74	0.96	18.1
	280	72	66	44	5	4	734	748	85.7	1 200	1 600	**31326JR**		7GB	87.3	152	155	262	236	261	7	23	4	3	0.83	0.73	0.40	18.9
	280	98.75	93	78	5	4	1 070	1 160	134	1 400	1 800	**32326**		—	69.1	152	163	262	226	259	10	15	4	3	0.35	1.73	0.95	26.5

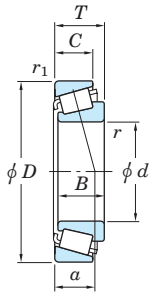
d 140 ~ (170) mm

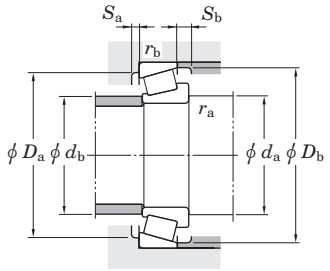




Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Dimension series to ISO355 (Refer.)	Load center (mm)	Mounting dimensions (mm)									Constant	Axial load factors		(Refer.) Mass
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.				a	d_a min.	d_b max.	D_a max.	D_b min.	S_a min.	S_b min.	r_a max.	r_b max.	e	Y_1	Y_0	Mass (kg)
140	190	32	32	25	2	1.5	258	390	53.2	1 800	2 300	**32928JR**		2CC	33.6	150	150	181	184	6	7	2	1.5	0.36	1.67	0.92	2.57
	195	29	27	21	3	3	232	293	39.9	1 700	2 300	**T4CB140**		4CB	40.9	154	151	181	189	5	8	2.5	2.5	0.50	1.19	0.66	2.36
	210	45	45	34	2.5	2	435	585	79.2	1 700	2 200	**32028JR**		4DC	45.6	152	153	200	187	202	8	11	2	2	0.46	1.31	0.72	5.28
	210	56	56	44	2.5	2	510	758	90.9	1 600	2 200	**33028JR**		2DE	45.6	152	152	200	186	202	7	12	2	2	0.36	1.67	0.92	6.61
	250	45.75	42	36	4	3	526	570	71.8	1 500	1 900	**30228JR**		4FB	49.4	158	163	236	219	237	9	9.5	3	2.5	0.44	1.38	0.76	8.97
	250	71.75	68	58	4	3	796	961	112	1 500	2 000	**32228JR**		4FD	60.0	158	158	236	210	238	9	13.5	3	2.5	0.44	1.38	0.76	14.7
	300	67.75	62	44	5	4	655	627	74.5	1 100	1 500	**30328D**		—	90.2	162	169	282	254	280	7	23	4	3	0.81	0.74	0.41	20.0
	300	67.75	62	53	5	4	938	962	114	1 300	1 700	**30328JR**		2GB	56.9	162	179	282	254	273	10	14.5	4	3	0.35	1.74	0.96	22.6
	300	77	70	47	5	4	841	865	99.1	1 100	1 500	**31328JR**		7GB	93.8	162	167	282	254	280	8	26	4	3	0.83	0.73	0.40	23.3
	300	107.75	102	85	5	4	1 370	1 570	175	1 300	1 700	**32328R**		—	74.2	162	175	282	246	280	10	17	4	3	0.35	1.74	0.96	35.1
150	210	38	38	30	2.5	2	358	536	72.1	1 600	2 100	**32930JR**		2DC	36.1	162	163	200	194	202	7	8	2	2	0.33	1.83	1.01	3.96
	225	48	48	36	3	2.5	492	668	79.6	1 500	2 000	**32030JR**		4EC	48.8	164	164	213	200	216	8	12	2.5	2	0.46	1.31	0.72	6.41
	225	59	59	46	3	2.5	575	869	101	1 500	2 000	**33030JR**		2EE	47.8	164	164	213	200	217	8	13	2.5	2	0.36	1.65	0.90	8.09
	270	49	45	38	4	3	604	664	80.9	1 300	1 800	**30230JR**		4GB	52.4	168	175	256	234	255	9	11	3	2.5	0.44	1.38	0.76	11.6
	270	77	73	60	4	3	881	1 070	122	1 300	1 800	**32230JR**		4GD	65.2	168	170	256	226	254	8	17	3	2.5	0.44	1.38	0.76	18.2
	320	72	65	46	5	4	768	750	85.7	970	1 400	**30330D**		—	96.0	172	183	302	270	301	9	26	4	3	0.81	0.74	0.41	23.9
	320	72	65	55	5	4	1 050	1 080	129	1 200	1 500	**30330JR**		2GB	60.8	172	193	302	272	292	12	17	4	3	0.35	1.74	0.96	26.6
	320	82	75	50	5	4	952	989	110	980	1 400	**31330JR**		7GB	100.1	172	179	302	272	301	9	27	4	3	0.83	0.73	0.40	28.0
	320	114	108	90	5	4	1 550	1 790	195	1 200	1 600	**32330R**		—	78.4	172	187	302	263	298	10	17	4	3	0.35	1.74	0.96	42.0
160	220	32	30	23	3	3	282	379	50.2	1 500	2 000	**T4DB160**		4DB	44.7	174	172	206	204	213	5	9	2.5	2.5	0.49	1.23	0.68	3.23
	220	38	38	30	2.5	2	368	568	75.2	1 500	2 000	**32932JR**		2DC	38.4	172	173	210	204	212	7	8	2	2	0.35	1.73	0.95	4.19
	240	51	51	38	3	2.5	553	758	90.3	1 400	1 900	**32032JR**		4EC	52.1	174	175	228	213	231	8	13	2.5	2	0.46	1.31	0.72	7.75
	290	52	48	40	4	3	679	750	89.3	1 200	1 600	**30232JR**		4GB	56.3	178	189	276	252	269	8	12	3	2.5	0.44	1.38	0.76	14.1
	290	84	80	67	4	3	994	1 210	137	1 200	1 700	**32232JR**		4GD	70.3	178	182	276	242	274	10	17	3	2.5	0.44	1.38	0.76	23.2
	340	75	68	48	5	4	926	933	104	900	1 300	**30332D**		—	101.8	182	195	322	290	320	9	27	4	3	0.81	0.74	0.41	29.1
	340	75	68	58	5	4	1 170	1 220	142	1 100	1 400	**30332JR**		2GB	63.3	182	205	322	289	310	12	17	4	3	0.35	1.74	0.96	31.8
	340	121	114	95	5	4	1 530	1 720	187	1 100	1 400	**32332**		—	83.0	182	200	322	277	316	10	18	4	3	0.35	1.73	0.95	47.9
170	230	38	38	30	2.5	2	370	606	78.8	1 400	1 900	**32934JR**		3DC	42.0	182	183	220	213	222	7	8	2	2	0.38	1.57	0.86	4.49

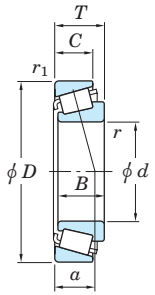
d (170) ~ 200 mm

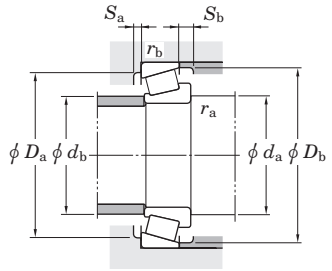




Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Dimension series to ISO355 (Refer.)	Load center (mm)	Mounting dimensions (mm)									Constant	Axial load factors		(Refer.) Mass (kg)
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.				a	d_a min.	d_b max.	D_a max.	D_b min.	S_a min.	S_b min.	r_a max.	r_b max.	e	Y_1	Y_0	
170	260	57	57	43	3	2.5	661	905	105	1 300	1 700	**32034JR**		4EC	55.8	184	187	248	249	10	14	2.5	2	0.44	1.35	0.74	10.5
	310	57	52	43	5	4	776	867	103	1 100	1 500	**30234JR**		4GB	61.2	192	202	292	288	8	14	4	3	0.44	1.38	0.76	17.8
	310	91	86	71	5	4	1 120	1 380	152	1 100	1 500	**32234JR**		4GD	76.2	192	195	292	294	10	20	4	3	0.44	1.38	0.76	28.9
	360	80	72	50	5	4	953	1 040	115	830	1 200	**30334D**		—	108.3	192	211	342	333	9	30	4	3	0.81	0.74	0.41	34.3
	360	80	72	62	5	4	1 300	1 370	155	1 000	1 300	**30334JR**		2GB	67.9	192	218	342	329	13	18	4	3	0.35	1.74	0.96	37.5
	360	127	120	100	5	4	1 640	1 830	193	1 000	1 300	**32334**		—	86.1	192	200	342	337	14	26	4	3	0.35	1.73	0.95	56.9
180	250	45	45	34	2.5	2	447	735	93.4	1 300	1 700	**32936JR**		4DC	53.5	192	193	240	241	8	11	2	2	0.48	1.25	0.69	6.64
	280	64	64	48	3	2.5	810	1 100	127	1 200	1 600	**32036JR**		3FD	59.5	194	199	268	268	10	16	2.5	2	0.42	1.42	0.78	14.1
	320	57	52	43	5	4	771	870	102	1 100	1 400	**30236JR**		4GB	63.6	202	211	302	297	9	14	4	3	0.45	1.33	0.73	18.3
	320	91	86	71	5	4	1 200	1 520	164	1 100	1 500	**32236JR**		4GD	77.8	202	204	302	303	10	20	4	3	0.45	1.33	0.73	29.9
	380	83	75	52	5	4	1 040	1 150	125	780	1 100	**30336D**		—	112.8	202	225	362	351	10	31	4	3	0.81	0.74	0.41	40.1
	380	83	75	64	5	4	1 130	1 110	126	940	1 300	**30336**		—	71.0	202	227	362	346	13	19	4	3	0.35	1.73	0.95	39.7
	380	134	126	106	5	4	1 760	1 980	206	960	1 300	**32336**		—	91.8	202	215	362	355	14	27	4	3	0.35	1.73	0.95	67.0
190	260	45	45	34	2.5	2	459	789	88.6	1 200	1 600	**32938JR**		4DC	55.0	202	204	250	252	8	11	2	2	0.48	1.26	0.69	6.89
	290	64	64	48	3	2.5	823	1 170	131	1 100	1 500	**32038JR**		4FD	62.9	204	209	278	279	10	16	2.5	2	0.44	1.36	0.75	14.7
	340	60	55	46	5	4	912	1 030	118	1 000	1 300	**30238JR**		4GB	66.4	212	225	322	318	12	13	4	3	0.44	1.38	0.76	21.9
	340	97	92	75	5	4	1 370	1 740	187	1 000	1 300	**32238JR**		4GD	81.9	212	216	322	323	12	22	4	3	0.44	1.38	0.76	36.6
	400	86	78	52	6	5	1 190	1 210	131	740	1 000	**30338D**		—	119.2	218	232	378	372	11	34	5	4	0.81	0.74	0.41	44.8
	400	86	78	65	6	5	1 260	1 250	139	880	1 200	**30338**		—	73.2	218	241	378	370	10	20	5	4	0.35	1.73	0.95	46.2
	400	140	132	109	6	5	1 940	2 190	224	890	1 200	**32338**		—	96.5	218	225	378	375	14	30	5	4	0.35	1.73	0.95	76.6
200	280	51	51	39	3	2.5	608	958	109	1 100	1 500	**32940JR**		3EC	53.6	214	216	268	271	9	12	2.5	2	0.39	1.52	0.84	9.44
	310	70	70	53	3	2.5	949	1 340	146	1 100	1 400	**32040JR**		4FD	66.9	214	221	298	297	11	17	2.5	2	0.43	1.39	0.77	19.1
	360	64	58	48	5	4	991	1 120	126	940	1 200	**30240JR**		4GB	70.3	222	238	342	336	12	15	4	3	0.44	1.38	0.76	26.4
	360	104	98	82	5	4	1 550	1 880	200	960	1 300	**32240JR**		3GD	84.6	222	225	342	340	11	22	4	3	0.41	1.48	0.81	44.2
	420	89	80	56	6	5	1 130	1 230	132	690	970	**30340D**		—	122.6	228	248	398	385	11	33	5	4	0.81	0.74	0.41	50.6
	420	89	80	67	6	5	1 400	1 450	159	820	1 100	**30340**		—	79.8	228	255	398	385	11	21	5	4	0.35	1.73	0.95	53.5
	420	146	138	115	6	5	2 240	2 580	260	830	1 100	**32340**		—	102.9	228	240	398	395	16	30	5	4	0.35	1.73	0.95	91.0

d 220 ~ 360 mm

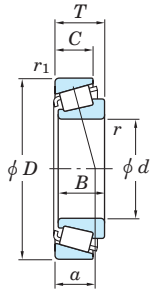


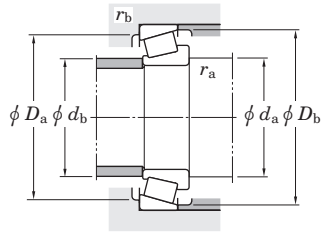


Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Dimension series to ISO355 (Refer.)	Load center (mm)	Mounting dimensions (mm)									Con-stant	Axial load factors		(Refer.) Mass (kg)
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.				a	d_a min.	d_b max.	D_a max.	D_b min.	S_a min.	S_b min.	r_a max.	r_b max.	e	Y_1	Y_0	
220	300	51	51	39	3	2.5	621	1 010	112	1 000	1 400	**32944JR**		3EC	58.6	234	234	288	275	290	9	12	2.5	2	0.43	1.41	0.78	10.1
	340	76	76	57	4	3	1 120	1 620	175	940	1 300	**32044JR**		4FD	72.8	238	243	326	300	326	12	19	3	2.5	0.43	1.39	0.77	25.2
	400	72	65	54	5	4	1 260	1 440	160	830	1 100	**30244JR**		—	76.5	242	263	382	344	371	14	17	4	3	0.44	1.43	0.79	35.9
	400	114	108	90	5	4	1 500	1 930	198	830	1 100	**32244**		—	95.9	242	260	382	333	377	16	14	4	3	0.43	1.39	0.77	56.8
	460	97	88	73	6	5	1 570	1 680	181	730	980	**30344**		—	84.6	248	282	438	386	420	12	23	5	4	0.35	1.73	0.95	69.0
240	320	51	51	39	3	2.5	645	1 090	119	940	1 300	**32948JR**		4EC	64.5	254	254	308	294	311	9	12	2.5	2	0.46	1.31	0.72	10.9
	360	76	76	57	4	3	1 160	1 720	180	870	1 200	**32048JR**		4FD	78.5	258	261	346	318	346	12	19	3	2.5	0.46	1.31	0.72	26.8
	440	79	72	60	5	4	1 540	1 790	191	730	980	**30248R**		—	82.7	262	287	422	377	409	14	18	4	3	0.42	1.43	0.79	49.5
	440	127	120	100	5	4	1 920	2 480	245	740	980	**32248**		—	106.1	262	282	422	365	415	16	14	4	3	0.43	1.39	0.77	76.4
260	360	63.5	63.5	48	3	2.5	926	1 550	163	830	1 100	**32952JR**		3EC	69.6	274	279	348	328	347	11	15.5	2.5	2	0.41	1.48	0.81	18.9
	400	87	87	65	5	4	1 470	2 170	221	770	1 000	**32052JR**		4FC	85.0	282	287	382	352	383	14	22	4	3	0.43	1.38	0.76	39.5
	480	89	80	67	6	5	1 510	1 860	190	650	870	**30252**		—	93.6	288	310	458	415	450	14	21	5	4	0.42	1.44	0.79	64.9
	480	137	130	106	6	5	2 200	2 870	276	660	880	**32252**		—	115.2	288	300	458	400	455	16	30	5	4	0.43	1.39	0.77	102
280	380	63.5	63.5	48	3	2.5	949	1 630	168	770	1 000	**32956JR**		4EC	75.1	294	298	368	347	368	11	15.5	2.5	2	0.43	1.39	0.76	20.1
	420	87	87	65	5	4	1 510	2 280	230	720	960	**32056JR**		4FC	91.1	302	305	402	370	402	14	22	4	3	0.46	1.31	0.72	41.7
	500	89	80	67	6	5	1 580	1 920	196	610	810	**30256**		—	96.2	308	325	478	440	475	14	21	5	4	0.42	1.44	0.79	67.6
	500	137	130	106	6	5	2 340	3 150	297	610	810	**32256**		—	117.2	308	325	478	420	474	16	30	5	4	0.43	1.39	0.77	108
300	420	76	76	57	4	3	1 320	2 210	223	680	910	**32960JR**		3FD	79.9	318	324	406	383	405	12	19	3	2.5	0.39	1.52	0.84	32.4
	460	100	100	74	5	4	1 800	2 660	263	640	850	**32060JR**		4GD	97.9	322	329	442	404	439	15	26	4	3	0.43	1.38	0.76	57.5
	540	96	85	71	6	5	1 890	2 360	240	550	730	**30260**		—	103.9	328	350	518	475	505	14	24	5	4	0.42	1.44	0.79	84.7
320	440	76	76	57	4	3	1 330	2 270	226	640	850	**32964JR**		3FD	85.0	338	342	426	401	426	12	19	3	2.5	0.42	1.44	0.79	34.0
	480	100	100	74	5	4	1 900	2 810	273	600	800	**32064JR**		4GD	103.0	342	344	462	418	461	16	26	4	3	0.46	1.31	0.72	58.7
	580	104	92	75	6	5	2 190	2 770	273	490	660	**30264**		—	111.9	348	370	558	505	540	14	28	5	4	0.42	1.44	0.79	108
340	460	76	76	57	4	3	1 340	2 340	229	590	790	**32968JR**		4FD	90.5	358	361	446	420	446	12	19	3	2.5	0.44	1.37	0.75	35.6
360	480	76	76	57	4	3	1 350	2 400	231	560	740	**32972JR**		4FD	96.2	378	379	466	438	466	12	19	3	2.5	0.46	1.31	0.72	37.1

Single-row tapered roller bearings
inch series

d 9.525 ~ (22.225) mm

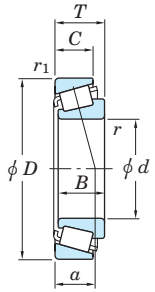


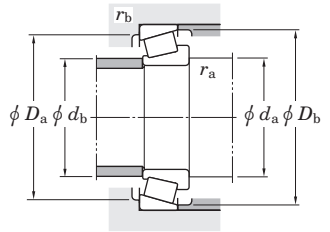


Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Load center (mm)	Mounting dimensions (mm)						Constant	Axial load factors		(Refer.) Mass (kg)	
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Inner ring	Outer ring	a	d_a	d_b	D_a	D_b	r_a max.	r_b max.	e	Y_1	Y_0	Inner ring	Outer ring
9.525	31.991	10.008	10.785	7.938	1.2	1.2	13.4	9.30	1.25	14 000	19 000	**A2037**	**A2126**	7.1	15.0	13.5	26.0	29.0	1.2	1.2	0.40	1.48	0.82	0.029	0.017
11.986	31.991	10.008	10.785	7.938	0.8	1.2	13.4	9.30	1.25	14 000	19 000	**A2047**	**A2126**	7.1	16.5	15.5	26.0	29.0	0.8	1.2	0.40	1.48	0.82	0.023	0.017
12.700	34.988	10.998	10.988	8.730	1.2	1.2	15.7	11.9	1.55	12 000	17 000	**A4050**	**A4138**	8.3	18.5	17.0	29.0	32.0	1.2	1.2	0.45	1.33	0.73	0.033	0.022
14.989	34.988	10.998	10.988	8.730	0.8	1.2	15.7	11.9	1.55	12 000	17 000	**A4059**	**A4138**	8.3	19.5	19.0	29.0	32.0	0.8	1.2	0.45	1.33	0.73	0.029	0.022
15.875	34.988	10.998	10.998	8.712	1.2	1.2	18.1	14.3	1.90	12 000	16 000	**L21549**	**L21511**	7.6	21.5	19.5	29.0	32.5	1.2	1.2	0.32	1.88	1.04	0.031	0.018
	41.275	14.288	14.681	11.112	1.2	2.0	27.3	20.5	2.85	11 000	14 000	**03062**	**03162**	9.3	21.5	20.0	34.0	37.5	1.2	2.0	0.31	1.93	1.06	0.060	0.035
	42.862	16.670	16.670	13.495	1.6	1.6	38.2	29.5	4.15	10 000	14 000	**17580R**	**17520**	10.9	23.0	21.0	36.5	39.0	1.6	1.6	0.33	1.81	1.00	0.078	0.048
	49.225	19.845	21.539	14.288	0.8	1.2	47.2	37.7	5.40	8 900	12 000	**09062**	**09195**	10.6	22.0	21.5	42.0	44.5	0.8	1.2	0.27	2.26	1.24	0.139	0.065
	53.975	22.225	21.839	15.875	0.8	2.4	52.6	41.2	5.65	8 400	11 000	**21063**	**21212**	16.6	29.0	26.5	43.0	50.0	0.8	2.4	0.59	1.02	0.56	0.163	0.097
16.000	47.000	21.000	21.000	16.000	1.0	2.0	45.4	37.7	5.05	9 800	13 000	**HM81649**	**HM81610**	15.0	27.5	23.0	37.5	43.0	1.0	2.0	0.55	1.10	0.60	0.111	0.080
17.462	39.878	13.843	14.605	10.668	1.2	1.2	31.8	26.0	3.60	11 000	14 000	**LM11749R**	**LM11710**	8.6	23.0	21.5	34.0	37.0	1.2	1.2	0.29	2.10	1.15	0.058	0.028
19.050	45.237	15.494	16.637	12.065	1.2	1.2	36.8	30.1	4.25	9 400	13 000	**LM11949**	**LM11910**	10.0	25.0	23.5	39.5	41.5	1.2	1.2	0.30	2.00	1.10	0.081	0.044
	49.225	19.845	21.539	14.288	1.2	1.2	47.2	37.7	5.40	8 900	12 000	**09078**	**09195**	10.6	25.5	24.0	42.0	44.5	1.2	1.2	0.27	2.26	1.24	0.124	0.065
	49.225	21.209	19.050	17.462	1.2	1.6	47.2	37.7	5.40	8 900	12 000	**09067**	**09196**	13.8	25.5	24.0	41.5	44.5	1.2	1.6	0.27	2.26	1.24	0.114	0.084
20.000	50.005	13.495	14.260	9.525	1.6	1.0	33.3	28.8	4.05	7 900	11 000	**07079**	**07196**	10.8	27.5	26.0	44.5	47.0	1.6	1.0	0.40	1.49	0.82	0.104	0.034
20.638	49.225	19.845	19.845	15.875	1.6	1.6	45.5	37.7	5.35	8 600	12 000	**12580**	**12520**	12.7	28.5	26.0	42.5	45.5	1.6	1.6	0.32	1.86	1.02	0.116	0.067
21.430	50.005	17.526	18.288	13.970	1.2	1.2	48.8	40.7	5.80	8 500	11 000	**M12649**	**M12610**	11.1	27.5	25.5	44.0	46.0	1.2	1.2	0.28	2.16	1.19	0.119	0.058
21.987	45.974	15.494	16.637	12.065	1.2	1.2	37.5	34.6	4.85	8 900	12 000	**LM12749**	**LM12711**	10.0	27.5	26.0	40.0	42.5	1.2	1.2	0.31	1.96	1.08	0.078	0.043
22.225	50.005	17.526	18.288	13.970	1.2	1.2	48.8	40.7	5.80	8 500	11 000	**M12648**	**M12610**	11.1	28.5	26.5	44.0	46.0	1.2	1.2	0.28	2.16	1.19	0.115	0.058
	52.388	19.368	20.168	14.288	1.6	1.6	45.9	37.9	5.45	8 000	11 000	**1380**	**1328**	11.6	29.5	29.5	45.0	48.5	1.6	1.6	0.29	2.05	1.13	0.132	0.066
	53.975	19.368	20.168	14.288	1.6	1.6	45.9	37.9	5.45	8 000	11 000	**1380**	**1329**	11.6	29.5	29.5	46.0	49.0	1.6	1.6	0.29	2.05	1.13	0.137	0.082

[Remark] Inch series tapered roller bearings with bore diameter larger than 100 mm are shown in catalog "large size ball & roller bearings".

d (22.225) ~ (26.988) mm



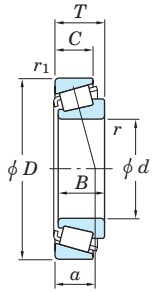


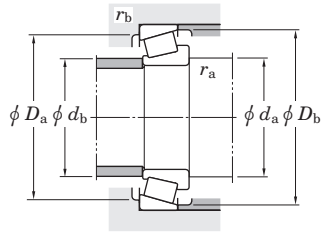
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Load center (mm)	Mounting dimensions (mm)						Constant	Axial load factors			(Refer.) Mass (kg)	
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Inner ring	Outer ring	a	d_a	d_b	D_a	D_b	r_a max.	r_b max.	e	Y_1	Y_0	Inner ring	Outer ring
22.225	56.896	19.368	19.837	15.875	1.2	1.2	50.0	43.1	6.20	7 600	10 000	**1755**	**1729**	12.5	29.0	27.5	49.0	51.0	1.2	1.2	0.31	1.95	1.07	0.150	0.100
	57.150	22.225	22.225	17.462	0.8	1.6	65.8	55.7	8.05	7 600	10 000	**1280**	**1220**	15.3	29.5	29.0	49.0	52.0	0.8	1.6	0.35	1.73	0.95	0.189	0.105
	66.421	23.812	25.433	19.050	1.6	1.2	83.8	75.2	11.2	6 500	8 700	**2684**	**2631**	13.9	31.5	29.0	58.0	60.0	1.6	1.2	0.25	2.36	1.30	0.295	0.163
22.606	47.000	15.500	15.500	12.000	1.6	1.0	35.0	32.8	4.45	8 700	12 000	**LM72849**	**LM72810**	12.3	30.0	28.0	40.5	44.0	1.6	1.0	0.47	1.27	0.70	0.076	0.047
23.812	50.292	14.224	14.732	10.668	1.6	1.2	39.1	37.0	5.15	7 800	10 000	**L44640R**	**L44610**	10.8	30.5	28.5	44.5	47.0	1.6	1.2	0.37	1.60	0.88	0.099	0.034
	56.896	19.368	19.837	15.875	0.8	1.2	50.0	43.1	6.20	7 600	10 000	**1779**	**1729**	12.5	29.5	28.5	49.0	51.0	0.8	1.2	0.31	1.95	1.07	0.141	0.100
24.981	50.005	13.495	14.260	9.525	1.6	1.0	33.3	28.8	4.05	7 900	11 000	**07098**	**07196**	10.8	31.0	29.0	44.5	47.0	1.6	1.0	0.40	1.49	0.82	0.084	0.034
	62.000	16.002	16.566	14.288	1.6	1.6	47.4	40.6	5.80	6 700	8 900	**17098**	**17244**	12.7	33.0	30.5	54.0	57.0	1.6	1.6	0.38	1.57	0.86	0.162	0.090
25.000	50.005	13.495	14.260	9.525	1.6	1.0	33.3	28.8	4.05	7 900	11 000	**07097**	**07196**	10.8	31.0	29.0	44.5	47.0	1.6	1.0	0.40	1.49	0.82	0.085	0.035
25.400	50.005	13.495	14.260	9.525	1.0	1.0	33.3	28.8	4.05	7 900	11 000	**07100**	**07196**	10.8	30.5	29.5	44.5	47.0	1.0	1.0	0.40	1.49	0.82	0.084	0.035
	50.005	13.495	14.260	9.525	1.6	1.0	33.3	28.8	4.05	7 900	11 000	**07100S**	**07196**	10.8	31.5	29.5	44.5	47.0	1.6	1.0	0.40	1.49	0.82	0.082	0.035
	50.292	14.224	14.732	10.668	1.2	1.2	39.1	37.0	5.15	7 800	10 000	**L44643R**	**L44610**	10.8	31.5	29.5	44.5	47.0	1.2	1.2	0.37	1.60	0.88	0.092	0.039
	51.994	15.011	14.260	12.700	1.0	1.2	33.3	28.8	4.05	7 900	11 000	**07100**	**07204**	12.3	30.5	29.5	45.0	48.0	1.0	1.2	0.40	1.49	0.82	0.075	0.065
	58.738	19.050	19.355	15.080	1.2	1.2	60.8	57.1	8.25	7 000	9 300	**1986R**	**1932**	13.1	32.5	30.5	52.0	54.0	1.2	1.2	0.33	1.82	1.00	0.179	0.088
	59.530	23.368	23.114	18.288	0.8	1.6	63.0	57.1	7.95	7 200	9 600	**M84249**	**M84210**	18.2	36.0	32.5	49.5	56.0	0.8	1.6	0.55	1.10	0.60	0.194	0.128
	61.912	19.050	20.638	14.288	0.8	2.0	55.7	50.7	7.30	6 400	8 600	**15101**	**15243**	13.2	32.5	31.5	55.0	58.0	0.8	2.0	0.35	1.71	0.94	0.215	0.080
	62.000	19.050	20.638	14.288	3.6	1.2	55.7	50.7	7.30	6 400	8 600	**15100**	**15245**	13.2	38.0	31.5	55.0	58.0	3.6	1.2	0.35	1.71	0.94	0.215	0.081
	63.500	19.050	20.638	14.288	0.8	1.2	55.7	50.7	7.30	6 400	8 600	**15101**	**15250R**	13.2	32.5	31.5	55.0	59.0	0.8	1.2	0.35	1.71	0.94	0.215	0.097
	64.292	21.432	21.432	16.670	1.6	1.6	69.1	70.7	9.90	6 400	8 500	**M86643R**	**M86610**	18.0	38.0	36.5	54.0	61.0	1.6	1.6	0.55	1.10	0.60	0.248	0.127
	66.421	23.812	25.433	19.050	1.2	1.2	83.8	75.2	11.2	6 500	8 700	**2687**	**2631**	13.9	33.5	31.5	58.0	60.0	1.2	1.2	0.25	2.36	1.30	0.272	0.163
	68.262	22.225	22.225	17.462	0.8	1.6	63.7	61.1	8.80	6 000	8 000	**02473**	**02420**	17.1	34.5	33.5	59.0	63.0	0.8	1.6	0.42	1.44	0.79	0.275	0.150
	72.233	25.400	25.400	19.842	0.8	2.4	83.8	87.4	12.4	5 700	7 600	**HM88630**	**HM88610**	20.7	39.5	39.5	60.0	69.0	0.8	2.4	0.55	1.10	0.60	0.391	0.185
26.162	66.421	23.812	25.433	19.050	1.6	1.2	83.8	75.2	11.2	6 500	8 700	**2682**	**2631**	13.9	34.5	32.0	58.0	60.0	1.6	1.2	0.25	2.36	1.30	0.268	0.163
26.988	50.292	14.224	14.732	10.668	3.6	1.2	39.1	37.0	5.15	7 800	10 000	**L44649R**	**L44610**	10.8	37.5	31.0	44.5	47.0	3.6	1.2	0.37	1.60	0.88	0.083	0.039

[Remark] Inch series tapered roller bearings with bore diameter larger than 100 mm are shown in catalog "large size ball & roller bearings".

Single-row tapered roller bearings
inch series

d (26.988) ~ (30.162) mm



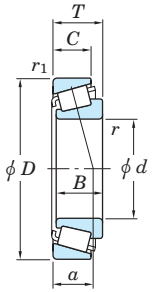


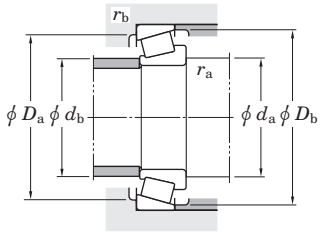
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Load center (mm)	Mounting dimensions (mm)						Constant	Axial load factors		(Refer.) Mass (kg)	
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Inner ring	Outer ring	a	d_a	d_b	D_a	D_b	r_a max.	r_b max.	e	Y_1	Y_0	Inner ring	Outer ring
26.988	60.325	19.842	17.462	15.875	3.6	1.6	47.2	42.7	6.10	7 000	9 400	**15580**	**15523**	15.1	38.5	32.0	51.0	54.0	3.6	1.6	0.35	1.73	0.95	0.140	0.122
	62.000	19.050	20.638	14.288	0.8	1.2	55.7	50.7	7.30	6 400	8 600	**15106**	**15245**	13.2	33.5	33.0	55.0	58.0	0.8	1.2	0.35	1.71	0.94	0.206	0.081
	66.421	23.812	25.433	19.050	1.6	1.2	83.8	75.2	11.2	6 500	8 700	**2688**	**2631**	13.9	35.0	33.0	58.0	60.0	1.6	1.2	0.25	2.36	1.30	0.262	0.163
28.575	57.150	17.462	17.462	13.495	3.6	1.6	47.2	42.7	6.10	7 000	9 400	**15590**	**15520**	12.7	39.0	33.5	51.0	53.0	3.6	1.6	0.35	1.73	0.95	0.131	0.069
	57.150	19.845	19.355	15.875	3.6	1.6	60.8	57.1	8.25	7 000	9 300	**1988R**	**1922**	13.9	39.5	33.5	51.0	53.5	3.6	1.6	0.33	1.82	1.00	0.151	0.076
	62.000	19.050	20.638	14.288	3.6	1.2	55.7	50.7	7.30	6 400	8 600	**15112**	**15245**	13.2	40.0	34.0	55.0	58.0	3.6	1.2	0.35	1.71	0.94	0.193	0.081
	62.000	19.050	20.638	14.288	0.8	1.2	55.7	50.7	7.30	6 400	8 600	**15113**	**15245**	13.2	34.5	34.0	55.0	58.0	0.8	1.2	0.35	1.71	0.94	0.195	0.081
	64.292	21.432	21.432	16.670	1.6	1.6	69.1	70.7	9.90	6 400	8 500	**M86647R**	**M86610**	18.0	40.0	38.0	54.0	61.0	1.6	1.6	0.55	1.10	0.60	0.225	0.127
	66.421	23.812	25.433	19.050	1.2	1.2	83.8	75.2	11.2	6 500	8 700	**2689**	**2631**	13.9	36.0	34.0	58.0	60.0	1.2	1.2	0.25	2.36	1.30	0.249	0.165
	68.262	22.225	22.225	17.462	0.8	1.6	63.7	61.1	8.80	6 000	8 000	**02474**	**02420**	17.1	36.5	36.0	59.0	63.0	0.8	1.6	0.42	1.44	0.79	0.252	0.150
	72.000	19.000	18.923	15.875	1.6	1.6	59.4	49.6	7.25	5 900	7 800	**26112**	**26283**	15.3	37.0	35.0	62.0	65.0	1.6	1.6	0.36	1.67	0.92	0.217	0.163
	72.626	24.608	24.257	17.462	4.8	1.6	77.3	60.5	8.75	6 100	8 100	**41125**	**41286**	20.7	48.0	36.5	61.0	68.0	4.8	1.6	0.60	1.00	0.55	0.292	0.177
	72.626	24.608	24.257	17.462	1.6	1.6	77.3	60.5	8.75	6 100	8 100	**41126**	**41286**	20.7	41.5	36.5	61.0	68.0	1.6	1.6	0.60	1.00	0.55	0.295	0.177
	72.626	30.162	29.997	23.812	3.6	3.2	98.6	89.3	13.3	5 800	7 700	**3192**	**3120**	20.3	42.5	37.0	61.0	67.0	3.6	3.2	0.33	1.80	0.99	0.401	0.222
	72.626	30.162	29.997	23.812	1.2	3.2	98.6	89.3	13.3	5 800	7 700	**3198**	**3120**	20.3	39.0	37.0	61.0	67.0	1.2	3.2	0.33	1.80	0.99	0.410	0.222
	73.025	22.225	22.225	17.462	0.8	3.2	68.8	65.7	9.55	5 500	7 400	**02872**	**02820**	18.4	37.5	37.0	62.0	68.0	0.8	3.2	0.45	1.32	0.73	0.319	0.158
29.000	50.292	14.224	14.732	10.668	3.6	1.2	36.3	37.2	5.15	7 600	10 000	**L45449**	**L45410**	10.9	39.5	33.0	44.5	48.0	3.6	1.2	0.37	1.62	0.89	0.079	0.036
29.367	66.421	23.812	25.433	19.050	3.6	1.2	83.8	75.2	11.2	6 500	8 700	**2690**	**2631**	13.9	41.0	35.0	58.0	60.0	3.6	1.2	0.25	2.36	1.30	0.242	0.165
29.987	62.000	16.002	16.566	14.288	1.6	1.6	47.4	40.6	5.80	6 700	8 900	**17118**	**17244**	12.7	37.0	34.5	54.0	57.0	1.6	1.6	0.38	1.57	0.86	0.135	0.090
	62.000	19.050	20.638	14.288	1.2	1.2	55.7	50.7	7.30	6 400	8 600	**15117**	**15245**	13.2	36.5	35.0	55.0	58.0	1.2	1.2	0.35	1.71	0.94	0.184	0.081
30.000	69.012	19.845	19.583	15.875	3.6	1.2	57.7	55.0	7.95	5 900	7 800	**14117A**	**14276**	15.5	42.5	39.5	60.0	63.0	3.6	1.2	0.38	1.57	0.86	0.225	0.135
30.112	62.000	19.050	20.638	14.288	0.8	1.2	55.7	50.7	7.30	6 400	8 600	**15116**	**15245**	13.2	36.0	35.5	55.0	58.0	0.8	1.2	0.35	1.71	0.94	0.184	0.081
30.162	62.000	16.002	16.566	14.288	1.6	1.6	47.4	40.6	5.80	6 700	8 900	**17119**	**17244**	12.7	37.0	34.5	54.0	57.0	1.6	1.6	0.38	1.57	0.86	0.139	0.091
	64.292	21.432	21.432	16.670	1.6	1.6	69.1	70.7	9.90	6 400	8 500	**M86649R**	**M86610**	18.0	41.0	38.0	54.0	61.0	1.6	1.6	0.55	1.10	0.60	0.213	0.127

[Remark] Inch series tapered roller bearings with bore diameter larger than 100 mm are shown in catalog "large size ball & roller bearings".

Single-row tapered roller bearings
inch series

d (30.162) ~ (34.925) mm



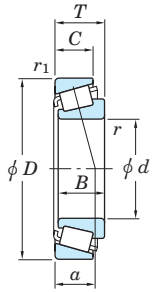


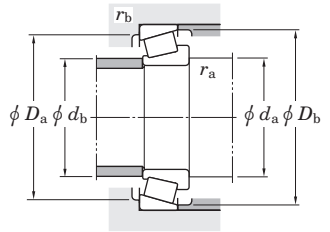
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Load center (mm)	Mounting dimensions (mm)						Constant	Axial load factors		(Refer.) Mass (kg)	
d	D	T	B	C	r 1) min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Inner ring	Outer ring	a	d_a	d_b	D_a	D_b	r_a max.	r_b max.	e	Y_1	Y_0	Inner ring	Outer ring
30.162	68.262	22.225	22.225	17.462	2.4	1.6	70.2	71.1	10.0	6 000	7 900	**M88043**	**M88010**	19.2	43.5	39.5	58.0	65.0	2.4	1.6	0.55	1.10	0.60	0.258	0.144
30.213	62.000	19.050	20.638	14.288	3.6	1.2	55.7	50.7	7.30	6 400	8 600	**15118**	**15245**	13.2	41.5	35.5	55.0	58.0	3.6	1.2	0.35	1.71	0.94	0.181	0.081
	62.000	19.050	20.638	14.288	1.6	1.2	55.7	50.7	7.30	6 400	8 600	**15119**	**15245**	13.2	37.5	35.5	55.0	58.0	1.6	1.2	0.35	1.71	0.94	0.183	0.081
	62.000	19.050	20.638	14.288	0.8	1.2	55.7	50.7	7.30	6 400	8 600	**15120**	**15245**	13.2	36.0	35.5	55.0	58.0	0.8	1.2	0.35	1.71	0.94	0.183	0.081
30.226	69.012	19.845	19.583	15.875	0.8	3.2	57.7	55.0	7.95	5 900	7 800	**14116**	**14274**	15.5	37.0	36.5	59.0	63.0	0.8	3.2	0.38	1.57	0.86	0.226	0.131
31.750	58.738	14.684	15.080	10.716	1.0	1.0	37.0	33.3	4.60	6 600	8 900	**08125**	**08231**	13.5	37.5	36.0	52.0	55.0	1.0	1.0	0.48	1.26	0.69	0.109	0.056
	59.131	15.875	16.764	11.811	SP	1.2	44.8	43.1	6.05	6 600	8 800	**LM67048**	**LM67010**	13.0	42.5	36.0	52.0	56.0	3.5	1.2	0.41	1.46	0.80	0.120	0.062
	62.000	18.161	19.050	14.288	SP	1.2	55.7	50.7	7.30	6 400	8 600	**15123**	**15245**	13.2	42.5	36.5	55.0	58.0	3.5	1.2	0.35	1.71	0.94	0.157	0.081
	62.000	19.050	20.638	14.288	3.6	1.2	55.7	50.7	7.30	6 400	8 600	**15125**	**15245**	13.2	42.5	36.5	55.0	58.0	3.6	1.2	0.35	1.71	0.94	0.169	0.081
	62.000	19.050	20.638	14.288	0.8	1.2	55.7	50.7	7.30	6 400	8 600	**15126**	**15245**	13.2	37.0	36.5	55.0	58.0	0.8	1.2	0.35	1.71	0.94	0.171	0.081
	66.421	25.400	25.357	20.638	0.8	3.2	89.2	85.1	12.7	6 000	8 000	**2580**	**2520**	16.0	38.5	37.5	57.0	62.5	0.8	3.2	0.27	2.19	1.21	0.281	0.123
	68.262	22.225	22.225	17.462	3.6	1.6	63.7	61.1	8.80	6 000	8 000	**02475**	**02420**	17.1	44.5	38.5	59.0	63.0	3.6	1.6	0.42	1.44	0.79	0.224	0.150
	68.262	22.225	22.225	17.462	0.8	1.6	63.7	61.1	8.80	6 000	8 000	**02476**	**02420**	17.1	39.0	38.5	59.0	63.0	0.8	1.6	0.42	1.44	0.79	0.226	0.150
	68.262	22.225	22.225	17.462	1.6	1.6	70.2	71.1	10.0	6 000	7 900	**M88046**	**M88010**	19.2	43.0	40.5	58.0	65.0	1.6	1.6	0.55	1.10	0.60	0.245	0.144
	73.025	22.225	22.225	17.462	3.6	3.2	68.8	65.7	9.55	5 600	7 400	**02875**	**02820**	17.1	45.5	39.5	62.0	68.0	3.6	3.2	0.45	1.32	0.73	0.293	0.158
	73.025	22.225	22.225	17.462	0.8	3.2	68.8	65.7	9.55	5 500	7 400	**02876**	**02820**	17.1	40.0	39.5	62.0	68.0	0.8	3.2	0.45	1.32	0.73	0.293	0.158
	73.025	29.370	27.783	23.020	1.2	3.2	93.0	101	14.2	5 600	7 500	**HM88542**	**HM88510**	23.4	45.5	42.5	59.0	70.0	1.2	3.2	0.55	1.10	0.60	0.377	0.238
	73.812	29.370	27.783	23.020	1.2	3.2	93.0	101	14.2	5 600	7 500	**HM88542**	**HM88512**	23.4	45.5	42.5	59.0	70.0	1.2	3.2	0.55	1.10	0.60	0.377	0.254
33.338	68.262	22.225	22.225	17.462	0.8	1.6	70.2	71.1	10.0	6 000	7 900	**M88048**	**M88010**	19.2	42.5	41.0	58.0	65.0	0.8	1.6	0.55	1.10	0.60	0.231	0.144
	72.000	19.000	18.923	15.875	3.6	1.6	69.8	60.0	8.85	5 900	7 800	**26131**	**26283**	14.3	44.5	38.5	62.0	65.0	3.6	1.6	0.36	1.67	0.92	0.200	0.163
	73.025	29.370	27.783	23.020	0.8	3.2	93.0	101	14.2	5 600	7 500	**HM88547**	**HM88510**	23.4	45.5	42.6	59.0	70.0	0.8	3.2	0.55	1.10	0.60	0.360	0.238
	76.200	29.370	28.575	23.020	0.8	3.2	99.5	107	15.2	5 400	7 200	**HM89443**	**HM89410**	23.9	46.5	44.6	62.0	73.0	0.8	3.2	0.55	1.10	0.60	0.415	0.254
34.925	65.088	18.034	18.288	13.970	SP	1.2	60.0	58.5	8.40	6 000	8 000	**LM48548**	**LM48510**	14.3	46.0	40.0	58.0	61.0	3.5	1.2	0.38	1.59	0.88	0.164	0.086
	69.012	26.982	26.721	15.875	0.8	1.2	57.7	55.0	7.95	5 900	7 800	**14136A**	**14276**	22.6	40.0	38.0	60.0	63.0	0.8	1.2	0.38	1.57	0.86	0.254	0.133
	72.233	25.400	25.400	19.842	2.4	2.4	83.8	87.4	12.4	5 700	7 600	**HM88649**	**HM88610**	20.7	48.5	42.5	60.0	69.0	2.4	2.4	0.55	1.10	0.60	0.301	0.185

[Note] 1) SP indicates the specially chamfered from.

[Remark] Inch series tapered roller bearings with bore diameter larger than 100 mm are shown in catalog "large size ball & roller bearings".

d (34.925) ~ (38.100) mm



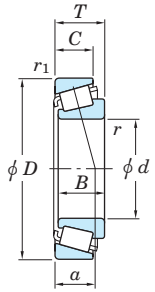


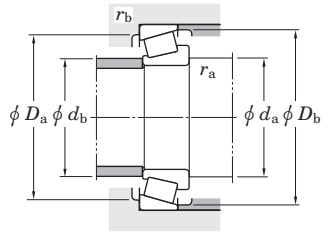
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. [2]		Load center (mm)	Mounting dimensions (mm)						Constant	Axial load factors		(Refer.) Mass (kg)	
d	D	T	B	C	r [1] min.	r_1 [1] min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Inner ring	Outer ring	a	d_a	d_b	D_a	D_b	r_a max.	r_b max.	e	Y_1	Y_0	Inner ring	Outer ring
34.925	72.238	20.638	20.638	15.875	3.6	1.2	62.3	61.3	8.90	5 600	7 400	**16137**	**16284**	16.6	46.5	40.5	63.0	67.0	3.6	1.2	0.40	1.49	0.82	0.236	0.144
	73.025	22.225	22.225	17.462	3.6	3.2	68.8	65.7	9.55	5 500	7 400	**02877**	**02820**	18.4	48.5	42.0	62.0	68.0	3.6	3.2	0.45	1.32	0.73	0.262	0.158
	73.025	22.225	22.225	17.462	0.8	3.2	68.8	65.7	9.55	5 500	7 400	**02878**	**02820**	18.4	42.5	42.0	62.0	68.0	0.8	3.2	0.45	1.32	0.73	0.265	0.158
	73.025	23.812	24.608	19.050	1.6	0.8	90.1	87.3	13.1	5 600	7 400	**25877R**	**25821**	15.8	43.0	40.5	65.0	68.0	1.6	0.8	0.29	2.07	1.14	0.310	0.165
	73.025	26.988	26.975	22.225	3.6	1.6	97.2	94.1	13.9	5 700	7 600	**23690**	**23620**	18.8	49.0	42.0	64.0	68.0	3.6	1.6	0.37	1.62	0.89	0.326	0.212
	76.200	20.638	20.940	15.507	1.6	1.2	71.6	65.9	9.70	5 300	7 000	**28137**	**28300**	16.5	43.5	41.0	68.0	71.0	1.6	1.2	0.40	1.49	0.82	0.315	0.137
	76.200	23.812	25.654	19.050	3.6	3.2	92.6	92.2	13.8	5 400	7 200	**2796R**	**2720**	15.9	47.5	41.0	66.0	70.0	3.6	3.2	0.30	1.98	1.09	0.344	0.185
	76.200	29.370	28.575	23.812	1.6	3.2	101	97.4	14.4	5 400	7 200	**31594**	**31520**	21.6	46.0	43.5	64.0	72.0	1.6	3.2	0.40	1.49	0.82	0.388	0.232
	79.375	29.370	29.771	23.812	3.6	3.2	109	105	15.7	5 200	6 900	**3478**	**3420**	20.8	50.0	43.5	67.0	74.0	3.6	3.2	0.37	1.64	0.90	0.462	0.256
	87.312	30.162	30.886	23.812	3.6	3.2	120	120	18.2	4 600	6 200	**3581R**	**3525**	20.5	48.0	45.5	75.0	81.0	3.6	3.2	0.31	1.96	1.08	0.622	0.300
	95.250	27.783	29.901	22.225	0.8	2.4	129	122	18.8	4 500	5 900	**449**	**432**	18.4	44.0	43.5	83.0	87.0	0.8	2.4	0.28	2.11	1.16	0.686	0.384
34.980	59.131	15.875	16.764	11.938	SP	1.2	44.9	48.5	6.85	6 400	8 500	**L68149**	**L68110**	13.2	45.5	39.0	53.0	56.0	3.5	1.2	0.42	1.44	0.79	0.112	0.056
	59.975	15.875	16.764	11.938	SP	1.2	44.9	48.5	6.85	6 400	8 500	**L68149**	**L68111**	13.2	45.5	39.0	53.0	56.0	3.5	1.2	0.42	1.44	0.79	0.112	0.063
35.000	79.375	23.812	25.400	19.050	0.8	0.8	101	105	15.8	5 000	6 700	**26883R**	**26822**	16.4	42.5	42.0	71.0	74.0	0.8	0.8	0.32	1.88	1.04	0.414	0.186
	80.000	21.000	22.403	17.826	0.8	1.2	85.0	74.8	11.4	4 900	6 600	**339**	**332**	15.1	42.5	41.5	73.0	75.0	0.8	1.2	0.27	2.20	1.21	0.385	0.144
35.717	72.233	25.400	25.400	19.842	3.6	2.4	83.8	87.4	12.4	5 700	7 600	**HM88648**	**HM88610**	20.7	52.0	42.5	60.0	69.0	3.6	2.4	0.55	1.10	0.60	0.291	0.185
36.487	73.025	23.812	24.608	19.050	1.6	0.8	90.1	87.3	13.1	5 600	7 400	**25880R**	**25821**	15.8	44.0	42.0	65.0	68.0	1.6	0.8	0.29	2.07	1.14	0.294	0.165
	73.025	23.812	25.654	19.050	3.6	0.8	92.6	92.2	13.8	5 400	7 200	**2794R**	**2735X**	15.9	49.0	42.5	66.0	69.0	3.6	0.8	0.30	1.98	1.09	0.344	0.134
36.512	76.200	29.370	28.575	23.020	3.6	0.8	99.5	107	15.2	5 400	7 200	**HM89449**	**HM89411**	23.9	54.0	44.5	65.0	73.0	3.6	0.8	0.55	1.10	0.60	0.386	0.258
	79.375	23.812	25.400	19.050	0.8	0.8	101	105	15.8	5 000	6 700	**26877R**	**26822**	16.4	44.0	43.0	71.0	74.0	0.8	0.8	0.32	1.88	1.04	0.404	0.186
	79.375	29.370	29.771	23.812	0.8	3.2	109	105	15.7	5 200	6 900	**3479**	**3420**	20.8	45.5	44.5	67.0	74.0	0.8	3.2	0.37	1.64	0.90	0.429	0.259
	85.725	30.162	30.162	23.812	0.8	3.2	135	136	20.3	4 800	6 400	**3878**	**3820**	22.9	48.0	47.0	73.0	81.0	0.8	3.2	0.40	1.49	0.82	0.605	0.285
38.000	63.000	17.000	17.000	13.500	SP	SP	54.7	58.2	8.25	6 000	8 000	**JL69349**	**JL69310**	14.6	49.0	41.0	60.0	56.5	3.5	1.2	0.42	1.44	0.79	0.128	0.070
38.100	63.500	12.700	11.908	9.525	1.6	0.8	32.1	33.1	4.60	5 800	7 700	**13889**	**13830**	11.9	45.0	42.5	59.0	60.0	1.6	0.8	0.35	1.73	0.95	0.104	0.045

[Notes] 1) SP indicates the specially chamfered from.
2) To the bearings with supplementary code "J" attached at the front of bearing number, tolerances shown in table 7-8 on page A72 are applied.

[Remark] Inch series tapered roller bearings with bore diameter larger than 100 mm are shown in catalog "large size ball & roller bearings".

d (38.100) ~ (40.000) mm



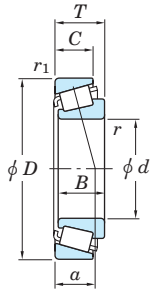


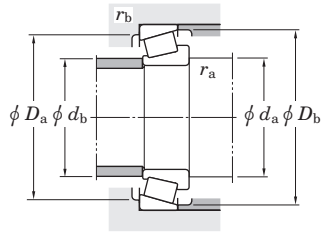
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Load center (mm)	Mounting dimensions (mm)						Constant	Axial load factors		(Refer.) Mass (kg)	
d	D	T	B	C	r 1) min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Inner ring	Outer ring	a	d_a	d_b	D_a	D_b	r_a max.	r_b max.	e	Y_1	Y_0	Inner ring	Outer ring
38.100	65.088	12.700	11.908	9.525	1.6	0.8	32.1	33.1	4.60	5 800	7 700	**13889**	**13836**	11.9	45.0	42.5	59.0	61.0	1.6	0.8	0.35	1.73	0.95	0.104	0.046
	65.088	18.034	18.288	13.970	SP	1.2	53.9	56.5	8.15	5 800	7 800	**LM29748**	**LM29710**	13.8	49.0	42.5	59.0	62.0	3.5	1.2	0.33	1.80	0.99	0.154	0.079
	65.088	19.812	18.288	15.748	2.4	1.2	53.9	56.5	8.15	5 800	7 800	**LM29749**	**LM29711**	15.6	46.0	42.5	58.0	62.0	2.4	1.2	0.33	1.80	0.99	0.159	0.092
	69.012	19.050	19.050	15.083	2.0	2.4	61.7	62.0	8.95	5 600	7 500	**13687**	**13621**	16.1	46.5	43.0	61.0	65.0	2.0	2.4	0.40	1.49	0.82	0.191	0.102
	71.438	15.875	16.520	11.908	1.6	1.0	57.6	53.8	7.70	5 700	7 600	**19150R**	**19281**	14.5	45.0	43.0	63.0	66.0	1.6	1.0	0.44	1.35	0.74	0.167	0.105
	71.996	17.018	16.520	14.288	1.6	1.6	57.6	53.8	7.70	5 700	7 600	**19150R**	**19283**	15.7	45.0	43.0	63.0	66.0	1.6	1.6	0.44	1.35	0.74	0.167	0.132
	71.996	19.000	20.638	14.237	3.6	1.6	62.3	61.3	8.90	5 600	7 400	**16150**	**16282**	15.0	49.5	43.0	63.0	67.0	3.6	1.6	0.40	1.49	0.82	0.207	0.121
	72.238	20.638	20.638	15.875	3.6	1.2	62.3	61.3	8.90	5 600	7 400	**16150**	**16284**	16.6	49.5	43.0	63.0	67.0	3.6	1.2	0.40	1.49	0.82	0.207	0.144
	72.238	23.812	20.638	19.050	3.6	2.4	62.3	61.3	8.90	5 600	7 400	**16150**	**16283**	19.8	49.5	43.0	61.0	67.0	3.6	2.4	0.40	1.49	0.82	0.207	0.183
	73.025	23.812	25.654	19.050	3.6	0.8	92.6	92.2	13.8	5 400	7 200	**2788R**	**2735X**	15.9	50.0	43.5	66.0	69.0	3.6	0.8	0.30	1.98	1.09	0.308	0.134
	76.200	23.812	25.654	19.050	3.6	0.8	92.6	92.2	13.8	5 400	7 200	**2788R**	**2729**	15.9	50.0	43.5	68.0	70.0	3.6	0.8	0.30	1.98	1.09	0.308	0.189
	79.375	29.370	29.771	23.812	3.6	3.2	109	105	15.7	5 200	6 900	**3490**	**3420**	20.8	52.0	45.9	67.0	74.0	3.6	3.2	0.37	1.64	0.90	0.419	0.256
	80.035	21.432	20.940	15.875	1.6	1.6	71.6	65.9	9.70	5 300	7 000	**28150**	**28317**	16.9	45.5	43.5	69.0	73.0	1.6	1.6	0.40	1.49	0.82	0.285	0.201
	80.035	24.608	23.698	18.512	0.8	1.6	91.6	91.6	13.3	5 200	6 900	**27880**	**27820**	22.2	48.0	47.0	68.0	75.0	0.8	1.6	0.56	1.07	0.59	0.378	0.208
	80.035	24.608	23.698	18.512	3.6	1.6	91.6	91.6	13.3	5 200	6 900	**27881**	**27820**	22.2	53.0	47.0	68.0	75.0	3.6	1.6	0.56	1.07	0.59	0.378	0.208
	82.550	29.370	28.575	23.020	0.8	3.2	109	117	16.9	4 900	6 600	**HM801346**	**HM801310**	24.4	51.0	49.0	68.0	78.0	0.8	3.2	0.55	1.10	0.60	0.483	0.282
	82.550	29.370	28.575	23.020	2.4	3.2	109	117	16.9	4 900	6 600	**HM801346X**	**HM801310**	24.4	54.0	49.0	68.0	78.0	2.4	3.2	0.55	1.10	0.60	0.483	0.282
	82.931	23.812	25.400	19.050	0.8	0.8	96.8	100	15.1	4 800	6 300	**25572**	**25520**	17.5	46.0	46.0	74.0	77.0	0.8	0.8	0.33	1.79	0.99	0.437	0.203
	88.501	26.988	29.083	22.225	3.6	1.6	123	112	17.2	4 900	6 500	**418**	**414**	16.9	51.0	44.5	77.0	80.0	3.6	1.6	0.26	2.28	1.25	0.523	0.325
	90.488	39.688	40.386	33.338	1.6	3.2	166	169	25.9	4 500	6 000	**4375**	**4335**	25.6	51.0	48.5	77.0	85.0	1.6	3.2	0.28	2.11	1.16	0.841	0.459
	101.600	34.925	36.068	26.988	3.6	3.2	164	159	24.8	4 000	5 300	**525**	**522**	22.2	54.0	48.0	89.0	95.0	3.6	3.2	0.29	2.10	1.16	1.05	0.411
39.688	73.025	16.667	17.462	12.700	0.8	1.6	57.6	55.8	8.15	5 200	6 900	**18587**	**18520**	14.5	46.0	46.0	66.0	69.0	0.8	1.6	0.35	1.71	0.94	0.215	0.085
	73.025	23.812	25.654	19.050	3.6	0.8	92.6	92.2	13.8	5 400	7 200	**2789R**	**2735X**	15.9	52.0	45.0	66.0	69.0	3.6	0.8	0.30	1.98	1.09	0.288	0.134
	80.167	29.370	30.391	23.812	0.8	3.2	114	106	16.2	5 000	6 700	**3386**	**3320**	18.7	46.5	45.5	70.0	75.0	0.8	3.2	0.27	2.20	1.21	0.442	0.217
	84.138	29.370	30.391	23.812	3.6	3.2	114	106	16.2	5 000	6 700	**3382**	**3328**	18.7	52.0	45.5	72.0	76.0	3.6	3.2	0.27	2.20	1.21	0.438	0.312
40.000	76.200	20.638	20.940	15.507	1.6	1.2	71.6	65.9	9.70	5 300	7 000	**28158**	**28300**	16.5	47.5	45.0	68.0	71.0	1.6	1.2	0.40	1.49	0.82	0.266	0.137
	80.000	21.000	22.403	17.826	3.6	1.2	85.0	74.8	11.4	4 900	6 600	**344**	**332**	15.1	52.0	45.5	73.0	75.0	3.6	1.2	0.27	2.20	1.21	0.334	0.144

[Note] 1) SP indicates the specially chamfered from.

[Remark] Inch series tapered roller bearings with bore diameter larger than 100 mm are shown in catalog "large size ball & roller bearings".

Single-row tapered roller bearings
inch series
d (40.000) ~ 42.070 mm

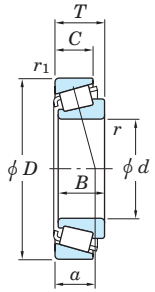


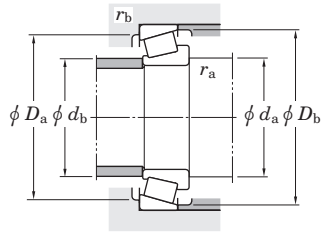


Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Load center (mm)	Mounting dimensions (mm)						Constant	Axial load factors		(Refer.) Mass (kg)	
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Inner ring	Outer ring	a	d_a	d_b	D_a	D_b	r_a max.	r_b max.	e	Y_1	Y_0	Inner ring	Outer ring
40.000	80.000	21.000	22.403	17.826	0.8	1.2	85.0	74.8	11.4	4 900	6 600	**344A**	**332**	15.1	46.0	45.5	73.0	75.0	0.8	1.2	0.27	2.20	1.21	0.334	0.144
	85.000	20.638	21.692	17.462	0.8	1.2	89.6	81.7	12.4	4 600	6 200	**350A**	**354A**	15.5	47.5	46.5	77.0	80.0	0.8	1.2	0.31	1.96	1.08	0.416	0.162
	88.501	26.988	29.083	22.225	3.6	1.6	123	112	17.2	4 900	6 500	**420**	**414**	16.9	52.0	46.0	77.0	80.0	3.6	1.6	0.26	2.28	1.25	0.465	0.325
	107.950	36.512	36.957	28.575	3.6	3.2	172	172	26.8	3 800	5 100	**543**	**532X**	23.9	57.0	50.0	94.0	100.0	3.6	3.2	0.30	2.03	1.11	1.17	0.570
40.483	82.550	29.370	28.575	23.020	3.6	3.2	109	117	16.9	4 900	6 600	**HM801349**	**HM801310**	24.4	58.0	49.0	68.0	78.0	3.6	3.2	0.55	1.10	0.60	0.450	0.282
41.275	73.025	16.667	17.462	12.700	3.6	1.6	57.6	55.8	8.15	5 200	6 900	**18590**	**18520**	14.5	53.0	46.0	66.0	69.0	3.6	1.6	0.35	1.71	0.94	0.199	0.085
	73.431	19.558	19.812	14.732	3.6	0.8	72.5	73.0	10.6	5 200	7 000	**LM501349**	**LM501310**	16.1	53.0	46.5	67.0	70.0	3.6	0.8	0.40	1.50	0.83	0.227	0.107
	73.431	21.430	19.812	16.604	3.6	0.8	72.5	73.0	10.6	5 200	7 000	**LM501349**	**LM501314**	18.0	53.0	46.5	66.0	70.0	3.6	0.8	0.40	1.50	0.83	0.227	0.126
	73.431	23.012	19.812	18.186	3.6	2.4	72.5	73.0	10.6	5 200	7 000	**LM501349**	**LM501311**	16.1	53.0	46.5	64.0	70.0	3.6	2.4	0.40	1.50	0.83	0.227	0.140
	76.200	18.009	17.384	14.288	1.6	1.6	64.7	63.3	9.15	5 200	6 900	**11162R**	**11300**	17.5	49.0	46.5	67.0	72.0	1.6	1.6	0.49	1.23	0.68	0.221	0.127
	76.200	22.225	23.020	17.462	3.6	0.8	82.9	83.3	12.3	5 200	6 900	**24780R**	**24720**	17.4	54.0	47.0	68.0	72.0	3.6	0.8	0.39	1.53	0.84	0.275	0.148
	80.000	21.000	22.403	17.826	0.8	1.2	85.0	74.8	11.4	4 900	6 600	**336**	**332**	15.1	47.0	46.0	73.0	75.0	0.8	1.2	0.27	2.20	1.21	0.325	0.144
	80.000	21.000	22.403	17.826	3.6	1.2	85.0	74.8	11.4	4 900	6 600	**342**	**332**	15.1	53.0	46.0	73.0	75.0	3.6	1.2	0.27	2.20	1.21	0.317	0.144
	82.550	26.543	25.654	20.193	3.6	3.2	105	105	15.4	4 900	6 500	**M802048**	**M802011**	23.3	57.0	50.6	70.0	79.0	3.6	3.2	0.55	1.10	0.60	0.403	0.227
	85.725	30.162	30.162	23.812	3.6	1.2	135	136	20.3	4 800	6 400	**3877**	**3821**	22.9	57.0	50.3	75.0	81.0	3.6	1.2	0.40	1.49	0.82	0.506	0.324
	87.312	30.162	30.886	23.812	0.8	3.2	120	120	18.2	4 600	6 200	**3576R**	**3525**	20.5	49.0	48.0	75.0	81.0	0.8	3.2	0.31	1.96	1.08	0.533	0.300
	88.501	26.988	29.083	22.225	3.6	1.6	123	112	17.2	4 900	6 500	**419**	**414**	16.9	54.0	47.0	77.0	80.0	3.6	1.6	0.26	2.28	1.25	0.441	0.325
	88.900	20.638	22.225	16.513	3.6	1.2	92.9	87.3	13.3	4 400	5 800	**365A**	**362A**	16.1	55.0	48.5	81.0	84.0	3.6	1.2	0.32	1.88	1.03	0.458	0.164
	88.900	30.162	29.370	23.020	0.8	3.2	124	125	18.5	4 600	6 100	**HM803145**	**HM803110**	26.1	54.0	53.0	74.0	85.0	0.8	3.2	0.55	1.10	0.60	0.577	0.318
	88.900	30.162	29.370	23.020	3.6	3.2	124	125	18.5	4 600	6 100	**HM803146**	**HM803110**	26.1	60.0	53.0	74.0	85.0	3.6	3.2	0.55	1.10	0.60	0.574	0.318
	90.488	39.688	40.386	33.338	3.6	3.2	166	169	25.9	4 500	6 000	**4388**	**4335**	25.6	57.0	51.0	77.0	85.0	3.6	3.2	0.28	2.11	1.16	0.775	0.454
	93.662	31.750	31.750	26.195	0.8	3.2	132	134	20.2	4 400	5 800	**46162**	**46368**	24.0	52.0	51.0	79.0	87.0	0.8	3.2	0.40	1.49	0.82	0.695	0.403
	95.250	30.162	29.370	23.020	3.6	3.2	130	140	20.7	3 300	4 400	**HM804840**	**HM804810**	26.5	61.0	54.0	81.0	91.0	3.6	3.2	0.55	1.10	0.60	0.719	0.351
	101.600	34.925	36.068	26.988	3.6	3.2	164	159	24.8	4 000	5 300	**526**	**522**	22.2	57.0	50.0	89.0	95.0	3.6	3.2	0.29	2.10	1.16	1.02	0.411
	104.775	36.512	36.512	28.575	1.6	3.2	176	195	29.3	3 800	5 100	**HM807035**	**HM807010**	29.3	60.0	57.0	89.0	100.0	1.6	3.2	0.49	1.23	0.68	1.19	0.497
42.070	90.488	39.688	40.386	33.338	3.6	3.2	166	169	25.9	4 500	6 000	**4395**	**4335**	25.6	58.0	51.0	77.0	85.0	3.6	3.2	0.28	2.11	1.16	0.751	0.459

[Remark] Inch series tapered roller bearings with bore diameter larger than 100 mm are shown in catalog "large size ball & roller bearings".

d 42.862 ~ 45.000 mm

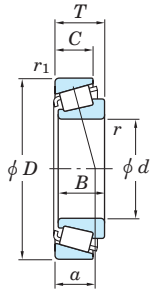


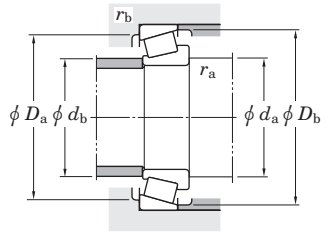


Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Load center (mm)	Mounting dimensions (mm)						Constant	Axial load factors			(Refer.) Mass (kg)	
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Inner ring	Outer ring	a	d_a	d_b	D_a	D_b	r_a max.	r_b max.	e	Y_1	Y_0	Inner ring	Outer ring
42.862	76.992	17.463	17.145	11.908	1.6	1.6	60.8	62.2	8.95	5 000	6 600	**12168**	**12303**	17.5	51.0	48.5	68.0	73.0	1.6	1.6	0.51	1.19	0.65	0.220	0.097
42.875	79.375	23.812	25.400	19.050	3.6	0.8	101	105	15.8	5 000	6 700	**26884R**	**26822**	16.1	55.0	48.5	71.0	74.0	3.6	0.8	0.32	1.88	1.04	0.314	0.186
	82.931	23.812	25.400	19.050	3.6	0.8	96.8	100	15.1	4 800	6 300	**25577**	**25520**	17.5	55.0	49.0	74.0	77.0	3.6	0.8	0.33	1.79	0.99	0.382	0.200
44.450	73.025	18.258	18.258	15.083	1.6	1.6	59.4	65.5	9.50	5 100	6 800	**L102849**	**L102810**	14.6	51.0	49.0	66.0	69.0	1.6	1.6	0.32	1.88	1.04	0.183	0.102
	76.992	17.463	17.145	11.908	1.6	1.6	60.8	62.2	8.95	5 000	6 600	**12175**	**12303**	17.5	52.0	49.5	68.0	73.0	1.6	1.6	0.51	1.19	0.65	0.206	0.097
	79.375	17.462	17.462	13.495	2.8	1.6	59.2	59.1	8.65	4 800	6 400	**18685**	**18620**	16.0	54.0	49.5	71.0	74.0	2.8	1.6	0.37	1.60	0.88	0.214	0.126
	82.931	23.812	25.400	19.050	5.2	0.8	96.8	100	15.1	4 800	6 300	**25582**	**25520**	17.5	59.0	51.0	74.0	77.0	5.2	0.8	0.33	1.79	0.99	0.361	0.200
	84.138	30.162	30.886	23.812	3.6	3.2	120	120	18.2	4 600	6 200	**3578R**	**3520**	20.5	57.0	51.0	74.0	79.5	3.6	3.2	0.31	1.96	1.08	0.479	0.221
	85.000	20.638	21.692	17.462	2.4	1.2	89.6	81.7	12.4	4 600	6 200	**355**	**354A**	15.5	54.0	50.0	77.0	80.0	2.4	1.2	0.31	1.96	1.08	0.344	0.160
	85.000	20.638	21.692	17.462	0.8	1.2	89.6	81.7	12.4	4 600	6 200	**355A**	**354A**	15.5	51.0	50.0	77.0	80.0	0.8	1.2	0.31	1.96	1.08	0.344	0.160
	88.900	30.162	29.370	23.020	3.6	3.2	124	125	18.5	4 600	6 100	**HM803149**	**HM803110**	26.1	62.0	53.4	74.0	85.0	3.6	3.2	0.55	1.10	0.60	0.525	0.318
	93.662	31.750	31.750	25.400	3.6	3.2	131	123	18.8	4 400	5 900	**49175**	**49368**	22.9	59.0	53.0	82.0	87.0	3.6	3.2	0.36	1.67	0.92	0.645	0.371
	93.662	31.750	31.750	26.195	0.8	3.2	132	134	20.2	4 400	5 800	**46175**	**46368**	24.0	55.0	54.0	79.0	87.0	0.8	3.2	0.40	1.49	0.82	0.609	0.403
	93.662	31.750	31.750	26.195	3.6	3.2	132	134	20.2	4 400	5 800	**46176**	**46368**	24.0	60.0	54.0	79.0	87.0	3.6	3.2	0.40	1.49	0.82	0.609	0.403
	95.250	27.783	28.575	22.225	0.8	2.4	135	141	21.6	4 100	5 400	**33885**	**33821**	20.4	53.0	53.0	85.0	90.0	0.8	2.4	0.33	1.82	1.00	0.714	0.264
	95.250	27.783	29.901	22.225	3.6	0.8	129	122	18.8	4 500	5 900	**438**	**432A**	18.4	57.0	51.0	84.0	87.0	3.6	0.8	0.28	2.11	1.16	0.555	0.375
	95.250	30.162	29.370	23.020	0.8	2.4	130	140	20.7	3 300	4 400	**HM804842**	**HM804810**	26.5	57.0	57.0	81.0	91.0	0.8	2.4	0.55	1.10	0.60	0.673	0.351
	95.250	30.162	29.370	23.020	3.6	2.4	130	140	20.7	3 300	4 400	**HM804843**	**HM804810**	26.5	63.0	57.0	81.0	91.0	3.6	2.4	0.55	1.10	0.60	0.670	0.351
	98.425	30.162	31.750	25.400	0.8	3.2	143	143	21.9	3 900	5 200	**49576**	**49520**	24.1	55.0	54.0	88.0	96.0	0.8	3.2	0.40	1.50	0.82	0.856	0.384
	101.600	34.925	36.068	26.988	3.6	3.2	164	159	24.8	4 000	5 300	**527**	**522**	22.2	59.0	53.0	89.0	95.0	3.6	3.2	0.29	2.10	1.16	0.939	0.411
	104.775	36.512	36.512	28.575	3.6	3.2	176	195	29.3	3 800	5 100	**HM807040**	**HM807010**	29.3	66.0	59.0	89.0	100.0	3.6	3.2	0.49	1.23	0.68	1.13	0.497
	111.125	38.100	36.957	30.162	3.6	3.2	172	172	26.8	3 800	5 100	**535**	**532A**	23.9	60.0	54.0	95.0	100.0	3.6	3.2	0.30	2.03	1.11	1.09	0.746
	120.650	41.275	41.275	31.750	3.6	3.2	218	217	34.0	3 500	4 600	**615**	**612**	27.3	62.0	56.0	105.0	110.0	3.6	3.2	0.31	1.91	1.05	1.48	0.853
44.983	93.264	30.162	30.302	23.812	3.6	3.2	129	137	20.9	4 200	5 500	**3776**	**3720**	22.2	59.0	53.0	82.0	88.0	3.6	3.2	0.34	1.77	0.97	0.650	0.288
45.000	85.000	20.638	21.692	17.462	1.6	1.2	89.6	81.7	12.4	4 600	6 200	**358**	**354A**	15.5	52.5	50.0	77.0	80.0	1.6	1.2	0.31	1.96	1.08	0.338	0.162

[Remark] Inch series tapered roller bearings with bore diameter larger than 100 mm are shown in catalog "large size ball & roller bearings".

d 45.242 ~ 49.212 mm

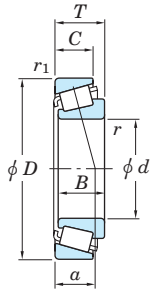


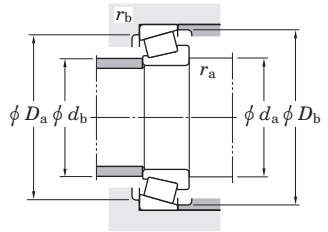


Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Load center (mm)	Mounting dimensions (mm)						Constant	Axial load factors			(Refer.) Mass (kg)	
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Inner ring	Outer ring	a	d_a	d_b	D_a	D_b	r_a max.	r_b max.	e	Y_1	Y_0	Inner ring	Outer ring
45.242	73.431	19.558	19.812	15.748	3.6	0.8	70.0	78.1	11.4	5 100	6 700	**LM102949**	**LM102910**	14.7	56.0	50.0	68.0	70.0	3.6	0.8	0.31	1.97	1.08	0.209	0.100
	77.788	19.842	19.842	15.080	3.6	0.8	71.7	73.5	10.7	4 900	6 500	**LM603049**	**LM603011**	17.5	57.0	50.0	71.0	74.0	3.6	0.8	0.43	1.41	0.77	0.243	0.120
	77.788	21.430	19.842	16.667	3.6	0.8	71.7	73.5	10.7	4 900	6 500	**LM603049**	**LM603012**	19.1	57.0	50.0	71.0	74.0	3.6	0.8	0.43	1.41	0.77	0.243	0.138
	79.974	19.842	19.842	15.080	3.6	0.8	71.7	73.5	10.7	4 900	6 500	**LM603049**	**LM603014**	17.5	57.0	50.0	71.0	74.0	3.6	0.8	0.43	1.41	0.77	0.243	0.152
45.618	85.000	23.812	25.400	19.050	3.6	2.4	96.8	100	15.1	4 800	6 300	**25590**	**25526**	17.5	58.0	51.0	74.0	78.0	3.6	2.4	0.33	1.79	0.99	0.344	0.241
45.987	74.976	18.000	18.000	14.000	2.4	1.6	66.2	74.6	10.8	5 000	6 600	**LM503349R**	**LM503310**	16.0	53.0	51.0	67.0	72.0	2.4	1.6	0.40	1.49	0.82	0.207	0.095
46.038	79.375	17.462	17.462	13.495	2.8	1.6	59.2	59.1	8.65	4 800	6 400	**18690**	**18620**	16.0	56.0	51.0	71.0	74.0	2.8	1.6	0.37	1.60	0.88	0.208	0.123
	85.000	20.638	21.692	17.462	3.6	1.2	89.6	81.7	12.4	4 600	6 200	**359A**	**354A**	15.5	57.0	51.0	77.0	80.0	3.6	1.2	0.31	1.96	1.08	0.323	0.160
	85.000	20.638	21.692	17.462	2.4	1.2	89.6	81.7	12.4	4 600	6 200	**359S**	**354A**	15.5	55.0	51.0	77.0	80.0	2.4	1.2	0.31	1.96	1.08	0.323	0.160
	85.000	25.400	25.608	20.638	3.6	1.2	100	106	16.0	4 600	6 100	**2984**	**2924**	18.9	58.0	52.0	76.0	80.0	3.6	1.2	0.35	1.73	0.95	0.389	0.220
47.625	88.900	20.638	22.225	16.513	3.6	1.2	92.9	87.3	13.3	4 400	5 800	**369A**	**362A**	16.1	60.0	53.0	81.0	84.0	3.6	1.2	0.32	1.88	1.03	0.373	0.164
	88.900	25.400	25.400	19.050	3.6	3.2	109	112	16.6	4 400	5 900	**M804049**	**M804010**	23.6	62.0	55.0	76.0	85.0	3.6	3.2	0.55	1.10	0.60	0.450	0.216
	95.250	30.162	29.370	23.020	3.6	3.2	130	140	20.7	3 300	4 400	**HM804846**	**HM804810**	26.5	64.0	57.0	81.0	91.0	3.6	3.2	0.55	1.10	0.60	0.617	0.351
	96.838	21.000	21.946	15.875	0.8	0.8	101	101	15.3	3 900	5 200	**386A**	**382A**	17.4	56.0	55.0	89.0	92.0	0.8	0.8	0.35	1.69	0.93	0.563	0.177
	101.600	34.925	36.068	26.988	3.6	3.2	164	159	24.8	4 000	5 300	**528**	**522**	22.2	62.0	55.0	89.0	95.0	3.6	3.2	0.29	2.10	1.16	0.871	0.411
	104.775	30.162	29.317	24.605	4.8	3.2	136	144	22.2	3 700	4 900	**463**	**453X**	23.6	65.0	56.0	92.0	98.0	4.8	3.2	0.34	1.79	0.98	0.838	0.372
	104.775	30.162	29.317	24.605	0.8	3.2	136	144	22.2	3 700	4 900	**467**	**453X**	23.6	57.0	56.0	92.0	98.0	0.8	3.2	0.34	1.79	0.98	0.844	0.372
	104.775	30.162	30.958	23.812	3.6	3.2	157	165	25.6	3 700	4 900	**45282**	**45220**	22.2	64.0	59.0	93.0	99.0	3.6	3.2	0.33	1.80	0.99	0.940	0.345
48.412	95.250	30.162	29.370	23.020	2.4	3.2	130	140	20.7	3 300	4 400	**HM804848**	**HM804810**	26.5	63.0	57.5	81.0	91.0	2.4	3.2	0.55	1.10	0.60	0.606	0.351
	95.250	30.162	29.370	23.020	3.6	3.2	130	140	20.7	3 300	4 400	**HM804849**	**HM804810**	26.5	66.0	57.5	81.0	91.0	3.6	3.2	0.55	1.10	0.60	0.604	0.351
49.212	88.900	20.638	22.225	16.513	0.8	1.2	92.9	87.3	13.3	4 400	5 800	**365S**	**362A**	16.1	55.0	54.0	81.0	84.0	0.8	1.2	0.32	1.88	1.03	0.366	0.164
	104.775	36.512	36.512	28.575	3.6	3.2	176	195	29.3	3 800	5 100	**HM807044**	**HM807010**	29.3	69.0	63.0	89.0	100.0	3.6	3.2	0.49	1.23	0.68	1.03	0.497
	114.300	44.450	44.450	34.925	3.6	3.2	237	230	35.1	3 800	5 000	**65390**	**65320**	31.7	70.0	60.0	97.0	107.0	3.6	3.2	0.43	1.40	0.77	1.28	0.894
	114.300	44.450	44.450	36.068	3.6	3.2	265	263	35.4	3 700	5 000	**HH506348**	**HH506310**	30.6	71.0	61.0	97.0	107.0	3.6	3.2	0.40	1.49	0.82	1.49	0.834

[Remark] Inch series tapered roller bearings with bore diameter larger than 100 mm are shown in catalog "large size ball & roller bearings".

d 49.987 ~ (50.800) mm





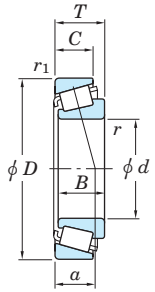
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. [1]		Load center (mm)	Mounting dimensions (mm)						Constant	Axial load factors			(Refer.) Mass (kg)	
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Inner ring	Outer ring	a	d_a	d_b	D_a	D_b	r_a max.	r_b max.	e	Y_1	Y_0	Inner ring	Outer ring
49.987	92.075	24.608	25.400	19.845	2.4	0.8	107	119	17.9	4 200	5 600	**28579R**	**28521**	19.9	60.0	56.0	83.0	87.0	2.4	0.8	0.38	1.59	0.87	0.463	0.247
50.000	82.000	21.501	21.501	17.000	3.0	0.5	90.0	97.9	14.7	4 500	6 000	**JLM104948**	**JLM104910**	16.2	60.0	55.0	76.0	78.0	3.0	0.5	0.31	1.97	1.08	0.304	0.128
	88.900	20.638	22.225	16.513	2.0	1.2	92.9	87.3	13.3	4 400	5 800	**365**	**362A**	16.1	58.0	55.0	81.0	84.0	2.0	1.2	0.32	1.88	1.03	0.346	0.164
	88.900	20.638	22.225	16.513	2.4	1.2	92.9	87.3	13.3	4 400	5 800	**366**	**362A**	16.1	59.0	55.0	81.0	84.0	2.4	1.2	0.32	1.88	1.03	0.351	0.166
	90.000	28.000	28.000	23.000	3.0	2.5	132	138	21.1	4 300	5 800	**JM205149**	**JM205110**	20.2	62.0	57.0	80.0	85.0	3.0	2.5	0.33	1.82	1.00	0.508	0.243
	105.000	37.000	36.000	29.000	3.0	2.8	186	205	30.6	3 800	5 100	**JHM807045**	**JHM807012**	29.4	69.0	63.0	90.0	100.0	3.0	2.8	0.49	1.23	0.68	1.01	0.523
	110.000	22.000	21.996	18.824	0.8	1.2	109	116	17.7	3 400	4 500	**396**	**394A**	21.3	61.0	60.0	101.0	105.0	0.8	1.2	0.40	1.49	0.82	0.777	0.264
50.800	80.962	18.258	18.258	14.288	1.6	1.6	67.8	81.1	11.8	4 600	6 100	**L305649R**	**L305610**	16.0	58.0	56.0	73.0	77.0	1.6	1.6	0.35	1.69	0.93	0.228	0.119
	82.550	21.590	22.225	16.510	3.6	1.2	77.0	84.3	12.5	4 500	6 000	**LM104949**	**LM104911**	16.4	62.0	55.0	75.0	78.0	3.6	1.2	0.31	1.97	1.08	0.287	0.131
	85.725	19.050	18.263	12.700	1.6	1.6	63.8	66.4	9.55	4 400	5 900	**18200**	**18337**	22.7	59.0	56.0	76.0	81.0	1.6	1.6	0.57	1.06	0.58	0.268	0.134
	88.900	17.462	17.462	13.495	3.6	1.2	62.5	65.5	9.55	4 400	5 900	**18790**	**18724**	17.4	62.0	56.0	78.0	82.0	3.6	1.2	0.41	1.48	0.81	0.226	0.190
	88.900	20.638	22.225	16.513	1.6	1.2	92.9	87.3	13.3	4 400	5 800	**368**	**362A**	16.1	58.0	56.0	81.0	84.0	1.6	1.2	0.32	1.88	1.03	0.333	0.164
	88.900	20.638	22.225	16.513	3.6	1.2	92.9	87.3	13.3	4 400	5 800	**368A**	**362A**	16.1	62.0	56.0	81.0	84.0	3.6	1.2	0.32	1.88	1.03	0.331	0.164
	88.900	20.638	22.225	16.513	5.2	1.2	92.9	87.3	13.3	4 400	5 800	**370A**	**362A**	16.1	65.0	56.0	81.0	84.0	5.2	1.2	0.32	1.88	1.03	0.326	0.164
	92.075	24.608	25.400	19.845	3.6	0.8	107	119	17.9	4 200	5 600	**28580R**	**28521**	19.9	63.0	57.0	83.0	87.0	3.6	0.8	0.38	1.59	0.87	0.453	0.247
	93.264	20.638	22.225	15.083	2.4	1.2	105	98.5	15.1	4 200	5 600	**375**	**374**	17.1	60.0	57.0	85.0	88.0	2.4	1.2	0.34	1.77	0.97	0.416	0.174
	93.264	30.162	30.302	23.812	3.6	3.2	129	137	20.9	4 200	5 500	**3780**	**3720**	22.2	64.0	58.0	82.0	88.0	3.6	3.2	0.34	1.77	0.97	0.547	0.288
	93.264	30.162	30.302	23.812	3.6	0.8	129	137	20.9	4 200	5 500	**3780**	**3730**	22.2	64.0	58.0	84.0	88.0	3.6	0.8	0.34	1.77	0.97	0.547	0.293
	95.250	27.783	28.575	22.225	3.6	0.8	135	141	21.6	4 100	5 400	**33889**	**33822**	20.4	64.0	58.0	86.0	90.0	3.6	0.8	0.33	1.82	1.00	0.604	0.267
	96.838	21.000	21.946	15.875	0.8	0.8	101	101	15.3	3 900	5 200	**385AX**	**382A**	17.4	59.0	58.0	89.0	92.0	0.8	0.8	0.35	1.69	0.93	0.521	0.177
	97.630	24.608	24.608	19.446	3.6	0.8	113	131	19.7	3 900	5 200	**28678**	**28622**	21.2	65.0	58.0	88.0	92.0	3.6	0.8	0.40	1.49	0.82	0.569	0.267
	98.425	30.162	30.302	23.812	3.6	3.2	129	137	20.9	4 200	5 500	**3780**	**3732**	22.2	64.0	58.0	84.0	90.0	3.6	3.2	0.34	1.77	0.97	0.547	0.433
	101.600	31.750	31.750	25.400	3.6	3.2	143	143	21.9	3 900	5 200	**49585**	**49520**	24.1	66.0	59.0	88.0	96.0	3.6	3.2	0.40	1.50	0.82	0.736	0.384
	101.600	34.925	36.068	26.988	0.8	3.2	164	159	24.8	4 000	5 300	**529**	**522**	22.2	59.0	58.0	89.0	95.0	0.8	3.2	0.29	2.10	1.16	0.806	0.411
	101.600	34.925	36.068	26.988	3.6	3.2	164	159	24.8	4 000	5 300	**529X**	**522**	22.2	65.0	58.0	89.0	95.0	3.6	3.2	0.29	2.10	1.16	0.802	0.411
	104.775	30.162	30.958	23.812	6.4	3.2	157	165	25.6	3 700	4 900	**45284**	**45220**	22.2	71.0	59.0	93.0	99.0	6.4	3.2	0.33	1.80	0.99	0.873	0.345
	104.775	36.512	36.512	28.575	3.6	3.2	185	187	28.6	3 900	5 100	**59200**	**59412**	26.9	68.0	61.0	92.0	99.0	3.6	3.2	0.40	1.49	0.82	0.767	0.623

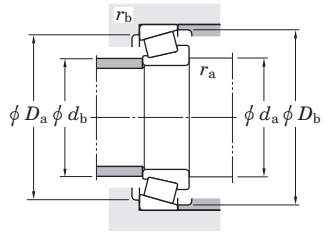
[Note] 1) To the bearings with supplementary code "J" attached at the front of bearing number, tolerances shown in table 7-8 on page A72 are applied.

[Remark] Inch series tapered roller bearings with bore diameter larger than 100 mm are shown in catalog "large size ball & roller bearings".

Single-row tapered roller bearings
inch series

d (50.800) ~ (55.000) mm



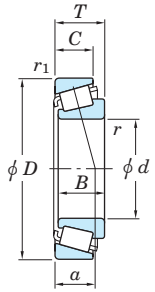


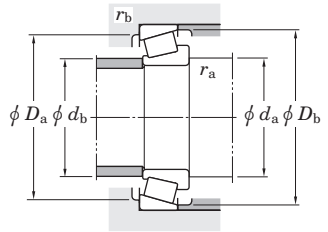
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. [1]		Load center (mm)	Mounting dimensions (mm)						Constant	Axial load factors			(Refer.) Mass (kg)	
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Inner ring	Outer ring	a	d_a	d_b	D_a	D_b	r_a max.	r_b max.	e	Y_1	Y_0	Inner ring	Outer ring
50.800	104.775	36.512	36.512	28.575	3.6	3.2	176	195	29.3	3 800	5 100	**HM807046**	**HM807010**	29.3	70.0	63.0	89.0	100.0	3.6	3.2	0.49	1.23	0.68	0.995	0.497
	104.775	39.688	40.157	33.338	3.6	3.2	189	211	32.3	3 800	5 100	**4580**	**4535**	27.3	67.0	61.0	90.0	99.0	3.6	3.2	0.34	1.79	0.98	1.06	0.576
	107.950	36.512	36.957	28.575	3.6	3.2	172	172	26.8	3 800	5 100	**537**	**532X**	23.9	65.0	59.0	94.0	100.0	3.6	3.2	0.30	2.03	1.11	0.969	0.569
	112.712	30.162	30.162	23.812	3.6	3.2	184	207	32.1	3 300	4 500	**39575**	**39520**	23.3	68.0	61.0	101.0	107.0	3.6	3.2	0.34	1.77	0.97	1.13	0.355
	120.650	41.275	41.275	31.750	3.6	3.2	218	217	34.0	3 500	4 600	**619**	**612**	27.3	67.0	61.0	105.0	110.0	3.6	3.2	0.31	1.91	1.05	1.44	0.853
	127.000	44.450	44.450	34.925	3.6	3.2	259	269	41.0	3 300	4 400	**65200**	**65500**	35.2	75.0	69.0	107.0	119.0	3.6	3.2	0.49	1.23	0.68	1.86	1.03
51.592	88.900	20.638	22.225	16.513	2.0	1.2	92.9	87.3	13.3	4 400	5 800	**368S**	**362A**	16.1	59.0	56.0	81.0	84.0	2.0	1.2	0.32	1.88	1.03	0.321	0.164
52.388	92.075	24.608	25.400	19.845	3.6	0.8	107	119	17.9	4 200	5 600	**28584R**	**28521**	19.9	65.0	58.0	83.0	87.0	3.6	0.8	0.38	1.59	0.87	0.435	0.247
	104.775	30.162	29.317	24.605	1.6	3.2	136	144	22.2	3 700	4 900	**468**	**453X**	23.6	62.0	60.0	92.0	98.0	1.6	3.2	0.34	1.79	0.98	0.748	0.372
53.975	88.900	19.050	19.050	13.492	2.4	2.0	79.1	86.8	12.6	4 200	5 600	**LM806649**	**LM806610**	21.5	63.0	60.0	80.0	85.0	2.4	2.0	0.55	1.10	0.60	0.312	0.135
	95.250	27.783	28.575	22.225	1.6	0.8	135	141	21.6	4 100	5 400	**33895**	**33822**	20.4	63.0	60.0	86.0	90.0	1.6	0.8	0.33	1.82	1.00	0.550	0.267
	104.775	30.162	29.317	24.605	3.6	3.2	136	144	22.2	3 700	4 900	**456**	**453X**	23.6	68.0	61.0	92.0	98.0	3.6	3.2	0.34	1.79	0.98	0.728	0.372
	104.775	36.512	36.512	28.575	3.6	3.2	176	195	29.3	3 800	5 100	**HM807049**	**HM807010**	29.3	73.0	63.0	89.0	100.0	3.6	3.2	0.49	1.23	0.68	0.921	0.497
	104.775	39.688	40.157	33.338	3.6	3.2	189	211	32.3	3 800	5 100	**4595**	**4535**	27.3	70.0	63.0	90.0	99.0	3.6	3.2	0.34	1.79	0.98	0.981	0.576
	107.950	36.512	36.957	28.575	3.6	3.2	172	172	26.8	3 800	5 100	**539**	**532X**	23.9	68.0	61.0	94.0	100.0	3.6	3.2	0.30	2.03	1.11	0.894	0.569
	107.950	36.512	36.957	28.575	5.6	3.2	172	172	26.8	3 800	5 100	**539A**	**532X**	23.9	72.0	61.0	94.0	100.0	5.6	3.2	0.30	2.03	1.11	0.861	0.569
	117.475	33.338	31.750	23.812	3.6	3.2	162	152	23.2	3 500	4 600	**66212R**	**66462**	33.2	73.0	67.0	100.0	111.0	3.6	3.2	0.63	0.96	0.53	1.03	0.552
	120.650	41.275	41.275	31.750	3.6	3.2	218	217	34.0	3 500	4 600	**621**	**612**	27.3	70.0	63.0	105.0	110.0	3.6	3.2	0.31	1.91	1.05	1.36	0.853
	122.238	33.338	31.750	23.812	3.6	3.2	160	153	23.3	3 300	4 300	**66584**	**66520**	35.4	75.0	68.0	105.0	116.0	3.6	3.2	0.67	0.90	0.50	1.25	0.551
	122.238	43.658	43.764	36.512	3.6	3.2	276	318	43.6	3 200	4 300	**5578R**	**5535**	31.1	73.0	67.0	106.0	116.0	3.6	3.2	0.36	1.67	0.92	1.84	0.807
	123.825	38.100	36.678	30.162	3.6	3.2	202	223	34.8	3 200	4 200	**557S**	**552A**	28.7	71.0	65.0	109.0	116.0	3.6	3.2	0.35	1.73	0.95	1.47	0.756
	127.000	44.450	44.450	34.925	3.6	3.2	259	269	41.0	3 300	4 400	**65212**	**65500**	35.2	77.0	71.0	107.0	119.0	3.6	3.2	0.49	1.23	0.68	1.78	1.02
54.988	104.775	30.162	29.317	24.605	2.4	3.2	136	144	22.2	3 700	4 900	**466**	**453X**	23.6	67.0	61.0	92.0	98.0	2.4	3.2	0.34	1.79	0.98	0.708	0.372
54.991	135.755	53.975	56.007	44.450	3.6	3.2	333	357	49.3	3 000	4 000	**6381**	**6320**	34.8	76.0	70.0	117.0	126.0	3.6	3.2	0.32	1.85	1.02	2.75	1.37
55.000	90.000	23.000	23.000	18.500	1.6	0.5	102	115	17.2	4 200	5 500	**JLM506849**	**JLM506810**	20.1	63.0	61.0	82.0	86.0	1.6	0.5	0.40	1.49	0.82	0.370	0.183

[Note] 1) To the bearings with supplementary code "J" attached at the front of bearing number, tolerances shown in table 7-8 on page A72 are applied.

[Remark] Inch series tapered roller bearings with bore diameter larger than 100 mm are shown in catalog "large size ball & roller bearings".

d (55.000) ~ (60.000) mm



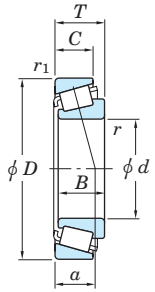


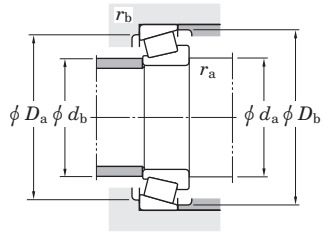
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. [1]		Load center (mm)	Mounting dimensions (mm)						Constant	Axial load factors		(Refer.) Mass (kg)	
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Inner ring	Outer ring	a	d_a	d_b	D_a	D_b	r_a max.	r_b max.	e	Y_1	Y_0	Inner ring	Outer ring
55.000	95.000	29.000	29.000	23.500	1.6	2.8	138	150	23.0	4 000	5 300	**JM207049**	**JM207010**	21.3	64.0	62.0	85.0	91.0	1.6	2.8	0.33	1.79	0.99	0.567	0.256
	96.838	21.000	21.946	15.875	2.4	0.8	101	101	15.3	3 900	5 200	**385**	**382A**	17.4	65.0	61.0	89.0	92.0	2.4	0.8	0.35	1.69	0.93	0.461	0.177
	96.838	21.000	21.946	15.875	3.6	0.8	101	101	15.3	3 900	5 200	**385X**	**382A**	17.4	67.0	61.0	89.0	92.0	3.6	0.8	0.35	1.69	0.93	0.459	0.177
	110.000	39.000	39.000	32.000	3.0	2.5	220	224	34.7	3 600	4 900	**JH307749**	**JH307710**	26.8	71.0	64.0	97.0	104.0	3.0	2.5	0.35	1.73	0.95	1.16	0.560
55.562	97.630	24.608	24.608	19.446	3.6	0.8	113	131	19.7	3 900	5 200	**28680**	**28622**	21.2	68.0	62.0	88.0	92.0	3.6	0.8	0.40	1.49	0.82	0.492	0.267
	122.238	43.658	43.764	36.512	1.2	3.2	276	318	43.6	3 200	4 300	**5566R**	**5535**	31.1	70.0	68.0	106.0	116.0	1.2	3.2	0.36	1.67	0.92	1.82	0.807
	127.000	36.512	36.512	26.988	3.6	3.2	209	235	36.2	3 000	4 000	**HM813840**	**HM813810**	32.9	76.0	70.0	111.0	121.0	3.6	3.2	0.50	1.20	0.66	1.72	0.606
55.575	96.838	21.000	21.946	15.875	2.4	0.8	101	101	15.3	3 900	5 200	**389**	**382A**	17.4	65.0	61.0	89.0	92.0	2.4	0.8	0.35	1.69	0.93	0.452	0.177
57.150	96.838	21.000	21.946	15.875	2.4	0.8	101	101	15.3	3 900	5 200	**387**	**382A**	17.4	66.0	62.0	89.0	92.0	2.4	0.8	0.35	1.69	0.93	0.428	0.177
	96.838	21.000	21.946	15.875	3.6	0.8	101	101	15.3	3 900	5 200	**387A**	**382A**	17.4	69.0	62.0	89.0	92.0	3.6	0.8	0.35	1.69	0.93	0.426	0.177
	96.838	21.000	21.946	15.875	5.2	0.8	101	101	15.3	3 900	5 200	**387AS**	**382A**	17.4	72.0	62.0	89.0	92.0	5.2	0.8	0.35	1.69	0.93	0.422	0.177
	96.838	21.000	21.946	15.875	0.8	0.8	101	101	15.3	3 900	5 200	**387S**	**382A**	17.4	63.0	62.0	89.0	92.0	0.8	0.8	0.35	1.69	0.93	0.431	0.177
	98.425	21.000	21.946	17.826	2.4	0.8	101	101	15.3	3 900	5 200	**387**	**382**	17.4	66.0	62.0	89.0	92.0	2.4	0.8	0.35	1.69	0.93	0.428	0.223
	104.775	30.162	29.317	24.605	2.4	3.2	136	144	22.2	3 700	4 900	**462**	**453X**	23.6	67.0	63.0	92.0	98.0	2.4	3.2	0.34	1.79	0.98	0.685	0.372
	104.775	30.162	29.317	24.605	3.6	3.2	136	144	22.2	3 700	4 900	**469**	**453X**	23.6	70.0	63.0	92.0	98.0	3.6	3.2	0.34	1.79	0.98	0.682	0.372
	104.775	30.162	30.958	23.812	6.4	0.8	157	165	25.6	3 700	4 900	**45291**	**45221**	22.2	76.0	65.0	95.0	99.0	6.4	0.8	0.33	1.80	0.99	0.742	0.350
	112.712	30.162	30.048	23.812	3.6	3.2	139	164	25.1	3 400	4 500	**3979**	**3920**	25.9	72.0	66.0	99.0	106.0	3.6	3.2	0.40	1.49	0.82	0.916	0.448
	112.712	30.162	30.162	23.812	3.6	3.2	184	207	32.1	3 300	4 500	**39580**	**39520**	23.3	72.0	66.0	101.0	107.0	3.6	3.2	0.34	1.77	0.97	1.05	0.355
	112.712	30.162	30.162	23.812	7.9	3.2	184	207	32.1	3 300	4 500	**39581**	**39520**	23.3	81.0	66.0	101.0	107.0	7.9	3.2	0.34	1.77	0.97	1.03	0.355
	117.475	30.162	30.162	23.812	3.6	3.2	148	179	27.4	3 200	4 200	**33225**	**33462**	27.8	74.0	68.0	104.0	112.0	3.6	3.2	0.44	1.38	0.76	1.13	0.442
	120.650	41.275	41.275	31.750	3.6	3.2	218	217	34.0	3 500	4 600	**623**	**612**	27.3	72.0	66.0	105.0	110.0	3.6	3.2	0.31	1.91	1.05	1.27	0.853
	127.000	44.450	44.450	34.925	3.6	3.2	259	269	41.0	3 300	4 400	**65225**	**65500**	35.2	80.0	71.0	107.0	119.0	3.6	3.2	0.49	1.23	0.68	1.69	1.02
57.531	96.838	21.000	21.946	15.875	3.6	0.8	101	101	15.3	3 900	5 200	**388A**	**382A**	17.4	69.0	63.0	89.0	92.0	3.6	0.8	0.35	1.69	0.93	0.420	0.177
59.972	122.238	33.338	31.750	23.812	0.8	3.2	160	153	23.3	3 300	4 300	**66589**	**66520**	35.4	74.0	73.0	105.0	116.0	0.8	3.2	0.67	0.90	0.50	1.11	0.551
60.000	95.000	24.000	24.000	19.000	5.0	2.5	108	125	18.9	3 900	5 200	**JLM508748**	**JLM508710**	21.2	75.0	66.0	85.0	91.0	5.0	2.5	0.40	1.49	0.82	0.402	0.196

[Note] 1) To the bearings with supplementary code "J" attached at the front of bearing number, tolerances shown in table 7-8 on page A72 are applied.

[Remark] Inch series tapered roller bearings with bore diameter larger than 100 mm are shown in catalog "large size ball & roller bearings".

d (60.000) ~ (65.000) mm



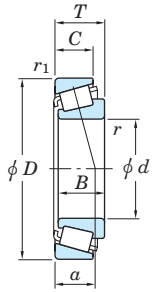


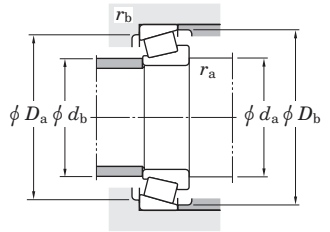
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. [1]		Load center (mm)	Mounting dimensions (mm)						Constant	Axial load factors		(Refer.) Mass (kg)	
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Inner ring	Outer ring	a	d_a	d_b	D_a	D_b	r_a max.	r_b max.	e	Y_1	Y_0	Inner ring	Outer ring
60.000	107.950	25.400	25.400	19.050	3.6	3.2	116	143	21.6	3 400	4 500	**29580**	**29520**	24.7	74.0	68.0	96.0	103.0	3.6	3.2	0.46	1.31	0.72	0.713	0.277
	110.000	22.000	21.996	18.824	0.8	1.2	109	116	17.7	3 400	4 500	**397**	**394A**	21.3	69.0	68.0	101.0	104.5	0.8	1.2	0.40	1.49	0.82	0.637	0.259
60.325	100.000	25.400	25.400	19.845	3.6	3.2	115	137	20.6	3 700	4 900	**28985**	**28921**	22.8	73.0	67.0	89.0	96.0	3.6	3.2	0.43	1.41	0.78	0.533	0.230
	101.600	25.400	25.400	19.845	3.6	3.2	115	137	20.6	3 700	4 900	**28985**	**28920**	22.8	73.0	67.0	89.0	96.0	3.6	3.2	0.43	1.41	0.78	0.533	0.269
	122.238	43.658	43.764	36.512	3.6	3.2	276	318	43.6	3 200	4 300	**5583R**	**5535**	31.1	78.0	72.0	106.0	116.0	3.6	3.2	0.36	1.67	0.92	1.66	0.807
	127.000	36.512	36.512	26.988	3.6	1.6	209	235	36.2	3 000	4 000	**HM813841**	**HM813811**	32.9	80.0	73.0	113.0	121.0	3.6	1.6	0.50	1.20	0.66	1.60	0.622
	127.000	36.512	36.512	26.988	1.6	3.2	209	235	36.2	3 000	4 000	**HM813841A**	**HM813810**	32.9	74.0	71.0	110.0	121.0	1.6	3.2	0.50	1.20	0.66	1.62	0.606
	127.000	44.450	44.450	34.925	3.6	3.2	259	269	41.0	3 300	4 400	**65237**	**65500**	35.2	82.0	71.0	107.0	119.0	3.6	3.2	0.49	1.23	0.68	1.59	1.02
	127.000	44.450	44.450	34.925	1.6	3.2	259	269	41.0	3 300	4 400	**65237A**	**65500**	35.2	78.0	71.0	107.0	119.0	1.6	3.2	0.49	1.23	0.68	1.59	1.02
	136.525	46.038	46.038	36.512	3.6	3.2	290	369	49.6	2 800	3 700	**H715332**	**H715311**	37.0	84.0	78.0	118.0	132.0	3.6	3.2	0.47	1.27	0.70	2.56	0.950
61.912	110.000	22.000	21.996	18.824	0.8	1.2	109	116	17.7	3 400	4 500	**392**	**394A**	21.3	70.0	69.0	101.0	104.5	0.8	1.2	0.40	1.49	0.82	0.606	0.259
63.500	107.950	25.400	25.400	19.050	1.6	3.2	116	143	21.6	3 400	4 500	**29586**	**29520**	24.7	73.0	71.0	96.0	103.0	1.6	3.2	0.46	1.31	0.72	0.649	0.277
	110.000	22.000	21.996	18.824	1.6	1.2	109	116	17.7	3 400	4 500	**390A**	**394A**	21.3	73.0	70.0	101.0	104.5	1.6	1.2	0.40	1.49	0.82	0.579	0.259
	110.000	22.000	21.996	18.824	3.6	1.2	109	116	17.7	3 400	4 500	**395**	**394A**	21.3	77.0	70.0	101.0	104.5	3.6	1.2	0.40	1.49	0.82	0.575	0.259
	110.000	25.400	25.400	19.050	3.6	1.2	116	143	21.6	3 400	4 500	**29585**	**29521**	24.7	77.0	71.0	99.0	104.0	3.6	1.2	0.46	1.31	0.72	0.644	0.333
	112.712	30.162	30.162	23.812	3.6	3.2	184	207	32.1	3 300	4 500	**39585**	**39520**	23.3	77.0	71.0	101.0	107.0	3.6	3.2	0.34	1.77	0.97	0.908	0.355
	120.000	29.794	29.007	24.237	0.8	2.0	148	161	25.0	3 200	4 200	**477**	**472**	25.7	73.0	72.0	108.0	113.0	0.8	2.0	0.38	1.56	0.86	0.967	0.493
	122.238	38.354	38.100	29.718	3.6	3.2	238	249	39.1	3 200	4 300	**HM212046**	**HM212011**	27.6	80.0	73.0	108.0	116.0	3.6	3.2	0.34	1.78	0.98	1.36	0.591
	122.238	43.658	43.764	36.512	3.6	3.2	276	318	43.6	3 200	4 300	**5584R**	**5535**	31.1	81.0	75.0	106.0	116.0	3.6	3.2	0.36	1.67	0.92	1.56	0.807
	127.000	36.512	36.170	28.575	3.6	3.2	196	226	35.3	3 000	4 000	**565**	**563**	28.6	80.0	73.0	112.0	120.0	3.6	3.2	0.36	1.65	0.91	1.43	0.648
	135.755	53.975	56.007	44.450	4.3	3.2	333	357	49.3	3 000	4 000	**6382**	**6320**	34.8	84.0	77.0	117.0	126.0	4.3	3.2	0.32	1.85	1.02	2.29	1.39
	136.525	41.275	41.275	31.750	3.6	3.2	302	308	48.1	2 900	3 800	**H414235**	**H414210**	30.3	82.0	78.0	121.0	129.0	3.6	3.2	0.36	1.67	0.92	2.11	0.796
64.986	112.712	30.162	30.924	23.812	2.4	3.2	184	207	32.1	3 300	4 500	**39586**	**39520**	23.3	76.0	72.0	101.0	107.0	2.4	3.2	0.34	1.77	0.97	0.845	0.355
65.000	105.000	24.000	23.000	18.500	3.0	1.0	120	129	19.6	3 500	4 700	**JLM710949**	**JLM710910**	23.8	77.0	71.0	96.0	100.5	3.0	1.0	0.45	1.32	0.73	0.513	0.234
	110.000	28.000	28.000	22.500	3.0	2.8	170	191	29.4	3 400	4 600	**JM511946**	**JM511910**	24.5	78.0	72.0	99.0	105.0	3.0	2.8	0.40	1.49	0.82	0.733	0.338

[Note] 1) To the bearings with supplementary code "J" attached at the front of bearing number, tolerances shown in table 7-8 on page A72 are applied.

[Remark] Inch series tapered roller bearings with bore diameter larger than 100 mm are shown in catalog "large size ball & roller bearings".

d (65.000) ~ 68.262 mm



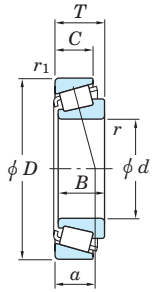


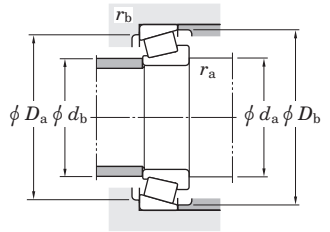
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. [1]		Load center (mm)	Mounting dimensions (mm)						Constant	Axial load factors		(Refer.) Mass (kg)	
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Inner ring	Outer ring	a	d_a	d_b	D_a	D_b	r_a max.	r_b max.	e	Y_1	Y_0	Inner ring	Outer ring
65.000	120.000	39.000	38.500	32.000	3.0	2.8	236	255	39.7	3 200	4 300	**JH211749**	**JH211710**	27.9	80.0	74.0	107.0	114.0	3.0	2.8	0.34	1.78	0.98	1.27	0.618
	120.000	39.000	38.500	32.000	7.1	2.8	236	255	39.7	3 200	4 300	**JH211749A**	**JH211710**	27.9	88.0	74.0	107.0	114.0	7.1	2.8	0.34	1.78	0.98	1.27	0.618
65.088	135.755	53.975	56.007	44.450	3.6	3.2	333	357	49.3	3 000	4 000	**6379**	**6320**	34.8	84.0	77.5	117.0	126.0	3.6	3.2	0.32	1.85	1.02	2.34	1.37
	136.525	46.038	46.038	36.512	3.6	3.2	290	369	49.6	2 800	3 700	**H715340**	**H715311**	37.0	88.0	82.0	118.0	132.0	3.6	3.2	0.47	1.27	0.70	2.39	0.950
65.883	122.238	43.658	43.764	36.512	3.6	3.2	276	318	43.6	3 200	4 300	**5595R**	**5535**	31.1	83.0	77.0	106.0	116.0	3.6	3.2	0.36	1.67	0.92	1.48	0.807
66.675	110.000	22.000	21.996	18.824	0.8	1.2	109	116	17.7	3 400	4 500	**395A**	**394A**	21.3	73.0	73.0	101.0	104.5	0.8	1.2	0.40	1.49	0.82	0.524	0.259
	110.000	22.000	21.996	18.824	3.6	1.2	109	116	17.7	3 400	4 500	**395S**	**394A**	21.3	79.0	73.0	101.0	104.5	3.6	1.2	0.40	1.49	0.82	0.519	0.259
	112.712	30.162	30.048	23.812	3.6	0.8	139	164	25.1	3 400	4 500	**3984**	**3925**	25.9	80.0	74.0	101.0	106.0	3.6	0.8	0.40	1.49	0.82	0.700	0.454
	112.712	30.162	30.162	23.812	3.6	3.2	184	207	32.1	3 300	4 500	**39590**	**39520**	23.3	80.0	74.0	101.0	107.0	3.6	3.2	0.34	1.77	0.97	0.832	0.355
	112.712	30.162	30.162	23.812	3.6	0.8	184	207	32.1	3 300	4 500	**39590**	**39521**	23.3	80.0	74.0	103.0	107.0	3.6	0.8	0.34	1.77	0.97	0.832	0.360
	117.475	30.162	30.162	23.812	3.6	3.2	148	179	27.4	3 200	4 200	**33262**	**33462**	27.8	81.0	75.0	104.0	112.0	3.6	3.2	0.44	1.38	0.76	0.910	0.436
	122.238	38.100	38.354	29.718	3.6	1.6	238	249	39.1	3 200	4 300	**HM212049**	**HM212010**	27.3	82.0	75.5	110.0	116.0	3.6	1.6	0.34	1.78	0.98	1.26	0.596
	127.000	36.512	36.512	26.988	3.6	1.6	209	235	36.2	3 000	4 000	**HM813844**	**HM813811**	32.9	85.0	78.0	113.0	121.0	3.6	1.6	0.50	1.20	0.66	1.42	0.622
	130.175	41.275	41.275	31.750	3.6	3.2	246	267	41.8	3 000	3 900	**641**	**633**	30.3	83.0	77.0	116.0	124.0	3.6	3.2	0.36	1.66	0.91	1.68	0.703
	135.755	53.975	56.007	44.450	4.3	3.2	333	357	49.3	3 000	4 000	**6386**	**6320**	34.8	87.0	77.5	117.0	126.0	4.3	3.2	0.32	1.85	1.02	2.27	1.37
	135.755	53.975	56.007	44.450	6.4	3.2	333	357	49.3	3 000	4 000	**6389**	**6320**	34.8	91.0	77.5	117.0	126.0	6.4	3.2	0.32	1.85	1.02	2.15	1.37
	136.525	41.275	41.275	31.750	3.6	3.2	302	308	48.1	2 900	3 800	**H414242**	**H414210**	30.3	85.0	81.0	121.0	129.0	3.6	3.2	0.36	1.67	0.92	2.01	0.796
	136.525	46.038	46.038	36.512	3.6	3.2	290	369	49.6	2 800	3 700	**H715341**	**H715311**	37.0	89.0	83.0	118.0	132.0	3.6	3.2	0.47	1.27	0.70	2.33	0.950
68.262	110.000	22.000	21.996	18.824	2.4	1.2	109	116	17.7	3 400	4 500	**399A**	**394A**	21.3	78.0	74.0	101.0	104.5	2.4	1.2	0.40	1.49	0.82	0.493	0.259
	110.000	22.000	21.996	18.824	5.2	1.2	109	116	17.7	3 400	4 500	**399AS**	**394A**	21.3	83.0	74.0	101.0	104.5	5.2	1.2	0.40	1.49	0.82	0.485	0.259
	117.475	30.162	30.162	23.812	3.6	3.2	148	179	27.4	3 200	4 200	**33269**	**33462**	27.8	82.0	76.0	104.0	112.0	3.6	3.2	0.44	1.38	0.76	0.870	0.436
	127.000	36.512	36.170	28.575	3.6	3.2	196	226	35.3	3 000	4 000	**570**	**563**	28.6	83.0	77.0	112.0	120.0	3.6	3.2	0.36	1.65	0.91	1.29	0.648
	136.525	41.275	41.275	31.750	3.6	3.2	284	308	46.1	2 900	3 800	**H414245**	**H414210**	30.3	86.0	82.0	121.0	129.0	3.6	3.2	0.36	1.67	0.92	1.92	0.788
	136.525	46.038	46.038	36.512	3.6	3.2	290	369	49.6	2 800	3 700	**H715343**	**H715311**	37.0	90.0	84.0	118.0	132.0	3.6	3.2	0.47	1.27	0.70	2.27	0.950
	152.400	47.625	46.038	31.750	3.6	3.2	306	278	38.3	2 700	3 600	**9185**	**9121**	44.5	94.0	81.5	130.0	145.0	3.6	3.2	0.66	0.91	0.50	2.67	1.20

[Note] 1) To the bearings with supplementary code "J" attached at the front of bearing number, tolerances shown in table 7-8 on page A72 are applied.

[Remark] Inch series tapered roller bearings with bore diameter larger than 100 mm are shown in catalog "large size ball & roller bearings".

d 69.850 ~ (73.025) mm



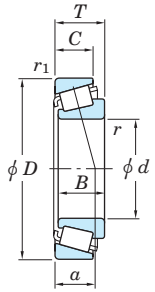


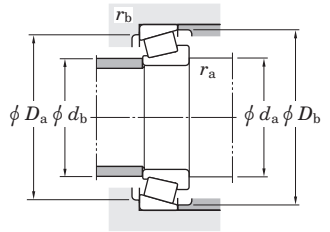
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. [1]		Load center (mm)	Mounting dimensions (mm)						Constant	Axial load factors		(Refer.) Mass (kg)	
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Inner ring	Outer ring	a	d_a	d_b	D_a	D_b	r_a max.	r_b max.	e	Y_1	Y_0	Inner ring	Outer ring
69.850	98.425	13.495	13.495	9.525	1.6	1.6	49.1	59.8	8.45	3 500	4 700	**LL713049**	**LL713010**	18.4	77.0	74.0	92.0	94.5	1.6	1.6	0.44	1.37	0.75	0.205	0.086
	112.712	22.225	21.996	15.875	1.6	0.8	115	127	19.4	3 300	4 400	**LM613449**	**LM613410**	21.9	78.0	76.0	104.0	107.0	1.6	0.8	0.42	1.44	0.79	0.562	0.238
	112.712	25.400	25.400	19.050	1.6	3.2	122	155	23.3	3 200	4 300	**29675**	**29620**	26.2	80.0	77.0	101.0	109.0	1.6	3.2	0.49	1.23	0.68	0.676	0.270
	117.475	30.162	30.162	23.812	3.6	3.2	148	179	27.4	3 200	4 200	**33275**	**33462**	27.8	84.0	77.0	104.0	112.0	3.6	3.2	0.44	1.38	0.76	0.830	0.436
	120.000	29.002	29.007	23.444	3.6	3.2	148	161	25.0	3 200	4 200	**482**	**472A**	24.9	83.0	77.0	106.0	114.0	3.6	3.2	0.38	1.56	0.86	0.791	0.462
	120.000	29.794	29.007	24.237	3.6	2.0	148	161	25.0	3 200	4 200	**482**	**472**	25.7	83.0	77.0	108.0	113.0	3.6	2.0	0.38	1.56	0.86	0.791	0.487
	120.000	32.545	32.545	26.195	3.6	3.2	189	218	33.9	3 100	4 200	**47487R**	**47420**	26.6	84.0	78.0	107.0	114.0	3.6	3.2	0.36	1.67	0.92	1.01	0.476
	120.650	32.545	32.545	26.195	3.6	0.8	189	218	33.9	3 100	4 200	**47487R**	**47423**	26.6	84.0	78.0	109.0	114.0	3.6	0.8	0.36	1.67	0.92	1.01	0.513
	123.825	30.162	29.007	24.605	3.6	3.2	148	161	25.0	3 200	4 200	**482**	**472X**	26.0	83.0	77.0	109.0	114.0	3.6	3.2	0.38	1.56	0.86	0.791	0.625
	127.000	36.512	36.170	28.575	3.6	3.2	196	226	35.3	3 000	4 000	**566**	**563**	28.6	85.0	78.0	112.0	120.0	3.6	3.2	0.36	1.65	0.91	1.24	0.648
	146.050	41.275	41.275	31.750	3.6	3.2	261	301	45.3	2 600	3 400	**655**	**653**	33.4	88.0	82.0	131.0	139.0	3.6	3.2	0.41	1.47	0.81	2.35	0.891
	150.089	44.450	46.672	36.512	3.6	3.2	330	368	50.1	2 500	3 400	**745AR**	**742**	32.4	88.0	82.0	134.0	142.0	3.6	3.2	0.33	1.84	1.01	2.79	1.07
	168.275	53.975	56.363	41.275	3.6	3.2	429	467	62.1	2 300	3 100	**835R**	**832**	35.0	91.0	84.0	149.0	155.0	3.6	3.2	0.30	2.00	1.10	4.32	1.72
69.952	121.442	24.608	23.012	17.462	2.0	2.0	113	127	19.4	3 000	4 000	**34274**	**34478**	26.8	81.0	78.0	110.0	116.0	2.0	2.0	0.45	1.33	0.73	0.764	0.316
70.000	110.000	26.000	25.000	20.500	1.0	2.5	129	158	23.9	3 300	4 400	**JLM813049**	**JLM813010**	26.1	78.0	77.0	98.0	105.0	1.0	2.5	0.49	1.23	0.68	0.590	0.300
	115.000	29.000	29.000	23.000	3.0	2.5	155	173	26.6	3 200	4 300	**JM612949**	**JM612910**	26.2	83.0	77.0	103.0	110.0	3.0	2.5	0.43	1.39	0.77	0.776	0.358
71.438	117.475	30.162	30.162	23.812	3.6	3.2	148	179	27.4	3 200	4 200	**33281**	**33462**	27.8	85.0	79.0	104.0	112.0	3.6	3.2	0.44	1.38	0.76	0.789	0.436
	120.000	32.545	32.545	26.195	3.6	3.2	189	218	33.9	3 100	4 200	**47490R**	**47420**	26.6	86.0	79.0	107.0	114.0	3.6	3.2	0.36	1.67	0.92	0.964	0.476
	127.000	36.512	36.170	28.575	3.6	3.2	196	226	35.3	3 000	4 000	**567A**	**563**	28.6	86.0	80.0	112.0	120.0	3.6	3.2	0.36	1.65	0.91	1.19	0.648
	127.000	36.512	36.512	26.988	3.6	1.6	209	235	36.2	3 000	4 000	**HM813849**	**HM813811**	32.9	89.0	81.9	113.0	121.0	3.6	1.6	0.50	1.20	0.66	1.28	0.622
	136.525	41.275	41.275	31.750	3.6	3.2	284	308	46.1	2 900	3 800	**H414249**	**H414210**	30.3	89.0	83.3	121.0	129.0	3.6	3.2	0.36	1.67	0.92	1.80	0.788
	136.525	46.038	46.038	36.512	3.6	3.2	290	369	49.6	2 800	3 700	**H715345**	**H715311**	37.0	93.0	87.0	118.0	132.0	3.6	3.2	0.47	1.27	0.70	2.15	0.950
73.025	112.712	25.400	25.400	19.050	3.6	3.2	122	155	23.3	3 200	4 300	**29685**	**29620**	26.2	86.0	80.0	101.0	109.0	3.6	3.2	0.49	1.23	0.68	0.602	0.270
	117.475	30.162	30.162	23.812	3.6	3.2	148	179	27.4	3 200	4 200	**33287**	**33462**	27.8	87.0	80.0	104.0	112.0	3.6	3.2	0.44	1.38	0.76	0.747	0.436
	127.000	36.512	36.170	28.575	3.6	3.2	196	226	35.3	3 000	4 000	**567**	**563**	28.6	88.0	81.0	112.0	120.0	3.6	3.2	0.36	1.65	0.91	1.14	0.648
	139.992	36.512	36.098	28.575	3.6	3.2	220	262	39.8	2 700	3 600	**576R**	**572**	31.0	90.0	83.0	125.0	133.0	3.6	3.2	0.40	1.49	0.82	1.74	0.779

[Note] 1) To the bearings with supplementary code "J" attached at the front of bearing number, tolerances shown in table 7-8 on page A72 are applied.

[Remark] Inch series tapered roller bearings with bore diameter larger than 100 mm are shown in catalog "large size ball & roller bearings".

d (73.025) ~ 76.200 mm



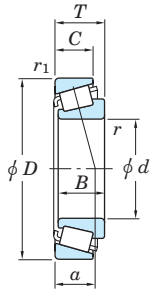


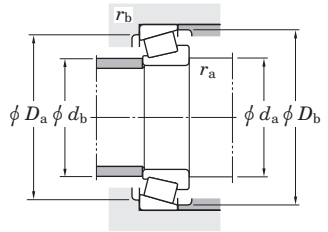
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. [1]		Load center (mm)	Mounting dimensions (mm)						Constant	Axial load factors			(Refer.) Mass (kg)	
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Inner ring	Outer ring	a	d_a	d_b	D_a	D_b	r_a max.	r_b max.	e	Y_1	Y_0	Inner ring	Outer ring
73.025	146.050	41.275	41.275	31.750	3.6	3.2	261	301	45.3	2 600	3 400	**657**	**653**	33.4	90.0	85.0	131.0	139.0	3.6	3.2	0.41	1.47	0.81	2.28	0.880
	149.225	53.975	54.229	44.450	3.6	3.2	357	404	54.4	2 700	3 500	**6460**	**6420**	39.3	93.0	87.0	129.0	141.0	3.6	3.2	0.36	1.66	0.91	2.79	1.61
	150.089	44.450	46.672	36.512	3.6	3.2	330	368	50.1	2 500	3 400	**744R**	**742**	32.4	91.0	85.0	134.0	142.0	3.6	3.2	0.33	1.84	1.01	2.66	1.07
	161.925	47.625	48.260	38.100	3.6	3.2	342	391	52.4	2 400	3 200	**762**	**752**	35.5	92.0	97.0	144.0	150.0	3.6	3.2	0.34	1.76	0.97	3.18	1.61
73.817	112.712	25.400	25.400	19.050	1.6	3.2	122	155	23.3	3 200	4 300	**29688**	**29620**	26.2	83.0	81.0	101.0	109.0	1.6	3.2	0.49	1.23	0.68	0.588	0.270
	127.000	36.512	36.170	28.575	0.8	3.2	196	226	35.3	3 000	4 000	**568**	**563**	28.6	83.0	82.0	112.0	120.0	0.8	3.2	0.36	1.65	0.91	1.12	0.648
74.612	139.992	36.512	36.098	28.575	3.6	3.2	220	262	39.8	2 700	3 600	**577R**	**572**	31.0	91.0	85.0	125.0	133.0	3.6	3.2	0.40	1.49	0.82	1.69	0.779
75.000	115.000	25.000	25.000	19.000	3.0	2.8	127	151	23.0	3 100	4 200	**JLM714149**	**JLM714110**	25.5	87.0	81.0	104.0	110.0	3.0	2.8	0.46	1.31	0.72	0.612	0.269
	120.000	31.000	29.500	25.000	3.0	2.8	182	216	33.2	3 100	4 100	**JM714249**	**JM714210**	30.0	88.0	82.9	108.0	115.0	3.0	2.8	0.44	1.35	0.74	0.846	0.430
	145.000	51.000	51.000	42.000	3.0	2.5	362	412	55.2	2 700	3 600	**JH415647**	**JH415610**	36.6	94.0	89.0	129.0	139.0	3.0	2.5	0.36	1.66	0.91	2.66	1.18
76.200	121.442	24.608	23.012	17.462	3.6	2.0	113	127	19.4	3 000	4 000	**34301**	**34478**	26.8	89.0	83.0	110.0	116.0	3.6	2.0	0.45	1.33	0.73	0.617	0.313
	127.000	30.162	31.000	22.225	3.6	3.2	179	225	32.3	2 400	3 200	**42687**	**42620**	27.1	90.0	84.0	114.0	121.0	3.6	3.2	0.42	1.43	0.79	1.05	0.434
	127.000	30.162	31.000	22.225	6.4	3.2	179	225	32.3	2 400	3 200	**42688**	**42620**	27.1	96.0	84.0	114.0	121.0	6.4	3.2	0.42	1.43	0.79	1.04	0.434
	133.350	30.162	29.769	22.225	6.4	3.2	167	198	30.0	2 700	3 600	**495AX**	**492A**	29.8	98.0	86.0	120.0	128.0	6.4	3.2	0.44	1.35	0.74	1.20	0.430
	133.350	33.338	33.338	26.195	6.4	3.2	193	245	37.2	2 700	3 700	**47678R**	**47620**	29.2	97.0	90.0	119.0	128.0	6.4	3.2	0.40	1.48	0.82	1.29	0.577
	133.350	33.338	33.338	26.195	0.8	3.2	193	245	37.2	2 700	3 700	**47680R**	**47620**	29.2	86.0	85.0	119.0	128.0	0.8	3.2	0.40	1.48	0.82	1.39	0.577
	135.733	44.450	46.101	34.925	3.6	3.2	267	337	51.0	2 800	3 700	**5760**	**5735**	33.0	94.0	88.0	119.0	130.0	3.6	3.2	0.41	1.48	0.81	1.85	0.877
	136.525	30.162	29.769	22.225	3.6	3.2	167	198	30.0	2 700	3 600	**495A**	**493**	29.8	92.0	86.0	122.0	130.0	3.6	3.2	0.44	1.35	0.74	1.26	0.544
	139.992	36.512	36.098	28.575	3.6	3.2	220	262	39.8	2 700	3 600	**575R**	**572**	31.0	92.0	86.0	125.0	133.0	3.6	3.2	0.40	1.49	0.82	1.64	0.779
	139.992	36.512	36.098	28.575	6.7	3.2	220	262	39.8	2 700	3 600	**575SR**	**572**	31.0	99.0	86.0	125.0	133.0	6.7	3.2	0.40	1.49	0.82	1.61	0.779
	149.225	53.975	54.229	44.450	3.6	3.2	357	404	54.4	2 700	3 500	**6461**	**6420**	39.3	96.0	89.5	129.0	141.0	3.6	3.2	0.36	1.66	0.91	2.64	1.61
	149.225	53.975	54.229	44.450	9.5	3.2	357	404	54.4	2 700	3 500	**6461A**	**6420**	39.3	105.0	90.0	129.0	141.0	9.5	3.2	0.36	1.66	0.91	2.60	1.61
	150.089	44.450	46.672	36.512	3.6	3.2	330	368	50.1	2 500	3 400	**748SR**	**742**	32.4	93.0	87.0	134.0	142.0	3.6	3.2	0.33	1.84	1.01	2.51	1.06
	152.400	41.275	41.275	31.750	3.6	3.2	261	301	45.3	2 600	3 400	**659**	**652**	33.4	93.0	87.0	134.0	141.0	3.6	3.2	0.41	1.47	0.81	2.16	1.25
	190.500	57.150	57.531	46.038	3.6	3.2	549	602	76.9	2 000	2 700	**HH221430**	**HH221410**	42.5	101.0	95.0	171.0	179.0	3.6	3.2	0.33	1.79	0.99	6.33	2.21

[Note] 1) To the bearings with supplementary code "J" attached at the front of bearing number, tolerances shown in table 7-8 on page A72 are applied.

[Remark] Inch series tapered roller bearings with bore diameter larger than 100 mm are shown in catalog "large size ball & roller bearings".

d 77.788 ~ (83.345) mm



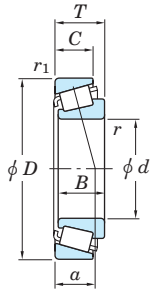


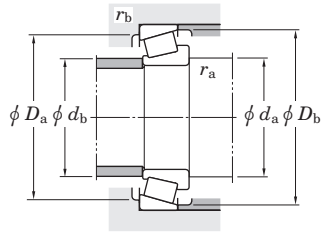
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. [1]		Load center (mm)	Mounting dimensions (mm)						Constant	Axial load factors			(Refer.) Mass (kg)	
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Inner ring	Outer ring	a	d_a	d_b	D_a	D_b	r_a max.	r_b max.	e	Y_1	Y_0	Inner ring	Outer ring
77.788	117.475	25.400	25.400	19.050	3.6	3.2	127	166	25.1	3 100	4 100	**LM814849**	**LM814810**	27.6	91.0	85.0	105.0	113.0	3.6	3.2	0.51	1.18	0.65	0.619	0.295
	121.442	24.608	23.012	17.462	3.6	2.0	113	127	19.4	3 000	4 000	**34306**	**34478**	26.8	90.0	84.0	110.0	116.0	3.6	2.0	0.45	1.33	0.73	0.583	0.313
	121.442	24.608	23.012	17.462	6.4	2.0	113	127	19.4	3 000	4 000	**34307**	**34478**	26.8	96.0	84.0	110.0	116.0	6.4	2.0	0.45	1.33	0.73	0.571	0.313
	127.000	30.162	31.000	22.225	3.6	3.2	179	225	32.3	2 400	3 200	**42690**	**42620**	27.1	91.0	85.0	114.0	121.0	3.6	3.2	0.42	1.43	0.79	1.00	0.434
79.375	146.050	41.275	41.275	31.750	3.6	3.2	261	301	45.3	2 600	3 400	**661**	**653**	33.4	96.0	90.0	131.0	139.0	3.6	3.2	0.41	1.47	0.81	2.04	0.880
	161.925	47.625	48.260	38.100	7.9	3.2	342	391	52.4	2 400	3 200	**756A**	**752**	35.5	106.0	91.0	144.0	150.0	7.9	3.2	0.34	1.76	0.97	2.95	1.59
	190.500	57.150	57.531	46.038	3.6	3.2	549	602	76.9	2 000	2 700	**HH221431**	**HH221410**	42.5	103.0	97.0	171.0	179.0	3.6	3.2	0.33	1.79	0.99	6.16	2.21
80.000	130.000	35.000	34.000	28.500	3.2	2.5	211	256	39.3	2 800	3 800	**JM515649**	**JM515610**	29.6	94.0	88.0	117.0	125.0	3.2	2.5	0.39	1.54	0.85	1.19	0.575
	200.000	52.761	49.212	34.925	3.6	3.2	433	471	58.8	1 400	1 900	**98316**	**98788**	54.5	111.0	105.0	174.0	188.0	3.6	3.2	0.63	0.95	0.52	5.73	2.28
80.962	133.350	30.162	29.769	22.225	3.6	3.2	167	198	30.0	2 700	3 600	**496**	**492A**	29.8	95.0	89.0	120.0	128.0	3.6	3.2	0.44	1.35	0.74	1.12	0.429
	133.350	33.338	33.338	26.195	3.6	3.2	193	245	37.2	2 700	3 700	**47681R**	**47620**	29.2	95.0	89.0	119.0	128.0	3.6	3.2	0.40	1.48	0.82	1.17	0.577
	139.992	36.512	36.098	28.575	3.6	3.2	220	262	39.8	2 700	3 600	**581R**	**572**	31.0	96.0	90.0	125.0	133.0	3.6	3.2	0.40	1.49	0.82	1.47	0.779
	150.089	44.450	46.672	36.512	5.2	3.2	330	368	50.1	2 500	3 400	**740R**	**742**	32.4	101.0	91.0	134.0	142.0	5.2	3.2	0.33	1.84	1.01	2.30	1.06
82.550	125.412	25.400	25.400	19.845	3.6	1.6	126	162	24.4	2 900	3 800	**27687**	**27620**	24.7	96.0	89.0	115.0	120.0	3.6	1.6	0.42	1.44	0.79	0.710	0.344
	133.350	30.162	29.769	22.225	3.6	3.2	167	198	30.0	2 700	3 600	**495**	**492A**	29.8	97.0	90.0	120.0	128.0	3.6	3.2	0.44	1.35	0.74	1.08	0.429
	133.350	33.338	33.338	26.195	3.6	0.8	193	245	37.2	2 700	3 700	**47686R**	**47620A**	29.2	97.0	90.0	121.0	128.0	3.6	0.8	0.40	1.48	0.82	1.13	0.577
	133.350	39.688	39.688	32.545	6.7	3.2	222	306	45.9	2 800	3 700	**HM516448**	**HM516410**	32.2	105.0	92.0	118.0	128.0	6.7	3.2	0.40	1.49	0.82	1.33	0.763
	139.700	36.512	36.098	28.575	3.6	3.2	220	262	39.8	2 700	3 600	**580R**	**572X**	31.0	98.0	91.0	125.0	133.0	3.6	3.2	0.40	1.49	0.82	1.41	0.765
	139.992	36.512	36.098	28.575	3.6	3.2	220	262	39.8	2 700	3 600	**580R**	**572**	31.0	98.0	91.0	125.0	133.0	3.6	3.2	0.40	1.49	0.82	1.41	0.779
	139.992	36.512	36.098	28.575	6.7	3.2	220	262	39.8	2 700	3 600	**582R**	**572**	31.0	104.0	91.0	125.0	133.0	6.7	3.2	0.40	1.49	0.82	1.40	0.779
	146.050	41.275	41.275	31.750	3.6	3.2	261	301	45.3	2 600	3 400	**663**	**653**	33.4	99.0	92.0	131.0	139.0	3.6	3.2	0.41	1.47	0.81	1.91	0.880
	150.089	44.450	46.672	36.512	3.6	3.2	330	368	50.1	2 500	3 400	**749AR**	**742**	32.4	99.0	93.0	134.0	142.0	3.6	3.2	0.33	1.84	1.01	2.23	1.06
	150.089	44.450	46.672	36.512	6.7	3.2	330	368	50.1	2 500	3 400	**750AR**	**742**	32.4	106.0	93.0	134.0	142.0	6.7	3.2	0.33	1.84	1.01	2.19	1.06
	161.925	47.625	48.260	38.100	3.6	3.2	342	391	52.4	2 400	3 200	**757**	**752**	35.5	100.0	94.0	144.0	150.0	3.6	3.2	0.34	1.76	0.97	2.83	1.59
83.345	125.412	25.400	25.400	19.845	0.8	1.6	126	162	24.4	2 900	3 800	**27689**	**27620**	24.7	90.0	90.0	115.0	120.0	0.8	1.6	0.42	1.44	0.79	0.746	0.344

[Note] 1) To the bearings with supplementary code "J" attached at the front of bearing number, tolerances shown in table 7-8 on page A72 are applied.

[Remark] Inch series tapered roller bearings with bore diameter larger than 100 mm are shown in catalog "large size ball & roller bearings".

d (83.345) ~ (88.900) mm



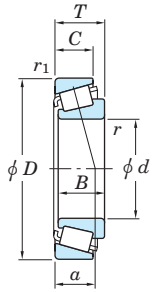


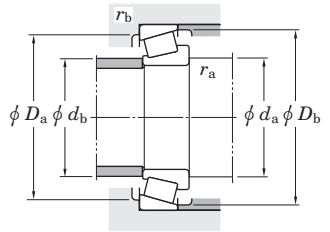
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. [1]		Load center (mm)	Mounting dimensions (mm)						Constant	Axial load factors			(Refer.) Mass (kg)	
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Inner ring	Outer ring	a	d_a	d_b	D_a	D_b	r_a max.	r_b max.	e	Y_1	Y_0	Inner ring	Outer ring
83.345	125.412	25.400	25.400	19.845	3.6	1.6	126	162	24.4	2 900	3 800	**27690**	**27620**	24.7	96.0	90.0	115.0	120.0	3.6	1.6	0.42	1.44	0.79	0.689	0.344
	125.412	25.400	25.400	19.845	6.4	1.6	126	162	24.4	2 900	3 800	**27691**	**27620**	24.7	102.0	90.0	115.0	120.0	6.4	1.6	0.42	1.44	0.79	0.646	0.344
84.138	133.350	30.162	29.769	22.225	3.6	3.2	167	198	30.0	2 700	3 600	**498**	**492A**	29.8	98.0	91.0	120.0	128.0	3.6	3.2	0.44	1.35	0.74	1.04	0.429
85.000	130.000	30.000	29.000	24.000	3.0	2.5	179	228	34.5	2 800	3 700	**JM716649**	**JM716610**	29.1	98.0	92.0	117.0	125.0	3.0	2.5	0.44	1.35	0.74	0.937	0.456
	140.000	39.000	38.000	31.500	3.0	2.5	254	308	46.4	2 700	3 500	**JHM516849**	**JHM516810**	32.8	100.0	93.9	125.0	134.0	3.0	2.5	0.41	1.47	0.81	1.54	0.759
	150.000	46.000	46.000	38.000	3.0	2.5	342	390	53.1	2 500	3 400	**JH217249**	**JH217210**	33.6	101.0	95.2	134.0	142.0	3.0	2.5	0.33	1.80	0.99	2.28	1.08
	200.000	52.761	49.212	34.925	3.6	3.2	433	471	58.8	1 400	1 900	**98335**	**98788**	54.5	115.0	109.0	174.0	188.0	3.6	3.2	0.63	0.95	0.52	5.47	2.28
85.026	150.089	44.450	46.672	36.512	3.6	3.2	330	368	50.1	2 500	3 400	**749R**	**742**	32.4	101.0	95.0	134.0	142.0	3.6	3.2	0.33	1.84	1.01	2.12	1.06
	150.089	44.450	46.672	36.512	5.2	3.2	330	368	50.1	2 500	3 400	**749SR**	**742**	32.4	104.0	95.0	134.0	142.0	5.2	3.2	0.33	1.84	1.01	2.08	1.06
85.725	133.350	30.162	29.769	22.225	3.6	3.2	167	198	30.0	2 700	3 600	**497**	**492A**	29.8	99.0	93.0	120.0	128.0	3.6	3.2	0.44	1.35	0.74	0.978	0.429
	136.525	30.162	29.769	22.225	6.4	3.2	167	198	30.0	2 700	3 600	**497A**	**493**	29.8	105.0	93.0	122.0	130.0	6.4	3.2	0.44	1.35	0.74	0.965	0.544
	142.138	42.862	42.862	34.133	4.8	3.2	276	351	52.4	2 600	3 500	**HM617049**	**HM617010**	35.2	106.0	95.7	125.0	137.0	4.8	3.2	0.43	1.39	0.76	1.72	0.902
	146.050	41.275	41.275	31.750	3.6	3.2	261	301	45.3	2 600	3 400	**665**	**653**	33.4	102.0	95.0	131.0	139.0	3.6	3.2	0.41	1.47	0.81	1.77	0.880
	146.050	41.275	41.275	31.750	6.4	3.2	261	301	45.3	2 600	3 400	**665A**	**653**	33.4	107.0	95.0	131.0	139.0	6.4	3.2	0.41	1.47	0.81	1.76	0.880
	152.400	39.688	36.322	30.162	3.6	3.2	230	287	42.5	2 400	3 300	**596**	**592A**	37.1	102.0	96.0	135.0	144.0	3.6	3.2	0.44	1.36	0.75	1.83	1.04
	161.925	47.625	48.260	38.100	3.6	3.2	342	391	52.4	2 400	3 200	**758**	**752**	35.5	103.0	97.0	144.0	150.0	3.6	3.2	0.34	1.76	0.97	2.67	1.59
	168.275	41.275	41.275	30.162	3.6	3.2	282	349	50.4	2 200	3 000	**677**	**672**	38.6	105.0	99.0	149.0	160.0	3.6	3.2	0.47	1.28	0.70	2.89	1.22
	168.275	53.975	56.363	41.275	3.6	3.2	429	467	62.1	2 300	3 100	**841R**	**832**	35.0	104.0	97.0	149.0	155.0	3.6	3.2	0.30	2.00	1.10	3.47	1.72
88.900	123.825	20.638	20.638	16.670	1.6	1.6	102	145	21.5	2 800	3 700	**L217849**	**L217810**	20.7	97.0	94.0	116.0	119.0	1.6	1.6	0.33	1.82	1.00	0.507	0.235
	152.400	39.688	39.688	30.162	6.4	3.2	311	359	53.5	2 400	3 200	**HM518445**	**HM518410**	33.1	110.0	98.0	135.0	146.0	6.4	3.2	0.40	1.49	0.82	2.10	0.768
	161.925	47.625	48.260	38.100	3.6	3.2	342	391	52.4	2 400	3 200	**759**	**752**	35.5	106.0	99.0	144.0	150.0	3.6	3.2	0.34	1.76	0.97	2.50	1.59
	161.925	47.625	48.260	38.100	7.1	3.2	342	391	52.4	2 400	3 200	**766**	**752**	35.5	113.0	99.0	144.0	150.0	7.1	3.2	0.34	1.76	0.97	2.48	1.59
	161.925	53.975	55.100	42.862	3.6	3.2	395	471	61.4	2 400	3 200	**6580R**	**6535**	49.8	109.0	98.0	141.0	154.0	3.6	3.2	0.40	1.50	0.82	3.09	1.65
	168.275	41.275	41.275	30.162	3.6	3.2	282	349	50.4	2 200	3 000	**679**	**672**	38.6	107.0	101.0	149.0	160.0	3.6	3.2	0.47	1.28	0.70	2.75	1.22
	190.500	57.150	57.531	44.450	7.9	3.2	482	565	72.4	2 100	2 700	**855R**	**854**	40.0	118.0	103.0	170.0	174.0	7.9	3.2	0.33	1.79	0.99	5.05	2.66

[Note] 1) To the bearings with supplementary code "J" attached at the front of bearing number, tolerances shown in table 7-8 on page A72 are applied.

[Remark] Inch series tapered roller bearings with bore diameter larger than 100 mm are shown in catalog "large size ball & roller bearings".

Single-row tapered roller bearings
inch series
d (88.900) ~ 99.975 mm



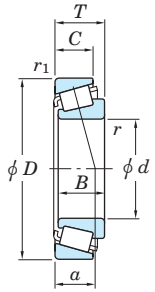


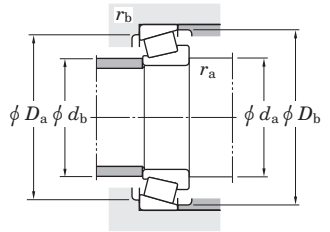
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. [1]		Load center (mm)	Mounting dimensions (mm)						Constant	Axial load factors			(Refer.) Mass (kg)	
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Inner ring	Outer ring	a	d_a	d_b	D_a	D_b	r_a max.	r_b max.	e	Y_1	Y_0	Inner ring	Outer ring
88.900	190.500	57.150	57.531	46.038	7.9	3.2	549	602	76.9	2 000	2 700	**HH221434**	**HH221410**	42.5	120.0	105.0	171.0	179.0	7.9	3.2	0.33	1.79	0.99	5.57	2.21
	200.000	52.761	49.212	34.925	3.6	3.2	433	471	58.8	1 400	1 900	**98350**	**98788**	54.5	118.0	112.0	174.0	188.0	3.6	3.2	0.63	0.95	0.52	5.27	2.28
89.974	146.975	40.000	40.000	32.500	7.1	3.6	259	310	46.6	2 500	3 300	**HM218248**	**HM218210**	30.8	112.0	99.0	133.0	141.0	7.1	3.6	0.33	1.80	0.99	1.66	0.784
90.000	145.000	35.000	34.000	27.000	3.0	2.5	244	291	43.5	2 500	3 400	**JM718149**	**JM718110**	32.7	105.0	99.0	131.0	139.0	3.0	2.5	0.44	1.35	0.74	1.47	0.652
	155.000	44.000	44.000	35.500	3.0	2.5	363	407	54.8	2 400	3 200	**JHM318448**	**JHM318410**	34.5	106.0	100.0	140.0	148.0	3.0	2.5	0.34	1.76	0.97	2.37	1.00
	161.925	53.975	55.100	42.862	3.0	3.2	395	471	61.4	2 400	3 200	**6581XR**	**6535**	41.0	102.0	98.0	141.0	154.0	3.0	3.2	0.40	1.50	0.82	3.02	1.65
90.488	161.925	47.625	48.260	38.100	3.6	3.2	342	391	52.4	2 400	3 200	**760**	**752**	35.5	107.0	101.0	144.0	150.0	3.6	3.2	0.34	1.76	0.97	2.42	1.59
92.075	146.050	33.338	34.925	26.195	3.6	3.2	223	293	43.2	2 500	3 300	**47890R**	**47820**	32.6	107.0	101.0	131.0	140.0	3.6	3.2	0.45	1.34	0.74	1.46	0.657
	168.275	41.275	41.275	30.162	3.6	3.2	282	349	50.4	2 200	3 000	**681**	**672**	38.6	110.0	104.0	149.0	160.0	3.6	3.2	0.47	1.28	0.70	2.61	1.22
	168.275	41.275	41.275	30.162	6.4	3.2	282	349	50.4	2 200	3 000	**681A**	**672**	38.6	116.0	104.0	149.0	160.0	6.4	3.2	0.47	1.28	0.70	2.60	1.22
	180.975	47.625	48.006	38.100	3.6	3.2	362	438	56.6	2 100	2 800	**778**	**772**	39.5	111.0	105.0	161.0	168.0	3.6	3.2	0.39	1.56	0.86	3.65	1.92
	190.500	57.150	57.531	44.450	7.9	3.2	482	565	72.4	2 100	2 700	**857R**	**854**	39.9	121.0	106.0	170.0	174.0	7.9	3.2	0.33	1.79	0.99	4.86	2.66
95.000	150.000	35.000	34.000	27.000	3.0	2.5	235	294	43.4	2 400	3 300	**JM719149**	**JM719113**	33.5	109.0	104.0	135.0	143.0	3.0	2.5	0.44	1.36	0.75	1.43	0.766
95.250	128.588	15.875	15.083	11.908	1.6	1.6	72.6	93.0	13.1	2 600	3 500	**LL319349**	**LL319310**	20.3	103.0	100.0	122.0	125.0	1.6	1.6	0.35	1.71	0.94	0.393	0.147
	130.175	20.638	21.432	16.670	1.6	1.6	121	167	24.7	2 600	3 500	**L319249**	**L319210**	22.2	107.0	101.0	122.0	125.0	1.6	1.6	0.35	1.72	0.95	0.548	0.246
	146.050	33.338	34.925	26.195	3.6	3.2	223	293	43.2	2 500	3 300	**47896R**	**47820**	32.6	110.0	103.0	131.0	140.0	3.6	3.2	0.45	1.34	0.74	1.34	0.657
	147.638	35.717	36.322	26.192	5.2	0.8	230	287	42.5	2 400	3 300	**594A**	**592XE**	33.4	113.0	104.0	135.0	142.0	5.2	0.8	0.44	1.36	0.75	1.45	0.620
	157.162	36.512	36.116	26.195	3.6	3.2	227	288	41.7	2 300	3 000	**52375**	**52618**	36.0	112.0	105.0	142.0	153.0	3.6	3.2	0.47	1.26	0.69	1.94	0.694
	168.275	41.275	41.275	30.162	3.6	3.2	282	349	50.4	2 200	3 000	**683**	**672**	38.6	113.0	106.0	149.0	160.0	3.6	3.2	0.47	1.28	0.70	2.46	1.22
	190.500	57.150	57.531	44.450	7.9	3.2	482	565	72.4	2 100	2 700	**864R**	**854**	39.9	123.0	108.0	170.0	174.0	7.9	3.2	0.33	1.79	0.99	4.64	2.66
	190.500	57.150	57.531	46.038	7.9	3.2	549	602	76.9	2 000	2 700	**HH221440**	**HH221410**	42.5	125.0	110.0	171.0	179.0	7.9	3.2	0.33	1.79	0.99	5.16	2.21
98.425	168.275	41.275	41.275	30.162	3.6	3.2	282	349	50.4	2 200	3 000	**685**	**672**	38.6	116.0	109.0	149.0	160.0	3.6	3.2	0.47	1.28	0.70	2.29	1.22
	190.500	57.150	57.531	46.038	3.6	3.2	549	602	76.9	2 000	2 700	**HH221442**	**HH221410**	42.5	119.0	113.0	171.0	179.0	3.6	3.2	0.33	1.79	0.99	4.97	2.21
99.975	212.725	66.675	66.675	53.975	3.6	3.2	641	699	87.1	1 800	2 400	**HH224334**	**HH224310**	47.6	122.0	117.0	192.0	202.0	3.6	3.2	0.33	1.84	1.01	7.91	3.03

[Note] 1) To the bearings with supplementary code "J" attached at the front of bearing number, tolerances shown in table 7-8 on page A72 are applied.

[Remark] Inch series tapered roller bearings with bore diameter larger than 100 mm are shown in catalog "large size ball & roller bearings".

d 99.982 ~ (107.950) mm



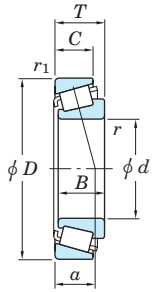


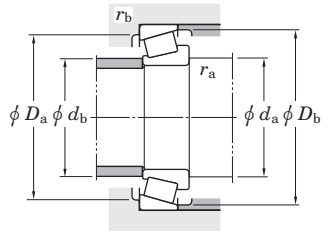
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. [1]		Load center (mm)	Mounting dimensions (mm)						Constant	Axial load factors			(Refer.) Mass (kg)	
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Inner ring	Outer ring	a	d_a	d_b	D_a	D_b	r_a max.	r_b max.	e	Y_1	Y_0	Inner ring	Outer ring
99.982	190.500	57.150	57.531	46.038	6.4	3.2	549	602	76.9	2 000	2 700	**HH221447**	**HH221410**	42.5	126.0	114.0	171.0	179.0	6.4	3.2	0.33	1.79	0.99	4.84	2.21
100.000	155.000	36.000	35.000	28.000	3.0	2.5	256	328	47.7	2 300	3 100	**JM720249**	**JM720210**	35.6	110.0	110.0	139.0	148.0	3.0	2.5	0.47	1.27	0.70	1.64	0.763
	160.000	41.000	40.000	32.000	3.0	2.5	298	378	54.6	2 300	3 000	**JHM720249**	**JHM720210**	38.3	110.0	111.0	143.0	153.0	3.0	2.5	0.47	1.28	0.70	2.11	0.964
100.012	157.162	36.512	36.116	26.195	3.6	3.2	227	288	41.7	2 300	3 000	**52393**	**52618**	36.0	113.0	115.0	142.0	153.0	3.6	3.2	0.47	1.26	0.69	1.74	0.694
101.600	157.162	36.512	36.116	26.195	3.6	3.2	227	288	41.7	2 300	3 000	**52400**	**52618**	36.0	114.0	115.0	142.0	153.0	3.6	3.2	0.47	1.26	0.69	1.67	0.694
	157.162	36.512	36.116	26.195	7.9	3.2	227	288	41.7	2 300	3 000	**52401**	**52618**	36.0	126.0	111.0	142.0	153.0	7.9	3.2	0.47	1.26	0.69	1.64	0.694
	168.275	41.275	41.275	30.162	3.6	3.2	282	349	50.4	2 200	3 000	**687**	**672**	38.6	114.0	115.0	146.0	157.0	3.6	3.2	0.47	1.28	0.70	2.15	1.22
	180.975	47.625	48.006	38.100	3.6	3.2	362	438	56.6	2 100	2 800	**780**	**772**	39.5	114.0	120.0	156.0	165.0	3.6	3.2	0.39	1.56	0.86	3.09	1.92
	190.500	57.150	57.531	44.450	7.9	3.2	482	565	72.4	2 100	2 700	**861R**	**854**	39.9	129.0	114.0	170.0	174.0	7.9	3.2	0.33	1.79	0.99	4.20	2.66
	190.500	57.150	57.531	46.038	7.9	3.2	549	602	76.9	2 000	2 700	**HH221449**	**HH221410**	42.5	123.0	119.0	168.0	178.0	7.9	3.2	0.33	1.79	0.99	4.72	2.21
	200.000	52.761	49.212	34.925	3.6	3.2	433	471	58.8	1 400	1 900	**98400**	**98788**	54.5	114.0	123.0	170.0	185.0	3.6	3.2	0.63	0.95	0.52	4.55	2.28
	212.725	66.675	66.675	53.975	7.1	3.2	563	674	84.1	1 800	2 400	**941**	**932**	47.6	121.0	135.0	181.0	192.0	7.1	3.2	0.33	1.84	1.01	7.07	4.07
	212.725	66.675	66.675	53.975	7.1	3.2	641	699	87.1	1 800	2 400	**HH224335**	**HH224310**	47.6	121.0	134.0	189.0	201.0	7.1	3.2	0.33	1.84	1.01	7.76	3.03
104.775	180.975	47.625	48.006	38.100	3.6	3.2	362	438	56.6	2 100	2 800	**782**	**772**	39.5	117.0	120.0	156.0	165.0	3.6	3.2	0.39	1.56	0.86	2.90	1.92
	180.975	47.625	48.006	38.100	6.4	3.2	362	438	56.6	2 100	2 800	**786**	**772**	39.5	123.0	120.0	156.0	165.0	6.4	3.2	0.39	1.56	0.86	2.88	1.92
	180.975	47.625	48.006	38.100	7.1	3.2	362	438	56.6	2 100	2 800	**787**	**772**	39.5	129.0	116.0	161.0	168.0	7.1	3.2	0.39	1.56	0.86	2.87	1.92
	190.500	47.625	49.212	34.925	3.6	3.2	381	483	60.9	1 900	2 600	**71412**	**71750**	40.9	117.0	131.0	167.0	177.0	3.6	3.2	0.42	1.44	0.79	3.96	1.72
106.362	165.100	36.512	36.512	26.988	3.6	3.2	245	325	46.3	2 200	2 900	**56418R**	**56650**	38.6	122.0	116.0	149.0	159.0	3.6	3.2	0.50	1.21	0.66	1.84	0.852
107.950	146.050	21.432	21.432	16.670	1.6	1.6	108	167	23.5	2 300	3 100	**L521949R**	**L521910**	26.2	116.0	114.0	136.0	141.0	1.6	1.6	0.39	1.53	0.84	0.665	0.325
	158.750	23.020	21.438	15.875	3.6	3.2	130	169	23.9	2 200	3 000	**37425**	**37625**	36.5	121.0	121.0	141.0	148.0	3.6	3.2	0.61	0.99	0.54	0.893	0.484
	159.987	34.925	34.925	26.988	3.6	3.2	231	319	45.8	2 200	2 900	**LM522546**	**LM522510**	32.9	122.0	116.0	146.0	154.0	3.6	3.2	0.40	1.50	0.82	1.64	0.784
	161.925	34.925	34.925	26.988	3.6	3.2	216	293	41.8	2 200	2 900	**48190**	**48120**	39.1	121.0	120.0	145.0	154.0	3.6	3.2	0.51	1.19	0.65	1.57	0.820
	165.100	36.512	36.512	26.988	3.6	3.2	245	325	46.3	2 200	2 900	**56425R**	**56650**	38.6	123.0	117.0	149.0	159.0	3.6	3.2	0.50	1.21	0.66	1.76	0.852
	168.275	36.512	36.512	26.988	3.6	3.2	245	325	46.3	2 200	2 900	**56425R**	**56662**	38.6	123.0	117.0	150.0	160.0	3.6	3.2	0.50	1.21	0.66	1.76	1.03
	190.500	47.625	49.212	34.925	3.6	3.2	381	483	60.9	1 900	2 600	**71425**	**71750**	40.9	121.0	131.0	167.0	177.0	3.6	3.2	0.42	1.44	0.79	3.76	1.72

[Note] 1) To the bearings with supplementary code "J" attached at the front of bearing number, tolerances shown in table 7-8 on page A72 are applied.

[Remark] Inch series tapered roller bearings with bore diameter larger than 100 mm are shown in catalog "large size ball & roller bearings".

d (107.950) ~ 127.000 mm



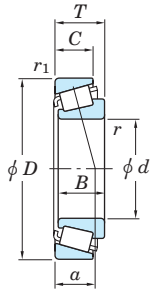


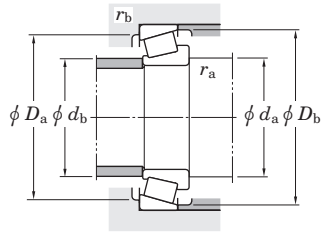
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. [1]		Load center (mm)	Mounting dimensions (mm)						Constant	Axial load factors			(Refer.) Mass (kg)	
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Inner ring	Outer ring	a	d_a	d_b	D_a	D_b	r_a max.	r_b max.	e	Y_1	Y_0	Inner ring	Outer ring
107.950	212.725	66.675	66.675	53.975	7.9	3.2	563	674	84.1	1 800	2 400	**936**	**932**	47.6	137.0	122.0	187.0	193.0	7.9	3.2	0.33	1.84	1.01	6.52	4.07
	212.725	66.675	66.675	53.975	7.9	3.2	641	699	87.1	1 800	2 400	**HH224340**	**HH224310**	47.6	129.0	134.0	189.0	201.0	7.9	3.2	0.33	1.84	1.01	7.21	3.03
109.538	158.750	23.020	21.438	15.875	3.6	3.2	130	169	23.9	2 200	3 000	**37431**	**37625**	36.5	123.0	116.0	143.0	152.0	6.4	6.4	0.61	0.99	0.54	0.848	0.484
109.987	159.987	34.925	34.925	26.988	7.9	3.2	231	319	45.8	2 200	2 900	**LM522548**	**LM522510**	32.9	131.0	121.0	146.0	154.0	7.9	3.2	0.40	1.50	0.82	1.52	0.784
	159.987	34.925	34.925	26.988	3.6	3.2	231	319	45.8	2 200	2 900	**LM522549**	**LM522510**	32.9	123.0	121.0	146.0	154.0	3.6	3.2	0.40	1.50	0.82	1.55	0.784
109.992	177.800	41.275	41.275	30.162	3.6	3.2	294	380	53.4	2 000	2 700	**64433R**	**64700**	42.8	128.0	121.0	160.0	172.6	3.6	3.2	0.52	1.16	0.64	2.69	1.10
110.000	165.000	35.000	35.000	26.500	3.0	2.5	245	325	46.3	2 200	2 900	**JM822049**	**JM822010**	38.1	121.0	121.0	148.0	157.0	3.0	2.5	0.50	1.21	0.66	1.64	0.826
	180.000	47.000	46.000	38.000	3.0	2.5	385	487	62.3	2 000	2 700	**JHM522649**	**JHM522610**	40.6	121.0	125.0	160.0	171.0	3.0	2.5	0.41	1.48	0.81	3.08	1.49
114.300	177.800	41.275	41.275	30.162	3.6	3.2	294	380	53.4	2 000	2 700	**64450R**	**64700**	42.8	131.0	125.0	160.0	172.0	3.6	3.2	0.52	1.16	0.64	2.45	1.10
	180.975	34.925	31.750	25.400	3.6	3.2	216	247	35.1	2 000	2 700	**68450**	**68712**	40.6	127.0	131.0	161.0	170.0	3.6	3.2	0.50	1.21	0.66	1.89	1.04
	190.500	47.625	49.212	34.925	3.6	3.2	381	483	60.9	1 900	2 600	**71450**	**71750**	40.9	127.0	131.0	167.0	177.0	3.6	3.2	0.42	1.44	0.79	3.33	1.72
	212.725	66.675	66.675	53.975	7.1	3.2	563	674	84.1	1 800	2 400	**938**	**932**	47.6	141.0	128.0	187.0	193.0	7.1	3.2	0.33	1.84	1.01	5.96	4.07
	212.725	66.675	66.675	53.975	7.1	3.2	641	699	87.1	1 800	2 400	**HH224346**	**HH224310**	47.6	134.0	134.0	189.0	201.0	7.1	3.2	0.33	1.84	1.01	6.64	3.03
	273.050	82.550	82.550	53.975	6.4	6.4	885	898	104	1 500	1 900	**HH926744**	**HH926710**	76.1	133.0	151.0	230.0	252.0	6.4	6.4	0.63	0.95	0.52	15.0	6.97
114.976	212.725	66.675	66.675	53.975	7.1	3.2	641	699	87.1	1 800	2 400	**HH224349**	**HH224310**	47.6	135.0	134.0	189.0	201.0	7.1	3.2	0.33	1.84	1.01	6.58	3.03
115.087	190.500	47.625	49.212	34.925	3.6	3.2	381	483	60.9	1 900	2 600	**71453**	**71750**	40.9	133.0	126.0	171.0	181.0	3.6	3.2	0.42	1.44	0.79	3.28	1.72
	190.500	47.625	49.212	34.925	7.9	3.2	381	483	60.9	1 900	2 600	**71455**	**71750**	40.9	136.0	131.0	167.0	177.0	7.9	3.2	0.42	1.44	0.79	3.25	1.72
117.475	180.975	34.925	31.750	25.400	3.6	3.2	216	247	35.1	2 000	2 700	**68462**	**68712**	40.6	130.0	131.0	161.0	170.0	3.6	3.2	0.50	1.21	0.66	1.75	1.04
	180.975	34.925	31.750	25.400	7.9	3.2	216	247	35.1	2 000	2 700	**68463**	**68712**	40.6	141.0	125.0	163.0	172.0	7.9	3.2	0.50	1.21	0.66	1.61	1.05
120.650	190.500	46.038	46.038	34.925	3.6	1.6	393	512	63.9	1 900	2 500	**HM624749**	**HM624710**	41.6	146.0	132.0	174.0	184.0	3.6	1.6	0.43	1.41	0.77	3.20	1.44
	254.000	77.788	82.550	61.912	9.5	6.4	895	1 050	125	1 500	2 000	**HH228340**	**HH228310**	54.3	158.0	142.0	223.0	234.0	9.5	6.4	0.32	1.87	1.03	12.6	6.00
127.000	254.000	77.788	82.550	61.912	9.5	6.4	895	1 050	125	1 500	2 000	**HH228349**	**HH228310**	54.3	164.0	148.0	223.0	234.0	9.5	6.4	0.32	1.87	1.03	11.8	6.00

[Note] 1) To the bearings with supplementary code "J" attached at the front of bearing number, tolerances shown in table 7-8 on page A72 are applied.

[Remark] Inch series tapered roller bearings with bore diameter larger than 100 mm are shown in catalog "large size ball & roller bearings".

d 133.350 ~ 292.100 mm



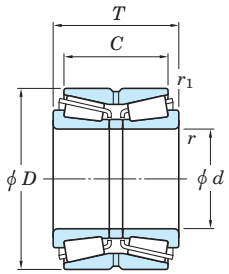


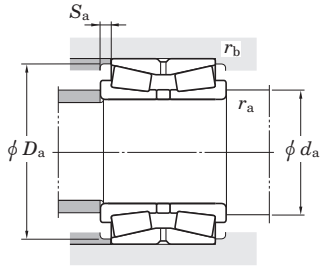
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No. [1]		Load center (mm)	Mounting dimensions (mm)						Constant	Axial load factors			(Refer.) Mass (kg)	
d	D	T	B	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Inner ring	Outer ring	a	d_a	d_b	D_a	D_b	r_a max.	r_b max.	e	Y_1	Y_0	Inner ring	Outer ring
133.350	177.008	25.400	26.195	20.638	1.6	1.6	176	278	38.2	1 900	2 500	**L327249**	**L327210**	29.1	142.0	145.0	164.0	171.0	1.6	1.6	0.35	1.72	0.95	1.14	0.543
142.875	200.025	41.275	39.688	34.130	7.9	3.3	307	491	66.5	1 700	2 200	**48684**	**48620**	38.4	166.0	151.0	185.0	193.0	7.9	3.3	0.34	1.78	0.98	2.43	1.38
	200.025	41.275	39.688	34.130	3.6	3.3	307	491	66.5	1 700	2 200	**48685**	**48620**	38.4	156.0	157.0	182.0	192.0	3.6	3.3	0.34	1.78	0.98	2.46	1.38
170.000	230.000	39.000	38.000	31.000	3.0	2.5	363	558	72.8	1 400	1 900	**JHM534149**	**JHM534110**	43.6	181.0	184.0	214.0	222.0	3.0	2.5	0.38	1.57	0.86	3.17	1.29
	240.000	46.000	44.500	37.000	3.0	2.5	443	666	77.1	1 400	1 800	**JM734449**	**JM734410**	50.6	181.0	184.0	220.0	231.0	3.0	2.5	0.44	1.37	0.75	4.31	2.00
171.450	222.250	25.400	24.608	19.050	1.6	1.6	197	299	38.7	1 400	1 900	**L435049**	**L435010**	36.0	181.0	179.0	211.0	215.0	1.6	1.6	0.38	1.60	0.88	1.63	0.697
180.000	250.000	47.000	45.000	37.000	3.0	2.5	456	705	81.7	1 300	1 700	**JM736149**	**JM736110**	55.2	191.0	193.0	230.0	242.0	3.0	2.5	0.48	1.25	0.69	4.47	2.10
190.000	260.000	46.000	44.000	36.500	3.0	2.5	461	723	81.4	1 200	1 700	**JM738249**	**JM738210**	56.0	201.0	203.0	240.0	251.0	3.0	2.5	0.48	1.26	0.69	4.71	2.18
196.850	254.000	28.575	27.783	21.433	1.6	1.6	236	387	48.2	1 200	1 600	**L540049**	**L540010**	43.1	206.0	214.0	238.0	245.0	1.6	1.6	0.40	1.51	0.83	2.34	1.02
200.000	300.000	65.000	62.000	51.000	3.6	2.5	773	1 140	124	1 100	1 500	**JHM840449**	**JHM840410**	72.1	213.0	218.0	270.0	288.0	3.6	2.5	0.52	1.15	0.63	9.97	5.13
220.878	317.500	47.625	52.388	36.513	3.2	3.2	611	928	103	970	1 300	**LM245833**	**LM245810**	50.5	234.0	253.0	296.0	304.0	3.2	3.2	0.33	1.80	0.99	9.56	2.78
228.600	358.775	71.438	71.438	53.975	3.6	3.2	968	1 590	166	840	1 100	**M249732**	**M249710**	64.4	242.0	279.0	330.0	343.0	3.6	3.2	0.33	1.80	0.99	20.1	6.44
230.188	317.500	47.625	52.388	36.513	3.2	3.2	611	928	103	970	1 300	**LM245846**	**LM245810**	50.5	242.0	238.0	309.0	312.0	3.2	3.2	0.33	1.80	0.99	8.25	2.78
231.775	317.500	47.625	52.388	36.513	3.2	3.2	611	928	103	970	1 300	**LM245848**	**LM245810**	50.5	244.0	240.0	309.0	312.0	3.2	3.2	0.33	1.80	0.99	8.02	2.78
	336.550	65.088	65.088	50.800	6.4	3.2	887	1 380	150	920	1 200	**M246942**	**M246910**	59.9	258.0	249.0	313.0	322.0	6.4	3.2	0.33	1.80	0.99	13.1	5.44
	358.775	71.438	71.438	53.975	6.4	3.2	968	1 590	166	920	1 200	**M249734**	**M249710**	64.4	258.0	253.0	335.0	343.0	6.4	3.2	0.33	1.80	0.99	19.9	6.44
254.000	358.775	71.438	71.438	53.975	3.6	3.2	968	1 590	166	840	1 100	**M249749**	**M249710**	64.4	268.0	279.0	330.0	343.0	3.6	3.2	0.33	1.80	0.99	14.8	6.44
257.175	342.900	57.150	57.150	44.450	6.4	3.2	764	1 280	135	870	1 200	**M349549**	**M349510**	60.1	276.0	276.0	320.0	330.0	6.4	3.2	0.35	1.73	0.95	9.27	3.99
292.100	374.650	47.625	47.625	34.925	3.6	3.2	587	971	111	760	1 000	**L555249**	**L555210**	64.7	306.0	309.0	351.0	360.0	3.6	3.2	0.40	1.49	0.82	7.97	3.53

[Note] 1) To the bearings with supplementary code "J" attached at the front of bearing number, tolerances shown in table 7-8 on page A72 are applied.

[Remark] Inch series tapered roller bearings with bore diameter larger than 100 mm are shown in catalog "large size ball & roller bearings".

d 25 ~ (60) mm

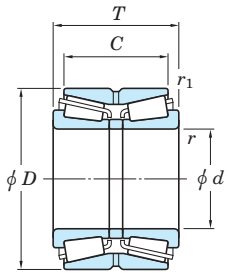


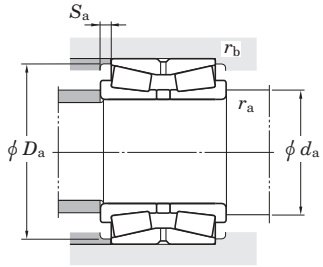


Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)					Constant	Axial load factors			(Refer.) Mass
d	D	T	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.		d_a min.	D_a min.	S_a min.	r_a max.	r_b max.	e	Y_2	Y_3	Y_0	(kg)
25	62	40	29.5	1.5	0.6	85.2	84.9	11.6	4 500	6 400	**46T30305DJR/29.5**	33.5	58.5	5	1.5	0.6	0.83	0.82	1.22	0.8	0.592
30	72	45	31.5	1.5	0.6	109	110	15.4	3 900	5 400	**46T30306DJR/31.5**	38.5	68	6.5	1.5	0.6	0.83	0.82	1.22	0.8	0.872
35	80	51	35.5	2	0.6	135	138	19.7	3 400	4 800	**46T30307DJR/35.5**	45	76.5	7.5	2	0.6	0.83	0.82	1.22	0.8	1.2
40	80	45	37.5	1.5	0.6	134	138	20.6	4 000	5 300	**46T30208JR/37.5**	48.5	75	3.5	1.5	0.6	0.37	1.8	2.68	1.76	0.954
	80	55	43.5	1.5	0.6	166	182	27.3	4 000	5 300	**46T32208JR/43.5**	48.5	75	5.5	1.5	0.6	0.37	1.8	2.68	1.76	1.19
	90	56	39.5	2	0.6	172	180	26.2	3 000	4 200	**46T30308DJR/39.5**	50	86.5	8	2	0.6	0.83	0.82	1.22	0.8	1.67
	90	56	45.5	2	0.6	194	202	31.0	3 600	4 900	**46T30308JR/45.5**	50	82	5	2	0.6	0.35	1.96	2.91	1.91	1.67
45	85	47	37.5	1.5	0.6	144	155	23.1	3 700	4 900	**46T30209JR/37.5**	53.5	80	4.5	1.5	0.6	0.4	1.67	2.48	1.63	1.1
	85	55	43.5	1.5	0.6	180	207	31.2	3 700	4 900	**46T32209JR-1/43.5**	53.5	81	5.5	1.5	0.6	0.4	1.67	2.48	1.63	1.31
	100	60	41.5	2	0.6	204	214	31.7	2 700	3 800	**46T30309DJR/41.5**	55	96	9	2	0.6	0.83	0.82	1.22	0.8	2.15
	100	60	49.5	2	0.6	242	256	39.8	3 300	4 300	**46T30309JR/49.5**	55	93	5	2	0.6	0.35	1.96	2.91	1.91	2.2
50	90	49	39.5	1.5	0.6	164	183	27.6	3 400	4 600	**46T30210JR/39.5**	58.5	85	4.5	1.5	0.6	0.42	1.61	2.39	1.57	1.22
	90	55	43.5	1.5	0.6	182	211	31.8	3 500	4 600	**46T32210JR/43.5**	58.5	85	5.5	1.5	0.6	0.42	1.61	2.39	1.57	1.39
	110	64	51.5	2	0.6	295	305	47.9	3 000	4 000	**46T30310JR/51.5**	62	102	6	2	0.6	0.35	1.96	2.91	1.91	2.68
	110	73	52.5	2	0.6	247	266	39.5	2 500	3 500	**46T30310DJR/52.5**	62	105	10	2	0.6	0.83	0.82	1.22	0.8	3.11
	110	90	71.5	2	0.6	378	440	68.4	3 000	4 000	**46T32310JR/71.5**	62	102	9	2	0.6	0.35	1.96	2.91	1.91	3.95
55	100	51	41.5	2	0.6	203	226	34.6	3 100	4 100	**46T30211JR/41.5**	65	94	4.5	2	0.6	0.4	1.67	2.48	1.63	1.6
	100	60	48.5	2	0.6	230	266	41.0	3 100	4 100	**46T32211JR-1/48.5**	65	95	5.5	2	0.6	0.4	1.67	2.48	1.63	1.87
	120	70	49	2	0.6	276	297	44.6	2 300	3 200	**46T30311DJR/49**	67	113	10.5	2	0.6	0.83	0.82	1.22	0.8	3.54
	120	70	57	2	0.6	320	341	53.9	2 700	3 600	**46T30311JR/57**	67	111	6.5	2	0.6	0.35	1.96	2.91	1.91	3.57
	120	97	76	2	0.6	429	500	78.2	2 700	3 600	**46T32311JR/76**	67	111	10.5	2	0.6	0.35	1.96	2.91	1.91	4.98
60	110	53	43.5	2	0.6	228	254	39.4	2 800	3 800	**46T30212JR/43.5**	70	103	4.5	2	0.6	0.4	1.67	2.48	1.63	2.04
	110	66	54.5	2	0.6	282	334	51.8	2 800	3 800	**46T32212JR/54.5**	70	104	5.5	2	0.6	0.4	1.67	2.48	1.63	—
	130	74	51	2.5	1	327	359	54.2	2 100	2 900	**46T30312DJR/51**	74	124	11.5	2.5	1	0.83	0.82	1.22	0.8	4.45
	130	74	59	2.5	1	372	401	63.8	2 500	3 300	**46T30312JR/59**	74	120	7.5	2.5	1	0.35	1.96	2.91	1.91	4.46

[Remark] Bearings not shown above (e.g. inch series) are shown in catalog "large size ball & roller bearings".

Double-row tapered roller bearings
TDO type
d (60) ~ (90) mm

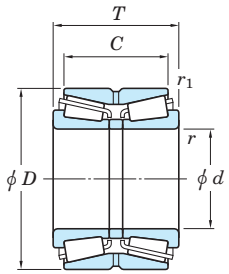


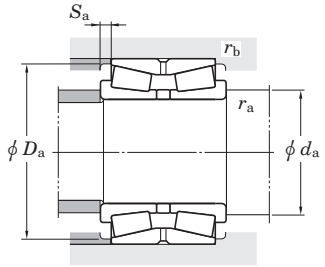


Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)					Constant	Axial load factors			(Refer.) Mass
d	D	T	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.		d_a min.	D_a min.	S_a min.	r_a max.	r_b max.	e	Y_2	Y_3	Y_0	(kg)
60	130	104	81	2.5	1	524	629	88.3	2 500	3 300	**46T32312JR/81**	74	120	11.5	2.5	1	0.35	1.96	2.91	1.91	6.45
65	120	56	46.5	2	0.6	275	311	48.7	2 600	3 400	**46T30213JR/46.5**	75	113	4.5	2	0.6	0.4	1.67	2.48	1.63	—
	120	73	61.5	2	0.6	337	406	63.3	2 600	3 400	**46T32213JR/61.5**	75	115	5.5	2	0.6	0.4	1.67	2.48	1.63	3.4
	140	79	53	2.5	1	377	417	62.8	1 900	2 700	**46T30313DJR/53**	79	133	13	2.5	1	0.83	0.82	1.22	0.8	5.3
	140	79	63	2.5	1	437	478	75.3	2 300	3 000	**46T30313JR/63**	79	130	8	2.5	1	0.35	1.96	2.91	1.91	5.51
	140	108	84	2.5	1	593	714	99.2	2 300	3 100	**46T32313JR/84**	79	130	12	2.5	1	0.35	1.96	2.91	1.91	7.71
70	125	59	48.5	2	0.6	296	346	54.2	2 400	3 300	**46T30214JR/48.5**	80	118	5	2	0.6	0.42	1.61	2.39	1.57	—
	125	74	61.5	2	0.6	363	450	70.4	2 400	3 300	**46T32214JR/61.5**	80	119	6	2	0.6	0.42	1.61	2.39	1.57	3.7
	150	83	57	2.5	1	421	470	69.8	1 800	2 500	**46T30314DJR/57**	84	142	13	2.5	1	0.83	0.82	1.22	0.8	6.48
	150	83	67	2.5	1	493	546	84.4	2 100	2 800	**46T30314JR/67**	84	140	8	2.5	1	0.35	1.96	2.91	1.91	6.65
	150	116	92	2.5	1	679	829	114	2 200	2 900	**46T32314JR/92**	84	140	12	2.5	1	0.35	1.96	2.91	1.91	9.46
75	115	30	26	1.5	0.6	89.9	105	14.6	2 500	3 300	**46215**	83.5	106.5	2	1.5	0.6	0.32	2.12	3.15	2.07	0.994
	115	38	30	1.5	0.6	153	207	31.2	2 500	3 300	**46215A**	83.5	107.4	4	1.5	0.6	0.32	2.12	3.15	2.07	1.32
	130	62	51.5	2	0.6	305	362	56.4	2 300	3 100	**46T30215JR/51.5**	85	124	5	2	0.6	0.44	1.55	2.31	1.52	3.12
	130	74	61.5	2	0.6	373	469	72.7	2 300	3 100	**46T32215JR/61.5**	85	125	6	2	0.6	0.44	1.55	2.31	1.52	3.85
	160	87	69	2.5	1	557	621	89.8	2 000	2 600	**46T30315JR/69**	89	149	9	2.5	1	0.35	1.96	2.91	1.91	7.8
	160	125	99	2.5	1	779	963	129	2 000	2 700	**46T32315JR/99**	89	149	13	2.5	1	0.35	1.96	2.91	1.91	11.5
80	125	34	30	1.5	0.6	136	155	22.6	2 300	3 100	**46216**	88.5	116.9	2	1.5	0.6	0.35	1.95	2.90	1.91	1.38
	140	64	51.5	2	0.6	346	405	62.3	2 200	2 900	**46T30216JR/51.5**	92	132	6	2	0.6	0.42	1.61	2.39	1.57	3.76
	140	78	63.5	2	0.6	434	542	83.1	2 200	2 900	**46T32216JR/63.5**	92	134	7	2	0.6	0.42	1.61	2.39	1.57	4.71
	170	92	73	2.5	1	630	711	99.8	1 800	2 500	**46T30316JR/73**	94	159	9.5	2.5	1	0.35	1.96	2.91	1.91	9.44
85	150	70	57	2	0.6	391	463	70.3	2 000	2 700	**46T30217JR/57**	97	141	6.5	2	0.6	0.42	1.61	2.39	1.57	4.79
	150	86	69	2	0.6	498	630	95.1	2 000	2 700	**46T32217JR/69**	97	142	8.5	2	0.6	0.42	1.61	2.39	1.57	6.05
	180	98	77	3	1	679	768	106	1 700	2 300	**46T30317JR/77**	103	167	10.5	3	1	0.35	1.96	2.91	1.91	11
	180	137	108	3	1	941	1 170	155	1 800	2 400	**46T32317JR/108**	103	167	14.5	3	1	0.35	1.96	2.91	1.91	16
90	140	37	33	2	0.6	171	199	28.8	2 100	2 800	**46218**	100	130.6	2	2	0.6	0.35	1.95	2.90	1.91	1.89

[Remark] Bearings not shown above (e.g. inch series) are shown in catalog "large size ball & roller bearings".

Double-row tapered roller bearings
TDO type
d (90) ~ 110 mm

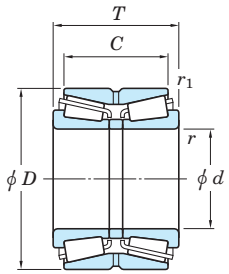


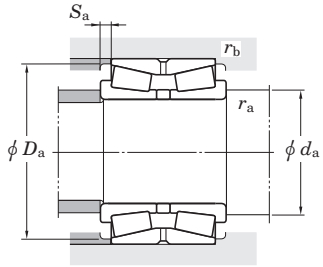


Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)					Constant	Axial load factors			(Refer.) Mass
d	D	T	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.		d_a min.	D_a min.	S_a min.	r_a max.	r_b max.	e	Y_2	Y_3	Y_0	(kg)
90	140	46	37	2	0.6	196	266	39.3	2 000	2 700	**46218A**	100	129.9	4.5	2	0.6	0.32	2.12	3.15	2.07	2.37
	160	74	61	2	0.6	438	522	78.1	1 900	2 500	**46T30218JR/61**	102	150	6.5	2	0.6	0.42	1.61	2.39	1.57	5.85
	160	94	77	2	0.6	565	724	107	1 900	2 500	**46T32218JR/77**	102	152	8.5	2	0.6	0.42	1.61	2.39	1.57	7.53
	190	102	81	3	1	741	841	114	1 600	2 200	**46T30318JR/81**	108	177	10.5	3	1	0.35	1.96	2.91	1.91	13
	190	144	115	3	1	989	1 230	157	1 700	2 200	**46T32318JR/115**	108	177	14.5	3	1	0.35	1.96	2.91	1.91	18.6
95	170	78	63	2.5	1	496	598	88.1	1 800	2 400	**46T30219JR/63**	109	159	7.5	2.5	1	0.42	1.61	2.39	1.57	7.01
	170	100	83	2.5	1	667	877	128	1 800	2 400	**46T32219JR/83**	109	161	8.5	2.5	1	0.42	1.61	2.39	1.57	9.25
	200	108	85	3	1	798	909	122	1 600	2 100	**46T30319JR/85**	113	186	11.5	3	1	0.35	1.96	2.91	1.91	14.8
	200	151	118	3	1	1 110	1 390	178	1 600	2 100	**46T32319JR/118**	113	186	16.5	3	1	0.35	1.96	2.91	1.91	21.4
100	150	46	37	2	0.6	226	293	42.6	1 900	2 500	**46220A**	110	142	4.5	2	0.6	0.35	1.95	2.90	1.91	2.53
	165	52	46	2.5	0.6	249	305	44.1	1 700	2 300	**46320**	112	154	3	2	0.6	0.35	1.95	2.90	1.91	4.03
	165	65	52	2.5	0.6	333	443	64.7	1 800	2 300	**46320A**	112	153	6.5	2	0.6	0.35	1.95	2.90	1.91	4.97
	180	83	67	2.5	1	554	676	98.2	1 700	2 200	**46T30220JR/67**	114	168	8	2.5	1	0.42	1.61	2.39	1.57	8.33
	180	107	87	2.5	1	745	990	128	1 700	2 200	**46T32220JR/87**	114	171	10	2.5	1	0.42	1.61	2.39	1.57	11.1
	215	112	87	3	1	906	1 040	136	1 500	1 900	**46T30320JR/87**	118	200	12.5	3	1	0.35	1.96	2.91	1.91	18.1
	215	162	127	3	1	1 240	1 570	194	1 500	2 000	**46T32320JR/127**	118	200	17.5	3	1	0.35	1.96	2.91	1.91	27.2
105	190	88	70	2.5	1	618	761	105	1 600	2 100	**46T30221JR/70**	119	178	9	2.5	1	0.42	1.61	2.39	1.57	9.87
	190	115	95	2.5	1	840	1 130	146	1 600	2 100	**46T32221JR/95**	119	180	10	2.5	1	0.42	1.61	2.39	1.57	13.5
	225	116	91	3	1	995	1 160	147	1 400	1 800	**46T30321JR/91**	123	209	12.5	3	1	0.35	1.96	2.91	1.91	20.7
	225	170	133	3	1	1 360	1 730	214	1 400	1 900	**46T32321JR/133**	123	209	18.5	3	1	0.35	1.96	2.91	1.91	30.9
110	170	45	40	2.5	0.6	219	304	42.5	1 700	2 200	**46222**	122	158	2.5	2	0.6	0.35	1.95	2.90	1.91	3.58
	180	56	50	2.5	0.6	308	388	55.3	1 600	2 100	**46322**	122	168	3	2	0.6	0.35	1.95	2.90	1.91	5.13
	180	70	56	2.5	0.6	391	533	76.1	1 600	2 100	**46322A**	122	168	7	2	0.6	0.35	1.92	2.86	1.88	6.43
	200	92	74	2.5	1	695	868	116	1 500	2 000	**46T30222JR/74**	124	188	9	2.5	1	0.42	1.61	2.39	1.57	11.6
	200	121	101	2.5	1	938	1 280	161	1 500	2 000	**46T32222JR/101**	124	190	10	2.5	1	0.42	1.61	2.39	1.57	15.9
	240	118	93	3	1	1 030	1 180	150	1 300	1 700	**46T30322JR/93**	128	222	12.5	3	1	0.35	1.96	2.91	1.91	23.8
	240	181	142	3	1	1 480	1 890	230	1 300	1 700	**46T32322JR/142**	128	222	19.5	3	1	0.35	1.96	2.91	1.91	37.3

[Remark] Bearings not shown above (e.g. inch series) are shown in catalog "large size ball & roller bearings".

d 120 ~ (150) mm

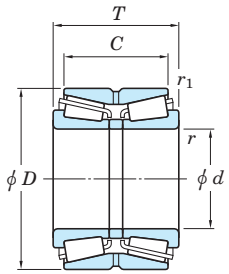


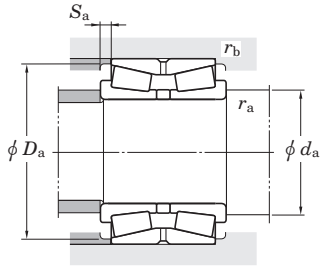


Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)					Constant	Axial load factors			(Refer.) Mass
d	D	T	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.		d_a min.	D_a min.	S_a min.	r_a max.	r_b max.	e	Y_2	Y_3	Y_0	(kg)
120	180	46	41	2.5	0.6	232	317	43.6	1 500	2 000	**46224**	132	170	2.5	2	0.6	0.35	1.95	2.90	1.91	3.81
	180	58	46	2.5	0.6	309	460	64.4	1 500	2 100	**46224A**	132	169	6	2	0.6	0.35	1.95	2.90	1.91	4.66
	200	62	55	2.5	0.6	367	470	65.7	1 400	1 900	**46324**	132	184	3.5	2	0.6	0.35	1.95	2.90	1.91	7.28
	200	78	62	2.5	0.6	486	672	93.9	1 400	1 900	**46324A**	132	185	8	2	0.6	0.35	1.95	2.90	1.91	9.14
	200	100	84	2.5	0.6	670	1 010	125	1 400	1 900	**46324AS**	132	190	8	2	0.6	0.35	1.95	2.90	1.91	12.0
	215	97	78	2.5	1	745	945	123	1 400	1 800	**46T30224JR/78**	134	203	9.5	2.5	1	0.44	1.55	2.31	1.52	13.9
	215	132	109	2.5	1	1 010	1 380	168	1 400	1 900	**46T32224JR/109**	134	204	11.5	2.5	1	0.44	1.55	2.31	1.52	19.8
	260	128	101	3	1	1 220	1 430	180	1 200	1 600	**46T30324JR/101**	138	239	13.5	3	1	0.35	1.96	2.91	1.91	30.6
	260	188	145	4	1.5	1 720	2 210	261	1 200	1 600	**46T32324JR/145**	142	239	21.5	4	1.5	0.35	1.96	2.91	1.91	45.9
130	200	52	46	2.5	0.6	299	425	57.8	1 400	1 800	**46226**	142	187	3	2	0.6	0.35	1.95	2.90	1.91	5.57
	200	65	52	2.5	0.6	400	618	85.0	1 400	1 900	**46226A**	142	185	6.5	2	0.6	0.35	1.95	2.90	1.91	7.06
	210	64	57	2.5	0.6	404	535	73.6	1 400	1 800	**46326**	142	196	3.5	2	0.6	0.36	1.87	2.79	1.83	7.81
	210	80	64	2.5	0.6	513	723	99.3	1 300	1 800	**46326A**	142	198	8	2	0.6	0.36	1.87	2.79	1.83	9.57
	230	98	78.5	3	1	809	1 020	131	1 300	1 700	**46T30226JR/78.5**	148	218	9.5	3	1	0.44	1.55	2.31	1.52	15.7
	230	145	117.5	3	1	1 190	1 660	200	1 300	1 700	**46T32226JR/117.5**	148	219	14	3	1	0.44	1.55	2.31	1.52	24.1
	280	137	107.5	4	1.5	1 410	1 670	203	1 100	1 400	**46T30326JR/107.5**	152	255	15	4	1.5	0.35	1.96	2.91	1.91	38.1
140	210	53	47	2.5	0.6	299	404	54.5	1 300	1 800	**46228**	152	196	3	2	0.6	0.33	2.03	3.02	1.98	5.85
	210	66	53	2.5	0.6	452	639	86.9	1 300	1 800	**46228A**	152	199	6.5	2	0.6	0.47	1.43	2.12	1.40	7.18
	225	68	61	3	1	423	564	76.1	1 200	1 700	**46328**	154	210	3.5	2.5	1	0.35	1.95	2.90	1.91	9.56
	225	85	68	3	1	597	836	113	1 200	1 700	**46328A**	154	212	8	2.5	1	0.35	1.95	2.90	1.91	11.8
	250	102	82.5	3	1	902	1 140	144	1 200	1 500	**46T30228JR/82.5**	158	237	9.5	3	1	0.44	1.55	2.31	1.52	19.7
	250	153	125.5	3	1	1 360	1 920	224	1 200	1 600	**46T32228JR/125.5**	158	238	14	3	1	0.44	1.55	2.31	1.52	30.2
	300	145	115.5	4	1.5	1 610	1 920	228	1 000	1 300	**46T30328JR/115.5**	162	273	15	4	1.5	0.35	1.96	2.91	1.91	46.6
150	225	56	50	3	1	348	476	63.2	1 200	1 600	**46230**	164	213	3	2.5	1	0.33	2.03	3.02	1.98	7.09
	225	70	56	3	1	472	703	94.1	1 200	1 600	**46230A**	164	213	7	2.5	1	0.33	2.03	3.02	1.98	8.82
	250	80	71	3	1	587	786	98.4	1 100	1 500	**46330**	164	233	4.5	2.5	1	0.35	1.95	2.90	1.91	14.6
	250	100	80	3	1	748	1 070	132	1 100	1 500	**46330A**	164	234	10	2.5	1	0.35	1.95	2.90	1.91	17.6
	270	109	87	3	1	1 040	1 330	162	1 100	1 400	**46T30230JR/87**	168	255	11	3	1	0.44	1.55	2.31	1.52	24.6

[Remark] Bearings not shown above (e.g. inch series) are shown in catalog "large size ball & roller bearings".

d (150) ~ (200) mm

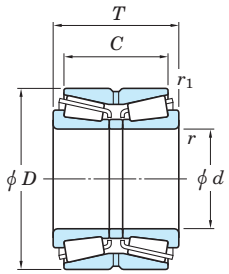


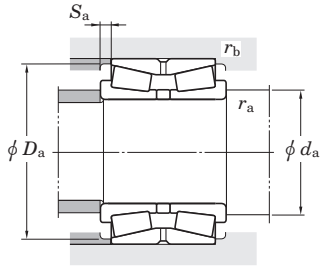


Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)					Constant	Axial load factors			(Refer.) Mass
d	D	T	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.		d_a min.	D_a min.	S_a min.	r_a max.	r_b max.	e	Y_2	Y_3	Y_0	(kg)
150	270	164	130	3	1	1 510	2 130	245	1 100	1 400	**46T32230JR/130**	168	254	17	3	1	0.44	1.55	2.31	1.52	38
	320	154	120	4	1.5	1 800	2 160	257	930	1 200	**46T30330JR/120**	172	292	17	4	1.5	0.35	1.96	2.91	1.91	56
160	240	60	53	3	1	405	565	74.0	1 100	1 500	**46232**	174	228	3.5	2.5	1	0.33	2.03	3.02	1.98	8.71
	240	75	60	3	1	508	756	99.6	1 100	1 500	**46232A**	174	226	7.5	2.5	1	0.33	2.03	3.02	1.98	10.6
	270	86	76	3	1	695	950	115	1 000	1 400	**46332**	174	252	5	2.5	1	0.35	1.95	2.90	1.91	18.8
	270	108	86	3	1	871	1 270	150	1 000	1 400	**46332A**	174	252	11	2.5	1	0.35	1.95	2.90	1.91	23.1
	290	115	91	3	1	1 160	1 500	179	980	1 300	**46T30232JR/91**	178	269	12	3	1	0.44	1.55	2.31	1.52	29.9
	290	178	144	3	1	1 700	2 420	273	1 000	1 300	**46T32232JR/144**	178	274	17	3	1	0.44	1.55	2.31	1.52	47.6
170	260	67	60	3	1	480	642	83.4	1 000	1 400	**46234**	184	243	3.5	2.5	1	0.33	2.03	3.02	1.98	11.4
	260	84	67	3	1	629	969	125	1 000	1 400	**46234A**	184	244	8.5	2.5	1	0.33	2.03	3.02	1.98	14.7
	280	88	78	3	1	754	1 050	125	970	1 300	**46334**	184	263	5	2.5	1	0.33	2.06	3.06	2.01	19.8
	280	110	88	3	1	938	1 390	163	980	1 300	**46334A**	184	260	11	2.5	1	0.33	2.06	3.06	2.01	24.7
	310	125	97	4	1.5	1 330	1 730	205	900	1 200	**46T30234JR/97**	192	288	14	4	1.5	0.44	1.55	2.31	1.52	37.5
	310	192	152	4	1.5	1 930	2 760	303	910	1 200	**46T32234JR/152**	192	294	20	4	1.5	0.44	1.55	2.31	1.52	58.8
180	280	74	66	3	1	582	801	98.9	950	1 300	**46236**	194	263	4	2.5	1	0.33	2.03	3.02	1.98	15.5
	280	93	74	3	1	732	1 080	131	960	1 300	**46236A**	194	261	9.5	2.5	1	0.33	2.03	3.02	1.98	19.0
	300	96	85	4	1.5	872	1 240	149	910	1 200	**46336**	198	277	5.5	3	1.5	0.33	2.06	3.06	2.01	25.8
	300	120	96	4	1.5	1 080	1 630	190	900	1 200	**46336A**	198	279	12	3	1.5	0.33	2.06	3.06	2.01	31.3
	320	127	99	4	1.5	1 320	1 740	204	860	1 200	**46T30236JR/99**	202	297	14	4	1.5	0.45	1.5	2.23	1.47	40.1
	320	192	152	4	1.5	2 060	3 030	328	880	1 200	**46T32236JR/152**	202	303	20	4	1.5	0.45	1.5	2.23	1.47	62.5
190	290	75	67	3	1	610	866	106	910	1 200	**46238**	204	272	4	2.5	1	0.32	2.12	3.15	2.07	16.5
	290	94	75	3	1	793	1 170	140	900	1 200	**46238A**	204	274	9.5	2.5	1	0.33	2.03	3.02	1.98	20.0
	320	104	92	4	1.5	1 020	1 450	168	830	1 100	**46338**	208	298	6	3	1.5	0.35	1.95	2.90	1.91	31.9
	320	130	104	4	1.5	1 230	1 860	212	840	1 100	**46338A**	208	298	13	3	1.5	0.35	1.95	2.90	1.91	39.0
	340	133	105	4	1.5	1 560	2 060	235	800	1 100	**46T30238JR/105**	212	318	14	4	1.5	0.44	1.55	2.31	1.52	47.8
	340	204	160	4	1.5	2 340	3 480	373	810	1 100	**46T32238JR/160**	212	323	22	4	1.5	0.44	1.55	2.31	1.52	75.1
200	310	82	73	3	1	716	1 040	123	850	1 100	**46240**	214	288	4.5	2.5	1	0.32	2.12	3.15	2.07	21.4

[Remark] Bearings not shown above (e.g. inch series) are shown in catalog "large size ball & roller bearings".

Double-row tapered roller bearings
TDO type
d (200) ~ (300) mm

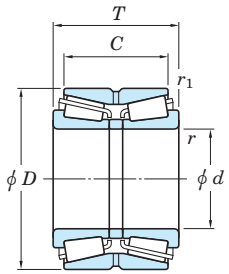


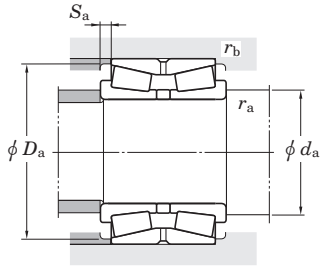


Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)					Constant	Axial load factors			(Refer.) Mass
d	D	T	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.		d_a min.	D_a min.	S_a min.	r_a max.	r_b max.	e	Y_2	Y_3	Y_0	(kg)
200	310	103	82	3	1	893	1 380	160	840	1 100	**46240A**	214	289	10.5	2.5	1	0.32	2.12	3.15	2.07	26.3
	340	112	100	4	1.5	1 100	1 580	180	780	1 000	**46340**	218	316	6	3	1.5	0.35	1.95	2.90	1.91	39.6
	340	140	112	4	1.5	1 350	2 040	226	770	1 000	**46340A**	218	319	14	3	1.5	0.35	1.95	2.90	1.91	48.2
	360	142	110	4	1.5	1 700	2 240	252	750	1 000	**46T30240JR/110**	222	336	16	4	1.5	0.44	1.55	2.31	1.52	56.5
	360	218	174	4	1.5	2 660	3 760	399	770	1 000	**46T32240JR/174**	222	340	22	4	1.5	0.41	1.66	2.47	1.62	88.2
220	340	90	80	4	1.5	849	1 240	142	750	990	**46244**	238	319	5	3	1.5	0.32	2.12	3.15	2.07	27.8
	340	113	90	4	1.5	1 040	1 620	183	750	1 000	**46244A**	238	318	11.5	3	1.5	0.32	2.12	3.15	2.07	34.2
	370	120	107	5	1.5	1 260	1 810	202	700	930	**46344**	242	346	6.5	4	1.5	0.35	1.95	2.90	1.91	49.1
	370	150	120	5	1.5	1 600	2 470	272	710	940	**46344A**	242	343	15	4	1.5	0.35	1.95	2.90	1.91	60.1
	400	150	114	4	1.5	2 170	2 880	320	660	890	**46T30244JR/114**	242	371	18	4	1.5	0.42	1.61	2.39	1.57	75.8
240	360	92	82	4	1.5	962	1 430	159	690	920	**46248**	258	338	5	3	1.5	0.32	2.12	3.15	2.07	29.6
	360	115	92	4	1.5	1 240	1 980	216	690	920	**46248A**	258	341	11.5	3	1.5	0.32	2.12	3.15	2.07	36.9
	400	128	114	5	1.5	1 490	2 180	241	630	840	**46348**	262	377	7	4	1.5	0.35	1.95	2.90	1.91	59.0
	400	160	128	5	1.5	1 940	3 060	325	630	850	**46348A**	262	373	16	4	1.5	0.35	1.95	2.90	1.91	76.2
260	400	104	92	5	1.5	1 170	1 830	200	610	820	**46252**	282	373	6	4	1.5	0.33	2.03	3.02	1.98	44.6
	400	130	104	5	1.5	1 520	2 480	265	610	810	**46252A**	282	376	13	4	1.5	0.32	2.12	3.15	2.07	54.8
	440	144	128	5	1.5	1 900	2 880	302	560	750	**46352**	282	410	8	4	1.5	0.35	1.95	2.90	1.91	83.8
	440	180	144	5	1.5	2 430	3 960	408	570	760	**46352A**	282	409	18	4	1.5	0.35	1.95	2.90	1.91	105
280	420	106	94	5	1.5	1 260	1 970	213	570	760	**46256**	302	395	6	4	1.5	0.33	2.03	3.02	1.98	46.9
	420	133	106	5	1.5	1 570	2 610	277	570	760	**46256A**	302	394	13.5	4	1.5	0.33	2.03	3.02	1.98	58.9
	460	146	130	6	2	1 950	2 930	308	530	700	**46356**	308	430	8	5	2	0.35	1.95	2.90	1.91	90.0
	460	183	146	6	2	2 470	3 940	407	520	690	**46356A**	308	434	18.5	5	2	0.35	1.95	2.90	1.91	111
300	460	118	105	5	1.5	1 630	2 400	254	500	670	**46260**	322	436	6.5	4	1.5	0.32	2.12	3.15	2.07	64.6
	460	148	118	5	1.5	2 050	3 230	331	510	680	**46260A**	322	433	15	4	1.5	0.32	2.12	3.15	2.07	80.2
	500	160	142	6	2	2 320	3 540	366	470	620	**46360**	328	469	9	5	2	0.35	1.95	2.90	1.91	116
	500	200	160	6	2	2 860	4 630	463	470	630	**46360A**	328	466	20	5	2	0.35	1.95	2.90	1.91	144

[Remark] Bearings not shown above (e.g. inch series) are shown in catalog "large size ball & roller bearings".

Double-row tapered roller bearings
TDO type
d (300) ~420 mm

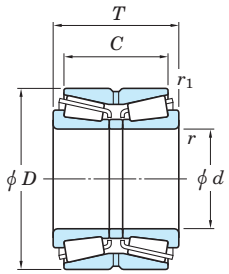


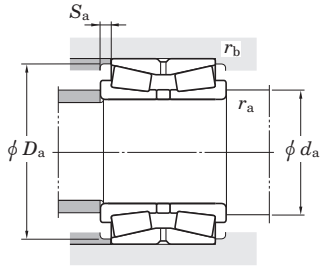


Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)					Constant	Axial load factors			(Refer.) Mass
d	D	T	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.		d_a min.	D_a min.	S_a min.	r_a max.	r_b max.	e	Y_2	Y_3	Y_0	(kg)
300	500	200	160	6	1.5	3 140	4 650	474	—	—	**46360D**	328	475	20	5	1.5	0.40	1.68	2.50	1.64	139
320	480	121	108	5	1.5	1 800	2 700	283	480	640	**46264**	342	452	6.5	4	1.5	0.32	2.12	3.15	2.07	71.6
	480	151	121	5	1.5	2 060	3 410	342	470	630	**46264A**	342	454	15	4	1.5	0.32	2.12	3.15	2.07	87.7
	540	176	157	6	2	2 880	4 570	457	420	560	**46364**	348	502	9.5	5	2	0.35	1.95	2.90	1.91	154
	540	220	176	6	2	3 280	5 390	528	430	570	**46364A**	348	497	22	5	2	0.35	1.95	2.90	1.91	190
340	520	133	118	6	2	1 940	3 070	314	420	570	**46268**	368	489	7.5	5	2	0.32	2.12	3.15	2.07	95.3
	520	165	133	6	2	2 420	4 060	406	420	560	**46268A**	368	491	16	5	2	0.32	2.12	3.15	2.07	117
	580	190	169	6	2	2 980	4 620	454	380	510	**46368**	368	539	10.5	5	2	0.35	1.95	2.90	1.91	198
	580	238	190	6	2	3 820	6 340	606	370	500	**46368A**	368	543	24	5	2	0.35	1.95	2.90	1.91	244
360	540	134	120	6	2	2 070	3 290	332	400	530	**46272**	388	510	7	5	2	0.32	2.12	3.15	2.07	93.0
	540	169	134	6	2	2 530	4 230	419	390	530	**46272A**	388	512	17.5	5	2	0.32	2.12	3.15	2.07	124
	600	192	171	6	2	3 600	4 880	473	360	480	**46372**	388	557	10.5	5	2	0.35	1.95	2.90	1.91	206
	600	240	192	6	2	4 590	7 230	689	360	480	**46372A**	388	568	24	5	2	0.39	1.74	2.59	1.70	254
380	560	135	122	6	2	2 190	3 560	355	370	500	**46276**	408	530	6.5	5	2	0.32	2.12	3.15	2.07	100
	560	171	135	6	2	2 810	4 670	456	380	500	**46276A**	408	531	18	5	2	0.39	1.74	2.59	1.70	129
	620	194	173	6	2	3 380	5 220	500	340	450	**46376**	408	582	10.5	5	2	0.39	1.74	2.59	1.70	215
	620	243	194	6	2	4 390	7 360	683	330	440	**46376A**	408	587	24.5	5	2	0.35	1.95	2.90	1.91	265
400	600	148	132	6	2	2 350	3 720	366	340	460	**46280**	428	560	8	5	2	0.32	2.12	3.15	2.07	135
	600	185	148	6	2	3 030	5 150	491	340	460	**46280A**	428	563	18.5	5	2	0.32	2.12	3.15	2.07	167
	650	200	178	6	3	3 740	5 920	565	320	420	**46380**	428	605	11	5	2.5	0.35	1.95	2.90	1.91	243
	650	250	200	6	3	5 110	8 850	811	310	420	**46380A**	428	610	25	5	2.5	0.35	1.95	2.90	1.91	306
420	620	150	134	6	2	2 520	4 130	399	320	420	**46284**	448	590	8	5	2	0.33	2.03	3.02	1.98	142
	620	188	150	6	2	3 390	5 660	534	320	430	**46284A**	448	589	19	5	2	0.39	1.74	2.59	1.70	176
	700	224	200	6	3	4 650	6 880	647	290	380	**46384**	448	656	12	5	2.5	0.39	1.74	2.59	1.70	325
	700	280	224	6	3	6 040	9 620	861	290	380	**46384A**	448	659	28	5	2.5	0.39	1.74	2.59	1.70	400

[Remark] Bearings not shown above (e.g. inch series) are shown in catalog "large size ball & roller bearings".

d 440 ~ 500 mm

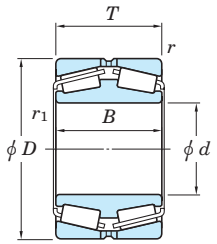


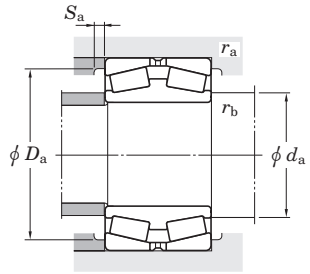


Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)					Con-stant	Axial load factors			(Refer.) Mass
d	D	T	C	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.		d_a min.	D_a min.	S_a min.	r_a max.	r_b max.	e	Y_2	Y_3	Y_0	(kg)
440	650	157	140	6	3	2 840	4 430	423	300	390	**46288**	468	622	8.5	5	2.5	0.33	2.03	3.02	1.98	156
	650	196	157	6	3	3 770	6 370	600	300	400	**46288A**	468	620	19.5	5	2.5	0.39	1.74	2.59	1.70	198
	720	226	201	6	3	4 950	8 110	744	270	360	**46388**	468	676	12.5	5	2.5	0.39	1.74	2.59	1.70	354
	720	283	226	6	3	6 210	10 100	893	270	360	**46388A**	468	679	28.5	5	2.5	0.40	1.68	2.51	1.65	418
460	680	163	145	6	3	3 130	5 340	507	280	370	**46292**	488	637	9	5	2.5	0.37	1.83	2.72	1.78	196
	680	204	163	6	3	4 040	6 850	635	280	370	**46292A**	488	646	20.5	5	2.5	0.39	1.74	2.59	1.70	232
	760	240	214	7.5	4	5 460	9 000	817	250	330	**46392**	496	710	13	6	3	0.39	1.74	2.59	1.70	424
	760	300	240	7.5	4	7 130	11 600	1010	250	330	**46392A**	496	718	30	6	3	0.39	1.74	2.59	1.70	506
480	700	165	147	6	3	3 180	5 300	494	260	340	**46296**	508	672	9	5	2.5	0.33	2.03	3.02	1.98	186
	700	206	165	6	3	4 040	7 230	666	260	340	**46296A**	508	666	20.5	5	2.5	0.33	2.03	3.02	1.98	240
	790	248	221	7.5	4	5 820	8 920	810	230	310	**46396**	516	742	13.5	6	3	0.39	1.74	2.59	1.70	457
	790	310	248	7.5	4	7 530	12 400	1060	230	310	**46396A**	516	749	31	6	3	0.39	1.74	2.59	1.70	560
500	720	167	149	6	3	3 230	5 690	529	250	330	**462/500**	528	679	9	5	2.5	0.40	1.71	2.54	1.67	210
	720	209	167	6	3	4 390	7 850	712	250	330	**462/500A**	528	690	21	5	2.5	0.42	1.62	2.41	1.58	258
	830	264	235	7.5	4	6 570	10 900	955	210	280	**463/500**	536	776	14.5	6	3	0.39	1.74	2.59	1.70	559
	830	330	264	7.5	4	8 510	14 000	1170	210	280	**463/500A**	536	784	33	6	3	0.39	1.74	2.59	1.70	669

[Remark] Bearings not shown above (e.g. inch series) are shown in catalog "large size ball & roller bearings".

Double-row tapered roller bearings
TDI type
d 100 ~ (220) mm

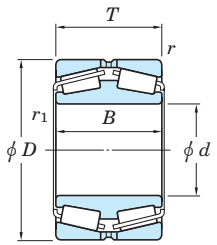


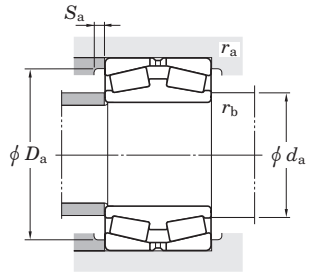


Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)						Constant	Axial load factors			(Refer.) Mass
d	D	B	T	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.		d_a max.	D_a max.	D_a min.	S_a min.	r_a max.	r_b max.	e	Y_2	Y_3	Y_0	(kg)
100	165	52	52	2	2.5	298	384	55.9	1 800	2 300	**45320**	119	155	148	3.9	2	2	0.35	1.95	2.90	1.91	4.26
110	180	56	56	2	2.5	378	505	72.2	1 600	2 100	**45322**	128	170	160	4	2	2	0.35	1.95	2.90	1.91	5.40
120	180	46	46	2	2.5	286	424	59.4	1 500	2 100	**45224**	138	170	163	4	2	2	0.26	2.55	3.80	2.50	4.08
	200	62	62	2	2.5	444	598	83.4	1 400	1 900	**45324**	142	190	178	4	2	2	0.35	1.95	2.90	1.91	7.92
130	200	52	52	2	2.5	376	548	75.6	1 400	1 800	**45226**	152	190	179	4	2	2	0.27	2.47	3.67	2.41	5.96
	210	64	64	2	2.5	476	657	90.3	1 300	1 800	**45326**	153	200	185	4	2	2	0.36	1.87	2.79	1.83	8.41
140	210	53	53	2	2.5	390	564	76.9	1 300	1 800	**45228**	159	200	188	4	2	2	0.27	2.47	3.67	2.41	6.45
	225	68	68	2.5	3	611	807	103	1 200	1 700	**45328**	160	213	210	4	2	2.5	0.40	1.68	2.50	1.64	10.0
150	225	56	56	2.5	3	445	686	91.6	1 200	1 600	**45230**	174	213	203	4	2	2.5	0.26	2.55	3.80	2.50	7.87
	250	80	80	2.5	3	684	955	120	1 100	1 500	**45330**	179	238	220	4	2	2.5	0.35	1.95	2.90	1.91	15.5
160	240	60	60	2.5	3	488	705	93.1	1 100	1 500	**45232**	184	228	217	5	2	2.5	0.24	2.79	4.15	2.73	9.22
	270	86	86	2.5	3	832	1 100	146	1 000	1 400	**45332**	193	258	237	4	2	2.5	0.35	1.95	2.90	1.91	19.8
170	260	67	67	2.5	3	654	956	124	1 000	1 400	**45234**	195	248	233	5	2	2.5	0.31	2.21	3.29	2.16	12.4
	280	88	88	2.5	3	834	1 210	145	970	1 300	**45334**	201	268	247	5	2	2.5	0.33	2.03	3.02	1.98	21.6
180	280	74	74	2.5	3	722	1 050	125	950	1 300	**45236**	208	268	250	5	2	2.5	0.28	2.43	3.61	2.37	16.8
	300	96	96	3	4	992	1 370	162	910	1 200	**45336**	210	286	263	5	2.5	3	0.35	1.95	2.90	1.91	26.5
190	290	75	75	2.5	3	751	1 130	133	900	1 200	**45238**	219	278	260	5	2	2.5	0.26	2.55	3.80	2.50	17.7
	320	104	104	3	4	1 130	1 590	183	840	1 100	**45338**	224	306	280	5	2.5	3	0.35	1.95	2.90	1.91	34.0
200	310	82	82	2.5	3	913	1 410	166	830	1 100	**45240**	234	298	280	5	2	2.5	0.26	2.55	3.80	2.50	22.9
	340	112	112	3	4	1 250	1 840	208	770	1 000	**45340**	244	326	300	5	2.5	3	0.35	1.95	2.90	1.91	41.9
220	340	90	90	3	4	933	1 460	167	740	990	**45244**	259	326	306	5	2.5	3	0.28	2.43	3.61	2.37	28.5

[Remark] Bearings not shown above (e.g. inch series) are shown in catalog "large size ball & roller bearings".

Double-row tapered roller bearings
TDI type
d (220) ~ (420) mm

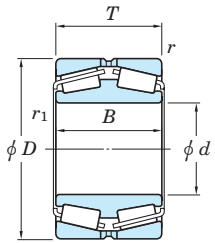


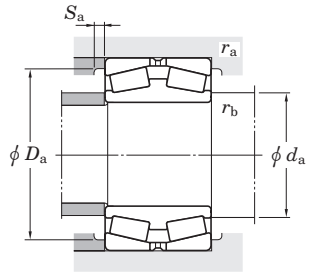


Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)						Constant	Axial load factors			(Refer.) Mass
d	D	B	T	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.		d_a max.	D_a max.	D_a min.	S_a min.	r_a max.	r_b max.	e	Y_2	Y_3	Y_0	(kg)
220	370	120	120	4	5	1 400	2 060	226	700	930	**45344**	263	352	324	5	3	4	0.35	1.95	2.90	1.91	50.8
230	350	90	90	3	4	991	1 560	177	710	950	**45246**	267	336	318	6	2.5	3	0.28	2.43	3.61	2.37	30.6
240	360	92	92	3	4	1 150	1 790	200	690	920	**45248**	271	346	325	5	2.5	3	0.32	2.12	3.15	2.07	32.2
	400	128	128	4	5	1 650	2 470	265	630	840	**45348**	286	382	354	5	3	4	0.35	1.95	2.90	1.91	65.4
260	400	104	104	4	5	1 320	2 120	227	610	810	**45252**	302	382	360	6	3	4	0.25	2.74	4.08	2.68	48.1
	440	144	144	4	5	2 180	3 440	357	560	750	**45352**	313	422	386	6	3	4	0.35	1.95	2.90	1.91	92.2
280	420	106	106	4	5	1 490	2 470	265	560	750	**45256**	321	402	370	6	3	4	0.25	2.69	4.00	2.63	51.9
	460	146	146	5	6	2 310	3 320	351	520	700	**45356**	323	438	409	6	4	5	0.39	1.74	2.59	1.70	93.1
300	460	118	118	4	5	1 870	3 150	325	500	670	**45260**	350	442	418	6	3	4	0.25	2.74	4.08	2.68	78.5
	500	160	160	5	6	2 670	4 240	431	470	630	**45360**	356	478	440	6	4	5	0.35	1.95	2.90	1.91	129
320	480	121	121	4	5	1 830	3 180	322	470	630	**45264**	368	462	434	6	3	4	0.26	2.55	3.80	2.50	77.8
	540	176	176	5	6	3 380	5 280	528	430	570	**45364R**	378	518	474	6	4	5	0.32	2.12	3.15	2.07	167
340	520	133	133	5	6	2 380	3 850	372	420	570	**45268**	398	498	464	6	4	5	0.26	2.55	3.80	2.50	104
	580	190	190	5	6	3 790	5 470	537	390	510	**45368**	401	558	515	6	4	5	0.32	2.12	3.15	2.07	202
360	540	134	134	5	6	2 370	3 910	393	400	540	**45272**	408	518	488	11	4	5	0.32	2.12	3.15	2.07	101
	600	192	192	5	6	4 230	6 750	648	360	490	**45372**	419	578	528	10	4	5	0.32	2.12	3.15	2.07	228
380	560	135	135	5	6	2 300	3 790	371	380	500	**45276**	428	538	510	6	4	5	0.27	2.47	3.67	2.41	112
	620	194	194	5	6	3 860	6 360	606	340	450	**45376**	445	598	545	6	4	5	0.32	2.12	3.15	2.07	234
400	600	148	148	5	6	3 020	4 960	478	340	450	**45280**	452	578	545	6	4	5	0.33	2.03	3.02	1.98	143
	650	200	200	6	6	4 840	7 810	735	320	420	**45380**	458	622	580	11	5	5	0.39	1.74	2.59	1.70	265
420	620	150	150	5	6	3 010	5 200	496	320	430	**45284**	475	598	564	6	4	5	0.33	2.03	3.02	1.98	152

[Remark] Bearings not shown above (e.g. inch series) are shown in catalog "large size ball & roller bearings".

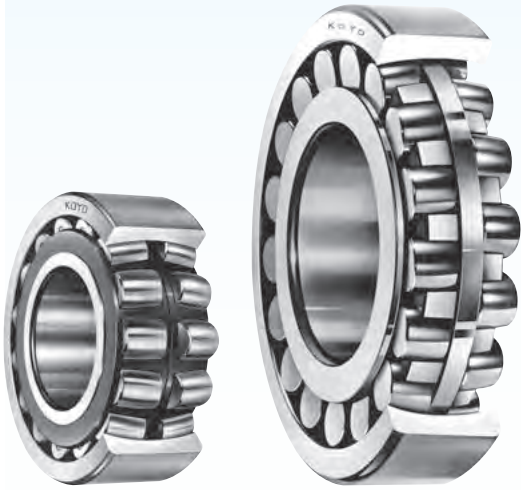
Double-row tapered roller bearings
TDI type
d (420) ~ 500 mm





Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.	Mounting dimensions (mm)						Con-stant	Axial load factors			(Refer.) Mass (kg)
d	D	B	T	r min.	r_1 min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.		d_a max.	D_a max.	D_a min.	S_a min.	r_a max.	r_b max.	e	Y_2	Y_3	Y_0	
420	700	224	224	6	6	5 430	8 380	777	280	380	**45384**	488	672	623	7	5	5	0.39	1.74	2.59	1.70	352
440	650	157	157	6	6	3 190	5 500	512	300	390	**45288**	500	622	592	10	5	5	0.28	2.43	3.61	2.37	182
	720	226	226	6	6	5 750	9 130	834	270	360	**45388**	506	692	642	7	5	5	0.39	1.74	2.59	1.70	367
460	680	163	163	6	6	3 480	5 660	531	280	370	**45292**	510	652	616	6	5	5	0.39	1.74	2.59	1.70	197
	760	240	240	7.5	7.5	6 570	10 400	927	250	330	**45392**	532	724	677	7	6	6	0.39	1.74	2.59	1.70	444
480	700	165	165	6	6	3 830	6 710	614	260	350	**45296**	531	672	625	6	5	5	0.40	1.68	2.50	1.64	215
500	720	167	167	6	6	4 300	7 350	681	250	330	**452/500**	545	692	645	8	5	5	0.39	1.74	2.59	1.70	222
	830	264	264	7.5	7.5	7 970	12 300	1110	210	280	**453/500**	587	794	729	7	6	6	0.33	2.03	3.02	1.98	586

[Remark] Bearings not shown above (e.g. inch series) are shown in catalog "large size ball & roller bearings".



Spherical roller bearings

Spherical roller bearings feature a large load rating capacity and self-aligning capability.

This type of bearing is suitable for low- or medium-speed applications which involve heavy or impact loading.

- These bearings are divided into R(RR), RZ and RHA types, which differ in internal structure. (refer to Table 1.)
- Each type can be produced with a cylindrical bore or tapered bore.

Bearings with a tapered bore can be fit and removed easily using an adapter assembly or withdrawal sleeve.

The rate of taper is equivalent among all bearing series.

240 and 241 series ... 1 : 30 (supplementary code "K30")

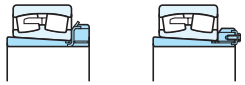
Others ... 1 : 12 (supplementary code "K")

Spherical roller bearings

Cylindrical bore Tapered bore

Bore diameter **25** – **500** mm

Adapter assemblies



Bore diameter **20** – **470** mm

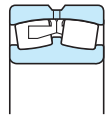
Withdrawal sleeves

Bore diameter **35** – **480** mm

Table 1 Spherical roller bearings : types and structures

Structure	 R, RR type	 RZ type	 RHA type
Roller	Convex asymmetrical roller	Convex symmetrical roller	Convex symmetrical roller
Cage	Copper alloy prong type machined cage	Pressed cage	Copper alloy integral type machined cage
Inner ring (with or without rib)	With center rib	Without center rib (guide ring)	Without center rib (guide ring)
	With ribs on both sides (to prevent rollers from falling)	Without ribs on both sides	With ribs on both sides (to prevent rollers from falling)
Characteristics	Excellent high-speed properties	Excellent high-speed properties Large load rating capacity Usable at high temperatures (up to 200°C)	Large load rating capacity

Spherical roller bearings for shaker screens



- These bearings consist of convex asymmetric rollers and a prong type, copper alloy, outer ring guided, machined cage. This cage possesses optimum characteristics for use with shaker screens.
- The bearings most commonly used with shaker screens are 223 series spherical roller bearings. They are identified by the supplementary code "ROVS W502." The outer ring outside diameter tolerance of these bearings is held to a small allowable variation.

■ Bearings with lubrication holes and a lubrication groove

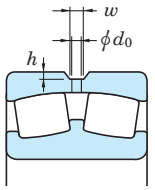
- Outer rings can be provided with lubrication holes, a lubrication groove and an anti-rotation pin hole. (Specifications are given in Table 4.)
- Inner rings can also be provided with lubrication holes and a lubrication groove.

Table 2 Supplementary codes for identification of bearings with lubrication holes, lubrication groove and anti-rotation pin hole (outer ring)

Supplementary code		Number of lubrication holes	Hole layout
With lubrication holes and lubrication groove	With lubrication holes, lubrication groove and anti-rotation pin hole		
W33	**W3N**	3[1)]	3 equally spaced positions[1)]
W33A	W3NA	4	4 equally spaced positions
–	W3NB	5	6 equally spaced positions[2)]
W33C	W3NC	6	6 equally spaced positions
–	W3ND	7	8 equally spaced positions[2)]
W33T	–	8	8 equally spaced positions

Table 3 Supplementary codes for identification of bearings with lubrication holes and/or lubrication groove

Supplementary code	Inner ring		Outer ring	
	Number of lubrication holes	Lubrication groove	Number of lubrication holes	Lubrication groove
W513	3	–	3	○
W518	3	–	3	–
W26	3	–	–	–



[Notes] 1) Also 4 or 6 holes are provided in smaller size bearings, consult with JTEKT.
2) One hole is used for the antirotation pin.
[Remark] Boldfaced codes indicate JTEKT standards.

Table 4 (1) Lubrication hole and lubrication groove dimensions Unit : mm

Bore diameter number	Nominal bore diameter d	239			230			240			231			241			222			232			213			223		
		d_0	w	h	d_0	w	h	d_0	w	h	d_0	w	h	d_0	w	h	d_0	w	h	d_0	w	h	d_0	w	h	d_0	w	h
5	25	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	4	0.7	–	–	–	–	–	–	–	–	–
6	30	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	4	0.7	–	–	–	3	4	0.7	–	–	–
7	35	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	4	0.8	–	–	–	3	4	0.7	3	4	1
8	40	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	4	0.8	–	–	–	3	4	0.7	4	5	1
9	45	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	4	0.8	–	–	–	3	4	0.7	4	6	1
10	50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	4	0.8	–	–	–	3	4	0.7	4	6	1
11	55	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	4	0.8	–	–	–	3	4	0.7	4	6	1.1
12	60	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	4	1	–	–	–	3	4	1	4	6	1.1
13	65	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	4	1	–	–	–	3	4	1	4	6	1.2
14	70	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	4	1	–	–	–	3	4	1	5	7	1.3
15	75	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	4	1	–	–	–	3	4	1	5	7	1.3
16	80	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	4	1	4	6	1.2	4	6	1	5	7	1.3
17	85	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4	5	1	4	6	1.2	4	6	1.2	6	8	1.3
18	90	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4	5	1	5	8	1.2	4	6	1.2	6	8	1.3
19	95	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	5	6	1.2	5	8	1.2	4	6	1.2	6	8	2
20	100	–	–	–	4	5	1	–	–	–	5	6	1.4	–	–	–	5	6	1.2	5	8	1.2	4	6	1.2	6	8	2
22	110	–	–	–	5	7	1	–	–	–	5	6	1.4	6	8	1.5	5	7	1.5	6	8	1.7	4	6	1.2	6	8	2
24	120	–	–	–	5	7	1	5	6	1.4	5	6	1.4	6	8	1.5	5	7	1.5	6	10	1.7	–	–	–	8	10	2.5
26	130	–	–	–	5	7	1.2	6	8	1.5	5	6	1.5	6	8	1.5	5	7	1.5	6	10	1.7	–	–	–	8	12	2.5
28	140	4	5	1	5	7	1.2	6	8	1.5	6	8	1.5	8	10	2	6	8	1.8	8	10	2.5	–	–	–	12	14	3
30	150	5	7	1	5	8	1.2	6	8	1.5	6	10	1.5	8	10	2	6	10	1.8	8	10	2.5	–	–	–	12	14	3
32	160	5	7	1.2	5	8	1.2	6	8	1.5	8	12	2	10	12	2	10	12	2.5	10	12	2.5	–	–	–	12	14	3
34	170	5	7	1.2	6	10	1.5	8	10	2	8	12	2	10	12	2	12	14	3	10	12	2.5	–	–	–	12	14	3
36	180	6	7	1.3	8	12	1.5	10	12	2.5	10	12	2.5	10	12	2	12	14	3	10	12	2.5	–	–	–	14	16.5	4
38	190	5	7	1.2	10	12	2.5	10	12	2.5	10	12	2.5	10	12	2	12	14	3	12	14	3	–	–	–	14	16.5	4
40	200	6	8	1.5	10	12	2.5	10	12	2.5	12	14	3	12	14	3	12	14	3	12	14	3	–	–	–	14	16.5	4
44	220	6	8	1.5	10	12	2.5	10	12	2.5	12	14	3	12	14	3	12	14	3	12	14	3	–	–	–	14	16.5	4
48	240	6	8	1.5	10	12	2.5	10	12	2.5	12	14	3	12	14	3	14	16.5	4	14	16.5	4	–	–	–	14	16.5	4
52	260	10	12	2.5	12	14	3	12	14	3	12	14	3	12	14	3	14	16.5	4	14	16.5	4	–	–	–	14	16.5	4
56	280	10	12	2.5	12	14	3	12	14	3	12	14	3	12	14	3	14	16.5	4	14	16.5	4	–	–	–	14	16.5	4
60	300	10	12	2.5	12	14	3	12	14	3	12	14	3	12	14	3	14	16.5	4	14	16.5	4	–	–	–	14	16.5	4
64	320	10	12	2.5	12	14	3	12	14	3	14	16.5	4	14	16.5	4	14	16.5	4	14	16.5	4	–	–	–	14	16.5	4
68	340	12	14	3	14	16.5	4	14	16.5	3	14	16.5	4	14	16.5	4	14	16.5	4	14	16.5	4	–	–	–	14	16.5	4
72	360	12	14	3	14	16.5	4	14	16.5	3	14	16.5	4	14	16.5	4	14	16.5	4	14	16.5	4	–	–	–	14	16.5	4

Table 4 (2) Lubrication hole and lubrication groove dimensions Unit : mm

Bore diameter number	Nominal bore diameter d	239			230			240			231			241			222			232			213			223		
		d_0	w	h	d_0	w	h	d_0	w	h	d_0	w	h	d_0	w	h	d_0	w	h	d_0	w	h	d_0	w	h	d_0	w	h
76	380	12	14	3	14	16.5	4	14	16.5	3	14	16.5	4	14	16.5	4	–	–	–	14	16.5	4	–	–	–	–	–	–
80	400	12	14	3	14	16.5	4	14	16.5	4	14	16.5	4	14	16.5	4	–	–	–	14	16.5	4	–	–	–	–	–	–
84	420	12	14	3	14	16.5	4	14	16.5	4	14	16.5	4	14	16.5	4	–	–	–	14	16.5	4	–	–	–	–	–	–
88	440	14	16.5	4	14	16.5	4	14	16.5	4	14	16.5	4	14	16.5	4	–	–	–	14	16.5	4	–	–	–	–	–	–
92	460	14	16.5	4	14	16.5	4	14	16.5	4	14	16.5	4	14	16.5	4	–	–	–	14	16.5	4	–	–	–	–	–	–
96	480	14	16.5	4	14	16.5	4	14	16.5	4	14	16.5	4	14	16.5	4	–	–	–	14	16.5	4	–	–	–	–	–	–
/500	500	14	16.5	4	14	16.5	4	14	16.5	4	14	16.5	4	14	16.5	5	–	–	–	14	16.5	4	–	–	–	–	–	–

Boundary dimensions	As specified in JIS B 1512.
Tolerances	As specified in JIS B 1514-1, class 0. (refer to Table 7-3 on pp. A 60 – A 63.) Refer to Table 7-11 on p. A 76 for the tolerance of tapered bores.
Radial internal clearance	As specified in JIS B 1520. (refer to Table 10-9 on p. A 108.)
Recommended fits	Refer to Table 9-4 on pp. A 91, 92.
Standard cages	Refer to Table 5.
Allowable aligning angle	Refer to Table 5. (varies depending on bearing series.)
Equivalent radial load	Dynamic equivalent radial load $\left(\text{When } \frac{F_a}{F_r} \leqq e\right) \quad P_r = F_r + Y_1 F_a \qquad \left(\text{When } \frac{F_a}{F_r} > e\right) \quad P_r = 0.67 F_r + Y_2 F_a$ Static equivalent radial load $P_{0r} = F_r + Y_0 F_a$ [Note] Refer to the specification table for the values of axial load factors Y_1, Y_2 and Y_0 and of constant e.

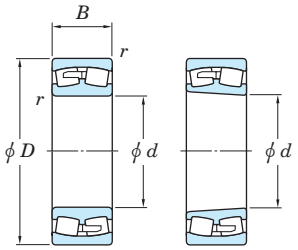
[Remark] If the ratio of axial load to radial load exceeds the value e given in the specification table ($F_a / F_r > e$), slippage occurs between rollers in rows that are not axial-loaded and the raceway.
This may cause smearing, especially when the bearing is large. Consult with JTEKT on the use of bearings under such conditions.

Table 5 Application of standard cages and allowable aligning angle

Bearing series	Standard cages		Allowable aligning angle
	Pressed cage	Machined cage	
239 R	——	23930R – 239/500R	0.026 rad (1.5°)
230 R	——	23038R – 230/500R	0.026 rad (1.5°)
RZ	23020RZ – 23036RZ	——	
RHA	——	23038RHA – 23096RHA	
240 R(RR)	——	24036RR – 240/500R	0.035 rad (2°)
RZ	24022RZ – 24034RZ	——	
RHA	——	24038RHA – 24096RHA	
231 R	——	23136R – 231/500R	0.026 rad (1.5°)
RZ	23120RZ – 23134RZ	——	
RHA	——	23136RHA – 23196RHA	
241 R(RR)	——	24132RR – 241/500R	0.044 rad (2.5°)
RZ	24122RZ – 24130RZ	——	
RHA	——	24136RHA – 24196RHA	
222 R(RR)	——	22232RR – 22272R	0.026 rad (1.5°)
RZ	22205RZ – 22230RZ	——	
RHA	——	22232RHA – 22260RHA	
232 R	——	23232R – 232/500R	0.044 rad (2.5°)
RZ	23216RZ – 23230RZ	——	
RHA	——	23232RHA – 23296RHA	
213 R	——	——	0.017 rad (1°)
RZ	21306RZ – 21322RZ	——	
223 R(RR)	——	22330R – 22360R	0.035 rad (2°)
RZ	22308RZ – 22326RZ	——	
RHA	——	22330RHA – 22356RHA	

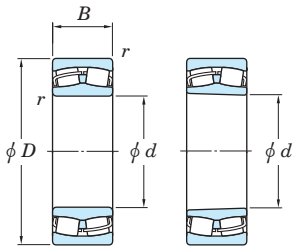
d 25 ~ 70 mm

R, RR



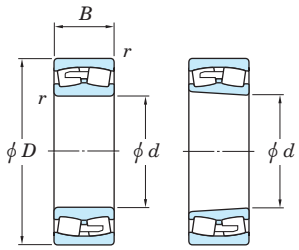
Cylindrical bore | Tapered bore

RZ

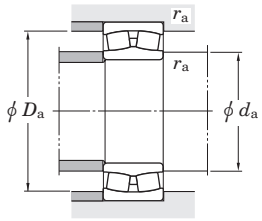


Cylindrical bore | Tapered bore

RHA



Cylindrical bore | Tapered bore

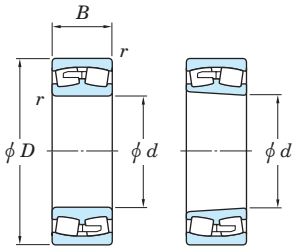


Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Mounting dimensions (mm)					Con-stant	Axial load factors			(Refer.) Mass (kg)	
d	D	B	r min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Cylindrical bore	Tapered bore	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
25	52	18	1	56.8	48.1	3.90	9 600	12 800	**22205RZ**	**22205RZK**	31	31	46	46	1	0.35	1.91	2.85	1.87	0.188	0.184
30	62	20	1	76.6	65.9	5.30	8 100	10 900	**22206RZ**	**22206RZK**	36	36.5	56	55.5	1	0.33	2.04	3.04	2.00	0.296	0.290
	72	19	1.1	74.2	62.7	4.80	7 200	9 600	**21306RZ**	**21306RZK**	37	41.5	65	61.5	1	0.27	2.49	3.71	2.43	0.430	0.424
35	72	23	1.1	100	88.7	7.75	6 900	9 200	**22207RZ**	**22207RZK**	42	42.5	65	64	1	0.32	2.09	3.11	2.04	0.459	0.449
	80	21	1.5	86.8	75.8	5.90	6 200	8 300	**21307RZ**	**21307RZK**	43.5	46.5	71.5	68.5	1.5	0.27	2.49	3.71	2.43	0.572	0.564
40	80	23	1.1	114	102	9.55	6 200	8 300	**22208RZ**	**22208RZK**	47	49	73	72.5	1	0.28	2.37	3.53	2.32	0.602	0.591
	90	23	1.5	105	95.5	7.55	5 600	7 600	**21308RZ**	**21308RZK**	48.5	53.5	81.5	77	1.5	0.26	2.55	3.80	2.50	0.781	0.770
	90	33	1.5	170	152	11.8	5 600	7 600	**22308RZ**	**22308RZK**	48.5	51	81.5	78.5	1.5	0.37	1.83	2.72	1.79	1.08	1.06
45	85	23	1.1	119	110	10.2	5 800	7 700	**22209RZ**	**22209RZK**	52	53.5	78	77.5	1	0.26	2.55	3.80	2.50	0.602	0.590
	100	25	1.5	132	124	9.95	5 000	6 700	**21309RZ**	**21309RZK**	53.5	60	91.5	86	1.5	0.26	2.62	3.90	2.56	1.05	1.04
	100	36	1.5	208	183	13.8	5 100	6 700	**22309RZ**	**22309RZK**	53.5	55.5	91.5	87	1.5	0.37	1.83	2.72	1.79	1.42	1.39
50	90	23	1.1	128	122	12.7	5 400	7 200	**22210RZ**	**22210RZK**	57	58.5	83	82.5	1	0.24	2.79	4.15	2.73	0.648	0.634
	110	27	2	157	151	12.0	4 500	6 100	**21310RZ**	**21310RZK**	60	67	100	94.5	2	0.25	2.71	4.04	2.65	1.37	1.35
	110	40	2	255	237	17.5	4 500	6 200	**22310RZ**	**22310RZK**	60	62.5	100	95.5	2	0.36	1.85	2.76	1.81	1.92	1.88
55	100	25	1.5	154	144	15.0	4 700	6 300	**22211RZ**	**22211RZK**	63.5	64	91.5	91.5	1.5	0.24	2.84	4.23	2.78	0.867	0.849
	120	29	2	180	165	13.0	4 100	5 600	**21311RZ**	**21311RZK**	65	71.5	110	101.5	2	0.25	2.71	4.03	2.65	1.69	1.67
	120	43	2	296	264	21.1	4 100	5 500	**22311RZ**	**22311RZK**	65	66	110	104	2	0.36	1.85	2.76	1.81	2.40	2.35
60	110	28	1.5	190	181	18.7	4 300	5 800	**22212RZ**	**22212RZK**	68.5	70	101.5	100	1.5	0.25	2.74	4.08	2.68	1.19	1.17
	130	31	2.1	210	193	15.1	3 900	5 100	**21312RZ**	**21312RZK**	72	77.5	118	110	2	0.24	2.78	4.14	2.72	2.11	2.08
	130	46	2.1	354	334	24.9	3 900	5 100	**22312RZ**	**22312RZK**	72	73.5	118	113	2	0.36	1.86	2.77	1.82	3.06	2.99
65	120	31	1.5	222	211	20.7	4 000	5 200	**22213RZ**	**22213RZK**	73.5	76	111.5	109	1.5	0.25	2.69	4.00	2.63	1.55	1.52
	140	33	2.1	242	232	19.8	3 600	4 700	**21313RZ**	**21313RZK**	77	85.5	128	119	2	0.24	2.83	4.21	2.76	2.62	2.58
	140	48	2.1	382	360	30.8	3 600	4 700	**22313RZ**	**22313RZK**	77	79.5	128	122	2	0.34	1.98	2.94	1.93	3.66	3.58
70	125	31	1.5	233	222	24.4	3 700	5 000	**22214RZ**	**22214RZK**	78.5	80	116.5	114	1.5	0.24	2.87	4.27	2.80	1.64	1.61
	150	35	2.1	268	260	21.6	3 300	4 400	**21314RZ**	**21314RZK**	82	91	138	126.5	2	0.24	2.84	4.23	2.78	3.19	3.15
	150	51	2.1	435	413	35.0	3 300	4 400	**22314RZ**	**22314RZK**	82	85.5	138	131	2	0.34	1.98	2.94	1.93	4.45	4.36

[Remark] Standard cage types used for the above bearings are shown in Table 5 earlier in this section.

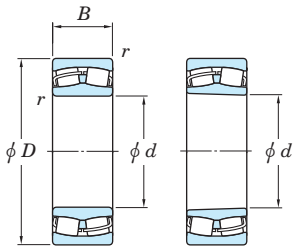
d 75 ~ (110) mm

R, RR



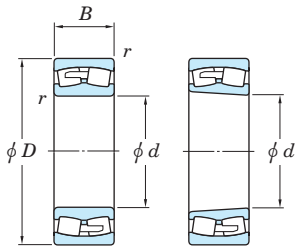
Cylindrical bore | Tapered bore

RZ

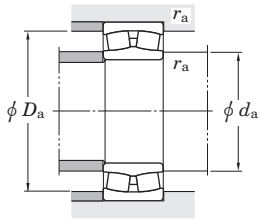


Cylindrical bore | Tapered bore

RHA



Cylindrical bore | Tapered bore

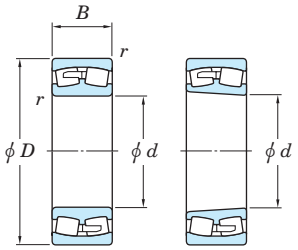


Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Mounting dimensions (mm)					Con-stant	Axial load factors			(Refer.) Mass (kg)	
d	D	B	r min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Cylindrical bore	Tapered bore	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
75	130	31	1.5	241	236	28.2	3 600	4 700	**22215RZ**	**22215RZK**	83.5	85.5	121.5	119	1.5	0.22	3.07	4.57	3.00	1.73	1.69
	160	37	2.1	306	298	24.3	3 000	4 100	**21315RZ**	**21315RZK**	87	98	148	138	2	0.24	2.87	4.27	2.80	3.81	3.76
	160	55	2.1	492	473	38.4	3 000	4 100	**22315RZ**	**22315RZK**	87	91	148	139.5	2	0.35	1.95	2.90	1.91	5.45	5.33
80	140	33	2	271	271	30.5	3 300	4 400	**22216RZ**	**22216RZK**	90	92	130	128	2	0.22	3.07	4.57	3.00	2.17	2.13
	140	44.4	2	305	342	31.2	3 300	4 400	**23216RZ**	**23216RZK**	90	93	130	124	2	0.29	2.35	3.50	2.30	2.95	2.86
	170	39	2.1	344	339	27.5	2 900	3 900	**21316RZ**	**21316RZK**	92	104	158	146	2	0.23	2.88	4.29	2.82	4.53	4.47
	170	58	2.1	539	521	41.7	2 900	3 900	**22316RZ**	**22316RZK**	92	97	158	148	2	0.35	1.95	2.90	1.91	6.44	6.30
85	150	36	2	322	324	35.7	3 000	4 100	**22217RZ**	**22217RZK**	95	97	140	137	2	0.22	3.01	4.48	2.94	2.75	2.69
	150	49.2	2	358	410	36.2	3 000	4 100	**23217RZ**	**23217RZK**	95	99	140	134	2	0.30	2.25	3.34	2.20	3.78	3.67
	180	41	3	374	372	29.6	2 800	3 600	**21317RZ**	**21317RZK**	99	109	166	154	2.5	0.23	2.89	4.33	2.83	5.32	5.25
	180	60	3	601	586	47.8	2 800	3 600	**22317RZ**	**22317RZK**	99	103	166	157	2.5	0.33	2.02	3.00	1.97	7.47	7.31
90	160	40	2	372	381	39.2	2 900	3 900	**22218RZ**	**22218RZK**	100	104	150	145	2	0.24	2.79	4.15	2.73	3.50	3.43
	160	52.4	2	421	482	42.9	2 900	3 900	**23218RZ**	**23218RZK**	100	103	150	141	2	0.32	2.14	3.19	2.09	4.63	4.50
	190	43	3	413	416	32.9	2 600	3 400	**21318RZ**	**21318RZK**	104	116	176	162	2.5	0.23	2.91	4.30	2.84	6.20	6.11
	190	64	3	672	662	50.5	2 600	3 400	**22318RZ**	**22318RZK**	104	108	176	166	2.5	0.34	2.00	2.98	1.96	8.82	8.63
95	170	43	2.1	417	422	42.7	2 800	3 600	**22219RZ**	**22219RZK**	107	109	158	154	2	0.24	2.76	4.11	2.70	4.24	4.15
	170	55.6	2.1	457	516	43.9	2 800	3 600	**23219RZ**	**23219RZK**	107	110	158	150	2	0.30	2.25	3.34	2.20	5.50	5.35
	200	45	3	452	461	36.3	2 500	3 200	**21319RZ**	**21319RZK**	109	123	186	171	2.5	0.23	2.92	4.35	2.86	7.16	7.06
	200	67	3	733	726	55.6	2 500	3 200	**22319RZ**	**22319RZK**	109	114	186	174	2.5	0.33	2.02	3.00	1.97	10.2	9.98
100	150	37	1.5	262	332	33.7	2 900	3 900	**23020RZ**	**23020RZK**	109	110	141	138	1.5	0.22	3.01	4.48	2.94	2.34	2.27
	165	52	2	412	510	48.5	2 800	3 600	**23120RZ**	**23120RZK**	110	114	155	147	2	0.29	2.33	3.47	2.28	4.52	4.38
	180	46	2.1	470	481	47.6	2 600	3 400	**22220RZ**	**22220RZK**	112	115	168	163	2	0.25	2.74	4.08	2.68	5.11	5.00
	180	60.3	2.1	533	629	53.5	2 600	3 400	**23220RZ**	**23220RZK**	112	116	168	157	2	0.32	2.09	3.11	2.04	6.85	6.66
	215	47	3	519	524	40.2	2 200	3 000	**21320RZ**	**21320RZK**	114	131	201	184	2.5	0.22	3.02	4.49	2.95	8.79	8.68
	215	73	3	875	877	63.9	2 200	3 000	**22320RZ**	**22320RZK**	114	121	201	187	2.5	0.35	1.95	2.90	1.91	13.2	12.9
110	170	45	2	377	486	48.4	2 600	3 400	**23022RZ**	**23022RZK**	120	123	160	156	2	0.24	2.84	4.23	2.78	3.85	3.74

[Remark] Standard cage types used for the above bearings are shown in Table 5 earlier in this section.

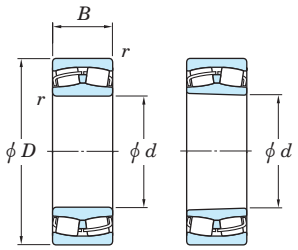
d (110) ~ 140 mm

R, RR



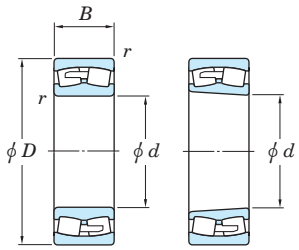
Cylindrical bore | Tapered bore

RZ

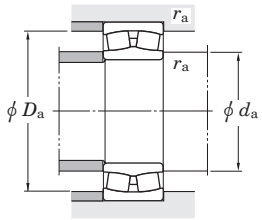


Cylindrical bore | Tapered bore

RHA



Cylindrical bore | Tapered bore

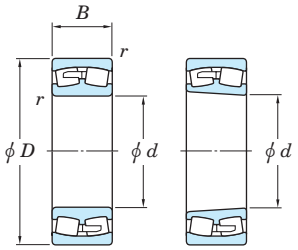


Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Mounting dimensions (mm)					Con-stant	Axial load factors			(Refer.) Mass (kg)	
d	D	B	r min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Cylindrical bore	Tapered bore	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
110	170	60	2	472	647	58.6	2 600	3 600	**24022RZ**	**24022RZK30**	120	120	160	151	2	0.32	2.08	3.10	2.04	5.07	4.99
	180	56	2	484	605	53.7	2 500	3 300	**23122RZ**	**23122RZK**	120	125	170	161	2	0.29	2.36	3.51	2.31	5.72	5.54
	180	69	2	569	778	63.4	2 500	3 300	**24122RZ**	**24122RZK30**	120	120	170	154	2	0.37	1.84	2.74	1.80	6.98	6.87
	200	53	2.1	612	642	58.7	2 300	3 000	**22222RZ**	**22222RZK**	122	127	188	180	2	0.26	2.64	3.93	2.58	7.37	7.21
	200	69.8	2.1	672	792	65.4	2 300	3 000	**23222RZ**	**23222RZK**	122	127	188	173	2	0.34	1.99	2.96	1.94	9.76	9.48
	240	50	3	604	616	46.0	1 900	2 600	**21322RZ**	**21322RZK**	124	147	226	205	2.5	0.21	3.19	4.75	3.12	11.8	11.7
	240	80	3	1 040	1 040	77.7	1 900	2 600	**22322RZ**	**22322RZK**	124	136	226	208	2.5	0.33	2.03	3.02	1.98	18.1	17.7
120	180	46	2	394	524	51.6	2 300	3 200	**23024RZ**	**23024RZK**	130	132	170	165	2	0.23	2.95	4.40	2.89	4.20	4.07
	180	60	2	484	709	61.8	2 300	3 200	**24024RZ**	**24024RZK30**	130	130	170	160	2	0.30	2.23	3.32	2.18	5.43	5.34
	200	62	2	571	714	61.2	2 200	3 000	**23124RZ**	**23124RZK**	130	137	190	176	2	0.29	2.34	3.49	2.29	7.98	7.74
	200	80	2	733	1 020	78.6	2 200	3 000	**24124RZ**	**24124RZK30**	130	133	190	172	2	0.38	1.75	2.61	1.72	10.2	10.0
	215	58	2.1	706	764	67.2	2 100	2 800	**22224RZ**	**22224RZK**	132	138	203	193	2	0.26	2.60	3.87	2.54	9.31	9.10
	215	76	2.1	772	956	78.9	2 100	2 900	**23224RZ**	**23224RZK**	132	139	203	185	2	0.34	1.97	2.94	1.93	12.2	11.8
	260	86	3	1 120	1 130	87.2	1 800	2 500	**22324RZ**	**22324RZK**	134	149	246	228	2.5	0.33	2.03	3.02	1.98	22.8	22.3
130	200	52	2	509	674	63.6	2 200	2 900	**23026RZ**	**23026RZK**	140	145	190	182	2	0.24	2.87	4.27	2.80	6.15	5.97
	200	69	2	625	914	77.3	2 200	2 900	**24026RZ**	**24026RZK30**	140	143	190	177	2	0.32	2.14	3.18	2.09	8.03	7.90
	210	64	2	621	799	68.4	2 100	2 800	**23126RZ**	**23126RZK**	140	147	200	187	2	0.28	2.42	3.61	2.37	8.71	8.44
	210	80	2	754	1 080	91.8	2 100	2 800	**24126RZ**	**24126RZK30**	140	145	200	184	2	0.36	1.90	2.83	1.86	10.8	10.6
	230	64	3	821	914	74.4	1 900	2 600	**22226RZ**	**22226RZK**	144	148	216	206	2.5	0.26	2.55	3.80	2.50	11.6	11.3
	230	80	3	880	1 090	89.4	1 900	2 600	**23226RZ**	**23226RZK**	144	151	216	201	2.5	0.33	2.05	3.05	2.00	14.4	14.0
	280	93	4	1 310	1 340	98.6	1 700	2 200	**22326RZ**	**22326RZK**	148	160	262	245	3	0.33	2.03	3.02	1.98	28.5	27.9
140	210	53	2	530	723	67.9	2 100	2 800	**23028RZ**	**23028RZK**	150	155	200	192	2	0.23	2.98	4.44	2.92	6.62	6.42
	210	69	2	640	957	81.7	2 100	2 800	**24028RZ**	**24028RZK30**	150	153	200	188	2	0.30	2.28	3.39	2.23	8.49	8.35
	225	68	2.1	710	940	79.6	1 900	2 600	**23128RZ**	**23128RZK**	152	158	213	201	2	0.28	2.45	3.65	2.40	10.6	10.3
	225	85	2.1	853	1 170	90.7	1 900	2 600	**24128RZ**	**24128RZK30**	152	153	213	194	2	0.36	1.89	2.82	1.85	13.1	12.9
	250	68	3	947	1 030	85.2	1 800	2 300	**22228RZ**	**22228RZK**	154	158	236	224	2.5	0.26	2.60	3.87	2.54	14.5	14.2
	250	88	3	1 020	1 290	103	1 800	2 300	**23228RZ**	**23228RZK**	154	161	236	214	2.5	0.34	1.99	2.96	1.95	19.0	18.4
	300	102	4	1 470	1 570	105	1 500	2 100	**22328RZ**	**22328RZK**	158	172	282	255	3	0.35	1.95	2.90	1.90	35.7	34.9

[Remark] Standard cage types used for the above bearings are shown in Table 5 earlier in this section.

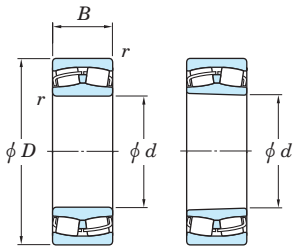
d 150 ~ (170) mm

R, RR



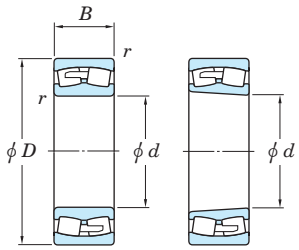
Cylindrical bore | Tapered bore

RZ

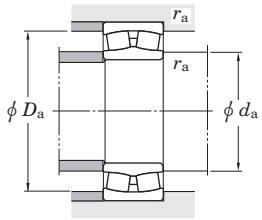


Cylindrical bore | Tapered bore

RHA



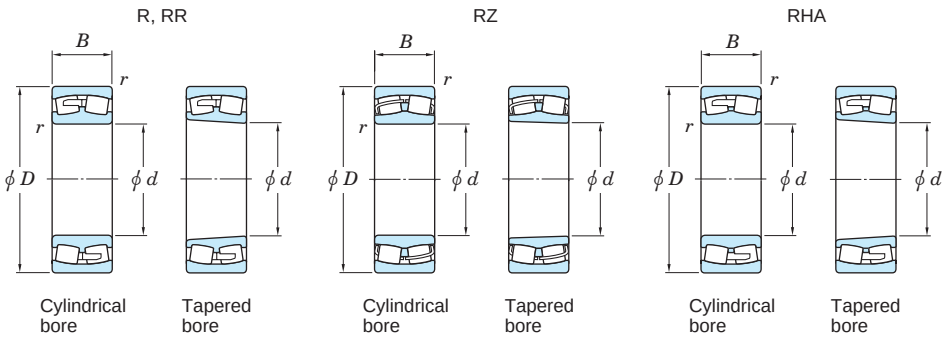
Cylindrical bore | Tapered bore

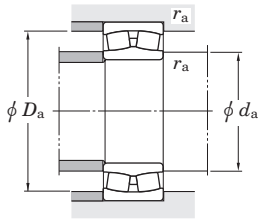


Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Mounting dimensions (mm)					Constant	Axial load factors			(Refer.) Mass (kg)	
d	D	B	r min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Cylindrical bore	Tapered bore	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
150	210	45	2	418	622	62.5	1 600	2 100	**23930R**	**23930RK**	160	170	200	195	2	0.20	3.44	5.12	3.36	5.09	4.93
	225	56	2.1	579	797	76.3	1 900	2 500	**23030RZ**	**23030RZK**	162	166	213	205	2	0.22	3.04	4.53	2.97	8.01	7.77
	225	75	2.1	724	1 100	90.3	1 900	2 500	**24030RZ**	**24030RZK**	162	163	213	199	2	0.30	2.23	3.32	2.18	10.6	10.4
	250	80	2.1	902	1 230	102	1 800	2 300	**23130RZ**	**23130RZK**	162	171	238	216	2	0.30	2.24	3.34	2.19	16.4	15.9
	250	100	2.1	1 110	1 590	116	1 800	2 300	**24130RZ**	**24130RZK**	162	166	238	213	2	0.38	1.77	2.64	1.73	19.9	19.6
	270	73	3	1 080	1 200	102	1 700	2 200	**22230RZ**	**22230RZK**	164	172	256	243	2.5	0.25	2.69	4.00	2.63	18.9	18.5
	270	96	3	1 200	1 540	121	1 700	2 200	**23230RZ**	**23230RZK**	164	173	256	230	2.5	0.34	1.96	2.93	1.92	24.5	23.8
	320	108	4	1 540	1 600	175	1 200	1 500	**22330R**	**22330RK**	168	195	302	273	3	0.38	1.78	2.64	1.74	43.6	42.7
	320	108	4	1 620	1 740	121	1 200	1 500	**22330RHA**	**22330RHAK**	168	196	302	273	3	0.35	1.93	2.87	1.88	40.3	39.4
160	220	45	2	426	649	65.4	1 500	2 000	**23932R**	**23932RK**	170	179	210	204	2	0.19	3.60	5.37	3.52	5.37	5.20
	240	60	2.1	667	924	86.0	1 800	2 300	**23032RZ**	**23032RZK**	172	177	228	219	2	0.22	3.01	4.48	2.94	9.74	9.44
	240	80	2.1	829	1 270	103	1 800	2 300	**24032RZ**	**24032RZK30**	172	175	228	215	2	0.30	2.24	3.34	2.19	12.9	12.7
	270	86	2.1	1 070	1 430	117	1 700	2 200	**23132RZ**	**23132RZK**	172	182	258	234	2	0.30	2.22	3.30	2.17	20.8	20.2
	270	109	2.1	1 270	1 720	145	1 300	1 700	**24132RR**	**24132RRK30**	172	188	258	230	2	0.39	1.72	2.56	1.68	25.9	25.5
	290	80	3	1 110	1 270	127	1 200	1 600	**22232R**	**22232RK**	174	199	276	257	2.5	0.28	2.40	3.57	2.35	23.4	22.9
	290	80	3	1 120	1 320	97.1	1 200	1 600	**22232RHA**	**22232RHAK**	174	200	276	257	2.5	0.27	2.49	3.71	2.44	21.9	21.4
	290	104	3	1 290	1 650	163	1 200	1 600	**23232R**	**23232RK**	174	194	276	245	2.5	0.38	1.79	2.66	1.75	31.0	30.1
	290	104	3	1 370	1 780	139	1 200	1 600	**23232RHA**	**23232RHAK**	174	193	276	245	2.5	0.36	1.87	2.78	1.83	29.4	28.5
	340	114	4	1 720	1 790	188	1 100	1 400	**22332R**	**22332RK**	178	207	322	290	3	0.38	1.76	2.62	1.72	51.9	51.0
	340	114	4	1 780	1 940	135	1 100	1 400	**22332RHA**	**22332RHAK**	178	210	322	290	3	0.35	1.94	2.89	1.90	48.0	47.1
170	230	45	2	441	691	69.6	1 400	1 900	**23934R**	**23934RK**	180	189	220	214	2	0.18	3.78	5.63	3.70	5.67	5.49
	260	67	2.1	795	1 090	97.9	1 700	2 200	**23034RZ**	**23034RZK**	182	189	248	236	2	0.23	2.90	4.31	2.83	13.2	12.8
	260	90	2.1	1 010	1 540	120	1 700	2 200	**24034RZ**	**24034RZK30**	182	184	248	227	2	0.32	2.11	3.15	2.07	17.5	17.2
	280	88	2.1	1 150	1 550	124	1 500	2 100	**23134RZ**	**23134RZK**	182	194	268	249	2	0.29	2.30	3.43	2.25	21.9	21.2
	280	109	2.1	1 320	1 820	154	1 200	1 600	**24134RR**	**24134RRK30**	182	198	268	241	2	0.37	1.80	2.68	1.76	27.2	26.8
	310	86	4	1 190	1 390	141	1 100	1 500	**22234R**	**22234RK**	188	212	292	271	3	0.29	2.29	3.41	2.24	29.0	28.4
	310	86	4	1 260	1 490	109	1 100	1 500	**22234RHA**	**22234RHAK**	188	210	292	271	3	0.28	2.45	3.64	2.39	27.1	26.5
	310	110	4	1 560	1 920	127	1 100	1 500	**23234RR**	**23234RRK**	188	209	292	268	3	0.37	1.85	2.75	1.80	37.2	36.1
	310	110	4	1 520	1 940	147	1 100	1 500	**23234RHA**	**23234RHAK**	188	207	292	261	3	0.36	1.89	2.82	1.85	35.6	34.6

[Remark] Standard cage types used for the above bearings are shown in Table 5 earlier in this section.

d (170) ~ (190) mm



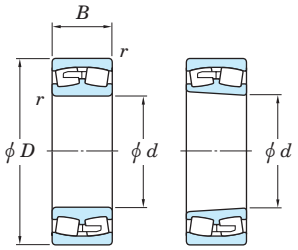


Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Mounting dimensions (mm)					Con-stant	Axial load factors			(Refer.) Mass (kg)	
d	D	B	r min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Cylindrical bore	Tapered bore	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
170	360	120	4	1 830	1 920	206	1 000	1 300	**22334R**	**22334RK**	188	221	342	307	3	0.38	1.77	2.64	1.73	62.0	60.8
	360	120	4	1 990	2 200	150	1 000	1 300	**22334RHA**	**22334RHAK**	188	222	342	307	3	0.35	1.95	2.91	1.91	57.3	56.1
180	250	52	2	599	939	88.9	1 300	1 700	**23936R**	**23936RK**	190	203	240	232	2	0.19	3.55	5.29	3.48	8.22	7.97
	280	74	2.1	966	1 330	118	1 500	1 900	**23036RZ**	**23036RZK**	192	202	268	253	2	0.24	2.84	4.23	2.78	17.4	16.9
	280	100	2.1	1 170	1 710	138	1 200	1 600	**24036RR**	**24036RRK30**	192	206	268	246	2	0.34	2.00	2.98	1.96	23.4	23.0
	300	96	3	1 260	1 800	165	1 100	1 500	**23136R**	**23136RK**	194	214	286	259	2.5	0.33	2.04	3.04	2.00	28.4	27.5
	300	96	3	1 330	1 790	139	1 100	1 500	**23136RHA**	**23136RHAK**	194	215	286	265	2.5	0.31	2.19	3.25	2.14	26.5	25.6
	300	118	3	1 530	2 120	176	1 100	1 500	**24136RR**	**24136RRK30**	194	211	286	258	2.5	0.38	1.78	2.65	1.74	34.4	33.9
	300	118	3	1 510	2 240	155	1 100	1 500	**24136RHA**	**24136RHAK30**	194	207	286	255	2.5	0.38	1.79	2.66	1.75	31.8	31.2
	320	86	4	1 220	1 450	165	1 100	1 400	**22236R**	**22236RK**	198	222	302	281	3	0.28	2.37	3.53	2.32	30.5	29.8
	320	86	4	1 320	1 610	118	1 100	1 400	**22236RHA**	**22236RHAK**	198	221	302	281	3	0.26	2.55	3.80	2.50	28.5	27.8
	320	112	4	1 640	2 100	134	1 100	1 400	**23236RR**	**23236RRK**	198	219	302	279	3	0.36	1.87	2.78	1.83	39.8	38.6
	320	112	4	1 660	2 170	166	1 100	1 400	**23236RHA**	**23236RHAK**	198	220	302	277	3	0.34	1.97	2.93	1.92	37.7	36.5
	380	126	4	2 180	2 360	263	920	1 200	**22336R**	**22336RK**	198	237	362	327	3	0.36	1.89	2.81	1.84	71.4	69.9
	380	126	4	2 180	2 410	163	930	1 200	**22336RHA**	**22336RHAK**	198	235	362	323	3	0.34	1.97	2.94	1.93	66.0	64.5
190	260	52	2	608	969	90.7	1 200	1 600	**23938R**	**23938RK**	200	212	250	241	2	0.18	3.69	5.50	3.61	8.40	8.10
	290	75	2.1	923	1 370	132	1 100	1 500	**23038R**	**23038RK**	202	221	278	260	2	0.25	2.67	3.97	2.61	18.8	18.2
	290	75	2.1	992	1 430	115	1 100	1 500	**23038RHA**	**23038RHAK**	202	219	278	260	2	0.25	2.75	4.10	2.69	17.2	16.6
	290	100	2.1	1 240	1 840	161	1 100	1 500	**24038RR**	**24038RRK30**	202	215	278	257	2	0.33	2.06	3.07	2.02	24.5	24.1
	290	100	2.1	1 230	1 920	152	1 100	1 500	**24038RHA**	**24038RHAK30**	202	215	278	256	2	0.32	2.14	3.19	2.09	22.4	22.0
	320	104	3	1 370	2 000	162	1 000	1 400	**23138R**	**23138RK**	204	229	306	275	2.5	0.34	1.96	2.92	1.92	35.5	34.4
	320	104	3	1 520	2 080	161	1 000	1 400	**23138RHA**	**23138RHAK**	204	227	306	281	2.5	0.31	2.14	3.19	2.10	33.2	32.1
	320	128	3	1 750	2 470	198	1 000	1 400	**24138RR**	**24138RRK30**	204	223	306	272	2.5	0.39	1.74	2.59	1.70	43.0	42.4
	320	128	3	1 770	2 630	179	1 000	1 400	**24138RHA**	**24138RHAK30**	204	222	306	272	2.5	0.38	1.76	2.63	1.72	40.1	39.5
	340	92	4	1 390	1 730	172	1 000	1 300	**22238R**	**22238RK**	208	236	322	296	3	0.29	2.29	3.41	2.24	37.4	36.6
	340	92	4	1 420	1 770	128	1 000	1 300	**22238RHA**	**22238RHAK**	208	234	322	296	3	0.27	2.52	3.76	2.46	34.9	34.1
	340	120	4	1 830	2 370	160	1 000	1 300	**23238RR**	**23238RRK**	208	233	322	294	3	0.36	1.86	2.76	1.81	48.5	47.1
	340	120	4	1 870	2 470	185	990	1 300	**23238RHA**	**23238RHAK**	208	233	322	293	3	0.35	1.94	2.89	1.90	44.9	43.5
	400	132	5	2 380	2 610	258	880	1 200	**22338R**	**22338RK**	212	248	378	342	4	0.38	1.79	2.66	1.75	84.1	82.4

[Remark] Standard cage types used for the above bearings are shown in Table 5 earlier in this section.

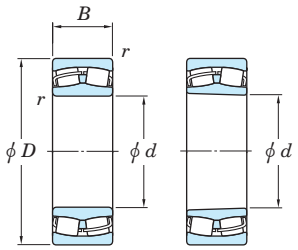
d (190) ~ (220) mm

R, RR



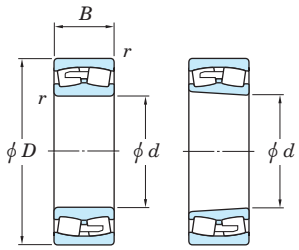
Cylindrical bore | Tapered bore

RZ

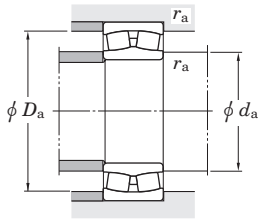


Cylindrical bore | Tapered bore

RHA



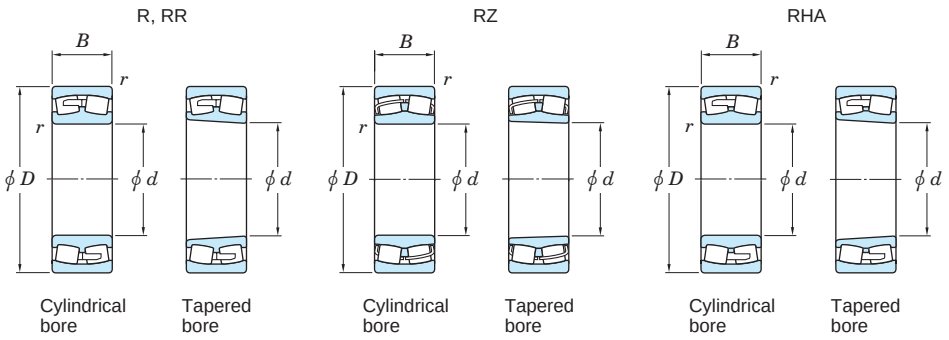
Cylindrical bore | Tapered bore

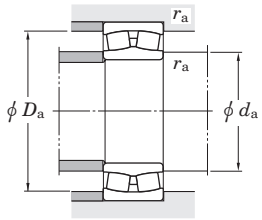


Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Mounting dimensions (mm)					Con-stant	Axial load factors			(Refer.) Mass (kg)	
d	D	B	r min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Cylindrical bore	Tapered bore	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
190	400	132	5	2 430	2 810	192	870	1 200	**22338RHA**	**22338RHAK**	212	251	378	342	4	0.34	1.99	2.97	1.95	77.7	76.0
200	280	60	2.1	753	1 190	109	1 100	1 500	**23940R**	**23940RK**	212	226	268	259	2	0.20	3.44	5.13	3.37	12.0	11.6
	310	82	2.1	1 120	1 670	155	1 000	1 400	**23040R**	**23040RK**	212	235	298	278	2	0.26	2.62	3.90	2.56	24.1	23.4
	310	82	2.1	1 180	1 680	133	1 100	1 400	**23040RHA**	**23040RHAK**	212	231	298	278	2	0.25	2.68	3.99	2.62	22.0	21.3
	310	109	2.1	1 430	2 110	180	1 100	1 400	**24040RR**	**24040RRK30**	212	228	298	273	2	0.33	2.02	3.00	1.97	31.2	30.7
	310	109	2.1	1 440	2 230	173	1 100	1 400	**24040RHA**	**24040RHAK30**	212	227	298	272	2	0.33	2.06	3.07	2.02	28.5	28.0
	340	112	3	1 740	2 350	186	980	1 300	**23140RR**	**23140RRK**	214	241	326	298	2.5	0.33	2.04	3.03	1.99	43.3	42.0
	340	112	3	1 730	2 340	178	970	1 300	**23140RHA**	**23140RHAK**	214	239	326	297	2.5	0.32	2.10	3.13	2.06	40.8	39.5
	340	140	3	2 030	2 820	222	990	1 300	**24140RR**	**24140RRK30**	214	234	326	289	2.5	0.40	1.68	2.49	1.64	53.3	52.5
	340	140	3	2 000	2 970	196	990	1 300	**24140RHA**	**24140RHAK30**	214	232	326	286	2.5	0.41	1.65	2.46	1.62	49.5	48.7
	360	98	4	1 620	2 050	138	930	1 200	**22240RR**	**22240RRK**	218	252	342	316	3	0.30	2.26	3.36	2.21	45.0	44.0
	360	98	4	1 630	2 030	146	940	1 300	**22240RHA**	**22240RHAK**	218	247	342	316	3	0.27	2.50	3.72	2.45	42.0	41.0
	360	128	4	1 950	2 610	228	940	1 300	**23240R**	**23240RK**	218	244	342	306	3	0.38	1.79	2.67	1.75	58.1	56.4
	360	128	4	2 080	2 780	209	930	1 200	**23240RHA**	**23240RHAK**	218	245	342	309	3	0.35	1.92	2.86	1.88	55.1	53.4
	420	138	5	2 510	2 750	288	830	1 100	**22340R**	**22340RK**	222	260	398	359	4	0.38	1.80	2.68	1.76	95.4	93.5
	420	138	5	2 570	2 920	193	820	1 100	**22340RHA**	**22340RHAK**	222	262	398	356	4	0.34	1.99	2.97	1.95	88.1	86.2
220	300	60	2.1	792	1 300	119	1 000	1 400	**23944R**	**23944RK**	232	246	288	279	2	0.18	3.70	5.50	3.61	13.0	12.6
	340	90	3	1 230	1 890	173	940	1 300	**23044R**	**23044RK**	234	256	326	301	2.5	0.26	2.55	3.80	2.50	31.5	30.6
	340	90	3	1 370	1 950	148	940	1 200	**23044RHA**	**23044RHAK**	234	255	326	307	2.5	0.25	2.69	4.01	2.63	28.8	27.9
	340	118	3	1 660	2 480	208	950	1 300	**24044RR**	**24044RRK30**	234	251	326	300	2.5	0.33	2.04	3.04	2.00	40.5	39.8
	340	118	3	1 680	2 630	199	950	1 300	**24044RHA**	**24044RHAK30**	234	248	326	297	2.5	0.33	2.08	3.09	2.03	37.0	36.4
	370	120	4	1 810	2 700	205	880	1 200	**23144R**	**23144RK**	238	266	352	319	3	0.34	2.00	2.98	1.96	54.8	53.2
	370	120	4	2 000	2 790	208	870	1 200	**23144RHA**	**23144RHAK**	238	263	352	324	3	0.31	2.15	3.20	2.10	51.2	49.6
	370	150	4	2 360	3 390	258	880	1 200	**24144RR**	**24144RRK30**	238	258	352	315	3	0.39	1.71	2.55	1.67	67.3	66.2
	370	150	4	2 330	3 550	229	880	1 200	**24144RHA**	**24144RHAK30**	238	255	352	313	3	0.40	1.69	2.52	1.65	62.0	61.0
	400	108	4	2 000	2 410	257	820	1 100	**22244RR**	**22244RRK**	238	276	382	355	3	0.28	2.40	3.57	2.34	60.3	59.0
	400	108	4	1 980	2 440	168	820	1 100	**22244RHA**	**22244RHAK**	238	274	382	349	3	0.27	2.52	3.76	2.47	58.8	57.5
	400	144	4	2 350	3 200	259	830	1 100	**23244R**	**23244RK**	238	268	382	336	3	0.39	1.71	2.55	1.68	81.6	79.2
	400	144	4	2 520	3 350	239	810	1 100	**23244RHA**	**23244RHAK**	238	272	382	346	3	0.36	1.89	2.81	1.85	77.4	75.0

[Remark] Standard cage types used for the above bearings are shown in Table 5 earlier in this section.

d (220) ~ (260) mm



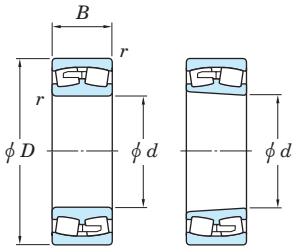


Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Mounting dimensions (mm)					Constant	Axial load factors			(Refer.) Mass (kg)	
d	D	B	r min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Cylindrical bore	Tapered bore	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
220	460	145	5	2 980	3 380	359	720	960	**22344R**	**22344RK**	242	290	438	393	4	0.34	2.00	2.99	1.96	124	122
	460	145	5	2 960	3 470	226	730	970	**22344RHA**	**22344RHAK**	242	290	438	390	4	0.32	2.08	3.09	2.03	115	113
240	320	60	2.1	814	1 380	128	940	1 300	**23948R**	**23948RK**	252	265	308	298	2	0.17	3.95	5.88	3.86	14.0	13.5
	360	92	3	1 480	2 190	161	860	1 100	**23048RR**	**23048RRK**	254	276	346	327	2.5	0.25	2.73	4.07	2.67	33.9	32.9
	360	92	3	1 470	2 180	166	860	1 100	**23048RHA**	**23048RHAK**	254	275	346	327	2.5	0.24	2.83	4.21	2.77	31.9	30.9
	360	118	3	1 750	2 710	228	870	1 200	**24048RR**	**24048RRK30**	254	272	346	321	2.5	0.31	2.20	3.27	2.15	43.5	42.9
	360	118	3	1 750	2 840	215	870	1 200	**24048RHA**	**24048RHAK30**	254	269	346	321	2.5	0.30	2.24	3.33	2.19	39.6	39.0
	400	128	4	2 280	3 220	213	790	1 100	**23148RR**	**23148RRK**	258	287	382	353	3	0.32	2.11	3.14	2.06	67.2	65.1
	400	128	4	2 270	3 200	233	790	1 000	**23148RHA**	**23148RHAK**	258	286	382	353	3	0.31	2.19	3.25	2.14	63.1	61.1
	400	160	4	2 640	3 850	287	800	1 100	**24148RR**	**24148RRK30**	258	280	382	340	3	0.39	1.75	2.60	1.71	82.7	81.4
	400	160	4	2 670	4 130	262	800	1 100	**24148RHA**	**24148RHAK30**	258	278	382	340	3	0.39	1.72	2.56	1.68	76.6	75.3
	440	120	4	2 390	2 940	295	730	970	**22248R**	**22248RK**	258	299	422	384	3	0.29	2.35	3.50	2.30	85.0	83.2
	440	120	4	2 400	2 990	202	730	970	**22248RHA**	**22248RHAK**	258	299	422	384	3	0.27	2.49	3.71	2.43	79.4	77.6
	440	160	4	3 050	3 970	310	730	970	**23248RR**	**23248RRK**	258	295	422	376	3	0.38	1.78	2.64	1.74	110	107
	440	160	4	3 080	4 130	289	730	970	**23248RHA**	**23248RHAK**	258	295	422	376	3	0.36	1.87	2.78	1.83	104	101
	500	155	5	3 360	4 020	347	650	870	**22348R**	**22348RK**	262	320	478	420	4	0.35	1.94	2.89	1.90	157	154
	500	155	5	3 400	3 990	255	650	870	**22348RHA**	**22348RHAK**	262	315	478	426	4	0.32	2.12	3.16	2.07	145	142
260	360	75	2.1	1 140	1 880	160	820	1 100	**23952R**	**23952RK**	272	292	348	333	2	0.19	3.54	5.27	3.46	24.0	23.3
	400	104	4	1 670	2 570	212	760	1 000	**23052R**	**23052RK**	278	304	382	359	3	0.25	2.65	3.95	2.59	50.7	49.3
	400	104	4	1 850	2 720	201	760	1 000	**23052RHA**	**23052RHAK**	278	302	382	359	3	0.25	2.75	4.10	2.69	46.3	44.9
	400	140	4	2 280	3 570	282	770	1 000	**24052RR**	**24052RRK30**	278	296	382	352	3	0.33	2.02	3.01	1.98	66.3	65.2
	400	140	4	2 270	3 670	265	770	1 000	**24052RHA**	**24052RHAK30**	278	292	382	347	3	0.33	2.06	3.07	2.02	60.3	59.4
	440	144	4	2 760	3 850	231	710	940	**23152RR**	**23152RRK**	278	313	422	387	3	0.33	2.05	3.06	2.01	92.2	89.4
	440	144	4	2 790	4 000	285	700	930	**23152RHA**	**23152RHAK**	278	311	422	384	3	0.32	2.12	3.16	2.08	87.4	84.6
	440	180	4	3 250	4 700	345	720	950	**24152RR**	**24152RRK30**	278	304	422	374	3	0.40	1.69	2.51	1.65	114	112
	440	180	4	3 210	4 950	309	720	950	**24152RHA**	**24152RHAK30**	278	299	422	368	3	0.41	1.66	2.47	1.62	106	105
	480	130	5	2 800	3 460	347	650	870	**22252R**	**22252RK**	282	326	458	419	4	0.28	2.40	3.57	2.35	110	108
	480	130	5	2 790	3 430	226	650	870	**22252RHA**	**22252RHAK**	282	324	458	418	4	0.27	2.50	3.72	2.44	103	101
	480	174	5	3 440	4 640	326	640	860	**23252R**	**23252RK**	282	325	458	408	4	0.40	1.69	2.51	1.65	144	140

[Remark] Standard cage types used for the above bearings are shown in Table 5 earlier in this section.

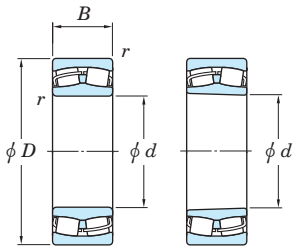
d (260) ~ (300) mm

R, RR



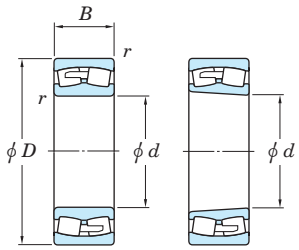
Cylindrical bore | Tapered bore

RZ

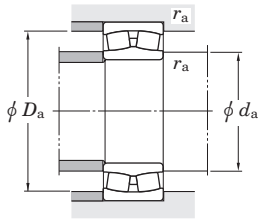


Cylindrical bore | Tapered bore

RHA



Cylindrical bore | Tapered bore

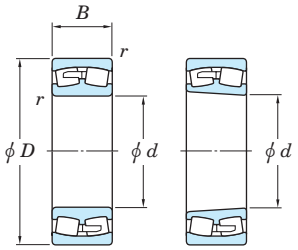


Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Mounting dimensions (mm)					Con-stant	Axial load factors			(Refer.) Mass (kg)	
d	D	B	r min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Cylindrical bore	Tapered bore	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
260	480	174	5	3 590	4 900	280	650	860	**23252RHA**	**23252RHAK**	282	322	458	408	4	0.36	1.87	2.78	1.83	137	133
	540	165	6	3 540	4 380	363	590	780	**22352R**	**22352RK**	288	346	512	453	5	0.35	1.94	2.89	1.90	196	192
	540	165	6	3 900	4 620	290	580	780	**22352RHA**	**22352RHAK**	288	342	512	461	5	0.31	2.15	3.21	2.11	181	177
280	380	75	2.1	1 160	1 960	165	760	1 000	**23956R**	**23956RK**	292	312	368	353	2	0.18	3.74	5.57	3.66	26.0	25.2
	420	106	4	1 790	2 860	235	710	950	**23056R**	**23056RK**	298	322	402	377	3	0.25	2.74	4.08	2.68	54.5	52.9
	420	106	4	1 940	2 950	218	700	940	**23056RHA**	**23056RHAK**	298	322	402	380	3	0.24	2.87	4.27	2.80	49.8	48.2
	420	140	4	2 370	3 780	291	710	950	**24056RR**	**24056RRK30**	298	316	402	373	3	0.31	2.15	3.21	2.11	70.2	69.1
	420	140	4	2 390	4 000	287	710	950	**24056RHA**	**24056RHAK30**	298	314	402	372	3	0.31	2.20	3.28	2.15	64.0	62.9
	460	146	5	2 910	4 160	250	660	880	**23156RR**	**23156RRK**	302	332	438	407	4	0.32	2.14	3.18	2.09	98.8	95.7
	460	146	5	2 940	4 290	304	650	870	**23156RHA**	**23156RHAK**	302	331	438	406	4	0.30	2.22	3.30	2.17	93.4	90.3
	460	180	5	3 390	5 140	370	660	880	**24156RR**	**24156RRK30**	302	326	438	396	4	0.38	1.79	2.67	1.75	122	120
	460	180	5	3 320	5 240	322	660	880	**24156RHA**	**24156RHAK30**	302	321	438	390	4	0.38	1.76	2.62	1.72	113	112
	500	130	5	2 640	3 380	308	610	810	**22256R**	**22256RK**	302	347	478	438	4	0.28	2.42	3.60	2.37	114	112
	500	130	5	2 900	3 670	240	610	810	**22256RHA**	**22256RHAK**	302	346	478	440	4	0.26	2.64	3.93	2.58	106	104
	500	176	5	3 370	4 910	323	610	820	**23256R**	**23256RK**	302	345	478	421	4	0.37	1.83	2.72	1.79	153	149
	500	176	5	3 770	5 300	365	600	800	**23256RHA**	**23256RHAK**	302	343	478	430	4	0.35	1.95	2.91	1.91	145	141
	580	175	6	3 930	4 910	407	530	710	**22356R**	**22356RK**	308	372	552	486	5	0.34	1.98	2.95	1.93	229	225
	580	175	6	4 390	5 260	325	530	700	**22356RHA**	**22356RHAK**	308	367	552	495	5	0.31	2.19	3.25	2.14	212	208
300	420	90	3	1 610	2 610	220	680	910	**23960R**	**23960RK**	314	336	406	387	2.5	0.20	3.42	5.09	3.34	40.0	38.8
	460	118	4	2 190	3 480	286	630	840	**23060R**	**23060RK**	318	351	442	412	3	0.25	2.69	4.00	2.63	75.8	73.7
	460	118	4	2 370	3 700	255	630	840	**23060RHA**	**23060RHAK**	318	347	442	416	3	0.24	2.79	4.16	2.73	68.9	66.8
	460	160	4	2 950	4 690	354	640	850	**24060RR**	**24060RRK30**	318	342	442	406	3	0.33	2.04	3.04	2.00	99.5	97.9
	460	160	4	2 950	4 910	350	640	850	**24060RHA**	**24060RHAK30**	318	338	442	404	3	0.32	2.09	3.11	2.04	90.7	89.1
	500	160	5	3 450	5 030	351	590	790	**23160RR**	**23160RRK**	322	358	478	439	4	0.32	2.09	3.11	2.04	131	127
	500	160	5	3 430	4 970	345	580	780	**23160RHA**	**23160RHAK**	322	357	478	439	4	0.31	2.18	3.25	2.13	123	119
	500	200	5	4 160	6 280	433	590	790	**24160RR**	**24160RRK30**	322	349	478	425	4	0.40	1.67	2.49	1.63	162	160
	500	200	5	4 030	6 420	385	590	790	**24160RHA**	**24160RHAK30**	322	347	478	424	4	0.39	1.72	2.56	1.68	150	148
	540	140	5	3 360	4 330	412	550	740	**22260R**	**22260RK**	322	368	518	467	4	0.27	2.48	3.69	2.43	145	142
	540	140	5	3 320	4 360	284	550	740	**22260RHA**	**22260RHAK**	322	370	518	467	4	0.26	2.62	3.90	2.56	135	132

[Remark] Standard cage types used for the above bearings are shown in Table 5 earlier in this section.

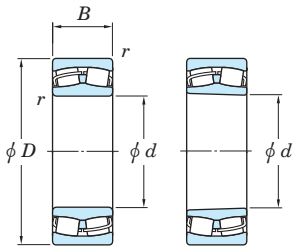
d (300) ~ (360) mm

R, RR



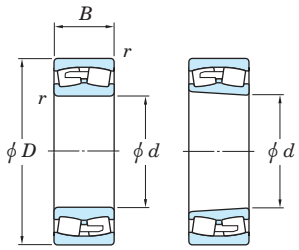
Cylindrical bore | Tapered bore

RZ

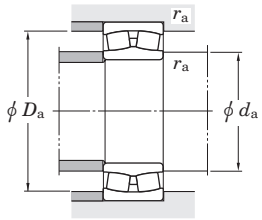


Cylindrical bore | Tapered bore

RHA



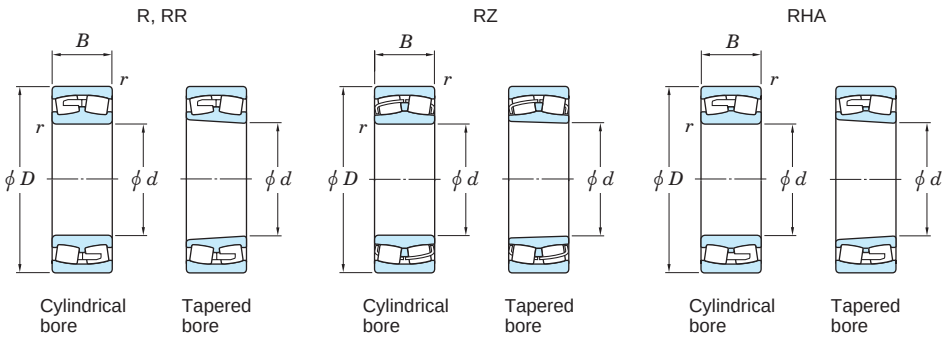
Cylindrical bore | Tapered bore

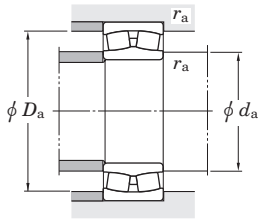


Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Mounting dimensions (mm)					Con-stant	Axial load factors			(Refer.) Mass (kg)	
d	D	B	r min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Cylindrical bore	Tapered bore	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
300	540	192	5	4 300	5 910	401	540	720	**23260R**	**23260RK**	322	370	518	464	4	0.37	1.83	2.72	1.79	197	192
	540	192	5	4 440	6 310	429	540	720	**23260RHA**	**23260RHAK**	322	371	518	464	4	0.35	1.93	2.88	1.89	187	182
	620	185	7.5	4 890	5 430	555	470	630	**22360R**	**22360RK**	336	390	584	547	6	0.32	2.09	3.10	2.04	289	284
320	440	90	3	1 670	2 870	233	630	840	**23964R**	**23964RK**	334	358	426	408	2.5	0.19	3.61	5.38	3.53	43.0	41.7
	480	121	4	2 290	3 740	295	590	790	**23064R**	**23064RK**	338	369	462	431	3	0.24	2.76	4.11	2.70	81.2	78.8
	480	121	4	2 490	3 850	278	590	780	**23064RHA**	**23064RHAK**	338	367	462	436	3	0.24	2.87	4.27	2.80	74.5	72.1
	480	160	4	3 020	4 920	382	590	790	**24064RR**	**24064RRK30**	338	363	462	427	3	0.31	2.16	3.22	2.11	105	103
	480	160	4	3 060	5 230	363	590	790	**24064RHA**	**24064RHAK30**	338	360	462	425	3	0.31	2.21	3.29	2.16	93.4	91.4
	540	176	5	3 650	5 700	366	530	700	**23164R**	**23164RK**	342	389	518	467	4	0.33	2.04	3.04	2.00	171	166
	540	176	5	4 040	5 960	404	530	700	**23164RHA**	**23164RHAK**	342	383	518	472	4	0.32	2.13	3.17	2.08	160	155
	540	218	5	4 680	6 950	486	530	710	**24164RR**	**24164RRK30**	342	373	518	460	4	0.39	1.72	2.56	1.68	208	205
	540	218	5	4 550	7 190	429	530	710	**24164RHA**	**24164RHAK30**	342	371	518	458	4	0.40	1.70	2.52	1.66	199	196
	580	150	5	3 420	4 540	385	490	660	**22264R**	**22264RK**	342	402	558	504	4	0.28	2.41	3.59	2.35	175	171
	580	208	5	4 550	6 550	496	500	670	**23264R**	**23264RK**	342	394	558	488	4	0.38	1.76	2.62	1.72	249	242
	580	208	5	5 020	7 030	464	490	650	**23264RHA**	**23264RHAK**	342	392	558	495	4	0.36	1.90	2.83	1.86	236	229
340	460	90	3	1 680	2 980	242	590	790	**23968R**	**23968RK**	354	377	446	426	2.5	0.18	3.82	5.69	3.74	45.0	43.6
	520	133	5	2 670	4 330	353	530	710	**23068R**	**23068RK**	362	397	498	465	4	0.25	2.69	4.00	2.63	108	105
	520	133	5	2 930	4 470	312	530	710	**23068RHA**	**23068RHAK**	362	393	498	468	4	0.24	2.80	4.18	2.74	98.7	95.7
	520	180	5	3 680	5 970	432	530	710	**24068RR**	**24068RRK30**	362	387	498	460	4	0.33	2.06	3.06	2.01	142	140
	520	180	5	3 720	6 330	430	530	710	**24068RHA**	**24068RHAK30**	362	385	498	459	4	0.32	2.11	3.14	2.06	130	128
	580	190	5	4 130	6 430	472	480	640	**23168R**	**23168RK**	362	413	558	497	4	0.34	1.97	2.93	1.93	216	210
	580	190	5	4 620	6 720	449	480	640	**23168RHA**	**23168RHAK**	362	407	558	503	4	0.32	2.11	3.14	2.06	202	196
	580	243	5	5 570	8 400	564	490	650	**24168RR**	**24168RRK30**	362	396	558	490	4	0.41	1.64	2.45	1.61	270	266
	580	243	5	5 490	8 810	449	490	650	**24168RHA**	**24168RHAK30**	362	390	558	482	4	0.42	1.61	2.39	1.57	259	255
	620	165	6	4 430	5 430	551	440	590	**22268R**	**22268RK**	368	424	592	551	5	0.28	2.43	3.61	2.37	221	216
	620	224	6	5 130	7 560	526	450	600	**23268R**	**23268RK**	368	423	592	521	5	0.38	1.77	2.63	1.73	306	297
	620	224	6	5 690	8 030	517	440	590	**23268RHA**	**23268RHAK**	368	418	592	532	5	0.36	1.88	2.81	1.84	290	281
360	480	90	3	1 710	3 060	248	550	730	**23972R**	**23972RK**	374	399	466	447	2.5	0.17	3.95	5.88	3.86	46.5	45.0

[Remark] Standard cage types used for the above bearings are shown in Table 5 earlier in this section.

d (360) ~ (400) mm



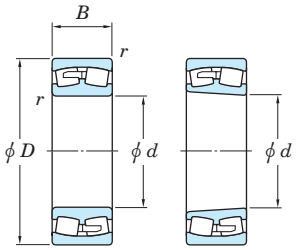


Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Mounting dimensions (mm)					Con-stant	Axial load factors			(Refer.) Mass (kg)	
d	D	B	r min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Cylindrical bore	Tapered bore	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
360	540	134	5	2 860	4 800	375	500	660	**23072R**	**23072RK**	382	416	518	484	4	0.24	2.76	4.11	2.70	115	111
	540	134	5	3 040	4 770	334	500	660	**23072RHA**	**23072RHAK**	382	414	518	489	4	0.23	2.92	4.34	2.85	105	101
	540	180	5	3 810	6 300	465	500	660	**24072RR**	**24072RRK30**	382	407	518	481	4	0.31	2.15	3.21	2.11	149	147
	540	180	5	3 810	6 620	446	500	660	**24072RHA**	**24072RHAK30**	382	406	518	480	4	0.30	2.22	3.30	2.17	135	133
	600	192	5	4 740	7 040	459	440	590	**23172R**	**23172RK**	382	431	578	527	4	0.33	2.07	3.09	2.03	228	221
	600	192	5	4 830	7 210	474	450	590	**23172RHA**	**23172RHAK**	382	429	578	527	4	0.31	2.19	3.25	2.14	213	206
	600	243	5	5 080	7 690	437	450	600	**24172R**	**24172RK30**	382	420	578	512	4	0.39	1.74	2.59	1.70	287	283
	600	243	5	5 580	9 180	517	460	610	**24172RHA**	**24172RHAK30**	382	413	578	505	4	0.40	1.69	2.51	1.65	274	270
	650	170	6	4 710	5 830	583	410	550	**22272R**	**22272RK**	388	447	622	579	5	0.27	2.47	3.68	2.42	248	243
	650	232	6	6 080	8 810	548	410	540	**23272R**	**23272RK**	388	446	622	555	5	0.37	1.83	2.72	1.79	346	336
	650	232	6	6 220	9 050	591	410	550	**23272RHA**	**23272RHAK**	388	442	622	558	5	0.35	1.92	2.85	1.87	328	318
380	520	106	4	2 220	3 940	295	500	660	**23976R**	**23976RK**	398	425	502	481	3	0.19	3.62	5.39	3.54	70.0	67.9
	560	135	5	2 910	4 970	355	470	630	**23076R**	**23076RK**	402	433	538	503	4	0.24	2.79	4.16	2.73	122	118
	560	135	5	3 160	5 080	354	460	620	**23076RHA**	**23076RHAK**	402	434	538	512	4	0.22	3.03	4.51	2.96	112	108
	560	180	5	3 900	6 590	486	470	620	**24076RR**	**24076RRK30**	402	428	538	502	4	0.30	2.26	3.36	2.21	156	154
	560	180	5	3 900	6 910	454	470	620	**24076RHA**	**24076RHAK30**	402	426	538	502	4	0.29	2.32	3.45	2.27	142	139
	620	194	5	4 520	7 320	442	420	560	**23176R**	**23176RK**	402	454	598	540	4	0.31	2.18	3.24	2.13	240	233
	620	194	5	5 030	7 700	503	420	560	**23176RHA**	**23176RHAK**	402	450	598	547	4	0.30	2.26	3.36	2.21	224	217
	620	243	5	5 300	8 220	467	430	570	**24176R**	**24176RK30**	402	439	598	529	4	0.38	1.78	2.65	1.74	302	297
	620	243	5	5 870	9 840	561	420	560	**24176RHA**	**24176RHAK30**	402	438	598	534	4	0.38	1.78	2.65	1.74	288	283
	680	240	6	6 510	9 500	590	380	500	**23276R**	**23276RK**	408	469	652	583	5	0.36	1.85	2.76	1.81	386	375
	680	240	6	6 660	9 760	622	380	510	**23276RHA**	**23276RHAK**	408	466	652	586	5	0.35	1.94	2.89	1.90	365	354
400	540	106	4	2 350	4 300	320	470	620	**23980R**	**23980RK**	418	443	522	500	3	0.18	3.76	5.59	3.67	73.0	70.7
	600	148	5	3 390	5 790	408	420	560	**23080R**	**23080RK**	422	462	578	540	4	0.24	2.84	4.23	2.78	155	151
	600	148	5	3 690	5 860	398	420	560	**23080RHA**	**23080RHAK**	422	460	578	543	4	0.23	2.94	4.37	2.87	142	138
	600	200	5	4 820	8 110	444	430	570	**24080R**	**24080RK30**	422	450	578	531	4	0.32	2.09	3.12	2.05	206	203
	600	200	5	4 620	8 140	535	420	570	**24080RHA**	**24080RHAK30**	422	450	578	534	4	0.31	2.21	3.29	2.16	192	189
	650	200	6	4 730	7 780	521	390	520	**23180R**	**23180RK**	428	476	622	564	5	0.31	2.19	3.25	2.14	273	265

[Remark] Standard cage types used for the above bearings are shown in Table 5 earlier in this section.

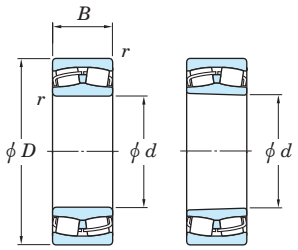
d (400) ~ (460) mm

R, RR



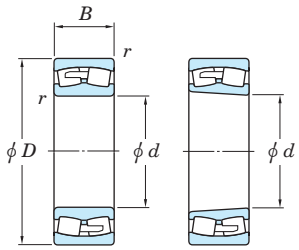
Cylindrical bore | Tapered bore

RZ

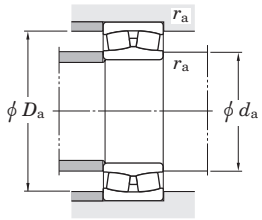


Cylindrical bore | Tapered bore

RHA



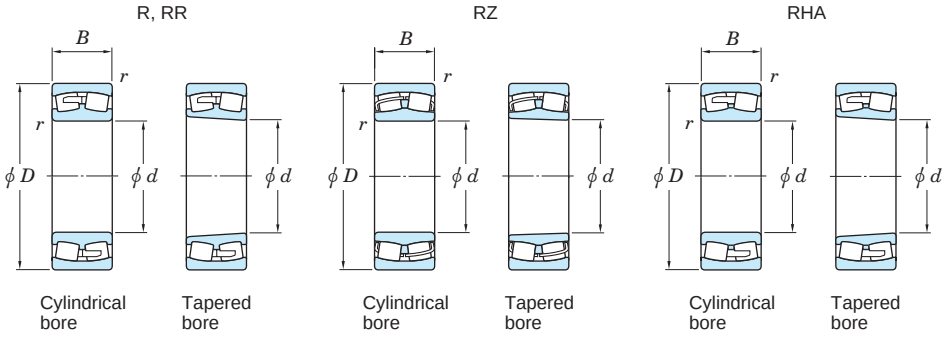
Cylindrical bore | Tapered bore

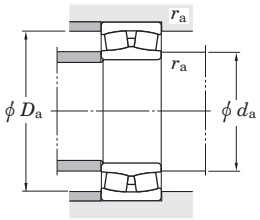


Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Mounting dimensions (mm)					Con-stant	Axial load factors			(Refer.) Mass (kg)	
d	D	B	r min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Cylindrical bore	Tapered bore	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
400	650	200	6	5 410	8 300	542	390	520	**23180RHA**	**23180RHAK**	428	473	622	574	5	0.29	2.30	3.43	2.25	255	247
	650	250	6	5 840	9 140	499	390	530	**24180R**	**24180RK30**	428	461	622	558	5	0.37	1.82	2.70	1.78	338	333
	650	250	6	6 290	10 600	600	390	520	**24180RHA**	**24180RHAK30**	428	462	622	558	5	0.37	1.82	2.71	1.78	322	317
	720	256	6	6 540	9 850	590	350	470	**23280R**	**23280RK**	428	496	692	605	5	0.37	1.80	2.69	1.76	468	454
	720	256	6	7 320	10 600	665	350	460	**23280RHA**	**23280RHAK**	428	489	692	619	5	0.35	1.92	2.86	1.88	441	427
420	560	106	4	2 330	4 320	331	430	580	**23984R**	**23984RK**	438	465	542	522	3	0.17	3.91	5.82	3.82	76.0	73.6
	620	150	5	3 500	6 120	412	400	530	**23084R**	**23084RK**	442	483	598	560	4	0.23	2.90	4.31	2.83	164	159
	620	150	5	3 820	6 230	425	400	530	**23084RHA**	**23084RHAK**	442	480	598	563	4	0.22	3.02	4.49	2.95	150	145
	620	200	5	4 510	7 600	438	400	530	**24084R**	**24084RK30**	442	471	598	554	4	0.30	2.23	3.32	2.18	212	209
	620	200	5	4 730	8 490	555	400	530	**24084RHA**	**24084RHAK30**	442	471	598	554	4	0.29	2.31	3.44	2.26	198	195
	700	224	6	5 620	9 110	583	350	470	**23184R**	**23184RK**	448	506	672	604	5	0.33	2.03	3.02	1.98	363	352
	700	224	6	6 330	9 630	616	350	470	**23184RHA**	**23184RHAK**	448	500	672	615	5	0.31	2.19	3.25	2.14	339	328
	700	280	6	6 840	10 600	574	360	480	**24184R**	**24184RK30**	448	486	672	593	5	0.40	1.71	2.54	1.67	445	438
	700	280	6	7 420	12 400	685	350	470	**24184RHA**	**24184RHAK30**	448	486	672	596	5	0.39	1.72	2.56	1.68	425	418
	760	272	7.5	8 130	11 500	754	320	430	**23284R**	**23284RK**	456	514	724	652	6	0.37	1.84	2.74	1.80	556	540
	760	272	7.5	8 230	11 900	735	320	430	**23284RHA**	**23284RHAK**	456	512	724	652	6	0.36	1.90	2.83	1.86	525	508
440	600	118	4	2 910	5 330	387	400	530	**23988R**	**23988RK**	458	490	582	554	3	0.18	3.75	5.58	3.66	101	97.8
	650	157	6	3 790	6 540	455	370	500	**23088R**	**23088RK**	468	501	622	584	5	0.24	2.76	4.11	2.70	188	183
	650	157	6	4 230	6 910	465	370	490	**23088RHA**	**23088RHAK**	468	504	622	591	5	0.22	3.04	4.53	2.97	172	167
	650	212	6	4 910	8 320	475	370	490	**24088R**	**24088RK30**	468	494	622	579	5	0.29	2.35	3.50	2.30	247	243
	650	212	6	5 290	9 560	618	370	490	**24088RHA**	**24088RHAK30**	468	492	622	575	5	0.30	2.28	3.39	2.23	231	227
	720	226	6	5 800	9 600	591	330	440	**23188R**	**23188RK**	468	526	692	625	5	0.33	2.08	3.09	2.03	378	366
	720	226	6	6 590	10 300	655	330	440	**23188RHA**	**23188RHAK**	468	521	692	636	5	0.30	2.25	3.34	2.20	353	341
	720	280	6	7 080	11 200	589	340	450	**24188R**	**24188RK30**	468	507	692	615	5	0.38	1.76	2.62	1.72	460	453
	720	280	6	7 540	12 900	707	330	440	**24188RHA**	**24188RHAK30**	468	509	692	616	5	0.38	1.79	2.67	1.75	439	432
	790	280	7.5	8 580	12 300	793	300	400	**23288R**	**23288RK**	476	540	754	684	6	0.36	1.86	2.77	1.82	613	595
	790	280	7.5	8 670	12 700	776	300	390	**23288RHA**	**23288RHAK**	476	539	754	682	6	0.35	1.93	2.88	1.89	580	562
460	600	90	3	1 800	3 660	306	350	460	**23896R**	**23896RK**	476	519	586	568	2.5	0.13	5.06	7.53	4.95	60.4	58.4

[Remark] Standard cage types used for the above bearings are shown in Table 5 earlier in this section.

d (460) ~ 500 mm

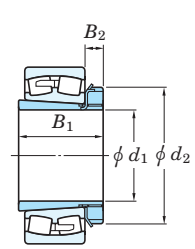




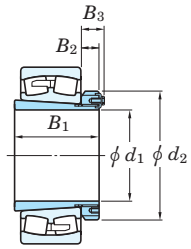
Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.		Mounting dimensions (mm)					Con-stant	Axial load factors			(Refer.) Mass (kg)	
d	D	B	r min.	C_r	C_{0r}	C_u	Grease lub.	Oil lub.	Cylindrical bore	Tapered bore	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_1	Y_2	Y_0	Cylindrical bore	Tapered bore
460	620	118	4	2 890	5 350	404	370	500	**23992R**	**23992RK**	478	512	602	577	3	0.17	3.89	5.79	3.80	107	104
	680	163	6	4 060	7 170	480	340	460	**23092R**	**23092RK**	488	529	652	613	5	0.23	2.92	4.34	2.85	215	209
	680	163	6	4 520	7 430	497	340	460	**23092RHA**	**23092RHAK**	488	527	652	618	5	0.22	3.04	4.53	2.97	197	191
	680	218	6	5 740	10 100	536	340	460	**24092R**	**24092RK30**	488	519	652	607	5	0.30	2.23	3.32	2.18	277	272
	680	218	6	5 660	10 300	656	340	460	**24092RHA**	**24092RHAK30**	488	518	652	604	5	0.29	2.33	3.46	2.27	259	254
	760	240	7.5	6 510	10 800	648	310	410	**23192R**	**23192RK**	496	552	724	656	6	0.33	2.07	3.09	2.03	450	436
	760	240	7.5	7 240	11 200	697	300	400	**23192RHA**	**23192RHAK**	496	546	724	669	6	0.30	2.22	3.31	2.17	420	406
	760	300	7.5	7 320	12 200	597	310	410	**24192R**	**24192RK30**	496	537	724	647	6	0.35	1.95	2.90	1.91	550	541
	760	300	7.5	8 390	14 200	746	310	410	**24192RHA**	**24192RHAK30**	496	535	724	651	6	0.38	1.75	2.61	1.72	525	516
	830	296	7.5	9 520	13 700	867	270	370	**23292R**	**23292RK**	496	567	794	718	6	0.36	1.85	2.76	1.81	720	699
	830	296	7.5	9 600	14 200	856	270	360	**23292RHA**	**23292RHAK**	496	564	794	714	6	0.35	1.92	2.85	1.87	679	658
480	650	128	5	3 290	6 130	446	350	460	**23996R**	**23996RK**	502	534	628	603	4	0.18	3.75	5.59	3.67	123	119
	700	165	6	4 190	7 540	505	320	430	**23096R**	**23096RK**	508	549	672	633	5	0.22	3.01	4.47	2.94	225	218
	700	165	6	4 670	7 860	532	320	430	**23096RHA**	**23096RHAK**	508	548	672	639	5	0.22	3.12	4.64	3.05	206	199
	700	218	6	5 540	9 650	514	320	430	**24096R**	**24096RK30**	508	539	672	626	5	0.29	2.32	3.45	2.26	287	282
	700	218	6	5 800	10 700	492	320	430	**24096RHA**	**24096RHAK30**	508	537	672	626	5	0.28	2.41	3.59	2.35	268	263
	790	248	7.5	6 840	11 500	698	280	380	**23196R**	**23196RK**	516	579	754	685	6	0.32	2.09	3.12	2.05	503	488
	790	248	7.5	7 740	12 000	638	280	380	**23196RHA**	**23196RHAK**	516	570	754	697	6	0.30	2.24	3.34	2.19	470	455
	790	308	7.5	8 730	14 800	707	280	380	**24196R**	**24196RK30**	516	560	754	678	6	0.39	1.74	2.59	1.70	606	597
	790	308	7.5	9 880	15 900	792	290	380	**24196RHA**	**24196RHAK30**	516	553	754	684	6	0.38	1.78	2.65	1.74	580	568
	870	310	7.5	10 500	15 100	953	250	340	**23296R**	**23296RK**	516	588	834	745	6	0.36	1.85	2.75	1.81	831	807
	870	310	7.5	10 600	15 700	791	250	340	**23296RHA**	**23296RHAK**	516	589	834	748	6	0.35	1.91	2.85	1.87	785	761
500	670	128	5	3 330	6 310	447	330	440	**239/500R**	**239/500RK**	522	553	648	622	4	0.17	3.87	5.76	3.79	131	127
	720	167	6	4 490	8 090	561	310	410	**230/500R**	**230/500RK**	528	568	692	656	5	0.23	2.94	4.37	2.87	235	228
	720	218	6	5 620	10 300	545	310	410	**240/500R**	**240/500RK30**	528	561	692	647	5	0.28	2.39	3.56	2.34	297	292
	830	264	7.5	7 750	13 000	708	260	350	**231/500R**	**231/500RK**	536	601	794	714	6	0.33	2.05	3.05	2.00	595	577
	830	325	7.5	9 350	15 900	763	260	350	**241/500R**	**241/500RK30**	536	591	794	712	6	0.36	1.85	2.76	1.81	712	701
	920	336	7.5	11 000	16 700	908	230	310	**232/500R**	**232/500RK**	536	622	884	774	6	0.39	1.74	2.59	1.70	1 020	992

[Remark] Standard cage types used for the above bearings are shown in Table 5 earlier in this section.

d_1 20 ~ 65 mm



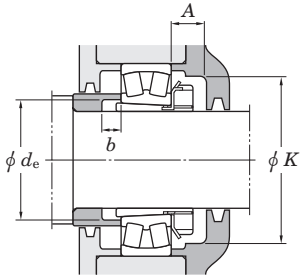
$d_1 \leq 180$ mm



$d_1 \geq 200$ mm

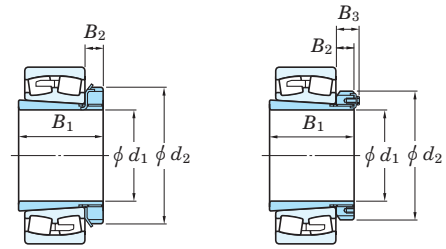
Boundary dimensions (mm)					Brg. bore	Designations	Mounting dimensions (mm)				Mass	(Refer.)	
d_1	B_1	d_2	B_2	B_3	d (mm)	Bearing + **adapter ass'y**	A min.	K min.	d_e min.	b min.	Brg.+adapter ass'y (kg)	Adapter sleeve No.	Locknut No.
20	29	38	8	—	25	22205RZK+**H305X**	15	45	29	5	0.269	A305X	AN05
25	31	45	8	—	30	22206RZK+**H306X**	15	50	34	5	0.404	A306X	AN06
	31	45	8	—	30	21306RZK+**H306X**	15	50	34	6	0.538	A306X	AN06
30	35	52	9	—	35	22207RZK+**H307X**	17	58	39	5	0.610	A307X	AN07
	35	52	9	—	35	21307RZK+**H307X**	17	58	39	7	0.725	A307X	AN07
35	36	58	10	—	40	22208RZK+**H308X**	17	65	44	5	0.793	A308X	AN08
	36	58	10	—	40	21308RZK+**H308X**	17	65	44	5	0.972	A308X	AN08
	46	58	10	—	40	22308RZK+**H2308X**	17	65	45	5	1.30	A2308X	AN08
40	39	65	11	—	45	22209RZK+**H309X**	17	72	49	8	0.855	A309X	AN09
	39	65	11	—	45	21309RZK+**H309X**	17	72	49	5	1.31	A309X	AN09
	50	65	11	—	45	22309RZK+**H2309X**	17	72	50	5	1.70	A2309X	AN09
45	42	70	12	—	50	22210RZK+**H310X**	19	76	54	10	0.953	A310X	AN10
	42	70	12	—	50	21310RZK+**H310X**	19	76	54	5	1.67	A310X	AN10
	55	70	12	—	50	22310RZK+**H2310X**	19	76	56	5	2.26	A2310X	AN10
50	45	75	12	—	55	22211RZK+**H311X**	19	85	60	11	1.22	A311X	AN11
	45	75	12	—	55	21311RZK+**H311X**	19	85	60	6	2.04	A311X	AN11
	59	75	12	—	55	22311RZK+**H2311X**	19	85	61	6	2.80	A2311X	AN11
55	47	80	13	—	60	22212RZK+**H312X**	20	90	65	9	1.59	A312X	AN12
	47	80	13	—	60	21312RZK+**H312X**	20	90	65	5	2.50	A312X	AN12
	62	80	13	—	60	22312RZK+**H2312X**	20	90	66	5	3.50	A2312X	AN12
60	50	85	14	—	65	22213RZK+**H313X**	21	96	70	8	2.01	A313X	AN13
	50	85	14	—	65	21313RZK+**H313X**	21	96	70	5	3.07	A313X	AN13
	65	85	14	—	65	22313RZK+**H2313X**	21	96	72	5	4.17	A2313X	AN13
65	55	98	15	—	75	22215RZK+**H315X**	23	110	80	12	2.58	A315X	AN15
	55	98	15	—	75	21315RZK+**H315X**	23	110	80	5	4.65	A315X	AN15
	73	98	15	—	75	22315RZK+**H2315X**	23	110	82	5	6.44	A2315X	AN15

d_1 70 ~ 110 mm



Boundary dimensions (mm)					Brg. bore	Designations	Mounting dimensions (mm)				Mass	(Refer.)	
d_1	B_1	d_2	B_2	B_3	d (mm)	Bearing + **adapter ass'y**	A min.	K min.	d_e min.	b min.	Brg.+adapter ass'y (kg)	Adapter sleeve No.	Locknut No.
70	59	105	17	—	80	22216RZK+**H316X**	25	120	86	12	3.22	A316X	AN16
	59	105	17	—	80	21316RZK+**H316X**	25	120	86	5	5.56	A316X	AN16
	78	105	17	—	80	22316RZK+**H2316X**	25	120	87	5	7.64	A2316X	AN16
75	63	110	18	—	85	22217RZK+**H317X**	27	128	91	12	3.93	A317X	AN17
	63	110	18	—	85	21317RZK+**H317X**	27	128	91	6	6.49	A317X	AN17
	82	110	18	—	85	22317RZK+**H2317X**	27	128	94	6	8.83	A2317X	AN17
80	65	120	18	—	90	22218RZK+**H318X**	28	139	96	10	4.88	A318X	AN18
	86	120	18	—	90	23218RZK+**H2318X**	28	139	99	18	6.20	A2318X	AN18
	65	120	18	—	90	21318RZK+**H318X**	28	139	96	6	7.56	A318X	AN18
	86	120	18	—	90	22318RZK+**H2318X**	28	139	99	6	10.3	A2318X	AN18
85	68	125	19	—	95	22219RZK+**H319X**	29	145	102	9	5.77	A319X	AN19
	68	125	19	—	95	21319RZK+**H319X**	29	145	102	7	8.68	A319X	AN19
	90	125	19	—	95	22319RZK+**H2319X**	29	145	105	7	12.0	A2319X	AN19
90	71	130	20	—	100	22220RZK+**H320X**	30	150	107	8	6.80	A320X	AN20
	97	130	20	—	100	23220RZK+**H2320X**	30	150	110	19	8.94	A2320X	AN20
	71	130	20	—	100	21320RZK+**H320X**	30	150	107	7	10.5	A320X	AN20
	97	130	20	—	100	22320RZK+**H2320X**	30	150	110	7	15.2	A2320X	AN20
100	81	145	21	—	110	23122RZK+**H3122X**	32	170	117	7	7.91	A3122X	AN22
	77	145	21	—	110	22222RZK+**H322X**	32	170	117	6	9.50	A322X	AN22
	105	145	21	—	110	23222RZK+**H2322X**	32	170	121	17	12.4	A2322X	AN22
	77	145	21	—	110	21322RZK+**H322X**	32	170	117	9	14.0	A322X	AN22
	105	145	21	—	110	22322RZK+**H2322X**	32	170	121	7	20.6	A2322X	AN22
110	72	145	22	—	120	23024RZK+**H3024X**	33	180	127	7	6.12	A3024	ANL24
	88	155	22	—	120	23124RZK+**H3124X**	33	180	128	7	10.5	A3124	AN24
	88	155	22	—	120	22224RZK+**H3124X**	33	180	128	11	11.9	A3124	AN24
	112	155	22	—	120	23224RZK+**H2324X**	33	180	131	17	15.1	A2324	AN24
	112	155	22	—	120	22324RZK+**H2324X**	33	180	131	7	25.6	A2324	AN24

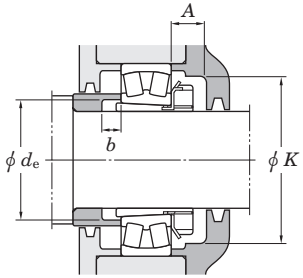
d_1 115 ~ (150) mm



$d_1 \leq 180$ mm $\quad$ $d_1 \geq 200$ mm

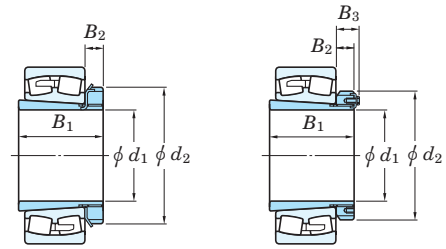
Boundary dimensions (mm)					Brg. bore	Designations	Mounting dimensions (mm)				Mass	(Refer.)	
d_1	B_1	d_2	B_2	B_3	d (mm)	Bearing + **adapter ass'y**	A min.	K min.	d_e min.	b min.	Brg.+adapter ass'y (kg)	Adapter sleeve No.	Locknut No.
115	80	155	23	—	130	23026RZK+**H3026**	34	190	137	8	9.01	A3026	ANL26
	92	165	23	—	130	23126RZK+**H3126**	34	190	138	8	12.3	A3126	AN26
	92	165	23	—	130	22226RZK+**H3126**	34	190	138	8	15.1	A3126	AN26
	121	165	23	—	130	23226RZK+**H2326**	34	190	142	21	18.8	A2326	AN26
	121	165	23	—	130	22326RZK+**H2326**	34	190	142	8	32.7	A2326	AN26
125	82	165	24	—	140	23028RZK+**H3028**	36	205	147	8	9.79	A3028	ANL28
	97	180	24	—	140	23128RZK+**H3128**	36	205	149	8	14.9	A3128	AN28
	97	180	24	—	140	22228RZK+**H3128**	36	205	149	8	18.8	A3128	AN28
	131	180	24	—	140	23228RZK+**H2328**	36	205	152	22	24.3	A2328	AN28
	131	180	24	—	140	22328RZK+**H2328**	36	205	152	8	40.8	A2328	AN28
135	87	180	26	—	150	23030RZK+**H3030**	37	220	158	8	11.9	A3030	ANL30
	111	195	26	—	150	23130RZK+**H3130**	37	220	160	8	21.7	A3130	AN30
	111	195	26	—	150	22230RZK+**H3130**	37	220	160	15	24.3	A3130	AN30
	139	195	26	—	150	23230RZK+**H2330**	37	220	163	20	30.8	A2330	AN30
	139	195	26	—	150	22330RK+**H2330**	37	220	163	8	49.7	A2330	AN30
	139	195	26	—	150	22330RHAK+**H2330**	37	220	163	8	46.4	A2330	AN30
140	93	190	28	—	160	23032RZK+**H3032**	39	230	168	8	15.0	A3032	ANL32
	119	210	28	—	160	23132RZK+**H3132**	39	230	170	8	27.9	A3132	AN32
	119	210	28	—	160	22232RK+**H3132**	39	230	170	14	30.6	A3132	AN32
	119	210	28	—	160	22232RHAK+**H3132**	39	230	170	14	29.1	A3132	AN32
	147	210	28	—	160	23232RK+**H2332**	39	230	174	18	39.6	A2332	AN32
	147	210	28	—	160	23232RHAK+**H2332**	39	230	174	18	38.0	A2332	AN32
	147	210	28	—	160	22332RK+**H2332**	39	230	174	8	60.5	A2332	AN32
	147	210	28	—	160	22332RHAK+**H2332**	39	230	174	8	56.6	A2332	AN32
150	101	200	29	—	170	23034RZK+**H3034**	40	250	179	8	19.2	A3034	ANL34
	122	220	29	—	170	23134RZK+**H3134**	40	250	180	8	30.0	A3134	AN34
	122	220	29	—	170	22234RK+**H3134**	40	250	180	10	37.2	A3134	AN34
	122	220	29	—	170	22234RHAK+**H3134**	40	250	180	10	35.3	A3134	AN34

d_1 (150) ~ (180) mm



Boundary dimensions (mm)					Brg. bore	Designations	Mounting dimensions (mm)				Mass	(Refer.)	
d_1	B_1	d_2	B_2	B_3	d (mm)	Bearing + **adapter ass'y**	A min.	K min.	d_e min.	b min.	Brg.+adapter ass'y (kg)	Adapter sleeve No.	Locknut No.
150	154	220	29	—	170	23234RRK+**H2334**	40	250	185	18	47.2	A2334	AN34
	154	220	29	—	170	23234RHAK+**H2334**	40	250	185	18	45.3	A2334	AN34
	154	220	29	—	170	22334RK+**H2334**	40	250	185	8	71.5	A2334	AN34
	154	220	29	—	170	22334RHAK+**H2334**	40	250	185	8	66.8	A2334	AN34
160	109	210	30	—	180	23036RZK+**H3036**	41	260	189	8	24.2	A3036	ANL36
	131	230	30	—	180	23136RK+**H3136**	41	260	191	8	37.1	A3136	AN36
	131	230	30	—	180	23136RHAK+**H3136**	41	260	191	8	35.2	A3136	AN36
	131	230	30	—	180	22236RK+**H3136**	41	260	191	18	39.4	A3136	AN36
	131	230	30	—	180	22236RHAK+**H3136**	41	260	191	18	37.4	A3136	AN36
	161	230	30	—	180	23236RRK+**H2336**	41	260	195	22	50.5	A2336	AN36
	161	230	30	—	180	23236RHAK+**H2336**	41	260	195	22	48.4	A2336	AN36
	161	230	30	—	180	22336RK+**H2336**	41	260	195	8	81.8	A2336	AN36
	161	230	30	—	180	22336RHAK+**H2336**	41	260	195	8	76.4	A2336	AN36
170	112	220	31	—	190	23038RK+**H3038**	43	270	199	9	26.1	A3038	ANL38
	112	220	31	—	190	23038RHAK+**H3038**	43	270	199	9	24.5	A3038	ANL38
	141	240	31	—	190	23138RK+**H3138**	43	270	202	9	45.3	A3138	AN38
	141	240	31	—	190	23138RHAK+**H3138**	43	270	202	9	43.0	A3138	AN38
	141	240	31	—	190	22238RK+**H3138**	43	270	202	21	47.5	A3138	AN38
	141	240	31	—	190	22238RHAK+**H3138**	43	270	202	21	45.0	A3138	AN38
	169	240	31	—	190	23238RRK+**H2338**	43	270	206	21	59.2	A2338	AN38
	169	240	31	—	190	23238RHAK+**H2338**	43	270	206	21	56.7	A2338	AN38
	169	240	31	—	190	22338RK+**H2338**	43	270	206	9	95.6	A2338	AN38
	169	240	31	—	190	22338RHAK+**H2338**	43	270	206	9	89.2	A2338	AN38
180	120	240	32	—	200	23040RK+**H3040**	46	280	210	10	32.8	A3040	ANL40
	120	240	32	—	200	23040RHAK+**H3040**	46	280	210	10	30.7	A3040	ANL40
	150	250	32	—	200	23140RRK+**H3140**	46	280	212	10	54.7	A3140	AN40
	150	250	32	—	200	23140RHAK+**H3140**	46	280	212	10	51.8	A3140	AN40
	150	250	32	—	200	22240RRK+**H3140**	46	280	212	24	56.3	A3140	AN40

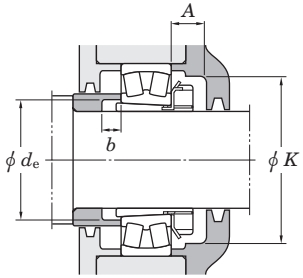
d_1 (180) ~ (240) mm



$d_1 \leq 180$ mm $\quad$ $d_1 \geq 200$ mm

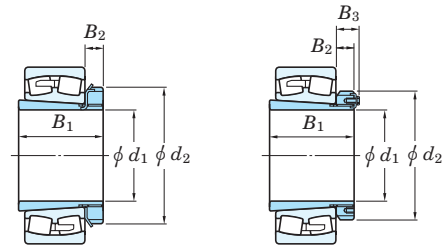
Boundary dimensions (mm)					Brg. bore	Designations	Mounting dimensions (mm)				Mass	(Refer.)	
d_1	B_1	d_2	B_2	B_3	d (mm)	Bearing + **adapter ass'y**	A min.	K min.	d_e min.	b min.	Brg.+adapter ass'y (kg)	Adapter sleeve No.	Locknut No.
180	150	250	32	—	200	22240RHAK+**H3140**	46	280	212	24	53.3	A3140	AN40
	176	250	32	—	200	23240RK+**H2340**	46	280	216	20	71.0	A2340	AN40
	176	250	32	—	200	23240RHAK+**H2340**	46	280	216	20	68.0	A2340	AN40
	176	250	32	—	200	22340RK+**H2340**	46	280	216	10	108	A2340	AN40
	176	250	32	—	200	22340RHAK+**H2340**	46	280	216	10	101	A2340	AN40
200	128	260	30	41	220	23044RK+**H3044**	—	—	231	12	41.4	A3044	ANL44
	128	260	30	41	220	23044RHAK+**H3044**	—	—	231	12	38.7	A3044	ANL44
	158	280	32	44	220	23144RK+**H3144**	—	—	233	10	68.4	A3144	AN44
	158	280	32	44	220	23144RHAK+**H3144**	—	—	233	10	64.8	A3144	AN44
	158	280	32	44	220	22244RRK+**H3144**	—	—	233	22	76.9	A3144	AN44
	158	280	32	44	220	22244RHAK+**H3144**	—	—	233	22	72.7	A3144	AN44
	183	280	32	44	220	23244RK+**H2344**	—	—	236	11	96.5	A2344	AN44
	183	280	32	44	220	23244RHAK+**H2344**	—	—	236	11	92.3	A2344	AN44
	183	280	32	44	220	22344RK+**H2344**	—	—	236	10	139	A2344	AN44
	183	280	32	44	220	22344RHAK+**H2344**	—	—	236	10	130	A2344	AN44
220	133	290	34	46	240	23048RRK+**H3048**	—	—	251	11	47.7	A3048	ANL48
	133	290	34	46	240	23048RHAK+**H3048**	—	—	251	11	44.8	A3048	ANL48
	169	300	34	46	240	23148RRK+**H3148**	—	—	254	11	83.6	A3148	AN48
	169	300	34	46	240	23148RHAK+**H3148**	—	—	254	11	79.1	A3148	AN48
	169	300	34	46	240	22248RK+**H3148**	—	—	254	19	101	A3148	AN48
	169	300	34	46	240	22248RHAK+**H3148**	—	—	254	19	95.6	A3148	AN48
	196	300	34	46	240	23248RRK+**H2348**	—	—	257	6	128	A2348	AN48
	196	300	34	46	240	23248RHAK+**H2348**	—	—	257	6	122	A2348	AN48
	196	300	34	46	240	22348RK+**H2348**	—	—	257	11	175	A2348	AN48
	196	300	34	46	240	22348RHAK+**H2348**	—	—	257	11	163	A2348	AN48
240	147	310	34	46	260	23052RK+**H3052**	—	—	272	13	65.4	A3052	ANL52
	147	310	34	46	260	23052RHAK+**H3052**	—	—	272	13	61.0	A3052	ANL52
	187	330	36	49	260	23152RRK+**H3152**	—	—	276	11	114	A3152	AN52

d_1 (240) ~ (300) mm



Boundary dimensions (mm)					Brg. bore	Designations	Mounting dimensions (mm)				Mass	(Refer.)	
d_1	B_1	d_2	B_2	B_3	d (mm)	Bearing + **adapter ass'y**	A min.	K min.	d_e min.	b min.	Brg.+adapter ass'y (kg)	Adapter sleeve No.	Locknut No.
240	187	330	36	49	260	23152RHAK+**H3152**	—	—	276	11	108	A3152	AN52
	187	330	36	49	260	22252RK+**H3152**	—	—	276	25	131	A3152	AN52
	187	330	36	49	260	22252RHAK+**H3152**	—	—	276	25	124	A3152	AN52
	208	330	36	49	260	23252RK+**H2352**	—	—	278	2	165	A2352	AN52
	208	330	36	49	260	23252RHAK+**H2352**	—	—	278	2	158	A2352	AN52
	208	330	36	49	260	22352RK+**H2352**	—	—	278	11	217	A2352	AN52
	208	330	36	49	260	22352RHAK+**H2352**	—	—	278	11	202	A2352	AN52
260	152	330	38	50	280	23056RK+**H3056**	—	—	292	12	71.5	A3056	ANL56
	152	330	38	50	280	23056RHAK+**H3056**	—	—	292	12	66.8	A3056	ANL56
	192	350	38	51	280	23156RRK+**H3156**	—	—	296	12	123	A3156	AN56
	192	350	38	51	280	23156RHAK+**H3156**	—	—	296	12	116	A3156	AN56
	192	350	38	51	280	22256RK+**H3156**	—	—	296	28	138	A3156	AN56
	192	350	38	51	280	22256RHAK+**H3156**	—	—	296	28	130	A3156	AN56
	221	350	38	51	280	23256RK+**H2356**	—	—	299	11	178	A2356	AN56
	221	350	38	51	280	23256RHAK+**H2356**	—	—	299	11	170	A2356	AN56
	221	350	38	51	280	22356RK+**H2356**	—	—	299	12	254	A2356	AN56
	221	350	38	51	280	22356RHAK+**H2356**	—	—	299	12	237	A2356	AN56
280	168	360	42	54	300	23060RK+**H3060**	—	—	313	12	97.7	A3060	ANL60
	168	360	42	54	300	23060RHAK+**H3060**	—	—	313	12	90.8	A3060	ANL60
	208	380	40	53	300	23160RRK+**H3160**	—	—	317	12	159	A3160	AN60
	208	380	40	53	300	23160RHAK+**H3160**	—	—	317	12	150	A3160	AN60
	208	380	40	53	300	22260RK+**H3160**	—	—	317	32	173	A3160	AN60
	208	380	40	53	300	22260RHAK+**H3160**	—	—	317	32	163	A3160	AN60
	240	380	40	53	300	23260RK+**H3260**	—	—	321	12	227	A3260	AN60
	240	380	40	53	300	23260RHAK+**H3260**	—	—	321	12	217	A3260	AN60
300	171	380	42	55	320	23064RK+**H3064**	—	—	334	13	105	A3064	ANL64
	171	380	42	55	320	23064RHAK+**H3064**	—	—	334	13	98.1	A3064	ANL64
	226	400	42	56	320	23164RK+**H3164**	—	—	339	13	202	A3164	AN64

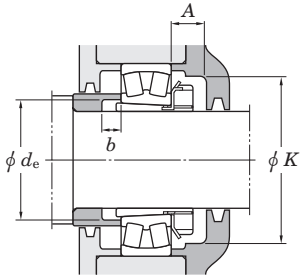
d_1 (300) ~ 380 mm



$d_1 \leq 180$ mm　　$d_1 \geq 200$ mm

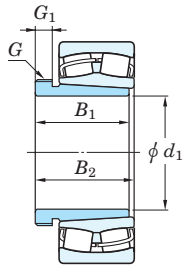
Boundary dimensions (mm)					Brg. bore	Designations	Mounting dimensions (mm)				Mass	(Refer.)	
d_1	B_1	d_2	B_2	B_3	d (mm)	Bearing + **adapter ass'y**	A min.	K min.	d_e min.	b min.	Brg.+adapter ass'y (kg)	Adapter sleeve No.	Locknut No.
300	226	400	42	56	320	23164RHAK+**H3164**	—	—	339	13	191	A3164	AN64
	226	400	42	56	320	22264RK+**H3164**	—	—	339	39	207	A3164	AN64
	258	400	42	56	320	23264RK+**H3264**	—	—	343	13	283	A3264	AN64
	258	400	42	56	320	23264RHAK+**H3264**	—	—	343	13	270	A3264	AN64
320	187	400	45	58	340	23068RK+**H3068**	—	—	355	14	135	A3068	ANL68
	187	400	45	58	340	23068RHAK+**H3068**	—	—	355	14	126	A3068	ANL68
	254	440	55	72	340	23168RK+**H3168**	—	—	360	14	262	A3168	AN68
	254	440	55	72	340	23168RHAK+**H3168**	—	—	360	14	248	A3168	AN68
	288	440	55	72	340	23268RK+**H3268**	—	—	364	14	355	A3268	AN68
	288	440	55	72	340	23268RHAK+**H3268**	—	—	364	14	339	A3268	AN68
340	188	420	45	58	360	23072RK+**H3072**	—	—	375	14	143	A3072	ANL72
	188	420	45	58	360	23072RHAK+**H3072**	—	—	375	14	133	A3072	ANL72
	259	460	58	75	360	23172RK+**H3172**	—	—	380	14	278	A3172	AN72
	259	460	58	75	360	23172RHAK+**H3172**	—	—	380	14	263	A3172	AN72
	299	460	58	75	360	23272RK+**H3272**	—	—	385	14	400	A3272	AN72
	299	460	58	75	360	23272RHAK+**H3272**	—	—	385	14	382	A3272	AN72
360	193	450	48	62	380	23076RK+**H3076**	—	—	396	15	156	A3076	ANL76
	193	450	48	62	380	23076RHAK+**H3076**	—	—	396	15	146	A3076	ANL76
	264	490	60	77	380	23176RK+**H3176**	—	—	401	15	298	A3176	AN76
	264	490	60	77	380	23176RHAK+**H3176**	—	—	401	15	282	A3176	AN76
	310	490	60	77	380	23276RK+**H3276**	—	—	405	15	448	A3276	AN76
	310	490	60	77	380	23276RHAK+**H3276**	—	—	405	15	427	A3276	AN76
380	210	470	52	66	400	23080RK+**H3080**	—	—	417	15	195	A3080	ANL80
	210	470	52	66	400	23080RHAK+**H3080**	—	—	417	15	182	A3080	ANL80
	272	520	62	82	400	23180RK+**H3180**	—	—	421	15	339	A3180	AN80
	272	520	62	82	400	23180RHAK+**H3180**	—	—	421	15	321	A3180	AN80
	328	520	62	82	400	23280RK+**H3280**	—	—	427	15	539	A3280	AN80
	328	520	62	82	400	23280RHAK+**H3280**	—	—	427	15	512	A3280	AN80

d_1 400 ~ 470 mm



Boundary dimensions (mm)					Brg. bore	Designations	Mounting dimensions (mm)				Mass	(Refer.)	
d_1	B_1	d_2	B_2	B_3	d (mm)	Bearing + **adapter ass'y**	A min.	K min.	d_e min.	b min.	Brg.+adapter ass'y (kg)	Adapter sleeve No.	Locknut No.
400	212	490	52	66	420	23084RK+**H3084**	—	—	437	16	205	A3084	ANL84
	212	490	52	66	420	23084RHAK+**H3084**	—	—	437	16	191	A3084	ANL84
	304	540	70	90	420	23184RK+**H3184**	—	—	443	16	441	A3184	AN84
	304	540	70	90	420	23184RHAK+**H3184**	—	—	443	16	417	A3184	AN84
	352	540	70	90	420	23284RK+**H3284**	—	—	448	16	639	A3284	AN84
	352	540	70	90	420	23284RHAK+**H3284**	—	—	448	16	607	A3284	AN84
410	228	520	60	77	440	23088RK+**H3088**	—	—	458	17	252	A3088	ANL88
	228	520	60	77	440	23088RHAK+**H3088**	—	—	458	17	236	A3088	ANL88
	307	560	70	90	440	23188RK+**H3188**	—	—	464	17	474	A3188	AN88
	307	560	70	90	440	23188RHAK+**H3188**	—	—	464	17	449	A3188	AN88
	361	560	70	90	440	23288RK+**H3288**	—	—	469	17	718	A3288	AN88
	361	560	70	90	440	23288RHAK+**H3288**	—	—	469	17	685	A3288	AN88
430	234	540	60	77	460	23092RK+**H3092**	—	—	478	17	283	A3092	ANL92
	234	540	60	77	460	23092RHAK+**H3092**	—	—	478	17	265	A3092	ANL92
	326	580	75	95	460	23192RK+**H3192**	—	—	485	17	559	A3192	AN92
	326	580	75	95	460	23192RHAK+**H3192**	—	—	485	17	529	A3192	AN92
	382	580	75	95	460	23292RK+**H3292**	—	—	491	17	838	A3292	AN92
	382	580	75	95	460	23292RHAK+**H3292**	—	—	491	17	797	A3292	AN92
450	237	560	60	77	480	23096RK+**H3096**	—	—	499	18	295	A3096	ANL96
	237	560	60	77	480	23096RHAK+**H3096**	—	—	499	18	276	A3096	ANL96
	335	620	75	95	480	23196RK+**H3196**	—	—	505	18	628	A3196	AN96
	335	620	75	95	480	23196RHAK+**H3196**	—	—	505	18	595	A3196	AN96
	397	620	75	95	480	23296RK+**H3296**	—	—	512	18	966	A3296	AN96
	397	620	75	95	480	23296RHAK+**H3296**	—	—	512	18	920	A3296	AN96
470	247	580	68	85	500	230/500RK+**H30/500**	—	—	519	18	315	A30/500	ANL100
	356	630	80	100	500	231/500RK+**H31/500**	—	—	527	18	727	A31/500	AN100
	428	630	80	100	500	232/500RK+**H32/500**	—	—	534	18	1 167	A32/500	AN100

d_1 35 ~ (75) mm



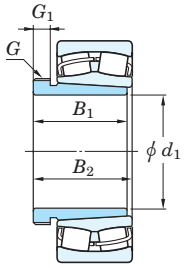
d_1	Boundary dimensions (mm) B_1	B_2	G [1] Screw size	G_1	Brg. bore d (mm)	Designations Bearing + withdrawal sleeve	Mass Brg.+withdrawal sleeve (kg)	(Refer.) Applicable locknut No.
35	29	32	M45×1.5	6	40	22208RZK+**AH308**	0.681	AN09
	29	32	M45×1.5	6	40	21308RZK+**AH308**	0.860	AN09
	40	43	M45×1.5	7	40	22308RZK+**AH2308**	1.19	AN09
40	31	34	M50×1.5	6	45	22209RZK+**AH309**	0.699	AN10
	31	34	M50×1.5	6	45	21309RZK+**AH309**	1.14	AN10
	44	47	M50×1.5	7	45	22309RZK+**AH2309**	1.55	AN10
45	35	38	M55×2	7	50	22210RZK+**AHX310**	0.771	AN11
	35	38	M55×2	7	50	21310RZK+**AHX310**	1.49	AN11
	50	53	M55×2	9	50	22310RZK+**AHX2310**	2.09	AN11
50	37	40	M60×2	7	55	22211RZK+**AHX311**	1.01	AN12
	37	40	M60×2	7	55	21311RZK+**AHX311**	1.83	AN12
	54	57	M60×2	10	55	22311RZK+**AHX2311**	2.60	AN12
55	40	43	M65×2	8	60	22212RZK+**AHX312**	1.35	AN13
	40	43	M65×2	8	60	21312RZK+**AHX312**	2.27	AN13
	58	61	M65×2	11	60	22312RZK+**AHX2312**	3.29	AN13
60	42	45	M75×2	8	65	22213RZK+**AH313**	1.77	AN15
	42	45	M75×2	8	65	21313RZK+**AH313**	2.84	AN15
	61	64	M75×2	12	65	22313RZK+**AH2313**	3.98	AN15
65	43	47	M80×2	8	70	22214RZK+**AH314**	1.89	AN16
	43	47	M80×2	8	70	21314RZK+**AH314**	3.43	AN16
	64	68	M80×2	12	70	22314RZK+**AHX2314**	4.82	AN16
70	45	49	M85×2	8	75	22215RZK+**AH315**	2.01	AN17
	45	49	M85×2	8	75	21315RZK+**AH315**	4.07	AN17
	68	72	M85×2	12	75	22315RZK+**AHX2315**	5.87	AN17
75	48	52	M90×2	8	80	22216RZK+**AH316**	2.49	AN18
	48	52	M90×2	8	80	21316RZK+**AH316**	4.83	AN18

[Note] 1) Basic profile and dimensions of screw thread identified by prefix M are in accordance with JIS B 0205.
Basic profile and dimensions of screw thread identified by prefix Tr are in accordance with JIS B 0216.

d_1 (75) ~ (115) mm

d_1	Boundary dimensions (mm) B_1	B_2	G [1] Screw size	G_1	Brg. bore d (mm)	Designations Bearing + withdrawal sleeve	Mass Brg.+withdrawal sleeve (kg)	(Refer.) Applicable locknut No.
75	71	75	M90×2	12	80	22316RZK+**AHX2316**	6.90	AN18
80	52	56	M95×2	9	85	22217RZK+**AHX317**	3.12	AN19
	52	56	M95×2	9	85	21317RZK+**AHX317**	5.68	AN19
	74	78	M95×2	13	85	22317RZK+**AHX2317**	7.98	AN19
85	53	57	M100×2	9	90	22218RZK+**AHX318**	3.89	AN20
	63	67	M100×2	10	90	23218RZK+**AHX3218**	5.08	AN20
	53	57	M100×2	9	90	21318RZK+**AHX318**	6.58	AN20
	79	83	M100×2	14	90	22318RZK+**AHX2318**	9.41	AN20
90	57	61	M105×2	10	95	22219RZK+**AHX319**	4.68	AN21
	57	61	M105×2	10	95	21319RZK+**AHX319**	7.59	AN21
	85	89	M105×2	16	95	22319RZK+**AHX2319**	10.9	AN21
95	59	63	M110×2	10	100	22220RZK+**AHX320**	5.58	AN22
	73	77	M110×2	11	100	23220RZK+**AHX3220**	7.43	AN22
	59	63	M110×2	10	100	21320RZK+**AHX320**	9.26	AN22
	90	94	M110×2	16	100	22320RZK+**AHX2320**	13.9	AN22
105	68	72	M120×2	11	110	23122RZK+**AHX3122**	6.30	AN24
	82	91	M115×2	13	110	24122RZK30+**AH24122**	7.60	AN23
	68	72	M120×2	11	110	22222RZK+**AHX3122**	7.97	AN24
	82	86	M125×2	11	110	23222RZK+**AHX3222**	10.5	AN25
	63	67	M120×2	12	110	21322RZK+**AHX322**	12.3	AN24
	98	102	M125×2	16	110	22322RZK+**AHX2322**	19.1	AN25
115	60	64	M130×2	13	120	23024RZK+**AHX3024**	4.82	AN26
	73	82	M125×2	13	120	24024RZK30+**AH24024**	5.99	AN25
	75	79	M130×2	12	120	23124RZK+**AHX3124**	8.69	AN26
	93	102	M130×2	13	120	24124RZK30+**AH24124**	11.0	AN26
	75	79	M130×2	12	120	22224RZK+**AHX3124**	10.1	AN26

d_1 (115) ~ (150) mm



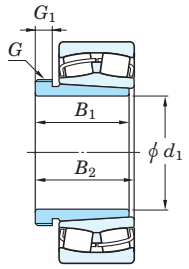
Boundary dimensions (mm)					Brg. bore	Designations	Mass	(Refer.)
d_1	B_1	B_2	G [1] Screw size	G_1	d (mm)	Bearing + **withdrawal sleeve**	Brg.+withdrawal sleeve (kg)	**Applicable locknut No.**
115	90	94	M135×2	13	120	23224RZK+**AHX3224**	13.1	AN27
	105	109	M135×2	17	120	22324RZK+**AHX2324**	23.9	AN27
125	67	71	M140×2	14	130	23026RZK+**AHX3026**	6.90	AN28
	83	93	M135×2	14	130	24026RZK30+**AH24026**	8.74	AN27
	78	82	M140×2	12	130	23126RZK+**AHX3126**	9.52	AN28
	94	104	M140×2	14	130	24126RZK30+**AH24126**	11.7	AN28
	78	82	M140×2	12	130	22226RZK+**AHX3126**	12.4	AN28
	98	102	M145×2	15	130	23226RZK+**AHX3226**	15.6	AN29
	115	119	M145×2	19	130	22326RZK+**AHX2326**	29.9	AN29
135	68	73	M150×2	14	140	23028RZK+**AHX3028**	7.43	AN30
	83	93	M145×2	14	140	24028RZK30+**AH24028**	9.26	AN29
	83	88	M150×2	14	140	23128RZK+**AHX3128**	11.5	AN30
	99	109	M150×2	14	140	24128RZK30+**AH24128**	14.1	AN30
	83	88	M150×2	14	140	22228RZK+**AHX3128**	15.4	AN30
	104	109	M155×3	15	140	23228RZK+**AHX3228**	20.3	AN31
	125	130	M155×3	20	140	22328RZK+**AHX2328**	35.0	AN31
145	72	77	M160×3	15	150	23030RZK+**AHX3030**	8.92	AN32
	90	101	M155×3	15	150	24030RZK30+**AH24030**	11.4	AN31
	96	101	M165×3	15	150	23130RZK+**AHX3130**	17.7	AN33
	115	126	M160×3	15	150	24130RZK30+**AH24130**	21.2	AN32
	96	101	M165×3	15	150	22230RZK+**AHX3130**	20.3	AN33
	114	119	M165×3	17	150	23230RZK+**AHX3230**	26.0	AN33
	135	140	M165×3	24	150	22330RK+**AHX2330**	45.5	AN33
	135	140	M165×3	24	150	22330RHAK+**AHX2330**	42.2	AN33
150	77	82	M170×3	16	160	23032RZK+**AH3032**	11.5	AN34
	95	106	M170×3	15	160	24032RZK30+**AH24032**	15.0	AN34
	103	108	M180×3	16	160	23132RZK+**AH3132**	23.4	AN36

[Note] 1) Basic profile and dimensions of screw thread identified by prefix M are in accordance with JIS B 0205.
Basic profile and dimensions of screw thread identified by prefix Tr are in accordance with JIS B 0216.

d_1 (150) ~ 170 mm

Boundary dimensions (mm)					Brg. bore	Designations	Mass	(Refer.)
d_1	B_1	B_2	G [1] Screw size	G_1	d (mm)	Bearing + **withdrawal sleeve**	Brg.+withdrawal sleeve (kg)	**Applicable locknut No.**
150	103	108	M180×3	16	160	22232RK+**AH3132**	26.1	AN36
	103	108	M180×3	16	160	22232RHAK+**AH3132**	24.6	AN36
	124	130	M180×3	20	160	23232RK+**AH3232**	35.1	AN36
	124	130	M180×3	20	160	23232RHAK+**AH3232**	32.6	AN36
	140	146	M180×3	24	160	22332RK+**AH2332**	55.7	AN36
	140	146	M180×3	24	160	22332RHAK+**AH2332**	51.8	AN36
160	85	90	M180×3	17	170	23034RZK+**AH3034**	15.2	AN36
	106	117	M180×3	16	170	24034RZK30+**AH24034**	20.0	AN36
	104	109	M190×3	16	170	23134RZK+**AH3134**	24.6	AN38
	125	136	M180×3	16	170	24134RRK30+**AH24134**	30.0	AN36
	104	109	M190×3	16	170	22234RK+**AH3134**	31.8	AN38
	104	109	M190×3	16	170	22234RHAK+**AH3134**	29.9	AN38
	134	140	M190×3	24	170	23234RRK+**AH3234**	42.3	AN38
	134	140	M190×3	24	170	23234RHAK+**AH3234**	39.4	AN38
	146	152	M190×3	24	170	22334RK+**AH2334**	66.1	AN38
	146	152	M190×3	24	170	22334RHAK+**AH2334**	61.4	AN38
170	92	98	M190×3	17	180	23036RZK+**AH3036**	19.7	AN38
	116	127	M190×3	16	180	24036RRK30+**AH24036**	26.1	AN38
	116	122	M200×3	19	180	23136RK+**AH3136**	31.7	AN40
	116	122	M200×3	19	180	23136RHAK+**AH3136**	29.8	AN40
	134	145	M190×3	16	180	24136RRK30+**AH24136**	37.6	AN38
	134	145	M190×3	16	180	24136RHAK30+**AH24136**	34.9	AN38
	105	110	M200×3	17	180	22236RK+**AH2236**	33.5	AN40
	105	110	M200×3	17	180	22236RHAK+**AH2236**	31.5	AN40
	140	146	M200×3	24	180	23236RRK+**AH3236**	45.1	AN40
	140	146	M200×3	24	180	23236RHAK+**AH3236**	41.8	AN40
	154	160	M200×3	24	180	22336RK+**AH2336**	75.7	AN40
	154	160	M200×3	24	180	22336RHAK+**AH2336**	70.3	AN40

d_1 180 ~ 190 mm



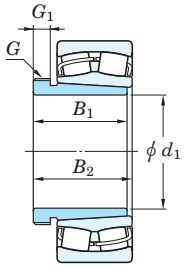
d_1	Boundary dimensions (mm) B_1	B_2	G [1] Screw size	G_1	Brg. bore d (mm)	Designations Bearing + withdrawal sleeve	Mass Brg.+withdrawal sleeve (kg)	(Refer.) Applicable locknut No.
180	96	102	Tr205×4	18	190	23038RK+**AH3038**	21.5	HNL41
	96	102	Tr205×4	18	190	23038RHAK+**AH3038**	19.9	HNL41
	118	131	M200×3	18	190	24038RRK30+**AH24038**	27.6	AN40
	118	131	M200×3	18	190	24038RHAK30+**AH24038**	25.5	AN40
	125	131	Tr210×4	20	190	23138RK+**AH3138**	39.3	HN42
	125	131	Tr210×4	20	190	23138RHAK+**AH3138**	37.0	HN42
	146	159	M200×3	18	190	24138RRK30+**AH24138**	46.7	AN40
	146	159	M200×3	18	190	24138RHAK30+**AH24138**	43.8	AN40
	112	117	Tr210×4	18	190	22238RK+**AH2238**	40.9	HN42
	112	117	Tr210×4	18	190	22238RHAK+**AH2238**	38.4	HN42
	145	152	Tr210×4	25	190	23238RRK+**AH3238**	53.3	HN42
	145	152	Tr210×4	25	190	23238RHAK+**AH3238**	49.4	HN42
	160	167	Tr210×4	26	190	22338RK+**AH2338**	89.0	HN42
	160	167	Tr210×4	26	190	22338RHAK+**AH2338**	82.6	HN42
190	102	108	Tr215×4	19	200	23040RK+**AH3040**	27.2	HNL43
	102	108	Tr215×4	19	200	23040RHAK+**AH3040**	25.1	HNL43
	127	140	Tr210×4	18	200	24040RRK30+**AH24040**	34.6	HN42
	127	140	Tr210×4	18	200	24040RHAK30+**AH24040**	31.9	HN42
	134	140	Tr220×4	21	200	23140RRK+**AH3140**	47.9	HN44
	134	140	Tr220×4	21	200	23140RHAK+**AH3140**	45.0	HN44
	158	171	Tr210×4	18	200	24140RRK30+**AH24140**	57.6	HN42
	158	171	Tr210×4	18	200	24140RHAK30+**AH24140**	53.8	HN42
	118	123	Tr220×4	19	200	22240RRK+**AH2240**	48.7	HN44
	118	123	Tr220×4	19	200	22240RHAK+**AH2240**	45.7	HN44
	153	160	Tr220×4	25	200	23240RK+**AH3240**	64.7	HN44
	153	160	Tr220×4	25	200	23240RHAK+**AH3240**	60.1	HN44
	170	177	Tr220×4	26	200	22340RK+**AH2340**	101	HN44
	170	177	Tr220×4	26	200	22340RHAK+**AH2340**	93.4	HN44

[Note] 1) Basic profile and dimensions of screw thread identified by prefix M are in accordance with JIS B 0205.
Basic profile and dimensions of screw thread identified by prefix Tr are in accordance with JIS B 0216.

d_1 200 ~ 220 mm

d_1	Boundary dimensions (mm) B_1	B_2	G [1] Screw size	G_1	Brg. bore d (mm)	Designations Bearing + withdrawal sleeve	Mass Brg.+withdrawal sleeve (kg)	(Refer.) Applicable locknut No.
200	111	117	Tr235×4	20	220	23044RK+**AH3044**	38.0	HNL47
	111	117	Tr235×4	20	220	23044RHAK+**AH3044**	35.3	HNL47
	138	152	Tr230×4	20	220	24044RRK30+**AH24044**	48.1	—
	138	152	Tr230×4	20	220	24044RHAK30+**AH24044**	44.7	—
	145	151	Tr240×4	23	220	23144RK+**AH3144**	63.6	HN48
	145	151	Tr240×4	23	220	23144RHAK+**AH3144**	60.0	HN48
	170	184	Tr230×4	20	220	24144RRK30+**AH24144**	76.4	—
	170	184	Tr230×4	20	220	24144RHAK30+**AH24144**	71.2	—
	130	136	Tr240×4	20	220	22244RRK+**AH2244**	70.8	HN48
	130	136	Tr240×4	20	220	22244RHAK+**AH2244**	66.6	HN48
	181	189	Tr240×4	30	220	23244RK+**AH2344**	95.1	HN48
	181	189	Tr240×4	30	220	23244RHAK+**AH2344**	88.5	HN48
	181	189	Tr240×4	30	220	22344RK+**AH2344**	136	HN48
	181	189	Tr240×4	30	220	22344RHAK+**AH2344**	127	HN48
220	116	123	Tr260×4	21	240	23048RRK+**AH3048**	42.6	HNL52
	116	123	Tr260×4	21	240	23048RHAK+**AH3048**	39.7	HNL52
	138	153	Tr250×4	20	240	24048RRK30+**AH24048**	51.9	—
	138	153	Tr250×4	20	240	24048RHAK30+**AH24048**	48.0	—
	154	161	Tr260×4	25	240	23148RRK+**AH3148**	77.6	HN52
	154	161	Tr260×4	25	240	23148RHAK+**AH3148**	73.1	HN52
	180	195	Tr260×4	20	240	24148RRK30+**AH24148**	94.0	HN52
	180	195	Tr260×4	20	240	24148RHAK30+**AH24148**	87.9	HN52
	144	150	Tr260×4	21	240	22248RK+**AH2248**	94.3	HN52
	144	150	Tr260×4	21	240	22248RHAK+**AH2248**	88.7	HN52
	189	197	Tr260×4	30	240	23248RRK+**AH2348**	126	HN52
	189	197	Tr260×4	30	240	23248RHAK+**AH2348**	117	HN52
	189	197	Tr260×4	30	240	22348RK+**AH2348**	170	HN52
	189	197	Tr260×4	30	240	22348RHAK+**AH2348**	158	HN52

d_1 240 ~ 260 mm



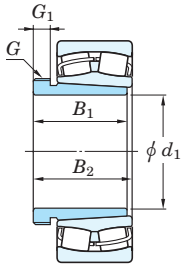
d_1	Boundary dimensions (mm) B_1	B_2	G [1] Screw size	G_1	Brg. bore d (mm)	Designations Bearing + withdrawal sleeve	Mass Brg.+withdrawal sleeve (kg)	(Refer.) Applicable locknut No.
240	128	135	Tr280×4	23	260	23052RK+**AH3052**	60.0	HNL56
	128	135	Tr280×4	23	260	23052RHAK+**AH3052**	55.6	HNL56
	162	178	Tr270×4	22	260	24052RRK30+**AH24052**	77.0	—
	162	178	Tr270×4	22	260	24052RHAK30+**AH24052**	71.2	—
	172	179	Tr290×4	26	260	23152RK+**AH3152**	107	HN58
	172	179	Tr290×4	26	260	23152RHAK+**AH3152**	101	HN58
	202	218	Tr280×4	22	260	24152RRK30+**AH24152**	128	—
	202	218	Tr280×4	22	260	24152RHAK30+**AH24152**	120	—
	155	161	Tr290×4	23	260	22252RK+**AH2252**	122	HN58
	155	161	Tr290×4	23	260	22252RHAK+**AH2252**	115	HN58
	205	213	Tr290×4	30	260	23252RK+**AH2352**	164	HN58
	205	213	Tr290×4	30	260	23252RHAK+**AH2352**	153	HN58
	205	213	Tr290×4	30	260	22352RK+**AH2352**	212	HN58
	205	213	Tr290×4	30	260	22352RHAK+**AH2352**	197	HN58
260	131	139	Tr300×4	24	280	23056RK+**AH3056**	64.9	HNL60
	131	139	Tr300×4	24	280	23056RHAK+**AH3056**	60.2	HNL60
	162	179	Tr290×4	22	280	24056RRK30+**AH24056**	81.9	HN58
	162	179	Tr290×4	22	280	24056RHAK30+**AH24056**	75.7	HN58
	175	183	Tr310×5	28	280	23156RRK+**AH3156**	114	HN62
	175	183	Tr310×5	28	280	23156RHAK+**AH3156**	108	HN62
	202	219	Tr300×4	22	280	24156RRK30+**AH24156**	136	—
	202	219	Tr300×4	22	280	24156RHAK30+**AH24156**	128	—
	155	163	Tr310×5	24	280	22256RK+**AH2256**	127	HN62
	155	163	Tr310×5	24	280	22256RHAK+**AH2256**	119	HN62
	212	220	Tr310×5	30	280	23256RK+**AH2356**	175	HN62
	212	220	Tr310×5	30	280	23256RHAK+**AH2356**	163	HN62
	212	220	Tr310×5	30	280	22356RK+**AH2356**	247	HN62
	212	220	Tr310×5	30	280	22356RHAK+**AH2356**	230	HN62

[Note] 1) Basic profile and dimensions of screw thread identified by prefix M are in accordance with JIS B 0205.
Basic profile and dimensions of screw thread identified by prefix Tr are in accordance with JIS B 0216.

d_1 280 ~ (320) mm

d_1	Boundary dimensions (mm) B_1	B_2	G [1] Screw size	G_1	Brg. bore d (mm)	Designations Bearing + withdrawal sleeve	Mass Brg.+withdrawal sleeve (kg)	(Refer.) Applicable locknut No.
280	145	153	Tr320×5	26	300	23060RK+**AH3060**	88.1	HNL64
	145	153	Tr320×5	26	300	23060RHAK+**AH3060**	81.2	HNL64
	184	202	Tr310×5	24	300	24060RRK30+**AH24060**	112	HN62
	184	202	Tr310×5	24	300	24060RHAK30+**AH24060**	105	HN62
	192	200	Tr330×5	30	300	23160RRK+**AH3160**	149	HN66
	192	200	Tr330×5	30	300	23160RHAK+**AH3160**	140	HN66
	224	242	Tr320×5	24	300	24160RRK30+**AH24160**	180	—
	224	242	Tr320×5	24	300	24160RHAK30+**AH24160**	168	—
	170	178	Tr330×5	26	300	22260RK+**AH2260**	160	HN66
	170	178	Tr330×5	26	300	22260RHAK+**AH2260**	150	HN66
	228	236	Tr330×5	34	300	23260RK+**AH3260**	223	HN66
	228	236	Tr330×5	34	300	23260RHAK+**AH3260**	208	HN66
300	149	157	Tr345×5	27	320	23064RK+**AH3064**	94.8	HNL69
	149	157	Tr345×5	27	320	23064RHAK+**AH3064**	88.1	HNL69
	184	202	Tr330×5	24	320	24064RRK30+**AH24064**	120	HN66
	184	202	Tr330×5	24	320	24064RHAK30+**AH24064**	108	HN66
	209	217	Tr350×5	31	320	23164RK+**AH3164**	191	HN70
	209	217	Tr350×5	31	320	23164RHAK+**AH3164**	180	HN70
	242	260	Tr340×5	24	320	24164RRK30+**AH24164**	226	—
	242	260	Tr340×5	24	320	24164RHAK30+**AH24164**	217	—
	180	190	Tr350×5	27	320	22264RK+**AH2264**	191	HN70
	246	254	Tr350×5	36	320	23264RK+**AH3264**	280	HN70
	246	254	Tr350×5	36	320	23264RHAK+**AH3264**	260	HN70
320	162	171	Tr365×5	28	340	23068RK+**AH3068**	125	HNL73
	162	171	Tr365×5	28	340	23068RHAK+**AH3068**	115	HNL73
	225	234	Tr370×5	33	340	23168RK+**AH3168**	239	HN74
	225	234	Tr370×5	33	340	23168RHAK+**AH3168**	225	HN74
	269	288	Tr360×5	26	340	24168RRK30+**AH24168**	293	—

d_1 (320) ~ 380 mm



Boundary dimensions (mm) d_1	B_1	B_2	G [1] Screw size	G_1	Brg. bore d (mm)	Designations Bearing + withdrawal sleeve	Mass Brg.+withdrawal sleeve (kg)	(Refer.) Applicable locknut No.
320	269	288	Tr360×5	26	340	24168RHAK30+**AH24168**	282	—
	264	273	Tr370×5	38	340	23268RK+**AH3268**	342	HN74
	264	273	Tr370×5	38	340	23268RHAK+**AH3268**	317	HN74
340	167	176	Tr385×5	30	360	23072RK+**AH3072**	132	HNL77
	167	176	Tr385×5	30	360	23072RHAK+**AH3072**	122	HNL77
	229	238	Tr400×5	35	360	23172RK+**AH3172**	254	HN80
	232	238	Tr400×5	35	360	23172RHAK+**AH3172**	239	HN80
	269	289	Tr380×5	26	360	24172RK30+**AH24172**	313	—
	269	289	Tr380×5	26	360	24172RHAK30+**AH24172**	300	—
	274	283	Tr400×5	40	360	23272RK+**AH3272**	388	HN80
	274	283	Tr400×5	40	360	23272RHAK+**AH3272**	360	HN80
360	170	180	Tr410×5	31	380	23076RK+**AH3076**	141	HNL82
	170	180	Tr410×5	31	380	23076RHAK+**AH3076**	131	HNL82
	232	242	Tr420×5	36	380	23176RK+**AH3176**	269	HN84
	240	242	Tr420×5	36	380	23176RHAK+**AH3176**	253	HN84
	271	291	Tr400×5	28	380	24176RK30+**AH24176**	328	HN80
	271	291	Tr400×5	28	380	24176RHAK30+**AH24176**	314	HN80
	284	294	Tr420×5	42	380	23276RK+**AH3276**	432	HN84
	284	294	Tr420×5	42	380	23276RHAK+**AH3276**	400	HN84
380	183	193	Tr430×5	33	400	23080RK+**AH3080**	178	HNL86
	183	193	Tr430×5	33	400	23080RHAK+**AH3080**	165	HNL86
	240	250	Tr440×5	38	400	23180RK+**AH3180**	305	HN88
	266	250	Tr440×5	38	400	23180RHAK+**AH3180**	287	HN88
	278	298	Tr420×5	28	400	24180RK30+**AH24180**	368	HN84
	278	298	Tr420×5	28	400	24180RHAK30+**AH24180**	352	HN84
	302	312	Tr440×5	44	400	23280RK+**AH3280**	521	HN88
	302	312	Tr440×5	44	400	23280RHAK+**AH3280**	480	HN88

[Note] 1) Basic profile and dimensions of screw thread identified by prefix M are in accordance with JIS B 0205.
Basic profile and dimensions of screw thread identified by prefix Tr are in accordance with JIS B 0216.

d_1 400 ~ 480 mm

Boundary dimensions (mm) d_1	B_1	B_2	G [1] Screw size	G_1	Brg. bore d (mm)	Designations Bearing + withdrawal sleeve	Mass Brg.+withdrawal sleeve (kg)	(Refer.) Applicable locknut No.
400	186	196	Tr450×5	34	420	23084RK+**AH3084**	188	HNL90
	186	196	Tr450×5	34	420	23084RHAK+**AH3084**	174	HNL90
	266	276	Tr460×5	40	420	23184RK+**AH3184**	399	HN92
	270	276	Tr460×5	40	420	23184RHAK+**AH3184**	375	HN92
	321	331	Tr460×5	46	420	23284RK+**AH3284**	673	HN92
	321	331	Tr460×5	46	420	23284RHAK+**AH3284**	568	HN92
420	194	205	Tr470×5	35	440	23088RK+**AHX3088**	215	HNL94
	194	205	Tr470×5	35	440	23088RHAK+**AHX3088**	199	HNL94
	270	281	Tr480×5	42	440	23188RK+**AHX3188**	416	HN96
	285	281	Tr480×5	42	440	23188RHAK+**AHX3188**	391	HN96
	330	341	Tr480×5	48	440	23288RK+**AHX3288**	678	HN96
	330	341	Tr480×5	48	440	23288RHAK+**AHX3288**	627	HN96
440	202	213	Tr490×5	37	460	23092RK+**AHX3092**	244	HNL98
	202	213	Tr490×5	37	460	23092RHAK+**AHX3092**	226	HNL98
	285	296	Tr510×6	43	460	23192RK+**AHX3192**	494	HN102
	295	296	Tr510×6	43	460	23192RHAK+**AHX3192**	464	HN102
	349	360	Tr510×6	50	460	23292RK+**AHX3292**	795	HN102
	349	360	Tr510×6	50	460	23292RHAK+**AHX3292**	733	HN102
460	205	217	Tr520×6	38	480	23096RK+**AHX3096**	257	HNL104
	205	217	Tr520×6	38	480	23096RHAK+**AHX3096**	238	HNL104
	295	307	Tr530×6	45	480	23196RK+**AHX3196**	551	HN106
	313	307	Tr530×6	45	480	23196RHAK+**AHX3196**	518	HN106
	364	376	Tr530×6	52	480	23296RK+**AHX3296**	914	HN106
	364	376	Tr530×6	52	480	23296RHAK+**AHX3296**	844	HN106
480	209	221	Tr540×6	40	500	230/500RK+**AHX30/500**	271	HNL108
	313	325	Tr550×6	47	500	231/500RK+**AHX31/500**	648	HN110
	393	405	Tr550×6	54	500	232/500RK+**AHX32/500**	1 015	HN110

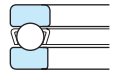
Thrust ball bearings

Thrust ball bearings are divided into single and double direction types. The former is able to accommodate axial load in one direction, while the latter is able to accommodate it in both directions.

Neither is suitable for applications that involve radial load or high-speed rotation.

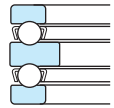
Bearings whose housing race back face is spherical (with a spherical back face or aligning seat race) are designed with a self-aligning capability and can accommodate the effects of inaccurate mounting.

Single direction thrust ball bearings



Bore diameter **10** – **360** mm

Double direction thrust ball bearings



Bore diameter **10** – **190** mm

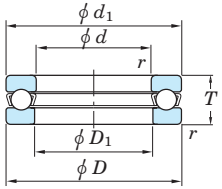
Boundary dimensions	As specified in JIS B 1512.
Tolerances	As specified in JIS B 1514-2. (refer to Table 7-9 on p. A 74.)
Recommended fits	Refer to Table 9-8 on p. A 98.
Standard cages	● Pressed cage (supplementary code : //) ● Copper alloy or carbon steel machined cage (supplementary code : FY or FC) ● Polyamide resin molded cage (supplementary code : MG)
Required minimum axial load	A certain degree of load is necessary in order for bearings to operate satisfactorily. (refer to p. A 116.)
Allowable misalignment	Misalignment not allowed. (for flat back face type.)
Equivalent axial load	Dynamic equivalent axial load $P_a = F_a$ Static equivalent axial load $P_{0a} = F_a$

Application of standard cages

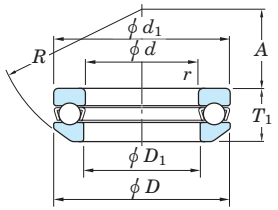
Bearing series	Molded cage	Pressed cage	Machined cage
511	51100 – 51107	51108 – 51132	51134 – 51172
512	51200 – 51207	51208 – 51224	51226 – 51272
532	53200 – 53207	53208 – 53224	53226 – 53272
532 U	53200U – 53207U	53208U – 53224U	53226U – 53272U
513	–	51305 – 51313	51314 – 51340
533	–	53305 – 53313	53314 – 53340
533 U	–	53305U – 53313U	53314U – 53340U
514	–	51405 – 51416	51417 – 51436
534	–	53405 – 53416	53417 – 53420
534 U	–	53405U – 53416U	53417U – 53420U
522	–	52202 – 52224	52226 – 52244
542	–	54202 – 54224	54226 – 54244
542 U	–	54205U – 54224U	54226U – 54244U
523	–	52305 – 52313	52314 – 52340
543	–	54305 – 54313	54314 – 54324
543 U	–	54305U – 54313U	54314U – 54324U
524	–	52405 – 52411	52412 – 52444
544	–	54405 – 54411	54412 – 54420
544 U	–	54405U – 54411U	54412U – 54420U

Single direction thrust ball bearings

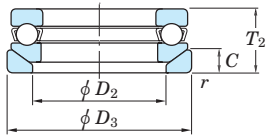
d 10 ~ (40) mm



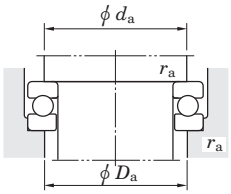
With flat back faces

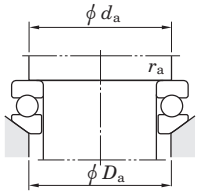


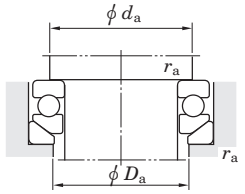
With spherical back face



With aligning seat race

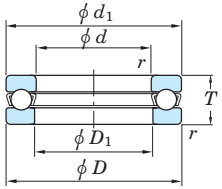




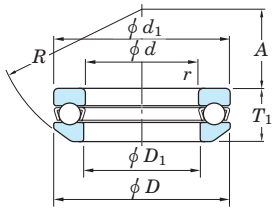


Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.			Dimensions (mm)							Mounting dimensions (mm)			(Refer.) Mass (kg)		
d	D	T	T_1	T_2	r min.	C_a	C_{0a}	C_u	Grease lub.	Oil lub.	With flat back faces	With spherical back face	With aligning seat race	d_1 max.	D_1 min.	D_2	D_3	A	R	C	d_a min.	D_a max.	r_a max.	With flat back faces	With spherical back face	With aligning seat race
10	24	9	—	—	0.3	12.5	14.0	0.630	6 500	10 000	**51100**	—	—	24	11	—	—	—	—	—	18	16	0.3	0.020	—	—
	26	11	11.6	13	0.6	15.8	17.1	0.770	5 700	8 800	**51200**	**53200**	**53200U**	26	12	18	28	8.5	22	3.5	20	16	0.6	0.030	0.029	0.037
12	26	9	—	—	0.3	12.9	14.0	0.690	6 500	10 000	**51101**	—	—	26	13	—	—	—	—	—	20	18	0.3	0.022	—	—
	28	11	11.4	13	0.6	16.5	19.0	0.860	5 400	8 300	**51201**	**53201**	**53201U**	28	14	20	30	11.5	25	3.5	22	18	0.6	0.034	0.031	0.043
15	28	9	—	—	0.3	13.2	15.4	0.760	6 100	9 400	**51102**	—	—	28	16	—	—	—	—	—	23	20	0.3	0.024	—	—
	32	12	13.3	15	0.6	20.8	24.8	1.10	4 900	7 500	**51202**	**53202**	**53202U**	32	17	24	35	12	28	4	25	22	0.6	0.046	0.048	0.062
17	30	9	—	—	0.3	13.5	18.2	0.820	6 100	9 400	**51103**	—	—	30	18	—	—	—	—	—	25	22	0.3	0.028	—	—
	35	12	13.2	15	0.6	21.5	27.3	1.25	4 900	7 500	**51203**	**53203**	**53203U**	35	19	26	38	16	32	4	28	24	0.6	0.053	0.055	0.070
20	35	10	—	—	0.3	17.8	24.7	1.10	5 100	7 900	**51104**	—	—	35	21	—	—	—	—	—	29	26	0.3	0.040	—	—
	40	14	14.7	17	0.6	27.9	37.7	1.70	3 900	6 000	**51204**	**53204**	**53204U**	40	22	30	42	18	36	5	32	28	0.6	0.082	0.080	0.100
25	42	11	—	—	0.6	24.4	37.2	1.70	4 400	6 800	**51105**	—	—	42	26	—	—	—	—	—	35	32	0.6	0.059	—	—
	47	15	16.7	19	0.6	34.6	50.4	2.30	3 600	5 500	**51205**	**53205**	**53205U**	47	27	36	50	19	40	5.5	38	34	0.6	0.120	0.120	0.152
	52	18	19.8	22	1	44.7	61.4	2.75	3 100	4 800	**51305**	**53305**	**53305U**	52	27	38	55	21	45	6	41	36	1	0.180	0.180	0.224
	60	24	26.4	29	1	69.5	89.4	4.05	2 600	4 000	**51405**	**53405**	**53405U**	60	27	42	62	19	50	8	46	39	1	0.340	0.350	0.442
30	47	11	—	—	0.6	25.5	42.2	1.90	4 300	6 600	**51106**	—	—	47	32	—	—	—	—	—	40	37	0.6	0.068	—	—
	52	16	17.8	20	0.6	36.7	58.2	2.65	3 400	5 200	**51206**	**53206**	**53206U**	52	32	42	55	22	45	5.5	43	39	0.6	0.150	0.160	0.193
	60	21	22.6	25	1	53.5	78.7	3.55	2 700	4 200	**51306**	**53306**	**53306U**	60	32	45	62	22	50	7	48	42	1	0.270	0.270	0.326
	70	28	30.1	33	1	91.0	126	5.70	2 200	3 400	**51406**	**53406**	**53406U**	70	32	50	75	20	56	9	54	46	1	0.530	0.530	0.660
35	52	12	—	—	0.6	25.5	47.2	2.00	3 900	6 000	**51107**	—	—	52	37	—	—	—	—	—	45	42	0.6	0.090	—	—
	62	18	19.9	22	1	48.9	78.2	3.55	2 900	4 500	**51207**	**53207**	**53207U**	62	37	48	65	24	50	7	51	46	1	0.220	0.220	0.277
	68	24	25.6	28	1	69.3	105	4.75	2 400	3 700	**51307**	**53307**	**53307U**	68	37	52	72	24	56	7.5	55	48	1	0.390	0.400	0.484
	80	32	34	37	1.1	109	155	7.00	1 900	2 900	**51407**	**53407**	**53407U**	80	37	58	85	23	64	10	62	53	1	0.790	0.790	0.960
40	60	13	—	—	0.6	33.6	62.8	2.85	3 400	5 300	**51108**	—	—	60	42	—	—	—	—	—	52	48	0.6	0.120	—	—
	68	19	20.3	23	1	58.7	98.3	4.45	2 700	4 200	**51208**	**53208**	**53208U**	68	42	55	72	28.5	56	7	57	51	1	0.270	0.270	0.340
	78	26	28.5	31	1	86.6	135	6.05	2 100	3 300	**51308**	**53308**	**53308U**	78	42	60	82	28	64	8.5	63	55	1	0.550	0.570	0.690

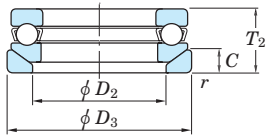
[Remark] Standard cage types used for the above bearings are described earlier in this section.



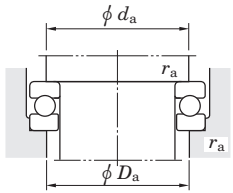
With flat back faces

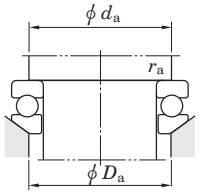


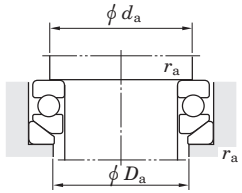
With spherical back face



With aligning seat race



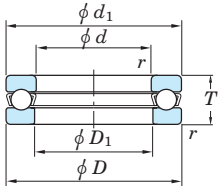




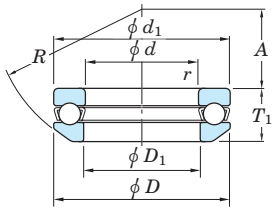
Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.			Dimensions (mm)							Mounting dimensions (mm)			(Refer.) Mass (kg)		
d	D	T	T_1	T_2	r min.	C_a	C_{0a}	C_u	Grease lub.	Oil lub.	With flat back faces	With spherical back face	With aligning seat race	d_1 max.	D_1 min.	D_2	D_3	A	R	C	d_a min.	D_a max.	r_a max.	With flat back faces	With spherical back face	With aligning seat race
40	90	36	38.2	42	1.1	141	205	9.25	1 700	2 600	**51408**	**53408**	**53408U**	90	42	65	95	26	72	12	70	60	1	1.14	1.12	1.37
45	65	14	—	—	0.6	34.8	69.1	3.10	3 200	5 000	**51109**	—	—	65	47	—	—	—	—	—	57	53	0.6	0.150	—	—
	73	20	21.3	24	1	59.7	105	4.75	2 600	4 000	**51209**	**53209**	**53209U**	73	47	60	78	26	56	7.5	62	56	1	0.320	0.310	0.397
	85	28	30.1	33	1	100	163	7.40	1 900	3 000	**51309**	**53309**	**53309U**	85	47	65	90	25	64	10	69	61	1	0.690	0.680	0.850
	100	39	42.4	46	1.1	162	242	10.9	1 500	2 300	**51409**	**53409**	**53409U**	100	47	72	105	29	80	12.5	78	67	1	1.47	1.50	1.82
50	70	14	—	—	0.6	35.9	75.4	3.40	3 100	4 800	**51110**	—	—	70	52	—	—	—	—	—	62	58	0.6	0.160	—	—
	78	22	23.5	26	1	60.6	111	5.05	2 300	3 600	**51210**	**53210**	**53210U**	78	52	62	82	32.5	64	7.5	67	61	1	0.390	0.380	0.480
	95	31	34.3	37	1.1	121	202	9.10	1 800	2 700	**51310**	**53310**	**53310U**	95	52	72	100	28	72	11	77	68	1	1.00	1.01	1.24
	110	43	45.6	50	1.5	185	283	12.8	1 400	2 100	**51410**	**53410**	**53410U**	110	52	80	115	35	90	14	86	74	1.5	1.99	1.97	2.38
55	78	16	—	—	0.6	43.5	93.1	4.20	2 800	4 300	**51111**	—	—	78	57	—	—	—	—	—	69	64	0.6	0.240	—	—
	90	25	27.3	30	1	86.7	159	7.20	2 100	3 200	**51211**	**53211**	**53211U**	90	57	72	95	35	72	9	76	69	1	0.610	0.620	0.770
	105	35	39.3	42	1.1	149	246	11.1	1 600	2 400	**51311**	**53311**	**53311U**	105	57	80	110	30	80	11.5	85	75	1	1.34	1.41	1.69
	120	48	50.5	55	1.5	223	359	16.2	1 200	1 900	**51411**	**53411**	**53411U**	120	57	88	125	28	90	15.5	94	81	1.5	2.64	2.57	3.10
60	85	17	—	—	1	51.8	113	5.10	2 600	4 000	**51112**	—	—	85	62	—	—	—	—	—	75	70	1	0.290	—	—
	95	26	28	31	1	92.0	179	8.05	1 900	3 000	**51212**	**53212**	**53212U**	95	62	78	100	32.5	72	9	81	74	1	0.690	0.690	0.850
	110	35	38.3	42	1.1	154	267	12.1	1 500	2 300	**51312**	**53312**	**53312U**	110	62	85	115	41	90	11.5	90	80	1	1.43	1.47	1.78
	130	51	54	58	1.5	267	437	19.7	1 100	1 700	**51412**	**53412**	**53412U**	130	62	95	135	34	100	16	102	88	1.5	3.51	3.44	4.13
65	90	18	—	—	1	52.1	117	5.30	2 400	3 700	**51113**	—	—	90	67	—	—	—	—	—	80	75	1	0.340	—	—
	100	27	28.7	32	1	93.6	189	8.50	1 900	2 900	**51213**	**53213**	**53213U**	100	67	82	105	40	80	9	86	79	1	0.770	0.750	0.930
	115	36	39.4	43	1.1	159	287	13.0	1 400	2 200	**51313**	**53313**	**53313U**	115	67	90	120	38.5	90	12.5	95	85	1	1.57	1.61	1.95
	140	56	60.2	65	2	290	493	22.0	1 000	1 600	**51413**	**53413**	**53413U**	140	68	100	145	40	112	17.5	110	95	2	4.47	4.47	5.28
70	95	18	—	—	1	53.8	127	5.70	2 300	3 600	**51114**	—	—	95	72	—	—	—	—	—	85	80	1	0.360	—	—
	105	27	28.8	32	1	95.2	199	8.95	1 800	2 800	**51214**	**53214**	**53214U**	105	72	88	110	38	80	9	91	84	1	0.810	0.800	0.990
	125	40	44.2	48	1.1	167	291	13.1	1 300	2 000	**51314**	**53314**	**53314U**	125	72	98	130	43	100	13	103	92	1	2.06	2.15	2.56
	150	60	63.6	69	2	312	553	23.8	940	1 450	**51414**	**53414**	**53414U**	150	73	110	155	34	112	19.5	118	102	2	5.48	5.38	6.37

[Remark] Standard cage types used for the above bearings are described earlier in this section.

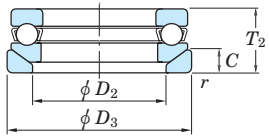
d 75 ~ (120) mm



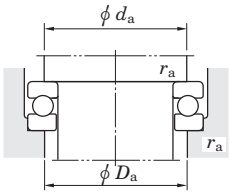
With flat back faces

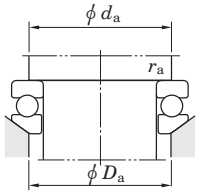


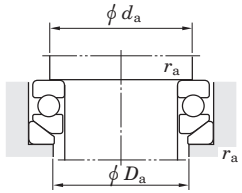
With spherical back face



With aligning seat race



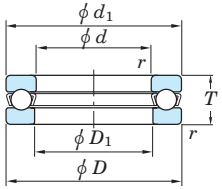




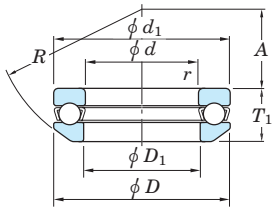
Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.			Dimensions (mm)							Mounting dimensions (mm)			(Refer.) Mass (kg)		
d	D	T	T_1	T_2	r min.	C_a	C_{0a}	C_u	Grease lub.	Oil lub.	With flat back faces	With spherical back face	With aligning seat race	d_1 max.	D_1 min.	D_2	D_3	A	R	C	d_a min.	D_a max.	r_a max.	With flat back faces	With spherical back face	With aligning seat race
75	100	19	—	—	1	55.5	136	6.15	2 200	3 400	**51115**	—	—	100	77	—	—	—	—	—	90	85	1	0.420	—	—
	110	27	28.3	32	1	96.7	209	9.40	1 800	2 700	**51215**	**53215**	**53215U**	110	77	92	115	49	90	9.5	96	89	1	0.860	0.850	1.06
	135	44	48.1	52	1.5	192	339	15.0	1 200	1 900	**51315**	**53315**	**53315U**	135	77	105	140	37	100	15	111	99	1.5	2.68	2.72	3.27
	160	65	69	75	2	315	560	23.3	880	1 350	**51415**	**53415**	**53415U**	160	78	115	165	42	125	21	125	110	2	6.75	6.64	7.87
80	105	19	—	—	1	55.8	141	6.35	2 100	3 300	**51116**	—	—	105	82	—	—	—	—	—	95	90	1	0.430	—	—
	115	28	29.5	33	1	98.1	218	9.85	1 700	2 600	**51216**	**53216**	**53216U**	115	82	98	120	46	90	10	101	94	1	0.950	0.930	1.15
	140	44	47.6	52	1.5	200	368	15.8	1 200	1 800	**51316**	**53316**	**53316U**	140	82	110	145	50	112	15	116	104	1.5	2.82	2.86	3.43
	170	68	72.2	78	2.1	337	621	25.1	810	1 250	**51416**	**53416**	**53416U**	170	83	125	175	36	125	22	133	117	2	7.97	7.84	9.22
85	110	19	—	—	1	57.4	150	6.80	2 100	3 200	**51117**	—	—	110	87	—	—	—	—	—	100	95	1	0.460	—	—
	125	31	33.1	37	1	119	264	11.6	1 500	2 300	**51217**	**53217**	**53217U**	125	88	105	130	52	100	11	109	101	1	1.29	1.28	1.57
	150	49	53.1	58	1.5	232	419	17.5	1 100	1 700	**51317**	**53317**	**53317U**	150	88	115	155	43	112	17.5	124	111	1.5	3.66	3.63	4.44
	180	72	77	83	2.1	384	753	29.5	780	1 200	**51417**	**53417**	**53417U**	177	88	130	185	47	140	23	141	124	2	9.29	9.20	10.8
90	120	22	—	—	1	74.6	190	8.40	1 900	2 900	**51118**	—	—	120	92	—	—	—	—	—	108	102	1	0.680	—	—
	135	35	38.5	42	1.1	146	326	13.9	1 400	2 100	**51218**	**53218**	**53218U**	135	93	110	140	45	100	13.5	117	108	1	1.77	1.77	2.19
	155	50	54.6	59	1.5	242	454	18.5	1 000	1 600	**51318**	**53318**	**53318U**	155	93	120	160	40	112	18	129	116	1.5	3.88	3.87	4.71
	190	77	81.2	88	2.1	409	826	31.5	710	1 100	**51418**	**53418**	**53418U**	187	93	140	195	40	140	25.5	149	131	2	11.0	10.7	12.6
100	135	25	—	—	1	106	268	11.2	1 600	2 500	**51120**	—	—	135	102	—	—	—	—	—	121	114	1	0.990	—	—
	150	38	40.9	45	1.1	183	410	16.6	1 200	1 900	**51220**	**53220**	**53220U**	150	103	125	155	52	112	14	130	120	1	2.36	2.34	2.84
	170	55	59.2	64	1.5	296	595	23.2	940	1 450	**51320**	**53320**	**53320U**	170	103	135	175	46	125	18	142	128	1.5	5.11	5.10	6.05
	210	85	90	98	3	460	983	35.7	620	950	**51420**	**53420**	**53420U**	205	103	155	220	50	160	27	165	145	2.5	14.6	14.5	17.4
110	145	25	—	—	1	109	288	11.5	1 600	2 400	**51122**	—	—	145	112	—	—	—	—	—	131	124	1	1.08	—	—
	160	38	40.2	45	1.1	191	450	17.6	1 200	1 800	**51222**	**53222**	**53222U**	160	113	135	165	65	125	14	140	130	1	2.57	2.50	3.06
	190	63	67.2	72	2	334	704	25.9	810	1 250	**51322**	**53322**	**53322U**	187	113	150	195	51	140	20.5	158	142	2	7.72	7.63	8.90
	230	95	—	—	3	474	1 070	37.1	550	850	**51422**	—	—	225	113	—	—	—	—	—	181	159	2.5	19.8	—	—
120	155	25	—	—	1	111	305	11.9	1 500	2 300	**51124**	—	—	155	122	—	—	—	—	—	141	134	1	1.16	—	—

[Remark] Standard cage types used for the above bearings are described earlier in this section.

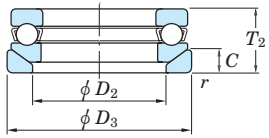
d (120) ~ (180) mm



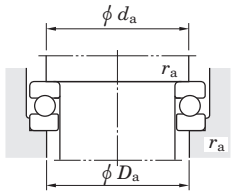
With flat back faces

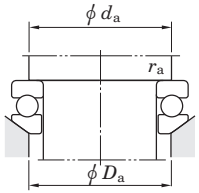


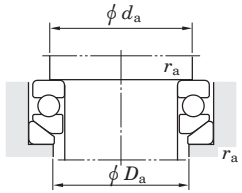
With spherical back face



With aligning seat race



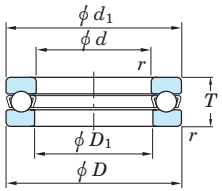




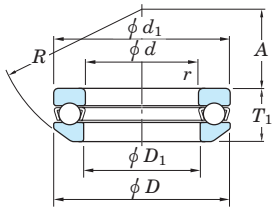
Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.			Dimensions (mm)							Mounting dimensions (mm)			(Refer.) Mass (kg)		
d	D	T	T_1	T_2	r min.	C_a	C_{0a}	C_u	Grease lub.	Oil lub.	With flat back faces	With spherical back face	With aligning seat race	d_1 max.	D_1 min.	D_2	D_3	A	R	C	d_a min.	D_a max.	r_a max.	With flat back faces	With spherical back face	With aligning seat race
120	170	39	40.8	46	1.1	192	470	17.7	1 100	1 700	**51224**	**53224**	**53224U**	170	123	145	175	61	125	15	150	140	1	2.86	2.81	3.46
	210	70	74.1	80	2.1	389	869	30.5	710	1 100	**51324**	**53324**	**53324U**	205	123	165	220	63	160	22	173	157	2	10.6	10.4	12.4
	250	102	—	—	4	601	1 460	48.5	520	800	**51424**	—	—	245	123	—	—	—	—	—	196	174	3	25.0	—	—
130	170	30	—	—	1	130	350	13.0	1 300	2 000	**51126**	—	—	170	132	—	—	—	—	—	154	146	1	1.87	—	—
	190	45	47.9	53	1.5	254	620	22.2	970	1 500	**51226**	**53226**	**53226U**	187	133	160	195	67	140	17	166	154	1.5	4.09	3.98	4.88
	225	75	80.3	86	2.1	413	958	32.5	650	1 000	**51326**	**53326**	**53326U**	220	134	177	235	53	160	26	186	169	2	13.0	12.7	15.2
	270	110	—	—	4	623	1 540	49.0	490	750	**51426**	—	—	265	134	—	—	—	—	—	212	188	3	31.4	—	—
140	180	31	—	—	1	133	375	13.5	1 200	1 900	**51128**	—	—	178	142	—	—	—	—	—	164	156	1	2.02	—	—
	200	46	48.6	55	1.5	234	650	19.6	940	1 450	**51228**	**53228**	**53228U**	197	143	170	210	87	160	17	176	164	1.5	4.46	4.35	5.89
	240	80	84.9	92	2.1	458	1 130	36.9	620	950	**51328**	**53328**	**53328U**	235	144	190	250	68	180	26	199	181	2	15.5	15.1	18.0
	280	112	—	—	4	650	1 680	52.2	450	700	**51428**	—	—	275	144	—	—	—	—	—	222	198	3	33.9	—	—
150	190	31	—	—	1	137	400	13.9	1 200	1 900	**51130**	—	—	188	152	—	—	—	—	—	174	166	1	2.15	—	—
	215	50	53.3	60	1.5	266	652	21.8	840	1 300	**51230**	**53230**	**53230U**	212	153	180	225	79	160	20.5	189	176	1.5	5.64	5.45	7.14
	250	80	83.7	92	2.1	451	1 130	36.0	580	900	**51330**	**53330**	**53330U**	245	154	200	260	89.5	200	26	209	191	2	16.3	15.7	18.8
	300	120	—	—	4	711	1 910	57.4	420	650	**51430**	—	—	295	154	—	—	—	—	—	238	212	3	41.6	—	—
160	200	31	—	—	1	140	425	14.4	1 200	1 800	**51132**	—	—	198	162	—	—	—	—	—	184	176	1	2.28	—	—
	225	51	54.7	61	1.5	279	718	23.4	810	1 250	**51232**	**53232**	**53232U**	222	163	190	235	74	160	21	199	186	1.5	6.53	6.09	7.90
	270	87	91.7	100	3	512	1 340	41.3	550	850	**51332**	**53332**	**53332U**	265	164	215	280	77	200	29	225	205	2.5	21.0	21.0	23.4
	320	130	—	—	5	852	2 410	70.3	390	600	**51432**	—	—	315	164	—	—	—	—	—	254	226	4	51.2	—	—
170	215	34	—	—	1.1	168	510	16.7	1 100	1 700	**51134**	—	—	213	172	—	—	—	—	—	197	188	1	3.25	—	—
	240	55	58.7	65	1.5	326	834	26.3	750	1 150	**51234**	**53234**	**53234U**	237	173	200	250	91	180	21.5	212	198	1.5	8.12	7.69	9.83
	280	87	91.3	100	3	579	1 570	47.4	520	800	**51334**	**53334**	**53334U**	275	174	220	290	105	225	29	235	215	2.5	22.0	22.0	24.5
	340	135	—	—	5	943	2 730	77.2	360	550	**51434**	—	—	335	174	—	—	—	—	—	270	240	4	60.0	—	—
180	225	34	—	—	1.1	168	525	16.7	1 000	1 600	**51136**	—	—	222	183	—	—	—	—	—	207	198	1	3.39	—	—
	250	56	58.2	66	1.5	332	874	26.9	710	1 100	**51236**	**53236**	**53236U**	247	183	210	260	112	200	21.5	222	208	1.5	8.68	8.08	10.4
	300	95	99.3	109	3	578	1 580	46.2	490	750	**51336**	**53336**	**53336U**	295	184	240	310	91	225	32	251	229	2.5	28.1	26.9	29.9

[Remark] Standard cage types used for the above bearings are described earlier in this section.

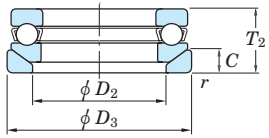
d (180) ~ 360 mm



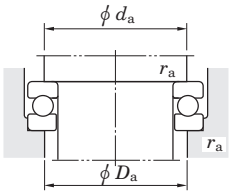
With flat back faces

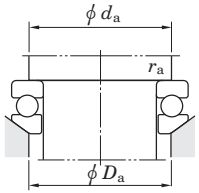


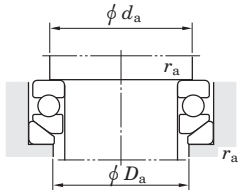
With spherical back face



With aligning seat race





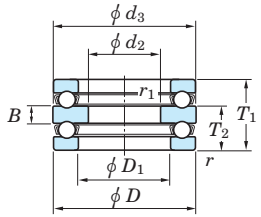


Boundary dimensions (mm)						Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.			Dimensions (mm)							Mounting dimensions (mm)			(Refer.) Mass (kg)		
d	D	T	T_1	T_2	r min.	C_a	C_{0a}	C_u	Grease lub.	Oil lub.	With flat back faces	With spherical back face	With aligning seat race	d_1 max.	D_1 min.	D_2	D_3	A	R	C	d_a min.	D_a max.	r_a max.	With flat back faces	With spherical back face	With aligning seat race
180	360	140	—	—	5	928	2 730	75.1	320	500	**51436**	—	—	355	184	—	—	—	—	—	286	254	4	69.5	—	—
190	240	37	—	—	1.1	213	655	20.2	970	1 500	**51138**	—	—	237	193	—	—	—	—	—	220	210	1	3.95	—	—
	270	62	65.7	73	2	385	1 060	31.4	650	1 000	**51238**	**53238**	**53238U**	267	194	230	280	98	200	23	238	222	2	11.7	11.2	13.9
	320	105	111	121	4	679	1 950	55.3	440	680	**51338**	**53338**	**53338U**	315	195	255	330	104	250	33	266	244	3	36.0	36.3	39.7
200	250	37	—	—	1.1	215	675	20.4	940	1 450	**51140**	—	—	247	203	—	—	—	—	—	230	220	1	4.13	—	—
	280	62	65.3	74	2	392	1 110	32.2	620	950	**51240**	**53240**	**53240U**	277	204	240	290	125	225	23	248	232	2	12.2	11.6	14.8
	340	110	118.4	130	4	745	2 220	61.1	420	650	**51340**	**53340**	**53340U**	335	205	270	350	92	250	38	282	258	3	42.9	42.7	46.7
220	270	37	—	—	1.1	221	740	21.3	880	1 350	**51144**	—	—	267	223	—	—	—	—	—	250	240	1	4.50	—	—
	300	63	65.6	75	2	428	1 310	36.6	580	900	**51244**	**53244**	**53244U**	297	224	260	310	118	225	25	268	252	2	13.5	12.6	15.9
240	300	45	—	—	1.5	301	1 020	28.0	750	1 150	**51148**	—	—	297	243	—	—	—	—	—	276	264	1.5	7.38	—	—
	340	78	81.6	92	2.1	553	1 800	47.8	520	800	**51248**	**53248**	**53248U**	335	244	290	350	122	250	30	299	281	2	23.1	20.9	25.6
260	320	45	—	—	1.5	289	990	26.2	710	1 100	**51152**	—	—	317	263	—	—	—	—	—	296	284	1.5	7.93	—	—
	360	79	82.8	93	2.1	556	1 880	48.1	490	750	**51252**	**53252**	**53252U**	355	264	305	370	152	280	30	319	301	2	25.0	22.6	28.5
280	350	53	—	—	1.5	411	1 430	36.4	640	900	**51156**	—	—	347	283	—	—	—	—	—	322	308	1.5	12.0	—	—
300	380	62	—	—	2	454	1 610	39.4	540	810	**51160**	—	—	376	304	—	—	—	—	—	348	332	2	17.5	—	—
	420	95	100.5	112	3	713	2 600	61.9	400	600	**51260**	**53260**	**53260U**	415	304	360	430	164	320	34	371	349	2.5	42.5	39.5	48.0
320	400	63	—	—	2	474	1 760	41.9	540	810	**51164**	—	—	396	324	—	—	—	—	—	368	352	2	19.0	—	—
	440	95	100.5	112	3	721	2 710	62.9	400	600	**51264**	**53264**	**53264U**	435	325	380	450	157	320	36	391	369	2.5	45.0	42.0	52.0
340	420	64	—	—	2	483	1 860	43.1	500	770	**51168**	—	—	416	344	—	—	—	—	—	388	372	2	20.5	—	—
	460	96	100.3	113	3	730	2 830	63.8	380	570	**51268**	**53268**	**53268U**	455	345	400	470	199	360	36	411	389	2.5	48.0	45.0	55.0
360	440	65	—	—	2	493	1 960	44.3	500	720	**51172**	—	—	436	364	—	—	—	—	—	408	392	2	21.5	—	—
	500	110	116.7	130	4	876	3 500	76.1	340	500	**51272**	**53272**	**53272U**	495	365	430	510	172	360	43	443	417	3	70.0	65.0	82.0

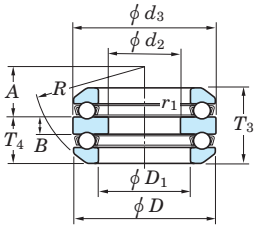
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Double direction thrust ball bearings

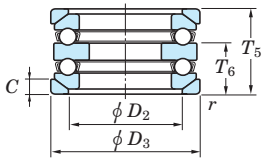
d_2 10 ~ (50) mm



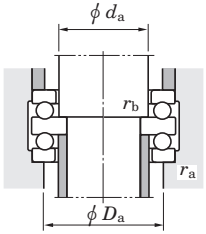
With flat back faces

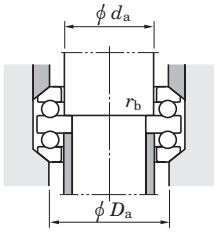


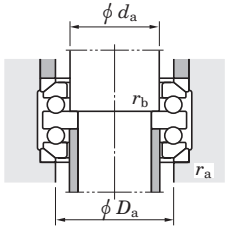
With spherical back faces



With aligning seat races





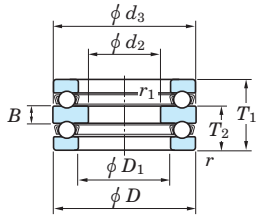


Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.			Dimensions (mm)										Mounting dimensions (mm)				(Refer.) Mass (kg)	
d_2	D	T_1	T_3	T_5	r min.	r_1 min.	C_a	C_{0a}	C_u	Grease lub.	Oil lub.	With flat back faces	With spherical back faces	With aligning seat races	d_3 max.	D_1 min.	D_2	D_3	T_2	T_4	T_6	A	R	B	C	d_a min.	D_a max.	r_a max.	r_b max.	With flat back faces	With aligning seat races
10	32	22	24.6	28	0.6	0.3	20.8	24.8	1.10	4 900	7 500	**52202**	**54202**	**54202U**	32	17	24	35	13.5	14.8	16.5	10.5	28	5	4	15	24	0.6	0.3	0.085	0.118
15	40	26	27.4	32	0.6	0.3	27.9	37.7	1.70	3 900	6 000	**52204**	**54204**	**54204U**	40	22	30	42	16	16.7	19	16	36	6	5	20	30	0.6	0.3	0.150	0.190
	60	45	49.8	55	1	0.6	69.5	89.4	4.05	2 600	4 000	**52405**	**54405**	**54405U**	60	27	42	62	28	30.4	33	15	50	11	8	25	42	1	0.6	0.630	0.804
20	47	28	31.4	36	0.6	0.3	34.6	50.4	2.30	3 600	5 500	**52205**	**54205**	**54205U**	47	27	36	50	17.5	19.2	21.5	16.5	40	7	5.5	25	36	0.6	0.3	0.230	0.304
	52	34	37.6	42	1	0.3	44.7	61.4	2.75	3 100	4 800	**52305**	**54305**	**54305U**	52	27	38	55	21	22.8	25	18	45	8	6	25	38	1	0.3	0.330	0.428
	70	52	56.2	62	1	0.6	91.0	126	5.70	2 200	3 400	**52406**	**54406**	**54406U**	70	32	50	75	32	34.1	37	16	56	12	9	30	50	1	0.6	1.00	1.25
25	52	29	32.6	37	0.6	0.3	36.7	54.3	2.65	3 400	5 200	**52206**	**54206**	**54206U**	52	32	42	55	18	19.8	22	20	45	7	5.5	30	42	0.6	0.3	0.270	0.346
	60	38	41.2	46	1	0.3	53.5	78.7	3.55	2 700	4 200	**52306**	**54306**	**54306U**	60	32	45	62	23.5	25.1	27.5	19.5	50	9	7	30	45	1	0.3	0.490	0.602
	80	59	63	69	1.1	0.6	109	155	7.00	1 900	2 900	**52407**	**54407**	**54407U**	80	37	58	85	36.5	38.5	41.5	18.5	64	14	10	35	58	1	0.6	1.44	1.79
30	62	34	37.8	42	1	0.3	48.9	83.8	3.55	2 900	4 500	**52207**	**54207**	**54207U**	62	37	48	65	21	22.9	25	21	50	8	7	35	48	1	0.3	0.420	0.544
	68	36	38.6	44	1	0.6	58.7	98.3	4.45	2 700	4 200	**52208**	**54208**	**54208U**	68	42	55	72	22.5	23.8	26.5	25	56	9	7	40	55	1	0.6	0.540	0.680
	68	44	47.2	52	1	0.3	69.3	105	4.75	2 400	3 700	**52307**	**54307**	**54307U**	68	37	52	72	27	28.6	31	21	56	10	7.5	35	52	1	0.3	0.710	0.898
	78	49	54	59	1	0.6	86.6	135	6.05	2 100	3 300	**52308**	**54308**	**54308U**	78	42	60	82	30.5	33	35.5	23.5	64	12	8.5	40	60	1	0.6	1.06	1.34
	90	65	69.4	77	1.1	0.6	141	205	9.25	1 700	2 600	**52408**	**54408**	**54408U**	90	42	65	95	40	42.2	46	22	72	15	12	40	65	1	0.6	2.03	2.55
35	73	37	39.6	45	1	0.6	59.7	105	4.75	2 600	4 000	**52209**	**54209**	**54209U**	73	47	60	78	23	24.3	27	23	56	9	7.5	45	60	1	0.6	0.620	0.784
	85	52	56.2	62	1	0.6	100	163	7.40	1 900	3 000	**52309**	**54309**	**54309U**	85	47	65	90	32	34.1	37	21	64	12	10	45	65	1	0.6	1.29	1.62
	100	72	78.8	86	1.1	0.6	162	242	10.9	1 500	2 300	**52409**	**54409**	**54409U**	100	47	72	105	44.5	47.9	51.5	23.5	80	17	12.5	45	72	1	0.6	2.91	3.42
40	78	39	42	47	1	0.6	60.6	111	5.05	2 300	3 600	**52210**	**54210**	**54210U**	78	52	62	82	24	25.5	28	30.5	64	9	7.5	50	62	1	0.6	0.710	0.890
	95	58	64.6	70	1.1	0.6	121	186	9.10	1 800	2 700	**52310**	**54310**	**54310U**	95	52	72	100	36	39.3	42	23	72	14	11	50	72	1	0.6	1.86	2.35
	110	78	83.2	92	1.5	0.6	185	283	12.8	1 400	2 100	**52410**	**54410**	**54410U**	110	52	80	115	48	50.6	55	30	90	18	14	50	80	1.5	0.6	3.56	4.39
45	90	45	49.6	55	1	0.6	86.7	159	7.20	2 100	3 200	**52211**	**54211**	**54211U**	90	57	72	95	27.5	29.8	32.5	32.5	72	10	9	55	72	1	0.6	1.12	1.44
	105	64	72.6	78	1.1	0.6	149	246	11.1	1 600	2 400	**52311**	**54311**	**54311U**	105	57	80	110	39.5	43.8	46.5	25.5	80	15	11.5	55	80	1	0.6	2.51	3.21
	120	87	92	101	1.5	0.6	223	359	16.2	1 200	1 900	**52411**	**54411**	**54411U**	120	57	88	125	53.5	56	60.5	22.5	90	20	15.5	55	88	1.5	0.6	4.70	5.62
50	95	46	50	56	1	0.6	92.0	179	8.05	1 900	3 000	**52212**	**54212**	**54212U**	95	62	78	100	28	30	33	30.5	72	10	9	60	78	1	0.6	1.25	1.57
	110	64	70.6	78	1.1	0.6	154	267	12.1	1 500	2 300	**52312**	**54312**	**54312U**	110	62	85	115	39.5	42.8	46.5	36.5	90	15	11.5	60	85	1	0.6	2.68	3.37
	130	93	99	107	1.5	0.6	267	397	19.7	1 100	1 700	**52412**	**54412**	**54412U**	130	62	95	135	57	60	64	28	100	21	16	60	95	1.5	0.6	6.33	7.60

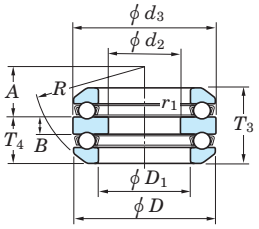
[Remark] Standard cage types used for the above bearings are described earlier in this section.

Double direction thrust ball bearings

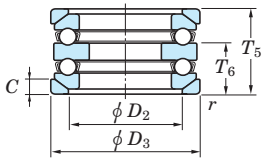
d_2 (50) ~ 95 mm



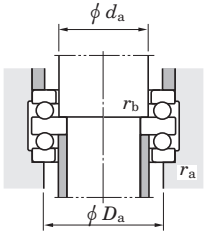
With flat back faces

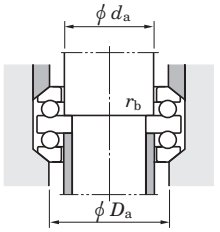


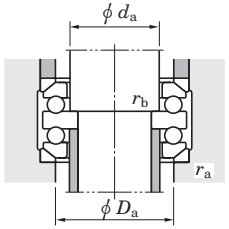
With spherical back faces



With aligning seat races



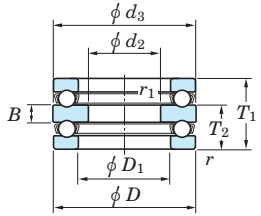




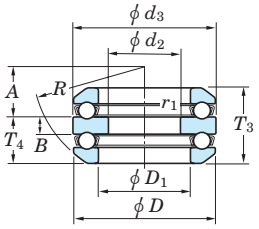
Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.			Dimensions (mm)										Mounting dimensions (mm)				(Refer.) Mass (kg)	
d_2	D	T_1	T_3	T_5	r min.	r_1 min.	C_a	C_{0a}	C_u	Grease lub.	Oil lub.	With flat back faces	With spherical back faces	With aligning seat races	d_3 max.	D_1 min.	D_2	D_3	T_2	T_4	T_6	A	R	B	C	d_a min.	D_a max.	r_a max.	r_b max.	With flat back faces	With aligning seat races
50	140	101	109.4	119	2	1	290	493	22.0	1 000	1 600	**52413**	**54413**	**54413U**	140	68	100	145	62	66.2	71	34	112	23	17.5	65	100	2	1	8.03	9.72
55	100	47	50.4	57	1	0.6	93.6	189	8.50	1 900	2 900	**52213**	**54213**	**54213U**	100	67	82	105	28.5	30.2	33.5	38.5	80	10	9	65	82	1	0.6	1.36	1.70
	105	47	50.6	57	1	1	95.2	189	8.95	1 800	2 800	**52214**	**54214**	**54214U**	105	72	88	110	28.5	30.3	33.5	36.5	80	10	9	70	88	1	1	1.48	1.84
	115	65	71.8	79	1.1	0.6	159	287	13.0	1 400	2 200	**52313**	**54313**	**54313U**	115	67	90	120	40	43.4	47	34.5	90	15	12.5	65	90	1	0.6	2.90	3.66
	125	72	80.4	88	1.1	1	167	339	13.1	1 300	2 000	**52314**	**54314**	**54314U**	125	72	98	130	44	48.2	52	39	100	16	13	70	98	1	1	3.90	4.78
	150	107	114.2	125	2	1	312	553	23.8	940	1 450	**52414**	**54414**	**54414U**	150	73	110	155	65.5	69.1	74.5	28.5	112	24	19.5	70	110	2	1	9.71	11.6
60	110	47	49.6	57	1	1	96.7	209	9.40	1 800	2 700	**52215**	**54215**	**54215U**	110	77	92	115	28.5	29.8	33.5	47.5	90	10	9.5	75	92	1	1	1.57	1.96
	135	79	87.2	95	1.5	1	192	396	15.0	1 200	1 900	**52315**	**54315**	**54315U**	135	77	105	140	48.5	52.6	56.5	32.5	100	18	15	75	105	1.5	1	4.83	6.08
	160	115	123	135	2	1	315	560	23.3	880	1 350	**52415**	**54415**	**54415U**	160	78	115	165	70.5	74.5	80.5	36.5	125	26	21	75	115	2	1	11.8	14.3
65	115	48	51	58	1	1	98.1	218	9.85	1 700	2 600	**52216**	**54216**	**54216U**	115	82	98	120	29	30.5	34	45	90	10	10	80	98	1	1	1.69	2.09
	140	79	86.2	95	1.5	1	200	424	15.8	1 200	1 800	**52316**	**54316**	**54316U**	140	82	110	145	48.5	52.1	56.5	45.5	112	18	15	80	110	1.5	1	5.06	6.36
	170	120	128.4	140	2.1	1	337	621	25.1	810	1 250	**52416**	**54416**	**54416U**	170	83	125	175	73.5	77.7	83.5	30.5	125	27	22	80	125	2	1	14.0	16.6
	180	128	138	150	2.1	1.1	384	753	29.5	780	1 200	**52417**	**54417**	**54417U**	179.5	88	130	185	78.5	83.5	89.5	40.5	140	29	23	85	130	2	1	17.5	19.7
70	125	55	59.2	67	1	1	119	251	11.6	1 500	2 300	**52217**	**54217**	**54217U**	125	88	105	130	33.5	35.6	39.5	49.5	100	12	11	85	105	1	1	2.34	2.90
	150	87	95.2	105	1.5	1	232	489	17.5	1 100	1 700	**52317**	**54317**	**54317U**	150	88	115	155	53	57.1	62	39	112	19	17.5	85	115	1.5	1	6.43	8.03
	190	135	143.4	157	2.1	1.1	409	826	31.5	710	1 100	**52418**	**54418**	**54418U**	189.5	93	140	195	82.5	86.7	93.5	34.5	140	30	25.5	90	140	2	1	19.6	22.8
75	135	62	69	76	1.1	1	146	326	13.9	1 400	2 100	**52218**	**54218**	**54218U**	135	93	110	140	38	41.5	45	42	100	14	13.5	90	110	1	1	3.22	4.07
	155	88	97.2	106	1.5	1	242	524	18.5	1 000	1 600	**52318**	**54318**	**54318U**	155	93	120	160	53.5	58.1	62.5	36.5	112	19	18	90	120	1.5	1	6.60	8.44
80	210	150	160	176	3	1.1	460	983	35.7	620	950	**52420**	**54420**	**54420U**	209.5	103	155	220	91.5	96.5	104.5	43.5	160	33	27	100	155	2.5	1	26.6	32.0
85	150	67	72.8	81	1.1	1	183	410	16.6	1 200	1 900	**52220**	**54220**	**54220U**	150	103	125	155	41	43.9	48	49	112	15	14	100	125	1	1	4.29	5.25
	170	97	105.4	115	1.5	1	296	596	23.2	940	1 450	**52320**	**54320**	**54320U**	170	103	135	175	59	63.2	68	42	125	21	18	100	135	1.5	1	8.90	10.8
90	230	166	—	—	3	1.1	474	1 070	37.1	550	850	**52422**	—	—	229	113	—	—	101.5	—	—	—	—	37	—	110	170	2.5	1	34.9	—
95	160	67	71.4	81	1.1	1	191	431	17.6	1 200	1 800	**52222**	**54222**	**54222U**	160	113	135	165	41	43.2	48	62	125	15	14	110	135	1	1	4.68	5.66
	190	110	118.4	128	2	1	334	754	25.9	810	1 250	**52322**	**54322**	**54322U**	189.5	113	150	195	67	71.2	76	47	140	24	20.5	110	150	2	1	13.8	16.3
	250	177	—	—	4	1.5	601	1 460	48.5	520	800	**52424**	—	—	249	123	—	—	108.5	—	—	—	—	40	—	120	185	3	1.5	44.2	—

[Remark] Standard cage types used for the above bearings are described earlier in this section.

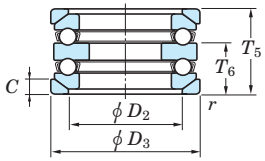
d_2 100 ~ 190 mm



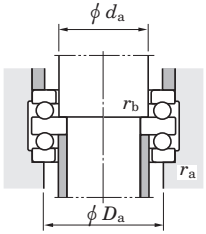
With flat back faces

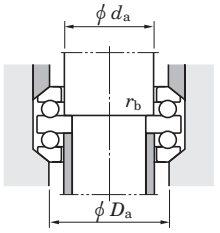


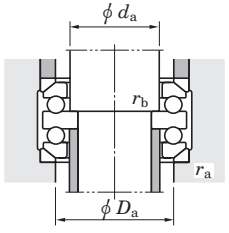
With spherical back faces



With aligning seat races





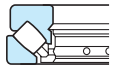


Boundary dimensions (mm)							Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})		Bearing No.			Dimensions (mm)										Mounting dimensions (mm)				(Refer.) Mass (kg)	
d_2	D	T_1	T_3	T_5	r min.	r_1 min.	C_a	C_{0a}	C_u	Grease lub.	Oil lub.	With flat back faces	With spherical back faces	With aligning seat races	d_3 max.	D_1 min.	D_2	D_3	T_2	T_4	T_6	A	R	B	C	d_a min.	D_a max.	r_a max.	r_b max.	With flat back faces	With aligning seat races
100	170	68	71.6	82	1.1	1.1	192	472	17.7	1 100	1 700	**52224**	**54224**	**54224U**	170	123	145	175	41.5	43.3	48.5	58.5	125	15	15	120	145	1	1	5.24	6.44
	210	123	131.2	143	2.1	1.1	389	931	30.5	710	1 100	**52324**	**54324**	**54324U**	209.5	123	165	220	75	79.1	85	58	160	27	22	120	165	2	1	17.2	22.9
	270	192	—	—	4	2	623	1 540	49.0	490	750	**52426**	—	—	269	134	—	—	117	—	—	—	—	42	—	130	200	3	2	56.5	—
110	190	80	85.8	96	1.5	1.1	254	622	22.2	970	1 500	**52226**	**54226**	**54226U**	189.5	133	160	195	49	51.9	57	63	140	18	17	130	160	1.5	1	7.72	9.29
	225	130	—	—	2.1	1.1	413	1 030	32.5	650	1 000	**52326**	—	—	224	134	—	—	80	—	—	—	—	30	—	130	177	2	1	22.1	—
	280	196	—	—	4	2	650	1 680	52.2	450	700	**52428**	—	—	279	144	—	—	120	—	—	—	—	44	—	140	206	3	2	60.6	—
120	200	81	86.2	99	1.5	1.1	234	669	19.6	940	1 450	**52228**	**54228**	**54228U**	199.5	143	170	210	49.5	52.1	58.5	83.5	160	18	17	140	170	1.5	1	8.31	10.5
	240	140	—	—	2.1	1.1	458	1 130	36.9	620	950	**52328**	—	—	239	144	—	—	85.5	—	—	—	—	31	—	140	190	2	1	27.8	—
	300	209	—	—	4	2	711	1 910	57.4	420	650	**52430**	—	—	299	154	—	—	127.5	—	—	—	—	46	—	150	225	3	2	73.9	—
130	215	89	95.6	109	1.5	1.1	266	768	21.8	840	1 300	**52230**	**54230**	**54230U**	214.5	153	180	225	54.5	57.8	64.5	74.5	160	20	20.5	150	180	1.5	1	10.6	13.6
	250	140	—	—	2.1	1.1	451	1 200	36.0	580	900	**52330**	—	—	249	154	—	—	85.5	—	—	—	—	31	—	150	200	2	1	29.2	—
	320	226	—	—	5	2	852	2 410	70.3	390	600	**52432**	—	—	319	164	—	—	138	—	—	—	—	50	—	160	240	4	2	90.3	—
135	340	236	—	—	5	2.1	943	2 730	77.2	360	550	**52434**	—	—	339	174	—	—	143	—	—	—	—	50	—	170	255	4	2	108	—
140	225	90	97.4	110	1.5	1.1	279	803	23.4	810	1 250	**52232**	**54232**	**54232U**	224.5	163	190	235	55	58.7	65	70	160	20	21	160	190	1.5	1	12.2	14.6
	270	153	—	—	3	1.1	512	1 570	41.3	550	850	**52332**	—	—	269	164	—	—	93	—	—	—	—	33	—	160	215	2.5	1	37.7	—
	360	245	—	—	5	3	928	2 730	75.1	320	500	**52436**	—	—	359	184	—	—	148.5	—	—	—	—	52	—	180	270	4	2.5	126	—
150	240	97	104.4	117	1.5	1.1	326	874	26.3	750	1 150	**52234**	**54234**	**54234U**	239.5	173	200	250	59	62.7	69	87	180	21	21.5	170	200	1.5	1	15.2	17.8
	250	98	102.4	118	1.5	2	332	986	26.9	710	1 100	**52236**	**54236**	**54236U**	249	183	210	260	59.5	61.7	69.5	108.5	200	21	21.5	180	210	1.5	2	15.9	19.6
	280	153	—	—	3	1.1	579	1 570	47.4	520	800	**52334**	—	—	279	174	—	—	93	—	—	—	—	33	—	170	220	2.5	1	39.6	—
	300	165	—	—	3	2	578	1 580	46.2	490	750	**52336**	—	—	299	184	—	—	101	—	—	—	—	37	—	180	240	2.5	2	50.9	—
160	270	109	116.4	131	2	2	385	1 010	31.4	650	1 000	**52238**	**54238**	**54238U**	269	194	220	280	66.5	70.2	77.5	93.5	200	24	23	190	230	2	2	21.6	25.2
	320	183	—	—	4	2	679	1 950	55.3	440	680	**52338**	—	—	319	195	—	—	111.5	—	—	—	—	40	—	190	255	3	2	64.9	—
170	280	109	115.6	133	2	2	392	1 110	32.2	620	950	**52240**	**54240**	**54240U**	279	204	240	290	66.5	69.8	78.5	120.5	225	24	23	200	240	2	2	22.7	27.3
	340	192	—	—	4	2	745	2 220	61.1	420	650	**52340**	—	—	339	205	—	—	117	—	—	—	—	42	—	200	270	3	2	77.8	—
190	300	110	115.2	134	2	2	428	1 310	36.6	580	900	**52244**	**54244**	**54244U**	299	224	260	310	67	69.6	79	114	225	24	25	220	260	2	2	23.9	29.5

[Remark] Standard cage types used for the above bearings are described earlier in this section.

Spherical thrust roller bearings

Spherical thrust roller bearings



Bore diameter **60** – **500** mm

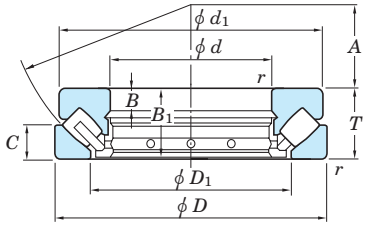
Spherical thrust roller bearings are designed to carry high axial loads. They can also support radial load if magnitude is no more than 55 % of the axial load being carried.

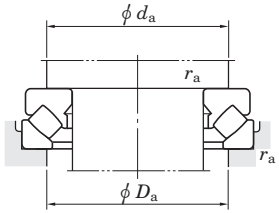
These bearings are not suitable for high-speed rotation.

Having a spherical housing race raceway surface, these bearings are self-alignings, adjusting to axial inclination.

They are usually used with oil lubrication.

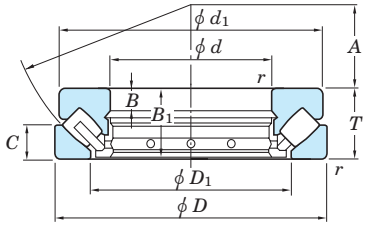
Boundary dimensions	As specified in JIS B 1512.
Tolerances	As specified in JIS B 1514-2, class 0. (refer to table 7-10 on p. A 75.)
Recommended fits	Refer to Table 9-8 on p. A 98.
Required minimum axial load	A certain degree of load is necessary in order for bearings to operate satisfactorily. (refer to p. A 116.)
Standard cage	Copper alloy machined cage (supplementary code : FY)
Allowable aligning angle	0.035 – 0.052 rad (2° – 3°) in general, depending on bearing series.
Equivalent axial load	Dynamic equivalent axial load $P_a = 1.2F_r + F_a$ Static equivalent axial load $P_{0a} \fallingdotseq 2.7F_r + F_a$ (Note : $F_r / F_a \leqq 0.55$)

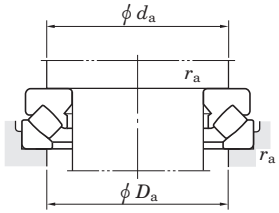




Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speed (min^{-1})	Bearing No.		Dimensions (mm)						Mounting dimensions (mm)			(Refer.) Mass
d	D	T	r min.	C_a	C_{0a}	C_u	Oil lub.			d_1	D_1	B	B_1	C	A	d_a min.	D_a max.	r_a max.	(kg)
60	130	42	1.5	399	884	73.7	2 700	**29412R**		123	89	15	39.5	20	38	90	108	1.5	2.75
65	140	45	2	450	1 020	73.4	2 500	**29413R**		133	96	16	42.5	21	42	100	115	2	3.41
70	150	48	2	485	1 100	105	2 300	**29414R**		142	103	17	45.5	23	44	105	125	2	4.16
75	160	51	2	584	1 360	102	2 100	**29415R**		152	109	18	48	24	47	115	132	2	4.98
80	170	54	2.1	631	1 480	128	2 000	**29416R**		162	117	19	51	26	50	120	140	2	5.95
85	150	39	1.5	400	1 000	100	2 600	**29317R**		143.5	114	13	37	19	50	115	135	1.5	2.87
	180	58	2.1	714	1 700	124	1 900	**29417R**		170	125	21	55	28	54	130	150	2	7.19
90	155	39	1.5	412	1 050	103	2 500	**29318R**		148.5	117	13	37	19	52	120	140	1.5	3.06
	190	60	2.1	821	2 010	158	1 800	**29418R**		180	132	22	57	29	56	135	157	2	8.28
100	170	42	1.5	481	1 270	118	2 300	**29320R**		163	129	14	40	20.8	58	130	150	1.5	3.91
	210	67	3	911	2 220	166	1 650	**29420R**		200	146	24	64	32	62	150	175	2.5	11.2
110	190	48	2	628	1 690	147	2 000	**29322R**		182	143	16	45.5	23	64	145	165	2	5.67
	230	73	3	1 120	2 810	203	1 500	**29422R**		220	162	26	69	35	69	165	190	2.5	14.7
120	210	54	2.1	759	2 030	182	1 800	**29324R**		200	159	18	51	26	70	160	180	2	7.90
	250	78	4	1 300	3 270	241	1 350	**29424R**		236	174	29	74	37	74	180	205	3	18.5
130	225	58	2.1	894	2 440	209	1 700	**29326R**		215	171	19	55	28	76	170	195	2	9.45
	270	85	4	1 490	3 870	270	1 250	**29426R**		255	189	31	81	41	81	195	225	3	23.5
140	240	60	2.1	898	2 490	206	1 600	**29328R**		230	183	20	57	29	82	185	205	2	11.1
	280	85	4	1 560	4 080	289	1 250	**29428R**		268	199	31	81	41	86	205	235	3	24.6
150	250	60	2.1	965	2 740	233	1 550	**29330R**		240	194	20	57	29	87	195	215	2	11.7
	300	90	4	1 730	4 620	334	1 100	**29430R**		285	214	32	86	44	92	220	250	3	29.6
160	270	67	3	1 150	3 070	272	1 400	**29332R**		260	208	23	64	32	92	210	235	2.5	15.4
	320	95	5	1 990	5 370	375	1 050	**29432R**		306	229	34	91	45	99	230	265	4	35.9

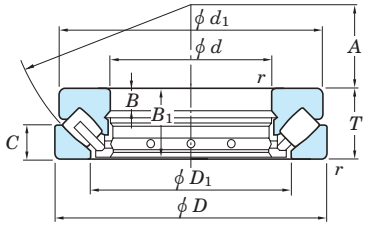
d 170 ~ 320 mm

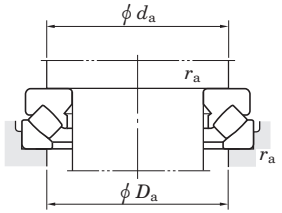




Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speed (min^{-1})	Bearing No.		Dimensions (mm)						Mounting dimensions (mm)			(Refer.) Mass
d	D	T	r min.	C_a	C_{0a}	C_u	Oil lub.			d_1	D_1	B	B_1	C	A	d_a min.	D_a max.	r_a max.	(kg)
170	280	67	3	1 190	3 180	286	1 350	**29334R**		270	216	23	64	32	96	220	245	2.5	15.4
	340	103	5	2 120	5 880	389	950	**29434R**		324	243	37	99	50	104	245	285	4	44.0
180	300	73	3	1 380	3 170	330	1 250	**29336R**		290	232	25	69	35	103	235	260	2.5	20.7
	360	109	5	2 450	6 590	447	900	**29436R**		342	255	39	105	52	110	260	300	4	52.2
190	320	78	4	1 570	4 230	369	1 150	**29338R**		308	246	27	74	38	110	250	275	3	25.1
	380	115	5	2 790	7 690	504	850	**29438R**		360	271	41	111	55	117	275	320	4	61.4
200	280	48	2	641	2 170	151	1 600	**29240**		271	236	15	45	24	108	235	255	2	8.90
	340	85	4	1 810	5 040	415	1 050	**29340R**		325	261	29	81	41	116	265	295	3	31.2
	400	122	5	3 060	8 470	575	800	**29440R**		380	286	43	117	59	122	290	335	4	73.0
220	300	48	2	670	2 340	148	1 550	**29244**		292	254	15	45	24	117	260	275	2	10.0
	360	85	4	1 840	5 240	439	1 000	**29344R**		345	280	29	81	41	125	285	315	3	33.3
	420	122	6	3 160	8 990	619	750	**29444R**		400	308	43	117	58	132	310	355	5	74.2
240	340	60	2.1	1 030	3 670	233	1 250	**29248**		330	283	19	57	30	130	285	305	2	16.7
	380	85	4	1 790	5 330	99.3	950	**29348A**		365	300	29	81	41	135	300	330	3	35.5
	440	122	6	3 260	9 510	659	700	**29448R**		420	326	43	117	59	142	330	375	5	83.0
260	360	60	2.1	1 050	3 720	240	1 200	**29252**		350	302	19	57	30	139	305	325	2	18.5
	420	95	5	1 960	6 040	389	850	**29352**		405	329	32	91	45	148	330	365	4	51.5
	480	132	6	3 760	11 100	764	650	**29452R**		460	357	48	127	64	154	360	405	5	110
280	380	60	2.1	1 030	3 730	225	1 150	**29256**		370	323	19	57	30	150	325	345	2	19.5
	440	95	5	2 200	6 870	439	800	**29356**		423	348	32	91	46	158	350	390	4	53.2
	520	145	6	4 560	13 600	907	550	**29456R**		495	387	52	140	68	166	390	440	5	137
300	420	73	3	1 330	4 880	302	950	**29260**		405	353	21	69	38	162	355	380	2.5	30.5
	480	109	5	2 470	7 780	496	700	**29360**		460	379	37	105	50	168	380	420	4	74.9
	540	145	6	4 670	14 900	925	550	**29460R**		515	402	52	140	70	175	410	460	5	146
320	440	73	3	1 780	6 480	321	900	**29264R**		430	372	21	69	38	172	375	400	2.5	32.7
	500	109	5	2 890	9 380	573	650	**29364**		482	399	37	105	53	180	400	440	4	78.0
	580	155	7.5	5 190	16 100	1 040	500	**29464R**		555	435	55	149	75	191	435	495	6	179

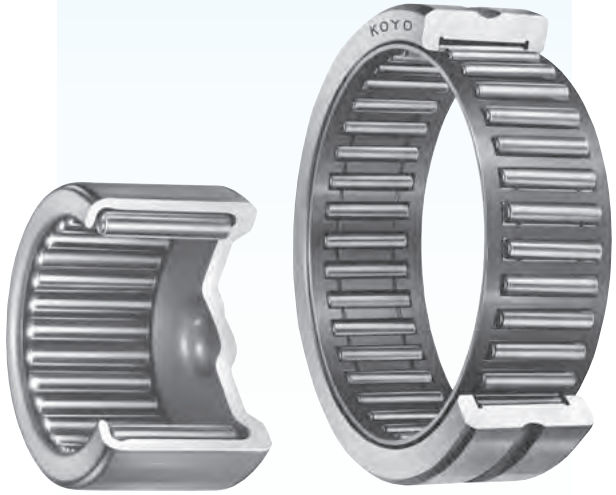
d 340 ~ 500 mm





Boundary dimensions (mm)				Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speed (min^{-1})	Bearing No.		Dimensions (mm)						Mounting dimensions (mm)			(Refer.) Mass
d	D	T	r min.	C_a	C_{0a}	C_u	Oil lub.			d_1	D_1	B	B_1	C	A	d_a min.	D_a max.	r_a max.	(kg)
340	460	73	3	1 800	6 420	307	900	**29268R**		445	395	21	69	37	183	395	420	2.5	34.7
	540	122	5	3 810	12 700	890	600	**29368R**		520	428	41	117	59	192	430	470	4	106
	620	170	7.5	6 190	19 400	1 210	450	**29468R**		590	462	61	164	82	201	465	530	6	224
360	500	85	4	1 650	6 080	332	750	**29272**		485	423	25	81	44	194	420	455	3	51.8
	560	122	5	3 890	13 200	923	550	**29372R**		540	448	41	117	59	202	450	495	4	110
	640	170	7.5	6 440	20 600	1 300	450	**29472R**		610	480	61	164	82	210	485	550	6	231
380	520	85	4	1 750	6 610	343	700	**29276**		505	441	27	81	42	202	440	475	3	52.8
	600	132	6	4 430	15 000	1 030	500	**29376R**		580	477	44	127	63	216	480	525	5	141
	670	175	7.5	6 780	22 000	1 300	410	**29476R**		640	504	63	168	85	230	510	575	6	263
400	540	85	4	1 980	7 610	377	700	**29280**		526	460	27	81	42	212	460	490	3	55.3
	620	132	6	4 630	16 100	1 080	500	**29380R**		596	494	44	127	64	225	500	550	5	144
	710	185	7.5	7 750	25 300	1 530	380	**29480R**		680	534	67	178	89	236	540	610	6	315
420	580	95	5	2 310	8 750	463	600	**29284**		564	489	30	91	46	225	490	525	4	75.4
	650	140	6	5 070	17 700	1 160	450	**29384R**		626	520	48	135	68	235	525	575	5	169
	730	185	7.5	7 960	26 500	1 630	370	**29484R**		700	556	67	178	89	244	560	630	6	330
440	600	95	5	2 340	8 970	441	600	**29288**		585	508	30	91	49	235	510	545	4	77.9
	680	145	6	5 360	18 800	1 250	420	**29388R**		655	548	49	140	70	245	550	600	5	190
	780	206	9.5	9 100	30 000	1 800	320	**29488R**		745	588	74	199	100	260	595	670	8	423
460	620	95	5	2 460	9 620	440	550	**29292**		605	530	30	91	46	245	530	570	4	81.0
	710	150	6	4 580	15 800	875	400	**29392**		685	567	51	144	72	257	575	630	5	216
	800	206	9.5	9 360	31 600	1 870	300	**29492R**		765	608	74	199	100	272	615	690	8	438
480	650	103	5	2 880	11 600	531	500	**29296**		635	556	33	99	55	259	555	595	4	89.0
	850	224	9.5	10 900	36 300	2 100	270	**29496R**		810	638	81	216	108	280	645	730	8	548
500	870	224	9.5	10 800	36 400	2 120	270	**294/500R**		830	661	81	216	107	290	670	750	8	562

Needle roller bearings



Needle roller bearings are small in sectional height, therefore useful in making machinery smaller and lighter. This type of bearing is used in a wide range of machinery, such as automobiles, motor cycles, electric machines, machine tools, aerospace and office equipment.

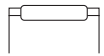
- Compact, highly rigid and superior in load carrying performance, compared with other types of bearings.
- Excellent for carrying oscillating loads; contains many small diameter rollers.

- Widely employed in stud type and yoke type track rollers used as guide rollers in cam mechanisms or linear motion units. Allowable loads of these truck rollers are examined with load ratings different form those of general bearings. For detailed information, contact us.
  Also used in miniature one-way clutches in the clutch mechanisms of office equipment, such as copying machines.

The catalog also covers bearings employing rollers other than those prescribed in JIS B 1506 "rollers for roller bearings".

For details, refer to JTEKT separate catalog “Needle Roller Bearings” (CAT. NO. B2020E)

Needle roller and cage assemblies

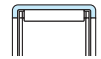


Bore diameter of a needle roller and cage assembly

Metric series **3** – **110** mm

Inch series **9.525** – **127.000** mm

Drawn cup needle roller bearings



Metric series Roller set bore dia. **3** – **60** mm

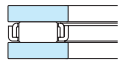
Inch series Roller set bore dia. **3.175** – **69.850** mm

Heavy-duty needle roller bearings

Metric series Roller set bore dia. **5** – **175** mm

Inch series Roller set bore dia. **15.875** – **88.900** mm

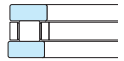
Needle roller thrust bearings



Metric series Bore dia. **6** – **160** mm

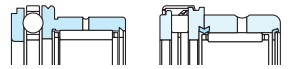
Inch series Bore dia. **6.350** – **104.780** mm

Cylindrical roller thrust bearings



Bore dia. **15** – **90** mm

Combined needle roller bearings



Roller set bore dia. **10** – **70** mm

Inner rings

Metric series Bore dia. **5** – **180** mm

Inch series Bore dia. **9.525** – **76.2** mm

Miniature one-way clutches (Refer.)

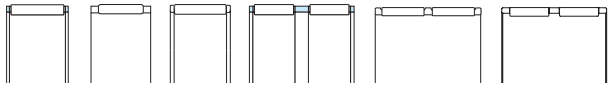
Roller set bore dia. **4** – **12** mm

Table 1 (1) Types of needle roller bearing

(1) Radial Needle Roller and Cage Assemblies

Metric Series

Single-Row, Double-Row



K, RF, RFN | RS, R, RP | RV, V, VS | K ... ZW, WRF | WR, WRS | WRP

Inch Series

Single-Row

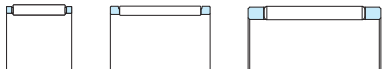
WJ, WJC

Metric Series

Assemblies for Crank Pin End Applications

K.BE | BE, GS | VE, VS P

Assemblies for Wrist Pin End Applications

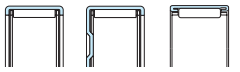


K.SE | R P | RE, UR P

(2) Drawn Cup Needle Roller Bearings

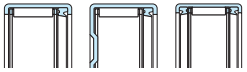
Metric Series (Caged)

Open Ends, Closed One End



BKM, BSM, HK | BK | BTM, BHTM

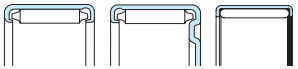
Sealed



HK RS | BK RS | BKM UU, BHKM UU, HK .2RS

(Full Complement)

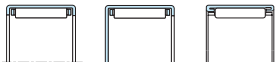
Open Ends, Closed One End



BM, BHM, DL | DLF | YM

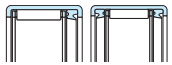
Inch Series (Caged)

Open Ends, Closed One End



J,JH | MJ-1,MJH-1 | BT

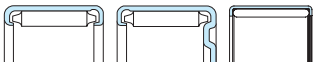
Sealed



JT | JTT

(Full Complement)

Open Ends, Closed One End



B,BH | M-1, MH-1 | Y

Extra-Precision

GB,GBH

Inner Rings

Inch Series

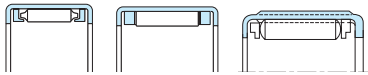
IRA, IR (4 digit or less)

The needle roller bearings explained in this catalog are indicated in blue.
For additional details on Koyo's Needle Roller Bearing product line please refer to Catalog B2020E.

(3) Drawn Cup Roller Clutches

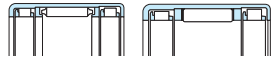
Metric Series

Clutches



FC | FCS FCL-K FC-K | 1WC EWC

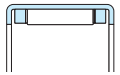
Clutch and Bearing Assemblies



FCB | FCBL-K FCBN-K

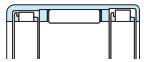
Inch Series

Clutches



RC RC-FS

Clutch and Bearing Assemblies

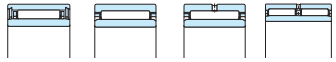


RCB RCB-FS

(4) Heavy-Duty Needle Roller Bearings

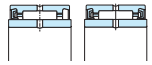
Metric Series (Caged, With Inner Ring)

Unsealed



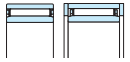
NKJ | NQI | NKJ,NKJS NA48,49,69 | NA69

Sealed



NA49RS | NA49.2RS

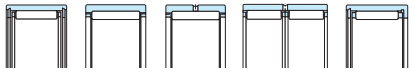
Without Flanges



NAO | +SNSH

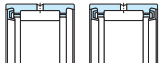
(Without Inner Ring)

Unsealed



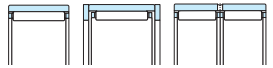
NK | NQ | NK.NKS RNA48,49,69 | RNA69 | NKTN

Sealed



RNA49RS | RNA49.2RS

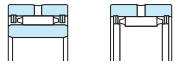
Without Flanges



RNAO | +SNSH | RNAO

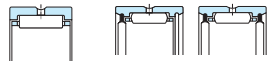
(Full Complement) | **Inch Series (Without Inner Ring)** | **Inner Rings**

With Inner Ring | Without Inner Ring



NA | RNA

Unsealed | Sealed



HJ | HJ-RS | HJ-.2RS

Inch Series

IR

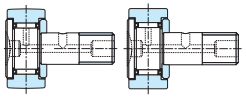
Table 1 (2) Types of needle roller bearing

(5) Track Rollers

[Stud-Type]

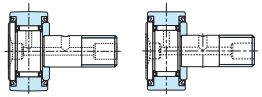
Metric Series (Caged)

Unsealed



KR KR.DZ

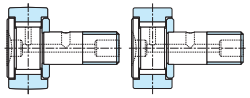
Sealed



KR .2RS KR.DZ.2RS

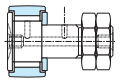
(Full Complement)

Unsealed



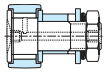
KRV KRV.DZ

Standard Series



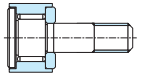
GC16-90/GCL16-90

Eccentric



GCR, GCRL

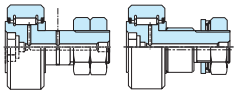
Small Series



GC10-15/GCL10-15

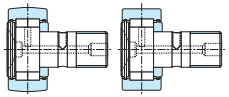
Light Series

Eccentric



GCU,GCUL GCUR,GCURL

Cylindrical Rollers



NUKR NUKR.DZ

[Yoke-Type]

Metric Series (Caged, Without End Washers)

Unsealed, Without Inner Ring

RSTO

RSTO.DZ

Unsealed, With Inner Ring

STO

STO.DZ

Sealed, Without Inner Ring

RNA22.2RS

RNA22.2RS.DZ

(Caged, Without End Washers)

Sealed, With Inner Ring

NA22.2RS

NA22.2RS.DZ

(Caged, With End Washers)

With Inner Ring

NATR

NATR.DZ

STO.ZZ

STO.ZZ.DZ

(Full Complement, With End Washers)

Small Series

FP,FPL

Non-Separable

FG,FGL

Without Inner Ring Unsealed

RNA...B6
RNAB
RNAL

With Inner Ring, Cylindrical Rollers

NUTR

NUTR.DZ

(Full Complement, With Metal Seals)

Non-Separable, Light Series, Heavy Series

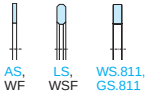
FGU,FGUL

(6) Thrust Bearings, Assemblies, Washers

Metric Series

Thrust Needle Roller and Cage Assemblies and Thrust Washers

FNT, AXK, TP, TV

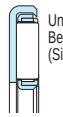


AS, WF LS, WSF WS.811, GS.811

Unitized Thrust Bearing Assemblies (Double-Washer)

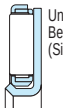
FNTKF, TPK JL, TVK JL

Unitized Thrust Bearing Assemblies (Single-Washer)



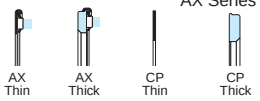
FNTK, TPK J, TVK J

Unitized Thrust Bearing Assemblies (Single-Washer)



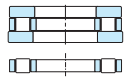
FNTF, TPK L, TVK L

Unitized Thrust Bearing Assembly AX Series



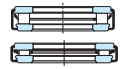
AX Thin AX Thick CP Thin CP Thick

Thrust Cylindrical Roller and Cage Assemblies and Thrust Washers



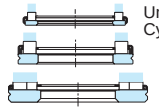
811, 812 Series
K.811,K.812

Needle Rollers, Cylindrical Rollers



AXZ,ARZ

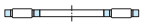
Unitized Cylindrical Rollers



AR

Inch Series

Thrust Needle Roller and Cage Assemblies and Thrust Washers



NTA

Thrust Cylindrical Roller and Cage Assembly

NTH

Cylindrical Roller Thrust Bearing

NTHA

(7) Combined Needle Roller Bearings

Metric Series (Heavy-Duty, Without Inner Ring)

Ball Thrust Series

Separable

NAXK

Non-Separable

NAXK.Z

Cylindrical Roller Thrust Series

Non-Separable

RAXZ500

Separable

NAXR

Non-Separable

NAXR.Z

Needle Roller and Cylindrical Roller Thrust Series

No Washer

RAX500

No Washer

RAX400

(Drawn Cup, Without Inner Ring)

Needle Roller Thrust Series

Open Ends

RAX700

Closed One End

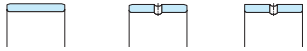
RAXF700

(8) Needle Rollers, Accessories

Inner Rings (Caged)

<Metric Series>

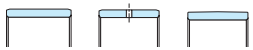
For Drawn Cup Needle Roller Bearings, Heavy-Duty



JR,IM..P JR.JS1 JRZ.JS1

(Full Complement)

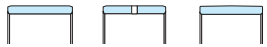
For Drawn Cup Needle Roller Bearings



IM IMC IM...R6

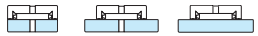
End Washer

For Machine-Tool Quality Precision-Combined Bearings



IM IMC IM...R6

For RNA Bearings (With Oil Holes, Extra Wide)



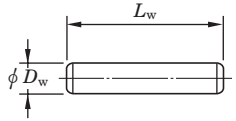
BIC BICG BIG,BIK,BIP

For Metric Series NAO and RNAO Bearings

SNSH

[Tolerances of needle roller bearings]

Table 2 Tolerance grades of needle rollers (JIS B 1506)



Unit : μm

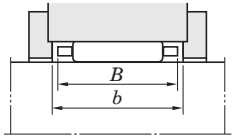
Class	Single [1] plane diameter variation V_{Dwp} max.	Deviation [1] from circular form Δ_{Rw} max.	Gauge lot [1] diameter variation V_{DwL} max.
2	1	1	2
3	1.5	1.5	3
5	2	2.5	5

Class	Actual [2] length deviation Δ_{Lws}	Recommended gauge S
2	h 13	0/– 2, – 1/– 3, – 2/– 4, – 3/– 5, – 4/– 6, – 5/– 7, – 6/– 8, – 7/– 9, – 8/– 10
3		0/– 3, – 1.5/– 4.5, – 3/– 6, – 4.5/– 7.5, – 6/– 9,– 7/– 10
5		0/– 5, – 3/– 8, – 5/– 10

[Notes] 1) Values apply only at middle of roller length.
2) Applied tolerance differs according to L_w division.

[Remark] Along the entire length of the roller, all the actually measured diameters should not exceed the actual maximum diameter at the middle of the entire length of the roller by the lengths shown below.
a) Class 2 : 0.5 μm b) Class 3 : 0.8 μm
c) Class 5 : 1 μm

Table 3 Tolerance of needle roller cage width B (JIS B 1536-3)



Bearing type	B deviation (mm)	
	upper	lower
K, K...ZW	– 0.2	– 0.55
WJ, WJC	*0*	*– 0.38*

[Remark] Values in Italics are prescribed in JTEKT standards.

[Reference] The guide width (b) should satisfy the equation : $b = B +$ (H11)

Table 4 Metric series drawn cup needle roller bearing gauge specifications (caged)

Unit : mm

Nominal bore diameter	Ring gage [1]	Needle roller complement bore diameter	
		max.	min.
3	6.484	3.024	3.006
4	7.984	4.028	4.010
5	8.984	5.028	5.010
6	9.984	6.028	6.010
7	10.980	7.031	7.013
8	11.980	8.031	8.013
9	12.980	9.031	9.013
10	13.980	10.031	10.013
12	15.980	12.034	12.016
12	17.980	12.034	12.016
13	18.976	13.034	13.016
14	19.976	14.034	14.016
15	20.976	15.034	15.016
16	21.976	16.034	16.016
17	22.976	17.034	17.016
18	23.976	18.034	18.016
20	25.976	20.041	20.020
22	27.976	22.041	22.020
25	31.972	25.041	25.020
28	34.972	28.041	28.020
30	36.972	30.041	30.020
35	41.972	35.050	35.025
40	46.972	40.050	40.025
45	51.967	45.050	45.025
50	57.967	50.050	50.025
60	67.967	60.060	60.030

[Note] 1) The ring gage sizes are in accordance with ISO N6 lower limit.

Table 5 Inch series drawn cup needle roller bearing gauge specifications (caged)

Unit : mm

Bearing bore designation	Nominal shaft diameter	Nominal bore diameter	Ring gage	Needle roller complement bore diameter	
				max.	min.
2	3.175	3.175	6.363	3.218	3.195
2 1/2	3.970	3.967	7.155	4.013	3.99
3	4.763	4.763	8.730	4.806	4.783
4	6.350	6.350	11.125	6.411	6.388
5	7.938	7.938	12.713	7.998	7.976
H 5	H 7.938	7.938	14.300	7.998	7.976
6	9.525	9.525	14.300	9.586	9.563
H 6	H 9.525	9.525	15.888	9.586	9.563
7	11.113	11.113	15.888	11.174	11.151
H 7	H 11.113	11.113	17.475	11.174	11.151
8	12.700	12.700	17.475	12.761	12.738
H 8	H12.700	12.700	19.063	12.761	12.738
9	14.288	14.288	19.063	14.349	14.326
H 9	H 14.288	14.288	20.650	14.349	14.326
10	15.875	15.875	20.650	14.349	15.913
H 10	H 15.875	15.875	22.238	14.349	15.913
11	17.463	17.463	22.238	17.524	17.501
H 11	H 17.463	17.463	23.825	17.524	17.501
12	19.050	19.050	25.387	19.086	19.063
H 12	H 19.050	19.050	26.975	19.086	19.063
13	20.638	20.638	26.975	20.673	20.650
H 13	H 20.638	20.638	28.562	20.673	20.650
14	22.225	22.225	28.562	22.261	22.238
H 14	H 22.225	22.225	30.150	22.261	22.238
15	23.813	23.813	30.150	23.848	23.825
16	25.400	25.400	31.737	25.436	25.413
H 16	H 25.400	25.400	33.325	25.436	25.413
17	26.988	26.988	33.325	27.023	27.000
18	28.575	28.575	34.912	28.611	28.588
H 18	H 28.575	28.575	38.087	28.611	28.588
19	30.163	30.163	38.087	30.198	30.175
20	31.750	31.750	38.087	31.786	31.763
H 20	H 31.750	31.750	41.262	31.786	31.763
21	33.338	33.338	41.262	33.376	33.350
22	34.925	34.925	41.262	34.963	34.938
H 22	H 34.925	34.925	44.437	34.963	34.938
24	38.100	38.100	47.612	38.141	38.113
26	41.275	41.275	50.787	41.316	41.288
28	44.450	44.450	53.962	44.493	44.463
30	47.625	47.625	57.137	47.668	47.638
32	50.800	50.800	60.312	50.846	50.815
H 33	H 52.388	52.388	64.280	52.436	52.400
34	53.975	53.975	63.487	54.026	53.990
36	57.150	57.150	66.662	57.201	57.165
42	66.675	66.675	76.187	66.736	66.700
44	69.850	69.850	79.362	69.911	69.875
56	88.900	88.900	101.587	88.961	88.925
88	139.700	139.700	152.375	139.774	139.725

[Remark] Bearing bore should be checked with "go" and "no go" plug gages. The "go" gage size is the minimum needle roller complement bore diameter. The "no go" gage size is larger than the maximum needle roller complement bore diameter by 0.0001 in.

Table 6 Metric series caged needle roller complement bore diameter for bearings without inner rings

Unit : mm

F_w		$\Delta F_{w\,min.}$	
over	up to	max.	min.
3	**6**	+ 0.018	+ 0.010
6	**10**	+ 0.022	+ 0.013
10	**18**	+ 0.027	+ 0.016
18	**30**	+ 0.033	+ 0.020
30	**50**	+ 0.041	+ 0.025
50	**80**	+ 0.049	+ 0.030
80	**120**	+ 0.058	+ 0.036
120	**180**	+ 0.068	+ 0.043
180	**250**	+ 0.079	+ 0.050
250	**315**	+ 0.088	+ 0.056
315	**400**	+ 0.098	+ 0.062

Table 7 Metric series heavy-duty needle roller bearing tolerances = JIS B 1415 (ISO 492) =

(1) Inner ring

Unit : μm

Nominal bore diameter d (mm)		Single plane mean bore diameter deviation Δ_{dmp}						Single plane bore diameter variation V_{dsp}			Mean bore diameter variation V_{dmp}			Radial runout of assembled bearing inner ring K_{ia}			S_d	Single inner ring width deviation Δ_{Bs}						Inner ring width variation V_{Bs}		
		class 0		class 6		class 5		Diameter series 9										class 0		class 6		class 5				
over	up to	upper	lower	upper	lower	upper	lower	class 0	class 6	class 5	class 0	class 6	class 5	class 0	class 6	class 5	class 5	upper	lower	upper	lower	upper	lower	class 0	class 6	class 5
								max.			max.			max.			max.							max.		
2.5	10	0	– 8	0	– 7	0	– 5	10	9	5	6	5	3	10	6	4	7	0	–120	0	–120	0	– 40	15	15	5
10	18	0	– 8	0	– 7	0	– 5	10	9	5	6	5	3	10	7	4	7	0	–120	0	–120	0	– 80	20	20	5
18	30	0	–10	0	– 8	0	– 6	13	10	6	8	6	3	13	8	4	8	0	–120	0	–120	0	–120	20	20	5
30	50	0	–12	0	–10	0	– 8	15	13	8	9	8	4	15	10	5	8	0	–120	0	–120	0	–120	20	20	5
50	80	0	–15	0	–12	0	– 9	19	15	9	11	9	5	20	10	5	8	0	–150	0	–150	0	–150	25	25	6
80	120	0	–20	0	–15	0	–10	25	19	10	15	11	5	25	13	6	9	0	–200	0	–200	0	–200	25	25	7
120	150	0	–25	0	–18	0	–13	31	23	13	19	14	7	30	18	8	10	0	–250	0	–250	0	–250	30	30	8
150	180	0	–25	0	–18	0	–13	31	23	13	19	14	7	30	18	8	10	0	–250	0	–250	0	–250	30	30	8
180	250	0	–30	0	–22	0	–15	38	28	15	23	17	8	40	20	10	11	0	–300	0	–300	0	–300	30	30	10

S_d : Perpendicularity of inner ring face with respect to the bore

(2) Outer ring

Unit : μm

Nominal outside diameter D (mm)		Single plane mean outside diameter deviation Δ_{Dmp}						Single plane outside diameter variation V_{Dsp}			Mean outside diameter variation V_{Dmp}			Radial runout of assembled bearing outer ring K_{ea}			S_D	Δ_{Cs}		Ring width variation V_{Cs}		
		class 0		class 6		class 5		Diameter series 9										class 0, 6, 5				
over	up to	upper	lower	upper	lower	upper	lower	class 0[1)]	class 6[1)]	class 5	class 0[1)]	class 6[1)]	class 5	class 0	class 6	class 5	class 5	upper	lower	class 0	class 6	class 5
								max.			max.			max.			max.			max.		
6	18	0	– 8	0	– 7	0	– 5	10	9	5	6	5	3	15	8	5	8					5
18	30	0	– 9	0	– 8	0	– 6	12	10	6	7	6	3	15	9	6	8					5
30	50	0	–11	0	– 9	0	– 7	14	11	7	8	7	4	20	10	7	8					5
50	80	0	–13	0	–11	0	– 9	16	14	9	10	8	5	25	13	8	8	Shall conform to the tolerance Δ_{Bs} on d of the same bearing		Shall conform to the tolerance V_{Bs} on d of the same bearing		6
80	120	0	–15	0	–13	0	–10	19	16	10	11	10	5	35	18	10	9					8
120	150	0	–18	0	–15	0	–11	23	19	11	14	11	6	40	20	11	10					8
150	180	0	–25	0	–18	0	–13	31	23	13	19	14	7	45	23	13	10					8
180	250	0	–30	0	–20	0	–15	38	25	15	23	15	8	50	25	15	11					10
250	315	0	–35	0	–25	0	–18	44	31	18	26	19	9	60	30	18	13					11

[Note] 1) Shall be applied when locating snap ring is not fitted.

S_D : Perpendicularity of outer ring outside surface with respect to the face

Δ_{Cs} : Deviation of a single outer ring width

Table 8 Inch series heavy-duty needle roller bearing (HJ outer ring)

(1) Outside diameter and width tolerances Unit : mm

Nominal outside diameter D		Single plane mean outside diameter deviation (D_{mp}) [1]		Deviaiton from nominal of width (C)	
over	up to	max.	min.	max.	min.
19.050	50.800	+0	–0.013		
50.800	82.550	+0	–0.015	+0	–0.013
82.550	120.650	+0	–0.020		

[Note] 1) "Single mean diameter" is defined as the mean diameter in a single radial plane.

(2) Roller complement bore tolerance Unit : mm

Nominal roller complement bore diameter F_w		Deviaiton from nominal of the smallest single diameter of the roller complement bore (F_m) [1]	
over	up to	max.	min.
12.700	15.875	+0.043	+0.020
15.875	28.575	+0.046	+0.023
28.575	41.275	+0.048	+0.025
41.275	47.625	+0.050	+0.025
47.625	69.850	+0.053	+0.028
69.850	76.200	+0.058	+0.028
76.200	101.600	+0.060	+0.030

[Note] 1) "The smallest single diameter of the roller complement bore" is defined as the diameter of the cylinder which, when used as a bearing inner ring, results in zero radial internal clearance in the bearing on at least one diameter.

Table 9 Inch series heavy-duty needle roller bearing (IR inner ring)

(1) Bore and width tolerances Unit : mm

Nominal bore diameter d		Single plane mean bore diameter deviation (d_{mp}) [1]		Deviaiton from nominal of width (B)	
over	up to	max.	min.	max.	min.
7.938	19.050	+0	–0.010		
19.050	50.800	+0	–0.013	+0.25	+0.12
50.800	82.550	+0	–0.015		

[Note] 1) "Single mean diameter" is defined as the mean diameter in a single radial plane.

(2) Outside diameter tolerance Unit : mm

Nominal outside diameter F		Single plane mean outside diameter deviation (F_{mp}) [1]	
over	up to	max.	min.
12.700	15.875	–0.013	–0.023
15.875	25.400	–0.018	–0.031
25.400	28.575	–0.023	–0.036
28.575	34.925	–0.023	–0.036
34.925	47.625	–0.025	–0.038
47.625	76.200	–0.028	–0.040
76.200	95.250	–0.033	–0.046

[Note] 1) "Single mean diameter" is defined as the mean diameter in a single radial plane.

Table 10 Tolerance for metric series thrust needle roller and cage assemblies (type code : FNT)

(1) Bore diameter Unit : mm

Nominal bore diameter D_{c1}		Smallest single bore diameter deviation (E11)	
over	up to	upper	lower
3	6	+0.095	+0.020
6	10	+0.115	+0.025
10	18	+0.142	+0.032
18	30	+0.170	+0.040
30	50	+0.210	+0.050
50	80	+0.250	+0.060
80	120	+0.292	+0.072
120	180	+0.335	+0.085

(2) Outside diameter Unit : mm

Nominal outside diameter D_c		Largest single outside diameter deviation (c12)	
over	up to	upper	lower
18	30	–0.110	–0.320
30	40	–0.120	–0.370
40	50	–0.130	–0.380
50	65	–0.140	–0.440
65	80	–0.150	–0.450
80	100	–0.170	–0.520
100	120	–0.180	–0.530
120	140	–0.200	–0.600
140	160	–0.210	–0.610
160	180	–0.230	–0.630
180	200	–0.240	–0.700

Table 11 Tolerance for metric series thrust needle roller and cage assemblies (type code : AXK)

(1) Bore diameter Unit : mm

Nominal bore diameter D_{c1}		Smallest single bore diameter deviation (E12)	
over	up to	upper	lower
3	6	+0.140	+0.020
6	10	+0.175	+0.025
10	18	+0.212	+0.032
18	30	+0.250	+0.040
30	50	+0.300	+0.050
50	80	+0.360	+0.060
80	120	+0.422	+0.072
120	180	+0.485	+0.085

(2) Outside diameter Unit : mm

Nominal outside diameter D_c		Largest single outside diameter deviation (c13)	
over	up to	upper	lower
18	30	–0.110	–0.440
30	40	–0.120	–0.510
40	50	–0.130	–0.520
50	65	–0.140	–0.600
65	80	–0.150	–0.610
80	100	–0.170	–0.710
100	120	–0.180	–0.720
120	140	–0.200	–0.830
140	160	–0.210	–0.840
160	180	–0.230	–0.860
180	200	–0.240	–0.960

Table 12 Tolerance for metric series thrust washers (type code : AS series)

(1) Bore diameter Unit : mm

Nominal bore diameter d		Smallest single bore diameter deviation (E13)	
over	up to	upper	lower
3	6	+0.200	+0.020
6	10	+0.245	+0.025
10	18	+0.302	+0.032
18	30	+0.370	+0.040
30	50	+0.440	+0.050
50	80	+0.520	+0.060
80	120	+0.612	+0.072
120	180	+0.715	+0.085

(2) Outside diameter Unit : mm

Nominal outside diameter d_1		Largest single outside diameter deviation (e13)	
over	up to	upper	lower
18	30	–0.040	–0.370
30	50	–0.050	–0.440
50	80	–0.060	–0.520
80	120	–0.072	–0.612
120	180	–0.085	–0.715
180	250	–0.100	–0.820

Table 13 Tolerance for metric series thrust washers (type code : LS series)

(1) Bore diameter Unit : mm

Nominal bore diameter d		Smallest single bore diameter deviation (E12)	
over	up to	upper	lower
3	6	+0.140	+0.020
6	10	+0.175	+0.025
10	18	+0.212	+0.032
18	30	+0.250	+0.040
30	50	+0.300	+0.050
50	80	+0.360	+0.060
80	120	+0.422	+0.072
120	180	+0.485	+0.085

(2) Outside diameter Unit : mm

Nominal outside diameter d_1		Largest single outside diameter deviation (a12)	
over	up to	upper	lower
18	30	–0.300	–0.510
30	40	–0.310	–0.560
40	50	–0.320	–0.570
50	65	–0.340	–0.640
65	80	–0.360	–0.660
80	100	–0.380	–0.730
100	120	–0.410	–0.760
120	140	–0.460	–0.860
140	160	–0.520	–0.920
160	180	–0.580	–0.980
180	200	–0.660	–1.120

[Remark] Thickness tolerances for series LS heavy thrust washers are given in bearing tables.

Table 14 Tolerance for metric series shaft piloted washers of thrust bearings (type code : WS.811 and WS.812)

Unit : mm

Nominal bore diameter d		Tolerance class P0				Tolerance class P6				Tolerance class P5			
		Deviations Δ_{dmp}		Variation V_{dsp}	S_i 1)	Deviations Δ_{dmp}		Variation V_{dsp}	S_i 1)	Deviations Δ_{dmp}		Variation V_{dsp}	S_i 1)
over	up to	upper	lower	max.	min.	upper	lower	max.	min.	upper	lower	max.	min.
	18	+0	−0.008	0.006	0.010	+0	−0.008	0.006	0.005	+0	−0.008	0.006	0.003
18	30	+0	−0.010	0.008	0.010	+0	−0.010	0.008	0.005	+0	−0.010	0.008	0.003
30	50	+0	−0.012	0.009	0.010	+0	−0.012	0.009	0.006	+0	−0.012	0.009	0.003
50	80	+0	−0.015	0.011	0.010	+0	−0.015	0.011	0.007	+0	−0.015	0.011	0.004
80	120	+0	−0.020	0.015	0.015	+0	−0.020	0.015	0.008	+0	−0.020	0.015	0.004
120	180	+0	−0.025	0.019	0.015	+0	−0.025	0.019	0.009	+0	−0.025	0.019	0.005
180	250	+0	−0.030	0.023	0.020	+0	−0.030	0.023	0.010	+0	−0.030	0.023	0.005
250	315	+0	−0.035	0.026	0.025	+0	−0.035	0.026	0.013	+0	−0.035	0.026	0.007
315	400	+0	−0.040	0.030	0.030	+0	−0.040	0.030	0.015	+0	−0.040	0.030	0.007
400	500	+0	−0.045	0.034	0.030	+0	−0.045	0.034	0.018	+0	−0.045	0.034	0.009

[Note] 1) The values of the wall thickness variation S_e, for the housing piloted washer are identical to S_i for the shaft - piloted washers.
Δ_{dmp} : Single plane mean bore diameter deviation
V_{dsp} : Single plane bore diameter variation
S_i : Wall thickness variation

Table 15 Tolerance for metric series housing piloted washers of thrust bearings (type code : GS.811 and GS.812)

Unit : mm

Nominal outside diameter D		Tolerance class P0			Tolerance class P6			Tolerance class P5		
		Deviations Δ_{Dmp}		Variation V_{Dsp}	Deviations Δ_{Dmp}		Variation V_{Dsp}	Deviations Δ_{Dmp}		Variation V_{Dsp}
over	up to	upper	lower	max.	upper	lower	max.	upper	lower	max.
	30	+0	−0.013	0.010	+0	−0.013	0.010	+0	−0.013	0.010
30	50	+0	−0.016	0.012	+0	−0.016	0.012	+0	−0.016	0.012
50	80	+0	−0.019	0.014	+0	−0.019	0.014	+0	−0.019	0.014
80	120	+0	−0.022	0.017	+0	−0.022	0.017	+0	−0.022	0.017
120	180	+0	−0.025	0.019	+0	−0.025	0.019	+0	−0.025	0.019
180	250	+0	−0.030	0.023	+0	−0.030	0.023	+0	−0.030	0.023
250	315	+0	−0.035	0.026	+0	−0.035	0.026	+0	−0.035	0.026
315	400	+0	−0.040	0.030	+0	−0.040	0.030	+0	−0.040	0.030
400	500	+0	−0.045	0.034	+0	−0.045	0.034	+0	−0.045	0.034

[Note] Δ_{Dmp} : Single plane mean outside diameter deviation
V_{Dsp} : Single plane outside diameter variation

Table 16 Tolerance for inch series thrust needle roller and cage assemblies (type code : NTA)

Unit : mm

Needle roller diameter (nominal) D_w	Deviations			
	Bore diameter D_{c1}		Outside diameter D_c	
	upper	lower	upper	lower
1.981	+0.178	+0.051	−0.254	−0.508
3.175	+0.254	+0.051	−0.254	−0.635

Table 17 Tolerance for inch series thrust washers (type code : TRA, TRB, etc.)

(1) Bore diameter

Unit : mm

Nominal bore diameter d		Deviations	
over	up to	upper	lower
6.000	57.200	+0.300	+0.050
57.200	133.400	+0.430	+0.050

(2) Outside diameter

Unit : mm

Nominal Outside diameter d_1		Deviations	
over	up to	upper	lower
6.000	133.400	−0.025	−0.760

Table 18 Tolerance for combined needle roller bearings (thrust component thickness (C_1))

Unit : mm

Bearing series	Tolerance	
	upper	lower
NAXK, NAXK.Z	+0	−0.200
NAXR, NAXR.Z		
RAXZ	+0.100	−0.110

[Recommended fit and internal clearance]

Table 19 Recommended fit for metric series radial needle roller and cage assemblies

Condition	Tolerance zone class		
	Shaft		Housing bore
Radial clearance	$F_w \leqq 50$ mm	$F_w > 50$ mm	
Smaller than normal	j 5	h 5	G 6
Normal	h 5	g 5	
Larger than normal	g 6	f 6	

Table 20 Recommended fit for metric series drawn cup needle roller bearings

Bearing type	Operating condition	Shaft fit (recommended internal radial clearances)	Housing fit (recommended internal radial clearances)
HK, BK (caged)	One piece heavy section steel or cast iron housing	h5 (h6)	N6 (N7)
	Housing material of low rigidity	h5 (h6)	R6 (R7)
	Outer ring rotation (one piece heavy section steel or cast iron housing)	f5 (f6)	R6 (R7)
	Oscillating Motion	j5 (j6)	1)

[Note] 1) Tolerance dependent on housing design.
[Remark] When the bearing is provided with an inner ring, the shaft tolerance class h5 should be selected.

Table 21 Recommended fit for inch series drawn cup needle roller bearings

Bearing design	Shaft			Housing		
	Classification	max.	min.	Classification	max.	min.
J, JTT 1)	$F_w \leqq 5.556$ mm (7/32")	0	−0.008 mm (−0.0003")	$D \leqq 7.144$ mm (9/32")	+0.013 mm (−0.0005")	0
	5.556 mm (7/32") $< F_w \leqq$ 50.006 mm (1 31/32")	0	−0.013 mm (−0.0005")			
	50.006 mm (1 31/32") $< F_w \leqq$ 119.856 mm (4 23/32")	0	−0.015 mm (−0.0006")	7.144 mm (9/32") $< D$	+0.013 mm (−0.0005")	+0.013 mm (−0.0005")
	119.856 mm (4 23/32") $< F_w \leqq$ 180.181 mm (7 3/32")	0	−0.018 mm (−0.0007")			

[Note] 1) Special fits
When D = 8.733 mm (0.3438") : housing fit : −0.003 mm (−0.0001") maximum, −0.015 mm (−0.0006") minimum
When D = 22.212 mm (0.8745") : housing fit : +0.025 mm (+0.0010") maximum, 0 mm (0") minimum
When D = 152.400 mm (6.0000") : housing fit : +0.025 mm (+0.0010") maximum, −0.025 mm (−0.0010") minimum

Table 22 Recommended fit for metric series heavy-duty needle roller bearings

Without inner ring

Rotation conditions	Nominal housing bore diameter D (mm)	ISO tolerance zone for housing		Nominal shaft diameter F shaft (mm)	ISO tolerance zone for shaft	
		caged	full		caged	full
Load stationary relative to housing	all diameters	H7 (J7)	J6	all diameters	h6 (h5)	h5
General work with larger clearance		K7	—		g6	—
Load rotates relative to housing		N7	M6		f6	g5

[Remark] Care should be taken that the selected bearing internal clearance is appropriate for the operating conditions.

Table 23 Recommended fit for metric series needle roller thrust bearings

Bearing components	Shaft tolerance (shaft piloting)	Housing tolerance (housing piloting)
Needle roller and cage assembly. Types : AXK, FNT	h8	H8
Thin thrust washer. Type : AS	h8	H8
Heavy thrust washer. Type : LS	h8	H8
Shaft-piloted thrust washer. Type : WS.811	h6 (j6)	Clearance
Housing-piloted thrust washer. Type : GS.811	Clearance	H7 (K7)

Table 24 Recommended fit for metric series cylindrical roller thrust bearings

Bearing components	Shaft tolerance (shaft piloting)	Housing tolerance (housing piloting)	Piloting components
Thrust cylindrical roller and cage assembly. Types : K.811 and K.812	h8	H10	Shaft
Heavy thrust washer. Type : LS	h10	H11	Shaft
Shaft-piloted thrust washer. Types : WS.811, WS.812	h6 (j6)	Clearance	Shaft
Housing-piloted thrust washer. Types : GS.811, GS.812	Clearance	H7 (K7)	Housing

[Shaft and housing specifications]

Table 25 Specifications of shafts and housings (needle roller and cage assemblies, drawn cup needle roller bearings, and heavy-duty needle roller bearings)

	Shaft		Housing bore	
	Raceway surface	Fitting surface	Raceway surface	Fitting surface
Roundness	· Shaft diameter ≦ 25 mm : 2.5 μm or less · Shaft diameter > 25 mm : 2.5 μm × (shaft diameter /25 mm) or less	One-half the shaft diameter tolerance or less	8 μm or one-half the bore tolerance or less	One-half the bore tolerance or less
Variation of mean diameter (Cylindricity)	Within the range of the bearing width, 5 μm or less per 25 mm or one-half the bearing tolerance or less (whichever is smaller)	One-half the shaft diameter tolerance or less	Within the range of the bearing width, 5 μm or less per 25 mm or one-half the bearing tolerance or less (whichever is smaller)	Within the length of the outer ring, 13 μm or one-half the diameter tolerance (whichever is smaller) or less
Surface roughness	0.2 a or less	0.8 a or less	0.2 a or less	1.6 a or less
Hardness	58 HRC or harder [1)]	—	58 HRC or harder [1)]	—
Shaft slope	13 μm or less per 25 mm		—	

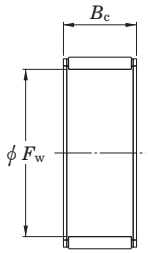
[Note] 1) During the carburizing or induction-hardening of case hardened steel, not only must the surface hardness requirement specified above be met, but the case depth of HV 550 (52.3 HRC) must be met in the range of 0.08 D_w to 0.10 D_w mm. (D_w : roller diameter)

Table 26 Needle roller thrust bearing mounting surface specifications

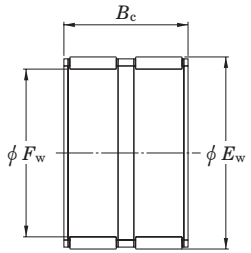
Flatness (dishing or coning)		Maximum angle : Arctan 0.001
Squareness		Maximum angle : Arctan 0.0005
Roughness (Ra)		0.2 a or less
Hardness		58 HRC or harder (refer to the note for Table 25 above regarding depth.)

Radial needle roller and cage assemblies
single-row, double-row assemblies
metric series
K, K ZW series

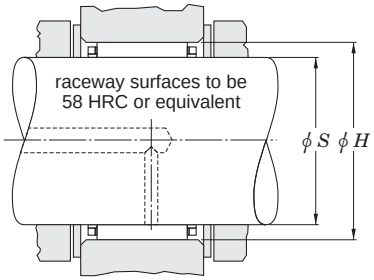
Shaft dia. 3 ~ (10) mm



K



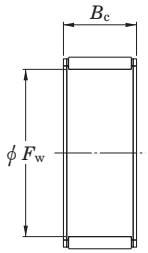
K ZW



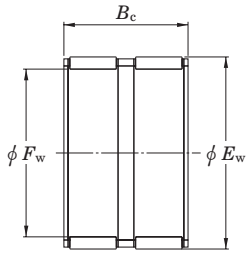
Boundary dimensions (mm)				Bearing No.	Basic load ratings (kN)		Fatigue load limit (kN)	Cage material [1]	Limiting speeds (min^{-1})			(Refer.) Mass (kg)	Recommended dimensions (mm)			
													S (Shaft)		H (Housing)	
Shaft dia.	F_w	E_w	B_c −0.20 −0.55		C_r	C_{0r}	C_u	P / S	Grease lub.	Oil lub.			max.	min.	max.	min.
3	3	5	7	K3X5X7TN	1.56	1.29	0.200	P	48 000	74 000		0.0002	3.000	2.996	5.004	5.012
4	4	7	7	K4X7X7TN	1.83	1.32	0.200	P	34 000	52 000		0.0005	4.000	3.995	7.014	7.005
5	5	8	8	K5X8X8TN	2.18	1.71	0.260	P	31 000	47 000		0.0007	5.000	4.995	8.014	8.005
	5	8	10	K5X8X10TN	3.04	2.63	0.400	P	31 000	47 000		0.0008	5.000	4.995	8.014	8.005
	5	9	13	K5X9X13TN	4.29	3.55	0.540	P	26 000	40 000		0.002	5.000	4.995	9.014	9.005
6	6	9	8	K6X9X8H	3.19	2.90	0.420	S	29 000	44 000		0.0008	6.000	5.995	9.014	9.005
	6	9	8	K6X9X8TN	2.47	2.07	0.310	P	29 000	44 000		0.001	6.000	5.995	9.014	9.005
	6	9	10	K6X9X10TN	3.07	2.74	0.420	P	29 000	44 000		0.001	6.000	5.995	9.014	9.005
7	7	10	8	K7X10X8TN	2.74	2.44	0.370	P	28 000	42 000		0.001	7.000	6.994	10.014	10.005
	7	10	10	K7X10X10TN	3.40	3.22	0.490	P	28 000	42 000		0.001	7.000	6.994	10.014	10.005
	7	11	15	K7X11X15TN	6.44	6.24	0.940	P	23 000	35 000		0.003	7.000	6.994	11.017	11.006
8	8	11	8	K8X11X8FV	3.23	3.11	0.470	S	26 000	41 000		0.002	8.000	7.994	11.017	11.006
	8	11	8	K8X11X8TN	2.34	2.05	0.300	P	26 000	41 000		0.001	8.000	7.994	11.017	11.006
	8	11	10	K8X11X10H	4.57	4.89	0.740	S	26 000	41 000		0.002	8.000	7.994	11.017	11.006
	8	11	10	K8X11X10FV	4.01	4.11	0.630	S	26 000	41 000		0.002	8.000	7.994	11.017	11.006
	8	11	10	K8x11x10TN	3.84	3.91	0.600	P	26 000	41 000		0.001	8.000	7.994	11.006	11.017
	8	11	13	K8x11x13TN	5.18	5.75	0.870	P	26 000	41 000		0.002	8.000	7.994	11.006	11.017
	8	11	13	K8X11X13H	5.22	5.78	0.880	S	26 000	41 000		0.003	8.000	7.994	11.017	11.006
9	9	12	10	K9X12X10FH	4.27	4.60	0.700	S	26 000	40 000		0.003	9.000	8.994	12.017	12.006
	9	12	10	K9X12X10FV	4.27	4.60	0.700	S	26 000	40 000		0.002	9.000	8.994	12.017	12.006
	9	12	13	K9X12X13FH	5.57	6.47	0.980	S	26 000	40 000		0.003	9.000	8.994	12.017	12.006
	9	12	13	K9X12X13FV	5.57	6.47	0.980	S	26 000	40 000		0.003	9.000	8.994	12.017	12.006
	9	13	8	K9X13X8H	3.96	3.50	0.530	S	21 000	32 000		0.003	9.000	8.994	13.017	13.006
10	10	13	10	K10X13X10H	5.40	6.43	0.980	S	25 000	39 000		0.002	10.000	9.994	13.017	13.006
	10	13	10	K10X13X10TN	4.29	4.77	0.730	P	25 000	39 000		0.002	10.000	9.994	13.017	13.006
	10	13	13	K10X13X13	5.90	7.16	1.10	S	25 000	39 000		0.003	10.000	9.994	13.017	13.006

[Note] 1) Cage material: P: polymer cage, S: steel cage

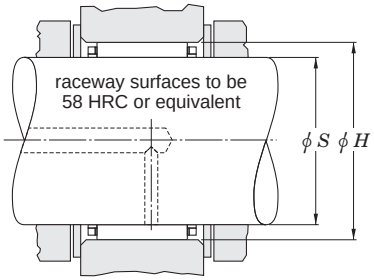
Radial needle roller and cage assemblies
single-row, double-row assemblies
metric series
K, K ZW series
Shaft dia. (10) ~ (15) mm



K



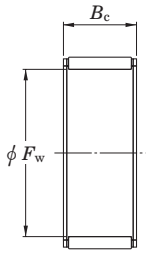
K ZW



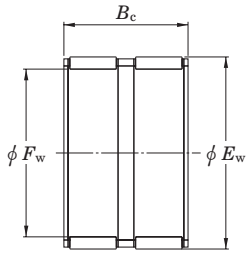
Boundary dimensions (mm) Shaft dia.	F_w	E_w	B_c −0.20 −0.55	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Cage material 1) P / S	Limiting speeds (min^{-1}) Grease lub.	Oil lub.		(Refer.) Mass (kg)	Recommended dimensions (mm) S (Shaft) max.	min.	H (Housing) max.	min.
10	10	13	16	**K10X13X16**	7.43	9.64	1.50	S	25 000	39 000		0.004	10.000	9.994	13.017	13.006
	10	14	10	**K10X14X10H**	6.12	6.29	0.960	S	20 000	31 000		0.003	10.000	9.994	14.017	14.006
	10	14	13	**K10X14X13H**	7.88	8.71	1.35	S	20 000	31 000		0.004	10.000	9.994	14.017	14.006
	10	16	12	**K10X16X12F**	8.39	7.47	1.15	S	15 000	24 000		0.006	10.000	9.994	16.017	16.006
	10	16	12	**K10X16X12TN**	7.50	6.40	0.970	P	15 000	24 000		0.005	10.000	9.994	16.017	16.006
12	12	15	10	**K12X15X10H**	5.85	7.51	1.15	S	24 000	37 000		0.003	12.000	11.992	15.017	15.006
	12	15	13	**K12X15X13H**	6.78	9.03	1.40	S	24 000	37 000		0.004	12.000	11.992	15.017	15.006
	12	16	13	**K12X16X13H**	7.49	8.51	1.60	S	19 000	30 000		0.006	12.000	11.992	16.017	16.006
	12	17	13	**K12X17X13**	8.93	9.29	1.20	S	16 000	25 000		0.008	12.000	11.992	17.017	17.006
	12	18	12	**K12X18X12H**	9.76	9.40	1.40	S	14 000	22 000		0.009	12.000	11.992	18.017	18.006
13	13	17	10	**K13X17X10**	7.22	8.33	1.25	S	19 000	29 000		0.004	13.000	12.992	17.017	17.006
	13	18	15	**K13X18X15F**	10.8	12.1	1.85	S	16 000	25 000		0.008	13.000	12.992	18.017	18.006
14	14	18	8	**K14X18X8**	5.39	5.82	0.880	S	19 000	29 000		0.004	14.000	13.992	18.017	18.006
	14	18	10	**K14X18X10**	7.17	8.41	1.30	S	19 000	29 000		0.005	14.000	13.992	18.017	18.006
	14	18	13	**K14X18X13**	9.73	12.5	1.90	S	19 000	29 000		0.006	14.000	13.992	18.017	18.006
	14	18	15	**K14X18X15**	10.5	13.8	2.15	S	19 000	29 000		0.007	14.000	13.992	18.017	18.006
	14	18	17	**K14X18X17H**	12.4	17.1	2.65	S	19 000	29 000		0.008	14.000	13.992	18.017	18.006
	14	19	13	**K14X19X13H**	10.2	11.4	1.75	S	16 000	24 000		0.008	14.000	13.992	19.020	19.007
	14	19	18	**K14X19X18F**	13.2	16.0	2.50	S	16 000	24 000		0.011	14.000	13.992	19.020	19.007
	14	20	12	**K14X20X12**	10.5	10.6	1.60	S	14 000	21 000		0.009	14.000	13.992	20.020	20.007
15	15	18	14	**K15X18X14TN**	7.92	11.9	1.80	P	13 000	23 000		0.003	15.000	14.992	18.017	18.006
	15	18	16	**K15X18X16F**	8.36	12.6	1.95	S	13 000	23 000		0.005	15.000	14.992	18.017	18.006
	15	18	17	**K15X18X17**	8.08	12.1	1.85	S	23 000	36 000		0.005	15.000	14.992	18.017	18.006
	15	19	10	**K15X19X10**	7.87	9.69	1.45	S	18 000	28 000		0.005	15.000	14.992	19.020	19.007
	15	19	13	**K15X19X13**	9.66	12.6	1.90	S	18 000	28 000		0.007	15.000	14.992	19.020	19.007
	15	19	17	**K15X19X17H**	12.3	17.2	2.65	S	18 000	28 000		0.009	15.000	14.992	19.020	19.007
	15	19	22	**K15X19X22ZW**	12.2	17.0	2.60	S	18 000	28 000		0.010	15.000	14.992	19.020	19.007

[Note] 1) Cage material: P: polymer cage, S: steel cage

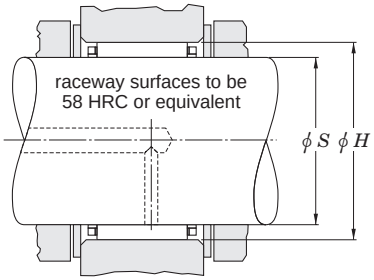
Radial needle roller and cage assemblies
single-row, double-row assemblies
metric series
K, K ZW series
Shaft dia. (15) ~ (18) mm



K



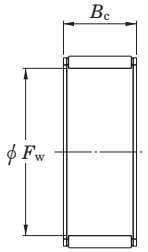
K ZW



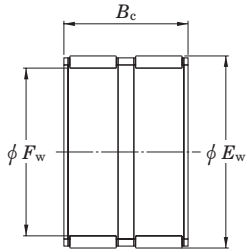
Shaft dia.	Boundary dimensions (mm) F_w	E_w	B_c −0.20 −0.55	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Cage material 1) P / S	Limiting speeds (min^{-1}) Grease lub.	Oil lub.		(Refer.) Mass (kg)	Recommended dimensions (mm) S (Shaft) max.	min.	H (Housing) max.	min.
15	15	20	13	**K15X20X13H**	9.93	11.3	1.80	S	16 000	24 000		0.008	15.000	14.992	20.020	20.007
	15	21	15	**K15X21X15**	13.4	14.8	2.30	S	14 000	21 000		0.013	15.000	14.992	21.020	21.007
	15	21	21	**K15X21X21H**	18.0	21.7	3.40	S	14 000	21 000		0.018	15.000	14.992	21.020	21.007
16	16	20	8	**K16X20X8F**	6.37	7.51	1.15	S	18 000	28 000		0.005	16.000	15.992	20.020	20.007
	16	20	10	**K16X20X10H**	7.82	9.76	1.50	S	18 000	28 000		0.006	16.000	15.992	20.020	20.007
	16	20	13	**K16X20X13**	10.1	13.5	2.05	S	18 000	28 000		0.007	16.000	15.992	20.020	20.007
	16	20	14	**K16X20X14**	10.8	14.8	2.25	S	18 000	28 000		0.007	16.000	15.992	20.020	20.007
	16	20	17	**K16X20X17H**	12.9	18.5	2.85	S	18 000	28 000		0.008	16.000	15.992	20.020	20.007
	16	20	20	**K16X20X20**	13.4	19.5	3.05	S	18 000	28 000		0.011	16.000	15.992	20.020	20.007
	16	22	12	**K16X22X12**	11.2	11.9	1.80	S	19 000	29 000		0.010	16.000	15.992	22.020	22.007
	16	22	16	**K16X22X16H**	14.9	17.2	2.70	S	19 000	29 000		0.014	16.000	15.992	22.020	22.007
	16	22	20	**K16X22X20**	18.6	22.9	3.60	S	19 000	29 000		0.017	16.000	15.992	22.020	22.007
	16	24	20	**K16X24X20**	20.2	21.4	3.45	S	20 000	30 000		0.025	16.000	15.992	24.020	24.007
17	17	20	10	**K17X20X10**	5.96	8.53	1.30	S	16 000	25 000		0.004	17.000	16.992	20.020	20.007
	17	21	10	**K17X21X10**	8.12	10.4	1.60	S	17 000	26 000		0.006	17.000	16.992	21.020	21.007
	17	21	12.8	**K17X21X13H**	10.5	14.5	2.20	S	17 000	26 000		0.008	17.000	16.992	21.020	21.007
	17	21	15	**K17X21X15**	11.4	16.1	2.50	S	17 000	26 000		0.008	17.000	16.992	21.020	21.007
	17	21	17	**K17X21X17H**	13.4	19.8	3.05	S	17 000	26 000		0.011	17.000	16.992	21.020	21.007
	17	22	20	**K17X22X20FH**	17.0	23.3	3.65	S	17 000	27 000		0.015	17.000	16.992	22.020	22.007
	17	23	15	**K17X23X15F**	14.1	16.3	2.55	S	18 000	27 000		0.010	17.000	16.992	23.020	23.007
18	18	22	8	**K18X22X8F**	6.32	7.70	1.15	S	16 000	24 000		0.005	18.000	17.992	22.020	22.007
	18	22	10	**K18X22X10H**	8.41	11.1	1.70	S	16 000	24 000		0.006	18.000	17.992	22.020	22.007
	18	22	13	**K18X22X13H**	10.8	15.4	2.35	S	16 000	24 000		0.008	18.000	17.992	22.020	22.007
	18	22	14	**K18X22X14**	11.6	16.8	2.55	S	16 000	24 000		0.009	18.000	17.992	22.020	22.007
	18	22	14	**K18X22X14FV**	11.3	16.3	2.45	S	16 000	24 000		0.009	18.000	17.992	22.020	22.007
	18	22	17	**K18X22X17H**	13.3	19.9	3.10	S	16 000	24 000		0.009	18.000	17.992	22.020	22.007
	18	22	20	**K18X22X20F**	15.0	23.4	3.65	S	16 000	24 000		0.011	18.000	17.992	22.020	22.007
	18	24	12	**K18X24X12**	11.8	13.1	1.95	S	17 000	25 000		0.011	18.000	17.992	24.020	24.007

[Note] 1) Cage material: P: polymer cage, S: steel cage

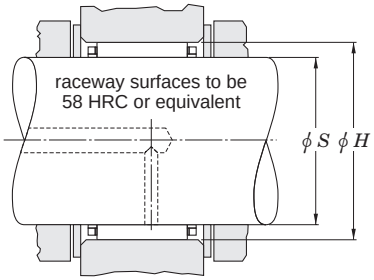
Radial needle roller and cage assemblies
single-row, double-row assemblies
metric series
K, K ZW series
Shaft dia. (18) ~ (22) mm



K



K ZW

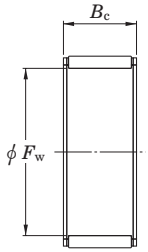


Boundary dimensions (mm) Shaft dia.	F_w	E_w	B_c −0.20 −0.55	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Cage material 1) P / S	Limiting speeds (min^{-1}) Grease lub.	Oil lub.		(Refer.) Mass (kg)	Recommended dimensions (mm) S (Shaft) max.	min.	H (Housing) max.	min.
18	18	24	20	**K18X24X20H**	19.4	24.9	3.90	S	16 000	25 000		0.019	18.000	17.992	24.020	24.007
	18	25	22	**K18X25X22H**	23.3	28.6	4.50	S	17 000	26 000		0.025	18.000	17.992	25.020	25.007
	18	26	12	**K18X26X12FV**	13.8	13.5	2.10	S	11 000	17 000		0.020	18.000	17.992	26.020	26.007
	18	26	20	**K18X26X20F**	21.7	24.1	3.85	S	17 000	26 000		0.027	18.000	17.992	26.020	26.007
19	19	23	13	**K19X23X13**	10.8	15.5	2.35	S	15 000	23 000		0.008	19.000	18.991	23.020	23.007
	19	23	17	**K19X23X17**	13.4	20.6	3.20	S	15 000	23 000		0.011	19.000	18.991	23.020	23.007
20	20	24	8	**K20X24X8F**	7.31	9.60	1.50	S	14 000	22 000		0.005	20.000	19.991	24.020	24.007
	20	24	10	**K20X24X10H**	8.97	12.5	2.05	S	14 000	22 000		0.006	20.000	19.991	24.020	24.007
	20	24	12	**K20X24X12**	10.7	15.7	2.40	S	14 000	22 000		0.008	20.000	19.991	24.020	24.007
	20	24	13	**K20X24X13H**	11.5	17.3	1.30	S	14 000	22 000		0.009	20.000	19.991	24.020	24.007
	20	24	14	**K20X24X14**	12.4	18.9	2.85	S	14 000	22 000		0.009	20.000	19.991	24.020	24.007
	20	24	17	**K20X24X17H**	14.8	23.7	3.65	S	14 000	22 000		0.011	20.000	19.991	24.020	24.007
	20	26	12	**K20X26X12**	13.0	15.3	2.30	S	15 000	23 000		0.012	20.000	19.991	26.020	26.007
	20	26	13	**K20X26X13H**	13.4	15.9	2.35	S	15 000	23 000		0.014	20.000	19.991	26.020	26.007
	20	26	17	**K20X26X17H**	19.3	25.5	4.00	S	15 000	23 000		0.017	20.000	19.991	26.020	26.007
	20	26	20	**K20X26X20**	20.3	27.2	4.25	S	15 000	23 000		0.020	20.000	19.991	26.020	26.007
	20	28	20	**K20X28X20H**	24.6	29.0	2.70	S	15 000	23 000		0.028	20.000	19.991	28.020	28.007
	20	28	25	**K20X28X25H**	29.7	37.0	5.80	S	15 000	23 000		0.036	20.000	19.991	28.020	28.007
	20	30	30	**K20X30X30H**	38.9	45.8	7.20	S	16 000	24 000		0.055	20.000	19.991	30.020	30.007
	20	32	36	**K20X32X36H**	49.9	57.0	9.15	S	16 000	25 000		0.082	20.000	19.991	32.025	32.009
21	21	25	17	**K21X25X17H**	14.3	23.1	3.60	S	14 000	21 000		0.013	21.000	20.991	25.020	25.007
22	22	26	10	**K22X26X10H**	9.81	14.5	2.20	S	13 000	20 000		0.007	22.000	21.991	26.020	26.007
	22	26	13	**K22X26X13H**	11.8	18.3	2.95	S	13 000	20 000		0.012	22.000	21.991	26.020	26.007
	22	26	17	**K22X26X17H**	15.6	26.3	4.05	S	13 000	20 000		0.012	22.000	21.991	26.020	26.007
	22	26	18	**K22X26X18H**	15.3	25.5	4.00	S	13 000	20 000		0.017	22.000	21.991	26.020	26.007
	22	28	13	**K22X28X13**	13.9	17.1	2.60	S	13 000	20 000		0.015	22.000	21.991	28.020	28.007
	22	28	17	**K22X28X17H**	18.2	24.2	3.80	S	13 000	20 000		0.020	22.000	21.991	28.020	28.007

[Note] 1) Cage material: P: polymer cage, S: steel cage

Radial needle roller and cage assemblies
single-row, double-row assemblies
metric series
K, K ZW series

Shaft dia. (22) ~ (25) mm



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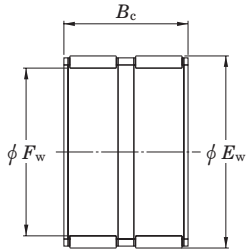
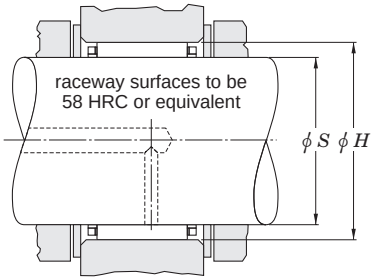


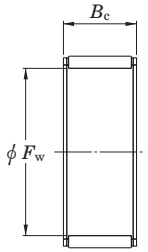
K ZW



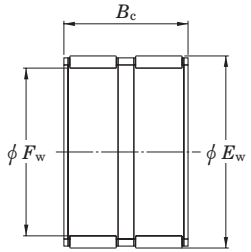
Shaft dia.	Boundary dimensions (mm) F_w	E_w	B_c −0.20 −0.55	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Cage material 1) P / S	Limiting speeds (min^{-1}) Grease lub.	Oil lub.		(Refer.) Mass (kg)	Recommended dimensions (mm) S (Shaft) max.	min.	H (Housing) max.	min.
22	22	30	15	**K22X30X15H**	19.7	22.3	3.45	S	14 000	21 000		0.023	22.000	21.991	30.020	30.007
	22	30	20	**K22X30X20FV**	24.4	29.4	4.70	S	14 000	21 000		0.031	22.000	21.991	30.020	30.007
	22	32	24	**K22X32X24F**	33.1	37.9	6.05	S	14 000	22 000		0.046	22.000	21.991	32.025	32.009
	22	32	30	**K22X32X30H**	41.8	51.3	8.05	S	14 000	22 000		0.057	22.000	21.991	32.025	32.009
23	23	28	24	**K23X28X24F**	22.4	36.2	5.70	S	12 000	19 000		0.023	23.000	22.991	28.020	28.007
	23	35	16	**K23X35X16H**	25.9	25.1	3.90	S	14 000	21 000		0.040	23.000	22.991	35.025	35.009
24	24	28	10	**K24X28X10H**	9.67	14.6	2.20	S	12 000	18 000		0.027	24.000	23.991	28.020	28.007
	24	28	13	**K24X28X13H**	12.5	20.2	3.05	S	12 000	18 000		0.010	24.000	23.991	28.020	28.007
	24	28	16	**K24X28X16F**	12.6	20.4	3.10	S	12 000	18 000		0.012	24.000	23.991	28.020	28.007
	24	28	17	**K24X28X17H**	15.4	26.4	4.10	S	12 000	18 000		0.013	24.000	23.991	28.020	28.007
	24	30	10	**K24X30X10TN**	11.3	13.5	2.05	P	12 000	19 000		0.008	24.000	23.991	30.020	30.007
	24	30	17	**K24X30X17H**	19.8	27.7	4.35	S	12 000	19 000		0.020	24.000	23.991	30.020	30.007
	24	30	22	**K24X30X22**	25.0	37.3	5.80	S	12 000	19 000		0.024	24.000	23.991	30.020	30.007
	24	36	23	**K24X36X23H**	37.1	40.1	6.40	S	13 000	20 000		0.070	24.000	23.991	36.025	36.009
25	25	29	10	**K25X29X10H**	9.61	14.6	2.25	S	11 000	17 000		0.008	25.000	24.991	29.020	29.007
	25	29	13	**K25X29X13H**	12.8	21.1	3.20	S	11 000	17 000		0.010	25.000	24.991	29.020	29.007
	25	29	17	**K25X29X17H**	15.1	26.2	4.10	S	11 000	17 000		0.016	25.000	24.991	29.020	29.007
	25	30	13	**K25X30X13**	14.6	21.4	3.25	S	11 000	17 000		0.012	25.000	24.991	30.020	30.007
	25	30	17	**K25X30X17H**	18.8	29.8	4.60	S	11 000	17 000		0.016	25.000	24.991	30.020	30.007
	25	30	18	**K25X30X18**	20.6	33.4	5.30	S	11 000	17 000		0.017	25.000	24.991	30.020	30.007
	25	30	20	**K25X30X20H**	21.9	36.1	5.65	S	11 000	17 000		0.019	25.000	24.991	30.020	30.007
	25	30	24	**K25X30X24H**	24.8	42.4	6.60	S	11 000	17 000		0.024	25.000	24.991	30.020	30.007
	25	30	26	**K25X30X26ZW**	23.0	38.6	5.90	S	11 000	17 000		0.027	25.000	24.991	30.020	30.007
	25	31	14	**K25X31X14H**	16.8	22.7	3.45	S	12 000	18 000		0.017	25.000	24.991	31.025	31.009
	25	31	17	**K25X31X17H**	19.7	27.8	4.35	S	12 000	18 000		0.020	25.000	24.991	31.025	31.009
	25	31	21	**K25X31X21H**	25.1	38.0	5.95	S	12 000	18 000		0.026	25.000	24.991	31.025	31.009
	25	31	24	**K25X31X24FH**	25.3	38.5	6.05	S	12 000	18 000		0.031	25.000	24.991	31.025	31.009
	25	32	16	**K25X32X16**	19.8	25.3	4.00	S	12 000	18 000		0.027	25.000	24.991	32.025	32.009

[Note] 1) Cage material: P: polymer cage, S: steel cage

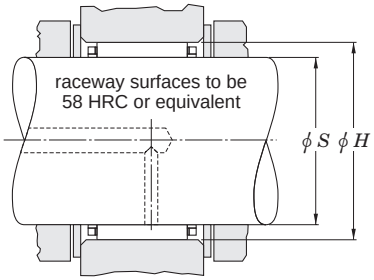
Radial needle roller and cage assemblies
single-row, double-row assemblies
metric series
K, K ZW series
Shaft dia. (25) ~ 29 mm



K



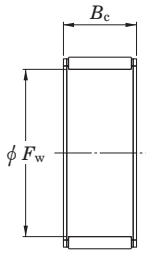
K ZW



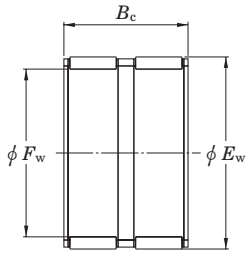
Boundary dimensions (mm) Shaft dia.	F_w	E_w	B_c $^{-0.20}_{-0.55}$	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Cage material [1] P / S	Limiting speeds (min^{-1}) Grease lub.	Oil lub.		(Refer.) Mass (kg)	Recommended dimensions (mm) S (Shaft) max.	min.	H (Housing) max.	min.
25	25	33	20	**K25X33X20H**	28.8	37.6	5.95	S	12 000	18 000		0.035	25.000	24.991	33.025	33.009
	25	33	24	**K25X33X24H**	32.3	43.5	6.85	S	12 000	18 000		0.038	25.000	24.991	33.025	33.009
	25	33	25	**K25X33X25H**	33.0	44.6	7.00	S	12 000	18 000		0.041	25.000	24.991	33.025	33.009
	25	35	23.7	**K25X35X23,7H**	35.9	42.3	6.90	S	12 000	19 000		0.050	25.000	24.991	35.025	35.009
	25	35	25	**K25X35X25H**	37.8	46.2	7.25	S	12 000	19 000		0.054	25.000	24.991	35.025	35.009
	25	35	30	**K25X35X30H**	44.6	57.2	9.00	S	12 000	19 000		0.060	25.000	24.991	35.025	35.009
	25	35	36	**K25X35X36H**	52.4	70.4	11.0	S	12 000	19 000		0.074	25.000	24.991	35.025	35.009
	25	37	20	**K25X37X20H**	32.5	34.1	5.45	S	12 000	19 000		0.055	25.000	24.991	37.025	37.009
26	26	30	10	**K26X30X10F**	9.46	14.5	2.20	S	11 000	16 000		0.007	26.000	25.991	30.020	30.007
	26	30	13	**K26X30X13**	12.3	20.4	3.10	S	10 000	16 000		0.011	26.000	25.991	30.020	30.007
	26	30	17	**K26X30X17**	15.0	26.3	3.10	S	10 000	16 000		0.014	26.000	25.991	30.020	30.007
	26	30	22	**K26X30X22ZW**	16.7	30.2	4.60	S	10 000	16 000		0.018	26.000	25.991	30.020	30.007
28	28	32	21	**K28X32X21F**	18.7	35.7	5.55	S	9 900	15 000		0.018	28.000	27.991	32.025	32.009
	28	33	13	**K28X33X13F**	14.1	21.4	3.25	S	10 000	15 000		0.015	28.000	27.991	33.025	33.009
	28	33	17	**K28X33X17H**	19.8	33.0	5.10	S	10 000	15 000		0.018	28.000	27.991	33.025	33.009
	28	33	27	**K28X33X27**	29.0	53.8	8.30	S	10 000	15 000		0.027	28.000	27.991	33.025	33.009
	28	34	17	**K28X34X17**	21.1	31.5	6.30	S	10 000	16 000		0.022	28.000	27.991	34.025	34.009
	28	34	20	**K28X34X20H**	24.4	37.8	7.65	S	10 000	16 000		0.025	28.000	27.991	34.025	34.009
	28	35	15	**K28X35X15H**	19.5	25.6	3.95	S	10 000	16 000		0.025	28.000	27.991	35.025	35.009
	28	35	16	**K28X35X16H**	21.5	29.1	4.60	S	10 000	16 000		0.026	28.000	27.991	35.025	35.009
	28	35	27	**K28X35X27H**	35.2	54.7	8.50	S	10 000	16 000		0.042	28.000	27.991	35.025	35.009
	28	36	20	**K28X36X20FV**	27.8	37.0	5.95	S	10 000	16 000		0.039	28.000	27.991	36.025	36.009
	28	38	25	**K28X38X25,5**	40.9	52.7	8.25	S	11 000	16 000		0.059	28.000	27.991	38.025	38.009
	28	40	18	**K28X40X18H**	33.6	36.5	5.90	S	11 000	17 000		0.060	28.000	27.991	40.025	40.009
	28	40	25	**K28X40X25H**	45.5	54.0	8.55	S	11 000	17 000		0.072	28.000	27.991	40.025	40.009
	28	40	30	**K28X40X30H**	54.3	67.8	10.7	S	11 000	17 000		0.100	28.000	27.991	40.025	40.009
	28	41	25	**K28X41X25H**	49.2	57.1	9.05	S	11 000	17 000		0.082	28.000	27.991	41.025	41.009
29	29	34	27	**K29X34X27F**	28.9	54.0	8.40	S	9 700	15 000		0.033	29.000	28.991	34.025	34.009

[Note] 1) Cage material: P: polymer cage, S: steel cage

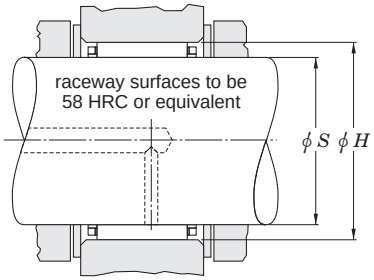
Radial needle roller and cage assemblies
single-row, double-row assemblies
metric series
K, K ZW series
Shaft dia. 30 ~ (34) mm



K



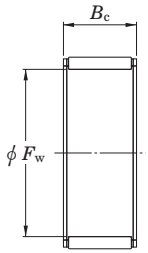
K ZW



Shaft dia.	Boundary dimensions (mm) F_w	E_w	B_c $^{-0.20}_{-0.55}$	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Cage material [1] P / S	Limiting speeds (min^{-1}) Grease lub.	Oil lub.		(Refer.) Mass (kg)	Recommended dimensions (mm) S (Shaft) max.	min.	H (Housing) max.	min.
30	30	34	13	**K30X34X13**	13.5	24.1	3.65	S	9 200	14 000		0.011	30.000	29.991	34.025	34.009
	30	35	13	**K30X35X13H**	15.6	24.9	3.80	S	9 300	14 000		0.017	30.000	29.991	35.025	35.009
	30	35	17	**K30X35X17H**	20.2	34.6	5.35	S	9 300	14 000		0.022	30.000	29.991	35.025	35.009
	30	35	20	**K30X35X20H**	23.5	41.9	6.55	S	9 300	14 000		0.023	30.000	29.991	35.025	35.009
	30	35	22.8	**K30X35X23F**	25.6	46.8	7.40	S	9 300	14 000		0.028	30.000	29.991	35.025	35.009
	30	35	27	**K30X35X27H**	30.6	59.0	9.10	S	9 300	14 000		0.032	30.000	29.991	35.025	35.009
	30	35	27	**K30X35X27HZW**	19.9	33.6	5.10	S	9 300	14 000		0.033	30.000	29.991	35.025	35.009
	30	36	14	**K30X36X14**	18.0	26.2	4.00	S	9 500	15 000		0.020	30.000	29.991	36.025	36.009
	30	37	17.8	**K30X37X18**	24.3	34.8	6.00	S	9 600	15 000		0.033	30.000	29.991	37.025	37.009
	30	40	30	**K30X40X30H**	49.2	67.8	10.6	S	9 900	15 000		0.077	30.000	29.991	40.025	40.009
	30	42	30	**K30X42X30H**	54.2	68.6	10.8	S	10 000	16 000		0.096	30.000	29.991	42.025	42.009
	30	44	26	**K30X44X26H**	52.4	59.9	9.55	S	10 000	16 000		0.095	30.000	29.991	44.025	44.009
32	32	36	15	**K32X36X15F**	11.6	20.2	3.10	S	8 600	13 000		0.015	32.000	31.989	36.025	36.009
	32	37	13	**K32X37X13**	15.2	24.4	4.00	S	8 700	13 000		0.018	32.000	31.989	37.025	37.009
	32	37	17	**K32X37X17H**	20.0	34.8	5.40	S	8 700	13 000		0.020	32.000	31.989	37.025	37.009
	32	37	27	**K32X37X27**	29.3	56.8	8.85	S	8 700	13 000		0.035	32.000	31.989	37.025	37.009
	32	38	20	**K32X38X20H**	27.3	45.7	7.15	S	8 800	14 000		0.030	32.000	31.989	38.025	38.009
	32	38	26	**K32X38X26H**	33.2	58.8	9.15	S	8 800	14 000		0.037	32.000	31.989	38.025	38.009
	32	39	16	**K32X39X16H**	23.0	33.0	5.20	S	8 900	14 000		0.030	32.000	31.989	39.025	39.009
	32	39	18	**K32X39X18H**	25.8	38.2	6.05	S	8 900	14 000		0.033	32.000	31.989	39.025	39.009
	32	40	25	**K32X40X25H**	37.9	57.2	8.90	S	9 000	14 000		0.052	32.000	31.989	40.025	40.009
	32	40	36	**K32X40X36H**	52.3	86.4	13.6	S	9 000	14 000		0.080	32.000	31.989	40.025	40.009
	32	42	42	**K32X42X42H**	69.2	108	17.1	S	9 200	14 000		0.110	32.000	31.989	42.025	42.009
	32	46	18	**K32X46X18H**	39.2	41.9	6.80	S	9 600	15 000		0.075	32.000	31.989	46.025	46.009
	32	46	32	**K32X46X32H**	67.0	83.4	13.1	S	9 600	15 000		0.140	32.000	31.989	46.025	46.009
	32	46	40	**K32X46X40H**	81.7	108	12.2	S	9 600	15 000		0.158	32.000	31.989	46.025	46.009
33	33	51	23	**K33X51X23H**	55.9	57.6	9.35	S	9 600	15 000		0.140	33.000	32.989	51.029	51.010
34	34	38	11	**K34X38X11**	12.2	21.9	3.35	S	8 100	12 000		0.011	34.000	33.989	38.025	38.009

[Note] 1) Cage material: P: polymer cage, S: steel cage

Radial needle roller and cage assemblies
single-row, double-row assemblies
metric series
K, K ZW series
Shaft dia. (34) ~ (38) mm



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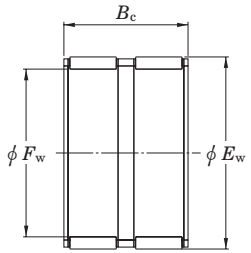
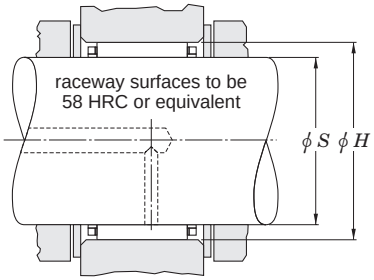


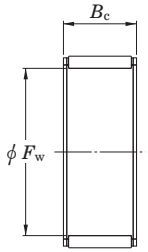
K ZW



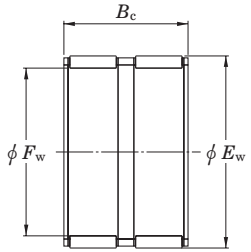
Boundary dimensions (mm) Shaft dia.	F_w	E_w	B_c −0.20 −0.55	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Cage material 1) P / S	Limiting speeds (min^{-1}) Grease lub.	Oil lub.		(Refer.) Mass (kg)	Recommended dimensions (mm) S (Shaft) max.	min.	H (Housing) max.	min.
34	34	44	26	**K34X44X26FH**	42.9	58.9	9.40	S	8 600	13 000		0.080	34.000	33.989	44.025	44.009
35	35	40	13	**K35X40X13H**	16.2	27.2	4.15	S	7 900	12 000		0.018	35.000	34.989	40.025	40.009
	35	40	17	**K35X40X17H**	22.1	40.8	6.35	S	7 900	12 000		0.025	35.000	34.989	40.025	40.009
	35	40	19	**K35X40X19H**	23.2	43.2	6.80	S	7 900	12 000		0.025	35.000	34.989	40.025	40.009
	35	40	25	**K35X40X25H**	28.4	56.2	8.70	S	7 900	12 000		0.035	35.000	34.989	40.025	40.009
	35	40	27	**K35X40X27H**	29.8	59.6	9.20	S	7 900	12 000		0.037	35.000	34.989	40.025	40.009
	35	42	16	**K35X42X16AH**	24.5	36.8	5.80	S	8 100	12 000		0.031	35.000	34.989	42.025	42.009
	35	42	18	**K35X42X18**	27.5	42.6	6.75	S	8 100	12 000		0.035	35.000	34.989	42.025	42.009
	35	42	20	**K35X42X20H**	30.4	48.5	7.65	S	8 100	12 000		0.037	35.000	34.989	42.025	42.009
	35	42	30	**K35X42X30FH**	40.5	70.0	10.9	S	8 100	12 000		0.061	35.000	34.989	42.025	42.009
	35	45	20	**K35X45X20FH**	36.5	49.9	8.00	S	8 400	13 000		0.059	35.000	34.989	45.025	45.009
	35	45	30	**K35X45X30F**	51.2	74.5	11.7	S	8 400	13 000		0.100	35.000	34.989	45.025	45.009
	35	45	35	**K35X45X35H**	62.1	95.5	15.0	S	8 400	13 000		0.085	35.000	34.989	45.025	45.009
	35	45	41	**K35X45X41**	70.8	113	17.7	S	8 400	13 000		0.120	35.000	34.989	45.025	45.009
	35	45	49	**K35X45X49H**	82.5	138	21.4	S	8 400	13 000		0.143	35.000	34.989	45.025	45.009
	35	45	49	**K35X45X49HZW**	71.8	115	18.1	S	8 400	13 000		0.143	35.000	34.989	45.025	45.009
	35	50	23	**K35X50X23H**	53.0	60.3	9.75	S	8 700	13 000		0.110	35.000	34.989	50.025	50.009
	35	50	40	**K35X50X40F**	79.7	102	16.2	S	8 700	13 000		0.200	35.000	34.989	50.025	50.009
36	36	40	29	**K36X40X29TN**	21.2	45.2	7.15	P	7 600	12 000		0.029	36.000	35.989	40.025	40.009
	36	42	16	**K36X42X16**	22.8	37.7	5.95	S	7 800	12 000		0.027	36.000	35.989	42.025	42.009
37	37	42	13	**K37X42X13H**	16.9	29.4	4.50	S	7 500	11 000		0.017	37.000	36.989	42.025	42.009
	37	42	17	**K37X42X17H**	21.9	41.0	6.35	S	7 500	11 000		0.025	37.000	36.989	42.025	42.009
	37	42	27	**K37X42X27F**	32.1	66.9	10.4	S	7 500	11 000		0.039	37.000	36.989	42.025	42.009
	37	44	19	**K37X44X19H**	29.7	48.0	7.65	S	7 600	12 000		0.039	37.000	36.989	44.025	44.009
38	38	41	9	**K38X41X9TN**	5.93	11.0	1.65	P	7 100	11 000		0.004	38.000	37.989	41.025	41.009
	38	43	17	**K38X43X17H**	21.8	41.0	6.35	S	7 300	11 000		0.032	38.000	37.989	43.025	43.009
	38	43	27	**K38X43X27**	31.9	67.0	10.4	S	7 300	11 000		0.041	38.000	37.989	43.025	43.009

[Note] 1) Cage material: P: polymer cage, S: steel cage

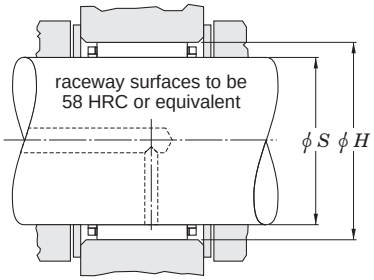
Radial needle roller and cage assemblies
single-row, double-row assemblies
metric series
K, K ZW series
Shaft dia. (38) ~ 42 mm



K



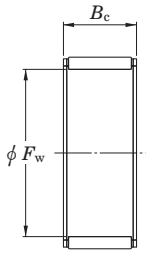
K ZW



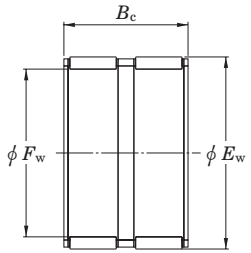
Boundary dimensions (mm) Shaft dia.	F_w	E_w	B_c −0.20 −0.55	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Cage material 1) P / S	Limiting speeds (min^{-1}) Grease lub.	Oil lub.		(Refer.) Mass (kg)	Recommended dimensions (mm) S (Shaft) max.	min.	H (Housing) max.	min.
38	38	46	19.8	**K38X46X20H**	33.3	51.0	8.10	S	7 500	12 000		0.055	38.000	37.989	46.025	46.009
	38	46	32	**K38X46X32H**	55.2	98.1	15.3	S	7 500	12 000		0.090	38.000	37.989	46.025	46.009
	38	50	25	**K38X50X25**	53.0	70.8	11.2	S	7 800	12 000		0.100	38.000	37.989	50.025	50.009
	38	50	33	**K38X50X33H**	68.3	98.2	15.4	S	7 800	12 000		0.126	38.000	37.989	50.025	50.009
	38	50	40	**K38X50X40FH**	76.2	113	17.8	S	7 800	12 000		0.170	38.000	37.989	50.025	50.009
40	40	45	13	**K40X45X13H**	17.6	31.7	4.80	S	6 900	11 000		0.022	40.000	39.989	45.025	45.009
	40	45	18	**K40X45X18H**	25.1	50.4	8.00	S	6 900	11 000		0.031	40.000	39.989	45.025	45.009
	40	45	21	**K40X45X21H**	23.3	45.2	8.50	S	6 900	11 000		0.033	40.000	39.989	45.025	45.009
	40	45	27	**K40X45X27H**	32.7	70.2	10.8	S	6 900	11 000		0.040	40.000	39.989	45.025	45.009
	40	45	27	**K40X45X27TN**	33.3	72.1	11.2	P	6 900	11 000		0.030	40.000	39.989	45.025	45.009
	40	45	29	**K40X45X29H**	34.7	75.9	11.7	S	6 900	11 000		0.050	40.000	39.989	45.025	45.009
	40	46	17	**K40X46X17**	25.2	44.0	6.95	S	7 000	11 000		0.033	40.000	39.989	46.025	46.009
	40	47	18	**K40X47X18**	28.0	45.6	7.25	S	7 000	11 000		0.041	40.000	39.989	47.025	47.009
	40	47	20	**K40X47X20**	31.1	52.1	8.25	S	7 000	11 000		0.042	40.000	39.989	47.025	47.009
	40	48	20	**K40X48X20FV1**	35.5	56.3	8.45	S	7 100	11 000		0.052	40.000	39.989	48.025	48.009
	40	48	20	**K40X48X20H**	35.5	56.3	8.95	S	7 100	11 000		0.050	40.000	39.989	48.025	48.009
	40	48	35	**K40X48X35H**	57.3	104	16.3	S	7 100	11 000		0.098	40.000	39.989	48.025	48.009
	40	50	27	**K40X50X27H**	53.0	81.0	12.7	S	7 200	11 000		0.084	40.000	39.989	50.025	50.009
	40	55	45	**K40X55X45H**	103	146	23.0	S	7 500	12 000		0.221	40.000	39.989	55.029	55.010
	40	56	26	**K40X56X26H**	63.7	75.7	12.0	S	7 600	12 000		0.138	40.000	39.989	56.029	56.010
41	41	48	31	**K41X48X31HZW**	38.0	68.1	10.6	S	6 800	11 000		0.067	41.000	40.989	48.025	48.009
42	42	47	13	**K42X47X13H**	18.7	34.9	5.30	S	6 500	10 000		0.027	42.000	41.989	47.025	47.009
	42	47	17	**K42X47X17H**	22.8	45.2	7.30	S	6 500	10 000		0.028	42.000	41.989	47.025	47.009
	42	47	27	**K42X47X27H**	33.8	74.7	11.6	S	6 500	10 000		0.041	42.000	41.989	47.025	47.009
	42	48	24	**K42X48X24F**	33.1	63.9	10.1	S	6 600	10 000		0.046	42.000	41.989	48.025	48.009
	42	50	13	**K42X50X13H**	20.9	28.9	4.45	S	6 700	10 000		0.035	42.000	41.989	50.025	50.009
	42	50	20	**K42X50X20H**	35.2	56.6	9.00	S	6 700	10 000		0.054	42.000	41.989	50.025	50.009
	42	50	30	**K42X50X30H**	51.3	91.9	14.4	S	6 700	10 000		0.080	42.000	41.989	50.025	50.009

[Note] 1) Cage material: P: polymer cage, S: steel cage

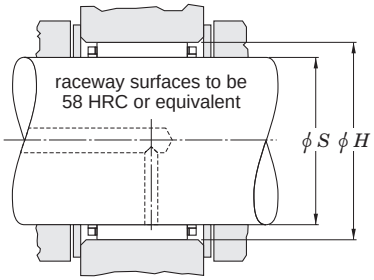
Radial needle roller and cage assemblies
single-row, double-row assemblies
metric series
K, K ZW series
Shaft dia. 43 ~ (47) mm



K



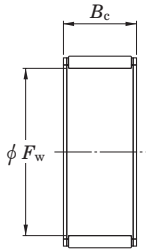
K ZW



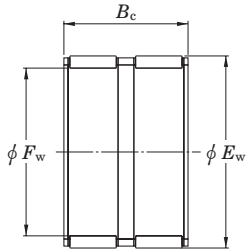
Boundary dimensions (mm) Shaft dia.	F_w	E_w	B_c −0.20 −0.55	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Cage material 1) P / S	Limiting speeds (min^{-1}) Grease lub.	Oil lub.		(Refer.) Mass (kg)	Recommended dimensions (mm) S (Shaft) max.	min.	H (Housing) max.	min.
43	43	48	17	**K43X48X17FH**	23.0	45.8	6.85	S	6 400	9 800		0.036	43.000	42.989	48.025	48.009
	43	48	27	**K43X48X27H**	34.8	78.0	12.1	S	6 400	9 800		0.050	43.000	42.989	48.025	48.009
44	44	50	22	**K44X50X22H**	31.6	60.6	9.45	S	6 400	9 900		0.046	44.000	43.989	50.025	50.009
	44	50	30	**K44X50X30,5HZW**	35.5	70.5	10.7	S	6 400	9 900		0.068	44.000	43.989	50.025	50.009
45	45	50	13	**K45X50X13H**	18.4	35.1	5.35	S	6 100	9 400		0.022	45.000	44.989	50.025	50.009
	45	50	15	**K45X50X15H**	19.4	37.3	5.75	S	6 100	9 400		0.028	45.000	44.989	50.025	50.009
	45	50	17	**K45X50X17H**	24.9	51.8	8.05	S	6 100	9 400		0.030	45.000	44.989	50.025	50.009
	45	50	20	**K45X50X20F**	27.0	57.4	9.00	S	6 100	9 400		0.040	45.000	44.989	50.025	50.009
	45	50	21	**K45X50X21CH**	24.6	50.4	7.85	S	6 100	9 400		0.036	45.000	44.989	50.025	50.009
	45	50	27	**K45X50X27FH**	34.2	77.4	12.0	S	6 100	9 400		0.043	45.000	44.989	50.025	50.009
	45	50	27	**K45X50X27TN**	31.8	70.7	11.0	P	6 100	9 400		0.048	45.000	44.989	50.025	50.009
	45	52	18	**K45X52X18H**	30.1	52.0	8.25	S	6 200	9 500		0.045	45.000	44.989	52.029	52.010
	45	52	21	**K45X52X21F**	35.0	63.2	9.90	S	6 200	9 500		0.055	45.000	44.989	52.029	52.010
	45	53	20	**K45X53X20H**	36.0	59.5	9.45	S	6 200	9 600		0.054	45.000	44.989	53.029	53.010
	45	53	24.8	**K45X53X25H**	45.9	81.5	12.7	S	6 200	9 600		0.072	45.000	44.989	53.029	53.010
	45	53	25	**K45X53X25F**	42.5	73.7	11.7	S	6 200	9 600		0.075	45.000	44.989	53.029	53.010
	45	53	28	**K45X53X28H**	49.3	89.2	13.9	S	6 200	9 600		0.078	45.000	44.989	53.029	53.010
	45	55	20	**K45X55X20H**	42.0	62.2	10.0	S	6 400	9 800		0.074	45.000	44.989	55.029	55.010
	45	59	18	**K45X59X18H**	47.8	58.9	9.60	S	6 600	10 000		0.107	45.000	44.989	59.029	59.010
	45	59	18	**K45X59X18TN**	45.7	55.4	9.00	P	6 600	10 000		0.097	45.000	44.989	59.029	59.010
	45	59	36	**K45X59X36H**	82.4	118	18.6	S	6 600	10 000		0.181	45.000	44.989	59.029	59.010
	45	60	30	**K45X60X30H**	75.5	101	16.0	S	6 600	10 000		0.171	45.000	44.989	60.029	60.010
	45	60	45	**K45X60X45H**	108	160	25.2	S	6 600	10 000		0.280	45.000	44.989	60.029	60.010
46	46	53	36	**K46X53X36HZW**	48.6	96.7	15.3	S	6 100	9 300		0.100	46.000	45.989	53.029	53.010
47	47	52	15	**K47X52X15FH**	20.1	39.8	6.15	S	5 800	8 900		0.030	47.000	46.989	52.029	52.010
	47	52	17	**K47X52X17H**	24.2	50.4	7.85	S	5 800	8 900		0.032	47.000	46.989	52.029	52.010
	47	52	27	**K47X52X27H**	36.6	85.9	13.3	S	5 800	8 900		0.045	47.000	46.989	52.029	52.010

[Note] 1) Cage material: P: polymer cage, S: steel cage

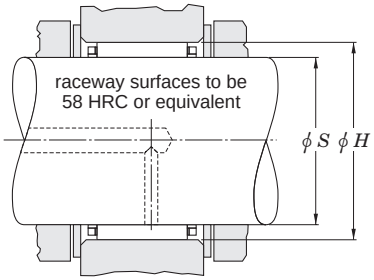
Radial needle roller and cage assemblies
single-row, double-row assemblies
metric series
K, K ZW series
Shaft dia. (47) ~ (55) mm



K



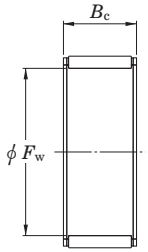
K ZW



Boundary dimensions (mm) Shaft dia.	F_w	E_w	B_c −0.20 −0.55	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Cage material 1) P / S	Limiting speeds (min^{-1}) Grease lub.	Oil lub.		(Refer.) Mass (kg)	Recommended dimensions (mm) S (Shaft) max.	min.	H (Housing) max.	min.
47	47	55	28	**K47X55X28FV1**	48.9	89.5	14.0	S	6 000	9 200		0.092	47.000	46.989	55.029	55.010
48	48	53	17	**K48X53X17H**	25.7	54.9	8.55	S	5 700	8 700		0.032	48.000	47.989	53.029	53.010
	48	54	19	**K48X54X19H**	30.9	61.2	9.85	S	5 700	8 800		0.042	48.000	47.989	54.029	54.010
49	49	55	32	**K49X55X32HZW**	40.2	86.4	13.4	S	5 600	8 600		0.080	49.000	48.989	55.029	55.010
	49	65	38	**K49X65X38H**	100	142	22.7	S	6 100	9 300		0.244	49.000	48.989	65.029	65.010
50	50	55	17	**K50X55X17H**	25.5	55.0	8.55	S	5 400	8 400		0.032	50.000	49.989	55.029	55.010
	50	55	20	**K50X55X20H**	30.2	68.5	10.7	S	5 400	8 400		0.038	50.000	49.989	55.029	55.010
	50	55	30	**K50X55X30**	38.2	92.4	14.4	S	5 400	8 400		0.057	50.000	49.989	55.029	55.010
	50	55	30	**K50X55X30FV1**	38.2	92.4	14.4	S	5 400	8 400		0.057	50.000	49.989	55.029	55.010
	50	56	23	**K50X56X23**	35.5	74.1	11.7	S	5 500	8 500		0.051	50.000	49.989	56.029	56.010
	50	57	18	**K50X57X18FH**	31.3	56.4	8.95	S	5 500	8 500		0.050	50.000	49.989	57.029	57.010
	50	58	20	**K50X58X20H**	38.8	67.8	10.8	S	5 600	8 600		0.065	50.000	49.989	58.029	58.010
	50	58	25	**K50X58X25H**	46.5	85.6	13.4	S	5 600	8 600		0.081	50.000	49.989	58.029	58.010
	50	58	35	**K50X58X35H**	64.9	131	20.6	S	5 600	8 600		0.105	50.000	49.989	58.029	58.010
	50	62	30	**K50X62X30H**	64.6	98.1	15.5	S	5 800	8 900		0.136	50.000	49.989	62.029	62.010
	50	66	30	**K50X66X30H**	80.9	109	17.4	S	5 900	9 100		0.192	50.000	49.989	66.029	66.010
	50	70	32	**K50X70X32H**	103	129	20.6	S	6 100	9 300		0.224	50.000	49.989	70.029	70.010
52	52	57	12	**K52X57X12**	18.4	36.7	5.60	S	5 200	8 000		0.022	52.000	51.987	57.029	57.010
	52	57	17	**K52X57X17H**	21.4	44.3	6.90	S	5 200	8 000		0.035	52.000	51.987	57.029	57.010
	52	60	24	**K52X60X24**	47.1	88.3	13.9	S	5 400	8 200		0.078	52.000	51.987	60.029	60.010
55	55	60	17	**K55X60X17**	26.0	58.3	9.10	S	4 900	7 600		0.037	55.000	54.987	60.029	60.010
	55	60	20	**K55X60X20H**	30.7	72.4	11.3	S	4 900	7 600		0.042	55.000	54.987	60.029	60.010
	55	60	27	**K55X60X27H**	40.1	102	15.7	S	4 900	7 600		0.055	55.000	54.987	60.029	60.010
	55	60	30	**K55X60X30FH**	40.6	103	16.1	S	4 900	7 600		0.068	55.000	54.987	60.029	60.010
	55	61	26	**K55X61X26H**	44.3	102	15.9	S	5 000	7 600		0.063	55.000	54.987	61.029	61.010
	55	62	18	**K55X62X18H**	33.2	62.8	10.0	S	5 000	7 700		0.055	55.000	54.987	62.029	62.010
	55	63	15	**K55X63X15F**	30.5	51.5	8.00	S	5 000	7 800		0.054	55.000	54.987	63.029	63.010

[Note] 1) Cage material: P: polymer cage, S: steel cage

Radial needle roller and cage assemblies
single-row, double-row assemblies
metric series
K, K ZW series
Shaft dia. (55) ~ 68 mm



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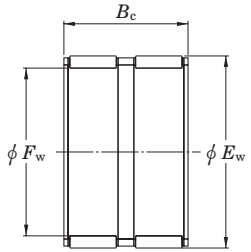
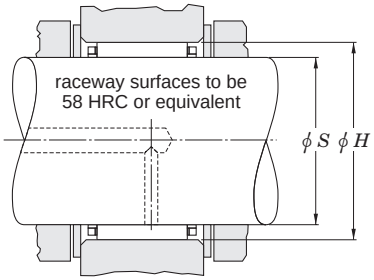


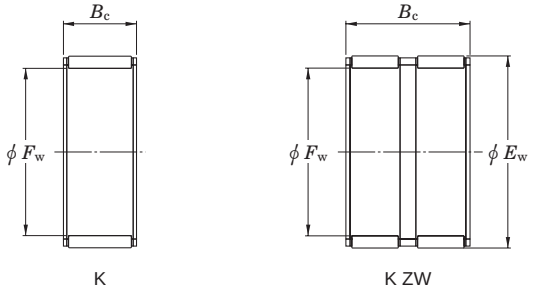
K ZW



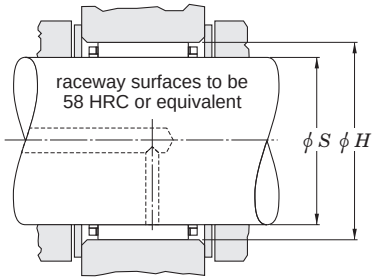
Boundary dimensions (mm) Shaft dia.	F_w	E_w	B_c −0.20 −0.55	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Cage material 1) P / S	Limiting speeds (min^{-1}) Grease lub.	Oil lub.		(Refer.) Mass (kg)	Recommended dimensions (mm) S (Shaft) max.	min.	H (Housing) max.	min.
55	55	63	20	**K55X63X20**	40.3	73.5	11.7	S	5 000	7 800		0.072	55.000	54.987	63.029	63.010
	55	63	25	**K55X63X25**	49.8	96.5	15.1	S	5 000	7 800		0.080	55.000	54.987	63.029	63.010
	55	63	32	**K55X63X32**	62.3	129	20.0	S	5 000	7 800		0.108	55.000	54.987	63.029	63.010
58	58	63	17	**K58X63X17F**	27.0	62.6	9.80	S	4 700	7 200		0.037	58.000	57.987	63.029	63.010
	58	64	19	**K58X64X19H**	32.9	70.6	11.3	S	4 700	7 200		0.037	58.000	57.987	64.029	64.010
	58	65	18	**K58X65X18H**	34.3	67.1	10.7	S	4 700	7 300		0.058	58.000	57.987	65.029	65.010
60	60	65	20	**K60X65X20H**	31.9	78.1	12.2	S	4 500	6 900		0.046	60.000	59.987	65.029	65.010
	60	65	26.8	**K60X65X27FH**	39.5	103	16.0	S	4 500	6 900		0.059	60.000	59.987	65.029	65.010
	60	65	29.8	**K60X65X30FH**	42.9	114	17.8	S	4 500	6 900		0.085	60.000	59.987	65.029	65.010
	60	65	30	**K60X65X30**	42.9	114	17.8	S	4 500	6 900		0.070	60.000	59.987	65.029	65.010
	60	68	17	**K60X68X17F**	34.2	61.4	9.50	S	4 600	7 100		0.066	60.000	59.987	68.029	68.010
	60	68	20	**K60X68X20H**	41.8	79.2	12.6	S	4 600	7 100		0.066	60.000	59.987	68.029	68.010
	60	68	23	**K60X68X23H**	49.0	97.2	15.4	S	4 600	7 100		0.089	60.000	59.987	68.029	68.010
	60	68	25	**K60X68X25**	51.6	104	16.3	S	4 600	7 100		0.091	60.000	59.987	68.029	68.010
	60	68	30	**K60X68X30ZW**	46.4	90.1	13.9	S	4 600	7 100		0.119	60.000	59.987	68.029	68.010
63	63	71	20	**K63X71X20**	41.4	79.4	12.7	S	4 400	6 700		0.070	63.000	62.987	71.029	71.010
64	64	70	16	**K64X70X16**	26.4	55.1	8.55	S	4 200	6 500		0.049	64.000	63.987	70.029	70.010
65	65	70	20	**K65X70X20CH**	28.6	69.2	10.8	S	4 100	6 400		0.050	65.000	64.987	70.029	70.010
	65	70	30	**K65X70X30**	44.4	123	19.1	S	4 100	6 400		0.075	65.000	64.987	70.029	70.010
	65	73	23	**K65X73X23H**	48.2	97.7	15.5	S	4 200	6 500		0.091	65.000	64.987	73.029	73.010
	65	73	30	**K65X73X30H**	60.1	129	20.3	S	4 200	6 500		0.116	65.000	64.987	73.029	73.010
68	68	74	20	**K68X74X20FH**	37.5	88.1	13.2	S	4 000	6 100		0.062	68.000	67.987	74.029	74.010
	68	74	28	**K68X74X28CH**	44.8	110	17.1	S	4 000	6 100		0.082	68.000	67.987	74.029	74.010
	68	74	30	**K68X74X30H**	47.6	119	18.5	S	4 000	6 100		0.098	68.000	67.987	74.029	74.010
	68	74	35	**K68X74X35HZW**	45.1	111	17.1	S	4 000	6 100		0.120	68.000	67.987	74.029	74.010
	68	76	20	**K68X76X20**	43.8	87.8	14.0	S	4 000	6 200		0.086	68.000	67.987	76.029	76.010

[Note] 1) Cage material: P: polymer cage, S: steel cage

Radial needle roller and cage assemblies
single-row, double-row assemblies
metric series
K, K ZW series
Shaft dia. 70 ~ 95 mm



K K ZW

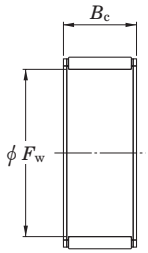


Boundary dimensions (mm) Shaft dia.	F_w	E_w	B_c −0.20 −0.55	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Cage material [1] P / S	Limiting speeds (min^{-1}) Grease lub.	Oil lub.		(Refer.) Mass (kg)	Recommended dimensions (mm) S (Shaft) max.	min.	H (Housing) max.	min.
70	70	76	20	**K70X76X20**	36.1	84.7	13.5	S	3 900	5 900		0.065	70.000	69.987	76.029	76.010
	70	76	30	**K70X76X30**	51.6	134.0	20.9	S	3 900	5 900		0.097	70.000	69.987	76.029	76.010
	70	78	20	**K70X78X20H**	43.6	87.9	14.0	S	3 900	6 000		0.090	70.000	69.987	78.029	78.010
	70	78	23	**K70X78X23F**	49.8	104.0	16.6	S	3 900	6 000		0.115	70.000	69.987	78.029	78.010
	70	78	24.8	**K70X78X25F**	49.8	104.0	16.6	S	3 900	6 000		0.115	70.000	69.987	78.029	78.010
	70	78	30	**K70X78X30H**	62.2	139.0	21.8	S	3 900	6 000		0.140	70.000	69.987	78.029	78.010
	70	78	46	**K70X78X46ZW**	78.4	187.0	29.5	S	3 900	6 000		0.188	70.000	69.987	78.029	78.010
	70	85	40	**K70X85X40F**	118	203	32.4	S	4 100	6 300		0.338	70.000	69.987	85.034	85.012
	70	88	30	**K70X88X30H**	115	175	28.1	S	4 100	6 400		0.205	70.000	69.987	88.034	88.012
72	72	80	20	**K72X80X20**	44.4	90.7	14.5	S	3 800	5 800		0.084	72.000	71.987	80.029	80.010
73	73	79	20	**K73X79X20**	37.0	88.7	14.1	S	3 700	5 700		0.068	73.000	72.987	79.029	79.010
75	75	81	20	**K75X81X20F**	37.4	90.7	14.5	S	3 600	5 500		0.075	75.000	74.987	81.034	81.012
	75	83	23	**K75X83X23**	52.5	114.0	18.2	S	3 600	5 600		0.104	75.000	74.987	83.034	83.012
	75	83	30	**K75X83X30**	60.9	138	21.7	S	3 600	5 600		0.141	75.000	74.987	83.034	83.012
	75	83	30	**K75X83X30FH**	60.9	138	21.7	S	3 600	5 600		0.141	75.000	74.987	83.034	83.012
80	80	86	20	**K80X86X20H**	38.6	96.7	15.4	S	3 400	5 200		0.072	80.000	79.987	86.034	86.012
	80	88	25	**K80X88X25FV1**	54.0	121	19.2	S	3 400	5 200		0.134	80.000	79.987	88.034	88.012
	80	88	30	**K80X88X30**	67.5	161	25.4	S	3 400	5 200		0.153	80.000	79.987	88.034	88.012
85	85	92	20	**K85X92X20H**	39.9	91.7	14.6	S	3 200	4 900		0.085	84.988	84.973	92.034	92.012
	85	93	25	**K85X93X25F**	58.8	138	21.7	S	3 200	4 900		0.128	84.988	84.973	93.034	93.012
	85	93	30	**K85X93X30H**	69.4	170.4	26.8	S	3 200	4 900		0.166	84.988	84.973	93.034	93.012
90	90	97	20	**K90X97X20**	46.3	114	18.1	S	3 000	4 600		0.095	89.988	89.973	97.034	97.012
	90	98	25	**K90X98X25F**	54.8	128	20.3	S	3 000	4 600		0.134	89.988	89.973	98.034	98.012
	90	98	30	**K90X98X30**	63.6	155	24.3	S	3 000	4 600		0.168	89.988	89.973	98.034	98.012
95	95	103	20	**K95X103X20**	49.3	114	18.3	S	2 800	4 400		0.130	94.988	94.973	103.034	103.012
	95	103	30	**K95X103X30F**	71.0	183	28.6	S	2 800	4 400		0.180	94.988	94.973	103.034	103.012

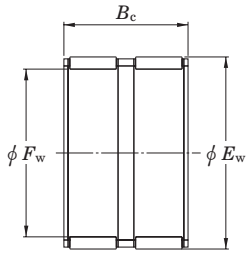
[Note] 1) Cage material: P: polymer cage, S: steel cage

Radial needle roller and cage assemblies
single-row, double-row assemblies
metric series
K, K ZW series

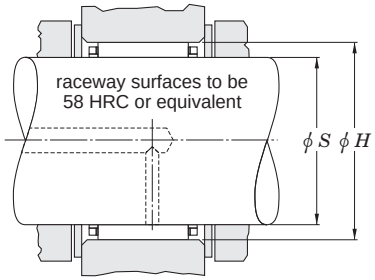
Shaft dia. 100 ~ 110 mm



K



K ZW

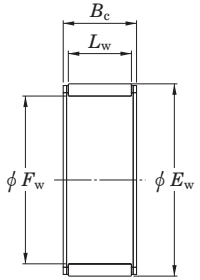


Boundary dimensions (mm)				Bearing No.	Basic load ratings (kN)		Fatigue load limit (kN)	Cage material [1]	Limiting speeds (min^{-1})			(Refer.) Mass (kg)	Recommended dimensions (mm)			
													S (Shaft)		H (Housing)	
Shaft dia.	F_w	E_w	B_c −0.20 −0.55		C_r	C_{0r}	C_u	P / S	Grease lub.	Oil lub.			max.	min.	max.	min.
100	100	108	30	**K100X108X30**	72.4	191	29.5	S	2 700	4 200		0.210	99.988	99.973	108.034	108.012
110	110	118	24	**K110X118X24**	64.0	168	25.6	S	2 400	3 800		0.165	109.988	109.973	118.034	118.012
	110	118	30	**K110X118X30H**	75.3	207	31.2	S	2 400	3 800		0.200	109.988	109.973	118.034	118.012

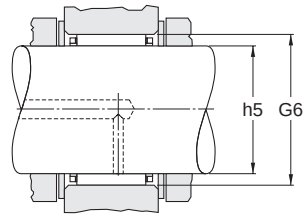
[Note] 1) Cage material: P: polymer cage, S: steel cage

Radial needle roller and cage assemblies
single-row assemblies
inch series

Shaft dia. $^{3}/_{8} \sim (1\ ^{1}/_{2})$ in
(9.525 ~ (38.100) mm)



WJ, WJC



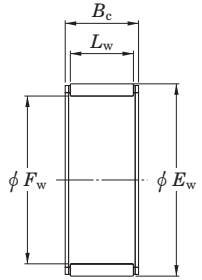
raceway surfaces to be
58 HRC or equivalent

Shaft dia. (in)	Boundary dimensions (mm) F_w	E_w	B_c $^{+0}_{-0.38}$	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Limiting speeds (min^{-1}) Grease lub.	Oil lub.	Recommended dimensions (mm) Shaft dia. (h5) max.	min.	Housing bore dia. (G6) max.	min.	(Refer.) Mass (kg)
$^{3}/_{8}$	9.525	12.700	9.53	**WJC-060806**	3.87	4.00	0.600	24 000	37 000	9.525	9.520	12.715	12.705	0.003
$^{1}/_{2}$	12.700	15.875	12.70	**WJC-081008**	6.23	8.01	1.65	23 000	35 000	12.700	12.692	15.890	15.880	0.005
$^{9}/_{16}$	14.288	17.463	12.70	**WJC-091108**	6.81	9.25	1.40	22 000	34 000	14.288	14.280	17.478	17.468	0.006
$^{5}/_{8}$	15.875	19.050	12.70	**WJC-101208**	7.03	9.96	1.50	18 000	27 000	15.875	15.867	19.070	19.058	0.006
	15.875	22.225	15.88	**WJ-101410**	15.6	17.8	2.80	19 000	29 000	15.875	15.867	22.245	22.233	0.012
	15.875	22.225	22.23	**WJ-101414**	21.3	26.4	4.10	19 000	29 000	15.875	15.867	22.245	22.233	0.017
$^{3}/_{4}$	19.050	25.400	25.40	**WJ-121616**	26.8	37.2	5.80	16 000	24 000	19.050	19.040	25.420	25.408	0.023
$^{13}/_{16}$	20.638	26.988	22.23	**WJ-131714**	25.1	35.0	5.50	14 000	22 000	20.638	20.627	27.008	26.995	0.021
$^{7}/_{8}$	22.225	28.575	25.40	**WJ-141816**	29.2	43.5	6.75	13 000	20 000	22.225	22.215	28.595	28.583	0.026
1	25.400	33.338	19.05	**WJ-162112**	28.1	37.1	5.90	12 000	18 000	25.400	25.390	33.363	33.348	0.029
	25.400	33.338	25.40	**WJ-162116**	36.8	52.5	8.20	12 000	18 000	25.400	25.390	33.363	33.348	0.038
	25.400	33.338	31.75	**WJ-162120**	44.5	67.2	10.5	12 000	18 000	25.400	25.390	33.363	33.348	0.048
$1\ ^{1}/_{8}$	28.575	38.100	25.40	**WJ-182416**	42.4	57.8	9.05	10 000	16 000	28.575	28.565	38.125	38.110	0.041
	28.575	38.100	31.75	**WJ-182420**	52.0	74.7	11.7	10 000	16 000	28.575	28.565	38.125	38.110	0.065
$1\ ^{1}/_{4}$	31.750	41.275	19.05	**WJ-202612**	33.4	43.7	7.05	9 300	14 000	31.750	31.740	41.300	41.285	0.043
	31.750	41.275	25.40	**WJ-202616**	44.1	62.3	9.80	9 300	14 000	31.750	31.740	41.300	41.285	0.061
	31.750	41.275	31.75	**WJ-202620**	53.8	81.0	12.6	9 300	14 000	31.750	31.740	41.300	41.285	0.071
	31.750	41.275	38.10	**WJ-202624**	63.6	99.6	15.6	9 300	14 000	31.750	31.740	41.300	41.285	0.085
$1\ ^{3}/_{8}$	34.925	44.450	25.40	**WJ-222816**	45.8	67.2	10.5	8 300	13 000	34.925	34.915	44.475	44.460	0.067
	34.925	44.450	31.75	**WJ-222820**	56.0	87.2	13.6	8 300	13 000	34.925	34.915	44.475	44.460	0.077
$1\ ^{1}/_{2}$	38.100	47.625	25.40	**WJ-243016**	47.2	71.6	11.3	7 600	12 000	38.100	38.090	47.650	47.635	0.078
	38.100	47.625	31.75	**WJ-243020**	57.8	93.0	14.5	7 600	12 000	38.100	38.090	47.650	47.635	0.083

[Remarks] 1) Load ratings are based on a minimum raceway hardness of 58 HRC or equivalent.
2) Minimum axial clearance should be 0.02 mm (0.008 in).

Radial needle roller and cage assemblies
single-row assemblies
inch series

Shaft dia. (1 1/2) ~ 3 in
((38.100) ~ 76.200 mm)



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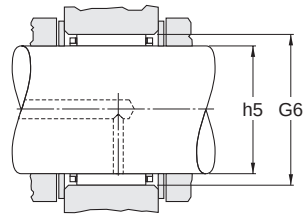


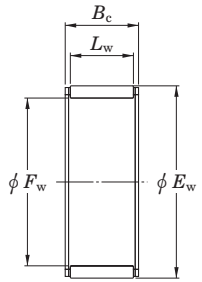
raceway surfaces to be
58 HRC or equivalent

Boundary dimensions (mm) Shaft dia. (in)	F_w	E_w	B_c +0 −0.38	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Limiting speeds (min^{-1}) Grease lub.	Oil lub.	Recommended dimensions (mm) Shaft dia. (h5) max.	min.	Housing bore dia. (G6) max.	min.	(Refer.) Mass (kg)
1 1/2	38.100	47.625	38.10	**WJ-243024**	68.1	114.8	18.0	7 600	12 000	38.100	38.090	47.650	47.635	0.100
	38.100	47.625	44.45	**WJ-243028**	77.4	135.7	21.2	7 600	12 000	38.100	38.090	47.650	47.635	0.134
1 3/4	44.450	53.975	19.05	**WJ-283412**	39.5	59.6	9.60	6 400	9 900	44.450	44.440	54.003	53.985	0.058
	44.450	53.975	25.40	**WJ-283416**	52.0	85.0	13.4	6 400	9 900	44.450	44.440	54.003	53.985	0.084
	44.450	53.975	38.10	**WJ-283424**	74.7	136	21.3	6 400	9 900	44.450	44.440	54.003	53.985	0.115
2	50.800	60.325	19.05	**WJ-323812**	42.8	69.0	11.1	5 600	8 600	50.800	50.787	60.353	60.335	0.065
	50.800	60.325	25.40	**WJ-323816**	56.5	98.0	15.5	5 600	8 600	50.800	50.787	60.353	60.335	0.105
	50.800	60.325	31.75	**WJ-323820**	69.0	127	20.0	5 600	8 600	50.800	50.787	60.353	60.335	0.108
	50.800	60.325	38.10	**WJ-323824**	81.0	157	24.6	5 600	8 600	50.800	50.787	60.353	60.335	0.130
2 1/16	52.388	61.913	25.40	**WJ-333916**	57.8	102	16.2	5 400	8 300	52.388	52.375	61.940	61.923	0.099
2 1/8	53.975	63.500	25.40	**WJ-344016**	52.5	92.08	14.6	5 200	8 000	53.975	53.962	63.528	63.510	0.089
	53.975	63.500	38.10	**WJ-344024**	78.3	153	24.0	5 200	8 000	53.975	53.962	63.528	63.510	0.137
2 3/16	55.563	65.088	19.05	**WJ-354112**	44.5	75.17	12.2	5 000	7 800	55.563	55.550	65.115	65.098	0.070
	55.563	65.088	25.40	**WJ-354116**	57.8	107	16.9	5 000	7 800	55.563	55.550	65.115	65.098	0.094
2 1/4	57.150	66.675	25.40	**WJ-364216**	53.8	96.08	15.2	4 900	7 500	57.150	57.137	66.703	66.685	0.096
	57.150	66.675	31.75	**WJ-364220**	67.6	128	20.1	4 900	7 500	57.150	57.137	66.703	66.685	0.120
2 3/8	60.325	69.850	38.10	**WJ-384424**	81.4	167	26.1	4 600	7 100	60.325	60.312	69.878	69.860	0.151
2 1/2	63.500	73.025	25.40	**WJ-404616**	55.6	104	16.5	4 400	6 700	63.500	63.487	73.053	73.035	0.106
	63.500	73.025	31.75	**WJ-404620**	69.8	139	21.8	4 400	6 700	63.500	63.487	73.053	73.035	0.132
	63.500	73.025	38.10	**WJ-404624**	83.2	173	27.2	4 400	6 700	63.500	63.487	73.053	73.035	0.179
2 3/4	69.850	79.375	25.40	**WJ-445016**	57.8	112.54	17.8	4 000	6 100	69.850	69.837	79.403	79.385	0.116
3	76.200	85.725	25.40	**WJ-485416**	59.6	120.55	19.1	3 600	5 600	76.200	76.187	85.761	85.738	0.126
	76.200	85.725	38.10	**WJ-485424**	85.4	191.72	29.9	3 600	5 600	76.200	76.187	85.761	85.738	0.189

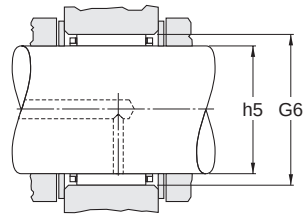
[Remarks] 1) Load ratings are based on a minimum raceway hardness of 58 HRC or equivalent.
2) Minimum axial clearance should be 0.02 mm (0.008 in).

Radial needle roller and cage assemblies
single-row assemblies
inch series

Shaft dia. 3 1/4 ~ 5 in
(82.550 ~ 127.000 mm)



WJ, WJC



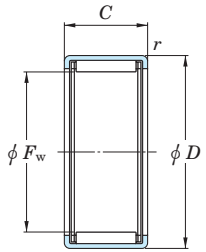
raceway surfaces to be
58 HRC or equivalent

Boundary dimensions (mm)				Bearing No.	Basic load ratings (kN)		Fatigue load limit (kN)	Limiting speeds (min^{-1})			Recommended dimensions (mm)				(Refer.) Mass (kg)
Shaft dia. (in)	F_w	E_w	B_c +0 −0.38		C_r	C_{0r}	C_u	Grease lub.	Oil lub.		Shaft dia. (h5) max.	Shaft dia. (h5) min.	Housing bore dia. (G6) max.	Housing bore dia. (G6) min.	
3 1/4	82.550	92.075	25.40	**WJ-525816**	61.4	128.55	20.4	3 300	5 100		82.550	82.535	92.111	92.088	0.136
	82.550	92.075	38.10	**WJ-525824**	88.1	204.62	31.9	3 300	5 100		82.550	82.535	92.111	92.088	0.220
3 1/2	88.900	98.425	25.40	**WJ-566216**	63.2	136.56	21.7	3 100	4 700		88.900	88.885	98.461	98.438	0.146
	88.900	101.600	25.40	**WJ-566416**	79.6	150.35	23.9	3 100	4 800		88.900	88.885	101.636	101.613	0.197
	88.900	101.600	38.10	**WJ-566424**	113	237.53	37.4	3 100	4 800		88.900	88.885	101.636	101.613	0.296
4	101.600	114.300	25.40	**WJ-647216**	83.6	166.59	30.9	2 700	4 200		101.600	101.585	114.336	114.313	0.224
	101.600	114.300	38.10	**WJ-647224**	119	263.33	40.6	2 700	4 200		101.600	101.585	114.336	114.313	0.335
5	127.000	152.400	38.10	**WJ-809624**	211	365.20	51.9	2 200	3 400		127.000	126.982	152.438	152.415	1.018

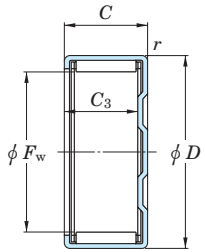
[Remarks] 1) Load ratings are based on a minimum raceway hardness of 58 HRC or equivalent.
2) Minimum axial clearance should be 0.02 mm (0.008 in).

Drawn cup needle roller bearings caged, open ends, closed one end metric series HK, BK series

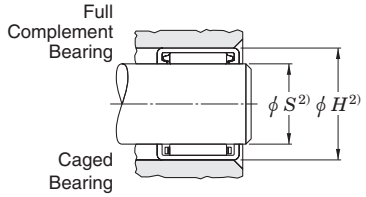
Shaft dia. 3 ~ (10) mm



HK



BK



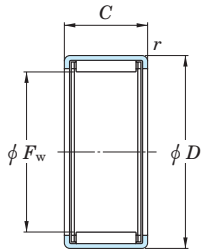
Shaft surface to be 58 HRC or equivalent

Shaft dia.	Boundary dimensions (mm) F_w	D	C $^{+0}_{-0.3}$	C_3 min.	r min.	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Limiting speeds (min^{-1}) Grease lub.	Oil lub.		(Refer.) Mass (kg)	Inspection gage	Mounting inner ring (pages B466 to B475)
3	3	6.5	6	5.20	0.30	**BK0306**	1.20	0.78	0.130	30 000	46 000		0.001	Table 4	
	3	6.5	6	—	0.30	**HK0306**	1.60	1.14	0.130	30 000	46 000		0.001	Table 4	
4	4	8	8	6.40	0.40	**BK0408**	1.83	1.32	0.200	25 000	39 000		0.002	Table 4	
	4	8	8	—	0.40	**HK0408**	1.88	1.38	0.200	25 000	39 000		0.002	Table 4	
5	5	9	9	7.40	0.40	**BK0509**	2.52	2.07	0.320	23 000	36 000		0.002	Table 4	
	5	9	9	—	0.40	**HK0509**	2.52	2.07	0.320	23 000	36 000		0.002	Table 4	
6	6	10	8	6.40	0.40	**BK0608**	2.34	1.95	0.290	22 000	33 000		0.002	Table 4	
	6	10	8	—	0.40	**HK0608**	2.34	1.95	0.290	22 000	33 000		0.002	Table 4	
	6	10	9	7.40	0.40	**BK0609**	3.14	2.85	0.290	22 000	33 000		0.003	Table 4	
	6	10	9	—	0.40	**HK0609**	3.14	2.85	0.290	22 000	33 000		0.002	Table 4	
7	7	11	9	7.40	0.40	**BK0709**	3.24	3.10	0.470	21 000	32 000		0.003	Table 4	
	7	11	9	—	0.40	**HK0709**	3.23	3.05	0.470	21 000	32 000		0.003	Table 4	
8	8	12	8	6.40	0.40	**BK0808**	2.90	2.73	0.400	20 000	31 000		0.003	Table 4	
	8	12	8	—	0.40	**HK0808**	2.90	2.73	0.400	20 000	31 000		0.003	Table 4	
	8	12	10	8.40	0.40	**BK0810**	3.93	4.14	0.600	20 000	31 000		0.004	Table 4	JR5x8x12
	8	12	10	—	0.40	**HK0810**	3.95	4.07	0.600	20 000	31 000		0.004	Table 4	JR5x8x12
9	9	13	10	8.40	0.40	**BK0910**	4.57	5.07	0.770	19 000	30 000		0.004	Table 4	JR6x9x12
	9	13	10	—	0.40	**HK0910**	4.57	5.07	0.770	19 000	30 000		0.004	Table 4	JR6x9x12
	9	13	12	10.40	0.40	**BK0912**	5.65	6.65	1.00	19 000	30 000		0.005	Table 4	JR6x9x12
	9	13	12	—	0.40	**HK0912**	5.65	6.65	1.00	19 000	30 000		0.005	Table 4	JR6x9x12
10	10	14	10	8.40	0.40	**BK1010**	4.78	5.51	0.840	19 000	29 000		0.004	Table 4	JR7x10x10,5
	10	14	10	—	0.40	**HK1010**	4.78	5.51	0.840	19 000	29 000		0.004	Table 4	JR7x10x10,5
	10	14	12	10.40	0.40	**BK1012**	5.90	7.23	1.10	19 000	29 000		0.006	Table 4	JR7x10x12
	10	14	12	—	0.40	**HK1012**	5.90	7.23	1.10	19 000	29 000		0.005	Table 4	JR7x10x12

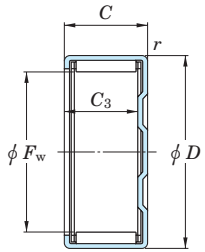
[Notes] 1) Drawn cup needle roller bearings with two needle roller and cage assemblies and one lubricating hole.
2) For the recommended mounting dimensions see Table 20.

Drawn cup needle roller bearings caged, open ends, closed one end metric series HK, BK series

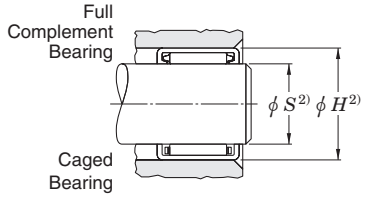
Shaft dia. (10) ~ (18) mm



HK



BK



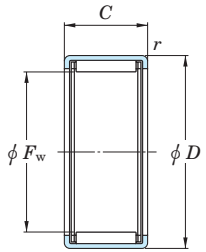
Shaft surface to be 58 HRC or equivalent

Shaft dia.	Boundary dimensions (mm) F_w	D	C $^{+0}_{-0.3}$	C_3 min.	r min.	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Limiting speeds (min^{-1}) Grease lub.	Oil lub.		(Refer.) Mass (kg)	Inspection gage	Mounting inner ring (pages B466 to B475)
10	10	14	15	13.40	0.40	**BK1015**	7.49	9.81	1.50	19 000	29 000		0.006	Table 4	JR7x10x16
	10	14	15	—	0.40	**HK1015**	7.49	9.81	1.50	19 000	29 000		0.006	Table 4	JR7x10x16
12	12	16	10	8.40	0.4	**BK1210**	4.96	6.08	0.890	18 000	28 000		0.006	Table 4	JR8x12x10,5
	12	16	10	—	0.4	**HK1210**	4.96	6.08	0.890	18 000	28 000		0.006	Table 4	JR8x12x10,5
	12	18	12	9.30	1	**BK1212**	6.61	7.29	1.10	14 000	22 000		0.012	Table 4	JR8x12x12,5
	12	18	12	—	1	**HK1212**	6.61	7.29	1.10	14 000	22 000		0.01	Table 4	JR8x12x12,5
13	13	19	12	9.30	1	**BK1312**	6.92	7.89	1.20	14 000	22 000		0.012	Table 4	JR10x13x12,5
	13	19	12	—	1	**HK1312**	6.92	7.89	1.20	14 000	22 000		0.01	Table 4	JR10x13x12,5
14	14	20	12	9.30	1	**BK1412**	7.21	8.50	1.30	14 000	21 000		0.014	Table 4	JR10x14x12
	14	20	12	—	1	**HK1412**	7.21	8.50	1.30	14 000	21 000		0.011	Table 4	JR10x14x12
15	15	21	12	9.30	1	**BK1512**	7.16	8.57	1.40	14 000	21 000		0.015	Table 4	JR12x15x12,5
	15	21	12	—	1	**HK1512**	7.49	9.11	1.40	14 000	21 000		0.012	Table 4	JR12x15x12,5
	15	21	16	13.30	1	**BK1516**	10.70	14.4	2.20	14 000	21 000		0.019	Table 4	JR12x15x16,5
	15	21	16	—	1	**HK1516**	10.70	14.4	2.20	14 000	21 000		0.018	Table 4	JR12x15x16,5
	15	21	22	19.30	1	**BK1522** [1]	13.50	19.4	2.95	14 000	21 000		0.022	Table 4	JR12x15x22,5
	15	21	22	—	1	**HK1522** [1]	13.50	19.4	2.95	14 000	21 000		0.024	Table 4	JR12x15x22,5
16	16	22	12	9.30	1	**BK1612**	7.76	9.72	1.50	14 000	21 000		0.016	Table 4	JR12x16x12
	16	22	12	—	1	**HK1612**	7.76	9.72	1.50	14 000	21 000		0.012	Table 4	JR12x16x12
	16	22	16	13.30	1	**BK1616**	11.1	15.3	2.35	14 000	21 000		0.02	Table 4	JR12x16x16
	16	22	16	—	1	**HK1616**	11.1	15.3	2.35	14 000	21 000		0.016	Table 4	JR12x16x16
	16	22	22	19.30	1	**BK1622** [1]	13.4	19.5	2.95	14 000	21 000		0.028	Table 4	JR12x16x22
	16	22	22	—	1	**HK1622** [1]	13.40	19.5	2.95	14 000	21 000		0.022	Table 4	JR12x16x22
17	17	23	12	9.30	1	**BK1712**	8.12	10.4	1.60	13 000	20 000		0.018	Table 4	
	17	23	12	—	1	**HK1712**	8.12	10.4	1.60	13 000	20 000		0.013	Table 4	
18	18	24	12	9.30	1	**BK1812**	8.41	11.11	1.70	12 000	18 000		0.017	Table 4	

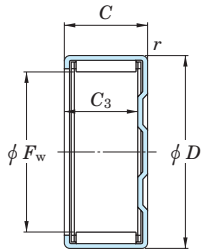
[Notes] 1) Drawn cup needle roller bearings with two needle roller and cage assemblies and one lubricating hole.
2) For the recommended mounting dimensions see Table 20.

Drawn cup needle roller bearings caged, open ends, closed one end metric series HK, BK series

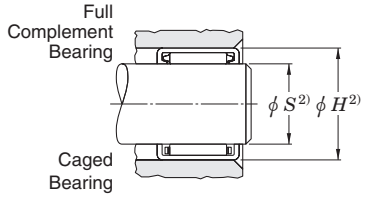
Shaft dia. (18) ~ (25) mm



HK



BK



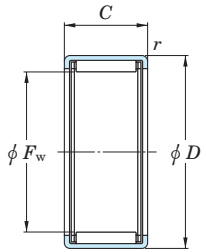
Shaft surface to be 58 HRC or equivalent

Shaft dia.	Boundary dimensions (mm) F_w	D	C $^{+0}_{-0.3}$	C_3 min.	r min.	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Limiting speeds (min^{-1}) Grease lub.	Oil lub.		(Refer.) Mass (kg)	Inspection gage	Mounting inner ring (pages B466 to B475)
18	18	24	12	—	1	**HK1812**	8.41	11.11	1.70	12 000	18 000		0.015	Table 4	
	18	24	16	13.30	1	**BK1816**	11.6	16.8	2.55	12 000	18 000		0.022	Table 4	JR15x18x16,5
	18	24	16	—	1	**HK1816**	11.6	16.8	2.55	12 000	18 000		0.018	Table 4	JR15x18x16,5
20	20	26	12	9.3	1	**BK2012**	8.97	12.5	1.90	11 000	16 000		0.017	Table 4	JR15x20x12
	20	26	12	—	1	**HK2012**	8.97	12.5	1.90	11 000	16 000		0.015	Table 4	JR15x20x12
	20	26	16	13.3	1	**BK2016**	12.40	18.90	2.85	11 000	16 000		0.024	Table 4	JR17x20x16,5
	20	26	16	—	1	**HK2016**	12.40	18.90	2.85	11 000	16 000		0.022	Table 4	JR17x20x16,5
	20	26	20	17.3	1	**BK2020**	15.50	25.30	3.95	11 000	16 000		0.027	Table 4	JR17x20x20,5
	20	26	20	—	1	**HK2020**	15.90	26.20	3.95	11 000	16 000		0.025	Table 4	JR17x20x20,5
	20	26	30	27.3	1	**BK2030** [1]	21.20	37.80	5.75	11 000	16 000		0.043	Table 4	JR17x20x30,5
	20	26	30	—	1	**HK2030** [1]	21.20	37.80	5.75	11 000	16 000		0.041	Table 4	JR17x20x30,5
22	22	28	10	8.4	1	**BK2210**	7.06	9.49	1.45	9 600	15 000		0.013	Table 4	
	22	28	10	—	1	**HK2210**	7.06	9.49	1.45	9 600	15 000		0.013	Table 4	
	22	28	12	9.3	1	**BK2212**	9.81	14.50	2.20	9 600	15 000		0.02	Table 4	JR17x22x13
	22	28	12	—	1	**HK2212**	9.81	14.50	2.20	9 600	15 000		0.015	Table 4	JR17x22x13
	22	28	16	13.3	1	**BK2216**	13.10	20.90	3.20	9 600	15 000		0.027	Table 4	JR17x22x16
	22	28	16	—	1	**HK2216**	13.10	20.90	3.20	9 600	15 000		0.022	Table 4	JR17x22x16
	22	28	20	17.3	1	**BK2220**	15.30	25.50	4.00	9 600	15 000		0.028	Table 4	JR17x22x23
	22	28	20	—	1	**HK2220**	15.30	25.50	4.00	9 600	15 000		0.026	Table 4	JR17x22x23
25	25	32	12	9.30	1	**BK2512**	10.90	14.70	2.25	8 500	13 000		0.025	Table 4	
	25	32	12	—	1	**HK2512**	10.90	14.70	2.25	8 500	13 000		0.021	Table 4	
	25	32	16	13.3	1	**BK2516**	15.60	23.50	3.55	8 500	13 000		0.031	Table 4	JR20x25x17
	25	32	16	—	1	**HK2516**	15.60	23.50	3.55	8 500	13 000		0.028	Table 4	JR20x25x17
	25	32	20	17.3	1	**BK2520**	20.60	33.40	5.30	8 500	13 000		0.043	Table 4	JR20x25x20,5
	25	32	20	—	1	**HK2520**	20.60	33.40	5.30	8 500	13 000		0.040	Table 4	JR20x25x20,5
	25	32	26	23.3	1	**BK2526**	25.70	44.40	6.95	8 500	13 000		0.051	Table 4	JR20x25x26,5
	25	32	26	—	1	**HK2526**	25.70	44.40	6.95	8 500	13 000		0.046	Table 4	JR20x25x26,5

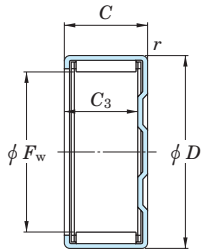
[Notes] 1) Drawn cup needle roller bearings with two needle roller and cage assemblies and one lubricating hole.
2) For the recommended mounting dimensions see Table 20.

Drawn cup needle roller bearings caged, open ends, closed one end metric series HK, BK series

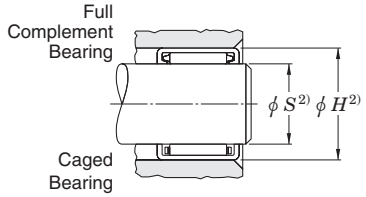
Shaft dia. (25) ~ (45) mm



HK



BK



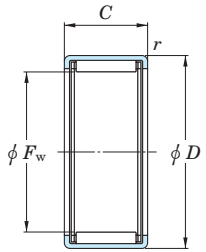
Shaft surface to be 58 HRC or equivalent

Shaft dia.	Boundary dimensions (mm) F_w	D	C +0 −0.3	C_3 min.	r min.	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Limiting speeds (min^{-1}) Grease lub.	Oil lub.		(Refer.) Mass (kg)	Inspection gage	Mounting inner ring (pages B466 to B475)
25	25	32	38	35.3	1	**BK2538** [1]	35.30	66.90	10.6	8 500	13 000		0.077	Table 4	JR20x25x38,5
	25	32	38	—	1	**HK2538** [1]	35.30	66.90	10.6	8 500	13 000		0.068	Table 4	JR20x25x38,5
28	28	35	16	13.30	1	**BK2816**	15.9	24.9	3.85	7 500	12 000		0.038	Table 4	JR22x28x17
	28	35	16	—	1	**HK2816**	15.9	24.9	3.85	7 500	12 000		0.032	Table 4	JR22x28x17
	28	35	20	17.3	1	**BK2820**	20.9	35.3	5.60	7 500	12 000		0.047	Table 4	JR22x28x20,5
	28	35	20	—	1	**HK2820**	20.9	35.3	5.60	7 500	12 000		0.040	Table 4	JR22x28x20,5
30	30	37	12	9.3	1	**BK3012**	11.6	16.8	2.90	7 000	11 000		0.031	Table 4	
	30	37	12	—	1	**HK3012**	12.0	17.7	2.70	7 000	11 000		0.024	Table 4	
	30	37	16	13.30	1	**BK3016**	16.8	27.3	4.20	7 000	11 000		0.041	Table 4	JR25x30x17
	30	37	16	—	1	**HK3016**	16.8	27.3	4.20	7 000	11 000		0.032	Table 4	JR25x30x17
	30	37	20	17.3	1	**BK3020**	22.4	39.6	6.25	7 000	11 000		0.053	Table 4	JR25x30x20,5
	30	37	20	—	1	**HK3020**	22.4	39.6	6.25	7 000	11 000		0.042	Table 4	JR25x30x20,5
	30	37	26	23.3	1	**BK3026**	27.4	51.2	7.95	7 000	11 000		0.067	Table 4	JR25x30x26,5
	30	37	26	—	1	**HK3026**	27.4	51.2	7.95	7 000	11 000		0.054	Table 4	JR25x30x26,5
	30	37	38	35.3	1	**BK3038** [1]	38.4	79.2	12.5	7 000	11 000		0.093	Table 4	JR25x30x38,5
	30	37	38	—	1	**HK3038** [1]	38.4	79.2	12.5	7 000	11 000		0.075	Table 4	JR25x30x38,5
35	35	42	12	—	1	**HK3512**	13.0	20.6	2.90	5 900	9 100		0.028	Table 4	
	35	42	16	—	1	**HK3516**	17.4	29.9	4.60	5 900	9 100		0.037	Table 4	JR30x35x17
	35	42	20	17.3	1	**BK3520**	24.5	46.8	7.40	5 900	9 100		0.065	Table 4	JR30x35x20,5
	35	42	20	—	1	**HK3520**	24.5	46.8	7.40	5 900	9 100		0.049	Table 4	JR30x35x20,5
40	40	47	12	—	1	**HK4012**	14.7	25.3	3.40	5 200	7 900		0.033	Table 4	
	40	47	16	—	1	**HK4016**	18.9	34.8	5.35	5 200	7 900		0.042	Table 4	JR35x40x17
	40	47	20	17.3	1	**BK4020**	25.1	50.4	8.00	5 200	7 900		0.070	Table 4	JR35x40x20,5
	40	47	20	—	1	**HK4020**	25.1	50.4	8.00	5 200	7 900		0.060	Table 4	JR35x40x20,5
45	45	52	12	—	1	**HK4512**	14.1	24.8	3.75	4 600	7 000		0.036	Table 4	

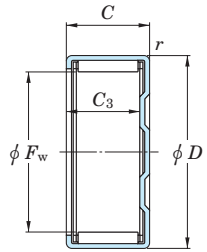
[Notes] 1) Drawn cup needle roller bearings with two needle roller and cage assemblies and one lubricating hole.
2) For the recommended mounting dimensions see Table 20.

Drawn cup needle roller bearings caged, open ends, closed one end metric series HK, BK series

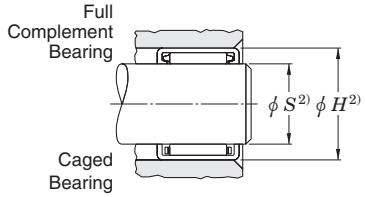
Shaft dia. (45) ~ 60 mm



HK



BK



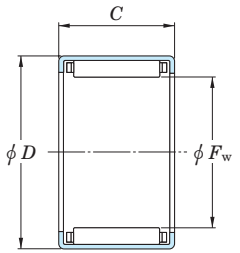
Shaft surface to be 58 HRC or equivalent

Shaft dia.	Boundary dimensions (mm) F_w	D	C $^{+0}_{-0.3}$	C_3 min.	r min.	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Limiting speeds (min^{-1}) Grease lub.	Oil lub.		(Refer.) Mass (kg)	Inspection gage	Mounting inner ring (pages B466 to B475)
45	45	52	16	—	1	**HK4516**	19.8	38.5	5.95	4 600	7 000		0.048	Table 4	JR40x45x17
	45	52	20	17.3	1	**BK4520**	26.3	55.4	8.80	4 600	7 000		0.079	Table 4	JR40x45x20,5
	45	52	20	—	1	**HK4520**	27.2	58.2	8.80	4 600	7 000		0.059	Table 4	JR40x45x20,5
50	50	58	12	—	1	**HK5012**	17.0	28.7	4.40	4 100	6 300		0.045	Table 4	
	50	58	20	—	1	**HK5020**	30.9	62.2	8.80	4 100	6 300		0.072	Table 4	JR45x50x20
	50	58	25	—	1	**HK5025**	35.5	74.1	11.7	4 100	6 300		0.092	Table 4	JR45x50x25,5
55	55	63	20	—	1	**HK5520**	31.0	64.4	10.0	3 700	5 700		0.079	Table 4	
60	60	68	12	—	1	**HK6012**	18.6	34.4	5.25	3 400	5 200		0.060	Table 4	
	60	68	20	—	1	**HK6020**	32.5	70.2	10.9	3 400	5 200		0.090	Table 4	

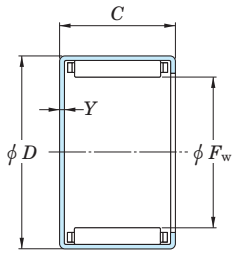
[Notes] 1) Drawn cup needle roller bearings with two needle roller and cage assemblies and one lubricating hole.
2) For the recommended mounting dimensions see Table 20.

Drawn cup needle roller bearings caged, open ends, closed one end inch series J, JH, MJ-1, MJH-1 series

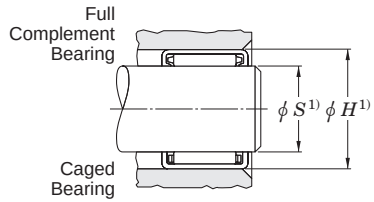
Shaft dia. $^1/_8 \sim {}^1/_2$ in (3.175 ~ 12.700 mm)



J, JH



MJ-1, MJH-1



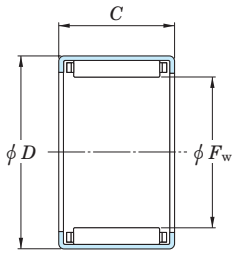
Shaft surface to be 58 HRC or equivalent

Shaft dia. (in)	Boundary dimensions (mm) F_w	D	C $^{+0}_{-0.3}$	Y max.	Bearing No. With open ends	With closed end	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Limiting speeds (min^{-1}) Grease lub.	Oil lub.	(Refer.) Mass (kg) With open ends	With closed end	Inspection gage
$^1/_8$	3.175	6.350	4.78	—	**JP-23-F**	—	0.90	0.61	0.100	33 000	51 000	0.001	—	Table 5
	3.175	6.350	6.35	—	**JP-24-F**	—	1.33	1.01	0.150	33 000	51 000	0.001	—	Table 5
$^5/_{32}$	3.970	7.142	4.78	—	**JP-2 1/2 3F**	—	0.91	0.62	0.110	31 000	47 000	0.001	—	Table 5
$^3/_{16}$	4.763	8.733	4.77	—	**JP-33-F**	—	1.07	0.73	0.120	25 000	38 000	0.001	—	Table 5
	4.763	8.733	6.35	—	**JP-34-F**	—	1.72	1.34	0.200	25 000	38 000	0.001	—	Table 5
	4.763	8.733	9.53	1.02	**J-36**	**MJ-361**	2.28	1.92	0.290	25 000	38 000	0.002	0.002	Table 5
$^1/_4$	6.350	11.113	7.92	1.02	**J-45**	**MJ-451**	2.21	1.74	0.300	20 000	30 000	0.003	0.003	Table 5
	6.350	11.113	11.13	1.02	**J-47**	**MJ-471**	3.40	3.01	0.450	20 000	30 000	0.004	0.004	Table 5
$^5/_{16}$	7.938	12.700	7.92	—	**J-55**	—	2.40	2.01	0.340	18 000	28 000	0.003	—	Table 5
	7.938	12.700	11.13	1.02	**J-57**	**MJ-571**	4.03	3.92	0.590	18 000	28 000	0.004	0.005	Table 5
	7.938	14.288	11.13	1.02	**JH-57**	**MJH-571**	4.65	3.76	0.570	14 000	22 000	0.006	0.007	Table 5
$^3/_8$	9.525	14.288	7.92	1.02	**J-65**	**MJ-651**	2.73	2.49	0.430	18 000	27 000	0.004	0.004	Table 5
	9.525	14.288	9.53	1.02	**J-66**	**MJ-661**	3.53	3.46	0.530	18 000	27 000	0.004	0.005	Table 5
	9.525	14.288	12.70	1.02	**J-68**	**MJ-681**	5.22	5.72	0.860	18 000	27 000	0.005	0.006	Table 5
	9.525	15.875	12.70	—	**JH-68**	—	6.59	6.08	0.920	13 000	20 000	0.008	—	Table 5
$^7/_{16}$	11.113	15.875	12.70	1.02	**J-78**	**MJ-781**	6.34	7.67	1.15	17 000	26 000	0.006	0.007	Table 5
	11.113	17.463	12.70	—	**JH-78**	—	7.10	6.89	1.05	13 000	19 000	0.009	—	Table 5
$^1/_2$	12.700	17.463	7.92	1.02	**J-85**	**MJ-851**	3.46	3.66	0.630	16 000	25 000	0.005	0.005	Table 5
	12.700	17.463	9.53	1.02	**J-86**	**MJ-861**	4.67	5.39	0.830	16 000	25 000	0.005	0.006	Table 5
	12.700	17.463	12.70	1.02	**J-88**	**MJ-881**	6.32	7.92	1.20	16 000	25 000	0.007	0.008	Table 5
	12.700	17.463	19.05	—	**J-812**	—	10.23	14.72	2.25	16 000	25 000	0.010	—	Table 5
	12.700	19.050	11.13	1.02	**JH-87**	**MJH-871**	6.39	6.20	0.950	12 000	19 000	0.009	0.010	Table 5
	12.700	19.050	12.70	1.02	**JH-88**	**MJH-881**	7.56	7.69	1.15	12 000	19 000	0.010	0.012	Table 5
	12.700	19.050	19.05	—	**JH-812**	—	12.32	14.41	2.25	12 000	19 000	0.015	—	Table 5

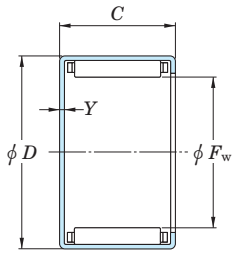
[Note] 1) For the recommended mounting dimensions see Table 21.

Drawn cup needle roller bearings caged, open ends, closed one end inch series J, JH, MJ-1, MJH-1 series

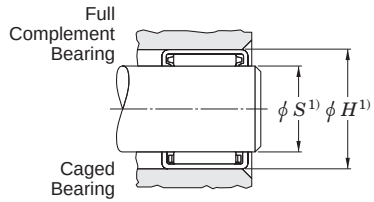
Shaft dia. $^{9}/_{16} \sim {}^{7}/_{8}$ in (14.288 ~ 22.225 mm)



J, JH



MJ-1, MJH-1



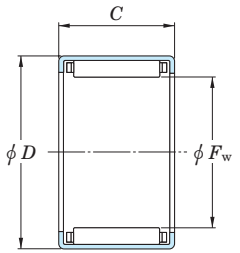
Shaft surface to be 58 HRC or equivalent

Shaft dia. (in)	Boundary dimensions (mm) F_w	D	C $^{+0}_{-0.3}$	Y max.	Bearing No. With open ends	With closed end	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u		Limiting speeds (min^{-1}) Grease lub.	Oil lub.	(Refer.) Mass (kg) With open ends	With closed end	Inspection gage
$^{9}/_{16}$	14.288	19.050	11.13	1.02	**J-97**	**MJ-971**	5.47	6.80	1.05		16 000	25 000	0.007	0.009	Table 5
	14.288	19.050	12.70	1.02	**J-98**	**MJ-981**	6.23	8.03	1.20		16 000	25 000	0.008	0.009	Table 5
	14.288	19.050	15.88	—	**J-910**	—	8.27	11.60	1.75		16 000	25 000	0.010	—	Table 5
	14.288	20.638	12.70	1.02	**JH-98**	**MJH-981**	7.98	8.49	1.30		12 000	18 000	0.011	0.014	Table 5
$^{5}/_{8}$	15.875	20.638	12.70	1.02	**J-108**	**MJ-1081**	6.71	9.13	1.40		13 000	21 000	0.009	0.010	Table 5
	15.875	20.638	15.88	1.02	**J-1010**	**MJ-10101**	8.80	12.94	1.95		13 000	21 000	0.010	0.013	Table 5
	15.875	20.638	19.05	1.02	**J-1012**	**MJ-10121**	11.80	18.86	2.90		13 000	21 000	0.013	0.015	Table 5
	15.875	22.212	15.88	1.02	**JH-1010**	**MJH-10101**	11.57	14.10	2.15		14 000	21 000	0.015	0.017	Table 5
	15.875	22.212	25.40	1.02	**JH-1016**	**MJH-10161**	19.79	28.11	4.35		14 000	21 000	0.024	0.028	Table 5
$^{11}/_{16}$	17.463	22.212	19.05	1.02	**J-1112**	**MJ-11121**	12.46	20.91	3.20		12 000	19 000	0.014	0.016	Table 5
	17.463	23.813	15.88	1.02	**JH-1110**	**MJH-11101**	12.05	15.21	2.30		13 000	19 000	0.016	0.019	Table 5
	17.463	23.813	19.05	—	**JH-1112**	—	16.10	22.20	3.10		13 000	19 000	0.019	—	Table 5
$^{3}/_{4}$	19.050	25.400	9.53	—	**J-126**	—	6.49	7.05	1.10		11 000	18 000	0.010	—	Table 5
	19.050	25.400	12.70	—	**J-128**	—	9.94	12.19	1.85		11 000	18 000	0.014	—	Table 5
	19.050	25.400	15.88	1.02	**J-1210**	**MJ-12101**	12.50	16.32	2.50		11 000	18 000	0.017	0.020	Table 5
	19.050	25.400	19.05	1.02	**J-1212**	**MJ-12121**	15.52	21.62	3.35		11 000	18 000	0.020	0.025	Table 5
	19.050	26.988	19.05	1.02	**JH-1212**	**MJH-12121**	19.08	23.58	3.70		12 000	18 000	0.026	0.031	Table 5
$^{13}/_{16}$	20.638	26.988	22.23	—	**J-1314**	—	19.31	29.31	4.55		10 000	16 000	0.025	—	Table 5
	20.638	28.575	19.05	1.27	**JH-1312**	**MJH-13121**	18.77	24.50	3.85		11 000	16 000	0.028	0.034	Table 5
$^{7}/_{8}$	22.225	28.575	9.53	—	**J-146**	—	7.20	8.43	1.30		9 700	15 000	0.012	—	Table 5
	22.225	28.575	12.70	—	**J-148**	—	10.94	14.50	2.20		9 700	15 000	0.015	—	Table 5
	22.225	28.575	19.05	1.02	**J-1412**	**MJ-14121**	17.88	27.18	4.20		9 700	15 000	0.024	0.028	Table 5
	22.225	28.575	25.40	1.02	**J-1416**	**MJ-14161**	23.66	38.97	6.05		9 700	15 000	0.031	0.059	Table 5
	22.225	30.163	19.05	1.27	**JH-1412**	**MJH-14121**	18.33	24.50	3.75		9 800	15 000	0.030	0.036	Table 5
	22.225	30.163	25.40	1.27	**JH-1416**	**MJH-14161**	25.40	37.37	5.80		9 800	15 000	0.040	0.048	Table 5

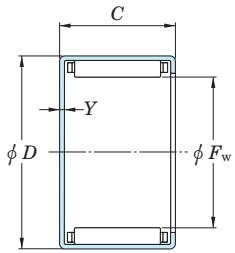
[Note] 1) For the recommended mounting dimensions see Table 21.

Drawn cup needle roller bearings caged, open ends, closed one end inch series J, JH, MJ-1, MJH-1 series

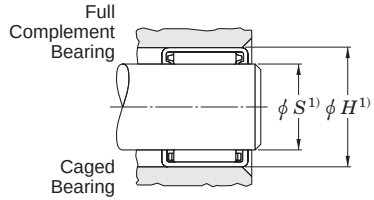
Shaft dia. 1 ~ (1 3/4) in (25.400 ~ (44.450) mm)



J, JH



MJ-1, MJH-1



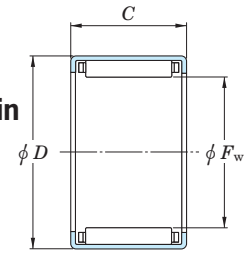
Shaft surface to be 58 HRC or equivalent

Shaft dia. (in)	Boundary dimensions (mm) F_w	D	C $^{+0}_{-0.3}$	Y max.	Bearing No. With open ends	With closed end	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Limiting speeds (min^{-1}) Grease lub.	Oil lub.	(Refer.) Mass (kg) With open ends	With closed end	Inspection gage
1	25.400	31.750	19.05	—	**J-1612**	—	18.15	28.82	4.45	8 400	13 000	0.026	—	Table 5
	25.400	31.750	25.40	1.02	**J-1616**	**MJ-16161**	24.95	43.41	6.75	8 400	13 000	0.035	0.042	Table 5
	25.400	33.338	19.05	1.27	**JH-1612**	**MJH-16121**	20.68	29.58	4.60	8 500	13 000	0.034	0.040	Table 5
	25.400	33.338	25.40	1.27	**JH-1616**	**MJH-16161**	27.58	42.88	6.65	8 500	13 000	0.045	0.054	Table 5
1 1/8	28.575	34.925	12.70	1.02	**J-188**	**MJ-1881**	11.65	16.95	2.55	7 400	11 000	0.020	0.023	Table 5
	28.575	34.925	19.05	1.02	**J-1812**	**MJ-18121**	19.04	31.76	4.90	7 400	11 000	0.029	0.035	Table 5
	28.575	34.925	25.40	1.02	**J-1816**	**MJ-18161**	26.16	48.04	7.40	7 400	11 000	0.039	0.047	Table 5
	28.575	38.100	19.05	1.27	**JH-1812**	**MJH-18121**	23.35	31.32	4.75	7 600	12 000	0.046	0.055	Table 5
	28.575	38.100	25.40	1.27	**JH-1816**	**MJH-18161**	33.14	49.38	7.70	7 600	12 000	0.061	0.074	Table 5
	28.575	38.100	28.58	1.27	**JH-1818**	**MJH-18181**	36.30	55.16	8.60	7 600	12 000	0.069	0.082	Table 5
1 1/4	31.750	38.100	19.05	1.02	**J-2012**	**MJ-20121**	19.84	34.70	5.35	6 600	10 000	0.036	0.043	Table 5
	31.750	38.100	25.40	1.02	**J-2016**	**MJ-20161**	28.82	56.49	8.70	6 600	10 000	0.043	0.051	Table 5
	31.750	41.275	19.05	—	**JH-2012**	—	24.11	33.94	5.80	6 800	10 000	0.050	—	Table 5
	31.750	41.275	25.40	—	**JH-2016**	—	33.94	52.93	8.20	6 800	10 000	0.067	—	Table 5
	31.750	41.275	31.75	—	**JH-2020**	—	43.37	72.51	10.8	6 800	10 000	0.084	—	Table 5
1 3/8	34.925	41.275	12.70	1.02	**J-228**	**MJ-2281**	13.97	22.91	3.50	6 000	9 200	0.024	0.028	Table 5
	34.925	41.275	19.05	—	**J-2212**	—	22.82	42.97	6.65	6 000	9 200	0.035	—	Table 5
	34.925	44.450	19.05	1.27	**JH-2212**	**MJH-22121**	26.24	38.43	5.90	6 100	9 400	0.055	0.065	Table 5
	34.925	44.450	25.40	1.27	**JH-2216**	**MJH-22161**	36.52	58.72	9.20	6 100	9 400	0.073	0.087	Table 5
1 1/2	38.100	47.625	19.05	1.27	**J-2412**	**MJ-24121**	29.89	47.15	7.40	5 600	8 600	0.059	0.094	Table 5
	38.100	47.625	25.40	1.27	**J-2416**	**MJ-24161**	39.32	66.72	10.4	5 600	8 600	0.079	0.094	Table 5
	38.100	47.625	31.75	—	**J-2420**	—	49.38	89.85	14.0	5 600	8 600	0.099	—	Table 5
1 5/8	41.275	50.800	15.88	—	**J-2610**	—	26.11	40.97	6.25	5 100	7 900	0.053	—	Table 5
	41.275	50.800	25.40	1.27	**J-2616**	**M-26161**	39.28	68.95	10.8	5 100	7 900	0.085	0.101	Table 5
1 3/4	44.450	53.975	19.05	1.27	**J-2812**	**MJ-28121**	29.58	49.38	7.45	4 700	7 300	0.068	0.081	Table 5

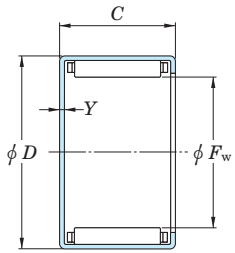
[Note] 1) For the recommended mounting dimensions see Table 21.

Drawn cup needle roller bearings caged, open ends, closed one end inch series J, JH, MJ-1, MJH-1 series

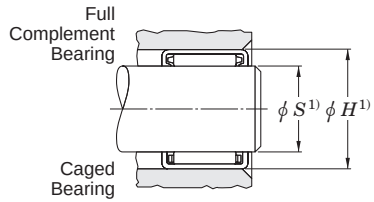
Shaft dia. (1 3/4) ~ 2 3/4 in ((44.450) ~ 69.850 mm)



J, JH



MJ-1, MJH-1



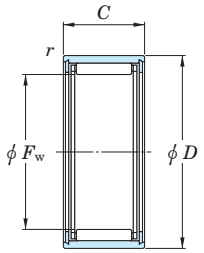
Shaft surface to be 58 HRC or equivalent

Shaft dia. (in)	Boundary dimensions (mm) F_w	D	C $^{+0}_{-0.3}$	Y max.	Bearing No. With open ends	With closed end	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u		Limiting speeds (min^{-1}) Grease lub.	Oil lub.	(Refer.) Mass (kg) With open ends	With closed end	Inspection gage
1 3/4	44.450	53.975	25.40	1.27	**J-2816**	**MJ-28161**	40.08	72.95	11.4		4 700	7 300	0.091	0.108	Table 5
	44.450	53.975	38.10	1.27	**J-2824**	**MJ-28241**	59.61	121.88	18.9		4 700	7 300	0.136	0.162	Table 5
1 7/8	47.625	57.150	25.40	1.27	**J-3016**	**MJ-30161**	41.10	76.06	11.9		4 400	6 800	0.097	0.115	Table 5
2	50.800	60.325	25.40	1.27	**J-3216**	**MJ-32161**	42.39	81.40	12.7		4 100	6 300	0.103	0.137	Table 5
2 1/4	57.150	66.675	19.05	—	**J-3612**	—	35.41	65.83	10.0		3 600	5 600	0.086	—	Table 5
	57.150	66.675	25.40	—	**J-3616**	—	46.26	92.52	14.4		3 600	5 600	0.114	—	Table 5
2 3/4	69.850	79.375	19.05	—	**J-4412**	—	36.25	72.95	11.3		2 900	4 500	0.103	—	Table 5

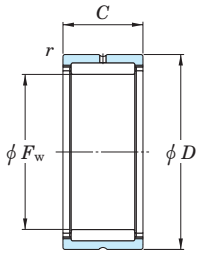
[Note] 1) For the recommended mounting dimensions see Table 21.

Heavy-duty needle roller bearings without inner rings metric series NK, NKS, RNA48, RNA49 RNA69, NKTN series

Shaft dia. 5 ~ (17) mm



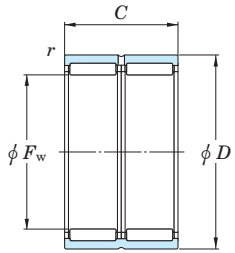
NK ($\phi F_w \leq 10$)



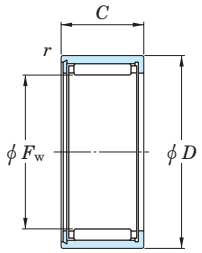
NK ($\phi F_w \geq 12$), NKS, RNA48, RNA49, RNA69 ($\phi F_w \leq 35$)

Shaft dia.	Boundary dimensions (mm) F_w	D	C	r min.	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Limiting speeds (min^{-1}) Grease lub.	Oil lub.	(Refer.) Mass (kg)
5	5	10	10	0.2	NK5/10TN	2.18	1.71	0.260	31 000	47 000	0.004
	5	10	12	0.2	NK5/12TN	3.04	2.63	0.400	31 000	47 000	0.004
6	6	12	10	0.2	NK6/10	3.19	2.90	0.420	29 000	44 000	0.005
	6	12	12	0.2	NK6/12TN	3.07	2.74	0.420	29 000	44 000	0.006
7	7	14	10	0.3	NK7/10TN	2.74	2.44	0.370	28 000	42 000	0.007
	7	14	12	0.3	NK7/12TN	3.40	3.22	0.490	28 000	42 000	0.009
8	8	15	12	0.3	NK8/12	4.57	4.89	0.740	26 000	41 000	0.011
	8	15	12	0.3	NK8/12ASR1	4.57	4.89	0.740	26 000	41 000	0.011
	8	15	16	0.3	NK8/16	5.22	5.78	0.880	26 000	41 000	0.013
9	9	16	12	0.3	NK9/12	4.27	4.60	0.700	26 000	40 000	0.012
	9	16	16	0.3	NK9/16	5.57	6.47	0.980	26 000	40 000	0.015
10	10	17	12	0.3	NK10/12	5.40	6.43	0.980	25 000	39 000	0.013
	10	17	16	0.3	NK10/16TN	5.30	6.27	0.940	25 000	39 000	0.015
12	12	19	12	0.3	NK12/12	6.86	7.60	1.15	19 000	30 000	0.013
	12	19	16	0.3	NK12/16	6.78	9.03	1.40	24 000	37 000	0.018
14	14	22	13	0.3	RNA4900	9.39	10.3	1.55	16 000	24 000	0.018
	14	22	16	0.3	NK14/16	12.4	14.8	2.25	16 000	24 000	0.023
	14	22	20	0.3	NK14/20	14.7	18.4	2.90	16 000	24 000	0.028
15	15	23	16	0.3	NK15/16	12.4	15.0	2.30	15 000	24 000	0.024
	15	23	20	0.3	NK15/20	14.7	18.6	2.95	15 000	24 000	0.031
16	16	24	13	0.3	RNA4901	10.5	12.3	1.85	18 000	28 000	0.020
	16	24	16	0.3	NK16/16	15.4	20.2	2.50	18 000	28 000	0.025
	16	24	20	0.3	NK16/20	16.1	21.3	3.20	18 000	28 000	0.036
	16	24	22	0.3	RNA6901	16.1	21.3	3.30	18 000	28 000	0.036
17	17	25	16	0.3	NK17/16	13.6	17.5	2.70	17 000	27 000	0.027

Shaft dia. (17) ~ 25 mm



RNA69 ($\phi F_w \geq 40$)

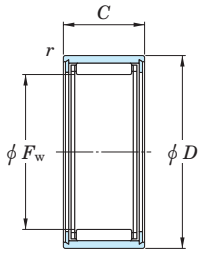


NKTN

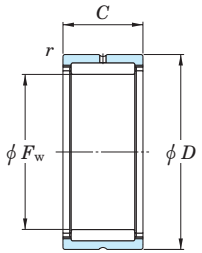
Shaft dia.	Boundary dimensions (mm) F_w	D	C	r min.	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Limiting speeds (min^{-1}) Grease lub.	Oil lub.	(Refer.) Mass (kg)
17	17	25	20	0.3	NK17/20	15.4	20.4	3.25	17 000	27 000	0.034
18	18	26	16	0.3	NK18/16	13.6	17.7	2.70	16 000	25 000	0.028
	18	26	20	0.3	NK18/20	16.1	22.0	3.50	16 000	25 000	0.035
19	19	27	16	0.3	NK19/16	14.1	19.0	2.90	15 000	24 000	0.029
	19	27	20	0.3	NK19/20	18.8	23.6	3.75	15 000	24 000	0.037
	19	30	16	0.3	NKS18	15.9	16.2	2.45	17 000	26 000	0.045
20	20	28	13	0.3	RNA4902	11.8	15.3	2.35	14 000	22 000	0.023
	20	28	16	0.3	NK20/16	14.1	19.1	2.90	14 000	22 000	0.030
	20	28	20	0.3	NK20/20	17.5	25.3	4.00	14 000	22 000	0.038
	20	28	23	0.3	RNA6902	18.4	26.9	4.20	14 000	22 000	0.042
	20	32	20	0.6	NKS20	24.4	26.7	4.30	15 000	24 000	0.058
21	21	29	16	0.3	NK21/16	15.3	21.6	3.30	14 000	21 000	0.032
	21	29	20	0.3	NK21/20	18.1	26.9	4.25	14 000	21 000	0.040
22	22	30	13	0.3	RNA4903	12.2	16.4	2.50	13 000	20 000	0.025
	22	30	16	0.3	NK22/16	15.2	21.7	3.30	13 000	20 000	0.033
	22	30	20	0.3	NK22/20	18.0	27.0	4.30	13 000	20 000	0.041
	22	30	23	0.3	RNA6903	19.8	30.6	4.75	13 000	20 000	0.056
	22	35	20	0.6	NKS22	22.9	27.1	4.30	14 000	21 000	0.069
24	24	32	16	0.3	NK24/16	16.2	24.3	3.70	12 000	18 000	0.035
	24	32	20	0.3	NK24/20	19.3	30.3	4.80	12 000	18 000	0.045
	24	37	20	0.6	NKS24	29.1	32.8	5.30	13 000	20 000	0.073
25	25	33	16	0.3	NK25/16	16.1	24.4	3.75	11 000	17 000	0.037
	25	33	20	0.3	NK25/20	19.1	30.4	4.80	11 000	17 000	0.047
	25	37	17	0.3	RNA4904	21.3	25.5	3.95	12 000	18 000	0.061
	25	37	30	0.3	RNA6904	36.6	51.0	7.95	12 000	18 000	0.091
	25	38	20	0.6	NKS25	29.1	33.0	5.30	12 000	19 000	0.076

Heavy-duty needle roller bearings without inner rings metric series NK, NKS, RNA48, RNA49 RNA69, NKTN series

Shaft dia. 26 ~ 37 mm



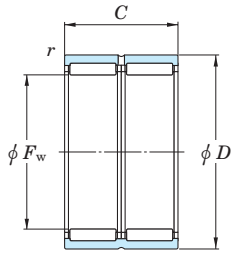
NK ($\phi F_w \leq 10$)



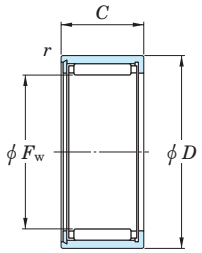
NK ($\phi F_w \geq 12$), NKS, RNA48, RNA49, RNA69 ($\phi F_w \leq 35$)

Shaft dia.	Boundary dimensions (mm) F_w	D	C	r min.	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Limiting speeds (min^{-1}) Grease lub.	Oil lub.	(Refer.) Mass (kg)
26	26	34	16	0.3	**NK26/16**	16.6	25.7	3.95	11 000	17 000	0.039
	26	34	20	0.3	**NK26/20**	19.7	32.0	5.05	11 000	17 000	0.048
28	28	37	20	0.3	**NK28/20**	22.6	34.4	5.50	10 000	16 000	0.057
	28	37	30	0.3	**NK28/30**	29.0	53.8	8.30	10 000	16 000	0.088
	28	39	17	0.3	**RNA49/22**	23.3	29.6	4.55	10 000	16 000	0.059
	28	39	30	0.3	**RNA69/22**	30.6	50.7	3.95	10 000	16 000	0.107
	28	42	20	0.6	**NKS28**	30.3	38.4	6.15	11 000	16 000	0.094
29	29	38	20	0.3	**NK29/20**	23.4	36.4	5.80	9 800	15 000	0.059
	29	38	30	0.3	**NK29/30**	29.8	56.4	8.70	9 700	15 000	0.090
30	30	40	20	0.3	**NK30/20**	24.2	38.3	6.10	9 500	15 000	0.071
	30	40	30	0.3	**NK30/30**	34.7	61.0	9.45	9 500	15 000	0.107
	30	42	17	0.3	**RNA4905**	24.3	31.7	4.90	9 700	15 000	0.071
	30	42	30	0.3	**RNA6905**	39.7	59.6	9.30	9 700	15 000	0.127
	30	45	20	0.6	**NKS30**	34.3	42.8	6.85	9 900	15 000	0.114
32	32	42	20	0.3	**NK32/20**	24.8	40.4	6.45	8 800	14 000	0.074
	32	42	30	0.3	**NK32/30**	35.6	64.3	9.95	8 800	14 000	0.112
	32	45	17	0.3	**RNA49/28**	25.1	33.8	5.20	9 000	14 000	0.080
	32	45	30	0.3	**RNA69/28**	43.2	62.5	9.75	9 100	14 000	0.140
	32	47	22	0.6	**NKS32**	36.0	46.2	7.40	9 200	14 000	0.120
35	35	45	20	0.3	**NK35/20**	26.1	44.4	7.05	8 000	12 000	0.081
	35	45	30	0.3	**NK35/30**	37.4	70.6	11.0	8 000	12 000	0.122
	35	47	18	0.3	**RNA4906**	25.9	36.0	5.55	8 200	13 000	0.081
	35	47	30	0.3	**RNA6906**	42.6	68.2	10.6	8 200	13 000	0.148
	35	50	22	0.6	**NKS35**	37.5	49.9	8.00	8 400	13 000	0.130
37	37	47	20	0.3	**NK37/20**	26.6	46.4	7.40	7 600	12 000	0.084
	37	47	30	0.3	**NK37/30**	38.2	73.9	11.5	7 600	12 000	0.128
	37	52	22	0.6	**NKS37**	39.0	53.4	8.55	7 900	12 000	0.134

Shaft dia. 38 ~ 52 mm



RNA69 ($\phi F_w \geq 40$)

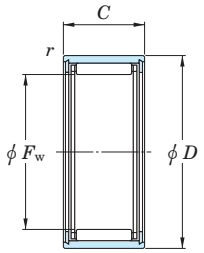


NKTN

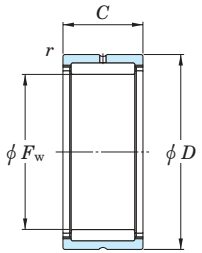
Shaft dia.	Boundary dimensions (mm) F_w	D	C	r min.	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Limiting speeds (min^{-1}) Grease lub.	Oil lub.	(Refer.) Mass (kg)
38	38	48	20	0.3	**NK38/20**	21.7	40.9	6.40	7 300	11 000	0.087
	38	48	30	0.3	**NK38/30**	31.9	67.0	10.4	7 300	11 000	0.131
40	40	50	20	0.3	**NK40/20**	27.8	50.4	8.05	7 000	11 000	0.089
	40	50	30	0.3	**NK40/30**	40.0	80.2	12.4	7 000	11 000	0.137
	40	52	20	0.6	**RNA49/32**	32.0	49.3	7.85	7 100	11 000	0.100
	40	52	36	0.6	**RNA69/32**	48.6	84.5	26.1	7 100	11 000	0.185
	40	55	22	0.6	**NKS40**	40.3	57.0	9.15	7 200	11 000	0.140
42	42	52	20	0.3	**NK42/20**	28.3	52.4	8.35	6 600	10 000	0.085
	42	52	30	0.3	**NK42/30**	40.7	83.5	13.0	6 600	10 000	0.141
	42	55	20	0.6	**RNA4907**	32.8	51.7	8.25	6 700	10 000	0.114
	42	55	36	0.6	**RNA6907**	49.9	88.7	13.7	6 700	10 000	0.218
43	43	53	20	0.3	**NK43/20**	29.0	54.4	8.65	6 400	9 900	0.096
	43	53	30	0.3	**NK43/30**	41.6	86.6	13.4	6 400	9 900	0.134
	43	58	22	0.6	**NKS43**	41.6	60.7	9.75	6 700	10 000	0.150
45	45	55	20	0.3	**NK45/20**	29.5	56.4	9.00	6 100	9 400	0.100
	45	55	30	0.3	**NK45/30**	42.3	89.8	13.9	6 100	9 400	0.151
	45	60	22	0.6	**NKS45**	43.0	64.2	10.3	6 400	9 800	0.156
47	47	57	20	0.3	**NK47/20**	30.0	58.5	9.30	5 900	9 000	0.104
	47	57	30	0.3	**NK47/30**	43.0	93.1	14.4	5 900	9 000	0.158
48	48	62	22	0.6	**RNA4908**	44.2	67.8	10.9	5 900	9 100	0.154
	48	62	40	0.6	**RNA6908**	70.8	124	19.8	5 900	9 100	0.300
50	50	62	25	0.3	**NK50/25**	40.7	79.3	12.5	5 500	8 500	0.171
	50	62	35	0.6	**NK50/35**	55.0	117	18.2	5 500	8 500	0.242
	50	65	22	1	**NKS50**	45.5	71.3	11.4	5 700	8 700	0.170
52	52	68	22	0.6	**RNA4909**	46.8	74.8	12.0	5 400	8 400	0.201
	52	68	40	0.6	**RNA6909**	74.7	137	21.7	5 400	8 400	0.392

Heavy-duty needle roller bearings without inner rings metric series NK, NKS, RNA48, RNA49 RNA69, NKTN series

Shaft dia. 55 ~ (75) mm



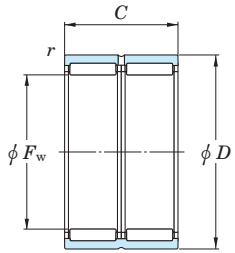
NK ($\phi F_w \leq 10$)



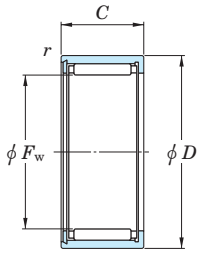
NK ($\phi F_w \geq 12$), NKS, RNA48, RNA49, RNA69 ($\phi F_w \leq 35$)

Shaft dia.	Boundary dimensions (mm) F_w	D	C	r min.	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Limiting speeds (min^{-1}) Grease lub.	Oil lub.	(Refer.) Mass (kg)
55	55	68	25	0.6	**NK55/25**	46.1	87.3	13.9	5 000	7 800	0.207
	55	68	35	0.6	**NK55/35**	62.3	129	20.0	5 000	7 800	0.293
	55	72	22	1	**NKS55**	47.9	78.4	12.6	5 100	7 900	0.225
58	58	72	22	0.6	**RNA4910**	48.9	82.0	13.2	4 800	7 400	0.179
	58	72	40	0.6	**RNA6910**	75.7	144	22.8	4 800	7 400	0.364
60	60	72	25	0.6	**NK60/25**	44.3	94.0	14.9	4 400	7 000	0.202
	60	72	35	0.6	**NK60/35**	59.9	139	21.5	4 400	7 000	0.286
	60	80	28	1.1	**NKS60**	66.9	103	16.5	4 800	7 300	0.337
63	63	80	25	1	**RNA4911**	62.0	107	17.1	4 500	6 900	0.285
	63	80	45	1	**RNA6911**	94.2	172	27.8	4 500	6 900	0.540
65	65	78	25	0.6	**NK65/25**	48.2	97.7	15.5	4 200	6 500	0.257
	65	78	35	0.6	**NK65/35**	65.2	144	22.4	4 200	6 500	0.298
	65	85	28	1.1	**NKS65**	71.0	114	18.3	4 200	6 700	0.362
68	68	82	25	0.6	**NK68/25**	49.0	101	16.1	4 000	6 200	0.287
	68	82	35	0.6	**NK68/35**	66.2	149	23.2	4 000	6 200	0.350
	68	85	25	1	**RNA4912**	64.8	116	18.6	4 100	6 300	0.304
	68	85	45	1	**RNA6912**	99.3	189	30.5	4 100	6 300	0.546
70	70	85	25	0.6	**NK70/25**	43.6	87.9	16.6	3 900	6 000	0.298
	70	85	35	0.6	**NK70/35**	62.2	139	24.0	3 900	6 000	0.411
	70	90	28	1.1	**NKS70**	72.6	120	19.3	4 000	6 200	0.383
72	72	90	25	1	**RNA4913**	66.0	121	19.4	3 900	5 900	0.346
	72	90	45	1	**RNA6913**	107	213	34.5	3 900	5 900	0.679
73	73	90	25	0.6	**NK73/25**	61.5	119	19.0	3 800	5 800	0.320
	73	90	35	0.6	**NK73/35**	82.5	173	27.1	3 800	5 800	0.450
75	75	92	25	0.6	**NK75/25**	43.7	90.2	19.0	3 600	5 600	0.364
	75	92	35	0.6	**NK75/35**	60.9	138	27.1	3 600	5 600	0.518

Shaft dia. (75) ~ 110 mm



RNA69 ($\phi F_w \geq 40$)

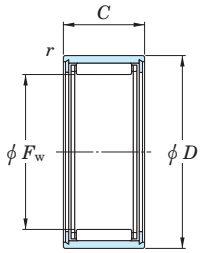


NKTN

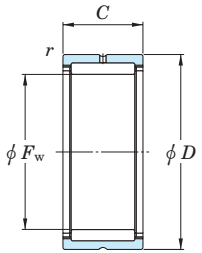
Shaft dia.	Boundary dimensions (mm) F_w	D	C	r min.	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Limiting speeds (min^{-1}) Grease lub.	Oil lub.	(Refer.) Mass (kg)
75	75	95	28	1.1	**NKS75**	76.5	132	21.1	3 700	5 800	0.413
80	80	95	25	1	**NK80/25**	65.0	131	21.0	3 400	5 300	0.331
	80	95	35	1	**NK80/35**	79.7	184	28.7	3 400	5 300	0.380
	80	100	30	1	**RNA4914**	86.3	157	25.1	3 500	5 400	0.502
	80	100	54	1	**RNA6914**	137	286	45.7	3 500	5 400	0.946
85	85	105	25	1	**NK85/25**	76.4	137	22.2	3 300	5 000	0.506
	85	105	30	1	**RNA4915**	92.4	175	28.0	3 300	5 000	0.528
	85	105	35	1	**NK85/35**	108	214	34.7	3 300	5 000	0.610
	85	105	54	1	**RNA6915**	143	308	49.3	3 300	5 000	1.020
90	90	110	25	1	**NK90/25**	79.5	147	23.8	3 100	4 700	0.450
	90	110	30	1	**RNA4916**	91.5	176	28.1	3 100	4 700	0.556
	90	110	35	1	**NK90/35**	113	230	36.1	3 100	4 700	0.745
	90	110	54	1	**RNA6916**	126	320	50.8	3 100	4 700	1.050
95	95	115	26	1	**NK95/26**	49.3	114	24.6	2 800	4 400	0.572
	95	115	36	1	**NK95/36**	114	238	37.3	2 900	4 500	0.803
100	100	120	26	1	**NK100/26**	83.6	163	25.8	2 800	4 200	0.530
	100	120	35	1.1	**RNA4917**	110	230	36.0	2 800	4 200	0.715
	100	120	36	1	**NK100/36**	118	254	39.1	2 800	4 200	0.658
	100	120	63	1.1	**RNA6917**	150	416	63.0	2 800	4 200	1.350
105	105	125	26	1	**NK105/26**	52.2	127	19.9	2 600	3 900	0.595
	105	125	35	1.1	**RNA4918**	114	245	37.8	2 600	4 000	0.746
	105	125	63	1.1	**RNA6918**	154	437	66.0	2 600	4 000	1.500
110	110	130	30	1.1	**NK110/30**	103	220	33.6	2 500	3 800	0.660
	110	130	35	1.1	**RNA4919**	115	253	38.4	2 500	3 800	0.777
	110	130	40	1.1	**NK110/40**	132	301	45.7	2 500	3 800	0.900
	110	130	63	1.1	**RNA6919**	158	458	68.8	2 500	3 800	1.470

Heavy-duty needle roller bearings without inner rings metric series NK, NKS, RNA48, RNA49 RNA69, NKTN series

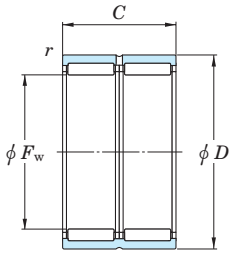
Shaft dia. 115 ~ 175 mm



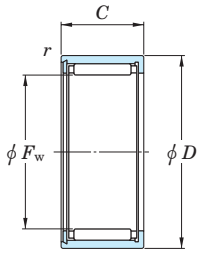
NK ($\phi F_w \leq 10$)



NK ($\phi F_w \geq 12$), NKS, RNA48, RNA49, RNA69 ($\phi F_w \leq 35$)



RNA69 ($\phi F_w \geq 40$)

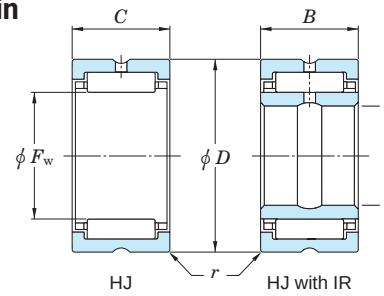


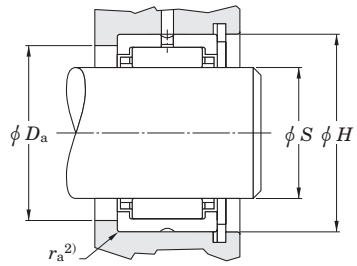
NKTN

Shaft dia.	Boundary dimensions (mm) F_w	D	C	r min.	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Limiting speeds (min^{-1}) Grease lub.	Oil lub.	(Refer.) Mass (kg)
115	115	140	40	1.1	**RNA4920**	139	296	43.9	2 400	3 700	1.220
120	120	140	30	1	**RNA4822**	90.3	230	33.7	2 300	3 500	0.785
125	125	150	40	1.1	**RNA4922**	147	325	47.0	2 200	3 400	1.320
130	130	150	30	1	**RNA4824**	94.1	249	35.7	2 100	3 200	0.850
135	135	165	45	1.1	**RNA4924**	177	407	58.5	2 000	3 100	1.980
145	145	165	35	1	**RNA4826**	112	323	44.8	1 900	2 900	1.100
150	150	180	50	1.5	**RNA4926**	201	495	68.7	1 800	2 800	2.420
155	155	175	35	1.1	**RNA4828**	116	346	47.1	1 700	2 700	1.170
160	160	190	50	1.5	**RNA4928**	214	549	74.8	1 700	2 600	2.560
165	165	190	40	1.1	**RNA4830**	142	402	53.5	1 600	2 500	1.540
175	175	200	40	1.1	**RNA4832**	146	425	55.6	1 500	2 400	1.910

HJ type

Shaft dia. 5/8 ~ (1 3/4) in (15.875 ~ (44.450) mm)



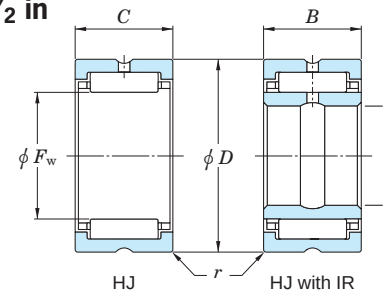


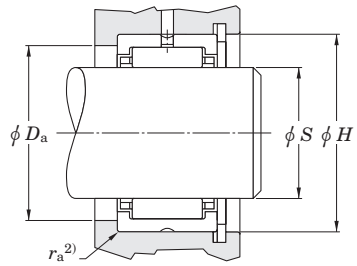
Shaft surface to be 58 HRC or equivalent

Shaft dia. (in)	Boundary dimensions (mm) F_w	D	C (B)	r min.	Bearing No.	Used with inner ring No. 1)	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Limiting speeds (min^{-1}) Grease lub.	Oil lub.	(Refer.) Mass (kg)	Recommended dimensions Clearance fit S (h6) max.	min.	H (H7) max.	min.	Tight transition fit S (f6) max.	min.	H (N7) max.	min.	Shoulder dia. D_a ±0.38
5/8	15.875	28.575	19.050	0.64	HJ-101812	IR-061012	19.3	20.7	3.25	20 000	30 000	0.050	15.875	15.865	28.595	28.575	15.860	15.850	28.567	28.547	23.83
3/4	19.050	31.750	19.050	1.02	HJ-122012	IR-081212	20.7	23.3	3.65	16 000	25 000	0.059	19.050	19.037	31.775	31.750	19.030	19.017	31.742	31.717	26.97
	19.050	31.750	25.400	1.02	HJ-122016	IR-081216	27.5	33.7	5.30	16 000	25 000	0.077	19.050	19.037	31.775	31.750	19.030	19.017	31.742	31.717	26.97
7/8	22.225	34.925	19.050	1.02	HJ-142212	IR-101412	23	27.9	4.35	13 000	21 000	0.064	22.225	22.212	34.950	34.925	22.205	22.192	34.917	34.892	30.18
	22.225	34.925	25.400	1.02	HJ-142216	IR-101416	30.7	40.3	6.35	13 000	21 000	0.086	22.225	22.212	34.950	34.925	22.205	22.192	34.917	34.892	30.18
1	25.400	38.100	19.050	1.02	HJ-162412	IR-121612	25.3	32.5	5.10	12 000	18 000	0.073	25.400	25.387	38.125	38.100	25.380	25.367	38.092	38.067	33.32
	25.400	38.100	25.400	1.02	HJ-162416	IR-121616	33.6	47.2	7.40	12 000	18 000	0.095	25.400	25.387	38.125	38.100	25.380	25.367	38.092	38.067	33.32
	25.400	38.100	25.400	1.02	HJ-162416	IR-131616	33.6	47.2	7.40	12 000	18 000	0.095	25.400	25.387	38.125	38.100	25.380	25.367	38.092	38.067	33.32
1 1/8	28.575	41.275	25.400	1.02	HJ-182616	IR-141816	36.3	53.8	8.45	10 000	16 000	0.104	28.575	28.562	41.300	41.275	28.555	28.542	41.267	41.242	36.53
	28.575	41.275	25.400	1.02	HJ-182616	IR-151816	36.3	53.8	8.45	10 000	16 000	0.104	28.575	28.562	41.300	41.275	28.555	28.542	41.267	41.242	36.53
	28.575	41.275	31.750	1.02	HJ-182620	IR-141820	44.9	70.3	10.9	10 000	16 000	0.132	28.575	28.562	41.300	41.275	28.555	28.542	41.267	41.242	36.53
	28.575	41.275	31.750	1.02	HJ-182620	IR-151820	44.9	70.3	10.9	10 000	16 000	0.132	28.575	28.562	41.300	41.275	28.555	28.542	41.267	41.242	36.53
1 1/4	31.750	44.450	25.400	1.02	HJ-202816	IR-162016	37.4	57.4	9.00	9 100	14 000	0.113	31.750	31.735	44.475	44.450	31.725	31.709	44.442	44.417	39.67
	31.750	44.450	31.750	1.02	HJ-202820	IR-162020	46.3	75.2	11.7	9 100	14 000	0.145	31.750	31.735	44.475	44.450	31.725	31.709	44.442	44.417	39.67
1 3/8	34.925	47.625	25.400	1.02	HJ-223016	IR-182216	39.8	64.1	10.1	8 200	13 000	0.127	34.925	34.910	47.650	47.625	34.900	34.884	47.617	47.592	42.88
	34.925	47.625	31.750	1.02	HJ-223020	IR-182220	49.4	84.1	13.0	8 200	13 000	0.159	34.925	34.910	47.650	47.625	34.900	34.884	47.617	47.592	42.88
1 1/2	38.100	52.388	25.400	1.52	HJ-243316	IR-202416	47.6	72.5	11.4	7 600	12 000	0.154	38.100	38.085	52.418	52.388	38.075	38.059	52.380	52.349	47.63
	38.100	52.388	31.750	1.52	HJ-243320	IR-192420	58.7	95.2	14.9	7 600	12 000	0.195	38.100	38.085	52.418	52.388	38.075	38.059	52.380	52.349	47.63
	38.100	52.388	31.750	1.52	HJ-243320	IR-202420	58.7	95.2	14.9	7 600	12 000	0.195	38.100	38.085	52.418	52.388	38.075	38.059	52.380	52.349	47.63
1 5/8	41.275	55.563	25.400	1.52	HJ-263516	IR-212616	48.5	76.5	12.1	7 000	11 000	0.163	41.275	41.260	55.593	55.563	41.250	41.234	55.555	55.524	50.80
	41.275	55.563	31.750	1.52	HJ-263520	IR-212620	60.1	100.5	15.7	7 000	11 000	0.209	41.275	41.260	55.593	55.563	41.250	41.234	55.555	55.524	50.80
	41.275	55.563	31.750	1.52	HJ-263520	IR-222620	60.1	100.5	15.7	7 000	11 000	0.209	41.275	41.260	55.593	55.563	41.250	41.234	55.555	55.524	50.80
1 3/4	44.450	58.738	25.400	1.52	HJ-283716	IR-232816	49.8	81.0	12.8	6 400	9 900	0.177	44.450	44.435	58.768	58.738	44.425	44.409	58.730	58.699	53.98
	44.450	58.738	25.400	1.52	HJ-283716	IR-242816	49.8	81.0	12.8	6 400	9 900	0.177	44.450	44.435	58.768	58.738	44.425	44.409	58.730	58.699	53.98
	44.450	58.738	31.750	1.52	HJ-283720	IR-222820	61.8	106	16.6	6 400	9 900	0.222	44.450	44.435	58.768	58.738	44.425	44.409	58.730	58.699	53.98

[Notes] 1) See pages B478 to B480 for inch series inner rings. Order inner rings separately.
2) $r_{a\,max}$ is equal to the minimum bearing chamfer (r_{min}) at unmarked end.

Shaft dia. (1 3/4) ~ 3 1/2 in ((44.450) ~ 88.900 mm)



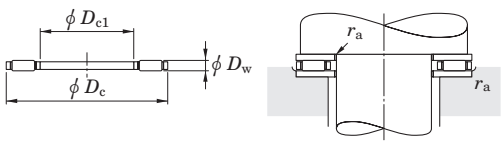


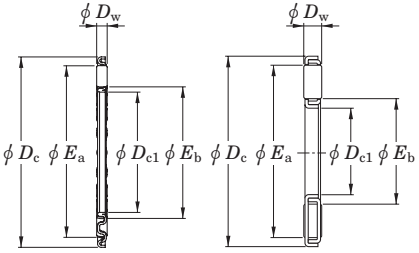
Shaft surface to be 58 HRC or equivalent

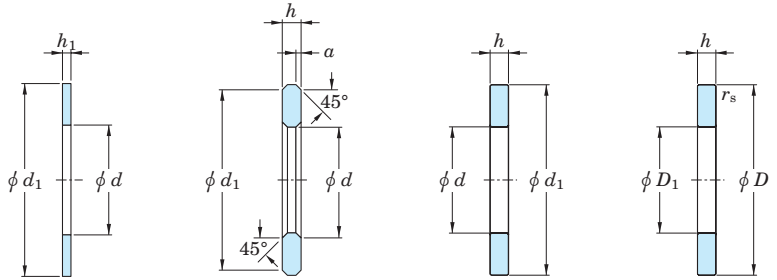
Shaft dia. (in)	Boundary dimensions (mm) F_w	D	C (B)	r min.	Bearing No.	Used with inner ring No. 1)	Basic load ratings (kN) C_r	C_{0r}	Fatigue load limit (kN) C_u	Limiting speeds (min^{-1}) Grease lub.	Oil lub.	(Refer.) Mass (kg)	Recommended dimensions Clearance fit S (h6) max.	min.	H (H7) max.	min.	Tight transition fit S (f6) max.	min.	H (N7) max.	min.	Shoulder dia. D_a ±0.38
1 3/4	44.450	58.738	31.750	1.52	HJ-283720	IR-232820	61.8	106	16.6	6 400	9 900	0.222	44.450	44.435	58.768	58.738	44.425	44.409	58.730	58.699	53.98
	44.450	58.738	31.750	1.52	HJ-283720	IR-242820	61.8	106	16.6	6 400	9 900	0.222	44.450	44.435	58.768	58.738	44.425	44.409	58.730	58.699	53.98
1 7/8	47.625	61.913	31.750	1.52	HJ-303920	IR-253020	65.4	117	18.1	6 000	9 200	0.236	47.625	47.610	61.943	61.913	47.600	47.584	61.905	61.874	57.15
2	50.800	65.088	25.400	1.52	HJ-324116	IR-273216	53.8	93.0	14.7	5 600	8 600	0.200	50.800	50.782	65.118	65.088	50.770	50.752	65.080	65.049	60.33
	50.800	65.088	31.750	1.52	HJ-324120	IR-243220	66.7	122	19.1	5 600	8 600	0.249	50.800	50.782	65.118	65.088	50.770	50.752	65.080	65.049	60.33
	50.800	65.088	31.750	1.52	HJ-324120	IR-253220	66.7	122	19.1	5 600	8 600	0.249	50.800	50.782	65.118	65.088	50.770	50.752	65.080	65.049	60.33
	50.800	65.088	31.750	1.52	HJ-324120	IR-263220	66.7	122	19.1	5 600	8 600	0.249	50.800	50.782	65.118	65.088	50.770	50.752	65.080	65.049	60.33
	50.800	65.088	31.750	1.52	HJ-324120	IR-273220	66.7	122	19.1	5 600	8 600	0.249	50.800	50.782	65.118	65.088	50.770	50.752	65.080	65.049	60.33
2 1/4	57.150	76.200	38.100	1.52	HJ-364824	IR-283624	89.9	164	25.7	5 000	7 600	0.458	57.150	57.132	76.230	76.200	57.120	57.102	76.192	76.162	68.28
	57.150	76.200	44.450	1.52	HJ-364828	IR-283628	104	198	30.8	5 000	7 600	0.531	57.150	57.132	76.230	76.200	57.120	57.102	76.192	76.162	68.28
2 1/2	63.500	82.550	38.100	2.03	HJ-405224	IR-314024	97.0	187	29.4	4 400	6 800	0.499	63.500	63.482	82.586	82.550	63.470	63.452	82.537	82.502	74.63
	63.500	82.550	38.100	2.03	HJ-405224	IR-324024	97.0	187	29.4	4 400	6 800	0.499	63.500	63.482	82.586	82.550	63.470	63.452	82.537	82.502	74.63
	63.500	82.550	44.450	2.03	HJ-405228	IR-314028	97.0	187	35.2	4 400	6 800	0.499	63.500	63.482	82.586	82.550	63.470	63.452	82.537	82.502	74.63
	63.500	82.550	44.450	2.03	HJ-405228	IR-324028	97.0	187	35.2	4 400	6 800	0.499	63.500	63.482	82.586	82.550	63.470	63.452	82.537	82.502	74.63
2 3/4	69.850	88.900	25.400	2.03	HJ-445616	—	67.2	120	19.1	4 000	6 200	0.363	69.850	69.832	88.936	88.900	69.820	69.802	88.887	88.852	80.98
	69.850	88.900	38.100	2.03	HJ-445624	IR-364424	101	203	31.9	4 000	6 200	0.544	69.850	69.832	88.936	88.900	69.820	69.802	88.887	88.852	80.98
	69.850	88.900	44.450	2.03	HJ-445628	IR-354428	117	245	38.2	4 000	6 200	0.635	69.850	69.832	88.936	88.900	69.820	69.802	88.887	88.852	80.98
	69.850	88.900	44.450	2.03	HJ-445628	IR-364428	117	245	38.2	4 000	6 200	0.635	69.850	69.832	88.936	88.900	69.820	69.802	88.887	88.852	80.98
3	76.200	95.250	38.100	2.03	HJ-486024	IR-404824	107	226	35.5	3 700	5 600	0.585	76.200	76.182	95.286	95.250	76.170	76.152	95.237	95.202	87.33
	76.200	95.250	44.450	2.03	HJ-486028	IR-384828	124	273	42.5	3 700	5 600	0.685	76.200	76.182	95.286	95.250	76.170	76.152	95.237	95.202	87.33
	76.200	95.250	44.450	2.03	HJ-486028	IR-404828	124	273	42.5	3 700	5 600	0.685	76.200	76.182	95.286	95.250	76.170	76.152	95.237	95.202	87.33
3 1/4	82.550	107.950	44.450	2.03	HJ-526828	IR-445228	162	305	48.3	3 400	5 300	1.016	82.550	82.527	107.986	107.950	82.514	82.492	107.937	107.902	98.43
	82.550	107.950	50.800	2.03	HJ-526832	IR-445232	184	358	56.2	3 400	5 300	1.161	82.550	82.527	107.986	107.950	82.514	82.492	107.937	107.902	98.43
3 1/2	88.900	114.300	50.800	2.03	HJ-567232	IR-475632	187	375	58.9	3 200	4 900	1.238	88.900	88.877	114.336	114.300	88.864	88.842	114.287	114.252	104.78
	88.900	114.300	50.800	2.03	HJ-567232	IR-485632	187	375	58.9	3 200	4 900	1.238	88.900	88.877	114.336	114.300	88.864	88.842	114.287	114.252	104.78

[Notes] 1) See pages B478 to B480 for inch series inner rings. Order inner rings separately.
2) $r_{a\,max}$ is equal to the minimum bearing chamfer (r_{min}) at unmarked end.

Shaft dia. 6 ~ 45 mm

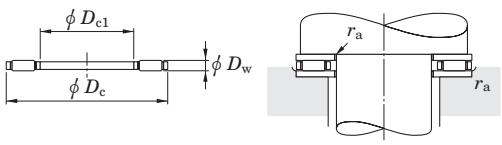


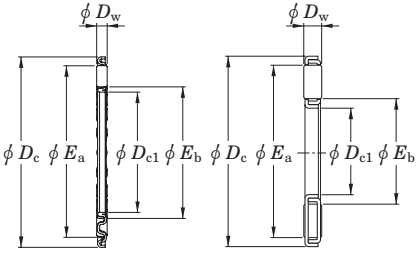




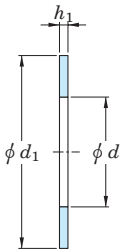
Shaft dia.	Boundary dimensions (mm) D_{c1}	D_c	D_w	E_a	E_b	r_a max.	Bearing No.	Basic load ratings (kN) C_a	C_{0a}	Fatigue load limit (kN) C_u	Limiting speed (min^{-1}) Oil lub.	(Refer.) Mass (kg)	Washer dimensions (mm) d	D, d_1	D_1	Thin h_1 (mm)	Thin Washer No.	(Refer.) Mass (kg)	Heavy (LS) h (h11) (mm)	a (mm)	Heavy (LS) Washer No.	(Refer.) Mass (kg)	Heavy h (mm)	Heavy r min. (mm)	Heavy Washer No. Shaft piloted	Heavy Washer No. Housing piloted	(Refer.) Mass (kg)
6	6	19	2	16.9	7.8	0.3	**AXK0619TN**	6.37	14.3	1.40	23 000	0.001	6	19		1.00	AS0619	0.001									
				18.0	8.0	0.3	**FNT-619**	6.82	15.6	1.50	21 000	0.002															
8	8	21	2	18.6	9.6	0.3	**AXK0821TN**	8.34	21.1	2.00	20 000	0.001	8	21		1.00	AS0821	0.002	2.75	0.30	LS0821	0.004					
				20.0	10.0	0.3	**FNT-821**	7.67	19.1	1.85	20 000	0.002															
10	10	24	2	22.5	11.0	0.3	**AXK1024**	9.32	25.9	2.90	17 000	0.003	10	24		1.00	AS1024	0.003	2.75	0.50	LS1024	0.008					
				23.0	12.0	0.3	**FNT-1024**	9.14	25.2	2.40	17 000	0.002															
12	12	26	2	24.5	13.0	0.3	**AXK1226**	10.8	32.3	3.40	15 000	0.004	12	26		1.00	AS1226	0.003	2.75	0.50	LS1226	0.009					
				25.0	14.0	0.3	**FNT-1226**	9.92	29.0	2.75	15 000	0.004															
15	15	28	2	27.0	17.0	0.3	**AXK1528**	11.1	35.2	3.35	15 000	0.004	15	28	16	1.00	AS1528	0.003	2.75	0.50	LS1528	0.010	2.75	0.30	WS.81102	GS.81102	0.0100
				27.0	17.0	0.3	**FNT-1528**	10.2	31.3	3.00	15 000	0.004															
17	17	30	2	28.7	18.3	0.3	**AXK1730TN**	11.7	38.7	3.70	14 000	0.004	17	30	18	1.00	AS1730	0.003	2.75	0.50	LS1730	0.011	2.75	0.30	WS.81103	GS.81103	0.011
				29.0	19.0	0.3	**FNT-1730**	10.8	34.8	3.35	14 000	0.004															
20	20	35	2	34.0	22.0	0.3	**AXK2035**	12.8	45.4	4.40	12 000	0.006	20	35	21	1.00	AS2035	0.005	2.75	0.50	LS2035	0.014	2.75	0.30	WS.81104	GS.81104	0.014
				34.0	22.0	0.3	**FNTA-2035**	13.8	50.7	4.80	12 000	0.005															
25	25	42	2	41.0	29.0	0.6	**AXK2542**	14.3	56.8	5.50	10 000	0.007	25	42	26	1.00	AS2542	0.007	3.00	1.00	LS2542	0.021	3.00	0.60	WS.81105	GS.81105	0.021
				41.0	27.0	0.6	**FNT-2542**	18.0	75.3	8.05	9 700	0.008															
30	30	47	2	46.0	35.0	0.6	**AXK3047**	16.0	68.1	6.60	9 000	0.009	30	47	32	1.00	AS3047	0.008	3.00	1.00	LS3047	0.023	3.00	0.60	WS.81106	GS.81106	0.023
				46.0	32.0	0.6	**FNTA-3047**	18.6	82.4	8.65	8 900	0.009															
35	35	52	2	51.0	40.0	0.6	**AXK3552**	17.4	79.5	7.70	8 100	0.010	35	52	37	1.00	AS3552	0.009	3.50	1.00	LS3552	0.030	3.50	0.60	WS.81107	GS.81107	0.032
				51.0	37.0	0.6	**FNT-3552**	21.7	104.0	11.1	7 900	0.010															
40	40	60	3	58.0	45.0	0.6	**AXK4060**	27.1	110.0	11.9	7 000	0.016	40	60	42	1.00	AS4060	0.012	3.50	1.00	LS4060	0.041	3.50	0.60	WS.81108	GS.81108	0.043
				57.0	43.0	0.6	**FNT-4060**	31.5	132.0	14.6	7 100	0.020															
45	45	65	3	63.0	50.0	0.6	**AXK4565**	29.0	124.0	13.4	6 500	0.020	45	65	47	1.00	AS4565	0.013	4.00	1.00	LS4565	0.052	4.00	0.60	WS.81109	GS.81109	0.054
				63.0	47.0	0.6	**FNT-4565**	37.6	172.0	18.5	6 400	0.024															

Shaft dia. 50 ~ 160 mm

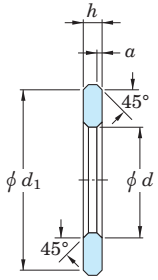




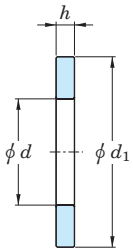
AXK FNT



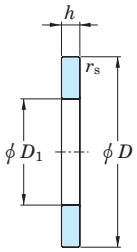
AS
(h_1 = 1.0)



LS



WS.811



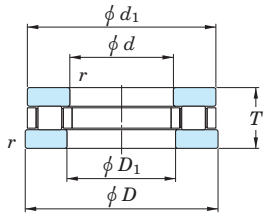
GS.811

Shaft dia.	Boundary dimensions (mm) D_{c1}	D_c	D_w	E_a	E_b	r_a max.	Bearing No.	Basic load ratings (kN) C_a	C_{0a}	Fatigue load limit (kN) C_u	Limiting speed (min^{-1}) Oil lub.	(Refer.) Mass (kg)
50	50	70	3	68.0	55.0	0.6	**AXK5070**	30.8	137.0	14.9	6 000	0.020
				68.0	52.0	0.6	**FNT-5070**	37.9	179.0	19.1	5 900	0.026
55	55	78	3	76.0	60.0	0.6	**AXK5578**	39.4	195.0	20.5	5 300	0.026
				76.0	57.0	0.6	**FNT-5578**	48.5	254.0	26.3	5 300	0.033
60	60	85	3	83.0	65.0	0.6	**AXK6085**	44.5	234.0	24.7	4 900	0.035
65	65	90	3	88.0	70.0	0.6	**AXK6590**	46.7	254	26.8	4 600	0.036
70	70	95	4	93.0	74.0	0.6	**AXK7095**	53.8	253	28.0	4 400	0.055
				93.0	73.0	0.6	**FNTA-7095**	66.6	333	35.3	4 400	0.057
75	75	100	4	98.0	79.0	0.6	**AXK75100**	55.1	266	29.4	4 200	0.058
				98.0	78.0	0.6	**FNT-75100**	71.6	374	39.7	4 100	0.064
80	80	105	4	103.0	84.0	0.6	**AXK80105**	56.4	279	30.8	4 000	0.092
				103.0	83.0	0.6	**FNTA-80105**	71.3	379	40.1	3 900	0.062
85	85	110	4	108.0	89.0	0.6	**AXK85110**	57.6	291	32.2	3 800	0.063
90	90	120	4	118.0	94.0	0.6	**AXK90120**	72.9	405	43.0	3 500	0.081
100	100	135	4	133.0	105.0	0.6	**AXK100135**	90.2	552	56.4	3 100	0.106
110	110	145	4	143.0	115.0	0.6	**AXK110145**	93.2	591	59.0	2 800	0.117
120	120	155	4	153.0	125.0	0.6	**AXK120155**	98.5	650	63.5	2 700	0.126
130	130	170	5	167.0	136.0	0.6	**AXK130170**	132	829	78.7	2 400	0.198
140	140	180	5	177.0	146.0	0.6	**AXK140180**	136	887	82.5	2 300	0.221
150	150	190	5	187.0	156.0	0.6	**AXK150190**	141	944	86.2	2 200	0.225
160	160	200	5	197.0	166.0	0.6	**AXK160200**	146	1 000	89.9	2 100	0.249

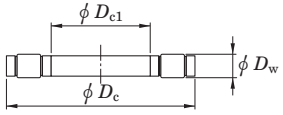
Shaft dia.	Washer dimensions (mm) d	D, d_1	D_1	Thin h_1 (mm)	Thin Washer No.	Thin (Refer.) Mass (kg)	Heavy (LS) h (h11) (mm)	Heavy (LS) a (mm)	Heavy (LS) Washer No.	Heavy (LS) (Refer.) Mass (kg)	Heavy h (mm)	Heavy r min. (mm)	Heavy Washer No. Shaft piloted	Heavy Washer No. Housing piloted	(Refer.) Mass (kg)
50	50	70	52	1.00	AS5070	0.014	4.00	1.00	LS5070	0.0560	4.00	0.60	WS.81110	GS.81110	0.059
55	55	78	57	1.00	AS5578	0.018	5.00	1.00	LS5578	0.0910	5.00	0.60	WS.81111	GS.81111	0.094
60	60	85	62	1.00	AS6085	0.022	4.75	1.50	LS6085	0.102	4.75	1.00	WS.81112	GS.81112	0.106
65	65	90	67	1.00	AS6590	0.023	5.25	1.50	LS6590	0.121	5.25	1.00	WS.81113	GS.81113	0.125
70	70	95	72	1.00	AS7095	0.025	5.25	1.50	LS7095	0.1280	5.25	1.00	WS.81114	GS.81114	0.133
75	75	100	77	1.00	AS75100	0.027	5.75	1.50	LS75100	0.1500	5.75	1.00	WS.81115	GS.81115	0.155
80	80	105	82	1.00	AS80105	0.028	5.75	1.50	LS80105	0.1580	5.75	1.00	WS.81116	GS.81116	0.165
85	85	110	87	1.00	AS85110	0.028	5.75	1.50	LS85110	0.166	5.75	1.00	WS.81117	GS.81117	0.173
90	90	120	92	1.00	AS90120	0.038	6.50	1.50	LS90120	0.245	6.50	1.00	WS.81118	GS.81118	0.253
100	100	135		1.00	AS100135	0.050									
110	110	145		1.00	AS110145	0.055	7.00	1.50	LS110145	0.373	7.00				
120	120	155		1.00	AS120155	0.059									
130	130	170		1.00	AS130170	0.074	9.00	1.50	LS130170	0.065					
140	140	180		1.00	AS140180	0.078									
150	150	190		1.00	AS150190	0.083									
160	160	200		1.00	AS160200	0.089									

Needle roller thrust bearings, assemblies, washers
thrust cylindrical roller and cage assemblies, thrust washers
metric series

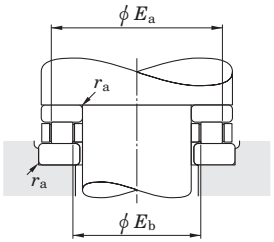
Shaft dia. 15 ~ 55 mm

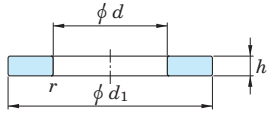


811, 812

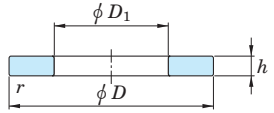


K.811, K.812





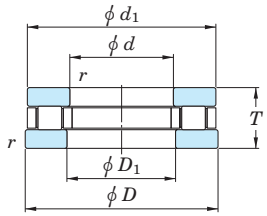
WS.811, WS.812



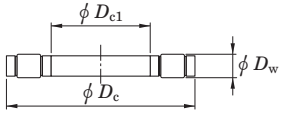
GS.811, GS.812

Shaft dia.	Boundary dimensions (mm) D_{c1} (E11)	D_c (a13)	D_w	T	E_b max.	E_a min.	r_a max.	Bearing No.	Basic load ratings (kN) C_a	C_{0a}	Fatigue load limit (kN) C_u	Limiting speed (min^{-1}) Oil lub.		(Refer.) Mass (kg)	Washer dimensions (mm) d	D_1	D, d_1	h max.	h min.	r min.	Washer No. Shaft piloted	Housing piloted	(Refer.) Mass (kg)
15	15	28	3.5	9	18	25	0.3	**K.81102LPB**	12.1	26.3	3.70	12 000		0.006	15	16	28	2.75	2.64	0.3	WS.81102	GS.81102	0.010
	15	28	3.5	9	18	25	0.3	**K.81102TVP**	12.8	28.6	4.05	12 000		0.006	15	16	28	2.75	2.64	0.3	WS.81102	GS.81102	0.010
17	17	30	3.5	—	20	27	0.3	**K.81103LPB**	12.6	28.6	4.05	11 000		0.008	17	18	30	2.75	2.64	0.3	WS.81103	GS.81103	0.011
	17	30	3.5	9	20	27	0.3	**K.81103TVP**	14.2	33.4	4.70	11 000		0.008	17	18	30	2.75	2.64	0.3	WS.81103	GS.81103	0.011
20	20	35	4.5	10	23	32	0.3	**K.81104TVP**	23.6	56.8	6.85	9 500		0.009	20	21	35	2.75	2.62	0.3	WS.81104	GS.81104	0.014
25	25	42	5.0	11	28	39	0.6	**K.81105TVP**	31.2	81.0	11.4	8 000		0.014	25	26	42	3.00	2.87	0.6	WS.81105	GS.81105	0.021
30	30	47	5.0	—	33	44	0.6	**K.81106LPB**	28.5	69.5	10.7	6 700		0.026	30	32	47	3.00	2.87	0.6	WS.81106	GS.81106	0.023
	30	47	5.0	11	33	44	0.6	**K.81106TVP**	33.0	91.1	12.8	6 700		0.016	30	32	47	3.00	2.87	0.6	WS.81106	GS.81106	0.023
	30	52	7.5	—	33	49	0.6	**K.81206LPB**	53.4	129	13.9	6 300		0.052	30	32	52	4.25	4.12	0.6	WS.81206	GS.81206	0.047
	30	52	7.5	16	33	49	0.6	**K.81206TVP**	56.9	141	15.2	6 300		0.034	30	32	52	4.25	4.12	0.6	WS.81206	GS.81206	0.047
35	35	52	5.0	—	38	49	0.6	**K.81107LPB**	30.8	86.0	12.1	6 000		0.025	35	37	52	3.50	3.34	0.6	WS.81107	GS.81107	0.032
	35	52	5.0	12	38	49	0.6	**K.81107TVP**	34.8	101	14.2	6 000		0.020	35	37	52	3.50	3.34	0.6	WS.81107	GS.81107	0.032
	35	62	7.5	—	41	56	1.0	**K.81207LPB**	58.3	152	16.5	5 300		0.073	35	37	62	5.25	5.09	1.0	WS.81207	GS.81207	0.085
	35	62	7.5	18	41	56	1.0	**K.81207TVP**	61.6	164	17.7	5 300		0.055	35	37	62	5.25	5.09	1.0	WS.81207	GS.81207	0.085
40	40	60	6.0	—	44	56	0.6	**K.81108LPB**	44.2	126	12.0	5 300		0.044	40	42	60	3.50	3.34	0.6	WS.81108	GS.81108	0.043
	40	60	6.0	13	44	56	0.6	**K.81108TVP**	49.8	148	14.1	5 300		0.031	40	42	60	3.50	3.34	0.6	WS.81108	GS.81108	0.043
	40	68	9.0	19	45	63	1.0	**K.81208TVP**	86.8	233	26.9	4 800		0.076	40	42	68	5.00	4.84	1.0	WS.81208	GS.81208	0.093
45	45	65	6.0	—	49	61	0.6	**K.81109LPB**	47.0	140	13.4	4 800		0.035	45	47	65	4.00	3.84	0.6	WS.81109	GS.81109	0.054
	45	65	6.0	14	49	61	0.6	**K.81109TVP**	52.3	163	15.5	4 800		0.035	45	47	65	4.00	3.84	0.6	WS.81109	GS.81109	0.054
	45	73	9.0	—	50	68	1.0	**K.81209TVP**	94.2	266	30.8	4 500		0.083	45	47	73	5.50	5.34	1.0	WS.81209	GS.81209	0.112
50	50	70	6.0	14	54	66	0.6	**K.81110LPB**	49.7	155	14.8	4 300		0.052	50	52	70	4.00	3.84	0.6	WS.81110	GS.81110	0.059
	50	70	6.0	14	54	66	0.6	**K.81110TVP**	54.8	177	17.0	4 300		0.042	50	52	70	4.00	3.84	0.6	WS.81110	GS.81110	0.059
	50	78	9.0	22	55	73	1.0	**K.81210TVP**	101	299	34.6	4 000		0.089	50	52	78	6.5	6.34	1.0	WS.81210	GS.81210	0.144
55	55	78	6.0	16	60	73	0.6	**K.81111TVP**	60.3	207	19.8	4 000		0.066	55	57	78	5.00	4.81	0.6	WS.81111	GS.81111	0.094
	55	90	11.0	—	61	84	1.0	**K.81211LPB**	127	359	39.6	3 600		0.156	55	57	90	7.00	6.81	1.0	WS.81211	GS.81211	0.219
	55	90	11.0	25	61	84	1.0	**K.81211TVP**	138	403	45.2	3 600		0.140	55	57	90	7.00	6.81	1.0	WS.81211	GS.81211	0.219

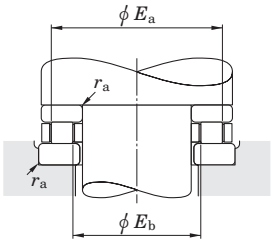
Shaft dia. 60 ~ 90 mm

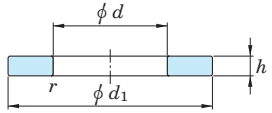


811, 812

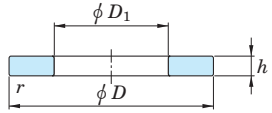


K.811, K.812





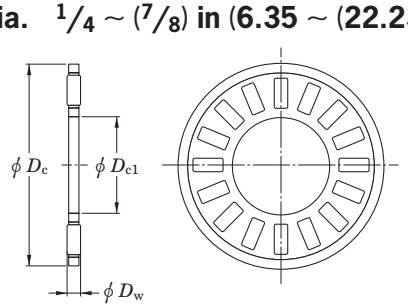
WS.811, WS.812



GS.811, GS.812

Shaft dia.	Boundary dimensions (mm) D_{c1} (E11)	D_c (a13)	D_w	T	E_b max.	E_a min.	r_a max.	Bearing No.	Basic load ratings (kN) C_a	C_{0a}	Fatigue load limit (kN) C_u	Limiting speed (min^{-1}) Oil lub.		(Refer.) Mass (kg)	Washer dimensions (mm) d	D_1	D, d_1	h max.	h min.	r min.	Washer No. Shaft piloted	Housing piloted	(Refer.) Mass (kg)
60	60	85	7.5	17	65	80	1.0	**K.81112TVP**	84.4	281	30.4	3 600		0.103	60	62	85	4.75	4.56	1.0	WS.81112	GS.81112	0.106
	60	95	11.0	26	66	89	1.0	**K.81212LPB**	129	378	42.4	3 400		0.166	60	62	95	7.50	7.31	1.0	WS.81212	GS.81212	0.251
65	65	90	7.5	18	70	85	1.0	**K.81113TVP**	88.3	305	33.0	3 400		0.109	65	67	90	5.25	5.06	1.0	WS.81113	GS.81113	0.125
	65	100	11.0	27	71	94	1.0	**K.81213LPB**	134	403	45.2	3 200		0.176	65	67	100	8.00	7.81	1.0	WS.81213	GS.81213	0.285
70	70	95	7.5	18	75	90	1.0	**K.81114TVP**	92.1	328	35.5	3 200		0.056	70	72	95	5.25	5.06	1.0	WS.81114	GS.81114	0.133
	70	105	11.0	27	76	99	1.0	**K.81214LPB**	138	428	48.0	3 000		0.186	70	72	105	8.00	7.81	1.0	WS.81214	GS.81214	0.302
75	75	100	7.5	19	80	95	1.0	**K.81115LPB**	86.1	305	33.0	3 000		0.091	75	77	100	5.75	5.56	1.0	WS.81115	GS.81115	0.155
	75	110	11.0	27	81	104	1.0	**K.81215LPB**	143	453	50.9	2 800		0.197	75	77	110	8.00	7.81	1.0	WS.81215	GS.81215	0.319
80	80	105	7.5	19	85	100	1.0	**K.81116LPB**	87.5	316	34.2	2 800		0.103	80	82	105	5.75	5.56	1.0	WS.81116	GS.81116	0.165
	80	115	11.0	28	86	109	1.0	**K.81216LPB**	147	478	53.7	2 600		0.208	80	82	115	8.50	8.31	1.0	WS.81216	GS.81216	0.357
85	85	110	7.5	19	90	105	1.0	**K.81117LPB**	88.9	328	35.5	2 600		0.108	85	87	110	5.75	5.53	1.0	WS.81117	GS.81117	0.173
	85	125	12.0	31	93	117	1.0	**K.81217LPB**	174	572	65.5	2 400		0.376	85	88	125	9.50	9.28	1.0	WS.81217	GS.81217	0.492
90	90	120	9.0	22	96	114	1.0	**K.81118LPB**	119	432	49.3	2 400		0.156	90	92	120	6.50	6.28	1.0	WS.81118	GS.81118	0.253
	90	135	14.0	35	98	127	1.0	**K.81218LPB**	215	691	81.5	2 400		0.540	90	93	135	10.50	10.28	1.1	WS.81218	GS.81218	0.655

Shaft dia. $^{1}/_{4} \sim (^{7}/_{8})$ in (6.35 ~ (22.23) mm)



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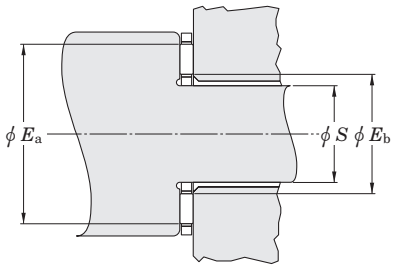
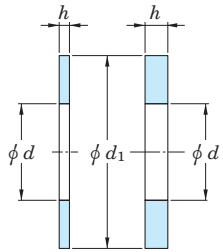
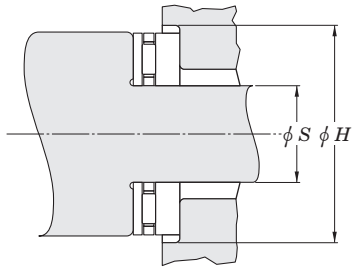


Raceway hardness to be 58 HRC or equivalent



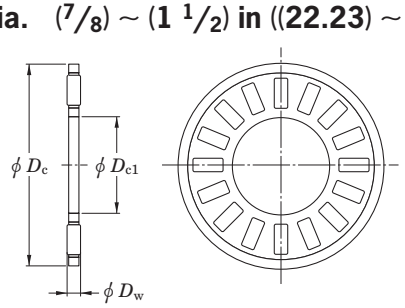


Shaft dia. (in)	Boundary dimensions (mm) D_{c1}	D_c	D_w	E_b	E_a	Bearing No.	Basic load ratings (kN) C_a	C_{0a}	Fatigue load limit (kN) C_u	Limiting speed [1] (min^{-1})	(Refer.) Mass (kg)	Washer No.	Washer dimensions (mm) d	d_1	h max.	h min.	Piloting dimensions (mm) S max.	S min.	Dia. to clear O.D. (mm) H [2]	(Refer.) Washer mass (kg)
$^{1}/_{4}$	6.35	17.45	1.984	8.636	14.732	**NTA-411**	5.12	10.76	1.05	26 000	0.001	TRA-411	6.35	17.45	0.81	0.76	6.35	6.27	18.26	0.001
												TRB-411	6.35	17.45	1.60	1.52	6.35	6.27	18.26	0.002
												TRC-411	6.35	17.45	2.41	2.34	6.35	6.27	18.26	0.004
$^{5}/_{16}$	7.92	19.05	1.984	10.16	16.256	**NTA-512**	5.83	13.17	1.30	24 000	0.002	TRA-512	7.92	19.05	0.81	0.76	7.92	7.85	19.84	0.001
												TRB-512	7.92	19.05	1.60	1.52	7.92	7.85	19.84	0.003
$^{3}/_{8}$	9.53	20.625	1.984	11.68	18.034	**NTA-613**	6.05	14.32	1.40	22 000	0.002	TRA-613	9.53	20.62	0.81	0.76	9.53	9.45	21.44	0.001
												TRB-613	9.53	20.62	1.60	1.52	9.53	9.45	21.44	0.003
												TRC-613	9.53	20.62	2.41	2.34	9.53	9.45	21.44	0.004
$^{1}/_{2}$	12.70	23.80	1.984	14.99	21.08	**NTA-815**	7.16	19.13	1.85	19 000	0.002	TRA-815	12.70	23.80	0.81	0.76	12.70	12.62	24.61	0.002
												TRB-815	12.70	23.80	1.60	1.52	12.70	12.62	24.61	0.004
												TRC-815	12.70	23.80	2.41	2.34	12.70	12.62	24.61	0.005
$^{9}/_{16}$	14.275	25.40	1.9837	16.51	22.606	**NTA-916**	7.70	21.53	2.10	18 000	0.003	TRA-916	14.27	25.40	0.81	0.76	14.27	14.20	26.19	0.002
												TRB-916	14.27	25.40	1.60	1.52	14.27	14.20	26.19	0.004
												TRC-916	14.27	25.40	2.41	2.34	14.27	14.20	26.19	0.006
$^{5}/_{8}$	15.88	28.575	1.9837	18.03	25.908	**NTA-1018**	9.79	30.38	2.85	15 000	0.003	TRA-1018	15.88	28.58	0.81	0.76	15.88	15.80	29.36	0.003
												TRB-1018	15.88	28.58	1.60	1.52	15.88	15.80	29.36	0.005
												TRC-1018	15.88	28.58	2.41	2.34	15.88	15.80	29.36	0.008
												TRD-1018	15.88	28.58	3.20	3.12	15.88	15.80	29.36	0.011
												TRE-1018	15.88	28.58	3.99	3.91	15.88	15.80	29.36	0.013
$^{3}/_{4}$	19.05	31.75	1.9837	21.34	28.956	**NTA-1220**	10.90	36.48	3.40	14 000	0.004	TRA-1220	19.05	31.75	0.81	0.76	19.05	18.97	32.54	0.003
												TRB-1220	19.05	31.75	1.60	1.52	19.05	18.97	32.54	0.006
												TRC-1220	19.05	31.75	2.41	2.34	19.05	18.97	32.54	0.010
												TRD-1220	19.05	31.75	3.20	3.12	19.05	18.97	32.54	0.012
												TRE-1220	19.05	31.75	3.99	3.91	19.05	18.97	32.54	0.015
$^{7}/_{8}$	22.23	36.50	1.984	24.38	33.782	**NTA-1423**	13.43	49.82	4.65	12 000	0.005	TRA-1423	22.23	36.50	0.81	0.76	22.23	22.15	37.31	0.004
												TRB-1423	22.23	36.50	1.60	1.52	22.23	22.15	37.31	0.008

[Notes] 1) Limiting speeds listed are based on adequate oil lubrication.
Suggestions for an application requiring O.D. piloting should be determined in consultation with JTEKT.

2) If the shaft and the housing adjacent to the bearing O.D. are not concentric, the T.I.R. between the shaft and housing should be added to this dimension.

Shaft dia. (7/8) ~ (1 1/2) in ((22.23) ~ (38.10) mm)



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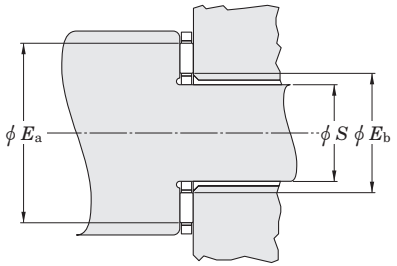
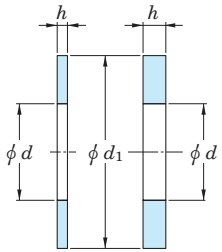
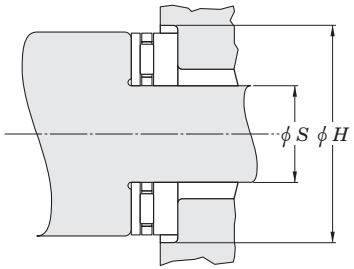


Raceway hardness to be 58 HRC or equivalent



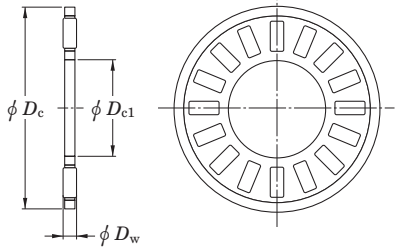


Shaft dia. (in)	Boundary dimensions (mm) D_{c1}	D_c	D_w	E_b	E_a	Bearing No.	Basic load ratings (kN) C_a	C_{0a}	Fatigue load limit (kN) C_u	Limiting speed [1] (min^{-1})		(Refer.) Mass (kg)	Washer No.	Washer dimensions (mm) d	d_1	h max.	h min.	Piloting dimensions (mm) S max.	S min.	Dia. to clear O.D. (mm) H [2]	(Refer.) Washer mass (kg)
7/8													TRC-1423	22.23	36.50	2.41	2.34	22.23	22.15	37.31	0.012
													TRD-1423	22.23	36.50	3.20	3.12	22.23	22.15	37.31	0.015
	22.23	42.85	1.984	25.91	39.878	NTC-1427	18.46	78.29	8.05	9 800		0.008	TRB-1427	22.23	42.86	1.60	1.52	22.23	22.15	43.66	0.013
													TRC-1427	22.23	42.86	2.41	2.34	22.23	22.15	43.66	0.020
													TRD-1427	22.23	42.86	3.20	3.12	22.23	22.15	43.66	0.026
1	25.40	39.675	1.984	27.69	36.83	NTA-1625	13.83	53.82	5.00	11 000		0.006	TRA-1625	25.40	39.67	0.81	0.76	25.40	25.32	40.49	0.005
													TRB-1625	25.40	39.67	1.60	1.52	25.40	25.32	40.49	0.009
													TRD-1625	25.40	39.67	3.20	3.12	25.40	25.32	40.49	0.017
													TRE-1625	25.40	39.67	3.99	3.91	25.40	25.32	40.49	0.021
1 1/8	28.58	44.45	1.9837	30.73	41.656	NTA-1828	16.68	71.17	7.30	9 600		0.009	TRA-1828	28.58	44.45	0.81	0.76	28.58	28.50	45.24	0.006
													TRB-1828	28.58	44.45	1.60	1.52	28.58	28.50	45.24	0.011
													TRC-1828	28.58	44.45	2.41	2.34	28.58	28.50	45.24	0.017
													TRD-1828	28.58	44.45	3.20	3.12	28.58	28.50	45.24	0.022
1 1/4	31.75	49.20	1.9837	34.04	46.228	NTA-2031	20.15	93.41	9.55	8 600		0.010	TRA-2031	31.75	49.20	0.81	0.76	31.75	31.67	50.01	0.007
													TRB-2031	31.75	49.20	1.60	1.52	31.75	31.67	50.01	0.014
													TRC-2031	31.75	49.20	2.41	2.34	31.75	31.67	50.01	0.020
													TRD-2031	31.75	49.20	3.20	3.12	31.75	31.67	50.01	0.026
													TRF-2031	31.75	49.20	4.78	4.70	31.75	31.67	50.01	0.041
1 3/8	34.93	52.375	1.9837	37.08	49.53	NTA-2233	21.35	103.20	10.5	8 000		0.010	TRA-2233	34.93	52.37	0.81	0.76	34.93	34.85	53.19	0.007
													TRB-2233	34.93	52.37	1.60	1.52	34.93	34.85	53.19	0.015
													TRC-2233	34.93	52.37	2.41	2.34	34.93	34.85	53.19	0.018
													TRD-2233	34.93	52.37	3.20	3.12	34.93	34.85	53.19	0.029
													TRE-2233	34.93	52.37	3.99	3.91	34.93	34.85	53.19	0.037
													TRF-2233	34.93	52.37	4.78	4.70	34.93	34.85	53.19	0.044
1 1/2	38.10	55.55	1.9837	40.39	52.578	NTA-2435	23.22	117.88	12.0	7 600		0.011	TRA-2435	38.10	55.55	0.81	0.76	38.10	38.02	56.36	0.008
													TRB-2435	38.10	55.55	1.60	1.52	38.10	38.02	56.36	0.015

[Notes] 1) Limiting speeds listed are based on adequate oil lubrication.
Suggestions for an application requiring O.D. piloting should be determined in consultation with JTEKT.

2) If the shaft and the housing adjacent to the bearing O.D. are not concentric, the T.I.R. between the shaft and housing should be added to this dimension.

Shaft dia. (1 1/2) ~ (2 1/2) in ((38.10) ~ (63.50) mm)



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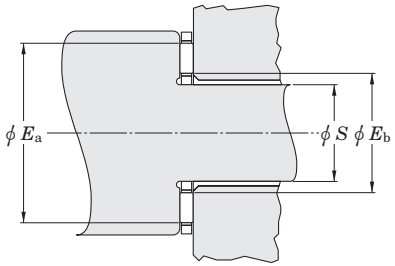
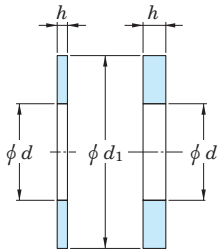
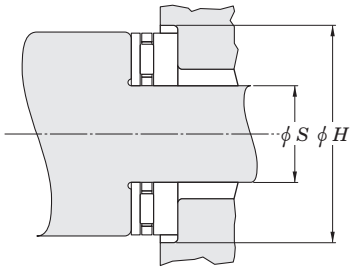


Raceway hardness to be 58 HRC or equivalent



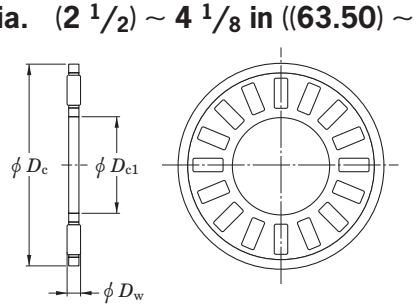


Shaft dia. (in)	Boundary dimensions (mm) D_{c1}	D_c	D_w	E_b	E_a	Bearing No.	Basic load ratings (kN) C_a	C_{0a}	Fatigue load limit (kN) C_u	Limiting speed [1] (min^{-1})	(Refer.) Mass (kg)	Washer No.	Washer dimensions (mm) d	d_1	h max.	h min.	Piloting dimensions (mm) S max.	S min.	Dia. to clear O.D. (mm) H [2]	(Refer.) Washer mass (kg)
1 1/2	38.10	55.55	1.9837	40.39	52.578	**NTA-2435**	23.22	117.88	12.0	7 600	0.011	TRC-2435	38.10	55.55	2.41	2.34	38.10	38.02	56.36	0.023
												TRD-2435	38.10	55.55	3.20	3.12	38.10	38.02	56.36	0.030
												TRF-2435	38.10	55.55	4.78	4.70	38.10	38.02	56.36	0.045
1 3/4	44.45	63.50	1.984	46.74	58.928	**NTA-2840**	25.31	137.45	14.0	6 800	0.014	TRA-2840	44.45	63.50	0.81	0.76	44.45	44.37	64.29	0.010
												TRB-2840	44.45	63.50	1.60	1.52	44.45	44.37	64.29	0.020
												TRC-2840	44.45	63.50	2.41	2.34	44.45	44.37	64.29	0.029
												TRD-2840	44.45	63.50	3.20	3.12	44.45	44.37	64.29	0.038
												TRF-2840	44.45	63.50	4.78	4.70	44.45	44.37	64.29	0.057
2	50.80	69.85	1.9837	53.09	65.278	**NTA-3244**	24.02	132.56	13.5	6 100	0.015	TRA-3244	50.80	69.85	0.81	0.76	50.80	50.72	70.64	0.011
												TRB-3244	50.80	69.85	1.60	1.52	50.80	50.72	70.64	0.022
												TRC-3244	50.80	69.85	2.41	2.34	50.80	50.72	70.64	0.033
												TRD-3244	50.80	69.85	3.20	3.12	50.80	50.72	70.64	0.044
												TRF-3244	50.80	69.85	4.78	4.70	50.80	50.72	70.64	0.066
2 1/8	53.98	73.025	1.984	56.39	68.58	**NTA-3446**	24.42	137.45	14.0	5 800	0.016	TRA-3446	53.98	73.03	0.81	0.76	53.98	53.90	73.81	0.012
												TRB-3446	53.98	73.03	1.60	1.52	53.98	53.90	73.81	0.024
												TRC-3446	53.98	73.03	2.41	2.34	53.98	53.90	73.81	0.035
												TRD-3446	53.98	73.03	3.20	3.12	53.98	53.90	73.81	0.047
2 1/4	57.15	76.20	1.984	59.44	71.628	**NTA-3648**	24.78	142.34	14.6	5 600	0.017	TRA-3648	57.15	76.20	0.81	0.76	57.15	57.07	76.99	0.012
												TRB-3648	57.15	76.20	1.60	1.52	57.15	57.07	76.99	0.022
												TRC-3648	57.15	76.20	2.41	2.34	57.15	57.07	76.99	0.037
												TRD-3648	57.15	76.20	3.20	3.12	57.15	57.07	76.99	0.048
												TRF-3648	57.15	76.20	4.78	4.70	57.15	57.07	76.99	0.071
	57.15	79.375	3.175	59.94	75.184	**NTA-3650**	37.68	177.04	18.6	5 300	0.029						57.15	57.07	76.99	
2 1/2	63.50	82.55	1.9837	65.79	77.978	**NTA-4052**	25.53	152.13	15.6	5 100	0.019	TRA-4052	63.50	82.55	0.81	0.76	63.50	63.42	83.34	0.013
												TRB-4052	63.50	82.55	1.60	1.52	63.50	63.42	83.34	0.027
												TRC-4052	63.50	82.55	2.41	2.34	63.50	63.42	83.34	0.041

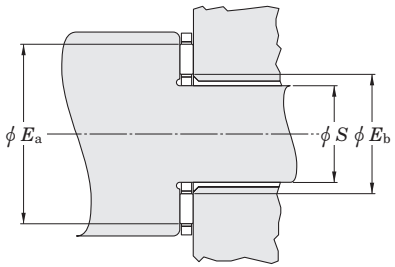
[Notes] 1) Limiting speeds listed are based on adequate oil lubrication.
Suggestions for an application requiring O.D. piloting should be determined in consultation with JTEKT.

2) If the shaft and the housing adjacent to the bearing O.D. are not concentric, the T.I.R. between the shaft and housing should be added to this dimension.

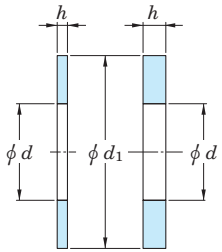
Shaft dia. (2 1/2) ~ 4 1/8 in ((63.50) ~ 104.78 mm)

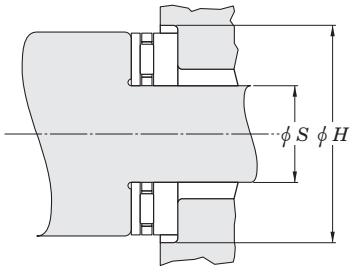


NTA



Raceway hardness to be 58 HRC or equivalent





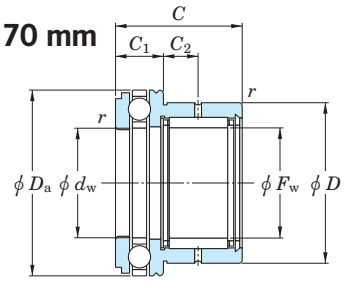
Shaft dia. (in)	Boundary dimensions (mm) D_{c1}	D_c	D_w	E_b	E_a	Bearing No.	Basic load ratings (kN) C_a	C_{0a}	Fatigue load limit (kN) C_u	Limiting speed [1] (min^{-1})	(Refer.) Mass (kg)	Washer No.	Washer dimensions (mm) d	d_1	h max.	h min.	Piloting dimensions (mm) S max.	S min.	Dia. to clear O.D. (mm) H [2]	(Refer.) Washer mass (kg)
2 1/2	63.50	82.55	1.9837	65.79	77.978	**NTA-4052**	25.53	152.13	15.6	5 100	0.019	TRC-4052	63.50	82.55	3.20	3.12	63.50	63.42	83.34	0.054
2 3/4	69.85	92.075	3.175	72.64	87.884	**NTA-4458**	47.60	255.8	26.8	4 600	0.037	TRA-4458	69.85	92.08	0.81	0.76	69.85	69.77	92.86	0.018
												TRB-4458	69.85	92.08	1.60	1.52	69.85	69.77	92.86	0.035
												TRC-4458	69.85	92.08	2.41	2.34	69.85	69.77	92.86	0.051
												TRD-4458	69.85	92.08	3.20	3.12	69.85	69.77	92.86	0.069
												TRF-4458	69.85	92.08	4.78	4.70	69.85	69.77	92.86	0.104
3	76.20	95.25	1.9837	78.49	90.678	**NTA-4860**	26.96	172.1	17.6	4 400	0.022	TRA-4860	76.20	95.25	0.81	0.76	76.20	76.12	96.04	0.015
												TRB-4860	76.20	95.25	1.60	1.52	76.20	76.12	96.04	0.032
												TRD-4860	76.20	95.25	3.20	3.12	76.20	76.12	96.04	0.061
3 1/4	82.55	104.78	3.175	85.34	100.58	**NTA-5266**	51.60	294.9	30.9	4 000	0.042	TRA-5266	82.55	104.78	0.81	0.76	82.55	82.47	105.56	0.020
												TRD-5266	82.55	104.78	3.20	3.12	82.55	82.47	105.56	0.080
3 3/4	95.25	117.48	3.175	98.04	113.28	**NTA-6074**	56.05	344.3	35.5	3 500	0.050	TRA-6074	95.25	117.48	0.81	0.76	95.25	95.17	118.26	0.023
												TRB-6074	95.25	117.48	1.60	1.52	95.25	95.17	118.26	0.046
												TRC-6074	95.25	117.48	2.41	2.34	95.25	95.17	118.26	0.069
												TRD-6074	95.25	117.48	3.20	3.12	95.25	95.17	118.26	0.092
4 1/8	104.78	128.57	3.175	107.44	124.46	**NTA-6681**	63.61	414.6	41.3	3 200	0.062	TRA-6681	104.78	128.57	0.81	0.76	104.78	104.70	129.39	0.027
												TRC-6681	104.78	128.57	2.41	2.34	104.78	104.70	129.39	0.081
												TRD-6681	104.78	128.57	3.20	3.12	104.78	104.70	129.39	0.109
												TRF-6681	104.78	128.57	4.78	4.70	104.78	104.70	129.39	0.161

[Notes] 1) Limiting speeds listed are based on adequate oil lubrication.
Suggestions for an application requiring O.D. piloting should be determined in consultation with JTEKT.

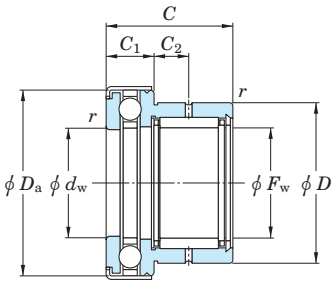
2) If the shaft and the housing adjacent to the bearing O.D. are not concentric, the T.I.R. between the shaft and housing should be added to this dimension.

Combined needle roller bearings
ball thrust series
metric series

Shaft dia. 10 ~ 70 mm



NAXK

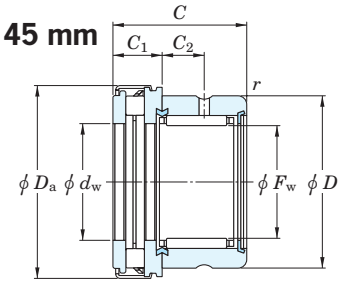


NAXK.Z

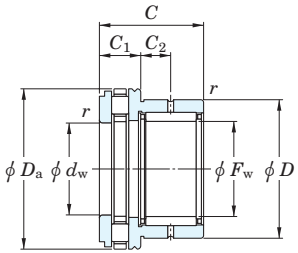
Shaft dia.	Boundary dimensions (mm) F_w	D	C	d_w (E7)	D_a	C_1	C_2	r min.	Bearing No.	Limiting speed (min^{-1}) Oil lub.	Basic load ratings (kN) Radial C_r	Radial C_{0r}	Thrust C_a	Thrust C_{0a}	Fatigue load limits (kN) C_u Radial	Thrust	(Refer.) Mass (kg)	Matching inner ring No.
10	10	19	23	10	24	9	6.5	0.3	**NAXK10**	9 500	7.9	8.7	10.4	14	1.35	0.630	0.04	JR7x10x16
	10	19	23	10	25	9	6.5	0.3	**NAXK10Z**	9 500	7.9	8.7	10.4	14	1.35	0.630	0.04	JR7x10x16
12	12	21	23	12	26	9	6.5	0.3	**NAXK12**	9 000	7.5	8.5	10.7	15.4	1.30	0.690	0.046	JR9x12x16
	12	21	23	12	27	9	6.5	0.3	**NAXK12Z**	9 000	7.5	8.5	10.7	15.4	1.30	0.690	0.047	JR9x12x16
15	15	24	23	15	28	9	6.5	0.3	**NAXK15**	8 500	9.7	12.6	10.9	16.8	1.90	0.760	0.047	JR12x15x16
	15	24	23	15	29	9	6.5	0.3	**NAXK15Z**	8 500	9.7	12.6	10.9	16.8	1.90	0.760	0.05	JR12x15x16
17	17	26	25	17	30	9	8	0.3	**NAXK17**	8 500	11.4	16.1	11.8	19.6	2.50	0.880	0.06	JR14x17x17
	17	26	25	17	31	9	8	0.3	**NAXK17Z**	8 500	11.4	16.1	11.8	19.6	2.50	0.880	0.064	JR14x17x17
20	20	30	30	20	35	10	10.5	0.3	**NAXK20**	7 000	14.8	23.7	15.5	26.6	3.65	1.20	0.089	JR17x20x20
	20	30	30	20	36	10	10.5	0.3	**NAXK20Z**	7 000	14.8	23.7	15.5	26.6	3.65	1.20	0.094	JR17x20x20
25	25	37	30	25	42	11	9.5	0.6	**NAXK25**	6 300	18.8	29.8	18.8	35.5	4.60	1.60	0.134	JR20x25x20
	25	37	30	25	43	11	9.5	0.6	**NAXK25Z**	6 300	18.8	29.8	18.8	35.5	4.60	1.60	0.141	JR20x25x20
30	30	42	30	30	47	11	9.5	0.6	**NAXK30**	5 600	20.2	34.6	19.5	39.9	5.35	2.15	0.146	JR25x30x20
	30	42	30	30	48	11	9.5	0.6	**NAXK30Z**	5 600	20.2	34.6	19.5	39.9	5.35	2.15	0.154	JR25x30x20
35	35	47	30	35	52	12	9	0.6	**NAXK35**	5 300	22.1	40.8	20.8	46.6	6.35	2.10	0.176	JR30x35x20
	35	47	30	35	53	12	9	0.6	**NAXK35Z**	5 300	22.1	40.8	20.8	46.6	6.35	2.10	0.184	JR30x35x20
40	40	52	32	40	60	13	10	0.6	**NAXK40**	4 500	23.8	47	28	62.9	7.30	2.85	0.224	JR35x40x20
	40	52	32	40	61	13	10	0.6	**NAXK40Z**	4 500	23.8	47	28	62.9	7.30	2.85	0.233	JR35x40x20
45	45	58	32	45	65	14	9	0.6	**NAXK45**	4 500	24.9	51.8	29	69.2	8.05	3.10	0.262	JR40x45x20
	45	58	32	45	66.5	14	9	0.6	**NAXK45Z**	4 500	24.9	51.8	29	69.2	8.05	3.10	0.275	JR40x45x20
50	50	62	35	50	70	14	10	0.6	**NAXK50**	4 300	30.2	68.5	29.9	75.5	10.7	3.40	0.316	JR45x50x25
	50	62	35	50	71.5	14	10	0.6	**NAXK50Z**	4 300	30.2	68.5	29.9	75.5	10.7	3.40	0.332	JR45x50x25
60	60	72	40	60	85	17	12	1	**NAXK60**	3 600	31.9	78.1	43	113	12.2	5.10	0.48	JR50x60x25
70	70	85	40	70	95	18	11	1	**NAXK70**	3 400	43.6	87.9	41.6	110	13.9	4.95	0.659	JR60x70x25

Combined needle roller bearings
cylindrical roller thrust series
metric series

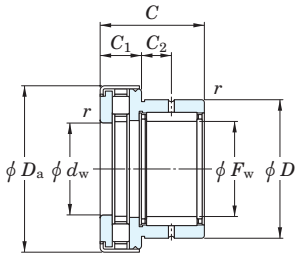
Shaft dia. 10 ~ 45 mm



RAXZ 500



NAXR

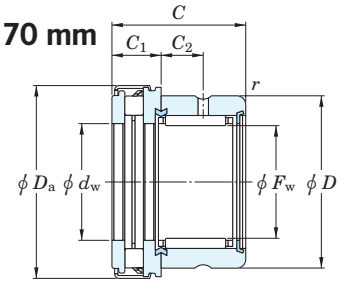


NAXR.Z

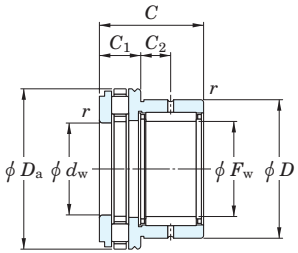
Shaft dia.	Boundary dimensions (mm) F_w	D	C	d_w (E7)	D_a	C_1	C_2	r min.	Bearing No. RAXZ	NAXR	NAXR.Z	Limiting speed (min^{-1})	Basic load ratings (kN) Radial C_r	C_{0r}	Thrust C_a	C_{0a}	Fatigue load limits (kN) C_u Radial	Thrust	(Refer.) Mass (kg)	Matching inner ring No.
10	10	19	21.5	10	22.4	7.5	6	0.35	**RAXZ 510**	—	—	15 500	5.9	7.2	8.2	17.9	1.15	1.85	0.026	IM 7 10 16 P
12	12	21	22	12	26.4	8	6	0.35	**RAXZ 512**	—	—	13 000	6.8	9.0	12.7	29.5	1.30	3.10	0.033	IM 9 12 16 P
15	15	24	23	15	28	9	6.5	0.3	—	**NAXR15**	—	12 000	9.7	12.6	12.1	26.3	2.30	3.70	0.032	JR12x15x16
	15	24	23	15	29	9	6.5	0.3	—	—	**NAXR15.Z**	12 000	9.7	12.6	12.1	26.3	2.30	3.70	0.035	JR12x15x16
	15	24	22	15	28.4	8	6	0.35	**RAXZ 515**	—	—	11 500	9.7	12.6	14.0	34.0	1.80	3.65	0.036	IM 12 15 16 P
17	17	26	25	17	30	9	8.0	0.3	—	**NAXR17**	—	11 000	11.4	16.1	12.6	28.6	2.70	4.05	0.050	JR14x17x17
	17	26	25	17	31	9	8.0	0.3	—	—	**NAXR17.Z**	11 000	11.4	16.1	12.6	28.6	2.70	4.05	0.053	JR14x17x17
	17	26	24	17	30.4	8	8	0.65	**RAXZ 517**	—	—	10 500	11.8	16.3	15.0	39.0	2.50	4.15	0.044	IM 14 17 17 P
20	20	30	30	20	35	10	10.5	0.3	—	**NAXR20TN**	—	9 500	14.8	23.7	23.6	56.8	4.00	8.00	0.090	JR17x20x20
	20	30	30	20	36	10	10.5	0.3	—	—	**NAXR20Z.TN**	9 500	14.8	23.7	23.6	56.8	4.00	8.00	0.095	JR17x20x20
	20	30	29	20	35.4	11	9	0.85	**RAXZ 520**	—	—	9 000	14.8	23.7	22.0	54.0	3.55	5.55	0.070	IM 15 20 20 P
25	25	37	30	25	42	11	9.5	0.6	—	**NAXR25TN**	—	8 000	18.8	29.8	31.2	81.0	4.80	11.4	0.146	JR20x25x20
	25	37	30	25	43	11	9.5	0.6	—	—	**NAXR25Z.TN**	8 000	18.8	29.8	31.2	81.0	4.80	11.4	0.152	JR20x25x20
	25	37	29	25	43	11	9	0.85	**RAXZ 525**	—	—	7 500	15.1	26.2	25.5	70.0	4.25	7.15	0.105	IM 20 25 20 P
30	30	42	30	30	47	11	9.5	0.6	—	**NAXR30TN**	—	6 700	20.2	34.6	33.0	91.1	6.10	12.8	0.162	JR25x30x20
	30	42	30	30	48	11	9.5	0.6	—	—	**NAXR30Z.TN**	6 700	20.2	34.6	33.0	91.1	6.10	12.8	0.169	JR25x30x20
	30	42	29	30	48	11	9	0.85	**RAXZ 530**	—	—	6 500	20.2	34.6	26.5	77.0	5.25	7.90	0.118	IM 25 30 20 P
35	35	47	30	35	52	12	9.0	0.6	—	**NAXR35**	—	6 000	22.1	40.8	30.9	86.0	7.05	12.1	0.186	JR30x35x20
	35	47	30	35	53	12	9.0	0.6	—	—	**NAXR35.Z**	6 000	22.1	40.8	30.9	86.0	7.05	12.1	0.195	JR30x35x20
	35	47	30	35	54	12	9	0.85	**RAXZ 535**	—	—	5 500	22.1	40.8	33.8	94.0	6.15	8.80	0.146	IM 30 35 20 P
40	40	52	32	40	60	13	10.0	0.6	—	**NAXR40**	—	5 300	23.8	47.0	44.5	126.0	8.05	12.0	0.288	JR35x40x20
	40	52	32	40	61	13	10.0	0.6	—	—	**NAXR40.Z**	5 300	23.8	47.0	44.5	126.0	8.05	12.0	0.299	JR35x40x20
	40	52	31	40	61	13	9	0.85	**RAXZ 540**	—	—	5 000	23.8	47.0	46.0	129.0	7.00	5.95	0.174	IM 35 40 20 P
45	45	58	32	45	65	14	9.0	0.6	—	**NAXR45TN**	—	4 800	24.9	51.8	47.0	140.0	9.00	15.5	0.360	JR40x45x20
	45	58	32	45	66	14	9.0	0.6	—	—	**NAXR45Z.TN**	4 800	24.9	51.8	47.0	140.0	9.00	15.5	0.370	JR40x45x20
	45	58	31	45	66	13	9	0.85	**RAXZ 545**	—	—	4 500	24.9	51.8	49.0	143.0	7.90	6.60	0.206	IM 40 45 20 P

Combined needle roller bearings
cylindrical roller thrust series
metric series

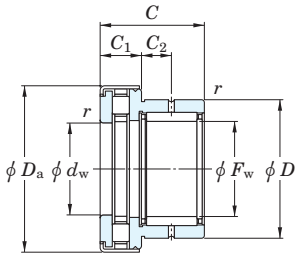
Shaft dia. 50 ~ 70 mm



RAXZ 500



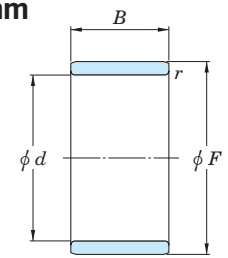
NAXR



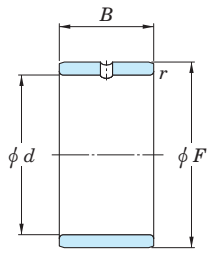
NAXR.Z

Shaft dia.	Boundary dimensions (mm) F_w	D	C	d_w (E7)	D_a	C_1	C_2	r min.	Bearing No. RAXZ	NAXR	NAXR.Z	Limiting speed (min^{-1})	Basic load ratings (kN) Radial C_r	Radial C_{0r}	Thrust C_a	Thrust C_{0a}	Fatigue load limits (kN) C_u Radial	Thrust	(Refer.) Mass (kg)	Matching inner ring No.
50	50	62	35	50	70	14	10.0	0.6	—	**NAXR50**	—	4 300	30.2	68.5	49.7	155.0	12.5	14.8	0.432	JR45x50x25
	50	62	35	50	71	14	10.0	0.6	—	—	**NAXR50.Z**	4 300	30.2	68.5	49.7	155.0	12.5	14.8	0.452	JR45x50x25
	50	62	34	50	71	13	11	1.3	**RAXZ 550**	—	—	4 000	30.2	68.5	51.0	157.0	9.60	7.25	0.232	IM 45 50 25 P
60	60	72	36	60	86	15	11	1.3	**RAXZ 560**	—	—	3 500	31.9	78.1	71.0	255.0	11.5	18.4	0.327	IM 55 60 25 P
70	70	85	36	70	96	15	11	1.3	**RAXZ 570**	—	—	3 000	36.1	84.7	77.0	295.0	13.3	21.2	0.435	IM 60 70 25 P

Shaft dia. 5 ~ (10) mm



JR, IM..P

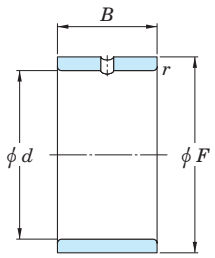


JR.JS1

Shaft dia.	Boundary dimensions (mm) d	F	B	r min.	Bearing No.	(Refer.) Mass (kg)
5	5	8	8	0.3	JR5x8x8JS1	0.002
	5	8	12	0.3	JR5x8x12	0.003
	5	8	16	0.3	JR5x8x16	0.004
6	6	9	8	0.3	JR6x9x8JS1	0.002
	6	9	12	0.3	JR6x9x12	0.003
	6	9	16	0.3	JR6x9x16	0.004
	6	10	10	0.3	JR6x10x10	0.004
	6	10	10	0.3	JR6x10x10JS1	0.004
	6	10	12	0.3	JRZ6x10x12JS1	0.005
7	7	10	10.5	0.3	JR7x10x10,5	0.003
	7	10	12	0.3	JR7x10x12	0.004
	7	10	16	0.3	JR7x10x16	0.005
8	8	12	10	0.3	JR8x12x10	0.005
	8	12	10	0.3	JR8x12x10JS1	0.005
	8	12	10.5	0.3	JR8x12x10,5	0.005
	8	12	12	0.3	JRZ8xl2x12JS1	0.006
	8	12	12.5	0.3	JR8x12x12,5	0.006
	8	12	16	0.3	IM 8 12 16 P	0.007
9	9	12	12	0.3	JR9x12x12	0.005
	9	12	16	0.3	JR9x12x16	0.006
10	10	13	12.5	0.3	JR10x13x12,5	0.005
	10	14	11	0.3	JR10x14x11JS1	0.007
	10	14	12	0.3	JR10x14x12	0.007
	10	14	12	0.3	JR10x14x12JS1	0.007
	10	14	13	0.3	JR10x14x13	0.007
	10	14	14	0.3	JRZ10x14x14JS1	0.008
	10	14	16	0.3	JR10x14x16	0.009

[Note] 1) Please contact JTEKT about outside diameter tolerance.

Shaft dia. (10) ~ (15) mm

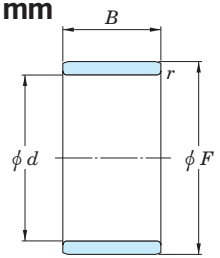


JRZ.JS1

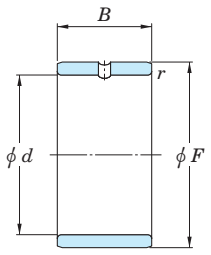
Shaft dia.	Boundary dimensions (mm) d	F	B	r min.	Bearing No.	(Refer.) Mass (kg)
10	10	14	20	0.3	JR10x14x20	0.012
12	12	15	12.5	0.3	JR12x15x12,5	0.006
	12	15	16	0.3	JR12x15x16	0.008
	12	15	16.5	0.3	JR12x15x16,5	0.008
	12	15	18.5	0.3	JR12x15x18,5	0.009
	12	15	22.4	0.2	IM 12 15 22,4 P	0.011
	12	15	22.5	0.3	JR12x15x22,5	0.011
	12	16	12	0.3	JR12x16x12	0.008
	12	16	12	0.3	JR12x16x12JS1	0.008
	12	16	13	0.3	JR12x16x13	0.008
	12	16	14	0.3	JRZ12x16x14JS1	0.010
	12	16	16	0.3	JR12x16x16	0.011
	12	16	20	0.3	JR12x16x20	0.014
	12	16	22	0.3	JR12x16x22	0.015
13	13	18	16	0.35	IM 13 18 16 P	0.015
14	14	17	17	0.3	JR14x17x17	0.009
15	15	18	16.5	0.3	JR15x18x16,5	0.010
	15	19	16	0.3	JR15x19x16	0.013
	15	19	20	0.3	JR15x19x20	0.017
	15	20	12	0.3	JR15x20x12	0.012
	15	20	12	0.3	JR15x20x12JS1	0.012
	15	20	13	0.3	JR15x20x13	0.014
	15	20	14	0.3	JRZ15x20x14JS1	0.015
	15	20	16	0.3	JR15x20x16	0.017
	15	20	20	0.35	IM 15 20 20 P	0.021
	15	20	23	0.3	JR15x20x23	0.025

[Note] 1) Please contact JTEKT about outside diameter tolerance.

Shaft dia. (15) ~ (20) mm



JR, IM..P

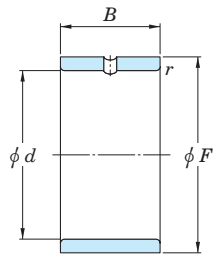


JR.JS1

Shaft dia.	Boundary dimensions (mm) d	F	B	r min.	Bearing No.	(Refer.) Mass (kg)
15	15	20	26	0.3	**JR15x20x26**	0.028
17	17	20	16.5	0.3	**JR17x20x16,5**	0.011
	17	20	20	0.3	**JR17x20x20**	0.014
	17	20	20.5	0.3	**JR17x20x20,5**	0.014
	17	20	30.5	0.3	**JR17x20x30,5**	0.021
	17	21	16	0.3	**JR17x21x16**	0.015
	17	21	20	0.3	**JR17x21x20**	0.019
	17	22	13	0.3	**JR17x22x13**	0.015
	17	22[1)]	13	0.35	**IM 4903**	0.015
	17	22	16	0.3	**JR17x22x16**	0.019
	17	22	16	0.3	**JR17x22x16JS1**	0.019
	17	22	16	0.3	**JRZ17x22x16JS1**	0.019
	17	22	20	0.35	**IM 17 22 20 P**	0.023
	17	22	23	0.3	**JR17x22x23**	0.028
	17	22	26	0.3	**JR17x22x26**	0.031
	17	22	32	0.3	**JR17x22x32**	0.038
20	20	24	16	0.3	**JR20x24x16**	0.018
	20	24	20	0.3	**JR20x24x20**	0.022
	20	25	16	0.3	**JR20x25x16**	0.022
	20	25	16	0.3	**JR20x25x16JS1**	0.022
	20	25	17	0.3	**JR20x25x17**	0.023
	20	25	18	0.3	**JRZ20x25x18JS1**	0.025
	20	25	20	0.3	**JR20x25x20**	0.028
	20	25	20.5	0.3	**JR20x25x20,5**	0.029
	20	25	26	0.3	**JR20x25x26**	0.036
	20	25	26.5	0.3	**JR20x25x26,5**	0.037
	20	25	30	0.3	**JR20x25x30**	0.042
	20	25	32	0.3	**JR20x25x32**	0.044

[Note] 1) Please contact JTEKT about outside diameter tolerance.

Shaft dia. (20) ~ (30) mm



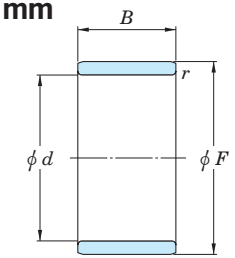
JRZ.JS1

Shaft dia.	Boundary dimensions (mm) d	F	B	r min.	Bearing No.	(Refer.) Mass (kg)
20	20	25	38.5	0.3	**JR20x25x38,5**	0.054
22	22	26	16	0.3	**JR22x26x16**	0.019
	22	26	20	0.3	**JR22x26x20**	0.023
	22	28	17	0.3	**JR22x28x17**	0.030
	22	28	20.5	0.3	**JR22x28x20,5**	0.038
	22	28	30	0.3	**JR22x28x30**	0.056
23	23	28	20	0.35	**IM 23 28 20 P**	0.030
25	25	29	20	0.3	**JR25x29x20**	0.027
	25	29	30	0.3	**JR25x29x30**	0.040
	25	30	16	0.3	**JR25x30x16**	0.027
	25	30	16	0.3	**JR25x30x16JS1**	0.027
	25	30	17	0.3	**JR25x30x17**	0.028
	25	30	18	0.3	**JRZ25x30x18JS1**	0.031
	25	30	20	0.3	**JR25x30x20**	0.034
	25	30	20.5	0.3	**JR25x30x20,5**	0.035
	25	30	26	0.3	**JR25x30x26**	0.044
	25	30	26.5	0.3	**JR25x30x26,5**	0.045
	25	30	30	0.3	**JR25x30x30**	0.051
	25	30	32	0.3	**JR25x30x32**	0.054
	25	30	38.5	0.3	**JR25x30x38,5**	0.066
28	28	32	17	0.3	**JR28x32x17**	0.028
	28	32	20	0.3	**JR28x32x20**	0.030
	28	32	30	0.3	**JR28x32x30**	0.044
30	30	35	16	0.3	**JR30x35x16**	0.031
	30	35	17	0.3	**JR30x35x17**	0.033
	30	35[1)]	17	0.35	**IM 4906**	0.033

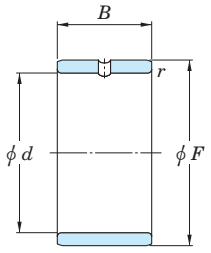
[Note] 1) Please contact JTEKT about outside diameter tolerance.

Needle roller bearings, accessories
inner rings
metric series

Shaft dia. (30) ~ 38 mm



JR, IM..P

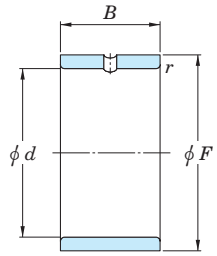


JR.JS1

Shaft dia.	Boundary dimensions (mm) d	F	B	r min.	Bearing No.	(Refer.) Mass (kg)
30	30	35	18	0.3	**JRZ30x35x18JS1**	0.036
	30	35	20	0.3	**JR30x35x20**	0.039
	30	35	20	0.3	**JRZ30x35x20JS1**	0.039
	30	35	20.5	0.3	**JR30x35x20,5**	0.040
	30	35	26	0.3	**JR30x35x26**	0.054
	30	35	30	0.3	**JR30x35x30**	0.057
	30	35	32	0.3	**JR30x35x32**	0.062
	30	38	20	0.6	**JR30x38x20JS1**	0.067
32	32	37	20	0.3	**JR32x37x20**	0.043
	32	37	30	0.3	**JR32x37x30**	0.064
	32	40	20	0.6	**JR32x40x20**	0.069
	32	40	36	0.6	**JR32x40x36**	0.128
35	35	40	17	0.3	**JR35x40x17**	0.040
	35	40	20	0.3	**JR35x40x20**	0.046
	35	40	20.5	0.3	**JR35x40x20,5**	0.049
	35	40	22	0.3	**JR35x40x22**	0.052
	35	40	30	0.3	**JR35x40x30**	0.071
	35	40	34	0.3	**JR35x40x34**	0.080
	35	40	40	0.3	**JR35x40x40**	0.094
	35	42	20	0.6	**JR35x42x20**	0.065
	35	42	20	0.6	**JR35x42x20JS1**	0.065
	35	42	23	0.6	**JRZ35x42x23JS1**	0.074
	35	42	36	0.6	**JR35x42x36**	0.122
	35	44	22	0.6	**JR35x44x22**	0.097
37	37	42	20	0.35	**IM 37 42 20 P**	0.046
38	38	43	20	0.3	**JR38x43x20**	0.050
	38	43	30	0.3	**JR38x43x30**	0.075

[Note] 1) Please contact JTEKT about outside diameter tolerance.

Shaft dia. 40 ~ 45 mm



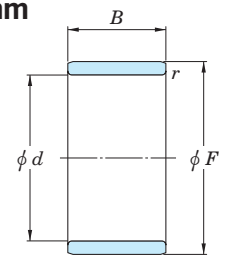
JRZ.JS1

Shaft dia.	Boundary dimensions (mm) d	F	B	r min.	Bearing No.	(Refer.) Mass (kg)
40	40	45	17	0.3	**JR40x45x17**	0.044
	40	45	20	0.3	**JR40x45x20**	0.052
	40	45	20.5	0.3	**JR40x45x20,5**	0.054
	40	45	25	0.35	**IM 40 45 25 P**	0.062
	40	45	30	0.3	**JR40x45x30**	0.078
	40	45	34	0.3	**JR40x45x34**	0.089
	40	45	40	0.3	**JR40x45x40**	0.115
	40	48	22	0.6	**JR40x48x22**	0.094
	40	48	23	0.6	**JRZ40x48x23JS1**	0.100
	40	48	40	0.6	**JR40x48x40**	0.173
	40	50	20	1	**JR40x50x20**	0.110
42	42	47	20	0.3	**JR42x47x20**	0.055
	42	47	30	0.3	**JR42x47x30**	0.083
45	45	50	20	0.3	**JR45x50x20**	0.058
	45	50	25	0.6	**JR45x50x25**	0.073
	45	50	25.5	0.3	**JR45x50x25,5**	0.075
	45	50	35	0.6	**JR45x50x35**	0.103
	45	50	40	0.3	**JR45x50x40**	0.117
	45	52	22	0.6	**JR45x52x22**	0.090
	45	52[1)]	22	0.85	**IM 4909**	0.087
	45	52	23	0.6	**JR45x52x23**	0.096
	45	52	23	0.6	**JRZ45x52x23JS1**	0.096
	45	52	40	0.6	**JR45x52x40**	0.167
	45	55	20	1	**JR45x55x20**	0.133
	45	55	20	1	**JR45x55x20JS1**	0.133
	45	55	22	1	**JR45x55x22**	0.135
	45	55	40	1	**JR45x55x40**	0.247

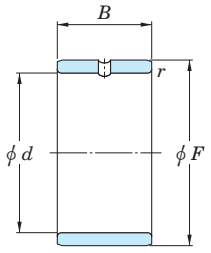
[Note] 1) Please contact JTEKT about outside diameter tolerance.

Needle roller bearings, accessories
inner rings
metric series

Shaft dia. 50 ~ 60 mm



JR, IM..P

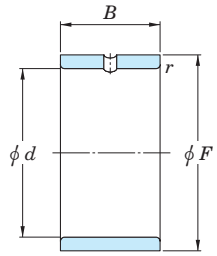


JR.JS1

Shaft dia.	Boundary dimensions (mm) d	F	B	r min.	Bearing No.	(Refer.) Mass (kg)
50	50	55	20	0.3	JR50x55x20	0.065
	50	55	25	0.6	JR50x55x25	0.081
	50	55	35	0.65	IM 50 55 35 P	0.107
	50	55	35	0.6	JR50x55x35	0.113
	50	55	40	0.3	JR50x55x40	0.130
	50	58	22	0.6	JR50x58x22	0.117
	50	58	23	0.6	JRZ50x58x23JS1	0.122
	50	58	40	0.6	JR50x58x40	0.213
	50	60	20	1	JR50x60x20	0.155
	50	60	20	1	JR50x60x20JS1	0.155
	50	60	25	1	JR50x60x25	0.170
	50	60	40	1	JR50x60x40	0.310
55	55	60	25	0.6	JR55x60x25	0.088
	55	60	35	0.65	IM 55 60 35 P	0.118
	55	60	35	0.6	JR55x60x35	0.124
	55	63	25	1	JR55x63x25	0.141
	55	63	45	1	JR55x63x45	0.286
	55	65	30	1	JR55x65x30	0.222
	55	65	60	1	JR55x65x60	0.444
58	58	65	25	0.85	IM 58 65 25 P	0.125
60	60	68	25	0.6	JR60x68x25	0.153
	60	68	35	0.6	JR60x68x35	0.220
	60	68	45	1	JR60x68x45	0.284
	60	70	25	1	JR60x70x25	0.200
	60	70	30	1	JR60x70x30	0.240
	60	70	35	0.85	IM 60 70 35 P	0.280
	60	70	60	1	JR60x70x60	0.480

[Note] 1) Please contact JTEKT about outside diameter tolerance.

Shaft dia. 65 ~ (90) mm

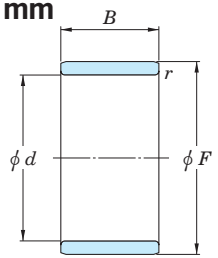


JRZ.JS1

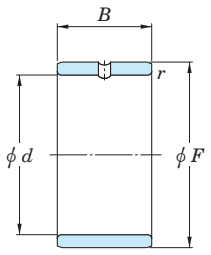
Shaft dia.	Boundary dimensions (mm) d	F	B	r min.	Bearing No.	(Refer.) Mass (kg)
65	65	72	25	1	JR65x72x25	0.143
	65	72	45	1	JR65x72x45	0.266
	65	73	25	0.6	JR65x73x25	0.170
	65	73	35	0.6	JR65x73x35	0.240
	65	75	28	1	JR65x75x28	0.240
	65	75	30	1	JR65x75x30	0.260
	65	75	60	1	JR65x75x60	0.520
70	70	80	25	1	JR70x80x25	0.230
	70	80	30	1	JR70x80x30	0.270
	70	80	35	1	JR70x80x35	0.320
	70	80	54	1	JR70x80x54	0.500
	70	80	60	1	JR70x80x60	0.556
75	75	85	25	1	JR75x85x25	0.240
	75	85	30	1	JR75x85x30	0.289
	75	85	35	1	JR75x85x35	0.338
	75	85	54	1	JR75x85x54	0.530
80	80	90	25	1	JR80x90x25	0.260
	80	90	30	1	JR80x90x30	0.306
	80	90	35	1	JR80x90x35	0.355
	80	90	54	1	JR80x90x54	0.565
85	85	95	26	1	JR85x95x26	0.290
	85	95	30	1	JR85x95x30	0.334
	85	95	36	1	JR85x95x36	0.397
	85	100	35	1.1	JR85x100x35	0.595
	85	100	63	1.1	JR85x100x63	1.080
90	90	100	26	1	JR90x100x26	0.300

[Note] 1) Please contact JTEKT about outside diameter tolerance.

Shaft dia. (90) ~ 170 mm



JR, IM..P

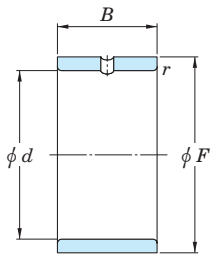


JR.JS1

Shaft dia.	Boundary dimensions (mm) d	F	B	r min.	Bearing No.	(Refer.) Mass (kg)
90	90	100	30	1	**JR90x100x30**	0.350
	90	100	36	1	**JR90x100x36**	0.422
	90	105	32	1.1	**JR90x105x32**	0.580
	90	105	35	1.1	**JR90x105x35**	0.624
	90	105	63	1.1	**JR90x105x63**	1.140
95	95	105	26	1	**JR95x105x26**	0.310
	95	105	36	1	**JR95x105x36**	0.430
	95	110	35	1.1	**JR95x110x35**	0.653
	95	110	63	1.1	**JR95x110x63**	1.200
100	100	110	30	1.1	**JR100x110x30**	0.384
	100	110	40	1.1	**JR100x110x40**	0.510
	100	115	40	1.1	**JR100x115x40**	0.790
110	110	120	30	1	**JR110x120x30**	0.425
	110	125	40	1.1	**JR110x125x40**	0.870
120	120	130	30	1	**JR120x130x30**	0.460
	120	135	45	1.1	**JR120x135x45**	1.060
130	130	145	35	1.1	**JR130x145x35**	0.890
	130	150	50	1.5	**JR130x150x50**	1.730
140	140	155	35	1.1	**JR140x155x35**	0.955
	140	160	50	1.5	**JR140x160x50**	1.860
150	150	165	40	1.1	**JR150x165x40**	1.170
160	160	175	40	1.1	**JR160x175x40**	1.240
170	170	185	45	1.1	**JR170x185x45**	1.480

[Note] 1) Please contact JTEKT about outside diameter tolerance.

Shaft dia. 180 mm

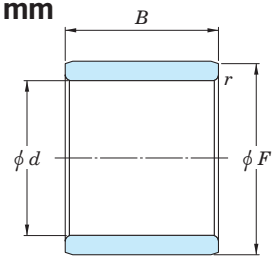


JRZ.JS1

Shaft dia.	Boundary dimensions (mm) d	F	B	r min.	Bearing No.	(Refer.) Mass (kg)
180	180	195	45	1.1	**JR180x195x45**	1.560

[Note] 1) Please contact JTEKT about outside diameter tolerance.

Shaft dia. 17 ~ 45 mm



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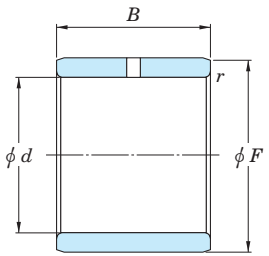
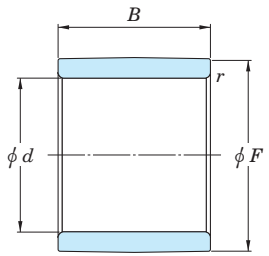


IMC

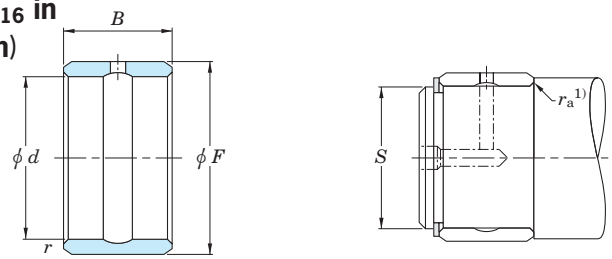


IM...R6

Shaft dia.	Boundary dimensions (mm) d	F [1]	B	r min.	Bearing No.	(Refer.) Mass (kg)
17	17	20	27.5	0.2	**IM 19017**	0.019
	17	20	32	0.2	**IM 20617**	0.021
20	20	25	27.5	0.35	**IM 19020**	0.038
	20	25	32	0.35	**IM 20620**	0.044
25	25	30	27.5	0.35	**IM 19025**	0.042
	25	30	32	0.35	**IM 20625**	0.052
30	30	35	27.5	0.35	**IM 19030**	0.053
	30	35	32	0.35	**IM 20630**	0.061
35	35	40	27.5	0.35	**IM 19035**	0.063
	35	40	32	0.35	**IM 20635**	0.072
40	40	45	27.5	0.35	**IM 19040**	0.069
	40	45	32	0.35	**IM 20640**	0.080
45	45	50	30.5	0.65	**IM 19045**	0.085
	45	50	35	0.65	**IM 20645**	0.096

[Note] 1) Please contact JTEKT about outside diameter tolerance.

Shaft dia. 3/8 ~ 1 5/16 in (9.525 ~ 33.338 mm)



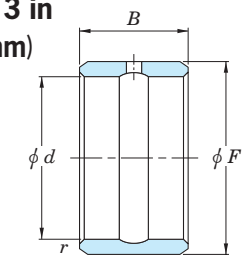
Shaft dia. (in)	Boundary dimensions (mm) d	F	B	r min.	Inner ring No.	(Refer.) Mass (kg)	Shaft dia. (mm) Loose transition fit max.	Loose transition fit min.	Interference fit max.	Interference fit min.	Used with bearing No.
3/8	9.525	15.875	19.05	0.64	IR-061012	0.018	9.520	9.510	9.538	9.530	HJ-101812
1/2	12.700	19.050	19.05	1.02	IR-081212	0.023	12.692	12.682	12.715	12.708	HJ-122012
	12.700	19.050	25.40	1.02	IR-081216	0.032	12.692	12.682	12.715	12.708	HJ-122016
5/8	15.875	22.225	19.05	1.02	IR-101412	0.027	15.867	15.857	15.890	15.883	HJ-142212
	15.875	22.225	25.40	1.02	IR-101416	0.036	15.867	15.857	15.890	15.883	HJ-142216
11/16	17.463	22.225	19.05	1.02	IR-111412	0.023	17.455	17.445	17.478	17.470	HJ-142212
3/4	19.050	25.400	19.05	1.02	IR-121612	0.032	19.042	19.030	19.068	19.058	HJ-162412
	19.050	25.400	25.40	1.02	IR-121616	0.041	19.042	19.030	19.068	19.058	HJ-162416
13/16	20.638	25.400	25.40	1.02	IR-131616	0.032	20.630	20.617	20.655	20.645	HJ-162416
7/8	22.225	28.575	25.40	1.02	IR-141816	0.050	22.217	22.205	22.243	22.233	HJ-182616
	22.225	28.575	31.75	1.02	IR-141820	0.059	22.217	22.205	22.243	22.233	HJ-182620
15/16	23.813	28.575	25.40	1.02	IR-151816	0.036	23.805	23.792	23.830	23.820	HJ-182616
	23.813	28.575	31.75	1.02	IR-151820	0.045	23.805	23.792	23.830	23.820	HJ-182620
1	25.400	31.750	25.40	1.02	IR-162016	0.054	25.392	25.380	25.418	25.408	HJ-202816
	25.400	31.750	31.75	1.02	IR-162020	0.068	25.392	25.380	25.418	25.408	HJ-202820
1 1/8	28.575	34.925	25.40	1.02	IR-182216	0.059	28.567	28.555	28.593	28.583	HJ-223016
	28.575	34.925	31.75	1.02	IR-182220	0.077	28.567	28.555	28.593	28.583	HJ-223020
1 1/16	30.163	38.100	31.75	1.52	IR-192420	0.100	30.155	30.142	30.180	30.170	HJ-243320
1 1/4	31.750	38.100	25.40	1.52	IR-202416	0.068	31.740	31.725	31.770	31.760	HJ-243316
	31.750	38.100	31.75	1.52	IR-202420	0.082	31.740	31.725	31.770	31.760	HJ-243320
1 5/16	33.338	41.275	25.40	1.52	IR-212616	0.086	33.327	33.312	33.358	33.348	HJ-263516
	33.338	41.275	31.75	1.52	IR-212620	0.109	33.327	33.312	33.358	33.348	HJ-263520

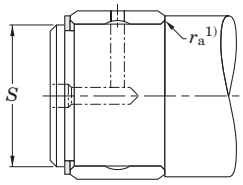
[Note] 1) $r_{a\,max}$ is equal to the minimum bearing chamfer ($r_{s\,min}$).

Shaft dia. 1 3/8 ~ (2 1/2) in (34.925 ~ (63.500) mm)

Shaft dia. (in)	Boundary dimensions (mm) d	F	B	r min.	Inner ring No.	(Refer.) Mass (kg)	Shaft dia. (mm) Loose transition fit max.	Loose transition fit min.	Interference fit max.	Interference fit min.	Used with bearing No.
1 3/8	34.925	41.275	31.75	1.52	IR-222620	0.091	34.915	34.900	34.945	34.935	HJ-263520
	34.925	44.450	31.75	1.52	IR-222820	0.141	34.915	34.900	34.945	34.935	HJ-283720
1 7/16	36.513	44.450	25.40	1.52	IR-232816	0.095	36.502	36.487	36.533	36.523	HJ-283716
	36.513	44.450	31.75	1.52	IR-232820	0.118	36.502	36.487	36.533	36.523	HJ-283720
1 1/2	38.100	44.450	25.40	1.52	IR-242816	0.077	38.090	38.075	38.120	38.110	HJ-283716
	38.100	44.450	31.75	1.52	IR-242820	0.095	38.090	38.075	38.120	38.110	HJ-283720
	38.100	50.800	31.75	1.52	IR-243220	0.209	38.090	38.075	38.120	38.110	HJ-324120
1 9/16	39.688	47.625	31.75	1.52	IR-253020	0.127	39.677	39.662	39.708	39.698	HJ-303920
	39.688	50.800	31.75	1.52	IR-253220	0.186	39.677	39.662	39.708	39.698	HJ-324120
1 5/8	41.275	50.800	31.75	1.52	IR-263220	0.163	41.265	41.250	41.295	41.285	HJ-324120
1 11/16	42.863	50.800	25.40	1.52	IR-273216	0.109	42.852	42.837	42.883	42.873	HJ-324116
	42.863	50.800	31.75	1.52	IR-273220	0.136	42.852	42.837	42.883	42.873	HJ-324120
1 3/4	44.450	57.150	38.10	1.52	IR-283624	0.286	44.440	44.425	44.470	44.460	HJ-364824
	44.450	57.150	44.45	1.52	IR-283628	0.336	44.440	44.425	44.470	44.460	HJ-364828
1 15/16	49.213	63.500	38.10	2.03	IR-314024	0.358	49.202	49.187	49.233	49.223	HJ-405224
	49.213	63.500	44.45	2.03	IR-314028	0.417	49.202	49.187	49.233	49.223	HJ-405228
2	50.800	63.500	38.10	2.03	IR-324024	0.322	50.790	50.772	50.823	50.810	HJ-405224
	50.800	63.500	44.45	2.03	IR-324028	0.376	50.790	50.772	50.823	50.810	HJ-405228
2 3/16	55.563	69.850	44.45	2.03	IR-354428	0.467	55.552	55.535	55.585	55.573	HJ-445628
2 1/4	57.150	69.850	38.10	2.03	IR-364424	0.358	57.140	57.122	57.173	57.160	HJ-445624
	57.150	69.850	44.45	2.03	IR-364428	0.417	57.140	57.122	57.173	57.160	HJ-445628
2 3/8	60.325	76.200	44.45	2.03	IR-384828	0.562	60.315	60.297	60.348	60.335	HJ-486028
2 1/2	63.500	76.200	38.10	2.03	IR-404824	0.395	63.490	63.472	63.523	63.510	HJ-486024

Shaft dia. (2 1/2) ~ 3 in ((63.500) ~ 76.200 mm)





Shaft dia. (in)	Boundary dimensions (mm) d	F	B	r min.	Inner ring No.	(Refer.) Mass (kg)	Shaft dia. (mm) Loose transition fit max.	Loose transition fit min.	Interference fit max.	Interference fit min.	Used with bearing No.
2 1/2	63.500	76.200	44.45	2.03	**IR-404828**	0.463	63.490	63.472	63.523	63.510	**HJ-486028**
2 3/4	69.850	82.550	44.45	2.03	**IR-445228**	0.503	69.840	69.822	69.873	69.860	**HJ-526828**
	69.850	82.550	50.80	2.03	**IR-445232**	0.576	69.840	69.822	69.873	69.860	**HJ-526832**
2 15/16	74.613	88.900	50.80	2.03	**IR-475632**	0.694	74.602	74.585	74.635	74.623	**HJ-567232**
3	76.200	88.900	50.80	2.03	**IR-485632**	0.621	76.190	76.172	76.223	76.210	**HJ-567232**

[Note] 1) $r_{a\,max}$ is equal to the minimum bearing chamfer ($r_{s\,min}$).

Miniature one-way clutches

Miniature one-way clutches consist of a case carburizing steel drawn cup, metal or synthetic resin spring, synthetic resin cage and needle rollers.

They are used in clutch mechanisms of various machines. Use in office automation equipment such as copying and facsimile machines is especially common.

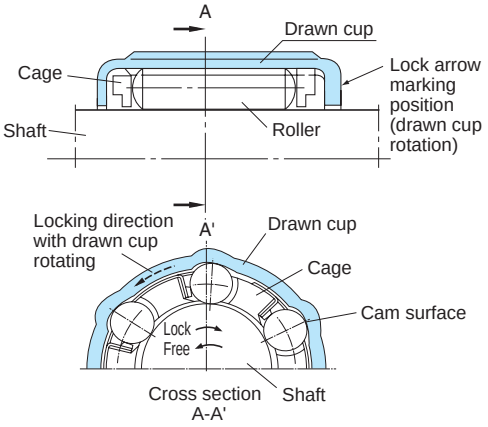
- Useful for making equipment smaller and lighter, due to a drawn cup made of thin sheet steel.
- Locking protrusions are provided around the drawn cup, so that creeping can be prevented without having to hold the surface dimensional accuracy precisely.
- Pre-lubricated with optimum grease, so that no lubrication is necessary under normal operating conditions.
- Unit products with a synthetic resin housing are also available.
  They are compatible with components of various types, such as gears, timing pulleys, cams and rubber rollers. Consult with JTEKT for further information.

1WC series

EWC series

Various housings and unit products

Structure and principles



[When the clutch system works]

When the shaft rotates clockwise as in cross section A-A', rollers are locked while engaged with the drawn cup cam surfaces by the effect of springs (wedging of the shaft by the cam surfaces). The drawn cup is driven as a consequence.

[Clutch idle running]

When the shaft rotates counter-clockwise as in cross section A-A', rollers move away from the drawn cup cam surfaces and rotate freely.

Miniature one-way clutch types and characteristics

	1WC series (with metal springs)	EWC series (with synthetic resin springs)	
	Heavy load type	Heavy load type	Light load type
	1WC...	EWC...C	EWC...A
Torque capacity	Heavy load	Heavy load	Light load
Operating temperature range	– 10 to + 90°C	– 10 to + 70°C	
Locking life	Locking system can function more than one million. (Note : this estimation is valid as long as torque magnitude does not exceed the torque capacity shown in the specification table.)		
Insert molding	Possible	Impossible	
Delivery of clutch only	Possible		
Unit delivery	Possible		

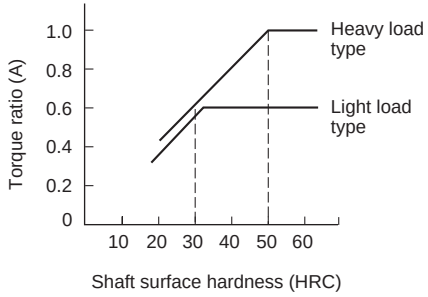
Shaft tolerance

	Heavy load type (1WC... , EWC...C)	Light load type (EWC...A)
Shaft tolerance class	h 8	
Surface hardness	50 HRC or harder	30 HRC or harder
Roughness (Ra)	0.3 a or less	0.8 a or less
Roundness and cylindricity	0.005 mm or less	

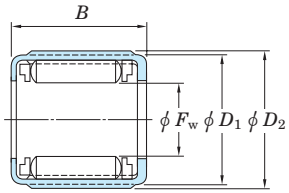
[Remarks] In some operating conditions, shafts need not be as accurate as shown here.
For example :

1. When clutch engaging accuracy is considered unimportant, or when a radial load or moment is not generated, the shaft diameter tolerance can be :
   { shaft diameter 6 mm or less, and EWC0809 (C, A) : 0 to – 0.040 mm
   shaft diameter 8 mm or more : h 10
2. When the loaded torque is smaller than the torque capacity, shaft surface hardness can be determined as follows :
   * The diagram on the right shows approximate shaft surface hardness relative to torque ratio A.

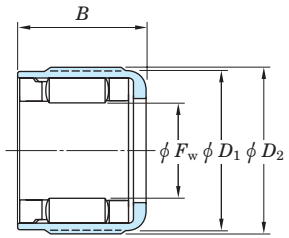
$$\text{Torque ratio (A)} = \frac{\text{Loaded torque}}{\text{Heavy load type torque capacity}}$$



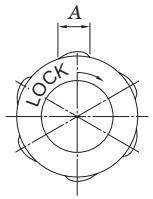
d 4 ~ 12 mm

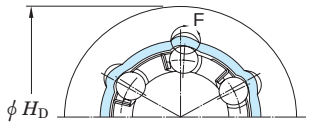


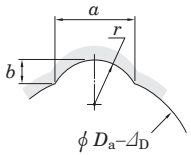
1WC series



EWC series







Details of section F

Shaft dia. (mm)	Boundary dimensions (mm)					Torque capacity	Designations			No. of [1] outer ring protrusion	Recommended housing dimensions (mm)						(Refer.) Mass (g)	
d	F_w	D_1	D_2	B	A	(N·m)	1WC series (With metal springs)	EWC series (With resin springs)			H_D	a	b	r	D_a	Δ_D [2]	1WC	EWC
4	4	8	8.4	6	2.6	0.08	—	**EWC0406A**		4	12	2.65	0.50	2	8	0.06	—	1.0
	4	8	8.4	6	2.6	0.15	—	**EWC0406C**		4	12	2.65	0.50	2	8	0.06	—	1.0
6	6	10	10.4	8	2.8	0.25	—	**EWC0608A**		6	14	2.8	0.57	2	10	0.08	—	1.7
	6	10	10.4	8	2.8	0.44	—	**EWC0608C**		6	14	2.8	0.57	2	10	0.08	—	1.7
	6	10	10.4	8	2.8	0.44	**1WC0608**	—		6	14	2.8	0.57	2	10	0.08	2.0	—
	6	10	10.4	12	2.8	0.88	**1WC0612**	—		6	14	2.8	0.57	2	10	0.08	3.0	—
8	8	12	12.4	9	2.6	0.49	—	**EWC0809A**		6	16	2.6	0.48	2	12	0.10	—	2.4
	8	12	12.4	9	2.6	0.88	—	**EWC0809C**		6	16	2.6	0.48	2	12	0.10	—	2.4
	8	14.2	15	12	3.6	1.18	—	**EWC0812A**		6	18.5	3.6	0.87	2.3	14.2	0.11	—	5.8
	8	14.2	15	12	3.6	1.96	—	**EWC0812C**		6	18.5	3.6	0.87	2.3	14.2	0.11	—	5.8
	8	14.2	15	12	3.6	1.96	**1WC0812**	—		6	18.5	3.6	0.87	2.3	14.2	0.11	7.0	—
	8	14.2	15	14.5	3.6	2.65	**1WC0815**	—		6	18.5	3.6	0.87	2.3	14.2	0.11	8.0	—
10	10	16	17	10	5	1.18	—	**EWC1010A**		6	21	5.0	1.20	3.2	16	0.13	—	6.0
	10	16	17	10	5	1.96	—	**EWC1010C**		6	21	5.0	1.20	3.2	16	0.13	—	6.0
	10	16	17	12	5	1.37	—	**EWC1012A**		6	21	5.0	1.20	3.2	16	0.13	—	6.8
	10	16	17	12	5	2.35	—	**EWC1012C**		6	21	5.0	1.20	3.2	16	0.13	—	6.8
	10	16	17	12	5	2.35	**1WC1012**	—		6	21	5.0	1.20	3.2	16	0.13	8.0	—
12	12	18	19	16	5.1	6.28	**1WC1216**	—		8	23	5.1	1.20	3.3	18	0.14	12	—

[Notes] 1) Provided at equal intervals.
2) Recommended interference when polyacetal resin housing is used.

Ball bearing units

Ball bearing units consist of pre-lubricated sealed ball bearings and a housing which varies in shape.

They are capable of aligning themselves efficiently using the spherical fitting surface between the bearing and housing, effectively preventing overloads due to misalignment.

For details, refer to JTEKT separate catalog “Ball bearing units” (CAT. NO. B2007E).

K-series super thin section ball bearings

Koyo K-series super thin section ball bearings were developed to meet current engineering needs for thinner, lighter bearings. They are used extensively in automation and labor saving equipment, such as industrial robots.

These bearings are sorted into nine dimension series according to cross-sectional area.

Those of the same dimension series have an equivalent cross-sectional area irrespective of the bore diameter.

They are available in three types that differ in structure.

■ Deep groove type

Carries radial load, axial load in both directions, and combined loads.

■ Angular contact type

Has a 30° contact angle, and carries radial load and axial load in one direction.
Two bearings are usually used together facing one another.

■ Four-point contact type

Has a contact angle of 30° both to the right and to the left.
Able to carry axial load in both directions. Also able to support moment and radial loads.

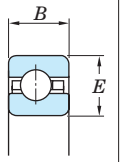
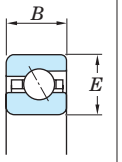
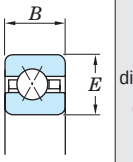
		Bearing type code			
		C (Deep groove type)	A (Angular contact type)	X (Four-point contact type)	
Dimension series code	Cross-sectional dimension $B = E$ (mm)				Bore diameter (mm)
T	4.762	K T C	K T A	K T X	25.4 to 38.1
A	6.35	K A C	K A A	K A X	50.8 to 304.8
B	7.938	K B C	K B A	K B X	50.8 to 508
C	9.525	K C C	K C A	K C X	101.6 to 762
D	12.7	K D C	K D A	K D X	
F	19.05	K F C	K F A	K F X	101.6 to 1 016
G	25.4	K G C	K G A	K G X	
J	$B = 11.1$ $E = 9.525$	–	KJA...RD 	–	101.6 to 304.8
U	$B = 12.7$ $E = 9.525$	KUC...2RD 	–	KUX...2RD 	

Table 1 K-series super thin section ball bearings : tolerance

Unit : μm

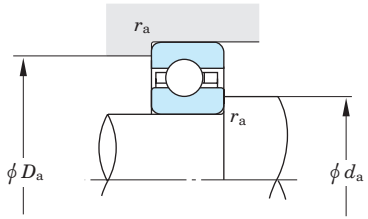
Bore diameter number	Single plane mean bore diameter deviation Δ_{dmp}					Single plane mean outside diameter deviation Δ_{Dmp}					Single inner (outer) ring width deviation Δ_{Bs}, Δ_{Cs}			Radial runout of assembled bearing ring, max.										Assembled bearing ring face runout with raceway, max.				Bore diameter number
														Inner ring K_{ia}					Outer ring K_{ea}						Inner ring S_{ia}		Outer ring S_{ea}		
	classes K0, K1, K2		class K3	class K4	class K6	classes K0, K1, K2		class K3	class K4	class K6	classes K0, K1, K2	classes K3, K4	class K6	class K0		class K3	classes K1, K4	classes K2, K6	class K0		class K3	classes K1, K4	classes K2, K6	classes K1, K4	classes K0, K2 K3, K6	classes K1, K4	classes K0, K2 K3, K6	
	div. Ⅰ	div. Ⅱ				div. Ⅰ	div. Ⅱ							div. Ⅰ	div. Ⅱ				div. Ⅰ	div. Ⅱ									
010	0 −10		0 −5	0 −5	0 −4	0 −13		0 −8	0 −5	0 −5	0 −127			13	8	8	5	4	20	10	10	5	5	8	Same as limit values for radial runout of assembled bearing inner ring	8	Same as limit values for radial runout of assembled bearing outer ring	010
015	0 −13		0 −8											15	10	10												015
020	0 −15		0 −10	0 −8	0 −5			0 −10	0 −8	0 −8				20	13	10			25	13	13	8		10				020
025																												025
030						0 −15								25	15	13	8	5	30	15	15	10		13				030
035	0 −20		0 −13	0 −8	0 −6																							035
040																												040
042						0 −20		0 −13	0 −10	0 −10					20				36	20	20		8					042
045																												045
047														30		15								10				047
050	0 −25		0 −15	0 −10	0 −8										25				41	25	23	13						050
055						0 −25		0 −15																				055
060																												060
065																												065
070						0 −30		0 −18	0 −13	0 −10											25							070
075	0 −30		0 −18	0 −13	0 −10									41	30	20	10	8	46	30		10		13		15		075
080																												080
090																												090
100	0 −36	0 −36	0 −20		0 −13	0 −36	0 −36	0 −20		0 −13				46	36	25	13	10	51	36	30	15		15		18		100
110																												110
120								0 −23	0 −15	0 −15						30					36	18	13			20		120
140	0 −41			0 −15		0 −41						0 −254												18				140
160	0 −46	0 −41	0 −23			0 −46	0 −41	0 −25	0 −18		0 −254				41	36	18			41	41	20		20		23		160
180														51														180
200	0 −51	0 −46	0 −25	0 −18		0 −51	0 −46	0 −30	0 −20						46	41	20			46	46	23		23		25		200
250	0 −76					0 −76																						250
300																												300
350	0 −102	0 −51				0 −102	0 −51								51					51								350
400																												400

[Notes] Division Ⅰ is for deep groove type ball bearings.
Division Ⅱ is for angular contact type and four-point contact type ball bearings.

Table 2 Standard radil internal clearance of deep groove and four-point contact type ball bearings Unit : μm

Bore diameter number	Radial internal clearance				
	classes K0, K1, K2		class K3	class K4	class K6
	Deep groove type	Four-point contact type			
010	25 – 41	25 – 38	18 – 28	13 – 23	10 – 20
015	30 – 46	30 – 43	20 – 30		13 – 23
020	30 – 61	30 – 56	20 – 46	15 – 30	10 – 25
025					
030					15 – 30
035	41 – 71	41 – 66	25 – 51		
040					
042				20 – 36	20 – 36
045					
047	51 – 86	51 – 76	30 – 56		
050					
055				25 – 41	
060					
065					
070			36 – 61		
075	61 – 107	61 – 86			
080					
090					
100	71 – 122	71 – 97	41 – 66		25 – 41
110					
120			46 – 71	30 – 46	
140	81 – 132				30 – 46
160	91 – 142	81 – 107	51 – 76	36 – 51	
180					
200	102 – 152	91 – 117	61 – 86	36 – 56	
250	152 – 203				
300					
350	203 – 254	102 – 127			
400					

Table 3 Mounting dimensions



Unit : mm

Dimension series	Bearing type			ϕd_a		ϕD_a		r_a
				max.	min.	min.	max.	max.
T	KTC	KTA	KTX	d + 5.3	d + 3.4	d + 4.2	d + 6.1	0.2
A	KAC	KAA	KAX	d + 7.3	d + 4.6	d + 5.4	d + 8.2	0.4
B	KBC	KBA	KBX	d + 9.3	d + 5.7	d + 6.6	d + 10.2	0.8
C	KCC	KCA	KCX	d + 11.3	d + 6.9	d + 7.7	d + 12.2	0.8
D	KDC	KDA	KDX	d + 15.3	d + 9.2	d + 10.1	d + 16.2	1.3
F	KFC	KFA	KFX	d + 23.3	d + 13.9	d + 14.8	d + 24.2	1.8
G	KGC	KGA	KGX	d + 31.3	d + 18.7	d +19.5	d + 32.1	1.8
J	–	KJA	–	d + 11.3	d + 6.9	d + 7.7	d + 12.2	0.2
U	KUC	–	KUX					

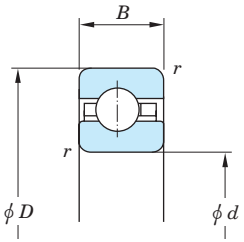
Table 4 Shaft diameter and housing bore diameter tolerance

Unit : μm

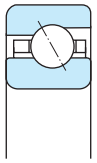
Bore diameter number	Inner ring rotation									Outer ring rotation									Bore diameter number
	Shaft diameter tolerance					Housing bore diameter tolerance				Shaft diameter tolerance					Housing bore diameter tolerance				
	classes K0, K1, K2		class K3	class K4	class K6	classes K0, K1, K2		class K3	class K4	class K6	classes K0, K1, K2		class K3	class K4	class K6	classes K0, K1, K2		class K3	class K4	class K6	
	div. Ⅰ	div. Ⅱ				div. Ⅰ	div. Ⅱ				div. Ⅰ	div. Ⅱ				div. Ⅰ	div. Ⅱ				
010	+10 0		+5 0	+5 0	+4 0	+13 0	+13 0	+8 0	+5 0	+5 0	−10 −20		−5 −10	−5 −10	−4 −8	−13 −25	−13 −25	−8 −15	−5 −10	−5 −10	010
015	+13 0		+8 0		+5 0						−13 −25		−8 −15		−5 −10						015
020	+15 0		+10 0	+8 0		+15 0	+13 0	+10 0	+8 0	+5 0	−15 −30		−10 −20	−8 −15		−15 −30	−13 −25	−10 −20	−8 −15	−5 −10	020
025																					025
030							+15 0			+8 0							−15 −30				030
035	+20 0		+13 0		+6 0	+15 0		+10 0			−20 −40		−13 −25		−6 −13						035
040																					040
042						+20 0		+13 0	+10 0	+10 0						−20 −40		−13 −25	−10 −20	−10 −20	042
045																					045
047	+25 0		+15 0	+10 0	+8 0						−25 −50		−15 −30	−10 −20	−8 −15						047
050																					050
055						+25 0		+15 0		+10 0						−25 −50		−15 −30		−10 −20	055
060																					060
065																					065
070						+30 0		+18 0	+13 0							−30 −60		−18 −35	−13 −25		070
075	+30 0		+18 0	+13 0	+10 0						−30 −60		−18 −35	−13 −25	−10 −20						075
080																					080
090																					090
100	+35 0	+35 0	+20 0		+13 0	+35 0	+35 0	+20 0		+13 0	−35 −70	−35 −70	−20 −40		−13 −25	−35 −70	−35 −70	−20 −40		−13 −25	100
110																					110
120								+23 0	+15 0									−23 −45	−15 −30		120
140	+40 0			+15 0		+40 0				+15 0	−48 −80			−15 −30		−40 −80				−15 −30	140
160	+45 0	+40 0	+23 0			+45 0	+40 0	+25 0	+18 0		−45 −90	−40 −80	−23 −45			−45 −90	−40 −80	−25 −50	−18 −35		160
180																					180
200	+50 0	+45 0	+25 0	+18 0		+50 0	+45 0	+30 0	+20 0		−50 −100	−45 −90	−25 −50	−15 −35		−50 −100	−45 −90	−30 −60	−18 −40		200
250	+75 0					+75 0					−75 −150					−75 −150					250
300																					300
350	+100 0	+50 0				+100 0	+50 0				−100 −200	−50 −100				−100 −200	−50 −100				350
400																					400

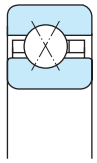
[Notes] Division Ⅰ is for deep groove type ball bearings.
Division Ⅱ is for angular contact type and four-point contact type ball bearings.

K-series super thin section ball bearings
open type
d 25.4 ~ (114.3) mm



Deep groove type

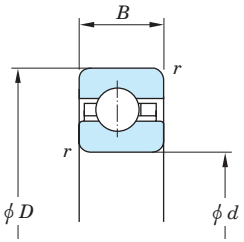

Angular contact type


Four-point contact type

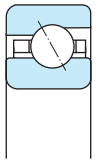
Boundary dimensions (mm)				Deep groove type			Angular contact type					Four-point contact type				(Refer.) Mass (kg)		
				Bearing No.	Basic load ratings (kN)		Bearing No.	Basic load ratings (kN)				Bearing No.	Basic load ratings (kN)						
d	D	B	r min.		C_r	C_{0r}		C_r	C_{0r}	C_a	C_{0a}		C_r	C_{0r}	C_a	C_{0a}	Deep groove type	Angular contact type	Four-point contact type
25.4	34.925	4.762	0.4	**KTC010**	2.50	1.95	**KTA010**	2.65	2.20	3.45	6.70	**KTX010**	2.15	1.65	3.70	7.15	0.012	0.011	0.012
38.1	47.625	4.762	0.4	**KTC015**	2.90	2.70	**KTA015**	3.05	3.10	4.00	9.35	**KTX015**	2.50	2.30	4.20	10.5	0.018	0.017	0.018
50.8	63.5	6.35	0.6	**KAC020**	4.50	4.30	**KAA020**	4.75	4.95	6.25	14.9	**KAX020**	3.90	3.70	6.60	16.9	0.045	0.045	0.045
	66.675	7.938	1	**KBC020**	6.35	5.85	**KBA020**	6.75	6.70	8.90	20.4	**KBX020**	5.55	5.00	9.35	22.0	0.073	0.068	0.073
63.5	76.2	6.35	0.6	**KAC025**	4.85	5.20	**KAA025**	5.10	5.95	6.75	18.0	**KAX025**	4.20	4.45	7.05	20.9	0.059	0.054	0.059
	79.375	7.938	1	**KBC025**	6.90	7.00	**KBA025**	7.35	8.15	9.65	24.6	**KBX025**	6.00	6.00	10.0	27.3	0.086	0.086	0.086
76.2	88.9	6.35	0.6	**KAC030**	5.20	6.10	**KAA030**	5.45	7.00	7.15	21.2	**KAX030**	4.50	5.25	7.45	24.9	0.068	0.064	0.068
	92.075	7.938	1	**KBC030**	7.35	8.15	**KBA030**	7.70	9.35	10.2	28.3	**KBX030**	6.35	7.00	10.6	32.5	0.109	0.100	0.109
88.9	101.6	6.35	0.6	**KAC035**	5.45	7.00	**KAA035**	5.75	8.00	7.55	24.3	**KAX035**	4.75	6.00	7.80	29.0	0.082	0.077	0.082
	104.775	7.938	1	**KBC035**	7.75	9.30	**KBA035**	8.20	10.7	10.8	32.5	**KBX035**	6.70	8.00	11.1	37.8	0.122	0.122	0.122
101.6	114.3	6.35	0.6	**KAC040**	5.75	7.85	**KAA040**	6.00	9.05	7.90	27.4	**KAX040**	4.95	6.80	8.10	33.0	0.086	0.086	0.086
	117.475	7.938	1	**KBC040**	8.10	10.5	**KBA040**	8.60	12.1	11.3	36.8	**KBX040**	7.05	9.00	11.6	43.1	0.136	0.136	0.136
	120.65	9.525	1	**KCC040**	10.3	12.4	**KCA040**	11.2	14.9	14.7	45.1	**KCX040**	8.95	10.6	14.8	50.0	0.204	0.200	0.204
	127	12.7	1.5	**KDC040**	15.7	17.2	**KDA040**	16.5	19.7	21.7	59.8	**KDX040**	13.6	14.8	22.6	67.4	0.354	0.363	0.354
	139.7	19.05	2	**KFC040**	28.2	28.1	**KFA040**	30.3	32.9	39.8	99.6	**KFX040**	24.6	24.0	41.0	103	0.862	0.871	0.862
	152.4	25.4	2	**KGC040**	42.6	39.6	**KGA040**	45.2	46.0	59.5	139	**KGX040**	37.3	34.5	62.4	141	1.63	1.64	1.63
107.95	120.65	6.35	0.6	**KAC042**	5.85	8.30	**KAA042**	6.15	9.55	8.10	29.0	**KAX042**	5.10	7.15	8.25	35.0	0.091	0.091	0.091
	123.825	7.938	1	**KBC042**	8.25	10.9	**KBA042**	8.75	12.7	11.5	38.6	**KBX042**	7.15	9.40	11.7	45.2	0.141	0.141	0.141
	127	9.525	1	**KCC042**	10.5	13.0	**KCA042**	11.5	15.8	15.1	47.8	**KCX042**	9.15	11.2	15.0	53.0	0.213	0.209	0.213
	133.35	12.7	1.5	**KDC042**	15.8	17.8	**KDA042**	16.8	20.8	22.1	62.9	**KDX042**	13.7	15.3	22.8	70.2	0.376	0.381	0.376
	146.05	19.05	2	**KFC042**	28.8	29.4	**KFA042**	30.6	34.0	40.3	103	**KFX042**	25.1	25.2	41.8	109	0.907	0.925	0.907
	158.75	25.4	2	**KGC042**	42.2	39.9	**KGA042**	46.2	48.0	60.8	146	**KGX042**	36.9	34.3	61.8	142	1.72	1.74	1.72
114.3	127	6.35	0.6	**KAC045**	6.00	8.75	**KAA045**	6.25	10.1	8.25	30.5	**KAX045**	5.20	7.55	8.40	37.0	0.100	0.095	0.100
	130.175	7.938	1	**KBC045**	8.45	11.6	**KBA045**	8.90	13.3	11.7	40.4	**KBX045**	7.35	10.0	12.0	48.3	0.150	0.154	0.150
	133.35	9.525	1	**KCC045**	10.7	13.7	**KCA045**	11.7	16.6	15.4	50.4	**KCX045**	9.30	11.8	15.3	56.1	0.218	0.222	0.218
	139.7	12.7	1.5	**KDC045**	16.3	19.0	**KDA045**	17.2	21.8	22.6	66.0	**KDX045**	14.2	16.3	23.4	75.5	0.399	0.399	0.399

K-series super thin section ball bearings open type

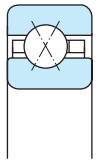
d (114.3)～(165.1) mm



Deep groove type



Angular contact type

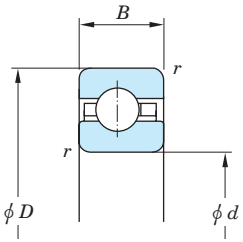


Four-point contact type

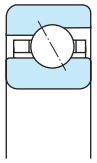
Boundary dimensions (mm)				Deep groove type			Angular contact type				Four-point contact type				(Refer.) Mass (kg)		
				Bearing No.	Basic load ratings (kN)		Bearing No.	Basic load ratings (kN)			Bearing No.	Basic load ratings (kN)					
d	D	B	r min.		C_r	C_{0r}		C_r	C_{0r}	C_a	C_{0a}		C_r	C_{0r}	C_a	C_{0a}	Deep groove type	Angular contact type	Four-point contact type
114.3	152.4	19.05	2	**KFC045**	29.4	30.8	**KFA045**	31.7	36.4	41.7	110	**KFX045**	25.6	26.3	42.6	115	0.953	0.971	0.953
	165.1	25.4	2	**KGC045**	43.6	42.7	**KGA045**	47.1	50.1	62.0	152	**KGX045**	38.1	36.4	63.6	152	1.81	1.79	1.81
120.65	133.35	6.35	0.6	**KAC047**	6.10	9.20	**KAA047**	6.40	10.6	8.40	32.1	**KAX047**	5.30	7.95	8.55	39.0	0.104	0.100	0.104
	136.525	7.938	1	**KBC047**	8.55	12.1	**KBA047**	9.10	14.2	12.0	42.9	**KBX047**	7.45	10.4	12.1	50.4	0.154	0.159	0.154
	139.7	9.525	1	**KCC047**	10.9	14.4	**KCA047**	12.0	17.5	15.7	53.0	**KCX047**	9.50	12.4	15.5	59.1	0.227	0.231	0.227
	146.05	12.7	1.5	**KDC047**	16.5	19.6	**KDA047**	17.5	22.8	23.0	69.1	**KDX047**	14.3	16.8	23.6	78.2	0.426	0.422	0.426
	158.75	19.05	2	**KFC047**	29.9	32.1	**KFA047**	32.0	37.5	42.2	114	**KFX047**	26.1	27.5	43.3	121	0.998	1.03	0.998
	171.45	25.4	2	**KGC047**	44.9	45.2	**KGA047**	48.0	52.1	63.1	158	**KGX047**	39.2	38.6	65.4	162	1.86	1.89	1.86
127	139.7	6.35	0.6	**KAC050**	6.20	9.65	**KAA050**	6.50	11.1	8.55	33.6	**KAX050**	5.35	8.35	8.65	41.1	0.109	0.104	0.109
	142.875	7.938	1	**KBC050**	8.80	12.8	**KBA050**	9.25	14.8	12.2	44.7	**KBX050**	7.60	11.0	12.4	53.6	0.172	0.168	0.172
	146.05	9.525	1	**KCC050**	11.1	15.0	**KCA050**	12.2	18.4	16.0	55.7	**KCX050**	9.65	12.9	15.8	62.1	0.263	0.245	0.263
	152.4	12.7	1.5	**KDC050**	16.9	20.8	**KDA050**	17.8	23.8	23.4	72.2	**KDX050**	14.7	17.9	24.2	83.5	0.454	0.445	0.454
	165.1	19.05	2	**KFC050**	30.5	33.4	**KFA050**	32.4	38.6	42.6	117	**KFX050**	26.5	28.7	44.0	127	1.04	1.08	1.04
	177.8	25.4	2	**KGC050**	46.2	47.6	**KGA050**	48.8	54.2	64.3	164	**KGX050**	40.3	40.7	67.1	173	1.95	2.00	1.95
139.7	152.4	6.35	0.6	**KAC055**	6.40	10.5	**KAA055**	6.75	12.1	8.85	36.8	**KAX055**	5.55	9.10	8.90	45.1	0.113	0.113	0.113
	155.575	7.938	1	**KBC055**	9.10	13.9	**KBA055**	9.60	16.2	12.6	49.0	**KBX055**	7.85	12.0	12.7	58.8	0.186	0.181	0.186
	158.75	9.525	1	**KCC055**	11.5	16.4	**KCA055**	12.5	19.8	16.5	60.0	**KCX055**	10.0	14.1	16.2	68.2	0.268	0.263	0.268
	165.1	12.7	1.5	**KDC055**	17.5	22.6	**KDA055**	18.4	25.9	24.2	78.5	**KDX055**	15.2	19.4	24.9	91.6	0.481	0.481	0.481
	177.8	19.05	2	**KFC055**	31.5	36.1	**KFA055**	33.6	42.1	44.3	128	**KFX055**	27.4	31.0	45.3	140	1.13	1.17	1.13
	190.5	25.4	2	**KGC055**	47.0	49.8	**KGA055**	50.5	58.3	66.4	177	**KGX055**	41.0	42.6	68.0	184	2.13	2.15	2.13
152.4	165.1	6.35	0.6	**KAC060**	6.60	11.4	**KAA060**	6.95	13.2	9.15	39.9	**KAX060**	5.75	9.85	9.15	49.1	0.127	0.127	0.127
	168.275	7.938	1	**KBC060**	9.35	15.1	**KBA060**	9.90	17.6	13.0	53.3	**KBX060**	8.10	13.0	13.1	64.1	0.200	0.200	0.200
	171.45	9.525	1	**KCC060**	11.9	17.7	**KCA060**	12.9	21.5	17.0	65.3	**KCX060**	10.3	15.3	16.7	74.2	0.286	0.290	0.286
	177.8	12.7	1.5	**KDC060**	18.0	24.4	**KDA060**	19.0	27.9	24.9	84.7	**KDX060**	15.7	21.0	25.5	99.7	0.526	0.522	0.526
	190.5	19.05	2	**KFC060**	32.5	38.8	**KFA060**	34.8	45.6	45.8	138	**KFX060**	28.2	33.3	46.5	152	1.22	1.23	1.22
	203.2	25.4	2	**KGC060**	49.3	54.7	**KGA060**	52.0	62.4	68.4	189	**KGX060**	42.9	46.8	71.1	205	2.31	2.30	2.31
165.1	177.8	6.35	0.6	**KAC065**	6.80	12.3	**KAA065**	7.15	14.2	9.40	43.0	**KAX065**	5.90	10.6	9.40	53.2	0.136	0.136	0.136
	180.975	7.938	1	**KBC065**	9.65	16.3	**KBA065**	10.1	18.8	13.3	56.9	**KBX065**	8.35	14.0	13.4	69.3	0.213	0.213	0.213

K-series super thin section ball bearings open type

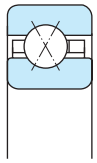
d (165.1) ~ 228.6 mm



Deep groove type



Angular contact type

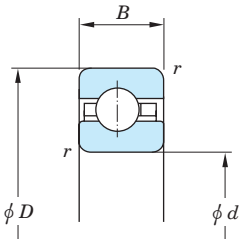


Four-point contact type

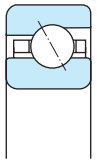
Boundary dimensions (mm)				Deep groove type			Angular contact type				Four-point contact type				(Refer.) Mass (kg)		
				Bearing No.	Basic load ratings (kN)		Bearing No.	Basic load ratings (kN)			Bearing No.	Basic load ratings (kN)					
d	D	B	r min.		C_r	C_{0r}		C_r	C_{0r}	C_a	C_{0a}		C_r	C_{0r}	C_a	C_{0a}	Deep groove type	Angular contact type	Four-point contact type
165.1	184.15	9.525	1	**KCC065**	12.2	19.0	**KCA065**	13.4	23.3	17.6	70.6	**KCX065**	10.6	16.4	17.1	80.3	0.308	0.308	0.308
	190.5	12.7	1.5	**KDC065**	18.6	26.1	**KDA065**	19.5	30.0	25.6	90.9	**KDX065**	16.1	22.5	26.2	108	0.553	0.562	0.553
	203.2	19.05	2	**KFC065**	33.4	41.5	**KFA065**	36.0	49.1	47.3	149	**KFX065**	29.0	35.6	47.7	164	1.32	1.33	1.32
	215.9	25.4	2	**KGC065**	50.0	57.0	**KGA065**	53.5	66.5	70.3	202	**KGX065**	43.5	48.8	71.8	216	2.45	2.45	2.45
177.8	190.5	6.35	0.6	**KAC070**	7.00	13.2	**KAA070**	7.35	15.2	9.65	46.1	**KAX070**	6.05	11.4	9.60	57.2	0.141	0.145	0.141
	193.675	7.938	1	**KBC070**	9.90	17.4	**KBA070**	10.4	20.2	13.7	61.2	**KBX070**	8.55	15.0	13.7	74.6	0.227	0.227	0.227
	196.85	9.525	1	**KCC070**	12.5	20.4	**KCA070**	13.6	24.7	17.9	74.9	**KCX070**	10.9	17.6	17.5	86.3	0.331	0.336	0.331
	203.2	12.7	1.5	**KDC070**	19.0	27.9	**KDA070**	20.0	32.1	26.3	97.2	**KDX070**	16.5	24.0	26.7	116	0.594	0.603	0.594
	215.9	19.05	2	**KFC070**	34.3	44.1	**KFA070**	37.0	52.6	48.7	159	**KFX070**	29.8	37.9	48.7	176	1.45	1.43	1.45
	228.6	25.4	2	**KGC070**	52.1	61.8	**KGA070**	54.8	70.7	72.2	214	**KGX070**	45.3	53.0	74.5	237	2.63	2.66	2.63
190.5	203.2	6.35	0.6	**KAC075**	7.15	14.1	**KAA075**	7.50	16.2	9.90	49.2	**KAX075**	6.20	12.2	9.80	61.3	0.154	0.154	0.154
	206.375	7.938	1	**KBC075**	10.1	18.6	**KBA075**	10.7	21.6	14.1	65.4	**KBX075**	8.80	16.0	14.0	79.8	0.240	0.245	0.240
	209.55	9.525	1	**KCC075**	12.8	21.7	**KCA075**	14.0	26.5	18.4	80.2	**KCX075**	11.1	18.7	17.8	92.4	0.354	0.354	0.354
	215.9	12.7	1.5	**KDC075**	19.5	29.7	**KDA075**	20.5	34.1	27.0	103	**KDX075**	16.9	25.6	27.3	124	0.640	0.644	0.640
	228.6	19.05	2	**KFC075**	35.1	46.8	**KFA075**	37.5	54.8	49.3	166	**KFX075**	30.5	40.2	49.8	188	1.54	1.54	1.54
	241.3	25.4	2	**KGC075**	52.6	64.1	**KGA075**	56.2	74.8	73.9	227	**KGX075**	45.8	55.0	75.2	249	2.77	2.81	2.77
203.2	215.9	6.35	0.6	**KAC080**	7.35	15.0	**KAA080**	7.70	17.3	10.1	52.3	**KAX080**	6.35	13.0	10.0	65.3	0.172	0.163	0.172
	219.075	7.938	1	**KBC080**	10.4	19.7	**KBA080**	11.0	23.0	14.4	69.7	**KBX080**	9.00	17.0	14.3	85.1	0.259	0.259	0.259
	222.25	9.525	1	**KCC080**	13.1	23.1	**KCA080**	14.4	28.2	18.9	85.5	**KCX080**	11.4	19.9	18.2	98.5	0.381	0.381	0.381
	228.6	12.7	1.5	**KDC080**	20.0	31.5	**KDA080**	21.0	36.2	27.6	110	**KDX080**	17.3	27.1	27.9	132	0.694	0.689	0.694
	241.3	19.05	2	**KFC080**	35.9	49.5	**KFA080**	38.5	58.3	50.6	177	**KFX080**	31.2	42.5	50.7	200	1.59	1.64	1.59
	254	25.4	2	**KGC080**	54.5	69.0	**KGA080**	57.4	78.9	75.5	239	**KGX080**	47.4	59.2	77.6	270	2.95	2.97	2.95
228.6	241.3	6.35	0.6	**KAC090**	7.65	16.8	**KAA090**	8.00	19.3	10.5	58.6	**KAX090**	6.60	14.5	10.4	73.4	0.200	0.186	0.200
	244.475	7.938	1	**KBC090**	10.8	22.1	**KBA090**	11.4	25.6	15.0	77.6	**KBX090**	9.35	19.1	14.8	95.6	0.299	0.290	0.299
	247.65	9.525	1	**KCC090**	13.7	25.7	**KCA090**	14.9	31.4	19.6	95.1	**KCX090**	11.9	22.2	18.9	111	0.426	0.445	0.426
	254	12.7	1.5	**KDC090**	20.8	35.0	**KDA090**	21.8	40.3	28.7	122	**KDX090**	18.0	30.2	28.9	148	0.780	0.767	0.780
	266.7	19.05	2	**KFC090**	37.4	54.8	**KFA090**	40.3	65.3	53.1	198	**KFX090**	32.5	47.2	52.6	224	1.77	1.79	1.77
	279.4	25.4	2	**KGC090**	56.8	76.1	**KGA090**	59.8	87.1	78.7	264	**KGX090**	49.4	65.3	80.5	302	3.27	3.27	3.27

K-series super thin section ball bearings open type

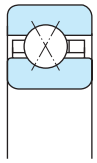
d 254 ~ 406.4 mm



Deep groove type



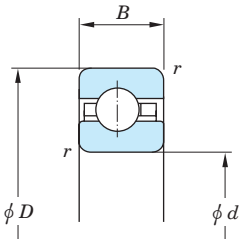
Angular contact type



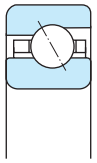
Four-point contact type

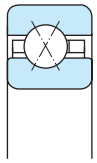
Boundary dimensions (mm)				Deep groove type			Angular contact type				Four-point contact type				(Refer.) Mass (kg)		
				Bearing No.	Basic load ratings (kN)		Bearing No.	Basic load ratings (kN)			Bearing No.	Basic load ratings (kN)					
d	D	B	r min.		C_r	C_{0r}		C_r	C_{0r}	C_a	C_{0a}		C_r	C_{0r}	C_a	C_{0a}	Deep groove type	Angular contact type	Four-point contact type
254	266.7	6.35	0.6	**KAC100**	7.95	18.6	**KAA100**	8.30	21.4	11.0	64.8	**KAX100**	6.85	16.0	10.7	81.4	0.227	0.204	0.227
	269.875	7.938	1	**KBC100**	11.2	24.4	**KBA100**	11.9	28.4	15.6	86.1	**KBX100**	9.75	21.1	15.3	106	0.331	0.322	0.331
	273.05	9.525	1	**KCC100**	14.2	28.4	**KCA100**	15.6	34.9	20.5	106	**KCX100**	12.3	24.5	19.5	123	0.481	0.472	0.481
	279.4	12.7	1.5	**KDC100**	21.6	38.6	**KDA100**	22.7	44.4	29.8	135	**KDX100**	18.7	33.3	29.8	164	0.853	0.848	0.853
	292.1	19.05	2	**KFC100**	38.8	60.2	**KFA100**	41.6	71.1	54.7	215	**KFX100**	33.7	51.8	54.3	249	1.95	2.00	1.95
	304.8	25.4	2	**KGC100**	59.0	83.2	**KGA100**	62.0	95.3	81.6	289	**KGX100**	51.2	71.5	83.1	334	3.58	3.63	3.58
279.4	292.1	6.35	0.6	**KAC110**	8.20	20.3	**KAA110**	8.60	23.4	11.3	71.0	**KAX110**	7.10	17.6	11.1	89.5	0.236	0.227	0.236
	295.275	7.938	1	**KBC110**	11.6	26.7	**KBA110**	12.3	31.0	16.1	94.0	**KBX110**	10.1	23.1	15.7	117	0.340	0.354	0.340
	298.45	9.525	1	**KCC110**	14.7	31.1	**KCA110**	16.1	38.0	21.1	115	**KCX110**	12.7	26.8	20.1	135	0.526	0.517	0.526
	304.8	12.7	1.5	**KDC110**	22.3	42.2	**KDA110**	23.4	48.5	30.8	147	**KDX110**	19.3	36.4	30.7	180	0.934	0.930	0.934
	317.5	19.05	2	**KFC110**	40.2	65.5	**KFA110**	43.2	78.0	56.9	236	**KFX110**	34.8	56.4	55.9	273	2.18	2.15	2.18
	330.2	25.4	2	**KGC110**	61.0	90.3	**KGA110**	64.1	104	84.3	314	**KGX110**	52.9	77.7	85.5	366	3.90	3.94	3.90
304.8	317.5	6.35	0.6	**KAC120**	8.45	22.1	**KAA120**	8.90	25.5	11.7	77.3	**KAX120**	7.35	19.1	11.4	97.6	0.254	0.245	0.254
	320.675	7.938	1	**KBC120**	12.0	29.0	**KBA120**	12.7	33.8	16.7	103	**KBX120**	10.4	25.1	16.2	127	0.376	0.386	0.376
	323.85	9.525	1	**KCC120**	15.2	33.8	**KCA120**	16.5	41.2	21.8	125	**KCX120**	13.1	29.2	20.6	147	0.567	0.558	0.567
	330.2	12.7	1.5	**KDC120**	23.0	45.7	**KDA120**	24.2	52.6	31.8	160	**KDX120**	20.0	39.5	31.5	197	1.02	1.01	1.02
	342.9	19.05	2	**KFC120**	41.4	70.9	**KFA120**	44.3	83.8	58.3	254	**KFX120**	35.9	61.1	57.4	297	2.36	2.36	2.36
	355.6	25.4	2	**KGC120**	62.9	97.5	**KGA120**	66.0	112	86.9	339	**KGX120**	54.5	83.9	87.8	399	4.22	4.30	4.22
355.6	371.475	7.938	1	**KBC140**	12.7	33.7	**KBA140**	13.4	39.1	17.6	118	**KBX140**	11.0	29.1	17.0	148	0.476	0.445	0.476
	374.65	9.525	1	**KCC140**	16.0	39.1	**KCA140**	17.5	47.9	23.0	145	**KCX140**	13.9	33.8	21.6	171	0.689	0.649	0.689
	381	12.7	1.5	**KDC140**	24.3	52.9	**KDA140**	25.5	60.9	33.6	184	**KDX140**	21.1	45.7	33.1	229	1.24	1.17	1.24
	393.7	19.05	2	**KFC140**	43.7	81.5	**KFA140**	46.8	96.5	61.6	293	**KFX140**	37.9	70.3	60.2	345	2.72	2.61	2.72
	406.4	25.4	2	**KGC140**	66.3	112	**KGA140**	69.7	128	91.7	389	**KGX140**	57.5	96.2	92.0	463	4.90	4.94	4.90
406.4	422.275	7.938	1	**KBC160**	13.3	38.3	**KBA160**	14.0	44.5	18.4	135	**KBX160**	11.5	33.1	17.7	169	0.544	0.508	0.544
	425.45	9.525	1	**KCC160**	16.8	44.4	**KCA160**	18.4	54.5	24.2	165	**KCX160**	14.6	38.4	22.6	195	0.785	0.739	0.785
	431.8	12.7	1.5	**KDC160**	25.5	60.0	**KDA160**	26.8	69.1	35.2	209	**KDX160**	22.1	51.8	34.5	261	1.41	1.33	1.41
	444.5	19.05	2	**KFC160**	45.8	92.2	**KFA160**	49.0	109	64.5	331	**KFX160**	39.7	79.6	62.7	394	3.22	3.08	3.22
	457.2	25.4	2	**KGC160**	69.5	126	**KGA160**	73.0	145	96.0	439	**KGX160**	60.3	109	95.9	528	5.58	5.62	5.58

K-series super thin section ball bearings
open type
d 457.2 ~ 1 016 mm



Deep groove type

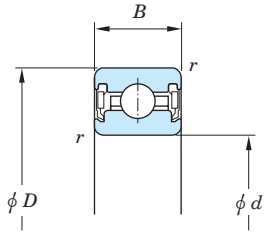

Angular contact type


Four-point contact type

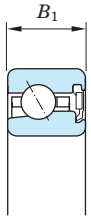
Boundary dimensions (mm)				Deep groove type			Angular contact type				Four-point contact type				(Refer.) Mass (kg)		
				Bearing No.	Basic load ratings (kN)		Bearing No.	Basic load ratings (kN)			Bearing No.	Basic load ratings (kN)					
d	D	B	r min.		C_r	C_{0r}		C_r	C_{0r}	C_a	C_{0a}		C_r	C_{0r}	C_a	C_{0a}	Deep groove type	Angular contact type	Four-point contact type
457.2	473.075	7.938	1	**KBC180**	13.9	42.9	**KBA180**	14.6	49.9	19.2	151	**KBX180**	12.0	37.1	18.4	190	0.612	0.572	0.612
	476.25	9.525	1	**KCC180**	17.5	49.8	**KCA180**	19.2	61.2	25.3	185	**KCX180**	15.2	43.0	23.4	220	0.880	0.830	0.880
	482.6	12.7	1.5	**KDC180**	26.6	67.1	**KDA180**	27.6	77.3	36.3	234	**KDX180**	23.0	58.0	35.8	293	1.58	1.49	1.58
	495.3	19.05	2	**KFC180**	47.8	103	**KFA180**	51.5	123	67.7	373	**KFX180**	41.4	88.8	65.0	442	3.58	3.48	3.58
	508	25.4	2	**KGC180**	72.5	140	**KGA180**	76.0	161	100	488	**KGX180**	62.8	121	99.4	592	6.21	6.26	6.21
508	523.875	7.938	1	**KBC200**	14.4	47.6	**KBA200**	15.2	55.3	20.0	168	**KBX200**	12.5	41.2	19.0	211	0.680	0.635	0.680
	527.05	9.525	1	**KCC200**	18.2	55.1	**KCA200**	19.9	67.5	26.2	205	**KCX200**	15.8	47.7	24.2	244	0.980	0.921	0.980
	533.4	12.7	1.5	**KDC200**	27.6	74.3	**KDA200**	29.0	85.6	38.1	259	**KDX200**	23.9	64.2	37.0	326	1.75	1.66	1.75
	546.1	19.05	2	**KFC200**	49.6	114	**KFA200**	53.4	136	70.3	412	**KFX200**	43.0	98.1	67.2	491	4.04	3.84	4.04
	558.8	25.4	2	**KGC200**	75.2	154	**KGA200**	78.9	178	104	538	**KGX200**	65.2	133	103	657	8.53	6.89	8.53
635	654.05	9.525	1	**KCC250**	19.7	68.5	**KCA250**	21.6	84.0	28.4	255	**KCX250**	17.1	59.2	26.0	304	1.22	1.14	1.22
	660.4	12.7	1.5	**KDC250**	29.9	92.1	**KDA250**	31.4	106	41.3	322	**KDX250**	25.9	79.6	39.7	407	2.17	2.06	2.17
	673.1	19.05	2	**KFC250**	53.7	140	**KFA250**	57.6	167	75.8	506	**KFX250**	46.5	121	72.0	612	4.94	4.76	4.94
	685.8	25.4	2	**KGC250**	81.4	190	**KGA250**	85.4	219	112	663	**KGX250**	70.5	164	110	819	8.85	8.53	8.85
762	781.05	9.525	1	**KCC300**	21.1	81.9	**KCA300**	23.1	101	30.3	305	**KCX300**	18.3	70.8	27.6	365	1.46	1.37	1.46
	787.4	12.7	1.5	**KDC300**	32.0	110	**KDA300**	33.5	127	44.1	384	**KDX300**	27.7	95.0	42.1	487	2.60	2.47	2.60
	800.1	19.05	2	**KFC300**	57.3	167	**KFA300**	61.6	200	81.0	605	**KFX300**	49.6	144	76.3	733	5.90	5.67	5.90
	812.8	25.4	2	**KGC300**	86.8	226	**KGA300**	91.1	260	120	788	**KGX300**	75.2	195	116	980	10.6	10.2	10.6
889	927.1	19.05	2	**KFC350**	60.6	194	**KFA350**	65.2	232	85.8	703	**KFX350**	52.5	168	80.1	854	6.85	6.62	6.85
	939.8	25.4	2	**KGC350**	91.7	261	**KGA350**	96.2	301	127	912	**KGX350**	79.4	226	122	1 140	12.3	11.9	12.3
1 016	1 054.1	19.05	2	**KFC400**	63.5	221	**KFA400**	68.4	264	90.0	801	**KFX400**	55.0	191	83.6	975	7.80	7.53	7.80
	1 066.8	25.4	2	**KGC400**	96.2	297	**KGA400**	101	342	133	1 040	**KGX400**	83.3	257	128	1 300	14.0	13.5	14.0

K-series super thin section ball bearings sealed type

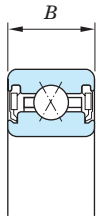
d 101.6 ~ 304.8 mm



Deep groove type
U size
(With seals)

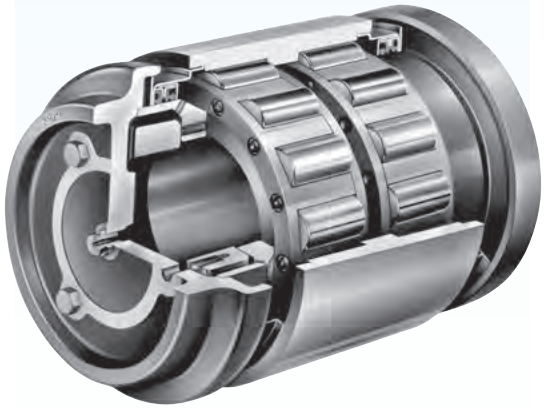


Angular contact type
J size
(With seal)



Four-point contact type
U size
(With seals)

Boundary dimensions (mm)					Deep groove type			Angular contact type					Four-point contact type				(Refer.) Mass (kg)		
						Basic load ratings (kN)			Basic load ratings (kN)					Basic load ratings (kN)						
d	D	B	B_1	r min.	Bearing No.	C_r	C_{0r}	Bearing No.	C_r	C_{0r}	C_a	C_{0a}	Bearing No.	C_r	C_{0r}	C_a	C_{0a}	Deep groove type	Angular contact type	Four-point contact type
101.6	120.65	12.7	11.1	0.4	**KUC040 2RD**	10.3	12.4	**KJA040 RD**	11.2	14.9	14.7	45.1	**KUX040 2RD**	8.95	10.6	14.8	50.0	0.249	0.222	0.249
107.95	127	12.7	11.1	0.4	**KUC042 2RD**	10.5	13.0	**KJA042 RD**	11.5	15.8	15.1	47.8	**KUX042 2RD**	9.15	11.2	15.0	53.0	0.263	0.236	0.263
114.3	133.35	12.7	11.1	0.4	**KUC045 2RD**	10.7	13.7	**KJA045 RD**	11.7	16.6	15.4	50.4	**KUX045 2RD**	9.30	11.8	15.3	56.1	0.277	0.254	0.277
120.65	139.7	12.7	11.1	0.4	**KUC047 2RD**	10.9	14.4	**KJA047 RD**	12.0	17.5	15.7	53.0	**KUX047 2RD**	9.50	12.4	15.5	59.1	0.295	0.268	0.295
127	146.05	12.7	11.1	0.4	**KUC050 2RD**	11.1	15.0	**KJA050 RD**	12.2	18.4	16.0	55.7	**KUX050 2RD**	9.65	12.9	15.8	62.1	0.308	0.281	0.308
139.7	158.75	12.7	11.1	0.4	**KUC055 2RD**	11.5	16.4	**KJA055 RD**	12.5	19.8	16.5	60.0	**KUX055 2RD**	10.0	14.1	16.2	68.2	0.336	0.304	0.336
152.4	171.45	12.7	11.1	0.4	**KUC060 2RD**	11.9	17.7	**KJA060 RD**	12.9	21.5	17.0	65.3	**KUX060 2RD**	10.3	15.3	16.7	74.2	0.367	0.331	0.367
165.1	184.15	12.7	11.1	0.4	**KUC065 2RD**	12.2	19.0	**KJA065 RD**	13.4	23.3	17.6	70.6	**KUX065 2RD**	10.6	16.4	17.1	80.3	0.395	0.354	0.395
177.8	196.85	12.7	11.1	0.4	**KUC070 2RD**	12.5	20.4	**KJA070 RD**	13.6	24.7	17.9	74.9	**KUX070 2RD**	10.9	17.6	17.5	86.3	0.422	0.381	0.422
190.5	209.55	12.7	11.1	0.4	**KUC075 2RD**	12.8	21.7	**KJA075 RD**	14.0	26.5	18.4	80.2	**KUX075 2RD**	11.1	18.7	17.8	92.4	0.449	0.404	0.449
203.2	222.25	12.7	11.1	0.4	**KUC080 2RD**	13.1	23.1	**KJA080 RD**	14.4	28.2	18.9	85.5	**KUX080 2RD**	11.4	19.9	18.2	98.5	0.481	0.431	0.481
228.6	247.65	12.7	11.1	0.4	**KUC090 2RD**	13.7	25.7	**KJA090 RD**	14.9	31.4	19.6	95.1	**KUX090 2RD**	11.9	22.2	18.9	111	0.535	0.499	0.535
254	273.05	12.7	11.1	0.4	**KUC100 2RD**	14.2	28.4	**KJA100 RD**	15.6	34.9	20.5	106	**KUX100 2RD**	12.3	24.5	19.5	123	0.594	0.531	0.594
279.4	298.45	12.7	11.1	0.4	**KUC110 2RD**	14.7	31.1	**KJA110 RD**	16.1	38.0	21.1	115	**KUX110 2RD**	12.7	26.8	20.1	135	0.649	0.581	0.649
304.8	323.85	12.7	11.1	0.4	**KUC120 2RD**	15.2	33.8	**KJA120 RD**	16.5	41.2	21.8	125	**KUX120 2RD**	13.1	29.2	20.6	147	0.708	0.630	0.708



Bearings for railway rolling stock axle journals

Bearings used to support rolling stock axle journals are required to be very strong and, at the same time, to be small because of limited space.

Double-row bearings that are larger in width than general bearings are popular in that they are compact and have high load ratings.

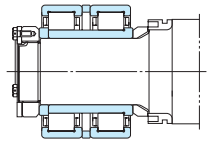
■ Cylindrical roller bearings

- Feature good high-speed performance, and can be maintained and inspected easily because of their separable structure.
  Most commonly used bearing.
- Those with a rib next to the inner ring are able to support not only radial load but also a certain degree of axial load, so that a ball bearing is not required to accommodate the axial load.

■ Sealed type cylindrical roller bearing units and tapered roller bearing units

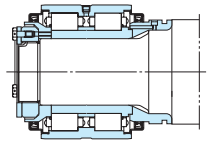
- Maintenance-free : pre-lubricated with grease and provided with oil seals.
- Can be used with a simplified axle box, or with an adapter instead.
- The inch series axle bearing units (ABU) are as specified in the "association of american rail-roads".

Cylindrical roller bearings



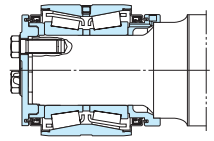
Bore diameter **85** – **133** mm

Sealed type cylindrical roller bearing units



Bore diameter **95** – **120** mm

Sealed type tapered roller bearing units(ABU)



Bore diameter **101.600** – **177.787** mm

Tolerances	● Cylindrical roller and axial load support ball bearings : as specified in JIS B 1514-1, class 0 (Table 7-3 on pp. A 60–A 63). (The tolerances for cylindrical roller bearing width and overall width are as shown in Table 1.) ● Metric series ABU bearings: refer to Table 2. ● Inch series ABU bearings : refer to Table 3.
Recommended fits	Refer to Table 4.
Radial internal clearance	● Cylindrical roller bearings : class C 3 UIC* standard cylindrical roller bearings : class C 4 (refer to Table 10-8 on p. A 106.) ● Axial load support ball bearings : class C 5 However, the clearance class should be adjusted according to the axle box structure. Consult with JTEKT for further information. ● ABU bearings : class C 3 (refer to Table 10-10 on p. A 110) *Denotes that the bearings are compatible with axle journals and axle boxes standardized by the UIC.

Table 1 Cylindrical roller bearings for axle journals : tolerances for inner ring width, outer ring width and overall width

(1) Tolerances for inner ring width and inner ring overall width Unit : μm

Bearing type	Design	Nominal bore diameter d (mm)		Δ_{Bs} or Δ_{B1s}	
		over	up to	upper	lower
Inner ring one-piece type, Inner ring with a rib and loose rib	1-1, 1-2 2-1, 2-3	80	120	0	− 400
		120	180	0	− 500
Two inner rings and spacer	2-2	80	120	0	− 600
		120	180	0	− 700

(2) Tolerances for outer ring width and outer ring overall width Unit : μm

Bearing type	Design	Nominal bore diameter d (mm)		Δ_{Cs} or Δ_{C1s}	
		over	up to	upper	lower
Outer ring one-piece type	2-3	80	120	0	− 300
		120	180	0	− 350
Outer ring and two loose ribs	1-1	80	120	+ 100	− 200
		120	180	+ 100	− 250
Two outer rings	2-1[1)]	120	180	0	− 500
Two outer rings and spacer	1-2 2-1, 2-2	80	120	0	− 500
		120	180	0	− 600

[Note] 1) (2-1) means that spacer shown in Design 2-1 is removed.

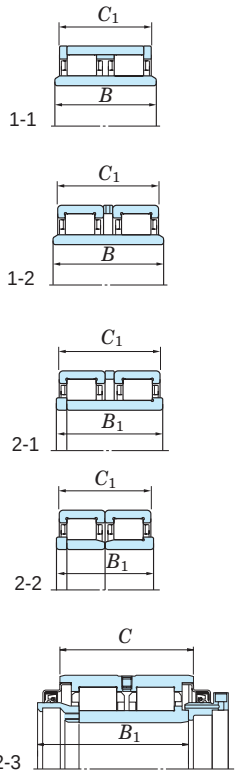


Table 2 Metric series ABU bearing tolerances Unit : μm

Nominal bore diameter d (mm)	Single plane mean bore diameter deviation Δ_{dmp}		Single plane mean outside diameter deviation Δ_{Dmp}		Single outer ring width deviation Δ_{Cs}		Actual overall width of inner rings deviation Δ_{B1s}	
	upper	lower	upper	lower	upper	lower	upper	lower
110	0	− 20	0	− 125	+ 50	− 50	+ 500	− 500
120	0	− 20			+ 100	− 100		
130	0	− 25			+ 100	− 100		

Table 3 Inch series ABU bearing tolerances Unit : μm

Nominal bore diameter d (mm)	Single plane mean bore diameter deviation Δ_{dmp}		Single plane mean outside diameter deviation Δ_{Dmp}		Single outer ring width deviation Δ_{Cs}		Actual overall width of inner rings deviation Δ_{B1s}	
	upper	lower	upper	lower	upper	lower	upper	lower
101.6to177.8	+ 25	0	+ 127	0	+ 50	− 250	+ 710	− 510

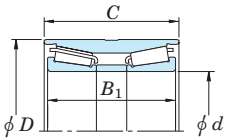
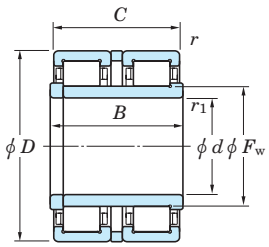


Table 4 Axle journal bearing recommended fits

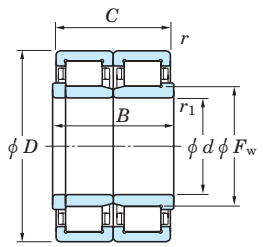
Bearing type	Axle journal diameter (mm)		Axle journal tolerance class	Axle box bore tolerance class
	over	up to		
Cylindrical roller bearing Tapered roller bearing	50	100	(m 6), n 6	H 7
	100	140	n 6	
	140	240	p 6	
Axial load support deep groove ball bearing	All diameters		k 5	Clearance fit (clearance of approx. 0.2 to 0.6 mm)

Cylindrical roller bearings for railway rolling stock axle journals

d 85 ~ (120) mm



Design 1

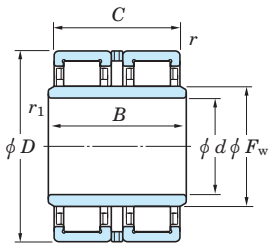


Design 2

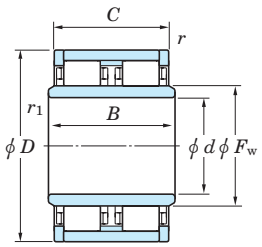
Boundary dimensions (mm)							Basic load ratings (kN)		Bearing No.[2]	Design[3]	(Refer.) Mass (kg)
d	D	B	C	F_w	r min.	r_1[1] min.	C_r	C_{0r}			
85	150	130	120	101.5	1.1	(7)	369	592	**2U2217SC**	3	8.6
90	160	88	80	107	2	2	355	529	**2CR90D**	1	7.2
95	170	120	105	114	1.1	(10)	497	804	**2UJ95**	4	10.9
	170	125	115	113.5	2.5	(7)	441	687	**2CR95A**	1	11.5
	170	130	130	114	2	2	441	688	**2UJ1917**	3	11.4
	170	140	125	114	1.1	(10)	555	926	**4UJ95**	5	12.7
100	180	150	134	120	1.1	(10)	594	990	**4UJ100**	5	15.1
	190	140	130	122	2.5	(7)	697	1 120	**20DC19130/140**	3	16.9
	200	170	170	125	2	(7)	755	1 160	**2CR100**	1	23.7
	200	170	170	125	2	(10)	755	1 160	**20DC20170**	3	23.2
110	200	180	160	134	1.1	(7)	721	1 190	**JC3**	5	22.6
	220	180	160	138	2.5	(7)	789	1 190	**JC6**	1	30.0
	220	185	180	138	2	(7)	922	1 460	**2CR110**	1	31.3
	225	150	140	138	1.1	(7)	833	1 230	**JC1A**	4	27.7
	225	150	140	138	2.5	(7)	897	1 350	**22DC23140/150**	3	26.7
	235	180	160	141	2.5	(7)	934	1 430	**JC2A**	3	35.3
116	220	185	180	142	2	(7)	891	1 470	**2CR116**	1	30.5
	225	150	140	197.5	1.1	(7)	786	1 220	**2UJ116**	4	26.0
120	225	170	165	145	3	(10)	876	1 380	**JC35**	1	29.4
	230	170	165	145	3	(10)	943	1 460	**JC34**	1	30.8
	230	177	150	145	3	(30)	943	1 460	**JC27X**	(1)	29.7
	240	160	160	150	3	7.5	961	1 500	**(24NJ/NJP2480)**	2	33.9
	240	180	160	150	1.1	(10)	1 020	1 580	**JC11**	4	35.5
	240	180	176	150	3	(7)	1 020	1 580	**JC12**	1	37.7

[Notes] 1) Values in ( ) indicate axial chamfer dimension.
2) Bearings indicated in ( ) are in accordance with UIC standards.
3) (1) means that the inner ring (rib side) shown in Design 1 has a special form.
(2) means that loose rib shown in Design 2 is replaced with thrust collar.

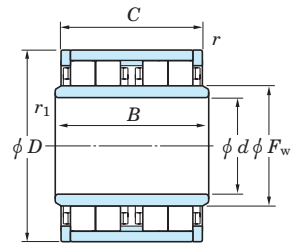
d (120) ~ 133 mm



Design 3



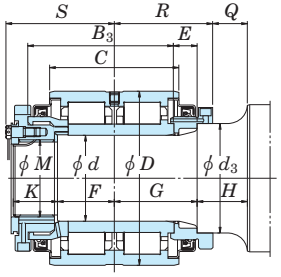
Design 4



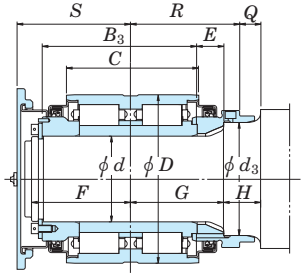
Design 5

Boundary dimensions (mm)							Basic load ratings (kN)		Bearing No.[2]	Design[3]	(Refer.) Mass (kg)
d	D	B	C	F_w	r min.	r_1[1] min.	C_r	C_{0r}			
120	240	185	180	150	2	(7)	983	1 600	**2CR120A**	1	37.8
130	220	170	160	152	1.1	0.6	865	1 520	**4UJ130B**	5	25.2
	240	160	160	157	3	5	867	1 390	**(2CR2624A)**	2	32.0
	240	180	160	158	1.1	(10)	970	1 610	**4UJ130A**	5	35.8
	240	204	198	157	3	5	867	1 390	**(2CR2624)**	2	35.4
	250	160	160	158	3	7.5	1 090	1 720	**(26NJ/NJP2580)**	2	36.4
	260	180	160	163	1.1	(10)	1 080	1 710	**JC5**	4	42.7
	260	185	180	163	3	(7)	1 030	1 610	**2CR130A**	1	44.2
	260	186	172	164	3	7.5	1 220	1 930	**26NJ/NUJ2686**	(2)	44.6
	260	205.5	180	163	3	(30)	1 030	1 610	**JC21**	(1)	45.1
	270	215	210	164	4	(15)	1 280	2 000	**JC29**	3	55.1
	280	215	210	167	4	(15)	1 440	2 250	**JC9-1**	3	61.4
133	280	215	210	167	4	(15)	1 440	2 250	**JC9-2**	3	59.8

d 95 ~ 120 mm



Design 1



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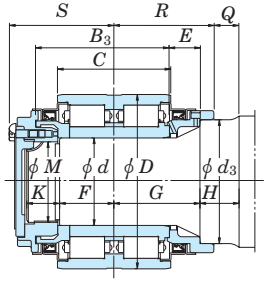

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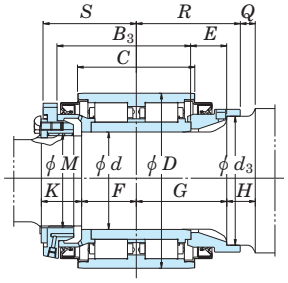

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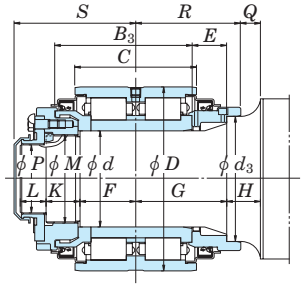

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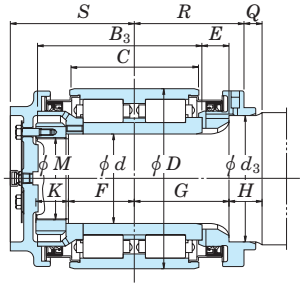
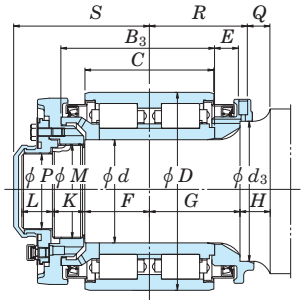
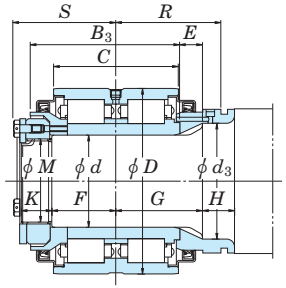


Design 6

Shaft dia. (mm) d	Unit No.	Design	Boundary dimensions (mm) d Brg.	D	C	B_3	d_3	E	F	G	H	K	L	M	P	Q	R	S	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	(Refer.) Unit Mass (kg)
95	JB1425	1	95	190	140	158	120	25	62	90	35	48	—	M85×4	—	18	107	119	19RDC19140/158	610	910	24.5
100	JB1199B	2	100	195	150	175	130	30	120	105	42	—	—	—	—	24	123	130	20RDC20150/133B	673	1 040	27.5
110	JB1462	3	110	220	145	171	155	39	70	110	50	42	—	M100×2	—	33	127	134	S-JC33	789	1 190	35.9
120	JB1356	4	120	220	150	170	158	46	70	116	36	51	—	M115×4	—	19	133	131	24RDC22150/170	702	1 110	34.9
	JB1380D	5	120	230	150	171	155	43	70	113	42	42	33	M110×2	85	25	130	152	JC32	831	1 290	39.0
	JB1010	6	120	240	170	218	168	35	87	125	45	43	—	M110×2	—	25	145	164	JC17	1 020	1 580	57.7
	JB1240	7	120	240	160	193	168	31	80	113	38	40	38	M110×2	85	27	128	169	JC26	935	1 420	51.1
	JB1377	8	120	240	160	192	150	30	83	112	40	38	—	M110×4	—	—	135	131	24RDC24160/192A	935	1 420	42.0



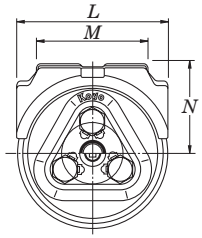
Design 7

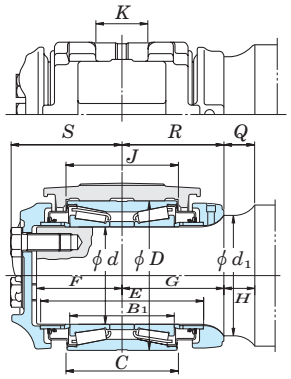


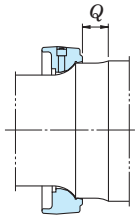
Design 8

Sealed type tapered roller bearings for railway rolling stock axle journals (ABU bearing)

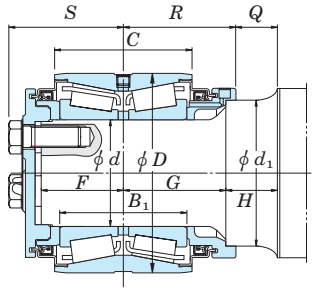
d 101.6 ~ 177.787 mm
110 ~ 130 mm



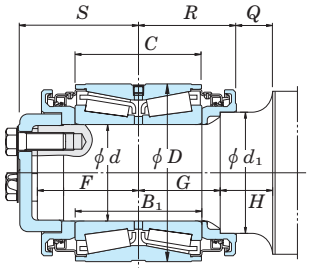




The shape of the backing ring used for JB1204P, JB1205P and JB1206P.



JB1486



JB1450

Dynamic equivalent load
(when $F_a/F_r \le e$)
$P=F_r+Y_2F_a$
(when $F_a/F_r > e$)
$P=0.67F_r+Y_3F_a$
Static equivalent load
$P_0=F_r+Y_0F_a$

Class	Axle size	Unit No.	Boundary dimensions (mm) Brg. d	Axle[1] d	D	B_1	C	d_1[1]	E	F	G	H	Q	R	S	Adapter No.	Dimensions of adapter (mm) J	K	L	M	N	Bolt size	Dimensions (mm) p	Bearing No.	Basic load ratings (kN) C_r	C_{0r}	Constant e	Axial load factors Y_2	Y_3	Y_0	(Refer.) Mass (kg) Unit	Adapter
B	4 1/4×8	JB1201	101.600	101.702 101.676	165.100	106.362	114.300	127.0	182.6	101.6	117.5	41.3	41.3	117.5	134.8	JB701	117.5	68.3	165.9	124.6	101.6	3/4-10 UNC	61.9	HM120848/ HM120817XD	402	769	0.26	2.55	3.80	2.50	17.3	3.8
C	5 ×9	JB1202	119.062	119.164 119.139	195.262	136.525	142.875	149.2	217.5	112.7	134.9	36.5	36.5	134.9	147.0	JB702	146.0	74.6	196.1	143.7	117.5	7/8-9 UNC	76.2	HM124646/ HM124618XD	626	1 200	0.26	2.55	3.80	2.50	25.3	6.1
D	5 1/2×10	JB1203	131.750	131.864 131.839	207.962	146.050	152.400	161.9	227.0	115.9	139.7	44.5	44.5	139.7	150.5	JB703	155.6	74.6	208.8	156.4	123.8	7/8-9 UNC	88.9	HM127446/ HM127415XD	641	1 270	0.26	2.55	3.80	2.50	28.3	7.4
E	6 ×11	JB1204	144.450	144.564 144.539	220.662	155.575	163.512	177.8	241.3	127.0	150.8	46.0	46.0	150.8	164.1	JB704	166.7	96.8	221.5	181.8	136.5	1-8 UNC	98.4	HM129848/ HM129814XD	667	1 380	0.26	2.55	3.80	2.50	34.3	10.8
		JB1204P	144.450	144.564 144.539	220.662	155.575	163.512	178.613 178.562	241.3	127.0	150.8	46.0	36.8	160.0	164.1	JB704	166.7	96.8	221.5	181.8	136.5	1-8 UNC	98.4	HM129848/ HM129814XD	667	1 380	0.26	2.55	3.80	2.50	35.0	10.8
F	6 1/2×12	JB1205	157.150	157.264 157.239	252.412	177.800	184.150	190.5	273.0	134.9	163.5	46.0	46.0	163.5	176.6	JB705	187.3	96.8	253.2	194.5	152.4	1 1/8-7 UNC	108.0	HM133444/ HM133416XD	910	1 890	0.26	2.55	3.80	2.50	51.6	16.3
		JB1205P	157.150	157.264 157.239	252.412	177.800	184.150	191.313 191.262	273.0	134.9	163.5	46.0	36.7	172.8	176.6	JB705	187.3	96.8	253.2	194.5	152.4	1 1/8-7 UNC	108.0	HM133444/ HM133416XD	910	1 890	0.26	2.55	3.80	2.50	52.4	16.3
G	7 ×12	JB1206P	177.787	177.902 177.876	276.225	180.975	185.738	203.251 203.200	269.9	130.2	150.8	58.7	46.0	163.5	180.1	JB706[2]	189.7	181.0	—	279.4	168.3	1 1/4-7 UNC	117.5	HM136948/ HM136916XD	1 080	2 220	0.26	2.55	3.80	2.50	59.2	23
—	110	JB558	110	110.076 110.054	175	125	130	155	206	105	135	30	30	135	136.4	JB558	134	70	175	135	110	M22	75	JT9	481	972	0.26	2.55	3.80	2.50	22.0	5.6
—		JB1486	110	110.059 110.037	205	130	140	150.068 150.043	—	85	105	53	43	115	118.4	—	—	—	—	—	—	M22	75	JT13	743	1 220	0.26	2.55	3.80	2.50	27.3	—
—	120	JB613	120	120.076 120.054	195	136	142	155	217	113	135	30	30	135	147.5	JB613	146	74.5	196	142.5	118	M22	75	JT10	626	1 200	0.26	2.55	3.80	2.50	27.0	6.2
—		JB1450	120	120.059 120.037	220	155	155	150.068 150.043	—	125	100	55	35	120	164.4	—	—	—	—	—	—	M22	75	JT12	907	1 670	0.26	2.55	3.80	2.50	36.6	—
—	130	JB633	130	130.076 130.054	208	146	152	165	227	139	139	26	26	139	149.2	JB633[2]	156	110	255	232	130	M22	89	JT11	641	1 270	0.26	2.55	3.80	2.50	30.0	14.3

[Notes] 1) Upper figures : max. value ; lower : min.value

2) JB706 and JB633 indicate the specifications of wide adapters.
Others indicate narrow adapters (shown in figures above).

Linear ball bearings

Linear ball bearings have an outer cylinder and a cage with three or more elliptic raceways inside. Balls are aligned on these raceways.

Ball complement bore diameter (mm)

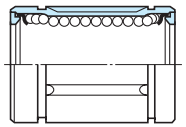
SDM series	6 –120
SDMF, SDMK series	6 – 80
SDE series	5 – 80

Standard type	Clearance adjustable type	Open type
		
Suitable for a wide range of applications and widely used in practice. The upper-class type is used for general purposes. The precision-class type is used when the bearing is required to be highly accurate.	The outer cylinder and side plate are slit axially so that the clearance between the bearing and shaft can be adjusted. Together with the use of a bore adjustable housing, a no-clearance state or light-preloaded state can be realized without fitting.	The outer cylinder and side plate each have a slit which is equivalent in size to a recirculating ball row raceway, so that the bearing does not interfere with a shaft strut during operation. This type is suitable for use with very long shafts. The bore diameter is adjustable.

Flanged type

Can be fit quickly, and helps make equipment smaller and lighter in weight. Helps reduce cost.

Sealed type



One or both side(s) is/are sealed with special synthetic rubber so that foreign material cannot enter the bearing while the grease is kept from leaking. This sealing can be provided on all bearings of the standard, clearance adjustable, open, and flanged types.

Bearing numbering system

SDM	35	UU	AJ	□□	□
Series code	Ball complement bore diameter number	Seal code	Shape code	Material code	Tolerance code

Series code		SDM : metric series SDMF : metric series (flanged type) SDMK : metric series (flanged type) SDE : metric series (popular ones in europe) SDB : inch series
Ball complement bore diameter number	Metric series	35 : ball complement bore diameter 35 mm
	Inch series	4 : ball complement bore diameter 4/16 = 1/4 inch
Seal code		UU : both sides sealed U : single side sealed Not specified : not sealed
Shape code		Not specified : standard type AJ : clearance adjustable type OP : open type
Material code	Outer cylinder and balls	Not specified : high carbon chrome bearing steel
	Cage	Not specified : cold rolled steel sheet MG : synthetic resin
Tolerance code		Not specified : upper-class P : precision-class

■ Linear ball bearing service life

Linear ball bearing service life refers to the distance that the bearing travels until the outer cylinder, balls or shaft become damaged because of rolling contact fatigue from repeated stress.

The basic dynamic load rating refers to the magnitude of a constant load which makes a bearing's service life end after it travels a distance of 50 km.

The linear ball bearing service life and the basic dynamic load rating bear the relation shown below :

$$L = 50\left(\frac{C}{P}\right)^3$$

where :

L : service life km
P : radial load on the bearing N
C : bearing basic dynamic load rating N
(refer to the specification table.)

Shaft surface hardness is closely related to running performance. In general, it is best for the hardness to be 60 thru 64 HRC.

If the hardness is 60 HRC or lower, the basic dynamic load rating (C) should be corrected by multiplying it by the appropriate hardness coefficient selected from Table 1.

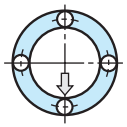
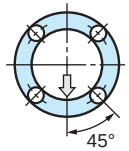
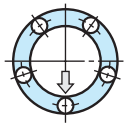
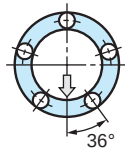
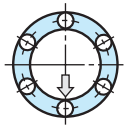
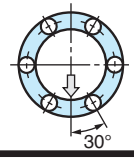
Table 1 Hardness coefficients

Shaft hardness HRC	Hardness coefficient f_H
60	1
59	0.97
57	0.88
55	0.76
53	0.64
51	0.52

● Ball row arrangement and load rating

The basic load ratings given in the specification table are those measured when a load is applied directly above a ball row (Q_1). When the load is applied between two ball rows, the load ratings become larger (Q_2). Table 2 lists the ratios of Q_2 ratings to Q_1 ratings.

Table 2 Ball row arrangement and the comparison of load ratings

Number of ball rows	When a load is applied directly above a row (Q_1)	When a load is applied between two rows (Q_2)	Ratios of Q_2 to Q_1
4			1.414
5			1.463
6			1.280

[Note] When there are only three rows, $Q_2 / Q_1 = 1$

■ Recommended fits for linear ball bearings

Table 3 lists the recommended fits for linear ball bearings.

When a bearing is mounted with a housing, the normal clearance fit should be selected. When the application is highly precise or special, the transition fit should be selected.

For the clearance adjustable and open type bearings, it is best for the shaft diameter to be smaller than the ball complement bore diameter lower deviation, and for the housing bore diameter to be larger than the bearing outside diameter upper deviation.

Table 3 Linear ball bearing recommended fits

Bearing	Tolerance	Shaft tolerance class		Housing bore tolerance class	
		Normal clearance	Close clearance	Clearance fit	Transition fit
SDM, SDB	Upper-class	f 6, g 6	h 6	H 7	JS 7 (J 7)
	Precision-class	f 5, g 5	h 5	H 6	JS 6 (J 6)
SDE	–	h 6	js 6 (j 6)	H 7	JS 7 (J 7)

■ Linear ball bearing clearance

Linear ball bearings provide linear motion smoothly with little wear when the clearance is 0.003 to 0.012 mm. However, when clearance increase due to wear is considered critical, e.g. when the bearing is provided to press die sets, precision machine tools or precision testers; when the bearing becomes unable to slide because of moment; or when smooth bearing operation is needed with no clearance provided, the clearance is adjusted to zero or negative.

In such a case, shafts generally need to be mounted by "selective fitting."

They should be handled carefully so as not to be preloaded excessively.

As Fig. 1 shows, the clearance of bearings with numbers SDM 6 thru SDM 10 can be easily set to zero or negative, by adjusting one of the three ball rows with a bolt.

Consult with JTEKT on the gauging of linear ball bearings and shafts which should be mounted by "selective fitting," as well as on the whole design of shafts.

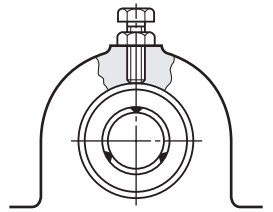


Fig. 1 Clearance adjustment

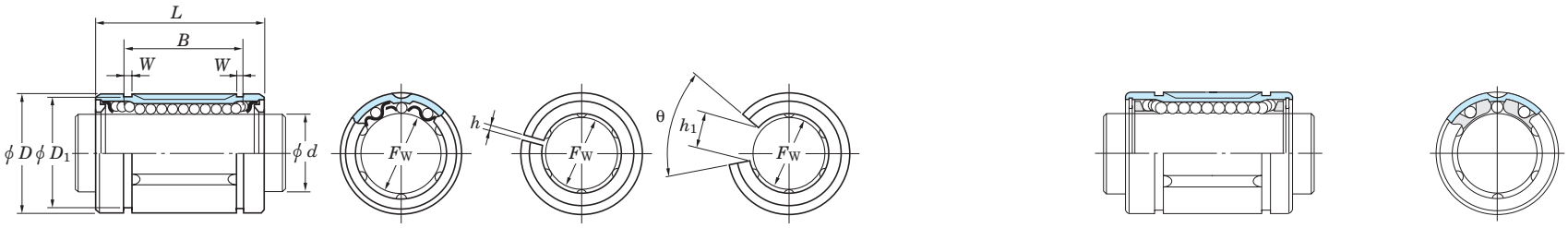
Table 4 SDM series linear ball bearing tolerances Unit : μm

Bearing number SDM	Ball complement bore diameter (F_w) deviation				Outside diameter (D) deviation		Overall length (L) deviation		B deviation		Eccentricity	
	Precision-class		Upper-class								Precision-class	Upper-class
	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	max.	
6, 8	0	– 6	0	– 9	0	– 11	0	– 200	0	– 200	8	12
10, 12, 13, 16	0	– 6	0	– 9	0	– 13	0	– 200	0	– 200	8	12
20	0	– 7	0	– 10	0	– 16	0	– 200	0	– 200	10	15
25, 30	0	– 7	0	– 10	0	– 16	0	– 300	0	– 300	10	15
35, 38, 40, 50	0	– 8	0	– 12	0	– 19	0	– 300	0	– 300	12	20
60	0	– 9	0	– 15	0	– 22	0	– 300	0	– 300	17	25
80	0	– 9	0	– 15	0	– 22	0	– 400	0	– 400	17	25
100, 120	0	– 10	0	– 20	0	– 25	0	– 400	0	– 400	20	30

Table 5 SDE series linear ball bearing tolerances Unit : μm

Bearing number SDE	Ball complement bore diameter (F_w) deviation		Outside diameter (D) deviation		Overall length (L) deviation		B deviation		Eccentricity
	upper	lower	upper	lower	upper	lower	upper	lower	max.
5, 8	+ 8	0	0	– 8	0	– 200	0	– 200	12
10, 12	+ 8	0	0	– 9	0	– 200	0	– 200	12
16	+ 9	– 1	0	– 9	0	– 200	0	– 200	12
20	+ 9	– 1	0	– 11	0	– 200	0	– 200	15
25, 30	+ 11	– 1	0	– 11	0	– 300	0	– 300	15
40, 50	+ 13	– 2	0	– 13	0	– 300	0	– 300	17
60	+ 13	– 2	0	– 15	0	– 400	0	– 400	20
80	+ 16	– 4	0	– 15	0	– 400	0	– 400	20

d 5 ~ (20) mm



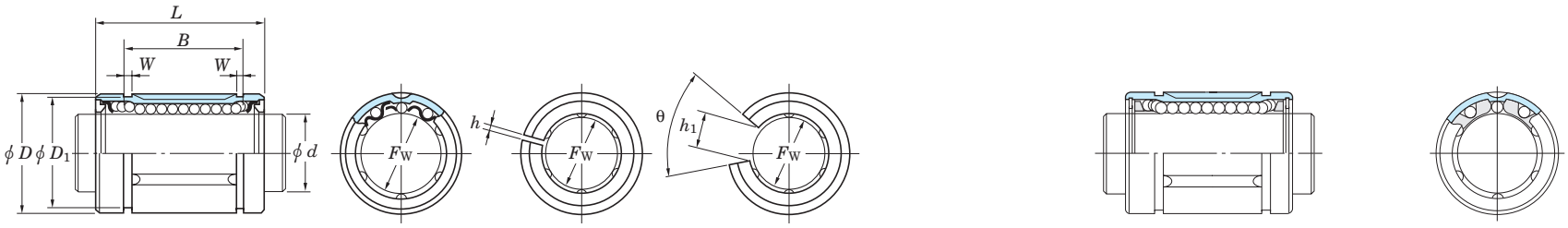
SDM, SDE | Standard type | Clearance adjustable type (...AJ) | Open type (...OP)

SDM...MD

Shaft dia. (mm)	Dimensions (mm)									Bearing No.[1]				No. of ball rows			Basic load ratings (N)		(Refer.) Mass (g)
d	F_w	D	L	B	W	D_1	h	h_1	θ	Standard type	Clearance adjustable type	Open type		Standard type	Clearanece adjustable type	Open type	C_r	C_{0r}	Standard type
5	5	12	22	14.5	1.1	11.5	—	—	—	**SDE5**	—	—		3	—	—	108	183	10
6	6	12	19	13.5	1.1	11.5	1	—	—	**SDM6**	**SDM6AJ**	—		3	3	—	108	186	7
	6	12	19	13.5	1.1	11.5	1	—	—	**SDM6MG**	**SDM6AJMG**	—		4	4	—	108	186	6
8	8	15	17	11.5	1.1	14.3	1	—	—	**SDM8S**	**SDM8SAJ**	—		3	3	—	96	160	10
	8	15	17	11.5	1.1	14.3	1	—	—	**SDM8SMG**	**SDM8SAJMG**	—		4	4	—	96	160	9
	8	15	24	17.5	1.1	14.3	1	—	—	**SDM8**	**SDM8AJ**	—		3	3	—	122	223	14
	8	15	24	17.5	1.1	14.3	1	—	—	**SDM8MG**	**SDM8AJMG**	—		4	4	—	134	255	13
	8	16	25	16.5	1.1	15.2	1	—	—	**SDE8**	**SDE8AJ**	—		3	3	—	122	223	20
	8	16	25	16.5	1.1	15.2	1	—	—	**SDE8MG**	**SDE8AJMG**	—		4	4	—	134	255	18
10	10	19	29	22	1.3	18	1	6.8	80°	**SDM10**	**SDM10AJ**	**SDM10OP**		4	4	3	259	424	27
	10	19	29	22	1.3	18	1	—	—	**SDM10MG**	**SDM8AJMG**	—		4	4	—	259	424	23
	10	19	29	22	1.3	18	1	6.8	80°	**SDE10**	**SDE10AJ**	**SDE10OP**		4	4	3	259	424	27
	10	19	29	22	1.3	18	1	—	—	**SDE10MG**	**SDE10AJMG**	—		4	4	—	259	424	23
12	12	21	30	23	1.3	20	1.5	8	80°	**SDM12**	**SDM12AJ**	**SDM12OP**		4	4	3	260	431	31
	12	21	30	23	1.3	20	1.5	—	—	**SDM12MG**	**SDM12AJMG**	—		4	4	—	260	431	27
	12	22	32	22.9	1.3	21	1.5	7.5	78°	**SDE12**	**SDE12AJ**	**SDE12OP**		4	4	3	289	503	42
	12	22	32	22.9	1.3	21	1.5	—	—	**SDE12MG**	**SDM12AJMG**	—		4	4	—	289	503	37
13	13	23	32	23	1.3	22	1.5	9	80°	**SDM13**	**SDM13AJ**	**SDM13OP**		4	4	3	289	506	41
	13	23	32	23	1.3	22	1.5	—	—	**SDM13MG**	**SDM13AJMG**	—		4	4	—	289	506	35
16	16	26	36	24.9	1.3	24.9	1.5	10	78°	**SDE16**	**SDE16AJ**	**SDE16OP**		4	4	3	319	587	53
	16	26	36	24.9	1.3	24.9	1.5	—	—	**SDE16MG**	**SDE16AJMG**	—		4	4	—	319	587	47
	16	28	37	26.5	1.6	27	1.5	11	80°	**SDM16**	**SDM16AJ**	**SDM16OP**		4	4	3	480	766	69
	16	28	37	26.5	1.6	27	1.5	—	—	**SDM16MG**	**SDM16AJMG**	—		4	4	—	480	766	59
20	20	32	42	30.5	1.6	30.5	1.5	11	60°	**SDM20**	**SDM20AJ**	**SDM20OP**		5	5	4	590	1 010	92
	20	32	42	30.5	1.6	30.5	1.5	—	—	**SDM20MG**	**SDM20AJMG**	—		5	5	—	590	1 010	79

[Note] 1) JTEKT also manufactures sealed types, which are identified by U (one side sealed) or UU (both sides sealed) after ball complement bore diameter number.

d (20) ~ 80 mm



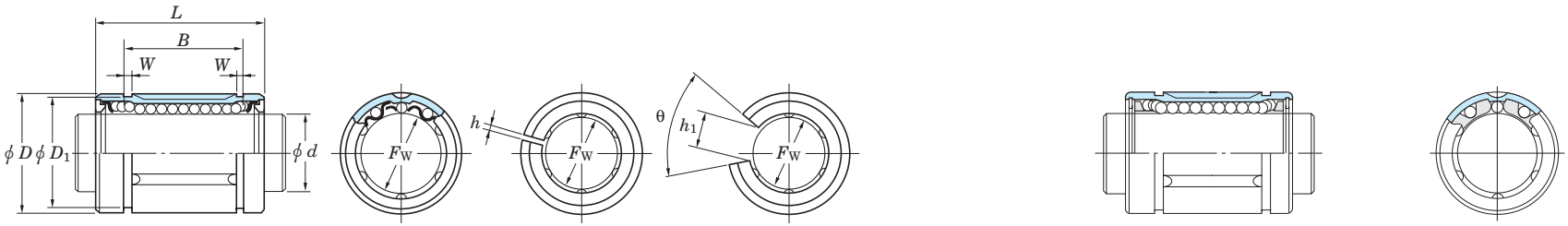
SDM, SDE | Standard type | Clearance adjustable type (...AJ) | Open type (...OP)

SDM...MD

Shaft dia. (mm)	Dimensions (mm)									Bearing No.[1]			No. of ball rows			Basic load ratings (N)		(Refer.) Mass (g)
d	F_w	D	L	B	W	D_1	h	h_1	θ	Standard type	Clearance adjustable type	Open type	Standard type	Clearanece adjustable type	Open type	C_r	C_{0r}	Standard type
20	20	32	45	31.5	1.6	30.3	2	10	60°	**SDE20**	**SDE20AJ**	**SDE20OP**	5	5	4	590	1 010	96
	20	32	45	31.5	1.6	30.3	2	—	—	**SDE20MG**	**SDE20AJMG**	—	5	5	—	590	1 010	88
25	25	40	58	44.1	1.85	37.5	2	12.5	60°	**SDE25**	**SDE25AJ**	**SDE25OP**	5	5	4	1 130	2 030	190
	25	40	58	44.1	1.85	37.5	2	—	—	**SDE25MG**	**SDE25AJMG**	—	5	5	—	1 130	2 030	170
	25	40	59	41	1.85	38	2	12	60°	**SDM25**	**SDM25AJ**	**SDM25OP**	5	5	4	1 130	2 030	200
	25	40	59	41	1.85	38	2	—	—	**SDM25MG**	**SDM25AJMG**	—	5	5	—	1 130	2 030	170
30	30	45	64	44.5	1.85	43	2.5	15	50°	**SDM30**	**SDM30AJ**	**SDM30OP**	6	6	5	1 470	2 770	250
	30	45	64	44.5	1.85	43	2.5	—	—	**SDM30MG**	**SDM30AJMG**	—	6	6	—	1 470	2 770	220
	30	47	68	52.1	1.85	44.5	2	12.5	50°	**SDE30**	**SDE30AJ**	**SDE30OP**	6	6	5	1 470	2 770	340
	30	47	68	52.1	1.85	44.5	2	—	—	**SDE30MG**	**SDE30AJMG**	—	6	6	—	1 470	2 770	320
35	35	52	70	49.5	2.1	49	2.5	17	50°	**SDM35**	**SDM35AJ**	**SDM35OP**	6	6	5	1 580	3 070	370
	35	52	70	49.5	2.1	49	2.5	—	—	**SDM35MG**	**SDM35AJMG**	—	6	6	—	1 580	3 070	330
38	38	57	76	58.5	2.1	54.5	3	18	50°	**SDM38**	**SDM38AJ**	**SDM38OP**	6	6	5	2 020	3 600	490
40	40	60	80	60.5	2.1	57	3	20	50°	**SDM40**	**SDM40AJ**	**SDM40OP**	6	6	5	2 180	4 010	590
	40	60	80	60.5	2.1	57	3	—	—	**SDM40MG**	**SDM40AJMG**	—	6	6	—	2 180	4 010	530
	40	62	80	60.6	2.15	59	3	16.8	50°	**SDE40**	**SDE40AJ**	**SDE40OP**	6	6	5	2 180	4 010	710
	40	62	80	60.6	2.15	59	3	—	—	**SDE40MG**	**SDE40AJMG**	—	6	6	—	2 180	4 010	650
50	50	75	100	77.6	2.65	72	3	21	50°	**SDE50**	**SDE50AJ**	**SDE50OP**	6	6	5	4 020	7 110	1 050
	50	80	100	74	2.6	76.5	3	25	50°	**SDM50**	**SDM50AJ**	**SDM50OP**	6	6	5	4 420	7 150	1 500
60	60	90	110	85	3.15	86.5	3	30	50°	**SDM60**	**SDM60AJ**	**SDM60OP**	6	6	5	5 170	9 030	1 850
	60	90	125	101.7	3.15	86.5	3	27.2	54°	**SDE60**	**SDE60AJ**	**SDE60OP**	6	6	5	6 470	11 100	1 900
80	80	120	140	105.5	4.15	116	3	40	50°	**SDM80**	**SDM80AJ**	**SDM80OP**	6	6	5	8 180	12 800	4 200
	80	120	165	133.7	4.15	116	3	36.3	54°	**SDE80**	**SDE80AJ**	**SDE80OP**	6	6	5	8 890	14 500	4 800

[Note] 1) JTEKT also manufactures sealed types, which are identified by U (one side sealed) or UU (both sides sealed) after ball complement bore diameter number.

d 100 ~ 120 mm

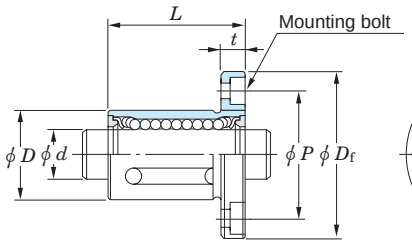


SDM, SDE | Standard type | Clearance adjustable type (...AJ) | Open type (...OP) | SDM...MD

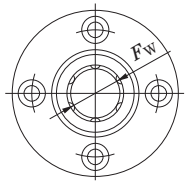
Shaft dia. (mm)	Dimensions (mm)									Bearing No.[1]				No. of ball rows			Basic load ratings (N)		(Refer.) Mass (g)
d	F_w	D	L	B	W	D_1	h	h_1	θ	Standard type	Clearance adjustable type	Open type		Standard type	Clearanece adjustable type	Open type	C_r	C_{0r}	Standard type
100	100	150	175	125.5	4.15	145	3	50	50°	**SDM100**	**SDM100AJ**	**SDM100OP**		6	6	5	12 300	19 700	8 200
120	120	180	200	158.6	4.15	175	4	85	80°	**SDM120**	**SDM120AJ**	**SDM120OP**		8	8	6	22 300	39 100	15 500

[Note] 1) JTEKT also manufactures sealed types, which are identified by U (one side sealed) or UU (both sides sealed) after ball complement bore diameter number.

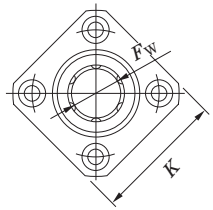
d 6 ~ 50 mm



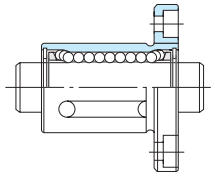
SDMF, SDMK



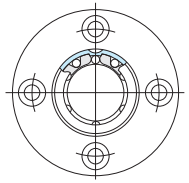
Round-flanged



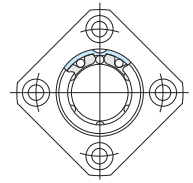
Square-flanged



SDMF...MG
SDMK...MG (Synthetic resin)



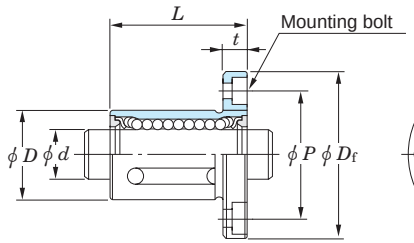
Round-flanged



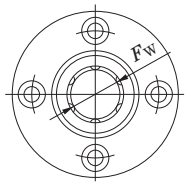
Square-flanged

Shaft dia. (mm)	Dimensions (mm)							Bolt size	Bearing No.		No. of ball rows	Basic load ratings (N)		(Refer.) Mass (g)
									Round-flanged type	Square-flanged type				Round-flanged type
d	F_w	D	L	D_f	K	t	P					C_r	C_{0r}	
6	6	12	19	28	22	5	20	M3	**SDMF6**	**SDMK6**	3	108	186	23
	6	12	19	28	22	5	20	M3	**SDMF6MG**	**SDMK6MG**	4	108	186	22
8	8	15	24	32	25	5	24	M3	**SDMF8**	**SDMK8**	3	122	223	35
	8	15	24	32	25	5	24	M3	**SDMF8MG**	**SDMK8MG**	4	134	255	34
10	10	19	29	40	30	6	29	M4	**SDMF10**	**SDMK10**	4	259	424	65
	10	19	29	40	30	6	29	M4	**SDMF10MG**	**SDMK10MG**	4	259	424	61
12	12	21	30	42	32	6	32	M4	**SDMF12**	**SDMK12**	4	260	431	72
	12	21	30	42	32	6	32	M4	**SDMF12MG**	**SDMK12MG**	4	260	431	68
13	13	23	32	43	34	6	33	M4	**SDMF13**	**SDMK13**	4	289	506	83
	13	23	32	43	34	6	33	M4	**SDMF13MG**	**SDMK13MG**	4	289	506	77
16	16	28	37	48	37	6	38	M4	**SDMF16**	**SDMK16**	4	480	766	120
	16	28	37	48	37	6	38	M4	**SDMF16MG**	**SDMK16MG**	4	480	766	110
20	20	32	42	54	42	8	43	M5	**SDMF20**	**SDMK20**	5	590	1 010	170
	20	32	42	54	42	8	43	M5	**SDMF20MG**	**SDMK20MG**	5	590	1 010	160
25	25	40	59	62	50	8	51	M5	**SDMF25**	**SDMK25**	5	1 130	2 030	290
	25	40	59	62	50	8	51	M5	**SDMF25MG**	**SDMK25MG**	5	1 130	2 030	270
30	30	45	64	74	58	10	60	M6	**SDMF30**	**SDMK30**	6	1 470	2 770	440
	30	45	64	74	58	10	60	M6	**SDMF30MG**	**SDMK30MG**	6	1 470	2 770	410
35	35	52	70	82	64	10	67	M6	**SDMF35**	**SDMK35**	6	1 580	3 070	610
	35	52	70	82	64	10	67	M6	**SDMF35MG**	**SDMK35MG**	6	1 580	3 070	560
40	40	60	80	96	75	13	78	M8	**SDMF40**	**SDMK40**	6	2 180	4 010	1 000
	40	60	80	96	75	13	78	M8	**SDMF40MG**	**SDMK40MG**	6	2 180	4 010	930
50	50	80	100	116	92	13	98	M8	**SDMF50**	**SDMK50**	6	4 420	7 150	2 000

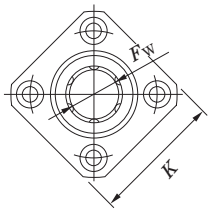
d 60 ~ 80 mm



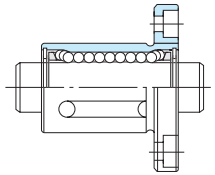
SDMF, SDMK



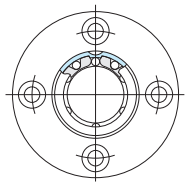
Round-flanged



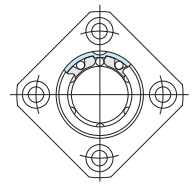
Square-flanged



SDMF...MG
SDMK...MG (Synthetic resin)



Round-flanged



Square-flanged

Shaft dia. (mm)	Dimensions (mm)							Bolt size	Bearing No.			No. of ball rows	Basic load ratings (N)		(Refer.) Mass (g)
									Round-flanged type	Square-flanged type					Round-flanged type
d	F_w	D	L	D_f	K	t	P						C_r	C_{0r}	
60	60	90	110	134	106	18	112	M10	**SDMF60**	**SDMK60**		6	5 170	9 030	2 800
80	80	120	140	164	136	18	142	M10	**SDMF80**	**SDMK80**		6	8 180	12 800	5 400

Locknuts, lockwashers & lock plates

Bearings are often fit to a shaft with an adapter sleeve, locknut, lockwasher or lock plate.

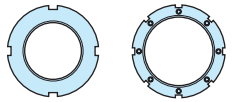
These accessories make it easy to attach and remove bearings.

They are standardized in JIS.

- Locknuts are standardized such that they can be used with either adapter sleeves, withdrawal sleeves or shafts.
- Lockwashers and lock plates are used as locks on locknuts.

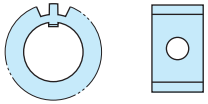
Lockwashers are used with bearings of bore diameter number 40 or lower. Lock plates are used with those of bore diameter 44 or higher.

Locknuts



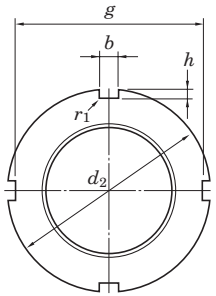
AN (ANL)	02 – 100
HN (HNL)	41 – 110

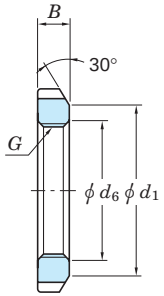
Lockwashers and lock plates



AW (AWL)	00 – 40(X)
AL (ALL)	44 – 100

AN02 ~ 25





Locknut No.	Thread size[1] G	Standard dimensions (mm) d_2	d_1	g	d_6	b	h	B	r_1 max.	(Refer.) Mass (kg)	Applicable[2] adapter sleeve (bore No.)	Applicable[3] lockwasher No.
AN 02	M 15×1	25	21	21	15.5	4	2	5	0.4	0.010	—	AW 02
03	M 17×1	28	24	24	17.5	4	2	5	0.4	0.013	—	03
04	M 20×1	32	26	28	20.5	4	2	6	0.4	0.019	04	04
AN 05	M 25×1.5	38	32	34	25.8	5	2	7	0.4	0.025	05	AW 05
06	M 30×1.5	45	38	41	30.8	5	2	7	0.4	0.043	06	06
07	M 35×1.5	52	44	48	35.8	5	2	8	0.4	0.053	07	07
AN 08	M 40×1.5	58	50	53	40.8	6	2.5	9	0.5	0.085	08	AW 08
09	M 45×1.5	65	56	60	45.8	6	2.5	10	0.5	0.119	09	09
10	M 50×1.5	70	61	65	50.8	6	2.5	11	0.5	0.148	10	10
AN 11	M 55×2	75	67	69	56	7	3	11	0.5	0.158	11	AW 11
12	M 60×2	80	73	74	61	7	3	11	0.5	0.174	12	12
13	M 65×2	85	79	79	66	7	3	12	0.5	0.203	13	13
AN 14	M 70×2	92	85	85	71	8	3.5	12	0.5	0.242	14	AW 14
15	M 75×2	98	90	91	76	8	3.5	13	0.5	0.287	15	15
16	M 80×2	105	95	98	81	8	3.5	15	0.6	0.397	16	16
AN 17	M 85×2	110	102	103	86	8	3.5	16	0.6	0.451	17	AW 17
18	M 90×2	120	108	112	91	10	4	16	0.6	0.556	18	18
19	M 95×2	125	113	117	96	10	4	17	0.6	0.658	19	19
AN 20	M100×2	130	120	122	101	10	4	18	0.6	0.698	20	AW 20
21	M105×2	140	126	130	106	12	5	18	0.7	0.845	21	21
22	M110×2	145	133	135	111	12	5	19	0.7	0.965	22	22
AN 23	M115×2	150	137	140	116	12	5	19	0.7	1.01	—	AW 23
24	M120×2	155	138	145	121	12	5	20	0.7	1.08	24	24
25	M125×2	160	148	150	126	12	5	21	0.7	1.19	—	25

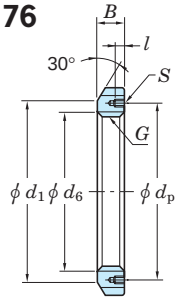
[Notes] 1) Basic profile and dimension of screw thread are in accordance with JIS B 0205.
2) Applicable to adapter sleeve series A31, A2, A3 and A23.
3) Applicable to lockwashers with flat inner tongue.
[Remark] Locknut series AN is used for adapter assembly series H2, H3, H23 and H31, while locknut series ANL is used for adapter assembly series H30.

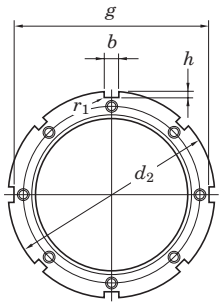
AN 26 ~ 40
ANL24 ~ 40

Locknut No.	Thread size[1] G	Standard dimensions (mm) d_2	d_1	g	d_6	b	h	B	r_1 max.	(Refer.) Mass (kg)	Applicable[2] adapter sleeve (bore No.)	Applicable[3] lockwasher No.
AN 26	M130×2	165	149	155	131	12	5	21	0.7	1.25	26	AW 26
AN 27	M135×2	175	160	163	136	14	6	22	0.7	1.55	—	AW 27
28	M140×2	180	160	168	141	14	6	22	0.7	1.56	28	28
AN 29	M145×2	190	172	178	146	14	6	24	0.7	1.80	—	AW 29
30	M150×2	195	171	183	151	14	6	24	0.7	2.03	30	30
31	M155×3	200	182	186	156.5	16	7	25	0.7	2.30	—	—
AN 32	M160×3	210	182	196	161.5	16	7	25	0.7	2.59	32	AW 32
33	M165×3	210	193	196	166.5	16	7	26	0.7	2.70	—	—
34	M170×3	220	193	206	171.5	16	7	26	0.7	2.80	34	34
AN 36	M180×3	230	203	214	181.5	18	8	27	0.7	3.07	36	AW 36
38	M190×3	240	214	224	191.5	18	8	28	0.7	3.39	38	38
40	M200×3	250	226	234	201.5	18	8	29	0.7	3.69	40	40
ANL24	M120×2	145	133	135	121	12	5	20	0.7	0.78	24	AWL24
26	M130×2	155	143	145	131	12	5	21	0.7	0.88	26	26
28	M140×2	165	151	153	141	14	6	22	0.7	0.99	28	28
ANL30	M150×2	180	164	168	151	14	6	24	0.7	1.33	30	AWL30
32	M160×3	190	174	176	161.5	16	7	25	0.7	1.56	32	32
34	M170×3	200	184	186	171.5	16	7	26	0.7	1.72	34	34
ANL36	M180×3	210	192	194	181.5	18	8	27	0.7	1.95	36	AWL36
38	M190×3	220	202	204	191.5	18	8	28	0.7	2.08	38	38
40	M200×3	240	218	224	201.5	18	8	29	0.7	2.98	40	40

Locknuts for adapter sleeves and shafts

AN 44 ~ 100
ANL 44 ~ 76





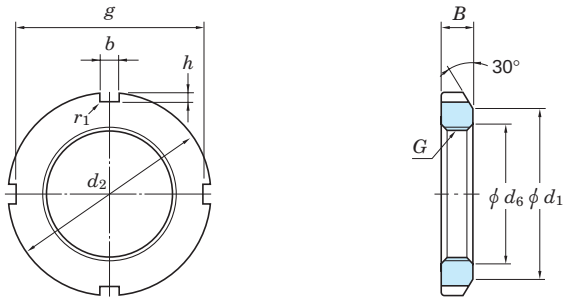
Locknut No.	Thread[1] size G	Standard dimensions (mm) d_2	d_1	g	d_6	b	h	B	r_1 max.	Tapped hole[2] (mm) l	S Thread size	d_p	(Refer.) Mass (kg)	Applicable adapter sleeve[3] (bore No.)	Applicable lock plate No.
AN 44	Tr220×4	280	250	260	222	20	10	32	0.8	15	M 8×1.25	238	5.16	44	AL 44
48	Tr240×4	300	270	280	242	20	10	34	0.8	15	M 8×1.25	258	5.91	48	44
52	Tr260×4	330	300	306	262	24	12	36	0.8	18	M10×1.5	281	7.99	52	52
AN 56	Tr280×4	350	320	326	282	24	12	38	0.8	18	M10×1.5	301	8.99	56	AL 52
60	Tr300×4	380	340	356	302	24	12	40	0.8	18	M10×1.5	326	11.7	60	60
64	Tr320×5	400	360	376	322.5	24	12	42	0.8	18	M10×1.5	345	13.0	64	64
AN 68	Tr340×5	440	400	410	342.5	28	15	55	1	21	M12×1.75	372	23.0	68	AL 68
72	Tr360×5	460	420	430	362.5	28	15	58	1	21	M12×1.75	392	25.0	72	68
76	Tr380×5	490	450	454	382.5	32	18	60	1	21	M12×1.75	414	30.8	76	76
AN 80	Tr400×5	520	470	484	402.5	32	18	62	1	27	M16×2	439	36.7	80	AL 80
84	Tr420×5	540	490	504	422.5	32	18	70	1	27	M16×2	459	43.3	84	80
88	Tr440×5	560	510	520	442.5	36	20	70	1	27	M16×2	477	45.1	88	88
AN 92	Tr460×5	580	540	540	462.5	36	20	75	1	27	M16×2	497	50.2	92	AL 88
96	Tr480×5	620	560	580	482.5	36	20	75	1	27	M16×2	527	62.0	96	96
100	Tr500×5	630	580	584	502.5	40	23	80	1	27	M16×2	539	63.1	/500	100
ANL44	Tr220×4	260	242	242	222	20	9	30	0.8	12	M 6×1	229	3.09	44	ALL44
48	Tr240×4	290	270	270	242	20	10	34	0.8	15	M 8×1.25	253	5.16	48	48
52	Tr260×4	310	290	290	262	20	10	34	0.8	15	M 8×1.25	273	5.67	52	48
ANL56	Tr280×4	330	310	310	282	24	10	38	0.8	15	M 8×1.25	293	6.78	56	ALL56
60	Tr300×4	360	336	336	302	24	12	42	0.8	15	M 8×1.25	316	9.62	60	60
64	Tr320×5	380	356	356	322.5	24	12	42	0.8	15	M 8×1.25	335	9.94	64	64
ANL68	Tr340×5	400	376	376	342.5	24	12	45	1	15	M 8×1.25	355	11.7	68	ALL64
72	Tr360×5	420	394	394	362.5	28	13	45	1	15	M 8×1.25	374	12.0	72	72
76	Tr380×5	450	422	422	382.5	28	14	48	1	18	M10×1.5	398	14.9	76	76

[Notes] 1) Basic profile and dimension of screw thread are in accordance with JIS B 0216.
2) Basic profile and dimension of bore with internal thread are in accordance with JIS B 0205.
3) Applicable to adapter sleeve series A31, A32, A23 and A30.

ANL 80 ~ 100

Locknut No.	Thread[1] size G	Standard dimensions (mm) d_2	d_1	g	d_6	b	h	B	r_1 max.	Tapped hole[2] (mm) l	S Thread size	d_p	(Refer.) Mass (kg)	Applicable adapter sleeve[3] (bore No.)	Applicable lock plate No.
ANL80	Tr400×5	470	442	442	402.5	28	14	52	1	18	M10×1.5	418	16.9	80	ALL76
84	Tr420×5	490	462	462	422.5	32	14	52	1	18	M10×1.5	438	17.4	84	84
88	Tr440×5	520	490	490	442.5	32	15	60	1	21	M12×1.75	462	26.2	88	88
ANL92	Tr460×5	540	510	510	462.5	32	15	60	1	21	M12×1.75	482	26.9	92	ALL88
96	Tr480×5	560	530	530	482.5	36	15	60	1	21	M12×1.75	502	28.3	96	96
100	Tr500×5	580	550	550	502.5	36	15	68	1	21	M12×1.75	522	33.6	/500	96

HN 42～110
HNL 41～ 64



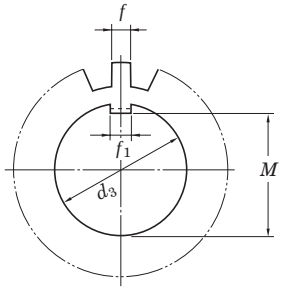
Locknut No.	Thread[1] size G	Standard dimensions (mm) d_2	d_1	g	d_6	b	h	B	r_1 max.	(Refer.) Mass (kg)	Withdrawal sleeve No.			
HN 42	Tr210×4	270	238	250	212	20	10	30	0.8	4.75	AH3138	AH2238	AH3238	AH2338
44	Tr220×4	280	250	260	222	20	10	32	0.8	5.35	3140	2240	3240	2340
48	Tr240×4	300	270	280	242	20	10	34	0.8	6.20	3144	2244	—	2344
HN 52	Tr260×4	330	300	306	262	24	12	36	0.8	8.55	AH3148	AH2248	—	AH2348
58	Tr290×4	370	330	346	292	24	12	40	0.8	11.8	3152	2252	—	2352
62	Tr310×5	390	350	366	312.5	24	12	42	0.8	13.4	3156	2256	—	2356
HN 66	Tr330×5	420	380	390	332.5	28	15	52	1	20.4	AH3160	AH2260	AH3260	—
70	Tr350×5	450	410	420	352.5	28	15	55	1	25.2	3164	2264	3264	—
74	Tr370×5	470	430	440	372.5	28	15	58	1	28.2	3168	—	3268	—
HN 80	Tr400×5	520	470	484	402.5	32	18	62	1	40.0	AH3172	—	AH3272	—
84	Tr420×5	540	490	504	422.5	32	18	70	1	46.9	3176	—	3276	—
88	Tr440×5	560	510	520	442.5	36	20	70	1	48.5	3180	—	3280	—
HN 92	Tr460×5	580	540	540	462.5	36	20	75	1	55.0	AH3184	—	AH3284	—
96	Tr480×5	620	560	580	482.5	36	20	75	1	67.0	X3188	—	X3288	—
102	Tr510×6	650	590	604	513	40	23	80	1	75.0	X3192	—	X3292	—
HN 106	Tr530×6	670	610	624	533	40	23	80	1	78.0	AHX3196	—	AHX3296	—
110	Tr550×6	700	640	654	553	40	23	80	1	92.5	X31/500	—	X32/500	—
HNL 41	Tr205×4	250	232	234	207	18	8	30	0.8	3.43	AH3038	AH238	—	—
43	Tr215×4	260	242	242	217	20	9	30	0.8	3.72	3040	240	—	—
47	Tr235×4	280	262	262	237	20	9	34	0.8	4.60	3044	244	—	—
HNL 52	Tr260×4	310	290	290	262	20	10	34	0.8	5.80	AH3048	AH248	—	—
56	Tr280×4	330	310	310	282	24	10	38	0.8	6.72	3052	252	—	—
60	Tr300×4	360	336	336	302	24	12	42	0.8	9.60	3056	256	—	—
HNL 64	Tr320×5	380	356	356	322.5	24	12	42	1	10.3	AH3060	—	—	—

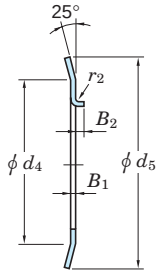
[Note] 1) Basic profile and dimension of screw thread are in accordance with JIS B 0216.
[Remark] Number of slots on nut may sometimes exceed that shown in the figure.

HNL 69～108

Locknut No.	Thread[1] size G	Standard dimensions (mm) d_2	d_1	g	d_6	b	h	B	r_1 max.	(Refer.) Mass (kg)	Withdrawal sleeve No.			
HNL 69	Tr345×5	410	384	384	347.5	28	13	45	1	11.5	3064	—	—	—
73	Tr365×5	430	404	404	367.5	28	13	48	1	14.2	3068	—	—	—
HNL 77	Tr385×5	450	422	422	387.5	28	14	48	1	15.0	AH3072	—	—	—
82	Tr410×5	480	452	452	412.5	32	14	52	1	19.0	3076	—	—	—
86	Tr430×5	500	472	472	432.5	32	14	52	1	19.8	3080	—	—	—
HNL 90	Tr450×5	520	490	490	452.5	32	15	60	1	23.8	AH3084	—	—	—
94	Tr470×5	540	510	510	472.5	32	15	60	1	25.0	X3088	—	—	—
98	Tr490×5	580	550	550	492.5	36	15	60	1	34.0	X3092	—	—	—
HNL104	Tr520×6	600	570	570	523	36	15	68	1	37.0	AHX3096	—	—	—
108	Tr540×6	630	590	590	543	40	20	68	1	43.5	X30/500	—	—	—

AW 00 ~ 24(X)





With bent inner tongue

With flat inner tongue

Lockwasher No. With bent inner tongue	Lockwasher No. With flat inner tongue	Standard dimensions (mm) d_3	M	f_1	B_1	f	d_4	d_5	r_2	B_2	No. of tooth	(Refer.) Mass (kg/100pcs.)	Applicable adapter sleeve (bore No.)	Applicable locknut No.
AW 00	AW 00X	10	8.5	3	1	3	13	21	0.5	2	9	0.131	—	AN 00
01	01X	12	10.5	3	1	3	17	25	0.5	2	9	0.192	—	01
02	02X	15	13.5	4	1	4	21	28	1	2.5	13	0.253	—	02
AW 03	AW 03X	17	15.5	4	1	4	24	32	1	2.5	13	0.313	—	AN 03
04	04X	20	18.5	4	1	4	26	36	1	2.5	13	0.350	04	04
05	05X	25	23	5	1.2	5	32	42	1	2.5	13	0.640	05	05
AW 06	AW 06X	30	27.5	5	1.2	5	38	49	1	2.5	13	0.780	06	AN 06
07	07X	35	32.5	6	1.2	5	44	57	1	2.5	15	1.04	07	07
08	08X	40	37.5	6	1.2	6	50	62	1	2.5	15	1.23	08	08
AW 09	AW 09X	45	42.5	6	1.2	6	56	69	1	2.5	17	1.52	09	AN 09
10	10X	50	47.5	6	1.2	6	61	74	1	2.5	17	1.60	10	10
11	11X	55	52.5	8	1.2	7	67	81	1	4	17	1.96	11	11
AW 12	AW 12X	60	57.5	8	1.5	7	73	86	1.2	4	17	2.53	12	AN 12
13	13X	65	62.5	8	1.5	7	79	92	1.2	4	19	2.90	13	13
14	14X	70	66.5	8	1.5	8	85	98	1.2	4	19	3.34	14	14
AW 15	AW 15X	75	71.5	8	1.5	8	90	104	1.2	4	19	3.56	15	AN 15
16	16X	80	76.5	10	1.8	8	95	112	1.2	4	19	4.64	16	16
17	17X	85	81.5	10	1.8	8	102	119	1.2	4	19	5.24	17	17
AW 18	AW 18X	90	86.5	10	1.8	10	108	126	1.2	4	19	6.23	18	AN 18
19	19X	95	91.5	10	1.8	10	113	133	1.2	4	19	6.70	19	19
20	20X	100	96.5	12	1.8	10	120	142	1.2	6	19	7.65	20	20
AW 21	AW 21X	105	100.5	12	1.8	12	126	145	1.2	6	19	8.26	21	AN 21
22	22X	110	105.5	12	1.8	12	133	154	1.2	6	19	9.40	22	22
23	23X	115	110.5	12	2	12	137	159	1.5	6	19	10.8	—	23
AW 24	AW 24X	120	115	14	2	12	138	164	1.5	6	19	10.5	24	AN 24

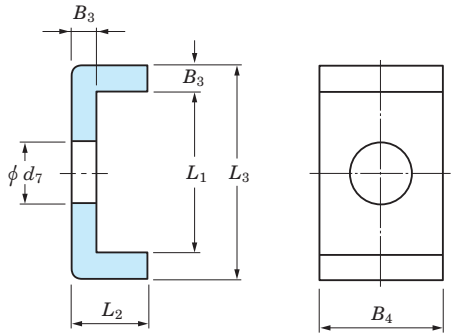
[Remark] 1) AW00~AW40, AW00X~AW40X are applicable to adapter assembly series H31, H2, H3 and H23.
2) AWL24~AWL40, AWL24X~AWL40X are applied to adapter assembly series H30.
3) For adapter sleeves with narrow slits, lockwashers with flat inner tongue should be used. Either type of lockwasher can be used for adapter sleeves with wide slits.

AW 25 ~ 40(X)
AWL 24 ~ 40(X)

Lockwasher No. With bent inner tongue	Lockwasher No. With flat inner tongue	Standard dimensions (mm) d_3	M	f_1	B_1	f	d_4	d_5	r_2	B_2	No. of tooth	(Refer.) Mass (kg/100pcs.)	Applicable adapter sleeve (bore No.)	Applicable locknut No.
AW 25	AW 25X	125	120	14	2	12	148	170	1.5	6	19	11.8	—	25
26	26X	130	125	14	2	12	149	175	1.5	6	19	11.3	26	26
AW 27	AW 27X	135	130	14	2	14	160	185	1.5	6	19	14.4	—	AN 27
28	28X	140	135	16	2	14	160	192	1.5	8	19	14.2	28	28
29	29X	145	140	16	2	14	172	202	1.5	8	19	16.8	—	29
AW 30	AW 30X	150	145	16	2	14	171	205	1.5	8	19	15.5	30	AN 30
31	31X	155	147.5	16	2.5	16	182	212	1.5	8	19	20.9	—	31
32	32X	160	154	18	2.5	16	182	217	1.5	8	19	22.2	32	32
AW 33	AW 33X	165	157.5	18	2.5	16	193	222	1.5	8	19	24.1	—	AN 33
34	34X	170	164	18	2.5	16	193	232	1.5	8	19	24.7	34	34
36	36X	180	174	20	2.5	18	203	242	1.5	8	19	26.8	36	36
AW 38	AW 38X	190	184	20	2.5	18	214	252	1.5	8	19	27.8	38	AN 38
40	40X	200	194	20	2.5	18	226	262	1.5	8	19	29.3	40	40
AWL24	AWL24X	120	115	14	2	12	133	155	1.5	6	19	7.70	24	ANL24
26	26X	130	125	14	2	12	143	165	1.5	6	19	8.70	26	26
28	28X	140	135	16	2	14	151	175	1.5	8	19	10.9	28	28
AWL30	AWL30X	150	145	16	2	14	164	190	1.5	8	19	11.3	30	ANL30
32	32X	160	154	18	2.5	16	174	200	1.5	8	19	16.2	32	32
34	34X	170	164	18	2.5	16	184	210	1.5	8	19	19.0	34	34
AWL36	AWL36X	180	174	20	2.5	18	192	220	1.5	8	19	18.0	36	ANL36
38	38X	190	184	20	2.5	18	202	230	1.5	8	19	20.5	38	38
40	40X	200	194	20	2.5	18	218	250	1.5	8	19	21.4	40	40

Lock plates

AL 44 ~ 100
ALL 44 ~ 96



Lock plate No.	Standard dimensions (mm) B_3	B_4	L_2	d_7	L_1	L_3	(Refer.) Mass (kg/100pcs.)	Applicable locknut No.
AL 44	4	20	12	9	22.5	30.5	2.60	AN 44,48
52	4	24	12	12	25.5	33.5	3.39	52,56
60	4	24	12	12	30.5	38.5	3.79	60
AL 64	5	24	15	12	31	41	5.35	AN 64
68	5	28	15	14	38	48	6.65	68,72
76	5	32	15	14	40	50	7.96	76
AL 80	5	32	15	18	45	55	8.20	AN 80,84
88	5	36	15	18	43	53	9.00	88,92
96	5	36	15	18	53	63	10.4	96
100	5	40	15	18	45	55	10.5	100
ALL44	4	20	12	7	13.5	21.5	2.12	ANL44
48	4	20	12	9	17.5	25.5	2.29	48,52
56	4	24	12	9	17.5	25.5	2.92	56
ALL60	4	24	12	9	20.5	28.5	3.16	ANL60
64	5	24	15	9	21	31	4.56	64,68
72	5	28	15	9	20	30	5.03	72
ALL76	5	28	15	12	24	34	5.28	ANL76,80
84	5	32	15	12	24	34	6.11	84
88	5	32	15	14	28	38	6.45	88,92
96	5	36	15	14	28	38	7.29	96,100

[Remark] Lock plate series AL are applicable to adapter assembly series H31, H32 and H23, while lock plate series ALL are applicable to H30.

Exsev&Ceramic bearing series

More and more bearings are being used in extreme special environments, such as in a vacuum, or in a clean, corrosive, or heated place. In some cases bearings are required to be insulated or antimagnetic.

Applications of bearings in such environments are increasing in the field of state-of-the-art technology, e.g. vacuum equipment, aerospace equipment and semi-conductor production facilities. Bearings made of conventional materials and lubricants can hardly meet these new needs.

JTEKT has succeeded in developing a series of bearings for use in extreme special environments, having started from the study of the very basics of materials and testing of their performance under various severe conditions.

JTEKT has standardized the following bearings as the "Koyo ***EXSEV*** bearing series".

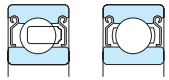
- Exsev bearings for use in a clean environment
  Designed for use in a vacuum.
  The friction surface of the bearing interior is coated with solid lubricant (or soft metal). Bearings pre-lubricated with special grease are also available.

- Exsev bearings for use in a vacuum environment
  Produce insignificant contamination, provided with rolling elements and a cage made of self-lubricating materials. Optimal for use in environments which need to be clean.

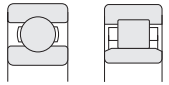
- Ceramic bearings
  Ceramic rings and rolling elements (silicon nitride Si_3N_4) ensure excellent performance in various extreme special environments.

Exsev bearings for use in a vacuum environment

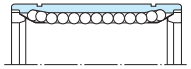
Exsev bearings for use in a clean environment



Ceramic bearings



Linear ball bearings for vacuum



For details, refer to JTEKT separate catalog "***EXSEV*** bearings and Ceramic bearings for extreme special environments" (CAT. NO. B2004E).

Bearings for machine tool spindles (for support of axial loading)

JTEKT supplies double direction angular contact thrust ball bearings and ACT type matched pair angular contact ball bearings which are used with machine tool spindles to support axial loading.

These bearings were developed to meet needs which have grown as machine tool spindle rotation has become faster and more accurate.

Several dimension series are available for selection according to operating conditions.

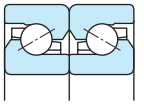
Double direction angular contact thrust ball bearings

Matched pair angular contact ball bearing (ACT type)

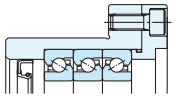
For details, refer to JTEKT separate catalog "Precision Ball and Roller Bearings for Machine Tools" (CAT. NO. B2005E).

Precision ball screw support bearings and bearing units

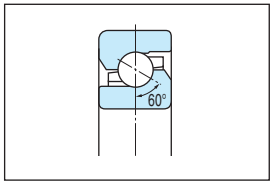
Support bearings



Support bearing units

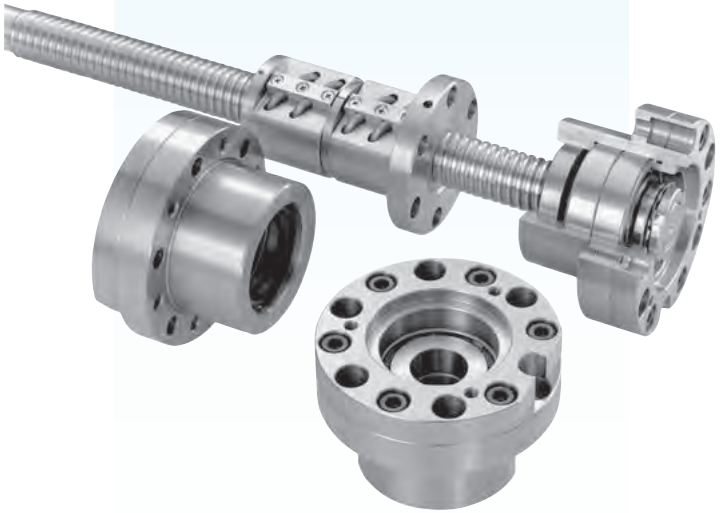


■ Support bearings were developed to support precision ball screw shafts. They have the same structure as angular contact thrust ball bearings with a contact angle of 60°.



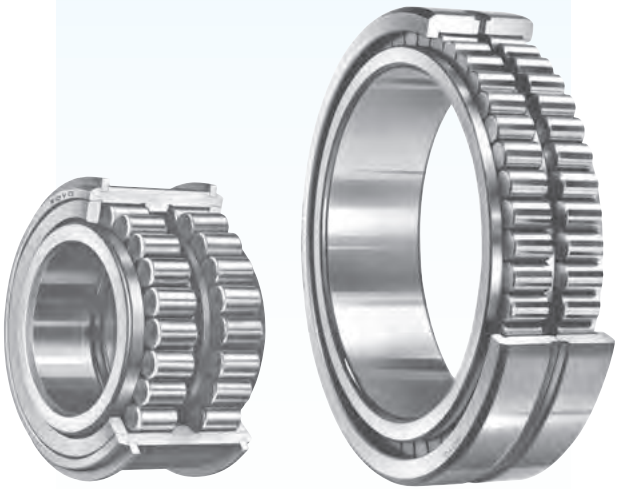
- Have a large axial load carrying capacity. Also able to carry a certain degree of radial load.
- Highly rigid in the axial direction.
- Starting torque is small.

■ Support bearing units consist of the bearings described above and a precisely processed housing. Units with a Koyo precision ball screw are also available.

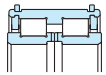


For details, refer to JTEKT separate catalog "Precision Ball and Roller Bearings for Machine Tools" (CAT. NO. B2005E).

Full complement type cylindrical roller bearings for crane sheaves



Shielded type



Open type

Crane rope sheaves and running wheels which are operated at low or medium speed are generally equipped with full complement type cylindrical roller bearings because the operation of these machines involves heavy, impact loading.

These bearings are divided into shielded and open types. The shielded type is often used with the outer ring rotation.

Shielded type

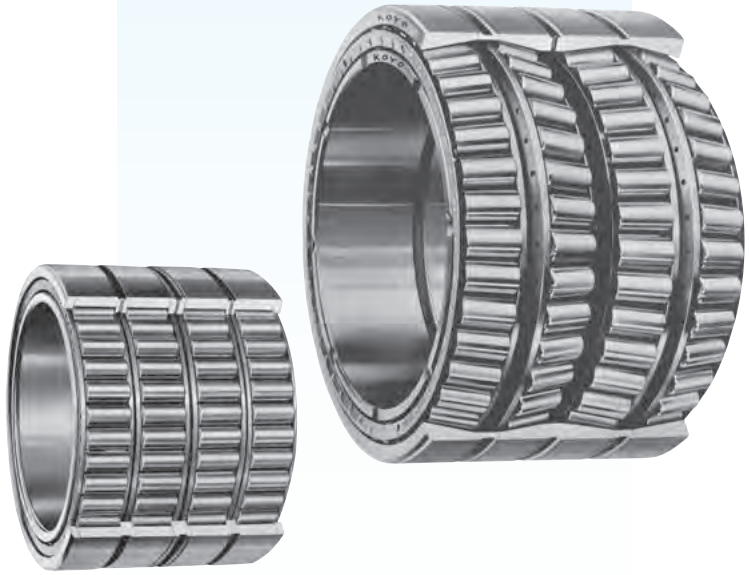
- The shielded type was developed for use with rope sheaves. It is shielded, non-separable and pre-lubricated with grease.
- Bearings with locating snap rings around the outer ring can be positioned and fit to sheaves with ease.
- The bearing surface is coated with phosphate for rust prevention.

Open type

- Open type bearings are further divided into those used on the fixed side and those used on the free side. The former carry axial load in both directions. The relative position of the latter's inner ring and outer ring can be adjusted by moving them along the axis.
- Open type bearings are separable because the outer ring divided into two annular pieces in a plane perpendicular to its axis. Triple-row and four-row bearings are available along with double-row types.

For details, refer to JTEKT separate catalog "Large size ball & roller bearings" (CAT. NO. B2002E).

Rolling mill roll neck bearings

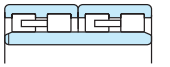


Rolling mill roll neck four-row cylindrical roller bearings and tapered roller bearings are designed to achieve the maximum load rating capacity in a limited space.

■ Four-row cylindrical roller bearings
- Suitable for high-speed rotation. Thin section designs are also available.
- The inner ring raceway surface and the roll can be finished simultaneously after the inner ring is mounted on the roll neck. This feature is useful in improving rolling mill accuracy.

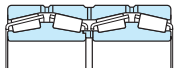
■ Four-row tapered roller bearings
- Suitable for low- and medium-speed rotation. Available in both metric and inch series.
- The internal clearance is preadjusted, facilitating mounting.
- More sealed type four-row tapered roller bearings are being used currently.

Four-row cylindrical roller bearings

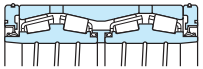


Cylindrical bore

Four-row tapered roller bearings



Open type



Sealed type

For details, refer to JTEKT separate catalog "Roll neck bearings for rolling mill" (CAT. NO. B2013E).

Bearings

1) General Bearings

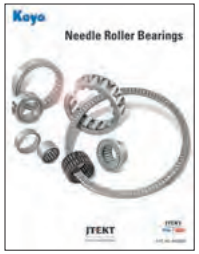
Large size ball & roller bearings

(CAT.NO.B2002E)

This catalog provides information on various large size ball and roller bearings for purposes such as steel making equipment, equipment for wind-power generation, civil engineering and construction machinery, and other large industrial machineries.
It contains large size bearings with bore diameter of 100 mm or more.

Needle roller bearings

(CAT.NO.B2020E)



More useful catalog of needle roller bearings as the Koyo brand.

The products published to the catalog

· Radial needle roller and cage assemblies
· Drawn cup needle roller bearings
· Drawn cup roller clutches
· Heavy-duty needle roller bearings
· Track rollers
· Thrust bearings, assemblies, washers
· Combined needle roller bearings
· Needle rollers, accessories

Inch series tapered roller bearings

(CAT.NO.B2009E)

This is the special catalog for tapered roller bearings containing frequently used series in addition to the products included in the "Ball & Roller Bearings" catalog (CAT.NO.B2001E), for improvement in the contents and easier reference.

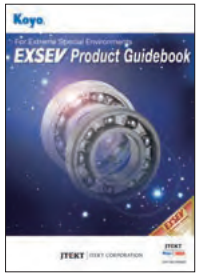
EXSEV BEARINGS AND CERAMIC BEARINGS

(CAT.NO.B2004E)

Suitable for use in special environments, such as clean room, vacuum, high-temperature, or chemical.
Available in sizes of 4 mm to 40 mm bearing bore.

EXSEV product guidebook

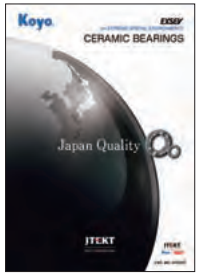
(CAT.NO.B1005E)



This is a summarized version of EXSEV BEARINGS AND CERAMIC BEARINGS FOR EXTREME SPECIAL ENVIRONMENTS (Cat. No.B2004E).
Please utilize this guidebook when selecting bearings.

CERAMIC BEARINGS

(CAT.NO.B1013E)



This pamphlet is targeting and introducing ceramic bearings.
For the easy selection, this pamphlet is introducing ceramic bearings at each use.
The following contents are included in this pamphlet:
· Ceramics Production Processes
· Properties of ceramic materials
· Features

JHS series RZ-type spherical roller bearings

(CAT.NO.B2023E)

This pamphlet introduces our "JHS Series" RZ-type Spherical Roller Bearings, which are a new generation of high-performance bearings made possible with advanced designs and processing technologies.
In addition to introducing the JHS Series, this pamphlet will also explain the features and structures of JHS Series RZ-type Spherical Roller Bearings.

2) Products for Steel Production Equipment

High-performance product series for steel production/rolling equipment

(CAT.NO.B1001E)

In this pamphlet, we will introduce high-performance products (bearings, drive shafts, and oil seals) that contribute to stable operations of steel production equipment.
This pamphlet contains two parts: an overall introduction and product introduction.

Products to be introduced include the following

· Bearings for roll necks
· Drive shafts for rolling mills
· Bearings for backing shafts of cluster mills
· Products for continuous casting machines

Cylindrical roller bearings for multi-roll mill backup rolls

(CAT.NO.B2012E)

Special designed bearings for multi-roll mill backup rolls.
The outer ring is made of special material and is heat-treated for surface hardness to ensure impact resistance, and thus reliability. In addition, JHS210 bearings meet the needs of our customers for long service lives.
This catalog provides information on the handling of the bearings (key points for the disassembling and inspecting of the bearings) as well as actual examples of bearing failures and countermeasures.

Roll neck bearings for rolling mill

(CAT.NO.B2013E)

This bearing is used for rolling mill roll necks.
This catalog includes data about countermeasures for damages particular to this application as well as dimensions tables.

Drive shafts for steel production/industrial equipment

(CAT.NO.B2021E)

Drive shafts for steel production/industrial equipment are included in this catalog.
Products line up, handling explanation cases of failures, technical data that includes selection criteria for each application are shown in this catalog.
Also, specifications, product introduction (phase adjustment, hyper coupling), etc are shown in this catalog.
This catalog can widely be used for from drive shaft selection to maintenance.

Oil seal for steel production equipment

(CAT.NO.B1020E)

This pamphlet introduces oil seals that are used in steel production equipment.
This pamphlet includes features and other information on products used in the following equipment:
· Rolling Mill
· Continuous Casting Machines
· Sintering Machine Pallet Cars and Converter Furnaces

JHS series hyper coupling

(CAT.NO.B1010E)

The hyper coupling is a torque limiter (cut-off device) that protects drive systems for heavy loads.
This catalog will show you operating principles, features of the products, examples of the applications, and the product lineup.

3) General Industrial equipment

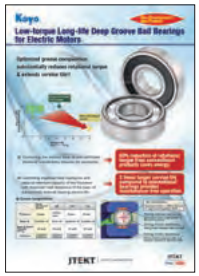
New ceramic ball bearings for electric motors

(CAT.NO.B1017E)

This pamphlet introduces our new ceramic ball bearings which have similar insulation properties to conventional ceramic ball bearings (silicon nitride), and their thermal expansion is close to that of steel ball bearings, so that there is very little change in clearance due to temperature.

Low-torque Long-life deep groove ball bearIngs for electric motors

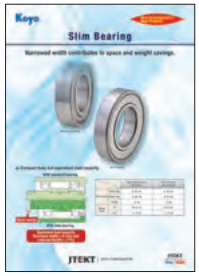
(CAT.NO.B1018E)



This pamphlet introduces our new deep groove ball bearings, with optimized grease composition which greatly reduces torque and extends service life, and also reduces energy consumption by the motor and contributes to reducing the need for maintenance.

Slim Bearing

(CAT.NO.B1021E)



This pamphlet introduces our slim bearings for which the seal groove width has been reduced by welding the shield directly to the outer ring instead of attaching the shield to the outer ring seal groove.

Motor-use Deep Groove Ball Bearings with Optimized Sound Output

(CAT.NO.B1022E)

This pamphlet introduces our deep groove ball bearings for which sound from unpleasant frequencies to the human ear has been reduced by optimizing the inner raceway surface through the use of 3D analysis.

Products for machine tools

(CAT.NO.B1016E)

This pamphlet introduces JTEKT's products for machine tools.
Contents
· Changes in Spindle Technologies
· Introduction to High-ability NX Series
(Ultra-high speed angular ball bearings and ultra-high speed cylindrical roller bearings)
· Introduction to bearings for spindle
· Introduction to ball screw-related products and spindle unit products
· Product line-up

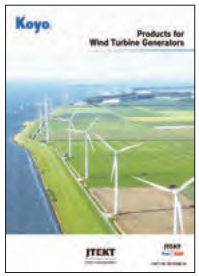
Precision ball & roller bearings for machine tools

(CAT.NO.B2005E)

This catalog includes high precision products such as cylindrical roller bearings and angular contact ball bearings, that are used for spindles of machine tools, and support bearing for precision ball screws.
This catalog gives technical descriptions including references for handling of bearings such as the guideline for selection of bearing, example of bearing installation, and example of bearing failures.

Products for Wind Turbine Generators

(CAT.NO.B1002E)



This catalog introduces main shaft bearings, gearbox bearings, and generator bearings for wind turbine generators.
The catalog also includes main shaft oil seals, hydraulic pumps, and machine tools for large components of wind turbine generators.

Product information for agricultural and construction equipment

(CAT.NO.B1009E)

This catalog is introducing the function needed to an agricultural machine and a construction machine, our technology and goods.
· Optimum design technologies (High performance tapered roller bearing)
· Heat treatment technologies (KE bearing, SH bearing)
· Analysis technologies, Surface reforming technology
· JHS Series Spherical Roller Bearings
· Propeller shaft for construction machinery, Oil seal, Hydraulic Components

High Wing Series Drive Shafts

(CAT.NO.B2022E)

Drive shafts for construction machinery/railway rolling stocks are included in this catalog.
Products line up, handling explanation, technical data that include cases of failures, specifications, etc are shown in this catalog.
This catalog can widely be used for from drive shaft selection to maintenance.

Bearings for Aerospace Applications

(CAT.NO.B1003JE)

This pamphlet introduces bearings that are used in airplanes and in space. The bearing usage locations and the airplane eras are gathered together and introduced in lists.

Miniature One-way Clutch

(CAT.NO.B2024E)

Miniature one-way clutches are used in clutch systems in various machines, including office automation equipment, ATMs, and various ticket vending machines.
This catalog also includes recommended polyacetal resin and steel housing dimensions.

Ball bearing units

(CAT.NO.B2007E)

This catalog has information about ball bearing units.
Technical descriptions, selection of ball bearing units, and dimensional tables of units, such as pillow block type, take-up type, cartridge type, and ball bearing for units, are included in this catalog.
Stainless-series and "compact" series are also included in this catalog.

Traction drive unit

(CAT.NO.B1011E)

A Traction Drive Unit has been conceived from bearing core technologies. A reducer with a minimal rotation irregularity is suitable for high-accuracy feeding, which is unachievable by using gears.

Oil seals & o-rings

(CAT.NO.R2001E)

This catalog includes oil seals, o-rings and back up rings.
Includes dimensional tables, technical explanations and handling information.

4) Automotive Components

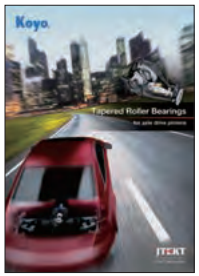
The 3rd generation ball hub units

(CAT.NO.B1004E)

This pamphlet introduces the main characteristics and design of the 3rd generation ball type hub units.
Features JTEKT's recommended hub unit numbers.

Tapered roller bearings for axle drive pinions

(CAT.NO.B1006E)



This pamphlet introduces tapered roller bearings for axle drive pinions.
Technology for torque reduction and longer service life, examination and evaluation methods, and recommended series bearing numbers.

Bearings

■Hub units

■Clutch release bearings

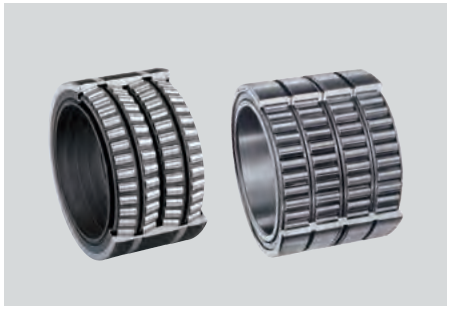
■Water pump bearings

■Bearings for rocker arms

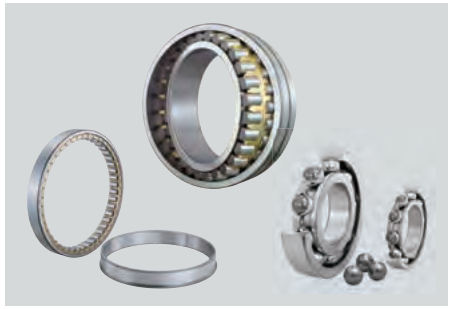
■CPA bearings

■LFT Ⅲ bearings

■KE bearings



■Roll neck bearings for rolling mill
(Steel production/rolling equipment)



■Bearings for wind turbine generator

■EXSEV & Ceramic bearings

■Bearings for railway rolling stock axle
journals

■Drive shafts

■Bearings for machine tools

■Bearings for aircraft/aerospace

Automotive Components

■Steering systems

■TORSEN LSD

■Intelligent torque controlled coupling (ITCC)

■Drive shafts (CVJ)

■Electric pumps for idle-stop system

■Pump for CVT

■Linear solenoid valve for AT and CVT

■Damper pulleys

Sensors

■Water level meters

■Pressure sensors/Transducers

Machine tools

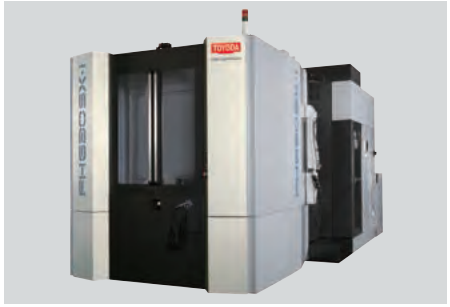
[Grinders]

■ Grinding center TG4

■ Cam shaft grinder GC20Mi

■ Cylindrical grinder e300G

[Machining Centers]



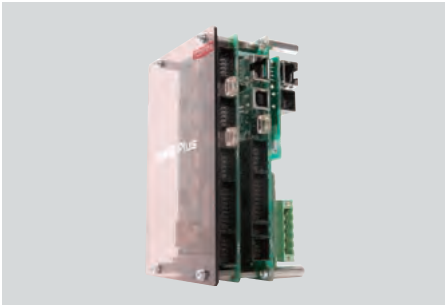
■ Horizontal spindle machining center
FH630SX-i

■ Vertical spindle machining center
FV2090S

Mechatronics

■ Programmable controller

TOYOPUC-PC10G



TOYOPUC-Plus

■ Direct circuit monitor

■ Small safety PLC TOYOPUC-PCS-J

Koyo Machine Industries Co., Ltd.


■Centerless grinding machine


■Surface grinding machine


■Fully automatic assembly inspection system


■Precision spindle unit


■Drive shaft


■Intermediate shafts


■Ball screws


■Indexing chuck

Koyo Sealing Techno Co., Ltd.


■Oil seals of various types


■O-rings of various types


■Functional parts of various types


■Bonded piston seals for AT and CVT

Toyooki Kogyo Co., Ltd.

Energy-saving hydraulic equipment


■Small pack


■TOYOPAC"ECO"


■Reduced wiring 4 pin connector solenoid valve


■Toyopac motion

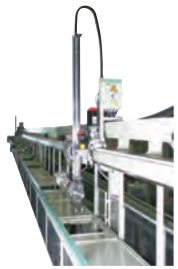
Inspection and testing machine


■High performance straightening machine

Automotive components

CNK Co., Ltd.

■Loader



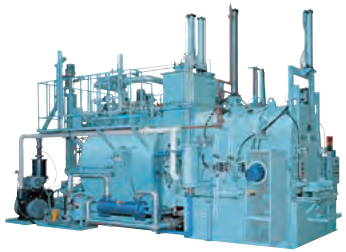
■DLC coating equipment

■Round eddy-current coolant system

■Heat treatment equipment

Koyo Thermo Systems Co., Ltd.

■Vacuum heat treatment furnace



■Non-frame KCF carburizing and quenching furnaces

■Vertical diffusion systems

■Electronic device for continuous furnace

■High temperature clean oven

■Experimental small electric furnace

HOUKO Co., Ltd

■General purpose cylindrical grinders G32 series

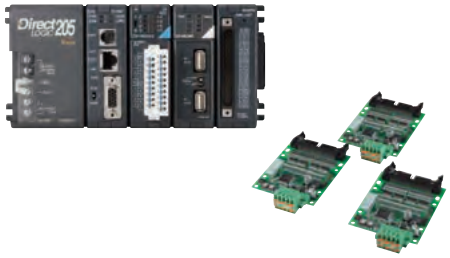
■CNC cylindrical grinders GE3/GL3S series

■Production type Cylindrical grinders GL4E series

■CNC large cylindrical grinders GE6 series

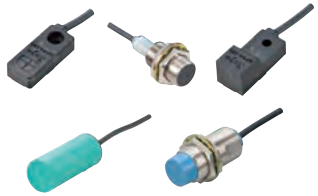
Koyo Electronics Industries Co., Ltd.

■Rotary encoders



■Programmable controllers

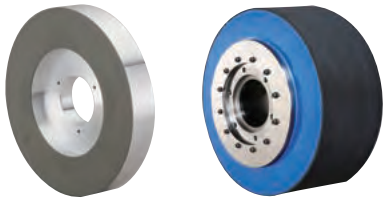
■HMI



■Proximity switch

Toyoda Van Moppes Ltd.

■Cam profile grinding vitrified wheel



■Two-sided surface grinding, centerless grinding wheel

■Rotary dressers

■Diamond centers

Supplementary table 1 (1) Boundary dimensions of radial bearings (except tapered roller bearings) – diameter series 7, 8, 9, 0 –

Unit : mm

Deep groove ball brg.	67						68										69								160	60						
Angular contact ball brg.																										70						
Self-aligning ball brg.																																
Cylindrical roller brg.																N 19	N 29		NNU 49							NU 10		NN 30				
Needle roller brg.									NA 48										NA 49	NA 59	NA 69											
Spherical roller brg.								238										239									230	240				

Bore dia. No.	Bore dia.	Diameter series 7					Diameter series 8									Diameter series 9										Diameter series 0								
		Outside dia.	Dimension series				Outside dia.	Dimension series								Outside dia.	Dimension series									Outside dia.	Dimension series							
			17	27	37	17~37		08	18	28	38	48	58	68	08	18~68		09	19	29	39	49	59	69	09	19~39	49~69		00	10	20	30	40	50	60	00	10~60
	d	D	Width B			r min.	D	Width B							r min.		D	Width B							r min.			D	Width B							r min.	
–	0.6	2	0.8	–	–	0.05	2.5	–	1	–	1.4				0.05	–	–	–	–	–					–	–	–	–	–	–	–	–	–	–	–	–	–
1	1	2.5	1	–	–	0.05	3	–	1	–	1.5				0.05	4	–	1.6	–	2.3					0.1	–	–	–	–	–	–	–	–	–	–	–	–
–	1.5	3	1	–	1.8	0.05	4	–	1.2	–	2				0.05	5	–	2	–	2.6					0.15	–	6	–	2.5	–	3						0.15
2	2	4	1.2	–	2	0.05	5	–	1.5	–	2.3				0.08	6	–	2.3	–	3					0.15	–	7	–	2.8	–	3.5						0.15
–	2.5	5	1.5	–	2.3	0.08	6	–	1.8	–	2.6				0.08	7	–	2.5	–	3.5					0.15	–	8	–	2.8	–	4						0.15
3	3	6	2	2.5	3	0.08	7	–	2	–	3				0.1	8	–	3	–	4					0.15	–	9	–	3	–	5						0.15
4	4	7	2	2.5	3	0.08	9	–	2.5	3.5	4				0.1	11	–	4	–	5	–	–	–	–	0.15	–	12	–	4	–	6						0.2
5	5	8	2	2.5	3	0.08	11	–	3	4	5				0.15	13	–	4	–	6	10	–	–	–	0.2	0.15	14	–	5	–	7						0.2
6	6	10	2.5	3	3.5	0.1	13	–	3.5	5	6				0.15	15	–	5	–	7	10	–	–	–	0.2	0.15	17	–	6	–	9						0.3
7	7	11	2.5	3	3.5	0.1	14	–	3.5	5	6	–	–	–	0.15	17	–	5	–	7	10	–	–	–	0.3	0.15	19	–	6	8	10	–	–	–	–	0.3
8	8	12	2.5	–	3.5	0.1	16	–	4	5	6	8	–	–	0.2	19	–	6	–	9	11	–	–	–	0.3	0.2	22	–	7	9	11	14	19	25	–	0.3
9	9	14	3	–	4.5	0.1	17	–	4	5	6	8	–	–	0.2	20	–	6	–	9	11	–	–	–	0.3	0.3	24	–	7	10	12	15	20	27	–	0.3
00	10	15	3	–	4.5	0.1	19	–	5	6	7	9	–	–	0.3	22	–	6	8	10	13	16	22	–	0.3	0.3	26	–	8	10	12	16	21	29	–	0.3
01	12	18	4	–	5	0.2	21	–	5	6	7	9	–	–	0.3	24	–	6	8	10	13	16	22	–	0.3	0.3	28	7	8	10	12	16	21	29	0.3	0.3
02	15	21	4	–	5	0.2	24	–	5	6	7	9	–	–	0.3	28	–	7	8.5	10	13	18	23	–	0.3	0.3	32	8	9	11	13	17	23	30	0.3	0.3
03	17	23	4	–	5	0.2	26	–	5	6	7	9	–	–	0.3	30	–	7	8.5	10	13	18	23	–	0.3	0.3	35	8	10	12	14	18	24	32	0.3	0.3
04	20	27	4	–	5	0.2	32	4	7	8	10	12	16	22	0.3	0.3	37	7	9	11	13	17	23	30	0.3	0.3	0.3	42	8	12	14	16	22	30	40	0.3	0.6
/22	22	–	–	–	–	–	34	4	7	–	10	–	16	22	0.3	0.3	39	7	9	11	13	17	23	30	0.3	0.3	0.3	44	8	12	14	16	22	30	40	0.3	0.6
05	25	32	4	–	5	0.2	37	4	7	8	10	12	16	22	0.3	0.3	42	7	9	11	13	17	23	30	0.3	0.3	0.3	47	8	12	14	16	22	30	40	0.3	0.6
/28	28	–	–	–	–	–	40	4	7	–	10	–	16	22	0.3	0.3	45	7	9	11	13	17	23	30	0.3	0.3	0.3	52	8	12	15	18	24	32	43	0.3	0.6
06	30	37	4	–	5	0.2	42	4	7	8	10	12	16	22	0.3	0.3	47	7	9	11	13	17	23	30	0.3	0.3	0.3	55	9	13	16	19	25	34	45	0.3	1
/32	32	–	–	–	–	–	44	4	7	–	10	–	16	22	0.3	0.3	52	7	10	13	15	20	27	36	0.3	0.6	0.6	58	9	13	16	20	26	35	47	0.3	1
07	35	–	–	–	–	–	47	4	7	8	10	12	16	22	0.3	0.3	55	7	10	13	15	20	27	36	0.3	0.6	0.6	62	9	14	17	20	27	36	48	0.3	1
08	40	–	–	–	–	–	52	4	7	8	10	12	16	22	0.3	0.3	62	8	12	14	16	22	30	40	0.3	0.6	0.6	68	9	15	18	21	28	38	50	0.3	1
09	45						58	4	7	8	10	13	18	23	0.3	0.3	68	8	12	14	16	22	30	40	0.3	0.6	0.6	75	10	16	19	23	30	40	54	0.6	1
10	50						65	5	7	10	12	15	20	27	0.3	0.3	72	8	12	14	16	22	30	40	0.3	0.6	0.6	80	10	16	19	23	30	40	54	0.6	1
11	55						72	7	9	11	13	17	23	30	0.3	0.3	80	9	13	16	19	25	34	45	0.3	1	1	90	11	18	22	26	35	46	63	0.6	1.1
12	60						78	7	10	12	14	18	24	32	0.3	0.3	85	9	13	16	19	25	34	45	0.3	1	1	95	11	18	22	26	35	46	63	0.6	1.1
13	65						85	7	10	13	15	20	27	36	0.3	0.6	90	9	13	16	19	25	34	45	0.3	1	1	100	11	18	22	26	35	46	63	0.6	1.1
14	70						90	8	10	13	15	20	27	36	0.3	0.6	100	10	16	19	23	30	40	54	0.6	1	1	110	13	20	24	30	40	54	71	0.6	1.1
15	75						95	8	10	13	15	20	27	36	0.3	0.6	105	10	16	19	23	30	40	54	0.6	1	1	115	13	20	24	30	40	54	71	0.6	1.1
16	80						100	8	10	13	15	20	27	36	0.3	0.6	110	10	16	19	23	30	40	54	0.6	1	1	125	14	22	27	34	45	60	80	0.6	1.1
17	85						110	9	13	16	19	25	34	45	0.3	1	120	11	18	22	26	35	46	63	0.6	1.1	1.1	130	14	22	27	34	45	60	80	0.6	1.1
18	90						115	9	13	16	19	25	34	45	0.3	1	125	11	18	22	26	35	46	63	0.6	1.1	1.1	140	16	24	30	37	50	67	90	1	1.5
19	95						120	9	13	16	19	25	34	45	0.3	1	130	11	18	22	26	35	46	63	0.6	1.1	1.1	145	16	24	30	37	50	67	90	1	1.5
20	100						125	9	13	16	19	25	34	45	0.3	1	140	13	20	24	30	40	54	71	0.6	1.1	1.1	150	16	24	30	37	50	67	90	1	1.5
21	105						130	9	13	16	19	25	34	45	0.3	1	145	13	20	24	30	40	54	71	0.6	1.1	1.1	160	18	26	33	41	56	75	100	1	2
22	110						140	10	16	19	23	30	40	54	0.6	1	150	13	20	24	30	40	54	71	0.6	1.1	1.1	170	19	28	36	45	60	80	109	1	2
24	120						150	10	16	19	23	30	40	54	0.6	1	165	14	22	27	34	45	60	80	0.6	1.1	1.1	180	19	28	36	46	60	80	109	1	2
26	130						165	11	18	22	26	35	46	63	0.6	1.1	180	16	24	30	37	50	67	90	1	1.5	1.5	200	22	33	42	52	69	95	125	1.1	2
28	140						175	11	18	22	26	35	46	63	0.6	1.1	190	16	24	30	37	50	67	90	1	1.5	1.5	210	22	33	42	53	69	95	125	1.1	2
30	150						190	13	20	24	30	40	54	71	0.6	1.1	210	19	28	36	45	60	80	109	1	2	2	225	24	35	45	56	75	100	136	1.1	2.1
32	160						200	13	20	24	30	40	54	71	0.6	1.1	220	19	28	36	45	60	80	109	1	2	2	240	25	38	48	60	80	109	145	1.5	2.1
34	170						215	14	22	27	34	45	60	80	0.6	1.1	230	19	28	36	45	60	80	109	1	2	2	260	28	42	54	67	90	122	160	1.5	2.1
36	180						225	14	22	27	34	45	60	80	0.6	1.1	250	22	33	42	52	69	95	125	1.1	2	2	280	31	46	60	74	100	136	180	2	2.1
38	190						240	16	24	30	37	50	67	90	1	1.5	260	22	33	42	52	69	95	125	1.1	2	2	290	31	46	60	75	100	136	180	2	2.1
40	200						250	16	24	30	37	50	67	90	1	1.5	280	25	38	48	60	80	109	145	1.5	2.1	2.1	310	34	51	66	82	109	150	200	2	2.1
44	220						270	16	24	30	37	50	67	90	1	1.5	300	25	38	48	60	80	109	145	1.5	2.1	2.1	340	37	56	72	90	118	160	218	2.1	3
48	240						300	19	28	36	45	60	80	109	1	2	320	25	38	48	60	80	109	145	1.5	2.1	2.1	360	37	56	72	92	118	160	218	2.1	3
52	260						320	19	28	36	45	60	80	109	1	2	360	31	46	60	75	100	136	180	2	2.1	2.1	400	44	65	82	104	140	190	250	3	4
56	280						350	22	33	42	52	69	95	125	1.1	2	380	31	46	60	75	100	136	180	2	2.1	2.1	420	44	65	82	106	140	190	250	3	4
60	300						380	25	38	48	60	80	109	145	1.5	2.1	420	37	56	72	90	118	160	218	2.1	3	3	460	50	74	95	118	160	218	290	4	4
64	320						400	25	38	48	60	80	109	145	1.5	2.1	440	37	56	72	90	118	160	218	2.1	3	3	480	50	74	95	121	160	218	290	4	4
68	340						420	25	38	48	60	80	109	145	1.5	2.1	460	37	56	72	90	118	160	218	2.1	3	3	520	57	82	106	133	180	243	325	4	5
72	360						440	25	38	48	60	80	109	145	1.5	2.1	480	37	56	72	90	118	160	218	2.1	3	3	540	57	82	106	134	180	243	325	4	5
76	380						480	31	46	60	75	100	136	180	2	2.1	520	44	65	82	106	140	190	250	3	4	4	560	57	82	106	135	180	243	325	4	5
80	400						500	31	46	60	75	100	136	180	2	2.1	540	44	65	82	106	140	190	250	3	4	4	600	63	90	118	148	200	272	355	5	5
84	420						520	31	46	60	75	100	136	180	2	2.1	560	44	65	82	106	140	190	250	3	4	4	620	63	90	118	150	200	272	355	5	5
88	440						540	31	46	60	75	100	136	180	2	2.1	600	50	74	95	118	160	218	290	4	4	4	650	67	94	122	157	212	280	375	5	6
92	460						580	37	56	72	90	118	160	218	2.1	3	620	50	74	95	118	160	218	290	4	4	4	680	71	100	128	163	218	300	400	5	6
96	480						600	37	56	72	90	118	160	218	2.1	3	650	54	78	100	128	170	230	308	4	5	5	700	71	100	128	165	218	300	400	5	6
/500	500						620	37	56	72	90	118	160	218	2.1	3	670	54	78	100	128	170	230	308	4	5	5	720	71	100	128	167	218	300	400	5	6
/530	530						650	37	56	72	90	118	160	218	2.1	3	710	57	82	106	136	180	243	325	4	5	5	780	80	112	142	185	250	335	450	6	6
/560	560						680	37	56	72	90	118	160	218	2.1	3	750	60	85	112	140	190	258	345	5	5	5	820	82	115	150	195	258	355	462	6	6
/600	600						730	42	60	78	98	128	175	236	3	3	800	63	90	118	150	200	272	355	5	5	5	870	85	118	155	200	272	365	488	6	6
/630	630						780	48	69	88	112	150	200	272	3	4	850	71	100	128	165	218	300	400	5	6	6	920	92	128	170	212	290	388	515	6	7.5
/670	670						820	48	69	88	112	150	200	272	3	4	900	73	103	136	170	230	308	412	5	6	6	980	100	136	180	230	308	425	560	6	7.5
/710	710						870	50	74	95	118	160	218	290	4	4	950	78	106	140	180	243	325	438	5	6	6	1030	103	140	185	236	315	438	580	6	7.5
/750	750						920	54	78	100	128	170	230	308	4	5	1000	80	112	145	185	250	335	450	6	6	6	1090	109	150	195	250	335	462	615	7.5	7.5
/800	800						980	57	82	106	136	180	243	325	4	5	1060	82	115	150	195	258	355	462	6	6	6	1150	112	155	200	258	345	475	630	7.5	7.5
/850	850						1030	57	82	106	136	180	243	325	4	5	1120	85	118	155	200	272	365	488	6	6	6	1220	118	165	212	272	365	500	670	7.5	7.5
/900	900						1090	60	85	112	140	190	258	345	5	5	1180	88	122	165	206	280	375	500	6	6	6	1280	122	170	218	280	375	515	690	7.5	7.5
/950	950						1150	63	90	118	150	200	272	355	5	5	1250	95	132	175	224	300	400	545	6	7.5	7.5	1360	132	180	236	300	412	560	730	7.5	7.5
/1000	1000						1220	71	100	128	165	218	300	400	5	6	1320	103	140	185	236	315	438	580	6	7.5	7.5	1420	136	185	243	308	412	560	750	7.5	7.5
/1060	1060						1280	71	100	128	165	218	300	400	5	6	1400	109	150	195	250	335	462	615	7.5	7.5	7.5	1500	140	195	250	325	438	600	800	9.5	9.5
/1120	1120						1360	78	106	140	180	243	325	438	5	6	1460	109	150	195	250	335	462	615	7.5	7.5	7.5	1580	145	200	265	345	462	615	825	9.5	9.5
/1180	1180						1420	78	106	140	180	243	325	438	5	6	1540	115	160	206	272	355	488	650	7.5	7.5	7.5	1660	155	212	272	355	475	650	875	9.5	9.5
/1250	1250						1500	80	112	145	185	250	335	450	6	6	1630	122	170	218	280	375	515	690	7.5	7.5	7.5	1750	–	218	290	375	500	–	–	–	9.5
/1320	1320						1600	88	122	165	206	280	375	500	6	6	1720	128	175	230	300	400	545	710	7.5	7.5	7.5	1850	–	230	300	400	530	–	–	–	12
/1400	1400						1700	95	132	175	224	300	400	545	6	7.5	1820	–	185	243	315	425	–	–	–	9.5	9.5	1950	–	243	315	412	545	–	–	–	12
/1500	1500						1820	–	140	185	243	315	–	–	–	7.5	1950	–	195	258	335	450	–	–	–	9.5	9.5	2120	–	272	355	462	615	–	–	–	12
/1600	1600						1950	–	155	200	265	345	–	–	–	7.5	2060	–	200	265	345	462	–	–	–	9.5	9.5	2240	–	280	365	475	630	–	–	–	12
/1700	1700						2060	–	160	206	272	355	–	–	–	7.5	2180	–	212	280	355	475	–	–	–	9.5	9.5	2360	–	290	375	500	650	–	–	–	15
/1800	1800						2180	–	165	218	290	375	–	–	–	9.5	2300	–	218	290	375	500	–	–	–	12	12	2500	–	308	400	530	690	–	–	–	15
/1900	1900						2300	–	175	230	300	400	–	–	–	9.5	2430	–	230	308	400	530	–	–	–	12	12	–	–	–	–	–	–	–	–	–	–
/2000	2000						2430	–	190	250	325	425	–	–	–	9.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

[Remark] The chamfer dimensions (r) in this table are not always applicable to the following corners. (a) Snap ring groove side corner of outer ring with snap ring groove. (b) No-rib side bearing ring corner of thin section cylindrical roller bearing. (c) Front bearing ring corner of angular contact ball bearing. (d) Inner ring corner of tapered bore bearing.

E1

E2

Koyo

Supplementary table 1 (2) Boundary dimensions of radial bearings (except tapered roller bearings) – diameter series 1, 2, 3, 4 –

Unit : mm

Deep groove ball bearing											62		42								63		43					64		
Angular contact ball bearing											72			32 52							73			33 53				74		
Self-aligning ball bearing											12		22								13		23							
Cylindrical roller bearing				NN 31							NU 2		NU 22	NU 32							NU 3		NU 23	NU 33				NU 4		
Needle roller bearing																														
Spherical roller bearing				231	241								222	232							213		223							

Bore dia. No.	Bore dia.	Diameter series 1								Diameter series 2									Diameter series 3									Diameter series 4			
		Outside dia.	Dimension series							Outside dia.	Dimension series								Outside dia.	Dimension series								Outside dia.	Dimension series		
			01	11	21	31	41	01	11~41		82	02	12	22	32	42	82	02~42		83	03	13	23	33	83	03~33		04	24	04, 24
	d	D	Width B					r min.		D	Width B						r min.		D	Width B				r min.			D	Width B		r min.
–	0.6																													
1	1																													
–	1.5																													
2	2									–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–					
–	2.5									–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–					
3	3									10	2.5	4	–	–	5	–	0.1	0.15	13	–	5	–	–	7	–	0.2					
4	4									13	3	5	–	–	7	–	0.15	0.2	16	–	5	–	–	9	–	0.3					
5	5									16	3.5	5	–	–	8	–	0.15	0.3	19	–	6	–	–	10	–	0.3					
6	6									19	4	6	–	–	10	–	0.2	0.3	22	–	7	–	11	13	–	0.3					
7	7									22	5	7	–	–	11	–	0.3	0.3	26	–	9	–	13	15	–	0.3	–	–	–	–	
8	8									24	5	8	–	–	12	–	0.3	0.3	28	–	9	–	13	15	–	0.3	30	10	14	0.6	
9	9									26	6	8	–	–	13	–	0.3	0.3	30	–	10	–	14	16	–	0.6	32	11	15	0.6	
00	10									30	7	9	–	14	14.3	–	0.3	0.6	35	9	11	–	17	19	0.3	0.6	37	12	16	0.6	
01	12									32	7	10	–	14	15.9	–	0.3	0.6	37	9	12	–	17	19	0.3	1	42	13	19	1	
02	15									35	8	11	–	14	15.9	20	0.3	0.6	42	9	13	–	17	19	0.3	1	52	15	24	1.1	
03	17									40	8	12	–	16	17.5	22	0.3	0.6	47	10	14	–	19	22.2	0.6	1	62	17	29	1.1	
04	20									47	9	14	–	18	20.6	27	0.3	1	52	10	15	–	21	22.2	0.6	1.1	72	19	33	1.1	
/22	22									50	9	14	–	18	20.6	27	0.3	1	56	11	16	–	21	25	0.6	1.1	–	–	–	–	
05	25									52	10	15	–	18	20.6	27	0.3	1	62	12	17	–	24	25.4	0.6	1.1	80	21	36	1.5	
/28	28									58	10	16	–	19	23	30	0.6	1	68	13	18	–	24	30	0.6	1.1	–	–	–	–	
06	30									62	10	16	–	20	23.8	32	0.6	1	72	13	19	–	27	30.2	0.6	1.1	90	23	40	1.5	
/32	32									65	11	17	–	21	25	33	0.6	1	75	14	20	–	28	32	0.6	1.1	–	–	–	–	
07	35									72	12	17	–	23	27	37	0.6	1.1	80	14	21	–	31	34.9	0.6	1.5	100	25	43	1.5	
08	40									80	13	18	–	23	30.2	40	0.6	1.1	90	16	23	–	33	36.5	1	1.5	110	27	46	2	
09	45									85	13	19	–	23	30.2	40	0.6	1.1	100	17	25	–	36	39.7	1	1.5	120	29	50	2	
10	50									90	13	20	–	23	30.2	40	0.6	1.1	110	19	27	–	40	44.4	1	2	130	31	53	2.1	
11	55									100	14	21	–	25	33.3	45	0.6	1.5	120	21	29	–	43	49.2	1.1	2	140	33	57	2.1	
12	60									110	16	22	–	28	36.5	50	1	1.5	130	22	31	–	46	54	1.1	2.1	150	35	60	2.1	
13	65									120	18	23	–	31	38.1	56	1	1.5	140	24	33	–	48	58.7	1.1	2.1	160	37	64	2.1	
14	70									125	18	24	–	31	39.7	56	1	1.5	150	25	35	–	51	63.5	1.5	2.1	180	42	74	3	
15	75									130	18	25	–	31	41.3	56	1	1.5	160	27	37	–	55	68.3	1.5	2.1	190	45	77	3	
16	80									140	19	26	–	33	44.4	60	1	2	170	28	39	–	58	68.3	1.5	2.1	200	48	80	3	
17	85									150	21	28	–	36	49.2	65	1.1	2	180	30	41	–	60	73	2	3	210	52	86	4	
18	90	150	–	–	–	–	60	–	2	160	22	30	–	40	52.4	69	1.1	2	190	30	43	–	64	73	2	3	225	54	90	4	
19	95	160	–	–	–	–	65	–	2	170	24	32	–	43	55.6	75	1.1	2.1	200	33	45	–	67	77.8	2	3	240	55	95	4	
20	100	165	21	30	39	52	65	1.1	2	180	25	34	–	46	60.3	80	1.5	2.1	215	36	47	51	73	82.6	2.1	3	250	58	98	4	
21	105	175	22	33	42	56	69	1.1	2	190	27	36	–	50	65.1	85	1.5	2.1	225	37	49	53	77	87.3	2.1	3	260	60	100	4	
22	110	180	22	33	42	56	69	1.1	2	200	28	38	–	53	69.8	90	1.5	2.1	240	42	50	57	80	92.1	3	3	280	65	108	4	
24	120	200	25	38	48	62	80	1.5	2	215	–	40	42	58	76	95	–	2.1	260	44	55	62	86	106	3	3	310	72	118	5	
26	130	210	25	38	48	64	80	1.5	2	230	–	40	46	64	80	100	–	3	280	48	58	66	93	112	3	4	340	78	128	5	
28	140	225	27	40	50	68	85	1.5	2.1	250	–	42	50	68	88	109	–	3	300	50	62	70	102	118	4	4	360	82	132	5	
30	150	250	31	46	60	80	100	2	2.1	270	–	45	54	73	96	118	–	3	320	–	65	75	108	128	–	4	380	85	138	5	
32	160	270	34	51	66	86	109	2	2.1	290	–	48	58	80	104	128	–	3	340	–	68	79	114	136	–	4	400	88	142	5	
34	170	280	34	51	66	88	109	2	2.1	310	–	52	62	86	110	140	–	4	360	–	72	84	120	140	–	4	420	92	145	5	
36	180	300	37	56	72	96	118	2.1	3	320	–	52	62	86	112	140	–	4	380	–	75	88	126	150	–	4	440	95	150	6	
38	190	320	42	60	78	104	128	3	3	340	–	55	65	92	120	150	–	4	400	–	78	92	132	155	–	5	460	98	155	6	
40	200	340	44	65	82	112	140	3	3	360	–	58	70	98	128	160	–	4	420	–	80	97	138	165	–	5	480	102	160	6	
44	220	370	48	69	88	120	150	3	4	400	–	65	78	108	144	180	–	4	460	–	88	106	145	180	–	5	540	115	180	6	
48	240	400	50	74	95	128	160	4	4	440	–	72	85	120	160	200	–	4	500	–	95	114	155	195	–	5	580	122	190	6	
52	260	440	57	82	106	144	180	4	4	480	–	80	90	130	174	218	–	5	540	–	102	123	165	206	–	6	620	132	206	7.5	
56	280	460	57	82	106	146	180	4	5	500	–	80	90	130	176	218	–	5	580	–	108	132	175	224	–	6	670	140	224	7.5	
60	300	500	63	90	118	160	200	5	5	540	–	85	98	140	192	243	–	5	620	–	109	140	185	236	–	7.5	710	150	236	7.5	
64	320	540	71	100	128	176	218	5	5	580	–	92	105	150	208	258	–	5	670	–	112	155	200	258	–	7.5	750	155	250	9.5	
68	340	580	78	106	140	190	243	5	5	620	–	92	118	165	224	280	–	6	710	–	118	165	212	272	–	7.5	800	165	265	9.5	
72	360	600	78	106	140	192	243	5	5	650	–	95	122	170	232	290	–	6	750	–	125	170	224	290	–	7.5	850	180	280	9.5	
76	380	620	78	106	140	194	243	5	5	680	–	95	132	175	240	300	–	6	780	–	128	175	230	300	–	7.5	900	190	300	9.5	
80	400	650	80	112	145	200	250	6	6	720	–	103	140	185	256	315	–	6	820	–	136	185	243	308	–	7.5	950	200	315	12	
84	420	700	88	122	165	224	280	6	6	760	–	109	150	195	272	335	–	7.5	850	–	136	190	250	315	–	9.5	980	206	325	12	
88	440	720	88	122	165	226	280	6	6	790	–	112	155	200	280	345	–	7.5	900	–	145	200	265	345	–	9.5	1030	212	335	12	
92	460	760	95	132	175	240	300	6	7.5	830	–	118	165	212	296	365	–	7.5	950	–	155	212	280	365	–	9.5	1060	218	345	12	
96	480	790	100	136	180	248	308	6	7.5	870	–	125	170	224	310	388	–	7.5	980	–	160	218	290	375	–	9.5	1120	230	365	15	
/500	500	830	106	145	190	264	325	7.5	7.5	920	–	136	185	243	336	412	–	7.5	1030	–	170	230	300	388	–	12	1150	236	375	15	
/530	530	870	109	150	195	272	335	7.5	7.5	980	–	145	200	258	355	450	–	9.5	1090	–	180	243	325	412	–	12	1220	250	400	15	
/560	560	920	115	160	206	280	355	7.5	7.5	1030	–	150	206	272	365	475	–	9.5	1150	–	190	258	335	438	–	12	1280	258	412	15	
/600	600	980	122	170	218	300	375	7.5	7.5	1090	–	155	212	280	388	488	–	9.5	1220	–	200	272	355	462	–	15	1360	272	438	15	
/630	630	1030	128	175	230	315	400	7.5	7.5	1150	–	165	230	300	412	515	–	12	1280	–	206	280	375	488	–	15	1420	280	450	15	
/670	670	1090	136	185	243	336	412	7.5	7.5	1220	–	175	243	315	438	545	–	12	1360	–	218	300	400	515	–	15	1500	290	475	15	
/710	710	1150	140	195	250	345	438	9.5	9.5	1280	–	180	250	325	450	560	–	12	1420	–	224	308	412	530	–	15	–	–	–	–	
/750	750	1220	150	206	272	365	475	9.5	9.5	1360	–	195	265	345	475	615	–	15	1500	–	236	325	438	560	–	15	–	–	–	–	
/800	800	1280	155	212	272	375	475	9.5	9.5	1420	–	200	272	355	488	615	–	15	1600	–	258	355	462	600	–	15					
/850	850	1360	165	224	290	400	500	12	12	1500	–	206	280	375	515	650	–	15	1700	–	272	375	488	630	–	19					
/900	900	1420	165	230	300	412	515	12	12	1580	–	218	300	388	515	670	–	15	1780	–	280	388	500	650	–	19					
/950	950	1500	175	243	315	438	545	12	12	1660	–	230	315	412	530	710	–	15	1850	–	290	400	515	670	–	19					
/1000	1000	1580	185	258	335	462	580	12	12	1750	–	243	330	425	560	750	–	15	1950	–	300	412	545	710	–	19					
/1060	1060	1660	190	265	345	475	600	12	15	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–				
/1120	1120	1750	–	280	365	475	630	–	15																					
/1180	1180	1850	–	290	388	500	670	–	15																					
/1250	1250	1950	–	308	400	530	710	–	15																					
/1320	1320	2060	–	325	425	560	750	–	15																					
/1400	1400	2180	–	345	450	580	775	–	19																					
/1500	1500	2300	–	355	462	600	800	–	19																					

[Remark] The chamfer dimensions (r) in this table are not always applicable to the following corners.
(a) Snap ring groove side corner of outer ring with snap ring groove. (b) No-rib side bearing ring corner of thin section cylindrical roller bearing.
(c) Front bearing ring corner of angular contact ball bearing. (d) Inner ring corner of tapered bore bearing.

Supplementary table 2 Boundary dimensions of tapered roller bearings

Unit : mm

Tapered roller bearing	329						320				330					331						302				322			332				303 , 303D					313			323					Tapered roller bearing
	Diameter series 9						Diameter series 0									Diameter series 1						Diameter series 2												Diameter series 3												
Bore dia. No.	Bore dia.	Outside dia.	Dimension series 29			Chamfer		Outside dia.	Dimension series 20			Dimension series 30			Chamfer		Outside dia.	Dimension series 31			Chamfer		Outside dia.	Dimension series 02				Dimension series 22			Dimension series 32			Chamfer		Outside dia.	Dimension series 03					Dimension series 13			Dimension series 23			Chamfer		Bore dia.	Bore dia. No.
						Inner ring	Outer ring								Inner ring	Outer ring					Inner ring	Outer ring																							Inner ring	Outer ring		
	d	D	T	B	C	r min.		D	T	B	C	T	B	C	r min.		D	T	B	C	r min.		D	T	B	C	T	B	C	T	B	C	r min.		D	T	B	C_{303}	C_{303D}	T	B	C	T	B	C	r min.		d	
00	10																						–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	10	00
01	12																						–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	12	01
02	15																						(35	11.75	11	10)	–	–	–	–	–	–	–	–	42	14.25	13	11	–				–	–	–	1	1	15	02
03	17	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–						40	13.25	12	11	17.25	16	14	–	–	–	1	1	47	15.25	14	12	–				20.25	19	16	1	1	17	03
04	20	37	12	12	9	0.3	0.3	42	15	15	12	–	–	–	0.6	0.6							47	15.25	14	12	19.25	18	15	–	–	–	1	1	52	16.25	15	13	–				22.25	21	18	1.5	1.5	20	04
/22	22	40	12	12	9	0.3	0.3	44	15	15	11.5	–	–	–	0.6	0.6							50	–	–	–	–	–	–	–	–	–	1	1	56	–	–	–	–				–	–	–	–	–	22	/22
05	25	42	12	12	9	0.3	0.3	47	15	15	11.5	17	17	14	0.6	0.6							52	16.25	15	13	19.25	18	16 [2]	22	22	18	1	1	62	18.25	17	15	13				25.25	24	20	1.5	1.5	25	05
/28	28	45	12	12	9	0.3	0.3	52	16	16	12	–	–	–	1	1							58	–	–	–	(20.25	19	16) [1]	24	24	19	1	1	68	–	–	–	–				–	–	–	–	–	28	/28
06	30	47	12	12	9	0.3	0.3	55	17	17	13	20	20	16	1	1							62	17.25	16	14	21.25	20	17	25	25	19.5	1	1	72	20.75	19	16	14				28.75	27	23	1.5	1.5	30	06
/32	32	52	14	15	10	0.6	0.6	58	17	17	13	–	–	–	1	1	–	–	–	–	–	–	65	18.25	17	15	(22	21.5	17) [1]	26	26	20.5	1	1	75	–	–	–	–				29.75	28	23	1.5	1.5	32	/32
07	35	55	14	14	11.5	0.6	0.6	62	18	18	14	21	21	17	1	1	–	–	–	–	–	–	72	18.25	17	15	24.25	23	19	28	28	22	1.5	1.5	80	22.75	21	18	15				32.75	31	25	2	1.5	35	07
08	40	62	15	15	12	0.6	0.6	68	19	19	14.5	22	22	18	1	1	75	26	26	20.5	1.5	1.5	80	19.75	18	16	24.75	23	19	32	32	25	1.5	1.5	90	25.25	23	20	17				35.25	33	27	2	1.5	40	08
09	45	68	15	15	12	0.6	0.6	75	20	20	15.5	24	24	19	1	1	80	26	26	20.5	1.5	1.5	85	20.75	19	16	24.75	23	19	32	32	25	1.5	1.5	100	27.25	25	22	18				38.25	36	30	2	1.5	45	09
10	50	72	15	15	12	0.6	0.6	80	20	20	15.5	24	24	19	1	1	85	26	26	20	1.5	1.5	90	21.75	20	17	24.75	23	19 [3]	32	32	24.5	1.5	1.5	110	29.25	27	23	19				42.25	40	33	2.5	2	50	10
11	55	80	17	17	14	1	1	90	23	23	17.5	27	27	21	1.5	1.5	95	30	30	23	1.5	1.5	100	22.75	21	18	26.75	25	21	35	35	27	2	1.5	120	31.5	29	25	21				45.5	43	35	2.5	2	55	11
12	60	85	17	17	14	1	1	95	23	23	17.5	27	27	21	1.5	1.5	100	30	30	23	1.5	1.5	110	23.75	22	19	29.75	28	24	38	38	29	2	1.5	130	33.5	31	26	22				48.5	46	37	3	2.5	60	12
13	65	90	17	17	14	1	1	100	23	23	17.5	27	27	21	1.5	1.5	110	34	34	26.5	1.5	1.5	120	24.75	23	20	32.75	31	27	41	41	32	2	1.5	140	36	33	28	23				51	48	39	3	2.5	65	13
14	70	100	20	20	16	1	1	110	25	25	19	31	31	25.5	1.5	1.5	120	37	37	29	2	1.5	125	26.25	24	21	33.25	31	27	41	41	32	2	1.5	150	38	35	30	25				54	51	42	3	2.5	70	14
15	75	105	20	20	16	1	1	115	25	25	19	31	31	25.5	1.5	1.5	125	37	37	29	2	1.5	130	27.25	25	22	33.25	31	27	41	41	31	2	1.5	160	40	37	31	26				58	55	45	3	2.5	75	15
16	80	110	20	20	16	1	1	125	29	29	22	36	36	29.5	1.5	1.5	130	37	37	29	2	1.5	140	28.25	26	22	35.25	33	28	46	46	35	2.5	2	170	42.5	39	33	27				61.5	58	48	3	2.5	80	16
17	85	120	23	23	18	1.5	1.5	130	29	29	22	36	36	29.5	1.5	1.5	140	41	41	32	2.5	2	150	30.5	28	24	38.5	36	30	49	49	37	2.5	2	180	44.5	41	34	28				63.5	60	49	4	3	85	17
18	90	125	23	23	18	1.5	1.5	140	32	32	24	39	39	32.5	2	1.5	150	45	45	35	2.5	2	160	32.5	30	26	42.5	40	34	55	55	42	2.5	2	190	46.5	43	36	30	–	–	–	67.5	64	53	4	3	90	18
19	95	130	23	23	18	1.5	1.5	145	32	32	24	39	39	32.5	2	1.5	160	49	49	38	2.5	2	170	34.5	32	27	45.5	43	37	58	58	44	3	2.5	200	49.5	45	38	32	–	–	–	71.5	67	55	4	3	95	19
20	100	140	25	25	20	1.5	1.5	150	32	32	24	39	39	32.5	2	1.5	165	52	52	40	2.5	2	180	37	34	29	49	46	39	63	63	48	3	2.5	215	51.5	47	39	–	56.5	51	35	77.5	73	60	4	3	100	20
21	105	145	25	25	20	1.5	1.5	160	35	35	26	43	43	34	2.5	2	175	56	56	44	2.5	2	190	39	36	30	53	50	43	68	68	52	3	2.5	225	53.5	49	41	–	58	53	36	81.5	77	63	4	3	105	21
22	110	150	25	25	20	1.5	1.5	170	38	38	29	47	47	37	2.5	2	180	56	56	43	2.5	2	200	41	38	32	56	53	46	–	–	–	3	2.5	240	54.5	50	42	–	63	57	38	84.5	80	65	4	3	110	22
24	120	165	29	29	23	1.5	1.5	180	38	38	29	48	48	38	2.5	2	200	62	62	48	2.5	2	215	43.5	40	34	61.5	58	50	–	–	–	3	2.5	260	59.5	55	46	–	68	62	42	90.5	86	69	4	3	120	24
26	130	180	32	32	25	2	1.5	200	45	45	34	55	55	43	2.5	2	–	–	–	–	–	–	230	43.75	40	34	67.75	64	54	–	–	–	4	3	280	63.75	58	49	–	72	66	44	–	–	–	5	4	130	26
28	140	190	32	32	25	2	1.5	210	45	45	34	56	56	44	2.5	2	–	–	–	–	–	–	250	45.75	42	36	71.75	68	58	–	–	–	4	3	300	67.75	62	53	–	77	70	47	–	–	–	5	4	140	28
30	150	210	38	38	30	2.5	2	225	48	48	36	59	59	46	3	2.5	–	–	–	–	–	–	270	49	45	38	77	73	60	–	–	–	4	3	320	72	65	55		82	75	50	–	–	–	5	4	150	30
32	160	220	38	38	30	2.5	2	240	51	51	38	–	–	–	3	2.5							290	52	48	40	84	80	67	–	–	–	4	3	340	75	68	58	–	–	–	–	–	–	–	5	4	160	32
34	170	230	38	38	30	2.5	2	260	57	57	43	–	–	–	3	2.5							310	57	52	43	91	86	71	–	–	–	5	4	360	80	72	62	–	–	–	–	–	–	–	5	4	170	34
36	180	250	45	45	34	2.5	2	280	64	64	48	–	–	–	3	2.5							320	57	52	43	91	86	71	–	–	–	5	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	180	36
38	190	260	45	45	34	2.5	2	290	64	64	48				3	2.5							340	60	55	46	97	92	75	–	–	–	5	4															190	38
40	200	280	51	51	39	3	2.5	310	70	70	53				3	2.5							360	64	58	48	104	98	82	–	–	–	5	4															200	40
44	220	300	51	51	39	3	2.5	340	76	76	57				4	3							–	–	–	–	–	–	–	–	–	–	–	–															220	44
48	240	320	51	51	39	3	2.5	360	76	76	57				4	3																																	240	48
52	260	360	63.5	63.5	48	3	2.5	400	87	87	65				5	4																																	260	52
56	280	380	63.5	63.5	48	3	2.5	420	87	87	65				5	4																																	280	56
60	300	420	76	76	57	4	3	460	100	100	74				5	4																																	300	60
64	320	440	76	76	57	4	3	480	100	100	74				5	4																																	320	64
68	340	460	76	76	57	4	3	–	–	–	–				–	–																																	340	68
72	360	480	76	76	57	4	3	–	–	–	–				–	–																																	360	72

[Remark] In the new JIS, new dimension series (classified by contact angle) is also specified in accordance with ISO standards.

[Notes] 1) Bearing group with large contact angle
2) Outer ring width C of bearings with large contact angle is 15 mm.
3) Outer ring width C of bearings with large contact angle is 18 mm.

Supplementary table 3 Boundary dimensions of single direction thrust bearings (with flat back faces) – diameter series 0, 1, 2, 3, 4, 5 –

Unit : mm

Thrust ball brg.: 511 (dimension series 11), 512 (dimension series 12), 513 (dimension series 13), 514 (dimension series 14)
Spherical thrust roller bearings: 292 (dimension series 92), 293 (dimension series 93), 294 (dimension series 94)

Bore dia. No.	Bore dia. d	Diameter series 0: Outside dia. D	Height 70	Height 90	Height 10 T	Chamfer r min.	Diameter series 1: Outside dia. D	Height 71	Height 91	Height 11 T	11 (511) d_1 max.	11 (511) D_1 min.	Chamfer r min.
4	4	12	4	–	6	0.3	–	–	–	–	–	–	–
6	6	16	5	–	7	0.3	–	–	–	–	–	–	–
8	8	18	5	–	7	0.3	–	–	–	–	–	–	–
00	10	20	5	–	7	0.3	24	6	–	9	24	11	0.3
01	12	22	5	–	7	0.3	26	6	–	9	26	13	0.3
02	15	26	5	–	7	0.3	28	6	–	9	28	16	0.3
03	17	28	5	–	7	0.3	30	6	–	9	30	18	0.3
04	20	32	6	–	8	0.3	35	7	–	10	35	21	0.3
05	25	37	6	–	8	0.3	42	8	–	11	42	26	0.6
06	30	42	6	–	8	0.3	47	8	–	11	47	32	0.6
07	35	47	6	–	8	0.3	52	8	–	12	52	37	0.6
08	40	52	6	–	9	0.3	60	9	–	13	60	42	0.6
09	45	60	7	–	10	0.3	65	9	–	14	65	47	0.6
10	50	65	7	–	10	0.3	70	9	–	14	70	52	0.6
11	55	70	7	–	10	0.3	78	10	–	16	78	57	0.6
12	60	75	7	–	10	0.3	85	11	–	17	85	62	1
13	65	80	7	–	10	0.3	90	11	–	18	90	67	1
14	70	85	7	–	10	0.3	95	11	–	18	95	72	1
15	75	90	7	–	10	0.3	100	11	–	19	100	77	1
16	80	95	7	–	10	0.3	105	11	–	19	105	82	1
17	85	100	7	–	10	0.3	110	11	–	19	110	87	1
18	90	105	7	–	10	0.3	120	14	–	22	120	92	1
20	100	120	9	–	14	0.6	135	16	21	25	135	102	1
22	110	130	9	–	14	0.6	145	16	21	25	145	112	1
24	120	140	9	–	14	0.6	155	16	21	25	155	122	1
26	130	150	9	–	14	0.6	170	18	24	30	170	132	1
28	140	160	9	–	14	0.6	180	18	24	31	178	142	1
30	150	170	9	–	14	0.6	190	18	24	31	188	152	1
32	160	180	9	–	14	0.6	200	18	24	31	198	162	1
34	170	190	9	–	14	0.6	215	20	27	34	213	172	1.1
36	180	200	9	–	14	0.6	225	20	27	34	222	183	1.1
38	190	215	11	–	17	1	240	23	30	37	237	193	1.1
40	200	225	11	–	17	1	250	23	30	37	247	203	1.1
44	220	250	14	–	22	1	270	23	30	37	267	223	1.1
48	240	270	14	–	22	1	300	27	36	45	297	243	1.5
52	260	290	14	–	22	1	320	27	36	45	317	263	1.5
56	280	310	14	–	22	1	350	32	42	53	347	283	1.5
60	300	340	18	24	30	1	380	36	48	62	376	304	2
64	320	360	18	24	30	1	400	36	48	63	396	324	2
68	340	380	18	24	30	1	420	36	48	64	416	344	2
72	360	400	18	24	30	1	440	36	48	65	436	364	2
76	380	420	18	24	30	1	460	36	48	65	456	384	2
80	400	440	18	24	30	1	480	36	48	65	476	404	2
84	420	460	18	24	30	1	500	36	48	65	495	424	2
88	440	480	18	24	30	1	540	45	60	80	535	444	2.1
92	460	500	18	24	30	1	560	45	60	80	555	464	2.1
96	480	520	18	24	30	1	580	45	60	80	575	484	2.1
/500	500	540	18	24	30	1	600	45	60	80	595	504	2.1
/530	530	580	23	30	38	1.1	640	50	67	85	635	534	3
/560	560	610	23	30	38	1.1	670	50	67	85	665	564	3
/600	600	650	23	30	38	1.1	710	50	67	85	705	604	3
/630	630	680	23	30	38	1.1	750	54	73	95	745	634	3
/670	670	730	27	36	45	1.5	800	58	78	105	795	674	4
/710	710	780	32	42	53	1.5	850	63	85	112	845	714	4
/750	750	820	32	42	53	1.5	900	67	90	120	895	755	4
/800	800	870	32	42	53	1.5	950	67	90	120	945	805	4
/850	850	920	32	42	53	1.5	1000	67	90	120	995	855	4
/900	900	980	36	48	63	2	1060	73	95	130	1055	905	5
/950	950	1030	36	48	63	2	1120	78	103	135	1115	955	5
/1000	1000	1090	41	54	70	2.1	1180	82	109	140	1175	1005	5
/1060	1060	1150	41	54	70	2.1	1250	85	115	150	1245	1065	5
/1120	1120	1220	45	60	80	2.1	1320	90	122	160	1315	1125	5
/1180	1180	1280	45	60	80	2.1	1400	100	132	175	1395	1185	6
/1250	1250	1360	50	67	85	3	1460	–	–	175	1455	1255	6
/1320	1320	1440	–	–	95	3	1540	–	–	175	1535	1325	6
/1400	1400	1520	–	–	95	3	1630	–	–	180	1620	1410	6
/1500	1500	1630	–	–	105	4	1750	–	–	195	1740	1510	6
/1600	1600	1730	–	–	105	4	1850	–	–	195	1840	1610	6
/1700	1700	1840	–	–	112	4	1970	–	–	212	1960	1710	7.5
/1800	1800	1950	–	–	120	4	2080	–	–	220	2070	1810	7.5
/1900	1900	2060	–	–	130	5	2180	–	–	220	2170	1910	7.5
/2000	2000	2160	–	–	130	5	2300	–	–	236	2290	2010	7.5
/2120	2120	2300	–	–	140	5	2430	–	–	243	2420	2130	7.5
/2240	2240	2430	–	–	150	5	2570	–	–	258	2560	2250	9.5
/2360	2360	2550	–	–	150	5	2700	–	–	265	2690	2370	9.5
/2500	2500	2700	–	–	160	5	2850	–	–	272	2840	2510	9.5

Bore dia. No.	Bore dia. d	Diameter series 2: Outside dia. D	Height 72	Height 92 (292)	Height 12 T	12 (512) d_1 max.	12 (512) D_1 min.	Chamfer r min.	Diameter series 3: Outside dia. D	Height 73	Height 93 (293)	Height 13 T	13 (513) d_1 max.	13 (513) D_1 min.	Chamfer r min.
4	4	16	6	–	8	16	4	0.3	20	7	–	11	20	4	0.6
6	6	20	6	–	9	20	6	0.3	24	8	–	12	24	6	0.6
8	8	22	6	–	9	22	8	0.3	26	8	–	12	26	8	0.6
00	10	26	7	–	11	26	12	0.6	30	9	–	14	30	10	0.6
01	12	28	7	–	11	28	14	0.6	32	9	–	14	32	12	0.6
02	15	32	8	–	12	32	17	0.6	37	10	–	15	37	15	0.6
03	17	35	8	–	12	35	19	0.6	40	10	–	16	40	19	0.6
04	20	40	9	–	14	40	22	0.6	47	12	–	18	47	22	1
05	25	47	10	–	15	47	27	0.6	52	12	–	18	52	27	1
06	30	52	10	–	16	52	32	0.6	60	14	–	21	60	32	1
07	35	62	12	–	18	62	37	1	68	15	–	24	68	37	1
08	40	68	13	–	19	68	42	1	78	17	22	26	78	42	1
09	45	73	13	–	20	73	47	1	85	18	24	28	85	47	1
10	50	78	13	–	22	78	52	1	95	20	27	31	95	52	1.1
11	55	90	16	21	25	90	57	1	105	23	30	35	105	57	1.1
12	60	95	16	21	26	95	62	1	110	23	30	35	110	62	1.1
13	65	100	16	21	27	100	67	1	115	23	30	36	115	67	1.1
14	70	105	16	21	27	105	72	1	125	25	34	40	125	72	1.1
15	75	110	16	21	27	110	77	1	135	27	36	44	135	77	1.5
16	80	115	16	21	28	115	82	1	140	27	36	44	140	82	1.5
17	85	125	18	24	31	125	88	1	150	29	39	49	150	88	1.5
18	90	135	20	27	35	135	93	1.1	155	29	39	50	155	93	1.5
20	100	150	23	30	38	150	103	1.1	170	32	42	55	170	103	1.5
22	110	160	23	30	38	160	113	1.1	190	36	48	63	187	113	2
24	120	170	23	30	39	170	123	1.1	210	41	54	70	205	123	2.1
26	130	190	27	36	45	187	133	1.5	225	42	58	75	220	134	2.1
28	140	200	27	36	46	197	143	1.5	240	45	60	80	235	144	2.1
30	150	215	29	39	50	212	153	1.5	250	45	60	80	245	154	2.1
32	160	225	29	39	51	222	163	1.5	270	50	67	87	265	164	3
34	170	240	32	42	55	237	173	1.5	280	50	67	87	275	174	3
36	180	250	32	42	56	247	183	1.5	300	54	73	95	295	184	3
38	190	270	36	48	62	267	194	2	320	58	78	105	315	195	4
40	200	280	36	48	62	277	204	2	340	63	85	110	335	205	4
44	220	300	36	48	63	297	224	2	360	63	85	112	355	225	4
48	240	340	45	60	78	335	244	2.1	380	63	85	112	375	245	4
52	260	360	45	60	79	355	264	2.1	420	73	95	130	415	265	5
56	280	380	45	60	80	375	284	2.1	440	73	95	130	435	285	5
60	300	420	54	73	95	415	304	3	480	82	109	140	475	305	5
64	320	440	54	73	95	435	325	3	500	82	109	140	495	325	5
68	340	460	54	73	96	455	345	3	540	90	122	160	535	345	5
72	360	500	63	85	110	495	365	4	560	90	122	160	555	365	5
76	380	520	63	85	112	515	385	4	600	100	132	175	595	385	6
80	400	540	63	85	112	535	405	4	620	100	132	175	615	405	6
84	420	580	73	95	130	575	425	5	650	103	140	180	645	425	6
88	440	600	73	95	130	595	445	5	680	109	145	190	675	445	6
92	460	620	73	95	130	615	465	5	710	112	150	195	705	465	6
96	480	650	78	103	135	645	485	5	730	112	150	195	725	485	6
/500	500	670	78	103	135	665	505	5	750	112	150	195	745	505	6
/530	530	710	82	109	140	705	535	5	800	122	160	212	795	535	7.5
/560	560	750	85	115	150	745	565	5	850	132	175	224	845	565	7.5
/600	600	800	90	122	160	795	605	5	900	136	180	236	895	605	7.5
/630	630	850	100	132	175	845	635	6	950	145	190	250	945	635	9.5
/670	670	900	103	140	180	895	675	6	1000	150	200	258	995	675	9.5
/710	710	950	109	145	190	945	715	6	1060	160	212	272	1055	715	9.5
/750	750	1000	112	150	195	995	755	6	1120	165	224	290	1115	755	9.5
/800	800	1060	118	155	205	1055	805	7.5	1180	170	230	300	1175	805	9.5
/850	850	1120	122	160	212	1115	855	7.5	1250	180	243	315	1245	855	12
/900	900	1180	125	170	220	1175	905	7.5	1320	190	250	335	1315	905	12
/950	950	1250	136	180	236	1245	955	7.5	1400	200	272	355	1395	955	12
/1000	1000	1320	145	190	250	1315	1005	9.5	1460	–	276	–	–	–	12
/1060	1060	1400	155	206	265	1395	1065	9.5							
/1120	1120	1460	–	206	–	–	–	9.5							
/1180	1180	1520	–	206	–	–	–	9.5							
/1250	1250	1610	–	216	–	–	–	9.5							
/1320	1320	1700	–	228	–	–	–	9.5							
/1400	1400														
/1500	1500														
/1600	1600														
/1700	1700														
/1800	1800														
/1900	1900														
/2000	2000														
/2120	2120														
/2240	2240														
/2360	2360														
/2500	2500														

Bore dia. No.	Bore dia. d	Diameter series 4: Outside dia. D	Height 74	Height 94 (294)	Height 14 T	14 (514) d_1 max.	14 (514) D_1 min.	Chamfer r min.	Diameter series 5: Outside dia. D	Height * 95 T	Chamfer r min.
4	4										
6	6										
8	8										
00	10										
01	12										
02	15										
03	17	–	–	–	–	–	–	–	52	21	1
04	20	–	–	–	–	–	–	–	60	24	1
05	25	60	16	21	24	60	27	1	73	29	1.1
06	30	70	18	24	28	70	32	1	85	34	1.1
07	35	80	20	27	32	80	37	1.1	100	39	1.1
08	40	90	23	30	36	90	42	1.1	110	42	1.5
09	45	100	25	34	39	100	47	1.1	120	45	2
10	50	110	27	36	43	110	52	1.5	135	51	2
11	55	120	29	39	48	120	57	1.5	150	58	2.1
12	60	130	32	42	51	130	62	1.5	160	60	2.1
13	65	140	34	45	56	140	68	2	170	63	2.1
14	70	150	36	48	60	150	73	2	180	67	3
15	75	160	38	51	65	160	78	2	190	69	3
16	80	170	41	54	68	170	83	2.1	200	73	3
17	85	180	42	58	72	177	88	2.1	215	78	4
18	90	190	45	60	77	187	93	2.1	225	82	4
20	100	210	50	67	85	205	103	3	250	90	4
22	110	230	54	73	95	225	113	3	270	95	5
24	120	250	58	78	102	245	123	4	300	109	5
26	130	270	63	85	110	265	134	4	320	115	5
28	140	280	63	85	112	275	144	4	340	122	5
30	150	300	67	90	120	295	154	4	360	125	6
32	160	320	73	95	130	315	164	5	380	132	6
34	170	340	78	103	135	335	174	5	400	140	6
36	180	360	82	109	140	355	184	5	420	145	6
38	190	380	85	115	150	375	195	5	440	150	6
40	200	400	90	122	155	395	205	5	460	155	7.5
44	220	420	90	122	160	415	225	6	500	170	7.5
48	240	440	90	122	160	435	245	6	540	180	7.5
52	260	480	100	132	175	475	265	6	580	190	9.5
56	280	520	109	145	190	515	285	6	620	206	9.5
60	300	540	109	145	190	535	305	6	670	224	9.5
64	320	580	118	155	205	575	325	7.5	710	236	9.5
68	340	620	125	170	220	615	345	7.5	750	243	12
72	360	640	125	170	220	635	365	7.5	780	250	12
76	380	670	132	175	224	665	385	7.5	820	265	12
80	400	710	140	185	243	705	405	7.5	850	272	12
84	420	730	140	185	243	725	425	7.5	900	290	15
88	440	780	155	206	265	775	445	9.5	950	308	15
92	460	800	155	206	265	795	465	9.5	980	315	15
96	480	850	165	224	290	845	485	9.5	1000	315	15
/500	500	870	165	224	290	865	505	9.5	1060	335	15
/530	530	920	175	236	308	915	535	9.5	1090	335	15
/560	560	980	190	250	335	975	565	12	1150	355	15
/600	600	1030	195	258	335	1025	605	12	1220	375	15
/630	630	1090	206	280	365	1085	635	12	1280	388	15
/670	670	1150	218	290	375	1145	675	15	1320	388	15
/710	710	1220	230	308	400	1215	715	15	1400	412	15
/750	750	1280	236	315	412	1275	755	15			
/800	800	1360	250	335	438	1355	805	15			
/850	850	1440	–	354	–	–	–	15			
/900	900	1520	–	372	–	–	–	15			
/950	950	1600	–	390	–	–	–	15			
/1000	1000	1670	–	402	–	–	–	15			
/1060	1060	1770	–	426	–	–	–	15			
/1120	1120	1860	–	444	–	–	–	15			
/1180	1180	1950	–	462	–	–	–	19			
/1250	1250										
/1320	1320										
/1400	1400										
/1500	1500										
/1600	1600										
/1700	1700										
/1800	1800										
/1900	1900										
/2000	2000										
/2120	2120										
/2240	2240										
/2360	2360										
/2500	2500										

* Dimension series

Supplementary table 4 Boundary dimensios of double direction thrust ball bearings (with flat back faces)

Unit : mm

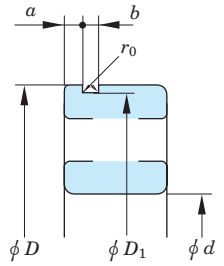
Bore dia. No.	522									523									Bore dia. No.	524									Bore dia. No.
	Diameter series 2									Diameter series 3										Diameter series 4									
	Dimension series 22									Dimension series 23										Dimension series 24									
	Bore dia. d_2	Out-side dia. D	Height T_1	Central race height B	d_3 max.	D_1 min.	r min.	r_1 min.	(Refer.) d [1]	Bore dia. d_2	Out-side dia. D	Height T_1	Central race height B	d_3 max.	D_1 min.	r min.	r_1 min.	(Refer.) d [1]		Bore dia. d_2	Out-side dia. D	Height T_1	Central race height B	d_3 max.	D_1 min.	r min.	r_1 min.	(Refer.) d [1]	
02	**10**	32	22	5	32	17	0.6	0.3	15	**10**	–	–	–	–	–	–	–	–	**02**	–	–	–	–	–	–	–	–	–	**02**
04	**15**	40	26	6	40	22	0.6	0.3	20	**15**	–	–	–	–	–	–	–	–	**04**	–	–	–	–	–	–	–	–	–	**04**
05	**20**	47	28	7	47	27	0.6	0.3	25	**20**	52	34	8	52	27	1	0.3	25	**05**	**15**	60	45	11	60	27	1	0.6	25	**05**
06	**25**	52	29	7	52	32	0.6	0.3	30	**25**	60	38	9	60	32	1	0.3	30	**06**	**20**	70	52	12	70	32	1	0.6	30	**06**
07	**30**	62	34	8	62	37	1	0.3	35	**30**	68	44	10	68	37	1	0.3	35	**07**	**25**	80	59	14	80	37	1.1	0.6	35	**07**
08	**30**	68	36	9	68	42	1	0.6	40	**30**	78	49	12	78	42	1	0.6	40	**08**	**30**	90	65	15	90	42	1.1	0.6	40	**08**
09	**35**	73	37	9	73	47	1	0.6	45	**35**	85	52	12	85	47	1	0.6	45	**09**	**35**	100	72	17	100	47	1.1	0.6	45	**09**
10	**40**	78	39	9	78	52	1	0.6	50	**40**	95	58	14	95	52	1.1	0.6	50	**10**	**40**	110	78	18	110	52	1.5	0.6	50	**10**
11	**45**	90	45	10	90	57	1	0.6	55	**45**	105	64	15	105	57	1.1	0.6	55	**11**	**45**	120	87	20	120	57	1.5	0.6	55	**11**
12	**50**	95	46	10	95	62	1	0.6	60	**50**	110	64	15	110	62	1.1	0.6	60	**12**	**50**	130	93	21	130	62	1.5	0.6	60	**12**
13	**55**	100	47	10	100	67	1	0.6	65	**55**	115	65	15	115	67	1.1	0.6	65	**13**	**50**	140	101	23	140	68	2	1	65	**13**
14	**55**	105	47	10	105	72	1	1	70	**55**	125	72	16	125	72	1.1	1	70	**14**	**55**	150	107	24	150	73	2	1	70	**14**
15	**60**	110	47	10	110	77	1	1	75	**60**	135	79	18	135	77	1.5	1	75	**15**	**60**	160	115	26	160	78	2	1	75	**15**
16	**65**	115	48	10	115	82	1	1	80	**65**	140	79	18	140	82	1.5	1	80	**16**	**65**	170	120	27	170	83	2.1	1	80	**16**
17	**70**	125	55	12	125	88	1	1	85	**70**	150	87	19	150	88	1.5	1	85	**17**	**65**	180	128	29	179.5	88	2.1	1.1	85	**17**
18	**75**	135	62	14	135	93	1.1	1	90	**75**	155	88	19	155	93	1.5	1	90	**18**	**70**	190	135	30	189.5	93	2.1	1.1	90	**18**
20	**85**	150	67	15	150	103	1.1	1	100	**85**	170	97	21	170	103	1.5	1	100	**20**	**80**	210	150	33	209.5	103	3	1.1	100	**20**
22	**95**	160	67	15	160	113	1.1	1	110	**95**	190	110	24	189.5	113	2	1	110	**22**	**90**	230	166	37	229	113	3	1.1	110	**22**
24	**100**	170	68	15	170	123	1.1	1.1	120	**100**	210	123	27	209.5	123	2.1	1.1	120	**24**	**95**	250	177	40	249	123	4	1.5	120	**24**
26	**110**	190	80	18	189.5	133	1.5	1.1	130	**110**	225	130	30	224	134	2.1	1.1	130	**26**	**100**	270	192	42	269	134	4	2	130	**26**
28	**120**	200	81	18	199.5	143	1.5	1.1	140	**120**	240	140	31	239	144	2.1	1.1	140	**28**	**110**	280	196	44	279	144	4	2	140	**28**
30	**130**	215	89	20	214.5	153	1.5	1.1	150	**130**	250	140	31	249	154	2.1	1.1	150	**30**	**120**	300	209	46	299	154	4	2	150	**30**
32	**140**	225	90	20	224.5	163	1.5	1.1	160	**140**	270	153	33	269	164	3	1.1	160	**32**	**130**	320	226	50	319	164	5	2	160	**32**
34	**150**	240	97	21	239.5	173	1.5	1.1	170	**150**	280	153	33	279	174	3	1.1	170	**34**	**135**	340	236	50	339	174	5	2.1	170	**34**
36	**150**	250	98	21	249	183	1.5	2	180	**150**	300	165	37	299	184	3	2	180	**36**	**140**	360	245	52	359	184	5	3	180	**36**
38	**160**	270	109	24	269	194	2	2	190	**160**	320	183	40	319	195	4	2	190	**38**	–	–	–	–	–	–	–	–	–	**38**
40	**170**	280	109	24	279	204	2	2	200	**170**	340	192	42	339	205	4	2	200	**40**	–	–	–	–	–	–	–	–	–	**40**
44	**190**	300	110	24	299	224	2	2	220	–	–	–	–	–	–	–	–	–	**44**	–	–	–	–	–	–	–	–	–	**44**

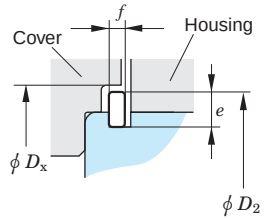
[Note] 1) Nominal bore diameter of single direction bearings of the same diameter series and with the same nominal outside diameter.

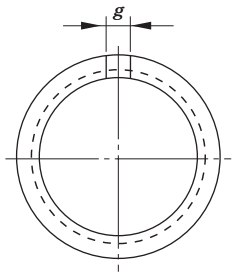
Supplementary table 5 (1) Dimension of snap ring grooves and locationg snap rings – diameter series 18, 19 –

Unit : mm

Applicable bearing			Snap ring groove									Locating snap ring						Housing
Bore dia. d		Outside dia. D	Snap ring groove dia. D_1		Position of snap ring groove a				Snap ring groove width b		Fillet radius of snap ring groove r_0	No.	Section height e		Thickness f		Mounted state		Shoulder bore dia. D_x
Dimension series					Dimension series 18		Dimension series 19										Distance between cut ends g	Locating snap ring O.D. D_2	
18	19		max.	min.	max.	min.	max.	min.	max.	min.	max.		max.	min.	max.	min.	max.	max.	max.
–	**10**	**22**	20.8	20.5	–	–	1.05	0.9	1.05	0.8	0.2	**NR 1022**	2.0	1.85	0.7	0.6	2	24.8	25.5
–	**12**	**24**	22.8	22.5	–	–	1.05	0.9	1.05	0.8	0.2	**NR 1024**	2.0	1.85	0.7	0.6	2	26.8	27.5
–	**15**	**28**	26.7	26.4	–	–	1.3	1.15	1.2	0.95	0.25	**NR 1028**	2.05	1.9	0.85	0.75	3	30.8	31.5
–	**17**	**30**	28.7	28.4	–	–	1.3	1.15	1.2	0.95	0.25	**NR 1030**	2.05	1.9	0.85	0.75	3	32.8	33.5
20	–	**32**	30.7	30.4	1.3	1.15	–	–	1.2	0.95	0.25	**NR 1032**	2.05	1.9	0.85	0.75	3	34.8	35.5
22	–	**34**	32.7	32.4	1.3	1.15	–	–	1.2	0.95	0.25	**NR 1034**	2.05	1.9	0.85	0.75	3	36.8	37.5
25	**20**	**37**	35.7	35.4	1.3	1.15	1.7	1.55	1.2	0.95	0.25	**NR 1037**	2.05	1.9	0.85	0.75	3	39.8	40.5
–	**22**	**39**	37.7	37.4	–	–	1.7	1.55	1.2	0.95	0.25	**NR 1039**	2.05	1.9	0.85	0.75	3	41.8	42.5
28	–	**40**	38.7	38.4	1.3	1.15	–	–	1.2	0.95	0.25	**NR 1040**	2.05	1.9	0.85	0.75	3	42.8	43.5
30	**25**	**42**	40.7	40.4	1.3	1.15	1.7	1.55	1.2	0.95	0.25	**NR 1042**	2.05	1.9	0.85	0.75	3	44.8	45.5
32	–	**44**	42.7	42.4	1.3	1.15	–	–	1.2	0.95	0.25	**NR 1044**	2.05	1.9	0.85	0.75	4	46.8	47.5
–	**28**	**45**	43.7	43.4	–	–	1.7	1.55	1.2	0.95	0.25	**NR 1045**	2.05	1.9	0.85	0.75	4	47.8	48.5
35	**30**	**47**	45.7	45.4	1.3	1.15	1.7	1.55	1.2	0.95	0.25	**NR 1047**	2.05	1.9	0.85	0.75	4	49.8	50.5
40	**32**	**52**	50.7	50.4	1.3	1.15	1.7	1.55	1.2	0.95	0.25	**NR 1052**	2.05	1.9	0.85	0.75	4	54.8	55.5
–	**35**	**55**	53.7	53.4	–	–	1.7	1.55	1.2	0.95	0.25	**NR 1055**	2.05	1.9	0.85	0.75	4	57.8	58.5
45	–	**58**	56.7	56.4	1.3	1.15	–	–	1.2	0.95	0.25	**NR 1058**	2.05	1.9	0.85	0.75	4	60.8	61.5
–	**40**	**62**	60.7	60.3	–	–	1.7	1.55	1.2	0.95	0.25	**NR 1062**	2.05	1.9	0.85	0.75	4	64.8	65.5
50	–	**65**	63.7	63.3	1.3	1.15	–	–	1.2	0.95	0.25	**NR 1065**	2.05	1.9	0.85	0.75	4	67.8	68.5
–	**45**	**68**	66.7	66.3	–	–	1.7	1.55	1.2	0.95	0.25	**NR 1068**	2.05	1.9	0.85	0.75	5	70.8	72
55	**50**	**72**	70.7	70.3	1.7	1.55	1.7	1.55	1.2	0.95	0.25	**NR 1072**	2.05	1.9	0.85	0.75	5	74.8	76
60	–	**78**	76.2	75.8	1.7	1.55	–	–	1.6	1.3	0.4	**NR 1078**	3.25	3.1	1.12	1.02	5	82.7	84
–	**55**	**80**	77.9	77.5	–	–	2.1	1.9	1.6	1.3	0.4	**NR 1080**	3.25	3.1	1.12	1.02	5	84.4	86
65	**60**	**85**	82.9	82.5	1.7	1.55	2.1	1.9	1.6	1.3	0.4	**NR 1085**	3.25	3.1	1.12	1.02	5	89.4	91
70	**65**	**90**	87.9	87.5	1.7	1.55	2.1	1.9	1.6	1.3	0.4	**NR 1090**	3.25	3.1	1.12	1.02	5	94.4	96
75	–	**95**	92.9	92.5	1.7	1.55	–	–	1.6	1.3	0.4	**NR 1095**	3.25	3.1	1.12	1.02	5	99.4	101
80	**70**	**100**	97.9	97.5	1.7	1.55	2.5	2.3	1.6	1.3	0.4	**NR 1100**	3.25	3.1	1.12	1.02	5	104.4	106
–	**75**	**105**	102.6	102.1	–	–	2.5	2.3	1.6	1.3	0.4	**NR 1105**	4.04	3.89	1.12	1.02	5	110.7	112
85	**80**	**110**	107.6	107.1	2.1	1.9	2.5	2.3	1.6	1.3	0.4	**NR 1110**	4.04	3.89	1.12	1.02	5	115.7	117
90	–	**115**	112.6	112.1	2.1	1.9	–	–	1.6	1.3	0.4	**NR 1115**	4.04	3.89	1.12	1.02	5	120.7	122
95	**85**	**120**	117.6	117.1	2.1	1.9	3.3	3.1	1.6	1.3	0.4	**NR 1120**	4.04	3.89	1.12	1.02	7	125.7	127
100	**90**	**125**	122.6	122.1	2.1	1.9	3.3	3.1	1.6	1.3	0.4	**NR 1125**	4.04	3.89	1.12	1.02	7	130.7	132
105	**95**	**130**	127.6	127.1	2.1	1.9	3.3	3.1	1.6	1.3	0.4	**NR 1130**	4.04	3.89	1.12	1.02	7	135.7	137
110	**100**	**140**	137.6	137.1	2.5	2.3	3.3	3.1	2.2	1.9	0.6	**NR 1140**	4.04	3.89	1.7	1.6	7	145.7	147
–	**105**	**145**	142.6	142.1	–	–	3.3	3.1	2.2	1.9	0.6	**NR 1145**	4.04	3.89	1.7	1.6	7	150.7	152
120	**110**	**150**	147.6	147.1	2.5	2.3	3.3	3.1	2.2	1.9	0.6	**NR 1150**	4.04	3.89	1.7	1.6	7	155.7	157
130	**120**	**165**	161.8	161.3	3.3	3.1	3.7	3.5	2.2	1.9	0.6	**NR 1165**	4.85	4.7	1.7	1.6	7	171.5	173
140	–	**175**	171.8	171.3	3.3	3.1	–	–	2.2	1.9	0.6	**NR 1175**	4.85	4.7	1.7	1.6	10	181.5	183
–	**130**	**180**	176.8	176.3	–	–	3.7	3.5	2.2	1.9	0.6	**NR 1180**	4.85	4.7	1.7	1.6	10	186.5	188
150	**140**	**190**	186.8	186.3	3.3	3.1	3.7	3.5	2.2	1.9	0.6	**NR 1190**	4.85	4.7	1.7	1.6	10	196.5	198
160	–	**200**	196.8	196.3	3.3	3.1	–	–	2.2	1.9	0.6	**NR 1200**	4.85	4.7	1.7	1.6	10	206.5	208







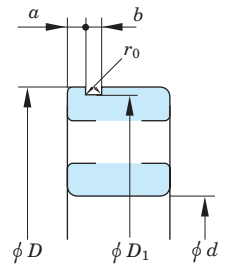
[Remark] Minimum chamfer dimension tolerances on snap ring groove-side outer ring are as follows :
Bearings belonging to dimension series 18 : 0.3 mm for those with nominal outside diameter not more than 78 mm ; 0.5 mm for those with nominal diameter over 78 mm.
Bearings belonging to dimension series 19 : 0.3 mm for those with nominal outside diameter not more than 47 mm ; 0.5 mm for those with nominal diameter over 47 mm.

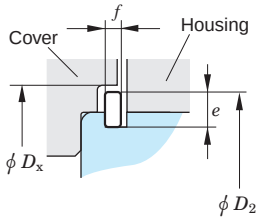
Supplementary table 5 (2) Dimension of snap ring grooves and locationg snap rings – diameter series 0, 2, 3, 4 –

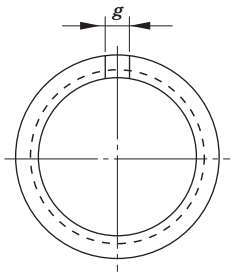
Unit : mm

Applicable bearing: Bore dia. d – Diameter series 0	2	3	4	Outside dia. D	Snap ring groove: Snap ring groove dia. D_1 max.	min.	Position of snap ring groove a – Diameter series 0 max.	min.	2, 3, 4 max.	min.	Snap ring groove width b max.	min.	Fillet radius of snap ring groove r_0 max.
–	10	9	8	30	28.17	27.91	–	–	2.06	1.9	1.65	1.35	0.4
15	12	–	9	32	30.15	29.9	2.06	1.9	2.06	1.9	1.65	1.35	0.4
17	15	10	–	35	33.17	32.92	2.06	1.9	2.06	1.9	1.65	1.35	0.4
–	–	12	10	37	34.77	34.52	–	–	2.06	1.9	1.65	1.35	0.4
–	17	–	–	40	38.1	37.85	–	–	2.06	1.9	1.65	1.35	0.4
20	–	15	12	42	39.75	39.5	2.06	1.9	2.06	1.9	1.65	1.35	0.4
22	–	–	–	44	41.75	41.5	2.06	1.9	–	–	1.65	1.35	0.4
25	20	17	–	47	44.6	44.35	2.06	1.9	2.46	2.31	1.65	1.35	0.4
–	22	–	–	50	47.6	47.35	–	–	2.46	2.31	1.65	1.35	0.4
28	25	20	15	52	49.73	49.48	2.06	1.9	2.46	2.31	1.65	1.35	0.4
30	–	–	–	55	52.6	52.35	2.08	1.88	–	–	1.65	1.35	0.4
–	–	22	–	56	53.6	53.35	–	–	2.46	2.31	1.65	1.35	0.4
32	28	–	–	58	55.6	55.35	2.08	1.88	2.46	2.31	1.65	1.35	0.4
35	30	25	17	62	59.61	59.11	2.08	1.88	3.28	3.07	2.2	1.9	0.6
–	32	–	–	65	62.6	62.1	–	–	3.28	3.07	2.2	1.9	0.6
40	–	28	–	68	64.82	64.31	2.49	2.29	3.28	3.07	2.2	1.9	0.6
–	35	30	20	72	68.81	68.3	–	–	3.28	3.07	2.2	1.9	0.6
45	–	32	–	75	71.83	71.32	2.49	2.29	3.28	3.07	2.2	1.9	0.6
50	40	35	25	80	76.81	76.3	2.49	2.29	3.28	3.07	2.2	1.9	0.6
–	45	–	–	85	81.81	81.31	–	–	3.28	3.07	2.2	1.9	0.6
55	50	40	30	90	86.79	86.28	2.87	2.67	3.28	3.07	3	2.7	0.6
60	–	–	–	95	91.82	91.31	2.87	2.67	–	–	3	2.7	0.6
65	55	45	35	100	96.8	96.29	2.87	2.67	3.28	3.07	3	2.7	0.6
70	60	50	40	110	106.81	106.3	2.87	2.67	3.28	3.07	3	2.7	0.6
75	–	–	–	115	111.81	111.3	2.87	2.67	–	–	3	2.7	0.6
–	65	55	45	120	115.21	114.71	–	–	4.06	3.86	3.4	3.1	0.6
80	70	–	–	125	120.22	119.71	2.87	2.67	4.06	3.86	3.4	3.1	0.6
85	75	60	50	130	125.22	124.71	2.87	2.67	4.06	3.86	3.4	3.1	0.6
90	80	65	55	140	135.23	134.72	3.71	3.45	4.9	4.65	3.4	3.1	0.6
95	–	–	–	145	140.23	139.73	3.71	3.45	–	–	3.4	3.1	0.6
100	85	70	60	150	145.24	144.73	3.71	3.45	4.9	4.65	3.4	3.1	0.6
105	90	75	65	160	155.22	154.71	3.71	3.45	4.9	4.65	3.4	3.1	0.6
110	95	80	–	170	163.65	163.14	3.71	3.45	5.69	5.44	3.8	3.5	0.6
120	100	85	70	180	173.66	173.15	3.71	3.45	5.69	5.44	3.8	3.5	0.6
–	105	90	75	190	183.64	183.13	–	–	5.69	5.44	3.8	3.5	0.6
130	110	95	80	200	193.65	193.14	5.69	5.44	5.69	5.44	3.8	3.5	0.6

Locating snap ring: No.	Section height e max.	min.	Thickness f max.	min.	Mounted state: Distance between cut ends g max.	Locating snap ring O.D. D_2 max.	Housing: Shoulder bore dia. D_x max.
NR 30	3.25	3.1	1.12	1.02	3	34.7	35.5
NR 32	3.25	3.1	1.12	1.02	3	36.7	37.5
NR 35	3.25	3.1	1.12	1.02	3	39.7	40.5
NR 37	3.25	3.1	1.12	1.02	3	41.3	42
NR 40	3.25	3.1	1.12	1.02	3	44.6	45.5
NR 42	3.25	3.1	1.12	1.02	3	46.3	47
NR 44	3.25	3.1	1.12	1.02	3	48.3	49
NR 47	4.04	3.89	1.12	1.02	4	52.7	53.5
NR 50	4.04	3.89	1.12	1.02	4	55.7	56.5
NR 52	4.04	3.89	1.12	1.02	4	57.9	58.5
NR 55	4.04	3.89	1.12	1.02	4	60.7	61.5
NR 56	4.04	3.89	1.12	1.02	4	61.7	62.5
NR 58	4.04	3.89	1.12	1.02	4	63.7	64.5
NR 62	4.04	3.89	1.7	1.6	4	67.7	68.5
NR 65	4.04	3.89	1.7	1.6	4	70.7	71.5
NR 68	4.85	4.7	1.7	1.6	5	74.6	76
NR 72	4.85	4.7	1.7	1.6	5	78.6	80
NR 75	4.85	4.7	1.7	1.6	5	81.6	83
NR 80	4.85	4.7	1.7	1.6	5	86.6	88
NR 85	4.85	4.7	1.7	1.6	5	91.6	93
NR 90	4.85	4.7	2.46	2.36	5	96.5	98
NR 95	4.85	4.7	2.46	2.36	5	101.6	103
NR100	4.85	4.7	2.46	2.36	5	106.5	108
NR110	4.85	4.7	2.46	2.36	5	116.6	118
NR115	4.85	4.7	2.46	2.36	5	121.6	123
NR120	7.21	7.06	2.82	2.72	7	129.7	131.5
NR125	7.21	7.06	2.82	2.72	7	134.7	136.5
NR130	7.21	7.06	2.82	2.72	7	139.7	141.5
NR140	7.21	7.06	2.82	2.72	7	149.7	152
NR145	7.21	7.06	2.82	2.72	7	154.7	157
NR150	7.21	7.06	2.82	2.72	7	159.7	162
NR160	7.21	7.06	2.82	2.72	7	169.7	172
NR170	9.6	9.45	3.1	3	10	182.9	185
NR180	9.6	9.45	3.1	3	10	192.9	195
NR190	9.6	9.45	3.1	3	10	202.9	205
NR200	9.6	9.45	3.1	3	10	212.9	215







[Remark] 1. Snap ring groove dimension does not apply to bearings of dimension series 00, 82 and 83.
2. The minimum permissible chamfer dimension for snap ring groove-side outer ring is 0.5 mm, except 0.3 mm for bearings belonging to diameter series 0 with nominal outside diameter not more than 35 mm.

Supplementary table 6 Shaft tolerances (deviation from nominal dimensions)

Unit : μm

Nominal shaft dia. (mm) over	up to	Deviation classes of shaft dia. d 6	e 6	f 6	g 5	g 6	h 5	h 6	h 7	h 8	h 9	h 10	js 5	js 6	js 7	j 5	j 6	k 5	k 6	k 7	m 5	m 6	m 7	n 5	n 6	p 6	r 6	r 7	Nominal shaft dia. (mm) over	up to	Δ_{dmp} [1] of bearing (class 0)
3	6	− 30 − 38	− 20 − 28	− 10 − 18	− 4 − 9	− 4 −12	− 0 − 5	− 0 − 8	0 −12	0 − 18	0 − 30	0 − 48	± 2.5	± 4	± 6	+ 3 − 2	+ 6 − 2	+ 6 + 1	+ 9 + 1	+13 + 1	+ 9 + 4	+12 + 4	+ 16 + 4	+13 + 8	+ 16 + 8	+ 20 + 12	+ 23 + 15	+ 27 + 15	3	6	0 − 8
6	10	− 40 − 49	− 25 − 34	− 13 − 22	− 5 −11	− 5 −14	− 0 − 6	− 0 − 9	0 −15	0 − 22	0 − 36	0 − 58	± 3	± 4.5	± 7.5	+ 4 − 2	+ 7 − 2	+ 7 + 1	+10 + 1	+16 + 1	+12 + 6	+15 + 6	+ 21 + 6	+16 +10	+ 19 + 10	+ 24 + 15	+ 28 + 19	+ 34 + 19	6	10	0 − 8
10	18	− 50 − 61	− 32 − 43	− 16 − 27	− 6 −14	− 6 −17	− 0 − 8	0 −11	0 −18	0 − 27	0 − 43	0 − 70	± 4	± 5.5	± 9	+ 5 − 3	+ 8 − 3	+ 9 + 1	+12 + 1	+19 + 1	+15 + 7	+18 + 7	+ 25 + 7	+20 +12	+ 23 + 12	+ 29 + 18	+ 34 + 23	+ 41 + 23	10	18	0 − 8
18	30	− 65 − 78	− 40 − 53	− 20 − 33	− 7 −16	− 7 −20	− 0 − 9	0 −13	0 −21	0 − 33	0 − 52	0 − 84	± 4.5	± 6.5	±10.5	+ 5 − 4	+ 9 − 4	+11 + 2	+15 + 2	+23 + 2	+17 + 8	+21 + 8	+ 29 + 8	+24 +15	+ 28 + 15	+ 35 + 22	+ 41 + 28	+ 49 + 28	18	30	0 − 10
30	50	− 80 − 96	− 50 − 66	− 25 − 41	− 9 −20	− 9 −25	0 −11	0 −16	0 −25	0 − 39	0 − 62	0 −100	± 5.5	± 8	±12.5	+ 6 − 5	+11 − 5	+13 + 2	+18 + 2	+27 + 2	+20 + 9	+25 + 9	+ 34 + 9	+28 +17	+ 33 + 17	+ 42 + 26	+ 50 + 34	+ 59 + 34	30	50	0 − 12
50	80	−100 −119	− 60 − 79	− 30 − 49	−10 −23	−10 −29	0 −13	0 −19	0 −30	0 − 46	0 − 74	0 −120	± 6.5	± 9.5	±15	+ 6 − 7	+12 − 7	+15 + 2	+21 + 2	+32 + 2	+24 +11	+30 +11	+ 41 + 11	+33 +20	+ 39 + 20	+ 51 + 32	+ 60 + 41 + 62 + 43	+ 71 + 41 + 73 + 43	50 65	65 80	0 − 15
80	120	−120 −142	− 72 − 94	− 36 − 58	−12 −27	−12 −34	0 −15	0 −22	0 −35	0 − 54	0 − 87	0 −140	± 7.5	±11	±17.5	+ 6 − 9	+13 − 9	+18 + 3	+25 + 3	+38 + 3	+28 +13	+35 +13	+ 48 + 13	+38 +23	+ 45 + 23	+ 59 + 37	+ 73 + 51 + 76 + 54	+ 86 + 51 + 89 + 54	80 100	100 120	0 − 20
120	180	−145 −170	− 85 −110	− 43 − 68	−14 −32	−14 −39	0 −18	0 −25	0 −40	0 − 63	0 −100	0 −160	± 9	±12.5	±20	+ 7 −11	+14 −11	+21 + 3	+28 + 3	+43 + 3	+33 +15	+40 +15	+ 55 + 15	+45 +27	+ 52 + 27	+ 68 + 43	+ 88 + 63 + 90 + 65 + 93 + 68	+103 + 63 +105 + 65 +108 + 68	120 140 160	140 160 180	0 − 25
180	250	−170 −199	−100 −129	− 50 − 79	−15 −35	−15 −44	0 −20	0 −29	0 −46	0 − 72	0 −115	0 −185	±10	±14.5	±23	+ 7 −13	+16 −13	+24 + 4	+33 + 4	+50 + 4	+37 +17	+46 +17	+ 63 + 17	+51 +31	+ 60 + 31	+ 79 + 50	+106 + 77 +109 + 80 +113 + 84	+123 + 77 +126 + 80 +130 + 84	180 200 225	200 225 250	0 − 30
250	315	−190 −222	−110 −142	− 56 − 88	−17 −40	−17 −49	0 −23	0 −32	0 −52	0 − 81	0 −130	0 −210	±11.5	±16	±26	+ 7 −16	±16	+27 + 4	+36 + 4	+56 + 4	+43 +20	+52 +20	+ 72 + 20	+57 +34	+ 66 + 34	+ 88 + 56	+126 + 94 +130 + 98	+146 + 94 +150 + 98	250 280	280 315	0 − 35
315	400	−210 −246	−125 −161	− 62 − 98	−18 −43	−18 −54	0 −25	0 −36	0 −57	0 − 89	0 −140	0 −230	±12.5	±18	±28.5	+ 7 −18	±18	+29 + 4	+40 + 4	+61 + 4	+46 +21	+57 +21	+ 78 + 21	+62 +37	+ 73 + 37	+ 98 + 62	+144 +108 +150 +114	+165 +108 +171 +114	315 355	355 400	0 − 40
400	500	−230 −270	−135 −175	− 68 −108	−20 −47	−20 −60	0 −27	0 −40	0 −63	0 − 97	0 −155	0 −250	±13.5	±20	±31.5	+ 7 −20	±20	+32 + 5	+45 + 5	+68 + 5	+50 +23	+63 +23	+ 86 + 23	+67 +40	+ 80 + 40	+108 + 68	+166 +126 +172 +132	+189 +126 +195 +132	400 450	450 500	0 − 45
500	630	−260 −304	−145 −189	− 76 −120	−22 −54	−22 −66	0 −32	0 −44	0 −70	0 −110	0 −175	0 −280	±16	±22	±35	–	–	+32 0	+44 0	+70 0	+58 +26	+70 +26	+ 96 + 26	+76 +44	+ 88 + 44	+122 + 78	+194 +150 +199 +155	+220 +150 +225 +155	500 560	560 630	0 − 50
630	800	−290 −340	−160 −210	− 80 −130	−24 −60	−24 −74	0 −36	0 −50	0 −80	0 −125	0 −200	0 −320	±18	±25	±40	–	–	+36 0	+50 0	+80 0	+66 +30	+80 +30	+110 + 30	+86 +50	+100 + 50	+138 + 88	+225 +175 +235 +185	+255 +175 +265 +185	630 710	710 800	0 − 75
800	1000	−320 −376	−170 −226	− 86 −142	−26 −66	−26 −82	0 −40	0 −56	0 −90	0 −140	0 −230	0 −360	±20	±28	±45	–	–	+40 0	+56 0	+90 0	+74 +34	+90 +34	+124 + 34	+96 +56	+112 + 56	+156 +100	+266 +210 +276 +220	+300 +210 +310 +220	800 900	900 1000	0 −100

[Note] 1) Δ_{dmp} : single plane mean bore diameter deviation

Supplementary table 7 Housing bore tolerances (deviation from nominal dimensions)

Unit : μm

Nominal Bore dia. (mm) over	up to	Deviation classes of housing bore E 6	F 6	F 7	G 6	G 7	H 6	H 7	H 8	H 9	H 10	JS 5	JS 6	JS 7	J 6	J 7	K 5	K 6	K 7	M 5	M 6	M 7	N 5	N 6	N 7	P 6	P 7	R 7	Nominal Bore dia. (mm) over	up to	(Refer.) Δ_{Dmp}[1] of bearing (class 0)
10	18	+ 43 + 32	+ 27 + 16	+ 34 + 16	+17 + 6	+ 24 + 6	+11 0	+ 18 0	+ 27 0	+ 43 0	+ 70 0	± 4	± 5.5	± 9	+ 6 – 5	+10 – 8	+ 2 – 6	+ 2 – 9	+ 6 – 12	– 4 –12	– 4 – 15	0 – 18	– 9 – 17	– 9 – 20	– 5 – 23	– 15 – 26	– 11 – 29	– 16 – 34	10	18	0 – 8
18	30	+ 53 + 40	+ 33 + 20	+ 41 + 20	+20 + 7	+ 28 + 7	+13 0	+ 21 0	+ 33 0	+ 52 0	+ 84 0	± 4.5	± 6.5	±10.5	+ 8 – 5	+12 – 9	+ 1 – 8	+ 2 –11	+ 6 – 15	– 5 –14	– 4 – 17	0 – 21	– 12 – 21	– 11 – 24	– 7 – 28	– 18 – 31	– 14 – 35	– 20 – 41	18	30	0 – 9
30	50	+ 66 + 50	+ 41 + 25	+ 50 + 25	+25 + 9	+ 34 + 9	+16 0	+ 25 0	+ 39 0	+ 62 0	+100 0	± 5.5	± 8	±12.5	+10 – 6	+14 –11	+ 2 – 9	+ 3 –13	+ 7 – 18	– 5 –16	– 4 – 20	0 – 25	– 13 – 24	– 12 – 28	– 8 – 33	– 21 – 37	– 17 – 42	– 25 – 50	30	50	0 – 11
50	80	+ 79 + 60	+ 49 + 30	+ 60 + 30	+29 +10	+ 40 + 10	+19 0	+ 30 0	+ 46 0	+ 74 0	+120 0	± 6.5	± 9.5	±15	+13 – 6	+18 –12	+ 3 –10	+ 4 –15	+ 9 – 21	– 6 –19	– 5 – 24	0 – 30	– 15 – 28	– 14 – 33	– 9 – 39	– 26 – 45	– 21 – 51	– 30 – 60	50	65	0 – 13
																												– 32 – 62	65	80	
80	120	+ 94 + 72	+ 58 + 36	+ 71 + 36	+34 +12	+ 47 + 12	+22 0	+ 35 0	+ 54 0	+ 87 0	+140 0	± 7.5	±11	±17.5	+16 – 6	+22 –13	+ 2 –13	+ 4 –18	+ 10 – 25	– 8 –23	– 6 – 28	0 – 35	– 18 – 33	– 16 – 38	– 10 – 45	– 30 – 52	– 24 – 59	– 38 – 73	80	100	0 – 15
																												– 41 – 76	100	120	
120	180	+110 + 85	+ 68 + 43	+ 83 + 43	+39 +14	+ 54 + 14	+25 0	+ 40 0	+ 63 0	+100 0	+160 0	± 9	±12.5	±20	+18 – 7	+26 –14	+ 3 –15	+ 4 –21	+ 12 – 28	– 9 –27	– 8 – 33	0 – 40	– 21 – 39	– 20 – 45	– 12 – 52	– 36 – 61	– 28 – 68	– 48 – 88	120	140	(up to 150) 0 – 18
																												– 50 – 90	140	160	(over to 150)
																												– 53 – 93	160	180	0 – 25
180	250	+129 +100	+ 79 + 50	+ 96 + 50	+44 +15	+ 61 + 15	+29 0	+ 46 0	+ 72 0	+115 0	+185 0	±10	±14.5	±23	+22 – 7	+30 –16	+ 2 –18	+ 5 –24	+ 13 – 33	–11 –31	– 8 – 37	0 – 46	– 25 – 45	– 22 – 51	– 14 – 60	– 41 – 70	– 33 – 79	– 60 –106	180	200	0 – 30
																												– 63 –109	200	225	
																												– 67 –113	225	250	
250	315	+142 +110	+ 88 + 56	+108 + 56	+49 +17	+ 69 + 17	+32 0	+ 52 0	+ 81 0	+130 0	+210 0	±11.5	±16	±26	+25 – 7	+36 –16	+ 3 –20	+ 5 –27	+ 16 – 36	–13 –36	– 9 – 41	0 – 52	– 27 – 50	– 25 – 57	– 14 – 66	– 47 – 79	– 36 – 88	– 74 –126	250	280	0 – 35
																												– 78 –130	280	315	
315	400	+161 +125	+ 98 + 62	+119 + 62	+54 +18	+ 75 + 18	+36 0	+ 57 0	+ 89 0	+140 0	+230 0	±12.5	±18	±28.5	+29 – 7	+39 –18	+ 3 –22	+ 7 –29	+ 17 – 40	–14 –39	– 10 – 46	0 – 57	– 30 – 55	– 26 – 62	– 16 – 73	– 51 – 87	– 41 – 98	– 87 –144	315	355	0 – 40
																												– 93 –150	355	400	
400	500	+175 +135	+108 + 68	+131 + 68	+60 +20	+ 83 + 20	+40 0	+ 63 0	+ 97 0	+155 0	+250 0	±13.5	±20	±31.5	+33 – 7	+43 –20	+ 2 –25	+ 8 –32	+ 18 – 45	–16 –43	– 10 – 50	0 – 63	– 33 – 60	– 27 – 67	– 17 – 80	– 55 – 95	– 45 –108	–103 –166	400	450	0 – 45
																												–109 –172	450	500	
500	630	+189 +145	+120 + 76	+146 + 76	+66 +22	+ 92 + 22	+44 0	+ 70 0	+110 0	+175 0	+280 0	±16	±22	±35	–	–	0 –32	0 –44	0 – 70	–26 –58	– 26 – 70	– 26 – 96	– 44 – 76	– 44 – 88	– 44 –114	– 78 –122	– 78 –148	–150 –220	500	560	0 – 50
																												–155 –225	560	630	
630	800	+210 +160	+130 + 80	+160 + 80	+74 +24	+104 + 24	+50 0	+ 80 0	+125 0	+200 0	+320 0	±18	±25	±40	–	–	0 –36	0 –50	0 – 80	–30 –66	– 30 – 80	– 30 –110	– 50 – 86	– 50 –100	– 50 –130	– 88 –138	– 88 –168	–175 –255	630	710	0 – 75
																												–185 –265	710	800	
800	1000	+226 +170	+142 + 86	+176 + 86	+82 +26	+116 + 26	+56 0	+ 90 0	+140 0	+230 0	+360 0	±20	±28	±45	–	–	0 –40	0 –56	0 – 90	–34 –74	– 34 – 90	– 34 –124	– 56 – 96	– 56 –112	– 56 –146	–100 –156	–100 –190	–210 –300	800	900	0 –100
																												–220 –310	900	1000	
1000	1250	+261 +195	+164 + 98	+203 + 98	+94 +28	+133 + 28	+66 0	+105 0	+165 0	+260 0	+420 0	±23.5	±33	±52.5	–	–	0 –47	0 –66	0 –105	–40 –87	– 40 –106	– 40 –145	– 66 –113	– 66 –132	– 66 –171	–120 –186	–120 –225	–250 –355	1000	1120	0 –125
																												–260 –365	1120	1250	

[Note] 1) Δ_{Dmp} : single plane mean outside diameter deviation

Supplementary table 8 Numerical values for standard tolerance grades IT (ISO 286-1 : 1988)

Basic size (mm)		Standard tolerance grades (IT)																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14[1]	15[1]	16[1]	17[1]	18[1]
over	up to	Tolerances (μm)											Tolerances (mm)						
–	3	0.8	1.2	2	3	4	6	10	14	25	40	60	0.10	0.14	0.26	0.40	0.60	1.00	1.40
3	6	1	1.5	2.5	4	5	8	12	18	30	48	75	0.12	0.18	0.30	0.48	0.75	1.20	1.80
6	10	1	1.5	2.5	4	6	9	15	22	36	58	90	0.15	0.22	0.36	0.58	0.90	1.50	2.20
10	18	1.2	2	3	5	8	11	18	27	43	70	110	0.18	0.27	0.43	0.70	1.10	1.80	2.70
18	30	1.5	2.5	4	6	9	13	21	33	52	84	130	0.21	0.33	0.52	0.84	1.30	2.10	3.30
30	50	1.5	2.5	4	7	11	16	25	39	62	100	160	0.25	0.39	0.62	1.00	1.60	2.50	3.90
50	80	2	3	5	8	13	19	30	46	74	120	190	0.30	0.46	0.74	1.20	1.90	3.00	4.60
80	120	2.5	4	6	10	15	22	35	54	87	140	220	0.35	0.54	0.87	1.40	2.20	3.50	5.40
120	180	3.5	5	8	12	18	25	40	63	100	160	250	0.40	0.63	1.00	1.60	2.50	4.00	6.30
180	250	4.5	7	10	14	20	29	46	72	115	185	290	0.46	0.72	1.15	1.85	2.90	4.60	7.20
250	315	6	8	12	16	23	32	52	81	130	210	320	0.52	0.81	1.30	2.10	3.20	5.20	8.10
315	400	7	9	13	18	25	36	57	89	140	230	360	0.57	0.89	1.40	2.30	3.60	5.70	8.90
400	500	8	10	15	20	27	40	63	97	155	250	400	0.63	0.97	1.55	2.50	4.00	6.30	9.70
500	630	–	–	–	–	–	44	70	110	175	280	440	0.70	1.10	1.75	2.80	4.40	7.00	11.00
630	800	–	–	–	–	–	50	80	125	200	320	500	0.80	1.25	2.00	3.20	5.00	8.00	12.50
800	1000	–	–	–	–	–	56	90	140	230	360	560	0.90	1.40	2.30	3.60	5.60	9.00	14.00
1000	1250	–	–	–	–	–	66	105	165	260	420	660	1.05	1.65	2.60	4.20	6.60	10.50	16.50
1250	1600	–	–	–	–	–	78	125	195	310	500	780	1.25	1.95	3.10	5.00	7.80	12.50	19.50
1600	2000	–	–	–	–	–	92	150	230	370	600	920	1.50	2.30	3.70	6.00	9.20	15.00	23.00
2000	2500	–	–	–	–	–	110	175	280	440	700	1100	1.75	2.80	4.40	7.00	11.00	17.50	28.00
2500	3150	–	–	–	–	–	135	210	330	540	860	1350	2.10	3.30	5.40	8.60	13.50	21.00	33.00

[Note] 1) Standard tolerance grades IT 14 to IT 18 (incl.) shall not be used for basic sizes less than or equal to 1 mm.

Supplementary table 9 Greek alphabet list

Name	Roman type	Italic type		Name	Roman type	Italic type	
	Capital	Capital	Lowercase		Capital	Capital	Lowercase
alpha	A	A	α	nu	N	N	ν
beta	B	B	β	xi	Ξ	Ξ	ξ
gamma	Γ	Γ	γ	omicron	O	O	o
delta	Δ	Δ	δ	pi	Π	Π	π
epsilon	E	E	ε	rho	P	P	ρ
zeta	Z	Z	ζ	sigma	Σ	Σ	σ
eta	H	H	η	tau	T	T	τ
theta	Θ	Θ	θ	upsilon	Y	Y	υ
iota	I	I	ι	phi	Φ	Φ	ϕ
kappa	K	K	κ	chi	X	X	χ
lambda	Λ	Λ	λ	psi	Ψ	Ψ	ψ
mu	M	M	μ	omega	Ω	Ω	ω

Supplementary table 10 Prefixes used with SI units

Factor	Prefix		Factor	Prefix	
	Name	Symbol		Name	Symbol
10^{18}	exa	E	10^{-1}	deci	d
10^{15}	peta	P	10^{-2}	centi	c
10^{12}	tera	T	10^{-3}	milli	m
10^{9}	giga	G	10^{-6}	micro	μ
10^{6}	mega	M	10^{-9}	nano	n
10^{3}	kilo	k	10^{-12}	pico	p
10^{2}	hecto	h	10^{-15}	femto	f
10	deka	da	10^{-18}	atto	a

Supplementary table 11 (1) SI units and conversion factors

Mass	SI units	Other units [1]	Conversion into SI units	Conversion from SI units
Angle	rad [radian(s)]	° [degree(s)] ＊ ′ [minute(s)] ＊ ″ [second(s)] ＊	1° = π /180 rad 1′ = π /10 800 rad 1″ = π /648 000 rad	1 rad = 57.295 78°
Length	m [meter(s)]	Å [Angstrom unit] μ [micron(s)] in [inch(es)] ft [foot(feet)] yd [yard(s)] mile [mile(s)]	1Å = 10^{-10}m = 0.1nm = 100pm 1μ = 1 μm 1in = 25.4 mm 1ft = 12 in = 0.304 8 m 1yd = 3 ft = 0.914 4 m 1mile = 5 280 ft = 1 609.344 m	1m = 10^{10}Å 1m = 39.37 in 1m = 3.280 8 ft 1m = 1.093 6 yd 1km = 0.621 4 mile
Area	m^2	a [are(s)] ha [hectare(s)] acre [acre(s)]	1a = 100 m^2 1ha = 10^4 m^2 1acre = 4 840 yd^2 = 4 046.86 m^2	 1km^2 = 247.1 acre
Volume	m^3	ℓ , L [liter(s)] ＊ cc [cubic centimeters] gal(US) [gallon(s)] floz(US) [fluid ounce(s)] barrel(US) [barrels(US)]	1 ℓ = 1 dm^3 = 10^{-3} m^3 1cc = 1 cm^3 = 10^{-6} m^3 1gal(US)= 231 in^3 = 3.785 41dm^3 1floz(US)= 29.573 5 cm^3 1barrel(US)= 158.987 dm^3	1m^3 = 10^3 ℓ 1m^3 = 10^6 cc 1m^3 = 264.17 gal 1m^3 = 33 814 floz 1m^3 = 6.289 8 barrel
Time	s [second(s)]	min [minute(s)] ＊ h [hour(s)] ＊ d [day(s)] ＊		
Angular velocity	rad / s			
Velocity	m / s	kn [knot(s)] m / h ＊	1kn = 1 852 m / h	1km / h = 0.539 96 kn
Acceleration	m / s^2	G	1G = 9.806 65 m/s^2	1m/s^2 = 0.101 97 G
Frequency	Hz [hertz]	c / s [cycle(s)/second]	1c / s = 1s^{-1} = 1 Hz	
Rotational frequency	s^{-1}	rpm [revolutions per minute] min^{-1} ＊ r / min	1rpm = 1 / 60 s^{-1}	1s^{-1} = 60 rpm
Mass	kg [kilogram(s)]	t [ton(s)] ＊ lb [pound(s)] gr [grain(s)] oz [ounce(s)] ton (UK) [ton(s)(UK)] ton (US) [ton(s)(US)] car [carat(s)]	1t = 10^3 kg 1lb = 0.453 592 37 kg 1gr = 64.798 91 mg 1oz = 1/16 lb = 28.349 5 g 1ton(UK) = 1 016.05 kg 1ton(US) = 907.185 kg 1car = 200 mg	1kg = 2.204 6 lb 1g = 15.432 4 gr 1kg = 35.274 0 oz 1t = 0.984 2 ton(UK) 1t = 1.102 3 ton(US) 1g = 5 car

[Note] ＊ : Unit can be used as an SI unit.
No asterisk : Unit cannot be used.

Supplementary table 11 (2) SI units and conversion factors

Mass	SI units	Other units [1]	Conversion into SI units	Conversion from SI units
Density	kg / m^3			
Linear density	kg / m			
Momentum	kg·m / s			
Moment of momentum, angular momentum	kg·m^2 / s			
Moment of inertia	kg·m^2			
Force	N [newton(s)]	dyn [dyne(s)] kgf [kilogram-force] gf [gram-force] tf [ton-force] lbf [pound-force]	1dyn = 10^{-5} N 1kgf = 9.806 65 N 1gf = 9.806 65×10^{-3} N 1tf = 9.806 65×10^3 N 1lbf = 4.448 22 N	1N = 10^5 dyn 1N = 0.101 97 kgf 1N = 0.224 809 lbf
Moment of force	N·m [Newton meter(s)]	gf·cm kgf·cm kgf·m tf·m lbf·ft	1gf·cm = 9.806 65×10^{-5} N·m 1kgf·cm = 9.806 65×10^{-2} N·m 1kgf·m = 9.806 65 N·m 1tf·m = 9.806 65×10^3 N·m 1lbf·ft = 1.355 82 N·m	 1N·m = 0.101 97 kgf·m 1N·m = 0.737 56 lbf·ft
Pressure, Normal stress	Pa [Pascal(s)] or N / m^2 {1 Pa = 1 N / m^2}	gf / cm^2 kgf / mm^2 kgf / m^2 lbf / in^2 bar [bar(s)] at [engineering air pressure] mH_2O, mAq [meter water column] atm [atmosphere] mHg [meter merury column] Torr [torr]	1gf/cm^2 = 9.806 65×10 Pa 1kgf/mm^2 = 9.806 65×10^6 Pa 1kgf/m^2 = 9.806 65 Pa 1lbf/in^2 = 6 894.76 Pa 1bar = 10^5 Pa 1at = 1kgf/cm^2 = 9.806 65×10^4 Pa 1mH_2O = 9.806 65×10^3 Pa 1atm = 101 325 Pa 1mHg = $\frac{101\,325}{0.76}$ Pa 1Torr = 1 mmHg = 133.322 Pa	 1MPa = 0.101 97 kgf / mm^2 1Pa = 0.101 97 kgf / m^2 1Pa = 0.145×10^{-3} lbf / in^2 1Pa = 10^{-2} mbar 1Pa = 7.500 6×10^{-3} Torr
Viscosity	Pa·s [pascal second]	P [poise] kgf·s / m^2	10^{-2} P = 1 cP = 1 mPa·s 1kgf·s / m^2 = 9.806 65 Pa·s	1Pa·s = 0.101 97 kgf·s / m^2
Kinematic viscosity	m^2 / s	St [stokes]	10^{-2} St = 1 cSt = 1 mm^2 / s	
Surface tension	N / m			

Supplementary table 11 (3) SI units and conversion factors

Mass	SI units	Other units [1]	Conversion into SI units	Conversion from SI units
Work, energy	J [joule(s)] {1 J=1 N·m}	eV [electron volt(s)] *	1eV = (1.602 189 2± 0.000 004 6)×10^{-19} J	
		erg [erg(s)]	1 erg = 10^{-7} J	1 J = 10^{7} erg
		kgf·m	1 kgf·m = 9.806 65 J	1 J = 0.101 97 kgf·m
		lbf·ft	1 lbf·ft = 1.355 82 J	1 J = 0.737 56 lbf·ft
Power	W [watt(s)]	erg / s [ergs per second]	1 erg / s = 10^{-7} W	
		kgf·m / s	1 kgf·m / s = 9.806 65 W	1 W = 0.101 97 kgf·m / s
		PS [French horse-power]	1 PS = 75 kgf·m / s = 735.5 W	1 W = 0.001 36 PS
		HP [horse-power (British)]	1 HP = 550 lbf·ft / s = 745.7 W	1 W = 0.001 34 HP
		lbf·ft / s	1 lbf·ft / s = 1.355 82 W	
Thermo-dynamic temperature	K [kelvin(s)]			
Celsius temperature	℃ [Celsius(s)] {t℃ = (t+273.15)K}	℉ [degree(s) Fahrenheit]	t ℉ = $\frac{5}{9}$ (t–32)℃	t ℃ = ($\frac{9}{5}$t+32)℉
Linear expansion coefficient	K^{-1}	$℃^{-1}$ [per degree]		
Heat	J [joule(s)] {1 J=1 N·m}	erg [erg(s)]	1 erg = 10^{-7} J	1 J = 10^{7} erg
		kgf·m		
		cal_{IT} [I. T. calories]	1 cal_{IT} = 4.186 8 J	1 J = 0.238 85 cal_{IT}
			1 $Mcal_{IT}$ = 1.163 kW·h	1 kW·h = 0.86 × 10^{6} cal_{IT}
Thermal conductivity	W/(m·K)	W/(m·℃)	1 W/(m·℃) = 1 W/(m·K)	
		cal/(s·m·℃)	1 cal/(s·m·℃) = 4.186 05 W/(m·K)	
Coefficient of heat transfer	W/(m^2·K)	W/(m^2·℃)	1 W/(m^2·℃) = 1 W/(m^2·K)	
		cal/(s·m^2·℃)	1 cal/(s·m^2·℃) = 4.186 05 W/(m^2·K)	
Heat capacity	J/K	J/℃	1 J/℃ = 1 J/K	
Massic heat capacity	J/(kg·K)	J/(kg·℃)		

[Note] * : Unit can be used as an SI unit.
No asterisk : Unit cannot be used.

Supplementary table 11 (4) SI units and conversion factors

Mass	SI units	Other units [1]	Conversion into SI units	Conversion from SI units
Electric current	A [ampere(s)]			
Electric charge, quantity of electricity	C [coulomb(s)] {1 C = 1 A·s}	A·h *	1 A·h = 3.6 kC	
Tension, electric potential	V [volt(s)] {1 V = 1 W/A}			
Capacitance	F [farad(s)] {1 F = 1 C/V}			
Magnetic field strength	A/m	Oe [oersted(s)]	1 Oe = $\frac{10^3}{4\pi}$ A/m	1 A/m = 4 π × 10^{-3} Oe
Magnetic flux density	T [tesla(s)] {1T=1N/(A·m) =1Wb/m^2 =1V·s/m^2}	Gs [gauss(es)]	1 Gs = 10^{-4} T	1 T = 10^{4} Gs
		γ [gamma(s)]	1 γ = 10^{-9} T	1 T = 10^{9} γ
Magnetic flux	Wb [weber(s)] {1 Wb = 1 V·s}	Mx [maxwell(s)]	1 Mx = 10^{-8} Wb	1 Wb = 10^{8} Mx
Self inductance	H [henry(-ries)] {1 H = 1 Wb/A}			
Resistance (to direct current)	Ω [ohm(s)] {1 Ω = 1 V/A}			
Conductance (to direct current)	S [siemens] {1 S = 1 A/V}			
Active power	W {1 W=1 J/s =1 A·V}			

Supplementary table 12 Inch/millimeter conversion

Inch		Inches										
		0	1	2	3	4	5	6	7	8	9	10
		mm										
0	0	**0**	**25.4000**	**50.8000**	**76.2000**	**101.6000**	**127.0000**	**152.4000**	**177.8000**	**203.2000**	**228.6000**	**254.0000**
1/64	0.015625	0.3969	25.7969	51.1969	76.5969	101.9969	127.3969	152.7969	178.1969	203.5969	228.9969	254.3969
1/32	0.03125	0.7938	26.1938	51.5938	76.9938	102.3938	127.7938	153.1938	178.5938	203.9938	229.3938	254.7938
3/64	0.046875	1.1906	26.5906	51.9906	77.3906	102.7906	128.1906	153.5906	178.9906	204.3906	229.7906	255.1906
1/16	0.0625	1.5875	26.9875	52.3875	77.7875	103.1875	128.5875	153.9875	179.3875	204.7875	230.1875	255.5875
5/64	0.078125	1.9844	27.3844	52.7844	78.1844	103.5844	128.9844	154.3844	179.7844	205.1844	230.5844	255.9844
3/32	0.09375	2.3812	27.7812	53.1812	78.5812	103.9812	129.3812	154.7812	180.1812	205.5812	230.9812	256.3812
7/64	0.109375	2.7781	28.1781	53.5781	78.9781	104.3781	129.7781	155.1781	180.5781	205.9781	231.3781	256.7781
1/8	0.125	**3.1750**	**28.5750**	**53.9750**	**79.3750**	**104.7750**	**130.1750**	**155.5750**	**180.9750**	**206.3750**	**231.7750**	**257.1750**
9/64	0.140625	3.5719	28.9719	54.3719	79.7719	105.1719	130.5719	155.9719	181.3719	206.7719	232.1719	257.5719
5/32	0.15625	3.9688	29.3688	54.7688	80.1688	105.5688	130.9688	156.3688	181.7688	207.1688	232.5688	257.9688
11/64	0.171875	4.3656	29.7656	55.1656	80.5656	105.9656	131.3656	156.7656	182.1656	207.5656	232.9656	258.3656
3/16	0.1875	4.7625	30.1625	55.5625	80.9625	106.3625	131.7625	157.1625	182.5625	207.9625	233.3625	258.7625
13/64	0.203125	5.1594	30.5594	55.9594	81.3594	106.7594	132.1594	157.5594	182.9594	208.3594	233.7594	259.1594
7/32	0.21875	5.5562	30.9562	56.3562	81.7562	107.1562	132.5562	157.9562	183.3562	208.7562	234.1562	259.5562
15/64	0.234375	5.9531	31.3531	56.7531	82.1531	107.5531	132.9531	158.3531	183.7531	209.1531	234.5531	259.9531
1/4	0.25	**6.3500**	**31.7500**	**57.1500**	**82.5500**	**107.9500**	**133.3500**	**158.7500**	**184.1500**	**209.5500**	**234.9500**	**260.3500**
17/64	0.265625	6.7469	32.1469	57.5469	82.9469	108.3469	133.7469	159.1469	184.5469	209.9469	235.3469	260.7469
9/32	0.28125	7.1438	32.5438	57.9438	83.3438	108.7438	134.1438	159.5438	184.9438	210.3438	235.7438	261.1438
19/64	0.296875	7.5406	32.9406	58.3406	83.7406	109.1406	134.5406	159.9406	185.3406	210.7406	236.1406	261.5406
5/16	0.3125	7.9375	33.3375	58.7375	84.1375	109.5375	134.9375	160.3375	185.7375	211.1375	236.5375	261.9375
21/64	0.328125	8.3344	33.7344	59.1344	84.5344	109.9344	135.3344	160.7344	186.1344	211.5344	236.9344	262.3344
11/32	0.34375	8.7312	34.1312	59.5312	84.9312	110.3312	135.7312	161.1312	186.5312	211.9312	237.3312	262.7312
23/64	0.359375	9.1281	34.5281	59.9281	85.3281	110.7281	136.1281	161.5281	186.9281	212.3281	237.7281	263.1281
3/8	0.375	**9.5250**	**34.9250**	**60.3250**	**85.7250**	**111.1250**	**136.5250**	**161.9250**	**187.3250**	**212.7250**	**238.1250**	**263.5250**
25/64	0.390625	9.9219	35.3219	60.7219	86.1219	111.5219	136.9219	162.3219	187.7219	213.1219	238.5219	263.9219
13/32	0.40625	10.3188	35.7188	61.1188	86.5188	111.9188	137.3188	162.7188	188.1188	213.5188	238.9188	264.3188
27/64	0.421875	10.7156	36.1156	61.5156	86.9156	112.3156	137.7156	163.1156	188.5156	213.9156	239.3156	264.7156
7/16	0.4375	11.1125	36.5125	61.9125	87.3125	112.7125	138.1125	163.5125	188.9125	214.3125	239.7125	265.1125
29/64	0.453125	11.5094	36.9094	62.3094	87.7094	113.1094	138.5094	163.9094	189.3094	214.7094	240.1094	265.5094
15/32	0.46875	11.9062	37.3062	62.7062	88.1062	113.5062	138.9062	164.3062	189.7062	215.1062	240.5062	265.9062
31/64	0.484375	12.3031	37.7031	63.1031	88.5031	113.9031	139.3031	164.7031	190.1031	215.5031	240.9031	266.3031
1/2	0.5	**12.7000**	**38.1000**	**63.5000**	**88.9000**	**114.3000**	**139.7000**	**165.1000**	**190.5000**	**215.9000**	**241.3000**	**266.7000**
33/64	0.515625	13.0969	38.4969	63.8969	89.2969	114.6969	140.0969	165.4969	190.8969	216.2969	241.6969	267.0969
17/32	0.53125	13.4938	38.8938	64.2938	89.6938	115.0938	140.4938	165.8938	191.2938	216.6938	242.0938	267.4938
35/64	0.546875	13.8906	39.2906	64.6906	90.0906	115.4906	140.8906	166.2906	191.6906	217.0906	242.4906	267.8906
9/16	0.5625	14.2875	39.6875	65.0875	90.4875	115.8875	141.2875	166.6875	192.0875	217.4875	242.8875	268.2875
37/64	0.578125	14.6844	40.0844	65.4844	90.8844	116.2844	141.6844	167.0844	192.4844	217.8844	243.2844	268.6844
19/32	0.59375	15.0812	40.4812	65.8812	91.2812	116.6812	142.0812	167.4812	192.8812	218.2812	243.6812	269.0812
39/64	0.609375	15.4781	40.8781	66.2781	91.6781	117.0781	142.4781	167.8781	193.2781	218.6781	244.0781	269.4781
5/8	0.625	**15.8750**	**41.2750**	**66.6750**	**92.0750**	**117.4750**	**142.8750**	**168.2750**	**193.6750**	**219.0750**	**244.4750**	**269.8750**
41/64	0.640625	16.2719	41.6719	67.0719	92.4719	117.8719	143.2719	168.6719	194.0719	219.4719	244.8719	270.2719
21/32	0.65625	16.6688	42.0688	67.4688	92.8688	118.2688	143.6688	169.0688	194.4688	219.8688	245.2688	270.6688
43/64	0.671875	17.0656	42.4656	67.8656	93.2656	118.6656	144.0656	169.4656	194.8656	220.2656	245.6656	271.0656
11/16	0.6875	17.4625	42.8625	68.2625	93.6625	119.0625	144.4625	169.8625	195.2625	220.6625	246.0625	271.4625
45/64	0.703125	17.8594	43.2594	68.6594	94.0594	119.4594	144.8594	170.2594	195.6594	221.0594	246.4594	271.8594
23/32	0.71875	18.2562	43.6562	69.0562	94.4562	119.8562	145.2562	170.6562	196.0562	221.4562	246.8562	272.2562
47/64	0.734375	18.6531	44.0531	69.4531	94.8531	120.2531	145.6531	171.0531	196.4531	221.8531	247.2531	272.6531
3/4	0.75	**19.0500**	**44.4500**	**69.8500**	**95.2500**	**120.6500**	**146.0500**	**171.4500**	**196.8500**	**222.2500**	**247.6500**	**273.0500**
49/64	0.765625	19.4469	44.8469	70.2469	95.6469	121.0469	146.4469	171.8469	197.2469	222.6469	248.0469	273.4469
25/32	0.78125	19.8438	45.2438	70.6438	96.0438	121.4438	146.8438	172.2438	197.6438	223.0438	248.4438	273.8438
51/64	0.796875	20.2406	45.6406	71.0406	96.4406	121.8406	147.2406	172.6406	198.0406	223.4406	248.8406	274.2406
13/16	0.8125	20.6375	46.0375	71.4375	96.8375	122.2375	147.6375	173.0375	198.4375	223.8375	249.2375	274.6375
53/64	0.828125	21.0344	46.4344	71.8344	97.2344	122.6344	148.0344	173.4344	198.8344	224.2344	249.6344	275.0344
27/32	0.84375	21.4312	46.8312	72.2312	97.6312	123.0312	148.4312	173.8312	199.2312	224.6312	250.0312	275.4312
55/64	0.859375	21.8281	47.2281	72.6281	98.0281	123.4281	148.8281	174.2281	199.6281	225.0281	250.4281	275.8281
7/8	0.875	**22.2250**	**47.6250**	**73.0250**	**98.4250**	**123.8250**	**149.2250**	**174.6250**	**200.0250**	**225.4250**	**250.8250**	**276.2250**
57/64	0.890625	22.6219	48.0219	73.4219	98.8219	124.2219	149.6219	175.0219	200.4219	225.8219	251.2219	276.6219
29/32	0.90625	23.0188	48.4188	73.8188	99.2188	124.6188	150.0188	175.4188	200.8188	226.2188	251.6188	277.0188
59/64	0.921875	23.4156	48.8156	74.2156	99.6156	125.0156	150.4156	175.8156	201.2156	226.6156	252.0156	277.4156
15/16	0.9375	23.8125	49.2125	74.6125	100.0125	125.4125	150.8125	176.2125	201.6125	227.0125	252.4125	277.8125
61/64	0.953125	24.2094	49.6094	75.0094	100.4094	125.8094	151.2094	176.6094	202.0094	227.4094	252.8094	278.2094
31/32	0.96875	24.6062	50.0062	75.4062	100.8062	126.2062	151.6062	177.0062	202.4062	227.8062	253.2062	278.6062
63/64	0.984375	25.0031	50.4031	75.8031	101.2031	126.6031	152.0031	177.4031	202.8031	228.2031	253.6031	279.0031

Supplementary table 13 Steel hardness conversion

Rockwell	Vicker's	Brinell		Rockwell		Shore
C-scale 1 471.0 N		Standard ball	Tungsten carbide ball	A-scale 588.4 N	B-scale 980.7 N	
68	940			85.6		97
67	900			85.0		95
66	865			84.5		92
65	832		739	83.9		91
64	800		722	83.4		88
63	772		705	82.8		87
62	746		688	82.3		85
61	720		670	81.8		83
60	697		654	81.2		81
59	674		634	80.7		80
58	653		615	80.1		78
57	633		595	79.6		76
56	613		577	79.0		75
55	595	–	560	78.5		74
54	577	–	543	78.0		72
53	560	–	525	77.4		71
52	544	500	512	76.8		69
51	528	487	496	76.3		68
50	513	475	481	75.9		67
49	498	464	469	75.2		66
48	484	451	455	74.7		64
47	471	442	443	74.1		63
46	458	432	432	73.6		62
45	446	421		73.1		60
44	434	409		72.5		58
43	423	400		72.0		57
42	412	390		71.5		56
41	402	381		70.9		55
40	392	371		70.4	–	54
39	382	362		69.9	–	52
38	372	353		69.4	–	51
37	363	344		68.9	–	50
36	354	336		68.4	(109.0)	49
35	345	327		67.9	(108.5)	48
34	336	319		67.4	(108.0)	47
33	327	311		66.8	(107.5)	46
32	318	301		66.3	(107.0)	44
31	310	294		65.8	(106.0)	43
30	302	286		65.3	(105.5)	42
29	294	279		64.7	(104.5)	41
28	286	271		64.3	(104.0)	41
27	279	264		63.8	(103.0)	40
26	272	258		63.3	(102.5)	38
25	266	253		62.8	(101.5)	38
24	260	247		62.4	(101.0)	37
23	254	243		62.0	100.0	36
22	248	237		61.5	99.0	35
21	243	231		61.0	98.5	35
20	238	226		60.5	97.8	34
(18)	230	219		–	96.7	33
(16)	222	212		–	95.5	32
(14)	213	203		–	93.9	31
(12)	204	194		–	92.3	29
(10)	196	187			90.7	28
(8)	188	179			89.5	27
(6)	180	171			87.1	26
(4)	173	165			85.5	25
(2)	166	158			83.5	24
(0)	160	152			81.7	24

Supplementary table 14 Surface roughness comparison

Arithmetical mean deviation of the profile R_a	Maximum height of the profile R_{max}	Ten-point height of irregularities R_z	Roughness grade numbers N
0.013 a	0.05 S	0.05 Z	–
0.025 a	0.1 S	0.1 Z	N 1
0.05 a	0.2 S	0.2 Z	N 2
0.10 a	0.4 S	0.4 Z	N 3
0.20 a	0.8 S	0.8 Z	N 4
0.40 a	1.6 S	1.6 Z	N 5
0.80 a	3.2 S	3.2 Z	N 6
1.6 a	6.3 S	6.3 Z	N 7
3.2 a	12.5 S	12.5 Z	N 8
6.3 a	25 S	25 Z	N 9
12.5 a	50 S	50 Z	N 10
25 a	100 S	100 Z	N 11
50 a	200 S	200 Z	N 12
100 a	400 S	400 Z	–

[Note] Above table is applicable only when processed surface peaks are of equal height.
Above table is roughly applicable to processed surface for general use.
Numbers are combined only for convenience in deciding surface roughness.

Supplementary table 15 Viscosity conversion

Kinematic viscosity mm^2/s	Saybolt SUS (second)		Redwood R (second)		Engler E (degree)
	100°F	210°F	50°C	100°C	
2	32.6	32.8	30.8	31.2	1.14
3	36.0	36.3	33.3	33.7	1.22
4	39.1	39.4	35.9	36.5	1.31
5	42.3	42.6	38.5	39.1	1.40
6	45.5	45.8	41.1	41.7	1.48
7	48.7	49.0	43.7	44.3	1.56
8	52.0	52.4	46.3	47.0	1.65
9	55.4	55.8	49.1	50.0	1.75
10	58.8	59.2	52.1	52.9	1.84
11	62.3	62.7	55.1	56.0	1.93
12	65.9	66.4	58.2	59.1	2.02
13	69.6	70.1	61.4	62.3	2.12
14	73.4	73.9	64.7	65.6	2.22
15	77.2	77.7	68.0	69.1	2.32
16	81.1	81.7	71.5	72.6	2.43
17	85.1	85.7	75.0	76.1	2.54
18	89.2	89.8	78.6	79.7	2.64
19	93.3	94.0	82.1	83.6	2.76
20	97.5	98.2	85.8	87.4	2.87
21	102	102	89.5	91.3	2.98
22	106	107	93.3	95.1	3.10
23	110	111	97.1	98.9	3.22
24	115	115	101	103	3.34
25	119	120	105	107	3.46
26	123	124	109	111	3.58
27	128	129	112	115	3.70
28	132	133	116	119	3.82
29	137	138	120	123	3.95
30	141	142	124	127	4.07
31	145	146	128	131	4.20
32	150	150	132	135	4.32
33	154	155	136	139	4.45
34	159	160	140	143	4.57

Kinematic viscosity mm^2/s	Saybolt SUS (second)		Redwood R (second)		Engler E (degree)
	100°F	210°F	50°C	100°C	
35	163	164	144	147	4.70
36	168	170	148	151	4.83
37	172	173	153	155	4.96
38	177	178	156	159	5.08
39	181	183	160	164	5.21
40	186	187	164	168	5.34
41	190	192	168	172	5.47
42	195	196	172	176	5.59
43	199	201	176	180	5.72
44	204	205	180	185	5.85
45	208	210	184	189	5.98
46	213	215	188	193	6.11
47	218	219	193	197	6.24
48	222	224	197	202	6.37
49	227	228	201	206	6.50
50	231	233	205	210	6.63
55	254	256	225	231	7.24
60	277	279	245	252	7.90
65	300	302	266	273	8.55
70	323	326	286	294	9.21
75	346	349	306	315	9.89
80	371	373	326	336	10.5
85	394	397	347	357	11.2
90	417	420	367	378	11.8
95	440	443	387	399	12.5
100	464	467	408	420	13.2
120	556	560	490	504	15.8
140	649	653	571	588	18.4
160	742	747	653	672	21.1
180	834	840	734	757	23.7
200	927	933	816	841	26.3
250	1159	1167	1020	1051	32.9
300	1391	1400	1224	1241	39.5

[Remark] $1mm^2/s = 1$ cSt (centi stokes)

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