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Ball & Roller Bearings

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1. Types and Features of Rolling Contact Bearings

1.1 Classification and Types of Rolling Contact Bearings

In general, rolling contact bearings may be classified as radial or thrust bearings according to bearing design or they may be classified as ball or roller bearings according to the type of rolling element.

Radial bearings are mainly designed for supporting a load perpendicular to a shaft axis, whereas thrust bearings accept loads parallel to the shaft axis.

Using the BALL and ROLLER classification ROLLER bearings may be further divided according to the shape of the roller into the sub-classes; Cylindrical roller, Tapered roller, Spherical roller, or Needle roller bearings. BALL bearings can be further divided according to the number of rows into either single-row or double-row (for Thrust Ball bearings, single-direction and double-direction.) BALL Bearing may be still further sub-divided into smaller segments according to the relationship between the bearing rings and rolling elements; the shape of bearing rings; and use of accessories.

Bearings are also classified by specific application, such as wheel bearings for automotive applications.

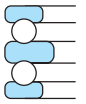
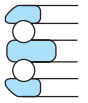
Table 1.1 Classification and Types of Rolling Contact Bearings

■Radial Bearings

Ball Bearings					
Bearing Types			Cross Sections	Bearing Series Symbols	
				JIS	Others
Deep Groove Ball Bearings	Single row	Without filling slot (JIS B 1521)		67 68 69 60 62 63	00B60 RLS RMS 16000
		Without filling slot (for unit; JIS B 1558)		UC UWE UNE UM UK	U B KH
		With filling slot		—	
	Double row	Without filling slot		—	
		With filling slot		—	42 43
Counter-Bored Bearings	Single row	Non-Separable		—	
		Separable (JIS B 1538)		E EN	BM
Angular Contact Ball Bearings	Single row	Non-Separable (JIS B 1522)		79 70 72 73	
		Separable		—	
	Double row	Without filling slot		—	52 53
		With filling slot		—	32 33
	Duplex mounting	DB mounting DF mounting DT mounting		—	
Self-Aligning Ball Bearings	Double row	Outer ring raceway: spherical (JIS B 1523)		12 13 22 23	

Roller Bearings						
Bearing Types					Cross Sections	Bearing Series Symbols
						JIS / Others
Cylindrical Roller Bearings	Single row	Inner ring with a rib	Without loose rib	Outer ring with ribs on both sides (JIS B1533)		NJ2 NJ22 NJ3 NJ23 NJ4
			With loose rib			NH2 NH22 NH3 NH23 NH4
			Inner ring without rib			NU10 NU2 NU22 NU3 NU23 NU4
		Inner ring with ribs on both sides		Outer ring with a rib (JIS B1533)		NF2 NF3 NF4
				Outer ring without rib (JIS B1533)		N2 N3 N4 / N10
	Double row	Inner ring with ribs on both sides		Outer ring without rib (JIS B1533)		NN30
		Inner ring without ribs on both sides		Outer ring with ribs on both sides (JIS B1533)		NNU49
Needle Roller Bearings	Single row	Inner ring without rib		Outer ring with ribs on both sides (JIS B1536)		NA48 NA49
		Without inner ring				RNA48 RNA49
Tapered Roller Bearings	Single row	Separable (JIS B1534)				320 302 322 303 303D 323 / 329 331 330 313 332
	Double row	Separable (Inward)				— / KBD
		Separable (Outward)				— / KBE KDE
Spherical Roller Bearings	Four row	Separable				—
	Single row	Outer ring raceway: spherical				—
	Double row	Outer ring raceway: spherical (JIS B1535)				239 222 230 232 240 213 231 223 241

■Thrust Bearings

Ball Bearings					
Bearing Types			Cross Sections	Bearing Series Symbols	
				JIS	Others
Thrust Ball Bearings	Single direction	Flat back face (JIS B 1532)		511 512 513 514	29 9 39 0
		Flat back face		—	TMN
		Flat back face		—	TG
		Spherical back face		—	532(U) 533(U) 534(U) 7(U) 37(U) 0OT6(U)
	Double direction	Flat back face (JIS B 1532)		522 523 524	19
		Spherical back face		—	542(U) 543(U) 544(U)
Thrust Angular Contact Ball Bearings	Single direction	Non-Separable (DB, DF DT, Others)		—	TAB
	Double direction	Separable		—	TAD

Roller Bearings					
Bearing Types			Cross Sections	Bearing Series Symbols	
				JIS	Others
Thrust Cylindrical Roller Bearings	Single direction	Flat back face		—	TMP
Thrust Tapered Roller Bearings		Flat back face		—	
Spherical Roller Thrust Bearings	Single direction	Outer ring raceway: spherical (JIS B 1539)		292 293 294	

■Bearings for Specific Application

Bearing Types	Cross Sections	Bearing Series Symbols	
		JIS	Others
Journal Bearings for Rolling Stocks		—	FCD JC AP
		—	JT
Sheave Bearings		—	E50 RB48 RC48

Table 1.2 Type and Features of Rolling Contact Bearings

Bearing Type \ Features	Load carrying capacity	High speed rotation	Accuracy	Low noise·Low torque	Permissible aligning of inner ring·outer ring	Rigidity	Aligning action	Separable inner ring·outer ring	Applicable to "fix side"	Applicable to "free side"	Inner ring with tapered bore	Reference pages
Deep Groove Ball Bearings	↑ ↔	●●●●	●●●	●●●	●●	●			○	□	○	139
Angular Contact Ball Bearings	↙	●●●●	●●●	●●●	●	●						165
Double row Angular Contact Ball Bearings	↙↗	●●●	●	●	●	●			○	□		185
Duplex Mounting Angular Contact Ball Bearings	↙↗	●●●	●●●	●●	●	●●			○	□		169
Self-Aligning Ball Bearings	↑ ↔	●●	●	●	●●●	●	○			□	○	191
Cylindrical Roller Bearings	↑	●●●	●●●	●●	●	●		○		○	○	201
Double row Cylindrical Roller Bearings	↑	●●●	●●●	●●	●	●●●		○		○	○	225
Cylindrical Roller Bearings With One Rib Inner Ring	↑ →	●●●	●●	●●	●	●●		○				201
Cylindrical Roller Bearings With L-shaped Thrust Collar	↑ ↔	●●●	●●	●●	●	●●		○	○			201
Needle Roller Bearings	↑	●●●	●	●	●	●●		○		○		–
Tapered Roller Bearings	↑ ←	●●	●●●	●	●	●●		○				229
Double-row Multi-row Tapered Roller Bearings	↑ ↙↗	●●	●	●	●	●●●●		○	○	□		229 295
Spherical Roller Bearings	↑ ↔	●●	●	●	●●●	●●●	○		○	□	○	357
Single Direction Thrust Ball Bearings	←	●	●●	●●	×	●		○				331
Single Direction Thrust Ball Bearings with Spherical back face	←	●	●	●●	●●●	●	○	○				331
Double-direction Thrust Angular Contact Ball Bearings	← →	●●●	●●●	●●	×	●●		○				371
Thrust Cylindrical Roller Bearings	←	●	●	●	×	●●●		○				–
Thrust Tapered Roller Bearings	←	●	●	●	×	●●●		○				–
Spherical Roller Thrust Bearings	↙	●	●	●	●●●	●●●	○	○				357
Reference pages	10 15	9 122	52	10 123	10	10 95	10	10	10	10	10 102	–

Remarks: 1. ↑ and ← → show radial load and axial load respectively ← and ← → mean single direction and double directions respectively.
2. Mark "●" shows possibility for getting the characteristics. More number of "●" means much easier than less number. "X" mean "not applicable".
3. "○" means "applicable". "□" means "can be applicable", but shaft thermal expansion must be absorbed.
4. Thrust Ball/Roller Bearings can sustain axial loads ONLY.
5. This table is for reference only. Bearings should be selected for specific applications.

1.2 Rolling Contact Bearing Designs and Features

Rolling Contact Bearings usually consist of an inner ring, outer ring, and rolling elements (balls or rollers), and a cage which positions the rolling elements at fixed intervals between the ring raceways. (See Figure 1).
Standard materials for inner and outer rings, and for the rolling elements, are high carbon chromium bearing steel or case hardening steel. The steel is heat-treated to an appropriate hardness to attain optimum resistance to rolling fatigue. Bearing surfaces are ground to a very high accuracy using special machine tools.
While each of the various types of rolling contact bearings has special features, the following features are common to most rolling contact bearing types:

- Rolling contact bearings have relatively low starting resistance. There is little difference between the starting and running resistance of rolling contact bearings.
- Dimensions and accuracy are standardized. Ready-made products of high quality are easy to obtain.
- Compared to "sliding" bearings, rolling contact bearings are less prone to wear and help to maintain the accuracy of the machine in which they are used.
- Rolling contact bearings consume small amounts of lubricant and are far less costly to maintain than sliding-type bearings.

To get optimum performance from a selected bearing, it is necessary to understand the design and features of the various bearing types and to then select bearings optimal to individual machine performance.

1.2.1 Deep Groove Ball Bearings

Deep Groove ball bearings are the most popular of all the ball bearing types because they are available in a wide variety of seal, shield and snap-ring arrangements.
The bearing ring grooves are circular arcs made slightly larger than the radius of the ball. The balls make point contact with the raceways (elliptical contact when loaded). The inner ring shoulders are of equal height (as the outer ring shoulders).
Deep Groove ball bearings can sustain radial, axial, or composite loads and because of simple design, this bearing type can be produced to provide both high-running accuracy and high-speed operation.
Deep Groove ball bearings having an outside diameter less than 9 mm are known as Miniature ball bearings. Deep Groove ball bearings having an outside diameter ≧ 9 mm and a bore diameter < 10 mm are known as Extra-small ball bearings.
Standard ball retainers (cages) are made from pressed steel. Machined cages are used in bearings operating at very high speeds or for large diameter bearings.
Deep groove ball bearings with seals or shields

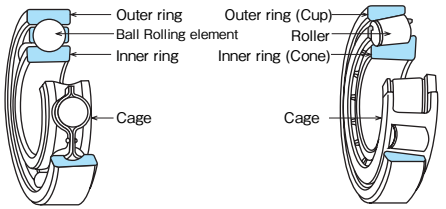


Fig 1. Rolling Contact Bearing Designs

are standardized. They contain proper amount of grease in advance.

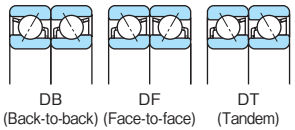
1.2.2 Single-row Angular Contact Ball Bearings

The raceways of both the inner and outer rings of this bearing type are made with a set contact angle. These bearings are non-separable. Since the balls are inserted utilizing counter-bore construction, a larger number of balls can be installed than in the case of Deep-groove ball bearings.

Standard cage materials may be pressed steel, high-strength brass, or synthetic resin. Cage material is dependent on the bearing series and or service condition.

Single-row Angular Contact ball bearings can sustain radial, axial or composite loads, however, any axial load must be in one direction.

This bearing type is generally used in pairs to handle the induced load resulting from the internal axial force generated by the applied radial load. When mounting two single bearings in adjacent positions, NACHI provides these combination parts (pairs) with preadjusted clearance. Paired combination bearings are matched sets. Combination or paired bearings can be arranged BACK-TO-BACK (DB), FACE-TO-FACE (DF), or in TANDEM (DT). DB or DF sets can sustain bidirectional axial loads.



1.2.3 Double-row Angular Contact Ball Bearings

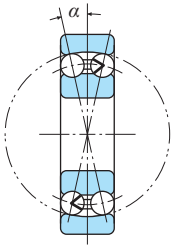
The construction of this ball bearing type is similar to the adjacent, BACK-TO-BACK mounting of two Single-row Angular Contact ball bearings. Because fewer balls can be inserted per row compared to Single-row Angular Contact ball bearings, a Double-row Angular Contact ball bearing will have less load capacity than an equivalent size/series BACK-TO-BACK set of two Single-row Angular Contact ball bearings.

This type bearing can sustain radial, moment and bi-directional axial loads.

1.2.4 Self-aligning Ball Bearings

This type is constructed with the inner ring and ball assembly contained within an outer ring which has a spherical raceway. Due to the construction, this bearing type will tolerate a small angular misalignment from deflection or mounting error.

Self-aligning Ball bearings are suitable for long



shafts where accurate positioning of housing bores is difficult. This type is often used in conjunction with pillow blocks. Cages are made from pressed steel or polyamide resin.

This bearing should only be used in light axial load applications due to the small axial support of the rolling elements by the outer ring raceway.

1.2.5 Cylindrical Roller Bearings

Construction of this roller bearing type is the simplest of all radial roller bearings. This bearing type is often used in high-speed applications.

Because the inner ring, outer ring, and rollers are in line contact, this bearing type has a large radial load capacity. Various Cylindrical roller bearing configurations are:

N,NJ,NF,NU,RNU : integral ribs (flanges)
NH,NP,NUP,NUH : integral and loose ribs
NN,NNU : double-row bearings

(See the Cylindrical roller bearing dimensional data section for description of configuration design).

Configurations having integral flanges or loose ribs on both the inner and outer rings can sustain a small amount of axial load. Since this bearing type supports axial loads as sliding action between the end of the rollers and flange faces, axial loading is limited.

Double-row Cylindrical roller bearings are used for high-speed, high-accuracy applications such as; main spindle support for lathes, milling machines, and machining centers.

Radial clearance of tapered-bore bearings can be adjusted during mounting of the bearing(s) onto the mating shaft.

Standard cages are pressed steel or polyamide resin. Machined cages of high-strength brass are used for bearings of large dimension or for high-speed applications.

1.2.6 Tapered Roller Bearings

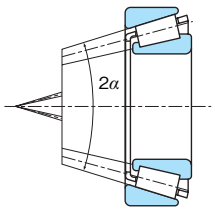
The inner and outer ring raceways and rollers of this type of bearing are made with a taper so that the planes of the surfaces of the raceways and roller axis meet at a point. The rollers are guided by the cone (inner ring) back-face rib.

A single-row Tapered roller bearing can support a combined radial and axial load. If either a radial load or bi-directional axial load is to be carried, a pair of bearings must be used in a “face-to-face” or “back-to-back” position.

Tapered roller bearings are separable into the components: outer ring, inner ring and roller assembly. The non-separable inner ring and roller assembly is called the “cone”, and the outer ring is called the “cup”. Internal clearance is established during mounting by the axial positioning of the cone relative to the cup.

This bearing type can be used in a preload situation to obtain higher rigidity and better running accuracy of the shaft.

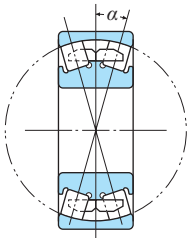
Double-row and four-row Tapered roller bearings are designed to carry radial, and bi-directional axial loads. Four-row Tapered roller bearings are used for the roll necks of rolling



machines and for other applications where heavy or impact loads are present.
Multi-row Tapered roller bearings have the serial number and the combination symbol stamped on the faces of the rings for clearance adjustment and must be assembled according to this number and symbol.
Pressed steel cages are used for small bore bearings and machined, high-strength brass or mild-steel cages are used for bearings with larger bores. Heavy-duty pin-type cages are used for some large-bore bearings.

1.2.7 Spherical Roller Bearings

NACHI double-row Spherical roller bearings are available in bore sizes from 25 mm to over 1000 mm.
The raceways in the outer ring of this type bearing are designed with a spherical surface whose center coincides with the bearing center.
NACHI Spherical roller bearings are of an improved design having a modified line contact between the raceways and rollers. This construction enables very high radial and impact-load capacity.
This bearing type can carry a moderately-high level of bi-directional axial load and is self-aligning. This type is used extensively for large machines where shaft deflection or mounting error may occur.
Spherical roller bearings are used for paper mill equipment, rolling machines, rolling stock, shaker screens and general industrial machinery. The mounting and dismounting of Spherical roller bearings is facilitated through the use of tapered-bore bearings in conjunction with tapered shaft, or adapters or withdrawal sleeves. Internal clearance can also be precisely set using a tapered-bore bearing.
Pressed steel cages are used for small-bore bearings and machined, high-strength brass cages are used for bearings with larger bores.

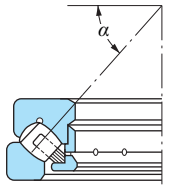


1.2.8 Thrust Ball Bearings

Thrust ball bearings can handle axial loads only. Bearing rings mounted on the shaft are called shaft washers, and those mounted in the bearing housing are called housing washers. Both washers contain grooves for the balls.
Thrust Ball bearings are of two types: single type which can support axial loads in only one direction and double type that can support bi-directional loads. The central washer of double type thrust ball bearing is located in an axial direction by a shaft shoulder and sleeve.
Thrust Ball bearings are not suitable for high-speed rotation since lubricant is expelled by centrifugal force. When used on a horizontal shaft, a minimum axial load must be applied.
Pressed steel plate, polyamide resin, machined high-strength brass or mild steel are used for cages.
Care must be taken in handling to prevent damage to the separable rings and ball assembly.

1.2.9 Spherical Roller Thrust Bearings

The raceway of housing washer of this bearing type is spherical with the center of the radius located on the bearing axis. The design provides self-alignment capability to the bearing. The contact angle (see sketch below) is approximately 45° enabling the bearing to support axial load and a small to moderate amount of radial load.
NACHI Spherical Roller Thrust bearings can sustain high loads at low-to-moderate speeds.
Because of the large load capacity and self-aligning characteristics, this bearing type is often used for injection molding machines, crane hooks and other large machines.
Cages are made from machined, high-strength brass or pressed steel.

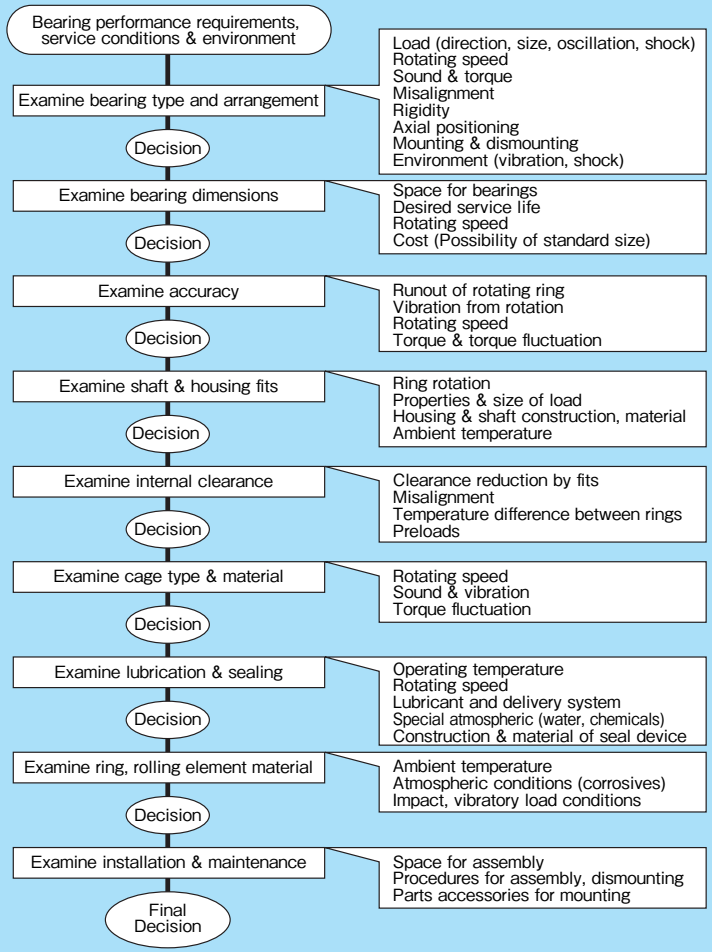


2. Selection of Rolling Contact Bearings

Rolling contact bearings are important, often critical, components of machinery. To meet the demands of a large variety of applications, rolling contact bearings are manufactured in a wide variety of types, sizes, and configurations. While machine performance and service life depend on which bearings are selected, it is often difficult to select the optimal bearing from among the many available variations.

While there is no “best” procedure for selecting the optimal bearing, Figure 2.1 provides an example of a procedure based on the establishment of priorities for the required bearing characteristics.

Fig. 2.1 Bearing Selection Procedure



2.1 Bearing Type Selection Considerations

2.1.1 Load

Bearing types are selected according to the types of load (radial, axial, moment) and the magnitude of these loads on the bearing.

Table 2.1 outlines the types of load and applicable bearing types. In bearings of identical dimensional series, a roller bearing will have a greater load rating capacity than a ball bearing.

2.1.2 Rotating Speed

Limiting speed of bearings is determined by bearing type, bearing dimensions, accuracy of work, construction of cages, load, lubricating system, and seal type and design. The bearing dimension tables show the rotating speed limits of standard rolling contact bearings as a guide of bearing type selection.

Bearings used at high rotating speeds should generally have high accuracy. In applications over the limiting speed, please consult NACHI for assistance.

2.1.3 Noise and Torque

All NACHI rolling contact bearings are designed and manufactured to operate with low noise and torque levels. Of the many types of ball and roller bearings, single-row deep-groove ball bearings will tend to operate with the lowest noise and torque levels.

2.1.4 Alignment

If the accuracy of alignment of the shaft and bearing housing is poor or the shaft is deflected due to load, the inner and outer rings of the bearings will be misaligned.

Non-self-aligning rolling contact bearings are capable of tolerating only that amount of misalignment which can be handled by the assembled internal clearance. If large inclination is expected to occur between the inner and outer rings, the choice of bearings should be from types such as thrust ball bearings with self-aligning washer, Self-aligning ball bearings, or Spherical roller bearings.

The permissible angle of inclination of bearings differs by bearing type, internal clearance, and load conditions. Table 2.2 outlines the permissible angles of misalignment by bearing type.

Internal bearing damage can occur if misalignment in the bearing is greater than the permissible angle. Please contact NACHI for assistance.

2.1.5 Rigidity

When rolling contact bearings are loaded, the contact section between the bearing rings and rolling elements will elastically deform. The magnitude of this elastic deformation will differ depending on load, bearing type, and bearing dimensions.

If bearings of identical dimension series are compared, roller bearings will have a much higher level of rigidity than ball bearings, and if bearings of identical type are compared, bearings of larger dimensions will have higher rigidity than those of smaller dimensions. (Preloading combinations of units of two or more bearings will increase rigidity.)

2.1.6 Mounting, Dismounting

Rolling contact bearings can be divided into bearing types classed as separable or non-separable. Mounting and dismounting is facilitated if a separable bearing type is used.

Use of tapered-bore bearings and sleeves or hydraulic assist also makes bearing mounting and dismounting easier.

There is a possibility that noise and shortening of life occur due to poor mounting of bearings. When bearings are mounted, the following items should be noticed.

- Keep the bearings clean

- Prevent from Rusting
- Protect bearings from damage

2.1.7 Axial Location; Bearing Arrangement

Generally the shaft is supported by two units (or the equivalent to two units) of bearings. Generally, one of the bearings acts to hold (or fix) the axial position of the assembly and the other bearing acts to allow linear expansion.
The fixed side bearing must be firmly seated against both housing and shaft.
Table 2.3 shows representative examples of actual bearing arrangements according to service conditions.

2.1.8 Bearing Environment

If there is a comparatively large source of vibration near the bearing mount, or if the bearing is to handle impact loading, the use of Spherical roller bearings or Spherical roller thrust bearings is recommended.
Standard bearings will not be suitable to operate under severe condition (load, rotating speed, operating temperature, lubrication amount, vibrating environment).

Table 2.1 Applicable Bearings vs Load Type

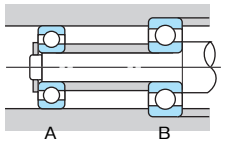
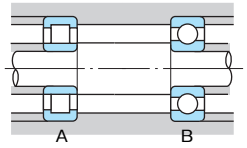
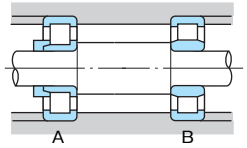
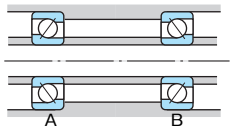
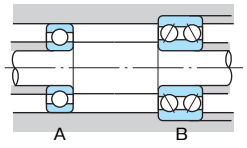
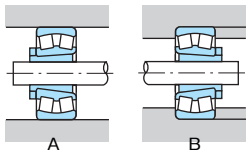
Load type / Bearing type	Radial		●		●	●		●
	Axial			●	●		●	●
	Moment					●	●	●
Single row Deep-groove Ball Bearings		○	△	○	○	△	○
Single row Angular Contact Ball Bearings			○	○			
Duplex Angular Contact Ball Bearings		○	○	○	○	○	○
Double row Angular Contact Ball Bearings		○	△	○	○	△	○
Cylindrical Roller Bearings		○		△			
Single row Tapered Roller Bearings			○	○	○	○	○
Double row Tapered Roller Bearings		○	○	○	○	○	○
Four-row Tapered Roller Bearings		○	○	○			
Spherical Roller Bearings		○		△			
Thrust Ball Bearings · Thrust Roller Bearings			○			△	

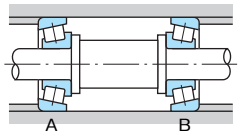
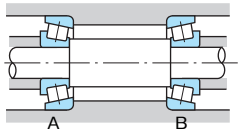
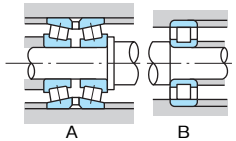
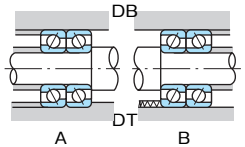
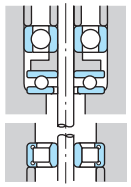
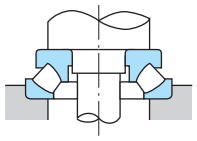
Remarks: ○ Bearing type can meet the load type.
△ Bearing can meet the load type conditionally. (Contact NACHI for more information.)

Table 2.2 Permissible Misalignment of Bearing Types

Bearing Type	Permissible angle of misalignment
Single row Deep-groove Ball Bearings	1/300
Single row Angular Contact Ball Bearings	1/1000
Cylindrical Roller Bearings	1/1000
Tapered Roller Bearings	1/800
Thrust Ball Bearings	1/2000

Table 2.3 Example of Bearing Arrangements

No.	Mounting examples	Applicable bearings A	Applicable bearings B	Application & design considerations
①		Deep Groove Ball Bearing	Deep Groove Ball Bearing	1. Popular mounting. 2. Ball bearings can support light-to-moderate axial loads. 3. One of the bearing outer ring must be free to move axially to handle thermal expansion. 4. Spherical roller bearings are good for heavy radial loads and light axial loads.
		Spherical Roller Bearing	Spherical Roller Bearing	
②		Cylindrical Roller Bearing; N, NU configuration	Deep Groove Ball Bearing	1. Popular mounting. 2. Not recommended to be used to handle angular misalignment and shaft deflection. 3. One of the bearings outer rings does not need to be configured to move. 4. Cylindrical roller bearing used on side that supports heavy load.
③		Cylindrical Roller Bearing; NH configuration	Cylindrical Roller Bearing; N, NU configuration	1. Easy mounting arrangement where interference fit is required for both inner and outer rings. 2. Not recommended for handling angular misalignment. 3. Thermal expansion taken internally. 4. Suitable for light axial load applications.
④		Deep Groove Ball Bearing	Deep Groove Ball Bearing	1. Preloading allows good rigidity. 2. Care must be taken in design of preload amount. 3. Angular contact ball bearings are better than Deep groove ball bearings for moderate axial loads and preload.
		Angular Contact Ball Bearing	Angular Contact Ball Bearing	
⑤		Deep Groove Ball Bearing	Double row Angular Contact Ball Bearing	1. Good for comparatively heavy axial loads that bear on either the left or right side. 2. Outer ring needs to be allowed to move right and left when deep groove ball bearing is used for side <A>. This is not needed if a cylindrical roller bearing is used and it is good for supporting larger radial loads.
		Cylindrical Roller Bearing; N, NU configuration	Double row Angular Contact Ball Bearing	
⑥		Self-Aligning Ball Bearing	Self-Aligning Ball Bearing	1. Good for angular misalignment and shaft deflection. 2. Use with adapter for long shafts which eliminates shaft shoulders and threading. 3. Outer ring of one bearing must be free to move in order to compensate automatically for thermal expansion or mounting errors. 4. Not recommended for large axial loads.
		Spherical Roller Bearing	Spherical Roller Bearing	

No.	Mounting examples	Applicable bearings A	Applicable bearings B	Application & design considerations
⑦		Tapered Roller Bearing	Tapered Roller Bearing	1. General application, direct mounting ("face-to-face"). 2. Good for heavy axial loads and preloading. 3. Inner ring is attached to the shaft in advance during assembly so inner ring interference is advantageous.
⑧		Tapered Roller Bearing	Tapered Roller Bearing	1. Indirect mounting ("back-to-back"). 2. Good for providing rigidity to shaft, especially when using short moment for bearing spacing. 3. Good for large axial loads. 4. Often assembled with preloading, but need to be cautious of preloading amount.Also, inner clearance must be adjusted carefully when inner clearance is not provided.
		Angular Contact Ball Bearing	Angular Contact Ball Bearing	
⑨		Tapered Roller Bearing	Cylindrical Roller Bearing; N, NU configuration	1. Used when accurate rotation is needed with comparatively heavy loads. 2. Preload to provide rigidity on side <A>. 3. Allows prevention of assembly error and thermal expansion in axial direction for cylindrical roller bearings. 4. Shaft and housing precision is good, assembly error must be reduced.
⑩		Combination Angular Contact Ball Bearing	Combination Angular Contact Ball Bearing	1. Used when accurate rotation is needed with light loads. 2. Provides shaft rigidity through preload configuration for each bearing.Inner clearance not normally provided. 3. Two bearings are set as a paired assembly, bearings must be examined for precision. 4. Mounting example above the shaft center line is DB assembly (called DF type when reversed), the lower part is called DT assembly.
⑪		Deep Groove Ball Bearing & Thrust Ball Bearing	Cylindrical Roller Bearing	1. Thrust ball bearing should be close to radial bearing to reduce shaft deflection. 2. When using a thrust ball bearing on a horizontal shaft, preloading must be done so that clearance does not occur between washer and rolling elements. 3. If shaft deflection or assembly error cannot be avoided, use thrust ball bearing with aligning seat or shperical back-face type.
		Cylindrical Roller Bearing & Thrust Ball Bearing	Cylindrical Roller Bearing	
⑫		Spherical Roller Thrust Bearing	(Radial Bearing)	1. Can be used when radial load is 55% or lower than the axial load. 2. Has self-aligning capability which can absorb housing error. 3. Good for heavy axial load. 4. Not normally used for high-speed rotation components. 5. Normally used in conjunction with radial bearings. 6. Use with preload.

3. Load Capacity and Life of Rolling Contact Bearings

3.1 Basic Dynamic Load Rating and Rating Life

Although requirements of rolling contact bearings vary somewhat with the individual application the principal requirements are:

- High load capabilities
- Smooth and quiet rotation
- High rigidity
- Low friction
- High accuracy
- Reliability

The reliability or durability requirement sets the time frame over which all other requirements are to be maintained. The reliability requirement (life in the broad sense) includes grease and acoustic life, as well as fatigue life. Reliability is reduced by various types of damage and degradation.

Improper handling, mounting, lubrication, and fits are the major causes of problems leading to lower-than-calculated bearing life. Regardless of how well they are maintained or mounted or handled, dynamic bearings will eventually fail from rolling fatigue generated by the repetitive stress of bearing load.

The service life of a bearing can be examined from two perspectives: 1) If, from inspection, a trace of fatigue becomes noticeable, the bearing should be deemed not suitable for further use; or 2) length of bearing life in hours or revolutions can be predefined as a limit beyond which the bearing is automatically replaced.

Since calculated fatigue life will vary with the size and type of bearings used under identical load conditions, great care must be taken in the analysis of the load conditions and the final choice of bearings to satisfy the application requirements.

Fatigue lives of individual bearing are dispersed. When a group of identical bearings operate under the same conditions, the statistical phenomenon of dispersion will appear. Use of average life is not an adequate criterion for selecting rolling contact bearings. Instead, it is more appropriate to consider a limit (hours or numbers of revolutions) which a large percentage of the operating bearings can attain.

Accordingly, the rating life and basic dynamic load rating Cr or Ca are defined using the following definition:

- Basic rating life is defined as the total number of revolutions (or total operating hours at some given constant speed) that 90% of a group of identical bearings operated individually under equal conditions can complete without suffering material damage from rolling fatigue.
- Basic dynamic load rating (Cr or Ca) is defined as a bearing load of constant direction and size that ends the bearing life after one million revolutions.

Constant-direction radial or thrust loads (for radial and thrust bearings, respectively) are used as the basis of the ratings.

The rating life of bearings is calculated by formulas (3.1) and (3.2):

$$L = \left(\frac{C}{P}\right)^{p} \quad \cdots\cdots (3.1)$$

$$L_h = \left(\frac{C}{P}\right)^{p} \cdot \frac{10^6}{60\,n} \quad \cdots\cdots (3.2)$$

Where:

- L : Basic rating life (10^6 rev.)
- L_h : Basic rating life in hours
- C : Basic dynamic load rating (N).
  (Cr for radial bearings and Ca for thrust bearings)
- P : Bearing load
  (dynamic equivalent load) (N)
  Pr for radial, and, Pa for thrust bearings
- p : 3 for ball, 10/3 for roller bearings
- n : Rotating speed (min^{-1})

The relationship of fh, the bearing life factor and f_n, the speed factor, is outlined in Table 3.1.

Formula (3.3) may be used to determine the basic dynamic load rating, C, of bearings given the bearing equivalent load, P, and the operating speed, n, in revolutions-per-minute.

$$C = \frac{P}{f_n} \cdot \left(\frac{L_h}{500}\right)^{1/p} \quad \cdots\cdots (3.3)$$

The lives of automobile wheel bearings may be defined in kilometers using the formula (3.4).

$$L_s = \frac{\pi \cdot D}{1000} \cdot L \quad \cdots\cdots (3.4)$$

Where:

- L_s : Kilometer traveled (10^6 km)
- D : Outside diameter of wheel (m)
- L : Life in revolutions

Table 3.2 shows values for the life factor, fh, by application and machine type.

If a bearing is used with vibrating or impact loads or low speed including no rotation, additional study with basic static load rating is required.

Table 3.1 Bearing Basic Rating Life; Life and Speed Factors

	Ball Bearings	Roller Bearings
Basic Rating Life	$L_h = 500\, f_h^{\,3}$	$L_h = 500\, f_h^{\frac{10}{3}}$
Life Factor	$f_h = f_n \frac{C}{P}$	$f_h = f_n \frac{C}{P}$
Speed Factor	$f_n = \left(\frac{10^6}{500 \times 60\, n}\right)^{\frac{1}{3}}$	$f_n = \left(\frac{10^6}{500 \times 60\, n}\right)^{\frac{3}{10}}$

Table 3.2 Guideline for Service Life Factor Required for Various Applications

Application conditions	Application example	Life Factor (f_h)
Infrequent use	Hinges	～1.5
Short period or Intermittent use	Hand tools Agricultural equipment Household apparatus Casting plant cranes	2～3
Intermittent, critical use	Power plant auxiliary machines Assembly line conveyers General crane applications Motors for home air conditioning	3～4
8 hour per day, intermittent	General gearing applications General industrial motors	3～5
8 hour per day, continuous	Cranes in continuous use Air blowers Mechanical power transmission General industrial machinery Industrial wood-working machines	4～5
24 hour per day, continuous	Compressors Mine hoists Marine propeller shafts Rolling machine tables	5～8
24 hours per day, breakdowns not allowed	Paper manufacturing Power plants Water supply equipment Mine water pumps, air blowers	6～

3.2 Basic Rating Life Calculation Guide

- Determine the bearing life normal to the application by using Table 3.2 to define the life factor, fh.
- Use rating life charts (nomograms) to calculate life. The nomogram for ball bearings is shown in Fig. 3.4. The nomogram for roller bearings is shown in Fig. 3.5. These nomograms are based on formulas (3.1) and (3.2).
- Where operating temperatures are to be in excess of 150°C, a correction factor must be applied to the bearing basic dynamic load rating. (See Item 3.3.1).
- If the bearings are to operate with vibration or impact loading, or where a bearing mounting or manufacturing error exists, the actual load may be greater than the calculated load. In this case, the calculated load must be multiplied by a safety factor to obtain an approximation of the actual load. For safety factors in actual application, refer to the machine and drive factors. (See Item 3.4.1 and 3.4.2)
- Bearings do not always operate under a constant load. When the bearing operates with a fluctuating load, the load must be converted to a constant size reflecting the effect of the fluctuating load. Conversion may be done using weighted average mean loading (See Item 3.4.4).
- By definition, bearing load Pr (simple radial load) or Pa (simple axial load) is a load with constant direction and size. When a composite load of radial and axial loads occurs on a radial bearing, these loads must be converted to a radial load reflecting the effect of the composite load. This effective load is called the DYNAMIC EQUIVALENT LOAD. (See Item 3.5).
- When calculating bearing load using the loads on a position on the shaft, it is necessary to calculate center distance between the load application point of the bearings. Many bearing types have load center points at the center line of the width as shown in Fig. 3.1. Single-row Angular Contact ball bearings and single-row Tapered roller bearings, have load center points off-center to the center line of the bearing width (See Fig. 3.2 and 3.3 respectively). Refer to the dimension tables for the value of the off-set.

Fig 3.1

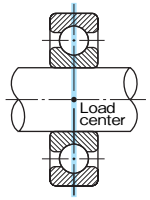
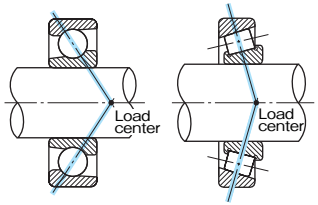


Fig 3.2 **Fig 3.3**



- The axial load limit for Cylindrical roller bearings is a function of the lubrication conditions and speed of rotation. This limit differs from a rating load as determined by fatigue life. (See Item 3.7).

Calculation example: 1

Suppose that an application has selection parameters as follows:

Bore: 50 mm or smaller

Outside diameter: 100 mm or smaller

Width: 20 mm or smaller

Radial load (Fr): 4000 N (Newtons)

Rotating speed (n): 1800min^{-1}

Life factor (fh): 2 or greater

Bearing type: Single-row deep groove ball bearing

From Table 3.1 the speed factor, fn is obtained as follows:

$$f_n = \left(\frac{10^6}{500 \times 60 \times 1800}\right)^{1/3} = 0.265$$

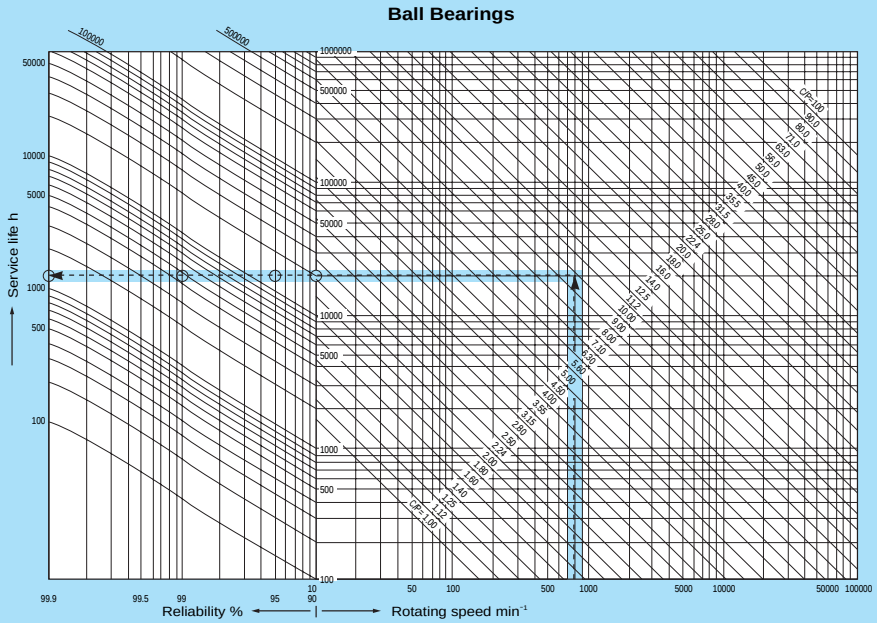
From Table 3.1,

$$Cr = \frac{f_h \cdot P}{f_n} = \frac{2 \times 4000}{0.265} = 30188N$$

Bearings having the required basic dynamic load rating are selected from the bearing dimension table(s). Of the two sizes meeting the load and diameter constraints, only bearing 6209 will satisfy the width constraint. Given the above parameters, bearing part 6209 would be the selection.

Bearing	Bore Dia. (mm)	Outside Dia. (mm)	Width (mm)	Basic Dynamic Load Rating (N)
6209	45	85	19	32500
6307	35	80	21	33500

Fig 3.4



Calculation example: 2

Object is to obtain service live for various levels of reliability for bearing number 6012 loaded with a dynamic equivalent radial load of Pr = 2940N, at rotating speed of n = 800 min^{-1}

Basic dynamic load rating is from dimension table (P147).

Cr=29400N

$$\frac{Cr}{Pr} = 10$$

*See Item 3.3.2 regarding reliability.

According to dotted line in figure;

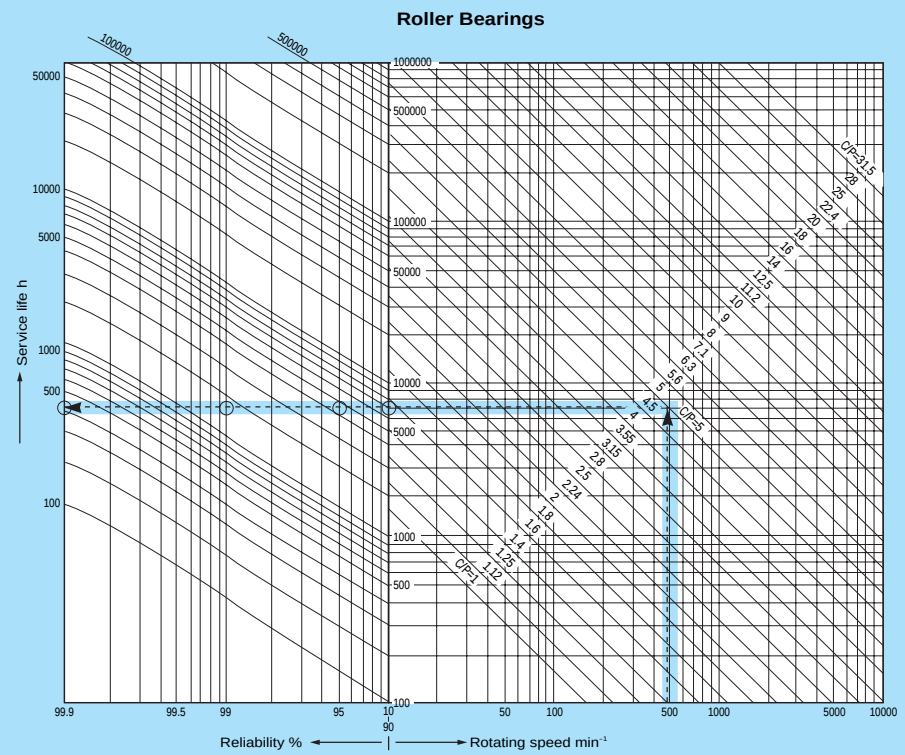
*When reliability is 90 % 20000 h

Reliability is 95 % 15000 h

Reliability is 99 % 4500 h

Reliability is 99.9 % 1200 h

Fig 3.5



Calculation example: 3

Object is to obtain service live for various levels of reliability for bearing number 22222EX loaded with a dynamic equivalent radial load of Pr = 98000N, at rotating speed of n=500min^{-1}.

Basic dynamic load rating is from dimension table (P311).

Cr=490000N

$\frac{Cr}{Pr}$ =5

*See Item 3.3.2 regarding reliability.

According to dotted line in figure;

*When reliability is 90	%	7000 h
Reliability is 95	%	4400 h
Reliability is 99	%	1500 h
Reliability is 99.9	%	400 h

3.3 Rating Life and Operating Temperature

3.3.1 Temperature-Related Decrease in Basic Dynamic Load Rating

Bearing ring diameters grow slightly with an increase in temperature. If the operating temperature does not exceed about 120°C, the bearing rings will return to their original dimensions at normal temperature. If the operating temperature exceeds this level (approximately 120°C), the bearing rings and rolling elements can undergo small, permanent changes in size.

To prevent these permanent changes in size, special heat-stabilization treatment can be used (see Table 3.3).

The S26 heat-treated bearings will resist dimensional change through a maximum temperature of 150°C. Bearings with the S26 heat-treated steel will suffer decreases to their rating life and will have dimensional changes if they are used at temperatures in excess of 150°C.

The S28 heat-treated bearings will resist dimensional change and have a temperature factor of 0.90 through a maximum temperature of 200°C.

If bearings are operated at temperatures exceeding the limit of the heat-stabilization, hardness of the bearing steel will be reduced. In calculating the life of such bearings, the basic dynamic load rating must be multiplied by the temperature factor as shown in Table 3.4.

Standard bearings run at an operating temperature exceeding 150°C, are subject to the basic dynamic load rating decreases as shown in Table 3.4.

Table 3.3 Heat Stabilization Treatment

Operation temperature range	Heat stabilization treatment symbol
～150°C	S26
～200°C	S28

Table 3.4 Temperature Factor

Bearing Temperature	～150°C	175°C	200°C
Temperature Factor	1	0.95	0.90

3.3.2 Life Calculation Factors

Rating Life Formula, $L=(C/P)^p$..... (3.1), is used when applying rolling contact bearings for normal use.

To provide for utilization of lubrication theory, and advances in bearing material and bearing manufacturing technology, the ISO and JIS have adopted the following life calculation formula.

Table 3.5 Reliability Factor a_1

Reliability %	99	98	97	96	95	90
a_1	0.21	0.33	0.44	0.53	0.62	1

$$Lna = a_1 \cdot a_2 \cdot a_3 \cdot \left(\frac{C}{P}\right)^p \quad \cdots\cdots\cdots\cdots\cdots\cdots \quad (3.5)$$

where:

L_{na} : Adjusted rating life (10^6 rev.)
a_1 : Reliability factor
a_2 : Material factor
a_3 : Application conditions factor

Formula (3.5) is applicable only when all bearing loads are considered and operating conditions are clearly defined.

Generally, reliability of 90% is used, and material and operating conditions may be considered as a_1, a_2, a_3=1, coinciding with formula (3.1)

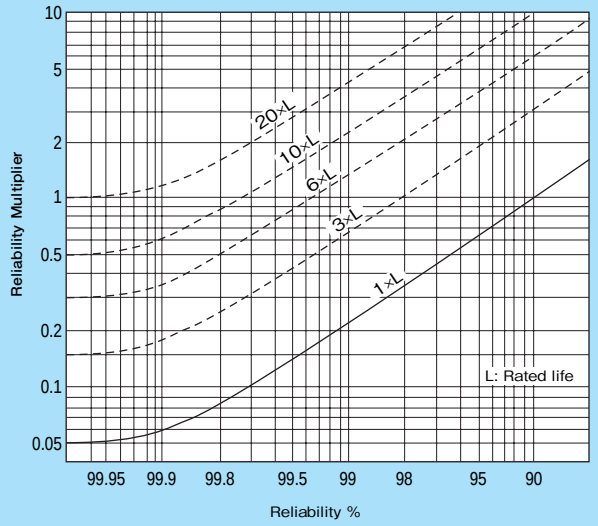
1) Reliability Factor, a_1

Reliability Factor, a_1, becomes 1 if 90% of a group of identical bearings operated individually under the same conditions can complete the calculated life without exhibiting material damage from rolling fatigue. Reliability is then set as 90%, and for reliability over 90%; a_1 takes a value from Table 3.5.

As observed from Table 3.5, the calculated bearing life decreases in proportion to a higher level of bearing reliabilities.

Fig. 3.6 shows the improved reliabilities when bearings having rating lives of 3, 6, 10 and 20 times are used in comparison with the 90% reliability (life-multiplying factor being 1) of a bearing having a given rating life.

Fig 3.6 Reliability Graph



Calculation example: 4

Bearing Number 6209 is used to support a radial load of 3160N. Object is to define the life and select a bearing which will have a reliability of 99.4%.

The life corresponding to the reliability of 90% is obtained as follows by reading the basic dynamic load rating, Cr=32500N from the dimension table and using formula (3.1):

$$\left(\frac{32500}{3160}\right)^3 \times 10^6 = 1088 \times 10^6 \text{rev.}$$

Reading Fig. 3.6, it can be seen that a bearing having a life -multiplying factor of 6 is required to attain 99.4% reliability. Applying this multiplier to the basic dynamic load rating, Cr as obtained from formula (3.1), will calculate as:

$$\left(\frac{Cr}{3160}\right)^3 \times 10^6 = 6 \times 1088 \times 10^6 \text{rev.}$$

From the above equation, obtain;

$$Cr = (6)^{1/3} \times 32500 = 1.817 \times 32500 = 59000N$$

The bearing meeting this basic dynamic load rating (in the same diameter series) is bearing number 6214.

2) Material factor, a_2

Material factor, a_2, is the adjustment factor applied as an increase to rating life for type and quality of material, special manufacturing process and/or special design.

The basic dynamic load rating, Cr (or Ca), listed in the bearing dimension tables reflects both the use of vacuum-degassed, high-carbon chrome bearing steel for all NACHI rolling contact bearings as well as improvements in manufacturing technology. The a_2-factor has a base value of 1 for NACHI standard parts.

Unless specialty steels are utilized, a_2 is defined as 1 when calculating the life using the formula (3.5).

3) Application condition factor, a_3

The application condition factor, a_3, is used to consider bearing load conditions, lubricating conditions, and temperature conditions.

Factor a_3 is set as 1 if the rolling elements and raceway surfaces are separated (good lubricating condition). When lubricating conditions are poor (as in the following cases), a_3 is less than 1:

- When the operating speed is slower than $dm \cdot n$ = 10,000. (Where $dm \cdot n$ = rolling element pitch diameter in millimeters times the speed in revolutions-per-minute).
- When lubricant has deteriorated.

At present, it is difficult to quantify the application condition factor because of the many variables involved.

Because factors a_2 and a_3 have interactive effects on each other, these two factors are treated as one value (a_2) (a_3). When lubrication and application conditions are good, the value (a_2) (a_3) can be set as equal to 1.

In case of poor lubrication such as when lubricant viscosity is considerably low, please consult NACHI.

3.4 Calculation of Bearing Load

Generally, the load that is applied to bearings is composed of loads generated by machine operation, drive components, and dead weight of the shaft and components mounted to and on the shaft. These loads can be precisely calculated. The above loads are usually accompanied by vibration and impact. With the exception of very special cases, it is impractical to calculate and add the specific effects of vibration and impact loading on each component in a machine. To facilitate the calculation and analysis of loading in a machine system, loading factors (based on empirical experience) have been developed as multipliers to the driving and static loads.

$$F = f_s \cdot F_c \quad \cdots\cdots (3.6)$$

where:

F : Bearing load (N)
f_s : Machine factor (Table 3.6)
F_c : Calculated load (N)

When a load fluctuates in magnitude, an average load must be calculated which reflects the effects of the fluctuating load.
When a composite load of radial and axial load occurs on a radial bearing, the loads must be converted to an effective radial load by use of the dynamic equivalent load formula for the specific bearing type. This value, P, is used in the basic rating life formula (3.1).

3.4.1 Belt Drives

Transferring power through belt drives requires initial belt tension. Radial load, K, that occurs from this tension can be calculated as follows:

$$M = 955000 \cdot \frac{H}{n} \quad \cdots\cdots (3.7)$$

$$K_t = \frac{M}{r} \quad \cdots\cdots (3.8)$$

where:

M : Rotating moment of pulley (N·cm)
K_t : Effective transfer power of belt (N) (tension side minus slack side)
H : Transfer power (kW)
n : Rotating speed of pulley (min^{-1})
r : Radius of pulley (cm)

Load that works on the shaft through the pulley is calculated by multiplying the effective transfer power, Kt, by the belt drive factors, f_1, from Table 3.7.
Generally,

$$K = f_1 \cdot K_t \quad \cdots\cdots (3.9)$$

where:

K : Radial load (N) applied to the pulley transferred by the belt
f_1 : Belt drive factor (Table 3.7)

Table 3.6 Machine Factors (f_s)

Type of Machine	f_s
Rotating machinery with no impact (motors, turbo compressor, conveyors, paper manufacturing machinery)	1～1.2
Machinery with low impact (internal combustion engines, reciprocating pumps, hoists, cranes)	1.2～1.5
Machines with high impact (drop hammers, crushers, rolling mill equipment)	1.5～3.0

Table 3.7 Belt Drive Factors (f_1)

Type of drive	f_1
Flat leather belt (with tension pulley)	1.75～2.5
Flat leather belt (without tension pulley) Silk belt, rubber belt Balata belt	2.25～3.5
V-belt	1.5～2
Steel strip belt	4～6
Cotton belt, hemp belt	2～6

Note: 1. For low speed use top value.

Table 3.8 Gear Factors (f_z)

Type of gear	f_z
Precision gears (Pitch and form errors of less than 0.02 mm)	1～1.1
Normal gears (Pitch and form errors of less than 0.02 to 0.1 mm)	1.1～1.3

3.4.2 Gear Drives

Shaft load from gear drives are calculated using the transfer power and type of gear.

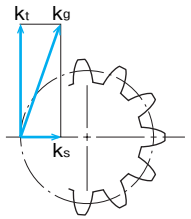


Fig 3.7

Helical, bevel and worm gears transmit radial loads and create an axial load component, while spur gears transmit only radial loads.
Gear load formulas described below refer to spur gears.

$$M = 955000 \cdot \frac{H}{n} \quad \cdots\cdots (3.10)$$

$$K_t = \frac{M}{r} \quad \cdots\cdots (3.11)$$

$$K_s = K_t \cdot \tan\alpha \quad \cdots\cdots (3.12)$$

$$K_g = \sqrt{K_t^2 + K_s^2} = K_t \cdot \sec\alpha \quad \cdots\cdots (3.13)$$

where:

M : Rotating gear moment (N·cm)
K_t : Tangential component of force (N)
K_s : Radial component of force (N)
K_g : Total gear load (N)
H : Transfer power (kW)
n : Rotating speed (min^{-1})
r : Drive gear pitch radius (cm)
α : Pressure angle of gear (°)

K_g, the total theoretical gear load, must be multiplied by both the gear precision factor and the machine factor (the latter of which takes into account impact and other forces dependent on machinery type).

$$K = f_z \cdot f_s \cdot K_g \quad \cdots\cdots (3.14)$$

where:

K : Gear load transmitted to shaft (N)
f_z : Gear precision factor (Table 3.8)
f_s : Machine factor (Table 3.6)

3.4.3 Load Distribution to Bearings

Load applied to a point on the shaft is distributed to the bearings supporting the shaft.
Reference Fig. 3.8,

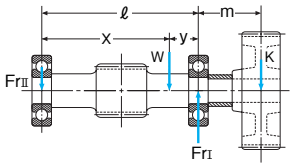


Fig 3.8

$$Fr_I = \frac{\ell + m}{\ell} K + \frac{x}{x + y} W \quad \cdots\cdots (3.15)$$

$$Fr_{II} = \frac{m}{\ell} K - \frac{y}{x + y} W \quad \cdots\cdots (3.16)$$

where:

Fr_I : Load working on bearing Ⅰ (N)
Fr_{II} : Load working on bearing Ⅱ (N)
K : Gear load transmitted to shaft (N)
W : Shaft Weight (N)
ℓ, m, x, y : Relative positions of the points of applied force.

3.4.4 Averaging Fluctuating Loads

A large load will have an emphasized effect on bearing life even if it is applied only for a very short duration of the total life-span of the bearing.
When the size of bearing load fluctuates with a defined cycle, bearing life may be calculated by deriving an average load simulating the affects of the fluctuating load.

(1) Step Type Load Fluctuation

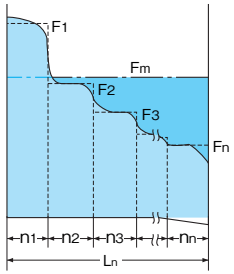


Fig 3.9

$$F_m = \sqrt[p]{\frac{F_1^p n_1 + F_2^p n_2 \cdots + F_n^p n_n}{n_1 + n_2 + \cdots\cdots + n_n}} \quad \cdots\cdots\cdots\cdots \quad (3.17)$$

where:

F_m : Average of fluctuating load (N)
n_1 : Total number of revolutions at load F_1 (rev.)
n_2 : Total number of revolutions at load F_2 (rev.)
n_n : Total number of revolutions at load Fn (rev.)
p : 3 for ball; 10/3 for roller bearings

In formula (3.17), if rotating speed is constant, and (n_1 + n_2 + ... + n_n) is referenced as applied time, then n_1, n_2 and n_n , can be replaced by time periods t_1, t_2, ... t_n respectively, in the formula.

(2) Linear Load Fluctuation

When the load fluctuates almost linearly (see Fig. 3.10), the following formula is used to obtain the average load.

$$F_m \fallingdotseq \frac{1}{3} F_{min} + \frac{2}{3} F_{max} \quad \cdots\cdots\cdots\cdots\cdots\cdots \quad (3.18)$$

where:

F_m : Average load (N)
F_{min} : Minimum load (N)
F_{max} : Maximum load (N)

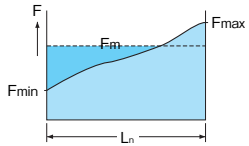


Fig 3.10

(3) Dynamic plus static load fluctuation

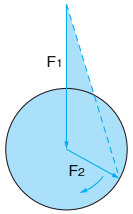


Fig 3.11

Where load F_1 of a constant size and direction, is combined with a constantly revolving load F_2 caused by an unbalanced load on the bearing (see Fig. 3.11), the average load is calculated using formula 3.19.

$$F_m \fallingdotseq AF_1 + F_2 \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \quad (3.19)$$

Value of A is taken from Fig. 3.12.

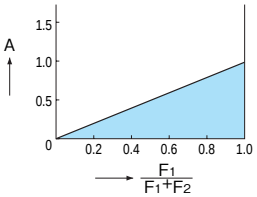


Fig 3.12

Calculation example: 5

A Single-row Deep-groove ball bearing is loaded with the fluctuating radial loads shown below.

Object: to obtain an average radial load on the bearing.

F_1=100N: 800 min^{-1} for 6 sec
F_2=50N: 1800 min^{-1} for 20 sec
F_3=200N: 3600 min^{-1} for 12 sec

Number of revolutions for the individual loads F_1, F_2 and F_3 are derived for the formula as follows.

$$n_1 = \frac{6}{60} \times 800 = 80 \text{ rev.}$$

$$n_2 = \frac{20}{60} \times 1800 = 600 \text{ rev.}$$

$$n_3 = \frac{12}{60} \times 3600 = 720 \text{ rev.}$$

Therefore,

$$n = n_1 + n_2 + n_3 = 1400 \text{ rev.}$$

From formula (3.17),

$$F_m = \sqrt[3]{\frac{100^3 \times 80 + 50^3 \times 600 + 200^3 \times 720}{1400}}$$

$$= 162 \text{ N}$$

3.5 Dynamic Equivalent Load

Dynamic equivalent load refers to a load having constant direction and magnitude such that theoretical calculations of bearing life using this load will simulate actual bearing life. This load is called dynamic equivalent radial load when calculated for radial bearings and dynamic equivalent axial load when calculated for thrust bearings.

In formula (3.1) expressing the relation between the bearing load and bearing life, bearing load, P, is either radial or axial load. Since radial and axial loads often occur simultaneously, the radial and axial loads must be converted to composite load within the dynamic equivalent load formula.

3.5.1 Dynamic Equivalent Radial Load

Dynamic equivalent radial load for radial bearings is calculated using the formula:

$$P_r = XF_r + YF_a \quad \cdots\cdots (3.20)$$

where:

- P_r : Dynamic equivalent radial load (N)
- F_r : Radial load (N)
- F_a : Axial load (N)
- X : Radial load factor (from dimensional tables)
- Y : Axial load factor (from dimensional tables)

In the above formula, if the axial load to radial load ratio, Fa/Fr, is less than or equal to e (a value determined by the bearing size and load as shown in the dimension tables), X, Y, and Pr will be as follows:

$X = 1$

$Y = 0$

$P_r = F_r$

3.5.2 Dynamic Equivalent Axial Load

While most thrust bearings are incapable of supporting any radial load, Spherical roller thrust bearings will support some radial load.

For Spherical roller thrust bearings, the dynamic equivalent axial load is derived using the formula:

$$P_a = F_a + 1.2F_r \quad \cdots\cdots (3.21)$$

where:

- P_a : Dynamic equivalent axial load (N)
- F_a : Axial load (N)
- F_r : Radial load (N)
- F_r/F_a must be $\leqq 0.55$

3.5.3 Dynamic Equivalent Load for Oscillating Loads

The dynamic equivalent load of radial bearings sustaining oscillating movements is derived using the formula:

$$P_r = \left(\frac{\psi}{90^\circ}\right)^{1/p}(XF_r + YF_a) \quad \cdots\cdots (3.22)$$

where:

- Pr : Dynamic equivalent load (N)
- ψ : Angle of oscillation (ψ must be $\geqq 90°/Z$)
- p : 3 for ball and 10/3 for bearings
- F_r : Radial load (N)
- F_a : Axial load (N)
- X : Radial load factor (from dimensional tables)
- Y : Axial load factor (from dimensional tables)
- Z : Number of rolling elements in row

If the value of $\psi < 90°/Z$, the above formula may not accurately predict bearing life since localized wear may be generated in the raceways. (Oil lubrication may be tried to prevent the wear (false brinelling) associated with low-amplitude operation in this type of application).

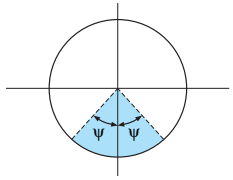


Fig 3.13

3.5.4 Angular Contact Ball; Tapered Roller Bearing Load

For single-row Angular Contact ball and single-row Tapered roller bearings, the load center dimensions from the bearing tables must be used when determining the relative load positions. The load-center positions of these bearings are off-set from the midpoint of the width of these bearings as shown in Fig 3.14 and 3.15).

The off-set dimension for Angular Contact ball and Tapered roller bearings is shown as the value “a” in the dimensional tables to indicate the load-center position. If moment loading is to be considered in a bearing system, location of load-center is of particular importance.

Where ℓ_1, m_1, x_1 or ℓ'_1, m'_1, x'_1, and y'_1 are applied to formulas (3.15) and (3.16) as effective intervals instead of ℓ, m, x, and y previously used in formulas (3.15) and (3.16). If a radial load is applied to two units of Tapered roller bearings used in pairs, an induced axial load will be produced. The magnitude of this induced axial force Fa’ is calculated using the formula:

$$F_a' = \frac{F_r}{2Y_1} \quad \cdots\cdots (3.23)$$

where:

- F_a' : Induced axial load (N)
- F_r : Radial load (N)
- Y_1 : Axial load factor (from dimension tables)

Axial and equivalent radial load on bearing calculated using formulas in Tables 3.9.

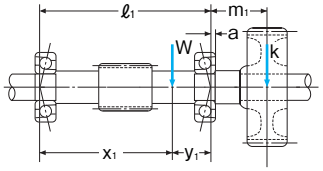


Fig 3.14

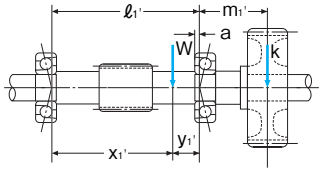
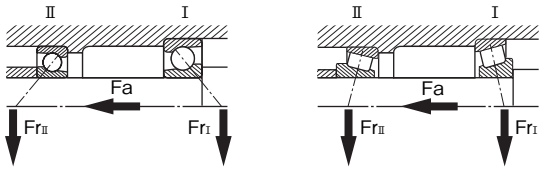
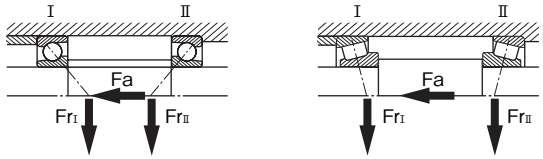
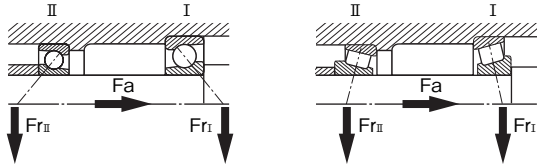
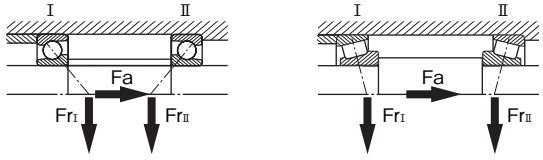


Fig 3.15

NACHI

Fr_{I}, Fr_{II} : Radial load applied to bearings Ⅰ and Ⅱ (N)
F_a : External axial load (N) direction shown by Table 3.9
Pr_{I}, Pr_{II} : Dynamic equivalent radial load on bearing Ⅰ and Ⅱ (N)
X_{I}, X_{II} : Radial Load Factor for bearings Ⅰ and Ⅱ from dimension tables
Y_{I}, Y_{II} : Axial Load Factor for bearings Ⅰ and Ⅱ from dimension tables

Table 3.9 Axial and Dynamic Equivalent Load of Angular Contact Ball and Tapered Roller Bearings

Bearing arrangement	Load conditions		Axial load	Dynamic equivalent radial load
	$Fa \geqq 0.5\left(\frac{Fr_{I}}{Y_{I}} - \frac{Fr_{II}}{Y_{II}}\right)$		$Fa_{I}=Fa_{II}+Fa$ $Fa_{II}=0.5\ \frac{Fr_{II}}{Y_{II}}$	$Pr_{I}=X_{I}Fr_{I}+Y_{I}(Fa_{II}+Fa)$ $Pr_{II}=Fr_{II}$
	$Fa < 0.5\left(\frac{Fr_{I}}{Y_{I}} - \frac{Fr_{II}}{Y_{II}}\right)$		$Fa_{I}=0.5\ \frac{Fr_{I}}{Y_{I}}$ $Fa_{II}=Fa_{I}-Fa$	$Pr_{I}=Fr_{I}$ $Pr_{II}=X_{II}Fr_{II}+Y_{II}(Fa_{I}-Fa)$
	$Fa \geqq 0.5\left(\frac{Fr_{II}}{Y_{II}} - \frac{Fr_{I}}{Y_{I}}\right)$		$Fa_{I}=0.5\ \frac{Fr_{I}}{Y_{I}}$ $Fa_{II}=Fa_{I}+Fa$	$Pr_{I}=Fr_{I}$ $Pr_{II}=X_{II}Fr_{II}+Y_{II}(Fa_{I}+Fa)$
	$Fa < 0.5\left(\frac{Fr_{II}}{Y_{II}} - \frac{Fr_{I}}{Y_{I}}\right)$		$Fa_{I}=Fa_{II}-Fa$ $Fa_{II}=0.5\ \frac{Fr_{II}}{Y_{II}}$	$Pr_{I}=X_{I}Fr_{I}+Y_{I}(Fa_{II}-Fa)$ $Pr_{II}=Fr_{II}$

Notes: 1. Apply when the bearing clearance and preload are 0.
2. Radial load in the direction opposite to the arrows above is also positive.

3.6 Basic Static Load Rating and Static Equivalent Load

3.6.1 Basic Static Load Rating

Load applied to stationary bearings can create permanent indentations in the load surfaces. While some level of deformation can be tolerated, a level of deformation will be reached where noise and vibration during operation of the bearing, will make the bearing unusable.
The term “Basic static load rating” refers to the maximum contact stress value of the static load where the rolling element and raceways contact. The ratings are:

- Self-aligning ball bearing ... 4600MPa
- Other ball bearings 4200MPa
- Roller bearings 4000MPa

With these contact stresses, the sum of deformations (ball/roller and raceway) is approximately 1/10000 of the diameter of the rolling element.
Basic static load ratings are shown in the dimension tables for each bearing number. The symbol C_{or} is for radial bearings and the symbol C_{oa} is for thrust bearings.

3.6.2 Static Equivalent Load

Static equivalent load is the static load that reflects the actual load conditions to the contact section of the rolling elements and raceway receiving the maximum stress. For radial bearings, radial load of a constant direction and magnitude is called the static equivalent radial load, and for thrust bearings, axial load of a constant direction and magnitude is called the static equivalent axial load.

1) Static equivalent radial load
To calculate the static equivalent radial load of a radial bearing supporting simultaneous radial and axial loads, the larger of the values obtained from formulas (3.24) and (3.25) are to be used.

$$P_{or}=X_oF_r+Y_oF_a \quad \cdots\cdots (3.24)$$
$$P_{or}=F_r \quad \cdots\cdots (3.25)$$

where:
P_{or} : Static equivalent radial load (N)
F_r : Radial load (N)
F_a : Axial load (N)
X_o & Y_o : Static radial and axial load factors from dimension tables

2) Static equivalent axial load
Static equivalent axial load for Spherical Thrust bearings is calculated using formula (3.26)

$$P_{oa}=F_a+2.7F_r \quad \cdots\cdots (3.26)$$

where:
P_{oa} : Static equivalent axial load (N)
F_a : Axial load (N)
F_r : Radial load (N)
F_r/F_a must be $\leqq 0.55$

3.6.3 Safety Factor

The basic static load rating is considered as the limiting load for general applications. An application may require a safety factor larger than 1 or allow a safety factor smaller than 1. Table 3.10 provides a guide for selection of the safety factor, S_o, to be used with formula (3.27) for calculation of the maximum (weighted) static equivalent load.

$$C_o=S_o \cdot P_{omax} \quad \cdots\cdots (3.27)$$

where:
C_o : Basic static load rating (N) (C_{or} for radial; C_{oa} for thrust bearings)
S_o : Safety factor (select from Table 3.10)
P_{omax} : Static equivalent load (N)

Table 3.10 Static Safety Factor S_o

Application conditions	S_o	
	Ball Bearings	Roller Bearings
High rotating accuracy is needed	2	3
Vibration and / or impact present	1.5	2
Normal operating conditions	1	1.5
Small amount of permanent deformation is tolerable	0.7	1

Note: Use value over 4 for Spherical Roller Thrust Bearings

3.7 Axial Load Capacity of Cylindrical Roller Bearings

Cylindrical roller bearings are generally used for supporting radial loads only. Bearings having flanges or loose ribs on both the inner and outer rings (such as on configurations NJ, NF, and NUP), are capable of supporting some amount of axial load. Since any axial loading on a cylindrical roller bearing is supported by a “sliding” action between the roller ends and flanges, allowable axial load is based on the limiting values of heat, seizure, and wear caused by this “sliding” contact.
Permissible axial loading (no consideration of bearing life as a radial bearing) on Cylindrical roller bearings is calculated using the following formula.

$$F_a=(p_v)\frac{\lambda}{n} \quad \cdots\cdots \text{Allowable axial load (N)}$$

p_v : Application factor from Table 3.11.1
λ : Bearing type factor from Table 3.11.2
n : Rotating speed (min^{-1})

However, there is another limit shown by the following formula because Fa exceeding the limit causes abnormal roller movement

Allowable axial load $\leqq k_1 \cdot F_r$

Bearing series	K_1
1000、200、200E 300、300E、400	0.2
2200、2200E、2300、2300E	0.4

Table 3.11.1 Application Factor (p_v)

Operating conditions (Load and lubrication)	(p_v)
Intermittent axial load, good heat conduction and good cooling or very large amount of lubricant	5400～6900
Intermittent axial load, good heat conduction and large amount of lubricant	2600～3200
Oil lubrication, good heat conduction or good cooling	1900～2200
Continuous axial load and oil lubrication or intermittent axial load and grease lubrication	1300～1600
Continuous axial load and grease lubrication	690～780

Table 3.11.2 Bearing Type Factor λ

Diameter Series	λ
0	19d
2	32d
3	45d
4	60d

d = bearing bore (mm)

When cylindrical roller bearings have an applied axial load, additional considerations are required as follows;

- Apply sufficient radial load to overcome axial load
- Supply sufficient lubricant between roller ends and flanges
- Use lubricant which has good film strength (pressure resistant) properties
- Practice good bearing mounting accuracy (see section 8.3)
- Allow sufficient running-in
- Minimize radial bearing clearance

4. Boundary Dimensions and Bearing Numbers of Rolling Contact Bearings

4.1 Boundary Dimensions of Rolling Contact Bearings

Boundary dimensions have been established in a standard plan for metric rolling contact bearings to facilitate the selection process, improve availability, and to limit the necessity for use of high cost, non-standard parts.

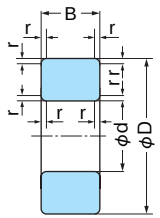
Boundary dimensions standards include the bore diameter (d), outside diameter (D), width (B), assembly width (T) or height (H), and the chamfer dimension (r) of bearings.

Boundary dimensions are standardized by the International Organization for Standardization (ISO 15) and also Japanese Industrial Standard (JIS B 1512).

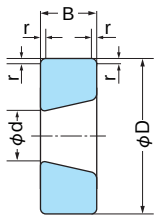
NACHI has adopted the ISO boundary dimension standards. Figures 4.6 and 4.7 show the relationship of the dimensions for radial and thrust rolling contact bearings (except for Tapered roller bearings).

Table 4.1 Boundary Dimensions Terminology

Series	Definition	Remarks
Diameter series	The diameter series is a series of standard outside diameters with standard bore diameters. Several series of outside diameters are set in stages to the same bearing bore diameter. Diameter series are labeled by single digit numbers 7, 8, 9, 0, 1, 2, 3, and 4.	(1) Diameter series is in ascending order by diameter size with number 7 the smallest and 4 the largest. (2) Each radial bearing diameter series has width series with numbers 8, 0, 1, 2, 3, 4, 5, 6. Number 8 is the minimum width to the same bore and outside diameter. Number 6 is the maximum width. (3) Each thrust bearing diameter series has width series with number 7, 9, 1 and 2. Number 7 is the minimum width to the same bore and outside diameter. Number 2 is the maximum width.
Width or Height series	Width or height series is a series of standard widths or heights with the same bore diameter within the same diameter series of bearings. These width or height series are labeled with single digit numbers. Width series 8, 0, 1, 2, 3, 4, 5, and 6 for radial bearings and height series 7, 9, 1, and 2 are for thrust bearings.	
Dimension series	Dimension series = width or height series number + Diameter series. Dimension series are labeled with a two digit number by combining numbers for the width or height series to the numbers for the diameter series. The two digit number has the width or height series in the lead position.	



Cylindrical bore



Tapered bore (1/12 or 1/30 taper)

Fig 4.1 Radial Bearings (except Tapered Roller Bearings)

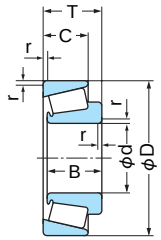


Fig 4.2 Tapered Roller Bearings

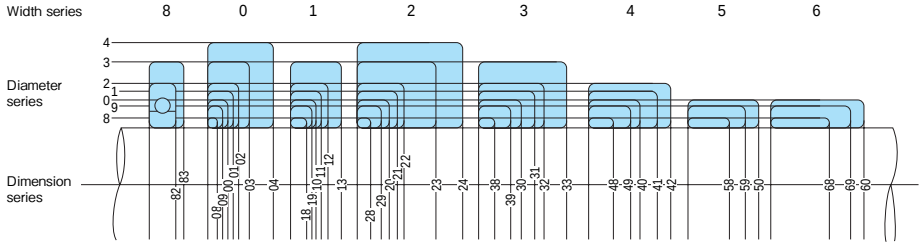


Fig 4.6 Graphical Representation of the Dimension series of Radial Bearings (except Tapered Roller Bearings)

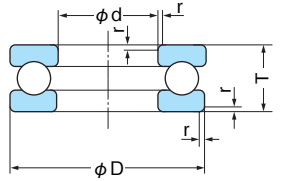


Fig 4.3 Single-direction Thrust Ball Bearings

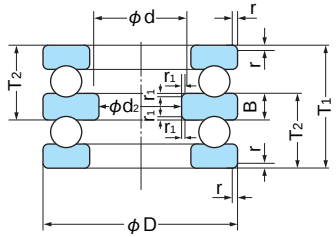


Fig 4.4 Double-direction Thrust Ball Bearings

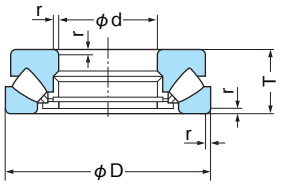


Fig 4.5 Spherical Roller Thrust Bearings

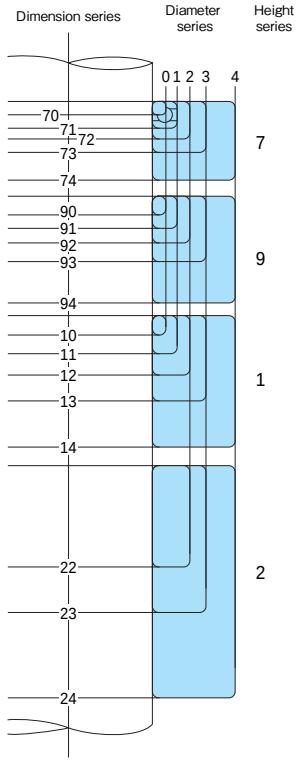


Fig 4.7 Graphical Representation of the Dimension series of Thrust Bearings (except diameter 5 series)

Table 4.2.1 Boundary Dimensions of Diameter Series 7, 8, 9, and 0

Unit: mm

Bearing bore diameter Nominal		Diameter series 7					Diameter series 8									Diameter series 9										Diameter series 0								
		Width series					Width series									Width series										Width series								
		1	2	3	Chamfer dimensions		0	1	2	3	4	5	6	Chamfer dimensions		0	1	2	3	4	5	6	Chamfer dimensions			0	1	2	3	4	5	6	Chamfer dimensions	
		Dimension series					Dimension series									Dimension series										Dimension series								
Bore No.	d	17	27	37	17 ~ 37	Nominal bearing outside diameter D	08	18	28	38	48	58	68	08	18 ~ 68	Nominal bearing outside diameter D	09	19	29	39	49	59	69	09	19 ~ 39	49 ~ 69	Nominal bearing outside diameter D	00	10	20	30	40	50	60	00	10 ~ 60
		Width B			r (min)		Width B							r (min)		Width B							r (min)				Width B							r (min)	
/0.6	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	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	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	145	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	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Remarks: 1. Chamfer dimensions r(min) are the smallest allowable

2. The chamfer dimensions given in this table do not necessarily apply to:
(1) the groove side of outer ring with snap ring groove (2) the flangeless side of thin cylindrical roller bearing rings
(3) the front face side of angular contact bearing rings (4) inner rings of bearings with tapered bore

Table 4.2.2 Boundary Dimensions of Diameter Series 1, 2, 3, and 4

Unit: mm

Single row radial ball bearings												62 72									63 73									
Double row radial ball bearings												12			32 52						13			33 53						
Cylindrical Roller Bearings												N2		N22							N3		N23				N4			
Spherical Roller Bearings					231	241								222	232						213		223							
Bearing bore diameter Nominal		Diameter series 1								Diameter series 2										Diameter series 3								Diameter series 4			
		Nominal bearing outside diameter D	Width series					Chamfer dimensions		Nominal bearing outside diameter D	Width series						Chamfer dimensions			Nominal bearing outside diameter D	Width series					Chamfer dimensions		Nominal bearing outside diameter D	Width series		Chamfer dimensions
			Dimension series								Dimension series										Dimension series								Dimension series		
Bore No.	d		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
			Width B					r (min)			Width B						r (min)				Width B					r (min)			Width B		r (min)
/0.6	0.6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
/1.5	1.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
/2.5	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	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
/1600	1600	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
/1700	1700	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
/1800	1800	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
/1900	1900	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
/2000	2000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Remarks: 1. Chamfer dimensions r(min) are the smallest allowable

2. The chamfer dimensions given in this table do not necessarily apply to:
   (1) the groove side of outer ring with snap ring groove
   (2) the flangeless side of thin cylindrical roller bearing rings
   (3) the front face side of angular contact bearing rings
   (4) inner rings of bearings with tapered bore

4.3 Boundary Dimensions of Tapered Roller Bearings

Table 4.3 Unit: mm

Tapered Roller Bearings		329						320				330					331						302				322			332					303		303D	313			323					Tapered Roller Bearings
Bearing bore diameter Nominal		Diameter series 9						Diameter series 0									Diameter series 1						Diameter series 2														Diameter series 3										Bearing bore diameter Nominal	
		Outside diameter	Width series 2			Chamfer dimensions		Outside diameter	Width series 2			Width series 3			Chamfer dimensions		Outside diameter	Width series 3			Chamfer dimensions		Outside diameter	Width series 0			Width series 2			Width series 3			Chamfer dimensions		Outside diameter	Width series 0			Width series 1			Width series 2			Chamfer dimensions			
Bore No.	d	D	B	C	T	Inner ring r (min)	Outer ring r (min)	D	B	C	T	B	C	T	Inner ring r (min)	Outer ring r (min)	D	B	C	T	Inner ring r (min)	Outer ring r (min)	D	B	C	T	B	C	T	B	C	T	Inner ring r (min)	Outer ring r (min)	D	B	C	C(1)	T	B	C	T	B	C	T	Inner ring r (min)	Outer ring r (min)	Bore No.	d
02	15	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	42	13	11	–	14.25	–	–	–	–	–	–	1	1	02	15
03	17	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	40	12	11	13.25	16	14	17.25	–	–	–	1	1	47	14	12	–	15.25	–	–	–	19	16	20.25	1	1	03	17
04	20	37	12	9	12	0.3	0.3	42	15	12	15	–	–	–	0.6	0.6	–	–	–	–	–	–	47	14	12	15.25	18	15	19.25	–	–	–	1	1	52	15	13	–	16.25	–	–	–	21	18	22.25	1.5	1.5	04	20
/22	22	40	12	9	12	0.3	0.3	44	15	11.5	15	–	–	–	0.6	0.6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	/22	22
05	25	42	12	9	12	0.3	0.3	47	15	11.5	15	17	14	17	0.6	0.6	–	–	–	–	–	–	52	15	13	16.25	18	16	19.25	22	18	22	1	1	62	17	15	13	18.25	–	–	–	24	20	25.25	1.5	1.5	05	25
/28	28	45	12	9	12	0.3	0.3	52	16	12	16	–	–	–	1	1	–	–	–	–	–	–	58	–	–	–	19	16	20.25	24	19	24	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	/28	28
06	30	47	12	9	12	0.3	0.3	55	17	13	17	20	16	20	1	1	–	–	–	–	–	–	62	16	14	17.25	20	17	21.25	25	19.5	25	1	1	72	19	16	14	20.75	–	–	–	27	23	28.75	1.5	1.5	06	30
/32	32	52	15	10	14	0.6	0.6	58	17	13	17	–	–	–	1	1	–	–	–	–	–	–	65	17	15	18.25	26.5	17	22	26	20.5	26	1	1	75	–	–	–	–	–	–	–	28	23	29.75	1.5	1.5	/32	32
07	35	55	14	11.5	14	0.6	0.6	62	18	14	18	21	17	21	1	1	–	–	–	–	–	–	72	17	15	18.25	23	19	24.25	28	22	28	1.5	1.5	80	21	18	15	22.75	–	–	–	31	25	32.75	2	1.5	07	35
08	40	62	15	12	15	0.6	0.6	68	19	14.5	19	22	18	22	1	1	75	26	20.5	26	1.5	1.5	80	18	16	19.75	23	19	24.75	32	25	32	1.5	1.5	90	23	20	17	25.25	–	–	–	33	27	35.25	2	1.5	08	40
09	45	68	15	12	15	0.6	0.6	75	20	15.5	20	24	19	24	1	1	80	26	20.5	26	1.5	1.5	85	19	16	20.75	23	19	24.75	32	25	32	1.5	1.5	100	25	22	18	27.25	–	–	–	36	30	38.25	2	1.5	09	45
10	50	72	15	12	15	0.6	0.6	80	20	15.5	20	24	19	24	1	1	85	26	20	26	1.5	1.5	90	20	17	21.75	23	19	24.75	32	24.5	32	1.5	1.5	110	27	23	19	29.25	–	–	–	40	33	42.25	2.5	2	10	50
11	55	80	17	14	17	1	1	90	23	17.5	23	27	21	27	1.5	1.5	95	30	23	30	1.5	1.5	100	21	18	22.75	25	21	26.75	35	27	35	2	1.5	120	29	25	21	31.5	–	–	–	43	35	45.5	2.5	2	11	55
12	60	85	17	14	17	1	1	95	23	17.5	23	27	21	27	1.5	1.5	100	30	23	30	1.5	1.5	110	22	19	23.75	28	24	29.75	38	29	38	2	1.5	130	31	26	22	33.5	–	–	–	46	37	48.5	3	2.5	12	60
13	65	90	17	14	17	1	1	100	23	17.5	23	27	21	27	1.5	1.5	110	34	26.5	34	1.5	1.5	120	23	20	24.75	31	27	32.75	41	32	41	2	1.5	140	33	28	23	36	–	–	–	48	39	51	3	2.5	13	65
14	70	100	20	16	20	1	1	110	25	19	25	31	25.5	31	1.5	1.5	120	37	29	37	2	1.5	125	24	21	26.25	31	27	33.25	41	32	41	2	1.5	150	35	30	25	38	–	–	–	51	42	54	3	2.5	14	70
15	75	105	20	16	20	1	1	115	25	19	25	31	25.5	31	1.5	1.5	125	37	29	37	2	1.5	130	25	22	27.25	31	27	33.25	41	31	41	2	1.5	160	37	31	26	40	–	–	–	55	45	58	3	2.5	15	75
16	80	110	20	16	20	1	1	125	29	22	29	36	29.5	36	1.5	1.5	130	37	29	37	2	1.5	140	26	22	28.25	33	28	35.25	46	35	46	2.5	2	170	39	33	27	42.5	–	–	–	58	48	61.5	3	2.5	16	80
17	85	120	23	18	23	1.5	1.5	130	29	22	29	36	29.5	36	1.5	1.5	140	41	32	41	2.5	2	150	28	24	30.5	36	30	38.5	49	37	49	2.5	2	180	41	34	28	44.5	–	–	–	60	49	63.5	4	3	17	85
18	90	125	23	18	23	1.5	1.5	140	32	24	32	39	32.5	39	2	1.5	150	45	35	45	2.5	2	160	30	26	32.5	40	34	42.5	55	42	55	2.5	2	190	43	36	30	46.5	–	–	–	64	53	67.5	4	3	18	90
19	95	130	23	18	23	1.5	1.5	145	32	24	32	39	32.5	39	2	1.5	160	49	38	49	2.5	2	170	32	27	34.5	43	37	45.5	58	44	58	3	2.5	200	45	38	32	49.5	–	–	–	67	55	71.5	4	3	19	95
20	100	140	25	20	25	1.5	1.5	150	32	24	32	39	32.5	39	2	1.5	165	52	40	52	2.5	2	180	34	29	37	46	39	49	63	48	63	3	2.5	215	47	39	–	51.5	51	35	56.5	73	60	77.5	4	3	20	100
21	105	145	25	20	25	1.5	1.5	160	35	26	35	43	34	43	2.5	2	175	56	44	56	2.5	2	190	36	30	39	50	43	53	68	52	68	3	2.5	225	49	41	–	53.5	53	36	58	77	63	81.5	4	3	21	105
22	110	150	25	20	25	1.5	1.5	170	38	29	38	47	37	47	2.5	2	180	56	43	56	2.5	2	200	38	32	41	53	46	56	–	–	–	3	2.5	240	50	42	–	54.5	57	38	63	80	65	84.5	4	3	22	110
24	120	165	29	23	29	1.5	1.5	180	38	29	38	48	38	48	2.5	2	200	62	48	62	2.5	2	215	40	34	43.5	58	50	61.5	–	–	–	3	2.5	260	55	46	–	59.5	62	42	68	86	69	90.5	4	3	24	120
26	130	180	32	25	32	2	1.5	200	45	34	45	55	43	55	2.5	2	–	–	–	–	–	–	230	40	34	43.75	64	54	67.75	–	–	–	4	3	280	58	49	–	63.75	66	44	72	–	–	–	5	4	26	130
28	140	190	32	25	32	2	1.5	210	45	34	45	56	44	56	2.5	2	–	–	–	–	–	–	250	42	36	45.75	68	58	71.75	–	–	–	4	3	300	62	53	–	67.75	70	47	77	–	–	–	5	4	28	140
30	150	210	38	30	38	2.5	2	225	48	36	48	59	46	59	3	2.5	–	–	–	–	–	–	270	45	38	49	73	60	77	–	–	–	4	3	320	65	55	–	72	75	50	82	–	–	–	5	4	30	150
32	160	220	38	30	38	2.5	2	240	51	38	51	–	–	–	3	2.5	–	–	–	–	–	–	290	48	40	52	80	67	84	–	–	–	4	3	340	68	58	–	75	–	–	–	–	–	–	5	4	32	160
34	170	230	38	30	38	2.5	2	260	57	43	57	–	–	–	3	2.5	–	–	–	–	–	–	310	52	43	57	86	71	91	–	–	–	5	4	360	72	62	–	80	–	–	–	–	–	–	5	4	34	170
36	180	250	45	34	45	2.5	2	280	64	48	64	–	–	–	3	2.5	–	–	–	–	–	–	320	52	43	57	86	71	91	–	–	–	5	4	–	–	–	–	–	–	–	–	–	–	–	–	–	36	180
38	190	260	45	34	45	2.5	2	290	64	48	64	–	–	–	3	2.5	–	–	–	–	–	–	340	55	46	60	92	75	97	–	–	–	5	4	–	–	–	–	–	–	–	–	–	–	–	–	–	38	190
40	200	280	51	39	51	3	2.5	310	70	53	70	–	–	–	3	2.5	–	–	–	–	–	–	360	58	48	64	98	82	104	–	–	–	5	4	–	–	–	–	–	–	–	–	–	–	–	–	–	40	200
44	220	300	51	39	51	3	2.5	340	76	57	76	–	–	–	4	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	44	220
48	240	320	51	39	51	3	2.5	360	76	57	76	–	–	–	4	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	48	240
52	260	360	63.5	48	63.5	3	2.5	400	87	65	87	–	–	–	5	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	52	260
56	280	380	63.5	48	63.5	3	2.5	420	87	65	87	–	–	–	5	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	56	280
60	300	420	76	57	76	4	3	460	100	74	100	–	–	–	5	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	60	300
64	320	440	76	57	76	4	3	480	100	74	100	–	–	–	5	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	64	320
68	340	460	76	57	76	4	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	68	340
72	360	480	76	57	76	4	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	72	360

Remarks: 1. Chamfer dimensions r(min) are the smallest chamfer dimensions allowable
2. Dimensions B, C, T of 32000 and 32200 series bearings without prefix E and suffix J listed on page 225 differ from the above dimensions.

Note: (1) To be applied to 303D series

4.4 Boundary Dimensions of Thrust Bearings with Flat Back Face

Table 4.4 Unit: mm

Single-direction Thrust Ball Bearings										511					512								513									514						Single-direction Thrust Ball Bearings
Double-direction Thrust Ball Bearings																522								523								294		524				Double-direction Thrust Ball Bearings
Spherical Roller Thrust Bearings														292								293															Spherical Roller Thrust Bearings
Bearing bore diameter Nominal		Diameter series 0					Diameter series 1					Diameter series 2										Diameter series 3									Diameter series 4						Diameter series 5			Bearing bore diameter Nominal
		Nominal bearing outside diameter D	Dimension series			Chamfer dimensions r (min)	Nominal bearing outside diameter D	Dimension series			Chamfer dimensions r (min)	Nominal bearing outside diameter D	Dimension series				Chamfer dimensions				Nominal bearing outside diameter D	Dimension series				Chamfer dimensions			Nominal bearing outside diameter D	Dimension series				Chamfer dimensions	Nominal bearing outside diameter D	Dimension series 95			
			70	90	10			71	91	11			72	92	12	22	22					73	93	13	23	23					74	94	14	24	24					
Bore No.	d		Height Nominal T					Height Nominal T					Height Nominal T				Center washer		r (min)	r1 (min)		Height Nominal T				Center washer		r (min)	r1 (min)		Height Nominal T				Center washer		r (min)	r1 (min)		Height T	r (min)		
																	Bore d2	Height B							Bore d2	Height B							Bore d2	Height B							
4	4	12	4	—	6	0.3	—	—	—	—	—	16	6	—	8	—	—	—	0.3	—		20	7	—	11	—	—	—	0.6	—	—	—	—	—	—	—	—	—	—	—	—	4	4
6	6	16	5	—	7	0.3	—	—	—	—	—	20	6	—	9	—	—	—	0.3	—		24	8	—	12	—	—	—	0.6	—	—	—	—	—	—	—	—	—	—	—	—	6	6
8	8	18	5	—	7	0.3	—	—	—	—	—	22	6	—	9	—	—	—	0.3	—		26	8	—	12	—	—	—	0.6	—	—	—	—	—	—	—	—	—	—	—	—	8	8
00	10	20	5	—	7	0.3	24	6	—	9	0.3	26	7	—	11	—	—	—	0.6	—		30	9	—	14	—	—	—	0.6	—	—	—	—	—	—	—	—	—	—	—	—	00	10
01	12	22	5	—	7	0.3	26	6	—	9	0.3	28	7	—	11	—	—	—	0.6	—		32	9	—	14	—	—	—	0.6	—	—	—	—	—	—	—	—	—	—	—	—	01	12
02	15	26	5	—	7	0.3	28	6	—	9	0.3	32	8	—	12	22	10	5	0.6	0.3		37	10	—	15	—	—	—	0.6	—	—	—	—	—	—	—	—	—	—	—	—	02	15
03	17	28	5	—	7	0.3	30	6	—	9	0.3	35	8	—	12	—	—	—	0.6	—		40	10	—	16	—	—	—	0.6	—	—	—	—	—	—	—	—	—	—	—	—	03	17
04	20	32	6	—	8	0.3	35	7	—	10	0.3	40	9	—	14	26	15	6	0.6	0.3		47	12	—	18	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	04	20
05	25	37	6	—	8	0.3	42	8	—	11	0.6	47	10	—	15	28	20	7	0.6	0.3		52	12	—	18	34	20	8	1	0.3	60	16	21	24	45	15	11	1	0.6	73	29	1.1	05	25
06	30	42	6	—	8	0.3	47	8	—	11	0.6	52	10	—	16	29	25	7	0.6	0.3		60	14	—	21	38	25	9	1	0.3	70	18	24	28	52	20	12	1	0.6	85	34	1.1	06	30
07	35	47	6	—	8	0.3	52	8	—	12	0.6	62	12	—	18	34	30	8	1	0.3		68	15	—	24	44	30	10	1	0.3	80	20	27	32	59	25	14	1.1	0.6	100	39	1.1	07	35
08	40	52	6	—	9	0.3	60	9	—	13	0.6	68	13	—	19	36	30	9	1	0.6		78	17	22	26	49	30	12	1	0.6	90	23	30	36	65	30	15	1.1	0.6	110	42	1.5	08	40
09	45	60	7	—	10	0.3	65	9	—	14	0.6	73	13	—	20	37	35	9	1	0.6		85	18	24	28	52	35	12	1	0.6	100	25	34	39	72	35	17	1.1	0.6	120	45	2	09	45
10	50	65	7	—	10	0.3	70	9	—	14	0.6	78	13	—	22	39	40	9	1	0.6		95	20	27	31	58	40	14	1.1	0.6	110	27	36	43	78	40	18	1.5	0.6	135	51	2	10	50
11	55	70	7	—	10	0.3	78	10	—	16	0.6	90	16	21	25	45	45	10	1	0.6		105	23	30	35	64	45	15	1.1	0.6	120	29	39	48	87	45	20	1.5	0.6	150	58	2.1	11	55
12	60	75	7	—	10	0.3	85	11	—	17	1	95	16	21	26	46	50	10	1	0.6		110	23	30	35	64	50	15	1.1	0.6	130	32	42	51	93	50	21	1.5	0.6	160	60	2.1	12	60
13	65	80	7	—	10	0.3	90	11	—	18	1	100	16	21	27	47	55	10	1	0.6		115	23	30	36	65	55	15	1.1	0.6	140	34	45	56	101	50	23	2	1	170	63	2.1	13	65
14	70	85	7	—	10	0.3	95	11	—	18	1	105	16	21	27	47	55	10	1	1		125	25	34	40	72	55	16	1.1	1	150	36	48	60	107	55	24	2	1	180	67	3	14	70
15	75	90	7	—	10	0.3	100	11	—	19	1	110	16	21	27	47	60	10	1	1		135	27	36	44	79	60	18	1.5	1	160	38	51	65	115	60	26	2	1	190	69	3	15	75
16	80	95	7	—	10	0.3	105	11	—	19	1	115	16	21	28	48	65	10	1	1		140	27	36	44	79	65	18	1.5	1	170	41	54	68	120	65	27	2.1	1	200	73	3	16	80
17	85	100	7	—	10	0.3	110	11	—	19	1	125	18	24	31	55	70	12	1	1		150	29	39	49	87	70	19	1.5	1	180	42	58	72	128	65	29	2.1	1.1	215	78	4	17	85
18	90	105	7	—	10	0.3	120	14	—	22	1	135	20	27	35	62	75	14	1.1	1		155	29	39	50	88	75	19	1.5	1	190	45	60	77	135	70	30	2.1	1.1	225	82	4	18	90
20	100	120	9	—	14	0.6	135	16	21	25	1	150	23	30	38	67	85	15	1.1	1		170	32	42	55	97	85	21	1.5	1	210	50	67	85	150	80	33	3	1.1	250	90	4	20	100
22	110	130	9	—	14	0.6	145	16	21	25	1	160	23	30	38	67	95	15	1.1	1		190	36	48	63	110	95	24	2	1	230	54	73	95	166	90	37	3	1.1	270	95	5	22	110
24	120	140	9	—	14	0.6	155	16	21	25	1	170	23	30	39	68	100	15	1.1	1.1		210	41	54	70	123	100	27	2.1	1.1	250	58	78	102	177	95	40	4	1.5	300	109	5	24	120
26	130	150	9	—	14	0.6	170	18	24	30	1	190	27	36	45	80	110	18	1.5	1.1		225	42	58	75	130	110	30	2.1	1.1	270	63	85	110	192	100	42	4	2	320	115	5	26	130
28	140	160	9	—	14	0.6	180	18	24	31	1	200	27	36	46	81	120	18	1.5	1.1		240	45	60	80	140	120	31	2.1	1.1	280	63	85	112	196	110	44	4	2	340	122	5	28	140
30	150	170	9	—	14	0.6	190	18	24	31	1	215	29	39	50	89	130	20	1.5	1.1		250	45	60	80	140	130	31	2.1	1.1	300	67	90	120	209	120	46	4	2	360	125	6	30	150
32	160	180	9	—	14	0.6	200	18	24	31	1	225	29	39	51	90	140	20	1.5	1.1		270	50	67	87	153	140	33	3	1.1	320	73	95	130	226	130	50	5	2	380	132	6	32	160
34	170	190	9	—	14	0.6	215	20	27	34	1.1	240	32	42	55	97	150	21	1.5	1.1		280	50	67	87	153	150	33	3	1.1	340	78	103	135	236	135	50	5	2.1	400	140	6	34	170
36	180	200	9	—	14	0.6	225	20	27	34	1.1	250	32	42	56	98	150	21	1.5	2		300	54	73	95	165	150	37	3	2	360	82	109	140	245	140	52	5	3	420	145	6	36	180
38	190	215	11	—	17	1	240	23	30	37	1.1	270	36	48	62	109	160	24	2	2		320	58	78	105	183	160	40	4	2	380	85	115	150	—	—	—	5	—	440	150	6	38	190
40	200	225	11	—	17	1	250	23	30	37	1.1	280	36	48	62	109	170	24	2	2		340	63	85	110	192	170	42	4	2	400	90	122	155	—	—	—	5	—	460	155	7.5	40	200
44	220	250	14	—	22	1	270	23	30	37	1.1	300	36	48	63	110	190	24	2	2		360	63	85	112	—	—	—	4	—	420	90	122	160	—	—	—	6	—	500	170	7.5	44	220
48	240	270	14	—	22	1	300	27	36	45	1.5	340	45	60	78	—	—	—	2.1	—		380	63	85	112	—	—	—	4	—	440	90	122	160	—	—	—	6	—	540	180	7.5	48	240
52	260	290	14	—	22	1	320	27	36	45	1.5	360	45	60	79	—	—	—	2.1	—		420	73	95	130	—	—	—	5	—	480	100	132	175	—	—	—	6	—	580	190	9.5	52	260
56	280	310	14	—	22	1	350	32	42	53	1.5	380	45	60	80	—	—	—	2.1	—		440	73	95	130	—	—	—	5	—	520	109	145	190	—	—	—	6	—	620	206	9.5	56	280
60	300	340	18	24	30	1	380	36	48	62	2	420	54	73	95	—	—	—	3	—		480	82	109	140	—	—	—	5	—	540	109	145	190	—	—	—	6	—	670	224	9.5	60	300
64	320	360	18	24	30	1	400	36	48	63	2	440	54	73	95	—	—	—	3	—		500	82	109	140	—	—	—	5	—	580	118	155	205	—	—	—	7.5	—	710	236	9.5	64	320
68	340	380	18	24	30	1	420	36	48	64	2	460	54	73	96	—	—	—	3	—		540	90	122	160	—	—	—	5	—	620	125	170	220	—	—	—	7.5	—	750	243	12	68	340
72	360	400	18	24	30	1	440	36	48	65	2	500	63	85	110	—	—	—	4	—		560	90	122	160	—	—	—	5	—	640	125	170	220	—	—	—	7.5	—	780	250	12	72	360
76	380	420	18	24	30	1	460	36	48	65	2	520	63	85	112	—	—	—	4	—		600	100	132	175	—	—	—	6	—	670	132	175	224	—	—	—	7.5	—	820	265	12	76	380
80	400	440	18	24	30	1	480	36	48	65	2	540	63	85	112	—	—	—	4	—		620	100	132	175	—	—	—	6	—	710	140	185	243	—	—	—	7.5	—	850	272	12	80	400
84	420	460	18	24	30	1	500	36	48	65	2	580	73	95	130	—	—	—	5	—		650	103	140	180	—	—	—	6	—	730	140	185	243	—	—	—	7.5	—	900	290	15	84	420
88	440	480	18	24	30	1	540	45	60	80	2.1	600	73	95	130	—	—	—	5	—		680	109	145	190	—	—	—	6	—	780	155	206	265	—	—	—	9.5	—	950	308	15	88	440
92	460	500	18	24	30	1	560	45	60	80	2.1	620	73	95	130	—	—	—	5	—		710	112	150	195	—	—	—	6	—	800	155	206	265	—	—	—	9.5	—	980	315	15	92	460
96	480	520	18	24	30	1	580	45	60	80	2.1	650	78	103	135	—	—	—	5	—		730	112	150	195	—	—	—	6	—	850	165	224	290	—	—	—	9.5	—	1000	315	15	96	480
/500	500	540	18	24	30	1	600	45	60	80	2.1	670	78	103	135	—	—	—	5	—		750	112	150	195	—	—	—	6	—	870	165	224	290	—	—	—	9.5	—	1060	335	15	/500	500
/530	530	580	23	30	38	1.1	640	50	67	85	3	710	82	109	140	—	—	—	5	—		800	122	160	212	—	—	—	7.5	—	920	175	236	308	—	—	—	9.5	—	1090	335	15	/530	530
/560	560	610	23	30	38	1.1	670	50	67	85	3	750	85	115	150	—	—	—	5	—		850	132	175	224	—	—	—	7.5	—	980	190	250	335	—	—	—	12	—	1150	355	15	/560	560
/600	600	650	23	30	38	1.1	710	50	67	85	3	800	90	122	160	—	—	—	5	—		900	136	180	236	—	—	—	7.5	—	1030	195	258	335	—	—	—	12	—	1220	375	15	/600	600
/630	630	680	23	30	38	1.1	750	54	73	95	3	850	100	132	175	—	—	—	6	—		950	145	190	250	—	—	—	9.5	—	1090	206	280	365	—	—	—	12	—	1280	388	15	/630	630
/670	670	730	27	36	45	1.5	800	58	78	105	4	900	103	140	180	—	—	—	6	—		1000	150	200	258	—	—	—	9.5	—	1150	218	290	375	—	—	—	15	—	1320	388	15	/670	670
/710	710	780	32	42	53	1.5	850	63	85	112	4	950	109	145	190	—	—	—	6	—		1060	160	212	272	—	—	—	9.5	—	1220	230	308	400	—	—	—	15	—	1400	412	15	/710	710
/750	750	820	32	42	53	1.5	900	67	90	120	4	1000	112	150	195	—	—	—	6	—		1120	165	224	290	—	—	—	9.5	—	1280	236	315	412	—	—	—	15	—	—	—	—	/750	750
/800	800	870	32	42	53	1.5	950	67	90	120	4	1060	118	155	205	—	—	—	7.5	—		1180	170	230	300	—	—	—	9.5	—	1360	250	335	438	—	—	—	15	—	—	—	—	/800	800
/850	850	920	32	42	53	1.5	1000	67	90	120	4	1120	122	160	212	—	—	—	7.5	—		1250	180	243	315	—	—	—	12	—	1440	—	354	—	—	—	—	15	—	—	—	—	/850	850
/900	900	980	36	48	63	2	1060	73	95	130	5	1180	125	170	220	—	—	—	7.5	—		1320	190	250	335	—	—	—	12	—	1520	—	372	—	—	—	—	15	—	—	—	—	/900	900
/950	950	1030	36	48	63	2	1120	78	103	135	5	1250	136	180	236	—	—	—	7.5	—		1400	200	272	355	—	—	—	12	—	1600	—	390	—	—	—	—	15	—	—	—	—	/950	950
/1000	1000	1090	41	54	70	2.1	1180	82	109	140	5	1320	145	190	250	—	—	—	9.5	—		1460	—	276	—	—	—	—	12	—	1670	—	402	—	—	—	—	15	—	—	—	—	/1000	1000
/1060	1060	1150	41	54	70	2.1	1250	85	115	150	5	1400	155	206	265	—	—	—	9.5	—		1540	—	288	—	—	—	—	15	—	1770	—	426	—	—	—	—	15	—	—	—	—	/1060	1060
/1120	1120	1220	45	60	80	2.1	1320	90	122	160	5	1460	—	206	—	—	—	—	9.5	—		1630	—	306	—	—	—	—	15	—	1860	—	444	—	—	—	—	15	—	—	—	—	/1120	1120
/1180	1180	1280	45	60	80	2.1	1400	100	132	175	6	1520	—	206	—	—	—	—	9.5	—		1710	—	318	—	—	—	—	15	—	1950	—	462	—	—	—	—	19	—	—	—	—	/1180	1180
/1250	1250	1360	50	67	85	3	1460	—	—	175	6	1610	—	216	—	—	—	—	9.5	—		1800	—	330	—	—	—	—	15	—	2050	—	480	—	—	—	—	19	—	—	—	—	/1250	1250
/1320	1320	1440	—	—	95	3	1540	—	—	175	6	1700	—	228	—	—	—	—	9.5	—		1900	—	348	—	—	—	—	19	—	2160	—	505	—	—	—	—	19	—	—	—	—	/1320	1320
/1400	1400	1520	—	—	95	3	1630	—	—	180	6	1760	—	234	—	—	—	—	12	—		2000	—	360	—	—	—	—	19	—	2280	—	530	—	—	—	—	19	—	—	—	—	/1400	1400
/1500	1500	1630	—	—	105	4	1750	—	—	195	6	1920	—	252	—	—	—	—	12	—		2140	—	384	—	—	—	—	19	—	—	—	—	—	—	—	—	—	—	—	—	—	/1500	1500
/1600	1600	1730	—	—	105	4	1850	—	—	195	6	2040	—	264	—	—	—	—	15	—		2270	—	402	—	—	—	—	19	—	—	—	—	—	—	—	—	—	—	—	—	—	/1600	1600
/1700	1700	1840	—	—	112	4	1970	—	—	212	7.5	2160	—	276	—	—	—	—	15	—		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	/1700	1700
/1800	1800	1950	—	—	120	4	2080	—	—	220	7.5	2280	—	280	—	—	—	—	15	—		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	/1800	1800
/1900	1900	2060	—	—	130	5	2180	—	—	220	7.5	—	—	—	—	—	—	—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	/1900	1900
/2000	2000	2160	—	—	130	5	2300	—	—	236	7.5	—	—	—	—	—	—	—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	/2000	2000
/2120	2120	2300	—	—	140	5	2430	—	—	243	7.5	—	—	—	—	—	—	—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	/2120	2120
/2240	2240	2430	—	—	150	5	2570	—	—	258	9.5	—	—	—	—	—	—	—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	/2240	2240
/2360	2360	2550	—	—	150	5	2700	—	—	265	9.5	—	—	—	—	—	—	—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	/2360	2360
/2500	2500	2700	—	—	160	5	2850	—	—	272	9.5	—	—	—	—	—	—	—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	/2500	2500

Remark: Chamfer dimensions r(min) are the smallest chamfer dimensions allowable.

4.5 Dimensions of Snap Ring Grooves and Snap Rings

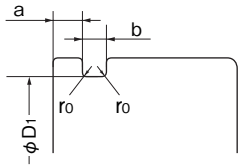


Table 4.5.1 Dimensions of Snap Ring Grooves for Bearing Dimension Series 18 and 19 Unit: mm

Nominal bearing outside diameter D	Snap ring groove diameter D1		Snap ring groove location a				Snap ring groove width b		Fillet radius at snap ring groove bottom r0	Applicable snap ring
			Dimension series 18		Dimension series 19					
	Max	Min	Max	Min	Max	Min	Max	Min	Max	
22	20.8	20.5	—	—	1.05	0.9	1.05	0.8	0.2	NR1022
24	22.8	22.5	—	—	1.05	0.9	1.05	0.8	0.2	NR1024
28	26.7	26.4	—	—	1.3	1.15	1.2	0.95	0.25	NR1028
30	28.7	28.4	—	—	1.3	1.15	1.2	0.95	0.25	NR1030
32	30.7	30.4	1.3	1.15	—	—	1.2	0.95	0.25	NR1032
34	32.7	32.4	1.3	1.15	—	—	1.2	0.95	0.25	NR1034
37	35.7	35.4	1.3	1.15	1.7	1.55	1.2	0.95	0.25	NR1037
39	37.7	37.4	—	—	1.7	1.55	1.2	0.95	0.25	NR1039
40	38.7	38.4	1.3	1.15	—	—	1.2	0.95	0.25	NR1040
42	40.7	40.4	1.3	1.15	1.7	1.55	1.2	0.95	0.25	NR1042
44	42.7	42.4	1.3	1.15	—	—	1.2	0.95	0.25	NR1044
45	43.7	43.4	—	—	1.7	1.55	1.2	0.95	0.25	NR1045
47	45.7	45.4	1.3	1.15	1.7	1.55	1.2	0.95	0.25	NR1047
52	50.7	50.4	1.3	1.15	1.7	1.55	1.2	0.95	0.25	NR1052
55	53.7	53.4	—	—	1.7	1.55	1.2	0.95	0.25	NR1055
58	56.7	56.4	1.3	1.15	—	—	1.2	0.95	0.25	NR1058
62	60.7	60.3	—	—	1.7	1.55	1.2	0.95	0.25	NR1062
65	63.7	63.3	1.3	1.15	—	—	1.2	0.95	0.25	NR1065
68	66.7	66.3	—	—	1.7	1.55	1.2	0.95	0.25	NR1068
72	70.7	70.3	1.7	1.55	1.7	1.55	1.2	0.95	0.25	NR1072
78	76.2	75.8	1.7	1.55	—	—	1.6	1.3	0.4	NR1078
80	77.9	77.5	—	—	2.1	1.9	1.6	1.3	0.4	NR1080
85	82.9	82.5	1.7	1.55	2.1	1.9	1.6	1.3	0.4	NR1085
90	87.9	87.5	1.7	1.55	2.1	1.9	1.6	1.3	0.4	NR1090
95	92.9	92.5	1.7	1.55	—	—	1.6	1.3	0.4	NR1095
100	97.9	97.5	1.7	1.55	2.5	2.3	1.6	1.3	0.4	NR1100
105	102.6	102.1	—	—	2.5	2.3	1.6	1.3	0.4	NR1105
110	107.6	107.1	2.1	1.9	2.5	2.3	1.6	1.3	0.4	NR1110
115	112.6	112.1	2.1	1.9	—	—	1.6	1.3	0.4	NR1115
120	117.6	117.1	2.1	1.9	3.3	3.1	1.6	1.3	0.4	NR1120
125	122.6	122.1	2.1	1.9	3.3	3.1	1.6	1.3	0.4	NR1125
130	127.6	127.1	2.1	1.9	3.3	3.1	1.6	1.3	0.4	NR1130
140	137.6	137.1	2.5	2.3	3.3	3.1	2.2	1.9	0.6	NR1140
145	142.6	142.1	—	—	3.3	3.1	2.2	1.9	0.6	NR1145
150	147.6	147.1	2.5	2.3	3.3	3.1	2.2	1.9	0.6	NR1150
165	161.8	161.3	3.3	3.1	3.7	3.5	2.2	1.9	0.6	NR1165
175	171.8	171.3	3.3	3.1	—	—	2.2	1.9	0.6	NR1175
180	176.8	176.3	—	—	3.7	3.5	2.2	1.9	0.6	NR1180
190	186.8	186.3	3.3	3.1	3.7	3.5	2.2	1.9	0.6	NR1190
200	196.8	196.3	3.3	3.1	—	—	2.2	1.9	0.6	NR1200

Remarks: Minimum allowable chamfer at groove side of outer ring by nominal bearing outside diameter are shown below.
0.3 mm in dimension series 18 up to and including D = 78 mm, over D = 78 is 0.5 mm.
0.3 mm in dimension series 19 up to and including D = 47 mm, over D = 47 is 0.5 mm.

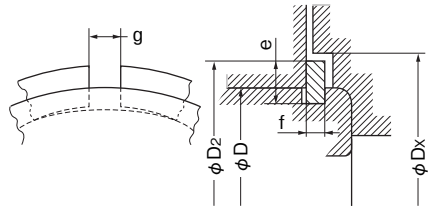


Table 4.5.2 Snap Ring Dimensions and Mounted Dimensions for Bearing Dimensions Series 18 and 19 Unit: mm

Snap ring No.	Snap ring dimensions				After snap ring mounting		Applicable Bearing			Diameter of end cover bore Dx (min)
	Section height e		Thickness f				Nominal bearing outside diameter D	Dimension series		
								18	19	
	Max	Min	Max	Min	Gap dimensions g	Outside diameter of snap ring D2 (max)	Nominal Bearing bore diameter d			
NR1022	2.0	1.85	0.7	0.6	2	24.8	22	—	10	25.5
NR1024	2.0	1.85	0.7	0.6	2	26.8	24	—	12	27.5
NR1028	2.05	1.9	0.85	0.75	3	30.8	28	—	15	31.5
NR1030	2.05	1.9	0.85	0.75	3	32.8	30	—	17	33.5
NR1032	2.05	1.9	0.85	0.75	3	34.8	32	20	—	35.5
NR1034	2.05	1.9	0.85	0.75	3	36.8	34	22	—	37.5
NR1037	2.05	1.9	0.85	0.75	3	39.8	37	25	20	40.5
NR1039	2.05	1.9	0.85	0.75	3	41.8	39	—	22	42.5
NR1040	2.05	1.9	0.85	0.75	3	42.8	40	28	—	43.5
NR1042	2.05	1.9	0.85	0.75	3	44.8	42	30	25	45.5
NR1044	2.05	1.9	0.85	0.75	4	46.8	44	32	—	47.5
NR1045	2.05	1.9	0.85	0.75	4	47.8	45	—	28	48.5
NR1047	2.05	1.9	0.85	0.75	4	49.8	47	35	30	50.5
NR1052	2.05	1.9	0.85	0.75	4	54.8	52	40	32	55.5
NR1055	2.05	1.9	0.85	0.75	4	57.8	55	—	35	58.5
NR1058	2.05	1.9	0.85	0.75	4	60.8	58	45	—	61.5
NR1062	2.05	1.9	0.85	0.75	4	64.8	62	—	40	65.5
NR1065	2.05	1.9	0.85	0.75	4	67.8	65	50	—	68.5
NR1068	2.05	1.9	0.85	0.75	5	70.8	68	—	45	72
NR1072	2.05	1.9	0.85	0.75	5	74.8	72	55	50	76
NR1078	3.25	3.1	1.12	1.02	5	82.7	78	60	—	84
NR1080	3.25	3.1	1.12	1.02	5	84.4	80	—	55	86
NR1085	3.25	3.1	1.12	1.02	5	89.4	85	65	60	91
NR1090	3.25	3.1	1.12	1.02	5	94.4	90	70	65	96
NR1095	3.25	3.1	1.12	1.02	5	99.4	95	75	—	101
NR1100	3.25	3.1	1.12	1.02	5	104.4	100	80	70	106
NR1105	4.04	3.89	1.12	1.02	5	110.7	105	—	75	112
NR1110	4.04	3.89	1.12	1.02	5	115.7	110	85	80	117
NR1115	4.04	3.89	1.12	1.02	5	120.7	115	90	—	122
NR1120	4.04	3.89	1.12	1.02	7	125.7	120	95	85	127
NR1125	4.04	3.89	1.12	1.02	7	130.7	125	100	90	132
NR1130	4.04	3.89	1.12	1.02	7	135.7	130	105	95	137
NR1140	4.04	3.89	1.7	1.6	7	145.7	140	110	100	147
NR1145	4.04	3.89	1.7	1.6	7	150.7	145	—	105	152
NR1150	4.04	3.89	1.7	1.6	7	155.7	150	120	110	157
NR1165	4.85	4.7	1.7	1.6	7	171.5	165	130	120	173
NR1175	4.85	4.7	1.7	1.6	10	181.5	175	140	—	183
NR1180	4.85	4.7	1.7	1.6	10	186.5	180	—	130	188
NR1190	4.85	4.7	1.7	1.6	10	196.5	190	150	140	198
NR1200	4.85	4.7	1.7	1.6	10	206.5	200	160	—	208

Remarks: Minimum allowable chamfer at groove side of outer ring by nominal bearing outside diameter are shown below.
0.3 mm in dimension series 18 up to and including D = 78 mm, over D = 78 is 0.5 mm.
0.3 mm in dimension series 19 up to and including D = 47 mm, over D = 47 is 0.5 mm.

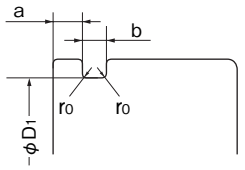


Table 4.5.3 Dimensions of Snap Ring Grooves for Bearing Diameter Series 0, 2, 3 and 4

Unit: mm

Nominal bearing outside diameter D	Snap ring groove diameter D1		Snap ring groove location a				Snap ring groove width b		Fillet radius at snap ring groove bottom r0	Applicable snap ring
			Dimension series 0		Dimension series 2, 3, 4					
	Max	Min	Max	Min	Max	Min	Max	Min	Max	
13	12.04	11.91	–	–	1.1	0.95	1.05	0.8	0.2	NR 13
16	15.16	15.04	–	–	1.2	1.05	1.05	0.8	0.2	NR 16
19	18.25	18.1	1.73	1.55	1.73	1.55	1.05	0.8	0.2	NR 19
22	21.11	20.95	1.73	1.55	1.73	1.55	1.05	0.8	0.2	NR 22
24	23	22.85	1.73	1.55	1.73	1.55	1.05	0.8	0.2	NR 24
26	25.15	25	1.73	1.55	1.73	1.55	1.05	0.8	0.2	NR 26
28	26.7	26.4	1.73	1.55	1.73	1.55	1.2	0.95	0.25	NR 28
30	28.17	27.91	–	–	2.06	1.9	1.65	1.35	0.4	NR 30
32	30.15	29.9	2.06	1.9	2.06	1.9	1.65	1.35	0.4	NR 32
35	33.17	32.92	2.06	1.9	2.06	1.9	1.65	1.35	0.4	NR 35
37	34.77	34.52	–	–	2.06	1.9	1.65	1.35	0.4	NR 37
40	38.1	37.85	–	–	2.06	1.9	1.65	1.35	0.4	NR 40
42	39.75	39.5	2.06	1.9	2.06	1.9	1.65	1.35	0.4	NR 42
44	41.75	41.5	2.06	1.9	–	–	1.65	1.35	0.4	NR 44
47	44.6	44.35	2.06	1.9	2.46	2.31	1.65	1.35	0.4	NR 47
50	47.6	47.35	–	–	2.46	2.31	1.65	1.35	0.4	NR 50
52	49.73	49.48	2.06	1.9	2.46	2.31	1.65	1.35	0.4	NR 52
55	52.6	52.35	2.08	1.88	–	–	1.65	1.35	0.4	NR 55
56	53.6	53.35	–	–	2.46	2.31	1.65	1.35	0.4	NR 56
58	55.6	55.35	2.08	1.88	2.46	2.31	1.65	1.35	0.4	NR 58
62	59.61	59.11	2.08	1.88	3.28	3.07	2.2	1.9	0.6	NR 62
65	62.6	62.1	–	–	3.28	3.07	2.2	1.9	0.6	NR 65
68	64.82	64.31	2.49	2.29	3.28	3.07	2.2	1.9	0.6	NR 68
72	68.81	68.3	–	–	3.28	3.07	2.2	1.9	0.6	NR 72
75	71.83	71.32	2.49	2.29	3.28	3.07	2.2	1.9	0.6	NR 75
80	76.81	76.3	2.49	2.29	3.28	3.07	2.2	1.9	0.6	NR 80
85	81.81	81.31	–	–	3.28	3.07	2.2	1.9	0.6	NR 85
90	86.79	86.28	2.87	2.67	3.28	3.07	3	2.7	0.6	NR 90
95	91.82	91.31	2.87	2.67	–	–	3	2.7	0.6	NR 95
100	96.8	96.29	2.87	2.67	3.28	3.07	3	2.7	0.6	NR100
110	106.81	106.3	2.87	2.67	3.28	3.07	3	2.7	0.6	NR110
115	111.81	111.3	2.87	2.67	–	–	3	2.7	0.6	NR115
120	115.21	114.71	–	–	4.06	3.86	3.4	3.1	0.6	NR120
125	120.22	119.71	2.87	2.67	4.06	3.86	3.4	3.1	0.6	NR125
130	125.22	124.71	2.87	2.67	4.06	3.86	3.4	3.1	0.6	NR130
140	135.23	134.72	3.71	3.45	4.9	4.65	3.4	3.1	0.6	NR140
145	140.23	139.73	3.71	3.45	–	–	3.4	3.1	0.6	NR145
150	145.24	144.73	3.71	3.45	4.9	4.65	3.4	3.1	0.6	NR150
160	155.22	154.71	3.71	3.45	4.9	4.65	3.4	3.1	0.6	NR160
170	163.65	163.14	3.71	3.45	5.69	5.44	3.8	3.5	0.6	NR170
180	173.66	173.15	3.71	3.45	5.69	5.44	3.8	3.5	0.6	NR180
190	183.64	183.13	–	–	5.69	5.44	3.8	3.5	0.6	NR190
200	193.65	193.14	5.69	5.44	5.69	5.44	3.8	3.5	0.6	NR200
210	203.6	203.1	5.69	5.44	–	–	3.8	3.5	1	NR210
215	208.6	208.1	–	–	5.69	5.44	3.8	3.5	1	NR215
225	217	216.5	6.5	6.2	6.5	6.2	4.9	4.5	1	NR225
230	222	221.5	–	–	6.5	6.2	4.9	4.5	1	NR230
240	232	231.5	6.5	6.2	6.5	6.2	4.9	4.5	1	NR240
250	242	241.5	–	–	6.5	6.2	4.9	4.5	1	NR250

Remarks: 1. These dimensions are applied to diameter series 0, 2, 3, and 4 but not to dimension series 00, 82, and 83.
2. Minimum allowable chamfer for outside of outer ring is 0.5 mm.
However, it is 0.3 mm for diameter series 0 and nominal bearing outside diameter 35 mm.

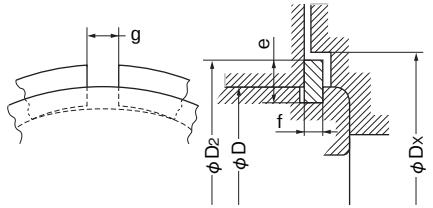


Table 4.5.4 Snap Ring Dimensions for Bearing Diameter Series 0, 2, 3 and 4

Unit: mm

Snap ring No.	Snap ring dimensions				After snap ring mounting		Applicable Bearing					Diameter of end cover bore Dx (min)
	Section height e		Thickness f				Nominal bearing outside diameter D	Diameter series				
								0	2	3	4	
	Max	Min	Max	Min	Gap dimensions g	Outside diameter of snap ring D2 (max)		Nominal Bearing bore diameter d				
NR 13	1.15	1.0	0.7	0.6	3	14.3	13	–	4	3	–	14.5
NR 16	1.65	1.5	0.7	0.6	3	18.5	16	–	5	4	–	19
NR 19	1.65	1.5	0.7	0.6	3	21.5	19	7	6	5	–	22
NR 22	2.00	1.85	0.7	0.6	3	25.1	22	8	7	6	–	25.5
NR 24	2.00	1.85	0.7	0.6	3	27	24	9	8	–	–	27.5
NR 26	2.00	1.85	0.7	0.6	3	29.2	26	10	9	7	–	30
NR 28	2.05	1.90	0.85	0.75	3	30.8	28	12	–	8	–	31.5
NR 30	3.25	3.1	1.12	1.02	3	34.7	30	–	10	9	8	35.5
NR 32	3.25	3.1	1.12	1.02	3	36.7	32	15	12	–	9	37.5
NR 35	3.25	3.1	1.12	1.02	3	39.7	35	17	15	10	–	40.5
NR 37	3.25	3.1	1.12	1.02	3	41.3	37	–	–	12	10	42
NR 40	3.25	3.1	1.12	1.02	3	44.6	40	–	17	–	–	45.5
NR 42	3.25	3.1	1.12	1.02	3	46.3	42	20	–	15	12	47
NR 44	3.25	3.1	1.12	1.02	3	48.3	44	22	–	–	–	49
NR 47	4.04	3.89	1.12	1.02	4	52.7	47	25	20	17	–	53.5
NR 50	4.04	3.89	1.12	1.02	4	55.7	50	–	22	–	–	56.5
NR 52	4.04	3.89	1.12	1.02	4	57.9	52	28	25	20	15	58.5
NR 55	4.04	3.89	1.12	1.02	4	60.7	55	30	–	–	–	61.5
NR 56	4.04	3.89	1.12	1.02	4	61.7	56	–	–	22	–	62.5
NR 58	4.04	3.89	1.12	1.02	4	63.7	58	32	28	–	–	64.5
NR 62	4.04	3.89	1.7	1.6	4	67.7	62	35	30	25	17	68.5
NR 65	4.04	3.89	1.7	1.6	4	70.7	65	–	32	–	–	71.5
NR 68	4.85	4.7	1.7	1.6	5	74.6	68	40	–	28	–	76
NR 72	4.85	4.7	1.7	1.6	5	78.6	72	–	35	30	20	80
NR 75	4.85	4.7	1.7	1.6	5	81.6	75	45	–	32	–	83
NR 80	4.85	4.7	1.7	1.6	5	86.6	80	50	40	35	25	88
NR 85	4.85	4.7	1.7	1.6	5	91.6	85	–	45	–	–	93
NR 90	4.85	4.7	2.46	2.36	5	96.5	90	55	50	40	30	98
NR 95	4.85	4.7	2.46	2.36	5	101.6	95	60	–	–	–	103
NR100	4.85	4.7	2.46	2.36	5	106.5	100	65	55	45	35	108
NR110	4.85	4.7	2.46	2.36	5	116.6	110	70	60	50	40	118
NR115	4.85	4.7	2.46	2.36	5	121.6	115	75	–	–	–	123
NR120	7.21	7.06	2.82	2.72	7	129.7	120	–	65	55	45	131.5
NR125	7.21	7.06	2.82	2.72	7	134.7	125	80	70	–	–	136.5
NR130	7.21	7.06	2.82	2.72	7	139.7	130	85	75	60	50	141.5
NR140	7.21	7.06	2.82	2.72	7	149.7	140	90	80	65	55	152
NR145	7.21	7.06	2.82	2.72	7	154.7	145	95	–	–	–	157
NR150	7.21	7.06	2.82	2.72	7	159.7	150	100	85	70	60	162
NR160	7.21	7.06	2.82	2.72	7	169.7	160	105	90	75	65	172
NR170	9.6	9.45	3.1	3	10	182.9	170	110	95	80	–	185
NR180	9.6	9.45	3.1	3	10	192.9	180	120	100	85	70	195
NR190	9.6	9.45	3.1	3	10	202.9	190	–	105	90	75	205
NR200	9.6	9.45	3.1	3	10	212.9	200	130	110	95	80	215
NR210	9.6	9.45	3.1	3	10	222.8	210	140	–	–	85	225
NR215	9.6	9.45	3.1	3	10	227.8	215	–	120	100	–	230
NR225	10	9.85	3.5	3.4	10	237	225	150	–	105	90	240
NR230	10	9.85	3.5	3.4	10	242	230	–	130	–	–	245
NR240	10	9.85	3.5	3.4	10	252	240	160	–	110	95	255
NR250	10	9.85	3.5	3.4	10	262	250	–	140	–	100	265

Remarks 1. These dimensions are applied to diameter series 0, 2, 3, and 4 but not to dimension series 00, 82, and 83.
2. Minimum allowable chamfer for outside of outer ring is 0.5 mm.
However, it is 0.3 mm for diameter series 0 and nominal bearing outside diameter 35 mm.

4.6 Rolling Contact Bearing Numbers

Table 4.6 Rolling Contact Bearing Numbers Configuration

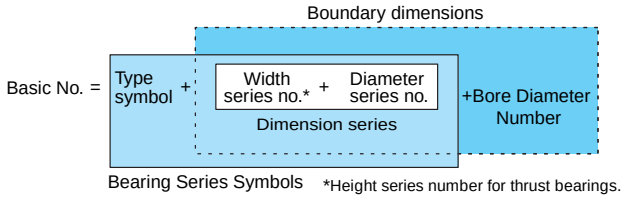
Supplementary Prefix symbol		Basic No.						Supplementary Suffix symbol																											
Material symbols		Bearing Series Code		Bore Diameter Number		Contact Angle Code		Special Design Symbols		*Cage symbols		External feature symbols				Combination symbols		*Sleeve symbols		Internal clearance symbols		Tolerance class symbols		Grease symbols	
												Seal or shield symbols			Ring modification symbols										
Prefix	Description		Description		Description		Description	Suffix	Description	Suffix	Description	Suffix	Description		Suffix	Description	Suffix	Description	Suffix	Description	Suffix	Description	Suffix	Description	Suffix	Description	Suffix	Description	Suffix	Description	Suffix	Description	Suffix	Description	Suffix	Description
B-	Case hardened steel	68	Single row Deep-groove Ball Bearings	1	Diameter 1 mm	Single row Angular Contact Ball Bearings		A	Inner ring width variation for tapered roller bearing	F	With machined mild steel cage	ZE	Shield one side		K	Bearing diameter 1/12 Taper	DB	Back-to-back mounting	+H	Adapter sleeve	C1	Radial clearance C1	(O)	JIS class 0	(AV2)	Shell Alvania grease No. 2
		69				C	Nominal contact angle over 10° under 22° (standard 15°)															C2	Radial clearance C2	P6	JIS class 6		
		60		2	2			E	Roller bearing design change	G	Non-metallic cage	Z	Shield one side				DF	Face-to-face mounting	+AH	Withdrawal sleeve	(CN)	Normal radial clearance	P6X	JIS class 6X	BC325	Esso Beacon 325
		:		3	3										K30	Bearing diameter 1/30 Taper											
C-	Case hardened steel	:		:	:	(A)	Nominal contact angle over 22° under 32° (standard 30°)			L	Machined light alloy cage	ZZE	Shield both sides				DT	Tandem mounting			C3	Radial clearance C3	P5	JIS class 5	MTSRL	Multemp SRL
		70	Single row Angular Contact Ball Bearings	:	:			J	Tapered roller bearing inner and outer rings internationally interchangeable	MY	Machined bronze cage	ZZ	Shield both sides		N	Snap ring groove on outer ring	KB	DB mounting with spacer to outer ring			C4	Radial clearance C4	P4	JIS class 4	PS2	Multemp PS2
		72		9	9																C5	Radial clearance C5	P2	JIS class 2		
		73		00	10																C1P	Radial clearance C1P (extra small ball bearings and miniature ball bearings) Radial clearance				
D-	Case hardened steel	:		01	12	B	Nominal contact angle over 32° under 45° (standard 40°)			V	No cage	NKE	Labyrinth seal one side		NR	Snap ring groove and snap ring on outer ring	+α	Spacer (+ α is nominal width in mm)			C2P	C2P (extra small ball bearings and miniature ball bearings) Radial clearance	UP	NACHI class UP		
		:		02	15																C6P	C6P (extra small ball bearings and miniature ball bearings)				
		12	Self-Aligning Ball Bearings	03	17																C9na	Cylindrical roller bearing non-interchangeable clearance C9				
		13		04	20																C1na	Cylindrical roller bearing non-interchangeable clearance C1				
H-	High speed steel	22		/22	22	Tapered Roller Bearings		S26	Heat stabilization treatment	Y	Pressed non-metallic cage	NK	Labyrinth seal one side				D DU	Flush ground ball bearing			C2na	Cylindrical roller bearing non-interchangeable clearance C2				
		:		05	25																CM	Deep groove ball bearings and non-interchangeable clearance of cylindrical roller bearings for electric motors				
		:		/28	28																CT	Interchangeable clearance of cylindrical roller bearings for electric motors				
S-	Stainless steel	NU 10	Cylindrical Roller Bearings	06	30	D	Nominal contact angle over 24° under 32°	S28	Heat stabilization treatment			-2NKE	Labyrinth seal both sides														
		NJ 2		/32	32																						
		N 3		07	35	C	Nominal contact angle over 17° under 24°					-2NK	Labyrinth seal both sides														
		NN 30		08	40			W20	Oil holes in outer ring			NSE	Contact seal one side														
		:		:	:																						
		:		:	:			W33	Oil holes and grooves in outer ring			NSL	Contact seal one side														
		NA48	Needle Roller Bearings	88	440																						
		NA49		92	460			E2	Spherical roller bearing with machined cage			-2NSE	Contact seal both sides														
		NA69		96	480																						
		:		/500	500			EX	High capacity spherical roller bearing			-2NSL	Contact seal both sides														
		:		/530	530																						
		320	Tapered Roller Bearings	/560	560			A2X	High speed spherical roller bearing																		
		322																									
		323						AEX	High speed and high capacity spherical roller bearing																		
		:																									
		:						V	Special design for vibrating machine																		
		230	Spherical Roller Bearings																								
		222																									
		223																									
		:																									
		:																									
		511	Flat Back Face Thrust Ball Bearings																								
		512																									
		513																									
		:																									
		:																									
		292	Spherical Roller Thrust Bearings																								
		293																									
		294																									
		:																									

Note: (1) Denotes polyamide for angular contact ball bearing of contact angle symbol C.

Remarks: 1. Symbols in parentheses can be omitted.
2. Symbols marked with an "*" are not marked on the bearings.
3. Bearing modification symbol NR is marked without R on the bearings.

NACHI Rolling Contact Bearing Numbers ···Examples

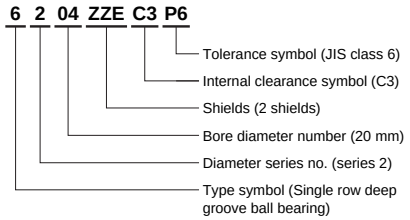
The NACHI part number for rolling contact bearings consists of the basic number and supplementary codes. The part number defines the bearing configuration, tolerance, general boundary dimensions, and other specifications.
NACHI uses supplemental prefix and suffix symbols as shown in Table 4.6. The NACHI basic number consists of the following:



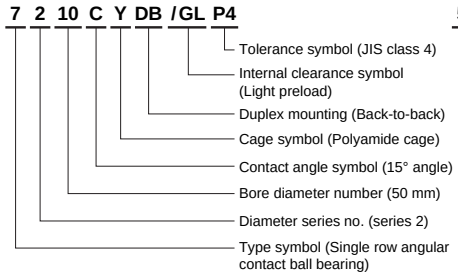
Bore Diameter number

Bore (mm)	4	5	6	7	8	9	10	12	15	17	20	25	····	480	500	530	····
Bore diameter number	4	5	6	7	8	9	00	01	02	03	04	05	····	96	/500	/530	····
Remarks	Bore Diameter						——				(bore dia.)/5			/bore diameter			

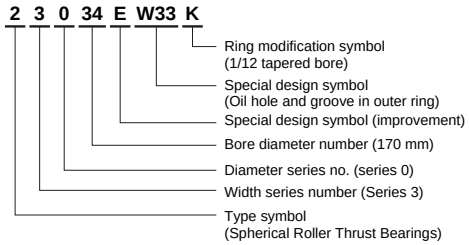
Example 1



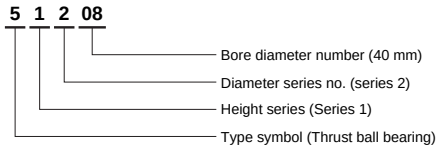
Example 2



Example 3

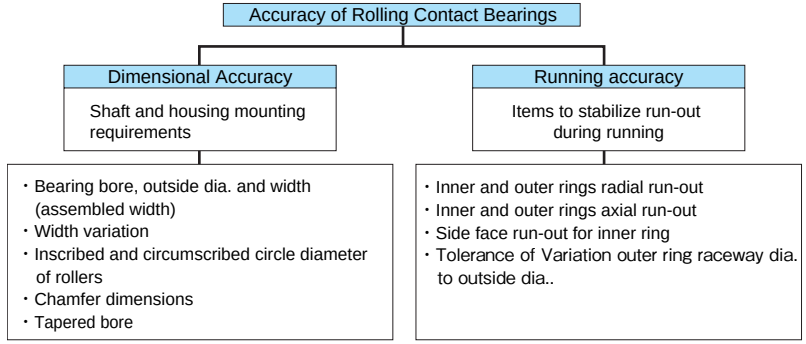


Example 4



5. Accuracy of Rolling Contact Bearings

The tolerance of rolling contact bearings includes dimensional and running accuracy. According to JIS (Japanese Industrial Standard), tolerance is classified into 6 classes; class 0, 6, 6X, 5, 4 and 2 with accuracy ascending from class 0 to 2.
Applicable tolerance classes to individual bearing types and applicable standards are shown in the table below.



Bearing types and tolerance classes

Bearing Type			Tolerance class					Related Standard	Reference Tables
Deep Groove Ball Bearings			JIS class 0	JIS class 6	JIS class 5	JIS class 4	JIS class 2	JIS B 1514	Table 5.1.1
Miniature Ball Bearings Extra Small Ball Bearings	Metric Series	Standard	JIS class 0	JIS class 6	JIS class 5	JIS class 4	JIS class 2	JIS B 1514	Table 5.1.2
		Instrument	—	—	ISO5A	ISO4A	—	ISO 1224	—
	Inch Series	Instrument	—	ABEC 3P	ABEC 5P	ABEC 7P	ABEC 9P	ANSI Std 12,2	—
Angular Contact Ball Bearings			JIS class 0	JIS class 6	JIS class 5	JIS class 4	JIS class 2	JIS B 1514	Table 5.1.1 Table 5.1.2
Self-Aligning Ball Bearings			JIS class 0	—	—	—	—		
Cylindrical Roller Bearings			JIS class 0	JIS class 6	JIS class 5	JIS class 4	JIS class 2		
Spherical Roller Bearings			JIS class 0	—	—	—	—		
Tapered Roller Bearings	Metric Series		JIS class 0 JIS class 6X	JIS class 6	JIS class 5	JIS class 4	—	JIS B 1514	Table 5.2.1 to 5.2.3
	Inch Series		CLASS 4	CLASS 2	CLASS 3	CLASS 0	CLASS 00	ANSI／ABMA 19	Table 5.5.1 to 5.5.4
Thrust Ball Bearings			JIS class 0	JIS class 6	JIS class 5	JIS class 4	—	JIS B 1514	Table 5.3.1 to 5.3.3
Spherical Roller Thrust Bearings			JIS class 0	—	—	—	—	JIS B 1514	Table 5.4.1, 5.4.2

Metric Radial Bearings (Except Tapered Roller Bearings) Class Comparison

Bearing Type			Tolerance class					Related Standard	Reference Tables
Comparative Classes (Reference)	ISO(1)		NORMAL CLASS	— CLASS 6	— CLASS 5	— CLASS 4	— CLASS 2	ISO 492 etc.	—
	DIN(2)		P0	P6	P5	P4	P2	DIN 620	—
	ANSI(3)／ABMA(4)	Ball Bearings	ABEC 1	ABEC 3	ABEC 5	ABEC 7	ABEC 9	ANSI／ABMA 20	—
		Roller Bearings	RBEC 1	RBEC 3	RBEC 5	—	—	ANSI／ABMA 20	—

Notes: (1) ISO International Standard (2) German Industrial Standards
(3) American National Standards Institute (4) American Bearing Manufacturers Association
Remark: For tolerances of chamfer dimensions, see Table 5.6.1 to 5.6.3; for accuracy of tapered bore, see Table 5.7.1 to 5.7.2.

5.1 Tolerance Values for Radial Bearings (Except Tapered Roller Bearings)

Table 5.1.1 Tolerance Values of Inner Ring and of Outer Ring Width

Unit: μm

Nominal bearing bore diameter d (mm)		Bearing with cylindrical bore																														Nominal bearing bore diameter d (mm)	
		Single plane mean bore diameter deviation (2) Δ_{dmp}										Deviation of a single bore diameter (2) Δ_{ds}				Bore diameter variation in a single radial plane (2) V_{dp}										Mean bore diameter variation (2) V_{dmp}							
		Class 0		Class 6		Class 5		Class 4		Class 2		Class 4 Diameter series 0,1,2,3,4		Class 2		Class 0 Diameter series			Class 6 Diameter series			Class 5 Diameter series		Class 4 Diameter series		Class 2	Class 0	Class 6	Class 5	Class 4	Class 2		
																7,8,9	0,1	2,3,4	7,8,9	0,1	2,3,4	7,8,9	0,1,2,3,4	7,8,9	0,1,2,3,4								
Over	Incl.	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	Max			Max			Max		Max		Max	Max	Max	Max	Max	Max	Over	Incl.
0.6(1)	2.5	0	–8	0	–7	0	–5	0	–4	0	–2.5	0	–4	0	–2.5	10	8	6	9	7	5	5	4	4	3	2.5	6	5	3	2	1.5	0.6(1)	2.5
2.5	10	0	–8	0	–7	0	–5	0	–4	0	–2.5	0	–4	0	–2.5	10	8	6	9	7	5	5	4	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	8	6	9	7	5	5	4	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	8	10	8	6	6	5	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	12	9	13	10	8	8	6	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	19	11	15	15	9	9	7	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	25	15	19	19	11	10	8	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	31	19	23	23	14	13	10	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	31	19	23	23	14	13	10	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	38	23	28	28	17	15	12	12	9	8	23	17	8	6	4	180	250
250	315	0	–35	0	–25	0	–18	–	–	–	–	–	–	–	–	44	44	26	31	31	19	18	14	–	–	–	26	19	9	–	–	250	315
315	400	0	–40	0	–30	0	–23	–	–	–	–	–	–	–	–	50	50	30	38	38	23	23	18	–	–	–	30	23	12	–	–	315	400
400	500	0	–45	0	–35	–	–	–	–	–	–	–	–	–	–	56	56	34	44	44	26	–	–	–	–	–	34	26	–	–	–	400	500
500	630	0	–50	0	–40	–	–	–	–	–	–	–	–	–	–	63	63	38	50	50	30	–	–	–	–	–	38	30	–	–	–	500	630
630	800	0	–75	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	630	800
800	1000	0	–100	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	800	1000
1000	1250	0	–125	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1000	1250
1250	1600	0	–160	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1250	1600
1600	2000	0	–200	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1600	2000

Unit: μm

Nominal bearing bore diameter d (mm)		Deviation of a single inner ring width (or a single outer ring width) (3) Δ_{Bs} (or Δ_{Cs})										Inner (or outer) ring width variation V_{Bs} (or V_{Cs})					Radial runout of assembled bearing inner ring K_{ia}					Inner ring reference face runout with bore S_d			Assembled bearing inner ring face runout with raceway (5) S_{ia}			Nominal bearing bore diameter d (mm)	
		Single bearing						Paired or stack mounted bearing (4)				Inner (or outer) ring (3)			Inner ring															
		Class 0 Class 6		Class 5 Class 4		Class 2		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	Class 5	Class 4	Class 2	Class 5	Class 4	Class 2		
Over	Incl.	High	Low	High	Low	High	Low	High	Low	High	Low	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Over	Incl.
0.6(1)	2.5	0	–40	0	–40	0	–40	–	–	0	–250	12	12	5	2.5	1.5	10	5	4	2.5	1.5	7	3	1.5	7	3	1.5	0.6(1)	2.5
2.5	10	0	–120	0	–40	0	–40	0	–250	0	–250	15	15	5	2.5	1.5	10	6	4	2.5	1.5	7	3	1.5	7	3	1.5	2.5	10
10	18	0	–120	0	–80	0	–80	0	–250	0	–250	20	20	5	2.5	1.5	10	7	4	2.5	1.5	7	3	1.5	7	3	1.5	10	18
18	30	0	–120	0	–120	0	–120	0	–250	0	–250	20	20	5	2.5	1.5	13	8	4	3	2.5	8	4	1.5	8	4	2.5	18	30
30	50	0	–120	0	–120	0	–120	0	–250	0	–250	20	20	5	3	1.5	15	10	5	4	2.5	8	4	1.5	8	4	2.5	30	50
50	80	0	–150	0	–150	0	–150	0	–380	0	–250	25	25	6	4	1.5	20	10	5	4	2.5	8	5	1.5	8	5	2.5	50	80
80	120	0	–200	0	–200	0	–200	0	–380	0	–380	25	25	7	4	2.5	25	13	6	5	2.5	9	5	2.5	9	5	2.5	80	120
120	150	0	–250	0	–250	0	–250	0	–500	0	–380	30	30	8	5	2.5	30	18	8	6	2.5	10	6	2.5	10	7	2.5	120	150
150	180	0	–250	0	–250	0	–250	0	–500	0	–380	30	30	8	5	4	30	18	8	6	5	10	6	4	10	7	5	150	180
180	250	0	–300	0	–300	0	–300	0	–500	0	–500	30	30	10	6	5	40	20	10	8	5	11	7	5	13	8	5	180	250
250	315	0	–350	0	–350	–	–	0	–500	0	–500	35	35	13	–	–	50	25	13	–	–	13	–	–	15	–	–	250	315
315	400	0	–400	0	–400	–	–	0	–630	0	–630	40	40	15	–	–	60	30	15	–	–	15	–	–	20	–	–	315	400
400	500	0	–450	–	–	–	–	–	–	–	–	50	45	–	–	–	65	35	–	–	–	–	–	–	–	–	–	400	500
500	630	0	–500	–	–	–	–	–	–	–	–	60	50	–	–	–	70	40	–	–	–	–	–	–	–	–	–	500	630
630	800	0	–750	–	–	–	–	–	–	–	–	70	–	–	–	–	80	–	–	–	–	–	–	–	–	–	–	630	800
800	1000	0	–1000	–	–	–	–	–	–	–	–	80	–	–	–	–	90	–	–	–	–	–	–	–	–	–	–	800	1000
1000	1250	0	–1250	–	–	–	–	–	–	–	–	100	–	–	–	–	100	–	–	–	–	–	–	–	–	–	–	1000	1250
1250	1600	0	–1600	–	–	–	–	–	–	–	–	120	–	–	–	–	120	–	–	–	–	–	–	–	–	–	–	1250	1600
1600	2000	0	–2000	–	–	–	–	–	–	–	–	140	–	–	–	–	140	–	–	–	–	–	–	–	–	–	–	1600	2000

Notes: (1) 0.6 mm is included in this group.
(2) Applies to bearings with cylindrical bore.
(3) Width deviation and variation of outer ring are the same as inner ring. Outer ring width variation of classes 5, 4 and 2 are listed in Table 5.1.2.
(4) Applies to the rings of single bearings made for mounted bearings.
(5) Applies to ball bearings such as deep groove ball bearings and angular contact ball bearings
Remark: The high deviation of bearing bore diameter of cylindrical bore bearings does not apply within a distance from the ring face of 1.2 x r (max) of the chamfer.

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Table 5.1.2 Tolerance Values of Outer Ring

Unit: μm

Nominal bearing outside diameter D (mm)		Bearing outside diameter														Nominal bearing outside diameter D (mm)	
		Single plane mean outside diameter deviation ΔD_{mp}										Deviation of a single outside diameter ΔD_s					
		Class 0		Class 6		Class 5		Class 4		Class 2		Class 4		Class 2			
												Diameter series					
												0,1,2,3,4					
Over	Incl.	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low		
2.5[1]	6	0	–8	0	–7	0	–5	0	–4	0	–2.5	0	–4	0	–2.5	2.5[1]	6
6	18	0	–8	0	–7	0	–5	0	–4	0	–2.5	0	–4	0	–2.5	6	18
18	30	0	–9	0	–8	0	–6	0	–5	0	–4	0	–5	0	–4	18	30
30	50	0	–11	0	–9	0	–7	0	–6	0	–4	0	–6	0	–4	30	50
50	80	0	–13	0	–11	0	–9	0	–7	0	–4	0	–7	0	–4	50	80
80	120	0	–15	0	–13	0	–10	0	–8	0	–5	0	–8	0	–5	80	120
120	150	0	–18	0	–15	0	–11	0	–9	0	–5	0	–9	0	–5	120	150
150	180	0	–25	0	–18	0	–13	0	–10	0	–7	0	–10	0	–7	150	180
180	250	0	–30	0	–20	0	–15	0	–11	0	–8	0	–11	0	–8	180	250
250	315	0	–35	0	–25	0	–18	0	–13	0	–8	0	–13	0	–8	250	315
315	400	0	–40	0	–28	0	–20	0	–15	0	–10	0	–15	0	–10	315	400
400	500	0	–45	0	–33	0	–23	–	–	–	–	–	–	–	–	400	500
500	630	0	–50	0	–38	0	–28	–	–	–	–	–	–	–	–	500	630
630	800	0	–75	0	–45	0	–35	–	–	–	–	–	–	–	–	630	800
800	1000	0	–100	0	–60	–	–	–	–	–	–	–	–	–	–	800	1000
1000	1250	0	–125	–	–	–	–	–	–	–	–	–	–	–	–	1000	1250
1250	1600	0	–160	–	–	–	–	–	–	–	–	–	–	–	–	1250	1600
1600	2000	0	–200	–	–	–	–	–	–	–	–	–	–	–	–	1600	2000
2000	2500	0	–250	–	–	–	–	–	–	–	–	–	–	–	–	2000	2500

Nominal bearing outside diameter D (mm)		Bearing outside diameter														Nominal bearing outside diameter D (mm)	
		Outside diameter variation in a single radial plane [2] V_{Dp}															
		Class 0				Class 6				Class 5		Class 4		Class 2			
		Open bearing			Seal or shield bearings	Open bearing			Seal or shield bearings	Open bearing		Open bearing					
		Diameter series				Diameter series				Diameter series		Diameter series		Open bearing			
		7,8,9	0,1	2,3,4	2,3,4	7,8,9	0,1	2,3,4	0,1,2,3,4	7,8,9	0,1,2,3,4	7,8,9	0,1,2,3,4				
		Max			Max	Max			Max	Max		Max		Max			
2.5[1]	6	10	8	6	10	9	7	5	9	5	4	4	3	2.5	2.5[1]	6
6	18	10	8	6	10	9	7	5	9	5	4	4	3	2.5	6	18
18	30	12	9	7	12	10	8	6	10	6	5	5	4	4	18	30
30	50	14	11	8	16	11	9	7	13	7	5	6	5	4	30	50
50	80	16	13	10	20	14	11	8	16	9	7	7	5	4	50	80
80	120	19	19	11	26	16	16	10	20	10	8	8	6	5	80	120
120	150	23	23	14	30	19	19	11	25	11	8	9	7	5	120	150
150	180	31	31	19	38	23	23	14	30	13	10	10	8	7	150	180
180	250	38	38	23	–	25	25	15	–	15	11	11	8	8	180	250
250	315	44	44	26	–	31	31	19	–	18	14	13	10	8	250	315
315	400	50	50	30	–	35	35	21	–	20	15	15	11	10	315	400
400	500	56	56	34	–	41	41	25	–	23	17	–	–	–	400	500
500	630	63	63	38	–	48	48	29	–	28	21	–	–	–	500	630
630	800	94	94	55	–	56	56	34	–	35	26	–	–	–	630	800
800	1000	125	125	75	–	75	75	45	–	–	–	–	–	–	800	1000
1000	1250	–	–	–	–	–	–	–	–	–	–	–	–	–	1000	1250
1250	1600	–	–	–	–	–	–	–	–	–	–	–	–	–	1250	1600
1600	2000	–	–	–	–	–	–	–	–	–	–	–	–	–	1600	2000
2000	2500	–	–	–	–	–	–	–	–	–	–	–	–	–	2000	2500

Unit: μm

Nominal bearing outside diameter D (mm)		Bearing outside diameter					Radial runout of assembled bearing outer ring K_{ea}					Variation of bearing outside suface generarix inclination with outer ring reference face S_D			Assembled bearing outer ring face runout with raceway [3] S_{ea}			Outer ring width variation [4] V_{Cs}			Nominal bearing outside diameter D (mm)	
		Mean outside diameter variation [2] V_{Dmp}																				
		Class 0	Class 6	Class 5	Class 4	Class 2	Class 0	Class 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		
Over	Incl.	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max		
2.5[1]	6	6	5	3	2	1.5	15	8	5	3	1.5	8	4	1.5	8	5	1.5	5	2.5	1.5	2.5[1]	6
6	18	6	5	3	2	1.5	15	8	5	3	1.5	8	4	1.5	8	5	1.5	5	2.5	1.5	6	18
18	30	7	6	3	2.5	2	15	9	6	4	2.5	8	4	1.5	8	5	2.5	5	2.5	1.5	18	30
30	50	8	7	4	3	2	20	10	7	5	2.5	8	4	1.5	8	5	2.5	5	2.5	1.5	30	50
50	80	10	8	5	3.5	2	25	13	8	5	4	8	4	1.5	10	5	4	6	3	1.5	50	80
80	120	11	10	5	4	2.5	35	18	10	6	5	9	5	2.5	11	6	5	8	4	2.5	80	120
120	150	14	11	6	5	2.5	40	20	11	7	5	10	5	2.5	13	7	5	8	5	2.5	120	150
150	180	19	14	7	5	3.5	45	23	13	8	5	10	5	2.5	14	8	5	8	5	2.5	150	180
180	250	23	15	8	6	4	50	25	15	10	7	11	7	4	15	10	7	10	7	4	180	250
250	315	26	19	9	7	4	60	30	18	11	7	13	8	5	18	10	7	11	7	5	250	315
315	400	30	21	10	8	5	70	35	20	13	8	13	10	7	20	13	8	13	8	7	315	400
400	500	34	25	12	–	–	80	40	23	–	–	15	–	–	23	–	–	15	–	–	400	500
500	630	38	29	14	–	–	100	50	25	–	–	18	–	–	25	–	–	18	–	–	500	630
630	800	55	34	18	–	–	120	60	30	–	–	20	–	–	30	–	–	20	–	–	630	800
800	1000	75	45	–	–	–	140	75	–	–	–	–	–	–	–	–	–	–	–	–	800	1000
1000	1250	–	–	–	–	–	160	–	–	–	–	–	–	–	–	–	–	–	–	–	1000	1250
1250	1600	–	–	–	–	–	190	–	–	–	–	–	–	–	–	–	–	–	–	–	1250	1600
1600	2000	–	–	–	–	–	220	–	–	–	–	–	–	–	–	–	–	–	–	–	1600	2000
2000	2500	–	–	–	–	–	250	–	–	–	–	–	–	–	–	–	–	–	–	–	2000	2500

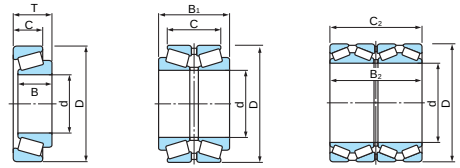
Notes: [1] 2.5 mm is included in this group.
[2] Applies if snap ring is not mounted.
[3] Applies to ball bearings such as deep groove ball bearings and angular contact ball bearings.
Outer ring width variation of classes 0 and 6 are listed in Table 5.1.1.
Remark: The low deviation of outside diameter of bearings does not apply within a distance from the ring face of 1.2 x r (max) of the chamfer.

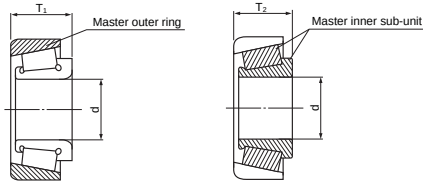
5.2 Tolerance Values for Metric Tapered Roller Bearings

Table 5.2.1 Tolerance Values of Inner Ring

Unit: μm

Nominal bearing bore diameter d (mm)		Bearing bore diameter: Single plane mean bore diameter deviation Δd_{mp}						Deviation of a single bore diameter Δd_s		Bore diameter variation in a single radial plane V_{dp}				Mean bore diameter variation V_{dmp}				Radial runout of assembled bearing inner ring K_{ia}				Inner ring reference face runout with bore S_d		Assembled bearing inner ring face runout with raceway S_{ia}
		Class 0 Class 6X		Class 6 Class 5		Class 4		Class 4		Class 0 Class 6X	Class 6	Class 5	Class 4	Class 0 Class 6X	Class 6	Class 5	Class 4	Class 0 Class 6X	Class 6	Class 5	Class 4	Class 5	Class 4	Class 4
Over	Incl.	High	Low	High	Low	High	Low	High	Low	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
10	18	0	–12	0	–7	0	–5	0	–5	12	7	5	4	9	5	5	4	15	7	5	3	7	3	3
18	30	0	–12	0	–8	0	–6	0	–6	12	8	6	5	9	6	5	4	18	8	5	3	8	4	4
30	50	0	–12	0	–10	0	–8	0	–8	12	10	8	6	9	8	5	5	20	10	6	4	8	4	4
50	80	0	–15	0	–12	0	–9	0	–9	15	12	9	7	11	9	6	5	25	10	7	4	8	5	4
80	120	0	–20	0	–15	0	–10	0	–10	20	15	11	8	15	11	8	5	30	13	8	5	9	5	5
120	180	0	–25	0	–18	0	–13	0	–13	25	18	14	10	19	14	9	7	35	18	11	6	10	6	7
180	250	0	–30	0	–22	0	–15	0	–15	30	22	17	11	23	16	11	8	50	20	13	8	11	7	8
250	315	0	–35	—	—	—	—	—	—	35	—	—	—	26	—	—	—	60	—	—	—	—	—	—
315	400	0	–40	—	—	—	—	—	—	40	—	—	—	30	—	—	—	70	—	—	—	—	—	—
400	500	0	–45	—	—	—	—	—	—	—	—	—	—	—	—	—	—	70	—	—	—	—	—	—
500	630	0	–50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	85	—	—	—	—	—	—
630	800	0	–75	—	—	—	—	—	—	—	—	—	—	—	—	—	—	100	—	—	—	—	—	—





Remarks: 1. The high deviation of inside diameter of bearings does not apply within a distance from the ring face of 1.2 x r (max) of the chamfer.
2. Part of this table is derived from NACHI standards

Table 5.2.2 Tolerance Values of Outer Ring

Unit: μm

Nominal bearing outside diameter D (mm)		Bearing outside diameter: Single plane mean outside diameter deviation ΔD_{mp}						Deviation of a single outside diameter ΔD_s		Outside diameter variation in a single radial plane V_{Dp}				Mean outside diameter variation V_{Dmp}				Radial runout of assembled bearing outer ring K_{ea}				Variation of bearing outside surface generatrix inclination with outer ring reference face S_D		Assembled bearing outer ring face runout with raceway S_{ea}
		Class 0 Class 6X		Class 6 Class 5		Class 4		Class 4		Class 0 Class 6X	Class 6	Class 5	Class 4	Class 0 Class 6X	Class 6	Class 5	Class 4	Class 0 Class 6X	Class 6	Class 5	Class 4	Class 5	Class 4	Class 4
Over	Incl.	High	Low	High	Low	High	Low	High	Low	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
18	30	0	–12	0	–8	0	–6	0	–6	12	8	6	5	9	6	5	4	18	9	6	4	8	4	5
30	50	0	–14	0	–9	0	–7	0	–7	14	9	7	5	11	7	5	5	20	10	7	5	8	4	5
50	80	0	–16	0	–11	0	–9	0	–9	16	11	8	7	12	8	6	5	25	13	8	5	8	4	5
80	120	0	–18	0	–13	0	–10	0	–10	18	13	10	8	14	10	7	5	35	18	10	6	9	5	6
120	150	0	–20	0	–15	0	–11	0	–11	20	15	11	8	15	11	8	6	40	20	11	7	10	5	7
150	180	0	–25	0	–18	0	–13	0	–13	25	18	14	10	19	14	9	7	45	23	13	8	10	5	8
180	250	0	–30	0	–20	0	–15	0	–15	30	20	15	11	23	15	10	8	50	25	15	10	11	7	10
250	315	0	–35	0	–25	0	–18	0	–18	35	25	19	14	26	19	13	9	60	30	18	11	13	8	10
315	400	0	–40	0	–28	0	–20	0	–20	40	28	22	15	30	21	14	10	70	35	20	13	13	10	13
400	500	0	–45	—	—	—	—	—	—	45	—	—	—	34	—	—	—	80	—	—	—	—	—	—
500	630	0	–50	—	—	—	—	—	—	50	—	—	—	38	—	—	—	100	—	—	—	—	—	—
630	800	0	–75	—	—	—	—	—	—	—	—	—	—	—	—	—	—	120	—	—	—	—	—	—
800	1000	0	–100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	120	—	—	—	—	—	—

Remarks: 1. The low deviation of outside diameter of bearings does not apply within a distance from the ring face of 1.2 x r (max) of the chamfer.
2. Part of this table is derived from NACHI standards

Table 5.2.3 Deviations of Single Ring Width, Bearing Width and Duplex/Stack Mounted Bearing Width

Unit: μm

Nominal bearing bore diameter d (mm)		Deviation of a single inner ring width ΔB_s						Deviation of a single outer ring width ΔC_s						Deviation of a actual bearing width ΔT_s						Deviation of the actual effective width of inner sub-unit ΔT_{1s}				Deviation of the actual effective width of outer sub-unit ΔT_{2s}				Deviation of duplex/stack mounted bearing width				Nominal bearing bore diameter d (mm)	
		Class 0 Class 6		Class 6X		Class 5 Class 4		Class 0 Class 6		Class 6X		Class 5 Class 4		Class 0 Class 6		Class 6X		Class 5 Class 4		Class 0		Class 6X		Class 0		Class 6X		ΔB_{2s}		ΔB_{2s} · ΔC_{2s}			
																												Duplex mounted bearing class 0		Four row bearing class 0			
Over	Incl.	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	Over	Incl.
10	18	0	–120	0	–50	0	–200	0	–120	0	–100	0	–200	+200	0	+100	0	+200	–200	+100	0	+50	0	+100	0	+50	0	+200	–200	—	—	10	18
18	30	0	–120	0	–50	0	–200	0	–120	0	–100	0	–200	+200	0	+100	0	+200	–200	+100	0	+50	0	+100	0	+50	0	+200	–200	—	—	18	30
30	50	0	–120	0	–50	0	–240	0	–120	0	–100	0	–240	+200	0	+100	0	+200	–200	+100	0	+50	0	+100	0	+50	0	+240	–240	—	—	30	50
50	80	0	–150	0	–50	0	–300	0	–150	0	–100	0	–300	+200	0	+100	0	+200	–200	+100	0	+50	0	+100	0	+50	0	+300	–300	+400	–400	50	80
80	120	0	–200	0	–50	0	–400	0	–200	0	–100	0	–400	+200	–200	+100	0	+200	–200	+100	–100	+50	0	+100	–100	+50	0	+400	–400	+500	–500	80	120
120	180	0	–250	0	–50	0	–500	0	–250	0	–100	0	–500	+350	–250	+150	0	+350	–250	+150	–150	+50	0	+200	–100	+100	0	+500	–500	+600	–600	120	180
180	250	0	–300	0	–50	0	–600	0	–300	0	–100	0	–600	+350	–250	+150	0	+350	–250	+150	–150	+50	0	+200	–100	+100	0	+600	–600	+750	–750	180	250
250	315	0	–350	0	–50	—	—	0	–350	0	–100	—	—	+350	–250	+200	0	—	—	+150	–150	+100	0	+200	–100	+100	0	+700	–700	+900	–900	250	315
315	400	0	–400	0	–50	—	—	0	–400	0	–100	—	—	+400	–400	+200	0	—	—	+200	–200	+100	0	+200	–200	+100	0	+800	–800	+1000	–1000	315	400
400	500	0	–450	—	—	—	—	0	–450	—	—	—	—	+400	–400	—	—	—	—	—	—	—	—	—	—	—	—	+900	–900	+1200	–1200	400	500
500	630	0	–500	—	—	—	—	0	–500	—	—	—	—	+500	–500	—	—	—	—	—	—	—	—	—	—	—	—	+1000	–1000	+1200	–1200	500	630
630	800	0	–750	—	—	—	—	0	–750	—	—	—	—	+600	–600	—	—	—	—	—	—	—	—	—	—	—	—	+1500	–1500	+1500	–1500	630	800

Remarks: Effective width of an inner sub-unit T_1 is the bearing width obtained when this sub-unit is mated with a master outer ring.
Effective width of an outer ring T_2 is the bearing width obtained when this ring is mated with a master inner sub-unit.

5.3 Tolerance Values for Thrust Ball Bearings

Table 5.3.1 Tolerance Values of Shaft Washer Bore Diameter

Unit: μm

Nominal bearing bore diameter d or d_2 (mm)		Single plane mean bore diameter deviation Δd_{mp} or Δd_{2mp}				Bore diameter variation, in a single radial plane V_{dp} or V_{d2p}		Washer thickness (raceway to back face or raceway) variation (1) S_i or S_e			
		Class 0 Class 6 Class 5		Class 4		Class 0 Class 6 Class 5	Class 4	Class 0	Class 6	Class 5	Class 4
Over	Incl.	High	Low	High	Low	Max	Max	Max	Max	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	—	—	40	25	13	8
800	1000	0	–100	—	—	—	—	45	30	15	—
1000	1250	0	–125	—	—	—	—	50	35	18	—

Table 5.3.2 Tolerance Values of Housing Washer Outside Diameter

Unit: μm

Nominal bearing outside diameter D (mm)		Mean outside diameter deviation, in a single plane ΔD_{mp}				Outside diameter variation in a single radial plane V_{Dp}	
		Class 0 Class 6 Class 5		Class 4		Class 0 Class 6 Class 5	Class 4
Over	Incl.	High	Low	High	Low	Max	Max
10	18	0	–11	0	–7	8	5
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	1000	0	–100	—	—	75	—
1000	1250	0	–125	—	—	—	—
1250	1600	0	–160	—	—	—	—

Note: (1) For double acting bearings, do not use d_2, use size classification d for the same diameter series and same outside diameter. Variation S_e for outer ring washer thickness applies to flat seat bearings only.

Table 5.3.3 Height Tolerances of Thrust Ball Bearings (with Flat Seat) and Central Washers (Class 0)

Unit: μm

Nominal bearing bore diameter d (1) (mm)		Deviation of single height, T ΔT_S		Deviation of single height, T_2 of double direction rhrust bearing (1) ΔT_{2S}		Deviation of single height, T_1 of double direction rhrust bearing (1) ΔT_{1S}		Deviation of center washer height T_1 (1) ΔB_S	
Over	Incl.	High	Low	High	Low	Max	Max	Max	Max
—	30	0	–75	0	–75	+50	–150	0	–50
30	50	0	–100	0	–100	+75	–200	0	–75
50	80	0	–125	0	–125	+100	–250	0	–100
80	120	0	–150	0	–150	+125	–300	0	–125
120	180	0	–175	0	–175	+150	–350	0	–150
180	250	0	–200	0	–200	+175	–400	0	–175
250	315	0	–225	0	–225	+200	–450	0	–200
315	400	0	–300	0	–300	+250	–600	0	–250

Note: (1) For the same diameter series, use size classification single-direction d for the same nominal bearing outside diameter.

5.4 Tolerance Values of Spherical Roller Thrust Bearings (Class 0)

Table 5.4.1 Tolerance Values of Inner Rings

Unit: μm

Nominal bearing bore diameter d (mm)		Single plane mean bore diameter deviation Δd_{mp}		Bore diameter variation, in a single radial plane V_{dp}	Inner ring reference face runout with bore S_d	Deviation of single height ΔT_S	
Over	Incl.	High	Low	Max	Max	Max	Max
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

Remark: The high deviation of inside diameter of bearings does not apply within a distance from the ring face of 1.2 x r (max) of the chamfer.

Table 5.4.2 Tolerance Values of Outer Rings

Unit: μm

Nominal bearing bore diameter D (mm)		Outside diameter deviation ΔD_{mp}	
Over	Incl.	High	Low
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	1000	0	−100

Remark: The low deviation of outside diameter of bearings does not apply within a distance from the ring face of 1.2 x r (max) of the chamfer.

5.5 Tolerance Values of Tapered Roller Bearings - Inch Series

Table 5.5.1 Tolerance of Inner Ring (Cone) Bore

Unit: μm

Nominal bearing bore diameter d mm (inch)		Deviation of single bore diameter Δd_S							
		CLASS 4		CLASS 3		CLASS 0		CLASS 00	
Over	Incl.	High	Low	High	Low	High	Low	High	Low
—	76.200 (3)	+ 13	0	+13	0	+13	0	+8	0
76.200 (3)	266.700 (10.5)	+ 25	0	+13	0	+13	0	+8	0
266.700 (10.5)	304.800 (12)	+ 25	0	+13	0	+13	0	+8	0
304.800 (12)	609.600 (24)	+ 51	0	+25	0	—	—	—	—
609.600 (24)	914.400 (36)	+ 76	0	+38	0	—	—	—	—
914.400 (36)	1219.200 (48)	+102	0	+51	0	—	—	—	—
1219.200 (48)	—	+127	0	+76	0	—	—	—	

Table 5.5.2 Tolerance of Outer Ring (Cup) Outside Diameter

Unit: μm

Nominal bearing outside diameter D mm (inch)		Deviation of single outside diameter ΔD_S							
		CLASS 4		CLASS 3		CLASS 0		CLASS 00	
Over	Incl.	High	Low	High	Low	High	Low	High	Low
—	266.700 (10.5)	+ 25	0	+13	0	+13	0	+8	0
266.700 (10.5)	304.800 (12)	+ 25	0	+13	0	+13	0	+8	0
304.800 (12)	609.600 (24)	+ 51	0	+25	0	—	—	—	—
609.600 (24)	914.400 (36)	+ 76	0	+38	0	—	—	—	—
914.400 (36)	1219.200 (48)	+102	0	+51	0	—	—	—	—
1219.200 (48)	—	+127	0	+76	0	—	—	—	—

Table 5.5.3 Tolerance of Bearing Width and Duplex/Stack Mounted Bearing Width (1)

Unit: μm

Nominal bearing bore diameter d mm (inch)		Nominal bearing outside diameter D mm (inch)		Deviation of the actual bearing width Δr_S					
				CLASS 4		CLASS 3		CLASS 0 CLASS 00	
Over	Incl.	Over	Incl.	High	Low	High	Low	High	Low
—	101.600 (4)	—	—	+203	0	+203	–203	+203	–203
101.600 (4)	266.700 (10.5)	—	—	+356	–254	+203	–203	+203	–203
266.700 (10.5)	304.800 (12)	—	—	+356	–254	+203	–203	+203	–203
304.800 (12)	609.600 (24)	—	508.000 (20)	+381	–381	+203	–203	—	—
304.800 (12)	609.600 (24)	508.000 (20)	—	+381	–381	+381	–381	—	—
609.600 (24)	—	—	—	+381	–381	+381	–381	—	—

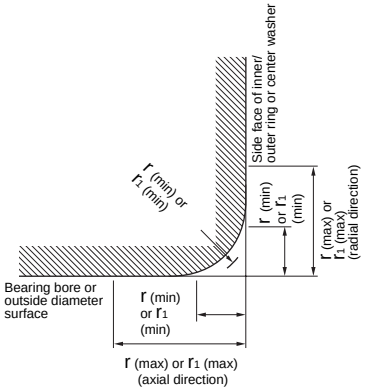
Note: (1) Deviation of the mounted width B_2, and C_2 four row tapered roller bearing is ±1524 μm for the tolerance classes of 4,3 and 0.

Table 5.5.4 Radial Runout of Assembled Bearing Inner Ring and Outer Ring

Unit: μm

Nominal bearing outside diameter D mm (inch)		Radial runout of assembled bearing inner ring K_{ea} and of assembled bearing outer ring K_{ea} (MAX)			
		CLASS 4	CLASS 3	CLASS 0	CLASS 00
Over	Incl.	High	High	High	High
—	266.700 (10.5)	51	8	4	2
266.700 (10.5)	304.800 (12)	51	8	4	2
304.800 (12)	609.600 (24)	51	18	—	—
609.600 (24)	914.400 (36)	76	51	—	—
914.400 (36)	—	76	76	—	—

5.6 Chamfer Dimension Limits



r : Chamfer dimensions of inner ring and outer ring
r1: Chamfer dimensions of inner ring and outer ring (front face etc.) or of center ring of thrust ball bearing

Remark: The exact shape of the chamfer surface is not specified, but its contour in an axial plane shall not be allowed to project beyond the imaginary circular arc, of radius r min, tangential to the ring face and the bore or outside cylindrical surface of the ring (see figure).

Table 5.6.1 Chamfer Dimension Limits of Radial Bearings Except Tapered Roller Bearings Unit: mm

Smallest permissible chamfer dimensions of inner and outer rings r (min) or r1 (min)	Nominal bearing bore diameter d		Largest permissible chamfer dimensions of inner and outer rings r (max) or r1 (max)		Reference
					Shaft and housing fillet radius ra
	Over	Incl.	Radial direction	Axial direction	Max
0.05	–	–	0.1	0.2	0.05
0.08	–	–	0.16	0.3	0.08
0.1	–	–	0.2	0.4	0.1
0.15	–	–	0.3	0.6	0.15
0.2	–	–	0.5	0.8	0.2
0.3	–	40	0.6	1	0.3
	40	–	0.8	1	
0.6	–	40	1	2	0.6
	40	–	1.3	2	
1	–	50	1.5	3	1
	50	–	1.9	3	
1.1	–	120	2	3.5	1
	120	–	2.5	4	
1.5	–	120	2.3	4	1.5
	120	–	3	5	
2	–	80	3	4.5	2
	80	220	3.5	5	
	220	–	3.8	6	
2.1	–	280	4	6.5	2
	280	–	4.5	7	
2.5	–	100	3.8	6	2
	100	280	4.5	6	
	280	–	5	7	
3	–	280	5	8	2.5
	280	–	5.5	8	
4	–	–	6.5	9	3
5	–	–	8	10	4
6	–	–	10	13	5
7.5	–	–	12.5	17	6
9.5	–	–	15	19	8
12	–	–	18	24	10
15	–	–	21	30	12
19	–	–	25	38	15

Remark: For bearings with nominal width 2 mm or less, r (max) values in the axial direction of the bearing are the same as for the radial direction.

Table 5.6.2 Chamfer Dimensions Limits of Tapered Roller Bearings Unit: mm

Smallest permissible chamfer dimensions of inner and outer rings r (min)	Bearing bore diameter or outside diameter (1) d or D		Largest permissible chamfer dimensions of inner and outer rings r (max)		Reference
					Shaft and housing fillet radius ra
	Over	Incl.	Radial direction	Axial direction	Max
0.3	–	40	0.7	1.4	0.3
	40	–	0.9	1.6	
0.6	–	40	1.1	1.7	0.6
	40	–	1.3	2	
1	–	50	1.6	2.5	1
	50	–	1.9	3	
1.5	–	120	2.3	3	1.5
	120	250	2.8	3.5	
	250	–	3.5	4	
2	–	120	2.8	4	2
	120	250	3.5	4.5	
	250	–	4	5	
2.5	–	120	3.5	5	2
	120	250	4	5.5	
	250	–	4.5	6	
3	–	120	4	5.5	2.5
	120	250	4.5	6.5	
	250	400	5	7	
	400	–	5.5	7.5	
4	–	120	5	7	3
	120	250	5.5	7.5	
	250	400	6	8	
	400	–	6.5	8.5	
5	–	180	6.5	8	4
	180	–	7.5	9	
6	–	180	7.5	10	5
	180	–	9	11	

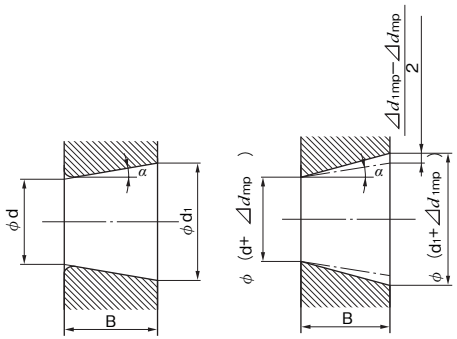
Note: (1) d and D are applied to inner ring and outer ring respectively.

Table 5.6.3 Chamfer Dimension Limits of Thrust Bearings Unit: mm

Smallest permissible chamfer dimensions of inner and outer rings r (min) or r1 (min)	Largest permissible single chamfer dimensions of inner and outer rings r (max) or r1 (max)	Reference
		Shaft and housing fillet radius ra
	Radial direction and axial direction	Max
0.05	0.1	0.05
0.08	0.16	0.08
0.1	0.2	0.1
0.15	0.3	0.15
0.2	0.5	0.2
0.3	0.8	0.3
0.6	1.5	0.6
1	2.2	1
1.1	2.7	1
1.5	3.5	1.5
2	4	2
2.1	4.5	2
3	5.5	2.5
4	6.5	3
5	8	4
6	10	5
7.5	12.5	6
9.5	15	8
12	18	10
15	21	12
19	25	15

5.7 Tolerances for Tapered Bores

d : Bearing bore diameter, nominal
d_1: Bore diameter at the theoretical large end of a tapered bore
in case of 1/12 taper d1=d+1/12B
in case of 1/30 taper d1=d+1/30B
Δd_{mp}: Mean bore diameter deviation at theoretical small end of a tapered bore
Δd_{1mp}: Mean bore diameter deviation at theoretical large end of a tapered bore
B: Bearing inner ring width, nominal
α: Nominal taper angle (half of cone angle)
in case of 1/12 taper α=2°23' 9.4"
=2.38594°
=0.041643 rad
in case of 1/30 taper α=0°57' 17.4"
=0.95484°
=0.016665 rad



Theoretical tapered bore

Tapered bore with actual mean diameters at their deviations

Table 5.7.1 1/12 Tapered Bore (Class 0) Unit: µm

Nominal bearing bore dimension d (mm)		Mean bore diameter deviation at theoretical small end of a tapered bore				Bore diameter variation in a single radial plane
		Δd_{mp}		$\Delta d_{1mp}-\Delta d_{mp}$		V_{dp} (1) (2)
Over	Incl.	High	Low	High	Low	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	1000	+140	0	+ 90	0	—
1000	1250	+165	0	+105	0	—
1250	1600	+195	0	+125	0	—

Notes: (1) Applicable to all radial planes of tapered bore.
(2) Not applicable to bearings of diameter series 7 and 8.

Table 5.7.2 1/30 Tapered Bore (Class 0) Unit: µm

Nominal bearing bore dimension d (mm)		Mean bore diameter deviation at theoretical small end of a tapered bore				Bore diameter variation in a single radial plane
		Δd_{mp}		$\Delta d_{1mp}-\Delta d_{mp}$		V_{dp} (1) (2)
Over	Incl.	High	Low	High	Low	Max
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

Notes: (1) Applicable to all radial planes of tapered bores.
(2) Not applicable to bearings of diameter series 7 and 8.

6. Internal Clearance of Rolling Contact Bearings

Bearing internal clearance refers to the distances between the bearing rings and rolling elements as shown in Fig. 6.1 and Fig. 6.2. The amount of alternating radial movement of the free bearing rings is defined as radial clearance, and the amount of alternating axial movement of the free bearing rings is defined as axial clearance.

The term internal clearance refers to a state where no force is applied to the bearing rings and rolling elements, i.e., an unloaded state.

Since a stabilizing, measuring load is applied to bearings when measuring the internal clearance, some elastic deformation occurs to the bearing rings and rolling elements, and the measured internal clearance will be larger than the real clearance by the value of deformation. The amount of elastic deformation caused by the measuring load may be disregarded for roller bearings, but must be compensated for when measuring ball bearing clearance because it will skew the internal clearance measurement.

Internal clearance values are described in the JIS (ISO) and the Japan Bearing Industrial Association Standards (BAS) as follows:

Deep-groove ball bearings
Self-aligning ball bearings
Cylindrical roller bearings
Spherical roller bearings
} JIS B1520 (ISO 5753)

For electric motor
Deep-groove ball bearings
Cylindrical roller bearings
} BAS 1003

Bearings not covered by either JIS (ISO) or BAS are standardized by NACHI. Tables 6.1 through 6.6 show internal clearance values for NACHI bearings.

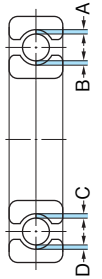


Fig 6.1 Radial internal clearance = A+B+C+D

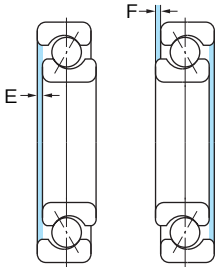


Fig 6.2 Axial internal clearance =E+F

Table 6.1 Radial Internal Clearance of Deep Groove Ball Bearings (JIS) Unit: µm

Nominal bearing bore diameter d (mm)		Radial Clearance									
		C2		CN (normal)		C3		C4		C5	
Over	Incl.	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
2.5	6	0	7	2	13	8	23	—	—	—	—
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
400	450	3	80	60	170	150	270	250	380	350	510
450	500	3	90	70	190	170	300	280	420	390	570
500	560	10	100	80	210	190	330	310	470	440	630
560	630	10	110	90	230	210	360	340	520	490	690
630	710	20	130	110	260	240	400	380	570	540	760
710	800	20	140	120	290	270	450	430	630	600	840
800	900	20	160	140	320	300	500	480	700	670	940
900	1000	20	170	150	350	330	550	530	770	740	1040
1000	1120	20	180	160	380	360	600	580	850	820	1150
1120	1250	20	190	170	410	390	650	630	920	890	1260

Table 6.2 Radial Internal Clearance of Self-aligning Ball Bearings (JIS)

Unit: μm

Nominal bearing bore diameter d (mm)		Radial clearance (cylindrical bore)										Radial clearance (tapered bore)									
		C2		CN (normal)		C3		C4		C5		C2		CN (normal)		C3		C4		C5	
Over	Incl.	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 6.3 Radial Internal Clearance of Cylindrical Roller Bearings

Table 6.3.1 Radial Internal Clearance of Cylindrical Roller Bearings (Cylindrical Bore) (JIS)

Unit: μm

Nominal bearing bore diameter d (mm)		Radial clearance									
		C2		CN (normal)		C3		C4		C5	
Over	Incl.	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

Table 6.3.2 Non-interchangeable Radial Internal Clearance of Cylindrical Roller Bearings (Tapered Bore) (NACHI)

Unit: μm

Nominal bearing bore diameter d (mm)		Radial clearance					
		C9na		C1na		C2na	
Over	Incl.	Min	Max	Min	Max	Min	Max
14	18	5	10	10	20	20	30
18	24	5	10	10	20	20	30
24	30	5	10	15	25	25	35
30	40	5	12	15	25	25	40
40	50	5	15	17	30	30	45
50	65	5	15	20	35	35	50
65	80	10	20	25	40	40	60
80	100	10	25	35	55	45	70
100	120	10	25	40	60	50	80
120	140	15	30	45	70	60	90
140	160	15	35	50	75	65	100
160	180	15	35	55	85	75	110
180	200	20	40	60	90	80	120
200	225	20	45	60	95	90	135
225	250	25	50	65	100	100	150
250	280	25	55	75	110	110	165
280	315	30	60	80	120	120	180
315	355	30	65	90	135	135	200
355	400	35	75	100	150	150	225
400	450	40	85	110	170	170	255
450	500	45	95	120	190	190	285

Remark: Shown for reference because JIS has not standardized non-interchangeable radial clearance for tapered bore bearings.

Table 6.4 Radial Internal Clearance of Spherical Roller Bearings (JIS)

Table 6.4.1 Radial Internal Clearance of Spherical Roller Bearings (Cylindrical Bore)

Unit: μm

Nominal bearing bore diameter d (mm)		Radial clearance									
		C2		CN (normal)		C3		C4		C5	
Over	Incl.	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	1000
560	630	170	310	310	480	480	650	650	850	850	1100
630	710	190	350	350	530	530	700	700	920	920	1190
710	800	210	390	390	580	580	770	770	1010	1010	1300
800	900	230	430	430	650	650	860	860	1120	1120	1440
900	1000	260	480	480	710	710	930	930	1220	1220	1570

Table 6.4.2 Radial Internal Clearance of Spherical Roller Bearings (Tapered Bore)

Unit: μm

Nominal bearing bore diameter d (mm)		Radial clearance									
		C2		CN (normal)		C3		C4		C5	
Over	Incl.	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	1000
500	560	290	410	410	540	540	680	680	870	870	1100
560	630	320	460	460	600	600	760	760	980	980	1230
630	710	350	510	510	670	670	850	850	1090	1090	1360
710	800	390	570	570	750	750	960	960	1220	1220	1500
800	900	440	640	640	840	840	1070	1070	1370	1370	1690
900	1000	490	710	710	930	930	1190	1190	1520	1520	1860

Table 6.5 Radial Internal Clearance of Double-Row and Duplex Tapered Roller Bearings (Cylindrical Bore) (NACHI)

Unit: μm

Nominal bearing bore diameter d (mm)		Radial clearance											
		C1		C2		CN (normal)		C3		C4		C5	
Over	Incl.	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
14	18	2	10	10	20	20	30	35	45	45	55	65	75
18	24	2	10	10	20	20	30	35	45	45	55	65	75
24	30	2	10	10	25	25	35	40	50	50	60	70	80
30	40	2	12	12	25	25	40	45	55	55	70	80	95
40	50	2	15	15	30	30	45	50	65	65	80	95	110
50	65	2	15	15	35	35	50	55	75	75	90	110	130
65	80	5	20	20	40	40	60	70	90	90	110	130	150
80	100	5	25	25	45	45	70	80	105	105	125	155	180
100	120	5	25	25	50	50	80	95	120	120	145	180	205
120	140	10	30	30	60	60	90	105	135	135	160	200	230
140	160	10	35	35	65	65	100	115	150	150	180	225	260
160	180	10	35	35	75	75	110	125	165	165	200	250	285
180	200	10	40	40	80	80	120	140	180	180	220	275	315
200	225	10	45	45	90	90	135	155	200	200	240	305	350
225	250	15	50	50	100	100	150	170	215	215	265	330	380
250	280	15	55	55	110	110	165	185	240	240	295	370	420
280	315	15	60	60	120	120	180	205	265	265	325	410	470
315	355	15	65	65	135	135	200	225	295	295	360	455	520
355	400	20	75	75	150	150	225	255	330	330	405	510	585
400	450	20	85	85	170	170	255	285	370	370	455	565	650
450	500	20	95	95	190	190	285	315	410	410	505	625	720

Table 6.6 Radial Internal Clearance of Ball Bearings for Electric Motors (BAS)

Table 6.6.1 Radial Internal Clearance of Deep Groove Ball Bearings

Unit: μm

Nominal bearing bore diameter d (mm)		Radial clearance CM	
Over	Incl.	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 in this group.
Remark: Clearance values in this table are for an unloaded measuring state.

Table 6.6.2 Radial Internal Clearance of Cylindrical Roller Bearings

Unit: μm

Nominal bearing bore diameter d (mm)		Radial clearance			
		Interchangeable CT		Non-interchangeable CM	
Over	Incl.	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

Remark: "Interchangeability CT" in this table means interchangeability between bearings of the same manufacturer only.

7. Materials for Rolling Contact Bearings

A rolling contact bearing consist of one or more rings and rolling elements (which directly support the loads) and, usually, a cage which keeps the rolling elements at equal intervals. Both rolling and sliding movements occur between these parts.

7.1 Bearing Ring and Rolling Elements

Because of high, repetitive stress to the rolling contact areas, fatigue phenomenon will occur to the bearing material after a duration of operation. Loading stress ultimately dislodges a surface section and the bearing fails. To delay the advent of material fatigue, bearing ring and rolling element materials should have the following properties:

- High level of hardness
- High rolling contact fatigue resistance
- Good wear resistance
- Dimensional stability
- Good mechanical strength

Standard NACHI material for bearing rings and rolling elements is vacuum-degassed, high-carbon, chrome bearing steel. See Table 7.1. For applications requiring a higher degree of reliability, bearing steel using a vacuum-melting process or electroslag solution (ERS).

The NACHI steel used for standard bearings is SUJ2 (JIS) steel. For large size bearings, SUJ3 or SUJ5 steels are used for hardenability. If impact resistance is required, SNCM series steel may be used (see Table 7.2).

In addition to the above, high-speed steel may be used for bearings for applications requiring tolerance to high temperatures.

Stainless steel may be used for bearings operating in a corrosive atmosphere.

Ceramic materials may be used for special applications.

7.2 Cage Material

Materials for cages are required to have the following properties:

- Good wear resistance
- Dimensional stability
- Good mechanical strength

Cold-rolled steel (see Table 7.5) is used for pressed cages. High-tensile-strength brass castings or carbon steel are used for machined cages (see Tables 7.6 and 7.7). Polyamide resins are used depending on the type of bearing and the application.

For selection of cage material, it is important to consider the operating conditions.

Polyamide cages should not be used at temperatures above 120˚C or below -40˚C.

Polyamide cages should not be used in vacuum because they become brittle due to dehydration.

Polyamide cages may be affected by the use of specific lubricants.

Brass cages should not be used at temperatures in excess 300˚C.

Brass cages are not suitable in Ammonia (e.g. in refrigeration) because Ammonia causes season cracking in brass.

Table 7.1 High Carbon Chrome Bearing Steel

Standard	Symbol	Chemical composition (%)						
		C	Si	Mn	P	S	Cr	Mo
JIS	SUJ 2	0.95～1.10	0.15～0.35	≦ 0.50	≦ 0.025	≦ 0.025	1.30～1.60	≦ 0.08
	SUJ 3	0.95～1.10	0.40～0.70	0.90～1.15	≦ 0.025	≦ 0.025	0.90～1.20	≦ 0.08
	SUJ 4	0.95～1.10	0.15～0.35	≦ 0.50	≦ 0.025	≦ 0.025	1.30～1.60	0.10～0.25
	SUJ 5	0.95～1.10	0.40～0.70	0.90～1.15	≦ 0.025	≦ 0.025	0.90～1.20	0.10～0.25
SAE	52100	0.98～1.10	0.15～0.35	0.25～0.45	≦ 0.025	≦ 0.025	1.30～1.60	≦ 0.10

Table 7.2 Case Hardening Steel

Standard	Symbol	Chemical composition (%)							
		C	Si	Mn	P	S	Ni	Cr	Mo
JIS	SNCM220	0.17～0.23	0.15～0.35	0.60～0.90	≦ 0.030	≦ 0.030	0.40～0.70	0.40～0.60	0.15～0.25
	SNCM420	0.17～0.23	0.15～0.35	0.40～0.70	≦ 0.030	≦ 0.030	1.60～2.00	0.40～0.60	0.15～0.30
	SNCM815	0.12～0.18	0.15～0.35	0.30～0.60	≦ 0.030	≦ 0.030	4.00～4.50	0.70～1.00	0.15～0.30
	SCr420	0.18～0.23	0.15～0.35	0.60～0.90	≦ 0.030	≦ 0.030	—	0.90～1.20	—
SAE	8620	0.18～0.23	0.15～0.35	0.70～0.90	≦ 0.035	≦ 0.040	0.40～0.70	0.40～0.60	0.15～0.25
	4320	0.17～0.22	0.15～0.35	0.45～0.65	≦ 0.035	≦ 0.040	1.65～2.00	0.40～0.60	0.20～0.30

Table 7.3 High-Speed Steel

Standard	Symbol	Chemical composition (%)											
		C	Si	Mn	P	S	Cr	Mo	V	Ni	Cu	Co	W
AISI	M50	0.77～0.85	≦ 0.25	≦ 0.35	≦ 0.015	≦ 0.015	3.75～4.25	4.00～4.50	0.90～1.10	≦ 0.15	≦ 0.10	≦ 0.25	≦ 0.25

Table 7.4 Stainless Steel

Standard	Symbol	Chemical composition (%)						
		C	Si	Mn	P	S	Cr	Mo
JIS	SUS440C	0.95～1.20	≦ 1.00	≦ 1.00	≦ 0.040	≦ 0.030	16.00～18.00	≦ 0.75

Remark: Low-chrome steel is also used sometimes.

Table 7.5 Cold Rolled Steel Strip and Cold Rolled Steel Sheet and Plate for Pressed Cage

Standard	Symbol	Chemical composition (%)				
		C	Si	Mn	P	S
BAS	SPB 1	≦ 0.10	≦ 0.04	0.25～0.45	≦ 0.030	≦ 0.030
	SPB 2	0.13～0.20	≦ 0.04	0.25～0.60	≦ 0.030	≦ 0.030
JIS	SPCC	≦ 0.12	—	≦ 0.50	≦ 0.040	≦ 0.045

Table 7.6 High Tensile Strength Brass Casting for Machined Cage

Standard	Symbol	Chemical composition (%)									
		Cu	Zn	Mn	Fe	Al	Sn	Ni	Pb	Si	Others
BAS	HBsCR	55.0～62.0	33.0～37.0	2.0～4.0	0.5～1.5	0.1～1.0	0.1～1.0	≦ 1.0	0.1～1.0	≦ 0.2	≦ 1.0
JIS	CAC301 (HBsC1)	55.0～60.0	33.0～42.0	0.1～1.5	0.5～1.5	0.5～1.5	≦ 1.0	≦ 1.0	≦ 0.4	≦ 0.1	—
	CAC302 (HBsC2)	55.0～60.0	30.0～42.0	0.1～3.5	0.5～2.0	0.5～2.0	≦ 1.0	≦ 1.0	≦ 0.4	≦ 0.1	—

Old symbols are shown in ( ) parentheses

Table 7.7 Steel for Machined Cages

Standard	Symbol	Chemical composition (%)				
		C	Si	Mn	P	S
JIS	S25C	0.22～0.28	0.15～0.35	0.30～0.60	≦ 0.030	≦ 0.035

8. Application of Rolling Contact Bearings

8.1 Fits and Clearance

8.1.1 Importance of Fit

To get the best performance from a rolling contact bearing, the fit between the inner ring and shaft, and outer ring and housing must be correct. If the mating surfaces lack interference, the bearing ring may move circumferentially on the shaft or in the housing. This phenomenon is called creep. Once mating surfaces start to creep, the bearing ring will begin to wear excessively and the shaft and/or housing may be damaged. Abrasive debris may enter the bearing, cause abnormal heating or vibration.

Creep is often impossible to prevent by mere fastening of the bearing in an axial direction. To prevent creep, the bearing rings that support the rotating load must be provided with necessary interference. The bearing rings that support stationary load normally do not require interference unless contact corrosion from vibration is a concern.

8.1.2 Selection of Fit

To select the most appropriate fit, the following items must be considered:

- direction of load
- characteristics of load
- magnitude of load
- temperature conditions
- mounting, and dismounting conditions

For general recommendations see Table 8.1.

For mounting bearings in a thin-walled housing or on a hollow shaft, larger interference than normal must be provided.

Split-housing applications requiring high precision or tight housing bore fits are not recommended. (A split housing may cause the outer ring to deform).

For application of bearings subjected to vibration, an interference fit should be applied to both inner and outer rings.

Tables 8.2 through 8.14 describe general fit recommendations. For fits not covered by these tables, please contact NACHI.

Table 8.1 Fit vs. Load Characteristics

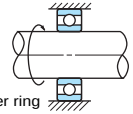
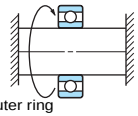
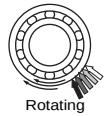
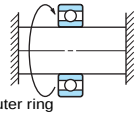
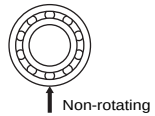
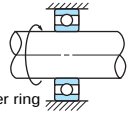
Ring rotation	Type of load	Load conditions	Fit	
			Inner ring	Outer ring
 Inner ring	Non-rotating	Rotating inner ring load	Interference fit	Loose fit
 Outer ring	 Rotating	Stationary outer ring load		
 Outer ring	 Non-rotating	Rotating outer ring load	Loose fit	Interference fit
 Inner ring	Rotating	Stationary inner ring load		
Load direction not constant	Rotating or stationary	Indeterminate direction load	Interference fit	Interference fit

Table 8.2.1 Bearing Bore (1) Fits for Radial Bearings

Bearing tolerance class	Tolerance class for shaft O.D.								
	For rotating inner ring load and indeterminate direction load							For rotating outer ring load	
Class 0, class 6	r 6	p 6	n 6	m 5 m 6	k 5 k 6	j 5 j 6 js 6	h 5	h 5 h 6	g 5 g 6
Class 5, class 4	—	—	—	m 5	k 4	js 4	h 4	h 5	—

Table 8.2.2 Bearing Outside Diameter (1) Fits for Radial Bearings (Except for Magneto Bearings)

Bearing tolerance class	Tolerance class for housing bore									
	For rotating inner ring load				For indeterminate direction loads			For rotating outer ring load		
Class 0, class 6	—	J 6 J 7	H 6 H 7	G 7	M 7	K 6 K 7	J 6 J 7	P 7	N 7	M 7
Class 5, class 4	K 5	Js 5	H 5	—	—	—	—	—	—	M 5

Table 8.3.1 Bearing Bore or Center Washer Bore (1) Fits for Thrust Bearings

Bearing tolerance class	Tolerance class for shaft O.D.					
	Axial load only	For composite load (spherical roller thrust bearings)				
Class 0	j 6 js 6	n 6	m 6	k 6	j 6 js 6	

Table 8.3.2 Bearing Outside Diameter (1) Fits for Thrust Bearings

Bearing tolerance class	Tolerance class for housing bore	
	Axial load only	For composite load (spherical roller thrust bearings)
Class 0	—	M 7 H 7

Note: (1) These dimensional deviations are based on JIS B 1514.

Table 8.4 Shaft Tolerances (1) for Radial Bearings

Operating conditions		Shaft dia. (mm)			Tolerance class for shaft O.D.	Remarks	Examples of application (reference)
		Ball Bearings	Cylindrical Roller Bearings Tapered Roller Bearings	Spherical Roller Bearings			
●Bearings with cylindrical bore							
Rotating outer ring load	When the inner ring is required to move on the shaft easily	For all shaft diameters			g6	When high precision is required, adopt g5 and h5. For large bearings, f6 is also adopted for easy movement.	Wheel on non-rotating shaft
	When the inner ring is not required to move on the shaft easily	For all shaft diameters			h6		Tension pulley, rope sheave
Rotating inner ring load or indeterminate direction load	Light load or fluctuating load	≦ 18	—	—	h5	When high precision is required, adopt j5, k5 and m5 instead of j6, k6 and m6 respectively.	Electrical appliance, Machine tools, pump, blower, hand truck, freight carrier
		18 to 100	≦ 40	—	j6		
		100 to 200	40 to 140	—	k6		
		—	140 to 200	—	m6		
	Normal load or heavy load	≦ 18	—	—	j5	The tolerances of k6 and m6 instead of k5 and m5 can be used for single row tapered roller bearings and single row angular contact bal bearings because the internal clearance fluctuation due to fit need not be considered.	General bearing application, electric motor, turbine, pump, internal combustion engine, wood working machine
		18 to 100	≦ 40	≦ 40	k5		
		100 to 200	40 to 100	40 to 65	m5		
		—	100 to 140	65 to 100	m6		
		—	140 to 200	100 to 140	n6		
		—	200 to 400	140 to 280	p6		
		—	—	Over 280	r6		
	Heavy or shock load	—	50 to 140	50 to 100	n6	A bearing with an internal clearance larger than CN (normal) clearance is needed.	Axles of locomotive and passenger train, traction motor
		—	140 to 200	100 to 140	p6		
		—	Over 200	Over 140	r6		
Centric axial load		≦ 250			j6	—	—
		Over 250			js6, j6		
●Bearing with tapered bore (with sleeve)							
For all load conditions		For all shaft diameters			h9/IT5	h10/IT7 can also be used for drive shafts. IT5 and IT7 indicate the shaft form error (roundness, cylindricity) should be limited within the tolerance ranges of IT5 and IT7.	General bearing application, railroad car axles

Note: (1) Shaft tolerances in this table are applied to solid steel shafts.
Remark: Heavy load equals P>0.12Cr, normal load equals 0.12Cr≧P>0.06Cr, light load equals P≦0.06Cr.

Table 8.5 Shaft Tolerances for Thrust Bearings

Operating conditions		Shaft dia. (mm)	Tolerance class for shaft O.D.
Axial load only (Thrust ball bearings and spherical roller thrust bearings)		≦ 250	j6
		Over 250	js6, j6
Composite load (Spherical Roller Thrust Bearings)	Rotating outer ring load	≦ 250	j6
		Over 250	js6, j6
	Rotating inner ring load or indeterminate direction load	≦ 200	k6
		200 to 400	m6
		Over 400	n5

Table 8.6 Housing Tolerances (1) for Radial Bearings (Except Inch-Series Tapered Roller Bearings)

Operating conditions			Tolerance class for housing bore	Outer ring movement (2)	Examples of application (reference)
Monoblock housing	Rotating outer ring load	When a heavy load is applied to a thin-walled housing or impact load	P7	Outer ring cannot move	Automotive wheel (roller bearing)
		Normal load or heavy load	N7		Automotive wheel (ball bearing)
		Light load or fluctuating load	M7		Conveyor roller, pulley, tension pulley
	Indeterminate direction load	Heavy impact load			Traction motor
		Heavy load or normal load: When the outer ring is not required to move in an axial direction	K7	Outer ring cannot move as principle	Electric motor, pump, crank shaft main bearing
Monoblock or split housing		Normal load or light load: When it is desirable that the outer ring can be moved in an axial direction	J7	Outer ring can move	Electric motor, pump, crank shaft main bearing
	Rotating inner ring load	Impact load: When no-load condition occurs temporarily			Railroad car axle
		All kinds of loads	H7	Outer ring can move easily	General bearing application, railroad car axle bearing
		Normal load or light load	H8		Gear transmission
		When there is thermal conduction through the shaft	G7		Paper mill (drying cylinder)
Monoblock housing	When extremely high accuracy is required	Fluctuating load: When extremely accurate rotation and high rigidity are required	N6	Outer ring cannot move	Roller bearing (outside diameter is over 125 mm) for spindle of machine tool
			M6		Roller bearing (outside diameter is under and including 125 mm) for spindle of machine tool
		Indeterminate direction light load: When extremely accurate rotation is required.	K6	Outer ring cannot move as principle	Spindle of grinding machine, ball bearing on grinding wheel side. High speed centrifugal compressor, fixed side bearing
		When extremely accurate rotation is required: When it is desirable that outer ring can be moved in axial direction.	J6	Outer ring can move	Spindle of grinding machine, ball bearing on drive side. High speed centrifugal compressor, free side bearing.

Notes: (1) This table applies to cast iron or steel housings. For light alloy housings, a tighter fit is used rather than those that meet with the tolerances in this table.
(2) Indicates whether the outer ring can or cannot move in axial direction for non-separable bearings.

Table 8.7 Housing Tolerances for Thrust Bearings

Operating conditions		Tolerance class for housing bore	Remarks
Axial load only (All thrust bearings)	Thrust Ball Bearings	H8	When high accuracy is not required, outer ring or aligning seat is mounted to provide clearance in radial direction.
	Spherical roller thrust bearings: When radial load is borne by another bearing.	—	Outer ring radial clearance is approximately 0.001D.
Composite load (Spherical Roller Thrust Bearings)	Stationary outer ring load or indeterminate direction load	H7 J7	—
	Rotating outer ring load	K7 M7	Bearing application in general When the radial load is comparatively large

Table 8.8 Fits of Inch Series Tapered Roller Bearings with Shafts

Table 8.8.1 For Bearings with ABMA Class 4

Unit: μm

Operating conditions			Nominal bearing bore diameter d (mm)		Bearing bore deviation		Shaft diameter deviation		Fit value (1)	
			Over	Incl.	High	Low	High	Low	Max	Min
Rotating inner ring load	Normal load No impact		–	76.2	+13	0	+ 38	+ 26	38T	12T
			76.2	304.8	+25	0	+ 64	+ 38	64T	13T
			304.8	609.6	+51	0	+127	+ 76	127T	25T
			609.6	914.4	+76	0	+191	+114	191T	38T
	Heavy load High speed rotation Impact load		–	76.2	+13	0	+ 64	+ 38	64T	25T
			76.2	304.8	+25	0		(2)		
			304.8	609.6	+51	0				
			609.6	914.4	+76	0	+381	+305	381T	229T
Rotating outer ring load	Normal load no impact	For non-grinding shaft (when ring is not needed to move on shaft)	–	76.2	+13	0	+ 13	0	13T	13L
			76.2	304.8	+25	0	+ 25	0	25T	25L
			304.8	609.6	+51	0	+ 51	0	51T	51L
			609.6	914.4	+76	0	+ 76	0	76T	76L
	Normal load no impact	Grinding machine shaft (when ring is needed to move on shaft)	–	76.2	+13	0	0	–13	0	26L
			76.2	304.8	+25	0	0	–25	0	51L
			304.8	609.6	+51	0	0	–51	0	102L
			609.6	914.4	+76	0	0	–76	0	152L

Notes (1) T: Tight fit, L: Loose fit.
(2) Mean amounts of tight fits are d/2000 mm.

Table 8.8.2 For Bearings with ABMA Class 3 and Class 0

Unit: μm

Operating conditions		Nominal bearing bore diameter d (mm)		Bearing bore deviation		Shaft diameter deviation		Fit value (1)	
		Over	Incl.	High	Low	High	Low	Max	Min
Rotating inner ring load	Main shaft of precision machine tool	–	304.8	+13	0	+ 38	+18	31T	5T
		304.8	609.6	+25	0	+ 64	+38	64T	13T
		609.6	914.4	+38	0	+102	+63	102T	25T
	Heavy load High speed rotation Impact load	–	76.2	+13	0				
		76.2	304.8	+13	0		(2)		
		304.8	609.6	+25	0				
		609.6	914.4	+38	0				
Rotating outer ring load	Main shaft of precision machine tool	–	304.8	+13	0	+ 13	+18	31T	5T
		304.8	609.6	+25	0	+ 64	+38	64T	13T
		609.6	914.4	+38	0	+102	+63	102T	25T

Notes: (1) T: Tight fit
(2) Mean amounts of tight fits are d/4000 mm.
(3) Bearing bore d of less than 241.3 mm are applied for class 0.

Table 8.9 Fits of Inch Series Tapered Roller Bearings with Housings

Table 8.9.1 For Bearings with ABMA Class 4

Unit: μm

Operating conditions		Nominal bearing outside diameter D (mm)		Bearing outside diameter deviation		Housing bore diameter deviation		Fit value (1)	
		Over	Incl.	High	Low	High	Low	Max	Min
Rotating inner ring load	Floating side or clamping side	–	76.2	+25	0	+ 76	+ 50	25L	76L
		76.2	127.0	+25	0	+ 76	+ 50	25L	76L
		127.0	304.8	+25	0	+ 76	+ 50	25L	76L
		304.8	609.6	+51	0	+152	+102	51L	152L
		609.6	914.4	+76	0	+229	+152	76L	229L
	Outer ring location in axial direction can be adjusted	–	76.2	+25	0	+ 25	0	25T	25L
		76.2	127.0	+25	0	+ 25	0	25T	25L
		127.0	304.8	+25	0	+ 51	0	25T	51L
		304.8	609.6	+51	0	+ 76	+ 26	25T	76L
		609.6	914.4	+76	0	+127	+ 51	25T	127L
	Outer ring location in axial direction cannot be adjusted	–	76.2	+25	0	–13	–39	64T	13T
		76.2	127.0	+25	0	–25	–51	76T	25T
		127.0	304.8	+25	0	–25	–51	76T	25T
		304.8	609.6	+51	0	–25	–76	127T	25T
		609.6	914.4	+76	0	–25	–102	178T	25T
Rotating outer ring load	Outer ring location in axial direction cannot be adjusted	–	76.2	+25	0	–13	–39	64T	13T
		76.2	127.0	+25	0	–25	–51	76T	25T
		127.0	304.8	+25	0	–25	–51	76T	25T
		304.8	609.6	+51	0	–25	–76	127T	25T
		609.6	914.4	+76	0	–25	–102	178T	25T

Notes (1) L: Loose fit, T: Tight fit.

Table 8.9.2 For Bearings with ABMA Class 3 and Class 0

Unit: μm

Operating conditions		Nominal bearing outside diameter D (mm)		Bearing outside diameter deviation		Housing bore diameter deviation		Fit value (1)	
		Over	Incl.	High	Low	High	Low	Max	Min
Rotating inner ring load	Floating side	–	152.4	+13	0	+38	+26	13L	38L
		152.4	304.8	+13	0	+38	+26	13L	38L
		304.8	609.6	+25	0	+64	+38	13L	64L
		609.6	914.4	+38	0	+89	+51	13L	89L
	Clamping side	–	152.4	+13	0	+25	+13	0	25L
		152.4	304.8	+13	0	+25	+13	0	25L
		304.8	609.6	+25	0	+51	+25	0	51L
		609.6	914.4	+38	0	+76	+38	0	76L
	Outer ring location in axial direction can be adjusted	–	152.4	+13	0	+13	0	13T	13L
		152.4	304.8	+13	0	+25	0	13T	25L
		304.8	609.6	+25	0	+25	0	25T	25L
		609.6	914.4	+38	0	+38	0	38T	38L
	Outer ring location in axial direction cannot be adjusted	–	152.4	+13	0	0	–12	25T	0
		152.4	304.8	+13	0	0	–25	38T	0
		304.8	609.6	+25	0	0	–26	51T	0
		609.6	914.4	+38	0	0	–38	76T	0
Rotating outer ring load	Normal load Outer ring location in axial direction cannot be adjusted	–	152.4	+13	0	–13	–25	38T	13T
		152.4	304.8	+13	0	–13	–38	51T	13T
		304.8	609.6	+25	0	–13	–39	64T	13T
		609.6	914.4	+38	0	–13	–51	89T	13T

Notes: (1) L: Loose fit, T: Tight fit.
(2) Bearing outer diameter D of less than 304.8 mm are applied for class 0.

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Table 8.10 Amounts of Fits: Radial Bearings with Tolerance JIS Class 0 (ISO Normal Class)

Table 8.10.1 Inner Ring with Shaft

Unit: μm

Nominal dimensions (mm)		Deviation of single plane mean bore dia. of bearing (1)		Shaft with tolerance grade IT5										Shaft with tolerance grade IT6													
				m5		h5		j5		h5		g5		r6		p6		n6		m6		k6		j6		h6		g6	
				Tight		Tight		Tight	Loose	Tight	Loose	Tight	Loose	Tight		Tight		Tight		Tight		Tight		Tight	Loose	Tight	Loose	Tight	Loose
Over	Incl.	High	Low	Max	Min	Max	Min	Max	Max	Max	Max	Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Max	Max	Max	Max	Max
3	6	0	–8	–	–	–	–	11	2	8	5	4	9	–	–	–	–	–	–	–	–	–	–	14	2	8	8	4	12
6	10	0	–8	–	–	–	–	12	2	8	6	3	11	–	–	–	–	–	–	–	–	–	–	15	2	8	9	3	14
10	18	0	–8	–	–	17	1	13	3	8	8	2	14	–	–	–	–	–	–	–	–	20	1	16	3	8	11	2	17
18	30	0	–10	–	–	21	2	15	4	10	9	3	16	–	–	–	–	–	–	–	–	25	2	19	4	10	13	3	20
30	50	0	–12	32	9	25	2	18	5	12	11	3	20	–	–	–	–	45	17	37	9	30	2	23	5	12	16	3	25
50	80	0	–15	39	11	30	2	21	7	15	13	5	23	–	–	–	–	54	20	45	11	36	2	27	7	15	19	5	29
80	120	0	–20	48	13	38	3	26	9	20	15	8	27	–	–	76	37	65	23	55	13	45	3	33	9	20	22	8	34
120	140													113	63														
140	160	0	–25	58	15	46	3	–	–	25	18	11	32	115	65	93	43	77	27	65	15	53	3	39	11	25	25	11	39
160	180													118	68														
180	200													136	77														
200	225	0	–30	67	17	54	4	–	–	30	20	13	35	139	80	109	50	90	31	76	17	63	4	46	13	30	29	15	44
225	250													143	84														
250	280	0	–35	–	–	–	–	–	–	35	23	18	40	161	94	123	56	–	–	–	–	–	–	51	16	35	32	18	49
280	315													165	98														
315	355	0	–40	–	–	–	–	–	–	40	25	22	43	184	108	138	62	–	–	–	–	–	–	58	18	40	36	22	54
355	400													190	114														
400	450	0	–45	–	–	–	–	–	–	45	27	25	47	211	126	–	–	–	–	–	–	–	–	65	20	45	40	26	60
450	500													217	132														

Note: (1) Δdmp specified in JIS B 1514.

Table 8.10.2 Outer Ring with Housing

Unit: μm

Nominal dimensions (mm)		Deviation of single plane mean outer dia. of bearing (1)		Housing with tolerance grade IT6						Housing with tolerance grade IT7													
				K6		J6		H6		P7		N7		M7		K7		J7		H7		G7	
				Tight	Loose	Tight	Loose	Tight	Loose	Tight		Tight	Loose	Tight	Loose	Tight	Loose	Tight	Loose	Tight	Loose	Loose	
Over	Incl.	High	Low	Max	Max	Max	Max	Max	Max	Max	Min	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Min	Max
6	10	0	–8	7	10	4	13	0	17	24	1	19	4	15	8	10	13	7	16	0	23	5	28
10	18	0	–8	9	10	5	14	0	19	29	3	23	3	18	8	12	14	8	18	0	26	6	32
18	30	0	–8	11	11	5	17	0	22	35	5	28	2	21	9	15	15	9	21	0	30	7	37
30	50	0	–11	13	14	6	21	0	27	42	6	33	3	25	11	18	18	11	25	0	36	9	45
50	80	0	–13	15	17	6	26	0	32	51	8	39	4	30	13	21	22	12	31	0	43	10	53
80	120	0	–15	18	19	6	31	0	37	59	9	45	5	35	15	25	25	13	37	0	50	12	62
120	150	0	–18	21	22	7	36	0	43	68	10	52	6	40	18	28	30	14	44	0	58	14	72
150	180	0	–25	21	29	7	43	0	50	68	3	60	13	40	25	28	37	14	51	0	65	14	79
180	250	0	–30	24	35	7	52	0	59	79	3	60	16	46	30	33	43	16	60	0	76	15	91
250	315	0	–35	27	40	7	60	0	67	88	1	66	21	52	35	36	51	16	71	0	87	17	104
315	400	0	–40	29	47	7	69	0	76	98	1	73	24	57	40	40	57	18	79	0	97	18	115
400	500	0	–45	32	53	7	78	0	85	108	0	80	28	63	45	45	63	20	88	0	108	20	128

Note: (1) ΔDmp specified in JIS B 1514.

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Table 8.11 Amounts of Fits: Radial Bearings with Tolerance JIS (ISO) Class 6

Table 8.11.1 Inner Ring with Shaft

Unit: μm

Nominal dimensions (mm)		Deviation of single plane mean bore dia. of bearing (1)		Shaft with tolerance grade IT5										Shaft with tolerance grade IT6													
				m5		h5		j5		h5		g5		r6		p6		n6		m6		k6		j6		h6		g6	
				Tight		Tight		Tight	Loose	Tight	Loose	Tight	Loose	Tight		Tight		Tight		Tight		Tight		Tight	Loose	Tight	Loose	Tight	Loose
Over	Incl.	High	Low	Max	Min	Max	Min	Max	Max	Max	Max	Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Max	Max	Max	Max	Max
3	6	0	–7	–	–	–	–	10	2	7	5	3	9	–	–	–	–	–	–	–	–	–	–	13	2	7	8	3	12
6	10	0	–7	–	–	–	–	11	2	7	6	2	11	–	–	–	–	–	–	–	–	–	–	14	2	7	9	2	14
10	18	0	–7	–	–	16	1	12	3	7	8	1	14	–	–	–	–	–	–	–	–	19	1	15	3	7	11	1	17
18	30	0	–8	–	–	19	2	13	4	8	9	1	16	–	–	–	–	–	–	–	–	23	2	17	4	8	13	1	20
30	50	0	–10	30	9	23	2	16	5	10	11	1	20	–	–	–	–	43	17	35	9	28	2	21	5	10	16	1	25
50	80	0	–12	36	11	27	2	18	7	12	13	2	23	–	–	–	–	51	20	42	11	33	2	24	7	12	19	2	29
80	120	0	–15	43	13	33	3	21	9	15	15	3	27	–	–	74	37	60	23	50	13	40	3	28	9	15	22	3	34
120	140													106	63														
140	160	0	–18	51	15	39	3	–	–	18	18	4	32	108	65	86	43	70	27	58	15	46	3	32	11	18	25	4	39
160	180													111	68														
180	200													128	77														
200	225	0	–22	58	17	46	4	–	–	22	20	7	35	131	80	101	50	82	31	68	17	55	4	38	13	22	29	7	44
225	250													138	84														

Note: (1) Δdmp specified in JIS B 1514.

Table 8.11.2 Outer Ring with Housing

Unit: μm

Nominal dimensions (mm)		Deviation of single plane mean outer dia. of bearing (1)		Housing with tolerance grade IT6						Housing with tolerance grade IT7													
				K6		J6		H6		P7		N7		M7		K7		J7		H7		G7	
				Tight	Loose	Tight	Loose	Tight	Loose	Tight		Tight	Loose	Tight	Loose	Tight	Loose	Tight	Loose	Tight	Loose	Loose	
Over	Incl.	High	Low	Max	Max	Max	Max	Max	Max	Max	Min	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Min	Max
6	10	0	–7	7	9	4	12	0	16	24	2	19	3	15	7	10	12	7	15	0	22	5	27
10	18	0	–7	9	9	5	13	0	18	29	4	23	2	18	7	12	13	8	17	0	25	6	31
18	30	0	–8	11	10	5	16	0	21	35	6	28	1	21	8	15	14	9	20	0	29	7	36
30	50	0	–9	13	12	6	19	0	25	42	8	33	1	25	9	18	16	11	23	0	34	9	43
50	80	0	–11	15	15	6	24	0	30	51	10	39	2	30	11	21	20	12	29	0	41	10	51
80	120	0	–13	18	17	6	29	0	35	59	11	45	3	35	13	25	23	13	35	0	48	12	60
120	150	0	–15	21	19	7	33	0	40	68	13	52	3	40	15	28	27	14	41	0	55	14	69
150	180	0	–18	21	22	7	36	0	43	68	10	60	6	40	18	28	30	14	44	0	58	14	72
180	250	0	–20	24	25	7	42	0	49	79	13	60	6	46	20	33	33	16	50	0	66	15	81
250	315	0	–25	27	30	7	50	0	57	88	11	66	11	52	25	36	41	16	61	0	77	17	94
315	400	0	–280	29	35	7	57	0	64	98	13	73	12	57	28	40	45	18	67	0	85	18	103

Note: (1) ΔDmp specified in JIS B 1514.

Table 8.12 Amounts of Fits: Radial Bearings with Tolerance JIS (ISO) Class 5

Table 8.12.1 Inner Ring with Shaft

Unit: μm

Nominal dimensions (mm)		Deviation of single plane mean bore dia. of bearing (1)		Shaft with tolerance grade IT4								Shaft with tolerance grade IT5			
				m4		k4		js4		h4		m5		h5	
				Tight		Tight		Tight	Loose	Tight	Loose	Tight		Tight	Loose
Over	Incl.	High	Low	Max	Min	Max	Min	Max	Max	Max	Max	Max	Min	Max	Max
3	6	0	–5	13	4	10	1	7	2	5	4	14	4	5	5
6	10	0	–5	15	6	10	1	7	2	5	4	17	6	5	6
10	18	0	–5	17	7	11	1	7.5	2.5	5	5	20	7	5	8
18	30	0	–6	20	8	14	2	9	3	6	6	23	8	6	9
30	50	0	–8	24	9	17	2	11.5	3.5	8	7	28	9	8	11
50	80	0	–9	28	11	19	2	13	4	9	8	33	11	9	13
80	120	0	–10	33	13	23	3	15	5	10	10	38	13	10	15
120	180	0	–13	40	15	28	3	19	6	13	12	46	15	13	18
180	250	0	–15	46	17	33	4	22	7	15	14	52	17	15	20

Note: (1) Δdmp specified in JIS B 1514.

Table 8.12.2 Outer Ring with Housing

Unit: μm

Nominal dimensions (mm)		Deviation of single plane mean outer dia. of bearing (1)		Housing with tolerance grade IT5							
				M5		K5		Js5		H5	
				Tight	Loose	Tight	Loose	Tight	Loose	Tight	Loose
Over	Incl.	High	Low	Max	Max	Max	Max	Max	Max	Max	Max
6	10	0	–5	10	1	5	6	3	8	0	11
10	18	0	–5	12	1	6	7	4	9	0	13
18	30	0	–6	14	1	8	7	4.5	10.5	0	15
30	50	0	–7	16	2	9	9	5.5	12.5	0	18
50	80	0	–9	19	3	10	12	6.5	15.5	0	22
80	120	0	–10	23	2	13	12	7.5	17.5	0	25
120	150	0	–11	27	2	15	14	9	20	0	29
150	180	0	–13	27	4	15	16	9	22	0	31
180	250	0	–15	31	4	18	17	10	25	0	35
250	315	0	–18	36	5	20	21	11.5	29.5	0	41
315	400	0	–20	39	6	22	23	12.5	32.5	0	45

Note: (1) ΔDmp specified in JIS B 1514.

Table 8.13 Amounts of Fits: Radial Bearings with Tolerance JIS (ISO) Class 4

Table 8.13.1 Inner Ring with Shaft

Unit: μm

Nominal dimensions (mm)		Deviation of single plane mean bore dia. of bearing (1)		Shaft with tolerance grade IT4								Shaft with tolerance grade IT5			
				m4		k4		js4		h4		m5		h5	
				Tight		Tight		Tight	Loose	Tight	Loose	Tight		Tight	Loose
Over	Incl.	High	Low	Max	Min	Max	Min	Max	Max	Max	Max	Max	Min	Max	Max
3	6	0	–4	12	4	9	1	6	2	4	4	13	4	4	5
6	10	0	–4	14	6	9	1	6	2	4	4	16	6	4	6
10	18	0	–4	16	7	10	1	6.5	2.5	4	5	19	7	4	8
18	30	0	–5	19	8	13	2	8	3	5	6	22	8	5	9
30	50	0	–6	22	9	15	2	9.5	3.5	6	7	26	9	6	11
50	80	0	–7	26	11	17	2	11	4	7	8	31	11	7	13
80	120	0	–8	31	13	21	3	13	5	8	10	36	13	8	15
120	180	0	–10	37	15	25	3	16	6	10	12	43	15	10	18
180	250	0	–12	43	17	30	4	19	7	12	14	49	17	12	20

Note: (1) Δdmp specified in JIS B 1514.

Table 8.13.2 Outer Ring with Housing

Unit: μm

Nominal dimensions (mm)		Deviation of single plane mean outer dia. of bearing (1)		Housing with tolerance grade IT5							
				M5		K5		Js5		H5	
				Tight	Loose	Tight	Loose	Tight	Loose	Tight	Loose
Over	Incl.	High	Low	Max	Max	Max	Max	Max	Max	Max	Max
6	10	0	–4	10	0	5	5	3	7	0	10
10	18	0	–4	12	0	6	6	4	8	0	12
18	30	0	–5	14	0	8	6	4.5	905	0	14
30	50	0	–6	16	1	9	8	5.5	11.5	0	17
50	80	0	–7	19	1	10	10	6.5	13.5	0	20
80	120	0	–8	23	0	13	10	7.5	15.5	0	23
120	150	0	–9	27	0	15	12	9	18	0	27
150	180	0	–10	27	1	15	13	9	19	0	28
180	250	0	–11	31	0	18	13	10	21	0	31
250	315	0	–13	36	0	20	16	11.5	24.5	0	36
315	400	0	–15	39	1	22	18	12.5	27.5	0	40

Note: (1) ΔDmp specified in JIS B 1514.

Table 8.14 Amounts of Fits: Thrust Bearings with Tolerance JIS (ISO) Class 0

Table 8.14.1 Shaft Washer or Center Washer with Shaft

Unit: μm

Nominal dimensions (mm)		Deviation of single plane mean bore dia. of bearing (1)		Shaft with tolerance grade IT6							
				n6		m6		k6		j6	
				Tight		Tight		Tight		Tight	Loose
Over	Incl.	High	Low	Max	Min	Max	Min	Max	Min	Max	Max
6	10	0	–8	—	—	—	—	18	1	15	2
10	18	0	–8	—	—	—	—	20	1	16	3
18	30	0	–10	—	—	—	—	25	2	19	4
30	50	0	–12	—	—	—	—	30	2	23	5
50	80	0	–15	—	—	—	—	36	2	27	7
80	120	0	–20	—	—	—	—	45	3	33	9
120	180	0	–25	—	—	—	—	53	3	39	11
180	250	0	–30	—	—	76	17	63	4	46	13
250	315	0	–35	—	—	87	20	—	—	51	16
315	400	0	–40	—	—	97	21	—	—	58	18
400	500	0	–45	125	40	—	—	—	—	65	20

Note: (1) Δdmp specified in JIS B 1514.

Table 8.14.2 Housing Washer with Housing

Unit: μm

Nominal dimensions (mm)		Deviation of single plane mean outer dia. of bearing (1)		Housing with tolerance grade IT7			
				M7		H7	
				Tight	Loose	Tight	Loose
Over	Incl.	High	Low	Max	Max	Max	Max
10	18	0	–11	18	11	0	29
18	30	0	–13	21	13	0	34
30	50	0	–16	25	16	0	41
50	80	0	–19	30	19	0	49
80	120	0	–22	35	22	0	57
120	180	0	–25	40	25	0	65
180	250	0	–30	46	30	0	76
250	315	0	–35	52	35	0	87
315	400	0	–40	57	40	0	97
400	500	0	–45	63	45	0	108

Note: (1) ΔDmp specified in JIS B 1514.

8.1.3 Calculating Fits

The fits for bearings are often determined empirically according to Table 8.1 through Table 8.14. These tables are NOT to be used for the following cases:

- If special materials are used for interfaces.
- If a hollow shaft is used.
- For high-precision applications.

(1) Reduction of Interference due to Bearing Load

When load is applied through a rotating inner ring, the ring will deform slightly and a gap will occur between the ring and the shaft at a position 180° from the point of load. This gap and "arc-of-no-contact" will increase as the load becomes heavier. A gearing effect will also occur due to the difference in diameters of rotation of the interfacing parts.

Formula (8.1) and Fig. 8.1 define the reduction (millimeters) in interference fit of the inner ring due to bearing load.

$$\Delta dF = 0.08 \times 10^{-3} \sqrt{\frac{d}{B}} Fr \quad \cdots\cdots\cdots\cdots\cdots\cdots \quad (8.1)$$

where:

ΔdF : Reduction in interference of inner ring fit due to bearing load (mm)
d : Bearing bore (shaft diameter) (mm)
B : Bearing inner ring width (mm)
Fr : Radial load on the bearing (N)

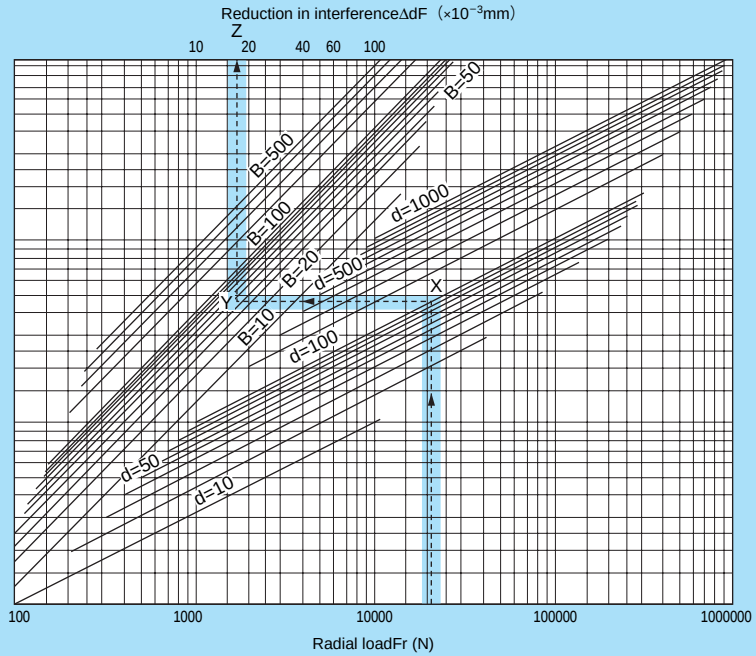


Fig. 8.1 Change in interference due to load

If the radial load is greater than 20% of the basic static load rating Cor, Formula (8.2) is to be used.

$$\Delta dF \geqq 0.02 \times 10^{-3} \frac{Fr}{B} \quad \cdots\cdots (8.2)$$

Calculation example: 6

Object: to obtain the amount of reduction in interference from bearing load where Fr on a single-row, Deep-groove ball bearing number 6320 is 21000N.

From the dimensional tables, d=100 mm, B=47 mm. From Fig. 8.1;

(a) Find 21000 on the line of Fr. Move vertically and intersect the line of d=100 (at point X).

(b) From the point X, move parallel with line Fr and intersect the line of B=47 (at point Y).

(c) Extend vertically from point Y. The intercept with the chart upper limit at point Z indicates the reduction dF (mm) of interference. In this case, ΔdF loss=0.017 (mm).

(2) Reduction in Interference due to temperature difference

Operating temperature differences will generally exist between the inner ring and shaft or the outer ring and bearing housing. Fits must be adjusted for differences of thermal expansion coefficients in the mating materials.

- If the bearing temperature is higher than that of the shaft, increase the fit.
- If heat is transferred through the shaft, the fit becomes tighter due to thermal expansion of the shaft. In such cases, increase the radial internal clearance of the bearing.

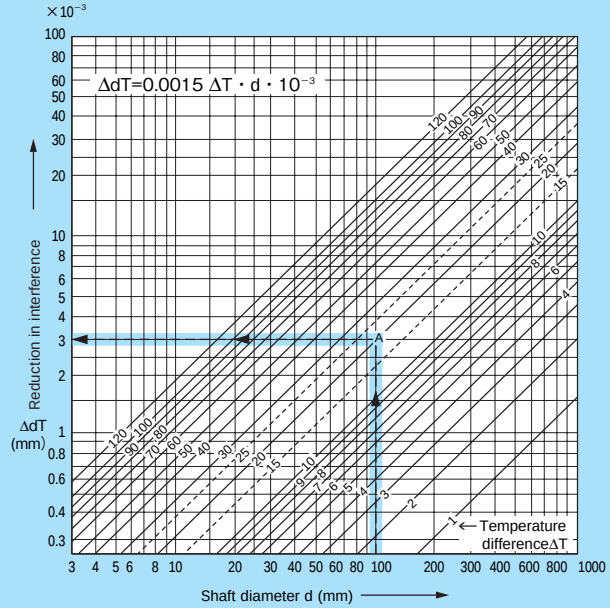


Fig. 8.2 Reduction in Interference of Inner Ring Due to Temperature Difference

- When the outer ring temperature is higher than the housing, reduce the fit with the housing and the radial internal clearance of the bearing.
- If the housing temperature is hotter than the bearing outer ring, check the rates of thermal expansion. It will probably be necessary to increase the fit due to larger growth of the housing bore.

Reduction of interference fit of the inner ring due to temperature differentials can be calculated using Formula (8.3) and Fig. 8.2.

$$\Delta dT = 0.0015\ \Delta T \cdot d \cdot 10^{-3} \quad \cdots\cdots (8.3)$$

where:

ΔdT : Reduction in interference of inner ring fit due to temperature difference (mm)

ΔT : Temperature difference between bearing and housing ambient (°C)

d : Bearing bore (shaft diameter) (mm)

Calculation example: 7

Obtain the reduction in interference for a temperature difference of 20°C existing between housing ambient temperature and internal temperature of a bearing with a bore diameter of 100 mm. From Fig. 8.2.

(a) Find the bore diameter d=100 on the horizontal axis. Draw a vertical line from the point until it intersects the line of temperature difference of 20°C at point A.

(b) Extend a line horizontally from point A left to the Y-axis. The reduction in interference can be read from the intersection with the vertical axis as ΔdT=0.003mm.

(3) Surface Finish Effects on Interference

Since surface asperities are subjected to smoothing when bearings are press-fit, the effective fit becomes smaller than the calculated fit. The amount of reduction in fit is dependent on the surface finish of the interfacing materials.

Effective fit of the inner ring to a solid shaft is calculated using Formulas (8.4.1), and (8.4.2). For ground and polished shafts,

$$\Delta de = \frac{d}{d+2} \Delta da \quad \cdots\cdots (8.4.1)$$

For turned shafts,

$$\Delta de = \frac{d}{d+3} \Delta da \quad \cdots\cdots (8.4.2)$$

where:

Δde : Effective interference (mm)

Δda : Calculated interference (mm)

d : Bearing bore diameter (mm)

(4) Necessary Interference for Inner Rings

Formulas (8.1), (8.2), (8.3), (8.4.1) and (8.4.2) have been used to calculate the effects of Load, Temperature, and Surface Finish in interference. To summarize the effects to a total required interference for the inner ring and shaft (where inner ring rotates against load), refer to Formulas (8.5.1) and (8.5.2).

For ground and polished shafts,

$$\Delta da \geqq (\Delta dF + \Delta dT)\left(\frac{d+2}{d}\right) \quad \cdots\cdots (8.5.1)$$

For turned shafts,

$$\Delta da \geqq (\Delta dF + \Delta dT)\left(\frac{d+3}{d}\right) \quad \cdots\cdots (8.5.2)$$

(5) Tensile Stress from Fits

When interference is provided, the bearing ring undergoes tensile stress. If the stress is excessive, the bearing ring will be damaged. When an inner ring is fitted to a solid steel shaft, stress, σ_i, should be limited to 100MPa or smaller using Formula (8.6). Empirically, the criterion of interference 0.001 of shaft diameter.

$$\sigma_i = \frac{E}{2} \cdot \frac{\Delta de}{d} \left\{1 + \left(\frac{d}{di}\right)^2\right\} \quad \cdots\cdots (8.6)$$

where:

σ_i : Maximum tensile stress of inner ring (MPa)
E : Young's modulus for steel: 2.07×10^5 (MPa)
Δde : Effective interference (mm)
d : Bearing bore diameter (mm)
di : Mean outside diameter of inner ring (mm)

Cylindrical roller bearings; and Self-aligning ball bearings of series 22 and 23:

$di \fallingdotseq 0.25(D+3d)$

All other bearings:

$di \fallingdotseq 0.1(3D+7d)$

where:

D: Bearing outside diameter (mm)

(6) Fits for Inner Rings with Hollow Shaft

Equivalent effective fit for a hollow shaft.

(a) Obtain the interference, Δda for a solid shaft of the identical diameter inner ring with either Table 8.4 or Formulas (8.5.1) and (8.5.2).

(b) Calculate interference Δdha for a hollow shaft and inner ring with Formula (8.7).

$$\Delta dha = \frac{1 - \left(\frac{dh}{di}\right)^2}{1 - \left(\frac{dh}{d}\right)^2} \Delta da \quad \cdots\cdots (8.7)$$

where:

Δdha : Calculated interference of hollow shaft (mm)
d_h : Bore diameter of hollow shaft (mm). For solid shaft, $d_h = 0$
d : bearing bore diameter (mm)
Δda : Calculated interference of solid shaft and inner ring (mm)

(c) Tensile stress of inner ring from fits for hollow steel shaft is calculated using Formula (8.8).

$$\sigma_i = \frac{E}{2} \cdot \frac{\Delta de}{d} \cdot \frac{\left\{1 - \left(\frac{dh}{d}\right)^2\right\}\left\{1 + \left(\frac{d}{di}\right)^2\right\}}{\left\{1 - \left(\frac{dh}{di}\right)^2\right\}} \quad \cdots\cdots (8.8)$$

(7) Outer Ring to Housing Fits

Interference fit must be provided between the outer ring and housing where there is rotating outer ring load or indeterminate load. Fits for outer ring and steel housing can be obtained by using Table 8.6

8.1.4 Selection of Bearing Clearance

The internal clearance of rolling contact bearings during operation (the operating clearance) is a factor which can affect bearing life, vibration, heat, sound, etc.

Theoretically, bearing life is maximum if bearings operate with a slight preload (a slight negative operating clearance). If a bearing is to operate with a slight preload, great care must be taken in the analysis and design of the application to be sure that preloads do not begin to rise during the bearing operation to a level which will lead to an upward spiraling of heat=greater preload=more heat=early bearing failure. And also a bearing with an excessive operating clearance will not perform its maximum load capability.

To prevent clearance problems, unmounted bearing clearance should be selected so that operating clearance will be slightly positive. (Note that bearings chosen for precision location functions are preloaded, but the amount of preload must be precisely controlled at assembly).

For non-separable, radial bearings, and for radial Cylindrical roller bearings, which are assembled in clearance groups with a set amount of "unmounted" internal clearance; the initial internal clearance will be the unmounted clearance minus clearance losses from mounting fits.

Typical clearance groups for the above types of bearings are:

C2: less than Normal clearance
CN: Normal clearance
C3: more than Normal clearance

CN (Normal) internal clearance is determined so that appropriate clearance will remain after the bearing is mounted to the shaft with an interference fit, but with no fit (no interference) between the outer ring and housing and the temperature difference between inner and outer ring is 10°C or less.

Table 8.15 indicates examples of selection for clearance groups other than CN (Normal) internal clearance.

Bearing clearance varies during operation with respect to the temperature rise and the type and magnitude of load. For example, if large reduction of clearance is expected, more initial clearance is required.

Table 8.15 Examples of Clearance Selection other than CN (Normal) Clearance

Application conditions	Clearance Selection	Examples of application (reference)
Large interference for heavy or impact load	C3 clearance or larger	Railroad car axle
Interference required for both inner and outer rings due to indeterminate heavy impact load		Traction motor
Inner ring is exposed to high temperature Outer ring is exposed to low temperature		Pulp and paper machine dryer For outdoor use in cold area
When shaft has a large deflection For increasing axial load capacity by increasing contact angle.		Semi-floating axle for automobiles Bearing of rail road car axle for carring axial load
When both inner and outer rings are clearance fitted	C2 clearance or smaller	Roll neck of rolling machine
For controlling vibration and sound		Small, special electric motors
For post assembly adjustment of clearance such as controlling run-out of shaft, etc.	C9na、C1na	Cylindrical roller bearing for lathe main shaft

Fig. 8.3 illustrates radial clearance of a single-row Deep-groove ball bearing.

(1) Operating Clearance

Operating clearance is defined as the clearance of a bearing operating in a machine at the operating temperature and load.

$$\Delta = \Delta o - (\delta t + \delta f) + \delta w \quad \cdots\cdots\cdots\cdots\cdots\cdots \quad (8.10)$$

where:

- Δ : Operating clearance (mm)
- Δo : unmounted bearing clearance
- δt : Variation of clearance from temperature difference between inner and outer rings (mm)
- δf : Reduction in clearance due to the fit of inner and outer rings (mm)
- δw : Increase of clearance due to load (mm)

(2) Internal clearance reduction due to temperature difference between inner and outer rings

Under normal operating conditions, the temperature of the rolling contact bearing components is, in ascending order from the lowest to the highest; the outer ring, the inner ring, and the rolling elements.

Since it is extremely difficult to measure the temperature of the rolling elements, operating temperature is calculated under the assumption that the temperature of the rolling element is equal to that of the inner ring. Therefore, the reduction in clearance due to temperature difference between the inner and outer rings can be obtained by the following formula:

$$\delta t = \alpha \cdot \Delta T \cdot Do \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \quad (8.11)$$

where:

- δt : Reduction in clearance due to temperature difference between inner and outer rings (mm)
- α : Linear expansion coefficient of bearing steel: 1.12×10^{-5} (1/°C) for operating temperature 300°C or less
- ΔT : Temperature difference between the inner and outer rings (°C)
- Do : Outer ring raceway diameter (mm)

Do≒0.2(4D+d) for Deep-groove ball bearings and Spherical roller bearings.

Do≒0.25(3D+d) for Cylindrical roller bearings.

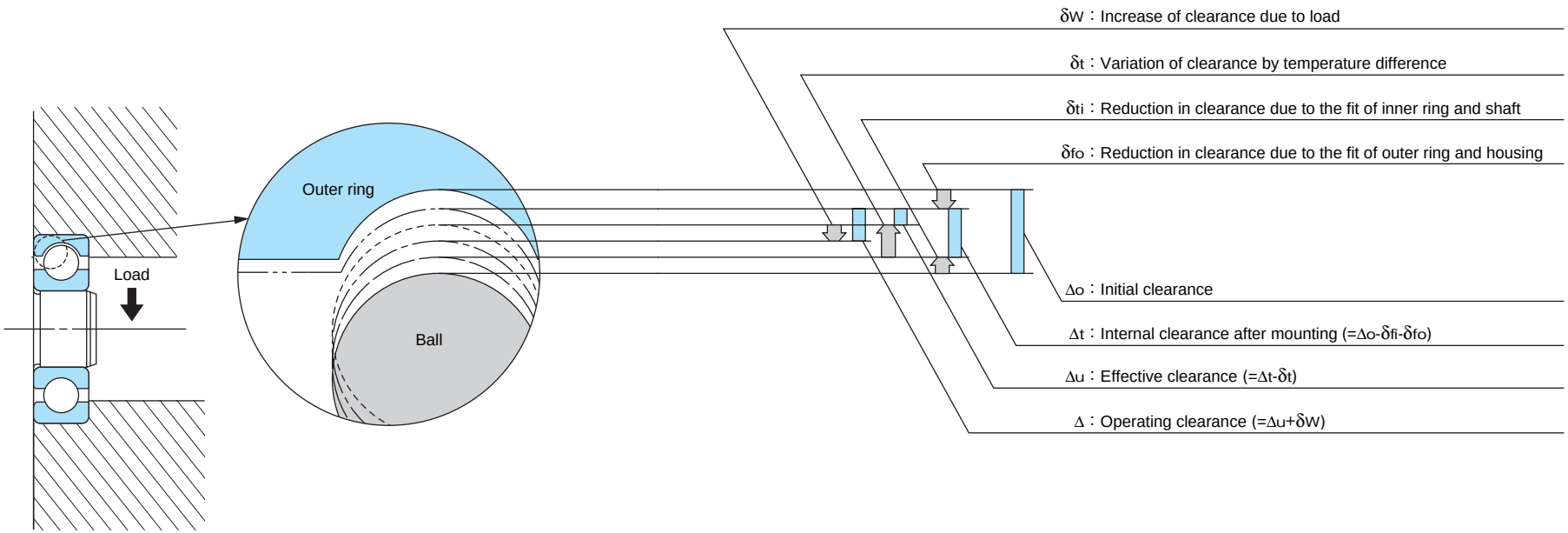


Fig. 8.3 Radial clearance of bearing

NACHI

(3) Reduction in clearance due to fit

When a bearing is mounted to a shaft or housing with an interference fit, the inner ring will expand or the outer ring will contract (due to the fit), causing reduction in the bearing internal clearance. Reduction in clearance due to fit can be calculated from the following formula:

$$\delta f = \delta fi + \delta fo \quad \cdots\cdots (8.12)$$

where:

- δf : Reduction in clearance due to fit (mm)
- δfi : Reduction in clearance due to expansion of the inner ring (mm)
- δfo : Reduction in clearance due to the contraction of the outer ring (mm)

$$\delta fi = \Delta de \cdot \frac{d}{di} \cdot \frac{1-\left(\frac{dh}{d}\right)^2}{1-\left(\frac{dh}{di}\right)^2} \quad \cdots\cdots (8.13)$$

$$\delta fo = \Delta De \cdot \frac{De}{D} \cdot \frac{1-\left(\frac{D}{Dh}\right)^2}{1-\left(\frac{De}{Dh}\right)^2} \quad \cdots\cdots (8.14)$$

where:

- Δde : Effective interference of the inner ring (mm)
- d : Bearing bore diameter (mm)
- di : Mean outside diameter of inner ring (mm)
- dh : Inside diameter of hollow shaft (mm) (Note): For solid shaft, dh=0
- ΔDe : Effective interference of outer ring (mm)
- D : Bearing outside diameter (mm)
- De : Mean inside diameter of outer ring (mm)
- Dh : Housing outside diameter (mm) (Note: If the housing is a rigid body, Dh=∞.

$di \fallingdotseq 0.25(D+3d)$ for Cylindrical roller bearings and Self-aligning Ball bearings of bearing series 22 and 23

$di \fallingdotseq 0.1(3D+7d)$ for other bearings

$De \fallingdotseq 0.25(3D+d)$ for Cylindrical roller bearings and Self-aligning Ball bearings of bearing series 22 and 23

$De \fallingdotseq 0.1(7D+3d)$ for other bearings

For estimating δf, the following may be used:

δf=0.7 ($\Delta de+\Delta De$) to 0.9 ($\Delta de+\delta De$),

with smaller values for heavy-section bearings (e.g. bearings of diameter series 4) and larger values for light-section bearing rings. (e.g. bearings of diameter series 9)

(4) Increase of clearance due to load

When a bearing is subjected to a load, elastic deformation will occur and this deformation will cause an increase in internal clearance. Table 8.16 outlines elastic deformation δr and δa.

Table 8.16 Load and Elastic Displacement

Bearing Types	Approximation of displacement from radial load δr (mm)	Approximation of displacement from axial load δa (mm)
Self-Aligning Ball Bearings	$\delta r = \frac{0.00070}{\cos\alpha}\sqrt[3]{\frac{Po^2}{Dw}}$	$\delta a = \frac{0.00070}{\sin\alpha}\sqrt[3]{\frac{P^2}{Dw}}$
Deep groove ball bearings, angular contact ball bearings	$\delta r = \frac{0.00044}{\cos\alpha}\sqrt[3]{\frac{Po^2}{Dw}}$	$\delta a = \frac{0.00044}{\sin\alpha}\sqrt[3]{\frac{P^2}{Dw}}$
Spherical Roller Bearings	$\delta r = \frac{0.00018}{\cos\alpha}\sqrt[4]{\frac{Po^3}{Lwe^2}}$	$\delta a = \frac{0.00018}{\sin\alpha}\sqrt[4]{\frac{P^3}{Lwe^2}}$
Cylindrical roller bearings, Tapered roller bearings	$\delta r = \frac{0.000077}{\cos\alpha} \cdot \frac{Po^{0.9}}{Lwe^{0.8}}$	$\delta a = \frac{0.000077}{\sin\alpha} \cdot \frac{P^{0.9}}{Lwe^{0.8}}$
Thrust Ball Bearings	—	$\delta a = \frac{0.00052}{\sin\alpha}\sqrt[3]{\frac{P^2}{Dw}}$
Po and P	$Po = \frac{5Fr}{iz\cos\alpha}$	$P = \frac{Fa}{z\sin\alpha}$

where: Fr = Radial load (N)
Fa = Axial load (N)
α = contact angle(°)
Dw = Diameter of ball or roller (mm)
Lwe =Effective roller length (mm)
i =Number of rows of ball or roller
z =Number of ball or roller per row

8.2 Preload and Rigidity

Generally, rolling contact bearings are mounted so that in operation, there will be a small amount of internal clearance. Applications may sometimes require that the bearings be provided with appropriate negative clearance called “preload” when assembled.

Preload has various purposes and effects. Since an incorrect amount of preload may adversely affect the rolling resistance, life, temperature rise, sound, etc. of bearings; extreme care must be taken when applying preload.

8.2.1 Purposes of Preload

(1) Increases rigidity of a shaft (that is, preloading can help to decrease the deflection of shafting).

(2) Enhances rotating accuracy of shaft. Minimizes axial movements and helps to prevent vibration and decrease noise.

(3) Prevents fretting caused by external vibration.

Item 1 and 2 are pertinent with respect to proper gear engagement, rotating accuracy of precision machinery and resonance of electric motor rotors.

8.2.2 Preloading Method and Measurement

(1) Preloading method

Preloading can be accomplished using one or more of the following methods:

a) Use of springs (disc and coil springs) “Constant-pressure” preloading.

b) Use of clamping nut “Fixed-position” preloading.

c) Use of spacer (spacer and shim) “Fixed-position” preloading.

Fig. 8.4 Axial Load and Axial Displacement

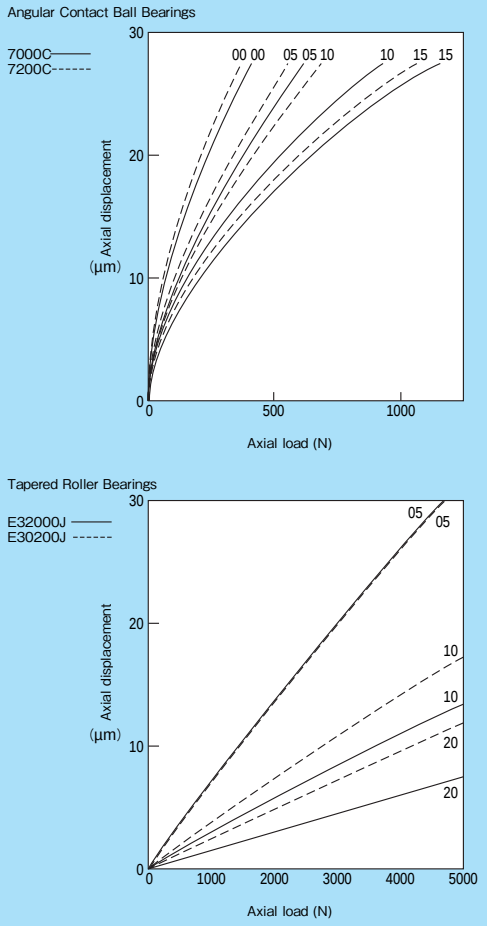
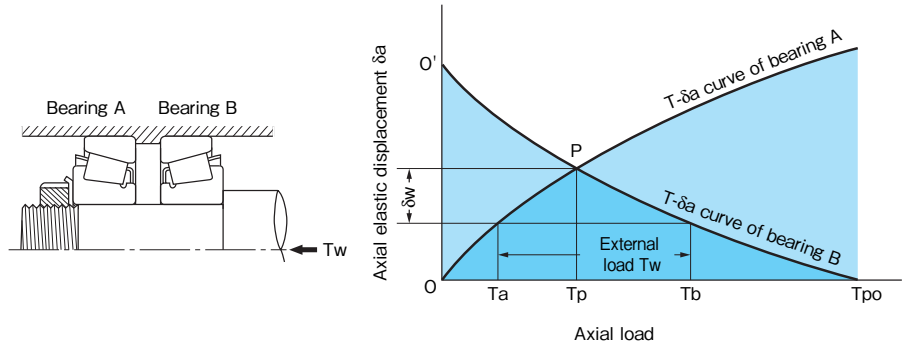


Fig. 8.5 Description of Fixed Position Preloading



(2) Measurement of preloading amount

a) Measuring method using axial load.

- If preloading is done using springs, the preloading amount is determined by the amount of spring displacement.
- If preloading is done using a clamping nut, the preload amount is determined by the relationship of the fastening torque of the nut and clamping force.

b) Measuring method using the bearing axial displacement (Fig. 8.4).
Preload amount is determined by relationship of axial load on the bearing and resulting axial displacement.

c) Measuring method using start-up friction torque of the bearing. Relationship between axial load and friction torque should be known for this method.

8.2.3 Effect of Preloading

To illustrate the effects of preloading on a duplex Tapered roller bearing set, apply the formula from Table 8.16 to calculate a set of curves for bearing A and bearing B. The example bearing set (see Fig. 8.5) is preloaded (fixed-position), and external load, Tw, is applied.

Load distribution to the two units of bearing in terms of the axial displacement will be calculated using the graphical solution procedures described as follows:

(1) Draw T-δa curve of bearing A.

(2) Take preload Tp on axis T, determine intersection P with the curve of bearing A, and draw T-δa curve of bearing B through point P.

(3) Connect the two curves with a length equivalent to the value of external load Tw.

(4) Load Ta and Tb equivalent to this point will become the load of the individual bearings under external load Tw.

(5) Disposition of bearing is obtained by the disposition δw of bearing B.

The disposition of bearing B will be obtained by subtracting disposition to Tp from the counterpart to Tb. The reason for this is that if the bearings are preloaded, the disposition of both bearings becomes constant within a range where preload is not offset to zero by an external load (O - O' in Fig. 8.5 is constant). In other words, bearing A becomes loosened by the amount displaced by the external load on bearing B. If the external load increases and preload is eliminated, load Tb on bearing B will be equal to the external load Tw and the load on bearing A becomes zero. Magnitude of the external load causing loss of preload is represented by Tpo in Fig. 8.5.

8.2.4 Duplex Bearing Preload, Clearance

The preload of duplex bearings can be defined as the clearance, 2A as shown in Fig. 8.6.

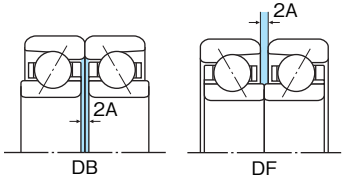


Fig 8.6

If preloading is an application necessity, it is very important that a very thorough application analysis is made, since, if an excessive amount of preload is applied, there can be abnormal heating, increase in rotating torque and / or a sharp drop in bearing life. Table 8.17 shows standard preload and Table 8.18 outlines target amount of fits for precision (tolerance class 5 or 4), Angular Contact ball bearings.

8.2.5 Thrust Bearing Minimum Axial Loads

When rotated at relatively high speeds, the contact angle between rolling elements and raceways of a thrust bearing changes due to centrifugal force. This can cause a skidding (sliding) action between the rolling elements and the raceways. This skidding action may cause smearing and scuffing on the rolling elements and raceway surfaces.

To prevent sliding action, thrust bearings must always be loaded with a minimum axial load. The minimum axial load is derived form Formulas (8.15), (8.16) and (8.17).

Thrust bearings can sustain axial load in only one direction. When a bi-directional axial load exists, preload must be provided by either using double bearings or springs (or load washers) to maintain the minimum axial load.

For vertical shafts, the axial load due to dead weight of the shaft (etc.), will often exceed the minimum axial load. Even in such cases, reversing axial loads may occur during operation causing the initial axial load to fall below the minimum load.

(1) Thrust ball bearing (adopt larger of values below)

$$F_{a\,min} = K \cdot n^2 \quad \cdots\cdots (8.15)$$

$$F_{a\,min} = \frac{Coa}{1000} \quad \cdots\cdots (8.16)$$

where:

$F_{a\,min}$: Minimum axial load (N)
K : Minimum axial load factor from Page 314.
n : Rotating speed (min^{-1})
C_{oa} : Basic static load rating (N)

(2) Spherical Roller Thrust Bearing

$$F_{a\,min} = \frac{Coa}{1000} \quad \cdots\cdots (8.17)$$

Table 8.17 Standard Preload Amounts for Precision Combination Angular Contact Ball Bearings Unit : N

Bore Diameter Number \ Preload	7000C (DB、DF)				7200C (DB、DF)				7300C (DB、DF)			
	E	L	M	H	E	L	M	H	E	L	M	H
00	20	50	100	145	30	70	145	195	50	100	195	295
01	20	50	100	145	30	70	145	195	50	100	195	295
02	20	50	100	145	30	70	145	195	50	100	195	295
03	20	50	100	145	30	70	145	195	50	100	195	295
04	50	100	195	295	70	145	295	490	100	195	390	590
05	50	100	195	295	70	145	295	490	100	195	390	590
06	50	100	195	390	70	145	295	590	100	195	390	685
07	70	145	295	390	100	195	490	590	145	295	590	685
08	70	145	295	590	100	195	490	785	145	295	590	980
09	70	145	295	590	100	195	490	785	145	295	590	980
10	70	145	295	590	100	195	490	785	145	295	590	980
11	100	195	390	785	145	295	590	980	195	390	785	1470
12	100	195	390	785	145	295	590	980	195	390	785	1470
13	100	195	390	785	145	295	590	980	195	390	785	1470
14	145	295	590	1170	195	390	785	1470	295	590	980	1960
15	145	295	590	1170	195	390	785	1470	295	590	980	1960
16	145	295	590	1170	195	390	785	1470	295	590	980	1960
17	195	390	785	1470	295	490	980	1960	390	785	1470	2940
18	195	390	785	1470	295	490	980	1960	390	785	1470	2940
19	195	390	785	1470	295	490	980	1960	390	785	1470	2940
20	195	390	785	1470	295	490	980	1960	390	785	1470	2940

Table 8.18 Target Interference Values for Precision (tolerance class 5 or 4) Angular Contact Ball Bearings Unit: μm

Nominal bearing bore diameter d (mm)		Shaft to inner ring	Nominal bearing outside diameter D (mm)		Housing to outer ring
Over	Incl.	Tight	Over	Incl.	Loose
—	18	0 ～ 2	—	18	—
18	30	0 ～ 3	18	30	2 ～ 6
30	50	0 ～ 3	30	50	2 ～ 6
50	80	0 ～ 4	50	80	3 ～ 9
80	120	0 ～ 4	80	120	3 ～ 9
120	150	—	120	150	4 ～ 12
150	180	—	150	180	4 ～ 12
180	250	—	180	250	5 ～ 15

Remark: Regarding the fit of housing and outer ring, take the smaller values of target clearance for the clamping side bearing and the larger values for the floating side.

8.3 Shaft and Housing Selection

Care must be taken in the design and manufacture of shafts and housings since inaccuracies in these components will probably result in poor bearing performance.

8.3.1 Accuracy and Surface Finish; Shafts and Housings

For general service conditions, the fit surfaces for shafts and housing bores for rolling contact bearings can be made using lathes or fine boring machines.

For applications requiring high-running accuracy, or for very quiet operation, or where high loads exist, a ground finish will be necessary.

Table 8.19 indicates the shaft and housing accuracy and surface roughness for normal service condition.

8.3.2 Shaft and Housing Design; Recommendations

- Design shafts as short as possible and of sufficient diameter to prevent bending. Design the housing and supports for appropriate rigidity.
- Use care in specifying the roundness, cylindricity, and surface finish of shaft and housing fit surfaces. See Table 8.19.
- Use care in specifying the squareness of the shaft shoulder to the shaft axis and squareness of the housing shoulder to the housing. See Table 8.19.
- Make sure that the radius, ra, of the shaft and housing is smaller than the bearing chamfer dimension, r (minimum) or r_1 (minimum) to prevent the shaft or housing from interfering with proper bearing seating. See Fig. 8.7.

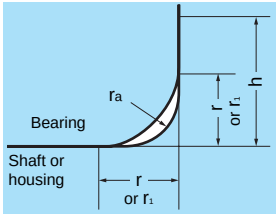


Fig. 8.7 Chamfer Dimension, fillet radius and Shoulder Height

Table 8.19 Shaft and Housing Accuracy and Surface Roughness

Item		Shaft	Housing bore
Roundness		≦ 0.5 times shaft diametral deviation	≦ 0.5 times housing bore deviation
Cylindricity		≦ 0.5 times shaft diametral deviation within range of bearing width	≦ 0.5 times bore deviation within range of bearing width
Shoulder squarness	small bearing	3/10000 or less	
	medium bearing	4/10000 or less	
	large bearing	5/10000 or less	
Fit surface roughness	small bearing	Ra<0.8μm	Ra<0.8μm
	medium bearing	Ra<0.8μm	Ra<0.8μm
	large bearing	Ra<1.6μm	Ra<3.2μm

For radial bearings in general, determine the maximum value of fillet radius ra and the minimum value of the shoulder height according to Table 8.20.

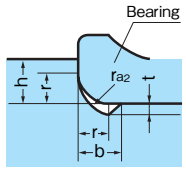


Fig. 8.8 Chamfer Dimensions and fillet radius

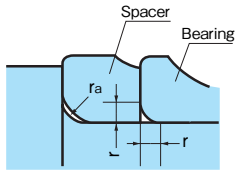


Fig. 8.9 Chamfer Dimensions and fillet radius when Using a Spacer

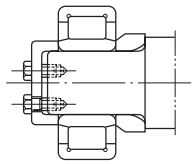


Fig 8.10

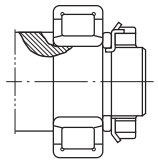


Fig 8.11

When using a ground finish, provide and undercut as shown in Fig. 8.8. See Table 8.21 for undercut dimensions.

- When using a fillet radius, (r_{a2}) larger than the bearing chamfer dimension (for enhancing the strength of the shaft or when shoulder height must be lower than specified in the dimension tables), install a spacer between the bearing and the shaft shoulder as shown in Fig. 8.9 and Fig. 8.10.
- For ease of dismounting, make the height of the shaft shoulder smaller than the inner ring outside (or land) diameter. If a higher shoulder is required for applying heavy axial load, install an undercut in the shaft as shown in Fig. 8.11.
- Finish bearing mounting screws, or clamping nuts as perpendicular to the shaft as possible and thread screws reverse to the rotating direction of the shaft.
- For split-type housings, carefully finish the matching faces of the split housing and install a relief on both sides of the bore diameter of the cap to prevent excessive force from being applied to the bearing when the housing cap is tightened.
- For light-alloy housings (having less rigidity), insert a steel bushing to provide additional rigidity.
- Generally, an interference fit is not adequate to axially locate a bearing. A shaft or housing backing shoulder should be used.

Table 8.20 Maximum Corner Radius and Minimum Shoulder Heights

Unit: mm

Minimum chamfer dimension r (min) or r_1 (min)	Shaft or housing		
	Radius r_a (max) of corner	Shoulder height h (min)	
		Bearing application in general	Special cases (1)
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
0.6	0.6	2.25	2
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	–
15	12	32	–
19	15	–	–

Note: (1) Data in the columns for special cases should be used when axial load is extremely small. The values in this column do not apply to tapered roller bearings, spherical roller bearings and angular contact ball bearings.

Remark: Symbols are based on Fig. 8.7.

Table 8.21 Undercut Dimensions for Ground Shaft

Unit: mm

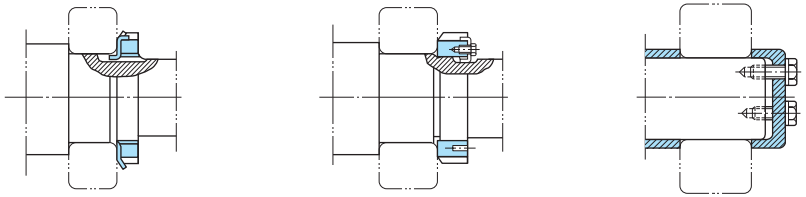
Minimum chamfer dimension r (min) or r_1 (min)	Undercut dimensions		
	t	r_{a2}	b
1	0.2	1.3	2
1.1	0.3	1.5	2.4
1.5	0.4	2	3.2
2	0.5	2.5	4
2.1	0.5	2.5	4
2.5	0.5	2.5	4
3	0.5	3	4.7
4	0.5	4	5.9
5	0.6	5	7.4
6	0.6	6	8.6
7.5	0.6	7	10

Remark: Symbols are based on Fig. 8.8.

8.3.3 Examples of Shaft Designs

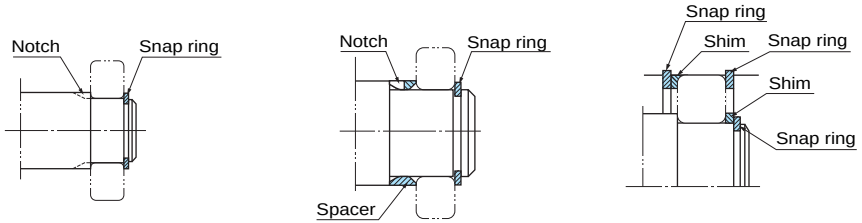
(1) Cylindrical-bore Bearing Shaft Design

- If axial load is applied away from the shaft shoulder, the inner ring can be locked into position using; a) nuts and washers (Fig. 8.12a); b) nuts and lock plates (Fig. 8.12b); or c) end plates and bolts (Fig. 8.12c). When using a lock washer WITHOUT a shaft keyway or slot, it is recommended that the direction of the nut thread be made reverse to that of the shaft rotation.
- When not supporting axial load on the shaft-end on the side opposite the shaft shoulder, you may elect to insert a snap ring in a shaft groove to prevent the inner ring from moving axially. To remove clearance between the snap ring and bearing ring, shims or spacers can be inserted. See Fig. 8.13.
- Snap rings can be applied when using spacers between gears, or pulleys instead of using a shaft shoulder. If axial load will act on the snap ring, insert a shim or spacer between the bearing ring and the snap ring to prevent the bending stress from applying axial load to the snap ring, and to eliminate any axial clearance between the snap ring and the snap ring groove. See Fig. 8.13.



(a) Shaft Nut and Washer (b) Shaft Nut and Lock Plate (c) End Plate and Bolts

Fig 8.12



(a) Snap Ring and Notched Shoulder (b) Snap Ring and Notched Spacer (c) Snap Ring and Spacer

Fig 8.13

(2) Tapered-bore Bearing Shaft Designs

Two methods of mounting tapered-bore bearings to a shaft are; direct mounting to a tapered shaft, or mounting to a cylindrical shaft using an adapter or withdrawal sleeve.
Use of adapter or withdrawal sleeves may allow use of less expensive shaft seats (no tapering cost), permits use of a larger shaft tolerance and allows variable location of a bearing on a shaft. See Figs. 8.14 to 8.16. Since the dimensional accuracy of sleeves is not as high as that of bearings, sleeves are not appropriate for applications requiring high accuracy or high rotational speed.

- Normally, tapered-bore bearings used with adapters do not employ shaft shoulders. To prevent nuts from loosening, use washers for shafts of diameters 200 mm or less, and lock plates for shafts of diameters 200 mm or more. Thread direction of the nut should be made in reverse to the direction of rotation.
- For shafts with shoulders, mount the tapered-bore bearing with withdrawal sleeves with nuts and washer or end plates and bolts. See Fig. 8.17.
- When accuracy is of primary importance, use the direct mount method using tapered-bore bearings mounted directly on tapered shafts. See Fig. 8.18.

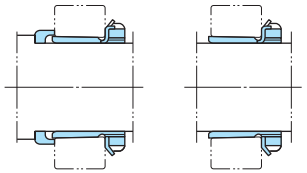


Fig. 8.14 Adapter Sleeve Mounting

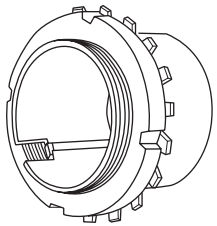


Fig. 8.15 Adapter Using Washer (Bearing Bore Diameter Number ≦ 40)

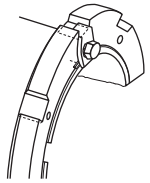


Fig. 8.16 Adapter Using Lock Plate (Bearing Bore Diameter Number > 40)

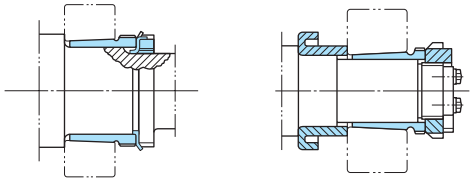


Fig. 8.17 Withdrawal Sleeve Mounting

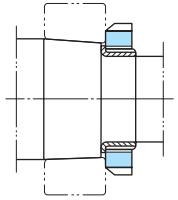


Fig. 8.18 Tapered Shaft Mounting Using Split Ring, Nut and Washer

8.3.4 Housing Designs

- When mounting two bearings to a common shaft, it is necessary to design a structure that allows linear expansion of the shaft due to temperature rise, and for mounting location errors made during assembly. To accomplish this, mount one of the bearings to support both radial and axial loads. Fix the inner and outer rings to the shaft and housing so that neither ring will move axially. Mount the other bearing so it can move axially as the “free” side bearing capable of supporting only radial load.
  If a bearing configuration is selected for the free side bearing which will not accommodate the linear movement of the shaft created by thermal expansion, select a housing fit which will permit axial movement of the outer ring in the housing.
- If a Cylindrical roller bearing with an N, NU, or RNU configuration is used for the free side bearing, then shaft expansion due to temperature rise can be relieved by axial movement of the inner ring of the bearing. See Fig. 8.19. Use of Cylindrical roller bearings may also facilitate assembly if an interference fit is required for both inner and outer rings (due to the load relationship).

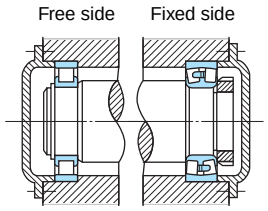


Fig 8.19

- If Cylindrical roller bearings with an NF or NJ configuration are used at both ends of a shaft, axial clearance must be prevented from becoming too small. Referring to Fig. 8.20, make width B (inner ring spacer) larger than the distance A between the outer rings.

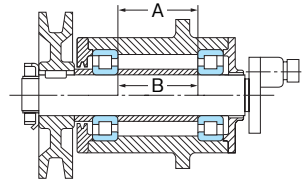


Fig 8.20

- If the amount of shaft expansion is small (due to small temperature rise or short shaft), and precise axial location is not needed then two units of non-separable configuration bearings may be used with both units having floating axial movement. In such cases, assemble the two units with axial clearance on both ends of the assembly. See Fig. 8.21. For mounting of two Deep-groove ball bearing pillow blocks with spherical outer ring bearing surfaces, lock and bolt the first pillow block into position, then lock the second block to the shaft. Pull the second block away from the first block while tightening the mounting bolts. Where axial expansion can not be handled by the clearance within the bearings, please consult NACHI.

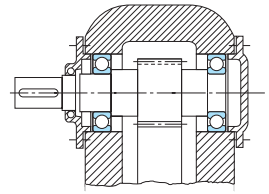


Fig 8.21

- Pairs of single-row Angular Contact ball, or Tapered roller bearings are often used for axial positioning. When bearing spacing is large, axial expansion from temperature rise is best handled using an assembly as shown in Fig. 8.22, where the paired bearings take axial and radial loads and another bearing (in the Figure, an NU-configured Cylindrical roller bearing), permits linear shaft expansion.

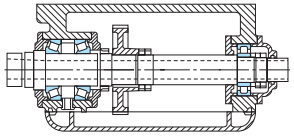


Fig 8.22

- When using horizontally-split pillow blocks as the fixed side bearing, the outer ring is located by using one or two positioning rings. When one ring is used, place it to the side of the adapter nut as shown in Fig. 8.23. When two positioning rings are used, place one on each side of the bearing (also see Fig. 8.23). To use a horizontally-split pillow block as the floating side bearing, mount the bearing without positioning rings.

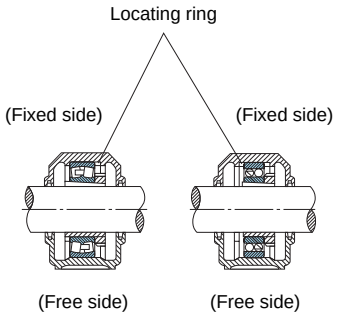


Fig 8.23

- Determine the position of the fixed bearing by considering the machinery application and the balance of rated life of the individual bearings. For example, when a bevel gear is used (see Fig. 8.24), set the bevel gear side as the fixed side to maintain the accuracy of the gear engagement. For electric motors, the fixed side bearing is often positioned on the non-driving side where a lower amount of radial load is applied, in order to equalize the bearing equivalent load and rated life between the two bearings.

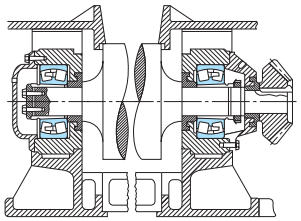


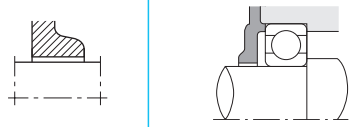
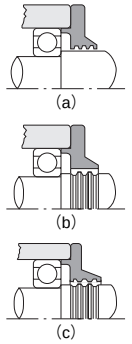
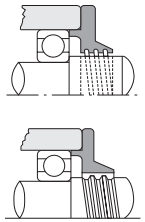
Fig 8.24

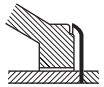
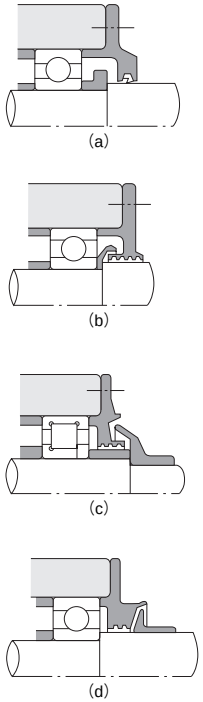
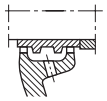
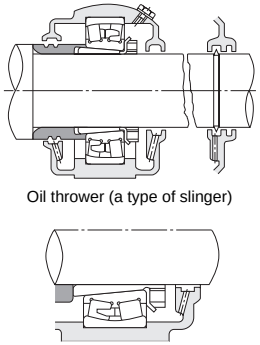
8.4 Sealing Devices

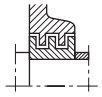
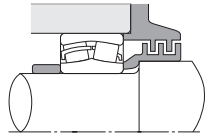
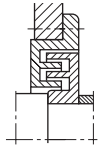
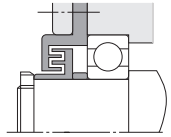
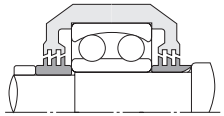
8.4.1 Sealing Device Requirements

- Must effectively stop foreign material intrusion.
- Must not create excessive frictional loss or heat.
- Must be easy to mount, dismount, and maintain.
- Must be inexpensive.

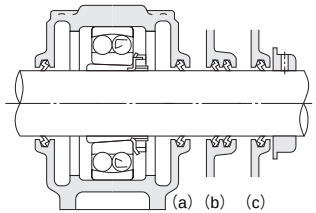
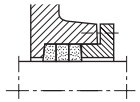
The lubrication method and sealing devices used must be compatible and appropriate for the application.
Integrally-sealed or shielded bearings may need separate, additional sealing devices if they are to be operated in an adverse atmosphere.

Type of Sealing Device	Design Example	Design Precautions
Linear gap (simple gap type)		1) Clearance between oil groove type shaft and housing Unit: mm Shaft dia. / Radial clearance 50 or less: 0.25～0.4 50 Over 200 Incl.: 0.5 ～1.5 2) Groove dimensions Width: 3 to 5 mm Depth: 4 to 5 mm 3) Where possible, provide three grooves or more. 4) Fill grooves with grease to aid in sealing out foreign material. 5) Threaded groove type is applicable to oil lubricated applications where the shaft is horizontal and operates in constant rotational direction. Thread grooves must be reverse to the rotation direction. Therefore, they are not applicable for shafts with indeterminate direction rotation. 6) Oil grooves are used alone if there is little foreign material, as a simple method to prevent oil leaks, usually they are combined with another method of sealing.
Coaxial groove (oil groove type)		
Threaded groove		

Type of Sealing Device		Design Example	Design Precautions
Slinger type		 (a) (b) (c) (d)	1) Seal types that sling oil, prevent oil leakage and dust entry through the centrifugal force generated by a rotor attached to the shaft. 2) (a) and (b) are good for preventing oil leakage. 3) (c) and (d) are good for preventing dust and water intrusion.
Oil thrower type (for oil lubrication)		 Oil thrower (a type of slinger)	1) Oil deposited in the grooves returns to the housing.

Type of Sealing Device		Design Example	Design Precautions
Radial labyrinth type			1) Labyrinth Clearance Unit: mm
Axial labyrinth type			2) There are radial labyrinth and axial labyrinth types of labyrinth seals. The radial labyrinth type requires a split housing. 3) These seals are very suitable for the prevention of oil leakage of high speed shafts. 4) For low speed rotation, apply grease to the grooves for better sealing. 5) If angular misalignment exists between the shaft and the housing, use self-aligning type labyrinth.
Self-aligning type labyrinth			

Shaft dia.	Labyrinth Clearance	
	Radial direction	Axial direction
50 or less	0.25～0.4	1～2
50 Over 200 Incl.	0.5 ～1.5	2～5

Type of Sealing Device	Design Example	Design Precautions
Seal ring type, (felt, leather, rubber, plastic)	 (a) (b) (c)	1) Sealing Material Temperature Range
Adjustable Seal type (includes metal packing, O-ring, etc.)		

Sealing material	Operating temperature range (˚C)
Nitrile	−25〜100
Acrylic	−15〜130
Silicon	−70〜200
Flourine	−30〜200
Ethylene tetrafluoride	−50〜220
Felt	−40〜120

2) Sealing Material Speed Limits m/s

Shaft diameter (mm)	~20	20~40	40~
Nitrile	4~ 8	8~12	12~16
Acrylic	4~12	12~18	18~25
Silicon	4~18	18~25	25~32
Flourine	4~18	18~25	25~32
Ethylene tetrafluoride	15		
Felt	3.5~4.5		

These values apply when shafts have good surface finish, roundness, and run-out.

3) Lubricate the sliding surfaces of seal and shaft.

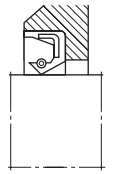
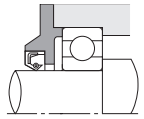
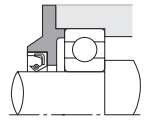
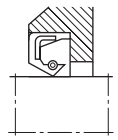
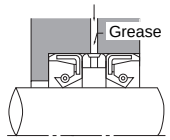
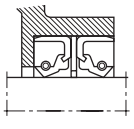
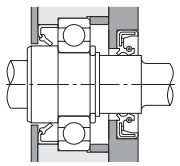
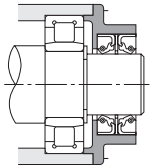
4) These seal types are mainly applicable to grease lubricated bearings.

5) Install one to three pieces of felt ring.

6) For felt rings in high speed applications, use hard seal material. Coat with mineral oil before mounting and insert tightly.

7) Felt will harden and lose elasticity under high temperature or speed.

8) Felt rings can prevent intrusion of small amounts of dust, for other applications it should be combined with a slinger or a synthetic rubber grease stopper that is the same size as the felt ring.

Type of Sealing Device	Design Example	Design Precautions
Oil seal type	  (a)  (b)   Grease   Oil seal example (1)  Oil seal example (2)	1) Speed and shaft surface roughness

Speed (m/s)	Surface Finish	Finish method
~ 5	Ra<0.8μm	Paper finish after grinding
5〜10	Ra<0.4μm	Paper finish after grinding
10〜	Ra<0.2μm	Lapping, or superfinishing, or electro polishing after quenching and grinding

2) Sliding section of shaft should be minimum hardness of HRC40, if possible hardness of HRC55 or higher is desirable.

3) Dimensional tolerance of sliding section of shaft is h9, for seal housing it is H8 or H7.

4) Since there are various shapes and materials for seals, select those that meet your purposes.

5) Control the shaft and seal eccentricity, particularly eccentric movement of the shaft. Shaft eccentricity of 0.02 to 0.05 or less is desirable.

6) Lubricate the sliding surfaces of seal and shaft.

8.5 Lubrication

8.5.1 Functions of Lubrication

The main purpose of lubricants in rolling contact bearings is to reduce friction and wear of each element. Lubricants perform this function by separating rolling and sliding surfaces with a very thin film of oil. Bearing performance and service life is largely dependent on the suitability of the lubricating system and lubricant to the application. Functions of lubrication in rolling contact bearings are:

① Lubrication of friction surfaces:
Reduction in;
1) Rolling friction between the rolling elements and raceways.
2) Sliding friction between roller end and guide faces of roller bearings.
3) Sliding friction between the rolling elements and retainer.
4) Sliding friction between the retainer and raceway guide surface.

② Removal of the heat from system produced by friction and external sources. An example of the heat removal function would be use of a circulating oil lubrication system for a high-speed application.

③ Dust-proofing and rust prevention:
1) Prevention of foreign material from entering the bearing.
2) Protection of bearing components from corrosion.

④ Relief of stress concentration:
1) Uniform distribution of stress to the rolling contact surface.
2) Relief of impact loads.

8.5.2 Lubrication Cautions

① Adequate lubricant film separation should be maintained between friction surfaces.

② Since the oil film required on contact surfaces is thermally feeble, adequate oil viscosity must be maintained.

③ Since lubricants tend to deteriorate with increase in temperature, bearing applications should be designed to keep the operating temperature as low as possible.

④ The lubricating system (method) must be suitable for the application and the lubricant must have appropriate properties.

⑤ The lubricant must be kept free from contamination and water.

8.5.3 Lubricating Methods

(1) Oil Lubrication

(1.1) Oil Bath Lubrication

- Oil bath lubrication is generally used for low-to-medium-speed operation.
- Excessive oil causes churning which can cause excessive temperature rise. Insufficient oil will probably lead to early bearing failure.
- Oil level gauges are recommended to check (and maintain) the proper oil level.
- Separation ribs may be installed at the bottom of the housing to reduce churning and or to dissipate heat.
- Static oil level should be at slightly below the center of the lowest rolling element of a bearing applied to a horizontal shaft. See Fig. 8.25. For vertical shafts, static oil level should cover 50% to 80% of the rolling element.
- When two or more bearings are used on a vertical shaft in the same housing, the lower bearing may create excessive temperature rise if an oil bath system is used (unless operated at very low speed). If excessive heat occurs, use a drip, splash, or circulating oil system.

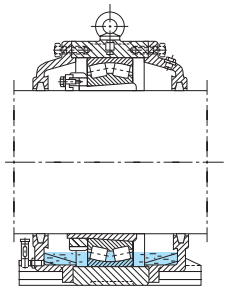


Fig 8.25

(1.2) Splash Lubrication

- In splash lubrication, oil is splashed on the bearing by a rotating element (an impeller or “slinger”) mounted on the shaft. The bearing is not immersed in the oil.
- In a gear box, the gears and bearings are often lubricated from a common oil reservoir with the gears serving as a slinger. Since oil viscosity for the gears may differ from that required for the bearings and the oil may contain particles worn from the gears, a separate lubrication system or method may improve bearing life. Sealed or shielded bearings and “magnetic” plugs are often used in conjunction with gear drives.
- A bearing on a vertical shaft can be provided with a conical rotary element under the bearing so that the oil rises on the conical surface and is atomized before entering the bearing. See Fig. 8.26.

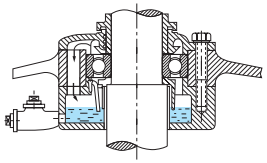


Fig 8.26

(1.3) Drip Lubrication

- Drip lubrication is used for bearings operated at relatively high speeds under low-to-medium loads.
- Drip lubrication is generally used for the radial bearing on a vertical or inclined shaft and oil is fed directly to the bearing.
- The lubricating oil is contained in a lubricator, and is fed to the bearing through a wick which also serves as a filter. A sight window is provided to allow checking the oil level.

Fig. 8.27 shows a drip lubricating system provided with a lubricator on top of the housing. Oil is dripped onto the shaft nut in the bearing box, and is atomized before entering the bearing.

Fig. 8.28 shows an oil metering system designed to feed several oil drops per minute to the bearing.

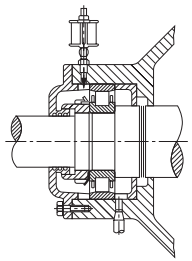


Fig 8.27

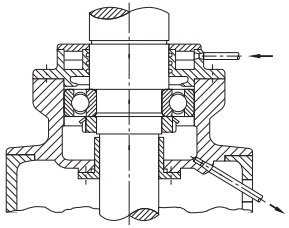


Fig 8.28

(1.4) Circulating Oil Lubrication

- Circulating oil lubrication has two purposes:
  1) To cool the bearing.
  2) To automatically feed oil to a specific area from a central system.
- A circulating oil system consists of an oil pump, cooling device, filter and delivery piping. Circulating oil systems utilize the pumping action of the bearings and augment the cooling effects of slingers.
- Circulating oil lubrication includes: drip, forced, and spray-mist lubrication.
- In a circulating oil lubricating system, the bearing is provided with an oil inlet located on one side of the bearing, and an oil outlet on the other side of the bearing.
- The oil outlet should be larger than the oil inlet so that excess oil does not remain in the bearing housing.

Fig. 8.29 shows a circulating system with an oil passage in the area of the housing which carries no load. This system is for steam-heated calender rolls in a paper mill. Cooled oil is circulated through the inner wall of the housing and passes through both bearings.

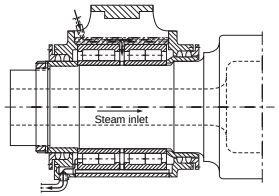


Fig 8.29

(1.5) Forced Lubrication

Forced lubrication is used to feed oil under pressure to overcome internal housing pressure in high-speed operation.

- The oil outlet should have a cross section twice that of the oil inlet.
- A “jet” lube system is sometimes used in high-speed applications to target oil directly to the rolling and sliding components of the bearing. See Fig. 8.30. Excessive oil should be discharged with a pump.

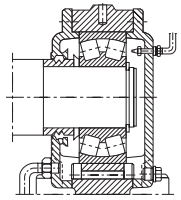


Fig 8.30

(1.6) Disk Lubrication

Disk lubrication utilizes a disk on the shaft which rotates at high speed. The disk is partially submerged in oil, and splashes oil to an upper oil sump, which in turn delivers the oil to the bearing by gravity. Disk lubrication is used on the bearings of superchargers and blowers. See Fig. 8.31.

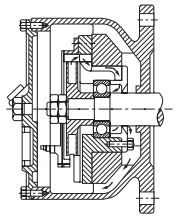


Fig 8.31

(1.7) Spray Mist Lubrication

- Fig. 8.32 shows an example of spray lubrication, which uses a turbo-compressor impeller to force oil into the bearing.
- Fig. 8.33 shows an example of oil mist applied to an oil atomizer (0.5 to 5.0 cc/h).

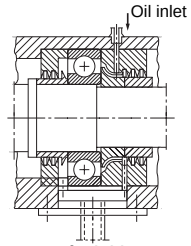


Fig 8.32

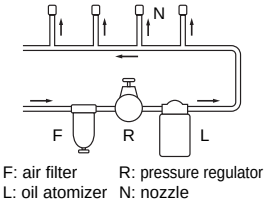


Fig 8.33

(1.8) Oil/Air Lubrication

Using the oil/air lubrication, a very small amount of oil is mixed with compressed air with a constant-quantity piston and mixing valve. This mixture is directed to the rolling part of bearings.

Because oil/air lubrication can reduce heat generation from bearings, this method is suited for high speed applications such as machine tools.

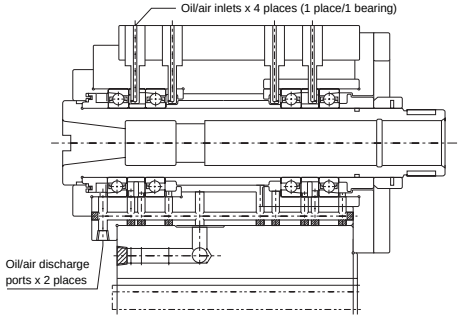


Fig 8.34

(2) Grease Lubrication

In using grease lubrication, the following items should be considered:

- Select grease having correct properties.
- Grease must be delivered in the right amount to the correct bearing area.
- Determine method of relubrication. Different greases should not be mixed because it can cause poor lubrication performance.
- Consider centralized lubrication for large-size machinery such as rolling mill equipment. See Fig. 8.35.1.

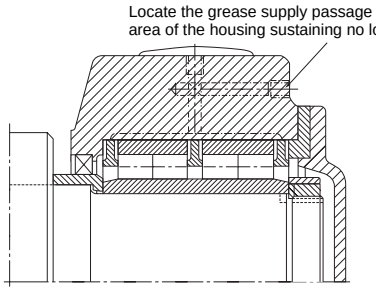


Fig. 8.35.1

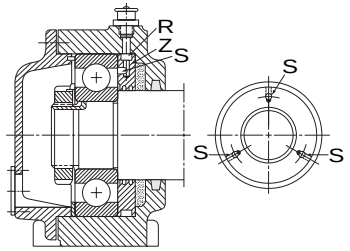
Fig. 8.35.2 shows a design utilizing a grease supply plate.

8.5.4 Lubricants

Rolling contact bearings use two forms of lubricants; lubricating oil and grease. In some special applications, solid lubricants such as molybdenum-disulfide, graphite, or PTFE are used. The lubricant should have the following properties:

- Low impurity and moisture content
- Temperature stability
- Non-corrosiveness
- Load pressure resistance
- Anti-wear action
- Anti-friction action
- High mechanical stability

See Tables 8.22 for a guide to selection of lubricating oil and grease.



S: nozzle
R: oil groove
Z: grease sector

Fig. 8.35.2

Table 8.22 Guide to Selecting Oil and Grease

Application conditions	Grease ([1])	Oil
Temperature	Not suitable for high temperature (100˚ to 120˚C)	Suitable for high temperature (with circulating cooling)
Speed	Low to medium speeds	Suitable for high speed operation (depending on lubrication method)
Load	Light to medium loads	Suitable for high loads
Housing design Maintenance	Simple	Complicated, need to consider prevention of oil leaks
Centralized lubrication	Possible	Easy
Dust filtration	Not possible	Possible (Circulating lubrication provides a filter to trap dust)
Rolling resistance	Large	Small (Correct oil quantity must be maintained)

Note: ([1]) Grease for regular rolling contact bearings.

A wide variety of lubricating oils and greases are commercially available for rolling contact bearings. It is important to select oils or greases with base oils having an appropriate viscosity for the operating condition.

Table 8.23.1 and 8.23.2 give generally recommended viscosities for bearings under normal operating conditions.

(1) Lubricating Oil

Oils with a viscosity too low for the application may allow a partial loss of raceway to rolling element separation, leading to early bearing failure. Oils with too high a viscosity will cause an increase in torque, resulting in power loss and abnormal temperature rise. In general, as the load increases, increase the oil viscosity. As speed of rotation increases, decrease the oil viscosity.

For Extra-small or Miniature ball bearings, low-viscosity lubricating oil will often be selected for low-torque requirements.

Table 8.23.2, and Fig. 8.36 on following pages can be used to aid in selection of appropriate oil viscosity.

Table 8.23.1 Bearing Types and Proper Viscosity of Lubricating Oils

Bearing type	Viscosity at operating temperature
Ball bearing, cylindrical roller bearing	Over 13 mm²/s
Tapered roller bearing, spherical roller bearing	Over 20 mm²/s
Spherical Roller Thrust Bearings	Over 32 mm²/s

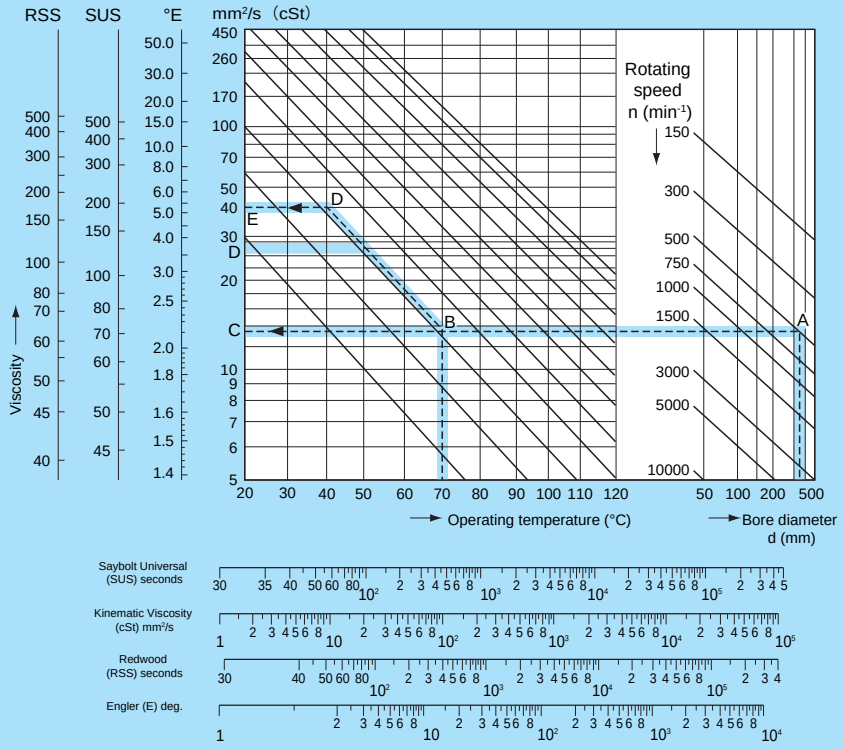
Remark: 1 mm²/s = 1cSt (centistokes)

Table 8.23.2 General Oil Selection Guide

Bearing operating temperature (˚C)	dn value	ISO viscosity grade (VG) of lubricating oil (at 40˚C)		Applicable Bearing
		Normal load	Heavy or impact load	
-30～0	Up to speed limit	22　32	46	All
0～ 60	Up to 15000	46　68	100	All
	15000～80000	32　46	68	All
	80000～150000	22　32	32	Except thrust ball bearings
	150000～500000	10	22　32	Single row radial ball bearings Cylindrical Roller Bearings
60～100	Up to 15000	150	220	All
	15000～80000	100	150	All
	80000～150000	68	100　150	Except thrust ball bearings
	150000～500000	32　46	68	Single row radial ball bearings Cylindrical Roller Bearings
100～150	Up to speed limit	320		All
0～ 60	Up to speed limit	46　68		Spherical Roller Bearings
60～100	Up to speed limit	150		

Remarks: 1. This table is a guide to oil selection based on JIS K 2001 classification of Industrial Lubricating Oil Viscosity.
2. Generally as load increases or speed decreases oil with a higher viscosity is used.
3. This table is a guide for oil bath lubrication and circulating oil lubrication.
4. For information on operating conditions beyond those of this table, contact NACHI.

Fig. 8.36 Viscosity-Temperature Line Diagram

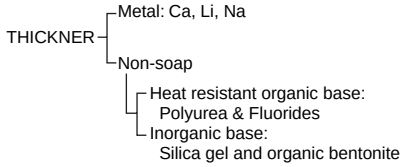


Example: Bearing Type : Cylindrical roller bearing
Bearing bore : 340 mm
Rotating speed : 500min^{-1}
Operating temp : 70°C
Required viscosity during operation (70°C) is determined by finding the intersection at A of rotating speed (500 min^{-1}) and bore (340 mm), then following a horizontal line from A to C for 13 mm²/s.
Then find the intersection B of a straight line AC from 40°C, base temperature specified by ISO Viscosity Grade (VG), to 70°C, then draw a slanted line passing through B parallel to the viscosity operating temperature graph, find the point where the line intersects the 40°C line, for a viscosity value of 40 mm²/s.
As a result, VG46, which satisfies a minimum 40 mm²/s, should be selected.

(2) Lubricating Grease
Lubricating grease is composed of a base oil, a thickener, and additives.

● Base Oil
Base oil refers to the liquid lubricant carried by a thickener. Mineral oils are widely used as the base oils for grease. Synthetic oils such as diester or silicone oil are also used for improving the heat resistance and stability of grease. In general, grease with a low-viscosity base oil is suitable for low temperatures and or low loads, while grease with a high viscosity base oil is suitable for high temperatures and or high loads.
Since lubricating performance is dependent on the thickener, additives, and viscosity, these components must be carefully selected to meet operating conditions.

● Thickener
The thickener has a sponge-like structure composed of a loose combination of fine fibers or particles. Thickeners are roughly divided into metal soap, and non-soap types as shown below.
Sodium (Na) soap grease may react with water to form an emulsion, and should not be used for bearings operating in a high-moisture environment.



● Additives
An additive is an agent that imparts performance enhancing properties to a grease, such as extreme pressure, rust resistance, anti-oxidation performance, or other properties.
Anti-oxidant additives protect grease from oxidation and deterioration under thermal influence over a long period. Extreme pressure additives improve load resistance and impact resistance. Rust preventive additives protect the bearing and other surrounding components against rusting.

● Penetration
Penetration is a measure which indicates the solidity of grease. A measurment device has a cone with a specified weight and shape. The cone is penetrated into the sample grease for a specified time. Penetration is the depth to which the cone penetrates (in units of 1/10 mm).

Table 8.24 Grease Number and Penetration

NLGI No.	Penetration (ASTM Worked)
0	355～385
1	310～340
2	265～295
3	220～250
4	175～205
5	130～160
6	85～115

● Dropping Point
Dropping point is the temperature at which a grease sample drops through a specified hole size after being heated and fluidized.

(3) Lubrication Amount
① Oil
When oil bath lubrication is being used and a bearing is mounted with its axis horizontal, oil should be added until the static oil level is at the center of the lowest bearing rolling element. For vertical shafts, add oil to cover 50% to 80% of the rolling element.

② Grease

The rolling bearing and bearing housing should be filled until the grease occupies about 33 to 50 % of the respective volumes. Temperatures will tend to rise as speed increases (due to churning). Higher-speed operation will be more sensitive to excess grease fill, so it follows that at higher dmn values, the grease-fill quantity must be reduced.

a) Amount of Initial Grease Fill

The amount of initial grease-fill required is calculated from the following equations:

Ball bearing:

$$Q = \frac{d^{2.5}}{900} \quad \cdots\cdots (8.18)$$

Roller bearing:

$$Q = \frac{d^{2.5}}{350} \quad \cdots\cdots (8.19)$$

where:

Q=Amount of filling grease (g)
(specific gravity of grease=0.9)
d=Bore diameter of bearing (mm)

b) Relubrication Amount Added at Service

$$Q = 0.005 \times D \cdot B \quad \cdots\cdots (8.20)$$

where:

Q=Amount of grease to add (g)
(specific gravity of grease=0.9)
D=Outside diameter of bearing (mm)
B=Inner ring width (mm)

③ Lubrication Interval

For a typical bearing, which operates at about 50˚C, lubricant should be replaced once a year. If operating temperature is 100˚C or more, the lubricant should be replaced more than once every three months even if it has good heat stability.

If oil bath lubricant becomes contaminated by water or foreign particles, it must be replaced immediately.

The grease relubrication interval can be estimated from Fig 8.37.

④ Grease Service Life

For applications where relubrication is not possible or practical, grease service life may be estimated using Formula (8.21).

The following formula was derived using a grease with Lithium thickener and mineral oil base.

$$\log L = (0.018f - 0.025)T - 2.77f + 6.3 \quad \cdots\cdots (8.21)$$

where:

L=Grease life (h)
f=(Operating speed) (min^{-1})/
(Bearing grease speed limit) (min^{-1})
If f is less than 0.25, f is set=0.25
T=Operating temperature (˚C)
If T is less than 30˚C, T is set=30.

Fig 8.37 Grease lubrication interval

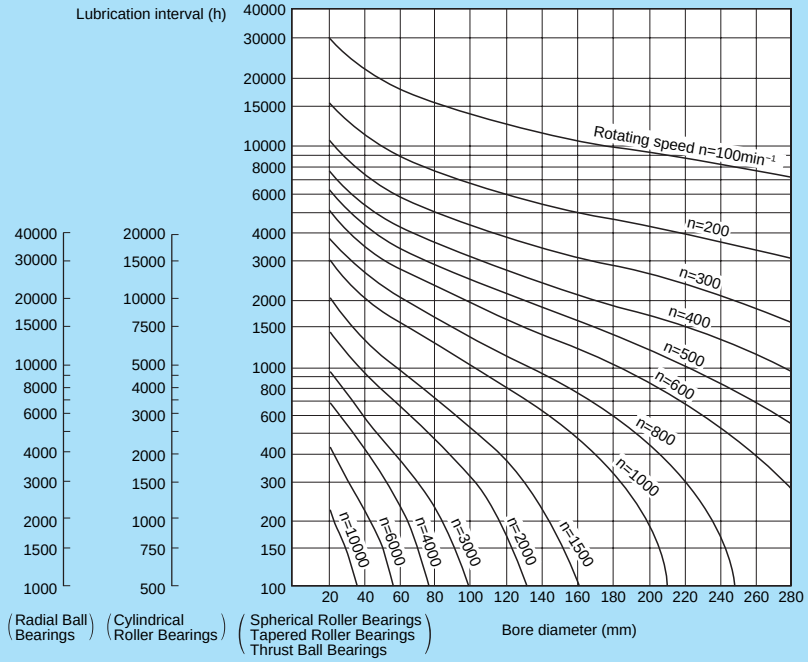


Table 8.25 Grease Properties

Popular name / Thickener / Base Oil / Properties	Cup Grease	Fiber Grease	Aluminum Grease	General-purpose Grease	Diester Grease	Silicone Grease	Mixed Base Grease	Complex Grease	Non-Soap Base Grease	
	Ca Soap	Na Soap	Al Soap	Li Soap			Ca + Na Soap, etc.	Li Complex Soap, etc.	Bentonite, Urea, Fluorine, etc.	
	Mineral Oil	Mineral Oil	Mineral Oil	Mineral Oil	Diester Oil	Silicone Oil	Mineral Oil	Mineral Oil	Mineral Oil	Synthetic Oil
Visual appearance	Like butter	Fibrous or like butter	Stringy or like butter	Like butter	Fibrous or like butter		Like butter	Fibrous or like butter	Like butter	
Dropping point (˚C)	85	160 or higher	85	170 or higher		200 or higher	150 or higher	200 or higher	250 or higher	
Operating temperature range (˚C)	-20～+70	-10～+120	-10～+80	-30～+120	-50～+130	-50～+170	-30～+120	-30～+140	-10～+130	-50～+200
Water Resistance	Good	Not possible (emulsification)	Good	Good			Not possible (for Na)	Good	Good	
Mechanical Stability	Fair	Good	Fair	Good			Good	Good	Good	
Remarks	Contains small amount of moisture for structure stability. Not suitable for use at high temperature.	Cannot be used with water or moisture due to emulsification with water. Used at relatively high temperature.	Used in vibrating conditions due to good tackiness.	General purpose grease. Widely used with small and medium size ball bearings.	Suitable for low temperature operation.	Wide working temperature range. Mainly used for light load conditions.	Used for large size bearings.	Suitable for high temperature operation and heavy load conditions.	Wide working temperature range. Depending on combination of thickener and base oil used, good high temperature, low temperature or chemical stability can be obtained.	

Remarks: 1. Greases with sodium (Na) soap thickener can not be used in applications where there is a risk of water or high humidity because they emulsify and flow out if they mix with water.
2. In case of mixing different brands of grease (not recommended), please consult the grease manufacturer to determine if there are any detrimental effects.
3. In case operating temperatures are beyond what are shown in the table, please consult NACHI.

8.6 Speed Limit

- Bearings exceeding a certain operating speed will begin to create internal heat which may not be controllable.
- Speed limits vary with bearing types, dimensions, lubrication system, internal design of the bearing, and working loads. In addition, speed limits will vary according to the type of integral bearing seal which may be used (dependent on the speed of the seal contact area).
- The term “speed limit” refers to the estimated speed, in revolutions per minute, at which bearings will remain serviceable.

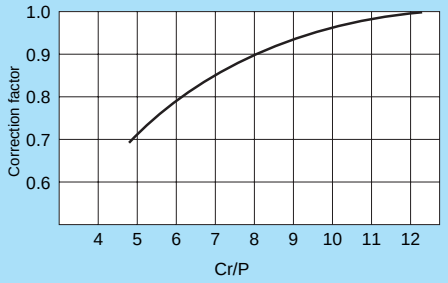
The dimension tables show speed limits for both grease and oil lubrication. Please note that the published speed limits are based on operation of properly lubricated, lightly-loaded bearings, installed on a horizontal shaft.

8.6.1 Speed Limit Correction for Load

As noted above, bearing speed limits will vary with respect to load. Figs. 8.38.1 and 8.38.2 allow calculation of a speed limit correction factor which is applied to the speed limit tables.

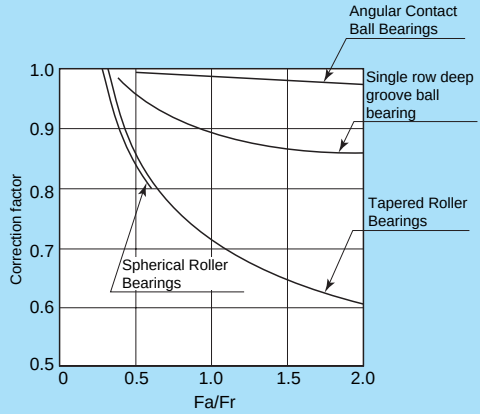
- In Fig. 8.38.1, Cr is the basic dynamic load rating and P is the equivalent dynamic load. If Cr/P is < 13, then the table speed limit is multiplied by the correction factor from the curve shown in Fig. 8.38.1.
- In addition, if the ratio of the axial load (Fa) to the radial load (Fr) is larger than 0.3, that is, if Fa/Fr > 0.3, then the speed limit must be FURTHER multiplied by a correction factor as shown in Fig. 8.38.2
- Where the bearing is used at 75% or more of the speed limit, lubrication becomes a more sensitive operating consideration. If grease is to be used, then selection of the correct

Fig. 8.38.1 Correction Factor for Bearing Load



Cr : Basic dynamic load rating (N)
P : Dynamic equivalent load (N)

Fig. 8.38.2 Correction Factor for Fa/Fr



Fa : Axial load (N)
Fr : Radial load (N)

type and amount of grease is of paramount importance. If oil is used, then the correct selection of the feeding method and rate, and oil specification is of extreme importance.

- Please contact NACHI for help in cases where application rotating speed exceeds the corrected bearing speed limit.
- If the bearing is used in excess of the corrected speed limit, consideration must be given to the accuracy and clearance of the bearing; and to the material and shape of the retainer. Table 8.26 provides a guideline for maximum speed for bearings using special cages and internal design.

Table 8.26 Correction of Allowable Speed Limit in High-speed Operation

Bearing Type	Correction factor
Deep Groove Ball Bearings	2.5
Angular Contact Ball Bearings	2
Cylindrical Roller Bearings (single row)	2.5
Tapered Roller Bearings	2
Spherical Roller Bearings	1.5

8.7 Friction and Temperature Rise

8.7.1 Friction Torque

Friction torque in rolling bearings will vary with the bearing load and the condition of the lubricant.

Where the bearing load is light-to-normal ($P \leqq 0.12C$) and the lubricant provides good separation between the rolling contact surfaces, bearing friction torque may be calculated using the following formula:

$$M = \mu \cdot F \cdot \frac{d}{2} \quad \cdots\cdots (8.22)$$

where:

M : friction torque (N·mm)
μ : coefficient of friction
F : bearing load (N)
d : shaft diameter (mm)

The coefficient of friction for various bearing types is shown in Table 8.27.

8.7.2 Temperature Rise

- Temperature rise in bearings is caused by the conversion of friction energy into heat.
- Bearing temperature will generally rise quite abruptly during the initial stage of operation and then gradually climb until a steady state is reached. The steady state condition will exist if temperature rise from frictional energy is removed by the cooling “heat-sink” effect from the shaft and housing, and from heat conductance via the shaft, housing and lubricant.
- The time until equilibrium is attained depends on the difference between heating volume generated by the bearing and the heating volume removed by the cooling effect.
- If the equilibrium temperature is excessively high, then review of the bearing application should be done. The bearing internal clearance or preload, fits, bearing support structure, seal contact area surface finish, rotating speed, load, and lubrication type, amount, and delivery system are subjects for investigation where excessive temperature occurs.
- An abnormal temperature rise can cause a spiraling condition where no equilibrium will occur, thus leading to a break-down in the lubricant and lubricant film, with catastrophic results.

Table 8.27 Coefficient of Friction

Bearing Types	Coefficient of friction (μ)	Load conditions
Single row Deep-groove Ball Bearings	0.0010～0.0015	Radial load
Single row Angular Contact Ball Bearings	0.0012～0.0018	Radial load
Cylindrical Roller Bearings	0.0008～0.0012	Radial load
Tapered Roller Bearings	0.0018～0.0025	Radial load
Self-Aligning Ball Bearings	0.0008～0.0012	Radial load
Spherical Roller Bearings	0.0020～0.0025	Radial load
Thrust Ball Bearings	0.0010～0.0015	Axial load
Spherical Roller Thrust Bearings	0.0020～0.0025	Axial load

8.8 Mounting and Dismounting

Rolling bearings have higher accuracy than other parts in most equipment and are often considered to be the most important rotating component. Improper handling of bearings reduces machine accuracy and can cause early bearing failures. To attain predicted bearing performance, utmost care should be taken in handling bearings from the point-of-receipt through the mounting operation.

8.8.1 Storage and Handling

The major problems encountered during bearing storage and handling operations are in rusting and impact damage to the parts.

- To protect bearings against rusting during storage, parts should be placed in a dry, clean, cool area. Bearings should not be subjected to extremes of humidity during storage.
- Impact to bearings can create damage to the raceways, rolling elements, and cages. Do not drop bearings. Bearings which are dropped should not be used for service.

8.8.2 Mounting

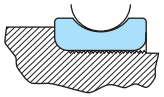
Proper bearing mounting governs the life, accuracy, and performance of a bearing. Before mounting the bearing, carefully check the following points.

Check to see if:

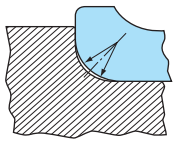
- the job standards are established and the necessary jigs are prepared.
- the shaft and housing size, tolerance, and finish are defined and met.
- lubricant type and amount specified is at hand.
- inspection standards are established.
- the method of cleaning the bearing and relevant parts is defined and understood.

(1) Mounting Precautions

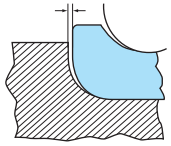
- Select a clean, dry place to handle the bearing, and keep necessary tools and workbench clean.
- Do not unpack the bearing until it is to be mounted.
- If the bearing is unpacked before mounting for acceptance inspection or for any other reason, follow these directions:
  a) If the bearing is to be mounted within a short time period, coat it with rust preventive oil and place it in a clean container.
  b) If the bearing will not be mounted in a short time, coat it with rust preventative oil and repack it in the original container.
- Check to see that the lubricant drums, cans, tubes, or applicators are clean and or closed. Check to be sure that the bearing housing is clean and free from flaws, impressions, burrs, or any other defects.
- For grease lubrication, you may fill the new bearing with grease without cleaning the bearing. If the bearing is small or is used for high-speed operation, whether it is lubricated with oil or grease, wash the bearing with clean kerosene or warm, light oil to remove the rust preventative. However bearings with seals or shields must not be washed and heated.
  If gear oil is used for lubrication, clean the bearing to remove any rust preventive oil.



Fit surface roughness
Fig 8.39



Corner radius of shaft (good)
Fig 8.40



Corner radius of shaft (poor)
Fig 8.41

(2) Shaft

- Before mounting the bearing on the shaft, check to see that the shaft is finished to the specified size and accuracy.
- Check the shaft for surface finish. If the shaft fit surface has a poor surface finish (see Fig. 8.39), the surface may be smoothed during mounting, possibly resulting in bearing ring creep, shaft wear, and early bearing failure.
- Be sure that the shaft shoulders are finished perpendicular to the shaft axis, otherwise the bearing will be misaligned resulting in early bearing failure.
- Finish the corner radius of the shaft to the specified dimensions. Make sure the corner radius of the shaft is slightly smaller than that of the bearing as shown in Fig. 8.40. Never have the corner radius of the shaft larger than that of the bearing (see Fig. 8.41), otherwise, the bearing ring may be misaligned and early bearing failure will occur.
- Out-of-roundness of shaft
  Make sure that the shaft is accurate to out-of-roundness and cylindricity specifications. The inner ring of the bearing is an elastic body, having a relatively thin wall, so if the inner ring is fitted to a shaft having poor roundness, the inner ring raceway will be deformed accordingly.
- Contact surface of oil seals
  When using an oil seal, finish the seal contact surface to Ra < 0.8 µm. If the finish is rougher than Ra < 0.8 µm, the seal will gradually wear until it has no sealing effect. Also make sure that the contact surface is within the runout tolerance, otherwise oil leaks may occur since the seal lip may not stay in contact with the rotating shaft. (See Page 113).

(3) Bearing Housing

- Purposes of the bearing housing are:
  a) to maintain the bearing position for load support.
  b) to protect the bearing from the intrusion of foreign material.
  c) to provide a structure that will keep the bearing well lubricated.
- Verify that the housing bore diameter is to design specifications. If a loose fit class of H or looser is specified, check to make certain that the bearing will move freely in the bearing housing during installation. On horizontally-split bearing housings such as used on pillow blocks, do not mix the caps and bases during a reassembly procedure since these parts are mated during manufacture. In the latter case, mixing may cause either pinching or looseness of the bearing.
- Allowance must be made for linear expansion of the shaft due to temperature rise. When two or more bearings are mounted on a single shaft, comply with the following directions:
  Fix one bearing in the axial direction in the housing, and make sure that the other bearing(s) are free to move in an axial direction.

(4) Accessory Mounting Parts

Prior to bearing mounting, gather a set of the parts required for the mounting job. These accessory parts may include washers, adapters, withdrawal sleeves, spacer rings, slingers, oil seals, O-rings, shaft nuts, and snap rings for the shaft and or housing bore. Thoroughly clean these accessory parts and check them for appearance and size.

Other Precautions

- Be sure that the side of the shaft nut is perpendicular to the thread, otherwise, when tightened, the side of the shaft nut will make uneven contact with the side of the bearing causing early bearing failure. Use particular care when the bearing is used for high-accuracy applications such as machine tools.
- Check washers and spacer rings for parallelism of both sides.
- The oil seal and O-ring may create a temperature rise because the contact force is too great or because they are initially dry. Apply oil or grease to the contact surfaces to help prevent premature wear and reduce torque.

8.8.3 Bearing Mounting Considerations

When pressing a bearing into position, press against the ring with interference fit. Pressing through the rolling elements will cause damage, such as brinell marks or cracks to the elements and rings making the bearing unusable.

For inner ring rotating loads, the bearing is generally interference-fit to the shaft and either expansion fitting or press fitting can be used. Thermal expansion fitting may be the more appropriate method for mounting larger bore bearings.

A tapered-bore bearing can be mounted directly to a tapered shaft or with an adapter or withdrawal sleeve. When a withdrawal sleeve is used for larger bore bearings, the hydraulic mounting procedure will facilitate the process. Note that the use of hydraulic mounting of bearings to tapered journals is also very useful for larger bearing sizes.

For an outer ring rotating load, the bearing is usually interference-fitted with the housing. Either press fitting or shrink fitting may be used. In the case of the latter process, the bearing or bearing outer ring may be cooled to attain the fit.

(1) Mounting Cylindrical-bore Bearings

- Press fitting

Many cylindrical-bore bearing applications use press fitting with the shaft. Use a jig which matches the inner ring as shown in Fig. 8.42. Press fit the inner ring using a press or jack.

To press fit the inner and outer rings simultaneously, use a jig as shown in Fig. 8.43. Apply high-viscosity oil to the shaft and the contact faces of the bearing before press fitting.

- Thermal expansion Fitting

Thermal expansion fitting is an appropriate procedure for mounting larger bore bearings. This fitting procedure can be completed quickly without applying undue stress to the ring being fit. The ring may be heated using a heating tank or an induction heater. Bearing rings must not be heated to a temperature exceeding 120˚C. Fig. 8.44 provides the amount of heat rise required, vs. bore size.

After mounting a heated bearing, secure it in the required position otherwise the bearing will tend to move axially as it cools.

Caution: When fitting rings onto a shaft or into a housing using the thermal expansion method, be sure that the procedure can be completed smoothly and quickly. If the ring should misalign or stop movement before it has reached the desired position, it may be very difficult to reposition the ring to the correct location.

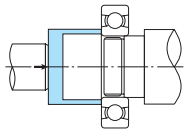


Fig. 8.42 Press Fitting of Inner Ring

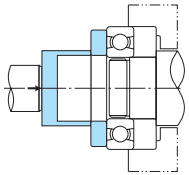


Fig. 8.43 Simultaneous Press Fitting of Inner Ring

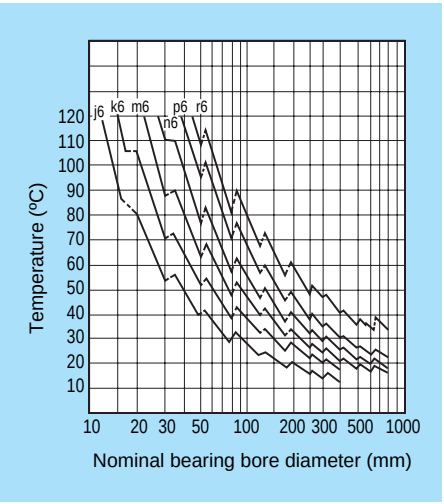


Fig. 8.44 Relationship between Required Bearing Temperature and Fit

(2) Mounting Tapered-bore Bearings

Using a split-sleeve adapter permits the mounting of tapered-bore bearings in any axial position on shaft but care must be taken to ensure that the bearing will be located at the correct position.

To mount a tapered-bore bearing using an adapter sleeve, first mount the bearing which is to be the stationary (fixed) bearing. Define and record the distance which the free bearing is expected to move in an axial direction in the housing.

Mount the free bearing so that the axial clearance provided for axial travel of the outer ring of the free bearing is on the outboard side (side farthest from the stationary bearing).

The required interference fit for tapered-bore, Spherical roller bearings can be attained using one of two methods:

a) by driving the bearing onto the sleeve by a predetermined distance; or,
b) by measurement of residual bearing internal clearance as the sleeve is pushed into the bearing inner ring (see Table 8.28). Since exact measurement of the axial drive-up distance is extremely difficult, the residual method is usually the method of choice.

The residual clearance method involves measuring the bearing unmounted internal clearance and then driving up the adapter sleeve until the measured clearance (the residual) = the unmounted (original) clearance - the reduction amount required to attain the correct interference fit (see Table 8.28 for the reduction amount). Clearance measurements are made using a thickness (feeler) gauge. (Note that the thickness gauge should be inserted over two or three unloaded rollers on each row of rollers and that the bearing bore must be in a horizontal position with respect to the shaft axis, with the outer ring centered over the rolling elements).

Table 8.28 shows axial movement and radial clearance reduction for the mounting of Spherical roller bearings.

Heating of larger tapered-bore bearings may be used in conjunction with measurement of travel distance but be sure to check the results using the residual clearance method (taking the unmounted clearance measurements and the final, residual clearance, when the bearing is cool). Also be sure that the bearing is not heated to over 120˚C.

When using a withdrawal sleeve for large-bore bearings, use of a hydraulic assist procedure is recommended. See Fig. 8.45 which shows use of a hydraulic nut.

(3) Other Mounting Precautions

- For paired Tapered roller bearings, be sure to adjust the axial clearance to the specified value using shims where necessary.
- For bearing types with separable inner and outer members such as Cylindrical or Tapered roller bearings, mount the inner and outer ring separately and carefully assemble the shaft into the housing while making sure that no damage occurs to the inner or outer rings or rolling elements.

Table 8.28 Tapered Bore Spherical Roller Bearings: Axial Movement and Radial Clearance Reduction mm

Nominal bearing bore diameter d (mm)		Radial clearance reduction		Axial movement			
				1/12 Taper		1/30 Taper	
Over	Incl.	Min	Max	Min	Max	Min	Max
30	40	0.020	0.025	0.35	0.4	—	—
40	50	0.025	0.030	0.4	0.45	—	—
50	65	0.030	0.040	0.45	0.6	—	—
65	80	0.040	0.050	0.6	0.75	—	—
80	100	0.045	0.060	0.7	0.9	1.75	2.25
100	120	0.050	0.070	0.75	1.1	1.9	2.75
120	140	0.065	0.090	1.1	1.4	2.75	3.5
140	160	0.075	0.100	1.2	1.6	3.0	4.0
160	180	0.080	0.110	1.3	1.7	3.25	4.25
180	200	0.090	0.120	1.4	1.9	3.5	5.0
200	225	0.100	0.140	1.6	2.2	4.0	5.5
225	250	0.110	0.150	1.7	2.4	4.25	6.0
250	280	0.120	0.170	1.9	2.7	4.75	6.75
280	315	0.130	0.190	2.0	3.0	5.0	7.5
315	355	0.150	0.210	2.4	3.3	6.0	8.25
355	400	0.170	0.230	2.6	3.6	6.5	9.0
400	450	0.200	0.260	3.1	4.0	7.75	10.0
450	500	0.210	0.280	3.3	4.4	8.25	11.0

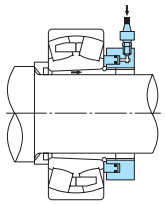


Fig 8.45 Hydraulic Nut

8.8.4 Mounting and Dismounting Force

An approximate force necessary to install or remove an inner ring from a shaft may be calculated using the following equation.

$$Ka = fk \cdot fe \cdot \Delta de \quad \cdots\cdots (8.23)$$

where:

Ka : Mounting or dismount force (kN)
Δde : effective interference (mm)
fk : factor from Table 8.29
fe : from following equation

$$fe = B \cdot \left[1 - \left(\frac{d}{di}\right)^2\right]$$

where:

B : inner ring width (mm)
d : inner ring bore diameter (mm)
di : mean inner ring outside diameter (mm)
di : ≒ 0.25 (D+3d)···for Cylindrical roller bearings and Self-aligning Ball bearing series 22 and 23
di : ≒ 0.1 (3D+7d)···for other bearings

where

D : Bearing outside diameter

Table 8.29 fk value

Conditions	fk (1) (average)
Inner ring pressed to cylindrical shaft	39
Inner ring pulled from cylindrical shaft	59
Inner ring press fit to tapered shaft or sleeve	54
Inner ring pulled from tapered shaft	44
Tapered sleeve press fit between shaft & bearing	98
Tapered sleeve pulled from between shaft & bearing	108

Note: (1) Shaft and bearing bore thinly coated with oil.

Fig. 8.46～8.49 show dismount and press fit force by diameter series.

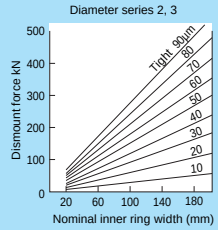


Fig. 8.46 Dismount force

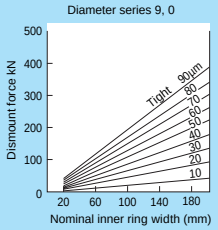


Fig. 8.47 Dismount force

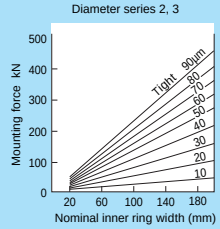


Fig. 8.48 Mounting Force

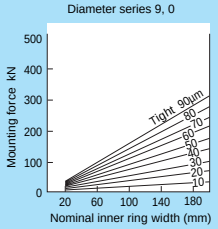


Fig. 8.49 Mounting Force

8.8.5 Operation Inspection

Verify satisfactory service with a test run. General precautions for a test run are:

- Make sure that all drive covers are in place, all bolts and nuts are tight, and appropriate clearance is provided between the shaft and all stationary parts.
- If possible, manually turn the shaft to see if there is rubbing or abnormal noise.
- If the machine is large and the shaft cannot be turned by hand, start the machine at as low speed as possible and check for rubbing or abnormal noise while coasting the machine.
- If no trouble is found during the above checks, run the machine at the design speed until attaining a steady-state temperature.
- Recheck bolt and nut tightness. Check for oil leaks, and abnormal noise. If possible, extract a sample of the oil and check it for foreign matter.
- Begin regular operation.

If trouble is encountered during machine operation, refer to Section 9, “Trouble-shooting Bearing Problems”.

8.8.6 Dismounting

Bearings may be dismounted for periodic machine inspection, or when machine break down has occurred. The condition of all rotating parts and interfaces should be checked and recorded to collect data for operating improvements. The recording of data is essential where a part failure has occurred to enable a solution to any existing trouble.
In dismounting the bearing, check to see:

- If the bearing is satisfactorily mounted. (Bolts, and nuts tightened, interference of slinger with bearing housing, etc.)
- If there is (was) an adequate lubricant supply. Check for lubricant contamination and sample for residue.
- That the inner and outer ring have retained the fits as mounted.
- If the bearing clearance is as specified. If possible, measure the clearance of the mounted bearing.
- The condition of the bearing.

Before starting to dismount a bearing, review the following points:

- Dismount method
- Fit conditions
- Jigs required for dismounting
  - Press (Fig. 8.50)
  - Spanner wrench (Fig. 8.51)
  - Puller (Fig. 8.52)
  - Special puller (Fig. 8.53)
  - Holder (Fig. 8.54)

To dismount a Cylindrical roller bearing, the inner ring may be locally heated with an induction heater to facilitate removal from the shaft. (See Fig. 8.55.)
For large-bore bearings, which are often difficult to dismount, a hydraulic nut or oil injector system is recommended. See Fig. 8.45 and Fig. 8.56 respectively.

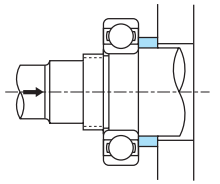


Fig. 8.50 Dismounting Bearing Using Press

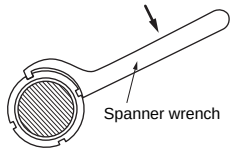


Fig. 8.51 Dismounting Bearing with Spanner Wrench

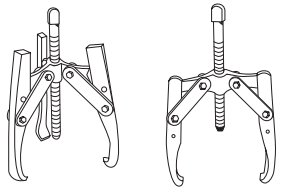


Fig 8.52

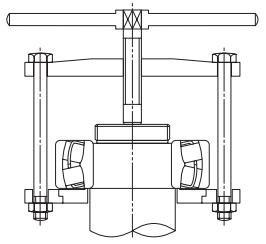


Fig. 8.53 Dismounting Bearing with Special Puller

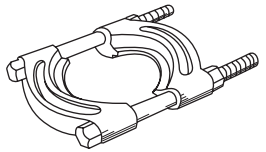


Fig. 8.54 Puller Attachment

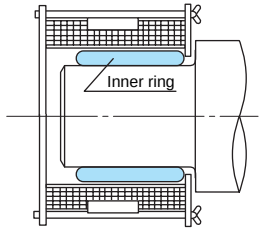
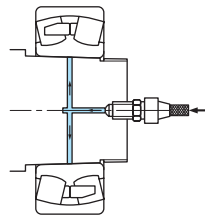


Fig. 8.55 Inner Ring Removal with Induction Heater



Dismounting Bearing with Oil Injector

Fig. 8.56

9. Trouble-shooting Bearing Problems

Rolling contact bearings must be carefully handled, mounted, and maintained in order to operate satisfactorily.
The cause of unsatisfactory operation must be determined to prevent recurrence. There are three categories of data which should be gathered to enable the correct diagnosis of bearing problems:

- Time of occurrence.
- Symptoms during operation.
- Condition of bearing.

Although the origin of bearing problems can sometimes be determined using data from only one of the data categories, quick and accurate analysis requires as much data as possible.
See Tables 9.1, 9.2 and 9.3.

Table 9.1 Diagnosis According to Time that Bearing Problem Occurs

Time of Occurrence \ Cause	Bearing selection	Design or manufacture of housing or other parts	Lubricant type, system or amount	Defective bearing	Bearing installation	Seal failure
Soon after installation	○	○	○	○	○	
Soon after periodic disassembly			○		○	
Soon after re-lubrication			○			
After replacement or repair of shaft, housing or other parts		○	○		○	
During normal operation						○

Table 9.2 Diagnosis According to Abnormal Conditions Occurring During Operation

Operating condition		Cause	Remarks
Noise	Low metallic sound.	Impressions on raceway.	Check with audiophone, vibration pickup, etc.
	High level metallic sound.	Loss of clearance, poor lubrication.	
	Irregular sound.	Excess clearance, contaminants, defect of rolling element surface, improper lubrication.	
	Ever-changing sound.	Change of clearance due to temperature rise. Defect in progress on raceway.	
Abnormal temperature rise.		Loss of clearance, creep, insufficient or excess lubricant, excess load.	Use a surface thermometer.
Reduction in accuracy.		Raceway or rolling element damaged by impurities, or insufficient lubricant.	Example: Lathe: stick-slip marks. Grinder: wavy pattern. Cold roll mill: occulting wave pattern.
Unstable operation.		Damaged raceway, rolling element. Foreign matter. Excess clearance.	Example: Electric fan: extreme vibration. Power saw: impact to support. Internal combustion engine: Vibrating crankshaft.
Contaminated lubricant.		Poor lubrication, foreign matter, long term wear.	

Table 9.3 Symptoms and Countermeasures of Bearing Problems (examples indicated)

(1) Premature Flaking

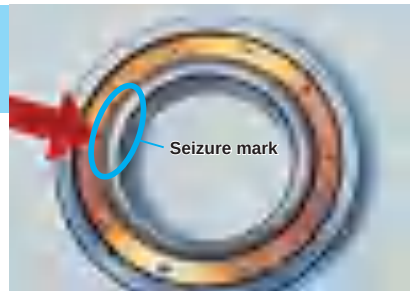
The repeated heavy stress cycle between the bearing raceway and rolling element surface results in fatigue cracks which become loosened from bearing materials.

■Causes
- Abnormal axial load or excessive load caused by expanded shaft.
- Deflection or misalignment of shaft.
- Poor parallelism of inner and outer rings.
- Poor lubrication.
- Rusting, Nicks, Galling from dirt, etc.

■Countermeasures
- Clearance fit for the outer ring of one bearing to allow the floating end to move freely axially.
- Correct alignment of shaft and bearing housing.
- Improve mounting and alignment.
- Carefully clean and handle shaft and housing.
- Review type and quantity of lubricant.

(2) Seizure

Bearing is seized up by excessive heat. Discoloration, softening and fusion of raceway and rolling element.



■Causes
- Loss of clearance.
- Operating over limiting speed.
- Poor or improper lubricant.

■Countermeasures
- Review fitting and bearing clearance.
- Review type of bearing.
- Select a proper lubricant, and feed it in proper quantity.

(3) Breakage

Splits and cracks in the inner/outer ring or rolling element.

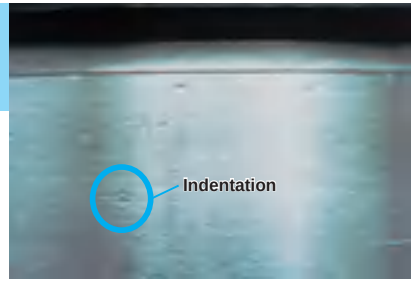
■Causes
- Excessive interference fit.
- Bearing seat has larger corner radius than bearing.
- Excess clearance during operation.
- Excess impact load.

■Countermeasures
- Check fits. Finish shaft and sleeve to higher accuracy.
- Make shaft corner radius smaller than that of the bearing.
- Check fits and bearing clearance.
- Re-check load conditions.

Table 9.3 Symptoms and Countermeasures of Bearing Problems

(4) Indentation

Brinelling, indentation and pear skin appearance of bearing raceway and rolling element.

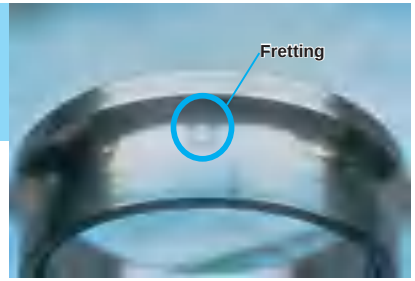


■Causes
- Impact applied during mounting.
- Impact from dropped bearing.
- Contamination
- Load applied to bearing at rest in excess of static load rating.

■Countermeasures
- Carefully handle the bearing.
- Clean shaft and housing.
- Improve the sealing.
- Re-check load conditions.

(5) Fretting

Occurs when a small relative motion is repeatedly caused in non-rotating bearing. Fretting surface wear produces red colored particles at fitting surface.

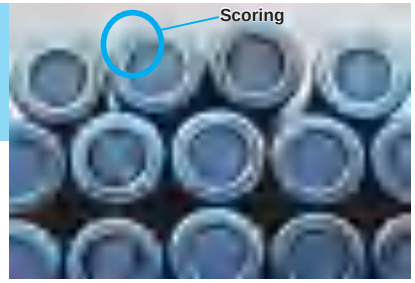


■Causes
- Vibration applied to bearing at rest (e.g. during shipment).
- Oscilation with smaller amplitude.
- Minute clearance on fit surface.
- Slight sliding during operation as a result reduced interference under a load.

■Countermeasures
- Fit the shaft and housing during shipment.
- Apply a preload. Use oil for lubrication.
- Increase the interference.
- Apply oil.

(6) Scoring

Metal to metal contact of bearing raceway, flange face, rolling element and retainer due to destruction of oil film.



■Causes
- Incorrect lubrication.
- Contamination by foreign matter.
- Deflection or misalignment of shaft. Excessive axial load.
- Sharp speed increase at startup.

■Countermeasures
- Review type and quantity of lubricant.
- Improve sealing and component cleaning.
- Correct mounting errors. Review load conditions.
- Change to smooth acceleration.

(7) Smearing

Metal to metal contact due to the destruction of oil film.
Sliding motion between outer/inner ring and rolling element.

■Causes
- Excess axial load.
- Misalignment of bearing.
- Poor lubrication.
- Intrusion and galling caused by foreign matter.
- High acceleration on start-up.

■Countermeasures
- Correct mounting errors.
- Review the load condition.
- Select a proper lubricant, and feed it in proper quantity.
- Improve the sealing.
- Clean shaft and housing.
- Avoid sharp acceleration.

(8) Excessive Wear

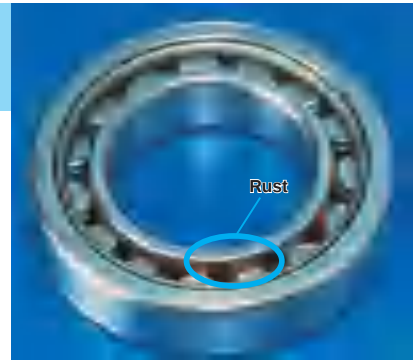
Abnormal wear of flange face, rolling element and retainer.

■Causes
- Foreign matter and corrosion acting as lapping agent.
- Insufficient or incorrect lubricant.

■Countermeasures
- Improve sealing.
- Clean shaft and housing.
- Check lubricant for type and amount.

(9) Rusting, Corrosion

Rusting and corrosion of bearing ring and rolling element surface.



■Causes
- Improper storage, cleaning.
- Improper washing oil.
- Poor rust prevention.
- Corrosive gas, liquid or water.
- Handling with unprotected hands.
- Chemical action of lubricant.

■Countermeasures
- Improve storage and handling.
- Re-check washing oil.
- Review rust prevention.
- Improve sealing.
- Correct handling.
- Check lubricant.

Table 9.3 Symptoms and Countermeasures of Bearing Problems

(10) Creep
Galling, wear, sliding and discoloration of fit face.

■Causes
- Insufficient interference.
- Insufficient tightened sleeve.
- Insufficient surface pressure due to low rigidity and inaccurate shaft and housing.

■Countermeasures
- Check fits.
- Tighten sleeve.
- Redesign for greater rigidity.

NACHI

Deep-groove Ball Bearings

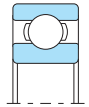
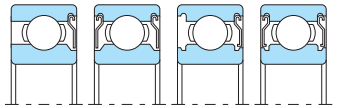
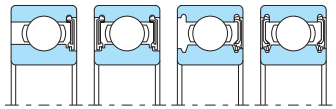
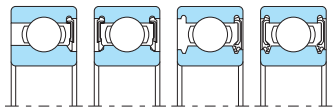
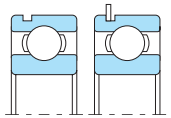
Accuracy ····· Page 52
Internal clearance ····· Page 64
Dimensions of snap ring ····· Page 45

Because of their versatility, Single-row, Deep-groove Ball Bearings are the most popular of all the ball bearing types. NACHI Deep-groove Ball Bearings are available in a wide range of series defined by the JIS (ISO) standard dimension plan and are also made to meet specialized dimension and configuration requirements. NACHI Deep-groove Ball Bearings are manufactured in both standard precision grade (ISO Grade 0 -ABEC Grade 1) as well as in high-precision grades.

Table 1 shows common, standard configurations of Single-row Deep-groove Ball Bearings.

Table 2 next page shows a comparison of general characteristics of seal and shield designs for Single-row, Deep-groove Ball bearings.

Table 1. Standard Configuration of Single-row, Deep-groove Ball Bearings

Configuration		Design	Cross section
Open (no seals, shields)		Consists of inner and outer rings, balls, and cage.	 Open
(1)Sealed or shielded Bearings	Shield	One or two steel shields provide labyrinth clearance	 Z ZZ ZE ZZE
	Non-contact Rubber Seal(2)	One or two non-contact rubber seals provide labyrinth clearance	 NK 2NK NKE 2NKE
	Contact Rubber Seal(2)	One or two contact rubber seals in contact with inner ring	 NSL 2NSL NSE 2NSE
Snap-ring Groove in Outer Ring	N : with snap-ring groove in outer ring. NR: with groove and snap ring in outer ring. (Use of snap ring allows easy mounting and simplified housing design.) Sealed or shielded bearings are also available, contact NACHI for more information.		 N NR

Notes: (1) One seal or shield type bearings may have a seal groove on the other side.
Seals or shields for two seal or two shield bearings have the same marks as one seal or one shield bearings.
(2) NKE seals are blue and NSE seals are brown

Table 2. Comparison of Seal and Shield Characteristics

Characteristics	Shield (Z, ZE)	Non-contact Rubber Seal (NK, NKE)	Contact Rubber Seal (NSL, NSE)
Friction torque	Low	Low	Higher than NK, NKE, Z and ZE
High speed	Excellent	Excellent	Good (There is some limitation)
Grease sealing	Good	Better than Z, ZE	Exellent at low speed ①The grease may leak from the bearing at high speeds and high temperature. ②The grease may leak in case of outer ring rotation.
Dust proof	Good	Better than Z, ZE	Excellent (Can be used in severe dust environments)
Water proof	unsuitable	unsuitable	Excellent
Recommended operation temperature range for standard filled grease	–25～120°C	–25～120°C	–25～120°C

● Load rating

The values for basic dynamic load rating (Cr) and basic static load rating (Cor) given in the dimension table are for inner rings, outer rings and ball bearings of bearing steel with normal heat treatment.

● Attention

(1) Deep-groove Ball Bearings can sustain radial, axial or composite loads. However when excessive axial load is applied, please consult with NACHI.

(2) Because sealed or shielded bearings are designed for inner ring rotating applications, the filled grease may leak when they are used with a high speed outer ring rotating condition. In such a case, please contact NACHI.

(3) When bearings with contact rubber seals are used in a severe operating condition such as high speed or high temperature, the filled grease may leak. In such a case, a design change or another kind of grease is required.

(4) When a bearing is mounted on a shaft (into a housing), force should only be applied to the side face of the inner (outer) ring.

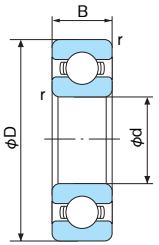
(5) The sealed or shielded bearings should not be washed or heated before mounting.

(6) It should be noted that mounting errors such as misalignment of the bearing rings cause an appreciable increase in noise level.

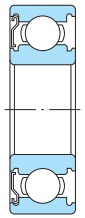
(7) The bearings must always be subjected to a minimum load to prevent sliding movements occurring between the balls and the raceways.

■ Deep-groove Ball Bearings

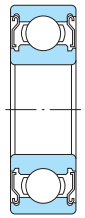
Bore Diameter: 10～25mm



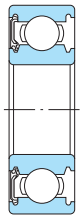
Open



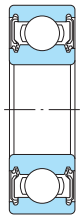
One shield (ZE)



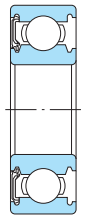
Two shields (ZZE)



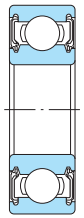
One contact seal (NSE)



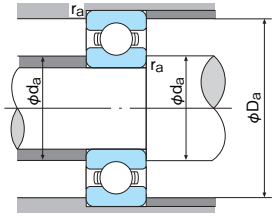
Two contact seals (2NSE)



One non-contact seal (NKE)



Two non-contact seals (2NKE)



■**Dynamic equivalent radial load**
Pr=XFr+YFa

■**Static equivalent radial load**
Larger value of following to be used:
Por=0.6Fr+0.5Fa
Por=Fr

$\frac{foFa}{Cor}$	e	$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26				1.71
1.03	0.28				1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34				1.31
3.45	0.38				1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44				1.00

1N=0.102kgf

Boundary dimensions (mm)				Bearing No.							Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Factor fo	Limiting speed (min^{-1})			Abutment and fillet dimensions (mm)			Mass (kg)	Bearing No.
														Grease lubrication		Oil lubrication					
d	D	B	r (min)	Open type	Shield type		Contact seal type		Non-contact seal type					Open type, ZE, ZZE,NKE,2NKE	NSE, 2NSE	Open type, ZE	da (min)	Da (max)	ra (max)		
10	19	5	0.3	6800	6800ZE	6800ZZE	6800NSE	6800-2NSE	6800NKE	6800-2NKE	2120	985	14.2	37000	24000	44000	12	17	0.3	0.005	6800
	22	6	0.3	6900	6900ZE	6900ZZE	6900NSE	6900-2NSE	6900NKE	6900-2NKE	2490	1130	14.0	33000	22000	38000	12	20	0.3	0.009	6900
	26	8	0.3	6000	6000ZE	6000ZZE	6000NSE	6000-2NSE	6000NKE	6000-2NKE	4550	1970	12.4	30000	22000	36000	12	24	0.3	0.019	6000
	30	9	0.6	6200	6200ZE	6200ZZE	6200NSE	6200-2NSE	6200NKE	6200-2NKE	5100	2390	13.2	25000	18000	30000	15	25	0.6	0.032	6200
	35	11	0.6	6300	6300ZE	6300ZZE	6300NSE	6300-2NSE	6300NKE	6300-2NKE	8100	3450	11.3	23000	17000	27000	15	30	0.6	0.053	6300
12	21	5	0.3	6801	6801ZE	6801ZZE	6801NSE	6801-2NSE	6801NKE	6801-2NKE	1920	1040	15.3	32000	20000	39000	14	19	0.3	0.006	6801
	24	6	0.3	6901	6901ZE	6901ZZE	6901NSE	6901-2NSE	6901NKE	6901-2NKE	2700	1320	14.5	30000	20000	36000	14	22	0.3	0.011	6901
	28	8	0.3	6001	6001ZE	6001ZZE	6001NSE	6001-2NSE	6001NKE	6001-2NKE	5100	2390	13.2	28000	18000	32000	14	26	0.3	0.023	6001
	32	10	0.6	6201	6201ZE	6201ZZE	6201NSE	6201-2NSE	6201NKE	6201-2NKE	6800	3050	12.3	22000	17000	28000	17	27	0.6	0.037	6201
	37	12	1	6301	6301ZE	6301ZZE	6301NSE	6301-2NSE	6301NKE	6301-2NKE	9750	4250	11.2	20000	16000	24000	18	31	1.0	0.060	6301
15	24	5	0.3	6802	6802ZE	6802ZZE	6802NSE	6802-2NSE	6802NKE	6802-2NKE	2080	1260	15.8	28000	17000	34000	17	22	0.3	0.007	6802
	28	7	0.3	6902	6902ZE	6902ZZE	6902NSE	6902-2NSE	6902NKE	6902-2NKE	4300	2250	14.3	26000	17000	31000	17	26	0.3	0.016	6902
	32	8	0.3	16002	—	—	—	—	—	—	5600	2840	13.9	24000	—	28000	20	27	0.3	0.025	16002
	32	9	0.3	6002	6002ZE	6002ZZE	6002NSE	6002-2NSE	6002NKE	6002-2NKE	5600	2840	13.9	24000	15000	28000	17	30	0.3	0.032	6002
	35	11	0.6	6202	6202ZE	6202ZZE	6202NSE	6202-2NSE	6202NKE	6202-2NKE	7650	3700	13.1	20000	15000	24000	20	30	0.6	0.045	6202
	42	13	1	6302	6302ZE	6302ZZE	6302NSE	6302-2NSE	6302NKE	6302-2NKE	11400	5400	12.3	17000	13000	21000	21	36	1.0	0.082	6302
17	26	5	0.3	6803	6803ZE	6803ZZE	6803NSE	6803-2NSE	6803NKE	6803-2NKE	2630	1570	16.1	26000	15000	30000	19	24	0.3	0.008	6803
	30	7	0.3	6903	6903ZE	6903ZZE	6903NSE	6903-2NSE	6903NKE	6903-2NKE	4600	2550	14.7	24000	15000	29000	19	28	0.3	0.018	6903
	35	8	0.3	16003	—	—	—	—	—	—	6000	3250	14.3	22000	—	26000	22	30	0.3	0.032	16003
	35	10	0.3	6003	6003ZE	6003ZZE	6003NSE	6003-2NSE	6003NKE	6003-2NKE	6000	3250	14.3	22000	14000	26000	19	33	0.3	0.039	6003
	40	12	0.6	6203	6203ZE	6203ZZE	6203NSE	6203-2NSE	6203NKE	6203-2NKE	9550	4800	13.1	18000	12000	21000	22	35	0.6	0.065	6203
	47	14	1	6303	6303ZE	6303ZZE	6303NSE	6303-2NSE	6303NKE	6303-2NKE	13600	6550	12.3	16000	11000	19000	23	41	1.0	0.115	6303
20	32	7	0.3	6804	6804ZE	6804ZZE	6804NSE	6804-2NSE	6804NKE	6804-2NKE	4000	2640	15.5	22000	13000	26000	22	30	0.3	0.019	6804
	37	9	0.3	6904	6904ZE	6904ZZE	6904NSE	6904-2NSE	6904NKE	6904-2NKE	6350	3700	14.8	19000	12000	23000	22	35	0.3	0.036	6904
	42	8	0.3	16004	—	—	—	—	—	—	7900	4500	14.5	18000	—	21000	25	37	0.3	0.050	16004
	42	12	0.6	6004	6004ZE	6004ZZE	6004NSE	6004-2NSE	6004NKE	6004-2NKE	9400	5000	13.9	18000	11000	21000	24	38	0.6	0.070	6004
	47	14	1	6204	6204ZE	6204ZZE	6204NSE	6204-2NSE	6204NKE	6204-2NKE	12800	6600	13.1	16000	11000	18000	26	41	1.0	0.106	6204
	52	15	1.1	6304	6304ZE	6304ZZE	6304NSE	6304-2NSE	6304NKE	6304-2NKE	15900	7900	12.4	14000	10000	17000	27	45	1.1	0.144	6304
22	50	14	1	62/22	62/22ZE	62/22ZZE	62/22NSE	62/22-2NSE	62/22NKE	62/22-2NKE	13900	6950	13.1	14000	9700	17000	28	44	1.0	0.120	62/22
	56	16	1.1	63/22	63/22ZE	63/22ZZE	63/22NSE	63/22-2NSE	63/22NKE	63/22-2NKE	18400	9250	12.4	13000	9500	16000	29	49	1.0	0.176	63/22
25	37	7	0.3	6805	6805ZE	6805ZZE	6805NSE	6805-2NSE	6805NKE	6805-2NKE	4300	2940	16.0	18000	10000	22000	27	35	0.3	0.022	6805
	42	9	0.3	6905	6905ZE	6905ZZE	6905NSE	6905-2NSE	6905NKE	6905-2NKE	7000	4500	15.3	16000	10000	20000	27	40	0.3	0.042	6905
	47	8	0.3	16005	—	—	—	—	—	—	6950	4600	15.6	15000	—	18000	30	42	0.3	0.060	16005
	47	12	0.6	6005	6005ZE	6005ZZE	6005NSE	6005-2NSE	6005NKE	6005-2NKE	10100	5850	14.5	15000	9500	18000	29	43	0.6	0.079	6005
	52	15	1	6205	6205ZE	6205ZZE	6205NSE	6205-2NSE	6205NKE	6205-2NKE	14000	7900	13.9	13000	9000	16000	31	46	1.0	0.128	6205
	62	17	1.1	6305	6305ZE	6305ZZE	6305NSE	6305-2NSE	6305NKE	6305-2NKE	23600	12100	12.2	12000	8100	14000	32	55	1.0	0.232	6305

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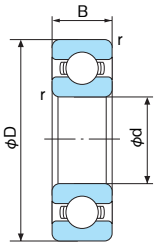
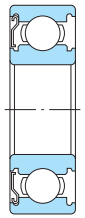
Deep-groove Ball Bearings

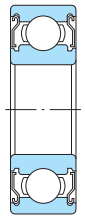
Bore Diameter: 28～50mm



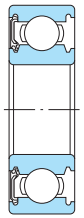
Open



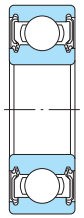
One shield (ZE)



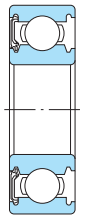
Two shields (ZZE)



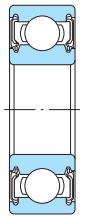
One contact seal (NSE)



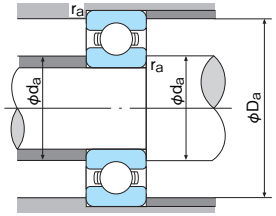
Two contact seals (2NSE)



One non-contact seal (NKE)



Two non-contact seals (2NKE)



■Dynamic equivalent radial load
Pr=XFr+YFa

■Static equivalent radial load
Larger value of following to be used:
Por=0.6Fr+0.5Fa
Por=Fr

$\frac{foFa}{Cor}$	e	$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26				1.71
1.03	0.28				1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34				1.31
3.45	0.38				1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44				1.00

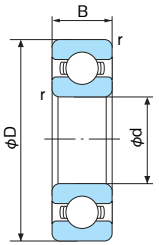
1N=0.102kgf

Boundary dimensions (mm)				Bearing No.								Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Factor fo	Limiting speed (min^{-1})			Abutment and fillet dimensions (mm)			Mass (kg)	Bearing No.
															Grease lubrication		Oil lubrication					
d	D	B	r (min)	Open type	Shield type		Contact seal type		Non-contact seal type						Open type, ZE, ZZE,NKE,2NKE	NSE, 2NSE	Open type, ZE	da (min)	Da (max)	ra (max)		
28	58	16	1	62/28	62/28ZE	62/28ZZE	62/28NSE	62/28-2NSE	62/28NKE	62/28-2NKE		17900	9750	13.1	12000	8200	14000	34	52	1.0	0.175	62/28
	68	18	1.1	63/28	63/28ZE	63/28ZZE	63/28NSE	63/28-2NSE	63/28NKE	63/28-2NSE		26800	14000	12.4	11000	7500	13000	35	61	1.0	0.287	63/28
30	42	7	0.3	6806	6806ZE	6806ZZE	6806NSE	6806-2NSE	6806NKE	6806-2NKE		5350	3800	16.4	15000	9000	18000	32	40	0.3	0.026	6806
	47	9	0.3	6906	6906ZE	6906ZZE	6906NSE	6906-2NSE	6906NKE	6906-2NKE		7250	5000	15.8	14000	8500	17000	32	45	0.3	0.045	6906
	55	9	0.3	16006	—	—	—	—	—	—		9950	6550	15.4	13000	—	15000	35	50	0.3	0.085	16006
	55	13	1	6006	6006ZE	6006ZZE	6006NSE	6006-2NSE	6006NKE	6006-2NKE		13200	8300	14.8	13000	8000	15000	35	50	1.0	0.117	6006
	62	16	1	6206	6206ZE	6206ZZE	6206NSE	6206-2NSE	6206NKE	6206-2NKE		19500	11300	13.9	11000	7500	13000	36	56	1.0	0.199	6206
	72	19	1.1	6306	6306ZE	6306ZZE	6306NSE	6306-2NSE	6306NKE	6306-2NKE		26700	15000	13.2	10000	6700	12000	37	65	1.0	0.346	6306
32	65	17	1	62/32	62/32ZE	62/32ZZE	62/32NSE	62/32-2NSE	62/32NKE	62/32-2NKE		22400	13100	13.6	11000	7100	12000	38	59	1.0	0.230	62/32
	75	20	1.1	63/32	63/32ZE	63/32ZZE	63/32NSE	63/32-2NSE	63/32NKE	63/32-2NKE		30000	16200	12.7	9500	6500	11000	39	68	1.0	0.382	63/32
35	47	7	0.3	6807	6807ZE	6807ZZE	6807NSE	6807-2NSE	6807NKE	6807-2NKE		4750	3800	16.4	14000	7600	16000	37	45	0.3	0.029	6807
	55	10	0.6	6907	6907ZE	6907ZZE	6907NSE	6907-2NSE	6907NKE	6907-2NKE		10400	7150	15.6	12000	7500	15000	39	51	0.6	0.073	6907
	62	9	0.3	16007	—	—	—	—	—	—		11700	8150	15.6	12000	—	14000	40	57	0.6	0.110	16007
	62	14	1	6007	6007ZE	6007ZZE	6007NSE	6007-2NSE	6007NKE	6007-2NKE		16000	10300	14.8	12000	6800	14000	40	57	1.0	0.156	6007
	72	17	1.1	6207	6207ZE	6207ZZE	6207NSE	6207-2NSE	6207NKE	6207-2NKE		25700	15300	13.8	9800	6300	11000	42	65	1.0	0.288	6207
	80	21	1.5	6307	6307ZE	6307ZZE	6307NSE	6307-2NSE	6307NKE	6307-2NKE		33500	19200	13.2	8800	6000	10000	44	71	1.5	0.457	6307
40	52	7	0.3	6808	6808ZE	6808ZZE	6808NSE	6808-2NSE	6808NKE	6808-2NKE		5950	4900	16.2	12000	6700	14000	42	50	0.3	0.033	6808
	62	12	0.6	6908	6908ZE	6908ZZE	6908NSE	6908-2NSE	6908NKE	6908-2NKE		13700	9950	15.8	11000	6300	13000	44	58	0.6	0.108	6908
	68	9	0.3	16008	—	—	—	—	—	—		11100	8550	16.1	10000	—	12000	45	63	0.3	0.125	16008
	68	15	1	6008	6008ZE	6008ZZE	6008NSE	6008-2NSE	6008NKE	6008-2NKE		16800	11500	15.3	10000	6100	12000	45	63	1.0	0.194	6008
	80	18	1.1	6208	6208ZE	6208ZZE	6208NSE	6208-2NSE	6208NKE	6208-2NKE		29100	17900	14.0	8700	5600	10000	47	73	1.0	0.366	6208
	90	23	1.5	6308	6308ZE	6308ZZE	6308NSE	6308-2NSE	6308NKE	6308-2NKE		40500	24100	13.2	7800	5300	9200	49	81	1.5	0.633	6308
45	58	7	0.3	6809	6809ZE	6809ZZE	6809NSE	6809-2NSE	6809NKE	6809-2NKE		5350	4900	16.1	11000	6000	13000	47	56	0.3	0.040	6809
	68	12	0.6	6909	6909ZE	6909ZZE	6909NSE	6909-2NSE	6909NKE	6909-2NKE		14100	10900	16.1	10000	5600	12000	49	64	0.6	0.122	6909
	75	10	0.6	16009	—	—	—	—	—	—		12900	10500	16.2	9200	—	11000	52	68	0.6	0.170	16009
	75	16	1	6009	6009ZE	6009ZZE	6009NSE	6009-2NSE	6009NKE	6009-2NKE		20900	15200	15.3	9200	5400	11000	50	70	1.0	0.246	6009
	85	19	1.1	6209	6209ZE	6209ZZE	6209NSE	6209-2NSE	6209NKE	6209-2NKE		32500	20500	14.1	7800	5300	9300	52	78	1.0	0.407	6209
	100	25	1.5	6309	6309ZE	6309ZZE	6309NSE	6309-2NSE	6309NKE	6309-2NKE		53000	32000	13.1	7000	4800	8200	54	91	1.5	0.833	6309
50	65	7	0.3	6810	6810ZE	6810ZZE	6810NSE	6810-2NSE	6810NKE	6810-2NKE		6400	5800	16.1	10000	5300	12000	52	63	0.3	0.052	6810
	72	12	0.6	6910	6910ZE	6910ZZE	6910NSE	6910-2NSE	6910NKE	6910-2NKE		14500	11700	16.1	9500	5300	11000	54	68	0.6	0.125	6910
	80	10	0.6	16010	—	—	—	—	—	—		16100	13100	16.1	8500	—	10000	57	73	0.6	0.180	16010
	80	16	1	6010	6010ZE	6010ZZE	6010NSE	6010-2NSE	6010NKE	6010-2NKE		21800	16600	15.6	8500	5000	10000	55	75	1.0	0.264	6010
	90	20	1.1	6210	6210ZE	6210ZZE	6210NSE	6210-2NSE	6210NKE	6210-2NKE		35000	23200	14.4	7100	4800	8600	57	83	1.0	0.463	6210
	110	27	2	6310	6310ZE	6310ZZE	6310NSE	6310-2NSE	6310NKE	6310-2NKE		62000	38000	13.1	6400	4300	7500	60	100	2.0	1.07	6310

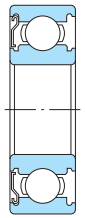
NACHI

Deep-groove Ball Bearings

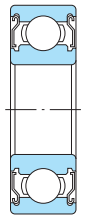
Bore Diameter: 55～80mm



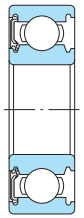
Open



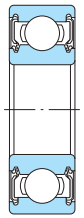
One shield (ZE)



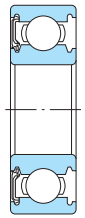
Two shields (ZZE)



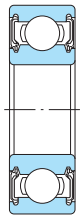
One contact seal (NSE)



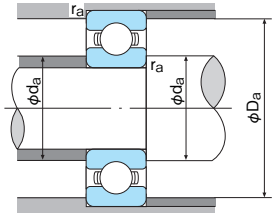
Two contact seals (2NSE)



One non-contact seal (NKE)



Two non-contact seals (2NKE)



■Dynamic equivalent radial load
Pr=XFr+YFa

■Static equivalent radial load
Larger value of following to be used:
Por=0.6Fr+0.5Fa
Por=Fr

$\frac{foFa}{Cor}$	e	$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26				1.71
1.03	0.28				1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34				1.31
3.45	0.38				1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44				1.00

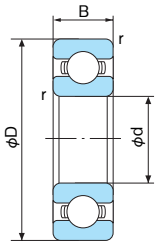
1N=0.102kgf

Boundary dimensions (mm)				Bearing No.								Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Factor fo	Limiting speed (min^{-1})			Abutment and fillet dimensions (mm)			Mass (kg)	Bearing No.
															Grease lubrication		Oil lubrication					
d	D	B	r (min)	Open type	Shield type		Contact seal type		Non-contact seal type						Open type, ZE, ZZE,NKE,2NKE	NSE, 2NSE	Open type, ZE	da (min)	Da (max)	ra (max)		
55	72	9	0.3	6811	6811Z	6811ZZ	—	—	—	—		8800	8100	16.2	8700	—	10000	57	70	0.3	0.083	6811
	80	13	1	6911	6911Z	6911ZZ	—	—	—	—		16000	13200	16.2	8200	—	9600	60	75	1.0	0.177	6911
	90	11	0.6	16011	—	—	—	—	—	—		15200	13500	16.5	7700	—	9000	62	83	0.6	0.260	16011
	90	18	1.1	6011	6011ZE	6011ZZE	6011NSE	6011-2NSE	6011NKE	6011-2NKE		28300	21300	15.4	7700	4500	9000	61	84	1.0	0.384	6011
	100	21	1.5	6211	6211ZE	6211ZZE	6211NSE	6211-2NSE	6211NKE	6211-2NSE		43500	29300	14.4	6400	4300	7700	64	91	1.5	0.607	6211
	120	29	2	6311	6311ZE	6311ZZE	6311NSE	6311-2NSE	6311NKE	6311-2NKE		71500	44500	13.1	5800	4000	6800	65	110	2.0	1.37	6311
60	78	10	0.3	6812	6812Z	6812ZZ	—	—	—	—		11500	10600	16.3	8000	—	9500	62	76	0.3	0.106	6812
	85	13	1	6912	6912Z	6912ZZ	—	—	—	—		15200	13500	16.5	7600	—	9000	65	80	1.0	0.191	6912
	95	11	0.6	16012	—	—	—	—	—	—		16200	14300	16.5	7100	—	8500	67	88	0.6	0.280	16012
	95	18	1.1	6012	6012ZE	6012ZZE	6012NSE	6012-2NSE	6012NKE	6012-2NKE		29400	23200	15.5	7100	4100	8500	66	89	1.0	0.418	6012
	110	22	1.5	6212	6212ZE	6212ZZE	6212NSE	6212-2NSE	6212NKE	6212-2NKE		52500	36000	14.3	6000	3800	7100	69	101	1.5	0.783	6212
	130	31	2.1	6312	6312ZE	6312ZZE	6312NSE	6312-2NSE	6312NKE	6312-2NKE		82000	52000	13.2	5400	3600	6300	72	118	2.0	1.70	6312
65	85	10	0.6	6813	6813Z	6813ZZ	—	—	—	—		11900	11500	16.2	7500	—	8700	69	81	0.6	0.125	6813
	90	13	1	6913	6913Z	6913ZZ	—	—	—	—		17400	16000	16.5	7100	—	8500	70	85	1.0	0.200	6913
	100	11	0.6	16013	—	—	—	—	—	—		20500	18600	16.4	6700	—	8000	72	93	0.6	0.300	16013
	100	18	1.1	6013	6013ZE	6013ZZE	6013NSE	6013-2NSE	6013NKE	6013-2NKE		30500	25200	15.7	6700	4000	8000	71	94	1.0	0.438	6013
	120	23	1.5	6213	6213ZE	6213ZZE	6213NSE	6213-2NSE	6213NKE	6213-2NKE		57000	40000	14.4	5500	3600	6500	74	111	1.5	0.990	3213
	140	33	2.1	6313	6313ZE	6313ZZE	6313NSE	6313-2NSE	6313NKE	6313-2NKE		92500	59500	13.2	4900	3400	6000	77	128	2.0	2.08	6313
70	90	10	0.6	6814	6814Z	6814ZZ	—	—	—	—		12100	11900	16.1	7000	—	8100	74	86	0.6	0.135	6814
	100	16	1	6914	6914Z	6914ZZ	—	—	—	—		23700	21100	16.3	6500	—	7700	75	95	1.0	0.327	6914
	110	13	0.6	16014	—	—	—	—	—	—		26800	23600	16.2	6100	—	7100	77	103	0.6	0.433	16014
	110	20	1.1	6014	6014ZE	6014ZZE	6014NSE	6014-2NSE	6014NKE	6014-2NKE		38000	31000	15.6	6100	3600	7100	76	104	1.0	0.607	6014
	125	24	1.5	6214	6214ZE	6214ZZE	6214NSE	6214-2NSE	6214NKE	6214-2NKE		62000	44000	14.4	5100	3400	6300	79	116	1.5	1.07	6214
	150	35	2.1	6314	6314ZE	6314ZZE	6314NSE	6314-2NSE	6314NKE	6314-2NKE		104000	68000	13.2	4600	3200	5400	82	138	2.0	2.52	6314
75	95	10	0.6	6815	6815Z	6815ZZ	—	—	—	—		12500	12800	16.0	6500	—	7600	79	91	0.6	0.145	6815
	105	16	1	6915	6915Z	6915ZZ	—	—	—	—		20800	19700	16.5	6200	—	7200	80	100	1.0	0.345	6915
	115	13	0.6	16015	—	—	—	—	—	—		27600	25300	16.4	5700	—	6700	82	108	0.6	0.457	16015
	115	20	1.1	6015	6015ZE	6015ZZE	6015NSE	6015-2NSE	6015NKE	6015-2NKE		39500	33500	15.7	5700	3400	6700	81	109	1.0	0.645	6015
	130	25	1.5	6215	6215ZE	6215ZZE	6215NSE	6215-2NSE	6215NKE	6215-2NKE		66000	49500	14.7	4800	3200	5600	84	121	1.5	1.18	6215
	160	37	2.1	6315	6315ZE	6315ZZE	6315NSE	6315-2NSE	6315NKE	6315-2NKE		113000	77000	13.2	4300	2900	5000	87	148	2.0	3.02	6315
80	100	10	0.6	6816	6816Z	6816ZZ	—	—	—	—		12700	13300	15.9	6000	—	7100	84	96	0.6	0.155	6816
	110	16	1	6916	6916Z	6916ZZ	—	—	—	—		27600	25300	16.4	5700	—	6700	85	105	1.0	0.363	6916
	125	14	0.6	16016	—	—	—	—	—	—		32000	29600	16.4	5300	—	6300	87	118	0.6	0.597	16016
	125	22	1.1	6016	6016Z	6016ZZ	—	—	—	—		47500	39500	15.6	5300	—	6300	86	119	1.0	0.855	6016
	140	26	2	6216	6216Z	6216ZZ	6216NSL	6216-2NSL	6216NK	6216-2NK		72500	53000	14.6	4500	3000	5300	90	130	2.0	1.40	6216
	170	39	2.1	6316	6316Z	6316ZZ	6316NSL	6316-2NSL	6316NK	6316-2NK		123000	86500	13.2	4000	2800	4800	92	158	2.0	3.59	6316

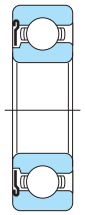
NACHI

Deep-groove Ball Bearings

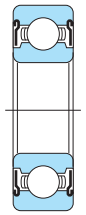
Bore Diameter: 85～110mm



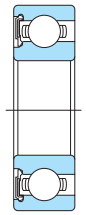
Open type



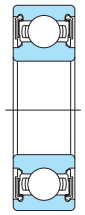
One shield (Z)



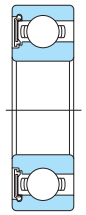
Two shields (ZZ)



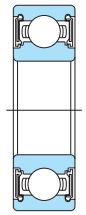
One contact seal (NSL)



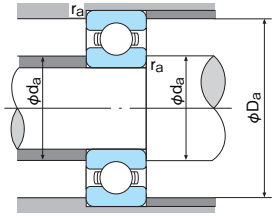
Two contact seals (2NSL)



One non-contact seal (NK)



Two non-contact seals (2NK)



■Dynamic equivalent radial load
Pr=XFr+YFa

■Static equivalent radial load
Larger value of following to be used:
Por=0.6Fr+0.5Fa
Por=Fr

$\frac{foFa}{Cor}$	e	$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26				1.71
1.03	0.28				1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34				1.31
3.45	0.38				1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44				1.00

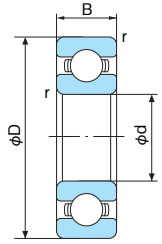
1N=0.102kgf

Boundary dimensions (mm)				Bearing No.							Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Factor fo	Limiting speed (min^{-1})			Abutment and fillet dimensions (mm)			Mass (kg)	Bearing No.
														Grease lubrication		Oil lubrication					
d	D	B	r (min)	Open type	Shield type		Contact seal type		Non-contact seal type					Open type, Z, ZZ, NK, 2NK	NSL, 2NSL	Open type, Z	da (min)	Da (max)	ra (max)		
85	110	13	1	6817	6817Z	6817ZZ	—	—	—	—	18700	19000	16.2	5700	—	6700	90	105	1.0	0.265	6817
	120	18	1.1	6917	6917Z	6917ZZ	—	—	—	—	32000	29600	16.4	5400	—	6300	91	113	1.0	0.517	6917
	130	14	0.6	16017	—	—	—	—	—	—	31500	29800	16.4	5000	—	6000	92	123	0.6	0.626	16017
	130	22	1.1	6017	6017Z	6017ZZ	—	—	—	—	49500	43000	15.7	5000	—	6000	91	124	1.1	0.895	6017
	150	28	2	6217	6217Z	6217ZZ	6217NSL	6217-2NSL	6217NK	6217-2NK	84000	62000	14.5	4300	2800	5000	95	140	2.0	1.79	6217
	180	41	3	6317	6317Z	6317ZZ	6317NSL	6317-2NSL	6317NK	6317-2NK	133000	96500	13.3	3800	2600	4500	99	166	2.5	4.23	6317
90	115	13	1	6818	6818Z	6818ZZ	—	—	—	—	19000	19700	16.1	5400	—	6300	95	110	1.0	0.280	6818
	125	18	1.1	6918	6918Z	6918ZZ	—	—	—	—	33000	31500	16.4	5100	—	6000	96	119	1.0	0.540	6918
	140	16	1	16018	—	—	—	—	—	—	41500	39500	16.3	4800	—	5600	99	131	1.0	0.848	16018
	140	24	1.5	6018	6018Z	6018ZZ	—	—	—	—	58000	49500	15.6	4800	—	5600	97	133	1.5	1.17	6018
	160	30	2	6218	6218Z	6218ZZ	6218NSL	6218-2NSL	6218NK	6218-2NK	96000	71500	14.5	4000	2600	4800	100	150	2.0	2.15	6218
	190	43	3	6318	6318Z	6318ZZ	6318NSL	6318-2NSL	6318NK	6318-2NK	143000	107000	13.3	3600	2400	4300	104	176	2.5	4.91	6318
95	120	13	1	6819	6819Z	6819ZZ	—	—	—	—	19300	20500	16.0	5000	—	6000	100	115	1.0	0.298	6819
	130	18	1.1	6919	6919Z	6919ZZ	—	—	—	—	33500	33500	16.5	4800	—	5700	101	124	1.0	0.567	6919
	145	16	1	16019	—	—	—	—	—	—	41000	39500	16.4	4600	—	5300	104	136	1.0	0.885	16019
	145	24	1.5	6019	6019Z	6019ZZ	—	—	—	—	60500	54000	15.8	4500	—	5300	102	138	1.5	1.22	6019
	170	32	2.1	6219	6219Z	6219ZZ	6219NSL	6219-2NSL	6219NK	6219-2NK	109000	81500	14.4	3800	2600	4500	107	158	2.0	2.62	6219
	200	45	3	6319	6319Z	6319ZZ	6319NSL	6319-2NSL	6319NK	6319-2NK	153000	118000	13.3	3300	2400	3900	109	186	2.5	5.67	6319
100	125	13	1	6820	6820Z	6820ZZ	—	—	—	—	19600	21200	16.0	4800	—	5600	105	120	1.0	0.311	6820
	140	20	1.1	6920	6920Z	6920ZZ	—	—	—	—	42500	36500	16.5	4500	—	5300	106	134	1.0	0.771	6920
	150	16	1	16020	—	—	—	—	—	—	37500	39500	16.4	4300	—	5300	109	141	1.0	0.910	16020
	150	24	1.5	6020	6020Z	6020ZZ	—	—	—	—	60000	54000	15.9	4300	—	5300	107	143	1.5	1.26	6020
	180	34	2.1	6220	6220Z	6220ZZ	6220NSL	6220-2NSL	6220NK	6220-2NK	122000	93000	14.4	3600	2400	4300	112	168	2.0	3.14	6220
	215	47	3	6320	6320Z	6320ZZ	6320NSL	6320-2NSL	6320NK	6320-2NK	173000	141000	13.2	3200	2200	3700	114	201	2.5	7.00	6320
105	130	13	1	6821	—	—	—	—	—	—	19900	21900	15.9	4800	—	5600	110	125	1.0	0.325	6821
	145	20	1.1	6921	—	—	—	—	—	—	42500	42000	16.4	4300	—	5300	111	139	1.0	0.793	6921
	160	18	1	16021	—	—	—	—	—	—	37500	50500	16.4	4000	—	4800	114	151	1.0	1.20	16021
	160	26	2	6021	6021Z	6021ZZ	—	—	—	—	72500	65500	15.8	4000	—	4800	113	152	2.0	1.60	6021
	190	36	2.1	6221	6221Z	6221ZZ	—	—	—	—	133000	104000	14.3	3400	—	4000	117	178	2.0	3.76	6221
	225	49	3	6321	6321Z	6321ZZ	—	—	—	—	184000	153000	13.2	3000	—	3600	119	211	2.5	8.05	6321
110	140	16	1	6822	—	—	—	—	—	—	27300	29400	16.9	4300	—	5300	115	135	1.0	0.510	6822
	150	20	1.1	6922	—	—	—	—	—	—	38000	38500	16.4	4300	—	5000	116	144	1.0	0.830	6922
	170	19	1	16022	—	—	—	—	—	—	44000	45000	16.5	3800	—	4500	119	161	1.0	1.46	16022
	170	28	2	6022	6022Z	6022ZZ	—	—	—	—	84500	73000	15.5	3800	—	4500	118	162	2.0	1.97	6022
	200	38	2.1	6222	6222Z	6222ZZ	—	—	—	—	144000	117000	14.3	3200	—	3800	122	188	2.0	4.36	6222
	240	50	3	6322	6322Z	6322ZZ	—	—	—	—	205000	179000	13.1	2900	—	3400	124	226	2.5	9.54	6322

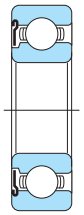
NACHI

Deep-groove Ball Bearings

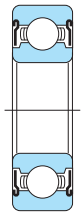
Bore Diameter: 120～170mm



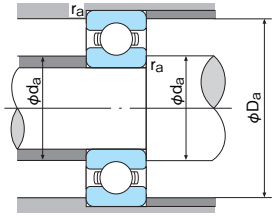
Open type



One shield (Z)



Two shields (ZZ)



■**Dynamic equivalent radial load**
Pr=XFr+YFa

■**Static equivalent radial load**
Larger value of following to be used:
Por=0.6Fr+0.5Fa
Por=Fr

$\frac{f_0 Fa}{Cor}$	e	$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26				1.71
1.03	0.28				1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34				1.31
3.45	0.38				1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44				1.00

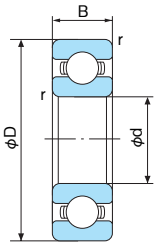
1N=0.102kgf

Boundary dimensions (mm)				Bearing No.								Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Factor fo	Limiting speed (min^{-1})			Abutment and fillet dimensions (mm)			Mass (kg)	Bearing No.
															Grease lubrication		Oil lubrication					
d	D	B	r (min)	Open type	Shield type		Contact seal type		Non-contact seal type						Open type, Z, ZZ	NSL, 2NSL	Open type, Z	da (min)	Da (max)	ra (max)		
120	150	16	1	6824	—	—	—	—	—	—		28300	31500	16.0	4000	—	4800	125	145	1.0	0.549	6824
	165	22	1.1	6924	—	—	—	—	—	—		53000	54000	16.5	3800	—	4600	126	159	1.0	1.13	6924
	180	19	1	16024	—	—	—	—	—	—		48000	50000	16.4	3600	—	4300	129	171	1.0	1.80	16024
	180	28	2	6024	6024Z	6024ZZ	—	—	—	—		88000	79500	15.7	3600	—	4300	128	172	2.0	2.67	6024
	215	40	2.1	6224	6224Z	6224ZZ	—	—	—	—		145000	118000	14.4	2900	—	3400	132	203	2.0	5.15	6224
	260	55	3	6324	6324Z	6324ZZ	—	—	—	—		207000	185000	13.6	2600	—	3100	134	246	2.5	14.6	6324
130	165	18	1.1	6826	—	—	—	—	—	—		37000	41000	16.1	3700	—	4400	136	158	1.0	0.790	6826
	180	24	1.5	6926	—	—	—	—	—	—		65000	67000	16.4	3500	—	4200	137	173	1.5	1.78	6926
	200	22	1.1	16026	—	—	—	—	—	—		55000	59500	16.3	3200	—	3800	144	186	1.0	2.69	16026
	200	33	2	6026	6026Z	6026ZZ	—	—	—	—		106000	101000	15.7	3200	—	3800	138	192	2.0	3.92	6026
	230	40	3	6226	6226Z	6226ZZ	—	—	—	—		167000	146000	14.5	2700	—	3200	144	216	2.5	5.82	6226
	280	58	4	6326	6326Z	6326ZZ	—	—	—	—		229000	214000	13.6	2400	—	2800	148	262	3.0	18.2	6326
140	175	18	1.1	6828	—	—	—	—	—	—		38000	44500	16.0	3400	—	4000	146	169	1.0	0.840	6828
	190	24	1.5	6928	—	—	—	—	—	—		66500	71000	16.5	3200	—	3800	147	183	1.5	1.90	6928
	210	22	1.1	16028	—	—	—	—	—	—		56000	62000	16.2	3000	—	3500	154	196	1.0	2.86	16028
	210	33	2	6028	6028Z	6028ZZ	—	—	—	—		110000	109000	15.9	3000	—	3600	148	202	2.0	4.15	6028
	250	42	3	6228	6228Z	6228ZZ	—	—	—	—		166000	150000	14.8	2500	—	2900	154	236	2.5	7.47	6228
	300	62	4	6328	6328Z	6328ZZ	—	—	—	—		253000	246000	13.6	2200	—	2600	158	282	3.0	21.8	6328
150	190	20	1.1	6830	—	—	—	—	—	—		47500	54500	16.1	3200	—	3800	156	184	1.0	1.20	6830
	210	28	2	6930	—	—	—	—	—	—		85500	87000	16.4	3000	—	3500	158	202	2.0	2.64	6930
	225	24	1.1	16030	—	—	—	—	—	—		76500	82500	16.5	2800	—	3200	164	211	1.0	3.58	16030
	225	35	2.1	6030	6030Z	6030ZZ	—	—	—	—		126000	126000	15.9	2800	—	3200	159	216	2.0	4.48	6030
	270	45	3	6230	6230Z	6230ZZ	—	—	—	—		176000	168000	15.2	2300	—	2700	164	256	2.5	9.41	6230
	320	65	4	6330	—	—	—	—	—	—		274000	284000	13.9	2100	—	2400	168	302	3.0	26.2	6330
160	200	20	1.1	6832	—	—	—	—	—	—		48500	56500	16.0	2900	—	3400	166	194	1.0	1.30	6832
	220	28	2	6932	—	—	—	—	—	—		87500	95500	16.5	2800	—	3300	168	212	2.0	3.01	6932
	240	38	2.1	6032	—	—	—	—	—	—		137000	135000	15.9	2600	—	3000	169	231	2.0	5.89	6032
	290	48	3	6232	6232Z	6232ZZ	—	—	—	—		185000	186000	15.4	2100	—	2500	174	276	2.5	14.3	6232
	340	68	4	6332	—	—	—	—	—	—		278000	287000	13.9	1900	—	2300	178	322	3.0	28.6	6332
170	215	22	1.1	6834	—	—	—	—	—	—		60000	70500	16.1	2700	—	3200	177	208	1.0	1.85	6834
	230	28	2	6934	—	—	—	—	—	—		86000	95000	16.4	2600	—	3100	178	222	2.0	3.17	6934
	260	42	2.1	6034	—	—	—	—	—	—		161000	160000	15.7	2400	—	2800	179	251	2.0	7.92	6034
	310	52	4	6234	—	—	—	—	—	—		212000	224000	15.3	2000	—	2400	188	292	3.0	17.5	6234
	360	72	4	6334	—	—	—	—	—	—		325000	355000	13.6	1800	—	2100	188	342	3.0	34.0	6334

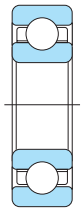
NACHI

■ Deep-groove Ball Bearings

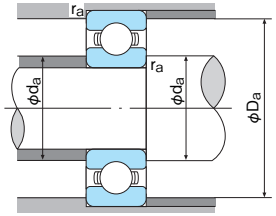
Bore Diameter: 180～280mm



Open type



Open type
(Machined cage)



■Dynamic equivalent radial load
Pr=XFr+YFa

■Static equivalent radial load
Larger value of following to be used:
Por=0.6Fr+0.5Fa
Por=Fr

$\frac{foFa}{Cor}$	e	$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26				1.71
1.03	0.28				1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34				1.31
3.45	0.38				1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44				1.00

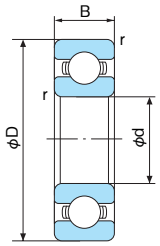
1N=0.102kgf

Boundary dimensions (mm)				Bearing No.							Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Factor fo	Limiting speed (min^{-1})			Abutment and fillet dimensions (mm)			Mass (kg)	Bearing No.
														Grease lubrication		Oil lubrication					
d	D	B	r (min)	Open type	Shield type		Contact seal type		Non-contact seal type					Open type	NSL, 2NSL	Open type	da (min)	Da (max)	ra (max)		
180	225	22	1.1	**6836**	–	–	–	–	–	–	60500	73000	16.0	2600	–	3000	187	218	1.0	2.02	**6836**
	250	33	2	**6936**	–	–	–	–	–	–	106000	117000	16.5	2400	–	2900	188	242	2.0	4.68	**6936**
	280	46	2.1	**6036**	–	–	–	–	–	–	174000	180000	15.8	2300	–	2700	189	271	2.0	10.3	**6036**
	320	52	4	**6236**	–	–	–	–	–	–	227000	242000	15.1	1900	–	2200	198	302	3.0	18.3	**6236**
	380	75	4	**6336**	–	–	–	–	–	–	325000	360000	13.9	1700	–	2000	198	362	3.0	41.9	**6336**
190	240	24	1.5	**6838**	–	–	–	–	–	–	73000	88000	16.1	2400	–	2900	198	232	1.5	2.60	**6838**
	260	33	2	**6938**	–	–	–	–	–	–	108000	123000	16.4	2300	–	2700	198	252	2.0	4.90	**6938**
	290	46	2.1	**6038**	–	–	–	–	–	–	188000	200000	15.7	2100	–	2500	199	281	2.0	10.8	**6038**
	340	55	4	**6238**	–	–	–	–	–	–	255000	282000	15.1	1800	–	2100	208	322	3.0	23.0	**6238**
	400	78	5	**6338**	–	–	–	–	–	–	355000	415000	14.1	1600	–	1900	212	378	4.0	48.2	**6338**
200	250	24	1.5	**6840**	–	–	–	–	–	–	74000	91000	15.9	2300	–	2700	208	242	1.5	2.70	**6840**
	280	38	2.1	**6940**	–	–	–	–	–	–	130000	146000	16.5	2200	–	2600	209	271	2.0	6.88	**6940**
	310	51	2.1	**6040**	–	–	–	–	–	–	202000	222000	15.8	2000	–	2400	209	301	2.0	13.9	**6040**
	360	58	4	**6240**	–	–	–	–	–	–	268000	310000	15.2	1700	–	2000	218	342	3.0	28.2	**6240**
	420	80	5	**6340**	–	–	–	–	–	–	380000	445000	13.9	1500	–	1800	222	398	4.0	54.6	**6340**
220	270	24	1.5	**6844**	–	–	–	–	–	–	76500	98000	15.9	2100	–	2400	228	262	1.5	2.98	**6844**
	300	38	2.1	**6944**	–	–	–	–	–	–	132000	154000	16.4	2000	–	2300	229	291	2.0	7.45	**6944**
	340	56	3	**6044**	–	–	–	–	–	–	214000	248000	15.9	1800	–	2200	230	330	2.5	18.4	**6044**
	400	65	4	**6244**	–	–	–	–	–	–	310000	375000	15.1	1500	–	1800	238	382	3.0	37.0	**6244**
240	300	28	2	**6848**	–	–	–	–	–	–	98500	127000	15.9	1900	–	2200	250	291	2.0	4.60	**6848**
	320	38	2.1	**6948**	–	–	–	–	–	–	154000	186000	16.3	1800	–	2100	249	311	2.0	8.02	**6948**
	360	56	3	**6048**	–	–	–	–	–	–	222000	268000	16.1	1700	–	2000	250	350	2.5	19.6	**6048**
	440	72	4	**6248**	–	–	–	–	–	–	340000	430000	15.2	1200	–	1500	258	322	3.0	49.9	**6248**
260	320	28	2	**6852**	–	–	–	–	–	–	101000	136000	15.8	1700	–	2000	269	311	2.0	4.95	**6852**
	360	46	2.1	**6952**	–	–	–	–	–	–	204000	254000	16.4	1600	–	1900	269	351	2.0	13.4	**6952**
	400	65	4	**6052**	–	–	–	–	–	–	252000	320000	16.1	1500	–	1800	272	388	3.0	29.3	**6052**
	480	80	5	**6252**	–	–	–	–	–	–	400000	540000	15.1	1100	–	1400	282	458	4.0	67.5	**6252**
280	350	33	2	**6856**	–	–	–	–	–	–	133000	177000	16.1	1600	–	1900	290	341	2.0	7.35	**6856**
	380	46	2.1	**6956**	–	–	–	–	–	–	209000	270000	16.3	1500	–	1800	289	371	2.0	14.3	**6956**
	420	65	4	**6056**	–	–	–	–	–	–	266000	350000	16.1	1400	–	1600	293	405	3.0	31.0	**6056**
	500	80	5	**6256**	–	–	–	–	–	–	400000	550000	15.3	1000	–	1300	302	478	4.0	71.0	**6256**

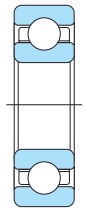
NACHI

Deep-groove Ball Bearings

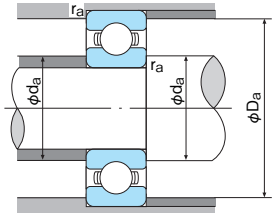
Bore Diameter: 300～320mm



Open type



Open type
(Machined cage)



■**Dynamic equivalent radial load**
Pr=XFr+YFa

■**Static equivalent radial load**
Larger value of following to be used:
Por=0.6Fr+0.5Fa
Por=Fr

$\frac{foFa}{Cor}$	e	$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26				1.71
1.03	0.28				1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34				1.31
3.45	0.38				1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44				1.00

1N=0.102kgf

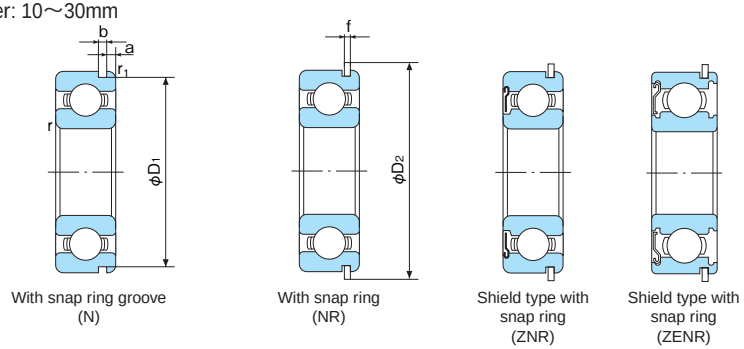
Boundary dimensions (mm)				Bearing No.							Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Factor fo	Limiting speed (min^{-1})			Abutment and fillet dimensions (mm)			Mass (kg)	Bearing No.
														Grease lubrication		Oil lubrication					
d	D	B	r (min)	Open type	Shield type		Contact seal type		Non-contact seal type					Open type	NSL, 2NSL	Open type	da (min)	Da (max)	ra (max)		
300	380	38	2.1	**6860**	—	—	—	—	—	—	166000	219000	16.0	1500	—	1700	311	369	2.0	10.4	**6860**
	420	56	3	**6960**	—	—	—	—	—	—	269000	370000	16.5	1400	—	1600	311	409	2.5	22.8	**6960**
	460	74	4	**6060**	—	—	—	—	—	—	355000	490000	15.0	1300	—	1500	313	447	3.0	43.8	**6060**
	540	85	5	**6260**	—	—	—	—	—	—	465000	670000	15.2	950	—	1200	322	518	4.0	88.6	**6260**
320	400	38	2.1	**6864**	—	—	—	—	—	—	164000	218000	15.9	1400	—	1600	330	389	2.0	10.9	**6864**
	440	56	3	**6964**	—	—	—	—	—	—	266000	370000	16.4	1300	—	1500	331	429	2.5	24.1	**6964**
	480	74	4	**6064**	—	—	—	—	—	—	340000	470000	15.3	1200	—	1400	333	467	3.0	46.1	**6064**

NACHI

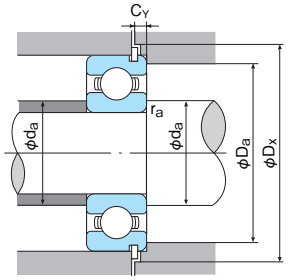
Deep-groove Ball Bearings

With snap ring groove / With snap ring / Shield type with snap ring

Bore Diameter: 10～30mm



With snap ring groove (N) | With snap ring (NR) | Shield type with snap ring (ZNR) | Shield type with snap ring (ZENR)



■Dynamic equivalent radial load
Pr=XFr+YFa

■Static equivalent radial load
Larger value of following to be used:
Por=0.6Fr+0.5Fa
Por=Fr

$\frac{foFa}{Cor}$	e	$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26				1.71
1.03	0.28				1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34				1.31
3.45	0.38				1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44				1.00

1N=0.102kgf

Boundary dimensions (mm)					Dimensions of snap ring groove and snap ring (mm)					Bearing No.(1)			Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Factor fo	Limiting speed (min-1)		Abutment and fillet dimensions (mm)					Mass (kg)	Bearing No.
d	D	B	r (min)	r1 (min)	D1 (max)	a (max)	b (min)	D2 (max)	f (max)							Grease lubrication	Oil lubrication	da (min)	Da (max)	Dx (min)	ra (max)	CY (max)		
10	22	6	0.3	0.3	20.8	1.05	0.8	24.8	0.7	6900N	6900NR	6900ZENR	2490	1130	14.0	33000	38000	12	20	25.5	0.3	1.5	0.010	6900N
	30	9	0.6	0.5	28.17	2.06	1.35	34.7	1.12	6200N	6200NR	6200ZENR	5100	2390	13.2	25000	30000	15	25	35.5	0.6	2.9	0.032	6200N
	35	11	0.6	0.5	33.17	2.06	1.35	39.7	1.12	6300N	6300NR	6300ZENR	8100	3450	11.3	23000	27000	15	30	40.5	0.6	2.9	0.053	6300N
12	24	6	0.3	0.3	22.8	1.05	0.8	26.8	0.7	6901N	6901NR	6901ZENR	2700	1320	14.5	30000	36000	14	22	27.5	0.3	1.5	0.012	6901N
	28	8	0.3	0.3	26.7	1.35	0.93	31	0.85	6001N	6001NR	6001ZENR	5100	2390	13.5	28000	32000	14	26	31.5	0.3	1.9	0.024	6001N
	32	10	0.6	0.5	30.15	2.06	1.35	36.7	1.12	6201N	6201NR	6201ZENR	6800	3050	12.3	22000	28000	17	27	37.5	0.6	2.9	0.037	6201N
	37	12	1	0.5	34.77	2.06	1.35	41.3	1.12	6301N	6301NR	6301ZENR	9750	4250	11.2	20000	24000	18	31	42	1	2.9	0.060	6301N
15	28	7	0.3	0.3	26.7	1.3	0.95	30.8	0.85	6902N	6902NR	6902ZENR	4300	2250	14.3	26000	31000	17	26	31.5	0.3	1.8	0.017	6902N
	32	9	0.3	0.3	30.15	2.06	1.35	36.7	1.12	6002N	6002NR	6002ZENR	5600	2840	13.9	24000	28000	17	30	37.5	0.3	2.9	0.033	6002N
	35	11	0.6	0.5	33.17	2.06	1.35	39.7	1.12	6202N	6202NR	6202ZENR	7650	3700	13.1	20000	24000	20	30	40.5	0.6	2.9	0.045	6202N
	42	13	1	0.5	39.75	2.06	1.35	46.3	1.12	6302N	6302NR	6302ZENR	11400	5400	12.3	17000	21000	21	36	47	1	2.9	0.082	6302N
17	30	7	0.3	0.3	28.7	1.3	0.95	32.8	0.85	6903N	6903NR	6903ZENR	4600	2550	14.7	24000	29000	19	28	33.5	0.3	1.8	0.019	6903N
	35	10	0.3	0.3	33.17	2.06	1.35	39.7	1.12	6003N	6003NR	6003ZENR	6000	3250	14.3	22000	26000	19	33	40.5	0.3	2.9	0.041	6003N
	40	12	0.6	0.5	38.1	2.06	1.35	44.6	1.12	6203N	6203NR	6203ZENR	9550	4800	13.1	18000	21000	22	35	45.5	0.6	2.9	0.065	6203N
	47	14	1	0.5	44.6	2.46	1.35	52.7	1.12	6303N	6303NR	6303ZENR	13600	6550	12.3	16000	19000	23	41	53.5	1	3.3	0.115	6303N
20	32	7	0.3	0.3	30.7	1.3	0.95	34.8	0.85	6804N	6804NR	6804ZENR	4000	2640	15.5	22000	26000	22	30	35.5	0.3	1.8	0.020	6804N
	37	9	0.3	0.3	35.7	1.7	0.95	39.8	0.85	6904N	6904NR	6904ZENR	6350	3700	14.8	19000	23000	22	35	40.5	0.3	2.3	0.037	6904N
	42	12	0.6	0.5	39.75	2.06	1.35	46.3	1.12	6004N	6004NR	6004ZENR	9400	5000	13.9	18000	21000	24	38	47	0.6	2.9	0.069	6004N
	47	14	1	0.5	44.6	2.46	1.35	52.7	1.12	6204N	6204NR	6204ZENR	12800	6600	13.1	16000	18000	26	41	53.5	1	3.3	0.106	6204N
	52	15	1.1	0.5	49.73	2.46	1.35	57.9	1.12	6304N	6304NR	6304ZENR	15900	7900	12.4	14000	17000	27	45	58.5	1	3.3	0.144	6304N
22	50	14	1	0.5	47.6	2.46	1.35	55.7	1.12	62/22N	62/22NR	62/22ZNR	13900	6950	13.1	14000	17000	28	44	56.5	1	3.3	0.120	62/22N
	56	16	1.1	0.5	53.6	2.46	1.35	61.7	1.12	63/22N	63/22NR	63/22ZNR	18400	9250	12.4	13000	16000	29	49	62.5	1	3.3	0.176	63/22N
25	37	7	0.3	0.3	35.7	1.3	0.95	39.8	0.85	6805N	6805NR	6805ZENR	4300	2940	16.0	18000	22000	27	35	40.5	0.3	1.8	0.023	6805N
	42	9	0.3	0.3	40.7	1.7	0.95	44.8	0.85	6905N	6905NR	6905ZENR	7000	4500	15.3	16000	20000	27	40	45.5	0.3	2.3	0.044	6905N
	47	12	0.6	0.5	44.6	2.06	1.35	52.7	1.12	6005N	6005NR	6005ZENR	10100	5850	14.5	15000	18000	29	43	53.5	0.6	2.9	0.078	6005N
	52	15	1	0.5	49.73	2.46	1.35	57.9	1.12	6205N	6205NR	6205ZENR	14000	7900	13.9	13000	16000	31	46	58.5	1	3.3	0.128	6205N
	62	17	1.1	0.5	59.61	3.28	1.9	67.7	1.7	6305N	6305NR	6305ZENR	23600	12100	12.2	12000	14000	32	55	68.5	1	4.6	0.232	6305N
28	58	16	1	0.5	55.6	2.46	1.35	63.7	1.12	62/28N	62/28NR	62/28ZENR	17900	9750	13.1	12000	14000	34	52	64.5	1	3.3	0.175	62/28N
	68	18	1.1	0.5	64.82	3.28	1.9	74.6	1.7	63/28N	63/28NR	63/28ZNR	26800	14000	12.4	11000	13000	35	61	76	1	4.6	0.287	63/28N
30	42	7	0.3	0.3	40.7	1.3	0.95	44.8	0.85	6806N	6806NR	6806ZENR	5350	3800	16.4	15000	18000	32	40	45.5	0.3	1.8	0.027	6806N
	47	9	0.3	0.3	45.7	1.7	0.95	49.8	0.85	6906N	6906NR	6906ZENR	7250	5000	15.8	14000	17000	32	45	50.5	0.3	2.3	0.047	6906N
	55	13	1	0.5	52.6	2.08	1.35	60.7	1.12	6006N	6006NR	6006ZENR	13200	8300	14.8	13000	15000	35	50	61.5	1	2.9	0.113	6006N
	62	16	1	0.5	59.61	3.28	1.9	67.7	1.7	6206N	6206NR	6206ZENR	19500	11300	13.9	11000	13000	36	56	68.5	1	4.6	0.199	6206N
	72	19	1.1	0.5	68.81	3.28	1.9	78.6	1.7	6306N	6306NR	6306ZENR	26700	15000	13.2	10000	12000	37	65	80	1	4.6	0.346	6306N

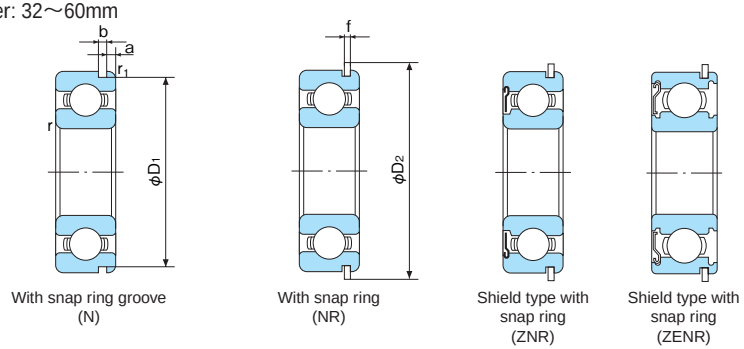
Note: (1) Bearing No. ZE means one shield type, two shields type is also available.
Remark: Dimensions of snap ring groove and snap ring are shown on pages 45 to 48.

NACHI

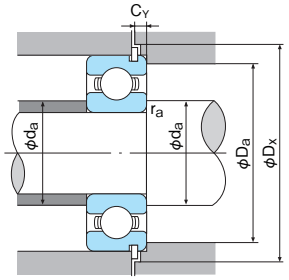
Deep-groove Ball Bearings

With snap ring groove / With snap ring / Shield type with snap ring

Bore Diameter: 32～60mm



With snap ring groove (N) | With snap ring (NR) | Shield type with snap ring (ZNR) | Shield type with snap ring (ZENR)



■Dynamic equivalent radial load
Pr=XFr+YFa

■Static equivalent radial load
Larger value of following to be used:
Por=0.6Fr+0.5Fa
Por=Fr

$\frac{foFa}{Cor}$	e	$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26				1.71
1.03	0.28				1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34				1.31
3.45	0.38				1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44				1.00

1N=0.102kgf

Boundary dimensions (mm)					Dimensions of snap ring groove and snap ring (mm)					Bearing No.(1)			Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Factor fo	Limiting speed (min-1)		Abutment and fillet dimensions (mm)					Mass (kg)	Bearing No.
d	D	B	r (min)	r1 (min)	D1 (max)	a (max)	b (min)	D2 (max)	f (max)							Grease lubrication	Oil lubrication	da (min)	Da (max)	Dx (min)	ra (max)	CY (max)		
32	65	17	1	0.5	62.6	3.28	1.9	70.7	1.7	62/32N	62/32NR	62/32ZNR	22400	13100	13.6	11000	12000	38	59	71.5	1	4.6	0.230	62/32N
	75	20	1.1	0.5	71.83	3.28	1.9	81.6	1.7	63/32N	63/32NR	63/32ZNR	30000	16200	12.7	9500	11000	39	68	83	1	4.6	0.382	63/32N
35	47	7	0.3	0.3	45.7	1.3	0.95	49.8	0.85	6807N	6807NR	6807ZENR	4750	3800	16.4	14000	16000	37	45	50.5	0.3	1.8	0.030	6807N
	55	10	0.6	0.5	53.7	1.7	0.95	57.8	0.85	6907N	6907NR	6907ZENR	10400	7150	15.6	12000	15000	39	51	58.5	0.6	2.3	0.075	6907N
	62	14	1	0.5	59.61	2.08	1.9	67.7	1.7	6007N	6007NR	6007ZENR	16000	10300	14.8	12000	14000	40	57	68.5	1	3.4	0.150	6007N
	72	17	1.1	0.5	68.81	3.28	1.9	78.6	1.6	6207N	6207NR	6207ZENR	25700	15300	13.8	9800	11000	42	65	80	1	4.6	0.288	6207N
	80	21	1.5	0.5	76.81	3.28	1.9	86.6	1.6	6307N	6307NR	6307ZENR	33500	19100	13.2	8800	10000	44	71	88	1.5	4.6	0.457	6307N
40	52	7	0.3	0.3	50.7	1.3	0.95	54.8	0.85	6808N	6808NR	6808ZENR	5950	4900	16.2	12000	14000	42	50	55.5	0.3	1.8	0.034	6808N
	62	12	0.6	0.5	60.7	1.7	0.95	64.8	0.85	6908N	6908NR	6908ZENR	13700	9950	15.8	11000	13000	44	58	65.5	0.6	2.3	0.110	6908N
	68	15	1	0.5	64.82	2.49	1.9	74.6	1.7	6008N	6008NR	6008ZENR	16800	11500	15.3	10000	12000	45	63	76	1	3.8	0.186	6008N
	80	18	1.1	0.5	76.81	3.28	1.9	86.6	1.7	6208N	6208NR	6208ZENR	29100	17900	14.0	8700	10000	47	73	88	1	4.6	0.366	6208N
	90	23	1.5	0.5	86.79	3.28	2.7	96.5	2.46	6308N	6308NR	6308ZENR	40500	24100	13.2	7800	9200	49	81	98	1.5	5.9	0.633	6308N
45	58	7	0.3	0.3	56.7	1.3	0.95	60.8	0.85	6809N	6809NR	6809ZENR	5350	4900	16.1	11000	13000	47	56	61.5	0.3	1.8	0.042	6809N
	68	12	0.6	0.5	66.7	1.7	0.95	70.8	0.85	6909N	6909NR	6909ZENR	14100	10900	16.1	10000	12000	49	64	72	0.6	2.3	0.124	6909N
	75	16	1	0.5	71.83	2.49	1.9	81.6	1.7	6009N	6009NR	6009ZENR	20900	15200	15.3	9200	11000	50	70	83	1	3.8	0.239	6009N
	85	19	1.1	0.5	81.81	3.28	1.9	91.6	1.7	6209N	6209NR	6209ZENR	32500	20500	14.1	7800	9300	52	78	93	1	4.6	0.407	6209N
	100	25	1.5	0.5	96.8	3.28	2.7	106.5	2.46	6309N	6309NR	6309ZENR	53000	32000	13.1	7000	8200	54	91	108	1.5	5.4	0.833	6309N
50	65	7	0.3	0.3	63.7	1.3	0.95	67.8	0.85	6810N	6810NR	6810ZENR	6400	5800	16.1	10000	12000	52	63	68.5	0.3	1.8	0.054	6810N
	72	12	0.6	0.5	70.7	1.7	0.95	74.8	0.85	6910N	6910NR	6910ZENR	14500	11700	16.1	9500	11000	54	68	76	0.6	2.3	0.127	6910N
	80	16	1	0.5	76.81	2.49	1.9	86.6	1.7	6010N	6010NR	6010ZENR	21800	16600	15.6	8500	10000	55	75	88	1	3.8	0.252	6010N
	90	20	1.1	0.5	86.79	3.28	2.7	96.5	2.46	6210N	6210NR	6210ZENR	35000	23200	14.4	7100	8600	57	83	98	1	5.4	0.463	6210N
	110	27	2	0.5	106.81	3.28	2.7	116.6	2.46	6310N	6310NR	6310ZENR	62000	38100	13.1	6400	7500	60	100	118	2	5.4	1.07	6310N
55	72	9	0.3	0.3	70.7	1.7	0.95	74.8	0.85	6811N	6811NR	6811ZNR	8800	8100	16.2	8700	10000	57	70	76	0.3	2.3	0.085	6811N
	80	13	1	0.5	77.9	2.1	1.3	84.4	1.12	6911N	6911NR	6911ZNR	16000	13200	16.2	8200	9600	60	75	86	1	2.9	0.180	6911N
	90	18	1.1	0.5	86.79	2.87	2.7	96.5	2.46	6011N	6011NR	6011ZENR	28300	21300	15.4	7700	9000	61	84	98	1	5	0.375	6011N
	100	21	1.5	0.5	96.8	3.28	2.7	106.5	2.46	6211N	6211NR	6211ZENR	43500	29300	14.4	6400	7700	64	91	108	1.5	5.4	0.607	6211N
	120	29	2	0.5	115.21	4.06	3.1	129.7	2.82	6311N	6311NR	6311ZENR	71500	44500	13.1	5800	6800	65	110	131.5	2	6.5	1.37	6311N
60	78	10	0.3	0.3	76.2	1.7	1.3	82.7	1.12	6812N	6812NR	6812ZNR	11500	10600	16.3	8000	9500	62	76	84	0.3	2.5	0.110	6812N
	85	13	1	0.5	82.9	2.1	1.3	89.4	1.12	6912N	6912NR	6912ZNR	15200	13500	16.5	7600	9000	65	80	91	1	2.9	0.195	6912N
	95	18	1.1	0.5	91.82	2.87	2.7	101.6	2.46	6012N	6012NR	6012ZENR	29400	23200	15.5	7100	8500	66	89	103	1	5	0.403	6012N
	110	22	1.5	0.5	106.81	3.28	2.7	116.6	2.46	6212N	6212NR	6212ZENR	52500	36000	14.3	6000	7100	69	101	118	1.5	5.4	0.783	6212N
	130	31	2.1	0.5	125.22	4.06	3.1	139.7	2.82	6312N	6312NR	6312ZENR	82000	52000	13.2	5400	6300	72	118	141.5	2	6.5	1.70	6312N

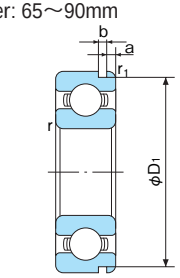
Note: (1) Bearing No. ZE means one shield type, two shields type is also available.
Remark: Dimensions of snap ring groove and snap ring are shown on pages 45 to 48.

NACHI

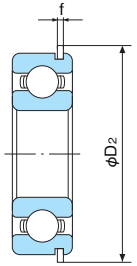
Deep-groove Ball Bearings

With snap ring groove / With snap ring / Shield type with snap ring

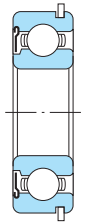
Bore Diameter: 65～90mm



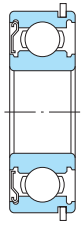
With snap ring groove (N)



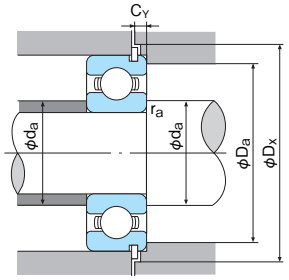
With snap ring (NR)



Shield type with snap ring (ZNR)



Shield type with snap ring (ZENR)



■**Dynamic equivalent radial load**
Pr=XFr+YFa

■**Static equivalent radial load**
Larger value of following to be used:
Por=0.6Fr+0.5Fa
Por=Fr

$\frac{foFa}{Cor}$	e	$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26				1.71
1.03	0.28				1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34				1.31
3.45	0.38				1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44				1.00

1N=0.102kgf

Boundary dimensions (mm)					Dimensions of snap ring groove and snap ring (mm)					Bearing No.(1)			Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Factor fo	Limiting speed (min-1)		Abutment and fillet dimensions (mm)					Mass (kg)	Bearing No.
d	D	B	r (min)	r1 (min)	D1 (max)	a (max)	b (min)	D2 (max)	f (max)							Grease lubrication	Oil lubrication	da (min)	Da (max)	Dx (min)	ra (max)	CY (max)		
	85	10	0.6	0.5	82.9	1.7	1.3	89.4	1.12	6813N	6813NR	6816ZNR	11900	11500	16.2	7500	8700	69	81	91	0.6	2.5	0.130	6813N
	90	13	1	0.5	87.9	2.1	1.3	94.4	1.12	6913N	6913NR	6913ZNR	17400	16000	16.5	7100	8500	70	85	96	1	2.9	0.210	6913N
65	100	18	1.1	0.5	96.8	2.87	2.7	106.5	2.46	6013N	6013NR	6013ZENR	30500	25200	15.7	6700	8000	71	94	108	1	5	0.413	6013N
	120	23	1.5	0.5	115.21	4.06	3.1	129.7	2.82	6213N	6213NR	6213ZENR	57000	40000	14.4	5500	6500	74	111	131.5	1.5	6.5	0.990	6213N
	140	33	2.1	0.5	135.23	4.9	3.1	149.7	2.82	6313N	6313NR	6313ZENR	92500	59500	13.2	4900	6000	77	128	152	2	7.3	2.08	6313N
	90	10	0.6	0.5	87.9	1.7	1.3	94.4	1.12	6814N	6814NR	6814ZNR	12100	11900	16.1	7000	8100	74	86	96	0.6	2.5	0.140	6814N
	100	16	1	0.5	97.9	2.5	1.3	104.4	1.12	6914N	6914NR	6914ZNR	23700	21100	16.3	6500	7700	75	95	106	1	3.3	0.332	6914N
70	110	20	1.1	0.5	106.81	2.87	2.7	116.6	2.46	6014N	6014NR	6014ZENR	38000	31000	15.6	6100	7100	76	104	118	1	5	0.580	6014N
	125	24	1.5	0.5	120.22	4.06	3.1	134.7	2.82	6214N	6214NR	6214ZENR	62000	44000	14.4	5100	6300	79	116	136.5	1.5	6.5	1.07	6214N
	150	35	2.1	0.5	145.24	4.9	3.1	159.7	2.82	6314N	6314NR	6314ZENR	104000	68000	13.2	4600	5400	82	138	162	2	7.3	2.52	6314N
	95	10	0.6	0.5	92.9	1.7	1.3	99.4	1.12	6815N	6815NR	6815ZNR	12500	12800	16.0	6500	7600	79	91	101	0.6	2.5	0.150	6815N
	105	16	1	0.5	102.6	2.5	1.3	110.7	1.12	6915N	6915NR	6915ZNR	20800	19700	16.5	6200	7200	80	100	112	1	3.3	0.350	6915N
75	115	20	1.1	0.5	111.81	2.87	2.7	121.6	2.46	6015N	6015NR	6015ZENR	39500	33500	15.7	5700	6700	81	109	123	1	5	0.615	6015N
	130	25	1.5	0.5	125.22	4.06	3.1	139.7	2.82	6215N	6215NR	6215ZENR	66000	49500	14.7	4800	5600	84	121	141.5	1.5	6.5	1.18	6215N
	160	37	2.1	0.5	155.22	4.9	3.1	169.7	2.82	6315N	6315NR	6315ZENR	113000	77000	13.2	4300	5000	87	148	172	2	7.3	3.02	6315N
	100	10	0.6	0.5	97.9	1.7	1.3	104.4	1.12	6816N	6816NR	6816ZNR	12700	13300	15.9	6000	7100	84	96	106	0.6	2.5	0.160	6816N
	110	16	1	0.5	107.6	2.5	1.3	115.7	1.12	6916N	6916NR	6916ZNR	27600	25300	16.4	5700	6700	85	105	117	1	3.3	0.370	6916N
80	125	22	1.1	0.5	120.22	2.87	3.1	134.7	2.82	6016N	6016NR	6016ZNR	47500	39500	15.6	5300	6300	86	119	136.5	1	5.3	0.825	6016N
	140	26	2	0.5	135.23	4.9	3.1	149.7	2.82	6216N	6216NR	6216ZNR	72500	53000	14.6	4500	5300	90	130	152	2	7.3	1.40	6216N
	170	39	2.1	0.5	163.65	5.69	3.5	182.9	3.1	6316N	6316NR	6316ZNR	123000	86500	13.2	4000	4800	92	158	185	2	8.4	3.59	6316N
	110	13	1	0.5	107.6	2.1	1.3	115.7	1.12	6817N	6817NR	6817ZNR	18700	19000	16.2	5700	6700	90	105	117	1	2.9	0.272	6817N
	120	18	1.1	0.5	117.6	3.3	1.3	125.7	1.12	6917N	6917NR	6917ZNR	32000	29600	16.4	5400	6300	91	113	127	1	4.1	0.524	6917N
85	130	22	1.1	0.5	125.22	2.87	3.1	139.7	2.82	6017N	6017NR	6017ZNR	49500	43000	15.7	5000	6000	91	124	141.5	1	5.3	0.863	6017N
	150	28	2	0.5	145.24	4.9	3.1	159.7	2.82	6217N	6217NR	6217ZNR	84000	62000	14.5	4300	5000	95	140	162	2	7.3	1.79	6217N
	180	41	3	0.5	173.66	5.69	3.5	192.9	3.1	6317N	6317NR	6317ZNR	133000	96500	13.3	3800	4500	99	166	195	2.5	8.4	4.23	6317N
	115	13	1	0.5	112.6	2.1	1.3	120.7	1.2	6818N	6818NR	6818ZNR	19000	19700	16.1	5400	6300	95	110	122	1	2.9	0.288	6818N
	125	18	1.1	0.5	122.6	3.3	1.3	130.7	1.12	6918N	6918NR	6918ZNR	33000	31500	16.4	5100	6000	96	119	132	1	4.1	0.549	6918N
90	140	24	1.5	0.5	135.23	3.71	3.1	149.7	2.82	6018N	6018NR	6018ZNR	58000	49500	15.6	4800	5600	97	133	152	1.5	6.1	1.13	6018N
	160	30	2	0.5	155.22	4.9	3.1	169.7	2.82	6218N	6218NR	6218ZNR	96000	71500	14.5	4000	4800	100	150	172	2	7.3	2.15	6218N
	190	43	3	0.5	183.64	5.69	3.5	202.9	3.1	6318N	6318NR	6318ZNR	143000	107000	13.3	3600	4300	104	176	205	2.5	8.4	4.91	6318N

Note: (1) Bearing No. ZE means one shield type, two shields type is also available.
Remark: Dimensions of snap ring groove and snap ring are shown on pages 45 to 48.

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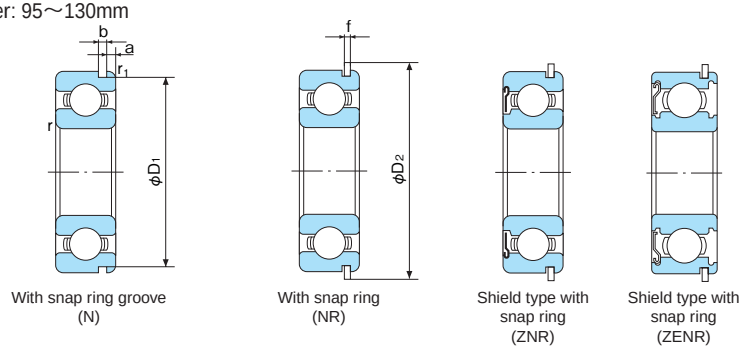
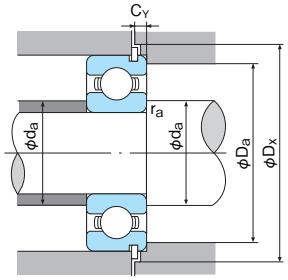
Deep-groove Ball Bearings

With snap ring groove / With snap ring / Shield type with snap ring

Bore Diameter: 95～130mm



With snap ring groove (N) | With snap ring (NR) | Shield type with snap ring (ZNR) | Shield type with snap ring (ZENR)



■**Dynamic equivalent radial load**
Pr=XFr+YFa

■**Static equivalent radial load**
Larger value of following to be used:
Por=0.6Fr+0.5Fa
Por=Fr

$\frac{foFa}{Cor}$	e	$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26				1.71
1.03	0.28				1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34				1.31
3.45	0.38				1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44				1.00

1N=0.102kgf

Boundary dimensions (mm)					Dimensions of snap ring groove and snap ring (mm)					Bearing No.(1)			Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Factor fo	Limiting speed (min-1)		Abutment and fillet dimensions (mm)					Mass (kg)	Bearing No.
d	D	B	r (min)	r1 (min)	D1 (max)	a (max)	b (min)	D2 (max)	f (max)							Grease lubrication	Oil lubrication	da (min)	Da (max)	Dx (min)	ra (max)	CY (max)		
95	120	13	1	0.5	117.6	2.1	1.3	125.7	1.12	6819N	6819NR	6819ZNR	19300	20500	16.0	5000	6000	100	115	127	1	2.9	0.307	6819N
	130	18	1.1	0.5	127.6	3.3	1.3	135.7	1.12	6919N	6919NR	6919ZNR	33500	33500	16.5	4800	5700	101	124	137	1	4.1	0.576	6919N
	145	24	1.5	0.5	140.23	3.71	3.1	154.7	2.82	6019N	6019NR	6019ZNR	60500	54000	15.8	4500	5300	102	138	157	1.5	6.1	1.16	6019N
	170	32	2.1	0.5	163.65	5.69	3.5	182.9	3.1	6219N	6219NR	6219ZNR	109000	81500	14.4	3800	4500	107	158	185	2	8.4	2.62	6219N
	200	45	3	0.5	193.65	5.69	3.5	212.9	3.1	6319N	6319NR	6319ZNR	153000	118000	13.3	3300	3900	109	186	215	2.5	8.4	5.67	6319N
100	125	13	1	0.5	122.6	2.1	1.3	130.7	1.12	6820N	6820NR	6820ZNR	19600	21200	16.0	4800	5600	105	120	132	1	2.9	0.320	6820N
	140	20	1.1	0.5	137.6	3.3	1.9	145.7	1.7	6920N	6920NR	6920ZNR	37000	36500	16.5	4500	5300	106	134	147	1	4.7	0.780	6920N
	150	24	1.5	0.5	145.24	3.71	3.1	159.7	2.82	6020N	6020NR	6020ZNR	60000	54000	15.9	4300	5300	107	143	162	1.5	6.1	1.20	6020N
	180	34	2.1	0.5	173.66	5.69	3.5	192.9	3.1	6220N	6220NR	6220ZNR	122000	93000	14.4	3600	4300	112	168	195	2	8.4	3.14	6220N
105	130	13	1	0.5	127.6	2.1	1.3	135.7	1.12	6821N	6821NR	6821ZNR	19900	21900	15.9	4800	5600	110	125	137	1	2.9	0.335	6821N
	145	20	1.1	0.5	142.6	3.3	1.9	150.7	1.7	6921N	6921NR	6921ZNR	42500	42000	16.4	4300	5300	111	139	152	1	4.7	0.803	6921N
	160	26	2	0.5	155.22	3.71	3.1	169.7	2.82	6021N	6021NR	6021ZNR	72500	65500	15.8	4000	4800	113	152	172	2	6.1	1.54	6021N
	190	36	2.1	0.5	183.64	5.69	3.5	202.9	3.1	6221N	6221NR	6221ZNR	133000	104000	14.3	3400	4000	117	178	205	2	8.4	3.76	6221N
110	140	16	1	0.5	137.6	2.5	1.9	145.7	1.7	6822N	6822NR	6822ZNR	27300	29400	16.9	4300	5300	115	135	147	1	3.9	0.526	6822N
	150	20	1.1	0.5	147.6	3.3	1.9	155.7	1.7	6922N	6922NR	6922ZNR	38000	38500	16.4	4300	5000	116	144	157	1	4.7	0.846	6922N
	170	28	2	0.5	163.65	3.71	3.5	182.9	3.1	6022N	6022NR	6022ZNR	84500	73000	15.5	3800	4500	118	162	185	2	6.4	1.91	6022N
	200	38	2.1	0.5	193.65	5.69	3.5	212.9	3.1	6222N	6222NR	6222ZNR	144000	117000	14.3	3200	3800	122	188	215	2	8.4	4.36	6222N
120	150	16	1	0.5	147.6	2.5	1.9	155.7	1.7	6824N	6824NR	6824ZNR	28300	31500	16.0	4000	4800	125	145	157	1	3.9	0.567	6824N
	165	22	1.1	0.5	161.8	3.7	1.9	171.5	1.7	6924N	6924NR	6924ZNR	53000	54000	16.5	3800	4600	126	159	173	1	5.1	1.15	6924N
	180	28	2	0.5	173.66	3.71	3.5	192.9	3.1	6024N	6024NR	6024ZNR	88000	79500	15.7	3600	4300	128	172	195	2	6.4	2.36	6024N
130	165	18	1.1	0.5	161.8	3.3	1.9	171.5	1.7	6826N	6826NR	6826ZNR	37000	41000	16.1	3700	4400	136	158	173	1	4.7	0.815	6826N
	180	24	1.5	0.5	176.8	3.7	1.9	186.5	1.7	6926N	6926NR	6926ZNR	65000	67000	16.4	3500	4200	137	173	188	1.5	5.1	1.81	6926N
	200	33	2	0.5	193.65	5.69	3.5	212.9	3.1	6026N	6026NR	6026ZNR	106000	101000	15.7	3200	3800	138	192	215	2	8.4	3.60	6026N

Note: (1) Bearing No. ZE means one shield type, two shields type is also available.
Remark: Dimensions of snap ring groove and snap ring are shown on pages 45 to 48.

Angular Contact Ball Bearings

Tolerance ····· Page 52
Preload ····· Page 95

● Design

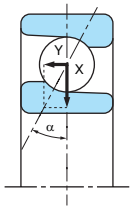
Angular Contact Ball Bearings can sustain combined loads of simultaneously acting radial and axial loads because they have a contact angle (α).

The contact angle is defined as the angle between the line joining the points of contact between the ball and the raceways in the radial plane.

1. Single-row Angular Contact Ball Bearings

These bearings are designed with three contact angle classifications as shown in Table 1.
Normally, contact angle A design and B design are fitted with a cage as shown in Table 2-1. High precision (JIS/ISO class 5 or higher) may be fitted with a machined cage of bronze or phenolic resin or a polyamide cage.
Contact angle C design are generally applied high precision, JIS (ISO) class 5 or higher, and are fitted with a machined phenolic resin cage or a polyamide cage.

Table 1. Contact Angle and Characteristics of Single-row Angular Contact Ball Bearings

Contact Angle Symbol	Example Bearing No.	Contact Angle (α)	Speed	Load capability comparison(2)		Cross section
				Radial Load Direction (X)	Axial Load Direction (Y)	
A	7205(1)	30°	—	—	—	
B	7205B	40°	Less	Less	Greater	
C	7205C	15°	Greater	Greater	Less	

Notes: (1) Contact angle symbol "A" is omitted.
(2) Axial load can be accommodated in one direction only.

Table 2-1. Angular Contact Ball Bearing Cage for Contact Angle Symbol A and B (For JIS/ISO class 0 or 6)

	Applicable Bore Diameter Number	
	Pressed Steel	Machined Brass
72, 72B	00～22	24～40
73, 73B	00～19	20～40

Table 2-2. Angular Contact Ball Bearing Cage for Contact Angle Symbol C

	Applicable Bore Diameter Number	
	Machined Synthetic Resin	Polyamide
70C	00～40	00～20
72C	00～26	00～20
73C	00～22	—

2. Combination Angular Contact Ball Bearings

Single-row Angular Contact Ball Bearings are seldom used as a single unit. Normally they are used as a combination of two and more units. High precision paired combination Angular Contact Ball Bearings (JIS/ISO class 5 or higher) are used for applications such as machine tool spindles and are usually preloaded. Three types of combinations are available:

1) DB, back - to - back
2) DF, face - to - face
3) DT, tandem

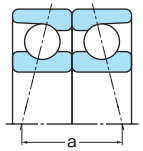
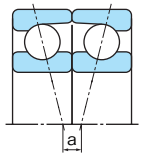
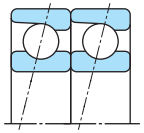
Because clearance of matched set parts is adjusted before shipment, care should be taken to prevent mixing of parts from other sets.

Load-carrying capability of combined Angular Contact Bearings are shown in Table 3.

Flush ground bearings or Universal matching bearings are also available.

DU can be mounted as back-to-back, face-to-face or in tandem.

Table 3. Load-carrying Characteristics of Combination Angular Contact Ball Bearings

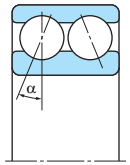
Configuration	Load Center Distance (a)	Load Capability	Moment Load Rigidity	Cross Section
Back - to -Back (DB)	Long	↑ ↑	Greater	
Face - to -Face (DF)	Short	↓ ↓	Less	
Tandem (DT)	—	→ ↑	—	

3. Double-row Angular Contact Ball Bearings

This type bearings is made in two contact angle levels as shown in Table 4. They are selected according to sustained axial and moment load. Pressed steel cage are used for them. Some sizes of Double-row Angular Contact Ball Bearing are available with contact seals (2NS) or shields (ZZ).

Table 4. Double-row Angular Contact Ball Bearing Contact Angles and Symbols

Contact Angle Symbol	Contact Angle (α)	Example Bearing No.
None	20°	5205
A	30°	5205A



● Flush ground set combinations (Universal matching)

NACHI Angular Contact Ball Bearings with a suffix U are flush ground to permit the use of random combinations where two or more bearings are mounted.

7206B U

7206CY U P4

U — Flush ground (free set matching)

● Speed Limits

With respect to single-row or combination bearings, the dimension tables show limiting speed for bearings made with machined cages or a polyamide cages. For bearings made with pressed-cages, multiply the table limit by 0.8.

For contact angle C design bearings, the table limiting speeds are applied to high precision bearings of class 5 or higher.

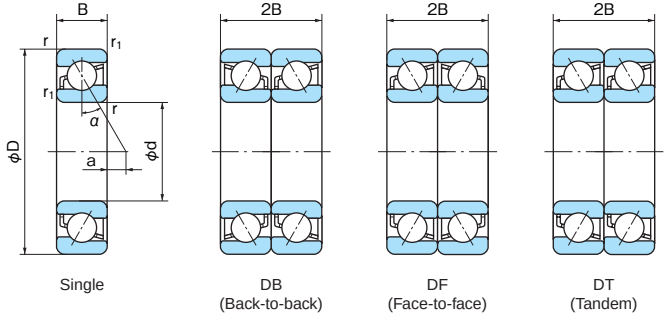
These limiting speeds can be applied when a high quality grease or oil is supplied in proper quantity under light load conditions. When Angular Contact Ball Bearings are used in combination of two or more units, or with larger preload to improve rigidity, the limiting speed must be decreased. Please contact NACHI for design assistance.

● Attention

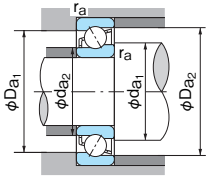
(1) If bearings are operated under severe conditions such as close to limiting speed, high temperature, or vibrating load, please consult NACHI.
(2) Bearings with polyamide cage should be use at less than 120°C.
(3) Combination Angular Contact Ball Bearings should not be mixed with those of other bearings.
(4) When combination bearings with a optional preload is required, please contact NACHI.

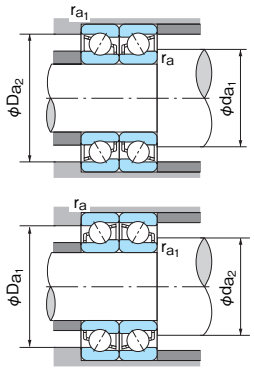
Angular Contact Ball Bearings Single Mounting / Duplex Mounting

Bore Diameter: 10～17mm



Single | DB (Back-to-back) | DF (Face-to-face) | DT (Tandem)





■Dynamic equivalent radial load

Pr＝XFr＋YFa

Contact angle	iFa/Cor	e	Single or DT: Fa/Fr > e		DB or DF: Fa/Fr ≦ e		DB or DF: Fa/Fr > e	
			X	Y	X	Y	X	Y
15°	0.015	0.38		1.47		1.65		2.39
	0.029	0.40	0.44	1.40	1	1.57	0.72	2.28
	0.058	0.43		1.30		1.46		2.11
	0.087	0.46		1.23		1.38		2.00
	0.12	0.47	0.44	1.19	1	1.34	0.72	1.93
	0.17	0.50		1.12		1.26		1.82
	0.29	0.55		1.02		1.14		1.66
	0.44	0.56	0.44	1.00	1	1.12	0.72	1.63
	0.58	0.56		1.00		1.12		1.63
30°	—	0.8	0.39	0.76	1	0.78	0.63	1.24
40°	—	1.14	0.35	0.57	1	0.55	0.57	0.93

■Static equivalent radial load

Por＝XoFr＋YoFa

Contact angle	Single or DT: X0	Single or DT: Y0	DB or DF: X0	DB or DF: Y0
15°	0.5	0.46	1	0.92
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

Single or DT mounting When Por＜Fr, use Pr = Fr

■i = 2 for DB or DF mounting
i = 1 for Single or DT mounting

■Single or DT mounting When Fa/Fr≦e, use Pr = Fr

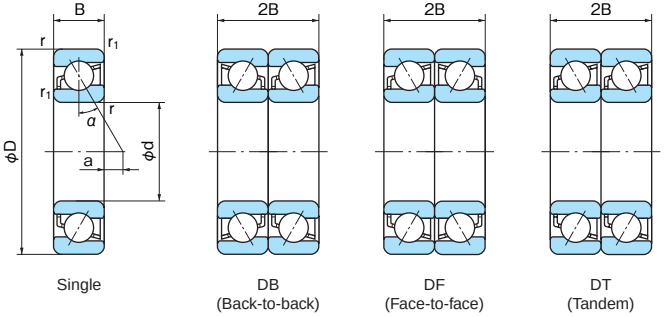
1N=0.102kgf

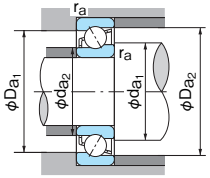
Boundary dimensions (mm) d	D	B	r (min)	r1 (min)	Load center (mm) a	Bearing No. Single	Duplex			Basic dynamic load rating Cr (N) Single	Duplex	Basic static load rating Cor (N) Single	Duplex	Limiting speed (min-1) Grease lubrication Single	Grease lubrication Duplex	Oil lubrication Single	Oil lubrication Duplex	Abutment and fillet dimensions (mm) da1 (min)	da2 (min)	Da1 (max)	Da2 (max)	ra (max)	ra1 (max)	Mass (kg) Single	Bearing No.
10	26	8	0.3	0.15	1.2	7000	7000DB	7000DF	7000DT	5000	8150	2340	4650	23000	19000	31000	26000	12	12	24	25	0.3	0.15	0.022	7000
	26	8	0.3	0.15	–1.9	7000C	7000CDB	7000CDF	7000CDT	5350	8700	2500	5000	44000	35000	61000	49000	12	12	24	25	0.3	0.15	0.022	7000C
	30	9	0.6	0.3	1.3	7200	7200DB	7200DF	7200DT	5400	8800	2710	5400	22000	18000	30000	24000	15	12	25	27.4	0.6	0.3	0.034	7200
	30	9	0.6	0.3	3.9	7200B	7200BDB	7200BDF	7200BDT	5150	8350	2570	5150	19000	16000	28000	22000	15	12	25	27.4	0.6	0.3	0.034	7200B
	30	9	0.6	0.3	–2.2	7200C	7200CDB	7200CDF	7200CDT	6950	11300	3300	6650	40000	32000	55000	44000	15	15	25	27.4	0.6	0.3	0.034	7200C
	35	11	0.6	0.3	1.0	7300	7300DB	7300DF	7300DT	9300	15100	4300	8600	20000	16000	26000	21000	15	12	30	32.4	0.6	0.3	0.055	7300
	35	11	0.6	0.3	3.9	7300B	7300BDB	7300BDF	7300BDT	8950	14500	4150	8250	18000	14000	24000	19000	15	12	30	32.4	0.6	0.3	0.055	7300B
	35	11	0.6	0.3	–2.8	7300C	7300CDB	7300CDF	7300CDT	9850	16000	4600	9250	36000	29000	49000	39000	15	15	30	32.4	0.6	0.3	0.055	7300C
12	28	8	0.3	0.15	1.7	7001	7001DB	7001DF	7001DT	5050	8800	2710	5700	22000	18000	29000	23000	14	14	26	27	0.3	0.15	0.024	7001
	28	8	0.3	0.15	–1.7	7001C	7001CDB	7001CDF	7001CDT	5800	9450	2910	5800	40000	32000	55000	44000	14	14	26	27	0.3	0.15	0.024	7001C
	32	10	0.6	0.3	1.4	7201	7201DB	7201DF	7201DT	7600	12400	3960	7950	20000	16000	27000	22000	17	14	27	29.4	0.6	0.3	0.040	7201
	32	10	0.6	0.3	4.2	7201B	7201BDB	7201BDF	7201BDT	7200	11700	3800	7550	17000	15000	24000	20000	17	14	27	29.4	0.6	0.3	0.040	7201B
	32	10	0.6	0.3	–2.5	7201C	7201CDB	7201CDF	7201CDT	7950	13000	3900	7750	36000	29000	50000	40000	17	17	27	29.4	0.6	0.3	0.040	7201C
	37	12	1	0.6	1.1	7301	7301DB	7301DF	7301DT	11200	18200	5250	10500	18000	15000	24000	20000	18	15	31	33.4	1	0.6	0.063	7301
	37	12	1	0.6	4.3	7301B	7301BDB	7301BDF	7301BDT	10800	17500	5050	10100	16000	13000	22000	18000	18	15	31	33.4	1	0.6	0.063	7301B
	37	12	1	0.6	–3.1	7301C	7301CDB	7301CDF	7301CDT	10800	17500	4900	9800	33000	26000	45000	36000	18	18	31	33.4	1	0.6	0.063	7301C
15	32	9	0.3	0.15	2.3	7002	7002DB	7002DF	7002DT	6150	9950	3400	6850	18000	15000	24000	20000	17	17	30	31	0.3	0.15	0.035	7002
	32	9	0.3	0.15	–1.8	7002C	7002CDB	7002CDF	7002CDT	6650	10800	3700	7450	34000	27000	47000	38000	17	17	30	31	0.3	0.15	0.035	7002C
	35	11	0.6	0.3	1.7	7202	7202DB	7202DF	7202DT	9050	14700	4700	9400	17000	14000	23000	19000	20	17	30	32.4	0.6	0.3	0.048	7202
	35	11	0.6	0.3	5.0	7202B	7202BDB	7202BDF	7202BDT	8600	14000	4500	8950	16000	12000	21000	17000	20	17	30	32.4	0.6	0.3	0.048	7202B
	35	11	0.6	0.3	–2.6	7202C	7202CDB	7202CDF	7202CDT	8700	14200	4550	9150	32000	26000	44000	35000	20	20	30	32.4	0.6	0.3	0.048	7202C
	42	13	1	0.6	1.7	7302	7302DB	7302DF	7302DT	13600	22000	7100	14200	16000	13000	21000	17000	21	18	36	38.4	1	0.6	0.085	7302
	42	13	1	0.6	5.5	7302B	7302BDB	7302BDF	7302BDT	12800	21000	6750	13500	14000	11000	19000	16000	21	18	36	38.4	1	0.6	0.085	7302B
	42	13	1	0.6	–3.1	7302C	7302CDB	7302CDF	7302CDT	13300	21700	6850	13700	28000	22000	39000	31000	21	21	36	38.4	1	0.6	0.085	7302C
17	35	10	0.3	0.15	2.5	7003	7003DB	7003DF	7003DT	6400	10400	3800	7650	17000	13000	22000	18000	19	19	33	34	0.3	0.15	0.045	7003
	35	10	0.3	0.15	–2.0	7003C	7003CDB	7003CDF	7003CDT	7000	11400	4150	8300	31000	25000	42000	34000	19	19	33	34	0.3	0.15	0.045	7003C
	40	12	0.6	0.3	2.2	7203	7203DB	7203DF	7203DT	11900	19400	6600	13200	16000	13000	21000	17000	22	19	35	37.4	0.6	0.3	0.070	7203
	40	12	0.6	0.3	6.0	7203B	7203BDB	7203BDF	7203BDT	11300	18400	6300	12600	14000	11000	19000	15000	22	19	35	37.4	0.6	0.3	0.070	7203B
	40	12	0.6	0.3	–2.7	7203C	7203CDB	7203CDF	7203CDT	10900	17800	5900	11800	28000	22000	39000	31000	22	22	35	37.4	0.6	0.3	0.070	7203C
	47	14	1	0.6	2.2	7303	7303DB	7303DF	7303DT	15900	25900	8650	17300	14000	11000	19000	15000	23	21	41	43.4	1	0.6	0.120	7303
	47	14	1	0.6	6.4	7303B	7303BDB	7303BDF	7303BDT	15200	24700	8250	16500	13000	10000	17000	14000	23	21	41	43.4	1	0.6	0.120	7303B
	47	14	1	0.6	–3.2	7303C	7303CDB	7303CDF	7303CDT	15900	25800	8350	16700	25000	20000	34000	27000	23	23	41	43.4	1	0.6	0.120	7303C

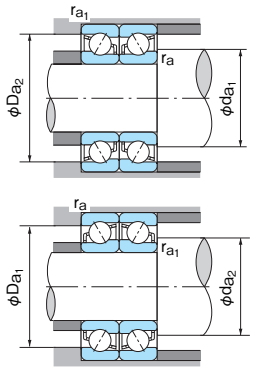
Remarks: 1. “a” means the distance between back face and load center.
2. See page 122 regarding limiting speeds.

Angular Contact Ball Bearings Single Mounting / Duplex Mounting

Bore Diameter: 20～35mm







■Dynamic equivalent radial load

Pr＝XFr＋YFa

Contact angle	iFa/Cor	e	Single or DT: Fa/Fr > e X	Single or DT: Fa/Fr > e Y	DB or DF: Fa/Fr ≦ e X	DB or DF: Fa/Fr ≦ e Y	DB or DF: Fa/Fr > e X	DB or DF: Fa/Fr > e Y
15°	0.015	0.38		1.47		1.65		2.39
	0.029	0.40	0.44	1.40	1	1.57	0.72	2.28
	0.058	0.43		1.30		1.46		2.11
	0.087	0.46		1.23		1.38		2.00
	0.12	0.47	0.44	1.19	1	1.34	0.72	1.93
	0.17	0.50		1.12		1.26		1.82
	0.29	0.55		1.02		1.14		1.66
	0.44	0.56	0.44	1.00	1	1.12	0.72	1.63
	0.58	0.56		1.00		1.12		1.63
30°	—	0.8	0.39	0.76	1	0.78	0.63	1.24
40°	—	1.14	0.35	0.57	1	0.55	0.57	0.93

■i = 2 for DB or DF mounting
i = 1 for Single or DT mounting

■Single or DT mounting When Fa/Fr≦e, use Pr = Fr

■Static equivalent radial load

Por＝XoFr＋YoFa

Contact angle	Single or DT: X0	Single or DT: Y0	DB or DF: X0	DB or DF: Y0
15°	0.5	0.46	1	0.92
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

Single or DT mounting When Por＜Fr, use Pr = Fr

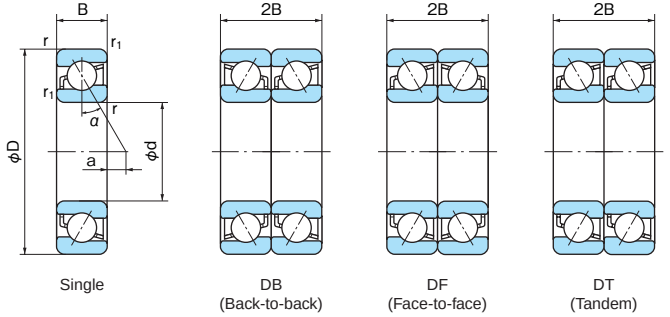
1N=0.102kgf

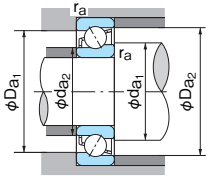
Boundary dimensions (mm) d	D	B	r (min)	r1 (min)	Load center (mm) a	Bearing No. Single	Duplex			Basic dynamic load rating Cr (N) Single	Duplex	Basic static load rating Cor (N) Single	Duplex	Limiting speed (min-1) Grease lubrication Single	Grease lubrication Duplex	Oil lubrication Single	Oil lubrication Duplex	Abutment and fillet dimensions (mm) da1 (min)	da2 (min)	Da1 (max)	Da2 (max)	ra (max)	ra1 (max)	Mass (kg) Single	Bearing No.
20	42	12	0.6	0.3	2.9	7004	7004DB	7004DF	7004DT	10300	16700	6050	12100	15000	12000	20000	16000	24	24	38	40	0.6	0.3	0.079	7004
	42	12	0.6	0.3	–2.4	7004C	7004CDB	7004CDF	7004CDT	11200	18200	6600	13200	26000	21000	35000	28000	24	24	38	40	0.6	0.3	0.079	7004C
	47	14	1	0.6	2.7	7204	7204DB	7204DF	7204DT	14500	23500	8300	16600	13000	10000	18000	14000	26	23	41	43.4	1	0.6	0.110	7204
	47	14	1	0.6	7.1	7204B	7204BDB	7204BDF	7204BDT	13700	22300	7850	15700	11000	9500	16000	13000	26	23	41	43.4	1	0.6	0.110	7204B
	47	14	1	0.6	–3.1	7204C	7204CDB	7204CDF	7204CDT	14700	23800	8150	16300	24000	19000	33000	26000	26	26	41	43.4	1	0.6	0.110	7204C
	52	15	1.1	0.6	2.9	7304	7304DB	7304DF	7304DT	18700	30500	10400	20800	13000	10000	17000	13000	27	25	45	47	1	0.6	0.150	7304
	52	15	1.1	0.6	7.6	7304B	7304BDB	7304BDF	7304BDT	17800	28900	9900	19800	10000	9000	15000	12000	27	25	45	47	1	0.6	0.150	7304B
	52	15	1.1	0.6	–3.2	7304C	7304CDB	7304CDF	7304CDT	18600	30000	10000	20000	22000	18000	31000	25000	27	27	45	47	1	0.6	0.150	7304C
25	47	12	0.6	0.3	4.4	7005	7005DB	7005DF	7005DT	11300	18400	7400	14800	13000	10000	17000	13000	29	29	43	45	0.6	0.3	0.091	7005
	47	12	0.6	0.3	–1.8	7005C	7005CDB	7005CDF	7005CDT	12900	21000	8650	17300	22000	18000	31000	25000	29	29	43	45	0.6	0.3	0.091	7005C
	52	15	1	0.6	3.6	7205	7205DB	7205DF	7205DT	16200	26300	10200	20500	12000	9500	15000	12000	31	28	46	48.4	1	0.6	0.135	7205
	52	15	1	0.6	8.9	7205B	7205BDB	7205BDF	7205BDT	15300	24800	9700	19400	9500	8000	14000	11000	31	28	46	48.4	1	0.6	0.135	7205B
	52	15	1	0.6	–3.1	7205C	7205CDB	7205CDF	7205CDT	16700	27100	10300	20700	21000	17000	29000	23000	31	31	46	48.4	1	0.6	0.135	7205C
	62	17	1.1	0.6	4.1	7305	7305DB	7305DF	7305DT	26400	43000	15800	31500	10000	8500	14000	11000	32	30	55	57	1	0.6	0.245	7305
	62	17	1.1	0.6	9.8	7305B	7305BDB	7305BDF	7305BDT	25100	40500	15100	30000	8500	7300	12000	10000	32	30	55	57	1	0.6	0.245	7305B
	62	17	1.1	0.6	–3.4	7305C	7305CDB	7305CDF	7305CDT	26600	43000	15500	31000	18000	14000	25000	20000	32	32	55	57	1	0.6	0.245	7305C
30	55	13	1	0.6	5.8	7006	7006DB	7006DF	7006DT	14500	23600	10100	20300	12000	8500	14000	11000	35	35	50	52	1	0.6	0.135	7006
	55	13	1	0.6	–1.6	7006C	7006CDB	7006CDF	7006CDT	16000	25900	11100	24000	19000	15000	26000	21000	35	35	50	52	1	0.6	0.135	7006C
	62	16	1	0.6	5.3	7206	7206DB	7206DF	7206DT	22500	36500	14800	29600	10000	8000	13000	10000	36	33	56	58.4	1	0.6	0.210	7206
	62	16	1	0.6	11.3	7206B	7206BDB	7206BDF	7206BDT	21200	34500	13900	27900	8500	7000	12000	9500	36	33	56	58.4	1	0.6	0.210	7206B
	62	16	1	0.6	–2.7	7206C	7206CDB	7206CDF	7206CDT	23200	37500	14900	29700	18000	14000	24000	19000	36	36	56	58.4	1	0.6	0.210	7206C
	72	19	1.1	0.6	5.2	7306	7306DB	7306DF	7306DT	33500	54500	22400	44500	9000	7000	12000	9500	37	35	65	67	1	0.6	0.360	7306
	72	19	1.1	0.6	11.9	7306B	7306BDB	7306BDF	7306BDT	32000	52000	21000	42000	7500	6100	10000	8500	37	35	65	67	1	0.6	0.360	7306B
	72	19	1.1	0.6	–3.6	7306C	7306CDB	7306CDF	7306CDT	32500	52500	20400	40500	16000	13000	22000	18000	37	37	65	67	1	0.6	0.360	7306C
35	62	14	1	0.6	7	7007	7007DB	7007DF	7007DT	17500	28500	12600	25200	9500	7500	13000	10000	40	40	57	59	1	0.6	0.170	7007
	62	14	1	0.6	–1.4	7007C	7007CDB	7007CDF	7007CDT	19300	31000	13700	27500	16000	13000	23000	18000	40	40	57	59	1	0.6	0.170	7007C
	72	17	1.1	0.6	6.9	7207	7207DB	7207DF	7207DT	29700	48000	20000	40000	8500	7000	11000	9500	42	40	65	67	1	0.6	0.295	7207
	72	17	1.1	0.6	14.1	7207B	7207BDB	7207BDF	7207BDT	28000	45500	19000	38000	7500	6000	10000	8000	42	40	65	67	1	0.6	0.295	7207B
	72	17	1.1	0.6	–2.8	7207C	7207CDB	7207CDF	7207CDT	30500	49500	20100	40000	15000	12000	21000	17000	42	42	65	67	1	0.6	0.295	7207C
	80	21	1.5	1	6.1	7307	7307DB	7307DF	7307DT	40000	65000	26300	52500	8000	6300	10000	8500	44	40	71	74.6	1.5	1	0.475	7307
	80	21	1.5	1	13.7	7307B	7307BDB	7307BDF	7307BDT	37500	61500	24900	49500	7000	5500	9500	7500	44	40	71	74.6	1.5	1	0.475	7307B
	80	21	1.5	1	–3.9	7307C	7307CDB	7307CDF	7307CDT	40500	66000	26000	52000	14000	11000	19000	15000	44	44	71	74.6	1.5	1	0.475	7307C

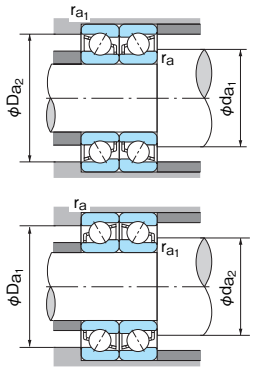
Remarks: 1. “a” means the distance between back face and load center.
2. See page 122 regarding limiting speeds.

Angular Contact Ball Bearings Single Mounting / Duplex Mounting

Bore Diameter: 40～55mm







■Dynamic equivalent radial load

Pr＝XFr＋YFa

Contact angle	iFa/Cor	e	Single or DT: Fa/Fr > e		DB or DF: Fa/Fr ≦ e		DB or DF: Fa/Fr > e	
			X	Y	X	Y	X	Y
15°	0.015	0.38		1.47		1.65		2.39
	0.029	0.40	0.44	1.40	1	1.57	0.72	2.28
	0.058	0.43		1.30		1.46		2.11
	0.087	0.46		1.23		1.38		2.00
	0.12	0.47	0.44	1.19	1	1.34	0.72	1.93
	0.17	0.50		1.12		1.26		1.82
	0.29	0.55		1.02		1.14		1.66
	0.44	0.56	0.44	1.00	1	1.12	0.72	1.63
	0.58	0.56		1.00		1.12		1.63
30°	—	0.8	0.39	0.76	1	0.78	0.63	1.24
40°	—	1.14	0.35	0.57	1	0.55	0.57	0.93

■Static equivalent radial load

Por＝XoFr＋YoFa

Contact angle	Single or DT: X0	Single or DT: Y0	DB or DF: X0	DB or DF: Y0
15°	0.5	0.46	1	0.92
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

Single or DT mounting When Por＜Fr, use Pr = Fr

■i = 2 for DB or DF mounting
i = 1 for Single or DT mounting

■Single or DT mounting When Fa/Fr≦e, use Pr = Fr

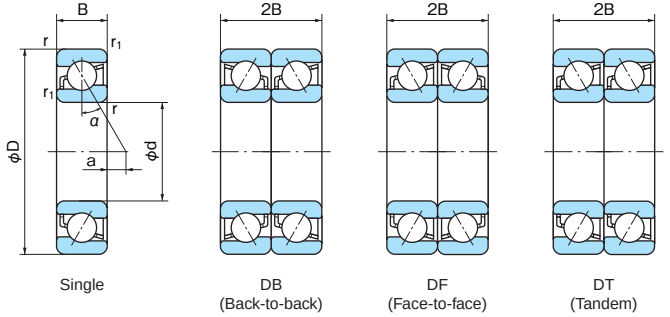
1N=0.102kgf

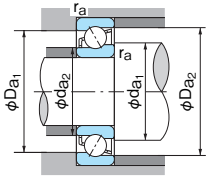
Boundary dimensions (mm) d	D	B	r (min)	r1 (min)	Load center (mm) a	Bearing No. Single	Duplex			Basic dynamic load rating Cr (N) Single	Duplex	Basic static load rating Cor (N) Single	Duplex	Limiting speed (min-1) Grease lubrication Single	Grease lubrication Duplex	Oil lubrication Single	Oil lubrication Duplex	Abutment and fillet dimensions (mm) da1 (min)	da2 (min)	Da1 (max)	Da2 (max)	ra (max)	ra1 (max)	Mass (kg) Single	Bearing No.
40	68	15	1	0.6	8.2	7008	7008DB	7008DF	7008DT	18800	30500	14500	29000	8500	6600	11000	9000	45	45	63	65	1	0.6	0.210	7008
	68	15	1	0.6	–1.3	7008C	7008CDB	7008CDF	7008CDT	20700	33500	16000	32000	15000	12000	20000	16000	45	45	63	65	1	0.6	0.210	7008C
	80	18	1.1	0.6	8.3	7208	7208DB	7208DF	7208DT	35000	57500	25200	50500	7500	6000	10000	8000	47	45	73	75	1	0.6	0.380	7208
	80	18	1.1	0.6	16.2	7208B	7208BDB	7208BDF	7208BDT	33000	54000	23700	47500	6700	5300	9200	7200	47	45	73	75	1	0.6	0.380	7208B
	80	18	1.1	0.6	–2.1	7208C	7208CDB	7208CDF	7208CDT	36500	59500	25400	50500	13000	10000	18000	14000	47	47	73	75	1	0.6	0.380	7208C
	90	23	1.5	1	7.3	7308	7308DB	7308DF	7308DT	49000	79000	33000	66000	7000	5500	9200	7500	49	45	81	84.6	1.5	1	0.655	7308
	90	23	1.5	1	15.8	7308B	7308BDB	7308BDF	7308BDT	46000	75000	31000	62500	6300	5000	8500	6700	49	45	81	84.6	1.5	1	0.655	7308B
	90	23	1.5	1	–4.0	7308C	7308CDB	7308CDF	7308CDT	49500	80500	32500	65500	12000	9600	17000	13000	49	49	81	84.6	1.5	1	0.655	7308C
45	75	16	1	0.6	9.3	7009	7009DB	7009DF	7009DT	22200	36000	17600	35000	7500	6000	10000	8000	50	50	70	72	1	0.6	0.265	7009
	75	16	1	0.6	–1.1	7009C	7009CDB	7009CDF	7009CDT	24600	40000	19400	39000	13000	10000	18000	14000	50	50	70	72	1	0.6	0.265	7009C
	85	19	1.1	0.6	9.3	7209	7209DB	7209DF	7209DT	39500	64500	28800	57500	7000	5500	9200	7500	52	50	78	80	1	0.6	0.430	7209
	85	19	1.1	0.6	17.8	7209B	7209BDB	7209BDF	7209BDT	37000	60500	27100	54000	6300	5000	8500	6700	52	50	78	80	1	0.6	0.430	7209B
	85	19	1.1	0.6	–2.0	7209C	7209CDB	7209CDF	7209CDT	41000	66500	29000	58000	12000	9600	17000	13000	52	52	78	80	1	0.6	0.430	7209C
	100	25	1.5	1	8.4	7309	7309DB	7309DF	7309DT	63500	103000	43500	87000	6300	5000	8500	6700	54	50	91	94.6	1.5	1	0.875	7309
	100	25	1.5	1	18.0	7309B	7309BDB	7309BDF	7309BDT	60000	97500	41500	82500	5600	4500	7500	6000	54	50	91	94.6	1.5	1	0.875	7309B
	100	25	1.5	1	–4.1	7309C	7309CDB	7309CDF	7309CDT	63500	103000	43500	87000	11000	8800	15000	12000	54	54	91	94.6	1.5	1	0.875	7309C
50	80	16	1	0.6	10.8	7010	7010DB	7010DF	7010DT	23600	38500	20000	40000	7000	5500	9200	7500	55	55	75	77	1	0.6	0.285	7010
	80	16	1	0.6	–0.5	7010C	7010CDB	7010CDF	7010CDT	26200	42500	22000	44000	12000	9600	17000	13000	55	55	75	77	1	0.6	0.285	7010C
	90	20	1.1	0.6	10.2	7210	7210DB	7210DF	7210DT	41000	67000	31500	63000	6300	5300	8500	6700	57	55	83	85	1	0.6	0.485	7210
	90	20	1.1	0.6	19.4	7210B	7210BDB	7210BDF	7210BDT	38500	63000	29600	59000	5600	4500	7500	6000	57	55	83	85	1	0.6	0.485	7210B
	90	20	1.1	0.6	–1.9	7210C	7210CDB	7210CDF	7210CDT	43000	70000	32000	63500	11000	8800	16000	13000	57	57	83	85	1	0.6	0.485	7210C
	110	27	2	1	9.6	7310	7310DB	7310DF	7310DT	74000	121000	52000	104000	5600	4500	7500	6000	60	56	100	104	2	1	1.14	7310
	110	27	2	1	20.1	7310B	7310BDB	7310BDF	7310BDT	70500	114000	49500	98500	5000	4000	6700	5300	60	56	100	104	2	1	1.14	7310B
	110	27	2	1	–4.3	7310C	7310CDB	7310CDF	7310CDT	75500	122000	51000	102000	10000	8000	14000	11000	60	60	100	104	2	1	1.14	7310C
55	90	18	1.1	0.6	11.9	7011	7011DB	7011DF	7011DT	31000	50500	26200	52500	6300	5000	8500	6700	61	61	84	86	1	0.6	0.420	7011
	90	18	1.1	0.6	–0.6	7011C	7011CDB	7011CDF	7011CDT	34500	56000	28800	57500	11000	8800	15000	12000	61	61	84	86	1	0.6	0.420	7011C
	100	21	1.5	1	11.9	7211	7211DB	7211DF	7211DT	51000	83000	39500	79000	6000	4500	7500	6300	64	60	91	94.6	1.5	1	0.635	7211
	100	21	1.5	1	22.1	7211B	7211BDB	7211BDF	7211BDT	48000	78000	37500	74500	5300	4000	7000	5500	64	60	91	94.6	1.5	1	0.635	7211B
	100	21	1.5	1	–1.6	7211C	7211CDB	7211CDF	7211CDT	53000	86500	40000	80000	10000	8000	14000	11000	64	64	91	94.6	1.5	1	0.635	7211C
	120	29	2	1	10.8	7311	7311DB	7311DF	7311DT	85500	139000	61500	123000	5000	4000	7000	5500	65	61	110	114	2	1	1.45	7311
	120	29	2	1	22.3	7311B	7311BDB	7311BDF	7311BDT	81000	132000	58000	116000	4500	3500	6200	5000	65	61	110	114	2	1	1.45	7311B
	120	29	2	1	–4.4	7311C	7311CDB	7311CDF	7311CDT	87000	142000	60000	121000	9100	7300	13000	10000	65	65	110	114	2	1	1.45	7311C

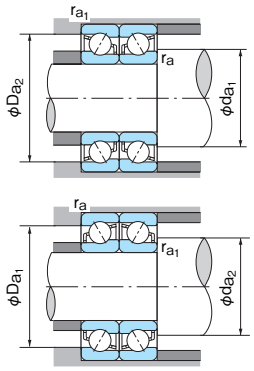
Remarks: 1. “a” means the distance between back face and load center.
2. See page 122 regarding limiting speeds.

Angular Contact Ball Bearings Single Mounting / Duplex Mounting

Bore Diameter: 60～75mm







■Dynamic equivalent radial load

Pr＝XFr＋YFa

Contact angle	iFa/Cor	e	Single or DT Fa/Fr ＞ e X	Single or DT Fa/Fr ＞ e Y	DB or DF Fa/Fr ≦ e X	DB or DF Fa/Fr ≦ e Y	DB or DF Fa/Fr ＞ e X	DB or DF Fa/Fr ＞ e Y
15°	0.015	0.38		1.47		1.65		2.39
	0.029	0.40	0.44	1.40	1	1.57	0.72	2.28
	0.058	0.43		1.30		1.46		2.11
	0.087	0.46		1.23		1.38		2.00
	0.12	0.47	0.44	1.19	1	1.34	0.72	1.93
	0.17	0.50		1.12		1.26		1.82
	0.29	0.55		1.02		1.14		1.66
	0.44	0.56	0.44	1.00	1	1.12	0.72	1.63
	0.58	0.56		1.00		1.12		1.63
30°	—	0.8	0.39	0.76	1	0.78	0.63	1.24
40°	—	1.14	0.35	0.57	1	0.55	0.57	0.93

■i = 2 for DB or DF mounting
i = 1 for Single or DT mounting

■Single or DT mounting When Fa/Fr≦e, use Pr = Fr

■Static equivalent radial load

Por＝XoFr＋YoFa

Contact angle	Single or DT X0	Single or DT Y0	DB or DF X0	DB or DF Y0
15°	0.5	0.46	1	0.92
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

Single or DT mounting When Por＜Fr, use Pr = Fr

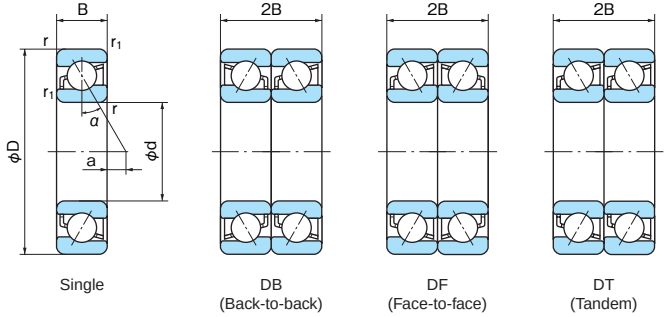
1N=0.102kgf

Boundary dimensions (mm) d	D	B	r (min)	r1 (min)	Load center (mm) a	Bearing No. Single	Duplex			Basic dynamic load rating Cr (N) Single	Duplex	Basic static load rating Cor (N) Single	Duplex	Limiting speed (min-1) Grease lubrication Single	Grease lubrication Duplex	Oil lubrication Single	Oil lubrication Duplex	Abutment and fillet dimensions (mm) da1 (min)	da2 (min)	Da1 (max)	Da2 (max)	ra (max)	ra1 (max)	Mass (kg) Single	Bearing No.
60	95	18	1.1	0.6	13.4	7012	7012DB	7012DF	7012DT	32000	51500	28000	56000	6000	4500	7600	6200	66	66	89	91	1	0.6	0.450	7012
	95	18	1.1	0.6	–0.1	7012C	7012CDB	7012CDF	7012CDT	35500	57500	30500	61500	10000	8000	14000	11000	66	66	89	91	1	0.6	0.450	7012C
	110	22	1.5	1	13.5	7212	7212DB	7212DF	7212DT	62000	100000	48500	97500	5300	4300	7100	5600	69	65	101	104.6	1.5	1	0.820	7212
	110	22	1.5	1	24.7	7212B	7212BDB	7212BDF	7212BDT	58000	94000	46000	92000	4800	3800	6300	5000	69	65	101	104.6	1.5	1	0.820	7212B
	110	22	1.5	1	–1.2	7212C	7212CDB	7212CDF	7212CDT	64500	105000	49500	98500	9400	7500	13000	10000	69	69	101	104.6	1.5	1	0.820	7212C
	130	31	2.1	1.1	11.9	7312	7312DB	7312DF	7312DT	98000	159000	71500	148000	4800	3800	6300	5000	72	67	118	123	2	1	1.81	7312
	130	31	2.1	1.1	24.4	7312B	7312BDB	7312BDF	7312BDT	92500	151000	67500	135000	4300	3400	5500	4500	72	67	118	123	2	1	1.81	7312B
	130	31	2.1	1.1	–4.5	7312C	7312CDB	7312CDF	7312CDT	99500	162000	70000	140000	8400	6700	12000	9600	72	72	118	123	2	1	1.81	7312C
65	100	18	1.1	0.6	14.8	7013	7013DB	7013DF	7013DT	33500	54500	31000	62500	5600	4300	7100	6000	71	71	94	96	1	0.6	0.470	7013
	100	18	1.1	0.6	0.5	7013C	7013CDB	7013CDF	7013CDT	37500	60500	34500	69000	9700	7800	13000	10000	71	71	94	96	1	0.6	0.470	7013C
	120	23	1.5	1	15.2	7213	7213DB	7213DF	7213DT	70000	114000	57800	116000	4900	3900	6500	5300	74	70	111	114.6	1.5	1	1.02	7213
	120	23	1.5	1	27.4	7213B	7213BDB	7213BDF	7213BDT	66000	107000	54500	109000	4300	3400	5600	4600	74	70	111	114.6	1.5	1	1.02	7213B
	120	23	1.5	1	–0.8	7213C	7213CDB	7213CDF	7213CDT	73500	120000	59000	118000	8600	6900	12000	9600	74	74	111	114.6	1.5	1	1.02	7213C
	140	33	2.1	1.1	13.1	7313	7313DB	7313DF	7313DT	111000	180000	82000	165000	4400	3600	5800	4700	77	72	128	133	2	1	2.22	7313
	140	33	2.1	1.1	26.6	7313B	7313BDB	7313BDF	7313BDT	105000	170000	77500	155000	4000	3200	5300	4200	77	72	128	133	2	1	2.22	7313B
	140	33	2.1	1.1	–4.7	7313C	7313CDB	7313CDF	7313CDT	113000	183000	81000	162000	7800	6200	11000	8800	77	77	128	133	2	1	2.22	7313C
70	110	20	1.1	0.6	16.0	7014	7014DB	7014DF	7014DT	42500	69000	39500	78500	5000	4000	6600	5300	76	76	104	106	1	0.6	0.660	7014
	110	20	1.1	0.6	0.4	7014C	7014CDB	7014CDF	7014CDT	47000	76500	43000	86500	8900	7100	12000	9600	76	76	104	106	1	0.6	0.660	7014C
	125	24	1.5	1	16.1	7214	7214DB	7214DF	7214DT	76500	124000	63500	127000	4500	3800	6300	5000	79	75	116	119.6	1.5	1	1.12	7214
	125	24	1.5	1	29.0	7214B	7214BDB	7214BDF	7214BDT	71500	116000	59500	120000	4300	3200	5600	4500	79	75	116	119.6	1.5	1	1.12	7214B
	125	24	1.5	1	–0.7	7214C	7214CDB	7214CDF	7214CDT	80000	130000	65000	130000	8200	6600	11000	8800	79	79	116	119.6	1.5	1	1.12	7214C
	150	35	2.1	1.1	14.3	7314	7314DB	7314DF	7314DT	125000	203000	94000	188000	4000	3200	5300	4300	82	77	138	143	2	1	2.70	7314
	150	35	2.1	1.1	28.7	7314B	7314BDB	7314BDF	7314BDT	118000	191000	88500	177000	3600	2900	4800	3900	82	77	138	143	2	1	2.70	7314B
	150	35	2.1	1.1	–4.8	7314C	7314CDB	7314CDF	7314CDT	127000	206000	92500	185000	7300	5800	10000	8000	82	82	138	143	2	1	2.70	7314C
75	115	20	1.1	0.6	17.4	7015	7015DB	7015DF	7015DT	43500	70500	41500	83000	4800	3800	6300	5000	81	81	109	111	1	0.6	0.695	7015
	115	20	1.1	0.6	1.0	7015C	7015CDB	7015CDF	7015CDT	48500	78500	46000	92000	8400	6700	12000	9600	81	81	109	111	1	0.6	0.695	7015C
	130	25	1.5	1	17.1	7215	7215DB	7215DF	7215DT	79000	129000	68500	137000	4300	3400	5800	4700	84	80	121	124.6	1.5	1	1.23	7215
	130	25	1.5	1	30.6	7215B	7215BDB	7215BDF	7215BDT	74000	120000	64000	128000	4000	3200	5300	4300	84	80	121	124.6	1.5	1	1.23	7215B
	130	25	1.5	1	–0.7	7215C	7215CDB	7215CDF	7215CDT	83500	135000	70000	141000	7800	6200	11000	8800	84	84	121	124.6	1.5	1	1.23	7215C
	160	37	2.1	1.1	15.4	7315	7315DB	7315DF	7315DT	136000	221000	106000	212000	3800	3000	5000	4000	87	82	148	153	2	1	3.15	7315
	160	37	2.1	1.1	30.9	7315B	7315BDB	7315BDF	7315BDT	128000	208000	100000	200000	3400	2700	4500	3600	87	82	148	153	2	1	3.15	7315B
	160	37	2.1	1.1	–4.9	7315C	7315CDB	7315CDF	7315CDT	138000	225000	104000	209000	6800	5400	9400	7500	87	87	148	153	2	1	3.15	7315C

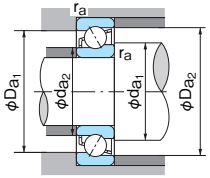
Remarks: 1. “a” means the distance between back face and load center.
2. See page 122 regarding limiting speeds.

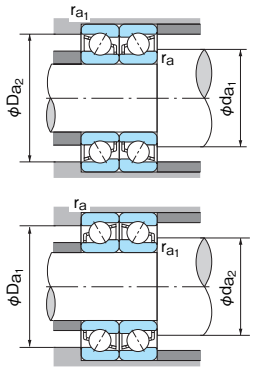
Angular Contact Ball Bearings Single Mounting / Duplex Mounting

Bore Diameter: 80～95mm



Single | DB (Back-to-back) | DF (Face-to-face) | DT (Tandem)





■Dynamic equivalent radial load

Pr＝XFr＋YFa

Contact angle	iFa/Cor	e	Single or DT: Fa/Fr > e X	Single or DT: Fa/Fr > e Y	DB or DF: Fa/Fr ≦ e X	DB or DF: Fa/Fr ≦ e Y	DB or DF: Fa/Fr > e X	DB or DF: Fa/Fr > e Y
15°	0.015	0.38		1.47		1.65		2.39
	0.029	0.40	0.44	1.40	1	1.57	0.72	2.28
	0.058	0.43		1.30		1.46		2.11
	0.087	0.46		1.23		1.38		2.00
	0.12	0.47	0.44	1.19	1	1.34	0.72	1.93
	0.17	0.50		1.12		1.26		1.82
	0.29	0.55		1.02		1.14		1.66
	0.44	0.56	0.44	1.00	1	1.12	0.72	1.63
	0.58	0.56		1.00		1.12		1.63
30°	—	0.8	0.39	0.76	1	0.78	0.63	1.24
40°	—	1.14	0.35	0.57	1	0.55	0.57	0.93

■i = 2 for DB or DF mounting
i = 1 for Single or DT mounting

■Single or DT mounting When Fa/Fr≦e, use Pr = Fr

■Static equivalent radial load

Por＝XoFr＋YoFa

Contact angle	Single or DT: X0	Single or DT: Y0	DB or DF: X0	DB or DF: Y0
15°	0.5	0.46	1	0.92
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

Single or DT mounting When Por＜Fr, use Pr = Fr

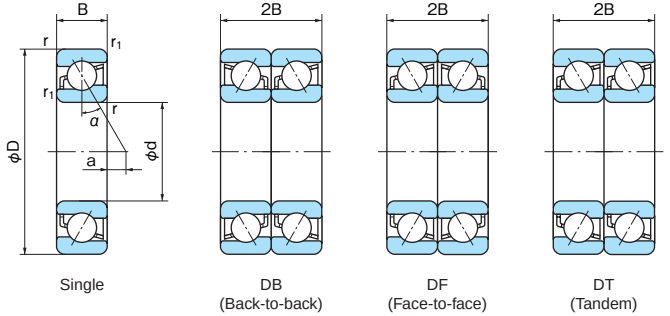
1N=0.102kgf

Boundary dimensions (mm) d	D	B	r (min)	r1 (min)	Load center (mm) a	Bearing No. Single	Duplex			Basic dynamic load rating Cr (N) Single	Duplex	Basic static load rating Cor (N) Single	Duplex	Limiting speed (min-1) Grease lubrication Single	Grease lubrication Duplex	Oil lubrication Single	Oil lubrication Duplex	Abutment and fillet dimensions (mm) da1 (min)	da2 (min)	Da1 (max)	Da2 (max)	ra (max)	ra1 (max)	Mass (kg) Single	Bearing No.
80	125	22	1.1	0.6	18.6	7016	7016DB	7016DF	7016DT	53500	86500	50500	101000	4400	3500	5800	4600	86	86	119	121	1	0.6	0.925	7016
	125	22	1.1	0.6	0.8	7016C	7016CDB	7016CDF	7016CDT	59000	96000	55500	111000	7800	6200	11000	8800	86	86	119	121	1	0.6	0.925	7016C
	140	26	2	1	18.8	7216	7216DB	7216DF	7216DT	89000	145000	76500	153000	4000	3200	5400	4300	90	86	130	134	2	1	1.50	7216
	140	26	2	1	33.2	7216B	7216BDB	7216BDF	7216BDT	83500	135000	71500	143000	3600	2800	5000	4000	90	86	130	134	2	1	1.50	7216B
	140	26	2	1	–0.3	7216C	7216CDB	7216CDF	7216CDT	93500	152000	78000	156000	7300	5800	10000	8000	90	90	130	134	2	1	1.50	7216C
	170	39	2.1	1.1	16.6	7316	7316DB	7316DF	7316DT	147000	239000	119000	238000	3600	2800	4800	3800	92	87	158	163	2	1	4.18	7316
	170	39	2.1	1.1	33.0	7316B	7316BDB	7316BDF	7316BDT	139000	226000	112000	225000	3200	2500	4200	3400	92	87	158	163	2	1	4.18	7316B
	170	39	2.1	1.1	–5.1	7316C	7316CDB	7316CDF	7316CDT	150000	243000	117000	235000	6400	5100	8800	7000	92	92	158	163	2	1	4.18	7316C
85	130	22	1.1	0.6	20	7017	7017DB	7017DF	7017DT	54500	88500	53500	107000	4100	3300	5500	4400	91	91	124	126	1	0.6	0.960	7017
	130	22	1.1	0.6	1.4	7017C	7017CDB	7017CDF	7017CDT	60500	98500	59000	118000	7400	5900	10000	8000	91	91	124	126	1	0.6	0.960	7017C
	150	28	2	1	19.9	7217	7217DB	7217DF	7217DT	103000	167000	89500	179000	3800	3000	5000	4000	95	91	140	144	2	1	1.87	7217
	150	28	2	1	35.4	7217B	7217BDB	7217BDF	7217BDT	96500	159000	83500	168000	3400	2600	4500	3800	95	91	140	144	2	1	1.87	7217B
	150	28	2	1	–0.4	7217C	7217CDB	7217CDF	7217CDT	100000	163000	85000	170000	6800	5400	9400	7500	95	95	140	144	2	1	1.87	7217C
	180	41	3	1.1	17.7	7317	7317DB	7317DF	7317DT	159000	258000	133000	266000	3400	2600	4500	3600	99	92	166	173	2.5	1	4.90	7317
	180	41	3	1.1	35.2	7317B	7317BDB	7317BDF	7317BDT	150000	244000	125000	251000	3000	2400	4000	3200	99	92	166	173	2.5	1	4.90	7317B
	180	41	3	1.1	–5.2	7317C	7317CDB	7317CDF	7317CDT	162000	263000	131000	262000	6000	4800	8300	6600	99	99	166	173	2.5	1	4.90	7317C
90	140	24	1.5	1	21.2	7018	7018DB	7018DF	7018DT	65000	106000	63000	126000	3800	3200	5200	4200	97	97	133	135.6	1.5	1	1.26	7018
	140	24	1.5	1	1.3	7018C	7018CDB	7018CDF	7018CDT	72000	117000	69500	139000	7000	5600	9600	7800	97	97	133	135.6	1.5	1	1.26	7018C
	160	30	2	1	21.1	7218	7218DB	7218DF	7218DT	118000	191000	103000	206000	3500	2800	4700	3700	100	96	150	154	2	1	2.30	7218
	160	30	2	1	37.5	7218B	7218BDB	7218BDF	7218BDT	110000	179000	97000	194000	3200	2500	4300	3400	100	96	150	154	2	1	2.30	7218B
	160	30	2	1	–0.6	7218C	7218CDB	7218CDF	7218CDT	124000	201000	105000	211000	6400	5100	8800	7000	100	100	150	154	2	1	2.30	7218C
	190	43	3	1.1	18.9	7318	7318DB	7318DF	7318DT	171000	277000	147000	295000	3200	2600	4300	3400	104	97	176	183	2.5	1	5.76	7318
	190	43	3	1.1	37.3	7318B	7318BDB	7318BDF	7318BDT	161000	262000	139000	278000	2800	2300	3800	3000	104	97	176	183	2.5	1	5.76	7318B
	190	43	3	1.1	–5.3	7318C	7318CDB	7318CDF	7318CDT	174000	282000	146000	291000	5700	4600	7900	6300	104	104	176	183	2.5	1	5.76	7318C
95	145	24	1.5	1	22.6	7019	7019DB	7019DF	7019DT	67000	109000	66500	133000	3800	3100	5200	4200	102	102	138	140.6	1.5	1	1.36	7019
	145	24	1.5	1	1.9	7019C	7019CDB	7019CDF	7019CDT	74000	120000	73500	147000	6700	5400	9200	7400	102	102	138	140.6	1.5	1	1.36	7019C
	170	32	2.1	1.1	22.2	7219	7219DB	7219DF	7219DT	126000	205000	112000	225000	3400	2600	4500	3600	107	102	158	163	2	1	2.78	7219
	170	32	2.1	1.1	39.7	7219B	7219BDB	7219BDF	7219BDT	120000	195000	105000	210000	3000	2400	4000	3200	107	102	158	163	2	1	2.78	7219B
	170	32	2.1	1.1	–0.7	7219C	7219CDB	7219CDF	7219CDT	133000	217000	115000	230000	6000	4800	8300	6600	107	107	158	163	2	1	2.78	7219C
	200	45	3	1.1	20.1	7319	7319DB	7319DF	7319DT	183000	297000	163000	325000	3000	2400	4000	3200	109	102	186	193	2.5	1	6.68	7319
	200	45	3	1.1	39.5	7319B	7319BDB	7319BDF	7319BDT	172000	280000	153000	305000	2500	2200	3600	3000	109	102	186	193	2.5	1	6.68	7319B
	200	45	3	1.1	–5.5	7319C	7319CDB	7319CDF	7319CDT	186000	300000	161000	320000	5400	4300	7500	6000	109	109	186	193	2.5	1	6.68	7319C

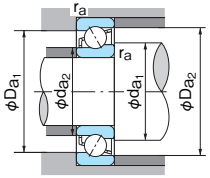
Remarks: 1. “a” means the distance between back face and load center.
2. See page 122 regarding limiting speeds.

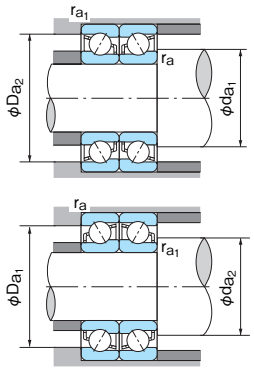
Angular Contact Ball Bearings Single Mounting / Duplex Mounting

Bore Diameter: 100～120mm



Single　DB (Back-to-back)　DF (Face-to-face)　DT (Tandem)





■Dynamic equivalent radial load

Pr＝XFr＋YFa

Contact angle	iFa/Cor	e	Single or DT: Fa/Fr > e		DB or DF: Fa/Fr ≦ e		DB or DF: Fa/Fr > e	
			X	Y	X	Y	X	Y
15°	0.015	0.38		1.47		1.65		2.39
	0.029	0.40	0.44	1.40	1	1.57	0.72	2.28
	0.058	0.43		1.30		1.46		2.11
	0.087	0.46		1.23		1.38		2.00
	0.12	0.47	0.44	1.19	1	1.34	0.72	1.93
	0.17	0.50		1.12		1.26		1.82
	0.29	0.55		1.02		1.14		1.66
	0.44	0.56	0.44	1.00	1	1.12	0.72	1.63
	0.58	0.56		1.00		1.12		1.63
30°	—	0.8	0.39	0.76	1	0.78	0.63	1.24
40°	—	1.14	0.35	0.57	1	0.55	0.57	0.93

■i = 2 for DB or DF mounting
i = 1 for Single or DT mounting

■Single or DT mounting When Fa/Fr≦e, use Pr = Fr

■Static equivalent radial load

Por＝XoFr＋YoFa

Contact angle	Single or DT: X0	Single or DT: Y0	DB or DF: X0	DB or DF: Y0
15°	0.5	0.46	1	0.92
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

Single or DT mounting When Por＜Fr, use Pr = Fr

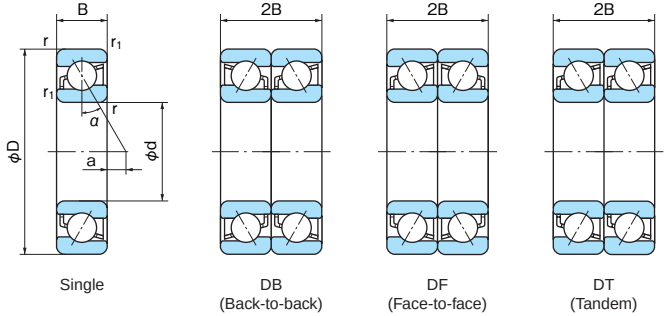
1N=0.102kgf

Boundary dimensions (mm) d	D	B	r (min)	r1 (min)	Load center (mm) a	Bearing No. Single	Duplex			Basic dynamic load rating Cr (N) Single	Duplex	Basic static load rating Cor (N) Single	Duplex	Limiting speed (min-1) Grease lubrication Single	Grease lubrication Duplex	Oil lubrication Single	Oil lubrication Duplex	Abutment and fillet dimensions (mm) da1 (min)	da2 (min)	Da1 (max)	Da2 (max)	ra (max)	ra1 (max)	Mass (kg) Single	Bearing No.
100	150	24	1.5	1	24.1	7020	7020DB	7020DF	7020DT	68500	111000	70500	141000	3600	2800	4800	3800	107	107	143	145.6	1.5	1	1.37	7020
	150	24	1.5	1	2.4	7020C	7020CDB	7020CDF	7020CDT	76000	123000	77500	156000	6400	5100	8800	7000	107	107	143	145.6	1.5	1	1.37	7020C
	180	34	2.1	1.1	23.4	7220	7220DB	7220DF	7220DT	144000	234000	126000	251000	3200	2400	4200	3400	112	107	168	173	2	1	3.32	7220
	180	34	2.1	1.1	41.8	7220B	7220BDB	7220BDF	7220BDT	135000	219000	118000	237000	2800	2200	3700	3000	112	107	168	173	2	1	3.32	7220B
	180	34	2.1	1.1	–0.8	7220C	7220CDB	7220CDF	7220CDT	150000	244000	128000	255000	5700	4600	7900	6300	112	112	168	173	2	1	3.32	7220C
	215	47	3	1.1	22.0	7320	7320DB	7320DF	7320DT	207000	335000	190000	380000	2800	2200	3800	3000	114	107	201	208	2.5	1	8.18	7320
	215	47	3	1.1	42.7	7320B	7320BDB	7320BDF	7320BDT	196000	320000	180000	360000	2400	2000	3300	2800	114	107	201	208	2.5	1	8.18	7320B
	215	47	3	1.1	–5.3	7320C	7320CDB	7320CDF	7320CDT	211000	340000	197000	385000	5100	4100	7000	5600	114	114	201	208	2.5	1	8.18	7320C
105	160	26	2	1	25.2	7021	7021DB	7021DF	7021DT	80000	130000	81500	163000	3300	2600	4400	3500	113	113	152	155	2	1	1.73	7021
	160	26	2	1	2.3	7021C	7021CDB	7021CDF	7021CDT	97000	158000	97500	195000	6000	4800	8300	6600	113	113	152	155	2	1	1.73	7021C
	190	36	2.1	1.1	24.6	7221	7221DB	7221DF	7221DT	157000	254000	141000	283000	3000	2400	4000	3200	117	112	178	183	2	1	3.93	7221
	190	36	2.1	1.1	44.0	7221B	7221BDB	7221BDF	7221BDT	147000	239000	135000	267000	2700	2100	3600	2900	117	112	178	183	2	1	3.93	7221B
	190	36	2.1	1.1	–0.9	7221C	7221CDB	7221CDF	7221CDT	163000	265000	144000	287000	5400	4300	7500	6000	117	117	178	183	2	1	3.93	7221C
	225	49	3	1.1	23.1	7321	7321DB	7321DF	7321DT	219000	355000	206000	410000	2700	2100	3600	2800	119	112	211	218	2.5	1	9.34	7321
	225	49	3	1.1	44.8	7321B	7321BDB	7321BDF	7321BDT	208000	335000	196000	390000	2400	1900	3200	2600	119	112	211	218	2.5	1	9.34	7321B
	225	49	3	1.1	–5.3	7321C	7321CDB	7321CDF	7321CDT	224000	365000	212000	425000	4800	3800	6700	5400	119	119	211	218	2.5	1	9.34	7321C
110	170	28	2	1	26.2	7022	7022DB	7022DF	7022DT	92000	149000	92500	185000	3200	2500	4300	3300	118	118	162	165	2	1	2.14	7022
	170	28	2	1	2.2	7022C	7022CDB	7022CDF	7022CDT	107000	173000	104000	209000	5700	4600	7900	6300	118	118	162	165	2	1	2.14	7022C
	200	38	2.1	1.1	25.7	7222	7222DB	7222DF	7222DT	170000	276000	158000	315000	2800	2200	3800	3000	122	117	188	193	2	1	4.62	7222
	200	38	2.1	1.1	46.1	7222B	7222BDB	7222BDF	7222BDT	159000	259000	149000	298000	2600	2000	3400	2800	122	117	188	193	2	1	4.62	7222B
	200	38	2.1	1.1	–1.0	7222C	7222CDB	7222CDF	7222CDT	171000	277000	157000	315000	5200	4200	7100	5700	122	122	188	193	2	1	4.62	7222C
	240	50	3	1.1	25.5	7322	7322DB	7322DF	7322DT	244000	395000	239000	480000	2600	2000	3400	2700	124	117	226	233	2.5	1	11.0	7322
	240	50	3	1.1	48.5	7322B	7322BDB	7322BDF	7322BDT	231000	375000	227000	455000	2200	1800	3000	2400	124	117	226	233	2.5	1	11.0	7322B
	240	50	3	1.1	–4.7	7322C	7322CDB	7322CDF	7322CDT	237000	385000	227000	455000	4600	3700	6300	5000	124	124	226	233	2.5	1	11.0	7322C
120	180	28	2	1	29.3	7024	7024DB	7024DF	7024DT	96500	157000	103000	206000	2900	2300	3800	3000	128	128	172	175	2	1	2.27	7024
	180	28	2	1	3.3	7024C	7024CDB	7024CDF	7024CDT	109000	178000	112000	223000	5300	4200	7300	5800	128	128	172	175	2	1	2.27	7024C
	215	40	2.1	1.1	28.4	7224	7224DB	7224DF	7224DT	182000	295000	180000	360000	2600	2100	3400	2700	132	127	203	208	2	1	6.05	7224
	215	40	2.1	1.1	50.3	7224B	7224BDB	7224BDF	7224BDT	170000	277000	169000	335000	2300	1900	3100	2500	132	127	203	208	2	1	6.05	7224B
	215	40	2.1	1.1	–0.6	7224C	7224CDB	7224CDF	7224CDT	185000	300000	176000	350000	4800	3800	6600	5300	132	132	203	208	2	1	6.05	7224C
	260	55	3	1.1	27.3	7324	7324DB	7324DF	7324DT	260000	420000	169000	540000	2200	1800	3000	2400	134	127	246	253	2.5	1	14.2	7324
	260	55	3	1.1	52.2	7324B	7324BDB	7324BDF	7324BDT	245000	400000	253000	505000	2100	1700	2800	2200	134	127	246	253	2.5	1	14.2	7324B

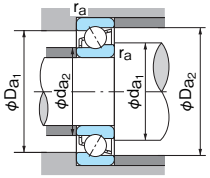
Remarks: 1. “a” means the distance between back face and load center.
2. See page 122 regarding limiting speeds.

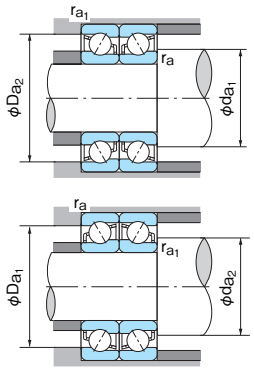
Angular Contact Ball Bearings Single Mounting / Duplex Mounting

Bore Diameter: 130～160mm



Single | DB (Back-to-back) | DF (Face-to-face) | DT (Tandem)





■Dynamic equivalent radial load

Pr＝XFr＋YFa

Contact angle	iFa/Cor	e	Single or DT: Fa/Fr > e X	Single or DT: Fa/Fr > e Y	DB or DF: Fa/Fr ≦ e X	DB or DF: Fa/Fr ≦ e Y	DB or DF: Fa/Fr > e X	DB or DF: Fa/Fr > e Y
15°	0.015	0.38		1.47		1.65		2.39
	0.029	0.40	0.44	1.40	1	1.57	0.72	2.28
	0.058	0.43		1.30		1.46		2.11
	0.087	0.46		1.23		1.38		2.00
	0.12	0.47	0.44	1.19	1	1.34	0.72	1.93
	0.17	0.50		1.12		1.26		1.82
	0.29	0.55		1.02		1.14		1.66
	0.44	0.56	0.44	1.00	1	1.12	0.72	1.63
	0.58	0.56		1.00		1.12		1.63
30°	—	0.8	0.39	0.76	1	0.78	0.63	1.24
40°	—	1.14	0.35	0.57	1	0.55	0.57	0.93

■i = 2 for DB or DF mounting
i = 1 for Single or DT mounting

■Single or DT mounting When Fa/Fr≦e, use Pr = Fr

■Static equivalent radial load

Por＝XoFr＋YoFa

Contact angle	Single or DT: X0	Single or DT: Y0	DB or DF: X0	DB or DF: Y0
15°	0.5	0.46	1	0.92
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

Single or DT mounting When Por＜Fr, use Pr = Fr

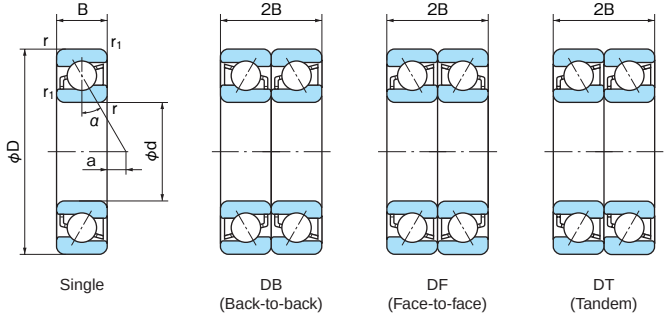
1N=0.102kgf

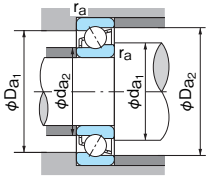
Boundary dimensions (mm) d	D	B	r (min)	r1 (min)	Load center (mm) a	Bearing No. Single	Duplex			Basic dynamic load rating Cr (N) Single	Duplex	Basic static load rating Cor (N) Single	Duplex	Limiting speed (min-1) Grease lubrication Single	Grease lubrication Duplex	Oil lubrication Single	Oil lubrication Duplex	Abutment and fillet dimensions (mm) da1 (min)	da2 (min)	Da1 (max)	Da2 (max)	ra (max)	ra1 (max)	Mass (kg) Single	Bearing No.
	200	33	2	1	31.1	7026	7026DB	7026DF	7026DT	117000	190000	125000	250000	2600	2200	3600	2700	138	138	192	195	2	1	3.43	7026
	200	33	2	1	2.5	7026C	7026CDB	7026CDF	7026CDT	130000	211000	138000	276000	4800	3800	6700	5400	138	138	192	195	2	1	3.43	7026C
	230	40	3	1.1	32	7226	7226DB	7226DF	7226DT	196000	320000	198000	395000	2400	1900	3100	2500	144	137	216	223	2.5	1	6.88	7226
130	230	40	3	1.1	55.5	7226B	7226BDB	7226BDF	7226BDT	184000	298000	185000	370000	2100	1700	2800	2300	144	137	216	223	2.5	1	6.88	7226B
	230	40	3	1.1	0.9	7226C	7226CDB	7226CDF	7226CDT	214000	350000	216000	430000	4400	3500	6100	4900	144	144	216	223	2.5	1	6.88	7226C
	280	58	4	1.5	30.2	7326	7326DB	7326DF	7326DT	300000	490000	330000	660000	2200	1700	2900	2200	148	139	262	271	3	1.5	17.4	7326
	280	58	4	1.5	57.0	7326B	7326BDB	7326BDF	7326BDT	284000	460000	310000	620000	1900	1500	2600	2000	148	139	262	271	3	1.5	17.4	7326B
	210	33	2	1	34	7028	7028DB	7028DF	7028DT	120000	194000	133000	265000	2400	1900	3300	2600	148	148	202	205	2	1	3.63	7028
	210	33	2	1	3.7	7028C	7028CDB	7028CDF	7028CDT	133000	216000	146000	292000	4600	3700	6300	5000	148	148	202	205	2	1	3.63	7028C
	250	42	3	1.1	35.3	7228	7228DB	7228DF	7228DT	211000	345000	228000	525000	2200	1800	3000	2400	154	147	236	243	2.5	1	8.78	7228
140	250	42	3	1.1	60.8	7228B	7228BDB	7228BDF	7228BDT	197000	320000	214000	425000	2000	1600	2600	2200	154	147	236	243	2.5	1	8.78	7228B
	250	42	3	1.1	1.3	7228C	7228CDB	7228CDF	7228CDT	223000	360000	235000	470000	4100	3300	5600	4500	154	154	236	243	2.5	1	8.78	7228C
	300	62	4	1.5	32.5	7328	7328DB	7328DF	7328DT	300000	490000	335000	670000	2000	1600	2600	2000	158	149	282	291	3	1.5	21.5	7328
	300	62	4	1.5	61.3	7328B	7328BDB	7328BDF	7328BDT	284000	460000	315000	635000	1700	1400	2400	1900	158	149	282	291	3	1.5	21.5	7328B
	225	35	2.1	1.1	36.6	7030	7030DB	7030DF	7030DT	137000	222000	154000	305000	2300	1800	3000	2400	159	159	216	219	2	1	4.42	7030
	225	35	2.1	1.1	4.1	7030C	7030CDB	7030CDF	7030CDT	152000	247000	169000	340000	4300	3400	5900	4700	159	159	216	219	2	1	4.42	7030C
	270	45	3	1.1	38.1	7230	7230DB	7230DF	7230DT	249000	405000	280000	560000	2000	1600	2800	2200	164	157	256	263	2.5	1	11.0	7230
150	270	45	3	1.1	65.6	7230B	7230BDB	7230BDF	7230BDT	223000	360000	246000	490000	1800	1500	2600	2000	164	157	256	263	2.5	1	11.0	7230B
	270	45	3	1.1	1.5	7230C	7230CDB	7230CDF	7230CDT	261000	425000	287000	575000	3800	3000	5200	4200	164	164	256	263	2.5	1	11.0	7230C
	320	65	4	1.5	35.3	7330	7330DB	7330DF	7330DT	330000	535000	380000	765000	1700	1400	2400	1800	168	159	302	311	3	1.5	25.1	7330
	320	65	4	1.5	66.1	7330B	7330BDB	7330BDF	7330BDT	310000	505000	360000	725000	1500	1300	2200	1600	168	159	302	311	3	1.5	25.1	7330B
	240	38	2.1	1.1	38.7	7032	7032DB	7032DF	7032DT	155000	252000	176000	350000	2100	1700	2800	2300	169	169	231	234	2	1	5.44	7032
	240	38	2.1	1.1	4.1	7032C	7032CDB	7032CDF	7032CDT	172000	280000	194000	390000	4000	3200	5500	4400	169	169	231	234	2	1	5.44	7032C
	290	48	3	1.1	41.0	7232	7232DB	7232DF	7232DT	263000	425000	305000	615000	1900	1500	2600	2000	174	167	276	283	2.5	1	13.7	7232
160	290	48	3	1.1	70.4	7232B	7232BDB	7232BDF	7232BDT	246000	400000	287000	575000	1700	1400	2200	1800	174	167	276	283	2.5	1	13.7	7232B
	290	48	3	1.1	2.4	7232C	7232CDB	7232CDF	7232CDT	288000	470000	335000	670000	3600	2900	4900	3900	174	167	276	283	2.5	1	13.7	7232C
	340	68	4	1.5	38.2	7332	7332DB	7332DF	7332DT	345000	565000	420000	845000	1700	1400	2200	1800	178	169	322	331	3	1.5	30.2	7332
	340	68	4	1.5	70.9	7332B	7332BDB	7332BDF	7332BDT	325000	530000	395000	795000	1500	1200	2000	1600	178	169	322	331	3	1.5	30.2	7332B

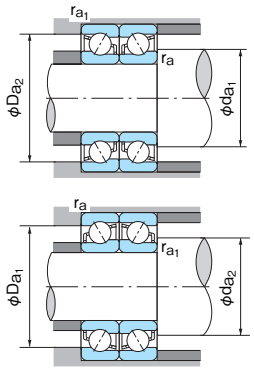
Remarks: 1. “a” means the distance between back face and load center.
2. See page 122 regarding limiting speeds.

Angular Contact Ball Bearings Single Mounting / Duplex Mounting

Bore Diameter: 170～200mm







■Dynamic equivalent radial load

Pr＝XFr＋YFa

Contact angle	iFa/Cor	e	Single or DT: Fa/Fr ＞ e		DB or DF: Fa/Fr ≦ e		DB or DF: Fa/Fr ＞ e	
			X	Y	X	Y	X	Y
15°	0.015	0.38		1.47		1.65		2.39
	0.029	0.40	0.44	1.40	1	1.57	0.72	2.28
	0.058	0.43		1.30		1.46		2.11
	0.087	0.46		1.23		1.38		2.00
	0.12	0.47	0.44	1.19	1	1.34	0.72	1.93
	0.17	0.50		1.12		1.26		1.82
	0.29	0.55		1.02		1.14		1.66
	0.44	0.56	0.44	1.00	1	1.12	0.72	1.63
	0.58	0.56		1.00		1.12		1.63
30°	—	0.8	0.39	0.76	1	0.78	0.63	1.24
40°	—	1.14	0.35	0.57	1	0.55	0.57	0.93

■Static equivalent radial load

Por＝XoFr＋YoFa

Contact angle	Single or DT: X0	Y0	DB or DF: X0	Y0
15°	0.5	0.46	1	0.92
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

Single or DT mounting When Por＜Fr, use Pr = Fr

■i = 2 for DB or DF mounting
i = 1 for Single or DT mounting

■Single or DT mounting When Fa/Fr≦e, use Pr = Fr

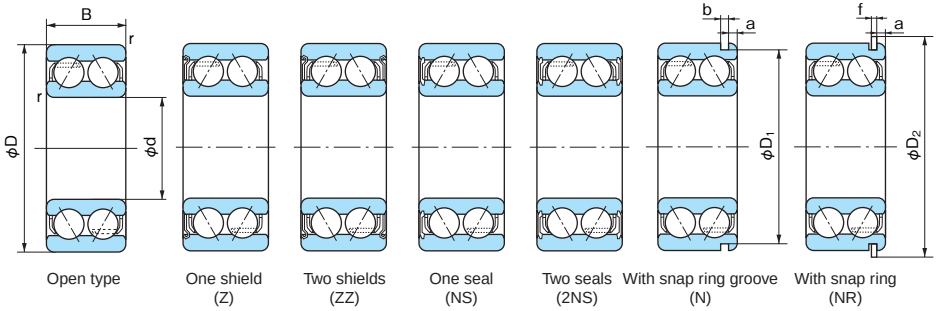
1N=0.102kgf

Boundary dimensions (mm) d	D	B	r (min)	r1 (min)	Load center (mm) a	Bearing No. Single	Duplex			Basic dynamic load rating Cr (N) Single	Duplex	Basic static load rating Cor (N) Single	Duplex	Limiting speed (min-1) Grease lubrication Single	Duplex	Oil lubrication Single	Duplex	Abutment and fillet dimensions (mm) da1 (min)	da2 (min)	Da1 (max)	Da2 (max)	ra (max)	ra1 (max)	Mass (kg) Single	Bearing No.
	260	42	2.1	1.1	41.1	7034	7034DB	7034DF	7034DT	179000	291000	210000	420000	2000	1600	2600	2100	179	179	251	254	2	1	7.87	7034
	260	42	2.1	1.1	3.8	7034C	7034CDB	7034CDF	7034CDT	206000	335000	236000	470000	3700	3000	5100	4100	179	179	251	254	2	1	7.87	7034C
	310	52	4	1.5	43.3	7234	7234DB	7234DF	7234DT	272000	440000	330000	660000	1800	1400	2400	1900	188	179	292	301	3	1.5	17.4	7234
170	310	52	4	1.5	74.7	7234B	7234BDB	7234BDF	7234BDT	254000	410000	310000	620000	1600	1300	2200	1700	188	179	292	301	3	1.5	17.4	7234B
	310	52	4	1.5	2.2	7234C	7234CDB	7234CDF	7234CDT	299000	485000	360000	725000	3300	2600	4600	3700	188	179	292	301	3	1.5	17.4	7234C
	360	72	4	1.5	40.5	7334	7334DB	7334DF	7334DT	390000	630000	485000	970000	1600	1300	2200	1700	188	179	342	351	3	1.5	35.7	7334
	360	72	4	1.5	75.2	7334B	7334BDB	7334BDF	7334BDT	365000	595000	460000	915000	1400	1100	2000	1600	188	179	342	351	3	1.5	35.7	7334B
	280	46	2.1	1.1	43.4	7036	7036DB	7036DF	7036DT	207000	335000	252000	505000	1900	1500	2500	2000	189	189	271	274	2	1	9.98	7036
	280	46	2.1	1.1	3.5	7036C	7036CDB	7036CDF	7036CDT	235000	385000	290000	580000	3500	2800	4800	3800	189	189	271	274	2	1	9.98	7036C
	320	52	4	1.5	46.2	7236	7236DB	7236DF	7236DT	281000	455000	350000	705000	1700	1300	2200	1800	198	189	302	311	3	1.5	19.9	7236
180	320	52	4	1.5	48.9	7236B	7236BDB	7236BDF	7236BDT	262000	425000	330000	660000	1500	1200	2000	1700	198	189	302	311	3	1.5	19.9	7236B
	320	52	4	1.5	3.3	7236C	7236CDB	7236CDF	7236CDT	310000	500000	385000	775000	3200	2600	4400	3500	198	189	302	311	3	1.5	19.9	7236C
	380	75	4	1.5	43.3	7336	7336DB	7336DF	7336DT	410000	665000	535000	1070000	1400	1200	2000	1600	198	189	362	371	3	1.5	41.3	7336
	380	75	4	1.5	80.0	7336B	7336BDB	7336BDF	7336BDT	385000	625000	505000	1010000	1300	1100	1900	1500	198	189	362	371	3	1.5	41.3	7336B
	290	46	2.1	1.1	46.3	7038	7038DB	7038DF	7038DT	218000	355000	277000	555000	1800	1400	2300	1900	199	199	281	284	2	1	10.7	7038
	290	46	2.1	1.1	4.7	7038C	7038CDB	7038CDF	7038CDT	248000	405000	310000	615000	3300	2600	4600	3700	199	199	281	284	2	1	10.7	7038C
	340	55	4	1.5	49.0	7238	7238DB	7238DF	7238DT	315000	510000	410000	825000	1600	1300	2200	1700	208	199	322	331	3	1.5	21.5	7238
190	340	55	4	1.5	83.7	7238B	7238BDB	7238BDF	7238BDT	294000	475000	385000	770000	1400	1100	2000	1600	208	199	322	331	3	1.5	21.5	7238B
	400	78	5	2	46.1	7338	7338DB	7338DF	7338DT	445000	725000	610000	1220000	1400	1100	1900	1500	212	200	378	390	4	2	47.6	7338
	400	78	5	2	84.8	7338B	7338BDB	7338BDF	7338BDT	420000	680000	575000	1150000	1300	1000	1800	1400	212	200	378	390	4	2	47.6	7338B
	310	51	2.1	1.1	48.1	7040	7040DB	7040DF	7040DT	226000	365000	277000	565000	1700	1300	2200	1800	209	209	301	304	2	1	13.8	7040
	310	51	2.1	1.1	3.9	7040C	7040CDB	7040CDF	7040CDT	274000	445000	360000	715000	3100	2500	4300	3400	209	209	301	304	2	1	13.8	7040C
	360	58	4	1.5	51.8	7240	7240DB	7240DF	7240DT	335000	550000	450000	900000	1500	1200	2000	1600	218	209	342	351	3	1.5	25.5	7240
200	360	58	4	1.5	88.5	7240B	7240BDB	7240BDF	7240BDT	315000	510000	420000	840000	1300	1000	1900	1500	218	209	342	351	3	1.5	25.5	7240B
	420	80	5	2	49.5	7340	7340DB	7340DF	7340DT	475000	770000	655000	1310000	1300	1100	1800	1400	222	210	398	410	4	2	53.7	7340
	420	80	5	2	90.1	7340B	7340BDB	7340BDF	7340BDT	445000	725000	620000	1240000	1200	1000	1700	1300	222	210	398	410	4	2	53.7	7340B

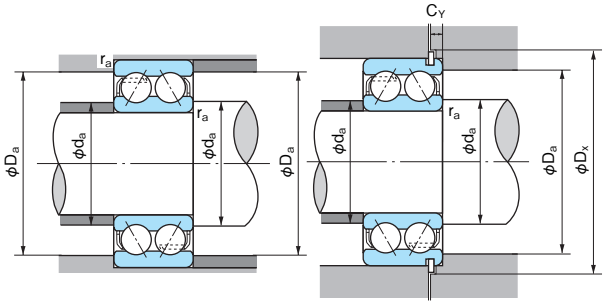
Remarks: 1. “a” means the distance between back face and load center.
2. See page 122 regarding limiting speeds.

Double-row Angular Contact Ball Bearings

Bore Diameter: 10～45mm



Open type | One shield (Z) | Two shields (ZZ) | One seal (NS) | Two seals (2NS) | With snap ring groove (N) | With snap ring (NR)



Dynamic equivalent radial load

Pr=XFr+YFa

Contact angle	e	Fa/Fr ≦ e		Fa/Fr > e	
		X	Y	X	Y
30°	0.80	1.0	0.78	0.63	1.24
20°	0.57	1.0	1.09	0.70	1.63

Static equivalent radial load

Nominal contact angle 30° : Por=Fr+0.66Fa

Nominal contact angle 20° : Por=Fr+0.84Fa

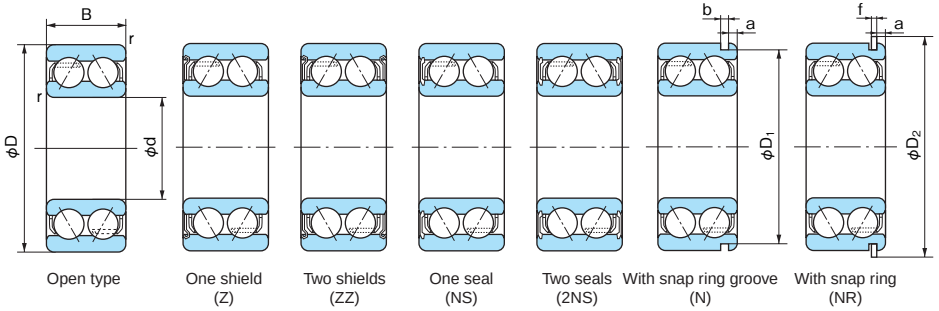
1N=0.102kgf

Boundary dimensions (mm)				Bearing No.							Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min-1)		Dimensions of snap ring groove and snap ring (mm)					Abutment and fillet dimensions (mm)						Mass (kg)	Bearing No.
d	D	B	r (min)	Open type	Shield type		Seal type		With snap ring groove	With snap ring			Grease lubrication	Oil lubrication	D1 (max)	a (max)	b (min)	D2 (max)	f (max)	da (min)	Da (max)	Dx (min)	ra (max)	CY (max)		
10	30	14.3	0.6	5200	5200Z	5200ZZ	5200NS	5200-2NS	5200N	5200NR	7300	4000	18000	24000	28.17	2.06	1.35	34.7	1.12	15	25	35.5	0.6	2.9	0.050	5200
	30	14.3	0.6	5200A	5200AZ	5200AZZ	5200ANS	5200A-2NS	5200AN	5200ANR	6950	3800	16000	22000	28.17	2.06	1.35	34.7	1.12	15	25	35.5	0.6	2.9	0.050	5200A
12	32	15.9	0.6	5201	5201Z	5201ZZ	5201NS	5201-2NS	5201N	5201NR	10700	5950	16000	22000	30.15	2.06	1.35	36.7	1.12	17	27	37.5	0.6	2.9	0.060	5201
	32	15.9	0.6	5201A	5201AZ	5201AZZ	5201ANS	5201A-2NS	5201AN	5201ANR	10300	5650	15000	20000	30.15	2.06	1.35	36.7	1.12	17	27	37.5	0.6	2.9	0.060	5201A
15	35	15.9	0.6	5202	5202Z	5202ZZ	5202NS	5202-2NS	5202N	5202NR	11900	7200	14000	19000	33.17	2.06	1.35	39.7	1.12	20	30	40.5	0.6	2.9	0.070	5202
	35	15.9	0.6	5202A	5202AZ	5202AZZ	5202ANS	5202A-2NS	5202AN	5202ANR	11400	6850	12000	17000	33.17	2.06	1.35	39.7	1.12	20	30	40.5	0.6	2.9	0.070	5202A
17	40	17.5	0.6	5203	5203Z	5203ZZ	5203NS	5203-2NS	5203N	5203NR	15000	9250	12000	17000	38.1	2.06	1.35	44.6	1.12	22	35	45.5	0.6	2.9	0.090	5203
	40	17.5	0.6	5203A	5203AZ	5203AZZ	5203ANS	5203A-2NS	5203AN	5203ANR	14200	8800	11000	15000	38.1	2.06	1.35	44.6	1.12	22	35	45.5	0.6	2.9	0.090	5203A
	47	22.2	1	5303	—	—	—	—	5303N	5303NR	21300	12700	10000	14000	44.6	2.46	1.35	52.7	1.12	23	41	53.5	1	3.3	0.140	5303
20	47	20.6	1	5204	5204Z	5204ZZ	5204NS	5204-2NS	5204N	5204NR	20000	12700	10000	14000	44.6	2.46	1.35	52.7	1.12	26	41	53.5	1	3.3	0.120	5204
	47	20.6	1	5204A	5204AZ	5204AZZ	5204ANS	5204A-2NS	5204AN	5204ANR	19000	12100	9500	13000	44.6	2.46	1.35	52.7	1.12	26	41	53.5	1	3.3	0.120	5204A
	52	22.2	1.1	5304	—	—	—	—	5304N	5304NR	21700	13300	9000	11000	49.73	2.46	1.35	57.9	1.12	27	45	58.5	1	3.3	0.230	5304
25	52	20.6	1	5205	5205Z	5205ZZ	5205NS	5205-2NS	5205N	5205NR	21800	15100	9500	13000	49.73	2.46	1.35	57.9	1.12	31	46	58.5	1	3.3	0.190	5205
	52	20.6	1	5205A	5205AZ	5205AZZ	5205ANS	5205A-2NS	5205AN	5205ANR	20600	14300	8000	11000	49.73	2.46	1.35	57.9	1.12	31	46	58.8	1	3.3	0.190	5205A
	62	25.4	1.1	5305	—	—	—	—	5305N	5305NR	32000	21600	7300	10000	59.61	3.28	1.9	67.7	1.7	32	55	68.5	1	4.7	0.340	5305
30	62	23.8	1	5206	—	—	—	—	5206N	5206NR	30500	21700	8000	11000	59.61	3.28	1.9	67.7	1.7	36	56	68.5	1	4.7	0.290	5206
	62	23.8	1	—	5206Z	5206ZZ	5206NS	5206-2NS	—	—	25900	18700	8000	—	—	—	—	—	—	36	56	—	1	—	0.290	5206Z
	62	23.8	1	5206A	—	—	—	—	5206AN	5206ANR	28600	20500	7000	9500	59.61	3.28	1.9	67.7	1.7	36	56	68.5	1	4.7	0.290	5206A
	62	23.8	1	—	5206AZ	5206AZZ	5206ANS	5206A-2NS	—	—	24400	17700	7000	—	—	—	—	—	—	36	56	—	1	—	0.290	5206AZ
	72	30.2	1.1	5306	—	—	—	—	5306N	5306NR	41500	29000	7000	9500	68.81	3.28	1.9	78.6	1.7	37	65	80	1	4.7	0.510	5306
35	72	27	1.1	5207	—	—	—	—	5207N	5207NR	40000	29500	7000	9500	68.81	3.28	1.9	78.6	1.7	42	65	80	1	4.7	0.430	5207
	72	27	1.1	—	5207Z	5207ZZ	5207NS	5207-2NS	—	—	35000	25900	7000	—	—	—	—	—	—	42	65	—	1	—	0.430	5207Z
	72	27	1.1	5207A	—	—	—	—	5207AN	5207ANR	38000	27700	6000	8000	68.81	3.28	1.9	78.6	1.7	42	65	80	1	4.7	0.430	5207A
	72	27	1.1	—	5207AZ	5207AZZ	5207ANS	5207A-2NS	—	—	33000	24500	6000	—	—	—	—	—	—	42	65	—	1	—	0.430	5207AZ
	80	34.9	1.5	5307	—	—	—	—	5307N	5307NR	52000	37000	6300	8500	76.81	3.28	1.9	86.6	1.7	44	71	88	1.5	4.7	0.790	5307
40	80	30.2	1.1	5208	—	—	—	—	5208N	5208NR	45500	34000	6000	8000	76.81	3.28	1.9	86.6	1.7	47	73	88	1	4.7	0.570	5208
	80	30.2	1.1	—	5208Z	5208ZZ	5208NS	5208-2NS	—	—	40000	30500	6000	—	—	—	—	—	—	47	73	—	1	—	0.570	5208Z
	80	30.2	1.1	5208A	—	—	—	—	5208AN	5208ANR	42500	32500	5300	7200	76.81	3.28	1.9	86.6	1.7	47	73	88	1	4.7	0.570	5208A
	80	30.2	1.1	—	5208AZ	5208AZZ	5208ANS	5208A-2NS	—	—	37500	28700	5300	—	—	—	—	—	—	47	73	—	1	—	0.570	5208AZ
	90	36.5	1.5	5308	—	—	—	—	5308N	5308NR	63500	46500	5500	7500	86.79	3.28	2.7	96.5	2.46	49	81	98	1.5	5.4	1.05	5308
45	85	30.2	1.1	5209	—	—	—	—	5209N	5209NR	51000	39000	5500	7500	81.81	3.28	1.9	91.6	1.7	52	78	93	1	4.7	0.620	5209
	85	30.2	1.1	—	5209Z	5209ZZ	5209NS	5209-2NS	—	—	42500	34500	5500	—	—	—	—	—	—	52	78	—	1	—	0.620	5209Z
	85	30.2	1.1	5209A	—	—	—	—	5209AN	5209ANR	48000	37000	5000	6700	81.81	3.28	1.9	91.6	1.7	52	78	93	1	4.7	0.620	5209A
	85	30.2	1.1	—	5209AZ	5209AZZ	5209ANS	5209A-2NS	—	—	40000	32500	5000	—	—	—	—	—	—	52	78	—	1	—	0.620	5209AZ
	100	39.7	1.5	5309	—	—	—	—	5309N	5309NR	76500	56500	5000	6700	96.8	3.28	2.7	106.5	2.46	54	91	108	1.5	5.4	1.42	5309

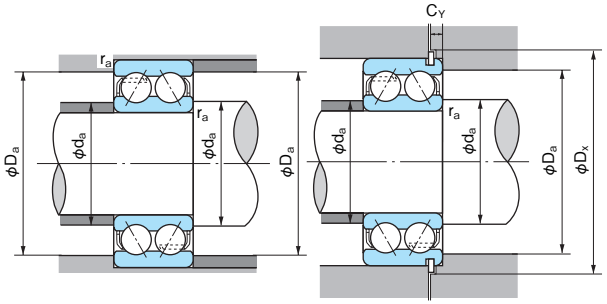
Remark: Dimensions and tolerances of snap ring groove and snap ring are shown on pages 45 to 48.

Double-row Angular Contact Ball Bearings

Bore Diameter: 50～85mm



Open type | One shield (Z) | Two shields (ZZ) | One seal (NS) | Two seals (2NS) | With snap ring groove (N) | With snap ring (NR)



Dynamic equivalent radial load

Pr=XFr+YFa

Contact angle	e	Fa/Fr ≦ e		Fa/Fr > e	
		X	Y	X	Y
30°	0.80	1.0	0.78	0.63	1.24
20°	0.57	1.0	1.09	0.70	1.63

Static equivalent radial load

Nominal contact angle 30° : Por=Fr+0.66Fa

Nominal contact angle 20° : Por=Fr+0.84Fa

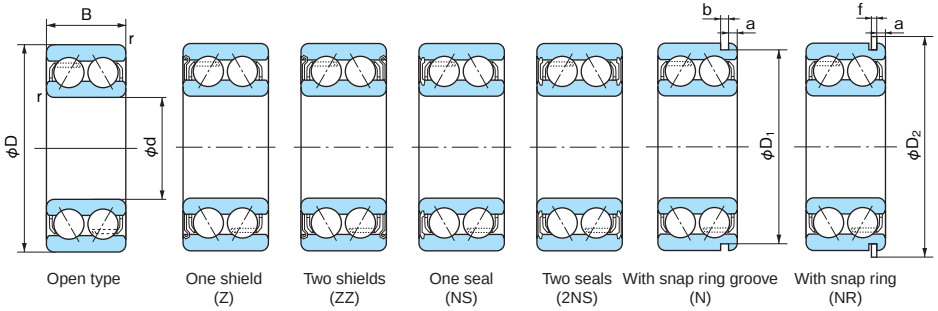
1N=0.102kgf

Boundary dimensions (mm)				Bearing No.						Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min-1)		Dimensions of snap ring groove and snap ring (mm)					Abutment and fillet dimensions (mm)					Mass (kg)	Bearing No.
d	D	B	r (min)	Open type	Shield type		Seal type		With snap ring groove	With snap ring		Grease lubrication	Oil lubrication	D1 (max)	a (max)	b (min)	D2 (max)	f (max)	da (min)	Da (max)	Dx (min)	ra (max)	CY (max)		
50	90	30.2	1.1	5210	—	—	—	—	5210N	5210NR	54500	44500	5000	6700	86.79	3.28	2.7	96.5	2.46	57	83	98	1	5.4	0.670	5210
	90	30.2	1.1	—	5210Z	5210ZZ	5210NS	5210-2NS	—	—	45000	39000	5000	—	—	—	—	—	—	57	83	—	1	—	0.670	5210Z
	90	30.2	1.1	5210A	—	—	—	—	5210AN	5210ANR	51000	42000	4500	6000	86.79	3.28	2.7	96.5	2.46	57	83	98	1	5.4	0.670	5210A
	90	30.2	1.1	—	5210AZ	5210AZZ	5210ANS	5210A-2NS	—	—	42000	36500	4500	—	—	—	—	—	—	57	83	—	1	—	0.670	5210AZ
	110	44.4	2	5310	—	—	—	—	5310N	5310NR	90000	68000	4500	6000	106.81	3.28	2.7	116.6	2.46	60	100	118	2	5.4	1.93	5310
55	100	33.3	1.5	5211	—	—	—	—	5211N	5211NR	67500	56500	4500	6300	96.8	3.28	2.7	106.5	2.46	64	91	108	1.5	5.4	0.960	5211
	100	33.3	1.5	—	5211Z	5211ZZ	—	—	—	—	57500	50500	4500	—	—	—	—	—	—	64	91	—	1.5	—	0.960	5211Z
	100	33.3	1.5	5211A	—	—	—	—	5211AN	5211ANR	63500	53000	4000	5500	96.8	3.28	2.7	106.5	2.46	64	91	108	1.5	5.4	0.960	5211A
	100	33.3	1.5	—	5211AZ	5211AZZ	—	—	—	—	54000	47500	4000	—	—	—	—	—	—	64	91	—	1.5	—	0.960	5211AZ
	120	49.2	2	5311	—	—	—	—	5311N	5311NR	112000	86500	4000	5500	115.21	4.06	3.1	129.7	2.82	65	110	131.5	2	6.5	2.30	5311
60	110	36.5	1.5	5212	—	—	—	—	5212N	5212NR	76000	62000	4300	5600	106.81	3.28	2.7	116.6	2.46	69	101	118	1.5	5.4	1.36	5212
	110	36.5	1.5	—	5212Z	5212ZZ	—	—	—	—	67000	57500	4300	—	—	—	—	—	—	69	101	—	1.5	—	1.36	5212Z
	110	36.5	1.5	5212A	—	—	—	—	5212AN	5212ANR	71500	58500	3800	5000	106.81	3.28	2.7	116.6	2.46	69	101	118	1.5	5.4	1.36	5212A
	110	36.5	1.5	—	5212AZ	5212AZZ	—	—	—	—	63000	54000	3800	—	—	—	—	—	—	69	101	—	1.5	—	1.36	5212AZ
	130	54	2.1	5312	—	—	—	—	5312N	5312NR	128000	101000	3800	5000	125.22	4.06	3.1	139.7	2.82	72	118	141.5	2	6.5	3.16	5312
65	120	38.1	1.5	5213	—	—	—	—	5213N	5213NR	89000	77000	3900	5300	115.21	4.06	3.1	129.7	2.82	74	111	131.5	1.5	6.5	1.66	5213
	120	38.1	1.5	—	5213Z	5213ZZ	—	—	—	—	78500	71000	3900	—	—	—	—	—	—	74	111	—	1.5	—	1.66	5213Z
	120	38.1	1.5	5213A	—	—	—	—	5213AN	5213ANR	83500	72500	3400	4600	115.21	4.06	3.1	129.7	2.82	74	111	131.5	1.5	6.5	1.66	5213A
	120	38.1	1.5	—	5213AZ	5213AZZ	—	—	—	—	73500	66500	3400	—	—	—	—	—	—	74	111	—	1.5	—	1.66	5213AZ
	140	58.7	2.1	5313	—	—	—	—	5313N	5313NR	145000	115000	3600	4700	135.23	4.9	3.1	149.7	2.82	77	128	152	2	7.4	3.86	5313
70	125	39.7	1.5	5214	—	—	—	—	5214N	5214NR	96500	84500	3800	5000	120.22	4.06	3.1	134.7	2.82	79	116	136.5	1.5	6.5	1.82	5214
	125	39.7	1.5	—	5214Z	5214ZZ	—	—	—	—	86000	79000	3800	—	—	—	—	—	—	79	116	—	1.5	—	1.82	5214Z
	125	39.7	1.5	5214A	—	—	—	—	5214AN	5214ANR	90500	79500	3200	4500	120.22	4.06	3.1	134.7	2.82	79	116	136.5	1.5	6.5	1.82	5214A
	125	39.7	1.5	—	5214AZ	5214AZZ	—	—	—	—	80500	74000	3200	—	—	—	—	—	—	79	116	—	1.5	—	1.82	5214AZ
	150	63.5	2.1	5314	—	—	—	—	5314N	5314NR	163000	132000	3200	4300	145.24	4.9	3.1	159.7	2.82	82	138	162	2	7.4	4.88	5314
75	130	41.3	1.5	5215	—	—	—	—	5215N	5215NR	96000	85500	3400	4700	125.22	4.06	3.1	139.7	2.82	84	121	141.5	1.5	6.5	1.91	5215
	130	41.3	1.5	—	5215Z	5215ZZ	—	—	—	—	94000	87000	3400	—	—	—	—	—	—	84	121	—	1.5	—	1.91	5215Z
	130	41.3	1.5	5215A	—	—	—	—	5215AN	5215ANR	90000	80500	3200	4300	125.22	4.06	3.1	139.7	2.82	84	121	141.5	1.5	6.5	1.91	5215A
	130	41.3	1.5	—	5215AZ	5215AZZ	—	—	—	—	88000	81500	3200	—	—	—	—	—	—	84	121	—	1.5	—	1.91	5215AZ
	160	68.3	2.1	5315	—	—	—	—	5315N	5315NR	178000	149000	3000	4000	155.22	4.9	3.1	169.7	2.82	87	148	172	2	7.4	5.51	5315
80	140	44.4	2	5216	—	—	—	—	5216N	5216NR	104000	94000	3500	4600	135.23	4.9	3.1	149.7	2.82	90	130	152	2	7.4	2.48	5216
	140	44.4	2	5216A	—	—	—	—	5216AN	5216ANR	97500	88500	2800	4000	135.23	4.9	3.1	149.7	2.82	90	130	152	2	7.4	2.48	5216A
	170	68.3	2.1	5316	—	—	—	—	5316N	5316NR	192000	167000	2800	4000	163.65	5.69	3.5	182.9	3.1	92	158	185	2	8.4	6.81	5316
85	150	49.2	2	5217	—	—	—	—	5217N	5217NR	112000	103000	3000	4000	145.24	4.9	3.1	159.7	2.82	95	140	162	2	7.4	3.40	5217
	150	49.2	2	5217A	—	—	—	—	5217AN	5217ANR	105000	96500	2600	3800	145.24	4.9	3.1	159.7	2.82	95	140	162	2	7.4	3.40	5217A

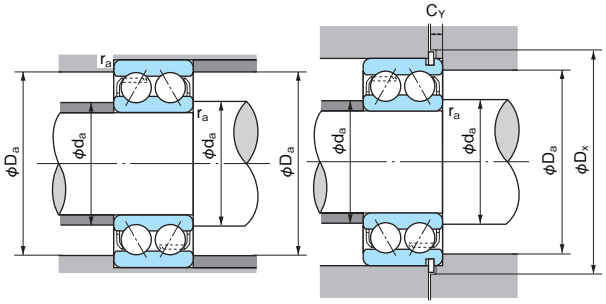
Remark: Dimensions and tolerances of snap ring groove and snap ring are shown on pages 45 to 48.

Double-row Angular Contact Ball Bearings

Bore Diameter: 90～100mm



Open type | One shield (Z) | Two shields (ZZ) | One seal (NS) | Two seals (2NS) | With snap ring groove (N) | With snap ring (NR)



■Dynamic equivalent radial load

Pr=XFr+YFa

Contact angle	e	$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
		X	Y	X	Y
30°	0.80	1.0	0.78	0.63	1.24
20°	0.57	1.0	1.09	0.70	1.63

■Static equivalent radial load

Nominal contact angle 30°：Por=Fr+0.66Fa

Nominal contact angle 20°：Por=Fr+0.84Fa

1N=0.102kgf

Boundary dimensions (mm)				Bearing No.						Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min-1)		Dimensions of snap ring groove and snap ring (mm)					Abutment and fillet dimensions (mm)						Mass (kg)	Bearing No.
d	D	B	r (min)	Open type	Shield type		Seal type		With snap ring groove	With snap ring				D1 (max)	a (max)	b (min)	D2 (max)	f (max)	da (min)	Da (max)	Dx (max)	ra (max)	CY (max)		
90	160	52.4	2	5218	—	—	—	—	5218N	5218NR	138000	133000	2700	3900	155.22	4.9	3.1	169.7	2.82	100	150	172	2	7.4	4.28	5218
	160	52.4	2	5218A	—	—	—	—	5218AN	5218ANR	129000	125000	2500	3500	155.22	4.9	3.1	169.7	2.82	100	150	172	2	7.4	4.28	5218A
95	170	55.6	2.1	5219	—	—	—	—	5219N	5219NR	149000	139000	2600	3700	163.65	5.69	3.5	182.9	3.1	107	158	185	2	8.4	5.02	5219
	170	55.6	2.1	5219A	—	—	—	—	5219AN	5219ANR	139000	131000	2400	3200	163.65	5.69	3.5	182.9	3.1	107	158	185	2	8.4	5.02	5219A
100	180	60.3	2.1	5220	—	—	—	—	5220N	5220NR	168000	159000	2400	3200	173.66	5.69	3.5	192.9	3.1	112	168	195	2	8.4	5.78	5220
	180	60.3	2.1	5220A	—	—	—	—	5220AN	5220ANR	158000	150000	2200	3000	173.66	5.69	3.5	192.9	3.1	112	168	195	2	8.4	5.78	5220A

Remark: Dimensions and tolerances of snap ring groove and snap ring are shown on pages 45 to 48.

NACHI

Self-aligning Ball Bearings

Tolerance ····· Page 52
Internal clearance ····· Page 64
Adapter sleeves ····· Page 592
Withdrawal sleeves ····· Page 592

● Design

Self-aligning Ball Bearings are particularly suitable for applications where misalignment occurs from errors in mounting or from shaft deflection.

For applications where the bearing load (particularly axial load) carrying capacity is insufficient, spherical roller bearings, which have the same self-aligning property, should be used instead.

● Cage

Bearings are fitted with pressed steel cage or polyamide cage.

The suffix G of bearing number on the packing surface indicate polyamide cage.

● Attention

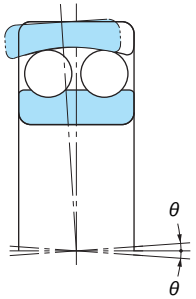
(1) Maximum permissible misalignment angle θ is about 2.5° in the 11 and 22 series, and about 3° in the 13 and 23 series under general service conditions. Care must be taken to provide sufficient clearance between the bearing and surrounding structure when bearing is operating in the full misaligned condition.

(2) Misaligned bearings will have a tendency to become noisy as speed increases. Due to noise-level constraints, the practical maximum misalignment may be considerably less than the maximum misalignment.

(3) The dimension tables show the width of the ball assembly as dimension B1 for larger bore sizes of Self-aligning Ball Bearings where width of the ball assembly extends beyond the ring width envelope.

(4) It is difficult to correctly measure the running clearance of bearings with tapered bore after mounting. Mounting of this type of bearing with tapered bores requires some experience and technique.

(5) The bearings with polyamide cage should be used at less than 120°C operating temperature.

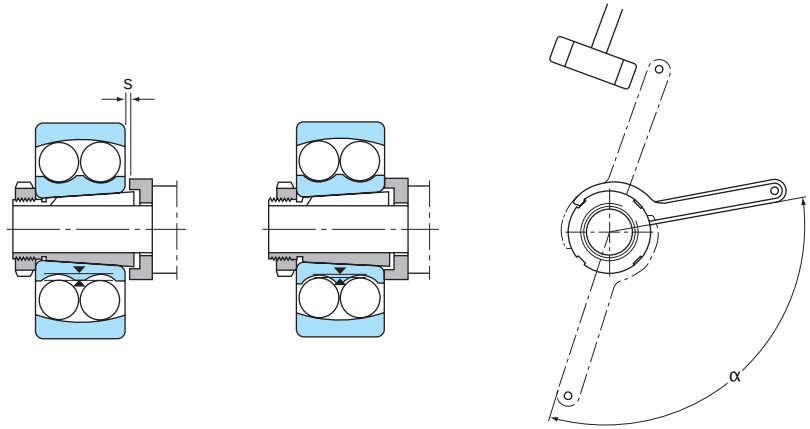


● Mounting bearings with tapered bore

Mounting bearings with a tapered bore requires some experience and technique. Bearings with tapered bore are always mounted with an interference fit on the shaft.

To measure the amount of interference fit on the shaft, the axial displacement of the inner ring or the reduction of radial internal clearance due to the interference fit can be used. Generally, the measurement of reduction in radial internal clearance is a more reliable method than measurement of the axial displacement of the inner ring.

Table 1. Mounting self-aligning ball bearings with tapered bore



Bearing Bore Diameter d (mm)	Tightening Angle α (degree)	Axial displacement s (mm)				Mean residual clearance after mounting bearings with initial clearance	
		Bearings series				Normal (μm)	C3 (μm)
		12K	13K	22K	23K		
20	70	0.22	0.23	–	–	10	20
25	70	0.22	0.23	0.22	0.23	10	20
30	70	0.22	0.23	0.22	0.23	10	20
35	70	0.30	0.30	0.30	0.30	10	20
40	70	0.30	0.30	0.30	0.30	10	20
45	70	0.31	0.34	0.31	0.33	15	25
50	70	0.31	0.34	0.31	0.33	15	25
55	90	0.40	0.41	0.39	0.40	15	30
60	90	0.40	0.41	0.39	0.40	15	30
65	90	0.40	0.41	0.39	0.40	15	30
75	120	0.45	0.47	0.43	0.46	20	40
80	120	0.45	0.47	0.43	0.46	20	40
85	120	0.58	0.60	0.54	0.59	20	40
90	120	0.58	0.60	0.54	0.59	20	40
95	120	0.58	0.60	0.54	0.59	20	40
100	120	0.58	0.60	0.54	0.59	20	40
105	120	0.67	–	0.66	–	25	55
110	120	0.67	0.70	0.66	0.69	25	55
120	120	0.67	–	–	–	25	55

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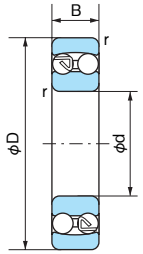
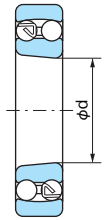
Self-aligning Ball Bearings

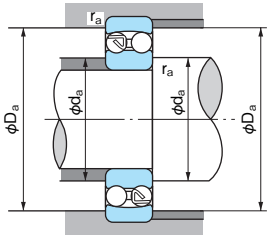
Bore Diameter: 10～40mm



Cylindrical bore



Tapered bore (Taper: 1/12)



■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.65	Y_2

■Static equivalent radial load

Por=Fr+YoFa

Values of e, Y_1, Y_2 and Y_0 from table.

1N=0.102kgf

Boundary dimensions (mm)					Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})		Axial load factor			Constant e	Abutment and fillet dimensions (mm)			Mass (kg) (Reference) Cylindrical bore	Bearing No.
d	D	B	B_1	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Y_1	Y_2	Y_0		da (min)	Da (max)	ra (max)		
10	30	9	—	0.6	**1200**	—	5500	1200	23000	28000	1.92	2.97	2.01	0.33	14	26	0.6	0.034	**1200**
	30	14	—	0.6	**2200**	—	7400	1600	23000	29000	1.07	1.65	1.12	0.59	14	26	0.6	0.047	**2200**
12	32	10	—	0.6	**1201**	—	5600	1250	21000	26000	1.89	2.93	1.98	0.33	16	28	0.6	0.040	**1201**
	32	14	—	0.6	**2201**	—	7650	1750	21000	26000	1.18	1.83	1.24	0.53	16	28	0.6	0.053	**2201**
	37	12	—	1	**1301**	—	9400	2150	18000	22000	1.77	2.74	1.86	0.36	17	32	1.0	0.067	**1301**
	37	17	—	1	**2301**	—	9700	2300	16000	22000	1.17	1.81	1.23	0.54	17	32	1.0	0.095	**2301**
15	35	11	—	0.6	**1202**	—	7450	1750	18000	22000	1.90	2.95	2.00	0.33	19	31	0.6	0.049	**1202**
	35	14	—	0.6	**2202**	—	7700	1850	18000	22000	1.27	1.97	1.33	0.50	19	31	0.6	0.060	**2202**
	42	13	—	1	**1302**	—	9550	2300	16000	20000	1.86	2.88	1.95	0.34	20	37	1.0	0.094	**1302**
	42	17	—	1	**2302**	—	12100	2900	14000	20000	1.27	1.96	1.33	0.50	20	37	1.0	0.114	**2302**
17	40	12	—	0.6	**1203**	—	7900	2000	16000	20000	2.03	3.14	2.12	0.31	21	36	0.6	0.073	**1203**
	40	16	—	0.6	**2203**	—	9800	2400	16000	20000	1.27	1.96	1.33	0.50	21	36	0.6	0.088	**2203**
	47	14	—	1	**1303**	—	12500	3200	14000	17000	1.92	2.97	2.01	0.33	22	42	1.0	0.130	**1303**
	47	19	—	1	**2303**	—	14500	3600	13000	18000	1.28	1.98	1.34	0.49	22	42	1.0	0.158	**2303**
20	47	14	—	1	**1204**	**1204K**	9900	2600	14000	17000	2.16	3.35	2.27	0.29	25	42	1.0	0.120	**1204**
	47	18	—	1	**2204**	**2204K**	12600	3300	14000	17000	1.31	2.02	1.37	0.48	25	42	1.0	0.140	**2204**
	52	15	—	1.1	**1304**	**1304K**	12400	3300	13000	15000	2.12	3.28	2.22	0.30	26.5	45.5	1.0	0.163	**1304**
	52	21	—	1.1	**2304**	**2304K**	18000	4700	11000	15000	1.29	2.00	1.35	0.49	26.5	45.5	1.0	0.209	**2304**
25	52	15	—	1	**1205**	**1205K**	12100	3300	12000	14000	2.28	3.52	2.39	0.28	30	47	1.0	0.141	**1205**
	52	18	—	1	**2205**	**2205K**	12600	3500	12000	15000	1.58	2.45	1.66	0.40	30	47	1.0	0.163	**2205**
	62	17	—	1.1	**1305**	**1305K**	18000	5000	9900	12000	2.31	3.57	2.42	0.27	31.5	55.5	1.0	0.257	**1305**
	62	24	—	1.1	**2305**	**2305K**	24400	6600	9400	13000	1.36	2.10	1.42	0.46	31.5	55.5	1.0	0.335	**2305**
30	62	16	—	1	**1206**	**1206K**	15600	4650	9900	12000	2.55	3.94	2.67	0.25	35	57	1.0	0.220	**1206**
	62	20	—	1	**2206**	**2206K**	15600	4650	10000	12000	1.79	2.77	1.87	0.35	35	57	1.0	0.260	**2206**
	72	19	—	1.1	**1306**	**1306K**	21300	6300	8700	11000	2.40	3.72	2.52	0.26	36.5	65.5	1.0	0.387	**1306**
	72	27	—	1.1	**2306**	**2306K**	31400	8750	8000	11000	1.44	2.23	1.51	0.44	36.5	65.5	1.0	0.500	**2306**
35	72	17	—	1.1	**1207**	**1207K**	15800	5100	8500	10000	2.71	4.20	2.84	0.23	41.5	65.5	1.0	0.323	**1207**
	72	23	—	1.1	**2207**	**2207K**	21600	6600	8500	10000	1.71	2.65	1.79	0.37	41.5	65.5	1.0	0.403	**2207**
	80	21	—	1.5	**1307**	**1307K**	25100	7850	7600	9300	2.48	3.84	2.60	0.25	43	72	1.5	0.510	**1307**
	80	31	—	1.5	**2307**	**2307K**	39400	11300	7100	9800	1.39	2.15	1.46	0.45	43	72	1.5	0.675	**2307**
40	80	18	—	1.1	**1208**	**1208K**	19200	6500	7500	9200	2.83	4.38	2.97	0.22	46.5	73.5	1.0	0.417	**1208**
	80	23	—	1.1	**2208**	**2208K**	22400	7400	7600	9300	1.92	2.96	2.01	0.33	46.5	73.5	1.0	0.505	**2208**
	90	23	—	1.5	**1308**	**1308K**	29500	9700	6900	8400	2.57	3.98	2.69	0.25	48	82	1.5	0.715	**1308**
	90	33	—	1.5	**2308**	**2308K**	44900	13500	6200	8600	1.47	2.27	1.54	0.43	48	82	1.5	0.925	**2308**

Remarks: 1. Suffix K means with a tapered bore (1/12)
2. Dimension B1 is the width of the ball assembly extends beyond the ring width dimension.

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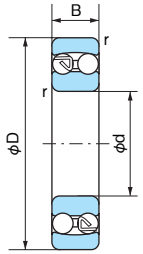
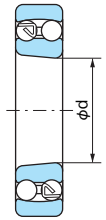
Self-aligning Ball Bearings

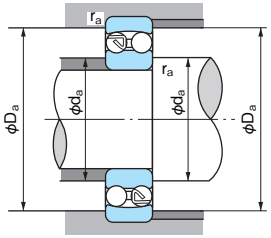
Bore Diameter: 45～80mm



Cylindrical bore



Tapered bore (Taper: 1/12)



■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.65	Y_2

■Static equivalent radial load

Por=Fr+YoFa

Values of e, Y_1, Y_2 and Y_0 from table.

1N=0.102kgf

Boundary dimensions (mm)					Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)		Limiting speed (min^{-1})		Axial load factor			Constant e	Abutment and fillet dimensions (mm)			Mass (kg) (Reference) Cylindrical bore	Bearing No.
d	D	B	B_1	r (min)	Cylindrical bore	Tapered bore				Grease lubrication	Oil lubrication	Y_1	Y_2	Y_0		da (min)	Da (max)	ra (max)		
45	85	19	—	1.1	**1209**	**1209K**	21800	7350		7000	8500	2.94	4.56	3.09	0.21	51.5	78.5	1.0	0.465	**1209**
	85	23	—	1.1	**2209**	**2209K**	23300	8150		7000	8500	2.09	3.23	2.19	0.30	51.5	78.5	1.0	0.545	**2209**
	100	25	—	1.5	**1309**	**1309K**	38100	12700		6100	7500	2.56	3.95	2.68	0.25	53	92	1.5	0.957	**1309**
	100	36	—	1.5	**2309**	**2309K**	54400	16700		5600	7700	1.51	2.33	1.58	0.42	53	92	1.5	1.23	**2309**
50	90	20	—	1.1	**1210**	**1210K**	22700	8100		6500	7900	3.07	4.76	3.22	0.21	56.5	83.5	1.0	0.525	**1210**
	90	23	—	1.1	**2210**	**2210K**	23300	8500		6500	7900	2.33	3.61	2.45	0.27	56.5	83.5	1.0	0.590	**2210**
	110	27	—	2	**1310**	**1310K**	43400	14100		5600	6800	2.70	4.17	2.83	0.23	59	101	2.0	1.21	**1310**
	110	40	—	2	**2310**	**2310K**	64600	20300		5100	7000	1.56	2.41	1.63	0.40	59	101	2.0	1.64	**2310**
55	100	21	—	1.5	**1211**	**1211K**	26800	10000		5800	7100	3.19	4.94	3.34	0.20	63	92	1.5	0.705	**1211**
	100	25	—	1.5	**2211**	**2211K**	26800	10000		5800	7100	2.35	3.64	2.47	0.27	63	92	1.5	0.810	**2211**
	120	29	—	2	**1311**	**1311K**	51300	17900		5000	6200	2.70	4.18	2.83	0.23	64	111	2.0	1.58	**1311**
	120	43	—	2	**2311**	**2311K**	75300	24000		4600	6400	1.53	2.37	1.60	0.41	64	111	2.0	2.10	**2311**
60	110	22	—	1.5	**1212**	**1212K**	30200	11500		5200	6400	3.37	5.22	3.53	0.19	68	102	1.5	0.900	**1212**
	110	28	—	1.5	**2212**	**2212K**	34100	12600		5300	6500	2.26	3.49	2.36	0.28	68	102	1.5	1.09	**2212**
	130	31	—	2.1	**1312**	**1312K**	57200	20800		4500	5500	2.91	4.50	3.05	0.22	71	119	2.0	1.96	**1312**
	130	46	—	2.1	**2312**	**2312K**	87200	28300		4200	5800	1.62	2.51	1.70	0.39	71	119	2.0	2.60	**2312**
65	120	23	—	1.5	**1213**	**1213K**	31000	12500		4800	5800	3.67	5.68	3.84	0.17	73	112	1.5	1.15	**1213**
	120	31	—	1.5	**2213**	**2213K**	43500	16400		4900	5900	2.24	3.47	2.35	0.28	73	112	1.5	1.46	**2213**
	140	33	—	2.1	**1313**	**1313K**	61700	22900		4300	5200	2.73	4.23	2.86	0.23	76	129	2.0	2.45	**1313**
	140	48	—	2.1	**2313**	**2313K**	95800	32500		3800	5300	1.66	2.58	1.74	0.38	76	129	2.0	3.23	**2313**
70	125	24	—	1.5	**1214**	—	34600	13800		4600	5700	3.48	5.38	3.64	0.18	78	117	1.5	1.26	**1214**
	125	31	—	1.5	**2214**	—	43900	17100		4600	5600	2.42	3.74	2.53	0.26	78	117	1.5	1.52	**2214**
	150	35	—	2.1	**1314**	—	74000	27700		4000	4900	2.84	4.40	2.98	0.22	81	139	2.0	2.99	**1314**
	150	51	—	2.1	**2314**	—	89600	31700		3600	4900	1.82	2.82	1.91	0.35	81	139	2.0	4.23	**2314**
75	130	25	—	1.5	**1215**	**1215K**	38800	15700		4300	5300	3.60	5.58	3.77	0.17	83	122	1.5	1.36	**1215**
	130	31	—	1.5	**2215**	**2215K**	44200	17800		4300	5300	2.49	3.85	2.61	0.25	83	122	1.5	1.62	**2215**
	160	37	—	2.1	**1315**	**1315K**	78900	29900		4000	4900	2.80	4.33	2.93	0.23	86	149	2.0	3.56	**1315**
	160	55	—	2.1	**2315**	**2315K**	103000	36800		3400	4600	1.86	2.88	1.95	0.34	86	149	2.0	5.13	**2315**
80	140	26	—	2	**1216**	**1216K**	39800	17000		4000	4900	3.90	6.03	4.08	0.16	89	131	2.0	1.67	**1216**
	140	33	—	2	**2216**	**2216K**	49000	19900		4100	5000	2.42	3.75	2.54	0.26	89	131	2.0	2.01	**2216**
	170	39	—	2.1	**1316**	**1316K**	88100	33100		3500	4300	2.90	4.49	3.04	0.22	91	159	2.0	4.18	**1316**
	170	58	—	2.1	**2316**	**2316K**	129000	45700		3100	4300	1.87	2.90	1.96	0.34	91	159	2.0	6.10	**2316**

Remarks: 1. Suffix K means with a tapered bore (1/12)

2. Dimension B1 is the width of the ball assembly extends beyond the ring width dimension.

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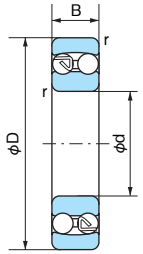
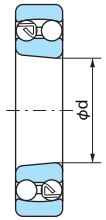
Self-aligning Ball Bearings

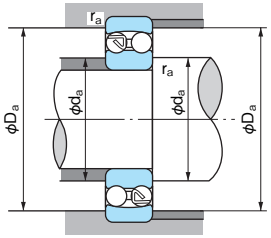
Bore Diameter: 85～110mm



Cylindrical bore



Tapered bore (Taper: 1/12)



■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.65	Y_2

■Static equivalent radial load

Por=Fr+YoFa

Values of e, Y_1, Y_2 and Y_0 from table.

1N=0.102kgf

Boundary dimensions (mm)					Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})		Axial load factor			Constant e	Abutment and fillet dimensions (mm)			Mass (kg) (Reference) Cylindrical bore	Bearing No.
d	D	B	B_1	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Y_1	Y_2	Y_0		da (min)	Da (max)	ra (max)		
85	150	28	—	2	**1217**	**1217K**	49200	20800	3800	4600	3.61	5.59	3.78	0.17	94	141	2	2.07	**1217**
	150	36	—	2	**2217**	**2217K**	58300	23600	3800	4600	2.49	3.85	2.61	0.25	94	141	2	2.52	**2217**
	180	41	—	3	**1317**	**1317K**	97300	37800	3300	4000	2.93	4.53	3.07	0.22	98	167	2.5	4.98	**1317**
	180	60	—	3	**2317**	**2317K**	141000	51500	3000	4100	1.82	2.82	1.91	0.35	98	167	2.5	7.05	**2317**
90	160	30	—	2	**1218**	**1218K**	56800	23400	3500	4300	3.69	5.70	3.86	0.17	99	151	2	2.52	**1218**
	160	40	—	2	**2218**	**2218K**	67700	27200	3500	4300	2.39	3.71	2.51	0.26	99	151	2	3.40	**2218**
	190	43	—	3	**1318**	**1318K**	116000	44400	3100	3800	2.81	4.35	2.94	0.22	103	177	2.5	5.80	**1318**
	190	64	—	3	**2318**	**2318K**	153000	57900	2800	3900	1.84	2.85	1.93	0.34	103	177	2.5	8.44	**2318**
95	170	32	—	2.1	**1219**	**1219K**	57000	24300	3300	4000	3.63	5.62	3.80	0.17	106	159	2	3.10	**1219**
	170	43	—	2.1	**2219**	**2219K**	82700	34300	3300	4000	2.43	3.76	2.55	0.26	106	159	2	4.10	**2219**
	200	45	48.2	3	**1319**	**1319K**	132000	50800	2900	3600	2.73	4.23	2.86	0.23	108	187	2.5	6.69	**1319**
	200	67	—	3	**2319**	**2319K**	166000	64800	2700	3700	1.82	2.82	1.91	0.35	108	187	2.5	9.79	**2319**
100	180	34	—	2.1	**1220**	**1220K**	69000	29700	3100	3800	3.62	5.60	3.79	0.17	111	169	2	3.70	**1220**
	180	46	—	2.1	**2220**	**2220K**	80900	34000	3100	3800	2.57	3.98	2.70	0.24	111	169	2	4.98	**2220**
	215	47	52	3	**1320**	**1320K**	143000	57300	2800	3400	2.66	4.11	2.78	0.24	113	202	2.5	8.30	**1320**
	215	73	—	3	**2320**	**2320K**	183000	73400	2400	3400	1.84	2.85	1.93	0.34	113	202	2.5	12.4	**2320**
105	190	36	—	2.1	**1221**	—	77000	34000	2900	3600	3.56	5.51	3.73	0.18	116	179	2	4.37	**1221**
	190	50	—	2.1	**2221**	—	94900	40100	3000	3600	2.43	3.76	2.55	0.26	116	179	2	6.07	**2221**
	225	49	54	3	**1321**	—	149000	60200	2600	3200	2.73	4.22	2.86	0.23	118	212	2.5	10.0	**1321**
	225	77	—	3	**2321**	—	187000	78000	2300	3200	1.75	2.71	1.83	0.36	118	212	2.5	14.3	**2321**
110	200	38	—	2.1	**1222**	**1222K**	80200	35200	2800	3400	3.64	5.63	3.81	0.17	121	189	2	5.15	**1222**
	200	53	—	2.1	**2222**	**2222K**	120000	48900	2800	3400	2.41	3.73	2.53	0.26	121	189	2	7.10	**2222**
	240	50	55.2	3	**1322**	**1322K**	150000	63200	2400	3000	2.82	4.37	2.96	0.22	123	227	2.5	11.8	**1322**
	240	80	—	3	**2322**	**2322K**	200000	85700	2200	3000	1.82	2.82	1.91	0.35	123	227	2.5	17.3	**2322**

Remarks: 1. Suffix K means with a tapered bore (1/12)

2. Dimension B1 is the width of the ball assembly extends beyond the ring width dimension.

NACHI

Cylindrical Roller Bearings

Tolerance ····· Page 52
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Axial load capacity ····· Page 34

● Designs and Configurations

NACHI Cylindrical Roller Bearings are produced in a wide variety of designs and configurations.

● Conventional Design

Cylindrical Roller Bearings of conventional design are available in 10 configurations as shown in Fig. 1. Configurations N, NU, NN and NNU will not sustain axial loading. These configurations must be used as the float end bearing.

Configurations NF, NJ, NUH are designed with the capability of sustaining axial loading in one direction. Configuration NUH is basically an NU bearing with an addition of a guide ring (an "L" ring).

The NUH dimensional data is the same as the NH bearing configuration.

Configuration NF, NJ, and NUH can sustain axial loading in one direction.

Configuration NH, NP, and NUP have bi-directional thrust load-carrying-capability.

- The suffix of the bearing number indicates:
  E: high capacity
  G: polyamide cage
- The bearing with polyamide cage should be used at less than 120˚C operating temperature.

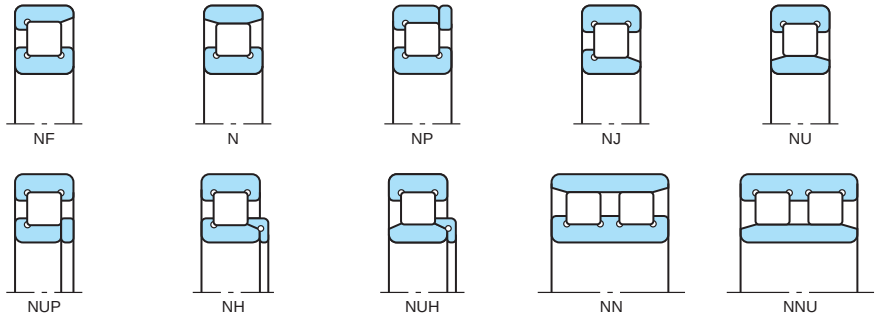


Fig 1. Cylindrical Roller Bearing Configurations

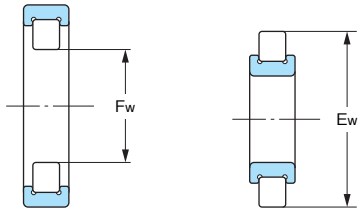
Table 1. Cylindrical Roller Bearing Standard Cage

Bearing series	Pressed Steel	Machined Brass
NU10	1007～1038	1040～10/500
NU2	203～ 228	230～ 264
NU22	2204～2226	2228～2252
NU3	304～ 324	326～ 352
NU23	2304～2319	2320～2340
NU4	405～ 416	417～ 430

● Interchangeable Bearings

Interchangeable cylindrical roller bearing means that a separable ring can be replaced by another ring of the bearing with the same bearing number without impairing the function of the bearing.

Table 2. Interchangeable Cylindrical Roller Bearings: Tolerance of Inscribed (Fw) and Circumscribed (Ew) Diameters



Unit: µm

Nominal bore dia. d (mm)		Tolerance of Fw		Tolerance of Ew	
Over	Incl.	High	Low	High	Low
—	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	—	—

● Radial Internal Clearance

The initial radial internal clearance of the bearing should be determined for optimal bearing operation.

The following procedure should be observed to determine the proper initial radial internal clearance:

(a) Place the bearing in an upright position with inner/outer ring faces parallel.
(b) Place thumbs on inner ring bore and oscillate inner ring two or three times, pressing down firmly. This "seats" the inner ring and rollers.
(c) Position the individual roller assemblies so that a roller is at the top of inner ring - on both sides of the bearing.
(d) Press the two rollers inward to assure contact with the center guide ring as well as the inner ring raceway.
(e) With the rollers in correct position, insert a thin feeler gauge between the rollers and the raceway. Caution : DO NOT ROLL THE BEARING.
(f) Move it carefully over the top roller between the roller and outer raceway.
(g) Repeat this procedure, using progressively thicker feeler gauge until one is found that will not go through.
(h) The gauge thickness that preceded the "No - GO" gauge is the radial internal clearance.

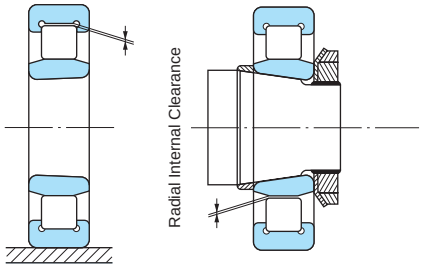
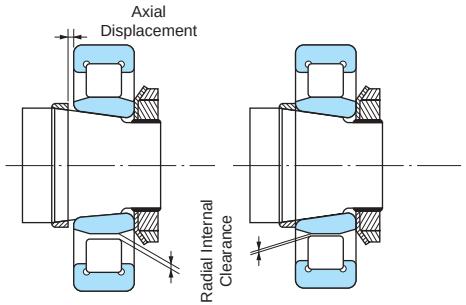


Table 3. Mounting cylindrical roller bearings with tapered bore



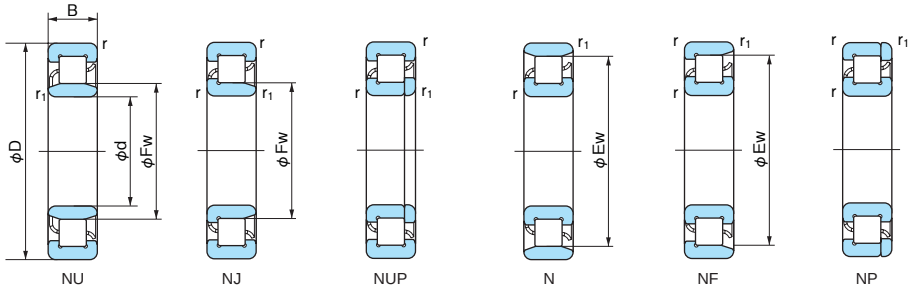
Unit: µm

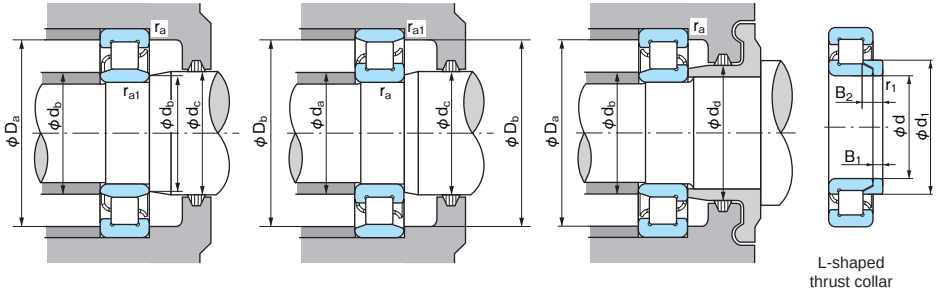
Bearing Bore Diameter d (mm)		Radial Clearance Reduction (mm)		Axial displacement Taper 1:12			
				Direct Mounting on the shaft (mm)		With Adapter Assemblies (mm)	
Over	Incl.	min	max	min	max	max	min
40	50	0.025	0.030	0.40	0.50	0.55	0.60
50	65	0.030	0.035	0.50	0.55	0.60	0.70
65	80	0.030	0.040	0.50	0.65	0.60	0.75
80	100	0.035	0.045	0.55	0.70	0.70	0.85
100	120	0.040	0.050	0.65	0.80	0.75	0.90
120	140	0.045	0.055	0.70	0.85	0.85	1.00
140	160	0.045	0.060	0.70	0.95	0.85	1.05
160	180	0.050	0.065	0.80	1.00	0.90	1.15
180	200	0.055	0.070	0.85	1.10	1.00	1.20
200	225	0.065	0.080	1.00	1.25	1.15	1.35
225	250	0.070	0.085	1.10	1.30	1.20	1.45
250	280	0.075	0.095	1.15	1.45	1.30	1.60
280	315	0.080	0.100	1.25	1.55	1.35	1.65
315	355	0.095	0.115	1.45	1.75	1.60	1.90
355	400	0.100	0.125	1.55	1.90	1.65	2.05
400	450	0.115	0.140	1.80	2.20	1.90	2.30
450	500	0.130	0.160	2.00	2.50	2.10	2.60

Note: 1. The axial displacement values are applied for mounting on a solid shaft. In case of a hollow shaft, larger axial displacement should be applied.
2. It is imperative to check radial internal clearance after mounting when ;
- The initial unmounted radial internal clearance is in the lower half of the tolerance range.
- There is a temperature difference between the inner and outer rings under operating conditions.
Internal clearance after mounting must be above the values shown in the table.

Cylindrical Roller Bearings

Bore Diameter: 17～30mm





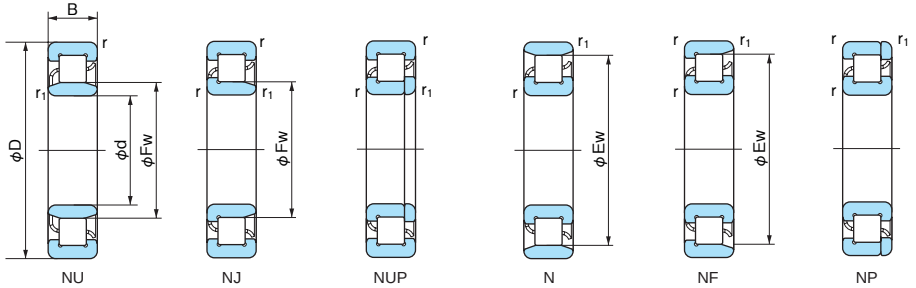
1N=0.102kgf

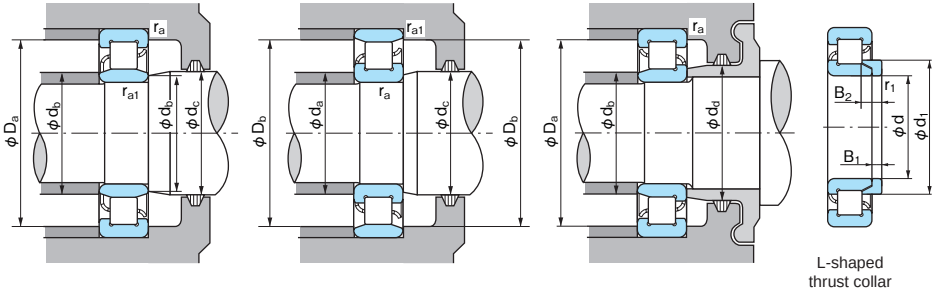
Boundary dimensions (mm)							Bearing No.						Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min⁻¹)(1)		Abutment and fillet dimensions (mm)										Mass (kg)		Dimensions of L-shaped thrust collar (mm)						
d	D	B	Ew	Fw	r (min)	r1 (min)	NU	NJ	NUP	N	NF	NP			Grease lubrication	Oil lubrication	da (min)	db (min)	db (max)	dc (min)	dd (min)	Da (max)	Db (max)	Db (min)	ra (max)	ra1 (max)			NU	N	Bearing No.	d	d1 (max)	B1	B2	r1 (min)	Mass (kg) Reference
17	40	12	33.9	22.9	0.6	0.3	NU 203	NJ	NUP	N	NF	NP	12600	7950	16000	19000	22	19	22	24	25	35	34	34	0.6	0.3	0.082	0.080	—	—	—	—	—	—	—	—
20	47	14	40	27	1	0.6	NU 204	NJ	NUP	N	NF	NP	15400	12700	15000	18000	26	25	26	29	32	41	42	42	1	0.6	0.112	0.110	HJ 204	20	30	3	6.75	0.6	0.012
	47	14	—	26.5	1	0.6	NU 204 E	NJ	NUP	—	—	—	25700	22600	13000	16000	—	25	26	29	32	41	—	—	1	0.6	0.124	—	HJ 204 E	20	29.8	3	5.5	0.6	0.011
	47	18	—	27	1	0.6	NU 2204	NJ	NUP	—	—	—	20700	18400	14000	17000	—	25	26	29	32	41	—	—	1	0.6	0.144	—	HJ 2204	20	30	3	7.5	0.6	0.012
	47	18	—	26.5	1	0.6	NU 2204 E	NJ	NUP	—	—	—	30500	28300	13000	16000	—	25	26	29	32	41	—	—	1	0.6	0.162	—	HJ 2204 E	20	29.8	3	6.5	0.6	0.011
	52	15	44.5	28.5	1.1	0.6	NU 304	NJ	NUP	N	NF	NP	21400	17300	12000	15000	27	25	27	30	33	45	47	47	1	0.6	0.154	0.150	HJ 304	20	31.8	4	7.5	0.6	0.017
	52	15	—	27.5	1.1	0.6	NU 304 EG	NJ	NUP	—	—	—	31500	26900	12000	15000	—	25	27	30	33	45	—	—	1	0.6	0.150	—	HJ 304 E	20	31.4	4	6.5	0.6	0.016
	52	21	—	28.5	1.1	0.6	NU 2304	NJ	NUP	—	—	—	30500	27200	11000	14000	—	25	27	30	33	45	—	—	1	0.6	0.213	—	HJ 2304	20	31.8	4	8.5	0.6	0.018
	52	21	—	27.5	1.1	0.6	NU 2304 E	NJ	NUP	—	—	—	42000	39000	11000	14000	—	25	27	30	33	45	—	—	1	0.6	0.240	—	HJ 2304 E	20	31.4	4	7.5	0.6	0.017
25	47	12	41.5	30.5	0.6	0.3	NU 1005	—	—	N	—	—	14300	13100	15000	18000	29	27.5	30	32	—	42	45	41.8	0.6	0.3	0.086	0.084	—	—	—	—	—	—	—	—
	52	15	45	32	1	0.6	NU 205	NJ	NUP	N	NF	NP	17700	15700	13000	16000	31	30	31	34	37	46	47	47	1	0.6	0.133	0.130	HJ 205	25	35	3	7.25	0.6	0.015
	52	15	—	31.5	1	0.6	NU 205 EG	NJ	NUP	—	—	—	29300	27700	12000	14000	—	30	31	34	37	46	—	—	1	0.6	0.140	—	HJ 205 E	25	34.8	3	6	0.6	0.013
	52	18	—	32	1	0.6	NU 2205	NJ	NUP	—	—	—	24300	23500	12000	14000	—	30	31	34	37	46	—	—	1	0.6	0.163	—	HJ 2205	25	35	3	7.5	0.6	0.016
	52	18	—	31.5	1	0.6	NU 2205 EG	NJ	NUP	—	—	—	35000	34500	12000	14000	—	30	31	34	37	46	—	—	1	0.6	0.185	—	HJ 2205 E	25	34.8	3	6.5	0.6	0.015
	62	17	53	35	1.1	1.1	NU 305	NJ	NUP	N	NF	NP	29300	25200	10000	13000	32	32	33	37	40	55	55	55	1	1	0.238	0.230	HJ 305	25	39	4	8	1.1	0.027
	62	17	—	34	1.1	1.1	NU 305 EG	NJ	NUP	—	—	—	41500	37500	10000	12000	—	32	33	37	40	55	—	—	1	1	0.240	—	HJ 305 E	25	38.2	4	7	1.1	0.024
	62	24	—	35	1.1	1.1	NU 2305	NJ	NUP	—	—	—	42500	41000	9300	11000	—	32	33	37	40	55	—	—	1	1	0.340	—	HJ 2305	25	39	4	9	1.1	0.029
	62	24	—	34	1.1	1.1	NU 2305 E	NJ	NUP	—	—	—	57000	56000	9000	11000	—	32	33	37	40	55	—	—	1	1	0.390	—	HJ 2305 E	25	38.2	4	8	1.1	0.026
	80	21	62.8	38.8	1.5	1.5	NU 405	NJ	NUP	N	NF	NP	46500	40000	9000	11000	33.5	33.5	38	41	46	71.5	71.5	64	1.5	1.5	0.564	0.550	HJ 405	25	43.6	6	10.5	1.5	0.054
30	55	13	48.5	36.5	1	0.6	NU 1006	—	—	N	—	—	19700	19600	12000	15000	35	33.5	35	38	—	49	52	49	1	0.6	0.123	0.121	—	—	—	—	—	—	—	—
	62	16	53.5	38.5	1	0.6	NU 206	NJ	NUP	N	NF	NP	23500	21500	11000	13000	36	35	37	40	44	56	57	56	1	0.6	0.204	0.200	HJ 206	30	41.8	4	8.25	0.6	0.026
	62	16	—	37.5	1	0.6	NU 206 EG	NJ	NUP	—	—	—	39000	37500	9500	12000	—	35	37	40	44	56	—	—	1	0.6	0.210	—	HJ 206 E	30	41.4	4	7	0.6	0.024
	62	20	—	38.5	1	0.6	NU 2206	NJ	NUP	—	—	—	33000	33000	10000	12000	—	35	37	40	44	56	—	—	1	0.6	0.262	—	HJ 2206	30	41.8	4	8.5	0.6	0.026
	62	20	—	37.5	1	0.6	NU 2206 EG	NJ	NUP	—	—	—	49000	50000	9500	12000	—	35	37	40	44	56	—	—	1	0.6	0.295	—	HJ 2206 E	30	41.4	4	7.5	0.6	0.025
	72	19	62	42	1.1	1.1	NU 306	NJ	NUP	N	NF	NP	38500	35000	8500	11000	37	37	40	44	48	65	65	64	1	1	0.357	0.350	HJ 306	30	45.9	5	9.5	1.1	0.044
	72	19	—	40.5	1.1	1.1	NU 306 EG	NJ	NUP	—	—	—	53000	50000	8500	10000	—	37	40	44	48	65	—	—	1	1	0.370	—	HJ 306 E	30	45.1	5	8.5	1.1	0.041
	72	27	—	42	1.1	1.1	NU 2306	NJ	NUP	—	—	—	51500	51000	8200	9800	—	37	40	44	48	65	—	—	1	1	0.500	—	HJ 2306	30	45.9	5	11.5	1.1	0.048
	72	27	—	40.5	1.1	1.1	NU 2306 E	NJ	NUP	—	—	—	74500	77500	8000	9500	—	37	40	44	48	65	—	—	1	1	0.585	—	HJ 2306 E	30	45.1	5	9.5	1.1	0.043
	90	23	73	45	1.5	1.5	NU 406	NJ	NUP	N	NF	NP	62500	55000	7500	9500	38.5	38.5	44	47	52	81.5	81.5	74	1.5	1.5	0.770	0.750	HJ 406	30	50.5	7	11.5	1.5	0.080

Note: (1) The dimension table shows limiting speed for bearings made with machined cages. For bearings made with pressed steel cages, multiply the table limits by 0.8.

Cylindrical Roller Bearings

Bore Diameter: 35～45mm





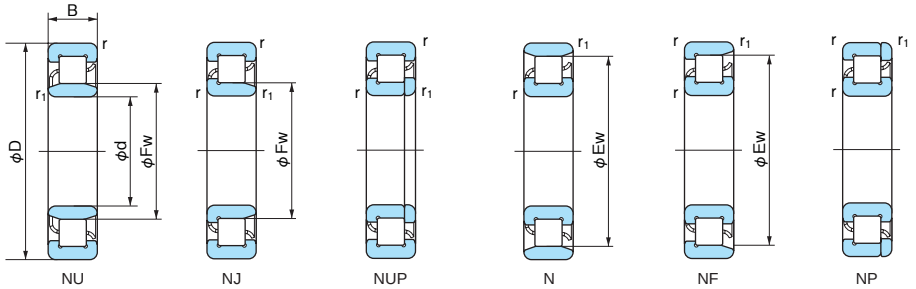
1N=0.102kgf

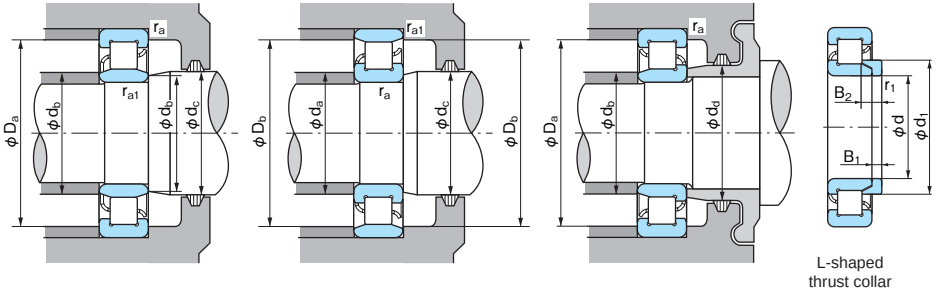
Boundary dimensions (mm)							Bearing No.						Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min⁻¹)(1)		Abutment and fillet dimensions (mm)										Mass (kg)		Dimensions of L-shaped thrust collar (mm)						
d	D	B	Ew	Fw	r (min)	r1 (min)	NU	NJ	NUP	N	NF	NP			Grease lubrication	Oil lubrication	da (min)	db (min)	db (max)	dc (min)	dd (min)	Da (max)	Db (max)	Db (min)	ra (max)	ra1 (max)	NU	N	Bearing No.	d	d1 (max)	B1	B2	r1 (min)	Mass (kg) Reference
35	62	14	55	42	1	0.6	NU 1007	—	—	N	—	—	22600	23200	11000	13000	40	38.5	41	44	—	56	59	55.5	1	0.6	0.185	0.182	—	—	—	—	—	—	—	—
	72	17	61.8	43.8	1.1	0.6	NU 207	NJ	NUP	N	NF	NP	33500	31500	9500	11000	42	40	43	46	50	65	67	64	1	0.6	0.295	0.290	HJ 207	35	47.6	4	8	0.6	0.032
	72	17	—	44	1.1	0.6	NU 207 EG	NJ	NUP	—	—	—	50500	50000	8500	10000	—	40	43	46	50	65	—	—	1	0.6	0.300	—	HJ 207 E	35	48.2	4	7	0.6	0.032
	72	23	—	43.8	1.1	0.6	NU 2207	NJ	NUP	—	—	—	49000	51000	8500	10000	—	40	43	46	50	65	—	—	1	0.6	0.402	—	HJ 2207	35	47.6	4	8.5	0.6	0.033
	72	23	—	44	1.1	0.6	NU 2207 EG	NJ	NUP	—	—	—	61500	65000	8500	10000	—	40	43	46	50	65	—	—	1	0.6	0.446	—	HJ 2207 E	35	48.2	4	8.5	0.6	0.035
	80	21	68.2	46.2	1.5	1.1	NU 307	NJ	NUP	N	NF	NP	49500	47000	8000	9500	43.5	42	45	48	53	71.5	73	71	1.5	1	0.470	0.460	HJ 307	35	50.8	6	11	1.1	0.060
	80	21	—	46.2	1.5	1.1	NU 307 EG	NJ	NUP	—	—	—	66500	65500	7500	9500	—	42	45	48	53	71.5	—	—	1.5	1	0.490	—	HJ 307 E	35	51.1	6	9.5	1.1	0.058
	80	31	—	46.2	1.5	1.1	NU 2307	NJ	NUP	—	—	—	60500	60000	7200	8600	—	42	45	48	53	71.5	—	—	1.5	1	0.696	—	HJ 2307	35	50.8	6	14	1.1	0.067
	80	31	—	46.2	1.5	1.1	NU 2307 E	NJ	NUP	—	—	—	99000	109000	6800	8500	—	42	45	48	53	71.5	—	—	1.5	1	0.780	—	HJ 2307 E	35	51.1	6	11	1.1	0.062
	100	25	83	53	1.5	1.5	NU 407	NJ	NUP	—	NF	NP	75500	69000	6700	8000	43.5	43.5	52	55	61	91.5	91.5	84	1.5	1.5	1.05	1.02	HJ 407	35	59	8	13	1.5	0.120
40	68	15	61	47	1	0.6	NU 1008	—	—	N	—	—	27300	29000	10000	12000	45	45	46	49	—	62	64	61.5	1	0.6	0.226	0.223	—	—	—	—	—	—	—	—
	80	18	70	50	1.1	1.1	NU 208	NJ	NUP	N	NF	NP	43500	43000	8500	10000	47	47	49	52	56	73	73	72	1	1	0.369	0.360	HJ 208	40	54.2	5	9	1.1	0.049
	80	18	—	49.5	1.1	1.1	NU 208 EG	NJ	NUP	—	—	—	55500	55500	9500	9000	—	47	49	52	56	73	—	—	1	1	0.380	—	HJ 208 E	40	54.1	5	8.5	1.1	0.047
	80	23	—	50	1.1	1.1	NU 2208	NJ	NUP	—	—	—	58000	62000	7500	9000	—	47	49	52	56	73	—	—	1	1	0.490	—	HJ 2208	40	54.2	5	9.5	1.1	0.050
	80	23	—	49.5	1.1	1.1	NU 2208 EG	NJ	NUP	—	—	—	72500	77500	7500	9000	—	47	49	52	56	73	—	—	1	1	0.743	—	HJ 2208 E	40	54.1	5	9	1.1	0.049
	90	23	77.5	53.5	1.5	1.5	NU 308	NJ	NUP	N	NF	NP	58500	57000	6700	8500	48.5	48.5	51	55	60	81.5	81.5	80	1.5	1.5	0.665	0.650	HJ 308	40	58.4	7	12.5	1.5	0.090
	90	23	—	52	1.5	1.5	NU 308 EG	NJ	NUP	—	—	—	83000	81500	6700	8000	—	48.5	51	55	60	81.5	—	—	1.5	1.5	0.670	—	HJ 308 E	40	57.7	7	11	1.5	0.084
	90	33	—	53.5	1.5	1.5	NU 2308	NJ	NUP	—	—	—	82500	88000	6500	7800	—	48.5	51	55	60	81.5	—	—	1.5	1.5	0.956	—	HJ 2308	40	58.4	7	14.5	1.5	0.097
	90	33	—	52	1.5	1.5	NU 2308 E	NJ	NUP	—	—	—	114000	122000	6400	7700	—	48.5	51	55	60	81.5	—	—	1.5	1.5	1.05	—	HJ 2308 E	40	57.7	7	12.5	1.5	0.090
	110	27	92	58	2	2	NU 408	NJ	NUP	N	NF	NP	95500	89000	6000	7500	50	50	57	60	67	100	100	93	2	2	1.33	1.30	HJ 408	40	64.8	8	13	2	0.144
45	75	16	67.5	52.5	1	0.6	NU 1009	—	—	N	—	—	32500	35500	9000	11000	50	50	52	54	—	69	71	68	1	0.6	0.284	0.289	—	—	—	—	—	—	—	—
	85	19	75	55	1.1	1.1	NU 209	NJ	NUP	N	NF	NP	46000	47000	7500	9000	52	52	54	57	61	78	78	77	1	1	0.430	0.420	HJ 209	45	59	5	9.5	1.1	0.054
	85	19	—	54.5	1.1	1.1	NU 209 EG	NJ	NUP	—	—	—	63000	66500	7000	8500	—	52	54	57	61	78	—	—	1	1	0.440	—	HJ 209 E	45	59.1	5	8.5	1.1	0.053
	85	23	—	55	1.1	1.1	NU 2209	NJ	NUP	—	—	—	61500	68000	7400	8900	—	52	54	57	61	78	—	—	1	1	0.536	—	HJ 2209	45	59	5	9.5	1.1	0.054
	85	23	—	54.5	1.1	1.1	NU 2209 EG	NJ	NUP	—	—	—	76000	84500	7000	8500	—	52	54	57	61	78	—	—	1	1	0.593	—	HJ 2209 E	45	59.1	5	9	1.1	0.054
	100	25	86.5	58.5	1.5	1.5	NU 309	NJ	NUP	N	NF	NP	78500	77500	6300	7500	53.5	53.5	57	60	66	91.5	91.5	89	1.5	1.5	0.871	0.850	HJ 309	45	64	7	12.5	1.5	0.105
	100	25	—	58.5	1.5	1.5	NU 309 EG	NJ	NUP	—	—	—	97500	98500	6000	7500	—	53.5	57	60	66	91.5	—	—	1.5	1.5	0.910	—	HJ 309 E	45	64.5	7	11.5	1.5	0.103
	100	36	—	58.5	1.5	1.5	NU 2309	NJ	NUP	—	—	—	99000	104000	6100	7300	—	53.5	57	60	66	91.5	—	—	1.5	1.5	1.25	—	HJ 2309	45	64	7	15	1.5	0.115
	100	36	—	58.5	1.5	1.5	NU 2309 E	NJ	NUP	—	—	—	137000	153000	6000	7200	—	53.5	57	60	66	91.5	—	—	1.5	1.5	1.40	—	HJ 2309 E	45	64.5	7	13	1.5	0.112
	120	29	100.5	64.5	2	2	NU 409	NJ	NUP	N	NF	NP	107000	102000	5600	6700	55	55	63	66	74	110	110	102	2	2	1.67	1.64	HJ 409	45	71.8	8	13.5	2	0.176

Note: (1) The dimension table shows limiting speed for bearings made with machined cages. For bearings made with pressed steel cages, multiply the table limits by 0.8.

Cylindrical Roller Bearings

Bore Diameter: 50～60mm





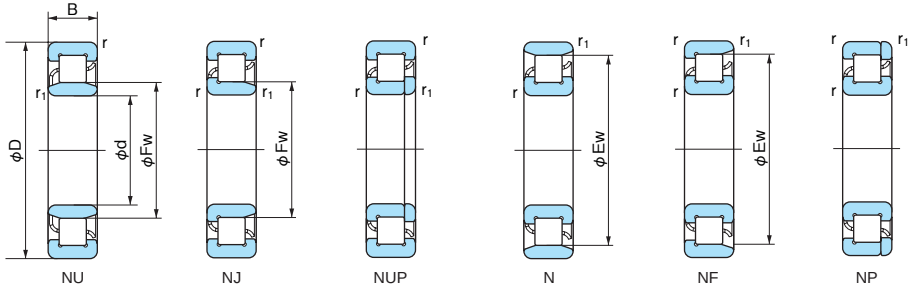
1N=0.102kgf

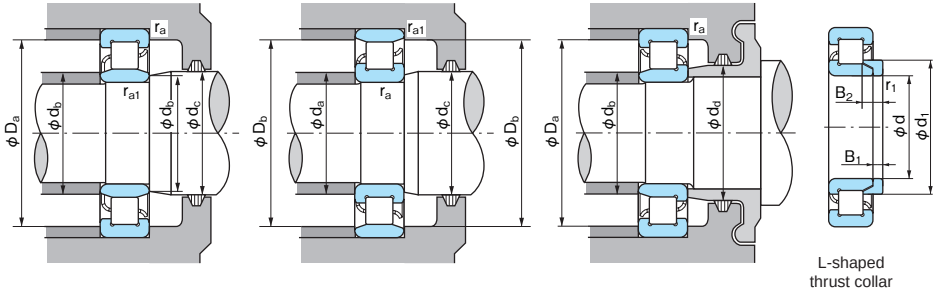
Boundary dimensions (mm)							Bearing No.						Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min⁻¹)(1)		Abutment and fillet dimensions (mm)								Mass (kg)		Dimensions of L-shaped thrust collar (mm)						
d	D	B	Ew	Fw	r (min)	r1 (min)	NU	NJ	NUP	N	NF	NP			Grease lubrication	Oil lubrication	da (min)	db (min)	db (max)	dc (min)	dd (min)	Da (max)	Db (max)	Db (min)	ra (max)	ra1 (max)	NU	N	Bearing No.	d	d1 (max)	B1	B2	r1 (min)	Mass (kg) Reference
50	80	16	72.5	57.5	1	0.6	NU 1010	—	—	N	—	—	32000	36000	8500	10000	53	55	57	59	—	74	76	73	1	0.6	0.310	0.306	—	—	—	—	—	—	—
	90	20	80.4	60.4	1.1	1.1	NU 210	NJ	NUP	N	NF	NP	48000	51000	7100	8500	57	57	58	62	67	83	83	83	1	1	0.481	0.470	HJ 210	50	64.6	5	10	1.1	0.063
	90	20	—	59.5	1.1	1.1	NU 210 EG	NJ	NUP	—	—	—	69000	76500	6400	7700	—	57	58	62	67	83	—	—	1	1	0.490	—	HJ 210 E	50	64.1	5	9	1.1	0.059
	90	23	—	60.4	1.1	1.1	NU 2210	NJ	NUP	—	—	—	64000	73500	6500	8000	—	57	58	62	67	83	—	—	1	1	0.580	—	HJ 2210	50	64.6	5	9.5	1.1	0.062
	90	23	—	59.5	1.1	1.1	NU 2210 EG	NJ	NUP	—	—	—	83500	97000	6400	8000	—	57	58	62	67	83	—	—	1	1	0.632	—	HJ 2210 E	50	64.1	5	9	1.1	0.059
	110	27	95	65	2	2	NU 310	NJ	NUP	N	NF	NP	87000	86000	5600	6700	60	60	63	67	73	100	100	98	2	2	1.17	1.14	HJ 310	50	71	8	14	2	0.145
	110	27	—	65	2	2	NU 310 EG	NJ	NUP	—	—	—	110000	113000	5400	6500	—	60	63	67	73	100	—	—	2	2	1.17	—	HJ 310 E	50	71.4	8	13	2	0.145
	110	40	—	65	2	2	NU 2310	NJ	NUP	—	—	—	121000	131000	5400	6500	—	60	63	67	73	100	—	—	2	2	1.69	—	HJ 2310	50	71	8	17	2	0.159
	110	40	—	65	2	2	NU 2310 E	NJ	NUP	—	—	—	163000	187000	5400	6500	—	60	63	67	73	100	—	—	2	2	1.85	—	HJ 2310 E	50	71.4	8	14.5	2	0.152
	130	31	110.8	70.8	2.1	2.1	NU 410	NJ	NUP	N	NF	NP	138000	136000	5000	6000	62	62	69	73	81	118	118	112	2	2	2.05	2.01	HJ 410	50	78.8	9	14.5	2.1	0.230
55	90	18	80.5	64.5	1.1	1	NU 1011	—	—	N	—	—	37500	44000	7500	9000	61.5	61	63	66	—	83	85	81.5	1	1	0.449	0.445	—	—	—	—	—	—	—
	100	21	88.5	66.5	1.5	1.1	NU 211	NJ	NUP	N	NF	NP	58000	62500	6300	7500	63.5	62	65	68	73	91.5	93	91	1.5	1	0.634	0.630	HJ 211	55	70.8	6	11	1.1	0.086
	100	21	—	66	1.5	1.1	NU 211 EG	NJ	NUP	—	—	—	86500	98500	5800	7100	—	62	65	68	73	91.5	—	—	1.5	1	0.670	—	HJ 211 E	55	70.9	6	9.5	1.1	0.083
	100	25	—	66.5	1.5	1.1	NU 2211	NJ	NUP	—	—	—	75500	87000	6200	7400	—	62	65	68	73	91.5	—	—	1.5	1	0.780	—	HJ 2211	55	70.8	6	11	1.1	0.086
	100	25	—	66	1.5	1.1	NU 2211 EG	NJ	NUP	—	—	—	101000	122000	5800	7100	—	62	65	68	73	91.5	—	—	1.5	1	0.870	—	HJ 2211 E	55	70.9	6	10	1.1	0.085
	120	29	104.5	70.5	2	2	NU 311	NJ	NUP	N	NF	NP	111000	111000	5000	6300	65	65	69	72	80	110	110	107	2	2	1.43	1.40	HJ 311	55	77.2	9	15	2	0.186
	120	29	—	70.5	2	2	NU 311 EG	NJ	NUP	—	—	—	137000	143000	4800	5600	—	65	69	72	80	110	—	—	2	2	1.50	—	HJ 311 E	55	77.6	9	14	2	0.186
	120	43	—	70.5	2	2	NU 2311	NJ	NUP	—	—	—	148000	162000	4800	5600	—	65	69	72	80	110	—	—	2	2	2.10	—	HJ 2311	55	77.2	9	18.5	2	0.206
	120	43	—	70.5	2	2	NU 2311 E	NJ	NUP	—	—	—	201000	233000	4800	5600	—	65	69	72	80	110	—	—	2	2	2.35	—	HJ 2311 E	55	77.6	9	15.5	2	0.195
	140	33	117.2	77.2	2.1	2.1	NU 411	NJ	NUP	N	NF	NP	139000	138000	4800	5600	67	67	76	79	87	128	128	119	2	2	2.54	2.51	HJ 411	55	85.2	10	16.5	2.1	0.292
60	95	18	85.5	69.5	1.1	1	NU 1012	—	—	N	—	—	40000	48500	6700	8500	66.5	66	68	71	—	88	90	86.5	1	1	0.484	0.477	—	—	—	—	—	—	—
	110	22	97.5	73.5	1.5	1.5	NU 212	NJ	NUP	N	NF	NP	68500	75000	6000	7100	68.5	68.5	71	75	80	101.5	101.5	100	1.5	1.5	0.835	0.820	HJ 212	60	78.4	6	11	1.5	0.109
	110	22	—	72	1.5	1.5	NU 212 E	NJ	NUP	—	—	—	97500	107000	5300	6300	—	68.5	71	75	80	101.5	—	—	1.5	1.5	0.921	—	HJ 212 E	60	77.7	6	10	1.5	0.104
	110	28	—	73.5	1.5	1.5	NU 2212	NJ	NUP	—	—	—	96000	116000	5300	6300	—	68.5	71	75	80	101.5	—	—	1.5	1.5	1.07	—	HJ 2212	60	78.4	6	11	1.5	0.109
	110	28	—	72	1.5	1.5	NU 2212 E	NJ	NUP	—	—	—	131000	157000	5300	6300	—	68.5	71	75	80	101.5	—	—	1.5	1.5	1.23	—	HJ 2212 E	60	77.7	6	10	1.5	0.104
	130	31	113	77	2.1	2.1	NU 312	NJ	NUP	N	NF	NP	124000	126000	4800	5600	72	72	75	79	86	118	118	116	2	2	1.82	1.78	HJ 312	60	84.2	9	15.5	2.1	0.224
	130	31	—	77	2.1	2.1	NU 312 EG	NJ	NUP	—	—	—	150000	157000	4300	5000	—	72	75	79	86	118	—	—	2	2	1.87	—	HJ 312 E	60	84.5	9	14.5	2.1	0.222
	130	46	—	77	2.1	2.1	NU 2312	NJ	NUP	—	—	—	169000	188000	4300	5300	—	72	75	79	86	118	—	—	2	2	2.69	—	HJ 2312	60	84.2	9	19	2.1	0.248
	130	46	—	77	2.1	2.1	NU 2312 E	NJ	NUP	—	—	—	222000	262000	4300	5300	—	72	75	79	86	118	—	—	2	2	3.01	—	HJ 2312 E	60	84.5	9	16	2.1	0.232
	150	35	127	83	2.1	2.1	NU 412	NJ	NUP	N	NF	NP	167000	168000	4300	5300	72	72	82	85	94	118	118	128	2	2	3.05	3.02	HJ 412	60	91.8	10	16.5	2.1	0.336

Note: (1) The dimension table shows limiting speed for bearings made with machined cages. For bearings made with pressed steel cages, multiply the table limits by 0.8.

Cylindrical Roller Bearings

Bore Diameter: 65～75mm





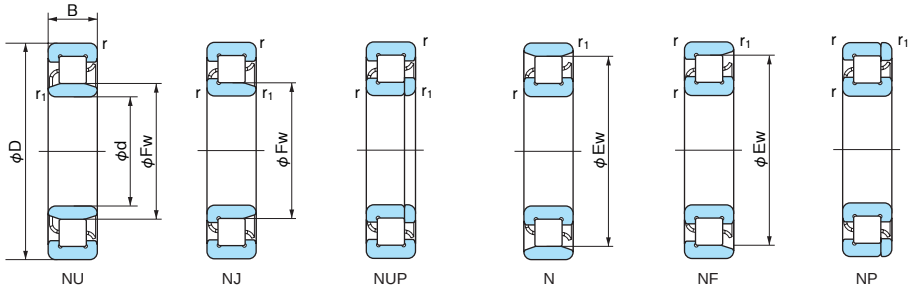
1N=0.102kgf

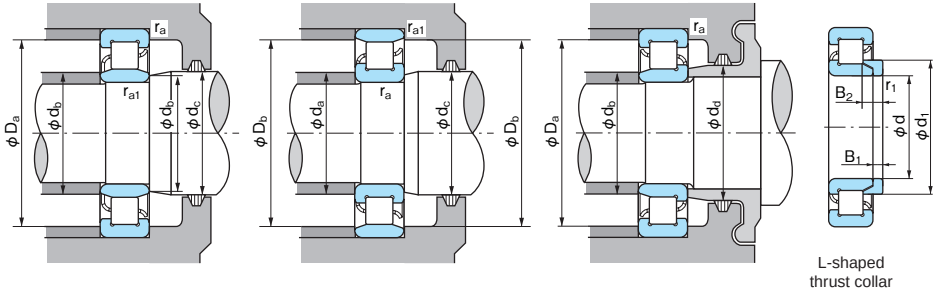
Boundary dimensions (mm)							Bearing No.						Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min⁻¹)(1)		Abutment and fillet dimensions (mm)										Mass (kg)		Dimensions of L-shaped thrust collar (mm)						
d	D	B	Ew	Fw	r (min)	r1 (min)	NU	NJ	NUP	N	NF	NP			Grease lubrication	Oil lubrication	da (min)	db (min)	db (max)	dc (min)	dd (min)	Da (max)	Db (max)	Db (min)	ra (max)	ra1 (max)	NU	N	Bearing No.	d	d1 (max)	B1	B2	r1 (min)	Mass (kg) Reference
65	100	18	90.5	74.5	1.1	1	NU 1013	—	—	N	—	—	41000	51000	6300	8000	71.5	71	73	75	—	93	95	91.5	1	1	0.514	0.560	—	—	—	—	—	—	—
	120	23	105.6	79.6	1.5	1.5	NU 213	NJ	NUP	N	NF	NP	84000	94500	5300	6300	73.5	73.5	77	81	87	111.5	111.5	108	1.5	1.5	1.06	1.04	HJ 213	65	84.8	6	11	1.5	0.127
	120	23	—	78.5	1.5	1.5	NU 213E	NJ	NUP	—	—	—	108000	119000	4800	5600	—	73.5	77	81	87	111.5	—	—	1.5	1.5	1.18	—	HJ 213E	65	84.5	6	10	1.5	0.123
	120	31	—	79.6	1.5	1.5	NU 2213	NJ	NUP	—	—	—	120000	149000	4800	6000	—	73.5	77	81	87	111.5	—	—	1.5	1.5	1.43	—	HJ 2213	65	84.8	6	11.5	1.5	0.130
	120	31	—	78.5	1.5	1.5	NU 2213E	NJ	NUP	—	—	—	149000	181000	4800	6000	—	73.5	77	81	87	111.5	—	—	1.5	1.5	1.65	—	HJ 2213E	65	84.5	6	10.5	1.5	0.126
	140	33	121.5	83.5	2.1	2.1	NU 313	NJ	NUP	N	NF	NP	135000	139000	4500	5300	77	77	81	85	93	128	128	125	2	2	2.27	2.22	HJ 313	65	91	10	17	2.1	0.286
	140	33	—	82.5	2.1	2.1	NU 313E	NJ	NUP	—	—	—	181000	191000	4000	4800	—	77	81	85	93	128	—	—	2	2	2.55	—	HJ 313E	65	90.6	10	15.5	2.1	0.274
	140	48	—	83.5	2.1	2.1	NU 2313	NJ	NUP	—	—	—	188000	212000	4000	4800	—	77	81	85	93	128	—	—	2	2	3.25	—	HJ 2313	65	91	10	20	2.1	0.309
	140	48	—	82.5	2.1	2.1	NU 2313E	NJ	NUP	—	—	—	247000	287000	3800	4800	—	77	81	85	93	128	—	—	2	2	3.56	—	HJ 2313E	65	90.6	10	18	2.1	0.309
	160	37	135.3	89.3	2.1	2.1	NU 413	NJ	NUP	N	NF	NP	195000	203000	4000	4800	77	77	88	91	100	148	148	137	2	2	3.68	3.58	HJ 413	65	98.5	11	18	2.1	0.417
70	110	20	100	80	1.1	1	NU 1014	—	—	N	—	—	58500	70500	6000	7100	76.5	76	78	82	—	103	105	100.5	1	1	0.712	0.702	—	—	—	—	—	—	—
	125	24	110.5	84.5	1.5	1.5	NU 214	NJ	NUP	N	NF	NP	83500	95000	5000	6300	78.5	78.5	82	86	92	116.5	116.5	114	1.5	1.5	1.16	1.14	HJ 214	70	89.6	7	12.5	1.5	0.154
	125	24	—	83.5	1.5	1.5	NU 214E	NJ	NUP	—	—	—	119000	137000	4600	5600	—	78.5	82	86	92	116.5	—	—	1.5	1.5	1.26	—	HJ 214E	70	89.5	7	11	1.5	0.149
	125	31	—	84.5	1.5	1.5	NU 2214	NJ	NUP	—	—	—	119000	151000	4800	5600	—	78.5	82	86	92	116.5	—	—	1.5	1.5	1.52	—	HJ 2214	70	89.6	7	12.5	1.5	0.154
	125	31	—	83.5	1.5	1.5	NU 2214E	NJ	NUP	—	—	—	156000	194000	4600	5600	—	78.5	82	86	92	116.5	—	—	1.5	1.5	1.68	—	HJ 2214E	70	89.5	7	11.5	1.5	0.152
	150	35	130	90	2.1	2.1	NU 314	NJ	NUP	N	NF	NP	158000	220000	4000	5000	82	82	87	92	100	138	138	134	2	2	2.73	2.68	HJ 314	70	98	10	17.5	2.1	0.336
	150	35	—	89	2.1	2.1	NU 314E	NJ	NUP	—	—	—	205000	222000	3600	4300	—	82	87	92	100	138	—	—	2	2	3.15	—	HJ 314E	70	97.5	10	15.5	2.1	0.315
	150	51	—	90	2.1	2.1	NU 2314	NJ	NUP	—	—	—	223000	262000	3800	4500	—	82	87	92	100	138	—	—	2	2	3.97	—	HJ 2314	70	98	10	20.5	2.1	0.362
	150	51	—	89	2.1	2.1	NU 2314E	NJ	NUP	—	—	—	274000	325000	3600	4500	—	82	87	92	100	138	—	—	2	2	4.30	—	HJ 2314E	70	97.5	10	18.5	2.1	0.343
	180	42	152	100	3	3	NU 414	NJ	NUP	N	NF	NP	228000	236000	3600	4300	84	84	99	102	112	166	166	153	2.5	2.5	5.40	5.26	HJ 414	70	110.5	12	20	3	0.607
75	115	20	105	85	1.1	1	NU 1015	—	—	N	—	—	60000	74500	5600	6700	81.5	81	83	87	—	108	110	105.5	1	1	0.745	0.735	—	—	—	—	—	—	—
	130	25	116.5	88.5	1.5	1.5	NU 215	NJ	NUP	N	NF	NP	96500	111000	4800	6000	83.5	83.5	87	90	96	121.5	121.5	120	1.5	1.5	1.24	1.22	HJ 215	75	94	7	12.5	1.5	0.161
	130	25	—	88.5	1.5	1.5	NU 215E	NJ	NUP	—	—	—	130000	156000	4300	5300	—	83.5	87	90	96	121.5	—	—	1.5	1.5	1.38	—	HJ 215E	75	94.5	7	11	1.5	0.159
	130	31	—	88.5	1.5	1.5	NU 2215	NJ	NUP	—	—	—	130000	162000	4500	5300	—	83.5	87	90	96	121.5	—	—	1.5	1.5	1.57	—	HJ 2215	75	94	7	12.5	1.5	0.161
	130	31	—	88.5	1.5	1.5	NU 2215E	NJ	NUP	—	—	—	162000	207000	4300	5300	—	83.5	87	90	96	121.5	—	—	1.5	1.5	1.80	—	HJ 2215E	75	94.5	7	11.5	1.5	0.162
	160	37	139.5	95.5	2.1	2.1	NU 315	NJ	NUP	N	NF	NP	190000	205000	3800	4800	87	87	93	97	106	148	148	143	2	2	3.21	3.15	HJ 315	75	104.2	11	18.5	2.1	0.406
	160	37	—	95	2.1	2.1	NU 315E	NJ	NUP	—	—	—	240000	263000	3400	4000	—	87	93	97	106	148	—	—	2	2	3.70	—	HJ 315E	75	104.2	11	16.5	2.1	0.389
	160	55	—	95.5	2.1	2.1	NU 2315	NJ	NUP	—	—	—	258000	300000	3400	4300	—	87	93	97	106	148	—	—	2	2	4.84	—	HJ 2315	75	104.2	11	21.5	2.1	0.437
	160	55	—	95	2.1	2.1	NU 2315E	NJ	NUP	—	—	—	330000	395000	3400	4300	—	87	93	97	106	148	—	—	2	2	5.30	—	HJ 2315E	75	104.2	11	19.5	2.1	0.421
	190	45	160.5	104.5	3	3	NU 415	NJ	NUP	N	NF	NP	262000	274000	3400	4000	89	89	103	107	118	176	176	162	2.5	2.5	6.40	6.25	HJ 415	75	116	13	21.5	3	0.710

Note: (1) The dimension table shows limiting speed for bearings made with machined cages. For bearings made with pressed steel cages, multiply the table limits by 0.8.

Cylindrical Roller Bearings

Bore Diameter: 80～90mm





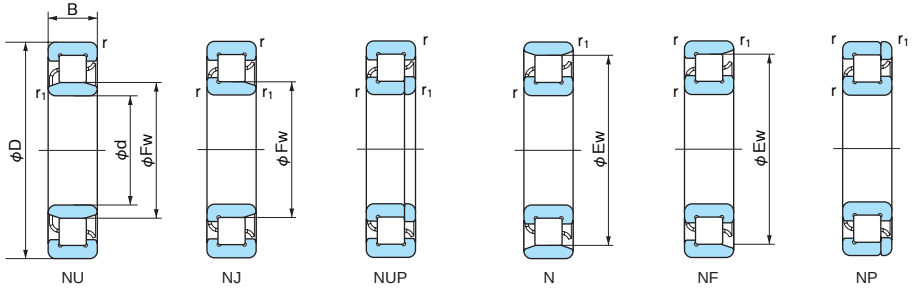
1N=0.102kgf

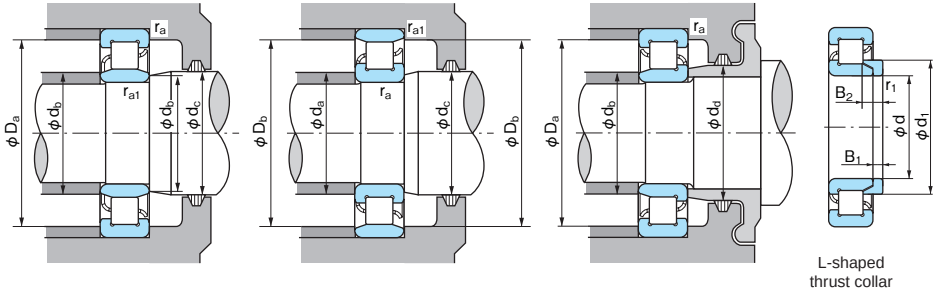
Boundary dimensions (mm)							Bearing No.						Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min⁻¹)(1)		Abutment and fillet dimensions (mm)								Mass (kg)		Dimensions of L-shaped thrust collar (mm)						
d	D	B	Ew	Fw	r (min)	r1 (min)	NU	NJ	NUP	N	NF	NP			Grease lubrication	Oil lubrication	da (min)	db (min)	db (max)	dc (min)	dd (min)	Da (max)	Db (max)	Db (min)	ra (max)	ra1 (max)	NU	N	Bearing No.	d	d1 (max)	B1	B2	r1 (min)	Mass (kg) Reference
80	125	22	113.5	91.5	1.1	1	NU 1016	—	—	N	—	—	72500	90500	5300	6300	86.5	86	90	94	—	118	120	113.5	1	1	1.03	0.994	—	—	—	—	—	—	—
	140	26	125.3	95.3	2	2	NU 216	NJ	NUP	N	NF	NP	106000	122000	4500	5300	90	90	94	97	104	130	130	128	2	2	1.53	1.50	HJ 216	80	101.2	8	13.5	2	0.214
	140	26	—	95.3	2	2	NU 216E	NJ	NUP	—	—	—	139000	167000	4000	4800	—	90	94	97	104	130	—	—	2	2	1.66	—	HJ 216E	80	101.6	8	12.5	2	0.213
	140	33	—	95.3	2	2	NU 2216	NJ	NUP	—	—	—	147000	186000	4000	5000	—	90	94	97	104	130	—	—	2	2	1.96	—	HJ 2216	80	101.2	8	13.5	2	0.214
	140	33	—	95.3	2	2	NU 2216E	NJ	NUP	—	—	—	186000	243000	4000	5000	—	90	94	97	104	130	—	—	2	2	2.15	—	HJ 2216E	80	101.6	8	12.5	2	0.213
	170	39	147	103	2.1	2.1	NU 316	NJ	NUP	N	NF	NP	190000	207000	3600	4300	92	92	99	105	114	158	158	151	2	2	3.93	3.83	HJ 316	80	111.8	11	19.5	2.1	0.479
	170	39	—	101	2.1	2.1	NU 316E	NJ	NUP	—	—	—	256000	282000	3200	3800	—	92	99	105	114	158	—	—	2	2	4.38	—	HJ 316E	80	110.6	11	17	2.1	0.440
	170	58	—	103	2.1	2.1	NU 2316	NJ	NUP	—	—	—	274000	330000	3200	4000	—	92	99	105	114	158	—	—	2	2	5.83	—	HJ 2316	80	111.8	11	23	2.1	0.517
	170	58	—	101	2.1	2.1	NU 2316E	NJ	NUP	—	—	—	355000	430000	3200	4000	—	92	99	105	114	158	—	—	2	2	6.35	—	HJ 2316E	80	110.6	11	20	2.1	0.475
	200	48	170	110	3	3	NU 416	NJ	NUP	N	NF	NP	299000	315000	3200	3800	94	94	109	112	124	186	186	172	2.5	2.5	7.45	7.28	HJ 416	80	122	13	22	3	0.779
85	130	22	118.5	96.5	1.1	1	NU 1017	—	—	N	—	—	74500	95500	5000	6000	91.5	91	95	99	—	123	125	118.5	1	1	1.06	1.04	—	—	—	—	—	—	—
	150	28	133.8	101.8	2	2	NU 217	NJ	NUP	N	NF	NP	120000	140000	4300	5000	95	95	99	104	110	140	140	137	2	2	1.92	1.87	HJ 217	85	108.2	8	14	2	0.253
	150	28	—	100.5	2	2	NU 217E	NJ	NUP	—	—	—	167000	199000	3800	4500	—	95	99	104	110	140	—	—	2	2	2.10	—	HJ 217E	85	107.6	8	12.5	2	0.239
	150	36	—	101.8	2	2	NU 2217	NJ	NUP	—	—	—	170000	218000	3800	4500	—	95	99	104	110	140	—	—	2	2	2.50	—	HJ 2217	85	108.2	8	14	2	0.253
	150	36	—	100.5	2	2	NU 2217E	NJ	NUP	—	—	—	217000	279000	3800	4500	—	95	99	104	110	140	—	—	2	2	2.75	—	HJ 2217E	85	107.6	8	13	2	0.243
	180	41	156	108	3	3	NU 317	NJ	NUP	N	NF	NP	224000	247000	3400	4000	99	99	106	110	119	166	166	160	2.5	2.5	4.54	4.44	HJ 317	85	117.5	12	20.5	3	0.560
	180	41	—	108	3	3	NU 317E	NJ	NUP	—	—	—	291000	330000	3000	3600	—	99	106	110	119	166	—	—	2.5	2.5	5.12	—	HJ 317E	85	117.9	12	18.5	3	0.545
	180	60	—	108	3	3	NU 2317	NJ	NUP	—	—	—	315000	380000	3000	3800	—	99	106	110	119	166	—	—	2.5	2.5	6.62	—	HJ 2317	85	117.5	12	24	3	0.603
	180	60	—	108	3	3	NU 2317E	NJ	NUP	—	—	—	390000	485000	3000	3600	—	99	106	110	119	166	—	—	2.5	2.5	7.35	—	HJ 2317E	85	117.9	12	22	3	0.590
	210	52	177	113	4	4	NU 417	NJ	NUP	N	NF	NP	330000	350000	3000	3800	103	103	111	115	128	192	192	179	3	3	9.10	8.68	HJ 417	85	126	14	24	4	0.876
90	140	24	127	103	1.5	1.1	NU 1018	—	—	N	—	—	88000	114000	4800	5600	98	97	101	106	—	131.5	133.5	127.5	1.5	1	1.36	1.34	—	—	—	—	—	5	—
	160	30	143	107	2	2	NU 218	NJ	NUP	N	NF	NP	152000	178000	4000	4800	100	100	105	109	116	150	150	146	2	2	2.30	2.25	HJ 218	90	114.2	9	15	2	0.311
	160	30	—	107	2	2	NU 218E	NJ	NUP	—	—	—	182000	217000	3600	4300	—	100	105	109	116	150	—	—	2	2	2.53	—	HJ 218E	90	114.4	9	14	2	0.306
	160	40	—	107	2	2	NU 2218	NJ	NUP	—	—	—	207000	265000	3600	4300	—	100	105	109	116	150	—	—	2	2	3.10	—	HJ 2218	90	114.2	9	16	2	0.320
	160	40	—	107	2	2	NU 2218E	NJ	NUP	—	—	—	242000	315000	3600	4300	—	100	105	109	116	150	—	—	2	2	3.48	—	HJ 2218E	90	114.4	9	15	2	0.315
	190	43	165	115	3	3	NU 318	NJ	NUP	N	NF	NP	240000	265000	3200	3800	104	104	111	117	127	176	176	169	2.5	2.5	5.37	5.25	HJ 318	90	125	12	21	3	0.644
	190	43	—	113.5	3	3	NU 318E	NJ	NUP	—	—	—	335000	380000	2800	3400	—	104	111	117	127	176	—	—	2.5	2.5	5.92	—	HJ 318E	90	124.2	12	18.5	3	0.601
	190	64	—	115	3	3	NU 2318	NJ	NUP	—	—	—	325000	395000	2800	3600	—	104	111	117	127	176	—	—	2.5	2.5	7.90	—	HJ 2318	90	125	12	26	3	0.713
	190	64	—	113.5	3	3	NU 2318E	NJ	NUP	—	—	—	435000	535000	2800	3400	—	104	111	117	127	176	—	—	2.5	2.5	8.72	—	HJ 2318E	90	124.2	12	22	3	0.653
	225	54	191.5	123.5	4	4	NU 418	NJ	NUP	N	NF	NP	375000	400000	2800	3400	108	108	122	125	139	207	207	194	3	3	10.6	10.3	HJ 418	90	137	14	24	4	1.06

Note: (1) The dimension table shows limiting speed for bearings made with machined cages. For bearings made with pressed steel cages, multiply the table limits by 0.8.

Cylindrical Roller Bearings

Bore Diameter: 95～110mm





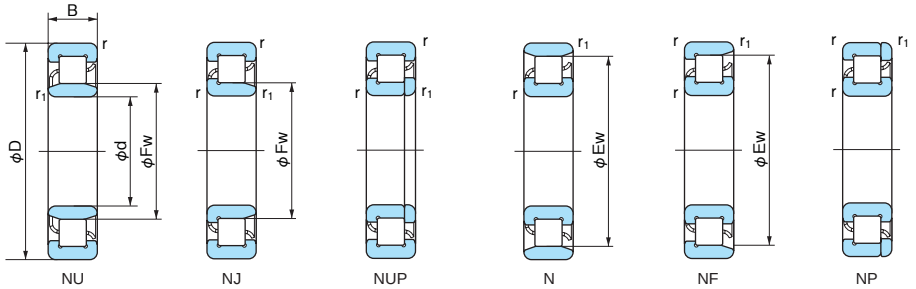
1N=0.102kgf

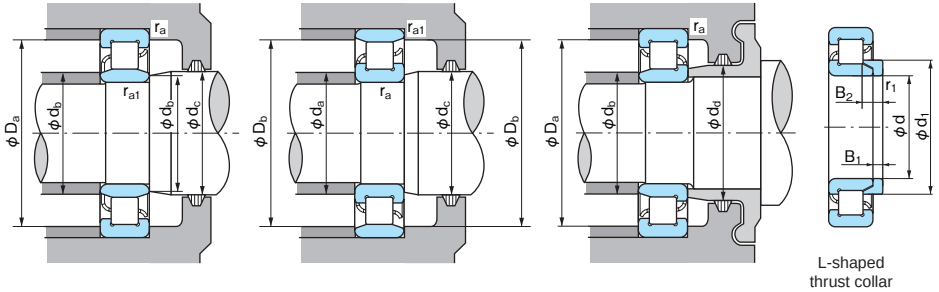
Boundary dimensions (mm)							Bearing No.						Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min⁻¹)(1)		Abutment and fillet dimensions (mm)										Mass (kg)		Dimensions of L-shaped thrust collar (mm)						
d	D	B	Ew	Fw	r (min)	r1 (min)	NU	NJ	NUP	N	NF	NP			Grease lubrication	Oil lubrication	da (min)	db (min)	db (max)	dc (min)	dd (min)	Da (max)	Db (max)	Db (min)	ra (max)	ra1 (max)			NU	N	Bearing No.	d	d1 (max)	B1	B2	r1 (min)	Mass (kg) Reference
95	145	24	132	108	1.5	1.1	NU 1019	—	—	N	—	—	90500	120000	4500	5300	103	102	106	111	—	136.5	138.5	132.5	1.5	1			1.42	1.40	—	—	—	—	—	—	—	—
	170	32	151.5	113.5	2.1	2.1	NU 219	NJ	NUP	N	NF	NP	165000	195000	3800	4500	107	107	111	116	123	158	158	155	2	2			2.81	2.75	HJ 219	95	121	9	15.5	2.1	0.357
	170	32	—	112.5	2.1	2.1	NU 219 E	NJ	NUP	—	—	—	222000	259000	3400	4000	—	107	111	116	123	158	—	—	2	2			3.08	—	HJ 219 E	95	120.6	9	14	2.1	0.340
	170	43	—	113.5	2.1	2.1	NU 2219	NJ	NUP	—	—	—	230000	298000	3400	4000	—	107	111	116	123	158	—	—	2	2			3.85	—	HJ 2219	95	121	9	16.5	2.1	0.367
	170	43	—	112.5	2.1	2.1	NU 2219 E	NJ	NUP	—	—	—	286000	370000	3400	4000	—	107	111	116	123	158	—	—	2	2			4.23	—	HJ 2219 E	95	120.6	9	15.5	2.1	0.357
	200	45	173.5	121.5	3	3	NU 319	NJ	NUP	N	NF	NP	259000	289000	3000	3600	109	109	119	124	134	186	186	178	2.5	2.5			6.23	6.13	HJ 319	95	132	13	22.5	3	0.774
	200	45	—	121.5	3	3	NU 319 E	NJ	NUP	—	—	—	335000	385000	2600	3200	—	109	119	124	134	186	—	—	2.5	2.5			6.92	—	HJ 319 E	95	132.2	13	20.5	3	0.750
	200	67	—	121.5	3	3	NU 2319	NJ	NUP	—	—	—	370000	460000	2600	3400	—	109	119	124	134	186	—	—	2.5	2.5			9.39	—	HJ 2319	95	132	13	26.5	3	0.836
	200	67	—	121.5	3	3	NU 2319 E	NJ	NUP	—	—	—	460000	585000	2600	3200	—	109	119	124	134	186	—	—	2.5	2.5			10.3	—	HJ 2319 E	95	132.2	13	20.5	3	0.750
	240	55	201.5	133.5	4	4	NU 419	NJ	NUP	N	NF	NP	400000	445000	2600	3200	113	113	132	136	149	222	222	204	3	3			14.0	13.6	HJ 419	95	147	15	25.5	4	1.32
100	150	24	137	113	1.5	1.1	NU 1020	—	—	N	—	—	93000	126000	4300	5300	108	107	111	116	—	141.5	143.5	137.5	1.5	1			1.48	1.46	—	—	—	—	—	—	—	—
	180	34	160	120	2.1	2.1	NU 220	NJ	NUP	N	NF	NP	183000	217000	3600	4300	112	112	117	122	130	168	168	164	2	2			3.30	3.23	HJ 220	100	128	10	17	2.1	0.448
	180	34	—	119	2.1	2.1	NU 220 E	NJ	NUP	—	—	—	250000	305000	3200	3800	—	112	117	122	130	168	—	—	2	2			3.73	—	HJ 220 E	100	127.5	10	15	2.1	0.421
	180	46	—	120	2.1	2.1	NU 2220	NJ	NUP	—	—	—	257000	335000	3200	3800	—	112	117	122	130	168	—	—	2	2			4.67	—	HJ 2220	100	128	10	18	2.1	0.459
	180	46	—	119	2.1	2.1	NU 2220 E	NJ	NUP	—	—	—	335000	445000	3200	3800	—	112	117	122	130	168	—	—	2	2			5.13	—	HJ 2220 E	100	127.5	10	16	2.1	0.433
	215	47	185.5	129.5	3	3	NU 320	NJ	NUP	N	NF	NP	300000	335000	2800	3400	114	114	125	132	143	201	201	190	2.5	2.5			7.70	7.53	HJ 320	100	140.5	13	22.5	3	0.892
	215	47	—	127.5	3	3	NU 320 E	NJ	NUP	—	—	—	380000	425000	2400	3000	—	114	125	132	143	201	—	—	2.5	2.5			8.45	—	HJ 320 E	100	139.6	13	20.5	3	0.850
	215	73	—	129.5	3	3	NU 2320	NJ	NUP	—	—	—	435000	545000	2400	3200	—	114	125	132	143	201	—	—	2.5	2.5			11.9	—	HJ 2320	100	140.5	13	27.5	3	0.977
	215	73	—	127.5	3	3	NU 2320 E	NJ	NUP	—	—	—	570000	715000	2400	3000	—	114	125	132	143	201	—	—	2.5	2.5			12.9	—	HJ 2320 E	100	139.6	13	23.5	3	0.906
	250	58	211	139	4	4	NU 420	NJ	NUP	N	NF	NP	450000	500000	2600	3000	118	118	137	141	156	232	232	213	3	3			14.4	14.0	HJ 420	100	153.5	16	27	4	1.52
105	160	26	145.5	119.5	2	1.1	NU 1021	—	—	N	—	—	109000	149000	4000	4800	114	112	118	122	—	150	153.5	146.5	2	1			1.88	1.85	—	—	—	—	—	—	—	—
	190	36	168.8	126.8	2.1	2.1	NU 221	NJ	NUP	N	NF	NP	202000	241000	3400	4000	117	117	124	129	137	178	178	173	2	2			4.03	3.95	HJ 221	105	135	10	17.5	2.1	0.507
	225	49	195	135	3	3	NU 321	NJ	NUP	N	NF	NP	340000	385000	2600	3200	119	119	132	137	149	211	211	199	2.5	2.5			8.73	8.51	HJ 321	105	147	13	22.5	3	0.977
	260	60	220.5	144.5	4	4	NU 421	NJ	NUP	N	NF	NP	495000	555000	2400	3000	123	123	143	147	162	242	242	223	3	3			19.5	19.1	HJ 421	105	159.5	16	27	4	1.62
110	170	28	155	125	2	1.1	NU 1022	—	—	N	—	—	131000	174000	3800	4500	119	117	124	128	—	160	163.5	156	2	1			2.34	2.31	—	—	—	—	—	—	—	—
	200	38	178.5	132.5	2.1	2.1	NU 222	NJ	NUP	N	NF	NP	240000	290000	3200	3800	122	122	130	135	144	188	188	182	2	2			4.64	4.58	HJ 222	110	141.5	11	18.5	2.1	0.608
	200	38	—	132.5	2.1	2.1	NU 222 E	NJ	NUP	—	—	—	293000	365000	2800	3400	—	122	130	135	144	188	—	—	2	2			5.17	—	HJ 222 E	110	141.7	11	17	2.1	0.593
	200	53	—	132.5	2.1	2.1	NU 2222	NJ	NUP	—	—	—	320000	440000	2800	3400	—	122	130	135	144	188	—	—	2	2			6.93	—	HJ 2222	110	141.5	11	20.5	2.1	0.600
	200	53	—	132.5	2.1	2.1	NU 2222 E	NJ	NUP	—	—	—	385000	515000	2800	3400	—	122	130	135	144	188	—	—	2	2			7.32	—	HJ 2222 E	110	141.7	11	19.5	2.1	0.629
	240	50	207	143	3	3	NU 322	NJ	NUP	N	NF	NP	380000	435000	2600	3000	124	124	140	145	158	226	226	211	2.5	2.5			10.4	10.2	HJ 322	110	155.5	14	23	3	1.17
	240	50	—	143	3	3	NU 322 E	NJ	NUP	—	—	—	450000	525000	2200	2800	—	124	140	145	158	226	—	—	2.5	2.5			11.1	—	HJ 322 E	110	155.8	14	22	3	1.16
	240	80	—	143	3	3	NU 2322	NJ	NUP	—	—	—	570000	735000	2200	2800	—	124	140	145	158	226	—	—	2.5	2.5			18.8	—	HJ 2322	110	155.5	14	28	3	1.27
	240	80	—	143	3	3	NU 2322 E	NJ	NUP	—	—	—	670000	880000	2200	2800	—	124	140	145	158	226	—	—	2.5	2.5			18.5	—	HJ 2322 E	110	155.8	14	26.5	3	1.26
	280	65	235	155	4	4	NU 422	NJ	NUP	N	NF	NP	550000	620000	2200	2800	128	128	153	157	173	262	262	237	3	3			20.5	19.9	HJ 422	110	171	17	29.5	4	2.05

Note: (1) The dimension table shows limiting speed for bearings made with machined cages. For bearings made with pressed steel cages, multiply the table limits by 0.8.

Cylindrical Roller Bearings

Bore Diameter: 120～140mm





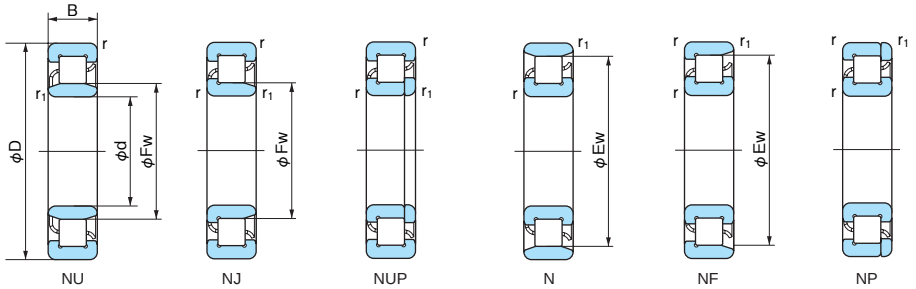
1N=0.102kgf

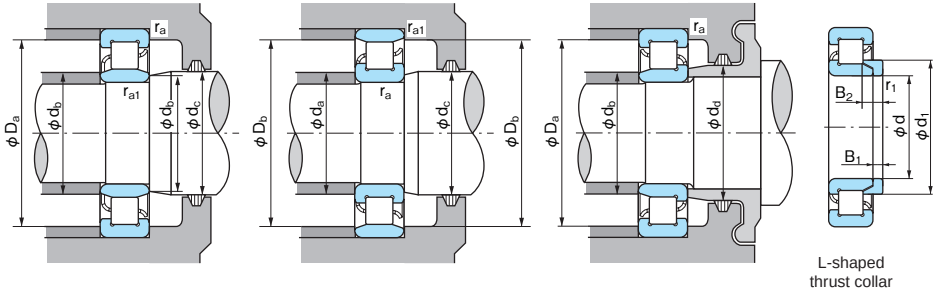
Boundary dimensions (mm)							Bearing No.						Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min⁻¹)(1)		Abutment and fillet dimensions (mm)										Mass (kg)		Dimensions of L-shaped thrust collar (mm)						
d	D	B	Ew	Fw	r (min)	r1 (min)	NU	NJ	NUP	N	NF	NP			Grease lubrication	Oil lubrication	da (min)	db (min)	db (max)	dc (min)	dd (min)	Da (max)	Db (max)	Db (min)	ra (max)	ra1 (max)			NU	N	Bearing No.	d	d1 (max)	B1	B2	r1 (min)	Mass (kg) Reference
120	180	28	165	135	2	1.1	NU 1024	—	—	N	—	—	139000	191000	3400	4300	129	127	134	138	—	170	173.5	166	2	1	2.51	2.47	—	—	—	—	—	—	—	—
	215	40	191.5	143.5	2.1	2.1	NU 224	NJ	NUP	N	NF	NP	260000	320000	3000	3400	132	132	141	146	156	203	203	196	2	2	5.61	5.50	HJ 224	120	153	11	19	2.1	0.700
	215	40	—	143.5	2.1	2.1	NU 224 E	NJ	NUP	—	—	—	335000	420000	2600	3200	—	132	141	146	156	203	—	—	2	2	6.25	—	HJ 224 E	120	153.4	11	17	2.1	0.680
	215	58	—	143.5	2.1	2.1	NU 2224	NJ	NUP	—	—	—	365000	490000	2600	3200	—	132	141	146	156	203	—	—	2	2	8.56	—	HJ 2224	120	153	11	22	2.1	0.749
	215	58	—	143.5	2.1	2.1	NU 2224 E	NJ	NUP	—	—	—	450000	620000	2600	3200	—	132	141	146	156	203	—	—	2	2	9.35	—	HJ 2224 E	120	153.4	11	20	2.1	0.731
	260	55	226	154	3	3	NU 324	NJ	NUP	N	NF	NP	450000	510000	2200	2800	134	134	151	156	171	246	246	230	2.5	2.5	15.4	15.1	HJ 324	120	168.5	14	23.5	3	1.38
	260	55	—	154	3	3	NU 324 E	NJ	NUP	—	—	—	530000	610000	2000	2600	—	134	151	156	171	246	—	—	2.5	2.5	15.2	—	HJ 324 E	120	168.6	14	22.5	3	1.36
	260	86	—	154	3	3	NU 2324	NJ	NUP	—	—	—	710000	920000	2000	2600	—	134	151	156	171	246	—	—	2.5	2.5	23.1	—	HJ 2324	120	168.5	14	28	3	1.51
	260	86	—	154	3	3	NU 2324 E	NJ	NUP	—	—	—	795000	1030000	2000	2600	—	134	151	156	171	246	—	—	2.5	2.5	22.9	—	HJ 2324 E	120	168.6	14	26	3	1.46
	310	72	260	170	5	5	NU 424	NJ	NUP	N	NF	NP	675000	770000	2000	2400	142	142	168	172	190	288	288	262	4	4	28.7	28.0	HJ 424	120	188	17	30.5	5	2.55
130	200	33	182	148	2	1.1	NU 1026	—	—	N	—	—	172000	238000	3200	3800	139	137	146	151	—	190	193.5	183	2	1	3.83	3.77	—	—	—	—	—	—	—	—
	230	40	204	156	3	3	NU 226	NJ	NUP	N	NF	NP	270000	340000	2600	3200	144	144	151	158	168	216	216	208	2.5	2.5	7.60	7.39	HJ 226	130	165.5	11	19	3	0.805
	230	40	—	153.5	3	3	NU 226 E	NJ	NUP	—	—	—	365000	455000	2400	2800	—	144	151	158	168	216	—	—	2.5	2.5	7.50	—	HJ 226 E	130	164.2	11	17	3	0.775
	230	64	—	156	3	3	NU 2226	NJ	NUP	—	—	—	380000	530000	2400	3000	—	144	151	158	168	216	—	—	2.5	2.5	11.2	—	HJ 2226	130	165.5	11	25	3	0.911
	230	64	—	153.5	3	3	NU 2226 E	NJ	NUP	—	—	—	530000	735000	2400	3000	—	144	151	158	168	216	—	—	2.5	2.5	12.5	—	HJ 2226 E	130	164.2	11	21	3	0.833
	280	58	243	167	4	4	NU 326	NJ	NUP	N	NF	NP	555000	665000	2200	2600	148	148	164	169	184	262	262	247	3	3	18.2	17.8	HJ 326	130	182	14	24	4	1.61
	280	58	—	167	4	4	NU 326 E	NJ	NUP	—	—	—	615000	735000	1900	2400	—	148	164	169	184	262	—	—	3	3	18.5	—	HJ 326 E	130	182.3	14	23	4	1.59
	280	93	—	167	4	4	NU 2326	NJ	NUP	—	—	—	840000	1130000	1900	2400	—	148	164	169	184	262	—	—	3	3	29.1	—	HJ 2326	130	182	14	29.5	4	1.78
	280	93	—	167	4	4	NU 2326 E	NJ	NUP	—	—	—	920000	1230000	1900	2400	—	148	164	169	184	262	—	—	3	3	28.5	—	HJ 2326 E	130	182.3	14	28	4	1.75
	340	78	285	185	5	5	NU 426	NJ	NUP	N	NF	NP	825000	955000	1800	2200	152	152	183	187	208	318	318	287	4	4	36.9	36.1	HJ 426	130	205	18	32	5	3.23
140	210	33	192	158	2	1.1	NU 1028	—	—	N	—	—	176000	250000	3000	3600	149	147	156	161	—	200	203.5	193	2	1	4.07	4.00	—	—	—	—	—	—	—	—
	250	42	221	169	3	3	NU 228	NJ	NUP	N	NF	NP	310000	420000	2400	3000	154	154	166	171	182	236	236	228	2.5	2.5	9.49	9.26	HJ 228	140	179.5	11	19	3	0.968
	250	42	—	169	3	3	NU 228 E	NJ	NUP	—	—	—	395000	515000	2200	2600	—	154	166	171	182	236	—	—	2.5	2.5	8.90	—	HJ 228 E	140	180	11	18	3	0.966
	250	68	—	169	3	3	NU 2228	NJ	NUP	—	—	—	465000	670000	2200	2800	—	154	166	171	182	236	—	—	2.5	2.5	14.3	—	HJ 2228	140	179.5	11	25	3	1.09
	250	68	—	169	3	3	NU 2228 E	NJ	NUP	—	—	—	570000	835000	2200	2600	—	154	166	171	182	236	—	—	2.5	2.5	14.9	—	HJ 2228 E	140	180	11	23	3	1.08
	300	62	260	180	4	4	NU 328	NJ	NUP	N	NF	NP	595000	745000	2000	2400	158	158	176	182	198	282	282	268	3	3	22.4	21.8	HJ 328	140	196	15	26	4	2.01
	300	62	—	180	4	4	NU 328 E	NJ	NUP	—	—	—	665000	795000	1800	2200	—	158	176	182	198	282	—	—	3	3	21.8	—	HJ 328 E	140	196	15	25	4	1.97
	300	102	—	180	4	4	NU 2328	NJ	NUP	—	—	—	920000	1250000	1800	2200	—	158	176	182	198	282	—	—	3	3	36.8	—	HJ 2328	140	196	15	33.5	4	2.27
	300	102	—	180	4	4	NU 2328 E	NJ	NUP	—	—	—	1020000	1380000	1800	2200	—	158	176	182	198	282	—	—	3	3	35.9	—	HJ 2328 E	140	196	15	31	4	2.18
	360	82	302	198	5	5	NU 428	NJ	NUP	N	NF	NP	875000	1020000	1700	2000	162	162	195	200	222	338	338	304	4	4	48.0	46.8	HJ 428	140	219	18	33	5	3.70

Note: (1) The dimension table shows limiting speed for bearings made with machined cages. For bearings made with pressed steel cages, multiply the table limits by 0.8.

Cylindrical Roller Bearings

Bore Diameter: 150～180mm





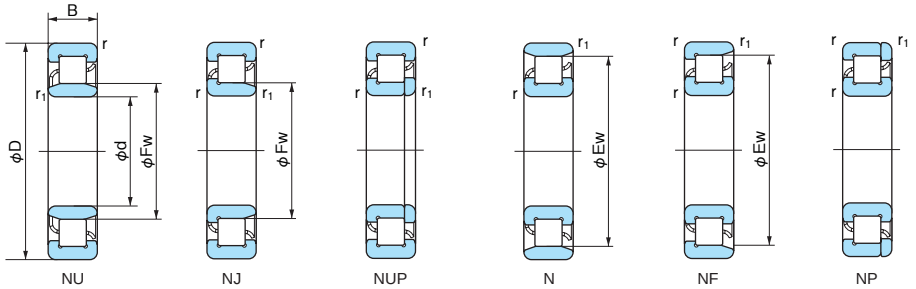
1N=0.102kgf

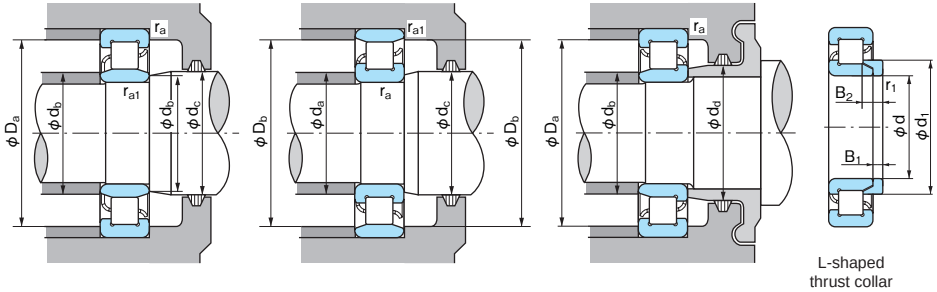
Boundary dimensions (mm)							Bearing No.						Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min⁻¹)(1)		Abutment and fillet dimensions (mm)								Mass (kg)		Dimensions of L-shaped thrust collar (mm)						
d	D	B	Ew	Fw	r (min)	r1 (min)	NU	NJ	NUP	N	NF	NP			Grease lubrication	Oil lubrication	da (min)	db (min)	db (max)	dc (min)	dd (min)	Da (max)	Db (max)	Db (min)	ra (max)	ra1 (max)	NU	N	Bearing No.	d	d1 (max)	B1	B2	r1 (min)	Mass (kg) Reference
150	225	35	205.5	169.5	2.1	1.5	NU 1030	—	—	N	—	—	202000	294000	2800	3400	161	158.5	167	173	—	213	217	207	2	1.5	4.90	4.83	—	—	—	—	—	—	—	—
	270	45	238	182	3	3	NU 230	NJ	NUP	N	NF	NP	375000	490000	2200	2800	164	164	179	184	196	256	256	245	2.5	2.5	11.9	11.7	HJ 230	150	193	12	20.5	3	1.22
	270	45	—	182	3	3	NU 230 E	NJ	NUP	—	—	—	450000	595000	2000	2400	—	164	179	184	196	256	—	—	2.5	2.5	11.5	—	HJ 230 E	150	193.7	12	19.5	3	1.23
	270	73	—	182	3	3	NU 2230	NJ	NUP	—	—	—	545000	800000	2000	2600	—	164	179	184	196	256	—	—	2.5	2.5	18.7	—	HJ 2230	150	193	12	26.5	3	1.36
	270	73	—	182	3	3	NU 2230 E	NJ	NUP	—	—	—	660000	990000	2000	2400	—	164	179	184	196	256	—	—	2.5	2.5	18.5	—	HJ 2230 E	150	193.7	12	24.5	3	1.35
	320	65	277	193	4	4	NU 330	NJ	NUP	N	NF	NP	660000	805000	1800	2200	168	168	190	195	213	302	302	287	3	3	26.5	25.9	HJ 330	150	210	15	26.5	4	2.32
	320	65	—	193	4	4	NU 330 E	NJ	NUP	—	—	—	755000	920000	1600	2000	—	168	190	195	213	302	—	—	3	3	28.8	—	HJ 330 E	150	210	15	25	4	2.26
	320	108	—	193	4	4	NU 2330	NJ	NUP	—	—	—	1020000	1400000	1700	2000	—	168	190	195	213	302	—	—	3	3	44.7	—	HJ 2330	150	210	15	34	4	2.62
	320	108	—	193	4	4	NU 2330 E	NJ	NUP	—	—	—	1160000	1600000	1600	2000	—	168	190	195	213	302	—	—	3	3	48.2	—	HJ 2330 E	150	210	15	31.5	4	2.52
	380	85	317	213	5	5	NU 430	NJ	NUP	N	NF	NP	930000	1120000	1600	2000	172	172	210	216	237	358	358	319	4	4	54.5	53.3	HJ 430	150	234	20	36.5	5	4.61
160	240	38	220	180	2.1	1.5	NU 1032	—	—	N	—	—	238000	340000	2600	3200	171	168.5	178	184	—	228	232	220	2	1.5	6.01	5.93	—	—	—	—	—	—	—	—
	290	48	255	195	3	3	NU 232	NJ	NUP	N	NF	NP	430000	570000	2200	2600	174	174	192	197	210	276	276	262	2.5	2.5	14.5	14.2	HJ 232	160	207	12	21	3	1.44
	290	48	—	195	3	3	NU 232 E	NJ	NUP	—	—	—	500000	665000	1900	2200	—	174	192	197	210	276	—	—	2.5	2.5	15.6	—	HJ 232 E	160	207.3	12	20	3	1.43
	290	80	—	195	3	3	NU 2232	NJ	NUP	—	—	—	630000	940000	1900	2400	—	174	192	197	210	276	—	—	2.5	2.5	24.1	—	HJ 2232	160	205	12	28	3	1.50
	290	80	—	193	3	3	NU 2232 E	NJ	NUP	—	—	—	810000	1190000	1900	2400	—	174	192	197	210	276	—	—	2.5	2.5	25.9	—	HJ 2232 E	160	206.1	12	24.5	3	1.54
	340	68	292	208	4	4	NU 332	NJ	NUP	N	NF	NP	700000	875000	1700	2000	178	178	200	211	228	322	322	304	3	3	31.2	30.6	HJ 332	160	225	15	28	4	2.71
	340	68	—	204	4	4	NU 332 E	NJ	NUP	—	—	—	860000	1050000	1700	2000	—	178	200	211	228	322	—	—	3	3	34.1	—	HJ 332 E	160	222.1	15	25	4	2.49
	340	114	—	208	4	4	NU 2332	NJ	NUP	—	—	—	1070000	1520000	1500	1900	—	178	200	211	228	322	—	—	3	3	52.5	—	HJ 2332	160	225	15	37	4	3.09
	340	114	—	204	4	4	NU 2332 E	NJ	NUP	—	—	—	1310000	1820000	1600	1900	—	178	200	211	228	322	—	—	3	3	57.2	—	HJ 2332 E	160	222.1	15	32	4	2.80
170	260	42	237	193	2.1	2.1	NU 1034	—	—	N	—	—	287000	415000	2400	2800	181	182	190	197	—	248	249	237	2	2	8.02	7.90	—	—	—	—	—	—	—	—
	310	52	272	208	4	4	NU 234	NJ	NUP	N	NF	NP	475000	635000	2000	2400	188	188	204	211	223	292	292	284	3	3	17.9	17.6	HJ 234	170	220.5	12	22	4	1.67
	310	52	—	207	4	4	NU 234 E	NJ	NUP	—	—	—	605000	800000	1900	2300	—	188	204	211	223	292	—	—	3	3	19.3	—	HJ 234 E	170	220.8	12	20	4	1.64
	310	86	—	208	4	4	NU 2234	NJ	NUP	—	—	—	725000	1100000	1800	2200	—	188	204	211	223	292	—	—	3	3	29.6	—	HJ 2234	170	219	12	29	4	1.78
	310	86	—	205	4	4	NU 2234 E	NJ	NUP	—	—	—	970000	1400000	1900	2300	—	188	204	211	223	292	—	—	3	3	31.9	—	HJ 2234 E	170	219.5	12	24	4	1.76
	360	72	310	220	4	4	NU 334	NJ	NUP	N	NF	NP	795000	1010000	1600	2000	188	188	216	223	241	342	342	314	3	3	37.1	36.1	HJ 334	170	238	16	29.5	4	3.20
	360	120	—	220	4	4	NU 2334	NJ	NUP	—	—	—	1220000	1750000	1400	1800	—	188	216	223	241	342	—	—	3	3	62.7	—	HJ 2334	170	238	16	38.5	4	3.62
180	280	46	255	205	2.1	2.1	NU 1036	—	—	N	—	—	355000	510000	2200	2600	191	192	203	209	—	268	269	256	2	2	10.8	10.5	—	—	—	—	—	—	—	—
	320	52	282	218	4	4	NU 236	NJ	NUP	N	NF	NP	495000	675000	1900	2200	198	198	214	221	233	302	302	294	3	3	19.3	18.3	HJ 236	180	230.5	12	22	4	1.76
	320	52	—	217	4	4	NU 236 E	NJ	NUP	—	—	—	625000	850000	1800	2200	—	198	214	221	233	302	—	—	3	3	20.5	—	HJ 236 E	180	230.8	12	20	4	1.73
	320	86	—	218	4	4	NU 2236	NJ	NUP	—	—	—	775000	1210000	1700	2000	—	198	214	221	233	302	—	—	3	3	30.4	—	HJ 2236	180	229	12	29	4	1.87
	320	86	—	215	4	4	NU 2236 E	NJ	NUP	—	—	—	1010000	1510000	1800	2200	—	198	214	221	233	302	—	—	3	3	34.5	—	HJ 2236 E	180	229.5	12	24	4	1.85
	380	75	328	232	4	4	NU 336	NJ	NUP	N	NF	NP	9050000	1150000	1500	1800	198	198	227	235	255	362	362	332	3	3	42.8	41.9	HJ 336	180	252	17	30.5	4	3.80
	380	126	—	232	4	4	NU 2336	NJ	NUP	—	—	—	1380000	1990000	1300	1700	—	198	227	235	255	362	—	—	3	3	73.1	—	HJ 2336	180	252	17	40	4	4.35

Note: (1) The dimension table shows limiting speed for bearings made with machined cages. For bearings made with pressed steel cages, multiply the table limits by 0.8.

Cylindrical Roller Bearings

Bore Diameter: 190～380mm





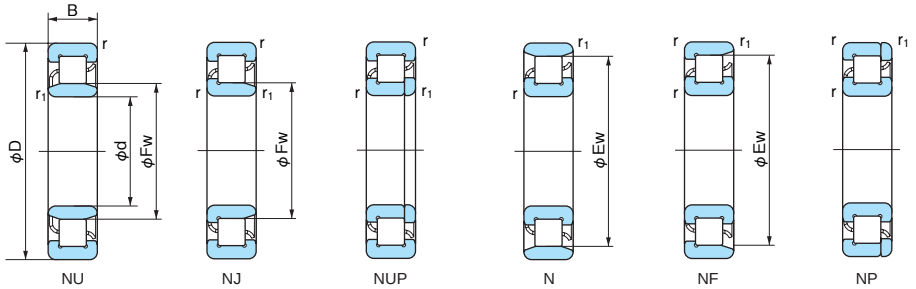
1N=0.102kgf

Boundary dimensions (mm)							Bearing No.						Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min⁻¹)(1)		Abutment and fillet dimensions (mm)										Mass (kg)		Dimensions of L-shaped thrust collar (mm)						
d	D	B	Ew	Fw	r (min)	r1 (min)	NU	NJ	NUP	N	NF	NP			Grease lubrication	Oil lubrication	da (min)	db (min)	db (max)	dc (min)	dd (min)	Da (max)	Db (max)	Db (min)	ra (max)	ra1 (max)	NU	N	Bearing No.	d	d1 (max)	B1	B2	r1 (min)	Mass (kg) Reference
	290	46	265	215	2.1	2.1	NU 1038	—	—	N	—	—	365000	535000	2000	2600	201	202	213	219	—	278	279	266	2	2	11.2	10.9	—	—	—	—	—	—	—
	340	55	299	231	4	4	NU 238	NJ	NUP	N	NF	NP	555000	770000	1800	2200	208	208	227	234	247	322	322	311	3	3	22.6	22.1	HJ 238	190	244.5	13	23.5	4	2.16
	340	55	—	230	4	4	NU 238 E	NJ	NUP	—	—	—	695000	955000	1700	2000	—	208	227	234	247	322	—	—	3	3	26.0	—	HJ 238 E	190	244.5	13	21.5	4	2.11
190	340	92	—	231	4	4	NU 2238	NJ	NUP	—	—	—	830000	1290000	1600	2000	—	208	227	234	247	322	—	—	3	3	37.5	—	HJ 2238	190	243	13	31.5	4	2.32
	340	92	—	228	4	4	NU 2238 E	NJ	NUP	—	—	—	1100000	1670000	1700	2000	—	208	227	234	247	322	—	—	3	3	45.2	—	HJ 2238 E	190	243.2	13	26.5	4	2.28
	400	78	345	245	5	5	NU 338	NJ	NUP	N	NF	NP	975000	1260000	1400	1700	212	212	240	248	268	378	378	349	4	4	49.4	48.3	HJ 338	190	265	18	32	5	4.36
	400	132	—	245	5	5	NU 2338	NJ	NUP	—	—	—	1520000	2220000	1300	1600	—	212	240	248	268	378	—	—	4	4	85.0	—	HJ 2338	190	265	18	41.5	5	4.92
	310	51	281	229	2.1	2.1	NU 1040	—	—	N	—	—	390000	580000	2000	2400	211	212	226	233	—	298	299	283	2	2	14.4	14.1	—	—	—	—	—	—	—
	360	58	316	244	4	4	NU 240	NJ	NUP	N	NF	NP	620000	865000	1500	1800	218	218	240	247	261	342	342	328	3	3	26.8	26.2	HJ 240	200	258	14	25	4	2.59
	360	58	—	243	4	4	NU 240 E	NJ	NUP	—	—	—	765000	1060000	1600	1900	—	218	240	247	261	342	—	—	3	3	29.5	—	HJ 240 E	200	258.2	14	23	4	2.54
200	360	98	—	244	4	4	NU 2240	NJ	NUP	—	—	—	925000	1440000	1500	1800	—	218	240	247	261	342	—	—	3	3	45.4	—	HJ 2240	200	258	14	34	4	2.95
	360	98	—	241	4	4	NU 2240 E	NJ	NUP	—	—	—	1220000	1870000	1500	1800	—	218	240	247	261	342	—	—	3	3	52.3	—	HJ 2240 E	200	256.9	14	28	4	2.73
	420	80	360	260	5	5	NU 340	NJ	NUP	N	NF	NP	975000	1270000	1300	1600	222	222	254	263	283	398	398	364	4	4	55.8	54.5	HJ 340	200	280	18	33	5	4.91
	420	138	—	260	5	5	NU 2340	NJ	NUP	—	—	—	1510000	2240000	1200	1500	—	222	254	263	283	398	—	—	4	4	96.8	—	HJ 2340	200	280	18	44.5	5	5.63
	340	56	310	250	3	3	NU 1044	—	—	N	—	—	500000	750000	1800	2300	233	234	248	254	—	326	327	311	2.5	2.5	18.8	18.5	—	—	—	—	—	—	—
220	400	65	350	270	4	4	NU 244	NJ	NUP	N	NF	NP	760000	1080000	1500	1800	238	238	266	273	289	382	382	362	3	3	37.8	37.0	HJ 244	220	286	15	27.5	4	3.53
	400	108	—	270	4	4	NU 2244	NJ	NUP	—	—	—	1140000	1810000	1400	1700	—	238	266	273	289	382	—	—	3	3	61.8	—	HJ 2244	220	286	15	36.5	4	3.99
	460	88	396	284	5	5	NU 344	NJ	NUP	N	NF	NP	1200000	1570000	1200	1500	242	242	279	287	307	438	438	400	4	4	73.6	71.7	HJ 344	220	307	20	36	5	6.53
	360	56	330	270	3	3	NU 1048	—	—	N	—	—	530000	820000	1700	2100	253	254	268	275	—	346	347	331	2.5	2.5	20.4	20.1	—	—	—	—	—	—	—
240	440	72	385	295	4	4	NU 248	NJ	NUP	N	NF	NP	935000	1340000	1400	1600	258	258	293	298	316	422	422	397	3	3	51.1	50.0	HJ 248	240	313	16	29.5	4	4.57
	440	120	—	295	4	4	NU 2248	NJ	NUP	—	—	—	1440000	2320000	1300	1600	—	258	293	298	316	422	—	—	3	3	83.5	—	HJ 2248	240	313	16	38.5	4	5.14
	500	95	430	310	5	5	NU 348	NJ	NUP	N	NF	NP	1430000	1950000	1100	1300	262	262	305	313	333	478	478	434	4	4	93.0	90.9	HJ 348	240	335	22	39.5	5	8.55
	400	65	364	296	4	4	NU 1052	—	—	N	—	—	645000	1000000	1600	1800	278	278	292	300	—	382	382	365	3	3	29.6	29.2	—	—	—	—	—	—	—
260	480	80	420	320	5	5	NU 252	NJ	NUP	N	NF	NP	1140000	1660000	1300	1500	282	282	318	323	343	458	458	432	4	4	69.0	66.7	HJ 252	260	340	18	33	5	6.12
	480	130	—	320	5	5	NU 2252	NJ	NUP	—	—	—	1780000	2930000	1100	1300	—	282	318	323	343	458	458	—	4	4	106	—	HJ 2252	260	340	18	40.5	5	6.69
	540	102	464	336	6	6	NU 352	NJ	NUP	N	NF	NP	1620000	2230000	1000	1200	288	288	331	339	359	512	512	468	5	5	117	114	HJ 352	260	362	24	43	6	8.77
280	420	65	384	316	4	4	NU 1056	—	—	N	—	—	660000	1050000	1500	1700	298	298	313	320	—	402	402	385	3	3	33.0	32.5	—	—	—	—	—	—	—
	500	80	440	340	5	5	NU 256	NJ	NUP	N	NF	NP	1140000	1680000	1200	1400	302	302	336	343	365	478	478	452	4	4	71.5	70.0	HJ 256	280	360	18	33	5	6.52
300	460	74	420	340	4	4	NU 1060	—	—	N	—	—	885000	1400000	1400	1500	318	318	337	344	—	442	442	421	3	3	44.7	44.1	—	—	—	—	—	—	—
	540	85	476	364	5	5	NU 260	NJ	NUP	N	NF	NP	1400000	2070000	1100	1300	322	322	361	368	392	518	518	487	4	4	88.9	87.0	HJ 260	300	387	20	34.5	5	8.33
320	480	74	440	360	4	4	NU 1064	—	—	N	—	—	905000	1470000	1300	1400	338	338	356	365	—	462	462	441	3	3	49.3	48.4	—	—	—	—	—	—	—
	580	92	510	390	5	5	NU 264	NJ	NUP	N	NF	NP	1600000	2390000	1000	1200	342	342	386	393	419	558	558	522	4	4	113	111	HJ 264	320	415	21	37	5	10.3
340	520	82	475	385	5	5	NU 1068	—	—	N	—	—	1080000	1740000	1200	1300	362	362	381	390	—	498	498	476	4	4	65.9	64.8	—	—	—	—	—	—	—
360	540	82	495	405	5	5	NU 1072	—	—	N	—	—	1110000	1830000	1100	1300	382	382	401	410	—	518	518	496	4	4	68.8	67.7	—	—	—	—	—	—	—
380	560	82	515	425	5	5	NU 1076	—	—	N	—	—	1140000	1910000	1000	1200	402	402	421	430	—	538	538	516	4	4	72.3	71.1	—	—	—	—	—	—	—

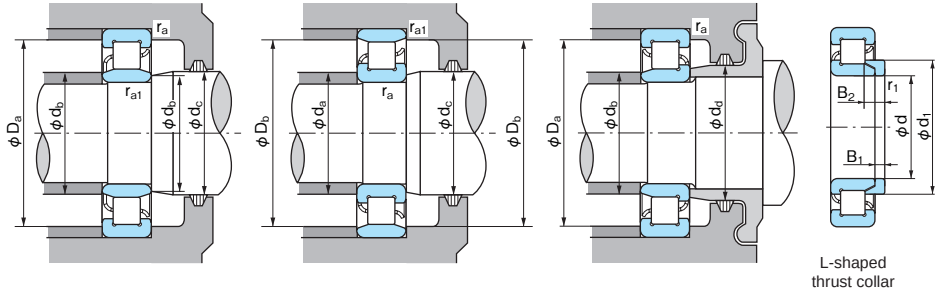
Note: (1) The dimension table shows limiting speed for bearings made with machined cages. For bearings made with pressed steel cages, multiply the table limits by 0.8.

Cylindrical Roller Bearings

Bore Diameter: 400～500mm



NU NJ NUP N NF NP



L-shaped thrust collar

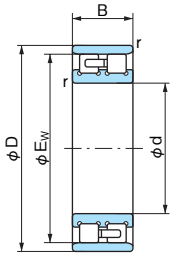
1N=0.102kgf

Boundary dimensions (mm)							Bearing No.						Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})(1)		Abutment and fillet dimensions (mm)										Mass (kg)		Dimensions of L-shaped thrust collar (mm)							
d	D	B	Ew	Fw	r (min)	r1 (min)	NU	NJ	NUP	N	NF	NP			Grease lubrication	Oil lubrication	da (min)	db (min)	db (max)	dc (min)	dd (min)	Da (max)	Db (max)	Db (min)	ra (max)	ra1 (max)	NU	N	Bearing No.	d	d1 (max)	B1	B2	r1 (min)	Mass (kg) Reference
400	600	90	550	450	5	5	**NU 1080**	—	—	**N**	—	—	1360000	2280000	950	1100	422	422	446	455	—	578	578	551	4	4	92.5	92.4	—	—	—	—	—	—	—
420	620	90	570	470	5	5	**NU 1084**	—	—	**N**	—	—	1390000	2380000	900	1100	442	442	466	475	—	598	598	571	4	4	97.6	95.8	—	—	—	—	—	—	—
440	650	94	597	493	6	6	**NU 1088**	—	—	**N**	—	—	1530000	2530000	850	1050	468	468	489	498	—	622	622	598	5	5	112	110	—	—	—	—	—	—	—
460	680	100	624	516	6	6	**NU 1092**	—	—	**N**	—	—	1630000	2740000	800	1000	488	488	512	520	—	652	652	625	5	5	130	128	—	—	—	—	—	—	—
480	700	100	644	536	6	6	**NU 1096**	—	—	**N**	—	—	1620000	2860000	780	950	508	508	532	541	—	672	672	645	5	5	135	132	—	—	—	—	—	—	—
500	720	100	664	556	6	6	**NU 10/500**	—	—	**N**	—	—	1700000	2970000	750	900	528	528	552	561	—	692	692	665	5	5	140	137	—	—	—	—	—	—	—

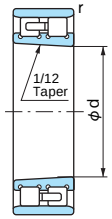
Note: (1) The dimension table shows limiting speed for bearings made with machined cages. For bearings made with pressed steel cages, multiply the table limits by 0.8.

Double-row Cylindrical Roller Bearings

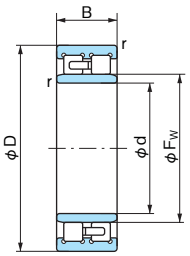
Bore Diameter: 25～180mm



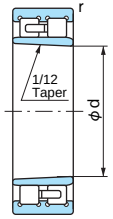
NN
Cylindrical bore



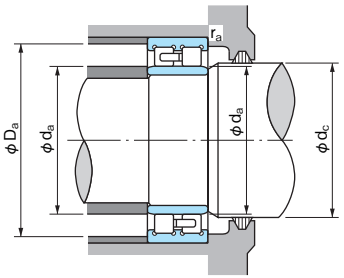
NN
Tapered bore (Taper: 1/12)

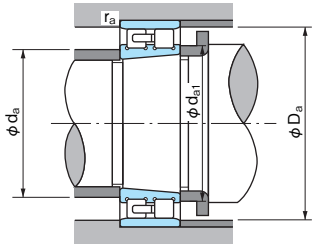


NNU
Cylindrical bore



NNU
Tapered bore (Taper: 1/12)





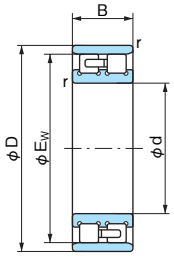
1N=0.102kgf

Boundary dimensions (mm)						Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min-1)		Abutment and fillet dimensions (mm)							Mass (kg) (Reference Tapered bore)	Bearing No.
d	D	B	Ew	Fw	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	da (min)	da (max)	da1 (min)	dc (min)	Da (max)	Da (min)	ra (max)		
25	47	16	41.3	—	0.6	NN3005	NN3005K	25800	30000	15000	17000	30	—	30	—	42	41.8	0.6	0.123	NN3005K
30	55	19	48.5	—	1	NN3006	NN3006K	31000	37000	12000	15000	36	—	37	—	49	49	1	0.199	NN3006K
35	62	20	55	—	1	NN3007	NN3007K	39500	50000	11000	13000	41	—	42	—	56	56	1	0.258	NN3007K
40	68	21	61	—	1	NN3008	NN3008K	43500	55500	9800	11000	46	—	48	—	62	62	1	0.312	NN3008K
45	75	23	67.5	—	1	NN3009	NN3009K	52000	68500	8800	10000	51	—	52	—	69	69	1	0.405	NN3009K
50	80	23	72.5	—	1	NN3010	NN3010K	53000	72500	8200	9600	56	—	58	—	74	74	1	0.454	NN3010K
55	90	26	81	—	1.1	NN3011	NN3011K	69500	96500	7300	8600	62	—	64	—	83	82	1	0.651	NN3011K
60	95	26	86.1	—	1.1	NN3012	NN3012K	73500	106000	6800	8000	67	—	68	—	88	87	1	0.704	NN3012K
65	100	26	91	—	1.1	NN3013	NN3013K	77000	116000	6400	7600	72	—	74	—	93	92	1	0.758	NN3013K
70	110	30	100	—	1.1	NN3014	NN3014K	97500	148000	5700	6800	77	—	78	—	103	101	1	1.04	NN3014K
75	115	30	105	—	1.1	NN3015	NN3015K	96500	149000	5500	6400	82	—	84	—	108	106	1	1.14	NN3015K
80	125	34	113	—	1.1	NN3016	NN3016K	119000	186000	5000	6000	87	—	90	—	118	114	1	1.52	NN3016K
85	130	34	118	—	1.1	NN3017	NN3017K	125000	201000	4800	5600	92	—	96	—	123	119	1	1.61	NN3017K
90	140	37	127	—	1.5	NN3018	NN3018K	143000	228000	4500	5200	98.5	—	100	—	131.5	129	1.5	2.07	NN3018K
95	145	37	132	—	1.5	NN3019	NN3019K	150000	246000	4300	5000	103.5	—	106	—	136.5	134	1.5	2.17	NN3019K
100	140	40	—	113	1.1	NNU4920	NNU4920K	155000	305000	4200	5000	106.5	111	110	115	133.5	—	1	1.77	NNU4920K
	150	37	137	—	1.5	NN3020	NN3020K	157000	265000	4000	4800	108.5	—	112	—	141.5	139	1.5	2.26	NN3020K
105	145	40	—	118	1.1	NNU4921	NNU4921K	161000	325000	4000	4800	111.5	116	115	120	138.5	—	1	1.85	NNU4921K
	160	41	146	—	2	NN3021	NN3021K	198000	320000	3800	4500	115	—	116	—	150	148	2	2.89	NN3021K
110	150	40	—	123	1.1	NNU4922	NNU4922K	167000	335000	3900	4600	116.5	121	120	125	143.5	—	1	1.93	NNU4922K
	170	45	155	—	2	NN3022	NN3022K	229000	375000	3600	4300	120	—	122	—	160	157	2	3.68	NN3022K
120	165	45	—	134.5	1.1	NNU4924	NNU4924K	183000	360000	3500	4200	126.5	133	130	137	158.5	—	1	2.65	NNU4924K
	180	46	165	—	2	NN3024	NN3024K	239000	405000	3300	3900	130	—	132	—	170	167	2	3.98	NN3024K
130	180	50	—	146	1.5	NNU4926	NNU4926K	275000	565000	3200	3800	138	144	142	148	172	—	1.5	3.55	NNU4926K
	200	52	182	—	2	NN3026	NN3026K	284000	475000	3000	3600	140	—	144	—	190	183	2	5.92	NN3026K
140	190	50	—	156	1.5	NNU4928	NNU4928K	283000	585000	3000	3600	148	154	151	158	182	—	1.5	3.80	NNU4928K
	210	53	192	—	2	NN3028	NN3028K	298000	515000	2800	3400	150	—	154	—	200	194	2	6.44	NN3028K
150	210	60	—	168.5	2	NNU4930	NNU4930K	350000	715000	2700	3300	159	166	162	171	201	—	2	5.95	NNU4930K
	225	56	206	—	2.1	NN3030	NN3030K	335000	585000	2600	3100	162	—	164	—	213	208	2	7.81	NN3030K
160	220	60	—	178.5	2	NNU4932	NNU4932K	365000	760000	2600	3100	169	176	172	182	211	—	2	6.25	NNU4932K
	240	60	219	—	2.1	NN3032	NN3032K	375000	660000	2500	2900	172	—	174	—	228	221	2	8.92	NN3032K
170	230	60	—	188.5	2	NNU4934	NNU4934K	375000	805000	2400	2900	179	186	182	192	221	—	2	6.60	NNU4934K
	260	67	236	—	2.1	NN3034	NN3034K	450000	805000	2300	2700	182	—	184	—	248	238	2	12.6	NN3034K
180	250	69	—	202	2	NNU4936	NNU4936K	480000	1020000	2200	2700	189	199	194	205	241	—	2	9.50	NNU4936K
	280	74	255	—	2.1	NN3036	NN3036K	565000	995000	2100	2500	192	—	196	—	268	257	2	16.6	NN3036K

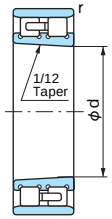
NACHI

Double-row Cylindrical Roller Bearings

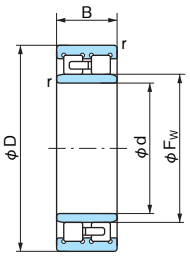
Bore Diameter: 190～320mm



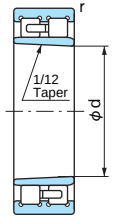
NN
Cylindrical bore



NN
Tapered bore (Taper: 1/12)



NNU
Cylindrical bore



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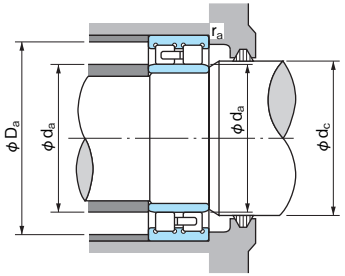
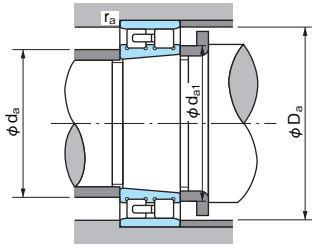
Tapered bore (Taper: 1/12)





1N=0.102kgf

Boundary dimensions (mm)						Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)		Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)							Mass (kg) (Reference Tapered bore)	Bearing No.
													da		da1	dc	Da		ra		
d	D	B	Ew	Fw	r (min)	Cylindrical bore	Tapered bore				Grease lubrication	Oil lubrication	(min)	(max)	(min)	(min)	(max)	(min)	(max)		
190	260	69	—	212	2	**NNU4938**	**NNU4938K**	485000	1060000		2100	2600	199	209	204	215	251	—	2	10.0	**NNU4938K**
	290	75	265	—	2.1	**NN3038**	**NN3038K**	595000	1080000		2000	2400	202	—	206	—	278	267	2	17.5	**NN3038K**
200	280	80	—	225	2.1	**NNU4940**	**NNU4940K**	570000	1220000		2000	2400	211	222	214	228	269	—	2	10.1	**NNU4940K**
	310	82	282	—	2.1	**NN3040**	**NN3040K**	655000	1170000		1900	2200	212	—	216	—	298	285	2	21.6	**NN3040K**
220	300	80	—	245	2.1	**NNU4944**	**NNU4944K**	600000	1330000		1800	2200	231	242	234	248	289	—	2	15.5	**NNU4944K**
	340	90	310	—	3	**NN3044**	**NN3044K**	815000	1480000		1700	2000	234	—	238	—	326	313	2.5	28.4	**NN3044K**
240	320	80	—	265	2.1	**NNU4948**	**NNU4948K**	625000	1450000		1700	2000	251	262	254	269	309	—	2	17.0	**NNU4948K**
	360	92	330	—	3	**NN3048**	**NN3048K**	855000	1600000		1600	1900	254	—	256	—	346	333	2.5	31.8	**NN3048K**
260	360	100	—	292	2.1	**NNU4952**	**NNU4952K**	935000	2100000		1500	1800	271	288	276	296	349	—	2	28.3	**NNU4952K**
	400	104	364	—	4	**NN3052**	**NN3052K**	1080000	2070000		1400	1700	278	—	280	—	382	367	3	46.0	**NN3052K**
280	380	100	—	312	2.1	**NNU4956**	**NNU4956K**	960000	2230000		1400	1700	291	308	296	316	369	—	2	30.3	**NNU4956K**
	420	106	384	—	4	**NN3056**	**NN3056K**	1080000	2080000		1300	1600	298	—	300	—	402	387	3	49.6	**NN3056K**
300	420	118	—	339	3	**NNU4960**	**NNU4960K**	1230000	2880000		1300	1500	313	335	320	343	407	—	2.5	46.7	**NNU4960K**
	460	118	418	—	4	**NN3060**	**NN3060K**	1430000	2740000		1200	1400	318	—	325	—	442	421	3	68.7	**NN3060K**
320	440	118	—	359	3	**NNU4964**	**NNU4964K**	1270000	3050000		1200	1400	333	335	340	363	427	—	2.5	49.6	**NNU4964**
	480	121	438	—	4	**NN3064**	**NN3064K**	1430000	2750000		1200	1400	338	—	345	—	462	442	3	74.0	**NN3064K**

NACHI

Tapered Roller Bearings

Tolerance / Metric series ····· Page 57
/ Inch series ····· Page 60
Internal clearance / Double-row
Tapered Roller Bearings ····· Page 64

● Interchangeability

Bearings designated as E ..... J (E prefix and J suffix) comply with ISO standards in sub-unit dimensions. The cups and cones of these bearings are internationally interchangeable.

α : Contact angle
C : Cup width
E : Cup smallest internal diameter

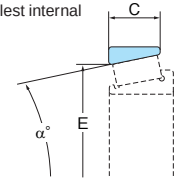


Fig 1. Sub-unit dimensions

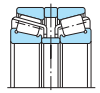
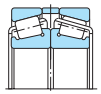
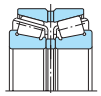
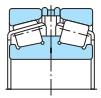
● Combination and Double-row Tapered Roller Bearings

When radial loads act on a Tapered roller bearing, an axial load is generated from the reaction of the internal contact angle of the bearing. This induced axial load creates a separating force on the cup and cone which is normally offset by mounting Tapered roller bearings in pairs or as multi-row sets.
Table 1 shows combination and double-row mounting of Tapered roller bearings.

● Inch Series

NACHI manufactures inch-dimensioned series Tapered Roller Bearings to ABMA (ANSI) standards.

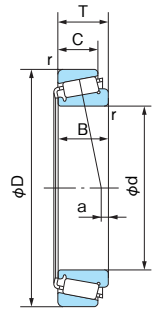
Table 1. Double-row Tapered Roller Bearing Configurations and Features

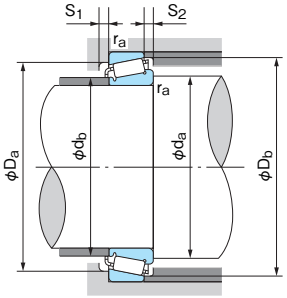
Series or Configuration	Cross section	Example Bearing Number	Adjustment
Back-to-back (DB mounting)		E32208JDB10	Combination of two standard single-row Tapered roller bearings. Two mounting systems are used; one using preset spacers, and the other requiring adjustment using either torque or end-play control.
Face-to-face (DF mounting)		E32208JDF	
KBE KDE		150KBE030	Either double inner or outer ring. Adjustment is normally done using spacers. If spacers are not used, please contact NACHI for end-play specifications.
KBD		150KBD030	

■ Tapered Roller Bearings

Metric Series

Bore Diameter: 15～35mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

Por=0.5Fr+Y_0Fa

Por=Fr

Values Y_0 from table.

1N=0.102kgf

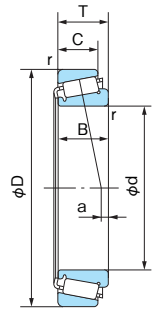
Boundary dimensions (mm)							Bearing No.	(Ref.) ISO355 Dimension series	Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)								Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference	Bearing No.
d	D	T	B	C	Cone r (min)	Cup r (min)					Grease lubrication	Oil lubrication	da (min)	db (max)	Da (min)	Db (min)	S1 (min)	S2 (min)	Cone ra (max)	Cup ra (max)			Y_1	Y_0		
15	35	11.75	11	10	0.6	0.6	H-E30202	—	15800	14500	12000	16000	19.5	20	29	33	2	1.7	0.6	0.6	3.4	0.32	1.88	1.04	0.054	H-E30202
	42	14.25	13	11	1	1	H-E30302J	2FB	21900	19200	10000	14000	20.5	22	36.5	38	2	3	1	1	4.3	0.29	2.11	1.16	0.098	H-E30302J
17	40	13.25	12	11	1	1	H-E30203J	2DB	20800	20700	10000	14000	22.5	23	33	37	2	2	1	1	3.2	0.35	1.74	0.96	0.081	H-E30203J
	47	15.25	14	12	1	1	H-E30303J	2FB	27400	24500	9200	12000	22.5	25	40	42	2	3	1	1	4.3	0.29	2.11	1.16	0.133	H-E30303J
	47	20.25	19	16	1	1	H-32303	—	31900	29900	9400	13000	22.5	25	39	43	2	4	1	1	7.9	0.29	1.97	1.08	0.176	H-32303
20	42	15	15	12	0.6	0.6	H-E32004J	3CC	27300	31500	9300	13000	24.5	25	35	39	3	3	0.6	0.6	4.5	0.37	1.60	0.88	0.102	H-E32004J
	47	15.25	14	12	1	1	H-E30204J	2DB	27000	27200	8700	12000	25.5	27	39	44	2	3	1	1	3.5	0.35	1.74	0.95	0.127	H-E30204J
	47	19.25	18	15	1	1	H-E32204	—	32500	34800	8700	12000	25.5	27	39	43	2	4	1	1	6.2	0.35	1.73	0.95	0.156	H-E32204
	52	16.25	16	13	1.5	1.5	H-E30304J	—	36400	35200	8300	11000	28.5	28	44	47	2	3	1.5	1.5	3.0	0.30	2.00	1.10	0.179	H-E30304J
	52	22.25	21	18	1.5	1.5	H-E32304J	2FD	45100	46700	8400	11000	28.5	27	43	47	3	4	1.5	1.5	7.8	0.30	2.00	1.10	0.239	H-E32304J
25	47	15	15	11.5	0.6	0.6	H-E32005J	4CC	30200	37700	8300	11000	29.5	30	40	44	3	3.5	0.6	0.6	3.2	0.43	1.39	0.77	0.118	H-E32005J
	47	17	17	14	0.6	0.6	H-E33005J	2CE	33500	42300	8300	11000	29.5	30	41	44	3	3	0.6	0.6	6.1	0.29	2.07	1.14	0.131	H-E33005J
	52	16.25	15	13	1	1	H-E30205J	3CC	31500	33700	7500	10000	30.5	31	44	48	2	3	1	1	3.3	0.37	1.60	0.88	0.156	H-E30205J
	52	19.25	18	16	1	1	H-E32205J	2CD	39800	44800	7900	11000	30.5	31	43	48	2	4	1	1	5.7	0.36	1.67	0.92	0.188	H-E32205J
	52	22	22	18	1	1	H-E33205J	2DE	48900	58500	7900	10000	30.5	30	43	49	4	4	1	1	7.9	0.35	1.71	0.94	0.225	H-E33205J
	62	18.25	17	15	1.5	1.5	H-E30305J	2FB	48200	46900	6800	9000	33.5	34	54	57	2	3	1.5	1.5	5.4	0.30	2.00	1.10	0.273	H-E30305J
	62	18.25	17	13	1.5	1.5	H-E30305DJ	7FB	39800	42500	5700	8000	33.5	34	47	58.5	3	5	1.5	1.5	–2.2	0.83	0.73	0.40	0.269	H-E30305DJ
	62	25.25	24	20	1.5	1.5	H-E32305J	2FD	61200	64100	6900	9100	33.5	33	52	57	3	5	1.5	1.5	8.6	0.30	2.00	1.10	0.386	H-E32305J
30	55	17	17	13	1	1	H-E32006J	4CC	38200	48000	7000	9400	35.5	35	47	52	3	4	1	1	3.4	0.43	1.39	0.77	0.177	H-E32006J
	55	20	20	16	1	1	H-E33006J	2CE	43200	55200	7000	9400	35.5	36	48	52	3	4	1	1	7.0	0.29	2.06	1.13	0.203	H-E33006J
	62	17.25	16	14	1	1	H-E30206J	3DB	41500	44800	6500	8700	35.5	37	53	57	2	3	1	1	3.1	0.37	1.60	0.88	0.236	H-E30206J
	62	21.25	20	17	1	1	H-E32206J	3DC	50700	57900	6500	8700	35.5	37	52	58	2	4	1	1	5.3	0.37	1.60	0.88	0.292	H-E32206J
	62	25	25	19.5	1	1	H-E33206J	2DE	66400	79400	6500	8700	35.5	36	53	58	2	5.5	1	1	8.7	0.34	1.76	0.97	0.359	H-E33206J
	72	20.75	19	16	1.5	1.5	H-E30306J	2FB	59600	60100	5800	7700	38.5	40	62	66	3	4.5	1.5	1.5	5.1	0.31	1.90	1.05	0.411	H-E30306J
	72	20.75	19	14	1.5	1.5	H-E30306DJ	7FB	50900	54900	4900	6800	38.5	40	55	68	3	6.5	1.5	1.5	–2.9	0.83	0.73	0.04	0.400	H-E30306DJ
	72	28.75	27	23	1.5	1.5	H-E32306J	2FD	82200	91600	5900	7900	38.5	39	59	66	3	5.5	1.5	1.5	9.8	0.31	1.90	1.05	0.588	H-E32306J
35	55	14	14	11.5	0.6	0.6	E32907J	2BD	26100	36500	6600	8800	39.5	40	49	52	2.5	2.5	0.6	0.6	3.1	0.29	2.06	1.13	0.120	E32907J
	62	18	18	14	1	1	H-E32007J	4CC	45500	59400	6200	8200	40.5	40	54	59	4	4	1	1	2.9	0.45	1.32	0.73	0.231	H-E32007J
	62	21	21	17	1	1	H-E33007J	2CE	51300	68000	6200	8200	40.5	41	55	59	3	4	1	1	6.8	0.31	1.97	1.08	0.263	H-E33007J
	72	18.25	17	15	1.5	1.5	H-E30207J	3DB	55100	60900	5600	7400	43.5	44	62	67	3	3	1.5	1.5	2.9	0.37	1.60	0.88	0.344	H-E30207J
	72	24.25	23	19	1.5	1.5	H-E32207J	3DC	69600	82400	5600	7500	43.5	43	61	67	3	5	1.5	1.5	6.0	0.37	1.60	0.88	0.453	H-E32207J
	72	28	28	22	1.5	1.5	H-E33207J	2DE	86700	107000	5700	7500	43.5	42	61	68	5	6	1.5	1.5	9.6	0.35	1.70	0.93	0.551	H-E33207J
	80	22.75	21	18	2	1.5	H-E30307J	2FB	76200	78900	5200	6900	45	45	70	74	3	4.5	2	1.5	5.8	0.31	1.90	1.05	0.527	H-E30307J
	80	22.75	21	15	2	1.5	H-E30307DJ	7FB	63100	69100	4300	6000	45	44	66	76.5	3	7.5	2	1.5	–4.1	0.83	0.73	0.40	0.536	H-E30307DJ
	80	32.75	31	25	2	1.5	H-E32307J	2FE	101000	114000	5300	7000	45	44	66	74	3	7.5	2	1.5	12.2	0.31	1.90	1.05	0.776	H-E32307J

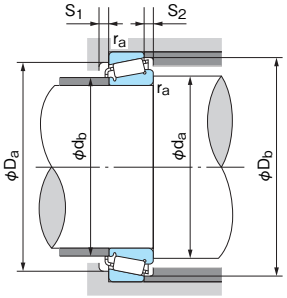
Note: (1) Minus value of load center “a” indicates that the center is located outside of cone backface.

■ Tapered Roller Bearings

Metric Series

Bore Diameter: 40～50mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

Por=0.5Fr+Y_0Fa

Por=Fr

Values Y_0 from table.

1N=0.102kgf

Boundary dimensions (mm)							Bearing No.	(Ref.) ISO355 Dimension series	Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)								Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference	Bearing No.
d	D	T	B	C	Cone r (min)	Cup r (min)					Grease lubrication	Oil lubrication	da (min)	db (max)	Da (min)	Db (min)	S1 (min)	S2 (min)	Cone ra (max)	Cup ra (max)			Y_1	Y_0		
40	62	15	15	12	0.6	0.6	H-E32908J	2BC	33500	48500	5900	7800	44.5	45	55	59	3	3	0.6	0.6	3.1	0.29	2.07	1.14	0.164	H-E32908J
	68	19	19	14.5	1	1	H-E32008J	3CD	53500	71400	5600	7400	45.5	46	60	65	4	4.5	1	1	3.9	0.38	1.58	0.87	0.282	H-E32008J
	68	22	22	18	1	1	H-E33008J	2BE	60400	84600	5500	7400	45.5	46	60	65	3	4	1	1	7.3	0.28	2.12	1.17	0.326	H-E33008J
	75	26	26	20.5	1.5	1.5	H-E33108J	2CE	82200	108000	5200	6900	48.5	47	65	71	4	5.5	1.5	1.5	7.7	0.36	1.69	0.93	0.508	H-E33108J
	80	19.75	18	16	1.5	1.5	H-E30208J	3DB	62900	69200	5000	6700	48.5	49	69	75	3	3.5	1.5	1.5	2.7	0.37	1.60	0.88	0.434	H-E30208J
	80	24.75	23	19	1.5	1.5	H-E32208J	3DC	77700	90800	5000	6600	48.5	48	68	75	3	5.5	1.5	1.5	5.3	0.37	1.60	0.88	0.554	H-E32208J
	80	32	32	25	1.5	1.5	H-E33208J	2DE	108000	139000	5000	6700	48.5	47	67	76	5	7	1.5	1.5	11.3	0.36	1.68	0.92	0.758	H-E33208J
	90	25.25	23	20	2	1.5	H-E30308J	2FB	90600	101000	4500	6100	50	52	77	82	3	5	2	1.5	5.4	0.35	1.74	0.96	0.757	H-E30308J
	90	25.25	23	17	2	1.5	H-E30308DJ	7FB	80500	90200	3800	5300	50	51	71	86	3	8	2	1.5	–4.6	0.83	0.73	0.40	0.757	H-E30308DJ
	90	35.25	33	27	2	1.5	H-E32308J	2FD	116000	139000	4600	6200	50	50	73	82	3	8	2	1.5	10.9	0.35	1.74	0.96	1.06	H-E32308J
45	68	15	15	12	0.6	0.6	H-E32909J	2BC	34700	52400	5300	7100	49.5	50	61	64	3	3	0.6	0.6	2.5	0.32	1.88	1.04	0.190	H-E32909J
	75	20	20	15.5	1	1	H-E32009J	3CC	62800	86500	5000	6600	50.5	51	67	72	4	4.5	1	1	3.5	0.39	1.53	0.84	0.354	H-E32009J
	75	24	24	19	1	1	H-E33009J	2CE	69600	101000	5000	6700	50.5	51	67	71	4	5	1	1	7.6	0.29	2.04	1.12	0.416	H-E33009J
	80	26	26	20.5	1.5	1.5	E33109J	3CE	87500	120000	4800	6400	53.5	52	69	76.5	4	5.5	1.5	1.5	6.6	0.38	1.57	0.86	0.563	E33109J
	85	20.75	19	16	1.5	1.5	H-E30209J	3DB	67200	77400	4600	6100	53.5	54	74	80	3	4.5	1.5	1.5	1.8	0.40	1.48	0.81	0.502	H-E30209J
	85	24.75	23	19	1.5	1.5	H-E32209J	3DC	78300	94100	4600	6100	53.5	53	73	81	3	5.5	1.5	1.5	3.8	0.40	1.48	0.81	0.587	H-E32209J
	85	32	32	25	1.5	1.5	E33209J	3DE	112000	149000	4600	6200	53.5	52	76.5	81	5	7	1.5	1.5	10.2	0.39	1.56	0.86	0.803	E33209J
	100	27.25	25	22	2	1.5	E30309J	2FB	113000	128000	4100	5400	55	59	86	93	3	5	2	1.5	5.9	0.35	1.74	0.96	1.01	E30309J
	100	27.25	25	18	2	1.5	E30309DJ	7FB	95100	107000	3400	4700	55	56	79	96	3	9	2	1.5	–5.7	0.83	0.73	0.40	0.973	E30309DJ
	100	38.25	36	30	2	1.5	E32309J	2FD	146000	180000	4100	5500	55	56	82	93	3	8	2	1.5	11.4	0.35	1.74	0.96	1.43	E32309J
50	72	15	15	12	0.6	0.6	E32910J	2BC	35900	56300	4900	6600	54.5	55	65	69	3	3	0.6	0.6	1.3	0.34	1.76	0.97	0.195	E32910J
	80	20	20	15.5	1	1	H-E32010J	3CC	65700	94500	4600	6100	55.5	56	72	77	4	4.5	1	1	2.3	0.42	1.42	0.78	0.389	H-E32010J
	80	24	24	19	1	1	E33010J	2CE	73000	110000	4600	6100	55.5	56	72	76	4	5	1	1	6.6	0.32	1.90	1.04	0.451	E33010J
	85	26	26	20	1.5	1.5	E33110J	3CE	89400	127000	4400	5900	58.5	56	74	81.5	4	6	1.5	1.5	5.4	0.41	1.46	0.80	0.594	E33110J
	90	21.75	20	17	1.5	1.5	H-E30210J	3DB	76500	91700	4300	5700	58.5	58	79	85	3	4.5	1.5	1.5	1.65	0.42	1.43	0.79	0.566	H-E30210J
	90	24.75	23	19	1.5	1.5	H-E32210J	3DC	85000	105000	4300	5700	58.5	58	78	85	3	5.5	1.5	1.5	4.1	0.42	1.43	0.79	0.643	H-E32210J
	90	32	32	24.5	1.5	1.5	H-E33210J	3DE	119000	167000	4300	5700	58.5	57	77	86.5	5	7.5	1.5	1.5	8.9	0.41	1.45	0.80	0.887	H-E33210J
	110	29.25	27	23	2.5	2	E30310J	2FB	137000	152000	3700	4900	62	65	95	102	3	6	2	2	6.4	0.35	1.74	0.96	1.32	E30310J
	110	29.25	27	19	2.5	2	E30310DJ	7FB	115000	133000	3100	4300	62	62	87	105	3	10	2	2	–5.8	0.83	0.73	0.40	1.25	E30310DJ
	110	42.25	40	33	2.5	2	E32310J	2FD	176000	220000	3700	5000	62	62	90	102	3	9	2	2	12.9	0.35	1.74	0.96	1.89	E32310J

Note: (1) Minus value of load center “a” indicates that the center is located outside of cone backface.

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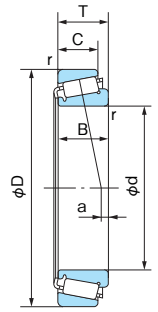
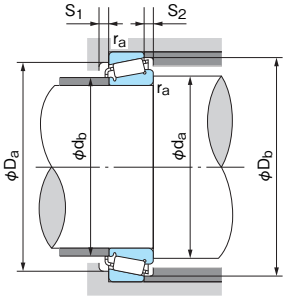
■ Tapered Roller Bearings

Metric Series

Bore Diameter: 55～65mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

Por=0.5Fr+Y_0Fa

Por=Fr

Values Y_0 from table.

1N=0.102kgf

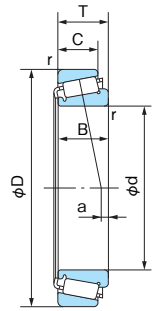
Boundary dimensions (mm)							Bearing No.	(Ref.) ISO355 Dimension series	Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min-1)		Abutment and fillet dimensions (mm)								Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference	Bearing No.
d	D	T	B	C	Cone r (min)	Cup r (min)					Grease lubrication	Oil lubrication	da (min)	db (max)	Da (min)	Db (min)	S1 (min)	S2 (min)	Cone ra (max)	Cup ra (max)			Y_1	Y_0		
55	80	17	17	14	1	1	E32911J	2BC	44600	73300	4400	5900	61	61	72	76	3	3	1	1	2.5	0.31	1.94	1.07	0.285	E32911J
	90	23	23	17.5	1.5	1.5	H-E32011J	3CC	84600	121000	4100	5500	63.5	63	81	86	4	5.5	1.5	1.5	3.2	0.41	1.48	0.81	0.569	H-E32011J
	90	27	27	21	1.5	1.5	E33011J	2CE	96500	149000	4100	5400	63.5	63	81	86	5	6	1.5	1.5	7.3	0.31	1.92	1.06	0.672	E33011J
	95	30	30	23	1.5	1.5	E33111J	3CE	116000	161000	4000	5300	63.5	62	83	91	5	7	1.5	1.5	7.5	0.37	1.60	0.88	0.868	E33111J
	100	22.75	21	18	2	1.5	E30211J	3DB	94600	113000	3900	5200	65	64	88	94	4	4.5	2	1.5	2.0	0.40	1.48	0.81	0.732	E30211J
	100	26.75	25	21	2	1.5	E32211J	3DC	107000	133000	3900	5200	65	63	87	95	4	5.5	2	1.5	3.7	0.40	1.48	0.81	0.863	E32211J
	100	35	35	27	2	1.5	E33211J	3DE	142000	189000	3900	5200	65	62	85	96	6	8	2	1.5	9.7	0.40	1.50	0.83	1.18	E33211J
	120	31.5	29	25	2.5	2	E30311J	2FB	149000	170000	3300	4500	67	71	104	111	4	6.5	2	2	6.0	0.35	1.74	0.96	1.65	E30311J
	120	31.5	29	21	2.5	2	E30311DJ	7FB	129000	148000	2900	4000	67	68	94	113	4	10.5	2	2	–6.9	0.83	0.73	0.40	1.59	E30311DJ
	120	45.5	43	35	2.5	2	E32311J	2FD	200000	250000	3400	4500	67	68	99	111	4	10.5	2	2	13.1	0.35	1.74	0.96	2.38	E32311J
60	85	17	17	14	1	1	E32912J	2BC	46200	78200	4100	5500	65.5	66	77	81	3	3	1	1	1.4	0.33	1.81	1.00	0.306	E32912J
	95	23	23	17.5	1.5	1.5	E32012J	4CC	86100	127000	3900	5200	68.5	67	85	91	4	5.5	1.5	1.5	2.0	0.43	1.39	0.77	0.621	E32012J
	95	27	27	21	1.5	1.5	E33012J	2CE	101000	162000	3900	5200	68.5	67	85	90	5	6	1.5	1.5	6.9	0.33	1.83	1.01	0.719	E33012J
	100	30	30	23	1.5	1.5	E33112J	3CE	118000	170000	3600	4900	68.5	67	88	96	5	7	1.5	1.5	6.3	0.40	1.51	0.83	0.923	E33112J
	110	23.75	22	19	2	1.5	E30212J	3EB	106000	127000	3500	4700	70	70	96	103	4	4.5	2	1.5	1.8	0.40	1.48	0.81	0.945	E30212J
	110	29.75	28	24	2	1.5	E32212J	3EC	132000	167000	3500	4700	70	69	95	104	4	5.5	2	1.5	4.6	0.40	1.48	0.81	1.19	E32212J
	110	38	38	29	2	1.5	E33212J	3EE	174000	239000	3600	4700	70	69	93	105	6	9	2	1.5	10.8	0.40	1.48	0.82	1.57	E33212J
	130	33.5	31	26	3	2.5	E30312J	2FB	173000	201000	3100	4100	74	77	112	120	4	7.5	2.5	2	6.6	0.35	1.74	0.96	2.08	E30312J
	130	33.5	31	22	3	2.5	E30312DJ	7FB	153000	179000	2600	3700	74	73	103	124	4	11.5	2.5	2	–7.3	0.83	0.73	0.40	2.01	E30312DJ
	130	48.5	46	37	3	2.5	32312J	2FD	221000	275000	3100	4200	74	74	107	120	4	11.5	2.5	2	16.2	0.35	1.74	0.96	2.92	32312J
65	90	17	17	14	1	1	E32913J	2BC	47400	83100	3900	5200	70.5	70	81	86	3	3	1	1	0.2	0.35	1.70	0.93	0.327	E32913J
	100	23	23	17.5	1.5	1.5	E32013J	4CC	90000	137000	3600	4800	73.5	72	90	97	4	5.5	1.5	1.5	0.5	0.46	1.31	0.72	0.664	E32013J
	100	27	27	21	1.5	1.5	E33013J	2CE	103000	169000	3600	4800	73.5	72	89	96	5	6	1.5	1.5	5.9	0.35	1.72	0.95	0.762	E33013J
	110	34	34	26.5	1.5	1.5	E33113J	3DE	152000	223000	3400	4600	73.5	73	96	106	6	7.5	1.5	1.5	8.1	0.39	1.55	0.85	1.33	E33113J
	120	24.75	23	20	2	1.5	E30213J	3EB	128000	156000	3200	4300	75	77	106	113	4	4.5	2	1.5	0.6	0.40	1.48	0.81	1.18	E30213J
	120	32.75	31	27	2	1.5	E32213J	3EC	157000	203000	3200	4300	75	76	104	115	4	5.5	2	1.5	6.1	0.40	1.48	0.82	1.58	E32213J
	120	41	41	32	2	1.5	E33213J	3EE	200000	277000	3200	4300	75	74	102	115	7	9	2	1.5	11	0.39	1.54	0.85	2.02	E33213J
	140	36	33	28	3	2.5	E30313J	2GB	204000	239000	2800	3800	79	83	122	130	4	8	2.5	2	6.7	0.35	1.74	0.96	2.56	E30313J
	140	36	33	23	3	2.5	E30313DJ	7GB	176000	209000	2400	3400	79	79	111	133	4	13	2.5	2	–8.3	0.83	0.73	0.40	2.44	E30313DJ
	140	51	48	39	3	2.5	E32313J	2GD	276000	357000	2900	3900	79	80	117	130	4	12	2.5	2	16.3	0.35	1.74	0.96	3.64	E32313J

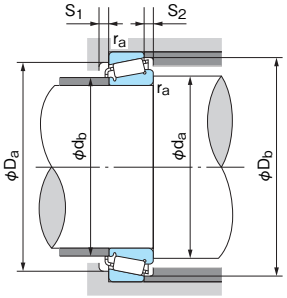
Note: (1) Minus value of load center “a” indicates that the center is located outside of cone backface.

■ Tapered Roller Bearings

Metric Series

Bore Diameter: 70～80mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

Por=0.5Fr+Y_0Fa

Por=Fr

Values Y_0 from table.

1N=0.102kgf

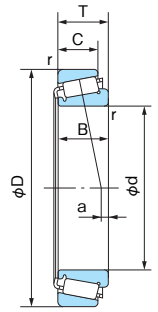
Boundary dimensions (mm)							Bearing No.	(Ref.) ISO355 Dimension series	Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)								Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference	Bearing No.
d	D	T	B	C	Cone r (min)	Cup r (min)					Grease lubrication	Oil lubrication	da (min)	db (max)	Da (min)	Db (min)	S_1 (min)	S_2 (min)	Cone ra (max)	Cup ra (max)			Y_1	Y_0		
70	100	20	20	16	1	1	E32914J	2BC	71000	115000	3500	4700	75.5	77	91	96	4	4	1	1	2.2	0.32	1.90	1.05	0.496	E32914J
	110	25	25	19	1.5	1.5	E32014J	4CC	108000	163000	3300	4400	78.5	78	98	105	5	6	1.5	1.5	1.4	0.43	1.38	0.76	0.884	E32014J
	110	31	31	25.5	1.5	1.5	E33014J	2CE	134000	208000	3300	4400	78.5	78	99	105	5	5.5	1.5	1.5	8.1	0.28	2.11	1.16	1.09	E33014J
	125	26.25	24	21	2	1.5	E30214J	3EB	138000	173000	3100	4100	80	81	110	118	4	5	2	1.5	0.3	0.42	1.43	0.79	1.32	E30214J
	125	33.25	31	27	2	1.5	E32214J	3EC	169000	225000	3100	4100	80	80	108	119	4	6	2	1.5	4.0	0.42	1.43	0.79	1.71	E32214J
	125	41	41	32	2	1.5	E33214J	3EE	206000	294000	3100	4100	80	79	107	120	7	9	2	1.5	9.8	0.41	1.47	0.81	2.16	E33214J
	150	38	35	30	3	2.5	E30314J	2GB	230000	273000	2600	3500	84	89	130	140	4	8	2.5	2	7.5	0.35	1.74	0.96	3.08	E30314J
	150	38	35	25	3	2.5	E30314DJ	7GB	197000	235000	2300	3200	84	84	118	142	4	13	2.5	2	–9.1	0.83	0.73	0.40	2.97	E30314DJ
	150	54	51	42	3	2.5	E32314J	2GD	317000	414000	2700	3600	84	86	125	140	4	12	2.5	2	16.6	0.35	1.74	0.96	4.50	E32314J
75	105	20	20	16	1	1	E32915J	2BC	73600	123000	3300	4400	80.5	81	97	101	4	4	1	1	1.1	0.33	1.80	0.99	0.526	E32915J
	115	25	25	19	1.5	1.5	E32015J	4CC	110000	169000	3100	4200	83.5	83	103	110	5	6	1.5	1.5	–0.1	0.46	1.31	0.72	0.93	E32015J
	115	31	31	25.5	1.5	1.5	E33015J	2CE	141000	225000	3000	4100	83.5	83	104	110	6	5.5	1.5	1.5	8.1	0.30	2.01	1.11	1.16	E33015J
	125	37	37	29	2	1.5	E33115J	3DE	186000	280000	3000	4000	85	84	109	120	6	8	2	1.5	7.5	0.40	1.51	0.83	1.84	E33115J
	130	27.25	25	22	2	1.5	E30215J	4DB	142000	181000	2900	3900	85	86	115	124	4	5	2	1.5	–0.3	0.44	1.38	0.76	1.42	E30215J
	130	33.25	31	27	2	1.5	E32215J	4DC	174000	234000	2900	3900	85	85	114	123	4	6	2	1.5	3.0	0.44	1.38	0.76	1.77	E32215J
	130	41	41	31	2	1.5	E33215J	3EE	212000	310000	2900	3900	85	83	111	125	7	10	2	1.5	8.5	0.43	1.40	0.77	2.26	E33215J
	160	40	37	31	3	2.5	E30315	2GB	250000	297000	2500	3300	89	95	139	149	4	9	2.5	2	8.1	0.35	1.73	0.95	3.52	E30315
	160	40	37	26	3	2.5	E30315D	—	222000	266000	2100	2900	89	91	127	151	6	14	2.5	2	–8.8	0.81	0.74	0.41	3.47	E30315D
	160	58	55	45	3	2.5	E32315J	2GD	363000	481000	2500	3300	89	91	133	149	4	13	2.5	2	18	0.35	1.74	0.96	5.41	E32315J
80	110	20	20	16	1	1	E32916J	2BC	76100	131000	3100	4200	85.5	86	101	106	4	4	1	1	–0.1	0.35	1.71	0.94	0.556	E32916J
	125	29	29	22	1.5	1.5	E32016J	3CC	147000	225000	2900	3900	88.5	89	112	120	6	7	1.5	1.5	2.3	0.42	1.42	0.78	1.32	E32016J
	125	36	36	29.5	1.5	1.5	E33016J	2CE	173000	288000	2900	3900	88.5	90	112	119	6	6.5	1.5	1.5	10.9	0.28	2.16	1.19	1.63	E33016J
	130	37	37	29	2	1.5	E33116J	3DE	191000	294000	2800	3800	90	89	114	126	6	8	2	1.5	6.5	0.42	1.44	0.79	1.93	E33116J
	140	28.25	26	22	2.5	2	E30216J	3EB	161000	202000	2700	3600	92	91	124	132	4	6	2	2	–0.3	0.42	1.43	0.79	1.72	E30216J
	140	35.25	33	28	2.5	2	E32216J	3EC	203000	271000	2700	3600	92	90	122	134	4	7	2	2	3.8	0.42	1.43	0.79	2.17	E32216J
	140	46	46	35	2.5	2	E33216	3EE	250000	371000	2700	3600	92	89	119	135	7	11	2	2	10.3	0.43	1.41	0.78	2.99	E33216
	170	42.5	39	33	3	2.5	E30316J	2GB	294000	355000	2300	3100	94	102	148	159	4	9.5	2.5	2	7.7	0.35	1.73	0.96	4.46	E30316J
	170	42.5	39	27	3	2.5	E30316DJ	7GB	236000	282000	2000	2800	94	97	134	159	6	15.5	2.5	2	–11.0	0.83	0.73	0.40	4.12	E30316DJ
	170	61.5	58	48	3	2.5	E32316	2GD	378000	497000	2300	3100	94	98	142	159	4	13.5	2.5	2	19.5	0.35	1.73	0.95	6.32	E32316

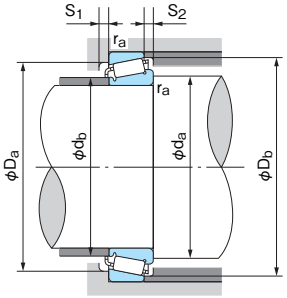
Note: (1) Minus value of load center “a” indicates that the center is located outside of cone backface.

■ Tapered Roller Bearings

Metric Series

Bore Diameter: 85～95mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

Por=0.5Fr+Y_0Fa

Por=Fr

Values Y_0 from table.

1N=0.102kgf

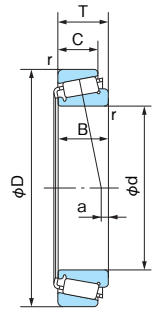
Boundary dimensions (mm)							Bearing No.	(Ref.) ISO355 Dimension series	Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)								Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference	Bearing No.
d	D	T	B	C	Cone r (min)	Cup r (min)					Grease lubrication	Oil lubrication	da (min)	db (max)	Da (min)	Db (min)	S1 (min)	S2 (min)	Cone ra (max)	Cup ra (max)			Y_1	Y_0		
85	120	23	23	18	1.5	1.5	**E32917J**	2BC	97100	165000	2900	3900	93.5	93	109	115	5	5	1.5	1.5	1.8	0.33	1.83	1.01	0.794	**E32917J**
	130	29	29	22	1.5	1.5	**E32017J**	4CC	150000	234000	2800	3700	93.5	94	117	125	6	7	1.5	1.5	1.0	0.44	1.36	0.75	1.38	**E32017J**
	130	36	36	29.5	1.5	1.5	**E33017J**	2CE	177000	300000	2800	3700	93.5	94	118	125	6	6.5	1.5	1.5	9.7	0.29	2.06	1.13	1.72	**E33017J**
	140	41	41	32	2.5	2.5	**E33117J**	3DE	224000	346000	2600	3500	97	95	122	135	7	9	2	2	7.8	0.41	1.48	0.81	2.43	**E33117J**
	150	30.5	28	24	2.5	2	**E30217J**	3EB	182000	231000	2500	3400	97	97	132	141	5	6.5	2	2	0.1	0.42	1.43	0.79	2.17	**E30217J**
	150	38.5	36	30	2.5	2	**E32217J**	3EC	232000	315000	2500	3300	97	96	130	142	5	8.5	2	2	4.3	0.42	1.43	0.79	2.80	**E32217J**
	150	49	49	37	2.5	2	**E33217J**	3EE	294000	439000	2500	3400	97	95	128	144	7	12	2	2	11.9	0.42	1.43	0.79	3.63	**E33217J**
	180	44.5	41	34	4	3	**E30317**	—	305000	367000	2200	2900	103	107	156	167	5	10.5	3	2.5	8.7	0.35	1.73	0.95	4.97	**E30317**
	180	44.5	41	28	4	3	**E30317DJ**	—	263000	317000	1900	2600	103	103	143	169	6	16.5	3	2.5	–11.8	0.83	0.73	0.41	4.81	**E30317DJ**
	180	63.5	60	49	4	3	**E32317J**	2GD	439000	587000	2200	3000	103	103	150	167	5	14.5	3	2.5	19.7	0.35	1.74	0.96	7.42	**E32317J**
90	125	23	23	18	1.5	1.5	**E32918J**	2BC	101000	175000	2800	3700	98.5	97	114	120	5	5	1.5	1.5	0.7	0.34	1.75	0.96	0.834	**E32918J**
	140	32	32	24	2	1.5	**E32018J**	3CC	178000	276000	2600	3500	100	100	125	134	6	8	2	1.5	2.2	0.42	1.42	0.78	1.80	**E32018J**
	140	39	39	32.5	2	2	**E33018J**	2CE	221000	367000	2600	3400	100	100	127	135	7	6.5	2	1.5	11.9	0.27	2.23	1.23	2.22	**E33018J**
	160	32.5	30	26	2.5	2	**E30218J**	3FB	204000	261000	2400	3200	102	103	140	150	5	6.5	2	2	–0.1	0.42	1.43	0.79	2.65	**E30218J**
	160	42.5	40	34	2.5	2	**E32218J**	3FC	263000	362000	2400	3200	102	102	138	152	5	8.5	2	2	5.5	0.42	1.43	0.79	3.47	**E32218J**
	190	46.5	43	36	4	3	**E30318**	—	336000	407000	2100	2700	108	113	165	177	5	10.5	3	2.5	9.3	0.35	1.73	0.95	5.78	**E30318**
	190	46.5	43	30	4	3	**E30318D**	—	282000	336000	1700	2400	108	109	151	179	6	16.5	3	2.5	–12.6	0.81	0.74	0.41	5.60	**E30318D**
	190	67.5	64	53	4	3	**E32318J**	—	461000	614000	2100	2800	108	108	157	177	5	14.5	3	2.5	20.9	0.35	1.74	0.96	8.61	**E32318J**
95	130	23	23	18	1.5	1.5	**E32919J**	2BC	104000	186000	2600	3500	103.5	102	119	125	5	5	1.5	1.5	–0.5	0.36	1.68	0.92	0.876	**E32919J**
	145	32	32	24	2	1.5	**E32019J**	4CC	182000	287000	2500	3300	105	105	130	140	6	8	2	1.5	0.8	0.44	1.36	0.75	1.88	**E32019J**
	145	39	39	32.5	2	1.5	**E33019J**	2CE	226000	382000	2500	3300	105	104	131	139	7	6.5	2	1.5	11.2	0.28	2.16	1.19	2.31	**E33019J**
	170	34.5	32	27	3	2.5	**E30219J**	3FB	231000	299000	2200	3000	109	110	149	159	5	7.5	2.5	2	–0.4	0.42	1.43	0.79	3.20	**E30219J**
	170	45.5	43	37	3	2.5	**E32219J**	3FC	311000	439000	2200	3000	109	108	145	161	5	8.5	2.5	2	6.6	0.42	1.43	0.79	4.34	**E32219J**
	170	58	58	44	3	2.5	**E33219J**	3FE	374000	582000	2200	2900	109	107	144	163	9	14	2.5	2	15.2	0.41	1.47	0.81	5.66	**E33219J**
	200	49.5	45	38	4	3	**30319**	—	317000	368000	2000	2600	113	118	172	186	5	11.5	3	2.5	9.7	0.35	1.73	0.95	6.32	**30319**
	200	49.5	45	32	4	3	**E30319DJ**	—	319000	391000	1700	2300	113	113	157	187	6	17.5	3	2.5	–13.2	0.81	0.73	0.40	6.68	**E30319DJ**
	200	71.5	67	55	4	3	**E32319J**	—	517000	695000	2000	2600	113	115	166	186	5	16.5	3	2.5	21.7	0.35	1.74	0.96	10.1	**E32319J**

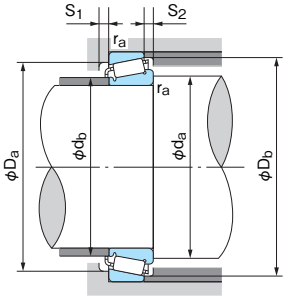
Note: (1) Minus value of load center “a” indicates that the center is located outside of cone backface.

■ Tapered Roller Bearings

Metric Series

Bore Diameter: 100～110mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

Por=0.5Fr+Y_0Fa

Por=Fr

Values Y_0 from table.

1N=0.102kgf

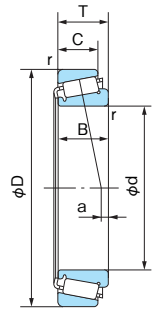
Boundary dimensions (mm)							Bearing No.	(Ref.) ISO355 Dimension series	Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)								Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference	Bearing No.
d	D	T	B	C	Cone r (min)	Cup r (min)					Grease lubrication	Oil lubrication	da (min)	db (max)	Da (min)	Db (min)	S1 (min)	S2 (min)	Cone ra (max)	Cup ra (max)			Y_1	Y_0		
100	140	25	25	20	1.5	1.5	**E32920J**	2CC	126000	217000	2400	3300	108.5	108	128	135	5	5	1.5	1.5	1.0	0.33	1.82	1.00	1.19	**E32920J**
	150	32	32	24	2	1.5	**E32020J**	4CC	185000	298000	2400	3200	110	109	134	144	6	8	2	1.5	–0.6	0.46	1.31	0.72	1.95	**E32020J**
	150	39	39	32.5	2	1.5	**E33020J**	2CE	231000	397000	2400	3200	110	108	135	143	7	6.5	2	1.5	10.4	0.29	2.09	1.15	2.40	**E33020J**
	165	52	52	40	2.5	2.5	**E33120J**	3EE	325000	523000	2200	3000	112	111	142	159	8	12	2	2	11.9	0.41	1.48	0.81	4.29	**E33120J**
	180	37	34	29	3	2.5	**E30220J**	3FB	258000	338000	2100	2800	114	116	157	168	5	8	2.5	2	0.2	0.42	1.43	0.79	3.83	**E30220J**
	180	49	46	39	3	2.5	**E32220J**	3FC	347000	495000	2100	2800	114	114	154	171	5	10	2.5	2	6.9	0.42	1.43	0.79	5.21	**E32220J**
	180	63	63	48	3	2.5	**E33220**	3FE	431000	680000	2100	2800	114	112	151	172	10	15	2.5	2	17.3	0.40	1.48	0.82	6.92	**E33220**
	215	51.5	47	39	4	3	**30320**	—	344000	400000	1800	2400	118	127	184	200	6	12.5	3	2.5	10.1	0.35	1.73	0.95	7.76	**30320**
	215	51.5	47	34	4	3	**30320D**	—	318000	374000	1500	2100	118	121	183	204	5	17	3	2.5	–14.4	0.81	0.74	0.41	8.02	**30320D**
	215	77.5	73	60	4	3	**32320**	—	491000	637000	1800	2400	118	123	177	200	8	17.5	3	2.5	24.9	0.35	1.73	0.95	12.2	**32320**
	215	56.5	51	35	4	3	**E31320J**	—	373000	459000	1500	2200	118	120	183	202	6	17.5	3	2.5	–11.2	0.83	0.73	0.40	8.72	**E31320J**
105	145	25	25	20	1.5	1.5	**E32921J**	2CC	128000	224000	2400	3100	113.5	113	133	140	5	5	1.5	1.5	–0.1	0.34	1.75	0.96	1.23	**E32921J**
	160	35	35	26	2.5	2	**E32021J**	4DC	215000	344000	2200	3000	117	116	143	154	6	9	2	2	0.5	0.44	1.35	0.74	2.45	**E32021J**
	160	43	43	34	2.5	2	**E33021J**	2DE	267000	461000	2200	3000	117	116	145	153	7	9	2	2	12.1	0.28	2.12	1.17	3.08	**E33021J**
	190	39	36	30	3	2.5	**E30221J**	—	288000	380000	2000	2600	119	122	165	178	6	9	2.5	2	0.0	0.42	1.43	0.79	4.49	**E30221J**
	190	53	50	43	3	2.5	**E32221J**	3FC	392000	567000	2000	2700	119	120	161	180	6	10	2.5	2	8.2	0.42	1.43	0.79	6.37	**E32221J**
	225	53.5	49	41	4	3	**30321**	—	371000	432000	1700	2300	123	132	193	209	7	12.5	3	2.5	10.4	0.35	1.73	0.95	8.74	**30321**
	225	53.5	49	36	4	3	**30321D**	—	339000	396000	1400	2000	123	127	193	209	6	11	3	2.5	–15.6	0.81	0.74	0.41	8.76	**30321D**
	225	81.5	77	63	4	3	**E32321J**	2GD	635000	886000	1800	2300	123	128	185	209	8	18.5	3	2.5	25.4	0.35	1.74	0.96	14.9	**E32321J**
110	150	25	25	20	1.5	1.5	**E32922J**	2CC	129000	231000	2300	3000	118.5	118	138	145	5	5	1.5	1.5	–1.3	0.36	1.69	0.93	1.28	**E32922J**
	170	38	38	29	2.5	2	**E32022J**	4DC	248000	395000	2100	2800	122	122	152	163	7	9	2	2	1.9	0.43	1.39	0.77	3.12	**E32022J**
	170	47	47	37	2.5	2	**E33022J**	2DE	287000	502000	2100	2800	122	123	152	161	7	10	2	2	13.6	0.29	2.09	1.15	3.81	**E33022J**
	180	56	56	43	2.5	2	**E33122J**	3EE	369000	634000	2000	2700	122	121	155	174	9	13	2	2	11.5	0.42	1.43	0.79	5.33	**E33122J**
	200	41	38	32	3	2.5	**E30222J**	3FB	324000	434000	1900	2500	124	129	174	188	6	9	2.5	2	0.2	0.42	1.43	0.79	5.33	**E30222J**
	200	56	53	46	3	2.5	**E32222J**	3FC	438000	640000	1900	2500	124	126	170	190	6	10	2.5	2	9.3	0.42	1.43	0.79	7.45	**E32222J**
	240	54.5	50	42	4	3	**E30322J**	—	481000	590000	1600	2100	128	141	206	222	8	12.5	3	2.5	8.2	0.35	1.74	0.96	11.4	**E30322J**
	240	54.5	50	36	4	3	**30322D**	—	365000	429000	1400	1900	128	135	205	222	6	18	3	2.5	–17.0	0.81	0.74	0.41	10.2	**30322D**
	240	84.5	80	65	4	3	**32322**	—	607000	796000	1600	2200	128	137	198	222	9	19.5	3	2.5	27.2	0.35	1.73	0.95	16.6	**32322**

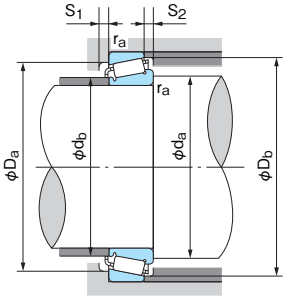
Note: (1) Minus value of load center “a” indicates that the center is located outside of cone backface.

■ Tapered Roller Bearings

Metric Series

Bore Diameter: 120～140mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

Por=0.5Fr+Y_0Fa

Por=Fr

Values Y_0 from table.

1N=0.102kgf

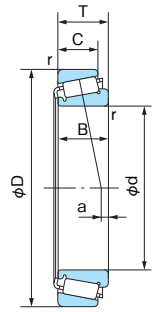
Boundary dimensions (mm)							Bearing No.	(Ref.) ISO355 Dimension series	Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)								Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference	Bearing No.
d	D	T	B	C	Cone r (min)	Cup r (min)					Grease lubrication	Oil lubrication	da (min)	db (max)	Da (min)	Db (min)	S1 (min)	S2 (min)	Cone ra (max)	Cup ra (max)			Y_1	Y_0		
120	165	29	29	23	1.5	1.5	**E32924J**	2CC	172000	298000	2100	2700	128.5	128	152	160	6	6	1.5	1.5	–0.4	0.35	1.72	0.95	1.77	**E32924J**
	180	38	38	29	2.5	2	**E32024J**	4DC	258000	427000	2000	2600	132	131	161	173	7	9	2	2	–0.8	0.46	1.31	0.72	3.34	**E32024J**
	180	48	48	38	2.5	2	**E33024J**	2DE	299000	540000	2000	2600	132	132	160	171	6	10	2	2	11.8	0.31	1.97	1.08	4.16	**E33024J**
	200	62	62	48	2.5	2	**E33124J**	3FE	462000	785000	1800	2400	132	133	172	192	9	14	2	2	14.2	0.40	1.51	0.83	7.73	**E33124J**
	215	43.5	40	34	3	2.5	**E30224J**	4FE	347000	473000	1700	2300	134	140	187	203	6	9.5	2.5	2	–0.7	0.44	1.38	0.76	6.36	**E30224J**
	215	61.5	58	50	3	2.5	**E32224J**	4FD	470000	691000	1700	2300	134	136	181	204	7	11.5	2.5	2	9.9	0.44	1.38	0.76	9.04	**E32224J**
	260	59.5	55	46	4	3	**30324**	—	505000	611000	1500	2000	138	152	221	239	10	13.5	3	2.5	10.6	0.35	1.73	0.96	13.7	**30324**
	260	59.5	55	37	4	3	**30324D**	—	430000	512000	1200	1700	138	145	219	239	6	21	3	2.5	–18.3	0.81	0.74	0.41	13.0	**30324D**
	260	90.5	86	69	4	3	**E32324J**	2GD	800000	1110000	1500	2000	138	148	213	239	9	21.5	3	2.5	27.8	0.35	1.74	0.96	22.2	**E32324J**
	260	68	62	42	4	3	**E31324J**	7GB	526000	665000	1300	1800	138	145	221	244	6	21	3	2.5	–13.9	0.83	0.73	0.40	15.4	**E31324J**
130	180	32	32	25	2	1.5	**E32926J**	2CC	200000	368000	1900	2500	140	141	165	174	6	7	2	1.5	0.6	0.34	1.77	0.97	2.42	**E32926J**
	200	45	45	34	2.5	2	**E32026J**	4EC	340000	563000	1800	2300	142	144	178	192	8	11	2	2	2.1	0.43	1.38	0.76	5.04	**E32026J**
	200	55	55	43	2.5	2	**E33026J**	2EE	390000	705000	1700	2300	142	143	178	192	8	12	2	2	12.5	0.34	1.76	0.97	6.19	**E33026J**
	230	43.75	40	34	4	3	**E30226J**	4FB	377000	511000	1600	2100	148	152	203	218	7	9.5	3	2.5	–2.7	0.44	1.38	0.76	7.24	**E30226J**
	230	67.75	64	54	4	3	**E32226J**	4FD	554000	830000	1600	2200	148	146	193	219	7	13.5	3	2.5	11.7	0.44	1.38	0.76	11.5	**E32226J**
	280	63.75	58	41	5	4	**E30326D**	—	536000	665000	1200	1600	152	155	240	261	7	22	4	3	–20.2	0.81	0.74	0.41	16.4	**E30326D**
	280	63.75	58	49	5	4	**30326**	—	563000	684000	1400	1800	152	164	239	255	8	14.5	4	3	10.9	0.35	1.73	0.95	16.9	**30326**
	280	98.75	93	78	5	4	**32326**	—	852000	1160000	1400	1800	152	163	226	259	10	15	4	3	29.6	0.35	1.73	0.95	26.5	**32326**
	280	72	66	44	5	4	**E31326J**	7GB	589000	748000	1200	1600	152	155	236	261	7	23	4	3	–15.3	0.83	0.73	0.40	18.9	**E31326J**
140	190	32	32	25	2	1.5	**E32928J**	2CC	206000	390000	1800	2300	150	150	174	184	6	7	2	1.5	–1.6	0.36	1.67	0.92	2.57	**E32928J**
	210	45	45	34	2.5	2	**E32028J**	4DC	346000	585000	1700	2200	152	153	187	202	8	11	2	2	–0.6	0.46	1.31	0.72	5.28	**E32028J**
	210	56	56	44	2.5	2	**E33028J**	2DE	406000	758000	1600	2200	152	152	186	202	7	12	2	2	10.4	0.36	1.67	0.92	6.61	**E33028J**
	250	45.75	42	36	4	3	**E30228**	—	405000	538000	1500	1900	158	163	219	237	9	9.5	3	2.5	–3.4	0.43	1.39	0.77	8.9	**E30228**
	250	71.75	68	58	4	3	**E32228J**	4FD	636000	961000	1500	2000	158	158	210	238	9	13.5	3	2.5	11.7	0.44	1.39	0.76	14.7	**E32228J**
	300	67.75	62	44	5	4	**30328D**	—	525000	627000	1100	1500	162	169	254	280	7	23	4	3	–22.4	0.81	0.74	0.41	20.0	**30328D**
	300	67.75	62	53	5	4	**30328**	—	626000	761000	1300	1700	162	179	254	273	10	14.5	4	3	12.2	0.35	1.73	0.95	20.4	**30328**
	300	107.75	102	85	5	4	**32328**	—	958000	1320000	1300	1700	162	175	246	280	10	17	4	3	34.1	0.35	1.73	0.95	33.5	**32328**
	300	77	70	47	5	4	**E31328J**	7GB	674000	865000	1100	1500	162	167	254	280	8	26	4	3	–16.8	0.83	0.73	0.40	23.3	**E31328J**

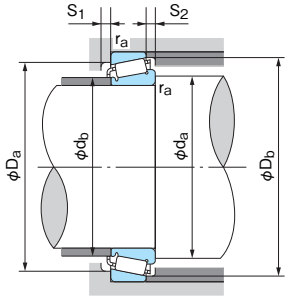
Note: (1) Minus value of load center “a” indicates that the center is located outside of cone backface.

■ Tapered Roller Bearings

Metric Series

Bore Diameter: 150～180mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

Por=0.5Fr+Y_0Fa

Por=Fr

Values Y_0 from table.

1N=0.102kgf

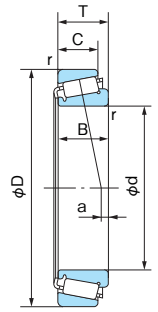
Boundary dimensions (mm)							Bearing No.	(Ref.) ISO355 Dimension series	Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min-1)		Abutment and fillet dimensions (mm)								Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference	Bearing No.
d	D	T	B	C	Cone r (min)	Cup r (min)					Grease lubrication	Oil lubrication	da (min)	db (max)	Da (min)	Db (min)	S1 (min)	S2 (min)	Cone ra (max)	Cup ra (max)			Y_1	Y_0		
	210	38	38	30	2.5	2	**E32930J**	2DC	286000	536000	1600	2100	162	163	194	202	7	8	2	2	1.9	0.33	1.83	1.01	3.96	**E32930J**
	225	48	48	36	3	2.5	**E32030J**	4EC	391000	668000	1500	2000	164	164	200	216	8	12	2.5	2	–0.8	0.46	1.31	0.72	6.41	**E32030J**
	270	49	45	38	4	3	**E30230**	—	466000	625000	1300	1800	168	175	234	255	9	11	3	2.5	–2.7	0.43	1.39	0.77	10.9	**E30230**
150	270	77	73	60	4	3	**E32230J**	4GD	704000	1070000	1300	1800	168	170	226	254	8	17	3	2.5	11.8	0.44	1.38	0.76	18.2	**E32230J**
	320	72	65	46	5	4	**30330D**	—	616000	750000	970	1400	172	183	270	301	9	26	4	3	–24.0	0.81	0.74	0.41	23.9	**30330D**
	320	72	65	55	5	4	**30330**	—	717000	962000	1200	1500	172	193	272	292	12	17	4	3	10.2	0.35	1.73	0.95	25.4	**30330**
	320	114	108	90	5	4	**E32330**	—	1240000	1790000	1200	1600	172	187	263	298	10	17	4	3	35.6	0.35	1.74	0.96	42.0	**E32330**
	220	38	38	30	2.5	2	**E32932J**	2DC	295000	568000	1500	2000	172	173	204	212	7	8	2	2	–0.4	0.35	1.73	0.95	4.19	**E32932J**
	240	51	51	38	3	2.5	**E32032J**	4EC	440000	758000	1400	1900	174	175	213	231	8	13	2.5	2	–1.1	0.46	1.31	0.72	7.75	**E32032J**
	290	52	48	40	4	3	**30232**	—	483000	637000	1200	1600	178	189	252	269	8	12	3	2.5	–5.4	0.46	1.31	0.72	13.3	**30232**
160	290	84	80	67	4	3	**E32232J**	4GD	795000	1210000	1200	1700	178	182	242	274	10	17	3	2.5	13.7	0.44	1.38	0.76	23.2	**E32232J**
	340	75	68	48	5	4	**30332D**	—	742000	933000	900	1300	182	195	290	320	9	27	4	3	–26.8	0.81	0.74	0.41	29.1	**30332D**
	340	75	68	58	5	4	**30332**	—	793000	981000	1100	1400	182	205	289	310	12	17	4	3	11.5	0.35	1.73	0.95	28.7	**30332**
	340	121	114	95	5	4	**32332**	—	1220000	1720000	1100	1400	182	200	277	316	10	18	4	3	38	0.35	1.73	0.95	47.9	**32332**
	230	38	38	34	2.5	2	**E32934J**	3DC	296000	606000	1400	1900	182	183	213	222	7	8	2	2	–4.0	0.38	1.57	0.86	4.49	**E32934J**
	260	57	57	43	3	2.5	**E32034J**	4EC	526000	905000	1300	1700	184	187	230	249	10	14	2.5	2	1.2	0.44	1.35	0.74	10.5	**E32034J**
	310	57	52	43	5	4	**30234**	—	544000	726000	1100	1500	192	202	269	288	8	4	4	3	–4.8	0.46	1.31	0.72	16.5	**30234**
170	310	91	86	71	5	4	**E32234J**	4GD	1000000	1610000	1100	1500	192	195	259	294	11	20	4	3	16.1	0.44	1.38	0.76	28.8	**E32234J**
	360	80	72	50	5	4	**30334D**	—	762000	1040000	830	1200	192	211	310	333	9	30	4	3	–28.3	0.81	0.74	0.41	34.3	**30334D**
	360	80	72	62	5	4	**30334**	—	828000	1020000	1000	1300	192	218	306	329	13	18	4	3	12.3	0.35	1.73	0.95	33.0	**30334**
	360	127	120	100	5	4	**32334**	—	1310000	1830000	1000	1300	192	200	295	337	14	26	4	3	40.9	0.35	1.73	0.95	55.8	**32334**
	250	45	45	34	2.5	2	**E32936J**	4DC	357000	735000	1300	1700	192	193	225	241	8	11	2	2	–8.5	0.48	1.25	0.69	6.64	**E32936J**
	280	64	64	48	3	2.5	**E32036J**	4EC	644000	1100000	1200	1600	194	199	247	268	10	16	2.5	2	4.5	0.42	1.42	0.78	14.1	**E32036J**
	320	57	52	43	5	4	**E30236J**	4GB	615000	870000	1100	1400	202	211	278	297	9	14	4	3	–6.6	0.45	1.33	0.73	18.3	**E30236J**
180	320	91	86	71	5	4	**E32236J**	4GD	957000	1520000	1100	1500	202	204	267	303	10	20	4	3	13.2	0.45	1.33	0.73	29.9	**E32236J**
	380	83	75	52	5	4	**30336D**	—	833000	1150000	780	1100	202	225	330	351	10	31	4	3	–29.8	0.81	0.74	0.41	40.1	**30336D**
	380	83	75	64	5	4	**30336**	—	901000	1110000	940	1300	202	227	318	346	13	19	4	3	12	0.35	1.73	0.95	39.7	**30336**
	380	134	126	105	5	4	**32336**	—	1410000	1980000	960	1300	202	215	310	355	14	27	4	3	42.2	0.35	1.73	0.95	67.0	**32336**

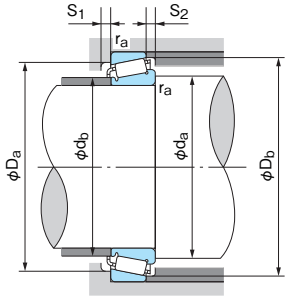
Note: (1) Minus value of load center “a” indicates that the center is located outside of cone backface.

■ Tapered Roller Bearings

Metric Series

Bore Diameter: 190～260mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

Por=0.5Fr+Y_0Fa

Por=Fr

Values Y_0 from table.

1N=0.102kgf

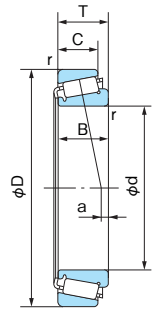
Boundary dimensions (mm)							Bearing No.	(Ref.) ISO355 Dimension series	Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)								Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference	Bearing No.
d	D	T	B	C	Cone r (min)	Cup r (min)					Grease lubrication	Oil lubrication	da (min)	db (max)	Da (min)	Db (min)	S1 (min)	S2 (min)	Cone ra (max)	Cup ra (max)			Y_1	Y_0		
190	260	45	45	34	2.5	2	**E32938J**	4DC	366000	789000	1200	1600	202	204	235	252	8	11	2	2	–10.0	0.48	1.26	0.69	6.89	**E32938J**
	290	64	64	48	3	2.5	**E32038J**	4FD	654000	1170000	1100	1500	204	209	257	279	10	16	2.5	2	1.1	0.44	1.36	0.75	14.7	**E32038J**
	340	60	55	46	5	4	**E30238J**	4GB	729000	1030000	1000	1400	212	225	298	318	12	13	4	3	–6.4	0.44	1.38	0.76	21.9	**E30238J**
	340	97	92	75	5	4	**E32238J**	4GD	1090000	1740000	1000	1400	208	216	290	330	6	12	4	3	15	0.46	1.31	0.72	33.9	**E32238J**
	400	86	78	52	6	5	**30338D**	—	950000	1210000	740	1000	218	232	350	372	11	34	5	4	–33.2	0.81	0.74	0.41	44.8	**30338D**
	400	86	78	65	5	5	**30338**	—	1010000	1250000	880	1200	218	241	342	370	10	20	5	4	12.8	0.35	1.73	0.95	46.2	**30338**
	400	140	132	109	5	5	**32338**	—	1550000	2190000	890	1200	218	225	330	375	14	30	5	4	43.5	0.35	1.73	0.95	76.6	**32338**
200	280	51	51	39	3	2.5	**E32940J**	3EC	486000	958000	1100	1500	214	216	257	271	9	12	2.5	2	–2.6	0.39	1.52	0.84	9.44	**E32940J**
	310	70	70	53	3	2.5	**E32040J**	4FD	755000	1340000	1100	1400	214	221	273	297	11	17	2.5	2	3.1	0.43	1.39	0.77	19.1	**E32040J**
	360	64	58	48	5	4	**E30240J**	4GB	792000	1120000	940	1200	222	238	315	336	12	15	4	3	–6.3	0.44	1.38	0.76	26.4	**E30240J**
	360	104	98	82	5	4	**E32240J**	4GD	1240000	1880000	960	1300	222	225	302	340	11	22	4	3	19.4	0.41	1.48	0.81	44.2	**E32240J**
	420	89	80	56	6	5	**30340D**	—	904000	1230000	690	970	228	248	365	385	11	33	5	4	–33.6	0.81	0.74	0.41	50.6	**30340D**
	420	89	80	67	5	5	**30340**	—	1120000	1450000	820	1100	228	255	354	385	11	21	5	4	9.2	0.35	1.73	0.95	53.5	**30340**
	420	146	138	115	5	5	**32340**	—	1790000	2580000	830	1100	228	240	345	395	16	30	5	4	43.1	0.35	1.73	0.95	91.0	**32340**
220	300	51	51	39	3	2.5	**E32944J**	3EC	498000	1010000	1000	1400	234	234	275	290	9	12	2.5	2	–7.6	0.43	1.41	0.78	10.1	**E32944J**
	340	76	76	57	4	3	**E32044J**	4FD	894000	1620000	940	1300	238	243	300	326	12	19	3	2.5	3.2	0.43	1.39	0.77	25.2	**E32044J**
	400	72	65	54	5	4	**E30244J**	—	1010000	1440000	830	1100	242	263	344	371	14	17	4	3	–4.5	0.44	1.43	0.79	35.9	**E30244J**
	400	114	108	90	5	4	**32244**	—	1190000	1930000	830	1100	242	260	333	377	16	14	4	3	18.1	0.43	1.39	0.77	56.8	**32244**
	460	97	88	73	5	5	**30344**	—	1260000	1680000	730	980	248	282	386	420	12	23	5	4	12.4	0.35	1.73	0.95	69.0	**30344**
	460	154	145	122	5	5	**32344**	—	2100000	3170000	750	1000	242	267	375	423	10	18	5	4	43	0.35	1.73	0.95	108	**32344**
240	320	51	51	39	3	2.5	**E32948J**	4EC	515000	1090000	940	1300	254	254	294	311	9	12	2.5	2	–13.5	0.46	1.31	0.72	10.9	**E32948J**
	360	76	76	57	4	3	**E32048J**	4FD	924000	1720000	870	1300	258	261	318	346	12	19	3	2.5	–2.5	0.46	1.31	0.72	26.8	**E32048J**
	440	79	72	60	5	4	**E30248**	—	1230000	1790000	730	980	262	287	377	409	14	18	4	3	–3.7	0.42	1.43	0.79	49.5	**E30248**
	440	127	120	100	5	4	**E32248**	—	1830000	3010000	740	980	262	282	365	415	16	14	4	3	22	0.44	1.38	0.76	80	**E32248**
	500	105	95	80	5	5	**30348**	—	1520000	2100000	670	890	268	308	414	445	16	21	5	4	13.3	0.35	1.73	0.95	87.3	**30348**
	500	165	155	132	5	5	**32348**	—	2510000	3870000	670	890	268	298	413	461	16	20	5	4	47.6	0.35	1.73	0.95	144	**32348**
260	360	63.5	63.5	48	3	2.5	**E32952J**	—	741000	1550000	830	1100	274	279	328	347	11	15.5	2.5	2	–6.1	0.41	1.48	0.81	18.9	**E32952J**
	400	87	87	65	5	4	**E32052J**	—	1170000	2170000	770	1000	282	287	352	383	14	22	4	3	2.0	0.43	1.38	0.76	39.5	**E32052J**
	480	89	80	67	6	5	**30252**	—	1210000	1860000	650	870	288	310	415	450	14	21	5	4	–4.6	0.42	1.44	0.79	64.9	**30252**
	480	137	130	106	6	5	**32252**	—	1760000	2870000	660	880	288	300	400	455	16	30	5	4	21.8	0.43	1.39	0.77	102	**32252**

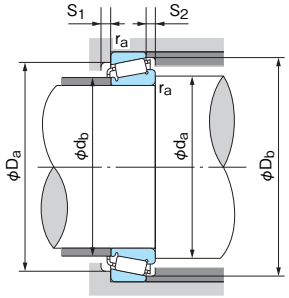
Note: (1) Minus value of load center “a” indicates that the center is located outside of cone backface.

■ Tapered Roller Bearings

Metric Series

Bore Diameter: 280～320mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

Por=0.5Fr+Y_0Fa

Por=Fr

Values Y_0 from table.

1N=0.102kgf

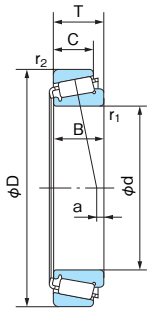
Boundary dimensions (mm)							Bearing No.	(Ref.) ISO355 Dimension series	Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)								Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference	Bearing No.
d	D	T	B	C	Cone r (min)	Cup r (min)					Grease lubrication	Oil lubrication	da (min)	db (max)	Da (min)	Db (min)	S1 (min)	S2 (min)	Cone ra (max)	Cup ra (max)			Y_1	Y_0		
280	380	63.5	63.5	48	3	2.5	**E32956J**	4EC	760000	1630000	770	1000	294	298	347	368	11	15.5	2.5	2	–11.6	0.43	1.39	0.76	20.1	**E32956J**
	420	87	87	65	5	4	**E32056J**	4FC	1200000	2280000	720	960	302	305	370	405	14	22	4	3	–4.1	0.46	1.31	0.72	41.7	**E32056J**
	500	89	80	67	6	5	**30256**	—	1260000	1920000	610	810	308	325	440	475	14	21	5	4	–7.2	0.42	1.44	0.79	67.6	**30256**
	500	137	130	106	6	5	**32256**	—	1860000	3150000	610	810	308	325	420	474	16	30	5	4	19.8	0.43	1.39	0.77	108.0	**32256**
300	420	76	76	57	4	3	**E32960J**	3FD	1050000	2210000	680	910	318	324	383	405	12	19	3	2.5	–3.9	0.39	1.52	0.84	32.4	**E32960J**
	460	100	100	74	5	4	**E32060J**	4GD	1430000	2660000	640	850	322	329	404	439	15	26	4	3	2.1	0.43	1.38	0.76	57.5	**E32060J**
	540	96	85	71	6	5	**30260**	—	1510000	2360000	550	730	328	350	475	505	14	24	5	4	–7.9	0.42	1.44	0.79	84.7	**30260**
	540	149	140	115	6	5	**32260**	—	2310000	4060000	570	780	322	343	456	510	6	15	5	4	17	0.47	1.27	0.70	132	**32260**
320	440	76	76	57	4	3	**E32964J**	3FD	1060000	2270000	640	850	338	342	401	426	12	19	3	2.5	–9.0	0.42	1.44	0.79	34.0	**E32964J**
	480	100	100	74	5	4	**E32064J**	4GD	1510000	2810000	600	800	342	344	418	461	16	26	4	3	–3.0	0.46	1.31	0.72	58.7	**E32064J**
	580	104	92	75	6	5	**30264**	—	1740000	2770000	490	660	348	370	505	540	14	28	5	4	–7.9	0.42	1.44	0.79	108	**30264**

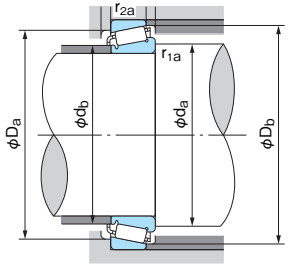
Note: (1) Minus value of load center “a” indicates that the center is located outside of cone backface.

Tapered Roller Bearings

Inch Series

Bore Diameter: 15.875～30.163mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

$Por=0.5Fr+Y_0Fa$

Por=Fr

Values Y_0 from table.

1N=0.102kgf

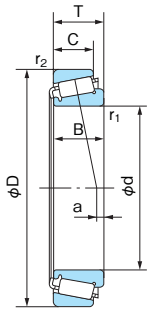
Boundary dimensions (mm)							Bearing No.		Basic load rating		Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)						Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference		Bearing No.	
d	D	T	B	C	r_1 (min)	r_2 (min)	Cone	Cup	Cr (kN)	Cor (kN)	Grease	Oil	da	db	Da	Db	r_{1a}	r_{2a}			Y_1	Y_0	Cone	Cup	Cone	Cup
15.875	42.863	14.288	14.288	9.525	1.60	1.60	H-11590	H-11520	17.8	17.7	10000	14000	24.5	22.5	34.5	39.5	1.60	1.60	1.2	0.70	0.85	0.47	0.06	0.04	H-11590	H-11520
17.463	39.878	13.843	14.605	10.668	1.20	1.20	H-LM11749R	H-LM11710	25.4	26.0	11000	14000	23.0	21.5	34.0	37.0	1.20	1.20	5.2	0.29	2.10	1.15	0.058	0.028	H-LM11749R	H-LM11710
19.050	45.237	15.494	16.637	12.065	1.20	1.20	H-LM11949	H-LM11910	29.4	30.1	9400	13000	25.0	23.5	39.5	41.5	1.20	1.20	5.5	0.30	2.00	1.10	0.081	0.044	H-LM11949	H-LM11910
	49.225	18.034	19.050	14.288	1.20	1.20	H-09067	H-09195	37.7	37.7	8900	12000	25.5	24.0	42.0	44.5	1.20	1.20	7.4	0.27	2.26	1.24	0.114	0.065	H-09067	H-09195
	53.975	22.225	21.839	15.875	1.57	2.36	H-21075	H-21212	42	41.2	8400	11000	31.5	26.0	43.0	50.0	1.57	2.36	5.6	0.59	1.02	0.56	0.159	0.095	H-21075	H-21212
21.430	50.005	17.526	18.288	13.970	1.17	1.17	H-M12649	H-M12610	39.1	40.7	8500	11000	27.5	25.5	44.0	46.0	1.17	1.17	6.4	0.28	2.16	1.19	0.119	0.058	H-M12649	H-M12610
21.987	45.237	15.494	16.637	12.065	1.27	1.27	H-LM12749	H-LM12710	30.1	34.6	8900	12000	27.5	26.0	39.5	42.0	1.27	1.27	5.5	0.31	1.96	1.08	0.078	0.038	H-LM12749	H-LM12710
	45.975	15.494	16.637	12.065	1.27	1.27	H-LM12749	H-LM12711	30.1	34.6	8900	12000	27.5	26.0	40.0	42.5	1.27	1.27	5.5	0.31	1.96	1.08	0.078	0.043	H-LM12749	H-LM12711
22.225	52.388	19.368	20.168	14.288	1.60	1.60	H-1380	H-1328	36.7	37.9	8000	11000	29.5	29.5	45.0	48.5	1.60	1.60	7.7	0.29	2.05	1.13	0.132	0.066	H-1380	H-1328
	56.896	19.368	19.837	15.875	1.20	1.20	H-1755	H-1729	40.0	43.1	7600	10000	29.0	27.5	49.0	51.0	1.20	1.20	7.1	0.31	1.95	1.07	0.150	0.100	H-1755	H-1729
	57.150	22.225	22.225	17.463	0.80	1.60	H-1280	H-1220	52.6	55.7	7600	10000	29.5	29.0	49.0	52.0	0.80	1.60	7.9	0.35	1.73	0.95	0.189	0.105	H-1280	H-1220
23.812	56.896	19.368	19.837	15.875	0.80	1.20	H-1779	H-1729	40.0	43.1	7600	10000	29.5	28.5	49.0	51.0	0.80	1.20	7.1	0.31	1.95	1.07	0.141	0.100	H-1779	H-1729
25.400	50.292	14.224	14.732	10.668	1.20	1.20	H-L44643R	H-L44610	31.2	37.0	7800	10000	31.5	29.5	44.5	47.0	1.20	1.20	3.2	0.37	1.60	0.88	0.092	0.039	H-L44643R	H-L44610
	57.150	19.431	19.431	14.732	1.57	1.57	H-M84548	H-M84510	42.2	49.2	7300	9700	36.0	33.0	48.5	54.0	1.57	1.57	3.4	0.55	1.10	0.60	0.156	0.088	H-M84548	H-M84510
	61.999	19.050	20.638	14.288	3.60	1.20	H-15100	H-15245	44.6	50.7	6400	8600	38.0	31.5	55.0	58.0	3.60	1.20	5.7	0.35	1.71	0.94	0.215	0.081	H-15100	H-15245
	61.999	19.050	20.638	14.288	0.80	1.20	H-15101	H-15245	44.6	50.7	6400	8600	32.5	31.5	55.0	58.0	0.80	1.20	5.7	0.35	1.71	0.94	0.215	0.081	H-15101	H-15245
	64.292	21.433	21.433	16.670	1.57	1.57	H-M86643R	H-M86610	55.2	70.7	6400	8500	38.0	36.5	54.0	61.0	1.57	1.57	3.4	0.55	1.10	0.60	0.248	0.127	H-M86643R	H-M86610
	65.088	22.225	21.463	15.875	1.60	1.60	H-23100	H-23256	47.8	51.7	5600	7900	39.0	34.5	53.0	61.0	1.60	1.60	2.2	0.73	0.82	0.45	0.231	0.141	H-23100	H-23256
26.157	61.913	19.050	20.638	14.288	0.80	2.00	H-15103	H-15243	44.6	50.7	6400	8600	33.0	32.5	55.0	58.0	0.80	2.00	5.7	0.35	1.71	0.94	0.213	0.079	H-15103	H-15243
	61.999	19.050	20.638	14.288	0.80	1.20	H-15103	H-15245	44.6	50.7	6400	8600	33.0	32.5	55.0	58.0	0.80	1.20	5.7	0.35	1.71	0.94	0.213	0.081	H-15103	H-15245
26.988	50.292	14.224	14.732	10.668	3.60	1.20	H-L44649R	H-L44610	31.2	37	7800	10000	37.5	31.0	44.5	47.0	3.60	1.20	3.2	0.37	1.60	0.88	0.083	0.039	H-L44649R	H-L44610
	61.999	19.050	20.638	14.288	0.80	1.20	H-15106	H-15245	44.6	50.7	6400	8600	33.5	33.0	55.0	58.0	0.80	1.20	5.7	0.35	1.71	0.94	0.206	0.081	H-15106	H-15245
	63.500	20.638	20.638	15.875	0.80	1.20	H-15106	H-15250	44.6	50.7	6400	8600	33.5	33.0	56.0	59.0	0.80	1.20	5.7	0.35	1.71	0.94	0.206	0.112	H-15106	H-15250
	63.500	20.638	20.638	15.875	0.80	1.60	H-15106	H-15250X	44.6	50.7	6400	8600	33.5	33.0	55.0	59.0	0.80	1.60	5.7	0.35	1.71	0.94	0.206	0.111	H-15106	H-15250X
28.575	57.150	19.845	19.355	15.875	3.60	1.60	H-1988R	H-1922	48.8	57.1	7000	9300	39.5	33.5	51.0	53.5	3.60	1.60	5.9	0.33	1.82	1.00	0.151	0.076	H-1988R	H-1922
	61.999	19.050	20.638	14.288	3.60	1.20	H-15112	H-15245	44.6	50.7	6400	8600	40.0	34.0	55.0	58.0	3.60	1.20	5.7	0.35	1.71	0.94	0.193	0.081	H-15112	H-15245
	63.500	20.638	20.638	15.875	3.60	1.20	H-15112	H-15250	44.6	50.7	6400	8600	40.0	34.0	56.0	59.0	3.60	1.20	5.7	0.35	1.71	0.94	0.193	0.112	H-15112	H-15250
	64.292	21.433	21.433	16.670	1.60	1.60	H-M86647R	H-M86610	55.2	70.7	6400	8500	40.0	38.0	54.0	61.0	1.60	1.60	3.4	0.55	1.10	0.60	0.225	0.127	H-M86647R	H-M86610
	68.263	22.225	22.225	17.463	0.80	1.60	H-02474	H-02420	51.0	61.1	6000	8000	36.5	36.0	59.0	63.0	0.80	1.60	5.1	0.42	1.44	0.79	0.252	0.150	H-02474	H-02420
	73.025	22.225	22.225	17.463	0.80	3.20	H-02872	H-02820	55.0	65.7	5500	7400	37.5	37.0	62.0	68.0	0.80	3.20	3.7	0.45	1.32	0.73	0.319	0.158	H-02872	H-02820
29.000	50.292	14.224	14.732	10.668	3.60	1.27	H-L45449	H-L45410	28.9	37.2	7600	10000	39.5	33.0	44.5	48.0	3.60	1.27	3.3	0.37	1.62	0.89	0.079	0.036	H-L45449	H-L45410
29.987	61.999	19.050	20.638	14.288	1.20	1.20	H-15117	H-15245	44.6	50.7	6400	8600	36.5	35.0	55.0	58.0	1.20	1.20	5.7	0.35	1.71	0.94	0.184	0.081	H-15117	H-15245
30.000	72.085	22.385	19.202	18.415	0.80	2.40	H-14118	H-14283	46.1	55	5900	7800	37.0	36.5	60.0	65.0	0.80	2.40	4.4	0.38	1.57	0.86	0.224	0.21	H-14118	H-14283
30.163	64.292	21.433	21.433	16.670	1.57	1.57	H-M86649R	H-M86610	55.2	70.7	6400	8500	41.0	38.0	54.0	61.0	1.57	1.57	3.4	0.55	1.10	0.60	0.213	0.127	H-M86649R	H-M86610
	68.263	22.225	22.225	17.463	2.40	1.60	H-M88043	H-M88010	56.1	71.1	6000	7900	43.5	39.5	58.0	65.0	2.40	1.60	3.0	0.55	1.10	0.60	0.258	0.144	H-M88043	H-M88010

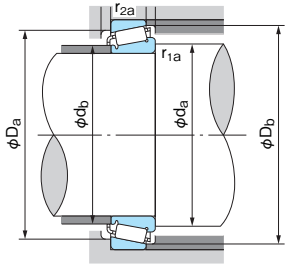
Note: (1) Minus value of load center "a" indicates that the center is located outside of cone backface.

Tapered Roller Bearings

Inch Series

Bore Diameter: 30.213～33.338mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

$Por=0.5Fr+Y_0Fa$

Por=Fr

Values Y_0 from table.

1N=0.102kgf

Boundary dimensions (mm)							Bearing No.		Basic load rating		Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)						Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference		Bearing No.	
d	D	T	B	C	r_1 (min)	r_2 (min)	Cone	Cup	Cr (kN)	Cor (kN)	Grease	Oil	da	db	Da	Db	r_{1a}	r_{2a}			Y_1	Y_0	Cone	Cup	Cone	Cup
30.213	61.999	19.050	20.638	14.288	3.60	1.20	H-15118	H-15245	44.6	50.7	6400	8600	41.5	35.5	55.0	58.0	3.60	1.20	5.7	0.35	1.71	0.94	0.181	0.081	H-15118	H-15245
	61.999	19.050	20.638	14.288	0.80	1.20	H-15120	H-15245	44.6	50.7	6400	8600	36.0	35.5	55.0	58.0	0.80	1.20	5.7	0.35	1.71	0.94	0.183	0.081	H-15120	H-15245
	63.500	20.638	20.638	15.875	3.60	1.20	H-15118	H-15250	44.6	50.7	6400	8600	41.5	35.5	56.0	59.0	3.60	1.20	5.7	0.35	1.71	0.94	0.181	0.112	H-15118	H-15250
	63.500	20.638	20.638	15.875	3.60	1.60	H-15118	H-15250X	44.6	50.7	6400	8600	41.5	35.5	55.0	59.0	3.60	1.60	5.7	0.35	1.71	0.94	0.181	0.111	H-15118	H-15250X
30.226	69.012	19.845	19.583	15.875	0.80	1.20	H-14116	H-14276	46.1	55	5900	7800	37.0	36.5	60.0	63.0	0.80	1.20	4.4	0.38	1.57	0.86	0.226	0.134	H-14116	H-14276
31.750	59.131	15.875	16.764	11.811	SP	1.20	H-LM67048	H-LM67010	35.8	43.1	6600	8800	42.5	36.0	52.0	56.0	SP	1.20	2.9	0.41	1.46	0.80	0.120	0.062	H-LM67048	H-LM67010
	61.999	18.161	19.050	14.288	SP	1.20	H-15123	H-15245	44.6	50.7	6400	8600	42.5	36.5	55.0	58.0	SP	1.20	4.8	0.35	1.71	0.94	0.157	0.081	H-15123	H-15245
	61.999	19.050	20.638	14.288	3.60	1.20	H-15125	H-15245	44.6	50.7	6400	8600	42.5	36.5	55.0	58.0	3.60	1.20	5.7	0.35	1.71	0.94	0.169	0.081	H-15125	H-15245
	61.999	19.050	20.638	14.288	0.80	1.20	H-15126	H-15245	44.6	50.7	6400	8600	37.0	36.5	55.0	58.0	0.80	1.20	5.7	0.35	1.71	0.94	0.171	0.081	H-15126	H-15245
	66.421	25.400	25.357	20.638	0.80	3.20	H-2580	H-2520	71.4	85.1	6000	8000	38.5	37.5	57.0	62.5	0.80	3.20	9.4	0.27	2.19	1.21	0.281	0.123	H-2580	H-2520
	68.263	22.225	22.225	17.463	3.60	1.60	H-02475	H-02420	51.0	61.1	6000	8000	44.5	38.5	59.0	63.0	3.60	1.60	5.1	0.42	1.44	0.79	0.224	0.150	H-02475	H-02420
	68.263	22.225	22.225	17.463	1.60	1.60	H-M88046	H-M88010	56.1	71.1	6000	7900	43.0	40.5	58.0	65.0	1.60	1.60	3.0	0.55	1.10	0.60	0.245	0.144	H-M88046	H-M88010
	69.012	19.845	19.583	15.875	3.60	1.20	H-14125A	H-14276	46.1	55	5900	7800	44.0	37.5	60.0	63.0	3.60	1.20	4.4	0.38	1.57	0.86	0.213	0.134	H-14125A	H-14276
	69.012	19.845	19.583	15.875	3.60	3.20	H-14125A	H-14274	46.1	55	5900	7800	44.0	37.5	59.0	63.0	3.60	3.20	4.4	0.38	1.57	0.86	0.213	0.131	H-14125A	H-14274
	69.850	23.813	25.357	19.050	0.80	1.20	H-2580	H-2523	71.4	85.1	6000	8000	38.5	37.5	61.0	64.0	0.80	1.20	9.4	0.27	2.19	1.21	0.281	0.168	H-2580	H-2523
33.338	68.263	22.225	22.225	17.463	0.80	1.60	H-M88048	H-M88010	56.1	71.1	6000	7900	42.5	41.0	58.0	65.0	0.80	1.60	3.0	0.55	1.10	0.60	0.231	0.144	H-M88048	H-M88010
	69.012	19.845	19.583	15.875	3.60	1.20	H-14130	H-14276	46.1	55.0	5900	7800	45.0	38.5	60.0	63.0	3.60	1.20	4.4	0.38	1.57	0.86	0.2	0.134	H-14130	H-14276
	69.012	19.845	19.583	15.875	0.80	3.20	H-14131	H-14274	46.1	55.0	5900	7800	39.5	38.5	59.0	63.0	0.80	3.20	4.4	0.38	1.57	0.86	0.203	0.131	H-14131	H-14274
	69.012	19.845	19.583	15.875	0.80	1.20	H-14131	H-14276	46.1	55.0	5900	7800	39.5	38.5	60.0	63.0	0.80	1.20	4.4	0.38	1.57	0.86	0.203	0.134	H-14131	H-14276
	69.012	19.845	19.583	15.875	3.60	3.20	H-14130	H-14274	46.1	55.0	5900	7800	45.0	38.5	59.0	63.0	3.60	3.20	4.4	0.38	1.57	0.86	0.2	0.131	H-14130	H-14274
	76.200	23.813	25.654	19.050	1.60	3.20	H-2790R	H-2720	74.1	92.2	5400	7200	42.0	40.0	66.0	70.0	1.60	3.20	8.1	0.30	1.98	1.09	0.364	0.184	H-2790R	H-2720

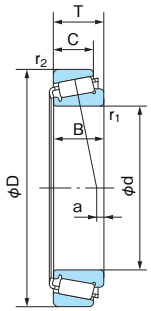
Notes: (1) Minus value of load center “a” indicates that the center is located outside of cone backface.
(2) SP indicates special surface handling configurations.

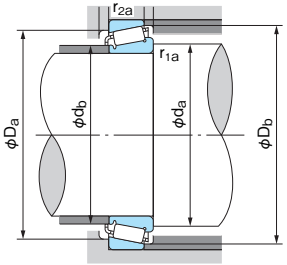
NACHI

■ Tapered Roller Bearings

Inch Series

Bore Diameter: 34.925～38.100mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

Por=0.5Fr+Y_0Fa

Por=Fr

Values Y_0 from table.

1N=0.102kgf

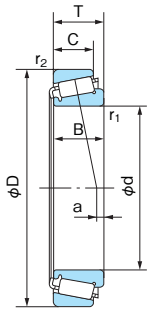
Boundary dimensions (mm)							Bearing No.		Basic load rating		Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)						Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference		Bearing No.	
d	D	T	B	C	r_1 (min)	r_2 (min)	Cone	Cup	Cr (kN)	Cor (kN)	Grease	Oil	da	db	Da	Db	r_{1a}	r_{2a}			Y_1	Y_0	Cone	Cup	Cone	Cup
34.925	65.088	18.034	18.288	13.970	SP	1.20	H-LM48548	H-LM48510	48.0	58.5	6000	8000	46.0	40.0	58.0	61.0	SP	1.20	3.7	0.38	1.59	0.88	0.164	0.086	H-LM48548	H-LM48510
	65.088	21.082	18.288	17.018	SP	1.60	H-LM48548	H-LM48511A	48.0	58.5	6000	8000	46.0	40.0	58.0	61.0	SP	1.60	3.7	0.38	1.59	0.88	0.164	0.113	H-LM48548	H-LM48511A
	65.088	18.034	18.288	13.970	0.80	1.20	H-LM48548A	H-LM48510	48.0	58.5	6000	8000	40.5	42.0	58.0	61.0	0.80	1.20	3.7	0.38	1.59	0.88	0.169	0.086	H-LM48548A	H-LM48510
	65.088	21.082	18.288	17.018	0.80	1.60	H-LM48548A	H-LM48511A	48.0	58.5	6000	8000	40.5	42.0	58.0	61.0	0.80	1.60	3.7	0.38	1.59	0.88	0.169	0.113	H-LM48548A	H-LM48511A
	69.012	19.845	19.583	15.875	1.60	3.20	H-14137A	H-14274	46.1	55.0	5900	7800	42.0	40.0	59.0	63.0	1.60	3.20	4.4	0.38	1.57	0.86	0.189	0.131	H-14137A	H-14274
	69.012	19.845	19.583	15.875	1.60	1.20	H-14137A	H-14276	46.1	55.0	5900	7800	42.0	40.0	60.0	63.0	1.60	1.20	4.4	0.38	1.57	0.86	0.189	0.134	H-14137A	H-14276
	69.012	19.845	19.583	15.875	3.60	3.20	H-14138A	H-14274	46.1	55.0	5900	7800	46.0	40.0	59.0	63.0	3.60	3.20	4.4	0.38	1.57	0.86	0.187	0.131	H-14138A	H-14274
	69.012	19.845	19.583	15.875	3.60	1.20	H-14138A	H-14276	46.1	55.0	5900	7800	46.0	40.0	60.0	63.0	3.60	1.20	4.4	0.38	1.57	0.86	0.187	0.134	H-14138A	H-14276
	72.233	25.400	25.400	19.842	2.40	2.40	H-HM88649	H-HM88610	66.9	87.4	5700	7600	48.5	42.5	60.0	69.0	2.40	2.40	4.7	0.55	1.10	0.60	0.301	0.185	H-HM88649	H-HM88610
	73.025	23.813	24.608	19.050	1.60	2.40	H-25877R	H-25820	72.2	87.3	5600	7400	43.0	40.5	64.0	68.0	1.60	2.40	8.2	0.29	2.07	1.14	0.31	0.164	H-25877R	H-25820
	73.025	23.813	24.608	19.050	1.60	0.80	H-25877R	H-25821	72.2	87.3	5600	7400	43.0	40.5	65.0	68.0	1.60	0.80	8.2	0.29	2.07	1.14	0.31	0.165	H-25877R	H-25821
	76.200	29.370	28.575	23.813	3.60	3.30	H-31593	H-31520	80.9	97.4	5400	7200	50.0	43.5	64.0	72.0	3.60	3.30	7.8	0.40	1.49	0.82	0.388	0.232	H-31593	H-31520
	76.200	29.370	28.575	23.813	1.60	3.30	H-31594	H-31520	80.9	97.4	5400	7200	46.0	43.5	64.0	72.0	1.60	3.30	7.8	0.40	1.49	0.82	0.388	0.232	H-31594	H-31520
	79.375	29.370	29.771	23.813	3.60	3.20	3478	3420	87.4	105	5200	6900	50.0	43.5	67.0	74.0	3.60	3.20	8.6	0.37	1.64	0.90	0.462	0.256	3478	3420
	80.167	29.370	30.391	23.813	3.60	3.20	3379	3320	91	106	5000	6700	48.0	41.5	70.0	75.0	3.60	3.20	10.7	0.27	2.20	1.21	0.505	0.217	3379	3320
	85.725	30.162	30.162	23.813	3.60	3.20	3872	3820	108	136	4800	6400	53.0	46.0	73.0	81.0	3.60	3.20	8.4	0.40	1.49	0.82	0.614	0.285	3872	3820
34.987	59.131	15.875	16.764	11.938	SP	1.27	H-L68149	H-L68110	35.7	48.5	6400	8500	45.5	39.0	53.0	56.0	SP	1.27	2.7	0.42	1.44	0.79	0.112	0.056	H-L68149	H-L68110
	59.975	15.875	16.764	11.938	SP	1.20	H-L68149	H-L68111	35.7	48.5	6400	8500	45.5	39.0	53.0	56.0	SP	1.20	2.7	0.42	1.44	0.79	0.112	0.063	H-L68149	H-L68111
36.487	73.025	23.813	24.608	19.050	1.60	2.40	H-25880R	H-25820	72.2	87.3	5600	7400	44.0	42.0	64.0	68.0	1.60	2.40	8.2	0.29	2.07	1.14	0.294	0.164	H-25880R	H-25820
	73.025	23.813	24.608	19.050	1.60	0.80	H-25880R	H-25821	72.2	87.3	5600	7400	44.0	42.0	65.0	68.0	1.60	0.80	8.2	0.29	2.07	1.14	0.294	0.165	H-25880R	H-25821
	76.200	23.813	25.654	19.050	1.60	3.20	H-2780R	H-2720	74.1	92.2	5400	7200	44.5	42.5	66.0	70.0	1.60	3.20	8.1	0.30	1.98	1.09	0.33	0.185	H-2780R	H-2720
36.513	76.200	29.370	28.575	23.813	3.60	3.30	H-31597	H-31520	80.9	97.4	5400	7200	51.0	44.5	64.0	72.0	3.60	3.30	7.8	0.40	1.49	0.82	0.368	0.232	H-31597	H-31520
	93.663	31.750	31.750	26.195	1.60	3.20	46143	46368	105	134	4400	5800	48.5	46.5	79.0	87.0	1.60	3.20	7.7	0.40	1.49	0.82	0.738	0.403	46143	46368
38.000	63.000	17.000	17.000	13.500	SP	SP	H-JL69349	H-JL69310	43.5	58.2	6000	8000	49.0	41.0	60.0	56.5	SP	SP	2.4	0.42	1.44	0.79	0.128	0.070	H-JL69349	H-JL69310
38.100	65.088	18.034	18.288	13.970	SP	1.17	H-LM29748	H-LM29710	42.9	56.5	5800	7800	49.0	42.5	59.0	62.0	SP	1.17	4.3	0.33	1.80	0.99	0.154	0.079	H-LM29748	H-LM29710
	65.088	18.034	18.288	13.970	2.36	1.17	H-LM29749	H-LM29710	42.9	56.5	5800	7800	46.0	42.5	59.0	62.0	2.36	1.17	4.3	0.33	1.80	0.99	0.159	0.079	H-LM29749	H-LM29710
	65.088	19.812	18.288	15.748	2.36	1.30	H-LM29749	H-LM29711	42.9	56.5	5800	7800	46.0	42.5	58.0	62.0	2.36	1.30	4.3	0.33	1.80	0.99	0.159	0.092	H-LM29749	H-LM29711
	68.275	20.000	16.520	16.032	1.60	1.60	H-19150R	H-19268X	46.1	53.8	5700	7600	45.0	43.0	61.0	65.0	1.60	1.60	1.4	0.44	1.35	0.74	0.167	0.109	H-19150R	H-19268X
	69.012	26.195	26.195	15.083	1.60	2.40	H-13686	H-13621	49.2	62	5600	7500	46.0	43.0	61.0	65.0	1.60	2.40	10.1	0.40	1.49	0.82	0.254	0.102	H-13686	H-13621
	76.200	23.813	25.654	19.050	3.60	3.20	H-2788R	H-2720	74.1	92.2	5400	7200	50.0	43.5	66.0	70.0	3.60	3.20	8.1	0.30	1.98	1.09	0.308	0.185	H-2788R	H-2720
	79.375	23.813	25.400	19.050	0.80	0.80	H-26878R.	H-26822.	81.1	105	5000	6700	45.0	44.5	71.0	74.0	0.80	0.80	7.5	0.32	1.88	1.04	0.397	0.185	H-26878R.	H-26822.
	79.375	29.370	29.771	23.813	3.60	3.20	3490	3420	87.4	105	5200	6900	52.0	45.9	67.0	74.0	3.60	3.20	8.6	0.37	1.64	0.90	0.421	0.256	3490	3420
	80.167	25.400	25.400	20.638	0.80	3.20	H-26878R.	H-26820.	81.1	105	5000	6700	45.0	44.5	69.0	74.0	0.80	3.20	7.5	0.32	1.88	1.04	0.397	0.217	H-26878R.	H-26820.
	88.501	26.988	29.083	22.225	3.60	1.60	418	414	98.2	112	4900	6500	51.0	44.5	77.0	80.0	3.60	1.60	10.1	0.26	2.28	1.25	0.523	0.325	418	414

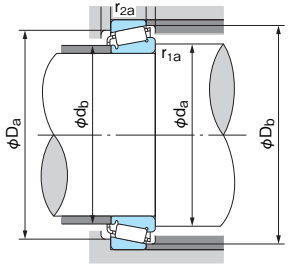
Notes: (1) Minus value of load center "a" indicates that the center is located outside of cone backface.
(2) SP indicates special surface handling configurations.

■ Tapered Roller Bearings

Inch Series

Bore Diameter: 39.688～42.875mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

$Por=0.5Fr+Y_0Fa$

Por=Fr

Values Y_0 from table.

1N=0.102kgf

Boundary dimensions (mm)							Bearing No.		Basic load rating		Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)						Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference		Bearing No.	
d	D	T	B	C	r_1 (min)	r_2 (min)	Cone	Cup	Cr (kN)	Cor (kN)	Grease	Oil	da	db	Da	Db	r_{1a}	r_{2a}			Y_1	Y_0	Cone	Cup	Cone	Cup
	73.025	25.654	22.098	21.336	0.80	2.40	**H-M201047R**	**H-M201011**	68.4	90.6	5300	7100	48.0	45.5	64.0	69.0	0.80	2.40	5.8	0.33	1.80	0.99	0.278	0.167	**H-M201047R**	**H-M201011**
39.688	76.200	23.813	25.654	19.050	3.60	3.20	**H-2789R**	**H-2720**	74.1	92.2	5400	7200	52.0	45.0	66.0	70.0	3.60	3.20	8.1	0.30	1.98	1.09	0.289	0.185	**H-2789R**	**H-2720**
	76.200	23.813	25.654	19.050	3.60	0.80	**H-2789R**	**H-2729**	74.1	92.2	5400	7200	52.0	45.0	68.0	70.0	3.60	0.80	8.1	0.30	1.98	1.09	0.289	0.189	**H-2789R**	**H-2729**
40.000	76.200	20.638	20.940	15.507	1.60	1.20	**28158**	**28300**	57.3	65.9	5300	7000	47.5	45.0	68.0	71.0	1.60	1.20	4.5	0.40	1.49	0.82	0.266	0.137	**28158**	**28300**
40.987	67.975	17.500	18.000	13.500	SP	1.60	**H-LM300849**	**H-LM300811**	44.0	59.5	5500	7400	52.0	45.0	61.0	65.0	SP	1.60	3.6	0.35	1.72	0.95	0.157	0.081	**H-LM300849**	**H-LM300811**
	73.025	16.667	17.463	12.700	3.60	1.60	**H-18590**	**H-18520**	45.9	55.8	5200	6900	53.0	46.0	66.0	69.0	3.60	1.60	2.2	0.35	1.71	0.94	0.199	0.085	**H-18590**	**H-18520**
	73.431	19.558	19.812	14.732	3.60	0.80	**H-LM501349**	**H-LM501310**	57.8	73.0	5200	7000	53.0	46.5	67.0	70.0	3.60	0.80	3.5	0.40	1.50	0.83	0.227	0.167	**H-LM501349**	**H-LM501310**
	73.431	21.430	19.812	16.604	3.60	0.80	**H-LM501349**	**H-LM501314**	57.8	73.0	5200	7000	53.0	46.5	66.0	70.0	3.60	0.80	3.5	0.40	1.50	0.83	0.227	0.126	**H-LM501349**	**H-LM501314**
	76.200	18.009	17.384	14.288	1.60	1.60	**11162R**	**11300**	51.6	63.3	5200	6900	49.0	46.5	67.0	72.0	1.60	1.60	0.5	0.49	1.23	0.68	0.221	0.127	**11162R**	**11300**
	76.200	22.225	23.020	17.463	3.60	0.80	**24780R**	**24720**	66.3	83.3	5200	6900	54.0	47.0	68.0	72.0	3.60	0.80	4.8	0.39	1.53	0.84	0.275	0.148	**24780R**	**24720**
	76.200	25.400	23.020	20.638	3.60	2.40	**24780R**	**24721**	66.3	83.3	5200	6900	54.0	47.0	72.0	66.0	3.60	2.40	4.8	0.39	1.53	0.84	0.275	0.186	**24780R**	**24721**
	79.375	23.813	25.400	19.050	3.60	0.80	**H-26882R.**	**H-26822.**	81.1	105	5000	6700	54.0	47.0	71.0	74.0	3.60	0.80	7.5	0.32	1.88	1.04	0.355	0.186	**H-26882R.**	**H-26822.**
	80.167	25.400	25.400	20.638	3.60	3.20	**H-26882R.**	**H-26820.**	81.1	105	5000	6700	54.0	47.0	70.0	74.0	3.60	3.20	7.5	0.32	1.88	1.04	0.355	0.217	**H-26882R.**	**H-26820.**
	80.167	29.370	30.391	23.813	3.60	3.20	**3383**	**3320**	91	106	5000	6700	53.0	46.5	70.0	75.0	3.60	3.20	10.7	0.27	2.20	1.21	0.419	0.217	**3383**	**3320**
41.275	80.167	29.370	30.391	23.813	0.80	3.20	**3384**	**3320**	91	106	5000	6700	47.0	46.5	70.0	75.0	0.80	3.20	10.7	0.27	2.20	1.21	0.421	0.217	**3384**	**3320**
	82.550	26.543	25.654	20.193	3.60	3.30	**H-M802048**	**H-M802011**	83.7	105	4900	6500	57.0	50.6	70.0	79.0	3.60	3.30	3.3	0.55	1.10	0.60	0.403	0.227	**H-M802048**	**H-M802011**
	84.138	30.163	30.886	23.813	3.60	3.20	**3577R**	**3520**	95.8	120	4600	6200	54.0	48.0	74.0	79.5	3.60	3.20	9.7	0.31	1.96	1.08	0.532	0.221	**3577R**	**3520**
	85.725	30.162	30.162	23.812	3.60	3.20	**3877**	**3820**	108	136	4800	6400	57.0	50.3	73.0	81.0	3.60	3.20	8.4	0.40	1.49	0.82	0.525	0.285	**3877**	**3820**
	87.313	30.163	30.886	23.813	3.60	3.20	**3577R**	**3525**	95.8	120	4600	6200	54.0	48.0	75.0	81.0	3.60	3.20	9.7	0.31	1.96	1.08	0.532	0.3	**3577R**	**3525**
	87.313	30.163	30.886	23.813	1.60	3.20	**H-3585R**	**H-3525**	95.8	120	4600	6200	50.0	48.0	75.0	81.0	1.60	3.20	9.7	0.31	1.96	1.08	0.537	0.3	**H-3585R**	**H-3525**
	88.900	30.163	29.370	23.020	0.80	3.30	**HM803145**	**HM803110**	99.6	125	4600	6100	54.0	53.0	74.0	85.0	0.80	3.30	4.1	0.55	1.10	0.60	0.577	0.318	**HM803145**	**HM803110**
	88.900	30.163	29.370	23.020	3.60	3.30	**HM803146**	**HM803110**	99.6	125	4600	6100	60.0	53.0	74.0	85.0	3.60	3.30	4.1	0.55	1.10	0.60	0.574	0.318	**HM803146**	**HM803110**
	90.488	39.688	40.386	33.338	3.60	3.20	**4388**	**4335**	132	169	4500	6000	57.0	51.0	77.0	85.0	3.60	3.20	14.1	0.28	2.11	1.16	0.775	0.454	**4388**	**4335**
42.863	87.313	30.163	30.886	23.813	3.60	3.20	**H-3579R**	**H-3525**	95.8	120	4600	6200	56.0	49.5	75.0	81.0	3.60	3.20	9.7	0.31	1.96	1.08	0.507	0.3	**H-3579R**	**H-3525**
	82.931	26.988	25.400	22.225	3.60	2.40	**H-25577**	**H-25523**	77.3	100	4800	6300	55.0	49.0	77.0	72.0	3.60	2.40	6.3	0.33	1.79	0.99	0.383	0.246	**H-25577**	**H-25523**
42.875	83.058	23.876	25.400	19.114	3.60	2.00	**H-25577**	**H-25522**	77.3	100	4800	6300	55.0	49.0	73.0	77.0	3.60	2.00	6.3	0.33	1.79	0.99	0.383	0.203	**H-25577**	**H-25522**

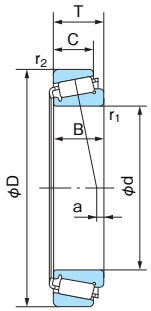
Notes: (1) Minus value of load center “a” indicates that the center is located outside of cone backface.
(2) SP indicates special surface handling configurations.

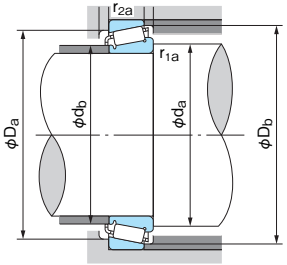
NACHI

■ Tapered Roller Bearings

Inch Series

Bore Diameter: 44.450～45.618mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

Por=0.5Fr+Y_0Fa

Por=Fr

Values Y_0 from table.

1N=0.102kgf

Boundary dimensions (mm)							Bearing No.		Basic load rating		Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)						Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference		Bearing No.	
d	D	T	B	C	r_1 (min)	r_2 (min)	Cone	Cup	Cr (kN)	Cor (kN)	Grease	Oil	da	db	Da	Db	r_{1a}	r_{2a}			Y_1	Y_0	Cone	Cup	Cone	Cup
44.450	82.931	23.813	25.400	19.050	3.60	0.80	H-25580	H-25520	77.3	100	4800	6300	57.0	55.0	74.0	77.0	3.60	0.80	6.3	0.33	1.79	0.99	0.362	0.2	H-25580	H-25520
	82.931	23.813	25.400	19.050	0.50	0.80	H-25581	H-25520	77.3	100	4800	6300	51.0	50.0	74.0	77.0	0.50	0.80	6.3	0.33	1.79	0.99	0.365	0.2	H-25581	H-25520
	83.058	23.876	25.400	19.114	3.60	2.00	H-25580	H-25522	77.3	100	4800	6300	57.0	50.0	73.0	77.0	3.60	2.00	6.3	0.33	1.79	0.99	0.362	0.203	H-25580	H-25522
	84.138	30.163	30.886	23.813	3.60	3.20	3578R	3520	95.8	120	4600	6200	57.0	51.0	74.0	79.5	3.60	3.20	9.7	0.31	1.96	1.08	0.479	0.221	3578R	3520
	85.001	20.638	21.692	17.463	3.60	1.30	355X	354A	71.8	81.7	4600	6200	56.0	50.0	77.0	80.0	3.60	1.30	5.1	0.31	1.96	1.08	0.342	0.16	355X	354A
	87.313	30.163	30.886	23.813	3.60	3.20	H-3578R	H-3525	95.8	120	4600	6200	57.0	51.0	75.0	81.0	3.60	3.20	9.7	0.31	1.96	1.08	0.483	0.3	H-3578R	H-3525
	88.900	30.163	29.370	23.020	3.60	3.20	HM803149	HM803110	99.6	125	4600	6100	62.0	53.4	74.0	85.0	3.60	3.20	4.1	0.55	1.10	0.60	0.525	0.318	HM803149	HM803110
	90.119	23.000	21.692	21.808	3.60	2.40	355X	352	71.8	81.7	4600	6200	56.0	50.0	82.0	78.0	3.60	2.40	5.1	0.31	1.96	1.08	0.342	0.318	355X	352
	92.075	30.163	29.370	23.020	3.60	3.20	HM803149	HM803112	99.6	125	4600	6100	62.0	53.4	75.0	85.0	3.60	3.20	4.1	0.55	1.10	0.60	0.525	0.398	HM803149	HM803112
	93.264	30.163	30.302	23.813	3.60	3.20	3782	3720	103	137	4200	5500	58.0	52.0	82.0	88.0	3.60	3.20	8.0	0.34	1.77	0.97	0.658	0.288	3782	3720
	95.250	30.958	28.301	20.638	1.20	0.80	53176	53375	88.7	98.4	3700	5200	59.0	52.5	81.0	89.0	1.20	0.80	1.0	0.74	0.81	0.45	0.562	0.363	53176	53375
	95.250	30.958	28.301	20.638	3.60	0.80	53177	53375	88.7	98.4	3700	5200	63.0	52.5	81.0	89.0	3.60	0.80	1.0	0.74	0.81	0.45	0.557	0.363	53177	53375
	95.250	27.783	28.575	22.225	0.80	0.80	33885	33822	108	141	4100	5400	53.0	53.0	86.0	90.0	0.80	0.80	7.4	0.33	1.82	1.00	0.714	0.267	33885	33822
	95.250	30.958	28.575	22.225	3.60	0.80	HM903249	HM903210	99.7	120	3700	5100	65.0	54.0	81.0	91.0	3.60	0.80	0.1	0.74	0.81	0.45	0.613	0.383	HM903249	HM903210
	95.250	30.163	29.370	23.020	3.60	3.20	HM804843	HM804810	104	140	3300	4400	63.0	57.0	81.0	91.0	3.60	3.20	3.7	0.55	1.10	0.60	0.67	0.351	HM804843	HM804810
	104.775	30.163	30.958	23.813	0.80	3.20	45280	45220	126	165	3700	4900	55.0	54.0	93.0	99.0	0.80	3.20	8.0	0.33	1.80	0.99	1	0.345	45280	45220
	104.775	36.513	36.513	28.575	3.60	3.20	HM807040	HM807010	141	195	3800	5100	66.0	59.0	89.0	100.0	3.60	3.20	7.2	0.49	1.23	0.68	1.13	0.497	HM807040	HM807010
	111.125	30.163	26.909	20.638	3.60	3.20	55175CR	55437	111	150	3100	4300	67.0	60.0	92.0	105.0	3.60	3.20	(7.2)	0.88	0.68	0.37	0.938	0.507	55175CR	55437
	114.300	44.450	44.450	34.925	3.60	3.20	65385	65320	189	230	3800	5000	65.0	59.0	97.0	107.0	3.60	3.20	12.5	0.43	1.40	0.77	1.48	0.869	65385	65320
44.983	82.931	23.813	25.400	19.050	1.60	0.80	H-25584	H-25520	77.3	100	4800	6300	53.0	51.0	74.0	77.0	1.60	0.80	6.3	0.33	1.79	0.99	0.357	0.2	H-25584	H-25520
	83.058	23.813	25.400	19.050	1.60	3.20	H-25584	H-25521	77.3	100	4800	6300	53.0	51.0	72.0	77.0	1.60	3.20	6.3	0.33	1.79	0.99	0.357	0.2	H-25584	H-25521
	83.058	23.876	25.400	19.114	1.60	2.00	H-25584	H-25522	77.3	100	4800	6300	53.0	51.0	73.0	77.0	1.60	2.00	6.3	0.33	1.79	0.99	0.357	0.203	H-25584	H-25522
	93.264	30.163	30.302	23.813	3.60	3.20	3776	3720	103	137	4200	5500	59.0	53.0	82.0	88.0	3.60	3.20	8.0	0.34	1.77	0.97	0.650	0.228	3776	3720
45.230	79.985	19.842	20.638	15.080	2.00	1.20	H-17887	H-17831	55.1	70.8	4800	6400	57.0	52.0	68.0	74.0	2.00	1.20	4.0	0.37	1.64	0.90	0.275	0.134	H-17887	H-17831
45.237	84.138	30.163	30.886	23.813	3.60	3.20	3586R	3520	95.8	120	4600	6200	58.0	52.0	74.0	79.5	3.60	3.20	9.7	0.31	1.96	1.08	0.467	0.221	3586R	3520
	87.313	30.163	30.886	23.813	3.60	3.20	3586R	3525	95.8	120	4600	6200	58.0	52.0	75.0	81.0	3.60	3.20	9.7	0.31	1.96	1.08	0.467	0.3	3586R	3525
45.242	73.431	19.558	19.812	15.748	3.60	0.80	H-LM102949	H-LM102910	55.6	78.1	5100	6700	56.0	50.0	68.0	70.0	3.60	0.80	4.9	0.31	1.97	1.08	0.209	0.100	H-LM102949	H-LM102910
	77.788	19.842	19.842	15.080	3.60	0.80	H-LM603049	H-LM603011	57.1	73.5	4900	6500	57.0	50.0	71.0	74.0	3.60	0.80	2.3	0.43	1.41	0.77	0.243	0.120	H-LM603049	H-LM603011
	77.788	21.430	19.842	16.667	3.60	0.80	H-LM603049	H-LM603012	57.1	73.5	4900	6500	57.0	50.0	71.0	74.0	3.60	0.80	2.3	0.43	1.41	0.77	0.243	0.138	H-LM603049	H-LM603012
	79.974	19.842	19.842	15.080	3.60	0.80	H-LM603049	H-LM603014	57.1	73.5	4900	6500	57.0	50.0	71.0	74.0	3.60	0.80	2.3	0.43	1.41	0.77	0.243	0.152	H-LM603049	H-LM603014
45.618	82.931	23.813	25.400	19.050	3.60	0.80	H-25590	H-25520	77.3	100	4800	6300	58.0	51.0	74.0	77.0	3.60	0.80	6.3	0.33	1.79	0.99	0.345	0.201	H-25590	H-25520
	82.931	26.988	25.400	22.225	3.60	2.40	H-25590	H-25523	77.3	100	4800	6300	58.0	51.0	72.0	77.0	3.60	2.40	6.3	0.33	1.79	0.99	0.345	0.246	H-25590	H-25523
	83.058	23.876	25.400	19.114	3.60	2.00	H-25590	H-25522	77.3	100	4800	6300	58.0	51.0	73.0	77.0	3.60	2.00	6.3	0.33	1.79	0.99	0.345	0.203	H-25590	H-25522
	83.058	23.813	25.400	19.050	3.60	3.20	H-25590	H-25521	77.3	100	4800	6300	58.0	51.0	72.0	77.0	3.60	3.20	6.3	0.33	1.79	0.99	0.345	0.2	H-25590	H-25521

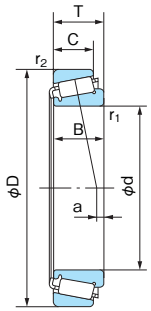
Note: (1) Minus value of load center "a" indicates that the center is located outside of cone backface.

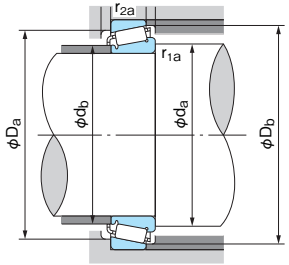
NACHI

■ Tapered Roller Bearings

Inch Series

Bore Diameter: 46.038～51.592mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

Por=0.5Fr+Y_0Fa

Por=Fr

Values Y_0 from table.

1N=0.102kgf

Boundary dimensions (mm)							Bearing No.		Basic load rating		Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)						Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference		Bearing No.	
d	D	T	B	C	r_1 (min)	r_2 (min)	Cone	Cup	Cr (kN)	Cor (kN)	Grease	Oil	da	db	Da	Db	r_{1a}	r_{2a}			Y_1	Y_0	Cone	Cup	Cone	Cup
46.038	79.375	17.463	17.463	13.495	2.80	1.60	18690	18620	47.1	59.1	4800	6400	56.0	51.0	71.0	74.0	2.80	1.60	1.5	0.37	1.60	0.88	0.208	0.123	18690	18620
	85.001	20.638	21.692	17.463	2.40	1.30	359S	354A	71.8	81.7	4600	6200	55.0	51.0	77.0	80.0	2.40	1.30	5.1	0.31	1.96	1.08	0.323	0.160	359S	354A
47.625	88.900	20.638	22.225	16.513	2.40	1.30	369S	362A	74.3	87.3	4400	5800	57.0	53.0	81.0	84.0	2.40	1.30	4.6	0.32	1.88	1.03	0.375	0.164	369S	362A
	88.900	25.400	25.400	19.050	3.60	3.20	M804049	M804010	87.1	112	4400	5900	62.0	55.0	76.0	85.0	3.60	3.20	2.1	0.55	1.10	0.60	0.450	0.216	M804049	M804010
	90.000	20.000	22.225	15.875	3.60	2.00	369A	362	74.3	87.3	4400	5800	60.0	53.0	81.0	84.0	3.60	2.00	4.6	0.32	1.88	1.03	0.373	0.173	369A	362
	93.264	30.163	30.302	23.813	3.60	3.20	3779	3720	103	137	4200	5500	61.0	55.0	82.0	88.0	3.60	3.20	8.0	0.34	1.77	0.97	0.606	0.288	3779	3720
	95.250	30.163	29.370	23.020	3.60	3.20	HM804846	HM804810	104	140	3300	4400	64.0	57.0	81.0	91.0	3.60	3.20	3.6	0.55	1.10	0.60	0.617	0.351	HM804846	HM804810
	107.950	36.513	36.957	28.575	3.60	3.20	536	532X	138	172	3800	5100	62.0	56.0	94.0	100.0	3.60	3.20	12.3	0.30	2.03	1.11	1.04	0.569	536	532X
48.412	95.250	30.163	29.370	23.020	2.40	3.20	HM804848	HM804810	104	140	3300	4400	63.0	57.5	81.0	91.0	2.40	3.20	3.7	0.55	1.10	0.60	0.606	0.351	HM804848	HM804810
49.213	104.775	36.513	36.513	28.575	3.60	3.20	HM807044	HM807010	141	195	3800	5100	69.0	63.0	89.0	100.0	3.60	3.20	7.2	0.49	1.23	0.68	1.03	0.497	HM807044	HM807010
50.000	82.000	21.500	21.500	17.000	3.00	0.50	H-JLM104948	H-JLM104910	71.7	97.9	4500	6000	60.0	55.0	76.0	78.0	3.00	0.50	5.3	0.31	1.97	1.08	0.304	0.128	H-JLM104948	H-JLM104910
	84.000	22.000	22.000	17.500	3.50	1.50	H-JLM704649	H-JLM704610	70.2	96.2	4500	6000	62.0	56.0	76.0	80.0	3.50	1.50	2.5	0.44	1.37	0.75	0.324	0.161	H-JLM704649	H-JLM704610
	90.000	28.000	28.000	23.000	3.00	2.50	JM205149	JM205110	105	138	4300	5800	62.0	57.0	80.0	85.0	3.00	2.50	7.8	0.33	1.82	1.00	0.508	0.243	JM205149	JM205110
	105.000	37.000	36.000	29.000	3.00	2.50	JHM807045E	JHM807012E	149	205	3800	5100	69.0	63.0	90.0	100.0	3.00	2.50	7.6	0.49	1.23	0.68	1.01	0.523	JHM807045E	JHM807012E
50.800	82.550	21.590	22.225	16.510	3.60	1.20	H-LM104949	H-LM104911	61.2	84.3	4500	6000	62.0	55.0	75.0	78.0	3.60	1.20	5.2	0.31	1.97	1.08	0.287	0.131	H-LM104949	H-LM104911
	82.931	21.590	22.225	16.510	3.60	1.20	H-LM104949	H-LM104912	61.2	84.3	4500	6000	62.0	55.0	75.0	78.0	3.60	1.20	5.2	0.31	1.97	1.08	0.287	0.138	H-LM104949	H-LM104912
	85.001	17.463	17.463	13.495	3.60	1.60	18790	18720	49.7	65.5	4400	5900	62.0	56.0	77.0	80.0	3.60	1.60	0.1	0.41	1.48	0.81	0.227	0.133	18790	18720
	88.900	20.638	22.225	16.513	3.60	1.30	368A	362A	74.3	87.3	4400	5800	62.0	56.0	81.0	84.0	3.60	1.30	4.6	0.32	1.88	1.03	0.331	0.164	368A	362A
	89.980	24.750	25.400	19.987	3.60	2.40	28580R	28520	84.8	119	4200	5600	63.0	57.0	81.0	86.0	3.60	2.40	4.7	0.38	1.59	0.87	0.458	0.198	28580R	28520
	90.000	20.000	22.225	15.875	3.60	2.00	368A	362	74.3	87.3	4400	5800	62.0	56.0	81.0	84.0	3.60	2.00	4.6	0.32	1.88	1.03	0.331	0.173	368A	362
	92.075	24.608	25.400	19.845	3.60	0.80	28580R.	28521	84.8	119	4200	5600	63.0	57.0	83.0	87.0	3.60	0.80	4.7	0.38	1.59	0.87	0.453	0.247	28580R.	28521
	93.264	30.163	30.302	23.813	0.80	3.20	3775	3720	103	137	4200	5500	58.0	58.0	82.0	88.0	0.80	3.20	8.0	0.34	1.77	0.97	0.551	0.288	3775	3720
	93.264	30.163	30.302	23.813	3.60	3.20	3780	3720	103	137	4200	5500	64.0	58.0	82.0	88.0	3.60	3.20	8.0	0.34	1.77	0.97	0.547	0.288	3780	3720
	95.250	27.783	28.575	22.225	3.60	2.40	33889	33821	108	141	4100	5400	64.0	58.0	85.0	90.0	3.60	2.40	7.4	0.33	1.82	1.00	0.604	0.264	33889	33821
	95.250	27.783	28.575	22.225	3.60	0.80	33889	33822	108	141	4100	5400	64.0	58.0	86.0	90.0	3.60	0.80	7.4	0.33	1.82	1.00	0.604	0.267	33889	33822
	97.630	24.608	24.608	19.446	3.60	0.80	28678	28622	89.6	131	3900	5200	65.0	58.0	88.0	92.0	3.60	0.80	3.4	0.40	1.49	0.82	0.569	0.267	28678	28622
	101.600	31.750	31.750	25.400	3.60	3.20	49585	49520	114	143	3900	5200	66.0	59.0	88.0	96.0	3.60	3.20	7.8	0.40	1.50	0.82	0.736	0.384	49585	49520
	101.600	34.925	36.068	26.988	0.80	3.20	529	522	131	159	4000	5300	59.0	58.0	89.0	95.0	0.80	3.20	12.7	0.29	2.10	1.16	0.806	0.411	529	522
	101.600	34.925	36.068	26.988	3.60	3.20	529X	522	131	159	4000	5300	65.0	58.0	89.0	95.0	3.60	3.20	12.7	0.29	2.10	1.16	0.802	0.411	529X	522
	104.775	30.163	30.958	23.813	6.40	3.20	45284	45220	126	165	3700	4900	71.0	59.0	93.0	99.0	6.40	3.20	8.0	0.33	1.80	0.99	0.873	0.345	45284	45220
	104.775	36.513	36.513	28.575	3.60	3.20	HM807046	HM807010	141	195	3800	5100	70.0	63.0	89.0	100.0	3.60	3.20	7.2	0.49	1.23	0.68	0.995	0.497	HM807046	HM807010
	107.950	36.513	36.957	28.575	3.60	3.20	537	532X	138	172	3800	5100	65.0	59.0	94.0	100.0	3.60	3.20	12.3	0.30	2.03	1.11	0.969	0.569	537	532X
51.592	90.000	20.000	22.225	15.875	2.00	2.00	368S	362	74.3	87.3	4400	5800	59.0	56.0	81.0	84.0	2.00	2.00	4.6	0.32	1.88	1.03	0.322	0.173	368S	362

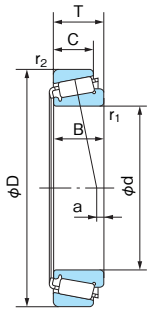
Note: (1) Minus value of load center "a" indicates that the center is located outside of cone backface.

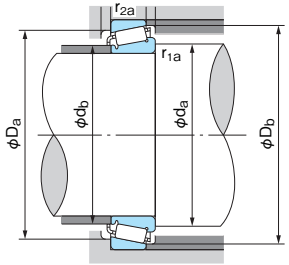
NACHI

Tapered Roller Bearings

Inch Series

Bore Diameter: 52.388～55.563mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

Por=0.5Fr+Y_0Fa

Por=Fr

Values Y_0 from table.

1N=0.102kgf

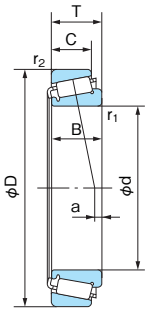
Boundary dimensions (mm)							Bearing No.		Basic load rating		Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)						Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference		Bearing No.	
d	D	T	B	C	r_1 (min)	r_2 (min)	Cone	Cup	Cr (kN)	Cor (kN)	Grease	Oil	da	db	Da	Db	r_{1a}	r_{2a}			Y_1	Y_0	Cone	Cup	Cone	Cup
52.388	92.075	24.608	25.400	19.845	3.60	0.80	28584R.	28521	84.8	119	4200	5600	65.0	58.0	83.0	87.0	3.60	0.80	4.7	0.38	1.59	0.87	0.435	0.247	28584R.	28521
	93.264	30.163	30.302	23.813	2.40	3.20	3767	3720	103	137	4200	5500	63.0	59.0	82.0	88.0	2.40	3.20	8.0	0.34	1.77	0.97	0.519	0.288	3767	3720
	95.250	27.783	28.575	22.225	1.60	2.40	33890	33821	108	141	4100	5400	61.0	59.0	85.0	90.0	1.60	2.40	7.4	0.33	1.82	1.00	0.581	0.264	33890	33821
	95.250	27.783	28.575	22.225	3.60	2.40	33891	33821	108	141	4100	5400	66.0	59.0	85.0	90.0	3.60	2.40	7.4	0.33	1.82	1.00	0.578	0.264	33891	33821
53.975	95.250	27.783	28.575	22.225	1.60	2.40	33895	33821	108	141	4100	5400	63.0	60.0	85.0	90.0	1.60	2.40	7.4	0.33	1.82	1.00	0.551	0.264	33895	33821
	95.250	27.783	28.575	22.225	1.60	0.80	33895	33822	108	141	4100	5400	63.0	60.0	86.0	90.0	1.60	0.80	7.4	0.33	1.82	1.00	0.551	0.267	33895	33822
	96.838	21.001	21.946	15.875	1.60	0.80	389AS	382A	80.4	101	3900	5200	62.0	60.0	89.0	92.0	1.60	0.80	3.6	0.35	1.69	0.93	0.479	0.177	389AS	382A
	98.425	21.001	21.946	17.826	0.80	0.80	389A	382	80.4	101	3900	5200	61.0	60.0	89.0	92.0	0.80	0.80	3.6	0.35	1.69	0.93	0.478	0.223	389A	382
	107.950	36.513	36.957	28.575	3.60	3.20	539	532X	138	172	3800	5100	68.0	61.0	94.0	100.0	3.60	3.20	12.3	0.30	2.03	1.11	0.894	0.569	539	532X
	123.825	38.100	36.678	30.163	3.60	3.20	557S	552A	162	223	3200	4200	71.0	65.0	109.0	116.0	3.60	3.20	9.4	0.35	1.73	0.95	1.47	0.756	557S	552A
54.991	135.755	53.975	56.007	44.450	3.60	3.20	6381	6320	266	357	3000	4000	76.0	70.0	117.0	126.0	3.60	3.20	19.2	0.32	1.85	1.02	2.75	1.37	6381	6320
55.000	90.000	23.000	23.000	18.500	1.60	0.50	JLM506849E	JLM506810E	81.4	115	4200	5500	63.0	61.0	82.0	86.0	1.60	0.50	2.9	0.40	1.49	0.82	0.370	0.183	JLM506849E	JLM506810E
	95.000	29.000	29.000	23.500	1.50	2.50	JM207049	JM207010	110	150	4000	5300	64.0	62.0	85.0	91.0	1.50	2.50	7.7	0.33	1.79	0.99	0.567	0.256	JM207049	JM207010
	95.000	29.000	29.000	23.500	6.00	2.50	JM207049A	JM207010	110	150	4000	5300	73.0	62.0	85.0	91.0	6.00	2.50	7.7	0.33	1.79	0.99	0.558	0.256	JM207049A	JM207010
	110.000	39.000	39.000	32.000	3.00	2.50	JH307749E	JH307710E	176	224	3600	4900	71.0	64.0	97.0	104.0	3.00	2.50	11.9	0.35	1.73	0.95	1.16	0.56	JH307749E	JH307710E
55.563	97.630	24.608	24.608	19.446	3.60	0.80	28680	28622	89.6	131	3900	5200	68.0	62.0	88.0	92.0	3.60	0.80	3.4	0.40	1.49	0.82	0.492	0.267	28680	28622

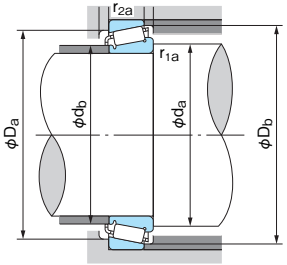
Note: (1) Minus value of load center “a” indicates that the center is located outside of cone backface.

Tapered Roller Bearings

Inch Series

Bore Diameter: 57.150～61.913mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

Por=0.5Fr+Y_0Fa

Por=Fr

Values Y_0 from table.

1N=0.102kgf

Boundary dimensions (mm)							Bearing No.		Basic load rating		Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)						Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference		Bearing No.	
d	D	T	B	C	r_1 (min)	r_2 (min)	Cone	Cup	Cr (kN)	Cor (kN)	Grease	Oil	da	db	Da	Db	r_{1a}	r_{2a}			Y_1	Y_0	Cone	Cup	Cone	Cup
	96.838	21.001	21.946	15.875	2.40	0.80	387	382A	80.4	101	3900	5200	66.0	62.0	89.0	92.0	2.40	0.80	3.6	0.35	1.69	0.93	0.428	0.177	387	382A
	96.838	25.400	21.946	20.274	2.40	2.40	387	382S	80.4	101	3900	5200	66.0	62.0	87.0	91.0	2.40	2.40	3.6	0.35	1.69	0.93	0.428	0.245	387	382S
	96.838	21.001	21.946	15.875	3.60	0.80	387A	382A	80.4	101	3900	5200	69.0	62.0	89.0	92.0	3.60	0.80	3.6	0.35	1.69	0.93	0.426	0.177	387A	382A
	96.838	25.400	21.946	20.274	3.60	2.40	387A	382S	80.4	101	3900	5200	72.0	62.0	87.0	91.0	3.60	2.40	3.6	0.35	1.69	0.93	0.426	0.245	387A	382S
	96.838	21.001	21.946	15.875	5.00	0.80	387AS	382A	80.4	101	3900	5200	72.0	62.0	89.0	92.0	5.00	0.80	3.6	0.35	1.69	0.93	0.422	0.177	387AS	382A
	96.838	25.400	21.946	20.274	5.00	2.40	387AS	382S	80.4	101	3900	5200	72.0	62.0	87.0	91.0	5.00	2.40	3.6	0.35	1.69	0.93	0.422	0.245	387AS	382S
	96.838	24.608	24.608	19.446	3.60	0.80	28682	28621	89.6	131	3900	5200	70.0	63.0	87.0	91.0	3.60	0.80	3.4	0.40	1.49	0.82	0.466	0.248	28682	28621
	97.630	24.608	24.608	19.446	3.60	0.80	28682	28622	89.6	131	3900	5200	70.0	63.0	88.0	92.0	3.60	0.80	3.4	0.40	1.49	0.82	0.466	0.267	28682	28622
	98.425	21.001	21.946	17.826	2.40	0.80	387	382	80.4	101	3900	5200	66.0	62.0	89.0	92.0	2.40	0.80	3.6	0.35	1.69	0.93	0.428	0.223	387	382
	98.425	21.001	21.946	17.826	3.60	0.80	387A	382	80.4	101	3900	5200	69.0	62.0	89.0	92.0	3.60	0.80	3.6	0.35	1.69	0.93	0.426	0.223	387A	382
57.150	104.775	30.163	29.317	24.605	2.40	3.30	462	453X	109	144	3700	4900	67.0	63.0	92.0	98.0	2.40	3.30	6.6	0.34	1.79	0.98	0.685	0.372	462	453X
	104.775	30.163	29.317	24.605	3.60	3.30	469	453X	109	144	3700	4900	70.0	63.0	92.0	98.0	3.60	3.30	6.6	0.34	1.79	0.98	0.682	0.372	469	453X
	104.775	30.163	30.958	23.813	0.80	3.20	45289	45220	126	165	3700	4900	65.0	65.0	93.0	99.0	0.80	3.20	8.0	0.33	1.80	0.99	0.757	0.345	45289	45220
	104.775	30.163	30.958	23.813	2.40	3.20	45290	45220	126	165	3700	4900	68.0	65.0	93.0	99.0	2.40	3.20	8.0	0.33	1.80	0.99	0.755	0.345	45290	45220
	104.775	30.163	30.958	23.813	2.40	0.80	45290	45221	126	165	3700	4900	68.0	65.0	95.0	99.0	2.40	0.80	8.0	0.33	1.80	0.99	0.755	0.35	45290	45221
	110.000	21.999	21.996	18.824	2.40	1.20	390	394A	86.4	116	3400	4500	70.0	66.0	101.0	104.5	2.40	1.20	0.7	0.40	1.49	0.82	0.682	0.259	390	394A
	112.713	30.163	30.163	23.813	3.60	3.20	39580	39520	147	207	3300	4500	72.0	66.0	101.0	107.0	3.60	3.20	6.9	0.34	1.77	0.97	1.05	0.355	39580	39520
	112.713	30.163	30.163	23.813	7.90	3.20	39581	39520	147	207	3300	4500	81.0	66.0	101.0	107.0	7.90	3.20	6.9	0.34	1.77	0.97	1.03	0.355	39581	39520
	117.475	33.338	31.750	23.813	3.60	3.20	66225R	66462	129	152	3500	4600	76.0	69.0	100.0	111.0	3.60	3.20	0.2	0.63	0.96	0.53	1.03	0.547	66225R	66462
	120.650	41.275	41.275	31.750	3.60	3.20	623	612	174	217	3500	4600	72.0	66.0	105.0	110.0	3.60	3.20	14.0	0.31	1.91	1.05	1.27	0.853	623	612
	123.825	38.100	36.678	30.163	3.60	3.20	555S	552A	162	223	3200	4200	73.0	67.0	109.0	116.0	3.60	3.20	9.4	0.35	1.73	0.95	1.4	0.756	555S	552A
57.531	98.425	21.001	21.946	17.826	3.60	0.80	388A	382	80.4	101	3900	5200	69.0	63.0	89.0	92.0	3.60	0.80	3.6	0.35	1.69	0.93	0.421	0.223	388A	382
59.987	134.983	33.449	30.925	21.948	3.60	3.60	HM911244R	HM911216	153	181	2600	3700	84.0	74.0	112.0	123.0	3.60	3.60	(7.1)	0.82	0.73	0.40	1.37	0.806	HM911244R	HM911216
	100.000	25.400	25.400	19.845	3.60	3.20	28985	28921	91.4	137	3700	4900	73.0	67.0	89.0	96.0	3.60	3.20	2.6	0.43	1.41	0.78	0.533	0.230	28985	28921
	100.000	25.400	25.400	19.845	3.60	0.80	28985	28921A	91.4	137	3700	4900	73.0	67.0	91.0	96.0	3.60	0.80	2.6	0.43	1.41	0.78	0.533	0.235	28985	28921A
	101.600	25.400	25.400	19.845	3.60	3.20	28985	28920	91.4	137	3700	4900	73.0	67.0	89.0	96.0	3.60	3.20	2.6	0.43	1.41	0.78	0.533	0.269	28985	28920
60.325	112.713	30.163	30.048	23.813	3.60	3.20	3980	3920	111	164	3400	4500	75.0	68.0	99.0	106.0	3.60	3.20	4.3	0.40	1.49	0.82	0.853	0.448	3980	3920
	123.825	38.100	36.678	30.163	7.90	3.20	557A	552A	162	223	3200	4200	84.0	69.0	109.0	116.0	7.90	3.20	9.4	0.35	1.73	0.95	1.3	0.756	557A	552A
	127.000	44.450	44.450	34.925	3.60	3.20	65237	65500	208	269	3300	4400	82.0	71.0	107.0	119.0	3.60	3.20	9.3	0.49	1.23	0.68	1.58	1.02	65237	65500
	136.525	46.038	46.038	36.513	3.60	3.20	H715332	H715311	231	369	2800	3700	84.0	78.0	118.0	132.0	3.60	3.20	9.0	0.47	1.27	0.70	2.56	0.950	H715332	H715311
61.913	110.000	21.999	21.996	18.824	0.80	1.20	392	394A	86.4	116	3400	4500	70.0	69.0	101.0	104.5	0.80	1.20	0.7	0.40	1.49	0.82	0.605	0.259	392	394A

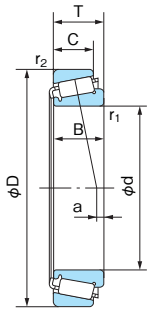
Note: (1) Minus value of load center “a” indicates that the center is located outside of cone backface.

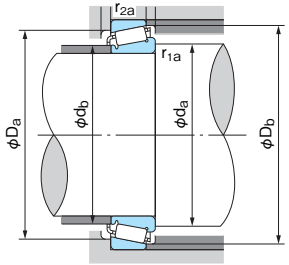
NACHI

■ Tapered Roller Bearings

Inch Series

Bore Diameter: 63.500～68.263mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

$Por=0.5Fr+Y_0Fa$

Por=Fr

Values Y_0 from table.

1N=0.102kgf

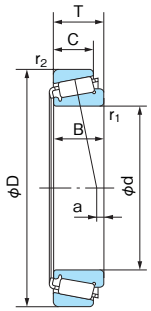
Boundary dimensions (mm)							Bearing No.		Basic load rating		Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)						Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference		Bearing No.	
d	D	T	B	C	r_1 (min)	r_2 (min)	Cone	Cup	Cr (kN)	Cor (kN)	Grease	Oil	da	db	Da	Db	r_{1a}	r_{2a}			Y_1	Y_0	Cone	Cup	Cone	Cup
63.500	107.950	25.400	25.400	19.050	3.60	3.20	29585	29520	92.8	143	3400	4500	77.0	71.0	96.0	103.0	3.60	3.20	0.7	0.46	1.31	0.72	0.644	0.277	29585	29520
	107.950	25.400	25.400	19.050	1.60	0.80	29586	29522	92.8	143	3400	4500	73.0	71.0	98.0	103.0	1.60	0.80	0.7	0.46	1.31	0.72	0.651	0.282	29586	29522
	110.000	21.999	21.996	18.824	1.60	1.20	390A	394A	86.4	116	3400	4500	73.0	70.0	101.0	104.5	1.60	1.20	0.7	0.40	1.49	0.82	0.579	0.259	390A	394A
	110.000	21.999	21.996	18.824	3.60	1.20	395	394A	86.4	116	3400	4500	77.0	70.0	101.0	104.5	3.60	1.20	0.7	0.40	1.49	0.82	0.575	0.259	395	394A
	110.000	25.400	25.400	19.050	3.60	1.20	29585	29521	92.8	143	3400	4500	77.0	71.0	99.0	104.0	3.60	1.20	0.7	0.46	1.31	0.72	0.644	0.333	29585	29521
	112.713	30.163	30.048	23.813	3.60	3.20	3982	3920	111	164	3400	4500	77.0	71.0	99.0	106.0	3.60	3.20	4.3	0.40	1.49	0.82	0.776	0.448	3982	3920
	112.713	30.163	30.163	23.813	3.60	3.20	39585	39520	147	207	3300	4500	77.0	71.0	101.0	107.0	3.60	3.20	6.9	0.34	1.77	0.97	0.908	0.355	39585	39520
	122.238	38.100	38.354	29.718	7.10	3.20	HM212047UR	HM212011UR	191	249	3200	4300	87.0	73.0	108.0	116.0	7.10	3.20	10.8	0.34	1.78	0.98	1.36	0.595	HM212047UR	HM212011UR
	123.825	38.100	36.678	30.163	3.60	3.20	559	552A	162	223	3200	4200	78.0	72.0	109.0	116.0	3.60	3.20	9.4	0.35	1.73	0.95	1.23	0.756	559	552A
	136.525	41.275	41.275	31.750	3.60	3.20	639	632	197	267	3000	3900	81.0	74.0	118.0	125.0	3.60	3.20	11.0	0.36	1.66	0.91	1.75	1.03	639	632
65.000	105.000	24.000	23.000	18.500	3.00	1.00	JLM710949UR	JLM710910UR	95.3	129	3500	4700	77.0	71.0	96.0	100.5	3.00	1.00	0.3	0.45	1.32	0.73	0.513	0.234	JLM710949UR	JLM710910UR
	110.000	28.000	28.000	22.500	3.00	2.50	JM511946E	JM511910E	136	191	3400	4600	78.0	72.0	99.0	105.0	3.00	2.50	4.0	0.40	1.49	0.82	0.733	0.338	JM511946E	JM511910E
	120.000	39.000	38.500	32.000	3.00	2.50	JH211749E	JH211710E	189	255	3200	4300	80.0	74.0	107.0	114.0	3.00	2.50	11.1	0.34	1.78	0.98	1.27	0.618	JH211749E	JH211710E
65.088	135.755	53.975	56.007	44.450	3.60	3.20	6379	6320	266	357	3000	4000	84.0	77.5	117.0	126.0	3.60	3.20	19.2	0.32	1.85	1.02	2.34	1.37	6379	6320
66.675	107.950	25.400	25.400	19.050	3.60	3.20	29590	29520	92.8	143	3400	4500	80.0	73.0	96.0	103.0	3.60	3.20	0.7	0.46	1.31	0.72	0.582	0.277	29590	29520
	107.950	25.400	25.400	19.050	3.60	0.80	29590	29522	92.8	143	3400	4500	80.0	73.0	96.0	103.0	3.60	0.80	0.7	0.46	1.31	0.72	0.582	0.282	29590	29522
	110.000	21.999	21.996	18.824	0.80	1.20	395A	394A	86.4	116	3400	4500	73.0	73.0	101.0	104.5	0.80	1.20	0.7	0.40	1.49	0.82	0.524	0.259	395A	394A
	110.000	21.999	21.996	18.824	3.60	1.20	395S	394A	86.4	116	3400	4500	79.0	73.0	101.0	104.5	3.60	1.20	0.7	0.40	1.49	0.82	0.519	0.259	395S	394A
	110.000	25.400	25.400	19.050	3.60	1.20	29590	29521	92.8	143	3400	4500	80.0	73.0	99.0	104.0	3.60	1.20	0.7	0.46	1.31	0.72	0.582	0.333	29590	29521
	112.713	30.163	30.048	23.813	3.60	3.20	3984	3920	111	164	3400	4500	80.0	74.0	99.0	106.0	3.60	3.20	4.3	0.40	1.49	0.82	0.705	0.448	3984	3920
	112.713	30.163	30.048	23.813	5.60	3.20	3994	3920	111	164	3400	4500	84.0	74.0	99.0	106.0	5.60	3.20	4.3	0.40	1.49	0.82	0.698	0.448	3994	3920
	112.713	30.163	30.163	23.813	3.60	3.20	39590	39520	147	207	3300	4500	80.0	74.0	101.0	107.0	3.60	3.20	6.9	0.34	1.77	0.97	0.832	0.355	39590	39520
	117.475	30.163	30.163	23.813	3.60	3.20	33262	33462	118	179	3200	4200	81.0	75.0	104.0	112.0	3.60	3.20	2.4	0.44	1.38	0.76	0.910	0.436	33262	33462
	122.238	38.100	38.354	29.718	3.60	1.60	HM212049	HM212010	191	249	3200	4300	82.0	75.5	110.0	116.0	3.60	1.60	10.8	0.34	1.78	0.98	1.26	0.596	HM212049	HM212010
	122.238	38.100	38.354	29.718	3.60	3.20	HM212049	HM212011	191	249	3200	4300	82.0	75.5	108.0	116.0	3.60	3.20	10.8	0.34	1.78	0.98	1.26	0.591	HM212049	HM212011
	123.825	38.100	36.678	30.163	3.60	3.20	560	552A	162	223	3200	4200	81.0	75.0	109.0	116.0	3.60	3.20	9.4	0.35	1.73	0.95	1.13	0.756	560	552A
	136.525	41.275	41.275	31.750	3.60	3.20	641	632	197	267	3000	3900	83.0	77.0	116.0	124.0	3.60	3.20	11.0	0.36	1.66	0.91	1.64	1.03	641	632
	135.755	53.975	56.007	44.450	4.30	3.20	6386	6320	266	357	3000	4000	87.0	77.5	117.0	126.0	4.30	3.20	19.2	0.32	1.85	1.02	2.27	1.37	6386	6320
	136.525	46.038	46.038	36.513	3.60	3.20	H715341	H715311	231	369	2800	3700	89.0	83.0	118.0	132.0	3.60	3.20	9.0	0.47	1.27	0.70	2.33	0.95	H715341	H715311
68.263	110.000	21.999	21.996	18.824	2.40	1.20	399A	394A	86.4	116	3400	4500	78.0	74.0	101.0	104.5	2.40	1.20	0.7	0.40	1.49	0.82	0.493	0.259	399A	394A
	110.000	21.999	21.996	18.824	5.20	1.20	399AS	394A	86.4	116	3400	4500	83.0	74.0	101.0	104.5	5.20	1.20	0.7	0.40	1.49	0.82	0.485	0.259	399AS	394A
	120.000	29.794	29.007	24.237	3.60	2.00	480	472	118	161	3200	4200	82.0	75.0	108.0	113.0	3.60	2.00	4.1	0.38	1.56	0.86	0.833	0.487	480	472
	123.825	38.100	36.678	30.163	3.60	3.20	560S	552A	162	223	3200	4200	83.0	76.0	109.0	116.0	3.60	3.20	9.4	0.35	1.73	0.95	1.09	0.756	560S	552A
	136.525	41.275	41.275	31.750	3.60	3.20	H414245.	H414210.	241	308	2900	3800	86.0	82.0	121.0	129.0	3.60	3.20	11.0	0.36	1.67	0.92	1.92	0.788	H414245.	H414210.

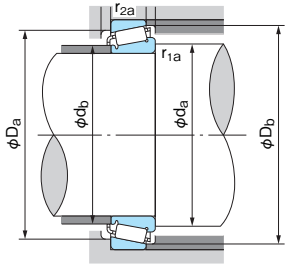
Note: (1) Minus value of load center "a" indicates that the center is located outside of cone backface.

Tapered Roller Bearings

Inch Series

Bore Diameter: 69.850～75,000mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

$Por=0.5Fr+Y_0Fa$

Por=Fr

Values Y_0 from table.

1N=0.102kgf

Boundary dimensions (mm)							Bearing No.		Basic load rating		Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)						Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference		Bearing No.	
d	D	T	B	C	r_1 (min)	r_2 (min)	Cone	Cup	Cr (kN)	Cor (kN)	Grease	Oil	da	db	Da	Db	r_{1a}	r_{2a}			Y_1	Y_0	Cone	Cup	Cone	Cup
69.850	112.713	25.400	25.400	19.050	1.60	3.20	29675	29620	97	155	3200	4300	80.0	77.0	101.0	109.0	1.60	3.20	(0.8)	0.49	1.23	0.68	0.676	0.27	29675	29620
	117.475	30.163	30.163	23.813	3.60	3.20	33275	33462	118	179	3200	4200	84.0	77.0	104.0	112.0	3.60	3.20	2.4	0.44	1.38	0.76	0.830	0.436	33275	33462
	120.000	29.794	29.007	24.237	3.60	2.00	482	472	118	161	3200	4200	83.0	77.0	108.0	113.0	3.60	2.00	4.1	0.38	1.56	0.86	0.791	0.487	482	472
	120.000	29.794	30.163	23.444	3.60	0.80	33275	33472	118	179	3200	4200	84.0	77.0	107.0	113.0	3.60	0.80	2.4	0.44	1.38	0.76	0.832	0.517	33275	33472
	120.000	32.545	32.545	26.195	3.60	3.20	47487R	47420	150	218	3100	4200	84.0	78.0	107.0	114.0	3.60	3.20	6.0	0.36	1.67	0.92	1.01	0.476	47487R	47420
	127.000	36.513	36.170	28.575	3.60	3.20	566	563	156	226	3000	4000	85.0	78.0	112.0	120.0	3.60	3.20	7.9	0.36	1.65	0.91	1.24	0.648	566	563
	136.525	41.275	41.275	31.750	3.60	3.20	643	632	197	267	3000	3900	86.0	80.0	118.0	125.0	3.60	3.20	11.0	0.36	1.66	0.91	1.53	1.03	643	632
	146.050	41.275	39.688	25.400	3.60	3.20	H913849R.F	H913810.F	202	237	2300	3300	95.0	82.5	124.0	138.0	3.60	3.20	(4.0)	0.78	0.77	0.42	2.06	0.9	H913849R.F	H913810.F
70.000	110.000	26.000	25.000	20.500	1.00	2.50	JLM813049	JLM813010	103	158	3300	4400	78.0	77.0	98.0	105.0	1.00	2.50	(0.2)	0.49	1.23	0.68	0.590	0.300	JLM813049	JLM813010
	115.000	29.000	29.000	23.000	3.00	2.50	JM612949	JM612910	123	173	3200	4300	83.0	77.0	103.0	110.0	3.00	2.50	2.8	0.43	1.39	0.77	0.776	0.358	JM612949	JM612910
	120.000	29.794	29.007	24.237	2.00	2.00	484	472	118	161	3200	4200	80.0	77.0	108.0	113.0	2.00	2.00	4.1	0.38	1.56	0.86	0.791	0.487	484	472
71.438	117.475	30.163	30.163	23.813	3.60	3.20	33281	33462	118	179	3200	4200	85.0	79.0	104.0	112.0	3.60	3.20	2.4	0.44	1.38	0.76	0.789	0.436	33281	33462
	120.000	29.794	30.163	23.444	3.60	0.80	33281	33472	118	179	3200	4200	85.0	79.0	107.0	113.0	3.60	0.80	2.4	0.44	1.38	0.76	0.789	0.518	33281	33472
	120.000	32.545	32.545	26.195	3.60	3.20	47490R	47420	150	218	3100	4200	86.0	79.0	107.0	114.0	3.60	3.20	6.0	0.36	1.67	0.92	0.964	0.476	47490R	47420
	136.525	41.275	41.275	31.750	6.40	3.20	645	632	197	267	3000	3900	93.0	81.0	118.0	125.0	6.40	3.20	11.0	0.36	1.66	0.91	1.46	1.03	645	632
	136.525	41.275	41.275	31.750	3.60	3.20	H414249.	H414210.	241	308	2900	3800	89.0	83.3	121.0	129.0	3.60	3.20	11.0	0.36	1.67	0.92	1.80	0.788	H414249.	H414210.
	136.525	46.038	46.038	36.513	3.60	3.20	H715345	H715311	231	369	2800	3700	93.0	87.0	118.0	132.0	3.60	3.20	9.0	0.47	1.27	0.70	2.15	0.95	H715345	H715311
73.025	112.713	25.400	25.400	19.050	3.60	3.20	29685	29620	97	155	3200	4300	86.0	80.0	101.0	109.0	3.60	3.20	(0.8)	0.49	1.23	0.68	0.602	0.27	29685	29620
	117.475	30.163	30.163	23.813	3.60	3.20	33287	33462	118	179	3200	4200	87.0	80.0	104.0	112.0	3.60	3.20	2.4	0.44	1.38	0.76	0.747	0.436	33287	33462
	120.000	29.794	30.163	23.444	3.60	0.80	33287	33472	118	179	3200	4200	87.0	80.0	107.0	113.0	3.60	0.80	2.4	0.44	1.38	0.76	0.747	0.518	33287	33472
	127.000	36.513	36.170	28.575	3.60	3.20	567	563	156	226	3000	4000	88.0	81.0	112.0	120.0	3.60	3.20	7.9	0.36	1.65	0.91	1.14	0.648	567	563
	139.992	36.513	36.098	28.575	3.60	3.20	576R	572	175	262	2700	3600	90.0	83.0	125.0	133.0	3.60	3.20	5.5	0.40	1.49	0.82	1.74	0.779	576R	572
75.000	115.000	25.000	25.000	19.000	3.00	2.50	JLM714149E	JLM714110E	101	151	3100	4200	87.0	81.0	104.0	110.0	3.00	2.50	(0.5)	0.46	1.31	0.72	0.612	0.269	JLM714149E	JLM714110E
	120.000	31.000	29.500	25.000	3.00	2.50	JM714249	JM714210	145	216	3100	4100	88.0	82.9	108.0	115.0	3.00	2.50	3.0	0.44	1.35	0.74	0.846	0.43	JM714249	JM714210
	145.000	51.000	51.000	42.000	3.00	2.50	JH415647	JH415610	290	412	2700	3600	94.0	89.0	129.0	139.0	3.00	2.50	14.4	0.36	1.60	0.91	2.66	1.18	JH415647	JH415610

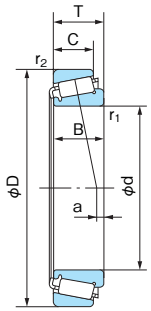
Note: (1) Minus value of load center "a" indicates that the center is located outside of cone backface.

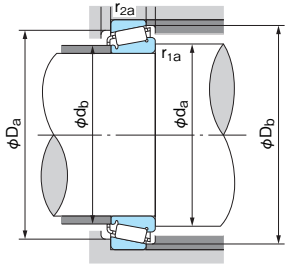
NACHI

Tapered Roller Bearings

Inch Series

Bore Diameter: 76.200～84.975mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

$Por=0.5Fr+Y_0Fa$

Por=Fr

Values Y_0 from table.

1N=0.102kgf

Boundary dimensions (mm)							Bearing No.		Basic load rating		Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)						Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference		Bearing No.	
d	D	T	B	C	r_1 (min)	r_2 (min)	Cone	Cup	Cr (kN)	Cor (kN)	Grease	Oil	da	db	Da	Db	r_{1a}	r_{2a}			Y_1	Y_0	Cone	Cup	Cone	Cup
76.200	121.442	24.608	23.012	17.463	2.00	2.00	34300	34478	90	127	3000	4000	86.0	83.0	110.0	116.0	2.00	2.00	(2.2)	0.45	1.33	0.73	0.622	0.312	34300	34478
	127.000	26.988	23.012	19.842	2.00	3.20	34300	34500	90	127	3000	4000	86.0	83.0	118.0	112.0	2.00	3.20	(2.2)	0.45	1.33	0.73	0.622	0.536	34300	34500
	127.000	30.163	31.001	22.225	6.40	3.20	42688	42620	143	225	2400	3200	96.0	84.0	114.0	121.0	6.40	3.20	3.1	0.42	1.43	0.79	1.04	0.434	42688	42620
	133.350	33.338	33.338	26.195	6.40	3.20	47678	47620	145	226	2700	3700	97.0	90.0	119.0	128.0	6.40	3.20	4.2	0.40	1.48	0.82	1.31	0.571	47678	47620
	133.350	33.338	33.338	26.195	3.60	3.20	47679	47620	145	226	2700	3700	91.0	85.0	119.0	128.0	3.60	3.20	4.2	0.40	1.48	0.82	1.32	0.571	47679	47620
	135.733	44.450	46.101	34.925	3.60	3.20	5760	5735	213	337	2800	3700	94.0	88.0	119.0	130.0	3.60	3.20	11.5	0.41	1.48	0.81	1.85	0.877	5760	5735
	136.525	30.163	29.769	22.225	3.60	3.20	495A	493	133	198	2700	3600	92.0	86.0	122.0	130.0	3.60	3.20	0.3	0.44	1.35	0.74	1.26	0.544	495A	493
	136.525	30.163	29.769	22.225	6.40	3.20	495AX	493	133	198	2700	3600	98.0	86.0	122.0	130.0	6.40	3.20	0.3	0.44	1.35	0.74	1.25	0.544	495AX	493
	139.992	36.513	36.098	28.575	3.60	3.20	575R	572	175	262	2700	3600	92.0	86.0	125.0	133.0	3.60	3.20	5.5	0.40	1.49	0.82	1.64	0.779	575R	572
	146.050	41.275	41.275	31.750	3.60	3.20	659	653	208	301	2600	3400	93.0	87.0	131.0	139.0	3.60	3.20	7.7	0.41	1.47	0.81	2.16	0.880	659	653
	152.400	41.275	41.275	31.750	3.60	3.20	659	652	208	301	2600	3400	93.0	87.0	134.0	141.0	3.60	3.20	7.7	0.41	1.47	0.81	2.16	1.25	659	652
	161.925	49.213	46.038	31.750	3.60	3.20	9285R	9220	246	286	2100	2900	103.0	90.5	138.0	153.0	3.60	3.20	(1.0)	0.71	0.85	0.47	3.01	1.38	9285R	9220
	161.925	47.625	48.260	38.100	3.60	3.20	755	752	273	391	2400	3200	95.0	88.0	144.0	150.0	3.60	3.20	12.1	0.34	1.76	0.97	3.12	1.59	755	752
77.788	117.475	25.400	25.400	19.050	3.60	3.20	LM814849	LM814810	101	166	3100	4100	91.0	85.0	105.0	113.0	3.60	3.20	(2.2)	0.51	1.18	0.65	0.619	0.295	LM814849	LM814810
	127.000	30.163	31.001	22.225	3.60	3.20	42690	42620	142	209	2400	3200	91.0	85.0	114.0	121.0	3.60	3.20	3.1	0.42	1.43	0.79	1.00	0.434	42690	42620
79.375	190.500	57.150	57.531	46.038	3.60	3.20	HH221431	HH221410	440	602	2000	2700	103.0	97.0	171.0	179.0	3.60	3.20	14.7	0.33	1.79	0.99	6.16	2.21	HH221431	HH221410
80.000	130.000	35.000	34.000	28.500	3.00	2.50	JM515649	JM515610	168	256	2800	3800	94.0	88.0	117.0	125.0	3.20	2.50	5.4	0.39	1.54	0.85	1.19	0.575	JM515649	JM515610
80.963	136.525	30.163	29.769	22.225	3.60	3.20	496	493	133	198	2700	3600	95.0	89.0	122.0	130.0	3.60	3.20	0.3	0.44	1.35	0.74	1.12	0.544	496	493
	150.089	44.450	46.673	36.513	5.20	3.20	740R	742	264	368	2500	3400	101.0	91.0	134.0	142.0	5.20	3.20	12.0	0.33	1.84	1.01	2.30	1.06	740R	742
82.550	125.413	25.400	25.400	19.845	3.60	1.60	27687	27620	101	162	2900	3800	96.0	89.0	115.0	120.0	3.60	1.60	0.7	0.42	1.44	0.79	0.710	0.344	27687	27620
	133.350	30.163	29.769	22.225	3.60	3.20	495	492A	133	198	2700	3600	97.0	90.0	120.0	128.0	3.60	3.20	0.3	0.44	1.35	0.74	1.08	0.429	495	492A
	133.350	33.338	33.338	26.195	3.60	3.20	47686	47620	145	226	2700	3700	97.0	90.0	119.0	128.0	3.60	3.20	4.2	0.40	1.48	0.82	1.12	0.571	47686	47620
	133.350	33.338	33.338	26.195	6.70	3.20	47687	47620	145	226	2700	3700	103.0	90.0	119.0	128.0	6.70	3.20	4.2	0.40	1.48	0.82	1.1	0.571	47687	47620
	133.350	39.688	39.688	32.545	3.60	3.20	HM516449	HM516410	177	306	2800	3700	99.0	92.0	118.0	128.0	3.60	3.20	7.5	0.40	1.49	0.82	1.34	0.762	HM516449	HM516410
	136.525	30.163	29.769	22.225	3.60	3.20	495	493	133	198	2700	3600	97.0	90.0	122.0	130.0	3.60	3.20	0.3	0.44	1.35	0.74	1.08	0.544	495	493
	139.992	36.513	36.098	28.575	3.60	3.20	580R	572	175	262	2700	3600	98.0	91.0	125.0	133.0	3.60	3.20	5.5	0.40	1.49	0.82	1.41	0.779	580R	572
	146.050	41.275	41.275	31.750	3.60	3.30	663	653	208	301	2600	3400	99.0	92.0	131.0	139.0	3.60	3.30	7.7	0.41	1.47	0.81	1.91	0.880	663	653
	150.089	44.450	46.673	36.513	3.60	3.20	749AR	742	264	368	2500	3400	99.0	93.0	134.0	142.0	3.60	3.20	12.0	0.33	1.84	1.01	2.23	1.06	749AR	742
	152.400	41.275	41.275	31.750	3.60	3.20	663	652	208	301	2600	3400	99.0	92.0	134.0	141.0	3.60	3.20	7.7	0.41	1.47	0.81	1.91	1.25	663	652
83.345	125.413	25.400	25.400	19.845	3.60	1.60	27690	27620	101	162	2900	3800	96.0	90.0	115.0	120.0	3.60	1.60	0.7	0.42	1.44	0.79	0.689	0.344	27690	27620
84.138	136.525	30.163	29.769	22.225	3.60	3.20	498	493	133	198	2700	3600	98.0	91.0	122.0	130.0	3.60	3.20	0.3	0.44	1.35	0.74	1.03	0.544	498	493
	152.400	41.275	41.275	31.750	3.60	3.20	664	652	208	301	2600	3400	99.0	93.0	134.0	141.0	3.60	3.20	7.7	0.41	1.47	0.81	1.84	1.25	664	652
	171.450	49.213	46.038	31.750	3.60	3.20	9385	9321	250	299	1900	2700	111.0	98.0	147.0	164.0	3.60	3.20	(5.9)	0.76	0.79	0.43	3.2	1.49	9385	9321
84.975	125.413	25.400	25.400	19.845	5.00	1.60	27695	27620	101	162	2900	3800	100.0	91.0	115.0	120.0	5.00	1.60	0.7	0.42	1.44	0.79	0.644	0.344	27695	27620

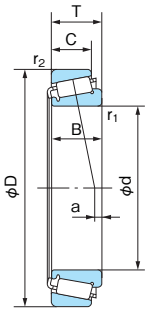
Note: (1) Minus value of load center "a" indicates that the center is located outside of cone backface.

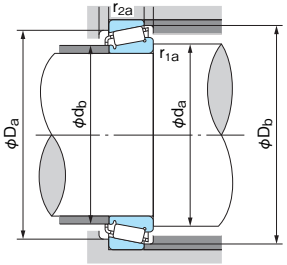
NACHI

Tapered Roller Bearings

Inch Series

Bore Diameter: 85.000～95,000mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

Por=0.5Fr+Y_0Fa

Por=Fr

Values Y_0 from table.

1N=0.102kgf

Boundary dimensions (mm)							Bearing No.		Basic load rating		Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)						Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference		Bearing No.	
d	D	T	B	C	r_1 (min)	r_2 (min)	Cone	Cup	Cr (kN)	Cor (kN)	Grease	Oil	da	db	Da	Db	r_{1a}	r_{2a}			Y_1	Y_0	Cone	Cup	Cone	Cup
	130.000	30.000	29.000	24.000	6.00	2.50	JM716648	JM716610	142	228	2800	3700	104.0	92.0	117.0	125.0	6.00	2.50	0.9	0.44	1.35	0.74	0.933	0.456	JM716648	JM716610
85.000	130.000	30.000	29.000	24.000	3.00	2.50	JM716649	JM716610	142	228	2800	3700	98.0	92.0	117.0	125.0	3.00	2.50	0.9	0.44	1.35	0.74	0.937	0.456	JM716649	JM716610
	140.000	39.000	38.000	31.500	3.00	2.50	JHM516849	JHM516810	203	308	2700	3500	100.0	93.9	125.0	134.0	3.00	2.50	6.2	0.41	1.47	0.81	1.54	0.759	JHM516849	JHM516810
85.001	188.913	53.297	52.761	31.750	3.60	3.20	90334	90744	264	336	1700	2400	116.0	112.0	161.0	179.0	3.60	3.20	(10.0)	0.87	0.69	0.38	4.63	1.87	90334	90744
	133.350	30.163	29.769	22.225	3.60	3.20	497	492A	133	198	2700	3600	99.0	93.0	120.0	128.0	3.60	3.20	0.3	0.44	1.35	0.74	0.978	0.429	497	492A
	136.525	30.163	29.769	22.225	3.60	3.20	497	493	133	198	2700	3600	99.0	93.0	122.0	130.0	3.60	3.20	0.3	0.44	1.35	0.74	0.978	0.544	497	493
	142.138	42.863	42.863	34.133	4.80	3.20	HM617049	HM617010	219	351	2600	3500	106.0	95.7	125.0	137.0	4.80	3.20	7.7	0.43	1.39	0.76	1.72	0.902	HM617049	HM617010
85.725	146.050	41.275	41.275	31.750	3.60	3.30	665	653	208	301	2600	3400	102.0	95.0	131.0	139.0	3.60	3.30	7.7	0.41	1.47	0.81	1.77	0.880	665	653
	146.050	41.275	41.275	31.750	6.40	3.30	665A	653	208	301	2600	3400	107.0	95.0	131.0	139.0	6.40	3.30	7.7	0.41	1.47	0.81	1.76	0.880	665A	653
	152.400	39.688	36.322	30.163	3.60	3.20	596	592A	183	287	2400	3300	102.0	96.0	135.0	144.0	3.60	3.20	2.6	0.44	1.36	0.75	1.83	1.04	596	592A
	161.925	47.625	48.260	38.100	3.60	3.20	758	752	273	391	2400	3200	103.0	97.0	144.0	150.0	3.60	3.20	12.1	0.34	1.76	0.97	2.67	1.59	758	752
	152.400	39.688	36.322	33.338	3.60	3.20	593	592	183	287	2400	3300	104.0	98.0	135.0	145.0	3.60	3.20	2.6	0.44	1.36	0.75	1.71	1.1	593	592
	152.400	39.688	36.322	30.163	6.40	3.20	593A	592A	183	287	2400	3300	110.0	98.0	135.0	144.0	6.40	3.20	2.6	0.44	1.36	0.75	1.7	1.04	593A	592A
	152.400	39.688	36.322	30.163	3.60	3.20	593	592A	183	287	2400	3300	104.0	98.0	135.0	144.0	3.60	3.20	2.6	0.44	1.36	0.75	1.71	1.04	593	592A
88.900	152.400	39.688	39.688	30.163	6.40	3.20	HM518445	HM518410	248	359	2400	3200	110.0	98.0	135.0	114.0	6.40	3.20	6.6	0.40	1.49	0.82	2.10	0.768	HM518445	HM518410
	161.925	47.625	48.260	38.100	3.60	3.20	759	752	273	391	2400	3200	106.0	99.0	144.0	150.0	3.60	3.20	12.1	0.34	1.76	0.97	2.50	1.59	759	752
	161.925	53.975	55.100	42.863	3.60	3.20	6580R	6535	316	471	2400	3200	109.0	98.0	141.0	154.0	3.60	3.20	12.5	0.40	1.50	0.82	3.09	1.65	6580R	6535
	168.275	53.975	56.363	41.275	3.60	3.20	850R	832	344	467	2300	3100	106.0	100.0	149.0	155.0	3.60	3.20	19.0	0.30	2.00	1.10	3.29	1.72	850R	832
89.974	146.975	40.000	40.000	32.499	7.10	3.60	HM218248	HM218210	206	310	2500	3300	112.0	99.0	133.0	141.0	7.10	3.60	9.2	0.33	1.80	0.99	1.66	0.784	HM218248	HM218210
	145.000	35.000	34.000	27.000	3.00	2.50	JM718149UR	JM718110UR	194	291	2500	3400	105.0	99.0	131.0	139.0	3.00	2.50	2.3	0.44	1.35	0.74	1.47	0.652	JM718149UR	JM718110UR
90.000	145.000	35.000	34.000	27.000	6.00	2.50	JM718149AUR	JM718110UR	194	291	2500	3400	111.0	99.0	131.0	139.0	6.00	2.50	2.3	0.44	1.35	0.74	1.46	0.652	JM718149AUR	JM718110UR
	155.000	44.000	44.000	35.500	3.00	2.50	JHM318448UR	JHM318410UR	290	407	2400	3200	106.0	100.0	140.0	148.0	3.00	2.50	10.4	0.34	1.76	0.97	2.37	1.00	JHM318448UR	JHM318410UR
	161.925	53.975	55.100	42.863	3.00	3.20	6581XR	6535	316	471	2400	3200	102.0	98.0	141.0	154.0	3.00	3.20	12.9	0.40	1.50	0.82	3.02	1.65	6581XR	6535
90.488	161.925	47.625	48.260	38.100	3.60	3.20	760	752	273	391	2400	3200	107.0	101.0	144.0	150.0	3.60	3.20	12.1	0.34	1.76	0.97	2.42	1.59	760	752
	146.050	33.338	34.925	26.195	3.60	3.20	47890R	47820	178	293	2500	3300	107.0	101.0	131.0	140.0	3.60	3.20	1.2	0.45	1.34	0.74	1.46	0.657	47890R	47820
	150.000	35.992	36.322	27.000	3.60	3.00	598	593X	183	287	2400	3300	107.0	101.0	134.0	142.0	3.60	3.00	2.6	0.44	1.36	0.75	1.58	0.763	598	593X
	150.000	35.992	36.322	27.000	6.40	3.00	598A	593X	183	287	2400	3300	113.0	101.0	134.0	142.0	6.40	3.00	2.6	0.44	1.36	0.75	1.57	0.763	598A	593X
92.075	152.400	39.688	36.322	33.338	3.60	3.20	598	592	183	287	2400	3300	107.0	101.0	135.0	145.0	3.60	3.20	2.6	0.44	1.36	0.75	1.58	1.1	598	592
	152.400	39.688	36.322	30.163	3.60	3.20	598	592A	183	287	2400	3300	107.0	101.0	135.0	144.0	3.60	3.20	2.6	0.44	1.36	0.75	1.58	1.04	598	592A
	152.400	39.688	36.322	30.163	6.40	3.20	598A	592A	183	287	2400	3300	113.0	101.0	135.0	144.0	6.40	3.20	2.6	0.44	1.36	0.75	1.57	1.04	598A	592A
	152.400	39.688	36.322	30.163	6.40	3.20	598AUR	592AUR	183	287	2400	3300	113.0	101.0	135.0	144.0	6.40	3.20	2.6	0.44	1.36	0.75	1.57	1.04	598AUR	592AUR
	168.275	41.275	41.275	30.163	3.60	3.30	681	672	224	349	2200	3000	110.0	104.0	149.0	160.0	3.60	3.30	2.6	0.47	1.28	0.70	2.61	1.22	681	672
93.663	148.430	28.575	28.971	21.433	3.00	3.00	42368	42584	143	225	2400	3200	107.0	102.0	134.0	142.0	3.00	3.00	(3.3)	0.49	1.22	0.67	1.21	0.546	42368	42584
95.000	150.000	35.000	34.000	27.000	3.00	2.50	JM719149	JM719113	187	294	2400	3300	109.0	104.0	135.0	143.0	3.00	2.50	1.5	0.44	1.36	0.75	1.43	0.766	JM719149	JM719113

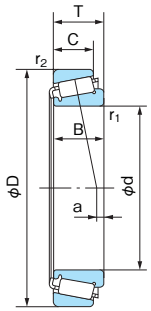
Note: (1) Minus value of load center "a" indicates that the center is located outside of cone backface.

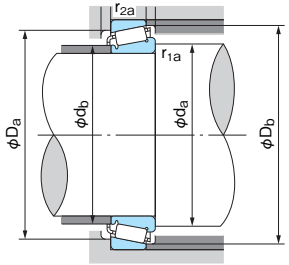
NACHI

Tapered Roller Bearings

Inch Series

Bore Diameter: 95.250～120.650mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

$Por=0.5Fr+Y_0Fa$

Por=Fr

Values Y_0 from table.

1N=0.102kgf

Boundary dimensions (mm)							Bearing No.		Basic load rating		Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)						Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference		Bearing No.	
d	D	T	B	C	r_1 (min)	r_2 (min)	Cone	Cup	Cr (kN)	Cor (kN)	Grease	Oil	da	db	Da	Db	r_{1a}	r_{2a}			Y_1	Y_0	Cone	Cup	Cone	Cup
	146.050	33.338	34.925	26.195	3.60	3.20	47896R	47820	178	293	2500	3300	110.0	103.0	131.0	140.0	3.60	3.20	1.2	0.45	1.34	0.74	1.34	0.657	47896R	47820
	149.225	31.750	28.971	24.608	3.60	3.20	42376	42587	143	225	2400	3200	109.0	103.0	98.0	104.0	3.60	3.20	(3.3)	0.49	1.22	0.67	1.15	0.702	42376	42587
	150.000	35.992	36.322	27.000	3.60	3.00	594	593X	183	287	2400	3300	110.0	104.0	134.0	142.0	3.60	3.00	2.6	0.44	1.36	0.75	1.45	0.763	594	593X
95.250	152.400	39.688	36.322	33.338	3.60	3.20	594	592	183	287	2400	3300	110.0	104.0	135.0	145.0	3.60	3.20	2.6	0.44	1.36	0.75	1.45	1.1	594	592
	152.400	39.688	36.322	30.163	3.60	3.20	594A	592A	183	287	2400	3300	110.0	104.0	135.0	144.0	3.60	3.20	2.6	0.44	1.36	0.75	1.45	1.04	594A	592A
	152.400	39.688	36.322	30.163	3.60	3.20	594	592A	183	287	2400	3300	110.0	104.0	135.0	144.0	3.60	3.20	2.6	0.44	1.36	0.75	1.45	1.04	594	592A
	168.275	41.275	41.275	30.163	3.60	3.30	683	672	224	349	2200	3000	113.0	106.0	149.0	160.0	3.60	3.30	2.6	0.47	1.28	0.70	2.46	1.22	683	672
96.838	148.430	28.575	28.971	21.433	3.60	3.00	42381	42584	143	225	2400	3200	110.0	104.0	134.0	142.0	3.60	3.00	(3.3)	0.49	1.22	0.67	1.1	0.546	42381	42584
99.975	156.975	42.000	42.000	34.000	7.90	3.60	HM220149	HM220110	245	396	2300	3100	122.9	109.0	142.0	151.0	7.90	3.60	9.6	0.33	1.80	0.99	2.04	0.862	HM220149	HM220110
	155.000	36.000	35.000	28.000	3.00	2.50	JM720249E	JM720210E	204	328	2300	3100	115.0	109.0	140.0	149.0	3.00	2.50	0.3	0.47	1.27	0.70	1.64	0.763	JM720249E	JM720210E
100.000	160.000	41.000	40.000	32.000	3.00	2.50	JHM720249	JHM720210	237	378	2300	3000	117.0	109.0	143.0	154.0	3.00	2.50	2.7	0.47	1.28	0.70	2.11	0.964	JHM720249	JHM720210
	200.000	52.761	49.213	34.925	3.60	3.20	98394X	98788	347	471	1400	1900	130.0	122.0	174.0	188.0	3.60	3.20	(1.9)	0.63	0.95	0.52	4.65	2.28	98394X	98788
100.013	157.163	36.513	36.116	26.195	3.60	3.20	52393	52618	180	288	2300	3000	116.0	109.0	142.0	152.0	3.60	3.20	0.5	0.47	1.26	0.69	1.74	0.694	52393	52618
	157.163	36.513	36.116	26.195	3.60	3.20	52400	52618	180	288	2300	3000	117.0	111.0	142.0	152.0	3.60	3.20	0.5	0.47	1.26	0.69	1.67	0.694	52400	52618
101.600	180.975	47.625	48.006	38.100	3.60	3.20	780	772	288	438	2100	2800	119.0	113.0	161.0	168.0	3.60	3.20	8.2	0.39	1.56	0.86	3.09	1.92	780	772
	190.500	57.150	57.531	46.038	7.90	3.20	HH221449	HH221410	440	602	2000	2700	131.0	115.0	171.0	179.0	7.90	3.20	14.7	0.33	1.79	0.99	4.72	2.21	HH221449	HH221410
	212.725	66.675	66.675	53.975	7.10	3.20	HH224335	HH224310	513	699	1800	2400	132.0	121.0	192.0	202.0	7.10	3.20	19.9	0.33	1.84	1.01	7.76	3.03	HH224335	HH224310
	180.975	47.625	48.006	38.100	3.60	3.20	782	772	288	438	2100	2800	122.0	116.0	161.0	168.0	3.60	3.20	8.2	0.39	1.56	0.86	2.90	1.92	782	772
104.775	180.975	47.625	48.006	38.100	6.40	3.20	786	772	288	438	2100	2800	128.0	116.0	161.0	168.0	6.40	3.20	8.2	0.39	1.56	0.86	2.88	1.92	786	772
	190.500	47.625	49.213	34.925	3.60	3.20	71412	71750	303	483	1900	2600	124.0	118.0	171.0	181.0	3.60	3.20	6.7	0.42	1.44	0.79	3.96	1.72	71412	71750
	158.750	23.020	21.438	15.875	3.60	3.20	37425	37625	104	169	2200	3000	122.0	115.0	143.0	152.0	3.60	3.20	(13.5)	0.61	0.99	0.54	0.893	0.484	37425	37625
107.950	165.100	36.513	36.513	26.988	3.60	3.20	56425R	56650	195	325	2200	2900	123.0	117.0	149.0	159.0	3.60	3.20	(2.0)	0.50	1.21	0.66	1.76	0.852	56425R	56650
	168.275	36.513	36.513	26.988	3.60	3.20	56425R	56662	195	325	2200	2900	123.0	117.0	150.0	160.0	3.60	3.20	(2.0)	0.50	1.21	0.66	1.76	1.03	56425R	56662
110.000	165.000	35.000	35.000	26.500	3.00	2.50	JM822049	JM822010	195	325	2200	2900	124.0	119.0	149.0	159.0	3.00	2.50	(3.1)	0.50	1.21	0.66	1.64	0.826	JM822049	JM822010
	180.000	47.000	46.000	38.000	3.00	2.50	JHM522649	JHM522610	306	487	2000	2700	127.0	122.0	162.0	172.0	3.00	2.50	6.4	0.41	1.48	0.81	3.08	1.49	JHM522649	JHM522610
	190.500	47.625	49.213	34.925	3.60	3.20	71450	71750	303	483	1900	2600	132.0	125.0	171.0	181.0	3.60	3.20	6.7	0.42	1.44	0.79	3.33	1.72	71450	71750
114.300	212.725	66.675	66.675	53.975	7.10	3.20	HH224346	HH224310	513	699	1800	2400	143.0	131.0	192.0	202.0	7.10	3.20	19.9	0.33	1.84	1.01	6.64	3.03	HH224346	HH224310
	212.725	66.675	66.675	53.975	7.10	3.20	938	932	450	674	1800	2400	141.0	128.0	187.0	193.0	7.10	3.20	19.1	0.33	1.84	1.01	5.96	4.07	938	932
	228.600	53.975	49.428	38.100	3.60	3.20	HM926740	HM926710	430	651	1300	1900	146.0	142.0	200.0	219.0	3.60	3.20	(14.1)	0.74	0.81	0.45	7.25	2.78	HM926740	HM926710
114.975	212.725	66.675	66.675	53.975	7.10	3.20	HH224349	HH224310	513	699	1800	2400	143.0	131.0	192.0	202.0	7.10	3.20	19.9	0.33	1.84	1.01	6.58	3.03	HH224349	HH224310
115.087	190.500	47.625	49.213	34.925	7.90	3.20	71455	71750	303	483	1900	2600	141.0	126.0	171.0	181.0	7.90	3.20	6.7	0.42	1.44	0.79	3.25	1.72	71455	71750
117.475	180.975	34.925	31.750	25.400	3.60	3.20	68462	68712	171	247	2000	2700	132.0	125.0	163.0	172.0	3.60	3.20	(5.8)	0.50	1.21	0.66	1.75	1.04	68462	68712
	206.375	47.625	47.625	34.925	3.20	3.20	795	792	326	548	1700	2300	139.0	134.0	186.0	198.0	3.20	3.20	1.9	0.46	1.31	0.72	4.53	1.88	795	792
120.650	234.950	63.500	63.500	49.213	6.40	3.20	95475	95925	523	826	1600	2100	149.0	137.0	209.0	217.0	6.40	3.20	13.6	0.37	1.62	0.89	8.34	4	95475	95925

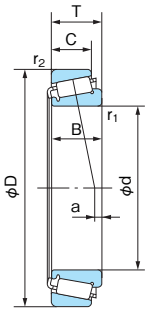
Note: (1) Minus value of load center "a" indicates that the center is located outside of cone backface.

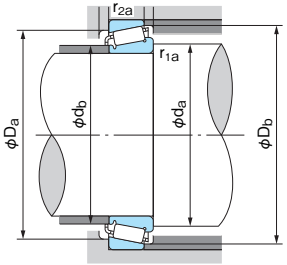
NACHI

Tapered Roller Bearings

Inch Series

Bore Diameter: 123.825～196.850mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	0	0.4	Y_1

Values e and Y_1 from table.

■Static equivalent radial load

Larger value of following to be used:

Por=0.5Fr+Y_0Fa

Por=Fr

Values Y_0 from table.

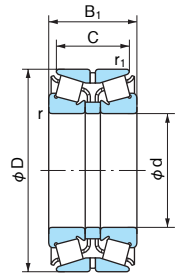
1N=0.102kgf

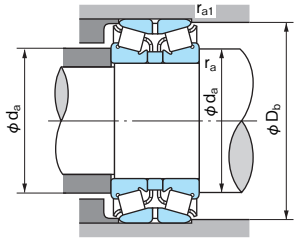
Boundary dimensions (mm)							Bearing No.		Basic load rating		Limiting speed (min^{-1})		Abutment and fillet dimensions (mm)						Load center (mm) a (1)	Constant e	Axial load factor		Mass(kg) Reference		Bearing No.	
d	D	T	B	C	r_1 (min)	r_2 (min)	Cone	Cup	Cr (kN)	Cor (kN)	Grease	Oil	da	db	Da	Db	r_{1a}	r_{2a}			Y_1	Y_0	Cone	Cup	Cone	Cup
123.825	182.563	39.688	38.100	33.338	3.60	3.20	**48286**	**48220**	227	429	1900	2500	139.0	133.0	168.0	176.0	3.60	3.20	5.6	0.31	1.97	1.08	2.3	1.13	**48286**	**48220**
125.298	228.600	53.975	49.428	38.100	3.60	3.20	**HM926745**	**HM926710**	430	651	1300	1900	154.0	143.0	200.0	219.0	3.60	3.20	(14.1)	0.74	0.81	0.45	6.46	2.78	**HM926745**	**HM926710**
	182.563	39.688	38.100	33.338	3.60	3.20	**48290**	**48220**	227	429	1700	2300	141.0	135.0	168.0	176.0	3.60	3.20	5.6	0.31	1.97	1.08	2.11	1.13	**48290**	**48220**
	196.850	46.038	46.038	38.100	3.60	3.20	**67388**	**67322**	311	561	1700	2300	144.0	138.0	180.0	189.0	3.60	3.20	6.3	0.34	1.74	0.96	3.63	1.45	**67388**	**67322**
127.000	215.900	47.625	47.625	34.925	3.60	3.20	**74500**	**74850**	322	549	1600	2200	148.0	141.0	196.0	208.0	3.60	3.20	(2.1)	0.49	1.23	0.68	4.92	1.93	**74500**	**74850**
	228.600	53.975	49.428	38.100	3.60	3.20	**HM926747**	**HM926710**	430	651	1300	1900	156.0	143.0	200.0	219.0	3.60	3.20	(14.1)	0.74	0.81	0.45	6.32	2.78	**HM926747**	**HM926710**
	254.000	77.788	82.550	61.913	9.50	6.40	**HH228349**	**HH228310**	717	1050	1500	2000	164.0	148.0	223.0	234.0	9.50	6.40	23.8	0.32	1.87	1.03	11.8	6.00	**HH228349**	**HH228310**
128.588	206.375	47.625	47.625	34.925	3.20	3.20	**799**	**792**	326	548	1700	2300	146.0	140.0	186.0	198.0	3.20	3.20	1.9	0.46	1.31	0.72	3.96	1.88	**799**	**792**
133.350	196.850	46.038	46.038	38.100	3.60	3.20	**67390**	**67322**	311	561	1700	2300	149.0	143.0	180.0	189.0	3.60	3.20	6.3	0.34	1.74	0.96	3.17	1.45	**67390**	**67322**
	215.900	47.625	47.625	34.925	3.60	3.20	**74525**	**74850**	322	549	1600	2200	152.0	146.0	196.0	208.0	3.60	3.20	(2.1)	0.49	1.23	0.68	4.44	1.93	**74525**	**74850**
136.525	190.500	39.688	39.688	33.338	3.60	3.20	**48393**	**48320**	236	472	1800	2400	151.0	144.0	177.0	184.0	3.60	3.20	3.8	0.32	1.87	1.03	2.25	1.15	**48393**	**48320**
	228.600	57.150	57.150	44.450	3.60	3.20	**898**	**892**	439	730	1600	2100	160.0	153.0	205.0	216.0	3.60	3.20	6.6	0.42	1.43	0.78	5.6	3.1	**898**	**892**
139.700	236.538	57.150	56.642	44.450	3.60	3.20	**HM231132**	**HM231110**	499	832	1500	2000	157.0	153.0	217.0	224.0	3.60	3.20	12.0	0.32	1.88	1.04	7.25	2.8	**HM231132**	**HM231110**
	254.000	66.675	66.675	47.625	7.10	3.20	**99550**	**99100**	549	913	1400	1900	170.0	156.0	227.0	238.0	7.10	3.20	11.7	0.41	1.47	0.81	10	4.19	**99550**	**99100**
142.875	193.675	28.575	28.575	23.020	1.60	1.60	**36686**	**36620**	187	375	1700	2300	153.0	151.0	182.0	188.0	1.60	1.60	(5.1)	0.37	1.63	0.90	1.71	0.715	**36686**	**36620**
	200.025	41.275	39.688	34.130	3.60	3.30	**48685**	**48620**	246	491	1700	2200	158.0	151.0	185.0	193.0	3.60	3.30	2.7	0.34	1.78	0.98	2.46	1.38	**48685**	**48620**
146.050	193.675	28.575	28.575	23.020	1.60	1.60	**36690**	**36620**	187	375	1700	2300	155.0	153.0	182.0	188.0	1.60	1.60	(5.1)	0.37	1.63	0.90	1.55	0.715	**36690**	**36620**
	236.538	57.150	56.642	44.450	3.60	3.20	**HM231140**	**HM231110**	499	832	1500	2000	164.0	160.0	217.0	224.0	3.60	3.20	12.0	0.32	1.88	1.04	6.65	2.8	**HM231140**	**HM231110**
149.225	236.538	57.150	56.642	44.450	6.40	3.20	**HM231148**	**HM231110**	499	832	1500	2000	172.0	163.0	217.0	224.0	6.40	3.20	12.0	0.32	1.88	1.04	6.3	2.8	**HM231148**	**HM231110**
158.750	225.425	41.275	39.688	33.338	3.60	3.20	**46780R**	**46720**	258	568	1400	1900	176.0	169.0	209.0	218.0	3.60	3.20	(2.7)	0.38	1.57	0.86	3.52	1.64	**46780R**	**46720**
165.100	247.650	47.625	47.625	38.100	3.60	3.20	**67780**	**67720**	346	701	1300	1800	185.0	179.0	229.0	240.0	3.60	3.20	(4.7)	0.44	1.36	0.75	5.66	2.3	**67780**	**67720**
168.275	247.650	47.625	47.625	38.100	3.60	3.20	**67782**	**67720**	346	701	1300	1800	187.0	181.0	229.0	240.0	3.60	3.20	(4.7)	0.44	1.36	0.75	5.35	2.3	**67782**	**67720**
170.000	230.000	39.000	38.000	31.000	3.00	2.50	**JHM534149**	**JHM534110**	291	558	1400	1900	184.0	178.0	217.0	224.0	3.00	2.50	(4.6)	0.38	1.57	0.86	3.17	1.29	**JHM534149**	**JHM534110**
	240.000	46.000	44.500	37.000	3.00	2.50	**JM734449**	**JM734410**	353	666	1400	1800	185.0	180.0	222.0	232.0	3.00	2.50	(4.1)	0.44	1.37	0.75	4.31	2.00	**JM734449**	**JM734410**
177.800	247.650	47.625	47.625	38.100	3.60	3.20	**67790**	**67720**	346	701	1300	1800	194.0	188.0	229.0	240.0	3.60	3.20	(4.7)	0.44	1.36	0.75	4.39	2.3	**67790**	**67720**
180.000	250.000	47.000	45.000	37.000	3.00	2.50	**JM736149**	**JM736110**	365	705	1300	1700	196.0	191.0	232.0	243.0	3.00	2.50	(8.4)	0.48	1.25	0.69	4.47	2.1	**JM736149**	**JM736110**
184.150	266.700	47.625	46.833	38.100	3.60	3.20	**67883**	**67820**	339	703	1200	1600	204.0	198.0	246.0	259.0	3.60	3.20	(10.2)	0.48	1.26	0.69	6.06	2.53	**67883**	**67820**
187.325	266.700	47.625	46.833	38.100	3.60	3.20	**67884**	**67820**	339	703	1200	1600	206.0	201.0	246.0	259.0	3.60	3.20	(10.2)	0.48	1.26	0.69	5.76	2.53	**67884**	**67820**
190.000	260.000	46.000	44.000	36.500	3.00	2.50	**JM738249**	**JM738210**	369	723	1200	1700	206.0	200.0	242.0	252.0	3.00	2.50	(10.1)	0.48	1.26	0.69	4.71	2.18	**JM738249**	**JM738210**
196.850	254.000	28.575	27.783	21.433	1.60	1.60	**L540049**	**L540010**	188	387	1200	1600	207.0	205.0	243.0	247.0	1.60	1.60	(14.6)	0.40	1.51	0.83	2.34	1.02	**L540049**	**L540010**

Note: (1) Minus value of load center "a" indicates that the center is located outside of cone backface.

Double-row Tapered Roller Bearings - Outward

Bore Diameter: 25～75mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values e, Y_1 and Y_2 from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

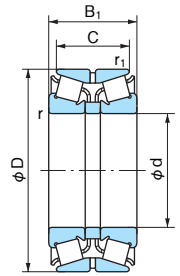
Values Y_0 from table.

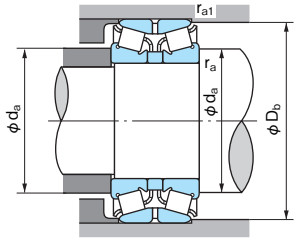
1N=0.102kgf

Boundary dimensions (mm)						Bearing No.	Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Abutment and fillet dimensions (mm)				Constant e	Axial load factor			Mass (kg)	Bearing No.
d	D	B_1	C	r (min)	r_1 (min)				da (min)	Db (min)	ra (max)	r_{a1} (max)		Y_1	Y_2	Y_0		
25	62	40	29.5	1.5	0.6	H-25KDE13	68300	84900	33.5	58.5	1.5	0.6	0.83	0.82	1.22	0.80	0.592	H-25KDE13
30	72	45	31.5	1.5	0.6	H-30KDE13	87300	110000	38.5	68	1.5	0.6	0.83	0.82	1.22	0.80	0.872	H-30KDE13
35	80	51	35.5	2	0.6	H-35KDE13	108000	138000	45	76.5	2	0.6	0.83	0.82	1.22	0.80	1.2	H-35KDE13
40	80	45	37.5	1.5	0.6	H-40KBE02	108000	138000	48.5	75	1.5	0.6	0.37	1.80	2.68	1.76	0.954	H-40KBE02
	80	55	43.5	1.5	0.6	H-40KBE22	133000	182000	48.5	75	1.5	0.6	0.37	1.80	2.68	1.76	1.19	H-40KBE22
	90	56	45.5	2	0.6	H-40KBE03	155000	202000	50	82	2	0.6	0.35	1.96	2.91	1.91	1.67	H-40KBE03
	90	56	39.5	2	0.6	H-40KDE13	138000	180000	50	86.5	2	0.6	0.83	0.82	1.22	0.80	1.67	H-40KDE13
45	85	47	37.5	1.5	0.6	H-45KBE02	115000	155000	53.5	80	1.5	0.6	0.40	1.67	2.48	1.63	1.1	H-45KBE02
	85	55	43.5	1.5	0.6	H-45KBE22	134000	188000	53.5	81	1.5	0.6	0.40	1.67	2.48	1.63	1.31	H-45KBE22
	100	60	49.5	2	0.6	45KBE03	193000	256000	55	93	2	0.6	0.35	1.96	2.91	1.91	2.2	45KBE03
	100	60	41.5	2	0.6	45KDE13	163000	214000	55	96	2	0.6	0.83	0.82	1.22	0.80	2.15	45KDE13
50	90	49	39.5	1.5	0.6	50KBE02	131000	183000	58.5	85	1.5	0.6	0.42	1.61	2.39	1.57	1.22	50KBE02
	90	55	43.5	1.5	0.6	50KBE22	146000	211000	58.5	85	1.5	0.6	0.42	1.61	2.39	1.57	1.39	50KBE22
	110	64	51.5	2	0.6	50KBE03	236000	305000	62	102	2	0.6	0.35	1.96	2.91	1.91	2.68	50KBE03
	110	64	43.5	2	0.6	50KDE13	198000	266000	62	105	2	0.6	0.83	0.82	1.22	0.80	3.11	50KDE13
55	100	51	41.5	2	0.6	55KBE02	162000	226000	65	94	2	0.6	0.40	1.67	2.48	1.63	1.6	55KBE02
	100	60	48.5	2	0.6	55KBE22	184000	266000	65	95	2	0.6	0.40	1.67	2.48	1.63	1.87	55KBE22
	120	70	57	2	0.6	55KBE03	256000	341000	67	111	2	0.6	0.35	1.96	2.91	1.91	3.57	55KBE03
	120	70	49	2	0.6	55KDE13	221000	297000	67	113	2	0.6	0.83	0.82	1.22	0.80	3.54	55KDE13
60	110	53	43.5	2	0.6	60KBE02	182000	254000	70	103	2	0.6	0.40	1.67	2.48	1.63	2.04	60KBE02
	110	66	54.5	2	0.6	60KBE22	226000	334000	70	104	2	0.6	0.40	1.67	2.48	1.63	2.57	60KBE22
	130	74	59	2.5	1	60KBE03	297000	401000	74	120	2.5	1	0.35	1.96	2.91	1.91	4.46	60KBE03
	130	74	51	2.5	1	60KDE13	262000	359000	74	124	2.5	1	0.83	0.82	1.22	0.8	4.45	60KDE13
65	120	56	46.5	2	0.6	65KBE02	220000	311000	75	113	2	0.6	0.40	1.67	2.48	1.63	2.84	65KBE02
	120	73	61.5	2	0.6	65KBE22	270000	406000	75	115	2	0.6	0.40	1.67	2.48	1.63	3.4	65KBE22
	140	79	63	2.5	1	65KBE03	349000	478000	79	130	2.5	1	0.35	1.96	2.91	1.91	5.51	65KBE03
	140	79	53	2.5	1	65KDE13	302000	417000	79	133	2.5	1	0.83	0.82	1.22	0.80	5.3	65KDE13
70	125	59	48.5	2	0.6	70KBE02	236000	346000	80	118	2	0.6	0.42	1.61	2.39	1.57	2.87	70KBE02
	125	74	61.5	2	0.6	70KBE22	290000	450000	80	119	2	0.6	0.42	1.61	2.39	1.57	3.7	70KBE22
	150	83	67	2.5	1	70KBE03	394000	546000	84	140	2.5	1	0.35	1.96	2.91	1.91	6.65	70KBE03
	150	83	57	2.5	1	70KDE13	338000	470000	84	142	2.5	1	0.83	0.82	1.22	0.8	6.48	70KDE13
75	130	62	51.5	2	0.6	75KBE02	244000	362000	85	124	2	0.6	0.44	1.55	2.31	1.52	3.12	75KBE02
	130	74	61.5	2	0.6	75KBE22	298000	469000	85	125	2	0.6	0.44	1.55	2.31	1.52	3.85	75KBE22
	160	87	69	2.5	1	75KBE03	429000	594000	89	149	2.5	1	0.35	1.96	2.91	1.91	7.8	75KBE03

Double-row Tapered Roller Bearings - Outward

Bore Diameter: 80～120mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values e, Y_1 and Y_2 from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

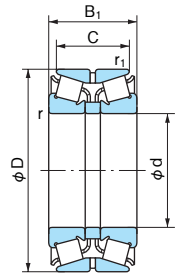
Values Y_0 from table.

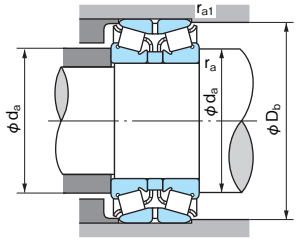
1N=0.102kgf

Boundary dimensions (mm)						Bearing No.	Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)		Abutment and fillet dimensions (mm)				Constant e	Axial load factor			Mass (kg)	Bearing No.
d	D	B_1	C	r (min)	r_1 (min)					da (min)	Db (min)	ra (max)	r_{a1} (max)		Y_1	Y_2	Y_0		
80	140	64	51.5	2	0.6	**80KBE02**	277000	405000		92	132	2	0.6	0.42	1.61	2.39	1.57	3.76	**80KBE02**
	140	78	63.5	2	0.6	**80KBE22**	347000	542000		92	134	2	0.6	0.42	1.61	2.39	1.57	4.71	**80KBE22**
	170	92	73	2.5	1	**80KBE03**	504000	711000		94	159	2.5	1	0.35	1.96	2.91	1.91	9.44	**80KBE03**
85	150	70	57	2	0.6	**85KBE02**	313000	463000		97	141	2	0.6	0.42	1.61	2.39	1.57	4.79	**85KBE02**
	150	86	69	2	0.6	**85KBE22**	398000	630000		97	142	2	0.6	0.42	1.61	2.39	1.57	6.05	**85KBE22**
	180	98	77	3	1	**85KBE03**	522000	733000		103	167	3	1	0.35	1.96	2.91	1.91	11	**85KBE03**
90	160	74	61	2	0.6	**90KBE02**	350000	522000		102	150	2	0.6	0.42	1.61	2.39	1.57	5.85	**90KBE02**
	160	94	77	2	0.6	**90KBE22**	451000	724000		102	152	2	0.6	0.42	1.61	2.39	1.57	7.53	**90KBE22**
	190	102	81	3	1	**90KBE03**	576000	812000		108	177	3	1	0.35	1.96	2.91	1.91	13	**90KBE03**
95	170	78	63	2.5	1	**95KBE02**	396000	598000		109	159	2.5	1	0.42	1.61	2.39	1.57	7.01	**95KBE02**
	170	100	83	2.5	1	**95KBE22**	533000	877000		109	161	2.5	1	0.42	1.61	2.39	1.57	9.25	**95KBE22**
	200	108	85	3	1	**95KBE03**	543000	736000		113	186	3	1	0.35	1.96	2.91	1.91	14.8	**95KBE03**
100	180	83	67	2.5	1	**100KBE02**	443000	676000		114	168	2.5	1	0.42	1.61	2.39	1.57	8.33	**100KBE02**
	180	107	87	2.5	1	**100KBE22**	596000	990000		114	171	2.5	1	0.42	1.61	2.39	1.57	11.1	**100KBE22**
	215	112	87	3	1	**100KBE03**	589000	798000		118	200	3	1	0.35	1.96	2.91	1.91	18.1	**100KBE03**
105	190	88	70	2.5	1	**105KBE02**	494000	761000		119	178	2.5	1	0.42	1.61	2.39	1.57	9.87	**105KBE02**
	190	115	95	2.5	1	**105KBE22**	672000	1130000		119	180	2.5	1	0.42	1.61	2.39	1.57	13.5	**105KBE22**
	225	116	91	3	1	**105KBE03**	636000	864000		123	209	3	1	0.35	1.96	2.91	1.91	20.7	**105KBE03**
110	180	70	56	2.5	0.6	**110KBE031**	324000	533000		122	168	2	0.6	0.35	1.92	2.86	1.88	6.43	**110KBE031**
	180	56	50	2.5	0.6	**110KBE131**	245000	388000		122	168	2	0.6	0.35	1.95	2.90	1.91	5.13	**110KBE131**
	200	92	74	2.5	1	**110KBE02**	556000	868000		124	188	2.5	1	0.42	1.61	2.39	1.57	11.6	**110KBE02**
	200	121	101	2.5	1	**110KBE22**	750000	1280000		124	190	2.5	1	0.42	1.61	2.39	1.57	15.9	**110KBE22**
	240	118	93	3	1	**110KBE03**	824000	1180000		128	222	3	1	0.35	1.96	2.91	1.91	23.8	**110KBE03**
120	180	58	46	2.5	0.6	**120KBE030**	247000	460000		132	169	2	0.6	0.35	1.95	2.90	1.91	4.66	**120KBE030**
	180	46	41	2.5	0.6	**120KBE130**	185000	317000		132	170	2	0.6	0.35	1.95	2.90	1.91	3.81	**120KBE130**
	200	78	62	2.5	0.6	**120KBE031**	387000	672000		132	185	2	0.6	0.35	1.95	2.90	1.91	9.14	**120KBE031**
	200	62	55	2.5	0.6	**120KBE131**	292000	470000		132	184	2	0.6	0.35	1.95	2.90	1.91	7.28	**120KBE131**
	215	97	78	2.5	1	**120KBE02**	595000	945000		134	203	2.5	1	0.44	1.55	2.31	1.52	13.9	**120KBE02**
	215	132	109	2.5	1	**120KBE22**	806000	1380000		134	204	2.5	1	0.44	1.55	2.31	1.52	19.8	**120KBE22**
	260	128	101	3	1	**120KBE03**	864000	1220000		138	239	3	1	0.35	1.96	2.91	1.91	30.6	**120KBE03**

Double-row Tapered Roller Bearings - Outward

Bore Diameter: 130～170mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values e, Y_1 and Y_2 from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

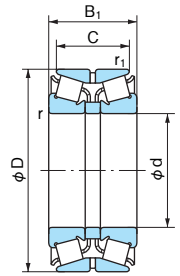
Values Y_0 from table.

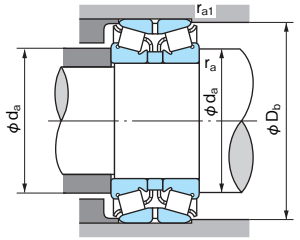
1N=0.102kgf

Boundary dimensions (mm)						Bearing No.	Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Abutment and fillet dimensions (mm)				Constant e	Axial load factor			Mass (kg)	Bearing No.
d	D	B_1	C	r (min)	r_1 (min)				da (min)	Db (min)	ra (max)	r_{a1} (max)		Y_1	Y_2	Y_0		
130	200	65	52	2.5	0.6	**130KBE030**	319000	618000	142	185	2	0.6	0.35	1.95	2.90	1.91	7.06	**130KBE030**
	200	52	46	2.5	0.6	**130KBE130**	239000	425000	142	187	2	0.6	0.35	1.95	2.90	1.91	5.57	**130KBE130**
	210	80	64	2.5	0.6	**130KBE031**	424000	723000	142	198	2	0.6	0.36	1.87	2.79	1.83	9.57	**130KBE031**
	210	64	57	2.5	0.6	**130KBE131**	322000	535000	142	196	2	0.6	0.36	1.87	2.79	1.83	7.81	**130KBE131**
	230	98	78.5	3	1	**130KBE02**	646000	1020000	148	218	3	1	0.44	1.55	2.31	1.52	15.7	**130KBE02**
	230	145	117.5	3	1	**130KBE22**	949000	1660000	148	219	3	1	0.44	1.55	2.31	1.52	24.1	**130KBE22**
	280	137	107.5	4	1.5	**130KBE03**	965000	1370000	152	255	4	1.5	0.35	1.96	2.91	1.91	38.1	**130KBE03**
140	210	66	53	2.5	0.6	**140KBE030**	360000	639000	152	199	2	0.6	0.47	1.43	2.12	1.40	7.18	**140KBE030**
	210	53	47	2.5	0.6	**140KBE130**	239000	404000	152	196	2	0.6	0.33	2.03	3.02	1.98	5.85	**140KBE130**
	225	85	68	3	1	**140KBE031**	475000	836000	154	212	2.5	1	0.35	1.95	2.90	1.91	11.8	**140KBE031**
	225	68	61	3	1	**140KBE131**	360000	564000	154	210	2.5	1	0.35	1.95	2.90	1.91	9.58	**140KBE131**
	250	102	82.5	3	1	**140KBE02**	694000	1080000	158	237	3	1	0.44	1.55	2.31	1.52	19.7	**140KBE02**
	250	153	125.5	3	1	**140KBE22**	1090000	1920000	158	238	3	1	0.44	1.55	2.31	1.52	30.2	**140KBE22**
	300	145	115.5	4	1.5	**140KBE03**	1070000	1520000	162	273	4	1.5	0.35	1.96	2.91	1.91	46.6	**140KBE03**
150	225	70	56	3	1	**150KBE030**	377000	703000	164	213	2.5	1	0.33	2.03	3.02	1.98	8.82	**150KBE030**
	225	56	50	3	1	**150KBE130**	278000	476000	164	213	2.5	1	0.33	2.03	3.02	1.98	7.09	**150KBE130**
	250	100	80	3	1	**150KBE031**	595000	1070000	164	234	2.5	1	0.35	1.95	2.90	1.91	17.6	**150KBE031**
	250	80	71	3	1	**150KBE131**	467000	786000	164	233	2.5	1	0.35	1.95	2.90	1.91	14.6	**150KBE131**
	270	109	87	3	1	**150KBE02**	799000	1250000	168	255	3	1	0.44	1.55	2.31	1.52	24.6	**150KBE02**
	270	164	130	3	1	**150KBE22**	1210000	2130000	168	254	3	1	0.44	1.55	2.31	1.52	38	**150KBE22**
	320	154	120	4	1.5	**150KBE03**	1230000	1920000	172	292	4	1.5	0.35	1.96	2.91	1.91	56	**150KBE03**
160	240	75	60	3	1	**160KBE030**	406000	756000	174	226	2.5	1	0.33	2.03	3.02	1.98	10.6	**160KBE030**
	240	60	53	3	1	**160KBE130**	324000	565000	174	228	2.5	1	0.33	2.03	3.02	1.98	8.71	**160KBE130**
	270	108	86	3	1	**160KBE031**	727000	1270000	174	252	2.5	1	0.35	1.95	2.90	1.91	23.1	**160KBE031**
	270	86	76	3	1	**160KBE131**	592000	950000	174	252	2.5	1	0.35	1.95	2.90	1.91	18.8	**160KBE131**
	290	115	91	3	1	**160KBE02**	827000	1270000	178	269	3	1	0.44	1.55	2.31	1.52	29.9	**160KBE02**
	290	178	144	3	1	**160KBE22**	1360000	2420000	178	274	3	1	0.44	1.55	2.31	1.52	47.6	**160KBE22**
170	260	84	67	3	1	**170KBE030**	502000	969000	184	244	2.5	1	0.33	2.03	3.02	1.98	14.7	**170KBE030**
	260	67	60	3	1	**170KBE130**	382000	642000	184	243	2.5	1	0.33	2.03	3.02	1.98	11.4	**170KBE130**
	280	110	88	3	1	**170KBE031**	776000	1390000	184	260	2.5	1	0.33	2.06	3.06	2.01	24.7	**170KBE031**
	280	88	78	3	1	**170KBE131**	599000	1050000	184	263	2.5	1	0.33	2.06	3.06	2.01	19.8	**170KBE131**
	310	125	97	4	1.5	**170KBE02**	932000	1450000	192	288	4	1.5	0.44	1.55	2.31	1.52	37.5	**170KBE02**
	310	192	152	4	1.5	**170KBE22**	1540000	2760000	192	294	4	1.5	0.44	1.55	2.31	1.52	58.8	**170KBE22**

Double-row Tapered Roller Bearings - Outward

Bore Diameter: 180～280mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values e, Y_1 and Y_2 from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

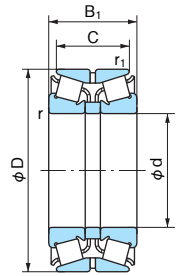
Values Y_0 from table.

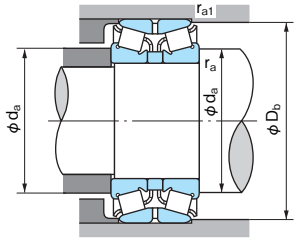
1N=0.102kgf

Boundary dimensions (mm)						Bearing No.	Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Abutment and fillet dimensions (mm)				Constant e	Axial load factor			Mass (kg)	Bearing No.
d	D	B_1	C	r (min)	r_1 (min)				da (min)	Db (min)	ra (max)	r_{a1} (max)		Y_1	Y_2	Y_0		
180	280	93	74	3	1	**180KBE030**	584000	1080000	194	261	2.5	1	0.33	2.03	3.02	1.98	19.0	**180KBE030**
	280	74	66	3	1	**180KBE130**	464000	801000	194	263	2.5	1	0.33	2.03	3.02	1.98	15.5	**180KBE130**
	300	120	96	4	1.5	**180KBE031**	894000	1630000	198	279	3	1.5	0.33	2.06	3.06	2.01	31.3	**180KBE031**
	300	96	85	4	1.5	**180KBE131**	693000	1240000	198	277	3	1.5	0.33	2.06	3.06	2.01	25.8	**180KBE131**
	320	127	99	4	1.5	**180KBE02**	1060000	1470000	202	297	4	1.5	0.45	1.5	2.23	1.47	40.1	**180KBE02**
	320	192	152	4	1.5	**180KBE22**	1640000	3030000	202	303	4	1.5	0.45	1.5	2.23	1.47	62.5	**180KBE22**
190	290	94	75	3	1	**190KBE030**	632000	1170000	204	274	2.5	1	0.33	2.03	3.02	1.98	20.0	**190KBE030**
	290	75	67	3	1	**190KBE130**	487000	866000	204	272	2.5	1	0.32	2.12	3.15	2.07	16.5	**190KBE130**
	320	130	104	4	1.5	**190KBE031**	1020000	1860000	208	298	3	1.5	0.35	1.95	2.90	1.91	39.0	**190KBE031**
	320	104	92	4	1.5	**190KBE131**	808000	1450000	208	298	3	1.5	0.35	1.95	2.90	1.91	31.9	**190KBE131**
	340	133	105	4	1.5	**190KBE02**	1250000	2060000	212	318	4	1.5	0.44	1.55	2.31	1.52	47.8	**190KBE02**
	340	204	160	4	1.5	**190KBE22**	1870000	3480000	212	323	4	1.5	0.44	1.55	2.31	1.52	75.1	**190KBE22**
200	310	103	82	3	1	**200KBE030**	713000	1380000	212	295	2.5	1	0.33	2.03	3.02	1.98	24.5	**200KBE030**
	310	82	73	3	1	**200KBE130**	572000	1040000	214	288	2.5	1	0.32	2.12	3.15	2.07	21.4	**200KBE130**
	340	140	112	4	1.5	**200KBE031**	1110000	2040000	218	319	3	1.5	0.35	1.95	2.90	1.91	48.2	**200KBE031**
	340	112	100	4	1.5	**200KBE131**	939000	1580000	218	316	3	1.5	0.35	1.95	2.90	1.91	39.6	**200KBE131**
	360	142	110	4	1.5	**200KBE02**	1360000	2240000	222	336	4	1.5	0.44	1.55	2.31	1.52	56.5	**200KBE02**
	360	218	174	4	1.5	**200KBE22**	2130000	3760000	222	340	4	1.5	0.41	1.66	2.47	1.62	88.2	**200KBE22**
220	340	113	90	4	1.5	**220KBE030**	832000	1620000	238	319	3	1.5	0.32	2.12	3.15	2.07	34.2	**220KBE030**
	340	90	80	4	1.5	**220KBE130**	677000	1240000	238	318	3	1.5	0.32	2.12	3.15	2.07	27.8	**220KBE130**
	370	150	120	5	1.5	**220KBE031**	1330000	2470000	242	343	4	1.5	0.35	1.95	2.90	1.91	60.1	**220KBE031**
	370	120	107	5	1.5	**220KBE131**	1070000	1810000	242	346	4	1.5	0.35	1.95	2.90	1.91	49.1	**220KBE131**
240	360	115	92	4	1.5	**240KBE030**	990000	1980000	258	341	3	1.5	0.32	2.12	3.15	2.07	36.9	**240KBE030**
	360	92	82	4	1.5	**240KBE130**	768000	1430000	258	338	3	1.5	0.32	2.12	3.15	2.07	29.6	**240KBE130**
	400	160	128	5	1.5	**240KBE031**	1540000	3060000	262	373	4	1.5	0.35	1.95	2.90	1.91	76.2	**240KBE031**
	400	128	114	5	1.5	**240KBE131**	1190000	2180000	262	377	4	1.5	0.35	1.95	2.90	1.91	59.0	**240KBE131**
260	400	130	104	5	1.5	**260KBE030**	1210000	2480000	282	376	4	1.5	0.32	2.12	3.15	2.07	54.8	**260KBE030**
	400	104	92	5	1.5	**260KBE130**	935000	1830000	282	373	4	1.5	0.33	2.03	3.02	1.98	44.6	**260KBE130**
	440	180	144	5	1.5	**260KBE031**	2010000	3960000	282	409	4	1.5	0.35	1.95	2.90	1.91	105	**260KBE031**
	440	144	128	5	1.5	**260KBE131**	1510000	2880000	282	410	4	1.5	0.35	1.95	2.90	1.91	83.8	**260KBE131**
280	420	133	106	5	1.5	**280KBE030**	1250000	2610000	302	394	4	1.5	0.33	2.03	3.02	1.98	58.9	**280KBE030**
	420	106	94	5	1.5	**280KBE130**	1010000	1970000	302	395	4	1.5	0.33	2.03	3.02	1.98	46.9	**280KBE130**
	460	183	146	6	2	**280KBE031**	2040000	3940000	308	434	5	2	0.35	1.95	2.90	1.91	111	**280KBE031**
	460	146	130	6	2	**280KBE131**	1550000	2930000	308	430	5	2	0.35	1.95	2.90	1.91	90.0	**280KBE131**

Double-row Tapered Roller Bearings - Outward

Bore Diameter: 300～460mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values e, Y_1 and Y_2 from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

Values Y_0 from table.

1N=0.102kgf

Boundary dimensions (mm)						Bearing No.	Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Abutment and fillet dimensions (mm)				Constant e	Axial load factor			Mass (kg)	Bearing No.
d	D	B_1	C	r (min)	r_1 (min)				da (min)	Db (min)	ra (max)	r_{a1} (max)		Y_1	Y_2	Y_0		
300	460	148	118	5	1.5	**300KBE030**	1630000	3230000	322	433	4	1.5	0.32	2.12	3.15	2.07	80.2	**300KBE030**
	460	118	105	5	1.5	**300KBE130**	1290000	2400000	322	436	4	1.5	0.32	2.12	3.15	2.07	64.6	**300KBE130**
	500	200	160	6	2	**300KBE031**	2270000	4630000	328	466	5	2	0.35	1.95	2.90	1.91	144	**300KBE031**
	500	160	142	6	2	**300KBE131**	1980000	3540000	328	469	5	2	0.35	1.95	2.90	1.91	116	**300KBE131**
320	480	151	121	5	1.5	**320KBE030**	1650000	3410000	342	452	4	1.5	0.32	2.12	3.15	2.07	87.7	**320KBE030**
	480	121	108	5	1.5	**320KBE130**	1430000	2700000	342	452	4	1.5	0.32	2.12	3.15	2.07	71.6	**320KBE130**
	540	220	176	6	2	**320KBE031**	2610000	5390000	348	497	5	2	0.35	1.95	2.90	1.91	190	**320KBE031**
	540	176	157	6	2	**320KBE131**	2440000	4570000	348	502	5	2	0.35	1.95	2.90	1.91	154	**320KBE131**
340	520	165	133	6	2	**340KBE030**	1930000	4060000	368	491	5	2	0.32	2.12	3.15	2.07	117	**340KBE030**
	520	133	118	6	2	**340KBE130**	1550000	3070000	368	489	5	2	0.32	2.12	3.15	2.07	95.3	**340KBE130**
	580	238	190	6	2	**340KBE031**	3160000	6340000	368	543	5	2	0.35	1.95	2.90	1.91	244	**340KBE031**
	580	190	169	6	2	**340KBE131**	2540000	4620000	368	539	5	2	0.35	1.95	2.90	1.91	198	**340KBE131**
360	540	169	134	6	2	**360KBE030**	2020000	4230000	388	512	5	2	0.32	2.12	3.15	2.07	124	**360KBE030**
	540	134	120	6	2	**360KBE130**	1660000	3290000	388	510	5	2	0.32	2.12	3.15	2.07	93.0	**360KBE130**
	600	240	192	6	2	**360KBE031**	3660000	7230000	388	568	5	2	0.39	1.74	2.59	1.70	254	**360KBE031**
	600	192	171	6	2	**360KBE131**	2680000	4880000	388	557	5	2	0.35	1.94	2.90	1.91	206	**360KBE131**
380	560	171	135	6	2	**380KBE030**	2240000	4670000	408	531	5	2	0.39	1.74	2.59	1.70	129	**380KBE030**
	560	135	122	6	2	**380KBE130**	1740000	3560000	408	530	5	2	0.32	2.12	3.15	2.07	100	**380KBE130**
	620	243	194	6	2	**380KBE031**	3490000	7360000	408	578	5	2	0.35	1.95	2.59	1.91	265	**380KBE031**
	620	194	173	6	2	**380KBE131**	2870000	5220000	408	582	5	2	0.39	1.74	2.90	1.71	215	**380KBE131**
400	600	185	148	6	2	**400KBE030**	2420000	5150000	428	563	5	2	0.32	2.12	3.15	2.07	167	**400KBE030**
	600	148	132	6	2	**400KBE130**	1870000	3720000	428	560	5	2	0.32	2.12	3.15	2.07	135	**400KBE130**
	650	250	200	6	3	**400KBE031**	4060000	8850000	428	610	5	2.5	0.35	1.95	2.90	1.91	306	**400KBE031**
	650	200	178	6	3	**400KBE131**	2980000	5920000	428	605	5	2.5	0.35	1.95	2.90	1.91	243	**400KBE131**
420	620	188	150	6	2	**420KBE030**	2700000	5660000	448	589	5	2	0.39	1.74	2.59	1.70	176	**420KBE030**
	620	150	134	6	2	**420KBE130**	2010000	4130000	448	590	5	2	0.33	2.03	3.02	1.98	142	**420KBE130**
	700	280	224	6	3	**420KBE031**	4810000	9620000	448	659	5	2.5	0.39	1.74	2.59	1.70	400	**420KBE031**
	700	224	200	6	3	**420KBE131**	3700000	6880000	448	659	5	2.5	0.39	1.74	2.59	1.70	325	**420KBE131**
440	650	196	157	6	3	**440KBE030**	3000000	6370000	468	620	5	2.5	0.39	1.74	2.59	1.70	198	**440KBE030**
	650	157	140	6	3	**440KBE130**	2260000	4430000	468	622	5	2.5	0.33	2.03	3.02	1.98	156	**440KBE130**
	720	283	226	6	3	**440KBE031**	4940000	10100000	468	679	5	2.5	0.40	1.68	2.51	1.65	418	**440KBE031**
460	680	204	163	6	3	**460KBE030**	3220000	6850000	488	646	5	2.5	0.39	1.74	2.59	1.70	232	**460KBE030**
	680	163	145	6	3	**460KBE130**	2500000	5340000	488	637	5	2.5	0.37	1.83	2.72	1.78	196	**460KBE130**
	760	300	240	7.5	4	**460KBE031**	5680000	11600000	496	718	6	3	0.39	1.74	2.59	1.70	506	**460KBE031**

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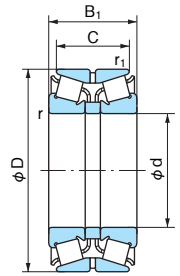
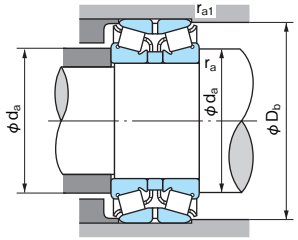
Double-row Tapered Roller Bearings - Outward

Bore Diameter: 480～500mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values e, Y_1 and Y_2 from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

Values Y_0 from table.

1N=0.102kgf

Boundary dimensions (mm)						Bearing No.	Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)		Abutment and fillet dimensions (mm)				Constant e	Axial load factor			Mass (kg)	Bearing No.
d	D	B_1	C	r (min)	r_1 (min)					da (min)	Db (min)	ra (max)	r_{a1} (max)		Y_1	Y_2	Y_0		
480	700	206	165	6	3	**480KBE030**	3220000	7230000		508	672	5	2.5	0.33	2.03	3.02	1.98	240	**480KBE030**
	700	165	147	6	3	**480KBE130**	2530000	5300000		508	666	5	2.5	0.33	2.03	3.02	1.98	186	**480KBE130**
	790	310	248	7.5	4	**480KBE031**	5990000	12400000		516	749	6	3	0.39	1.74	2.59	1.70	560	**480KBE031**
	790	248	221	7.5	4	**480KBE131**	4640000	8920000		516	742	6	3	0.39	1.74	2.59	1.70	457	**480KBE131**
500	720	209	167	6	3	**500KBE030**	3500000	7850000		528	690	5	2.5	0.42	1.62	2.41	1.58	258	**500KBE030**
	720	167	149	6	3	**500KBE130**	2580000	5690000		528	679	5	2.5	0.40	1.71	2.54	1.67	210	**500KBE130**
	830	264	235	7.5	4	**500KBE131**	5220000	10900000		536	776	6	3	0.39	1.74	2.59	1.70	559	**500KBE131**

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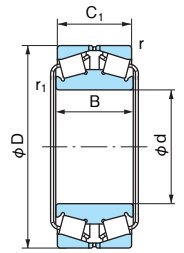
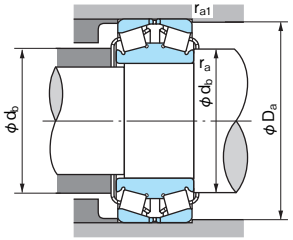
Double-row Tapered Roller Bearings - Inward

Bore Diameter: 110～360mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values e, Y_1, and Y_2 from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

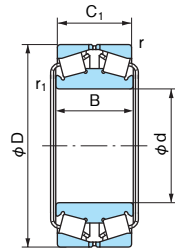
Values Y_0 from table.

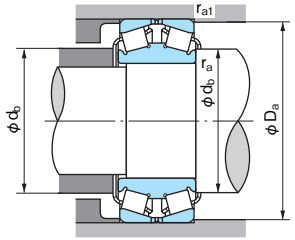
1N=0.102kgf

Boundary dimensions (mm)						Bearing No.	Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)		Abutment and fillet dimensions (mm)				Constant e	Axial load factor			Mass (kg)	Bearing No.
d	D	B	C_1	r (min)	r_1 (min)					db (min)	Da (min)	ra (max)	r_{a1} (max)		Y_1	Y_2	Y_0		
110	180	56	56	2	2.5	110KBD031	300000	505000		128	160	2	2	0.35	1.95	2.90	1.91	5.40	110KBD031
120	180	46	46	2	2.5	120KBD030	229000	424000		138	163	2	2	0.26	2.55	3.80	2.50	4.08	120KBD030
	200	62	62	2	2.5	120KBD031	353000	598000		142	178	2	2	0.35	1.95	2.90	1.91	7.92	120KBD031
130	200	52	52	2	2.5	130KBD030	300000	548000		152	179	2	2	0.27	2.47	3.67	2.41	5.96	130KBD030
	210	64	64	2	2.5	130KBD031	412000	657000		153	185	2	2	0.36	1.87	2.79	1.83	8.41	130KBD031
140	210	53	53	2	2.5	140KBD030	311000	564000		159	188	2	2	0.27	2.47	3.67	2.41	6.45	140KBD030
	225	68	68	2.5	3	140KBD031	486000	807000		160	210	2	2.5	0.40	1.68	2.50	1.64	10.0	140KBD031
150	225	56	56	2.5	3	150KBD030	355000	686000		174	203	2	2.5	0.26	2.55	3.80	2.50	7.78	150KBD030
	250	80	80	2.5	3	150KBD031	593000	955000		179	220	2	2.5	0.35	1.95	2.90	1.91	15.5	150KBD031
160	240	60	60	2.5	3	160KBD030	421000	705000		184	217	2	2.5	0.24	2.79	4.15	2.73	9.22	160KBD030
	270	86	86	2.5	3	160KBD031	678000	1100000		193	237	2	2.5	0.35	1.95	2.90	1.91	19.8	160KBD031
170	260	67	67	2.5	3	170KBD030	521000	956000		195	233	2	2.5	0.31	2.21	3.29	2.16	12.4	170KBD030
	280	88	88	2.5	3	170KBD031	723000	1210000		201	247	2	2.5	0.33	2.03	3.02	1.98	21.6	170KBD031
180	280	74	74	2.5	3	180KBD030	575000	1050000		208	250	2	2.5	0.28	2.43	3.61	2.37	16.8	180KBD030
	300	96	96	3	4	180KBD031	860000	1370000		210	263	2.5	3	0.35	1.95	2.90	1.91	26.5	180KBD031
190	290	75	75	2.5	3	190KBD030	599000	1130000		219	260	2	2.5	0.26	2.55	3.80	2.50	17.7	190KBD030
	320	104	104	3	4	190KBD031	981000	1590000		224	280	2.5	3	0.35	1.95	2.90	1.91	34.0	190KBD031
200	310	82	82	2.5	3	200KBD030	728000	1410000		234	280	2	2.5	0.26	2.55	3.80	2.50	22.9	200KBD030
	340	112	112	3	4	200KBD031	1080000	1840000		244	300	2.5	3	0.35	1.95	2.90	1.91	41.9	200KBD031
220	340	90	90	3	4	220KBD030	804000	1460000		259	306	2.5	3	0.28	2.43	3.61	2.37	28.5	220KBD030
	370	120	120	4	5	220KBD031	1210000	2060000		263	324	3	4	0.35	1.95	2.90	1.91	50.8	220KBD031
240	360	92	90	3	4	240KBD030	915000	1790000		271	325	2.5	3	0.32	2.12	3.15	2.07	32.2	240KBD030
	400	128	128	4	5	240KBD031	1430000	2470000		286	354	3	4	0.35	1.95	2.90	1.91	65.4	240KBD031
260	400	104	104	4	5	260KBD030	1140000	2120000		302	360	3	4	0.25	2.74	4.08	2.68	48.1	260KBD030
	440	144	144	4	5	260KBD031	1890000	3440000		313	386	3	4	0.35	1.95	2.90	1.91	92.2	260KBD031
280	420	106	106	4	5	280KBD030	1190000	2470000		321	370	3	4	0.25	2.69	4.00	2.63	51.9	280KBD030
300	460	118	118	4	5	300KBD030	1610000	3150000		350	418	3	4	0.25	2.74	4.08	2.68	78.5	300KBD030
	500	160	160	5	6	300KBD031	2120000	4240000		356	440	4	5	0.35	1.95	2.90	1.91	129	300KBD031
320	480	121	121	4	5	320KBD030	1630000	3180000		368	434	3	4	0.26	2.55	3.80	2.50	77.8	320KBD030
	540	176	176	5	6	320KBD031	2690000	5280000		378	474	4	5	0.32	2.12	3.15	2.07	167	320KBD031
340	580	190	190	5	6	340KBD031	3290000	5470000		401	515	4	5	0.32	2.12	3.15	2.07	202	340KBD031
360	540	134	134	5	6	360KBD030	2050000	3910000		408	488	4	5	0.32	2.12	3.15	2.06	101	360KBD030
	600	192	192	5	6	360KBD031	3360000	6750000		419	528	4	5	0.32	2.12	3.15	2.06	228	360KBD031

Double-row Tapered Roller Bearings - Inward

Bore Diameter: 380～500mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values e, Y_1, and Y_2 from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

Values Y_0 from table.

1N=0.102kgf

Boundary dimensions (mm)						Bearing No.	Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)		Abutment and fillet dimensions (mm)				Constant e	Axial load factor			Mass (kg)	Bearing No.
d	D	B	C_1	r (min)	r_1 (min)					db (min)	Da (min)	ra (max)	r_{a1} (max)		Y_1	Y_2	Y_0		
380	560	135	135	5	6	**380KBD030**	2060000	3790000		428	510	4	5	0.27	2.47	3.67	2.41	112	**380KBD030**
	620	194	194	5	6	**380KBD031**	3070000	6360000		445	545	4	5	0.32	2.12	3.15	2.07	234	**380KBD031**
400	600	148	148	5	6	**400KBD030**	2410000	4960000		452	545	4	5	0.33	2.03	3.02	1.98	143	**400KBD030**
	650	200	200	6	6	**400KBD031**	3850000	7810000		458	580	5	5	0.39	1.74	2.59	1.70	265	**400KBD031**
420	700	224	224	6	6	**420KBD031**	4710000	8380000		488	623	5	5	0.39	1.74	2.59	1.70	352	**420KBD031**
440	650	157	157	6	6	**440KBD030**	2750000	5500000		500	592	5	5	0.28	2.43	3.61	2.37	182	**440KBD030**
	720	226	226	6	6	**440KBD031**	4990000	9130000		506	642	5	5	0.39	1.74	2.59	1.70	367	**440KBD031**
460	680	163	163	6	6	**460KBD030**	3000000	5660000		510	616	5	5	0.39	1.74	2.59	1.70	197	**460KBD030**
480	700	165	165	6	6	**480KBD030**	3060000	6710000		531	625	5	5	0.40	1.68	2.50	1.64	215	**480KBD030**
500	720	167	167	6	6	**500KBD030**	3430000	7350000		545	645	5	5	0.39	1.74	2.59	1.70	222	**500KBD030**

Four-row Tapered Roller Bearings

Tolerance / metric series ····· Page 57
/ inch series ····· Page 60

● Design and Features

Four-row Tapered Roller Bearings are used for the roll necks of rolling mills and are designed to provide the maximum load capacity within the limited space while allowing easy inspection and maintenance.

Pin-type cages and hollow rollers are used in some of the larger bore sizes to maximize load capacity.

● Recommended Fit (cylindrical bore)

Metric series ···Table 1 and 2
Inch series ·····Table 3 and 4

● Bearing Clearance

Cylindrical-bore, Four-row Tapered Roller Bearings used for roll neck of rolling mill have a C2 or smaller clearance. If selection of special radial clearance is required for special service conditions, contact NACHI.

Bearing clearance for Four-row Tapered roller bearings is factory-adjusted as a set and the individual parts of a set must be mounted according to the set marks.

Table 1. Four-row Bearing Roll Neck Fits (Metric Series) Unit: μm

Nominal bearing bore diameter d (mm)		Single plane mean bore diameter deviation Δd_{mp}		Roll neck diameter deviation		Fit clearance		Wear limit of roll neck (Reference)
Over	Incl.	High	Low	High	Low	Min	Max	
80	120	0	–20	–120	–150	100	150	300
120	180	0	–25	–150	–175	125	175	350
180	250	0	–30	–175	–200	145	200	400
250	315	0	–35	–210	–240	175	240	480
315	400	0	–40	–240	–300	200	300	600
400	500	0	–45	–245	–300	200	300	600
500	630	0	–50	–250	–300	200	300	600

Table 2. Four-row Bearing Chock Fits (Metric Series) Unit: μm

Nominal bearing outside diameter D (mm)		Single plane mean outside diameter deviation ΔD_{mp}		Chock inside diameter deviation		Fit clearance		Wear limit of chock inside diameter (Reference)
Over	Incl.	High	Low	High	Low	Min	Max	
120	150	0	–20	+ 60	+25	25	80	160
150	180	0	–25	+125	+50	50	150	300
180	250	0	–30	+120	+50	50	150	300
250	315	0	–35	+115	+50	50	150	300
315	400	0	–40	+110	+50	50	150	300
400	500	0	–45	+105	+50	50	150	300
500	630	0	–50	+100	+50	50	150	300
630	800	0	–75	+150	+75	75	225	450

Table 3. Four-row Bearing Roll Neck Fits (Inch Series) Unit: μm

Nominal bearing bore diameter d (mm)				Single plane mean bore diameter deviation Δd_s		Roll neck diameter deviation		Fit clearance		Wear limit of roll neck (Reference)
Over		Incl.								
(mm)	(inch)	(mm)	(inch)	High	Low	High	Low	Min	Max	
127.000	5.0000	152.400	6.0000	+25	0	–120	–150	120	175	300
152.400	6.0000	203.200	8.0000	+25	0	–150	–175	150	200	400
203.200	8.0000	304.800	12.0000	+25	0	–175	–200	175	225	450
304.800	12.0000	609.600	24.0000	+51	0	–200	–250	200	301	600
609.600	24.0000	914.400	36.0000	+76	0	–250	–325	250	401	800

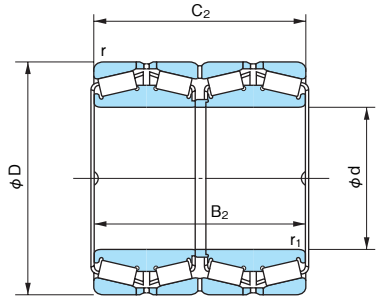
Table 4. Four-row Bearing Chock Fits (Inch Series) Unit: μm

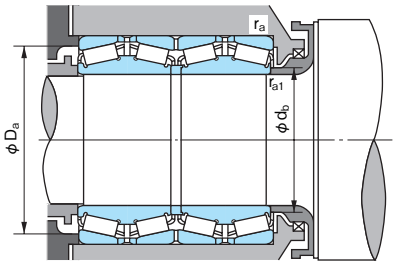
Nominal bearing outside diameter D (mm)				Single plane mean outside diameter deviation ΔD_s		Chock inside diameter deviation		Fit clearance		Wear limit of chock inside diameter (Reference)
Over		Incl.								
(mm)	(inch)	(mm)	(inch)	High	Low	High	Low	Min	Max	
—	—	304.800	12.0000	+25	0	+ 75	+ 50	25	75	300
304.800	12.0000	609.600	24.0000	+51	0	+150	+100	49	150	300
609.600	24.0000	914.400	36.0000	+76	0	+225	+150	74	225	450

Four-row Tapered Roller Bearings

Metric Series

Bore Diameter: 100～500mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values of Y_1, Y_2 and e from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

Values Y_0 from table.

1N=0.102kgf

Boundary dimensions (mm)								Bearing No.	Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)		r (min)	r_1 (min)	Abutment and fillet dimensions (mm)				Constant e	Axial load factor			Mass (kg) Reference	Bearing No.
d		D		B_2		C_2								db	Da	ra (max)	r_{a1} (max)		Y_1	Y_2	Y_0		
(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)																
100	3.9370	140	5.5118	104	4.0945	104	4.0945	100KBV039	300000	725000		2	2	108	130	2	2	0.32	2.12	3.15	2.07	5.0	100KBV039
110	4.3307	155	6.1023	114	4.4882	114	4.4882	110KBV039	365000	790000		2.5	2.5	120	145	2	2	0.40	1.68	2.50	1.64	6.4	110KBV039
120	4.7244	170	6.6929	124	4.8819	124	4.8819	120KBV039	435000	910000		2.5	2.5	130	160	2	2	0.32	2.12	3.15	2.07	8.5	120KBV039
130	5.1181	184	7.2441	134	5.2756	134	5.2756	130KBV039	555000	1330000		2.5	2.5	140	174	2	2	0.32	2.12	3.15	2.07	12.3	130KBV039
140	5.5118	198	7.7952	144	5.6693	144	5.6693	140KBV039	580000	1330000		2.5	2.5	153	184	2	2	0.29	2.32	3.45	2.26	13.3	140KBV039
150	5.9055	212	8.3465	155	6.1024	155	6.1024	150KBV039	680000	1550000		2.5	2.5	161	200	2	2	0.40	1.68	2.50	1.64	15.0	150KBV039
160	6.2992	226	8.8976	165	6.4961	165	6.4961	160KBV039	725000	1950000		2.5	2.5	173	208	2	2	0.35	1.95	2.90	1.91	20.2	160KBV039
170	6.6929	240	9.4488	175	6.8898	175	6.8898	170KBV039	915000	2220000		2.5	2.5	183	225	2	2	0.32	2.12	3.15	2.07	23.7	170KBV039
180	7.0866	254	10.0000	185	7.2835	185	7.2835	180KBV039	980000	2410000		2.5	2.5	193	235	2	2	0.40	1.68	2.50	1.64	28.0	180KBV039
190	7.4803	268	10.5512	196	7.7165	196	7.7165	190KBV039	1030000	2760000		2.5	2.5	204	245	2	2	0.47	1.43	2.12	1.40	33.0	190KBV039
200	7.8740	282	11.1024	206	8.1102	206	8.1102	200KBV039	1290000	3400000		2.5	2.5	215	263	2	2	0.40	1.68	2.50	1.64	49.2	200KBV039
220	8.6614	310	12.2047	226	8.8976	226	8.8976	220KBV039	1500000	4000000		3	3	234	296	2.5	2.5	0.35	1.95	2.90	1.91	52.7	220KBV039
240	9.4488	338	13.3071	248	9.7638	248	9.7638	240KBV039	1740000	4450000		3	3	260	310	2.5	2.5	0.29	2.32	3.45	2.26	68.3	240KBV039
260	10.2362	368	14.4882	268	10.5512	268	10.5512	260KBV039	2010000	5750000		4	4	282	348	3	3	0.33	2.03	3.02	1.98	90.0	260KBV039
280	11.0236	395	15.5512	288	11.3386	288	11.3386	280KBV039	2540000	7050000		4	4	300	374	3	3	0.33	2.03	3.02	1.98	108	280KBV039
300	11.8110	424	16.6929	310	12.2047	310	12.2047	300KBV039	2600000	6800000		4	4	320	394	3	3	0.35	1.95	2.90	1.91	137	300KBV039
320	12.5984	460	18.1102	338	13.3071	338	13.3071	320KBV039	3100000	8800000		4	4	340	428	3	3	0.35	1.95	2.90	1.91	183	320KBV039
340	13.3858	480	18.8976	350	13.7795	350	13.7795	340KBV039	3400000	10100000		5	5	362	458	4	4	0.29	2.32	3.45	2.26	198	340KBV039
360	14.1732	508	20.0000	370	14.5669	370	14.5669	360KBV039	4050000	11900000		5	5	382	486	4	4	0.40	1.68	2.50	1.64	233	360KBV039
380	14.9606	536	21.1024	390	15.3543	390	15.3543	380KBV039	4450000	13600000		5	5	408	500	4	4	0.40	1.68	2.50	1.64	271	380KBV039
400	15.7480	564	22.2047	412	16.2205	412	16.2205	400KBV039	4700000	14000000		5	5	422	542	4	4	0.36	1.87	2.79	1.83	317	400KBV039
420	16.5354	592	23.3071	432	17.0079	432	17.0079	420KBV039	4900000	14000000		5	5	450	556	4	4	0.36	1.87	2.79	1.83	366	420KBV039
440	17.3228	620	24.4094	454	17.8740	454	17.8740	440KBV039	6500000	19900000		6	6	474	574	5	5	0.33	2.03	3.02	1.98	422	440KBV039
460	18.1102	650	25.5906	474	18.6614	474	18.6614	460KBV039	6800000	19600000		6	6	488	622	5	5	0.33	2.03	3.02	1.98	487	460KBV039
480	18.8976	678	26.6929	494	19.4488	494	19.4488	480KBV039	7350000	22900000		6	6	515	637	5	5	0.33	2.02	3.01	1.97	552	480KBV039
500	19.6850	705	27.7559	515	20.2756	515	20.2756	500KBV039	7650000	24000000		6	6	528	677	5	5	0.33	2.03	3.02	1.98	650	500KBV039

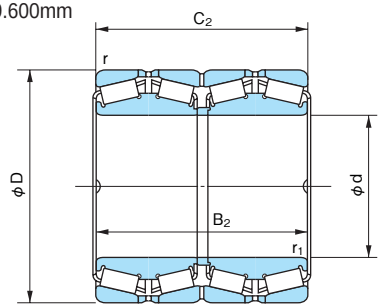
Remarks: 1. Regarding four-row tapered roller bearings except above-listed, please contact NACHI.
2. When using four-row tapered roller bearings, please contact NACHI.

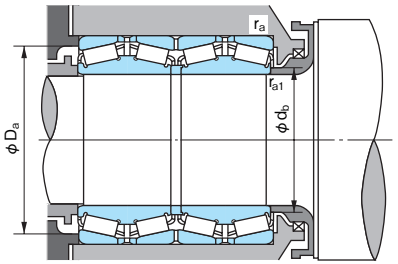
NACHI

Four-row Tapered Roller Bearings

Inch Series

Bore Diameter: 136.525～609.600mm





■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values of Y_1, Y_2 and e from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

Values Y_0 from table.

1N=0.102kgf

Boundary dimensions (mm)								Bearing No.	Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)		r (min)	r1 (min)	Abutment and fillet dimensions (mm)				Constant e	Axial load factor			Mass (kg) Reference	Reference Bearing No.	Bearing No.
d		D		B2		C2								db	Da	ra (max)	ra1 (max)		Y1	Y2	Y0			
(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)																	
136.525	**5.3750**	190.500	7.5000	161.925	6.3750	161.925	6.3750	**B26417**	715000	1900000		3.3	1.6	147	183	1.5	3.2	0.32	2.10	3.13	2.06	14.9	**48393D/48320/48320D**	**B26417**
139.700	**5.5000**	200.025	7.8750	157.165	6.1876	160.340	6.3126	**B28906**	720000	2020000		3.3	0.8	147	182	0.8	3.2	0.34	2.01	2.99	1.97	17.7	**48680D/48620/48620D**	**B28906**
152.400	**6.0000**	222.250	8.7500	174.625	6.8750	174.625	6.8750	**C21017**	910000	2070000		1.6	1.6	164	210	1.5	1.5	0.33	2.02	3.01	1.98	22.7	**M231649D/M231610/M231610D**	**C21017**
165.100	**6.5000**	225.425	8.8750	168.275	6.6250	168.275	6.6250	**B25971**	755000	2270000		3.2	0.8	175	207	0.8	3.2	0.38	1.76	2.63	1.72	20.2	**46791D/46720/46721D**	**B25971**
177.800	**7.0000**	247.650	9.7500	192.088	7.5625	192.088	7.5625	**C20498**	990000	2720000		3.3	1.5	190	229	1.5	3.2	0.44	1.54	2.29	1.50	29.0	**67791D/67720/67721D**	**C20498**
190.500	**7.5000**	266.700	10.5000	187.325	7.3750	188.912	7.4375	**C19114**	1030000	2900000		3.3	1.5	204	246	1.5	3.2	0.47	1.43	2.12	1.40	37.7	**67885D/67820/67820D**	**C19114**
244.475	**9.6250**	327.025	12.8750	193.675	7.6250	193.675	7.6250	**C27913**	1370000	3550000		3.3	1.5	258	309	1.5	3.2	0.32	2.10	3.13	2.06	43.0	**LM247748D/LM247710/LM247710D**	**C27913**
254.000	**10.0000**	358.775	14.1250	269.875	10.6250	269.875	10.6250	**C27916**	2120000	5800000		3.4	1.6	275	335	1.5	3.2	0.33	2.02	3.01	1.98	85.5	**M249748D/M249710/M249710D**	**C27916**
260.350	**10.2500**	422.275	16.6250	314.325	12.3750	317.500	12.5000	**C22144**	2980000	7150000		3.3	6.4	297	404	6.4	3.2	0.33	2.03	3.02	1.98	178	**HM252348D/HM252310/HM252310D**	**C22144**
266.700	**10.5000**	355.600	14.0000	230.188	9.0625	228.600	9.0000	**C19619**	1490000	4700000		3.2	1.6	277	337	1.5	3.2	0.37	1.80	2.69	1.76	65.6	**76590D/76520/76520D**	**C19619**
266.700	**10.5000**	355.600	14.0000	230.188	9.0625	228.600	9.0000	**C29167**	1790000	5200000		3.3	1.5	280	335	1.5	3.2	0.31	2.15	3.20	2.10	64.4	**LM451349D/LM451310/LM451310D**	**C29167**
279.400	**11.0000**	393.700	15.5000	269.875	10.6250	269.875	10.6250	**C19116**	1920000	5300000		6.4	1.5	297	357	1.5	6.4	0.40	1.68	2.50	1.64	103	**EE135111D/135155/135156XD**	**C19116**
285.750	**11.2500**	380.898	14.9960	244.475	9.6250	244.475	9.6250	**C27768**	1870000	6300000		3.3	1.5	296	362	1.5	3.2	0.43	1.57	2.34	1.53	84.3	**LM654648D/LM654610/LM654610D**	**C27768**
304.800	**12.0000**	419.100	16.5000	269.875	10.6250	269.875	10.6250	**C24618**	2460000	7050000		6.4	1.5	320	383	1.5	6.4	0.33	2.03	3.02	1.98	110	**M257149D/M257110/M257110D**	**C24618**
333.375	**13.1250**	469.900	18.5000	342.900	13.5000	342.900	13.5000	**C21093**	3450000	9900000		3.2	3.2	352	451	3.2	3.2	0.33	2.02	3.01	1.97	193	**HM261049D/HM261010/HM261010D**	**C21093**
343.052	**13.5060**	457.098	17.9960	254.000	10.0000	254.000	10.0000	**C29794**	2480000	7150000		3.3	1.5	356	428	1.5	3.2	0.45	1.49	2.21	1.45	113	**LM761649D/LM761610/LM761610D**	**C29794**
346.075	**13.6250**	488.950	19.2500	358.775	14.1250	358.775	14.1250	**C21179**	3950000	11600000		3.3	3.3	365	452	3.2	3.2	0.34	2.01	2.99	1.97	208	**HM262749D/HM262710/HM262710D**	**C21179**
384.175	**15.1250**	546.100	21.5000	400.050	15.7500	400.050	15.7500	**E17237**	5750000	16600000		6.4	3.3	414	507	3.2	6.4	0.33	2.02	3.01	1.98	308	**HM266449D/HM266410/HM266410D**	**E17237**
406.400	**16.0000**	546.100	21.5000	288.925	11.3750	288.925	11.3750	**E21147**	3050000	8500000		6.4	1.5	427	510	1.5	6.4	0.48	1.42	2.11	1.38	186	**LM767749D/LM767710/LM767710D**	**E21147**
431.800	**17.0000**	571.500	22.5000	279.400	11.0000	279.400	11.0000	**E12751**	2990000	9550000		3.3	1.5	452	540	1.5	3.2	0.39	1.75	2.60	1.71	191	**LM869449D/LM869410/LM869410D**	**E12751**
447.675	**17.6250**	635.000	25.0000	463.550	18.2500	463.550	18.2500	**E17442**	6700000	20500000		6.4	3.3	466	599	3.2	6.4	0.33	2.03	3.02	1.98	491	**M270749D/M270710/M270710D**	**E17442**
457.200	**18.0000**	596.900	23.5000	276.225	10.8750	279.400	11.0000	**E22321**	2950000	9900000		3.3	1.5	478	567	1.5	3.2	0.47	1.43	2.12	1.39	200	**L770847D/L770810/L770810D**	**E22321**
479.425	**18.8750**	679.450	26.7500	495.300	19.5000	495.300	19.5000	**E17717**	6450000	18900000		6.4	3.2	510	633	3.2	6.4	0.33	2.02	3.01	1.97	590	**M272749D/M272710/M272710XD**	**E17717**
482.600	**19.0000**	615.950	24.2500	330.200	13.0000	330.200	13.0000	**E24206**	3600000	11900000		6.4	3.4	501	579	3.2	6.4	0.33	2.03	3.02	1.98	251	**LM272249D/LM272210/LM272210D**	**E24206**
482.600	**19.0000**	647.700	25.5000	417.512	16.4375	417.512	16.4375	**E12372**	5950000	14800000		6.4	3.3	505	611	3.2	6.4	0.33	2.03	3.02	1.98	432	**M272647D/M272610/M272610D**	**E12372**
488.950	**19.2500**	660.400	26.0000	365.125	14.3750	361.950	14.2500	**E12371**	5250000	19900000		6.4	8.0	525	624	7.8	6.4	0.31	2.20	3.27	2.15	347	**EE640193D/640260/640261D**	**E12371**
571.500	**22.5000**	812.800	32.0000	593.725	23.3750	593.725	23.3750	**E23120**	10300000	34000000		6.4	3.3	608	776	3.2	6.4	0.33	2.02	3.01	1.98	1020	**M278749D/M278710/M278710D**	**E23120**
609.600	**24.0000**	787.400	31.0000	361.950	14.2500	361.950	14.2500	**E11996**	4800000	17300000		6.4	3.3	637	747	3.2	6.4	0.37	1.82	2.70	1.78	460	**EE649241D/649310/649311D**	**E11996**

Remarks: 1. Regarding four-row tapered roller bearings except above-listed, please contact NACHI.
2. When using four-row tapered roller bearings, please contact NACHI.

NACHI

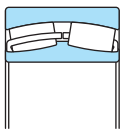
Spherical Roller Bearings

Tolerance ····· Page 52
Internal clearance ····· Page 64
Heat-stabilized treatment ····· Page 22
Adapter sleeves ····· Page 592
Withdrawal sleeves ····· Page 592

● Design and configurations

Spherical Roller Bearings are particularly suitable for applications where misalignment can arise from error in mounting or from shaft deflection. NACHI Spherical Roller Bearings are manufactured in a number of design and material configurations depending on the type of application and size of the bearing.
See Table 1 for the roller, the guide ring and cage design for NACHI Spherical Roller Bearings. They can sustain radial and axial loads.

Table 1. Design and configurations

Series \ Type	EX	EX1	E	E2	E	AEX	AX	A2X	AX
239					20, 26, 44～/1060		28～40		
230			20～36		38～/1000		20～36	38～48	
240		24～36			38～/600, /670, /800				24～36
231		20～34			36～/800		20～34	36～48	
241		22～32			36～/500				22～34
222	05～30		32	32	34～68	05～30		32	
232		18, 20～30	16, 17, 19		32～/600		20～30	32～40	
213		11～22	04～10, 24				06～22		
223	08～26				28～60	07～26		28, 30	
Cross section									
Roller	Symmetric			Symmetric		Nonsymmetric			Nonsymmetric
Center guide	Floating ring			Inner ring rib		Inner ring rib			Inner ring rib
Cage	Pressed steel			Machined high strength brass		Machined high strength brass			Pressed high strength brass

● Attention

(1) For high axial load applications, the axial load Fa must not exceed 0.6 of the radial load Fr. If the axial load exceeds 0.6 Fr, contact NACHI engineers for design assistance.

(2) For applications where oscillating loads (such as shaker screen applications) or high speed is involved, contact NACHI for design assistance.

(3) In very lightly loaded or no load conditions, sliding motion can occur which could damage the bearing.
To prevent this, bearings must be subjected to a load greater than 0.02 Cr (basic dynamic load rating).

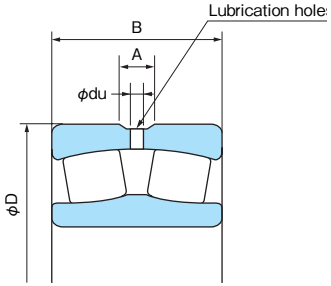
(4) The material coefficient number of the bearing is taken into consideration for the dynamic load rating.
* This only applies to spherical roller bearing.

● Lubrication Holes and Groove

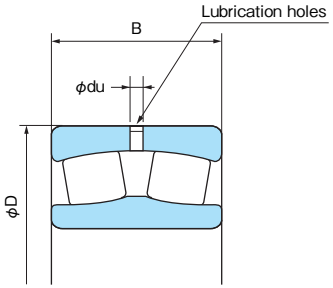
The outer ring of Spherical Roller Bearings are often made with lubrication holes and a groove for feeding lubricant. The outer ring may also be configured with oil holes only depending on fitting, mounting, or service conditions.
Table 2 shows the symbols for lubrication holes and grooves.
Hole diameter, groove width and hole count are according to the dimensions table.
Improved heat treatment technology allows for operation at 200˚C without change in dimensions.

Table 2. Lubrication holes and groove

Modification to outer ring	Suffix	Part No. Example
Lubrication holes and groove	W33	22330E W33
Lubrication holes	W20	22330E W20



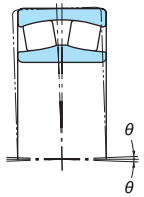
Lubrication holes and groove



Lubrication holes

● Misalignment

Maximum permissible misalignment angle is about 2° under general service conditions.
But its angle will vary with the series, service condition and surrounding structure.
As rotational speed increases, misaligned bearings will tend to generate more noise.
Due to noise constraints, the practical maximum misalignment in a bearing may be considerably less than the maximum permissible misalignment.



● Mounting bearings with tapered bore

Mounting bearings with a tapered bore requires some experience and technique. Bearings with tapered bore are always mounted with an interference fit on the shaft.
To measure the amount of interference fit on the shaft, the axial displacement of the inner ring or the reduction of radial internal clearance due to the interference fit can be used. Generally, the measurement of reduction in radial internal clearance is a more reliable method than measurement of the axial displacement of the inner ring.

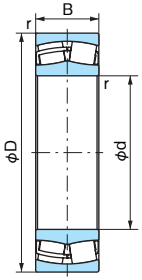
Unit: mm

Nominal bore diameter d		Radial clearance reduction		Axial displacement (1) Taper 1 : 12		Axial displacement (1) Taper 1 : 30		Necessary minimum internal clearance after mounting (2) (for initial clearance range)		
Over	Incl.	Max	Min	Min	Max	Min	Max	Normal	C3	C4
24	30	0.015	0.020	0.3	0.35	—	—	0.015	0.020	0.035
30	40	0.020	0.025	0.35	0.4	—	—	0.015	0.025	0.040
40	50	0.025	0.030	0.34	0.45	—	—	0.020	0.030	0.050
50	65	0.030	0.040	0.45	0.6	—	—	0.025	0.035	0.055
65	80	0.040	0.050	0.6	0.75	—	—	0.025	0.040	0.070
80	100	0.045	0.060	0.7	0.9	1.7	2.2	0.035	0.050	0.080
100	120	0.050	0.070	0.75	1.1	1.9	2.7	0.050	0.065	0.100
120	140	0.065	0.090	1.1	1.4	2.7	3.5	0.055	0.080	0.110
140	160	0.075	0.100	1.2	1.6	3.0	4.0	0.055	0.090	0.130
160	180	0.080	0.110	1.3	1.7	3.2	4.2	0.060	0.100	0.150
180	200	0.090	0.130	1.4	2.0	3.5	5.0	0.070	0.100	0.160
200	225	0.100	0.140	1.6	2.2	4.0	5.5	0.080	0.120	0.180
225	250	0.110	0.150	1.7	2.4	4.2	6.0	0.090	0.130	0.200
250	280	0.120	0.170	1.9	2.7	4.7	6.7	0.100	0.140	0.220
280	315	0.130	0.190	2.0	3.0	5.0	7.5	0.110	0.150	0.240
315	355	0.150	0.210	2.4	3.3	6.0	8.2	0.120	0.170	0.260
355	400	0.170	0.230	2.6	3.6	6.5	9.0	0.130	0.190	0.290
400	450	0.200	0.260	3.1	4.0	7.7	10	0.130	0.200	0.310
450	500	0.210	0.280	3.3	4.4	8.2	11	0.160	0.230	0.350
500	560	0.240	0.320	3.7	5.0	9.2	12.5	0.170	0.250	0.360
560	630	0.260	0.350	4.0	5.4	10	13.5	0.200	0.290	0.410
630	710	0.300	0.400	4.6	6.2	11.5	15.5	0.210	0.310	0.450
710	800	0.340	0.450	5.3	7.0	13.3	17.5	0.230	0.350	0.510
800	900	0.370	0.500	5.7	7.8	14.3	19.5	0.270	0.390	0.570
900	1000	0.410	0.550	6.3	8.5	15.8	21	0.300	0.430	0.640
1000	1120	0.450	0.600	6.8	9.0	17	23	0.320	0.480	0.700
1120	1250	0.490	0.650	7.4	9.8	18.5	25	0.340	0.540	0.770

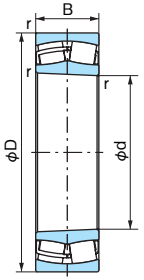
Notes: (1) The values are applied for mounting on solid shaft. In case of hollow shaft, larger axial displacement should be applied.
(2) In following cases, please make sure radial internal clearance after mounting. - Initial radial clearance is less than (bore diameter deviation) × 0.5 - Temperature difference exists between inner ring and outer ring under operation. Internal clearance after mounting must be over these values.

Spherical Roller Bearings

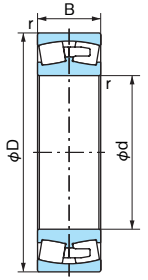
Bore Diameter: 20～50mm



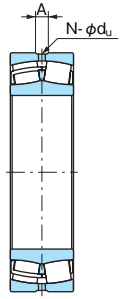
Cylindrical bore



Tapered bore

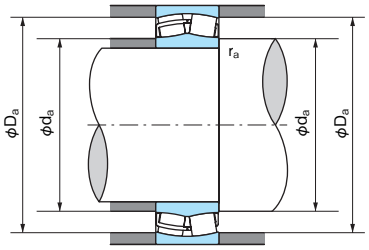


With machined brass cage



With oil holes / oil groove (W33)

1N=0.102kgf



■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values of Y_1, Y_2 and e from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

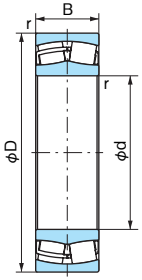
Values Y_0 from table.

Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant e	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.	
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter du	Groove width A	Hole count N	da (min)	Da (max)	ra (max)		Y_1	Y_2	Y_0		Cylindrical bore	Tapered bore
20	52	15	1.1	21304E	21304EK	47000	33500	11,000	14,000	3	6	4	27.0	45.0	1.0	0.31	2.20	3.27	2.15	0.18	21304E	21304EK
25	52	18	1	22205EX	22205EXK	63000	48000	10,500	13,000	3	5	4	30.5	46.5	1.0	0.35	1.91	2.85	1.87	0.19	22205EX	22205EXK
	52	18	1	22205AEX	22205AEXK	48500	34500	13,300	16,500	3	5	4	30.5	46.5	1.0	0.43	1.57	2.33	1.53	0.18	22205AEX	22205AEXK
	62	17	1.1	21305E	21305EK	64000	47500	9,000	11,500	6	6	4	32.0	53.0	1.0	0.28	2.39	3.56	2.34	0.29	21305E	21305EK
30	62	20	1	22206EX	22206EXK	84500	65000	8,500	11,000	3	5	4	35.5	56.5	1.0	0.33	2.04	3.04	2.00	0.30	22206EX	22206EXK
	62	20	1	22206AEX	22206AEXK	68000	48500	11,200	14,400	3	5	4	35.5	56.5	1.0	0.40	1.70	2.53	1.66	0.29	22206AEX	22206AEXK
	72	19	1.1	21306E	21306EK	83000	62500	8,000	9,500	3	5	4	38.0	65.0	1.0	0.27	2.49	3.71	2.43	0.43	21306E	21306EK
	72	19	1.1	21306AX	21306AXK	73000	50900	9,700	12,700	3	5	4	38.0	65.0	1.0	0.35	1.95	2.90	1.90	0.43	21306AX	21306AXK
35	72	23	1.1	22207EX	22207EXK	112000	88500	7,500	9,500	3	6	4	42.0	65.0	1.0	0.32	2.10	3.13	2.06	0.46	22207EX	22207EXK
	72	23	1.1	22207AEX	22207AEXK	94500	70000	9,600	12,400	3	6	4	42.0	65.0	1.0	0.39	1.74	2.60	1.71	0.46	22207AEX	22207AEXK
	80	21	1.5	21307E	21307EK	96000	76000	7,000	8,500	3	5	4	44.0	71.0	1.5	0.27	2.49	3.71	2.43	0.57	21307E	21307EK
	80	21	1.5	21307AX	21307AXK	89000	63100	9,000	11,200	3	5	4	44.0	71.0	1.5	0.33	2.03	3.03	1.99	0.56	21307AX	21307AXK
	80	31	1.5	22307AEX	22307AEXK	145000	107000	9,000	11,500	3	6	4	43.5	71.5	1.5	0.48	1.41	2.10	1.38	0.78	22307AEX	22307AEXK
40	80	23	1.1	22208EX	22208EXK	126000	102000	6,700	8,500	3	6	4	47.0	73.0	1.0	0.28	2.37	3.53	2.32	0.56	22208EX	22208EXK
	80	23	1.1	22208AEX	22208AEXK	106000	81000	8,500	10,900	3	6	4	47.0	73.0	1.0	0.34	1.99	2.96	1.94	0.56	22208AEX	22208AEXK
	90	23	1.5	21308E	21308EK	119000	95500	6,000	7,500	3	5	4	50.0	81.0	1.5	0.26	2.55	3.80	2.50	0.78	21308E	21308EK
	90	23	1.5	21308AX	21308AXK	116000	84400	7,500	9,750	3	5	4	50.0	81.0	1.5	0.32	2.09	3.11	2.04	0.79	21308AX	21308AXK
	90	33	1.5	22308EX	22308EXK	185000	151000	5,300	6,700	4	7	4	48.5	81.5	1.5	0.37	1.83	2.72	1.79	1.07	22308EX	22308EXK
	90	33	1.5	22308AEX	22308AEXK	172000	134000	7,800	10,000	4	7	4	48.5	81.5	1.5	0.43	1.55	2.31	1.54	1.05	22308AEX	22308AEXK
45	85	23	1.1	22209EX	22209EXK	133000	110000	6,000	7,500	3	6	4	52.0	78.0	1.0	0.26	2.55	3.80	2.50	0.61	22209EX	22209EXK
	85	23	1.1	22209AEX	22209AEXK	113000	85500	7,900	10,200	3	6	4	52.0	78.0	1.0	0.31	2.15	3.21	2.11	0.60	22209AEX	22209AEXK
	100	25	1.5	21309E	21309EK	150000	124000	5,000	6,300	3	5	4	55.0	92.0	1.5	0.26	2.62	3.90	2.56	1.05	21309E	21309EK
	100	25	1.5	21309AX	21309AXK	143000	105000	6,750	9,000	3	5	4	55.0	92.0	1.5	0.31	2.16	3.22	2.11	1.05	21309AX	21309AXK
	100	36	1.5	22309EX	22309EXK	230000	182000	4,500	5,600	4	8	4	53.5	91.5	1.5	0.37	1.83	2.72	1.79	1.41	22309EX	22309EXK
	100	36	1.5	22309AEX	22309AEXK	208000	157000	7,050	9,150	4	8	4	53.5	91.5	1.5	0.43	1.57	2.34	1.54	1.41	22309AEX	22309AEXK
50	90	23	1.1	22210EX	22210EXK	142000	122000	5,600	7,100	3	6	4	57.0	83.0	1.0	0.24	2.79	4.15	2.73	0.65	22210EX	22210EXK
	90	23	1.1	22210AEX	22210AEXK	119000	93500	7,350	9,600	3	6	4	57.0	83.0	1.0	0.29	2.34	3.48	2.28	0.65	22210AEX	22210AEXK
	110	27	2	21310E	21310EK	178000	151000	4,500	5,600	3	5	4	61.0	101.0	2.0	0.25	2.71	4.04	2.65	1.36	21310E	21310EK
	110	27	2	21310AX	21310AXK	170000	127000	6,000	8,250	3	5	4	61.0	101.0	2.0	0.30	2.24	3.34	2.19	1.36	21310AX	21310AXK
	110	40	2	22310EX	22310EXK	280000	235000	4,300	5,300	4	8	4	60.0	100.0	2.0	0.36	1.85	2.75	1.81	1.92	22310EX	22310EXK
	110	40	2	22310AEX	22310AEXK	254000	205000	6,300	8,250	4	8	4	60.0	100.0	2.0	0.42	1.62	2.42	1.59	1.88	22310AEX	22310AEXK

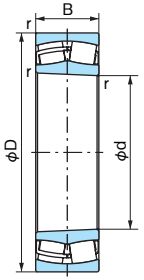
Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

Spherical Roller Bearings

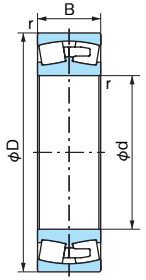
Bore Diameter: 55～75mm



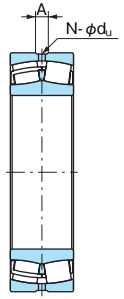
Cylindrical bore



Tapered bore

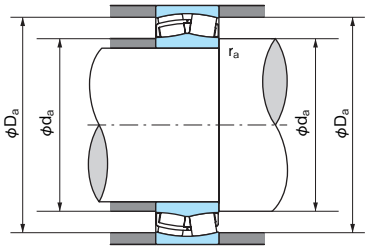


With machined brass cage



With oil holes / oil groove (W33)

1N=0.102kgf



■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values of Y_1, Y_2 and e from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

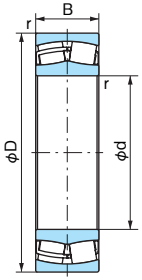
Values Y_0 from table.

Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant e	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.	
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter du	Groove width A	Hole count N	da (min)	Da (max)	ra (max)		Y_1	Y_2	Y_0		Cylindrical bore	Tapered bore
55	100	25	1.5	**22211EX**	**22211EXK**	171000	144000	5,300	6,700	3	6	4	63.5	91.5	1.5	0.24	2.84	4.23	2.78	0.88	**22211EX**	**22211EXK**
	100	25	1.5	**22211AEX**	**22211AEXK**	150000	118000	6,750	8,550	3	6	4	63.5	91.5	1.5	0.29	2.34	3.48	2.28	0.89	**22211AEX**	**22211AEXK**
	120	29	2	**21311EX1**	**21311EX1K**	200000	165000	4,500	5,600	3	5	4	65.0	110.0	2.0	0.25	2.71	4.03	2.65	1.70	**21311EX1**	**21311EX1K**
	120	29	2	**21311AX**	**21311AXK**	206000	171000	6,000	7,500	3	5	4	65.0	110.0	2.0	0.29	2.32	3.45	2.27	1.77	**21311AX**	**21311AXK**
	120	43	2	**22311EX**	**22311EXK**	325000	263000	3,800	4,800	4	8	4	65.0	110.0	2.0	0.36	1.85	2.75	1.81	2.40	**22311EX**	**22311EXK**
	120	43	2	**22311AEX**	**22311AEXK**	294000	227000	6,000	7,650	4	8	4	65.0	110.0	2.0	0.43	1.56	2.33	1.53	2.39	**22311AEX**	**22311AEXK**
60	110	28	1.5	**22212EX**	**22212EXK**	210000	179000	4,800	6,000	3	6	4	68.5	101.5	1.5	0.25	2.74	4.08	2.68	1.20	**22212EX**	**22212EXK**
	110	28	1.5	**22212AEX**	**22212AEXK**	179000	144000	6,150	7,800	3	6	4	68.5	101.5	1.5	0.29	2.29	3.41	2.24	1.22	**22212AEX**	**22212AEXK**
	130	31	2.1	**21312EX1**	**21312EX1K**	238000	193000	3,800	4,800	3	5	4	72.0	118.0	2.0	0.24	2.78	4.14	2.72	2.10	**21312EX1**	**21312EX1K**
	130	31	2.1	**21312AX**	**21312AXK**	228000	192000	5,250	6,750	3	5	4	72.0	118.0	2.0	0.29	2.36	3.52	2.31	2.19	**21312AX**	**21312AXK**
	130	46	2.1	**22312EX**	**22312EXK**	390000	330000	3,600	4,500	4	8	4	72.0	118.0	2.0	0.36	1.86	2.77	1.82	3.05	**22312EX**	**22312EXK**
	130	46	2.1	**22312AEX**	**22312AEXK**	340000	275000	5,400	6,900	4	8	4	72.0	118.0	2.0	0.41	1.65	2.46	1.62	3.01	**22312AEX**	**22312AEXK**
65	120	31	1.5	**22213EX**	**22213EXK**	246000	209000	4,300	5,300	3	6	4	73.5	111.5	1.5	0.25	2.69	4.00	2.63	1.56	**22213EX**	**22213EXK**
	120	31	1.5	**22213AEX**	**22213AEXK**	213000	169000	5,700	7,200	3	6	4	73.5	111.5	1.5	0.30	2.26	3.36	2.21	1.60	**22213AEX**	**22213AEXK**
	140	33	2.1	**21313EX1**	**21313EX1K**	270000	232000	3,600	4,500	3	6	4	77.0	128.0	2.0	0.24	2.83	4.21	2.76	2.60	**21313EX1**	**21313EX1K**
	140	33	2.1	**21313AX**	**21313AXK**	261000	222000	5,100	6,400	3	6	4	77.0	128.0	2.0	0.28	2.40	3.57	2.35	2.69	**21313AX**	**21313AXK**
	140	48	2.1	**22313EX**	**22313EXK**	415000	355000	3,200	4,000	4	8	4	77.0	128.0	2.0	0.34	1.98	2.94	1.93	3.67	**22313EX**	**22313EXK**
	140	48	2.1	**22313AEX**	**22313AEXK**	380000	310000	4,950	6,450	4	8	4	77.0	128.0	2.0	0.39	1.72	2.55	1.68	3.64	**22313AEX**	**22313AEXK**
70	125	31	1.5	**22214EX**	**22214EXK**	257000	220000	4,000	5,300	3	6	4	78.5	116.5	1.5	0.24	2.87	4.27	2.80	1.65	**22214EX**	**22214EXK**
	125	31	1.5	**22214AEX**	**22214AEXK**	225000	185000	5,400	6,900	3	6	4	78.5	116.5	1.5	0.28	2.39	3.55	2.33	1.69	**22214AEX**	**22214AEXK**
	150	35	2.1	**21314EX1**	**21314EX1K**	310000	260000	3,200	4,000	3	6	4	82.0	138.0	2.0	0.24	2.84	4.23	2.78	3.10	**21314EX1**	**21314EX1K**
	150	35	2.1	**21314AX**	**21314AXK**	305000	268000	4,500	6,000	3	6	4	82.0	138.0	2.0	0.28	2.45	3.64	2.39	3.30	**21314AX**	**21314AXK**
	150	51	2.1	**22314EX**	**22314EXK**	480000	415000	3,000	3,800	5	10	4	82.0	138.0	2.0	0.34	1.98	2.94	1.93	4.45	**22314EX**	**22314EXK**
	150	51	2.1	**22314AEX**	**22314AEXK**	445000	365000	4,650	6,000	5	10	4	82.0	138.0	2.0	0.40	1.71	2.54	1.67	4.46	**22314AEX**	**22314AEXK**
75	130	31	1.5	**22215EX**	**22215EXK**	265000	234000	4,000	5,000	3	6	4	83.5	121.5	1.5	0.22	3.07	4.58	3.01	1.74	**22215EX**	**22215EXK**
	130	31	1.5	**22215AEX**	**22215AEXK**	234000	191000	5,100	6,600	3	6	4	83.5	121.5	1.5	0.27	2.51	3.73	2.46	1.76	**22215AEX**	**22215AEXK**
	160	37	2.1	**21315EX1**	**21315EX1K**	340000	298000	3,200	4,000	3	6	4	87.0	148.0	2.0	0.23	2.87	4.27	2.80	3.80	**21315EX1**	**21315EX1K**
	160	37	2.1	**21315AX**	**21315AXK**	325000	286000	4,350	5,550	3	6	4	87.0	148.0	2.0	0.27	2.50	3.72	2.44	3.95	**21315AX**	**21315AXK**
	160	55	2.1	**22315EX**	**22315EXK**	550000	475000	2,800	3,600	5	10	4	87.0	148.0	2.0	0.35	1.95	2.90	1.91	5.44	**22315EX**	**22315EXK**
	160	55	2.1	**22315AEX**	**22315AEXK**	495000	415000	4,350	5,500	5	10	4	87.0	148.0	2.0	0.39	1.72	2.56	1.68	5.44	**22315AEX**	**22315AEXK**

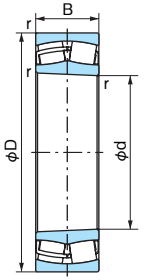
Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

Spherical Roller Bearings

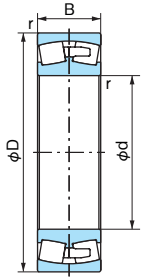
Bore Diameter: 80～95mm



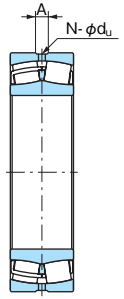
Cylindrical bore



Tapered bore

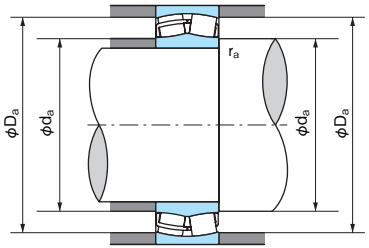


With machined brass cage



With oil holes / oil groove (W33)

1N=0.102kgf



■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values of Y_1, Y_2 and e from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

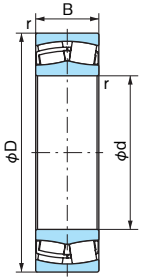
Values Y_0 from table.

Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant e	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.	
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter du	Groove width A	Hole count N	da (min)	Da (max)	ra (max)		Y_1	Y_2	Y_0		Cylindrical bore	Tapered bore
	140	33	2	**22216EX**	**22216EXK**	299000	269000	3,600	4,500	3	6	4	90.0	130.0	2.0	0.22	3.07	4.58	3.01	2.19	**22216EX**	**22216EXK**
	140	33	2	**22216AEX**	**22216AEXK**	279000	230000	4,800	6,100	3	6	4	90.0	130.0	2.0	0.27	2.51	3.74	2.46	2.24	**22216AEX**	**22216AEXK**
	140	44.4	2	**23216E**	**23216EK**	335000	335000	3,300	4,350	4	8	4	90.0	130.0	2.0	0.29	2.35	3.50	2.30	2.95	**23216E**	**23216EK**
80	170	39	2.1	**21316EX1**	**21316EX1K**	380000	339000	3,000	3,800	4	8	4	92.0	158.0	2.0	0.23	2.88	4.29	2.82	4.50	**21316EX1**	**21316EX1K**
	170	39	2.1	**21316AX**	**21316AXK**	355000	318000	4,200	5,250	4	8	4	92.0	158.0	2.0	0.26	2.55	3.80	2.50	4.67	**21316AX**	**21316AXK**
	170	58	2.1	**22316EX**	**22316EXK**	595000	520000	2,600	3,400	5	10	4	92.0	158.0	2.0	0.35	1.95	2.90	1.91	6.42	**22316EX**	**22316EXK**
	170	58	2.1	**22316AEX**	**22316AEXK**	550000	465000	4,050	5,250	5	10	4	92.0	158.0	2.0	0.38	1.75	2.61	1.72	6.43	**22316AEX**	**22316AEXK**
	150	36	2	**22217EX**	**22217EXK**	355000	320000	3,400	4,300	4	7	4	95.0	140.0	2.0	0.22	3.01	4.48	2.94	2.75	**22217EX**	**22217EXK**
	150	36	2	**22217AEX**	**22217AEXK**	310000	260000	4,200	5,700	4	7	4	95.0	140.0	2.0	0.27	2.47	3.67	2.41	2.82	**22217AEX**	**22217AEXK**
	150	49.2	2	**23217E**	**23217EK**	395000	405000	3,150	4,050	4	8	4	95.0	140.0	2.0	0.30	2.24	3.34	2.19	3.78	**23217E**	**23217EK**
85	180	41	3	**21317EX1**	**21317EX1K**	415000	372000	3,000	4,000	4	8	4	99.0	166.0	2.5	0.23	2.89	4.30	2.83	5.30	**21317EX1**	**21317EX1K**
	180	41	3	**21317AX**	**21317AXK**	400000	364000	3,900	5,100	4	8	4	99.0	166.0	2.5	0.26	2.55	3.79	2.49	5.52	**21317AX**	**21317AXK**
	180	60	3	**22317EX**	**22317EXK**	665000	585000	2,400	3,200	6	11	4	99.0	166.0	2.5	0.33	2.02	3.00	1.97	7.46	**22317EX**	**22317EXK**
	180	60	3	**22317AEX**	**22317AEXK**	590000	500000	3,900	4,950	6	11	4	99.0	166.0	2.5	0.38	1.78	2.65	1.74	7.47	**22317AEX**	**22317AEXK**
	160	40	2	**22218EX**	**22218EXK**	410000	375000	3,200	4,000	4	7	4	100.0	150.0	2.0	0.24	2.79	4.15	2.73	3.50	**22218EX**	**22218EXK**
	160	40	2	**22218AEX**	**22218AEXK**	360000	310000	4,000	5,400	4	7	4	100.0	150.0	2.0	0.28	2.42	3.60	2.36	3.56	**22218AEX**	**22218AEXK**
	160	52.4	2	**23218EX1**	**23218EX1K**	470000	482000	3,100	4,200	5	10	4	100.0	150.0	2.0	0.32	2.14	3.19	2.09	4.57	**23218EX1**	**23218EX1K**
90	190	43	3	**21318EX1**	**21318EX1K**	460000	410000	2,800	3,600	4	8	6	104.0	176.0	2.5	0.23	2.91	4.33	2.84	6.10	**21318EX1**	**21318EX1K**
	190	43	3	**21318AX**	**21318AXK**	460000	416000	3,700	4,800	4	8	6	104.0	176.0	2.5	0.26	2.55	3.80	2.50	6.45	**21318AX**	**21318AXK**
	190	64	3	**22318EX**	**22318EXK**	745000	660000	2,400	3,000	6	11	6	104.0	176.0	2.5	0.34	2.00	2.98	1.96	8.82	**22318EX**	**22318EXK**
	190	64	3	**22318AEX**	**22318AEXK**	690000	585000	3,700	4,800	6	11	6	104.0	176.0	2.5	0.39	1.73	2.57	1.69	8.91	**22318AEX**	**22318AEXK**
	170	43	2.1	**22219EX**	**22219EXK**	465000	420000	3,000	3,800	5	8	4	107.0	158.0	2.0	0.24	2.76	4.11	2.70	4.24	**22219EX**	**22219EXK**
	170	43	2.1	**22219AEX**	**22219AEXK**	410000	360000	3,900	5,100	5	8	4	107.0	158.0	2.0	0.28	2.38	3.55	2.33	4.35	**22219AEX**	**22219AEXK**
	170	55.6	2.1	**23219E**	**23219EK**	500000	510000	2,800	3,600	5	10	4	107.0	158.0	2.0	0.30	2.24	3.34	2.19	5.46	**23219E**	**23219EK**
95	200	45	3	**21319EX1**	**21319EX1K**	500000	461000	2,700	3,400	4	8	6	109.0	186.0	2.5	0.23	2.92	4.35	2.86	7.10	**21319EX1**	**21319EX1K**
	200	45	3	**21319AX**	**21319AXK**	495000	450000	3,400	4,500	4	8	6	109.0	186.0	2.5	0.27	2.54	3.79	2.49	7.44	**21319AX**	**21319AXK**
	200	67	3	**22319EX**	**22319EXK**	815000	725000	2,200	2,900	6	12	6	109.0	186.0	2.5	0.33	2.02	3.00	1.97	10.2	**22319EX**	**22319EXK**
	200	67	3	**22319AEX**	**22319AEXK**	755000	645000	3,450	4,500	6	12	6	109.0	186.0	2.5	0.39	1.74	2.59	1.70	10.3	**22319AEX**	**22319AEXK**

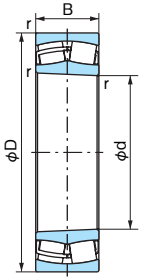
Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

Spherical Roller Bearings

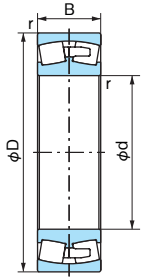
Bore Diameter: 100～110mm



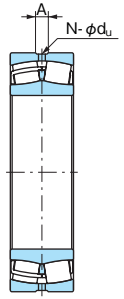
Cylindrical bore



Tapered bore

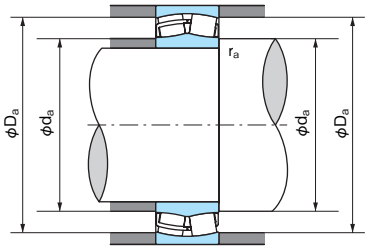


With machined brass cage



With oil holes / oil groove (W33)

1N=0.102kgf



■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values of Y_1, Y_2 and e from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

Values Y_0 from table.

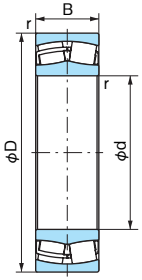
Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})			Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant e	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.	
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication		Hole diameter du	Groove width A	Hole count N	da (min)	Da (max)	ra (max)		Y_1	Y_2	Y_0		Cylindrical bore	Tapered bore
100	140	30	1.1	23920E	23920EK	197000	233000	3,400	4,500		3	8	4	107.0	133.0	1.0	0.20	3.42	5.08	3.34	1.46	23920E	23920EK
	150	37	1.5	23020E	23020EK	286000	325000	2,700	3,700		4	7	4	117.0	141.0	1.5	0.22	3.01	4.48	2.94	2.33	23020E	23020EK
	150	37	1.5	23020AX	23020AXK	267000	298000	4,200	5,400		4	7	4	117.0	141.0	1.5	0.26	2.64	3.93	2.58	2.40	23020AX	23020AXK
	165	52	2	23120EX1	23120EX1K	450000	500000	2,500	3,300		5	9	4	110.0	155.0	2.0	0.29	2.33	3.47	2.28	4.49	23120EX1	23120EX1K
	165	52	2	23120AX	23120AXK	450000	538000	3,300	4,500		5	9	4	110.0	155.0	2.0	0.34	1.98	2.94	1.93	4.70	23120AX	23120AXK
	180	46	2.1	22220EX	22220EXK	520000	480000	2,800	3,600		5	8	4	112.0	168.0	2.0	0.25	2.74	4.08	2.68	5.10	22220EX	22220EXK
	180	46	2.1	22220AEX	22220AEXK	465000	410000	3,700	4,800		5	8	4	112.0	168.0	2.0	0.29	2.37	3.52	2.31	5.24	22220AEX	22220AEXK
	180	60.3	2.1	23220EX1	23220EX1K	595000	629000	2,800	3,750		5	10	4	112.0	168.0	2.0	0.32	2.09	3.11	2.04	6.76	23220EX1	23220EX1K
	180	60.3	2.1	23220AX	23220AXK	575000	599000	3,100	4,200		5	10	4	112.0	168.0	2.0	0.36	1.88	2.80	1.84	6.88	23220AX	23220AXK
	215	47	3	21320EX1	21320EX1K	580000	524000	2,400	3,300		4	8	6	114.0	201.0	2.5	0.22	3.02	4.49	2.95	8.70	21320EX1	21320EX1K
	215	47	3	21320AX	21320AXK	545000	488000	3,300	4,200		4	8	6	114.0	201.0	2.5	0.26	2.62	3.91	2.57	9.06	21320AX	21320AXK
	215	73	3	22320EX	22320EXK	975000	875000	2,000	2,800		6	12	6	114.0	201.0	2.5	0.35	1.95	2.90	1.91	13.1	22320EX	22320EXK
	215	73	3	22320AEX	22320AEXK	890000	775000	3,300	4,200		6	12	6	114.0	201.0	2.5	0.39	1.72	2.57	1.69	13.2	22320AEX	22320AEXK
110	170	45	2	23022E	23022EK	415000	475000	2,700	3,600		5	9	4	120.0	160.0	2.0	0.24	2.84	4.23	2.78	3.84	23022E	23022EK
	170	45	2	23022AX	23022AXK	415000	478000	3,750	4,800		5	9	4	120.0	160.0	2.0	0.28	2.42	3.61	2.37	3.90	23022AX	23022AXK
	180	56	2	23122EX1	23122EX1K	540000	610000	2,700	3,600		5	9	4	120.0	170.0	2.0	0.29	2.36	3.51	2.31	5.70	23122EX1	23122EX1K
	180	56	2	23122AX	23122AXK	535000	605000	3,000	4,050		5	9	4	120.0	170.0	2.0	0.33	2.04	3.03	1.99	5.80	23122AX	23122AXK
	180	69	2	24122EX1	24122EX1K30	633000	743000	2,700	3,600		6	11	4	120.0	170.0	2.0	0.37	1.84	2.74	1.80	6.89	24122EX1	24122EX1K30
	180	69	2	24122AX	24122AXK30	620000	654000	2,700	3,600		6	11	4	120.0	170.0	2.0	0.37	1.80	2.69	1.76	6.85	24122AX	24122AXK30
	200	53	2.1	22222EX	22222EXK	680000	640000	2,600	3,200		5	10	6	122.0	188.0	2.0	0.26	2.64	3.93	2.58	7.36	22222EX	22222EXK
	200	53	2.1	22222AEX	22222AEXK	605000	550000	3,300	4,350		6	10	6	122.0	188.0	2.0	0.29	2.31	3.44	2.26	7.53	22222AEX	22222AEXK
	200	69.8	2.1	23222EX1	23222EX1K	750000	793000	2,550	3,300		6	11	6	122.0	188.0	2.0	0.34	1.99	2.96	1.94	9.60	23222EX1	23222EX1K
	200	69.8	2.1	23222AX	23222AXK	740000	801000	2,850	3,750		6	11	6	122.0	188.0	2.0	0.38	1.78	2.65	1.74	10.0	23222AX	23222AXK
	240	50	3	21322EX1	21322EX1K	675000	635000	2,100	2,850		4	8	6	124.0	226.0	2.5	0.21	3.19	4.75	3.12	11.6	21322EX1	21322EX1K
	240	50	3	21322AX	21322AXK	655000	601000	3,000	3,750		4	8	6	124.0	226.0	2.5	0.24	2.78	4.14	2.72	12.2	21322AX	21322AXK
	240	80	3	22322EX	22322EXK	1150000	1040000	1,950	2,700		6	12	6	124.0	226.0	2.5	0.33	2.03	3.02	1.98	18.1	22322EX	22322EXK
	240	80	3	22322AEX	22322AEXK	1030000	940000	3,000	3,750		6	12	6	124.0	226.0	2.5	0.38	1.77	2.63	1.73	18.2	22322AEX	22322AEXK

Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

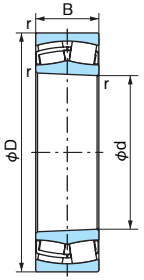
NACHI

Spherical Roller Bearings

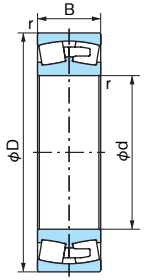
Bore Diameter: 120～130mm



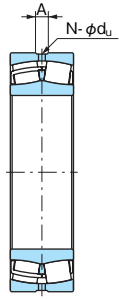
Cylindrical bore



Tapered bore

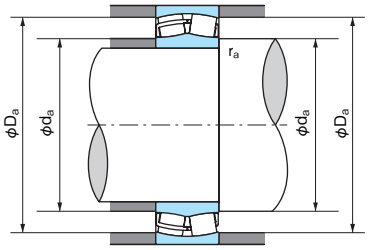


With machined brass cage



With oil holes / oil groove (W33)

1N=0.102kgf



■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values of Y_1, Y_2 and e from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

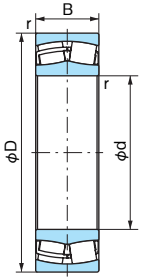
Values Y_0 from table.

Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant e	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.	
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter du	Groove width A	Hole count N	da (min)	Da (max)	ra (max)		Y_1	Y_2	Y_0		Cylindrical bore	Tapered bore
120	180	46	2	23024E	23024EK	430000	515000	2,550	3,300	5	9	4	130.0	170.0	2.0	0.23	2.95	4.39	2.89	4.20	23024E	23024EK
	180	46	2	23024AX	23024AXK	430000	516000	3,450	4,500	5	9	4	130.0	170.0	2.0	0.27	2.52	3.76	2.47	4.20	23024AX	23024AXK
	180	60	2	24024EX1	24024EX1K30	540000	683000	2,550	3,450	5	9	4	130.0	170.0	2.0	0.30	2.23	3.32	2.18	5.36	24024EX1	24024EX1K30
	180	60	2	24024AX	24024AXK30	540000	627000	2,550	3,450	5	9	4	130.0	170.0	2.0	0.31	2.21	3.29	2.16	5.26	24024AX	24024AXK30
	200	62	2	23124EX1	23124EX1K	675000	720000	2,400	3,300	5	9	6	130.0	190.0	2.0	0.29	2.34	3.49	2.29	7.90	23124EX1	23124EX1K
	200	62	2	23124AX	23124AXK	645000	734000	2,700	3,600	5	9	6	130.0	190.0	2.0	0.34	2.00	2.99	1.96	8.10	23124AX	23124AXK
	200	80	2	24124EX1	24124EX1K30	815000	970000	2,400	3,300	6	11	6	130.0	190.0	2.0	0.38	1.78	2.65	1.74	10.1	24124EX1	24124EX1K30
	200	80	2	24124AX	24124AXK30	780000	850000	2,400	3,300	6	11	6	130.0	190.0	2.0	0.39	1.73	2.58	1.69	9.90	24124AX	24124AXK30
	215	58	2.1	22224EX	22224EXK	785000	765000	2,400	3,000	5	10	6	132.0	203.0	2.0	0.26	2.60	3.87	2.54	9.28	22224EX	22224EXK
	215	58	2.1	22224AEX	22224AEXK	700000	650000	3,150	4,050	5	10	6	132.0	203.0	2.0	0.30	2.28	3.40	2.23	9.35	22224AEX	22224AEXK
	215	76	2.1	23224EX1	23224EX1K	860000	956000	2,250	3,150	6	13	6	132.0	203.0	2.0	0.34	1.97	2.94	1.93	12.0	23224EX1	23224EX1K
	215	76	2.1	23224AX	23224AXK	860000	962000	2,550	3,450	6	13	6	132.0	203.0	2.0	0.39	1.73	2.57	1.69	12.3	23224AX	23224AXK
	260	55	3	21324E	21324EK	790000	765000	1,950	2,400	5	12	6	134.0	246.0	2.5	0.21	3.17	4.72	3.10	15.3	21324E	21324EK
	260	86	3	22324EX	22324EXK	1250000	1130000	1,800	2,600	8	14	6	134.0	246.0	2.5	0.33	2.03	3.02	1.98	22.6	22324EX	22324EXK
	260	86	3	22324AEX	22324AEXK	1180000	1040000	2,700	3,450	8	14	6	134.0	246.0	2.5	0.38	1.77	2.64	1.73	22.2	22324AEX	22324AEXK
130	180	37	1.5	23926E	23926EK	284000	355000	2,700	3,450	4	8	4	138.5	171.5	1.5	0.18	3.66	5.46	3.58	2.87	23926E	23926EK
	200	52	2	23026E	23026EK	555000	660000	2,400	3,000	5	10	6	140.0	190.0	2.0	0.24	2.87	4.27	2.80	6.14	23026E	23026EK
	200	52	2	23026AX	23026AXK	560000	664000	3,150	4,050	5	10	6	140.0	190.0	2.0	0.27	2.50	3.72	2.44	6.10	23026AX	23026AXK
	200	69	2	24026EX1	24026EX1K30	710000	900000	2,400	3,150	6	11	6	140.0	190.0	2.0	0.32	2.14	3.18	2.09	7.93	24026EX1	24026EX1K30
	200	69	2	24026AX	24026AXK30	680000	803000	2,400	3,150	6	11	6	140.0	190.0	2.0	0.33	2.04	3.04	2.00	7.77	24026AX	24026AXK30
	210	64	2	23126EX1	23126EX1K	690000	799000	2,200	3,000	5	9	6	140.0	200.0	2.0	0.28	2.42	3.61	2.37	8.60	23126EX1	23126EX1K
	210	64	2	23126AX	23126AXK	705000	827000	2,500	3,300	5	9	6	140.0	200.0	2.0	0.30	2.25	3.34	2.20	8.90	23126AX	23126AXK
	210	80	2	24126EX1	24126EX1K30	840000	1030000	2,200	3,000	6	11	6	140.0	200.0	2.0	0.36	1.90	2.83	1.86	10.7	24126EX1	24126EX1K30
	210	80	2	24126AX	24126AXK30	815000	918000	2,200	3,000	6	11	6	140.0	200.0	2.0	0.37	1.83	2.72	1.79	10.5	24126AX	24126AXK30
	230	64	3	22226EX	22226EXK	910000	915000	2,200	2,600	5	10	6	144.0	216.0	2.5	0.26	2.55	3.80	2.50	11.6	22226EX	22226EXK
	230	64	3	22226AEX	22226AEXK	815000	765000	2,800	3,700	5	10	6	144.0	216.0	2.5	0.30	2.22	3.30	2.17	11.6	22226AEX	22226AEXK
	230	80	3	23226EX1	23226EX1K	980000	1090000	2,100	2,800	6	13	6	144.0	216.0	2.5	0.33	2.05	3.05	2.00	14.2	23226EX1	23226EX1K
	230	80	3	23226AX	23226AXK	965000	1070000	2,400	3,100	6	13	6	144.0	216.0	2.5	0.38	1.78	2.65	1.74	14.5	23226AX	23226AXK
	280	93	4	22326EX	22326EXK	1450000	1340000	1,700	2,500	8	16	6	148.0	262.0	3.0	0.33	2.03	3.02	1.98	28.4	22326EX	22326EXK
	280	93	4	22326AEX	22326AEXK	1370000	1220000	2,500	3,300	8	16	6	148.0	262.0	3.0	0.38	1.77	2.64	1.73	27.3	22326AEX	22326AEXK

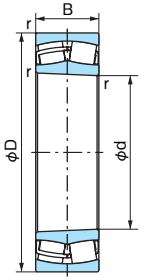
Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

Spherical Roller Bearings

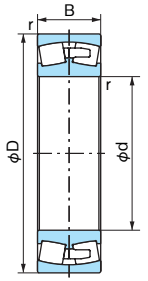
Bore Diameter: 140～150mm



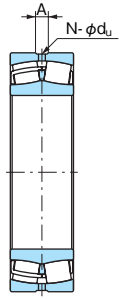
Cylindrical bore



Tapered bore

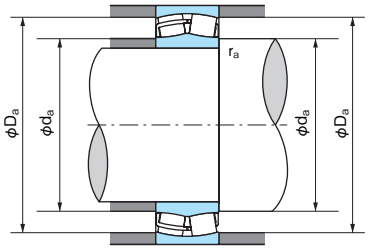


With machined brass cage



With oil holes / oil groove (W33)

1N=0.102kgf



■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values of Y_1, Y_2 and e from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

Values Y_0 from table.

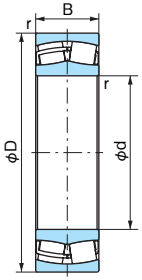
Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant e	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.	
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter du	Groove width A	Hole count N	da (min)	Da (max)	ra (max)		Y_1	Y_2	Y_0		Cylindrical bore	Tapered bore
140	190	37	1.5	23928AX	23928AXK	345000	466000	2,550	3,300	4	7	6	148.5	181.5	1.5	0.18	3.79	5.65	3.71	3.13	23928AX	23928AXK
	210	53	2	23028E	23028EK	585000	710000	2,400	2,800	5	10	6	150.0	200.0	2.0	0.23	2.98	4.44	2.91	6.61	23028E	23028EK
	210	53	2	23028AX	23028AXK	580000	711000	3,000	3,900	5	10	6	150.0	200.0	2.0	0.25	2.75	4.10	2.69	6.70	23028AX	23028AXK
	210	69	2	24028EX1	24028EX1K30	720000	920000	2,200	3,000	6	11	6	150.0	200.0	2.0	0.30	2.28	3.39	2.23	8.40	24028EX1	24028EX1K30
	210	69	2	24028AX	24028AXK30	720000	819000	2,200	3,000	6	11	6	150.0	200.0	2.0	0.31	2.15	3.20	2.10	8.22	24028AX	24028AXK30
	225	68	2.1	23128EX1	23128EX1K	790000	940000	2,100	2,850	6	11	6	152.0	213.0	2.0	0.28	2.45	3.65	2.40	10.5	23128EX1	23128EX1K
	225	68	2.1	23128AX	23128AXK	790000	934000	2,200	3,100	6	11	6	152.0	213.0	2.0	0.30	2.27	3.37	2.22	10.8	23128AX	23128AXK
	225	85	2.1	24128EX1	24128EX1K30	950000	1180000	2,100	2,800	8	14	6	152.0	213.0	2.0	0.36	1.87	2.79	1.83	13.0	24128EX1	24128EX1K30
	225	85	2.1	24128AX	24128AXK30	930000	1030000	2,100	2,800	8	14	6	152.0	213.0	2.0	0.36	1.87	2.79	1.83	12.7	24128AX	24128AXK30
	250	68	3	22228EX	22228EXK	1050000	1030000	1,900	2,500	6	12	6	154.0	236.0	2.5	0.26	2.60	3.87	2.54	13.9	22228EX	22228EXK
	250	68	3	22228AEX	22228AEXK	945000	890000	2,700	3,400	6	12	6	154.0	236.0	2.5	0.30	2.26	3.37	2.21	14.8	22228AEX	22228AEXK
	250	88	3	23228EX1	23228EX1K	1130000	1290000	1,900	2,500	8	15	6	154.0	236.0	2.5	0.34	1.99	2.96	1.95	18.8	23228EX1	23228EX1K
	250	88	3	23228AX	23228AXK	1120000	1270000	2,200	2,800	8	16	6	154.0	236.0	2.5	0.38	1.78	2.65	1.74	19.3	23228AX	23228AXK
	300	102	4	22328E	22328EK	1540000	1520000	1,600	2,200	10	22	6	158.0	282.0	3.0	0.37	1.82	2.72	1.78	35.9	22328E	22328EK
	300	102	4	22328A2X	22328A2XK	1560000	1540000	2,200	3,000	10	22	6	158.0	282.0	3.0	0.40	1.69	2.52	1.65	34.5	22328A2X	22328A2XK
150	210	45	2	23930AX	23930AXK	465000	622000	2,400	3,000	5	9	6	200.0	160.0	2.0	0.20	3.44	5.12	3.36	5.01	23930AX	23930AXK
	225	56	2.1	23030E	23030EK	640000	790000	1,900	2,500	5	11	6	162.0	213.0	2.0	0.22	3.04	4.53	2.97	8.01	23030E	23030EK
	225	56	2.1	23030AX	23030AXK	640000	791000	2,700	3,600	5	11	6	162.0	213.0	2.0	0.24	2.79	4.16	2.73	8.20	23030AX	23030AXK
	225	75	2.1	24030EX1	24030EX1K30	815000	1060000	2,100	2,700	6	11	6	162.0	213.0	2.0	0.30	2.23	3.32	2.18	10.5	24030EX1	24030EX1K
	225	75	2.1	24030AX	24030AXK30	815000	924000	2,100	2,700	6	11	6	162.0	213.0	2.0	0.32	2.10	3.13	2.06	10.4	24030AX	24030AXK30
	250	80	2.1	23130EX1	23130EX1K	1000000	1230000	1,900	2,500	6	13	6	162.0	238.0	2.0	0.30	2.24	3.34	2.19	16.2	23130EX1	23130EX1K
	250	80	2.1	23130AX	23130AXK	1030000	1310000	2,100	2,800	6	13	6	162.0	238.0	2.0	0.35	1.95	2.91	1.91	16.7	23130AX	23130AXK
	250	100	2.1	24130EX1	24130EX1K30	1230000	1520000	1,900	2,500	8	14	6	162.0	238.0	2.0	0.38	1.77	2.64	1.73	19.6	24130EX1	24130EX1K30
	250	100	2.1	24130AX	24130AXK30	1120000	1340000	1,900	2,500	8	14	6	162.0	238.0	2.0	0.38	1.76	2.62	1.72	19.5	24130AX	24130AXK30
	270	73	3	22230EX	22230EXK	1200000	1200000	1,800	2,400	6	14	6	164.0	256.0	2.5	0.25	2.69	4.00	2.63	18.9	22230EX	22230EXK
	270	73	3	22230AEX	22230AEXK	1060000	1020000	2,400	3,100	6	14	6	164.0	256.0	2.5	0.29	2.30	3.42	2.25	18.1	22230AEX	22230AEXK
	270	96	3	23230EX1	23230EX1K	1340000	1540000	1,800	2,400	8	15	6	164.0	256.0	2.5	0.34	1.96	2.93	1.92	24.2	23230EX1	23230EX1K
	270	96	3	23230AX	23230AXK	1320000	1530000	1,900	2,700	8	15	6	164.0	256.0	2.5	0.40	1.70	2.53	1.66	24.8	23230AX	23230AXK
	320	108	4	22330E	22330EK	1770000	1740000	1,500	2,100	10	22	6	168.0	302.0	3.0	0.37	1.82	2.70	1.78	43.3	22330E	22330EK
	320	108	4	22330A2X	22330A2XK	1720000	1710000	2,100	2,800	10	22	6	168.0	302.0	3.0	0.40	1.67	2.49	1.63	41.5	22330A2X	22330A2XK

Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

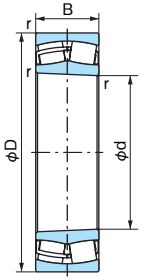
NACHI

Spherical Roller Bearings

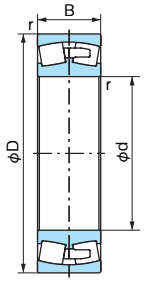
Bore Diameter: 160～170mm



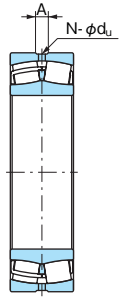
Cylindrical bore



Tapered bore

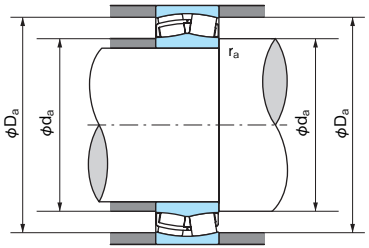


With machined brass cage



With oil holes / oil groove (W33)

1N=0.102kgf



■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values of Y_1, Y_2 and e from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

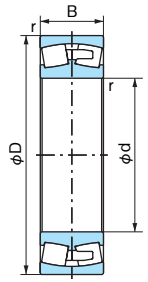
Values Y_0 from table.

Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant e	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.	
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter du	Groove width A	Hole count N	da (min)	Da (max)	ra (max)		Y_1	Y_2	Y_0		Cylindrical bore	Tapered bore
160	220	45	2	23932AX	23932AXK	475000	649000	2,250	2,800	5	10	6	170.0	210.0	2.0	0.19	3.60	5.37	3.52	5.29	23932AX	23932AXK
	240	60	2.1	23032E	23032EK	735000	915000	1,800	2,400	5	11	6	172.0	228.0	2.0	0.22	3.01	4.48	2.94	9.74	23032E	23032EK
	240	60	2.1	23032AX	23032AXK	735000	917000	2,500	3,300	5	11	6	172.0	228.0	2.0	0.24	2.79	4.16	2.73	9.90	23032AX	23032AXK
	240	80	2.1	24032EX1	24032EX1K30	950000	1280000	1,900	2,500	6	11	6	172.0	228.0	2.0	0.30	2.24	3.34	2.19	12.7	24032EX1	24032EX1K30
	240	80	2.1	24032AX	24032AXK30	915000	1110000	1,900	2,500	6	11	6	172.0	228.0	2.0	0.32	2.12	3.15	2.07	12.4	24032AX	24032AXK30
	270	86	2.1	23132EX1	23132EX1K	1180000	1430000	1,800	2,400	8	16	6	172.0	258.0	2.0	0.30	2.22	3.30	2.17	20.5	23132EX1	23132EX1K
	270	86	2.1	23132AX	23132AXK	1200000	1460000	1,900	2,500	8	16	6	172.0	258.0	2.0	0.34	1.96	2.91	1.91	21.2	23132AX	23132AXK
	270	109	2.1	24132EX1	24132EX1K30	1450000	1810000	1,800	2,400	10	17	6	172.0	258.0	2.0	0.39	1.74	2.59	1.70	25.5	24132EX1	24132EX1K30
	270	109	2.1	24132AX	24132AXK30	1340000	1610000	1,800	2,400	10	17	6	172.0	258.0	2.0	0.39	1.74	2.59	1.70	25.5	24132AX	24132AXK30
	290	80	3	22232E	22232EK	1230000	1330000	1,500	2,100	6	14	6	174.0	276.0	2.5	0.26	2.57	3.83	2.52	23.7	22232E	22232EK
	290	80	3	22232E2	22232E2K	1230000	1320000	1,800	2,400	6	14	6	174.0	276.0	2.5	0.28	2.37	3.53	2.32	24.0	22232E2	22232E2K
	290	80	3	22232A2X	22232A2XK	1210000	1300000	2,200	3,000	6	14	6	174.0	276.0	2.5	0.31	2.20	3.27	2.15	23.8	22232A2X	22232A2XK
	290	104	3	23232E	23232EK	1500000	1710000	1,300	1,800	10	22	6	174.0	276.0	2.5	0.37	1.82	2.71	1.78	30.4	23232E	23232EK
	290	104	3	23232A2X	23232A2XK	1460000	1650000	1,900	2,400	10	22	6	174.0	276.0	2.5	0.39	1.72	2.56	1.68	30.7	23232A2X	23232A2XK
	340	114	4	22332E	22332EK	1950000	1950000	1,400	1,900	10	22	6	178.0	322.0	3.0	0.36	1.85	2.75	1.81	51.4	22332E	22332EK
170	230	45	2	23934AX	23934AXK	490000	691000	2,100	2,700	5	10	6	180.0	220.0	2.0	0.18	3.78	5.63	3.70	5.58	23934AX	23934AXK
	260	67	2.1	23034E	23034EK	880000	1080000	1,600	2,200	6	13	6	182.0	248.0	2.0	0.23	2.89	4.31	2.83	13.1	23034E	23034EK
	260	67	2.1	23034AX	23034AXK	880000	1080000	2,400	3,100	6	13	6	182.0	248.0	2.0	0.27	2.51	3.74	2.45	13.1	23034AX	23034AXK
	260	90	2.1	24034EX1	24034EX1K30	1120000	1480000	1,800	2,400	8	14	6	182.0	248.0	2.0	0.32	2.11	3.15	2.07	17.3	24034EX1	24034EX1K30
	260	90	2.1	24034AX	24034AXK30	1030000	1320000	1,800	2,400	8	14	6	182.0	248.0	2.0	0.34	2.00	2.97	1.95	17.0	24034AX	24034AXK30
	280	88	2.1	23134EX1	23134EX1K	1260000	1530000	1,600	2,200	8	16	6	182.0	268.0	2.0	0.29	2.30	3.43	2.25	21.6	23134EX1	23134EX1K
	280	88	2.1	23134AX	23134AXK	1260000	1500000	1,800	2,400	8	16	6	182.0	268.0	2.0	0.34	2.01	3.00	1.97	22.2	23134AX	23134AXK
	280	109	2.1	24134AX	24134AXK30	1360000	1650000	1,600	2,200	10	17	6	182.0	268.0	2.0	0.37	1.82	2.70	1.78	26.4	24134AX	24134AXK30
	310	86	4	22234E	22234EK	1390000	1510000	1,400	1,900	8	18	6	188.0	292.0	3.0	0.29	2.33	3.47	2.28	30.0	22234E	22234EK
	310	110	4	23234E	23234EK	1720000	1970000	1,300	1,800	10	22	6	188.0	292.0	3.0	0.36	1.85	2.75	1.81	37.0	23234E	23234EK
	310	110	4	23234A2X	23234A2XK	1680000	1910000	1,800	2,250	10	22	6	188.0	292.0	3.0	0.39	1.71	2.54	1.67	37.6	23234A2X	23234A2XK
	360	120	4	22334E	22334EK	2150000	2200000	1,300	1,800	10	22	6	188.0	342.0	3.0	0.36	1.85	2.75	1.81	60.6	22334E	22334EK

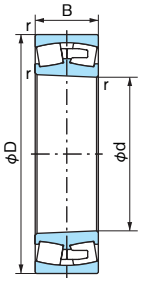
Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

Spherical Roller Bearings

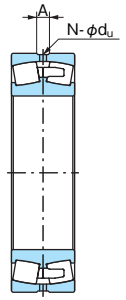
Bore Diameter: 180～200mm



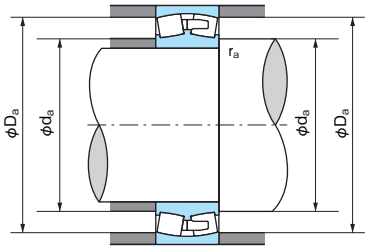
Cylindrical bore



Tapered bore



With oil holes / oil groove (W33)



■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values of Y_1, Y_2 and e from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

Values Y_0 from table.

1N=0.102kgf

Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant e	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.	
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter du	Groove width A	Hole count N	da (min)	Da (max)	ra (max)		Y_1	Y_2	Y_0		Cylindrical bore	Tapered bore
180	250	52	2	23936AX	23936AXK	665000	939000	1,900	2,500	6	10	6	190.0	240.0	2.0	0.19	3.55	5.29	3.48	8.10	23936AX	23936AXK
	280	74	2.1	23036E	23036EK	1070000	1330000	1,500	2,200	8	15	6	192.0	268.0	2.0	0.24	2.84	4.23	2.78	17.4	23036E	23036EK
	280	74	2.1	23036AX	23036AXK	1040000	1280000	2,200	2,800	8	15	6	192.0	268.0	2.0	0.27	2.47	3.67	2.41	17.5	23036AX	23036AXK
	280	100	2.1	24036EX1	24036EX1K30	1330000	1760000	1,600	2,100	8	16	6	192.0	268.0	2.0	0.33	2.04	3.03	1.99	22.7	24036EX1	24036EX1K30
	280	100	2.1	24036AX	24036AXK30	1230000	1580000	1,600	2,100	8	16	6	192.0	268.0	2.0	0.32	2.12	3.15	2.07	22.5	24036AX	24036AXK30
	300	96	3	23136E	23136EK	1490000	1810000	1,300	1,800	8	18	6	194.0	286.0	2.5	0.32	2.12	3.15	2.07	27.9	23136E	23136EK
	300	96	3	23136A2X	23136A2XK	1450000	1740000	1,800	2,200	8	18	6	194.0	286.0	2.5	0.33	2.04	3.04	2.00	28.2	23136A2X	23136A2XK
	300	118	3	24136E	24136EK30	1640000	2040000	1,350	1,800	10	22	6	194.0	286.0	2.5	0.39	1.73	2.57	1.69	33.7	24136E	24136EK30
	320	86	4	22236E	22236EK	1460000	1610000	1,400	1,900	8	18	6	198.0	302.0	3.0	0.28	2.43	3.61	2.37	30.9	22236E	22236EK
	320	112	4	23236E	23236EK	1790000	2100000	1,200	1,600	10	22	6	198.0	302.0	3.0	0.36	1.87	2.79	1.83	39.4	23236E	23236EK
	320	112	4	23236A2X	23236A2XK	1750000	2070000	1,800	2,200	10	22	6	198.0	302.0	3.0	0.39	1.75	2.61	1.71	39.0	23236A2X	23236A2XK
	380	126	4	22336E	22336EK	2380000	2400000	1,200	1,600	12	26	6	198.0	362.0	3.0	0.36	1.87	2.78	1.83	70.5	22336E	22336EK
190	260	52	2	23938AX	23938AXK	675000	969000	1,800	2,400	6	10	6	200.0	250.0	2.0	0.18	3.69	5.50	3.61	8.46	23938AX	23938AXK
	290	75	2.1	23038E	23038EK	1080000	1330000	1,400	1,900	6	14	6	202.0	278.0	2.0	0.25	2.69	4.00	2.63	18.4	23038E	23038EK
	290	75	2.1	23038A2X	23038A2XK	1080000	1310000	2,100	2,800	6	14	6	202.0	278.0	2.0	0.26	2.55	3.80	2.50	17.8	23038A2X	23038A2XK
	290	100	2.1	24038E	24038EK30	1420000	1920000	1,300	1,800	8	18	6	202.0	278.0	2.0	0.34	1.98	2.94	1.93	24.6	24038E	24038EK30
	320	104	3	23138E	23138EK	1720000	2120000	1,200	1,600	10	22	6	204.0	306.0	2.5	0.32	2.09	3.11	2.04	35.0	23138E	23138EK
	320	104	3	23138A2X	23138A2XK	1710000	2090000	1,600	2,100	10	22	6	204.0	306.0	2.5	0.34	1.96	2.92	1.92	33.5	23138A2X	23138A2XK
	320	128	3	24138E	24138EK30	1900000	2380000	1,200	1,600	12	26	6	204.0	306.0	2.5	0.40	1.68	2.50	1.64	42.0	24138E	24138EK30
	340	92	4	22238E	22238EK	1590000	1740000	1,300	1,800	8	18	6	208.0	322.0	3.0	0.28	2.39	3.56	2.34	37.2	22238E	22238EK
	340	120	4	23238E	23238EK	2070000	2450000	1,200	1,500	10	22	6	208.0	322.0	3.0	0.36	1.87	2.79	1.83	48.0	23238E	23238EK
	340	120	4	23238A2X	23238A2XK	2000000	2370000	1,600	2,100	10	22	6	208.0	322.0	3.0	0.39	1.72	2.56	1.68	47.5	23238A2X	23238A2XK
	400	132	5	22338E	22338EK	2600000	2670000	1,200	1,600	12	26	6	212.0	378.0	4.0	0.36	1.89	2.81	1.85	81.8	22338E	22338EK
200	280	60	2.1	23940AX	23940AXK	840000	1190000	1,800	2,200	6	11	6	212.0	268.0	2.0	0.20	3.44	5.13	3.37	11.9	23940AX	23940AXK
	310	82	2.1	23040E	23040EK	1270000	1560000	1,400	1,900	8	18	6	212.0	298.0	2.0	0.26	2.64	3.93	2.58	23.4	23040E	23040EK
	310	82	2.1	23040A2X	23040A2XK	1270000	1570000	1,900	2,500	8	18	6	212.0	298.0	2.0	0.28	2.45	3.64	2.39	23.3	23040A2X	23040A2XK
	310	109	2.1	24040E	24040EK30	1640000	2230000	1,200	1,600	10	22	6	212.0	298.0	2.0	0.35	1.95	2.90	1.91	31.2	24040E	24040EK30
	340	112	3	23140E	23140EK	1950000	2390000	1,200	1,500	10	22	6	214.0	326.0	2.5	0.33	2.06	3.06	2.01	42.7	23140E	23140EK
	340	112	3	23140A2X	23140A2XK	1900000	2330000	1,600	2,100	10	22	6	214.0	326.0	2.5	0.35	1.94	2.83	1.89	42.5	23140A2X	23140A2XK
	340	140	3	24140E	24140EK30	2220000	2820000	1,200	1,500	12	26	6	214.0	326.0	2.5	0.41	1.63	2.43	1.60	52.9	24140E	24140EK30
	360	98	4	22240E	22240EK	1810000	1990000	1,200	1,600	8	18	6	218.0	342.0	3.0	0.29	2.35	3.50	2.30	44.8	22240E	22240EK
	360	128	4	23240E	23240EK	2290000	2750000	1,200	1,500	12	26	6	218.0	342.0	3.0	0.37	1.85	2.75	1.80	57.7	23240E	23240EK
	360	128	4	23240A2X	23240A2XK	2240000	2680000	1,500	1,900	12	26	6	218.0	342.0	3.0	0.39	1.71	2.54	1.67	57.0	23240A2X	23240A2XK
	420	138	5	22340E	22340EK	2890000	3000000	1,200	1,500	12	26	6	222.0	398.0	4.0	0.35	1.93	2.87	1.88	93.7	22340E	22340EK

Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

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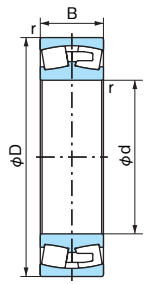
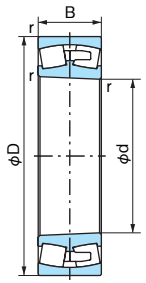
Spherical Roller Bearings

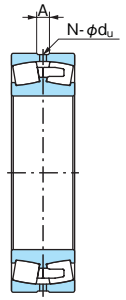
Bore Diameter: 220～260mm



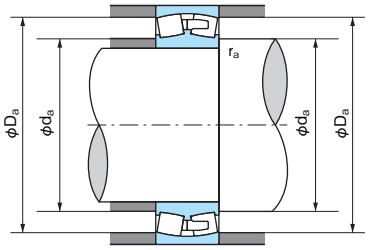
Cylindrical bore



Tapered bore



With oil holes / oil groove (W33)



■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values of Y_1, Y_2 and e from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

Values Y_0 from table.

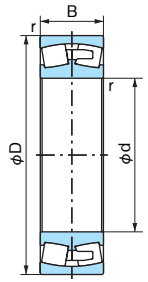
1N=0.102kgf

Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant e	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.	
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter du	Groove width A	Hole count N	da (min)	Da (max)	ra (max)		Y_1	Y_2	Y_0		Cylindrical bore	Tapered bore
220	300	60	2.1	**23944E**	**23944EK**	840000	1190000	1,300	1,800	6	12	6	232.0	288.0	2.0	0.18	3.75	5.59	3.67	12.6	**23944E**	**23944EK**
	340	90	3	**23044E**	**23044EK**	1470000	1880000	1,200	1,600	8	18	6	234.0	326.0	2.5	0.26	2.64	3.93	2.58	30.7	**23044E**	**23044EK**
	340	90	3	**23044A2X**	**23044A2XK**	1460000	1860000	1,800	2,400	8	18	6	234.0	326.0	2.5	0.27	2.51	3.74	2.45	30.5	**23044A2X**	**23044A2XK**
	340	118	3	**24044E**	**24044EK30**	1950000	2670000	1,200	1,500	10	22	6	234.0	326.0	2.5	0.34	1.98	2.95	1.94	40.3	**24044E**	**24044EK30**
	370	120	4	**23144E**	**23144EK**	2250000	2870000	1,000	1,300	10	22	6	238.0	352.0	3.0	0.33	2.06	3.07	2.02	54.3	**23144E**	**23144EK**
	370	120	4	**23144A2X**	**23144A2XK**	2210000	2780000	1,500	1,800	10	22	6	238.0	352.0	3.0	0.34	1.98	2.94	1.93	54.6	**23144A2X**	**23144A2XK**
	370	150	4	**24144E**	**24144EK30**	2530000	3250000	1,100	1,400	12	26	6	238.0	352.0	3.0	0.41	1.66	2.47	1.62	66.3	**24144E**	**24144EK30**
	400	108	4	**22244E**	**22244EK**	2140000	2380000	1,200	1,500	10	22	6	238.0	382.0	3.0	0.29	2.36	3.52	2.31	61.9	**22244E**	**22244EK**
	400	144	4	**23244E**	**23244EK**	2920000	3500000	1,000	1,200	12	26	6	238.0	382.0	3.0	0.37	1.83	2.72	1.79	81.4	**23244E**	**23244EK**
	460	145	5	**22344E**	**22344EK**	3350000	3600000	1,000	1,300	12	26	6	242.0	438.0	4.0	0.34	2.00	2.98	1.95	119	**22344E**	**22344EK**
240	320	60	2.1	**23948E**	**23948EK**	870000	1260000	1,200	1,600	6	12	6	252.0	308.0	2.0	0.17	3.95	5.87	3.86	13.7	**23948E**	**23948EK**
	360	92	3	**23048E**	**23048EK**	1530000	2000000	1,200	1,500	8	18	6	254.0	346.0	2.5	0.24	2.76	4.11	2.70	33.5	**23048E**	**23048EK**
	360	92	3	**23048A2X**	**23048A2XK**	1570000	2090000	1,600	2,200	8	18	6	254.0	346.0	2.5	0.27	2.53	3.77	2.47	33.5	**23048A2X**	**23048A2XK**
	360	118	3	**24048E**	**24048EK30**	1990000	2800000	1,000	1,300	10	22	6	254.0	346.0	2.5	0.32	2.10	3.13	2.05	43.3	**24048E**	**24048EK30**
	400	128	4	**23148E**	**23148EK**	2610000	3350000	1,000	1,200	12	26	6	258.0	382.0	3.0	0.32	2.13	3.17	2.08	66.6	**23148E**	**23148EK**
	400	128	4	**23148A2X**	**23148A2XK**	2540000	3250000	1,300	1,600	12	26	6	258.0	382.0	3.0	0.33	2.02	3.00	1.97	68.5	**23148A2X**	**23148A2XK**
	400	160	4	**24148E**	**24148EK30**	2850000	3700000	1,000	1,200	12	26	6	258.0	382.0	3.0	0.40	1.69	2.51	1.65	81.6	**24148E**	**24148EK30**
	440	120	4	**22248E**	**22248EK**	2630000	2930000	1,000	1,300	10	22	6	258.0	422.0	3.0	0.28	2.37	3.53	2.32	82.8	**22248E**	**22248EK**
	440	160	4	**23248E**	**23248EK**	3400000	4100000	945	1,200	12	26	6	258.0	422.0	3.0	0.37	1.80	2.68	1.76	109	**23248E**	**23248EK**
	500	155	5	**22348E**	**22348EK**	3850000	4100000	1,000	1,200	12	26	6	262.0	487.0	4.0	0.34	2.00	2.98	1.96	151	**22348E**	**22348EK**
260	360	75	2.1	**23952E**	**23952EK**	1240000	1780000	1,200	1,500	8	14	6	272.0	348.0	2.0	0.19	3.54	5.27	3.46	23.7	**23952E**	**23952EK**
	400	104	4	**23052E**	**23052EK**	1950000	2530000	1,100	1,400	10	22	6	278.0	382.0	3.0	0.25	2.66	3.97	2.61	48.9	**23052E**	**23052EK**
	400	140	4	**24052E**	**24052EK30**	2630000	3700000	940	1,200	12	26	6	278.0	382.0	3.0	0.34	1.98	2.94	1.93	65.7	**24052E**	**24052EK30**
	440	144	4	**23152E**	**23152EK**	3100000	4000000	900	1,100	12	26	6	278.0	422.0	3.0	0.33	2.06	3.06	2.01	92	**23152E**	**23152EK**
	440	180	4	**24152E**	**24152EK30**	3550000	4650000	900	1,100	15	32	6	278.0	422.0	3.0	0.42	1.59	2.37	1.56	113	**24152E**	**24152EK30**
	480	130	5	**22252E**	**22252EK**	3100000	3500000	1,000	1,200	12	26	6	282.0	458.0	4.0	0.28	2.40	3.57	2.34	107	**22252E**	**22252EK**
	480	174	5	**23252E**	**23252EK**	3950000	4800000	840	1,000	15	32	6	282.0	458.0	4.0	0.38	1.78	2.65	1.74	142	**23252E**	**23252EK**
	540	165	6	**22352E**	**22352EK**	4350000	4750000	900	1,100	15	32	8	288.0	512.0	5.0	0.33	2.04	3.03	1.99	187	**22352E**	**22352EK**

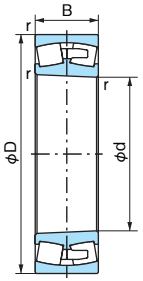
Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

Spherical Roller Bearings

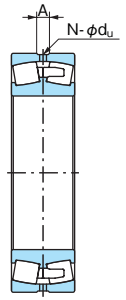
Bore Diameter: 280～340mm



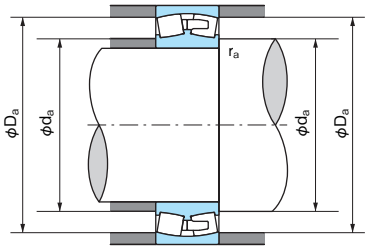
Cylindrical bore



Tapered bore



With oil holes / oil groove (W33)



■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values of Y_1, Y_2 and e from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

Values Y_0 from table.

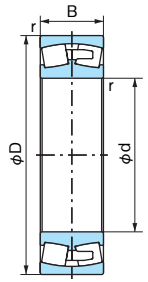
1N=0.102kgf

Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant e	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.	
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter du	Groove width A	Hole count N	da (min)	Da (max)	ra (max)		Y_1	Y_2	Y_0		Cylindrical bore	Tapered bore
280	380	75	2.1	**23956E**	**23956EK**	1260000	1840000	1,100	1,400	8	14	6	292.0	368.0	2.0	0.18	3.75	5.59	3.67	24.9	**23956E**	**23956EK**
	420	106	4	**23056E**	**23056EK**	2030000	2720000	1,000	1,300	10	22	6	298.0	402.0	3.0	0.24	2.79	4.15	2.73	52.7	**23056E**	**23056EK**
	420	140	4	**24056E**	**24056EK30**	2680000	3900000	900	1,100	12	26	6	298.0	402.0	3.0	0.32	2.09	3.11	2.04	69.6	**24056E**	**24056EK30**
	460	146	5	**23156E**	**23156EK**	3200000	4200000	840	1,000	12	26	6	302.0	438.0	4.0	0.32	2.12	3.15	2.07	98.4	**23156E**	**23156EK**
	460	180	5	**24156E**	**24156EK30**	3550000	4800000	840	1,000	15	32	6	302.0	438.0	4.0	0.39	1.74	2.59	1.70	120	**24156E**	**24156EK30**
	500	130	5	**22256E**	**22256EK**	3200000	3700000	940	1,200	12	26	6	302.0	478.0	4.0	0.27	2.53	3.77	2.47	113	**22256E**	**22256EK**
	500	176	5	**23256E**	**23256EK**	4150000	5200000	790	1,000	15	32	6	302.0	478.0	4.0	0.36	1.87	2.79	1.83	152	**23256E**	**23256EK**
	580	175	6	**22356E**	**22356EK**	4950000	5450000	840	1,000	15	32	8	308.0	552.0	5.0	0.33	2.07	3.09	2.03	228	**22356E**	**22356EK**
300	420	90	3	**23960E**	**23960EK**	1740000	2520000	1,000	1,200	10	18	6	314.0	406.0	2.5	0.20	3.42	5.08	3.34	39.7	**23960E**	**23960EK**
	460	118	4	**23060E**	**23060EK**	2500000	3300000	940	1,200	10	22	6	318.0	442.0	3.0	0.25	2.71	4.04	2.65	72.8	**23060E**	**23060EK**
	460	160	4	**24060E**	**24060EK30**	3350000	4850000	840	1,000	12	26	6	318.0	442.0	3.0	0.34	1.99	2.96	1.94	98.7	**24060E**	**24060EK30**
	500	160	5	**23160E**	**23160EK**	3650000	4750000	790	1,000	12	26	6	322.0	478.0	4.0	0.33	2.06	3.06	2.01	129	**23160E**	**23160EK**
	500	200	5	**24160E**	**24160EK30**	4450000	6100000	790	1,000	15	32	6	322.0	478.0	4.0	0.40	1.68	2.50	1.64	160	**24160E**	**24160EK30**
	540	140	5	**22260E**	**22260EK**	3700000	4300000	900	1,100	12	26	8	322.0	518.0	4.0	0.27	2.49	3.71	2.43	144	**22260E**	**22260EK**
	540	192	5	**23260E**	**23260EK**	4950000	6250000	720	900	15	32	8	322.0	518.0	4.0	0.37	1.84	2.73	1.80	196	**23260E**	**23260EK**
	620	185	7.5	**22360E**	**22360EK**	5500000	6050000	780	970	15	32	8	336.0	584.0	6.0	0.32	2.09	3.11	2.04	279	**22360E**	**22360EK**
320	440	90	3	**23964E**	**23964EK**	1770000	2610000	940	1,200	10	18	6	334.0	426.0	2.5	0.19	3.58	5.33	3.50	41.8	**23964E**	**23964EK**
	480	121	4	**23064E**	**23064EK**	2590000	3500000	900	1,100	12	26	6	338.0	462.0	3.0	0.24	2.76	4.11	2.70	78.6	**23064E**	**23064EK**
	480	160	4	**24064E**	**24064EK30**	3400000	5100000	790	1,000	12	26	6	338.0	462.0	3.0	0.32	2.09	3.11	2.04	104	**24064E**	**24064EK30**
	540	176	5	**23164E**	**23164EK**	4350000	5700000	720	900	15	32	8	342.0	518.0	4.0	0.33	2.03	3.02	1.98	168	**23164E**	**23164EK**
	540	218	5	**24164E**	**24164EK30**	5050000	6900000	720	900	15	35	4	342.0	518.0	4.0	0.41	1.65	2.46	1.61	206	**24164E**	**24164EK30**
	580	150	5	**22264E**	**22264EK**	4250000	4900000	820	1,000	12	26	8	342.0	558.0	4.0	0.27	2.51	3.73	2.45	179	**22264E**	**22264EK**
	580	208	5	**23264E**	**23264EK**	5600000	7200000	670	840	20	40	8	342.0	558.0	4.0	0.37	1.83	2.72	1.79	244	**23264E**	**23264EK**
340	460	90	3	**23968E**	**23968EK**	1830000	2790000	900	1,100	10	18	6	354.0	446.0	2.5	0.18	3.80	5.66	3.72	44.1	**23968E**	**23968EK**
	520	133	5	**23068E**	**23068EK**	3150000	4300000	840	1,000	12	26	8	362.0	498.0	4.0	0.25	2.74	4.08	2.68	104	**23068E**	**23068EK**
	520	180	5	**24068E**	**24068EK30**	4100000	6050000	720	900	15	32	8	362.0	498.0	4.0	0.34	1.98	2.94	1.93	141	**24068E**	**24068EK30**
	580	190	5	**23168E**	**23168EK**	5150000	6750000	670	840	15	32	8	362.0	558.0	4.0	0.33	2.03	3.02	1.98	212	**23168E**	**23168EK**
	580	243	5	**24168E**	**24168EK30**	6050000	8300000	670	840	20	40	8	362.0	558.0	4.0	0.42	1.62	2.42	1.59	267	**24168E**	**24168EK30**
	620	165	6	**22268E**	**22268EK**	5600000	6850000	750	930	15	32	8	368.0	592.0	5.0	0.27	2.49	3.71	2.43	224	**22268E**	**22268EK**
	620	224	6	**23268E**	**23268EK**	6300000	8000000	600	790	20	40	8	368.0	592.0	5.0	0.37	1.82	2.70	1.78	299	**23268E**	**23268EK**

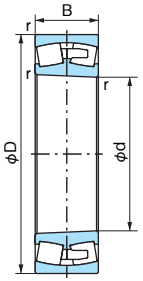
Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

Spherical Roller Bearings

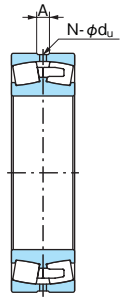
Bore Diameter: 360～440mm



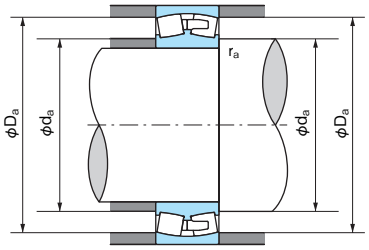
Cylindrical bore



Tapered bore



With oil holes / oil groove (W33)



■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values of Y_1, Y_2 and e from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

Values Y_0 from table.

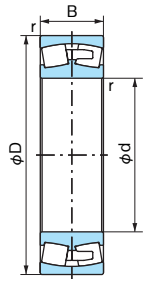
1N=0.102kgf

Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant e	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.	
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter du	Groove width A	Hole count N	da (min)	Da (max)	ra (max)		Y_1	Y_2	Y_0		Cylindrical bore	Tapered bore
360	480	90	3	**23972E**	**23972EK**	1890000	2960000	900	1,100	10	18	6	374.0	466.0	2.5	0.17	4.05	6.03	3.96	46.2	**23972E**	**23972EK**
	540	134	5	**23072E**	**23072EK**	3200000	4500000	790	1,000	12	26	8	382.0	518.0	4.0	0.24	2.84	4.23	2.78	110	**23072E**	**23072EK**
	540	180	5	**24072E**	**24072EK30**	4250000	6350000	670	840	15	32	8	382.0	518.0	4.0	0.33	2.06	3.06	2.01	148	**24072E**	**24072EK30**
	600	192	5	**23172E**	**23172EK**	5350000	7250000	640	790	15	32	8	382.0	578.0	4.0	0.33	2.07	3.09	2.03	225	**23172E**	**23172EK**
	600	243	5	**24172E**	**24172EK30**	6250000	8750000	640	790	20	40	8	382.0	578.0	4.0	0.42	1.60	2.39	1.57	279	**24172E**	**24172EK30**
	650	232	6	**23272E**	**23272EK**	6950000	9000000	570	750	20	40	8	388.0	622.0	5.0	0.37	1.82	2.70	1.78	342	**23272E**	**23272EK**
380	520	106	4	**23976E**	**23976EK**	2390000	3650000	790	1,000	12	24	8	398.0	502.0	3.0	0.19	3.58	5.33	3.50	68.2	**23976E**	**23976EK**
	560	135	5	**23076E**	**23076EK**	3300000	4700000	750	940	12	26	8	402.0	538.0	4.0	0.23	2.92	4.35	2.86	116	**23076E**	**23076EK**
	560	180	5	**24076E**	**24076EK30**	4300000	6650000	670	840	15	32	8	402.0	538.0	4.0	0.31	2.15	3.20	2.10	154	**24076E**	**24076EK30**
	620	194	5	**23176E**	**23176EK**	5400000	7400000	600	750	15	32	8	402.0	598.0	4.0	0.32	2.13	3.17	2.08	236	**23176E**	**23176EK**
	620	243	5	**24176E**	**24176EK30**	6450000	9300000	600	750	20	40	8	402.0	598.0	4.0	0.40	1.70	2.53	1.66	290	**24176E**	**24176EK30**
	680	240	6	**23276E**	**23276EK**	7500000	9800000	540	720	20	40	8	408.0	652.0	5.0	0.36	1.86	2.77	1.82	383	**23276E**	**23276EK**
400	540	106	4	**23980E**	**23980EK**	2470000	3900000	750	940	12	24	8	418.0	522.0	3.0	0.18	3.75	5.59	3.67	71.4	**23980E**	**23980EK**
	600	148	5	**23080E**	**23080EK**	3900000	5500000	720	900	12	26	8	422.0	578.0	4.0	0.24	2.81	4.19	2.75	151	**23080E**	**23080EK**
	600	200	5	**24080E**	**24080EK30**	5000000	7650000	600	750	15	32	8	422.0	578.0	4.0	0.33	2.03	3.02	1.98	204	**24080E**	**24080EK30**
	650	200	6	**23180E**	**23180EK**	5750000	7900000	570	720	15	32	8	428.0	622.0	5.0	0.31	2.18	3.24	2.13	266	**23180E**	**23180EK**
	650	250	6	**24180E**	**24180EK30**	6900000	9850000	570	720	20	40	8	428.0	622.0	5.0	0.39	1.73	2.57	1.69	330	**24180E**	**24180EK30**
	720	256	6	**23280E**	**23280EK**	8500000	11100000	510	670	20	45	8	428.0	692.0	5.0	0.36	1.86	2.77	1.82	461	**23280E**	**23280EK**
420	560	106	4	**23984E**	**23984EK**	2520000	4000000	720	900	12	24	8	438.0	542.0	3.0	0.18	3.85	5.73	3.76	74.4	**23984E**	**23984EK**
	620	150	5	**23084E**	**23084EK**	4050000	5850000	670	840	12	26	8	442.0	598.0	4.0	0.23	2.92	4.35	2.86	158	**23084E**	**23084EK**
	620	200	5	**24084E**	**24084EK30**	5150000	8000000	570	720	15	32	8	442.0	598.0	4.0	0.32	2.09	3.11	2.04	212	**24084E**	**24084EK30**
	700	224	6	**23184E**	**23184EK**	6800000	9250000	540	670	20	40	8	448.0	672.0	5.0	0.33	2.06	3.06	2.01	354	**23184E**	**23184EK**
	700	280	6	**24184E**	**24184EK30**	8350000	12000000	540	670	20	45	8	448.0	672.0	5.0	0.40	1.68	2.50	1.64	437	**24184E**	**24184EK30**
	760	272	7.5	**23284E**	**23284EK**	9400000	12500000	490	640	20	45	8	456.0	724.0	6.0	0.37	1.84	2.74	1.80	548	**23284E**	**23284EK**
440	600	118	4	**23988E**	**23988EK**	3100000	4900000	670	840	12	24	8	458.0	582.0	3.0	0.18	3.66	5.46	3.58	101	**23988E**	**23988EK**
	650	157	6	**23088E**	**23088EK**	4300000	6250000	640	790	12	26	8	468.0	622.0	5.0	0.24	2.87	4.27	2.80	183	**23088E**	**23088EK**
	650	212	6	**24088E**	**24088EK30**	5750000	9000000	540	670	20	40	8	468.0	622.0	5.0	0.32	2.09	3.11	2.04	247	**24088E**	**24088EK30**
	720	226	6	**23188E**	**23188EK**	7150000	10000000	510	640	20	40	8	468.0	692.0	5.0	0.32	2.13	3.17	2.08	371	**23188E**	**23188EK**
	720	280	6	**24188E**	**24188EK30**	8550000	12700000	510	640	20	45	8	468.0	692.0	5.0	0.39	1.73	2.58	1.69	460	**24188E**	**24188EK30**
	790	280	7.5	**23288E**	**23288EK**	10000000	13300000	480	600	20	45	8	476.0	754.0	6.0	0.36	1.86	2.77	1.82	605	**23288E**	**23288EK**

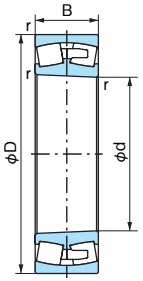
Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

Spherical Roller Bearings

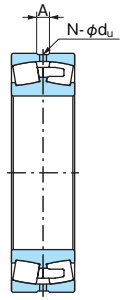
Bore Diameter : 460～600mm



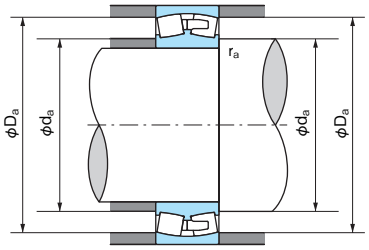
Cylindrical bore



Tapered bore



With oil holes / oil groove (W33)



■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values of Y_1, Y_2 and e from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

Values Y_0 from table.

1N=0.102kgf

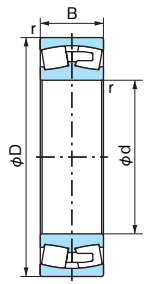
Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant e	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.	
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter du	Groove width A	Hole count N	da (min)	Da (max)	ra (max)		Y_1	Y_2	Y_0		Cylindrical bore	Tapered bore
460	620	118	4	**23992E**	**23992EK**	3050000	4900000	640	790	12	24	8	478.0	602.0	3.0	0.18	3.85	5.73	3.76	105	**23992E**	**23992EK**
	680	163	6	**23092E**	**23092EK**	4700000	6850000	600	750	15	32	8	488.0	652.0	5.0	0.23	2.92	4.35	2.86	208	**23092E**	**23092EK**
	680	218	6	**24092E**	**24092EK30**	6100000	9650000	510	640	20	40	8	488.0	652.0	5.0	0.32	2.12	3.15	2.07	279	**24092E**	**24092EK30**
	760	240	7.5	**23192E**	**23192EK**	8000000	11200000	480	600	20	40	8	496.0	724.0	6.0	0.32	2.12	3.15	2.07	446	**23192E**	**23192EK**
	760	300	7.5	**24192E**	**24192EK30**	9450000	13900000	480	600	20	45	8	496.0	724.0	6.0	0.40	1.69	2.52	1.65	550	**24192E**	**24192EK30**
	830	296	7.5	**23292E**	**23292EK**	10600000	14500000	450	570	20	45	8	496.0	794.0	6.0	0.36	1.85	2.75	1.81	709	**23292E**	**23292EK**
480	650	128	5	**23996E**	**23996EK**	3300000	5450000	645	790	15	32	8	502.0	628.0	4.0	0.18	3.75	5.59	3.67	126	**23996E**	**23996EK**
	700	165	6	**23096E**	**23096EK**	4850000	7250000	570	720	15	32	8	508.0	672.0	5.0	0.22	3.01	4.48	2.94	217	**23096E**	**23096EK**
	700	218	6	**24096E**	**24096EK30**	6300000	10100000	510	640	20	40	8	508.0	672.0	5.0	0.31	2.20	3.27	2.15	290	**24096E**	**24096EK30**
	790	248	7.5	**23196E**	**23196EK**	8500000	12000000	450	570	20	40	8	516.0	754.0	6.0	0.32	2.12	3.15	2.07	495	**23196E**	**23196EK**
	790	308	7.5	**24196E**	**24196EK30**	9950000	14800000	450	570	20	45	8	516.0	754.0	6.0	0.39	1.71	2.54	1.67	625	**24196E**	**24196EK30**
	870	310	7.5	**23296E**	**23296EK**	11300000	15400000	420	540	20	45	8	516.0	834.0	6.0	0.37	1.82	2.70	1.78	820	**23296E**	**23296EK**
500	670	128	5	**239/500E**	**239/500EK**	3400000	5700000	600	750	15	28	8	522.0	648.0	4.0	0.18	3.85	5.73	3.76	130	**239/500E**	**239/500EK**
	720	167	6	**230/500E**	**230/500EK**	5050000	7650000	570	720	15	32	8	528.0	692.0	5.0	0.22	3.07	4.57	3.00	228	**230/500E**	**230/500EK**
	720	218	6	**240/500E**	**240/500EK30**	6450000	10500000	480	600	20	40	8	528.0	692.0	5.0	0.30	2.26	3.37	2.21	300	**240/500E**	**240/500EK30**
	830	264	7.5	**231/500E**	**231/500EK**	9300000	13000000	420	540	20	45	8	536.0	794.0	6.0	0.32	2.09	3.11	2.04	584	**231/500E**	**231/500EK**
	830	325	7.5	**241/500E**	**241/500EK30**	11000000	16200000	420	540	25	50	8	536.0	794.0	6.0	0.40	1.70	2.53	1.66	718	**241/500E**	**241/500EK30**
	920	336	7.5	**232/500E**	**232/500EK**	13200000	17800000	390	510	25	50	8	536.0	884.0	6.0	0.38	1.78	2.65	1.74	1000	**232/500E**	**232/500EK**
530	710	136	5	**239/530E**	**239/530EK**	4100000	6800000	540	670	15	28	8	552.0	688.0	4.0	0.18	3.85	5.73	3.76	156	**239/530E**	**239/530EK**
	780	185	6	**230/530E**	**230/530EK**	6250000	9450000	550	670	15	32	8	558.0	752.0	5.0	0.23	2.98	4.44	2.91	308	**230/530E**	**230/530EK**
	780	250	6	**240/530E**	**240/530EK30**	7800000	12500000	450	550	20	40	8	558.0	752.0	5.0	0.32	2.12	3.15	2.07	417	**240/530E**	**240/530EK30**
	870	272	7.5	**231/530E**	**231/530EK**	10200000	14600000	390	510	20	45	8	566.0	834.0	6.0	0.32	2.13	3.17	2.08	640	**231/530E**	**231/530EK**
	980	355	9.5	**232/530E**	**232/530EK**	15300000	21000000	330	450	25	60	8	574.0	936.0	8.0	0.37	1.80	2.69	1.76	1215	**232/530E**	**232/530EK**
560	750	140	5	**239/560E**	**239/560EK**	4250000	6950000	510	640	15	28	8	582.0	728.0	4.0	0.17	3.90	5.80	3.81	177	**239/560E**	**239/560EK**
	820	195	6	**230/560E**	**230/560EK**	7000000	10800000	510	640	15	32	8	588.0	792.0	5.0	0.23	2.95	4.39	2.89	359	**230/560E**	**230/560EK**
	820	258	6	**240/560E**	**240/560EK30**	8350000	13500000	420	520	20	45	8	588.0	792.0	5.0	0.31	2.21	3.29	2.16	468	**240/560E**	**240/560EK30**
	920	280	7.5	**231/560E**	**231/560EK**	11000000	15800000	360	480	20	45	8	596.0	884.0	6.0	0.31	2.20	3.27	2.15	732	**231/560E**	**231/560EK**
	1030	365	9.5	**232/560E**	**232/560EK**	16000000	22000000	280	400	25	50	8	612.0	992.0	8.0	0.37	1.82	2.70	1.78	1390	**232/560E**	**232/560EK**
600	800	150	5	**239/600E**	**239/600EK**	4800000	8050000	480	600	20	35	8	622.0	778.0	4.0	0.17	3.95	5.87	3.86	214	**239/600E**	**239/600EK**
	870	200	6	**230/600E**	**230/600EK**	7650000	12000000	480	600	15	32	8	628.0	842.0	5.0	0.22	3.10	4.62	3.03	408	**230/600E**	**230/600EK**
	870	272	6	**240/600E**	**240/600EK30**	9050000	14900000	390	490	20	45	8	628.0	842.0	5.0	0.31	2.20	3.27	2.15	551	**240/600E**	**240/600EK30**
	980	300	7.5	**231/600E**	**231/600EK**	12100000	17500000	300	420	20	45	8	636.0	944.0	6.0	0.31	0.22	3.27	2.15	887	**231/600E**	**231/600EK**
	1090	388	9.5	**232/600E**	**232/600EK**	17900000	25100000	240	360	25	50	8	654.0	1048	8.0	0.37	1.82	2.70	1.78	1640	**232/600E**	**232/600EK**

Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

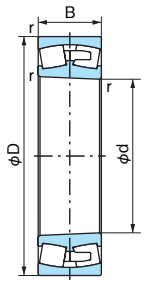
NACHI

Spherical Roller Bearings

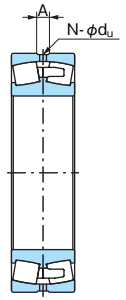
Bore Diameter : 630～1,060mm



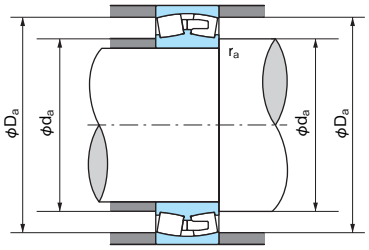
Cylindrical bore



Tapered bore



With oil holes / oil groove (W33)



■Dynamic equivalent radial load

Pr=XFr+YFa

$\frac{Fa}{Fr} \leqq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y_1	0.67	Y_2

Values of Y_1, Y_2 and e from table.

■Static equivalent radial load

Por=Fr+Y_0Fa

Values Y_0 from table.

1N=0.102kgf

Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min^{-1})		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant e	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.	
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter du	Groove width A	Hole count N	da (min)	Da (max)	ra (max)		Y_1	Y_2	Y_0		Cylindrical bore	Tapered bore
630	850	165	6	**239/630E**	**239/630EK**	5750000	9700000	420	540	20	35	8	658.0	822.0	5.0	0.18	3.71	5.52	3.62	273	**239/630E**	**239/630EK**
	920	212	7.5	**230/630E**	**230/630EK**	8350000	13100000	430	570	20	40	8	666.0	884.0	6.0	0.22	3.07	4.57	3.00	487	**230/630E**	**230/630EK**
	1030	315	7.5	**231/630E**	**231/630EK**	13500000	19800000	280	390	20	45	8	666.0	994.0	6.0	0.31	2.20	3.27	2.15	1070	**231/630E**	**231/630EK**
670	900	170	6	**239/670E**	**239/670EK**	6200000	10500000	390	510	20	35	8	698.0	872.0	5.0	0.17	3.90	5.80	3.81	316	**239/670E**	**239/670EK**
	980	230	7.5	**230/670E**	**230/670EK**	9650000	15300000	400	510	20	40	8	706.0	944.0	6.0	0.22	3.01	4.48	2.94	603	**230/670E**	**230/670EK**
	980	308	7.5	**240/670E**	**240/670EK30**	12000000	19800000	340	430	20	45	8	706.0	944.0	6.0	0.31	2.21	3.29	2.16	801	**240/670E**	**240/670EK30**
	1090	336	7.5	**231/670E**	**231/670EK**	15300000	23000000	270	360	25	50	8	706.0	1054	6.0	0.31	2.18	3.24	2.13	1260	**231/670E**	**231/670EK**
710	950	180	6	**239/710E**	**239/710EK**	6950000	12100000	360	480	20	35	8	738.0	922.0	5.0	0.17	3.90	5.80	3.81	369	**239/710E**	**239/710EK**
	1030	236	7.5	**230/710E**	**230/710EK**	10300000	16600000	370	480	20	40	8	746.0	994.0	6.0	0.22	3.10	4.62	3.03	676	**230/710E**	**230/710EK**
	1150	345	9.5	**231/710E**	**231/710EK**	16800000	25300000	250	330	25	50	8	754.0	1106	8.0	0.30	2.24	3.34	2.19	1432	**231/710E**	**231/710EK**
750	1000	185	6	**239/750E**	**239/750EK**	7500000	13200000	330	450	20	35	8	778.0	972.0	5.0	0.17	4.00	5.95	3.91	417	**239/750E**	**239/750EK**
	1090	250	7.5	**230/750E**	**230/750EK**	11700000	18900000	340	450	20	40	8	786.0	1054	6.0	0.22	3.10	4.62	3.03	803	**230/750E**	**230/750EK**
	1220	365	9.5	**231/750E**	**231/750EK**	18100000	27700000	220	280	25	50	8	794.0	1176	8.0	0.30	2.25	3.34	2.20	1710	**231/750E**	**231/750EK**
800	1060	195	6	**239/800E**	**239/800EK**	8150000	14500000	300	420	20	35	8	825.0	1032	5.0	0.17	4.00	5.96	3.91	470	**239/800E**	**239/800EK**
	1150	258	7.5	**230/800E**	**230/800EK**	12200000	20900000	310	400	20	45	8	836.0	1114	6.0	0.21	3.20	4.77	3.13	910	**230/800E**	**230/800EK**
	1150	345	7.5	**240/800E**	**240/800EK30**	15400000	27200000	300	370	25	50	8	836.0	1114	6.0	0.28	2.43	3.61	2.37	1200	**240/800E**	**240/800EK30**
	1280	375	9.5	**231/800E**	**231/800EK**	20000000	31000000	240	310	25	50	8	844.0	1236	8.0	0.29	2.32	3.45	2.26	1910	**231/800E**	**231/800EK**
850	1120	200	6	**239/850E**	**239/850EK**	8600000	15600000	280	390	20	40	8	878.0	1092	5.0	0.16	4.16	6.20	4.07	546	**239/850E**	**239/850EK**
	1220	272	7.5	**230/850E**	**230/850EK**	13600000	22500000	285	360	20	40	8	886.0	1184	6.0	0.21	3.20	4.77	3.13	1059	**230/850E**	**230/850EK**
900	1180	206	6	**239/900E**	**239/900EK**	9300000	17000000	270	360	20	40	8	928.0	1152	5.0	0.16	4.22	6.28	4.13	618	**239/900E**	**239/900EK**
	1280	280	7.5	**230/900E**	**230/900EK**	14600000	25400000	270	330	20	45	8	936.0	1244	6.0	0.21	3.27	4.87	3.20	1200	**230/900E**	**230/900EK**
950	1250	224	7.5	**239/950E**	**239/950EK**	10800000	19900000	250	330	20	40	8	986.0	1214	6.0	0.16	4.11	6.12	4.02	763	**239/950E**	**239/950EK**
	1360	300	7.5	**230/950E**	**230/950EK**	16100000	27200000	240	300	20	45	8	986.0	1324	6.0	0.21	3.23	4.82	3.16	1450	**230/950E**	**230/950EK**
1000	1320	236	7.5	**239/1000E**	**239/1000EK**	11600000	21300000	220	300	25	48	8	1036	1284	6.0	0.17	4.05	6.03	3.96	895	**239/1000E**	**239/1000EK**
	1420	308	7.5	**230/1000E**	**230/1000EK**	17200000	29700000	220	280	20	45	8	1036	1384	6.0	0.21	3.27	4.87	3.20	1610	**230/1000E**	**230/1000EK**
1060	1400	250	7.5	**239/1060E**	**239/1060EK**	13200000	24500000	210	270	25	48	8	1096	1364	6.0	0.17	4.05	6.03	3.96	1077	**239/1060E**	**239/1060EK**

Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

Thrust Ball Bearings

Tolerance ····· Page 52

● Design

Thrust Ball Bearings are made as single-direction and double-direction bearings. Single-direction Thrust Ball Bearings can sustain an axial load in only one direction, whereas Double-direction Thrust Ball Bearings can sustain bi-directional thrust load.

Both types of Thrust Ball Bearings cannot sustain a radial load.

Both Thrust Ball Bearings are available with aligning housing washers for mating with a housing having an aligning surface radius. Aligning seat washers with an aligning surface radius are also available for ease of design and mounting against a flat housing shoulder.

The Bearings with a polyamide cage are indicated suffix G at bearing number on package surface.

Table 1. Thrust Ball Bearings Series

Type	Flat back-face type	Spherical back-face type	With aligning seat
Single-direction	511	—	—
	512	532	532U
	513	533	533U
	514	534	534U
	29	—	—
	39	—	—
	O(1)	—	—
	TAM(2)	—	—
	TG(2)	—	—
Double-direction	522	542	542U
	523	543	543U
	524	544	544U

Notes: (1) Series O is inch-dimensioned.
(2) Series TAM, TG is extra-small and miniature.

Table 2.

Bearing series	Bore diameter No.
511	28～
512, 522, 532, 542	26～
513, 523, 533, 543	22～
514, 524, 534, 544	17～

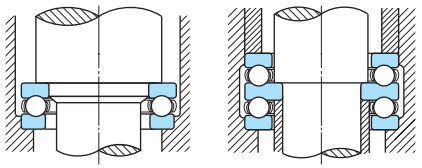
● Attention

(1) Thrust Ball Bearings with flat housing washers do not permit any angular misalignment between shaft and housing, nor can they accommodate any error of angle between the support surfaces in the housing and on the shaft.

(2) They are not suitable for high speed applications. Limiting speed are indicated in the dimension table.

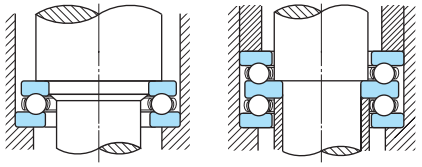
(3) The outside diameters of shaft washer and housing washer or center washer are the same, so clearance must be provided for the outside diameter of shaft washer or center washer by use of a step in the housing bore (See Fig.1). The outside diameter of the shaft washer or center washer of the bearings that are indicated in Table 2 are smaller than that of the housing washer, so no clearance step is required in the housing for the shaft (center) washer. See Fig.2.

(4) Bearings with polyamide cage should be used less than 120°C.



Single-direction Double-direction

Fig 1



Single-direction Double-direction

Fig 2

● Cage

Standard fitting cages are shown in Table 3. If other cages are necessary, please contact NACHI.

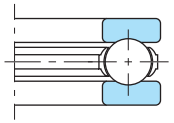


Fig 3. Polyamide

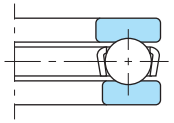


Fig 4. Pressed Steel

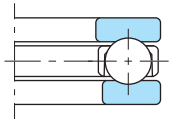


Fig 5. Machined

Table 3. Cage of Thrust Ball Bearings

Series	Diameter Number		
	Polyamide	Pressed Steel	Machined
511	00～07	08～52	56～72
512	01～07	00, 08～28	30～72
513	—	05～20	22～40
514	—	05～14	15～36
522	02～07	00, 08～28	30～44
523	—	05～20	22～40
524	—	05～14	15～36
532	01～07	00, 08～28	30～72
533	—	05～20	22～40
534	—	05～14	15～36
542	02～07	08～28	30～44
543	—	05～20	22～24
544	—	05～14	15～20
29	—	00～22	23～28
39	—	05～24	—
O	—	3～30	32～48
TAM	—	3～8(1)	—
TG	—	5～8(1)	—

Remark: Basic load rating of dimension table are indicated in using cage of table 3.
Note: (1) Indicate bore diameter not bore number.

● Minimum axial load

When Thrust Ball Bearings are run at high speeds, the contact angle between the ball and the raceway in the radial plane is affected by the centrifugal force of the balls and the sliding movement between the balls and raceways are occurred. The sliding movement may cause damage as smearing. To prevent this damage, Thrust Ball Bearings must be subjected to a given load more than a minimum load from function (1) or (2).

Single-direction Thrust Ball Bearings can sustain only one direction axial load, so if bi-direction axial loads are present, Double-direction Thrust Ball Bearings must be used and preloaded by a load more than the minimum load.

In case of a vertical axis, shaft weight often exceeds the minimum load. In this case, the acting load may be decreased by the external axial load acting in the opposite direction.

$$F_{a\,min} = K \cdot n^2 \quad \cdots\cdots (1)$$

$$F_{a\,min} = \frac{C_{oa}}{1000} \quad \cdots\cdots (2)$$

Use the larger result of (1) or (2)

$F_{a\,min}$: Minimum axial load (N)

K: inimum axial factor see Table 4

n: Rotating speed (min^{-1})

C_{oa}: Basic static load rating (N)

Table 4. Minimum axial factor K ($\times 10^{-6}$)

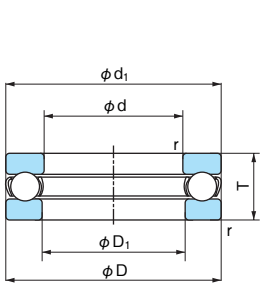
Bore No. \ Series	511	512, 522	513, 523	514, 524
00	1.03	1.55	—	—
01	1.26	1.92	—	—
02	1.56	3.36	—	—
03	1.84	4.09	—	—
04	3.42	7.33	—	—
05	7.19	13.1	20.4	43.8
06	9.36	17.2	33.1	81.4
07	11.2	32.8	58.3	128
08	20.4	49.7	97.2	221
09	24.6	57.9	138	316
10	29.3	66.8	211	440
11	44.6	133	326	656
12	64.7	160	375	956
13	72.0	179	428	1240
14	82.8	200	596	1580
15	94.3	222	808	1800
16	103	245	907	2230
17	116	359	1240	2740
18	187	528	1390	4320
20	363	850	1850	4790
22	423	1010	2740	8220
24	488	1130	4130	9980
26	648	1940	5140	16100
28	782	2150	6330	16900
30	886	2490	7140	25800
32	997	2880	9960	30000
34	1420	3940	11100	40100
36	1540	4330	15800	46330
38	2340	6290	23100	—
40	2520	6880	29700	—
44	3000	8130	—	—
48	4900	15900	—	—
52	5580	18400	—	—
56	9800	20400	—	—
60	14600	38000	—	—
64	16400	41800	—	—
68	18300	45700	—	—
72	20300	75600	—	—

Bore No. \ Series	29	39
00	1.55	—
01	1.92	—
02	2.64	—
03	3.30	—
04	3.82	—
04 1/2	6.41	—
05	7.51	14.2
06	9.72	28.9
07	20.1	52.3
08	25.1	81.0
09	31.6	140
10	46.1	209
11	54.4	284
12	60.7	350
13	86.0	426
14	99.5	556
15	114	704
16	152	927
17	172	1210
18	187	1580
19	286	2010
20	321	2090
21	346	2390
22	361	3220
23	350	3940
24	538	4500
25	498	—
26	—	—
27	—	—
28	794	—

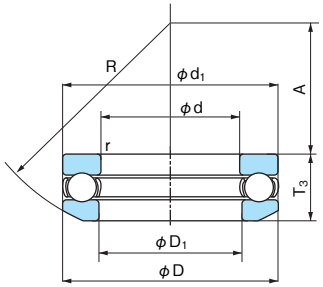
Bore No. \ Series	O
3	1.34
4	3.62
5	4.65
6	6.40
7	7.76
8	9.24
9	11.6
10	16.5
11	19.0
12	23.0
13	21.0
14	31.3
15	42.1
16	46.9
17	75.0
18	82.8
19	110
20	121
21	132
22	176
23	204
24	223
26	350
28	395
30	431
32	580
36	1100
40	1730
44	2840
48	3690

Single-direction Thrust Ball Bearings

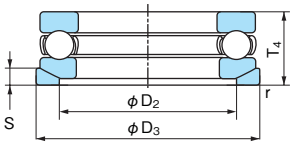
Bore Diameter: 10～50mm



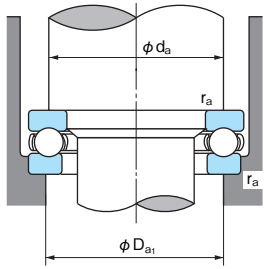
Flat back-face type

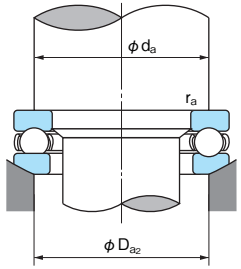


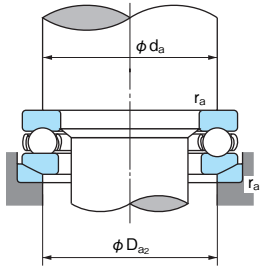
Spherical back-face type



With aligning seat







1N=0.102kgf

Boundary dimensions (mm)						Bearing No.			Basic dynamic load rating Ca (N)	Basic static load rating Coa (N)	Limiting speed (min-1)		Dimensions (mm)							Abutment and fillet dimensions (mm)				Mass (kg) Reference			Bearing No.
d	D	T	T3	T4	r (min)	Flat back-face type	Spherical back-face type	With aligning seat			Grease lubrication	Oil lubrication	D1 (min)	d1 (max)	D2	D3	S	R	A	da (min)	Da1 (max)	Da2 (max)	ra (max)	Flat back-face type	Spherical back-face type	With aligning seat	
10	24	9	—	—	0.3	51100	—	—	10000	14000	6800	10000	11	24	—	—	—	—	—	18	16	—	0.3	0.020	—	—	51100
	26	11	11.6	13	0.6	51200	53200	53200U	12700	17100	5900	8800	12	26	18	28	3.5	22	8.5	20	16	18	0.6	0.030	0.029	0.036	51200
12	26	9	—	—	0.3	51101	—	—	10300	15400	6500	9800	13	26	—	—	—	—	—	20	18	—	0.3	0.022	—	—	51101
	28	11	11.4	13	0.6	51201	53201	53201U	13200	19000	5600	8500	14	28	20	30	3.5	25	11.5	22	18	20	0.6	0.034	0.033	0.041	51201
15	28	9	—	—	0.3	51102	—	—	10500	16800	6200	9400	16	28	—	—	—	—	—	23	20	—	0.3	0.024	—	—	51102
	32	12	13.3	15	0.6	51202	53202	53202U	16600	24800	5100	7600	17	32	24	35	4	28	12	25	22	24	0.6	0.046	0.048	0.061	51202
17	30	9	—	—	0.3	51103	—	—	10800	18200	6000	9100	18	30	—	—	—	—	—	25	22	—	0.3	0.028	—	—	51103
	35	12	13.2	15	0.6	51203	53203	53203U	17100	27300	4800	7300	19	35	26	38	4	32	16	28	24	26	0.6	0.053	0.055	0.070	51203
20	35	10	—	—	0.3	51104	—	—	14300	24700	5300	8000	21	35	—	—	—	—	—	29	26	—	0.3	0.040	—	—	51104
	40	14	14.7	17	0.6	51204	53204	53204U	22200	37500	4200	6300	22	40	30	42	5	36	18	32	28	30	0.6	0.082	0.080	0.100	51204
25	42	11	—	—	0.6	51105	—	—	19500	37000	4600	6900	26	42	—	—	—	—	—	35	32	—	0.6	0.059	—	—	51105
	47	15	16.7	19	0.6	51205	53205	53205U	27800	50500	3700	5600	27	47	36	50	5.5	40	19	38	34	36	0.6	0.120	0.125	0.160	51205
	52	18	19.8	22	1	51305	53305	53305U	35500	61500	3200	4900	27	52	38	55	6	45	21	41	36	38	1	0.180	0.185	0.225	51305
	60	24	26.4	29	1	51405	53405	53405U	55500	89500	2600	3900	27	60	42	62	8	50	19	46	39	42	1	0.340	0.350	0.420	51405
30	47	11	—	—	0.6	51106	—	—	20400	42000	4300	6500	32	47	—	—	—	—	—	40	37	—	0.6	0.068	—	—	51106
	52	16	17.8	20	0.6	51206	53206	53206U	29300	58000	3400	5200	32	52	42	55	5.5	45	22	43	39	42	0.6	0.150	0.160	0.195	51206
	60	21	22.6	25	1	51306	53306	53306U	42500	78500	2800	4200	32	60	45	62	7	50	22	48	42	45	1	0.270	0.270	0.325	51306
	70	28	30.1	33	1	51406	53406	53406U	72500	126000	2200	3300	32	70	50	75	9	56	20	54	46	50	1	0.530	0.530	0.680	51406
35	52	12	—	—	0.6	51107	—	—	20400	44500	4000	6000	37	52	—	—	—	—	—	45	42	—	0.6	0.085	—	—	51107
	62	18	19.9	22	1	51207	53207	53207U	39000	78000	2900	4400	37	62	48	65	7	50	24	51	46	48	1	0.220	0.220	0.290	51207
	68	24	25.6	28	1	51307	53307	53307U	55500	105000	2400	3700	37	68	52	72	7.5	56	24	55	48	52	1	0.390	0.390	0.475	51307
	80	32	34	37	1.1	51407	53407	53407U	87000	155000	1900	2900	37	80	58	85	10	64	23	62	53	58	1	0.790	0.790	0.950	51407
40	60	13	—	—	0.6	51108	—	—	26900	63000	3500	5300	42	60	—	—	—	—	—	52	48	—	0.6	0.120	—	—	51108
	68	19	20.3	23	1	51208	53208	53208U	47000	98500	2700	4100	42	68	55	72	7	56	28.5	57	51	55	1	0.270	0.270	0.340	51208
	78	26	28.5	31	1	51308	53308	53308U	69000	135000	2200	3300	42	78	60	82	8.5	64	28	63	55	60	1	0.550	0.570	0.690	51308
	90	36	38.2	42	1.1	51408	53408	53408U	112000	205000	1700	2600	42	90	65	95	12	72	26	70	60	65	1	1.14	1.13	1.38	51408
45	65	14	—	—	0.6	51109	—	—	27800	69000	3300	4900	47	65	—	—	—	—	—	57	53	—	0.6	0.150	—	—	51109
	73	20	21.3	24	1	51209	53209	53209U	47500	105000	2600	3900	47	73	60	78	7.5	56	26	62	56	60	1	0.320	0.320	0.410	51209
	85	28	30.1	33	1	51309	53309	53309U	80000	163000	2000	3000	47	85	65	90	10	64	25	69	61	65	1	0.690	0.680	0.850	51309
	100	39	42.4	46	1.1	51409	53409	53409U	129000	243000	1600	2400	47	100	72	105	12.5	80	29	78	67	72	1	1.47	1.50	1.80	51409
50	70	14	—	—	0.6	51110	—	—	28800	75500	3100	4700	52	70	—	—	—	—	—	62	58	—	0.6	0.160	—	—	51110
	78	22	23.5	26	1	51210	53210	53210U	48500	112000	2400	3600	52	78	62	82	7.5	64	32.5	67	61	62	1	0.390	0.380	0.480	51210
	95	31	34.3	37	1.1	51310	53310	53310U	96500	202000	1800	2700	52	95	72	100	11	72	28	77	68	72	1	1.00	1.00	1.25	51310
	110	43	45.6	50	1.5	51410	53410	53410U	148000	283000	1400	2100	52	110	80	115	14	90	35	86	74	80	1.5	1.99	1.97	2.40	51410

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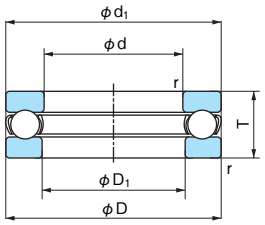
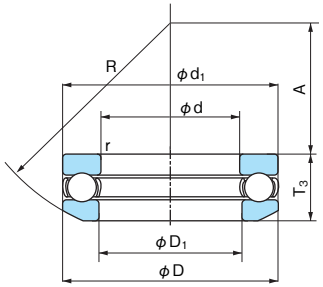
Single-direction Thrust Ball Bearings

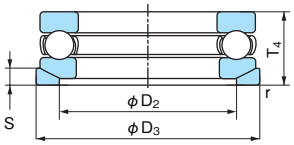
Bore Diameter: 55～100mm



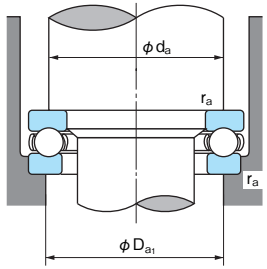
Flat back-face type

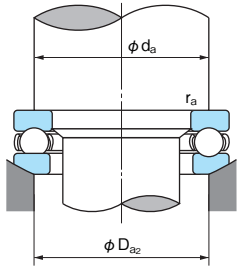


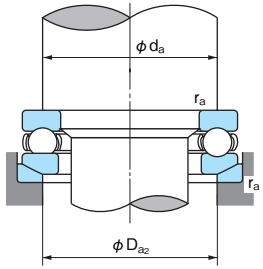
Spherical back-face type



With aligning seat







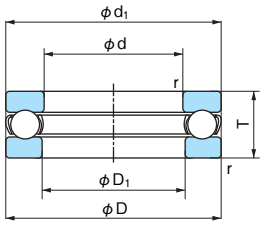
1N=0.102kgf

Boundary dimensions (mm)						Bearing No.			Basic dynamic load rating Ca (N)	Basic static load rating Coa (N)	Limiting speed (min-1)		Dimensions (mm)							Abutment and fillet dimensions (mm)				Mass (kg) Reference			Bearing No.
d	D	T	T3	T4	r (min)	Flat back-face type	Spherical back-face type	With aligning seat			Grease lubrication	Oil lubrication	D1 (min)	d1 (max)	D2	D3	S	R	A	da (min)	Da1 (max)	Da2 (max)	ra (max)	Flat back-face type	Spherical back-face type	With aligning seat	
55	78	16	—	—	0.6	51111	—	—	35000	93000	2800	4200	57	78	—	—	—	—	—	69	64	—	0.6	0.240	—	—	51111
	90	25	27.3	30	1	51211	53211	53211U	69500	159000	2100	3100	57	90	72	95	9	72	35	76	69	72	1	0.610	0.620	0.800	51211
	105	35	39.3	42	1.1	51311	53311	53311U	120000	246000	1600	2400	57	105	80	110	11.5	80	30	85	75	80	1	1.34	1.40	1.70	51311
	120	48	50.5	55	1.5	51411	53411	53411U	178000	360000	1300	1900	57	120	88	125	15.5	90	28	94	81	88	1.5	2.64	2.55	3.70	51411
60	85	17	—	—	1	51112	—	—	41500	113000	2600	3900	62	85	—	—	—	—	—	75	70	—	1	0.290	—	—	51112
	95	26	28	31	1	51212	53212	53212U	73500	179000	2000	3000	62	95	78	100	9	72	32.5	81	74	78	1	0.690	0.690	0.850	51212
	110	35	38.3	42	1.1	51312	53312	53312U	123000	267000	1600	2400	62	110	85	115	11.5	90	41	90	80	85	1	1.43	1.45	1.75	51312
	130	51	54	58	1.5	51412	53412	53412U	213000	435000	1200	1800	62	130	95	135	16	100	34	102	88	95	1.5	3.30	3.25	3.85	51412
65	90	18	—	—	1	51113	—	—	41500	117000	2400	3700	67	90	—	—	—	—	—	80	75	—	1	0.340	—	—	51113
	100	27	28.7	32	1	51213	53213	53213U	75000	189000	1900	2800	67	100	82	105	9	80	40	86	79	82	1	0.770	0.770	0.940	51213
	115	36	39.4	43	1.1	51313	53313	53313U	127000	287000	1500	2300	67	115	90	120	12.5	90	38.5	95	85	90	1	1.57	1.60	1.95	51313
	140	56	60.2	65	2	51413	53413	53413U	231000	495000	1100	1600	68	140	100	145	17.5	112	40	110	95	100	2	4.18	4.17	4.95	51413
70	95	18	—	—	1	51114	—	—	43000	127000	2400	3600	72	95	—	—	—	—	—	85	80	—	1	0.360	—	—	51114
	105	27	28.8	32	1	51214	53214	53214U	76000	199000	1800	2800	72	105	88	110	9	80	38	91	84	88	1	0.810	0.800	0.980	51214
	125	40	44.2	48	1.1	51314	53314	53314U	148000	340000	1400	2100	72	125	98	130	13	100	43	103	92	98	1	2.06	2.15	2.55	51314
	150	60	63.6	69	2	51414	53414	53414U	250000	555000	1000	1500	73	150	110	155	19.5	112	34	118	102	110	2	5.11	4.94	5.93	51414
75	100	19	—	—	1	51115	—	—	44500	136000	2200	3400	77	100	—	—	—	—	—	90	85	—	1	0.420	—	—	51115
	110	27	28.3	32	1	51215	53215	53215U	77500	209000	1800	2700	77	110	92	115	9.5	90	49	96	89	92	1	0.860	0.840	1.05	51215
	135	44	48.1	52	1.5	51315	53315	53315U	170000	395000	1200	1900	77	135	105	140	15	100	37	111	99	105	1.5	2.68	2.70	3.25	51315
	160	65	69	75	2	51415	53415	53415U	252000	560000	950	1400	78	160	115	165	21	125	42	126	109	115	2	6.35	6.25	7.60	51415
80	105	19	—	—	1	51116	—	—	44500	141000	2200	3300	82	105	—	—	—	—	—	95	90	—	1	0.430	—	—	51116
	115	28	29.5	33	1	51216	53216	53216U	78500	219000	1700	2600	82	115	98	120	10	90	46	101	94	98	1	0.950	0.930	1.16	51216
	140	44	47.6	52	1.5	51316	53316	53316U	176000	425000	1200	1800	82	140	110	145	15	112	50	116	104	110	1.5	2.82	2.85	3.45	51316
	170	68	72.2	78	2.1	51416	53416	53416U	270000	620000	900	1300	83	170	125	175	22	125	36	134	116	125	2	7.97	7.83	9.14	51416
85	110	19	—	—	1	51117	—	—	46000	150000	2100	3200	87	110	—	—	—	—	—	100	95	—	1	0.460	—	—	51117
	125	31	33.1	37	1	51217	53217	53217U	95500	264000	1600	2400	88	125	105	130	11	100	52	109	101	105	1	1.29	1.29	1.60	51217
	150	49	53.1	58	1.5	51317	53317	53317U	206000	490000	1100	1700	88	150	115	155	17.5	112	43	124	111	115	1.5	3.66	3.65	4.45	51317
	180	72	77	83	2.1	51417	53417	53417U	288000	685000	850	1200	88	177	130	185	23	140	47	142	123	130	2	9.30	9.20	10.9	51417
90	120	22	—	—	1	51118	—	—	59500	190000	1900	2900	92	120	—	—	—	—	—	108	102	—	1	0.680	—	—	51118
	135	35	38.5	42	1.1	51218	53218	53218U	116000	325000	1400	2100	93	135	110	140	13.5	100	45	117	108	110	1	1.77	1.78	2.22	51218
	155	50	54.6	59	1.5	51318	53318	53318U	213000	525000	1100	1600	93	155	120	160	18	112	40	129	116	120	1.5	3.88	3.84	4.70	51318
	190	77	81.2	88	2.1	51418	53418	53418U	305000	750000	790	1100	93	187	140	195	25.5	140	40	150	130	140	2	11.0	10.7	12.6	51418
100	135	25	—	—	1	51120	—	—	85000	268000	1700	2500	102	135	—	—	—	—	—	121	114	—	1	0.990	—	—	51120
	150	38	40.9	45	1.1	51220	53220	53220U	146000	410000	1300	1900	103	150	125	155	14	112	52	130	120	125	1	2.36	2.36	2.87	51220
	170	55	59.2	64	1.5	51320	53320	53320U	236000	595000	1000	1500	103	170	135	175	18	125	46	142	128	135	1.5	5.11	5.12	6.10	51320
	210	85	90	98	3	51420	53420	53420U	345000	895000	710	1000	103	205	155	220	27	160	50	166	144	155	2.5	14.7	14.5	17.2	51420

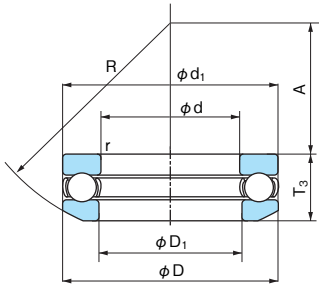
NACHI

Single-direction Thrust Ball Bearings

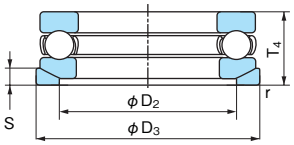
Bore Diameter: 110～190mm



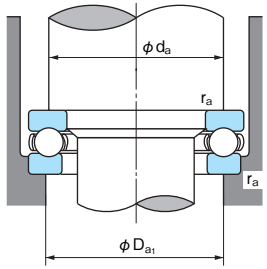
Flat back-face type

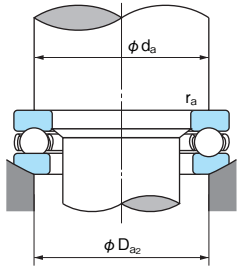


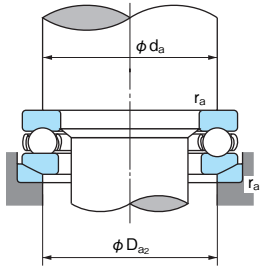
Spherical back-face type



With aligning seat







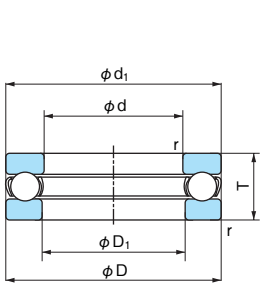
1N=0.102kgf

Boundary dimensions (mm)						Bearing No.			Basic dynamic load rating Ca (N)	Basic static load rating Coa (N)	Limiting speed (min-1)		Dimensions (mm)							Abutment and fillet dimensions (mm)				Mass (kg) Reference			Bearing No.
d	D	T	T3	T4	r (min)	Flat back-face type	Spherical back-face type	With aligning seat			Grease lubrication	Oil lubrication	D1 (min)	d1 (max)	D2	D3	S	R	A	da (min)	Da1 (max)	Da2 (max)	ra (max)	Flat back-face type	Spherical back-face type	With aligning seat	
110	145	25	—	—	1	51122	—	—	87000	288000	1600	2400	112	145	—	—	—	—	—	131	124	—	1	1.08	—	—	51122
	160	38	40.2	45	1.1	51222	53222	53222U	152000	450000	1200	1900	113	160	135	165	14	125	65	140	130	135	1	2.57	2.53	3.00	51222
	190	63	67.2	72	2	51322	53322	53322U	267000	705000	880	1300	113	187	150	195	20.5	140	51	158	142	150	2	7.73	7.66	8.96	51322
	230	95	99.7	109	3	51422	53422	53422U	435000	1240000	640	960	113	225	170	240	29	180	59	182	158	170	2.5	19.8	19.4	22.9	51422
120	155	25	—	—	1	51124	—	—	89000	305000	1600	2400	122	155	—	—	—	—	—	141	134	—	1	1.16	—	—	51124
	170	39	40.8	46	1.1	51224	53224	53224U	154000	470000	1200	1800	123	170	145	175	15	125	61	150	140	145	1	2.86	2.76	3.40	51224
	210	70	74.1	80	2.1	51324	53324	53324U	310000	870000	790	1100	123	205	165	220	22	160	63	174	156	165	2	10.6	10.4	12.4	51324
	250	102	107.3	118	4	51424	53424	53424U	455000	1340000	580	880	123	245	185	260	32	200	70	198	172	185	3	25.0	24.6	29.2	51424
130	170	30	—	—	1	51126	—	—	104000	350000	1300	2000	132	170	—	—	—	—	—	154	145	—	1	1.87	—	—	51126
	190	45	47.9	53	1.5	51226	53226	53226U	203000	620000	1000	1500	133	187	160	195	17	140	67	166	154	160	1.5	4.10	4.03	4.91	51226
	225	75	80.3	86	2.1	51326	53326	53326U	330000	960000	730	1100	134	220	177	235	26	160	53	187	168	177	2	12.7	12.6	15.2	51326
	270	110	115.2	128	4	51426	53426	53426U	555000	1750000	540	810	134	265	200	280	38	200	58	214	186	200	3	31.4	30.4	36.7	51426
140	180	31	—	—	1	51128	—	—	107000	375000	1300	1900	142	178	—	—	—	—	—	164	156	—	1	2.03	—	—	51128
	200	46	48.6	55	1.5	51228	53228	53228U	205000	650000	1000	1500	143	197	170	210	17	160	87	176	164	170	1.5	4.47	4.40	5.61	51228
	240	80	84.9	92	2.1	51328	53328	53328U	350000	1050000	680	1000	144	235	190	250	26	180	68	200	180	190	2	15.5	15.3	18.2	51328
	280	112	117	131	4	51428	53428	53428U	545000	1750000	520	780	144	275	206	290	38	225	83	224	196	206	3	33.9	32.9	39.9	51428
150	190	31	—	—	1	51130	—	—	109000	400000	1200	1900	152	188	—	—	—	—	—	174	166	—	1	2.16	—	—	51130
	215	50	53.3	60	1.5	51230	53230	53230U	213000	650000	940	1400	153	212	180	225	20.5	160	79	189	176	180	1.5	5.74	5.60	7.28	51230
	250	80	83.7	92	2.1	51330	53330	53330U	360000	1130000	670	1000	154	245	200	260	26	200	89.5	210	190	200	2	16.3	16.0	19.1	51330
	300	120	125.9	140	4	51430	53430	53430U	615000	2010000	480	720	154	295	225	310	41	225	69	240	210	225	3	41.6	40.5	48.5	51430
160	200	31	—	—	1	51132	—	—	112000	425000	1200	1800	162	198	—	—	—	—	—	184	176	—	1	2.27	—	—	51132
	225	51	54.7	61	1.5	51232	53232	53232U	223000	720000	900	1300	163	222	190	235	21	160	74	223	202	190	1.5	6.64	6.50	8.29	51232
	270	87	91.7	100	3	51332	53332	53332U	410000	1340000	610	920	164	265	215	280	29	200	77	226	204	215	2.5	21.0	20.5	24.5	51332
	320	130	135.3	150	5	51432	53432	53432U	680000	2410000	440	670	164	315	240	330	41.5	250	84	256	224	240	4	51.2	49.7	58.9	51432
170	215	34	—	—	1.1	51134	—	—	134000	510000	1100	1700	172	213	—	—	—	—	—	197	188	—	1	3.27	—	—	51134
	240	55	58.7	65	1.5	51234	53234	53234U	261000	835000	840	1200	173	237	200	250	21.5	180	91	212	198	200	1.5	8.13	7.89	9.95	51234
	280	87	91.3	100	3	51334	53334	53334U	420000	1430000	600	900	174	275	220	290	29	225	105	230	210	220	2.5	22.0	21.3	25.7	51334
	340	135	141	156	5	51434	53434	53434U	755000	2730000	420	630	174	335	255	350	46	250	74	272	238	255	4	60.1	58.1	69.1	51434
180	225	34	—	—	1.1	51136	—	—	135000	525000	1100	1600	183	222	—	—	—	—	—	207	198	—	1	3.37	—	—	51136
	250	56	58.2	66	1.5	51236	53236	53236U	266000	875000	810	1200	183	247	210	260	21.5	200	112	222	208	210	1.5	8.69	8.26	10.5	51236
	300	95	99.3	109	3	51336	53336	53336U	485000	1700000	550	820	184	295	240	310	32	225	91	252	228	240	2.5	28.2	27.0	32.0	51336
	360	140	148.3	164	5	51436	53436	53436U	785000	2980000	400	600	184	355	270	370	46.5	280	97	288	252	270	4	69.5	68.8	81.5	51436
190	240	37	—	—	1.1	51138	—	—	170000	655000	1000	1500	193	237	—	—	—	—	—	220	210	—	1	3.95	—	—	51138
	270	62	65.7	73	2	51238	53238	53238U	310000	1060000	740	1100	194	267	230	280	23	200	98	238	222	230	2	11.7	11.5	14.0	51238
	320	105	111	121	4	51338	53338	53338U	570000	2100000	500	750	195	315	255	330	33	250	104	268	242	255	3	36.1	35.8	41.9	51338

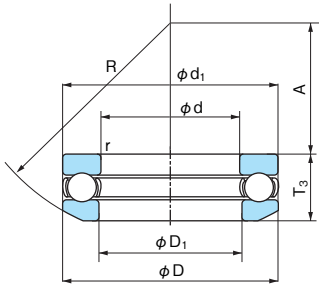
NACHI

Single-direction Thrust Ball Bearings

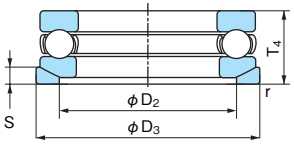
Bore Diameter: 200～360mm



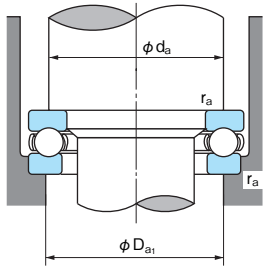
Flat back-face type

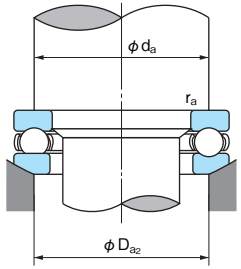


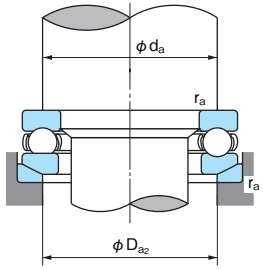
Spherical back-face type



With aligning seat







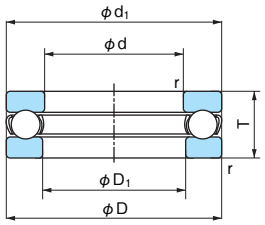
1N=0.102kgf

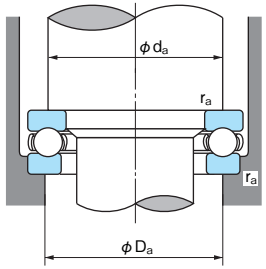
Boundary dimensions (mm)						Bearing No.			Basic dynamic load rating Ca (N)	Basic static load rating Coa (N)	Limiting speed (min^{-1})		Dimensions (mm)							Abutment and fillet dimensions (mm)				Mass (kg) Reference			Bearing No.
d	D	T	T_3	T_4	r (min)	Flat back-face type	Spherical back-face type	With aligning seat			Grease lubrication	Oil lubrication	D_1 (min)	d_1 (max)	D_2	D_3	S	R	A	da (min)	Da_1 (max)	Da_2 (max)	ra (max)	Flat back-face type	Spherical back-face type	With aligning seat	
200	250	37	–	–	1.1	**51140**	–	–	172000	675000	1000	1500	203	247	–	–	–	–	–	230	220	–	1	4.14	–	–	**51140**
	280	62	65.3	74	2	**51240**	**53240**	**53240U**	315000	1110000	720	1000	204	277	240	290	23	225	125	248	232	240	2	12.2	12.0	14.8	**51240**
	340	110	118.4	130	4	**51340**	**53340**	**53340U**	625000	2380000	470	710	205	335	270	350	38	250	92	284	256	270	3	43.0	43.1	51.0	**51340**
220	270	37	–	–	1.1	**51144**	–	–	177000	740000	970	1400	223	267	–	–	–	–	–	250	240	–	1	4.51	–	–	**51144**
	300	63	65.6	75	2	**51244**	**53244**	**53244U**	325000	1210000	690	1000	224	297	260	310	25	225	118	268	252	260	2	13.5	13.0	16.2	**51244**
240	300	45	–	–	1.5	**51148**	–	–	228000	935000	830	1200	243	297	–	–	–	–	–	276	264	–	1.5	7.35	–	–	**51148**
	340	78	81.6	92	2.1	**51248**	**53248**	**53248U**	430000	1730000	570	860	244	335	290	350	30	250	122	300	280	290	2	23.1	22.3	27.4	**51248**
260	320	45	–	–	1.5	**51152**	–	–	232000	990000	800	1200	263	317	–	–	–	–	–	296	284	–	1.5	7.94	–	–	**51152**
	360	79	82.8	93	2.1	**51252**	**53252**	**53252U**	445000	1880000	550	830	264	355	305	370	30	280	152	320	300	305	2	25.0	24.0	29.7	**51252**
280	350	53	–	–	1.5	**51156**	–	–	315000	1350000	700	1000	283	347	–	–	–	–	–	322	308	–	1.5	12.0	–	–	**51156**
	380	80	85	94	2.1	**51256**	**53256**	**53256U**	450000	1950000	530	800	284	375	325	390	31	280	143	340	320	325	2	27.0	26.2	32.3	**51256**
300	380	62	–	–	2	**51160**	–	–	370000	1660000	610	920	304	376	–	–	–	–	–	348	332	–	2	17.1	–	–	**51160**
	420	95	100.5	112	3	**51260**	**53260**	**53260U**	585000	2720000	450	680	304	415	360	430	34	320	164	372	348	360	2.5	42.3	41.7	49.9	**51260**
320	400	63	–	–	2	**51164**	–	–	380000	1760000	590	880	324	396	–	–	–	–	–	368	352	–	2	18.5	–	–	**51164**
	440	95	100.5	112	3	**51264**	**53264**	**53264U**	595000	2830000	440	660	325	435	380	450	36	320	157	392	368	380	2.5	44.7	43.8	52.7	**51264**
340	420	64	–	–	2	**51168**	–	–	385000	1860000	570	850	344	416	–	–	–	–	–	388	372	–	2	19.9	–	–	**51168**
	460	96	100.3	113	3	**51268**	**53268**	**53268U**	600000	2940000	430	640	345	455	400	470	36	360	199	412	388	400	2.5	47.6	46.4	56.2	**51268**
360	440	65	–	–	2	**51172**	–	–	395000	1960000	550	820	364	436	–	–	–	–	–	408	392	–	2	20.4	–	–	**51172**
	500	110	116.7	130	4	**51272**	**53272**	**53272U**	745000	3800000	380	570	365	495	430	510	43	360	172	444	416	430	3	69.0	67.7	81.5	**51272**

Single-direction Thrust Ball Bearings

Series 2900

Bore Diameter: 10～140mm





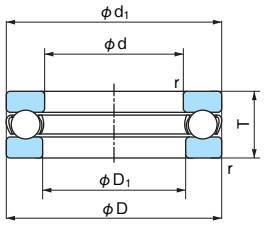
1N=0.102kgf

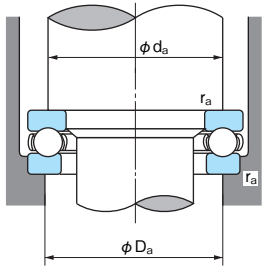
Boundary dimensions (mm)				Bearing No.	Basic dynamic load rating Ca (N)	Basic static load rating Coa (N)	Limiting speed (min-1)		Dimensions (mm)		Abutment and fillet dimensions (mm)			Mass (kg) Reference	Bearing No.
d	D	T	r (min)				Grease lubrication	Oil lubrication	D1 (min)	d1 (max)	da (min)	Da (max)	ra (max)		
10	26	12	0.6	2900	12700	17100	5600	8400	10.2	26	19.6	16.4	0.6	0.035	2900
12	28	12	0.6	2901	13200	19000	5400	8100	12.2	28	21.6	18.4	0.6	0.037	2901
15	31	12	0.6	2902	14300	22800	5100	7700	15.2	31	25	21	0.6	0.041	2902
18	35	12	0.6	2903	14400	24700	4800	7300	18.2	35	28	25	0.6	0.045	2903
20	37	12	0.6	2904	14800	26600	4700	7100	20.2	37	30	27	0.6	0.055	2904
22	42	14	0.6	2904½	18900	34500	4100	6100	22.2	42	34	30	0.6	0.085	2904½
25	45	14	0.6	2905	19300	37000	3900	5900	25.2	45	37	33	0.6	0.093	2905
30	50	14	0.6	2906	20200	42000	3700	5600	30.2	50	42	38	0.6	0.107	2906
35	55	16	0.6	2907	29900	62000	3300	5000	35.2	55	47	43	0.6	0.137	2907
40	60	16	0.6	2908	31000	70000	3200	4800	40.2	60	52	48	0.6	0.150	2908
45	68	16	0.6	2909	32500	77500	3000	4500	45.2	68	59	54	0.6	0.199	2909
50	74	18	0.6	2910	38500	94000	2700	4100	50.2	74	64	60	0.6	0.255	2910
55	78	18	0.6	2911	40000	103000	2600	4000	55.2	78	69	64	0.6	0.270	2911
60	82	18	0.6	2912	40500	108000	2600	3900	60.2	82	73	69	0.6	0.275	2912
65	90	20	0.6	2913	47500	129000	2300	3500	65.2	90	80	75	0.6	0.374	2913
70	95	20	0.6	2914	49000	140000	2200	3400	70.2	95	85	80	0.6	0.400	2914
75	100	20	0.6	2915	51000	151000	2200	3300	75.2	100	90	85	0.6	0.425	2915
80	110	22	0.6	2916	57000	171000	2000	3000	80.2	110	98	92	0.6	0.600	2916
85	115	22	0.6	2917	59000	184000	1900	2900	85.2	115	103	97	0.6	0.640	2917
90	120	22	0.6	2918	59500	190000	1900	2900	90.2	120	108	102	0.6	0.670	2918
95	130	25	0.6	2919	75500	236000	1700	2600	95.2	130	116	109	0.6	0.795	2919
100	135	25	0.6	2920	78000	253000	1700	2500	100.2	135	121	114	0.6	0.930	2920
105	140	25	0.6	2921	78500	262000	1600	2500	105.2	140	126	119	0.6	1.02	2921
110	145	25	0.6	2922	78000	262000	1600	2400	110.2	145	131	124	0.6	1.15	2922
115	150	25	0.6	2923	73500	245000	1600	2400	115.2	150	136	129	0.6	1.25	2923
120	160	27	0.6	2924	94000	314000	1500	2200	120.2	160	144	136	0.6	1.35	2924
125	165	27	0.6	2925	85500	298000	1400	2200	125.3	165	149	141	0.6	1.48	2925
140	185	31	0.6	2928	106000	375000	1300	1900	140.3	185	167	158	0.6	2.33	2928

Single-direction Thrust Ball Bearings

Series 3900

Bore Diameter: 25～120mm





1N=0.102kgf

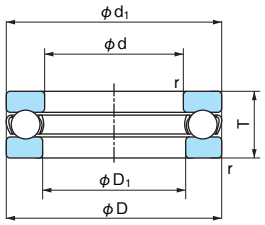
Boundary dimensions (mm)				Bearing No.	Basic dynamic load rating Ca (N)	Basic static load rating Coa (N)	Limiting speed (min^{-1})		Dimensions (mm)		Abutment and fillet dimensions (mm)			Mass (kg) Reference	Bearing No.
d	D	T	r (min)				Grease lubrication	Oil lubrication	D_1 (min)	d_1 (max)	da (min)	Da (max)	ra (max)		
25	52	16	1	**3905**	27100	50500	3400	5200	25.2	52	42	36	1.0	0.147	**3905**
30	60	19	1	**3906**	38000	72500	2900	4400	30.2	60	49	43	1.0	0.237	**3906**
35	68	22	1	**3907**	50500	99000	2500	3800	35.2	68	56.5	48.5	1.0	0.346	**3907**
40	76	25	1	**3908**	61000	119000	2200	3400	40.2	76	63	55	1.0	0.486	**3908**
45	85	28	1	**3909**	79500	163000	2000	3000	45.2	85	71	61	1.0	0.684	**3909**
50	92	31	1	**3910**	97000	202000	1800	2800	50.2	92	77	67	1.0	0.889	**3910**
55	100	33	1	**3911**	110000	240000	1700	2600	55.2	100	83.5	73.5	1.0	1.114	**3911**
60	106	35	1.5	**3912**	119000	263000	1600	2400	60.2	106	89	79	1.5	1.293	**3912**
65	112	36	1.5	**3913**	128000	287000	1500	2300	65.2	112	95.5	83.5	1.5	1.443	**3913**
70	120	38	1.5	**3914**	143000	335000	1400	2200	70.2	120	102	90	1.5	1.767	**3914**
75	128	41	1.5	**3915**	159000	365000	1300	2000	75.2	128	108.5	96.5	1.5	2.132	**3915**
80	136	44	1.5	**3916**	183000	425000	1200	1900	80.2	136	115	101	1.5	2.606	**3916**
85	145	47	1.5	**3917**	207000	490000	1100	1700	85.2	145	122	108	1.5	3.157	**3917**
90	155	50	1.5	**3918**	232000	555000	1100	1600	90.2	155	131	115	1.5	3.907	**3918**
95	165	54	1.5	**3919**	253000	630000	1000	1500	95.2	165	139	123	1.5	4.810	**3919**
100	172	57	1.5	**3920**	250000	630000	980	1400	100.2	172	144	128	1.5	5.454	**3920**
105	180	60	2.5	**3921**	257000	670000	930	1400	105.2	180	153	137	2.5	6.354	**3921**
110	190	63	2.5	**3922**	293000	785000	880	1300	110.2	190	159	141	2.5	7.333	**3922**
115	200	66	2.5	**3923**	315000	870000	840	1200	115.2	200	167.5	147.5	2.5	8.526	**3923**
120	210	69	2.5	**3924**	325000	930000	800	1200	120.2	210	178	158	2.5	10.195	**3924**

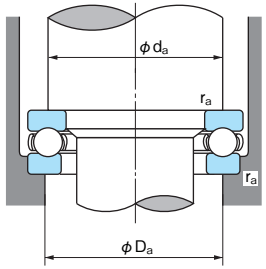
Single-direction Thrust Ball Bearings

Inch Series

Series O

Bore Diameter: 9.525～152.400mm





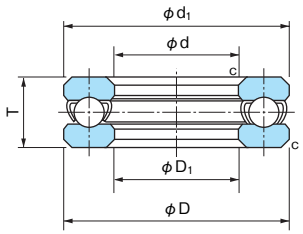
1N=0.102kgf

Boundary dimensions (mm)				Bearing No.	Basic dynamic load rating Ca (N)	Basic static load rating Coa (N)	Limiting speed (min-1)		Dimensions (mm)		Abutment and fillet dimensions (mm)			Mass (kg) Reference	Bearing No.
d	D	T	r (min)				Grease lubrication	Oil lubrication	D1 (min)	d1 (max)	da (min)	Da (max)	ra (max)		
9.525	25.400	13.494	0.8	O - 3	11800	15200	5400	8100	9.925	24.606	19.1	15.9	0.8	0.036	O - 3
12.700	32.544	15.875	0.8	O - 4	18600	25100	4300	6500	13.097	31.750	24.6	20.6	0.8	0.077	O - 4
15.875	35.719	15.875	0.8	O - 5	19400	28300	4100	6200	16.272	34.925	27.8	23.8	0.8	0.086	O - 5
19.050	38.894	15.875	0.8	O - 6	21400	34500	4000	6000	19.447	38.100	29	26	0.8	0.095	O - 6
22.225	42.069	15.875	0.8	O - 7	21900	37500	3800	5800	22.622	41.275	34	30	0.8	0.100	O - 7
25.400	45.244	15.875	1.6	O - 8	22500	41000	3700	5500	25.797	44.450	37	33	0.8	0.110	O - 8
28.575	48.419	15.875	1.6	O - 9	24100	47000	3600	5400	28.972	47.625	40	37	0.8	0.128	O - 9
31.750	53.181	18.256	1.6	O -10	27900	54500	3200	4800	32.147	52.388	45	40	0.8	0.164	O -10
34.925	56.356	18.256	1.6	O -11	28600	58000	3100	4600	35.322	55.562	48	43	0.8	0.186	O -11
38.100	59.531	18.256	1.6	O -12	30500	66000	3000	4500	38.497	58.738	51	47	1	0.200	O -12
41.275	62.706	18.256	1.6	O -13	26700	63000	2900	4400	41.672	61.912	54	50	1	0.210	O -13
44.450	68.262	19.050	1.6	O -14	32500	77500	2700	4100	44.847	67.469	59	54	1	0.260	O -14
47.625	71.438	19.050	1.6	O -15	37500	89000	2700	4000	48.021	70.644	62	57	1	0.285	O -15
50.800	75.406	19.050	2.4	O -16	38000	94000	2600	3900	51.594	74.613	66	61	1	0.300	O -16
53.975	81.756	22.225	2.4	O -17	49500	118000	2300	3500	54.769	80.962	71	65	1.6	0.405	O -17
57.150	84.931	22.225	2.4	O -18	50500	125000	2300	3400	57.944	84.138	74	68	1.6	0.450	O -18
60.325	91.281	25.400	2.4	O -19	58000	145000	2000	3100	61.119	90.488	79	73	1.6	0.590	O -19
63.500	94.456	25.400	2.4	O -20	59500	152000	2000	3000	64.294	93.662	82	76	1.6	0.610	O -20
66.675	97.631	25.400	2.4	O -21	60500	160000	2000	3000	67.469	96.838	85	79	1.6	0.660	O -21
69.850	102.394	25.400	2.4	O -22	71500	179000	1900	2900	70.644	101.600	89	83	1.6	0.700	O -22
73.025	105.569	25.400	2.4	O -23	75500	199000	1900	2800	73.819	104.775	93	86	1.6	0.730	O -23
76.200	111.125	28.575	3.2	O -24	77000	209000	1700	2600	77.788	109.538	97	90	2	0.900	O -24
82.550	122.238	31.750	3.2	O -26	97500	252000	1600	2400	84.138	120.650	106	98	2	1.30	O -26
88.900	128.588	31.750	3.2	O -28	99000	266000	1500	2300	90.488	127.000	113	105	2	1.32	O -28
95.250	134.938	31.750	3.2	O -30	98500	289000	1500	2200	96.838	133.350	119	111	2	1.36	O -30
101.600	147.638	34.925	3.2	O -32	113000	310000	1300	2000	103.188	146.050	129	120	2	1.88	O -32
114.300	166.688	44.450	4.8	O -36	157000	435000	1100	1700	115.888	165.100	146	135	3	3.18	O -36
127.000	185.738	50.800	4.8	O -40	193000	545000	1000	1500	128.588	184.150	162	150	3	4.54	O -40
139.700	204.788	55.562	4.8	O -44	248000	715000	910	1300	141.288	203.200	179	166	3	5.90	O -44
152.400	220.662	60.325	4.8	O -48	269000	805000	830	1200	153.988	219.075	193	180	3	7.25	O -48

Extra Small and Miniature Thrust Ball Bearings

TAM Type

Bore Diameter: 3～8mm



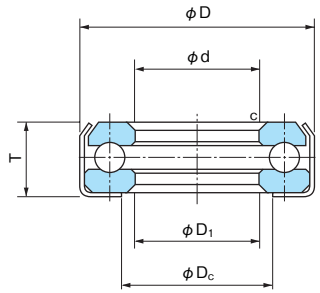
1N=0.102kgf

Boundary dimensions (mm)						Bearing No.	Basic dynamic load rating Ca (N)	Basic static load rating Coa (N)	Mass (kg) Reference
d	D	T	c	D_1	d_1				
3	8	3.5	0.2	3.2	8	**3TAM8**	1790	1720	0.6
4	9	4	0.2	4.1	9	**4TAM9**	1860	1970	0.8
5	10	4	0.3	5.1	10	**5TAM10**	1930	2220	0.9
6	12	4.5	0.3	6.2	12	**6TAM12**	1820	2220	1.7
7	14	4.5	0.3	7.2	14	**7TAM14**	2480	3140	2.3
8	16	5	0.3	8.2	16	**8TAM16**	3920	4990	3.4

Extra Small and Miniature Thrust Ball Bearings

TG Type (Banded)

Bore Diameter: 5～8mm

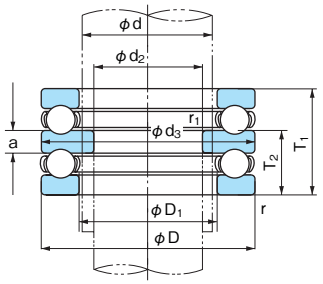


1N=0.102kgf

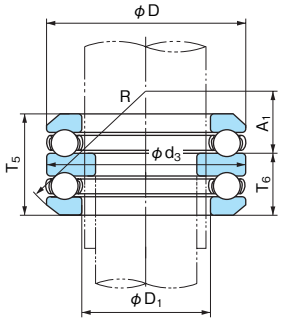
Boundary dimensions (mm)						Bearing No.	Basic dynamic load rating Ca (N)	Basic static load rating Coa (N)	Mass (kg) Reference
d	D	T	c	D_1	Dc				
5	10	4.2	0.3	5.1	5.8	**5TG-10**	2200	2710	1.3
6	12	4.7	0.5	6.2	7.2	**6TG-12**	2450	3450	2.2
7	14	4.7	0.5	7.2	8.2	**7TG-14**	3320	4890	3.0
8	16	5.2	0.5	8.2	9.2	**8TG-16**	4750	6650	4.0

Double-direction Thrust Ball Bearings

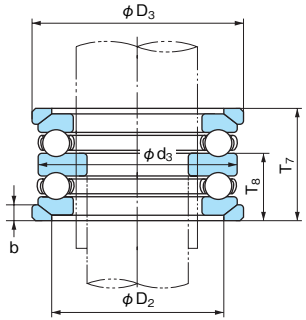
Bore Diameter: 15～75mm



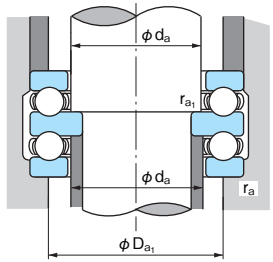
Flat back-face type

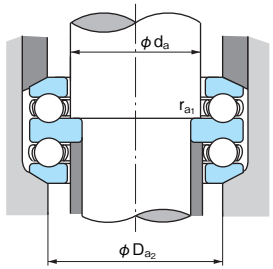


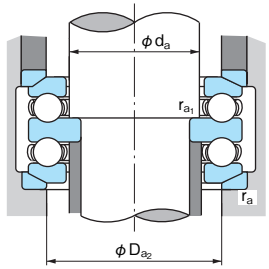
Spherical back-face type



With aligning seat





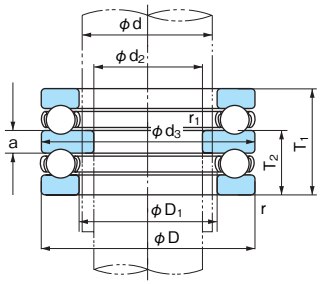


1N=0.102kgf

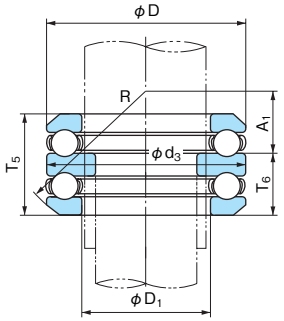
Boundary dimensions (mm)								Bearing No.			Basic dynamic load rating Ca (N)	Basic static load rating Coa (N)	Limiting speed (min-1)		Dimensions (mm)										Abutment and fillet dimensions (mm)					Mass (kg) Reference			Bearing No.
d	d2	D	T1	T5	T7	r (min)	r1 (min)	Flat back-face type	Spherical back-face type	With aligning seat			Grease lubrication	Oil lubrication	d3 (max)	D1 (min)	D2	D3	T2	T6	T8	a	b	A1	R	da (min)	Da1 (max)	Da2 (max)	ra (max)	ra1 (max)	Flat back-face type	Spherical back-face type	With aligning seat	
15	10	32	22	24.6	28	0.6	0.3	52202	54202	54202U	16600	24800	5100	7600	32	17	24	35	13.5	14.8	16.5	5	4	10.5	28	15	22	24	0.6	0.3	0.085	0.090	0.116	52202
20	15	40	26	27.4	32	0.6	0.3	52204	54204	54204U	22200	37500	4200	6300	40	22	30	42	16	16.7	19	6	5	16	36	20	28	30	0.6	0.3	0.150	0.147	0.189	52204
	20	47	28	31.4	36	0.6	0.3	52205	54205	54205U	27800	50500	3700	5600	47	27	36	50	17.5	19.2	21.5	7	5.5	16.5	40	25	34	36	0.6	0.3	0.230	0.241	0.305	52205
25	20	52	34	37.6	42	1	0.3	52305	54305	54305U	35500	61500	3200	4900	52	27	38	55	21	22.8	25	8	6	18	45	25	36	38	1	0.3	0.330	0.340	0.431	52305
	15	60	45	49.8	55	1	0.6	52405	54405	54405U	55500	89500	2600	3900	60	27	42	62	28	30.4	33	11	8	15	50	25	39	42	1	0.6	0.630	0.650	0.796	52405
	25	52	29	32.6	37	0.6	0.3	52206	54206	54206U	29300	58000	3400	5200	52	32	42	55	18	19.8	22	7	5.5	20	45	30	39	42	0.6	0.3	0.272	0.291	0.356	52206
30	25	60	38	41.2	46	1	0.3	52306	54306	54306U	42500	78500	2800	4200	60	32	45	62	23.5	25.1	27.5	9	7	19.5	50	30	42	45	1	0.3	0.490	0.495	0.607	52306
	20	70	52	56.2	62	1	0.6	52406	54406	54406U	72500	126000	2200	3300	70	32	50	75	32	34.1	37	12	9	16	56	30	46	50	1	0.6	1.00	1.00	1.26	52406
	30	62	34	37.8	42	1	0.3	52207	54207	54207U	39000	78000	2900	4400	62	37	48	65	21	22.9	25	8	7	21	50	35	46	48	1	0.3	0.420	0.431	0.550	52207
35	30	68	44	47.2	52	1	0.3	52307	54307	54307U	55500	105000	2400	3700	68	37	52	72	27	28.6	31	10	7.5	21	56	35	48	52	1	0.3	0.710	0.711	0.881	52307
	25	80	59	63	69	1.1	0.6	52407	54407	54407U	87000	155000	1900	2900	80	37	58	85	36.5	38.5	41.5	14	10	18.5	64	35	53	58	1	0.6	1.44	1.43	1.78	52407
	30	68	36	38.6	44	1	0.6	52208	54208	54208U	47000	98500	2700	4100	68	42	55	72	22.5	23.8	26.5	9	7	25	56	40	51	55	1	0.6	0.540	0.542	0.686	52208
40	30	78	49	54	59	1	0.6	52308	54308	54308U	69000	135000	2200	3300	78	42	60	82	30.5	33	35.5	12	8.5	23.5	64	40	55	60	1	0.6	1.06	1.10	1.33	52308
	30	90	65	69.4	77	1.1	0.6	52408	54408	54408U	112000	205000	1700	2600	90	42	65	95	40	42.2	46	15	12	22	72	40	60	65	1	0.6	2.03	2.00	2.52	52408
	35	73	37	39.6	45	1	0.6	52209	54209	54209U	47500	105000	2600	3900	73	47	60	78	23	24.3	27	9	7.5	23	56	45	56	60	1	0.6	0.620	0.617	0.796	52209
45	35	85	52	56.2	62	1	0.6	52309	54309	54309U	80000	163000	2000	3000	85	47	65	90	32	34.1	37	12	10	21	64	45	61	65	1	0.6	1.29	1.28	1.63	52309
	35	100	72	78.8	86	1.1	0.6	52409	54409	54409U	129000	243000	1600	2400	100	47	72	105	44.5	47.9	51.5	17	12.5	23.5	80	45	67	72	1	0.6	2.71	2.76	3.40	52409
	40	78	39	42	47	1	0.6	52210	54210	54210U	48500	112000	2400	3600	78	52	62	82	24	25.5	28	9	7.5	30.5	64	50	61	62	1	0.6	0.71	0.697	0.899	52210
50	40	95	58	64.6	70	1.1	0.6	52310	54310	54310U	96500	202000	1800	2700	95	52	72	100	36	39.3	42	14	11	23	72	50	68	72	1	0.6	1.86	1.92	2.37	52310
	40	110	78	83.2	92	1.5	0.6	52410	54410	54410U	148000	283000	1400	2100	110	52	80	115	48	50.6	55	18	14	30	90	50	74	80	1.5	0.6	3.56	3.52	4.36	52410
	45	90	45	49.6	55	1	0.6	52211	54211	54211U	69500	159000	2100	3100	90	57	72	95	27.5	29.8	32.5	10	9	32.5	72	55	69	72	1	0.6	1.12	1.14	1.54	52211
55	45	105	64	72.6	78	1.1	0.6	52311	54311	54311U	120000	246000	1600	2400	105	57	80	110	39.5	43.8	46.5	15	11.5	25.5	80	55	75	80	1	0.6	2.51	2.65	3.22	52311
	45	120	87	92	101	1.5	0.6	52411	54411	54411U	178000	360000	1300	1900	120	57	88	125	53.5	56	60.5	20	15.5	22.5	90	55	81	88	1.5	0.6	4.70	4.55	5.64	52411
	50	95	46	50	56	1	0.6	52212	54212	54212U	73500	179000	2000	3000	95	62	78	100	28	30	33	10	9	30.5	72	60	74	78	1	0.6	1.25	1.26	1.59	52212
60	50	110	64	70.6	78	1.1	0.6	52312	54312	54312U	123000	267000	1600	2400	110	62	85	115	39.5	42.8	46.5	15	11.5	36.5	90	60	80	85	1	0.6	2.68	2.76	3.39	52312
	50	130	93	99	107	1.5	0.6	52412	54412	54412U	213000	435000	1200	1800	130	62	95	135	57	60	64	21	16	28	100	60	88	95	1.5	0.6	6.33	6.20	7.45	52412
	55	100	47	50.4	57	1	0.6	52213	54213	54213U	75000	189000	1900	2800	100	67	82	105	28.5	30.2	33.5	10	9	38.5	80	65	79	82	1	0.6	1.36	1.35	1.72	52213
65	55	115	65	71.8	79	1.1	0.6	52313	54313	54313U	127000	287000	1500	2300	115	67	90	120	40	43.4	47	15	12.5	34.5	90	65	85	90	1	0.6	2.90	2.98	3.67	52313
	50	140	101	109.4	119	2	1	52413	54413	54413U	231000	495000	1100	1600	140	68	100	145	62	66.2	71	23	17.5	34	112	65	95	100	2	1	8.03	8.01	9.67	52413
	55	105	47	50.6	57	1	1	52214	54214	54214U	76000	199000	1800	2800	105	72	88	110	28.5	30.3	33.5	10	9	36.5	80	70	84	88	1	1	1.48	1.48	1.86	52214
70	55	125	72	80.4	88	1.1	1	52314	54314	54314U	148000	340000	1400	2100	125	72	98	130	44	48.2	52	16	13	39	100	70	92	98	1	1	3.90	4.08	4.92	52314
	55	150	107	114.2	125	2	1	52414	54414	54414U	250000	555000	1000	1500	150	73	110	155	65.5	69.1	74.5	24	19.5	28.5	112	70	102	110	2	1	9.71	9.50	11.5	52414
	60	110	47	49.6	57	1	1	52215	54215	54215U	77500	209000	1800	2700	110	77	92	115	28.5	29.8	33.5	10	9.5	47.5	90	75	89	92	1	1	1.57	1.53	1.96	52215
75	60	135	79	87.2	95	1.5	1	52315	54315	54315U	170000	395000	1200	1900	135	77	105	140	48.5	52.6	56.5	18	15	32.5	100	75	99	105	1.5	1	4.83	4.93	6.04	52315
	60	160	115	123	135	2	1	52415	54415	54415U	252000	560000	950	1400	160	78	115	165	70.5	74.5	80.5	26	21	36.5	125	75	109	115	2	1	11.8	11.6	14.1	52415

Double-direction Thrust Ball Bearings

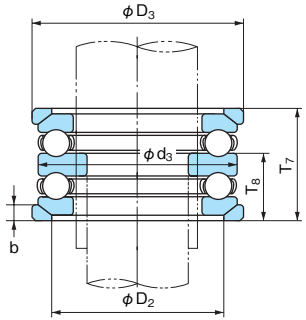
Bore Diameter: 80～170mm



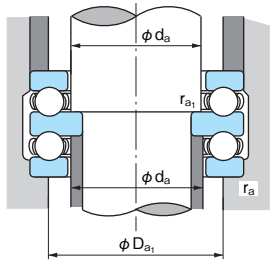
Flat back-face type

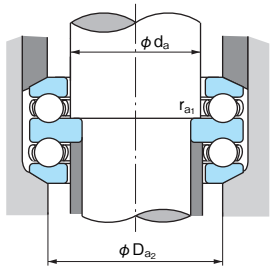


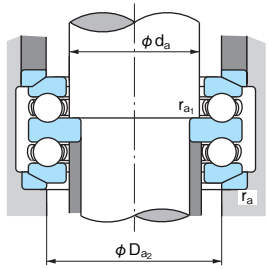
Spherical back-face type



With aligning seat





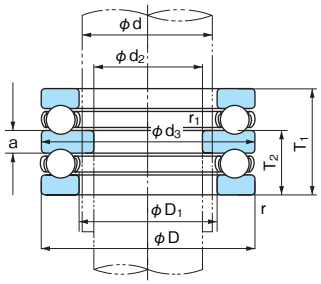


1N=0.102kgf

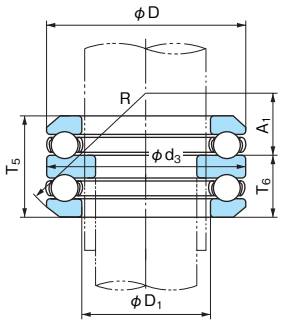
Boundary dimensions (mm)								Bearing No.			Basic dynamic load rating Ca (N)	Basic static load rating Coa (N)	Limiting speed (min⁻¹)		Dimensions (mm)											Abutment and fillet dimensions (mm)					Mass (kg) Reference			Bearing No.
d	d2	D	T1	T5	T7	r (min)	r1 (min)	Flat back-face type	Spherical back-face type	With aligning seat			Grease lubrication	Oil lubrication	d3 (max)	D1 (min)	D2	D3	T2	T6	T8	a	b	A1	R	da (min)	Da1 (max)	Da2 (max)	ra (max)	ra1 (max)	Flat back-face type	Spherical back-face type	With aligning seat	
	65	115	48	51	58	1	1	**52216**	**54216**	**54216U**	78500	219000	1700	2600	115	82	98	120	29	30.5	34	10	10	45	90	80	94	98	1	1	1.69	1.67	2.11	**52216**
80	65	140	79	86.2	95	1.5	1	**52316**	**54316**	**54316U**	176000	425000	1200	1800	140	82	110	145	48.5	52.1	56.5	18	15	45.5	112	80	104	110	1.5	1	5.06	5.14	6.29	**52316**
	65	170	120	128.4	140	2.1	1	**52416**	**54416**	**54416U**	270000	620000	900	1300	170	83	125	175	73.5	77.7	83.5	27	22	30.5	125	80	116	125	2	1	14.0	13.7	16.5	**52416**
	70	125	55	59.2	67	1	1	**52217**	**54217**	**54217U**	95500	264000	1600	2400	125	88	105	130	33.5	35.6	39.5	12	11	49.5	100	85	101	105	1	1	2.34	2.34	2.93	**52217**
85	70	150	87	95.2	105	1.5	1	**52317**	**54317**	**54317U**	206000	490000	1100	1700	150	88	115	155	53	57.1	62	19	17.5	39	112	85	111	115	1.5	1	6.43	6.41	8.05	**52317**
	65	180	128	138	150	2.1	1.1	**52417**	**54417**	**54417U**	288000	685000	850	1200	179.5	88	130	185	78.5	83.5	89.5	29	23	40.5	140	85	123	130	2	1	17.5	17.3	20.7	**52417**
	75	135	62	69	76	1.1	1	**52218**	**54218**	**54218U**	116000	325000	1400	2100	135	93	110	140	38	41.5	45	14	13.5	42	100	90	108	110	1	1	3.22	3.25	4.12	**52218**
90	75	155	88	97.2	106	1.5	1	**52318**	**54318**	**54318U**	213000	525000	1100	1600	155	93	120	160	53.5	58.1	62.5	19	18	36.5	112	90	116	120	1.5	1	6.60	6.62	8.33	**52318**
	70	190	135	143.4	157	2.1	1.1	**52418**	**54418**	**54418U**	305000	750000	790	1100	189.5	93	140	195	82.5	86.7	93.5	30	25.5	34.5	140	90	130	140	2	1	19.6	19.1	23.0	**52418**
	85	150	67	72.8	81	1.1	1	**52220**	**54220**	**54220U**	146000	410000	1300	1900	150	103	125	155	41	43.9	48	15	14	49	112	100	120	125	1	1	4.29	4.29	5.32	**52220**
100	85	170	97	105.4	115	1.5	1	**52320**	**54320**	**54320U**	236000	595000	1000	1500	170	103	135	175	59	63.2	68	21	18	42	125	100	128	135	1.5	1	8.90	8.92	10.8	**52320**
	80	210	150	160	176	3	1.1	**52420**	**54420**	**54420U**	345000	895000	710	1000	209.5	103	155	220	91.5	96.5	104.5	33	27	43.5	160	100	144	155	2.5	1	26.6	26.2	32.0	**52420**
	95	160	67	71.4	81	1.1	1	**52222**	**54222**	**54222U**	153000	450000	1200	1900	160	113	135	165	41	43.2	48	15	14	62	125	110	130	135	1	1	4.68	4.60	5.74	**52222**
110	95	190	110	118.4	128	2	1	**52322**	**54322**	**54322U**	268000	705000	880	1300	189.5	113	150	195	67	71.2	76	24	20.5	47	140	110	142	150	2	1	13.8	13.7	16.3	**52322**
	90	230	166	–	–	3	1.1	**52422**	–	–	435000	1240000	640	960	229	113	–	–	101.5	–	–	37	–	–	–	110	158	–	2.5	1	34.9	–	–	**52422**
	100	170	68	71.6	82	1.1	1.1	**52224**	**54224**	**54224U**	152000	470000	1200	1800	170	123	145	175	41.5	43.3	48.5	15	15	58.5	125	120	140	145	1	1	5.24	5.04	6.36	**52224**
120	100	210	123	131.2	143	2.1	1.1	**52324**	**54324**	**54324U**	267000	870000	790	1100	209.5	123	165	220	75	79.1	85	27	22	58	160	120	156	165	2	1	17.2	16.9	21.0	**52324**
	95	250	177	–	–	4	1.5	**52424**	–	–	455000	1340000	580	880	249	123	–	–	108.5	–	–	40	–	–	–	120	172	–	3	1.5	44.2	–	–	**52424**
	110	190	80	85.8	96	1.5	1.1	**52226**	**54226**	**54226U**	203000	620000	1000	1500	189.5	133	160	195	49	51.9	57	18	17	63	140	130	154	160	1.5	1	7.72	7.58	9.43	**52226**
130	110	225	130	–	–	2.1	1.1	**52326**	–	–	330000	960000	730	1100	224	134	–	–	80	–	–	30	–	–	–	130	168	–	2	1	22.1	–	–	**52326**
	100	270	192	–	–	4	2	**52426**	–	–	555000	1750000	540	810	269	134	–	–	117	–	–	42	–	–	–	130	186	–	3	2	56.5	–	–	**52426**
	120	200	81	86.2	99	1.5	1.1	**52228**	**54228**	**54228U**	205000	650000	1000	1500	199.5	143	170	210	49.5	52.1	58.5	18	17	83.5	160	140	164	170	1.5	1	8.93	8.79	11.3	**52228**
140	120	240	140	–	–	2.1	1.1	**52328**	–	–	350000	1050000	680	1000	239	144	–	–	85.5	–	–	31	–	–	–	140	180	–	2	1	27.8	–	–	**52328**
	110	280	196	–	–	4	2	**52428**	–	–	545000	1750000	520	780	279	144	–	–	120	–	–	44	–	–	–	140	196	–	3	2	60.6	–	–	**52428**
	130	215	89	95.6	109	1.5	1.1	**52230**	**54230**	**54230U**	213000	650000	940	1400	214.5	153	180	225	54.5	57.8	64.5	20	20.5	74.5	160	150	176	180	1.5	1	10.6	10.3	13.8	**52230**
150	130	250	140	–	–	2.1	1.1	**52330**	–	–	360000	1130000	670	1000	249	154	–	–	85.5	–	–	31	–	–	–	150	190	–	2	1	29.2	–	–	**52330**
	120	300	209	–	–	4	2	**52430**	–	–	615000	2010000	480	720	299	153	–	–	127.5	–	–	46	–	–	–	150	210	–	3	2	73.9	–	–	**52430**
	140	225	90	97.4	110	1.5	1.1	**52232**	**54232**	**54232U**	223000	720000	900	1300	224.5	163	190	235	55	58.7	65	20	21	70	160	160	186	190	1.5	1	12.2	11.9	15.6	**52232**
160	140	270	153	–	–	3	1.1	**52332**	–	–	410000	1340000	610	920	269	164	–	–	93	–	–	33	–	–	–	160	204	–	2.5	1	37.7	–	–	**52332**
	130	320	226	–	–	5	2	**52432**	–	–	680000	2410000	440	670	319	164	–	–	138	–	–	50	–	–	–	160	224	–	4	2	90.3	–	–	**52432**
	150	240	97	104.4	117	1.5	1.1	**52234**	**54234**	**54234U**	261000	835000	840	1200	239.5	173	200	250	59	62.7	69	21	21.5	87	180	170	198	200	1.5	1	15.2	14.7	19.1	**52234**
170	150	280	153	–	–	3	1.1	**52334**	–	–	420000	1430000	600	900	279	174	–	–	93	–	–	33	–	–	–	170	214	–	2.5	1	39.8	–	–	**52334**
	135	340	236	–	–	5	2.1	**52434**	–	–	755000	2730000	420	630	339	174	–	–	143	–	–	50	–	–	–	170	238	–	4	2	108	–	–	**52434**

Double-direction Thrust Ball Bearings

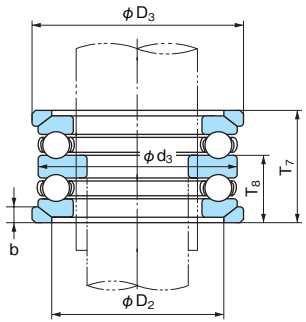
Bore Diameter: 180～220mm



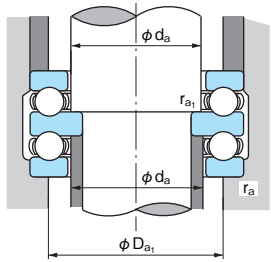
Flat back-face type

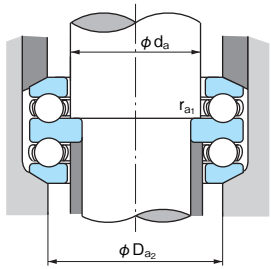


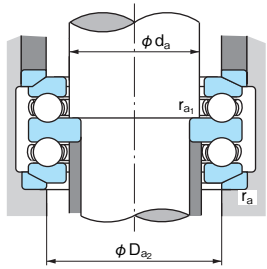
Spherical back-face type



With aligning seat







1N=0.102kgf

Boundary dimensions (mm)								Bearing No.			Basic dynamic load rating Ca (N)	Basic static load rating Coa (N)	Limiting speed (min⁻¹)		Dimensions (mm)											Abutment and fillet dimensions (mm)					Mass (kg) Reference			Bearing No.
d	d_2	D	T_1	T_5	T_7	r (min)	r_1 (min)	Flat back-face type	Spherical back-face type	With aligning seat			Grease lubrication	Oil lubrication	d_3 (max)	D_1 (min)	D_2	D_3	T_2	T_6	T_8	a	b	A_1	R	da (min)	Da_1 (max)	Da_2 (max)	ra (max)	ra_1 (max)	Flat back-face type	Spherical back-face type	With aligning seat	
180	150	250	98	102.4	118	1.5	2	**52236**	**54236**	**54236U**	266000	875000	810	1200	249	183	210	260	59.5	61.7	69.5	21	21.5	108.5	200	180	208	210	1.5	2	16.0	15.2	19.9	**52236**
	150	300	165	—	—	3	2	**52336**	—	—	485000	1700000	550	820	299	184	—	—	101	—	—	37	—	—	—	180	228	—	2.5	2	50.9	—	—	**52336**
	140	360	245	—	—	5	3	**52436**	—	—	785000	2980000	400	600	359	184	—	—	148.5	—	—	52	—	—	—	180	252	—	4	2.5	126	—	—	**52436**
190	160	270	109	116.4	131	2	2	**52238**	**54238**	**54238U**	310000	1060000	740	1100	269	194	230	280	66.5	70.2	77.5	24	23	93.5	200	190	222	230	2	2	21.6	21.2	26.5	**52238**
	160	320	183	—	—	4	2	**52338**	—	—	570000	2100000	500	750	319	195	—	—	111.5	—	—	40	—	—	—	190	242	—	3	2	64.9	—	—	**52338**
200	170	280	109	115.6	133	2	2	**52240**	**54240**	**54240U**	315000	1110000	720	1000	279	204	240	290	66.5	69.8	78.5	24	23	120.5	225	200	232	240	2	2	22.7	22.3	28.0	**52240**
	170	340	192	—	—	4	2	**52340**	—	—	625000	2380000	470	710	339	205	—	—	117	—	—	42	—	—	—	200	256	—	3	2	77.8	—	—	**52340**
220	190	300	110	115.2	134	2	2	**52244**	**54244**	**54244U**	325000	1210000	690	1000	299	224	260	310	67	69.6	79	24	25	114	225	220	252	260	2	2	23.9	22.9	29.6	**52244**

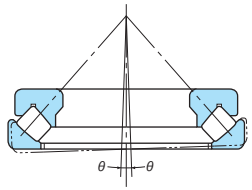
Spherical Roller Thrust Bearings

Tolerance ····· Page 52
Preload ····· Page 95

Because there are many sliding surfaces in Spherical Roller Thrust Bearings (cage-to-guide-sleeve and roller-ends-to-rib), oil lubricant (not grease) should be used.

● Aligning angle

Maximum permissible misalignment angle is about 2° under general service conditions. If the aligning advantages of this bearing type are to be realized, care must be taken to provide clearance for parts in the surrounding structure.



● The safety-factor "S_o" must be over 4.

● Minimum axial load

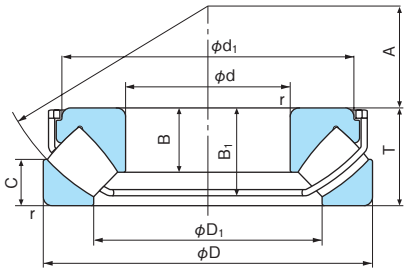
To prevent damage caused by sliding motion between the rollers and raceway, spherical roller thrust bearings must be subjected to a load more than the minimum load, Fa min.

$$F_{a\,min} = \frac{C_{oa}}{1000}$$

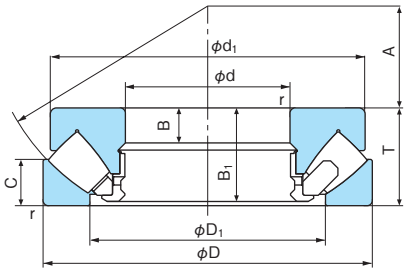
NACHI

Spherical Roller Thrust Bearings

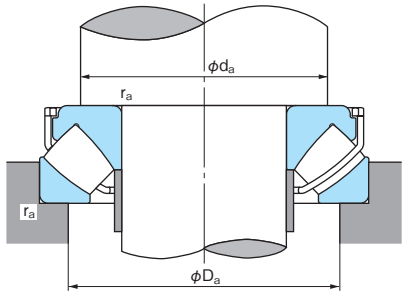
Bore Diameter: 60～130mm

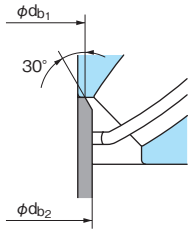


Type EX



Type E





■**Dynamic equivalent axial load**
Pa=Fa+1.2Fr

■**Static equivalent axial load**
Poa=Fa+2.7Fr
where, Fa: Axial load
Fr : Radial load
However $\frac{Fr}{Fa} \leqq 0.55$

However Fr/Fa ≦0.55 must be satisfied

1N=0.102kgf

Boundary dimensions (mm)				Bearing No.	Basic dynamic load rating Ca (N)	Basic static load rating Coa (N)	Limiting speed (min^{-1})		Reference Dimensions (mm)						Abutment and fillet dimensions (mm)			Spacer dimensions (mm)		Mass (kg) (Reference)	Bearing No.
d	D	T	r (min)				Grease lubrication	Oil lubrication	d_1	D_1	B	B_1	C	A	da (min)	Da (max)	ra (max)	db_1 (max)	db_2 (max)		
60	130	42	1.5	**29412E**	299000	890000	—	2800	123	89	15	39.5	20	38	91	108	1.5	—	—	2.75	**29412E**
	130	42	1.5	**29412EX**	350000	915000	1800	2800	113	87	27	37.1	20	38	91	108	1.5	66.0	66.0	2.50	**29412EX**
65	140	45	2	**29413E**	345000	1040000	—	2700	133	96	16	42.5	21	42	99	115	2.0	—	—	3.41	**29413E**
	140	45	2	**29413EX**	410000	1110000	1700	2700	123	93.5	29.5	40	21	42	99	115	2.0	72.0	72.0	3.20	**29413EX**
70	150	48	2	**29414E**	375000	1110000	—	2400	142	103	17	45.5	23	44	106	125	2.0	—	—	4.16	**29414E**
	150	48	2	**29414EX**	490000	1350000	1600	2400	128.3	98.4	32	42.7	23	44	106	125	2.0	75.5	77.5	3.82	**29414EX**
75	160	51	2	**29415E**	445000	1380000	—	2300	152	109	18	48	24	47	113	132	2.0	—	—	4.98	**29415E**
	160	51	2	**29415EX**	525000	1470000	1600	2300	140	105.6	34.5	45.6	24	47	113	132	2.0	82.5	82.5	4.70	**29415EX**
80	170	54	2.1	**29416E**	480000	1490000	—	2100	162	117	19	51	26	50	120	140	2.0	—	—	5.95	**29416E**
	170	54	2.1	**29416EX**	580000	1630000	1500	2100	149	113	36	48.2	26	50	120	140	2.0	88.0	88.0	5.60	**29416EX**
85	150	39	1.5	**29317E**	293000	990000	—	2700	143.5	114	13	37	19	50	115	135	1.5	—	—	2.87	**29317E**
	150	39	1.5	**29317EX**	365000	1060000	1600	2700	134	110.5	25	35	19	50	115	135	1.5	90.0	90.0	2.67	**29317EX**
	180	58	2.1	**29417E**	540000	1720000	—	2000	170	125	21	55	28	54	130	150	2.0	—	—	7.19	**29417E**
	180	58	2.1	**29417EX**	640000	1810000	1300	2000	158.2	120.5	37	50.6	28	54	130	150	2.0	94.0	94.0	6.69	**29417EX**
90	155	39	1.5	**29318E**	300000	1040000	—	2700	148.5	117	13	37	19	52	120	140	1.5	—	—	3.06	**29318E**
	155	39	1.5	**29318EX**	355000	1070000	1600	2700	135.2	116	23.8	35.1	19	52	120	140	1.5	95.0	95.0	2.75	**29318EX**
	190	60	2.1	**29418E**	620000	2020000	—	1900	180	132	22	57	29	56	135	157	2.0	—	—	8.28	**29418E**
	190	60	2.1	**29418EX**	710000	2080000	1300	1900	162	127	40.5	53	29	56	135	157	2.0	99.0	99.0	7.83	**29418EX**
100	170	42	1.5	**29320E**	355000	1260000	—	2500	163	129	14	40	20.8	58	130	150	1.5	—	—	3.91	**29320E**
	170	42	1.5	**29320EX**	435000	1400000	1500	2500	146.9	126	27	38.2	20.8	58	130	150	1.5	105.0	107.0	3.61	**29320EX**
	210	67	3	**29420E**	690000	2230000	—	1700	200	146	24	64	32	62	150	175	2.5	—	—	11.2	**29420E**
	210	67	3	**29420EX**	870000	2530000	1100	1700	181	139	44.5	59.6	32	62	150	175	2.5	108.0	110.0	10.6	**29420EX**
110	190	48	2	**29322E**	470000	1680000	—	2100	182	143	16	45.5	23	64	145	165	2.0	—	—	5.67	**29322E**
	190	48	2	**29322EX**	550000	1730000	1300	2100	165.1	140.6	30.9	44	23	64	145	165	2.0	116.0	117.0	5.22	**29322EX**
	230	73	3	**29422E**	845000	2820000	—	1500	220	162	26	69	35	69	165	190	2.5	—	—	14.7	**29422E**
	230	73	3	**29422EX**	1060000	3150000	950	1500	199.6	153.4	48	64.4	35	69	165	190	2.5	119.5	120.0	14.0	**29422EX**
120	210	54	2.1	**29324E**	565000	2030000	—	1900	200	159	18	51	26	70	160	180	2.0	—	—	7.90	**29324E**
	210	54	2.1	**29324EX**	670000	2160000	1100	1900	184.5	155	34.5	48.7	26	70	160	180	2.0	127.0	128.0	7.30	**29324EX**
	250	78	4	**29424E**	1030000	3450000	—	1400	236	174	29	74	37	74	180	205	3.0	—	—	18.5	**29424E**
	250	78	4	**29424EX**	1210000	3750000	900	1400	218	166.5	54	70.9	37	74	180	205	3.0	131.0	132.0	17.6	**29424EX**
130	225	58	2.1	**29326E**	665000	2420000	—	1800	215	171	19	55	28	76	170	195	2.0	—	—	9.45	**29326E**
	225	58	2.1	**29326EX**	770000	2440000	1000	1800	197.4	165.8	36.8	52.7	28	76	170	195	2.0	136.0	138.0	8.82	**29326EX**
	270	85	4	**29426E**	1140000	3850000	—	1200	255	189	31	81	41	81	195	225	3.0	—	—	23.5	**29426E**
	270	85	4	**29426EX**	1400000	4300000	850	1200	236.4	181	56	75	41	81	195	225	3.0	141.5	143.0	22.3	**29426EX**

Note: For heavy load application, d_a should be large enough to support the shaft washer rib.

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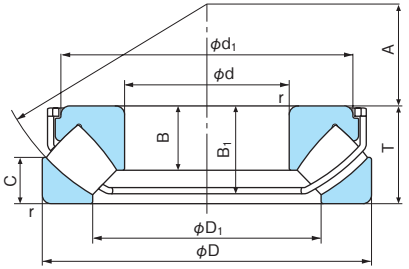
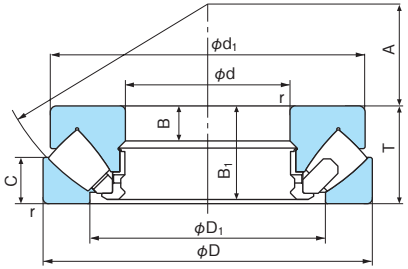
Spherical Roller Thrust Bearings

Bore Diameter: 140～240mm



Type EX



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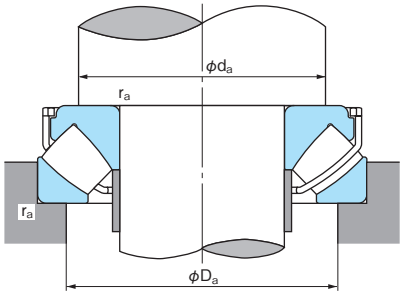
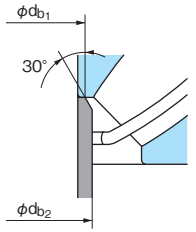




■**Dynamic equivalent axial load**

Pa=Fa+1.2Fr

■**Static equivalent axial load**

Poa=Fa+2.7Fr

where, Fa: Axial load

Fr : Radial load

However $\frac{Fr}{Fa} \leqq 0.55$

However Fr/Fa ≦0.55 must be satisfied

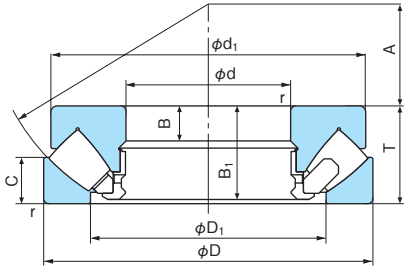
1N=0.102kgf

Boundary dimensions (mm)				Bearing No.	Basic dynamic load rating Ca (N)	Basic static load rating Coa (N)	Limiting speed (min-1)		Reference Dimensions (mm)						Abutment and fillet dimensions (mm)			Spacer dimensions (mm)		Mass (kg) (Reference)	Bearing No.
d	D	T	r (min)				Grease lubrication	Oil lubrication	d_1	D_1	B	B_1	C	A	da (min)	Da (max)	ra (max)	db_1 (max)	db_2 (max)		
140	240	60	2.1	**29328E**	700000	2560000	—	1600	230	183	20	57	29	82	185	205	2.0	—	—	11.2	**29328E**
	240	60	2.1	**29328EX**	860000	2840000	950	1600	218.4	179	38.5	54.8	29	82	185	205	2.0	147.5	149.0	10.5	**29328EX**
	280	85	4	**29428E**	1200000	4050000	—	1200	268	199	31	81	41	86	205	235	3.0	—	—	24.6	**29428E**
	280	85	4	**29428EX**	1410000	4350000	850	1200	246	196	53.6	74.4	41	86	205	235	3.0	153.0	160.0	22.8	**29428EX**
150	215	39	1.5	**29230E**	335000	1390000	—	2100	208	178	14	37	19	82	179	196	1.5	—	—	4.60	**29230E**
	250	60	2.1	**29330E**	735000	2840000	—	1600	240	194	20	57	29	87	195	215	2.0	—	—	11.7	**29330E**
	300	90	4	**29430E**	1330000	4600000	—	1100	285	214	32	86	44	92	220	250	3.0	—	—	29.6	**29430E**
	300	90	4	**29430EX**	1630000	5150000	800	1100	265.4	207.5	58.5	80.8	44	92	220	250	3.0	163.0	169.0	27.8	**29430EX**
160	225	39	1.5	**29232E**	345000	1470000	—	2100	219	188	14	37	19	85	189	206	1.5	—	—	4.70	**29232E**
	270	67	3	**29332E**	880000	3400000	—	1400	260	208	23	64	32	92	210	235	2.5	—	—	15.5	**29332E**
	270	67	3	**29332EX**	1040000	3500000	850	1400	243.4	199.8	44	61.4	32	92	210	235	2.5	166.0	174.0	14.5	**29332EX**
	320	95	5	**29432E**	1510000	5350000	—	1000	306	229	34	91	45	99	230	265	4.0	—	—	35.9	**29432E**
	320	95	5	**29432EX**	1820000	5750000	750	1000	283.8	222	62.5	85.7	45	99	230	265	4.0	174.5	181.0	33.4	**29432EX**
170	240	42	1.5	**29234E**	390000	1700000	—	1900	233	198	15	40	20	92	201	218	1.5	—	—	6.00	**29234E**
	280	67	3	**29334E**	900000	3550000	—	1400	270	216	23	64	32	96	220	245	2.5	—	—	16.3	**29334E**
	340	103	5	**29434E**	1670000	5900000	—	950	324	243	37	99	50	104	245	285	4.0	—	—	44.0	**29434E**
180	250	42	1.5	**29236E**	420000	1900000	—	1900	243	208	15	40	21	95	211	228	1.5	—	—	6.30	**29236E**
	300	73	3	**29336E**	1020000	3950000	—	1300	290	232	25	69	35	103	235	260	2.5	—	—	20.7	**29336E**
	360	109	5	**29436E**	1950000	7000000	—	860	342	255	39	105	52	110	260	300	4.0	—	—	52.2	**29436E**
190	270	48	2	**29238E**	540000	2300000	—	1800	262	223	15	45	24	104	225	245	2.0	—	—	8.50	**29238E**
	320	78	4	**29338E**	1170000	4550000	—	1100	308	246	27	74	38	110	250	275	3.0	—	—	25.5	**29338E**
	380	115	5	**29438E**	2120000	7750000	—	800	360	271	41	111	55	117	275	320	4.0	—	—	61.4	**29438E**
200	280	48	2	**29240E**	550000	2410000	—	1800	271	236	15	45	24	108	235	255	2.0	—	—	9.08	**29240E**
	340	85	4	**29340E**	1350000	5250000	—	1000	325	261	29	81	41	116	265	295	3.0	—	—	32.0	**29340E**
	400	122	5	**29440E**	2350000	8450000	—	740	380	286	43	117	59	122	290	335	4.0	—	—	73.0	**29440E**
220	300	48	2	**29244E**	595000	2750000	—	1600	292	254	15	45	24	117	260	275	2.0	—	—	9.84	**29244E**
	360	85	4	**29344E**	1410000	5750000	—	1000	345	280	29	81	41	125	285	315	3.0	—	—	34.5	**29344E**
	420	122	6	**29444E**	2410000	8950000	—	720	400	308	43	117	58	132	310	355	5.0	—	—	74.2	**29444E**
240	340	60	2.1	**29248E**	890000	4000000	—	1300	330	283	19	57	30	130	285	305	2.0	—	—	17.1	**29248E**
	380	85	4	**29348E**	1410000	5850000	—	980	365	300	29	81	41	135	300	330	3.0	—	—	36.3	**29348E**
	440	122	6	**29448E**	2480000	9450000	—	720	420	326	43	117	59	142	330	375	5.0	—	—	83.0	**29448E**

Note: For heavy load application, d_a should be large enough to support the shaft washer rib.

Spherical Roller Thrust Bearings

Bore Diameter: 260～460mm



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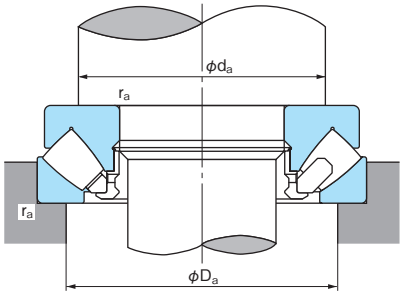

■**Dynamic equivalent axial load**
Pa=Fa+1.2Fr

■**Static equivalent axial load**
Poa=Fa+2.7Fr
where, Fa: Axial load
Fr : Radial load
However $\frac{Fr}{Fa} \leqq 0.55$

However Fr/Fa ≦0.55 must be satisfied

1N=0.102kgf

Boundary dimensions (mm)				Bearing No.	Basic dynamic load rating Ca (N)	Basic static load rating Coa (N)	Limiting speed (min^{-1})		Reference Dimensions (mm)						Abutment and fillet dimensions (mm)			Spacer dimensions (mm)		Mass (kg) (Reference)	Bearing No.
d	D	T	r (min)				Grease lubrication	Oil lubrication	d_1	D_1	B	B_1	C	A	da (min)	Da (max)	ra (max)	db_1 (max)	db_2 (max)		
260	360	60	2.1	**29252E**	915000	4250000	—	1300	350	302	19	57	30	139	305	325	2.0	—	—	18.5	**29252E**
	420	95	5	**29352E**	1810000	7500000	—	860	405	329	32	91	45	148	330	365	4.0	—	—	51.5	**29352E**
	480	132	6	**29452E**	2940000	11600000	—	640	460	357	48	127	64	154	360	405	5.0	—	—	106	**29452E**
280	380	60	2.1	**29256E**	935000	4500000	—	1200	370	323	19	57	30	150	325	345	2.0	—	—	19.5	**29256E**
	440	95	5	**29356E**	1850000	7950000	—	840	423	348	32	91	46	158	350	390	4.0	—	—	54.0	**29356E**
	520	145	6	**29456E**	3450000	13500000	—	580	495	387	52	140	68	166	390	440	5.0	—	—	137	**29456E**
300	420	73	3	**29260E**	1220000	5850000	—	1000	405	353	21	69	38	162	355	380	2.5	—	—	31.0	**29260E**
	480	109	5	**29360E**	2310000	10000000	—	720	460	379	37	105	50	168	380	420	4.0	—	—	75.4	**29360E**
	540	145	6	**29460E**	3650000	14800000	—	540	515	402	52	140	70	175	410	460	5.0	—	—	146	**29460E**
320	440	73	3	**29264E**	1270000	6150000	—	980	430	372	21	69	38	172	375	400	2.5	—	—	32.8	**29264E**
	500	109	5	**29364E**	2370000	10600000	—	720	482	399	37	105	53	180	400	440	4.0	—	—	80.0	**29364E**
	580	155	7.5	**29464E**	4050000	16800000	—	480	555	435	55	149	75	191	435	495	6.0	—	—	179	**29464E**
340	460	73	3	**29268E**	1290000	6350000	—	950	445	395	21	69	37	183	395	420	2.5	—	—	34.5	**29268E**
	540	122	5	**29368E**	2850000	12400000	—	630	520	428	41	117	59	192	430	470	4.0	—	—	106	**29368E**
	620	170	7.5	**29468E**	4750000	19300000	—	430	590	462	61	164	82	201	465	530	6.0	—	—	228	**29468E**
360	500	85	4	**29272E**	1650000	8050000	—	830	485	423	25	81	44	194	420	455	3.0	—	—	50.4	**29272E**
	560	122	5	**29372E**	2900000	12900000	—	600	540	448	41	117	59	202	450	495	4.0	—	—	111	**29372E**
	640	170	7.5	**29472E**	4900000	20500000	—	410	610	480	61	164	82	210	485	550	6.0	—	—	234	**29472E**
380	520	85	4	**29276E**	1780000	8800000	—	800	505	441	27	81	42	202	440	475	3.0	—	—	52.8	**29276E**
	600	132	6	**29376E**	3400000	15300000	—	540	580	477	44	127	63	216	480	525	5.0	—	—	140	**29376E**
	670	175	7.5	**29476E**	5200000	22000000	—	400	640	504	63	168	85	230	510	575	6.0	—	—	263	**29476E**
400	540	85	4	**29280E**	1840000	9250000	—	800	526	460	27	81	42	212	460	490	3.0	—	—	55.1	**29280E**
	620	132	6	**29380E**	3550000	16300000	—	530	596	494	44	127	64	225	500	550	5.0	—	—	146	**29380E**
	710	185	7.5	**29480E**	5850000	25000000	—	360	680	534	67	178	89	236	540	610	6.0	—	—	314	**29480E**
420	580	95	5	**29284E**	2260000	11300000	—	700	564	489	30	91	46	225	490	525	4.0	—	—	74.9	**29284E**
	650	140	6	**29384E**	3900000	17900000	—	480	626	520	48	135	68	235	525	575	5.0	—	—	170	**29384E**
	730	185	7.5	**29484E**	6050000	26000000	—	360	700	556	67	178	89	244	560	630	6.0	—	—	325	**29484E**
440	600	95	5	**29288E**	2290000	11800000	—	660	585	508	30	91	49	235	510	545	4.0	—	—	79.0	**29288E**
	680	145	6	**29388E**	4050000	19000000	—	450	655	548	49	140	70	245	550	600	5.0	—	—	192	**29388E**
	780	206	9.5	**29488E**	6950000	30000000	—	300	745	588	74	199	100	260	595	670	8.0	—	—	421	**29488E**
460	620	95	5	**29292E**	2290000	11900000	—	660	605	530	30	91	46	245	530	570	4.0	—	—	80.9	**29292E**
	710	150	6	**29392E**	4600000	21700000	—	430	685	567	51	144	72	257	575	630	5.0	—	—	216	**29392E**
	800	206	9.5	**29492E**	7150000	31500000	—	290	765	608	74	199	100	272	615	690	8.0	—	—	435	**29492E**

Note: For heavy load application, d_a should be large enough to support the shaft washer rib.

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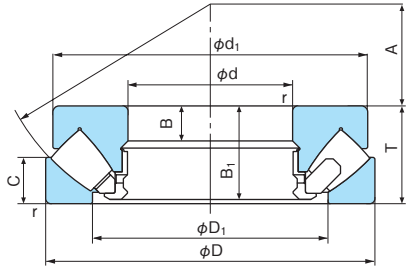
Spherical Roller Thrust Bearings

Bore Diameter: 480～530mm



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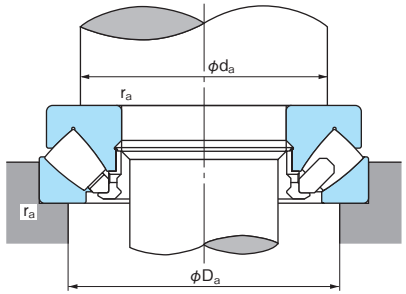


■Dynamic equivalent axial load

Pa=Fa+1.2Fr

■Static equivalent axial load

Poa=Fa+2.7Fr

where, Fa: Axial load

Fr : Radial load

However $\frac{Fr}{Fa} \leqq 0.55$

However Fr/Fa ≦0.55 must be satisfied

1N=0.102kgf

Boundary dimensions (mm)				Bearing No.	Basic dynamic load rating Ca (N)	Basic static load rating Coa (N)	Limiting speed (min^{-1})		Reference Dimensions (mm)						Abutment and fillet dimensions (mm)			Spacer dimensions (mm)		Mass (kg) (Reference)	Bearing No.
d	D	T	r (min)				Grease lubrication	Oil lubrication	d_1	D_1	B	B_1	C	A	da (min)	Da (max)	ra (max)	db_1 (max)	db_2 (max)		
480	650	103	5	**29296E**	2530000	13200000	—	600	635	556	33	99	55	259	555	595	4.0	—	—	97.5	**29296E**
	730	150	6	**29396E**	4630000	21900000	—	410	705	590	51	144	72	270	595	650	5.0	—	—	224	**29396E**
	850	224	9.5	**29496E**	8250000	36000000	—	260	810	638	81	216	108	280	645	730	8.0	—	—	543	**29496E**
500	670	103	5	**292/500E**	2590000	13800000	—	600	654	574	33	99	55	268	575	615	4.0	—	—	101	**292/500E**
	750	150	6	**293/500E**	4700000	22600000	—	410	725	611	51	144	74	280	615	670	5.0	—	—	231	**293/500E**
	870	224	9.5	**294/500E**	8250000	35000000	—	250	830	661	81	216	107	290	670	750	8.0	—	—	559	**294/500E**
530	710	109	5	**292/530E**	2820000	15100000	—	540	692	612	35	105	57	288	615	653	4.0	—	—	106	**292/530E**

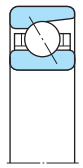
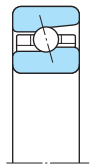
Note: For heavy load application, d_a should be large enough to support the shaft washer rib.

Precision Machine Tool Bearings

Bearings selected for use in machine tools are required to have a design which will ensure high rotational speed and high accuracy.

Bearings for Machine Tool Spindles

Spindle bearings are generally classified as those that support radial load and those that support thrust loads.

Angular Contact Ball Bearings	
	
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See page 166	See page 369

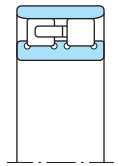
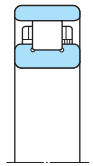
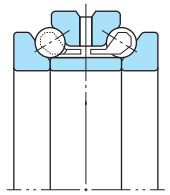
Cylindrical Roller Bearings	
	
NN30 NN30K	N10 N10K
See page 202	See page 202

Fig 1. The bearings for radial load

Double-direction Thrust Angular Contact Ball Bearings

TAD20
See page 373

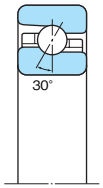
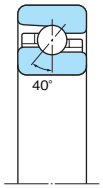
Combination Angular Contact Ball Bearings	
	
TAH10T	TBH10T
See page 375	See page 376

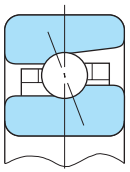
Fig 2. The bearings for axial load

High-speed Angular Contact Ball Bearings
BNH000 Series

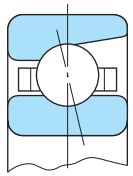
(1) High-speed Angular Contact Ball Bearings - BNH000 Series

● Feature design

BNH000 Series bearings are designed with smaller balls than Angular Contact Ball Bearings Type C. They are suitable for high-speed applications and lower heat generation and are typically used in high speed machining center spindles. (Their tolerance class is JIS (ISO) class 4 normally.)



BNH000



7000C

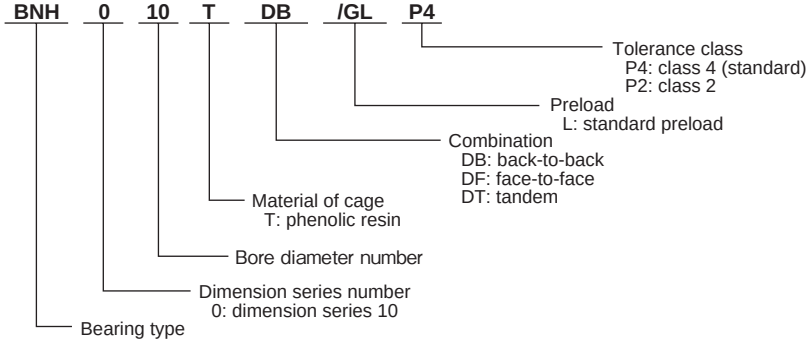
● Standard preload

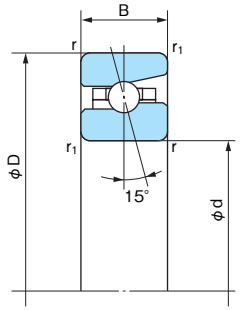
Standard preload of BNH type is designed with light preload.

Unit: N

Bore Diameter Number	BNH000
07	78.5
08 09 10	98.1
11 12 13	147
14 15	245
16 17	294
18 19 20	392
21	490
22 24	588
26	785
28	834
30	1080
32	1180
34	1370

● Bearing No.





1N=0.102kgf

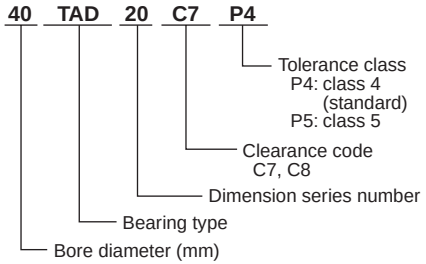
Bearing No.	Dimensions (mm)					Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min-1)	
	d	D	B	r (min)	r1 (min)			Grease lubrication	Oil lubrication
BNH 007	35	62	14	1	0.6	11600	9950	25000	35000
BNH 008	40	68	15	1	0.6	14800	12900	22000	32000
BNH 009	45	75	16	1	0.6	15500	14500	20000	28000
BNH 010	50	80	16	1	0.6	16100	15900	19000	26000
BNH 011	55	90	18	1	0.6	20000	20100	17000	24000
BNH 012	60	95	18	1.1	0.6	20800	21900	16000	22000
BNH 013	65	100	18	1.1	0.6	21500	23400	15000	21000
BNH 014	70	110	20	1.1	0.6	29400	31500	13000	19000
BNH 015	75	115	20	1.1	0.6	29800	32500	13000	18000
BNH 016	80	125	22	1.1	0.6	35000	39000	12000	17000
BNH 017	85	130	22	1.1	0.6	35500	40000	11000	16000
BNH 018	90	140	24	1.5	1	46500	53000	10000	15000
BNH 019	95	145	24	1.5	1	47000	55000	10000	14000
BNH 020	100	150	24	1.5	1	48000	56500	9600	14000
BNH 021	105	160	26	2	1	54500	65000	9100	13000
BNH 022	110	170	28	2	1	61000	74000	8600	12000
BNH 024	120	180	28	2	1	63000	79000	8000	11000
BNH 026	130	200	33	2	1	83500	105000	7300	10000
BNH 028	140	210	33	2	1	86000	112000	6900	9700
BNH 030	150	225	35	2.1	1	102000	132000	6400	9100
BNH 032	160	240	38	2.1	1	110000	145000	6000	8500
BNH 034	170	260	42	2.1	1	129000	173000	5600	7900

(2) Double-direction Thrust Angular Contact Ball Bearings - TAD20 Series

● Feature design

This is a double-row bearing with a one-piece outer ring. The ball assembly is arranged as a back-to-back, Angular Contact Ball Bearings with a high contact angle. This type is used as the Axial carrying Bearing in conjunction with a Double-row Cylindrical Roller Bearings.

● Bearing No.



● Tolerance

The outer ring is made with a negative tolerance for a clearance fit in the housing. This enables the associated radial bearing to carry a radial load.

● Standard preload

Bore Diameter Number	Standard preload (N)	
	C7	C8
20TAD20	215	590
30TAD20	245	
35TAD20		685
40TAD20	295	
45TAD20		785
50TAD20	345	880
55TAD20	390	980
60TAD20		
65TAD20	590	1250
70TAD20		1350
75TAD20	685	1750
80TAD20		
85TAD20		2150
90TAD20	1050	2850
95TAD20	1150	2950
100TAD20		3450
105TAD20	1450	
110TAD20		4400
120TAD20	1650	4700
130TAD20	1750	
140TAD20	1950	6350
150TAD20	2750	
160TAD20		6850
170TAD20	2950	8800
180TAD20	3900	
190TAD20		11800
200TAD20	4100	

Inner Ring and Height Tolerances

Unit: µm

Nominal bearing bore diameter d (mm)		Single plane mean bore diameter deviation Δd_{mb}				Variation of assembled height T		Width variation of inner ring V_{Bs} (Max)		Side face runout with reference to bore S_d (Max)		Side face runout with reference to raceway of assembled bearing inner ring and of assembled bearing outer ring S_{ia}, S_{ea} (Max)	
		Class 5		Class 4									
Over	Incl.	High	Low	High	Low	High	Low	Class 5	Class 4	Class 5	Class 4	Class 5	Class 4
18	30	0	– 6	0	– 5	0	–300	5	2.5	8	4	5	3
30	50	0	– 8	0	– 6	0	–400	5	3	8	4	5	3
50	80	0	– 9	0	– 7	0	–500	6	4	8	5	6	5
80	120	0	–10	0	– 8	0	–600	7	4	9	5	6	5
120	180	0	–13	0	–10	0	–700	8	5	10	6	8	6
180	250	0	–15	0	–12	0	–800	10	6	11	7	8	6

Variation and deviation of outer ring

Unit: µm

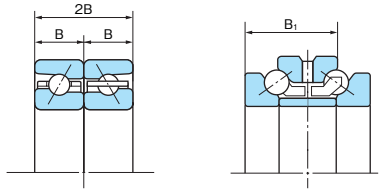
Nominal bearing bore diameter D (mm)		Single plane mean outside diameter deviation ΔD_{mb}		Width variation of inner ring V_{Cs} (Max)		Outside inclination of outer ring S_d (Max)	
		Class 5 · Class 4					
Over	Incl.	High	Low	Class 5	Class 4	Class 5	Class 4
18	30	–20	–27	5	2.5	8	4
30	50	–24	–33	6	3	8	4
50	80	–28	–38	8	4	9	5
80	120	–33	–44	8	5	10	5
120	180	–33	–46	8	5	10	5
180	250	–37	–52	10	7	11	7
250	315	–41	–59	11	7	13	8

(3) Combination Angular Contact Ball Bearings Type TAH10, TBH10

● Feature design

The ball diameter and quantity are the same as Double-direction Thrust Angular Contact Ball Bearings type TAD20. The contact angle is 30° for TAH10 type and 40° for TBH10 type. They are suitable for high-speed.

Their Duplex Combination width 2B of type DB or DF is the same as width B1 of TAD20 type. TAD20 type are interchangeable to TAH10 type or TBH10 type by changing the method of setting to shaft.



Type TAH (TBH) Type TAD

● Standard preload

Unit: N

Bore Diameter Number	Bearing	
	TAH	TBH
50	294	539
55	392	686
60		
65		
70	588	1080
75		
80	686	1270
85		
90	1080	1860
95		
100		
105	1180	2060
110	1370	2450
120	1470	2550
130	1860	3330
140	1960	3530
150	2450	4310
160	2650	4510
170	3040	5300

● Tolerance of outside diameter

The outside diameter of the outer ring is made with a special tolerance for a clearance fit in the housing.

This enables the associated radial bearing to carry a radial load, like as TAD20 type.

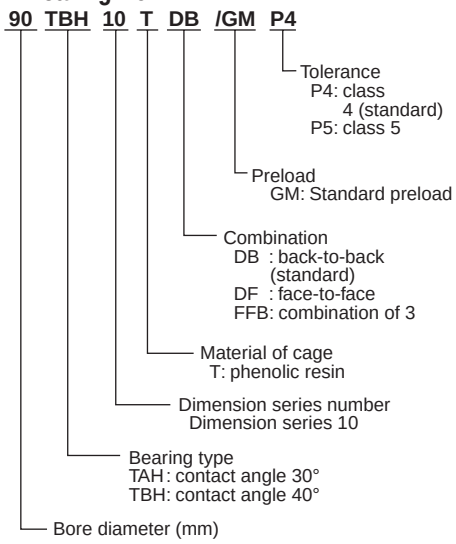
Tolerance of outside diameter

Unit: µm

Nominal bearing outside diameter D (mm)		Outside diameter deviation ΔD_s	
Over	Incl.	High	Low
30	50	–20	–41
50	80	–30	–49
80	120	–36	–58
120	180	–43	–68
180	250	–50	–79
250	315	–56	–88

JIS (ISO) class 4 for other tolerances

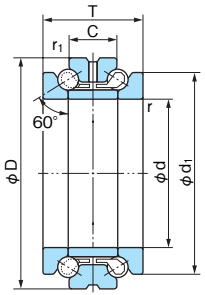
● Bearing No.

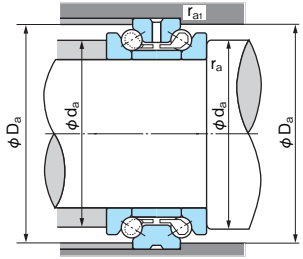


NACHI

Double-direction Thrust Angular Contact Ball Bearings

TAD20 Series





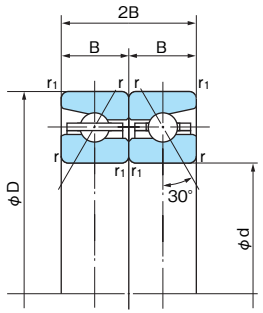
1N=0.102kgf

Boundary dimensions (mm)								Bearing No.		Basic dynamic load rating Ca (N)		Basic static load rating Coa (N)	Limiting speed (min-1)		Abutment and fillet dimensions (mm)				Mass (kg)	Bearing No. Standard type
d Standard type	d Large bore type(1)	D	d1	T	C	r (min)	r1 (min)	Standard type	Large bore type (1)				Grease lubrication	Oil lubrication	da (min)	Da (max)	ra (max)	ra1 (max)		
25	27	47	40	28	14	0.6	0.3	25TAD20	27TAD20	10700		19900	8000	10000	33	43.5	0.6	0.3	0.197	25TAD20
30	32	55	47	32	16	1	0.6	30	32	14000		27100	7000	9000	39	51	1	0.6	0.301	30
35	37	62	53	34	17	1	0.6	35	37	16200		33000	6200	8200	45	58	1	0.6	0.394	35
40	42	68	58.5	36	18	1	0.6	40TAD20	42TAD20	18600		39500	5800	7800	50	64	1	0.6	0.482	40TAD20
45	47	75	65	38	19	1	0.6	45	47	21200		47000	5500	7300	56	71	1	0.6	0.605	45
50	52	80	70	38	19	1	0.6	50	52	22000		52000	5000	6700	61	76	1	0.6	0.656	50
55	57	90	78	44	22	1.1	0.6	55TAD20	57TAD20	29900		71500	4500	6200	68	85	1	0.6	0.988	55TAD20
60	62	95	83	44	22	1.1	0.6	60	62	30500		75000	4300	6000	73	90	1	0.6	1.06	60
65	67	100	88	44	22	1.1	0.6	65	67	31500		81500	4100	5500	78	95	1	0.6	1.12	65
70	73	110	97	48	24	1.1	0.6	70TAD20	73TAD20	37500		99000	3800	5200	85	105	1	0.6	1.53	70TAD20
75	78	115	102	48	24	1.1	0.6	75	78	38500		107000	3600	4900	90	110	1	0.6	1.16	75
80	83	125	110	54	27	1.1	0.6	80	83	51000		138000	3400	4500	97	119	1	0.6	2.20	80
85	88	130	115	54	27	1.1	0.6	85TAD20	88TAD20	51500		144000	3200	4300	102	124	1	0.6	2.31	85TAD20
90	93	140	123	60	30	1.5	1	90	93	59000		166000	3000	4000	109	132	1.5	1	3.05	90
95	98	145	128	60	30	1.5	1	95	98	59500		173000	2900	3900	114	137	1.5	1	3.18	95
100	103	150	133	60	30	1.5	1	100TAD20	103TAD20	60500		180000	2800	3700	119	142	1.5	1	3.32	100TAD20
105	109	160	142	66	33	2	1	105	109	67000		199000	2600	3500	125	151	2	1	4.19	105
110	114	170	150	72	36	2	1	110	114	81500		236000	2500	3300	132	161	2	1	5.35	110
120	124	180	160	72	36	2	1	120TAD20	125TAD20	84000		256000	2300	3100	142	171	2	1	5.73	120TAD20
130	135	200	177	84	42	2	1	130	135	109000		325000	2100	2800	156	190	2	1	8.58	130
140	145	210	187	84	42	2	1	140	145	113000		355000	2000	2600	166	200	2	1	9.10	140
150	155	225	200	90	45	2.1	1.1	150TAD20	155TAD20	123000		390000	1850	2500	178	213	2	1	11.2	150TAD20
160	165	240	212	96	48	2.1	1.1	160	165	138000		435000	1750	2350	190	227	2	1	13.6	160
170	176	260	230	108	54	2.1	1.1	170	176	175000		550000	1600	2150	204	246	2	1	18.5	170
180	187	280	248	120	60	2.1	1.1	180TAD20	187TAD20	200000		640000	1500	2000	220	264	2	1	24.7	180TAD20
190	197	290	258	120	60	2.1	1.1	190	197	203000		665000	1450	1950	230	274	2	1	25.5	190
200	207	310	274	132	66	2.1	1.1	200	207	257000		835000	1350	1800	244	292	2	1	32.7	200

Note: (1) Large bore type bearings are used at large bore side of cylindrical roller bearings with tapered bore NN3000K type.

Combination Angular Contact Ball Bearings

TAH10 Series



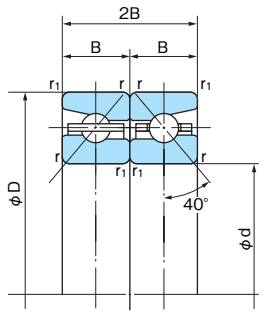
Type TAH

1N=0.102kgf

Bearing No.	Dimensions (mm)					Basic dynamic load rating Ca (N)	Basic static load rating Coa (N)	Limiting speed (min^{-1})	
	d	D	2B	r (min)	r_1 (min)			Grease lubrication	Oil lubrication
50TAH10DB	50	80	28.5	1	0.6	19200	40500	9200	11000
55TAH10DB	55	90	33	1.1	0.6	23800	51000	8300	9700
60TAH10DB	60	95	33	1.1	0.6	24700	56000	7700	9000
65TAH10DB	65	100	33	1.1	0.6	25600	61000	7300	8500
70TAH10DB	70	110	36	1.1	0.6	35000	80000	6700	7800
75TAH10DB	75	115	36	1.1	0.6	35500	83500	6300	7400
80TAH10DB	80	125	40.5	1.1	0.6	41500	99500	5900	6800
85TAH10DB	85	130	40.5	1.1	0.6	42000	104000	5600	6500
90TAH10DB	90	140	45	1.5	1	55500	135000	5200	6100
95TAH10DB	95	145	45	1.5	1	56000	141000	5000	5800
100TAH10DB	100	150	45	1.5	1	57000	147000	4800	5600
105TAH10DB	105	160	49.5	2	1	64500	168000	4500	5300
110TAH10DB	110	170	54	2	1	73000	191000	4300	5000
120TAH10DB	120	180	54	2	1	75000	207000	4000	4700
130TAH10DB	130	200	63	2	1	99500	269000	3600	4200
140TAH10DB	140	210	63	2	1	103000	291000	3400	4000
150TAH10DB	150	225	67.5	2.1	1.1	121000	340000	3200	3700
160TAH10DB	160	240	72	2.1	1.1	131000	375000	3000	3500
170TAH10DB	170	260	81	2.1	1.1	154000	445000	2800	3300

Combination Angular Contact Ball Bearings

TBH10 Series



Type TBH

1N=0.102kgf

Bearing No.	Dimensions (mm)					Basic dynamic load rating Ca (N)	Basic static load rating Coa (N)	Limiting speed (min^{-1})	
	d	D	2B	r (min)	r_1 (min)			Grease lubrication	Oil lubrication
50TBH10DB	50	80	28.5	1	0.6	22800	53000	7700	9200
55TBH10DB	55	90	33	1.1	0.6	28200	67000	6900	8300
60TBH10DB	60	95	33	1.1	0.6	29300	73000	6500	7700
65TBH10DB	65	100	33	1.1	0.6	30000	79500	6100	7300
70TBH10DB	70	110	36	1.1	0.6	41500	104000	5600	6700
75TBH10DB	75	115	36	1.1	0.6	42000	109000	5300	6300
80TBH10DB	80	125	40.5	1.1	0.6	49000	130000	4900	5900
85TBH10DB	85	130	40.5	1.1	0.6	50000	136000	4700	5600
90TBH10DB	90	140	45	1.5	1	65500	176000	4300	5200
95TBH10DB	95	145	45	1.5	1	66500	184000	4200	5000
100TBH10DB	100	150	45	1.5	1	67500	191000	4000	4800
105TBH10DB	105	160	49.5	2	1	76500	219000	3800	4500
110TBH10DB	110	170	54	2	1	86000	249000	3600	4300
120TBH10DB	120	180	54	2	1	88500	269000	3300	4000
130TBH10DB	130	200	63	2	1	118000	350000	3000	3600
140TBH10DB	140	210	63	2	1	121000	380000	2900	3400
150TBH10DB	150	225	67.5	2.1	1.1	143000	445000	2700	3200
160TBH10DB	160	240	72	2.1	1.1	155000	490000	2500	3000
170TBH10DB	170	260	81	2.1	1.1	182000	580000	2300	2800

Ball Screw Support Bearings

This type is used for supporting the ball screws that are used as actuators of high precision and high speed machines, precision measurement equipment, robots, etc.
This is a precision and high ability bearing.

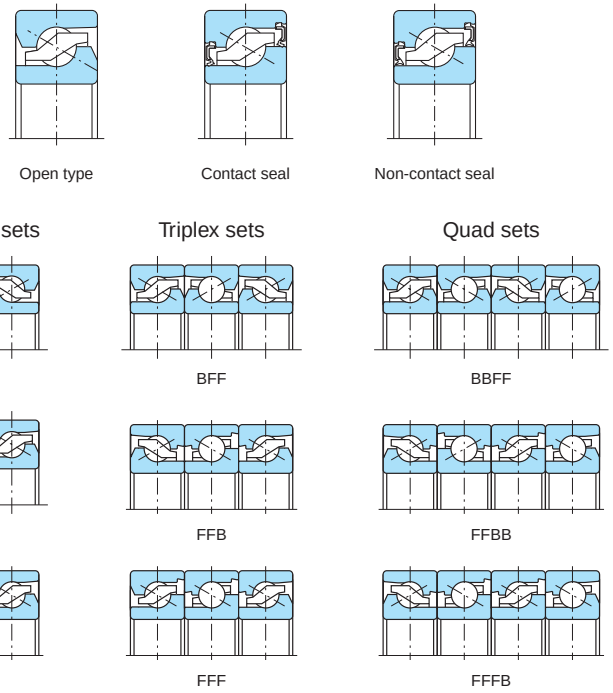
● Feature design

(1) High stiffness
These bearings are designed with polyamide cages and a greater number of balls than conventional angular contact ball bearings. For these reasons, bearing stiffness is greater than conventional bearings.

(2) Easy fitting and adjustment
These bearings are supplied with a pre-set preload so difficult adjustment and torque measurement is eliminated.

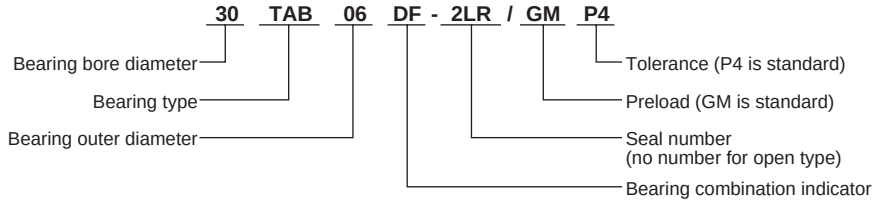
(3) Simplified bearing mounting structure
These bearings are supplied with a 60° contact angle so radial and thrust load combinations can be sustained. This results in a simplified and compact shaft and housing design.

(4) Available with seal
Seals come in both contact seal and non-contact seal types. It is possible to choose the type that best suits the application.

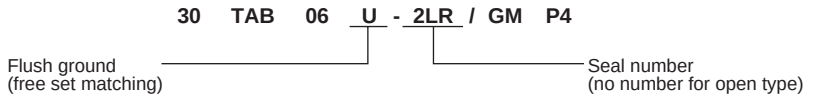


(Sealed bearings are sealed on the outside edges only when used in combination.)

● Bearing No.



Flush ground (universal matching)



● Tolerances

Tolerances for inner ring (outer ring width/axial runout)

Unit: μm

Nominal bearing bore diameter (mm)		Single planemean bore diameter variation Δd_{mp}, Δd_s				Bore diameter variation in a single radial plane V_{dp} (Max)		Mean bore diameter variation V_{dmp} (Max)		Deviation of a single(1) inner ring width (or a single outer ring width) ΔB_s(ΔC_s)				Width deviation V_{Bs} of inner ring (Max)		Radial runout of assembled bearing inner ring K_{ia} (Max)		Side face runout S_d with reference to bore (Max)		Side face runout with reference to raceway of assembled bearing inner ring S_{ia} and of assembled bearing outer ring S_{ea} (Max)	
		P5		P4						P5		P4									
Over	Incl.	High	Low	High	Low	P5	P4	P5	P4	High	Low	High	Low	P5	P4	P5	P4	P5	P4	P5	P4
10	18	0	–5	0	–4	4	3	4	3	0	– 80	0	– 80	5	2.5	4	2.5	7	3	4	2
18	30	0	–6	0	–5	5	4	5	4	0	–120	0	–120	5	2.5	4	3	8	4	5	2.5
30	50	0	–8	0	–6	6	5	6	5	0	–120	0	–120	5	3	5	4	8	4	6	2.5
50	60	0	–9	0	–7	7	6	7	6	0	–150	0	–150	6	4	5	4	8	5	7	2.5

Note: (1) These deviations are for single bearing. For combination bearings, multiply these values by row number.

Tolerances for outer ring

Unit: μm

Nominal bearing outside diameter (mm)		Single plane mean outside diameter variation of outer ring ΔD_{mp}, ΔD_s				Outside diameter variation in a single radial plane V_{Dp} (Max)		Mean outside diameter variation V_{Dmp} (Max)		Width deviation V_{Cs} of outer ring (Max)		Radial runout of assembled bearing outer ring K_{ea} (Max)		Outside inclination of outer ring S_D (Max)	
		P5		P4											
Over	Incl.	High	Low	High	Low	P5	P4	P5	P4	P5	P4	P5	P4	P5	P4
30	50	0	– 7	0	–6	5	5	4	3	5	2.5	7	5	8	4
50	80	0	– 9	0	–7	7	5	5	3.5	6	3	8	5	8	4
80	120	0	–10	0	–8	8	6	5	4	8	4	10	6	9	5

● Preload and Axial Spring Constant

Bearing No.	Standard Preload M (N) Combination Mounted Bearing				Axial Spring Constant (N/μm) Combination Mounted Bearing			
	DF DB	BFF FFB	BBFF FFBB	BFFF FFFB	DF DB	BFF FFB	BBFF FFBB	BFFF FFFB
15TAB04	2160	2940	4310	3430	735	1080	1470	1320
17TAB04	2160	2940	4310	3430	735	1080	1470	1320
20TAB04	2160	2940	4310	3430	735	1080	1470	1320
25TAB06	3330	4510	6670	5200	981	1470	1960	1910
30TAB06	3330	4510	6670	5200	981	1470	1960	1910
35TAB07	3920	5300	7840	6180	1230	1770	2350	2300
40TAB07	3920	5300	7840	6180	1230	1770	2350	2300
40TAB09	5200	7060	10400	8140	1320	1910	2550	2500
45TAB07	4120	5590	8240	6470	1270	1910	2550	2500
45TAB10	5980	8140	12000	9410	1470	2160	2890	2790
50TAB10	6280	8530	12600	9810	1520	2260	3040	2940
55TAB10	6280	8530	12600	9810	1520	2260	3040	2940
55TAB12	7060	9610	14100	11100	1770	2550	3480	3380
60TAB12	7060	9610	14100	11100	1770	2550	3480	3380

● Shaft and housing tolerance:

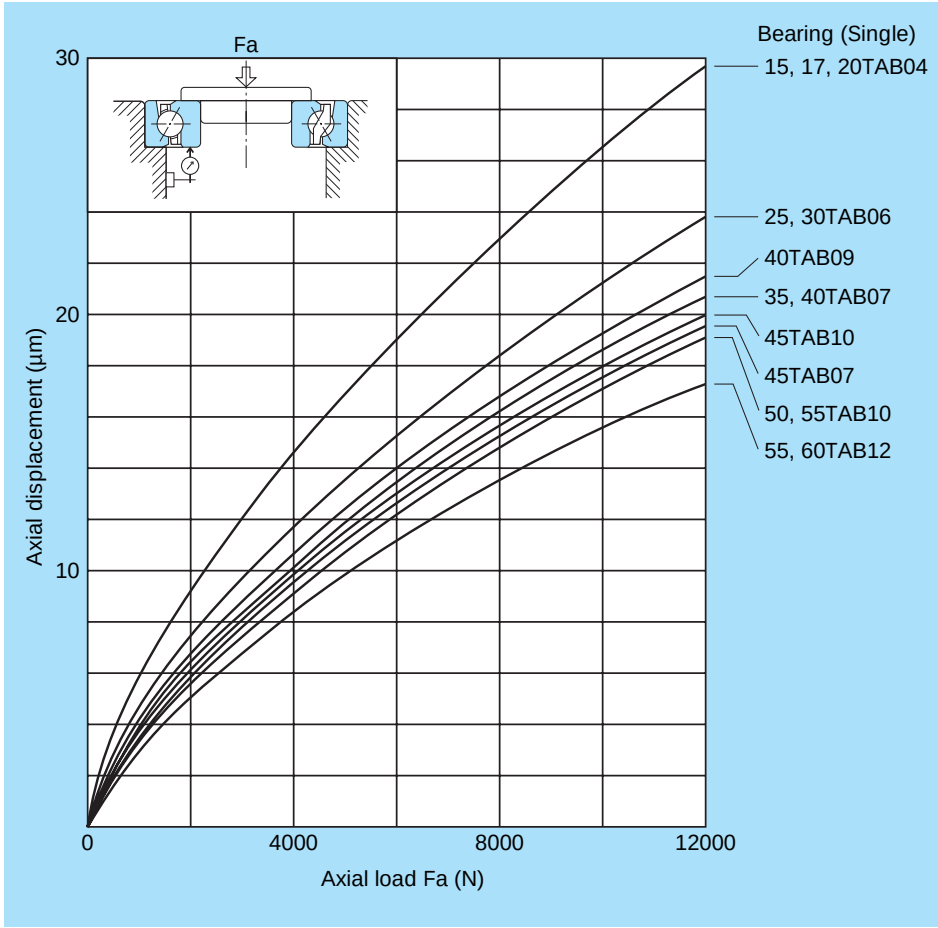
(1) For the fit, refer to the following table.

Shaft fit	h5
Housing fit	H6

(2) For the squareness of a shoulder, refer to the following table.

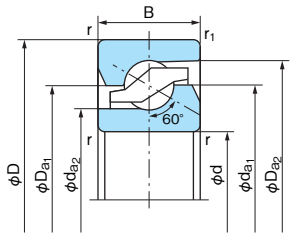
Dimensions of shaft diameter and housing bore diameter (mm)		Squareness (μm)
Over	Incl.	
—	80	4
80	120	5

● Axial Load and Axial Displacement

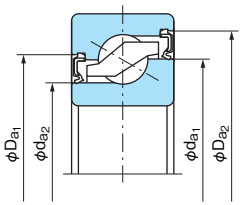


NACHI

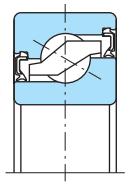
Ball Screw Support Bearings
TAB Series



Open



Contact seal (2LR)



Non-contact seal (2NK)

■Dynamic equivalent axial load

Pa=XFr+YFa

No. of Bearing in set		2		3			4			
Brgs loaded axial load		1	2	1	2	3	1	2	3	4
Fa/Fr≦e	X	1.9	—	1.43	2.33	—	1.17	2.33	2.53	—
	Y	0.54	—	0.77	0.35	—	0.89	0.35	0.26	—
Fa/Fr＞e	X	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
	Y	1	1	1	1	1	1	1	1	1

e=2.17

1N=0.102kgf

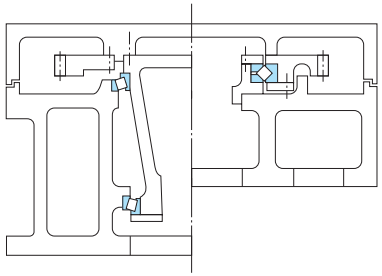
Boundary dimensions (mm)					Bearing No.	Basic dynamic load rating (2) Ca (N)	Axial limiting load (3) Coa (N)		Limiting speed (min-1)		Starting torque (N·cm)	Reference Dimensions (mm)				Mass (kg) (Reference)	Bearing No.
d	D	B	r (min)	r1 (min)					Grease lubrication	Oil lubrication	Grease lubrication	da1	da2	Da1	Da2		
15	47	15	1(1)	0.6	15TAB04DF(DB)	25900	32000		6300	8000	15	33.7	26.8	33.5	41	0.14	15TAB04DF(DB)
	47	15	1(1)	0.6	15TAB04DF(DB)-2NK	25900	32000		6300	—	—	33.7	26.8	35	41.9	0.14	15TAB04DF(DB)-2NK
	47	15	1(1)	0.6	15TAB04DF(DB)-2LR	25900	32000		6300	—	—	33.7	26.8	35	41.9	0.14	15TAB04DF(DB)-2LR
17	47	15	1	0.6	17TAB04DF(DB)	25900	32000		6300	8000	15	33.7	26.8	33.5	41	0.13	17TAB04DF(DB)
	47	15	1	0.6	17TAB04DF(DB)-2NK	25900	32000		6300	—	—	33.7	26.8	35	41.9	0.13	17TAB04DF(DB)-2NK
	47	15	1	0.6	17TAB04DF(DB)-2LR	25900	32000		6300	—	—	33.7	26.8	35	41.9	0.13	17TAB04DF(DB)-2LR
20	47	15	1	0.6	20TAB04DF(DB)	25900	32000		6300	8000	15	33.7	26.8	33.5	41	0.12	20TAB04DF(DB)
	47	15	1	0.6	20TAB04DF(DB)-2NK	25900	32000		6300	—	—	33.7	26.8	35	41.9	0.12	20TAB04DF(DB)-2NK
	47	15	1	0.6	20TAB04DF(DB)-2LR	25900	32000		6300	—	—	33.7	26.8	35	41.9	0.12	20TAB04DF(DB)-2LR
25	62	15	1	0.6	25TAB06DF(DB)	29900	46400		4650	6000	20	46.2	39.7	46	53.4	0.24	25TAB06DF(DB)
	62	15	1	0.6	25TAB06DF(DB)-2NK	29900	46400		4650	—	—	46.2	39.7	47.5	54.9	0.24	25TAB06DF(DB)-2NK
	62	15	1	0.6	25TAB06DF(DB)-2LR	29900	46400		4650	—	—	46.2	39.7	47.5	54.9	0.24	25TAB06DF(DB)-2LR
30	62	15	1	0.6	30TAB06DF(DB)	29900	46400		4650	6000	20	46.2	39.7	46	53.4	0.21	30TAB06DF(DB)
	62	15	1	0.6	30TAB06DF(DB)-2NK	29900	46400		4650	—	—	46.2	39.7	47.5	54.9	0.21	30TAB06DF(DB)-2NK
	62	15	1	0.6	30TAB06DF(DB)-2LR	29900	46400		4650	—	—	46.2	39.7	47.5	54.9	0.21	30TAB06DF(DB)-2LR
35	72	15	1	0.6	35TAB07DF(DB)	32500	54300		3750	5000	25	56.2	49.7	56	63.4	0.29	35TAB07DF(DB)
	72	15	1	0.6	35TAB07DF(DB)-2NK	32500	54300		3750	—	—	56.2	49.7	57.5	64.9	0.29	35TAB07DF(DB)-2NK
	72	15	1	0.6	35TAB07DF(DB)-2LR	32500	54300		3750	—	—	56.2	49.7	57.5	64.9	0.29	35TAB07DF(DB)-2LR
40	72	15	1	0.6	40TAB07DF(DB)	32500	54300		3750	5000	25	56.2	49.7	56	63.4	0.26	40TAB07DF(DB)
	72	15	1	0.6	40TAB07DF(DB)-2NK	32500	54300		3750	—	—	56.2	49.7	57.5	64.9	0.26	40TAB07DF(DB)-2NK
	72	15	1	0.6	40TAB07DF(DB)-2LR	32500	54300		3750	—	—	56.2	49.7	57.5	64.9	0.26	40TAB07DF(DB)-2LR
	90	20	1	0.6	40TAB09DF(DB)	65000	101000		3150	4000	30	67.2	57.2	67	78.4	0.62	40TAB09DF(DB)
	90	20	1	0.6	40TAB09DF(DB)-2NK	65000	101000		3150	—	—	67.2	57.2	68.5	79.9	0.62	40TAB09DF(DB)-2NK
	90	20	1	0.6	40TAB09DF(DB)-2LR	65000	101000		3150	—	—	67.2	57.2	68.5	79.9	0.62	40TAB09DF(DB)-2LR
45	75	15	1	0.6	45TAB07DF(DB)	33500	59500		3400	4500	50	61.7	55.2	61.5	68.9	0.25	45TAB07DF(DB)
	100	20	1	0.6	45TAB10DF(DB)	68000	113000		2850	3500	60	74.2	64.2	74	85.4	0.79	45TAB10DF(DB)
50	100	20	1	0.6	50TAB10DF(DB)	69500	119000		2700	3500	65	78.2	68.2	78	89.4	0.72	50TAB10DF(DB)
55	100	20	1	0.6	55TAB10DF(DB)	69500	119000		2700	3500	65	78.2	68.2	78	89.4	0.95	55TAB10DF(DB)
55	120	20	1	0.6	55TAB12DF(DB)	73000	137000		2300	3000	70	92.2	82.2	92	103.4	1.15	55TAB12DF(DB)
60	120	20	1	0.6	60TAB12DF(DB)	73000	137000		2300	3000	70	92.2	82.2	92	103.4	1.08	60TAB12DF(DB)

Notes: (1) r (min) = 0.6 for inner ring
(2) When bearing sets carry axial load with two or three rows, the numbers should be multiplied by 1.64 or 2.16.
(3) When bearing sets carry axial load with two or three rows, the numbers should be multiplied by 2 or 3.

Bearings for Turntable Applications

Cross Tapered Roller Bearings

This bearing type is designed with two inner rings and one outer ring. The rolling elements (Tapered rollers) are arranged with their surfaces contact the ring raceways in an alternating pattern.



Example of mounting of Tapered Roller Bearings and Cross Tapered Roller Bearing

● Feature design

(1) This type can sustain radial, overturning moment and bi-directional axial loads.
(2) Change in size due to thermal growth does not affect this type of bearing. Preload is stable over the entire temperature operating range.
(3) Light weight, compact, easy to assemble.

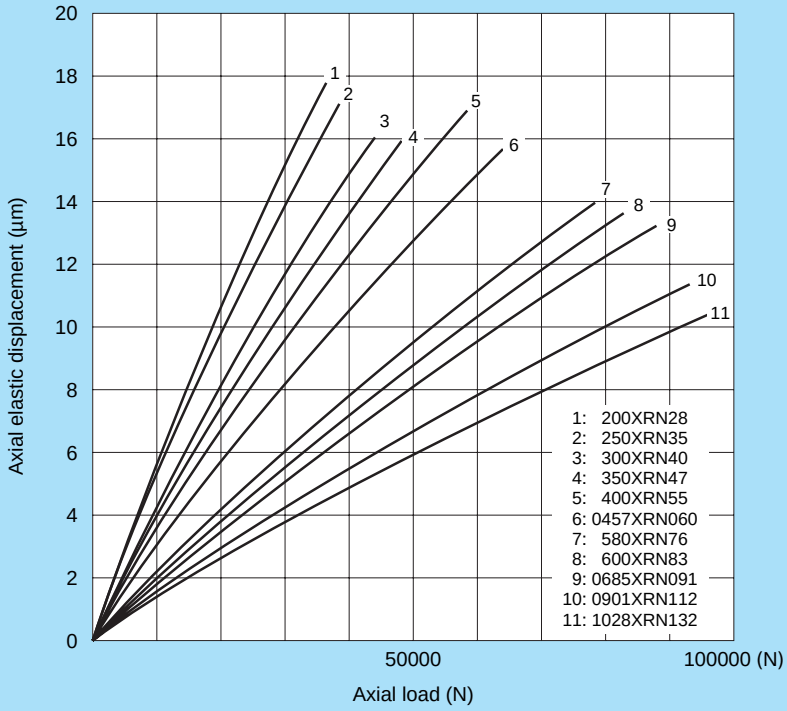
● Applications

(1) Worktable of machining centers or vertical grinding machines
(2) Work-spindle of lathes or grinding machines
(3) The indexing mechanisms of large milling machines or drilling machines
(4) Turntable mechanism of parabolic antenna

● Tolerances

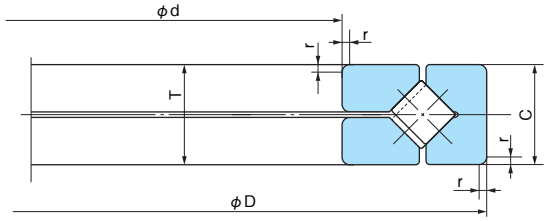
Bearing No.	Single plane mean bore diameter deviation Δd_{mp}		Single plane mean outside diameter deviation ΔD_{mp}		Variation of assembled height T		Outer ring runout Max (µm)	
	High	Low	High	Low	High	Low	Radial runout	Sideface runout
200XRN28	0	–15	0	–18	+350	–250	7	7
250XRN35	0	–10	0	–13	+350	–250	9	9
300XRN40	0	–13	0	–15	+350	–250	7	7
350XRN47	0	–13	0	–15	+350	–250	9	9
400XRN55	0	–13	0	–18	+350	–250	9	9
0457XRN060	+25	0	+25	0	+380	–380	9	9
580XRN76	+25	0	+38	0	+406	–406	10	10
600XRN83	+38	0	+38	0	+406	–406	12	12
0685XRN091	+38	0	+38	0	+508	–508	12	12
0901XRN112	+51	0	+51	0	+508	–508	14	14
1028XRN132	+76	0	+76	0	+760	–760	16	16

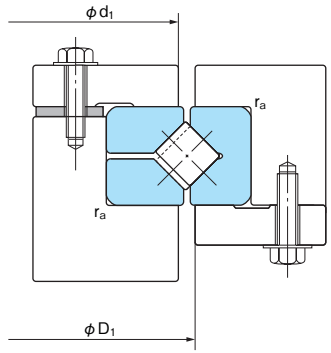
● Axial Load and Axial Displacement



Cross Tapered Roller Bearings

Bore Diameter: 200～1028.7mm





1N=0.102kgf

Bearing No.	Boundary dimensions (mm)				Basic dynamic load rating Ca (N)	Basic static load rating Coa (N)		Limiting speed (min-1)		Abutment and fillet dimensions (mm)			Bearing No.
	d	D	T (C)	r				Grease lubrication	Oil lubrication	d1 (min)	D1 (max)	ra (max)	
*200XRN28 (1)	200	280	30	1.5	144000	520000		480	950	235	249	1	*200XRN28 (1)
*250XRN35 (1)	250	350	40	3	170000	680000		400	800	302	312	1.5	*250XRN35 (1)
*300XRN40 (1)	300	400	38	3	268000	985000		330	650	345	369	2.5	*300XRN40 (1)
*350XRN47 (1)	350	470	50	3	284000	1230000		280	560	410	424	1.5	*350XRN47 (1)
*400XRN55 (1)	400	550	60	3.5	365000	1900000		250	500	475	492	1.5	*400XRN55 (1)
0457XRN060	457.2	609.6	63.5	3.3	370000	1670000		220	440	535	554	2	0457XRN060
580XRN76	580	760	80	6.4	830000	3800000		170	340	667	691	4	580XRN76
600XRN83	600	830	80	3.3	1030000	4600000		160	320	708	738	2	600XRN83
0685XRN091	685.8	914.4	79.375	3.3	1090000	5000000		140	280	807	834	2	0685XRN091
0901XRN112	901.7	1117.6	82.55	3.3	1090000	5650000		110	220	1013	1037	2	0901XRN112
1028XRN132	1028.7	1327.15	114.3	3.3	1830000	9300000		90	180	1184	1221	2	1028XRN132

Note: (1) Inner and outer diameters for bearings marked with * have minus (-) deviation.
Remark: This table is for bearings used in longitudinal rotating applications (such as tables).

Bearings for Rolling Stock

Various types of bearings are used as “rolling stock” bearings in railway axle-boxes. Cylindrical Roller Bearings and Tapered Roller Bearings are currently the bearing types most often favored for use since they can sustain high loads and provide excellent reliability.

● Journal Bearings

Double-row Cylindrical Roller Bearings or Double-row Tapered Roller Bearings for Journal applications are used for each of their capabilities. Cylindrical Roller Bearings are mostly used for easy maintenance and adaptability of high-speed. But in recent years, Tapered Roller Bearings are often used for adaptability of high-speed and long life without overhaul.

JIS (ISO) standard bearings are generally not used in journal bearing applications due to limited space and large load.

Journal bearings are specially designed wider bearings.

Cylindrical Roller bearings without a rib on the inner ring are used with the JB series Ball Bearings that handle axial loads.

Sealed Tapered Roller Bearings and sealed Cylindrical Roller Bearings with side ribs on the inner ring to carry thrust loads can be used for extended periods without overhaul. For this reason sealed bearings are used more often recently.

Bearings with a prefix JC, JT and JB are made to the specifications of Japan Railway Companies. A FCD type is made to NACHI design standards.

● Bearings for Gear box

These are bearings for a gearwheel and a pinion. They are mostly Tapered Roller Bearings, because they can sustain radial and large axial loads. They are lubricated with high viscosity gear oil, so the bearings for a pinion application are usually designed specially to prevent seizure at lower temperature. Also these bearings have been specially designed to withstand the severe vibration conditions which are normally found in this type application.

QT type bearings are made to the specifications of Japan Railway Companies, a ED type is made to NACHI design standards.

● Bearings for Traction motor

For traction motor, Deep-groove Ball Bearings and Cylindrical Roller Bearings without inner ring ribs are usually used together. These bearings have been specially designed to withstand high speed in grease lubrication and the severe vibrational load conditions.

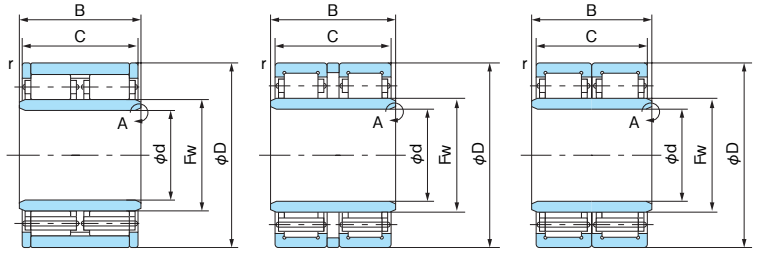
NACHI bearing numbers for the traction motor applications have suffix JT for Deep-groove Ball Bearings and T, TS, or TSL for Cylindrical Roller Bearings.

● Special designs

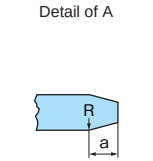
Contact NACHI for the availability of other sizes.

Journal Bearings for Railway Rolling Stock

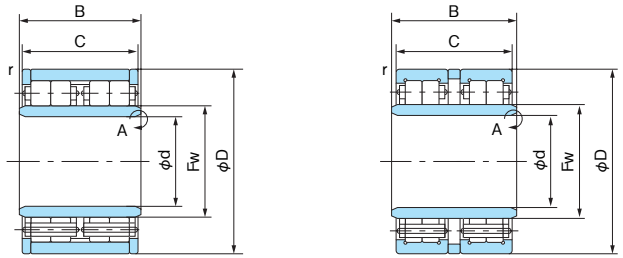
Cylindrical Roller Bearings



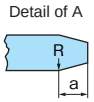
Design 1 Design 2 Design 3



a=4, 5, 7, 10, 12, 15

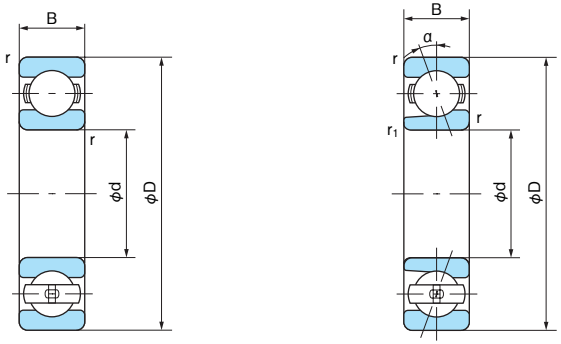


Design 4 Design 5



a=1, 7, 12

Radial Ball Bearings



Design 6 Design 7

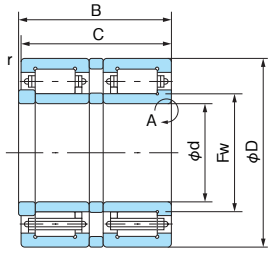
1N=0.102kgf

Bearing No.	Design No.	Boundary dimensions (mm)						Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Mass (kg) Reference
		d	D	C	B	Fw	r			
FCD75	1	75	155	90	100	95	1	287000	410000	7
FCD85S1	3	85	150	96	106	101.5	3	335000	590000	6
FCF85S	5	85	150	120	120	101.5	3	320000	560000	7
FCD85S	2	85	150	120	130	101.5	3	335000	590000	7
FCD95	1	95	170	105	120	113.5	1	380000	645000	11
FCF100	4	100	180	140	160	120	2	565000	1040000	14
JC3	4	110	200	160	180	134	2	575000	1190000	19
FCF110	4	110	210	160	180	136	2	720000	1280000	22
FCF110S1	4	110	180	140	160	127	2	795000	1370000	28
FCD110S5	1	110	220	160	180	138	2	795000	1370000	28
JC1	1	110	225	140	150	138	2	750000	1430000	28
JC2	1	110	235	160	180	141	2	835000	1550000	36
FCF120S3	4	120	205	150	165	141	2	675000	1290000	18
FCF120S1	4	120	205	160	170	141	2	715000	1390000	19
FCF120S4	4	120	220	160	180	146	3	805000	1510000	23
FCD120S7	1	120	220	160	180	146	3	835000	1580000	23
JC11	1	120	240	160	180	150	2	810000	1580000	35
FCF120S2	4	120	240	160	180	150	2	960000	1700000	35
FCD120S1	2	120	260	190	195	154	4	1070000	1840000	50
FCF130S	4	130	220	160	170	152	2	785000	1550000	22
FCD130S	1	130	230	120	120	156	2	615000	1110000	19
FCF130S1	4	130	240	160	170	158	2	880000	1610000	35
JC5	1	130	260	160	180	163	2	875000	1710000	42
JC29	2	130	270	210	215	164	5	1170000	2000000	56
JC9	2	130	280	210	215	167	5	1070000	2090000	61
FCF130	5	130	280	210	215	167	5	1340000	2360000	61
FCD140B	2	140	300	225	230	180	5	1440000	2500000	76
FCD160S	1	160	270	130	140	187	2	850000	1600000	27
FCD160	1	160	280	150	180	190	2	970000	1820000	34

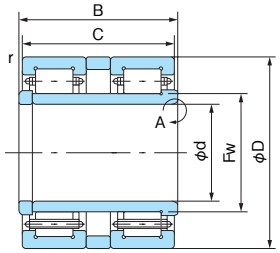
Bearing No.	Design No.	Boundary dimensions (mm)					Contact angle α °	Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Mass (kg) Reference
		d	D	B	r	r1				
JB8A	6	70	150	35	3.5	—	—	80000	153000	4
JB1D	7	85	180	41	4	2	20	98500	204000	5
JB1E	7	85	180	41	4	2	20	114000	255000	5
JB2	7	100	215	47	4	2	20	128000	292000	7
JB3	7	110	215	47	4	2	30	164000	355000	6
JB9	6	125	250	55	2	—	—	143000	350000	13
JB4	6	125	250	55	4	—	—	172000	395000	12

Journal Bearings for Railway Rolling Stock

Cylindrical Roller Bearings



Design 1



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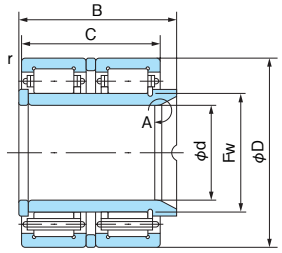

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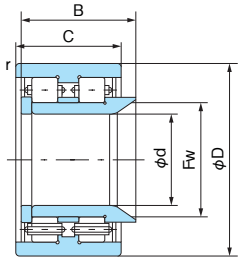
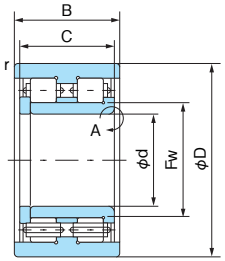


Design 4

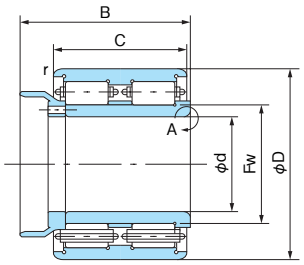


Design 5

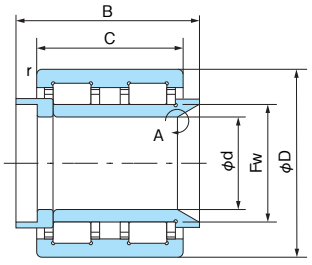
1N=0.102kgf

Bearing No.	Design No.	Boundary dimensions (mm)						Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Mass (kg) Reference
		d	D	C	B	Fw	r			
FCD85S2	2	85	150	85	86.5	101.5	2	425000	765000	14
FCD100S	1	100	200	170	170	125	4	650000	1100000	25
FCD110S3	1	110	220	180	183	138	3.5	795000	1370000	28
FCD110S7	2	110	220	175	180	138	3.5	715000	1190000	29
JC6	2	110	220	180	180	138	3.5	625000	1190000	30
FCD110S9	1	110	220	180	183	138	3.5	795000	1370000	30
FCD110S11	2	110	220	180	185	138	3.5	795000	1370000	31
JC36	6	120	220	145	171	146	1	700000	1120000	22
FCD120S20	6	120	220	160	229.5	146	1	755000	1230000	24
FCD120S21	5	120	220	160	185.5	146	1	755000	1230000	24
FCD120S22	7	120	220	160	242	144	1	815000	1320000	24
FCD120S9	1	120	220	180	183	142	3.5	835000	1580000	26
JC30・32	6	120	230	150	171	147	1	755000	1300000	30
JC34	2	120	230	165	170	145	4	935000	1440000	31
JC26	6	120	240	160	193	150	1	850000	1420000	35
JC12	2	120	240	176	180	150	4	805000	1580000	38
JC17	6	120	240	170	218	150	1	815000	1580000	40
FCD120S4	1	120	240	180	183	150	4	855000	1470000	35
FCD120S5	2	120	240	180	185	150	4	855000	1470000	35
FCD120S3	2	120	260	190	195	154	4	1100000	1840000	50
JC38	2	125	235	165	170	150	3	940000	1460000	32
FCD130S8	6	130	240	160	229.5	158	1	855000	1350000	34
JC21	3	130	260	180	205.5	163	4	825000	1610000	46
FCD130S6	2	130	260	180	185	163	4	1030000	1610000	45
JC37	2	130	265	166	166	161.5	3	1140000	1710000	43
FCD130S3	4	130	270	153	165	160.5	3	715000	1110000	37
JC16	2	130	280	210	210	167	5	1070000	2090000	61

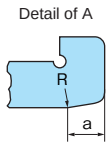
Sealed Cylindrical Roller Bearings



Design 6



Design 7



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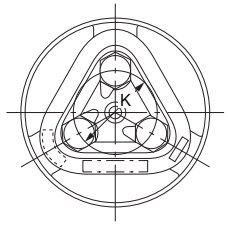
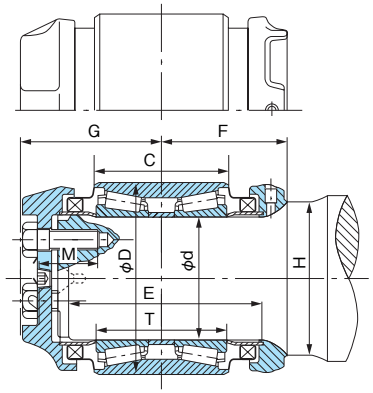
Journal Bearings for Railway Rolling Stock

Sealed Tapered Roller Bearings

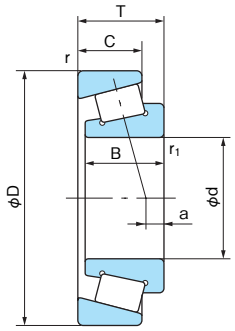




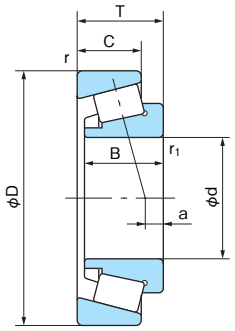
1N=0.102kgf

Bearing No.	Axle class	Size of journal	Applicable bearing No.	Boundary dimensions mm (inch)												Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Mass (kg) Reference
				d	D	C	T	E		F	G	H	K	Bolt size	M			
JT 9	—	110	JT 9	110	175	130	125	206		130	140.5	155	75	M22	50	375000	935000	22
JT14	—	110	JT14	110	190	150	145	—		150	134.4	150	75	M22	60	600000	1110000	25
JT10	—	120	JT10	120	195	142	136	217		142	149	155	75	M22	50	495000	1250000	27
JT12	—	120	JT12	120	220	155	155	—		155	159.4	150	75	M22	60	840000	1540000	39
JT11	—	130	JT11	130	208	152	146	227		152	150.7	165	89	M22	50	510000	1250000	30
AP50B	B	4-1/4 × 8	HM120848N/ HM120817XDN	101.600 (4)	165.100 (6-1/2)	114.300 (4-1/12)	107.950 (4-1/4)	200.025 (7-5/8)		117.5 (4-5/8)	130.2 (5-1/8)	127 (5)	61.9 (2-7/16)	3/4—10UNC-2A	44.45 (1-3/4)	390000	800000	20
AP50C	C	5 × 9	HM124646N/ HM124618XDN	119.062 (4-11/160)	195.262 (7-11/16)	142.875 (5-5/8)	136.525 (5-3/8)	217.488 (8-9/16)		134.9 (5-5/16)	147.6 (5-13/16)	149.2 (5-7/8)	76.2 (3)	7/8—9UNC-2A	50.80 (2)	590000	1250000	33
AP50D	D	5-1/2 ×10	HM127446N/ HM127415XDN	131.762 (5-3/16)	207.962 (8-3/16)	152.400 (6)	146.050 (5-3/4)	227.013 (8-15/16)		139.7 (5-1/2)	149.2 (5-7/8)	161.9 (6-3/8)	88.9 (3-1/2)	7/8—9UNC-2A	50.80 (2)	590000	1250000	37
AP50E	E	6 ×11	HM129848N/ HM129814XDN	144.462 (5-11/16)	220.662 (8-11/16)	163.512 (6-7/16)	155.575 (6-1/8)	241.300 (9-1/2)		150.8 (5-15/16)	165.1 (6-1/2)	177.8 (7)	98.4 (3-7/8)	1—8UNC-2A	57.15 (2-1/4)	650000	1480000	47
AP50F	F	6-1/2 ×12	HM133444N/ HM133416XDN	157.162 (6-3/16)	252.412 (9-15/16)	184.150 (7-1/4)	177.800 (7)	266.700 (10-1/2)		163.5 (6-7/16)	176.2 (6-15/16)	190.5 (7-1/2)	108.0 (4-1/4)	1-1/8—7UNC-2A	63.50 (2-1/2)	900000	1930000	66
AP50G	G	7 ×12	HM136948N/ HM136916XDN	177.800 (7)	276.225 (10-7/8)	185.739 (7-5/16)	180.975 (7-1/8)	254.000 (10)		150.8 (5-15/16)	177.8 (7)	203.2 (8)	117.5 (4-5/8)	1-1/4—7UNC-2A	69.85 (2-3/4)	975000	2170000	86

Bearings for Pinion



Design 1



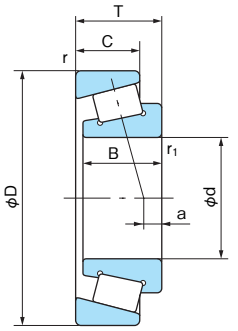
Design 2

1N=0.102kgf

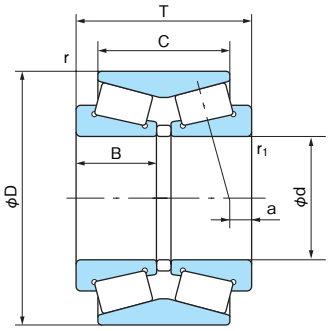
Bearing No.	Design No.	Boundary dimensions (mm)							Load center (mm)		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Mass (kg) Reference
		d	D	T	C	B	r	r_1	a (1)	e			
QT9	1	70	150	38	25	35	3.5	3.5	–8.2	0.81	165000	200000	3
QT9B-2	2	70	150	38	25	35	3.5	3.5	–8.2	0.81	165000	200000	3
QT31	2	70	150	40	27	37	2.5	3	–6.5	0.81	175000	205000	3
30315ED	1	75	160	40	31	37	3.5	3.5	7.6	0.35	212000	238000	3
QT7	1	75	160	40	27	37	3.5	3.5	–10.2	0.81	192000	218000	3
TSM15ED	1	75	175	52	40	50	3.5	3.5	8.1	0.46	282000	320000	6
QT4	1	80	170	42.5	28	39	3.5	3.5	–10.0	0.81	221000	256000	4
QT18	1	85	180	45.5	29	42	4.0	4	–9.5	0.81	244000	284000	5

Note: (1) Minus value of load center indicates center is outside cone backface.

Bearings for Gearwheel



Design 1



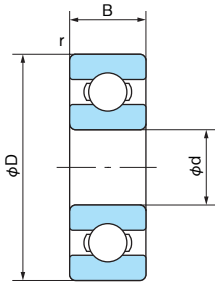
Design 2

1N=0.102kgf

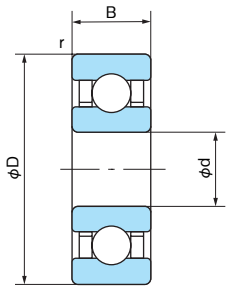
Bearing No.	Design No.	Boundary dimensions (mm)							Load center (mm)		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Mass (kg) Reference
		d	D	T	C	B	r	r_1	a (1)	e			
32936ED	1	180	250	45	34	42	3	3	–3.7	0.39	325000	620000	6
QT1	2	190	280	110	85	46	1	4	–23.0	0.67	575000	1170000	23
32038ED	1	190	290	64	52	60	3.5	3.5	2.4	0.37	550000	955000	14
QT6	2	190	300	110	85	46	1	4	–26.5	0.67	670000	1260000	27
QT29	1	193.675	282.575	50.8	36.513	47.625	2.5	3	–4.3	0.42	345000	605000	11
QT26	1	195	280	58	41	60	3.5	3.5	4.4	0.37	410000	745000	11
QT25	1	200	280	51	41	48	2.5	3	–3.6	0.37	345000	680000	10
32940ED	1	200	280	51	41	48	3.5	3.5	–3.6	0.37	345000	680000	10
QT13	2	200	290	110	85	46	1	4	–26.5	0.67	605000	1280000	21
QT28	2	202.5	290	110	85	46	0.6	4	–27.3	0.67	605000	1270000	21
QT33	1	205	283	51	41	48	2.5	3	–3.6	0.37	355000	695000	10
QT5	1	210	320	70	56	66	3.5	3.5	2.5	0.40	630000	1110000	19
QT24	1	210	320	70	56	75	3.5	3.5	2.5	0.40	630000	1110000	20
QT19-1	1	214	330	70	56	70	3.5	3.5	1.5	0.40	670000	1190000	21
QT32	1	218	315	65	49	70	2.5	3	4.1	0.37	605000	1180000	16

Note: (1) Minus value of load center indicates center is outside cone backface.

■ Ball Bearings for Traction Motor



Design 1

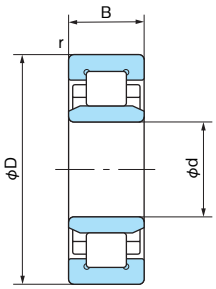


Design 2

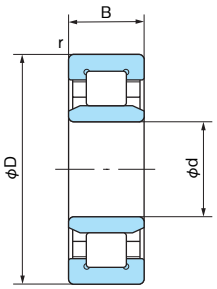
1N=0.102kgf

Bearing No.	Design No.	Boundary dimensions (mm)					Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Mass (kg) Reference
		d	D	C	B	r			
6311JT	1	55	120	29	29	3	71500	44500	1.4
6312JT	1	60	130	31	31	3.5	81500	52000	1.7
6314JT	1	70	150	35	35	3.5	104000	68000	2.5
6219JT	1	95	170	32	32	3.5	109000	815000	2.6
6219T	2	95	170	32	32	3.5	109000	815000	3.0

■ Cylindrical Roller Bearings for Traction Motor



Design 1



Design 2

1N=0.102kgf

Bearing No.	Design No.	Boundary dimensions (mm)				Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Mass (kg) Reference
		d	D	B	r			
NU214T	1	70	125	24	1.5	83000	95000	1.5
NU314T	1	70	150	35	2.1	158000	220000	3.1
NU315T	1	75	160	37	2.1	190000	205000	4.0
NU316T	1	80	170	39	2.1	190000	207000	4.6
NU316TSL	2	80	170	39	2.1			
NU219T	1	95	170	32	2.1	165000	195000	3.5
NU219TS	2	95	170	32	2.1			
NU220T	1	100	180	34	2.1	183000	217000	4.3

Sheave Bearings

This bearing type is designed as a double-row, full complement Cylindrical Roller bearing with ribs on both inner and outer rings. These bearings will sustain heavy radial load, and will handle moment load and will also take some axial load.

Sheave bearings are suitable for a wide variety of uses in addition to sheaves. They are used for hoisting drum and wheel applications, and other applications which operate under heavy load at low speed.

Bearing series	Description	Bearing series	Description
E50	This bearing series is designed for sheave application. It is a sealed (shield or seal) bearing and has a surface coating. The E50 series is made with two shields. The E50... NR and E50...NRNT have two snap rings in the outer ring. Series E50...NR is made with two shields, while the series E50...NRNT is made with two rubber seals.	RB48、RC48 RB49、RC49	These bearings are designed for general use. When mounting two or more bearings on an axle, the RB type should be used as a fixed side bearing and the RC type used as a free side bearing.

Deviation of bore diameter and bearing width Unit: μm

Nominal bearing bore diameter d (mm)		Deviation of d		Deviation of B	
Over	Incl.	High	Low	High	Low
30	50	0	–12	0	–120
50	80	0	–15	0	–150
80	120	0	–20	0	–200
120	150	0	–25	0	–250
150	180	0	–25	0	–250
180	250	0	–30	0	–300
250	315	0	–35	0	–350
315	400	0	–40	0	–400
400	500	0	–45	0	–450

Deviation of outside diameter of outer ring Unit: μm

Nominal bearing outside diameter D (mm)		Deviation of D	
Over	Incl.	High	Low
30	50	—	—
50	80	0	–13
80	120	0	–15
120	150	0	–18
150	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

Radial Clearance of Series 5000 Unit: μm

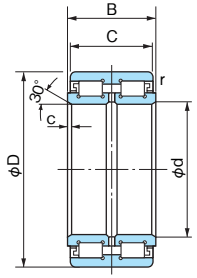
Nominal bearing outside diameter D (mm)		Standard radial clearance	
Over	Incl.	Low	High
	70	35	70
70	80	40	75
80	100	45	90
100	125	55	105
125	150	65	115
150	180	65	120
180	240	65	130
240	280	70	135
280	310	70	140
310	340	75	150
340	360	90	165
360	420	100	180
420	460	110	195
460	520	125	215
520	600	140	235
600	650	155	275
650	700	180	300

Radial Clearance of Series 4800/4900 Unit: μm

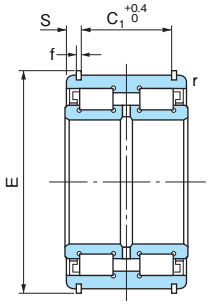
Nominal bearing outside diameter D (mm)		Standard radial clearance	
Over	Incl.	Low	High
	70	40	75
70	80	40	75
80	100	45	90
100	125	55	105
125	150	65	115
150	180	65	120
180	240	65	130
240	280	70	135
280	310	70	140
310	340	75	150
340	360	90	165
360	420	100	180
420	500	110	195

NACHI

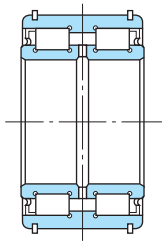
Sheave Bearings
Series 5000



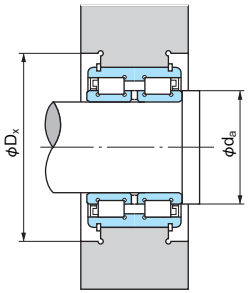
Shield type (E50)



Shield type (E50...NR)
with snap rings



Rubber seal type (E50...NRNT)
with snap rings



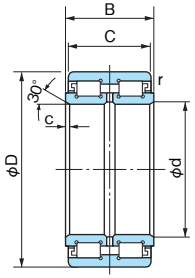
1N=0.102kgf

Boundary dimensions (mm)										Bearing No.				Basic load rating		Limiting speed (min-1)	Abutment and fillet dimensions (mm)		Mass (kg)
d	D	B	C	r (min)	c	E	C1	S	f	Without snap ring with shields	With snap rings with shields		With snap rings and rubber seals	Cr (N)	Cor (N)	Grease lubrication	da (min)	Dx (min)	
40	68	38	37	0.6	1.5	71.8	28	4.5	2	E5008	E5008NR		E5008NRNT	79000	125000	2500	46	80	0.57
45	75	40	39	0.6	1.5	78.8	30	4.5	2	E5009	E5009NR		E5009NRNT	95000	144000	2200	51	87	0.71
50	80	40	39	0.6	1.5	83.8	30	4.5	2	E5010	E5010NR		E5010NRNT	99500	158000	2000	56	92	0.77
55	90	46	45	0.6	2	94.8	34	5.5	2.5	E5011	E5011NR		E5011NRNT	117000	193000	1800	63	104	1.18
60	95	46	45	0.6	2	99.8	34	5.5	2.5	E5012	E5012NR		E5012NRNT	123000	208000	1650	68	109	1.26
65	100	46	45	0.6	2	104.8	34	5.5	2.5	E5013	E5013NR		E5013NRNT	128000	224000	1500	73	114	1.34
70	110	54	53	0.6	2	114.5	42	5.5	2.5	E5014	E5014NR		E5014NRNT	170000	285000	1400	78	124	1.91
75	115	54	53	0.6	2	119.5	42	5.5	2.5	E5015	E5015NR		E5015NRNT	177000	305000	1350	83	129	2.01
80	125	60	59	0.6	2	129.5	48	5.5	2.5	E5016	E5016NR		E5016NRNT	250000	430000	1250	88	139	2.71
85	130	60	59	0.6	2	134.5	48	5.5	2.5	E5017	E5017NR		E5017NRNT	255000	445000	1150	93	144	2.85
90	140	67	66	0.6	2.5	145.4	54	6	2.5	E5018	E5018NR		E5018NRNT	305000	540000	1100	100	156	3.81
95	145	67	66	0.6	2.5	150.4	54	6	2.5	E5019	E5019NR		E5019NRNT	310000	560000	1050	105	161	3.97
100	150	67	66	0.6	2.5	155.4	54	6	2.5	E5020	E5020NR		E5020NRNT	315000	585000	1000	110	165	4.14
110	170	80	79	1	3	175.4	65	7	2.5	E5022	E5022NR		E5022NRNT	380000	695000	900	122	186	6.69
120	180	80	79	1	3	188.4	65	7	3	E5024	E5024NR		E5024NRNT	400000	750000	850	132	198	7.24
130	200	95	94	1	3	208.4	77	8.5	3	E5026	E5026NR		E5026NRNT	535000	1000000	750	142	218	10.9
140	210	95	94	1	3	218.4	77	8.5	3	E5028	E5028NR		E5028NRNT	540000	1070000	700	152	228	11.9
150	225	100	99	1	3.5	233.4	81	9	3	E5030	E5030NR		E5030NRNT	620000	1210000	650	164	243	14.0
160	240	109	108	1.5	3.5	248.4	89	9.5	3	E5032	E5032NR		E5032NRNT	715000	1390000	600	174	258	17.1
170	260	122	121	1.5	3.5	270	99	11	4	E5034	E5034NR		E5034NRNT	850000	1730000	600	184	283	23.6
180	280	136	135	1.5	3.5	294	110	12.5	5	E5036	E5036NR		E5036NRNT	1060000	2140000	550	194	311	31.7
190	290	136	135	1.5	3.5	306	110	12.5	5	E5038	E5038NR		E5038NRNT	1110000	2230000	500	204	323	32.8
200	310	150	149	1.5	3.5	326	120	14.5	5	E5040	E5040NR		E5040NRNT	1300000	2650000	500	214	343	42.2
220	340	160	159	1.5	4	356	130	14.5	6	E5044	E5044NR		E5044NRNT	1300000	3100000	450	236	378	54.9
240	360	160	159	1.5	4	376	130	14.5	6	E5048	E5048NR		E5048NRNT	1560000	3350000	400	256	398	58.7
260	400	190	189	2	5	416	154	17.5	6	E5052	E5052NR		E5052NRNT	2110000	4500000	350	280	438	88.1
280	420	190	189	2	5	440	154	17.5	7	E5056	E5056NR		E5056NRNT	2200000	4850000	350	300	462	93.9
300	460	218	216	2	5	480	176	20	8	E5060	—		—	2650000	5850000	350	320	508	134
320	480	218	216	2	5	500	176	20	8	E5064	—		—	2680000	6150000	300	340	528	145
340	520	243	241	2.5	6	544	194	23.5	8	E5068	—		—	3350000	7550000	300	362	577	180

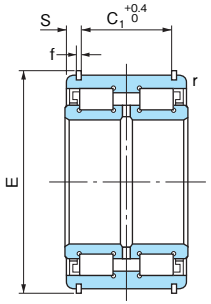
Remark: The bearings must be mounted without a clearance between two separate inner rings.

NACHI

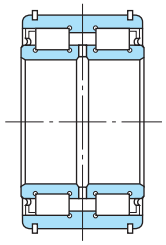
Sheave Bearings
Series 5000



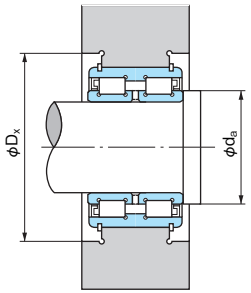
Shield type (E50)



Shield type (E50...NR)
with snap rings



Rubber seal type (E50...NRNT)
with snap rings



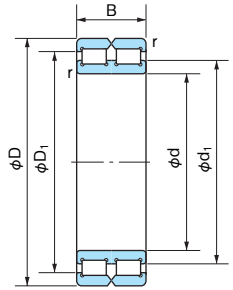
1N=0.102kgf

Boundary dimensions (mm)										Bearing No.				Basic load rating		Limiting speed (min^{-1})	Abutment and fillet dimensions (mm)		Mass (kg)
d	D	B	C	r (min)	c	E	C_1	S	f	Without snap ring with shields	With snap rings with shields		With snap rings and rubber seals	Cr (N)	Cor (N)	Grease lubrication	da (min)	Dx (min)	
360	540	243	241	2.5	6	564	194	23.5	10	**E5072**	—		—	3400000	7950000	250	382	597	190
380	560	243	241	2.5	6	584	194	23.5	10	**E5076**	—		—	3550000	8300000	250	402	617	200
400	600	272	270	2.5	6	630	210	30	12	**E5080**	—		—	4220000	10100000	250	422	666	265
420	620	272	270	2.5	6	650	210	30	12	**E5084**	—		—	4350000	10500000	230	442	686	275
440	650	280	278	3	8	680	210	34	12	**E5088**	—		—	4550000	10900000	220	464	719	310
460	680	300	298	3	8	710	230	34	12	**E5092**	—		—	5050000	12100000	200	484	749	365
480	700	300	298	3	8	730	230	34	12	**E5096**	—		—	5150000	12500000	200	504	769	380

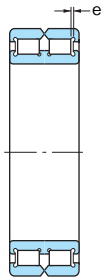
Remark: The bearings must be mounted without a clearance between two separate inner rings.

NACHI

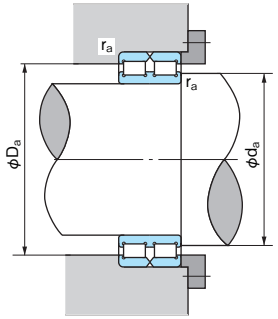
Sheave Bearings
Series 4800/4900



For fixed end (RB)



For free end (RC)



1N=0.102kgf

Boundary dimensions (mm)							Bearing No.		Basic load rating		Limiting speed (min-1)		Abutment and fillet dimensions (mm)			Mass (kg)	Basic No.
d	D	B	d1	D1	r (min)	e (1)	For fixed end	For free end	Cr (N)	Cor (N)	Grease lubrication	Oil lubrication	da (min)	Da (max)	ra (max)		
50	72	22	58	63.5	0.6	1	RB4910	RC4910	49000	83000	2000	4000	56	66	0.6	0.30	4910
60	85	25	69.5	76	1	1	RB4912	RC4912	68000	118000	1700	3400	67	78	1	0.46	4912
70	100	30	81.5	88.5	1	1	RB4914	RC4914	105000	193000	1400	2800	77	93	1	0.79	4914
80	110	30	92.5	99.5	1	1	RB4916	RC4916	113000	221000	1250	2500	87	103	1	0.88	4916
90	125	35	103	111.5	1.1	1	RB4918	RC4918	150000	300000	1100	2200	98	117	1	1.37	4918
100	140	40	116	125.5	1.1	1.5	RB4920	RC4920	194000	400000	1000	2000	108	132	1	2.01	4920
110	150	40	124.5	134	1.1	1.5	RB4922	RC4922	202000	430000	900	1800	118	142	1	2.18	4922
120	165	45	138.5	148.5	1.1	2	RB4924	RC4924	226000	560000	850	1700	128	157	1	2.98	4924
130	180	50	148.5	160.5	1.5	2	RB4926	RC4926	262000	555000	750	1500	140	170	1.5	3.97	4926
140	190	50	159	171	1.5	2	RB4928	RC4928	271000	595000	700	1400	150	180	1.5	4.26	4928
150	190	40	164.5	173.5	1.1	1.5	RB4830	RC4830	233000	575000	650	1300	158	182	1	2.90	4830
	210	60	171.5	186	2	2	RB4930	RC4930	405000	860000	650	1300	161	199	2	6.70	4930
160	200	40	176	185.5	1.1	1.5	RB4832	RC4832	242000	615000	650	1300	168	192	1	3.05	4832
	220	60	184.5	199.5	2	2	RB4932	RC4932	425000	935000	600	1200	171	209	2	7.03	4932
170	215	45	186	196.5	1.1	2	RB4834	RC4834	264000	650000	600	1200	178	207	1	4.10	4834
	230	60	193.5	208.5	2	2	RB4934	RC4934	435000	980000	600	1200	181	219	2	7.44	4934
180	225	45	199	209.5	1.1	2	RB4836	RC4836	273000	695000	550	1100	188	217	1	4.30	4836
	250	69	205.5	223	2	2.5	RB4936	RC4936	550000	1230000	550	1100	191	239	2	11.0	4936
190	240	50	208	220	1.5	2	RB4838	RC4838	315000	785000	550	1100	200	230	1.5	5.65	4838
	260	69	216	233	2	2.5	RB4938	RC4938	565000	1290000	500	1000	201	249	2	11.5	4938
200	250	50	218.5	230.5	1.5	2	RB4840	RC4840	320000	825000	500	1000	210	240	1.5	5.90	4840
	280	80	231.5	251	2.1	3	RB4940	RC4940	665000	1500000	500	1000	211	269	2	15.7	4940
220	270	50	239.5	251.5	1.5	2	RB4844	RC4844	335000	905000	450	900	230	260	1.5	6.40	4844
	300	80	249	268	2.1	3	RB4944	RC4944	695000	1620000	450	900	231	289	2	17.1	4944
240	300	60	260.5	275	2	2	RB4848	RC4848	510000	1330000	400	800	251	289	2	10.2	4848
	320	80	271.5	291	2.1	3	RB4948	RC4948	725000	1770000	400	800	253	307	2	18.4	4948
260	320	60	283	297.5	2	2	RB4852	RC4852	530000	1450000	400	800	271	309	2	11.0	4852
	360	100	296	321	2.1	3	RB4952	RC4952	1070000	2570000	350	700	273	347	2	32.0	4952
280	350	69	307.5	325	2	2.5	RB4856	RC4856	680000	1860000	350	700	291	339	2	16.0	4856
	380	100	318	342.5	2.1	3	RB4956	RC4956	1110000	2780000	350	700	293	367	2	33.9	4956
300	380	80	329	348	2.1	3	RB4860	RC4860	800000	2160000	350	700	313	367	2	23.0	4860
320	400	80	352	371	2.1	3	RB4864	RC4864	830000	2310000	300	600	333	387	2	24.3	4864
340	420	80	368	389	2.1	3	RB4868	RC4868	850000	2430000	300	600	353	407	2	25.6	4868
360	440	80	392	411.5	2.1	3	RB4872	RC4872	880000	2580000	250	500	373	427	2	27.0	4872
380	480	100	419	446	2.1	3	RB4876	RC4876	1290000	3600000	250	500	393	467	2	45.3	4876

Note (1): Axial permissible movement for free end bearing.
Remark: The bearings must be mounted without a clearance between two separate inner rings.

Ball Bearing Units

Ball Bearing Units offer a convenient method of applying highly reliable rolling contact bearings to applications without the necessity of manufacturing a bearing housing.

Generally Ball Bearing Units have following features.

- Self-aligning capability
- Sealed
- Easy to mount and dismount
- Interchangeability with foreign made units
- Many types suitable for applications
  Additionally NACHI Ball Bearing Units have the advantages of case of use and high reliability.
- Anti-rotation pin on outer ring
- Eccentric collar type is also available
- Base for mount locating pin
  Since Ball Bearings for units have the same geometry as deep groove ball bearings, load rating, reliability and other functions are equal with that of deep-groove ball bearings.

1. Designations

Number arrangement of Bearing Units and Ball bearings is shown as follows.

(1) Bearing Unit Numbers

C UK P 210 C CT4HR5 +H2310

- **Accessory No.**
  Adapter sleeves
  Frame of take-up type
- **Supplementary symbol**
  Internal clearance
  For high or low temperature
- **Bearing dimension series no.**
- **Housing type symbol**
  Pillow, Flange, Take-up, Cartridge and Hanger
- **Cover symbol**
  C : Pressed steel or cast iron cover with seal
  E : End cover of pressed steel
  CE: End cover of cast iron
- **Bearing type symbol**
  Cylindrical bore (With eccentric collar)
  Tapered bore
- **Covered housing symbol**
  C: For cast iron cover

(2) Ball Bearing Numbers

UG 208 C3HR4 +ER

- **Accessory symbol**
  Eccentric collar ER, AR
  Adapter sleeves
- **Supplementary symbol**
  Internal clearance
  For high or low temperature
- **Dimension series**
  First number:
  Diameter series no.
  2nd and 3rd number:
  Bore diameter no.
- **Type symbol**
  Set screw type: UC, B
  Eccentric collar type: KH, U, UG
  Adapter sleeve type: UK

Note: For type B bearings, a last digit of bore diameter number is used as dimension series number.

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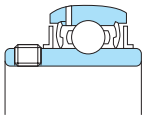
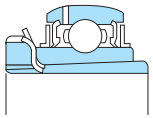
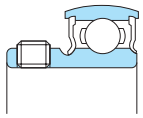
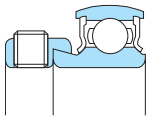
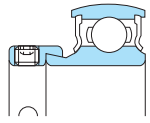
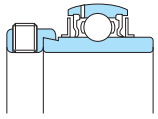
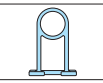
Contents of dimension tables (1)

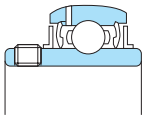
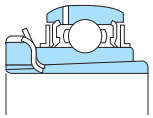
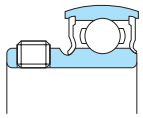
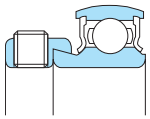
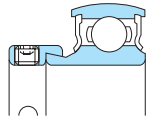
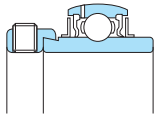
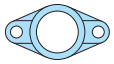
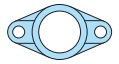
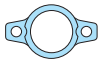
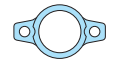
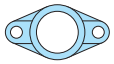
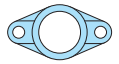
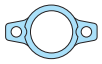
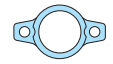
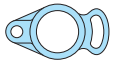
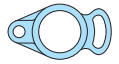
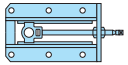
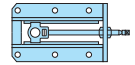
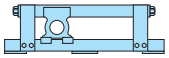
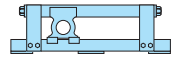
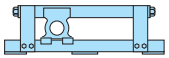
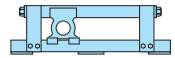
Symbol ○: Pressed steel cover type is available. ●: Cast iron cover type is available.

Housing type \ Ball bearing type		UC (MUC)  page 527	UK+H  page 529		B  page 531	KH AE  page 531	U, MU+ER  page 533	UG+ER  page 535	Ball bearing type \ Housing type
Cast Iron Series Standard Pillow block Type	P	UCP ○ ● page 417	UKP ○ ● page 421		BP page 425	–	–	UGP page 427	P
Cast Iron Series Thick Body Pillow block for Shock Applications	IP	UCIP ○ ● page 429	UKIP ○ ● page 431		–	–	–	–	IP
Cast Steel Series Pillow block for Heavy Loads	PK	UCPK ● page 433	UKPK ● page 425		–	–	–	–	PK
Cast Iron Series Pillow block with High Center Height	PH	UCPH page 437	–		–	–	–	–	PH 
Cast Iron Series Pillow block with Small Base	PA	UCPA page 439	–		–	–	–	–	PA
Cast Iron Series Pillow block for Free-end	EP	UCEP page 441	–		–	–	–	–	EP
Cast Iron Series Light Weight Pillow block for Light Load	LLP	–	–		BLLP page 443	KHLLP page 443	–	–	LLP
Stainless Steel Series Standard Pillow block	MP	MUCP page 445	–		–	–	–	–	MP
Alloy Series (Silver series) Compact Pillow block for Light Load	P (PZ3)	–	–		–	–	UP (MUP) page 447	–	P (PZ3)
Pressed Steel Series Pillow block for Extremely Light Load	PP	–	–		BPP page 449	KHPP page 449	–	–	PP
Cast Iron Series Square Flange Type	F	UCF ○ ● page 451	UKF ○ ● page 455		BF page 459	–	–	UGF page 461	F
Cast Iron Series Square Flange with Spigot Joint	FS	UCFS ● page 463	UKFS ● page 465		–	–	–	–	FS
Cast Iron Series Round Flange Type	FC	UCFC ○ ● page 467	UKFC ○ ● page 471		BFC page 473	–	–	UGFC page 475	FC

NACHI

Contents of dimension tables (2)

Symbol ○: Pressed steel cover type is available. ●: Cast iron cover type is available.

Housing type \ Ball bearing type		UC (MUC)  page 527	UK+H  page 529		B  page 531	KH AE  page 531	U, MU+ER  page 533	UG+ER  page 535	Ball bearing type \ Housing type	
Cast Iron Series Rhombic Flange Type	FL 	UCFL ○ ● page 477	UKFL ○ ● page 481		BFL page 485	–	–	UGFL page 487	FL 	
Cast Iron Series Light Weight Rhombic Flange for Light Load	LFL 	–	–		BLFL page 489	KHLFL page 489	–	–	LFL 	
Stainless Steel Series Rhombic Flange for Anti-Corrosion	MFL 	MUCFL page 491	–		–	–	–	–	MFL 	
Alloy Series (Silver Series) Compact Rhombic Flange for Light Load	FL (FLZ3) 	–	–		–	–	UFL (MUFL) page 493	–	FL (FLZ3) 	
Pressed Steel Series Round Flange for Extremely Light Load	PF	–	–		BPF page 495	KHPF page 495	–	–	PF	
Pressed Steel Series Rhombic Flange for Extremely Light Load	PFL	–	–		BPFL page 497	KHPFL page 497	–	–	PFL	
Cast Iron Series Transformed Rhombic Flange, Adjustable Center	FA 	UCFA page 499	–		–	–	–	–	FA 	
Cast Iron Series One Side Flange Type	FK	UCFK page 501	–		–	–	–	–	FK	
Cast Iron Series Standard Take-Up Type	T	UCT ○ ● page 503	UKT ○ ● page 507		BT page 511	–	–	–	T	
Cast Iron Series Take-Up Type with Frame of Angle Steel	T + WB 	UCT+WB page 513	–		–	–	–	–	T + WB 	
Cast Iron Series Take-Up Type with Frame of Light Channel Steel	TL + WL 	UCTL+WL page 515	–		–	–	–	–	TL + WL 	
Cast Iron Series Take-Up Type with Frame of Channel Steel	TU + WU 	UCTU+WU page 517	–		–	–	–	–	TU + WU 	
Cast Iron Series Cartridge Type	C	UCC page 521	UKC page 523		–	–	–	–	C	
Cast Iron Series Hanger Type	ECH	UCECH page 525	–		–	–	–	–	ECH	

2. Tolerance

Tolerances for ball bearings and housings are shown as follows.

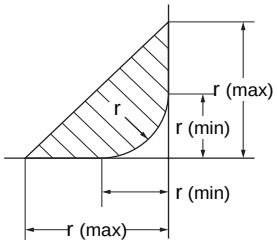
(1) Ball Bearing Tolerances

Tolerances of inner ring	Cylindrical bore: See Table 1 Tapered bore: See Table 5.7.1 (Page 63) 1/12 taper bore
Tolerances of outer ring	Tolerance class 0 of Table 5.1.2 (Page 55) Note: The lower limit of ΔD_{mp} is not applied within a distance of 1/4 of outer ring width from side faces.
Chamfer dimensions	See Table 2

Table 1. Tolerance of Inner Ring (Cylindrical bore) Unit: μm

Bore dia. Nominal d (mm)		Single plane mean bore dia. deviation Δd_{mp}		Bore dia. variation in a single radial plane V_{dp}	Deviation of a single inner ring width ΔB_s		Radial runout of assembled bearing inner ring K_{ia} (referaence)	Deviation of (1) eccentric value of inner ring eccentric face ΔH_s
Over	Incl.	High	Low	Max	High	Low	Max	
6	10	+12	0	8	0	–120	15	±100
10	18	+15	0	10	0	–120	15	±100
18	31.75	+18	0	12	0	–120	18	±100
31.75	50.8	+21	0	14	0	–120	20	±100
50.8	80	+24	0	16	0	–150	25	±100
80	120	+28	0	19	0	–200	30	–
120	180	+33	0	22	0	–250	35	–

Note: (1) This deviation is used on the eccentric locking collar type bearings.



Remark: The exact shape of the chamfer is not specified, but its contour will be in the area shown with oblique lines.

Table 2. Chamfer dimension Limits

Chamfer dimension Nominal r	r		Corner of shaft R
	Max	Min	Max
0.5	0.8	0.3	0.3
1	1.5	0.6	0.6
1.5	2	1	1
2	2.5	1.5	1
2.5	3	2	1.5
3	3.5	2.5	2
3.5	4	2.5	2
4	4.5	3	2.5
5	6	4	3

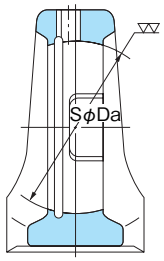
(2) Bearing Unit Housing Tolerances

Spherical bearing seating of cast iron housing	See Table 3
Others	See NACHI Bearing Units Catalog

Table 3. Tolerance of cast iron housing Unit: μm

Spherical bearing seating diameter nominal Da (mm)		Tolerance symbol H7			Tolerance symbol J7			Tolerance symbol K7		
		Deviation of single plane mean dia. of bearing seating ΔD_{am}		Bearing seating dia. variation in a single radial plane VD_{ap}	Deviation of single plane mean dia. of bearing seating ΔD_{am}		Bearing seating dia. variation in a single radial plane VD_{ap}	Deviation of single plane mean dia. of bearing seating ΔD_{am}		Bearing seating dia. variation in a single radial plane VD_{ap}
Over	Incl.	High	Low	Max	High	Low	Max	High	Low	Max
30	50	+25	0	10	+14	–11	10	+ 7	–18	10
50	80	+30	0	12	+18	–12	12	+ 9	–21	12
80	120	+35	0	14	+22	–13	14	+10	–25	14
120	180	+40	0	16	+26	–14	16	+12	–28	16
180	250	+46	0	18	+30	–16	18	+13	–33	18
250	315	+52	0	20	+36	–16	20	+16	–36	20

Notes: 1 Spherical bearing seat dimensions are divided into H7 for clearance fits and J7 and K7 for light interference fits. As NACHI bearings equipped with an anti-rotation pin to prevent outer race rotation, H7 is HACHI standard for the dimension.
2 For rotating outer ring load or fluctuating load applications, J7 or K7 fitting practice should be used.
3 Silver series of special alloy material are supplied with special tolerance.



3. Radial clearance of Ball Bearings

Cylindrical bore	See Table 6.1 (page 64); Radial internal clearance of deep-groove ball bearings (with cilindrical bore)
Tapered bore	CT2: CN for cylindrical bore CTN: C3 for cylindrical bore CT3: C4 for cylindrical bore They are considered the inner ring expansion by fitting with an adapter sleeve.

4. Shaft Tolerance

For cylindrical bore bearings	● Normal load: Shaft tolerance h7, h8 or js7 ● Heavy or shock load: Shaft tolerance k6, k7 or m6
For tapered bore bearings with an adaptor sleeve	● Shaft tolerance h9

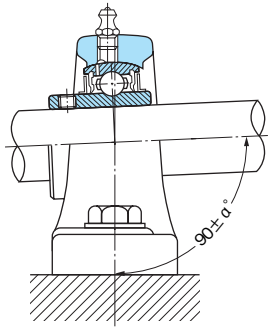
5. Maximum permissible misalignment angle

Normal permissible misalignment angle α is ±1.5°~2.5° because it is restricted by grease supply.

Even if grease is not supplied, it is desirable to use the same limiting value. If larger angles are needed, its angle is permissible to about ±5°.

The maximum misalignment angle of bearing units with a housing cover is ±1.0°~1.8°, beyond this angle the inner diameter of the cover will interfere the shaft.

To prevent the unequal contact between seals and shaft, excessive heat generation and dust intrusion, the misalignment angle should be minimized.



6. Maximum permissible operating temperature

Since Bearing units are sometimes used at higher or lower temperature than normal, NACHI prepares the special specification shown in Table 4.

In case of Bearing units with high temperature specification, the decrease in basic load rating should be considered, and radial clearance should be larger than normal clearance.

NACHI standard radial clearance for high temperature applications is C3 HR4, C4 HR5 and C4 HR23 for cylindrical bore bearings and CT3 HR4, CT4 HR23 for tapered bore bearings.

If there is a large temperature difference between the inner ring and outer ring, radial internal clearance should be determined reasonably.

Notes 1. If operating temperature exceeds 150°C, careful investigation, including radial internal clearance is required. In such case, Please consult NACHI with operating conditions.
2. The grease shown in Table 4 must be supplied for relubrication. If different greases are mixed, lubrication ability can deteriorate. Before supplying different grease, please consult NACHI or the grease manufactures.

Table 4. Operating Temperature Range

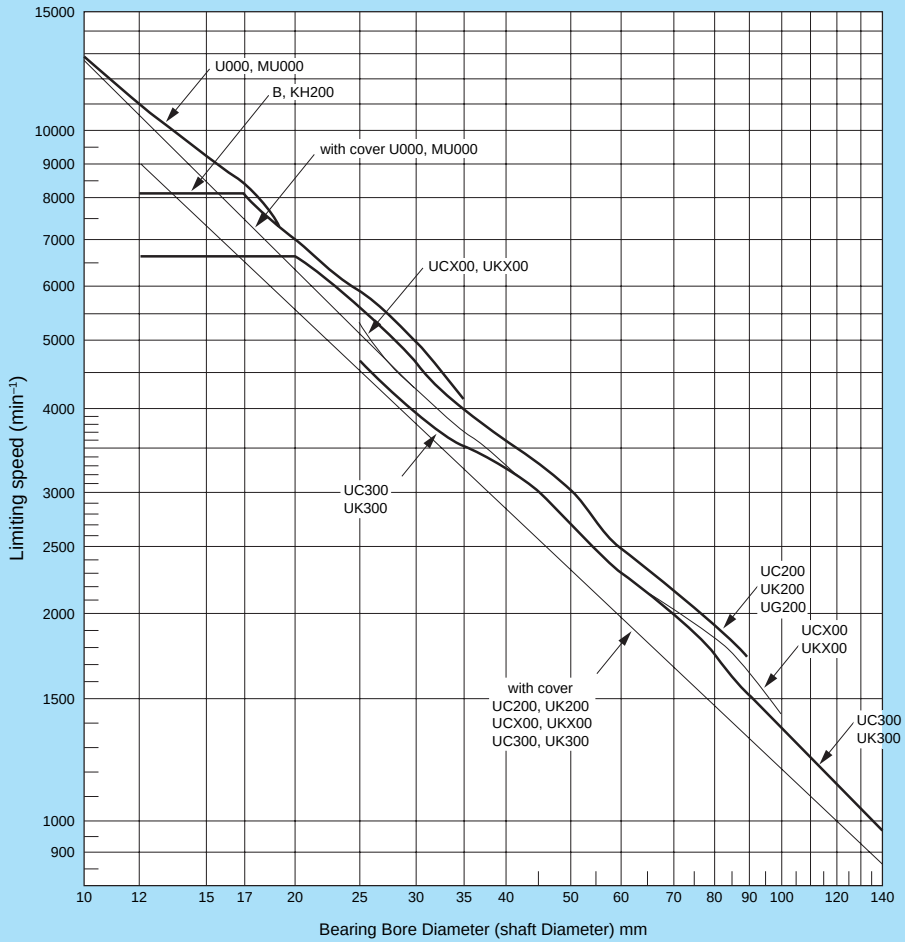
Series	Seal material	Grease	Operating temperature range (°C)	Slinger color
Silver series	Nitrile rubber (NBR)	Alvania Grease 3	– 10~+ 80	—
Standard	Nitrile rubber (NBR)	Alvania Grease 3	– 15~+100	Black
HR4 for high temperature	Nitrile rubber (NBR)	Superlube 3	Normal temperature~+120	Yellow
HR5 for high temperature	Silicone rubber	Superlube 3	Normal temperature~+200	Yellow
HR23 for high temperature	Silicone rubber	Fluorine-contained Grease	Normal temperature~+230	Black
CR2A for low temperature	Silicone rubber	Aero Shell Grease 7	- 40~+Normal temperature	White

7. Speed limit

Limiting speed of bearings is determined by the slip speed limit between the seal and inner ring or shaft.

Limiting speed of bearings is shown in the chart below. But this limiting speed should be decreased, if there are differences between shaft center and bearing center or a mixing resistance of grease for HR23 specification. When Bearing units are necessary to operate in excess of speed limit, please consult NACHI.

Limiting Speed for Bearing Units



NACHI

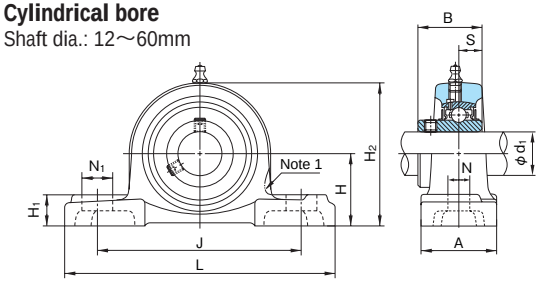
Pillow Block Units

UCP type

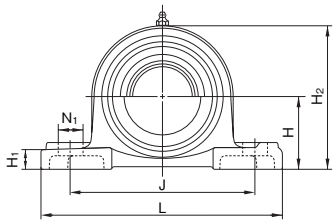
With set screws

Cylindrical bore

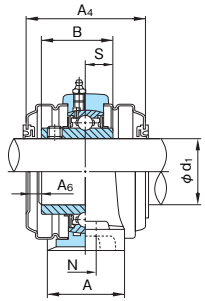
Shaft dia.: 12～60mm

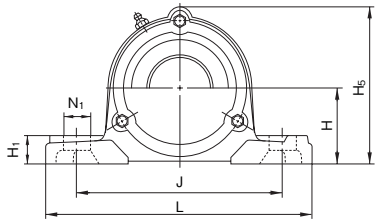


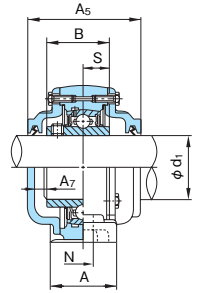
Note: The line shows figure of UCPX00 series



With steel covers







With cast covers

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)															Bolt size	Bearings			Housing No.	Unit No. with steel covers	Unit No. with cast covers	Mass of Unit (kg)		
		H	L	A	J	N	N_1	H_1	H_2	H_5	B	S	A_4	A_5	A_6	A_7		No.	Basic load rating (N) Cr	Basic load rating (N) Cor		Covers with rubber seal (End cover on one side)	Covers with rubber seal (End cover on one side)	standard	with steel cover	with cast covers
12	**UCP201**	30.2	127	38	95	13	19	15	62	66	31	12.7	56	62	8	6	M10	UC201	12800	6600	P203	**UCP201C(E)**	**CUCP201C(CE)**	0.65	0.71	1.1
15	**UCP202**	30.2	127	38	95	13	19	15	62	66	31	12.7	56	62	8	6	M10	UC202	12800	6600	P203	**UCP202C(E)**	**CUCP202C(CE)**	0.63	0.69	1.1
17	**UCP203**	30.2	127	38	95	13	19	15	62	66	31	12.7	56	62	8	6	M10	UC203	12800	6600	P203	**UCP203C(E)**	**CUCP203C(CE)**	0.62	0.68	1.1
20	**UCP204**	33.3	127	38	95	13	19	15	65	69	31	12.7	56	62	8	6	M10	UC204	12800	6600	P204	**UCP204C(E)**	**CUCP204C(CE)**	0.65	0.71	1.1
	UCP205	36.5	140	38	105	13	16	16	70	76	34	14.3	63	70	11	9	M10	UC205	14000	7900	P205	**UCP205C(E)**	**CUCP205C(CE)**	0.79	0.86	1.4
25	**UCPX05**	44.4	159	51	119	17	25	18	85	—	38.1	15.9	65	—	9	—	M14	UCX05	19600	11300	PX05	**UCPX05C(E)**	—	1.5	1.5	—
	UCP305	45	175	45	132	17	20	16	84	89	38	15	—	78	—	10	M14	UC305	21300	10900	P305	—	**CUCP305C(CE)**	1.6	—	2.1
	UCP206	42.9	165	48	121	17	21	18	83	87	38.1	15.9	65	74	9	8	M14	UC206	19600	11300	P206	**UCP206C(E)**	**CUCP206C(CE)**	1.3	1.4	2.0
30	**UCPX06**	47.6	175	57	127	17	25	20	94	—	42.9	17.5	70	—	8	—	M14	UCX06	25900	15400	PX06	**UCPX06C(E)**	—	1.9	1.9	—
	UCP306	50	180	50	140	17	20	19	94	99	43	17	—	84	—	10	M14	UC306	26800	15000	P306	—	**CUCP306C(CE)**	1.9	—	2.6
	UCP207	47.6	167	48	127	17	21	19	94	97	42.9	17.5	70	80	8	8	M14	UC207	25900	15400	P207	**UCP207C(E)**	**CUCP207C(CE)**	1.6	1.7	2.5
35	**UCPX07**	54	203	57	144	17	30	22	105	—	49.2	19	83	—	10	—	M14	UCX07	29300	17900	PX07	**UCPX07C(E)**	—	2.7	2.7	—
	UCP307	56	210	56	160	17	25	21	105	110	48	19	—	90	—	10	M14	UC307	33500	19200	P307	—	**CUCP307C(CE)**	2.7	—	3.4
	UCP208	49.2	184	54	137	17	25	19	100	104	49.2	19	82	90	10	8	M14	UC208	29300	17900	P208	**UCP208C(E)**	**CUCP208C(CE)**	2.0	2.2	3.0
40	**UCPX08**	58.7	222	67	156	20	32	26	113	—	49.2	19	82	—	10	—	M16	UCX08	33000	20500	PX08	**UCPX08C(E)**	—	3.5	3.5	—
	UCP308	60	220	60	170	17	27	23	116	122	52	19	—	100	—	11	M14	UC308	40500	23900	P308	—	**CUCP308C(CE)**	3.3	—	4.4
	UCP209	54	190	54	146	17	22	20	108	114	49.2	19	82	90	10	8	M14	UC209	33000	20500	P209	**UCP209C(E)**	**CUCP209C(CE)**	2.3	2.5	3.4
45	**UCPX09**	58.7	222	67	156	20	33	26	116	—	51.6	19	87	—	9	—	M16	UCX09	35500	23200	PX09	**UCPX09C(E)**	—	3.5	3.6	—
	UCP309	67	245	67	190	20	30	25	128	136	57	22	—	106	—	12	M16	UC309	51500	29500	P309	—	**CUCP309C(CE)**	4.5	—	5.8
	UCP210	57.2	206	60	159	20	25	22	114	120	51.6	19	87	98	9	10	M16	UC210	35500	23200	P210	**UCP210C(E)**	**CUCP210C(CE)**	2.7	3.0	4.1
50	**UCPX10**	63.5	241	73	171	20	36	27	126	—	55.6	22.2	88	—	9	—	M16	UCX10	43000	29400	PX10	**UCPX10C(E)**	—	4.2	4.5	—
	UCP310	75	275	75	212	20	35	28	143	149	61	22	—	114	—	12	M16	UC310	61500	38200	P310	—	**CUCP310C(CE)**	6.2	—	7.6
	UCP211	63.5	219	60	171	20	25	22	126	133	55.6	22.2	88	100	9	10	M16	UC211	43000	29400	P211	**UCP211C(E)**	**CUCP211C(CE)**	3.3	3.7	5.0
55	**UCPX11**	69.8	260	79	184	25	36	30	139	—	65.1	25.4	100	—	9	—	M20	UCX11	52500	36100	PX11	**UCPX11C(E)**	—	5.9	6.2	—
	UCP311	80	310	80	236	20	38	31	154	159	66	25	—	120	—	13	M16	UC311	71500	44800	P311	—	**CUCP311C(CE)**	7.7	—	9.6
	UCP212	69.8	241	70	184	20	25	25	138	145	65.1	25.4	102	114	10	11	M16	UC212	52500	36100	P212	**UCP212C(E)**	**CUCP212C(CE)**	4.7	5.1	6.7
60	**UCPX12**	76.2	286	83	203	25	41	32	151	—	65.1	25.4	104	—	11	—	M20	UCX12	57500	40000	PX12	**UCPX12C(E)**	—	7.2	7.4	—
	UCP312	85	330	85	250	25	38	33	165	169	71	26	—	130	—	14	M20	UC312	81500	52000	P312	—	**CUCP312C(CE)**	9.3	—	11.0

Remarks: 1. Grease nipple: 1/4-28UNF

Remarks: 2. Examples of unit numbers with covers:

With steel cover { Covers with rubber seal on both sides :UCP210C
An end cover and a cover with rubber seal :UCP210E

With cast covers { Covers with rubber seal on both sides :CUCP210C
An end cover and a cover with rubber seal :CUCP210CE

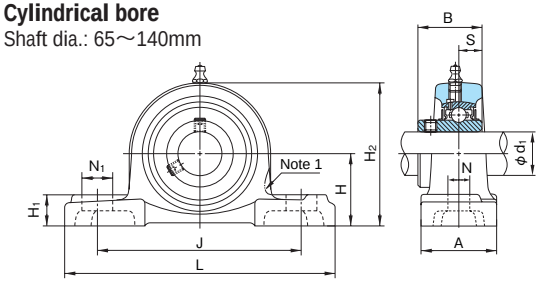
Pillow Block Units

UCP type

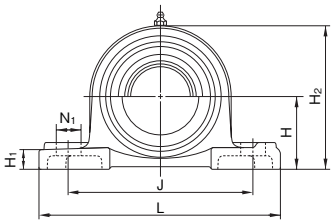
With set screws

Cylindrical bore

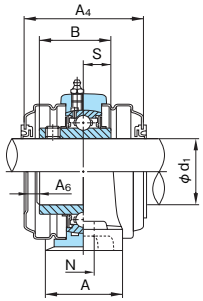
Shaft dia.: 65～140mm

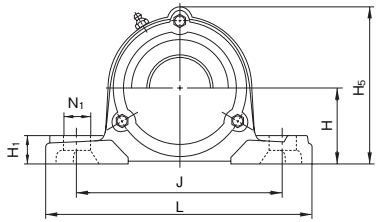


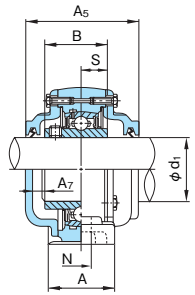
Note: The line shows figure of UCPX00 series



With steel covers







With cast covers

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)															Bolt size	Bearings			Housing No.	Unit No. with steel covers	Unit No. with cast covers	Mass of Unit (kg)		
		H	L	A	J	N	N_1	H_1	H_2	H_5	B	S	A_4	A_5	A_6	A_7		No.	Basic load rating (N) Cr	Basic load rating (N) Cor		Covers with rubber seal (End cover on one side)	Covers with rubber seal (End cover on one side)	standard	With steel cover	With cast covers
65	**UCP213**	76.2	265	70	203	25	29	27	150	156	65.1	25.4	102	118	10	13	M20	UC213	57500	40000	P213	**UCP213C(E)**	**CUCP213C(CE)**	5.6	6.1	7.8
	UCPX13	76.2	286	83	203	25	41	32	154	—	74.6	30.2	—	—	—	—	M20	UCX13	62000	44000	PX13	—	—	7.4	—	—
	UCP313	90	340	90	260	25	38	36	174	188	75	30	—	140	—	17	M20	UC313	92500	59700	P313	—	**CUCP313C(CE)**	9.8	—	14.3
70	**UCP214**	79.4	266	72	210	25	31	27	156	162	74.6	30.2	—	134	—	16	M20	UC214	62000	44000	P214	—	**CUCP214C(CE)**	7.3	—	9.3
	UCPX14	88.9	330	89	229	27	51	35	172	—	77.8	33.3	—	—	—	—	M22	UCX14	66000	48200	PX14	—	—	11.1	—	—
	UCP314	95	360	90	280	27	40	40	186	198	78	33	—	140	—	17	M22	UC314	104000	68000	P314	—	**CUCP314C(CE)**	11.4	—	16.7
75	**UCP215**	82.6	275	74	217	25	31	28	163	167	77.8	33.3	—	136	—	17	M20	UC215	66000	48200	P215	—	**CUCP215C(CE)**	7.9	—	9.6
	UCPX15	88.9	330	89	229	27	51	35	177	—	82.6	33.3	—	—	—	—	M22	UCX15	72500	53000	PX15	—	—	11.4	—	—
	UCP315	100	380	100	290	27	40	40	197	208	82	32	—	150	—	17	M22	UC315	114000	76900	P315	—	**CUCP315C(CE)**	13.6	—	19.6
80	**UCP216**	88.9	292	78	232	25	31	30	175	188	82.6	33.3	—	146	—	15	M20	UC216	72500	53000	P216	—	**CUCP216C(CE)**	10.0	—	12.2
	UCPX16	101.6	381	102	283	27	59	42	197	—	85.7	34.1	—	—	—	—	M22	UCX16	83500	61800	PX16	—	—	17.4	—	—
	UCP316	106	400	110	300	27	40	45	209	219	86	34	—	154	—	17	M22	UC316	123000	86400	P316	—	**CUCP316C(CE)**	16.4	—	23.5
85	**UCP217**	95.2	310	83	247	25	31	32	187	199	85.7	34.1	—	150	—	15	M20	UC217	83500	61800	P217	—	**CUCP217C(CE)**	12.2	—	14.2
	UCPX17	101.6	381	102	283	27	59	42	202	—	96	39.7	—	—	—	—	M22	UCX17	95500	71400	PX17	—	—	17.1	—	—
	UCP317	112	420	110	320	33	45	45	221	234	96	40	—	164	—	18	M27	UC317	132000	96500	P317	—	**CUCP317C(CE)**	18.6	—	27.0
90	**UCP218**	101.6	327	88	262	27	33	34	200	211	96	39.7	—	164	—	17	M22	UC218	95500	71400	P218	—	**CUCP218C(CE)**	14.7	—	18.2
	UCPX18	101.6	381	111	283	27	60	45	206	—	104	42.9	—	—	—	—	M22	UCX18	109000	81600	PX18	—	—	17.0	—	—
	UCP318	118	430	110	330	33	45	50	233	245	96	40	—	168	—	20	M27	UC318	143000	107200	P318	—	**CUCP318C(CE)**	20.9	—	30.4
95	**UCP319**	125	470	120	360	36	50	50	250	257	103	41	—	180	—	20	M30	UC319	153000	118400	P319	—	**CUCP319C(CE)**	26.5	—	36.8
100	**UCPX20**	127	432	121	337	33	64	52	250	—	117.5	49.2	—	—	—	—	M27	UCX20	134000	104700	PX20	—	—	33.0	—	—
	UCP320	140	490	120	380	36	50	55	275	282	108	42	—	190	—	21	M30	UC320	173000	140400	P320	—	**CUCP320C(CE)**	34.3	—	44.9
105	**UCP321**	140	490	120	380	36	50	55	278	287	112	44	—	194	—	21	M30	UC321	183000	153100	P321	—	**CUCP321C(CE)**	36.6	—	45.2
110	**UCP322**	150	520	140	400	40	55	60	295	305	117	46	—	210	—	26	M33	UC322	205000	178800	P322	—	**CUCP322C(CE)**	42.5	—	54.7
120	**UCP324**	160	570	140	450	40	55	70	321	328	126	51	—	220	—	25	M33	UC324	207000	184800	P324	—	**CUCP324C(CE)**	53.5	—	73.8
130	**UCP326**	180	600	140	480	40	55	80	354	358	135	54	—	230	—	24	M33	UC326	229000	214300	P326	—	**CUCP326C(CE)**	72.1	—	92.2
140	**UCP328**	200	620	140	500	40	55	80	388	388	145	59	—	240	—	24	M33	UC328	255000	246000	P328	—	**CUCP328C(CE)**	89.1	—	110

Remarks: 1. Grease nipple: 1/4-28UNF for bore number 13
PF1/8 for bore number 14 and over

Remarks: 2. Examples of unit numbers with covers:

With steel cover { Covers with rubber seal on both sides :UCP213C
An end cover and a cover with rubber seal :UCP213E

With cast covers { Covers with rubber seal on both sides :CUCP213C
An end cover and a cover with rubber seal :CUCP213CE

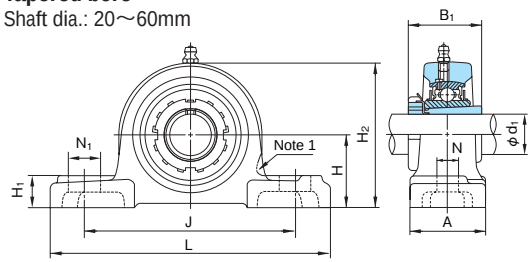
Pillow Block Units

UKP+H type

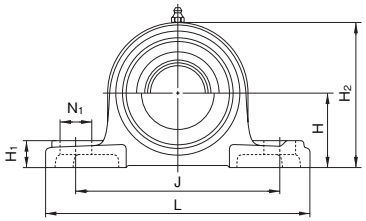
With adapter assembly

Tapered bore

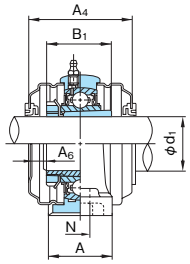
Shaft dia.: 20～60mm

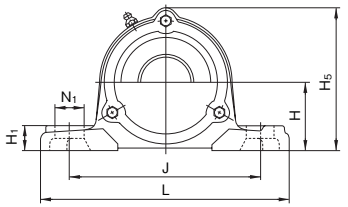


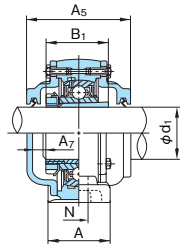
Note: The line shows figure of UCPX00 series



With steel cover







With cast covers

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)														Bolt size	Bearings			Housing No.	Unit No. with steel covers	Unit No. with cast covers	Mass of Unit (kg)		
		H	L	A	J	N	N_1	H_1	H_2	H_5	B_1	A_4	A_5	A_6	A_7		No.	Basic load rating (N) Cr	Cor		Covers with rubber seal (End cover on one side)	Covers with rubber seal (End cover on one side)	standard	with steel cover	with cast covers
20	**UKP205+H2305**	36.5	140	38	105	13	16	16	70	76	35	63	70	11	9	M10	UK205+H2305	14000	7900	P205	**UKP205C(E)+H2305**	**CUKP205C(CE)+H2305**	0.84	0.91	1.4
	UKPX05+H2305	44.4	159	51	119	17	25	18	85	—	35	65	—	10	—	M14	UKX05+H2305	19600	11300	PX05	**UKPX05C(E)+H2305**	—	1.5	1.5	—
	UKP305+H2305	45	175	45	132	17	20	16	84	89	35	—	78	—	12	M14	UK305+H2305	21300	10900	P305	—	**CUKP305C(CE)+H2305**	1.6	—	2.1
25	**UKP206+H2306**	42.9	165	48	121	17	21	18	83	87	38	65	74	10	10	M14	UK206+H2306	19600	11300	P206	**UKP206C(E)+H2306**	**CUKP206C(CE)+H2306**	1.4	1.5	2.1
	UKPX06+H2306	47.6	175	57	127	17	25	20	94	—	38	70	—	12	—	M14	UKX06+H2306	25900	15400	PX06	**UKPX06C(E)+H2306**	—	2.0	2.0	—
	UKP306+H2306	50	180	50	140	17	20	19	94	99	38	—	84	—	13	M14	UK306+H2306	26800	15000	P306	—	**CUKP306C(CE)+H2306**	1.9	—	2.6
30	**UKP207+H2307**	47.6	167	48	127	17	21	19	94	97	43	70	80	11	11	M14	UK207+H2307	25900	15400	P207	**UKP207C(E)+H2307**	**CUKP207C(CE)+H2307**	1.6	1.8	2.6
	UKPX07+H2307	54	203	57	144	17	30	22	105	—	43	83	—	17	—	M14	UKX07+H2307	29300	17900	PX07	**UKPX07C(E)+H2307**	—	2.7	2.7	—
	UKP307+H2307	56	210	56	160	17	25	21	105	110	43	—	90	—	14	M14	UK307+H2307	33500	19200	P307	—	**CUKP307C(CE)+H2307**	2.7	—	3.5
35	**UKP208+H2308**	49.2	184	54	137	17	25	19	100	104	46	82	90	15	14	M14	UK208+H2308	29300	17900	P208	**UKP208C(E)+H2308**	**CUKP208C(CE)+H2308**	2.1	2.3	3.1
	UKPX08+H2308	58.7	222	67	156	20	32	26	113	—	46	82	—	15	—	M16	UKX08+H2308	33000	20500	PX08	**UKPX08C(E)+H2308**	—	3.5	3.5	—
	UKP308+H2308	60	220	60	170	17	27	23	116	122	46	—	100	—	17	M14	UK308+H2308	40500	23900	P308	—	**CUKP308C(CE)+H2308**	3.0	—	4.4
40	**UKP209+H2309**	54	190	54	146	17	22	20	108	114	50	82	90	14	13	M14	UK209+H2309	33000	20500	P209	**UKP209C(E)+H2309**	**CUKP209C(CE)+H2309**	2.4	2.6	3.5
	UKPX09+H2309	58.7	222	67	156	20	33	26	116	—	50	87	—	16	—	M16	UKX09+H2309	35500	23200	PX09	**UKPX09C(E)+H2309**	—	3.5	3.6	—
	UKP309+H2309	67	245	67	190	20	30	25	128	136	50	—	106	—	17	M16	UK309+H2309	51500	29500	P309	—	**CUKP309C(CE)+H2309**	4.6	—	5.9
45	**UKP210+H2310**	57.2	206	60	159	20	25	22	114	120	55	87	98	15	15	M16	UK210+H2310	35500	23200	P210	**UKP210C(E)+H2310**	**CUKP210C(CE)+H2310**	2.8	3.2	4.2
	UKPX10+H2310	63.5	241	73	171	20	36	27	126	—	55	88	—	14	—	M16	UKX10+H2310	43000	29400	PX10	**UKPX10C(E)+H2310**	—	4.3	4.5	—
	UKP310+H2310	75	275	75	212	20	35	28	143	149	55	—	114	—	19	M16	UK310+H2310	61500	38200	P310	—	**CUKP310C(CE)+H2310**	6.2	—	7.8
50	**UKP211+H2311**	63.5	219	60	171	20	25	22	126	133	59	88	100	14	15	M16	UK211+H2311	43000	29400	P211	**UKP211C(E)+H2311**	**CUKP211C(CE)+H2311**	3.4	3.8	5.1
	UKPX11+H2311	69.8	260	79	184	25	36	30	139	—	59	100	—	19	—	M20	UKX11+H2311	52500	36100	PX11	**UKPX11C(E)+H2311**	—	5.8	6.0	—
	UKP311+H2311	80	310	80	236	20	38	31	154	159	59	—	120	—	20	M16	UK311+H2311	71500	44800	P311	—	**CUKP311C(CE)+H2311**	7.6	—	9.6
55	**UKP212+H2312**	69.8	241	70	184	20	25	25	138	145	62	102	114	19	20	M16	UK212+H2312	52500	36100	P212	**UKP212C(E)+H2312**	**CUKP212C(CE)+H2312**	4.8	5.2	6.8
	UKPX12+H2312	76.2	286	83	203	25	41	32	151	—	62	104	—	19	—	M20	UKX12+H2312	57500	40000	PX12	**UKPX12C(E)+H2312**	—	7.1	7.3	—
	UKP312+H2312	85	330	85	250	25	38	33	165	169	62	—	130	—	23	M20	UK312+H2312	81500	52000	P312	—	**CUKP312C(CE)+H2312**	9.3	—	11.7
60	**UKP213+H2313**	76.2	265	70	203	25	29	27	150	156	65	102	118	17	20	M20	UK213+H2313	57500	40000	P213	**UKP213C(E)+H2313**	**CUKP213C(CE)+H2313**	5.7	6.2	7.9
	UKPX13+H2313	76.2	286	83	203	25	41	32	154	—	65	—	—	—	—	M20	UKX13+H2313	62000	44000	PX13	—	—	7.2	—	—
	UKP313+H2313	90	340	90	260	25	38	36	174	188	65	—	140	—	24	M20	UK313+H2313	92500	59700	P313	—	**CUKP313C(CE)+H2313**	9.8	—	14.2

Remarks: 1. Grease nipple: 1/4-28UNF

Remarks: 2. Examples of unit numbers with covers:

With steel cover { Covers with rubber seal on both sides :UKP210C+H2310
An end cover and a cover with rubber seal :UKP210E+H2310

With cast covers { Covers with rubber seal on both sides :CUKP210C+H2310
An end cover and a cover with rubber seal :CUKP210CE+H2310

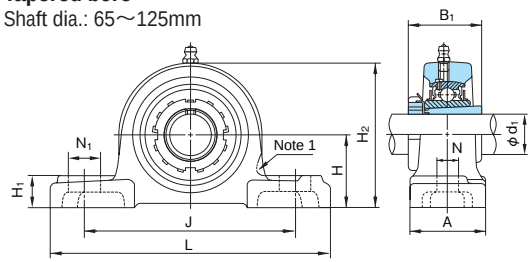
Pillow Block Units

UKP+H type

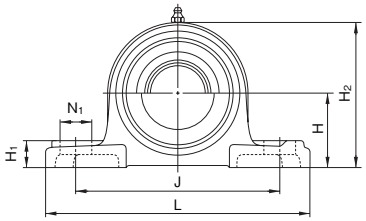
With adapter assembly

Tapered bore

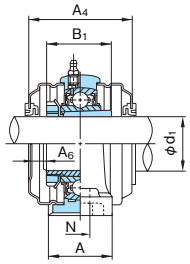
Shaft dia.: 65～125mm

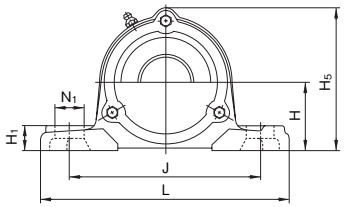


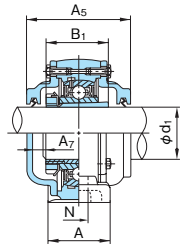
Note: The line shows figure of UCPX00 series



With steel cover







With cast covers

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)														Bolt size	Bearings			Housing No.	Unit No. with steel covers	Unit No. with cast covers	Mass of Unit (kg)		
		H	L	A	J	N	N_1	H_1	H_2	H_5	B_1	A_4	A_5	A_6	A_7		No.	Basic load rating (N) Cr	Basic load rating (N) Cor		Covers with rubber seal (End cover on one side)	Covers with rubber seal (End cover on one side)	standard	with steel cover	with cast covers
65	**UKP215+H2315**	82.6	275	74	217	25	31	28	163	167	73	—	136	—	26	M20	UK215+H2315	66000	48200	P215	—	**CUKP215C(CE)+H2315**	8.3	—	10.0
	UKPX15+H2315	88.9	330	89	229	27	51	35	177	—	73	—	—	—	—	M22	UKX15+H2315	72500	53000	PX15	—	**—**	11.5	—	—
	UKP315+H2315	100	380	100	290	27	40	40	197	208	73	—	150	—	25	M22	UK315+H2315	114000	76900	P315	—	**CUKP315C(CE)+H2315**	13.7	—	19.9
70	**UKP216+H2316**	88.9	292	78	232	25	31	30	175	188	78	—	146	—	26	M20	UK216+H2316	72500	53000	P216	—	**CUKP216C(CE)+H2316**	10.4	—	12.7
	UKPX16+H2316	101.6	381	102	283	27	59	42	197	—	78	—	—	—	—	M22	UKX16+H2316	83500	61800	PX16	—	**—**	17.4	—	—
	UKP316+H2316	106	400	110	300	27	40	45	209	219	78	—	154	—	23	M22	UK316+H2316	123000	86400	P316	—	**CUKP316C(CE)+H2316**	16.6	—	23.9
75	**UKP217+H2317**	95.2	310	83	247	25	31	32	187	199	82	—	150	—	26	M20	UK217+H2317	83500	61800	P217	—	**CUKP217C(CE)+H2317**	12.8	—	14.8
	UKPX17+H2317	101.6	381	102	283	27	59	42	202	—	82	—	—	—	—	M22	UKX17+H2317	95500	71400	PX17	—	**—**	17.0	—	—
	UKP317+H2317	112	420	110	320	33	45	45	221	234	82	—	164	—	26	M27	UK317+H2317	132000	96500	P317	—	**CUKP317C(CE)+H2317**	18.6	—	27.1
80	**UKP218+H2318**	101.6	327	88	262	27	33	34	200	211	86	—	164	—	31	M22	UK218+H2318	95500	71400	P218	—	**CUKP218C(CE)+H2318**	15.1	—	18.6
	UKPX18+H2318	101.6	381	111	283	27	60	45	206	—	86	—	—	—	—	M22	UKX18+H2318	109000	81600	PX18	—	**—**	16.7	—	—
	UKP318+H2318	118	430	110	330	33	45	50	233	245	86	—	168	—	26	M27	UK318+H2318	143000	107200	P318	—	**CUKP318C(CE)+H2318**	21.1	—	30.9
85	**UKP319+H2319**	125	470	120	360	36	50	50	250	257	90	—	180	—	30	M30	UK319+H2319	153000	118400	P319	—	**CUKP319C(CE)+H2319**	26.5	—	37.1
90	**UKPX20+H2320**	127	432	121	337	33	64	52	250	—	97	—	—	—	—	M27	UKX20+H2320	134000	104700	PX20	—	**—**	32.1	—	—
	UKP320+H2320	140	490	120	380	36	50	55	275	282	97	—	190	—	31	M30	UK320+H2320	173000	140400	P320	—	**CUKP320C(CE)+H2320**	34.3	—	45.2
100	**UKP322+H2322**	150	520	140	400	40	55	60	295	305	105	—	210	—	36	M33	UK322+H2322	205000	178800	P322	—	**CUKP322C(CE)+H2322**	42.6	—	55.1
110	**UKP324+H2324**	160	570	140	450	40	55	70	321	328	112	—	220	—	35	M33	UK324+H2324	207000	184800	P324	—	**CUKP324C(CE)+H2324**	53.0	—	73.8
115	**UKP326+H2326**	180	600	140	480	40	55	80	354	358	121	—	230	—	36	M33	UK326+H2326	229000	214300	P326	—	**CUKP326C(CE)+H2326**	72.4	—	93.3
125	**UKP328+H2328**	200	620	140	500	40	55	80	388	388	131	—	240	—	37	M33	UK328+H2328	255000	246000	P328	—	**CUKP328C(CE)+H2328**	89.4	—	111

Remarks: 1. Grease nipple: PF1/8

Remarks: 2. Examples of unit numbers with covers:

With cast covers { Covers with rubber seal on both sides :CUKP215C+H2315
An end cover and a cover with rubber seal :CUKP215CE+H2315

NACHI

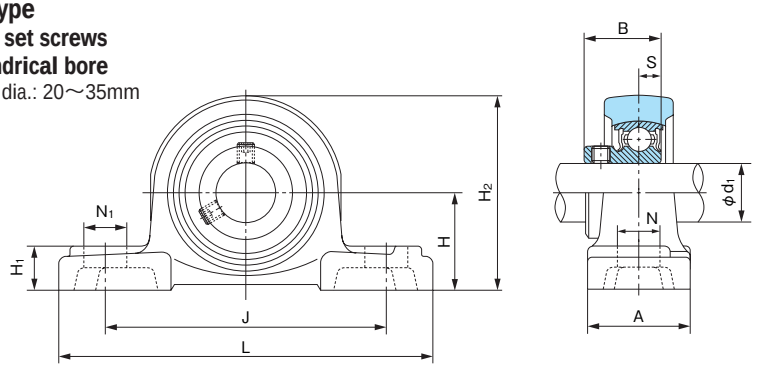
Pillow Block Units

BP type

With set screws

Cylindrical bore

Shaft dia.: 20～35mm



1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)										Bolt size		Bearings			Housing No.	Mass of Unit (kg)
		H	L	A	J	N	N_1	H_1	H_2	B	S			No.	Basic load rating (N)			
															Cr	Cor		
20	**BP204**	33.3	127	38	95	13	19	15	65	24.7	7	M10		B4	12800	6600	P204 G00	0.61
25	**BP205**	36.5	140	38	105	13	16	16	70	27	7.5	M10		B5	14000	7900	P205 G00	0.76
30	**BP206**	42.9	165	48	121	17	21	18	83	30.3	8	M14		B6	19600	11300	P206 G00	1.2
35	**BP207**	47.6	167	48	127	17	21	19	94	32.9	8.5	M14		B7	25900	15400	P207 G00	1.6

NACHI

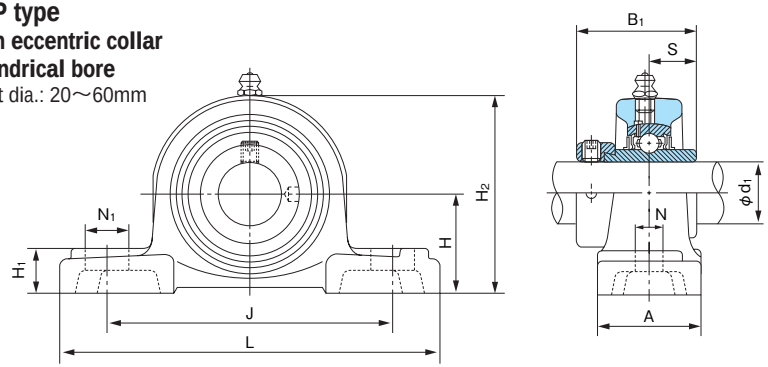
Pillow Block Units

UGP type

With eccentric collar

Cylindrical bore

Shaft dia.: 20～60mm



1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)										Bolt size		Bearings			Housing No.	Mass of Unit (kg)
		H	L	A	J	N	N_1	H_1	H_2	B_1	S			No.	Basic load rating (N) Cr	Basic load rating (N) Cor		
20	UGP204	33.3	127	38	95	13	19	15	65	43.7	17.1	M10		UG204+ER	12800	6600	P204	0.70
25	UGP205	36.5	140	38	105	13	16	16	70	44.4	17.5	M10		UG205+ER	14000	7900	P205	0.83
30	UGP206	42.9	165	48	121	17	21	18	83	48.4	18.3	M14		UG206+ER	19600	11300	P206	1.3
35	UGP207	47.6	167	48	127	17	21	19	94	51.1	18.8	M14		UG207+ER	25900	15400	P207	1.7
40	UGP208	49.2	184	54	137	17	25	19	100	56.3	21.4	M14		UG208+ER	29300	17900	P208	2.1
45	UGP209	54	190	54	146	17	22	20	108	56.3	21.4	M14		UG209+ER	33000	20500	P209	2.3
50	UGP210	57.2	206	60	159	20	25	22	114	62.7	24.6	M16		UG210+ER	35500	23200	P210	2.7
55	UGP211	63.5	219	60	171	20	25	22	126	71.4	27.8	M16		UG211+ER	43000	29400	P211	3.5
60	UGP212	69.8	241	70	184	20	25	25	138	77.8	31	M16		UG212+ER	52500	36100	P212	5.0

Remark: Grease nipple: 1/4-28UNF

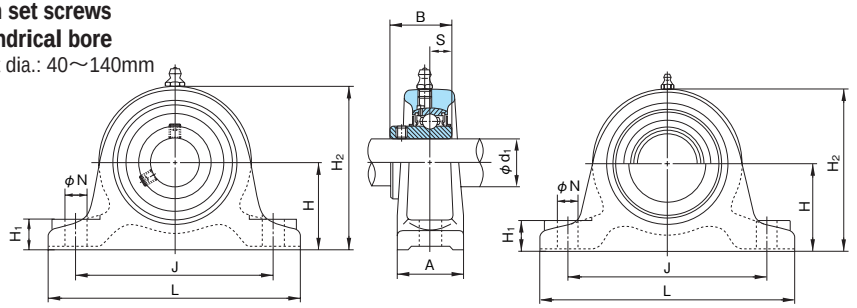
Pillow Block Units

UCIP type

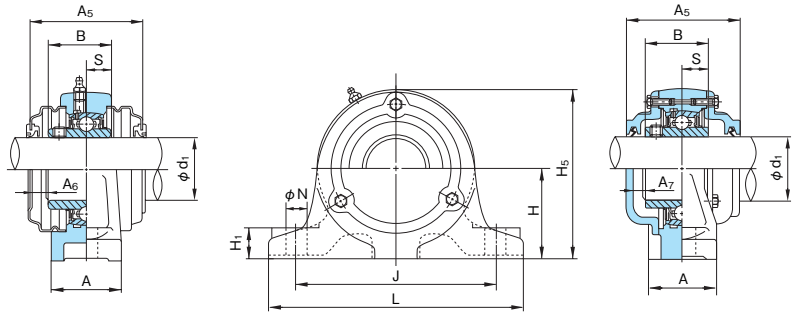
With set screws

Cylindrical bore

Shaft dia.: 40～140mm



With steel cover



With cast covers

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)														Bolt size		Bearings			Housing No.	Unit No. with steel covers	Unit No. with cast covers	Mass of Unit (kg)		
		H	L	A	J	N	H_1	H_2	H_5	B	S	A_4	A_5	A_6	A_7			No.	Basic load rating (N) Cr	Basic load rating (N) Cor		Covers with rubber seal (End cover on one side)	Covers with rubber seal (End cover on one side)	standard	with steel cover	With cast covers
40	**UCIP208**	60	200	60	150	19	25	115	115	49.2	19	86	90	12	8	M16		UC208	29300	17900	IP208	**UCIP208C(E)**	**CUCIP208C(CE)**	3.6	3.8	4.0
45	**UCIP209**	70	210	60	160	19	25	128	130	49.2	19	92	90	15	8	M16		UC209	33000	20500	IP209	**UCIP209C(E)**	**CUCIP209C(CE)**	3.8	4.1	4.5
50	**UCIP210**	70	220	60	170	19	28	132	133	51.6	19	92	98	12	10	M16		UC210	35500	23200	IP210	**UCIP210C(E)**	**CUCIP210C(CE)**	4.4	4.7	5.0
55	**UCIP211**	80	230	60	180	19	28	148	150	55.6	22.2	97	100	14	10	M16		UC211	43000	29400	IP211	**UCIP211C(E)**	**CUCIP211C(CE)**	5.5	5.8	6.2
60	**UCIP212**	80	260	70	200	22	30	155	155	65.1	25.4	113	114	15	11	M20		UC212	52500	36100	IP212	**UCIP212C(E)**	**CUCIP212C(CE)**	5.9	6.3	8.0
65	**UCIP213**	90	280	70	220	22	30	172	172	65.1	25.4	111	118	14	13	M20		UC213	57500	40000	IP213	**UCIP213C(E)**	**CUCIP213C(CE)**	7.5	8.0	10.1
	UCIP313	110	310	70	250	22	30	208	208	75	30	—	140	—	17	M20		UC313	92500	59700	IP313	—	**CUCIP313C(CE)**	12.4	—	16.5
70	**UCIP314**	110	330	75	270	25	35	215	215	78	33	—	140	—	17	M22		UC314	104000	68000	IP314	—	**CUCIP314C(CE)**	14.9	—	19.2
75	**UCIP315**	120	340	75	280	25	35	230	230	82	32	—	150	—	17	M22		UC315	114000	76900	IP315	—	**CUCIP315C(CE)**	16.2	—	21.8
80	**UCIP316**	120	350	85	290	25	40	235	235	86	34	—	154	—	17	M22		UC316	123000	86400	IP316	—	**CUCIP316C(CE)**	20.8	—	24.8
85	**UCIP317**	130	370	85	310	25	40	255	255	96	40	—	164	—	18	M22		UC317	132000	96500	IP317	—	**CUCIP317C(CE)**	23.1	—	29.4
90	**UCIP318**	130	400	85	330	29	45	260	260	96	40	—	168	—	20	M24		UC318	143000	107200	IP318	—	**CUCIP318C(CE)**	25.7	—	33.2
95	**UCIP319**	150	410	85	340	29	45	285	285	103	41	—	180	—	20	M24		UC319	153000	118400	IP319	—	**CUCIP319C(CE)**	29.7	—	38.5
100	**UCIP320**	150	430	85	360	29	45	295	295	108	42	—	190	—	21	M24		UC320	173000	140400	IP320	—	**CUCIP320C(CE)**	33.4	—	44.2
110	**UCIP322**	170	490	100	410	32	50	335	335	117	46	—	210	—	26	M27		UC322	205000	178800	IP322	—	**CUCIP322C(CE)**	50.4	—	61.2
120	**UCIP324**	170	510	100	430	32	50	345	345	126	51	—	220	—	25	M27		UC324	207000	184800	IP324	—	**CUCIP324C(CE)**	56.8	—	72.3
130	**UCIP326**	200	550	110	470	32	50	390	390	135	54	—	230	—	24	M27		UC326	229000	214300	IP326	—	**CUCIP326C(CE)**	73.2	—	94.3
140	**UCIP328**	200	590	110	500	35	55	400	400	145	59	—	240	—	24	M30		UC328	255000	246000	IP328	—	**CUCIP328C(CE)**	83.5		105

Remarks: 1. Grease nipple : 1/4-28UNF for bore number 13 and under
PF1/8 for bore number 14 and over

Remarks: 2. Examples of unit numbers with covers:

With steel cover { Covers with rubber seal on both sides :UCIP210C
An end cover and a cover with rubber seal :UCIP210E

With cast covers { Covers with rubber seal on both sides :CUCIP210C
An end cover and a cover with rubber seal :CUCIP210CE

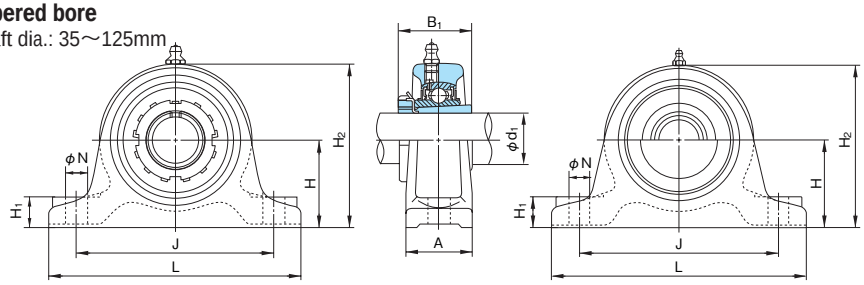
Pillow Block Units

UKIP+H type

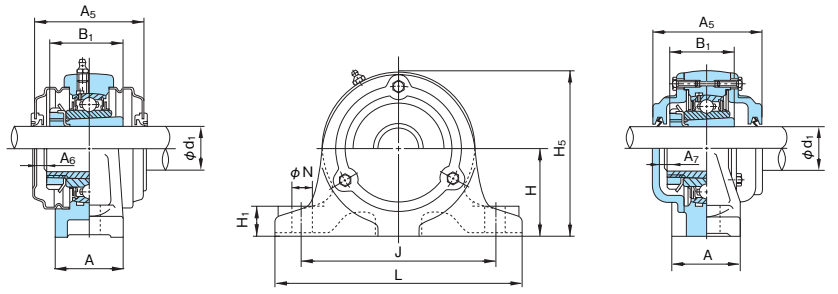
With adapter assembly

Tapered bore

Shaft dia.: 35～125mm



With steel covers



With cast covers

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)													Bolt size	Bearings			Housing No.	Unit No. with steel covers	Unit No. with cast covers	Mass of Unit (kg)		
		H	L	A	J	N	H_1	H_2	H_5	B_1	A_4	A_5	A_6	A_7		No.	Basic load rating (N) Cr	Basic load rating (N) Cor		Covers with rubber seal (End cover on one side)	Covers with rubber seal (End cover on one side)	standard	With steel cover	With cast cover
35	**UKIP208+H2308**	60	200	60	150	19	25	115	115	46	86	90	17	14	M16	UK208+H2308	29300	17900	IP208	**UKIP208C(E)+H2308**	**CUKIP208C(CE)+H2308**	3.7	3.9	4.1
40	**UKIP209+H2309**	70	210	60	160	19	25	128	130	50	92	90	19	13	M16	UK209+H2309	33000	20500	IP209	**UKIP209C(E)+H2309**	**CUKIP209C(CE)+H2309**	3.9	4.2	4.7
45	**UKIP210+H2310**	70	220	60	170	19	28	132	133	55	92	98	17	15	M16	UK210+H2310	35500	23200	IP210	**UKIP210C(E)+H2310**	**CUKIP210C(CE)+H2310**	4.6	4.9	5.2
50	**UKIP211+H2311**	80	230	60	180	19	28	148	150	59	97	100	19	15	M16	UK211+H2311	43000	29400	IP211	**UKIP211C(E)+H2311**	**CUKIP211C(CE)+H2311**	5.6	6.0	6.4
55	**UKIP212+H2312**	80	260	70	200	22	30	155	155	62	113	114	24	20	M20	UK212+H2312	52500	36100	IP212	**UKIP212C(E)+H2312**	**CUKIP212C(CE)+H2312**	5.9	6.4	8.2
60	**UKIP213+H2313**	90	280	70	220	22	30	172	172	65	111	118	21	20	M20	UK213+H2313	57500	40000	IP213	**UKIP213C(E)+H2313**	**CUKIP213C(CE)+H2313**	7.7	8.2	10.4
	UKIP313+H2313	110	310	70	250	22	30	208	208	65	—	140	—	24	M20	UK313+H2313	92500	59700	IP313	—	**CUKIP313C(CE)+H2313**	12.4	—	16.5
65	**UKIP315+H2315**	120	340	75	280	25	35	230	230	73	—	150	—	25	M22	UK315+H2315	114000	76900	IP315	—	**CUKIP315C(CE)+H2315**	16.3	—	22.2
70	**UKIP316+H2316**	120	350	85	290	25	40	235	235	78	—	154	—	23	M22	UK316+H2316	123000	86400	IP316	—	**CUKIP316C(CE)+H2316**	21.0	—	25.2
75	**UKIP317+H2317**	130	370	85	310	25	40	255	255	82	—	164	—	26	M22	UK317+H2317	132000	96500	IP317	—	**CUKIP317C(CE)+H2317**	23.1	—	29.6
80	**UKIP318+H2318**	130	400	85	330	29	45	260	260	86	—	168	—	26	M24	UK318+H2318	143000	107200	IP318	—	**CUKIP318C(CE)+H2318**	25.9	—	34.2
85	**UKIP319+H2319**	150	410	85	340	29	45	285	285	90	—	180	—	30	M24	UK319+H2319	153000	118400	IP319	—	**CUKIP319C(CE)+H2319**	29.7	—	38.7
90	**UKIP320+H2320**	150	430	85	360	29	45	295	295	97	—	190	—	31	M24	UK320+H2320	173000	140400	IP320	—	**CUKIP320C(CE)+H2320**	33.4	—	44.8
100	**UKIP322+H2322**	170	490	100	410	32	50	335	335	105	—	210	—	36	M27	UK322+H2322	205000	178800	IP322	—	**CUKIP322C(CE)+H2322**	50.5	—	61.9
110	**UKIP324+H2324**	170	510	100	430	32	50	345	345	112	—	220	—	35	M27	UK324+H2324	207000	184800	IP324	—	**CUKIP324C(CE)+H2324**	56.3	—	72.5
115	**UKIP326+H2326**	200	550	110	470	32	50	390	390	121	—	230	—	36	M27	UK326+H2326	229000	214300	IP326	—	**CUKIP326C(CE)+H2326**	73.5	—	95.8
125	**UKIP328+H2328**	200	590	110	500	35	55	400	400	131	—	240	—	37	M30	UK328+H2328	255000	246000	IP328	—	**CUKIP328C(CE)+H2328**	83.8	—	106

Remarks: 1. Grease nipple : 1/4-28UNF for bore number 13 and under
PF1/8 for bore number 14 and over

Remarks: 2. Examples of unit numbers with covers:

With steel cover { Covers with rubber seal on both sides :UKIP210C+H2310
An end cover and a cover with rubber seal :CUKP210CE+H2310

With cast cover { Covers with rubber seal on both sides :CUKP210C+H2310
An end cover and a cover with rubber seal :CUKIP210CE+H2310

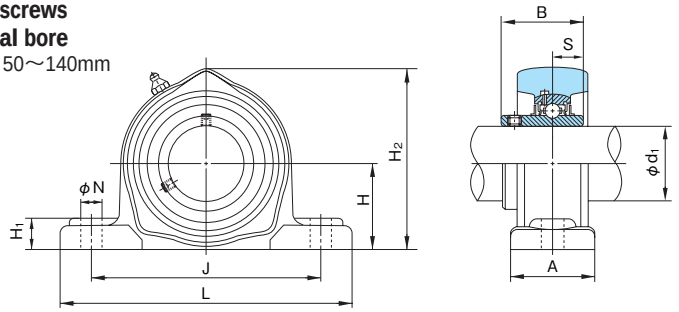
Cast Steel Pillow Block Units

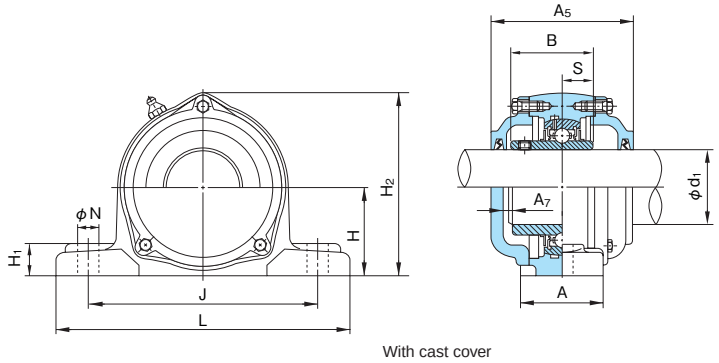
UCPK type

With set screws

Cylindrical bore

Shaft dia.: 50～140mm





With cast cover

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)											Bolt size		Bearings			Housing No.	Unit No. with cast covers	Mass of Unit (kg)	
		H	L	A	J	N	H_1	H_2	B	S	A_5	A_7			No.	Basic load rating (N) Cr	Basic load rating (N) Cor		Covers with rubber seal (End cover on one side)	standard	with cast cover
50	UCPK210	57.2	200	55	159	19	22	120	51.6	19	98	10	M16		UC210	35500	23200	PK210	CUCPK210C(CE)	3.5	4.4
55	UCPK211	63.5	216	55	171	19	22	133	55.6	22.2	100	10	M16		UC211	43000	29400	PK211	CUCPK211C(CE)	4.5	5.7
60	UCPK212	69.8	233	65	184	19	25	145	65.1	25.4	114	11	M16		UC212	52500	36100	PK212	CUCPK212C(CE)	5.7	6.8
65	UCPK213	76.2	258	70	203	24	27	156	65.1	25.4	118	13	M20		UC213	57500	40000	PK213	CUCPK213C(CE)	6.7	8.2
	UCPK313	90	326	85	260	24	36	188	75	30	140	17	M20		UC313	92500	59700	PK313	CUCPK313C(CE)	12.2	14.6
70	UCPK214	79.4	266	72	210	24	27	162	74.6	30.2	134	16	M20		UC214	62000	44000	PK214	CUCPK214C(CE)	7.6	9.4
	UCPK314	95	350	85	280	26	40	198	78	33	140	17	M22		UC314	104000	68000	PK314	CUCPK314C(CE)	14.8	17.5
75	UCPK215	82.6	272	74	217	24	28	167	77.8	33.3	136	17	M20		UC215	66000	48200	PK215	CUCPK215C(CE)	8.1	10.3
	UCPK315	100	366	90	290	26	40	208	82	32	150	17	M22		UC315	114000	76900	PK315	CUCPK315C(CE)	17.0	20.0
80	UCPK216	88.9	288	75	232	24	30	188	82.6	33.3	146	15	M20		UC216	72500	53000	PK216	CUCPK216C(CE)	10.4	13.3
	UCPK316	106	386	100	300	26	45	219	86	34	154	17	M22		UC316	123000	86400	PK316	CUCPK316C(CE)	19.7	23.4
85	UCPK217	95.2	303	80	247	24	32	199	85.7	34.1	150	15	M20		UC217	83500	61800	PK217	CUCPK217C(CE)	12.2	15.4
	UCPK317	112	407	105	320	32	45	234	96	40	164	18	M27		UC317	132000	96500	PK317	CUCPK317C(CE)	22.9	27.3
90	UCPK218	101.6	322	85	262	26	34	211	96	39.7	164	17	M22		UC218	95500	71400	PK218	CUCPK218C(CE)	15.2	18.9
	UCPK318	118	417	105	330	32	50	245	96	40	168	20	M27		UC318	143000	107200	PK318	CUCPK318C(CE)	25.9	30.8
95	UCPK319	125	455	115	360	35	50	257	103	41	180	20	M30		UC319	153000	118400	PK319	CUCPK319C(CE)	33.1	38.4
100	UCPK320	140	475	115	380	35	55	282	108	42	190	21	M30		UC320	173000	140400	PK320	CUCPK320C(CE)	40.2	46.4
105	UCPK321	140	475	115	380	35	55	287	112	44	194	21	M30		UC321	183000	153100	PK321	CUCPK321C(CE)	40.4	47.4
110	UCPK322	150	505	130	400	38	60	305	117	46	210	26	M33		UC322	205000	178800	PK322	CUCPK322C(CE)	47.8	55.9
120	UCPK324	160	555	130	450	38	70	328	126	51	220	25	M33		UC324	207000	184800	PK324	CUCPK324C(CE)	63.8	75.2
130	UCPK326	180	585	130	480	38	80	358	135	54	230	24	M33		UC326	229000	214300	PK326	CUCPK326C(CE)	81.6	94.4
140	UCPK328	200	605	130	500	38	80	388	145	59	240	24	M33		UC328	255000	246000	PK328	CUCPK328C(CE)	95.9	110

Remarks: 1. Please contact NACHI for units number appeared in italic.
2. Grease nipple : 1/4-28UNF for bore number 13 and under
PF1/8 for bore number 14 and over

Remarks: 3. Examples of unit numbers with covers:
With cast cover { Covers with rubber seal on both sides :CUCPK210C
An end cover and a cover with rubber seal :CUCPK210CE

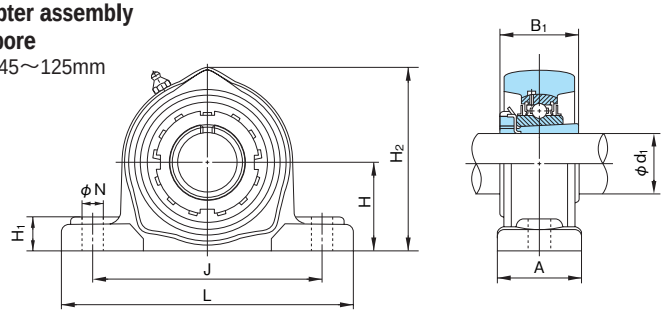
Cast Steel Pillow Block Units

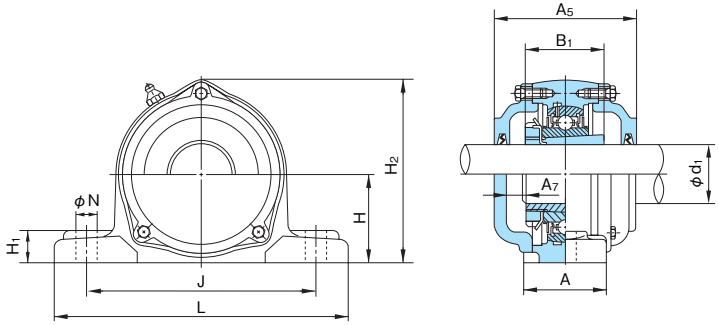
UKPK+H type

With adapter assembly

Tapered bore

Shaft dia.: 45～125mm





With cast cover

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)										Bolt size		Bearings			Housing No.	Unit No. with cast covers	Mass of Unit (kg)	
		H	L	A	J	N	H_1	H_2	B_1	A_5	A_7			No.	Basic load rating (N)			Both covers with rubber seal (one side end cover)	standard	with cast cover
															Cr	Cor				
45	***UKPK210+H2310***	*57.2*	*200*	*55*	*159*	*19*	*22*	*120*	*55*	*98*	*15*	*M16*		*UK210+H2310*	*35500*	*23200*	*PK210*	***CUKPK210C(CE)+H2310***	*3.6*	*4.6*
50	***UKPK211+H2311***	*63.5*	*216*	*55*	*171*	*19*	*22*	*133*	*59*	*100*	*15*	*M16*		*UK211+H2311*	*43000*	*29400*	*PK211*	***CUKPK211C(CE)+H2311***	*4.7*	*5.9*
55	***UKPK212+H2312***	*69.8*	*233*	*65*	*184*	*19*	*25*	*145*	*62*	*114*	*20*	*M16*		*UK212+H2312*	*52500*	*36100*	*PK212*	***CUKPK212C(CE)+H2312***	*5.7*	*6.9*
60	***UKPK213+H2313***	*76.2*	*258*	*70*	*203*	*24*	*27*	*156*	*65*	*118*	*20*	*M20*		*UK213+H2313*	*57500*	*40000*	*PK213*	***CUKPK213C(CE)+H2313***	*6.8*	*8.4*
	UKPK313+H2313	*90*	*326*	*85*	*260*	*24*	*36*	*188*	*65*	*140*	*24*	*M20*		*UK313+H2313*	*92500*	*59700*	*PK313*	***CUKPK313C(CE)+H2313***	*12.1*	*14.6*
65	***UKPK215+H2315***	*82.6*	*272*	*74*	*217*	*24*	*28*	*167*	*73*	*136*	*26*	*M20*		*UK215+H2315*	*66000*	*48200*	*PK215*	***CUKPK215C(CE)+H2315***	*8.5*	*10.7*
	UKPK315+H2315	*100*	*366*	*90*	*290*	*26*	*40*	*208*	*73*	*150*	*25*	*M22*		*UK315+H2315*	*114000*	*76900*	*PK315*	***CUKPK315C(CE)+H2315***	*17.2*	*20.4*
70	***UKPK216+H2316***	*88.9*	*288*	*75*	*232*	*24*	*30*	*188*	*78*	*146*	*26*	*M20*		*UK216+H2316*	*72500*	*53000*	*PK216*	***CUKPK216C(CE)+H2316***	*10.9*	*13.8*
	UKPK316+H2316	*106*	*386*	*100*	*300*	*26*	*45*	*219*	*78*	*154*	*23*	*M22*		*UK316+H2316*	*123000*	*86400*	*PK316*	***CUKPK316C(CE)+H2316***	*20.0*	*23.7*
75	***UKPK217+H2317***	*95.2*	*303*	*80*	*247*	*24*	*32*	*199*	*82*	*150*	*26*	*M20*		*UK217+H2317*	*83500*	*61800*	*PK217*	***CUKPK217C(CE)+H2317***	*12.8*	*16.1*
	UKPK317+H2317	*112*	*407*	*105*	*320*	*32*	*45*	*234*	*82*	*164*	*26*	*M27*		*UK317+H2317*	*132000*	*96500*	*PK317*	***CUKPK317C(CE)+H2317***	*22.9*	*27.4*
80	***UKPK218+H2318***	*101.6*	*322*	*85*	*262*	*26*	*34*	*211*	*86*	*164*	*31*	*M22*		*UK218+H2318*	*95500*	*71400*	*PK218*	***CUKPK218C(CE)+H2318***	*15.5*	*19.4*
	UKPK318+H2318	*118*	*417*	*105*	*330*	*32*	*50*	*245*	*86*	*168*	*26*	*M27*		*UK318+H2318*	*143000*	*107200*	*PK318*	***CUKPK318C(CE)+H2318***	*26.1*	*31.2*
85	***UKPK319+H2319***	*125*	*455*	*115*	*360*	*35*	*50*	*257*	*90*	*180*	*30*	*M30*		*UK319+H2319*	*153000*	*118400*	*PK319*	***CUKPK319C(CE)+H2319***	*33.1*	*38.7*
90	***UKPK320+H2320***	*140*	*475*	*115*	*380*	*35*	*55*	*282*	*97*	*190*	*31*	*M30*		*UK320+H2320*	*173000*	*140400*	*PK320*	***CUKPK320C(CE)+H2320***	*40.2*	*46.7*
100	***UKPK322+H2322***	*150*	*505*	*130*	*400*	*38*	*60*	*305*	*105*	*210*	*36*	*M33*		*UK322+H2322*	*205000*	*178800*	*PK322*	***CUKPK322C(CE)+H2322***	*47.9*	*56.5*
110	***UKPK324+H2324***	*160*	*555*	*130*	*450*	*38*	*70*	*328*	*112*	*220*	*35*	*M33*		*UK324+H2324*	*207000*	*184800*	*PK324*	***CUKPK324C(CE)+H2324***	*63.3*	*75.1*
115	***UKPK326+H2326***	*180*	*585*	*130*	*480*	*38*	*80*	*358*	*121*	*230*	*36*	*M33*		*UK326+H2326*	*229000*	*214300*	*PK326*	***CUKPK326C(CE)+H2326***	*81.9*	*95.3*
125	***UKPK328+H2328***	*200*	*605*	*130*	*500*	*38*	*80*	*388*	*131*	*240*	*37*	*M33*		*UK328+H2328*	*255000*	*246000*	*PK328*	***CUKPK328C(CE)+H2328***	*96.2*	*111*

Remarks: 1. Please contact NACHI for units number appeared in italic.
2. Grease nipple : 1/4-28UNF for bore number 13 and under
PF1/8 for bore number 14 and over

Remarks: 3. Examples of unit numbers with covers:
with cast cover { Covers with rubber seal on both sides :CUKPK210C+H2310
An end cover and a cover with rubber seal:CUKP210CE+H2310

NACHI

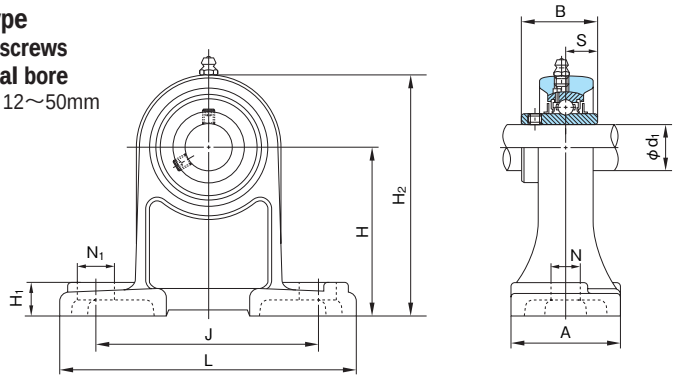
Pillow Block Units

UCPH type

With set screws

Cylindrical bore

Shaft dia.: 12～50mm



1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)										Bolt size		Bearings			Housing No.	Mass of Unit (kg)
		H	L	A	J	N	N_1	H_1	H_2	B	S			No.	Basic load rating (N)			
															Cr	Cor		
12	**UCPH201**	70	127	40	95	13	19	15	101	31	12.7	M10		UC201	12800	6600	PH204	1.0
15	**UCPH202**	70	127	40	95	13	19	15	101	31	12.7	M10		UC202	12800	6600	PH204	0.99
17	**UCPH203**	70	127	40	95	13	19	15	101	31	12.7	M10		UC203	12800	6600	PH204	0.98
20	**UCPH204**	70	127	40	95	13	19	15	101	31	12.7	M10		UC204	12800	6600	PH204	0.96
25	**UCPH205**	80	140	50	105	13	19	16	114	34	14.3	M10		UC205	14000	7900	PH205	1.2
30	**UCPH206**	90	165	50	121	17	21	18	130	38.1	15.9	M14		UC206	19600	11300	PH206	1.9
35	**UCPH207**	95	167	60	127	17	21	19	140	42.9	17.5	M14		UC207	25900	15400	PH207	2.4
40	**UCPH208**	100	184	70	137	17	25	19	149	49.2	19	M14		UC208	29300	17900	PH208	2.8
45	**UCPH209**	105	190	70	146	17	25	20	157	49.2	19	M14		UC209	33000	20500	PH209	3.2
50	**UCPH210**	110	206	70	159	20	25	22	165	51.6	19	M16		UC210	35500	23200	PH210	3.6

Remark: Grease nipple :1/4-28UNF

NACHI

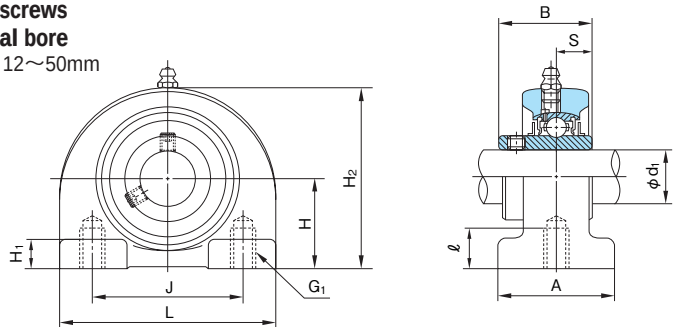
Pillow Block Units

UCPA type

With set screws

Cylindrical bore

Shaft dia.: 12～50mm



1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)											Bearings			Housing No.	Mass of Unit (kg)
		H	L	A	J	G_1	ℓ	H_1	H_2	B	S		No.	Basic load rating (N)			
														Cr	Cor		
12	UCPA201	30.2	76	38	52	M10×1.5	12	8	62	31	12.7		UC201	12800	6600	PA204	0.59
15	UCPA202	30.2	76	38	52	M10×1.5	12	8	62	31	12.7		UC202	12800	6600	PA204	0.57
17	UCPA203	30.2	76	38	52	M10×1.5	12	8	62	31	12.7		UC203	12800	6600	PA204	0.56
20	UCPA204	30.2	76	38	52	M10×1.5	12	8	62	31	12.7		UC204	12800	6600	PA204	0.54
25	UCPA205	36.5	84	38	56	M10×1.5	15	10	72	34	14.3		UC205	14000	7900	PA205	0.73
30	UCPA206	42.9	94	48	66	M14×2	18	10	84	38.1	15.9		UC206	19600	11300	PA206	1.11
35	UCPA207	47.6	110	48	80	M14×2	20	12	95	42.9	17.5		UC207	25900	15400	PA207	1.63
40	UCPA208	49.2	116	54	84	M14×2	20	12	100	49.2	19		UC208	29300	17900	PA208	1.85
45	UCPA209	54.2	120	54	90	M14×2	25	12	108	49.2	19		UC209	33000	20500	PA209	2.11
50	UCPA210	57.2	130	60	94	M16×2	25	14	116	51.6	19		UC210	35500	23200	PA210	2.52

Remark: Grease nipple: 1/4-28UNF

NACHI

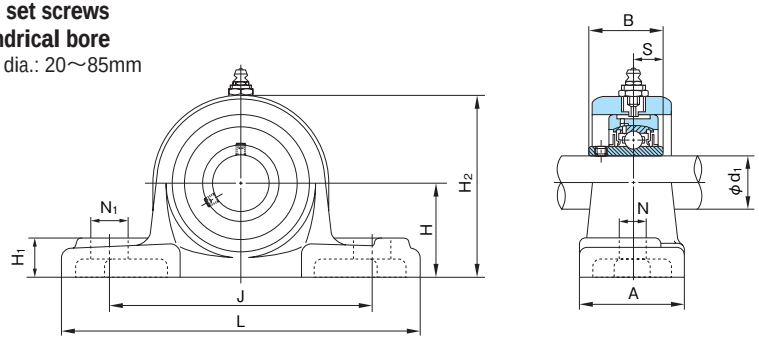
Pillow Block Units

UCEP type

With set screws

Cylindrical bore

Shaft dia.: 20～85mm



1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)										Axial displacement (mm)	Bolt size		Bearings			Housing No.		Mass of Unit (kg)
		H	L	A	J	N	N_1	H_1	H_2	B	S				No.	Basic load rating (N) Cr	Basic load rating (N) Cor	Pillow type Housing	Cartridge type Housing	
20	UCEP204	36.5	140	38	105	13	16	16	73	31	12.7	10	M10		UC204	12800	6600	EP204	EC204	1.1
25	UCEP205	44.4	159	51	119	17	20	18	85	34	14.3	10	M14		UC205	14000	7900	EP205	EC205	1.5
30	UCEP206	47.6	175	57	127	17	20	20	94	38.1	15.9	10	M14		UC206	19600	11300	EP206	EC206	2.0
35	UCEP207	54	203	57	144	17	20	22	108	42.9	17.5	10	M14		UC207	25900	15400	EP207	EC207	2.7
40	UCEP208	58.7	222	67	156	20	24	26	116	49.2	19	10	M16		UC208	29300	17900	EP209	EC208	3.5
45	UCEP209	58.7	222	67	156	20	24	26	116	49.2	19	10	M16		UC209	33000	20500	EP209	EC209	3.4
50	UCEP210	63.5	241	73	171	20	26	27	126	51.6	19	10	M16		UC210	35500	23200	EP210	EC210	4.1
55	UCEP211	69.8	260	79	184	25	28	30	139	55.6	22.2	10	M20		UC211	43000	29400	EP211	EC211	5.6
60	UCEP212	76.2	286	83	203	25	30	32	151	65.1	25.4	10	M20		UC212	52500	36100	EP212	EC212	7.1
65	UCEP213	76.2	286	83	203	25	30	32	154	65.1	25.4	10	M20		UC213	57500	40000	EP213	EC213	7.0
70	UCEP214	88.9	330	89	229	27	31	35	177	74.6	30.2	10	M22		UC214	62000	44000	EP215	EC214	10.8
75	UCEP215	88.9	330	89	229	27	31	35	177	77.8	33.3	10	M22		UC215	66000	48200	EP215	EC215	10.9
80	UCEP216	101.6	381	102	283	27	40	42	205	82.6	33.3	15	M22		UC216	72500	53000	EP217	EC216	17.1
85	UCEP217	101.6	381	102	283	27	40	42	205	85.7	34.1	15	M22		UC217	83500	61800	EP217	EC217	16.4

Remarks: 1. This unit allows the movement in axial direction to be used on free side and the mounting dimensions are equal to UCPX00 type.
2. Grease nipple: 1/4-28UNF for bore number 13 and under
PF1/8 for bore number 14 and over

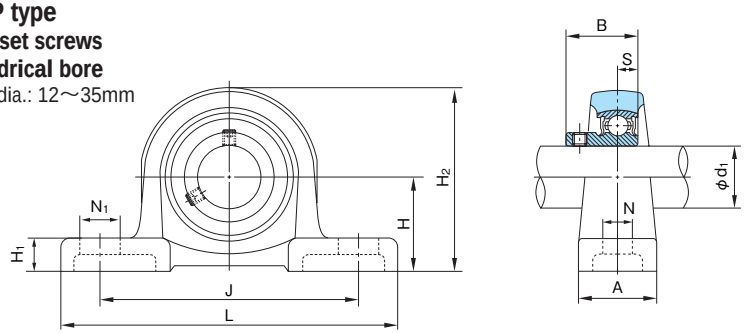
Pillow Block Units

BLLP type

With set screws

Cylindrical bore

Shaft dia.: 12～35mm

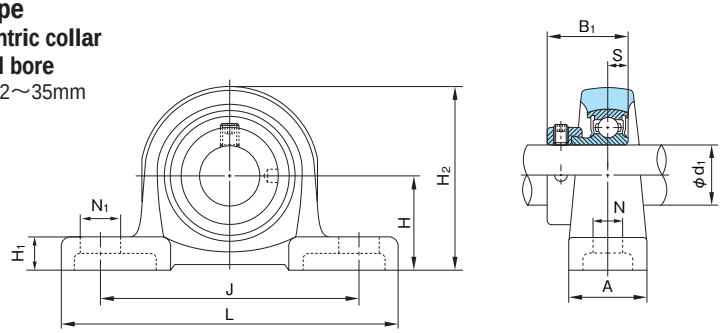


KHLLP type

With eccentric collar

Cylindrical bore

Shaft dia.: 12～35mm



BLLP type

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)										Bolt size		Bearings			Housing No.	Mass of Unit (kg)
		H	L	A	J	N	N_1	H_1	H_2	B	S			No.	Basic load rating (N) Cr	Basic load rating (N) Cor		
12	BLLP1J	30.2	114	25	87	12	16	12	57	22	6	M10		B1	9550	4800	LLP3J	0.39
15	BLLP2J	30.2	114	25	87	12	16	12	57	22	6	M10		B2	9550	4800	LLP3J	0.38
17	BLLP3J	30.2	114	25	87	12	16	12	57	22	6	M10		B3	9550	4800	LLP3J	0.36
20	BLLP4J	33.3	125	27	97	12	16	13	64	24.7	7	M10		B4	12800	6600	LLP4J	0.48
25	BLLP5J	36.5	130	29	100	12	16	13	70	27	7.5	M10		B5	14000	7900	LLP5J	0.59
30	BLLP6J	42.9	156	33	120	14	21	15	83	30.3	8	M12		B6	19600	11300	LLP6J	0.70
35	BLLP7J	47.6	165	35	127	14	21	16	93	32.9	8.5	M12		B7	25900	15400	LLP7J	0.98

Remark: Spherical bearing seating diameter of housing is applied tolerance class J7.

KHLLP type

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)										Bolt size		Bearings			Housing No.	Mass of Unit (kg)
		H	L	A	J	N	N_1	H_1	H_2	B_1	S			No.	Basic load rating (N) Cr	Basic load rating (N) Cor		
12	KHLLP201AJ	30.2	114	25	87	12	16	12	57	28.6	6.5	M10		KH201AE	9550	4800	LLP3J	0.41
15	KHLLP202AJ	30.2	114	25	87	12	16	12	57	28.6	6.5	M10		KH202AE	9550	4800	LLP3J	0.40
17	KHLLP203AJ	30.2	114	25	87	12	16	12	57	28.6	6.5	M10		KH203AE	9550	4800	LLP3J	0.39
20	KHLLP204AJ	33.3	125	27	97	12	16	13	64	31	7.5	M10		KH204AE	12800	6600	LLP4J	0.52
25	KHLLP205AJ	36.5	130	29	100	12	16	13	70	31	7.5	M10		KH205AE	14000	7900	LLP5J	0.63
30	KHLLP206AJ	42.9	156	33	120	14	21	15	83	35.7	9	M12		KH206AE	19600	11300	LLP6J	0.76
35	KHLLP207AJ	47.6	165	35	127	14	21	16	93	38.9	9.5	M12		KH207AE	25900	15400	LLP7J	1.09

Remark: Spherical bearing seating diameter of housing is applied tolerance class J7.

NACHI

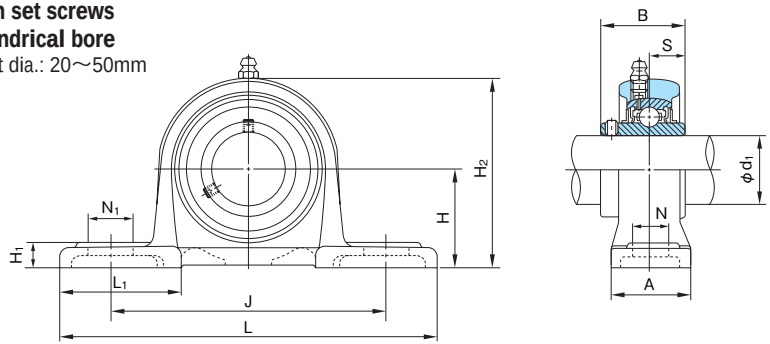
Pillow Block Units

MUCP type (Stainless Steel)

With set screws

Cylindrical bore

Shaft dia.: 20～50mm



1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)											Bolt size		Bearings			Housing No.	Mass of Unit (kg)
		H	L	A	J	N	N_1	H_1	H_2	L_1	B	S			No.	Basic load rating (N) Cr	Basic load rating (N) Cor		
20	MUCP204	33.3	127	30	95	13	19	9	64	42	31	12.7	M10		MUC204	10900	5300	MP204	0.50
25	MUCP205	36.5	140	30	105	13	19	10	70	42	34	14.3	M10		MUC205	11900	6300	MP205	0.65
30	MUCP206	42.9	165	36	121	17	21	11	82	53	38.1	15.9	M14		MUC206	16700	9050	MP206	0.95
35	MUCP207	47.6	167	38	127	17	21	12	92	54	42.9	17.5	M14		MUC207	22000	12300	MP207	1.25
40	MUCP208	49.2	184	40	137	17	22	12	98	52	49.2	19	M14		MUC208	24900	14300	MP208	1.50
45	MUCP209	54	190	40	146	17	22	13	105	60	49.2	19	M14		MUC209	28100	16400	MP209	1.75
50	MUCP210	57.2	206	45	159	20	25	14	112	65	51.6	19	M16		MUC210	30200	18600	MP210	2.05

Remark: Grease nipple: 1/4-28UNF

Silver series

Pillow Block Units

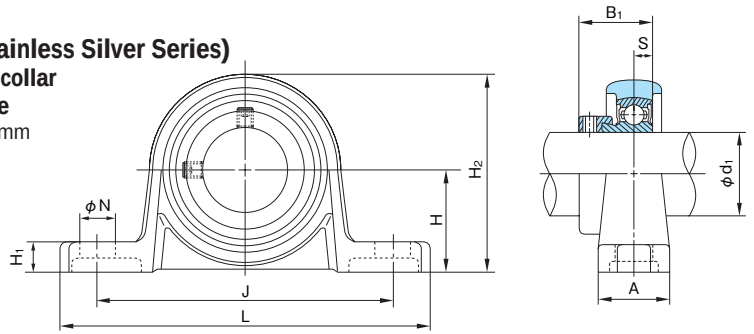
UP type

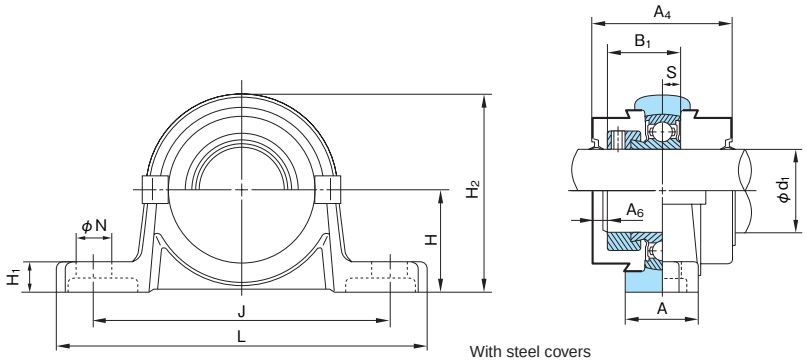
MUP type (Stainless Silver Series)

With eccentric collar

Cylindrical bore

Shaft dia.: 8～30mm





With steel covers

UP type

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)											Bolt size	Bearings			Housing No.	Unit No. with covers	Cover No. (Reference)		Mass of Unit (kg)	
		H	L	A	J	N	H_1	H_2	B_1	S	A_4	A_6		No.	Basic load rating (N)			Covers with rubber seal (End cover on one side)	Cover with rubber seal	Side end cover	standard	with steel cover
															Cr	Cor						
10	**UP000**	18	67	16	53	7	6	35	17.5	4	33	2	M 6	U000+ER	4600	2000	P000	**UP000C(E)**	000CP10	000CPE	77	85
12	**UP001**	19	71	16	56	7	6	38	17.5	4	33	2	M 6	U001+ER	5100	2400	P001	**UP001C(E)**	001CP12	001CPE	91	100
15	**UP002**	22	80	16	63	7	7	43	18.5	4.5	34	2	M 6	U002+ER	5600	2800	P002	**UP002C(E)**	002CP15	002CPE	125	135
17	**UP003**	24	85	18	67	7	7	47	20.5	5	38	2	M 6	U003+ER	6000	3300	P003	**UP003C(E)**	003CP17	003CPE	156	170
20	**UP004**	28	100	20	80	10	9	55	24.5	6	46	3	M 8	U004+ER	9350	5100	P04-5	**UP004C(E)**	04-5CP20	04-5CPE	230	250
25	**UP005**	32	112	20	90	10	10	62	25.5	6	47	3	M 8	U005+ER	10100	5800	P05-6	**UP005C(E)**	05-6CP25	05-6CPE	294	315
30	**UP006**	36	132	26	106	13	11	70	26.5	6.5	50	4	M10	U006+ER	13200	8300	P06-7	**UP006C(E)**	06-7CP30	06-7CPE	454	480
8	***UP 08***	*15*	*55*	*13*	*42*	*4.8*	*5*	*29*	*15*	*3.5*	—	—	*M 4*	*U08+ER*(1)	*3300*	*1260*	*P08*	—	—	—	*47*	—

Note: (1) Set screw type U08X is also available and the width of inner ring is 12mm.
Remarks: 1. Please contact NACHI for unit numbers appearing in italic.

Remarks: 2. Examples of unit numbers with covers: Covers with rubber seal on both sides :UP005C
An end cover and a cover with rubber seal :UP005E

MUP type (Stainless Silver Series)

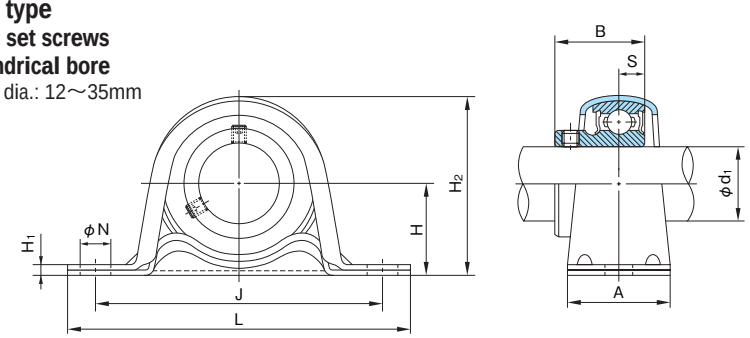
1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)											Bolt size	Bearings			Housing No.	Unit No. with covers	Cover No. (Reference)		Mass of Unit (kg)	
		H	L	A	J	N	H_1	H_2	B_1	S	A_4	A_6		No.	Basic load rating (N)			Covers with rubber seal (End cover on one side)	Cover with rubber seal	Side end cover	standard	with steel cover
															Cr	Cor						
10	**MUP000**	18	67	16	53	7	6	35	17.5	4	33	2	M 6	MU000+ER	3900	1550	P000Z3	**MUP000C(E)**	000CP10	000CPE	77	85
12	**MUP001**	19	71	16	56	7	6	38	17.5	4	33	2	M 6	MU001+ER	4300	1900	P001Z3	**MUP001C(E)**	001CP12	001CPE	91	100
15	**MUP002**	22	80	16	63	7	7	43	18.5	4.5	34	2	M 6	MU002+ER	4750	2250	P002Z3	**MUP002C(E)**	002CP15	002CPE	125	135
17	**MUP003**	24	85	18	67	7	7	47	20.5	5	38	2	M 6	MU003+ER	5100	2650	P003Z3	**MUP003C(E)**	003CP17	003CPE	156	170
20	**MUP004**	28	100	20	80	10	9	55	24.5	6	46	3	M 8	MU004+ER	7900	4000	P04-5Z3	**MUP004C(E)**	04-5CP20	04-5CPE	230	250
25	**MUP005**	32	112	20	90	10	10	62	25.5	6	47	3	M 8	MU005+ER	8600	4650	P05-6Z3	**MUP005C(E)**	05-6CP25	05-6CPE	294	315
30	**MUP006**	36	132	26	106	13	11	70	26.5	6.5	50	4	M10	MU006+ER	11300	6600	P06-7Z3	**MUP006C(E)**	06-7CP30	06-7CPE	454	480

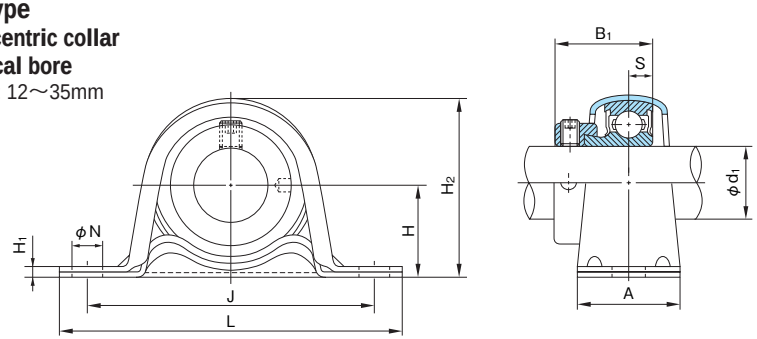
Remark : Examples of unit numbers with covers: Covers with rubber seal on both sides :MUP005C
An end cover and a cover with rubber seal :MUP005E

Pressed Steel Pillow Block Units

BPP type
With set screws
Cylindrical bore
Shaft dia.: 12～35mm



KHPP type
With eccentric collar
Cylindrical bore
Shaft dia.: 12～35mm



BPP type

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)									Bolt size		Bearings			Housing No.	Mass of Unit (kg)	Limiting load (N)	
		H	L	A	J	N	H_1	H_2	B	S			No.	Basic load rating (N) Cr	Basic load rating (N) Cor			Radial	Axial
12	BPP1	22.2	86	25	68	9.5	3.2	44	22	6	M 8		B1	9550	4800	PP3	0.16	2150	830
15	BPP2	22.2	86	25	68	9.5	3.2	44	22	6	M 8		B2	9550	4800	PP3	0.15	2150	830
17	BPP3	22.2	86	25	68	9.5	3.2	44	22	6	M 8		B3	9550	4800	PP3	0.13	2150	830
20	BPP4	25.4	98	32	76	9.5	3.2	50	24.7	7	M 8		B4	12800	6600	PP4	0.21	2650	1030
25	BPP5	28.6	108	32	86	11.5	4	56	27	7.5	M10		B5	14000	7900	PP5	0.29	3700	1470
30	BPP6	33.3	117	38	95	11.5	4	66	30.3	8	M10		B6	19600	11300	PP6	0.42	4400	1670
35	BPP7	39.7	129	42	106	11.5	4.6	78	32.9	8.5	M10		B7	25900	15400	PP7	0.61	4900	1860

KHPP type

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)									Bolt size		Bearings			Housing No.	Mass of Unit (kg)	Limiting load (N)	
		H	L	A	J	N	H_1	H_2	B_1	S			No.	Basic load rating (N) Cr	Basic load rating (N) Cor			Radial	Axial
12	KHPP201A	22.2	86	25	68	9.5	3.2	44	28.6	6.5	M 8		KH201AE	9550	4800	PP3	0.18	2150	830
15	KHPP202A	22.2	86	25	68	9.5	3.2	44	28.6	6.5	M 8		KH202AE	9550	4800	PP3	0.17	2150	830
17	KHPP203A	22.2	86	25	68	9.5	3.2	44	28.6	6.5	M 8		KH203AE	9550	4800	PP3	0.16	2150	830
20	KHPP204A	25.4	98	32	76	9.5	3.2	50	31	7.5	M 8		KH204AE	12800	6600	PP4	0.25	2650	1030
25	KHPP205A	28.6	108	32	86	11.5	4	56	31	7.5	M10		KH205AE	14000	7900	PP5	0.33	3700	1470
30	KHPP206A	33.3	117	38	95	11.5	4	66	35.7	9	M10		KH206AE	19600	11300	PP6	0.48	4400	1670
35	KHPP207A	39.7	129	42	106	11.5	4.6	78	38.9	9.5	M10		KH207AE	25900	15400	PP7	0.72	4900	1860

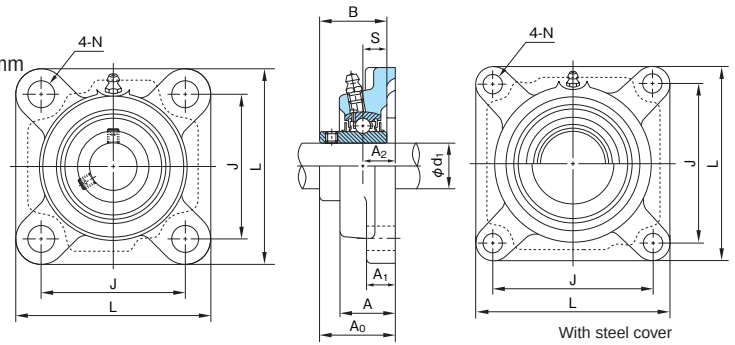
Square Flange Units

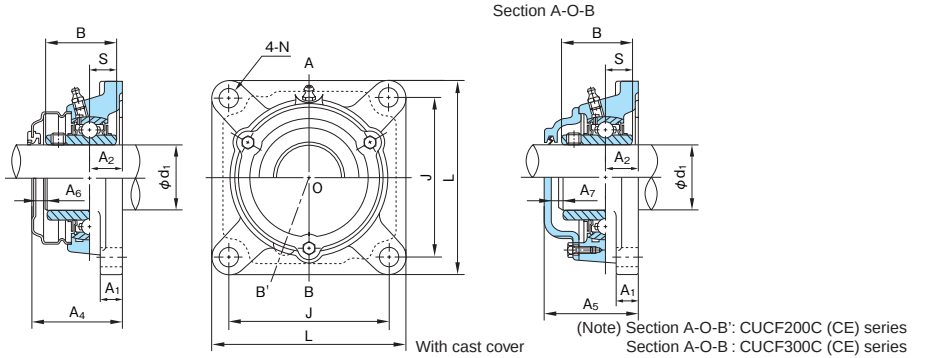
UCF type

With set screws

Cylindrical bore

Shaft dia.: 12～60mm





(Note) Section A-O-B': CUCF200C (CE) series
Section A-O-B : CUCF300C (CE) series

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)													Bolt size	Bearings			Housing No.	Unit No. with steel cover	Unit No. with cast cover	Mass of Unit (kg)		
		L	A	J	N	A_1	A_2	A_0	B	S	A_4	A_5	A_6	A_7		No.	Basic load rating (N) Cr	Cor		Cover with rubber seal (End cover)	Cover with rubber seal (End cover)	standard	with steel cover	with cast cover
12	UCF201	86	25.5	64	12	12	15	33.3	31	12.7	43	46	8	6	M10	UC201	12800	6600	F204	UCF201C(E)	CUCF201C(CE)	0.64	0.67	1.0
15	UCF202	86	25.5	64	12	12	15	33.3	31	12.7	43	46	8	6	M10	UC202	12800	6600	F204	UCF202C(E)	CUCF202C(CE)	0.62	0.65	1.0
17	UCF203	86	25.5	64	12	12	15	33.3	31	12.7	43	46	8	6	M10	UC203	12800	6600	F204	UCF203C(E)	CUCF203C(CE)	0.61	0.64	1.0
20	UCF204	86	25.5	64	12	12	15	33.3	31	12.7	43	46	8	6	M10	UC204	12800	6600	F204	UCF204C(E)	CUCF204C(CE)	0.59	0.62	1.0
	UCF205	95	27	70	12	14	16	35.7	34	14.3	48	51	11	9	M10	UC205	14000	7900	F205	UCF205C(E)	CUCF205C(CE)	0.82	0.86	1.2
25	UCFX05	108	30	83	12	13	18	40.2	38.1	15.9	51	—	9	—	M10	UCX05	19600	11300	FX05	UCFX05C(E)	—	1.1	1.2	—
	UCF305	110	29	80	16	13	16	39	38	15	—	55	—	10	M14	UC305	21300	10900	F305	—	CUCF305C(CE)	1.2	—	1.6
	UCF206	108	31	83	12	14	18	40.2	38.1	15.9	51	55	9	8	M10	UC206	19600	11300	F206	UCF206C(E)	CUCF206C(CE)	1.1	1.2	1.6
30	UCFX06	117	34	92	16	14	19	44.4	42.9	17.5	54	—	8	—	M14	UCX06	25900	15400	FX06	UCFX06C(E)	—	1.3	1.3	—
	UCF306	125	32	95	16	15	18	44	43	17	—	60	—	10	M14	UC306	26800	15000	F306	—	CUCF306C(CE)	1.7	—	2.1
	UCF207	117	34	92	14	16	19	44.4	42.9	17.5	54	59	8	8	M12	UC207	25900	15400	F207	UCF207C(E)	CUCF207C(CE)	1.5	1.6	2.1
35	UCFX07	130	38	102	16	14	21	51.2	49.2	19	63	—	10	—	M14	UCX07	29300	17900	FX07	UCFX07C(E)	—	1.8	1.8	—
	UCF307	135	36	100	19	16	20	49	48	19	—	65	—	10	M16	UC307	33500	19200	F307	—	CUCF307C(CE)	2.1	—	2.6
	UCF208	130	36	102	16	16	21	51.2	49.2	19	62	66	10	8	M14	UC208	29300	17900	F208	UCF208C(E)	CUCF208C(CE)	2.0	2.1	2.7
40	UCFX08	137	40	105	19	14	22	52.2	49.2	19	63	—	10	—	M16	UCX08	33000	20500	FX08	UCFX08C(E)	—	1.8	1.8	—
	UCF308	150	40	112	19	17	23	56	52	19	—	73	—	11	M16	UC308	40500	23900	F308	—	CUCF308C(CE)	2.9	—	3.4
	UCF209	137	38	105	16	18	22	52.2	49.2	19	63	67	10	8	M14	UC209	33000	20500	F209	UCF209C(E)	CUCF209C(CE)	2.4	2.5	3.1
45	UCFX09	143	40	111	19	14	23	55.6	51.6	19	67	—	9	—	M16	UCX09	35500	23200	FX09	UCFX09C(E)	—	2.4	2.5	—
	UCF309	160	44	125	19	18	25	60	57	22	—	78	—	12	M16	UC309	51500	29500	F309	—	CUCF309C(CE)	3.6	—	4.3
	UCF210	143	40	111	16	18	22	54.6	51.6	19	66	71	9	10	M14	UC210	35500	23200	F210	UCF210C(E)	CUCF210C(CE)	2.5	2.6	3.6
50	UCFX10	162	44	130	19	20	26	59.4	55.6	22.2	70	—	9	—	M16	UCX10	43000	29400	FX10	UCFX10C(E)	—	3.6	3.7	—
	UCF310	175	48	132	23	19	28	67	61	22	—	85	—	12	M20	UC310	61500	38200	F310	—	CUCF310C(CE)	4.7	—	5.5
	UCF211	162	43	130	19	20	25	58.4	55.6	22.2	69	75	9	10	M16	UC211	43000	29400	F211	UCF211C(E)	CUCF211C(CE)	3.4	3.6	4.6
55	UCFX11	175	49	143	19	20	29	68.7	65.1	25.4	79	—	9	—	M16	UCX11	52500	36100	FX11	UCFX11C(E)	—	4.5	4.6	—
	UCF311	185	52	140	23	20	30	71	66	25	—	90	—	13	M20	UC311	71500	44800	F311	—	CUCF311C(CE)	5.7	—	6.7
	UCF212	175	48	143	19	20	29	68.7	65.1	25.4	80	86	10	11	M16	UC212	52500	36100	F212	UCF212C(E)	CUCF212C(CE)	4.6	4.8	5.9
60	UCFX12	187	59	149	19	21	34	73.7	65.1	25.4	86	—	11	—	M16	UCX12	57500	40000	FX12	UCFX12C(E)	—	5.3	5.5	—
	UCF312	195	56	150	23	22	33	78	71	26	—	98	—	14	M20	UC312	81500	52000	F312	—	CUCF312C(CE)	6.8	—	7.7

Remarks: 1. Grease nipple :1/4-28UNF

Remarks: 2. Examples of unit numbers with cover:

With steel cover { Cover with rubber seal :UCF210C
End cover :UCF210E

With cast cover { Cover with rubber seal :CUCF210C
End cover :CUCF210CE

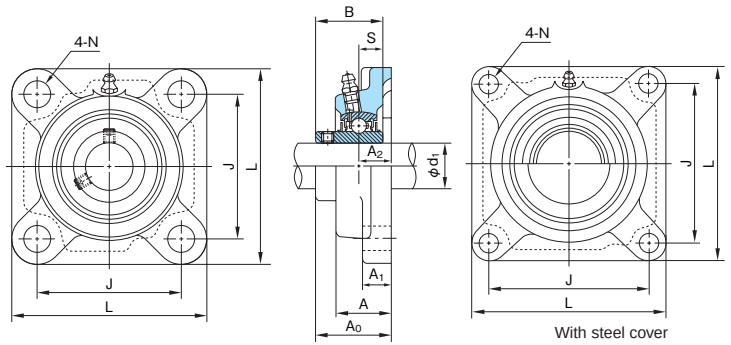
Square Flange Units

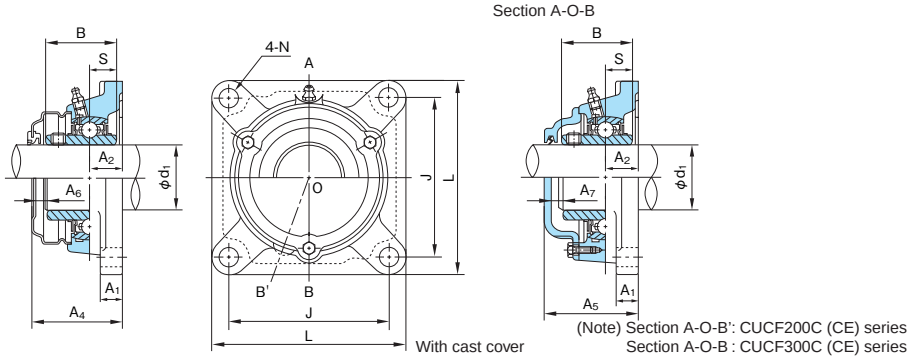
UCF type

With set screws

Cylindrical bore

Shaft dia.:
65～140mm





(Note) Section A-O-B': CUCF200C (CE) series
Section A-O-B : CUCF300C (CE) series

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)													Bolt size	Bearings			Housing No.	Unit No. with steel cover	Unit No. with cast cover	Mass of Unit (kg)		
		L	A	J	N	A_1	A_2	A_0	B	S	A_4	A_5	A_6	A_7		No.	Basic load rating (N) Cr	Cor		Cover with rubber seal (End cover)	Cover with rubber seal (End cover)	standard	With steel cover	With cast cover
65	**UCF213**	187	50	149	19	20	30	69.7	65.1	25.4	81	89	10	13	M16	UC213	57500	40000	F213	**UCF213C(E)**	**CUCF213C(CE)**	5.5	5.8	7.1
	UCFX13	187	59	149	19	21	34	78.4	74.6	30.2	—	—	—	—	M16	UCX13	62000	44000	FX13	—	—	5.5	—	—
	UCF313	208	58	166	23	22	33	78	75	30	—	103	—	17	M20	UC313	92500	59700	F313	—	**CUCF313C(CE)**	7.8	—	11.5
70	**UCF214**	193	54	152	19	24	31	75.4	74.6	30.2	—	98	—	16	M16	UC214	62000	44000	F214	—	**CUCF214C(CE)**	6.1	—	7.8
	UCFX14	197	60	152	23	24	37	81.5	77.8	33.3	—	—	—	—	M20	UCX14	66000	48200	FX14	—	—	7.7	—	—
	UCF314	226	61	178	25	25	36	81	78	33	—	106	—	17	M22	UC314	104000	68000	F314	—	**CUCF314C(CE)**	9.6	—	12.1
75	**UCF215**	200	56	159	19	24	34	78.5	77.8	33.3	—	102	—	17	M16	UC215	66000	48200	F215	—	**CUCF215C(CE)**	6.9	—	8.6
	UCFX15	197	68	152	23	24	40	89.3	82.6	33.3	—	—	—	—	M20	UCX15	72500	53000	FX15	—	—	7.7	—	—
	UCF315	236	66	184	25	25	39	89	82	32	—	114	—	17	M22	UC315	114000	76900	F315	—	**CUCF315C(CE)**	11.7	—	13.6
80	**UCF216**	208	58	165	23	24	34	83.3	82.6	33.3	—	107	—	15	M20	UC216	72500	53000	F216	—	**CUCF216C(CE)**	7.8	—	10.0
	UCFX16	214	70	171	23	24	40	91.6	85.7	34.1	—	—	—	—	M20	UCX16	83500	61800	FX16	—	—	10.2	—	—
	UCF316	250	68	196	31	27	38	90	86	34	—	115	—	17	M27	UC316	123000	86400	F316	—	**CUCF316C(CE)**	13.7	—	15.9
85	**UCF217**	220	63	175	23	26	36	87.6	85.7	34.1	—	111	—	15	M20	UC217	83500	61800	F217	—	**CUCF217C(CE)**	9.3	—	11.8
	UCFX17	214	70	171	23	24	40	96.3	96	39.7	—	—	—	—	M20	UCX17	95500	71400	FX17	—	—	10.2	—	—
	UCF317	260	74	204	31	27	44	100	96	40	—	126	—	18	M27	UC317	132000	96500	F317	—	**CUCF317C(CE)**	15.2	—	18.4
90	**UCF218**	235	68	187	23	26	40	96.3	96	39.7	—	122	—	17	M20	UC218	95500	71400	F218	—	**CUCF218C(CE)**	11.3	—	14.9
	UCFX18	214	76	171	23	24	45	106.1	104	42.9	—	—	—	—	M20	UCX18	109000	81600	FX18	—	—	10.6	—	—
	UCF318	280	76	216	35	30	44	100	96	40	—	128	—	20	M30	UC318	143000	107200	F318	—	**CUCF318C(CE)**	18.8	—	21.5
95	**UCF319**	290	94	228	35	30	59	121	103	41	—	149	—	20	M30	UC319	153000	118400	F319	—	**CUCF319C(CE)**	20.7	—	24.2
100	**UCFX20**	268	97	211	31	31	59	127.3	117.5	49.2	—	—	—	—	M27	UCX20	134000	104700	FX20	—	—	16.8	—	—
	UCF320	310	94	242	38	32	59	125	108	42	—	154	—	21	M33	UC320	173000	140400	F320	—	**CUCF320C(CE)**	24.8	—	29.6
105	**UCF321**	310	94	242	38	32	59	127	112	44	—	156	—	21	M33	UC321	183000	153100	F321	—	**CUCF321C(CE)**	25.6	—	32.2
110	**UCF322**	340	96	266	41	35	60	131	117	46	—	165	—	26	M36	UC322	205000	178800	F322	—	**CUCF322C(CE)**	34.7	—	38.7
120	**UCF324**	370	110	290	41	40	65	140	126	51	—	175	—	25	M36	UC324	207000	184800	F324	—	**CUCF324C(CE)**	47.2	—	52.3
130	**UCF326**	410	115	320	41	45	65	146	135	54	—	180	—	24	M36	UC326	229000	214300	F326	—	**CUCF326C(CE)**	62.7	—	67.3
140	**UCF328**	450	125	350	41	55	75	161	145	59	—	195	—	24	M36	UC328	255000	246000	F328	—	**CUCF328C(CE)**	87.0	—	89.4

Remarks: 1. Grease nipple : 1/4-28UNF for bore number 13 and under
PF1/8 for bore number 14 and over

Remarks: 2. Examples of unit numbers with cover:
With steel cover { Cover with rubber seal :UCF213C
End cover :UCF213E
With cast cover { Cover with rubber seal :CUCF213C
End cover :CUCF213CE

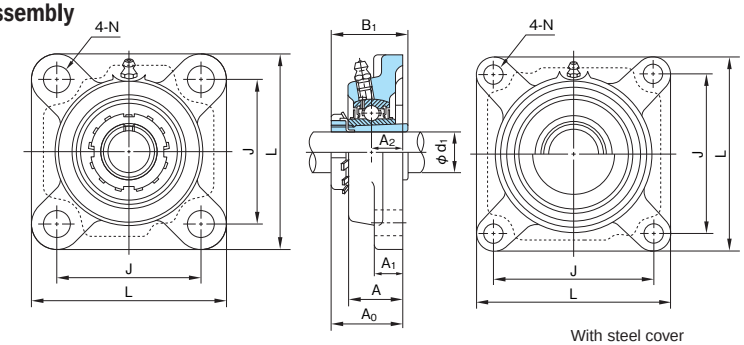
■ Square Flange Units

UKF+H type

With adapter assembly

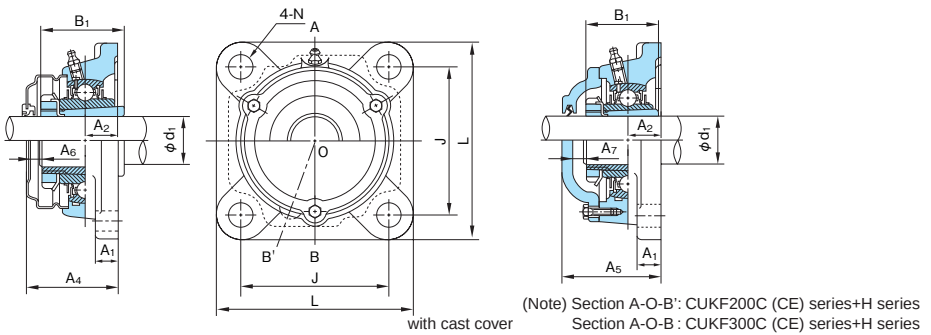
Tapered bore

Shaft dia.:
20～60mm



With steel cover

Section A-O-B



with cast cover

(Note) Section A-O-B': CUKF200C (CE) series+H series
Section A-O-B : CUKF300C (CE) series+H series

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)												Bolt size	Bearings			Housing No.	Unit No. with steel cover	Unit No. with cast cover	Mass of Unit (kg)		
		L	A	J	N	A_1	A_2	A_0	B_1	A_4	A_5	A_6	A_7		No.	Basic load rating (N) Cr	Basic load rating (N) Cor		Cover with rubber seal (End cover)	Cover with rubber seal (End cover)	standard	With steel cover	with cast cover
20	**UKF205+H2305**	95	27	70	12	14	16	35.5	35	48	51	11	9	M10	UK205+H2305	14000	7900	F205	**UKF205C(E)+H2305**	**CUKF205C(CE)+H2305**	0.87	0.91	1.3
	UKFX05+H2305	108	30	83	12	13	18	39	35	51	—	10	—	M10	UKX05+H2305	19600	11300	FX05	**UKFX05C(E)+H2305**	—	1.1	1.2	—
	UKF305+H2305	110	29	80	16	13	16	37	35	—	55	—	12	M14	UK305+H2305	21300	10900	F305	—	**CUKF305C(CE)+H2305**	1.2	—	1.7
25	**UKF206+H2306**	108	31	83	12	14	18	39	38	51	55	10	10	M10	UK206+H2306	19600	11300	F206	**UKF206C(E)+H2306**	**CUKF206C(CE)+H2306**	1.2	1.3	1.7
	UKFX06+H2306	117	34	92	16	14	19	40.5	38	54	—	12	—	M14	UKX06+H2306	25900	15400	FX06	**UKFX06C(E)+H2306**	—	1.4	1.4	—
	UKF306+H2306	125	32	95	16	15	18	40.5	38	—	60	—	13	M14	UK306+H2306	26800	15000	F306	—	**CUKF306C(CE)+H2306**	1.7	—	2.2
30	**UKF207+H2307**	117	34	92	14	16	19	41.5	43	54	59	11	11	M12	UK207+H2307	25900	15400	F207	**UKF207C(E)+H2307**	**CUKF207C(CE)+H2307**	1.5	1.7	2.2
	UKFX07+H2307	130	38	102	16	14	21	44.5	43	63	—	17	—	M14	UKX07+H2307	29300	17900	FX07	**UKFX07C(E)+H2307**	—	1.8	1.8	—
	UKF307+H2307	135	36	100	19	16	20	44.5	43	—	65	—	14	M16	UK307+H2307	33500	19200	F307	—	**CUKF307C(CE)+H2307**	2.1	—	2.7
35	**UKF208+H2308**	130	36	102	16	16	21	45.5	46	62	66	15	14	M14	UK208+H2308	29300	17900	F208	**UKF208C(E)+H2308**	**CUKF208C(CE)+H2308**	2.1	2.2	2.8
	UKFX08+H2308	137	40	105	19	14	22	47	46	63	—	15	—	M16	UKX08+H2308	33000	20500	FX08	**UKFX08C(E)+H2308**	—	1.8	1.8	—
	UKF308+H2308	150	40	112	19	17	23	50	46	—	73	—	17	M16	UK308+H2308	40500	23900	F308	—	**CUKF308C(CE)+H2308**	3.0	—	3.5
40	**UKF209+H2309**	137	38	105	16	18	22	48	50	63	67	14	13	M14	UK209+H2309	33000	20500	F209	**UKF209C(E)+H2309**	**CUKF209C(CE)+H2309**	2.5	2.6	3.2
	UKFX09+H2309	143	40	111	19	14	23	49.5	50	67	—	16	—	M16	UKX09+H2309	35500	23200	FX09	**UKFX09C(E)+H2309**	—	2.4	2.5	—
	UKF309+H2309	160	44	125	19	18	25	54.5	50	—	78	—	17	M16	UK309+H2309	51500	29500	F309	—	**CUKF309C(CE)+H2309**	3.6	—	4.4
45	**UKF210+H2310**	143	40	111	16	18	22	49.5	55	66	71	15	15	M14	UK210+H2310	35500	23200	F210	**UKF210C(E)+H2310**	**CUKF210C(CE)+H2310**	2.7	2.8	3.8
	UKFX10+H2310	162	44	130	19	20	26	54.5	55	70	—	14	—	M16	UKX10+H2310	43000	29400	FX10	**UKFX10C(E)+H2310**	—	3.6	3.7	—
	UKF310+H2310	175	48	132	23	19	28	60	55	—	85	—	19	M20	UK310+H2310	61500	38200	F310	—	**CUKF310C(CE)+H2310**	4.8	—	5.8
50	**UKF211+H2311**	162	43	130	19	20	25	53.5	59	69	75	14	15	M16	UK211+H2311	43000	29400	F211	**UKF211C(E)+H2311**	**CUKF211C(CE)+H2311**	3.6	3.8	4.8
	UKFX11+H2311	175	49	143	19	20	29	59	59	79	—	19	—	M16	UKX11+H2311	52500	36100	FX11	**UKFX11C(E)+H2311**	—	4.3	4.4	—
	UKF311+H2311	185	52	140	23	20	30	63.5	59	—	90	—	20	M20	UK311+H2311	71500	44800	F311	—	**CUKF311C(CE)+H2311**	5.7	—	6.8
55	**UKF212+H2312**	175	48	143	19	20	29	60	62	80	86	19	20	M16	UK212+H2312	52500	36100	F212	**UKF212C(E)+H2312**	**CUKF212C(CE)+H2312**	4.6	4.9	6.0
	UKFX12+H2312	187	59	149	19	21	34	66	62	86	—	19	—	M16	UKX12+H2312	57500	40000	FX12	**UKFX12C(E)+H2312**	—	5.3	5.4	—
	UKF312+H2312	195	56	150	23	22	33	69	62	—	98	—	23	M20	UK312+H2312	81500	52000	F312	—	**CUKF312C(CE)+H2312**	6.7	—	7.8
60	**UKF213+H2313**	187	50	149	19	20	30	63	65	81	89	17	20	M16	UK213+H2313	57500	40000	F213	**UKF213C(E)+H2313**	**CUKF213C(CE)+H2313**	5.7	6.0	7.2
	UKFX13+H2313	187	59	149	19	21	34	68	65	—	—	—	—	M16	UKX13+H2313	62000	44000	FX13	—	—	5.2	—	—
	UKF313+H2313	208	58	166	23	22	33	71	65	—	103	—	24	M20	UK313+H2313	92500	59700	F313	—	**CUKF313C(CE)+H2313**	7.7	—	11.5

Remarks: 1. Grease nipple: 1/4-28UNF

Remarks: 2. Examples of unit numbers with cover:

With steel cover { Cover with rubber seal :UKF210C+H2310
End cover :UKF210E+H2310

with cast cover { Cover with rubber seal :CUKF210C+H2310
End cover :CUKF210CE+H2310

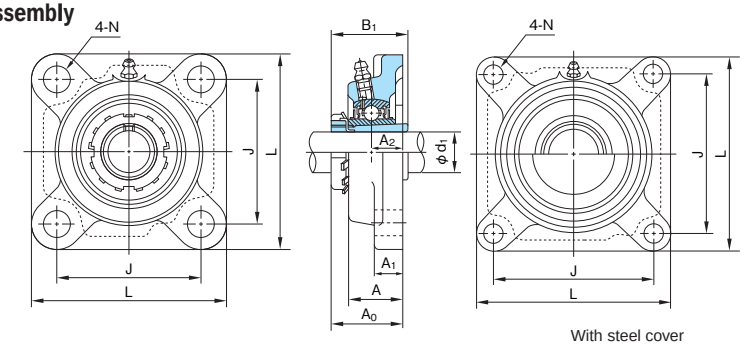
Square Flange Units

UKF+H type

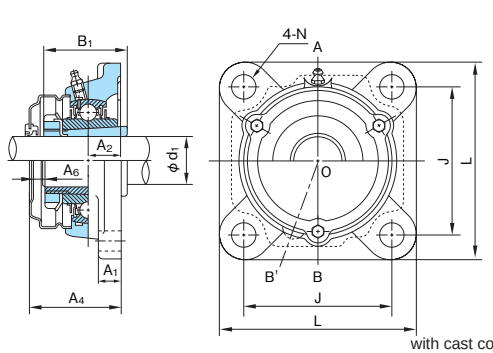
With adapter assembly

Tapered bore

Shaft dia.:
65～125mm

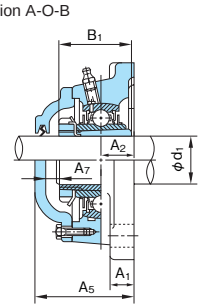


With steel cover



with cast cover

Section A-O-B



(Note) Section A-O-B': CUKF200C (CE) series+H series
Section A-O-B : CUKF300C (CE) series+H series

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)												Bolt size	Bearings			Housing No.	Unit No. with steel cover	Unit No. with cast cover	Mass of Unit (kg)		
		L	A	J	N	A_1	A_2	A_0	B_1	A_4	A_5	A_6	A_7		No.	Basic load rating (N) Cr	Basic load rating (N) Cor		Cover with rubber seal (End cover)	Cover with rubber seal (End cover)	standard	With steel cover	with cast cover
65	**UKF215+H2315**	200	56	159	19	24	34	69.5	73	—	102	—	26	M16	UK215+H2315	66000	48200	F215	—	**CUKF215C(CE)+H2315**	7.3	—	9.0
	UKFX15+H2315	197	68	152	23	24	40	77	73	—	—	—	—	M20	UKX15+H2315	72500	53000	FX15	—	—	7.7	—	—
	UKF315+H2315	236	66	184	25	25	39	81	73	—	114	—	25	M22	UK315+H2315	114000	76900	F315	—	**CUKF315C(CE)+H2315**	11.8	—	14.0
70	**UKF216+H2316**	208	58	165	23	24	34	73	78	—	107	—	26	M20	UK216+H2316	72500	53000	F216	—	**CUKF216C(CE)+H2316**	8.2	—	10.4
	UKFX16+H2316	214	70	171	23	24	40	80	78	—	—	—	—	M20	UKX16+H2316	83500	61800	FX16	—	—	10.2	—	—
	UKF316+H2316	250	68	196	31	27	38	83.5	78	—	115	—	23	M27	UK316+H2316	123000	86400	F316	—	**CUKF316C(CE)+H2316**	13.9	—	16.3
75	**UKF217+H2317**	220	63	175	23	26	36	77	82	—	111	—	26	M20	UK217+H2317	83500	61800	F217	—	**CUKF217C(CE)+H2317**	9.8	—	12.4
	UKFX17+H2317	214	70	171	23	24	40	82.5	82	—	—	—	—	M20	UKX17+H2317	95500	71400	FX17	—	—	10.1	—	—
	UKF317+H2317	260	74	204	31	27	44	92	82	—	126	—	26	M27	UK317+H2317	132000	96500	F317	—	**CUKF317C(CE)+H2317**	15.1	—	18.6
80	**UKF218+H2318**	235	68	187	23	26	40	82.5	86	—	122	—	31	M20	UK218+H2318	95500	71400	F218	—	**CUKF218C(CE)+H2318**	11.7	—	15.3
	UKFX18+H2318	214	76	171	23	24	45	89	86	—	—	—	—	M20	UKX18+H2318	109000	81600	FX18	—	—	10.2	—	—
	UKF318+H2318	280	76	216	35	30	44	93.5	86	—	128	—	26	M30	UK318+H2318	143000	107200	F318	—	**CUKF318C(CE)+H2318**	19.0	—	22.5
85	**UKF319+H2319**	290	94	228	35	30	59	111	90	—	149	—	30	M30	UK319+H2319	153000	118400	F319	—	**CUKF319C(CE)+H2319**	20.8	—	24.4
90	**UKFX20+H2320**	268	97	211	31	31	59	108	97	—	—	—	—	M27	UKX20+H2320	134000	104700	FX20	—	—	15.9	—	—
	UKF320+H2320	310	94	242	38	32	59	115	97	—	154	—	31	M33	UK320+H2320	173000	140400	F320	—	**CUKF320C(CE)+H2320**	24.8	—	30.2
100	**UKF322+H2322**	340	96	266	41	35	60	121	105	—	165	—	36	M36	UK322+H2322	205000	178800	F322	—	**CUKF322C(CE)+H2322**	34.8	—	39.4
110	**UKF324+H2324**	370	110	290	41	40	65	130	112	—	175	—	35	M36	UK324+H2324	207000	184800	F324	—	**CUKF324C(CE)+H2324**	46.7	—	52.5
115	**UKF326+H2326**	410	115	320	41	45	65	134	121	—	180	—	36	M36	UK326+H2326	229000	214300	F326	—	**CUKF326C(CE)+H2326**	63.0	—	68.8
125	**UKF328+H2328**	450	125	350	41	55	75	148	131	—	195	—	37	M36	UK328+H2328	255000	246000	F328	—	**CUKF328C(CE)+H2328**	87.3	—	90.9

Remarks: 1. Grease nipple : PF1/8

Remarks: 2. Examples of unit numbers with cover:
With cast cover { Cover with rubber seal :CUKF215C+H2315
End cover :CUKF215CE+H2315

NACHI

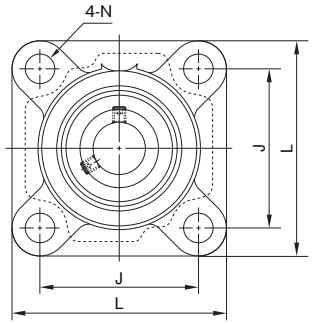
Square Flange Units

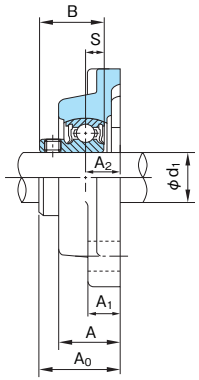
BF type

With set screws

Cylindrical bore

Shaft dia.: 20～35mm





1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)									Bolt size		Bearings			Housing No.	Mass of Unit (kg)
		L	A	J	N	A_1	A_2	A_0	B	S			No.	Basic load rating (N)			
														Cr	Cor		
20	**BF204**	86	25.5	64	12	12	15	32.7	24.7	7	M10		B4	12800	6600	F204 G00	0.55
25	**BF205**	95	27	70	12	14	16	36.2	27	7.5	M10		B5	14000	7900	F205 G00	0.79
30	**BF206**	108	31	83	12	14	18	40.3	30.3	8	M10		B6	19600	11300	F206 G00	1.1
35	**BF207**	117	34	92	14	16	19	43.4	32.9	8.5	M12		B7	25900	15400	F207 G00	1.5

NACHI

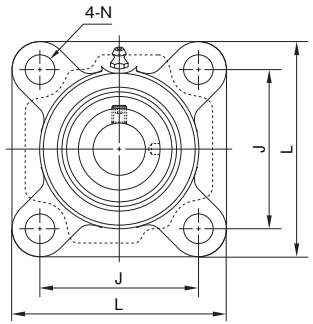
Square Flange Units

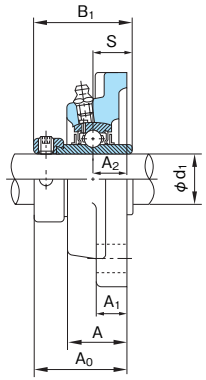
UGF type

With eccentric collar

Cylindrical bore

Shaft dia.: 20～60mm





1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)									Bolt size		Bearings			Housing No.	Mass of Unit (kg)
		L	A	J	N	A_1	A_2	A_0	B_1	S			No.	Basic load rating (N)			
														Cr	Cor		
20	**UGF204**	86	25.5	64	12	12	15	41.6	43.7	17.1	M10		UG204+ER	12800	6600	F204	0.63
25	**UGF205**	95	27	70	12	14	16	42.9	44.4	17.5	M10		UG205+ER	14000	7900	F205	0.76
30	**UGF206**	108	31	83	12	14	18	48.1	48.4	18.3	M10		UG206+ER	19600	11300	F206	1.1
35	**UGF207**	117	34	92	14	16	19	51.3	51.1	18.8	M12		UG207+ER	25900	15400	F207	1.5
40	**UGF208**	130	36	102	16	16	21	55.9	56.3	21.4	M14		UG208+ER	29300	17900	F208	1.9
45	**UGF209**	137	38	105	16	18	22	56.9	56.3	21.4	M14		UG209+ER	33000	20500	F209	2.9
50	**UGF210**	143	40	111	16	18	22	60.1	62.7	24.6	M14		UG210+ER	35500	23200	F210	2.5
55	**UGF211**	162	43	130	19	20	25	68.6	71.4	27.8	M16		UG211+ER	43000	29400	F211	3.6
60	**UGF212**	175	48	143	19	20	29	75.8	77.8	31	M16		UG212+ER	52500	36100	F212	4.3

Remark: Grease nipple: 1/4-28UNF

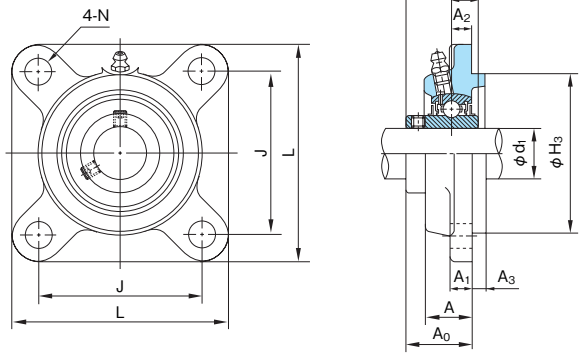
■ Square Flange Units with spigot joint

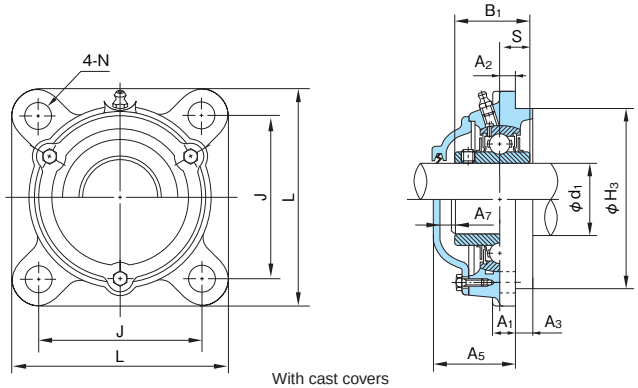
UCFS type

With set screws

Cylindrical bore

Shaft dia.: 25～140mm





With cast covers

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)													Bolt size		Bearings			Housing No.	Unit No. with cast cover	Mass of Unit (kg)	
		L	A	J	N	A_1	A_2	A_3	H_3	A_0	B	S	A_5	A_7			No.	Basic load rating (N) Cr	Basic load rating (N) Cor		Cover with rubber seal (End cover)	standard	With cast cover
25	UCFS305	110	22	80	16	13	9	7	80	32	38	15	48	10	M14		UC305	21300	10900	FS305	CUCFS305C(CE)	1.4	1.7
30	UCFS306	125	24	95	16	15	10	8	90	36	43	17	52	10	M14		UC306	26800	15000	FS306	CUCFS306C(CE)	1.9	2.3
35	UCFS307	135	27	100	19	16	11	9	100	40	48	19	56	10	M16		UC307	33500	19200	FS307	CUCFS307C(CE)	2.4	2.8
40	UCFS308	150	30	112	19	17	13	10	115	46	52	19	63	11	M16		UC308	40500	23900	FS308	CUCFS308C(CE)	3.3	3.8
45	UCFS309	160	33	125	19	18	14	11	125	49	57	22	67	12	M16		UC309	51500	29500	FS309	CUCFS309C(CE)	4.0	4.8
50	UCFS310	175	36	132	23	19	16	12	140	55	61	22	73	12	M20		UC310	61500	38200	FS310	CUCFS310C(CE)	5.3	6.1
55	UCFS311	185	39	140	23	20	17	13	150	58	66	25	77	13	M20		UC311	71500	44800	FS311	CUCFS311C(CE)	6.2	8.2
60	UCFS312	195	42	150	23	22	19	14	160	64	71	26	84	14	M20		UC312	81500	52000	FS312	CUCFS312C(CE)	7.4	8.5
65	UCFS313	208	40	166	23	22	15	18	175	60	75	30	85	17	M20		UC313	92500	59700	FS313	CUCFS313C(CE)	8.6	10.6
70	UCFS314	226	43	178	25	25	18	18	185	63	78	33	88	17	M22		UC314	104000	68000	FS314	CUCFS314C(CE)	11.2	13.0
75	UCFS315	236	48	184	25	25	21	18	200	71	82	32	96	17	M22		UC315	114000	76900	FS315	CUCFS315C(CE)	12.7	15.5
80	UCFS316	250	48	196	31	27	18	20	210	70	86	34	95	17	M27		UC316	123000	86400	FS316	CUCFS316C(CE)	14.3	17.6
85	UCFS317	260	54	204	31	27	24	20	220	80	96	40	106	18	M27		UC317	132000	96500	FS317	CUCFS317C(CE)	17.2	20.7
90	UCFS318	280	56	216	35	30	24	20	240	80	96	40	108	20	M30		UC318	143000	107200	FS318	CUCFS318C(CE)	20.4	24.9
95	UCFS319	290	74	228	35	30	39	20	250	101	103	41	129	20	M30		UC319	153000	118400	FS319	CUCFS319C(CE)	23.9	27.4
100	UCFS320	310	74	242	38	32	39	20	260	105	108	42	134	21	M33		UC320	173000	140400	FS320	CUCFS320C(CE)	27.1	33.9
105	UCFS321	310	74	242	38	32	39	20	260	107	112	44	136	21	M33		UC321	183000	153100	FS321	CUCFS321C(CE)	28.5	35.7
110	UCFS322	340	71	266	41	35	35	25	300	106	117	46	140	26	M36		UC322	205000	178800	FS322	CUCFS322C(CE)	36.8	43.6
120	UCFS324	370	80	290	41	40	35	30	330	110	126	51	145	25	M36		UC324	207000	184800	FS324	CUCFS324C(CE)	50.6	58.6
130	UCFS326	410	85	320	41	45	35	30	360	116	135	54	150	24	M36		UC326	229000	214300	FS326	CUCFS326C(CE)	67.8	75.7
140	UCFS328	450	95	350	41	55	45	30	400	131	145	59	165	24	M36		UC328	255000	246000	FS328	CUCFS328C(CE)	96.3	100

Remarks: 1. Grease nipple: 1/4-28UNF for bore number 13 and under
PF1/8 for bore number 14 and over

Remarks: 2. Examples of unit numbers with cover:
With cast cover { Cover with rubber seal :CUCFS310C
End cover :CUCFS310CE

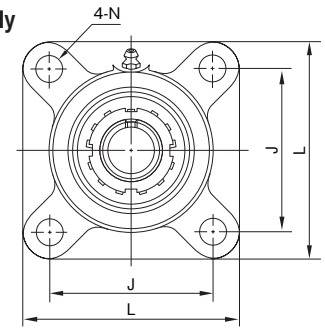
Square Flange Units with spigot joint

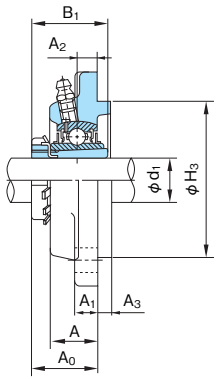
UKFS+H type

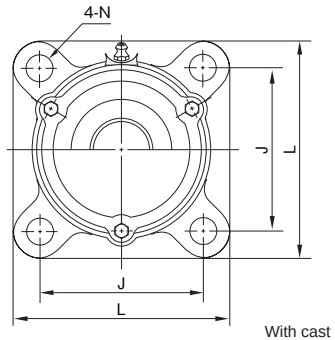
With adapter assembly

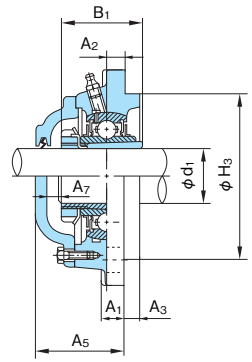
Tapered bore

Shaft dia. : 20～125mm









With cast covers

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)												Bolt size		Bearings			Housing No.	Unit No. with cast cover	Mass of Unit (kg)	
		L	A	J	N	A_1	A_2	A_3	H_3	A_0	B_1	A_5	A_7			No.	Basic load rating (N) Cr	Basic load rating (N) Cor		Cover with rubber seal (End cover)	standard	With cast cover
20	UKFS305+H2305	110	22	80	16	13	9	7	80	30	35	48	12	M14		UK305+H2305	21300	10900	FS305	CUKFS305C(CE)+H2305	1.4	1.8
25	UKFS306+H2306	125	24	95	16	15	10	8	90	32.5	38	52	13	M14		UK306+H2306	26800	15000	FS306	CUKFS306C(CE)+H2306	1.9	2.4
30	UKFS307+H2307	135	27	100	19	16	11	9	100	35.5	43	56	14	M16		UK307+H2307	33500	19200	FS307	CUKFS307C(CE)+H2307	2.4	2.9
35	UKFS308+H2308	150	30	112	19	17	13	10	115	40	46	63	17	M16		UK308+H2308	40500	23900	FS308	CUKFS308C(CE)+H2308	3.3	3.9
40	UKFS309+H2309	160	33	125	19	18	14	11	125	43.5	50	67	17	M16		UK309+H2309	51500	29500	FS309	CUKFS309C(CE)+H2309	4.0	4.9
45	UKFS310+H2310	175	36	132	23	19	16	12	140	48	55	73	19	M20		UK310+H2310	61500	38200	FS310	CUKFS310C(CE)+H2310	5.3	6.4
50	UKFS311+H2311	185	39	140	23	20	17	13	150	50.5	59	77	20	M20		UK311+H2311	71500	44800	FS311	CUKFS311C(CE)+H2311	6.2	8.3
55	UKFS312+H2312	195	42	150	23	22	19	14	160	55	62	84	23	M20		UK312+H2312	81500	52000	FS312	CUKFS312C(CE)+H2312	7.4	8.6
60	UKFS313+H2313	208	40	166	23	22	15	18	175	53	65	85	24	M20		UK313+H2313	92500	59700	FS313	CUKFS313C(CE)+H2313	8.5	10.6
65	UKFS315+H2315	236	48	184	25	25	21	18	200	63	73	96	25	M22		UK315+H2315	114000	76900	FS315	CUKFS315C(CE)+H2315	12.8	15.9
70	UKFS316+H2316	250	48	196	31	27	18	20	210	63.5	78	95	23	M27		UK316+H2316	123000	86400	FS316	CUKFS316C(CE)+H2316	14.5	18.0
75	UKFS317+H2317	260	54	204	31	27	24	20	220	72	82	106	26	M27		UK317+H2317	132000	96500	FS317	CUKFS317C(CE)+H2317	17.2	20.9
80	UKFS318+H2318	280	56	216	35	30	24	20	240	73.5	86	108	26	M30		UK318+H2318	143000	107200	FS318	CUKFS318C(CE)+H2318	20.6	25.9
85	UKFS319+H2319	290	74	228	35	30	39	20	250	91	90	129	30	M30		UK319+H2319	153000	118400	FS319	CUKFS319C(CE)+H2319	23.9	27.6
90	UKFS320+H2320	310	74	242	38	32	39	20	260	95	97	134	31	M33		UK320+H2320	173000	140400	FS320	CUKFS320C(CE)+H2320	27.1	34.5
100	UKFS322+H2322	340	71	266	41	35	35	25	300	96	105	140	36	M36		UK322+H2322	205000	178800	FS322	CUKFS322C(CE)+H2322	36.7	44.3
110	UKFS324+H2324	370	80	290	41	40	35	30	330	100	112	145	35	M36		UK324+H2324	207000	184800	FS324	CUKFS324C(CE)+H2324	50.1	58.8
115	UKFS326+H2326	410	85	320	41	45	35	30	360	104	121	150	36	M36		UK326+H2326	229000	214300	FS326	CUKFS326C(CE)+H2326	68.1	77.2
125	UKFS328+H2328	450	95	350	41	55	45	30	400	118	131	165	37	M36		UK238+H2328	255000	246000	FS328	CUKFS328C(CE)+H2328	96.6	102.0

Remarks: 1. Grease nipple: 1/4-28UNF for bore number 13 and under
PF1/8 for bore number 14 and over

Remarks: 2. Examples of unit numbers with cover:
With cast cover { Cover with rubber seal :CUKFS310C+H2310
End cover :CUKFS310CE+H2310

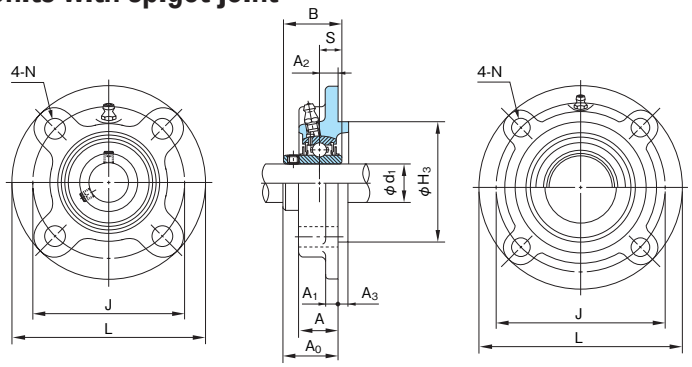
Round Flange Units with spigot joint

UCFC type

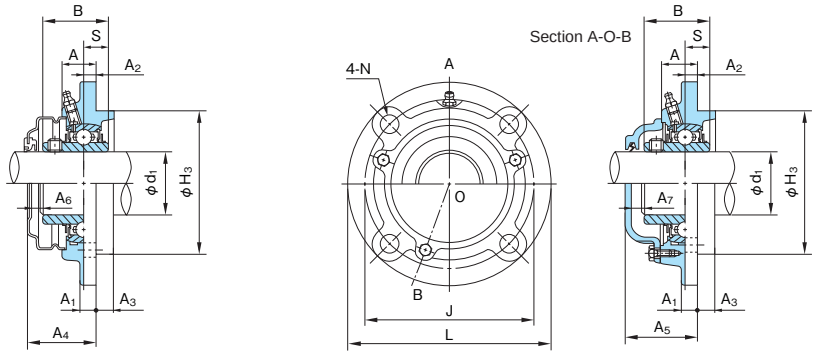
With set screws

Cylindrical bore

Shaft dia.: 12～70mm



With steel cover



With cast cover

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)															Bolt size	Bearings			Housing No.	Unit No. with steel cover	Unit No. with cast cover	Mass of Unit (kg)		
		L	A	J	N	A_1	A_2	A_3	H_3	A_0	B	S	A_4	A_5	A_6	A_7		No.	Basic load rating (N) Cr	Basic load rating (N) Cor		Cover with rubber seal (End cover)	Cover with rubber seal (End cover)	standard	With steel cover	With cast cover
12	**UCFC201**	100	20.5	78	12	7	10	5	62	28.3	31	12.7	38	41	8	6	M10	UC201	12800	6600	FC204	**UCFC201C(E)**	**CUCFC201C(CE)**	0.89	0.92	1.2
15	**UCFC202**	100	20.5	78	12	7	10	5	62	28.3	31	12.7	38	41	8	6	M10	UC202	12800	6600	FC204	**UCFC202C(E)**	**CUCFC202C(CE)**	0.87	0.90	1.2
17	**UCFC203**	100	20.5	78	12	7	10	5	62	28.3	31	12.7	38	41	8	6	M10	UC203	12800	6600	FC204	**UCFC203C(E)**	**CUCFC203C(CE)**	0.86	0.89	1.2
20	**UCFC204**	100	20.5	78	12	7	10	5	62	28.3	31	12.7	38	41	8	6	M10	UC204	12800	6600	FC204	**UCFC204C(E)**	**CUCFC204C(CE)**	0.84	0.87	1.2
25	**UCFC205**	115	21	90	12	7	10	6	70	29.7	34	14.3	42	45	11	9	M10	UC205	14000	7900	FC205	**UCFC205C(E)**	**CUCFC205C(CE)**	1.1	1.1	1.5
	UCFCX05	111	24	92	9.5	9.5	10	6	76	32.2	38.1	15.9	43	—	9	—	M 8	UCX05	19600	11300	FCX05	**UCFCX05C(E)**	—	1.1	1.1	—
30	**UCFC206**	125	23	100	12	8	10	8	80	32.2	38.1	15.9	43	47	9	8	M10	UC206	19600	11300	FC206	**UCFC206C(E)**	**CUCFC206C(CE)**	1.5	1.5	2.0
	UCFCX06	127	22.5	105	12	9.5	8	9.5	85	33.4	42.9	17.5	43	—	8	—	M10	UCX06	25900	15400	FCX06	**UCFCX06C(E)**	—	1.4	1.4	—
35	**UCFC207**	135	26	110	14	9	11	8	90	36.4	42.9	17.5	46	51	8	8	M12	UC207	25900	15400	FC207	**UCFC207C(E)**	**CUCFC207C(CE)**	1.7	1.8	2.4
	UCFCX07	133	26	111	12	11	9	11	92	39.2	49.2	19	48	—	7	—	M10	UCX07	29300	17900	FCX07	**UCFCX07C(E)**	—	1.8	1.8	—
40	**UCFC208**	145	26	120	14	9	11	10	100	41.2	49.2	19	52	56	10	8	M12	UC208	29300	17900	FC208	**UCFC208C(E)**	**CUCFC208C(CE)**	2.1	2.1	2.8
	UCFCX08	133	26	111	12	11	9	11	92	39.2	49.2	19	50	—	10	—	M10	UCX08	33000	20500	FCX08	**UCFCX08C(E)**	—	1.8	1.8	—
45	**UCFC209**	160	26	132	16	14	10	12	105	40.2	49.2	19	51	55	10	8	M14	UC209	33000	20500	FC309	**UCFC209C(E)**	**CUCFC209C(CE)**	3.0	3.1	3.7
	UCFCX09	155	25	130	14	11	8	12	108	40.6	51.6	19	52	—	10	—	M12	UCX09	35500	23200	FCX09	**UCFCX09C(E)**	—	2.5	2.6	—
50	**UCFC210**	165	28	138	16	14	10	12	110	42.6	51.6	19	54	59	9	10	M14	UC210	35500	23200	FC210	**UCFC210C(E)**	**CUCFC210C(CE)**	3.1	3.3	4.2
	UCFCX10	162	25	136	14	11	7	16	118	40.4	55.6	22.2	51	—	9	—	M12	UCX10	43000	29400	FCX10	**UCFCX10C(E)**	—	2.9	3.0	—
55	**UCFC211**	185	31	150	19	15	13	12	125	46.4	55.6	22.2	57	63	9	10	M16	UC211	43000	29400	FC211	**UCFC211C(E)**	**CUCFC211C(CE)**	3.9	4.0	5.0
	UCFCX11	180	26	152	16	13	4	22	127	43.7	65.1	25.4	54	—	9	—	M14	UCX11	52500	36100	FCX11	**UCFCX11C(E)**	—	4.0	4.2	—
60	**UCFC212**	195	36	160	19	15	17	12	135	56.7	65.1	25.4	68	74	10	11	M16	UC212	52500	36100	FC212	**UCFC212C(E)**	**CUCFC212C(CE)**	4.4	4.6	6.0
	UCFCX12	194	33	165	16	14	11	20	140	50.7	65.1	25.4	63	—	11	—	M14	UCX12	57500	40000	FCX12	**UCFCX12C(E)**	—	4.6	4.8	—
65	**UCFC213**	205	36	170	19	15	16	14	145	55.7	65.1	25.4	67	75	10	13	M16	UC213	57500	40000	FC213	**UCFC213C(E)**	**CUCFC213C(CE)**	5.3	5.5	7.0
	UCFCX13	194	33	165	16	14	11	20	140	55.4	74.6	30.2	—	—	—	—	M14	UCX13	62000	44000	FCX13	—	—	4.9	—	—
70	**UCFC214**	215	40	177	19	18	17	14	150	61.4	74.6	30.2	—	84	—	16	M16	UC214	62000	44000	FC214	—	**CUCFC214C(CE)**	6.8	—	8.2
	UCFCX14	222	36	190	19	14	14	20	164	58.5	77.8	33.3	—	—	—	—	M16	UCX14	66000	48200	FCX14	—	—	7.4	—	—

Remarks: 1. Grease nipple: 1/4-28UNF for bore number 13 and under
PF1/8 for bore number 14 and over

Remarks: 2. Examples of unit numbers with cover:

With steel cover { Cover with rubber seal :UCFC210C
End cover :UCFC210E

With cast cover { Cover with rubber seal :CUCFC210C
End cover :CUCFC210CE

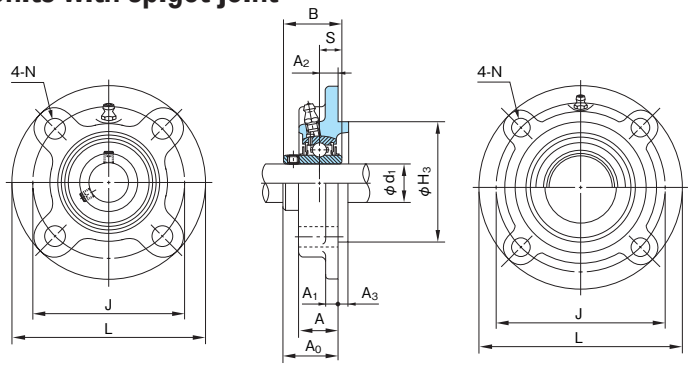
Round Flange Units with spigot joint

UCFC type

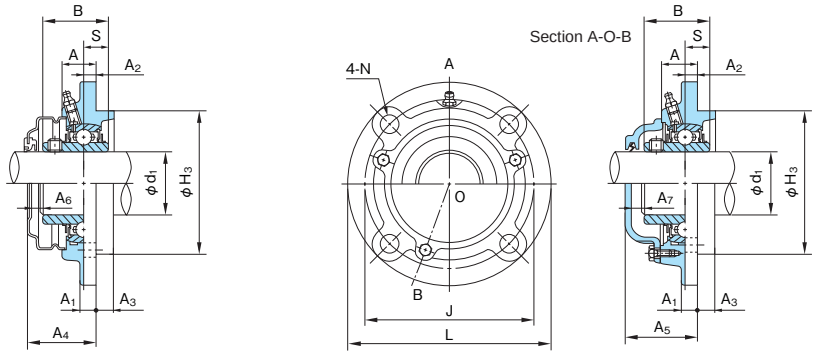
With set screws

Cylindrical bore

Shaft dia.: 75～100mm



With steel cover



With cast cover

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)															Bolt size	Bearings			Housing No.	Unit No. with steel cover	Unit No. with cast cover	Mass of Unit (kg)		
		L	A	J	N	A_1	A_2	A_3	H_3	A_0	B	S	A_4	A_5	A_6	A_7		No.	Basic load rating (N) Cr	Basic load rating (N) Cor		Cover with rubber seal (End cover)	Cover with rubber seal (End cover)	standard	With steel cover	With cast cover
75	**UCFC215**	220	40	184	19	18	18	16	160	62.5	77.8	33.3	—	86	—	17	M16	UC215	66000	48200	FC215	—	**CUCFC215C(CE)**	7.4	—	8.8
	UCFCX15	222	35	190	19	16	12	22	164	61.3	82.6	33.3	—	—	—	—	M16	UCX15	72500	53000	FCX15	—	—	7.4	—	—
80	**UCFC216**	240	42	200	23	18	18	16	170	67.3	82.6	33.3	—	91	—	15	M20	UC216	72500	53000	FC216	—	**CUCFC216C(CE)**	9.2	—	11.3
	UCFCX16	260	36	219	23	19	10	25	186	61.6	85.7	34.1	—	—	—	—	M20	UCX16	83500	61800	FCX16	—	—	11.5	—	—
85	**UCFC217**	250	45	208	23	20	18	18	180	69.6	85.7	34.1	—	93	—	15	M20	UC217	83500	61800	FC217	—	**CUCFC217C(CE)**	10.6	—	12.8
	UCFCX17	260	36	219	23	19	10	25	186	66.3	96	39.7	—	—	—	—	M20	UCX17	95500	71400	FCX17	—	—	11.1	—	—
90	**UCFC218**	265	50	220	23	20	22	18	190	78.3	96	39.7	—	104	—	17	M20	UC218	95500	71400	FC218	—	**CUCFC218C(CE)**	12.7	—	15.9
	UCFCX18	260	43	219	23	19	12	28	186	73.1	104	42.9	—	—	—	—	M20	UCX18	109000	81600	FCX18	—	—	11.3	—	—
100	**UCFCX20**	276	66	238	23	22	22	28	206	90.3	117.5	49.2	—	—	—	—	M20	UCX20	134000	104700	FCX20	—	—	15.9	—	—

Remarks: 1. Grease nipple: PF1/8

Remarks: 2. Examples of unit numbers with cover:

With cast cover { Cover with rubber seal :CUCFC215C
End cover :CUCFC215CE

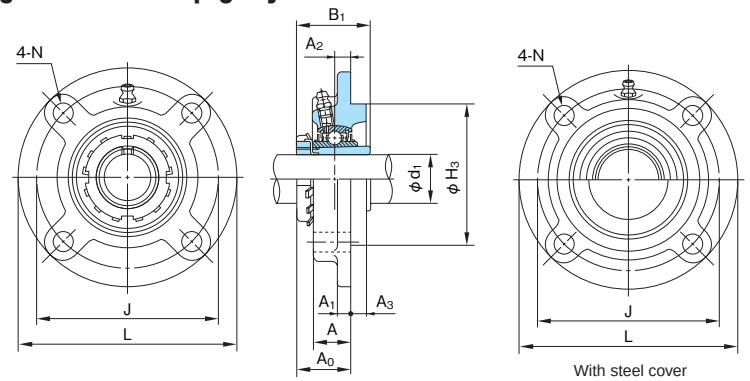
Round Flange Units with spigot joint

UKFC+H type

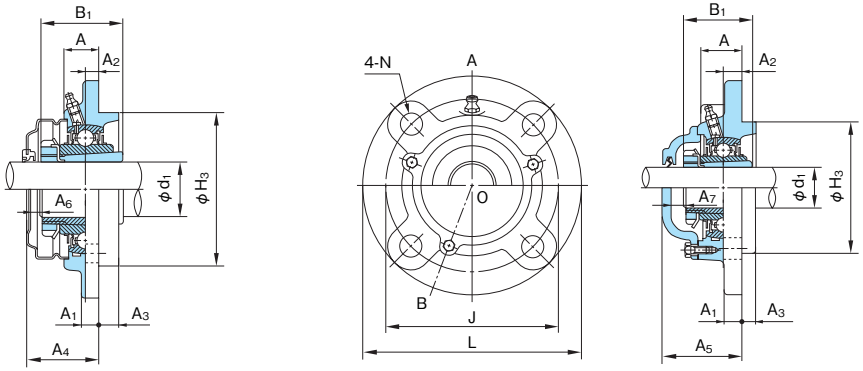
With adapter assembly

Tapered bore

Shaft dia.:
20～90mm



With steel cover



With cast cover

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)														Bolt size	Bearings			Housing No.	Unit No. with steel cover	Unit No. with cast cover	Mass of Unit (kg)		
		L	A	J	N	A_1	A_2	A_3	H_3	A_0	B_1	A_4	A_5	A_6	A_7		No.	Basic load rating (N) Cr	Cor		Cover with rubber seal (End cover)	Cover with rubber seal (End cover)	standard	With steel cover	With cast cover
20	**UKFC205+H2305**	115	21	90	12	7	10	6	70	29.5	35	42	45	11	9	M10	UK205+H2305	14000	7900	FC205	**UKFC205C(E)+H2305**	**CUKFC205C(CE)+H2305**	1.1	1.2	1.6
	UKFCX05+H2305	111	24	92	9.5	9.5	10	6	76	31	35	43	—	10	—	M 8	UKX05+H2305	19600	11300	FCX05	**UKFCX05C(E)+H2305**	—	1.1	1.1	—
25	**UKFC206+H2306**	125	23	100	12	8	10	8	80	31	38	43	47	10	10	M10	UK206+H2306	19600	11300	FC206	**UKFC206C(E)+H2306**	**CUKFC206C(CE)+H2306**	1.6	1.6	2.1
	UKFCX06+H2306	127	22.5	105	12	9.5	8	9.5	85	29.5	38	43	—	12	—	M10	UKX06+H2306	25900	15400	FCX06	**UKFCX06C(E)+H2306**	—	1.5	1.5	—
30	**UKFC207+H2307**	135	26	110	14	9	11	8	90	33.5	43	46	51	11	11	M12	UK207+H2307	25900	15400	FC207	**UKFC207C(E)+H2307**	**CUKFC207C(CE)+H2307**	1.8	1.9	2.5
	UKFCX07+H2307	133	26	111	12	11	9	11	92	32.5	43	48	—	14	—	M10	UKX07+H2307	29300	17900	FCX07	**UKFCX07C(E)+H2307**	—	1.8	1.8	—
35	**UKFC208+H2308**	145	26	120	14	9	11	10	100	35.5	46	52	56	15	14	M12	UK208+H2308	29300	17900	FC208	**UKFC208C(E)+H2308**	**CUKFC208C(CE)+H2308**	2.2	2.2	2.9
	UKFCX08+H2308	133	26	111	12	11	9	11	92	34	46	50	—	15	—	M10	UKX08+H2308	33000	20500	FCX08	**UKFCX08C(E)+H2308**	—	1.8	1.8	—
40	**UKFC209+H2309**	160	26	132	16	14	10	12	105	36	50	51	55	14	13	M14	UK209+H2309	33000	20500	FC209	**UKFC209C(E)+H2309**	**CUKFC209C(CE)+H2309**	3.1	3.2	3.8
	UKFCX09+H2309	155	25	130	14	11	8	12	108	34.5	50	52	—	16	—	M12	UKX09+H2309	35500	23200	FCX09	**UKFCX09C(E)+H2309**	—	2.5	2.6	—
45	**UKFC210+H2310**	165	28	138	16	14	10	12	110	37.5	55	54	59	15	15	M14	UK210+H2310	35500	23200	FC210	**UKFC210C(E)+H2310**	**CUKFC210C(CE)+H2310**	3.3	3.5	4.4
	UKFCX10+H2310	162	25	136	14	11	7	16	118	35.5	55	51	—	14	—	M12	UKX10+H2310	43000	29400	FCX10	**UKFCX10C(E)+H2310**	—	2.9	3.0	—
50	**UKFC211+H2311**	185	31	150	19	15	13	12	125	41.5	59	57	63	14	15	M16	UK211+H2311	43000	29400	FC211	**UKFC211C(E)+H2311**	**CUKFC211C(CE)+H2311**	4.0	4.2	5.2
	UKFCX11+H2311	180	26	152	16	13	4	22	127	34	59	54	—	19	—	M14	UKX11+H2311	52500	36100	FCX11	**UKFCX11C(E)+H2311**	—	3.9	4.0	—
55	**UKFC212+H2312**	195	36	160	19	15	17	12	135	48	62	68	74	19	20	M16	UK212+H2312	52500	36100	FC212	**UKFC212C(E)+H2312**	**CUKFC212C(CE)+H2312**	4.4	4.7	6.1
	UKFCX12+H2312	194	33	165	16	14	11	20	140	43	62	63	—	19	—	M14	UKX12+H2312	57500	40000	FCX12	**UKFCX12C(E)+H2312**	—	4.6	4.7	—
60	**UKFC213+H2313**	205	36	170	19	15	16	14	145	49	65	67	75	17	20	M16	UK213+H2313	57500	40000	FC213	**UKFC213C(E)+H2313**	**CUKFC213C(CE)+H2313**	5.4	5.7	7.2
	UKFCX13+H2313	194	33	165	16	14	11	20	140	45	65	—	—	—	—	M14	UKX13+H2313	62000	44000	FCX13	—	—	4.7	—	—
65	**UKFC215+H2315**	220	40	184	19	18	18	16	160	53.5	73	—	86	—	26	M16	UK215+H2315	66000	48200	FC215	—	**CUKFC215C(CE)+H2315**	7.8	—	9.2
	UKFCX15+H2315	222	35	190	19	16	12	22	164	49	73	—	—	—	—	M16	UKX15+H2315	72500	53000	FCX15	—	—	7.4	—	—
70	**UKFC216+H2316**	240	42	200	23	18	18	16	170	57	78	—	91	—	26	M20	UK216+H2316	72500	53000	FC216	—	**CUKFC216C(CE)+H2316**	9.6	—	11.7
	UKFCX16+H2316	260	36	219	23	19	10	25	186	50	78	—	—	—	—	M20	UKX16+H2316	83500	61800	FCX16	—	—	11.6	—	—
75	**UKFC217+H2317**	250	45	208	23	20	18	18	180	59	82	—	93	—	26	M20	UK217+H2317	83500	61800	FC217	—	**CUKFC217C(CE)+H2317**	11.1	—	13.4
	UKFCX17+H2317	260	36	219	23	19	10	25	186	52.5	82	—	—	—	—	M20	UKX17+H2317	95500	71400	FCX17	—	—	11.0	—	—
80	**UKFC218+H2318**	265	50	220	23	20	22	18	190	64.5	86	—	104	—	31	M20	UK218+H2318	95500	71400	FC218	—	**CUKFC218C(CE)+H2318**	13.1	—	16.3
	UKFCX18+H2318	260	43	219	23	19	12	28	186	56	86	—	—	—	—	M20	UKX18+H2318	109000	81600	FCX18	—	—	11.0	—	—
90	**UKFCX20+H2320**	276	66	238	23	22	22	28	206	71	97	—	—	—	—	M20	UKX20+H2320	134000	104700	FCX20	—	—	14.9	—	—

Remarks: 1. Grease nipple : 1/4-28UNF for bore number 13 and under
PF1/8 for bore number 14 and over

Remarks: 2. Examples of unit numbers with cover:
With steel cover { Cover with rubber seal :UKFC210C+H2310
End cover :UKFC210E+H2310
With cast cover { Cover with rubber seal :CUKFC210C+H2310
End cover :CUKFC210CE+H2310

NACHI

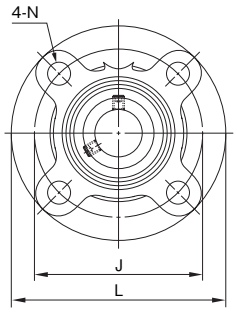
Round Flange Units with spigot joint

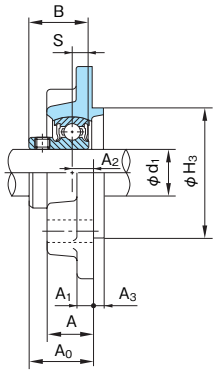
BFC type

With set screws

Cylindrical bore

Shaft dia.: 20～35mm





1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)											Bolt size		Bearings			Housing No.	Mass of Unit (kg)
		L	A	J	N	A_1	A_2	A_3	H_3	A_0	B	S			No.	Basic load rating (N) Cr	Basic load rating (N) Cor		
20	**BFC204**	100	20.5	78	12	7	10	5	62	27.7	24.7	7	M10		B4	12800	6600	FC204 G00	0.8
25	**BFC205**	115	21	90	12	7	10	6	70	30.2	27	7.5	M10		B5	14000	7900	FC205 G00	1.0
30	**BFC206**	125	23	100	12	8	10	8	80	32.3	30.3	8	M10		B6	19600	11300	FC206 G00	1.4
35	**BFC207**	135	26	110	14	9	11	8	90	35.4	32.9	8.5	M12		B7	25900	15400	FC207 G00	1.7

NACHI

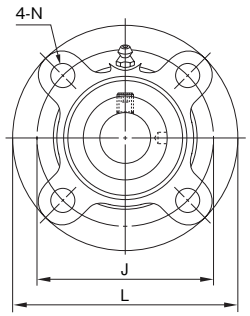
Round Flange Units with spigot joint

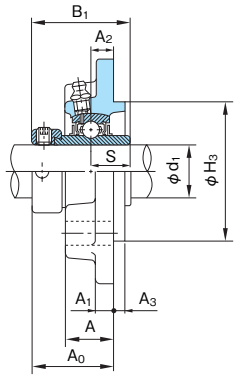
UGF type

With eccentric collar

Cylindrical bore

Shaft dia.: 20～60mm





1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)											Bolt size		Bearings			Housing No.	Mass of Unit (kg)
		L	A	J	N	A_1	A_2	A_3	H_3	A_0	B_1	S			No.	Basic load rating (N) Cr	Basic load rating (N) Cor		
20	**UGFC204**	100	20.5	78	12	7	10	5	62	36.6	43.7	17.1	M10		UG204+ER	12800	6600	FC204	0.89
25	**UGFC205**	115	21	90	12	7	10	6	70	36.9	44.4	17.5	M10		UG205+ER	14000	7900	FC205	1.0
30	**UGFC206**	125	23	100	12	8	10	8	80	40.1	48.4	18.3	M10		UG206+ER	19600	11300	FC206	1.2
35	**UGFC207**	135	26	110	14	9	11	8	90	43.3	51.1	18.8	M12		UG207+ER	25900	15400	FC207	1.7
40	**UGFC208**	145	26	120	14	9	11	10	100	45.9	56.3	21.4	M12		UG208+ER	29300	17900	FC208	2.0
45	**UGFC209**	160	26	132	16	14	10	12	105	44.9	56.3	21.4	M14		UG209+ER	33000	20500	FC209	2.5
50	**UGFC210**	165	28	138	16	14	10	12	110	48.1	62.7	24.6	M14		UG210+ER	35500	23200	FC210	2.8
55	**UGFC211**	185	31	150	19	15	13	12	125	56.6	71.4	27.8	M16		UG211+ER	43000	29400	FC211	4.1
60	**UGFC212**	195	36	160	19	15	17	12	135	63.8	77.8	31	M16		UG212+ER	52500	36100	FC212	4.8

Remark: Grease nipple:1/4-28UNF

NACHI

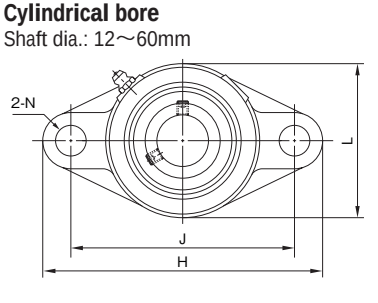
Rhombic Flange Units

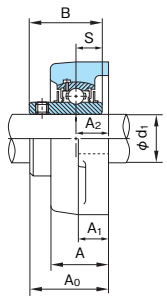
UCFL type

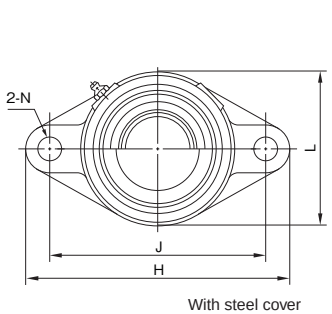
With set screws

Cylindrical bore

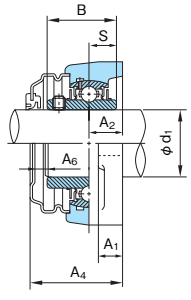
Shaft dia.: 12～60mm

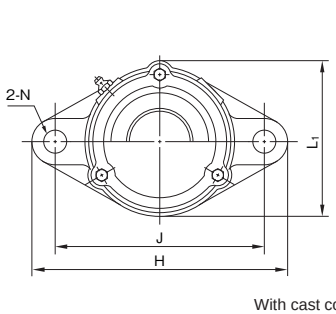


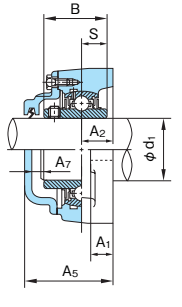




With steel cover







With cast cover

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)															Bolt size	Bearings			Housing No.	Unit No. with steel cover	Unit No. with cast cover	Mass of Unit (kg)		
		H	L	L_1	A	J	N	A_1	A_2	A_0	B	S	A_4	A_5	A_6	A_7		No.	Basic load rating (N) Cr	Basic load rating (N) Cor		Cover with rubber seal (End cover)	Cover with rubber seal (End cover)	standard	With steel cover	With cast cover
12	UCFL201	113	60	66	25.5	90	12	12	15	33.3	31	12.7	43	46	8	6	M10	UC201	12800	6600	FL204	UCFL201C(E)	CUCFL201C(CE)	0.50	0.53	0.8
15	UCFL202	113	60	66	25.5	90	12	12	15	33.3	31	12.7	43	46	8	6	M10	UC202	12800	6600	FL204	UCFL202C(E)	CUCFL202C(CE)	0.48	0.51	0.8
17	UCFL203	113	60	66	25.5	90	12	12	15	33.3	31	12.7	43	46	8	6	M10	UC203	12800	6600	FL204	UCFL203C(E)	CUCFL203C(CE)	0.47	0.50	0.8
20	UCFL204	113	60	66	25.5	90	12	12	15	33.3	31	12.7	43	46	8	6	M10	UC204	12800	6600	FL204	UCFL204C(E)	CUCFL204C(CE)	0.45	0.48	0.8
25	UCFL205	130	68	73	27	99	16	14	16	35.7	34	14.3	47	51	10	9	M14	UC205	14000	7900	FL205	UCFL205C(E)	CUCFL205C(CE)	0.63	0.67	1.0
	UCFLX05	141	83	—	30	117	12	13	18	40.2	38.1	15.9	51	—	8	—	M10	UCX05	19600	11300	FLX05	UCFLX05C(E)	—	1.0	1.0	—
	UCFL305	150	80	84	29	113	19	13	16	39	38	15	—	55	—	10	M16	UC305	21300	10900	FL305	—	CUCFL305C(CE)	1.1	—	1.4
30	UCFL206	148	80	84	31	117	16	14	18	40.2	38.1	15.9	49	55	8	8	M14	UC206	19600	11300	FL206	UCFL206C(E)	CUCFL206C(CE)	0.96	1.0	1.5
	UCFLX06	156	95	—	34	130	16	14	19	44.4	42.9	17.5	54	—	8	—	M14	UCX06	25900	15400	FLX06	UCFLX06C(E)	—	1.4	1.4	—
	UCFL306	180	90	94	32	134	23	15	18	44	43	17	—	60	—	10	M20	UC306	26800	15000	FL306	—	CUCFL306C(CE)	1.5	—	1.9
35	UCFL207	161	90	94	34	130	16	16	19	44.4	42.9	17.5	54	59	8	8	M14	UC207	25900	15400	FL207	UCFL207C(E)	CUCFL207C(CE)	1.2	1.3	1.9
	UCFLX07	171	105	—	38	144	16	14	21	51.2	49.2	19	63	—	10	—	M14	UCX07	29300	17900	FLX07	UCFLX07C(E)	—	1.9	2.0	—
	UCFL307	185	100	104	36	141	23	16	20	49	48	19	—	65	—	10	M20	UC307	33500	19200	FL307	—	CUCFL307C(CE)	1.8	—	2.3
40	UCFL208	175	100	104	36	144	16	16	21	51.2	49.2	19	61	66	9	8	M14	UC208	29300	17900	FL208	UCFL208C(E)	CUCFL208C(CE)	1.6	1.7	2.3
	UCFLX08	179	111	—	40	148	16	14	22	52.2	49.2	19	63	—	10	—	M14	UCX08	33000	20500	FLX08	UCFLX08C(E)	—	2.0	2.1	—
	UCFL308	200	112	118	40	158	23	17	23	56	52	19	—	73	—	11	M20	UC308	40500	23900	FL308	—	CUCFL308C(CE)	2.4	—	2.9
45	UCFL209	188	108	113	38	148	19	18	22	52.2	49.2	19	63	67	10	8	M16	UC209	33000	20500	FL209	UCFL209C(E)	CUCFL209C(CE)	1.9	2.0	2.7
	UCFLX09	189	116	—	40	157	16	14	23	55.6	51.6	19	67	—	9	—	M14	UCX09	35500	23200	FLX09	UCFLX09C(E)	—	2.4	2.5	—
	UCFL309	230	125	132	44	177	25	18	25	60	57	22	—	78	—	12	M22	UC309	51500	29500	FL309	—	CUCFL309C(CE)	3.4	—	4.2
50	UCFL210	197	115	120	40	157	19	18	22	54.6	51.6	19	66	71	9	10	M16	UC210	35500	23200	FL210	UCFL210C(E)	CUCFL210C(CE)	2.2	2.3	3.2
	UCFLX10	216	133	—	44	184	19	20	26	59.4	55.6	22.2	70	—	9	—	M16	UCX10	43000	29400	FLX10	UCFLX10C(E)	—	3.6	3.7	—
	UCFL310	240	140	144	48	187	25	19	28	67	61	22	—	85	—	12	M22	UC310	61500	38200	FL310	—	CUCFL310C(CE)	4.3	—	5.2
55	UCFL211	224	130	134	43	184	19	20	25	58.4	55.6	22.2	69	75	9	10	M16	UC211	43000	29400	FL211	UCFL211C(E)	CUCFL211C(CE)	3.2	3.3	4.3
	UCFL311	250	150	154	52	198	25	20	30	71	66	25	—	90	—	13	M22	UC311	71500	44800	FL311	—	CUCFL311C(CE)	5.1	—	6.0
60	UCFL212	250	140	144	48	202	23	20	29	68.7	65.1	25.4	80	86	10	11	M20	UC212	52500	36100	FL212	UCFL212C(E)	CUCFL212C(CE)	4.1	4.3	5.4
	UCFL312	270	160	164	56	212	31	22	33	78	71	26	—	98	—	14	M27	UC312	81500	52000	FL312	—	CUCFL312C(CE)	6.2	—	7.3

Remarks: 1. Grease nipple: 1/4-28UNF

Remarks: 2. Examples of unit numbers with cover:

With steel cover { Cover with rubber seal :UCFL210C
End cover :UCFL210E

With cast cover { Cover with rubber seal :CUCFL210C
End cover :CUCFL210CE

NACHI

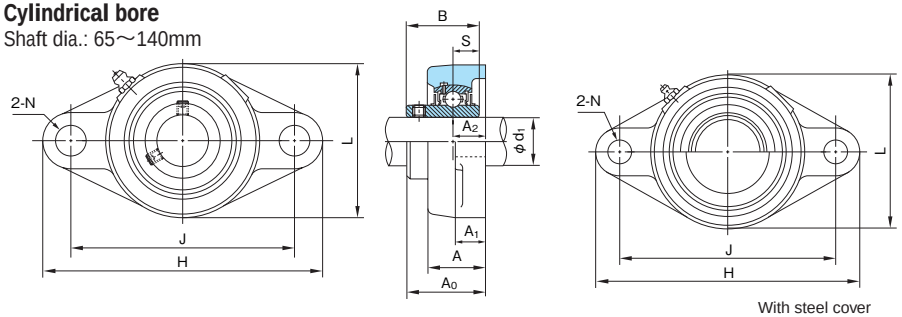
Rhombic Flange Units

UCFL type

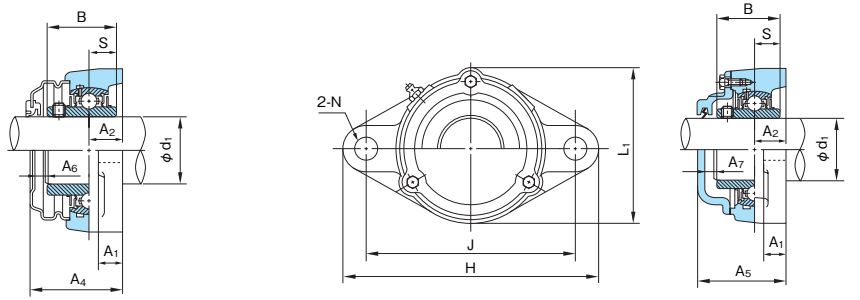
With set screws

Cylindrical bore

Shaft dia.: 65～140mm



With steel cover



With cast cover

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)															Bolt size	Bearings			Housing No.	Unit No. with steel cover	Unit No. with cast cover	Mass of Unit (kg)		
		H	L	L_1	A	J	N	A_1	A_2	A_0	B	S	A_4	A_5	A_6	A_7		No.	Basic load rating (N) Cr	Basic load rating (N) Cor		Cover with rubber seal (End cover)	Cover with rubber seal (End cover)	standard	With steel cover	With cast cover
65	**UCFL213**	258	155	157	50	210	23	24	30	69.7	65.1	25.4	81	89	10	13	M20	UC213	57500	40000	FL213	**UCFL213C(E)**	**CUCFL213C(CE)**	5.1	5.3	6.7
	UCFL313	295	175	186	58	240	31	25	33	78	75	30	—	103	—	17	M27	UC313	92500	59700	FL313	—	**CUCFL313C(CE)**	7.4	—	9.4
70	**UCFL214**	265	160	163	54	216	23	24	31	75.4	74.6	30.2	—	98	—	16	M20	UC214	62000	44000	FL214	—	**CUCFL214C(CE)**	6.0	—	7.4
	UCFL314	315	185	196	61	250	35	28	36	81	78	33	—	106	—	17	M30	UC314	104000	68000	FL314	—	**CUCFL314C(CE)**	9.0	—	11.8
75	**UCFL215**	275	165	168	56	225	23	24	34	78.5	77.8	33.3	—	102	—	17	M20	UC215	66000	48200	FL215	—	**CUCFL215C(CE)**	6.5	—	7.9
	UCFL315	320	195	206	66	260	35	30	39	89	82	32	—	114	—	17	M30	UC315	114000	76900	FL315	—	**CUCFL315C(CE)**	10.0	—	12.2
80	**UCFL216**	290	180	188	58	233	25	24	34	83.3	82.6	33.3	—	107	—	15	M22	UC216	72500	53000	FL216	—	**CUCFL216C(CE)**	8.0	—	10.2
	UCFL316	355	210	218	68	285	38	32	38	90	86	34	—	115	—	17	M33	UC316	123000	86400	FL316	—	**CUCFL316C(CE)**	12.6	—	15.5
85	**UCFL217**	305	190	198	63	248	25	26	36	87.6	85.7	34.1	—	111	—	15	M22	UC217	83500	61800	FL217	—	**CUCFL217C(CE)**	9.5	—	11.8
	UCFL317	370	220	232	74	300	38	32	44	100	96	40	—	126	—	18	M33	UC317	132000	96500	FL317	—	**CUCFL317C(CE)**	14.5	—	18.2
90	**UCFL218**	320	205	211	68	265	25	26	40	96.3	96	39.7	—	122	—	17	M22	UC218	95500	71400	FL218	—	**CUCFL218C(CE)**	11.9	—	15.0
	UCFL318	385	235	245	76	315	38	36	44	100	96	40	—	128	—	20	M33	UC318	143000	107200	FL318	—	**CUCFL318C(CE)**	17.1	—	20.7
95	**UCFL319**	405	250	257	94	330	41	40	59	121	103	41	—	149	—	20	M36	UC319	153000	118400	FL319	—	**CUCFL319C(CE)**	21.8	—	25.8
100	**UCFL320**	440	270	277	94	360	44	40	59	125	108	42	—	154	—	21	M39	UC320	173000	140400	FL320	—	**CUCFL320C(CE)**	26.5	—	30.6
105	**UCFL321**	440	270	282	94	360	44	40	59	127	112	44	—	156	—	21	M39	UC321	183000	153100	FL321	—	**CUCFL321C(CE)**	28.2	—	31.9
110	**UCFL322**	470	300	305	96	390	44	42	60	131	117	46	—	165	—	26	M39	UC322	205000	178800	FL322	—	**CUCFL322C(CE)**	33.1	—	38.7
120	**UCFL324**	520	330	333	110	430	47	48	65	140	126	51	—	175	—	25	M42	UC324	207000	184800	FL324	—	**CUCFL324C(CE)**	45.7	—	52.4
130	**UCFL326**	550	360	360	115	460	47	50	65	146	135	54	—	180	—	24	M42	UC326	229000	214300	FL326	—	**CUCFL326C(CE)**	57.5	—	64.4
140	**UCFL328**	600	400	400	125	500	51	60	75	161	145	59	—	195	—	24	M45	UC328	255000	246000	FL328	—	**CUCFL328C(CE)**	79.7	—	86.3

Remarks: 1. Grease nipple: 1/4-28UNF for bore number 13 and under
PF1/8 for bore number 14 and over

Remarks: 2. Examples of unit numbers with cover:

With steel cover { Cover with rubber seal :UCFL213C
End cover :UCFL213E

With cast cover { Cover with rubber seal :CUCFL213C
End cover :CUCFL213CE

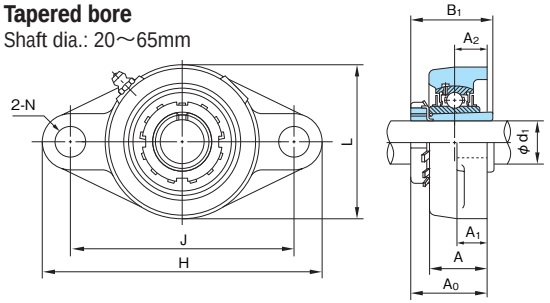
Rhombic Flange Units

UKFL+H type

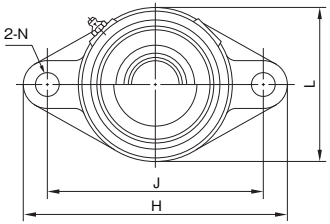
With adapter assembly

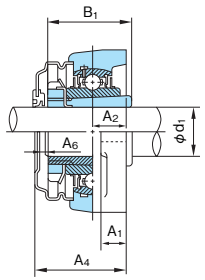
Tapered bore

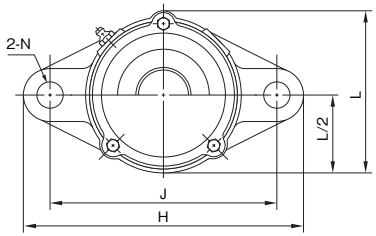
Shaft dia.: 20～65mm

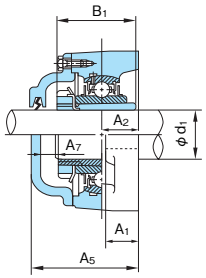


With steel cover









With cast cover

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)														Bolt size	Bearings			Housing No.	Unit No. with steel cover	Unit No. with cast cover	Mass of Unit (kg)		
		H	L	L_1	A	J	N	A_1	A_2	A_0	B_1	A_4	A_5	A_6	A_7		No.	Basic load rating (N) Cr	Basic load rating (N) Cor		Cover with rubber seal (End cover)	Cover with rubber seal (End cover)	standard	With steel cover	With cast cover
20	**UKFL205+H2305**	130	68	73	27	99	16	14	16	35.5	35	47	51	10	9	M14	UK205+H2305	14000	7900	FL205	**UKFL205C(E)+H2305**	**CUKFL205C(CE)+H2305**	0.68	0.72	1.1
	UKFLX05+H2305	141	83	—	30	117	12	13	18	39	35	51	—	9	—	M10	UKX05+H2305	19600	11300	FLX05	**UKFLX05C(E)+H2305**	—	1.0	1.0	—
	UKFL305+H2305	150	80	84	29	113	19	13	16	37	35	—	55	—	12	M16	UK305+H2305	21300	10900	FL305	—	**CUKFL305C(CE)+H2305**	1.1	—	1.5
25	**UKFL206+H2306**	148	80	84	31	117	16	14	18	39	38	49	55	9	10	M14	UK206+H2306	19600	11300	FL206	**UKFL206C(E)+H2306**	**CUKFL206C(CE)+H2306**	1.0	1.1	1.6
	UKFLX06+H2306	156	95	—	34	130	16	14	19	40.5	38	54	—	12	—	M14	UKX06+H2306	25900	15400	FLX06	**UKFLX06C(E)+H2306**	—	1.5	1.5	—
	UKFL306+H2306	180	90	94	32	134	23	15	18	40.5	38	—	60	—	13	M20	UK306+H2306	26800	15000	FL306	—	**CUKFL306C(CE)+H2306**	1.5	—	2.0
30	**UKFL207+H2307**	161	90	94	34	130	16	16	19	41.5	43	54	59	11	11	M14	UK207+H2307	25900	15400	FL207	**UKFL207C(E)+H2307**	**CUKFL207C(CE)+H2307**	1.3	1.4	2.0
	UKFLX07+H2307	171	105	—	38	144	16	14	21	44.5	43	63	—	17	—	M14	UKX07+H2307	29300	17900	FLX07	**UKFLX07C(E)+H2307**	—	1.9	2.0	—
	UKFL307+H2307	185	100	104	36	141	23	16	20	44.5	43	—	65	—	14	M20	UK307+H2307	33500	19200	FL307	—	**CUKFL307C(CE)+H2307**	1.9	—	2.4
35	**UKFL208+H2308**	175	100	104	36	144	16	16	21	45.5	46	61	66	14	14	M14	UK208+H2308	29300	17900	FL208	**UKFL208C(E)+H2308**	**CUKFL208C(CE)+H2308**	1.7	1.8	2.4
	UKFLX08+H2308	179	111	—	40	148	16	14	22	47	46	63	—	15	—	M14	UKX08+H2308	33000	20500	FLX08	**UKFLX08C(E)+H2308**	—	2.1	2.1	—
	UKFL308+H2308	200	112	118	40	158	23	17	23	50	46	—	73	—	17	M20	UK308+H2308	40500	23900	FL308	—	**CUKFL308C(CE)+H2308**	2.5	—	3.0
40	**UKFL209+H2309**	188	108	113	38	148	19	18	22	48	50	63	67	14	13	M16	UK209+H2309	33000	20500	FL209	**UKFL209C(E)+H2309**	**CUKFL209C(CE)+H2309**	2.0	2.1	2.8
	UKFLX09+H2309	189	116	—	40	157	16	14	23	49.5	50	67	—	16	—	M14	UKX09+H2309	35500	23200	FLX09	**UKFLX09C(E)+H2309**	—	2.4	2.5	—
	UKFL309+H2309	230	125	132	44	177	25	18	25	54.5	50	—	78	—	17	M22	UK309+H2309	51500	29500	FL309	—	**CUKFL309C(CE)+H2309**	3.4	—	4.3
45	**UKFL210+H2310**	197	115	120	40	157	19	18	22	49.5	55	66	71	15	15	M16	UK210+H2310	35500	23200	FL210	**UKFL210C(E)+H2310**	**CUKFL210C(CE)+H2310**	2.3	2.5	3.4
	UKFLX10+H2310	216	133	—	44	184	19	20	26	54.5	55	70	—	14	—	M16	UKX10+H2310	43000	29400	FLX10	**UKFLX10C(E)+H2310**	—	3.6	3.7	—
	UKFL310+H2310	240	140	144	48	187	25	19	28	60	55	—	85	—	19	M22	UK310+H2310	61500	38200	FL310	—	**CUKFL310C(CE)+H2310**	4.4	—	5.5
50	**UKFL211+H2311**	224	130	134	43	184	19	20	25	53.5	59	69	75	14	15	M16	UK211+H2311	43000	29400	FL211	**UKFL211C(E)+H2311**	**CUKFL211C(CE)+H2311**	3.3	3.5	4.5
	UKFL311+H2311	250	150	154	52	198	25	20	30	63.5	59	—	90	—	20	M22	UK311+H2311	71500	44800	FL311	—	**CUKFL311C(CE)+H2311**	5.1	—	6.1
55	**UKFL212+H2312**	250	140	144	48	202	23	20	29	60	62	80	86	19	20	M20	UK212+H2312	52500	36100	FL212	**UKFL212C(E)+H2312**	**CUKFL212C(CE)+H2312**	4.1	4.4	5.5
	UKFL312+H2312	270	160	164	56	212	31	22	33	69	62	—	98	—	23	M27	UK312+H2312	81500	52000	FL312	—	**CUKFL312C(CE)+H2312**	6.1	—	7.4
60	**UKFL213+H2313**	258	155	157	50	210	23	24	30	63	65	81	89	17	20	M20	UK213+H2313	57500	40000	FL213	**UKFL213C(E)+H2313**	**CUKFL213C(CE)+H2313**	5.2	5.5	6.9
	UKFL313+H2313	295	175	186	58	240	31	25	33	71	65	—	103	—	24	M27	UK313+H2313	92500	59700	FL313	—	**CUKFL313C(CE)+H2313**	7.4	—	9.4
65	**UKFL215+H2315**	275	165	168	56	225	23	24	34	69.5	73	—	102	—	26	M20	UK215+H2315	66000	48200	FL215	—	**CUKFL215C(CE)+H2315**	6.8	—	8.3
	UKFL315+H2315	320	195	206	66	260	35	30	39	81	73	—	114	—	25	M30	UK315+H2315	11400	76900	FL315	—	**CUKFL315C(CE)+H2315**	10.2	—	12.6

Remarks: 1. Grease nipple: 1/4-28UNF for bore number 13 and under
PF1/8 for bore number 14 and over

Remarks: 2. Examples of unit numbers with cover:
With steel cover { Cover with rubber seal :UKFL210C+H2310
End cover :UKFL210E+H2310
With cast cover { Cover with rubber seal :CUKFL210C+H2310
End cover :CUKFL210CE+H2310

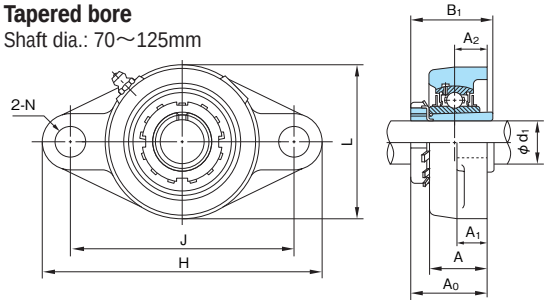
Rhombic Flange Units

UKFL+H type

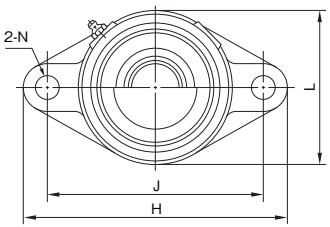
With adapter assembly

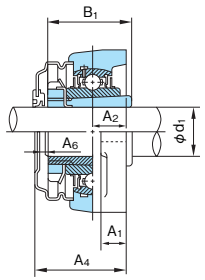
Tapered bore

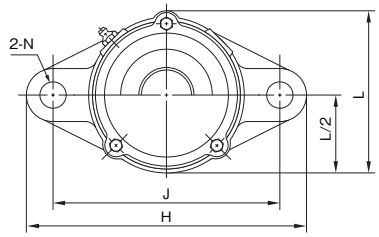
Shaft dia.: 70～125mm

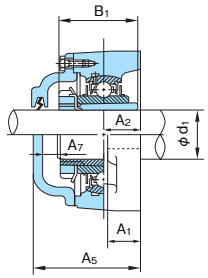


With steel cover









With cast cover

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)														Bolt size	Bearings			Housing No.	Unit No. with steel cover	Unit No. with cast cover	Mass of Unit (kg)		
		H	L	L_1	A	J	N	A_1	A_2	A_0	B_1	A_4	A_5	A_6	A_7		No.	Basic load rating (N) Cr	Basic load rating (N) Cor		Cover with rubber seal (End cover)	Cover with rubber seal (End cover)	standard	With steel cover	With cast cover
70	**UKFL216+H2316**	290	180	188	58	233	25	24	34	73	78	—	107	—	26	M22	UK216+H2316	72500	53000	FL216	—	**CUKFL216C(CE)+H2316**	8.4	—	10.6
	UKFL316+H2316	355	210	218	68	285	38	32	38	83.5	78	—	115	—	23	M33	UK316+H2316	123000	86400	FL316	—	**CUKFL316C(CE)+H2316**	12.8	—	15.9
75	**UKFL217+H2317**	305	190	198	63	248	25	26	36	77	82	—	111	—	26	M22	UK217+H2317	83500	61800	FL217	—	**CUKFL217C(CE)+H2317**	10.0	—	12.4
	UKFL317+H2317	370	220	232	74	300	38	32	44	92	82	—	126	—	26	M33	UK317+H2317	132000	96500	FL317	—	**CUKFL317C(CE)+H2317**	14.5	—	18.4
80	**UKFL218+H2318**	320	205	211	68	265	25	26	40	82.5	86	—	122	—	31	M22	UK218+H2318	95500	71400	FL218	—	**CUKFL218C(CE)+H2318**	12.3	—	15.4
	UKFL318+H2318	385	235	245	76	315	38	36	44	93.5	86	—	128	—	26	M33	UK318+H2318	143000	107200	FL318	—	**CUKFL318C(CE)+H2318**	17.2	—	21.7
85	**UKFL319+H2319**	405	250	257	94	330	41	40	59	111	90	—	149	—	30	M36	UK319+H2319	153000	118400	FL319	—	**CUKFL319C(CE)+H2319**	21.8	—	26.0
90	**UKFL320+H2320**	440	270	277	94	360	44	40	59	115	97	—	154	—	31	M39	UK320+H2320	173000	140400	FL320	—	**CUKFL320C(CE)+H2320**	26.5	—	31.2
100	**UKFL322+H2322**	470	300	305	96	390	44	42	60	121	105	—	165	—	36	M39	UK322+H2322	205000	178800	FL322	—	**CUKFL322C(CE)+H2322**	33.2	—	39.4
110	**UKFL324+H2324**	520	330	333	110	430	47	48	65	130	112	—	175	—	35	M42	UK324+H2324	207000	184800	FL324	—	**CUKFL324C(CE)+H2324**	45.2	—	52.6
115	**UKFL326+H2326**	550	360	360	115	460	47	50	65	134	121	—	180	—	36	M42	UK326+H2326	229000	214300	FL326	—	**CUKFL326C(CE)+H2326**	57.8	—	65.9
125	**UKFL328+H2328**	600	400	400	125	500	51	60	75	148	131	—	195	—	37	M45	UK328+H2328	255000	246000	FL328	—	**CUKFL328C(CE)+H2328**	80.0	—	87.8

Remarks: 1. Grease nipple: PF1/8

Remarks: 2. Examples of unit numbers with cover:

With cast cover { Cover with rubber seal :CUKFL320C+H2320
End cover :CUKFL320CE+H2320

NACHI

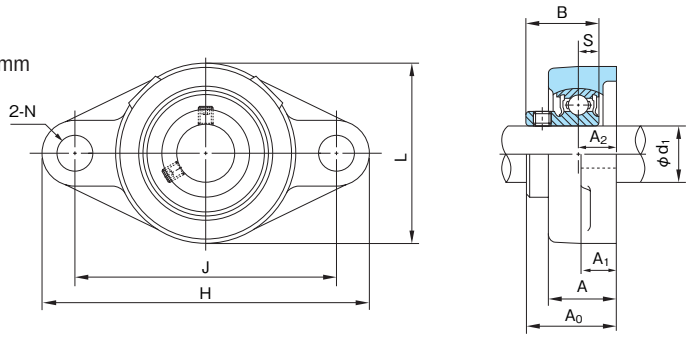
Rhombic Flange Units

BFL type

With set screws

Cylindrical bore

Shaft dia.: 20～35mm



1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)										Bolt size		Bearings			Housing No.	Mass of Unit (kg)
		H	L	A	J	N	A_1	A_2	A_0	B	S			No.	Basic load rating (N)			
															Cr	Cor		
20	**BFL204**	113	60	25.5	90	12	12	15	32.7	24.7	7	M10		B4	12800	6600	FL204 G00	0.41
25	**BFL205**	130	68	27	99	16	14	16	36.2	27	7.5	M14		B5	14000	7900	FL205 G00	0.60
30	**BFL206**	148	80	31	117	16	14	18	40.3	30.3	8	M14		B6	19600	11300	FL206 G00	0.88
35	**BFL207**	161	90	34	130	16	16	19	43.4	32.9	8.5	M14		B7	25900	15400	FL207 G00	1.2

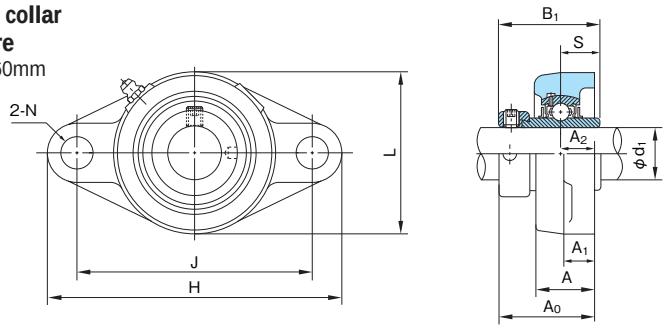
Rhombic Flange Units

UGFL type

With eccentric collar

Cylindrical bore

Shaft dia.: 20～60mm



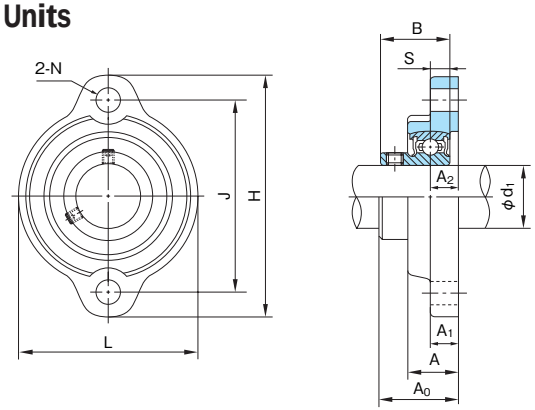
1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)										Bolt size		Bearings			Housing No.	Mass of Unit (kg)
		H	L	A	J	N	A_1	A_2	A_0	B_1	S			No.	Basic load rating (N)			
															Cr	Cor		
20	UGFL204	113	60	25.5	90	12	12	15	41.6	43.7	17.1	M10		UG204+ER	12800	6600	FL204	0.47
25	UGFL205	130	68	27	99	16	14	16	42.9	44.4	17.5	M14		UG205+ER	14000	7900	FL205	0.63
30	UGFL206	148	80	31	117	16	14	18	48.1	48.4	18.3	M14		UG206+ER	19600	11300	FL206	0.96
35	UGFL207	161	90	34	130	16	16	19	51.3	51.1	18.8	M14		UG207+ER	25900	15400	FL207	1.3
40	UGFL208	175	100	36	144	16	16	21	55.9	56.3	21.4	M14		UG208+ER	29300	17900	FL208	1.7
45	UGFL209	188	108	38	148	19	18	22	56.9	56.3	21.4	M16		UG209+ER	33000	20500	FL209	2.0
50	UGFL210	197	115	40	157	19	18	22	60.1	62.7	24.6	M16		UG210+ER	35500	23200	FL210	2.3
55	UGFL211	224	130	43	184	19	20	25	68.6	71.4	27.8	M16		UG211+ER	43000	29400	FL211	3.4
60	UGFL212	250	140	48	202	23	20	29	75.8	77.8	31	M20		UG212+ER	52500	36100	FL212	4.4

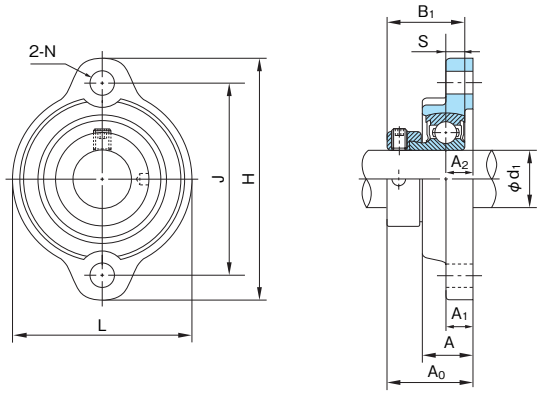
Remark: Grease nipple: 1/4-28UNF

Rhombic Flange Units

BLFL type
With set screws
Cylindrical bore
Shaft dia.: 12～35mm



KHLFL type
With eccentric collar
Cylindrical bore
Shaft dia.: 12～35mm



BLFL type

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)										Bolt size		Bearings			Housing No.	Mass of Unit (kg)
		H	L	A	J	N	A_1	A_2	A_0	B	S			No.	Basic load rating (N) Cr	Basic load rating (N) Cor		
12	BLFL1J	81	56	18	63.5	7	9.5	9.5	25.5	22	6	M 6		B1	9550	4800	LFL3J	0.28
15	BLFL2J	81	56	18	63.5	7	9.5	9.5	25.5	22	6	M 6		B2	9550	4800	LFL3J	0.27
17	BLFL3J	81	56	18	63.5	7	9.5	9.5	25.5	22	6	M 6		B3	9550	4800	LFL3J	0.25
20	BLFL4J	90	63	20	71.5	10	11	11	28.7	24.7	7	M 8		B4	12800	6600	LFL4J	0.30
25	BLFL5J	95	69	20	76	10	11	11	31.2	27	7.5	M 8		B5	14000	7900	LFL5J	0.40
30	BLFL6J	113	79	22.5	90.5	12	12	12	34.3	30.3	8	M10		B6	19600	11300	LFL6J	0.58
35	BLFL7J	122	89	24	100	12	13	13	37.4	32.9	8.5	M10		B7	25900	15400	LFL7J	0.81

Remark: Spherical bearing seating diameter of housing is applied tolerance class J7.

KHLFL type

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)										Bolt size		Bearings			Housing No.	Mass of Unit (kg)
		H	L	A	J	N	A_1	A_2	A_0	B_1	S			No.	Basic load rating (N) Cr	Basic load rating (N) Cor		
12	KHLFL201AJ	81	56	18	63.5	7	9.5	9.5	31.6	28.6	6.5	M 6		KH201AE	9550	4800	LFL3J	0.30
15	KHLFL202AJ	81	56	18	63.5	7	9.5	9.5	31.6	28.6	6.5	M 6		KH202AE	9550	4800	LFL3J	0.29
17	KHLFL203AJ	81	56	18	63.5	7	9.5	9.5	31.6	28.6	6.5	M 6		KH203AE	9550	4800	LFL3J	0.28
20	KHLFL204AJ	90	63	20	71.5	10	11	11	34.5	31	7.5	M 8		KH204AE	12800	6600	LFL4J	0.34
25	KHLFL205AJ	95	69	20	76	10	11	11	34.5	31	7.5	M 8		KH205AE	14000	7900	LFL5J	0.44
30	KHLFL206AJ	113	79	22.5	90.5	12	12	12	38.7	35.7	9	M10		KH206AE	19600	11300	LFL6J	0.64
35	KHLFL207AJ	122	89	24	100	12	13	13	42.4	38.9	9.5	M10		KH207AE	25900	15400	LFL7J	0.92

Remark: Spherical bearing seating diameter of housing is applied tolerance class J7.

NACHI

Rhombic Flange Units

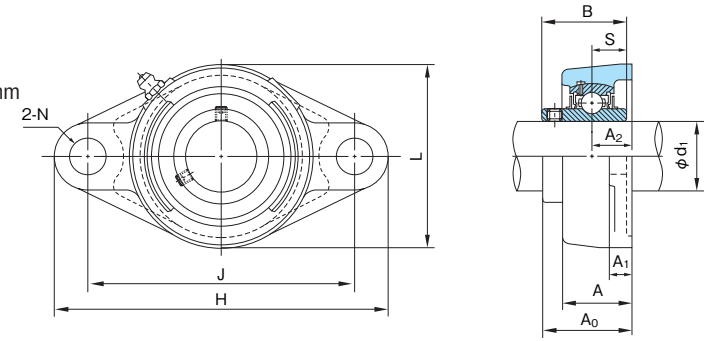
Cast Stainless Steel

MUCFL type

With set screws

Cylindrical bore

Shaft dia.: 20～50mm



1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)										Bolt size		Bearings			Housing No.	Mass of Unit (kg)
		H	L	A	J	N	A_1	A_2	A_0	B	S			No.	Basic load rating (N)			
															Cr	Cor		
20	**MUCFL204**	113	60	25.5	90	12	10	15	33.3	31	12.7	M10		MUC204	10900	5300	MFL204	0.35
25	**MUCFL205**	130	68	27	99	16	10	16	35.7	34	14.3	M14		MUC205	11900	6300	MFL205	0.50
30	**MUCFL206**	148	80	31	117	16	10	18	40.2	38.1	15.9	M14		MUC206	16700	9050	MFL206	0.80
35	**MUCFL207**	161	90	34	130	16	11	19	44.4	42.9	17.5	M14		MUC207	22000	12300	MFL207	1.05
40	**MUCFL208**	175	100	36	144	16	11	21	51.2	49.2	19	M14		MUC208	24900	14300	MFL208	1.35
45	**MUCFL209**	188	108	38	148	19	13	22	52.2	49.2	19	M16		MUC204	28100	16400	MFL209	1.65
50	**MUCFL210**	197	115	40	157	19	13	22	54.6	51.6	19	M16		MUC210	30200	18600	MFL210	1.90

Remark: Grease nipple: 1/4-28UNF

Silver series

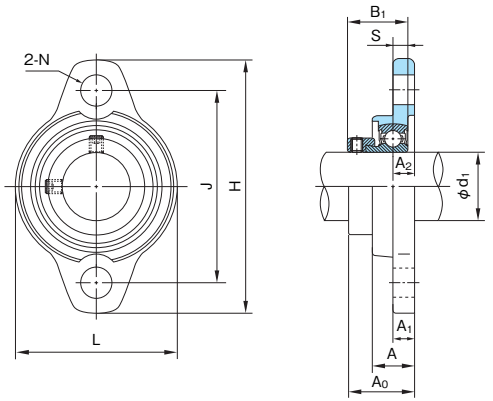
Rhombic Flange Units

UFL type

With eccentric collar

Cylindrical bore

Shaft dia.: 8～30mm

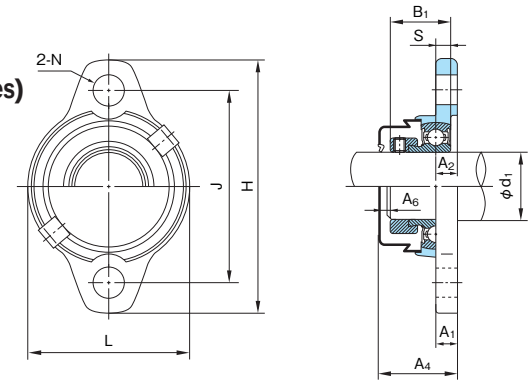


MUFL type (Stainless Silver Series)

With eccentric collar

Cylindrical bore

Shaft dia.: 10～30mm



With steel covers

UFL type

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)												Bolt size	Bearings			Housing No.	Unit No. with covers	Cover No. (Reference)		Mass of Unit (kg)	
		H	L	A	J	N	A_1	A_2	A_0	B_1	S	A_4	A_6		No.	Basic load rating (N) Cr	Basic load rating (N) Cor		Cover with rubber seal (End cover)	Cover with rubber seal	Side end cover	standard	with cover
10	UFL000	60	36	11.5	45	7	5.5	5.5	19	17.5	4	22	2	M 6	U000+ER	4600	2000	FL000	UFL000C(E)	000CP10	000CPE	60	65
12	UFL001	63	38	11.5	48	7	5.5	5.5	19	17.5	4	22	2	M 6	U001+ER	5100	2400	FL001	UFL001C(E)	001CP12	001CPE	76	80
15	UFL002	67	42	13	53	7	6.5	6.5	20.5	18.5	4.5	24	2	M 6	U002+ER	5600	2800	FL002	UFL002C(E)	002CP15	002CPE	100	105
17	UFL003	71	46	14	56	7	7	7	22.5	20.5	5	26	2	M 6	U003+ER	6000	3300	FL003	UFL003C(E)	003CP17	003CPE	129	135
20	UFL004	90	55	16	71	10	8	8	26.5	24.5	6	31	3	M 8	U004+ER	9350	5100	FL04-5	UFL004C(E)	04-5CP20	04-5CPE	205	215
25	UFL005	95	60	16	75	10	8	8	27.5	25.5	6	32	3	M 8	U005+ER	10100	5800	FL05-6	UFL005C(E)	05-6CP25	05-6CPE	244	255
30	UFL006	112	70	18	85	13	9	9	29	26.5	6.5	34	4	M10	U006+ER	13200	8300	FL06-7	UFL006C(E)	06-7CP30	06-7CPE	354	370
8	UFL 08	48	27	8.5	37	4.8	4	4.5	16	15	3.5	–	–	M 4	U 08+ER(1)	3300	1360	FL08	–	–	–	30	–

Note: (1) Set screw type U08X is also available. Inner ring width B of U08X is 12mm. Dimension A_0 with U08X is 13mm.

Remark: Examples of unit numbers with cover: Both covers with rubber seal : UFL005C
One side end cover : UFL005E

MUFL type (Stainless Silver Series)

1N=0.102kgf

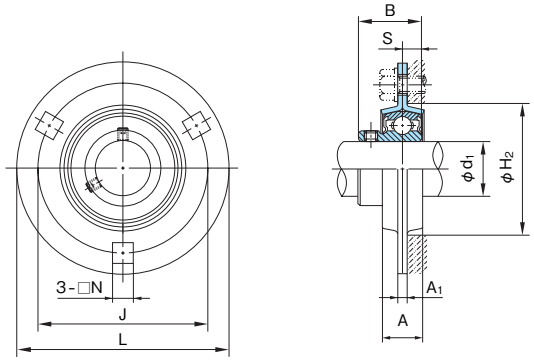
Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)												Bolt size	Bearings			Housing No.	Unit No. with covers	Cover No. (Reference)		Mass of Unit (kg)	
		H	L	A	J	N	A_1	A_2	A_0	B_1	S	A_4	A_6		No.	Basic load rating (N) Cr	Basic load rating (N) Cor		Cover with rubber seal (End cover)	Cover with rubber seal	Side end cover	standard	with cover
10	MUFL000	60	36	11.5	45	7	5.5	5.5	19	17.5	4	22	2	M 6	MU000+ER	3900	1550	FL000Z3	MUFL000C(E)	000CP10	000CPE	60	65
12	MUFL001	63	38	11.5	48	7	5.5	5.5	19	17.5	4	22	2	M 6	MU001+ER	4300	1900	FL001Z3	MUFL001C(E)	001CP12	001CPE	76	80
15	MUFL002	67	42	13	53	7	6.5	6.5	20.5	18.5	4.5	24	2	M 6	MU002+ER	4750	2250	FL002Z3	MUFL002C(E)	002CP15	002CPE	100	105
17	MUFL003	71	46	14	56	7	7	7	22.5	20.5	5	26	2	M 6	MU003+ER	5100	2650	FL003Z3	MUFL003C(E)	003CP17	003CPE	129	135
20	MUFL004	90	55	16	71	10	8	8	26.5	24.5	6	31	3	M 8	MU004+ER	7900	4000	FL04-5Z3	MUFL004C(E)	04-5CP20	04-5CPE	205	215
25	MUFL005	95	60	16	75	10	8	8	27.5	25.5	6	32	3	M 8	MU005+ER	8600	4650	FL05-6Z3	MUFL005C(E)	05-6CP25	05-6CPE	244	255
30	MUFL006	112	70	18	85	13	9	9	29	26.5	6.5	34	4	M10	MU006+ER	11300	6600	FL06-7Z3	MUFL006C(E)	06-7CP30	06-7CPE	354	370

Remark: Examples of unit numbers with cover: Cover with rubber seal : MUFL005C
One side end cover : MUFL005E

Pressed Steel Round Flange Units

BPF type

With set screws
Cylindrical bore
Shaft dia.: 12～35mm



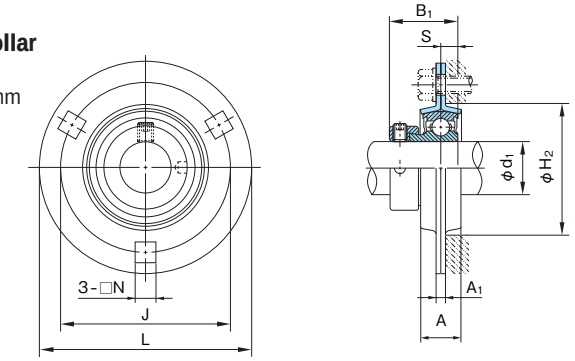
BPF type

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)								Bolt size		Bearings			Housing No.	Mass of Unit (kg)	Limiting load (N)	
		L	A	J	N	A_1	H_2 (Min)	B	S			No.	Basic load rating (N) Cr	Basic load rating (N) Cor			Radial	Axial
12	BPF1	81	14	63.5	7	4	49	22	6	M 6		B1	9550	4800	PF3	0.21	2650	1320
15	BPF2	81	14	63.5	7	4	49	22	6	M 6		B2	9550	4800	PF3	0.20	2650	1320
17	BPF3	81	14	63.5	7	4	49	22	6	M 6		B3	9550	4800	PF3	0.18	2650	1320
20	BPF4	90	16	71.5	9	4	56	24.7	7	M 8		B4	12800	6600	PF4	0.25	3100	1520
25	BPF5	95	18	76	9	4	60	27	7.5	M 8		B5	14000	7900	PF5	0.35	3550	1750
30	BPF6	113	18	90.5	11	5.2	71	30.3	8	M10		B6	19600	11300	PF6	0.54	4900	2450
35	BPF7	122	20	100	11	5.2	81	32.9	8.5	M10		B7	25900	15400	PF7	0.71	6200	3100

KHPF type

With eccentric collar
Cylindrical bore
Shaft dia.: 12～35mm



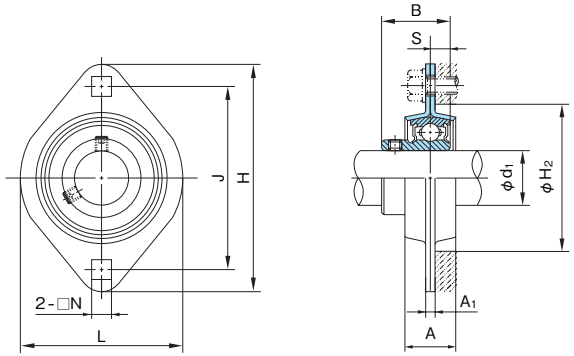
KHPF type

1N=0.102kgf

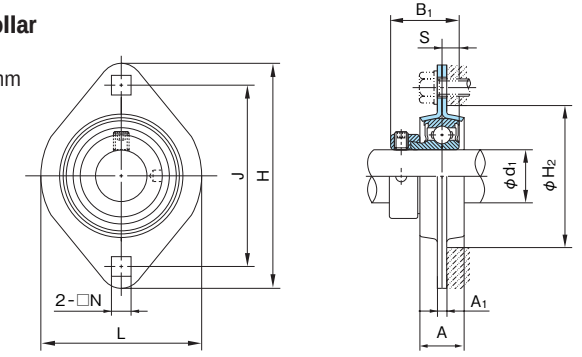
Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)								Bolt size		Bearings			Housing No.	Mass of Unit (kg)	Limiting load (N)	
		L	A	J	N	A_1	H_2 (Min)	B_1	S			No.	Basic load rating (N) Cr	Basic load rating (N) Cor			Radial	Axial
12	KHPF201A	81	14	63.5	7	4	49	28.6	6.5	M 6		KH201AE	9550	4800	PF3	0.23	2650	1320
15	KHPF202A	81	14	63.5	7	4	49	28.6	6.5	M 6		KH202AE	9550	4800	PF3	0.22	2650	1320
17	KHPF203A	81	14	63.5	7	4	49	28.6	6.5	M 6		KH203AE	9550	4800	PF3	0.21	2650	1320
20	KHPF204A	90	16	71.5	9	4	56	31	7.5	M 8		KH204AE	12800	6600	PF4	0.29	3100	1520
25	KHPF205A	95	18	76	9	4	60	31	7.5	M 8		KH205AE	14000	7900	PF5	0.39	3550	1750
30	KHPF206A	113	18	90.5	11	5.2	71	35.7	9	M10		KH206AE	19600	11300	PF6	0.60	4900	2450
35	KHPF207A	122	20	100	11	5.2	81	38.9	9.5	M10		KH207AE	25900	15400	PF7	0.82	6200	3100

Pressed Steel Rhombic Flange Units

BPFL type
With set screws
Cylindrical bore
Shaft dia.: 12～35mm



KHPFL type
With eccentric collar
Cylindrical bore
Shaft dia.: 12～35mm



BPFL type

1N=0.102kgf

Shaft dia. d1 (mm)	Unit No.	Boundary dimensions (mm)									Bolt size		Bearings			Housing No.	Mass of Unit (kg)	Limiting load (N)	
		H	L	A	J	N	A1	H2	B	S			No.	Basic load rating (N) Cr	Basic load rating (N) Cor			Radial	Axial
12	BPFL1	81	59	14	63.5	7	4	49	22	6	M 6		B1	9550	4800	PFL3	0.25	2650	640
15	BPFL2	81	59	14	63.5	7	4	49	22	6	M 6		B2	9550	4800	PFL3	0.24	2650	640
17	BPFL3	81	59	14	63.5	7	4	49	22	6	M 6		B3	9550	4800	PFL3	0.22	2650	640
20	BPFL4	90	67	16	71.5	9	4	56	24.7	7	M 8		B4	12800	6600	PFL4	0.29	3100	740
25	BPFL5	95	71	18	76	9	4	60	27	7.5	M 8		B5	14000	7900	PFL5	0.36	3550	900
30	BPFL6	113	84	18	90.5	11	5.2	71	30.3	8	M10		B6	19600	11300	PFL6	0.56	4900	1200
35	BPFL7	125	94	20	100	11	5.2	81	32.9	8.5	M10		B7	25900	15400	PFL7	0.70	6200	1500

KHPFL type

1N=0.102kgf

Shaft dia. d1 (mm)	Unit No.	Boundary dimensions (mm)									Bolt size		Bearings			Housing No.	Mass of Unit (kg)	Limiting load (N)	
		H	L	A	J	N	A1	H2	B1	S			No.	Basic load rating (N) Cr	Basic load rating (N) Cor			Radial	Axial
12	KHPFL201A	81	59	14	63.5	7	4	49	28.6	6.5	M 6		KH201AE	9550	4800	PFL3	0.27	2650	640
15	KHPFL202A	81	59	14	63.5	7	4	49	28.6	6.5	M 6		KH202AE	9550	4800	PFL3	0.26	2650	640
17	KHPFL203A	81	59	14	63.5	7	4	49	28.6	6.5	M 6		KH203AE	9550	4800	PFL3	0.25	2650	640
20	KHPFL204A	90	67	16	71.5	9	4	56	31	7.5	M 8		KH204AE	12800	6600	PFL4	0.33	3100	740
25	KHPFL205A	95	71	18	76	9	4	60	31	7.5	M 8		KH205AE	14000	7900	PFL5	0.40	3550	900
30	KHPFL206A	113	84	18	90.5	11	5.2	71	35.7	9	M10		KH206AE	19600	11300	PFL6	0.62	4900	1200
35	KHPFL207A	125	94	20	100	11	5.2	81	38.9	9.5	M10		KH207AE	25900	15400	PFL7	0.81	6200	1500

NACHI

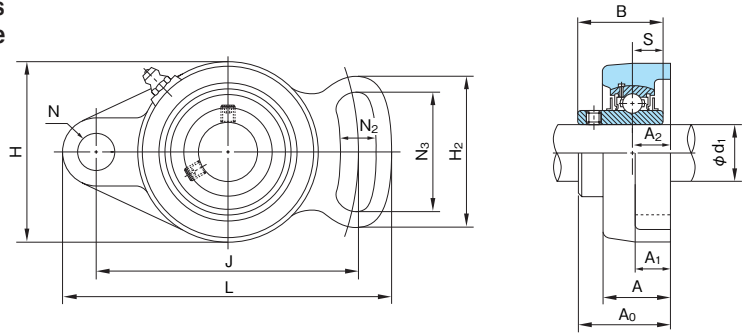
Transformed Rhombic Flange Units

UCFA type

With set screws

Cylindrical bore

Shaft dia.:
12～55mm



1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)													Bolt size		Bearings			Housing No.	Mass of Unit (kg)
		H	H_2	L	A	J	N	N_2	N_3	A_1	A_2	A_0	B	S			No.	Basic load rating (N) Cr	Basic load rating (N) Cor		
12	UCFA201	60	54	102	25.5	78	10	10	40	12	15	33.3	31	12.7	M 8		UC201	12800	6600	FA204	0.50
15	UCFA202	60	54	102	25.5	78	10	10	40	12	15	33.3	31	12.7	M 8		UC202	12800	6600	FA204	0.49
17	UCFA203	60	54	102	25.5	78	10	10	40	12	15	33.3	31	12.7	M 8		UC203	12800	6600	FA204	0.48
20	UCFA204	60	54	102	25.5	78	10	10	40	12	15	33.3	31	12.7	M 8		UC204	12800	6600	FA204	0.46
25	UCFA205	68	65	125	27	98	12	13	51	14	16	35.7	34	14.3	M10		UC205	14000	7900	FA205	0.66
30	UCFA206	80	72	144	31	117	12	13	58	14	18	40.2	38.1	15.9	M10		UC206	19600	11300	FA206	1.0
35	UCFA207	90	82	161	34	130	14	15	66	16	19	44.4	42.9	17.5	M12		UC207	25900	15400	FA207	1.4
40	UCFA208	100	87	175	36	144	14	15	71	16	21	51.2	49.2	19	M12		UC208	29300	17900	FA208	1.7
45	UCFA209	108	90	181	38	148	16	17	72	18	22	52.2	49.2	19	M14		UC209	33000	20500	FA209	2.0
50	UCFA210	115	94	190	40	157	16	17	76	18	22	54.6	51.6	19	M14		UC210	35500	23200	FA210	2.4
55	UCFA211	130	104	219	43	184	16	17	86	20	25	58.4	55.6	22.2	M14		UC211	43000	29400	FA211	3.4

Remark: Grease nipple: 1/4-28UNF

NACHI

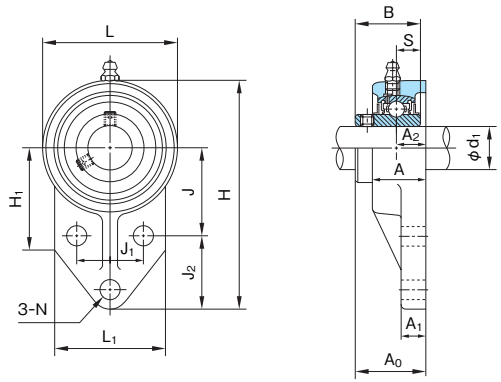
Flange Units

UCFK type

With set screws

Cylindrical bore

Shaft dia.: 12～50mm



1N=0.102kgf

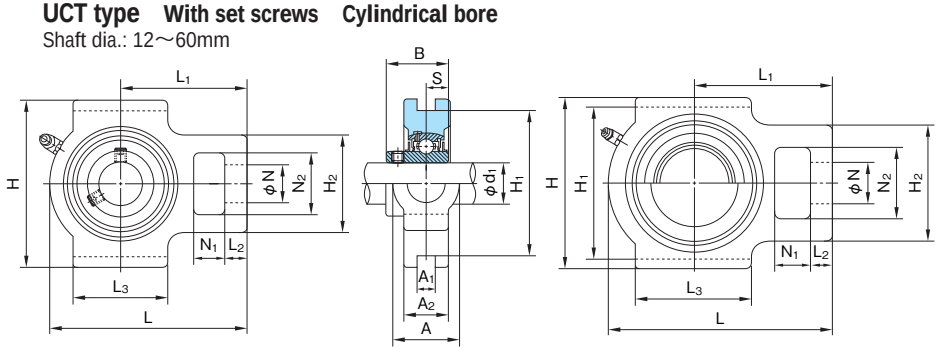
Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)														Bolt size		Bearings			Housing No.	Mass of Unit (kg)
		H	H_1	L	L_1	A	J	J_1	J_2	N	A_1	A_2	A_0	B	S			No.	Basic load rating (N) Cr	Basic load rating (N) Cor		
12	UCFK201	110	52	62	52	25.5	42	32	27	10	13	15	33.3	31	12.7	M 8		UC201	12800	6600	FK204	0.60
15	UCFK202	110	52	62	52	25.5	42	32	27	10	13	15	33.3	31	12.7	M 8		UC202	12800	6600	FK204	0.58
17	UCFK203	110	52	62	52	25.5	42	32	27	10	13	15	33.3	31	12.7	M 8		UC203	12800	6600	FK204	0.57
20	UCFK204	110	52	62	52	25.5	42	32	27	10	13	15	33.3	31	12.7	M 8		UC204	12800	6600	FK204	0.55
25	UCFK205	116	52	68	56	27	45	34	27	10	13	16	35.7	34	14.3	M 8		UC205	14000	7900	FK205	0.66
30	UCFK206	130	55	78	65	31	50	40	29	10	13	18	40.2	38.1	15.9	M 8		UC206	19600	11300	FK206	0.93
35	UCFK207	144	62	90	70	34	55	46	32	10	15	19	44.4	42.9	17.5	M 8		UC207	25900	15400	FK207	1.3
40	UCFK208	164	72	100	78	36	60	50	41	12	16	21	51.2	49.2	19	M10		UC208	29300	17900	FK208	1.7
45	UCFK209	174	76	106	80	38	65	54	43	12	18	22	52.2	49.2	19	M10		UC209	33000	20500	FK209	1.9
50	UCFK210	184	82	112	86	40	68	58	46	12	18	22	54.6	51.6	19	M10		UC210	35500	23200	FK210	2.2

Remark: Grease nipple: 1/4-28UNF

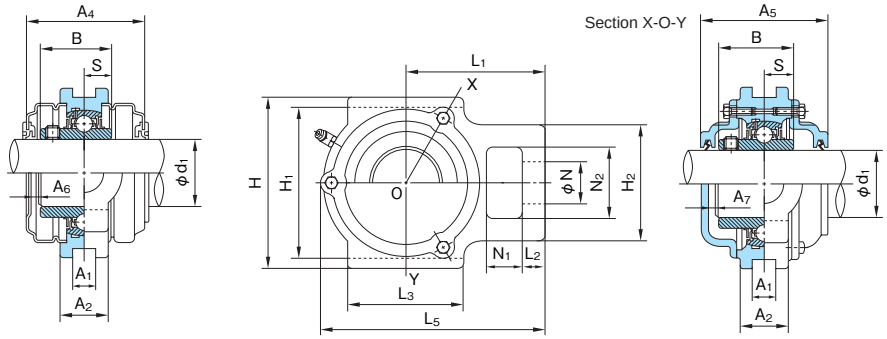
Take-up Units

UCT type With set screws Cylindrical bore

Shaft dia.: 12～60mm



With steel covers



With cast covers

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)																			
		A	A_1	A_2	H	H_1	H_2	L	L_5	L_1	L_2	L_3	N	N_1	N_2	B	S	A_4	A_5	A_6	A_7
12	UCT201	32	12	21	89	76	51	94	96	61	10	51	19	16	32	31	12.7	56	62	8	6
15	UCT202	32	12	21	89	76	51	94	96	61	10	51	19	16	32	31	12.7	56	62	8	6
17	UCT203	32	12	21	89	76	51	94	96	61	10	51	19	16	32	31	12.7	56	62	8	6
20	UCT204	32	12	21	89	76	51	94	96	61	10	51	19	16	32	31	12.7	56	62	8	6
25	UCT205	32	12	24	89	76	51	97	100	62	10	51	19	16	32	34	14.3	63	70	11	9
	UCTX05	37	12	28	102	89	56	113	—	70	10	57	22	16	37	38.1	15.9	65	—	9	—
	UCT305	36	12	26	89	80	62	122	122	76	12	65	26	16	36	38	15	—	78	—	10
30	UCT206	37	12	28	102	89	56	113	113	70	10	57	22	16	37	38.1	15.9	65	74	9	8
	UCTX06	37	12	30	102	89	64	129	—	78	13	64	22	16	37	42.9	17.5	70	—	8	—
	UCT306	41	16	28	100	90	70	137	137	85	14	74	28	18	41	43	17	—	84	—	10
35	UCT207	37	12	30	102	89	64	129	129	78	13	64	22	16	37	42.9	17.5	70	80	8	8
	UCTX07	49	16	36	114	102	83	144	—	88	15	83	29	19	49	49.2	19	83	—	10	—
	UCT307	45	16	32	111	100	75	150	150	94	15	80	30	20	45	48	19	—	90	—	10
40	UCT208	49	16	33	114	102	83	144	144	88	16	83	29	19	49	49.2	19	82	90	10	8
	UCTX08	49	16	36	117	102	83	144	—	87	15	83	29	19	49	49.2	19	82	—	10	—
	UCT308	50	18	34	124	112	83	162	162	100	17	89	32	22	50	52	19	—	100	—	11
45	UCT209	49	16	35	117	102	83	144	145	87	16	83	29	19	49	49.2	19	82	90	10	8
	UCTX09	49	16	38	117	102	83	149	—	90	16	86	29	19	49	51.6	19	87	—	9	—
	UCT309	55	18	38	138	125	90	178	178	110	18	97	34	24	55	57	22	—	106	—	12
50	UCT210	49	16	37	117	102	83	149	151	90	16	86	29	19	49	51.6	19	87	98	9	10
	UCTX10	64	22	42	146	130	102	171	—	106	19	95	35	25	64	55.6	22.2	88	—	9	—
	UCT310	61	20	40	151	140	98	191	191	117	20	106	37	27	61	61	22	—	114	—	12
55	UCT211	64	22	38	146	130	102	171	174	106	19	95	35	25	64	55.6	22.2	88	100	9	10
	UCTX11	64	22	44	146	130	102	194	—	119	19	102	35	32	64	65.1	25.4	100	—	9	—
	UCT311	66	22	44	163	150	105	207	207	127	21	115	39	29	66	66	25	—	120	—	13
60	UCT212	64	22	42	146	130	102	194	194	119	19	102	35	32	64	65.1	25.4	102	114	10	11
	UCTX12	70	26	48	167	151	111	224	—	137	21	121	41	32	70	65.1	25.4	104	—	11	—
	UCT312	71	22	46	178	160	113	220	220	135	23	123	41	31	71	71	26	—	130	—	14

Bearings			Housing No.	Unit No. with steel covers	Unit No. with cast covers	Mass of Unit (kg)		
No.	Basic load rating (N)							
	Cr	Cor		Covers with rubber seal (End cover on one side)	Covers with rubber seal (End cover on one side)	standard	With steel cover	With cast cover
UC201	12800	6600	T204	**UCT201C(E)**	**CUCT201C(CE)**	0.79	0.85	1.2
UC202	12800	6600	T204	**UCT202C(E)**	**CUCT202C(CE)**	0.77	0.83	1.2
UC203	12800	6600	T204	**UCT203C(E)**	**CUCT203C(CE)**	0.76	0.82	1.2
UC204	12800	6600	T204	**UCT204C(E)**	**CUCT204C(CE)**	0.74	0.80	1.2
UC205	14000	7900	T205	**UCT205C(E)**	**CUCT205C(CE)**	0.82	0.89	1.5
UCX05	19600	11300	TX05	**UCTX05C(E)**	—	1.3	1.3	—
UC305	21300	10900	T305	—	**CUCT305C(CE)**	1.4	—	2.0
UC206	19600	11300	T206	**UCT206C(E)**	**CUCT206C(CE)**	1.3	1.4	2.0
UCX06	25900	15400	TX06	**UCTX06C(E)**	—	1.6	1.6	—
UC306	26800	15000	T306	—	**CUCT306C(CE)**	1.8	—	2.5
UC207	25900	15400	T207	**UCT207C(E)**	**CUCT207C(CE)**	1.6	1.8	2.6
UCX07	29300	17900	TX07	**UCTX07C(E)**	—	2.6	2.6	—
UC307	33500	19200	T307	—	**CUCT307C(CE)**	2.4	—	3.3
UC208	29300	17900	T208	**UCT208C(E)**	**CUCT208C(CE)**	2.4	2.5	3.4
UCX08	33000	20500	TX08	**UCTX08C(E)**	—	2.6	2.6	—
UC308	40500	23900	T308	—	**CUCT308C(CE)**	3.0	—	4.0
UC209	33000	20500	T209	**UCT209C(E)**	**CUCT209C(CE)**	2.4	2.6	3.6
UCX09	35500	23200	TX09	**UCTX09C(E)**	—	2.8	3.0	—
UC309	51500	29500	T309	—	**CUCT309C(CE)**	4.1	—	5.5
UC210	35500	23200	T210	**UCT210C(E)**	**CUCT210C(CE)**	2.5	2.8	4.1
UCX10	43000	29400	TX10	**UCTX10C(E)**	—	4.4	4.6	—
UC310	61500	38200	T310	—	**CUCT310C(CE)**	5.2	—	6.8
UC211	43000	29400	T211	**UCT211C(E)**	**CUCT211C(CE)**	4.0	4.3	5.6
UCX11	52500	36100	TX11	**UCTX11C(E)**	—	5.2	5.5	—
UC311	71500	44800	T311	—	**CUCT311C(CE)**	6.4	—	8.3
UC212	52500	36100	T212	**UCT212C(E)**	**CUCT212C(CE)**	5.1	5.5	7.0
UCX12	57500	40000	TX12	**UCTX12C(E)**	—	7.2	7.4	—
UC312	81500	52000	T312	—	**CUCT312C(CE)**	7.6	—	10.7

Remarks: 1. Grease nipple: 1/4-28UNF

Remarks: 2. Examples of unit numbers with covers:

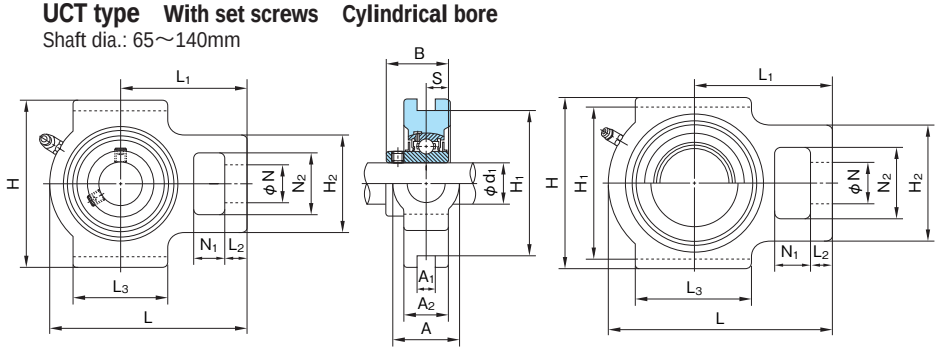
With steel cover { Covers with rubber seal on both sides :UCT210C
An end cover and a cover with rubber seal :UCT210E

With cast cover { Covers with rubber seal on both sides :CUCT210C
An end cover and a cover with rubber seal :CUCT210CE

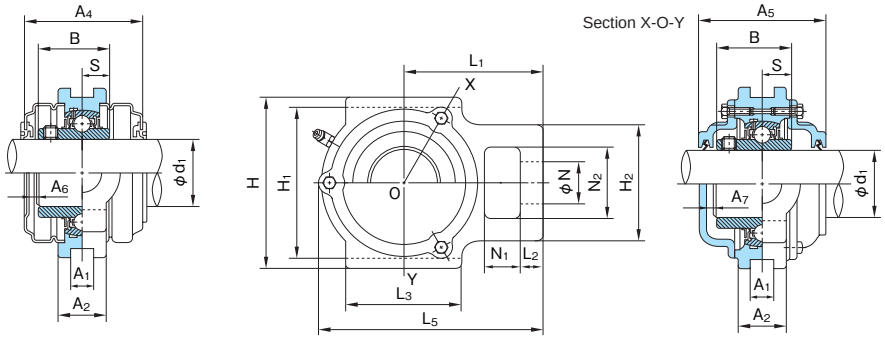
Take-up Units

UCT type With set screws Cylindrical bore

Shaft dia.: 65～140mm



With steel covers



With cast covers

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)																			
		A	A_1	A_2	H	H_1	H_2	L	L_5	L_1	L_2	L_3	N	N_1	N_2	B	S	A_4	A_5	A_6	A_7
65	UCT213	70	26	44	167	151	111	224	224	137	21	121	41	32	70	65.1	25.4	102	118	10	13
	UCTX13	70	26	48	167	151	111	224	—	137	21	121	41	32	70	74.6	30.2	—	—	—	—
	UCT313	80	26	50	190	170	116	238	242	146	25	134	43	32	70	75	30	—	140	—	17
70	UCT214	70	26	46	167	151	111	224	224	137	21	121	41	32	70	74.6	30.2	—	134	—	16
	UCTX14	70	26	48	167	151	111	232	—	140	21	121	41	32	70	77.8	33.3	—	—	—	—
	UCT314	90	26	52	202	180	130	252	256	155	25	140	46	36	85	78	33	—	140	—	17
75	UCT215	70	26	48	167	151	111	232	232	140	21	121	41	32	70	77.8	33.3	—	136	—	17
	UCTX15	70	28	48	184	165	111	235	—	140	21	121	41	32	70	82.6	33.3	—	—	—	—
	UCT315	90	26	55	216	192	132	262	266	160	25	150	46	36	85	82	32	—	150	—	17
80	UCT216	70	26	51	184	165	111	235	236	140	21	121	41	32	70	82.6	33.3	—	146	—	15
	UCTX16	73	28	54	198	173	124	260	—	162	28	157	48	38	73	85.7	34.1	—	—	—	—
	UCT316	102	30	60	230	204	150	282	285	174	28	160	53	42	98	86	34	—	154	—	17
85	UCT217	73	30	54	198	173	124	260	264	162	29	157	48	38	73	85.7	34.1	—	150	—	15
	UCTX17	73	28	54	198	173	124	260	—	162	28	157	48	38	73	96	39.7	—	—	—	—
	UCT317	102	32	64	240	214	152	298	302	183	30	170	53	42	98	96	40	—	164	—	18
90	UCT318	110	32	66	255	228	160	312	316	192	30	175	57	46	106	96	40	—	168	—	20
95	UCT319	110	35	72	270	240	165	322	326	197	31	180	57	46	106	103	41	—	180	—	20
100	UCT320	120	35	75	290	260	175	345	349	210	32	200	59	48	115	108	42	—	190	—	21
105	UCT321	120	35	75	290	260	175	345	354	210	32	200	59	48	115	112	44	—	194	—	21
110	UCT322	130	38	80	320	285	185	385	387	235	38	215	65	52	125	117	46	—	210	—	26
120	UCT324	140	45	90	355	320	210	432	432	267	42	230	70	60	140	126	51	—	220	—	25
130	UCT326	150	50	100	385	350	220	465	465	285	45	240	75	65	150	135	54	—	230	—	24
140	UCT328	155	50	100	415	380	230	515	515	315	50	255	80	70	160	145	59	—	240	—	24

Bearings			Housing No.	Unit No. with steel covers	Unit No. with cast covers	Mass of Unit (kg)		
No.	Basic load rating (N)							
	Cr	Cor		Covers with rubber seal (End cover on one side)	Covers with rubber seal (End cover on one side)	standard	With steel cover	With cast cover
UC213	57500	40000	T213	**UCT213C(E)**	**CUCT213C(CE)**	7.0	7.5	9.2
UCX13	62000	44000	TX13	—	—	7.4	—	—
UC313	92500	59700	T313	—	**CUCT313C(CE)**	9.2	—	12.9
UC214	62000	44000	T214	—	**CUCT214C(CE)**	7.1	—	9.8
UCX14	66000	48200	TX14	—	—	7.7	—	—
UC314	104000	68000	T314	—	**CUCT314C(CE)**	11.2	—	15.0
UC215	66000	48200	T215	—	**CUCT215C(CE)**	7.5	—	10.2
UCX15	72500	53000	TX15	—	—	8.4	—	—
UC315	114000	76900	T315	—	**CUCT315C(CE)**	13.0	—	17.2
UC216	72500	53000	T216	—	**CUCT216C(CE)**	8.5	—	12.4
UCX16	83500	61800	TX16	—	—	11.3	—	—
UC316	123000	86400	T316	—	**CUCT316C(CE)**	15.6	—	20.7
UC217	83500	61800	T217	—	**CUCT217C(CE)**	11.2	—	15.4
UCX17	95500	71400	TX17	—	—	11.0	—	—
UC317	132000	96500	T317	—	**CUCT317C(CE)**	19.3	—	24.4
UC318	143000	107200	T318	—	**CUCT318C(CE)**	21.2	—	27.4
UC319	153000	118400	T319	—	**CUCT319C(CE)**	24.4	—	31.3
UC320	173000	140400	T320	—	**CUCT320C(CE)**	30.6	—	37.9
UC321	183000	153100	T321	—	**CUCT321C(CE)**	30.2	—	38.2
UC322	205000	178800	T322	—	**CUCT322C(CE)**	38.8	—	48.2
UC324	207000	184800	T324	—	**CUCT324C(CE)**	54.6	—	67.3
UC326	229000	214300	T326	—	**CUCT326C(CE)**	68.4	—	83.5
UC328	255000	246000	T328	—	**CUCT328C(CE)**	83.2	—	101

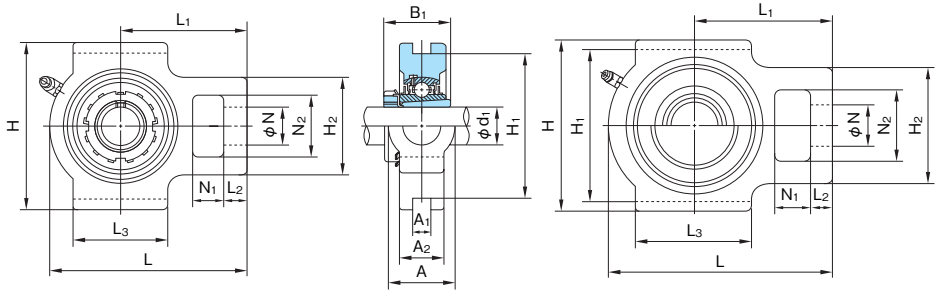
Remarks: 1. Grease nipple: 1/4-28UNF for bore number 13 and under
PF1/8 for bore number 14 and over

Remarks: 2. Examples of unit numbers with covers:
With steel cover { Covers with rubber seal on both sides :UCT213C
An end cover and a cover with rubber seal :UCT213E
With cast cover { Covers with rubber seal on both sides :CUCT213C
An end cover and a cover with rubber seal :CUCT213CE

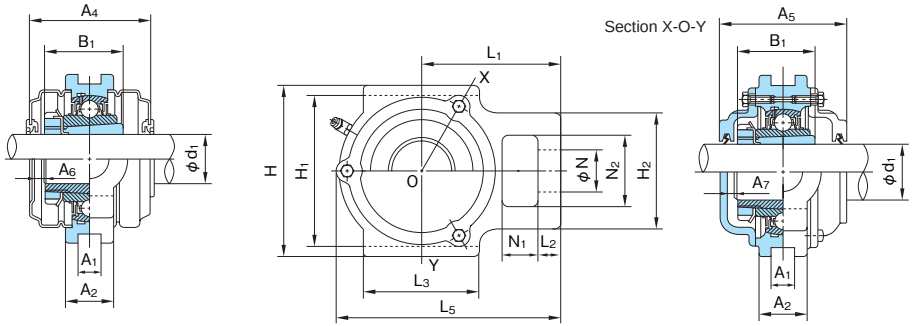
Take-up Units

UKT+H type With adapter assembly Tapered bore

Shaft dia.: 20～60mm



With steel covers



With cast covers

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)																			Bearings			Housing No.	Unit No. with steel covers	Unit No. with cast covers	Mass of Unit (kg)		
		A	A_1	A_2	H	H_1	H_2	L	L_5	L_1	L_2	L_3	N	N_1	N_2	B_1	A_4	A_5	A_6	A_7	No.	Basic load rating (N) Cr	Basic load rating (N) Cor		Covers with rubber seal (End cover on one side)	Covers with rubber seal (End cover on one side)	standard	With steel cover	With cast cover
20	UKT205+H2305	32	12	24	89	76	51	97	100	62	10	51	19	16	32	35	63	70	11	9	UK205+H2305	14000	7900	T205	UKT205C(E)+H2305	CUKT205C(CE)+H2305	0.83	0.94	1.6
	UKTX05+H2305	37	12	28	102	89	56	113	—	70	10	57	22	16	37	35	65	—	10	—	UKX05+H2305	19600	11300	TX05	UKTX05C(E)+H2305	—	1.3	1.3	—
	UKT305+H2305	36	12	26	89	80	62	122	122	76	12	65	26	16	36	35	—	78	—	12	UK305+H2305	21300	10900	T305	—	CUKT305C(CE)+H2305	1.4	—	2.1
25	UKT206+H2306	37	12	28	102	89	56	113	113	70	10	57	22	16	37	38	65	74	10	10	UK206+H2306	19600	11300	T206	UKT206C(E)+H2306	CUKT206C(CE)+H2306	1.4	1.5	2.1
	UKTX06+H2306	37	12	30	102	89	64	129	—	78	13	64	22	16	37	38	70	—	12	—	UKX06+H2306	25900	15400	TX06	UKTX06C(E)+H2306	—	1.7	1.7	—
	UKT306+H2306	41	16	28	100	90	70	137	137	85	14	74	28	18	41	38	—	84	—	13	UK306+H2306	26800	15000	T306	—	CUKT306C(CE)+H2306	1.8	—	2.6
30	UKT207+H2307	37	12	30	102	89	64	129	129	78	13	64	22	16	37	43	70	80	11	11	UK207+H2307	25900	15400	T207	UKT207C(E)+H2307	CUKT207C(CE)+H2307	1.7	1.9	2.7
	UKTX07+H2307	49	16	36	114	102	83	144	—	88	15	83	29	19	49	43	83	—	17	—	UKX07+H2307	29300	17900	TX07	UKTX07C(E)+H2307	—	2.6	2.6	—
	UKT307+H2307	45	16	32	111	100	75	150	150	94	15	80	30	20	45	43	—	90	—	14	UK307+H2307	33500	19200	T307	—	CUKT307C(CE)+H2307	2.5	—	3.4
35	UKT208+H2308	49	16	33	114	102	83	144	144	88	16	83	29	19	49	46	82	90	15	14	UK208+H2308	29300	17900	T208	UKT208C(E)+H2308	CUKT208C(CE)+H2308	2.5	2.6	3.5
	UKTX08+H2308	49	16	36	117	102	83	144	—	87	15	83	29	19	49	46	82	—	15	—	UKX08+H2308	33000	20500	TX08	UKTX08C(E)+H2308	—	2.6	2.6	—
	UKT308+H2308	50	18	34	124	112	83	162	162	100	17	89	32	22	50	46	—	100	—	17	UK308+H2308	40500	23900	T308	—	CUKT308C(CE)+H2308	3.1	—	4.1
40	UKT209+H2309	49	16	35	117	102	83	144	145	87	16	83	29	19	49	50	82	90	14	13	UK209+H2309	33000	20500	T209	UKT209C(E)+H2309	CUKT209C(CE)+H2309	2.5	2.7	3.8
	UKTX09+H2309	49	16	38	117	102	83	149	—	90	16	86	29	19	49	50	87	—	16	—	UKX09+H2309	35500	23200	TX09	UKTX09C(E)+H2309	—	2.8	3.0	—
	UKT309+H2309	55	18	38	138	125	90	178	178	110	18	97	34	24	55	50	—	106	—	17	UK309+H2309	51500	29500	T309	—	CUKT309C(CE)+H2309	4.1	—	5.6
45	UKT210+H2310	49	16	37	117	102	83	149	151	90	16	86	29	19	49	55	87	98	15	15	UK210+H2310	35500	23200	T210	UKT210C(E)+H2310	CUKT210C(CE)+H2310	2.7	3.0	4.3
	UKTX10+H2310	64	22	42	146	130	102	171	—	106	19	95	35	25	64	55	88	—	14	—	UKX10+H2310	43000	29400	TX10	UKTX10C(E)+H2310	—	4.4	4.6	—
	UKT310+H2310	61	20	40	151	140	98	191	191	117	20	106	37	27	61	55	—	114	—	19	UK310+H2310	61500	38200	T310	—	CUKT310C(CE)+H2310	5.3	—	7.1
50	UKT211+H2311	64	22	38	146	130	102	171	174	106	19	95	35	25	64	59	88	100	14	15	UK211+H2311	43000	29400	T211	UKT211C(E)+H2311	CUKT211C(CE)+H2311	4.1	4.5	5.8
	UKTX11+H2311	64	22	44	146	130	102	194	—	119	19	102	35	32	64	59	100	—	19	—	UKX11+H2311	52500	36100	TX11	UKTX11C(E)+H2311	—	5.1	5.3	—
	UKT311+H2311	66	22	44	163	150	105	207	207	127	21	115	39	29	66	59	—	120	—	20	UK311+H2311	71500	44800	T311	—	CUKT311C(CE)+H2311	6.4	—	8.4
55	UKT212+H2312	64	22	42	146	130	102	194	194	119	19	102	35	32	64	62	102	114	19	20	UK212+H2312	52500	36100	T212	UKT212C(E)+H2312	CUKT212C(CE)+H2312	5.1	5.6	7.2
	UKTX12+H2312	70	26	48	167	151	111	224	—	137	21	121	41	32	70	62	104	—	19	—	UKX12+H2312	57500	40000	TX12	UKTX12C(E)+H2312	—	7.1	7.3	—
	UKT312+H2312	71	22	46	178	160	113	220	220	135	23	123	41	31	71	62	—	130	—	23	UK312+H2312	81500	52000	T312	—	CUKT312C(CE)+H2312	7.6	—	10.8
60	UKT213+H2313	70	26	44	167	151	111	224	224	137	21	121	41	32	70	65	102	118	17	20	UK213+H2313	57500	40000	T213	UKT213C(E)+H2313	CUKT213C(CE)+H2313	7.1	7.6	9.5
	UKTX13+H2313	70	26	48	167	151	111	224	—	137	21	121	41	32	70	65	—	—	—	—	UKX13+H2313	62000	44000	TX13	—	—	7.2	—	—
	UKT313+H2313	80	26	50	190	170	116	238	242	146	25	134	43	32	70	65	—	140	—	24	UK313+H2313	92500	59700	T313	—	CUKT313C(CE)+H2313	9.1	—	12.9

Remarks: 1. Grease nipple: 1/4-28UNF

Remarks: 2. Examples of unit numbers with covers:

With steel cover { Covers with rubber seal on both sides :UKP210C+H2310
An end cover and a cover with rubber seal :UKT210E+H2310

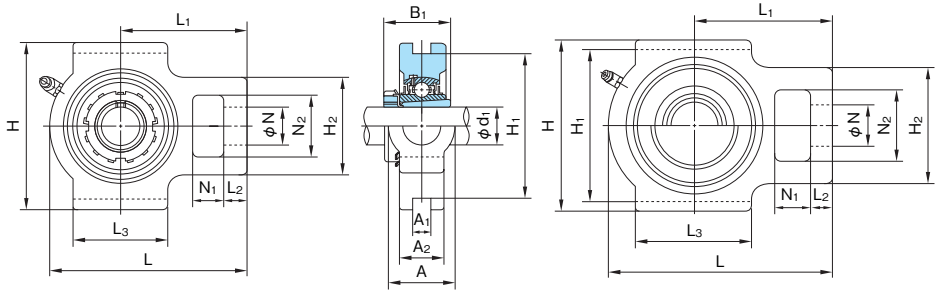
With cast cover { Covers with rubber seal on both sides :UKP210C+H2310
An end cover and a cover with rubber seal :CUKT210CE+H2310

NACHI

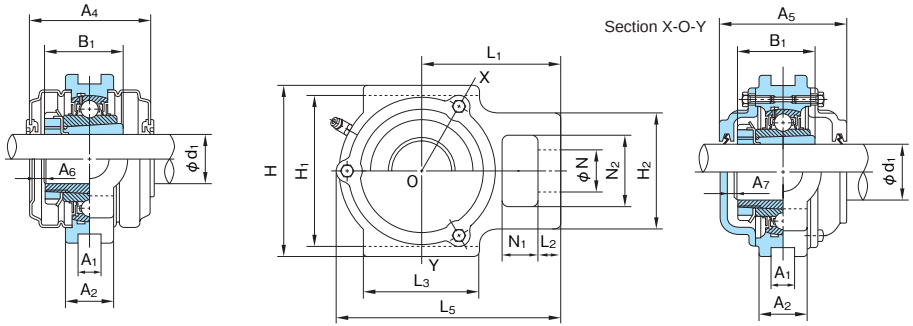
Take-up Units

UKT+H type With adapter assembly Tapered bore

Shaft dia.: 65～125mm



With steel covers



With cast covers

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)																			Bearings			Housing No.	Unit No. with steel covers	Unit No. with cast covers	Mass of Unit (kg)		
		A	A_1	A_2	H	H_1	H_2	L	L_5	L_1	L_2	L_3	N	N_1	N_2	B_1	A_4	A_5	A_6	A_7	No.	Basic load rating (N) Cr	Basic load rating (N) Cor		Covers with rubber seal (End cover on one side)	Covers with rubber seal (End cover on one side)	standard	With steel cover	With cast cover
65	**UKT215+H2315**	70	26	48	167	151	111	232	232	140	21	121	41	32	70	73	—	136	—	26	UK215+H2315	66000	48200	T215	—	**CUKT215C(CE)+H2315**	7.9	—	10.7
	UKTX15+H2315	70	28	48	184	165	111	235	—	140	21	121	41	32	70	73	—	—	—	—	UKX15+H2315	72500	53000	TX15	—	—	8.4	—	—
	UKT315+H2315	90	26	55	216	192	132	262	266	160	25	150	46	36	85	73	—	150	—	25	UK315+H2315	114000	76900	T315	—	**CUKT315C(CE)+H2315**	13.1	—	17.6
70	**UKT216+H2316**	70	26	51	184	165	111	235	236	140	21	121	41	32	70	78	—	146	—	26	UK216+H2316	72500	53000	T216	—	**CUKT216C(CE)+H2316**	8.9	—	12.9
	UKTX16+H2316	73	28	54	198	173	124	260	—	162	28	157	48	38	73	78	—	—	—	—	UKX16+H2316	83500	61800	TX16	—	—	11.4	—	—
	UKT316+H2316	102	30	60	230	204	150	282	285	174	28	160	53	42	98	78	—	154	—	23	UK316+H2316	123000	86400	T316	—	**CUKT316C(CE)+H2316**	15.9	—	21.1
75	**UKT217+H2317**	73	30	54	198	173	124	260	264	162	29	157	48	38	73	82	—	150	—	26	UK217+H2317	83500	61800	T217	—	**CUKT217C(CE)+H2317**	11.7	—	16.1
	UKTX17+H2317	73	28	54	198	173	124	260	—	162	28	157	48	38	73	82	—	—	—	—	UKX17+H2317	95500	71400	TX17	—	—	10.9	—	—
	UKT317+H2317	102	32	64	240	214	152	298	302	183	30	170	53	42	98	82	—	164	—	26	UK317+H2317	132000	96500	T317	—	**CUKT317C(CE)+H2317**	19.3	—	24.6
80	**UKT318+H2318**	110	32	66	255	228	160	312	316	192	30	175	57	46	106	86	—	168	—	26	UK318+H2318	143000	107200	T318	—	**CUKT318C(CE)+H2318**	21.4	—	28.4
85	**UKT319+H2319**	110	35	72	270	240	165	322	326	197	31	180	57	46	106	90	—	180	—	30	UK319+H2319	153000	118400	T319	—	**CUKT319C(CE)+H2319**	24.4	—	31.5
90	**UKT320+H2320**	120	35	75	290	260	175	345	349	210	32	200	59	48	115	97	—	190	—	31	UK320+H2320	173000	140400	T320	—	**CUKT320C(CE)+H2320**	30.6	—	38.5
100	**UKT322+H2322**	130	38	80	320	285	185	385	387	235	38	215	65	52	125	105	—	210	—	36	UK322+H2322	205000	178800	T322	—	**CUKT322C(CE)+H2322**	38.9	—	48.9
110	**UKT324+H2324**	140	45	90	355	320	210	432	432	267	42	230	70	60	140	112	—	220	—	35	UK324+H2324	207000	184800	T324	—	**CUKT324C(CE)+H2324**	54.1	—	67.5
115	**UKT326+H2326**	150	50	100	385	350	220	465	465	285	45	240	75	65	150	121	—	230	—	36	UK326+H2326	229000	214300	T326	—	**CUKT326C(CE)+H2326**	68.7	—	85.0
125	**UKT328+H2328**	155	50	100	415	380	230	515	515	315	50	255	80	70	160	131	—	240	—	37	UK328+H2328	255000	246000	T328	—	**CUKT328C(CE)+H2328**	83.5	—	103

Remarks: 1. Grease nipple: PF1/8

Remarks: 2. Examples of unit numbers with covers:

With cast cover { Covers with rubber seal on both sides :CUKT315C+H2315
An end cover and a cover with rubber seal :CUKT315CE+H2315

NACHI

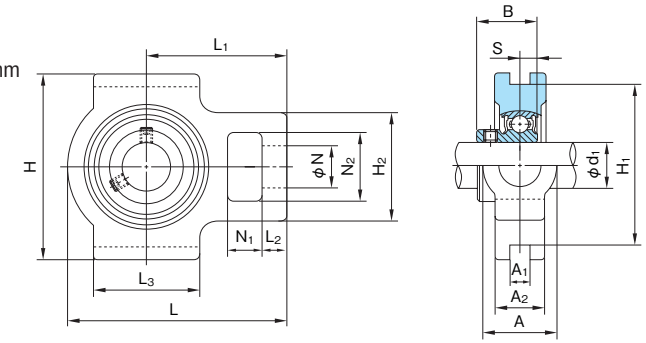
Take-up Units

BT200 type

With set screws

Cylindrical bore

Shaft dia.: 20～35mm



1N=0.102kgf

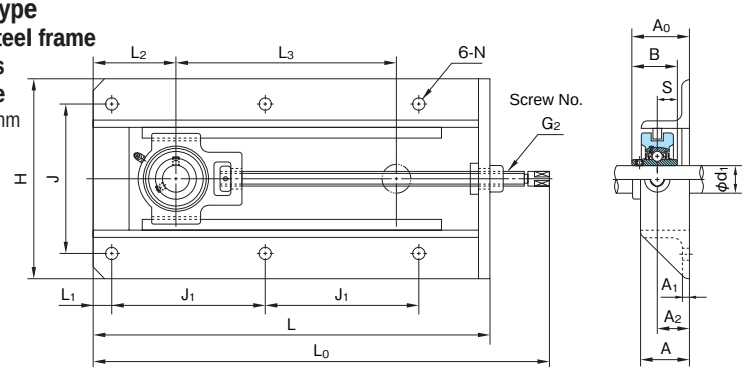
Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)																Bearings			Housing No.	Mass of Unit (kg)
		A	A_1	A_2	H	H_1	H_2	L	L_1	L_2	L_3	N	N_1	N_2	B	S		No.	Basic load rating (N) Cr	Basic load rating (N) Cor		
20	**BT204**	32	12	21	89	76	51	94	61	10	51	19	16	32	24.7	7		B4	12800	6600	T204 G00	0.70
25	**BT205**	32	12	24	89	76	51	97	62	10	51	19	16	32	27	7.5		B5	14000	7900	T205 G00	0.79
30	**BT206**	37	12	28	102	89	56	113	70	10	57	22	16	37	30.3	8		B6	19600	11300	T206 G00	1.2
35	**BT207**	37	12	30	102	89	64	129	78	13	64	22	16	37	32.9	8.5		B7	25900	15400	T207 G00	1.6

NACHI

Take-up Units

UCT200+WB type

With pressed steel frame
With set screws
Cylindrical bore
Shaft dia.: 12～65mm



1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)																Bolt size		Frame No.	Bearings			Mass of Unit (kg)
		H	L	J	J_1	N	L_1	L_2	L_3	G_2	L_0	A	A_1	A_2	A_0	B	S				No.	Basic load rating (N) Cr	Basic load rating (N) Cor	
12	UCT201+WB	199	317	154	117	12	19	83	150	Tr16	367	50	29	6	47.3	31	12.7	M10		WB205	UC201	12800	6600	5.0
15	UCT202+WB	199	317	154	117	12	19	83	150	Tr16	367	50	29	6	47.3	31	12.7	M10		WB205	UC202	12800	6600	5.0
17	UCT203+WB	199	317	154	117	12	19	83	150	Tr16	367	50	29	6	47.3	31	12.7	M10		WB205	UC203	12800	6600	5.0
20	UCT204+WB	199	317	154	117	12	19	83	150	Tr16	367	50	29	6	47.3	31	12.7	M10		WB205	UC204	12800	6600	5.0
25	UCT205+WB	199	317	154	117	12	19	83	150	Tr16	368	50	29	6	48.7	34	14.3	M10		WB205	UC205	14000	7900	5.0
30	UCT206+WB	212	337	166	127	12	19	95	150	Tr18	396	50	30	6	52.2	38.1	15.9	M10		WB206	UC206	19600	11300	5.9
35	UCT207+WB	212	429	166	173	12	19	99	230	Tr18	490	50	30	6	55.4	42.9	17.5	M10		WB207	UC207	25900	15400	7.9
40	UCT208+WB	233	520	192	219	15	22	108	300	Tr26	591	50	30	6	60.2	49.2	19	M12		WB210	UC208	29300	17900	11.1
45	UCT209+WB	233	520	192	219	15	22	108	300	Tr26	590	50	30	6	60.2	49.2	19	M12		WB210	UC209	33000	20500	11.1
50	UCT210+WB	233	520	192	219	15	22	108	300	Tr26	593	50	30	6	62.6	51.6	19	M12		WB210	UC210	35500	23200	11.2
55	UCT211+WB	301	542	240	230	15	22	114	300	Tr30	631	65	38	6	71.4	55.6	22.2	M12		WB211	UC211	43000	29400	17.3
60	UCT212+WB	301	568	240	243	15	22	127	300	Tr30	657	65	38	6	77.7	65.1	25.4	M12		WB212	UC212	52500	36100	18.7
65	UCT213+WB	322	606	260	260	15	22	144	300	Tr36	699	65	38	6	77.7	65.1	25.4	M12		WB213	UC213	57500	40000	23.4

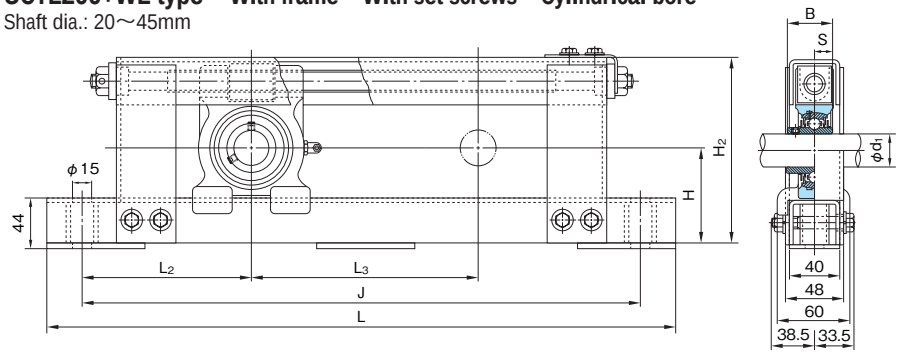
Remark: Grease nipple: 1/4-28UNF

NACHI

Take-up Units

UCTL200+WL type With frame With set screws Cylindrical bore

Shaft dia.: 20～45mm



1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)								Bolt size		Bearings			Housing No.	Frame No.	Mass of Unit (kg)
		H	H_2	L	J	L_2	L_3	B	S			No.	Basic load rating (N) Cr	Basic load rating (N) Cor			
20	*UCTL204+WL100*	77	146	430	370	135	100	31	12.7	M12		UC204	12800	6600	TL204	*WL204-100*	5.6
	UCTL204+WL200			530	470		200									WL204-200	6.3
	UCTL204+WL300			630	570		300									*WL204-300*	7.0
	UCTL204+WL400			730	670		400									*WL204-400*	7.7
25	*UCTL205+WL100*	82	156	440	380	140	100	34	14.3	M12		UC205	14000	7900	TL205	*WL205-100*	6.0
	UCTL205+WL200			540	480		200									WL205-200	6.7
	UCTL205+WL300			640	580		300									WL205-300	7.4
	UCTL205+WL400			740	680		400									*WL205-400*	8.1
30	*UCTL206+WL100*	87	166	450	390	145	100	38.1	15.9	M12		UC206	19600	11300	TL206	*WL206-100*	6.5
	UCTL206+WL200			550	490		200									WL206-200	7.2
	UCTL206+WL300			650	590		300									WL206-300	7.9
	UCTL206+WL400			750	690		400									*WL206-400*	8.6
35	*UCTL207+WL100*	92	176	460	400	150	100	42.9	17.5	M12		UC207	25900	15400	TL207	*WL207-100*	7.1
	UCTL207+WL200			560	500		200									WL207-200	7.8
	UCTL207+WL300			660	600		300									WL207-300	8.5
	UCTL207+WL400			760	700		400									*WL207-400*	9.2
40	*UCTL208+WL100*	97	186	470	410	155	100	49.2	19	M12		UC208	29300	17900	TL208	*WL208-100*	7.8
	UCTL208+WL200			570	510		200									WL208-200	8.5
	UCTL208+WL300			670	610		300									WL208-300	9.2
	UCTL208+WL400			770	710		400									*WL208-400*	9.9
45	*UCTL209+WL100*	100	192	480	420	160	100	49.2	19	M12		UC209	33000	20500	TL209	*WL209-100*	8.2
	UCTL209+WL200			580	520		200									WL209-200	8.9
	UCTL209+WL300			680	620		300									WL209-300	9.6
	UCTL209+WL400			780	720		400									*WL209-400*	10.3

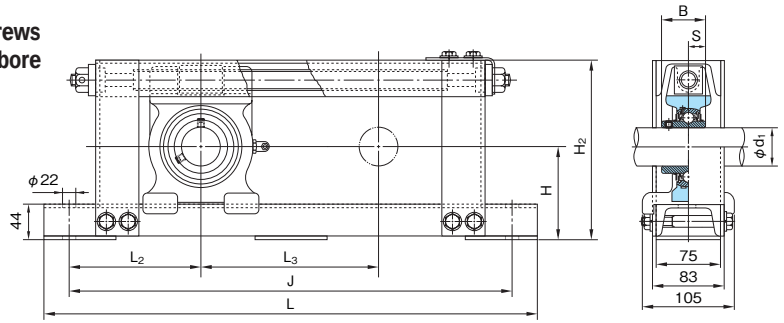
Remarks: 1. Please contact NACHI for *unit numbers appearing* in italic.
2. Grease nipple: PF1/8

NACHI

Take-up Units

UCTU200+WU type

With frame
With set screws
Cylindrical bore
Shaft dia.:
40～60mm



1N=0.102kgf

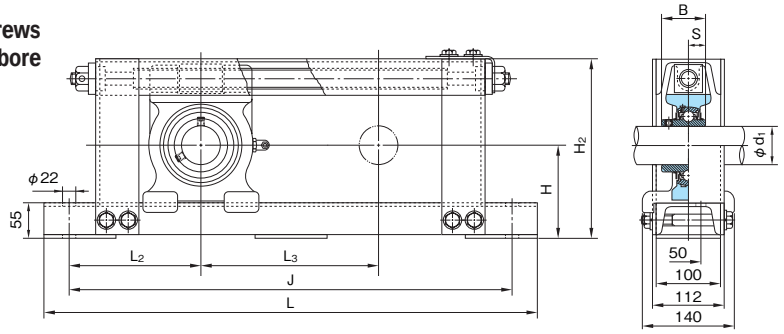
Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)								Bolt size		Bearings			Housing No.	Frame No.	Mass of Unit (kg)
		H	H_2	L	J	L_2	L_3	B	S			No.	Basic load rating (N) Cr	Basic load rating (N) Cor			
40	**UCTU208+WU500**	97	190	870	810	155	500	49.2	19	M18		UC208	29300	17900	TC208	**WU208-500**	19.0
	UCTU208+WU600			970	910		600									***WU208-600***	20.6
	UCTU208+WU700			1070	1010		700									***WU208-700***	22.2
	UCTU208+WU800			1170	1110		800									***WU208-800***	23.8
	UCTU208+WU900			1270	1210		900									***WU208-900***	25.3
45	**UCTU209+WU500**	102	200	880	820	160	500	19.2	19	M18		UC209	33000	20500	TC209	**WU209-500**	19.7
	UCTU209+WU600			980	920		600									***WU209-600***	21.3
	UCTU209+WU700			1080	1020		700									***WU209-700***	22.9
	UCTU209+WU800			1180	1120		800									***WU209-800***	24.5
	UCTU209+WU900			1280	1220		900									***WU209-900***	26.1
50	**UCTU210+WU500**	107	210	890	830	165	500	51.6	19	M18		UC210	35500	23200	TC210	**WU210-500**	20.5
	UCTU210+WU600			990	930		600									***WU210-600***	22.2
	UCTU210+WU700			1090	1030		700									***WU210-700***	23.8
	UCTU210+WU800			1190	1130		800									***WU210-800***	25.4
	UCTU210+WU900			1290	1230		900									***WU210-900***	27.0
55	**UCTU211+WU500**	115	230	910	850	175	500	55.6	22.2	M18		UC211	43000	29400	TC211	**WU211-500**	22.4
	UCTU211+WU600			1010	950		600									***WU211-600***	23.7
	UCTU211+WU700			1110	1050		700									***WU211-700***	25.8
	UCTU211+WU800			1210	1150		800									***WU211-800***	27.4
	UCTU211+WU900			1310	1250		900									***WU211-900***	29.1
60	**UCTU212+WU500**	120	240	920	860	180	500	65.1	25.4	M18		UC212	52500	36100	TC212	**WU212-500**	23.9
	UCTU212+WU600			1020	960		600									***WU212-600***	25.6
	UCTU212+WU700			1120	1060		700									***WU212-700***	27.2
	UCTU212+WU800			1220	1160		800									***WU212-800***	28.9
	UCTU212+WU900			1320	1260		900									***WU212-900***	30.6

Remarks: 1. Please contact NACHI for *unit numbers appearing* in italic.
2. Grease nipple: PF1/8

Take-up Units

UCTU300+WU type

With frame
With set screws
Cylindrical bore
Shaft dia.:
65～90mm



1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)								Bolt size		Bearings			Housing No.	Frame No.	Mass of Unit (kg)
		H	H_2	L	J	L_2	L_3	B	S			No.	Basic load rating (N) Cr	Basic load rating (N) Cor			
65	UCTU313+WU500	145	285	940	880	190	500	75	30	M18		UC313	92500	59700	TU313	WU313-500	38.3
	UCTU313+WU600			1040	980		600									*WU313-600*	40.6
	UCTU313+WU700			1140	1080		700									*WU313-700*	42.9
	UCTU313+WU800			1240	1180		800									*WU313-800*	45.3
	UCTU313+WU900			1340	1280		900									*WU313-900*	47.6
70	UCTU314+WU500	150	295	960	900	200	500	78	33	M18		UC314	104000	68000	TU314	WU314-500	40.8
	UCTU314+WU600			1060	1000		600									*WU314-600*	43.1
	UCTU314+WU700			1160	1100		700									*WU314-700*	45.4
	UCTU314+WU800			1260	1200		800									*WU314-800*	47.8
	UCTU314+WU900			1360	1300		900									*WU314-900*	50.1
75	UCTU315+WU500	155	305	980	920	210	500	82	32	M18		UC315	114000	76900	TU315	WU315-500	43.6
	UCTU315+WU600			1080	1020		600									*WU315-600*	45.9
	UCTU315+WU700			1180	1120		700									*WU315-700*	48.3
	UCTU315+WU800			1280	1220		800									*WU315-800*	50.6
	UCTU315+WU900			1380	1320		900									*WU315-900*	52.9
80	UCTU316+WU500	160	315	1000	940	220	500	86	34	M18		UC316	123000	86400	TU316	WU316-500	45.1
	UCTU316+WU600			1100	1040		600									*WU316-600*	47.4
	UCTU316+WU700			1200	1140		700									*WU316-700*	49.7
	UCTU316+WU800			1300	1240		800									*WU316-800*	52.0
	UCTU316+WU900			1400	1340		900									*WU316-900*	54.4
85	UCTU317+WU500	165	325	1020	960	230	500	96	40	M18		UC317	132000	96500	TU317	WU317-500	49.8
	UCTU317+WU600			1120	1060		600									*WU317-600*	52.1
	UCTU317+WU700			1220	1160		700									*WU317-700*	54.4
	UCTU317+WU800			1320	1260		800									*WU317-800*	56.7
	UCTU317+WU900			1420	1360		900									*WU317-900*	59.0
90	UCTU318+WU500	170	335	1050	990	245	500	96	40	M18		UC318	143000	107200	TU318	WU318-500	53.1
	UCTU318+WU600			1150	1090		600									*WU318-600*	55.4
	UCTU318+WU700			1250	1190		700									*WU318-700*	57.7
	UCTU318+WU800			1350	1290		800									*WU318-800*	60.1
	UCTU318+WU900			1450	1390		900									*WU318-900*	62.4

Remarks: 1. Please contact NACHI for *unit numbers appearing* in italic.
2. Grease nipple: PF1/8

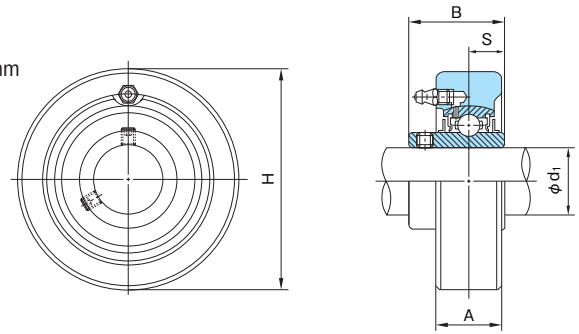
Cylindrical Cartridge Units

UCC type

With set screws

Cylindrical bore

Shaft dia.: 12～140mm



1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)				Bearings			Housing No.	Mass of Unit (kg)
		H	A	B	S	No.	Basic load rating (N) Cr	Cor		
12	UCC201	72	20	31	12.7	UC201	12800	6600	C204	0.54
15	UCC202	72	20	31	12.7	UC202	12800	6600	C204	0.52
17	UCC203	72	20	31	12.7	UC203	12800	6600	C204	0.51
20	UCC204	72	20	31	12.7	UC204	12800	6600	C204	0.49
25	UCC205	80	22	34	14.3	UC205	14000	7900	C205	0.65
	UCCX05	90	27	38.1	15.9	UCX05	19600	11300	CX05	1.0
	UCC305	90	26	38	15	UC305	21300	10900	C305	1.1
30	UCC206	85	27	38.1	15.9	UC206	19600	11300	C206	0.82
	UCCX06	100	30	42.9	17.5	UCX06	25900	15400	CX06	1.3
	UCC306	100	28	43	17	UC306	26800	15000	C306	1.3
35	UCC207	90	28	42.9	17.5	UC207	25900	15400	C207	0.93
	UCCX07	110	34	49.2	19	UCX07	29300	17900	CX07	1.9
	UCC307	110	32	48	19	UC307	33500	19200	C307	1.8
40	UCC208	100	30	49.2	19	UC208	29300	17900	C208	1.2
	UCCX08	120	38	49.2	19	UCX08	33000	20500	CX08	2.3
	UCC308	120	34	52	19	UC308	40500	23900	C308	2.2
45	UCC209	110	31	49.2	19	UC209	33000	20500	C209	1.5
	UCCX09	120	38	51.6	19	UCX09	35500	23200	CX09	2.3
	UCC309	130	38	57	22	UC309	51500	29500	C309	2.7
50	UCC210	120	33	51.6	19	UC210	35500	23200	C210	1.9
	UCCX10	130	40	55.6	22.2	UCX10	43000	29400	CX10	2.8
	UCC310	140	40	61	22	UC310	61500	38200	C310	3.3
55	UCC211	125	35	55.6	22.2	UC211	43000	29400	C211	2.1
	UCCX11	150	42	65.1	25.4	UCX11	52500	36100	CX11	4.7
	UCC311	150	44	66	25	UC311	71500	44800	C311	3.9
60	UCC212	130	38	65.1	25.4	UC212	52500	36100	C212	2.5
	UCCX12	160	44	65.1	25.4	UCX12	57500	40000	CX12	5.1
	UCC312	160	46	71	26	UC312	81500	52000	C312	4.8
65	UCC213	140	40	65.1	25.4	UC213	57500	40000	C213	3.0
	UCC313	170	50	75	30	UC313	92500	59700	C313	5.7
70	UCC314	180	52	78	33	UC314	104000	68000	C314	6.6
75	UCC315	190	55	82	32	UC315	114000	76900	C315	7.7
80	UCC316	200	60	86	34	UC316	123000	86400	C316	8.9
85	UCC317	215	64	96	40	UC317	132000	96500	C317	11.2
90	UCC318	225	66	96	40	UC318	143000	107200	C318	12.3
95	UCC319	240	72	103	41	UC319	153000	118400	C319	15.2

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)				Bearings			Housing No.	Mass of Unit (kg)
		H	A	B	S	No.	Basic load rating (N) Cr	Cor		
100	UCC320	260	75	108	42	UC320	173000	140400	C320	19.2
105	UCC321	260	75	112	44	UC321	183000	153100	C321	18.9
110	UCC322	300	80	117	46	UC322	205000	178800	C322	28.1
120	UCC324	320	90	126	51	UC324	207000	184800	C324	35.0
130	UCC326	340	100	135	54	UC326	229000	214300	C326	42.2
140	UCC328	360	100	145	59	UC328	255000	246000	C328	48.9

Remark: Grease nipple: 1/4-28UNF for bore number 13 and under
PF1/8 for bore number 14 and over

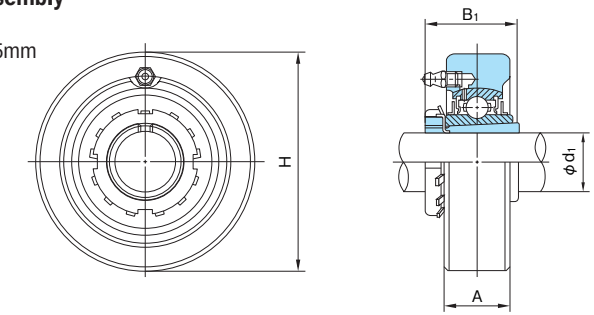
Cylindrical Cartridge Units

UKC+H type

With adapter assembly

Tapered bore

Shaft dia.: 20～125mm



1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)			Bearings			Housing No.	Mass of Unit (kg)
		H	A	B_1	No.	Basic load rating (N)			
						Cr	Cor		
20	**UKC205+H2305**	80	22	35	UK205+H2305	14000	7900	C205	0.70
	UKCX05+H2305	90	27	35	UKX05+H2305	19600	11300	CX05	1.0
	UKC305+H2305	90	26	35	UK305+H2305	21300	10900	C305	1.1
25	**UKC206+H2306**	85	27	38	UK206+H2306	19600	11300	C206	0.90
	UKCX06+H2306	100	30	38	UKX06+H2306	25900	15400	CX06	1.4
	UKC306+H2306	100	28	38	UK306+H2306	26800	15000	C306	1.4
30	**UKC207+H2307**	90	28	43	UK207+H2307	25900	15400	C207	0.99
	UKCX07+H2307	110	34	43	UKX07+H2307	29300	17900	CX07	1.8
	UKC307+H2307	110	32	43	UK307+H2307	33500	19200	C307	1.8
35	**UKC208+H2308**	100	30	46	UK208+H2308	29300	17900	C208	1.3
	UKCX08+H2308	120	38	46	UKX08+H2308	33000	20500	CX08	2.3
	UKC308+H2308	120	34	46	UK308+H2308	40500	23900	C308	2.2
40	**UKC209+H2309**	110	31	50	UK209+H2309	33000	20500	C209	1.7
	UKCX09+H2309	120	38	50	UKX09+H2309	35500	23200	CX09	2.3
	UKC309+H2309	130	38	50	UK309+H2309	51500	29500	C309	2.7
45	**UKC210+H2310**	120	33	55	UK210+H2310	35500	23200	C210	2.1
	UKCX10+H2310	130	40	55	UKX10+H2310	43000	29400	CX10	2.8
	UKC310+H2310	140	40	55	UK310+H2310	61500	38200	C310	3.3
50	**UKC211+H2311**	125	35	59	UK211+H2311	43000	29400	C211	2.3
	UKCX11+H2311	150	42	59	UKX11+H2311	52500	36100	CX11	4.6
	UKC311+H2311	150	44	59	UK311+H2311	71500	44800	C311	3.9
55	**UKC212+H2312**	130	38	62	UK212+H2312	52500	36100	C212	2.6
	UKCX12+H2312	160	44	62	UKX12+H2312	57500	40000	CX12	5.1
	UKC312+H2312	160	46	62	UK312+H2312	81500	52000	C312	4.7
60	**UKC213+H2313**	140	40	65	UK213+H2313	57500	40000	C212	3.1
	UKC313+H2313	170	50	65	UK313+H2313	92500	59700	C312	5.6
65	**UKC315+H2315**	190	55	73	UK315+H2315	114000	76900	C315	7.8
70	**UKC316+H2316**	200	60	78	UK316+H2316	123000	86400	C316	9.1
75	**UKC317+H2317**	215	64	82	UK317+H2317	132000	96500	C317	11.2
80	**UKC318+H2318**	225	66	86	UK318+H2318	143000	107200	C318	12.5
85	**UKC319+H2319**	240	72	90	UK319+H2319	153000	118400	C319	15.2
90	**UKC320+H2320**	260	75	97	UK320+H2320	173000	140400	C320	19.2

1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)			Bearings			Housing No.	Mass of Unit (kg)
		H	A	B_1	No.	Basic load rating (N)			
						Cr	Cor		
100	**UKC322+H2322**	300	80	105	UK322+H2322	205000	178800	C322	28.2
110	**UKC324+H2324**	320	90	112	UK324+H2324	207000	184800	C324	34.5
115	**UKC326+H2326**	340	100	121	UK326+H2326	229000	214300	C326	42.5
125	**UKC328+H2328**	360	100	131	UK328+H2328	255000	246000	C328	49.2

Remark: Grease nipple: 1/4-28UNF for bore number 13 and under
PF1/8 for bore number 14 and over

NACHI

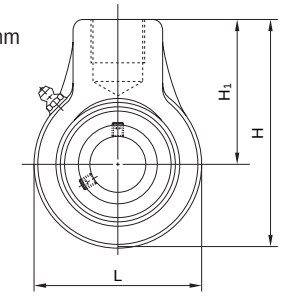
Hanger Units

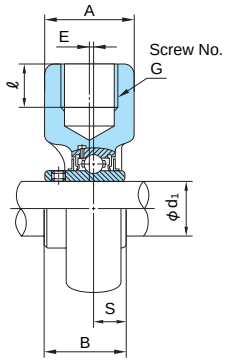
UCECH type

With set screws

Cylindrical bore

Shaft dia.: 12～60mm





1N=0.102kgf

Shaft dia. d_1 (mm)	Unit No.	Boundary dimensions (mm)										Bearings			Housing No.	Mass of Unit (kg)
		H	L	H_1	A	G	ℓ	B	S	E		No.	Basic load rating (N)			
													Cr	Cor		
12	**UCECH201**	96	64	64	40	PF3/4	19	31	12.7	0		UC201	12800	6600	ECH204	0.85
15	**UCECH202**	96	64	64	40	PF3/4	19	31	12.7	0		UC202	12800	6600	ECH204	0.83
17	**UCECH203**	96	64	64	40	PF3/4	19	31	12.7	0		UC203	12800	6600	ECH204	0.82
20	**UCECH204**	96	64	64	40	PF3/4	19	31	12.7	0		UC204	12800	6600	ECH204	0.80
25	**UCECH205**	99	70	64	40	PF3/4	19	34	14.3	0		UC205	14000	7900	ECH205	0.74
30	**UCECH206**	104	80	64	40	PF3/4	19	38.1	15.9	0		UC206	19600	11300	ECH206	0.91
35	**UCECH207**	116	92	70	40	PF3/4	19	42.9	17.5	0		UC207	25900	15400	ECH207	1.2
40	**UCECH208**	121	96	73	40	PF3/4	19	49.2	19	2		UC208	29300	17900	ECH208	1.4
45	**UCECH209**	136	108	82	48	PF1	21	49.2	19	4		UC209	33000	20500	ECH209	1.8
50	**UCECH210**	140	114	83	48	PF1	21	51.6	19	5		UC210	35500	23200	ECH210	1.9
55	**UCECH211**	160	126	97	60	PF1¼	28	55.6	22.2	6		UC211	43000	29400	ECH211	2.3
60	**UCECH212**	173	142	102	60	PF1¼	28	65.1	25.4	9		UC212	52500	36100	ECH212	4.2

Remark: Grease nipple: 1/4-28UNF

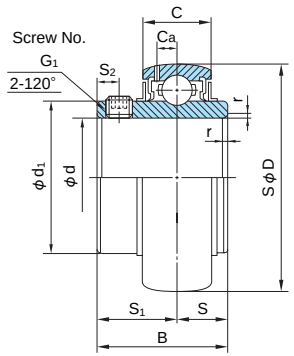
Ball Bearings for Units

UC type

With set screws

Cylindrical bore

Shaft dia.: 12～140mm



1N=0.102kgf

Shaft dia. (mm)	Ball Bearing No.	Boundary dimensions (mm)											Basic load rating (N)		Mass (kg)
		d	D	B	C	r	S	S_1	S_2	G_1	Ca	d_1	Cr	Cor	
12	UC201	12	47	31	17	1	12.7	18.3	4.5	M 6×0.75	4.5	29	12800	6600	0.21
15	UC202	15	47	31	17	1	12.7	18.3	4.5	M 6×0.75	4.5	29	12800	6600	0.19
17	UC203	17	47	31	17	1	12.7	18.3	4.5	M 6×0.75	4.5	29	12800	6600	0.18
20	UC204	20	47	31	17	1.5	12.7	18.3	4.5	M 6×0.75	4.5	29	12800	6600	0.16
25	UC205	25	52	34	17	1.5	14.3	19.7	5	M 6×0.75	4.5	34	14000	7900	0.19
	UCX05	25	62	38.1	19	1.5	15.9	22.2	5	M 6×0.75	5.1	40.5	19600	11300	0.37
	UC305	25	62	38	21	2	15	23	6	M 6×0.75	6.1	36.9	21300	10900	0.44
30	UC206	30	62	38.1	19	1.5	15.9	22.2	5	M 6×0.75	5.1	40.5	19600	11300	0.31
	UCX06	30	72	42.9	20	1.5	17.5	25.4	6	M 8×1	5.8	48	25900	15400	0.46
	UC306	30	72	43	23	2	17	26	6	M 6×0.75	6.7	45	26800	15000	0.56
35	UC207	35	72	42.9	20	2	17.5	25.4	6	M 8×1	5.8	48	25900	15400	0.48
	UCX07	35	80	49.2	21	2	19	30.2	8	M 8×1	6.2	53	29300	17900	0.74
	UC307	35	80	48	25	2.5	19	29	8	M 8×1	7.4	50.5	33500	19200	0.71
40	UC208	40	80	49.2	21	2	19	30.2	8	M 8×1	6.2	53	29300	17900	0.62
	UCX08	40	85	49.2	22	2	19	30.2	8	M 8×1	6.5	57.3	33000	20500	0.80
	UC308	40	90	52	27	2.5	19	33	10	M10×1.25	8.2	56	40500	23900	1.00
45	UC209	45	85	49.2	22	2	19	30.2	8	M 8×1	6.5	57.3	33000	20500	0.67
	UCX09	45	90	51.6	23	2	19	32.6	9	M10×1.25	6.5	63	35500	23200	0.92
	UC309	45	100	57	30	2.5	22	35	10	M10×1.25	9	63	51500	29500	1.28
50	UC210	50	90	51.6	23	2	19	32.6	9	M10×1.25	6.5	63	35500	23200	0.78
	UCX10	50	100	55.6	24	2	22.2	33.4	9	M10×1.25	7.3	70	43000	29400	1.21
	UC310	50	110	61	32	3	22	39	12	M12×1.5	10	70.5	61500	38200	1.65
55	UC211	55	100	55.6	24	2.5	22.2	33.4	9	M10×1.25	7.3	70	43000	29400	1.03
	UCX11	55	110	65.1	26	2.5	25.4	39.7	10	M10×1.25	7.7	77	52500	36100	1.72
	UC311	55	120	66	34	3	25	41	12	M12×1.5	10.7	76.5	71500	44800	2.07
60	UC212	60	110	65.1	26	2.5	25.4	39.7	10	M10×1.25	7.7	77	52500	36100	1.45
	UCX12	60	120	65.1	27	2.5	25.4	39.7	10	M10×1.25	8.3	82.1	57500	40000	1.97
	UC312	60	130	71	36	3.5	26	45	12	M12×1.5	11.5	82.5	81500	52000	2.59
65	UC213	65	120	65.1	27	2.5	25.4	39.7	10	M10×1.25	8.3	82.1	57500	40000	1.71
	UCX13	65	125	74.6	29	2.5	30.2	44.4	12	M12×1.5	8.7	87	62000	44000	2.33
	UC313	65	140	75	38	3.5	30	45	12	M12×1.5	12.2	88.5	92500	59700	3.15
70	UC214	70	125	74.6	29	2.5	30.2	44.4	12	M12×1.5	8.7	87	62000	44000	2.06
	UCX14	70	130	77.8	30	2.5	33.3	44.5	12	M12×1.5	9.2	91.5	66000	48200	2.57
	UC314	70	150	78	40	3.5	33	45	12	M12×1.5	13	95.2	104000	68000	3.83

1N=0.102kgf

Shaft dia. (mm)	Ball Bearing No.	Boundary dimensions (mm)											Basic load rating (N)		Mass (kg)
		d	D	B	C	r	S	S_1	S_2	G_1	Ca	d_1	Cr	Cor	
75	UC215	75	130	77.8	30	2.5	33.3	44.5	14	M12×1.5	9.2	91.5	66000	48200	2.22
	UCX15	75	140	82.6	32	2.5	33.3	49.3	12	M12×1.5	9.6	98.5	72500	53000	3.22
	UC315	75	160	82	42	3.5	32	50	14	M14×1.5	13.8	101.5	114000	76900	4.59
80	UC216	80	140	82.6	32	3	33.3	49.3	14	M12×1.5	9.6	98.5	72500	53000	2.82
	UCX16	80	150	85.7	34	3	34.1	51.6	12	M12×1.5	10.5	105	83500	61800	3.81
	UC316	80	170	86	44	3.5	34	52	14	M14×1.5	14.5	108	123000	86400	5.40
85	UC217	85	150	85.7	34	3	34.1	51.6	14	M12×1.5	10.5	105	83500	61800	3.38
	UCX17	85	160	96	36	3	39.7	56.3	12	M12×1.5	11.1	111.5	95500	71400	4.83
	UC317	85	180	96	46	4	40	56	16	M16×1.5	15	114.5	132000	96500	6.58
90	UC218	90	160	96	36	3	39.7	56.3	15	M12×1.5	11.1	111.5	95500	71400	4.34
	UCX18	90	170	104	38	3	42.9	61.1	14	M14×1.5	11.9	118	109000	81600	5.49
	UC318	90	190	96	48	4	40	56	16	M16×1.5	15.9	121	143000	107200	7.34
95	UC319	95	200	103	50	4	41	62	16	M16×1.5	16.7	127.5	153000	118400	8.70
100	UCX20	100	190	117.5	42	3.5	49.2	68.3	16	M16×1.5	13	132.5	134000	104700	9.04
	UC320	100	215	108	54	4	42	66	18	M18×1.5	18	135.5	173000	140400	10.8
105	UC321	105	225	112	56	4	44	68	18	M18×1.5	19	142	183000	153100	12.2
110	UC322	110	240	117	60	4	46	71	18	M18×1.5	21	152	205000	178800	14.3
120	UC324	120	260	126	64	4	51	75	18	M18×1.5	22	165	207000	184800	18.5
130	UC326	130	280	135	68	5	54	81	20	M20×1.5	23	178	229000	214300	23.0
140	UC328	140	300	145	73	5	59	86	20	M20×1.5	25	191.5	255000	246000	28.5

Remark: Chamfer dimensions **"r"** shown in the table are nominal dimension.

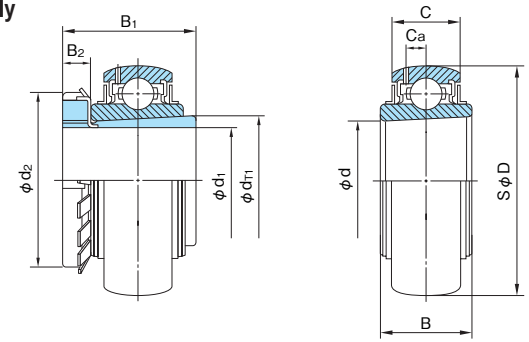
Ball Bearings for Units

UK+H type

With adapter assembly

Tapered bore

Shaft dia.: 20～125mm



1N=0.102kgf

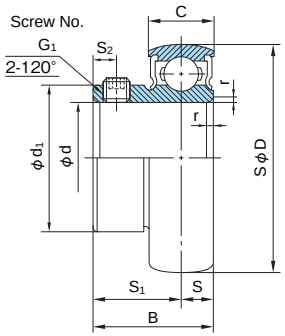
Shaft dia. (mm)	Ball Bearing No.	Boundary dimensions (mm)										Basic load rating (N)		Mass (kg)
		d_1	D	B_1	d	B	C	C_a	B_2	d_2	dT_1	Cr	Cor	
20	UK205+H2305	20	52	35	25	23	17	4.5	8	38	27.5	14000	7900	0.24
	UKX05+H2305	20	62	35	25	26	19	5.1	8	38	27.5	19600	11300	0.37
	UK305+H2305	20	62	35	25	26	21	6.1	8	38	27.5	21300	10900	0.48
25	UK206+H2306	25	62	38	30	26	19	5.1	8	45	32.5	19600	11300	0.40
	UKX06+H2306	25	72	38	30	27	20	5.8	8	45	32.5	25900	15400	0.54
	UK306+H2306	25	72	38	30	29	23	6.7	8	45	32.5	26800	15000	0.59
30	UK207+H2307	30	72	43	35	27	20	5.8	9	52	38	25900	15400	0.53
	UKX07+H2307	30	80	43	35	29	21	6.2	9	52	38	29300	17900	0.70
	UK307+H2307	30	80	43	35	31	25	7.4	9	52	38	33500	19200	0.74
35	UK208+H2308	35	80	46	40	29	21	6.2	10	58	43	29300	17900	0.69
	UKX08+H2308	35	85	46	40	30	22	6.5	10	58	43	33000	20500	0.81
	UK308+H2308	35	90	46	40	34	27	8.2	10	58	43	40500	23900	1.01
40	UK209+H2309	40	85	50	45	30	22	6.5	11	65	48.5	33000	20500	0.77
	UKX09+H2309	40	90	50	45	31	23	6.5	11	65	48.5	35500	23200	0.94
	UK309+H2309	40	100	50	45	37	30	9	11	65	48.5	51500	29500	1.31
45	UK210+H2310	45	90	55	50	31	23	6.5	12	70	54	35500	23200	0.93
	UKX10+H2310	45	100	55	50	33	24	7.3	12	70	54	43000	29400	1.22
	UK310+H2310	45	110	55	50	40	32	10	12	70	54	61500	38200	1.68
50	UK211+H2311	50	100	59	55	33	24	7.3	12	75	59	43000	29400	1.16
	UKX11+H2311	50	110	59	55	36	26	7.7	12	75	59	52500	36100	1.54
	UK311+H2311	50	120	59	55	43	34	10.7	12	75	59	71500	44800	2.06
55	UK212+H2312	55	110	62	60	36	26	7.7	13	80	64.5	52500	36100	1.47
	UKX12+H2312	55	120	62	60	38	27	8.3	13	80	64.5	57500	40000	1.89
	UK312+H2312	55	130	62	60	46	36	11.5	13	80	64.5	81500	52000	2.53
60	UK213+H2313	60	120	65	65	38	27	8.3	14	85	69.5	57500	40000	1.82
	UKX13+H2313	60	125	65	65	40	29	8.7	14	85	69.5	62000	44000	2.09
	UK313+H2313	60	140	65	65	48	38	12.2	14	85	69.5	92500	59700	3.07
65	UK215+H2315	65	130	73	75	41	30	9.2	15	98	80	66000	48200	2.59
	UKX15+H2315	65	140	73	75	44	32	9.6	15	98	80	72500	53000	3.25
	UK315+H2315	65	160	73	75	54	42	13.8	15	98	80	114000	76900	4.74
70	UK216+H2316	70	140	78	80	44	32	9.6	17	105	85.5	72500	53000	3.27
	UKX16+H2316	70	150	78	80	46	34	10.5	17	105	85.5	83500	61800	3.86
	UK316+H2316	70	170	78	80	57	44	14.5	17	105	85.5	123000	86400	5.62
75	UK217+H2317	75	150	82	85	46	34	10.5	18	110	90.5	83500	61800	3.92
	UKX17+H2317	75	160	82	85	49	36	11.1	18	110	90.5	95500	71400	4.72
	UK317+H2317	75	180	82	85	60	46	15	18	110	90.5	132000	96500	6.56

1N=0.102kgf

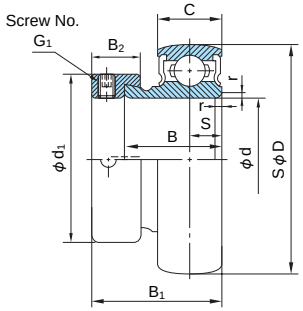
Shaft dia. (mm)	Ball Bearing No.	Boundary dimensions (mm)										Basic load rating (N)		Mass (kg)
		d_1	D	B_1	d	B	C	C_a	B_2	d_2	dT_1	Cr	Cor	
80	UK218+H2318	80	160	86	90	49	36	11.1	18	120	96	95500	71400	4.68
	UKX18+H2318	80	170	86	90	52	38	11.9	18	120	96	109000	81600	5.11
	UK318+H2318	80	190	86	90	63	48	15.9	18	120	96	143000	107200	7.52
85	UK319+H2319	85	200	90	95	66	50	16.7	19	125	101	153000	118400	8.72
90	UKX20+H2320	90	190	97	100	58	42	13	20	130	106.5	134000	104700	8.10
	UK320+H2320	90	215	97	100	72	54	18	20	130	106.5	173000	140400	10.8
100	UK322+H2322	100	240	105	110	80	60	21	21	145	117	205000	178800	14.4
110	UK324+H2324	110	260	112	120	86	64	22	22	155	127.5	207000	184800	18.0
115	UK326+H2326	115	280	121	130	92	68	23	23	165	138.5	229000	214300	23.3
125	UK328+H2328	125	300	131	140	98	73	25	24	180	149	255000	246000	28.8

Ball Bearings for Units

B type
With set screws
Cylindrical bore
Shaft dia.: 12～35mm



KHAE type
With eccentric collar
Cylindrical bore
Shaft dia.: 12～35mm



B type

1N=0.102kgf

Shaft dia. (mm)	Ball Bearing No.	Boundary dimensions (mm)											Basic load rating (N)		Mass (kg)
		d	D	B	C	r	S	S_1	S_2	G_1	d_1		Cr	Cor	
12	B1	12	40	22	12	1	6	16	4	M5×0.8	24.7		9550	4800	0.10
15	B2	15	40	22	12	1	6	16	4	M5×0.8	24.7		9550	4800	0.09
17	B3	17	40	22	12	1	6	16	4	M5×0.8	24.7		9550	4800	0.07
20	B4	20	47	24.7	14	1.5	7	17.7	4.5	M5×0.8	29		12800	6600	0.12
25	B5	25	52	27	15	1.5	7.5	19.5	5	M6×0.75	34		14000	7900	0.16
30	B6	30	62	30.3	16	1.5	8	22.3	5	M6×0.75	40.5		19600	11300	0.25
35	B7	35	72	32.9	17	2	8.5	24.4	6	M8×1	48		25900	15400	0.38

Remark: Chamfer dimensions **"r"** shown in the table are nominal dimension.

KHAE type

1N=0.102kgf

Shaft dia. (mm)	Ball Bearing No.	Boundary dimensions (mm)											Basic load rating (N)		Mass (kg)
		d	D	B_1	B	C	r	S	d_1	B_2	G		Cr	Cor	
12	KH201AE	12	40	28.6	19.1	12	1	6.5	28.6	13.5	M 6×0.75		9550	4800	0.12
15	KH202AE	15	40	28.6	19.1	12	1	6.5	28.6	13.5	M 6×0.75		9550	4800	0.11
17	KH203AE	17	40	28.6	19.1	12	1	6.5	28.6	13.5	M 6×0.75		9550	4800	0.10
20	KH204AE	20	47	31	21.5	14	1.5	7.5	33.3	13.5	M 6×0.75		12800	6600	0.16
25	KH205AE	25	52	31	21.5	15	1.5	7.5	38.1	13.5	M 6×0.75		14000	7900	0.20
30	KH206AE	30	62	35.7	23.8	16	1.5	9	44.5	15.9	M 8×1		19600	11300	0.31
35	KH207AE	35	72	38.9	25.4	17	2	9.5	55.6	17.5	M10×1.25		25900	15400	0.49

Remark: Chamfer dimensions **"r"** shown in the table are nominal dimension.

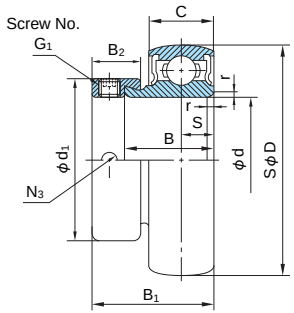
NACHI

Silver series

Ball Bearings for Units

With eccentric collar
Cylindrical bore
U+ER type
Shaft dia.: 8～30mm

MU+ER type (Stainless Silver Series)
Shaft dia.: 10～30mm



U+ER type

1N=0.102kgf

Shaft dia. (mm)	Ball Bearing No.	Boundary dimensions (mm)												Basic load rating (N)		Mass (kg)
		d	D	B_1	B	C	r	S	d_1	B_2	G_1	N_3		Cr	Cor	
10	U000+ER	10	26	17.5	11	8	0.5	4	17	8.5	M4×0.7	3.5		4600	2000	30
12	U001+ER	12	28	17.5	11	8	0.5	4	19	8.5	M4×0.7	3.5		5100	2400	36
15	U002+ER	15	32	18.5	12	9	0.5	4.5	22	8.5	M4×0.7	3.5		5600	2800	50
17	U003+ER	17	35	20.5	13.5	10	0.5	5	25	9.5	M4×0.7	3.5		6000	3300	62
20	U004+ER	20	42	24.5	16.5	12	1	6	30	11	M5×0.8	5		9350	5100	104
25	U005+ER	25	47	25.5	17.5	12	1	6	36	12	M5×0.8	5		10100	5800	133
30	U006+ER	30	55	26.5	18.5	13	1.5	6.5	42	12	M5×0.8	5		13200	8300	186
8	U 08+ER(1)	8	22	15	10	7	0.3	3.5	14	7	M3×0.5	2.5		3300	1360	16

Note: (1) U08X with set screws is available. U08X: B=12, d1=11.3, set screw 2-M3×0.5 S2=2.5 (side surface to set screw center)
Remark: Chamfer dimensions **"r"** shown in the table are nominal dimension.

MU+ER type (Stainless Silver Series)

1N=0.102kgf

Shaft dia. (mm)	Ball Bearing No.	Boundary dimensions (mm)												Basic load rating (N)		Mass (kg)
		d	D	B_1	B	C	r	S	d_1	B_2	G_1	N_3		Cr	Cor	
10	MU000+ER	10	26	17.5	11	8	0.5	4	17	8.5	M4×0.7	3.5		3900	1550	30
12	MU001+ER	12	28	17.5	11	8	0.5	4	19	8.5	M4×0.7	3.5		4300	1900	36
15	MU002+ER	15	32	18.5	12	9	0.5	4.5	22	8.5	M4×0.7	3.5		4750	2250	50
17	MU003+ER	17	35	20.5	13.5	10	0.5	5	25	9.5	M4×0.7	3.5		5100	2650	62
20	MU004+ER	20	42	24.5	16.5	12	1	6	30	11	M5×0.8	5		7900	4000	104
25	MU005+ER	25	47	25.5	17.5	12	1	6	36	12	M5×0.8	5		8600	4650	133
30	MU006+ER	30	55	26.5	18.5	13	1.5	6.5	42	12	M5×0.8	5		11300	6600	186

Remark: Chamfer dimensions **"r"** shown in the table are nominal dimension.

NACHI

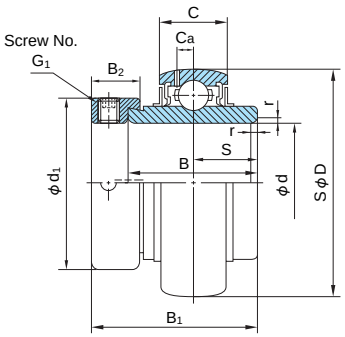
Ball Bearings for Units

UG+ER type

With eccentric collar

Cylindrical bore

Shaft dia.: 20～60mm



1N=0.102kgf

Shaft dia. (mm)	Ball Bearing No.	Boundary dimensions (mm)											Basic load rating (N)		Mass (kg)
		d	D	B_1	B	C	r	S	d_1	B_2	G_1		Cr	Cor	
20	**UG204+ER**	20	47	43.7	34.2	17	1.5	17.1	33.3	13.5	M 6×0.75		12800	6600	0.21
25	**UG205+ER**	25	52	44.4	34.9	17	1.5	17.5	38.1	13.5	M 6×0.75		14000	7900	0.23
30	**UG206+ER**	30	62	48.4	36.5	19	1.5	18.3	44.5	15.9	M 8×1		19600	11300	0.37
35	**UG207+ER**	35	72	51.1	37.6	20	2	18.8	55.6	17.5	M10×1.25		25900	15400	0.60
40	**UG208+ER**	40	80	56.3	42.8	21	2	21.4	60.3	18.3	M10×1.25		29300	17900	0.76
45	**UG209+ER**	45	85	56.3	42.8	22	2	21.4	63.5	18.3	M10×1.25		33000	20500	0.79
50	**UG210+ER**	50	90	62.7	49.2	23	2	24.6	69.9	18.3	M10×1.25		35500	23200	0.91
55	**UG211+ER**	55	100	71.4	55.5	24	2.5	27.8	76.2	20.7	M12×1.5		43000	29400	1.26
60	**UG212+ER**	60	110	77.8	61.9	26	2.5	31	84.2	22.3	M12×1.5		52500	36100	1.70

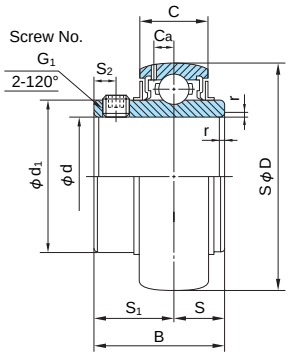
Remark: Chamfer dimensions **"r"** shown in the table are nominal dimension.

NACHI

Ball Bearings for Units

With stainless
MUC type
With set screws
Cylindrical bore

Shaft dia.: 20～50mm



1N=0.102kgf

Shaft dia. (mm)	Ball Bearing No.	Boundary dimensions (mm)												Basic load rating (N)		Mass (kg)
		d	D	B	C	r	S	S_1	S_2	G_1	C_a	d_1		Cr	Cor	
20	**MUC204**	20	47	31	17	1.5	12.7	18.3	4.5	M 6×1	4.5	29		10900	5300	0.16
25	**MUC205**	25	52	34	17	1.5	14.3	19.7	5	M 6×1	4.5	34		11900	6300	0.19
30	**MUC206**	30	62	38.1	19	1.5	15.9	22.2	5	M 6×1	5.1	40.5		16700	9050	0.31
35	**MUC207**	35	72	42.9	20	2	17.5	25.4	6	M 8×1	5.8	48		22000	12300	0.48
40	**MUC208**	40	80	49.2	21	2	19	30.2	8	M 8×1	6.2	53		24900	14300	0.62
45	**MUC209**	45	85	49.2	22	2	19	30.2	8	M 8×1	6.5	57.3		28100	16400	0.67
50	**MUC210**	50	90	51.6	23	2	19	32.6	9	M10×1.25	6.5	63		30200	18600	0.78

Remark: Chamfer dimensions **"r"** shown in the table are nominal dimension.

Plummer Block Housings

Plummer Block housings ease to constitute bearing units by using with self-aligning ball bearings or spherical roller bearings.
NACHI Plummer Block housing design is improved in term of accuracy, strength and rigidity.

● Features

- Wide range of sizes and configurations allows selection of optimal housing.
- Low weight to strength ratio.
- For straight shaft, the bearings with tapered bore and adapter can be mounted at any selected shaft position.
- For stepped-shaft, the bearings with cylindrical bore are fixed by shaft nut.

Remark: Housings not listed in the dimensions tables are also manufactured, consult NACHI for more information.

Table of contents

Type		Symbol	Bore diameter on both sides	Applicable Bearing	Shaft Dia. (mm)	Page
Split type	SN Standard type	SN5	Same	Tapered bore with adapter	20～140	page 545
		SN6			20～140	
		SN30			10～170	
		SN31			00～170	
	SN Flat bottom type	SN5F	Same	Tapered bore with adapter	20～140	page 553
		SN6F			20～140	
	SN Large bore dia on both sides	SN2	Same	Cylindrical bore	25～160	page 559
		SN3			25～ 85	
		SN2C	Difference	Cylindrical bore	25～160	
		SN3C			25～ 85	
	SN Large bore dia on both sides Flat bottom	SN2F	Same	Cylindrical bore	25～160	page 565
		SN3F			25～ 85	
		SN2FC	Difference	Cylindrical bore	25～160	
		SN3FC			25～ 85	
	SD Standard type	SD5	Same	Tapered bore with adapter	150～300	page 571
		SD6			150～260	
		SD30			150～300	
		SD31			150～300	
One-piece type	V Standard type	V	Same	Tapered bore with adapter	30～200	page 575
			Difference	Cylindrical bore	35～220	page 583

Remark: Please contact NACHI for housings not listed in table, special dimension, and with special accessories.

1. Materials for Plummer Block Housings

NACHI Plummer Blocks are made of gray cast iron FC200.
Spheroidal graphite iron castings FCD450 or carbon steel castings SC450 can be used for severe conditions such as vibration, shock and heavy load.
Materials for accessories are shown in right table.

Materials for Accessories

Accessory	Material	Symbol
Bolt	Rolled steels for general structure	SS400
Spring lock washer	High carbon steel wire rods	SWRH62B
Cover of V series	Gray iron castings	FC200
Oil seal	Nitrile rubber	NBR
Drainage plug	Carbon steels for machine structure use	S10C
Eyebolt	Rolled steels for general structure	SS400
Grease nipple	Free-cutting brass	C3604B
Locating ring	Gray iron castings	FC200
Adapter sleeve, Locknut, Lockplate	Carbon steels for machine structure use or Rolled steels for general structure	S25C or SS400
Plain washer	Rolled steels for general structure	SS400

2. Designations

(1) Designations of Plummer Block Housings

Designations of Plummer Block Housings are shown as follows.

• Split-housings

SN 2 20 D F2 C Supplementary symbol **E NA P3 S0**

- **Type symbol**: SN: Standard type; SD: Large type for heavy load
- **Dimension series number**: 5,6,30,31: Applied to Tapered bore bearing; 2,3: Applied to Cylindrical bore bearing
- **Bore diameter number** (Same as bore diameter number of applied bearing)
- **Material symbol**: (None): Gray cast iron FC200; D: Spheroidal graphite iron castings FCD450; S: Carbon steel castings SC450
- **Bottom face symbol**: (None): Hollow bottom (Standard); F: Flat bottom (without bolt hole); F2: Flat bottom (with 2 bolt holes); F4: Flat bottom (with 4 bolt holes)
- **Bore dia. on both sides**: (None): Same; C: Difference
- **Oil seal**: (None): GS seal(Standard); ZS: ZF seal; SO: Without oil seal
- **Drainage cap**: (None): Standard (one side except SD type); PD: Both sides; P3: PT3/8 threads for cap; P4: PT1/2 threads for cap
- **Grease nipple**: (None): A type nipple (Standard); NB: B type nipple
- **End cover**: (None): Without end cover; E: Insert type; EH: Bolt attach type; EM: one-piece type

Remarks 1. When symbol are omitted, shift to left side.
2. Threads and number of grease inlet/outlet are shown in tables.
3. Grease nipple A type is attached at grease inlet.

• One-piece housings

V 215 D C 135 – 110

- **Type symbol**: V
- **Housing seating diameter** (Same as outside diameter of bearing)
- **Material symbol**: (None): Gray cast iron FC200; D: Spheroidal graphite iron castings FCD450; S: Carbon steel castings SC450
- **Cover symbol**
- **Shaft diameter of small diameter side**: Numerical: Shaft diameter (mm); 0: End cover
- **Shaft diameter of large diameter side**: Numerical: Shaft diameter (mm)

Remarks 1. When symbol are omitted, shift to left side.
2. Supplementary symbols accord with split housing.
3. Threads and number of oil inlet/outlet are shown in tables.
4. Grease nipple of button-head type is attached at grease inlet.

(2) Locating Rings

Locating ring for fixed side housing is identified as follows. locating ring should be prepared besides plummer block housings.
The dimension table show the designation and number of ring required for each bearing.

SR 180 × 12.1 × 2

- **Locating ring symbol: SR**
- **Outside diameter (mm)** (Same as outside diameter of bearing)
- **Width (mm)**
- **Required number**

Remark: The necessary number of locating rings is shown as "X number or required locating rings" immediately after the part number.

(3) Combination of Plummer Block Housing, Bearing, Adapter and Locating Ring

The designations of combination are obtained by adding each with '+' as following order.

SN520 + 22220EX + H320X + SR200×13.5 × 2

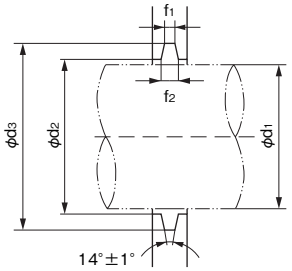
Plummer block housing + Bearing + Adapter + Locating ring SR outer diameter (mm) × width (mm) × Number of locating ring

Remark: Designations for parts not required are omitted.

3. Tolerances for Plummer Block Housings

The tolerances of housing seating bore, width and height from mounting face to centerline of housing seating bore are shown in dimension tables.

The bore diameter and tolerance of the openings at both sides of housings are shown in right table.



Side opening of housing

Dimensions and Tolerances of Side Openings Unit: mm

Shaft Dia d_1	d_2		d_3		f_1		f_2	Oil seal (Ref.)
	Nominal	Tolerance (H12)	Nominal	Tolerance (H12)	Nominal	Tolerance (H13)	Nominal	
20	21.5	+0.210 0	31	+0.250 0	3	+0.140 0	4.2	GS 5
25	26.5		38		4		5.4	GS 6
30	31.5		43		4		5.4	GS 7
35	36.5	+0.250 0	48		4		5.4	GS 8
40	41.5		53	+0.300 0	4		5.4	GS 9
45	46.5		58		4		5.4	GS 10
50	51.5	+0.300 0	67		5	+0.180 0	6.9	GS 11
55	56		72		5		6.9	GS 12
60	62		77		5		6.9	GS 13
65	67		82	+0.350 0	5		6.8	GS 15
70	72		89		6		8.1	GS 16
75	77		94		6		8.1	GS 17
80	82	+0.350 0	99		6		8.1	GS 18
85	87		104		6		8.1	GS 19
90	92		111		7		9.3	GS 20
95	97		116		7		9.3	GS 21
100	102		125	+0.400 0	8		10.8	GS 22
105	107		130		8		10.8	GS 23
110	113	+0.400 0	135		8		10.7	GS 24
115	118		140		8		10.7	GS 26
120	123		145		8		10.7	GS 27
125	128		154		9		12.2	GS 28
130	133		159		9		12.2	GS 29
135	138		164		9	+0.220 0	12.2	GS 30
140	143		173		00		13.7	GS 32
145	148		178		10		13.7	GS 33
150	153		183	+0.460 0	10		13.7	GS 34
155	158		188		10		13.7	GS 35
160	163		193		10		13.7	GS 36
165	168		198		10		13.7	GS 37
170	173	+0.460 0	203		10		13.7	GS 38
175	178		208		10		13.7	GS 39
180	183		213		10		13.7	GS 40
190	193		223		10		13.7	GS 42
200	203		240		11		15.5	GS 44
210	213		250		11		15.5	GS 46
220	223		260	+0.520 0	11		15.5	GS 48
230	233		270		11		15.5	GS 50
240	243		286		12		17.3	GS 52
250	253	+0.520 0	296		12		17.3	GS 54
260	263		306		12		17.3	GS 56
270	273		322	+0.570 0	13		19	GS 58
280	283		332		13	+0.270 0	19	GS 60
300	303		352		13		19	GS 64
320	323	+0.570 0	370		14		19.8	GS 68
340	343		390		14		19.8	GS 72
360	363		412	+0.630 0	13		19	GS 76
380	383		432		13		19	GS 80
400	403	+0.630 0	452		14		20	GS 84
410	413		460		14		19.8	GS 88
430	433		480		14		19.8	GS 92
450	453		505	+0.700 0	14		20.3	GS 96

Remark: Number of oil seal is applicable to ZF seal with same number.

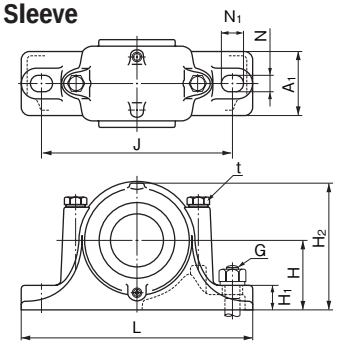
〔Reference〕

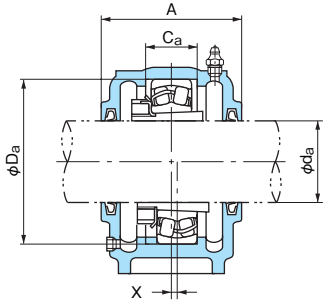
Bearing type / Housing type	Self-aligning Ball Bearings				Spherical Roller Bearings					
	12	22	13	23	230	231	222	232	213	223
SN5 SN5F	05K ~22K	05K ~22K	–	–	–	–	05K ~32K	18K ~32K	–	–
SN6 SN6F	–	–	05K ~22K	05K ~22K	–	–	–	–	05K ~22K	08K ~32K
SN30	–	–	–	–	24K ~38K	–	–	–	–	–
SN31	–	–	–	–	–	22K ~38K	–	–	–	–
SN2 SN2F	05 ~22	05 ~22	–	–	–	–	05 ~32	18 ~32	–	–
SN3 SN3F	–	–	05 ~17	05 ~17	–	–	–	–	05 ~17	08 ~17
SD5	–	–	–	–	–	–	34K ~64K	–	–	–
SD6	–	–	–	–	–	–	–	–	–	34K ~56K
SD30	–	–	–	–	34K ~64K	–	–	–	–	–
SD31	–	–	–	–	–	34K ~64K	–	–	–	–
V	08(K) ~22(K)	08(K) ~22(K)	07(K) ~22(K)	07(K) ~22(K)	22(K) ~44(K)	22(K) ~40(K)	08(K) ~38(K)	22(K) ~38(K)	07(K) ~22(K)	08(K) ~32(K)

Plummer Block Housings

SN5, SN6, SN30, SN31 Series for Bearing with Adapter Sleeve

Shaft Diameter: 20～55mm

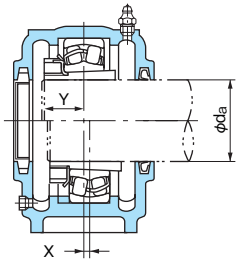




Through Shaft Type

Free side

Fixed side



Shaft End Type

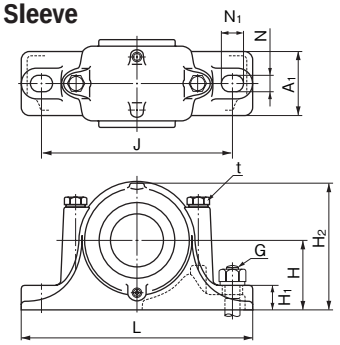
Shaft dia. da (mm)	Dimensions (mm)													Mass (kg) (Reference)	Designations		Applicable parts					Y (Reference)
	Da (H8)	H (h13)	J	N	N1	A	L	A1	H1	H2	Ca (H13)	G (Nominal)	t (Nominal) (Reference)		Through Shaft Type	Shaft End Type	Self-aligning ball bearings	Spherical roller bearings	Adapter sleeve	Oil seal	Locating ring Designations	Locating ring Q'ty	
20	52	40	130	15	20	67	165	46	22	75	25	M12	M 8	1.1	SN505	SN505E	1205K	—	H205X	GS 5	SR52×5	2	17
																	2205K	22205EXK	H305X		SR52×7	1	19
	62	50	150	15	20	80	185	52	22	90	34	M12	M 8	1.6	SN605	SN605E	1305K	21305EK	H305X	GS 5	SR62×8.5	2	18
																	2305K	—	H2305X		SR62×10	1	22
25	62	50	150	15	20	77	185	52	22	90	30	M12	M 8	1.7	SN506	SN506E	1206K	—	H206X	GS 6	SR62×7	2	18
																	2206K	22206EXK	H306X		SR62×10	1	20
	72	50	150	15	20	82	185	52	22	95	37	M12	M10	1.8	SN606	SN606E	1306K	21306EK	H306X	GS 6	SR72×9	2	19
																	2306K	—	H2306X		SR72×10	1	23
30	72	50	150	15	20	82	185	52	22	95	33	M12	M10	1.9	SN507	SN507E	1207K	—	H207X	GS 7	SR72×8	2	19
																	2207K	22207EXK	H307X		SR72×10	1	22
	80	60	170	15	20	90	205	60	25	110	41	M12	M10	2.6	SN607	SN607E	1307K	21307EK	H307X	GS 7	SR80×10	2	21
																	2307K	—	H2307X		SR80×10	1	26
35	80	60	170	15	20	85	205	60	25	110	33	M12	M10	2.6	SN508	SN508E	1208K	—	H208X	GS 8	SR80×7.5	2	21
																	2208K	22208EXK	H308X		SR80×10	1	23
	90	60	170	15	20	95	205	60	25	115	43	M12	M10	2.9	SN608	SN608E	1308K	21308EK	H308X	GS 8	SR90×10	2	23
																	2308K	22308EXK	H2308X		SR90×10	1	28
40	85	60	170	15	20	85	205	60	25	112	31	M12	M10	2.8	SN509	SN509E	1209K	—	H209X	GS 9	SR85×6	2	22
																	2209K	22209EXK	H309X		SR85×8	1	24
	100	70	210	18	23	105	255	70	28	130	46	M16	M12	4.1	SN609	SN609E	1309K	21309EK	H309X	GS 9	SR100×10.5	2	25
																	2309K	22309EXK	H2309X		SR100×10	1	31
45	90	60	170	15	20	90	205	60	25	115	33	M12	M10	3.0	SN510	SN510E	1210K	—	H210X	GS10	SR90×6.5	2	24
																	2210K	22210EXK	H310X		SR90×10	1	25
	110	70	210	18	23	115	255	70	30	135	50	M16	M12	4.7	SN610	SN610E	1310K	21310EK	H310X	GS10	SR110×11.5	2	27
																	2310K	22310EXK	H2310X		SR110×10	1	34
50	100	70	210	18	23	95	255	70	28	130	33	M16	M12	4.5	SN511	SN511E	1211K	—	H211X	GS11	SR100×6	2	25
																	2211K	22211EXK	H311X		SR100×8	1	27
	120	80	230	18	23	120	275	80	30	150	53	M16	M12	5.8	SN611	SN611E	1311K	21311EK	H311X	GS11	SR120×12	2	29
																	2311K	22311EXK	H2311X		SR120×10	1	36
55	110	70	210	18	23	105	255	70	30	135	38	M16	M12	5.0	SN512	SN512E	1212K	—	H212X	GS12	SR110×8	2	26
																	2212K	22212EXK	H312X		SR110×10	1	29
	130	80	230	18	23	125	280	80	30	155	56	M16	M12	6.5	SN612	SN612E	1312K	21312EK	H312X	GS12	SR130×12.5	2	31
																	2312K	22312EXK	H2312X		SR130×10	1	39

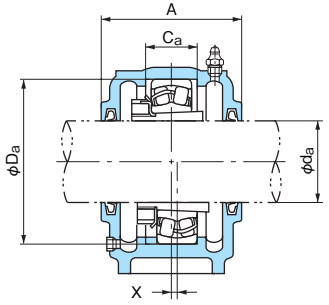
Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only.
To make a complete unit, please order the corresponding bearing, adapter sleeve and locating rings shown in the table additionally.
2. The masses in the table do not include the bearing, adapter sleeve and locating rings but the bolts.
3. H8, H13 and h13 in the table means tolerance classes specified in JIS B 0401.
4. The tolerance of locating ring O.D. is h12, and 0 ~ -0.2 for the width.
5. When one locating ring is used for fixed-end, the offset (X dimension) of bearing center from the center of the plummer block housing is a half of the locating ring width.
6. The threads for plugs are PT1/8. SN505 does not have a drain hole.
7. ZF type oil seals are also available instead of GS type seals.
8. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

Plummer Block Housings

SN5, SN6, SN30, SN31 Series for Bearing with Adapter Sleeve

Shaft Diameter: 60～90mm

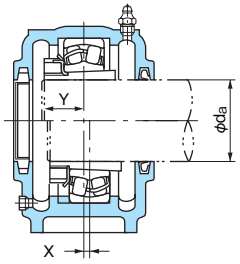




Through Shaft Type

Free side

Fixed side



Shaft End Type

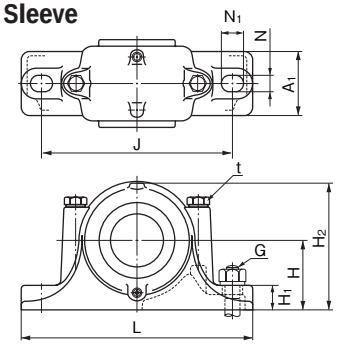
Shaft dia. da (mm)	Dimensions (mm)													Mass (kg) (Reference)	Designations		Applicable parts					Y (Reference)
	Da (H8)	H (h13)	J	N	N1	A	L	A1	H1	H2	Ca (H13)	G (Nominal)	t (Nominal) (Reference)		Through Shaft Type	Shaft End Type	Self-aligning ball bearings	Spherical roller bearings	Adapter sleeve	Oil seal	Locating ring Designations	Locating ring Q'ty	
60	120	80	230	18	23	110	275	80	30	150	43	M16	M12	5.6	SN513	SN513E	1213K	—	H213X	GS13	SR120×10	2	28
																	2213K	22213EXK	H313X		SR120×12	1	32
	140	95	260	22	27	130	315	90	32	175	58	M20	M16	8.7	SN613	SN613E	1313K	21313EK	H313X	GS13	SR140×12.5	2	33
																	2313K	22313EXK	H2313X		SR140×10	1	40
65	130	80	230	18	23	115	280	80	30	155	41	M16	M12	7.0	SN515	SN515E	1215K	—	H215X	GS15	SR130×8	2	30
																	2215K	22215EXK	H315X		SR130×10	1	33
	160	100	290	22	27	140	345	100	35	195	65	M20	M16	11	SN615	SN615E	1315K	21315EK	H315X	GS15	SR160×14	2	36
																	2315K	22315EXK	H2315X		SR160×10	1	45
70	140	95	260	22	27	120	315	90	32	175	43	M20	M16	9.0	SN516	SN516E	1216K	—	H216X	GS16	SR140×8.5	2	32
																	2216K	22216EXK	H316X		SR140×10	1	36
	170	112	290	22	27	145	345	100	35	212	68	M20	M16	13	SN616	SN616E	1316K	21316EK	H316X	GS16	SR170×14.5	2	39
																	2316K	22316EXK	H2316X		SR170×10	1	48
75	150	95	260	22	27	125	320	90	32	185	46	M20	M16	10	SN517	SN517E	1217K	—	H217X	GS17	SR150×9	2	34
																	2217K	22217EXK	H317X		SR150×10	1	38
	180	112	320	26	32	155	380	110	40	223	70	M24	M20	15	SN617	SN617E	1317K	21317EK	H317X	GS17	SR180×14.5	2	41
																	2317K	22317EXK	H2317X		SR180×10	1	50
80	160	100	290	22	27	145	345	100	35	195	62.4	M20	M16	13	SN518	SN518E	1218K	—	H218X	GS18	SR160×16.2	2	35
																	2218K	22218EXK	H318X		SR160×11.2	2	40
																	—	23218EK	H2318X		SR160×10	1	46
	190	112	320	26	32	160	380	110	40	230	74	M24	M20	19	SN618	SN618E	1318K	21318EK	H318X	GS18	SR190×15.5	2	42
																	2318K	22318EXK	H2318X		SR190×10	1	52
85	170	112	290	22	27	140	345	100	35	210	53	M20	M16	15	SN519	SN519E	1219K	—	H219X	GS19	SR170×10.5	2	37
																	2219K	22219EXK	H319X		SR170×10	1	43
	200	125	350	26	32	170	410	120	45	250	77	M24	M20	22	SN619	SN619E	1319K	21319EK	H319X	GS19	SR200×16	2	44
																	2319K	22319EXK	H2319X		SR200×10	1	55
90	180	112	320	26	32	160	380	110	40	218	70.3	M24	M20	19	SN520	SN520E	1220K	—	H220X	GS20	SR180×18.1	2	39
																	2220K	22220EXK	H320X		SR180×12.1	2	45
																	—	23220EK	H2320X		SR180×10	1	52
	215	140	350	26	32	175	410	120	45	270	83	M24	M20	25	SN620	SN620E	1320K	21320EK	H320X	GS20	SR215×18	2	46
																	2320K	22320EXK	H2320X		SR215×10	1	59

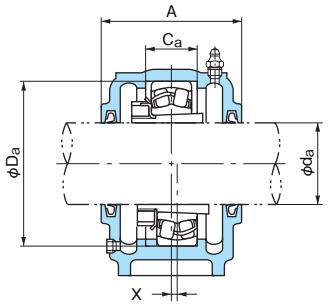
Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only.
To make a complete unit, please order the corresponding bearing, adapter sleeve and locating rings shown in the table additionally.
2. The masses in the table do not include the bearing, adapter sleeve and locating rings but the bolts.
3. H8, H13 and h13 in the table means tolerance classes specified in JIS B 0401.
4. The tolerance of locating ring O.D. is h12, and 0 ~ -0.2 for the width.
5. Plummer block housings SN3028, SN3126, SN524, SN620 and larger are provided with eye bolts.
6. When one locating ring is used for fixed-end, the offset (X dimension) of bearing center from the center of the plummer block housing is a half of the locating ring width.
7. The threads for plugs are PT1/8 for SN519, SN616 and smaller, and PT1/4 for the others.
8. ZF type oil seals are also available instead of GS type seals.
9. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

Plummer Block Housings

SN5, SN6, SN30, SN31 Series
for Bearing with Adapter Sleeve

Shaft Diameter: 100～135mm

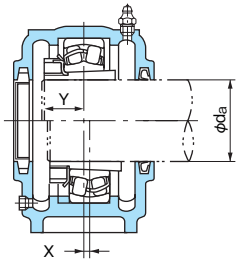




Through Shaft Type

Free side

Fixed side



Shaft End Type

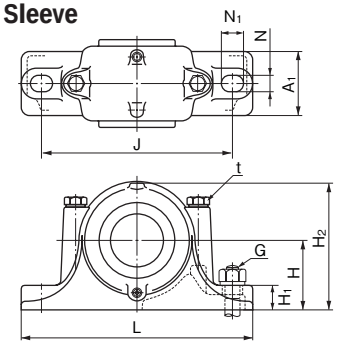
Shaft dia. da (mm)	Dimensions (mm)													Mass (kg) (Reference)	Designations		Applicable parts						Y (Reference)
	Da (H8)	H (h13)	J	N	N1	A	L	A1	H1	H2	Ca (H13)	G (Nominal)	t (Nominal) (Reference)		Through Shaft Type	Shaft End Type	Self-aligning ball bearings	Spherical roller bearings	Adapter sleeve	Oil seal	Locating ring Designations	Locating ring Q'ty	
100	180	112	320	26	32	155	380	110	40	223	66	M24	M20	18	SN3122	SN3122E	—	23122EK	H3122X	GS22	SR180×10	1	51
	200	125	350	26	32	175	410	120	45	240	80	M24	M20	20	SN522	SN522E	1222K	—	H222X	GS22	SR200×21	2	42
																	2222K	22222EXK	H322X		SR200×13.5	2	50
																	—	23222EK	H2322X		SR200×10	1	58
	240	150	390	28	36	190	450	130	50	300	90	M24	M24	32	SN622	SN622E	1322K	21322EK	H322X	GS22	SR240×20	2	48
																	2322K	22322EXK	H2322X		SR240×10	1	63
110	180	112	320	26	32	150	380	110	40	223	56	M24	M20	16	SN3024	SN3024E	—	23024EK	H3024X	GS24	SR180×10	1	47
	200	125	350	26	32	165	410	120	45	245	72	M24	M20	20	SN3124	SN3124E	—	23124EK	H3124X	GS24	SR200×10	1	55
	215	140	350	26	32	185	410	120	45	270	86	M24	M20	25	SN524	SN524E	—	22224EK	H3124X	GS24	SR215×14	2	53
																	—	23224EK	H2324X		SR215×10	1	62
	260	160	450	33	42	200	530	160	60	320	96	M30	M24	48	SN624	SN624E	—	22324EK	H2324X	GS24	SR260×10	1	67
115	200	125	350	26	32	160	410	120	45	245	62	M24	M20	19	SN3026	SN3026E	—	23026EK	H3026	GS26	SR200×10	1	51
	210	140	350	26	32	170	410	120	45	270	74	M24	M20	26	SN3126	SN3126E	—	23126EK	H3126	GS26	SR210×10	1	57
	230	150	380	28	36	190	445	130	50	290	90	M24	M24	30	SN526	SN526E	—	22226EK	H3126	GS26	SR230×13	2	57
																	—	23226EK	H2326		SR230×10	1	65
	280	170	470	33	42	210	550	160	60	340	103	M30	M24	56	SN626	SN626E	—	22326EK	H2326	GS26	SR280×10	1	72
125	210	140	350	26	32	170	410	120	45	270	63	M24	M20	25	SN3028	SN3028E	—	23028EK	H3028	GS28	SR210×10	1	53
	225	150	380	28	36	180	445	130	50	290	78	M24	M24	32	SN3128	SN3128E	—	23128EK	H3128	GS28	SR225×10	1	60
	250	150	420	33	42	205	500	150	50	305	98	M30	M24	38	SN528	SN528E	—	22228EXK	H3128	GS28	SR250×15	2	60
																	—	23228EK	H2328		SR250×10	1	70
	300	180	520	35	45	235	610	170	65	365	112	M30	M30	72	SN628	SN628E	—	22328EK	H2328	GS28	SR300×10	1	77
135	225	150	380	28	36	175	445	130	50	290	66	M24	M24	29	SN3030	SN3030E	—	23030EK	H3030	GS30	SR225×10	1	56
	250	150	420	33	42	200	500	150	50	305	90	M30	M24	38	SN3130	SN3130E	—	23130EK	H3130	GS30	SR250×10	1	68
	270	160	450	33	42	220	530	160	60	325	106	M30	M24	46	SN530	SN530E	—	22230EK	H3130	GS30	SR270×16.5	2	65
																	—	23230EK	H2330		SR270×10	1	76
	320	190	560	35	45	245	650	180	65	385	118	M30	M30	98	SN630	SN630E	—	22330EK	H2330	GS30	SR320×10	1	82

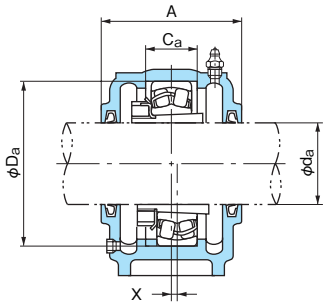
Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only.
To make a complete unit, please order the corresponding bearing, adapter sleeve and locating rings shown in the table additionally.
2. The masses in the table do not include the bearing, adapter sleeve and locating rings but the bolts.
3. H8, H13 and h13 in the table means tolerance classes specified in JIS B 0401.
4. The tolerance of locating ring O.D. is h12, and 0 ~ -0.2 for the width.
5. Plummer block housings SN3028, SN3126, SN524, SN620 and larger are provided with eye bolts.
6. When one locating ring is used for fixed-end, the offset (X dimension) of bearing center from the center of the plummer block housing is a half of the locating ring width.
7. The threads for plugs are PT1/4.
8. ZF type oil seals are also available instead of GS type seals.
9. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

Plummer Block Housings

SN5, SN6, SN30, SN31 Series
for Bearing with Adapter Sleeve

Shaft Diameter: 140～170mm

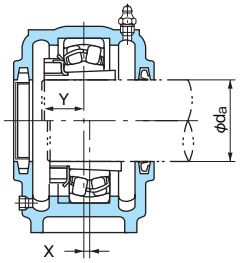




Through Shaft Type

Free side

Fixed side



Shaft End Type

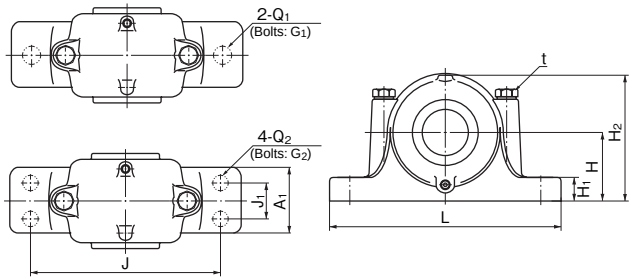
Shaft dia. da (mm)	Dimensions (mm)													Mass (kg) (Reference)	Designations		Applicable parts					Y (Reference)
	Da (H8)	H (h13)	J	N	N1	A	L	A1	H1	H2	Ca (H13)	G (Nominal)	t (Nominal) (Reference)		Through Shaft Type	Shaft End Type	Spherical roller bearings	Adapter sleeve	Oil seal	Locating ring		
																				Designations	Q'ty	
140	240	150	390	28	36	190	450	130	50	300	70	M24	M24	32	**SN3032**	**SN3032E**	23032EK	H3032	GS32	SR240×10	1	61
	270	160	450	33	42	215	530	160	60	325	96	M30	M24	48	**SN3132**	**SN3132E**	23132EK	H3132	GS32	SR270×10	1	74
	290	170	470	33	42	235	550	160	60	345	114	M30	M24	50	**SN532**	**SN532E**	22232EK	H3132	GS32	SR290×17	2	71
																	23232EK	H2332		SR290×10	1	83
	340	200	580	42	50	255	680	190	70	405	124	M36	M30	115	**SN632**	**SN632E**	22332EK	H2332	GS32	SR340×10	1	88
150	260	160	450	33	42	200	530	160	60	320	77	M30	M24	40	**SN3034**	**SN3034E**	23034EK	H3034	GS34	SR260×10	1	66
	280	170	470	33	42	220	550	160	60	340	98	M30	M24	58	**SN3134**	**SN3134E**	23134EK	H3134	GS34	SR280×10	1	76
160	280	170	470	33	42	210	550	160	60	340	84	M30	M24	50	**SN3036**	**SN3036E**	23036EK	H3036	GS36	SR280×10	1	70
	300	180	520	35	45	230	610	170	65	365	106	M30	M30	70	**SN3136**	**SN3136E**	23136EK	H3136	GS36	SR300×10	1	81
170	290	170	470	33	42	210	550	160	60	345	85	M30	M24	55	**SN3038**	**SN3038E**	23038EK	H3038	GS38	SR290×10	1	72
	320	190	560	35	45	240	650	180	65	385	114	M30	M30	90	**SN3138**	**SN3138E**	23138EK	H3138	GS38	SR320×10	1	86

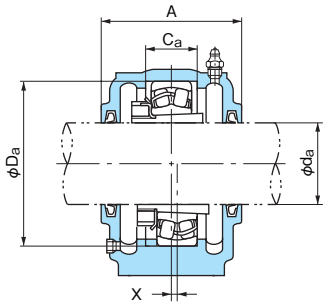
Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only.
To make a complete unit, please order the corresponding bearing, adapter sleeve and locating rings shown in the table additionally.
2. The masses in the table do not include the bearing, adapter sleeve and locating rings but the bolts.
3. H8, H13 and h13 in the table means tolerance classes specified in JIS B 0401.
4. The tolerance of locating ring O.D. is h12, and 0 ~ -0.2 for the width.
5. Plummer block housings SN3028, SN3126,SN524, SN620 and larger are provided with eye bolts.
6. When one locating ring is used for fixed-end, the offset (X dimension) of bearing center from the center of the plummer block housing is a half of the locating ring width.
7. The threads for plugs are PT1/4.
8. ZF type oil seals are also available instead of GS type seals.
9. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

Plummer Block Housings

Flat Bottom Type SN5F, SN6F Series for Bearing with Adapter Sleeve

Shaft Diameter: 20～55mm

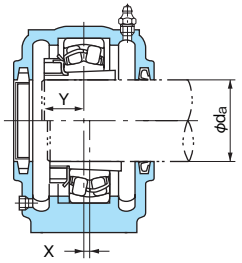




Through Shaft Type

Free side

Fixed side



Shaft End Type

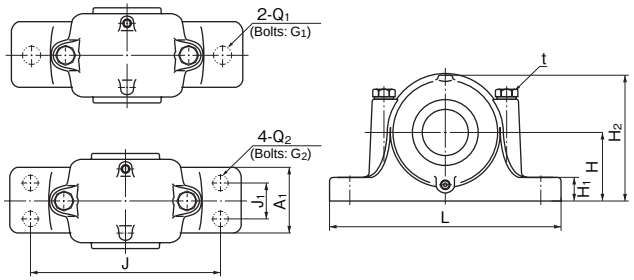
Shaft dia. da (mm)	Dimensions (mm)								Bolt holes (Reference) (mm)						t (Nominal) (Reference)	Mass (kg) (Reference)	Designations		Applicable parts					Y (Reference)
	Da (H8)	H (h13)	A	L	A1	H1	H2	Ca (H13)	J	Q1	G1 (Nominal)	J1	Q2	G2 (Nominal)			Through Shaft Type	Shaft End Type	Self-aligning ball bearings	Spherical roller bearings	Adapter sleeve	Oil seal	Locating ring Designations	Locating ring Q'ty	
20	52	40	67	165	46	22	75	25	130	15	M12	25	10	M 8	M 8	1.7	SN505F	SN505FE	1205K	—	H205X	GS 5	SR52×5	2	17
																			2205K	22205EXK	H305X		SR52×7	1	19
	62	50	80	185	52	22	90	34	150	15	M12	25	12	M10	M 8	2.4	SN605F	SN605FE	1305K	21305EK	H305X	GS 5	SR62×8.5	2	18
																			2305K	—	H2305X		SR62×10	1	22
25	62	50	77	185	52	22	90	30	150	15	M12	25	12	M10	M 8	2.5	SN506F	SN506FE	1206K	—	H206X	GS 6	SR62×7	2	18
																			2206K	22206EXK	H306X		SR62×10	1	20
	72	50	82	185	52	22	95	37	150	15	M12	25	12	M10	M10	2.5	SN606F	SN606FE	1306K	21306EK	H306X	GS 6	SR72×9	2	19
																			2306K	—	H2306X		SR72×10	1	23
30	72	50	82	185	52	22	95	33	150	15	M12	25	12	M10	M10	2.6	SN507F	SN507FE	1207K	—	H207X	GS 7	SR72×8	2	19
																			2207K	22207EXK	H307X		SR72×10	1	22
	80	60	90	205	60	25	110	41	170	15	M12	30	12	M10	M10	3.8	SN607F	SN607FE	1307K	21307EK	H307X	GS 7	SR80×10	2	21
																			2307K	—	H2307X		SR80×10	1	26
35	80	60	85	205	60	25	110	33	170	15	M12	30	12	M10	M10	4.0	SN508F	SN508FE	1208K	—	H208X	GS 8	SR80×7.5	2	21
																			2208K	22208EXK	H308X		SR80×10	1	23
	90	60	95	205	60	25	115	43	170	15	M12	30	12	M10	M10	4.0	SN608F	SN608FE	1308K	21308EK	H308X	GS 8	SR90×10	2	23
																			2308K	22308EXK	H2308X		SR90×10	1	28
40	85	60	85	205	60	25	112	31	170	15	M12	30	12	M10	M10	4.4	SN509F	SN509FE	1209K	—	H209X	GS 9	SR85×6	2	22
																			2209K	22209EXK	H309X		SR85×8	1	24
	100	70	105	255	70	28	130	46	210	19	M16	35	15	M12	M12	6.0	SN609F	SN609FE	1309K	21309EK	H309X	GS 9	SR100×10.5	2	25
																			2309K	22309EXK	H2309X		SR100×10	1	31
45	90	60	90	205	60	25	115	33	170	15	M12	30	12	M10	M10	4.7	SN510F	SN510FE	1210K	—	H210X	GS10	SR90×6.5	2	24
																			2210K	22210EXK	H310X		SR90×10	1	25
	110	70	115	255	70	30	135	50	210	19	M16	35	15	M12	M12	6.5	SN610F	SN610FE	1310K	21310EK	H310X	GS10	SR110×11.5	2	27
																			2310K	22310EXK	H2310X		SR110×10	1	34
50	100	70	95	255	70	28	130	33	210	19	M16	35	15	M12	M12	6.3	SN511F	SN511FE	1211K	—	H211X	GS11	SR100×6	2	25
																			2211K	22211EXK	H311X		SR100×8	1	27
	120	80	120	275	80	30	150	53	230	19	M16	40	15	M12	M12	8.5	SN611F	SN611FE	1311K	21311EK	H311X	GS11	SR120×12	2	29
																			2311K	22311EXK	H2311X		SR120×10	1	36
55	110	70	105	255	70	30	135	38	210	19	M16	35	15	M12	M12	6.9	SN512F	SN512FE	1212K	—	H212X	GS12	SR110×8	2	26
																			2212K	22212EXK	H312X		SR110×10	1	29
	130	80	125	280	80	30	155	56	230	19	M16	40	15	M12	M12	9.0	SN612F	SN612FE	1312K	21312EK	H312X	GS12	SR130×12.5	2	31
																			2312K	22312EXK	H2312X		SR130×10	1	39

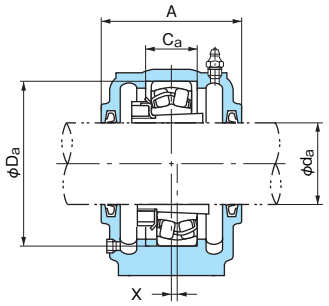
Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only.
To make a complete unit, please order the corresponding bearing, adapter sleeve and locating rings shown in the table additionally.
2. The masses in the table do not include the bearing, adapter sleeve and locating rings but the bolts.
3. H8, H13 and h13 in the table means tolerance classes specified in JIS B 0401.
4. The tolerance of locating ring O.D. is h12, and 0 ~ -0.2 for the width.
5. When one locating ring is used for fixed-end, the offset (X dimension) of bearing center from the center of the plummer block housing is a half of the locating ring width.
6. The threads for plugs are PT1/8. SN505F does not have a drain hole.
7. ZF type oil seals are also available instead of GS type seals.
8. Please specify number of bolt holes.
9. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

Plummer Block Housings

Flat Bottom Type SN5F, SN6F Series for Bearing with Adapter Sleeve

Shaft Diameter: 60～90mm

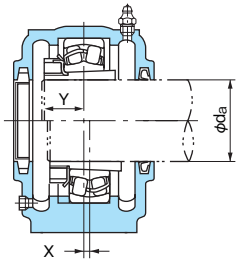




Through Shaft Type

Free side

Fixed side



Shaft End Type

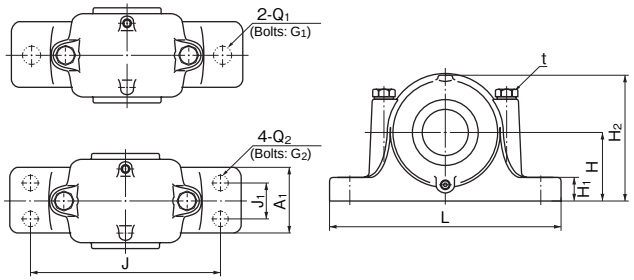
Shaft dia. da (mm)	Dimensions (mm)								Bolt holes (Reference)						t (Nominal) (Reference)	Mass (kg) (Reference)	Designations		Applicable parts					Y (Reference)
	Da (H8)	H (h13)	A	L	A1	H1	H2	Ca (H13)	J	Q1	G1 (Nominal)	J1	Q2	G2 (Nominal)			Through Shaft Type	Shaft End Type	Self-aligning ball bearings	Spherical roller bearings	Adapter sleeve	Oil seal	Locating ring Designations	Locating ring Q'ty	
60	120	80	110	275	80	30	150	43	230	19	M16	40	15	M12	M12	7.0	SN513F	SN513FE	1213K	—	H213X	GS13	SR120×10	2	28
																			2213K	22213EXK	H313X		SR120×12	1	32
	140	95	130	315	90	32	175	58	260	24	M20	50	19	M16	M16	13	SN613F	SN613FE	1313K	21313EK	H313X	GS13	SR140×12.5	2	33
																			2313K	22313EXK	H2313X		SR140×10	1	40
65	130	80	115	280	80	30	155	41	230	19	M16	40	15	M12	M12	8.8	SN515F	SN515FE	1215K	—	H215X	GS15	SR130×8	2	30
																			2215K	22215EXK	H315X		SR130×10	1	33
	160	100	140	345	100	35	195	65	290	24	M20	50	19	M16	M16	16	SN615F	SN615FE	1315K	21315EK	H315X	GS15	SR160×14	2	36
																			2315K	22315EXK	H2315X		SR160×10	1	45
70	140	95	120	315	90	32	175	43	260	24	M20	50	19	M16	M16	13	SN516F	SN516FE	1216K	—	H216X	GS16	SR140×8.5	2	32
																			2216K	22216EXK	H316X		SR140×10	1	36
	170	112	145	345	100	35	212	68	290	24	M20	50	19	M16	M16	17	SN616F	SN616FE	1316K	21316EK	H316X	GS16	SR170×14.5	2	39
																			2316K	22316EXK	H2316X		SR170×10	1	48
75	150	95	125	320	90	32	185	46	260	24	M20	50	19	M16	M16	14	SN517F	SN517FE	1217K	—	H217X	GS17	SR150×9	2	34
																			2217K	22217EXK	H317X		SR150×10	1	38
	180	112	155	380	110	40	223	70	320	28	M24	60	24	M20	M20	24	SN617F	SN617FE	1317K	21317EK	H317X	GS17	SR180×14.5	2	41
																			2317K	22317EXK	H2317X		SR180×10	1	50
80	160	100	145	345	100	35	195	62.4	290	24	M20	50	19	M16	M16	18	SN518F	SN518FE	1218K	—	H218X	GS18	SR160×16.2	2	35
																			2218K	22218EXK	H318X		SR160×11.2	2	40
																			—	23218EK	H2318X		SR160×10	1	46
	190	112	160	380	110	40	230	74	320	28	M24	60	24	M20	M20	26	SN618F	SN618FE	1318K	21318EK	H318X	GS18	SR190×15.5	2	42
																			2318K	22318EXK	H2318X		SR190×10	1	52
85	170	112	140	345	100	35	210	53	290	24	M20	50	19	M16	M16	20	SN519F	SN519FE	1219K	—	H219X	GS19	SR170×10.5	2	37
																			2219K	22219EXK	H319X		SR170×10	1	43
	200	125	170	410	120	45	250	77	350	28	M24	70	24	M20	M20	30	SN619F	SN619FE	1319K	21319EK	H319X	GS19	SR200×16	2	44
																			2319K	22319EXK	H2319X		SR200×10	1	55
90	180	112	160	380	110	40	218	70.3	320	28	M24	60	24	M20	M20	26	SN520F	SN520FE	1220K	—	H220X	GS20	SR180×18.1	2	39
																			2220K	22220EXK	H320X		SR180×12.1	2	45
																			—	23220EK	H2320X		SR180×10	1	52
	215	140	175	410	120	45	270	83	350	28	M24	70	24	M20	M20	35	SN620F	SN620FE	1320K	21320EK	H320X	GS20	SR215×18	2	46
																			2320K	22320EXK	H2320X		SR215×10	1	59

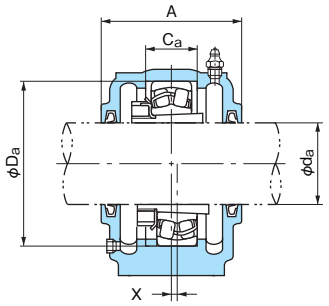
Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only.
To make a complete unit, please order the corresponding bearing, adapter sleeve and locating rings shown in the table additionally.
2. The masses in the table do not include the bearing, adapter sleeve and locating rings but the bolts.
3. H8, H13 and h13 in the table means tolerance classes specified in JIS B 0401.
4. The tolerance of locating ring O.D. is h12, and 0 ~ -0.2 for the width.
5. Plummer block housings SN524F, SN620F and larger are provided with eye bolts.
6. When one locating ring is used for fixed-end, the offset (X dimension) of bearing center from the center of the plummer block housing is a half of the locating ring width.
7. The threads for plugs are PT1/8 for SN519F, SN616F and smaller, and PT1/4 for the others.
8. ZF type oil seals are also available instead of GS type seals.
9. Please specify number of bolt holes.
10. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

Plummer Block Housings

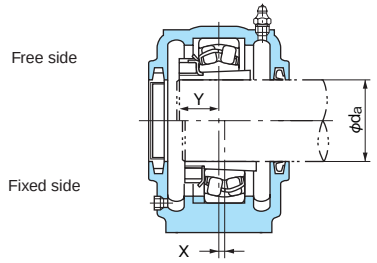
Flat Bottom Type SN5F, SN6F Series for Bearing with Adapter Sleeve

Shaft Diameter: 100～140mm





Through Shaft Type



Shaft End Type

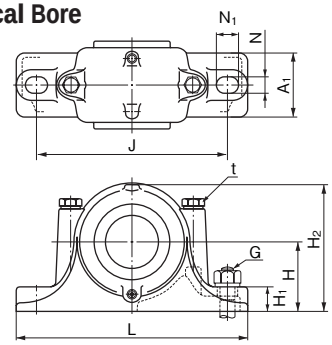
Shaft dia. da (mm)	Dimensions (mm)								Bolt holes (Reference)						t (Nominal) (Reference)	Mass (kg) (Reference)	Designations		Applicable parts					Y (Reference)
	Da (H8)	H (h13)	A	L	A1	H1	H2	Ca (H13)	J	Q1	G1 (Nominal)	J1	Q2	G2 (Nominal)			Through Shaft Type	Shaft End Type	Self-aligning ball bearings	Spherical roller bearings	Adapter sleeve	Oil seal	Locating ring Designations	Locating ring Q'ty	
100	200	125	175	410	120	45	240	80	350	28	M24	70	24	M20	M20	28	SN522F	SN522FE	1222K	—	H222X	GS22	SR200×21	2	42
																			2222K	22222EXK	H322X		SR200×13.5	2	50
																			—	23222EK	H2322X		SR200×10	1	58
	240	150	190	450	130	50	300	90	390	28	M24	70	28	M24	M24	45	SN622F	SN622FE	1322K	21322EK	H322X	GS22	SR240×20	2	48
																			2322K	22322EXK	H2322X		SR240×10	1	63
110	215	140	185	410	120	45	270	86	350	28	M24	70	24	M20	M20	35	SN524F	SN524FE	—	22224EXK	H3124X	GS24	SR215×14	2	53
																			—	23224EK	H2324X		SR215×10	1	62
	260	160	200	530	160	60	320	96	450	35	M30	90	28	M24	M24	63	SN624F	SN624FE	—	22324EK	H2324X	GS24	SR260×10	1	67
115	230	150	190	445	130	50	290	90	380	28	M24	70	28	M24	M24	42	SN526F	SN526FE	—	22226EXK	H3126	GS26	SR230×13	2	57
																			—	23226EK	H2326		SR230×10	1	65
	280	170	210	550	160	60	340	103	470	35	M30	90	28	M24	M24	74	SN626F	SN626FE	—	22326EK	H2326	GS26	SR280×10	1	72
125	250	150	205	500	150	50	305	98	420	35	M30	80	28	M24	M24	52	SN528F	SN528FE	—	22228EXK	H3128	GS28	SR250×15	2	60
																			—	23228EK	H2328		SR250×10	1	70
	300	180	235	610	170	65	365	112	520	35	M30	100	28	M24	M30	92	SN628F	SN628FE	—	22328EK	H2328	GS28	SR300×10	1	77
135	270	160	220	530	160	60	325	106	450	35	M30	90	28	M24	M24	61	SN530F	SN530FE	—	22230EK	H3130	GS30	SR270×16.5	2	65
																			—	23230EK	H2330		SR270×10	1	76
	320	190	245	650	180	65	385	118	560	35	M30	110	28	M24	M30	120	SN630F	SN630FE	—	22330EK	H2330	GS30	SR320×10	1	82
140	290	170	235	550	160	60	345	114	470	35	M30	90	28	M24	M24	68	SN532F	SN532FE	—	22232EK	H3132	GS32	SR290×17	2	71
																			—	23232EK	H2332		SR290×10	1	83
	340	200	255	680	190	70	405	124	580	42	M36	110	35	M30	M30	140	SN632F	SN632FE	—	22332EK	H2332	GS32	SR340×10	1	88

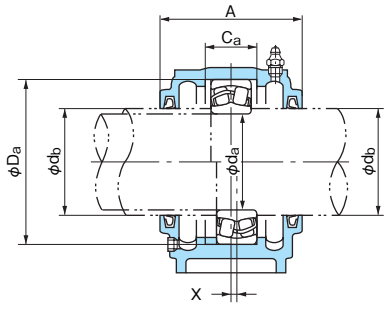
Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only.
To make a complete unit, please order the corresponding bearing, adapter sleeve and locating rings shown in the table additionally.
2. The masses in the table do not include the bearing, adapter sleeve and locating rings but the bolts.
3. H8, H13 and h13 in the table means tolerance classes specified in JIS B 0401.
4. The tolerance of locating ring O.D. is h12, and 0 ~ -0.2 for the width.
5. Plummer block housings SN524F, SN620F and larger are provided with eye bolts.
6. When one locating ring is used for fixed-end, the offset (X dimension) of bearing center from the center of the plummer block housing is a half of the locating ring width.
7. The threads for plugs are PT1/4.
8. ZF type oil seals are also available instead of GS type seals.
9. Please specify number of bolt holes.
10. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

Plummer Block Housings

SN2, SN3 Series
for Bearing with Cylindrical Bore

Shaft Diameter: 25～55mm

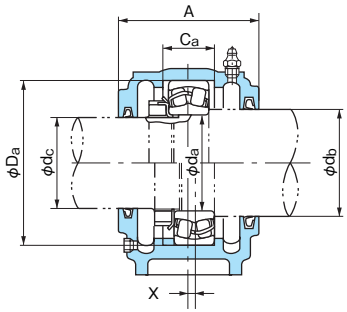




Same Bore Type

Free side

Fixed side



Different Bore Type

Shaft dia. (mm)			Dimensions (mm)													Mass (kg) (Reference)	Designations		Applicable parts								Y (Reference)
																									Oil seal		Locating ring		
da	db	dc	Da (H8)	H (h13)	J	N	N1	A	L	A1	H1	H2	Ca (H13)	G (Nominal)	t (Nominal) (Reference)		Same Bore Type	Different Bore Type	Self-aligning ball bearings	Spherical roller bearings	Nut	Locking washer	db side	dc side	Designations	Q'ty	
25	30(1)	20	52	40	130	15	20	67	165	46	22	75	25	M12	M 8	1.1	SN205	SN205C	1205	—	AN05	AW05X	GS 7	GS 5	SR52×5	2	17
																			2205	22205EX					SR52×7	1	19
			62	50	150	15	20	80	185	52	22	90	34	M12	M 8	1.6	SN305	SN305C	1305	21305E	AN05	AW05X	GS 7	GS 5	SR62×8.5	2	18
																			2305	—					SR62×10	1	22
30	35(1)	25	62	50	150	15	20	77	185	52	22	90	30	M12	M 8	1.7	SN206	SN206C	1206	—	AN06	AW06X	GS 8	GS 6	SR62×7	2	18
																			2206	22206EX					SR62×10	1	20
			72	50	150	15	20	82	185	52	22	95	37	M12	M10	1.8	SN306	SN306C	1306	21306E	AN06	AW06X	GS 8	GS 6	SR72×9	2	19
																			2306	—					SR72×10	1	23
35	45	30	72	50	150	15	20	82	185	52	22	95	33	M12	M10	1.9	SN207	SN207C	1207	—	AN07	AW07X	GS10	GS 7	SR72×8	2	19
																			2207	22207EX					SR72×10	1	22
			80	60	170	15	20	90	205	60	25	110	41	M12	M10	2.6	SN307	SN307C	1307	21307E	AN07	AW07X	GS10	GS 7	SR80×10	2	21
																			2307	—					SR80×10	1	26
40	50	35	80	60	170	15	20	85	205	60	25	110	33	M12	M10	2.6	SN208	SN208C	1208	—	AN08	AW08X	GS11	GS 8	SR80×7.5	2	21
																			2208	22208EX					SR80×10	1	23
			90	60	170	15	20	95	205	60	25	115	43	M12	M10	2.9	SN308	SN308C	1308	21308E	AN08	AW08X	GS11	GS 8	SR90×10	2	23
																			2308	22308EX					SR90×10	1	28
45	55	40	85	60	170	15	20	85	205	60	25	112	31	M12	M10	2.8	SN209	SN209C	1209	—	AN09	AW09X	GS12	GS 9	SR85×6	2	22
																			2209	22209EX					SR85×8	1	24
			100	70	210	18	23	105	255	70	28	130	46	M16	M12	4.1	SN309	SN309C	1309	21309E	AN09	AW09X	GS12	GS 9	SR100×10.5	2	25
																			2309	22309EX					SR100×10	1	31
50	60	45	90	60	170	15	20	90	205	60	25	115	33	M12	M10	3.0	SN210	SN210C	1210	—	AN10	AW10X	GS13	GS10	SR90×6.5	2	24
																			2210	22210EX					SR90×10	1	25
			110	70	210	18	23	115	255	70	30	135	50	M16	M12	4.7	SN310	SN310C	1310	21310E	AN10	AW10X	GS13	GS10	SR110×11.5	2	27
																			2310	22310EX					SR110×10	1	34
55	65	50	100	70	210	18	23	95	255	70	28	130	33	M16	M12	4.5	SN211	SN211C	1211	—	AN11	AW11X	GS15	GS11	SR100×6	2	25
																			2211	22211EX					SR100×8	1	27
			120	80	230	18	23	120	275	80	30	150	53	M16	M12	5.8	SN311	SN311C	1311	21311E	AN11	AW11X	GS15	GS11	SR120×12	2	29
																			2311	22311EX					SR120×10	1	36

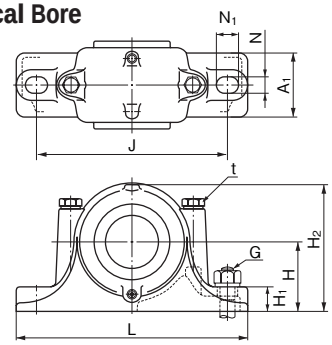
Note: (1) When heavy axial load is applied, a spacer with large O.D. and small inner chamfer must be used between the bearing and shaft shoulder to obtain a sufficient contact area.

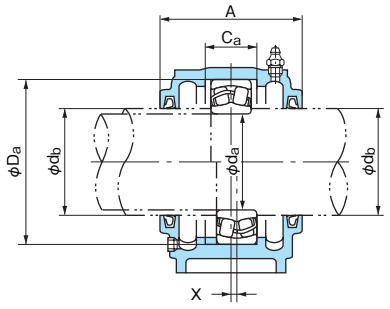
Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only.
To make a complete unit, please order the corresponding bearing, adapter sleeve and locating rings shown in the table additionally.
2. The masses in the table do not include the bearing, nut and locating rings but the bolts.
3. H8, H13 and h13 in the table means tolerance classes specified in JIS B 0401.
4. The tolerance of locating ring O.D. is h12, and 0 ~ -0.2 for the width.
5. The threads for plugs are PT1/8. SN205 does not have a drain holes.
6. When one locating ring is used for fixed-end, the offset (X dimension) of bearing center from the center of the plummer block housing is a half of the locating ring width.
7. ZF type oil seals are also available instead of GS type seals.
8. SNxxxC type housings for shaft diameters different from the dimensions db or dc shown in the table can be custom ordered.
9. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

Plummer Block Housings

SN2, SN3 Series
for Bearing with Cylindrical Bore

Shaft Diameter: 60～95mm

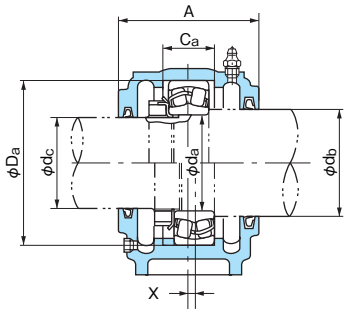




Same Bore Type

Free side

Fixed side



Different Bore Type

Shaft dia. (mm)			Dimensions (mm)													Mass (kg) (Reference)	Designations		Applicable parts								Y (Reference)
																			Self-aligning ball bearings	Spherical roller bearings	Nut	Locking washer	Oil seal		Locating ring		
da	db	dc	Da (H8)	H (h13)	J	N	N1	A	L	A1	H1	H2	Ca (H13)	G (Nominal)	t (Nominal) (Reference)		Same Bore Type	Different Bore Type					db side	dc side	Designations	Q'ty	
60	70	55	110	70	210	18	23	105	255	70	30	135	38	M16	M12	5.0	SN212	SN212C	1212	—	AN12	AW12X	GS16	GS12	SR110×8	2	26
																			2212	22212EX					SR110×10	1	29
	70(1)	55	130	80	230	18	23	125	280	80	30	155	56	M16	M12	6.5	SN312	SN312C	1312	21312E	AN12	AW12X	GS16	GS12	SR130×12.5	2	31
																			2312	22312EX					SR130×10	1	39
65	75	60	120	80	230	18	23	110	275	80	30	150	43	M16	M12	5.6	SN213	SN213C	1213	—	AN13	AW13X	GS17	GS13	SR120×10	2	28
																			2213	22213EX					SR120×12	1	32
	75(1)	60	140	95	260	22	27	130	315	90	32	175	58	M20	M16	8.7	SN313	SN313C	1313	21313E	AN13	AW13X	GS17	GS13	SR140×12.5	2	33
																			2313	22313EX					SR140×10	1	40
70	80	65	125	80	230	18	23	115	275	80	30	155	44	M16	M12	6.2	SN214	SN214C	1214	—	AN14	AW14X	GS18	GS15	SR125×10	2	28
																			2214	22214EX					SR125×13	1	32
	80(1)	65	150	95	260	22	27	130	320	90	32	185	61	M20	M16	10	SN314	SN314C	1314	21314E	AN14	AW14X	GS18	GS15	SR150×13	2	34
																			2314	22314EX					SR150×10	1	42
75	85	70	130	80	230	18	23	115	280	80	30	155	41	M16	M12	7.0	SN215	SN215C	1215	—	AN15	AW15X	GS19	GS16	SR130×8	2	30
																			2215	22215EX					SR130×10	1	33
	85(1)	70	160	100	290	22	27	140	345	100	35	195	65	M20	M16	11	SN315	SN315C	1315	21315E	AN15	AW15X	GS19	GS16	SR160×14	2	36
																			2315	22315EX					SR160×10	1	45
80	90	75	140	95	260	22	27	120	315	90	32	175	43	M20	M16	9.0	SN216	SN216C	1216	—	AN16	AW16X	GS20	GS17	SR140×8.5	2	32
																			2216	22216EX					SR140×10	1	36
	90(1)	75	170	112	290	22	27	145	345	100	35	212	68	M20	M16	13	SN316	SN316C	1316	21316E	AN16	AW16X	GS20	GS17	SR170×14.5	2	39
																			2316	22316EX					SR170×10	1	48
85	95	80	150	95	260	22	27	125	320	90	32	185	46	M20	M16	10	SN217	SN217C	1217	—	AN17	AW17X	GS21	GS18	SR150×9	2	34
																			2217	22217EX					SR150×10	1	38
	95(1)	80	180	112	320	26	32	155	380	110	40	223	70	M24	M20	15	SN317	SN317C	1317	21317E	AN17	AW17X	GS21	GS18	SR180×14.5	2	41
																			2317	22317EX					SR180×10	1	50
90	100	85	160	100	290	22	27	145	345	100	35	195	62.4	M20	M16	13	SN218	SN218C	1218	—	AN18	AW18X	GS22	GS19	SR160×16.2	2	35
																			2218	22218EX					SR160×11.2	2	40
																			—	23218E					SR160×10	1	46
95	110	90	170	112	290	22	27	140	345	100	35	210	53	M20	M16	15	SN219	SN219C	1219	—	AN19	AW19X	GS24	GS20	SR170×10.5	2	37
																			2219	22219EX					SR170×10	1	43

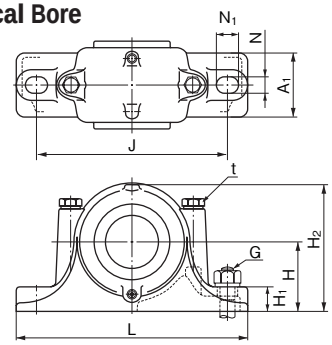
Note: (1) When heavy axial load is applied, a spacer with large O.D. and small inner chamfer must be used between the bearing and shaft shoulder to obtain a sufficient contact area.

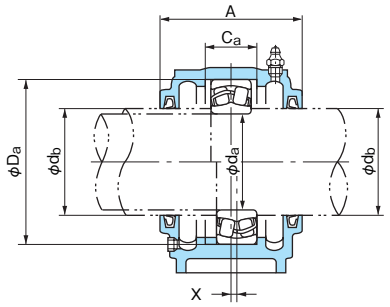
Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only. To make a complete unit, please order the corresponding bearing, adapter sleeve and locating rings shown in the table additionally.
2. The masses in the table do not include the bearing, nut and locating rings but the bolts.
3. H8, H13 and h13 in the table means tolerance classes specified in JIS B 0401.
4. The tolerance of locating ring O.D. is h12, and 0 ~ -0.2 for the width.
5. Plummer block housings SN224 and larger are provided with eye bolts.
6. The threads for plugs are PT1/8 for SN316F and smaller, and PT1/4 for the others.
7. When one locating ring is used for fixed-end, the offset (X dimension) of bearing center from the center of the plummer block housing is a half of the locating ring width.
8. ZF type oil seals are also available instead of GS type seals.
9. SNxxxC type housings for different shaft diameters db or dc from the dimensions shown above are also available.
10. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

Plummer Block Housings

SN2, SN3 Series
for Bearing with Cylindrical Bore

Shaft Diameter: 100～160mm

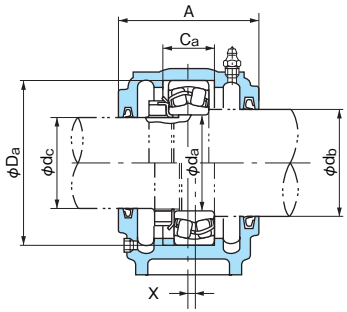




Same Bore Type

Free side

Fixed side



Different Bore Type

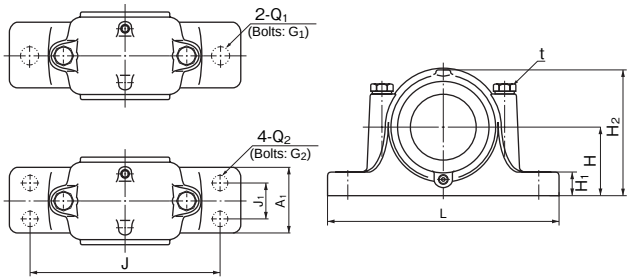
Shaft dia. (mm)			Dimensions (mm)													Mass (kg) (Reference)	Designations		Applicable parts							Y (Reference)
da	db	dc	Da (H8)	H (h13)	J	N	N1	A	L	A1	H1	H2	Ca (H13)	G (Nominal)	t (Nominal) (Reference)		Same Bore Type	Different Bore Type	Self-aligning ball bearings	Spherical roller bearings	Nut	Locking washer	Oil seal db side	Oil seal dc side	Locating ring Designations	Locating ring Q'ty	
100	115	95	180	112	320	26	32	160	380	110	40	218	70.3	M24	M20	19		SN220	SN220C	1220	—	AN20	AW20X	GS26	GS21	SR180×18.1	2	39
																				2220	22220EX					SR180×12.1	2	45
																				—	23220E					SR180×10	1	52
110	125	105	200	125	350	26	32	175	410	120	45	240	80	M24	M20	20		SN222	SN222C	1222	—	AN22	AW22X	GS28	GS23	SR200×21	2	42
																				2222	22222EX					SR200×13.5	2	50
																				—	23222E					SR200×10	1	58
120	135	115	215	140	350	26	32	185	410	120	45	270	86	M24	M20	25		SN224	SN224C	—	22224EX	AN24	AW24X	GS30	GS26	SR215×14	2	53
																				—	23224E					SR215×10	1	62
130	145	125	230	150	380	28	36	190	445	130	50	290	90	M24	M24	30		SN226	SN226C	—	22226EX	AN26	AW26	GS33	GS28	SR230×13	2	57
																				—	23226E					SR230×10	1	65
140	155	135	250	150	420	33	42	205	500	150	50	305	98	M30	M24	38		SN228	SN228C	—	22228EX	AN28	AW28	GS35	GS30	SR250×15	2	60
																				—	23228E					SR250×10	1	70
150	165	145	270	160	450	33	42	220	530	160	60	325	106	M30	M24	46		SN230	SN230C	—	22230E	AN30	AW30	GS37	GS33	SR270×16.5	2	65
																				—	23230E					SR270×10	1	76
160	175	150	290	170	470	33	42	235	550	160	60	345	114	M30	M24	50		SN232	SN232C	—	22232E	AN32	AW32	GS39	GS34	SR290×17	2	71
																				—	23232E					SR290×10	1	83

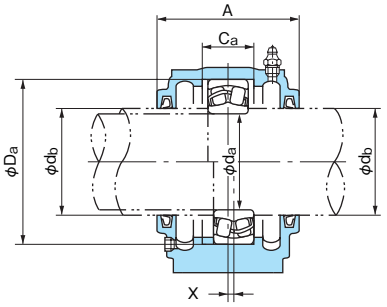
Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only.
To make a complete unit, please order the corresponding bearing, adapter sleeve and locating rings shown in the table additionally.
2. The masses in the table do not include the bearing, nut and locating rings but the bolts.
3. H8, H13 and h13 in the table means tolerance classes specified in JIS B 0401.
4. The tolerance of locating ring O.D. is h12, and 0 ~ -0.2 for the width.
5. Plummer block housings SN224 and larger are provided with eye bolts.
6. The threads for plugs are PT1/8 for SN316F and smaller, and PT1/4 for the others.
7. When one locating ring is used for fixed-end, the offset (X dimension) of bearing center from the center of the plummer block housing is a half of the locating ring width.
8. ZF type oil seals are also available instead of GS type seals.
9. SNxxxC type housings for different shaft diameters db or dc from the dimensions shown above are also available.
10. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

Plummer Block Housings

Flat Bottom Type SN2F, SN3F Series for Bearing with Cylindrical Bore

Shaft Diameter: 25～55mm

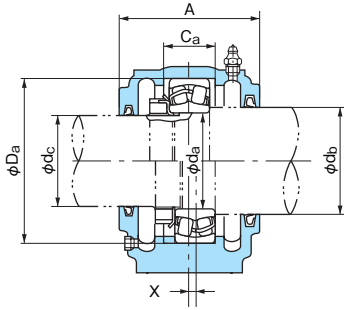




Same Bore Type

Free side

Fixed side



Different Bore Type

Shaft dia. (mm)			Dimensions (mm)								Bolt holes (Reference)						t (Nominal) (Reference)	Mass (kg) (Reference)	Designations		Applicable parts							Y (Reference)
da	db	dc	Da (H8)	H (h13)	A	L	A1	H1	H2	Ca (H13)	J	Q1	G1 (Nominal)	J1	Q2	G2 (Nominal)			Same Bore Type	Different Bore Type	Self-aligning ball bearings	Spherical roller bearings	Nut	Locking washer	Oil seal db side	Oil seal dc side	Locating ring Designations	Locating ring Q'ty	
25	30(1)	20	52	40	67	165	46	22	75	25	130	15	M12	25	10	M 8	M 8	1.7	SN205F	SN205FC	1205	—	AN05	AW05X	GS 7	GS 5	SR52×5	2	17
																					2205	22205EX					SR52×7	1	19
			62	50	80	185	52	22	90	34	150	15	M12	25	12	M10	M 8	2.4	SN305F	SN305FC	1305	21305E	AN05	AW05X	GS 7	GS 5	SR62×8.5	2	18
																					2305	—					SR62×10	1	22
30	35(1)	25	62	50	77	185	52	22	90	30	150	15	M12	25	12	M10	M 8	2.5	SN206F	SN206FC	1206	—	AN06	AW06X	GS 8	GS 6	SR62×7	2	18
																					2206	22206EX					SR62×10	1	20
			72	50	82	185	52	22	95	37	150	15	M12	25	12	M10	M10	2.5	SN306F	SN306FC	1306	21306E	AN06	AW06X	GS 8	GS 6	SR72×9	2	19
																					2306	—					SR72×10	1	23
35	45	30	72	50	82	185	52	22	95	33	150	15	M12	25	12	M10	M10	2.6	SN207F	SN207FC	1207	—	AN07	AW07X	GS10	GS 7	SR72×8	2	19
																					2207	22207EX					SR72×10	1	22
			80	60	90	205	60	25	110	41	170	15	M12	30	12	M10	M10	3.8	SN307F	SN307FC	1307	21307E	AN07	AW07X	GS10	GS 7	SR80×10	2	21
																					2307	—					SR80×10	1	26
40	50	35	80	60	85	205	60	25	110	33	170	15	M12	30	12	M10	M10	4.0	SN208F	SN208FC	1208	—	AN08	AW08X	GS11	GS 8	SR80×7.5	2	21
																					2208	22208EX					SR80×10	1	23
			90	60	95	205	60	25	115	43	170	15	M12	30	12	M10	M10	4.0	SN308F	SN308FC	1308	21308E	AN08	AW08X	GS11	GS 8	SR90×10	2	23
																					2308	22308EX					SR90×10	1	28
45	55	40	85	60	85	205	60	25	112	31	170	15	M12	30	12	M10	M10	4.4	SN209F	SN209FC	1209	—	AN09	AW09X	GS12	GS 9	SR85×6	2	22
																					2209	22209EX					SR85×8	1	24
			100	70	105	255	70	28	130	46	210	19	M16	35	15	M12	M12	6.0	SN309F	SN309FC	1309	21309E	AN09	AW09X	GS12	GS 9	SR100×10.5	2	25
																					2309	22309EX					SR100×10	1	31
50	60	45	90	60	90	205	60	25	115	33	170	15	M12	30	12	M10	M10	4.7	SN210F	SN210FC	1210	—	AN10	AW10X	GS13	GS10	SR90×6.5	2	24
																					2210	22210EX					SR90×10	1	25
			110	70	115	255	70	30	135	50	210	19	M16	35	15	M12	M12	6.5	SN310F	SN310FC	1310	21310E	AN10	AW10X	GS13	GS10	SR110×11.5	2	27
																					2310	22310EX					SR110×10	1	34
55	65	50	100	70	95	255	70	28	130	33	210	19	M16	35	15	M12	M12	6.3	SN211F	SN211FC	1211	—	AN11	AW11X	GS15	GS11	SR100×6	2	25
																					2211	22211EX					SR100×8	1	27
			120	80	120	275	80	30	150	53	230	19	M16	40	15	M12	M12	8.5	SN311F	SN311FC	1311	21311E	AN11	AW11X	GS15	GS11	SR120×12	2	29
																					2311	22311EX					SR120×10	1	36

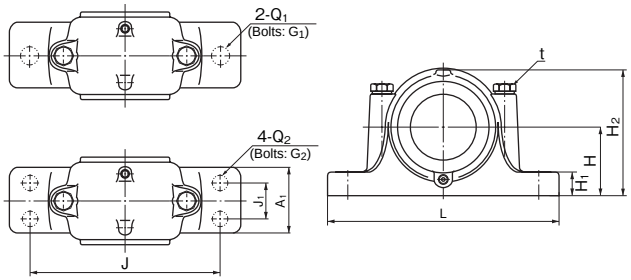
Note: (1) When heavy axial load is applied, a spacer with large O.D. and small inner chamfer must be used between the bearing and shaft shoulder to obtain a sufficient contact area.

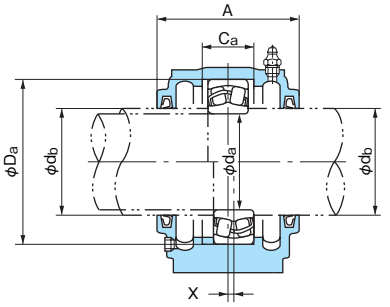
Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only. To make a complete unit, please order the corresponding bearing, adapter sleeve and locating rings shown in the table additionally.
2. The masses in the table do not include the bearing, nut and locating rings but the bolts.
3. H8, H13 and h13 in the table means tolerance classes specified in JIS B 0401.
4. The tolerance of locating ring O.D. is h12, and 0 ~ -0.2 for the width.
5. The threads for plugs are PT1/8. SN205 does not have a drain holes.
6. When one locating ring is used for fixed-end, the offset (X dimension) of bearing center from the center of the plummer block housing is a half of the locating ring width.
7. ZF type oil seals are also available instead of GS type seals.
8. SNxxxC type housings for shaft diameters different from the dimensions db or dc shown in the table can be custom ordered.
9. Please specify number of bolt holes.
10. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

Plummer Block Housings

Flat Bottom Type SN2F, SN3F Series for Bearing with Cylindrical Bore

Shaft Diameter: 60～95mm

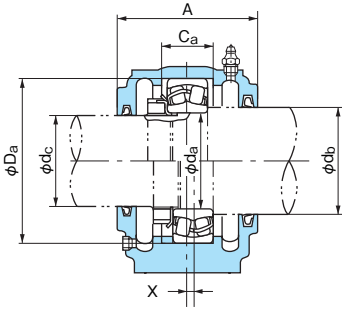




Same Bore Type

Free side

Fixed side



Different Bore Type

Shaft dia. (mm)			Dimensions (mm)								Bolt holes (Reference)						t (Nominal) (Reference)	Mass (kg) (Reference)	Designations		Applicable parts							Y (Reference)
																									Oil seal		Locating ring		
da	db	dc	Da (H8)	H (h13)	A	L	A1	H1	H2	Ca (H13)	J	Q1	G1 (Nominal)	J1	Q2	G2 (Nominal)			Same Bore Type	Different Bore Type	Self-aligning ball bearings	Spherical roller bearings	Nut	Locking washer	db side	dc side	Designations	Q'ty	
60	70	55	110	70	105	255	70	30	135	38	210	19	M16	35	15	M12	M12	6.9	SN212F	SN212FC	1212	—	AN12	AW12X	GS16	GS12	SR110×8	2	26
																					2212	22212EX					SR110×10	1	29
	70(1)	55	130	80	125	280	80	30	155	56	230	19	M16	40	15	M12	M12	9.0	SN312F	SN312FC	1312	21312E	AN12	AW12X	GS16	GS12	SR130×12.5	2	31
																					2312	22312EX					SR130×10	1	39
65	75	60	120	80	110	275	80	30	150	43	230	19	M16	40	15	M12	M12	7.0	SN213F	SN213FC	1213	—	AN13	AW13X	GS17	GS13	SR120×10	2	28
																					2213	22213EX					SR120×12	1	32
	75(1)	60	140	95	130	315	90	32	175	58	260	24	M20	50	19	M16	M16	13	SN313F	SN313FC	1313	21313E	AN13	AW13X	GS17	GS13	SR140×12.5	2	33
																					2313	22313EX					SR140×10	1	40
70	80	65	125	80	115	275	80	30	155	44	230	19	M16	40	15	M12	M12	7.6	SN214F	SN214FC	1214	—	AN14	AW14X	GS18	GS15	SR125×10	2	28
																					2214	22214EX					SR125×13	1	32
	80(1)	65	150	95	130	320	90	32	185	61	260	24	M20	50	19	M16	M16	15	SN314F	SN314FC	1314	21314E	AN14	AW14X	GS18	GS15	SR150×13	2	34
																					2314	22314EX					SR150×10	1	42
75	85	70	130	80	115	280	80	30	155	41	230	19	M16	40	15	M12	M12	8.8	SN215F	SN215FC	1215	—	AN15	AW15X	GS19	GS16	SR130×8	2	30
																					2215	22215EX					SR130×10	1	33
	85(1)	70	160	100	140	345	100	35	195	65	290	24	M20	50	19	M16	M16	16	SN315F	SN315FC	1315	21315E	AN15	AW15X	GS19	GS16	SR160×14	2	36
																					2315	22315EX					SR160×10	1	45
80	90	75	140	95	120	315	90	32	175	43	260	24	M20	50	19	M16	M16	13	SN216F	SN216FC	1216	—	AN16	AW16X	GS20	GS17	SR140×8.5	2	32
																					2216	22216EX					SR140×10	1	36
	90(1)	75	170	112	145	345	100	35	212	68	290	24	M20	50	19	M16	M16	17	SN316F	SN316FC	1316	21316E	AN16	AW16X	GS20	GS17	SR170×14.5	2	39
																					2316	22316EX					SR170×10	1	48
85	95	80	150	95	125	320	90	32	185	46	260	24	M20	50	19	M16	M16	14	SN217F	SN217FC	1217	—	AN17	AW17X	GS21	GS18	SR150×9	2	34
																					2217	22217EX					SR150×10	1	38
	95(1)	80	180	112	155	380	110	40	223	70	320	28	M24	60	24	M20	M20	24	SN317F	SN317FC	1317	21317E	AN17	AW17X	GS21	GS18	SR180×14.5	2	41
																					2317	22317EX					SR180×10	1	50
90	100	85	160	100	145	345	100	35	195	62.4	290	24	M20	50	19	M16	M16	18	SN218F	SN218FC	1218	—	AN18	AW18X	GS22	GS19	SR160×16.2	2	35
																					2218	22218EX					SR160×11.2	2	40
																					—	23218E					SR160×10	1	46
95	110	90	170	112	140	345	100	35	210	53	290	24	M20	50	19	M16	M16	20	SN219F	SN219FC	1219	—	AN19	AW19X	GS24	GS20	SR170×10.5	2	37
																					2219	22219EX					SR170×10	1	43

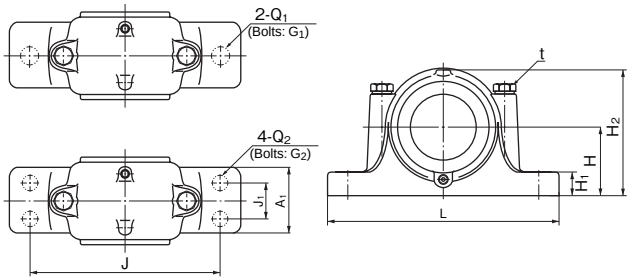
Note: (1) When heavy axial load is applied, a spacer with large O.D. and small inner chamfer must be used between the bearing and shaft shoulder to obtain a sufficient contact area.

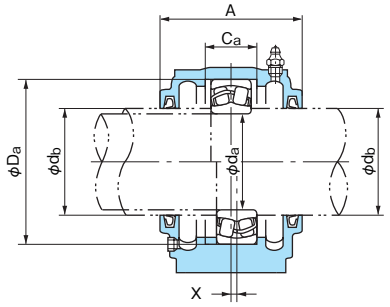
Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only. To make a complete unit, please order the corresponding bearing, adapter sleeve and locating rings shown in the table additionally.
2. The masses in the table do not include the bearing, nut and locating rings but the bolts.
3. H8, H13 and h13 in the table means tolerance classes specified in JIS B 0401.
4. The tolerance of locating ring O.D. is h12, and 0 ~ -0.2 for the width.
5. Plummer block housings SN224F and larger are provided with eye bolts.
6. The threads for plugs are PT1/8 for SN219F, SN316F and smaller, and PT1/4 for the others.
7. When one locating ring is used for fixed-end, the offset (X dimension) of bearing center from the center of the plummer block housing is a half of the locating ring width.
8. ZF type oil seals are also available instead of GS type seals.
9. SNxxxC type housings for shaft diameters different from the dimensions db or dc shown in the table can be custom ordered.
10. Please specify number of bolt holes.
11. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

Plummer Block Housings

Flat Bottom Type SN2F, SN3F Series for Bearing with Cylindrical Bore

Shaft Diameter: 100～160mm

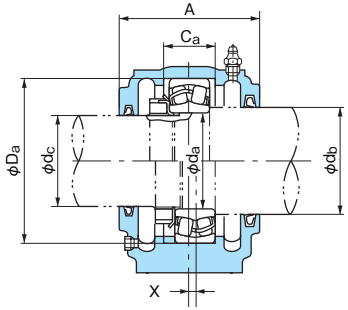




Same Bore Type

Free side

Fixed side



Different Bore Type

Shaft dia. (mm)			Dimensions (mm)								Bolt holes (Reference)						t (Nominal) (Reference)	Mass (kg) (Reference)	Designations		Applicable parts							Y (Reference)
																					Self-aligning ball bearings	Spherical roller bearings	Nut	Locking washer	Oil seal		Locating ring		
da	db	dc	Da (H8)	H (h13)	A	L	A1	H1	H2	Ca (H13)	J	Q1	G1 (Nominal)	J1	Q2	G2 (Nominal)			Same Bore Type	Different Bore Type					db side	dc side	Designations	Q'ty	
100	115	95	180	112	160	380	110	40	218	70.3	320	28	M24	60	24	M20	M20	26	SN220F	SN220FC	1220	—	AN20	AW20X	GS26	GS21	SR180×18.1	2	39
																					2220	22220EX					SR180×12.1	2	45
																					—	23220E					SR180×10	1	52
110	125	105	200	125	175	410	120	45	240	80	350	28	M24	70	24	M20	M20	28	SN222F	SN222FC	1222	—	AN22	AW22X	GS28	GS23	SR200×21	2	42
																					2222	22222EX					SR200×13.5	2	50
																					—	23222E					SR200×10	1	58
120	135	115	215	140	185	410	120	45	270	86	350	28	M24	70	24	M20	M20	35	SN224F	SN224FC	—	22224EX	AN24	AW24X	GS30	GS26	SR215×14	2	53
																					—	23224E					SR215×10	1	62
130	145	125	230	150	190	445	130	50	290	90	380	28	M24	70	28	M24	M24	42	SN226F	SN226FC	—	22226EX	AN26	AW26	GS33	GS28	SR230×13	2	57
																					—	23226E					SR230×10	1	65
140	155	135	250	150	205	500	150	50	305	98	420	35	M30	80	28	M24	M24	52	SN228F	SN228FC	—	22228EX	AN28	AW28	GS35	GS30	SR250×15	2	60
																					—	23228E					SR250×10	1	70
150	165	145	270	160	220	530	160	60	325	106	450	35	M30	90	28	M24	M24	61	SN230F	SN230FC	—	22230E	AN30	AW30	GS37	GS33	SR270×16.5	2	65
																					—	23230E					SR270×10	1	76
160	175	150	290	170	235	550	160	60	345	114	470	35	M30	90	28	M24	M24	68	SN232F	SN232FC	—	22232E	AN32	AW32	GS39	GS34	SR290×17	2	71
																					—	23232E					SR290×10	1	83

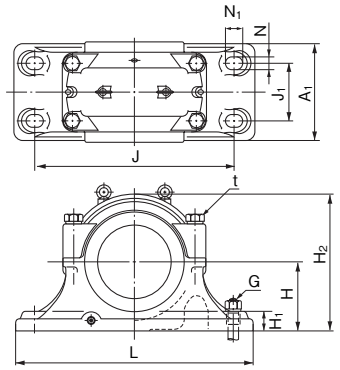
Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only.
To make a complete unit, please order the corresponding bearing, adapter sleeve and locating rings shown in the table additionally.
2. The masses in the table do not include the bearing, nut and locating rings but the bolts.
3. H8, H13 and h13 in the table means tolerance classes specified in JIS B 0401.
4. The tolerance of locating ring O.D. is h12, and 0 ~ -0.2 for the width.
5. Plummer block housings SN224F and larger are provided with eye bolts.
6. The threads for plugs are PT1/8 for SN219F, SN316F and smaller, and PT1/4 for the others.
7. When one locating ring is used for fixed-end, the offset (X dimension) of bearing center from the center of the plummer block housing is a half of the locating ring width.
8. ZF type oil seals are also available instead of GS type seals.
9. SNxxxC type housings for shaft diameters different from the dimensions db or dc shown in the table can be custom ordered.
10. Please specify number of bolt holes.
11. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

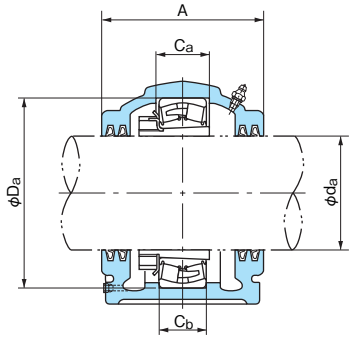
NACHI

Plummer Block Housings

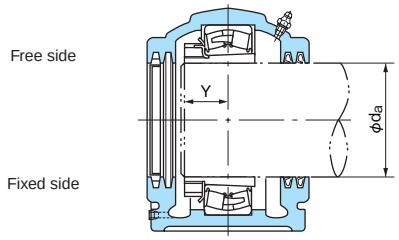
SD5, SD6, SD30, SD31 Series for Bearing with Adapter Sleeve

Shaft Diameter: 150～240mm





Through Shaft Type



Shaft End Type

Shaft dia. da (mm)	Dimensions (mm)															Mass (kg) (Reference)	Designations		Applicable parts			Y (Reference)
	Da (H8)	H (h13)	J	J1	N	N1	A	L	A1	H1	H2	Ca (H13)	Cb (H13)	G (Nominal)	t (Nominal) (Reference)		Free side	Fixed side	Spherical roller bearings	Adapter sleeve	Oil seal	
150	260	160	450	110	36	46	230	540	200	50	315	77	67	M30	M24	70	SD3034	SD3034G	23034EK	H3034	GS34	66
	280	170	470	120	36	46	250	560	220	50	335	98	88	M30	M24	75	SD3134	SD3134G	23134EK	H3134	GS34	76
	310	180	510	140	36	46	270	620	250	60	360	96	86	M30	M24	100	SD534	SD534G	22234EK	H3134	GS34	75
	360	210	610	170	36	46	300	740	290	65	420	130	120	M30	M30	160	SD634	SD634G	22334EK	H2334	GS34	92
160	280	170	470	120	36	46	250	560	220	50	335	84	74	M30	M24	79	SD3036	SD3036G	23036EK	H3036	GS36	70
	300	180	520	140	36	46	270	630	250	55	355	106	96	M30	M24	94	SD3136	SD3136G	23136EK	H3136	GS36	81
	320	190	540	150	36	46	280	650	260	60	380	96	86	M30	M24	110	SD536	SD536G	22236EK	H3136	GS36	76
	380	225	640	180	43	59	320	780	310	70	450	136	126	M36	M30	195	SD636	SD636G	22336EK	H2336	GS36	96
170	290	170	470	120	36	46	250	560	220	50	340	85	75	M30	M24	87	SD3038	SD3038G	23038EK	H3038	GS38	72
	320	190	560	140	36	46	290	680	270	55	385	114	104	M30	M24	110	SD3138	SD3138G	23138EK	H3138	GS38	86
	340	200	570	160	36	46	290	700	280	65	400	102	92	M30	M30	130	SD538	SD538G	22238EK	H3138	GS38	80
	400	240	680	190	43	59	330	820	320	70	475	142	132	M36	M30	210	SD638	SD638G	22338EK	H2338	GS38	100
180	310	180	510	140	36	46	270	620	250	60	360	92	82	M30	M24	100	SD3040	SD3040G	23040EK	H3040	GS40	76
	340	200	570	160	36	46	310	700	280	65	400	122	112	M30	M30	130	SD3140	SD3140G	23140EK	H3140	GS40	91
	360	210	610	170	36	46	300	740	290	65	420	108	98	M30	M30	155	SD540	SD540G	22240EK	H3140	GS40	84
	420	250	710	200	43	59	350	860	340	85	500	148	138	M36	M36	240	SD640	SD640G	22340EK	H2340	GS40	104
200	340	200	570	160	36	46	290	700	280	65	400	100	90	M30	M30	130	SD3044	SD3044G	23044EK	H3044	GS44	79
	370	225	640	180	43	59	320	780	310	70	445	130	120	M36	M30	180	SD3144	SD3144G	23144EK	H3144	GS44	96
	400	240	680	190	43	59	330	820	320	70	475	118	108	M36	M30	205	SD544	SD544G	22244EK	H3144	GS44	90
	460	280	770	210	43	59	360	920	350	85	550	155	145	M36	M36	315	SD644	SD644G	22344EK	H2344	GS44	109
220	360	210	610	170	36	46	300	740	290	65	420	102	92	M30	M30	160	SD3048	SD3048G	23048EK	H3048	GS48	84
	400	240	680	190	43	59	330	820	320	70	475	138	128	M36	M30	210	SD3148	SD3148G	23148EK	H3148	GS48	102
	440	260	740	200	43	59	340	880	330	85	515	130	120	M36	M36	240	SD548	SD548G	22248EK	H3148	GS48	98
	500	300	830	230	50	67	390	990	380	100	590	165	155	M42	M36	405	SD648	SD648G	22348EK	H2348	GS48	116
240	400	240	680	190	43	59	340	820	320	70	475	114	104	M36	M30	210	SD3052	SD3052G	23052EK	H3052	GS52	90
	440	260	740	200	43	59	360	880	350	85	515	154	144	M36	M36	240	SD3152	SD3152G	23152EK	H3152	GS52	112
	480	280	790	210	43	59	370	940	360	85	560	140	130	M36	M36	315	SD552	SD552G	22252EK	H3152	GS52	105
	540	325	890	250	50	67	410	1060	400	100	640	175	165	M42	M36	480	SD652	SD652G	22352EK	H2352	GS52	123

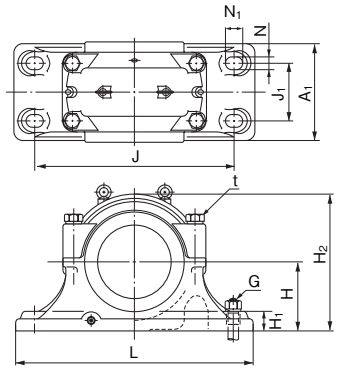
Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only.
To make a complete unit, please order the corresponding bearing, adapter sleeve and locating rings shown in the table additionally.
2. Dimension Ca is for the free side housings and dimension Cb for the fixed side housings. (Locating rings are not required in the fixed side housings.)
3. The masses in the table do not include the bearing and adapter sleeve but the bolts.
4. H8, H13 and h13 in the table means tolerance classes specified in JIS B 0401.
5. The thread for a grease nipple is PT1/4, and the threads for tow drain plugs are PT3/8.
6. Plummer block housings listed in the above table are provided with eye bolts.
7. Designations of shaft end type housings have suffix “E” at the end.
8. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

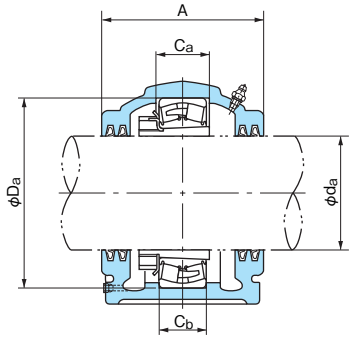
NACHI

Plummer Block Housings

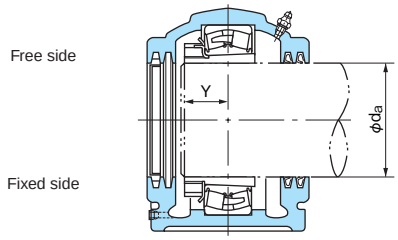
SD5, SD6, SD30, SD31 Series for Bearing with Adapter Sleeve

Shaft Diameter: 260～300mm





Through Shaft Type



Shaft End Type

Shaft dia. da (mm)	Dimensions (mm)															Mass (kg) (Reference)	Designations		Applicable parts			Y (Reference)
	Da (H8)	H (h13)	J	J1	N	N1	A	L	A1	H1	H2	Ca (H13)	Cb (H13)	G (Nominal)	t (Nominal) (Reference)		Free side	Fixed side	Spherical roller bearings	Adapter sleeve	Oil seal	
260	420	250	710	200	43	59	350	860	340	85	500	116	106	M36	M36	240	**SD3056**	**SD3056G**	23056EK	H3056	GS56	95
	460	280	770	210	43	59	360	920	350	85	550	156	146	M36	M36	315	**SD3156**	**SD3156G**	23156EK	H3156	GS56	115
	500	300	830	230	50	67	390	990	380	100	590	140	130	M42	M36	390	**SD556**	**SD556G**	22256EK	H3156	GS56	107
	580	355	930	270	57	77	440	1110	430	110	690	185	175	M48	M42	610	**SD656**	**SD656G**	22356EK	H2356	GS56	130
280	460	280	770	210	43	59	360	920	350	85	550	128	118	M36	M36	300	**SD3060**	**SD3060G**	23060EK	H3060	GS60	105
	500	300	830	230	50	67	390	990	380	100	590	170	160	M42	M36	405	**SD3160**	**SD3160G**	23160EK	H3160	GS60	124
	540	325	890	250	50	67	410	1060	400	100	640	150	140	M42	M36	465	**SD560**	**SD560G**	22260EK	H3160	GS60	114
300	480	280	790	210	43	59	380	940	360	85	560	131	121	M36	M36	320	**SD3064**	**SD3064G**	23064EK	H3064	GS64	108
	540	325	890	250	50	67	430	1060	400	100	640	186	176	M42	M36	480	**SD3164**	**SD3164G**	23164EK	H3164	GS64	135
	580	355	930	270	57	77	440	1110	430	110	690	160	150	M48	M42	595	**SD564**	**SD564G**	22264EK	H3164	GS64	122

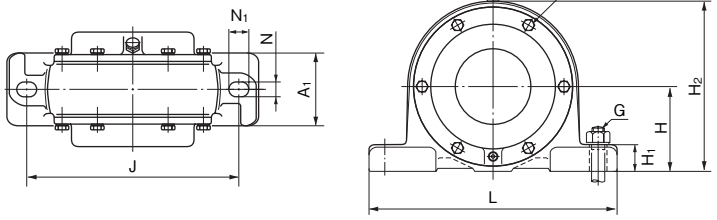
Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only.
To make a complete unit, please order the corresponding bearing, adapter sleeve and locating rings shown in the table additionally.
2. Dimension C_a is for the free side housings and dimension C_b for the fixed side housings. (Locating rings are not required in the fixed side housings.)
3. The masses in the table do not include the bearing and adapter sleeve but the bolts.
4. H8, H13 and h13 in the table means tolerance classes specified in JIS B 0401.
5. The thread for a grease nipple is PT1/4, and the threads for tow drain plugs are PT3/8.
6. Plummer block housings listed in the above table are provided with eye bolts.
7. Designations of shaft end type housings have suffix “E” at the end.
8. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

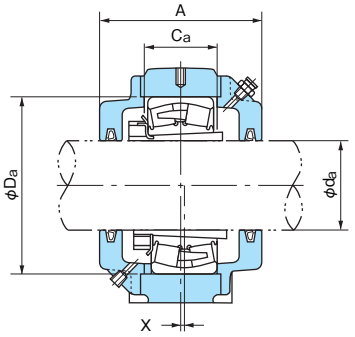
One piece type Plummer Block Housings

V Series

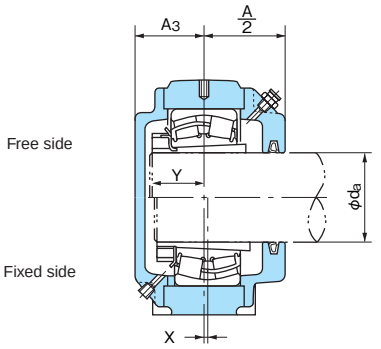
for Bearing with Adapter Sleeve

Shaft Diameter: 30～60mm





Through Shaft Type



Shaft End Type

Shaft dia. da (mm)	Dimensions (mm)														Mass (kg) (Reference)	Designations		Applicable parts						Y (Reference)
	Da (H7)	H (h11)	J	N	N1	A	L	A1	A3	H1	H2	Ca	G (Nominal)	t (Nominal) (Reference)		Through Shaft Type	Shaft End Type	Self-aligning ball bearings	Spherical roller bearings	Adapter sleeve	Oil seal	Locating ring Designations	Locating ring Q'ty	
30	80	60	170	16	20	95	205	60	40.5	25	118	37	M14	M6	4.8	V080C30-30	V080C30-0	1307K	21307EK	H307X	GS 7	SR80×8	2	21
																		2307K	—	H2307X		SR80×6	1	26
35	80	60	170	16	20	95	205	60	40.5	25	118	37	M14	M6	4.3	V080C35-35	V080C35-0	1208K	—	H208X	GS 8	SR80×9.5	2	21
																		2208K	22208EXK	H308X		SR80×7	2	23
	90	67	170	16	20	100	205	60	42.5	25	128	39	M14	M6	5.1	V090C35-35	V090C35-0	1308K	21308EK	H308X	GS 8	SR90×8	2	23
																		2308K	22308EXK	H2308X		SR90×6	1	28
40	85	63	170	16	20	98	205	60	42.5	25	125	39	M14	M6	4.7	V085C40-40	V085C40-0	1209K	—	H209X	GS 9	SR85×10	2	22
																		2209K	22209EXK	H309X		SR85×8	2	24
	100	71	210	16	23	106	255	70	47	28	140	42	M14	M6	6.9	V100C40-40	V100C40-0	1309K	21309EK	H309X	GS 9	SR100×8.5	2	25
																		2309K	22309EXK	H2309X		SR100×6	1	31
45	90	67	170	16	20	100	205	60	42.5	25	128	39	M14	M6	4.6	V090C45-45	V090C45-0	1210K	—	H210X	GS10	SR90×9.5	2	24
																		2210K	22210EXK	H310X		SR90×8	2	25
	110	80	210	21	25	112	255	70	47	30	155	46	M18	M6	8.9	V110C45-45	V110C45-0	1310K	21310EK	H310X	GS10	SR110×9.5	2	27
																		2310K	22310EXK	H2310X		SR110×6	1	34
50	100	71	210	16	23	106	255	70	47	28	140	42	M14	M6	6.4	V100C50-50	V100C50-0	1211K	—	H211X	GS11	SR100×10.5	2	25
																		2211K	22211EXK	H311X		SR100×8.5	2	27
	120	85	230	21	25	118	275	80	50	30	165	49	M18	M6	11	V120C50-50	V120C50-0	1311K	21311EK	H311X	GS11	SR120×10	2	29
																		2311K	22311EXK	H2311X		SR120×6	1	36
55	110	80	210	21	25	112	255	70	47	30	155	46	M18	M6	8.0	V110C55-55	V110C55-0	1212K	—	H212X	GS12	SR110×12	2	26
																		2212K	22212EXK	H312X		SR110×9	2	29
	130	90	230	21	25	118	280	80	50	30	175	50	M18	M6	12	V130C55-55	V130C55-0	1312K	21312EK	H312X	GS12	SR130×9.5	2	31
																		2312K	22312EXK	H2312X		SR130×4	1	39
60	120	85	230	21	25	118	275	80	50	30	165	49	M18	M6	10	V120C60-60	V120C60-0	1213K	—	H213X	GS13	SR120×13	2	28
																		2213K	22213EXK	H313X		SR120×9	2	32
	125	90	230	21	25	118	280	80	50	30	175	50	M18	M6	11	V125C60-60	V125C60-0	—	22214EXK	H314X	GS13	SR125×9.5	2	32
	140	100	260	25	30	136	315	90	58	32	195	56	M22	M8	18	V140C60-60	V140C60-0	1313K	21313EK	H313X	GS13	SR140×11.5	2	33
																		2313K	22313EXK	H2313X		SR140×8	1	40
	150	100	260	25	30	140	315	90	60	32	195	56	M22	M8	16	V150C60-60	V150C60-0	—	21314EK	H314X	GS13	SR150×10.5	2	34
																		—	22314EXK	H2314X		SR150×5	1	42

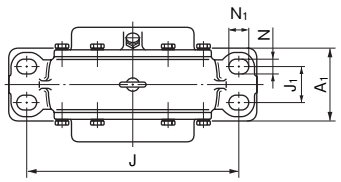
Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only.
To make a complete unit, please order the corresponding bearing, adapter sleeve and locating rings shown in the table additionally.
2. The masses in the table do not include the bearing, adapter sleeve and locating rings.
3. H7 and h11 in the table means tolerance classes specified in JIS B 0401.
4. The tolerance of locating ring O.D. is h12, and 0 ~ -0.2 for the width.
5. Plummer block housings V180 and larger are provided with eye bolts.
6. The threads for plugs and grease nipples are PT1/8 for V170 and smaller, and PT1/4 for V180 and larger.
7. When one locating ring is used for fixed-end, the offset (X dimension) of bearing center from the center of the housing is a half of the locating ring width.
8. ZF type oil seals are also available instead of GS type seals.
9. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

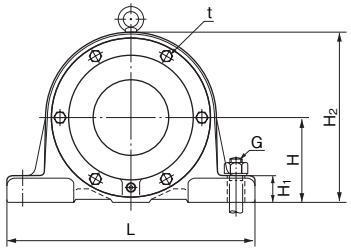
One piece type Plummer Block Housings

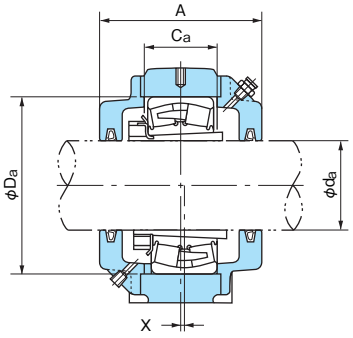
V Series

for Bearing with Adapter Sleeve

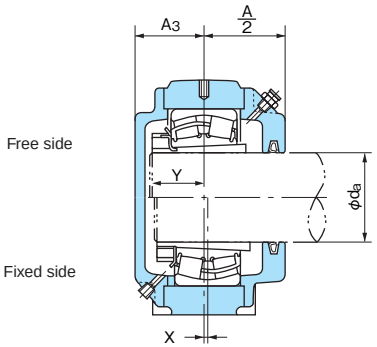
Shaft dia.: 65～90mm







Through Shaft Type



Shaft End Type

Shaft dia. da (mm)	Dimensions (mm)															Mass (kg) (Reference)	Designations		Applicable parts						Y (Reference)
	Da (H7)	H (h11)	J	J1	N	N1	A	L	A1	A3	H1	H2	Ca	G (Nominal)	t (Nominal) (Reference)		Through Shaft Type	Shaft End Type	Self-aligning ball bearings	Spherical roller bearings	Adapter sleeve	Oil seal	Locating ring Designations	Locating ring Q'ty	
65	130	90	230	—	21	25	118	280	80	50	30	175	50	M18	M 6	11	V130C65-65	V130C65-0	1215K	—	H215X	GS15	SR130×12.5	2	30
																			2215K	22215EXK	H315X		SR130×9.5	2	33
	160	112	290	—	25	30	150	345	100	65	35	224	62	M22	M 8	24	V160C65-65	V160C65-0	1315K	21315EK	H315X	GS15	SR160×12.5	2	36
																			2315K	22315EXK	H2315X		SR160×7	1	45
70	140	100	260	—	25	30	136	315	90	58	32	195	56	M22	M 8	17	V140C70-70	V140C70-0	1216K	—	H216X	GS16	SR140×15	2	32
																			2216K	22216EXK	H316X		SR140×11.5	2	36
	170	112	290	—	25	30	165	345	100	72.5	35	224	62	M22	M 8	22	V170C70-70	V170C70-0	1316K	21316EK	H316X	GS16	SR170×11.5	2	39
																			2316K	22316EXK	H2316X		SR170×4	1	48
75	150	100	260	—	25	30	140	315	90	60	32	195	56	M22	M 8	16	V150C75-75	V150C75-0	1217K	—	H217X	GS17	SR150×14	2	34
																			2217K	22217EXK	H317X		SR150×10	2	38
	180	125	320	56	23	32	170	380	110	75	40	243	70	M20	M 8	29	V180C75-75	V180C75-0	1317K	21317EK	H317X	GS17	SR180×14.5	2	41
																			2317K	22317EXK	H2317X		SR180×10	1	50
80	160	112	290	—	25	30	150	345	100	65	35	224	62	M22	M 8	24	V160C80-80	V160C80-0	1218K	—	H218X	GS18	SR160×16	2	35
																			2218K	22218EXK	H318X		SR160×11	2	40
	190	125	320	56	23	32	170	380	110	75	40	243	70	M20	M 8	26	V190C80-80	V190C80-0	1318K	21318EK	H318X	GS18	SR190×13.5	2	42
																			2318K	22318EXK	H2318X		SR190×6	1	52
85	170	112	290	—	25	30	165	345	100	72.5	35	224	62	M22	M 8	22	V170C85-85	V170C85-0	1219K	—	H219X	GS19	SR170×15	2	37
																			2219K	22219EXK	H319X		SR170×9.5	2	43
	200	132	350	60	23	32	190	410	120	82	45	265	82	M20	M10	40	V200C85-85	V200C85-0	1319K	21319EK	H319X	GS19	SR200×18.5	2	44
																			2319K	22319EXK	H2319X		SR200×15	1	55
90	180	125	320	56	23	32	170	380	110	75	40	243	70	M20	M 8	28	V180C90-90	V180C90-0	1220K	—	H220X	GS20	SR180×18	2	39
																			2220K	22220EXK	H320X		SR180×12	2	45
	215	140	350	60	23	32	190	410	120	82	45	280	82	M20	M10	42	V215C90-90	V215C90-0	1320K	21320EK	H320X	GS20	SR215×17.5	2	46
																			2320K	22320EXK	H2320X		SR215×9	1	59

Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only.
To make a complete unit, please order the corresponding bearing, adapter sleeve and locating rings shown in the table additionally.
2. The masses in the table do not include the bearing, adapter sleeve and locating rings.
3. H7 and h11 in the table means tolerance classes specified in JIS B 0401.
4. The tolerance of locating ring O.D. is h12, and 0 ~ -0.2 for the width.
5. Plummer block housings V180 and larger are provided with eye bolts.
6. The threads for plugs and grease nipples are PT1/8 for V170 and smaller, and PT1/4 for V180 and larger.
7. When one locating ring is used for fixed-end, the offset (X dimension) of bearing center from the center of the housing is a half of the locating ring width.
8. ZF type oil seals are also available instead of GS type seals.
9. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

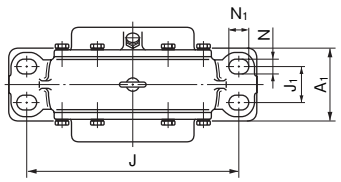
NACHI

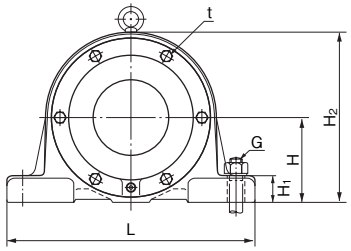
One piece type Plummer Block Housings

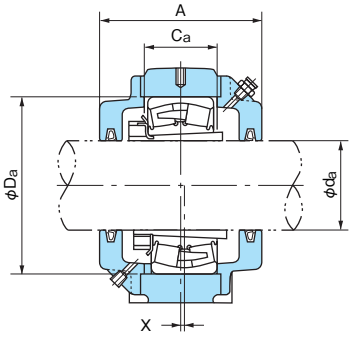
V Series

for Bearing with Adapter Sleeve

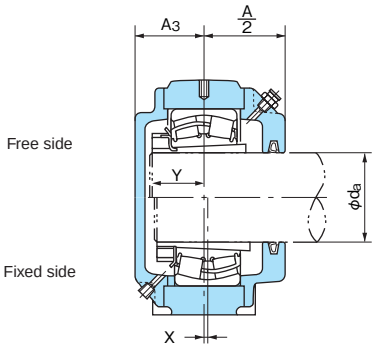
Shaft Diameter: 100～135mm







Through Shaft Type



Shaft End Type

Shaft dia. da (mm)	Dimensions (mm)															Mass (kg) (Reference)	Designations		Applicable parts					Y (Reference)
	Da (H7)	H (h11)	J	J1	N	N1	A	L	A1	A3	H1	H2	Ca	G (Nominal)	t (Nominal) (Reference)		Through Shaft Type	Shaft End Type	Self-aligning ball bearings	Spherical roller bearings	Adapter sleeve	Oil seal	Locating ring Designations	Locating ring Q'ty	
	170	112	290	—	25	30	165	345	100	72.5	35	224	62	M22	M 8	20	V170C100-100	V170C100-0	—	23022EK	H322X	GS22	SR170×8.5	2	46
	180	125	320	56	23	32	170	380	110	75	40	243	70	M20	M 8	26	V180C100-100	V180C100-0	—	23122EK	H3122X	GS22	SR180×14	1	51
	200	132	350	60	23	32	190	410	120	82	45	265	82	M20	M10	39	V200C100-100	V200C100-0	1222K	—	H222X	GS22	SR200×22	2	42
100																			2222K	22222EXK	H322X		SR200×14.5	2	50
																			—	23222EK	H2322X		SR200×12.2	1	58
	240	160	390	80	23	32	218	470	150	96	50	315	96	M20	M10	60	V240C100-100	V240C100-0	1322K	21322EK	H322X	GS22	SR240×23	2	48
																			2322K	22322EXK	H2322X		SR240×16	1	63
	180	125	320	56	23	32	170	380	110	75	40	243	70	M20	M 8	25	V180C110-110	V180C110-0	—	23024EK	H3024X	GS24	SR180×12	2	47
	200	132	350	60	23	32	190	410	120	82	45	265	82	M20	M10	39	V200C110-110	V200C110-0	—	23124EK	H3124X	GS24	SR200×20	1	55
110	215	140	350	60	23	32	190	410	120	82	45	280	82	M20	M10	41	V215C110-110	V215C110-0	—	22224EXK	H3124X	GS24	SR215×12	2	53
																			—	23224EK	H2324X		SR215×6	1	62
	260	170	450	92	29	42	236	540	160	105	60	335	103	M24	M10	72	V260C110-110	V260C110-0	—	22324EK	H2324X	GS24	SR260×17	1	67
	200	132	350	60	23	32	190	410	120	82	45	265	82	M20	M10	38	V200C115-115	V200C115-0	—	23026EK	H3026	GS26	SR200×15	2	51
	210	140	350	60	23	32	190	410	120	82	45	280	82	M20	M10	42	V210C115-115	V210C115-0	—	23126EK	H3126	GS26	SR210×18	1	57
115	230	150	380	65	23	32	200	450	130	87	50	300	86	M20	M10	50	V230C115-115	V230C115-0	—	22226EXK	H3126	GS26	SR230×11	2	57
																			—	23226EK	H2326		SR230×6	1	65
	280	180	470	92	29	42	243	560	160	108.5	60	355	108	M24	M10	82	V280C115-115	V280C115-0	—	22326EK	H2326	GS26	SR280×15	1	72
	210	140	350	60	23	32	190	410	120	82	45	280	82	M20	M10	40	V210C125-125	V210C125-0	—	23028EK	H3028	GS28	SR210×14.5	2	53
	225	150	380	65	23	32	200	450	130	87	50	300	86	M20	M10	50	V225C125-125	V225C125-0	—	23128EK	H3128	GS28	SR225×18	1	60
125	250	160	420	80	23	32	218	500	150	96	50	315	94	M20	M10	54	V250C125-125	V250C125-0	—	22228EXK	H3128	GS28	SR250×13	2	60
																			—	23228EK	H2328		SR250×6	1	70
	300	190	520	92	29	50	250	610	170	112	65	375	113	M24	M12	97	V300C125-125	V300C125-0	—	22328EK	H2328	GS28	SR300×11	1	77
	225	150	380	65	23	32	200	450	130	87	50	300	86	M20	M10	50	V225C135-135	V225C135-0	—	23030EK	H3030	GS30	SR225×15	2	56
	250	160	420	80	23	32	218	500	150	96	50	315	94	M20	M10	52	V250C135-135	V250C135-0	—	23130EK	H3130	GS30	SR250×14	1	68
135	270	170	450	92	29	42	236	540	160	105	60	335	103	M24	M10	64	V270C135-135	V270C135-0	—	22230EK	H3130	GS30	SR270×15	2	65
																			—	23230EK	H2330		SR270×7	1	76
	320	200	560	92	29	50	258	660	180	116	65	405	122	M24	M12	128	V320C135-135	V320C135-0	—	22330EK	H2330	GS30	SR320×14	1	82

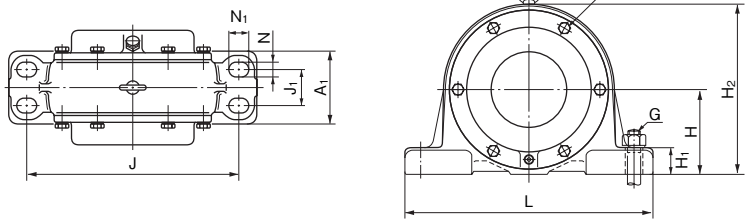
Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only.
To make a complete unit, please order the corresponding bearing, adapter sleeve and locating rings shown in the table additionally.
2. The masses in the table do not include the bearing, adapter sleeve and locating rings.
3. H7 and h11 in the table means tolerance classes specified in JIS B 0401.
4. The tolerance of locating ring O.D. is h12, and 0 ~ -0.2 for the width.
5. Plummer block housings V180 and larger are provided with eye bolts.
6. The threads for plugs and grease nipples are PT1/8 for V170 and smaller, and PT1/4 for V180 and larger.
7. When one locating ring is used for fixed-end, the offset (X dimension) of bearing center from the center of the housing is a half of the locating ring width.
8. ZF type oil seals are also available instead of GS type seals.
9. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

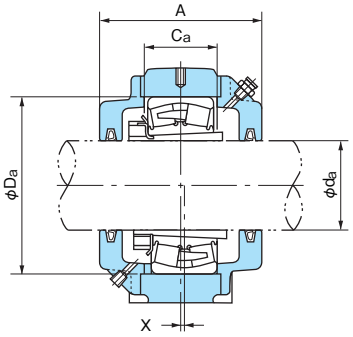
One piece type Plummer Block Housings

V Series

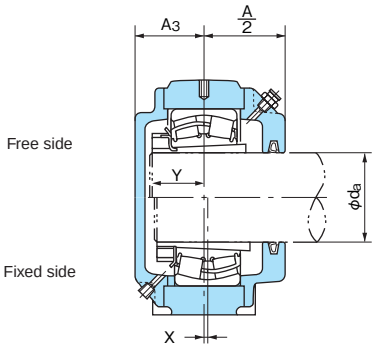
for Bearing with Adapter Sleeve

Shaft Diameter: 140～200mm





Through Shaft Type



Shaft End Type

Shaft dia. da (mm)	Dimensions (mm)															Mass (kg) (Reference)	Designations		Applicable parts					Y (Reference)
	Da (H7)	H (h11)	J	J1	N	N1	A	L	A1	A3	H1	H2	Ca	G (Nominal)	t (Nominal) (Reference)		Through Shaft Type	Shaft End Type	Spherical roller bearings	Adapter sleeve	Oil seal	Locating ring Designations	Locating ring Q'ty	
140	240	160	390	80	23	32	218	470	150	96	50	315	96	M20	M10	57	**V240C140-140**	**V240C140-0**	23032EK	H3032	GS32	SR240×18	2	61
	270	170	450	92	29	42	236	540	160	105	60	335	103	M24	M10	60	**V270C140-140**	**V270C140-0**	23132EK	H3132	GS32	SR270×17	1	74
	290	190	470	92	29	50	250	560	170	112	60	375	113	M24	M12	100	**V290C140-140**	**V290C140-0**	22232EK	H3132	GS32	SR290×16.5	2	71
																			23232EK	H2332		SR290×9	1	83
	340	212	580	104	33	54	300	680	190	137	65	425	130	M27	M12	143	**V340C140-140**	**V340C140-0**	22332EK	H2332	GS32	SR340×16	1	88
150	260	170	450	92	29	42	236	540	160	105	60	335	103	M24	M10	69	**V260C150-150**	**V260C150-0**	23034EK	H3034	GS34	SR260×18	2	66
	280	180	470	92	29	42	243	560	160	108.5	60	355	108	M24	M10	80	**V280C150-150**	**V280C150-0**	23134EK	H3134	GS34	SR280×20	1	76
	310	200	560	92	29	50	258	660	180	116	65	405	122	M24	M12	120	**V310C150-150**	**V310C150-0**	22234EK	H3134	GS34	SR310×18	2	75
																			23234EK	H2334		SR310×12	1	87
160	280	180	470	92	29	42	243	560	160	108.5	60	355	108	M24	M10	79	**V280C160-160**	**V280C160-0**	23036EK	H3036	GS36	SR280×17	2	70
	300	190	520	92	29	50	250	610	170	112	65	375	113	M24	M12	95	**V300C160-160**	**V300C160-0**	23136EK	H3136	GS36	SR300×17	1	81
	320	200	560	92	29	50	258	660	180	116	65	405	122	M24	M12	115	**V320C160-160**	**V320C160-0**	22236EK	H3136	GS36	SR320×18	2	76
																			23236EK	H2336		SR320×10	1	89
170	290	190	470	92	29	50	250	560	170	112	60	375	113	M24	M12	94	**V290C170-170**	**V290C170-0**	23038EK	H3038	GS38	SR290×19	2	72
	320	200	560	92	29	50	258	660	180	116	65	405	122	M24	M12	124	**V320C170-170**	**V320C170-0**	23138EK	H3138	GS38	SR320×18	1	86
	340	212	580	104	33	54	300	680	190	137	65	425	130	M27	M12	140	**V340C170-170**	**V340C170-0**	22238EK	H3138	GS38	SR340×19	2	80
																			23238EK	H2338		SR340×10	1	94
180	310	200	560	92	29	50	258	660	180	116	65	405	122	M24	M12	117	**V310C180-180**	**V310C180-0**	23040EK	H3040	GS40	SR310×20	2	76
	340	212	580	104	33	54	300	680	190	137	65	425	130	M27	M12	138	**V340C180-180**	**V340C180-0**	23140EK	H3140	GS40	SR340×18	1	91
200	340	212	580	104	33	54	300	680	190	137	65	425	130	M27	M12	136	**V340C200-200**	**V340C200-0**	23044EK	H3044	GS44	SR340×20	2	79

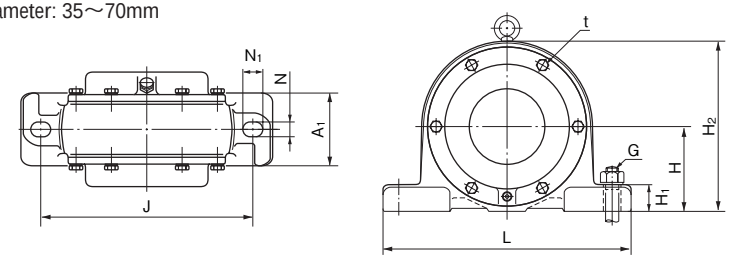
Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only.
To make a complete unit, please order the corresponding bearing, adapter sleeve and locating rings shown in the table additionally.
2. The masses in the table do not include the bearing, adapter sleeve and locating rings.
3. H7 and h11 in the table means tolerance classes specified in JIS B 0401.
4. The tolerance of locating ring O.D. is h12, and 0 ~ -0.2 for the width.
5. Plummer block housings V180 and larger are provided with eye bolts.
6. The threads for plugs and grease nipples are PT1/8 for V170 and smaller, and PT1/4 for V180 and larger.
7. When one locating ring is used for fixed-end, the offset (X dimension) of bearing center from the center of the housing is a half of the locating ring width.
8. ZF type oil seals are also available instead of GS type seals.
9. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

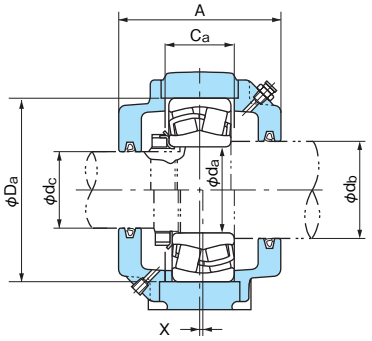
One piece type Plummer Block Housings

V Series

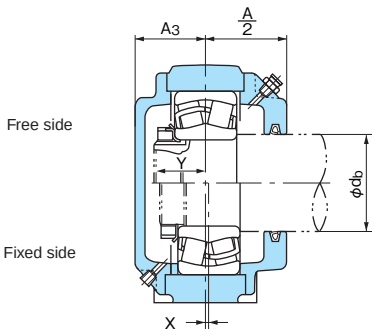
for Bearing with Cylindrical Bore

Shaft Diameter: 35～70mm





Through Shaft Type



Shaft End Type

Shaft dia. (mm)			Dimensions (mm)														Mass (kg) (Reference)	Designations		Applicable parts							Y (Reference)
da	db	dc	Da (H7)	H (h11)	J	N	N1	A	L	A1	A3	H1	H2	Ca	G (Nominal)	t (Nominal) (Reference)		Through Shaft Type	Shaft End Type	Self-aligning ball bearings	Spherical roller bearings	Nut	Locking washer	Oil seal db side	Oil seal dc side	Locating ring Designations	Locating ring Q'ty	
35	45	30	80	60	170	16	20	95	205	60	40.5	25	118	37	M14	M6	4.5		V080C45-30	V080C45-0	1307	21307E	AN07	AW07X	GS10	GS 7	SR80×8	2	21
																					2307	—					SR80×6	1	26
40	50	35	80	60	170	16	20	95	205	60	40.5	25	118	37	M14	M6	4.0		V080C50-35	V080C50-0	1208	—	AN08	AW08X	GS11	GS 8	SR80×9.5	2	21
																					2208	22208EX					SR80×7	2	23
			90	67	170	16	20	100	205	60	42.5	25	128	39	M14	M6	4.8		V090C50-35	V090C50-0	1308	21308E	AN08	AW08X	GS11	GS 8	SR90×8	2	23
																					2308	22308EX					SR90×6	1	28
45	55	40	85	63	170	16	20	98	205	60	42.5	25	125	39	M14	M6	4.5		V085C55-40	V085C55-0	1209	—	AN09	AW09X	GS12	GS 9	SR85×10	2	22
																					2209	22209EX					SR85×8	2	24
			100	71	210	16	23	106	255	70	47	28	140	42	M14	M6	6.4		V100C55-40	V100C55-0	1309	21309E	AN09	AW09X	GS12	GS 9	SR100×8.5	2	25
																					2309	22309EX					SR100×6	1	31
50	60	45	90	67	170	16	20	100	205	60	42.5	25	128	39	M14	M6	4.3		V090C60-45	V090C60-0	1210	—	AN10	AW10X	GS13	GS10	SR90×9.5	2	24
																					2210	22210EX					SR90×8	2	25
			110	80	210	21	25	112	255	70	47	30	155	46	M18	M6	7.8		V110C60-45	V110C60-0	1310	21310E	AN10	AW10X	GS13	GS10	SR110×9.5	2	27
																					2310	22310EX					SR110×6	1	34
55	65	50	100	71	210	16	23	106	255	70	47	28	140	42	M14	M6	6.0		V100C65-50	V100C65-0	1211	—	AN11	AW11X	GS15	GS11	SR100×10.5	2	25
																					2211	22211EX					SR100×8.5	2	27
			120	85	230	21	25	118	275	80	50	30	165	49	M18	M6	10		V120C65-50	V120C65-0	1311	21311E	AN11	AW11X	GS15	GS11	SR120×10	2	29
																					2311	22311EX					SR120×6	1	36
60	70	55	110	80	210	21	25	112	255	70	47	30	155	46	M18	M6	7.6		V110C70-55	V110C70-0	1212	—	AN12	AW12X	GS16	GS12	SR110×12	2	26
																					2212	22212EX					SR110×9	2	29
	70(1)	55	130	90	230	21	25	118	280	80	50	30	175	50	M18	M6	11		V130C70-55	V130C70-0	1312	21312E	AN12	AW12X	GS16	GS12	SR130×9.5	2	31
																					2312	22312EX					SR130×4	1	39
65	75	60	120	85	230	21	25	118	275	80	50	30	165	49	M18	M6	9.6		V120C75-60	V120C75-0	1213	—	AN13	AW13X	GS17	GS13	SR120×13	2	28
																					2213	22213EX					SR120×9	2	32
	75(1)	60	140	100	260	25	30	136	315	90	58	32	195	56	M22	M8	17		V140C75-60	V140C75-0	1313	21313E	AN13	AW13X	GS17	GS13	SR140×11.5	2	33
																					2313	22313EX					SR140×8	1	40
70	80	60	125	90	230	21	25	118	280	80	50	30	175	50	M18	M6	10		V125C80-60	V125C80-0	1214	—	AN14	AW14X	GS18	GS13	SR125×13	2	28
																					2214	22214EX					SR125×9.5	2	32
	80(1)	60	150	100	260	25	30	140	315	90	60	32	195	56	M22	M8	16		V150C80-60	V150C80-0	1314	21314E	AN14	AW14X	GS18	GS13	SR150×10.5	2	34
																					2314	22314EX					SR150×5	1	42

Note: (1) When heavy axial load is applied, a spacer with large O.D. and small inner chamfer must be used between the bearing and shaft shoulder to obtain a sufficient contact area.

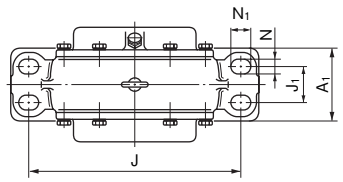
Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only. To make a complete unit, please order the corresponding bearing, nuts and locating rings shown in the table additionally.
2. The masses in the table do not include the bearing, nuts and locating rings.
3. H7 and h11 in the table means tolerance classes specified in JIS B 0401.
4. The tolerance of locating ring O.D. is h12, and 0 ~ -0.2 for the width.
5. Plummer block housings V180 and larger are provided with eye bolts.
6. The threads for plugs and grease nipples are PT1/8 for V170 and smaller, and PT1/4 for V180 and larger.
7. When one locating ring is used for fixed-end, the offset (X dimension) of bearing center from the center of the housing is a half of the locating ring width.
8. ZF type oil seals are also available instead of GS type seals.
9. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

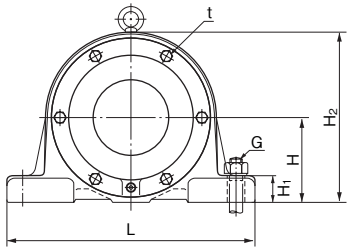
One piece type Plummer Block Housings

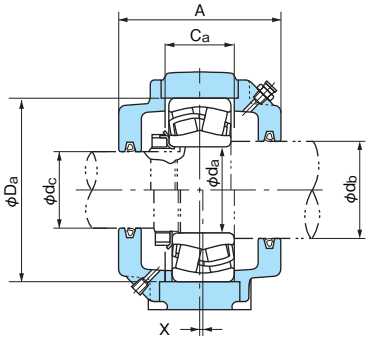
V Series

for Bearing with Cylindrical Bore

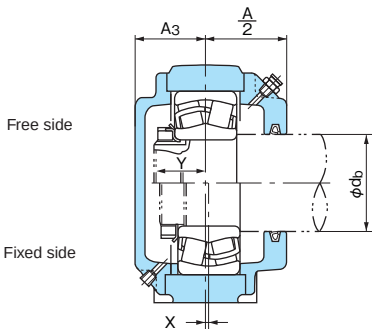
Shaft Diameter: 75～100mm







Through Shaft Type



Shaft End Type

Shaft dia. (mm)			Dimensions (mm)															Mass (kg) (Reference)	Designations		Applicable parts							Y (Reference)
																					Self-aligning ball bearings	Spherical roller bearings	Nut	Locking washer	Oil seal		Locating ring		
da	db	dc	Da (H7)	H (h11)	J	J1	N	N1	A	L	A1	A3	H1	H2	Ca	G (Nominal)	t (Nominal) (Reference)		Through Shaft Type	Shaft End Type				db side	dc side	Designations	Q'ty	
75	85	65	130	90	230	—	21	25	118	280	80	50	30	175	50	M18	M 6	10	V130C85-65	V130C85-0	1215	—	AN15	AW15X	GS19	GS15	SR130×12.5	2	30
						—															2215	22215EX					SR130×9.5	2	33
	85(1)	65	160	112	290	—	25	30	150	345	100	65	35	224	62	M22	M 8	23	V160C85-65	V160C85-0	1315	21315E	AN15	AW15X	GS19	GS15	SR160×12.5	2	36
						—															2315	22315EX					SR160×7	1	45
80	90	70	140	100	260	—	25	30	136	315	90	58	32	195	56	M22	M 8	17	V140C90-70	V140C90-0	1216	—	AN16	AW16X	GS20	GS16	SR140×15	2	32
						—															2216	22216EX					SR140×11.5	2	36
	90(1)	70	170	112	290	—	25	30	165	345	100	72.5	35	224	62	M22	M 8	21	V170C90-70	V170C90-0	1316	21316E	AN16	AW16X	GS20	GS16	SR170×11.5	2	39
						—															2316	22316EX					SR170×4	1	48
85	95	75	150	100	260	—	25	30	140	315	90	60	32	195	56	M22	M 8	15	V150C95-75	V150C95-0	1217	—	AN17	AW17X	GS21	GS17	SR150×14	2	34
																					2217	22217EX					SR150×10	2	38
	95(1)	75	180	125	320	56	23	32	170	380	110	75	40	243	70	M20	M 8	28	V180C95-75	V180C95-0	1317	21317E	AN17	AW17X	GS21	GS17	SR180×14.5	2	41
																					2317	22317EX					SR180×10	1	50
90	100	80	160	112	290	—	25	30	150	345	100	65	35	224	62	M22	M 8	23	V160C100-80	V160C100-0	1218	—	AN18	AW18X	GS22	GS18	SR160×16	2	35
																					2218	22218EX					SR160×11	2	40
	100(1)	80	190	125	320	56	23	32	170	380	110	75	40	243	70	M20	M 8	25	V190C100-80	V190C100-0	1318	21318E	AN18	AW18X	GS22	GS18	SR190×13.5	2	42
																					2318	22318EX					SR190×6	1	52
95	110	85	170	112	290	—	25	30	165	345	100	72.5	35	224	62	M22	M 8	21	V170C110-85	V170C110-0	1219	—	AN19	AW19X	GS24	GS19	SR170×15	2	37
																					2219	22219EX					SR170×9.5	2	43
			200	132	350	60	23	32	190	410	120	82	45	265	82	M20	M10	39	V200C110-85	V200C110-0	1319	21319E	AN19	AW19X	GS24	GS19	SR200×18.5	2	44
																					2319	22319EX					SR200×15	1	55
100	115	90	180	125	320	56	23	32	170	380	110	75	40	243	70	M20	M 8	27	V180C115-90	V180C115-0	1220	—	AN20	AW20X	GS26	GS20	SR180×18	2	39
																					2220	22220EX					SR180×12	2	45
			215	140	350	60	23	32	190	410	120	82	45	280	82	M20	M10	40	V215C115-90	V215C115-0	1320	21320E	AN20	AW20X	GS26	GS20	SR215×17.5	2	46
																					2320	22320EX					SR215×9	1	59

Note: (1) When heavy axial load is applied, a spacer with large O.D. and small inner chamfer must be used between the bearing and shaft shoulder to obtain a sufficient contact area.

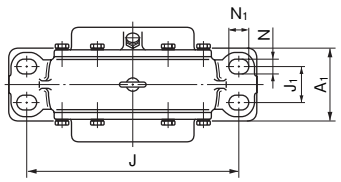
Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only.
To make a complete unit, please order the corresponding bearing, nuts and locating rings shown in the table additionally.
2. The masses in the table do not include the bearing, nuts and locating rings.
3. H7 and h11 in the table means tolerance classes specified in JIS B 0401.
4. The tolerance of locating ring O.D. is h12, and 0 ~ -0.2 for the width.
5. Plummer block housings V180 and larger are provided with eye bolts.
6. The threads for plugs and grease nipples are PT1/8 for V170 and smaller, and PT1/4 for V180 and larger.
7. When one locating ring is used for fixed-end, the offset (X dimension) of bearing center from the center of the housing is a half of the locating ring width.
8. ZF type oil seals are also available instead of GS type seals.
9. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

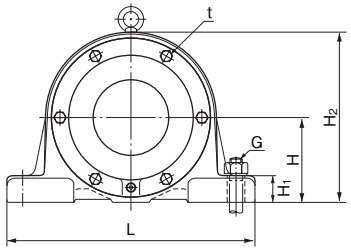
One piece type Plummer Block Housings

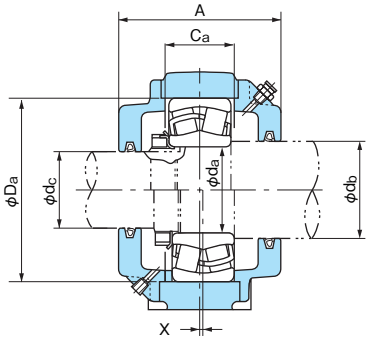
V Series

for Bearing with Cylindrical Bore

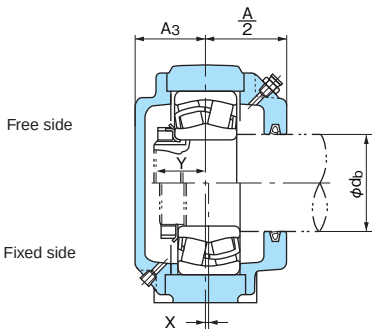
Shaft Diameter: 110～160mm







Through Shaft Type



Shaft End Type

Shaft dia. (mm)			Dimensions (mm)															Mass (kg) (Reference)	Designations		Applicable parts							Y (Reference)
																					Self-aligning ball bearings	Spherical roller bearings	Nut	Locking washer	Oil seal		Locating ring		
da	db	dc	Da (H7)	H (h11)	J	J1	N	N1	A	L	A1	A3	H1	H2	Ca	G (Nominal)	t (Nominal) (Reference)		Through Shaft Type	Shaft End Type					db side	dc side	Designations	Q'ty	
	120	100	170	112	290	—	25	30	165	345	100	72.5	35	224	62	M22	M 8	19	V170C120-100	V170C120-0	—	23022E	AN22	AW22X	GS27	GS22	SR170×8.5	2	46
			180	125	320	56	23	32	170	380	110	75	40	243	70	M20	M 8	25	V180C120-100	V180C120-0	—	23122E	AN22	AW22X	GS27	GS22	SR180×14	1	51
	125	100	200	132	350	60	23	32	190	410	120	82	45	265	82	M20	M10	38	V200C125-100	V200C125-0	1222	—	AN22	AW22X	GS28	GS22	SR200×22	2	42
110																					2222	22222EX					SR200×14.5	2	50
																					—	23222E					SR200×12.2	1	58
			240	160	390	80	23	32	218	470	150	96	50	315	96	M20	M10	58	V240C125-100	V240C125-0	1322	21322E	AN22	AW22X	GS28	GS22	SR240×23	2	48
																					2322	22322EX					SR240×16	1	63
	130	110	180	125	320	56	23	32	170	380	110	75	40	243	70	M20	M 8	24	V180C130-110	V180C130-0	—	23024E	ANL24	AWL24X	GS29	GS24	SR180×12	2	47
			200	132	350	60	23	32	190	410	120	82	45	265	82	M20	M10	37	V200C130-110	V200C130-0	—	23124E	AN24	AW24X	GS29	GS24	SR200×20	1	55
120	135	110	215	140	350	60	23	32	190	410	120	82	45	280	82	M20	M10	40	V215C135-110	V215C135-0	—	22224EX	AN24	AW24X	GS30	GS24	SR215×12	2	53
																					—	23224E					SR215×6	1	62
			260	170	450	92	29	42	236	540	160	105	60	335	103	M24	M10	64	V260C135-110	V260C135-0	—	22324E	AN24	AW24X	GS30	GS24	SR260×17	1	67
	140	115	200	132	350	60	23	32	190	410	120	82	45	265	82	M20	M10	36	V200C140-115	V200C140-0	—	23026E	ANL26	AWL26	GS32	GS26	SR200×15	2	51
			210	140	350	60	23	32	190	410	120	82	45	280	82	M20	M10	40	V210C140-115	V210C140-0	—	23126E	AN26	AW26	GS32	GS26	SR210×18	1	57
130	145	115	230	150	380	65	23	32	200	450	130	87	50	300	86	M20	M10	48	V230C145-115	V230C145-0	—	22226EX	AN26	AW26	GS33	GS26	SR230×11	2	57
																					—	23226E					SR230×6	1	65
	150	115	280	180	470	92	29	42	243	560	160	108.5	60	355	108	M24	M10	80	V280C150-115	V280C150-0	—	22326E	AN26	AW26	GS34	GS26	SR280×15	1	72
	150	125	210	140	350	60	23	32	190	410	120	82	45	280	82	M20	M10	39	V210C150-125	V210C150-0	—	23028E	ANL28	AWL28	GS34	GS28	SR210×14.5	2	53
	155	125	225	150	380	65	23	32	200	450	130	87	50	300	86	M20	M10	48	V225C155-125	V225C155-0	—	23128E	AN28	AW28	GS35	GS28	SR225×18	1	60
140			250	160	420	80	23	32	218	500	150	96	50	315	94	M20	M10	53	V250C155-125	V250C155-0	—	22228EX	AN28	AW28	GS35	GS28	SR250×13	2	60
																					—	23228E					SR250×6	1	70
	160	125	300	190	520	92	29	50	250	610	170	112	65	375	113	M24	M12	94	V300C160-125	V300C160-0	—	22328E	AN28	AW28	GS36	GS28	SR300×11	1	77
	160(1)	135	225	150	380	65	23	32	200	450	130	87	50	300	86	M20	M10	48	V225C160-135	V225C160-0	—	23030E	ANL30	AWL30	GS36	GS30	SR225×15	2	56
	165	135	250	160	420	80	23	32	218	500	150	96	50	315	94	M20	M10	50	V250C165-135	V250C165-0	—	23130E	AN30	AW30	GS37	GS30	SR250×14	1	68
150			270	170	450	92	29	42	236	540	160	105	60	335	103	M24	M10	62	V270C165-135	V270C165-0	—	22230E	AN30	AW30	GS37	GS30	SR270×15	2	65
																					—	23230E					SR270×7	1	76
	170	135	320	200	560	92	29	50	258	660	180	116	65	405	122	M24	M12	113	V320C170-135	V320C170-0	—	22330E	AN30	AW30	GS38	GS30	SR320×14	1	82
	170(1)	140	240	160	390	80	23	32	218	470	150	96	50	315	96	M20	M10	55	V240C170-140	V240C170-0	—	23032E	ANL32	AWL32	GS38	GS32	SR240×18	2	61
	175	140	270	170	450	92	29	42	236	540	160	105	60	335	103	M24	M10	58	V270C175-140	V270C175-0	—	23132E	AN32	AW32	GS39	GS32	SR270×17	1	74
160			290	190	470	92	29	50	250	560	170	112	60	375	113	M24	M12	96	V290C175-140	V290C175-0	—	22232E	AN32	AW32	GS39	GS32	SR290×16.5	2	71
																					—	23232E					SR290×9	1	83
	180	140	340	212	580	104	33	54	300	680	190	137	65	425	130	M27	M12	138	V340C180-140	V340C180-0	—	22332E	AN32	AW32	GS40	GS32	SR340×16	1	88

Note: (1) When heavy axial load is applied, a spacer with large O.D. and small inner chamfer must be used between the bearing and shaft shoulder to obtain a sufficient contact area.

Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only. To make a complete unit, please order the corresponding bearing, nuts and locating rings shown in the table additionally.
2. The masses in the table do not include the bearing, nuts and locating rings.
3. H7 and h11 in the table means tolerance classes specified in JIS B 0401.
4. The tolerance of locating ring O.D. is h12, and 0 ~ -0.2 for the width.
5. Plummer block housings V180 and larger are provided with eye bolts.
6. The threads for plugs and grease nipples are PT1/8 for V170 and smaller, and PT1/4 for V180 and larger.
7. When one locating ring is used for fixed-end, the offset (X dimension) of bearing center from the center of the housing is a half of the locating ring width.
8. ZF type oil seals are also available instead of GS type seals.
9. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

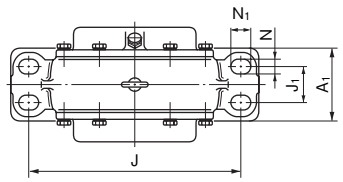
NACHI

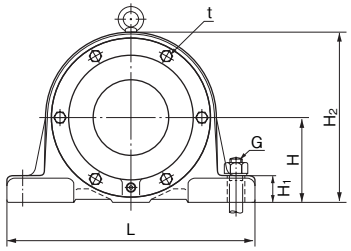
One piece type Plummer Block Housings

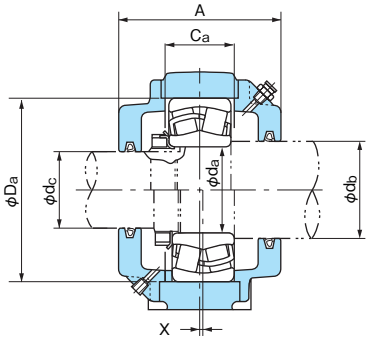
V Series

for Bearing with Cylindrical Bore

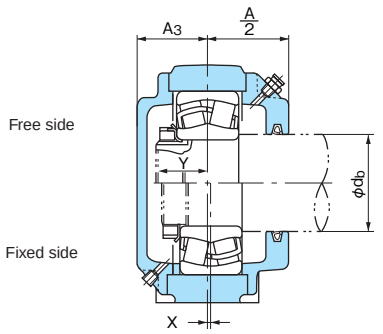
Shaft Diameter: 170～220mm







Through Shaft Type



Shaft End Type

Shaft dia. (mm)			Dimensions (mm)															Mass (kg) (Reference)	Designations		Applicable parts						Y (Reference)
																	t (Nominal) (Reference)		Through Shaft Type	Shaft End Type	Spherical roller bearings	Nut	Locking washer	Oil seal		Locating ring		
da	db	dc	Da (H7)	H (h11)	J	J1	N	N1	A	L	A1	A3	H1	H2	Ca	G (Nominal)								db side	dc side	Designations	Q'ty	
170	180(1)	150	260	170	450	92	29	42	236	540	160	105	60	335	103	M24	M10	66	V260C180-150	V260C180-0	23034E	ANL34	AWL34	GS40	GS34	SR260×18	2	66
	190	150	280	180	470	92	29	42	243	560	160	108.5	60	355	108	M24	M10	78	V280C190-150	V280C190-0	23134E	AN34	AW34	GS42	GS34	SR280×20	1	76
			310	200	560	92	29	50	258	660	180	116	65	405	122	M24	M12	115	V310C190-150	V310C190-0	22234E	AN34	AW34	GS42	GS34	SR310×18	2	75
																					23234E					SR310×12	1	87
180	190(1)	160	280	180	470	92	29	42	243	560	160	108.5	60	355	108	M24	M10	78	V280C190-160	V280C190-0	23036E	ANL36	AWL36	GS42	GS36	SR280×17	2	70
	200	160	300	190	520	92	29	50	250	610	170	112	65	375	113	M24	M12	92	V300C200-160	V300C200-0	23136E	AN36	AW36	GS44	GS36	SR300×17	1	81
			320	200	560	92	29	50	258	660	180	116	65	405	122	M24	M12	110	V320C200-160	V320C200-0	22236E	AN36	AW36	GS44	GS36	SR320×18	2	76
																					23236E					SR320×10	1	89
190	200(1)	170	290	190	470	92	29	50	250	560	170	112	60	375	113	M24	M12	91	V290C200-170	V290C200-0	23038E	ANL38	AWL38	GS44	GS38	SR290×19	2	72
	210	170	320	200	560	92	29	50	258	660	180	116	65	405	122	M24	M12	120	V320C210-170	V320C210-0	23138E	AN38	AW38	GS46	GS38	SR320×18	1	86
			340	212	580	104	33	54	300	680	190	137	65	425	130	M27	M12	135	V340C210-170	V340C210-0	22238E	AN38	AW38	GS46	GS38	SR340×19	2	80
																					23238E					SR340×10	1	94
200	210(1)	180	310	200	560	92	29	50	258	660	180	116	65	405	122	M24	M12	125	V310C210-180	V310C210-0	23040E	ANL40	AWL40	GS46	GS40	SR310×20	2	76
	220	180	340	212	580	104	33	54	300	680	190	137	65	425	130	M27	M12	135	V340C220-180	V340C220-0	23140E	AN40	AW40	GS48	GS40	SR340×18	1	91
220	230(1)	200	340	212	580	104	33	54	300	680	190	137	65	425	130	M27	M12	132	V340C230-200	V340C230-0	23044E	ANL44	ALL44	GS50	GS44	SR340×20	2	79

Note: (1) When heavy axial load is applied, a spacer with large O.D. and small inner chamfer must be used between the bearing and shaft shoulder to obtain a sufficient contact area.

Remarks: 1. Plummer block housings are housings with oil seals, a plug and a grease nipple only. To make a complete unit, please order the corresponding bearing, nuts and locating rings shown in the table additionally.
2. The masses in the table do not include the bearing, nuts and locating rings.
3. H7 and h11 in the table means tolerance classes specified in JIS B 0401.
4. The tolerance of locating ring O.D. is h12, and 0 ~ -0.2 for the width.
5. Plummer block housings V180 and larger are provided with eye bolts.
6. The threads for plugs and grease nipples are PT1/8 for V170 and smaller, and PT1/4 for V180 and larger.
7. When one locating ring is used for fixed-end, the offset (X dimension) of bearing center from the center of the housing is a half of the locating ring width.
8. ZF type oil seals are also available instead of GS type seals.
9. The dimension Y indicates the distance from the bearing center to the outer side face of the nut.

Mounting Accessories

Adapter Assemblies
Withdrawal Sleeves
Locknuts
Lockwashers
Lock plates

Adapter Assemblies and Applied Bearing Bore Numbers

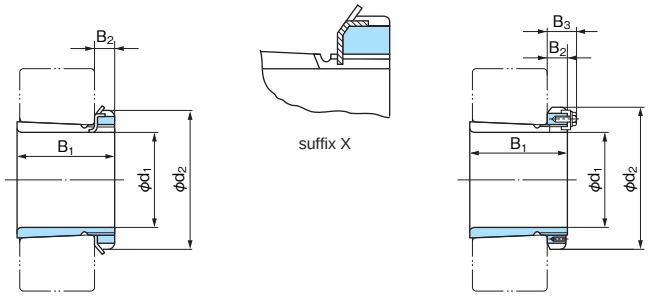
Bearing		Adapter Assembly series					
		H30	H31	H2	H32	H3	H23
Self-aligning Ball Bearings	12 K			04～22			
	22 K					04～22	
	13 K					04～22	
	23 K						04～22
Spherical Roller Bearings	230 K	24～/500					
	231 K		22～/500				
	222 K		24～64			05～22	
	232 K				60～/500		18～56
	213 K					05～22	
	223 K						08～56
Ball Bearings for Bearing Units	UK2						05～18
	UKX						05～28
	UK3						05～20

Withdrawal Sleeves and Applied Bearing Bore Numbers

Bearing		Withdrawal Sleeve series						
		AH30	AH31	AH2	AH22	AH32	AH3	AH23
Self-aligning Ball Bearings	12 K			08～22				
	22 K		22					08～20
	13 K						08～22	
	23 K							08～22
Spherical Roller Bearings	230 K	24～/500						
	231 K		22～/500					
	222 K		22～34		36～64		08～20	
	232 K					18～40 60～/500		44～56
	213 K						08～22	
	223 K							08～56

Note: In case of spherical roller bearings without outer rib on inner ring, locknut may have a larger bore than the outside diameter of the inner ring. Please check the dimensions.

Adapter Assemblies
Series H30 / HE30

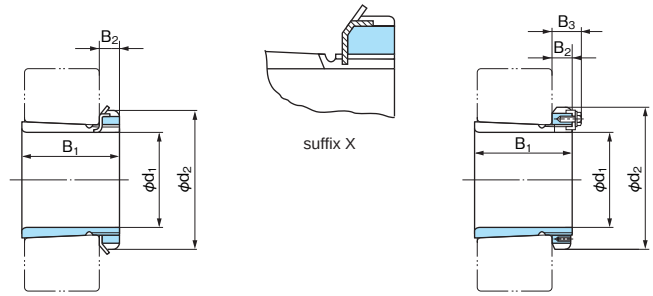


Adapter Ass'y with Lockwasher　　Adapter Ass'y with Lock Plate

Bearing bore No.	Dimensions (mm)						Mass(1) (kg) (reference)	Adapter Ass'y No.		Part No.			
	d1		d2	B1	B2	B3		H	HE	Adapter(2) sleeve	Locknut	Lockwasher	Lock Plate
	H	HE											
24	110	107.95	145	72	22	—	1.96	H3024X	HE3024X	A3024X	ANL 24	AWL 24X	—
26	115	114.30	155	80	23	—	2.85	H3026	HE3026	A3026	ANL 26	AWL 26	—
28	125	127.00	165	82	24	—	3.18	H3028	HE3028	A3028	ANL 28	AWL 28	—
30	135	133.35	180	87	26	—	3.90	H3030	HE3030	A3030	ANL 30	AWL 30	—
32	140	139.70	190	93	28	—	5.20	H3032	HE3032	A3032	ANL 32	AWL 32	—
34	150	152.40	200	101	29	—	6.00	H3034	HE3034	A3034	ANL 34	AWL 34	—
36	160	165.10	210	109	30	—	6.85	H3036	HE3036	A3036	ANL 36	AWL 36	—
38	170	171.45	220	112	31	—	7.45	H3038	HE3038	A3038	ANL 38	AWL 38	—
40	180	177.80	240	120	32	—	9.20	H3040	HE3040	A3040	ANL 40	AWL 40	—
44	200	—	260	128	30	41	10.3	H3044	—	A3044	ANL 44	—	ALL 44
48	220	—	290	133	34	46	13.4	H3048	—	A3048	ANL 48	—	ALL 48
52	240	—	310	145	34	46	15.6	H3052	—	A3052	ANL 52	—	ALL 48
56	260	—	330	152	38	50	17.7	H3056	—	A3056	ANL 56	—	ALL 56
60	280	—	360	168	42	54	22.8	H3060	—	A3060	ANL 60	—	ALL 60
64	300	—	380	171	42	55	24.6	H3064	—	A3064	ANL 64	—	ALL 64
68	320	—	400	187	45	58	28.6	H3068	—	A3068	ANL 68	—	ALL 64
72	340	—	420	188	45	58	30.6	H3072	—	A3072	ANL 72	—	ALL 72
76	360	—	450	193	48	62	35.8	H3076	—	A3076	ANL 76	—	ALL 76
80	380	—	470	210	52	66	42.1	H3080	—	A3080	ANL 80	—	ALL 76
84	400	—	490	212	52	66	44.3	H3084	—	A3084	ANL 84	—	ALL 84
88	410	—	520	228	60	77	67.0	H3088	—	A3088	ANL 88	—	ALL 88
92	430	—	540	234	60	77	71.5	H3092	—	A3092	ANL 92	—	ALL 88
96	450	—	560	237	60	77	75.2	H3096	—	A3096	ANL 96	—	ALL 96
/500	470	—	580	247	68	85	81.8	H30/500	—	A30/500	ANL100	—	ALL 96

Notes: (1) The masses in the table are for H series.
(2) The numbers in the table mean sleeves for H series.
Sleeves for HE series have prefix AE instead of A.
Remark: Suffix X means narrow axial slot type. For this type sleeves, only lockwashers with straight inner tab can be used.

Adapter Assemblies
Series H31 / HE31

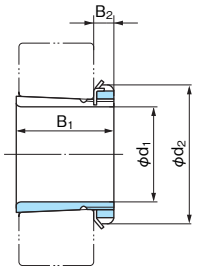


Adapter Ass'y with Lockwasher　　Adapter Ass'y with Lock Plate

Bearing bore No.	Dimensions (mm)						Mass(1) (kg) (reference)	Adapter Ass'y No.		Part No.			
	d1		d2	B1	B2	B3		H	HE	Adapter(2) sleeve	Locknut	Lockwasher	Lock Plate
	H	HE											
22	100	101.60	145	81	21	—	2.25	H3122X	HE3122X	A3122X	AN 22	AW 22X	—
24	110	107.95	155	88	22	—	2.64	H3124X	HE3124X	A3124X	AN 24	AW 24X	—
26	115	114.30	165	92	23	—	3.66	H3126	HE3126	A3126	AN 26	AW 26	—
28	125	127.00	180	97	24	—	4.34	H3128	HE3128	A3128	AN 28	AW 28	—
30	135	133.35	195	111	26	—	5.54	H3130	HE3130	A3130	AN 30	AW 30	—
32	140	139.70	210	119	28	—	7.70	H3132	HE3132	A3132	AN 32	AW 32	—
34	150	152.40	220	122	29	—	8.40	H3134	HE3134	A3134	AN 34	AW 34	—
36	160	165.10	230	131	30	—	9.50	H3136	HE3136	A3136	AN 36	AW 36	—
38	170	171.45	240	141	31	—	10.8	H3138	HE3138	A3138	AN 38	AW 38	—
40	180	177.80	250	150	32	—	12.1	H3140	HE3140	A3140	AN 40	AW 40	—
44	200	—	280	158	32	44	14.7	H3144	—	A3144	AN 44	—	AL 44
48	220	—	300	169	34	46	17.3	H3148	—	A3148	AN 48	—	AL 44
52	240	—	330	187	36	49	22.0	H3152	—	A3152	AN 52	—	AL 52
56	260	—	350	192	38	51	24.5	H3156	—	A3156	AN 56	—	AL 52
60	280	—	380	208	40	53	30.3	H3160	—	A3160	AN 60	—	AL 60
64	300	—	400	226	42	56	35.0	H3164	—	A3164	AN 64	—	AL 64
68	320	—	440	254	55	72	49.5	H3168	—	A3168	AN 68	—	AL 68
72	340	—	460	259	58	75	54.5	H3172	—	A3172	AN 72	—	AL 68
76	360	—	490	264	60	77	61.6	H3176	—	A3176	AN 76	—	AL 76
80	380	—	520	272	62	82	70.1	H3180	—	A3180	AN 80	—	AL 80
84	400	—	540	304	70	90	84.0	H3184	—	A3184	AN 84	—	AL 80
88	410	—	560	307	70	90	103	H3188	—	A3188	AN 88	—	AL 88
92	430	—	580	326	75	95	116	H3192	—	A3192	AN 92	—	AL 88
96	450	—	620	335	75	95	133	H3196	—	A3196	AN 96	—	AL 96
/500	470	—	630	356	80	100	143	H31/500	—	A31/500	AN100	—	AL100

Notes: (1) The masses in the table are for H series.
(2) The numbers in the table mean sleeves for H series.
Sleeves for HE series have prefix AE instead of A.
Remark: Suffix X means narrow axial slot type. For this type sleeves, only lockwashers with straight inner tab can be used.

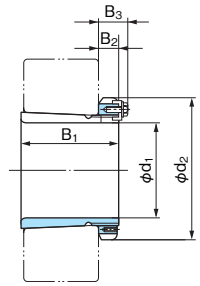
Adapter Assemblies
Series H2 / HE2 / HS2



Bearing bore No.	Dimensions (mm)						Mass(1) (kg) (reference)	Adapter Ass'y No.			Part No.		
	d1			d2	B1	B2							
	H	HE	HS					H	HE	HS	Adapter(2) sleeve	Locknut	Lockwasher
04	17	—	—	32	24	7	0.041	H204X	—	—	A204X	AN 04	AW 04X
05	20	19.050	—	38	26	8	0.070	H205X	HE205X	—	A205X	AN 05	AW 05X
06	25	25.400	22.225	45	27	8	0.099	H206X	HE206X	HS206X	A206X	AN 06	AW 06X
07	30	—	28.575	52	29	9	0.125	H207X	—	HS207X	A207X	AN 07	AW 07X
08	35	31.750	34.925	58	31	10	0.174	H208X	HE208X	HS208X	A208X	AN 08	AW 08X
09	40	38.100	—	65	33	11	0.226	H209X	HE209X	—	A209X	AN 09	AW 09X
10	45	44.450	41.275	70	35	12	0.274	H210X	HE210X	HS210X	A210X	AN 10	AW 10X
11	50	50.800	47.625	75	37	12	0.308	H211X	HE211X	HS211X	A211X	AN 11	AW 11X
12	55	—	53.975	80	38	13	0.346	H212X	—	HS212X	A212X	AN 12	AW 12X
13	60	57.150	60.325	85	40	14	0.401	H213X	HE213X	HS213X	A213X	AN 13	AW 13X
14	60	—	—	92	41	14	0.550	H214X	—	—	A214X	AN 14	AW 14X
15	65	63.500	66.675	98	43	15	0.708	H215X	HE215X	HS215X	A215X	AN 15	AW 15X
16	70	69.850	—	105	46	17	0.881	H216X	HE216X	—	A216X	AN 16	AW 16X
17	75	76.200	73.025	110	50	18	1.02	H217X	HE217X	HS217X	A217X	AN 17	AW 17X
18	80	—	79.375	120	52	18	1.18	H218X	—	HS218X	A218X	AN 18	AW 18X
19	85	82.550	85.725	125	55	19	1.37	H219X	HE219X	HS219X	A219X	AN 19	AW 19X
20	90	88.900	—	130	58	20	1.49	H220X	HE220X	—	A220X	AN 20	AW 20X
21	95	—	—	140	60	20	1.70	H221X	—	—	A221X	AN 21	AW 21X
22	100	101.600	—	145	63	21	1.93	H222X	HE222X	—	A222X	AN 22	AW 22X

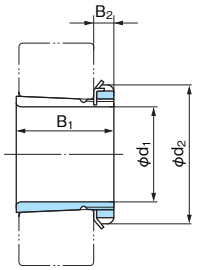
Notes: (1) The masses in the table are for H series.
(2) The numbers in the table mean sleeves for H series.
Sleeves for HE or HS series have prefix AE or AS.
Remark: Suffix X means narrow axial slot type. For this type sleeves, only lockwashers with straight inner tab can be used.

Adapter Assemblies
Series H32



Bearing bore No.	Dimensions (mm)					Mass (kg) (reference)	Adapter Ass'y No.	Part No.		
	d1	d2	B1	B2	B3			Adapter sleeve	Locknut	Lockwasher
60	280	380	240	40	53	34.0	H3260	A3260	AN 60	AL 60
64	300	400	258	42	56	39.4	H3264	A3264	AN 64	AL 64
68	320	440	288	55	72	54.6	H3268	A3268	AN 68	AL 68
72	340	460	299	58	75	60.2	H3272	A3272	AN 72	AL 68
76	360	490	310	60	77	69.6	H3276	A3276	AN 76	AL 76
80	380	520	328	62	82	80.9	H3280	A3280	AN 80	AL 80
84	400	540	352	70	90	94.6	H3284	A3284	AN 84	AL 80
88	410	560	361	70	90	118	H3288	A3288	AN 88	AL 88
92	430	580	382	75	95	133	H3292	A3292	AN 92	AL 88
96	450	620	397	75	95	153	H3296	A3296	AN 96	AL 96
/500	470	630	428	80	100	166	H32/500	A32/500	AN100	AL100

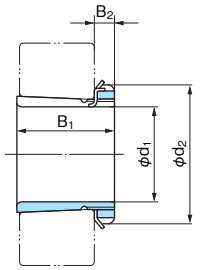
Adapter Assemblies
Series H3 / HE3 / HS3



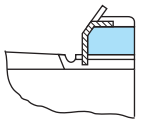
Bearing bore No.	Dimensions (mm)						Mass(1) (kg) (reference)	Adapter Ass'y No.			Part No.		
	d1			d2	B1	B2		H	HE	HS	Adapter(2) sleeve	Locknut	Lockwasher
	H	HE	HS										
04	17	—	—	32	28	7	0.045	H304X	—	—	A304X	AN 04	AW 04X
05	20	19.050	—	38	29	8	0.075	H305X	HE305X	—	A305X	AN 05	AW 05X
06	25	25.400	22.225	45	31	8	0.109	H306X	HE306X	HS306X	A306X	AN 06	AW 06X
07	30	—	28.575	52	35	9	0.142	H307X	—	HS307X	A307X	AN 07	AW 07X
08	35	31.750	34.925	58	36	10	0.189	H308X	HE308X	HS308X	A308X	AN 08	AW 08X
09	40	38.100	—	65	39	11	0.248	H309X	HE309X	—	A309X	AN 09	AW 09X
10	45	44.450	41.275	70	42	12	0.302	H310X	HE310X	HS310X	A310X	AN 10	AW 10X
11	50	50.800	47.625	75	45	12	0.345	H311X	HE311X	HS311X	A311X	AN 11	AW 11X
12	55	—	53.975	80	47	13	0.393	H312X	—	HS312X	A312X	AN 12	AW 12X
13	60	57.150	60.325	85	50	14	0.459	H313X	HE313X	HS313X	A313X	AN 13	AW 13X
14	60	—	—	92	52	14	0.723	H314X	—	—	A314X	AN 14	AW 14X
15	65	63.500	66.675	98	55	15	0.830	H315X	HE315X	HS315X	A315X	AN 15	AW 15X
16	70	69.850	—	105	59	17	1.03	H316X	HE316X	—	A316X	AN 16	AW 16X
17	75	76.200	73.025	110	63	18	1.18	H317X	HE317X	HS317X	A317X	AN 17	AW 17X
18	80	—	79.375	120	65	18	1.37	H318X	—	HS318X	A318X	AN 18	AW 18X
19	85	82.550	85.725	125	68	19	1.56	H319X	HE319X	HS319X	A319X	AN 19	AW 19X
20	90	88.900	—	130	71	20	1.69	H320X	HE320X	—	A320X	AN 20	AW 20X
21	95	—	—	140	74	20	1.93	H321X	—	—	A321X	AN 21	AW 21X
22	100	101.600	—	145	77	21	2.18	H322X	HE322X	—	A322X	AN 22	AW 22X

Notes: (1) The masses in the table are for H series.
(2) The numbers in the table mean sleeves for H series.
Sleeves for HE or HS series have prefix AE or AS.
Remark: Suffix X means narrow axial slot type. For this type sleeves, only lockwashers with straight inner tab can be used.

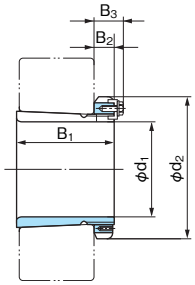
Adapter Assemblies
Series H23 / HE23



Adapter Ass'y with Lockwasher



suffix X

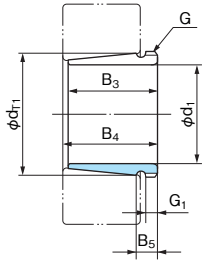


Adapter Ass'y with Lock Plate

Bearing bore No.	Dimensions (mm)							Mass(1) (kg) (reference)	Adapter Ass'y No.		Part No.			
	d1		d2	B1	B2	B3		H	HE	Adapter(2) sleeve	Locknut	Lockwasher	Lock Plate
	H	HE												
04	17	—	32	31	7	—	0.049	H2304X	—	A2304X	AN 04	AW 04X	—
05	20	19.05	38	35	8	—	0.087	H2305X	HE2305X	A2305X	AN 05	AW 05X	—
06	25	25.40	45	38	8	—	0.126	H2306X	HE2306X	A2306X	AN 06	AW 06X	—
07	30	—	52	43	9	—	0.165	H2307X	—	A2307X	AN 07	AW 07X	—
08	35	31.75	58	46	10	—	0.224	H2308X	HE2308X	A2308X	AN 08	AW 08X	—
09	40	38.10	65	50	11	—	0.280	H2309X	HE2309X	A2309X	AN 09	AW 09X	—
10	45	44.45	70	55	12	—	0.362	H2310X	HE2310X	A2310X	AN 10	AW 10X	—
11	50	50.80	75	59	12	—	0.420	H2311X	HE2311X	A2311X	AN 11	AW 11X	—
12	55	—	80	62	13	—	0.480	H2312X	—	A2312X	AN 12	AW 12X	—
13	60	57.15	85	65	14	—	0.556	H2313X	HE2313X	A2313X	AN 13	AW 13X	—
14	60	—	92	68	14	—	0.897	H2314X	—	A2314X	AN 14	AW 14X	—
15	65	63.50	98	73	15	—	1.05	H2315X	HE2315X	A2315X	AN 15	AW 15X	—
16	70	69.85	105	78	17	—	1.28	H2316X	HE2316X	A2316X	AN 16	AW 16X	—
17	75	76.20	110	82	18	—	1.45	H2317X	HE2317X	A2317X	AN 17	AW 17X	—
18	80	—	120	86	18	—	1.70	H2318X	—	A2318X	AN 18	AW 18X	—
19	85	82.55	125	90	19	—	1.94	H2319X	HE2319X	A2319X	AN 19	AW 19X	—
20	90	88.90	130	97	20	—	2.15	H2320X	HE2320X	A2320X	AN 20	AW 20X	—
21	95	—	140	101	20	—	2.45	H2321X	—	A2321X	AN 21	AW 21X	—
22	100	101.60	145	105	21	—	2.74	H2322X	HE2322X	A2322X	AN 22	AW 22X	—
24	110	107.95	155	112	22	—	3.20	H2324X	HE2324X	A2324X	AN 24	AW 24X	—
26	115	114.30	165	121	23	—	4.60	H2326	HE2326	A2326	AN 26	AW 26	—
28	125	127.00	180	131	24	—	5.52	H2328	HE2328	A2328	AN 28	AW 28	—
30	135	133.35	195	139	26	—	6.60	H2330	HE2330	A2330	AN 30	AW 30	—
32	140	139.70	210	147	28	—	9.15	H2332	HE2332	A2332	AN 32	AW 32	—
34	150	152.40	220	154	29	—	10.4	H2334	HE2334	A2334	AN 34	AW 34	—
36	160	165.10	230	161	30	—	11.3	H2336	HE2336	A2336	AN 36	AW 36	—
38	170	171.45	240	169	31	—	12.6	H2338	HE2338	A2338	AN 38	AW 38	—
40	180	177.80	250	176	32	—	13.9	H2340	HE2340	A2340	AN 40	AW 40	—
44	200	—	280	183	32	44	16.6	H2344	—	A2344	AN 44	—	AL 44
48	220	—	300	196	34	46	19.7	H2348	—	A2348	AN 48	—	AL 44
52	240	—	330	208	36	49	24.2	H2352	—	A2352	AN 52	—	AL 52
56	260	—	350	221	38	51	27.8	H2356	—	A2356	AN 56	—	AL 52

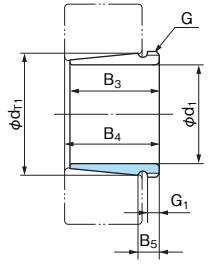
Notes: (1) The masses in the table are for H series.
(2) The numbers in the table mean sleeves for H series.
Sleeves for HE series have prefix AE instead of A.
Remarks: 1. Suffix X means narrow axial slot type. For this type sleeves, only lockwashers with straight inner tab can be used.
2. Inch bore type HS series is also available.

Withdrawal Sleeves
Series AH30 / AHX30



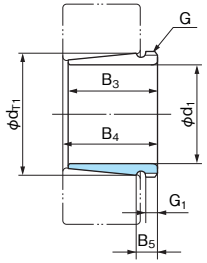
Bearing bore No.	Thread Nominal G	Dimensions (mm)						Mass (kg) (reference)	Withdrawal Sleeve No.	Locknut No.
		d_1	B_3	B_4	d_{T1}	B_5	G_1			
24	M 130×2	115	60	64	124.00	16	13	0.75	AHX3024	AN 26
26	M 140×2	125	67	71	134.50	17	14	0.93	AHX3026	AN 28
28	M 150×2	135	68	73	144.67	17	14	1.01	AHX3028	AN 30
30	M 160×3	145	72	77	154.92	18	15	1.15	AHX3030	AN 32
32	M 170×3	150	77	82	165.25	19	16	2.10	AH 3032	AN 34
34	M 180×3	160	85	90	175.83	20	17	2.50	AH 3034	AN 36
36	M 190×3	170	92	98	186.08	25	17	2.90	AH 3036	AN 38
38	Tr 205×4	180	96	102	196.50	24	18	3.40	AH 3038	HNL 41
40	Tr 215×4	190	102	108	206.92	25	19	3.80	AH 3040	HNL 43
44	Tr 235×4	200	111	117	227.58	26	20	7.40	AH 3044	HNL 47
48	Tr 260×4	220	116	123	248.00	27	21	8.80	AH 3048	HNL 52
52	Tr 280×4	240	128	135	268.83	29	23	10.7	AH 3052	HNL 56
56	Tr 300×4	260	131	139	289.08	30	24	12.0	AH 3056	HNL 60
60	Tr 320×5	280	145	153	310.08	32	26	14.4	AH 3060	HNL 64
64	Tr 345×5	300	149	157	330.33	33	27	16.0	AH 3064	HNL 69
68	Tr 365×5	320	162	171	351.42	34	28	19.5	AH 3068	HNL 73
72	Tr 385×5	340	167	176	371.67	36	30	21.0	AH 3072	HNL 77
76	Tr 410×5	360	170	180	391.92	37	31	23.5	AH 3076	HNL 82
80	Tr 430×5	380	183	193	412.83	39	33	27.2	AH 3080	HNL 86
84	Tr 450×5	400	186	196	433.00	40	34	29.1	AH 3084	HNL 90
88	Tr 470×5	420	194	205	453.67	41	35	32.1	AHX3088	HNL 94
92	Tr 490×5	440	202	213	474.17	43	37	35.3	AHX3092	HNL 98
96	Tr 520×6	460	205	217	494.42	44	38	40.0	AHX3096	HNL104
/500	Tr 540×6	480	209	221	514.58	46	40	42.5	AHX30/500	HNL108

Withdrawal Sleeves
Series AH30 / AHX30



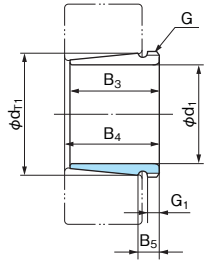
Bearing bore No.	Thread Nominal G	Dimensions (mm)						Mass (kg) (reference)	Withdrawal Sleeve No.	Locknut No.
		d_1	B_3	B_4	d_{T1}	B_5	G_1			
22	M 120×2	105	68	72	114.83	14	11	0.76	AHX3122	AN 24
24	M 130×2	115	75	79	125.33	15	12	0.95	AHX3124	AN 26
26	M 140×2	125	78	82	135.58	15	12	1.08	AHX3126	AN 28
28	M 150×2	135	83	88	145.92	17	14	1.28	AHX3128	AN 30
30	M 165×3	145	96	101	156.92	18	15	1.79	AHX3130	AN 33
32	M 180×3	150	103	108	167.42	19	16	3.20	AH 3132	AN 36
34	M 190×3	160	104	109	177.50	19	16	3.50	AH 3134	AN 38
36	M 200×3	170	116	122	188.33	22	19	4.20	AH 3136	AN 40
38	Tr 210×4	180	125	131	198.75	26	20	4.90	AH 3138	HN 42
40	Tr 220×4	190	134	140	209.42	27	21	5.60	AH 3140	HN 44
44	Tr 240×4	200	145	151	230.17	29	23	10.4	AH 3144	HN 48
48	Tr 260×4	220	154	161	250.83	31	25	12.1	AH 3148	HN 52
52	Tr 290×4	240	172	179	272.25	32	26	16.2	AH 3152	HN 58
56	Tr 310×5	260	175	183	292.42	34	28	17.6	AH 3156	HN 62
60	Tr 330×5	280	192	200	313.67	36	30	21.0	AH 3160	HN 66
64	Tr 350×5	300	209	217	335.00	37	31	24.7	AH 3164	HN 70
68	Tr 370×5	320	225	234	356.25	39	33	29.0	AH 3168	HN 74
72	Tr 400×5	340	229	238	376.42	41	35	33.1	AH 3172	HN 80
76	Tr 420×5	360	232	242	396.67	42	36	35.8	AH 3176	HN 84
80	Tr 440×5	380	240	250	417.17	44	38	38.9	AH 3180	HN 88
84	Tr 460×5	400	266	276	439.17	46	40	46.0	AH 3184	HN 92
88	Tr 480×5	420	270	281	459.42	48	42	49.2	AHX3188	HN 96
92	Tr 510×6	440	285	296	480.58	49	43	57.7	AHX3192	HN102
96	Tr 530×6	460	295	307	501.33	51	45	63.1	AHX3196	HN106
/500	Tr 550×6	480	313	325	522.67	53	47	70.9	AHX31/500	HN110

Withdrawal Sleeves
Series AH2



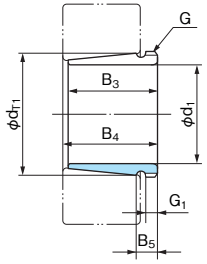
Bearing bore No.	Thread Nominal G	Dimensions (mm)						Mass (kg) (reference)	Withdrawal Sleeve No.	Locknut No.
		d_1	B_3	B_4	d_{T1}	B_5	G_1 (reference)			
08	M 45×1.5	35	25	27	41.50	9	6	0.094	AH 208	AN 09
09	M 50×1.5	40	26	29	46.67	9	6	0.104	AH 209	AN 10
10	M 55×2	45	28	31	51.15	10	7	0.130	AH 210	AN 11
11	M 60×2	50	29	32	56.83	10	7	0.167	AH 211	AN 12
12	M 65×2	55	32	35	62.00	11	8	0.175	AH 212	AN 13
13	M 75×2	60	32.5	36	67.08	11	8	0.242	AH 213	AN 15
14	M 80×2	65	33.5	37	72.17	11	8	0.255	AH 214	AN 16
15	M 85×2	70	34.5	38	77.25	11	8	0.280	AH 215	AN 17
16	M 90×2	75	35.5	39	82.33	11	8	0.306	AH 216	AN 18
17	M 95×2	80	38.5	42	87.50	12	9	0.353	AH 217	AN 19
18	M 100×2	85	40	44	92.67	12	9	0.427	AH 218	AN 20
19	M 105×2	90	43	47	97.83	13	10	0.486	AH 219	AN 21
20	M 110×2	95	45	49	103.00	13	10	0.525	AH 220	AN 22
21	M 115×2	100	47	51	108.08	14	11	0.580	AH 221	AN 23
22	M 120×2	105	50	54	113.33	14	11	0.647	AH 222	AN 24
24	M 130×2	115	53	57	123.50	15	12	0.755	AH 224	AN 26
26	M 140×2	125	53	57	133.50	15	12	0.815	AH 226	AN 28
28	M 150×2	135	56	61	143.75	16	13	1.00	AH 228	AN 30
30	M 160×3	145	60	65	154.00	17	14	1.16	AH 230	AN 32
32	M 170×3	150	64	69	164.25	18	15	1.91	AH 232	AN 34
34	M 180×3	160	69	74	174.58	19	16	2.21	AH 234	AN 36
36	M 190×3	170	69	74	184.58	19	16	2.34	AH 236	AN 38
38	Tr 205×4	180	73	78	194.58	23	17	2.94	AH 238	HNL41
40	Tr 215×4	190	77	82	204.83	24	18	3.12	AH 240	HNL43
44	Tr 235×4	200	85	91	225.58	24	18	6.10	AH 244	HNL47
48	Tr 260×4	220	96	102	246.17	28	22	8.16	AH 248	HNL52
52	Tr 280×4	240	105	111	266.83	29	23	9.89	AH 252	HNL56
56	Tr 300×4	260	105	113	287.00	29	23	10.4	AH 256	HNL60

Withdrawal Sleeves
Series AH22 / AH32 / AHX32



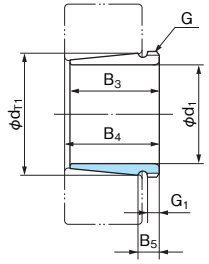
Bearing bore No.	Thread Nominal G	Dimensions (mm)						Mass (kg) (reference)	Withdrawal Sleeve No.	Locknut No.
		d_1	B_3	B_4	d_{T1}	B_5	G_1 (reference)			
36	M 200×3	170	105	110	187.50	20	17	3.70	AH 2236	AN 40
38	Tr 210×4	180	112	117	197.75	24	18	4.30	AH 2238	HN 42
40	Tr 220×4	190	118	123	208.17	25	19	4.70	AH 2240	HN 44
44	Tr 240×4	200	130	136	229.17	26	20	9.20	AH 2244	HN 48
48	Tr 260×4	220	144	150	250.25	27	21	11.1	AH 2248	HN 52
52	Tr 290×4	240	155	161	271.00	29	23	14.0	AH 2252	HN 58
56	Tr 310×5	260	155	163	291.08	30	24	15.2	AH 2256	HN 62
60	Tr 330×5	280	170	178	312.17	32	26	18.1	AH 2260	HN 66
64	Tr 350×5	300	180	190	333.08	33	27	20.2	AH 2264	HN 70
18	M 100×2	85	63	67	94.50	13	10	0.576	AHX3218	AN 20
19	M 105×2	90	67	71	99.75	14	11	0.680	AH 3219	AN 21
20	M 110×2	95	73	77	105.25	14	11	0.767	AHX3220	AN 22
21	M 115×2	100	78	82	110.67	14	11	0.890	AH 3221	AN 23
22	M 125×2	105	82	86	116.00	14	11	1.04	AHX3222	AN 25
24	M 135×2	115	90	94	126.50	16	13	1.30	AHX3224	AN 27
26	M 145×2	125	98	102	137.00	18	15	1.60	AHX3226	AN 29
28	M 155×3	135	104	109	147.58	18	15	1.90	AHX3228	AN 31
30	M 165×3	145	114	119	158.25	20	17	2.30	AHX3230	AN 33
32	M 180×3	150	124	130	168.92	23	20	4.09	AH 3232	AN 36
34	M 190×3	160	134	140	179.42	27	24	4.81	AH 3234	AN 38
36	M 200×3	170	140	146	189.92	27	24	5.31	AH 3236	AN 40
38	Tr 210×4	180	145	152	200.08	31	25	5.90	AH 3238	AN 42
40	Tr 220×4	190	153	160	210.75	31	25	6.67	AH 3240	AN 44
60	Tr 330×5	280	228	236	316.33	40	34	26.0	AH 3260	HN 66
64	Tr 350×5	300	246	254	337.67	42	36	30.6	AH 3264	HN 70
68	Tr 370×5	320	264	273	359.08	44	38	35.8	AH 3268	HN 74
72	Tr 400×5	340	274	283	379.75	46	40	41.6	AH 3272	HN 80
76	Tr 420×5	360	284	294	400.50	48	42	46.3	AH 3276	HN 84
80	Tr 440×5	380	302	312	421.83	50	44	52.5	AH 3280	HN 88
84	Tr 460×5	400	321	331	443.25	52	46	59.4	AH 3284	HN 92
88	Tr 480×5	420	330	341	463.92	54	48	64.7	AHX3288	HN 96
92	Tr 510×6	440	349	360	485.33	56	50	75.6	AHX3292	HN102
96	Tr 530×6	460	364	376	506.50	58	52	83.6	AHX3296	HN106
/500	Tr 550×6	480	393	405	528.75	60	54	94.7	AHX32/500	HN110

Withdrawal Sleeves
Series AH3 / AHX30



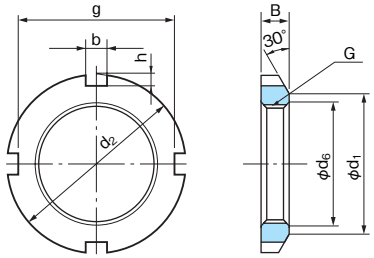
Bearing bore No.	Thread Nominal G	Dimensions (mm)						Mass (kg) (reference)	Withdrawal Sleeve No.	Locknut No.
		d_1	B_3	B_4	d_{T_1}	B_5	G_1 (reference)			
08	M 45×1.5	35	29	32	41.92	9	6	0.096	AH 308	AN 09
09	M 50×1.5	40	31	34	47.08	9	6	0.109	AH 309	AN 10
10	M 55×2	45	35	38	52.33	10	7	0.137	AHX310	AN 11
11	M 60×2	50	37	40	57.38	11.5	7	0.161	AHX311	AN 12
12	M 65×2	55	40	43	62.38	14.5	8	0.189	AHX312	AN 13
13	M 75×2	60	42	45	67.83	11	8	0.253	AH 313	AN 15
14	M 80×2	65	43	47	73.00	11	8	0.280	AH 314	AN 16
15	M 85×2	70	45	49	78.17	11	8	0.313	AH 315	AN 17
16	M 90×2	75	48	52	83.42	11	8	0.365	AH 316	AN 18
17	M 95×2	80	52	56	88.67	12	9	0.429	AHX317	AN 19
18	M 100×2	85	53	57	93.75	12	9	0.461	AHX318	AN 20
19	M 105×2	90	57	61	99.00	13	10	0.532	AHX319	AN 21
20	M 110×2	95	59	63	104.17	13	10	0.582	AHX320	AN 22
21	M 115×2	100	62	66	109.25	15	12	0.600	AHX321	AN 23
22	M 120×2	105	63	67	114.33	15	12	0.663	AHX322	AN 24
24	M 130×2	115	69	73	124.75	16	13	0.875	AHX324	AN 26
26	M 140×2	125	74	78	135.08	17	14	1.03	AHX326	AN 28
28	M 150×2	135	77	82	145.42	17	14	1.15	AHX328	AN 30
30	M 165×3	145	83	88	155.83	18	15	1.55	AHX330	AN 33
32	M 180×3	150	88	93	166.17	19	16	2.73	AH 332	AN 36
34	M 190×3	160	93	98	176.50	20	17	3.19	AH 334	AN 38

Withdrawal Sleeves
Series AH23 / AHX23



Bearing bore No.	Thread Nominal G	Dimensions (mm)						Mass (kg) (reference)	Withdrawal Sleeve No.	Locknut No.
		d_1	B_3	B_4	d_{T_1}	B_5	G_1 (reference)			
08	M 45×1.5	35	40	43	42.75	10	7	0.128	AH 2308	AN 09
09	M 50×1.5	40	44	47	48.00	11	7	0.164	AH 2309	AN 10
10	M 55×2	45	50	53	53.17	15	9	0.209	AHX2310	AN 11
11	M 60×2	50	54	57	58.42	16	10	0.253	AHX2311	AN 12
12	M 65×2	55	58	61	63.63	17.5	11	0.297	AHX2312	AN 13
13	M 75×2	60	61	64	69.08	15	12	0.395	AH 2313	AN 15
14	M 80×2	65	64	68	74.42	15	12	0.466	AHX2314	AN 16
15	M 85×2	70	68	72	79.75	15	12	0.534	AHX2315	AN 17
16	M 90×2	75	71	75	85.00	15	12	0.597	AHX2316	AN 18
17	M 95×2	80	74	78	90.17	16	13	0.670	AHX2317	AN 19
18	M 100×2	85	79	83	95.50	17	14	0.779	AHX2318	AN 20
19	M 105×2	90	85	89	100.83	19	16	0.886	AHX2319	AN 21
20	M 110×2	95	90	94	106.25	19	16	0.988	AHX2320	AN 22
21	—	—	—	—	—	—	—	—	—	—
22	M 125×2	105	98	102	116.92	19	16	1.35	AHX2322	AN 25
24	M 135×2	115	105	109	127.42	20	17	1.60	AHX2324	AN 27
26	M 145×2	125	115	119	138.08	22	19	2.00	AHX2326	AN 29
28	M 155×3	135	125	130	148.92	23	20	2.33	AHX2328	AN 31
30	M 165×3	145	135	140	159.42	27	24	2.82	AHX2330	AN 33
32	M 180×3	150	140	146	169.92	27	24	4.70	AH 2332	AN 36
34	M 190×3	160	146	152	180.42	27	24	5.30	AH 2334	AN 38
36	M 200×3	170	154	160	190.92	29	26	5.90	AH 2336	AN 40
38	Tr 210×4	180	160	167	201.25	32	26	6.50	AH 2338	HN 42
40	Tr 220×4	190	170	177	211.75	36	30	7.50	AH 2340	HN 44
44	Tr 240×4	200	181	189	232.75	36	30	13.4	AH 2344	HN 48
48	Tr 260×4	220	189	197	253.42	36	30	15.5	AH 2348	HN 52
52	Tr 290×4	240	205	213	274.75	36	30	20.0	AH 2352	HN 58
56	Tr 310×5	260	212	220	295.33	36	30	21.5	AH 2356	HN 62

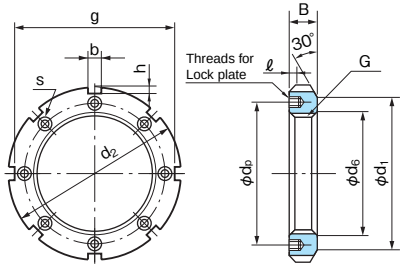
Locknuts
Series AN / ANL



No.	Thread Nominal G	Dimensions (mm)							Mass (kg) (reference)	Lockwasher No.
		d_1	d_2	B	b	h	g	d_6		
AN 02	M 15×1	21	25	5	4	2	21	15.5	0.010	AW 02
AN 03	M 17×1	24	28	5	4	2	24	17.5	0.013	AW 03
AN 04	M 20×1	26	32	6	4	2	28	20.5	0.019	AW 04
AN 05	M 25×1.5	32	38	7	5	2	34	25.8	0.025	AW 05
AN 06	M 30×1.5	38	45	7	5	2	41	30.8	0.043	AW 06
AN 07	M 35×1.5	44	52	8	5	2	48	35.8	0.053	AW 07
AN 08	M 40×1.5	50	58	9	6	2.5	53	40.8	0.085	AW 08
AN 09	M 45×1.5	56	65	10	6	2.5	60	45.8	0.119	AW 09
AN 10	M 50×1.5	61	70	11	6	2.5	65	50.8	0.148	AW 10
AN 11	M 55×2	67	75	11	7	3	69	56	0.158	AW 11
AN 12	M 60×2	73	80	11	7	3	74	61	0.174	AW 12
AN 13	M 65×2	79	85	12	7	3	79	66	0.203	AW 13
AN 14	M 70×2	85	92	12	8	3.5	85	71	0.242	AW 14
AN 15	M 75×2	90	98	13	8	3.5	91	76	0.287	AW 15
AN 16	M 80×2	95	105	15	8	3.5	98	81	0.397	AW 16
AN 17	M 85×2	102	110	16	8	3.5	103	86	0.451	AW 17
AN 18	M 90×2	108	120	16	10	4	112	91	0.556	AW 18
AN 19	M 95×2	113	125	17	10	4	117	96	0.658	AW 19
AN 20	M 100×2	120	130	18	10	4	122	101	0.698	AW 20
AN 21	M 105×2	126	140	18	12	5	130	106	0.845	AW 21
AN 22	M 110×2	133	145	19	12	5	135	111	0.965	AW 22
AN 23	M 115×2	137	150	19	12	5	140	116	1.01	AW 23
AN 24	M 120×2	138	155	20	12	5	145	121	1.08	AW 24
AN 25	M 125×2	148	160	21	12	5	150	126	1.19	AW 25
AN 26	M 130×2	149	165	21	12	5	155	131	1.25	AW 26
AN 27	M 135×2	160	175	22	14	6	163	136	1.55	AW 27
AN 28	M 140×2	160	180	22	14	6	168	141	1.56	AW 28
AN 29	M 145×2	171	190	24	14	6	178	146	2.00	AW 29
AN 30	M 150×2	171	195	24	14	6	183	151	2.03	AW 30
AN 31	M 155×3	182	200	25	16	7	186	156.5	2.21	AW 31
AN 32	M 160×3	182	210	25	16	7	196	161.5	2.59	AW 32
AN 33	M 165×3	193	210	26	16	7	196	166.5	2.43	AW 33
AN 34	M 170×3	193	220	26	16	7	206	171.5	2.80	AW 34
AN 36	M 180×3	203	230	27	18	8	214	181.5	3.07	AW 36
AN 38	M 190×3	214	240	28	18	8	224	191.5	3.39	AW 38
AN 40	M 200×3	226	250	29	18	8	234	201.5	3.69	AW 40

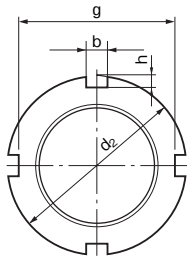
No.	Thread Nominal G	Dimensions (mm)							Mass (kg) (reference)	Lockwasher No.
		d_1	d_2	B	b	h	g	d_6		
ANL 24	M 120×2	133	145	20	12	5	135	121	0.780	AWL24
ANL 26	M 130×2	143	155	21	12	5	145	131	0.880	AWL26
ANL 28	M 140×2	151	165	22	14	6	153	141	0.990	AWL28
ANL 30	M 150×2	164	180	24	14	6	168	151	1.38	AWL30
ANL 32	M 160×3	174	190	25	16	7	176	161.5	1.56	AWL32
ANL 34	M 170×3	184	200	26	16	7	186	171.5	1.72	AWL34
ANL 36	M 180×3	192	210	27	18	8	194	181.5	1.95	AWL36
ANL 38	M 190×3	202	220	28	18	8	204	191.5	2.08	AWL38
ANL 40	M 200×3	218	240	29	18	8	224	201.5	2.98	AWL40

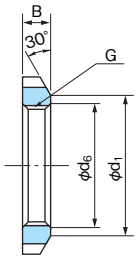
Locknuts
Series AN / ANL



No.	Thread Nominal G	Dimensions (mm)										Mass (kg) (reference)	Lockwasher No.
		d_1	d_2	B	b	h	g	d_6	ℓ	s	d_p		
AN 44	Tr 220×4	250	280	32	20	10	260	222	15	M 8×1.25	238	5.20	AL 44
AN 48	Tr 240×4	270	300	34	20	10	280	242	15	M 8×1.25	258	5.95	AL 44
AN 52	Tr 260×4	300	330	36	24	12	306	262	18	M 10×1.5	281	8.05	AL 52
AN 56	Tr 280×4	320	350	38	24	12	326	282	18	M 10×1.5	301	9.05	AL 52
AN 60	Tr 300×4	340	380	40	24	12	356	302	18	M 10×1.5	326	11.8	AL 60
AN 64	Tr 320×5	360	400	42	24	12	376	322.5	18	M 10×1.5	345	13.1	AL 64
AN 68	Tr 340×5	400	440	55	28	15	410	342.5	21	M 12×1.75	372	23.1	AL 68
AN 72	Tr 360×5	420	460	58	28	15	430	362.5	21	M 12×1.75	392	25.1	AL 68
AN 76	Tr 380×5	450	490	60	32	18	454	382.5	21	M 12×1.75	414	30.9	AL 76
AN 80	Tr 400×5	470	520	62	32	18	484	402.5	27	M 16×2	439	36.9	AL 80
AN 84	Tr 420×5	490	540	70	32	18	504	422.5	27	M 16×2	459	43.5	AL 80
AN 88	Tr 440×5	510	560	70	36	20	520	442.5	27	M 16×2	477	45.3	AL 88
AN 92	Tr 460×5	540	580	75	36	20	540	462.5	27	M 16×2	497	50.4	AL 88
AN 96	Tr 480×5	560	620	75	36	20	580	482.5	27	M 16×2	527	62.2	AL 96
AN 100	Tr 500×5	580	630	80	40	23	584	502.5	27	M 16×2	539	63.3	AL 100
ANL 44	Tr 220×4	242	260	30	20	9	242	222	12	M 6×1	229	3.09	ALL 44
ANL 48	Tr 240×4	270	290	34	20	10	270	242	15	M 8×1.25	253	5.16	ALL 48
ANL 52	Tr 260×4	290	310	34	20	10	290	262	15	M 8×1.25	273	5.67	ALL 48
ANL 56	Tr 280×4	310	330	38	24	10	310	282	15	M 8×1.25	293	6.78	ALL 56
ANL 60	Tr 300×4	336	360	42	24	12	336	302	15	M 8×1.25	316	9.62	ALL 60
ANL 64	Tr 320×5	356	380	42	24	12	356	322.5	15	M 8×1.25	335	9.94	ALL 64
ANL 68	Tr 340×5	376	400	45	24	12	376	342.5	15	M 8×1.25	355	11.7	ALL 64
ANL 72	Tr 360×5	394	420	45	28	13	394	362.5	15	M 8×1.25	374	12.0	ALL 72
ANL 76	Tr 380×5	422	450	48	28	14	422	382.5	18	M 10×1.5	398	14.9	ALL 76
ANL 80	Tr 400×5	442	470	52	28	14	442	402.5	18	M 10×1.5	418	16.9	ALL 76
ANL 84	Tr 420×5	462	490	52	32	14	462	422.5	18	M 10×1.5	438	17.4	ALL 84
ANL 88	Tr 440×5	490	520	60	32	15	490	442.5	21	M 12×1.75	462	26.2	ALL 88
ANL 92	Tr 460×5	510	540	60	32	15	510	462.5	21	M 12×1.75	482	29.6	ALL 88
ANL 96	Tr 480×5	530	560	60	36	15	530	482.5	21	M 12×1.75	502	28.3	ALL 96
ANL100	Tr 500×5	550	580	68	36	15	550	502.5	21	M 12×1.75	522	33.6	ALL 96

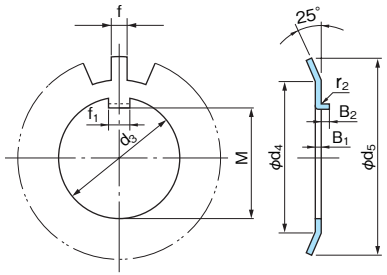
Nuts for withdrawal sleeves
Series HN / HNL



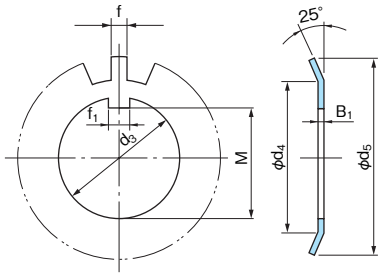


No.	Thread Nominal G	Dimensions (mm)							Mass (kg) (reference)
		d_1	d_2	B	b	h	g	d_6	
HN 42	Tr 210×4	238	270	30	20	10	250	212	4.75
HN 44	Tr 220×4	250	280	32	20	10	260	222	5.35
HN 48	Tr 240×4	270	300	34	20	10	280	242	6.20
HN 52	Tr 260×4	300	330	36	24	12	306	262	8.55
HN 58	Tr 290×4	330	370	40	24	12	346	292	11.8
HN 62	Tr 310×5	350	390	42	24	12	366	312.5	13.4
HN 66	Tr 330×5	380	420	52	28	15	390	332.5	20.4
HN 70	Tr 350×5	410	450	55	28	15	420	352.5	25.2
HN 74	Tr 370×5	430	470	58	28	15	440	372.5	28.2
HN 80	Tr 400×5	470	520	62	32	18	484	402.5	40.0
HN 84	Tr 420×5	490	540	70	32	18	504	422.5	46.9
HN 88	Tr 440×5	510	560	70	36	20	520	442.5	48.5
HN 92	Tr 460×5	540	580	75	36	20	540	462.5	55.0
HN 96	Tr 480×5	560	620	75	36	20	580	482.5	67.0
HN 102	Tr 510×6	590	650	80	40	23	604	513	69.0
HN 106	Tr 530×6	610	670	80	40	23	624	533	78.0
HN 110	Tr 550×6	640	700	80	40	23	654	553	92.5
HNL 41	Tr 205×4	232	250	30	18	8	234	207	3.43
HNL 43	Tr 215×4	242	260	30	20	9	242	217	3.72
HNL 47	Tr 235×4	262	280	34	20	9	262	237	4.60
HNL 52	Tr 260×4	290	310	34	20	10	290	262	5.80
HNL 56	Tr 280×4	310	330	38	24	10	310	282	6.72
HNL 60	Tr 300×4	336	360	42	24	12	336	302	9.60
HNL 64	Tr 320×5	356	380	42	24	12	356	322.5	10.3
HNL 69	Tr 345×5	384	410	45	28	13	384	347.5	11.5
HNL 73	Tr 365×5	404	430	48	28	13	404	367.5	14.2
HNL 77	Tr 385×5	422	450	48	28	14	422	387.5	15.0
HNL 82	Tr 410×5	452	480	52	32	14	452	412.5	19.0
HNL 86	Tr 430×5	472	500	52	32	14	472	432.5	19.8
HNL 90	Tr 450×5	490	520	60	32	15	490	452.5	23.8
HNL 94	Tr 470×5	510	540	60	32	15	510	472.5	25.0
HNL 98	Tr 490×5	550	580	60	36	15	550	492.5	34.0
HNL104	Tr 520×6	570	600	68	36	15	570	523	37.0
HNL108	Tr 540×6	590	630	68	40	20	590	543	43.5

Lockwashers
Series AW / AWL



Bended inner tab type



Straight inner tab type

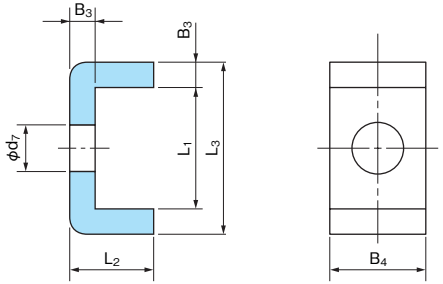
No.		Dimensions (mm)									No. of Teeth	Mass (kg/100pcs) (reference)	Locknut No.
Bended inner tab	Straight inner tab	d_3	d_4	d_5	f_1	M	B_1	Bended inner tab B_2	Bended inner tab r_2	f			
AW 02	AW 02X	15	21	28	4	13.5	1	2.5	1	4	13	0.253	AN 02
AW 03	AW 03X	17	24	32	4	15.5	1	2.5	1	4	13	0.313	AN 03
AW 04	AW 04X	20	26	36	4	18.5	1	2.5	1	4	13	0.350	AN 04
AW 05	AW 05X	25	32	42	5	23	1.2	2.5	1	5	13	0.640	AN 05
AW 06	AW 06X	30	38	49	5	27.5	1.2	2.5	1	5	13	0.780	AN 06
AW 07	AW 07X	35	44	57	6	32.5	1.2	2.5	1	5	15	1.04	AN 07
AW 08	AW 08X	40	50	62	6	37.5	1.2	2.5	1	6	15	1.23	AN 08
AW 09	AW 09X	45	56	69	6	42.5	1.2	2.5	1	6	17	1.52	AN 09
AW 10	AW 10X	50	61	74	6	47.5	1.2	2.5	1	6	17	1.60	AN 10
AW 11	AW 11X	55	67	81	8	52.5	1.2	4	1	7	17	1.96	AN 11
AW 12	AW 12X	60	73	86	8	57.5	1.5	4	1.2	7	17	2.53	AN 12
AW 13	AW 13X	65	79	92	8	62.5	1.5	4	1.2	7	19	2.90	AN 13
AW 14	AW 14X	70	85	98	8	66.5	1.5	4	1.2	8	19	3.34	AN 14
AW 15	AW 15X	75	90	104	8	71.5	1.5	4	1.2	8	19	3.56	AN 15
AW 16	AW 16X	80	95	112	10	76.5	1.8	4	1.2	8	19	4.64	AN 16
AW 17	AW 17X	85	102	119	10	81.5	1.8	4	1.2	8	19	5.24	AN 17
AW 18	AW 18X	90	108	126	10	86.5	1.8	4	1.2	10	19	6.23	AN 18
AW 19	AW 19X	95	113	133	10	91.5	1.8	4	1.2	10	19	6.70	AN 19
AW 20	AW 20X	100	120	142	12	96.5	1.8	6	1.2	10	19	7.65	AN 20
AW 21	AW 21X	105	126	145	12	100.5	1.8	6	1.2	12	19	8.26	AN 21
AW 22	AW 22X	110	133	154	12	105.5	1.8	6	1.2	12	19	9.40	AN 22
AW 23	AW 23X	115	137	159	12	110.5	2	6	1.5	12	19	10.8	AN 23
AW 24	AW 24X	120	138	164	14	115	2	6	1.5	12	19	10.5	AN 24
AW 25	AW 25X	125	148	170	14	120	2	6	1.5	12	19	11.8	AN 25
AW 26	AW 26X	130	149	175	14	125	2	6	1.5	12	19	11.3	AN 26
AW 27	AW 27X	135	160	185	14	130	2	6	1.5	14	19	14.4	AN 27
AW 28	AW 28X	140	160	192	16	135	2	8	1.5	14	19	14.2	AN 28
AW 29	AW 29X	145	171	202	16	140	2	8	1.5	14	19	16.8	AN 29
AW 30	AW 30X	150	171	205	16	145	2	8	1.5	14	19	15.5	AN 30
AW 31	AW 31X	155	182	212	16	147.5	2.5	8	1.5	16	19	20.9	AN 31
AW 32	AW 32X	160	182	217	18	154	2.5	8	1.5	16	19	22.2	AN 32
AW 33	AW 33X	165	193	222	18	157.5	2.5	8	1.5	16	19	24.1	AN 33
AW 34	AW 34X	170	193	232	18	164	2.5	8	1.5	16	19	24.7	AN 34
AW 36	AW 36X	180	203	242	20	174	2.5	8	1.5	18	19	26.8	AN 36
AW 38	AW 38X	190	214	252	20	184	2.5	8	1.5	18	19	27.8	AN 38
AW 40	AW 40X	200	226	262	20	194	2.5	8	1.5	18	19	29.3	AN 40

No.		Dimensions (mm)									No. of Teeth	Mass (kg/100pcs) (reference)	Locknut No.
Bended inner tab	Straight inner tab	d_3	d_4	d_5	f_1	M	B_1	Bended inner tab B_2	Bended inner tab r_2	f			
AWL 24	AWL 24X	120	133	155	14	115	2	6	1.5	12	19	7.70	ANL 24
AWL 26	AWL 26X	130	143	165	14	125	2	6	1.5	12	19	8.70	ANL 26
AWL 28	AWL 28X	140	151	175	16	135	2	8	1.5	14	19	10.9	ANL 28
AWL 30	AWL 30X	150	164	190	16	145	2	8	1.5	14	19	11.3	ANL 30
AWL 32	AWL 32X	160	174	200	18	154	2.5	8	1.5	16	19	16.2	ANL 32
AWL 34	AWL 34X	170	184	210	18	164	2.5	8	1.5	16	19	19.0	ANL 34
AWL 36	AWL 36X	180	192	220	20	174	2.5	8	1.5	18	19	18.0	ANL 36
AWL 38	AWL 38X	190	202	230	20	184	2.5	8	1.5	18	19	20.5	ANL 38
AWL 40	AWL 40X	200	218	250	20	194	2.5	8	1.5	18	19	21.4	ANL 40

Remark: Narrow slot adapters with part numbers with an X suffix in the series H2, H3 and H23 use straight type inner tabs. Wide slot adapters with part numbers with an X suffix can use either bended or straight inner tabs.

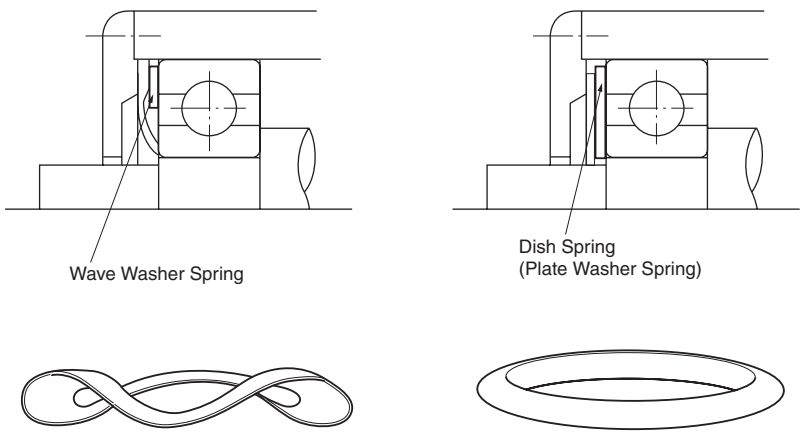
NACHI

Lock Plates
Series AL / ALL



No.	Dimensions (mm)						Mass (kg/100pcs) (reference)	Nut No.
	B_3	B_4	L_2	d_7	L_1	L_3		
AL 44	4	20	12	9	22.5	30.5	2.60	AN44 , AN48
AL 52	4	24	12	12	25.5	33.5	3.39	AN52 , AN56
AL 60	4	24	12	12	30.5	38.5	3.79	AN60
AL 64	5	24	15	12	31	41	5.35	AN64
AL 68	5	28	15	14	38	48	6.65	AN68 , AN72
AL 76	5	32	15	14	40	50	7.96	AN76
AL 80	5	32	15	18	45	55	8.20	AN80 , AN84
AL 88	5	36	15	18	43	53	9.00	AN88 , AN92
AL 96	5	36	15	18	53	63	10.4	AN96
AL 100	5	40	15	18	45	55	10.5	AN100
ALL 44	4	20	12	7	13.5	21.5	2.12	ANL44
ALL 48	4	20	12	9	17.5	25.5	2.29	ANL48, ANL52
ALL 56	4	24	12	9	17.5	25.5	2.92	ANL56
ALL 60	4	24	12	9	20.5	28.5	3.16	ANL60
ALL 64	5	24	15	9	21	31	4.56	ANL64, ANL68
ALL 72	5	28	15	9	20	30	5.03	ANL72
ALL 76	5	28	15	12	24	34	5.28	ANL76, ANL80
ALL 84	5	32	15	12	24	34	6.11	ANL84
ALL 88	5	32	15	14	28	38	6.45	ANL88, ANL92
ALL 96	5	36	15	14	28	38	7.29	ANL96, ANL100

■ Dish Spring for Bearings



The application for electrical motors may sometimes require that the bearings be provided with appropriate preload when assembled.
In case of motors the residual clearance 0 after mounting is best for low noise.
Preload has the following various purposes and effects.

<Purpose of Preload>

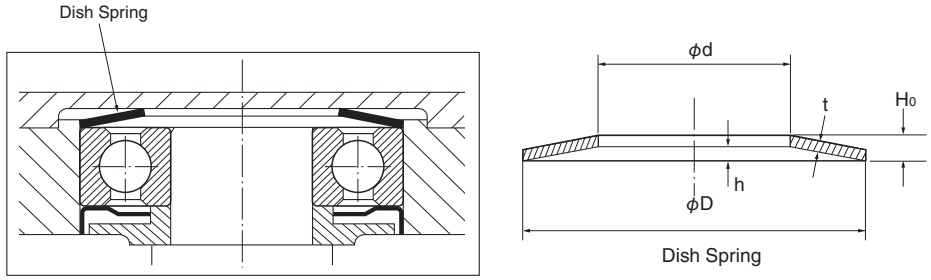
(1) Enhances rotating accuracy of shaft. Minimizes axial movements and helps to prevent vibration and decrease noise.
(2) Prevents fretting caused by external vibration.
(3) Increases rigidity of a shaft (that is, preloading can help to decrease the deflection of shafting).

<Preloading method>

Use of springs (wave washer spring or dish spring) “Constantpressure” preloading.
The preload for electrical motor bearings may be calculated by using the following equations.
Tp=Preload Force (kgf) d=Inner Ring Bore Diameter(mm)

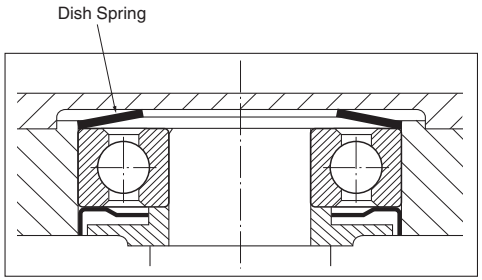
Tp=(0.4～0.8)d or Tp=0.6d-3

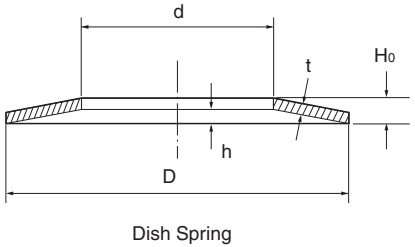
Preload by Dish Springs for Bearings



Bearing No.	Bearing I.D (dmm)	Spring No.	Target Preload (Tp N)		Recommended Preload (N)	Flexure (dmm)	Spring Hgt (Ho mm)
			Tp=(0.4～0.8)d Range	Tp=0.6d-3			
6001	12	HDS-28	47.0～94.1	41.2	88.7	0.25	0.75
6002	15	HDS-32	58.8～117.6	58.8	100.0	0.41	0.64
6003	17	HDS-35b	66.6～133.3	70.6	110.0	0.28	0.87
6004	20	HDS-42	78.4～156.8	88.2	116.0	0.38	0.97
6005	25	HDS-47	98.0～196.0	117.6	145.0	0.38	1.07
6006	30	HDS-55	117.6～235.2	147.0	163.0	0.56	0.89
6007	35	HDS-62	137.2～274.4	176.4	168.0	0.48	1.27
6008	40	HDS-68	156.8～313.6	205.8	183.0	0.64	1.01
6009	45	HDS-75	176.4～352.8	235.2	236.0	0.56	1.19
6010	50	HDS-80b	196.0～392.0	264.6	256.0	0.58	1.57
6011	55	HDS-90b	215.6～431.2	294.0	321.0	0.55	1.75
6200	10	HDS-30	39.2～78.4	29.4	84.2	0.28	0.77
6201	12	HDS-32	47.0～94.1	41.2	82.6	0.28	0.77
6202	15	HDS-35b	58.8～117.6	58.8	110.0	0.28	0.87
6203	17	HDS-40	66.6～133.3	70.6	107.0	0.33	0.92
6204	20	HDS-47	78.4～156.8	88.2	145.0	0.38	1.07
6205	25	HDS-52	98.0～196.0	117.6	128.0	0.38	1.07
6206	30	HDS-62	117.6～235.2	147.0	168.0	0.48	1.27
6207	35	HDS-72b	137.2～274.4	176.4	219.0	0.45	1.45
6208	40	HDS-80b	156.8～313.6	205.8	256.0	0.58	1.57
6209	45	HDS-85	176.4～352.8	235.2	344.0	0.55	1.75
6210	50	HDS-90b	196.0～392.0	264.6	321.0	0.55	1.75
6300	10	HDS-35a	39.2～78.4	29.4	62.0	0.28	0.77
6301	12	HDS-37	47.0～94.1	41.2	108.0	0.33	0.92
6302	15	HDS-42	58.8～117.6	58.8	116.0	0.38	0.97
6303	17	HDS-47	66.6～133.3	70.6	145.0	0.38	1.07
6304	20	HDS-52	78.4～156.8	88.2	128.0	0.38	1.07
6305	25	HDS-62	98.0～196.0	117.6	168.0	0.48	1.27
6306	30	HDS-72a	117.6～235.2	147.0	253.0	0.55	1.55
6307	35	HDS-80a	137.2～274.4	176.4	221.0	0.58	1.57
6308	40	HDS-90a	156.8～313.6	205.8	276.0	0.55	1.75
6309	45	HDS-100a	176.4～352.8	235.2	266.0	0.63	1.82
6310	50	HDS-110a	196.0～392.0	264.6	304.0	0.78	1.97

Dish Spring List for Bearings





Dish Spring

Unit (mm)

Size	Applicable Bearing No.	Dish Spring Size (mm)					Spring Load (N)			
							Flexure 0.5h		Flexure 0.75h	
		D	d	t	h	Ho	P	δ	P	δ
HDS-10	EL3 623	9.8	6.2	0.20	0.20	0.40	18.40	0.10	23.20	0.15
HDS-13	EL4 624	12.8	7.2	0.25	0.25	0.50	23.90	0.13	29.70	0.19
HDS-16	R4 EL5 625 634	15.8	8.2		0.30	0.55	19.40	0.15	23.40	0.23
HDS-19a	R5 EL6 626 635	18.8	9.2	0.30	0.35	0.65	26.60	0.18	31.50	0.26
HDS-19b	EL7 607		10.2	0.35		0.70	41.20		50.80	
HDS-22	R7 EL8 608 627 636	21.8	12.3		0.40	0.75	38.40	0.20	46.60	0.30
HDS-24	EL9 609 628	23.7	14.3	0.40	0.50	0.90	68.80	0.25	81.30	0.38
HDS-26	R9 6000 629 637	25.7					54.30		64.10	
HDS-28	6001 638	27.7	17.3	0.50		1.00	88.70		113.00	
HDS-30	6200	29.7			0.55	1.05	84.20	0.28	102.00	0.41
HDS-32	6002 6201	31.7	20.4				82.60		100.00	
HDS-35a	6300	34.6					62.70		76.00	
HDS-35b	6003 6202		22.4	0.60		1.15	110.00		139.00	
HDS-37	6301	36.6	20.4		0.65	1.25	108.00	0.33	132.00	0.49
HDS-40	6203	39.6	25.5				107.00		131.00	
HDS-42	6004 6302	41.6			0.75	1.35	116.00	0.38	135.00	0.56
HDS-47	6005 6204 6303	46.5	30.5	0.70		1.45	145.00		177.00	
HDS-52	6205 6304	51.5	35.5				128.00		156.00	
HDS-55	6006	54.5	40.5				133.00		163.00	
HDS-62	6007 6206 6305	61.5		0.80	0.95	1.75	168.00	0.48	200.00	0.71
HDS-68	6008	67.5	50.5		0.85	1.65	148.00	0.43	183.00	0.64
HDS-72a	6306	71.5	45.5	1.00	1.10	2.10	253.00	0.55	312.00	0.83
HDS-72b	6207		50.5		0.90	1.90	219.00	0.45	286.00	0.68
HDS-75	6009	74.5	55.5		0.75	1.75	177.00	0.38	236.00	0.56
HDS-80a	6307	79.5	50.5		1.15	2.15	221.00	0.58	266.00	0.86
HDS-80b	6010 6208		55.5				256.00		308.00	
HDS-85	6209	84.5	60.5	1.20	1.10	2.30	344.00	0.55	445.00	0.83
HDS-90a	6308	89.5					276.00		357.00	
HDS-90b	6011 6210		65.5				321.00		416.00	
HDS-95	6012	94.5	75.5		0.85	2.05	260.00	0.43	351.00	0.64
HDS-100a	6309	99.0	65.5		1.25	2.45	266.00	0.63	331.00	0.94
HDS-100b	6013 6211		70.5				303.00		376.00	
HDS-110a	6310	109.0			1.55	2.75	304.00	0.78	353.00	1.16
HDS-110b	6014 6212		75.5				339.00		393.00	
HDS-115	6015	114.0	90.5		1.30	2.50	321.00	0.65	396.00	0.98
HDS-120a	6311	119.0	75.5		1.55	2.75	249.00	0.78	289.00	1.16

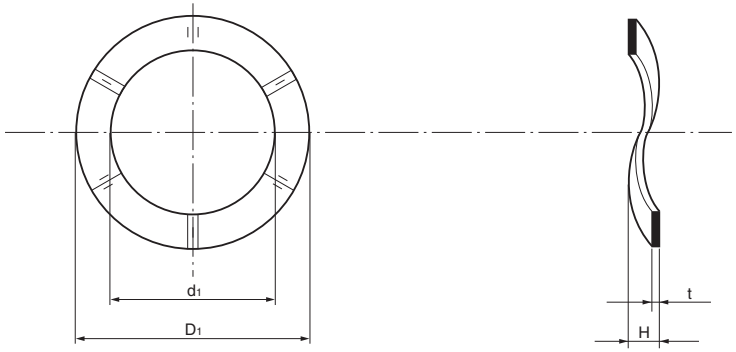
Unit (mm)

Size	Applicable Bearing No.	Dish Spring Size (mm)					Spring Load (N)			
							Flexure 0.5h		Flexure 0.75h	
		D	d	t	h	Ho	P	δ	P	δ
HDS-120b	6213	119.0	85.5	1.20	1.55	2.75	305.00	0.78	354.00	1.16
HDS-125	6016 6214	124.0	90.5				291.00		337.00	
HDS-130a	6312	129.0	85.5	1.50	1.70	3.20	438.00	0.85	533.00	1.28
HDS-130b	6017 6215		95.5				540.00		657.00	
HDS-140a	6313	139.0	90.5				368.00		448.00	
HDS-140b	6018 6216		101.0		1.75	3.25	469.00	0.88	563.00	1.31
HDS-150a	6314	149.0	95.5		1.70	3.20	313.00	0.85	381.00	1.28
HDS-150b	6217		106.0				371.00		452.00	
HDS-160a	6315	159.0	101.0	1.60	1.85	3.45	365.00	0.93	440.00	1.39
HDS-160b	6218		111.0				422.00		508.00	
HDS-170a	6316	169.0			2.05	3.65	403.00	1.03	469.00	1.54
HDS-170b	6219		121.0				467.00		544.00	
HDS-180a	6317	179.0		2.00	2.20	4.20	706.00	1.10	866.00	1.65
HDS-180b	6220		126.0				758.00		930.00	
HDS-190a	6318	189.0	121.0		2.30	4.30	629.00	1.15	762.00	1.73
HDS-190b	6221		131.0				711.00		861.00	
HDS-200a	6319	198.0			2.50	4.50	692.00	1.25	815.00	1.88
HDS-200b	6222		141.0				786.00		925.00	
HDS-215a	6320	213.0	151.0	2.30	2.20		772.00	1.10	986.00	1.65
HDS-225	6321	223.0	161.0		2.30	4.60	783.00	1.15	989.00	1.73
HDS-230	6226	228.0			2.60	4.90	870.00	1.30	1060.00	1.95
HDS-240	6322	238.0			2.85	5.15	864.00	1.43	1020.00	2.14
HDS-250	6228	248.0	171.0	2.50	2.50	5.00	819.00	1.25	1030.00	1.88
HDS-260	6324	258.0			3.00	5.50	951.00	1.50	113.000	2.25
HDS-270	6230	268.0	181.0		3.10	5.60	960.00	1.55		2.33
HDS-280	6326	278.0			3.25	5.75	917.00	1.63	1060.00	2.44
HDS-290	6232	288.0	193.0				892.00		1030.00	
HDS-300	6328	298.0					791.00		917.00	
HDS-310	6234	308.0	202.0	3.00	3.10	6.10	1070.00	1.55	1330.00	2.33
HDS-320a	6330	318.0	212.0		3.20	6.20	1080.00	1.60	1340.00	2.40
HDS-340a	6332	338.0	232.0		3.60	6.60	1220.00	1.80	1450.00	2.70
HDS-360a	6334	358.0	242.0		3.90	6.90	1210.00	1.95	1410.00	2.93
HDS-380	6336	378.0	252.0				1060.00		1230.00	
HDS-400	6338	398.0	262.0	3.50	4.20	7.70	1520.00	2.10	1810.00	3.15
HDS-420	6340	418.0	272.0	4.00	3.80	7.80	159.00	1.90	2030.00	2.85

Material: Carbon spring steel between S65CM and S75CM (JIS)
Hardness: between HRC38 and HRC45

NACHI

Wave Springs for Bearings (Reference)



W=0.6d-3 W: Preload(Kgf)/d: Bore diameter
L=(1.94×dm3×W/(E×b×t3×N)(mm)
L: elastic displacement (mm)
dm=(d1+D1)/2 (mm) b=(D1-d1)/2 (mm)
t: thickness of sheet (mm)
E=20000 (kgf/mm2)
N: wave number

Spring No.	Outside Diameter of Bearing (mm)	d_1: Bore Diameter of Spring (mm)	D_1: Outside Diameter of Spring (mm)	H: Height of Spring (mm)	t: Thickness of Sheet (mm)		Wave Number	Spring Constant (mm/kgf)	Applied Bearing No.				
W22	22	14.5	21	2.4	0.2		3	0.2576	6900				
W26	26	19.5	24.8	3.2	0.2		3	0.9139		6000			
W28	28	20.9	26.9	3	0.25		3	0.3488	6902	6001			
W30	30	22	28.5	4.1	0.25		3	0.3796	6903		6200		
W32	32	23.5	30.5	4	0.25		3	0.4310		6002	6201		
W35	35	26.4	33.9	3.5	0.3		3	0.3242		6003	6202	6300	
W40	40	29.8	38.3	5	0.3		3	0.4120		6203			
W42	42	30.1	40.6	4.5	0.3		3	0.3732	6905	6004		6302	
W47	47	33.7	45.5	5	0.3		3	0.4688	6906	6005	6204	6303	
W52	52	38.5	50	7.2	0.3		3	0.6683		6205	6304		
W62	62	47.2	60.2	6.5	0.4		3	0.4458	6908	6007	6206	6305	6403
W72	72	55	70.5	7	0.45		3	0.4190	6910		6207	6306	6404
W80	80	61.3	77.8	8.5	0.45		3	0.5359	6911	6010	6208	6307	6405
W90	90	69	88.5	7	0.6		3	0.2777	6913	6011	6210	6308	6406
W100	100	79.3	98.8	6.5	0.7		3	0.2529	6914	6013	6211	6309	6407
W110	110	88.9	108.9	8	0.8		3	0.2263	6916	6014	6212	6310	6408
W120	120	95.8	118.9	8.5	0.8		3	0.2505	6917		6213	6311	6409
W130	130	108.3	128.3	11	0.8		3	0.3872	6919	6017	6215	6312	6410
W140	140	112.4	138.4	11	0.8		3	0.3548	6920	6018	6216	6313	6411

Material: Spring Steel (JIS G3311/JIS G3506)/HARDNESS: HRc40-50/SURFACE TREATMENT PHOSPHATE COATING

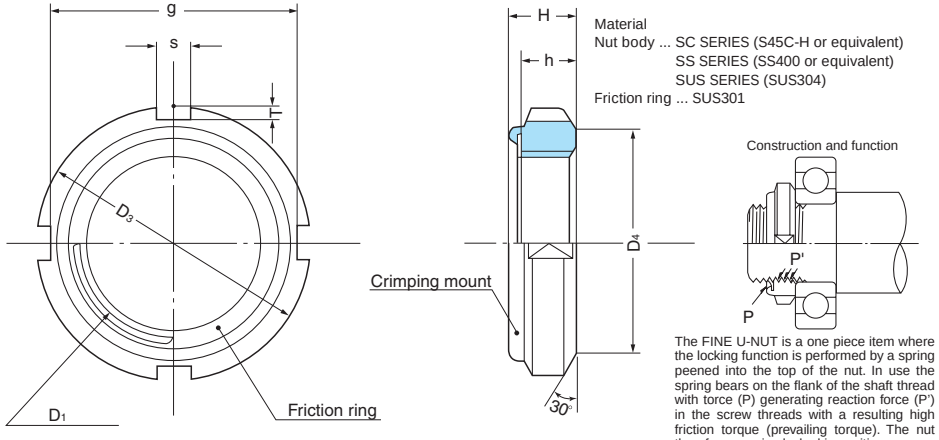
Notes: 1. 't' means thickness of raw sheet.

2. 'd_1' means inscribed circle and 'D_1' means circumscribed circle.

3. 'H' means the height of spring of which the tops of 3 waves indicate same height first of all when it is compressed between 2 parallel plates

■ Convenient Locking Nuts for Bearings

● Dimension Table for Fine U-NUT



Material
Nut body ... SC SERIES (S45C-H or equivalent)
SS SERIES (SS400 or equivalent)
SUS SERIES (SUS304)
Friction ring ... SUS301

Construction and function

The FINE U-NUT is a one piece item where the locking function is performed by a spring peened into the top of the nut. In use the spring bears on the flank of the shaft thread with torce (P) generating reaction force (P') in the screw threads with a resulting high friction torque (prevailing torque). The nut therefore remains locked in position

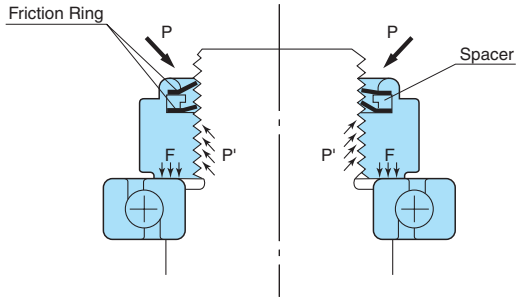
Thread accuracy: ISO6H(JIS CLASS2) Unit: mm

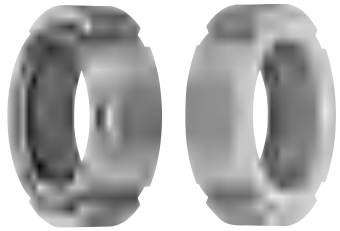
SC Series	SS Series	SUS Series	Designation of thread D_1	D_3	D_4	g	T	S	h	H	Perpendicularity of bearing surface
FU00SC	FU00SS	FU00SUS	M10×0.75	18	13.5	14.4	1.8	3	4	5.2 ± 0.3	
FU01SC	FU01SS	FU01SUS	M12×1.0	22	17	18.4	1.8	3	4	5.4	
FU02SC	FU02SS	FU02SUS	M15×1.0	25	21	21.4	1.8	4	5	6.5	
FU03SC	FU03SS	FU03SUS	M17×1.0	28	24	24.2	1.9	4	5	6.4 ± 0.5	
FU04SC	FU04SS	FU04SUS	M20×1.0	32	26	28.4	1.8	4	6	7.7	
FU05SC	FU05SS	FU05SUS	M25×1.5	38	32	34	2	5	7	9.1	0.05
FU06SC	FU06SS	FU06SUS	M30×1.5	45	38	41	2	5	7	9.1	
FU07SC	FU07SS	FU07SUS	M35×1.5	52	44	48	2	5	8	10.2 ± 0.8	
FU08SC	FU08SS	FU08SUS	M40×1.5	58	50 0 −0.5	53	2.5	6 ± 0.2	9	11.2	
FU09SC	FU09SS	FU09SUS	M45×1.5	65	56	60	2.5	6	10	12.5	
FU10SC	FU10SS	FU10SUS	M50×1.5	70	61	65	2.5	6	11	13.5 ± 1.0	
FU11SC	FU11SS	FU11SUS	M55×2.0	75	67	69	3	7	11	13.5	
FU12SC	FU12SS	FU12SUS	M60×2.0	80	73	74	3	7	11	13.5	
FU13SC	FU13SS	FU13SUS	M65×2.0	85	79	79	3	7	12	15	
FU14SC	FU14SS	FU14SUS	M70×2.0	92	85	85	3.5	8	12	15	
FU15SC	FU15SS	FU15SUS	M75×2.0	98 0 −0.5	90	91 0 −0.5	3.5	8	13	15.8	
FU16SC	FU16SS	FU16SUS	M80×2.0	105	95	98	3.5	8	15	18.6	
FU17SC	FU17SS	FU17SUS	M85×2.0	110	102	103	3.5	8	16	19.2	0.07
FU18SC	FU18SS	FU18SUS	M90×2.0	120	108	112	4	10	16	20.3	
FU19SC	FU19SS	FU19SUS	M95×2.0	125	113	117	4	10	17	21.3 ± 1.5	
FU20SC	FU20SS	FU20SUS	M100×2.0	130	120	122	4	10	18	22.3	
FU21SC	—	—	M105×2.0	140	126	130	4	12	18	22.3	
FU22SC	—	—	M110×2.0	145	133	135	5	12	19	23.3	
FU23SC	—	—	M115×2.0	150	137 0 −0.75	140	5	12 ± 0.3	19	23.3	
FU24SC	—	—	M120×2.0	155	138	145	5	12	20	24.3	
FU25SC	—	—	M125×2.0	160	148	150	5	12	21	25.4	
FU26SC	—	—	M130×2.0	165	149	155	5	12	21	25.4	
FU27SC	—	—	M135×2.0	175	160	163	6	14	22	26.6	0.10
FU28SC	—	—	M140×2.0	180	160	168	6	14	22	26.6 ± 1.5	
FU29SC	—	—	M145×2.0	190	171	178	6	14	24	28.6	
FU30SC	—	—	M150×2.0	195	171	183	6	14	24	28.3	

* Dimensions may be subject to change without notice due to our policy of product improvements.

● Construction and Function

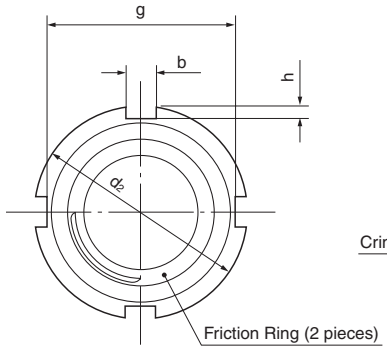
The TWIN FU-NUT has two friction rings and a spacer which are secured to the upper surface of the nut, as shown below.
The two friction rings are arranged so that stress P generated by the spring action and the reaction P' act symmetrically about the shaft centre. This arrangement ensures an even contact force F around the contact face.

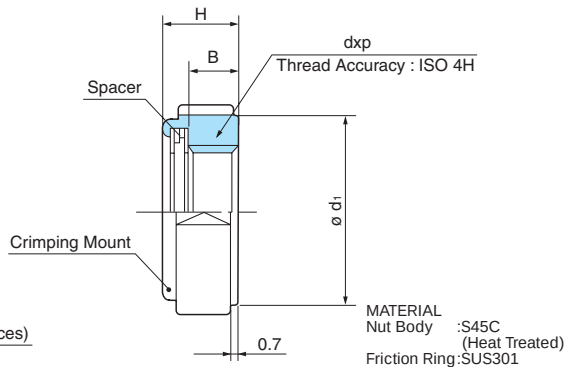




- Accuracy of thread is ISO 4H
- Excellent locking performance
- Bearing surface run out to thread form is held to within a few microns
- Simple assembly, as for a standard nut

● Dimension Table for Twin FU-NUT





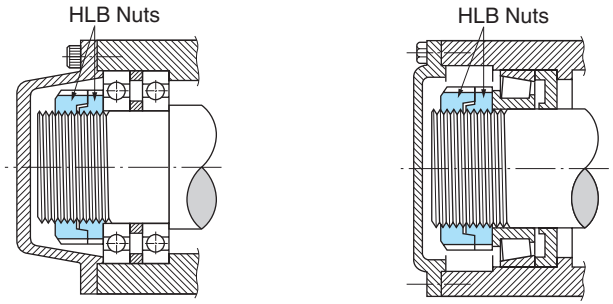
MATERIAL
Nut Body :S45C (Heat Treated)
Friction Ring :SUS301
Spacer :SUS301

*Simultaneous processing of the thread and the bearing surface.

Dimensions in millimeters

Code No.	d×p	φ d_1	d_2	H	B	b	h	g	Imin=B+3.5p	Allowable axial dead load (KN)
TFU02SC	M15 × 1	21	25	9.9	7	4	1.8	21.4	10.5	34.1
TFU03SC	M17 × 1	23.5	28	10.1	7	4	2	24	10.5	38.6
TFU04SC	M20 × 1	27	32	12.3	9	4	2	28	12.5	59.4
TFU05SC	M25 × 1.5	33	38	14.2	10	5	2	34	15.3	80.8
TFU06SC	M30 × 1.5	40 0 −0.3	45 0 −0.5	14.3 ±0.5	10	5 ±0.2	2	41 0 −0.5	15.3	97.0
TFU07SC	M35 × 1.5	47	52	16.5	12	5	2	48	17.3	137.8
TFU08SC	M40 × 1.5	52	58	17.6	13	6	2.5	53	18.3	171.4
TFU09SC	M45 × 1.5	59	65	19.7	15	6	2.5	60	20.3	224.5
TFU10SC	M50 × 1.5	64	70	20.8	16	6	2.5	65	21.3	266.8

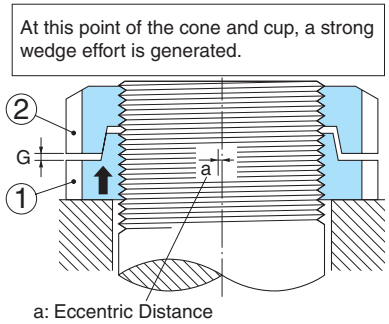
■ Convenient HLB Locking Nuts for Bearings

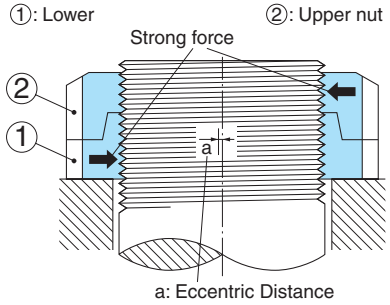


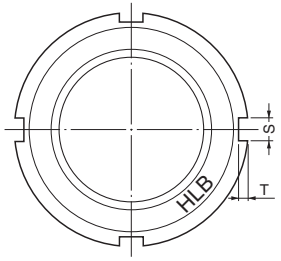
● Structure and Function

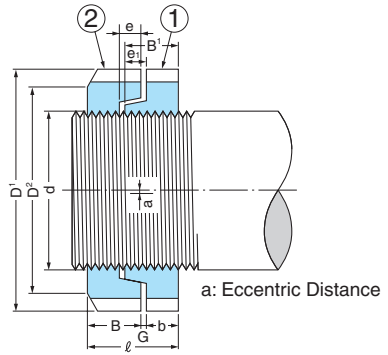
Locking performance of HLB nuts is based on the principle of a wedge.
After a lower nut is tightened, the upper nut is tightened by hand.
In this case, there is the clearance(G) between the lower nut and the upper nut.

The clearance(G) generates strong force and this force works to prevent the nuts from loosening, when the upper nut is tighted up to 0 clearance.
Because the cone of the lower nut and the cup of the upper nut are eccentric.









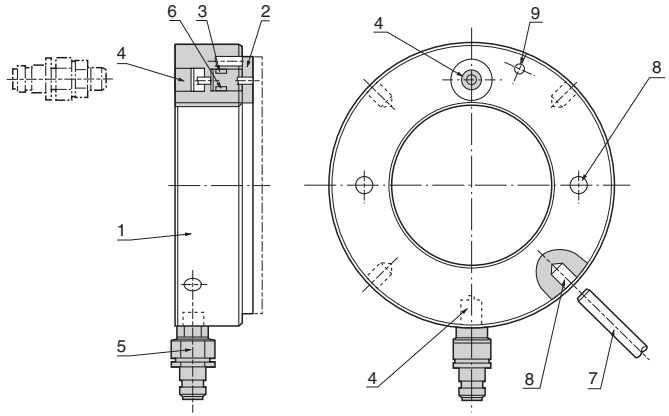
Material: SS400,S45C or SUS304
Outside shapes are standardized in JIS B 1554 and thread accuracy depends on ISO6H(JIS CLASS2).

Unit: mm

Nut No.	d×p	Nut ①				Nut ②				Common to ① and ②		Set Hight L		Perpendicularity of the base (max)	Weight of 1 set (g)
		D^1	B^1	e_1	b	D^1	D^2	B	e	S	T	(min)	(max)		
HLB-01	M12×1	22	6	2.5	3.5	22	17	6	2.7	3	2	9.5	10.5	0.05	17
HLB-02	M15×1	25	7	2.5	4.5	25	21	7	2.7	4	2	11.5	12.5	0.05	23
HLB-03	M17×1	28	7	2.5	4.5	28	24	7	2.7	4	2	11.5	12.5	0.05	29
HLB-04	M20×1	32	8	2.5	5.5	32	26	8	2.7	4	2	13.5	14.5	0.05	43
HLB-05	M25×1.5	38	10	4	6	38	32	10	4.2	5	2	16	17.5	0.05	72
HLB-06	M30×1.5	45	10	4	6	45	38	10	4.2	5	2	16	17.5	0.05	103
HLB-07	M35×1.5	52	11	4	7	52	44	11	4.2	5	2	18	19.5	0.05	150
HLB-08	M40×1.5	58	9	4	5	58	50	12	4.2	6	2.5	17	18.5	0.05	170
HLB-09	M45×1.5	65	10	4	6	65	56	13	4.2	6	2.5	19	20.5	0.05	240
HLB-10	M50×1.5	70	11	4	7	70	61	14	4.2	6	2.5	21	22.5	0.05	285
HLB-11	M55×2	75	11	5	6	75	67	15	5.2	7	3	21	23	0.07	310
HLB-12	M60×2	80	11	5	6	80	73	15	5.2	7	3	21	23	0.07	340
HLB-13	M65×2	85	12	5	7	85	79	12	5.2	7	3	19	21	0.07	330
HLB-14	M70×2	92	12	5	7	92	85	12	5.2	8	3.5	19	21	0.07	390
HLB-15	M75×2	98	13	5	8	98	90	13	5.2	8	3.5	21	23	0.07	480
HLB-16	M80×2	105	15	5	10	105	95	15	5.2	8	3.5	25	27	0.07	660
HLB-17	M85×2	110	16	5	11	110	102	16	5.2	8	3.5	27	29	0.07	760
HLB-18	M90×2	120	16	5	11	120	108	16	5.2	10	4	27	29	0.07	940
HLB-19	M95×2	125	17	5	12	125	113	17	5.2	10	4	29	31	0.07	1000
HLB-20	M100×2	130	18	5	13	130	120	18	5.2	10	4	31	33	0.07	1230
HLB-21	M105×2	140	18	6	12	140	126	18	6.5	12	5	30	32	0.1	1500
HLB-22	M110×2	145	19	6	13	145	133	19	6.5	12	5	32	34	0.1	1600
HLB-23	M115×2	150	19	6	13	150	137	19	6.5	12	5	32	34	0.1	1700
HLB-24	M120×2	155	20	7	13	155	138	20	7.5	12	5	33	35	0.1	1800
HLB-25	M125×2	160	21	7	14	160	148	21	7.5	12	5	35	37	0.1	1900
HLB-26	M130×2	165	21	7	14	165	149	21	7.5	12	5	35	37	0.1	2100
HLB-27	M135×2	175	22	7	15	175	160	22	7.5	14	6	37	39	0.1	2600
HLB-28	M140×2	180	22	7	15	180	160	22	7.5	14	6	37	39	0.1	2700
HLB-29	M145×2	190	24	8	16	190	171	24	8.5	14	6	40	43	0.1	3400
HLB-30	M150×2	195	24	8	16	195	171	24	8.5	14	6	40	43	0.1	3550
HLB-31	M155×3	200	25	8	17	200	182	25	8.5	16	7	42	45	0.1	3800
HLB-32	M160×3	210	25	8	17	210	182	25	8.5	16	7	42	45	0.1	4200
HLB-33	M165×3	210	26	9	17	210	193	26	9.5	16	7	43	46	0.1	4300
HLB-34	M170×3	220	26	9	17	220	193	26	9.5	16	7	43	46	0.1	4750
HLB-36	M180×3	230	27	9	18	230	203	27	9.5	18	8	45	48	0.1	5000
HLB-38	M190×3	240	28	9	18	240	214	28	9.5	18	8	46	49	0.1	5500
HLB-40	M200×3	250	29	9	19	250	226	29	9.5	18	8	48	51	0.1	6300

■ Hydraulic Nuts for Bearings

When larger bearings are mounted and dismounted, the work is considerably eased by using hydraulic nuts. See Fig.2 and Fig.3 in case of mounting and Fig.4 and Fig.5 in case of dismounting.



1: Cylinder 2: Piston 3: O-ring 4: Connecting bore G1/4 5: Nipple G1/4
6: Pressure chamber 7: Bar for rotating cylinder 8: Hole for bar
9: Hole for indicator to measure the stroke

Fig.1. Structure

1. Structure

with two hydraulic connection bores on OD and on end face

Hydraulic nuts consist of two basic components: an internally threaded steel cylinder (1) with a circular groove in one face,and an annular piston (2) which is inserted into the cylinder.
Two O-rings (3) between cylinder and piston serve as seals.
When oil is pumped into the pressure chamber (6), the force with which the piston is ejected is sufficient to mount or dismount bearings.
The hydraulic medium is oil and can be fed through two hydraulic connection bores G1/4(4) by a pressure source (e.g. a hand pump). The connection bores are located on the end face and also on the OD. All hydraulic nuts are equipped with a nipple (5) for quick coupling to the oil supply; the threaded hole not being used is plugged by a closure nipple with ball,which is supplied with hydraulic nuts.
Unthreaded holes (8) are provided to take a drift of suitable length so that the screwing on of the nut is facilitated. Two of these holes are in the side faces and four around the circumference. The nut should be carefully turned until it abuts the bearing and the piston is fully retracted into the cylinder.
And another unthreaded hole (9) is provided to take an indicator to measure the stroke of the piston.

2. Threads

Hydraulic nuts up to and including size 40 have metric ISO threads to tolerance 6H(ISO 965/Ⅲ-1980) and the larger nuts from size 41 have metric ISO trapezoidal threads to tolerance 7H(ISO 2901-1977).
The mating thread on the shaft should be made to tolerance 6g(ISO 2901-1977) for the sizes and tolerance 7e(ISO 2901-1977) for the sizes with trapezoidal thread.

3. Material

The cylinders of nuts up to and including size 58 are made of hardened steel and the matching pistons are made of carbon chromunum (bearing) steel. From size 60 the cylinders and pistons are made of construction steel.

4. Maintenance

If hydraulic nuts are not to be used for some time, they should be protected against corrosion. The holes for the oil supply leads should also be plugged.
If oil leaves the hydraulic nut when the piston is operated, this generally means that the seal is torn or damaged and must be replaced. To do this, the piston should be pressed out of the ring. To facilitate this operation, three auxiliary holes with closure nipples are provided in the full face of the cylinder. Using pins, which are supplied with the nut, the piston can be pushed out of the cylinder.

5. How to use

5.1 Mounting

(1) When mounting rolling bearings with a tapered bore on a tapered seating, adapter sleeve or withdrawal sleeve, the hydraulic nut is screwed on to a threaded section of the shaft or on to the sleeve thread until it abuts the bearing inner ring (Fig.2), or a special nut (Fig.3), or an end plate attached to the shaft end.

(2) The piston is in the initial position, i.e. it is fully retracted.

(3) A pump is used to inject pressurised oil into the nut. This displaces the piston axially and the bearing is pressed up on to the tapered seating. The permissible stroke (axial displacement) has been chosen to enable all bearings having bores with a taper of 1:12 or 1:30 to be mounted in a single operation.

(4) After mounting has been completed, the return valve of the pump should be opened so that the pressurised oil can leave the nut. To completely empty the oil, the piston must be returned to its original position. This is most easily accomplished by screwing the nut further up the shaft or sleeve thread.

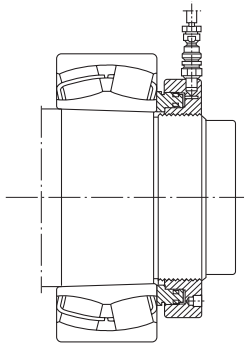


Fig.2. The threaded section of a shaft

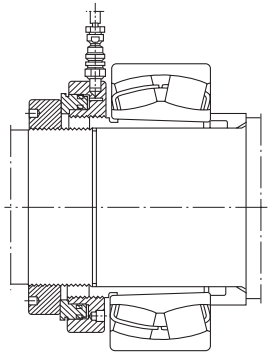


Fig.3. Sleeve thread

5.2 Dismounting

(1) When dismounting rolling bearings from withdrawal or adapter sleeves, the hydraulic nut is screwed on to the sleeve thread until it rests against the bearing inner ring (Fig.4), or a special nut, or against a special supprt ring (Fig.5).

(2) By displacing the piston, the sleeve will be withdrawn from the bearing bore, or the bearing will be pressed off the adapter sleeve.

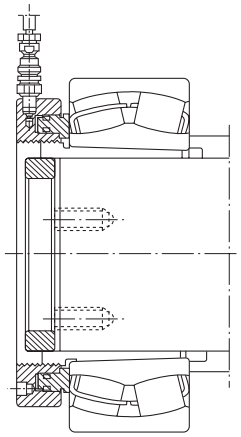


Fig.4. Sleeve thread

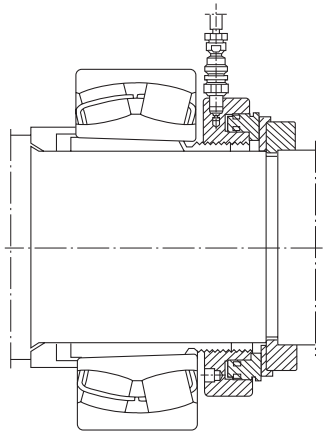


Fig.5. Sleeve thread and special supporting ring

6. Pumps

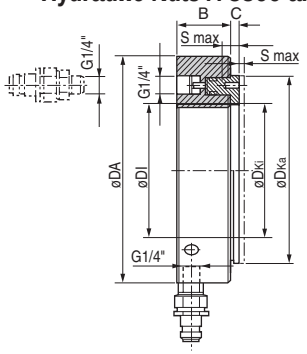
The pumps required to operate the hydraulic nuts should be suitable for pressures of 60 to 80 Mpa.

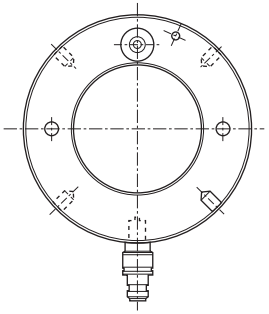
7. Pressure media

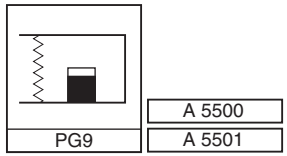
Normal machine oils having a viscosity of 300 mm2/s at the operating temperature are suitable pressure media. For mounting in the cold, less viscous oils should be used, e.g. oils for transformers.

Convenient HLB Locking Nuts for Bearings

Hydraulic Nuts A 5500 and A 5501 with metric thread







$$F = \frac{A \cdot p}{10.000}$$

F: Mounting or Dismounting Force (KN)
A: Piston Area (mm^2)
p: Oil Pressure (bar)
Max. 1000 bar

Thread DI *) (mm)	Article No.		Plain Bore DI (mm)	Article No.	OD DA (mm)	Height B (mm)	Projecting Length C (mm)	Stroke Smax. (mm)	Ring Piston (mm)		Piston Area A_k (mm^2)	Weight (Steel) Ca. (kg)
	Right Hand	Left Hand		Bore					ϕDKi	ϕDKa		
M 50 × 1.5	A 5500.1001	A 5500.1002	46.7	A 5500.1005	114	38	4	5	50.5	85	2.900	2.70
M 55 × 2	A 5500.1101	A 5500.1102	51.1	A 5500.1105	120	38	4	5	55.5	90	3.150	2.75
M 60 × 2	A 5500.1201	A 5500.1202	56.1	A 5500.1205	125	38	5	5	60.5	95	3.300	2.80
M 65 × 2	A 5500.1301	A 5500.1302	61.1	A 5500.1305	130	38	5	5	65.5	101	3.600	3.00
M 70 × 2	A 5500.1401	A 5500.1402	66.1	A 5500.1405	135	38	5	5	70.5	107	3.800	3.20
M 75 × 2	A 5500.1501	A 5500.1502	71.1	A 5500.1505	140	38	5	5	75.5	112	4.000	3.40
M 80 × 2	A 5500.1601	A 5500.1602	76.1	A 5500.1605	146	38	5	5	80.5	117	4.200	3.70
M 85 × 2	A 5500.1701	A 5500.1702	81.1	A 5500.1705	150	38	5	5	85.5	122	4.400	3.75
M 90 × 2	A 5500.1801	A 5500.1802	86.1	A 5500.1805	156	38	5	5	90.5	127	4.700	4.00
M 95 × 2	A 5500.1901	A 5500.1902	91.1	A 5500.1905	162	38	5	5	95.5	133	4.900	4.30
M 100 × 2	A 5500.2001	A 5500.2002	96.1	A 5500.2005	166	38	6	5	100.5	138	5.100	4.40
M 105 × 2	A 5500.2101	A 5500.2102	101.1	A 5500.2105	172	38	6	5	105.5	143	5.300	4.65
M 110 × 2	A 5500.2201	A 5500.2202	106.1	A 5500.2205	178	38	6	5	110.5	149	5.600	4.95
M 115 × 2	A 5500.2301	A 5500.2302	111.1	A 5500.2305	182	38	6	5	115.5	154	5.800	5.00
M 120 × 2	A 5500.2401	A 5500.2402	116.1	A 5500.2405	188	38	6	5	120.5	159	6.000	5.25
M 125 × 2	A 5500.2501	A 5500.2502	121.1	A 5500.2505	192	38	6	5	125.5	164	6.200	5.35
M 130 × 2	A 5500.2601	A 5500.2602	126.1	A 5500.2605	198	38	6	5	130.5	170	6.400	5.65
M 135 × 2	A 5500.2701	A 5500.2702	131.1	A 5500.2705	204	38	6	5	135.5	175	6.600	5.90
M 140 × 2	A 5500.2801	A 5500.2802	136.1	A 5500.2805	208	38	7	5	140.5	180	6.800	6.00
M 145 × 2	A 5500.2901	A 5500.2902	141.1	A 5500.2905	214	39	7	5	145.5	186	7.300	6.50
M 150 × 2	A 5500.3001	A 5500.3002	146.1	A 5500.3005	220	39	7	5	150.5	191	7.500	6.60
M 155 × 3	A 5500.3101	A 5500.3102	149.8	A 5500.3105	226	39	7	5	155.5	198	8.100	6.95
M 160 × 3	A 5500.3201	A 5500.3202	154.8	A 5500.3205	232	40	7	6	160.5	204	8.600	7.60
M 165 × 3	A 5500.3301	A 5500.3302	159.8	A 5500.3305	238	40	7	6	165.5	209	8.900	7.90
M 170 × 3	A 5500.3401	A 5500.3402	164.8	A 5500.3405	244	41	7	6	170.5	215	9.400	8.40
M 180 × 3	A 5500.3601	A 5500.3602	174.8	A 5500.3605	256	41	7	6	180.5	227	10.300	9.15
M 190 × 3	A 5500.3801	A 5500.3802	184.8	A 5500.3805	270	42	8	7	191	239	11.500	10.5
M 200 × 3	A 5500.4001	A 5500.4002	194.8	A 5500.4005	282	43	8	8	201	251	12.500	11.5
TR 205 × 4	A 5500.4101	A 5500.4102	200.2	A 5500.4105	288	43	8	8	207	256	12.800	12.0
TR 210 × 4	A 5500.4201	A 5500.4202	205.2	A 5500.4205	294	44	8	9	212	262	13.400	12.5
TR 215 × 4	A 5500.4301	A 5500.4302	210.2	A 5500.4305	300	44	8	9	217	267	13.700	13.0
TR 220 × 4	A 5500.4401	A 5500.4402	215.2	A 5500.4405	306	44	8	9	222	273	14.400	13.5
TR 225 × 4	A 5500.4501	A 5500.4502	220.2	A 5500.4505	312	45	8	9	227	280	15.200	14.5
TR 230 × 4	A 5500.4601	A 5500.4602	225.2	A 5500.4605	318	45	8	9	232	285	15.500	14.5
TR 235 × 4	A 5500.4701	A 5500.4702	230.2	A 5500.4705	326	46	8	10	237	291	16.200	16.0
TR 240 × 4	A 5500.4801	A 5500.4802	235.2	A 5500.4805	330	46	9	10	242	296	16.500	16.0

Thread DI *) (mm)	Article No.		Plain Bore DI (mm)	Article No.	OD DA (mm)	Height B (mm)	Projecting Length C (mm)	Stroke Smax. (mm)	Ring Piston (mm)		Piston Area A_k (mm^2)	Weight (Steel) Ca. (kg)
	Right Hand	Left Hand		Bore					ϕDKi	ϕDKa		
TR 250 × 4	A 5500.5001	A 5500.5002	245.2	A 5500.5005	342	46	9	10	252	307	17.600	17.5
TR 260 × 4	A 5500.5201	A 5500.5202	255.2	A 5500.5205	356	47	9	11	262	319	18.800	19.0
TR 270 × 4	A 5500.5401	A 5500.5402	265.2	A 5500.5405	368	48	9	12	272	330	19.800	20.5
TR 280 × 4	A 5500.5601	A 5500.5602	275.2	A 5500.5605	380	49	9	12	282	341	21.100	22.0
TR 290 × 4	A 5500.5801	A 5500.5802	285.2	A 5500.5805	390	49	9	13	292	353	22.400	22.5
TR 300 × 4	A 5500.6001	A 5500.6002	295.2	A 5500.6005	404	51	10	14	302	364	23.600	25.5
TR 310 × 5	A 5500.6201	A 5500.6202	304.7	A 5500.6205	416	52	10	14	312	375	24.900	27.0
TR 320 × 5	A 5500.6401	A 5500.6402	314.7	A 5500.6405	428	53	10	14	322	387	26.300	29.5
TR 330 × 5	A 5500.6601	A 5500.6602	324.7	A 5500.6605	438	53	10	14	332	397	27.000	30.0
TR 340 × 5	A 5500.6801	A 5500.6802	334.7	A 5500.6805	450	54	10	14	342	408	28.400	31.5
TR 345 × 5	A 5500.6901	A 5500.6902	339.7	A 5500.6905	456	54	10	14	347	414	29.400	32.5
TR 350 × 5	A 5500.7001	A 5500.7002	344.7	A 5500.7005	464	56	10	14	352	420	29.900	35.0
TR 360 × 5	A 5500.7201	A 5500.7202	354.7	A 5500.7205	472	56	10	15	362	431	31.300	35.5
TR 365 × 5	A 5500.7301	A 5500.7302	359.7	A 5500.7305	482	57	11	15	367	436	31.700	38.5
TR 370 × 5	A 5500.7401	A 5500.7402	364.7	A 5500.7405	486	57	11	16	372	442	32.800	39.0
TR 380 × 5	A 5500.7601	A 5500.7602	374.7	A 5500.7605	498	58	11	16	382	452	33.500	40.5
TR 385 × 5	A 5500.7701	A 5500.7702	379.7	A 5500.7705	504	58	11	16	387	459	34.700	41.0
TR 400 × 5	A 5500.8001	A 5500.8002	394.7	A 5500.8005	522	60	11	17	402	475	36.700	45.5
TR 410 × 5	A 5500.8201	A 5500.8202	404.7	A 5500.8205	534	61	11	17	412	486	38.300	48.0
TR 420 × 5	A 5500.8401	A 5500.8402	414.7	A 5500.8405	546	61	11	17	422	498	40.000	50.0
TR 430 × 5	A 5500.8601	A 5500.8602	424.7	A 5500.8605	556	62	11	17	432	508	40.800	52.5
TR 440 × 5	A 5500.8801	A 5500.8802	434.7	A 5500.8805	566	62	12	17	442	519	42.500	54.0
TR 450 × 5	A 5500.9001	A 5500.9002	444.7	A 5500.9005	580	64	12	17	452	530	44.100	57.5
TR 460 × 5	A 5500.9201	A 5500.9202	454.7	A 5500.9205	590	64	12	17	462	541	45.100	60
TR 470 × 5	A 5500.9401	A 5500.9402	464.7	A 5500.9405	602	65	12	18	472	552	46.900	62
TR 480 × 5	A 5500.9601	A 5500.9602	474.7	A 5500.9605	612	65	12	19	482	563	48.600	63
TR 490 × 5	A 5500.9801	A 5500.9802	484.7	A 5500.9805	624	66	12	19	492	573	49.500	66
TR 500 × 5	A 5501.0001	A 5501.0002	494.7	A 5501.0005	636	67	12	19	502	585	51.500	70
TR 510 × 6	A 5501.0201	A 5501.0202	503.7	A 5501.0205	648	68	12	20	512	595	53.300	74
TR 520 × 6	A 5501.0401	A 5501.0402	513.7	A 5501.0405	658	68	13	20	522	606	54.300	75
TR 530 × 6	A 5501.0601	A 5501.0602	523.7	A 5501.0605	670	69	13	21	532	617	56.200	79
TR 540 × 6	A 5501.0801	A 5501.0802	533.7	A 5501.0805	682	69	13	21	542	629	58.200	81
TR 550 × 6	A 5501.1001	A 5501.1002	543.7	A 5501.1005	693	70	13	21	552	639	59.200	84
TR 560 × 6	A 5501.1201	A 5501.1202	553.7	A 5501.1205	704	71	13	22	562	650	61.200	88
TR 570 × 6	A 5501.1401	A 5501.1402	563.7	A 5501.1405	716	72	13	23	572	661	63.200	91
TR 580 × 6	A 5501.1601	A 5501.1602	573.7	A 5501.1605	726	72	13	23	582	671	64.200	94

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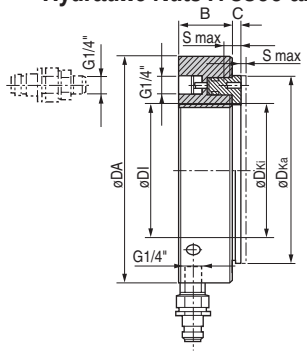
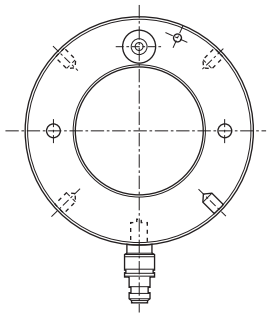
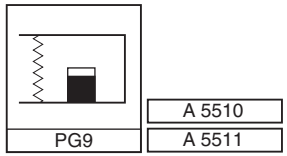
Thread DI *) (mm)	Article No.		Plain Bore DI (mm)	Article No.	OD DA (mm)	Height B (mm)	Projecting Length C (mm)	Stroke Smax. (mm)	Ring Piston (mm)		Piston Area A_k (mm^2)	Weight (Steel) Ca. (kg)
	Right Hand	Left Hand		Bore					ϕD_{Ki}	ϕD_{Ka}		
TR 600 × 6	A 5501.2001	A 5501.2002	593.7	A 5501.2005	748	73	13	23	602	693	67.300	100
TR 630 × 6	A 5501.2601	A 5501.2602	623.7	A 5501.2605	782	74	14	23	632	726	72.900	110
TR 650 × 6	A 5501.3001	A 5501.3002	643.7	A 5501.3005	804	75	14	23	652	747	76.200	115
TR 670 × 6	A 5501.3401	A 5501.3402	663.7	A 5501.3405	826	76	14	24	672	768	79.500	120
TR 690 × 6	A 5501.3801	A 5501.3802	683.7	A 5501.3805	848	77	14	25	692	791	84.200	127
TR 710 × 7	A 5501.4201	A 5501.4202	702.7	A 5501.4205	870	78	15	25	712	812	87.700	135
TR 750 × 7	A 5501.5001	A 5501.5002	742.7	A 5501.5005	912	79	15	25	752	855	95.200	146
TR 800 × 7	A 5501.6001	A 5501.6002	792.7	A 5501.6005	965	80	16	25	802	908	103.900	161
TR 850 × 7	A 5501.7001	A 5501.7002	842.7	A 5501.7005	1020	83	16	26	852	962	114.600	181
TR 900 × 7	A 5501.8001	A 5501.8002	892.7	A 5501.8005	1075	86	17	30	902	1015	124.100	205
TR 950 × 8	A 5501.9001	A 5501.9002	941.7	A 5501.9005	1126	86	17	30	952	1069	135.700	218
TR 1000 × 8	A 5502.0001	A 5502.0002	991.7	A 5502.0005	1180	88	17	34	1002	1122	145.800	239

Convenient HLB Locking Nuts for Bearings

Hydraulic Nuts A 5500 and A 5501 with metric thread and Plain bore







$$F = \frac{A \cdot p}{10.000}$$

F: Mounting or Dismounting Force (KN)
A: Piston Area (mm^2)
p: Oil Pressure (bar)
Max. 1000 bar

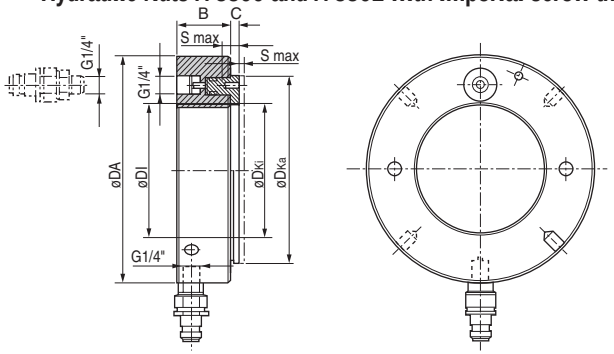
Thread DI *) (mm)	Article No.		Plain Bore DI (mm)	Article No.	OD DA (mm)	Height B (mm)	Projecting Length C (mm)	Stroke Smax. (mm)	Ring Piston (mm)		Piston Area A_k (mm^2)	Weight (Steel) Ca. (kg)
	Right Hand	Left Hand		Bore					ϕD_{Ki}	ϕD_{Ka}		
M 50 × 1.5	A 5510.1001	A 5510.1002	46.7	A 5510.1005	114	38	4	5	50.5	104	2.900	2.70
M 55 × 2	A 5510.1101	A 5510.1102	51.1	A 5510.1105	120	38	4	5	55.5	109	3.150	2.75
M 60 × 2	A 5510.1201	A 5510.1202	56.1	A 5510.1205	125	38	5	5	60.5	115	3.300	2.80
M 65 × 2	A 5510.1301	A 5510.1302	61.1	A 5510.1305	130	38	5	5	65.5	121	3.600	3.00
M 70 × 2	A 5510.1401	A 5510.1402	66.1	A 5510.1405	135	38	5	5	70.5	127	3.800	3.20
M 75 × 2	A 5510.1501	A 5510.1502	71.1	A 5510.1505	140	38	5	5	75.5	132	4.000	3.40
M 80 × 2	A 5510.1601	A 5510.1602	76.1	A 5510.1605	146	38	5	5	80.5	137	4.200	3.70
M 85 × 2	A 5510.1701	A 5510.1702	81.1	A 5510.1705	150	38	5	5	85.5	142	4.400	3.75
M 90 × 2	A 5510.1801	A 5510.1802	86.1	A 5510.1805	156	38	5	5	90.5	147	4.700	4.00
M 95 × 2	A 5510.1901	A 5510.1902	91.1	A 5510.1905	162	38	5	5	95.5	153	4.900	4.30
M 100 × 2	A 5510.2001	A 5510.2002	96.1	A 5510.2005	166	38	6	5	100.5	158	5.100	4.40
M 105 × 2	A 5510.2101	A 5510.2102	101.1	A 5510.2105	172	38	6	5	105.5	163	5.300	4.65
M 110 × 2	A 5510.2201	A 5510.2202	106.1	A 5510.2205	178	38	6	5	110.5	169	5.600	4.95
M 115 × 2	A 5510.2301	A 5510.2302	111.1	A 5510.2305	182	38	6	5	115.5	174	5.800	5.00
M 120 × 2	A 5510.2401	A 5510.2402	116.1	A 5510.2405	188	38	6	5	120.5	179	6.000	5.25
M 125 × 2	A 5510.2501	A 5510.2502	121.1	A 5510.2505	192	38	6	5	125.5	184	6.200	5.35
M 130 × 2	A 5510.2601	A 5510.2602	126.1	A 5510.2605	198	38	6	5	130.5	190	6.400	5.65
M 135 × 2	A 5510.2701	A 5510.2702	131.1	A 5510.2705	204	38	6	5	135.5	195	6.600	5.90
M 140 × 2	A 5510.2801	A 5510.2802	136.1	A 5510.2805	208	38	7	5	140.5	200	6.800	6.00
M 145 × 2	A 5510.2901	A 5510.2902	141.1	A 5510.2905	214	39	7	5	145.5	206	7.300	6.50
M 150 × 2	A 5510.3001	A 5510.3002	146.1	A 5510.3005	220	39	7	5	150.5	211	7.500	6.60
M 155 × 3	A 5510.3101	A 5510.3102	149.8	A 5510.3105	226	39	7	5	155.5	218	8.100	6.95
M 160 × 3	A 5510.3201	A 5510.3202	154.8	A 5510.3205	232	40	7	6	160.5	224	8.600	7.60
M 165 × 3	A 5510.3301	A 5510.3302	159.8	A 5510.3305	238	40	7	6	165.5	229	8.900	7.90
M 170 × 3	A 5510.3401	A 5510.3402	164.8	A 5510.3405	244	41	7	6	170.5	235	9.400	8.40
M 180 × 3	A 5510.3601	A 5510.3602	174.8	A 5510.3605	256	41	7	6	180.5	247	10.300	9.15
M 190 × 3	A 5510.3801	A 5510.3802	184.8	A 5510.3805	270	42	8	7	191	259	11.500	10.5
M 200 × 3	A 5510.4001	A 5510.4002	194.8	A 5510.4005	282	43	8	8	201	271	12.500	11.5
TR 205 × 4	A 5510.4101	A 5510.4102	200.2	A 5510.4105	288	43	8	8	207	276	12.800	12.0
TR 210 × 4	A 5510.4201	A 5510.4202	205.2	A 5510.4205	294	44	8	9	212	282	13.400	12.5
TR 215 × 4	A 5510.4301	A 5510.4302	210.2	A 5500.4305	300	44	8	9	217	287	13.700	13.0
TR 220 × 4	A 5510.4401	A 5510.4402	215.2	A 5510.4405	306	44	8	9	222	293	14.400	13.5
TR 225 × 4	A 5510.4501	A 5510.4502	220.2	A 5510.4505	312	45	8	9	227	300	15.200	14.5
TR 230 × 4	A 5510.4601	A 5510.4602	225.2	A 5510.4605	318	45	8	9	232	305	15.500	14.5
TR 235 × 4	A 5510.4701	A 5510.4702	230.2	A 5510.4705	326	46	8	10	237	311	16.200	16.0
TR 240 × 4	A 5510.4801	A 5510.4802	235.2	A 5510.4805	330	46	9	10	242	316	16.500	16.0

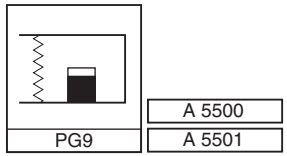
Thread DI *) (mm)	Article No.		Plain Bore DI (mm)	Article No.	OD DA (mm)	Height B (mm)	Projecting Length C (mm)	Stroke Smax. (mm)	Ring Piston (mm)		Piston Area A_k (mm^2)	Weight (Steel) Ca. (kg)
	Right Hand	Left Hand		Bore					ϕD_{Ki}	ϕD_{Ka}		
TR 250 × 4	A 5510.5001	A 5510.5002	245.2	A 5510.5005	342	46	9	10	252	329	17.600	17.5
TR 260 × 4	A 5510.5201	A 5510.5202	255.2	A 5510.5205	356	47	9	11	262	341	18.800	19.0
TR 270 × 4	A 5510.5401	A 5510.5402	265.2	A 5510.5405	368	48	9	12	272	352	19.800	20.5
TR 280 × 4	A 5510.5601	A 5510.5602	275.2	A 5510.5605	380	49	9	12	282	363	21.100	22.0
TR 290 × 4	A 5510.5801	A 5510.5802	285.2	A 5510.5805	390	49	9	13	292	375	22.400	22.5
TR 300 × 4	A 5510.6001	A 5510.6002	295.2	A 5510.6005	404	51	10	14	302	386	23.600	25.5
TR 310 × 5	A 5510.6201	A 5510.6202	304.7	A 5510.6205	416	52	10	14	312	397	24.900	27.0
TR 320 × 5	A 5510.6401	A 5510.6402	314.7	A 5510.6405	428	53	10	14	322	409	26.300	29.5
TR 330 × 5	A 5510.6601	A 5510.6602	324.7	A 5510.6605	438	53	10	14	332	419	27.000	30.0
TR 340 × 5	A 5510.6801	A 5510.6802	334.7	A 5510.6805	450	54	10	14	342	430	28.400	31.5
TR 345 × 5	A 5510.6901	A 5510.6902	339.7	A 5510.6905	456	54	10	14	347	436	29.400	32.5
TR 350 × 5	A 5510.7001	A 5510.7002	344.7	A 5510.7005	464	56	10	14	352	442	29.900	35.0
TR 360 × 5	A 5510.7201	A 5510.7202	354.7	A 5510.7205	472	56	10	15	362	455	31.300	35.5
TR 365 × 5	A 5510.7301	A 5510.7302	359.7	A 5510.7305	482	57	11	15	367	460	31.700	38.5
TR 370 × 5	A 5510.7401	A 5510.7402	364.7	A 5510.7405	486	57	11	16	372	466	32.800	39.0
TR 380 × 5	A 5510.7601	A 5510.7602	374.7	A 5510.7605	498	58	11	16	382	476	33.500	40.5
TR 385 × 5	A 5510.7701	A 5510.7702	379.7	A 5510.7705	504	58	11	16	387	483	34.700	41.0
TR 400 × 5	A 5510.8001	A 5510.8002	394.7	A 5510.8005	522	60	11	17	402	499	36.700	45.5
TR 410 × 5	A 5510.8201	A 5510.8202	404.7	A 5510.8205	534	61	11	17	412	510	38.300	48.0
TR 420 × 5	A 5510.8401	A 5510.8402	414.7	A 5510.8405	546	61	11	17	422	522	40.000	50.0
TR 430 × 5	A 5510.8601	A 5510.8602	424.7	A 5510.8605	556	62	11	17	432	532	40.800	52.5
TR 440 × 5	A 5510.8801	A 5510.8802	434.7	A 5510.8805	566	62	12	17	442	543	42.500	54.0
TR 450 × 5	A 5510.9001	A 5510.9002	444.7	A 5510.9005	580	64	12	17	452	554	44.100	57.5
TR 460 × 5	A 5510.9201	A 5510.9202	454.7	A 5510.9205	590	64	12	17	462	565	45.100	60
TR 470 × 5	A 5510.9401	A 5510.9402	464.7	A 5510.9405	602	65	12	18	472	576	46.900	62
TR 480 × 5	A 5500.9601	A 5500.9602	474.7	A 5500.9605	612	65	12	19	482	563	48.600	63
TR 490 × 5	A 5500.9801	A 5500.9802	484.7	A 5500.9805	624	66	12	19	492	573	49.500	66
TR 500 × 5	A 5501.0001	A 5501.0002	494.7	A 5501.0005	636	67	12	19	502	585	51.500	70
TR 510 × 6	A 5501.0201	A 5501.0202	503.7	A 5501.0205	648	68	12	20	512	595	53.300	74
TR 520 × 6	A 5501.0401	A 5501.0402	513.7	A 5501.0405	658	68	13	20	522	606	54.300	75
TR 530 × 6	A 5501.0601	A 5501.0602	523.7	A 5501.0605	670	69	13	21	532	617	56.200	79
TR 540 × 6	A 5501.0801	A 5501.0802	533.7	A 5501.0805	682	69	13	21	542	629	58.200	81
TR 550 × 6	A 5501.1001	A 5501.1002	543.7	A 5501.1005	693	70	13	21	552	639	59.200	84
TR 560 × 6	A 5501.1201	A 5501.1202	553.7	A 5501.1205	704	71	13	22	562	650	61.200	88
TR 570 × 6	A 5501.1401	A 5501.1402	563.7	A 5501.1405	716	72	13	23	572	661	63.200	91
TR 580 × 6	A 5501.1601	A 5501.1602	573.7	A 5501.1605	726	72	13	23	582	671	64.200	94

Thread DI *) (mm)	Article No.		Plain Bore DI (mm)	Article No.	OD DA (mm)	Height B (mm)	Projecting Length C (mm)	Stroke Smax. (mm)	Ring Piston (mm)		Piston Area A_k (mm^2)	Weight (Steel) Ca. (kg)
	Right Hand	Left Hand		Bore					ϕD_{Ki}	ϕD_{Ka}		
TR 600 × 6	A 5501.2001	A 5501.2002	593.7	A 5501.2005	748	73	13	23	602	693	67.300	100
TR 630 × 6	A 5501.2601	A 5501.2602	623.7	A 5501.2605	782	74	14	23	632	726	72.900	110
TR 650 × 6	A 5501.3001	A 5501.3002	643.7	A 5501.3005	804	75	14	23	652	747	76.200	115
TR 670 × 6	A 5501.3401	A 5501.3402	663.7	A 5501.3405	826	76	14	24	672	768	79.500	120
TR 690 × 6	A 5501.3801	A 5501.3802	683.7	A 5501.3805	848	77	14	25	692	791	84.200	127
TR 710 × 7	A 5501.4201	A 5501.4202	702.7	A 5501.4205	870	78	15	25	712	812	87.700	135
TR 750 × 7	A 5501.5001	A 5501.5002	742.7	A 5501.5005	912	79	15	25	752	855	95.200	146
TR 800 × 7	A 5501.6001	A 5501.6002	792.7	A 5501.6005	965	80	16	25	802	908	103.900	161
TR 850 × 7	A 5501.7001	A 5501.7002	842.7	A 5501.7005	1020	83	16	26	852	962	114.600	181
TR 900 × 7	A 5501.8001	A 5501.8002	892.7	A 5501.8005	1075	86	17	30	902	1015	124.100	205
TR 950 × 8	A 5501.9001	A 5501.9002	941.7	A 5501.9005	1126	86	17	30	952	1069	135.700	218
TR 1000 × 8	A 5502.0001	A 5502.0002	991.7	A 5502.0005	1180	88	17	34	1002	1122	145.800	239

Convenient HLB Locking Nuts for Bearings

Hydraulic Nuts A 5500 and A 5501 with imperial screw thread (UN or ACME thread form)





$$F = \frac{A \cdot p}{10.000}$$

F: Mounting or Dismounting Force (KN)
A: Piston Area (mm^2)
p: Oil Pressure (bar)
Max. 1000 bar

Thread DI *)	Article No.		OD DA (mm)	Height B (mm)	Projecting Length C (mm)	Stroke Smax. (mm)	Ring Piston (mm)		Piston Area A_k (mm^2)	Weight (Steel) Ca. (kg)
	Right Hand	Left Hand					ϕDKi	ϕDKa		
UN 1.967-18TPI	A 5500.1003	A 5500.1004	114	38	4	5	50.5	85	2.900	2.70
UN 2.157-18TPI	A 5500.1103	A 5500.1104	120	38	4	5	55.5	90	3.150	2.75
UN 2.360-18TPI	A 5500.1203	A 5500.1204	125	38	5	5	60.5	95	3.300	2.80
UN 2.548-18TPI	A 5500.1303	A 5500.1304	130	38	5	5	65.5	101	3.600	3.00
UN 2.751-18TPI	A 5500.1403	A 5500.1404	135	38	5	5	70.5	107	3.800	3.25
UN 2.933-12TPI	A 5500.1503	A 5500.1504	140	38	5	5	75.5	112	4.000	3.40
UN 3.137-12TPI	A 5500.1603	A 5500.1604	146	38	5	5	80.5	117	4.200	3.75
UN 3.340-12TPI	A 5500.1703	A 5500.1704	150	38	5	5	85.5	122	4.400	3.80
UN 3.527-12TPI	A 5500.1803	A 5500.1804	156	38	5	5	90.5	127	4.700	4.00
UN 3.730-12TPI	A 5500.1903	A 5500.1904	162	38	5	5	95.5	133	4.900	4.30
UN 3.918-12TPI	A 5500.2003	A 5500.2004	166	38	6	5	100.5	138	5.100	4.40
UN 4.122-12TPI	A 5500.2103	A 5500.2104	172	38	6	5	105.5	143	5.300	4.70
UN 4.325-12TPI	A 5500.2203	A 5500.2204	178	38	6	5	110.5	149	5.600	4.95
UN 4.716-12TPI	A 5500.2403	A 5500.2404	188	38	6	5	120.5	159	6.000	5.25
UN 5.106-12TPI	A 5500.2603	A 5500.2604	198	38	6	5	130.5	170	6.400	5.65
UN 5.497-12TPI	A 5500.2803	A 5500.2804	208	38	7	5	140.5	180	6.800	6.00
UN 5.888-12TPI	A 5500.3003	A 5500.3004	220	39	7	5	150.5	191	7.500	6.60
UN 6.284-8TPI	A 5500.3203	A 5500.3204	232	40	7	6	160.5	204	8.600	7.60
UN 6.659-8TPI	A 5500.3403	A 5500.3404	244	41	7	6	170.5	215	9.400	8.40
UN 7.066-8TPI	A 5500.3603	A 5500.3604	256	41	7	6	180.5	227	10.300	9.15
UN 7.472-8TPI	A 5500.3803	A 5500.3804	270	42	8	7	191	239	11.500	10.5
UN 7.847-8TPI	A 5500.4003	A 5500.4004	282	43	8	8	201	251	12.500	11.5
UN 8.628-8TPI	A 5500.4403	A 5500.4404	306	44	8	9	222	273	14.400	13.5
UN 9.442-6TPI	A 5500.4803	A 5500.4804	330	46	9	10	242	296	16.500	16.0

Thread DI *)	Article No.		OD DA (mm)	Height B (mm)	Projecting Length C (mm)	Stroke Smax. (mm)	Ring Piston (mm)		Piston Area A_k (mm^2)	Weight (Steel) Ca. (kg)
	Right Hand	Left Hand					ϕDKi	ϕDKa		
UN 10.192-6TPI	A 5500.5203	A 5500.5204	356	47	9	11	262	319	18.800	19.0
UN 11.004-6TPI	A 5500.5603	A 5500.5604	380	49	9	12	282	341	21.100	22.0
UN 11.785-6TPI	A 5500.6003	A 5500.6004	404	51	10	14	302	364	23.600	25.5
UN 12.562-6TPI	A 5500.6403	A 5500.6404	428	53	10	14	322	387	26.300	29.5
ACME 13.339-5TPI	A 5500.6803	A 5500.6804	450	54	10	14	342	408	28.400	31.5
ACME 14.170-5TPI	A 5500.7203	A 5500.7204	472	56	10	15	362	431	31.300	35.5
ACME 14.957-5TPI	A 5500.7603	A 5500.7604	498	58	11	16	382	452	33.500	40.5
ACME 15.745-5TPI	A 5500.8003	A 5500.8004	522	60	11	17	402	475	36.700	45.5
ACME 16.532-5TPI	A 5500.8403	A 5500.8404	546	61	11	17	422	498	40.000	50
ACME 17.319-5TPI	A 5500.8803	A 5500.8804	566	62	12	17	442	519	42.500	54
ACME 18.107-5TPI	A 5500.9203	A 5500.9204	590	64	12	17	462	541	45.100	60
ACME 18.894-5TPI	A 5500.9603	A 5500.9604	612	65	12	19	482	563	48.600	63
ACME 19.682-5TPI	A 5501.0003	A 5501.0004	636	67	12	19	502	585	51.500	70
ACME 20.867-4TPI	A 5501.0603	A 5501.0604	670	69	13	21	532	617	56.200	79
ACME 22.048-4TPI	A 5501.1203	A 5501.1204	704	71	13	22	562	650	61.200	88
ACME 23.623-4TPI	A 5501.2003	A 5501.2004	748	73	13	23	602	693	67.300	100
ACME 24.804-4TPI	A 5501.2603	A 5501.2604	782	74	14	23	632	726	72.900	110
ACME 26.379-4TPI	A 5501.3403	A 5501.3404	826	76	14	24	672	768	79.500	120
ACME 27.961-3TPI	A 5501.4203	A 5501.4204	870	78	15	25	712	812	87.700	135
ACME 29.536-3TPI	A 5501.5003	A 5501.5004	912	79	15	25	752	855	95.200	145
ACME 31.504-3TPI	A 5501.6003	A 5501.6004	965	80	16	25	802	908	103.900	160
ACME 33.473-3TPI	A 5501.7003	A 5501.7004	1020	83	16	26	852	962	114.600	180
ACME 35.441-3TPI	A 5501.8003	A 5501.8004	1075	86	17	30	902	1015	124.100	205
ACME 37.410-3TPI	A 5501.9003	A 5501.9004	1126	86	17	30	952	1069	135.700	220

■ Bearing Heater

Ecological and High Functional Bearing Heater

● Use

When hydraulic tools or oil injection method cannot be used, the only alternative is often to heat the bearings or bearing rings before mounting or dismounting.
If heaters are correctly used they are excellent aids both for the occasional mounting or dismounting operation as well as for the regular requirements of line operation.

● Caution

Heating should always be done with care and it should be remembered that bearings should not be strongly heated and certainly not to temperatures above 120˚C.
Greased and sealed bearings should generally not be heated.

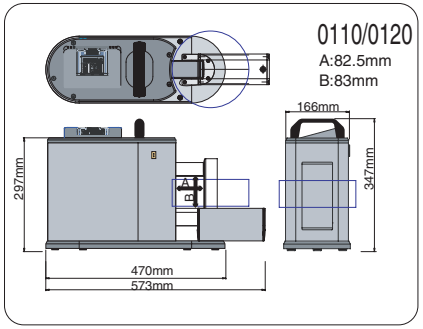
IHE0320, IHE0340
IHE0620, IHE0640

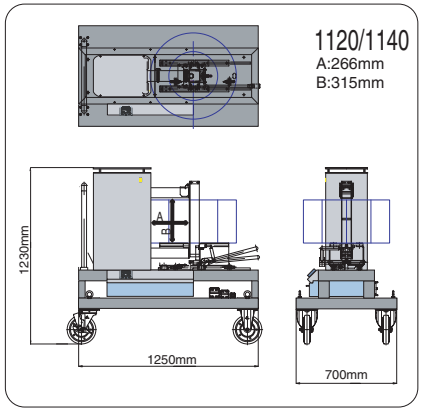
IHE0110
IHE0120

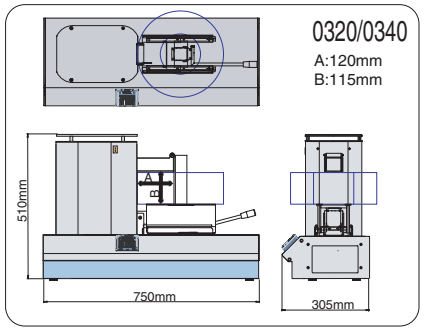
NACHI

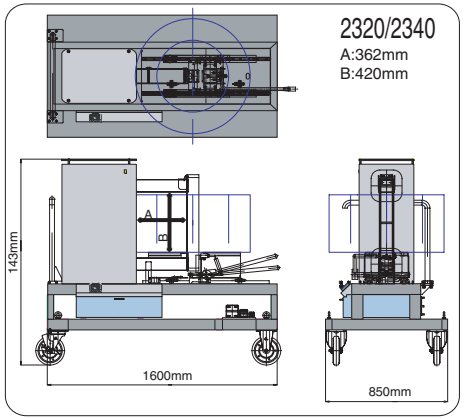
Inverter Driven Bearing Heater Standard Specifications

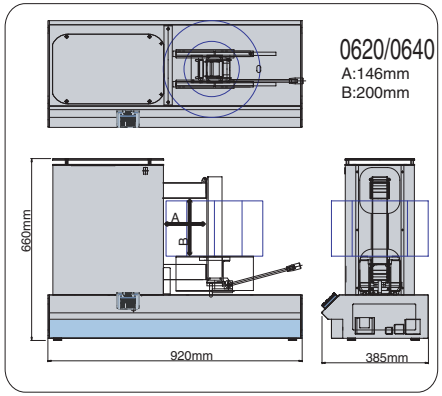
Items	detail items		1kVA100V	1kVA200V	3.3kVA		3.3kVA	6.6kVA	6.6kVA	11.8kVA	11.8kVA	23kVA	23kVA
type			IHE0110	IHE0120	IHE0320		IHE0340	IHE0620	IHE0640	IHE1120	IHE1140	IHE2320	IHE2340
Heating Capacity			1kVA	1kVA	3.3kVA		3.3kVA	6.6kVA	6.6kVA	11.8kVA	11.8kVA	23kVA	23kVA
Applicable Bearing Size	Mimimal bore diameter (mmϕ)		20	20	35		35	35	35	50	50	50	50
	Maximum outside diameter (mmϕ)		200	200	300		300	350	350	600	600	800	800
	Thickness (mm)		70	70	110		110	200	200	300	300	400	400
	Weight (kg)		12	12	40		40	80	80	300	300	600	600
Heating Bearing type	Can heat pre-greased bearing		Yes										
	Can heat sealed bearing		Yes										
Power Supply Characteristics	Phase		Single	Single	Three		Three	Three	Three	Three	Three	Three	Three
	Voltage (V)		100-120V	200-240V	200-240V		380-480V	200-240V	380-480V	200-240V	380-480V	200-240V	380-480V
	Frequency		50/60Hz	50/60Hz	50/60Hz		50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60Hz
	Input Current (A) (maximum)		16.1A	9.7A	12.8A		7.5A	30.0A	16.1A	56.9A	29A	97A	49.6A
Dimensions of body	H (mm)		347	347	510		510	660	660	1230	1230	1435	1435
	D (mm)		175	175	305		305	385	385	700	700	850	850
	W (mm)		573	573	750		750	920	920	1250	1250	1600	1600
	Total weight (kg)		14	14	42		42	72	72	172	172	278	278
Control Specifications	Temperature Control Mode	Range	0 ― 250˚C										
		temp. sensor type	K-type										
		Accuracy	1˚C										
	Time Control Mode	Range	0-60min										
		Accuracy	1s										
	Power Reduction	By 10%	50-100%										
	Demagnetization	Accuracy	300μT(3G)										
Operation Spec.	Operation		Operator with LEDs										
	Sequence Operation		Yes										
Temp. Display	Temp. Display		Celsius/Fahrenheit										
Environment specifications	Application site	Application site	Indoor (no corrosive gas,dust,etc)										
		Overvoltage Category	2	2	3		3	3	3	3	3	3	3
		Pollution Degree	2	2	2		2	2	2	2	2	2	2
	Ambient Operating Temp.		― 10˚C ～ 35˚C										
	Altitude		2000m max										
	Ambient Operating Humidity.		92% RH max										
I-type core	N-CI-1815	(bore diameter 20 ～ 35)	●	●									
	N-CI-1825	(bore diameter 35 ～ 50)	●	●									
	N-CI-1835	(bore diameter 50above)	●	●									
	N-CI-2525	(bore diameter 35 ～ 50)			●		●						
	N-CI-2535	(bore diameter 50 ～ 70)			●		●						
	N-CI-2545	(bore diameter 70above)			●		●						
	N-CI-3725	(bore diameter 35 ～ 50)						●	●				
	N-CI-3735	(bore diameter 50 ～ 80)						●	●				
	N-CI-3755	(bore diameter 80above)						●	●				
	N-CI-5235	(bore diameter 50 ～ 80)								●	●		
	N-CI-5255	(bore diameter 80 ～ 100)								●	●		
	N-CI-5270	(bore diameter 100above)								●	●		
	N-CI-6735	(bore diameter 50 ～ 80)										●	●
	N-CI-6755	(bore diameter 80 ～ 130)										●	●
	N-CI-6785	(bore diameter 130above)										●	●
temperature sensor	N-CTC-300	length 300mm	●	●									
	N-CTC-500	length 500mm			●		●	●	●				
	N-CTC-1000	length 1000mm								●	●	●	●











Three Features

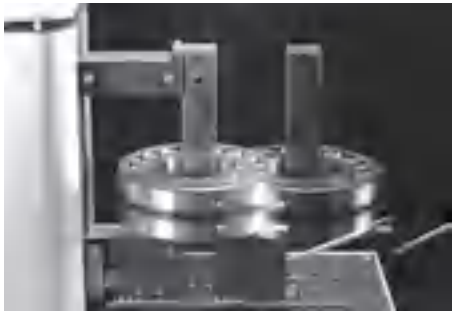
Versatile and Wide Range Use	Induction Bearing Heater is designed mainly for heating up bearings. However, it can heat up bushings, gears, pulleys, couplings and other ring shaped objects.
Built-in Demagnetization Function	Induction Bearing Heater is all digitally controlled and demagnetizes bearings automatically after heating. Also, it can demagnetize bearings manually.
Temperature Control and Timer Control	Induction Bearing Heater has two control modes: Temperature Control Mode and Timer Control Mode. In Temperature Control Mode, Temperature can be set up to 250C as standard. Depending on region where it is used, temperature indication of Celsius can be changed to Fahrenheit and vice versa with Control Panel operation. Temperature retention function keeps bearing at the set temperature infinitely after it is reached until Stop is pressed. In Timer Control Mode, time can be set up to 60 minutes.

Three Advantages

Even Heating without Damage to Bearing	Use of direct flame or blow torch to heat up bearings is hazardous, risky, and causes uneven thermal expansion and/or material alteration. Induction Bearing Heater adopts electromagnetic induction principle to heat bearing(s) evenly to be thermally expanded without any damage to bearing(s). This feature eliminates unnecessary trouble to improve work efficiency.
Quick and Efficient Heating without Fire	Induction Bearing Heater has exciting coils embedded into a core as primary winding as in a transformer. AC current flowing in the coils induces a secondary current around the inner ring of bearing to generate heat necessary for its expansion due to bearing's own electrical resistance. This leads to little waste of energy (low energy loss) and quick heating of bearing (work) only . The induction Heating Method of non-use of fire accomplishes High Safety, Reliability and Work Efficiency for drastic shortening of the time necessary for Shrink Fit Process.
Clean Heating without Impurities Intruded	The shrink fit process using an oil bath requires extra time and cost for cleaning after fitting bearing(work) even though new oil is used. Induction Bearing Heater, without the use of oil, enables heating cleanly even a grease sealed bearing that will retain original pre-lubrication inside bearing. This leads to improvement of working environment because no oil storage management is required.

Slide type Bearing Installation Table

Once bearing and I-type core are installed in Slide Type Bearing Installation Table, all you have to do is to move the table to the heating position along the guide by pushing the lever. This device enables easy mounting and dismounting of even a hot and/or heavy bearing.



Small and Sensitive Temperature Sensor

Small and sensitive temperature sensor continuously monitors the bearing temperature to ensure precise detection of bearing (work) temperature even at high temperature rising rate as well as when the sensor is set in a confined small area.

Compatibility with a Wide Range of Various Voltage of Power Supply

ETOH's Induction Bearing Heater is compatible with a wide range of various voltages and various frequencies of power supplies around the globe. Stationary types of Bearing Heater are connected to 3-phase AC power Supply while portable types are connected to single phase AC power supply.

Fault Tolerance

In the case of heating unwittingly without installing the temperature sensor on the work (bearing) and in any other abnormal incident that should happen, Bearing Heater detects the fault(s) to stop heating automatically. In this manner, for Safe Operation of Bearing Heater, all possible measures conceivable are taken.

Operation Information Availability

Operation Panel is common to all types of ETOH's induction Bearing Heater and easy-to-use, user friendly, and can be operated instinctively at sight of the push-button symbols representing the individual elemental commands of Bearing Heater, as the result of our searching user's convenience. The external control signal inputs and outputs are equipped as standard and they allow Bearing Heater to be embedded into your FA system.

Broad Range of Work Size

ETOH's induction Bearing Heater accommodates broad range of work (bearing) size by selecting I-type core suitable for the work inner ring diameter.

Optimal Heating with Accordance with Bearing (work) Applied

ETOH's induction Bearing Heater senses the electrical properties of the work (bearing) and the I-type core to heat the work (bearing) in the optimal condition. ETOH's induction Bearing Heater is featured to have convenient Power Reduction Function of setting the reduction rate 50%-100% by 10% for a delicate work (bearing) necessary to be heated amply and slowly.

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Appendix Table

inch－mm Conversion Table ——— Table 1
kgf－N Conversion Table ——— Table 2
kg－lb Conversion Table ——— Table 3
˚C－˚F Conversion Table ——— Table 4
Hardness Conversion Table ——— Table 5
Tolerance of Shaft ——— Table 6
Tolerance of Housing Bore ——— Table 7
International Units SI Conversion Table ——— Table 8
SI Prefixes ——— Table 9
Lubricating Greases ——— Table 10

■ Table 1. inch－mm Conversion Table

inch		0”	1”	2”	3”	4”	5”	6”	7”	8”
Fractions	Decimals									
0	.000000	0.0000	25.4000	50.8000	76.2000	101.6000	127.0000	152.4000	177.8000	203.2000
1/64	.015625	0.3969	25.7969	51.1969	76.5969	101.9969	127.3969	152.7969	178.1969	203.5969
1/32	.031250	0.7938	26.1938	51.5938	76.9938	102.3938	127.7938	153.1938	178.5938	203.9938
3/64	.046875	1.1906	26.5906	51.9906	77.3906	102.7906	128.1906	153.5906	178.9906	204.3906
1/16	.062500	1.5875	26.9875	52.3875	77.7875	103.1875	128.5875	153.9875	179.3875	204.7875
5/64	.078125	1.9844	27.3844	52.7844	78.1844	103.5844	128.9844	154.3844	179.7844	205.1844
3/32	.093750	2.3812	27.7812	53.1812	78.5812	103.9812	129.3812	154.7812	180.1812	205.5812
7/64	.109375	2.7781	28.1781	53.5781	78.9781	104.3781	129.7781	155.1781	180.5781	205.9781
1/ 8	.125000	3.1750	28.5750	53.9750	79.3750	104.7750	130.1750	155.5750	180.9750	206.3750
9/64	.140625	3.5719	28.9719	54.3719	79.7719	105.1719	130.5719	155.9719	181.3719	206.7719
5/32	.156250	3.9688	29.3688	54.7688	80.1688	105.5688	130.9688	156.3688	181.7688	207.1688
11/64	.171875	4.3656	29.7656	55.1656	80.5656	105.9656	131.3656	156.7656	182.1656	207.5656
3/16	.187500	4.7625	30.1625	55.5625	80.9625	106.3625	131.7625	157.1625	182.5625	207.9625
13/64	.203125	5.1594	30.5594	55.9594	81.3594	106.7594	132.1594	157.5594	182.9594	208.3594
7/32	.218750	5.5562	30.9562	56.3562	81.7562	107.1562	132.5562	157.9562	183.3562	208.7562
15/64	.234375	5.9531	31.3531	56.7531	82.1531	107.5531	132.9531	158.3531	183.7531	209.1531
1/ 4	.250000	6.3500	31.7500	57.1500	82.5500	107.9500	133.3500	158.7500	184.1500	209.5500
17/64	.265625	6.7469	32.1469	57.5469	82.9469	108.3469	133.7469	159.1469	184.5469	209.9469
9/32	.281250	7.1438	32.5438	57.9438	83.3438	108.7438	134.1438	159.5438	184.9438	210.3438
19/64	.296875	7.5406	32.9406	58.3406	83.7406	109.1406	134.5406	159.9406	185.3406	210.7406
5/16	.312500	7.9375	33.3375	58.7375	84.1375	109.5375	134.9375	160.3375	185.7375	211.1375
21/64	.328125	8.3344	33.7344	59.1344	84.5344	109.9344	135.3344	160.7344	186.1344	211.5344
11/32	.343750	8.7312	34.1312	59.5312	84.9312	110.3312	135.7312	161.1312	186.5312	211.9312
23/64	.359375	9.1281	34.5281	59.9281	85.3281	110.1250	136.1281	161.5281	186.9281	212.3281
3/ 8	.375000	9.5250	34.9250	60.3250	85.7250	111.1250	136.5250	161.9250	187.3250	212.7250
25/64	.390625	9.9219	35.3219	60.7219	86.1219	111.5219	136.9219	162.3219	187.7219	213.1219
13/32	.406250	10.3188	35.7188	61.1188	86.5188	111.9188	137.3188	162.7188	188.1188	213.5188
27/64	.218875	10.7156	36.1156	61.5156	86.9156	112.3156	137.7156	163.1156	188.5156	213.9156
7/16	.437500	11.1125	36.5125	61.9125	87.3125	112.7125	138.1125	163.5125	188.9125	214.3125
29/64	.453125	11.5094	36.9094	62.3094	87.7094	113.1094	138.5094	163.9094	189.3094	214.7094
15/32	.468750	11.9062	37.3062	62.7062	88.1062	113.5062	138.9062	164.3062	189.7062	215.1062
31/64	.484375	12.3031	37.7031	63.1031	88.5031	113.9031	139.3031	164.7031	190.1031	215.5031
1/ 2	.500000	12.7000	38.1000	63.5000	88.9000	114.3000	139.7000	165.1000	190.5000	215.9000
33/64	.515625	13.0969	38.4969	63.8969	89.2969	114.6969	140.0969	165.4969	190.8969	216.2669
17/32	.531250	13.4938	38.8938	64.2938	89.6938	115.0938	140.4938	165.8938	191.2938	216.6938
35/64	.546875	13.8906	39.2906	64.6906	90.0906	115.4906	140.8906	166.2906	191.6906	217.0906
9/16	.562500	14.2875	39.6875	65.0875	90.4875	115.8875	141.2875	166.6875	192.0875	217.4875
37/64	.578125	14.6844	40.0844	65.4844	90.8844	116.2844	141.6844	167.0844	192.4844	217.8844
19/32	.593750	15.0812	40.4812	65.8812	91.2812	116.6812	142.0812	167.4812	192.8812	218.2812
39/64	.609375	15.4781	40.8781	66.2781	91.6781	117.0781	142.4781	167.8781	193.2781	218.6781
5/ 8	.625000	15.8750	41.2750	66.6750	92.0750	117.4750	142.8750	168.2750	193.6750	219.0750
41/64	.640625	16.2719	41.6719	67.0719	92.4719	117.8719	143.2719	168.6719	194.0719	219.4719
21/32	.656250	16.6688	42.0688	67.4688	92.8688	118.2688	143.6688	169.0688	194.4688	219.8688
43/64	.671875	17.0656	42.4656	67.8656	93.2656	118.6656	144.0656	169.4656	194.8656	220.2656
11/16	.687500	17.4625	42.8625	68.2625	93.6625	119.0625	144.4625	169.8625	195.2625	220.6625
45/64	.703125	17.8594	43.2594	68.6594	94.0594	119.4594	144.8594	170.2594	195.6594	221.0594
23/32	.718750	18.2562	43.6562	69.0562	94.4652	119.8562	145.2562	170.6562	196.0562	221.4562
47/64	.734375	18.6531	44.0531	69.4531	94.8531	120.2531	145.6531	171.0531	196.4531	221.8531
3/ 4	.750000	19.0500	44.4500	69.8500	95.2500	120.6500	146.0500	171.4500	196.8500	222.2500
49/64	.765625	19.4469	44.8469	70.2469	95.6469	121.0469	146.4469	171.8469	197.2469	222.6469
25/32	.781250	19.8438	45.2438	70.6438	96.0438	121.4438	146.8438	172.2438	197.6438	223.0438
51/64	.796875	20.2406	45.6406	71.0406	96.4406	121.8406	147.2406	127.6406	198.0406	223.4406
13/16	.812500	20.6375	46.0375	71.4375	96.8375	122.2375	147.6375	173.0375	198.4375	223.8375
53/64	.828125	21.0344	46.4344	71.8344	97.2344	122.6344	148.0344	173.4344	198.8344	224.2344
27/32	.843750	21.4312	46.8312	72.2312	97.6312	123.0312	148.4312	173.8312	199.2312	224.6312
55/64	.859375	21.8281	47.2281	72.6281	98.0281	123.4281	148.8281	174.2281	199.6281	225.0281
7/ 8	.875000	22.2250	47.6250	73.0250	98.4250	123.8250	149.2250	174.6250	200.0250	225.4250
57/64	.890625	22.6219	48.0219	73.4219	98.8219	124.2219	149.6219	175.0219	200.4219	225.8219
29/32	.906250	23.0188	48.4188	73.8188	99.2188	124.6188	150.0188	175.4188	200.8188	226.2188
59/64	.921875	23.4156	48.8156	74.2156	99.6156	125.0156	150.4156	175.8156	201.2156	226.6156
15/16	.937500	23.8125	49.2125	74.6125	100.0125	125.4125	150.8125	176.2125	201.6125	227.0125
61/64	.953125	24.2094	49.6094	75.0094	100.4094	125.8094	151.2094	176.6094	202.0094	227.4094
31/32	.968750	24.6062	50.0062	75.4062	100.8062	126.2062	151.6062	177.0062	202.4062	227.8062
63/64	.984375	25.0031	50.4031	75.8031	101.2031	126.6031	152.0031	177.4031	202.8031	228.2031

Table 2. kgf—N Conversion Table

1 kgf = 9.80665 N
1 N = 0.101972 kgf

kgf		N	kgf		N	kgf		N
0.1020	1	9.8066	3.4670	34	333.43	6.8321	67	657.05
0.2039	2	19.613	3.5690	35	343.23	6.9341	68	666.85
0.3059	3	29.420	3.6710	36	353.04	7.0360	69	676.66
0.4079	4	39.227	3.7730	37	362.85	7.1380	70	686.47
0.5099	5	49.033	3.8749	38	372.65	7.2400	71	696.27
0.6118	6	58.840	3.9769	39	382.46	7.3420	72	706.08
0.7138	7	68.647	4.0789	40	392.27	7.4439	73	715.89
0.8158	8	78.453	4.1808	41	402.07	7.5459	74	725.69
0.9177	9	88.260	4.2828	42	411.88	7.6479	75	735.50
1.0197	10	98.066	4.3848	43	421.69	7.7498	76	745.31
1.1217	11	107.87	4.4868	44	431.49	7.8518	77	755.11
1.2237	12	117.68	4.5887	45	441.30	7.9538	78	764.92
1.3256	13	127.49	4.6907	46	451.11	8.0558	79	774.73
1.4276	14	137.29	4.7927	47	460.91	8.1577	80	784.53
1.5296	15	147.10	4.8946	48	470.72	8.2597	81	794.34
1.6315	16	156.91	4.9966	49	480.53	8.3617	82	804.15
1.7335	17	166.71	5.0986	50	490.33	8.4636	83	813.95
1.8355	18	176.52	5.2006	51	500.14	8.5656	84	823.76
1.9375	19	186.33	5.3025	52	509.95	8.6676	85	833.57
2.0394	20	196.13	5.4045	53	519.75	8.7696	86	843.37
2.1414	21	205.94	5.5065	54	529.56	8.8716	87	853.18
2.2434	22	215.75	5.6084	55	539.37	8.9735	88	862.99
2.3453	23	225.55	5.7104	56	549.17	9.0755	89	872.79
2.4473	24	235.36	5.8124	57	558.98	9.1774	90	882.60
2.5493	25	245.17	5.9144	58	568.79	9.2794	91	892.41
2.6513	26	254.97	6.0163	59	578.59	9.3814	92	902.21
2.7532	27	264.78	6.1183	60	588.40	9.4834	93	912.02
2.8552	28	274.59	6.2203	61	598.21	9.5853	94	921.83
2.9572	29	284.39	6.3222	62	608.01	9.6873	95	931.63
3.0591	30	294.20	6.4242	63	617.82	9.7893	96	941.44
3.1611	31	304.01	6.5262	64	627.63	9.8912	97	951.25
3.2631	32	313.81	6.6282	65	637.43	9.9932	98	961.05
3.3651	33	323.62	6.7301	66	647.24	10.0952	99	970.86

How to convert: (1) When 10kgf should be converted into N, look for the number 10 on the central column in the first file.
The number at its right hand side shows 98.066N
(2) To the contrary, 10N can be converted into 1.0197kgf.

Table 3. kg—lb Conversion Table

1 kg = 2.204622 lb
1 lb = 0.45359 kg

kg		lb	kg		lb	kg		lb
0.454	1	2.205	15.422	34	74.957	30.391	67	147.71
0.907	2	4.409	15.876	35	77.162	30.844	68	149.91
1.361	3	6.614	16.329	36	79.366	31.298	69	152.12
1.814	4	8.818	16.783	37	81.571	31.751	70	154.32
2.268	5	11.023	17.236	38	83.776	32.205	71	156.53
2.722	6	13.228	17.690	39	85.980	32.659	72	158.73
3.175	7	15.432	18.144	40	88.185	33.112	73	160.94
3.629	8	17.637	18.597	41	90.390	33.566	74	163.14
4.082	9	19.842	19.051	42	92.594	34.019	75	165.35
4.536	10	22.046	19.504	43	94.799	34.473	76	167.55
4.990	11	24.251	19.958	44	97.003	34.927	77	169.76
5.443	12	26.455	20.412	45	99.208	35.380	78	171.96
5.897	13	28.660	20.865	46	101.41	35.834	79	174.17
6.350	14	30.865	21.319	47	103.62	36.287	80	176.37
6.804	15	33.069	21.772	48	105.82	36.741	81	178.57
7.257	16	35.274	22.226	49	108.03	37.194	82	180.78
7.711	17	37.479	22.680	50	110.23	37.648	83	182.98
8.165	18	39.683	23.133	51	112.44	38.102	84	185.19
8.618	19	41.888	23.587	52	114.64	38.555	85	187.39
9.072	20	44.092	24.040	53	116.84	39.009	86	189.60
9.525	21	46.297	24.494	54	119.05	39.462	87	191.80
9.979	22	48.502	24.948	55	121.25	39.916	88	194.01
10.433	23	50.706	25.401	56	123.46	40.370	89	196.21
10.886	24	52.911	25.855	57	125.66	40.823	90	198.42
11.340	25	55.116	26.308	58	127.87	41.277	91	200.62
11.793	26	57.320	26.762	59	130.07	41.730	92	202.83
12.247	27	59.525	27.216	60	132.28	42.184	93	205.03
12.701	28	61.729	27.669	61	134.48	42.638	94	207.23
13.154	29	63.934	28.123	62	136.69	43.091	95	209.44
13.608	30	66.139	28.576	63	138.89	43.545	96	211.64
14.061	31	68.343	29.030	64	141.10	43.998	97	213.85
14.515	32	70.548	29.483	65	143.30	44.452	98	216.05
14.968	33	72.753	29.937	66	145.51	44.906	99	218.26

How to convert: (1) When 43kg should be converted into lb, look for the number 43 on the central column in the second file.
The number at its right hand side shows 94.799lb.
(2) To the contrary, 43lb can be converted into 19.504kg.

Table 4. °C—°F Conversion Table

$$C = \frac{5}{9}(F-32)$$

$$F = \frac{9}{5}C+32$$

°C		°F	°C		°F	°C		°F	°C		°F
–73	**–100**	–148	–1.7	**29**	84.2	17.8	**64**	147.2	37.2	**99**	210.2
–62	**– 80**	–112	–1.1	**30**	86.0	18.3	**65**	149.0	37.8	**100**	212.0
–51	**– 60**	– 76	–0.6	**31**	87.8	18.9	**66**	150.8	40.6	**105**	221
–40	**– 40**	– 40	0	**32**	89.6	19.4	**67**	152.6	43	**110**	230
–29	**– 20**	– 4	0.6	**33**	91.4	20.0	**68**	154.4	49	**120**	248
–23.3	**– 10**	14	1.1	**34**	93.2	20.6	**69**	156.2	54	**130**	266
–17.8	**0**	32	1.7	**35**	95.0	21.1	**70**	158.0	60	**140**	284
–17.2	**1**	33.8	2.2	**36**	96.8	21.7	**71**	159.8	66	**150**	302
–16.7	**2**	35.6	2.8	**37**	98.6	22.2	**72**	161.6	71	**160**	320
–16.1	**3**	37.4	3.3	**38**	100.4	22.8	**73**	163.4	77	**170**	338
–15.6	**4**	39.2	3.9	**39**	102.2	23.3	**74**	165.2	82	**180**	356
–15.0	**5**	41.0	4.4	**40**	104.0	23.9	**75**	167.0	88	**190**	374
–14.4	**6**	42.8	5.0	**41**	105.8	24.4	**76**	168.8	93	**200**	392
–13.9	**7**	44.6	5.6	**42**	107.6	25.0	**77**	170.6	121	**250**	482
–13.3	**8**	46.4	6.1	**43**	109.4	25.6	**78**	172.4	149	**300**	572
–12.8	**9**	48.2	6.7	**44**	111.2	26.1	**79**	174.2	177	**350**	662
–12.2	**10**	50.0	7.2	**45**	113.0	26.7	**80**	176.0	204	**400**	752
–11.7	**11**	51.8	7.8	**46**	114.8	27.2	**81**	177.8	232	**450**	842
–11.1	**12**	53.6	8.3	**47**	116.6	27.8	**82**	179.6	260	**500**	932
–10.6	**13**	55.4	8.9	**48**	118.4	28.3	**83**	181.4	288	**550**	1022
–10.0	**14**	57.2	9.4	**49**	120.2	28.9	**84**	183.2	316	**600**	1112
– 9.4	**15**	59.0	10.0	**50**	122.0	29.4	**85**	185.0	343	**650**	1202
– 8.9	**16**	60.8	10.6	**51**	123.8	30.0	**86**	186.8	371	**700**	1292
– 8.3	**17**	62.6	11.1	**52**	125.6	30.6	**87**	188.6	399	**750**	1382
– 7.8	**18**	64.4	11.7	**53**	127.4	31.1	**88**	190.4	427	**800**	1472
– 7.2	**19**	66.2	12.2	**54**	129.2	31.7	**89**	192.2	454	**850**	1562
– 6.7	**20**	68.0	12.8	**55**	131.0	32.2	**90**	194.0	482	**900**	1652
– 6.1	**21**	69.8	13.3	**56**	132.8	32.8	**91**	195.8	510	**950**	1742
– 5.6	**22**	71.6	13.9	**57**	134.6	33.3	**92**	197.6	538	**1000**	1832
– 5.0	**23**	73.4	14.4	**58**	136.4	33.9	**93**	199.4	593	**1100**	2012
– 4.4	**24**	75.2	15.0	**59**	138.2	34.4	**94**	201.2	649	**1200**	2192
– 3.9	**25**	77.0	15.6	**60**	140.0	35.0	**95**	203.0	704	**1300**	2372
– 3.3	**26**	78.8	16.1	**61**	141.8	35.6	**96**	204.8	760	**1400**	2552
– 2.8	**27**	80.6	16.7	**62**	143.6	36.1	**97**	206.6	816	**1500**	2732
– 2.2	**28**	82.4	17.2	**63**	145.4	36.7	**98**	208.4	871	**1600**	2912

How to convert: (1) When 43°C should be converted into °F, look for the number 43 on the central column in the second file.
The number at its right hand side shows 109.4°F.
(2) To the contrary, 43°F can be converted into 6.1°C.

Table 5. Hardness Conversion Table

Nearly conversion for Rockwell C scale of Steel

Rockwell C scale (1471N)	Vickers	Brinell		Rockwell		Shore
		Standard ball	Tungsten carbide ball	A scale (588.4N)	B scale (980.7N)	
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	421	73.1	—	60
44	434	409	409	72.5	—	58
43	423	400	400	72.0	—	57
42	412	390	390	71.5	—	56
41	402	381	381	70.9	—	55
40	392	371	371	70.4	—	54
39	382	362	362	69.9	—	52
38	372	353	353	69.4	—	51
37	363	344	344	68.9	—	50
36	354	336	336	68.4	(109.0)	49
35	345	327	327	67.9	(108.5)	48
34	336	319	319	67.4	(108.0)	47
33	327	311	311	66.8	(107.5)	46
32	318	301	301	66.3	(107.0)	44
31	310	294	294	65.8	(106.0)	43
30	302	286	286	65.3	(105.5)	42
29	294	279	279	64.7	(104.5)	41
28	286	271	271	64.3	(104.0)	41
27	279	264	264	63.8	(103.0)	40
26	272	258	258	63.3	(102.5)	38
25	266	253	253	62.8	(101.5)	38
24	260	247	247	62.4	(101.0)	37
23	254	243	243	62.0	100.0	36
22	248	237	237	61.5	99.0	35
21	243	231	231	61.0	98.5	35
20	238	226	226	60.5	97.8	34
(18)	230	219	219	—	96.7	33
(16)	222	212	212	—	95.5	32
(14)	213	203	203	—	93.9	31
(12)	204	194	194	—	92.3	29
(10)	196	187	187	—	90.7	28
(8)	188	179	179	—	89.5	27
(6)	180	171	171	—	87.1	26
(4)	173	165	165	—	85.5	25
(2)	166	158	158	—	83.5	24
(0)	160	152	152	—	81.7	24

Numbers with ( ) are for reference.

Table 6. Tolerance of Shaft

Unit: μm

Dimension (mm)		a13		c12		d6		e6		e13		f5		f6		g5		g6		h4		h5		h6		h7		h8		h9		h10		h11		h13		js4		Dimension (mm)	
Over	Incl.	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	Over	Incl.
3	6	– 270	– 450	– 70	– 190	– 30	– 38	– 20	– 28	– 20	– 200	–10	–15	– 10	– 18	– 4	– 9	– 4	– 12	0	– 4	0	– 5	0	– 8	0	– 12	0	– 18	0	– 30	0	– 48	0	– 75	0	–180	+ 2	– 2	3	6
6	10	– 280	– 500	– 80	– 230	– 40	– 49	– 25	– 34	– 25	– 245	–13	–19	– 13	– 22	– 5	–11	– 5	– 14	0	– 4	0	– 6	0	– 9	0	– 15	0	– 22	0	– 36	0	– 58	0	– 90	0	–220	+ 2	– 2	6	10
10	18	– 290	– 560	– 95	– 275	– 50	– 61	– 32	– 43	– 32	– 302	–16	–24	– 16	– 27	– 6	–14	– 6	– 17	0	– 5	0	– 8	0	–11	0	– 18	0	– 27	0	– 43	0	– 70	0	–110	0	–270	+ 2.5	– 2.5	10	18
18	30	– 300	– 630	–110	– 320	– 65	– 78	– 40	– 53	– 40	– 370	–20	–29	– 20	– 33	– 7	–16	– 7	– 20	0	– 6	0	– 9	0	–13	0	– 21	0	– 33	0	– 52	0	– 84	0	–130	0	–330	+ 3	– 3	18	30
30	40	– 310	– 700	–120	– 370	– 80	– 96	– 50	– 66	– 50	– 440	–25	–36	– 25	– 41	– 9	–20	– 9	– 25	0	– 7	0	–11	0	–16	0	– 25	0	– 39	0	– 62	0	–100	0	–160	0	–390	+ 3.5	– 3.5	30	40
40	50	– 320	– 710	–130	– 380																																			40	50
50	65	– 340	– 800	–140	– 440	–100	–119	– 60	– 79	– 60	– 520	–30	–43	– 30	– 49	–10	–23	–10	– 29	0	– 8	0	–13	0	–19	0	– 30	0	– 46	0	– 74	0	–120	0	–190	0	–460	+ 4	– 4	50	65
65	80	– 360	– 820	–150	– 450																																			65	80
80	100	– 380	– 920	–170	– 520	–120	–142	– 72	– 94	– 72	– 612	–36	–51	– 36	– 58	–12	–27	–12	– 34	0	–10	0	–15	0	–22	0	– 35	0	– 54	0	– 87	0	–140	0	–220	0	–540	+ 5	– 5	80	100
100	120	– 410	– 950	–180	– 530																																			100	120
120	140	– 460	–1090	–200	– 600	–145	–170	– 85	–110	– 85	– 715	–43	–61	– 43	– 68	–14	–32	–14	– 39	0	–12	0	–18	0	–25	0	– 40	0	– 63	0	–100	0	–160	0	–250	0	–630	+ 6	– 6	120	140
140	160	– 520	–1150	–210	– 610																																			140	160
160	180	– 580	–1210	–230	– 630																																			160	180
180	200	– 660	–1380	–240	– 700	–170	–199	–100	–129	–100	– 820	–50	–70	– 50	– 79	–15	–35	–15	– 44	0	–14	0	–20	0	–29	0	– 46	0	– 72	0	–115	0	–185	0	–290	0	–720	+ 7	– 7	180	200
200	225	– 740	–1460	–260	– 720																																			200	225
225	250	– 820	–1540	–280	– 740																																			225	250
250	280	– 920	–1730	–300	– 820	–190	–222	–110	–142	–110	– 920	–56	–79	– 56	– 88	–17	–40	–17	– 49	0	–16	0	–23	0	–32	0	– 52	0	– 81	0	–130	0	–210	0	–320	0	–810	+ 8	– 8	250	280
280	315	–1050	–1860	–330	– 850																																			280	315
315	355	–1200	–2090	–360	– 930	–210	–246	–125	–161	–125	–1015	–62	–87	– 62	– 98	–18	–43	–18	– 54	0	–18	0	–25	0	–36	0	– 57	0	– 89	0	–140	0	–230	0	–360	0	–890	+ 9	– 9	315	355
355	400	–1350	–2240	–400	– 970																																			355	400
400	450	–1550	–2470	–440	–1070	–230	–270	–135	–175	–135	–1105	–68	–95	– 68	–108	–20	–47	–20	– 60	0	–20	0	–27	0	–40	0	– 63	0	– 97	0	–155	0	–250	0	–400	0	–970	+10	–10	400	450
450	500	–1650	–2620	–480	–1110																																			450	500
500	560	–		–	–	–260	–304	–145	–189	–	–	–	–	– 76	–120	–	–	–22	– 66	–	–	–	–	0	–44	0	– 70	0	–110	0	–175	0	–280	0	–440	–	–	–	–	500	560
560	630																																							560	630
630	710	–		–	–	–290	–340	–160	–210	–	–	–	–	– 80	–130	–	–	–24	– 74	–	–	–	–	0	–50	0	– 80	0	–125	0	–200	0	–320	0	–500	–	–	–	–	630	710
710	800																																							710	800
800	900	–		–	–	–320	–376	–170	–226	–	–	–	–	– 86	–142	–	–	–26	– 82	–	–	–	–	0	–56	0	– 90	0	–140	0	–230	0	–360	0	–560	–	–	–	–	800	900
900	1000																																							900	1000
1000	1120	–		–	–	–350	–416	–195	–261	–	–	–	–	– 98	–164	–	–	–28	– 94	–	–	–	–	0	–66	0	–105	0	–165	0	–260	0	–420	0	–660	–	–	–	–	1000	1120
1120	1250																																							1120	1250
1250	1400	–		–	–	–390	–468	–220	–298	–	–	–	–	–110	–188	–	–	–30	–108	–	–	–	–	0	–78	0	–125	0	–195	0	–310	0	–500	0	–780	–	–	–	–	1250	1400
1400	1600																																							1400	1600

Unit: μm

Dimension (mm)		j5		js5		j6		js6		j7		k4		k5		k6		m5		m6		n5		n6		p5		p6		r6		r7		Base Tolerance				Dimension (mm)	
Over	Incl.	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	IT2	IT3	IT5	IT7	Over	Incl.
3	6	+3	– 2	+ 2.5	– 2.5	+ 6	– 2	+ 4	– 4	+ 8	– 4	+ 5	+1	+ 6	+1	+ 9	+1	+ 9	+ 4	+ 12	+ 4	+13	+ 8	+ 16	+ 8	+17	+12	+ 20	+ 12	+ 23	+ 15	+ 27	+ 15	1.5	2.5	5	12	3	6
6	10	+4	– 2	+ 3	– 3	+ 7	– 2	+ 4.5	– 4.5	+10	– 5	+ 5	+1	+ 7	+1	+10	+1	+12	+ 6	+ 15	+ 6	+16	+10	+ 19	+10	+21	+15	+ 24	+ 15	+ 28	+ 19	+ 34	+ 19	1.5	2.5	6	15	6	10
10	18	+5	– 3	+ 4	– 4	+ 8	– 3	+ 5.5	– 5.5	+12	– 6	+ 6	+1	+ 9	+1	+12	+1	+15	+ 7	+ 18	+ 7	+20	+12	+ 23	+12	+26	+18	+ 29	+ 18	+ 34	+ 23	+ 41	+ 23	2	3	8	18	10	18
18	30	+5	– 4	+ 4.5	– 4.5	+ 9	– 4	+ 6.8	– 6.8	+13	– 8	+ 8	+2	+11	+2	+15	+2	+17	+ 8	+ 21	+ 8	+24	+15	+ 28	+15	+31	+22	+ 35	+ 22	+ 41	+ 28	+ 49	+ 28	2.5	4	9	21	18	30
30	40	+6	– 5	+ 5.5	– 5.5	+11	– 5	+ 8	– 8	+15	–10	+ 9	+2	+13	+2	+18	+2	+20	+ 9	+ 25	+ 9	+28	+17	+ 33	+17	+37	+26	+ 42	+ 26	+ 50	+ 34	+ 59	+ 34	2.5	4	11	25	30	40
40	50																																							40	50
50	65	+6	– 7	+ 6.5	– 6.5	+12	– 7	+ 9.5	– 9.5	+18	–12	+10	+2	+15	+2	+21	+2	+24	+11	+ 30	+11	+33	+20	+ 39	+20	+45	+32	+ 51	+ 32	+ 60	+ 41	+ 71	+ 41	3	5	13	30	50	65
65	80																													+ 62	+ 43	+ 73	+ 43					65	80
80	100	+6	– 9	+ 7.5	– 7.5	+13	– 9	+11	–11	+20	–15	+13	+3	+18	+3	+25	+3	+28	+13	+ 35	+13	+38	+23	+ 45	+23	+52	+37	+ 59	+ 37	+ 73	+ 51	+ 86	+ 51	4	6	15	35	80	100
100	120																													+ 76	+ 54	+ 89	+ 54					100	120
120	140	+7	–11	+ 9	– 9	+14	–11	+12.5	–12.5	+22	–18	+15	+3	+21	+3	+28	+3	+33	+15	+ 40	+15	+45	+27	+ 52	+27	+61	+43	+ 68	+ 43	+ 88	+ 63	+103	+ 63	5	8	18	40	120	140
140	160																													+ 90	+ 65	+105	+ 65					140	160
160	180																													+ 93	+ 68	+108	+ 68					160	180
180	200	+7	–13	+10	–10	+16	–13	+14.5	–14.5	+25	–21	+18	+4	+24	+4	+33	+4	+37	+17	+ 46	+17	+51	+31	+ 60	+31	+70	+50	+ 79	+ 50	+106	+ 77	+123	+ 77	7	10	20	46	180	200
200	225																													+109	+ 80	+126	+ 80					200	225
225	250																													+113	+ 84	+130	+ 84					225	250
250	280	+7	–16	+11.5	–11.5	+16	–16	+16	–16	+26	–26	+20	+4	+27	+4	+36	+4	+43	+20	+ 52	+20	+57	+34	+ 66	+34	+79	+56	+ 88	+ 56	+126	+ 94	+146	+ 94	8	12	23	52	250	280
280	315																													+130	+ 98	+150	+ 98					280	315
315	355	+7	–18	+12.5	–12.5	+18	–18	+18	–18	+29	–28	+22	+4	+29	+4	+40	+4	+46	+21	+ 57	+21	+62	+37	+ 73	+37	+87	+62	+ 98	+ 62	+144	+108	+165	+108	9	13	25	57	315	355
355	400																													+150	+114	+171	+114					355	400
400	450	+7	–20	+13.5	–13.5	+20	–20	+20	–20	+31	–32	+25	+5	+32	+5	+45	+5	+50	+23	+ 63	+23	+67	+40	+ 80	+40	+95	+68	+108	+ 68	+166	+126	+189	+126	10	15	27	63	400	450
450	500																													+172	+132	+195	+132					450	500
500	560	–	–	–	–	–	–	+22	–22	–	–	–	–	–	–	+44	0	–	–	+ 70	+26	–	–	+ 88	+44	–	–	+122	+ 78	+194	+150	+220	+150	–	–	–	70	500	560
560	630																													+199	+155	+225	+155					560	630
630	710	–	–	–	–	–	–	+25	–25	–	–	–	–	–	–	+50	0	–	–	+ 80	+30	–	–	+100	+50	–	–	+138	+ 88	+225	+175	+255	+175	–	–	–	80	630	710
710	800																													+235	+185	+265	+185					710	800
800	900	–	–	–	–	–	–	+28	–28	–	–	–	–	–	–	+56	0	–	–	+ 90	+34	–	–	+112	+56	–	–	+156	+100	+266	+210	+300	+210	–	–	–	90	800	900
900	1000																													+276	+220	+310	+220					900	1000
1000	1120	–	–	–	–	–	–	+33	–33	–	–	–	–	–	–	+66	0	–	–	+106	+40	–	–	+132	+66	–	–	+186	+120	+316	+250	+355	+250	–	–	–	105	1000	1120
1120	1250																													+326	+260	+365	+260					1120	1250
1250	1400	–	–	–	–	–	–	+39	–39	–	–	–	–	–	–	+78	0	–	–	+126	+48	–	–	+156	+78	–	–	+218	+140	+378	+300	+425	+300	–	–	–	125	1250	1400
1400	1600																													+408	+330	+455	+330					1400	1600

■ Table 7. Tolerance of Housing Bore

Unit: μm

Dimension (mm)		E7		E10		E11		E12		F6		F7		F8		G6		G7		H6		H7		H8		H9		H10		H11		H13		J6		Js6		J7		Js7		K5		Dimension (mm)	
Over	Incl.	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	Over	Incl.
3	6	+ 32	+ 20	+ 68	+ 20	+ 95	+ 20	+140	+ 20	+ 18	+ 10	+ 22	+ 10	+ 28	+ 10	+ 12	+ 4	+ 16	+ 4	+ 8	0	+ 12	0	+ 18	0	+ 30	0	+ 48	0	+ 75	0	+180	0	+ 5	–3	+ 4	– 4	+ 6	– 6	+ 6	– 6	0	– 5	3	6
6	10	+ 40	+ 25	+ 83	+ 25	+115	+ 25	+175	+ 25	+ 22	+ 13	+ 28	+ 13	+ 35	+ 13	+ 14	+ 5	+ 20	+ 5	+ 9	0	+ 15	0	+ 22	0	+ 36	0	+ 58	0	+ 90	0	+220	0	+ 5	–4	+ 4.5	– 4.5	+ 8	– 7	+ 7.5	– 7.5	+1	– 5	6	10
10	18	+ 50	+ 32	+102	+ 32	+142	+ 32	+212	+ 32	+ 27	+ 16	+ 34	+ 16	+ 43	+ 16	+ 17	+ 6	+ 24	+ 6	+11	0	+ 18	0	+ 27	0	+ 43	0	+ 70	0	+110	0	+270	0	+ 6	–5	+ 5.5	– 5.5	+10	– 8	+ 9	– 9	+2	– 6	10	18
18	30	+ 61	+ 40	+124	+ 40	+170	+ 40	+250	+ 40	+ 33	+ 20	+ 41	+ 20	+ 53	+ 20	+ 20	+ 7	+ 28	+ 7	+13	0	+ 21	0	+ 33	0	+ 52	0	+ 84	0	+130	0	+330	0	+ 8	–5	+ 6.5	– 6.5	+12	– 9	+10.5	–10.5	+1	– 8	18	30
30	40	+ 75	+ 50	+150	+ 50	+210	+ 50	+300	+ 50	+ 41	+ 25	+ 50	+ 25	+ 64	+ 25	+ 25	+ 9	+ 34	+ 9	+16	0	+ 25	0	+ 39	0	+ 62	0	+100	0	+160	0	+390	0	+10	–6	+ 8	– 8	+14	–11	+12.5	–12.5	+2	– 9	30	40
40	50																																											40	50
50	65	+ 90	+ 60	+180	+ 60	+250	+ 60	+360	+ 60	+ 49	+ 30	+ 60	+ 30	+ 76	+ 30	+ 29	+10	+ 40	+10	+19	0	+ 30	0	+ 46	0	+ 74	0	+120	0	+190	0	+460	0	+13	–6	+ 9.5	– 9.5	+18	–12	+15	–15	+3	–10	50	65
65	80																																											65	80
80	100	+107	+ 72	+212	+ 72	+292	+ 72	+422	+ 72	+ 58	+ 36	+ 71	+ 36	+ 90	+ 36	+ 34	+12	+ 47	+12	+22	0	+ 35	0	+ 54	0	+ 87	0	+140	0	+220	0	+540	0	+16	–6	+11	–11	+22	–13	+17.5	–17.5	+2	–13	80	100
100	120																																											100	120
120	140	+125	+ 85	+245	+ 85	+335	+ 85	+485	+ 85	+ 68	+ 43	+ 83	+ 43	+106	+ 43	+ 39	+14	+ 54	+14	+25	0	+ 40	0	+ 63	0	+100	0	+160	0	+250	0	+630	0	+18	–7	+12.5	–12.5	+26	–14	+20	–20	+3	–15	120	140
140	160																																										140	160
160	180																																										160	180
180	200	+146	+100	+285	+100	+390	+100	+560	+100	+ 79	+ 50	+ 96	+ 50	+122	+ 50	+ 44	+15	+ 61	+15	+29	0	+ 46	0	+ 72	0	+115	0	+185	0	+290	0	+720	0	+22	–7	+14.5	–14.5	+30	–16	+23	–23	+2	–18	180	200
200	225																																										200	225
225	250																																										225	250
250	280	+146	+110	+320	+110	+430	+110	+630	+110	+ 88	+ 56	+108	+ 56	+137	+ 56	+ 49	+17	+ 69	+17	+32	0	+ 52	0	+ 81	0	+130	0	+210	0	+320	0	+810	0	+25	–7	+16	–16	+36	–16	+26	–26	+3	–20	250	280
280	315																																										280	315
315	355	+182	+125	+355	+125	+485	+125	+695	+125	+ 98	+ 62	+119	+ 62	+151	+ 62	+ 54	+18	+ 75	+18	+36	0	+ 57	0	+ 89	0	+140	0	+230	0	+360	0	+890	0	+29	–7	+18	–18	+39	–18	+28.5	–28.5	+3	–22	315	355
355	400																																										355	400
400	450	+198	+135	+385	+135	+535	+135	+765	+135	+108	+ 68	+131	+ 68	+165	+ 68	+ 60	+20	+ 83	+20	+40	0	+ 63	0	+ 97	0	+155	0	+250	0	+400	0	+970	0	+33	–7	+20	–20	+43	–20	+31.5	–31.5	+2	–25	400	450
450	500																																										450	500
500	560	+215	+145	—	—	—	—	—	—	+120	+ 76	+146	+ 76	+186	+ 76	+ 66	+22	+ 92	+22	+44	0	+ 70	0	+110	0	+175	0	+280	0	+440	0	—		—	—	+22	–22	—	—	+35	–35	—	—	500	560
560	630																																										560	630
630	710	+240	+160	—	—	—	—	—	—	+130	+ 80	+160	+ 80	+205	+ 80	+ 74	+24	+104	+24	+50	0	+ 80	0	+125	0	+200	0	+320	0	+500	0	—		—	—	+25	–25	—	—	+40	–40	—	—	630	710
710	800																																										710	800
800	900	+260	+170	—	—	—	—	—	—	+142	+ 86	+176	+ 86	+226	+ 86	+ 82	+26	+116	+26	+56	0	+ 90	0	+140	0	+230	0	+360	0	+560	0	—		—	—	+28	–28	—	—	+45	–45	—	—	800	900
900	1000																																										900	1000
1000	1120	+300	+195	—	—	—	—	—	—	+164	+ 98	+203	+ 98	+263	+ 98	+ 94	+28	+133	+28	+66	0	+105	0	+165	0	+260	0	+420	0	+660	0	—		—	—	+33	–33	—	—	+52.5	–52.5	—	—	1000	1120
1120	1250																																										1120	1250
1250	1400	+345	+220	—	—	—	—	—	—	+188	+110	+235	+110	+305	+110	+108	+30	+155	+30	+78	0	+125	0	+195	0	+310	0	+500	0	+780	0	—		—	—	+39	–39	—	—	+62.5	–62.5	—	—	1250	1400
1400	1600																																										1400	1600
1600	1800	+390	+240	—	—	—	—	—	—	+212	+120	+270	+120	+350	+120	+124	+32	+182	+32	+92	0	+150	0	+230	0	+370	0	+600	0	+920	0	—		—	—	+46	–46	—	—	+75	–75	—	—	1600	1800
1800	2000																																										1800	2000

Unit: μm

Dimension (mm)		K6		K7		M6		M7		N6		N7		P6		P7		R6		R7	
Over	Incl.	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low
3	6	+2	– 6	+ 3	– 9	– 1	– 9	0	– 12	– 5	– 13	– 4	– 16	– 9	– 17	– 8	– 20	– 12	– 20	– 11	– 23
6	10	+2	– 7	+ 5	– 10	– 3	– 12	0	– 15	– 7	– 16	– 4	– 19	– 12	– 21	– 9	– 24	– 16	– 25	– 13	– 28
10	18	+2	– 9	+ 6	– 12	– 4	– 15	0	– 18	– 9	– 20	– 5	– 23	– 15	– 26	– 11	– 29	– 20	– 31	– 16	– 34
18	30	+2	–11	+ 6	– 15	– 4	– 17	0	– 21	–11	– 24	– 7	– 28	– 18	– 31	– 14	– 35	– 24	– 37	– 20	– 41
30	40	+3	–13	+ 7	– 18	– 4	– 20	0	– 25	–12	– 28	– 8	– 33	– 21	– 37	– 17	– 42	– 29	– 45	– 25	– 50
40	50																				
50	65	+4	–15	+ 9	– 21	– 5	– 24	0	– 30	–14	– 33	– 9	– 39	– 26	– 45	– 21	– 51	– 35	– 54	– 30	– 60
65	80																	– 37	– 56	– 32	– 62
80	100	+4	–18	+10	– 25	– 6	– 28	0	– 35	–16	– 38	–10	– 45	– 30	– 52	– 24	– 59	– 44	– 66	– 38	– 73
100	120																	– 47	– 69	– 41	– 76
120	140	+4	–21	+12	– 28	– 8	– 33	0	– 40	–20	– 45	–12	– 52	– 36	– 61	– 28	– 68	– 56	– 81	– 48	– 88
140	160																	– 58	– 83	– 50	– 90
160	180																	– 61	– 86	– 53	– 93
180	200	+5	–24	+13	– 33	– 8	– 37	0	– 46	–22	– 51	–14	– 60	– 41	– 70	– 33	– 79	– 68	– 97	– 60	–106
200	225																	– 71	–100	– 63	–109
225	250																	– 75	–104	– 67	–113
250	280	+5	–27	+16	– 36	– 9	– 41	0	– 52	–25	– 57	–14	– 66	– 47	– 79	– 36	– 88	– 85	–117	– 74	–126
280	315																	– 89	–121	– 78	–130
315	355	+7	–29	+17	– 40	–10	– 46	0	– 57	–26	– 62	–16	– 73	– 51	– 87	– 41	– 98	– 97	–133	– 87	–144
355	400																	–103	–139	– 93	–150
400	450	+8	–32	+18	– 45	–10	– 50	0	– 63	–27	– 67	–17	– 80	– 55	– 95	– 45	–108	–113	–153	–103	–166
450	500																	–119	–159	–109	–172
500	560	0	–44	0	– 70	–26	– 70	–26	– 96	–44	– 88	–44	–114	– 78	–122	– 78	–148	–150	–194	–150	–220
560	630																	–155	–199	–155	–225
630	710	0	–50	0	– 80	–30	– 80	–30	–110	–50	–100	–50	–130	– 88	–138	– 88	–168	–175	–225	–175	–255
710	800																	–185	–235	–185	–265
800	900	0	–56	0	– 90	–34	– 90	–34	–124	–56	–112	–56	–146	–100	–156	–100	–190	–210	–266	–210	–300
900	1000																	–220	–276	–220	–310
1000	1120	0	–66	0	–105	–40	–106	–40	–145	–66	–132	–66	–171	–120	–186	–120	–225	–250	–316	–250	–355
1120	1250																	–260	–326	–260	–365
1250	1400	0	–78	0	–125	–48	–126	–48	–173	–78	–156	–78	–203	–140	–218	–140	–265	–300	–378	–300	–425
1400	1600																	–330	–408	–330	–455
1600	1800	0	–92	0	–150	–58	–150	–58	–208	–92	–184	–92	–242	–170	–262	–170	–320	–370	–462	–370	–520
1800	2000																	–400	–492	–400	–550

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Table 8. International Units SI Conversion Table

Category	Name of unit	Symbol	Conversion to SI	SI name of unit	SI abbreviation
Angle	Degree Minute Second	**°** **'** **"**	π/180 π/10800 π/648000	Radian	**rad**
Length	Meter Micron Angstrom Nautical mile	**m** **μ** **Å** **mile**	1 10^{-6} 10^{-10} 1852	Meter	**m**
Area	Square meter Radius Hectare	**m^2** **a** **ha**	1 10^{2} 10^{4}	Square meter	**m^2**
Volume	Cubic meter Liter	**m^3** **ℓ**	1 10^{-3}	Cubic meter	**m^3**
Mass	Kilogram Ton Atomic mass unit	**kg** **t** **u**	1 10^{3} ≒ 1.66057×10^{-27}	Kilogram	**kg**
Time	Second Minute Hour Day	**s** **min** **h** **d**	1 60 3600 86400	Second	**s**
Speed	Meter per second Knot	**m/s** **kn**	1 1852/3600	Meter per second	**m/s**
Frequency and oscillation	Cycle	**s^{-1}**	1	Hertz	**Hz**
Speed of rotation	revolution per minute	**min^{-1}**	1/60	per second	**s^{-1}**
Angular speed	Radial per second	**rad/s**	1	Radian per second	**rad/s**
Acceleration	Meters per second squared Gravity	**m/s^2** **G**	1 9.80665	Meters per second squared	**m/s^2**
Force	Kilogram force Ton force Dyne	**kgf** **tf** **dyn**	9.80665 9806.65 10^{-5}	Newton	**N**
Moment of force	Kilogram force meter	**kgf·m**	9.80665	Newton meter	**N·m**
Stress and pressure	Kilogram force per meter squared Kilogram force per centimeter squared Kilogram force millimeter squared	**kgf/m^2** **kgf/cm^2** **kgf/mm^2**	9.80665 9.80665×10^{4} 9.80665×10^{6}	Pascal	**Pa**

Category	Name of unit	Symbol	Conversion to SI	SI name of unit	SI abbreviation
Pressure	Meter of water Millimeter of mercury Torr Atmosphere Bar	**mH_2O** **mmHg** **Torr** **atm** **bar**	9806.65 101325/760 101325/760 101325 10^{5}	Pascal	**Pa**
Energy	Erg I. T. Calorie Kilogram force meter Kilowatt hour Metric horsepower hour Electron volt	**erg** **cal_{IT}** **kgf·m** **kw·h** **PS·h** **eV**	10^{-7} 4.1868 9.80665 3.600×10^{6} ≒ 2.64779×10^{6} ≒ 1.60219×10^{-19}	Joule	**J**
Power and dynamic force	Watt Horsepower Kilogram force meter per second	**W** **PS** **kgf·m/s**	1 ≒ 735.5 9.80665	Watt	**W**
Viscosity	Poise Centipoise Kilogram force per square meter	**P** **cP** **$kgf\cdot s/m^2$**	10^{-1} 10^{-3} 9.80665	Pascal second	**Pa·s**
Kinematic viscosity	Stoke Centistoke	**St** **cSt**	10^{-4} 10^{-6}	Square meter per second	**m^2/s**

Table 9. SI Prefixes

Factor	Prefix	
	Name	Symbol
10^{18}	Exa	E
10^{15}	Peta	P
10^{12}	Tera	T
10^{9}	Giga	G
10^{6}	Mega	M
10^{3}	Kilo	k
10^{2}	Hecto	h
10	Deca	da

Factor	Prefix	
	Name	Symbol
10^{-1}	Deci	d
10^{-2}	Centi	c
10^{-3}	Milli	m
10^{-6}	Micro	μ
10^{-9}	Nano	n
10^{-12}	Pico	p
10^{-15}	Femto	f
10^{-18}	Atto	a

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■ Table 10. Lubricating Greases

Typical Lubricating Greases for Bearings

Name of Grease	Grease Maker	Base Oil	Thickener	Penetration	Dropping point (°C)		Operating temperature range (°C)	Color	Properties				
									Water Resistance	High Speed Rotation	Noise	Grease Life at High Temp.	Torque at Low Temp.
Daphne Eponech No. 2	Idemitsu Kosan	Hydrodesulfurized wax	Lithium	280	197		–40～130	Tan	○				
Beacon 325	Exxon Mobil	Diester Oil	Lithium	280	193		–54～120	Light Gray	○	○			○
Polyrex EM	Exxon Mobil	Mineral Oil	Polyurea	285	300		–20～180	Blue	○	○		○	
Mobilgrease 28	Exxon Mobil	Diester Oil+Mineral Oil+Synthetic Hydrocarbon	Microgel	270	270		–62～177	Red	○			○	
Mobilux 2	Exxon Mobil	Mineral Oil	Lithium	270	178		0～125	Brown	○				
Temprex N3	Exxon Mobil	Mineral Oil	Lithium Complex	235	300		–30～150	Green	○	○		○	
Barrierta IMI	NOK Kluber	Flourine	PTFE	280	None		–50～220	White	○	○		○	○
Isoflex NBU15	NOK Kluber	Diester+Mineral Oil	Barium Complex	280	250		–40～130	Beige	○	○			
Isoflex NCA15	NOK Kluber	Synthetic Ester Mineral Blend	Calcium Complex	280	180		–50～120	Beige	○	○			
Isoflex LDS18SA	NOK Kluber	Ester Oil	Lithium	280	190		–60～130	Yellow	○	○			○
NOXLUB BN2420P	NOK Kluber	PFPE Oil	Special Thickner	280	None		–35～220	White				○	
NOXLUB BN4020	NOK Kluber	PFPE Oil	Special Thickner	280	None		–35～260	White				○	
Stabrags NBU 8 EP	NOK Kluber	Mineral Oil	Barium Complex	280	220		–35～150	Beige					○
Multemp LRL3	Kyodo Yushi	Polyolester	Lithium	235	208		–50～150	Peach White	○		○	○	○
Multemp PS2	Kyodo Yushi	Diester Oil+Mineral Oil	Lithium	275	190		–55～130	White	○	○			
Multemp SRL	Kyodo Yushi	Tetraester	Lithium	245	191		–40～150	Light Yellow	○		○	○	○
Alvania Grease 2S	Shell	Mineral Oil	Lithium	276	185		–25～120	Tan	○		○		
Alvania Grease 3S	Shell	Mineral Oil	Lithium	240	185		–20～135	Tan	○		○	○	
AeroShell Grease 7	Shell	Diester Oil	Microgel	285	268		–73～150	Light Brown	○	○		○	○
Alvania EP Grease 2	Shell	Mineral Oil	Lithium	285	185		–15～110	Reddish Brown	○				
Retinax LX No.2	Shell	Mineral Oil	Lithium Complex	270	250		–15～150	Light Brown	○			○	○
SH44M（DC44M）	Dow Corning Toray	Silicone Oil	Lithium	260	210		–40～180	Brown	○			○	○
NIGACE WR-S	Nippon Grease	Synthetic Oil	Urea	240	290		–30～150	Light Yellow	○			○	

Remarks: 1. When the grease is used at temperature near the high or low end of the recommended operating temperature, please contact NACHI.
2. Generally Ester oil may give damage to polyacrylic rubber or ABS resin. Please be careful, when you use grease with Ester base oil.
3. Do not mix different type of greases.
4. If sodium thickener grease is mixed with water, the grease become soft and may leak.

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