Basic Technical Information/技术说明

PRODUCTS Tables/产品

User's Guide for Rolling Bearings
滚动轴承的使用说明和注意事项

品质传承 精益求精
Swiss Quality China Made

Jesa, founded in 1969, located in Fribourg, is the No. 1 bearing manufacturer in Swizterland.

Jesa (Wuxi) Co., Ltd. is a Sino-Swiss joint-venture enterprise. By introducing the Swiss management, quality control system, technology and excellent design **Jesa Wuxi** has organized an integrated bearing production base for Jesa group worldwide in Wuxi of Yangtze River Delta, the most developed area in China. **Jesa Wuxi** focuses on the manufacturing of various kinds of high precision bearing products, more than 2000 types of products cover most of the popular precision ball bearings in all industry fields such as automotive, power tools, electrical motors, industrial fans, textile machines, printing machines, furniture, escalator, and etc..

JESA公司成立于1969年，位于Fribourg，瑞士最大的轴承制造商。

杰尚无锡公司为**JESA** 瑞士在中国的合资企业。通过引进瑞士的先进管理和质量控制体系以及采用其先进的技术和设计，并结合本地的资源及生产优势，杰尚无锡已在中国最发达的长三角地区的无锡为杰尚全球集团组建了一个一体化的生产基地。杰尚无锡致力于轴承产品的生产与制造，其产品涵盖各工业门类中常用的精密球轴承, 如汽车、电动工具、电机、工业风扇、纺织机械、印刷机械、高档家具、自动扶梯 及其它。

杰 尚 理 念
JESA Concept - 6 points

客户至上 OUR CLIENTS motivate us and drive our way of thinking. We are dynamic and proactive in search of your perfect solution. We do whatever is required to achieve success for customers.

开拓创新 INNOVATION is embedded in the JESA culture. We interact with all parties to provide maximum creativity.

精益求精 PRECISION is the main aim of our products, services and timescales.

以人为本 EMPLOYEES are our sources of competitive advantage and we are proud of our team. They are reliable, loyal and contribute significantly to our success. We expect them to play a pivotal role in our future.

诚信合作 PARTNERS are our major drivers, both customers and suppliers. They are extremely competent and contribute significantly to our proposals.

持续发展 CONTINUITY is assured. This is achieved by substantial investment in the latest technology and our aim to continually strive for continuous improvement. Jesa takes their responsibilities to life and to environment very seriously.

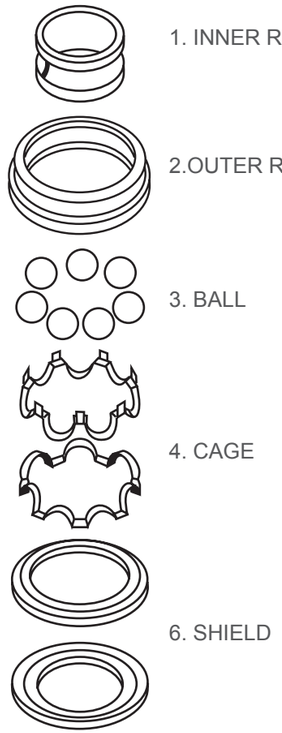
技 术 说 明
Basic Technical Information

1 Structure and Feature / 结构及特点

1.1 Structure / 结构

Ball bearings consist of two circular steel rings and a set of rolling elements. One of the rings is much larger than the other. It is referred as the outer ring. The smaller of the two is the inner ring. A predetermined number of solid balls are formed into geometric shapes and placed at equal intervals in the open space between the two rings. These components are usually made of steel and are referred to as rolling elements. A cage, or retainer, is then used to maintain the intervals between the rolling elements.

No.	Essential Components
1	Inner Ring
2	Outer Ring
3	Balls / Rolling Elements
4	Cage / Retainer
5	Lubricant
6	Shield / Seal （Optional）



1.2 Feature / 特点

Customer use of surface tension allows balls of high accuracy to be made much cheaper than comparable cylinders. Ball bearings can support both radial (perpendicular to the shaft) and axial loads (parallel to the shaft). For lightly-loaded bearings, balls offer lower friction than rollers. Ball bearings can operate when the bearing races are misaligned.

2 Bearing Selection / 轴承的选择

2.1 Guideline / 总则

Ball bearings come in a wide variety of types, shapes and dimensions. The most important factor to consider in bearing selection is a bearing that will enable the machine or part in which it is installed to satisfactorily perform as expected.

To facilitate the selection process and to be able to select the most suitable bearing for the application, it is necessary to analyze the prerequisites and examine them from various standpoints. While there are no hard-and-fast rules in selecting a bearing, the following list of evaluation steps is offered as a general guideline in selecting the most appropriate bearing.

(1) Understand the type of machine the bearing is to be used in and operating conditions.
(2) Clearly define all demand factors.
(3) Select bearing type.
(4) Select bearing arrangement.
(5) Select bearing dimensions.
(6) Select bearing specifications.
(7) Select mounting method, etc.

2.2 Operating conditions and environment / 使用条件和环境

When selecting a bearing, having an accurate and comprehensive knowledge of which part of the machine or equipment it is to be installed in and the operating requirements and environment in which it will function, is the basis for selecting just the right bearing for the job. In the selection process, the following data is needed.

(1) The equipment's function and construction.
(2) Bearing mounting location.
(3) Bearing load (direction and value).
(4) Bearing speed.
(5) Vibration and shock load.
(6) Bearing temperature (ambient and friction generated).
(7) Environment (corrosion, lubrication, cleanliness of the environment, etc.).

2.3 Demand factors / 需求因素

The required performance capacity and function demands are defined in accordance with the bearing application conditions and operating conditions. A list of general demand factors to be considered：

(1) Dimension limitations
(2) Durability
(3) Running accuracy
(4) Allowable speed
(5) Rigidity
(6) Noise/vibration
(7) Friction torque
(8) Allowable misalignment for inner/outer rings
(9) Requirements for mounting-dismounting
(10) Bearing availability and economy

2.4 Arrangement selection/排列选择

Shaft assemblies generally require two bearings to support and locate the shaft both radially and axially relative to the stationary housing. These two bearings are called the fixed and floating bearings. The fixed bearing takes both radial and axial loads and “locates” or aligns the shaft axially in relation to the housing. Being axially “free”, the floating bearing relieves stress caused by expansion and contraction of the shaft due to fluctuations in temperature, and can also allow for misalignment caused by fitting errors.

Bearings which can best support axial loads in both directions are most suitable for use as fixed bearings. In floating bearings the axial displacement can take place in the raceway (for example: cylindrical roller bearings) or along the fitting surfaces (for example: deep groove ball bearings). There is also the “cross location” arrangement in which both bearings (for example: angular contact ball bearings) act as fixing and non-fixing bearings simultaneously, each bearing guiding and supporting the shaft in one axial direction only. This arrangement is used mainly in comparatively short shaft applications.

2.5 Dimension selection/尺寸选择

Bearing dimension selection is generally based on the operating load and the bearing’s life expectancy requirements, as well as the bearing’s rated load capacity.

2.6 Specification determination/规格制定

Specifications for rolling bearings which are designed for the widest possible use have been standardized. However, to meet the diversity of applications required, a bearing of nonstandard design specifications may be selected. Items relating to bearing specification determination are：

(1) Bearing tolerance (dimensional and running)

(2) Bearing internal clearance and preload

(3) Bearing material and heat treatment

(4) Cage design and material

3 Load and Life / 负荷和寿命

ANSI/ABMA defines the recommended practice in fitting bearing inner rings to shaft and outer rings in housings. These fits are recommended in terms of light, normal, and heavy loading as defined:

Load	Ball Bearing
Light	⩽ 0.07 C*
Normal	＞ 0.07 C ⩽ 0.15 C
Heavy	＞ 0.15 C

* C : Rated load defined in bearing catalogue

3.1 Equivalent static load / 当量静负荷

Equivalent static load is an imaginary load. When the bearing is in a static mode or the rotating speed is extremely low, under conditions of this imaginary load, the contact stress of ball and raceway groove which bear the max. load is the same as that under actual load conditions.

The equivalent static load of radial bearing will adopt the larger value which results from the following two formulas.

$Po= XoFr+YoFa$

$Po= fr$

Among them:

Po indicates the equivalent static load (N,kgf)

Fr indicates the radial load (N,kgf)

Fa indicates the axial load (N,kgf)

Xo indicates the static radial load coefficient

Yo indicates the static axial load coefficient

3.2 Equivalent dynamic load / 当量动负荷

Calculation of radial bearing according to the following formula:

$P=XFr+YFa$

Among them:

P indicates the equivalent dynamic load (N,kgf)

Fr indicates the radial load (N,kgf)

Fa indicates the axial load (N,kgf)

X indicates the radial load coefficient

Y indicates the axial load coefficient

Though it can calculate the radial load and axial load, the load which actually effects the bearing is usually larger than the calculated value because of the mechanical vibration impact. The load value can be worked out according to the following formula:

$Fr=fw.Frc$

$Fa=fw.Fac$

Among them, Fr, Fa indicate the load (N,kgf) which effects the bearing.

Frc, Fac show the theoretically calculated load (N,kgf)

3.3 Basic rating static load / 基本静负荷

Basic rated static load (Co) is a static load which makes the bearing create the following calculated contact stress between the raceway groove contact part and ball that endures the max. stress. Ball bearing is 4200 Mpa ($428kgf/mm^2$)

In the contact part which bears such kind of contact stress, the sum total of the permanent deformation volume from the ball and raceway groove is about 0.0001 times of the ball package diameter.

3.4 Basic rating dynamic load / 基本静负荷

Basic dynamic load rating functions as the constant load to the external ring static bearing. Under this kind of load, the rated fatigue life is 1 million revolutions, r.p.m.
Rated fatigue life refers to total frequency of bearing running with 90% reliability to same model bearings under the same operating conditions. Under the circumstances of definite rotating speed, it usually indicates the rated fatigue life by total running period. It is common to only take the fatigue life into consideration for the research of bearing life.

Basic rated life of ball bearing (total rotary number) $L_{10}=(\frac{Cr}{p})^3$
It indicates the relations amid basic rated transient load, equivalent moving load and basic rated life. (time) $L_{10h}=\frac{10^6}{60n}(\frac{Cr}{p})^3$
It is more convenient to indicate the life by time when the bearing is rotated by Constant speed, as it is shown in formula

In the formula,
L_{10} indicates the basic rated life.
L_{10h} is indicated by hour to show the basic rated life
P indicates the equivalent moving load, N (kgf)
Cr indicates the basic dynamic load rating, N(kgf)
n indicates the rotating speed, rpm

3.5 Bearing life / 轴承寿命

After certain period of the bearing running, the accuracy has been lowered; the noise and vibration have been increased with lubricating grease ageing. The running face has been striped because of fatigue. Therefore the bearing can not be used any more. The service life of this kind of bearing is called the bearing life in a broad sense. They are respectively named as accuracy life, noise life, lubricating grease life , rolling fatigue life etc.

4 Dimensions and designations / 型号命名

1	2	3	4	5	6	7	8	9	10
Material	Type	Size	Cage	Shield/Seal	Additional on outer ring	Clearance	Precision	Vibration Level	Lubrication
S	MR	148	W	ZZ	NR	C2	A5	Z2	JL-02
Default = Chrome steel 100 Cr6 **S=** Stainless steel AISI 440C	**MR** =Metric **R**=inch Size	Basic model Abbreviation for the bearing according DIN (ISO, AFMBA)	**W** = Metallic Crown **J** = Metallic Ribbon **T9H** = Glass fiber reinforced molded nylon	**ENCLOSURES** Default = Open sides **Z** = Single metallic shield **ZZ** = Double metallic shield **RS** = Single rubber seal-contact **2RS** = Double rubber seal-contact **RZ** = Single rubber seal non-contact **2RZ** = Double rubber seal non-contact **Z/RS** = One side shield another side seal	Default= Radial without flange or Groove **F** = Radial with flange N = Groove only NR = Groove with snap ring installed	C0 C1 C2 C3 C4 C5	A1 = ABEC 1 / P0 A3 = ABEC 3 / P6 A5 = ABEC 5 / P5 A7 = ABEC 7 / P4	Z1 Z2 Z3	Lubricant letter codes are followed by a number to indicate specific type. See: Lubrication

5 Tolerance and Accuracy
公差和精度

JESA Wuxi bearings are manufactured according to DIN P0, P6, P5 and P4, respectively ABMA ABEC1, ABEC3, ABEC5 and ABEC7. For other types of functions, our special bearings have a suitable tolerance.

d, ds	Nominal bore diameter; Single bore diameter
dmp	Mean bore diameter: arithmetical mean of the largest & smallest single bore diameters measured in one radial plane
△dmp	dmp - d: deviation of mean bore diameter from the nominal dimension
△ds	ds - d: deviation of single bore diameter from the nominal dimension
Vdp	Bore diameter variation: difference between the largest & smallest single bore diameters in one radial plane
Vdmp	dmp max - dmp min: mean bore diameter variation; difference between the largest & smallest mean bore diameters
D, Ds	Nominal outside diameter; Single outside diameter
Dmp	Mean outside diameter: arithmetical mean of the largest & smallest single outside diameters in one radial plane
△Dmp	Dmp - D: deviation of mean outside diameter from nominal dimension
△Ds	Ds - D: deviation of mean outside diameter from nominal dimension
VDp	Outside diameter variation: difference between the largest & smallest single outside diameter in one radial plane
VDmp	Dmp max - Dmp min: mean outside diameter variation; difference between the largest & smallest mean outside diameters
Bs, Cs	Single ring width (inner and outer ring)
△Bs	Bs – B: Deviation of a single inner ring width from nominal dimension
△Cs	Cs – C: Deviation of a single outer ring width from nominal dimension
VBs	Bs max - Bs-min: Variation of inner ring widths; difference between the largest & smallest single inner ring width
VCs	Cs max - Cs min: Variation of outer ring widths; difference between the largest & smallest single outer ring width
Kia	Radial runout of assembled bearing inner ring
Kea	Radial runout of assembled bearing outer ring
Sd	Side face runout of inner ring with reference to bore
SD	Variation in inclination of outside cylindrical surface to outer ring side face
Sia	Assembled bearing inner ring face runout with raceway
Sea	Assembled bearing outer ring face runout with raceway

Inner ring tolerance
内圈公差

Grade 等级	d mm over	d mm to	△dmp um up	△dmp um to	Vdp (um) Series of OD 7.8.9 Max	Vdp (um) 0.1 Max	Vdp (um) 2.3.4 Max	Vdmp um Max	Kia um Max	Sia um Max	Sd um MAx	△Bs um up	△Bs um to	VBs um Max
P0 ABEC1	0.6	2.5	0	-8	10	8	6	6	10	-	-	0	-40	12
	2.5	10	0	-8	10	8	6	6	10	-	-	0	-120	15
	10	18	0	-8	10	8	6	6	10	-	-	0	-120	20
	18	30	0	-10	13	10	8	8	13	-	-	0	-120	20
	30	50	0	-12	15	12	9	9	15	-	-	0	-120	20
	50	80	0	-15	19	19	11	11	20	-	-	0	-150	25
	80	120	0	-20	25	25	15	15	25	-	-	0	-200	25
P6 ABEC3	0.6	2.5	0	-7	8	7	5	5	5	-	-	0	-40	12
	2.5	10	0	-7	9	7	5	5	6	-	-	0	-120	15
	10	18	0	-7	9	7	5	5	7	-	-	0	-120	20
	18	30	0	-8	10	8	6	6	8	-	-	0	-120	20
	30	50	0	-10	13	10	8	8	10	-	-	0	-120	20
	50	80	0	-12	15	15	9	9	10	-	-	0	-150	25
	80	120	0	-15	19	19	11	11	13	-	-	0	-200	25
P5 ABEC5	0.6	2.5	0	-5	5	4		3	4	7	7	0	-40	5
	2.5	10	0	-5	5	4		3	4	7	7	0	-40	5
	10	18	0	-5	5	4		3	4	7	7	0	-80	5
	18	30	0	-6	6	5		3	4	8	8	0	-120	5
	30	50	0	-8	8	6		4	5	8	8	0	-120	5
	50	80	0	-9	9	7		5	5	8	8	0	-150	6
	80	120	0	-10	10	8		5	6	9	9	0	-200	7
P4 ABEC7	0.6	2.5	0	-2.5	4	3		2	2.5	3	3	0	-40	2.5
	2.5	10	0	-2.5	4	3		2	2.5	3	3	0	-40	2.5
	10	18	0	-2.5	4	3		2	2.5	3	3	0	-80	2.5
	18	30	0	-2.5	5	4		2.5	3	4	4	0	-120	2.5
	30	50	0	-2.5	6	5		3	4	4	4	0	-120	3
	50	80	0	-4	7	5		3.5	4	5	5	0	-150	4
	80	120	0	-5	8	6		4	5	5	5	0	-200	4

Outer ring tolerance
外圈公差

Grade 等级	D mm		△Dmp um		VDp (um) Series of OD 7.8.9	0.1	2.3.4	Sealed 2.3.4	VDmp um	Kea um	Sea um	SD um	△Cs um		VCs um
	over	to	up	to	Max				Max	Max	Max	MAx	up	to	Max
P0 ABEC1	2.5	18	0	-8	10	8	6	10	6	15	-	-			
	18	30	0	-9	12	9	7	12	7	15	-	-			
	30	50	0	-11	14	11	8	16	8	20	-	-			
	50	80	0	-13	16	13	10	20	10	25	-	-			
	80	120	0	-15	19	19	11	26	11	35	-	-			Same as the VBs of the same bearing
	120	150	0	-18	23	23	14	30	14	40	-	-			
	150	180	0	-25	31	31	19	38	19	45	-	-			
P6 ABEC3	2.5	18	0	-7	9	7	5	9	5	8	-	-			
	18	30	0	-8	10	8	6	10	6	9	-	-			
	30	50	0	-9	11	9	7	13	7	10	-	-			
	50	80	0	-11	14	11	8	16	8	13	-	-			
	80	120	0	-13	16	16	10	20	10	18	-	-			
	120	150	0	-15	19	19	11	25	11	20	-	-			
	150	180	0	-18	23	23	14	30	14	23	-	-			
P5 ABEC5	2.5	18	0	-5	5		4	-	3	5	8	8	Same as the △Bs of the same bearing		5
	18	30	0	-6	6		5	-	3	6	8	8			5
	30	50	0	-7	7		5	-	4	7	8	8			5
	50	80	0	-9	9		7	-	5	8	10	8			6
	80	120	0	-10	10		8	-	5	10	11	9			8
	120	150	0	-11	11		10	-	6	11	13	10			8
	150	180	0	-13	13		11	-	7	13	14	10			8
P4 ABEC7	2.5	18	0	-4	4		3	-	2	3	5	4			2.5
	18	30	0	-5	5		4	-	2.5	4	5	4			2.5
	30	50	0	-6	6		5	-	3	5	5	4			2.5
	50	80	0	-7	7		5	-	3.5	5	5	4			3
	80	120	0	-8	8		6	-	4	6	6	5			4
	120	150	0	-9	9		7	-	5	7	7	5			5
	150	180	0	-10	10		8	-	5	8	8	5			5

6 Tolerance on Shafts and in Housings
装配轴孔公差

Ball and roller bearings are usually mounted on shafts or in housings with interference fits. This is done to prevent fretting corrosion that could be produced by relative movement between the bearing inner-ring bore and the shaft O.D. or the bearing outer-ring O.D. and the housing bore. The interference fit of the bearing inner ring with the shaft is usually accomplished by pressing the former member over the latter.

Each shaft-bearing fit tolerance range is designated by a lower case letter followed by a number, foe example, g6, h5, and so on up to the tightest fit r7. Similarly each tolerance range symbol for housing-bearing fit consists of an upper case letter followed by a number, for example, G7, H7, and so on up to the tightest fit P7.

Figure 6.1 graphically illustrates the range of each fit designation. Table 6.1 gives the ANSI/ABMA recommended practice for fitting rings on shaft. Table 6.2 similarly gives the data for fitting of bearing O.D. in housing bores.

Figure 6.1

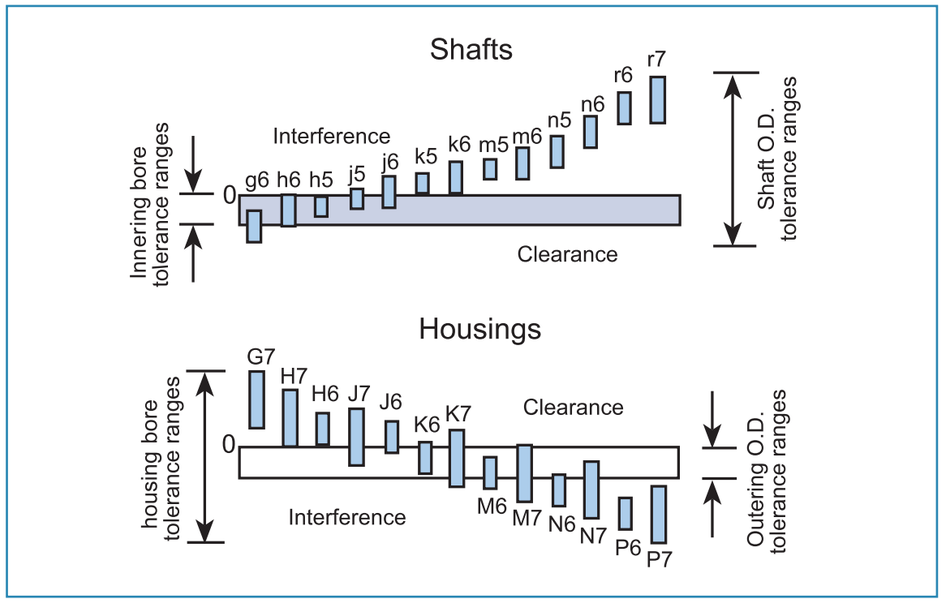


Table 6.1 Shaft Tolerance Range Classification Selection vs Bearing Operating Conditions for Metric Radial Ball Bearings of Tolerance Classes ABEC-1 or RBEC-1.
(Dimensions in Millimeters.)

DESIGN & OPERATING CONDITIONS			BALL BEARINGS		
Rotational Conditions	Inner Ring Axial Displaceability	Radial Loading	d Over	d Incl.	Tolerance Classification[1]
Inner Ring Rotating in relation to Load Direction or Load Direction is Indeterminate		Light	0	18	h5
			18	All	j6[2]
		Normal	0	18	j5
			18	All	k6
		Heavy	18	100	k5
			100	All	m5
Inner Ring Stationary in Relation to Load Direction	Inner Ring must be easily axially displaceable	Light Normal Heavy	All Sizes		g6
	Inner Ring need not be easily axially displaceable	Light Normal Heavy	All Sizes		h6
Pure Thrust (Axial) Load			All Sizes		j6

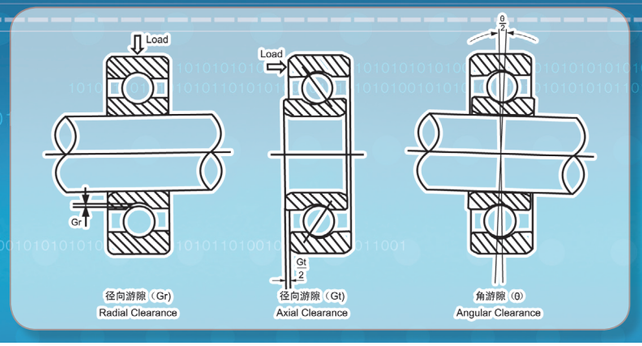
1. Tolerance classification shown is for solid steel shaft. For hollow or nonferrous shaft, tighter fits may be needed.
2. If greater accuracy is needed, substitute j5, k5 and m5 for j6, k6 and m6 respectively.

Table 6.2 Housing Bore Tolerance Range Classification Selection vs Bearing Operating Conditions for Metric Radial Ball Bearings.

DESIGN & OPERATING CONDITIONS				Tolerance Classification[1]
Rotational Conditions	Loading	Other Conditions	Outer Ring Axial Diaplaceability	
Outer Ring Stationary in relation to load direction	Light Normal or Heavy	Heat input through shaft	Outer ring axially diaplaceable	G7 [3]
		Housing split axially		H7 [2]
		Housing not split axially		H6 [2]
	Shock with temporary complete unloading		Transitional Range [4]	J6 [2]
Load Direction indeterminate	Light			
	Normal or heavy	Split not recommended		K6 [2]
	Heavy			M6 [2]
Outer Ring Rotating in relation to load direction	Light			
	Normal or heavy		Outer ring not easily axially displaceable	N6 [2]
	Heavy	Thin wall housing not split		P6 [2]

1. For cast iron or steel housings. For housings of non-ferrous alloys tighter fits may be needed.
2. Where wider tolerances are permissible, use tolerance classifications H8, H7, J7, K7, M7, N7 and P7 in place of H7, H6, J6, K6, M6, N6 and P6 respectively.
3. For large bearings and temperature differences between outer ring and housings greater than 10℃, F7 may be used instead of G7.
4. The tolerance zones are such that outer ring may be either tight or loose in the housing.

7 Bearing Internal Clearance
内部游隙



Internal clearance is the play between the outer ring, inner ring and rolling element. Generally, the amount of up and down movement of the outer ring with respect to the fixed inner ring is called the radial internal clearance and its right and left movement, the axial internal clearance. The angular clearance is the inclination of the outer ring with respect to the fixed inner ring. Bearing internal clearance in operation has a significant influence on noise, vibration, heat and fatigue life.

Radial Internal Clearance Standard for Deep Grove Ball Bearings

d(mm)		C2		C0 (CN)		C3		C4		C5	
over	To	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

*for measuring clearance, offset by compensation factor listed as below

d(mm)		Measuring load	C2	C0	C3	C4	C5
over	To	(N)					
10*	18	24.5	3~4	4	4	4	4
18	50	49	4~5	5	6	6	6
50	280	147	6~8	8	9	9	9

*included 10mm

Symbol	MC1		MC2		MC3		MC4		MC5		MC6	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Value	0	5	3	8	5	10	8	13	13	20	20	28

*for measuring clearance, offset by compensation factor listed as below

Symbol	MC1	MC2	MC3	MC4	MC5	MC6
Value	1	1	1	1	2	2

Measuring load is as follows:
Miniature bearings(OD<9) 2.5N
Small bearing(OD>=9, ID<10) 4.4N

8 Material
材质

8.1 Rings and Balls

The performance of a ball bearing is highly influenced by material which is used. The rings and balls of Jesa bearings are made of refined high carbon chrome steel AISI52100 or stainless steel AISI440C. For hybrid ceramic ball bearings, Silicon Nitride balls (Si3N4) was used for higher speed, extended operation life.

Chemical composition of chrome steel and stainless steel

Material	Chemical Composition						Equivalent		Hardness
	C%	Si%	Mn%	S%	P%	Cr%	GB	DIN	(HRC)
AISI 52100	0.95-1.05	0.15-0.3	0.25-0.45	<0.025	<0.025	1.3-1.6	GCr15	100Cr6	60~64
AISI 440C	0.90-1.05	<0.80	<0.8	<0.04	<0.03	16-19	9Cr18	X102CrMo17	58~62

8.2 Cages

Cage is to separate the balls at equal distances and guide the balls to keep low friction and heat development at a minimum. Cages are normally punch-pressed from brass strips H62 or steel strips 08, SPCC BQB402, as well as stainless steel strips AISI304, AISI302, fiber reinforced phonetic resin, etc.

8.3 Shields and seals

Shields: made of SPCC JISG3141 or stainless steel AISI304 or AISI302.
Seals: synthetic rubber hot pressed with steel skeleton (AISI304 or AISI302 may used for stainless steel bearings)

The function of seals and shields is to protect the bearing from contaminants and avoid any grease leakage. Shield is in non-contact design while a distinction is made between contact and non-contact seal.

9 Lubrications
润滑

Lubrication increases bearing life in most operating environments. Normally they are grease or oil.

Grease: Grease lubricant is comprised of a base oil carried in a thickening agent, which delays migration and evaporation of the oil, lengthening its effective operational and shelf life. Additives may also be included in the basic grease formula to improve corrosion resistance, reduce oxidation, and otherwise improve the lubricant performance. Grease lubrication is recommended unless low torque or high speed is essential to the application.

Oil: In general, oil is used as a lubricant where grease is unsuitable, for example, where low torque or high speed are considered. Typical oils used are the same as those used as the base oils in greases. The operational life of oils is usually much less than that of equivalent greases due to evaporative losses.

Specification of General Purpose Grease / 常用油脂规格表

Manufacturer	Grease Name	Code	Thickener	Base oil	Drop Point	Consistency	Operating Temp. °C low	Operating Temp. °C up
Kyodo Yushi	Multemp SRL	JL-01	Lithium hydroxyl Stearate	Polyol Ester, Diester	190	250	-50	150
	Multemp SRH	JL-18	Lithium soap	Polyol ester	200	250	-40	150
Shell	Alvania RLQ 2	JL-02	Lithium	Mineral	195	265-295	-25	120
	Alvania EP LF 2	JL-03	Lithium	Mineral	185	276	-20	110
	Aero Shell Fluid 12	JL-10	-	-	-	-	-40	100
Kluber	Staburags NBU 12/300KP	JL-04	Barium complex soap	Mineral oil	220	285-315	-20	140
	Isoflex LDS 18 special A	JL-05	Lithium soap	Ester oil, Mineral oil	190	265-295	-50	120
	Microlube GL 261	JL-06	spec. Lithium soap	Mineral hydrocarbon oil	220	310-340	-30	140
	Barrierta L55/2	JL-07	PTFE	Perfluorinated polyether oil	-	265-295	-40	260
	Isoflex NBU 15	JL-08	Barium complex soap	Mineral oil, Synthetic hydrocarbon oil, Ester oil	220	265-295	-40	130
	Kluberplex BEM 34-132	JL-11	Sp. Calcium soap	Synthetic hydrocarbon oil, Mineral oil	220	265-295	-35	140
	Klueberquiet BQ 72-72	JL-12	Polyurea	Ester oil	220	250-280	-45	180
	Petamo GHY 133N	JL-13	Polyurea	Mineral oil, Synthetic hydrocarbon oil	250	265-295	-30	160
	Isoflex Topas L32	JL-14	Lithium soap	Synthetic hydrocarbon oil	185	265-295	-60	130
	Asonic HQ 72-102	JL-15	Polyurea	Ester oil	240	250-280	-40	180
	Isoflex Super LDS 18	JL-17	Lithium soap	Ester oil, Mineral oil	190	265-295	-50	120
	Staburags NBU 12	JL-20	Barium complex soap	Mineral oil, Synthetic hydrocarbon oil, Ester oil	-	245-275	-15	140
ESSO	ESSO Unirex N3	JL-09	Lithium-complex	-	230	235	-20	150
	ESSO Beacon 325	JL-16	Lithium	Ester	180	285	-54	120
Nye	Nye Rheolube 390-A	JL-19	Aluminum complex soap	PAO	173	295	-50	125

TEMPERATURE CONVERSION: °F=(1.8 x °C) +32

10 Engineering Service
技术支持

Today, JESA Wuxi continues to meet the challenge of manufacturing of high quality ball bearing. As a TS-16949 and ISO 9001 certified company, excellence in manufacturing remains our guiding principle. Today, JESA Wuxi's reputation in the design and manufacture of deep groove and angular contact ball bearings is unsurpassed. Applications include automobile, machine tool, special machinery and building equipment.

JESA Wuxi Engineering services are available to all customers and prospective users of ball bearings. Our engineers and technicians have capabilities in every area of bearing design development, application, and testing. When bearing performance involving torque, vibration or stiffness is an issue, they can perform computer analysis of characteristics and requirements in order to determine a suitable bearing design.

10.1 Computer aid design/计算机辅助设计

3D Model

If standard catalogue bearings can not meet customer's needs, our development engineers can design a special bearing to satisfy your needs.

10.2 Analysis and Simulation/分析及模拟

JESA Wuxi engineering team can draw upon a wealth of technical information to aid in failure analysis or troubleshooting of performance problems. They can readily identify the contributing causes and recommend solutions to improve bearing performance or life.

10.3 Engineering Specification Form/技术规格表

In preparation for ordering JESA bearings, you may wish to note your system requirements on this form. All the information, you given us, will help to ensure that the components selected provide the optimum performance for your needs. If you would like more detailed information, please contact your local JESA representative. Please contact JESA for assistance in selecting Bearing and bearing parts.

See right page >>>

JESA.

Engineering Specification Form

Customer Information	Company / Department			
	Address			
	Phone / Fax			
	E-mail			
Model number / dimensions	Basic model number	If model ordered is a special size (d×D×B)		
		ϕ x ϕ x		
Equipment	1.New equipment 2.Experience of use with similar equipment 3.Replacement purposes			
	Type (model No.) Capacity Number used per machine			
Location used	1.Free side 2.Fixed side 3.Horizontal axis 4.Vertical axis 5.Diagonal axis			
Operating conditions	Rotation mode	1.Inner ring turns 2.Outer ring turns 3.Inner and outer rings turn 4.Continuous 5.Intermittent 6.Fluctuating 7.Reversing 8.Sudden acceleration 9.Vibration 10.Other ( )		
	Speed (rpm)	Minimum	Normal (continuous)	Maximum
	Loading (N)	Maximum load	Normal load (continuous)	
	Loading Radial			
	Loading Axial			
	Type of load	1.Vibration 2.Shock 3.Fluctuation 4.Moment 5.Other ( )		
	Temperature (℃)	Ambient:	Working:	
	Environment	Humidity		
	Environment	Cleanliness		
	Environment	Pressure Pa		
	Environment	Corrosion		
Current specifications	Material Inner ring:	Outer ring:	Balls:	Cage:
	Lubricant:			
	Other:			
	Frequency of replacement			
Diagram of installation site or other appropriate information				

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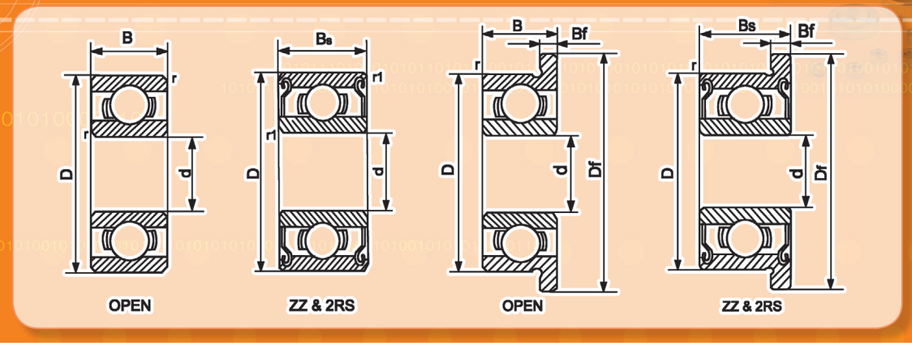
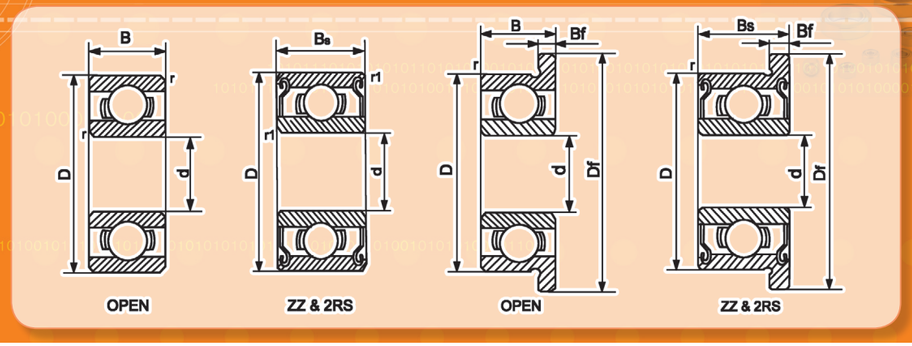
products



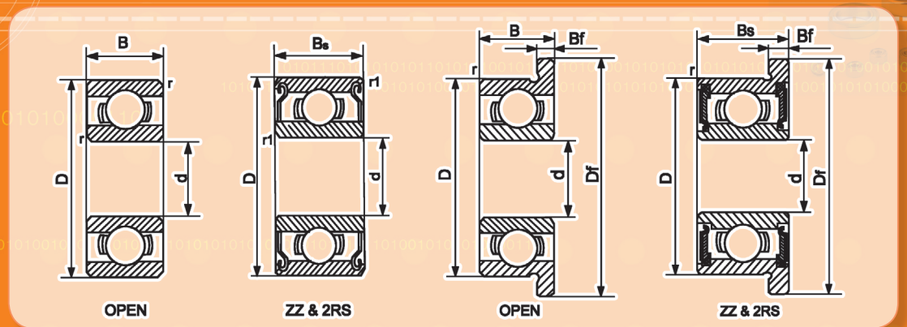
Basic Dimensions d	D	B Open	B Sealed	Type	Basic Load Cr	Basic Load Co	Speed Grease	Speed Oil	Flange Dia. Df	Flange Width Bf Open	Flange Width Bf Sealed	Weight Normal Open	Weight Normal Sealed	Weight Flanged Open	Weight Flanged Sealed
		mm			N		x 1000rpm		mm	mm		g		g	
	4	1.2	2	672	124	40	91	104	-	-		0.05	0.07	-	-
	5	1.5	2.3	682	169	50	85	100	6.1	0.5	0.6	0.15	0.2	0.19	0.24
	5	2	2.5	MR52	169	50	85	100	6.2	0.6	0.6	0.14	0.2	0.19	0.25
2	6	2.3	3	692	330	99	75	90	7.5	0.6	0.8	0.28	0.35	0.35	0.45
	6	2.5	2.5	MR62	330	99	75	90	7.2	0.6		0.28	0.33	0.34	-
	7	2.5	3	MR72	386	129	63	75	8.2	0.6	0.6	0.43	0.53	0.5	0.6
	7	2.8	3.5	602	386	129	60	71	8.5	0.7	0.9	0.5	0.6	0.6	0.73
	6	1.8	2.6	682X	209	74	71	80	7.1	0.5	0.8	0.2	0.35	0.24	0.42
2.5	7	2.5	3.5	692X	386	129	63	75	8.5	0.7	0.9	0.4	0.55	0.5	0.68
	8	2.5	-	MR82X	558	180	60	67	9.2	0.6	-	0.52	-	0.6	-
	8	2.8	4	602X	552	177	60	71	9.5	0.7	0.9	0.61	0.85	0.72	0.99
	6	2	2.5	MR63	209	74	71	80	7.2	0.6	0.6	0.2	0.28	0.26	0.34
	7	2	3	683	311	112	63	75	8.1	0.5	0.8	0.32	0.45	0.37	0.53
	8	2.5	3	MR83	395	141	60	67	9.2	0.6	-	0.51	0.67	0.59	-
	8	3	4	693	558	180	60	67	9.5	0.7	0.9	0.6	0.8	0.71	0.94
3	9	2.5	4	MR93	571	189	56	67	10.2	0.6	0.8	0.75	1.15	0.83	1.3
	9	3	5	603	571	189	56	67	10.5	0.7	1	0.84	1.13	0.96	1.61
	10	4	4	623	631	219	50	60	11.5	1	1	1.45	1.65	1.65	1.85
	13	5	5	633	1301	488	40	48	-	-	-	3.27	3.43	-	-
	7	2	2.5	MR74	311	115	60	67	8.2	0.6	0.6	0.23	0.33	0.3	0.4
	8	2	3	MR84	395	141	56	67	9.2	0.6	0.6	0.39	0.56	0.47	0.64
	9	2.5	4	684	641	227	53	63	10.3	0.6	1	0.65	1	0.74	1.15
	10	3	4	MR104	711	272	48	56	11.2	0.6	0.8	0.96	1.33	1.04	1.5
4	11	4	4	694	957	350	48	56	12.5	1	1	1.69	1.75	1.91	1.97
	12	4	4	604	957	350	48	56	13.5	1	1	2.19	2.34	2.42	2.57
	13	5	5	624	1301	488	40	48	15	1	1	3.1	3.2	3.44	3.54
	16	5	5	634	1340	523	36	43	18	1	1	5.24	5.44	5.66	5.86

Miniature Bearings – Metric series
微型球轴承·公制系列



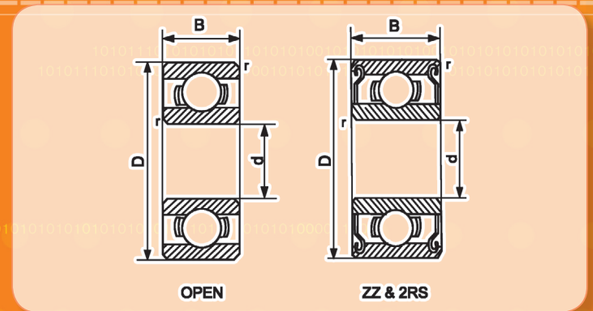
Basic Dimensions d	D	B Open	B Sealed	Type	Basic Load Cr	Basic Load Co	Speed Grease	Speed Oil	Flange Dia. Df	Flange Width Bf Open	Flange Width Bf Sealed	Weight Normal Open	Weight Normal Sealed	Weight Flanged Open	Weight Flanged Sealed
		mm			N		x 1000rpm		mm	mm		g		g	
	8	2	2.5	MR85	308	120	53	63	9.2	0.1	0.6	0.25	0.34	0.33	0.42
	9	2.5	3	MR95	431	169	50	60	10.2	0.6	0.6	0.54	0.58	0.62	0.66
	10	3	4	MR105	431	169	50	60	11.2	0.6	0.8	0.91	1.26	1	1.38
	11	-	4	MR115	716	282	45	53	12.6	-	0.8	-	0.62	-	0.81
5	11	3	5	685	716	282	45	53	12.5	0.8	1	1.16	1.93	1.33	2.15
	13	4	4	695	1077	432	43	50	15	1	1	2.39	2.31	2.73	2.65
	14	5	5	605	1329	507	40	50	16	1	1	3.46	3.75	3.83	4.12
	16	5	5	625	1729	675	36	43	18	1	1	4.95	5.1	5.37	5.52
	19	6	6	635	2336	896	32	40	22	1.5	1.5	8.5	8.89	9.26	9.65
	10	2.5	3	MR106	496	218	45	53	11.2	0.6	0.6	0.55	0.7	0.64	0.79
	12	3	4	MR126	716	295	43	50	13.2	0.6	0.8	1.25	1.66	1.44	1.86
	13	3.5	5	686	1082	442	40	50	15	1	1.1	1.87	2.68	2.21	3.06
6	15	5	5	696	1340	523	40	45	17	1.2	1.2	3.85	3.65	4.24	4.04
	17	6	6	606	2263	846	38	45	19	1.2	1.2	5.94	6.89	6.47	7.42
	19	6	6	626	2336	896	32	40	22	1.5	1.5	8.12	8.65	9.25	9.78
	22	7	7	636	3333	1423	30	36	-	-	-	13.9	14.5	-	-
	11	2.5	3	MR117	455	202	43	50	12.2	0.6	0.6	0.59	0.71	0.69	0.81
	13	3	4	MR137	541	276	40	48	14.2	0.6	0.8	1.52	2.01	1.64	2.17
	14	3.5	5	687	1173	513	40	50	16	1	1.1	2.03	2.95	2.4	3.35
7	17	5	5	697	1605	719	36	43	19	1.2	1.2	5.26	5.01	5.79	5.54
	19	6	6	607	2336	896	36	43	22	1.5	1.5	7.8	8.24	8.93	9.37
	22	7	7	627	3287	1379	30	36	25	1.5	1.5	12.7	13.1	14	14.4
	26	9	9	637	4563	1983	28	34	-	-	-	24.2	25.8	-	-
	12	2.5	3.5	MR128	543	274	40	48	13.2	0.6	0.8	0.7	0.99	0.81	1.14
	14	3.5	4	MR148	817	386	38	45	15.6	0.8	0.8	1.9	2.19	2.13	2.42
	16	4	5	688	1252	592	36	43	18	1	1.1	3.11	4.05	3.53	4.51
8	19	6	6	698	2237	917	36	43	22	1.5	1.5	7.12	7.57	8.5	8.7
	22	7	7	608	3293	1379	34	40	25	1.5	1.5	11.8	12.9	13.1	14.2
	24	8	8	628	3333	1423	28	34	-	-	-	17.1	18.5	-	-
	28	9	9	638	4563	1983	28	34	-	-	-	28.1	30.3	-	-
	14	3	4.5	679	919	468	36	42	15.5	0.8	0.8	1.35	1.98	1.57	2.2
	17	4	5	689	1327	668	36	43	19	1	1.1	3.41	4.38	3.85	4.87
	20	7	6	699	2467	1081	34	40	23	1.5	1.5	8.38	8.54	9.57	9.73
9	24	7	7	609	3356	1444	32	38	27	1.5	1.5	14.7	16	16.1	17.4
	26	8	8	629	4575	1983	28	34	-	-	-	19	21.8	-	-
	30	10	10	639	4659	2080	24	30	-	-	-	36.2	37.1	-	-

Miniature Bearings – Inch series
微型球轴承·英制系列



Basic Dimensions d	D	B Open	B Sealed	Type	Basic Load Cr	Basic Load Co	Speed Grease	Speed Oil	Flange Dia. Df	Flange Width Bf Open	Flange Width Bf Sealed	Weight Normal Open	Weight Normal Sealed	Weight Flanged Open	Weight Flanged Sealed
	mm				N		x 1000rpm		mm	mm		g		g	
1.984	6.350	2.38	3.57	R1-4	284	96	67	80	7.518	0.584	0.787	0.40	0.53	0.46	0.61
2.380	4.762	1.59	2.38	R133	189	60	80	95	5.944	0.457	0.787	0.10	0.15	0.13	0.21
	7.938	2.78	3.57	R1-5	552	176	60	71	9.119	0.584	0.787	0.60	1.15	0.67	1.25
3.175	6.350	2.38	2.78	R144	311	110	67	80	7.518	0.584	0.787	0.27	0.32	0.33	0.40
	7.938	2.78	3.57	R2-5	558	180	60	67	9.119	0.584	0.787	0.50	0.74	0.57	0.84
	9.525	2.78	3.57	R2-6	640	227	53	63	10.72	0.584	0.787	0.96	1.23	1.05	1.35
	9.525	3.97	3.97	R2	631	219	56	67	11.18	0.762	0.762	1.04	1.37	1.20	1.53
	12.700	4.37	4.37	R2A	640	227	53	63	-	-	-	3.30	3.30	-	-
3.967	7.938	2.78	3.18	R155	359	150	53	63	9.119	0.584	0.914	0.51	0.61	0.58	0.72
4.762	7.938	2.78	3.18	R156	359	150	53	63	9.119	0.584	0.914	0.40	0.45	0.47	0.56
	9.525	3.18	3.18	R166	709	272	50	60	10.72	0.584	0.787	0.81	0.85	0.90	0.97
	12.700	3.97	4.98	R3	1301	488	43	53	14.35	1.067	1.067	2.21	2.95	2.5	3.24
	15.880	4.98	4.98	R3A	1480	621	38	45	-	-	-	4.75	5.08	-	-
6.350	9.525	3.18	3.18	R168	373	172	48	56	10.72	0.584	0.914	0.57	0.60	0.66	0.73
	12.700	3.18	4.76	R188	1082	442	40	50	13.89	0.584	1.143	1.60	2.32	1.71	2.54
	15.880	4.98	4.98	R4	1480	621	38	45	17.53	1.067	1.607	4.46	4.54	4.82	4.90
	19.050	5.56	7.14	R4A	2336	896	36	43	-	-	-	7.48	10.0	-	-
7.938	12.700	3.97	3.97	R1810	542	276	40	48	13.89	0.787	0.787	1.39	1.57	1.54	1.72
9.525	22.230	5.56	7.14	R6	3332	1422	32	38	24.61	1.575	1.575	9.02	11.7	9.71	12.4
12.700	28.580	6.35	7.94	R8	5108	2413	27	32	31.12	1.575	1.575	11.6	24.1	13.0	25.6
15.875	34.930	7.14	8.73	R10	5988	3287	21	25	-	-	-	23.5	38.1		-
19.050	41.280	7.94	11.11	R12	9378	5057	17	21	-	-	-	53.1	69.3		-
22.225	47.625	9.53	12.70	R14	10060	5850	15	18	-	-	-	74.8		-	-
25.400	50.800	9.53	12.70	R16	10060	5850	14	16	-	-	-	80.8		-	-
28.575	53.975	9.53	12.70	R18	13230	8300	13	15	-	-	-	84.7		-	-
31.750	57.150	9.53	12.70	R20	13230	8300	12	14	-	-	-	90.3		-	-
34.925	63.500	11.11	14.29	R22	16210	10420	11	13	-	-	-	133.2		-	-
38.100	66.675	11.11	14.29	R24	17030	11700	10	12	-	-	-	138.4		-	-
15.875	34.925	-	11.00	99502H	7650	3720	17	22	-	-	-	-	43.0	-	-

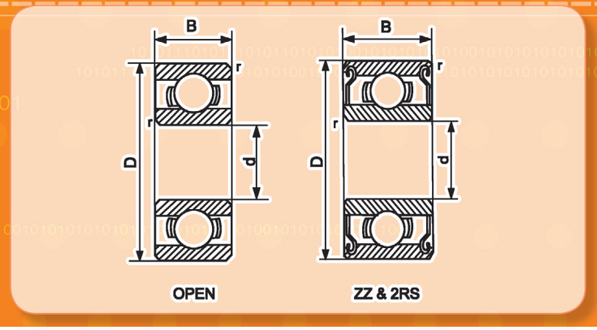
Deep Groove Ball Bearings – 6700, 6800 series
深沟球轴承·薄壁系列



Bearing Type	Principal Dimensions d	D	B	Radius Rs(min)	Basic Load Cr	Basic Load Co	Limiting speed Grease	Limiting speed oil	Weight
	mm				N		r/min		kg
6700	10	15	*4	0.15	800	390	15000	17000	0.0014
6701	12	18	4	0.20	910	530	13000	15000	0.0031
6702	15	21	4	0.20	850	490	11000	13000	0.0036
6703	17	23	4	0.20	960	610	9500	11000	0.0040
6704	20	27	4	0.20	1030	720	8500	10000	0.0059
6705	25	32	4	0.20	1090	830	7000	8000	0.0071
6706	30	37	4	0.20	1170	980	5500	7000	0.0083
6707	35	44	5	0.30	1866	1635	4900	6000	0.0150
6708	40	50	6	0.30	2516	2233	4300	5000	0.0230
6709	45	55	6	0.30	2580	2397	3900	4600	0.0250
6710	50	62	6	0.30	2670	2640	3500	4100	0.0640
6800	10	19	5	0.30	1380	585	36000	43000	0.0055
6801	12	21	5	0.30	1430	670	32000	38000	0.0063
6802	15	24	5	0.30	1560	800	28000	34000	0.0074
6803	17	26	5	0.30	1680	930	24000	30000	0.0082
6804	20	32	7	0.30	2700	1500	19000	24000	0.018
6805	25	37	7	0.30	4360	2600	17000	20000	0.022
6806	30	42	7	0.30	4490	2900	15000	18000	0.027
6807	35	47	7	0.30	4750	3200	13000	16000	0.030
6808	40	52	7	0.30	4940	3450	11000	14000	0.034
6809	45	58	7	0.30	6050	4300	9500	12000	0.040
6810	50	65	7	0.30	6240	4750	9000	11000	0.052
6811	55	72	9	0.30	8840	6800	8500	10000	0.083
6812	60	78	10	0.30	8710	6700	7500	9000	0.110
6813	65	85	10	0.60	11900	9650	7000	8500	0.130
6814	70	90	10	0.60	12100	10000	6700	8000	0.140
6815	75	95	10	0.60	12500	10800	6300	7500	0.150
6816	80	100	10	0.60	12700	11200	6000	7000	0.150
6817	85	110	13	1.00	19500	16600	5300	6300	0.270
6818	90	115	13	1.00	19500	17000	5300	6300	0.280
6819	95	120	13	1.00	19900	17600	5000	6000	0.300
6820	100	125	13	1.00	19900	18300	4800	5600	0.310

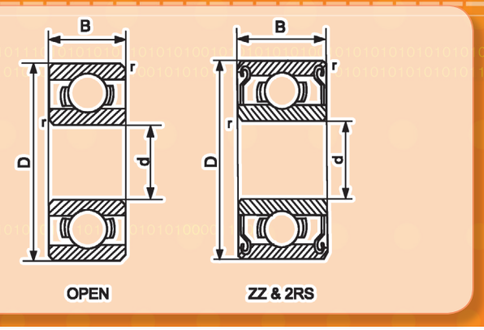
* OPEN Type: 3mm

Deep Groove Ball Bearings – 6900 series
深沟球轴承·薄壁系列



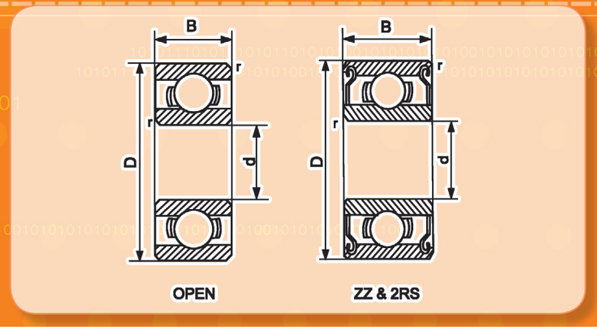
Bearing Type	Principal Dimensions d	D	B	Radius Rs(min)	Basic Load Cr	Co	Limiting speed Grease	oil	Weight
	mm				N		r/min		kg
6900	10	22	6	0.30	1950	750	34000	40000	0.010
6901	12	24	6	0.30	2250	980	30000	36000	0.011
6902	15	28	7	0.30	4030	2040	24000	30000	0.016
6903	17	30	7	0.30	4360	2320	22000	28000	0.018
6904	20	37	9	0.30	6370	3650	18000	22000	0.038
6905	25	42	9	0.30	6630	4000	16000	19000	0.045
6906	30	47	9	0.30	7280	4550	14000	17000	0.051
6907	35	55	10	0.60	9560	6200	11000	14000	0.08
6908	40	62	12	0.60	13800	9300	10000	13000	0.12
6909	45	68	12	0.60	14000	9800	9000	11000	0.14
6910	50	72	12	0.60	14600	10400	8500	10000	0.14
6911	55	80	13	1.00	15900	11400	8000	9500	0.19
6912	60	85	13	1.00	16500	12000	7500	9000	0.20
6913	65	90	13	1.00	17400	13400	6700	8000	0.22
6914	70	100	16	1.00	23800	18300	6300	7500	0.35
6915	75	105	16	1.00	24200	19300	6000	7000	0.37
6916	80	110	16	1.00	25100	20400	5600	6700	0.40
6917	85	120	18	1.10	31900	30000	5300	6300	0.55
6918	90	125	18	1.10	33200	31500	5000	6000	0.59
6919	95	130	18	1.10	33800	33500	4800	5600	0.61
6920	100	140	20	1.10	42300	41500	4500	5300	0.83

Deep Groove Ball Bearings – 16000 series
深沟球轴承·公制系列



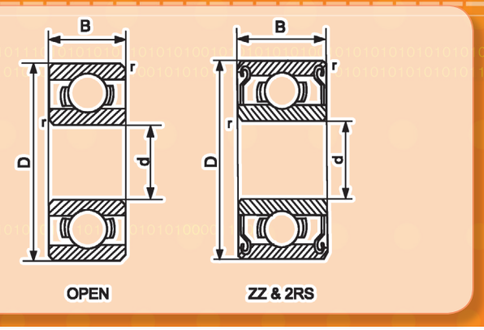
Bearing Type	Principal Dimensions d	D	B	Radius Rs(min)	Basic Load Cr	Co	Limiting speed Grease	oil	Weight
	mm				N		r/min		kg
16100	10	28	8	0.3	4620	1960	28000	34000	0.022
16101	12	30	8	0.3	5070	2360	26000	32000	0.023
16002	15	32	8	0.3	5590	2850	22000	28000	0.025
16003	17	35	8	0.3	6050	3250	19000	24000	0.032
16004	20	42	8	0.3	6890	4050	17000	20000	0.050
16005	25	47	8	0.3	7610	4750	14000	17000	0.060
16006	30	55	9	0.3	11200	7350	12000	15000	0.085
16007	35	62	9	0.3	12400	8150	10000	13000	0.110
16008	40	68	9	0.3	13300	9150	9500	12000	0.130
16009	45	75	10	0.6	15600	10800	9000	11000	0.170
16010	50	80	10	0.6	16300	11400	8500	10000	0.180
16011	55	90	11	0.6	19500	14000	7500	9000	0.260
16012	60	95	11	0.6	19900	15000	6700	8000	0.280
16013	65	100	11	0.6	21200	16600	6300	7500	0.300
16014	70	110	13	0.6	28100	25000	6000	7000	0.430
16015	75	115	13	0.6	28600	27000	5600	6700	0.460
16016	80	125	14	0.6	33200	31500	5300	6300	0.600
16017	85	130	14	0.6	33800	33500	5000	6000	0.630
16018	90	140	16	1.0	41600	39000	4800	5600	0.850
16019	95	145	16	1.0	42300	41500	4500	5300	0.890
16020	100	150	16	1.0	44200	44000	4300	5000	0.910

Deep Groove Ball Bearings – 6000 series
深沟球轴承·公制系列



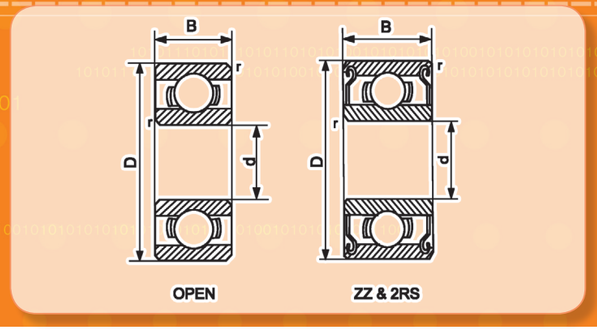
Bearing Type	Principal Dimensions d	D	B	Radius Rs(min)	Basic Load Cr	Co	Limiting speed Grease	oil	Weight
	mm				N		r/min		kg
6000	10	26	8	0.3	4620	1960	30000	36000	0.019
6001	12	28	8	0.3	5070	2360	26000	32000	0.022
6002	15	32	9	0.3	5590	2850	22000	28000	0.030
6003	17	35	10	0.3	6050	3250	19000	24000	0.039
6004	20	42	12	0.6	9360	5000	17000	20000	0.069
6005	25	47	12	0.6	11200	6550	15000	18000	0.080
6006	30	55	13	1.0	13300	8300	12000	15000	0.120
6007	35	62	14	1.0	15900	10200	10000	13000	0.160
6008	40	68	15	1.0	16800	11600	9500	12000	0.190
6009	45	75	16	1.0	20800	14600	9000	11000	0.250
6010	50	80	16	1.0	21600	16000	8500	10000	0.260
6011	55	90	18	1.1	28100	21200	7500	9000	0.390
6012	60	95	18	1.1	29600	23200	6700	8000	0.420
6013	65	100	18	1.1	30700	25000	6300	7500	0.440
6014	70	110	20	1.1	37700	31000	6000	7000	0.600
6015	75	115	20	1.1	39700	33500	5600	6700	0.640
6016	80	125	22	1.1	47500	40000	5300	6300	0.850
6017	85	130	22	1.1	49400	43000	5000	6000	0.890
6018	90	140	24	1.5	58500	50000	4800	5600	1.150
6019	95	145	24	1.5	60500	54000	4500	5300	1.200
6020	100	150	24	1.5	60500	54000	4300	5000	1.250

Deep Groove Ball Bearings – 6200 series
深沟球轴承·公制系列



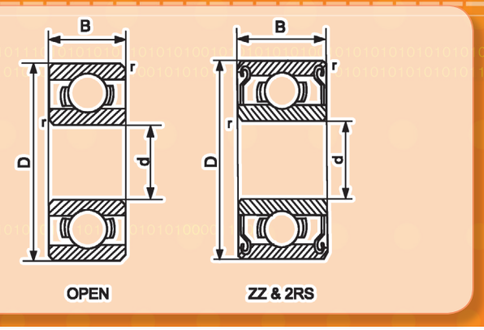
Bearing Type	Principal Dimensions d	D	B	Radius Rs(min)	Basic Load Cr	Co	Limiting speed Grease	oil	Weight
	mm				N		r/min		kg
6200	10	30	9	0.6	5070	2360	24000	30000	0.032
6201	12	32	10	0.6	6890	3100	22000	28000	0.037
6202	15	35	11	0.6	7800	3750	19000	24000	0.045
6203	17	40	12	0.6	9560	4750	17000	20000	0.065
6204	20	47	14	1.0	12700	6550	15000	18000	0.110
6205	25	52	15	1.0	14000	7800	12000	15000	0.130
6206	30	62	16	1.0	19500	11200	10000	13000	0.200
6207	35	72	17	1.1	25500	15300	9000	11000	0.290
6208	40	80	18	1.1	30700	19000	8500	10000	0.370
6209	45	85	19	1.1	33200	21600	7500	9000	0.410
6210	50	90	20	1.1	35100	23200	7000	8500	0.460
6211	55	100	21	1.5	43600	29000	6300	7500	0.610
6212	60	110	22	1.5	52700	36000	6000	7000	0.780
6213	65	120	23	1.5	55900	40500	5300	6300	0.990
6214	70	125	24	1.5	60500	45000	5000	6000	1.050
6215	75	130	25	1.5	66300	49000	4800	5600	1.200
6216	80	140	26	2.0	70200	55000	4500	5300	1.400
6217	85	150	28	2.0	83200	64000	4300	5000	1.800
6218	90	160	30	2.0	95600	73500	3800	4500	2.150
6219	95	170	32	2.1	108000	81500	3600	4300	2.600
6220	100	180	34	2.1	124000	93000	3400	4000	3.150

Deep Groove Ball Bearings - 6300 series
深沟球轴承·公制系列



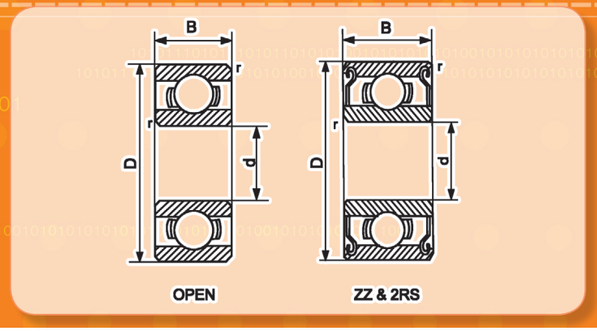
Bearing Type	Principal Dimensions d	D	B	Radius Rs(min)	Basic Load Cr	Co	Limiting speed Grease	oil	Weight
	mm				N		r/min		kg
6300	10	35	11	0.6	8060	3400	20000	26000	0.053
6301	12	37	12	1.0	9750	4150	19000	24000	0.060
6302	15	42	13	1.0	11400	5400	17000	20000	0.082
6303	17	47	14	1.0	13500	6550	16000	19000	0.120
6304	20	52	15	1.1	15900	7800	13000	16000	0.140
6305	25	62	17	1.1	22500	11600	11000	14000	0.230
6306	30	72	19	1.1	28100	16000	9000	11000	0.350
6307	35	80	21	1.5	33200	19000	8500	10000	0.460
6308	40	90	23	1.5	41000	24000	7500	9000	0.630
6309	45	100	25	1.5	52700	31500	6700	8000	0.830
6310	50	110	27	2.0	61800	38000	6300	7500	1.050
6311	55	120	29	2.0	71500	45000	5600	6700	1.350
6312	60	130	31	2.1	81900	52000	5000	6000	1.700
6313	65	140	33	2.1	92300	60000	4800	5600	2.100
6314	70	150	35	2.1	104000	68000	4500	5300	2.500
6315	75	160	37	2.1	114000	76500	4300	5000	3.000
6316	80	170	39	2.1	124000	86500	3800	4500	3.600
6317	85	180	41	3.0	133000	96500	3600	4300	4.250
6318	90	190	43	3.0	143000	108000	3400	4000	4.900
6319	95	200	45	3.0	153000	118000	3200	3800	5.650
6320	100	215	47	3.0	174000	140000	3000	3600	7.000

Deep Groove Ball Bearings - 6400 series
深沟球轴承·公制系列



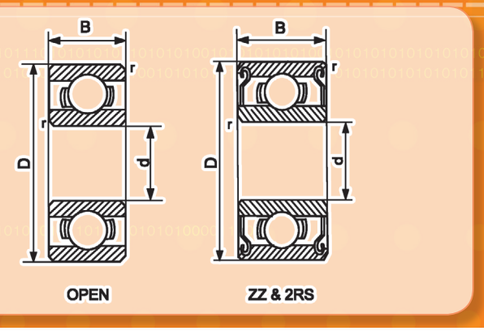
Bearing Type	Principal Dimensions d	D	B	Radius Rs(min)	Basic Load Cr	Co	Limiting speed Grease	oil	Weight
	mm				KN		r/min		kg
6403	17	62	17	1.1	22.9	10.8	12000	15000	0.27
6404	20	72	19	1.1	30.7	15	10000	13000	0.4
6405	25	80	21	1.5	35.8	19.3	9000	11000	0.53
6406	30	90	23	1.5	43.6	23.6	8500	10000	0.74
6407	35	100	25	1.5	55.3	31	7000	8500	0.95
6408	40	110	27	2	63.7	36.5	6700	8000	1.25
6409	45	120	29	2	76.1	45	6000	7000	1.55
6410	50	130	31	2.1	87.1	52	5300	6300	1.90

Deep Groove Ball Bearings-62200, 62300 series
深沟球轴承·公制系列



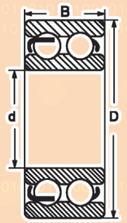
Bearing Type	Principal Dimensions d	D	B	Radius Rs(min)	Basic Load Cr	Co	Limiting speed Grease	oil	Weight
	mm				KN		r/min		kg
62200	10	30	14	0.6	5.11	2.39	24000	30000	0.044
62201	12	32	14	0.6	6.82	3.06	22000	28000	0.053
62202	15	35	14	0.6	7.67	3.72	19000	24000	0.065
62203	17	40	16	0.6	9.57	4.79	17000	20000	0.069
62204	20	47	18	1	12.84	6.65	15000	18000	0.145
62205	25	52	18	1	14.02	7.88	12000	15000	0.172
62206	30	62	20	1	19.46	11.31	10000	13000	0.275
62207	35	72	23	2	25.67	15.3	9500	12000	0.41
62208	40	80	23	2	29.52	18.14	8500	10000	0.616
62209	45	85	23	2	31.67	20.68	8000	9500	0.625
62210	50	90	23	2	35.07	23.18	7500	9000	0.726
62300	10	35	11	0.6	7.66	3.48	20000	26000	0.078
62301	12	37	12	1	9.72	5.08	19000	24000	0.079
62302	15	42	13	1	11.5	5.42	17000	20000	0.099
62303	17	47	14	1	13.5	6.58	16000	18000	0.14
62304	20	52	15	1.1	15.8	7.88	13000	16000	0.185
62305	25	62	17	1.1	22.2	11.5	11000	14000	0.284
62306	30	72	19	1.1	27	15.2	9000	11000	0.46
62307	35	80	21	1.5	33.2	19.2	8500	10000	0.56
62308	40	90	23	1.5	40.8	24	7500	9000	0.85
62309	45	100	25	1.5	52.8	31.8	6700	8000	1.1
62310	50	110	40	2	62	38	6000	7000	1.5

Deep Groove Ball Bearings-1600 series
深沟球轴承·单列英制系列



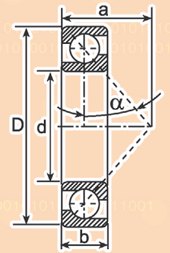
Bearing Type	d		Principal Dimensions D		B		Basic Load Cr	Co	Weight Grease
	(Frac.)	(IN)	(Frac.)	(IN)	(Frac.)	(IN)	N		g
1601	3/16	0.1875	11/16	0.6875	1/4	0.250	1280	578	4.1
1602	1/4	0.2500	11/16	0.6875	1/4	0.250	1280	578	6.4
1603	5/16	0.3125	7/8	0.8750	9/32	0.281	1925	916	9.5
1604	3/8	0.3750	7/8	0.8750	9/32	0.281	1925	916	8.6
1605	5/16	0.3125	29/32	0.9062	5/16	0.312	1556	845	16.8
1606	3/8	0.3750	29/32	0.9062	5/16	0.312	1556	845	21.8
1607	7/16	0.4375	29/32	0.9062	5/16	0.312	1556	845	22.2
1614	3/8	0.3750	1-1/8	1.1250	3/8	0.375	2952	1556	34.9
1615	7/16	0.4375	1-1/8	1.1250	3/8	0.375	2952	1556	32.2
1616	1/2	0.5000	1-1/8	1.1250	3/8	0.375	2952	1556	29.9
1620	7/16	0.4375	1-3/8	1.3750	7/16	0.437	3916	2147	45.4
1621	1/2	0.5000	1-3/8	1.3750	7/16	0.437	3916	2147	48.1
1622	9/16	0.5625	1-3/8	1.3750	7/16	0.437	3916	2147	45.8
1623	5/8	0.6250	1-3/8	1.3750	7/16	0.437	3916	2147	39.9
1628	5/8	0.6250	1-5/8	1.6250	1/2	0.500	5001	2921	72.1
1630	3/4	0.750	1-5/8	1.6250	1/2	0.500	5001	2921	64.9
1633	5/8	0.6250	1-3/4	1.7500	1/2	0.500	5001	2921	92.1
1635	3/4	0.7500	1-3/4	1.7500	1/2	0.500	5001	2921	84.8
1638	3/4	0.7500	2	2.0000	9/16	0.562	7468	4534	120.2
1640	7/8	0.8750	2	2.0000	9/16	0.562	7468	4534	112.0
1641	1	1.0000	2	2.0000	9/16	0.562	7468	4534	100.2
1652	1-1/8	1.1250	2-1/2	2.5000	5/8	0.625	9602	6370	210.0
1654	1-1/4	1.2500	2-1/2	2.5000	5/8	0.625	9602	6370	190.1
1657	1-1/4	1.2500	2-9/16	2.5625	11/16	0.687	11229	7913	205.0
1658	1-5/16	1.3125	2-9/16	2.5625	11/16	0.687	11229	7913	200.0

Deep Groove Ball Bearings-4200, 4300 series
深沟球轴承·双列系列



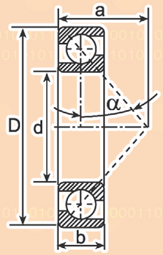
Bearing Type	Principal Dimensions			Basic Load		Limiting speed		Weight
	d	D	B	Cr	Co	Grease	oil	
	mm			kN		r/min		kg
4200	10	30	14	9.23	5.2	18000	22000	0.049
4201	12	32	14	10.6	6.2	17000	20000	0.053
4202	15	35	14	11.9	7.5	14000	17000	0.059
4203	17	40	16	14.8	9.5	12000	15000	0.09
4204	20	47	18	17.8	12.5	10000	13000	0.14
4205	25	52	18	19.0	14.6	9000	11000	0.16
4206	30	62	20	26.0	20.8	8000	9500	0.26
4207	35	72	23	35.1	28.5	6700	8000	0.40
4208	40	80	23	37.1	32.5	6000	7000	0.50
4209	45	85	23	39.0	36.0	5600	6700	0.54
4210	50	90	23	41.0	40.0	5000	6000	0.58
4211	55	100	25	44.9	44.0	4800	5600	0.80
4212	60	110	28	57.2	55.0	4500	5300	1.10
4213	65	120	31	67.6	67.0	4000	4800	1.45
4214	70	125	31	70.2	73.5	3600	4300	1.50
4215	75	130	31	72.8	80.0	3400	4000	1.60
4302	15	42	17	13.1	11.7	11000	14000	0.123
4303	17	47	19	16.5	15.0	9400	13000	0.171
4304	20	52	21	19.5	17.0	8300	11000	0.227
4305	25	62	24	26.3	25.7	6700	9000	0.365
4306	30	72	27	35.5	35.9	5700	7500	0.542
4307	35	80	31	40.6	41.8	5200	7000	0.752
4308	40	90	33	40.6	48.8	4600	6100	1.01
4309	45	100	36	57.6	62.4	4100	5500	1.35
4310	50	110	40	70.4	77.7	3700	5000	1.80
4311	55	120	43	84.2	94.4	3400	4600	2.29
4312	60	130	46	99.2	113.0	3100	4200	2.87
4313	65	140	48	107.0	124.0	2900	6900	3.46
4314	70	150	51	115.0	136.0	2700	3600	4.21
4315	75	160	55	132.0	158.0	2500	3400	5.15

Angular Contact Ball Bearings-71800 series
角接触球轴承·单列系列



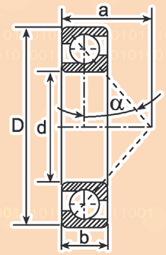
Bearing Type	Principal Dimensions			α= 15° Suffix C				α= 25° Suffix AC			
	d	D	B	Basic Load(kN)		Limiting speed(r/min)		Basic Load(kN)		Limiting speed(r/min)	
	mm			Cr	Cor	Grease	oil	Cr	Cor	Grease	oil
71800	10	19	5	1.9	0.98	75000	120000	1.8	0.93	70000	110000
71801	12	21	5	2.08	1.18	67000	100000	1.96	1.12	60000	90000
71802	15	24	5	2.28	1.5	56000	85000	2.16	1.4	50000	75000
71803	17	26	5	2.32	1.6	50000	75000	2.2	1.53	48000	70000
71804	20	32	7	3.8	2.65	43000	63000	3.65	2.5	38000	56000
71805	25	37	7	4.15	3.2	36000	53000	3.9	3	32000	48000
71806	30	42	7	4.4	3.65	30000	45000	4.15	3.4	28000	43000
71807	35	47	7	4.65	4.15	26000	40000	4.4	3.8	24000	38000
71808	40	52	7	4.8	4.55	24000	38000	4.55	4.25	22000	36000
71809	45	58	7	7.2	6.95	22000	36000	6.8	6.4	19000	32000
71810	50	65	7	7.35	7.35	19000	32000	6.95	6.8	17000	28000
71811	55	72	9	10.2	10.2	17000	28000	9.65	9.5	16000	26000
71812	60	78	10	13.2	13.2	16000	26000	12.2	12.2	14000	22000
71813	65	85	10	13.4	14	15000	24000	12.7	12.9	13000	20000
71814	70	90	10	14	15	14000	22000	12.9	13.7	13000	20000
71815	75	95	10	14.3	15.6	13000	20000	13.4	14.6	12000	19000

Angular Contact Ball Bearings-71900 series
角接触球轴承·单列系列



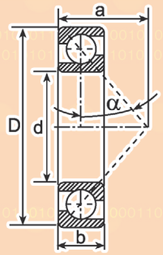
Bearing Type	Principal Dimensions			α= 15° Suffix C				α= 25° Suffix AC				Weight
	d	D	B	Basic Load(kN)		Limiting speed(r/min)		Basic Load(kN)		Limiting speed(r/min)		
	mm			Cr	Cor	Grease	oil	Cr	Cor	Grease	oil	kg
71900	10	22	6	3	1.53	70000	110000	2.9	1.46	63000	95000	0.009
71901	12	24	6	3.35	1.86	60000	90000	3.2	1.76	56000	85000	0.011
71902	15	28	7	5	2.9	50000	75000	4.8	2.75	48000	70000	0.015
71903	17	30	7	5.3	3.15	48000	70000	5	3	43000	63000	0.02
71904	20	37	9	7.35	4.55	38000	56000	6.95	4.4	36000	53000	0.034
71905	25	42	9	8.15	5.7	32000	48000	7.8	5.5	30000	45000	0.04
71906	30	47	9	8.65	6.55	28000	43000	8.15	6.3	26000	40000	0.046
71907	35	55	10	11.8	9.5	24000	38000	11	9	22000	36000	0.076
71908	40	62	12	17.6	13.7	22000	36000	16.6	13.2	20000	34000	0.105
71909	45	68	12	18.6	15.6	19000	32000	17.6	15	18000	30000	0.126
71910	50	72	12	19	16.6	18000	30000	18	15.6	16000	26000	0.129
71911	55	80	13	22.8	20.4	16000	26000	21.6	19.3	15000	24000	0.176
71912	60	85	13	24	22.8	15000	24000	22.8	21.6	14000	22000	0.19
71913	60	90	13	24.5	24	14000	22000	22.8	22.4	13000	20000	0.202
71914	70	100	16	33.5	32.5	13000	20000	31.5	31	12000	19000	0.331
71915	75	105	16	34	34.5	12000	19000	32	32.5	11000	18000	0.351
71916	80	110	16	34.5	36	12000	19000	32.5	34	11000	18000	0.37
71917	85	120	18	45	46.5	11000	18000	42.5	44	9500	16000	0.536
71918	90	125	18	45.5	49	10000	17000	43	46.5	9000	15000	0.565
71919	95	130	18	46.5	51	9500	16000	44	48	8500	14000	0.578
71920	100	140	20	58.5	64	9000	15000	55	60	8000	13000	0.882

Angular Contact Ball Bearings-7000 series
角接触球轴承·单列系列



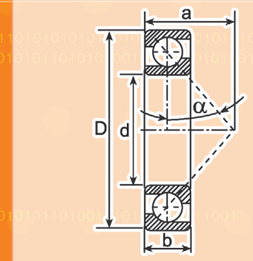
Bearing Type	Principal Dimensions			α= 15° Suffix C				α= 25° Suffix AC				Weight
	d	D	B	Basic Load(kN)		Limiting speed(r/min)		Basic Load(kN)		Limiting speed(r/min)		
	mm			Cr	Cor	Grease	oil	Cr	Cor	Grease	oil	kg
7000	10	26	8	4.25	2.08	60000	90000	4.05	2	56000	85000	0.021
7001	12	28	8	4.75	2.6	56000	85000	4.55	2.5	50000	75000	0.024
7002	15	32	9	6.2	3.4	48000	70000	6	3.25	43000	63000	0.034
7003	17	35	10	8.65	4.9	43000	63000	8.3	4.75	38000	56000	0.044
7004	20	42	12	10.4	6	36000	53000	10	5.7	32000	48000	0.069
7005	25	47	12	14.6	9.15	30000	45000	13.7	8.65	28000	43000	0.084
7006	30	55	13	15	10.2	26000	40000	14.3	9.8	24000	38000	0.117
7007	35	62	14	19	13.7	22000	36000	18.3	12.9	20000	34000	0.157
7008	40	68	15	20.4	16	20000	34000	19.6	15	19000	32000	0.196
7009	45	75	16	27.5	21.2	18000	30000	26.5	20	17000	28000	0.236
7010	50	80	16	28.5	22.8	17000	28000	27	21.6	15000	24000	0.262
7011	55	90	18	38	31	15000	24000	36	29	14000	22000	0.383
7012	60	95	18	39	33.5	14000	22000	36.5	31.5	13000	20000	0.41
7013	65	100	18	40	35.5	13000	20000	38	33.5	12000	19000	0.435
7014	70	110	20	50	43	12000	19000	46.5	41.5	11000	18000	0.59
7015	75	115	20	51	46.5	12000	19000	48	44	11000	18000	0.62
7016	80	125	22	63	58.5	11000	18000	60	55	9500	16000	0.857
7017	85	130	22	65.5	62	10000	17000	62	58.5	9000	15000	0.903
7018	90	140	24	76.5	72	9500	16000	72	68	8500	14000	1.18
7019	95	145	24	78	76.5	9000	15000	75	72	8000	13000	1.19
7020	100	150	24	81.5	81.5	8500	14000	76.5	76.5	7500	12000	1.28

Angular Contact Ball Bearings-7200 C\AC series
角接触球轴承·单列系列



Bearing Type	Principal Dimensions			α= 15° Suffix C				α= 25° Suffix AC				Weight
	d	D	B	Basic Load(kN)		Limiting speed(r/min)		Basic Load(kN)		Limiting speed(r/min)		
	mm			Cr	Cor	Grease	oil	Cr	Cor	Grease	oil	kg
7200	10	30	9	5.85	2.9	56000	85000	5.6	2.8	50000	75000	0.030
7201	12	32	10	7.65	3.9	50000	75000	7.35	3.75	45000	67000	0.036
7202	15	35	11	9.65	5	45000	67000	9.3	4.8	40000	60000	0.045
7203	17	40	12	10.8	5.85	38000	56000	10.4	5.6	36000	53000	0.065
7204	20	47	14	14.6	8.15	32000	48000	14	7.8	30000	45000	0.108
7205	25	52	15	15.6	9.3	28000	43000	15	9	26000	40000	0.133
7206	30	62	16	23.2	14.6	24000	38000	22	14	22000	36000	0.204
7207	35	72	17	25.5	18	20000	34000	24.5	17	19000	32000	0.296
7208	40	80	18	32	22.4	18000	30000	30.5	21.6	17000	28000	0.364
7209	45	85	19	33.5	24.5	17000	28000	32	23.6	15000	24000	0.408
7210	50	90	20	43	31.5	16000	26000	40.5	30.5	14000	22000	0.459
7211	55	100	21	46.5	37.5	14000	22000	44	35.5	13000	20000	0.608
7212	60	110	22	55	44	13000	20000	52	42.5	12000	19000	0.782
7213	65	120	23	57	48	12000	19000	54	45.5	11000	18000	0.997
7214	70	125	24	69.5	58.5	11000	18000	65.5	56	10000	17000	1.08
7215	75	130	25	72	63	11000	18000	68	60	9500	16000	1.18
7216	80	140	26	93	78	10000	17000	88	73.5	9000	15000	1.45
7217	85	150	28	95.5	85	9000	15000	91.5	80	8000	13000	1.85
7218	90	160	30	122	104	8500	14000	116	100	7500	12000	2.25
7219	95	170	32	127	114	8000	13000	122	108	7000	11000	2.72
7220	100	180	34	132	122	7500	12000	125	116	6700	10000	3.21

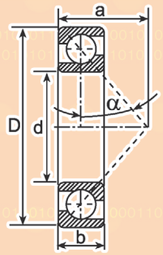
Angular Contact Ball Bearings-7200B series
角接触球轴承·单列系列



Bearing Type	Principal Dimensions			Basic Load		Limiting speed		Weight
	d	D	B	Cr	Cor	Grease	oil	
	mm			kN		r/min		kg
7200B	10	30	9	7.02	3.35	19000	28000	0.030
7201B	12	32	10	7.61	3.80	18000	26000	0.036
7202B	15	35	11	8.84	4.80	17000	24000	0.045
7203B	17	40	12	11.1	6.10	15000	20000	0.065
7204B	20	47	14	14.0	8.30	12000	17000	0.110
7205B	25	52	15	15.6	10.2	10000	15000	0.130
7206B	30	62	16	23.8	15.6	8500	12000	0.200
7207B	35	72	17	30.7	20.8	8000	11000	0.280
7208B	40	80	18	36.4	26.0	7000	9500	0.370
7209B	45	85	19	37.7	28.0	6700	9000	0.420
7210B	50	90	20	39.0	30.5	6000	8000	0.470
7211B	55	100	21	48.8	38.0	5600	7500	0.620
7212B	60	110	22	57.2	45.5	5000	6700	0.800
7213B	65	120	23	66.3	54.0	4500	6000	1.000
7214B	70	125	24	71.5	60.0	4300	5600	1.100
7215B	75	130	25	72.8	64.0	4300	5600	1.200
7216B	80	140	26	83.2	73.5	3800	5000	1.450
7217B	85	150	28	95.6	83.0	3600	4800	1.850
7218B	90	160	30	108.0	96.5	3400	4500	2.300
7219B	95	170	32	124.0	108.0	3200	4300	2.700
7220B	100	180	34	135.0	122.0	3000	4000	3.300

Suffix B: α= 40°

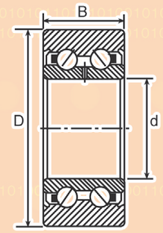
Angular Contact Ball Bearings-7300B series
角接触球轴承·单列系列



Bearing Type	Principal Dimensions			Basic Load		Limiting speed		Weight
	d	D	B	Cr	Cor	Grease	oil	
	mm			kN		r/min		kg
7302B	15	42	13	13.0	6.70	15000	20000	0.08
7303B	17	47	14	15.9	8.30	13000	18000	0.11
7304B	20	52	15	19.0	10.4	11000	16000	0.14
7305B	25	62	17	26.0	15.6	9000	13000	0.23
7306B	30	72	19	34.5	21.2	8000	11000	0.34
7307B	35	80	21	39.0	24.5	7500	10000	0.45
7308B	40	90	23	49.4	33.5	6700	9000	0.63
7309B	45	100	25	60.5	41.5	6000	8000	0.85
7310B	50	110	27	74.1	51.0	5300	7000	1.10
7311B	55	120	29	85.2	60.0	4800	6300	1.40
7312B	60	130	31	95.6	69.5	4500	6000	1.75
7313B	65	140	33	108.0	80.0	4300	5600	2.15
7314B	70	150	35	119.0	90.0	3800	5000	2.65
7315B	75	160	37	133.0	106.0	3600	4800	3.20
7316B	80	170	39	143.0	118.0	3400	4500	3.80
7317B	85	180	41	153.0	132.0	3200	4300	4.45
7318B	90	190	43	165.0	146.0	3000	4000	5.20
7319B	95	200	45	178.0	163.0	2800	3800	6.05
7320B	100	215	47	203.0	190.0	2600	3600	7.50

Suffix B: $\alpha = 40^0$

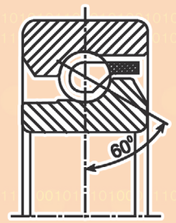
Angular Contact Ball Bearings – 5200, 5300 series
角接触球轴承·双列系列



Bearing Type	Principal Dimensions			Basic Load		Limiting speed		Weight
	d	D	B	Cr	Cor	Grease	oil	
	mm			kN		r/min		kg
5200	10	30	14	6.95	3.80	14000	19000	0.049
5201	12	32	15.9	9.15	5.05	13000	17000	0.057
5202	15	35	15.9	10	6.05	11000	15000	0.064
5203	17	40	17.5	13.2	8.15	11000	14000	0.091
5204	20	47	20.6	19.7	12.60	8800	12000	0.120
5205	25	52	20.6	21.4	14.80	7700	10000	0.190
5206	30	62	23.8	29.7	21.30	6400	8600	0.290
5207	35	72	26.7	39.2	29.00	5500	7300	0.430
5208	40	80	30.2	44.4	33.60	5000	6700	0.570
5209	45	85	30.2	49.9	38.40	4600	6100	0.620
5210	50	90	30.2	53.3	43.60	4300	5600	0.670
5211	55	100	33.3	65.9	55.20	3800	5100	0.960
5212	60	110	36.5	74.4	60.80	3500	4700	1.360
5213	65	120	38.1	86.9	75.30	3200	4300	1.660
5214	70	125	39.7	94.5	82.60	3100	4100	1.810
5215	75	130	41.3	92.4	120.00	2900	3900	2.100
5302	15	42	19	17.2	10.1	9900	13000	0.132
5303	17	47	22.2	20.4	12.1	9000	12000	0.181
5304	20	52	22.2	20.6	12.7	8000	11000	0.217
5305	25	62	25.4	30.5	20.5	6700	8900	0.372
5306	30	72	30.2	39.5	27.5	5700	7600	0.553
5307	35	80	34.9	49.5	35.0	5000	6600	0.766
5308	40	90	36.5	60.5	44.0	4400	5900	1.01
5309	45	100	39.7	72.5	54.0	4000	5300	1.34
5310	50	110	44.4	85.5	64.5	3600	4800	1.81
5311	55	120	49.2	106	82.0	3300	4400	2.32
5312	60	130	54	122	95.5	3000	4000	3.05
5313	65	140	58.7	138	109.0	2800	3700	3.96
5314	70	150	63.5	155	125.0	2600	3500	4.74
5315	75	160	68.3	168	141.0	2400	3200	5.65

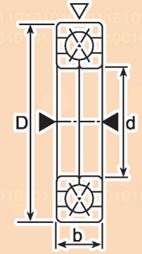
Note: 3200 series, dimension same as 5200 series; 3300 series, dimension same as 5300 series

Angular Contact Ball Bearings-Ball Screw series
角接触球轴承·滚珠丝杆系列



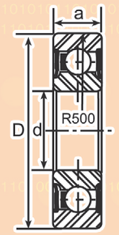
Bearing Type	Bore Diameter d	Outside Diameter D	Pair Width B	ATTAINABLE SPEEDS(RPM)		Dynamic Thrust Capacity(ibs.)	Static Trust Capacity (lbs.)
	mm	mm	mm	oil	Grease	Pair	Pair
BSB2047	20	47	30	16000	11000	4300	5600
BSB2562	25	62	30	13000	9000	6400	9300
BSB3062	30	62	30	13000	9000	5800	8800
BSB3572	35	72	30	11000	8000	6700	11200
BSB4072	40	72	30	11000	8000	6300	11000
BSB4090	40	90	40	8500	6300	11250	18680
BSB4575	45	75	30	10000	7500	6400	11700
BSB45100	45	100	40	7500	5600	13200	23400
BSB50100	50	100	40	7500	5600	13200	23400

Angular Contact Ball Bearings-Four point contact series
角接触球轴承·四点接触系列



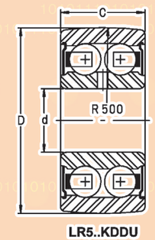
Bearing Type	Principal Dimensions d	D	B	Basic Load Cr	Cor	Limiting speed Grease	oil	Weight
	mm			kN		r/min		kg
QJ206	30	62	16	31	45	8500	12000	0.24
QJ207	35	72	17	41	61.5	7500	10000	0.35
QJ208	40	80	18	49	77.5	6700	9000	0.45
QJ209	45	85	19	55	88.5	6300	8500	0.52
QJ210	50	90	20	57	97	5600	8000	0.59
QJ211	55	100	21	71	122	5300	7100	0.77
QJ212	60	110	22	85.5	150	4800	6300	0.98
QJ213	65	120	23	97.5	179	4300	6000	1.2
QJ214	70	125	24	106	197	4000	5600	1.3
QJ215	75	130	25	110	212	3800	5300	1.5
QJ216	80	140	26	124	236	3600	5000	1.85
QJ217	85	150	28	143	276	3400	4800	2.2
QJ218	90	160	30	164	320	3200	4300	2.75
QJ219	95	170	32	177	340	3000	4000	3.35
QJ220	100	180	34	199	390	2800	3800	4.0
QJ306	30	72	19	46	63	8000	11000	0.42
QJ307	35	80	21	55	80	7100	9500	0.57
QJ308	40	90	23	67	100	6300	8500	0.78
QJ309	45	100	25	87.5	133	5600	7500	1.05
QJ310	50	110	27	102	159	5000	6700	1.35
QJ311	55	120	29	118	187	4500	6300	1.75
QJ312	60	130	31	135	217	4300	5600	2.15
QJ313	65	140	33	153	250	3800	5300	2.7
QJ314	70	150	35	172	285	3600	5000	3.18
QJ315	75	160	37	187	320	3400	4800	3.9
QJ316	80	170	39	202	360	3200	4300	4.6
QJ317	85	180	41	218	405	3000	4000	5.34
QJ318	90	190	43	235	450	2800	3800	6.4
QJ319	95	200	45	251	495	2600	3600	7.4
QJ320	100	215	47	300	640	2400	3400	9.3

Track roller bearings-LR6.. and LR2.. series
导轮轴承·单列系列

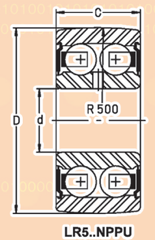


Bearing Type	Principal Dimensions d	D	B	Basic Load Cr	Cor	Speed Greasel	Weight
	mm			kN		r/min	kg
LR604 NPPU	4	13	4	970	360	40000	0.01
LR605 NPPU	5	16	5	1330	500	38000	0.01
LR605 KDDU	5	16	5	1330	500	38000	0.01
LR606 NPPU	6	19	6	1970	740	36000	0.01
LR606 KDDU	6	19	6	1970	740	36000	0.01
LR607 NPPU	7	22	6	2340	890	34000	0.01
LR607 KDDU	7	22	6	2340	8970	34000	0.01
LR608 NPPU	8	24	7	3300	1350	32000	0.02
LR608 KDDU	8	24	7	3300	1350	32000	0.02
LR6000 NPPU	10	28	8	4600	1960	28000	0.02
LR6001 NPPU	12	30	8	5100	2350	26000	0.03
LR200 NPPU	10	32	9	5100	2370	16000	0.05
LR200 KDD	10	32	9	5100	2370	16000	0.05
LR200 NPP	10	32	9	5100	2370	16000	0.05
LR201 NPPU	12	35	10	6800	3050	15000	0.05
LR201 NPP	12	35	10	6800	3050	15000	0.05
LR6002 NPPU	15	35	9	5600	2850	22000	0.05
LR202 NPPU	15	40	11	7600	3700	14000	0.07
LR202 NPP	15	40	11	7600	3700	14000	0.07
LR6003 NPPU	17	40	10	6000	3220	19000	0.07
LR203 NPPU	17	47	12	9600	4750	11000	0.11
LR203 NPP	17	47	12	9600	4750	11000	0.11
LR6004 NPPU	20	47	12	9400	5000	17000	0.11
LR204 NPPU	20	52	14	12800	6600	10000	0.15
LR204 NPP	20	52	14	12800	6600	10000	0.15
LR205 NPPU	25	62	15	14000	7800	9000	0.23
LR205 NPP	25	62	15	14000	7800	9000	0.23
LR206 NPPU	30	72	16	19500	11300	7100	0.33
LR206 NPP	30	72	16	19500	11300	7100	0.33
LR207 NPPU	35	80	17	25500	15300	5600	0.4
LR207 NPP	35	80	17	25500	15300	5600	0.4
LR208 NPPU	40	85	18	32500	19800	5000	0.45
LR208 NPP	40	85	18	32500	19800	5000	0.45
LR209 NPPU	45	90	19	32500	20400	4500	0.5
LR209 NPP	45	90	19	32500	20400	4500	0.5

Track roller bearings-LR5.. series
导轮轴承·双列系列



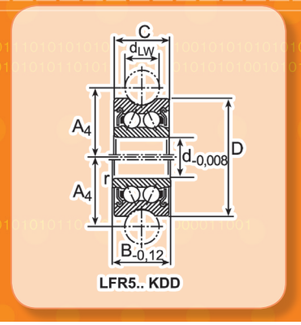
LR5..KDDU



LR5..NPPU

Bearing Type	Principal Dimensions d	D	B	Basic Load Cr	Cor	Speed Greasel	Weight
	mm			kN		r/min	kg
LR 50/5 NPPU	5	17	7	1810	950	23500	0.01
LR 50/6 NPPU	6	19	9	3100	1400	22500	0.02
LR 50/7 NPPU	7	22	10	3650	1700	21000	0.02
LR 50/8 NPPU	8	24	11	5200	2610	20000	0.03
LR 5000 NPPU	10	28	12	5700	3250	18500	0.03
LR 5200 KDDU	10	32	14	8000	4600	16000	0.07
LR 5200 KDD	10	32	14	8000	4600	16000	0.07
LR 5200 NPPU	10	32	14	8000	4600	16000	0.07
LR 5001 NPPU	12	30	12	6200	3750	17500	0.03
LR 5201 KDDU	12	35	15.9	10600	5900	15000	0.08
LR 5201 KDD	12	35	15.9	10600	5900	15000	0.08
LR 5201 NPPU	12	35	15.9	10600	5900	15000	0.08
LR 5301 NPPU	12	42	19	14700	8400	10500	0.12
LR 5002 NPPU	15	35	13	8600	5400	14500	0.05
LR 5202 KDDU	15	40	15.9	11800	7100	14000	0.11
LR 5202 KDD	15	40	15.9	11800	7100	14000	0.11
LR 5202 NPPU	15	40	15.9	11800	7100	14000	0.11
LR 5302 NPPU	15	47	19	17700	10300	10000	0.15
LR 5003 NPPU	17	40	14	9200	6200	12500	0.07
LR 5203 KDDU	17	47	17.5	14800	9100	11000	0.17
LR 5203 KDD	17	47	17.5	14800	9100	11000	0.17
LR 5203 NPPU	17	47	17.5	14800	9100	11000	0.17
LR 5303 NPPU	17	52	22.2	21100	12500	9500	0.21
LR 5004 NPPU	20	47	16	14500	9600	11000	0.12
LR 5204 KDDU	20	52	20.6	19900	12600	10000	0.23
LR 5204 KDD	20	52	20.6	19900	12600	10000	0.23
LR 5204 NPPU	20	52	20.6	19900	12600	10000	0.23
LR 5304 KDDU	20	62	22.2	24500	15800	9000	0.34
LR 5304 KDD	20	62	22.2	24500	15800	9000	0.34
LR 5304 NPPU	20	62	22.2	24500	15800	9000	0.34
LR 5005 NPPU	25	52	16	15500	11100	9500	0.15
LR 5205 KDDU	25	62	20.6	21600	14900	9000	0.34
LR 5205 KDD	25	62	20.6	21600	14900	9000	0.34
LR 5205 NPPU	25	62	20.6	21600	14900	9000	0.34
LR 5305 KDD	25	72	25.4	32500	21600	7900	0.5
LR 5305 KDDU	25	72	25.4	32500	21600	7900	0.5
LR 5305 NPPU	25	72	25.4	32500	21600	7900	0.5

Track roller bearings-LFR5.. series
导轮轴承·双列系列



LFR5.. KDD

Bearing Type	Principal Dimensions						Basic Load		Weight
	A4	B	C	D	d	dLW	Cr	Cor	
	mm						N		kg
LFR 50/5 KDD	10.5	8	7	17	5	6	1270	890	0.01
LFR 50/8 KDD	14	-	11	24	8	6	3670	2280	0.02
LFR 5201 KDD	20.65	-	15.9	35	12	10	8500	5100	0.08
LFR 5301 KDD	24	-	19	42	12	10	13000	7700	0.10
LFR 5201-12 KDD	21.75	-	15.9	35	12	12	8400	5000	0.08
LFR 5302 KDD	26.65	-	19	47	15	10	16200	9200	0.17
LFR 5204-16 KDD	31.5	22.6	20.6	52	20	16	16800	9500	0.23
LFR 5206-20 KDD	41	25.8	23.8	72	25	20	24500	16600	0.25
LFR 5206-25 KDD	43.5	25.8	23.8	72	25	25	29200	16400	0.25
LFR 5207-30 KDD	51	29	27	80	30	30	38000	20800	0.66
LFR 5208-40 KDD	62.5	38	36	98	40	40	54800	29000	1.36

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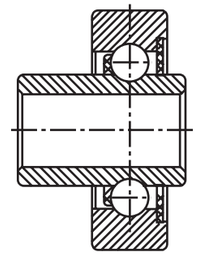
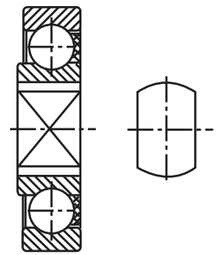
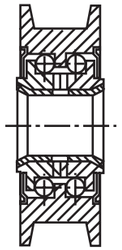
Customized Special Size bearings
定制非标准轴承


Track roller


Special Bearing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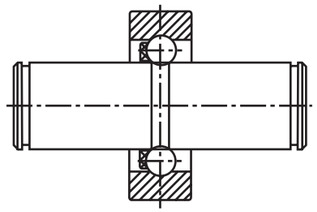
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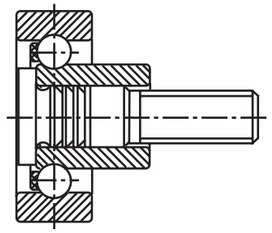
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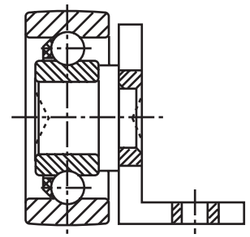
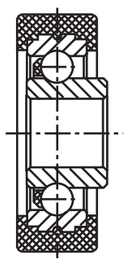
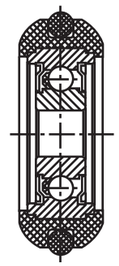
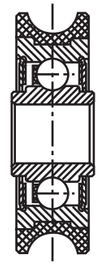
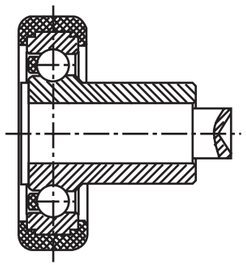
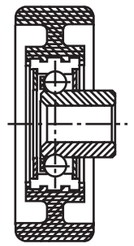

Track roller unit

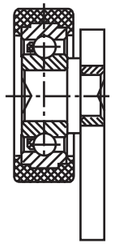

Track roller


Special Bearing


Track roller


Track roller


Track roller


Track roller unit

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滚动轴承的使用说明和注意事项
User's Guide for Rolling Bearings

一 滚动轴承使用时注意事项
1. Consideration When Using Rolling Bearing

作为一种精密部件，轴承的使用有一定条件和要求，应谨慎使用，规范操作。任何高性能轴承如果使用不当，则不会得到预期的表现，甚至会产生严重后果。

As precision unit, certain conditions and requirements should be observed when using rolling bearing. Rolling bearings should be handled carefully during operation. In case of improper application of a high performance bearing, the predictive result won't be reached and further more a loss in bearing performance and lifetime noticed.

1）保持轴承及其周围环境的清洁

Keep the bearing and surroundings clean

即使是肉眼无法察觉的小尘埃，也会给轴承带来不利影响。所以必须保持工作环境清洁。

Small dust particles which can't be seen by the naked eye will cause problem if these enter the bearing. Therefore, it is absolutely necessary to keep the working environment clean.

2）谨慎使用，规范操作

Careful handling

在使用中轴承如果受到冲击，会产生伤痕，故应避免。

If the bearing is dropped or in heavy contact with something else, there is a high risk of damage to the internal balls and raceways. Be careful when handling.

3） 使用准确的操作工具

Use correct assembly tools.

请不要随意使用任何不专业的替代工具，以避免产生碎片或造成严重撞击。

Don't use any nonprofessional tools that will creating chips or cause damage.

4） 注意保管和防锈

Proper storage and rust prevention

手汗和污垢可能产生锈蚀。所以建议操作前洗净双手，并戴上薄膜或乳胶手套。

如不使用轴承，请勿破坏轴承原包装。轴承在涂抹防锈油后一般用防锈纸或者塑料套筒包装，打开包装后未及使用者，必须重新涂抹专用防锈油后包装。如随意弃置于工作桌面，而直接暴露在空气之中，可能导致轴承迅速生锈。（详见第五章）

Hand perspiration, debrie and humidity may cause rust so that it is recommended to wash both hands thoroughly and wear film or latex gloves before handling.

Don't open the original package until immediately before mounting. Normally the bearing is coated with a preservative oil before being packed in specialized anti- rust paper or tubes. If the bearing packing is opened and the bearing not fitted, recoating it with the specialized corrosive inhibitive oil and re-pack. Do not leave the opened bearing unfitted (see Chapter 5).

二 滚动轴承的安装
2. Mounting of Rolling Bearing

2.1 安装前的检查
Inspection before Mounting

正确的安装直接影响轴承的寿命，精度和性能。

Correct mounting of rolling bearing will directly affect its service life, accuracy and performance.

安装轴承以前，请仔细校核以下各点

Therefore, check the following issues before mounting

1 作业标准的建立和必需的装配夹具的准备

Establish an assembly specification and prepare necessary assembling fixtures.

2 轴和轴承座尺寸，公差和终加工的确定和匹配

Decide the dimensions of the shaft and bore of the bearing housing, their tolerances and fits after final grinding

3 润滑剂型号和数量是否符合规定

Does the type of lubricant or quantity meet the specification?

4 检验标准的建立

Establish an inspection & test standard

5是否有清洁轴承和相关零件的方法

Is there any method of cleaning related components before assembly?

2.2 安装前的保护措施
Protective Measures before Mounting

1 选择清洁干燥地点并保证工具和工作台的清洁

Select a clean and dry place as well as keeping tools and the fitting table clean.

2 轴承安装前请不要打开包装

Don't open the package until immediately before mounting the bearing.

3 如因需要检验或者其他原因而没有及时进行包装的轴承，可以采取以下办法：

If the bearing hasn't been re-packed into the package due to necessary inspection or other reasons, following measures may be taken:

a. 如在短期内即将被安装，请在轴承表面涂抹一层防锈油，并放置在干净容器中。

If the bearing will be mounted in a short period of time, please coat preservative on the surface before putting into a clean container.

b. 如短期内不被安装，请在外表面涂抹防锈油并重新放回原容器内。

In case the bearing won't be mounted in short term, put it back to its original package after coating preservative on its surface.

4 检查润滑剂容器和注入器是否清洁；确认轴承座是否清洁且没有裂纹，擦痕，毛刺或其他瑕疵。

Check to see if the lubricant container and its filler are clean and make sure the bearing housing is clean without any flaws, scrapes, burrs or any other defects.

5 带脂轴承可能感觉未被清洗。若因轴承小或者需要做高速运转，请使用专用清洗油去脂。但是带密封圈或者防尘盖的轴承一律不准进行清洗或加热。

Remove any excess grease or oil from the mating components before assembly Bearings which have integral seals or shields on both sides should not be washed or heated before mounting.

2.3 关于轴的检查
Shaft Inspection

1 确认轴经过终加工，并已经达到规定的尺寸和精度。
Ensure the shaft has been finally ground to its specified size and accuracy.

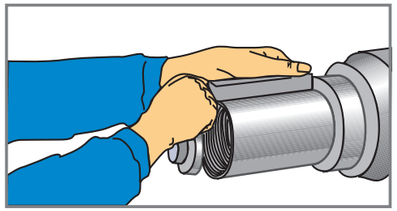
2 检查轴的表面光洁度。如光洁度不良可能导致轴承套圈蠕动并造成轴承早期失效。
Inspect the surface finish of the shaft. Poor surface finish will lead to fretting corrosion of bearing rings that results in bearing premature failure.

3 保证轴肩与轴线成直角终加工，否则轴承可能失调。
Assure that the shaft shoulder is perpendicular to the shaft axis so as to prevent misalignment of the bearing.

4 修正轴的圆角半径，确保圆角半径小于轴承倒角半径，否则有可能造成轴承失调。
Correct fillet radius of the shaft is necessary to assure its radius is smaller than the chamfer of bearing inner ring to prevent mis-fitting of the bearing.

5 确保轴的圆度误差和圆柱度，如圆度不良可能造成轴承内圈变形。
Assure the roundness and cylindricity of the shaft are within specification. Any out of roundness will cause distortion of the bearing inner ring.

图2.1 安装前轴的检查
Fig. 2.1 Shaft Inspection before Mounting



2.4 关于轴承座的检查
Housing Inspection

轴承座为轴承使用提供了：
The functions of bearing housing are as follows:

a 定位作用
Positioning

b 保护轴承，减少或者防止污染
Protect bearing to reduce or against debrie ingress

c 良好的轴承润滑
Good lubrication to the bearing

1 核实轴承座孔符号设计要求，如果规定H级间隙配合或间隙更大的配合，就要查实轴承在安装期间是否可在轴承座中自由移动。关于水平安装的轴承，诸如用于带座轴承的轴承座，在重新装配期间不要将上盖和基座搞混，避免引起轴承夹紧或松动。
Make sure the housing bore is correctly sized to provide either a sliding fit or fixed fit as required for your application.

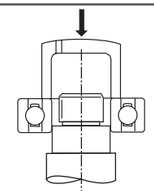
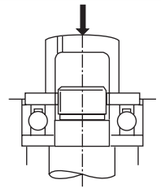
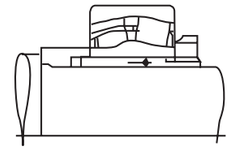
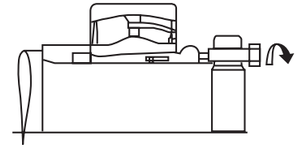
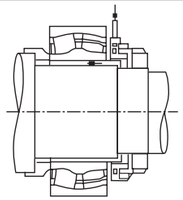
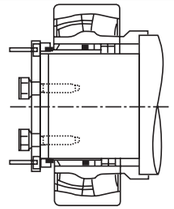
2 必须允许由于温升引起的轴的线性膨胀。当两套或多套轴承同时安装于同一轴上时，应于轴向固定一套轴承于轴承座中，并确保其他轴承沿轴向作自由移动。
Linear thermo expansion of the shaft should be allowed. Hence, when two or more sets of bearings are mounted on the same shaft, one of them should be fixed axially in the bearing housing and the others can move back and forth freely along the axial direction.

2.5 安装附件
Mounting Accessories

标准的轴承安装作业用零件可能包括：
The standard tools of mounting bearing might include:
垫圈，紧定套，退卸套，隔圈，油封，轴螺母和止动环
Washers, tightening bush, dismounting sleeve, spacer, oil seal, shaft nut and snap ring
使用前务必检查外观，尺寸和精度，做好清洁工作。
Check appearance, dimensions and accuracy, and ensure thorough cleaning before use

2.6 安装方法
Mounting Method

2.6.1 一般轴承安装方法如下：
The Conventional Mounting Method of Bearing Is as Follows:

轴承类型 **Bearing Type**	安装方式 **Mounting Method**	图例 **Sketch**
圆柱孔 **Cylindrical hole**	内圈压入 **Press inner ring**	
	内外圈同时压入 **Press both inner & outer rings simultaneously**	
锥孔 **Tapered hole**	用紧定套安装 **Mounted with tightening bush**	
	用拆卸套筒安装 **Mounted with dismounting sleeve**	
	用油压螺母安装 **Mounted with hydraulic nut**	
	特殊油压安装 **Mounted with special hydraulic way**	

2.6.2 常见的安装方法
The Common Mounting Method

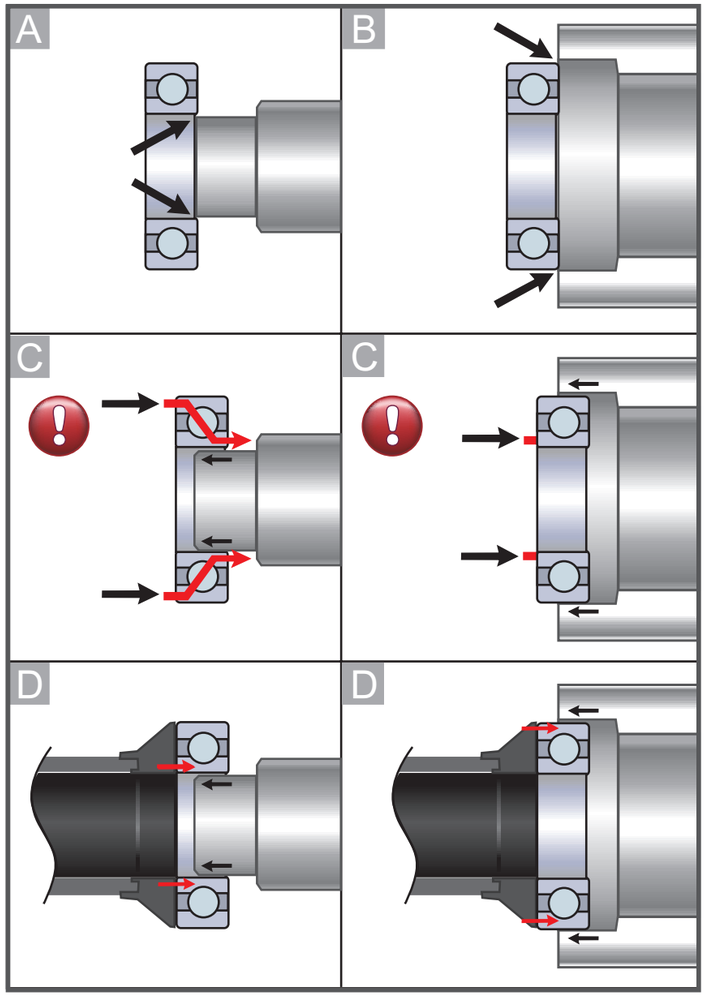


图2.2 轴承安装方法
Fig.2.2 Mounting Method of Bearing

A	轴承和轴过盈配合 Interference fit between bearing and shaft
B	轴承和轴承座过盈配合 Interference fit between bearing and housing
C	错误的安装方法：损伤沟道 Wrong method: will damage raceway
D	正确的安装方法，保护沟道 Correct method: to protect raceway

2.6.3 压力机压入
Press Bearing equally with a Press

Fig. 2.3 Mounting bearing with a press

注意：将轴承安装到轴的时候，安装施力面一般为：内圈或者内外圈同时施力。绝对不可以对外圈单独施力，以免造成滚道压痕，压伤。

Caution: When mounting a bearing onto the shaft, the mounting force normally should be applied onto the inner ring or both inner and outer rings simultaneously. Never apply force only to the outer ring in order to prevent indentation damage on raceway.

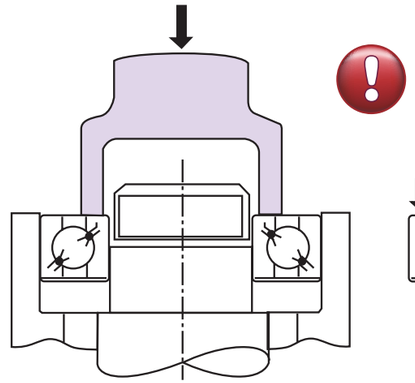


图2.4 应该注意避免的错误安装方法
Fig. 2.4 Careful to avoid using the wrong mounting methods

再者，建议操作前在配合面上涂油。万不得已要用榔头敲打得场合，要在内圈垫块作业。因为这种操作有可能造成轴承损伤，所以只限于过盈量小的情况，不能用于过盈量大的情况或者中，大型轴承。

Further more, it is recommended to coat oil on the mating surfaces before mounting (anti fretting paste). In case a hammer should be used, a similar sized ring has to be put on the inner ring to prevent damage and ensure even load distribution. This method can only be used when the magnitude of interference is small. It is not recommended to use this method for large magnitude of interference or medium- and large-sized rolling bearings.

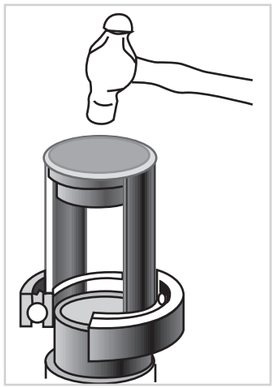


图2.5 使用垫块作业
Fig. 2.5 Mounting operation with a similar ring

2.6.4 热装方法
Thermal Mounting Method

对于难以压入的大型轴承，一般通过在油中加热，使之膨胀，然后安装的方法。

For large-sized bearing which is hard to press onto the shaft, the normal way is to heat the bearing ring to be fitted before mounting.

一般情况下，轴承温度高于轴80 到90°C （144 到162°F）已足够进行安装。

Under normal condition, when the bearing temperature is heated to 80°C to 90°C (144°F-192°F) higher than the shaft temperature, it will be quite easy to conduct the mounting operation.

注意： 轴承加热温度不可得高于125°C （257°F），更不应使用明火加热。

Caution: Never heat the bearing to a temperature more than 125°C (257°F) and it is also do not use fire to heat directly.

轴承尽量不要接触油槽底部，如可能请置于金属网台或悬置。

Bearing should be laid on wire-mesh shelf or hanged in the oil bath in stead of directly on the bottom of the heating bath. Special bearing heaters are available on the market.

考虑到加热后使用过程中由于温度降低而导致内圈收缩，请加热至比所需温度略高程度。

Considering the shrinkage of the inner ring during the mounting operation due to temperature decreases, please heat the bearing to a temperature which is a little bit higher than the required.

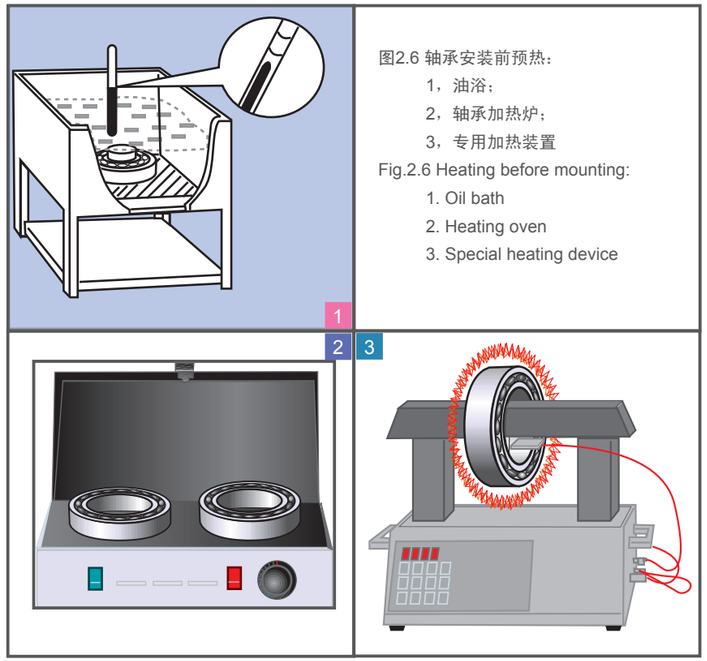


图2.6 轴承安装前预热：
1，油浴；
2，轴承加热炉；
3，专用加热装置

Fig.2.6 Heating before mounting:
1. Oil bath
2. Heating oven
3. Special heating device

2.6.5 锥孔轴承的安装
Tapered Bore Bearing Mounting

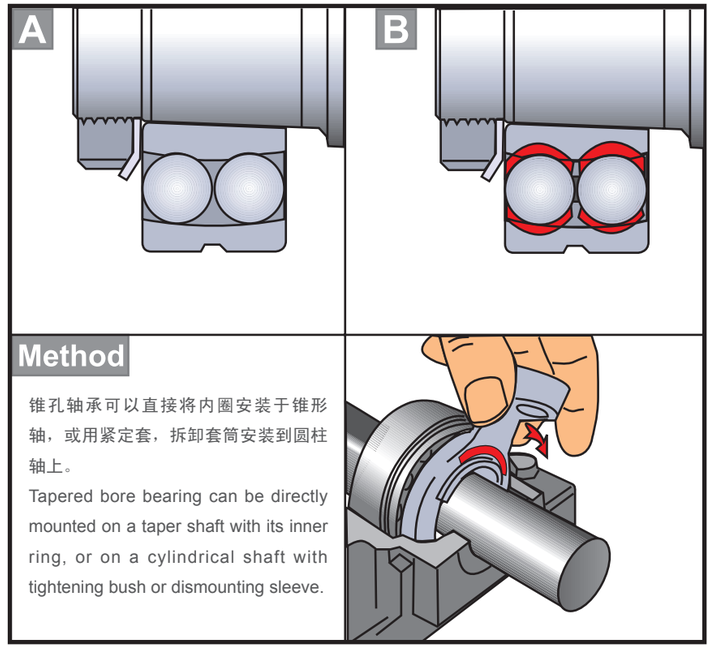


图2.7 **锥形孔轴承的安装**
Fig.2.7 Tapered bore bearing mounting

A	**正确的方法：压入适当，保证一定游隙** Correct method: Press the bearing properly to be sure there will be a certain clearance
B	**错误的方法：压入过度，游隙消失，沟道可能受损** Incorrect method: Press the bearing excessively so that there is no clearance and the raceway might be damaged

锥孔调心轴承压入量按照以下表格中数据为基准。安装时应该注意游隙的减少量。
The pressed amount of the tapered bore spherical bearing listed in following table should be regarded as a reference and also pay attention to the reduction of the clearance when mounting.

锥孔调心轴承安装压入量和游隙减少量
Pressed value & clearance reduction when mounting tapered bore spherical bearing

公称轴承内径 Nominal Bore Diameter		径向游隙减少量 Radial Clearance Reduction		轴向压入量 Axial Pressed value				小残留游隙 Min. Residual Clearance	
				1:12		1:30			
≥	<	min	max	Min	max	min	max	C0组	C3组
30	40	0.025	0.030	0.040	0.450	/	/	0.010	0.025
40	50	0.030	0.035	0.450	0.550	/	/	0.015	0.030
50	65	0.030	0.035	0.450	0.550	/	/	0.025	0.035
65	80	0.040	0.045	0.600	0.700	/	/	0.030	0.040
80	100	0.045	0.055	0.700	0.850	1.750	2.150	0.035	0.050
100	120	0.050	0.060	0.750	0.900	1.900	2.250	0.045	0.065
120	140	0.060	0.070	0.900	1.100	2.250	2.750	0.055	0.080

2.7 安装后的运转检查
Test Running after Mounting

1）运转检查

Test Running

轴承安装结束后，为了检查是否安装正确，应进行运转检验。

Test running should be carried out after mounting to see if the mounting is correct.

对于小型机械，可以用手旋转确认是否顺利。检查项目如下：

For small-sized machinery, hand turning to see if the running is smooth. Is recommended. The following issues should be checked:

是否有因异物，伤痕，压痕造成的运转不畅

Is there any contaminant, or assembly damage that causes uneven running?

是否有因安装不良或轴承座加工不良引起的旋转扭矩不均

Is there any improper installation or incorrect machining of the bearing housing that causes uneven rotation torque?

是否有因游隙过小，安装误差或密封摩擦而产生的扭矩过大

Is there any excessive torque resulting from too small clearance, or is there any mounting error or seal frication?

如无异常，则可以开始动力运转。

If everything is good, a power drive test can be conducted.

动力运转应从无负荷低速状态开始，慢慢提高至所定条件额定运转。检查项目如下：

This kind of running test should be carried out at low speed and without load, and then slowly increase the speed until the specified conditions are reached. Following issues should be checked in this test:

a. 是否有异常音响，温度转移，润滑剂泄露及变色

If there is any abnormal noise, temperature transfer, leakage or color change of the lubricant.

b. 一旦发现异常，应立即停止运转，检查机械，有必要时候卸下轴承检查。

If any abnormal circumstances have been found, stop running immediately and check the machinery. If necessary, dismount the bearing for inspection.

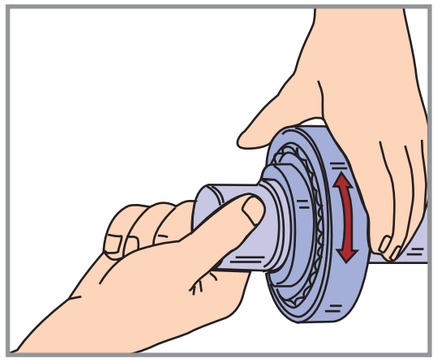


图2.8 旋转检查
Fig.2.8 Test Running

2） **温度检查**

Temperature Inspection

轴承温度可以从外壳外表推测或者直接测量获得。轴承温度从运转开始逐渐上升，1-2小时后稳定。如因轴承或安装不良，轴承温度会急剧上升。原因诸多，包括润滑剂过多，游隙过小，安装不良，密封装置摩擦过大，轴承结构和润滑方法选择不当等等。

Bearing temperature during running can be gauged on exterior surface of the bearing housing or, more accurately measured directly on the bearing. Bearing temperature will increase gradually after starting up and reach equilibrium in one or two hours. If the bearing has a problem or the mounting is improper, the bearing temperature will increase rapidly. This may be due to following causes such as too much lubricant, too small clearance, bad installation, excessive seal friction, improper bearing selection or lubrication, etc.

3） **噪音检查**

Noise Inspection

检查项目如下：大的金属噪声，异常声音，不规则声音。

Following items shall be checked: Loud metallic noise, abnormal or irregular sounds.

三. 轴承的异常运转，原因与分析
3. Abnormal Running of Rolling Bearing with Its Causes & Analysis

滚动轴承要求在使用中，小心操作，安装和维护，以便正常运转。

It is required to be very careful in operation, mounting and maintenance of rolling bearing so as to achieve proper running.

运转异常的情况及原因需引起足够重视，并于第一时间收集以下三类数据以帮助诊断并解决问题：

Great attention should be paid to any abnormal running condition and its root causes found. Find out the following three categories of information to help diagnosis and solve problems:

1 **发生时间**

When irregular noise occurs

2 **运转期间征兆**

Symptoms during operation

3 **轴承状况**

Bearing condition

如果一时不能解决，请及时联系杰尚公司，并提供尽可能详细的数据，这对于我们准确分析并处理问题十分关键。

In case the trouble can not be eliminated temporarily, please contact Jesa , who will review the application and make accurate analysis as well as providing a solution.

出现异常运转，请参照以下原因与对策：
Troubleshooting:

运转状态 Problem		推测原因 Possible Causes	建议对策 Troubleshooting
噪声 Noise	大的金属噪声 Loud Metallic Noise	异常负荷 Abnormal load	修正配合，研究轴承游隙，调整预负荷，修正轴承座挡肩位置 Adjust the fit, study bearing clearance adjust preload, adjust shoulder position of bearing housing
		安装不良 Poor mounting	提高轴，轴承座的加工精度，改善安装精度和办法 Increase machining accuracy for both shaft and housing, improve mounting accuracy & method
		润滑剂不足或不适合 Insufficient or improper lubricant	补充润滑剂，或选择恰当的润滑剂 Add more lubricant or select proper lubricant
		旋转零件有接触 Contact between rotating components	修改密封的接触部分 Modify the contact area of the seal
	规则音 Regular Noise	由于异物，滚动面产生压痕，锈，伤痕 Indentation, rust or scar on raceway caused by contaminant	更换轴承，清洗零件，改善密封，使用正确的润滑剂 Change the bearing, washing component, improve seal and use correct lubricant
		（钢渗碳后）表面变形 Surface distortion after carburizing	更换轴承，注意使用 Change the bearing
		滚道面剥离 raceway danage	更换轴承 Change the bearing
	不规则音 Irregular Noise	游隙过大 Excessive clearance	研究配合及游隙，修改预负荷 Study the fits & clearance, modify preload
		异物侵入 contaminated bearing	更换轴承，清洗零件，改善密封，使用干净的润滑剂 Change the bearing, washing components, improve seal and use clean lubricant
		球受伤，剥离 Ball damage	更换轴承 Change the bearing

运转状态 Problem	推测原因 Possible Causes	建议对策 Troubleshooting
异常的温度上升 Abnormal Temperature Increase	**润滑剂过多** Excessive lubricant	**适量使用，或者使用较硬的润滑脂** Adequate volume to be used according to the Jesa recomendation
	润滑剂不足或不适合 Insufficient or improper lubricant	**补充润滑剂，或选择恰当的润滑剂** Add more lubricant or select proper lubricant
	异常负荷 Abnormal load	**修正配合，研究轴承游隙，调整预负荷，修正轴承座挡肩位置** Adjust the fit, study bearing clearance adjust preload, adjust shoulder position of bearing housing
	安装不良 Poor mounting	**提高轴，轴承座的加工精度，改善安装精度和办法** Increase machining accuracy for both shaft and housing, improve mounting accuracy & method
	配合面蠕变，密封装置摩擦过大 Creepage between the mating surfaces or excessive friction of seal	**更换轴承，研究配合，修改轴承座，更改密封形式** Change the bearing fit, modify bearing housing, change the seal type
润滑剂泄漏过多，变色 Excessive Leakage or Color Change of Lubricant	**润滑剂过多，异物侵入；磨损粉末产生，侵入** Excessive lubricant, or Contamination with metallic debrie	**适量使用润滑剂，研究更换润滑剂或轴承，清洗轴承座** Adequate volume of lubricant to be used, study to change lubricant or ensure that assembly area is clean

四. 轴承的拆卸
4. Dismounting of Rolling Bearing

轴承拆卸时应该考虑拆卸后的用途：如果作报废处理时，可以采取最简单的办法。如果需要重新使用，或者查明故障原因，请务必避免损坏轴承及部件。

Application of the dismounted bearing should be considered prior to dismounting, e.g. if the dismounted bearing will never be reused, the most simple way can be taken to dismount it. However, if the bearing will be reused or bearing analysis for a problem is required,, try to avoid damaging the bearing or machine unit on disassembly.

尤其是过盈配合的轴承，由于拆卸时容易受伤，在设计时应该考虑拆卸需要，甚至需要使用或者设计专用拆卸工具。切忌野蛮操作。

Especially for the bearing with interference fit, it is easily damaged when dismounting. It helps to consider the dismounting procedure during application design. Even it is necessary to use or design a special-purposed dismounting tool.

另外为了查明故障原因，拆卸前应注明轴承的方向和位置。

In addition and in order to find the real cause of a problem, be clear of the indication of direction and location of the bearing before dismounting

拆卸的方法如下表：
The dismounting method is as follows:

拆卸方法 Dismounting Method					
内圈拆卸 Dismounting inner ring	**圆柱孔轴承** Cylindrical bore bearing	**利用压力机** With press	**利用油压** Hydraulic pressure	**利用拆卸器** With dismounting tool	**利用感应加热装置** With induction heating device
	圆锥孔轴承 Tapered bore bearing	**利用楔，夹钳** With wedge & pliers	**利用油压** Hydraulic pressure	**利用螺母螺栓** With nuts & bolts	**利用油压螺母** With hydraulic nut
外圈拆卸 Dismounting outer ring		**利用拆卸切口** With dismounting notch	**利用拆卸螺孔和螺栓** With dismounting threaded holes & bolts		

最常用的一些拆卸方法，供参考。如下图：
The most common dismounting methods for reference (see following drawings)

图4.1 利用拆卸器
Fig.4.1 Use the Dismounting Device

图4.2 拆卸器
Fig.4.2 Dismounting Device

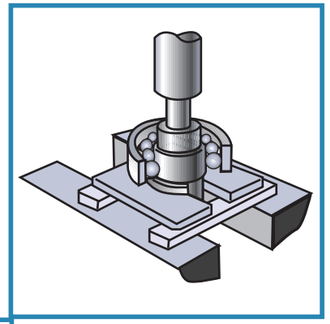


图4.3 用压力机，注意垫块
Fig.4.3 Use Press & Pad

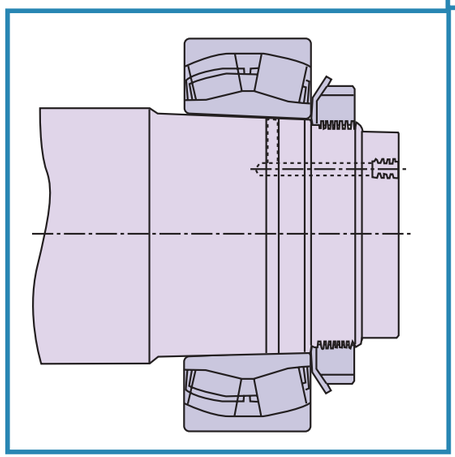


图4.4 利用油压（锥孔轴承）
Fig.4.4 Use Hydraulic Pressure（for Tapered Bore Bearing）

五. 轴承的贮藏与保管
5. Storage & Safekeeping of Rolling Bearings

1 **储存轴承的仓库室内应干燥、通风，并能阻止阳光直接射入和雨、雪、沙尘吹入；**

The storage of rolling bearings should be in a dry, humidity control and ventilated environment. The area should also prevent direct sunlight and the outside elements entering the storage area.

2 **保持稳定的室内温度，最低不得低于5℃，最高不得超过30℃，相对湿度不超过60%；防锈油在50℃-60℃下，否则，就会流出，应注意仓库阴凉通风。**

Keep the room temperature of the warehouse stable, which is not less than 5℃ and no more than 30℃. The relative humidity should be no more than 60%. Anti-rust oil will flow out when temperature 50℃-60℃. These conditions are needed to ensure the longest possible shelf life.

3 **室内也不得与酸、碱、化学药品、化工原料等有害物质储存在一起。仓库周围避免腐蚀气体。**

The storage area should not be used to store any hazardous materials such as acid, alkali, chemicals or raw materials. The area should be free from any corrosive gases..

4 **轴承入库时，应先做好入库技术验收工作。**

Incoming quality inspection should be carried out prior to receiving bearings into the warehouse.

5 **检验轴承产品表面情况时，应带薄膜或乳胶手套或用蜡纸衬垫，避免手指直接接触轴承表面。**

Wear film or latex gloves, or use waxed paper on a worktable to perform the visual appearance inspection of the bearing so as to avoid contacting the bearing surface you're your hands.

6 **轴承放在仓库内储存时，成批装箱微型轴承可重迭码垛保管，垛底应适当垫高，以便通风和防止受潮。小型、少量轴承，也可连同包装放在货架上保管。货架须与外墙离开一些，货架底层应高于地面30cm，以防止墙上潮气渗入轴承包装中。**

When rolling bearings are stored in a warehouse, batches of miniature bearings packed in the crates can be stacked on the pallet. The pallet should be properly stacked to ensure all round ventilation and prevent with the effects of damp. For small quantities of small-sized bearings, store them with the original packaging on storage rack, which should be separated from the outside wall to prevent humidity and possible damage the rolling bearings. The bottom of storage rack should be at least 30 cm high above the floor.

7 **轴承在储存期间，应定期检查一次（一般6个月，湿热地区可3个月）。主要检查轴承的外、内包装以及实际产品表面的油封、防锈情况、有无损坏、油脂和变质现象。如发现损坏、变质现象、或轴承保管期已经超过规定期间，则应及时把这些轴承取出，或更换包装，或对轴承重新进行清洗防锈和油封包装再进行储存；或采取其它处理措施。**

During storage, inspection should be conducted regularly (normally, once every six months. In hot and humid areas once every three months). The inspection mainly includes external and internal packaging conditions, seals, antirust condition, any damage, grease condition or any deterioration. If there is some damage or deterioration seen, or the storage is more than the specified time, these bearings should be re-packed, or re-washed and greased, before packing them again for further storage.

8 **由于掉落轴承可能引起滚道，滚动体和保持架受伤。因此，摔落过后的轴承不能再使用。**

Be careful not to drop any bearings. Otherwise, the raceway, rolling elements, the cage or other featyres might be damaged. Any bearing that has been dropped must be scrapped