

## 1. Design features and special characteristics

### 1.1 Angular contact ball bearing

Angular contact ball bearings are non-separable type bearings. The line connecting the contact points of the ball and inner ring and the ball and outer ring creates an angle with the line drawn in the radial direction called the contact angle.

In addition to radial loads, single direction axial loads can also be accommodated by angular contact ball bearings.

Furthermore, since an axial load is generated from a radial force, these bearings are generally used in pairs facing each other. Standard type, high speed use type and ultra high speed varieties of angular contact ball bearings are available through **NTN**, and there are also many duplex varieties. A bearing accuracy of JIS Class 5 or higher is applied to duplex type angular contact ball bearings, and in many cases they are given a preload, in compliance with standard preload levels, before being used in an application. **Table 2** shows information concerning angular contact ball bearings, and **Table 3** shows similar information for duplex angular contact ball bearings.

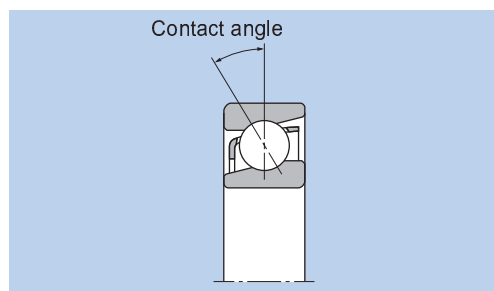


Diagram 1.

Table 1 Contact angle and contact angle codes

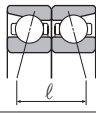
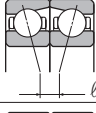

Contact angle	15°	30°	40°
Code	C	A <sup>①</sup>	B

① A 30° contact angle is standard, and therefore the code "A" will usually be omitted.

Table 2 Angular contact ball bearing types and characteristics

Type	Design	Characteristics
Standard type		<ul style="list-style-type: none"> <li>Available in bearing series 79, 70, 72, 72B, 73, and 73B.</li> <li>Contact angles: 30° and 40° (with B) available.</li> <li>Standard bearing cage type differs depending on bearing no. (Refer to <b>Table 4</b>)</li> </ul>
High speed use		<ul style="list-style-type: none"> <li>Available in bearing series 78C, 79C, 70C, 72C, and 73C.</li> <li>Contact angles: 15°</li> <li>All bearing accuracies JIS Class 5 or higher.</li> <li>Standard bearing cage type differs depending on bearing no. (Refer to <b>Table 4</b>)</li> </ul>
Ultra high speed use	 BNT type  HSB type	<ul style="list-style-type: none"> <li>Available in bearing series HSB9C, HSB0C, BNT0, and BNT2; all boundary dimensions agree with JIS series dimensions.</li> <li>Contact angles: 15°; HSB type HSB9 and HSB0: 15° and 30°.</li> <li>All bearing accuracies JIS Class 5 or higher.</li> <li>BNT type internal design can be altered; suitable for higher speed applications than high speed use bearings.</li> <li>HSB series bearings have smaller diameter of balls than high speed use type bearings, so benefit by less torque for high precision, high speed applications.</li> <li>The inner ring bore diameter and outer ring inner diameter of the HSB series have a ground undercut on one side enabling easy oil flow.</li> <li>For even higher speed applications, there is a bearing in this series equipped with ceramic ball bearings.</li> <li>For standard cage types refer to <b>Table 4</b>; molded resin cages are also available for some varieties.</li> </ul>

**Table 3 Duplex angular contact ball bearings — types and characteristics**

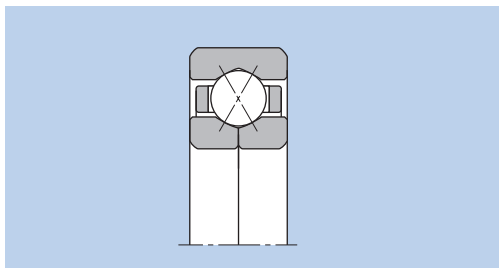
Duplex type		Characteristics
Back-to-back duplex (DB)		<ul style="list-style-type: none"> <li>• Can accommodate radial loads and axial loads in either direction.</li> <li>• Has a large distance <math>l</math> between the acting load center of the bearing, and therefore a large momentary force load capacity.</li> <li>• Allowable misalignment angle is small.</li> </ul>
Face-to-face duplex (DF)		<ul style="list-style-type: none"> <li>• Can accommodate radial loads and axial loads in either direction.</li> <li>• Has a smaller distance <math>l</math> between the acting load center of the bearing, and therefore a smaller momentary force load capacity.</li> <li>• Has a larger allowable misalignment angle than back-to-back duplex type.</li> </ul>
Tandem duplex (DT)		<ul style="list-style-type: none"> <li>• Can accommodate radial loads and single direction axial loads.</li> <li>• Axial loads are received by both bearings as a set, and therefore heavy axial loads can be accommodated.</li> </ul>

Note: 1. Duplex bearings are manufactured in a set to specified clearance and preload values, therefore they must be assembled together with identically numbered bearings and not mixed with other arrangements.

2. Triplex arrangements of angular contact bearings are also available. Consult NTN Engineering for details.

## 1.2 Four-point angular contact ball bearings

Four-point angular contact ball bearings have a contact angle of  $30^\circ$  and inner rings which are separated in half. As shown in **Diagram 2**, when the inner and outer rings receive a radial load the ball bearings contact the inner and outer rings at four points. This construction enables a single bearing to accommodate axial loads from either direction, and when generally under a simple axial load or heavy axial load, the bearing functions in reliance on two contact points like ordinary bearings.



**Diagram 2.**

## 1.3 Double row angular contact ball bearings

The structure of double row angular contact ball bearings is designed by arranging two single row angular contact bearings back-to-back in duplex (DB) to form one united bearing with a contact angle of  $30^\circ$ .

These bearings are capable of accommodating radial

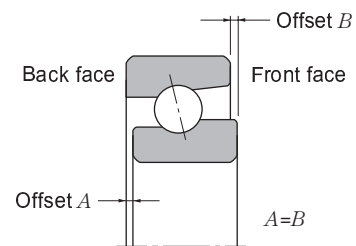
loads, axial loads in either direction, and have a high capacity for momentary loads as well.

As shown in **Diagram 3**, sealed and shielded type double row angular contact ball bearings are also available. Standard loads vary from those of open type bearings.

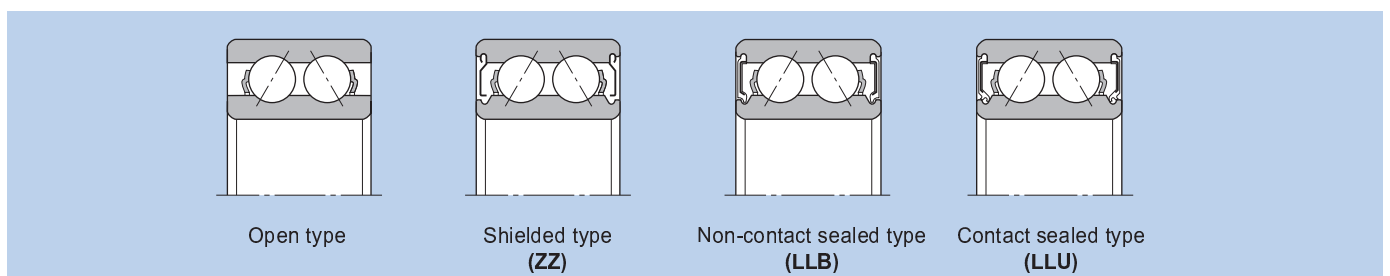
### ■ Flush ground

"Flush ground" is the name given to the finishing method shown in **Diagram 4** where the offset of the front and back faces of the bearing are ground to the same value. By doing this, a stated clearance or preload value can be achieved by using bearings with identical codes for these values, in other words by combining either DB or DF series bearings. DT series bearings can also be used in various arrangements to achieve uniform load distribution.

All BNT type bearings are flush ground, but other angular contact ball bearing series are not. If it is necessary to flush grind any of these other bearings, please consult NTN Engineering.



**Diagram 4.**



**Diagram 3.**

## 2. Standard cage types

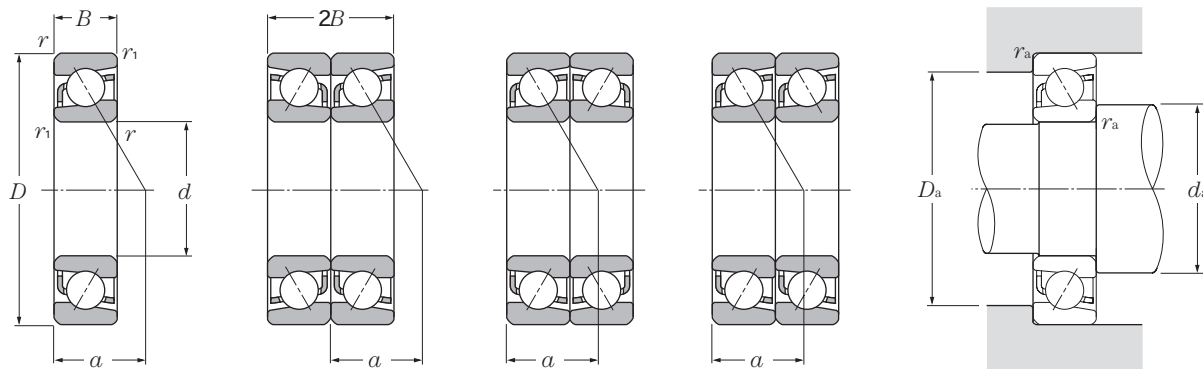
Table 4 lists the standard cage types for angular contact ball bearings. For high speed use angular contact ball bearings, molded resin cages and machined cages are widely used.

Table 4 Standard cages for angular contact ball bearings

Type	Bearing series	Molded resin cage	Pressed cage	Machined cage
Standard	79	7904~7913	—	7914 ~7960
	70	7000~7024	—	7026 ~7040
	72	—	7200 ~7222	7224 ~7240
	73	—	7300 ~7322	7324 ~7340
	72B	—	7200B~7222B	7224B ~7240B
	73B	—	7300B~7322B	7324B ~7340B
	High speed use	78C	—	—
79C		7904C~7913C	—	7914C ~7934C
70C		7000C~7024C	—	7026C ~7040C
72C		7200C~7220C	—	7221C ~7240C
73C		7303C~7312C	—	7300C ~7302C
				7313C ~7340C
Ultra high speed use	BNT0	—	—	BNT000 ~BNT009
	BNT2	—	—	BNT200 ~BNT209
	HSB9C	—	—	HSB910C~HSB934C
	HSB0C	HSB010C~HSB032C	—	HSB034C
4-point contact	QJ2	—	—	QJ208 ~QJ224
	QJ3	—	—	QJ306 ~QJ324
Double row	52	—	5200 ~5218	5219, 5220
	53	—	5302 ~5315	—

Note: 1. Standard cages for 5S-BNT and 5S-HSB type bearings are the same as cages for BNT and HSB type bearings.

2. Due to the material characteristics of molded resin cages, use at application temperatures in excess of 120°C is not possible.

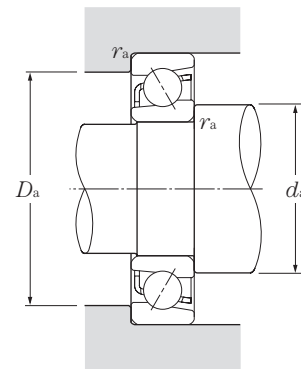


Single

Back-to-back arrangement (DB)

Face-to-face arrangement (DF)

Tandem arrangement (DT)



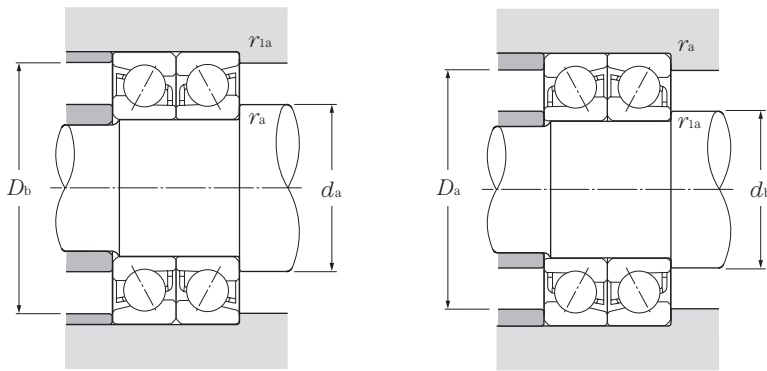
$d$  10~30mm

$d$	Boundary dimensions					Basic load ratings				Limiting speeds <sup>①</sup>		Bearing numbers <sup>②</sup>	Load center mm $a$	Mass kg single (approx.)
	$D$	$B$	$2B$	$r_{s\ min}$ <sup>③</sup>	$r_{ls\ min}$ <sup>③</sup>	dynamic	static	dynamic	static	grease	oil			
	mm	mm	mm	mm	mm	kN	kN	kgf	kgf	rpm	rpm			
10	26	8	16	0.3	0.15	4.65	2.07	470	212	29,000	39,000	7000	9	0.023
	30	9	18	0.6	0.3	5.45	2.74	555	279	28,000	37,000	7200	10.5	0.029
	30	9	18	0.6	0.3	5.00	2.52	510	257	24,000	32,000	7200B	13	0.029
	35	11	22	0.6	0.3	10.1	4.95	1,030	500	26,000	34,000	7300	12	0.04
	35	11	22	0.6	0.3	9.50	4.60	970	470	22,000	29,000	7300B	15	0.041
12	28	8	16	0.3	0.15	5.05	2.46	515	251	26,000	35,000	7001	10	0.025
	32	10	20	0.6	0.3	7.60	3.95	775	405	25,000	33,000	7201	11.5	0.035
	32	10	20	0.6	0.3	7.00	3.65	715	375	21,000	28,000	7201B	14	0.036
	37	12	24	1	0.6	11.2	5.25	1,140	535	23,000	30,000	7301	13	0.044
	37	12	24	1	0.6	10.5	4.95	1,080	505	19,000	26,000	7301B	16.5	0.045
15	32	9	18	0.3	0.15	5.80	3.15	590	320	23,000	31,000	7002	11.5	0.035
	35	11	22	0.6	0.3	9.05	4.70	925	480	22,000	29,000	7202	12.5	0.046
	35	11	22	0.6	0.3	8.35	4.35	855	445	18,000	25,000	7202B	16	0.046
	42	13	26	1	0.6	13.5	7.20	1,370	735	19,000	26,000	7302	15	0.055
	42	13	26	1	0.6	12.5	6.65	1,270	680	17,000	22,000	7302B	19	0.057
17	35	10	20	0.3	0.15	7.15	3.85	730	390	21,000	28,000	7003	12.5	0.046
	40	12	24	0.6	0.3	12.0	6.60	1,220	675	19,000	26,000	7203	14.5	0.064
	40	12	24	0.6	0.3	11.0	6.10	1,120	625	17,000	22,000	7203B	18	0.066
	47	14	28	1	0.6	15.9	8.65	1,630	880	18,000	24,000	7303	16	0.107
	47	14	28	1	0.6	14.8	8.00	1,510	820	15,000	20,000	7303B	20.5	0.109
20	42	12	24	0.6	0.3	9.70	5.60	990	570	19,000	25,000	7004	15	0.08
	47	14	28	1	0.6	14.5	8.40	1,480	855	17,000	23,000	7204	17	0.1
	47	14	28	1	0.6	13.3	7.70	1,360	785	15,000	20,000	7204B	21.5	0.102
	52	15	30	1.1	0.6	18.7	10.4	1,910	1,060	16,000	21,000	7304	18	0.138
	52	15	30	1.1	0.6	17.3	9.65	1,770	985	13,000	18,000	7304B	22.5	0.141
25	42	9	18	0.3	0.15	7.15	4.95	730	505	17,000	22,000	7905	14	0.05
	47	12	24	0.6	0.3	10.7	6.85	1,100	700	16,000	21,000	7005	16.5	0.093
	52	15	30	1	0.6	16.2	10.3	1,650	1,050	14,000	19,000	7205	19	0.125
	52	15	30	1	0.6	14.8	9.40	1,510	960	12,000	16,000	7205B	24	0.129
	62	17	34	1.1	0.6	26.4	15.8	2,690	1,610	13,000	17,000	7305	21	0.23
	62	17	34	1.1	0.6	24.4	14.6	2,490	1,490	11,000	15,000	7305B	27	0.234
30	47	9	18	0.3	0.15	7.55	5.75	770	585	14,000	19,000	7906	15.5	0.058
	55	13	26	1	0.6	13.9	9.45	1,410	965	13,000	18,000	7006	19	0.135

① This value achieved with machined cages; when pressed cages are used, 80% of this value is acceptable.

② Bearing numbers appended with the code "B" have a contact angle of 40°; bearings with this code have a contact angle of 30°.

③ Smallest allowable dimension for chamfer dimension  $r$  or  $r_1$ .



### Equivalent bearing load

**dynamic**  
 $P_r = X F_r + Y F_a$

Contact angle	e	Single, DT				DB, DF			
		$F_a / F_r \leq e$		$F_a / F_r > e$		$F_a / F_r \leq e$		$F_a / F_r > e$	
		X	Y	X	Y	X	Y	X	Y
30°	0.80	1	0	0.39	0.76	1	0.78	0.63	1.24
40°	1.14	1	0	0.35	0.57	1	0.55	0.57	0.93

### static

$P_{or} = X_o F_r + Y_o F_a$

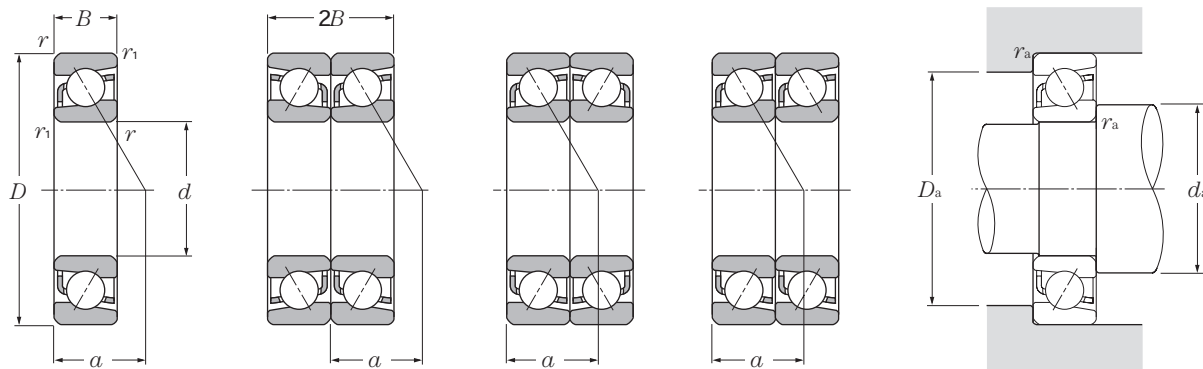
Contact angle	Single, DT		DB, DF	
	$X_o$	$Y_o$	$X_o$	$Y_o$
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

For single and DT arrangement,

When  $P_{or} < F_r$  use  $P_{or} = F_r$

Basic load ratings				Limiting speeds <sup>①</sup>		Bearing numbers <sup>②</sup>			Abutment and fillet dimensions					
dynamic (duplex) kN	static C <sub>or</sub>	dynamic (duplex) kgf	static C <sub>or</sub>	(duplex) rpm		DB	DF	DT	mm					
C <sub>r</sub>	C <sub>or</sub>	C <sub>r</sub>	C <sub>or</sub>	grease	oil				d <sub>a</sub> min	d <sub>b</sub> min	D <sub>a</sub> max	D <sub>b</sub> max	r <sub>as</sub> max	r <sub>ias</sub> max
7.50	4.15	765	425	23,000	31,000	DB	DF	DT	12.5	12.5	23.5	24.8	0.3	0.15
8.80	5.45	900	560	22,000	30,000	DB	DF	DT	14.5	12.5	25.5	27.5	0.6	0.3
8.10	5.05	825	515	19,000	26,000	DB	DF	DT	14.5	12.5	25.5	27.5	0.6	0.3
16.5	9.85	1,680	1,000	20,000	27,000	DB	DF	DT	14.5	12.5	30.5	32.5	0.6	0.3
15.4	9.20	1,570	940	18,000	24,000	DB	DF	DT	14.5	12.5	30.5	32.5	0.6	0.3
8.20	4.90	840	500	21,000	28,000	DB	DF	DT	14.5	14.5	25.5	26.8	0.3	0.15
12.3	7.95	1,260	810	20,000	26,000	DB	DF	DT	16.5	14.5	27.5	29.5	0.6	0.3
11.4	7.35	1,160	750	17,000	23,000	DB	DF	DT	16.5	14.5	27.5	29.5	0.6	0.3
18.2	10.5	1,850	1,070	18,000	24,000	DB	DF	DT	17.5	16.5	31.5	32.5	1	0.6
17.1	9.90	1,750	1,010	16,000	21,000	DB	DF	DT	17.5	16.5	31.5	32.5	1	0.6
9.40	6.30	960	640	18,000	24,000	DB	DF	DT	17.5	17.5	29.5	30.8	0.3	0.15
14.7	9.40	1,500	960	17,000	23,000	DB	DF	DT	19.5	17.5	30.5	32.5	0.6	0.3
13.6	8.70	1,390	885	15,000	20,000	DB	DF	DT	19.5	17.5	30.5	32.5	0.6	0.3
21.9	14.4	2,230	1,470	15,000	21,000	DB	DF	DT	20.5	19.5	36.5	37.5	1	0.6
20.3	13.3	2,070	1,360	13,000	18,000	DB	DF	DT	20.5	19.5	36.5	37.5	1	0.6
11.6	7.65	1,190	780	17,000	22,000	DB	DF	DT	19.5	19.5	32.5	33.8	0.3	0.15
19.4	13.2	1,980	1,350	15,000	21,000	DB	DF	DT	21.5	19.5	35.5	37.5	0.6	0.3
17.9	12.2	1,830	1,250	13,000	18,000	DB	DF	DT	21.5	19.5	35.5	37.5	0.6	0.3
25.9	17.3	2,640	1,760	14,000	19,000	DB	DF	DT	22.5	21.5	41.5	42.5	1	0.6
24.0	16.0	2,450	1,640	12,000	16,000	DB	DF	DT	22.5	21.5	41.5	42.5	1	0.6
15.8	11.2	1,610	1,140	15,000	20,000	DB	DF	DT	24.5	24.5	37.5	39.5	0.6	0.3
23.6	16.8	2,400	1,710	14,000	18,000	DB	DF	DT	25.5	24.5	41.5	42.5	1	0.6
21.6	15.4	2,200	1,570	12,000	16,000	DB	DF	DT	25.5	24.5	41.5	42.5	1	0.6
30.5	20.8	3,100	2,130	12,000	17,000	DB	DF	DT	27	24.5	45	47.5	1	0.6
28.2	19.3	2,870	1,970	11,000	14,000	DB	DF	DT	27	24.5	45	47.5	1	0.6
11.6	9.95	1,180	1,010	13,000	18,000	DB	DF	DT	27.5	27.5	39.5	40.8	0.3	0.15
17.5	13.7	1,780	1,400	12,000	17,000	DB	DF	DT	29.5	29.5	42.5	44.5	0.6	0.3
26.3	20.6	2,690	2,100	11,000	15,000	DB	DF	DT	30.5	29.5	46.5	47.5	1	0.6
24.0	18.8	2,450	1,920	10,000	13,000	DB	DF	DT	30.5	29.5	46.5	47.5	1	0.6
43.0	31.5	4,400	3,250	10,000	14,000	DB	DF	DT	32	29.5	55	57.5	1	0.6
39.5	29.3	4,050	2,980	9,100	12,000	DB	DF	DT	32	29.5	55	57.5	1	0.6
12.3	11.5	1,250	1,170	12,000	15,000	DB	DF	DT	32.5	32.5	44.5	45.8	0.3	0.15
22.5	18.9	2,300	1,930	11,000	14,000	DB	DF	DT	35.5	35.5	49.5	50.5	1	0.6

Note: For bearing series 79 and 70, inner rings are constructed with groove abutments on both sides. Therefore, the inner ring chamfer dimension  $r_i$  is identical to dimension  $r$ . Furthermore, the radius  $r_s$  of the shaft corner roundness is likewise identical to  $r_s$ .



Single

Back-to-back arrangement (DB)

Face-to-face arrangement (DF)

Tandem arrangement (DT)

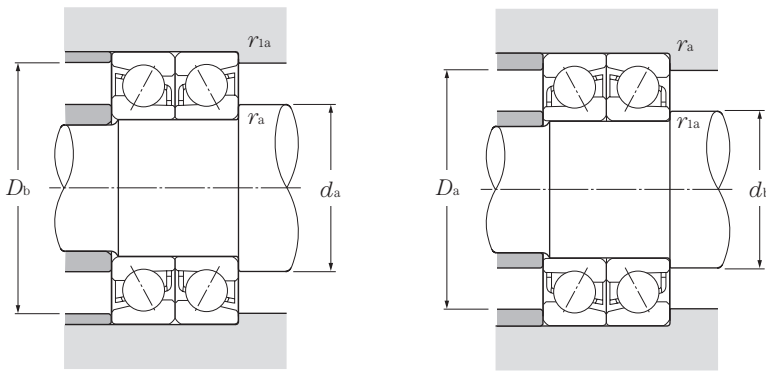
d 30~55mm

d	Boundary dimensions					Basic load ratings				Limiting speeds <sup>①</sup>		Bearing numbers <sup>②</sup>	Load center mm a	Mass kg single (approx.)
	D	B	2B	r <sub>s min</sub> <sup>③</sup>	r <sub>1s min</sub> <sup>③</sup>	dynamic		static		grease	oil			
	mm	mm	mm	mm	mm	C <sub>r</sub>	C <sub>or</sub>	C <sub>r</sub>	C <sub>or</sub>	rpm	rpm			
30	62	16	32	1	0.6	22.5	14.8	2,300	1,510	12,000	16,000	7206	21.5	0.193
	62	16	32	1	0.6	20.5	13.5	2,090	1,380	11,000	14,000	7206B	27.5	0.197
	72	19	38	1.1	0.6	33.5	22.3	3,450	2,280	11,000	15,000	7306	24.5	0.345
	72	19	38	1.1	0.6	31.0	20.5	3,150	2,090	9,600	13,000	7306B	31.5	0.352
35	55	10	20	0.6	0.3	12.0	8.85	1,220	905	13,000	17,000	7907	18	0.088
	62	14	28	1	0.6	17.5	12.6	1,790	1,280	12,000	16,000	7007	21	0.18
	72	17	34	1.1	0.6	29.7	20.1	3,050	2,050	11,000	14,000	7207	24	0.281
	72	17	34	1.1	0.6	27.1	18.4	2,760	1,870	9,300	12,000	7207B	31	0.287
	80	21	42	1.5	1	40.0	26.3	4,050	2,680	9,800	13,000	7307	27	0.462
80	21	42	1.5	1	36.5	24.2	3,750	2,470	8,400	11,000	7307B	34.5	0.469	
40	62	12	24	0.6	0.3	12.7	10.2	1,290	1,040	11,000	15,000	7908	20.5	0.13
	68	15	30	1	0.6	18.8	14.6	1,910	1,490	10,000	14,000	7008	23	0.222
	80	18	36	1.1	0.6	35.5	25.1	3,600	2,560	9,600	13,000	7208	26.5	0.355
	80	18	36	1.1	0.6	32.0	23.0	3,250	2,340	8,300	11,000	7208B	34	0.375
	90	23	46	1.5	1	49.0	33.0	5,000	3,350	8,600	12,000	7308	30.5	0.625
	90	23	46	1.5	1	45.0	30.5	4,550	3,100	7,400	9,900	7308B	39	0.636
45	68	12	24	0.6	0.3	15.7	12.9	1,600	1,310	10,000	14,000	7909	22.5	0.15
	75	16	32	1	0.6	22.3	17.7	2,270	1,800	9,500	13,000	7009	25.5	0.282
	85	19	38	1.1	0.6	39.5	28.7	4,050	2,930	8,700	12,000	7209	28.5	0.404
	85	19	38	1.1	0.6	36.0	26.2	3,650	2,680	7,400	9,900	7209B	37	0.41
	100	25	50	1.5	1	63.5	44.0	6,450	4,500	7,800	10,000	7309	33.5	0.837
	100	25	50	1.5	1	58.5	40.0	5,950	4,100	6,600	8,900	7309B	43.0	0.854
50	72	12	24	0.6	0.3	16.6	14.5	1,690	1,470	9,200	12,000	7910	23.5	0.157
	80	16	32	1	0.6	23.7	20.1	2,410	2,050	8,600	11,000	7010	27	0.306
	90	20	40	1.1	0.6	41.5	31.5	4,200	3,200	7,900	10,000	7210	30	0.457
	90	20	40	1.1	0.6	37.5	28.6	3,800	2,920	6,700	9,000	7210B	39.5	0.466
	110	27	54	2	1	74.0	52.0	7,600	5,350	7,100	9,400	7310	36.5	1.09
	110	27	54	2	1	68.0	48.0	6,950	4,950	6,000	8,100	7310B	47	1.11
55	80	13	26	1	0.6	17.3	16.1	1,770	1,640	8,400	11,000	7911	26	0.214
	90	18	36	1.1	0.6	31.0	26.3	3,150	2,680	7,900	11,000	7011	30	0.447
	100	21	42	1.5	1	51.0	39.5	5,200	4,050	7,100	9,500	7211	33	0.6
	100	21	42	1.5	1	46.5	36.0	4,700	3,700	6,100	8,200	7211B	43	0.612
	120	29	58	2	1	86.0	61.5	8,750	6,300	6,400	8,600	7311	40	1.39
	120	29	58	2	1	79.0	56.5	8,050	5,800	5,500	7,300	7311B	52	1.42

① This value achieved with machined cages; when pressed cages are used, 80% of this value is acceptable.

② Bearing numbers appended with the code "B" have a contact angle of 40°; bearings with this code have a contact angle of 30°.

③ Minimal allowable dimension for chamfer dimension r or r<sub>1</sub>.



### Equivalent bearing load

**dynamic**  
 $P_r = X F_r + Y F_a$

Contact angle	e	Single, DT				DB, DF			
		$F_a / F_r \leq e$		$F_a / F_r > e$		$F_a / F_r \leq e$		$F_a / F_r > e$	
		X	Y	X	Y	X	Y	X	Y
30°	0.80	1	0	0.39	0.76	1	0.78	0.63	1.24
40°	1.14	1	0	0.35	0.57	1	0.55	0.57	0.93

### static

$P_{or} = X_o F_r + Y_o F_a$

Contact angle	Single, DT		DB, DF	
	$X_o$	$Y_o$	$X_o$	$Y_o$
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

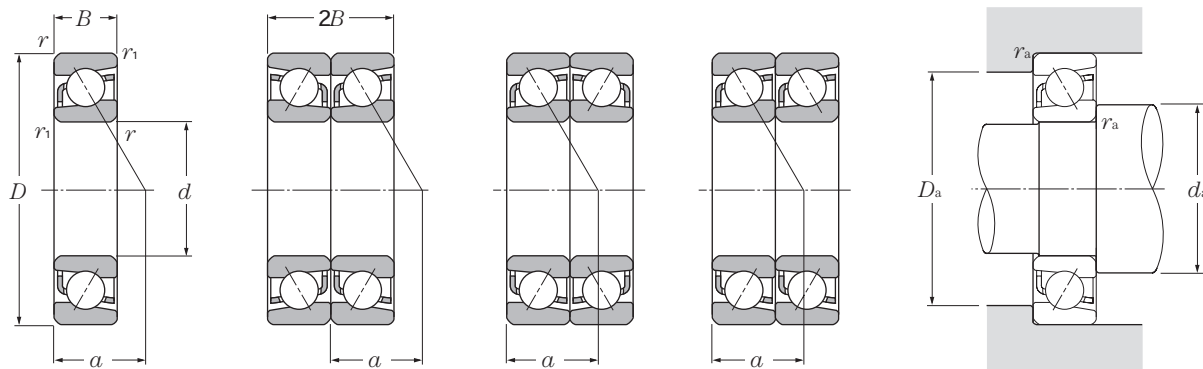
For single and DT arrangement,

When  $P_{or} < F_r$  use  $P_{or} = F_r$

Basic load ratings				Limiting speeds <sup>①</sup>		Bearing numbers <sup>②</sup>			Abutment and fillet dimensions					
dynamic (duplex) kN	static C <sub>or</sub>	dynamic (duplex) kgf	static C <sub>or</sub>	(duplex) rpm		DB	DF	DT	mm					
C <sub>r</sub>	C <sub>or</sub>	C <sub>r</sub>	C <sub>or</sub>	grease	oil				d <sub>a</sub> min	d <sub>b</sub> min	D <sub>a</sub> max	D <sub>b</sub> max	r <sub>as</sub> max	r <sub>ias</sub> max
36.5	29.6	3,750	3,000	9,800	13,000	DB	DF	DT	35.5	34.5	56.5	57.5	1	0.6
33.5	27.1	3,400	2,760	8,600	11,000	DB	DF	DT	35.5	34.5	56.5	57.5	1	0.6
54.5	44.5	5,550	4,550	8,900	12,000	DB	DF	DT	37	34.5	65	67.5	1	0.6
50.0	41.0	5,100	4,200	7,700	10,000	DB	DF	DT	37	34.5	65	67.5	1	0.6
19.5	17.7	1,990	1,810	10,000	13,000	DB	DF	DT	39.5	39.5	50.5	52.5	0.6	0.3
28.5	25.1	2,900	2,560	9,400	13,000	DB	DF	DT	40.5	40.5	56.5	57.5	1	0.6
48.5	40.0	4,900	4,100	8,600	11,000	DB	DF	DT	42	39.5	65	67.5	1	0.6
44.0	36.5	4,500	3,750	7,500	10,000	DB	DF	DT	42	39.5	65	67.5	1	0.6
65.0	52.5	6,600	5,350	7,800	10,000	DB	DF	DT	43.5	40.5	71.5	74.5	1.5	1
59.5	48.5	6,100	4,950	6,800	9,000	DB	DF	DT	43.5	40.5	71.5	74.5	1.5	1
20.6	20.4	2,100	2,080	9,000	12,000	DB	DF	DT	44.5	44.5	57.5	59.5	0.6	0.3
30.5	29.2	3,100	2,970	8,300	11,000	DB	DF	DT	45.5	45.5	62.5	63.5	1	0.6
57.5	50.5	5,850	5,150	7,700	10,000	DB	DF	DT	47	44.5	73.0	75.5	1	0.6
52.0	46.0	5,300	4,700	6,700	8,900	DB	DF	DT	47	44.5	73	75.5	1	0.6
79.5	66.0	8,100	6,700	6,900	9,200	DB	DF	DT	48.5	45.5	81.5	84.5	1.5	1
73.0	60.5	7,400	6,200	6,000	8,000	DB	DF	DT	48.5	45.5	81.5	84.5	1.5	1
25.5	25.7	2,600	2,620	8,100	11,000	DB	DF	DT	49.5	49.5	63.5	65.5	0.6	0.3
36.0	35.5	3,700	3,600	7,500	10,000	DB	DF	DT	50.5	50.5	69.5	70.5	1	0.6
64.5	57.5	6,550	5,850	6,900	9,200	DB	DF	DT	52	49.5	78	80.5	1	0.6
58.5	52.5	5,950	5,350	6,000	8,000	DB	DF	DT	52	49.5	78	80.5	1	0.6
103	88.0	10,500	8,950	6,200	8,200	DB	DF	DT	53.5	50.5	91.5	94.5	1.5	1
95.0	80.5	9,650	8,250	5,400	7,200	DB	DF	DT	53.5	50.5	91.5	94.5	1.5	1
27.0	28.9	2,750	2,950	7,300	9,800	DB	DF	DT	54.5	54.5	67.5	69.5	0.6	0.3
38.5	40.0	3,900	4,100	6,800	9,100	DB	DF	DT	55.5	55.5	74.5	75.5	1	0.6
67.0	63.0	6,850	6,400	6,300	8,300	DB	DF	DT	57	54.5	83	85.5	1	0.6
60.5	57.0	6,200	5,850	5,500	7,300	DB	DF	DT	57	54.5	83	85.5	1	0.6
121	105	12,300	10,700	5,600	7,500	DB	DF	DT	60	55.5	100	104.5	2	1
111	96.0	11,300	9,850	4,900	6,500	DB	DF	DT	60	55.5	100	104.5	2	1
28.1	32.0	2,870	3,300	6,700	8,900	DB	DF	DT	60.5	60.5	74.5	75.5	1	0.6
50.5	52.5	5,150	5,350	6,300	8,400	DB	DF	DT	62	62	83	85.5	1	0.6
83.0	79.0	8,450	8,050	5,700	7,600	DB	DF	DT	63.5	60.5	91.5	94.5	1.5	1
75.0	72.0	7,650	7,350	5,000	6,600	DB	DF	DT	63.5	60.5	91.5	94.5	1.5	1
139	123	14,200	12,600	5,100	6,800	DB	DF	DT	65	60.5	110	114.5	2	1
128	113	13,000	11,600	4,500	5,900	DB	DF	DT	65	60.5	110	114.5	2	1

Note: For bearing series 79 and 70, inner rings are constructed with groove abutments on both sides. Therefore, the inner ring chamfer dimension  $r_i$  is identical to dimension  $r$ . Furthermore, the radius  $r_s$  of the shaft corner roundness is, likewise, identical to  $r_s$ .





Single

Back-to-back arrangement (DB)

Face-to-face arrangement (DF)

Tandem arrangement (DT)

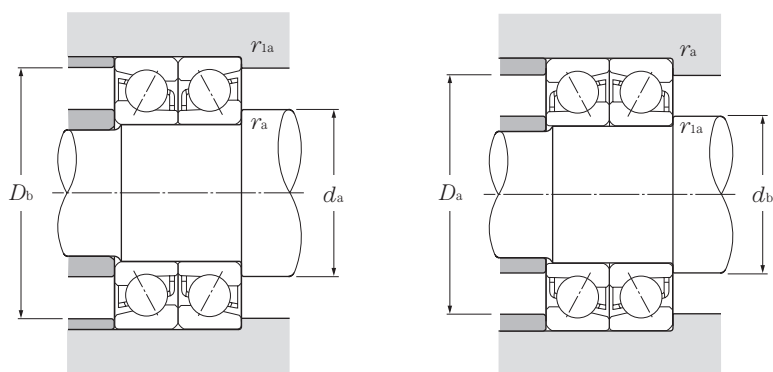
$d$  60~85mm

$d$	Boundary dimensions					Basic load ratings				Limiting speeds <sup>①</sup>		Bearing numbers <sup>②</sup>	Load center mm $a$	Mass kg single (approx.)
	$D$	$B$	$2B$	$r_{s\ min}$ <sup>③</sup>	$r_{ls\ min}$ <sup>③</sup>	dynamic	static	dynamic	static	grease	oil			
	mm	mm	mm	mm	mm	kN	kN	kgf	kgf	rpm	rpm			
60	85	13	26	1	0.6	18.1	17.4	1,840	1,780	7,800	10,000	7912	27.5	0.23
	95	18	36	1.1	0.6	32.0	28.1	3,250	2,860	7,200	9,600	7012	31.5	0.478
	110	22	44	1.5	1	61.5	49.0	6,300	5,000	6,600	8,800	7212	36	0.765
	110	22	44	1.5	1	56.0	44.5	5,700	4,550	5,700	7,600	7212B	47.5	0.78
	130	31	62	2.1	1.1	98.0	71.5	10,000	7,300	5,900	7,900	7312	43	1.74
	130	31	62	2.1	1.1	90.0	66.0	9,200	6,700	5,100	6,800	7312B	56	1.77
65	90	13	26	1	0.6	18.3	18.0	1,860	1,840	7,200	9,600	7913	29	0.245
	100	18	36	1.1	0.6	33.5	31.5	3,450	3,200	6,700	9,000	7013	33	0.509
	120	23	46	1.5	1	70.5	58.0	7,150	5,900	6,100	8,100	7213	38	0.962
	120	23	46	1.5	1	63.5	52.5	6,500	5,350	5,200	7,000	7213B	50.5	0.981
	140	33	66	2.1	1.1	111	82.0	11,300	8,350	5,500	7,300	7313	46	2.11
	140	33	66	2.1	1.1	102	75.0	10,400	7,700	4,700	6,300	7313B	59.5	2.15
70	100	16	32	1	0.6	26.2	26.2	2,670	2,670	6,700	9,000	7914	32.5	0.397
	110	20	40	1.1	0.6	42.5	39.5	4,350	4,000	6,200	8,300	7014	36	0.705
	125	24	48	1.5	1	76.5	63.5	7,800	6,500	5,700	7,600	7214	40	1.09
	125	24	48	1.5	1	69.0	58.0	7,050	5,900	4,900	6,500	7214B	53	1.11
	150	35	70	2.1	1.1	125	93.5	12,700	9,550	5,100	6,800	7314	49.5	2.56
	150	35	70	2.1	1.1	114	86	11,700	8,800	4,400	5,800	7314B	63.5	2.61
75	105	16	32	1	0.6	26.50	27.1	2,710	2,760	6,300	8,400	7915	34	0.42
	115	20	40	1.1	0.6	43.50	41.5	4,450	4,250	5,800	7,800	7015	37.5	0.745
	130	25	50	1.5	1	79.0	68.5	8,050	7,000	5,300	7,100	7215	42.5	1.17
	130	25	50	1.5	1	71.5	62.0	7,300	6,350	4,500	6,000	7215B	56	1.19
	160	37	74	2.1	1.1	136	106	13,800	10,800	4,800	6,300	7315	52.5	3.07
	160	37	74	2.1	1.1	125	97.5	12,700	9,900	4,100	5,400	7315B	68	3.13
80	110	16	32	1	0.6	26.9	28.0	2,740	2,860	5,900	7,800	7916	35.5	0.444
	125	22	44	1.1	0.6	53.5	50.5	5,450	5,150	5,500	7,300	7016	40.5	0.994
	140	26	52	2	1	89.0	76.0	9,100	7,750	5,000	6,600	7216	45	1.39
	140	26	52	2	1	80.5	69.5	8,200	7,050	4,300	5,700	7216B	59	1.42
	170	39	78	2.1	1.1	147	119	15,000	12,100	4,500	5,900	7316	55.5	3.65
	170	39	78	2.1	1.1	135	109	13,800	11,100	3,800	5,100	7316B	72	3.72
85	120	18	36	1.1	0.6	36.0	38.0	3,700	3,850	5,500	7,400	7917	38.5	0.628
	130	22	44	1.1	0.6	54.5	53.5	5,600	5,450	5,100	6,900	7017	42	1.04
	150	28	56	2	1	99.5	88.5	10,100	9,050	4,700	6,200	7217	48	1.78
	150	28	56	2	1	90.0	80.5	9,150	8,200	4,000	5,300	7217B	63.5	1.82

① This value achieved with machined cages; when pressed cages are used, 80% of this value is acceptable.

② Bearing numbers appended with the code "B" have a contact angle of 40°; bearings with this code have a contact angle of 30°.

③ Minimal allowable dimension for chamfer dimension  $r$  or  $r_1$ .



### Equivalent bearing load

**dynamic**  
 $P_r = X F_r + Y F_a$

Contact angle	e	Single, DT				DB, DF			
		$F_a / F_r \leq e$		$F_a / F_r > e$		$F_a / F_r \leq e$		$F_a / F_r > e$	
		X	Y	X	Y	X	Y	X	Y
30°	0.80	1	0	0.39	0.76	1	0.78	0.63	1.24
40°	1.14	1	0	0.35	0.57	1	0.55	0.57	0.93

### static

$P_{or} = X_o F_r + Y_o F_a$

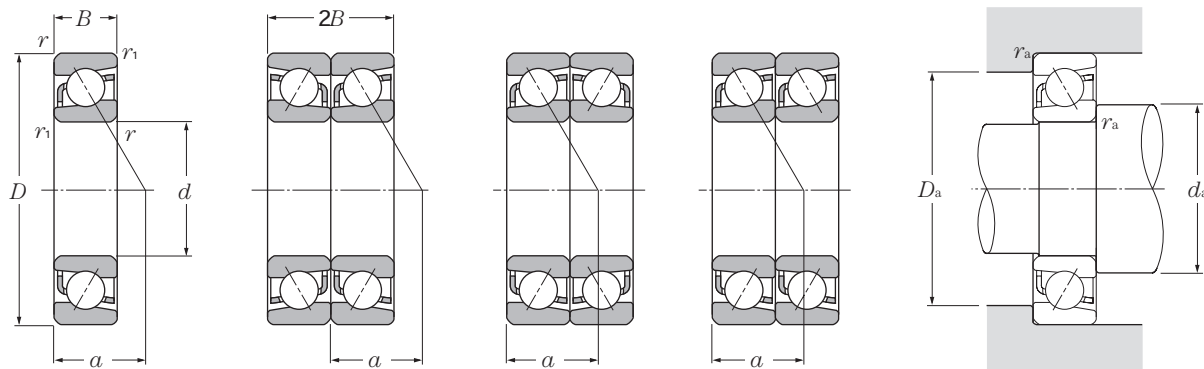
Contact angle	Single, DT		DB, DF	
	$X_o$	$Y_o$	$X_o$	$Y_o$
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

For single and DT arrangement,

When  $P_{or} < F_r$  use  $P_{or} = F_r$

Basic load ratings				Limiting speeds <sup>①</sup>		Bearing numbers <sup>②</sup>			Abutment and fillet dimensions					
dynamic (duplex) $C_r$	static $C_{or}$	dynamic (duplex) $C_r$	static $C_{or}$	(duplex) rpm		DB	DF	DT	mm					
kN		kgf		grease	oil				$d_a$ min	$d_b$ min	$D_a$ max	$D_b$ max	$r_{as}$ max	$r_{ias}$ max
29.3	35.0	2,990	3,550	6,200	8,300	DB	DF	DT	65.5	65.5	79.5	80.5	1	0.6
52.0	56.0	5,300	5,700	5,800	7,700	DB	DF	DT	67	67	88	90.5	1	0.6
100	98.0	10,200	10,000	5,300	7,000	DB	DF	DT	68.5	65.5	101.5	104.5	1.5	1
91.0	89.0	9,250	9,100	4,600	6,100	DB	DF	DT	68.5	65.5	101.5	104.5	1.5	1
159	143	16,200	14,600	4,700	6,300	DB	DF	DT	72	67	118	123	2	1
146	132	14,900	13,400	4,100	5,500	DB	DF	DT	72	67	118	123	2	1
29.7	36.0	3,050	3,700	5,700	7,600	DB	DF	DT	70.5	70.5	84.5	85.5	1	0.6
55.0	62.5	5,600	6,400	5,400	7,100	DB	DF	DT	72	72	93	95.5	1	0.6
114	116	11,600	11,800	4,900	6,500	DB	DF	DT	73.5	70.5	111.5	114.5	1.5	1
103	105	10,500	10,700	4,200	5,600	DB	DF	DT	73.5	70.5	111.5	114.5	1.5	1
180	164	18,400	16,700	4,400	5,800	DB	DF	DT	77	72	128	133	2	1
166	151	16,900	15,400	3,800	5,100	DB	DF	DT	77	72	128	133	2	1
42.5	52.5	4,350	5,350	5,300	7,100	DB	DF	DT	75.5	75.5	94.5	95.5	1	0.6
69.5	78.5	7,050	8,050	5,000	6,600	DB	DF	DT	77	77	103	105.5	1	0.6
124	127	12,600	13,000	4,500	6,000	DB	DF	DT	78.5	75.5	116.5	119.5	1.5	1
112	116	11,500	11,800	3,900	5,200	DB	DF	DT	78.5	75.5	116.5	119.5	1.5	1
203	187	20,700	19,100	4,100	5,400	DB	DF	DT	82	77	138	143	2	1
186	172	19,000	17,600	3,500	4,700	DB	DF	DT	82	77	138	143	2	1
43.0	54.0	4,400	5,500	5,000	6,700	DB	DF	DT	80.5	80.5	99.5	100.5	1	0.6
71.0	83.5	7,250	8,500	4,600	6,200	DB	DF	DT	82	82	108	110.5	1	0.6
128	137	13,100	14,000	4,200	5,600	DB	DF	DT	83.5	80.5	121.5	124.5	1.5	1
116	124	11,800	12,700	3,700	4,900	DB	DF	DT	83.5	80.5	121.5	124.5	1.5	1
221	212	22,500	21,600	3,800	5,000	DB	DF	DT	87	82	148	153	2	1
202	195	20,600	19,800	3,300	4,400	DB	DF	DT	87	82	148	153	2	1
43.5	56.0	4,450	5,700	4,700	6,200	DB	DF	DT	85.5	85.5	104.5	105.5	1	0.6
86.5	101	8,850	10,300	4,400	5,800	DB	DF	DT	87	87	118	120.5	1	0.6
145	152	14,700	15,500	3,900	5,300	DB	DF	DT	90	85.5	130	134.5	2	1
131	139	13,300	14,100	3,400	4,600	DB	DF	DT	90	85.5	130	134.5	2	1
239	238	24,400	24,200	3,500	4,700	DB	DF	DT	92	87	158	163	2	1
219	218	22,300	22,300	3,100	4,100	DB	DF	DT	92	87	158	163	2	1
59.0	76.0	6,000	7,750	4,400	5,900	DB	DF	DT	92	92	113	115.5	1	0.6
89.0	107	9,050	10,900	4,100	5,500	DB	DF	DT	92	92	123	125.5	1	0.6
162	177	16,500	18,100	3,700	5,000	DB	DF	DT	95	90.5	140	144.5	2	1
146	161	14,900	16,400	3,200	4,300	DB	DF	DT	95	90.5	140	144.5	2	1

Note: For bearing series 79 and 70, inner rings are constructed with groove abutments on both sides. Therefore, the inner ring chamfer dimension  $r_i$  is identical to dimension  $r$ . Furthermore, the radius  $r_s$  of the shaft corner roundness is, likewise, identical to  $r_s$ .



Single

Back-to-back arrangement (DB)

Face-to-face arrangement (DF)

Tandem arrangement (DT)

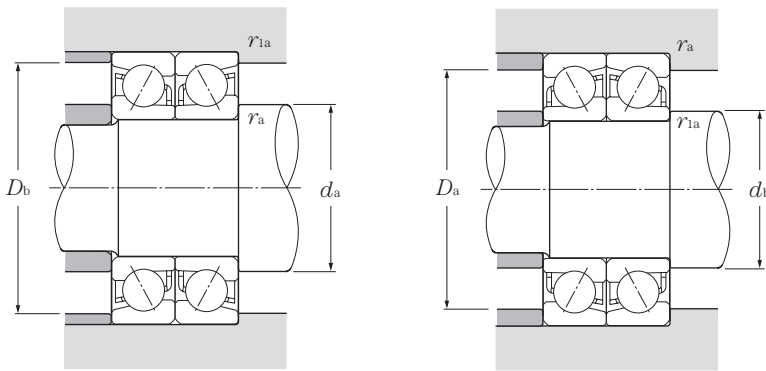
$d$  85~120mm

$d$	Boundary dimensions					Basic load ratings				Limiting speeds <sup>①</sup>		Bearing numbers <sup>②</sup>	Load center mm $a$	Mass kg single (approx.)
	$D$	$B$	$2B$	$r_{s\ min}$ <sup>③</sup>	$r_{is\ min}$ <sup>③</sup>	dynamic	static	dynamic	static	grease	oil			
	mm	mm	mm	mm	mm	kN	kN	kgf	kgf	rpm	rpm			
85	180	41	82	3	1.1	159	133	16,200	13,500	4,200	5,600	7317	59	4.34
	180	41	82	3	1.1	146	122	14,800	12,400	3,600	4,800	7317B	76	4.43
90	125	18	36	1.1	0.6	36.0	38.0	3,650	3,850	5,200	7,000	7918	40	0.658
	140	24	48	1.5	1	65.0	63.5	6,650	6,450	4,900	6,500	7018	45	1.35
	160	30	60	2.0	1	118	103	12,000	10,500	4,400	5,900	7218	51	2.18
	160	30	60	2.0	1	107	94.0	10,900	9,550	3,800	5,000	7218B	67.5	2.22
	190	43	86	3.0	1.1	171	147	17,400	15,000	4,000	5,300	7318	62	5.06
190	43	86	3.0	1.1	156	135	15,900	13,800	3,400	4,500	7318B	80.5	5.16	
95	130	18	36	1.1	0.6	37.0	40.5	3,800	4,150	5,000	6,600	7919	41.5	0.688
	145	24	48	1.5	1	67.0	67.0	6,800	6,800	4,600	6,100	7019	46.5	1.41
	170	32	64	2.1	1.1	133	118	13,600	12,000	4,100	5,500	7219	54.5	2.67
	170	32	64	2.1	1.1	121	107	12,300	11,000	3,500	4,700	7219B	71.5	2.72
	200	45	90	3	1.1	183	162	18,600	16,600	3,700	5,000	7319	65	5.89
200	45	90	3	1.1	167	149	17,100	15,200	3,200	4,200	7319B	84.5	6	
100	140	20	40	1.1	0.6	48.0	52.5	4,900	5,350	4,700	6,200	7920	44.5	0.934
	150	24	48	1.5	1	68.5	70.5	6,950	7,200	4,400	5,800	7020	48	1.47
	180	34	68	2.1	1.1	144	126	14,700	12,800	3,900	5,200	7220	57.5	3.2
	180	34	68	2.1	1.1	130	114	13,300	11,700	3,400	4,500	7220B	76	3.26
	215	47	94	3	1.1	207	193	21,100	19,700	3,500	4,700	7320	69	7.18
215	47	94	3	1.1	190	178	19,400	18,100	3,000	4,000	7320B	89.5	7.32	
105	145	20	40	1.1	0.6	48.5	54.5	4,950	5,550	4,400	5,900	7921	46	0.972
	160	26	52	2	1	80.0	81.5	8,150	8,350	4,100	5,500	7021	51.5	1.86
	190	36	72	2.1	1.1	157	142	16,000	14,400	3,700	5,000	7221	60.5	3.79
	190	36	72	2.1	1.1	142	129	14,500	13,100	3,200	4,300	7221B	80	3.87
	225	49	98	3	1.1	220	210	22,400	21,500	3,400	4,500	7321	72	8.2
225	49	98	3	1.1	202	194	20,600	19,700	2,900	3,800	7321B	93.5	8.36	
110	150	20	40	1.1	0.6	49.5	56.0	5,050	5,700	4,200	5,700	7922	47.5	1.01
	170	28	56	2	1	92.0	93.0	9,350	9,450	3,900	5,300	7022	54.5	2.3
	200	38	76	2.1	1.1	170	158	17,300	16,100	3,500	4,700	7222	64	4.45
	200	38	76	2.1	1.1	154	144	15,700	14,700	3,000	4,000	7222B	84	4.54
	240	50	100	3	1.1	246	246	25,100	25,100	3,200	4,300	7322	76	9.6
240	50	100	3	1.1	226	226	23,000	23,100	2,700	3,700	7322B	99	9.8	
120	165	22	44	1.1	0.6	61.0	69.5	6,200	7,100	3,900	5,200	7924	52	1.66

① This value achieved with machined cages; when pressed cages are used, 80% of this value is acceptable.

② Bearing numbers appended with the code "B" have a contact angle of 40°; bearings with this code have a contact angle of 30°.

③ Minimal allowable dimension for chamfer dimension  $r$  or  $r_1$ .



### Equivalent bearing load

**dynamic**  
 $P_r = X F_r + Y F_a$

Contact angle	e	Single, DT				DB, DF			
		$F_a / F_r \leq e$		$F_a / F_r > e$		$F_a / F_r \leq e$		$F_a / F_r > e$	
		X	Y	X	Y	X	Y	X	Y
30°	0.80	1	0	0.39	0.76	1	0.78	0.63	1.24
40°	1.14	1	0	0.35	0.57	1	0.55	0.57	0.93

### static

$P_{or} = X_o F_r + Y_o F_a$

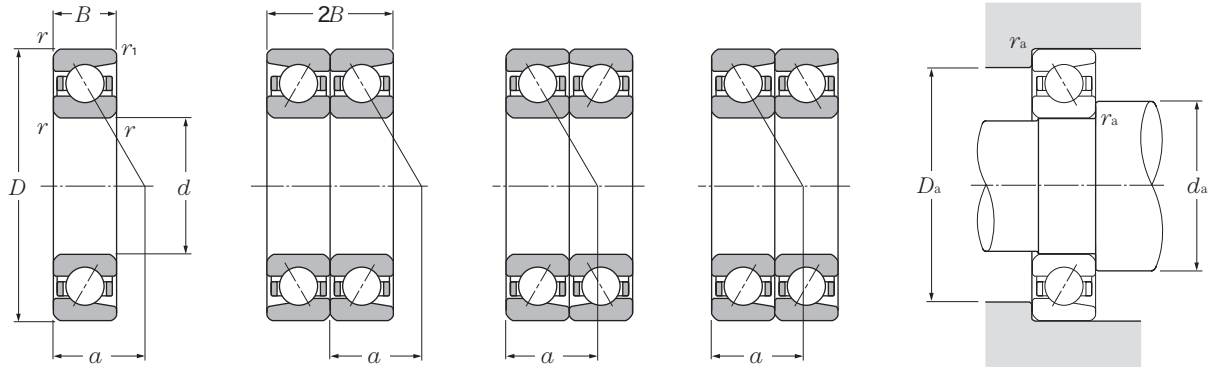
Contact angle	Single, DT		DB, DF	
	$X_o$	$Y_o$	$X_o$	$Y_o$
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

For single and DT arrangement,

When  $P_{or} < F_r$  use  $P_{or} = F_r$

Basic load ratings				Limiting speeds <sup>①</sup>		Bearing numbers <sup>②</sup>			Abutment and fillet dimensions					
dynamic (duplex) $C_r$	static $C_{or}$	dynamic (duplex) $C_r$	static $C_{or}$	(duplex) rpm		DB	DF	DT	mm					
kN		kgf		grease	oil				$d_a$ min	$d_b$ min	$D_a$ max	$D_b$ max	$r_{as}$ max	$r_{ias}$ max
258	265	26,300	27,000	3,300	4,500	DB	DF	DT	99	92	166	173	2.5	1
236	244	24,100	24,900	2,900	3,900	DB	DF	DT	99	92	166	173	2.5	1
58.0	75.5	5,900	7,700	4,200	5,500	DB	DF	DT	97	97	118	120.5	1	0.6
106	127	10,800	12,900	3,900	5,200	DB	DF	DT	98.5	98.5	131.5	134.5	1.5	1
191	206	19,500	21,000	3,500	4,700	DB	DF	DT	100	95.5	150	154.5	2	1
173	188	17,700	19,100	3,100	4,100	DB	DF	DT	100	95.5	150	154.5	2	1
277	294	28,300	30,000	3,200	4,200	DB	DF	DT	104	97	176	183	2.5	1
254	270	25,900	27,600	2,700	3,700	DB	DF	DT	104	97	176	183	2.5	1
60.5	81.5	6,150	8,300	3,900	5,300	DB	DF	DT	102	102	123	125.5	1	0.6
109	134	11,100	13,600	3,700	4,900	DB	DF	DT	103.5	103.5	136.5	139.5	1.5	1
217	236	22,100	24,100	3,300	4,400	DB	DF	DT	107	102	158	163	2	1
196	215	20,000	21,900	2,900	3,800	DB	DF	DT	107	102	158	163	2	1
297	325	30,500	33,000	3,000	3,900	DB	DF	DT	109	102	186	193	2.5	1
272	298	27,700	30,500	2,600	3,400	DB	DF	DT	109	102	186	193	2.5	1
78.0	105	7,950	10,700	3,700	5,000	DB	DF	DT	107	107	133	135.5	1	0.6
111	141	11,300	14,400	3,500	4,600	DB	DF	DT	108.5	108.5	141.5	144.5	1.5	1
233	251	23,800	25,600	3,100	4,200	DB	DF	DT	112	107	168	173	2	1
212	229	21,600	23,300	2,700	3,600	DB	DF	DT	112	107	168	173	2	1
335	385	34,500	39,500	2,800	3,700	DB	DF	DT	114	107	201	208	2.5	1
310	355	31,500	36,000	2,400	3,300	DB	DF	DT	114	107	201	208	2.5	1
79.0	109	8,050	11,100	3,500	4,700	DB	DF	DT	112	112	138	140.5	1	0.6
130	163	13,300	16,700	3,300	4,400	DB	DF	DT	115	115	150	154.5	2	1
254	283	25,900	28,900	3,000	4,000	DB	DF	DT	117	112	178	183	2	1
231	258	23,500	26,300	2,600	3,500	DB	DF	DT	117	112	178	183	2	1
355	420	36,500	43,000	2,700	3,600	DB	DF	DT	119	112	211	218	2.5	1
330	385	33,500	39,500	2,300	3,100	DB	DF	DT	119	112	211	218	2.5	1
80.0	112	8,150	11,400	3,400	4,500	DB	DF	DT	117	117	143	145.5	1	0.6
149	186	15,200	18,900	3,100	4,200	DB	DF	DT	120	120	160	164.5	2	1
276	315	28,100	32,500	2,800	3,800	DB	DF	DT	122	117	188	193	2	1
250	289	25,500	29,400	2,500	3,300	DB	DF	DT	122	117	188	193	2	1
400	490	41,000	50,000	2,600	3,400	DB	DF	DT	124	117	226	233	2.5	1
365	455	37,500	46,000	2,200	3,000	DB	DF	DT	124	117	226	233	2.5	1
99.0	139	10,100	14,200	3,100	4,100	DB	DF	DT	127	127	158	160.5	1	0.6

Note: For bearing series 79 and 70, inner rings are constructed with groove abutments on both sides. Therefore, the inner ring chamfer dimension  $r_i$  is identical to dimension  $r$ . Furthermore, the radius  $r_s$  of the shaft corner roundness is, likewise, identical to  $r_s$ .



Single

Back-to-back arrangement (DB)

Face-to-face arrangement (DF)

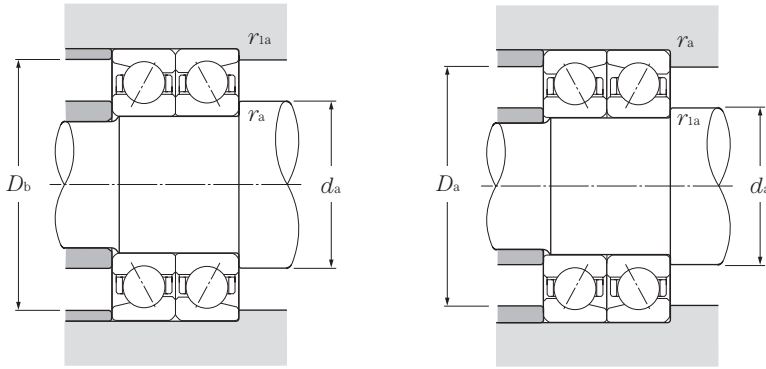
Tandem arrangement (DT)

$d$  120~170mm

$d$	Boundary dimensions					Basic load ratings				Limiting speeds		Bearing numbers	Load center mm $a$	Mass kg single (approx.)
	$D$	$B$	$2B$	$r_{s\ min}^{②}$	$r_{is\ min}^{②}$	dynamic	static	dynamic	static	grease	oil			
	mm					kN		kgf		rpm				
120	180	28	56	2	1	93.5	98.5	9,550	10,000	3,600	4,800	7024	57.5	2.47
	215	40	80	2.1	1.1	183	177	18,600	18,100	3,200	4,300	7224	68.5	6.26
	215	40	80	2.1	1.1	165	162	16,900	16,500	2,800	3,700	7224B	90.5	6.26
	260	55	110	3	1.1	246	252	25,100	25,700	2,900	3,900	7324	82.5	14.7
	260	55	110	3	1.1	225	231	23,000	23,600	2,500	3,300	7324B	107	14.7
130	180	24	48	1.5	1	75.0	87.5	7,650	8,900	3,600	4,700	7926	56.5	1.82
	200	33	66	2	1	117	125	12,000	12,800	3,300	4,400	7026	64	3.73
	230	40	80	3	1.1	196	198	20,000	20,200	3,000	4,000	7226	72	7.15
	230	40	80	3	1.1	177	180	18,100	18,300	2,500	3,400	7226B	95.5	7.15
	280	58	116	4	1.5	273	293	27,900	29,800	2,700	3,600	7326	88	17.6
	280	58	116	4	1.5	250	268	25,500	27,400	2,300	3,100	7326B	115	17.6
140	190	24	48	1.5	1	75.5	90.0	7,700	9,150	3,300	4,400	7928	59.5	1.94
	210	33	66	2	1	120	133	12,200	13,500	3,100	4,100	7028	67	3.96
	250	42	84	3	1.1	203	215	20,700	21,900	2,700	3,600	7228	77.5	8.78
	250	42	84	3	1.1	183	195	18,700	19,900	2,300	3,100	7228B	103	8.78
	300	62	124	4	1.5	300	335	30,500	34,500	2,500	3,300	7328	94.5	21.5
	300	62	124	4	1.5	275	310	28,100	31,500	2,100	2,800	7328B	123	21.5
	150	210	28	56	2	1	97.5	117	9,900	11,900	3,100	4,100	7930	66
225		35	70	2.1	1.1	137	154	14,000	15,700	2,800	3,800	7030	71.5	4.82
270		45	90	3	1.1	232	259	23,700	26,400	2,500	3,400	7230	83	11
270		45	90	3	1.1	210	235	21,400	24,000	2,200	2,900	7230B	111	11
320		65	130	4	1.5	330	380	33,500	39,000	2,300	3,100	7330	100	25.1
320		65	130	4	1.5	300	350	30,500	36,000	2,000	2,600	7330B	131	25.1
160	220	28	56	2	1	98.5	121	10,000	12,300	2,800	3,800	7932	69	3.13
	240	38	76	2.1	1.1	155	176	15,800	18,000	2,700	3,600	7032	77	5.96
	290	48	96	3	1.1	263	305	26,800	31,500	2,400	3,200	7232	89	13.7
	290	48	96	3	1.1	238	279	24,200	28,400	2,000	2,700	7232B	118	13.7
	340	68	136	4	1.5	345	420	35,500	43,000	2,100	2,800	7332	106	29.8
	340	68	136	4	1.5	315	385	32,000	39,500	1,800	2,400	7332B	139	29.8
170	230	28	56	2	1	102	129	10,400	13,100	2,700	3,600	7934	71.5	3.29
	260	42	84	2.1	1.1	186	214	18,900	21,900	2,500	3,300	7034	83	7.96
	310	52	104	4	1.5	295	360	30,000	36,500	2,200	3,000	7234	95.5	17
	310	52	104	4	1.5	266	325	27,200	33,000	1,900	2,500	7234B	127	17
	360	72	144	4	1.5	390	485	39,500	49,500	2,000	2,700	7334	113	35.3

① Bearing numbers appended with the code "B" have a contact angle of 40°; bearings with this code have a contact angle of 30°.

② Smallest allowable dimension for chamfer dimension  $r$ .



### Equivalent bearing load

**dynamic**  
 $P_r = X F_r + Y F_a$

Contact angle	e	Single, DT				DB, DF			
		$F_a / F_r \leq e$		$F_a / F_r > e$		$F_a / F_r \leq e$		$F_a / F_r > e$	
		X	Y	X	Y	X	Y	X	Y
30°	0.80	1	0	0.39	0.76	1	0.78	0.63	1.24
40°	1.14	1	0	0.35	0.57	1	0.55	0.57	0.93

### static

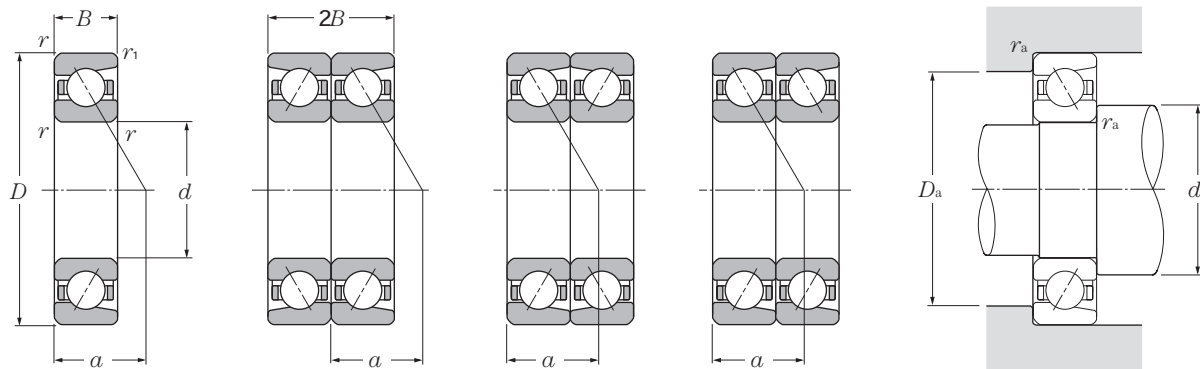
$P_{or} = X_o F_r + Y_o F_a$

Contact angle	Single, DT		DB, DF	
	$X_o$	$Y_o$	$X_o$	$Y_o$
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

For single and DT arrangement,

When  $P_{or} < F_r$  use  $P_{or} = F_r$

Basic load ratings				Limiting speeds		Bearing numbers			Abutment and fillet dimensions				
dynamic (duplex) kN	static kgf	dynamic (duplex) kN	static kgf	(duplex) rpm		DB	DF	DT	mm				
$C_r$	$C_{or}$	$C_r$	$C_{or}$	grease	oil				$d_a$ min	$D_a$ max	$D_b$ max	$r_{as}$ max	$r_{1as}$ max
152	197	15,500	20,100	2,900	3,800	DB	DF	DT	130	170	174.5	2	1
297	355	30,500	36,000	2,600	3,400	DB	DF	DT	132	203	208	2	1
269	325	27,400	33,000	2,300	3,000	DB	DF	DT	132	203	208	2	1
400	505	41,000	51,500	2,300	3,100	DB	DF	DT	134	246	253	2.5	1
365	460	37,500	47,000	2,000	2,700	DB	DF	DT	134	246	253	2.5	1
121	175	12,400	17,800	2,800	3,800	DB	DF	DT	138.5	171.5	174.5	1.5	1
191	251	19,400	25,600	2,600	3,500	DB	DF	DT	140	190	194.5	2	1
320	395	32,500	40,500	2,400	3,100	DB	DF	DT	144	216	223	2.5	1
288	360	29,400	36,500	2,100	2,700	DB	DF	DT	144	216	223	2.5	1
445	585	45,500	59,500	2,100	2,800	DB	DF	DT	148	262	271.5	3	1.5
405	535	41,500	54,500	1,900	2,500	DB	DF	DT	148	262	271.5	3	1.5
123	180	12,500	18,300	2,600	3,500	DB	DF	DT	148.5	181.5	184.5	1.5	1
194	265	19,800	27,000	2,400	3,300	DB	DF	DT	150	200	204.5	2	1
330	430	33,500	44,000	2,200	2,900	DB	DF	DT	154	236	243	2.5	1
297	390	30,500	40,000	1,900	2,500	DB	DF	DT	154	236	243	2.5	1
490	670	50,000	68,500	2,000	2,600	DB	DF	DT	158	282	291.5	3	1.5
445	615	45,500	63,000	1,700	2,300	DB	DF	DT	158	282	291.5	3	1.5
158	234	16,100	23,900	2,400	3,300	DB	DF	DT	160	200	204.5	2	1
222	305	22,700	31,500	2,300	3,000	DB	DF	DT	162	213	218	2	1
375	515	38,500	53,000	2,000	2,700	DB	DF	DT	164	256	263	2.5	1
340	470	34,500	48,000	1,800	2,400	DB	DF	DT	164	256	263	2.5	1
535	765	54,500	78,000	1,800	2,400	DB	DF	DT	168	302	311.5	3	1.5
490	700	50,000	71,500	1,600	2,100	DB	DF	DT	168	302	311.5	3	1.5
160	241	16,300	24,600	2,300	3,000	DB	DF	DT	170	210	214.5	2	1
252	355	25,700	36,000	2,100	2,800	DB	DF	DT	172	228	233	2	1
425	615	43,500	62,500	1,900	2,500	DB	DF	DT	174	276	283	2.5	1
385	555	39,500	57,000	1,600	2,200	DB	DF	DT	174	276	283	2.5	1
565	845	57,500	86,000	1,700	2,300	DB	DF	DT	178	322	331.5	3	1.5
515	770	52,500	79,000	1,500	2,000	DB	DF	DT	178	322	331.5	3	1.5
165	257	16,900	26,200	2,100	2,800	DB	DF	DT	180	220	224.5	2	1
300	430	31,000	43,500	2,000	2,600	DB	DF	DT	182	248	253	2	1
480	715	49,000	73,000	1,800	2,400	DB	DF	DT	188	292	301.5	3	1.5
435	650	44,000	66,500	1,500	2,100	DB	DF	DT	188	292	301.5	3	1.5
630	970	64,500	99,000	1,600	2,100	DB	DF	DT	188	342	351.5	3	1.5



Single

Back-to-back arrangement (DB)

Face-to-face arrangement (DF)

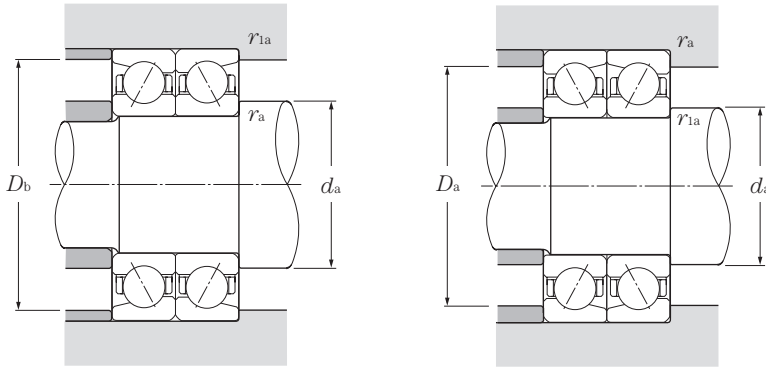
Tandem arrangement (DT)

**d** 170~300mm

d	Boundary dimensions						Basic load ratings				Limiting speeds		Bearing numbers	Load center mm a	Mass kg single (approx.)
	D	B	2B	r <sub>s min</sub>	r <sub>is min</sub>	C <sub>r</sub>	C <sub>or</sub>	C <sub>r</sub>	C <sub>or</sub>	grease	oil				
	mm	mm	mm	mm	mm	kN	kN	kgf	kgf	rpm	rpm				
<b>170</b>	360	72	144	4	1.5	355	445	36,000	45,500	1,700	2,300	<b>7334B</b>	147	35.3	
<b>180</b>	250	33	66	2	1	131	163	13,400	16,600	2,500	3,300	<b>7936</b>	78.5	4.87	
	280	46	92	2.1	1.1	219	266	22,300	27,100	2,300	3,100	<b>7036</b>	89.5	10.4	
	320	52	104	4	1.5	305	385	31,000	39,000	2,100	2,800	<b>7236</b>	98	17.7	
	320	52	104	4	1.5	276	350	28,100	35,500	1,800	2,400	<b>7236B</b>	131	17.7	
	380	75	150	4	1.5	410	535	41,500	54,500	1,900	2,500	<b>7336</b>	118	40.9	
	380	75	150	4	1.5	375	490	38,000	50,000	1,600	2,100	<b>7336B</b>	155	40.9	
<b>190</b>	260	33	66	2	1	133	169	13,500	17,200	2,400	3,200	<b>7938</b>	81.5	5.1	
	290	46	92	2.1	1.1	224	280	22,800	28,600	2,200	2,900	<b>7038</b>	92.5	10.8	
	340	55	110	4	1.5	305	390	31,000	39,500	2,000	2,600	<b>7238</b>	104	21.3	
	340	55	110	4	1.5	273	355	27,800	36,000	1,700	2,200	<b>7238B</b>	139	21.3	
	400	78	156	5	2	430	585	44,000	59,500	1,800	2,300	<b>7338</b>	124	47	
	400	78	156	5	2	390	535	40,000	54,500	1,500	2,000	<b>7338B</b>	163	47	
<b>200</b>	280	38	76	2.1	1.1	185	231	18,900	23,600	2,200	3,000	<b>7940</b>	88.5	7.15	
	310	51	102	2.1	1.1	252	325	25,700	33,000	2,100	2,800	<b>7040</b>	99	14	
	360	58	116	4	1.5	335	450	34,500	46,000	1,900	2,500	<b>7240</b>	110	25.3	
	360	58	116	4	1.5	305	410	31,000	41,500	1,600	2,100	<b>7240B</b>	146	25.3	
	420	80	160	5	2	450	605	46,000	62,000	1,700	2,200	<b>7340</b>	130	53.1	
	420	80	160	5	2	410	555	42,000	56,500	1,400	1,900	<b>7340B</b>	170	53.1	
<b>220</b>	300	38	76	2.1	1.1	187	239	19,000	24,300	2,000	2,700	<b>7944</b>	94	7.74	
<b>240</b>	320	38	76	2.1	1.1	197	264	20,100	26,900	1,800	2,400	<b>7948</b>	100	8.34	
<b>260</b>	360	46	92	2.1	1.1	258	375	26,300	38,000	1,700	2,200	<b>7952</b>	112	14	
<b>280</b>	380	46	92	2.1	1.1	261	385	26,600	39,500	1,500	2,100	<b>7956</b>	118	14.8	
<b>300</b>	420	56	112	3	1.1	325	520	33,500	53,000	1,400	1,900	<b>7960</b>	132	23.7	

① Bearing numbers appended with the code "B" have a contact angle of 40°; bearings with this code have a contact angle of 30°.

② Minimal allowable dimension for chamfer dimension r or r<sub>i</sub>.



### Equivalent bearing load

**dynamic**  
 $P_r = XF_r + YF_a$

Contact angle	e	Single, DT				DB, DF			
		$F_a/F_r \leq e$		$F_a/F_r > e$		$F_a/F_r \leq e$		$F_a/F_r > e$	
		X	Y	X	Y	X	Y	X	Y
30°	0.80	1	0	0.39	0.76	1	0.78	0.63	1.24
40°	1.14	1	0	0.35	0.57	1	0.55	0.57	0.93

### static

$P_{or} = X_o F_r + Y_o F_a$

Contact angle	Single, DT		DB, DF	
	$X_o$	$Y_o$	$X_o$	$Y_o$
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

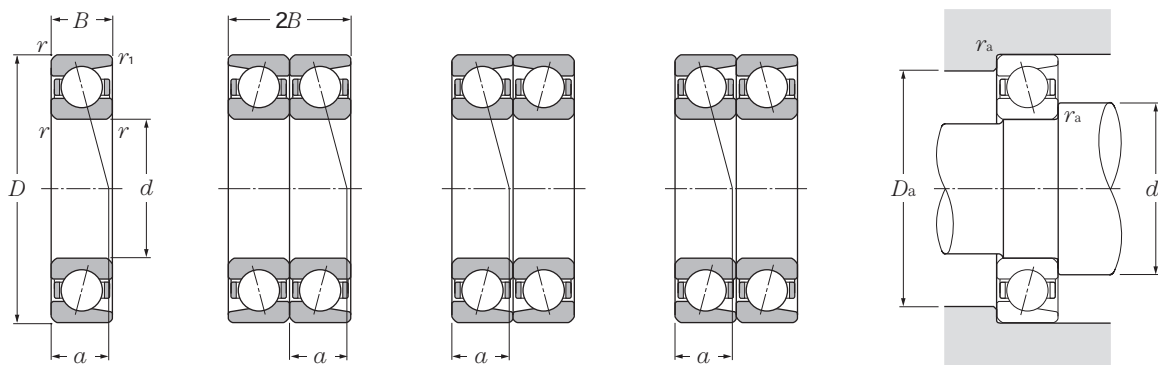
For single and DT arrangement,

When  $P_{or} < F_r$  use  $P_{or} = F_r$

Basic load ratings				Limiting speeds		Bearing numbers ①			Abutment and fillet dimensions				
dynamic (duplex) kN	static C <sub>or</sub>	dynamic (duplex) kgf	static C <sub>or</sub>	(duplex) rpm		DB	DF	DT	mm				
C <sub>r</sub>	C <sub>or</sub>	C <sub>r</sub>	C <sub>or</sub>	grease	oil				d <sub>a</sub> min	D <sub>a</sub> max	D <sub>b</sub> max	r <sub>as</sub> max	r <sub>1as</sub> max
575	890	59,000	90,500	1,400	1,800	DB	DF	DT	188	342	351.5	3	1.5
213	325	21,700	33,500	2,000	2,700	DB	DF	DT	190	240	244.5	2	1
355	530	36,500	54,000	1,900	2,500	DB	DF	DT	192	268	273	2	1
495	770	50,500	78,500	1,700	2,200	DB	DF	DT	198	302	311.5	3	1.5
450	700	45,500	71,000	1,400	1,900	DB	DF	DT	198	302	311.5	3	1.5
665	1 070	68,000	109,000	1,500	2,000	DB	DF	DT	198	362	371.5	3	1.5
605	975	62,000	99,500	1,300	1,700	DB	DF	DT	198	362	371.5	3	1.5
216	335	22,000	34,500	1,900	2,500	DB	DF	DT	200	250	254.5	2	1
365	560	37,000	57,000	1,800	2,300	DB	DF	DT	202	278	283	2	1
495	780	50,000	79,500	1,600	2,100	DB	DF	DT	208	322	331.5	3	1.5
445	705	45,000	72,000	1,400	1,800	DB	DF	DT	208	322	331.5	3	1.5
695	1 170	71,000	119,000	1,400	1,900	DB	DF	DT	212	378	390	4	2
635	1 070	64,500	109,000	1,200	1,600	DB	DF	DT	212	378	390	4	2
300	465	30,500	47,000	1,800	2,400	DB	DF	DT	212	268	273	2	1
410	650	41,500	66,000	1,700	2,200	DB	DF	DT	212	298	303	2	1
550	900	56,000	92,000	1,500	2,000	DB	DF	DT	218	342	351.5	3	1.5
495	815	50,500	83,000	1,300	1,700	DB	DF	DT	218	342	351.5	3	1.5
730	1 210	74,500	124,000	1,300	1,800	DB	DF	DT	222	398	410	4	2
665	1 110	68,000	113,000	1,200	1,500	DB	DF	DT	222	398	410	4	2
305	475	31,000	48,500	1,600	2,100	DB	DF	DT	232	288	293	2	1
320	530	32,500	54,000	1,500	1,900	DB	DF	DT	252	308	313	2	1
420	750	42,500	76,500	1,300	1,800	DB	DF	DT	272	348	353	2	1
425	775	43,000	79,000	1,200	1,600	DB	DF	DT	292	368	373	2	1
530	1 040	54,000	106,000	1,100	1,500	DB	DF	DT	314	406	413	2.5	1



# High Speed Single and Duplex Arrangements



Single

Back-to-back arrangement (DB)

Face-to-face arrangement (DF)

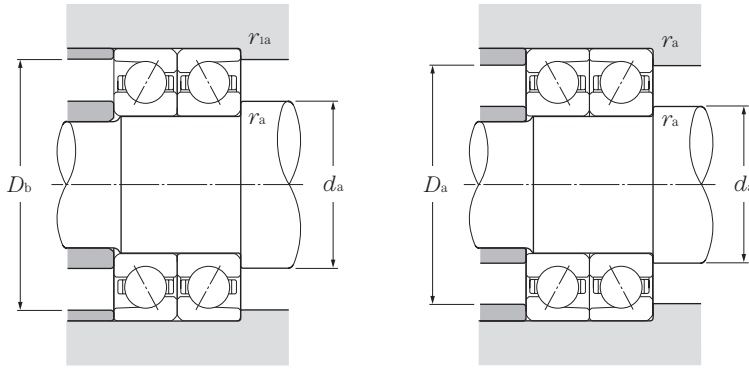
Tandem arrangement (DT)

$d$  10~40mm

$d$	Boundary dimensions					Basic load ratings				Limiting speeds <sup>①</sup>		Bearing numbers	Load center $a$	Mass kg single (approx.)
	$D$	$B$	$2B$	$r_{s \min}$ <sup>②</sup>	$r_{is \min}$ <sup>②</sup>	dynamic	static	dynamic	static	grease	oil			
	mm	mm	mm	mm	mm	kN	kN	kgf	kgf	rpm	rpm			
10	26	8	16	0.3	0.15	4.90	2.20	500	225	43,000	58,000	7000C	6.5	0.019
	30	9	18	0.6	0.3	5.40	2.64	555	269	41,000	55,000	7200C	7	0.029
12	28	8	16	0.3	0.15	5.40	2.64	555	269	39,000	52,000	7001C	6.5	0.021
	32	10	20	0.6	0.3	7.10	3.45	720	355	36,000	49,000	7201C	8	0.036
15	32	9	18	0.3	0.15	6.25	3.40	635	345	34,000	45,000	7002C	7.5	0.029
	35	11	22	0.6	0.3	9.00	4.50	915	460	32,000	42,000	7202C	9	0.045
	42	13	26	1	0.6	13.30	6.85	1,360	700	28,000	38,000	7302C	10.5	0.081
17	35	10	20	0.3	0.15	7.70	4.10	785	420	31,000	41,000	7003C	8.5	0.038
	40	12	24	0.6	0.3	11.2	5.75	1,140	590	29,000	38,000	7203C	10	0.062
	47	14	28	1	0.6	15.7	8.25	1,600	840	26,000	35,000	7303C	11.5	0.109
20	42	12	24	0.6	0.3	10.5	6.05	1,070	615	27,000	36,000	7004C	10	0.066
	47	14	28	1	0.6	14.6	8.15	1,490	835	25,000	34,000	7204C	11.5	0.1
	52	15	30	1.1	0.6	18.5	9.95	1,890	1,020	23,000	31,000	7304C	12.5	0.14
25	37	7	14	0.3	0.15	5.05	3.85	515	390	27,000	36,000	7805C	7.5	0.021
	42	9	18	0.3	0.15	7.85	5.40	800	555	25,000	33,000	7905C	9	0.042
	47	12	24	0.6	0.3	11.7	7.45	1,190	755	23,000	31,000	7005C	11	0.078
	52	15	30	1	0.6	16.6	10.2	1,690	1,050	21,000	28,000	7205C	12.5	0.121
	62	17	34	1.1	0.6	26.4	15.3	2,690	1,560	19,000	26,000	7305C	14.5	0.222
30	42	7	14	0.3	0.15	5.35	4.50	545	460	23,000	31,000	7806C	8.5	0.025
	47	9	18	0.3	0.15	8.30	6.25	845	640	21,000	28,000	7906C	9.5	0.048
	55	13	26	1	0.6	15.1	10.3	1,540	1,050	20,000	26,000	7006C	12.5	0.112
	62	16	32	1	0.6	23.0	14.7	2,350	1,500	18,000	24,000	7206C	14	0.191
	72	19	38	1.1	0.6	32.5	20.3	3,300	2,070	16,000	22,000	7306C	16.5	0.33
35	47	7	14	0.3	0.15	5.80	5.25	590	535	20,000	27,000	7807C	9	0.028
	55	10	20	0.6	0.3	13.2	9.65	1,340	985	19,000	25,000	7907C	11	0.073
	62	14	28	1	0.6	19.1	13.7	1,950	1,390	17,000	23,000	7007C	13.5	0.149
	72	17	34	1.1	0.6	30.5	19.9	3,100	2,030	16,000	21,000	7207C	15.5	0.273
	80	21	42	1.5	1	40.5	25.8	4,100	2,630	14,000	19,000	7307C	18	0.44
40	52	7	14	0.3	0.15	6.05	5.75	615	585	18,000	24,000	7808C	9.5	0.031
	62	12	24	0.6	0.3	14.0	11.1	1,420	1,140	17,000	22,000	7908C	13	0.109
	68	15	30	1	0.6	20.6	15.9	2,100	1,620	15,000	21,000	7008C	14.5	0.184
	80	18	36	1.1	0.6	36.5	25.2	3,700	2,570	14,000	19,000	7208C	17	0.35

① This value was achieved with laminated phenol resin machined cages; in the case of molded resin cages, with oil lubricant, the value will be 75% of this.

② Minimal allowable dimension for chamfer dimension  $r$  or  $r_1$ .



### Equivalent bearing load dynamic

$$P_r = XF_r + YF_a$$

$\frac{F_a^{(3)}}{C_{or}}$	e	Single, DT				DB, DF			
		$F_a/F_r \leq e$		$F_a/F_r > e$		$F_a/F_r \leq e$		$F_a/F_r > e$	
		X	Y	X	Y	X	Y	X	Y
0.010	0.37				1.51			1.70	2.46
0.020	0.39				1.45			1.62	2.35
0.040	0.41				1.36			1.52	2.21
0.070	0.44				1.28			1.43	2.08
0.10	0.46	1	0	0.44	1.22	1		1.37	1.98
0.15	0.49				1.15			1.29	1.87
0.20	0.51				1.10			1.23	1.78
0.30	0.55				1.02			1.15	1.66
0.40	0.56				1.00			1.12	1.63
0.50	0.56				1.00			1.12	1.63

### static

$$P_{or} = X_o F_r + Y_o F_a$$

Single, DT		DB, DF	
$X_o$	$Y_o$	$X_o$	$Y_o$
0.5	0.46	1	0.92

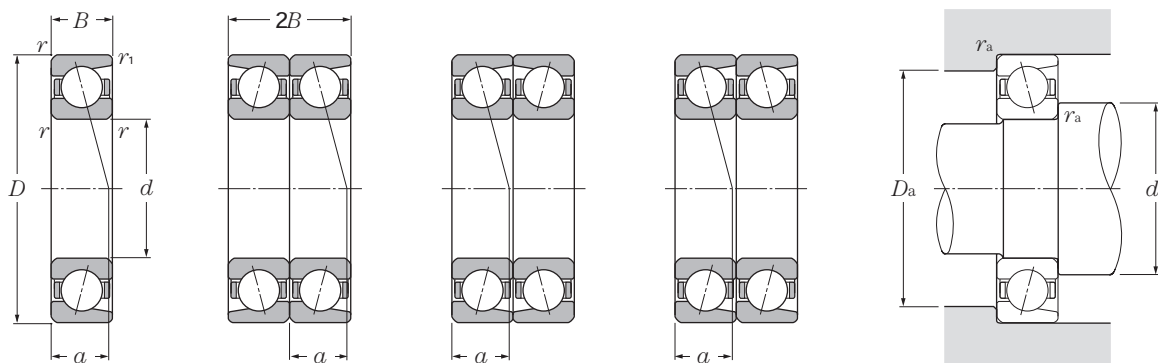
For single and DT arrangement,

When  $P_{or} < F_r$  use  $P_{or} = F_r$

Basic load ratings				Limiting speeds <sup>①</sup>		Bearing numbers			Abutment and fillet dimensions				
dynamic (duplex) kN	static C <sub>or</sub>	dynamic (duplex) kgf	static C <sub>or</sub>	(duplex) rpm		DB	DF	DT	mm				
C <sub>r</sub>	C <sub>or</sub>	C <sub>r</sub>	C <sub>or</sub>	grease	oil				d <sub>a</sub> min	D <sub>a</sub> max	D <sub>b</sub> max	r <sub>as</sub> max	r <sub>1as</sub> max
7.95	4.40	815	450	34,000	46,000	DB	DF	DT	12.5	23.5	24.8	0.3	0.15
8.80	5.25	900	540	32,000	43,000	DB	DF	DT	14.5	25.5	27.5	0.6	0.3
8.80	5.25	900	540	31,000	41,000	DB	DF	DT	14.5	25.5	26.8	0.3	0.15
11.5	6.95	1,170	705	29,000	38,000	DB	DF	DT	16.5	27.5	29.5	0.6	0.3
10.1	6.75	1,030	690	27,000	36,000	DB	DF	DT	17.5	29.5	30.8	0.3	0.15
14.6	9.05	1,490	920	25,000	33,000	DB	DF	DT	19.5	30.5	32.5	0.6	0.3
21.6	13.7	2,200	1,400	23,000	30,000	DB	DF	DT	20.5	36.5	37.5	1	0.6
12.5	8.25	1,280	840	24,000	33,000	DB	DF	DT	19.5	32.5	33.8	0.3	0.15
18.1	11.5	1,850	1,180	23,000	30,000	DB	DF	DT	21.5	35.5	37.5	0.6	0.3
25.6	16.5	2,610	1,680	21,000	27,000	DB	DF	DT	22.5	41.5	42.5	1	0.6
17.0	12.1	1,740	1,230	22,000	29,000	DB	DF	DT	24.5	37.5	39.5	0.6	0.3
23.7	16.3	2,420	1,670	20,000	27,000	DB	DF	DT	25.5	41.5	42.5	1	0.6
30.0	19.9	3,050	2,030	18,000	24,000	DB	DF	DT	27	45	47.5	1	0.6
8.20	7.65	835	780	21,000	28,000	DB	DF	DT	27.5	34.5	35.8	0.3	0.15
12.7	10.8	1,300	1,110	19,000	26,000	DB	DF	DT	27.5	39.5	40.8	0.3	0.15
19.0	14.9	1,940	1,510	18,000	24,000	DB	DF	DT	29.5	42.5	44.5	0.6	0.3
27.0	20.5	2,750	2,090	17,000	22,000	DB	DF	DT	30.5	46.5	47.5	1	0.6
43.0	30.5	4,350	3,100	15,000	20,000	DB	DF	DT	32	55	57.5	1	0.6
8.70	9.00	890	920	18,000	24,000	DB	DF	DT	32.5	39.5	40.8	0.3	0.15
13.5	12.5	1,380	1,280	17,000	22,000	DB	DF	DT	32.5	44.5	45.8	0.3	0.15
24.6	20.6	2,510	2,100	16,000	21,000	DB	DF	DT	35.5	49.5	50.5	1	0.6
37.5	29.5	3,800	3,000	14,000	19,000	DB	DF	DT	35.5	56.5	57.5	1	0.6
52.5	40.5	5,350	4,150	13,000	17,000	DB	DF	DT	37	65	67.5	1	0.6
9.40	10.5	960	1,070	16,000	21,000	DB	DF	DT	37.5	44.5	45.8	0.3	0.15
21.4	19.3	2,180	1,970	15,000	20,000	DB	DF	DT	39.5	50.5	52.5	0.6	0.3
31.0	27.3	3,150	2,790	14,000	18,000	DB	DF	DT	40.5	56.5	57.5	1	0.6
49.5	40.0	5,050	4,050	13,000	17,000	DB	DF	DT	42	65	67.5	1	0.6
65.5	51.5	6,700	5,250	11,000	15,000	DB	DF	DT	43.5	71.5	74.5	1.5	1
9.80	11.5	1,000	1,170	14,000	19,000	DB	DF	DT	42.5	49.5	50.8	0.3	0.15
22.7	22.3	2,310	2,270	13,000	18,000	DB	DF	DT	44.5	57.5	59.5	0.6	0.3
33.5	32.0	3,400	3,250	12,000	16,000	DB	DF	DT	45.5	62.5	63.5	1	0.6
59.0	50.5	6,000	5,150	11,000	15,000	DB	DF	DT	47	73	75.5	1	0.6

① For back-to-back and face-to-face duplex arrangements, find with the formula  $2F_a / C_{or}$ .

Note: This bearing has a contact angle of 15° and is manufactured with accuracies of JIS Class 5 or higher.

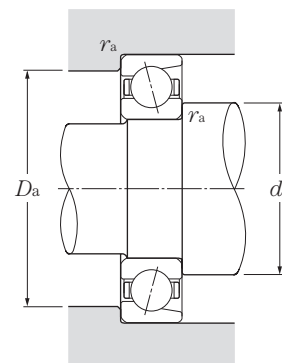


Single

Back-to-back arrangement (DB)

Face-to-face arrangement (DF)

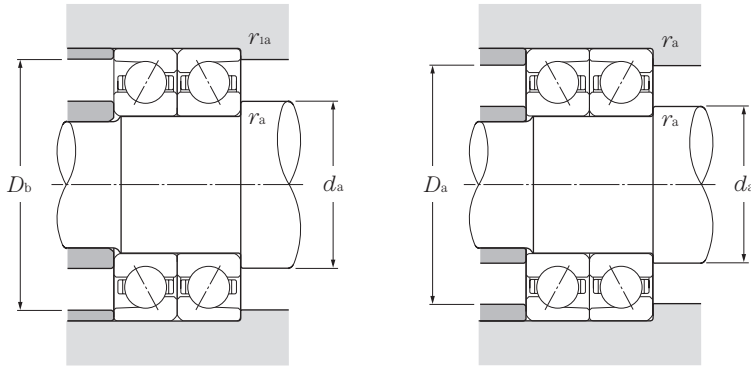
Tandem arrangement (DT)



**d 40~75mm**

d	Boundary dimensions					Basic load ratings				Limiting speeds <sup>①</sup>		Bearing numbers	Load center mm a	Mass kg single (approx.)	
	D	B	2B	r <sub>s min</sub> <sup>②</sup>	r <sub>is min</sub> <sup>②</sup>	dynamic		static		grease	oil				
	mm	mm	mm	mm	mm	kN	kN	kgf	kgf	rpm	rpm				
<b>40</b>	90	23	46	1.5	1	49.5	32.5	5,050	3,300	13,000	17,000	<b>7308C</b>	20	0.606	
	<b>45</b>	58	7	14	0.3	0.15	7.60	7.40	775	755	16,000	21,000	<b>7809C</b>	10.5	0.038
		68	12	24	0.6	0.3	17.3	14.1	1,760	1,430	15,000	20,000	<b>7909C</b>	13.5	0.126
		75	16	32	1	0.6	24.4	19.3	2,490	1,960	14,000	19,000	<b>7009C</b>	16	0.233
		85	19	38	1.1	0.6	41.0	28.8	4,150	2,940	13,000	17,000	<b>7209C</b>	18	0.4
100	25	50	1.5	1	64.0	43.0	6,550	4,400	11,000	15,000	<b>7309C</b>	22.5	0.83		
<b>50</b>	65	7	14	0.3	0.15	7.90	8.05	805	820	14,000	19,000	<b>7810C</b>	11	0.049	
	72	12	24	0.6	0.3	18.3	15.8	1,870	1,620	14,000	18,000	<b>7910C</b>	14	0.131	
	80	16	32	1	0.6	26.0	21.9	2,650	2,230	13,000	17,000	<b>7010C</b>	16.5	0.253	
	90	20	40	1.1	0.6	43.0	31.5	4,350	3,250	12,000	15,000	<b>7210C</b>	19.5	0.454	
	110	27	54	2	1	75.0	51.5	7,650	5,250	10,000	14,000	<b>7310C</b>	24.5	1.05	
<b>55</b>	72	9	18	0.3	0.15	13.1	12.7	1,330	1,300	13,000	18,000	<b>7811C</b>	13	0.079	
	80	13	26	1.0	0.6	19.1	17.7	1,950	1,810	12,000	16,000	<b>7911C</b>	15.5	0.178	
	90	18	36	1.1	0.6	34.0	28.6	3,500	2,920	12,000	15,000	<b>7011C</b>	18.5	0.37	
	100	21	42	1.5	1	53.0	40.0	5,400	4,100	11,000	14,000	<b>7211C</b>	21	0.593	
	120	29	58	2.0	1	87.0	60.5	8,850	6,200	9,400	13,000	<b>7311C</b>	26.5	1.34	
<b>60</b>	78	10	20	0.3	0.15	13.4	13.6	1,370	1,390	12,000	16,000	<b>7812C</b>	14	0.101	
	85	13	26	1	0.6	20.0	19.5	2,040	1,990	11,000	15,000	<b>7912C</b>	16	0.191	
	95	18	36	1.1	0.6	35.0	30.5	3,550	3,150	11,000	14,000	<b>7012C</b>	19.5	0.387	
	110	22	44	1.5	1	64.0	49.5	6,550	5,050	9,700	13,000	<b>7212C</b>	22.5	0.757	
	130	31	62	2.1	1.1	99.0	70.5	10,100	7,150	8,700	12,000	<b>7312C</b>	28.5	1.68	
<b>65</b>	85	10	20	0.6	0.3	14.1	14.9	1,440	1,520	11,000	15,000	<b>7813C</b>	15	0.122	
	90	13	26	1	0.6	20.2	20.4	2,060	2,080	11,000	14,000	<b>7913C</b>	17	0.204	
	100	18	36	1.1	0.6	37.0	34.5	3,800	3,500	9,900	13,000	<b>7013C</b>	20	0.421	
	120	23	46	1.5	1	70.0	55.0	7,100	5,600	9,000	12,000	<b>7213C</b>	24	0.948	
	140	33	66	2.1	1.1	112	80.5	11,400	8,200	8,100	11,000	<b>7313C</b>	30	2.06	
<b>70</b>	90	10	20	0.6	0.3	14.5	15.8	1,470	1,610	10,000	14,000	<b>7814C</b>	15.5	0.13	
	100	16	32	1	0.6	28.9	29.0	2,950	2,960	9,900	13,000	<b>7914C</b>	19.5	0.331	
	110	20	40	1.1	0.6	47.0	43.0	4,800	4,400	9,200	12,000	<b>7014C</b>	22	0.583	
	125	24	48	1.5	1	76.0	60.0	7,750	6,150	8,300	11,000	<b>7214C</b>	25	1.04	
	150	35	70	2.1	1.1	126	92.0	12,900	9,350	7,500	10,000	<b>7314C</b>	32	2.5	
<b>75</b>	95	10	20	0.6	0.3	14.8	16.7	1,510	1,700	9,700	13,000	<b>7815C</b>	16.5	0.138	
	105	16	32	1	0.6	29.4	30.5	3,000	3,100	9,200	12,000	<b>7915C</b>	20	0.35	

① This value was achieved with laminated phenol resin machined cages; in the case of molded resin cages, with oil lubricant, the value will be 75% of this.  
 ② Minimal allowable dimension for chamfer dimension r or r<sub>i</sub>.



### Equivalent bearing load dynamic

$$P_r = XF_r + YF_a$$

$\frac{F_a}{C_{or}}$	$e$	Single, DT				DB, DF			
		$F_a/F_r \leq e$		$F_a/F_r > e$		$F_a/F_r \leq e$		$F_a/F_r > e$	
		X	Y	X	Y	X	Y	X	Y
0.010	0.37				1.51		1.70		2.46
0.020	0.39				1.45		1.62		2.35
0.040	0.41				1.36		1.52		2.21
0.070	0.44				1.28		1.43		2.08
0.10	0.46				1.22		1.37		1.98
0.15	0.49	1	0	0.44	1.15	1	1.29	0.72	1.87
0.20	0.51				1.10		1.23		1.78
0.30	0.55				1.02		1.15		1.66
0.40	0.56				1.00		1.12		1.63
0.50	0.56				1.00		1.12		1.63

### static

$$P_{or} = X_o F_r + Y_o F_a$$

Single, DT		DB, DF	
$X_o$	$Y_o$	$X_o$	$Y_o$
0.5	0.46	1	0.92

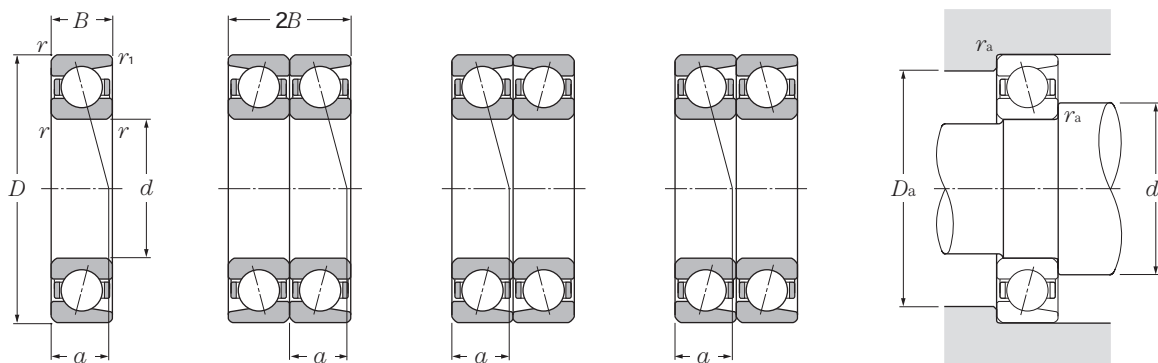
For single and DT arrangement,

When  $P_{or} < F_r$  use  $P_{or} = F_r$

Basic load ratings				Limiting speeds <sup>①</sup>		Bearing numbers			Abutment and fillet dimensions				
dynamic (duplex) kN	static $C_{or}$	dynamic (duplex) kgf	static $C_{or}$	(duplex) rpm		DB	DF	DT	mm				
$C_r$	$C_{or}$	$C_r$	$C_{or}$	grease	oil				$d_a$ min	$D_a$ max	$D_b$ max	$r_{as}$ max	$r_{1as}$ max
80.0	64.5	8,150	6,600	10,000	13,000	DB	DF	DT	48.5	81.5	84.5	1.5	1
12.3	14.8	1,260	1,510	13,000	17,000	DB	DF	DT	47.5	55.5	56.8	0.3	0.15
28.1	28.1	2,870	2,870	12,000	16,000	DB	DF	DT	49.5	63.5	65.5	0.6	0.3
39.5	38.5	4,050	3,950	11,000	15,000	DB	DF	DT	50.5	69.5	70.5	1	0.6
66.5	57.5	6,750	5,850	10,000	13,000	DB	DF	DT	52	78	80.5	1	0.6
104	86.0	10,600	8,800	9,000	12,000	DB	DF	DT	53.5	91.5	94.5	1.5	1
12.8	16.1	1,300	1,640	11,000	15,000	DB	DF	DT	52.5	62.5	63.8	0.3	0.15
29.8	31.5	3,050	3,250	11,000	14,000	DB	DF	DT	54.5	67.5	69.5	0.6	0.3
42.0	44.0	4,300	4,450	10,000	13,000	DB	DF	DT	55.5	74.5	75.5	1	0.6
69.5	63.5	7,100	6,450	9,100	12,000	DB	DF	DT	57	83	85.5	1	0.6
122	103	12,400	10,500	8,200	11,000	DB	DF	DT	60	100	104.5	2	1
21.2	25.5	2,160	2,600	10,000	14,000	DB	DF	DT	57.5	69.5	70.8	0.3	0.15
31.0	35.5	3,150	3,600	9,800	13,000	DB	DF	DT	60.5	74.5	75.5	1	0.6
55.5	57.5	5,650	5,850	9,200	12,000	DB	DF	DT	62	83	85.5	1	0.6
86.0	80.0	8,750	8,150	8,300	11,000	DB	DF	DT	63.5	91.5	94.5	1.5	1
141	121	14,400	12,400	7,500	9,900	DB	DF	DT	65	110	114.5	2	1
21.8	27.2	2,230	2,770	9,600	13,000	DB	DF	DT	62.5	75.5	76.8	0.3	0.15
32.5	39.0	3,300	4,000	9,000	12,000	DB	DF	DT	65.5	79.5	80.5	1	0.6
57.0	61.5	5,800	6,250	8,400	11,000	DB	DF	DT	67	88	90.5	1	0.6
104	99.0	10,600	10,100	7,700	10,000	DB	DF	DT	68.5	101.5	104.5	1.5	1
161	141	16,400	14,300	6,900	9,200	DB	DF	DT	72	118	123	2	1
22.9	29.9	2,340	3,050	8,900	12,000	DB	DF	DT	69.5	80.5	82.5	0.6	0.3
33.0	40.5	3,350	4,150	8,400	11,000	DB	DF	DT	70.5	84.5	85.5	1	0.6
60.5	68.5	6,150	7,000	7,800	10,000	DB	DF	DT	72	93	95.5	1	0.6
113	110	11,600	11,200	7,100	9,500	DB	DF	DT	73.5	111.5	114.5	1.5	1
182	161	18,600	16,400	6,400	8,500	DB	DF	DT	77	128	133	2	1
23.5	31.5	2,390	3,250	8,200	11,000	DB	DF	DT	74.5	85.5	87.5	0.6	0.3
47.0	58.0	4,800	5,900	7,800	10,000	DB	DF	DT	75.5	94.5	95.5	1	0.6
76.0	86.0	7,750	8,750	7,300	9,700	DB	DF	DT	77	103	105.5	1	0.6
123	120	12,600	12,300	6,600	8,800	DB	DF	DT	78.5	116.5	119.5	1.5	1
205	184	20,900	18,700	5,900	7,900	DB	DF	DT	82	138	143	2	1
24.0	33.5	2,450	3,400	7,700	10,000	DB	DF	DT	79.5	90.5	92.5	0.6	0.3
47.5	61.0	4,850	6,200	7,300	9,700	DB	DF	DT	80.5	99.5	100.5	1	0.6

① For back-to-back and face-to-face duplex arrangements, find with the formula  $2F_a / C_{or}$ .

Note: This bearing has a contact angle of 15° and is manufactured with accuracies of JIS Class 5 or higher.



Single

Back-to-back arrangement (DB)

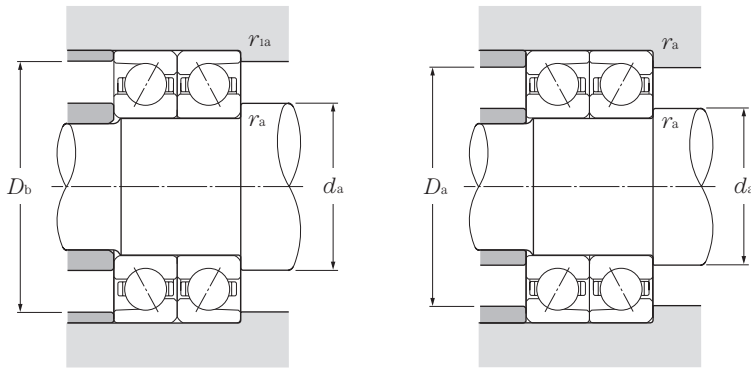
Face-to-face arrangement (DF)

Tandem arrangement (DT)

**d 75~105mm**

d	Boundary dimensions					Basic load ratings				Limiting speeds <sup>①</sup>		Bearing numbers	Load center mm a	Mass kg single (approx.)
	D	B	2B	r <sub>s min</sub> <sup>②</sup>	r <sub>is min</sub> <sup>②</sup>	dynamic		static		grease	oil			
	mm	mm	mm	mm	mm	C <sub>r</sub>	C <sub>or</sub>	C <sub>r</sub>	C <sub>or</sub>	rpm	rpm			
75	115	20	40	1.1	0.6	48.0	45.5	4,900	4,650	8,600	11,000	7015C	22.5	0.63
	130	25	50	1.5	1	79.5	65.5	8,100	6,700	7,800	10,000	7215C	26.5	1.14
	160	37	74	2.1	1.1	137	104	14,000	10,600	7,000	9,300	7315C	34	3.09
80	100	10	20	0.6	0.3	15.1	17.6	1,540	1,790	9,100	12,000	7816C	17	0.146
	110	16	32	1	0.6	29.8	31.5	3,050	3,200	8,600	12,000	7916C	21	0.37
	125	22	44	1.1	0.6	58.5	55.5	6,000	5,650	8,000	11,000	7016C	24.5	0.822
	140	26	52	2	1	93.0	77.5	9,450	7,900	7,300	9,700	7216C	27.5	1.39
	170	39	78	2.1	1.1	149	117	15,200	11,900	6,500	8,700	7316C	36	3.55
85	110	13	26	1	0.6	22.1	24.7	2,250	2,520	8,600	11,000	7817C	19.5	0.257
	120	18	36	1.1	0.6	40.0	42.5	4,100	4,300	8,100	11,000	7917C	22.5	0.523
	130	22	44	1.1	0.6	60.0	58.5	6,150	6,000	7,600	10,000	7017C	25.5	0.862
	150	28	56	2	1	104	90.5	10,600	9,200	6,900	9,100	7217C	30	1.73
	180	41	82	3	1.1	161	130	16,400	13,300	6,200	8,200	7317C	38.5	4.18
90	115	13	26	1	0.6	22.7	26.1	2,320	2,670	8,100	11,000	7818C	20	0.27
	125	18	36	1.1	0.6	39.5	42.5	4,050	4,350	7,700	10,000	7918C	23.5	0.549
	140	24	48	1.5	1	71.5	69.0	7,300	7,050	7,100	9,500	7018C	27.5	1.12
	160	30	60	2	1	123	105	12,500	10,700	6,500	8,600	7218C	31.5	2.13
	190	43	86	3	1.1	183	158	18,700	16,100	5,800	7,800	7318C	40.5	4.88
95	120	13	26	1	0.6	23.4	27.6	2,380	2,820	7,600	10,000	7819C	21	0.283
	130	18	36	1.1	0.6	41.0	46.0	4,200	4,650	7,300	9,700	7919C	24	0.574
	145	24	48	1.5	1	73.5	73.0	7,500	7,450	6,800	9,000	7019C	28	1.17
	170	32	64	2.1	1.1	139	120	14,200	12,200	6,100	8,100	7219C	34	2.58
	200	45	90	3	1.1	196	174	20,000	17,800	5,500	7,300	7319C	42.5	5.65
100	125	13	26	1	0.6	23.5	28.3	2,400	2,890	7,200	9,600	7820C	21.5	0.296
	140	20	40	1.1	0.6	53.0	58.5	5,400	6,000	6,900	9,100	7920C	26	0.778
	150	24	48	1.5	1	75.5	77.0	7,700	7,900	6,400	8,600	7020C	28.5	1.25
	180	34	68	2.1	1.1	149	127	15,200	12,900	5,800	7,700	7220C	36	3.08
	215	47	94	3	1.1	222	207	22,700	21,100	5,200	6,900	7320C	44.5	6.9
105	130	13	26	1	0.6	24.1	29.8	2,460	3,050	6,900	9,200	7821C	22	0.31
	145	20	40	1.1	0.6	54.0	61.5	5,500	6,250	6,500	8,700	7921C	26.5	0.81
	160	26	52	2	1	88.0	89.5	9,000	9,100	6,100	8,100	7021C	31	1.53
	190	36	72	2.1	1.1	162	143	16,600	14,600	5,500	7,300	7221C	38	3.66
	225	49	98	3	1.1	236	226	24,100	23,000	4,900	6,600	7321C	46.5	7.86

① This value was achieved with laminated phenol resin machined cages; in the case of molded resin cages, with oil lubricant, the value will be 75% of this.  
 ② Minimal allowable dimension for chamfer dimension r or r<sub>a</sub>.



### Equivalent bearing load dynamic

$$P_r = XF_r + YF_a$$

$\frac{F_a}{C_{or}}$ <sup>3)</sup>	e	Single, DT				DB, DF			
		$F_a/F_r \leq e$		$F_a/F_r > e$		$F_a/F_r \leq e$		$F_a/F_r > e$	
		X	Y	X	Y	X	Y	X	Y
0.010	0.37				1.51		1.70		2.46
0.020	0.39				1.45		1.62		2.35
0.040	0.41				1.36		1.52		2.21
0.070	0.44				1.28		1.43		2.08
0.10	0.46				1.22		1.37		1.98
0.15	0.49	1	0	0.44	1.15	1	1.29	0.72	1.87
0.20	0.51				1.10		1.23		1.78
0.30	0.55				1.02		1.15		1.66
0.40	0.56				1.00		1.12		1.63
0.50	0.56				1.00		1.12		1.63

### static

$$P_{or} = X_o F_r + Y_o F_a$$

Single, DT		DB, DF	
X <sub>o</sub>	Y <sub>o</sub>	X <sub>o</sub>	Y <sub>o</sub>
0.5	0.46	1	0.92

For single and DT arrangement,

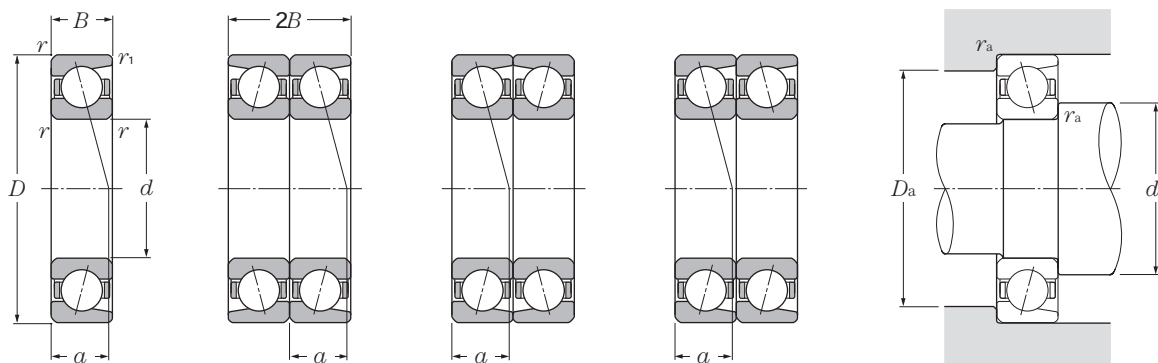
When  $P_{or} < F_r$  use  $P_{or} = F_r$

Basic load ratings				Limiting speeds <sup>1)</sup>		Bearing numbers			Abutment and fillet dimensions				
dynamic (duplex) kN	static C <sub>or</sub>	dynamic (duplex) kgf	static C <sub>or</sub>	(duplex) rpm		DB	DF	DT	mm				
C <sub>r</sub>	C <sub>or</sub>	C <sub>r</sub>	C <sub>or</sub>	grease	oil				d <sub>a</sub> min	D <sub>a</sub> max	D <sub>b</sub> max	r <sub>as</sub> max	r <sub>1as</sub> max
78.0	91.5	7,950	9,300	6,800	9,000	DB	DF	DT	82	108	110.5	1	0.6
129	131	13,100	13,400	6,200	8,200	DB	DF	DT	83.5	121.5	124.5	1.5	1
223	208	22,800	21,200	5,500	7,400	DB	DF	DT	87	148	153	2	1
24.6	35.0	2,510	3,600	7,200	9,600	DB	DF	DT	84.5	95.5	97.5	0.6	0.3
48.5	63.0	4,950	6,450	6,800	9,100	DB	DF	DT	85.5	104.5	105.5	1	0.6
95.5	111	9,700	11,300	6,400	8,500	DB	DF	DT	87	118	120.5	1	0.6
151	155	15,400	15,800	5,800	7,700	DB	DF	DT	90	130	134.5	2	1
242	234	24,700	23,800	5,200	6,900	DB	DF	DT	92	158	163	2	1
36.0	49.5	3,650	5,050	6,800	9,100	DB	DF	DT	90.5	104.5	105.5	1	0.6
65.0	84.5	6,650	8,650	6,400	8,600	DB	DF	DT	92	113	115.5	1	0.6
98.0	117	9,950	12,000	6,000	8,000	DB	DF	DT	92	123	125.5	1	0.6
169	181	17,200	18,400	5,400	7,200	DB	DF	DT	95	140	144.5	2	1
261	261	26,600	26,600	4,900	6,500	DB	DF	DT	99	166	173	2.5	1
37.0	52.5	3,750	5,350	6,400	8,500	DB	DF	DT	95.5	109.5	110.5	1	0.6
64.5	85.0	6,550	8,700	6,100	8,100	DB	DF	DT	97	118	120.5	1	0.6
116	138	11,900	14,100	5,700	7,500	DB	DF	DT	98.5	131.5	134.5	1.5	1
199	209	20,300	21,400	5,100	6,800	DB	DF	DT	100	150	154.5	2	1
297	315	30,500	32,000	4,600	6,100	DB	DF	DT	104	176	183	2.5	1
38.0	55.5	3,850	5,650	6,000	8,000	DB	DF	DT	100.5	114.5	115.5	1	0.6
67.0	91.5	6,850	9,350	5,800	7,700	DB	DF	DT	102	123	125.5	1	0.6
119	146	12,200	14,900	5,400	7,100	DB	DF	DT	103.5	136.5	139.5	1.5	1
226	240	23,000	24,400	4,800	6,400	DB	DF	DT	107	158	163	2	1
320	350	32,500	35,500	4,300	5,800	DB	DF	DT	109	186	193	2.5	1
38.0	56.5	3,900	5,750	5,700	7,600	DB	DF	DT	105.5	119.5	120.5	1	0.6
86.0	117	8,750	12,000	5,400	7,200	DB	DF	DT	107	133	135.5	1	0.6
122	154	12,500	15,800	5,100	6,800	DB	DF	DT	108.5	141.5	144.5	1.5	1
242	254	24,700	25,900	4,600	6,100	DB	DF	DT	112	168	173	2	1
360	415	37,000	42,000	4,100	5,500	DB	DF	DT	114	201	208	2.5	1
39.0	59.5	4,000	6,050	5,500	7,300	DB	DF	DT	110.5	124.5	125.5	1	0.6
87.5	123	8,900	12,500	5,200	6,900	DB	DF	DT	112	138	140.5	1	0.6
143	179	14,600	18,200	4,800	6,400	DB	DF	DT	115	150	154.5	2	1
264	286	26,900	29,100	4,400	5,800	DB	DF	DT	117	178	183	2	1
385	450	39,000	46,000	3,900	5,200	DB	DF	DT	119	211	218	2.5	1

<sup>3)</sup> For back-to-back and face-to-face duplex arrangements, find with the formula  $2F_a / C_{or}$ .

Note: This bearing has a contact angle of 15° and is manufactured with accuracies of JIS Class 5 or higher.

# High Speed Single and Duplex Arrangements

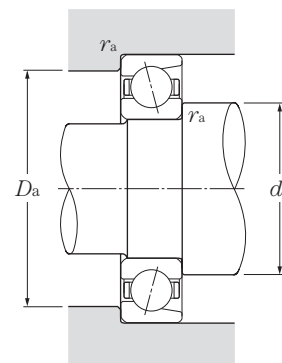


Single

Back-to-back arrangement (DB)

Face-to-face arrangement (DF)

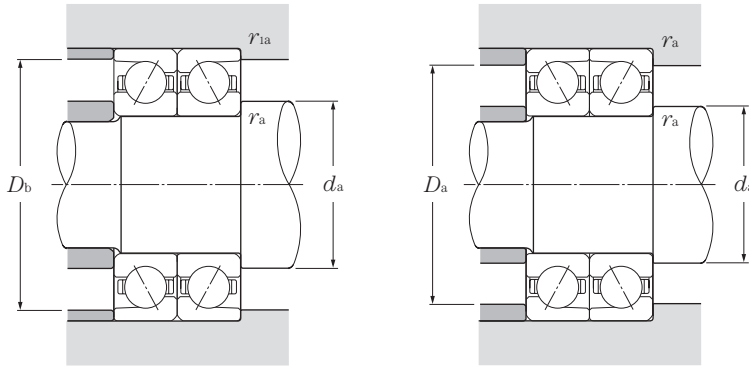
Tandem arrangement (DT)



d 110~200mm

d	Boundary dimensions					Basic load ratings				Limiting speeds <sup>①</sup>		Bearing numbers	Load center mm a	Mass kg single (approx.)
	D	B	2B	r <sub>s min</sub> <sup>②</sup>	r <sub>is min</sub> <sup>②</sup>	dynamic		static		grease	oil			
	mm	mm	mm	mm	mm	kN	C <sub>or</sub>	kgf	C <sub>or</sub>	rpm	rpm			
110	140	16	32	1	0.6	34.5	42.5	3,550	4,350	6,500	8,700	7822C	24.5	0.486
	150	20	40	1.1	0.6	54.5	63.5	5,550	6,450	6,200	8,300	7922C	27.5	0.843
	170	28	56	2	1	101	101	10,300	10,300	5,800	7,700	7022C	33	1.91
	200	38	76	2.1	1.1	176	160	17,900	16,300	5,200	6,900	7222C	40	4.29
	240	50	100	3	1.1	249	241	25,400	24,600	4,700	6,300	7322C	48.5	9.22
120	150	16	32	1	0.6	35.0	44.5	3,600	4,550	6,000	8,000	7824C	26	0.525
	165	22	44	1.1	0.6	67.5	78.5	6,850	8,000	5,700	7,600	7924C	30	1.38
	180	28	56	2	1	103	108	10,500	11,000	5,300	7,100	7024C	34	2.04
	215	40	80	2.1	1.1	199	192	20,200	19,600	4,800	6,400	7224C	42.5	5.16
130	165	18	36	1.1	0.6	47.0	59.5	4,750	6,050	5,500	7,400	7826C	29	0.911
	180	24	48	1.5	1	82.5	98.0	8,450	10,000	5,200	7,000	7926C	33	1.82
	200	33	66	2	1	129	137	13,200	14,000	4,900	6,500	7026C	38.5	3.73
	230	40	80	3	1.1	213	214	21,700	21,800	4,400	5,800	7226C	44	5.83
140	175	18	36	1.1	0.6	47.5	62.5	4,850	6,350	5,100	6,800	7828C	30	0.973
	190	24	48	1.5	1	83.5	101	8,500	10,300	4,800	6,400	7928C	34	1.94
	210	33	66	2	1	132	145	13,500	14,800	4,500	6,000	7028C	40	3.96
	250	42	84	3	1.1	221	233	22,600	23,800	4,000	5,300	7228C	47	7.3
150	190	20	40	1.1	0.6	60.5	79.5	6,150	8,100	4,700	6,300	7830C	33	1.33
	210	28	56	2	1	108	132	11,000	13,400	4,500	6,000	7930C	38	2.96
	225	35	70	2.1	1.1	151	168	15,400	17,200	4,200	5,600	7030C	42.5	4.82
	270	45	90	3	1.1	253	281	25,800	28,600	3,700	5,000	7230C	50.5	11
160	200	20	40	1.1	0.6	62.0	83.5	6,300	8,500	4,400	5,900	7832C	34	1.41
	220	28	56	2	1	109	136	11,100	13,900	4,200	5,600	7932C	39.5	3.13
	240	38	76	2.1	1.1	171	193	17,400	19,700	3,900	5,200	7032C	46	5.96
170	215	22	44	1.1	0.6	76.0	102	7,750	10,400	4,100	5,500	7834C	37	1.87
	230	28	56	2	1	113	145	11,500	14,800	3,900	5,300	7934C	41	3.29
	260	42	84	2.1	1.1	205	234	20,900	23,900	3,700	4,900	7034C	50	7.96
180	280	46	92	2.1	1.1	241	290	24,500	29,600	3,400	4,600	7036C	54	10.4
190	290	46	92	2.1	1.1	247	305	25,100	31,500	3,200	4,300	7038C	55	10.8
200	310	51	102	2.1	1.1	277	355	28,200	36,000	3,100	4,100	7040C	59.5	14

① This value was achieved with laminated phenol resin machined cages; in the case of molded resin cages, with oil lubricant, the value will be 75% of this.  
 ② Minimal allowable dimension for chamfer dimension r or r<sub>1</sub>.



### Equivalent bearing load dynamic

$$P_r = XF_r + YF_a$$

$\frac{F_a}{C_{or}}$	$e$	Single, DT				DB, DF			
		$F_a/F_r \leq e$		$F_a/F_r > e$		$F_a/F_r \leq e$		$F_a/F_r > e$	
		X	Y	X	Y	X	Y	X	Y
0.010	0.37				1.51		1.70		2.46
0.020	0.39				1.45		1.62		2.35
0.040	0.41				1.36		1.52		2.21
0.070	0.44				1.28		1.43		2.08
0.10	0.46				1.22		1.37		1.98
0.15	0.49	1	0	0.44	1.15	1	1.29	0.72	1.87
0.20	0.51				1.10		1.23		1.78
0.30	0.55				1.02		1.15		1.66
0.40	0.56				1.00		1.12		1.63
0.50	0.56				1.00		1.12		1.63

### static

$$P_{or} = X_o F_r + Y_o F_a$$

Single, DT		DB, DF	
$X_o$	$Y_o$	$X_o$	$Y_o$
0.5	0.46	1	0.92

For single and DT arrangement,

When  $P_{or} < F_r$  use  $P_{or} = F_r$

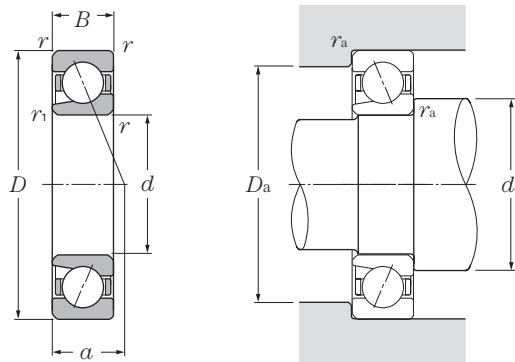
Basic load ratings				Limiting speeds <sup>①</sup>		Bearing numbers			Abutment and fillet dimensions				
dynamic (duplex) kN	static $C_{or}$	dynamic (duplex) kgf	static $C_{or}$	(duplex) rpm		DB	DF	DT	mm				
$C_r$	$C_{or}$	$C_r$	$C_{or}$	grease	oil				$d_a$ min	$D_a$ max	$D_b$ max	$r_{as}$ max	$r_{1as}$ max
56.0	85.0	5,750	8,700	5,200	6,900	DB	DF	DT	115.5	134.5	135.5	1	0.6
89.0	127	9,050	12,900	4,900	6,600	DB	DF	DT	117	143	145.5	1	0.6
164	203	16,700	20,700	4,600	6,100	DB	DF	DT	120	160	164.5	2	1
286	320	29,200	32,500	4,100	5,500	DB	DF	DT	122	188	193	2	1
405	485	41,000	49,000	3,700	5,000	DB	DF	DT	124	226	233	2.5	1
57.0	89.5	5,800	9,100	4,700	6,300	DB	DF	DT	125.5	144.5	145.5	1	0.6
109	157	11,200	16,000	4,500	6,000	DB	DF	DT	127	158	160.5	1	0.6
168	216	17,100	22,000	4,200	5,600	DB	DF	DT	130	170	174.5	2	1
325	385	33,000	39,000	3,800	5,000	DB	DF	DT	132	203	208	2	1
76.0	119	7,750	12,100	4,400	5,800	DB	DF	DT	137	158	160.5	1	0.60
134	196	13,700	20,000	4,100	5,500	DB	DF	DT	138.5	171.5	174.5	1.5	1
210	274	21,400	28,000	3,800	5,100	DB	DF	DT	140	190	194.5	2	1
345	430	35,500	43,500	3,500	4,600	DB	DF	DT	144	216	223	2.5	1
77.5	125	7,900	12,700	4,000	5,400	DB	DF	DT	147	168	170.5	1	0.6
136	203	13,800	20,700	3,800	5,100	DB	DF	DT	148.5	181.5	184.5	1.5	1
214	290	21,900	29,600	3,600	4,800	DB	DF	DT	150	200	204.5	2	1
360	465	36,500	47,500	3,200	4,200	DB	DF	DT	154	236	243	2.5	1
98.5	159	10,000	16,200	3,700	5,000	DB	DF	DT	157	183	185.5	1	0.6
175	263	17,800	26,800	3,600	4,800	DB	DF	DT	160	200	204.5	2	1
245	335	25,000	34,500	3,300	4,400	DB	DF	DT	162	213	218	2	1
410	560	42,000	57,500	3,000	4,000	DB	DF	DT	164	256	263	2.5	1
100	167	10,200	17,000	3,500	4,700	DB	DF	DT	167	193	195.5	1	0.6
177	272	18,100	27,800	3,300	4,400	DB	DF	DT	170	210	214.5	2	1
278	385	28,300	39,500	3,100	4,100	DB	DF	DT	172	228	233	2	1
123	204	12,600	20,800	3,300	4,400	DB	DF	DT	177	208	210.5	1	0.6
183	290	18,700	29,600	3,100	4,200	DB	DF	DT	180	220	224.5	2	1
330	470	34,000	48,000	2,900	3,900	DB	DF	DT	182	248	253	2	1
390	580	40,000	59,000	2,700	3,600	DB	DF	DT	192	268	273	2	1
400	615	41,000	62,500	2,600	3,400	DB	DF	DT	202	278	283	2	1
450	710	46,000	72,500	2,400	3,200	DB	DF	DT	212	298	303	2	1

① For back-to-back and face-to-face duplex arrangements, find with the formula  $2F_a / C_{or}$ .

Note: This bearing has a contact angle of 15° and is manufactured with accuracies of JIS Class 5 or higher.



## BNT type



### Equivalent bearing load dynamic

$$P_r = XF_r + YF_a$$

$\frac{F_a}{C_{or}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.010	0.35	1	0	0.44	1.58
0.020	0.36				1.54
0.040	0.38				1.48
0.070	0.40				1.41
0.10	0.41				1.37
0.15	0.43				1.31
0.20	0.44				1.26
0.30	0.47				1.20
0.40	0.49				1.15
0.50	0.50				1.11

### static

$$P_{or} = 0.52F_r + 0.54F_a$$

When  $P_{or} < F_r$  use  $P_{or} = F_r$

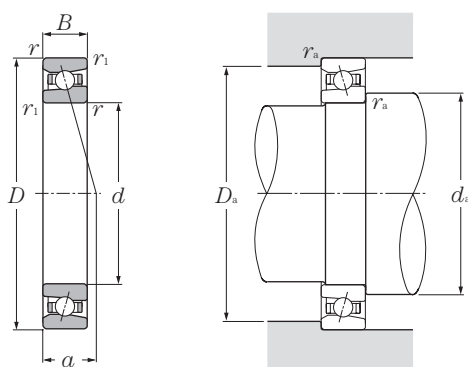
## d 10~45mm

d	Boundary dimensions					Basic load ratings				Limiting speeds		Bearing numbers	Abutment and fillet dimensions			Load center	Mass
	mm					dynamic	static	dynamic	static	rpm			mm				
	D	B	$r_{s \min}$ <sup>①</sup>	$r_{1s \min}$ <sup>①</sup>	$r_{1s \min}$ <sup>①</sup>	$C_r$	$C_{or}$	$C_r$	$C_{or}$	grease	oil		$d_a$	$D_a$	$r_{as}$		
10	26	8	0.3	0.15	3.75	1.45	385	148	48,000	64,000	BNT000	12.5	23.5	0.3	6.5	0.015	
	30	9	0.6	0.3	4.15	1.71	420	175	46,000	61,000	BNT200	14.5	25.5	0.6	7	0.019	
12	28	8	0.3	0.15	4.15	1.73	420	176	43,000	57,000	BNT001	14.5	25.5	0.3	6.5	0.020	
	32	10	0.6	0.3	5.40	2.28	550	232	40,000	54,000	BNT201	16.5	27.5	0.6	8	0.025	
15	32	9	0.3	0.15	4.75	2.22	485	226	38,000	50,000	BNT002	17.5	29.5	0.3	7.5	0.029	
	35	11	0.6	0.3	6.85	2.97	700	300	35,000	47,000	BNT202	19.5	30.5	0.6	9	0.035	
17	35	10	0.3	0.15	5.90	2.70	600	275	34,000	46,000	BNT003	19.5	32.5	0.3	8.5	0.033	
	40	12	0.6	0.3	8.55	3.80	870	385	32,000	42,000	BNT203	21.5	35.5	0.6	10	0.054	
20	42	12	0.6	0.3	8.00	3.95	815	405	30,000	40,000	BNT004	24.5	37.5	0.6	10	0.057	
	47	14	1	0.6	11.2	5.35	1,140	545	28,000	38,000	BNT204	25.5	41.5	1	11.5	0.092	
25	47	12	0.6	0.3	8.95	4.85	910	495	25,000	34,000	BNT005	29.5	42.5	0.6	11	0.067	
	52	15	1	0.6	12.7	6.70	1,290	685	24,000	31,000	BNT205	30.5	46.5	1	12.5	0.127	
30	55	13	1	0.6	11.6	6.75	1,180	685	22,000	29,000	BNT006	35.5	49.5	1	12.5	0.109	
	62	16	1	0.6	17.6	9.60	1,800	980	20,000	27,000	BNT206	35.5	56.5	1	14	0.201	
35	62	14	1	0.6	14.6	8.95	1,490	910	19,000	26,000	BNT007	40.5	56.5	1	13.5	0.146	
	72	17	1.1	0.6	23.2	13.1	2,370	1,330	18,000	24,000	BNT207	42	65	1	15.5	0.294	
40	68	15	1	0.6	15.7	10.4	1,600	1,060	17,000	23,000	BNT008	45.5	62.5	1	14.5	0.182	
	80	18	1.1	0.6	27.8	16.5	2,830	1,680	16,000	21,000	BNT208	47	73	1	17	0.383	
45	75	16	1	0.6	18.6	12.6	1,900	1,290	15,000	21,000	BNT009	50.5	69.5	1	16	0.235	
	85	19	1.1	0.6	31.0	18.9	3,200	1,920	14,000	19,000	BNT209	52	78	1	18	0.437	

① Minimal allowable dimension for chamfer dimension r or r<sub>1</sub>.

Note: This bearing is manufactured with accuracies of JIS Class 5 or higher.

## HSB type



### Equivalent bearing load dynamic

$$P_r = XF_r + YF_a$$

$\frac{F_a}{C_{or}}$	$e$	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.010	0.35				1.58
0.020	0.36				1.54
0.040	0.38				1.48
0.070	0.40				1.41
0.10	0.41				1.37
0.15	0.43	1	0	0.44	1.31
0.20	0.44				1.26
0.30	0.47				1.20
0.40	0.49				1.15
0.50	0.50				1.11

### static

$$P_{or} = 0.52F_r + 0.54F_a$$

When  $P_{or} < F_r$  use  $P_{or} = F_r$

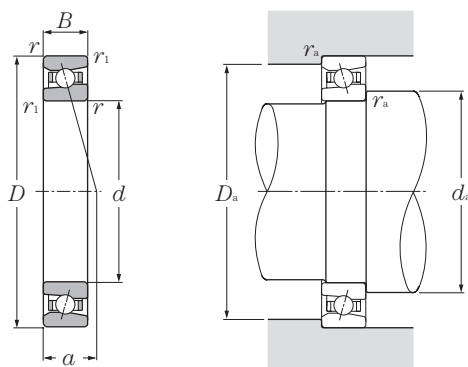
## d 50~110mm

d	Boundary dimensions				Basic load ratings				Limiting speeds		Bearing numbers	Abutment and fillet dimensions			Load center	Mass
	mm				dynamic	static	dynamic	static	rpm			mm				
	D	B	$r_{s \min}$ ①	$r_{1s \min}$ ①	$C_r$	$C_{or}$	$C_r$	$C_{or}$	grease	oil		$d_a$ min	$D_a$ max	$r_{as}$ max		
50	72	12	0.6	0.3	10.6	7.30	1,080	745	15,000	20,000	HSB910C	54.5	67.5	0.6	14	0.141
	80	16	1	0.6	20.8	11.4	2,120	1,160	14,000	19,000	HSB010C	55.5	74.5	1	16.5	0.256
55	80	13	1	0.6	13.5	9.20	1,380	940	14,000	18,000	HSB911C	60.5	74.5	1	15.5	0.192
	90	18	1.1	0.6	22.6	13.6	2,300	1,380	13,000	17,000	HSB011C	62	83	1	18.5	0.397
60	85	13	1	0.6	13.9	9.95	1,420	1,010	13,000	17,000	HSB912C	65.5	79.5	1	16	0.206
	95	18	1.1	0.6	23.7	15.0	2,410	1,530	12,000	16,000	HSB012C	67	88	1	19.5	0.425
65	90	13	1	0.6	14.3	10.7	1,460	1,090	12,000	16,000	HSB913C	70.5	84.5	1	17	0.22
	100	18	1.1	0.6	24	15.8	2,450	1,610	11,000	15,000	HSB013C	72	93	1	20	0.452
70	100	16	1	0.6	18	13.5	1,830	1,370	11,000	15,000	HSB914C	75.5	94.5	1	19.5	0.362
	110	20	1.1	0.6	29.4	19.9	3,000	2,030	10,000	14,000	HSB014C	77	103	1	22	0.64
75	105	16	1	0.6	18.5	14.4	1,880	1,470	10,000	14,000	HSB915C	80.5	99.5	1	20	0.383
	115	20	1.1	0.6	31.5	22.4	3,200	2,290	9,500	13,000	HSB015C	82	108	1	22.5	0.68
80	110	16	1	0.6	18.9	15.4	1,930	1,570	9,600	13,000	HSB916C	85.5	104.5	1	20.5	0.405
	125	22	1.1	0.6	36	25.7	3,650	2,620	8,900	12,000	HSB016C	87	118	1	24.5	0.915
85	120	18	1.1	0.6	22.7	18.3	2,320	1,860	9,000	12,000	HSB917C	92	113	1	22.5	0.578
	130	22	1.1	0.6	36.5	26.8	3,700	2,740	8,400	11,000	HSB017C	92	123	1	25.5	0.959
90	125	18	1.1	0.6	23.4	19.5	2,380	1,980	8,500	11,000	HSB918C	97	118	1	23.5	0.607
	140	24	1.5	1	42	31.5	4,300	3,200	7,900	11,000	HSB018C	98.5	131.5	1.5	27.5	1.25
95	130	18	1.1	0.6	24	20.6	2,440	2,110	8,100	11,000	HSB919C	102	123	1	24	0.636
	145	24	1.5	1	42.5	32.5	4,350	3,350	7,500	10,000	HSB019C	103.5	136.5	1.5	28	1.3
100	140	20	1.1	0.6	33.5	28	3,450	2,850	7,600	10,000	HSB920C	107	133	1	26	0.856
	150	24	1.5	1	44	35	4,500	3,600	7,100	9,500	HSB020C	108.5	141.5	1.5	28.5	1.36
105	145	20	1.1	0.6	34.5	29.7	3,550	3,050	7,300	9,700	HSB921C	112	138	1	26.5	0.893
	160	26	2	1	50.5	40.5	5,150	4,150	6,700	9,000	HSB021C	115	150	2	31	1.73
110	150	20	1.1	0.6	35	30.5	3,550	3,150	6,900	9,200	HSB922C	117	143	1	27.5	0.928
	170	28	2	1	62.5	49.5	6,400	5,000	6,400	8,600	HSB022C	120	160	2	33	2.13

① Minimal allowable dimension for chamfer dimension  $r$  or  $r_1$ .

Note: This bearing is manufactured with accuracies of JIS Class 5 or higher.

## HSB type



### Equivalent bearing load dynamic

$$P_r = X F_r + Y F_a$$

$\frac{F_a}{C_{or}}$	$e$	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.010	0.35				1.58
0.020	0.36				1.54
0.040	0.38				1.48
0.070	0.40				1.41
0.10	0.41				1.37
0.15	0.43	1	0	0.44	1.31
0.20	0.44				1.26
0.30	0.47				1.20
0.40	0.49				1.15
0.50	0.50				1.11

### static

$$P_{or} = 0.52 F_r + 0.54 F_a$$

When  $P_{or} < F_r$  use  $P_{or} = F_r$

## d 120~170mm

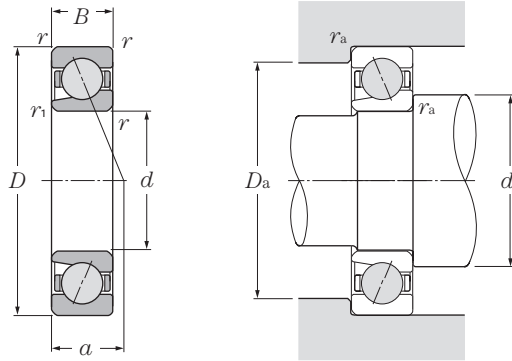
d	Boundary dimensions					Basic load ratings				Limiting speeds		Bearing numbers	Abutment and fillet dimensions			Load center	Mass center
	D	B	$r_{s \min}$	$r_{1s \min}$	$C_r$	$C_{or}$	$C_r$	$C_{or}$	grease	oil	$d_a$		$D_a$	$r_{as}$	a		
	mm	mm	mm	mm	mm	kN	kgf	kgf	rpm	rpm	mm		mm	mm	mm		
120	165	22	1.1	0.60	41	36.5	4,150	3,750	6,300	8,500	HSB924C	127	158	1	30	1.27	
	180	28	2	1	63	51.5	6,450	5,250	5,900	7,900	HSB024C	130	170	2	34	2.28	
130	180	24	1.5	1	48.5	45	4,950	4,600	5,800	7,800	HSB926C	138.5	171.5	1.5	33	1.69	
	200	33	2	1	90.5	71	9,250	7,250	5,400	7,200	HSB026C	140	190	2	38.5	3.40	
140	190	24	1.5	1	48.5	46.5	4,950	4,750	5,400	7,100	HSB928C	148.5	181.5	1.5	34	1.8	
	210	33	2	1	93.5	77	9,550	7,850	5,000	6,700	HSB028C	150	200	2	40	3.68	
150	210	28	2	1	68	63	6,950	6,400	5,000	6,700	HSB930C	160	200	2	38	2.74	
	225	35	2.1	1.1	96.5	83	9,850	8,450	4,600	6,200	HSB030C	162	213	2	42.5	4.46	
160	220	28	2	1	69.5	66.5	7,100	6,800	4,600	6,200	HSB932C	170	210	2	39.5	2.89	
	240	38	2.1	1.1	113	97	11,500	9,850	4,300	5,800	HSB032C	172	228	2	46	5.46	
170	230	28	2	1	71	70.5	7,250	7,200	4,400	5,800	HSB934C	180	220	2	41	3.04	
	260	42	2.1	1.1	129	111	13,200	11,300	4,100	5,400	HSB034C	182	248	2	50	7.37	

① Minimal allowable dimension for chamfer dimension  $r$  or  $r_1$ .

Note: This bearing is manufactured with accuracies of JIS Class 5 or higher.



## 5S-BNT type



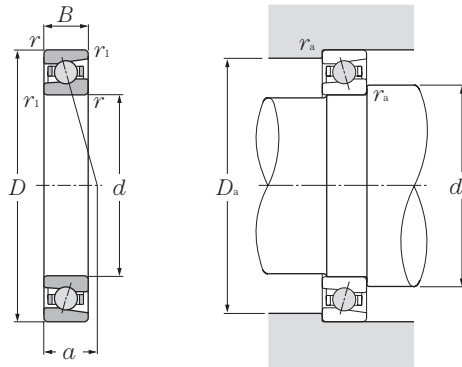
### d 10~45mm

d	Boundary dimensions mm				Basic load ratings <sup>②</sup> dynamic (approx.)		Bearing numbers	Abutment and fillet dimensions			Load center mm	Mass kg (approx.)
	D	B	r <sub>s min</sub> <sup>①</sup>	r <sub>ls min</sub> <sup>①</sup>	C <sub>r</sub>	C <sub>r</sub>		d <sub>a</sub> min	D <sub>a</sub> max	r <sub>as</sub> max		
10	26	8	0.3	0.15	3.75	385	5S-BNT000	12.5	23.5	0.3	6.5	0.013
	30	9	0.6	0.3	4.95	500	5S-BNT200	14.5	25.5	0.6	7	0.016
12	28	8	0.3	0.15	4.15	420	5S-BNT001	14.5	25.5	0.3	6.5	0.018
	32	10	0.6	0.3	5.40	550	5S-BNT201	16.5	27.5	0.6	8	0.021
15	32	9	0.3	0.15	4.75	485	5S-BNT002	17.5	29.5	0.3	7.5	0.026
	35	11	0.6	0.3	6.85	700	5S-BNT202	19.5	30.5	0.6	9	0.03
17	35	10	0.3	0.15	5.90	600	5S-BNT003	19.5	32.5	0.3	8.5	0.029
	40	12	0.6	0.3	8.55	870	5S-BNT203	21.5	35.5	0.6	10	0.046
20	42	12	0.6	0.3	8.00	815	5S-BNT004	24.5	37.5	0.6	10	0.05
	47	14	1	0.6	11.2	1,140	5S-BNT204	25.5	41.5	1	11.5	0.08
25	47	12	0.6	0.3	8.95	910	5S-BNT005	29.5	42.5	0.6	11	0.059
	52	15	1	0.6	12.7	1,290	5S-BNT205	30.5	46.5	1	12.5	0.113
30	55	13	1	0.6	11.6	1,180	5S-BNT006	35.5	49.5	1	12.5	0.097
	62	16	1	0.6	17.6	1,800	5S-BNT206	35.5	56.5	1	14	0.113
35	62	14	1	0.6	14.6	1,490	5S-BNT007	40.5	56.5	1	13.5	0.128
	72	17	1.1	0.6	23.2	2,370	5S-BNT207	42	65	1	15.5	0.255
40	68	15	1	0.6	15.7	1,600	5S-BNT008	45.5	62.5	1	14.5	0.162
	80	18	1.1	0.6	27.8	2,830	5S-BNT208	47	73	1	17	0.331
45	75	16	1	0.6	18.6	1,900	5S-BNT009	50.5	69.5	1	16	0.208
	85	19	1.1	0.6	31.0	3,200	5S-BNT209	52	78	1	18	0.374

① Minimal allowable dimension for chamfer dimension  $r$  or  $r_1$ .

② There is no JIS regulation table concerning basic rated loads for ceramic ball angular contact ball bearings. In NTN wear life testing, these bearings displayed the same wear life as steel angular contact ball bearings; therefore, the values for steel bearings have been given as reference.

## 5S-HSB type



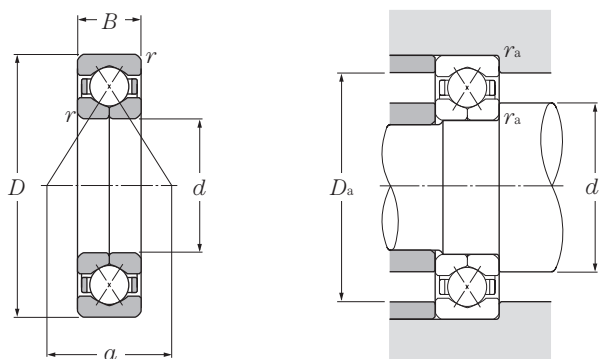
### d 50~120mm

d	Boundary dimensions mm					Basic load ratings <sup>②</sup> dynamic (approx.) kN      kgf		Bearing numbers	Abutment and fillet dimensions mm			Load center mm	Mass kg (approx.)
	D	B	r <sub>s min</sub> <sup>①</sup>	r <sub>ls min</sub> <sup>①</sup>	C <sub>r</sub>	C <sub>r</sub>	d <sub>a min</sub>		D <sub>a max</sub>	r <sub>as max</sub>	a		
50	72	12	0.6	0.3	10.6	1,080	5S-HSB910C 5S-HSB010C	54.5	67.5	0.6	14	0.134	
	80	16	1	0.6	20.8	2,120		55.5	74.5	1	16.5	0.234	
55	80	13	1	0.6	13.5	1,380	5S-HSB911C 5S-HSB011C	60.5	74.5	1	15.5	0.18	
	90	18	1.1	0.6	22.6	2,300		62	83	1	18.5	0.372	
60	85	13	1	0.6	13.9	1,420	5S-HSB912C 5S-HSB012C	65.5	79.5	1	16	0.194	
	95	18	1.1	0.6	23.7	2,410		67	88	1	19.5	0.398	
65	90	13	1	0.6	14.3	1,460	5S-HSB913C 5S-HSB103C	70.5	84.5	1	17	0.207	
	100	18	1.1	0.6	24.0	2,450		72	93	1	20	0.423	
70	100	16	1	0.6	18.0	1,830	5S-HSB914C 5S-HSB014C	75.5	94.5	1	19.5	0.343	
	110	20	1.1	0.6	29.4	3,000		77	103	1	22	0.601	
75	105	16	1	0.6	18.5	1,880	5S-HSB915C 5S-HSB015C	80.5	99.5	1	20	0.363	
	115	20	1.1	0.6	31.5	3,200		82	108	1	22.5	0.636	
80	110	16	1	0.6	18.9	1,930	5S-HSB916C 5S-HSB016C	85.5	104.5	1	20.5	0.384	
	125	22	1.1	0.6	36.0	3,650		87	118	1	24.5	0.86	
85	120	18	1.1	0.6	22.7	2,320	5S-HSB917C 5S-HSB017C	92	113	1	22.5	0.55	
	130	22	1.1	0.6	36.5	3,700		92	123	1	25.5	0.901	
90	125	18	1.1	0.6	23.4	2,380	5S-HSB918C 5S-HSB018C	97	118	1	23.5	0.577	
	140	24	1.5	1	42.0	4,300		98.5	131.5	1.5	27.5	1.18	
95	130	18	1.1	0.6	24.0	2,440	5S-HSB919C 5S-HSB019C	102	123	1	24	0.604	
	145	24	1.5	1	42.5	4,350		103.5	136.5	1.5	28	1.23	
100	140	20	1.1	0.6	33.5	3,450	5S-HSB920C 5S-HSB020C	107	133	1	26	0.837	
	150	24	1.5	1	44.0	4,500		108.5	141.5	1.5	28.5	1.28	
105	145	20	1.1	0.6	34.5	3,550	5S-HSB921C 5S-HSB021C	112	138	1	26.5	0.837	
	160	26	2	1	50.5	5,150		115	150	2	31	1.63	
110	150	20	1.1	0.6	35.0	3,550	5S-HSB922C 5S-HSB022C	117	143	1	27.5	0.87	
	170	28	2	1	62.5	6,400		120	160	2	33	1.99	
120	165	22	1.1	0.6	41.0	4,150	5S-HSB924C 5S-HSB024C	127	158	1	30	1.2	
	180	28	2	1	63.0	6,450		130	170	2	34	2.13	

① Minimal allowable dimension for chamfer dimension  $r$  or  $r_1$ . ② There is no JIS formula concerning basic rated loads for ceramic ball angular contact ball bearings. In NTN fatigue life tests, these bearings achieved the same fatigue life as steel angular contact ball bearings; therefore, the values for steel bearings have been given as reference.

Note: For bearings with a bore diameter larger than 120mm, consult NTN Engineering.

## QJ type



Equivalent bearing load  
**dynamic**  
 $P_a = F_a$   
**static**  
 $P_{oa} = F_a$

### d 30~90mm

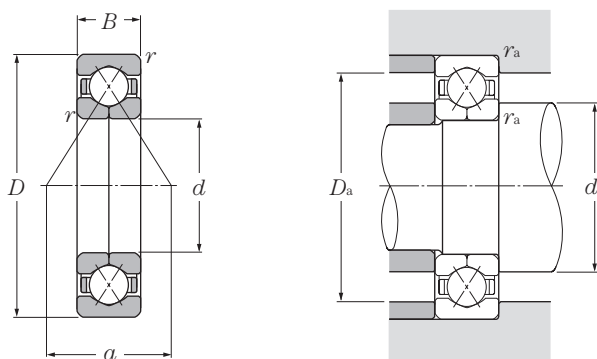
Boundary dimensions				Basic load ratings				Limiting speeds		Bearing numbers	Abutment and fillet dimensions			Load center	Mass
mm				dynamic	static	dynamic	static	rpm			mm				
d	D	B	$r_{s\ min}^{\text{①}}$	$C_a$	$C_{oa}$	$C_a$	$C_{oa}$	grease	oil		$d_a$ min	$D_a$ max	$r_{as}$ max	a	(approx.) kg
30	72	19	1.1	39.5	57.5	4,050	5,850	8,000	11,000	QJ306	37	65	1	30	0.42
	80	21	1.5	49.5	73.0	5,050	7,450	7,000	9,300		QJ307	43.5	71.5	1.5	33
40	80	18	1.1	44.0	70.5	4,500	7,200	6,900	9,200	QJ208 QJ308	47	73	1	34.5	0.45
	90	23	1.5	60.5	91.5	6,200	9,350	6,200	8,200		48.5	81.5	1.5	37.5	0.78
45	85	19	1.1	49.5	81.0	5,050	8,250	6,200	8,200	QJ209 QJ309	52	78	1	37.5	0.52
	100	25	1.5	79.0	121	8,050	12,300	5,500	7,400		53.5	91.5	1.5	42	1.05
50	90	20	1.1	52.0	89.0	5,300	9,050	5,600	7,500	QJ210 QJ310	57	83	1	40.5	0.603
	110	27	2	92.0	145	9,400	14,700	5,000	6,700		60	100	2	46	1.38
55	100	21	1.5	64.0	112	6,550	11,400	5,100	6,800	QJ211 QJ311	63.5	91.5	1.5	44.5	0.78
	120	29	2	106	170	10,900	17,400	4,600	6,100		65	110	2	50.5	1.76
60	110	22	1.5	77.5	138	7,900	14,000	4,700	6,300	QJ212 QJ312	68.5	101.5	1.5	49	0.98
	130	31	2.1	122	198	12,400	20,200	4,200	5,700		72	118	2	55	2.18
65	120	23	1.5	84.5	153	8,600	15,600	4,400	5,800	QJ213 QJ313	73.5	111.5	1.5	53.5	1.24
	140	33	2.1	138	228	14,100	23,200	3,900	5,200		77	128	2	59	2.7
70	125	24	1.5	92.0	168	9,350	17,200	4,000	5,400	QJ214 QJ314	78.5	116.5	1.5	56.5	1.36
	150	35	2.1	155	260	15,800	26,500	3,600	4,800		82	138	2	63.5	3.27
75	130	25	1.5	96.0	183	9,750	18,600	3,800	5,000	QJ215 QJ315	83.5	121.5	1.5	59	1.53
	160	37	2.1	169	294	17,200	30,000	3,400	4,500		87	148	2	68	3.9
80	140	26	2	112	217	11,400	22,100	3,500	4,700	QJ216 QJ316	90	130	2	63.5	1.83
	170	39	2.1	183	330	18,600	33,500	3,200	4,200		92	158	2	72	4.64
85	150	28	2	126	252	12,800	25,700	3,300	4,400	QJ217 QJ317	95	140	2	68	2.3
	180	41	3	197	370	20,100	37,500	3,000	4,000		99	166	2.5	76.5	5.43
90	160	30	2	148	293	15,100	29,900	3,100	4,200	QJ218 QJ318	100	150	2	72	2.76
	190	43	3	212	410	21,600	41,500	2,800	3,800		104	176	2.5	81	6.31

① Smallest allowable dimension for chamfer dimension r.

Note: 1. These bearings are also manufactured with a slot in the chamfer section of the outer ring to stop whirling.

2. This bearing is widely used in applications where the only type of load is axial. When considering it for use where radial loads are applied, consult NTN Engineering.

## QJ type



Equivalent bearing load  
**dynamic**  
 $P_a = F_a$   
**static**  
 $P_{0a} = F_a$

### d 95~120mm

d	Boundary dimensions			Basic load ratings				Limiting speeds		Bearing numbers	Abutment and fillet dimensions			Load center	Mass
	D	B	$r_{s \min}$ ①	dynamic	static	dynamic	static	grease	oil		$d_a$	$D_a$	$r_{as}$		
	mm	mm		kN		kgf					min	max	max	a	(approx.)
95	170	32	2.1	168	335	17,200	34,000	3,000	3,900	<b>QJ219</b>	107	158	2	76.5	3.35
	200	45	3	227	450	23,100	46,000	2,700	3,500	<b>QJ319</b>	109	186	2.5	85	7.41
100	180	34	2.1	181	355	18,400	36,000	2,800	3,700	<b>QJ220</b>	112	168	2	81	4.02
	215	47	3	273	585	27,800	59,500	2,500	3,400	<b>QJ320</b>	114	201	2.5	91	9.14
105	190	36	2.1	197	400	20,100	41,000	2,700	3,600	<b>QJ221</b>	117	178	2	85	4.75
	225	49	3	273	585	27,900	59,500	2,400	3,200	<b>QJ321</b>	119	211	2.5	95.5	10.4
110	200	38	2.1	213	450	21,700	45,500	2,500	3,400	<b>QJ222</b>	122	188	2	89.5	5.62
	240	50	3	305	680	31,000	69,500	2,300	3,100	<b>QJ322</b>	124	226	2.5	101	12
120	215	40	2.1	240	540	24,500	55,000	2,300	3,100	<b>QJ224</b>	132	203	2	96.5	6.75
	260	55	3	325	765	33,000	78,000	2,100	2,800	<b>QJ324</b>	134	246	2.5	110	15.9

① Smallest allowable dimension for chamfer dimension r.

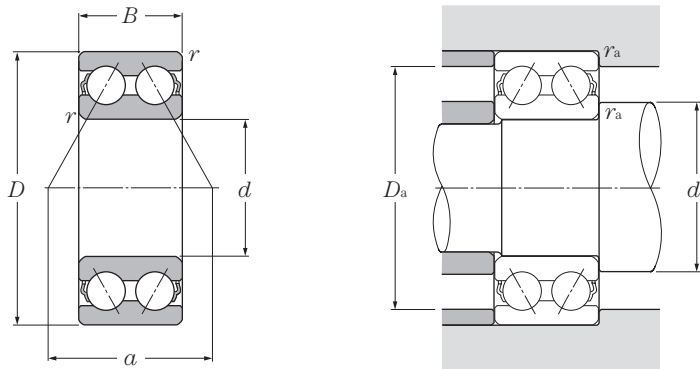
Note: 1. These bearings are also manufactured with a slot in the chamfer section of the outer ring to stop whirling.

2. This bearing is widely used in applications where the only type of load is axial. When considering it for use where radial loads are applied, consult NTN Engineering.



# Double Row Angular Contact Ball Bearings

NTN



Equivalent bearing load  
dynamic

$$P_r = XF_r + YF_a$$

e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
	X	Y	X	Y
0.80	1	0.78	0.63	1.24

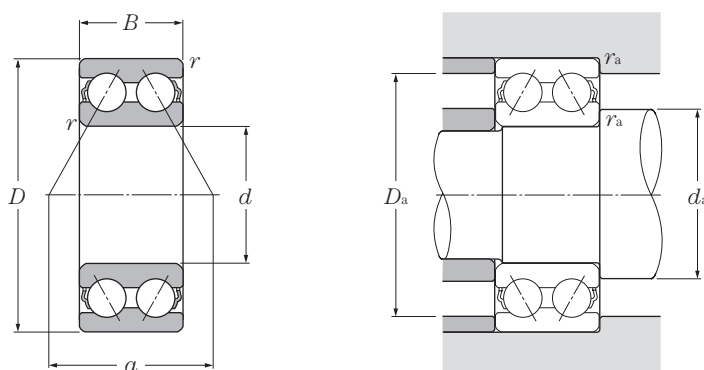
static

$$P_{or} = F_r + 0.66F_a$$

d 10~65mm

d	Boundary dimensions			Basic load ratings				Limiting speeds		Bearing numbers	Abutment and fillet dimensions			Load center	Mass
	D	B	$r_{s \min}$ ①	dynamic	static	dynamic	static	grease	oil		$d_a$	$D_a$	$r_{as}$		
	mm	mm	mm	kN	kN	kgf	kgf	rpm	rpm		mm	mm	mm	mm	kg
10	30	14.3	0.6	6.95	3.80	710	385	14,000	19,000	5200	14.5	25.5	0.6	17.5	0.049
12	32	15.9	0.6	9.15	5.05	930	515	13,000	17,000	5201	16.5	27.5	0.6	19	0.057
15	35	15.9	0.6	10.0	6.05	1,020	615	11,000	15,000	5202 5302	19.5	30.5	0.6	21	0.064
	42	19	1	17.2	10.1	1,760	1,030	9,900	13,000			20.5	36.5	1	26
17	40	17.5	0.6	12.8	7.90	1,300	805	9,900	13,000	5203 5303	21.5	35.5	0.6	24	0.096
	47	22.2	1	20.4	12.1	2,080	1,230	9,000	12,000			22.5	41.5	1	28.5
20	47	20.6	1	19.0	12.1	1,940	1,230	8,800	12,000	5204 5304	25.5	41.5	1	28	0.153
	52	22.2	1.1	20.6	12.7	2,110	1,290	8,000	11,000			27	45	1	30.5
25	52	20.6	1	20.6	14.3	2,100	1,450	7,300	9,800	5205 5305	30.5	46.5	1	31.5	0.175
	62	25.4	1.1	30.5	20.5	3,100	2,090	6,700	8,900			32	55	1	36.5
30	62	23.8	1	28.6	20.4	2,920	2,080	6,300	8,400	5206 5306	35.5	56.5	1	36.5	0.286
	72	30.2	1.1	39.5	27.5	4,050	2,800	5,700	7,600			37	65	1	43
35	72	27	1.1	38.0	27.8	3,850	2,830	5,500	7,400	5207 5307	42	65	1	42.5	0.436
	80	34.9	1.5	49.5	35.0	5,050	3,550	5,000	6,600			43.5	71.5	1.5	48.5
40	80	30.2	1.1	42.5	32.5	4,350	3,300	4,900	6,600	5208 5308	47	73	1	47.5	0.59
	90	36.5	1.5	60.5	44.0	6,150	4,500	4,400	5,900			48.5	81.5	1.5	53.5
45	85	30.2	1.1	48.0	37.0	4,900	3,750	4,400	5,900	5209 5309	52	78	1	50.5	0.64
	100	39.7	1.5	72.5	54.0	7,400	5,500	4,000	5,300			53.5	91.5	1.5	60
50	90	30.2	1.1	51.0	42.0	5,200	4,250	4,000	5,300	5210 5310	57	83	1	54	0.689
	110	44.4	2	85.5	64.5	8,700	6,600	3,600	4,800			60	100	2	65.5
55	100	33.3	1.5	63.0	53.0	6,450	5,400	3,600	4,900	5211 5311	63.5	91.5	1.5	60.5	0.986
	120	49.2	2	106	82.0	10,800	8,400	3,300	4,400			65	110	2	73
60	110	36.5	1.5	71.5	58.5	7,300	5,950	3,400	4,500	5212 5312	68.5	101.5	1.5	65.5	1.27
	130	54	2.1	122	95.5	12,400	9,750	3,000	4,000			72	118	2	79.5
65	120	38.1	1.5	83.5	72.5	8,500	7,400	3,100	4,200	5213 5313	73.5	111.5	1.5	71	1.57
	140	58.7	2.1	138	109	14,000	11,200	2,800	3,700			77	128	2	84.5

① Smallest allowable dimension for chamfer dimension r.



### Equivalent bearing load

#### dynamic

$$P_r = XF_r + YF_a$$

e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
	X	Y	X	Y
0.80	1	0.78	0.63	1.24

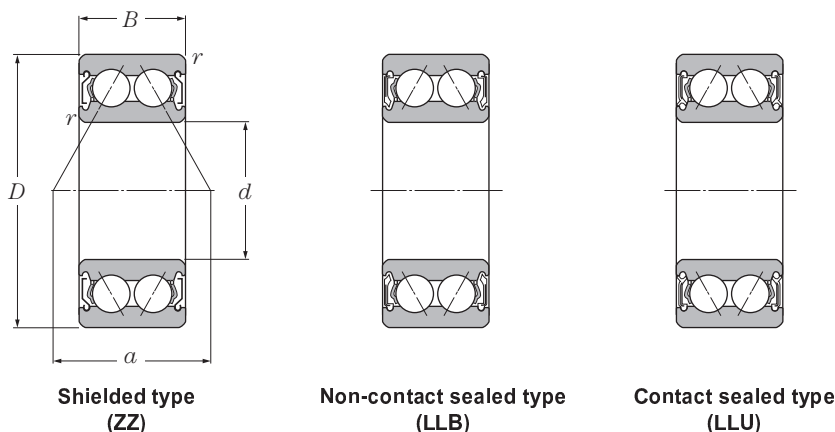
#### static

$$P_{or} = F_r + 0.66F_a$$

## d 70~100mm

d	Boundary dimensions			Basic load ratings				Limiting speeds		Bearing numbers	Abutment and fillet dimensions			Load center	Mass
	D	B	$r_{s \min}$ ①	dynamic	static	dynamic	static	grease	oil		$d_a$	$D_a$	$r_{as}$		
	mm	mm	mm	kN	kN	kgf	kgf	rpm	rpm		mm	mm	mm	mm	kg
70	125	39.7	1.5	90.5	79.5	9,250	8,100	2,900	3,900	5214	78.5	116.5	1.5	74.5	1.8
	150	63.5	2.1	155	125	15,800	12,700	2,600	3,500	5314	82	138	2	93	4.74
75	130	41.3	1.5	90.0	80.5	9,200	8,200	2,700	3,600	5215	83.5	121.5	1.5	78	1.9
	160	68.3	2.1	168	141	17,200	14,400	2,400	3,200	5315	87	148	2	98	5.65
80	140	44.4	2	106	95.5	10,800	9,700	2,500	3,400	5216	90	130	2	83.5	2.39
85	150	49.2	2	112	106	11,400	10,900	2,400	3,200	5217	95	140	2	91	3.06
90	160	52.4	2	140	129	14,300	13,100	2,200	3,000	5218	100	150	2	95.5	3.73
95	170	55.6	2.1	159	148	16,200	15,000	2,100	2,800	5219	107	158	2	101	4.86
100	180	60.3	2.1	178	167	18,200	17,100	2,000	2,700	5220	112	168	2	108	5.94

① Smallest allowable dimension for chamfer dimension r.

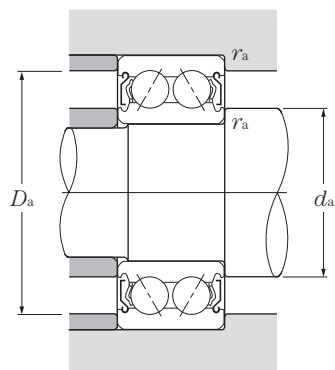


**d 10~40mm**

d	Boundary dimensions			Basic load ratings				Limiting speeds		Bearing numbers <sup>②</sup>		
	mm			dynamic	static	dynamic	static	rpm		sealed	non-contact type	contact type
	D	B	r <sub>s min</sub> <sup>①</sup>	C <sub>r</sub>	C <sub>or</sub>	C <sub>r</sub>	C <sub>or</sub>	grease ZZ,LLB,LLU	oil Z,LB			
10	30	14.3	0.6	6.95	3.80	710	385	14,000	19,000	5200AZZ	LLB	LLU
12	32	15.9	0.6	7.60	4.50	775	455	13,000	17,000	5201AZZ	LLB	LLU
15	35	15.9	0.6	8.20	5.25	835	535	11,000	15,000	5202BZZ	LLB	LLU
	42	19	1	14.2	8.85	1,450	900	9,900	13,000			
17	40	17.5	0.6	10.8	7.10	1,100	720	9,900	13,000	5203BZZ	LLB	LLU
	47	22.2	1	17.4	10.4	1,770	1,060	9,000	12,000			
20	47	20.6	1	15.8	10.1	1,610	1,030	8,800	12,000	5204BZZ	LLB	LLU
	52	22.2	1.1	19.1	12.4	1,940	1,260	8,000	11,000			
25	52	20.6	1	18.2	13.2	1,850	1,350	7,300	9,800	5205BZZ	LLB	LLU
	62	25.4	1.1	26.5	17.9	2,700	1,830	6,700	8,900			
30	62	23.8	1	26.1	19.7	2,660	2,010	6,300	8,400	5206CZZ	LLB	LLU
	72	30.2	1.1	33.0	24.3	3,350	2,480	5,700	7,600			
35	72	27	1.1	33.0	24.5	3,350	2,500	5,500	7,400	5207AZZ	LLB	LLU
	80	34.9	1.5	49.5	35.0	5,050	3,550	5,000	6,600			
40	80	30.2	1.1	40.5	32.0	4,100	3,250	4,900	6,600	5208AZZ	LLB	LLU
	90	36.5	1.5	55.0	40.0	5,600	4,100	4,400	5,900			

① Smallest allowable dimension for chamfer dimension r.

② This bearing number is for double sealed and double shielded type bearings, but single sealed and single shielded type are also available.



**Equivalent bearing load dynamic**

$$P_r = X F_r + Y F_a$$

e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
	X	Y	X	Y
0.80	1	0.78	0.63	1.24

**static**

$$P_{or} = F_r + 0.66 F_a$$

Abutment and fillet dimensions				Load center mm a	Mass kg (approx.)
mm					
$d_a$		$D_a$	$r_{as}$		
min	max	max	max		
14.5	16	25.5	0.6	16.5	0.049
16.5	17	27.5	0.6	18.5	0.057
19.5	20	30.5	0.6	20.5	0.064
20.5	23	36.5	1	24	0.132
21.5	23	35.5	0.6	23	0.096
22.5	25	41.5	1	27	0.181
25.5	27	41.5	1	27.5	0.153
27	28.5	45	1	29.5	0.217
30.5	32	46.5	1	30.5	0.175
32	35	55	1	35.5	0.362
35.5	39	56.5	1	36.5	0.286
37	43	65	1	41	0.553
42	45	65	1	42	0.436
43.5	47	71.5	1.5	47.5	0.766
47	51	73	1	46	0.59
48.5	54	81.5	1.5	52.5	1.01