

Deep-groove Ball Bearings

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MORO *dal 1984*
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Because of their versatility, Single-row, Deep-groove Ball Bearings are the most popular of all the ball bearing types. NACHI Deep-groove Ball Bearings are available in a wide range of series defined by the JIS (ISO) standard dimension plan and are also made to meet specialized dimension and configuration requirements. NACHI Deep-groove Ball Bearings are manufactured in both standard precision grade

(ISO Grade 0 -ABEC Grade 1) as well as in high-precision grades.

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

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

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

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

Notes: (¹) One seal or shield type bearings may have a seal groove on the other side.

Seals or shields for two seal or two shield bearings have the same marks as one seal or one shield bearings.

(²) NKE seals are blue and NSE seals are brown

Table 2. Comparison of Seal and Shield Characteristics

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

● Load rating

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

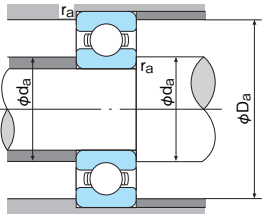
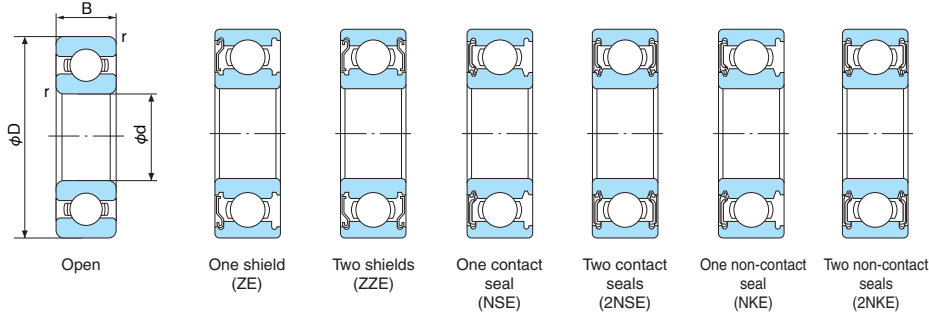
● Attention

- (1) Deep-groove Ball Bearings can sustain radial, axial or composite loads. However when excessive axial load is applied, please consult with NACHI.
- (2) Because sealed or shielded bearings are designed for inner ring rotating applications, the filled grease may leak when they are used with a high speed outer ring rotating condition. In such a case, please contact NACHI.
- (3) When bearings with contact rubber seals are used in a severe operating condition such as high speed or high temperature, the filled grease may leak. In such a case, a design change or another kind of grease is required.

- (4) When a bearing is mounted on a shaft (into a housing), force should only be applied to the side face of the inner (outer) ring.
- (5) The sealed or shielded bearings should not be washed or heated before mounting.
- (6) It should be noted that mounting errors such as misalignment of the bearing rings cause an appreciable increase in noise level.
- (7) The bearings must always be subjected to a minimum load to prevent sliding movements occurring between the balls and the raceways.

Deep-groove Ball Bearings

Bore Diameter: 10~25mm



Dynamic equivalent radial load
 $P_r = X F_r + Y F_a$

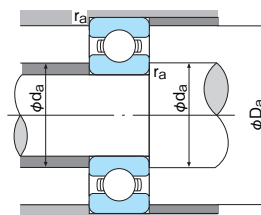
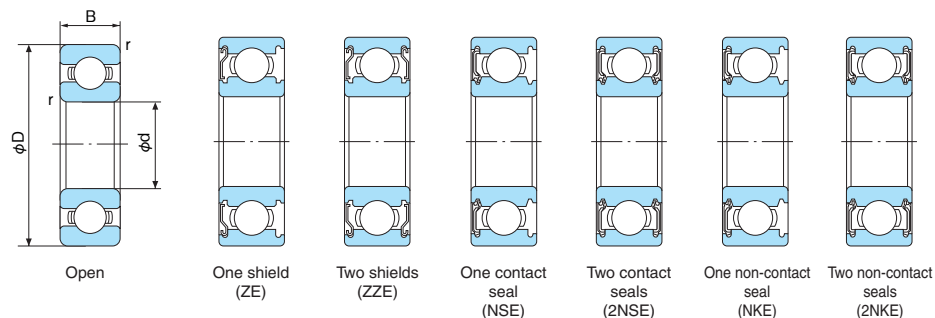
Static equivalent radial load
Larger value of following to be used:
 $P_0 = 0.6 F_r + 0.5 F_a$
 $P_0 = F_r$

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

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

Deep-groove Ball Bearings

Bore Diameter: 28~50mm



■ Dynamic equivalent radial load
 $P_r = X F_r + Y F_a$

■ Static equivalent radial load
 Larger value of following to be used:
 $P_s = 0.6 F_r + 0.5 F_a$
 $P_s = F_r$

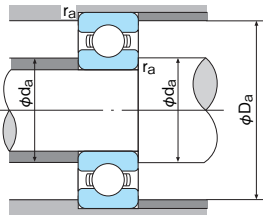
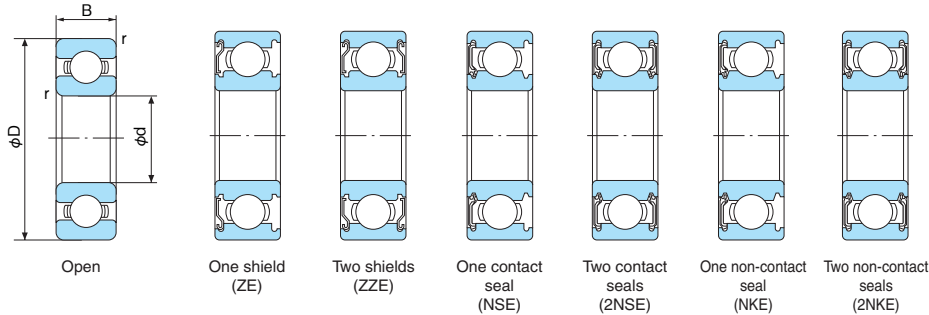
$\frac{F_a}{F_r}$ Cor	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26				1.71
1.03	0.28				1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34				1.31
3.45	0.38				1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44				1.00

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

1N=0.102kgf

Deep-groove Ball Bearings

Bore Diameter: 55~80mm



Dynamic equivalent radial load
 $P_r = X F_r + Y F_a$

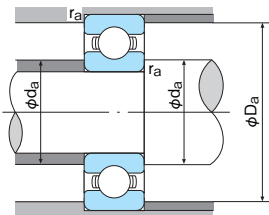
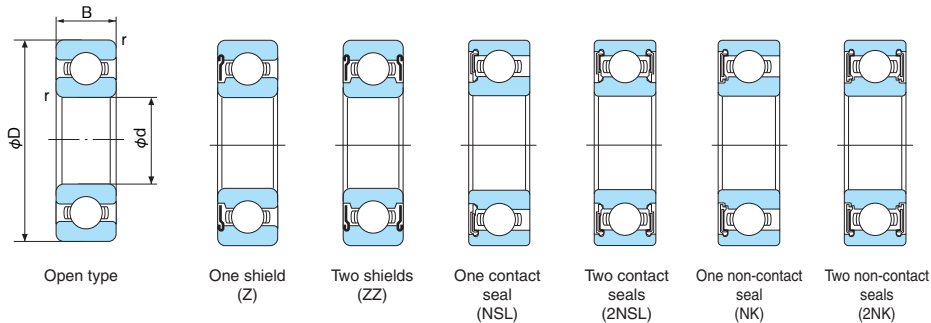
Static equivalent radial load
Larger value of following to be used:
 $P_0 = 0.6 F_r + 0.5 F_a$
 $P_0 = F_r$

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

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

Deep-groove Ball Bearings

Bore Diameter: 85~110mm



Dynamic equivalent radial load
 $P_r = X F_r + Y F_a$

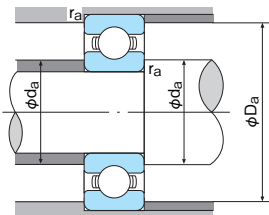
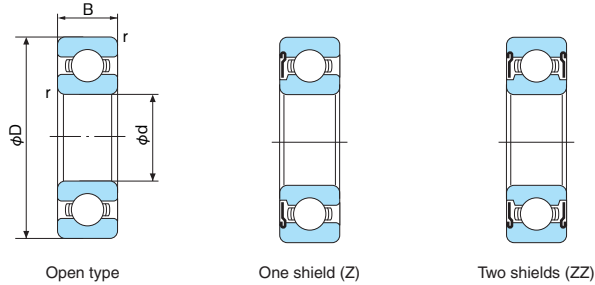
Static equivalent radial load
Larger value of following to be used:
 $P_0 = 0.6 F_r + 0.5 F_a$
 $P_0 = F_r$

$\frac{F_0 F_a}{C_0 r}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26				1.71
1.03	0.28				1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34				1.31
3.45	0.38				1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44				1.00

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

Deep-groove Ball Bearings

Bore Diameter: 120~170mm



Dynamic equivalent radial load
 $P_r = X F_r + Y F_a$

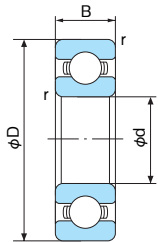
Static equivalent radial load
Larger value of following to be used:
 $P_{0r} = 0.6 F_r + 0.5 F_a$
 $P_{0r} = F_r$

$\frac{F_0 F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26				1.71
1.03	0.28				1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34				1.31
3.45	0.38				1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44				1.00

											1N=0.102kgf											
Boundary dimensions (mm)				Bearing No.								Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Factor fo	Limiting speed (min ⁻¹)			Abutment and fillet dimensions (mm)			Mass (kg)	Bearing No.
d	D	B	r (mm)	Open type	Shield type		Contact seal type		Non-contact seal type						Grease lubrication		Oil lubrication	da (mm)	Da (max)	ra (max)		
															Open type, Z, ZZ	NSL, 2NSL	Open type, Z					
120	150	16	1	6824	—	—	—	—	—	—	28300	31500	16.0	4000	—	4800	125	145	1.0	0.549	6824	
	165	22	1.1	6924	—	—	—	—	—	—	53000	54000	16.5	3800	—	4600	126	159	1.0	1.13	6924	
	180	19	1	16024	—	—	—	—	—	—	48000	50000	16.4	3600	—	4300	129	171	1.0	1.80	16024	
	180	28	2	6024	6024Z	6024ZZ	—	—	—	—	88000	79500	15.7	3600	—	4300	128	172	2.0	2.67	6024	
	215	40	2.1	6224	6224Z	6224ZZ	—	—	—	—	145000	118000	14.4	2900	—	3400	132	203	2.0	5.15	6224	
	260	55	3	6324	6324Z	6324ZZ	—	—	—	—	207000	185000	13.6	2600	—	3100	134	246	2.5	14.6	6324	
130	165	18	1.1	6826	—	—	—	—	—	—	37000	41000	16.1	3700	—	4400	136	158	1.0	0.790	6826	
	180	24	1.5	6926	—	—	—	—	—	—	65000	67000	16.4	3500	—	4200	137	173	1.5	1.78	6926	
	200	22	1.1	16026	—	—	—	—	—	—	55000	59500	16.3	3200	—	3800	144	186	1.0	2.69	16026	
	200	33	2	6026	6026Z	6026ZZ	—	—	—	—	106000	101000	15.7	3200	—	3800	138	192	2.0	3.92	6026	
	230	40	3	6226	6226Z	6226ZZ	—	—	—	—	167000	146000	14.5	2700	—	3200	144	216	2.5	5.82	6226	
	280	58	4	6326	6326Z	6326ZZ	—	—	—	—	229000	214000	13.6	2400	—	2800	148	262	3.0	18.2	6326	
140	175	18	1.1	6828	—	—	—	—	—	—	38000	44500	16.0	3400	—	4000	146	169	1.0	0.840	6828	
	190	24	1.5	6928	—	—	—	—	—	—	66500	71000	16.5	3200	—	3800	147	183	1.5	1.90	6928	
	210	22	1.1	16028	—	—	—	—	—	—	56000	62000	16.2	3000	—	3500	154	196	1.0	2.86	16028	
	210	33	2	6028	6028Z	6028ZZ	—	—	—	—	110000	109000	15.9	3000	—	3600	148	202	2.0	4.15	6028	
	250	42	3	6228	6228Z	6228ZZ	—	—	—	—	166000	150000	14.8	2500	—	2900	154	236	2.5	7.47	6228	
	300	62	4	6328	6328Z	6328ZZ	—	—	—	—	253000	246000	13.6	2200	—	2600	158	282	3.0	21.8	6328	
150	190	20	1.1	6830	—	—	—	—	—	—	47500	54500	16.1	3200	—	3800	156	184	1.0	1.20	6830	
	210	28	2	6930	—	—	—	—	—	—	85500	87000	16.4	3000	—	3500	158	202	2.0	2.64	6930	
	225	24	1.1	16030	—	—	—	—	—	—	76500	82500	16.5	2800	—	3200	164	211	1.0	3.58	16030	
	225	35	2.1	6030	6030Z	6030ZZ	—	—	—	—	126000	126000	15.9	2800	—	3200	159	216	2.0	4.48	6030	
	270	45	3	6230	6230Z	6230ZZ	—	—	—	—	176000	168000	15.2	2300	—	2700	164	256	2.5	9.41	6230	
	320	65	4	6330	—	—	—	—	—	—	274000	284000	13.9	2100	—	2400	168	302	3.0	26.2	6330	
160	200	20	1.1	6832	—	—	—	—	—	—	48500	56500	16.0	2900	—	3400	166	194	1.0	1.30	6832	
	220	28	2	6932	—	—	—	—	—	—	87500	95500	16.5	2800	—	3300	168	212	2.0	3.01	6932	
	240	38	2.1	6032	—	—	—	—	—	—	137000	135000	15.9	2600	—	3000	169	231	2.0	5.89	6032	
	290	48	3	6232	6232Z	6232ZZ	—	—	—	—	185000	186000	15.4	2100	—	2500	174	276	2.5	14.3	6232	
	340	68	4	6332	—	—	—	—	—	—	278000	287000	13.9	1900	—	2300	178	322	3.0	28.6	6332	
170	215	22	1.1	6834	—	—	—	—	—	—	60000	70500	16.1	2700	—	3200	177	208	1.0	1.85	6834	
	230	28	2	6934	—	—	—	—	—	—	86000	95000	16.4	2600	—	3100	178	222	2.0	3.17	6934	
	260	42	2.1	6034	—	—	—	—	—	—	161000	160000	15.7	2400	—	2800	179	251	2.0	7.92	6034	
	310	52	4	6234	—	—	—	—	—	—	212000	224000	15.3	2000	—	2400	188	292	3.0	17.5	6234	
	360	72	4	6334	—	—	—	—	—	—	325000	355000	13.6	1800	—	2100	188	342	3.0	34.0	6334	

Deep-groove Ball Bearings

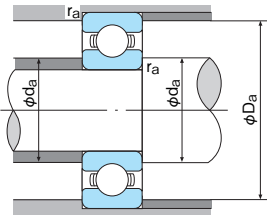
Bore Diameter: 180~280mm



Open type



Open type
(Machined cage)



Dynamic equivalent radial load
 $P_r = X F_r + Y F_a$

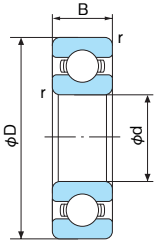
Static equivalent radial load
Larger value of following to be used:
 $P_{or} = 0.6 F_r + 0.5 F_a$
 $P_{or} = F_r$

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

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

■ Deep-groove Ball Bearings

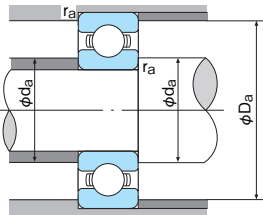
Bore Diameter: 300~320mm



Open type



Open type
(Machined cage)



■ Dynamic equivalent radial load
 $P_r = X F_r + Y F_a$

■ Static equivalent radial load
Larger value of following to be used:
 $P_{0r} = 0.6 F_r + 0.5 F_a$
 $P_{0r} = F_r$

$\frac{10 F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26				1.71
1.03	0.28				1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34				1.31
3.45	0.38				1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44				1.00

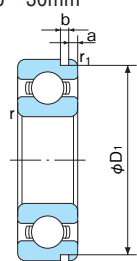
Boundary dimensions (mm)				Bearing No.							Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Factor fo	Limiting speed (min ⁻¹)			Abutment and fillet dimensions (mm)			Mass (kg)	Bearing No.
d	D	B	r (mm)											Open type	Shield type		Contact seal type		Non-contact seal type		
			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

1N=0.102kgf

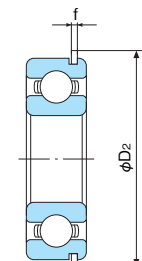
Deep-groove Ball Bearings

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

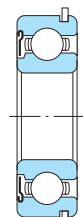
Bore Diameter: 10~30mm



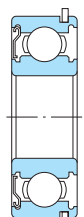
With snap ring groove
(N)



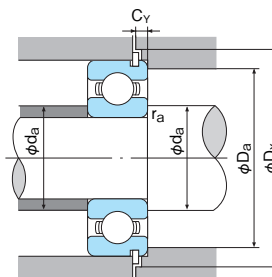
With snap ring
(NR)



Shield type with
snap ring
(ZNR)



Shield type with
snap ring
(ZENR)



■ Dynamic equivalent radial load
 $P_r = X F_r + Y F_a$

■ Static equivalent radial load
Larger value of following to be used:
 $P_{or} = 0.6 F_r + 0.5 F_a$
 $P_{or} = F_r$

$\frac{10 F_a}{C_{or}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26				1.71
1.03	0.28				1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34				1.31
3.45	0.38				1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44				1.00

1N=0.102kgf

Boundary dimensions (mm)					Dimensions of snap ring groove and snap ring (mm)					Bearing No. (1)			Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Factor fo	Limiting speed (min ⁻¹)		Abutment and fillet dimensions (mm)					Mass (kg)	Bearing No.
d	D	B	r (min)	r ₁ (min)	D ₁ (max)	a (max)	b (min)	D ₂ (max)	f (max)							Grease lubrication	Oil lubrication	d _a (min)	D _a (max)	D _x (min)	r _a (max)	C _γ (max)		
10	22	6	0.3	0.3	20.8	1.05	0.8	24.8	0.7	6900N	6900NR	6900ZENR	2490	1130	14.0	33000	38000	12	20	25.5	0.3	1.5	0.010	6900N
	30	9	0.6	0.5	28.17	2.06	1.35	34.7	1.12	6200N	6200NR	6200ZENR	5100	2390	13.2	25000	30000	15	25	35.5	0.6	2.9	0.032	6200N
	35	11	0.6	0.5	33.17	2.06	1.35	39.7	1.12	6300N	6300NR	6300ZENR	8100	3450	11.3	23000	27000	15	30	40.5	0.6	2.9	0.053	6300N
12	24	6	0.3	0.3	22.8	1.05	0.8	26.8	0.7	6901N	6901NR	6901ZENR	2700	1320	14.5	30000	36000	14	22	27.5	0.3	1.5	0.012	6901N
	28	8	0.3	0.3	26.7	1.35	0.93	31	0.85	6001N	6001NR	6001ZENR	5100	2390	13.5	28000	32000	14	26	31.5	0.3	1.9	0.024	6001N
	32	10	0.6	0.5	30.15	2.06	1.35	36.7	1.12	6201N	6201NR	6201ZENR	6800	3050	12.3	22000	28000	17	27	37.5	0.6	2.9	0.037	6201N
	37	12	1	0.5	34.77	2.06	1.35	41.3	1.12	6301N	6301NR	6301ZENR	9750	4250	11.2	20000	24000	18	31	42	1	2.9	0.060	6301N
15	28	7	0.3	0.3	26.7	1.3	0.95	30.8	0.85	6902N	6902NR	6902ZENR	4300	2250	14.3	26000	31000	17	26	31.5	0.3	1.8	0.017	6902N
	32	9	0.3	0.3	30.15	2.06	1.35	36.7	1.12	6002N	6002NR	6002ZENR	5600	2840	13.9	24000	28000	17	30	37.5	0.3	2.9	0.033	6002N
	35	11	0.6	0.5	33.17	2.06	1.35	39.7	1.12	6202N	6202NR	6202ZENR	7650	3700	13.1	20000	24000	20	30	40.5	0.6	2.9	0.045	6202N
	42	13	1	0.5	39.75	2.06	1.35	46.3	1.12	6302N	6302NR	6302ZENR	11400	5400	12.3	17000	21000	21	36	47	1	2.9	0.082	6302N
17	30	7	0.3	0.3	28.7	1.3	0.95	32.8	0.85	6903N	6903NR	6903ZENR	4600	2550	14.7	24000	29000	19	28	33.5	0.3	1.8	0.019	6903N
	35	10	0.3	0.3	33.17	2.06	1.35	39.7	1.12	6003N	6003NR	6003ZENR	6000	3250	14.3	22000	26000	19	33	40.5	0.3	2.9	0.041	6003N
	40	12	0.6	0.5	38.1	2.06	1.35	44.6	1.12	6203N	6203NR	6203ZENR	9550	4800	13.1	18000	21000	22	35	45.5	0.6	2.9	0.065	6203N
	47	14	1	0.5	44.6	2.46	1.35	52.7	1.12	6303N	6303NR	6303ZENR	13600	6550	12.3	16000	19000	23	41	53.5	1	3.3	0.115	6303N
20	32	7	0.3	0.3	30.7	1.3	0.95	34.8	0.85	6804N	6804NR	6804ZENR	4000	2640	15.5	22000	26000	22	30	35.5	0.3	1.8	0.020	6804N
	37	9	0.3	0.3	35.7	1.7	0.95	39.8	0.85	6904N	6904NR	6904ZENR	6350	3700	14.8	19000	23000	22	35	40.5	0.3	2.3	0.037	6904N
	42	12	0.6	0.5	39.75	2.06	1.35	46.3	1.12	6004N	6004NR	6004ZENR	9400	5000	13.9	18000	21000	24	38	47	0.6	2.9	0.069	6004N
	47	14	1	0.5	44.6	2.46	1.35	52.7	1.12	6204N	6204NR	6204ZENR	12800	6600	13.1	16000	18000	26	41	53.5	1	3.3	0.106	6204N
	52	15	1.1	0.5	49.73	2.46	1.35	57.9	1.12	6304N	6304NR	6304ZENR	15900	7900	12.4	14000	17000	27	45	58.5	1	3.3	0.144	6304N
22	50	14	1	0.5	47.6	2.46	1.35	55.7	1.12	62/22N	62/22NR	62/22ZENR	13900	6950	13.1	14000	17000	28	44	56.5	1	3.3	0.120	62/22N
	56	16	1.1	0.5	53.6	2.46	1.35	61.7	1.12	63/22N	63/22NR	63/22ZENR	18400	9250	12.4	13000	16000	29	49	62.5	1	3.3	0.176	63/22N
25	37	7	0.3	0.3	35.7	1.3	0.95	39.8	0.85	6805N	6805NR	6805ZENR	4300	2940	16.0	18000	22000	27	35	40.5	0.3	1.8	0.023	6805N
	42	9	0.3	0.3	40.7	1.7	0.95	44.8	0.85	6905N	6905NR	6905ZENR	7000	4500	15.3	16000	20000	27	40	45.5	0.3	2.3	0.044	6905N
	47	12	0.6	0.5	44.6	2.06	1.35	52.7	1.12	6005N	6005NR	6005ZENR	10100	5850	14.5	15000	18000	29	43	53.5	0.6	2.9	0.078	6005N
	52	15	1	0.5	49.73	2.46	1.35	57.9	1.12	6205N	6205NR	6205ZENR	14000	7900	13.9	13000	16000	31	46	58.5	1	3.3	0.128	6205N
	62	17	1.1	0.5	59.61	3.28	1.9	67.7	1.7	6305N	6305NR	6305ZENR	23600	12100	12.2	12000	14000	32	55	68.5	1	4.6	0.232	6305N
28	58	16	1	0.5	55.6	2.46	1.35	63.7	1.12	62/28N	62/28NR	62/28ZENR	17900	9750	13.1	12000	14000	34	52	64.5	1	3.3	0.175	62/28N
	68	18	1.1	0.5	64.82	3.28	1.9	74.6	1.7	63/28N	63/28NR	63/28ZENR	26800	14000	12.4	11000	13000	35	61	76	1	4.6	0.287	63/28N
30	42	7	0.3	0.3	40.7	1.3	0.95	44.8	0.85	6806N	6806NR	6806ZENR	5350	3800	16.4	15000	18000	32	40	45.5	0.3	1.8	0.027	6806N
	47	9	0.3	0.3	45.7	1.7	0.95	49.8	0.85	6906N	6906NR	6906ZENR	7250	5000	15.8	14000	17000	32	45	50.5	0.3	2.3	0.047	6906N
	55	13	1	0.5	52.6	2.08	1.35	60.7	1.12	6006N	6006NR	6006ZENR	13200	8300	14.8	13000	15000	35	50	61.5	1	2.9	0.113	6006N
	62	16	1	0.5	59.61	3.28	1.9	67.7	1.7	6206N	6206NR	6206ZENR	19500	11300	13.9	11000	13000	36	56	68.5	1	4.6	0.199	6206N
	72	19	1.1	0.5	68.81	3.28	1.9	78.6	1.7	6306N	6306NR	6306ZENR	26700	15000	13.2	10000	12000	37	65	80	1	4.6	0.346	6306N

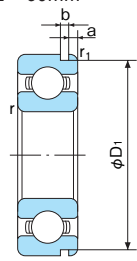
Note: (1) Bearing No. ZE means one shield type, two shields type is also available.

Remark: Dimensions of snap ring groove and snap ring are shown on pages 45 to 48.

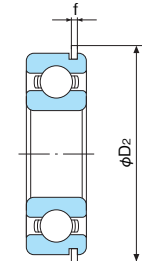
Deep-groove Ball Bearings

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

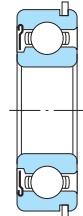
Bore Diameter: 32~60mm



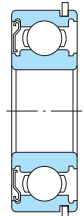
With snap ring groove
(N)



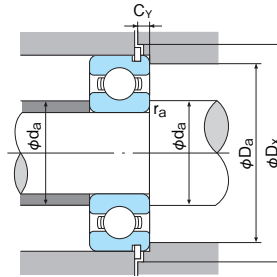
With snap ring
(NR)



Shield type with
snap ring
(ZNR)



Shield type with
snap ring
(ZENR)



■ Dynamic equivalent radial load
 $P_r = X F_r + Y F_a$

■ Static equivalent radial load
Larger value of following to be used:
 $P_s = 0.6 F_r + 0.5 F_a$
 $P_s = F_r$

$\frac{10 F_a}{C_{or}}$	e	$\frac{F_a}{F_r} \leq e$	$\frac{F_a}{F_r} > e$	
0.172	0.19	X	Y	X
0.345	0.22	1	0	0.56
0.689	0.26			1.71
1.03	0.28			1.55
1.38	0.30	1	0	0.56
2.07	0.34			1.31
3.45	0.38			1.15
5.17	0.42	1	0	0.56
6.89	0.44			1.00

1N=0.102kgf

Boundary dimensions (mm)					Dimensions of snap ring groove and snap ring (mm)					Bearing No.(1)				Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Factor fo	Limiting speed (min ⁻¹)		Abutment and fillet dimensions (mm)					Mass (kg)	Bearing No.
d	D	B	r (min)	r1 (min)	D1 (max)	a (max)	b (min)	D2 (max)	f (max)								Grease lubrication	Oil lubrication	da (min)	Da (max)	Dx (min)	ra (max)	Cy (max)		
32	65	17	1	0.5	62.6	3.28	1.9	70.7	1.7	62/32N	62/32NR	62/32ZNR		22400	13100	13.6	11000	12000	38	59	71.5	1	4.6	0.230	62/32N
	75	20	1.1	0.5	71.83	3.28	1.9	81.6	1.7	63/32N	63/32NR	63/32ZNR		30000	16200	12.7	9500	11000	39	68	83	1	4.6	0.382	63/32N
35	47	7	0.3	0.3	45.7	1.3	0.95	49.8	0.85	6807N	6807NR	6807ZNR		4750	3800	16.4	14000	16000	37	45	50.5	0.3	1.8	0.030	6807N
	55	10	0.6	0.5	53.7	1.7	0.95	57.8	0.85	6907N	6907NR	6907ZNR		10400	7150	15.6	12000	15000	39	51	58.5	0.6	2.3	0.075	6907N
	62	14	1	0.5	59.61	2.08	1.9	67.7	1.7	6007N	6007NR	6007ZNR		16000	10300	14.8	12000	14000	40	57	68.5	1	3.4	0.150	6007N
	72	17	1.1	0.5	68.81	3.28	1.9	78.6	1.6	6207N	6207NR	6207ZNR		25700	15300	13.8	9800	11000	42	65	80	1	4.6	0.288	6207N
	80	21	1.5	0.5	76.81	3.28	1.9	86.6	1.6	6307N	6307NR	6307ZNR		33500	19100	13.2	8800	10000	44	71	88	1.5	4.6	0.457	6307N
40	52	7	0.3	0.3	50.7	1.3	0.95	54.8	0.85	6808N	6808NR	6808ZNR		5950	4900	16.2	12000	14000	42	50	55.5	0.3	1.8	0.034	6808N
	62	12	0.6	0.5	60.7	1.7	0.95	64.8	0.85	6908N	6908NR	6908ZNR		13700	9950	15.8	11000	13000	44	58	65.5	0.6	2.3	0.110	6908N
	68	15	1	0.5	64.82	2.49	1.9	74.6	1.7	6008N	6008NR	6008ZNR		16800	11500	15.3	10000	12000	45	63	76	1	3.8	0.186	6008N
	80	18	1.1	0.5	76.81	3.28	1.9	86.6	1.7	6208N	6208NR	6208ZNR		29100	17900	14.0	8700	10000	47	73	88	1	4.6	0.366	6208N
	90	23	1.5	0.5	86.79	3.28	2.7	96.5	2.46	6308N	6308NR	6308ZNR		40500	24100	13.2	7800	9200	49	81	98	1.5	5.9	0.633	6308N
45	58	7	0.3	0.3	56.7	1.3	0.95	60.8	0.85	6809N	6809NR	6809ZNR		5350	4900	16.1	11000	13000	47	56	61.5	0.3	1.8	0.042	6809N
	68	12	0.6	0.5	66.7	1.7	0.95	70.8	0.85	6909N	6909NR	6909ZNR		14100	10900	16.1	10000	12000	49	64	72	0.6	2.3	0.124	6909N
	75	16	1	0.5	71.83	2.49	1.9	81.6	1.7	6009N	6009NR	6009ZNR		20900	15200	15.3	9200	11000	50	70	83	1	3.8	0.239	6009N
	85	19	1.1	0.5	81.81	3.28	1.9	91.6	1.7	6209N	6209NR	6209ZNR		32500	20500	14.1	7800	9300	52	78	93	1	4.6	0.407	6209N
	100	25	1.5	0.5	96.8	3.28	2.7	106.5	2.46	6309N	6309NR	6309ZNR		53000	32000	13.1	7000	8200	54	91	108	1.5	5.4	0.833	6309N
50	65	7	0.3	0.3	63.7	1.3	0.95	67.8	0.85	6810N	6810NR	6810ZNR		6400	5800	16.1	10000	12000	52	63	68.5	0.3	1.8	0.054	6810N
	72	12	0.6	0.5	70.7	1.7	0.95	74.8	0.85	6910N	6910NR	6910ZNR		14500	11700	16.1	9500	11000	54	68	76	0.6	2.3	0.127	6910N
	80	16	1	0.5	76.81	2.49	1.9	86.6	1.7	6010N	6010NR	6010ZNR		21800	16600	15.6	8500	10000	55	75	88	1	3.8	0.252	6010N
	90	20	1.1	0.5	86.79	3.28	2.7	96.5	2.46	6210N	6210NR	6210ZNR		35000	23200	14.4	7100	8600	57	83	98	1	5.4	0.463	6210N
	110	27	2	0.5	106.81	3.28	2.7	116.6	2.46	6310N	6310NR	6310ZNR		62000	38100	13.1	6400	7500	60	100	118	2	5.4	1.07	6310N
55	72	9	0.3	0.3	70.7	1.7	0.95	74.8	0.85	6811N	6811NR	6811ZNR		8800	8100	16.2	8700	10000	57	70	76	0.3	2.3	0.085	6811N
	80	13	1	0.5	77.9	2.1	1.3	84.4	1.12	6911N	6911NR	6911ZNR		16000	13200	16.2	8200	9600	60	75	86	1	2.9	0.180	6911N
	90	18	1.1	0.5	86.79	2.87	2.7	96.5	2.46	6011N	6011NR	6011ZNR		28300	21300	15.4	7700	9000	61	84	98	1	5	0.375	6011N
	100	21	1.5	0.5	96.8	3.28	2.7	106.5	2.46	6211N	6211NR	6211ZNR		43500	29300	14.4	6400	7700	64	91	108	1.5	5.4	0.607	6211N
	120	29	2	0.5	115.21	4.06	3.1	129.7	2.82	6311N	6311NR	6311ZNR		71500	44500	13.1	5800	6800	65	110	131.5	2	6.5	1.37	6311N
60	78	10	0.3	0.3	76.2	1.7	1.3	82.7	1.12	6812N	6812NR	6812ZNR		11500	10600	16.3	8000	9500	62	76	84	0.3	2.5	0.110	6812N
	85	13	1	0.5	82.9	2.1	1.3	89.4	1.12	6912N	6912NR	6912ZNR		15200	13500	16.5	7600	9000	65	80	91	1	2.9	0.195	6912N
	95	18	1.1	0.5	91.82	2.87	2.7	101.6	2.46	6012N	6012NR	6012ZNR		29400	23200	15.5	7100	8500	66	89	103	1	5	0.403	6012N
	110	22	1.5	0.5	106.81	3.28	2.7	116.6	2.46	6212N	6212NR	6212ZNR		52500	36000	14.3	6000	7100	69	101	118	1.5	5.4	0.783	6212N
	130	31	2.1	0.5	125.22	4.06	3.1	139.7	2.82	6312N	6312NR	6312ZNR		82000	52000	13.2	5400	6300	72	118	141.5	2	6.5	1.70	6312N

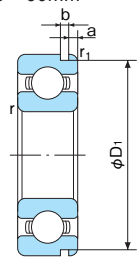
Note: (1) Bearing No. ZE means one shield type, two shields type is also available.

Remark: Dimensions of snap ring groove and snap ring are shown on pages 45 to 48.

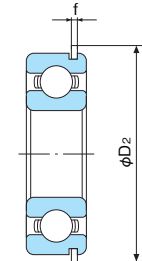
Deep-groove Ball Bearings

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

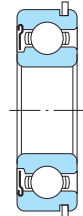
Bore Diameter: 65~90mm



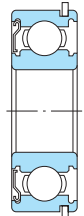
With snap ring groove
(N)



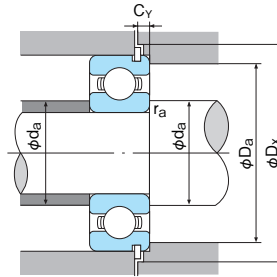
With snap ring
(NR)



Shield type with
snap ring
(ZNR)



Shield type with
snap ring
(ZENR)



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

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

$\frac{10Fa}{Cor}$	e	$\frac{Fa}{Fr} \leq e$	$\frac{Fa}{Fr} > e$	
		X	Y	
0.172	0.19			2.30
0.345	0.22	1	0	1.99
0.689	0.26			1.71
1.03	0.28			1.55
1.38	0.30	1	0	1.45
2.07	0.34			1.31
3.45	0.38			1.15
5.17	0.42	1	0	1.04
6.89	0.44			1.00

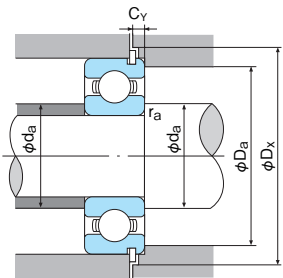
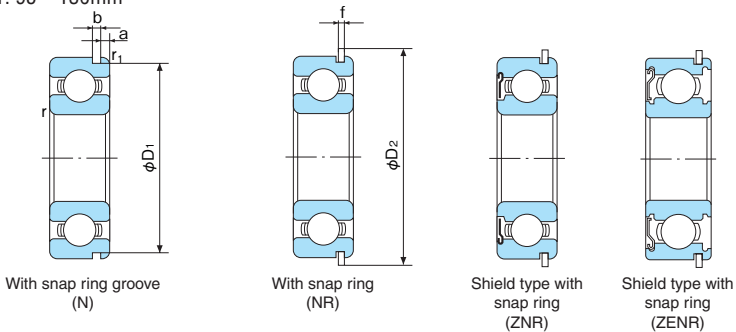
1N=0.102kgf

Boundary dimensions (mm)					Dimensions of snap ring groove and snap ring (mm)					Bearing No.(1)				Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Factor fo	Limiting speed (min ⁻¹)		Abutment and fillet dimensions (mm)					Mass (kg)	Bearing No.
d	D	B	r (min)	r1 (min)	D1 (max)	a (max)	b (min)	D2 (max)	f (max)								Grease lubrication	Oil lubrication	da (min)	Da (max)	Dx (min)	ra (max)	Cy (max)		
65	85	10	0.6	0.5	82.9	1.7	1.3	89.4	1.12	6813N	6813NR	6816ZNR		11900	11500	16.2	7500	8700	69	81	91	0.6	2.5	0.130	6813N
	90	13	1	0.5	87.9	2.1	1.3	94.4	1.12	6913N	6913NR	6913ZNR		17400	16000	16.5	7100	8500	70	85	96	1	2.9	0.210	6913N
	100	18	1.1	0.5	96.8	2.87	2.7	106.5	2.46	6013N	6013NR	6013ZENR		30500	25200	15.7	6700	8000	71	94	108	1	5	0.413	6013N
	120	23	1.5	0.5	115.21	4.06	3.1	129.7	2.82	6213N	6213NR	6213ZENR		57000	40000	14.4	5500	6500	74	111	131.5	1.5	6.5	0.990	6213N
	140	33	2.1	0.5	135.23	4.9	3.1	149.7	2.82	6313N	6313NR	6313ZENR		92500	59500	13.2	4900	6000	77	128	152	2	7.3	2.08	6313N
70	90	10	0.6	0.5	87.9	1.7	1.3	94.4	1.12	6814N	6814NR	6814ZNR		12100	11900	16.1	7000	8100	74	86	96	0.6	2.5	0.140	6814N
	100	16	1	0.5	97.9	2.5	1.3	104.4	1.12	6914N	6914NR	6914ZNR		23700	21100	16.3	6500	7700	75	95	106	1	3.3	0.332	6914N
	110	20	1.1	0.5	106.81	2.87	2.7	116.6	2.46	6014N	6014NR	6014ZENR		38000	31000	15.6	6100	7100	76	104	118	1	5	0.580	6014N
	125	24	1.5	0.5	120.22	4.06	3.1	134.7	2.82	6214N	6214NR	6214ZENR		62000	44000	14.4	5100	6300	79	116	136.5	1.5	6.5	1.07	6214N
	150	35	2.1	0.5	145.24	4.9	3.1	159.7	2.82	6314N	6314NR	6314ZENR		104000	68000	13.2	4600	5400	82	138	162	2	7.3	2.52	6314N
75	95	10	0.6	0.5	92.9	1.7	1.3	99.4	1.12	6815N	6815NR	6815ZNR		12500	12800	16.0	6500	7600	79	91	101	0.6	2.5	0.150	6815N
	105	16	1	0.5	102.6	2.5	1.3	110.7	1.12	6915N	6915NR	6915ZNR		20800	19700	16.5	6200	7200	80	100	112	1	3.3	0.350	6915N
	115	20	1.1	0.5	111.81	2.87	2.7	121.6	2.46	6015N	6015NR	6015ZENR		39500	33500	15.7	5700	6700	81	109	123	1	5	0.615	6015N
	130	25	1.5	0.5	125.22	4.06	3.1	139.7	2.82	6215N	6215NR	6215ZENR		66000	49500	14.7	4800	5600	84	121	141.5	1.5	6.5	1.18	6215N
	160	37	2.1	0.5	155.22	4.9	3.1	169.7	2.82	6315N	6315NR	6315ZENR		113000	77000	13.2	4300	5000	87	148	172	2	7.3	3.02	6315N
80	100	10	0.6	0.5	97.9	1.7	1.3	104.4	1.12	6816N	6816NR	6816ZNR		12700	13300	15.9	6000	7100	84	96	106	0.6	2.5	0.160	6816N
	110	16	1	0.5	107.6	2.5	1.3	115.7	1.12	6916N	6916NR	6916ZNR		27600	25300	16.4	5700	6700	85	105	117	1	3.3	0.370	6916N
	125	22	1.1	0.5	120.22	2.87	3.1	134.7	2.82	6016N	6016NR	6016ZENR		47500	39500	15.6	5300	6300	86	119	136.5	1	5.3	0.825	6016N
	140	26	2	0.5	135.23	4.9	3.1	149.7	2.82	6216N	6216NR	6216ZNR		72500	53000	14.6	4500	5300	90	130	152	2	7.3	1.40	6216N
	170	39	2.1	0.5	163.65	5.69	3.5	182.9	3.1	6316N	6316NR	6316ZNR		123000	86500	13.2	4000	4800	92	158	185	2	8.4	3.59	6316N
85	110	13	1	0.5	107.6	2.1	1.3	115.7	1.12	6817N	6817NR	6817ZNR		18700	19000	16.2	5700	6700	90	105	117	1	2.9	0.272	6817N
	120	18	1.1	0.5	117.6	3.3	1.3	125.7	1.12	6917N	6917NR	6917ZNR		32000	29600	16.4	5400	6300	91	113	127	1	4.1	0.524	6917N
	130	22	1.1	0.5	125.22	2.87	3.1	139.7	2.82	6017N	6017NR	6017ZNR		49500	43000	15.7	5000	6000	91	124	141.5	1	5.3	0.863	6017N
	150	28	2	0.5	145.24	4.9	3.1	159.7	2.82	6217N	6217NR	6217ZNR		84000	62000	14.5	4300	5000	95	140	162	2	7.3	1.79	6217N
	180	41	3	0.5	173.66	5.69	3.5	192.9	3.1	6317N	6317NR	6317ZNR		133000	96500	13.3	3800	4500	99	166	195	2.5	8.4	4.23	6317N
90	115	13	1	0.5	112.6	2.1	1.3	120.7	1.2	6818N	6818NR	6818ZNR		19000	19700	16.1	5400	6300	95	110	122	1	2.9	0.288	6818N
	125	18	1.1	0.5	122.6	3.3	1.3	130.7	1.12	6918N	6918NR	6918ZNR		33000	31500	16.4	5100	6000	96	119	132	1	4.1	0.549	6918N
	140	24	1.5	0.5	135.23	3.71	3.1	149.7	2.82	6018N	6018NR	6018ZENR		58000	49500	15.6	4800	5600	97	133	152	1.5	6.1	1.13	6018N
	160	30	2	0.5	155.22	4.9	3.1	169.7	2.82	6218N	6218NR	6218ZNR		96000	71500	14.5	4000	4800	100	150	172	2	7.3	2.15	6218N
	190	43	3	0.5	183.64	5.69	3.5	202.9	3.1	6318N	6318NR	6318ZNR		143000	107000	13.3	3600	4300	104	176	205	2.5	8.4	4.91	6318N

Note: (1) Bearing No. ZE means one shield type, two shields type is also available.

Remark: Dimensions of snap ring groove and snap ring are shown on pages 45 to 48.

■ Deep-groove Ball Bearings
With snap ring groove / With snap ring / Shield type with snap ring
Bore Diameter: 95~130mm



■ Dynamic equivalent radial load
 $P_r = X F_r + Y F_a$

■ Static equivalent radial load
Larger value of following to be used:
 $P_{or} = 0.6 F_r + 0.5 F_a$
 $P_{or} = F_r$

$\frac{10 F_a}{C_{or}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26				1.71
1.03	0.28				1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34				1.31
3.45	0.38				1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44				1.00

Boundary dimensions (mm)					Dimensions of snap ring groove and snap ring (mm)					Bearing No.(1)			Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Factor fo	Limiting speed (min ⁻¹)		Abutment and fillet dimensions (mm)					Mass (kg)	Bearing No.
d	D	B	r (min)	r1 (min)	D1 (max)	a (max)	b (min)	D2 (max)	f (max)							Grease lubrication	Oil lubrication	da (min)	Da (max)	Dx (min)	ra (max)	Cy (max)		
95	120	13	1	0.5	117.6	2.1	1.3	125.7	1.12	6819N	6819NR	6819ZNR	19300	20500	16.0	5000	6000	100	115	127	1	2.9	0.307	6819N
	130	18	1.1	0.5	127.6	3.3	1.3	135.7	1.12	6919N	6919NR	6919ZNR	33500	33500	16.5	4800	5700	101	124	137	1	4.1	0.576	6919N
	145	24	1.5	0.5	140.23	3.71	3.1	154.7	2.82	6019N	6019NR	6019ZNR	60500	54000	15.8	4500	5300	102	138	157	1.5	6.1	1.16	6019N
	170	32	2.1	0.5	163.65	5.69	3.5	182.9	3.1	6219N	6219NR	6219ZNR	109000	81500	14.4	3800	4500	107	158	185	2	8.4	2.62	6219N
	200	45	3	0.5	193.65	5.69	3.5	212.9	3.1	6319N	6319NR	6319ZNR	153000	118000	13.3	3300	3900	109	186	215	2.5	8.4	5.67	6319N
100	125	13	1	0.5	122.6	2.1	1.3	130.7	1.12	6820N	6820NR	6820ZNR	19600	21200	16.0	4800	5600	105	120	132	1	2.9	0.320	6820N
	140	20	1.1	0.5	137.6	3.3	1.9	145.7	1.7	6920N	6920NR	6920ZNR	37000	36500	16.5	4500	5300	106	134	147	1	4.7	0.780	6920N
	150	24	1.5	0.5	145.24	3.71	3.1	159.7	2.82	6020N	6020NR	6020ZNR	60000	54000	15.9	4300	5300	107	143	162	1.5	6.1	1.20	6020N
	180	34	2.1	0.5	173.66	5.69	3.5	192.9	3.1	6220N	6220NR	6220ZNR	122000	93000	14.4	3600	4300	112	168	195	2	8.4	3.14	6220N
105	130	13	1	0.5	127.6	2.1	1.3	135.7	1.12	6821N	6821NR	6821ZNR	19900	21900	15.9	4800	5600	110	125	137	1	2.9	0.335	6821N
	145	20	1.1	0.5	142.6	3.3	1.9	150.7	1.7	6921N	6921NR	6921ZNR	42500	42000	16.4	4300	5300	111	139	152	1	4.7	0.803	6921N
	160	26	2	0.5	155.22	3.71	3.1	169.7	2.82	6021N	6021NR	6021ZNR	72500	65500	15.8	4000	4800	113	152	172	2	6.1	1.54	6021N
	190	36	2.1	0.5	183.64	5.69	3.5	202.9	3.1	6221N	6221NR	6221ZNR	133000	104000	14.3	3400	4000	117	178	205	2	8.4	3.76	6221N
110	140	16	1	0.5	137.6	2.5	1.9	145.7	1.7	6822N	6822NR	6822ZNR	27300	29400	16.9	4300	5300	115	135	147	1	3.9	0.526	6822N
	150	20	1.1	0.5	147.6	3.3	1.9	155.7	1.7	6922N	6922NR	6922ZNR	38000	38500	16.4	4300	5000	116	144	157	1	4.7	0.846	6922N
	170	28	2	0.5	163.65	3.71	3.5	182.9	3.1	6022N	6022NR	6022ZNR	84500	73000	15.5	3800	4500	118	162	185	2	6.4	1.91	6022N
	200	38	2.1	0.5	193.65	5.69	3.5	212.9	3.1	6222N	6222NR	6222ZNR	144000	117000	14.3	3200	3800	122	188	215	2	8.4	4.36	6222N
120	150	16	1	0.5	147.6	2.5	1.9	155.7	1.7	6824N	6824NR	6824ZNR	28300	31500	16.0	4000	4800	125	145	157	1	3.9	0.567	6824N
	165	22	1.1	0.5	161.8	3.7	1.9	171.5	1.7	6924N	6924NR	6924ZNR	53000	54000	16.5	3800	4600	126	159	173	1	5.1	1.15	6924N
	180	28	2	0.5	173.66	3.71	3.5	192.9	3.1	6024N	6024NR	6024ZNR	88000	79500	15.7	3600	4300	128	172	195	2	6.4	2.36	6024N
130	165	18	1.1	0.5	161.8	3.3	1.9	171.5	1.7	6826N	6826NR	6826ZNR	37000	41000	16.1	3700	4400	136	158	173	1	4.7	0.815	6826N
	180	24	1.5	0.5	176.8	3.7	1.9	186.5	1.7	6926N	6926NR	6926ZNR	65000	67000	16.4	3500	4200	137	173	188	1.5	5.1	1.81	6926N
	200	33	2	0.5	193.65	5.69	3.5	212.9	3.1	6026N	6026NR	6026ZNR	106000	101000	15.7	3200	3800	138	192	215	2	8.4	3.60	6026N

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

Angular Contact Ball Bearings

Tolerance Page 52
Preload Page 95

● Design

Angular Contact Ball Bearings can sustain combined loads of simultaneously acting radial and axial loads because they have a contact angle (α).

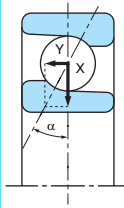
The contact angle is defined as the angle between the line joining the points of contact between the ball and the raceways in the radial plane.

1. Single-row Angular Contact Ball Bearings

These bearings are designed with three contact angle classifications as shown in Table 1. Normally, contact angle A design and B design are fitted with a cage as shown in Table 2-1. High precision (JIS/ISO class 5 or higher) may be fitted with a machined cage of bronze or

phenolic resin or a polyamide cage. Contact angle C design are generally applied high precision, JIS (ISO) class 5 or higher, and are fitted with a machined phenolic resin cage or a polyamide cage.

Table 1. Contact Angle and Characteristics of Single-row Angular Contact Ball Bearings

Contact Angle Symbol	Example Bearing No.	Contact Angle (α)	Speed	Load capability comparison ⁽²⁾		Cross section
				Radial Load Direction (X)	Axial Load Direction (Y)	
A	7205 ⁽¹⁾	30°	—	—	—	
B	7205B	40°	Less	Less	Greater	
C	7205C	15°	Greater	Greater	Less	

Notes: ⁽¹⁾ Contact angle symbol "A" is omitted.
⁽²⁾ Axial load can be accommodated in one direction only.

Table 2-1. Angular Contact Ball Bearing Cage for Contact Angle Symbol A and B (For JIS/ISO class 0 or 6)

	Applicable Bore Diameter Number	
	Pressed Steel	Machined Brass
72, 72B	00~22	24~40
73, 73B	00~19	20~40

Table 2-2. Angular Contact Ball Bearing Cage for Contact Angle Symbol C

	Applicable Bore Diameter Number	
	Machined Synthetic Resin	Polyamide
70C	00~40	00~20
72C	00~26	00~20
73C	00~22	—



2. Combination Angular Contact Ball Bearings

Single-row Angular Contact Ball Bearings are seldom used as a single unit. Normally they are used as a combination of two and more units. High precision paired combination Angular Contact Ball Bearings (JIS/ISO class 5 or higher) are used for applications such as machine tool spindles and are usually preloaded. Three types of combinations are available:

- 1) DB, back - to - back
- 2) DF, face - to - face

3) DT, tandem
Because clearance of matched set parts is adjusted before shipment, care should be taken to prevent mixing of parts from other sets. Load-carrying capability of combined Angular Contact Bearings are shown in Table 3. Flush ground bearings or Universal matching bearings are also available. DU can be mounted as back-to-back, face-to-face or in tandem.

Table 3. Load-carrying Characteristics of Combination Angular Contact Ball Bearings

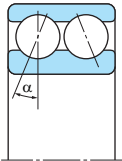
Configuration	Load Center Distance (a)	Load Capability	Moment Load Rigidity	Cross Section
Back - to -Back (DB)	Long		Greater	
Face - to -Face (DF)	Short		Less	
Tandem (DT)	—		—	

3. Double-row Angular Contact Ball Bearings

This type bearings is made in two contact angle levels as shown in Table 4. They are selected according to sustained axial and moment load. Pressed steel cage are used for them. Some sizes of Double-row Angular Contact Ball Bearing are available with contact seals (2NS) or shields (ZZ).

Table 4. Double-row Angular Contact Ball Bearing Contact Angles and Symbols

Contact Angle Symbol	Contact Angle (α)	Example Bearing No.
None	20°	5205
A	30°	5205A



● Flush ground set combinations (Universal matching)

NACHI Angular Contact Ball Bearings with a suffix U are flush ground to permit the use of random combinations where two or more bearings are mounted.

7206B U
7206CY U P4
Flush ground (free set matching)

● Speed Limits

With respect to single-row or combination bearings, the dimension tables show limiting speed for bearings made with machined cages or a polyamide cages. For bearings made with pressed-cages, multiply the table limit by 0.8. For contact angle C design bearings, the table limiting speeds are applied to high precision bearings of class 5 or higher. These limiting speeds can be applied when a

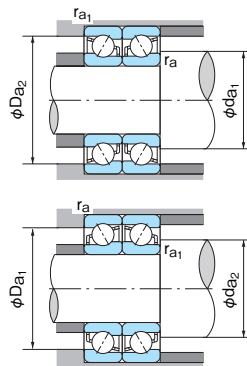
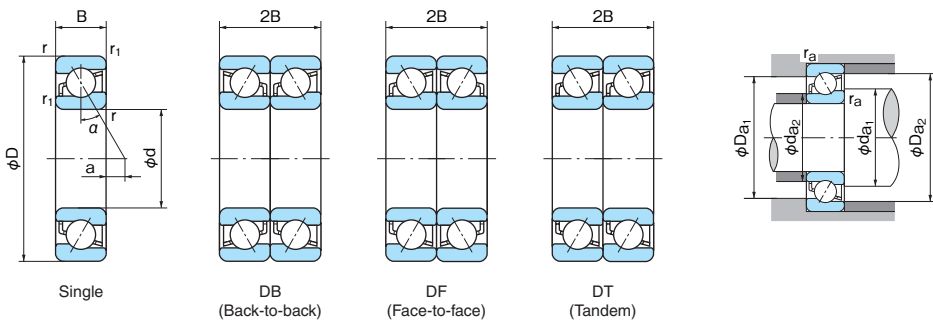
high quality grease or oil is supplied in proper quantity under light load conditions. When Angular Contact Ball Bearings are used in combination of two or more units, or with larger preload to improve rigidity, the limiting speed must be decreased. Please contact NACHI for design assistance.

● Attention

- (1) If bearings are operated under severe conditions such as close to limiting speed, high temperature, or vibrating load, please consult NACHI.
- (2) Bearings with polyamide cage should be use at less than 120°C.
- (3) Combination Angular Contact Ball Bearings should not be mixed with those of other bearings.
- (4) When combination bearings with a optional preload is required, please contact NACHI.

Angular Contact Ball Bearings Single Mounting / Duplex Mounting

Bore Diameter: 10~17mm



Dynamic equivalent radial load
Pr=XFr+YFa

Contact angle	iFa Cor	e	Single or DT						DB or DF					
			Fa Fr		> e		Fa Fr		≤ e		Fa Fr		> e	
			X	Y	X	Y	X	Y	X	Y	X	Y	X	Y
15°	0.015	0.38				1.47			1.65			2.39		
	0.029	0.40	0.44	1.40	1	1.57	0.72	2.28						
	0.058	0.43		1.30		1.46		2.11						
	0.087	0.46		1.23		1.38		2.00						
	0.12	0.47	0.44	1.19	1	1.34	0.72	1.93						
	0.17	0.50		1.12		1.26		1.82						
	0.29	0.55		1.02		1.14		1.66						
	0.44	0.56	0.44	1.00	1	1.12	0.72	1.63						
	0.58	0.56		1.00		1.12		1.63						
	—	0.8	0.39	0.76	1	0.78	0.63	1.24						
30°	—	1.14	0.35	0.57	1	0.55	0.57	0.93						
40°	—													

Static equivalent radial load
Por=XoFr+YoFa

Contact angle	Single or DT		DB or DF	
	Xo	Yo	Xo	Yo
15°	0.5	0.46	1	0.92
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

Single or DT mounting When Por<Fr, use Pr = Fr

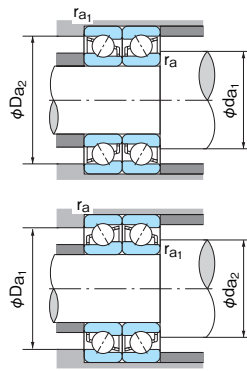
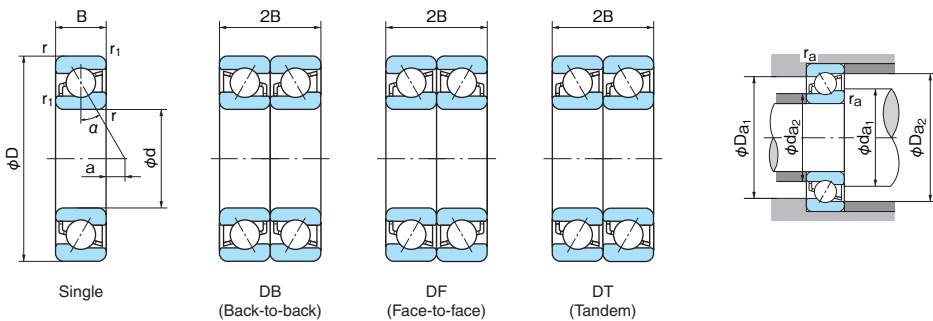
i = 2 for DB or DF mounting
i = 1 for Single or DT mounting
Single or DT mounting When Fa/Fr≤e, use Pr = Fr

Boundary dimensions (mm)						Load center (mm) a	Bearing No.				Basic dynamic load rating Cr (N)		Basic static load rating Cor (N)	Limiting speed (min ⁻¹)				Abutment and fillet dimensions (mm)						Mass (kg) Single	Bearing No.
d	D	B	r (min)	r1 (min)	Single		Duplex			Single	Duplex	Grease lubrication		Oil lubrication		da1 (min)	da2 (min)	Da1 (max)	Da2 (max)	ra (max)	ra1 (max)				
							Single	Duplex	Single			Duplex		Single	Duplex							Single	Duplex		
10	26	8	0.3	0.15	1.2	7000	7000DB	7000DF	7000DT	5000	8150	2340	4650	23000	19000	31000	26000	12	12	24	25	0.3	0.15	0.022	7000
	26	8	0.3	0.15	-1.9	7000C	7000CDB	7000CDF	7000CDT	5350	8700	2500	5000	44000	35000	61000	49000	12	12	24	25	0.3	0.15	0.022	7000C
	30	9	0.6	0.3	1.3	7200	7200DB	7200DF	7200DT	5400	8800	2710	5400	22000	18000	30000	24000	15	12	25	27.4	0.6	0.3	0.034	7200
	30	9	0.6	0.3	3.9	7200B	7200BDB	7200BDF	7200BDT	5150	8350	2570	5150	19000	16000	28000	22000	15	12	25	27.4	0.6	0.3	0.034	7200B
	30	9	0.6	0.3	-2.2	7200C	7200CDB	7200CDF	7200CDT	6950	11300	3300	6650	40000	32000	55000	44000	15	15	25	27.4	0.6	0.3	0.034	7200C
	35	11	0.6	0.3	1.0	7300	7300DB	7300DF	7300DT	9300	15100	4300	8600	20000	16000	26000	21000	15	12	30	32.4	0.6	0.3	0.055	7300
	35	11	0.6	0.3	3.9	7300B	7300BDB	7300BDF	7300BDT	8950	14500	4150	8250	18000	14000	24000	19000	15	12	30	32.4	0.6	0.3	0.055	7300B
	35	11	0.6	0.3	-2.8	7300C	7300CDB	7300CDF	7300CDT	9850	16000	4600	9250	36000	29000	49000	39000	15	15	30	32.4	0.6	0.3	0.055	7300C
12	28	8	0.3	0.15	1.7	7001	7001DB	7001DF	7001DT	5050	8800	2710	5700	22000	18000	29000	23000	14	14	26	27	0.3	0.15	0.024	7001
	28	8	0.3	0.15	-1.7	7001C	7001CDB	7001CDF	7001CDT	5800	9450	2910	5800	40000	32000	55000	44000	14	14	26	27	0.3	0.15	0.024	7001C
	32	10	0.6	0.3	1.4	7201	7201DB	7201DF	7201DT	7600	12400	3960	7950	20000	16000	27000	22000	17	14	27	29.4	0.6	0.3	0.040	7201
	32	10	0.6	0.3	4.2	7201B	7201BDB	7201BDF	7201BDT	7200	11700	3800	7550	17000	15000	24000	20000	17	14	27	29.4	0.6	0.3	0.040	7201B
	32	10	0.6	0.3	-2.5	7201C	7201CDB	7201CDF	7201CDT	7950	13000	3900	7750	36000	29000	50000	40000	17	17	27	29.4	0.6	0.3	0.040	7201C
	37	12	1	0.6	1.1	7301	7301DB	7301DF	7301DT	11200	18200	5250	10500	18000	15000	24000	20000	18	15	31	33.4	1	0.6	0.063	7301
	37	12	1	0.6	4.3	7301B	7301BDB	7301BDF	7301BDT	10800	17500	5050	10100	16000	13000	22000	18000	18	15	31	33.4	1	0.6	0.063	7301B
	37	12	1	0.6	-3.1	7301C	7301CDB	7301CDF	7301CDT	10800	17500	4900	9800	33000	26000	45000	36000	18	18	31	33.4	1	0.6	0.063	7301C
15	32	9	0.3	0.15	2.3	7002	7002DB	7002DF	7002DT	6150	9950	3400	6850	18000	15000	24000	20000	17	17	30	31	0.3	0.15	0.035	7002
	32	9	0.3	0.15	-1.8	7002C	7002CDB	7002CDF	7002CDT	6650	10800	3700	7450	34000	27000	47000	38000	17	17	30	31	0.3	0.15	0.035	7002C
	35	11	0.6	0.3	1.7	7202	7202DB	7202DF	7202DT	9050	14700	4700	9400	17000	14000	23000	19000	20	17	30	32.4	0.6	0.3	0.048	7202
	35	11	0.6	0.3	5.0	7202B	7202BDB	7202BDF	7202BDT	8600	14000	4500	8950	16000	12000	21000	17000	20	17	30	32.4	0.6	0.3	0.048	7202B
	35	11	0.6	0.3	-2.6	7202C	7202CDB	7202CDF	7202CDT	8700	14200	4550	9150	32000	26000	44000	35000	20	20	30	32.4	0.6	0.3	0.048	7202C
	42	13	1	0.6	1.7	7302	7302DB	7302DF	7302DT	13600	22000	7100	14200	16000	13000	21000	17000	21	18	36	38.4	1	0.6	0.085	7302
	42	13	1	0.6	5.5	7302B	7302BDB	7302BDF	7302BDT	12800	21000	6750	13500	14000	11000	19000	16000	21	18	36	38.4	1	0.6	0.085	7302B
	42	13	1	0.6	-3.1	7302C	7302CDB	7302CDF	7302CDT	13300	21700	6850	13700	28000	22000	39000	31000	21	21	36	38.4	1	0.6	0.085	7302C
17	35	10	0.3	0.15	2.5	7003	7003DB	7003DF	7003DT	6400	10400	3800	7650	17000	13000	22000	18000	19	19	33	34	0.3	0.15	0.045	7003
	35	10	0.3	0.15	-2.0	7003C	7003CDB	7003CDF	7003CDT	7000	11400	4150	8300	31000	25000	42000	34000	19	19	33	34	0.3	0.15	0.045	7003C
	40	12	0.6	0.3	2.2	7203	7203DB	7203DF	7203DT	11900	19400	6600	13200	16000	13000	21000	17000	22	19	35	37.4	0.6	0.3	0.070	7203
	40	12	0.6	0.3	6.0	7203B	7203BDB	7203BDF	7203BDT	11300	18400	6300	12600	14000	11000	19000	15000	22	19	35	37.4	0.6	0.3	0.070	7203B
	40	12	0.6	0.3	-2.7	7203C	7203CDB	7203CDF	7203CDT	10900	17800	5900	11800	28000	22000	39000	31000	22	22	35	37.4	0.6	0.3	0.070	7203C
	47	14	1	0.6	2.2	7303	7303DB	7303DF	7303DT	15900	25900	8650	17300	14000	11000	19000	15000	23	21	41	43.4	1	0.6	0.120	7303
	47	14	1	0.6	6.4	7303B	7303BDB	7303BDF	7303BDT	15200	24700	8250	16500	13000	10000	17000	14000	23	21	41	43.4	1	0.6	0.120	7303B
	47	14	1	0.6	-3.2	7303C	7303CDB	7303CDF	7303CDT	15900	25800	8350	16700	25000	20000	34000	27000	23	23	41	43.4	1	0.6	0.120	7303C

Remarks: 1. "a" means the distance between back face and load center.
2. See page 122 regarding limiting speeds.

Angular Contact Ball Bearings Single Mounting / Duplex Mounting

Bore Diameter: 20~35mm



Dynamic equivalent radial load
 $P_r = X F_r + Y F_a$

Contact angle	iFaCor	e	Single or DT						DB or DF					
			FaFr > e		FaFr ≤ e		FaFr > e		FaFr ≤ e		FaFr > e		FaFr ≤ e	
			X	Y	X	Y	X	Y	X	Y	X	Y	X	Y
15°	0.015	0.38					1.47	1.65			1.47	1.65	2.39	2.28
	0.029	0.40	0.44	1.40	1	1.57	1.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
	0.058	0.43		1.30		1.46		2.11						
	0.087	0.46		1.23		1.38		2.00						
	0.12	0.47	0.44	1.19	1	1.34	0.72	1.93						
	0.17	0.50		1.12		1.26		1.82						
	0.29	0.55		1.02		1.14		1.66						
	0.44	0.56	0.44	1.00	1	1.12	0.72	1.63						
30°	—	0.8	0.39	0.76	1	0.78	0.63	1.24						
	—	1.14	0.35	0.57	1	0.55	0.57	0.93						
40°	—													

Static equivalent radial load
 $P_{or} = X_o F_r + Y_o F_a$

Contact angle	Single or DT				DB or DF			
	X _o	Y _o	X _o	Y _o	X _o	Y _o	X _o	Y _o
15°	0.5	0.46	1	0.92				
30°	0.5	0.33	1	0.66				
40°	0.5	0.26	1	0.52				

Single or DT mounting When $P_{or} < F_r$, use $P_r = F_r$

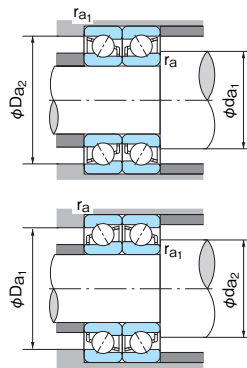
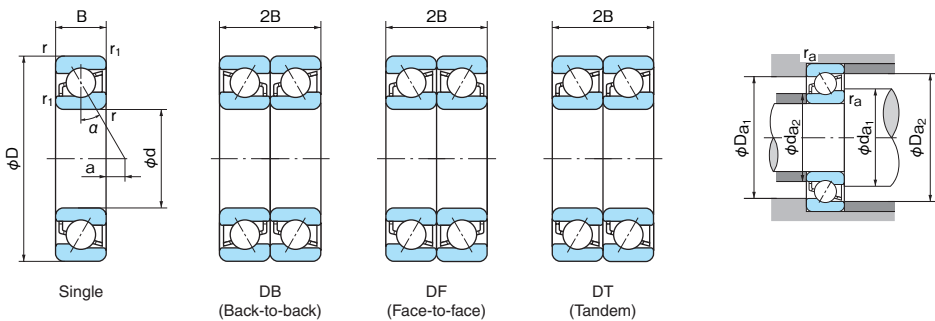
i = 2 for DB or DF mounting
i = 1 for Single or DT mounting
Single or DT mounting When $F_a/F_r \leq e$, use $P_r = F_r$

Boundary dimensions (mm)					Load center (mm) a	Bearing No.				Basic dynamic load rating Cr (N)		Basic static load rating Cor (N)		Limiting speed (min ⁻¹)				Abutment and fillet dimensions (mm)						Mass (kg) Single	Bearing No.
d	D	B	r (min)	r ₁ (min)		Single	Duplex			Single	Duplex	Single	Duplex	Grease lubrication		Oil lubrication		d _{a1} (min)	d _{a2} (min)	D _{a1} (max)	D _{a2} (max)	r _a (max)	r _{a1} (max)		
20	42	12	0.6	0.3	2.9	7004	7004DB	7004DF	7004DT	10300	16700	6050	12100	15000	12000	20000	16000	24	24	38	40	0.6	0.3	0.079	7004
	42	12	0.6	0.3	-2.4	7004C	7004CDB	7004CDF	7004CDT	11200	18200	6600	13200	26000	21000	35000	28000	24	24	38	40	0.6	0.3	0.079	7004C
	47	14	1	0.6	2.7	7204	7204DB	7204DF	7204DT	14500	23500	8300	16600	13000	10000	18000	14000	26	23	41	43.4	1	0.6	0.110	7204
	47	14	1	0.6	7.1	7204B	7204BDB	7204BDF	7204BDT	13700	22300	7850	15700	11000	9500	16000	13000	26	23	41	43.4	1	0.6	0.110	7204B
	47	14	1	0.6	-3.1	7204C	7204CDB	7204CDF	7204CDT	14700	23800	8150	16300	24000	19000	33000	26000	26	26	41	43.4	1	0.6	0.110	7204C
	52	15	1.1	0.6	2.9	7304	7304DB	7304DF	7304DT	18700	30500	10400	20800	13000	10000	17000	13000	27	25	45	47	1	0.6	0.150	7304
	52	15	1.1	0.6	7.6	7304B	7304BDB	7304BDF	7304BDT	17800	28900	9900	19800	10000	9000	15000	12000	27	25	45	47	1	0.6	0.150	7304B
	52	15	1.1	0.6	-3.2	7304C	7304CDB	7304CDF	7304CDT	18600	30000	10000	20000	22000	18000	31000	25000	27	27	45	47	1	0.6	0.150	7304C
25	47	12	0.6	0.3	4.4	7005	7005DB	7005DF	7005DT	11300	18400	7400	14800	13000	10000	17000	13000	29	29	43	45	0.6	0.3	0.091	7005
	47	12	0.6	0.3	-1.8	7005C	7005CDB	7005CDF	7005CDT	12900	21000	8650	17300	22000	18000	31000	25000	29	29	43	45	0.6	0.3	0.091	7005C
	52	15	1	0.6	3.6	7205	7205DB	7205DF	7205DT	16200	26300	10200	20500	12000	9500	15000	12000	31	28	46	48.4	1	0.6	0.135	7205
	52	15	1	0.6	8.9	7205B	7205BDB	7205BDF	7205BDT	15300	24800	9700	19400	9500	8000	14000	11000	31	28	46	48.4	1	0.6	0.135	7205B
	52	15	1	0.6	-3.1	7205C	7205CDB	7205CDF	7205CDT	16700	27100	10300	20700	21000	17000	29000	23000	31	31	46	48.4	1	0.6	0.135	7205C
	62	17	1.1	0.6	4.1	7305	7305DB	7305DF	7305DT	26400	43000	15800	31500	10000	8500	14000	11000	32	30	55	57	1	0.6	0.245	7305
	62	17	1.1	0.6	9.8	7305B	7305BDB	7305BDF	7305BDT	25100	40500	15100	30000	8500	7300	12000	10000	32	30	55	57	1	0.6	0.245	7305B
	62	17	1.1	0.6	-3.4	7305C	7305CDB	7305CDF	7305CDT	26600	43000	15500	31000	18000	14000	25000	20000	32	32	55	57	1	0.6	0.245	7305C
30	55	13	1	0.6	5.8	7006	7006DB	7006DF	7006DT	14500	23600	10100	20300	12000	8500	14000	11000	35	35	50	52	1	0.6	0.135	7006
	55	13	1	0.6	-1.6	7006C	7006CDB	7006CDF	7006CDT	16000	25900	11100	24000	19000	15000	26000	21000	35	35	50	52	1	0.6	0.135	7006C
	62	16	1	0.6	5.3	7206	7206DB	7206DF	7206DT	22500	36500	14800	29600	10000	8000	13000	10000	36	33	56	58.4	1	0.6	0.210	7206
	62	16	1	0.6	11.3	7206B	7206BDB	7206BDF	7206BDT	21200	34500	13900	27900	8500	7000	12000	9500	36	33	56	58.4	1	0.6	0.210	7206B
	62	16	1	0.6	-2.7	7206C	7206CDB	7206CDF	7206CDT	23200	37500	14900	29700	18000	14000	24000	19000	36	36	56	58.4	1	0.6	0.210	7206C
	72	19	1.1	0.6	5.2	7306	7306DB	7306DF	7306DT	33500	54500	22400	44500	9000	7000	12000	9500	37	35	65	67	1	0.6	0.360	7306
	72	19	1.1	0.6	11.9	7306B	7306BDB	7306BDF	7306BDT	32000	52000	21000	42000	7500	6100	10000	8500	37	35	65	67	1	0.6	0.360	7306B
	72	19	1.1	0.6	-3.6	7306C	7306CDB	7306CDF	7306CDT	32500	52500	20400	40500	16000	13000	22000	18000	37	37	65	67	1	0.6	0.360	7306C
35	62	14	1	0.6	7	7007	7007DB	7007DF	7007DT	17500	28500	12600	25200	9500	7500	13000	10000	40	40	57	59	1	0.6	0.170	7007
	62	14	1	0.6	-1.4	7007C	7007CDB	7007CDF	7007CDT	19300	31000	13700	27500	16000	13000	23000	18000	40	40	57	59	1	0.6	0.170	7007C
	72	17	1.1	0.6	6.9	7207	7207DB	7207DF	7207DT	29700	48000	20000	40000	8500	7000	11000	9500	42	40	65	67	1	0.6	0.295	7207
	72	17	1.1	0.6	14.1	7207B	7207BDB	7207BDF	7207BDT	28000	45500	19000	38000	7500	6000	10000	8000	42	40	65	67	1	0.6	0.295	7207B
	72	17	1.1	0.6	-2.8	7207C	7207CDB	7207CDF	7207CDT	30500	49500	20100	40000	15000	12000	21000	17000	42	42	65	67	1	0.6	0.295	7207C
	80	21	1.5	1	6.1	7307	7307DB	7307DF	7307DT	40000	65000	26300	52500	8000	6300	10000	8500	44	40	71	74.6	1.5	1	0.475	7307
	80	21	1.5	1	13.7	7307B	7307BDB	7307BDF	7307BDT	37500	61500	24900	49500	7000	5500	9500	7500	44	40	71	74.6	1.5	1	0.475	7307B
	80	21	1.5	1	-3.9	7307C	7307CDB	7307CDF	7307CDT	40500	66000	26000	52000	14000	11000	19000	15000	44	44	71	74.6	1.5	1	0.475	7307C

Remarks: 1. "a" means the distance between back face and load center.
2. See page 122 regarding limiting speeds.

Angular Contact Ball Bearings Single Mounting / Duplex Mounting

Bore Diameter: 40~55mm



Dynamic equivalent radial load
Pr=XFr+YFa

Contact angle	iFa Cor	e	Single or DT						DB or DF					
			Fa Fr		> e		Fa Fr		≤ e		Fa Fr		> e	
			X	Y	X	Y	X	Y	X	Y	X	Y	X	Y
15°	0.015	0.38				1.47			1.65					
	0.029	0.40	0.44	1.40	1	1.57	0.72	2.39						
	0.058	0.43		1.30		1.46		2.11						
	0.087	0.46		1.23		1.38		2.00						
	0.12	0.47	0.44	1.19	1	1.34	0.72	1.93						
	0.17	0.50		1.12		1.26		1.82						
	0.29	0.55		1.02		1.14		1.66						
	0.44	0.56	0.44	1.00	1	1.12	0.72	1.63						
	0.58	0.56		1.00		1.12		1.63						
	—	0.8	0.39	0.76	1	0.78	0.63	1.24						
30°	—	1.14	0.35	0.57	1	0.55	0.57	0.93						

Static equivalent radial load
Por=XoFr+YoFa

Contact angle	Single or DT		DB or DF	
	Xo	Yo	Xo	Yo
15°	0.5	0.46	1	0.92
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

Single or DT mounting When Por<Fr, use Pr = Fr

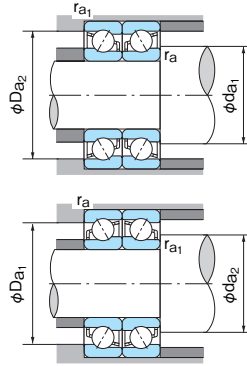
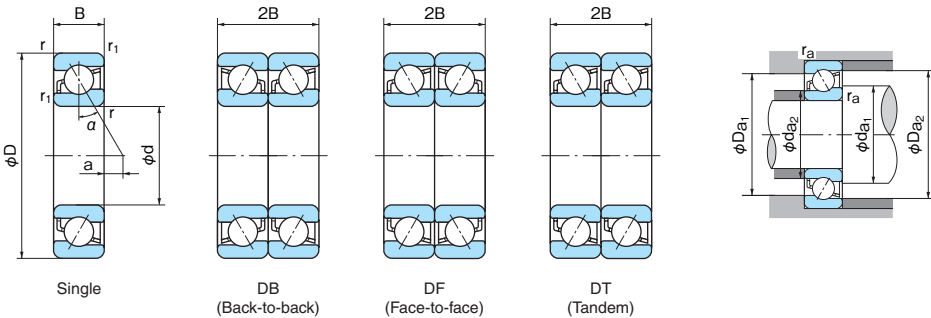
i = 2 for DB or DF mounting
i = 1 for Single or DT mounting
Single or DT mounting When Fa/Fr≤e, use Pr = Fr

Boundary dimensions (mm)					Load center (mm) a	Bearing No.				Basic dynamic load rating Cr (N)		Basic static load rating Cor (N)	Limiting speed (min ⁻¹)				Abutment and fillet dimensions (mm)						Mass (kg) Single	Bearing No.		
d	D	B	r (min)	r1 (min)		Single	Duplex			Single	Duplex		Grease lubrication		Oil lubrication		da1 (min)	da2 (min)	Da1 (max)	Da2 (max)	ra (max)	ra1 (max)				
													Single	Duplex	Single	Duplex									Single	Duplex
40	68	15	1	0.6	8.2	7008	7008DB	7008DF	7008DT	18800	30500		14500	29000	8500	6600	11000	9000	45	45	63	65	1	0.6	0.210	7008
	68	15	1	0.6	-1.3	7008C	7008CDB	7008CDF	7008CDT	20700	33500		16000	32000	15000	12000	20000	16000	45	45	63	65	1	0.6	0.210	7008C
	80	18	1.1	0.6	8.3	7208	7208DB	7208DF	7208DT	35000	57500		25200	50500	7500	6000	10000	8000	47	45	73	75	1	0.6	0.380	7208
	80	18	1.1	0.6	16.2	7208B	7208BDB	7208BDF	7208BDT	33000	54000		23700	47500	6700	5300	9200	7200	47	45	73	75	1	0.6	0.380	7208B
	80	18	1.1	0.6	-2.1	7208C	7208CDB	7208CDF	7208CDT	36500	59500		25400	50500	13000	10000	18000	14000	47	47	73	75	1	0.6	0.380	7208C
	90	23	1.5	1	7.3	7308	7308DB	7308DF	7308DT	49000	79000		33000	66000	7000	5500	9200	7500	49	45	81	84.6	1.5	1	0.655	7308
	90	23	1.5	1	15.8	7308B	7308BDB	7308BDF	7308BDT	46000	75000		31000	62500	6300	5000	8500	6700	49	45	81	84.6	1.5	1	0.655	7308B
	90	23	1.5	1	-4.0	7308C	7308CDB	7308CDF	7308CDT	49500	80500		32500	65500	12000	9600	17000	13000	49	49	81	84.6	1.5	1	0.655	7308C
45	75	16	1	0.6	9.3	7009	7009DB	7009DF	7009DT	22200	36000		17600	35000	7500	6000	10000	8000	50	50	70	72	1	0.6	0.265	7009
	75	16	1	0.6	-1.1	7009C	7009CDB	7009CDF	7009CDT	24600	40000		19400	39000	13000	10000	18000	14000	50	50	70	72	1	0.6	0.265	7009C
	85	19	1.1	0.6	9.3	7209	7209DB	7209DF	7209DT	39500	64500		28800	57500	7000	5500	9200	7500	52	50	78	80	1	0.6	0.430	7209
	85	19	1.1	0.6	17.8	7209B	7209BDB	7209BDF	7209BDT	37000	60500		27100	54000	6300	5000	8500	6700	52	50	78	80	1	0.6	0.430	7209B
	85	19	1.1	0.6	-2.0	7209C	7209CDB	7209CDF	7209CDT	41000	66500		29000	58000	12000	9600	17000	13000	52	52	78	80	1	0.6	0.430	7209C
	100	25	1.5	1	8.4	7309	7309DB	7309DF	7309DT	63500	103000		43500	87000	6300	5000	8500	6700	54	50	91	94.6	1.5	1	0.875	7309
	100	25	1.5	1	18.0	7309B	7309BDB	7309BDF	7309BDT	60000	97500		41500	82500	5600	4500	7500	6000	54	50	91	94.6	1.5	1	0.875	7309B
	100	25	1.5	1	-4.1	7309C	7309CDB	7309CDF	7309CDT	63500	103000		43500	87000	11000	8800	15000	12000	54	54	91	94.6	1.5	1	0.875	7309C
50	80	16	1	0.6	10.8	7010	7010DB	7010DF	7010DT	23600	38500		20000	40000	7000	5500	9200	7500	55	55	75	77	1	0.6	0.285	7010
	80	16	1	0.6	-0.5	7010C	7010CDB	7010CDF	7010CDT	26200	42500		22000	44000	12000	9600	17000	13000	55	55	75	77	1	0.6	0.285	7010C
	90	20	1.1	0.6	10.2	7210	7210DB	7210DF	7210DT	41000	67000		31500	63000	6300	5300	8500	6700	57	55	83	85	1	0.6	0.485	7210
	90	20	1.1	0.6	19.4	7210B	7210BDB	7210BDF	7210BDT	38500	63000		29600	59000	5600	4500	7500	6000	57	55	83	85	1	0.6	0.485	7210B
	90	20	1.1	0.6	-1.9	7210C	7210CDB	7210CDF	7210CDT	43000	70000		32000	63500	11000	8800	16000	13000	57	57	83	85	1	0.6	0.485	7210C
	110	27	2	1	9.6	7310	7310DB	7310DF	7310DT	74000	121000		52000	104000	5600	4500	7500	6000	60	56	100	104	2	1	1.14	7310
	110	27	2	1	20.1	7310B	7310BDB	7310BDF	7310BDT	70500	114000		49500	98500	5000	4000	6700	5300	60	56	100	104	2	1	1.14	7310B
	110	27	2	1	-4.3	7310C	7310CDB	7310CDF	7310CDT	75500	122000		51000	102000	10000	8000	14000	11000	60	60	100	104	2	1	1.14	7310C
55	90	18	1.1	0.6	11.9	7011	7011DB	7011DF	7011DT	31000	50500		26200	52500	6300	5000	8500	6700	61	61	84	86	1	0.6	0.420	7011
	90	18	1.1	0.6	-0.6	7011C	7011CDB	7011CDF	7011CDT	34500	56000		28800	57500	11000	8800	15000	12000	61	61	84	86	1	0.6	0.420	7011C
	100	21	1.5	1	11.9	7211	7211DB	7211DF	7211DT	51000	83000		39500	79000	6000	4500	7500	6300	64	60	91	94.6	1.5	1	0.635	7211
	100	21	1.5	1	22.1	7211B	7211BDB	7211BDF	7211BDT	48000	78000		37500	74500	5300	4000	7000	5500	64	60	91	94.6	1.5	1	0.635	7211B
	100	21	1.5	1	-1.6	7211C	7211CDB	7211CDF	7211CDT	53000	86500		40000	80000	10000	8000	14000	11000	64	64	91	94.6	1.5	1	0.635	7211C
	120	29	2	1	10.8	7311	7311DB	7311DF	7311DT	85500	139000		61500	123000	5000	4000	7000	5500	65	61	110	114	2	1	1.45	7311
	120	29	2	1	22.3	7311B	7311BDB	7311BDF	7311BDT	81000	132000		58000	116000	4500	3500	6200	5000	65	61	110	114	2	1	1.45	7311B
	120	29	2	1	-4.4	7311C	7311CDB	7311CDF	7311CDT	87000	142000		60000	121000	9100	7300	13000	10000	65	65	110	114	2	1	1.45	7311C

Remarks: 1. "a" means the distance between back face and load center.
2. See page 122 regarding limiting speeds.

Angular Contact Ball Bearings Single Mounting / Duplex Mounting

Bore Diameter: 60~75mm



Dynamic equivalent radial load
Pr=XFr+YFa

Contact angle	iFa Cor	e	DB or DF					
			Single or DT		Fa Fr		Fa Fr	
			X	Y	X	Y	X	Y
15°	0.015	0.38			1.47	1.65		
	0.029	0.40	0.44	1.40	1	1.57	0.72	2.39
	0.058	0.43		1.30		1.46		2.28
	0.087	0.46		1.23		1.38		2.00
	0.12	0.47	0.44	1.19	1	1.34	0.72	1.93
	0.17	0.50		1.12		1.26		1.82
	0.29	0.55		1.02		1.14		1.66
	0.44	0.56	0.44	1.00	1	1.12	0.72	1.63
	0.58	0.56		1.00		1.12		1.63
	—	0.8	0.39	0.76	1	0.78	0.63	1.24
30°	—	1.14	0.35	0.57	1	0.55	0.57	0.93
40°	—	—	—	—	—	—	—	—

Static equivalent radial load
Por=XoFr+YoFa

Contact angle	Single or DT		DB or DF	
	Xo	Yo	Xo	Yo
15°	0.5	0.46	1	0.92
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

Single or DT mounting When Por<XoFr, use Pr = Fr

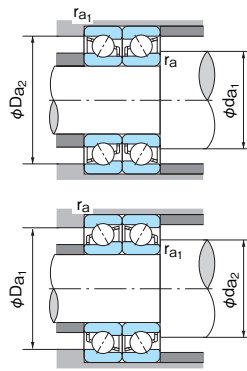
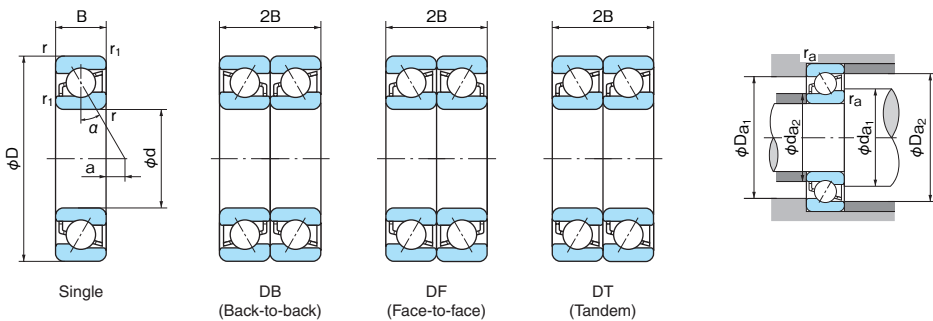
i = 2 for DB or DF mounting
i = 1 for Single or DT mounting
Single or DT mounting When Fa/Fr≤e, use Pr = Fr

Boundary dimensions (mm)					Load center (mm) a	Bearing No.				Basic dynamic load rating Cr (N)		Basic static load rating Cor (N)	Limiting speed (min ⁻¹)				Abutment and fillet dimensions (mm)						Mass (kg) Single	Bearing No.		
d	D	B	r (min)	r ₁ (min)		Single	Duplex			Single	Duplex		Grease lubrication		Oil lubrication		d _{a1} (min)	d _{a2} (min)	D _{a1} (max)	D _{a2} (max)	r _a (max)	r _{a1} (max)				
													Single	Duplex	Single	Duplex									Single	Duplex
60	95	18	1.1	0.6	13.4	7012	7012DB	7012DF	7012DT	32000	51500		28000	56000	6000	4500	7600	6200	66	66	89	91	1	0.6	0.450	7012
	95	18	1.1	0.6	−0.1	7012C	7012CDB	7012CDF	7012CDT	35500	57500		30500	61500	10000	8000	14000	11000	66	66	89	91	1	0.6	0.450	7012C
	110	22	1.5	1	13.5	7212	7212DB	7212DF	7212DT	62000	100000		48500	97500	5300	4300	7100	5600	69	65	101	104.6	1.5	1	0.820	7212
	110	22	1.5	1	24.7	7212B	7212BDB	7212BDF	7212BDT	58000	94000		46000	92000	4800	3800	6300	5000	69	65	101	104.6	1.5	1	0.820	7212B
	110	22	1.5	1	−1.2	7212C	7212CDB	7212CDF	7212CDT	64500	105000		49500	98500	9400	7500	13000	10000	69	69	101	104.6	1.5	1	0.820	7212C
	130	31	2.1	1.1	11.9	7312	7312DB	7312DF	7312DT	98000	159000		71500	148000	4800	3800	6300	5000	72	67	118	123	2	1	1.81	7312
	130	31	2.1	1.1	24.4	7312B	7312BDB	7312BDF	7312BDT	92500	151000		67500	135000	4300	3400	5500	4500	72	67	118	123	2	1	1.81	7312B
	130	31	2.1	1.1	−4.5	7312C	7312CDB	7312CDF	7312CDT	99500	162000		70000	140000	8400	6700	12000	9600	72	72	118	123	2	1	1.81	7312C
65	100	18	1.1	0.6	14.8	7013	7013DB	7013DF	7013DT	33500	54500		31000	62500	5600	4300	7100	6000	71	71	94	96	1	0.6	0.470	7013
	100	18	1.1	0.6	0.5	7013C	7013CDB	7013CDF	7013CDT	37500	60500		34500	69000	9700	7800	13000	10000	71	71	94	96	1	0.6	0.470	7013C
	120	23	1.5	1	15.2	7213	7213DB	7213DF	7213DT	70000	114000		57800	116000	4900	3900	6500	5300	74	70	111	114.6	1.5	1	1.02	7213
	120	23	1.5	1	27.4	7213B	7213BDB	7213BDF	7213BDT	66000	107000		54500	109000	4300	3400	5600	4600	74	70	111	114.6	1.5	1	1.02	7213B
	120	23	1.5	1	−0.8	7213C	7213CDB	7213CDF	7213CDT	73500	120000		59000	118000	8600	6900	12000	9600	74	74	111	114.6	1.5	1	1.02	7213C
	140	33	2.1	1.1	13.1	7313	7313DB	7313DF	7313DT	111000	180000		82000	165000	4400	3600	5800	4700	77	72	128	133	2	1	2.22	7313
	140	33	2.1	1.1	26.6	7313B	7313BDB	7313BDF	7313BDT	105000	170000		77500	155000	4000	3200	5300	4200	77	72	128	133	2	1	2.22	7313B
	140	33	2.1	1.1	−4.7	7313C	7313CDB	7313CDF	7313CDT	113000	183000		81000	162000	7800	6200	11000	8800	77	77	128	133	2	1	2.22	7313C
70	110	20	1.1	0.6	16.0	7014	7014DB	7014DF	7014DT	42500	69000		39500	78500	5000	4000	6600	5300	76	76	104	106	1	0.6	0.660	7014
	110	20	1.1	0.6	0.4	7014C	7014CDB	7014CDF	7014CDT	47000	76500		43000	86500	8900	7100	12000	9600	76	76	104	106	1	0.6	0.660	7014C
	125	24	1.5	1	16.1	7214	7214DB	7214DF	7214DT	76500	124000		63500	127000	4500	3800	6300	5000	79	75	116	119.6	1.5	1	1.12	7214
	125	24	1.5	1	29.0	7214B	7214BDB	7214BDF	7214BDT	71500	116000		59500	120000	4300	3200	5600	4500	79	75	116	119.6	1.5	1	1.12	7214B
	125	24	1.5	1	−0.7	7214C	7214CDB	7214CDF	7214CDT	80000	130000		65000	130000	8200	6600	11000	8800	79	79	116	119.6	1.5	1	1.12	7214C
	150	35	2.1	1.1	14.3	7314	7314DB	7314DF	7314DT	125000	203000		94000	188000	4000	3200	5300	4300	82	77	138	143	2	1	2.70	7314
	150	35	2.1	1.1	28.7	7314B	7314BDB	7314BDF	7314BDT	118000	191000		88500	177000	3600	2900	4800	3900	82	77	138	143	2	1	2.70	7314B
	150	35	2.1	1.1	−4.8	7314C	7314CDB	7314CDF	7314CDT	127000	206000		92500	185000	7300	5800	10000	8000	82	82	138	143	2	1	2.70	7314C
75	115	20	1.1	0.6	17.4	7015	7015DB	7015DF	7015DT	43500	70500		41500	83000	4800	3800	6300	5000	81	81	109	111	1	0.6	0.695	7015
	115	20	1.1	0.6	1.0	7015C	7015CDB	7015CDF	7015CDT	48500	78500		46000	92000	8400	6700	12000	9600	81	81	109	111	1	0.6	0.695	7015C
	130	25	1.5	1	17.1	7215	7215DB	7215DF	7215DT	79000	129000		68500	137000	4300	3400	5800	4700	84	80	121	124.6	1.5	1	1.23	7215
	130	25	1.5	1	30.6	7215B	7215BDB	7215BDF	7215BDT	74000	120000		64000	128000	4000	3200	5300	4300	84	80	121	124.6	1.5	1	1.23	7215B
	130	25	1.5	1	−0.7	7215C	7215CDB	7215CDF	7215CDT	83500	135000		70000	141000	7800	6200	11000	8800	84	84	121	124.6	1.5	1	1.23	7215C
	160	37	2.1	1.1	15.4	7315	7315DB	7315DF	7315DT	136000	221000		106000	212000	3800	3000	5000	4000	87	82	148	153	2	1	3.15	7315
	160	37	2.1	1.1	30.9	7315B	7315BDB	7315BDF	7315BDT	128000	208000		100000	200000	3400	2700	4500	3600	87	82	148	153	2	1	3.15	7315B
	160	37	2.1	1.1	−4.9	7315C	7315CDB	7315CDF	7315CDT	138000	225000		104000	209000	6800	5400	9400	7500	87	87	148	153	2	1	3.15	7315C

Remarks: 1. "a" means the distance between back face and load center.
2. See page 122 regarding limiting speeds.

Angular Contact Ball Bearings Single Mounting / Duplex Mounting

Bore Diameter: 80~95mm



Dynamic equivalent radial load
 $P_r = X F_r + Y F_a$

Contact angle	iFaCor	e	DB or DF					
			Single or DT		FaFr > e		FaFr ≤ e	
			X	Y	X	Y	X	Y
15°	0.015	0.38			1.47	1.65		
	0.029	0.40	0.44	1.40	1	1.57	0.72	2.39
	0.058	0.43		1.30		1.46		2.28
	0.087	0.46		1.23		1.38		2.00
	0.12	0.47	0.44	1.19	1	1.34	0.72	1.93
	0.17	0.50		1.12		1.26		1.82
	0.29	0.55		1.02		1.14		1.66
	0.44	0.56	0.44	1.00	1	1.12	0.72	1.63
30°	—	0.8	0.39	0.76	1	0.78	0.63	1.24
	—	1.14	0.35	0.57	1	0.55	0.57	0.93

Static equivalent radial load
 $P_{or} = X_o F_r + Y_o F_a$

Contact angle	Single or DT		DB or DF	
	X _o	Y _o	X _o	Y _o
15°	0.5	0.46	1	0.92
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

Single or DT mounting When $P_{or} < F_r$, use $P_r = F_r$

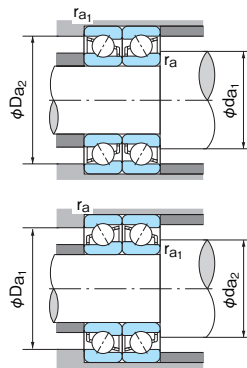
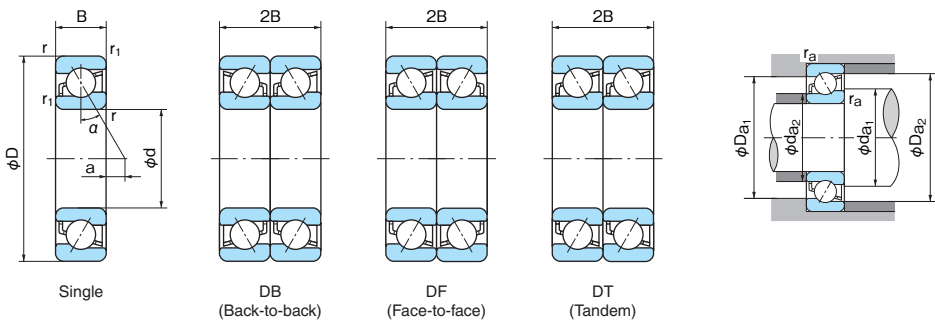
i = 2 for DB or DF mounting
i = 1 for Single or DT mounting
Single or DT mounting When $F_a/F_r \leq e$, use $P_r = F_r$

Boundary dimensions (mm)						Bearing No.				Basic dynamic load rating Cr (N)		Basic static load rating Cor (N)		Limiting speed (min ⁻¹)				Abutment and fillet dimensions (mm)						Mass (kg) Single	Bearing No.
d	D	B	r (min)	r ₁ (min)	a	Single	Duplex			Single	Duplex	Single	Duplex	Grease lubrication		Oil lubrication		d _{a1} (min)	d _{a2} (min)	D _{a1} (max)	D _{a2} (max)	r _a (max)	r _{a1} (max)		
80	125	22	1.1	0.6	18.6	7016	7016DB	7016DF	7016DT	53500	86500	50500	101000	4400	3500	5800	4600	86	86	119	121	1	0.6	0.925	7016
	125	22	1.1	0.6	0.8	7016C	7016CDB	7016CDF	7016CDT	59000	96000	55500	111000	7800	6200	11000	8800	86	86	119	121	1	0.6	0.925	7016C
	140	26	2	1	18.8	7216	7216DB	7216DF	7216DT	89000	145000	76500	153000	4000	3200	5400	4300	90	86	130	134	2	1	1.50	7216
	140	26	2	1	33.2	7216B	7216BDB	7216BDF	7216BDT	83500	135000	71500	143000	3600	2800	5000	4000	90	86	130	134	2	1	1.50	7216B
	140	26	2	1	-0.3	7216C	7216CDB	7216CDF	7216CDT	93500	152000	78000	156000	7300	5800	10000	8000	90	90	130	134	2	1	1.50	7216C
	170	39	2.1	1.1	16.6	7316	7316DB	7316DF	7316DT	147000	239000	119000	238000	3600	2800	4800	3800	92	87	158	163	2	1	4.18	7316
	170	39	2.1	1.1	33.0	7316B	7316BDB	7316BDF	7316BDT	139000	226000	112000	225000	3200	2500	4200	3400	92	87	158	163	2	1	4.18	7316B
85	130	22	1.1	0.6	20	7017	7017DB	7017DF	7017DT	54500	88500	53500	107000	4100	3300	5500	4400	91	91	124	126	1	0.6	0.960	7017
	130	22	1.1	0.6	1.4	7017C	7017CDB	7017CDF	7017CDT	60500	98500	59000	118000	7400	5900	10000	8000	91	91	124	126	1	0.6	0.960	7017C
	150	28	2	1	19.9	7217	7217DB	7217DF	7217DT	103000	167000	89500	179000	3800	3000	5000	4000	95	91	140	144	2	1	1.87	7217
	150	28	2	1	35.4	7217B	7217BDB	7217BDF	7217BDT	96500	159000	83500	168000	3400	2600	4500	3800	95	91	140	144	2	1	1.87	7217B
	150	28	2	1	-0.4	7217C	7217CDB	7217CDF	7217CDT	100000	163000	85000	170000	6800	5400	9400	7500	95	95	140	144	2	1	1.87	7217C
	180	41	3	1.1	17.7	7317	7317DB	7317DF	7317DT	159000	258000	133000	266000	3400	2600	4500	3600	99	92	166	173	2.5	1	4.90	7317
	180	41	3	1.1	35.2	7317B	7317BDB	7317BDF	7317BDT	150000	244000	125000	251000	3000	2400	4000	3200	99	92	166	173	2.5	1	4.90	7317B
90	140	24	1.5	1	21.2	7018	7018DB	7018DF	7018DT	65000	106000	63000	126000	3800	3200	5200	4200	97	97	133	135.6	1.5	1	1.26	7018
	140	24	1.5	1	1.3	7018C	7018CDB	7018CDF	7018CDT	72000	117000	69500	139000	7000	5600	9600	7800	97	97	133	135.6	1.5	1	1.26	7018C
	160	30	2	1	21.1	7218	7218DB	7218DF	7218DT	118000	191000	103000	206000	3500	2800	4700	3700	100	96	150	154	2	1	2.30	7218
	160	30	2	1	37.5	7218B	7218BDB	7218BDF	7218BDT	110000	179000	97000	194000	3200	2500	4300	3400	100	96	150	154	2	1	2.30	7218B
	160	30	2	1	-0.6	7218C	7218CDB	7218CDF	7218CDT	124000	201000	105000	211000	6400	5100	8800	7000	100	100	150	154	2	1	2.30	7218C
	190	43	3	1.1	18.9	7318	7318DB	7318DF	7318DT	171000	277000	147000	295000	3200	2600	4300	3400	104	97	176	183	2.5	1	5.76	7318
	190	43	3	1.1	37.3	7318B	7318BDB	7318BDF	7318BDT	161000	262000	139000	278000	2800	2300	3800	3000	104	97	176	183	2.5	1	5.76	7318B
95	140	24	1.5	1	22.6	7019	7019DB	7019DF	7019DT	67000	109000	66500	133000	3800	3100	5200	4200	102	102	138	140.6	1.5	1	1.36	7019
	145	24	1.5	1	1.9	7019C	7019CDB	7019CDF	7019CDT	74000	120000	73500	147000	6700	5400	9200	7400	102	102	138	140.6	1.5	1	1.36	7019C
	170	32	2.1	1.1	22.2	7219	7219DB	7219DF	7219DT	126000	205000	112000	225000	3400	2600	4500	3600	107	102	158	163	2	1	2.78	7219
	170	32	2.1	1.1	39.7	7219B	7219BDB	7219BDF	7219BDT	120000	195000	105000	210000	3000	2400	4000	3200	107	102	158	163	2	1	2.78	7219B
	170	32	2.1	1.1	-0.7	7219C	7219CDB	7219CDF	7219CDT	133000	217000	115000	230000	6000	4800	8300	6600	107	107	158	163	2	1	2.78	7219C
	200	45	3	1.1	20.1	7319	7319DB	7319DF	7319DT	183000	297000	163000	325000	3000	2400	4000	3200	109	102	186	193	2.5	1	6.68	7319
	200	45	3	1.1	39.5	7319B	7319BDB	7319BDF	7319BDT	172000	280000	153000	305000	2500	2200	3600	3000	109	102	186	193	2.5	1	6.68	7319B
95	200	45	3	1.1	-5.5	7319C	7319CDB	7319CDF	7319CDT	186000	300000	161000	320000	5400	4300	7500	6000	109	109	186	193	2.5	1	6.68	7319C

Remarks: 1. "a" means the distance between back face and load center.
2. See page 122 regarding limiting speeds.

Angular Contact Ball Bearings Single Mounting / Duplex Mounting

Bore Diameter: 100~120mm



Dynamic equivalent radial load
 $P_r = X F_r + Y F_a$

Contact angle	iFaCor	e	DB or DF					
			Single or DT		FaFr > e		FaFr ≤ e	
			X	Y	X	Y	X	Y
15°	0.015	0.38			1.47	1.65		2.39
	0.029	0.40	0.44	1.40	1	1.57	0.72	2.28
	0.058	0.43		1.30		1.46		2.11
	0.087	0.46		1.23		1.38		2.00
	0.12	0.47	0.44	1.19	1	1.34	0.72	1.93
	0.17	0.50		1.12		1.26		1.82
	0.29	0.55		1.02		1.14		1.66
	0.44	0.56	0.44	1.00	1	1.12	0.72	1.63
	0.58	0.56		1.00		1.12		1.63
	—	0.8	0.39	0.76	1	0.78	0.63	1.24
30°	—	1.14	0.35	0.57	1	0.55	0.57	0.93
40°	—	—	—	—	—	—	—	—

Static equivalent radial load
 $P_{0r} = X_0 F_r + Y_0 F_a$

Contact angle	X0	Y0	Single or DT		DB or DF	
			X0	Y0	X0	Y0
			X0	Y0	X0	Y0
15°	0.5	0.46	1	0.92	1	0.92
30°	0.5	0.33	1	0.66	1	0.66
40°	0.5	0.26	1	0.52	1	0.52

Single or DT mounting When $P_{0r} < P_r$, use $P_r = P_r$

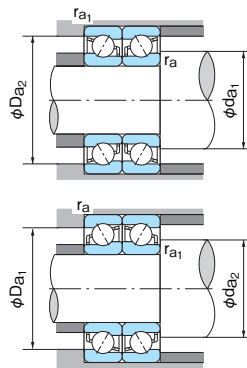
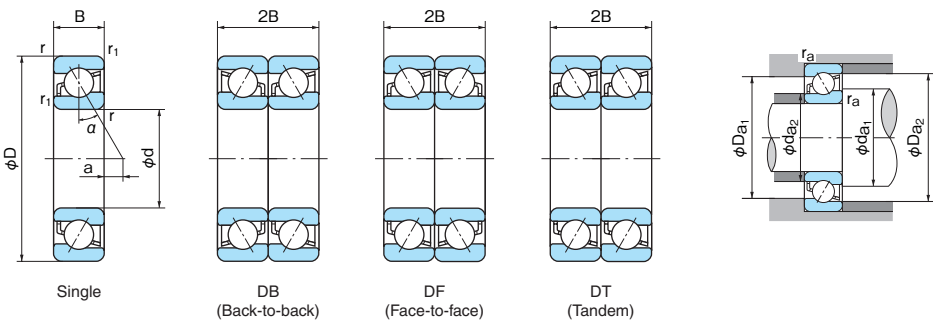
i = 2 for DB or DF mounting
i = 1 for Single or DT mounting
Single or DT mounting When $F_a/F_r \leq e$, use $P_r = P_r$

Boundary dimensions (mm)					Load center (mm) a	Bearing No.				Basic dynamic load rating Cr (N)		Basic static load rating Cor (N)	Limiting speed (min ⁻¹)				Abutment and fillet dimensions (mm)						Mass (kg) Single	Bearing No.		
d	D	B	r (min)	r1 (min)		Single	Duplex			Single	Duplex		Grease lubrication		Oil lubrication		da1 (min)	da2 (min)	Da1 (max)	Da2 (max)	ra (max)	ra1 (max)				
													Single	Duplex	Single	Duplex										
100	150	24	1.5	1	24.1	7020	7020DB	7020DF	7020DT	68500	111000		70500	141000	3600	2800	4800	3800	107	107	143	145.6	1.5	1	1.37	7020
	150	24	1.5	1	2.4	7020C	7020CDB	7020CDF	7020CDT	76000	123000		77500	156000	6400	5100	8800	7000	107	107	143	145.6	1.5	1	1.37	7020C
	180	34	2.1	1.1	23.4	7220	7220DB	7220DF	7220DT	144000	234000		126000	251000	3200	2400	4200	3400	112	107	168	173	2	1	3.32	7220
	180	34	2.1	1.1	41.8	7220B	7220BDB	7220BDF	7220BDT	135000	219000		118000	237000	2800	2200	3700	3000	112	107	168	173	2	1	3.32	7220B
	180	34	2.1	1.1	-0.8	7220C	7220CDB	7220CDF	7220CDT	150000	244000		128000	255000	5700	4600	7900	6300	112	112	168	173	2	1	3.32	7220C
	215	47	3	1.1	22.0	7320	7320DB	7320DF	7320DT	207000	335000		190000	380000	2800	2200	3800	3000	114	107	201	208	2.5	1	8.18	7320
	215	47	3	1.1	42.7	7320B	7320BDB	7320BDF	7320BDT	196000	320000		180000	360000	2400	2000	3300	2800	114	107	201	208	2.5	1	8.18	7320B
	215	47	3	1.1	-5.3	7320C	7320CDB	7320CDF	7320CDT	211000	340000		197000	385000	5100	4100	7000	5600	114	114	201	208	2.5	1	8.18	7320C
105	160	26	2	1	25.2	7021	7021DB	7021DF	7021DT	80000	130000		81500	163000	3300	2600	4400	3500	113	113	152	155	2	1	1.73	7021
	160	26	2	1	2.3	7021C	7021CDB	7021CDF	7021CDT	97000	158000		97500	195000	6000	4800	8300	6600	113	113	152	155	2	1	1.73	7021C
	190	36	2.1	1.1	24.6	7221	7221DB	7221DF	7221DT	157000	254000		141000	283000	3000	2400	4000	3200	117	112	178	183	2	1	3.93	7221
	190	36	2.1	1.1	44.0	7221B	7221BDB	7221BDF	7221BDT	147000	239000		135000	267000	2700	2100	3600	2900	117	112	178	183	2	1	3.93	7221B
	190	36	2.1	1.1	-0.9	7221C	7221CDB	7221CDF	7221CDT	163000	265000		144000	287000	5400	4300	7500	6000	117	117	178	183	2	1	3.93	7221C
	225	49	3	1.1	23.1	7321	7321DB	7321DF	7321DT	219000	355000		206000	410000	2700	2100	3600	2800	119	112	211	218	2.5	1	9.34	7321
	225	49	3	1.1	44.8	7321B	7321BDB	7321BDF	7321BDT	208000	335000		196000	390000	2400	1900	3200	2600	119	112	211	218	2.5	1	9.34	7321B
	225	49	3	1.1	-5.3	7321C	7321CDB	7321CDF	7321CDT	224000	365000		212000	425000	4800	3800	6700	5400	119	119	211	218	2.5	1	9.34	7321C
110	170	28	2	1	26.2	7022	7022DB	7022DF	7022DT	92000	149000		92500	185000	3200	2500	4300	3300	118	118	162	165	2	1	2.14	7022
	170	28	2	1	2.2	7022C	7022CDB	7022CDF	7022CDT	107000	173000		104000	209000	5700	4600	7900	6300	118	118	162	165	2	1	2.14	7022C
	200	38	2.1	1.1	25.7	7222	7222DB	7222DF	7222DT	170000	276000		158000	315000	2800	2200	3800	3000	122	117	188	193	2	1	4.62	7222
	200	38	2.1	1.1	46.1	7222B	7222BDB	7222BDF	7222BDT	159000	259000		149000	298000	2600	2000	3400	2800	122	117	188	193	2	1	4.62	7222B
	200	38	2.1	1.1	-1.0	7222C	7222CDB	7222CDF	7222CDT	171000	277000		157000	315000	5200	4200	7100	5700	122	122	188	193	2	1	4.62	7222C
	240	50	3	1.1	25.5	7322	7322DB	7322DF	7322DT	244000	395000		239000	480000	2600	2000	3400	2700	124	117	226	233	2.5	1	11.0	7322
	240	50	3	1.1	48.5	7322B	7322BDB	7322BDF	7322BDT	231000	375000		227000	455000	2200	1800	3000	2400	124	117	226	233	2.5	1	11.0	7322B
	240	50	3	1.1	-4.7	7322C	7322CDB	7322CDF	7322CDT	237000	385000		227000	455000	4600	3700	6300	5000	124	124	226	233	2.5	1	11.0	7322C
120	180	28	2	1	29.3	7024	7024DB	7024DF	7024DT	96500	157000		103000	206000	2900	2300	3800	3000	128	128	172	175	2	1	2.27	7024
	180	28	2	1	3.3	7024C	7024CDB	7024CDF	7024CDT	109000	178000		112000	223000	5300	4200	7300	5800	128	128	172	175	2	1	2.27	7024C
	215	40	2.1	1.1	28.4	7224	7224DB	7224DF	7224DT	182000	295000		180000	360000	2600	2100	3400	2700	132	127	203	208	2	1	6.05	7224
	215	40	2.1	1.1	50.3	7224B	7224BDB	7224BDF	7224BDT	170000	277000		169000	335000	2300	1900	3100	2500	132	127	203	208	2	1	6.05	7224B
	215	40	2.1	1.1	-0.6	7224C	7224CDB	7224CDF	7224CDT	185000	300000		176000	350000	4800	3800	6600	5300	132	132	203	208	2	1	6.05	7224C
	260	55	3	1.1	27.3	7324	7324DB	7324DF	7324DT	260000	420000		169000	540000	2200	1800	3000	2400	134	127	246	253	2.5	1	14.2	7324
	260	55	3	1.1	52.2	7324B	7324BDB	7324BDF	7324BDT	245000	400000		253000	505000	2100	1700	2800	2200	134	127	246	253	2.5	1	14.2	7324B

Remarks: 1. "a" means the distance between back face and load center.
2. See page 122 regarding limiting speeds.

Angular Contact Ball Bearings Single Mounting / Duplex Mounting

Bore Diameter: 130~160mm



Dynamic equivalent radial load
 $P_r = X F_r + Y F_a$

Contact angle	iFa Cor	e	Single or DT		DB or DF			
			Fa Fr		Fa Fr		Fa Fr	
			X	Y	X	Y	X	Y
15°	0.015	0.38			1.47	1.65		2.39
	0.029	0.40	0.44	1.40	1	1.57	0.72	2.28
	0.058	0.43		1.30		1.46		2.11
	0.087	0.46		1.23		1.38		2.00
	0.12	0.47	0.44	1.19	1	1.34	0.72	1.93
	0.17	0.50		1.12		1.26		1.82
	0.29	0.55		1.02		1.14		1.66
	0.44	0.56	0.44	1.00	1	1.12	0.72	1.63
	0.58	0.56		1.00		1.12		1.63
	—	0.8	0.39	0.76	1	0.78	0.63	1.24
30°	—	0.8	0.39	0.76	1	0.78	0.63	1.24
40°	—	1.14	0.35	0.57	1	0.55	0.57	0.93

Static equivalent radial load
 $P_0 = X_0 F_r + Y_0 F_a$

Contact angle	Single or DT		DB or DF	
	X ₀	Y ₀	X ₀	Y ₀
15°	0.5	0.46	1	0.92
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

Single or DT mounting When $P_0 < F_r$, use $P_r = F_r$

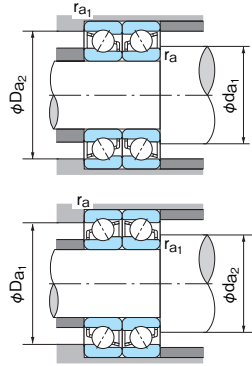
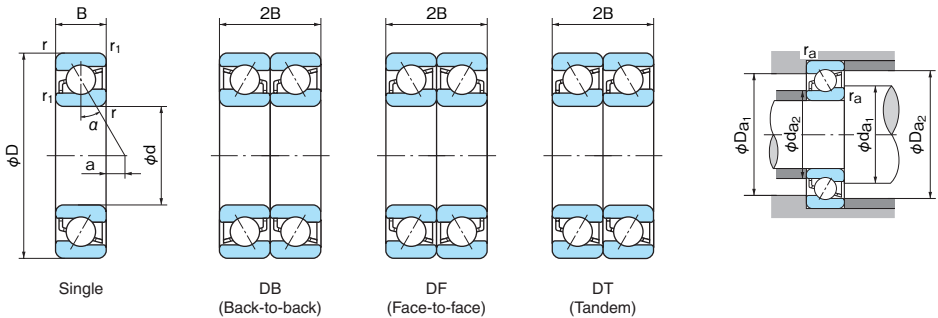
i = 2 for DB or DF mounting
i = 1 for Single or DT mounting
Single or DT mounting When $F_a/F_r \leq e$, use $P_r = F_r$

Boundary dimensions (mm)						Bearing No.				Basic dynamic load rating Cr (N)		Basic static load rating Cor (N)		Limiting speed (min ⁻¹)				Abutment and fillet dimensions (mm)						Mass (kg) Single	Bearing No.
d	D	B	r (min)	r ₁ (min)	a	Single	Duplex			Single	Duplex	Single	Duplex	Grease lubrication		Oil lubrication		d _{a1} (min)	d _{a2} (min)	D _{a1} (max)	D _{a2} (max)	r _a (max)	r _{a1} (max)		
130	200	33	2	1	31.1	7026	7026DB	7026DF	7026DT	117000	190000	125000	250000	2600	2200	3600	2700	138	138	192	195	2	1	3.43	7026
	200	33	2	1	2.5	7026C	7026CDB	7026CDF	7026CDT	130000	211000	138000	276000	4800	3800	6700	5400	138	138	192	195	2	1	3.43	7026C
	230	40	3	1.1	32	7226	7226DB	7226DF	7226DT	196000	320000	198000	395000	2400	1900	3100	2500	144	137	216	223	2.5	1	6.88	7226
	230	40	3	1.1	55.5	7226B	7226BDB	7226BDF	7226BDT	184000	298000	185000	370000	2100	1700	2800	2300	144	137	216	223	2.5	1	6.88	7226B
	230	40	3	1.1	0.9	7226C	7226CDB	7226CDF	7226CDT	214000	350000	216000	430000	4400	3500	6100	4900	144	144	216	223	2.5	1	6.88	7226C
	280	58	4	1.5	30.2	7326	7326DB	7326DF	7326DT	300000	490000	330000	660000	2200	1700	2900	2200	148	139	262	271	3	1.5	17.4	7326
	280	58	4	1.5	57.0	7326B	7326BDB	7326BDF	7326BDT	284000	460000	310000	620000	1900	1500	2600	2000	148	139	262	271	3	1.5	17.4	7326B
140	210	33	2	1	34	7028	7028DB	7028DF	7028DT	120000	194000	133000	265000	2400	1900	3300	2600	148	148	202	205	2	1	3.63	7028
	210	33	2	1	3.7	7028C	7028CDB	7028CDF	7028CDT	133000	216000	146000	292000	4600	3700	6300	5000	148	148	202	205	2	1	3.63	7028C
	250	42	3	1.1	35.3	7228	7228DB	7228DF	7228DT	211000	345000	228000	525000	2200	1800	3000	2400	154	147	236	243	2.5	1	8.78	7228
	250	42	3	1.1	60.8	7228B	7228BDB	7228BDF	7228BDT	197000	320000	214000	425000	2000	1600	2600	2200	154	147	236	243	2.5	1	8.78	7228B
	250	42	3	1.1	1.3	7228C	7228CDB	7228CDF	7228CDT	223000	360000	235000	470000	4100	3300	5600	4500	154	154	236	243	2.5	1	8.78	7228C
	300	62	4	1.5	32.5	7328	7328DB	7328DF	7328DT	300000	490000	335000	670000	2000	1600	2600	2000	158	149	282	291	3	1.5	21.5	7328
	300	62	4	1.5	61.3	7328B	7328BDB	7328BDF	7328BDT	284000	460000	315000	635000	1700	1400	2400	1900	158	149	282	291	3	1.5	21.5	7328B
150	225	35	2.1	1.1	36.6	7030	7030DB	7030DF	7030DT	137000	222000	154000	305000	2300	1800	3000	2400	159	159	216	219	2	1	4.42	7030
	225	35	2.1	1.1	4.1	7030C	7030CDB	7030CDF	7030CDT	152000	247000	169000	340000	4300	3400	5900	4700	159	159	216	219	2	1	4.42	7030C
	270	45	3	1.1	38.1	7230	7230DB	7230DF	7230DT	249000	405000	280000	560000	2000	1600	2800	2200	164	157	256	263	2.5	1	11.0	7230
	270	45	3	1.1	65.6	7230B	7230BDB	7230BDF	7230BDT	223000	360000	246000	490000	1800	1500	2600	2000	164	157	256	263	2.5	1	11.0	7230B
	270	45	3	1.1	1.5	7230C	7230CDB	7230CDF	7230CDT	261000	425000	287000	575000	3800	3000	5200	4200	164	164	256	263	2.5	1	11.0	7230C
	320	65	4	1.5	35.3	7330	7330DB	7330DF	7330DT	330000	535000	380000	765000	1700	1400	2400	1800	168	159	302	311	3	1.5	25.1	7330
	320	65	4	1.5	66.1	7330B	7330BDB	7330BDF	7330BDT	310000	505000	360000	725000	1500	1300	2200	1600	168	159	302	311	3	1.5	25.1	7330B
160	240	38	2.1	1.1	38.7	7032	7032DB	7032DF	7032DT	155000	252000	176000	350000	2100	1700	2800	2300	169	169	231	234	2	1	5.44	7032
	240	38	2.1	1.1	4.1	7032C	7032CDB	7032CDF	7032CDT	172000	280000	194000	390000	4000	3200	5500	4400	169	169	231	234	2	1	5.44	7032C
	290	48	3	1.1	41.0	7232	7232DB	7232DF	7232DT	263000	425000	305000	615000	1900	1500	2600	2000	174	167	276	283	2.5	1	13.7	7232
	290	48	3	1.1	70.4	7232B	7232BDB	7232BDF	7232BDT	246000	400000	287000	575000	1700	1400	2200	1800	174	167	276	283	2.5	1	13.7	7232B
	290	48	3	1.1	2.4	7232C	7232CDB	7232CDF	7232CDT	288000	470000	335000	670000	3600	2900	4900	3900	174	167	276	283	2.5	1	13.7	7232C
	340	68	4	1.5	38.2	7332	7332DB	7332DF	7332DT	345000	565000	420000	845000	1700	1400	2200	1800	178	169	322	331	3	1.5	30.2	7332
	340	68	4	1.5	70.9	7332B	7332BDB	7332BDF	7332BDT	325000	530000	395000	795000	1500	1200	2000	1600	178	169	322	331	3	1.5	30.2	7332B

Remarks: 1. "a" means the distance between back face and load center.
2. See page 122 regarding limiting speeds.

Angular Contact Ball Bearings Single Mounting / Duplex Mounting

Bore Diameter: 170~200mm



Dynamic equivalent radial load
Pr=XFr+YFa

Contact angle	iFa Cor	e	Single or DT		DB or DF			
			Fa Fr		Fa Fr		Fa Fr	
			X	Y	X	Y	X	Y
15°	0.015	0.38			1.47	1.65		2.39
	0.029	0.40	0.44	1.40	1	1.57	0.72	2.28
	0.058	0.43		1.30		1.46		2.11
	0.087	0.46		1.23		1.38		2.00
	0.12	0.47	0.44	1.19	1	1.34	0.72	1.93
	0.17	0.50		1.12		1.26		1.82
	0.29	0.55		1.02		1.14		1.66
	0.44	0.56	0.44	1.00	1	1.12	0.72	1.63
30°	—	0.8	0.39	0.76	1	0.78	0.63	1.24
	—	1.14	0.35	0.57	1	0.55	0.57	0.93

Static equivalent radial load
Por=XoFr+YoFa

Contact angle	Single or DT		DB or DF	
	Xo	Yo	Xo	Yo
15°	0.5	0.46	1	0.92
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

Single or DT mounting When Por<Fr, use Pr = Fr

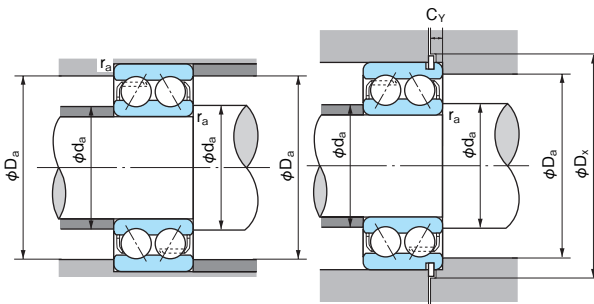
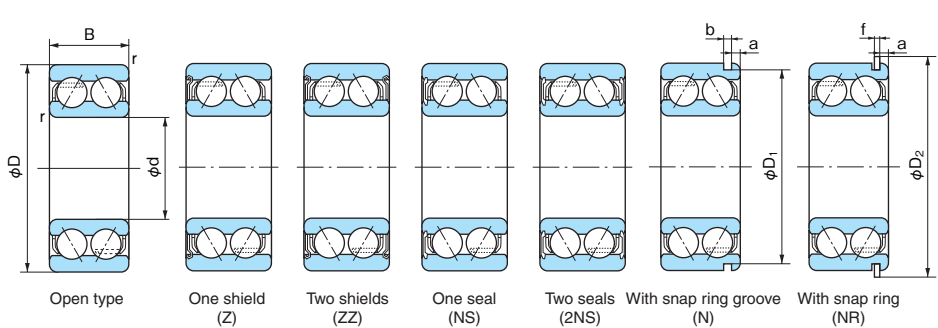
i = 2 for DB or DF mounting
i = 1 for Single or DT mounting
Single or DT mounting When Fa/Fr≤e, use Pr = Fr

Boundary dimensions (mm)					Load center (mm) a	Bearing No.				Basic dynamic load rating Cr (N)		Basic static load rating Cor (N)	Limiting speed (min ⁻¹)				Abutment and fillet dimensions (mm)						Mass (kg) Single	Bearing No.		
d	D	B	r (min)	r1 (min)		Single	Duplex			Single	Duplex		Grease lubrication		Oil lubrication		d _{a1} (min)	d _{a2} (min)	Da ₁ (max)	Da ₂ (max)	ra (max)	ra ₁ (max)				
													Single	Duplex	Single	Duplex										
170	260	42	2.1	1.1	41.1	7034	7034DB	7034DF	7034DT	179000	291000		210000	420000	2000	1600	2600	2100	179	179	251	254	2	1	7.87	7034
	260	42	2.1	1.1	3.8	7034C	7034CDB	7034CDF	7034CDT	206000	335000		236000	470000	3700	3000	5100	4100	179	179	251	254	2	1	7.87	7034C
	310	52	4	1.5	43.3	7234	7234DB	7234DF	7234DT	272000	440000		330000	660000	1800	1400	2400	1900	188	179	292	301	3	1.5	17.4	7234
	310	52	4	1.5	74.7	7234B	7234BDB	7234BDF	7234BDT	254000	410000		310000	620000	1600	1300	2200	1700	188	179	292	301	3	1.5	17.4	7234B
	310	52	4	1.5	2.2	7234C	7234CDB	7234CDF	7234CDT	299000	485000		360000	725000	3300	2600	4600	3700	188	179	292	301	3	1.5	17.4	7234C
	360	72	4	1.5	40.5	7334	7334DB	7334DF	7334DT	390000	630000		485000	970000	1600	1300	2200	1700	188	179	342	351	3	1.5	35.7	7334
	360	72	4	1.5	75.2	7334B	7334BDB	7334BDF	7334BDT	365000	595000		460000	915000	1400	1100	2000	1600	188	179	342	351	3	1.5	35.7	7334B
180	280	46	2.1	1.1	43.4	7036	7036DB	7036DF	7036DT	207000	335000		252000	505000	1900	1500	2500	2000	189	189	271	274	2	1	9.98	7036
	280	46	2.1	1.1	3.5	7036C	7036CDB	7036CDF	7036CDT	235000	385000		290000	580000	3500	2800	4800	3800	189	189	271	274	2	1	9.98	7036C
	320	52	4	1.5	46.2	7236	7236DB	7236DF	7236DT	281000	455000		350000	705000	1700	1300	2200	1800	198	189	302	311	3	1.5	19.9	7236
	320	52	4	1.5	48.9	7236B	7236BDB	7236BDF	7236BDT	262000	425000		330000	660000	1500	1200	2000	1700	198	189	302	311	3	1.5	19.9	7236B
	320	52	4	1.5	3.3	7236C	7236CDB	7236CDF	7236CDT	310000	500000		385000	775000	3200	2600	4400	3500	198	189	302	311	3	1.5	19.9	7236C
	380	75	4	1.5	43.3	7336	7336DB	7336DF	7336DT	410000	665000		535000	1070000	1400	1200	2000	1600	198	189	362	371	3	1.5	41.3	7336
	380	75	4	1.5	80.0	7336B	7336BDB	7336BDF	7336BDT	385000	625000		505000	1010000	1300	1100	1900	1500	198	189	362	371	3	1.5	41.3	7336B
190	290	46	2.1	1.1	46.3	7038	7038DB	7038DF	7038DT	218000	355000		277000	555000	1800	1400	2300	1900	199	199	281	284	2	1	10.7	7038
	290	46	2.1	1.1	4.7	7038C	7038CDB	7038CDF	7038CDT	248000	405000		310000	615000	3300	2600	4600	3700	199	199	281	284	2	1	10.7	7038C
	340	55	4	1.5	49.0	7238	7238DB	7238DF	7238DT	315000	510000		410000	825000	1600	1300	2200	1700	208	199	322	331	3	1.5	21.5	7238
	340	55	4	1.5	83.7	7238B	7238BDB	7238BDF	7238BDT	294000	475000		385000	770000	1400	1100	2000	1600	208	199	322	331	3	1.5	21.5	7238B
	400	78	5	2	46.1	7338	7338DB	7338DF	7338DT	445000	725000		610000	1220000	1400	1100	1900	1500	212	200	378	390	4	2	47.6	7338
	400	78	5	2	84.8	7338B	7338BDB	7338BDF	7338BDT	420000	680000		575000	1150000	1300	1000	1800	1400	212	200	378	390	4	2	47.6	7338B
200	310	51	2.1	1.1	48.1	7040	7040DB	7040DF	7040DT	226000	365000		277000	565000	1700	1300	2200	1800	209	209	301	304	2	1	13.8	7040
	310	51	2.1	1.1	3.9	7040C	7040CDB	7040CDF	7040CDT	274000	445000		360000	715000	3100	2500	4300	3400	209	209	301	304	2	1	13.8	7040C
	360	58	4	1.5	51.8	7240	7240DB	7240DF	7240DT	335000	550000		450000	900000	1500	1200	2000	1600	218	209	342	351	3	1.5	25.5	7240
	360	58	4	1.5	88.5	7240B	7240BDB	7240BDF	7240BDT	315000	510000		420000	840000	1300	1000	1900	1500	218	209	342	351	3	1.5	25.5	7240B
	420	80	5	2	49.5	7340	7340DB	7340DF	7340DT	475000	770000		655000	1310000	1300	1100	1800	1400	222	210	398	410	4	2	53.7	7340
	420	80	5	2	90.1	7340B	7340BDB	7340BDF	7340BDT	445000	725000		620000	1240000	1200	1000	1700	1300	222	210	398	410	4	2	53.7	7340B

Remarks: 1. "a" means the distance between back face and load center.
2. See page 122 regarding limiting speeds.

Double-row Angular Contact Ball Bearings

Bore Diameter: 10~45mm



Dynamic equivalent radial load
 $P_r = X F_r + Y F_a$

Contact angle	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
30°	0.80	1.0	0.78	0.63	1.24
20°	0.57	1.0	1.09	0.70	1.63

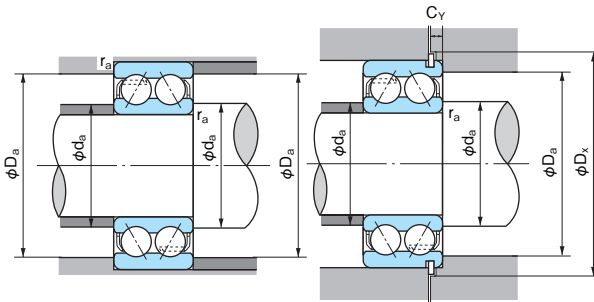
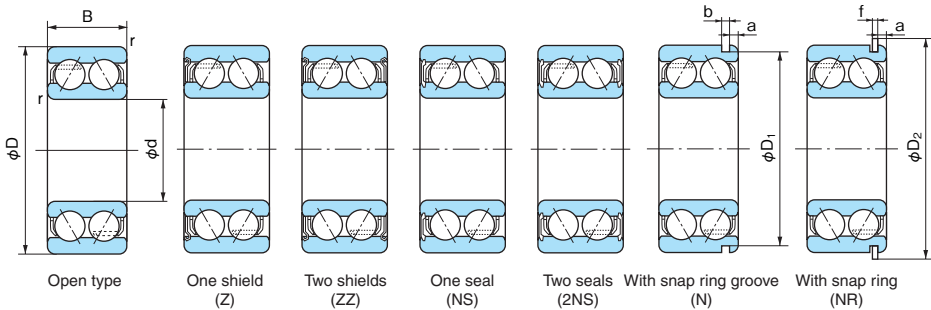
Static equivalent radial load
Nominal contact angle 30° : $P_0 = F_r + 0.66 F_a$
Nominal contact angle 20° : $P_0 = F_r + 0.84 F_a$

Boundary dimensions (mm)				Bearing No.							Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min ⁻¹)		Dimensions of snap ring groove and snap ring (mm)						Abutment and fillet dimensions (mm)					Mass (kg)	Bearing No.	
d	D	B	r (min)	Open type	Shield type		Seal type		With snap ring groove	With snap ring			Grease lubrication	Oil lubrication	D ₁ (max)	a (max)	b (min)	D ₂ (max)	f (max)	d _a (min)	D _a (max)	D _x (min)	r _a (max)	C _γ (max)				
10	30	14.3	0.6	5200	5200Z	5200ZZ	5200NS	5200-2NS	5200N	5200NR	7300	4000			18000	24000	28.17	2.06	1.35	34.7	1.12	15	25	35.5	0.6	2.9	0.050	5200
	30	14.3	0.6	5200A	5200AZ	5200AZZ	5200ANS	5200A-2NS	5200AN	5200ANR	6950	3800			16000	22000	28.17	2.06	1.35	34.7	1.12	15	25	35.5	0.6	2.9	0.050	5200A
12	32	15.9	0.6	5201	5201Z	5201ZZ	5201NS	5201-2NS	5201N	5201NR	10700	5950			16000	22000	30.15	2.06	1.35	36.7	1.12	17	27	37.5	0.6	2.9	0.060	5201
	32	15.9	0.6	5201A	5201AZ	5201AZZ	5201ANS	5201A-2NS	5201AN	5201ANR	10300	5650			15000	20000	30.15	2.06	1.35	36.7	1.12	17	27	37.5	0.6	2.9	0.060	5201A
15	35	15.9	0.6	5202	5202Z	5202ZZ	5202NS	5202-2NS	5202N	5202NR	11900	7200			14000	19000	33.17	2.06	1.35	39.7	1.12	20	30	40.5	0.6	2.9	0.070	5202
	35	15.9	0.6	5202A	5202AZ	5202AZZ	5202ANS	5202A-2NS	5202AN	5202ANR	11400	6850			12000	17000	33.17	2.06	1.35	39.7	1.12	20	30	40.5	0.6	2.9	0.070	5202A
17	40	17.5	0.6	5203	5203Z	5203ZZ	5203NS	5203-2NS	5203N	5203NR	15000	9250			12000	17000	38.1	2.06	1.35	44.6	1.12	22	35	45.5	0.6	2.9	0.090	5203
	40	17.5	0.6	5203A	5203AZ	5203AZZ	5203ANS	5203A-2NS	5203AN	5203ANR	14200	8800			11000	15000	38.1	2.06	1.35	44.6	1.12	22	35	45.5	0.6	2.9	0.090	5203A
	47	22.2	1	5303	—	—	—	—	5303N	5303NR	21300	12700			10000	14000	44.6	2.46	1.35	52.7	1.12	23	41	53.5	1	3.3	0.140	5303
20	47	20.6	1	5204	5204Z	5204ZZ	5204NS	5204-2NS	5204N	5204NR	20000	12700			10000	14000	44.6	2.46	1.35	52.7	1.12	26	41	53.5	1	3.3	0.120	5204
	47	20.6	1	5204A	5204AZ	5204AZZ	5204ANS	5204A-2NS	5204AN	5204ANR	19000	12100			9500	13000	44.6	2.46	1.35	52.7	1.12	26	41	53.5	1	3.3	0.120	5204A
	52	22.2	1.1	5304	—	—	—	—	5304N	5304NR	21700	13300			9000	11000	49.73	2.46	1.35	57.9	1.12	27	45	58.5	1	3.3	0.230	5304
25	52	20.6	1	5205	5205Z	5205ZZ	5205NS	5205-2NS	5205N	5205NR	21800	15100			9500	13000	49.73	2.46	1.35	57.9	1.12	31	46	58.5	1	3.3	0.190	5205
	52	20.6	1	5205A	5205AZ	5205AZZ	5205ANS	5205A-2NS	5205AN	5205ANR	20600	14300			8000	11000	49.73	2.46	1.35	57.9	1.12	31	46	58.8	1	3.3	0.190	5205A
	62	25.4	1.1	5305	—	—	—	—	5305N	5305NR	32000	21600			7300	10000	59.61	3.28	1.9	67.7	1.7	32	55	68.5	1	4.7	0.340	5305
30	62	23.8	1	5206	—	—	—	—	5206N	5206NR	30500	21700			8000	11000	59.61	3.28	1.9	67.7	1.7	36	56	68.5	1	4.7	0.290	5206
	62	23.8	1	—	5206Z	5206ZZ	5206NS	5206-2NS	—	—	25900	18700			8000	—	—	—	—	—	36	56	—	1	—	0.290	5206Z	
	62	23.8	1	5206A	—	—	—	—	5206AN	5206ANR	28600	20500			7000	9500	59.61	3.28	1.9	67.7	1.7	36	56	68.5	1	4.7	0.290	5206A
	62	23.8	1	—	5206AZ	5206AZZ	5206ANS	5206A-2NS	—	—	24400	17700			7000	—	—	—	—	—	36	56	—	1	—	0.290	5206AZ	
	72	30.2	1.1	5306	—	—	—	—	5306N	5306NR	41500	29000			7000	9500	68.81	3.28	1.9	78.6	1.7	37	65	80	1	4.7	0.510	5306
35	72	27	1.1	5207	—	—	—	—	5207N	5207NR	40000	29500			7000	9500	68.81	3.28	1.9	78.6	1.7	42	65	80	1	4.7	0.430	5207
	72	27	1.1	—	5207Z	5207ZZ	5207NS	5207-2NS	—	—	35000	25900			7000	—	—	—	—	—	42	65	—	1	—	0.430	5207Z	
	72	27	1.1	5207A	—	—	—	—	5207AN	5207ANR	38000	27700			6000	8000	68.81	3.28	1.9	78.6	1.7	42	65	80	1	4.7	0.430	5207A
	72	27	1.1	—	5207AZ	5207AZZ	5207ANS	5207A-2NS	—	—	33000	24500			6000	—	—	—	—	—	42	65	—	1	—	0.430	5207AZ	
	80	34.9	1.5	5307	—	—	—	—	5307N	5307NR	52000	37000			6300	8500	76.81	3.28	1.9	86.6	1.7	44	71	88	1.5	4.7	0.790	5307
40	80	30.2	1.1	5208	—	—	—	—	5208N	5208NR	45500	34000			6000	8000	76.81	3.28	1.9	86.6	1.7	47	73	88	1	4.7	0.570	5208
	80	30.2	1.1	—	5208Z	5208ZZ	5208NS	5208-2NS	—	—	40000	30500			6000	—	—	—	—	—	47	73	—	1	—	0.570	5208Z	
	80	30.2	1.1	5208A	—	—	—	—	5208AN	5208ANR	42500	32500			5300	7200	76.81	3.28	1.9	86.6	1.7	47	73	88	1	4.7	0.570	5208A
	80	30.2	1.1	—	5208AZ	5208AZZ	5208ANS	5208A-2NS	—	—	37500	28700			5300	—	—	—	—	—	47	73	—	1	—	0.570	5208AZ	
	90	36.5	1.5	5308	—	—	—	—	5308N	5308NR	63500	46500			5500	7500	86.79	3.28	2.7	96.5	2.46	49	81	98	1.5	5.4	1.05	5308
45	85	30.2	1.1	5209	—	—	—	—	5209N	5209NR	51000	39000			5500	7500	81.81	3.28	1.9	91.6	1.7	52	78	93	1	4.7	0.620	5209
	85	30.2	1.1	—	5209Z	5209ZZ	5209NS	5209-2NS	—	—	42500	34500			5500	—	—	—	—	—	52	78	—	1	—	0.620	5209Z	
	85	30.2	1.1	5209A	—	—	—	—	5209AN	5209ANR	48000	37000			5000	6700	81.81	3.28	1.9	91.6	1.7	52	78	93	1	4.7	0.620	5209A
	85	30.2	1.1	—	5209AZ	5209AZZ	5209ANS	5209A-2NS	—	—	40000	32500			5000	—	—	—	—	—	52	78	—	1	—	0.620	5209AZ	
	100	39.7	1.5	5309	—	—	—	—	5309N	5309NR	76500	56500			5000	6700	96.8	3.28	2.7	106.5	2.46	54	91	108	1.5	5.4	1.42	5309

Remark: Dimensions and tolerances of snap ring groove and snap ring are shown on pages 45 to 48.

Double-row Angular Contact Ball Bearings

Bore Diameter: 50~85mm



Dynamic equivalent radial load
 $P_r = X F_r + Y F_a$

Contact angle	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
30°	0.80	1.0	0.78	0.63	1.24
20°	0.57	1.0	1.09	0.70	1.63

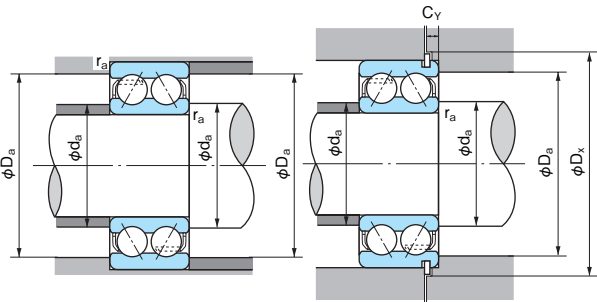
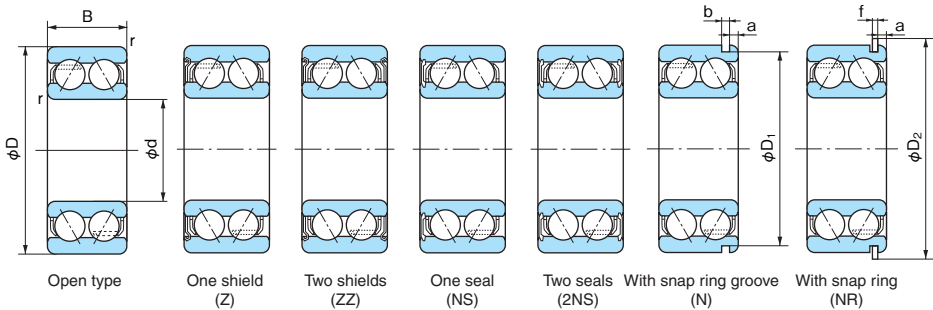
Static equivalent radial load
Nominal contact angle 30° : $P_{or} = F_r + 0.66 F_a$
Nominal contact angle 20° : $P_{or} = F_r + 0.84 F_a$

Boundary dimensions (mm)				Bearing No.						Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min ⁻¹)	Dimensions of snap ring groove and snap ring (mm)						Abutment and fillet dimensions (mm)						Mass (kg)	Bearing No.
d	D	B	r (min)	Open type	Shield type		Seal type		With snap ring groove	With snap ring			Grease lubrication	Oil lubrication	D ₁ (max)	a (max)	b (min)	D ₂ (max)	f (max)	d _a (min)	D _a (max)	D _x (min)	r _a (max)	C _γ (max)		
50	90	30.2	1.1	5210	—	—	—	—	5210N	5210NR	54500	44500	5000	6700	86.79	3.28	2.7	96.5	2.46	57	83	98	1	5.4	0.670	5210
	90	30.2	1.1	—	5210Z	5210ZZ	5210NS	5210-2NS	—	—	45000	39000	5000	—	—	—	—	—	—	57	83	—	1	—	0.670	5210Z
	90	30.2	1.1	5210A	—	—	—	—	5210AN	5210ANR	51000	42000	4500	6000	86.79	3.28	2.7	96.5	2.46	57	83	98	1	5.4	0.670	5210A
	90	30.2	1.1	—	5210AZ	5210AZZ	5210ANS	5210A-2NS	—	—	42000	36500	4500	—	—	—	—	—	—	57	83	—	1	—	0.670	5210AZ
	110	44.4	2	5310	—	—	—	—	5310N	5310NR	90000	68000	4500	6000	106.81	3.28	2.7	116.6	2.46	60	100	118	2	5.4	1.93	5310
55	100	33.3	1.5	5211	—	—	—	—	5211N	5211NR	67500	56500	4500	6300	96.8	3.28	2.7	106.5	2.46	64	91	108	1.5	5.4	0.960	5211
	100	33.3	1.5	—	5211Z	5211ZZ	—	—	—	—	57500	50500	4500	—	—	—	—	—	—	64	91	—	1.5	—	0.960	5211Z
	100	33.3	1.5	5211A	—	—	—	—	5211AN	5211ANR	63500	53000	4000	5500	96.8	3.28	2.7	106.5	2.46	64	91	108	1.5	5.4	0.960	5211A
	100	33.3	1.5	—	5211AZ	5211AZZ	—	—	—	—	54000	47500	4000	—	—	—	—	—	—	64	91	—	1.5	—	0.960	5211AZ
	120	49.2	2	5311	—	—	—	—	5311N	5311NR	112000	86500	4000	5500	115.21	4.06	3.1	129.7	2.82	65	110	131.5	2	6.5	2.30	5311
60	110	36.5	1.5	5212	—	—	—	—	5212N	5212NR	76000	62000	4300	5600	106.81	3.28	2.7	116.6	2.46	69	101	118	1.5	5.4	1.36	5212
	110	36.5	1.5	—	5212Z	5212ZZ	—	—	—	—	67000	57500	4300	—	—	—	—	—	—	69	101	—	1.5	—	1.36	5212Z
	110	36.5	1.5	5212A	—	—	—	—	5212AN	5212ANR	71500	58500	3800	5000	106.81	3.28	2.7	116.6	2.46	69	101	118	1.5	5.4	1.36	5212A
	110	36.5	1.5	—	5212AZ	5212AZZ	—	—	—	—	63000	54000	3800	—	—	—	—	—	—	69	101	—	1.5	—	1.36	5212AZ
	130	54	2.1	5312	—	—	—	—	5312N	5312NR	128000	101000	3800	5000	125.22	4.06	3.1	139.7	2.82	72	118	141.5	2	6.5	3.16	5312
65	120	38.1	1.5	5213	—	—	—	—	5213N	5213NR	89000	77000	3900	5300	115.21	4.06	3.1	129.7	2.82	74	111	131.5	1.5	6.5	1.66	5213
	120	38.1	1.5	—	5213Z	5213ZZ	—	—	—	—	78500	71000	3900	—	—	—	—	—	—	74	111	—	1.5	—	1.66	5213Z
	120	38.1	1.5	5213A	—	—	—	—	5213AN	5213ANR	83500	72500	3400	4600	115.21	4.06	3.1	129.7	2.82	74	111	131.5	1.5	6.5	1.66	5213A
	120	38.1	1.5	—	5213AZ	5213AZZ	—	—	—	—	73500	66500	3400	—	—	—	—	—	—	74	111	—	1.5	—	1.66	5213AZ
	140	58.7	2.1	5313	—	—	—	—	5313N	5313NR	145000	115000	3600	4700	135.23	4.9	3.1	149.7	2.82	77	128	152	2	7.4	3.86	5313
70	125	39.7	1.5	5214	—	—	—	—	5214N	5214NR	96500	84500	3800	5000	120.22	4.06	3.1	134.7	2.82	79	116	136.5	1.5	6.5	1.82	5214
	125	39.7	1.5	—	5214Z	5214ZZ	—	—	—	—	86000	79000	3800	—	—	—	—	—	—	79	116	—	1.5	—	1.82	5214Z
	125	39.7	1.5	5214A	—	—	—	—	5214AN	5214ANR	90500	79500	3200	4500	120.22	4.06	3.1	134.7	2.82	79	116	136.5	1.5	6.5	1.82	5214A
	125	39.7	1.5	—	5214AZ	5214AZZ	—	—	—	—	80500	74000	3200	—	—	—	—	—	—	79	116	—	1.5	—	1.82	5214AZ
	150	63.5	2.1	5314	—	—	—	—	5314N	5314NR	163000	132000	3200	4300	145.24	4.9	3.1	159.7	2.82	82	138	162	2	7.4	4.88	5314
75	130	41.3	1.5	5215	—	—	—	—	5215N	5215NR	96000	85500	3400	4700	125.22	4.06	3.1	139.7	2.82	84	121	141.5	1.5	6.5	1.91	5215
	130	41.3	1.5	—	5215Z	5215ZZ	—	—	—	—	94000	87000	3400	—	—	—	—	—	—	84	121	—	1.5	—	1.91	5215Z
	130	41.3	1.5	5215A	—	—	—	—	5215AN	5215ANR	90000	80500	3200	4300	125.22	4.06	3.1	139.7	2.82	84	121	141.5	1.5	6.5	1.91	5215A
	130	41.3	1.5	—	5215AZ	5215AZZ	—	—	—	—	88000	81500	3200	—	—	—	—	—	—	84	121	—	1.5	—	1.91	5215AZ
	160	68.3	2.1	5315	—	—	—	—	5315N	5315NR	178000	149000	3000	4000	155.22	4.9	3.1	169.7	2.82	87	148	172	2	7.4	5.51	5315
80	140	44.4	2	5216	—	—	—	—	5216N	5216NR	104000	94000	3500	4600	135.23	4.9	3.1	149.7	2.82	90	130	152	2	7.4	2.48	5216
	140	44.4	2	5216A	—	—	—	—	5216AN	5216ANR	97500	88500	2800	4000	135.23	4.9	3.1	149.7	2.82	90	130	152	2	7.4	2.48	5216A
	170	68.3	2.1	5316	—	—	—	—	5316N	5316NR	192000	167000	2800	4000	163.65	5.69	3.5	182.9	3.1	92	158	185	2	8.4	6.81	5316
85	150	49.2	2	5217	—	—	—	—	5217N	5217NR	112000	103000	3000	4000	145.24	4.9	3.1	159.7	2.82	95	140	162	2	7.4	3.40	5217
	150	49.2	2	5217A	—	—	—	—	5217AN	5217ANR	105000	96500	2600	3800	145.24	4.9	3.1	159.7	2.82	95	140	162	2	7.4	3.40	5217A

Remark: Dimensions and tolerances of snap ring groove and snap ring are shown on pages 45 to 48.

Double-row Angular Contact Ball Bearings

Bore Diameter: 90~100mm



Dynamic equivalent radial load
 $P_r = X F_r + Y F_a$

Contact angle	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
30°	0.80	1.0	0.78	0.63	1.24
20°	0.57	1.0	1.09	0.70	1.63

Static equivalent radial load
Nominal contact angle 30° : $P_{or} = F_r + 0.66 F_a$
Nominal contact angle 20° : $P_{or} = F_r + 0.84 F_a$

Boundary dimensions (mm)				Bearing No.						Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min ⁻¹)		Dimensions of snap ring groove and snap ring (mm)					Abutment and fillet dimensions (mm)					Mass (kg)	Bearing No.	
d	D	B	r (min)	Open type	Shield type	Seal type	With snap ring groove	With snap ring			Grease lubrication	Oil lubrication	D ₁ (max)	a (max)	b (min)	D ₂ (max)	f (max)	d _a (min)	D _a (max)	D _x (min)	r _a (max)	C _Y (max)				
90	160	52.4	2	5218	—	—	—	—	5218N	5218NR	138000	133000	2700	3900	155.22	4.9	3.1	169.7	2.82	100	150	172	2	7.4	4.28	5218
	160	52.4	2	5218A	—	—	—	—	5218AN	5218ANR	129000	125000	2500	3500	155.22	4.9	3.1	169.7	2.82	100	150	172	2	7.4	4.28	5218A
95	170	55.6	2.1	5219	—	—	—	—	5219N	5219NR	149000	139000	2600	3700	163.65	5.69	3.5	182.9	3.1	107	158	185	2	8.4	5.02	5219
	170	55.6	2.1	5219A	—	—	—	—	5219AN	5219ANR	139000	131000	2400	3200	163.65	5.69	3.5	182.9	3.1	107	158	185	2	8.4	5.02	5219A
100	180	60.3	2.1	5220	—	—	—	—	5220N	5220NR	168000	159000	2400	3200	173.66	5.69	3.5	192.9	3.1	112	168	195	2	8.4	5.78	5220
	180	60.3	2.1	5220A	—	—	—	—	5220AN	5220ANR	158000	150000	2200	3000	173.66	5.69	3.5	192.9	3.1	112	168	195	2	8.4	5.78	5220A

Remark: Dimensions and tolerances of snap ring groove and snap ring are shown on pages 45 to 48.

Self-aligning Ball Bearings

Tolerance	Page 52
Internal clearance	Page 64
Adapter sleeves	Page 592
Withdrawal sleeves	Page 592



● Design

Self-aligning Ball Bearings are particularly suitable for applications where misalignment occurs from errors in mounting or from shaft deflection.

For applications where the bearing load (particularly axial load) carrying capacity is insufficient, spherical roller bearings, which have the same self-aligning property, should be used instead.

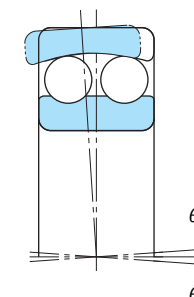
● Cage

Bearings are fitted with pressed steel cage or polyamide cage.

The suffix G of bearing number on the packing surface indicate polyamide cage.

● Attention

- (1) Maximum permissible misalignment angle θ is about 2.5° in the 11 and 22 series, and about 3° in the 13 and 23 series under general service conditions. Care must be taken to provide sufficient clearance between the bearing and surrounding structure when bearing is operating in the full misaligned condition.
- (2) Misaligned bearings will have a tendency to become noisy as speed increases. Due to noise-level constraints, the practical maximum misalignment may be considerably less than the maximum misalignment.
- (3) The dimension tables show the width of the ball assembly as dimension B1 for larger bore sizes of Self-aligning Ball Bearings where width of the ball assembly extends beyond the ring width envelope.
- (4) It is difficult to correctly measure the running clearance of bearings with tapered bore after mounting. Mounting of this type of bearing with tapered bores requires some experience and technique.
- (5) The bearings with polyamide cage should be used at less than 120°C operating temperature.



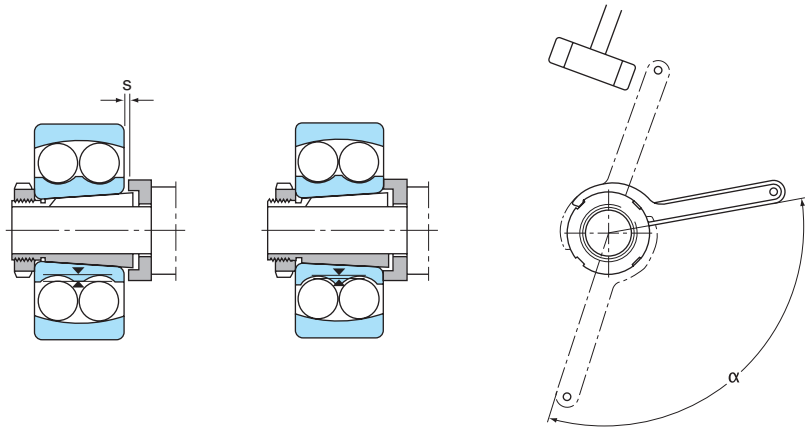
● Mounting bearings with tapered bore

Mounting bearings with a tapered bore requires some experience and technique. Bearings with tapered bore are always mounted with an interference fit on the shaft.

To measure the amount of interference fit on the shaft, the axial displacement of the inner ring or

the reduction of radial internal clearance due to the interference fit can be used. Generally, the measurement of reduction in radial internal clearance is a more reliable method than measurement of the axial displacement of the inner ring.

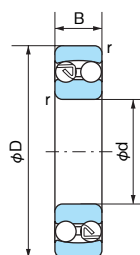
Table 1. Mounting self-aligning ball bearings with tapered bore



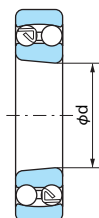
Bearing Bore Diameter d (mm)	Tightening Angle α (degree)	Axial displacement s (mm)				Mean residual clearance after mounting bearings with initial clearance	
		Bearings series				Normal (μm)	C3 (μm)
		12K	13K	22K	23K		
20	70	0.22	0.23	—	—	10	20
25	70	0.22	0.23	0.22	0.23	10	20
30	70	0.22	0.23	0.22	0.23	10	20
35	70	0.30	0.30	0.30	0.30	10	20
40	70	0.30	0.30	0.30	0.30	10	20
45	70	0.31	0.34	0.31	0.33	15	25
50	70	0.31	0.34	0.31	0.33	15	25
55	90	0.40	0.41	0.39	0.40	15	30
60	90	0.40	0.41	0.39	0.40	15	30
65	90	0.40	0.41	0.39	0.40	15	30
75	120	0.45	0.47	0.43	0.46	20	40
80	120	0.45	0.47	0.43	0.46	20	40
85	120	0.58	0.60	0.54	0.59	20	40
90	120	0.58	0.60	0.54	0.59	20	40
95	120	0.58	0.60	0.54	0.59	20	40
100	120	0.58	0.60	0.54	0.59	20	40
105	120	0.67	—	0.66	—	25	55
110	120	0.67	0.70	0.66	0.69	25	55
120	120	0.67	—	—	—	25	55

Self-aligning Ball Bearings

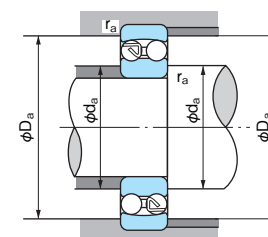
Bore Diameter: 10~40mm



Cylindrical bore



Tapered bore (Taper: 1/12)



Dynamic equivalent radial load
 $P_r = X F_r + Y F_a$

$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y_1	0.65	Y_2

Static equivalent radial load
 $P_0 = F_r + Y_0 F_a$

Values of e, Y_1 , Y_2 and Y_0 from table.

1N=0.102kgf

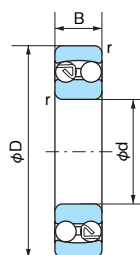
Boundary dimensions (mm)					Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)		Limiting speed (min ⁻¹)		Axial load factor			Constant e	Abutment and fillet dimensions (mm)			Mass (kg) (Reference) Cylindrical bore	Bearing No.
d	D	B	B ₁	r (min)	Cylindrical bore	Tapered bore				Grease lubrication	Oil lubrication	Y ₁	Y ₂	Y ₀		d _a (min)	D _a (max)	r _a (max)		
10	30	9	—	0.6	1200	—	5500	1200		23000	28000	1.92	2.97	2.01	0.33	14	26	0.6	0.034	1200
	30	14	—	0.6	2200	—	7400	1600		23000	29000	1.07	1.65	1.12	0.59	14	26	0.6	0.047	2200
12	32	10	—	0.6	1201	—	5600	1250		21000	26000	1.89	2.93	1.98	0.33	16	28	0.6	0.040	1201
	32	14	—	0.6	2201	—	7650	1750		21000	26000	1.18	1.83	1.24	0.53	16	28	0.6	0.053	2201
	37	12	—	1	1301	—	9400	2150		18000	22000	1.77	2.74	1.86	0.36	17	32	1.0	0.067	1301
	37	17	—	1	2301	—	9700	2300		16000	22000	1.17	1.81	1.23	0.54	17	32	1.0	0.095	2301
15	35	11	—	0.6	1202	—	7450	1750		18000	22000	1.90	2.95	2.00	0.33	19	31	0.6	0.049	1202
	35	14	—	0.6	2202	—	7700	1850		18000	22000	1.27	1.97	1.33	0.50	19	31	0.6	0.060	2202
	42	13	—	1	1302	—	9550	2300		16000	20000	1.86	2.88	1.95	0.34	20	37	1.0	0.094	1302
	42	17	—	1	2302	—	12100	2900		14000	20000	1.27	1.96	1.33	0.50	20	37	1.0	0.114	2302
17	40	12	—	0.6	1203	—	7900	2000		16000	20000	2.03	3.14	2.12	0.31	21	36	0.6	0.073	1203
	40	16	—	0.6	2203	—	9800	2400		16000	20000	1.27	1.96	1.33	0.50	21	36	0.6	0.088	2203
	47	14	—	1	1303	—	12500	3200		14000	17000	1.92	2.97	2.01	0.33	22	42	1.0	0.130	1303
	47	19	—	1	2303	—	14500	3600		13000	18000	1.28	1.98	1.34	0.49	22	42	1.0	0.158	2303
20	47	14	—	1	1204	1204K	9900	2600		14000	17000	2.16	3.35	2.27	0.29	25	42	1.0	0.120	1204
	47	18	—	1	2204	2204K	12600	3300		14000	17000	1.31	2.02	1.37	0.48	25	42	1.0	0.140	2204
	52	15	—	1.1	1304	1304K	12400	3300		13000	15000	2.12	3.28	2.22	0.30	26.5	45.5	1.0	0.163	1304
	52	21	—	1.1	2304	2304K	18000	4700		11000	15000	1.29	2.00	1.35	0.49	26.5	45.5	1.0	0.209	2304
25	52	15	—	1	1205	1205K	12100	3300		12000	14000	2.28	3.52	2.39	0.28	30	47	1.0	0.141	1205
	52	18	—	1	2205	2205K	12600	3500		12000	15000	1.58	2.45	1.66	0.40	30	47	1.0	0.163	2205
	62	17	—	1.1	1305	1305K	18000	5000		9900	12000	2.31	3.57	2.42	0.27	31.5	55.5	1.0	0.257	1305
	62	24	—	1.1	2305	2305K	24400	6600		9400	13000	1.36	2.10	1.42	0.46	31.5	55.5	1.0	0.335	2305
30	62	16	—	1	1206	1206K	15600	4650		9900	12000	2.55	3.94	2.67	0.25	35	57	1.0	0.220	1206
	62	20	—	1	2206	2206K	15600	4650		10000	12000	1.79	2.77	1.87	0.35	35	57	1.0	0.260	2206
	72	19	—	1.1	1306	1306K	21300	6300		8700	11000	2.40	3.72	2.52	0.26	36.5	65.5	1.0	0.387	1306
	72	27	—	1.1	2306	2306K	31400	8750		8000	11000	1.44	2.23	1.51	0.44	36.5	65.5	1.0	0.500	2306
35	72	17	—	1.1	1207	1207K	15800	5100		8500	10000	2.71	4.20	2.84	0.23	41.5	65.5	1.0	0.323	1207
	72	23	—	1.1	2207	2207K	21600	6600		8500	10000	1.71	2.65	1.79	0.37	41.5	65.5	1.0	0.403	2207
	80	21	—	1.5	1307	1307K	25100	7850		7600	9300	2.48	3.84	2.60	0.25	43	72	1.5	0.510	1307
	80	31	—	1.5	2307	2307K	39400	11300		7100	9800	1.39	2.15	1.46	0.45	43	72	1.5	0.675	2307
40	80	18	—	1.1	1208	1208K	19200	6500		7500	9200	2.83	4.38	2.97	0.22	46.5	73.5	1.0	0.417	1208
	80	23	—	1.1	2208	2208K	22400	7400		7600	9300	1.92	2.96	2.01	0.33	46.5	73.5	1.0	0.505	2208
	90	23	—	1.5	1308	1308K	29500	9700		6900	8400	2.57	3.98	2.69	0.25	48	82	1.5	0.715	1308
	90	33	—	1.5	2308	2308K	44900	13500		6200	8600	1.47	2.27	1.54	0.43	48	82	1.5	0.925	2308

Remarks: 1. Suffix K means with a tapered bore (1/12)

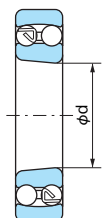
2. Dimension B₁ is the width of the ball assembly extends beyond the ring width dimension.

Self-aligning Ball Bearings

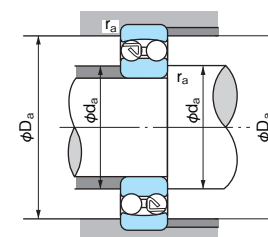
Bore Diameter: 45~80mm



Cylindrical bore



Tapered bore (Taper: 1/12)



Dynamic equivalent radial load
Pr=XFr+YFa

$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y ₁	0.65	Y ₂

Static equivalent radial load
P₀=Fr+Y₀Fa

Values of e, Y₁, Y₂ and Y₀ from table.

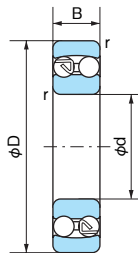
1N=0.102kgf

Boundary dimensions (mm)					Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)		Limiting speed (min ⁻¹)		Axial load factor			Constant e	Abutment and fillet dimensions (mm)			Mass (kg) (Reference) Cylindrical bore	Bearing No.
d	D	B	B ₁	r (min)	Cylindrical bore	Tapered bore				Grease lubrication	Oil lubrication	Y ₁	Y ₂	Y ₀		d _a (min)	D _a (max)	r _a (max)		
45	85	19	—	1.1	1209	1209K	21800	7350		7000	8500	2.94	4.56	3.09	0.21	51.5	78.5	1.0	0.465	1209
	85	23	—	1.1	2209	2209K	23300	8150		7000	8500	2.09	3.23	2.19	0.30	51.5	78.5	1.0	0.545	2209
	100	25	—	1.5	1309	1309K	38100	12700		6100	7500	2.56	3.95	2.68	0.25	53	92	1.5	0.957	1309
	100	36	—	1.5	2309	2309K	54400	16700		5600	7700	1.51	2.33	1.58	0.42	53	92	1.5	1.23	2309
50	90	20	—	1.1	1210	1210K	22700	8100		6500	7900	3.07	4.76	3.22	0.21	56.5	83.5	1.0	0.525	1210
	90	23	—	1.1	2210	2210K	23300	8500		6500	7900	2.33	3.61	2.45	0.27	56.5	83.5	1.0	0.590	2210
	110	27	—	2	1310	1310K	43400	14100		5600	6800	2.70	4.17	2.83	0.23	59	101	2.0	1.21	1310
	110	40	—	2	2310	2310K	64600	20300		5100	7000	1.56	2.41	1.63	0.40	59	101	2.0	1.64	2310
55	100	21	—	1.5	1211	1211K	26800	10000		5800	7100	3.19	4.94	3.34	0.20	63	92	1.5	0.705	1211
	100	25	—	1.5	2211	2211K	26800	10000		5800	7100	2.35	3.64	2.47	0.27	63	92	1.5	0.810	2211
	120	29	—	2	1311	1311K	51300	17900		5000	6200	2.70	4.18	2.83	0.23	64	111	2.0	1.58	1311
	120	43	—	2	2311	2311K	75300	24000		4600	6400	1.53	2.37	1.60	0.41	64	111	2.0	2.10	2311
60	110	22	—	1.5	1212	1212K	30200	11500		5200	6400	3.37	5.22	3.53	0.19	68	102	1.5	0.900	1212
	110	28	—	1.5	2212	2212K	34100	12600		5300	6500	2.26	3.49	2.36	0.28	68	102	1.5	1.09	2212
	130	31	—	2.1	1312	1312K	57200	20800		4500	5500	2.91	4.50	3.05	0.22	71	119	2.0	1.96	1312
	130	46	—	2.1	2312	2312K	87200	28300		4200	5800	1.62	2.51	1.70	0.39	71	119	2.0	2.60	2312
65	120	23	—	1.5	1213	1213K	31000	12500		4800	5800	3.67	5.68	3.84	0.17	73	112	1.5	1.15	1213
	120	31	—	1.5	2213	2213K	43500	16400		4900	5900	2.24	3.47	2.35	0.28	73	112	1.5	1.46	2213
	140	33	—	2.1	1313	1313K	61700	22900		4300	5200	2.73	4.23	2.86	0.23	76	129	2.0	2.45	1313
	140	48	—	2.1	2313	2313K	95800	32500		3800	5300	1.66	2.58	1.74	0.38	76	129	2.0	3.23	2313
70	125	24	—	1.5	1214	—	34600	13800		4600	5700	3.48	5.38	3.64	0.18	78	117	1.5	1.26	1214
	125	31	—	1.5	2214	—	43900	17100		4600	5600	2.42	3.74	2.53	0.26	78	117	1.5	1.52	2214
	150	35	—	2.1	1314	—	74000	27700		4000	4900	2.84	4.40	2.98	0.22	81	139	2.0	2.99	1314
	150	51	—	2.1	2314	—	89600	31700		3600	4900	1.82	2.82	1.91	0.35	81	139	2.0	4.23	2314
75	130	25	—	1.5	1215	1215K	38800	15700		4300	5300	3.60	5.58	3.77	0.17	83	122	1.5	1.36	1215
	130	31	—	1.5	2215	2215K	44200	17800		4300	5300	2.49	3.85	2.61	0.25	83	122	1.5	1.62	2215
	160	37	—	2.1	1315	1315K	78900	29900		4000	4900	2.80	4.33	2.93	0.23	86	149	2.0	3.56	1315
	160	55	—	2.1	2315	2315K	103000	36800		3400	4600	1.86	2.88	1.95	0.34	86	149	2.0	5.13	2315
80	140	26	—	2	1216	1216K	39800	17000		4000	4900	3.90	6.03	4.08	0.16	89	131	2.0	1.67	1216
	140	33	—	2	2216	2216K	49000	19900		4100	5000	2.42	3.75	2.54	0.26	89	131	2.0	2.01	2216
	170	39	—	2.1	1316	1316K	88100	33100		3500	4300	2.90	4.49	3.04	0.22	91	159	2.0	4.18	1316
	170	58	—	2.1	2316	2316K	129000	45700		3100	4300	1.87	2.90	1.96	0.34	91	159	2.0	6.10	2316

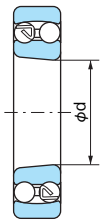
Remarks: 1. Suffix K means with a tapered bore (1/12)

2. Dimension B₁ is the width of the ball assembly extends beyond the ring width dimension.

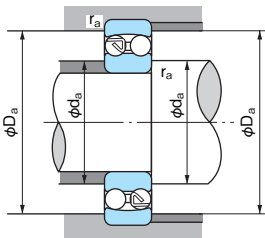
Self-aligning Ball Bearings
Bore Diameter: 85~110mm



Cylindrical bore



Tapered bore (Taper: 1/12)



Dynamic equivalent radial load

$P_r = X F_r + Y F_a$

$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y_1	0.65	Y_2

Static equivalent radial load

$P_{0r} = F_r + Y_0 F_a$

Values of e , Y_1 , Y_2 and Y_0 from table.

1N=0.102kgf

Boundary dimensions (mm)					Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)		Limiting speed (min ⁻¹)		Axial load factor			Constant e	Abutment and fillet dimensions (mm)			Mass (kg) (Reference) Cylindrical bore	Bearing No.
d	D	B	B ₁	r (min)	Cylindrical bore	Tapered bore				Grease lubrication	Oil lubrication	Y ₁	Y ₂	Y ₀		d _a (min)	D _a (max)	r _a (max)		
85	150	28	—	2	1217	1217K	49200	20800		3800	4600	3.61	5.59	3.78	0.17	94	141	2	2.07	1217
	150	36	—	2	2217	2217K	58300	23600		3800	4600	2.49	3.85	2.61	0.25	94	141	2	2.52	2217
	180	41	—	3	1317	1317K	97300	37800		3300	4000	2.93	4.53	3.07	0.22	98	167	2.5	4.98	1317
	180	60	—	3	2317	2317K	141000	51500		3000	4100	1.82	2.82	1.91	0.35	98	167	2.5	7.05	2317
90	160	30	—	2	1218	1218K	56800	23400		3500	4300	3.69	5.70	3.86	0.17	99	151	2	2.52	1218
	160	40	—	2	2218	2218K	67700	27200		3500	4300	2.39	3.71	2.51	0.26	99	151	2	3.40	2218
	190	43	—	3	1318	1318K	116000	44400		3100	3800	2.81	4.35	2.94	0.22	103	177	2.5	5.80	1318
	190	64	—	3	2318	2318K	153000	57900		2800	3900	1.84	2.85	1.93	0.34	103	177	2.5	8.44	2318
95	170	32	—	2.1	1219	1219K	57000	24300		3300	4000	3.63	5.62	3.80	0.17	106	159	2	3.10	1219
	170	43	—	2.1	2219	2219K	82700	34300		3300	4000	2.43	3.76	2.55	0.26	106	159	2	4.10	2219
	200	45	48.2	3	1319	1319K	132000	50800		2900	3600	2.73	4.23	2.86	0.23	108	187	2.5	6.69	1319
	200	67	—	3	2319	2319K	166000	64800		2700	3700	1.82	2.82	1.91	0.35	108	187	2.5	9.79	2319
100	180	34	—	2.1	1220	1220K	69000	29700		3100	3800	3.62	5.60	3.79	0.17	111	169	2	3.70	1220
	180	46	—	2.1	2220	2220K	80900	34000		3100	3800	2.57	3.98	2.70	0.24	111	169	2	4.98	2220
	215	47	52	3	1320	1320K	143000	57300		2800	3400	2.66	4.11	2.78	0.24	113	202	2.5	8.30	1320
	215	73	—	3	2320	2320K	183000	73400		2400	3400	1.84	2.85	1.93	0.34	113	202	2.5	12.4	2320
105	190	36	—	2.1	1221	—	77000	34000		2900	3600	3.56	5.51	3.73	0.18	116	179	2	4.37	1221
	190	50	—	2.1	2221	—	94900	40100		3000	3600	2.43	3.76	2.55	0.26	116	179	2	6.07	2221
	225	49	54	3	1321	—	149000	60200		2600	3200	2.73	4.22	2.86	0.23	118	212	2.5	10.0	1321
	225	77	—	3	2321	—	187000	78000		2300	3200	1.75	2.71	1.83	0.36	118	212	2.5	14.3	2321
110	200	38	—	2.1	1222	1222K	80200	35200		2800	3400	3.64	5.63	3.81	0.17	121	189	2	5.15	1222
	200	53	—	2.1	2222	2222K	120000	48900		2800	3400	2.41	3.73	2.53	0.26	121	189	2	7.10	2222
	240	50	55.2	3	1322	1322K	150000	63200		2400	3000	2.82	4.37	2.96	0.22	123	227	2.5	11.8	1322
	240	80	—	3	2322	2322K	200000	85700		2200	3000	1.82	2.82	1.91	0.35	123	227	2.5	17.3	2322

Remarks: 1. Suffix K means with a tapered bore (1/12)
2. Dimension B1 is the width of the ball assembly extends beyond the ring width dimension.