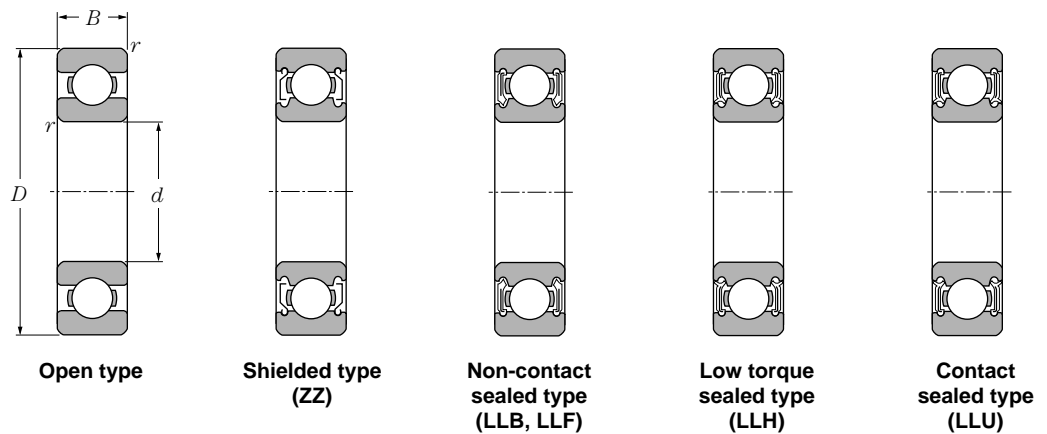


Deep Groove Ball Bearings

NTN

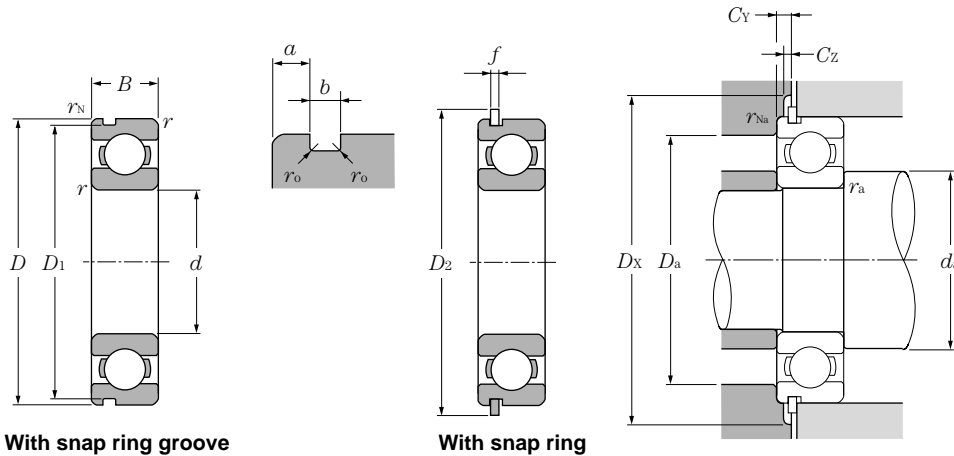


d 10 ~ 20mm

d	Boundary dimensions				Basic load ratings				Limiting speeds				Bearing numbers				
	mm				dynamic		static		rpm				open type	sealed type	non-contact type	low torque type	contact type
	D	B	r _{s min}	r _{NS min}	C _r	C _{or}	C _r	C _{or}	grease open type ZZ	oil open type Z LB	LLH	LLU					
10	15	3	0.1		0.855	0.435	87	44	10,000	12,000			6700				
	19	5	0.3		1.83	0.925	187	94	32,000	38,000		24,000	6800	ZZ	LLB		LLU
	22	6	0.3	0.3	2.7	1.27	275	129	30,000	36,000		21,000	6900	ZZ	LLB		LLU
	26	8	0.3		4.55	1.96	465	200	29,000	34,000	25,000	21,000	6000	ZZ	LLB	LLH	LLU
	30	9	0.6	0.5	5.10	2.39	520	244	25,000	30,000	21,000	18,000	6200	ZZ	LLB	LLH	LLU
	35	11	0.6	0.5	8.20	3.50	835	355	23,000	27,000	20,000	16,000	6300	ZZ	LLB	LLH	LLU
12	18	4	0.2		0.930	0.530	95	54	8,300	9,500			6701		LLF		
	21	5	0.3		1.92	1.04	195	106	29,000	35,000		20,000	6801	ZZ	LLB		LLU
	24	6	0.3	0.3	2.89	1.46	295	149	27,000	32,000		19,000	6901	ZZ	LLB		LLU
	28	7	0.3		5.10	2.39	520	244	26,000	30,000			16001				
	28	8	0.3		5.10	2.39	520	244	26,000	30,000	21,000	18,000	6001	ZZ	LLB	LLH	LLU
	32	10	0.6	0.5	6.10	2.75	620	280	22,000	26,000	20,000	16,000	6201	ZZ	LLB	LLH	LLU
	37	12	1	0.5	9.70	4.20	990	425	20,000	24,000	19,000	15,000	6301	ZZ	LLB	LLH	LLU
15	21	4	0.2		0.940	0.585	96	59	6,600	7,600			6702		LLF		
	24	5	0.3		2.08	1.26	212	128	26,000	31,000		17,000	6802	ZZ	LLB		LLU
	28	7	0.3	0.3	3.65	2.00	375	204	24,000	28,000		16,000	6902	ZZ	LLB		LLU
	32	8	0.3		5.60	2.83	570	289	22,000	26,000			16002				
	32	9	0.3	0.3	5.60	2.83	570	289	22,000	26,000	18,000	15,000	6002	ZZ	LLB	LLH	LLU
	35	11	0.6	0.5	7.75	3.60	790	365	19,000	23,000	18,000	15,000	6202	ZZ	LLB	LLH	LLU
	42	13	1	0.5	11.4	5.45	1,170	555	17,000	21,000	15,000	12,000	6302	ZZ	LLB	LLH	LLU
17	23	4	0.2		1.00	0.660	102	67	5,000	6,700			6703		LLF		
	26	5	0.3		2.23	1.46	227	149	24,000	28,000		15,000	6803	ZZ	LLB		LLU
	30	7	0.3	0.3	4.65	2.58	475	263	22,000	26,000		14,000	6903	ZZ	LLB		LLU
	35	8	0.3		6.80	3.35	695	345	20,000	24,000			16003				
	35	10	0.3	0.3	6.80	3.35	695	345	20,000	24,000	16,000	14,000	6003	ZZ	LLB	LLH	LLU
	40	12	0.6	0.5	9.60	4.60	980	465	18,000	21,000	15,000	12,000	6203	ZZ	LLB	LLH	LLU
	47	14	1	0.5	13.5	6.55	1,380	665	16,000	19,000	14,000	11,000	6303	ZZ	LLB	LLH	LLU
	62	17	1.1		22.7	10.8	2,320	1,100	14,000	16,000			6403				
20	27	4	0.2		1.04	0.730	106	74	5,000	5,700			6704		LLF		
	32	7	0.3	0.3	4.00	2.47	410	252	21,000	25,000		13,000	6804	ZZ	LLB		LLU
	37	9	0.3	0.3	6.40	3.70	650	375	19,000	23,000		12,000	6904	ZZ	LLB		LLU
	42	8	0.3		7.90	4.50	810	455	18,000	21,000			16004				
	42	12	0.6	0.5	9.40	5.05	955	515	18,000	21,000	13,000	11,000	6004	ZZ	LLB	LLH	LLU
	47	14	1	0.5	12.8	6.65	1,310	680	16,000	18,000	12,000	10,000	6204	ZZ	LLB	LLH	LLU
	52	15	1.1	0.5	15.9	7.90	1,620	805	14,000	17,000	12,000	10,000	6304	ZZ	LLB	LLH	LLU

① Smallest allowable dimension for chamfer dimension r.

Deep Groove Ball Bearings



With snap ring groove

With snap ring

Equivalent bearing load

dynamic

$$P_r = XF_r + YF_a$$

$\frac{F_a}{C_{or}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.010	0.18				2.46
0.020	0.20				2.14
0.040	0.24				1.83
0.070	0.27				1.61
0.10	0.29	1	0	0.56	1.48
0.15	0.32				1.35
0.20	0.35				1.25
0.30	0.38				1.13
0.40	0.41				1.05
0.50	0.44				1.00

static

$$P_{or} = 0.6F_r + 0.5F_a$$

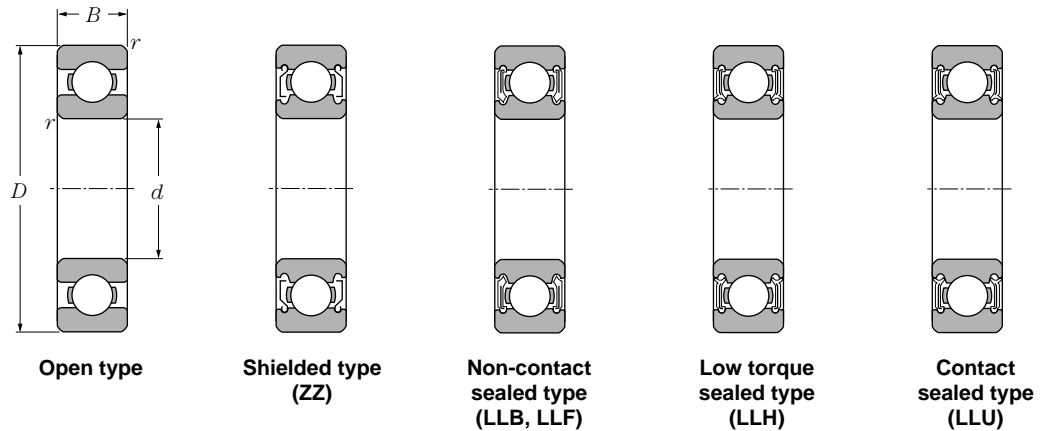
When $P_{or} < F_r$ use $P_{or} = F_r$

Bearing numbers		Snap ring groove dimensions mm				Snap ring dimensions mm		Abutment and fillet dimensions mm								Mass ⁴ kg
snap ring groove	snap ring	D_1 max	a max	b min	r_0 max	D_2 max	f max	d_a min	d_a max	D_a max	D_X (approx.)	C_Y max	C_Z min	r_{as} max	r_{nas} max	(approx.)
N	NR	20.8	1.05	0.8	0.2	24.8	0.7	10.8	12	14.2	25.5	1.5	0.7	0.3	0.3	0.0015
								12	12.5	17						0.005
								12	13	20						0.009
								12	13.5	24						0.019
N	NR	28.17	2.06	1.35	0.4	34.7	1.12	14	16	26	35.5	2.9	1.2	0.6	0.5	0.032
N	NR	33.17	2.06	1.35	0.4	39.7	1.12	14	17	31	40.5	2.9	1.2	0.6	0.5	0.053
N	NR	22.8	1.05	0.8	0.2	26.8	0.7	13.6	13.8	16.4	27.5	1.5	0.7	0.3	0.3	0.002
								14	14.5	19						0.006
								14	15	22						0.011
								14	16	26						0.019
N	NR	30.15	2.06	1.35	0.4	36.7	1.12	16	17	28	37.5	2.9	1.2	0.6	0.5	0.037
N	NR	34.77	2.06	1.35	0.4	41.3	1.12	17	18.5	32	42	2.9	1.2	1	0.5	0.06
N	NR	26.7	1.3	0.95	0.25	30.8	0.85	16.6	16.8	19.4	31.5	1.9	0.9	0.3	0.3	0.0025
								17	17.5	22						0.007
								17	17.5	26						0.016
								17	19	30						0.025
N	NR	30.15	2.06	1.35	0.4	36.7	1.12	17	19	30	37.5	2.9	1.2	0.3	0.3	0.03
N	NR	33.17	2.06	1.35	0.4	39.7	1.12	19	20	31	40.5	2.9	1.2	0.6	0.5	0.045
N	NR	39.75	2.06	1.35	0.4	46.3	1.12	20	23	37	47	2.9	1.2	1	0.5	0.082
N	NR	28.7	1.3	0.95	0.25	32.8	0.85	18.6	18.8	21.4	33.5	1.9	0.9	0.3	0.3	0.0025
								19	19.5	24						0.008
								19	20	28						0.018
								19	21	33						0.032
N	NR	33.17	2.06	1.35	0.4	39.7	1.12	19	21	33	40.5	2.9	1.2	0.3	0.3	0.039
N	NR	38.1	2.06	1.35	0.4	44.6	1.12	21	23	36	45.5	2.9	1.2	0.6	0.5	0.066
N	NR	44.6	2.46	1.35	0.4	52.7	1.12	22	25	42	53.5	3.3	1.2	1	0.5	0.115
								23.5		55.5				1		0.27
N	NR	30.7	1.3	0.95	0.25	34.8	0.85	21.6	22.3	25.4	35.5	1.9	0.9	0.3	0.3	0.0045
								22	22.5	30						0.019
								22	24	35						0.036
								22	26	40						0.051
N	NR	39.75	2.06	1.35	0.4	46.3	1.12	24	26	38	47	2.9	1.2	0.6	0.5	0.069
N	NR	44.6	2.46	1.35	0.4	52.7	1.12	25	28	42	53.5	3.3	1.2	1	0.5	0.106
N	NR	49.73	2.46	1.35	0.4	57.9	1.12	26.5	28.5	45.5	58.5	3.3	1.2	1	0.5	0.144

② Sealed and shielded bearings are also available. ③ This dimension applies to sealed and shielded bearings. ④ Does not include bearings with snap rings. ⑤ See page B-38.

Deep Groove Ball Bearings

NTN

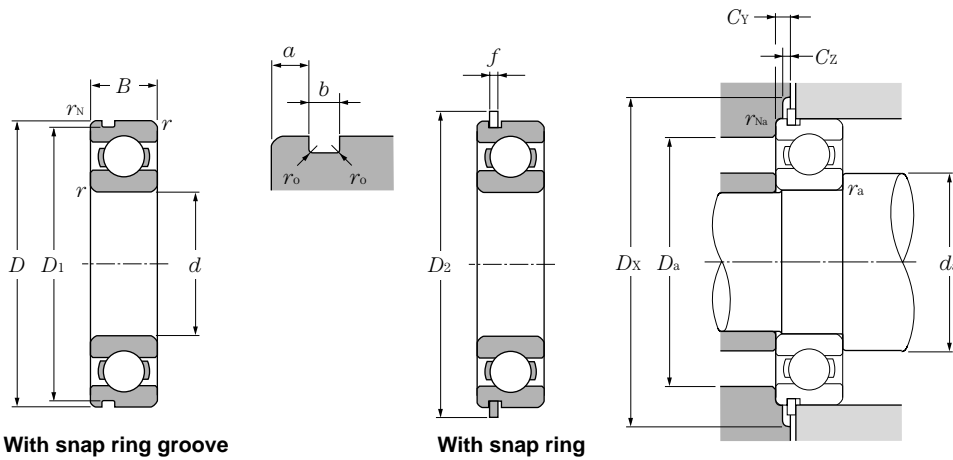


d 20 ~ 35mm

d	Boundary dimensions				Basic load ratings				Limiting speeds				Bearing numbers						
	mm				dynamic		static		rpm				open type	sealed type	non-contact type	low torque type	contact type		
	D	B	r _{s min} ①	r _{NS min}	C _r	C _{or}	C _r	C _{or}	grease open type ZZ	oil open type Z	LLB	LB						LLH	LLU
20	72	19	1.1		28.5	13.9	2,900	1,420	12,000	14,000					6404				
22	44	12	0.6	0.5	9.40	5.05	955	515	17,000	20,000	13,000	10,000	60/22	ZZ	LLB	LLH	LLU		
	50	14	1	0.5	12.9	6.80	1,320	690	14,000	17,000	12,000	9,700	62/22	ZZ	LLB	LLH	LLU		
	56	16	1.1	0.5	18.4	9.25	1,880	945	13,000	15,000	11,000	9,200	63/22	ZZ	LLB	LLH	LLU		
25	32	4	0.2		1.10	0.840	112	86	4,000	4,600			6705		LLF				
	37	7	0.3	0.3	4.30	2.95	435	300	18,000	21,000		10,000	6805	ZZ	LLB		LLU		
	42	9	0.3	0.3	7.05	4.55	715	460	16,000	19,000		9,800	6905	ZZ	LLB		LLU		
	47	8	0.3		8.35	5.10	855	520	15,000	18,000			16005						
	47	12	0.6	0.5	10.1	5.85	1,030	595	15,000	18,000	11,000	9,400	6005	ZZ	LLB	LLH	LLU		
	52	15	1	0.5	14.0	7.85	1,430	800	13,000	15,000	11,000	8,900	6205	ZZ	LLB	LLH	LLU		
	62	17	1.1	0.5	21.2	10.9	2,160	1,110	12,000	14,000	9,700	8,100	6305	ZZ	LLB	LLH	LLU		
80	21	1.5		34.5	17.5	3,550	1,780	10,000	12,000			6405							
28	52	12	0.6	0.5	12.5	7.40	1,270	755	14,000	16,000	10,000	8,400	60/28	ZZ	LLB	LLH	LLU		
	58	16	1	0.5	17.9	9.75	1,830	995	12,000	14,000	9,700	8,100	62/28	ZZ	LLB	LLH	LLU		
	68	18	1.1	0.5	26.7	14.0	2,730	1,430	11,000	13,000	8,900	7,400	63/28	ZZ	LLB	LLH	LLU		
30	37	4	0.2		1.14	0.950	117	97	3,300	3,800			6706		LLF				
	42	7	0.3	0.3	4.70	3.65	480	370	15,000	18,000		8,800	6806	ZZ	LLB		LLU		
	47	9	0.3	0.3	7.25	5.00	740	510	14,000	17,000		8,400	6906	ZZ	LLB		LLU		
	55	9	0.3		11.2	7.35	1,150	750	13,000	15,000			16006						
	55	13	1	0.5	13.2	8.3	1,350	845	13,000	15,000	9,200	7,700	6006	ZZ	LLB	LLH	LLU		
	62	16	1	0.5	19.5	11.3	1,980	1,150	11,000	13,000	8,800	7,300	6206	ZZ	LLB	LLH	LLU		
	72	19	1.1	0.5	26.7	15.0	2,720	1,530	10,000	12,000	7,900	6,600	6306	ZZ	LLB	LLH	LLU		
	90	23	1.5		43.5	23.9	4,400	2,440	8,800	10,000			6406						
32	58	13	1	0.5	11.8	8.05	1,200	820	12,000	15,000	8,700	7,200	60/32	ZZ	LLB	LLH	LLU		
	65	17	1	0.5	20.7	11.6	2,110	1,190	11,000	12,000	8,400	7,100	62/32	ZZ	LLB	LLH	LLU		
	75	20	1.1	0.5	29.8	16.9	3,050	1,730	9,500	11,000	7,700	6,500	63/32	ZZ	LLB	LLH	LLU		
35	47	7	0.3	0.3	4.90	4.05	500	410	13,000	16,000		7,600	6807	ZZ	LLB		LLU		
	55	10	0.6	0.5	9.55	6.85	975	695	12,000	15,000		7,100	6907	ZZ	LLB		LLU		
	62	9	0.3		11.7	8.20	1,190	835	12,000	14,000			16007						
	62	14	1	0.5	16.0	10.3	1,630	1,050	12,000	14,000	8,200	6,800	6007	ZZ	LLB	LLH	LLU		
	72	17	1.1	0.5	25.7	15.3	2,620	1,560	9,800	11,000	7,600	6,300	6207	ZZ	LLB	LLH	LLU		
	80	21	1.5	0.5	33.5	19.1	3,400	1,950	8,800	10,000	7,300	6,000	6307	ZZ	LLB	LLH	LLU		
100	25	1.5		55.0	31.0	5,600	3,150	7,800	9,100			6407							

① Smallest allowable dimension for chamfer dimension r.

Deep Groove Ball Bearings



Equivalent bearing load

dynamic

$$P_r = XF_r + YF_a$$

$\frac{F_a}{C_{or}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.010	0.18				2.46
0.020	0.20				2.14
0.040	0.24				1.83
0.070	0.27				1.61
0.10	0.29				1.48
0.15	0.32	1	0	0.56	1.35
0.20	0.35				1.25
0.30	0.38				1.13
0.40	0.41				1.05
0.50	0.44				1.00

static

$$P_{or} = 0.6F_r + 0.5F_a$$

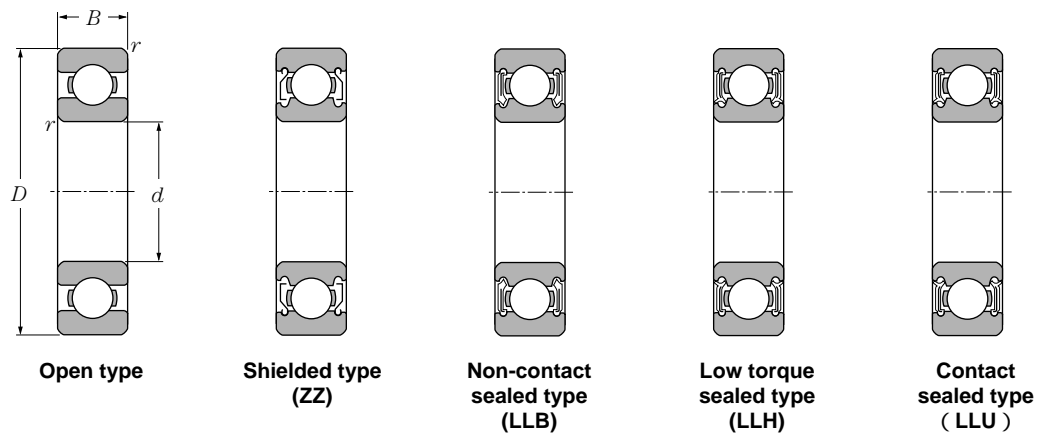
When $P_{or} < F_r$ use $P_{or} = F_r$

Bearing numbers		Snap ring groove dimensions mm				Snap ring dimensions mm		Abutment and fillet dimensions mm								Mass ^④ kg
snap ring groove	snap ring	D ₁ max	a max	b min	r _o max	D ₂ max	f max	d _a min	d _a max	D _a max	D _X (approx.)	C _Y max	C _Z min	r _{as} max	r _{Nas} max	(approx.)
								26.5		65.5				1		0.4
N	NR	41.75	2.06	1.35	0.4	48.3	1.12	26	26.5	40	49	2.9	1.2	0.6	0.5	0.074
N	NR	47.6	2.46	1.35	0.4	55.7	1.12	27	29.5	45	56.5	3.3	1.2	1	0.5	0.117
N	NR	53.6	2.46	1.35	0.4	61.7	1.12	28.5	31	49.5	62.5	3.3	1.2	1	0.5	0.176
								26.6	27.3	30.4				0.2		0.005
N	NR	35.7	1.3	0.95	0.25	39.8	0.85	27	28	35	40.5	1.9	0.9	0.3	0.3	0.022
N	NR	40.7	1.7	0.95	0.25	44.8	0.85	27	29	40	45.5	2.3	0.9	0.3	0.3	0.042
								27		45.0				0.3		0.06
N	NR	44.6	2.06	1.35	0.4	52.7	1.12	29	30.5	43	53.5	2.9	1.2	0.6	0.5	0.08
N	NR	49.73	2.46	1.35	0.4	57.9	1.12	30	32	47	58.5	3.3	1.2	1	0.5	0.128
N	NR	59.61	3.28	1.9	0.6	67.7	1.7	31.5	35	55.5	68.5	4.6	1.7	1	0.5	0.232
								33		72				1.5		0.53
N	NR	49.73	2.06	1.35	0.4	57.9	1.12	32	34	48	58.5	2.9	1.2	0.6	0.5	0.098
N	NR	55.6	2.46	1.35	0.4	63.7	1.12	33	35.5	53	64.5	3.3	1.2	1	0.5	0.171
N	NR	64.82	3.28	1.9	0.6	74.6	1.7	34.5	38.5	61.5	76	4.6	1.7	1	0.5	0.284
								31.6	32.3	35.4				0.2		0.006
N	NR	40.7	1.3	0.95	0.25	44.8	0.85	32	33	40	45.5	1.9	0.9	0.3	0.3	0.026
N	NR	45.7	1.7	0.95	0.25	49.8	0.85	32	34	45	50.5	2.3	0.9	0.3	0.3	0.048
								32		53				0.3		0.091
N	NR	52.6	2.08	1.35	0.4	60.7	1.12	35	37	50	61.5	2.9	1.2	1	0.5	0.116
N	NR	59.61	3.28	1.9	0.6	67.7	1.7	35	39	57	68.5	4.6	1.7	1	0.5	0.199
N	NR	68.81	3.28	1.9	0.6	78.6	1.7	36.5	43	65.5	80	4.6	1.7	1	0.5	0.36
								38		82				1.5		0.735
N	NR	55.6	2.08	1.35	0.4	63.7	1.12	37	39	53	64.5	2.9	1.2	1	0.5	0.129
N	NR	62.6	3.28	1.9	0.6	70.7	1.7	37	40	60	71.5	4.6	1.7	1	0.5	0.226
N	NR	71.83	3.28	1.9	0.6	81.6	1.7	38.5	43.5	68.5	83	4.6	1.7	1	0.5	0.382
N	NR	45.7	1.3	0.95	0.25	49.8	0.85	37	38	45	50.5	1.9	0.9	0.3	0.3	0.029
N	NR	53.7	1.7	0.95	0.25	57.8	0.85	39	40	51	58.5	2.3	0.9	0.6	0.5	0.074
								37		60				0.3		0.11
N	NR	59.61	2.08	1.9	0.6	67.7	1.7	40	42	57	68.5	3.4	1.7	1	0.5	0.155
N	NR	68.81	3.28	1.9	0.6	78.6	1.7	41.5	45	65.5	80	4.6	1.7	1	0.5	0.288
N	NR	76.81	3.28	1.9	0.6	86.6	1.7	43	47	72	88	4.6	1.7	1.5	0.5	0.457
								43		92				1.5		0.952

② Sealed and shielded bearings are also available. ③ This dimension applies to sealed and shielded bearings. ④ Does not include bearings with snap rings.

Deep Groove Ball Bearings

NTN

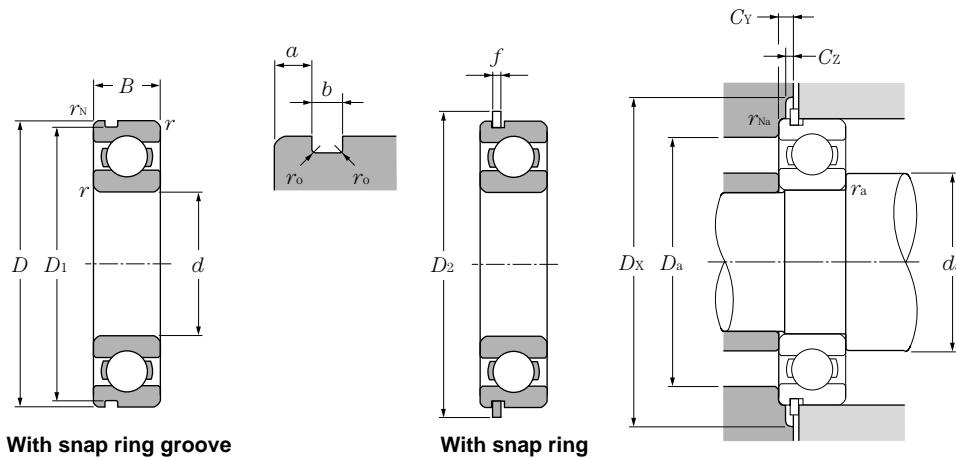


d 40 ~ 60mm

d	Boundary dimensions				Basic load ratings				Limiting speeds				Bearing numbers				
	mm				dynamic		static		rpm				open type	sealed type	non-contact type	low torque type	contact type
	D	B	r _{s min} ^①	r _{NS min}	C _r	C _{or}	C _r	C _{or}	grease open type ZZ	oil open type Z	LLB	LB					
40	52	7	0.3	0.3	5.10	4.40	520	445	12,000	14,000			6,700	6808	ZZ	LLB	LLU
	62	12	0.6	0.5	12.2	8.90	1,240	910	11,000	13,000			6,300	6908	ZZ	LLB	LLU
	68	9	0.3		12.6	9.65	1,290	985	10,000	12,000				16008			
	68	15	1	0.5	16.8	11.5	1,710	1,170	10,000	12,000	7,300	6,100	6008	ZZ	LLB	LLH	LLU
	80	18	1.1	0.5	29.1	17.8	2,970	1,820	8,700	10,000	6,700	5,600	6208	ZZ	LLB	LLH	LLU
	90	23	1.5	0.5	40.5	24.0	4,150	2,450	7,800	9,200	6,400	5,300	6308	ZZ	LLB	LLH	LLU
	110	27	2		63.5	36.5	6,500	3,750	7,000	8,200				6408			
45	58	7	0.3	0.3	5.35	4.95	550	500	11,000	12,000			5,900	6809	ZZ	LLB	LLU
	68	12	0.6	0.5	13.1	10.4	1,330	1,060	9,800	12,000			5,600	6909	ZZ	LLB	LLU
	75	10	0.6		12.9	10.5	1,320	1,070	9,200	11,000				16009			
	75	16	1	0.5	21.0	15.1	2,140	1,540	9,200	11,000	6,500	5,400	6009	ZZ	LLB	LLH	LLU
	85	19	1.1	0.5	32.5	20.4	3,350	2,080	7,800	9,200	6,200	5,200	6209	ZZ	LLB	LLH	LLU
	100	25	1.5	0.5	53.0	32.0	5,400	3,250	7,000	8,200	5,600	4,700	6309	ZZ	LLB	LLH	LLU
120	29	2		77.0	45.0	7,850	4,600	6,300	7,400				6409				
50	65	7	0.3	0.3	6.60	6.10	670	620	9,600	11,000			5,300	6810	ZZ	LLB	LLU
	72	12	0.6	0.5	13.4	11.2	1,370	1,140	8,900	11,000			5,100	6910	ZZ	LLB	LLU
	80	10	0.6		13.2	11.3	1,350	1,150	8,400	9,800				16010			
	80	16	1	0.5	21.8	16.6	2,230	1,690	8,400	9,800	6,000	5,000	6010	ZZ	LLB	LLH	LLU
	90	20	1.1	0.5	35.0	23.2	3,600	2,370	7,100	8,300	5,700	4,700	6210	ZZ	LLB	LLH	LLU
	110	27	2	0.5	62.0	38.5	6,300	3,900	6,400	7,500	5,000	4,200	6310	ZZ	LLB	LLH	LLU
130	31	2.1		83.0	49.5	8,450	5,050	5,700	6,700				6410				
55	72	9	0.3	0.3	8.80	8.10	900	825	8,700	10,000			4,800	6811	ZZ	LLB	LLU
	80	13	1	0.5	16.0	13.3	1,630	1,350	8,200	9,600			4,600	6911	ZZ	LLB	LLU
	90	11	0.6		18.6	15.3	1,900	1,560	7,700	9,000				16011			
	90	18	1.1	0.5	28.3	21.2	2,880	2,170	7,700	9,000		4,500	6011	ZZ	LLB	LLU	
	100	21	1.5	0.5	43.5	29.2	4,450	2,980	6,400	7,600		4,300	6211	ZZ	LLB	LLU	
	120	29	2	0.5	71.5	45.0	7,300	4,600	5,800	6,800		3,900	6311	ZZ	LLB	LLU	
140	33	2.1		89.0	54.0	9,050	5,500	5,200	6,100				6411				
60	78	10	0.3	0.3	11.5	10.6	1,170	1,080	8,000	9,400			4,400	6812	ZZ	LLB	LLU
	85	13	1	0.5	16.4	14.3	1,670	1,450	7,600	8,900		4,300	6912	ZZ	LLB	LLU	
	95	11	0.6		20.0	17.5	2,040	1,780	7,000	8,300				16012			
	95	18	1.1	0.5	29.5	23.2	3,000	2,370	7,000	8,300		4,100	6012	ZZ	LLB	LLU	
	110	22	1.5	0.5	52.5	36.0	5,350	3,700	6,000	7,000		3,800	6212	ZZ	LLB	LLU	
	130	31	2.1	0.5	82.0	52.0	8,350	5,300	5,400	6,300		3,600	6312	ZZ	LLB	LLU	
150	35	2.1		102	64.5	10,400	6,550	4,800	5,700				6412				

① Smallest allowable dimension for chamfer dimension r.

Deep Groove Ball Bearings



Equivalent bearing load

dynamic

$$P_r = XF_r + YF_a$$

$\frac{F_a}{C_{or}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.010	0.18				2.46
0.020	0.20				2.14
0.040	0.24				1.83
0.070	0.27				1.61
0.10	0.29				1.48
0.15	0.32	1	0	0.56	1.35
0.20	0.35				1.25
0.30	0.38				1.13
0.40	0.41				1.05
0.50	0.44				1.00

static

$$P_{or} = 0.6F_r + 0.5F_a$$

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

Bearing numbers		Snap ring groove dimensions mm				Snap ring dimensions mm		Abutment and fillet dimensions mm								Mass ^④ kg
snap ring groove	snap ring	D ₁ max	a max	b min	r _o max	D ₂ max	f max	d _a min	d _a max ^③	D _a max	D _X (approx.)	C _Y max	C _Z min	r _{as} max	r _{Nas} max	(approx.)
N	NR	50.7	1.3	0.95	0.25	54.8	0.85	42	43	50	55.5	1.9	0.9	0.3	0.3	0.033
N	NR	60.7	1.7	0.95	0.25	64.8	0.85	44	45	58	65.5	2.3	0.9	0.6	0.5	0.11
N	NR	64.82	2.49	1.9	0.6	74.6	1.7	45	47	63	76	3.8	1.7	1	0.5	0.19
N	NR	76.81	3.28	1.9	0.6	86.6	1.7	46.5	51	73.5	88	4.6	1.7	1	0.5	0.366
N	NR	86.79	3.28	2.7	0.6	96.5	2.46	48	54	82	98	5.4	2.5	1.5	0.5	0.63
								49		101				2.0		1.23
N	NR	56.7	1.3	0.95	0.25	60.8	0.85	47	48	56	61.5	1.9	0.9	0.3	0.3	0.04
N	NR	66.7	1.7	0.95	0.25	70.8	0.85	49	51	64	72	2.3	0.9	0.6	0.5	0.128
								49		71				0.6		0.171
N	NR	71.83	2.49	1.9	0.6	81.6	1.7	50	52.5	70	83	3.8	1.7	1	0.5	0.237
N	NR	81.81	3.28	1.9	0.6	91.6	1.7	51.5	55.5	78.5	93	4.6	1.7	1	0.5	0.398
N	NR	96.8	3.28	2.7	0.6	106.5	2.46	53	61.5	92	108	5.4	2.5	1.5	0.5	0.814
								54		111				2		1.53
N	NR	63.7	1.3	0.95	0.25	67.8	0.85	52	54	63	68.5	1.9	0.9	0.3	0.3	0.052
N	NR	70.7	1.7	0.95	0.25	74.8	0.85	54	55.5	68	76	2.3	0.9	0.6	0.5	0.132
								54		76				0.6		0.18
N	NR	76.81	2.49	1.9	0.6	86.6	1.7	55	57.5	75	88	3.8	1.7	1	0.5	0.261
N	NR	86.79	3.28	2.7	0.6	96.5	2.46	56.5	60	83.5	98	5.4	2.5	1	0.5	0.454
N	NR	106.81	3.28	2.7	0.6	116.6	2.46	59	68.5	101	118	5.4	2.5	2	0.5	1.07
								61		119				2		1.88
N	NR	70.7	1.7	0.95	0.25	74.8	0.85	57	59	70	76	2.3	0.9	0.3	0.3	0.083
N	NR	77.9	2.1	1.3	0.4	84.4	1.12	60	61.5	75	86	2.9	1.2	1	0.5	0.18
								59		86				0.6		0.258
N	NR	86.79	2.87	2.7	0.6	96.5	2.46	61.5	64	83.5	98	5	2.5	1	0.5	0.388
N	NR	96.8	3.28	2.7	0.6	106.5	2.46	63	67	92	108	5.4	2.5	1.5	0.5	0.601
N	NR	115.21	4.06	3.1	0.6	129.7	2.82	64	74	111	131.5	6.5	2.9	2	0.5	1.37
								66		129				2		2.29
N	NR	76.2	1.7	1.3	0.4	82.7	1.12	62	64.5	76	84	2.5	1.2	0.3	0.3	0.106
N	NR	82.9	2.1	1.3	0.4	89.4	1.12	65	66.5	80	91	2.9	1.2	1	0.5	0.193
								64		91				0.6		0.283
N	NR	91.82	2.87	2.7	0.6	101.6	2.46	66.5	69	88.5	103	5	2.5	1	0.5	0.414
N	NR	106.81	3.28	2.7	0.6	116.6	2.46	68	75	102	118	5.4	2.5	1.5	0.5	0.783
N	NR	125.22	4.06	3.1	0.6	139.7	2.82	71	80.5	119	141.5	6.5	2.9	2	0.5	1.73
								71		139				2		2.77

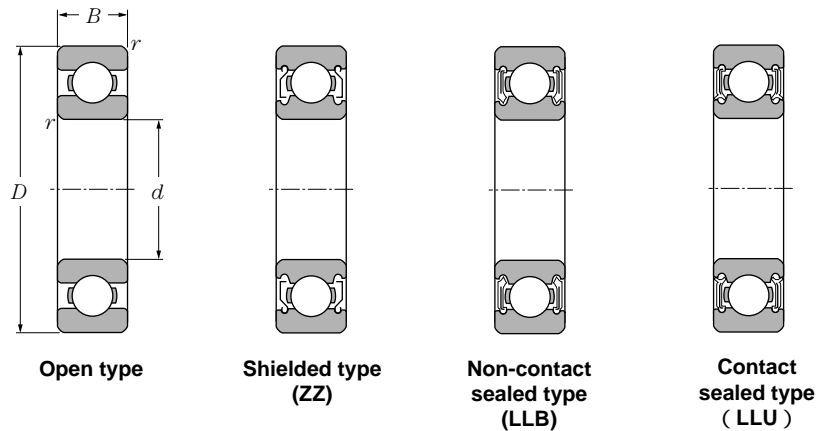
② Sealed and shielded bearings are also available.

③ This dimension applies to sealed and shielded bearings.

④ Does not include bearings with snap rings.

Deep Groove Ball Bearings

NTN

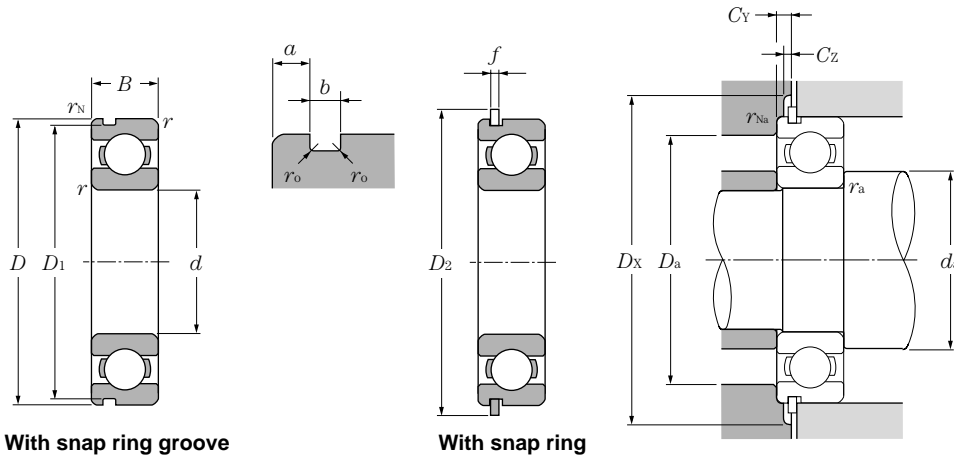


d 65 ~ 85mm

d	Boundary dimensions				Basic load ratings				Limiting speeds			Bearing numbers			
	mm				dynamic		static		rpm			open type	sealed type	non-contact type	contact type
	D	B	r _{s min} ^①	r _{NS min}	C _r	C _{or}	C _r	C _{or}	grease open type ZZ	oil open type LB	LLU				
65	85	10	0.6	0.5	11.6	11.0	1,180	1,120	7,400	8,700	4,100	6813	ZZ	LLB	LLU
	90	13	1	0.5	17.4	16.1	1,770	1,640	7,000	8,200	4,000	6913	ZZ	LLB	LLU
	100	11	0.6		20.5	18.7	2,090	1,910	6,500	7,700		16013			
	100	18	1.1	0.5	30.5	25.2	3,100	2,570	6,500	7,700	3,900	6013	ZZ	LLB	LLU
	120	23	1.5	0.5	57.5	40.0	5,850	4,100	5,500	6,500	3,600	6213	ZZ	LLB	LLU
	140	33	2.1	0.5	92.5	60.0	9,450	6,100	4,900	5,800	3,300	6313	ZZ	LLB	LLU
	160	37	2.1		111	72.5	11,300	7,400	4,400	5,200		6413			
70	90	10	0.6	0.5	12.1	11.9	1,230	1,220	6,900	8,100	3,800	6814	ZZ	LLB	LLU
	100	16	1	0.5	23.7	21.2	2,420	2,160	6,500	7,700	3,700	6914	ZZ	LLB	LLU
	110	13	0.6		24.4	22.6	2,480	2,300	6,100	7,100		16014			
	110	20	1.1	0.5	38.0	31.0	3,900	3,150	6,100	7,100	3,600	6014	ZZ	LLB	LLU
	125	24	1.5	0.5	62.0	44.0	6,350	4,500	5,100	6,000	3,400	6214	ZZ	LLB	LLU
	150	35	2.1	0.5	104	68.0	10,600	6,950	4,600	5,400	3,100	6314	ZZ	LLB	LLU
	180	42	3		128	89.5	13,100	9,100	4,100	4,800		6414			
75	95	10	0.6	0.5	12.5	12.9	1,280	1,310	6,400	7,600	3,600	6815	ZZ	LLB	LLU
	105	16	1	0.5	24.4	22.6	2,480	2,300	6,100	7,200	3,500	6915	ZZ	LLB	LLU
	115	13	0.6		25.0	24.0	2,540	2,450	5,700	6,700		16015			
	115	20	1.1	0.5	39.5	33.5	4,050	3,400	5,700	6,700	3,300	6015	ZZ	LLB	LLU
	130	25	1.5	0.5	66.0	49.5	6,750	5,050	4,800	5,600	3,200	6215	ZZ	LLB	LLU
	160	37	2.1	0.5	113	77.0	11,600	7,850	4,300	5,000	2,900	6315	ZZ	LLB	LLU
	190	45	3		138	99.0	14,000	10,100	3,800	4,500		6415			
80	100	10	0.6	0.5	12.7	13.3	1,290	1,360	6,000	7,100	3,400	6816	ZZ	LLB	LLU
	110	16	1	0.5	24.9	24.0	2,540	2,450	5,700	6,700	3,200	6916	ZZ	LLB	LLU
	125	14	0.6		25.4	25.1	2,590	2,560	5,300	6,200		16016			
	125	22	1.1	0.5	47.5	40.0	4,850	4,050	5,300	6,200	3,100	6016	ZZ	LLB	LLU
	140	26	2	0.5	72.5	53.0	7,400	5,400	4,500	5,300	3,000	6216	ZZ	LLB	LLU
	170	39	2.1	0.5	123	86.5	12,500	8,850	4,000	4,700	2,700	6316	ZZ	LLB	LLU
	200	48	3		164	125	16,700	12,800	3,600	4,200		6416			
85	110	13	1	0.5	18.7	19.0	1,910	1,940	5,700	6,700	3,100	6817	ZZ	LLB	LLU
	120	18	1.1	0.5	32.0	29.6	3,250	3,000	5,400	6,300	3,000	6917	ZZ	LLB	LLU
	130	14	0.6		25.9	26.2	2,640	2,670	5,000	5,900		16017			
	130	22	1.1	0.5	49.5	43.0	5,050	4,400	5,000	5,900	2,900	6017	ZZ	LLB	LLU
	150	28	2	0.5	83.5	64.0	8,500	6,500	4,200	5,000	2,800	6217	ZZ	LLB	LLU
	180	41	3	0.5	133	97.0	13,500	9,850	3,800	4,500	2,600	6317	ZZ	LLB	LLU

① Smallest allowable dimension for chamfer dimension r.

Deep Groove Ball Bearings



With snap ring groove

With snap ring

Equivalent bearing load

dynamic

$$P_r = XF_r + YF_a$$

$\frac{F_a}{C_{or}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.010	0.18				2.46
0.020	0.20				2.14
0.040	0.24				1.83
0.070	0.27				1.61
0.10	0.29				1.48
0.15	0.32	1	0	0.56	1.35
0.20	0.35				1.25
0.30	0.38				1.13
0.40	0.41				1.05
0.50	0.44				1.00

static

$$P_{or} = 0.6F_r + 0.5F_a$$

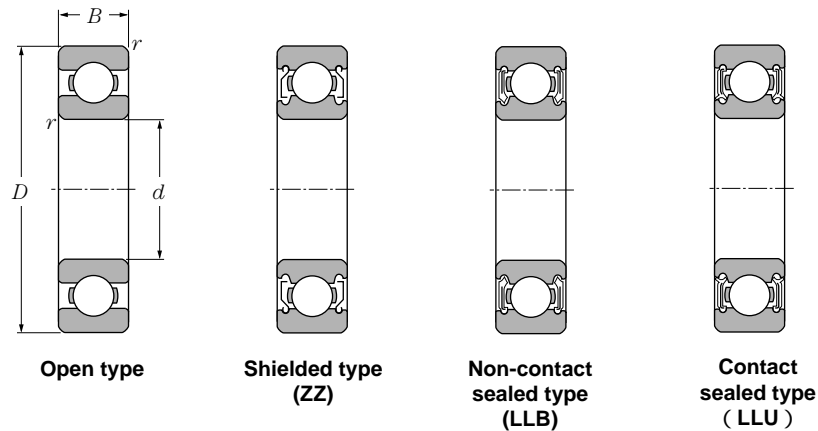
When $P_{or} < F_r$ use $P_{or} = F_r$

Bearing numbers		Snap ring groove dimensions mm				Snap ring dimensions mm		Abutment and fillet dimensions mm								Mass ^④ kg
snap ring groove	snap ring	D_1 max	a max	b min	r_0 max	D_2 max	f max	d_a min	d_a max ^③	D_a max	D_X (approx.)	C_Y max	C_Z min	r_{as} max	r_{Na} max	(approx.)
N	NR	82.9	1.7	1.3	0.4	89.4	1.12	69	70	81	91	2.5	1.2	0.6	0.5	0.128
N	NR	87.9	2.1	1.3	0.4	94.4	1.12	70	71.5	85	96	2.9	1.2	1	0.5	0.206
								69		96				0.6		0.307
N	NR	96.8	2.87	2.7	0.6	106.5	2.46	71.5	74	93.5	108	5	2.5	1	0.5	0.421
N	NR	115.21	4.06	3.1	0.6	129.7	2.82	73	80.5	112	131.5	6.5	2.9	1.5	0.5	0.99
N	NR	135.23	4.9	3.1	0.6	149.7	2.82	76	86	129	152	7.3	2.9	2	0.5	2.08
								76		149				2		3.3
N	NR	87.9	1.7	1.3	0.4	94.4	1.12	74	75.5	86	96	2.5	1.2	0.6	0.5	0.137
N	NR	97.9	2.5	1.3	0.4	104.4	1.12	75	77.5	95	106	3.3	1.2	1	0.5	0.334
								74		106				0.6		0.441
N	NR	106.81	2.87	2.7	0.6	116.6	2.46	76.5	80.5	103.5	118	5	2.5	1	0.5	0.604
N	NR	120.22	4.06	3.1	0.6	134.7	2.82	78	85	117	136.5	6.5	2.9	1.5	0.5	1.07
N	NR	145.24	4.9	3.1	0.6	159.7	2.82	81	92.5	139	162	7.3	2.9	2	0.5	2.52
								83		167				2.5		4.83
N	NR	92.9	1.7	1.3	0.4	99.4	1.12	79	80	91	101	2.5	1.2	0.6	0.5	0.145
N	NR	102.6	2.5	1.3	0.4	110.7	1.12	80	82.5	100	112	3.3	1.2	1	0.5	0.353
								79		111				0.6		0.464
N	NR	111.81	2.87	2.7	0.6	121.6	2.46	81.5	85.5	108.5	123	5	2.5	1	0.5	0.649
N	NR	125.22	4.06	3.1	0.6	139.7	2.82	83	90.5	122	141.5	6.5	2.9	1.5	0.5	1.18
N	NR	155.22	4.9	3.1	0.6	169.7	2.82	86	99	149	172	7.3	2.9	2	0.5	3.02
								88		177				2.5		5.72
N	NR	97.9	1.7	1.3	0.4	104.4	1.12	84	85	96	106	2.5	1.2	0.6	0.5	0.154
N	NR	107.6	2.5	1.3	0.4	115.7	1.12	85	88	105	117	3.3	1.2	1	0.5	0.373
								84		121				0.6		0.597
N	NR	120.22	2.87	3.1	0.6	134.7	2.82	86.5	91.5	118.5	136.5	5.3	2.9	1	0.5	0.854
N	NR	135.23	4.9	3.1	0.6	149.7	2.82	89	95.5	131	152	7.3	2.9	2	0.5	1.4
N	NR	163.65	5.69	3.5	0.6	182.9	3.1	91	105	159	185	8.4	3.1	2	0.5	3.59
								93		187				2.5		6.76
N	NR	107.6	2.1	1.3	0.4	115.7	1.12	90	91	105	117	2.9	1.2	1	0.5	0.27
N	NR	117.6	3.3	1.3	0.4	125.7	1.12	91.5	94	113.5	127	4.1	1.2	1	0.5	0.536
								89		126				0.6		0.626
N	NR	125.22	2.87	3.1	0.6	139.7	2.82	91.5	97	123.5	141.5	5.3	2.9	1	0.5	0.89
N	NR	145.24	4.9	3.1	0.6	159.7	2.82	94	103	141	162	7.3	2.9	2	0.5	1.79
N	NR	173.66	5.69	3.5	0.6	192.9	3.1	98	112	167	195	8.4	3.1	2.5	0.5	4.23

② Sealed and shielded bearings are also available. ③ This dimension applies to sealed and shielded bearings. ④ Does not include bearings with snap rings.

Deep Groove Ball Bearings

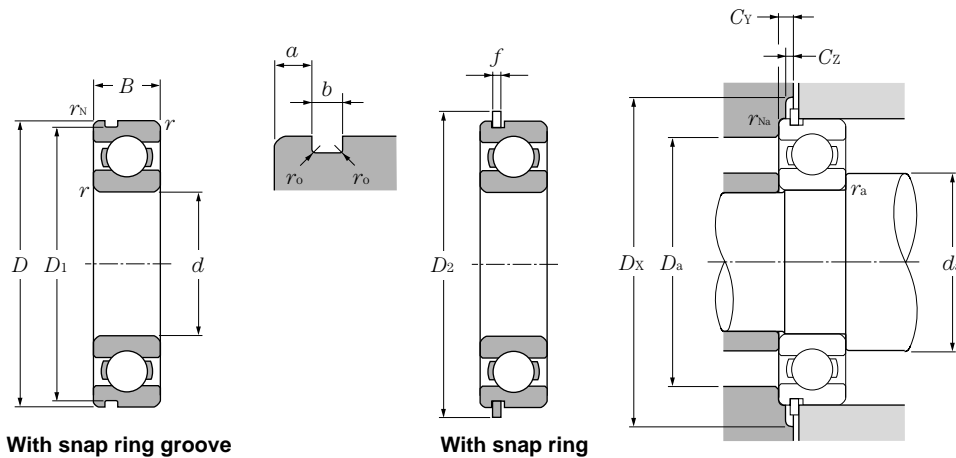
NTN

**d 90 ~ 120mm**

d	Boundary dimensions				Basic load ratings				Limiting speeds			Bearing numbers			
	mm				dynamic		static		rpm			open type	sealed type	non-contact type	contact type
	D	B	$r_{s\ min}$ ①	$r_{NS\ min}$	C_r	C_{or}	C_r	C_{or}	grease open type ZZ	oil open type LLB	LLU				
90	115	13	1	0.5	19.0	19.7	1,940	2,010	5,400	6,300	3,000	6818	ZZ	LLB	LLU
	125	18	1.1	0.5	33.0	31.5	3,350	3,200	5,100	6,000	2,900	6918	ZZ	LLB	LLU
	140	16	1		33.5	33.5	3,400	3,400	4,700	5,600		16018			
	140	24	1.5	0.5	58.0	49.5	5,950	5,050	4,700	5,600	2,800	6018	ZZ	LLB	LLU
	160	30	2	0.5	96.0	71.5	9,800	7,300	4,000	4,700	2,600	6218	ZZ	LLB	LLU
	190	43	3	0.5	143	107	14,500	10,900	3,600	4,200	2,400	6318	ZZ	LLB	LLU
95	120	13	1	0.5	19.3	20.5	1,970	2,090	5,000	5,900	2,800	6819	ZZ	LLB	LLU
	130	18	1.1	0.5	33.5	33.5	3,450	3,400	4,800	5,700	2,800	6919	ZZ	LLB	LLU
	145	16	1		34.5	35.0	3,500	3,550	4,500	5,300		16019			
	145	24	1.5	0.5	60.5	54.0	6,150	5,500	4,500	5,300	2,600	6019	ZZ	LLB	LLU
	170	32	2.1	0.5	109	82.0	11,100	8,350	3,700	4,400	2,500	6219	ZZ	LLB	LLU
	200	45	3	0.5	153	119	15,600	12,100	3,300	3,900	2,300	6319	ZZ		LLU
100	125	13	1	0.5	19.6	21.2	2,000	2,160	4,800	5,600	2,700	6820	ZZ	LLB	LLU
	140	20	1.1	0.5	41.0	39.5	4,200	4,050	4,500	5,300	2,600	6920	ZZ	LLB	LLU
	150	16	1		35.0	36.5	3,600	3,750	4,200	5,000		16020			
	150	24	1.5	0.5	60.0	54.0	6,150	5,500	4,200	5,000	2,600	6020	ZZ	LLB	LLU
	180	34	2.1	0.5	122	93.0	12,500	9,450	3,500	4,200	2,300	6220	ZZ	LLB	LLU
	215	47	3		173	141	17,600	14,400	3,200	3,700	2,200	6320	ZZ		LLU
105	130	13	1	0.5	19.8	22.0	2,020	2,240	4,600	5,400		6821			
	145	20	1.1	0.5	42.5	42.0	4,300	4,300	4,300	5,100	2,500	6921	ZZ	LLB	LLU
	160	18	1		52.0	50.5	5,300	5,150	4,000	4,700		16021			
	160	26	2	0.5	72.5	65.5	7,400	6,700	4,000	4,700	2,400	6021	ZZ	LLB	LLU
	190	36	2.1	0.5	133	105	13,600	10,700	3,400	4,000	2,300	6221	ZZ		LLU
	225	49	3		184	153	18,700	15,700	3,000	3,600	2,100	6321	ZZ		LLU
110	140	16	1	0.5	24.9	28.2	2,540	2,880	4,300	5,100		6822			
	150	20	1.1	0.5	43.5	44.5	4,450	4,550	4,100	4,800	2,400	6922	ZZ	LLB	LLU
	170	19	1		57.5	56.5	5,850	5,800	3,800	4,500		16022			
	170	28	2	0.5	82.0	73.0	8,350	7,450	3,800	4,500	2,300	6022	ZZ	LLB	LLU
	200	38	2.1	0.5	144	117	14,700	11,900	3,200	3,800	2,200	6222	ZZ		LLU
	240	50	3		205	179	20,900	18,300	2,900	3,400	1,900	6322	ZZ		LLU
120	150	16	1	0.5	28.9	33.0	2,950	3,350	4,000	4,700		6824			
	165	22	1.1	0.5	53.0	54.0	5,400	5,500	3,800	4,400		6924			
	180	19	1		63.0	63.5	6,450	6,450	3,500	4,100		16024			
	180	28	2	0.5	85.0	79.5	8,650	8,100	3,500	4,100	2,100	6024	ZZ	LLB	LLU

① Smallest allowable dimension for chamfer dimension r .

Deep Groove Ball Bearings



Equivalent bearing load

dynamic

$$P_r = X F_r + Y F_a$$

$\frac{F_a}{C_{or}}$	e	$\frac{F_a}{F_r}$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.010	0.18	1	0	0.56	2.46
0.020	0.20				2.14
0.040	0.24				1.83
0.070	0.27				1.61
0.10	0.29				1.48
0.15	0.32				1.35
0.20	0.35				1.25
0.30	0.38				1.13
0.40	0.41				1.05
0.50	0.44				1.00

static

$$P_{or} = 0.6 F_r + 0.5 F_a$$

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

Bearing numbers		Snap ring groove dimensions mm				Snap ring dimensions mm		Abutment and fillet dimensions mm								Mass ^④ kg
snap ring groove	snap ring	D_1 max	a max	b min	r_o max	D_2 max	f max	d_a min	d_a max ^③	D_a max	D_X (approx.)	C_Y max	C_Z min	r_{as} max	r_{Na} max	(approx.)
N	NR	112.6	2.1	1.3	0.4	120.7	1.12	95	96	110	122	2.9	1.2	1	0.5	0.285
N	NR	122.6	3.3	1.3	0.4	130.7	1.12	96.5	99	118.5	132	4.1	1.2	1	0.5	0.554
								95	135					1		0.848
N	NR	135.23	3.71	3.1	0.6	149.7	2.82	98	102	132	152	6.1	2.9	1.5	0.5	1.02
N	NR	155.22	4.9	3.1	0.6	169.7	2.82	99	109	151	172	7.3	2.9	2	0.5	2.15
N	NR	183.64	5.69	3.5	0.6	202.9	3.1	103	118	177	205	8.4	3.1	2.5	0.5	4.91
N	NR	117.6	2.1	1.3	0.4	125.7	1.12	100	101	115	127	2.9	1.2	1	0.5	0.3
N	NR	127.6	3.3	1.3	0.4	135.7	1.12	101.5	104	123.5	137	4.1	1.2	1	0.5	0.579
								100	140					1		0.885
N	NR	140.23	3.71	3.1	0.6	154.7	2.82	103	109	137	157	6.1	2.9	1.5	0.5	1.08
N	NR	163.65	5.69	3.5	0.6	182.9	3.1	106	116	159	185	8.4	3.1	2	0.5	2.62
N	NR	193.65	5.69	3.5	0.6	212.9	3.1	108	125	187	215	8.4	3.1	2.5	0.5	5.67
N	NR	122.6	2.1	1.3	0.4	130.7	1.12	105	106	120	132	2.9	1.2	1	0.5	0.313
N	NR	137.6	3.3	1.9	0.6	145.7	1.7	106.5	110	133.5	147	4.7	1.7	1	0.5	0.785
								105	145					1		0.91
N	NR	145.24	3.71	3.1	0.6	159.7	2.82	108	110	142	162	6.1	2.9	1.5	0.5	1.15
N	NR	173.66	5.69	3.5	0.6	192.9	3.1	111	122	169	195	8.4	3.1	2	0.5	3.14
								113	133	202				2.5		7
N	NR	127.6	2.1	1.3	0.4	135.7	1.12	110		125	137	2.9	1.2	1	0.5	0.33
N	NR	142.6	3.3	1.9	0.6	150.7	1.7	111.5	115	138.5	152	4.7	1.7	1	0.5	0.816
								110	155					1		1.2
N	NR	155.22	3.71	3.1	0.6	169.7	2.82	114	119	151	172	6.1	2.9	2	0.5	1.59
N	NR	183.64	5.69	3.5	0.6	202.9	3.1	116	125	179	205	8.4	3.1	2	0.5	3.7
								118	134	212				2.5		8.05
N	NR	137.6	2.5	1.9	0.6	145.7	1.7	115		135	147	3.9	1.7	1	0.5	0.515
N	NR	147.6	3.3	1.9	0.6	155.7	1.7	116.5	120	143.5	157	4.7	1.7	1	0.5	0.849
								115	165					1		1.46
N	NR	163.65	3.71	3.5	0.6	182.9	3.1	119	126	161	185	6.4	3.1	2	0.5	1.96
N	NR	193.65	5.69	3.5	0.6	212.9	3.1	121	132	189	215	8.4	3.1	2	0.5	4.36
								123	149	227				2.5		9.54
N	NR	147.6	2.5	1.9	0.6	155.7	1.7	125		145	157	3.9	1.7	1	0.5	0.555
N	NR	161.8	3.7	1.9	0.6	171.5	1.7	126.5		158.5	173	5.1	1.7	1	0.5	1.15
								125		175				1		1.56
N	NR	173.66	3.71	3.5	0.6	192.9	3.1	129	136	171	195	6.4	3.1	2	0.5	2.07

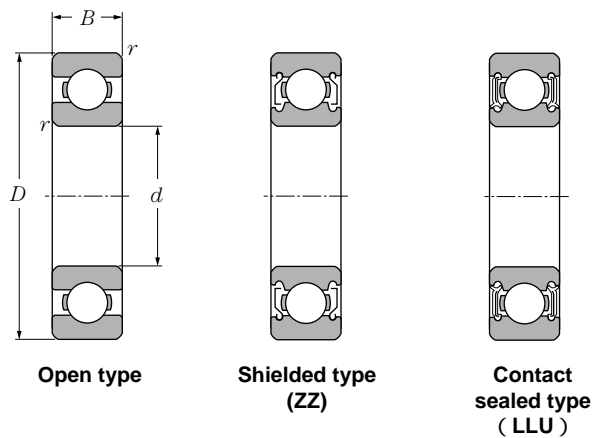
② Sealed and shielded bearings are also available.

③ This dimension applies to sealed and shielded bearings.

④ Does not include bearings with snap rings.

Deep Groove Ball Bearings

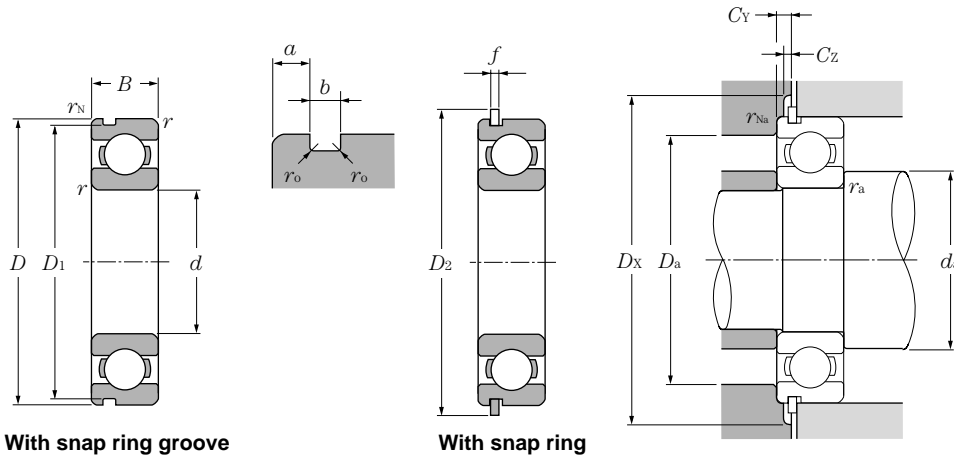
NTN

**d 120 ~ 170mm**

d	Boundary dimensions					Basic load ratings				Limiting speeds			Bearing numbers		
	D	B	r _{s min} ^①	r _{NS min}	mm	dynamic		static		rpm	rpm	rpm	open type	sealed type	contact type
						C _r	C _{or}	C _r	C _{or}						
120	215	40	2.1			155	131	15,900	13,400	2,900	3,400	2,000	6224	ZZ	LLU
	260	55	3			207	185	21,100	18,800	2,600	3,100		6324		
130	165	18	1.1	0.5		37.0	41.0	3,750	4,200	3,700	4,300		6826		
	180	24	1.5	0.5		65.0	67.5	6,650	6,850	3,500	4,100		6926		
	200	22	1.1			80.0	79.5	8,150	8,100	3,200	3,800		16026		
	200	33	2	0.5		106	101	10,800	10,300	3,200	3,800	1,900	6026	ZZ	LLU
	230	40	3			167	146	17,000	14,900	2,700	3,100		6226		
	280	58	4			229	214	23,400	21,800	2,400	2,800		6326		
140	175	18	1.1	0.5		38.5	44.5	3,900	4,550	3,400	4,000		6828		
	190	24	1.5	0.5		66.5	71.5	6,800	7,300	3,200	3,800		6928		
	210	22	1.1			82.0	85.0	8,350	8,650	3,000	3,500		16028		
	210	33	2			110	109	11,200	11,100	3,000	3,500	1,800	6028	ZZ	LLU
	250	42	3			166	150	17,000	15,300	2,500	2,900		6228		
	300	62	4			253	246	25,800	25,100	2,200	2,600		6328		
150	190	20	1.1	0.5		47.5	55.0	4,850	5,600	3,100	3,700		6830		
	210	28	2			85.0	90.5	8,650	9,200	3,000	3,500		6930		
	225	24	1.1			96.5	101	9,850	10,300	2,800	3,200		16030		
	225	35	2.1			126	126	12,800	12,800	2,800	3,200	1,700	6030	ZZ	LLU
	270	45	3			176	168	18,000	17,100	2,300	2,700		6230		
	320	65	4			274	284	28,000	28,900	2,100	2,400		6330		
160	200	20	1.1	0.5		48.5	57.0	4,950	5,800	2,900	3,400		6832		
	220	28	2			87.0	96.0	8,850	9,800	2,800	3,300		6932		
	240	25	1.5			99.0	108	10,100	11,000	2,600	3,000		16032		
	240	38	2.1			143	144	14,500	14,700	2,600	3,000	1,600	6032	ZZ	LLU
	290	48	3			185	186	18,900	19,000	2,100	2,500		6232		
	340	68	4			278	286	28,300	29,200	1,900	2,300		6332		
170	215	22	1.1			60.0	70.5	6,100	7,200	2,700	3,200		6834		
	230	28	2			86.0	95.5	8,750	9,750	2,600	3,100		6934		
	260	28	1.5			119	128	12,100	13,100	2,400	2,800		16034		
	260	42	2.1			168	172	17,200	17,600	2,400	2,800		6034		
	310	52	4			212	223	21,700	22,800	2,000	2,400		6234		
	360	72	4			325	355	33,500	36,000	1,800	2,100		6334		

① Smallest allowable dimension for chamfer dimension r.

Deep Groove Ball Bearings



With snap ring groove

With snap ring

Equivalent bearing load

dynamic

$$P_r = XF_r + YF_a$$

$\frac{F_a}{C_{or}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.010	0.18				2.46
0.020	0.20				2.14
0.040	0.24				1.83
0.070	0.27				1.61
0.10	0.29				1.48
0.15	0.32	1	0	0.56	1.35
0.20	0.35				1.25
0.30	0.38				1.13
0.40	0.41				1.05
0.50	0.44				1.00

static

$$P_{or} = 0.6F_r + 0.5F_a$$

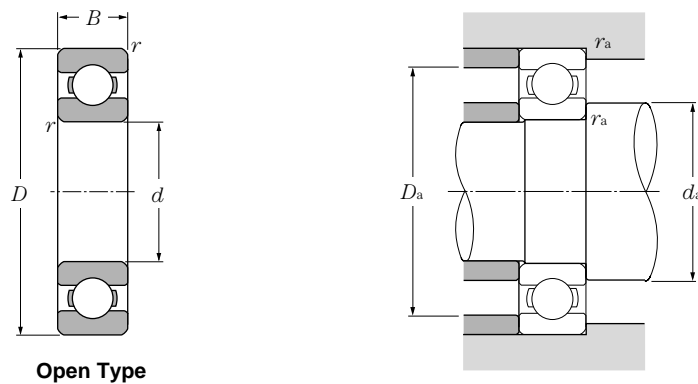
When $P_{or} < F_r$ use $P_{or} = F_r$

Bearing numbers		Snap ring groove dimensions mm				Snap ring dimensions mm		Abutment and fillet dimensions mm								Mass ^④ kg
snap ring groove	snap ring	D_1 max	a max	b min	r_0 max	D_2 max	f max	d_a min	d_a max ^③	D_a max	D_X (approx.)	C_Y max	C_Z min	r_{as} max	r_{Nas} max	(approx.)
								131	143	204				2		5.15
								133		247				2.5		12.4
N	NR	161.8	3.3	1.9	0.6	171.5	1.7	136.5		158.5	173	4.7	1.7	1	0.5	0.8
N	NR	176.8	3.7	1.9	0.6	186.5	1.7	138		172	188	5.1	1.7	1.5	0.5	1.52
								136.5		193.5				1		2.31
N	NR	193.65	5.69	3.5	0.6	212.9	3.1	139	148	191	215	8.4	3.1	2	0.5	3.16
								143		217				2.5		5.82
								146		264				3		15.3
N	NR	171.8	3.3	1.9	0.6	181.5	1.7	146.5		168.5	183	4.7	1.7	1	0.5	0.85
N	NR	186.8	3.7	1.9	0.6	196.5	1.7	148		182	198	5.1	1.7	1.5	0.5	1.62
								146.5		203.5				1		2.45
								149	158	201				2		3.35
								153		237				2.5		7.57
								156		284				3		18.5
N	NR	186.8	3.3	1.9	0.6	196.5	1.7	156.5		183.5	198	4.7	1.7	1	0.5	1.16
								159		201				2		2.47
								156.5		218.5				1		3.07
								161	169	214				2		4.08
								163		257				2.5		9.41
								166		304				3		22
N	NR	196.8	3.3	1.9	0.6	206.5	1.7	166.5		193.5	208	4.7	1.7	1	0.5	1.23
								169		211				2		2.61
								168		232				1.5		3.64
								171	183	229				2		5.05
								173		277				2.5		11.7
								176		324				3		26
								176.5		208.5				1		1.63
								179		221				2		2.74
								178		252				1.5		4.93
								181		249				2		6.76
								186		294				3		14.5
								186		344				3		30.7

② Sealed and shielded bearings are also available. ③ This dimension applies to sealed and shielded bearings. ④ Does not include bearings with snap rings.

Deep Groove Ball Bearings

NTN



Open Type

d 180 ~ 260mm

d	Boundary dimensions			Basic load ratings				Limiting speeds		Bearing numbers
	mm			dynamic	static	dynamic	static	rpm		
	D	B	r _{s min} ^①	C _r	C _{or}	C _r	C _{or}	grease open type	oil open type	
180	225	22	1.1	60.5	73.0	6,200	7,450	2,600	3,000	6836
	250	33	2	110	119	11,200	12,200	2,400	2,900	6936
	280	31	2	117	134	11,900	13,600	2,300	2,700	16036
	280	46	2.1	189	199	19,300	20,300	2,300	2,700	6036
	320	52	4	227	241	23,200	24,600	1,900	2,200	6236
	380	75	4	355	405	36,000	41,500	1,700	2,000	6336
190	240	24	1.5	73.0	88.0	7,450	9,000	2,400	2,900	6838
	260	33	2	113	127	11,500	13,000	2,300	2,700	6938
	290	31	2	134	156	13,700	15,900	2,100	2,500	16038
	290	46	2.1	197	215	20,100	21,900	2,100	2,500	6038
	340	55	4	255	281	26,000	28,700	1,800	2,100	6238
	400	78	5	355	415	36,000	42,500	1,600	1,900	6338
200	250	24	1.5	74.0	91.5	7,550	9,300	2,300	2,700	6840
	280	38	2.1	157	168	16,000	17,100	2,200	2,600	6940
	310	34	2	142	160	14,400	16,300	2,000	2,400	16040
	310	51	2.1	218	243	22,200	24,800	2,000	2,400	6040
	360	58	4	269	310	27,400	31,500	1,700	2,000	6240
	420	80	5	410	500	42,000	51,000	1,500	1,800	6340
220	270	24	1.5	76.5	98.0	7,800	10,000	2,100	2,400	6844
	300	38	2.1	160	180	16,400	18,400	2,000	2,300	6944
	340	37	2.1	181	216	18,500	22,000	1,800	2,200	16044
	340	56	3	241	289	24,600	29,400	1,800	2,200	6044
	400	65	4	297	365	30,500	37,000	1,500	1,800	6244
	460	88	5	410	520	42,000	53,000	1,400	1,600	6344
240	300	28	2	85.0	112	8,650	11,400	1,900	2,200	6848
	320	38	2.1	170	203	17,300	20,700	1,800	2,100	6948
	360	37	2.1	178	217	18,200	22,100	1,700	2,000	16048
	360	56	3	249	310	25,400	32,000	1,700	2,000	6048
260	320	28	2	87.0	120	8,900	12,200	1,700	2,000	6852
	360	46	2.1	222	280	22,600	28,500	1,600	1,900	6952
	400	44	3	227	299	23,200	30,500	1,500	1,800	16052
	400	65	4	291	375	29,700	38,500	1,500	1,800	6052

① Smallest allowable dimension for chamfer dimension r.

Deep Groove Ball Bearings



Equivalent bearing load dynamic

$$P_r = XF_r + YF_a$$

$\frac{F_a}{C_{or}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
		0.010	0.18		
0.020	0.20				2.14
0.040	0.24				1.83
0.070	0.27				1.61
0.10	0.29	1	0	0.56	1.48
0.15	0.32				1.35
0.20	0.35				1.25
0.30	0.38				1.13
0.40	0.41				1.05
0.50	0.44				1.00

static

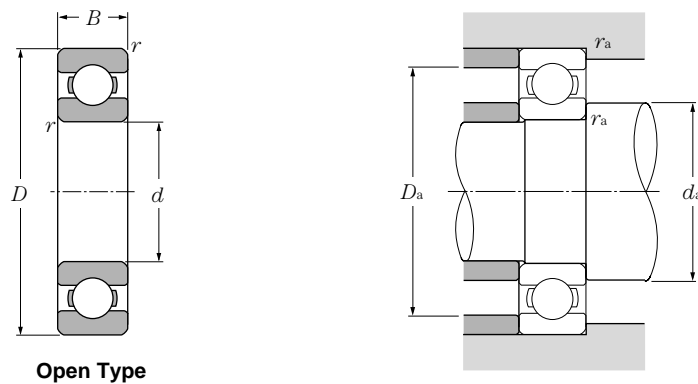
$$P_{or} = 0.6F_r + 0.5F_a$$

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

Abutment and fillet dimensions			Mass
mm			kg
d_a min	D_a max	r_{as} max	(approx.)
186.5	218.5	1	2.03
189	241	2	4.76
189	271	2	6.49
191	269	2	8.8
196	304	3	15.1
196	364	3	35.6
198	232	1.5	2.62
199	251	2	4.98
199	281	2	6.77
201	279	2	9.18
206	324	3	18.2
210	380	4	41
208	242	1.5	2.73
211	269	2	7.1
209	301	2	8.68
211	299	2	11.9
216	344	3	21.6
220	400	4	46.3
228	262	1.5	3
231	289	2	7.69
231	329	2	11.3
233	327	2.5	15.7
236	384	3	30.2
240	440	4	60.8
249	291	2	4.6
251	309	2	8.28
251	349	2	12.1
253	347	2.5	16.8
269	311	2	5
271	349	2	13.9
273	387	2.5	18.5
276	384	3	25

Deep Groove Ball Bearings

NTN

**d 280 ~ 440mm**

d	Boundary dimensions			Basic load ratings				Limiting speeds		Bearing numbers
	mm			dynamic	static	dynamic	static	rpm		
	D	B	r _{s min} ^①	C _r	C _{or}	C _r	C _{or}	grease open type	oil open type	
280	350	33	2	137	177	13,900	18,100	1,600	1,900	6856
	380	46	2.1	227	299	23,200	30,500	1,500	1,800	6956
	420	44	3	232	315	23,700	32,500	1,400	1,600	16056
	420	65	4	325	420	33,000	43,000	1,400	1,600	6056
300	380	38	2.1	162	210	16,500	21,500	1,500	1,700	6860
	420	56	3	276	375	28,200	38,500	1,400	1,600	6960
	460	50	4	292	410	29,800	42,000	1,300	1,500	16060
	460	74	4	355	480	36,000	49,000	1,300	1,500	6060
320	400	38	2.1	168	228	17,200	23,200	1,400	1,600	6864
	440	56	3	285	405	29,000	41,000	1,300	1,500	6964
	480	50	4	300	440	30,500	45,000	1,200	1,400	16064
	480	74	4	370	530	38,000	54,000	1,200	1,400	6064
340	420	38	2.1	170	236	17,400	24,000	1,300	1,500	6868
	460	56	3	293	430	29,800	44,000	1,200	1,400	6968
	520	57	4	340	515	35,000	52,500	1,100	1,300	16068
	520	82	5	420	610	42,500	62,500	1,100	1,300	6068
360	440	38	2.1	187	258	19,100	26,300	1,200	1,400	6872
	480	56	3	300	455	30,500	46,500	1,100	1,300	6972
	540	57	4	350	550	36,000	56,000	1,100	1,200	16072
	540	82	5	440	670	44,500	68,000	1,100	1,200	6072
380	480	46	2.1	231	340	23,600	34,500	1,100	1,300	6876
	520	65	4	325	510	33,000	52,000	1,100	1,200	6976
	560	82	5	455	725	46,500	74,000	990	1,200	6076
400	500	46	2.1	226	340	23,100	34,500	1,100	1,200	6880
	540	65	4	335	535	34,000	54,500	990	1,200	6980
	600	90	5	510	825	52,000	84,000	930	1,100	6080
420	520	46	2.1	260	405	26,500	41,500	1,000	1,200	6884
	560	65	4	340	560	35,000	57,000	940	1,100	6984
	620	90	5	530	895	54,000	91,000	880	1,000	6084
440	540	46	2.1	264	420	26,900	43,000	950	1,100	6888
	600	74	4	365	615	37,500	63,000	890	1,000	6988

① Smallest allowable dimension for chamfer dimension r.

Deep Groove Ball Bearings



Equivalent bearing load dynamic

$$P_r = XF_r + YF_a$$

$\frac{F_a}{C_{or}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
		0.010	0.18		
0.020	0.20				2.14
0.040	0.24				1.83
0.070	0.27				1.61
0.10	0.29	1	0	0.56	1.48
0.15	0.32				1.35
0.20	0.35				1.25
0.30	0.38				1.13
0.40	0.41				1.05
0.50	0.44				1.00

static

$$P_{or} = 0.6F_r + 0.5F_a$$

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

Abutment and fillet dimensions			Mass
mm			kg
d_a min	D_a max	r_{as} max	(approx.)
289	341	2	7.4
291	369	2	14.8
293	407	2.5	23
296	404	3	31
311	369	2	10.5
313	407	2.5	23.5
316	444	3	32.5
316	444	3	43.8
331	389	2	10.9
333	427	2.5	24.8
336	464	3	34.2
336	464	3	46.1
351	409	2	11.5
353	447	2.5	26.2
356	504	3	47.1
360	500	4	61.8
371	429	2	12.3
373	467	2.5	27.5
376	524	3	49.3
380	520	4	64.7
391	469	2	19.7
396	504	3	39.8
400	540	4	67.5
411	489	2	20.6
416	524	3	41.6
420	580	4	87.6
431	509	2	21.6
436	544	3	43.4
440	600	4	91.1
451	529	2	22.5
456	584	3	60

Deep Groove Ball Bearings



Equivalent bearing load dynamic

$$P_r = XF_r + YF_a$$

$\frac{F_a}{C_{or}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
		0.010	0.18		
0.020	0.20				2.14
0.040	0.24				1.83
0.070	0.27				1.61
0.10	0.29	1	0	0.56	1.48
0.15	0.32				1.35
0.20	0.35				1.25
0.30	0.38				1.13
0.40	0.41				1.05
0.50	0.44				1.00

static

$$P_{or} = 0.6F_r + 0.5F_a$$

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

Abutment and fillet dimensions			Mass
mm			kg
d_a min	D_a max	r_{as} max	(approx.)
473	567	2.5	34.8
476	604	3	62.2
493	587	2.5	36.2
500	630	4	73.0
513	607	2.5	37.5
520	650	4	75.5
543	637	2.5	39.5
573	667	2.5	41.5
613	717	2.5	51.7