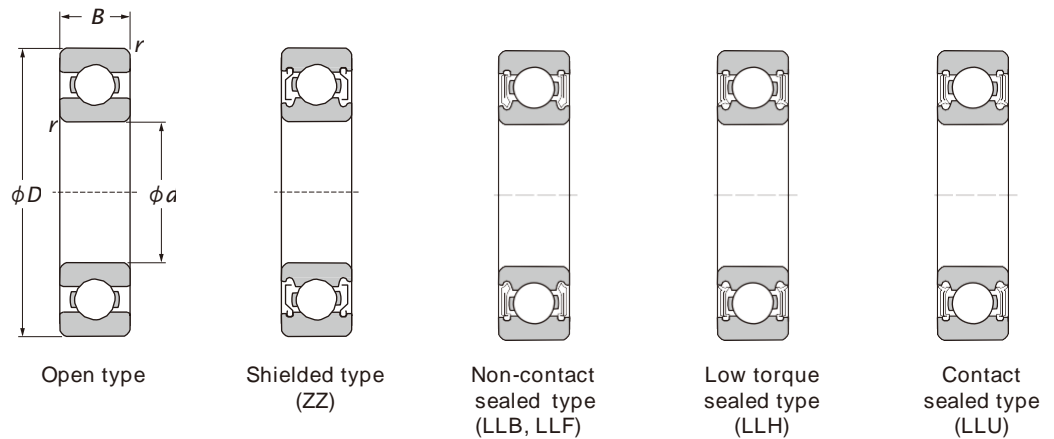


● Deep Groove Ball Bearings

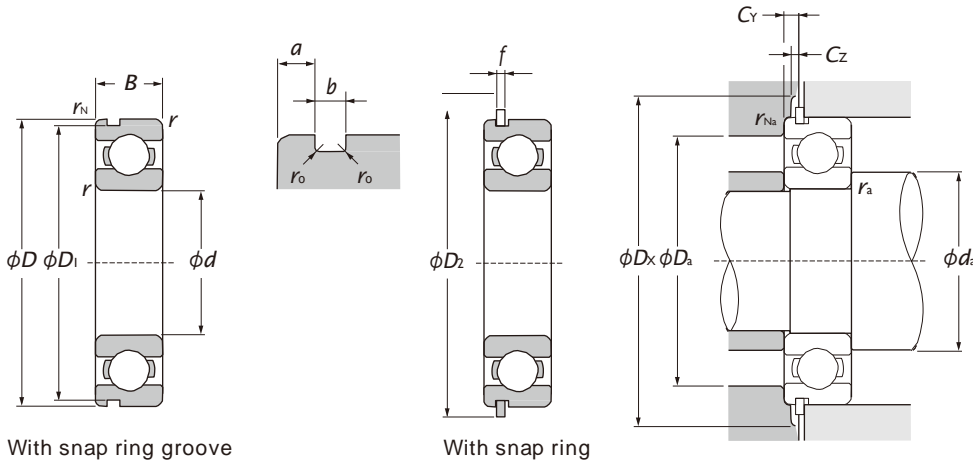


d 10 ~ 20mm

d	Boundary dimensions				Basic load ratings				Factor	Limiting speeds				Bearing numbers				
	mm				kN		kgf			grease open type ZZ	oil open type LLB	LLH	LLU	open type	shielded type	non-contact sealed type	low torque sealed type	contact sealed type
	D	B	$r_{smin}^{1)}$	r_{NSmin}	C_r	C_{or}	C_r	C_{or}										
10	15	3	0.1	—	0.855	0.435	87	44	15.7	10000	12000	—	—	6700	—	—	—	—
	19	5	0.3	—	1.83	0.925	187	94	14.8	32000	38000	—	24000	6800	ZZ	LLB	—	LLU
	22	6	0.3	0.3	2.7	1.27	275	129	14.0	30000	36000	—	21000	6900	ZZ	LLB	—	LLU
	26	8	0.3	—	4.55	1.96	465	200	12.4	29000	34000	25000	21000	6000	ZZ	LLB	LLH	LLU
	30	9	0.6	0.5	5.10	2.39	520	244	13.2	25000	30000	21000	18000	6200	ZZ	LLB	LLH	LLU
	35	11	0.6	0.5	8.20	3.50	835	355	11.4	23000	27000	20000	16000	6300	ZZ	LLB	LLH	LLU
12	18	4	0.2	—	0.930	0.530	95	54	16.2	8300	9500	—	—	6701	—	LLF	—	—
	21	5	0.3	—	1.92	1.04	195	106	15.3	29000	35000	—	20000	6801	ZZ	LLB	—	LLU
	24	6	0.3	0.3	2.89	1.46	295	149	14.5	27000	32000	—	19000	6901	ZZ	LLB	—	LLU
	28	7	0.3	—	5.10	2.39	520	244	13.2	26000	30000	—	—	16001	—	—	—	—
	28	8	0.3	—	5.10	2.39	520	244	13.2	26000	30000	21000	18000	6001	ZZ	LLB	LLH	LLU
	32	10	0.6	0.5	6.10	2.75	620	280	12.7	22000	26000	20000	16000	6201	ZZ	LLB	LLH	LLU
37	12	1	0.5	9.70	4.20	990	425	11.1	20000	24000	19000	15000	6301	ZZ	LLB	LLH	LLU	
15	21	4	0.2	—	0.940	0.585	96	59	16.5	6600	7600	—	—	6702	—	LLF	—	—
	24	5	0.3	—	2.08	1.26	212	128	15.8	26000	31000	—	17000	6802	ZZ	LLB	—	LLU
	28	7	0.3	0.3	3.65	2.00	375	204	14.8	24000	28000	—	16000	6902	ZZ	LLB	—	LLU
	32	8	0.3	—	5.60	2.83	570	289	13.9	22000	26000	—	—	16002	—	—	—	—
	32	9	0.3	0.3	5.60	2.83	570	289	13.9	22000	26000	18000	15000	6002	ZZ	LLB	LLH	LLU
	35	11	0.6	0.5	7.75	3.60	790	365	12.7	19000	23000	18000	15000	6202	ZZ	LLB	LLH	LLU
42	13	1	0.5	11.4	5.45	1170	555	12.3	17000	21000	15000	12000	6302	ZZ	LLB	LLH	LLU	
17	23	4	0.2	—	1.00	0.660	102	67	16.3	5000	6700	—	—	6703	—	LLF	—	—
	26	5	0.3	—	2.23	1.46	227	149	16.1	24000	28000	—	15000	6803	ZZ	LLB	—	LLU
	30	7	0.3	0.3	4.65	2.58	475	263	14.7	22000	26000	—	14000	6903	ZZ	LLB	—	LLU
	35	8	0.3	—	6.80	3.35	695	345	13.6	20000	24000	—	—	16003	—	—	—	—
	35	10	0.3	0.3	6.80	3.35	695	345	13.6	20000	24000	16000	14000	6003	ZZ	LLB	LLH	LLU
	40	12	0.6	0.5	9.60	4.60	980	465	12.8	18000	21000	15000	12000	6203	ZZ	LLB	LLH	LLU
47	14	1	0.5	13.5	6.55	1380	665	12.2	16000	19000	14000	11000	6303	ZZ	LLB	LLH	LLU	
62	17	1.1	—	22.7	10.8	2320	1100	11.1	14000	16000	—	—	6403	—	—	—	—	
20	27	4	0.2	—	1.04	0.730	106	74	16.1	5000	5700	—	—	6704	—	LLF	—	—
	32	7	0.3	0.3	4.00	2.47	410	252	15.5	21000	25000	—	13000	6804	ZZ	LLB	—	LLU
	37	9	0.3	0.3	6.40	3.70	650	375	14.7	19000	23000	—	12000	6904	ZZ	LLB	—	LLU
	42	8	0.3	—	7.90	4.50	810	455	14.5	18000	21000	—	—	16004	—	—	—	—
	42	12	0.6	0.5	9.40	5.05	955	515	13.9	18000	21000	13000	11000	6004	ZZ	LLB	LLH	LLU
	47	14	1	0.5	12.8	6.65	1310	680	13.2	16000	18000	12000	10000	6204	ZZ	LLB	LLH	LLU
52	15	1.1	0.5	15.9	7.90	1620	805	12.4	14000	17000	12000	10000	6304	ZZ	LLB	LLH	LLU	

1) Smallest allowable dimension for chamfer dimension r.

● Deep Groove Ball Bearings



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

$f_0 \cdot F_a$ C_{or}	e	$F_a \leq e F_r$		$F_a > e F_r$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22				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				1.04
6.89	0.44				1.00

Static equivalent radial load

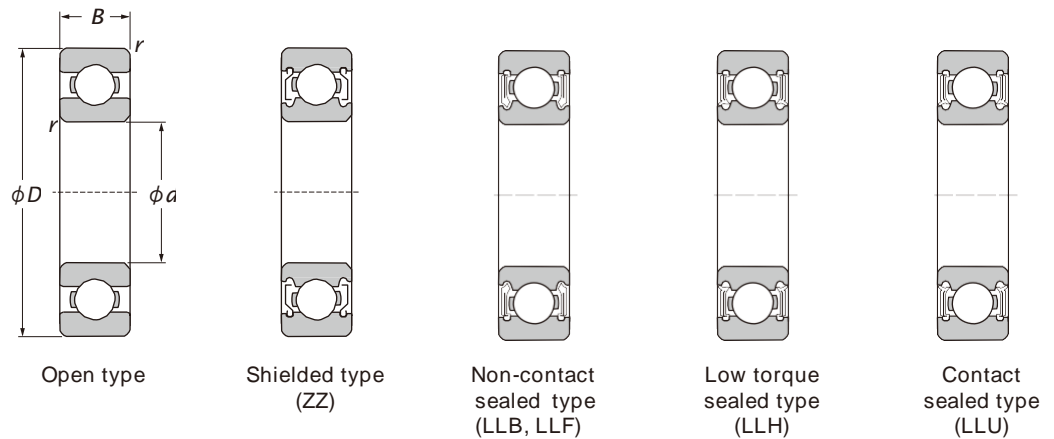
$$P_{or} = 0.6 F_r + 0.5 F_a$$

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⁾	
ring groove	ring groove	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.)	kg
—	—	—	—	—	—	—	—	10.8	—	14.2	—	—	—	0.1	—	—	0.0015
—	—	—	—	—	—	—	—	12	12.5	17	—	—	—	0.3	—	—	0.005
N	NR	20.8	1.05	0.8	0.2	24.8	0.7	12	13	20	25.5	1.5	0.7	0.3	0.3	—	0.009
— ⁵⁾	— ⁵⁾	—	—	—	—	—	—	12	13.5	24	—	—	—	0.3	—	—	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
—	—	—	—	—	—	—	—	13.6	13.8	16.4	—	—	—	0.2	—	—	0.002
—	—	—	—	—	—	—	—	14	14.5	19	—	—	—	0.3	—	—	0.006
N	NR	22.8	1.05	0.8	0.2	26.8	0.7	14	15	22	27.5	1.5	0.7	0.3	0.3	—	0.011
—	—	—	—	—	—	—	—	14	—	26	—	—	—	0.3	—	—	0.019
— ⁵⁾	— ⁵⁾	—	—	—	—	—	—	14	16	26	—	—	—	0.3	—	—	0.021
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
—	—	—	—	—	—	—	—	16.6	16.8	19.4	—	—	—	0.2	—	—	0.0025
—	—	—	—	—	—	—	—	17	17.5	22	—	—	—	0.3	—	—	0.007
N	NR	26.7	1.3	0.95	0.25	30.8	0.85	17	17.5	26	31.5	1.9	0.9	0.3	0.3	—	0.016
—	—	—	—	—	—	—	—	17	—	30	—	—	—	0.3	—	—	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
—	—	—	—	—	—	—	—	18.6	18.8	21.4	—	—	—	0.2	—	—	0.0025
—	—	—	—	—	—	—	—	19	19.5	24	—	—	—	0.3	—	—	0.008
N	NR	28.7	1.3	0.95	0.25	32.8	0.85	19	20	28	33.5	1.9	0.9	0.3	0.3	—	0.018
—	—	—	—	—	—	—	—	19	—	33	—	—	—	0.3	—	—	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
—	—	—	—	—	—	—	—	21.6	22.3	25.4	—	—	—	0.2	—	—	0.0045
N	NR	30.7	1.3	0.95	0.25	34.8	0.85	22	22.5	30	35.5	1.9	0.9	0.3	0.3	—	0.019
N	NR	35.7	1.7	0.95	0.25	39.8	0.85	22	24	35	40.5	2.3	0.9	0.3	0.3	—	0.036
—	—	—	—	—	—	—	—	22	—	40	—	—	—	0.3	—	—	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-40.

● Deep Groove Ball Bearings

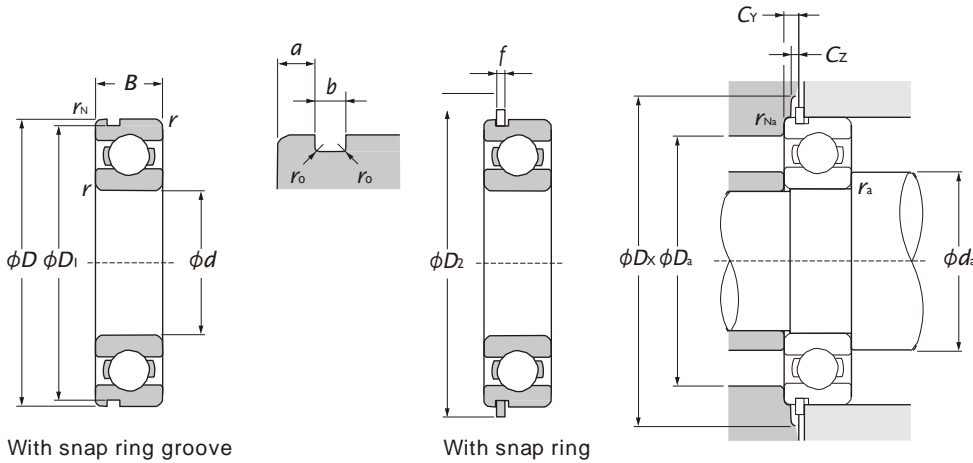


d 20 ~ 35mm

d	Boundary dimensions				Basic load ratings				Factor f_o	Limiting speeds				Bearing numbers				
	mm				kN		kgf			min ⁻¹				open type	shielded type	non-contact sealed type	low torque sealed type	contact sealed type
	D	B	$r_{smin}^{1)}$	r_{NSmin}	C_r	C_{or}	C_r	C_{or}		grease open type ZZ	oil open type LB	LLH	LLU					
20	72	19	1.1	—	28.5	13.9	2900	1420	11.4	12000	14000	—	—	6404	—	—	—	—
22	44	12	0.6	0.5	9.40	5.05	955	515	13.9	17000	20000	13000	10000	60/22	ZZ	LLB	LLH	LLU
	50	14	1	0.5	12.9	6.80	1320	690	13.5	14000	17000	12000	9700	62/22	ZZ	LLB	LLH	LLU
	56	16	1.1	0.5	18.4	9.25	1880	945	12.4	13000	15000	11000	9200	63/22	ZZ	LLB	LLH	LLU
25	32	4	0.2	—	1.10	0.840	112	86	15.8	4000	4600	—	—	6705	—	LLF	—	—
	37	7	0.3	0.3	4.30	2.95	435	300	16.1	18000	21000	—	10000	6805	ZZ	LLB	—	LLU
	42	9	0.3	0.3	7.05	4.55	715	460	15.4	16000	19000	—	9800	6905	ZZ	LLB	—	LLU
	47	8	0.3	—	8.35	5.10	855	520	15.1	15000	18000	—	—	16005	—	—	—	—
	47	12	0.6	0.5	10.1	5.85	1030	595	14.5	15000	18000	11000	9400	6005	ZZ	LLB	LLH	LLU
	52	15	1	0.5	14.0	7.85	1430	800	13.9	13000	15000	11000	8900	6205	ZZ	LLB	LLH	LLU
	62	17	1.1	0.5	21.2	10.9	2160	1110	12.6	12000	14000	9700	8100	6305	ZZ	LLB	LLH	LLU
80	21	1.5	—	34.5	17.5	3550	1780	11.6	10000	12000	—	—	6405	—	—	—	—	
28	52	12	0.6	0.5	12.5	7.40	1270	755	14.5	14000	16000	10000	8400	60/28	ZZ	LLB	LLH	LLU
	58	16	1	0.5	17.9	9.75	1830	995	13.4	12000	14000	9700	8100	62/28	ZZ	LLB	LLH	LLU
	68	18	1.1	0.5	26.7	14.0	2730	1430	12.4	11000	13000	8900	7400	63/28	ZZ	LLB	LLH	LLU
30	37	4	0.2	—	1.14	0.950	117	97	15.7	3300	3800	—	—	6706	—	LLF	—	—
	42	7	0.3	0.3	4.70	3.65	480	370	16.5	15000	18000	—	8800	6806	ZZ	LLB	—	LLU
	47	9	0.3	0.3	7.25	5.00	740	510	15.8	14000	17000	—	8400	6906	ZZ	LLB	—	LLU
	55	9	0.3	—	11.2	7.35	1150	750	15.2	13000	15000	—	—	16006	—	—	—	—
	55	13	1	0.5	13.2	8.3	1350	845	14.8	13000	15000	9200	7700	6006	ZZ	LLB	LLH	LLU
	62	16	1	0.5	19.5	11.3	1980	1150	13.8	11000	13000	8800	7300	6206	ZZ	LLB	LLH	LLU
	72	19	1.1	0.5	26.7	15.0	2720	1530	13.3	10000	12000	7900	6600	6306	ZZ	LLB	LLH	LLU
90	23	1.5	—	43.5	23.9	4400	2440	12.3	8800	10000	—	—	6406	—	—	—	—	
32	58	13	1	0.5	11.8	8.05	1200	820	15.4	12000	15000	8700	7200	60/32	ZZ	LLB	LLH	LLU
	65	17	1	0.5	20.7	11.6	2110	1190	13.6	11000	12000	8400	7100	62/32	ZZ	LLB	LLH	LLU
	75	20	1.1	0.5	29.8	16.9	3050	1730	13.1	9500	11000	7700	6500	63/32	ZZ	LLB	LLH	LLU
35	47	7	0.3	0.3	4.90	4.05	500	410	16.4	13000	16000	—	7600	6807	ZZ	LLB	—	LLU
	55	10	0.6	0.5	9.55	6.85	975	695	15.8	12000	15000	—	7100	6907	ZZ	LLB	—	LLU
	62	9	0.3	—	11.7	8.20	1190	835	15.6	12000	14000	—	—	16007	—	—	—	—
	62	14	1	0.5	16.0	10.3	1630	1050	14.8	12000	14000	8200	6800	6007	ZZ	LLB	LLH	LLU
	72	17	1.1	0.5	25.7	15.3	2620	1560	13.8	9800	11000	7600	6300	6207	ZZ	LLB	LLH	LLU
	80	21	1.5	0.5	33.5	19.1	3400	1950	13.1	8800	10000	7300	6000	6307	ZZ	LLB	LLH	LLU
100	25	1.5	—	55.0	31.0	5600	3150	12.3	7800	9100	—	—	6407	—	—	—	—	

1) Smallest allowable dimension for chamfer dimension r .

● Deep Groove Ball Bearings



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

$f_0 \cdot F_a$	e	$F_a \leq e F_r$		$F_a > e F_r$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22				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				1.04
6.89	0.44				1.00

Static equivalent radial load

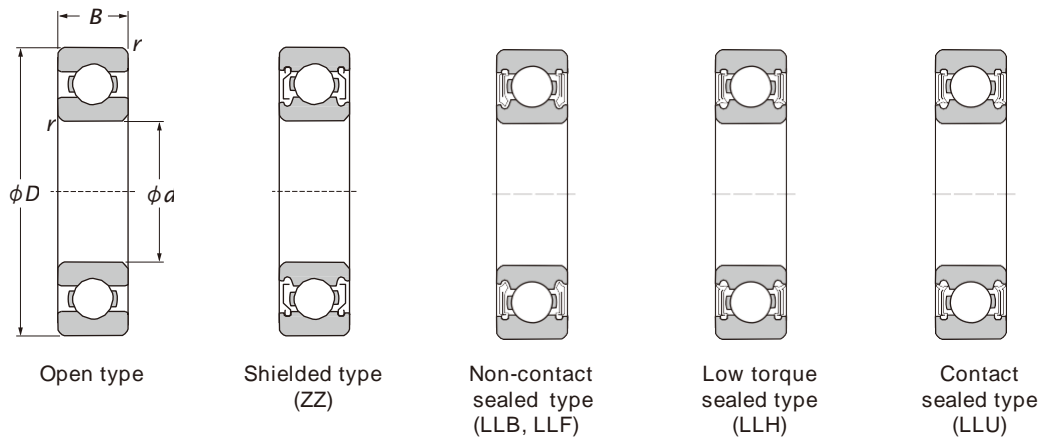
$$P_{or} = 0.6 F_r + 0.5 F_a$$

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⁾
ring groove	ring groove	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.)
—	—	—	—	—	—	—	—	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

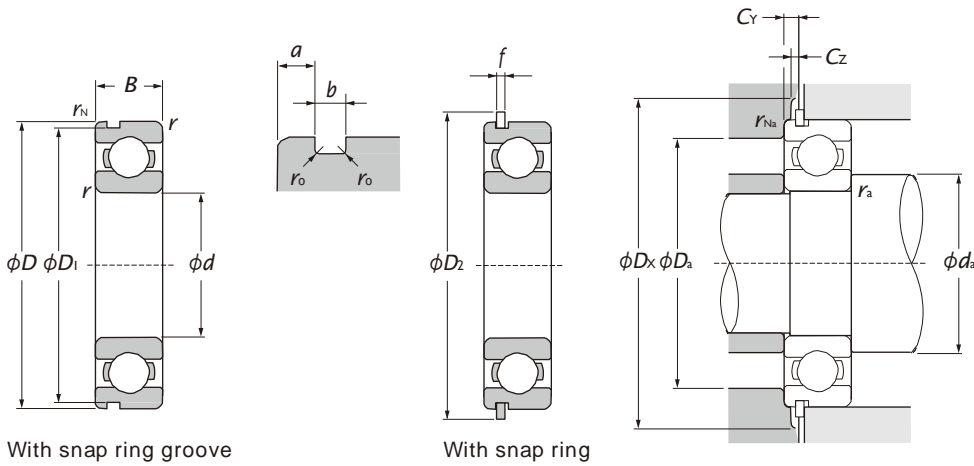


d 40 ~ 60mm

d	Boundary dimensions				Basic load ratings				Factor	Limiting speeds				Bearing numbers					
	mm				kN		kgf			f _o	min ⁻¹				open type	shielded type	non-contact sealed type	low torque sealed type	contact sealed type
	D	B	r _{smin} ¹⁾	r _{NSmin}	C _r	C _{or}	C _r	C _{or}			grease open type ZZ	oil open type LLB	Z	LLH					
40	52	7	0.3	0.3	5.10	4.40	520	445	16.3	12000	14000	—	6700	6808	ZZ	LLB	—	LLU	
	62	12	0.6	0.5	12.2	8.90	1240	910	15.8	11000	13000	—	6300	6908	ZZ	LLB	—	LLU	
	68	9	0.3	—	12.6	9.65	1290	985	16.0	10000	12000	—	—	16008	—	—	—	—	
	68	15	1	0.5	16.8	11.5	1710	1170	15.2	10000	12000	7300	6100	6008	ZZ	LLB	LLH	LLU	
	80	18	1.1	0.5	29.1	17.8	2970	1820	14.0	8700	10000	6700	5600	6208	ZZ	LLB	LLH	LLU	
	90	23	1.5	0.5	40.5	24.0	4150	2450	13.2	7800	9200	6400	5300	6308	ZZ	LLB	LLH	LLU	
	110	27	2	—	63.5	36.5	6500	3750	12.3	7000	8200	—	—	6408	—	—	—	—	
45	58	7	0.3	0.3	5.35	4.95	550	500	16.1	11000	12000	—	5900	6809	ZZ	LLB	—	LLU	
	68	12	0.6	0.5	13.1	10.4	1330	1060	16.1	9800	12000	—	5600	6909	ZZ	LLB	—	LLU	
	75	10	0.6	—	12.9	10.5	1320	1070	16.2	9200	11000	—	—	16009	—	—	—	—	
	75	16	1	0.5	21.0	15.1	2140	1540	15.3	9200	11000	6500	5400	6009	ZZ	LLB	LLH	LLU	
	85	19	1.1	0.5	32.5	20.4	3350	2080	14.1	7800	9200	6200	5200	6209	ZZ	LLB	LLH	LLU	
	100	25	1.5	0.5	53.0	32.0	5400	3250	13.1	7000	8200	5600	4700	6309	ZZ	LLB	LLH	LLU	
	120	29	2	—	77.0	45.0	7850	4600	12.1	6300	7400	—	—	6409	—	—	—	—	
50	65	7	0.3	0.3	6.60	6.10	670	620	16.1	9600	11000	—	5300	6810	ZZ	LLB	—	LLU	
	72	12	0.6	0.5	13.4	11.2	1370	1140	16.3	8900	11000	—	5100	6910	ZZ	LLB	—	LLU	
	80	10	0.6	—	13.2	11.3	1350	1150	16.4	8400	9800	—	—	16010	—	—	—	—	
	80	16	1	0.5	21.8	16.6	2230	1690	15.5	8400	9800	6000	5000	6010	ZZ	LLB	LLH	LLU	
	90	20	1.1	0.5	35.0	23.2	3600	2370	14.4	7100	8300	5700	4700	6210	ZZ	LLB	LLH	LLU	
	110	27	2	0.5	62.0	38.5	6300	3900	13.2	6400	7500	5000	4200	6310	ZZ	LLB	LLH	LLU	
	130	31	2.1	—	83.0	49.5	8450	5050	12.5	5700	6700	—	—	6410	—	—	—	—	
55	72	9	0.3	0.3	8.80	8.10	900	825	16.2	8700	10000	—	4800	6811	ZZ	LLB	—	LLU	
	80	13	1	0.5	16.0	13.3	1630	1350	16.2	8200	9600	—	4600	6911	ZZ	LLB	—	LLU	
	90	11	0.6	—	18.6	15.3	1900	1560	16.2	7700	9000	—	—	16011	—	—	—	—	
	90	18	1.1	0.5	28.3	21.2	2880	2170	15.3	7700	9000	—	4500	6011	ZZ	LLB	—	LLU	
	100	21	1.5	0.5	43.5	29.2	4450	2980	14.3	6400	7600	—	4300	6211	ZZ	LLB	—	LLU	
	120	29	2	0.5	71.5	45.0	7300	4600	13.2	5800	6800	—	3900	6311	ZZ	LLB	—	LLU	
	140	33	2.1	—	89.0	54.0	9050	5500	12.7	5200	6100	—	—	6411	—	—	—	—	
60	78	10	0.3	0.3	11.5	10.6	1170	1080	16.3	8000	9400	—	4400	6812	ZZ	LLB	—	LLU	
	85	13	1	0.5	16.4	14.3	1670	1450	16.4	7600	8900	—	4300	6912	ZZ	LLB	—	LLU	
	95	11	0.6	—	20.0	17.5	2040	1780	16.3	7000	8300	—	—	16012	—	—	—	—	
	95	18	1.1	0.5	29.5	23.2	3000	2370	15.6	7000	8300	—	4100	6012	ZZ	LLB	—	LLU	
	110	22	1.5	0.5	52.5	36.0	5350	3700	14.3	6000	7000	—	3800	6212	ZZ	LLB	—	LLU	
	130	31	2.1	0.5	82.0	52.0	8350	5300	13.2	5400	6300	—	3600	6312	ZZ	LLB	—	LLU	
	150	35	2.1	—	102	64.5	10400	6550	12.6	4800	5700	—	—	6412	—	—	—	—	

1) Smallest allowable dimension for chamfer dimension r.

● Deep Groove Ball Bearings



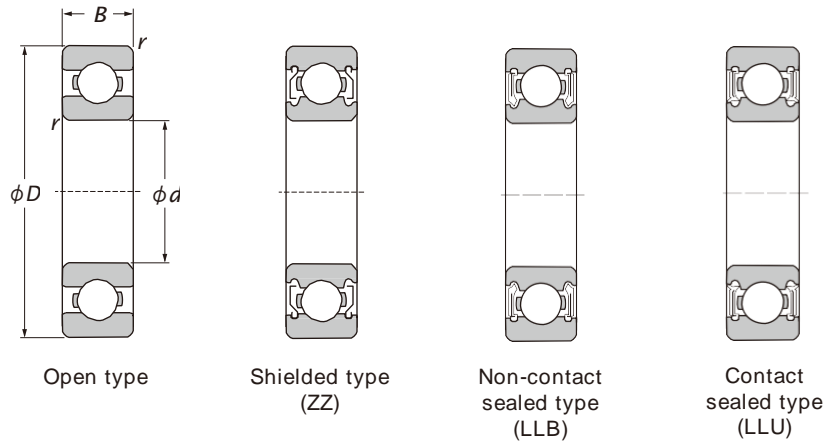
With snap ring groove

With snap ring

Bearing numbers		Snap ring groove dimensions mm				Snap ring dimensions mm		Abutment and fillet dimensions mm								Mass ⁴⁾
ring groove	ring groove	D_1 max	a max	b min	r_o max	D_2 max	f max	min	d_a max ³⁾	D_a max	D_x (approx.)	C_Y max	C_Z min	r_{as} max	r_{Nas} max	kg (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
—	—	—	—	—	—	—	—	42	—	66	—	—	—	0.3	—	0.125
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

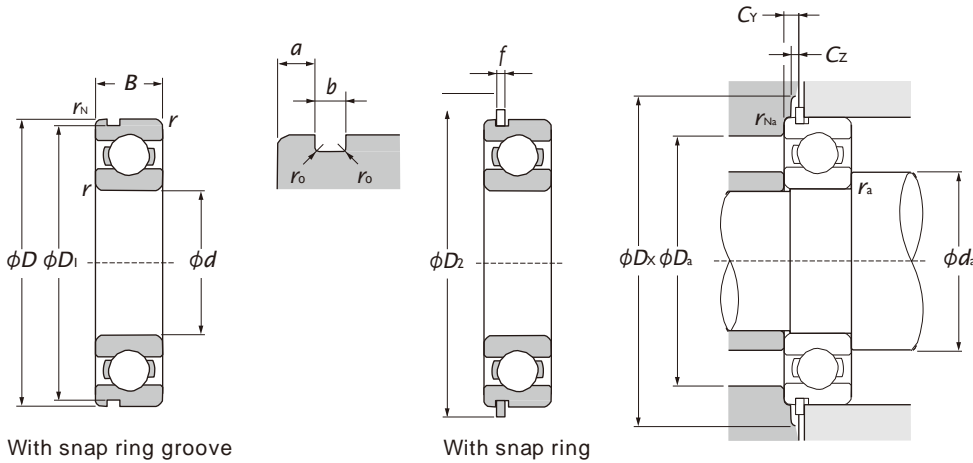


d 65 ~ 85mm

d	Boundary dimensions				Basic load ratings				Factor f_o	Limiting speeds			Bearing numbers				
	mm				kN		kgf			grease open type ZZ LLB	min ⁻¹ oil open type Z LB		LLU	open type	non- contact shielded type	low- torque sealed type	contact sealed type
	D	B	$r_{smin}^{1)}$	r_{NSmin}	C_r	C_{or}	C_r	C_{or}			Z	LB					
65	85	10	0.6	0.5	11.6	11.0	1 180	1 120	16.2	7 400	8 700	4 100	6813	ZZ	LLB	LLU	
	90	13	1	0.5	17.4	16.1	1 770	1 640	16.6	7 000	8 200	4 000	6913	ZZ	LLB	LLU	
	100	11	0.6	—	20.5	18.7	2 090	1 910	16.5	6 500	7 700	—	16013	—	—	—	
	100	18	1.1	0.5	30.5	25.2	3 100	2 570	15.8	6 500	7 700	3 900	6013	ZZ	LLB	LLU	
	120	23	1.5	0.5	57.5	40.0	5 850	4 100	14.4	5 500	6 500	3 600	6213	ZZ	LLB	LLU	
	140	33	2.1	0.5	92.5	60.0	9 450	6 100	13.2	4 900	5 800	3 300	6313	ZZ	LLB	LLU	
	160	37	2.1	—	111	72.5	11 300	7 400	12.7	4 400	5 200	—	6413	—	—	—	
70	90	10	0.6	0.5	12.1	11.9	1 230	1 220	16.1	6 900	8 100	3 800	6814	ZZ	LLB	LLU	
	100	16	1	0.5	23.7	21.2	2 420	2 160	16.3	6 500	7 700	3 700	6914	ZZ	LLB	LLU	
	110	13	0.6	—	24.4	22.6	2 480	2 300	16.5	6 100	7 100	—	16014	—	—	—	
	110	20	1.1	0.5	38.0	31.0	3 900	3 150	15.6	6 100	7 100	3 600	6014	ZZ	LLB	LLU	
	125	24	1.5	0.5	62.0	44.0	6 350	4 500	14.5	5 100	6 000	3 400	6214	ZZ	LLB	LLU	
	150	35	2.1	0.5	104	68.0	10 600	6 950	13.2	4 600	5 400	3 100	6314	ZZ	LLB	LLU	
	180	42	3	—	128	89.5	13 100	9 100	12.7	4 100	4 800	—	6414	—	—	—	
75	95	10	0.6	0.5	12.5	12.9	1 280	1 310	16.0	6 400	7 600	3 600	6815	ZZ	LLB	LLU	
	105	16	1	0.5	24.4	22.6	2 480	2 300	16.5	6 100	7 200	3 500	6915	ZZ	LLB	LLU	
	115	13	0.6	—	25.0	24.0	2 540	2 450	16.6	5 700	6 700	—	16015	—	—	—	
	115	20	1.1	0.5	39.5	33.5	4 050	3 400	15.8	5 700	6 700	3 300	6015	ZZ	LLB	LLU	
	130	25	1.5	0.5	66.0	49.5	6 750	5 050	14.7	4 800	5 600	3 200	6215	ZZ	LLB	LLU	
	160	37	2.1	0.5	113	77.0	11 600	7 850	13.2	4 300	5 000	2 900	6315	ZZ	LLB	LLU	
	190	45	3	—	138	99.0	14 000	10 100	12.7	3 800	4 500	—	6415	—	—	—	
80	100	10	0.6	0.5	12.7	13.3	1 290	1 360	16.0	6 000	7 100	3 400	6816	ZZ	LLB	LLU	
	110	16	1	0.5	24.9	24.0	2 540	2 450	16.6	5 700	6 700	3 200	6916	ZZ	LLB	LLU	
	125	14	0.6	—	25.4	25.1	2 590	2 560	16.4	5 300	6 200	—	16016	—	—	—	
	125	22	1.1	0.5	47.5	40.0	4 850	4 050	15.6	5 300	6 200	3 100	6016	ZZ	LLB	LLU	
	140	26	2	0.5	72.5	53.0	7 400	5 400	14.6	4 500	5 300	3 000	6216	ZZ	LLB	LLU	
	170	39	2.1	0.5	123	86.5	12 500	8 850	13.3	4 000	4 700	2 700	6316	ZZ	LLB	LLU	
	200	48	3	—	164	125	16 700	12 800	12.3	3 600	4 200	—	6416	—	—	—	
85	110	13	1	0.5	18.7	19.0	1 910	1 940	16.2	5 700	6 700	3 100	6817	ZZ	LLB	LLU	
	120	18	1.1	0.5	32.0	29.6	3 250	3 000	16.4	5 400	6 300	3 000	6917	ZZ	LLB	LLU	
	130	14	0.6	—	25.9	26.2	2 640	2 670	16.4	5 000	5 900	—	16017	—	—	—	
	130	22	1.1	0.5	49.5	43.0	5 050	4 400	15.8	5 000	5 900	2 900	6017	ZZ	LLB	LLU	
	150	28	2	0.5	83.5	64.0	8 500	6 500	14.7	4 200	5 000	2 800	6217	ZZ	LLB	LLU	
	180	41	3	0.5	133	97.0	13 500	9 850	13.3	3 800	4 500	2 600	6317	ZZ	LLB	LLU	

1) Smallest allowable dimension for chamfer dimension r .

● Deep Groove Ball Bearings



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

$f_0 \cdot F_a$ C_{or}	e	$F_a \leq e F_r$		$F_a > e F_r$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22				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				1.04
6.89	0.44				1.00

Static equivalent radial load

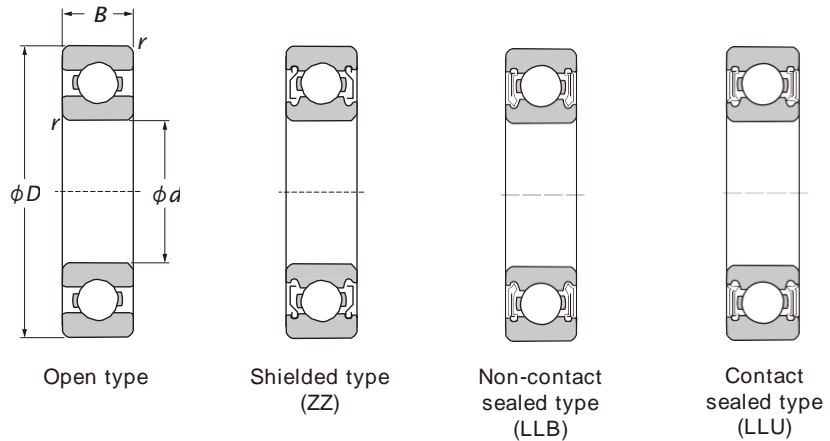
$$P_{or} = 0.6 F_r + 0.5 F_a$$

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⁾
ring groove	ring groove	D_1 max	a max	b min	r_o max	D_2 max	f max	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	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

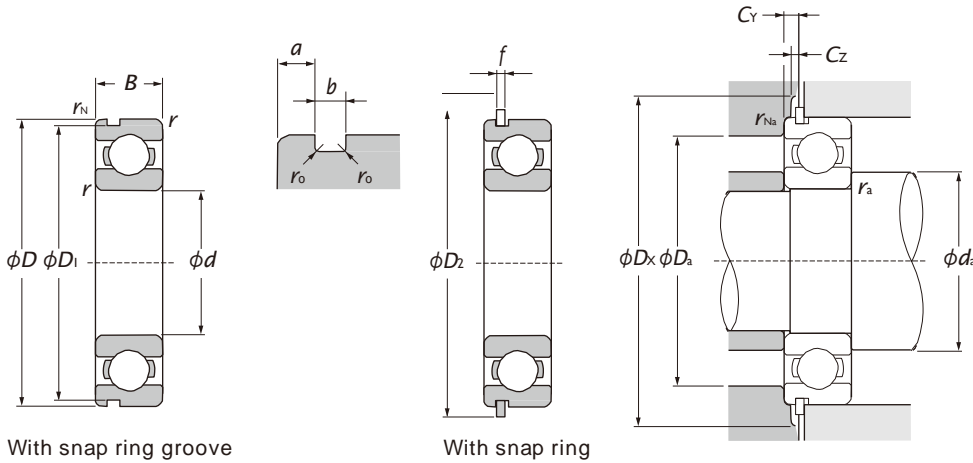


d 90 ~ 120mm

Boundary dimensions					Basic load ratings				Factor	Limiting speeds			Bearing numbers			
d	D	B	$r_{smin}^{1)}$	r_{NSmin}	dynamic		dynamic	static	f_o	min ⁻¹			open type	non-contact shielded type	low-torque sealed type	contact sealed type
					C_r	C_{or}	C_r	C_{or}		grease	oil	LLU				
mm					kN		kgf			ZZ	LLB	LLU				
90	115	13	1	0.5	19.0	19.7	1 940	2 010	16.1	5 400	6 300	3 000	6818	ZZ	LLB	LLU
	125	18	1.1	0.5	33.0	31.5	3 350	3 200	16.5	5 100	6 000	2 900	6918	ZZ	LLB	LLU
	140	16	1	—	33.5	33.5	3 400	3 400	16.5	4 700	5 600	—	16018	—	—	—
	140	24	1.5	0.5	58.0	49.5	5 950	5 050	15.6	4 700	5 600	2 800	6018	ZZ	LLB	LLU
	160	30	2	0.5	96.0	71.5	9 800	7 300	14.5	4 000	4 700	2 600	6218	ZZ	LLB	LLU
	190	43	3	0.5	143	107	14 500	10 900	13.3	3 600	4 200	2 400	6318	ZZ	LLB	LLU
95	120	13	1	0.5	19.3	20.5	1 970	2 090	16.1	5 000	5 900	2 800	6819	ZZ	LLB	LLU
	130	18	1.1	0.5	33.5	33.5	3 450	3 400	16.6	4 800	5 700	2 800	6919	ZZ	LLB	LLU
	145	16	1	—	34.5	35.0	3 500	3 550	16.5	4 500	5 300	—	16019	—	—	—
	145	24	1.5	0.5	60.5	54.0	6 150	5 500	15.8	4 500	5 300	2 600	6019	ZZ	LLB	LLU
	170	32	2.1	0.5	109	82.0	11 100	8 350	14.4	3 700	4 400	2 500	6219	ZZ	LLB	LLU
	200	45	3	0.5	153	119	15 600	12 100	13.3	3 300	3 900	2 300	6319	ZZ	—	LLU
100	125	13	1	0.5	19.6	21.2	2 000	2 160	16.0	4 800	5 600	2 700	6820	ZZ	LLB	LLU
	140	20	1.1	0.5	41.0	39.5	4 200	4 050	16.4	4 500	5 300	2 600	6920	ZZ	LLB	LLU
	150	16	1	—	35.0	36.5	3 600	3 750	16.4	4 200	5 000	—	16020	—	—	—
	150	24	1.5	0.5	60.0	54.0	6 150	5 500	15.9	4 200	5 000	2 600	6020	ZZ	LLB	LLU
	180	34	2.1	0.5	122	93.0	12 500	9 450	14.4	3 500	4 200	2 300	6220	ZZ	LLB	LLU
	215	47	3	—	173	141	17 600	14 400	13.2	3 200	3 700	2 200	6320	ZZ	—	LLU
105	130	13	1	0.5	19.8	22.0	2 020	2 240	15.9	4 600	5 400	—	6821	—	—	—
	145	20	1.1	0.5	42.5	42.0	4 300	4 300	16.5	4 300	5 100	2 500	6921	ZZ	LLB	LLU
	160	18	1	—	52.0	50.5	5 300	5 150	16.3	4 000	4 700	—	16021	—	—	—
	160	26	2	0.5	72.5	65.5	7 400	6 700	15.8	4 000	4 700	2 400	6021	ZZ	LLB	LLU
	190	36	2.1	0.5	133	105	13 600	10 700	14.4	3 400	4 000	2 300	6221	ZZ	—	LLU
	225	49	3	—	184	153	18 700	15 700	13.2	3 000	3 600	2 100	6321	ZZ	—	LLU
110	140	16	1	0.5	24.9	28.2	2 540	2 880	16.0	4 300	5 100	—	6822	—	—	—
	150	20	1.1	0.5	43.5	44.5	4 450	4 550	16.6	4 100	4 800	2 400	6922	ZZ	LLB	LLU
	170	19	1	—	57.5	56.5	5 850	5 800	16.3	3 800	4 500	—	16022	—	—	—
	170	28	2	0.5	82.0	73.0	8 350	7 450	15.6	3 800	4 500	2 300	6022	ZZ	LLB	LLU
	200	38	2.1	0.5	144	117	14 700	11 900	14.3	3 200	3 800	2 200	6222	ZZ	—	LLU
	240	50	3	—	205	179	20 900	18 300	13.1	2 900	3 400	1 900	6322	ZZ	—	LLU
120	150	16	1	0.5	28.9	33.0	2 950	3 350	16.0	4 000	4 700	—	6824	—	—	—
	165	22	1.1	0.5	53.0	54.0	5 400	5 500	16.5	3 800	4 400	—	6924	—	—	—
	180	19	1	—	63.0	63.5	6 450	6 450	16.4	3 500	4 100	—	16024	—	—	—
	180	28	2	0.5	85.0	79.5	8 650	8 100	15.9	3 500	4 100	2 100	6024	ZZ	LLB	LLU

1) Smallest allowable dimension for chamfer dimension r .

● Deep Groove Ball Bearings



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

$f_0 \cdot F_a$ C_{or}	e	$F_a \leq e F_r$		$F_a > e F_r$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22				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				1.04
6.89	0.44				1.00

Static equivalent radial load

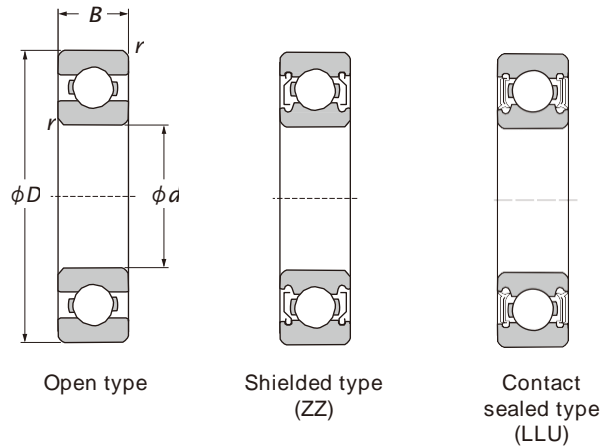
$$P_{or} = 0.6 F_r + 0.5 F_a$$

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 (approx.)	
	ring groove	ring groove	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
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
N	NR	208.6	5.69	3.5	1	227.8	3.1	113	133	202	230	8.4	3.1	2.5	0.5	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
N	NR	217.0	6.5	4.5	1	237	3.5	118	134	212	239	9.6	3.5	2.5	0.5	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
N	NR	232.0	6.5	4.5	1	252	3.5	123	149	227	254	9.6	3.5	2.5	0.5	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

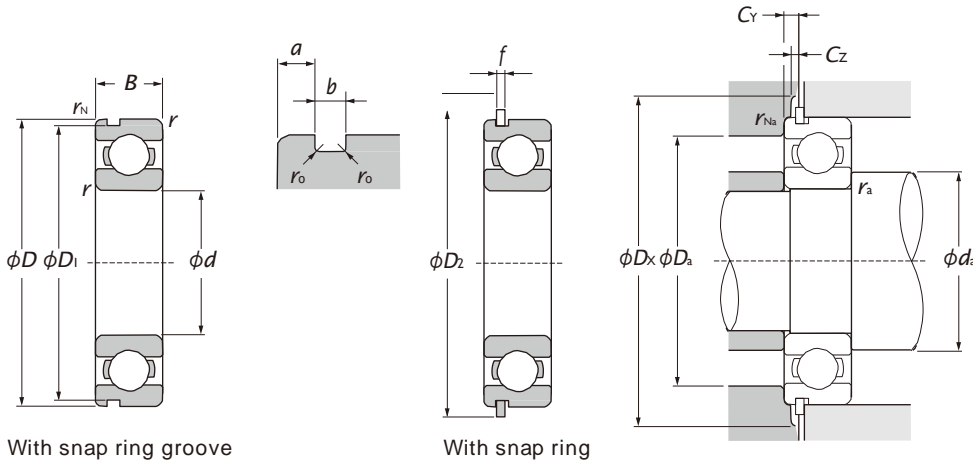


d 120 ~ 170mm

d	Boundary dimensions				Basic load ratings				Factor f_o	Limiting speeds			Bearing numbers		
	D	B	mm		kN		kgf			grease open type ZZ	min ⁻¹		open type	shielded type	contact sealed type
			$r_{smin}^{1)}$	r_{NSmin}	C_r	C_{or}	C_r	C_{or}			oil open type Z	LLU			
120	215	40	2.1	—	155	131	15 900	13 400	14.4	2 900	3 400	2 000	6224	ZZ	LLU
	260	55	3	—	207	185	21 100	18 800	13.5	2 600	3 100	—	6324	—	—
130	165	18	1.1	0.5	37.0	41.0	3 750	4 200	16.1	3 700	4 300	—	6826	—	—
	180	24	1.5	0.5	65.0	67.5	6 650	6 850	16.5	3 500	4 100	—	6926	—	—
	200	22	1.1	—	80.0	79.5	8 150	8 100	16.2	3 200	3 800	—	16026	—	—
	200	33	2	0.5	106	101	10 800	10 300	15.8	3 200	3 800	1 900	6026	ZZ	LLU
	230	40	3	—	167	146	17 000	14 900	14.5	2 700	3 100	—	6226	—	—
	280	58	4	—	229	214	23 400	21 800	13.6	2 400	2 800	—	6326	—	—
140	175	18	1.1	0.5	38.5	44.5	3 900	4 550	16.0	3 400	4 000	—	6828	—	—
	190	24	1.5	0.5	66.5	71.5	6 800	7 300	16.6	3 200	3 800	—	6928	—	—
	210	22	1.1	—	82.0	85.0	8 350	8 650	16.4	3 000	3 500	—	16028	—	—
	210	33	2	—	110	109	11 200	11 100	15.9	3 000	3 500	1 800	6028	ZZ	LLU
	250	42	3	—	166	150	17 000	15 300	14.8	2 500	2 900	—	6228	—	—
	300	62	4	—	253	246	25 800	25 100	13.6	2 200	2 600	—	6328	—	—
150	190	20	1.1	0.5	47.5	55.0	4 850	5 600	16.1	3 100	3 700	—	6830	—	—
	210	28	2	—	85.0	90.5	8 650	9 200	16.5	3 000	3 500	—	6930	—	—
	225	24	1.1	—	96.5	101	9 850	10 300	16.4	2 800	3 200	—	16030	—	—
	225	35	2.1	—	126	126	12 800	12 800	15.9	2 800	3 200	1 700	6030	ZZ	LLU
	270	45	3	—	176	168	18 000	17 100	15.1	2 300	2 700	—	6230	—	—
	320	65	4	—	274	284	28 000	28 900	13.9	2 100	2 400	—	6330	—	—
160	200	20	1.1	0.5	48.5	57.0	4 950	5 800	16.1	2 900	3 400	—	6832	—	—
	220	28	2	—	87.0	96.0	8 850	9 800	16.6	2 800	3 300	—	6932	—	—
	240	25	1.5	—	99.0	108	10 100	11 000	16.5	2 600	3 000	—	16032	—	—
	240	38	2.1	—	143	144	14 500	14 700	15.9	2 600	3 000	1 600	6032	ZZ	LLU
	290	48	3	—	185	186	18 900	19 000	15.4	2 100	2 500	—	6232	—	—
	340	68	4	—	278	286	28 300	29 200	13.9	1 900	2 300	—	6332	—	—
170	215	22	1.1	—	60.0	70.5	6 100	7 200	16.1	2 700	3 200	—	6834	—	—
	230	28	2	—	86.0	95.5	8 750	9 750	16.5	2 600	3 100	—	6934	—	—
	260	28	1.5	—	119	128	12 100	13 100	16.4	2 400	2 800	—	16034	—	—
	260	42	2.1	—	168	172	17 200	17 600	15.8	2 400	2 800	—	6034	—	—
	310	52	4	—	212	223	21 700	22 800	15.3	2 000	2 400	—	6234	—	—
	360	72	4	—	325	355	33 500	36 000	13.6	1 800	2 100	—	6334	—	—

1) Smallest allowable dimension for chamfer dimension r .

● Deep Groove Ball Bearings



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

$f_0 \cdot F_a$ C_{or}	e	$F_a \leq e F_r$		$F_a > e F_r$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22				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				1.04
6.89	0.44				1.00

Static equivalent radial load

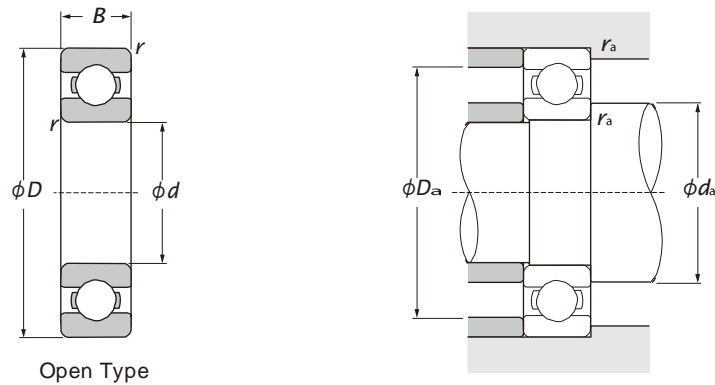
$$P_{or} = 0.6 F_r + 0.5 F_a$$

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⁾
ring groove	ring groove	D_1 max	a max	b min	r_0 max	D_2 max	f max	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	217.0	6.5	4.5	1	227.8	3.1	131	143	204	230	9.2	3.1	2	0.5	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
N	NR	222.0	6.5	4.5	1	242	3.5	143	—	217	244	9.6	3.5	2.5	0.5	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
N	NR	242.0	6.5	4.5	1	262	3.5	153	—	237	264	9.6	3.5	2.5	0.5	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



d 180 ~ 260mm

d	Boundary dimensions			Basic load ratings				Factor f_o	Limiting speeds		Bearing numbers
	mm			dynamic	static	dynamic	static		min ⁻¹		
	D	B	$r_{smin}^{1)}$	C_r	C_{or}	C_r	C_{or}		grease lubrication	oi lubrication	
180	225	22	1.1	60.5	73.0	6 200	7 450	16.1	2 600	3 000	6836
	250	33	2	110	119	11 200	12 200	16.5	2 400	2 900	6936
	280	31	2	117	134	11 900	13 600	16.5	2 300	2 700	16036
	280	46	2.1	189	199	19 300	20 300	15.6	2 300	2 700	6036
	320	52	4	227	241	23 200	24 600	15.1	1 900	2 200	6236
	380	75	4	355	405	36 000	41 500	13.9	1 700	2 000	6336
190	240	24	1.5	73.0	88.0	7 450	9 000	16.1	2 400	2 900	6838
	260	33	2	113	127	11 500	13 000	16.6	2 300	2 700	6938
	290	31	2	134	156	13 700	15 900	16.6	2 100	2 500	16038
	290	46	2.1	197	215	20 100	21 900	15.8	2 100	2 500	6038
	340	55	4	255	281	26 000	28 700	15.0	1 800	2 100	6238
	400	78	5	355	415	36 000	42 500	14.1	1 600	1 900	6338
200	250	24	1.5	74.0	91.5	7 550	9 300	16.1	2 300	2 700	6840
	280	38	2.1	157	168	16 000	17 100	16.2	2 200	2 600	6940
	310	34	2	142	160	14 400	16 300	16.6	2 000	2 400	16040
	310	51	2.1	218	243	22 200	24 800	15.6	2 000	2 400	6040
	360	58	4	269	310	27 400	31 500	15.2	1 700	2 000	6240
	420	80	5	410	500	42 000	51 000	13.8	1 500	1 800	6340
220	270	24	1.5	76.5	98.0	7 800	10 000	16.0	2 100	2 400	6844
	300	38	2.1	160	180	16 400	18 400	16.4	2 000	2 300	6944
	340	37	2.1	181	216	18 500	22 000	16.5	1 800	2 200	16044
	340	56	3	241	289	24 600	29 400	15.8	1 800	2 200	6044
	400	65	4	297	365	30 500	37 000	15.3	1 500	1 800	6244
	460	88	5	410	520	42 000	53 000	14.3	1 400	1 600	6344
240	300	28	2	85.0	112	8 650	11 400	15.9	1 900	2 200	6848
	320	38	2.1	170	203	17 300	20 700	16.5	1 800	2 100	6948
	360	37	2.1	178	217	18 200	22 100	16.5	1 700	2 000	16048
	360	56	3	249	310	25 400	32 000	16.0	1 700	2 000	6048
260	320	28	2	87.0	120	8 900	12 200	15.8	1 700	2 000	6852
	360	46	2.1	222	280	22 600	28 500	16.3	1 600	1 900	6952
	400	44	3	227	299	23 200	30 500	16.5	1 500	1 800	16052
	400	65	4	291	375	29 700	38 500	15.8	1 500	1 800	6052

1) Smallest allowable dimension for chamfer dimension r .

● Deep Groove Ball Bearings

Dynamic equivalent radial load

$$P_r = X F_r + Y F_a$$

$\frac{f_0 \cdot F_a}{C_{or}}$	e	$F_r \leq e$		$F_r > e$	
		X	Y	X	Y
		0.172	0.19		
0.345	0.22			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				1.04
6.89	0.44				1.00

Static equivalent radial load

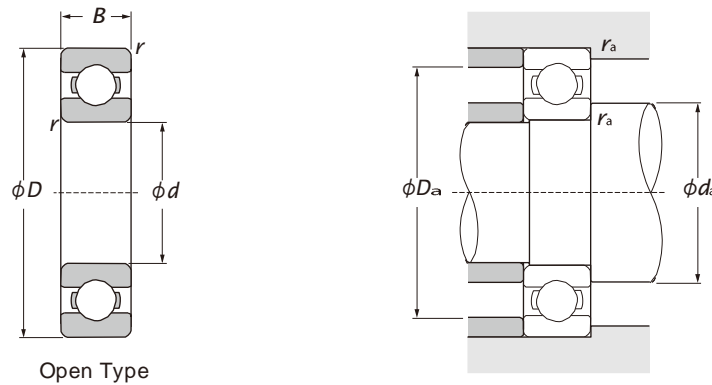
$$P_{or} = 0.6 F_r + 0.5 F_a$$

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

Abutment and fillet dimensions mm			Mass 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
<hr/>			
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
<hr/>			
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
<hr/>			
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
<hr/>			
249	291	2	4.6
251	309	2	8.28
251	349	2	12.1
253	347	2.5	16.8
<hr/>			
269	311	2	5
271	349	2	13.9
273	387	2.5	18.5
276	384	3	25



● Deep Groove Ball Bearings



d 280 ~ 440mm

d	Boundary dimensions			$r_{smin}^{1)}$	Basic load ratings				Factor f_o	Limiting speeds		Bearing numbers
	mm				dynamic	static	dynamic	static		min ⁻¹		
	D	B			C _r	C _{or}	C _r	C _{or}		grease lubrication	oi lubrication	
				kN		kgf				open type		
280	350	33	2	137	177	13 900	18 100	16.1	1 600	1 900	6856	
	380	46	2.1	227	299	23 200	30 500	16.5	1 500	1 800	6956	
	420	44	3	232	315	23 700	32 500	16.5	1 400	1 600	16056	
	420	65	4	325	420	33 000	43 000	15.5	1 400	1 600	6056	
300	380	38	2.1	162	210	16 500	21 500	16.1	1 500	1 700	6860	
	420	56	3	276	375	28 200	38 500	16.2	1 400	1 600	6960	
	460	50	4	292	410	29 800	42 000	16.3	1 300	1 500	16060	
	460	74	4	355	480	36 000	49 000	15.6	1 300	1 500	6060	
320	400	38	2.1	168	228	17 200	23 200	16.1	1 400	1 600	6864	
	440	56	3	285	405	29 000	41 000	16.4	1 300	1 500	6964	
	480	50	4	300	440	30 500	45 000	16.4	1 200	1 400	16064	
	480	74	4	370	530	38 000	54 000	15.7	1 200	1 400	6064	
340	420	38	2.1	170	236	17 400	24 000	16.0	1 300	1 500	6868	
	460	56	3	293	430	29 800	44 000	16.5	1 200	1 400	6968	
	520	57	4	340	515	35 000	52 500	16.3	1 100	1 300	16068	
	520	82	5	420	610	42 500	62 500	15.6	1 100	1 300	6068	
360	440	38	2.1	187	258	19 100	26 300	16.0	1 200	1 400	6872	
	480	56	3	300	455	30 500	46 500	16.5	1 100	1 300	6972	
	540	57	4	350	550	36 000	56 000	16.4	1 100	1 200	16072	
	540	82	5	440	670	44 500	68 000	15.7	1 100	1 200	6072	
380	480	46	2.1	231	340	23 600	34 500	16.1	1 100	1 300	6876	
	520	65	4	325	510	33 000	52 000	16.6	1 100	1 200	6976	
	560	82	5	455	725	46 500	74 000	15.9	990	1 200	6076	
400	500	46	2.1	226	340	23 100	34 500	16.0	1 100	1 200	6880	
	540	65	4	335	535	34 000	54 500	16.5	990	1 200	6980	
	600	90	5	510	825	52 000	84 000	15.7	930	1 100	6080	
420	520	46	2.1	260	405	26 500	41 500	16.1	1 000	1 200	6884	
	560	65	4	340	560	35 000	57 000	16.4	940	1 100	6984	
	620	90	5	530	895	54 000	91 000	15.8	880	1 000	6084	
440	540	46	2.1	264	420	26 900	43 000	16.0	950	1 100	6888	
	600	74	4	365	615	37 500	63 000	16.4	890	1 000	6988	

1) Smallest allowable dimension for chamfer dimension r .

● Deep Groove Ball Bearings

Dynamic equivalent radial load

$$P_r = X F_r + Y F_a$$

$\frac{f_0 \cdot F_a}{C_{or}}$	e	$F_r \leq e$		$F_r > e$	
		F_a		F_a	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22				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				1.04
6.89	0.44				1.00

Static equivalent radial load

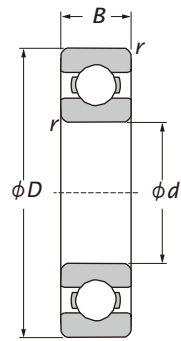
$$P_{or} = 0.6 F_r + 0.5 F_a$$

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

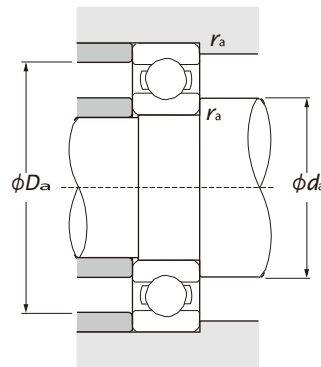
Abutment and fillet dimensions mm			Mass kg
d_a min	D_a max	r_{as} max	(approx.)
289	341	2	7.4
291	369	2	14.8
293	407	2.5	23
296	404	3	31
<hr/>			
311	369	2	10.5
313	407	2.5	23.5
316	444	3	32.5
316	444	3	43.8
<hr/>			
331	389	2	10.9
333	427	2.5	24.8
336	464	3	34.2
336	464	3	46.1
<hr/>			
351	409	2	11.5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



● Deep Groove Ball Bearings



Open Type



d 460 ~ 600mm

d	Boundary dimensions			Basic load ratings				Factor f_o	Limiting speeds		Bearing numbers
	mm			dynamic	static	dynamic	static		min ⁻¹		
	D	B	$r_{smin}^{1)}$	C _r	C _{or}	kgf	C _{or}		grease lubrication	oi lubrication	
460	580	56	3	315	515	32 000	52 500	16.2	900	1 100	6892
	620	74	4	375	645	38 500	66 000	16.4	850	1 000	6992
480	600	56	3	320	540	32 500	55 000	16.1	860	1 000	6896
	650	78	5	430	770	44 000	78 500	16.5	810	950	6996
500	620	56	3	325	560	33 500	57 000	16.1	820	970	68/500
	670	78	5	445	805	45 500	82 500	16.5	770	910	69/500
530	650	56	3	330	580	34 000	59 500	16.0	770	900	68/530
560	680	56	3	335	600	34 000	61 500	16.0	710	840	68/560
600	730	60	3	375	705	38 500	72 000	16.0	660	780	68/600

1) Smallest allowable dimension for chamfer dimension r .

• Deep Groove Ball Bearings

Dynamic equivalent radial load

$$P_r = X F_r + Y F_a$$

$\frac{f_0 \cdot F_a}{C_{or}}$	e	$F_r \leq e F_a$		$F_r > e F_a$	
		X	Y	X	Y
		0.172	0.19		
0.345	0.22			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				1.04
6.89	0.44				1.00

Static equivalent radial load

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

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

Abutment and fillet dimensions mm			Mass 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

