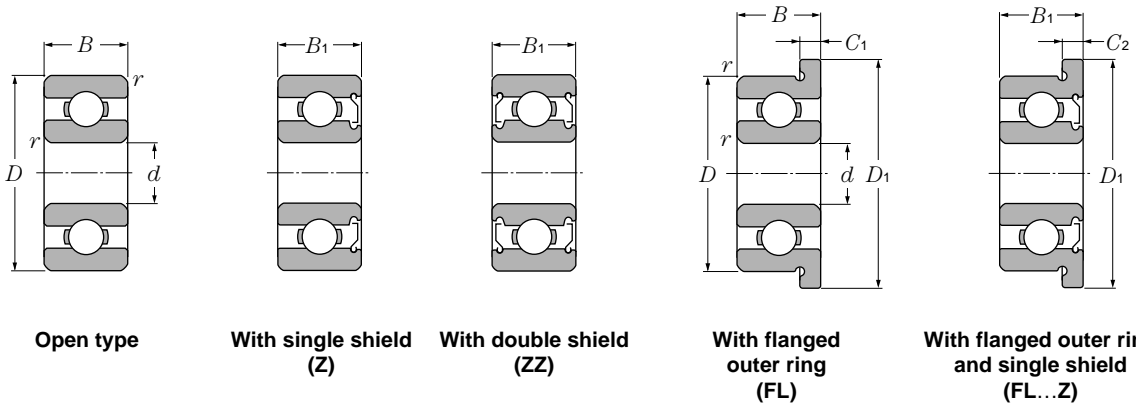


Miniature and Extra Small Ball Bearings

NTN

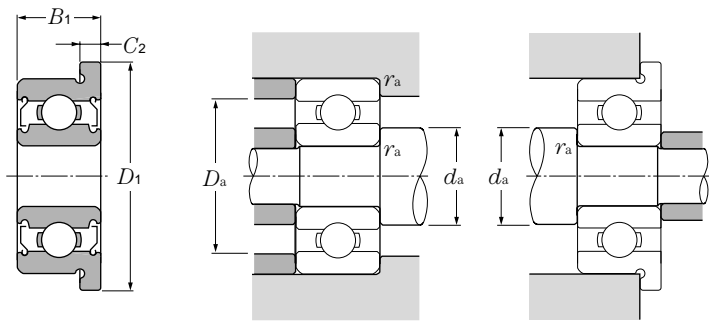
Inch system sizes



d 1.984 ~ 9.525mm

d	Boundary dimensions							Basic load ratings				Limiting speeds	
	D	B	B_1	mm		C_1	C_2	dynamic	static	dynamic	static	rpm	
				D_1	D_1			N	C_{or}	C_r	C_{or}	grease	oil
1.984	6.35	2.38	3.571	7.52	0.58	0.79	0.08	279	89.0	28	9	67,000	79,000
2.380	4.762	1.588	2.38	5.94	0.46	0.79	0.08	124	42.0	13	4.5	73,000	85,000
	7.938	2.779	3.571	9.12	0.58	0.79	0.13	430	152	44	16	56,000	66,000
3.175	6.35	2.38	2.779	7.52	0.58	0.79	0.08	284	96.0	29	10	59,000	70,000
	7.938	2.779	3.571	9.12	0.58	0.79	0.08	560	180	57	18	54,000	63,000
	9.525	2.779	3.571	10.72	0.53	0.79	0.13	640	224	65	23	49,000	58,000
	9.525	3.967	3.967	11.18	0.76	0.76	0.3	640	224	65	23	49,000	58,000
	12.7	4.366	4.366				0.3	1,150	395	117	40	43,000	51,000
3.967	7.938	2.779	3.175	9.12	0.58	0.91	0.08	335	133	34	14	51,000	60,000
4.762	7.938	2.779	3.175	9.12	0.58	0.91	0.08	395	143	40	15	49,000	58,000
	9.525	3.175	3.175	10.72	0.58	0.79	0.08	710	268	72	27	46,000	55,000
	12.7	3.967					0.3	1,310	490	134	50	41,000	48,000
	12.7	4.978	4.978	14.35	1.07	1.07	0.3	1,310	490	134	50	41,000	48,000
6.350	9.525	3.175	3.175	10.72	0.58	0.91	0.08	210	94.0	21	9.5	43,000	51,000
	12.7	3.175	4.762	13.89	0.58	1.14	0.13	830	370	84	38	39,000	46,000
	15.875	4.978	4.978	17.53	1.07	1.07	0.3	1,480	615	151	63	36,000	43,000
	19.05		7.142				0.41	2,340	885	238	90	34,000	40,000
9.525	22.225		7.142	24.61		1.57	0.41	3,300	1,400	340	142	31,000	37,000

① Smallest allowable dimension for chamfer dimension r .



With flanged outer ring and double shield (FL...ZZ)

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	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		

static

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

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

Bearing numbers						Abutment and fillet dimensions				Mass (approx. j g)	
open	with single shield	with double shield	with flanged outer ring	with flanged OR and single shield	with flanged OR and double shield	mm				open	with flanged outer ring
						d_a min	d_a max ^②	D_a max	r_{as} max		
R1-4	RA1-4ZA	ZZA	FLR1-4	FLRA1-4ZA	ZZA	2.8	3.3	5.5	0.08	0.35	0.41
R133	RA133ZA	ZZA	FLR133	FLRA133ZA	ZZA	2.9	3.1	4	0.08	0.12	0.16
R1-5	RA1-5ZA	ZZA	FLR1-5	FLRA1-5ZA	ZZA	3.2	4.3	7.1	0.1	0.69	0.76
R144	RA144ZA	ZZA	FLR144	FLRA144ZA	ZZA	3.9	4.0	5.5	0.08	0.27	0.33
R2-5	RA2-5Z	ZZ	FLR2-5	FLRA2-5Z	ZZ	4	4.4	7	0.08	0.61	0.68
R2-6	RA2-6ZA	ZZA	FLR2-6	FLRA2-6ZA	ZZA	4	5.2	8.7	0.1	0.88	0.96
R2	RA2ZA	ZZA	FLR2	FLRA2ZA	ZZA	4.8	5.2	7.8	0.3	1.3	1.5
RA2	RA2Z	ZZ				4.8	5.4	11	0.3	2.5	
R155	RA155ZA	ZZA	FLR155	FLRA155ZA	ZZA	4.8	5.3	7	0.08	0.54	0.61
R156	RA156Z	ZZ	FLR156	FLRA156Z	ZZ	5.5	5.6	7	0.08	0.44	0.51
R166	R166Z	ZZ	FLR166	FLRA166Z	ZZ	5.6	5.9	8.7	0.08	0.8	0.89
R3						6.4	7.2	11	0.3	2.2	
RA3	RA3Z	ZZ	FLRA3	FLRA3Z	ZZ	6.0	6.4	11	0.3	2.4	2.7
R168A	R168AZ	AZZ		FLRA168AZ	ZZ	7.1	7.3	8.7	0.08	0.6	0.69
R188	RA188ZA	ZZA	FLR188	FLRA188ZA	ZZA	7.2	8.2	11.8	0.1	1.6	1.7
R4	R4Z	ZZ	FLR4	FLR4Z	ZZ	8	8.6	14.2	0.3	4.4	4.8
	RA4Z	ZZ				8.4	9.5	17	0.4	11 ^③	
	R6Z	ZZ		FLR6Z	ZZ	11.5	11.9	20.2	0.4	14 ^③	15 ^③

② This dimension applies to sealed and shielded bearings.

③ Values for double shielded bearings shown.