

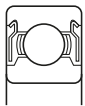


## Extra Small Ball Bearings

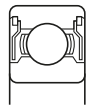
## Design, Types, and Type Symbols

Design · Types		Type Symbols				Remarks
		Metric	Inch	Special		
				Metric	Inch	
Single-row Deep Groove Ball Bearings		6 ○ ○	R	MR	—	Shielded · sealed bearings are available.
	Thin section 	—	—	SMT	—	
	With flange 	F6 ○ ○	FR	MF	—	Shielded · sealed bearings are available.
	Extended inner ring 	—	—	—	RW	Shielded bearings are available.
	With flange and extended inner ring 	—	—	—	FRW	Shielded bearings are available.
	For synchro motors 	—	—	—	SR00X00	Shielded bearings are available.
Pivot Ball Bearings		—	—	BCF	—	
Thrust Ball Bearings		—	—	F	—	

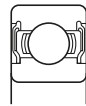
**Remark** Single-row angular contact ball bearings are available besides those shown above.



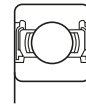
ZZ



ZZS



2RSR

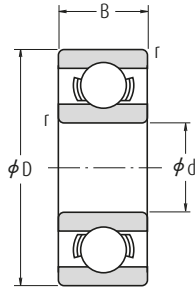


W

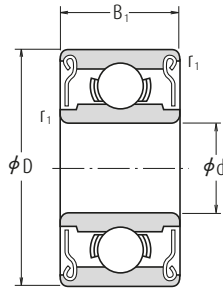
# Extra Small Ball Bearings - Miniature Ball Bearings



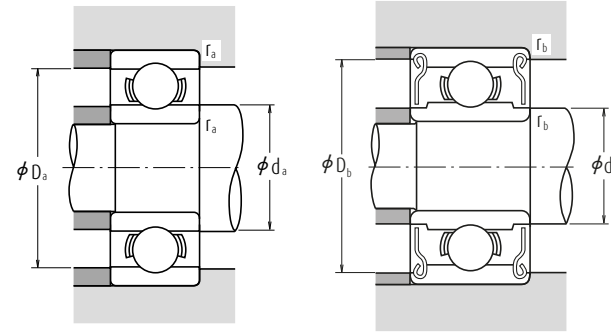
Metric Design  
Bore Diameter 1 – 4 mm



Open Type



Shielded Type  
ZZ · ZZ1



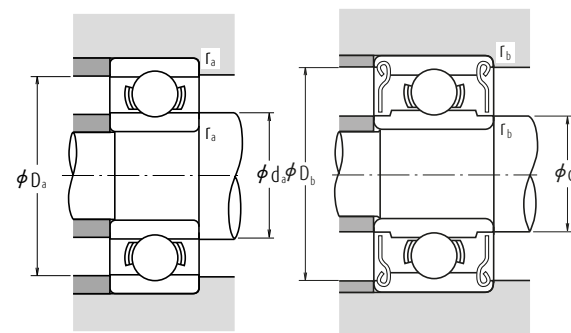
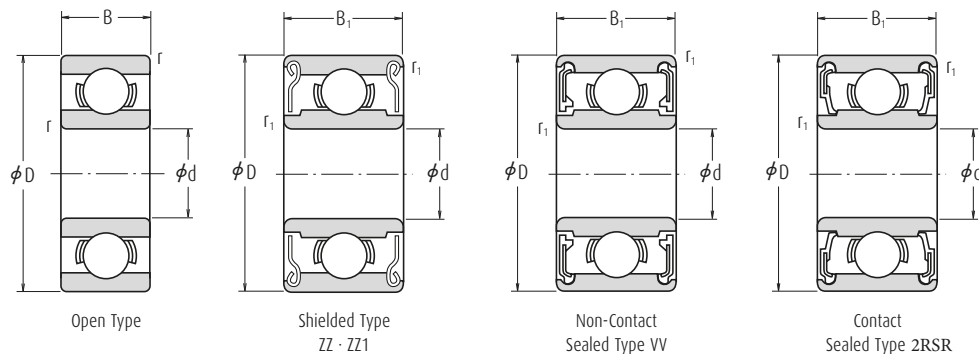
Boundary Dimensions (mm)					Basic Load Ratings (N)		Limiting Speeds (min <sup>-1</sup> )			Open
d	D	B	B <sub>1</sub>	r <sup>(1)</sup> min.	r <sub>1</sub> <sup>(1)</sup> min.	C <sub>r</sub>	C <sub>0r</sub>	Grease Open Z · ZZ	Oil Open Z	
1	3	1	—	0.05	—	80	23	130 000	150 000	681
	3	1.5	—	0.05	—	80	23	130 000	150 000	MR 31
	4	1.6	—	0.1	—	138	35	100 000	120 000	691
1.2	4	1.8	2.5	0.1	0.1	138	35	110 000	130 000	MR 41 X
1.5	4	1.2	2	0.05	0.05	112	33	100 000	120 000	681 X
	5	2	2.6	0.15	0.15	237	69	85 000	100 000	691 X
	6	2.5	3	0.15	0.15	330	98	75 000	90 000	601 X
2	5	1.5	2.3	0.08	0.08	169	50	85 000	100 000	682
	5	2	2.5	0.1	0.1	187	58	85 000	100 000	MR 52 B
	6	2.3	3	0.15	0.15	330	98	75 000	90 000	692
	6	2.5	2.5	0.15	0.15	330	98	75 000	90 000	MR 62
	7	2.5	3	0.15	0.15	385	127	63 000	75 000	MR 72
	7	2.8	3.5	0.15	0.15	385	127	63 000	75 000	602
2.5	6	1.8	2.6	0.08	0.08	208	74	71 000	80 000	682 X
	7	2.5	3.5	0.15	0.15	385	127	63 000	75 000	692 X
	8	2.5	—	0.2	—	560	179	60 000	67 000	MR 82 X
	8	2.8	4	0.15	0.15	550	175	60 000	71 000	602 X
3	6	2	2.5	0.1	0.1	208	74	71 000	80 000	MR 63
	7	2	3	0.1	0.1	390	130	63 000	75 000	683 A
	8	2.5	—	0.15	—	560	179	60 000	67 000	MR 83
	8	3	4	0.15	0.15	560	179	60 000	67 000	693
	9	2.5	4	0.2	0.15	570	187	56 000	67 000	MR 93
	9	3	5	0.15	0.15	570	187	56 000	67 000	603
	10	4	4	0.15	0.15	630	218	50 000	60 000	623
	13	5	5	0.2	0.2	1 300	485	40 000	48 000	633
4	7	2	—	0.1	—	310	115	60 000	67 000	MR 74
	7	—	2.5	—	0.1	255	107	60 000	71 000	—
	8	2	3	0.15	0.1	395	139	56 000	67 000	MR 84
	9	2.5	4	(0.15)	(0.15)	640	225	53 000	63 000	684 A
	10	3	4	0.2	0.15	710	270	50 000	60 000	MR 104 B
	11	4	4	0.15	0.15	960	345	48 000	56 000	694
	12	4	4	0.2	0.2	960	345	48 000	56 000	604
	13	5	5	0.2	0.2	1 300	485	40 000	48 000	624
	16	5	5	0.3	0.3	1 730	670	36 000	43 000	634

Note (1) The values in parentheses are not based on ISO 15.

Remark When using bearings with a rotating outer ring, please contact OID if they are shielded.

Bearing Numbers		Abutment and Fillet Dimensions (mm)						Mass (g)		
Shielded	Sealed	d <sub>a</sub> min.	d <sub>b</sub> max.	D <sub>a</sub> max.	D <sub>b</sub> min.	r <sub>a</sub> max.	r <sub>b</sub> max.	approx.		
		Open	Shielded							
—	—	1.4	—	2.6	—	0.05	—	0.03	—	
—	—	1.4	—	2.6	—	0.05	—	0.04	—	
—	—	1.8	—	3.2	—	0.1	—	0.09	—	
MR 41 XZZ	—	2.0	1.9	3.2	3.5	0.1	0.1	0.10	0.14	
681 XZZ	—	1.9	2.1	3.6	3.6	0.05	0.05	0.07	0.11	
691 XZZ	—	2.7	2.5	3.8	4.3	0.15	0.15	0.17	0.20	
601 XZZ	—	2.7	3.0	4.8	5.4	0.15	0.15	0.33	0.38	
682 ZZ	—	2.6	2.7	4.4	4.2	0.08	0.08	0.12	0.17	
MR 52 BZZ	—	2.8	2.7	4.2	4.4	0.1	0.1	0.16	0.23	
692 ZZ	—	3.2	3.0	4.8	5.4	0.15	0.15	0.28	0.38	
MR 62 ZZ	—	3.2	3.0	4.8	5.2	0.15	0.15	0.30	0.29	
MR 72 ZZ	—	3.2	3.8	5.8	6.2	0.15	0.15	0.45	0.49	
602 ZZ	—	3.2	3.8	5.8	6.2	0.15	0.15	0.51	0.58	
682 XZZ	—	3.1	3.7	5.4	5.4	0.08	0.08	0.23	0.29	
692 XZZ	—	3.7	3.8	5.8	6.2	0.15	0.15	0.41	0.55	
—	—	4.1	—	6.4	—	0.2	—	0.56	—	
602 XZZ	—	3.7	4.1	6.8	7.0	0.15	0.15	0.63	0.83	
MR 63 ZZ	—	3.8	3.7	5.2	5.4	0.1	0.1	0.20	0.27	
683 AZZ	—	3.8	4.0	6.2	6.4	0.1	0.1	0.32	0.45	
—	—	4.2	—	6.8	—	0.15	—	0.54	—	
693 ZZ	—	4.2	4.3	6.8	7.3	0.15	0.15	0.61	0.83	
MR 93 ZZ	—	4.6	4.3	7.4	7.9	0.2	0.15	0.73	1.18	
603 ZZ	—	4.2	4.3	7.8	7.9	0.15	0.15	0.87	1.45	
623 ZZ	—	4.2	4.3	8.8	8.0	0.15	0.15	1.65	1.66	
633 ZZ	—	4.6	6.0	11.4	11.3	0.2	0.2	3.38	3.33	
—	—	4.8	—	6.2	—	0.1	—	0.22	—	
MR 74 ZZ	—	—	4.8	—	6.3	—	0.1	—	0.29	
MR 84 ZZ	—	—	5.2	5.0	6.8	7.4	0.15	0.1	0.36	0.56
684 AZZ	—	—	4.8	5.2	8.2	8.1	0.1	0.1	0.63	1.01
MR 104 BZZ	—	—	5.6	5.9	8.4	8.8	0.2	0.15	1.04	1.42
694 ZZ	—	—	5.2	5.6	9.8	9.9	0.15	0.15	1.7	1.75
604 ZZ	—	—	5.6	5.6	10.4	9.9	0.2	0.2	2.25	2.29
624 ZZ	—	—	5.6	6.0	11.4	11.3	0.2	0.2	3.03	3.04
634 ZZ1	—	—	6.0	7.5	14.0	13.8	0.3	0.3	5.24	5.21

## Metric Design Bore Diameter 5 - 9 mm



Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min <sup>-1</sup> )			
d	D	B	B <sub>1</sub>	r <sup>(1)</sup> min.	r <sub>1</sub> <sup>(1)</sup> min.	C <sub>r</sub>	C <sub>0r</sub>	Grease		oil	
								Open Z · ZZ V · VV	D · 2RSR	Open Z	Open
5	8	2	—	0.1	—	310	120	53 000	—	63 000	MR 85
8	—	2.5	—	0.1	—	278	131	53 000	—	63 000	—
9	2.5	3	0.15	0.15	—	430	168	50 000	—	60 000	MR 95
10	3	4	0.15	0.15	—	430	168	50 000	—	60 000	MR 105
11	—	4	—	0.15	—	715	276	48 000	—	56 000	—
11	3	5	0.15	0.15	—	715	281	45 000	—	53 000	685
13	4	4	0.2	0.2	—	1 080	430	43 000	40 000	50 000	695
14	5	5	0.2	0.2	—	1 330	505	40 000	38 000	50 000	605
16	5	5	0.3	0.3	—	1 730	670	36 000	32 000	43 000	625
19	6	6	0.3	0.3	—	2 340	885	32 000	30 000	40 000	635
6	10	2.5	3	0.15	0.1	495	218	45 000	—	53 000	MR 106
12	3	4	0.2	0.15	—	715	292	43 000	40 000	50 000	MR 126
13	3.5	5	0.15	0.15	—	1 080	440	40 000	38 000	50 000	686 A
15	5	5	0.2	0.2	—	1 730	670	40 000	36 000	45 000	696
17	6	6	0.3	0.3	—	2 260	835	38 000	34 000	45 000	606
19	6	6	0.3	0.3	—	2 340	885	32 000	30 000	40 000	626
22	7	7	0.3	0.3	—	3 300	1 370	30 000	28 000	36 000	636
7	11	2.5	3	0.15	0.1	455	201	43 000	—	50 000	MR 117
13	3	4	0.2	0.15	—	540	276	40 000	—	48 000	MR 137
14	3.5	5	0.15	0.15	—	1 170	510	40 000	34 000	45 000	687
17	5	5	0.3	0.3	—	1 610	710	36 000	28 000	43 000	697
19	6	6	0.3	0.3	—	2 340	885	36 000	32 000	43 000	607
22	7	7	0.3	0.3	—	3 300	1 370	30 000	28 000	36 000	627
26	9	9	0.3	0.3	—	4 550	1 970	28 000	22 000	34 000	637
8	12	2.5	3.5	0.15	0.1	545	274	40 000	—	48 000	MR 128
14	3.5	4	0.2	0.15	—	820	385	38 000	32 000	45 000	MR 148
16	4	5	0.2	0.2	—	1 610	710	36 000	28 000	43 000	688 A
19	6	6	0.3	0.3	—	2 240	910	36 000	28 000	43 000	698
22	7	7	0.3	0.3	—	3 300	1 370	34 000	28 000	40 000	608
24	8	8	0.3	0.3	—	3 350	1 430	28 000	24 000	34 000	628
28	9	9	0.3	0.3	—	4 550	1 970	28 000	22 000	34 000	638
9	17	4	5	0.2	0.2	1 330	665	36 000	24 000	43 000	689
20	6	6	0.3	0.3	—	1 720	840	34 000	24 000	40 000	699
24	7	7	0.3	0.3	—	3 350	1 430	32 000	24 000	38 000	609
26	8	8	(0.6)	(0.6)	—	4 550	1 970	28 000	22 000	34 000	629
30	10	10	0.6	0.6	—	5 100	2 390	24 000	—	30 000	639

Bearing Numbers		Abutment and Fillet Dimensions (mm)						Mass (g)	
Shielded	Sealed	d <sub>a</sub> min.	d <sub>b</sub> max.	D <sub>a</sub> max.	D <sub>b</sub> min.	r <sub>a</sub> max.	r <sub>b</sub> max.	Open	Shielded
—	—	5.8	—	7.2	—	0.1	—	0.26	—
MR 85 ZZ	—	—	5.8	—	7.4	—	0.1	—	0.34
MR 95 ZZ1	—	6.2	6.0	7.8	8.2	0.15	0.15	0.50	0.58
MR 105 ZZ	—	6.2	6.0	8.8	8.4	0.15	0.15	0.95	1.29
MR 115 ZZ	VV	—	6.3	—	9.8	—	0.15	—	1.49
685 ZZ	—	6.2	6.2	9.8	9.9	0.15	0.15	1.2	1.96
695 ZZ	VV 2RSR	6.6	6.6	11.4	11.2	0.2	0.2	2.45	2.5
605 ZZ	— 2RSR	6.6	6.9	12.4	12.2	0.2	0.2	3.54	3.48
625 ZZ1	VV 2RSR	7.0	7.5	14.0	13.8	0.3	0.3	4.95	4.86
635 ZZ1	VV 2RSR	7.0	8.5	17.0	16.5	0.3	0.3	8.56	8.34
MR 106 ZZ1	—	7.2	7.0	8.8	9.3	0.15	0.1	0.56	0.68
MR 126 ZZ	— 2RSR	7.6	7.2	10.4	10.9	0.2	0.15	1.27	1.74
686 AZZ	VV 2RSR	7.2	7.4	11.8	11.7	0.15	0.15	1.91	2.69
696 ZZ1	VV 2RSR	7.6	7.9	13.4	13.3	0.2	0.2	3.88	3.72
606 ZZ	VV 2RSR	8.0	8.2	15.0	14.8	0.3	0.3	5.97	6.08
626 ZZ1	VV 2RSR	8.0	8.5	17.0	16.5	0.3	0.3	8.15	7.94
636 ZZ	VV 2RSR	8.0	10.5	20.0	19.0	0.3	0.3	14	14
MR 117 ZZ	—	8.2	8.0	9.8	10.5	0.15	0.1	0.62	0.72
MR 137 ZZ	—	8.6	9.0	11.4	11.6	0.2	0.15	1.58	2.02
687 ZZ1	VV 2RSR	8.2	8.5	12.8	12.7	0.15	0.15	2.13	2.97
697 ZZ1	VV 2RSR	9.0	10.2	15.0	14.8	0.3	0.3	5.26	5.12
607 ZZ1	VV 2RSR	9.0	9.1	17.0	16.5	0.3	0.3	7.67	7.51
627 ZZ	VV 2RSR	9.0	10.5	20.0	19.0	0.3	0.3	12.7	12.9
637 ZZ1	VV 2RSR	9.0	12.8	24.0	22.8	0.3	0.3	24	25
MR 128 ZZ1	—	9.2	9.0	10.8	11.3	0.15	0.1	0.71	0.97
MR 148 ZZ	VV 2RSR	9.6	9.2	12.4	12.8	0.2	0.15	1.86	2.16
688 AZZ1	VV 2RSR	9.6	10.2	14.4	14.2	0.2	0.2	3.12	4.02
698 ZZ	VV 2RSR	10.0	10.0	17.0	16.5	0.3	0.3	7.23	7.18
608 ZZ	VV 2RSR	10.0	10.5	20.0	19.0	0.3	0.3	12.1	12.2
628 ZZ	VV 2RSR	10.0	12.0	22.0	20.5	0.3	0.3	17.2	17.4
638 ZZ1	VV 2RSR	10.0	12.8	26.0	22.8	0.3	0.3	28.3	28.6
689 ZZ1	VV 2RSR	10.6	11.5	15.4	15.2	0.2	0.2	3.53	4.43
699 ZZ1	VV 2RSR	11.0	12.0	18.0	17.2	0.3	0.3	8.45	8.33
609 ZZ	VV 2RSR	11.0	12.0	22.8	20.5	0.3	0.3	14.5	14.7
629 ZZ	VV 2RSR	11.0	12.8	24.0	22.8	0.3	0.3	19.5	19.3
639 ZZ	VV	13.0	16.1	26.0	25.6	0.6	0.6	36.5	36

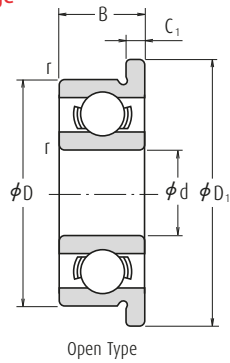
**Note** (1) The values in parentheses are not based on ISO 15.

**Remarks** 1. When using bearings with a rotating outer ring, please contact OID if they are sealed or shielded.  
2. Bearings with snap rings are also available, please contact OID.

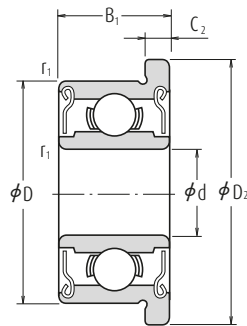
# Extra Small Ball Bearings · Miniature Ball Bearings



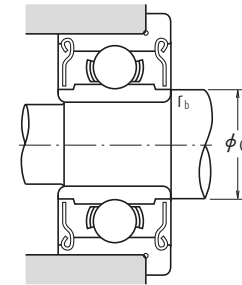
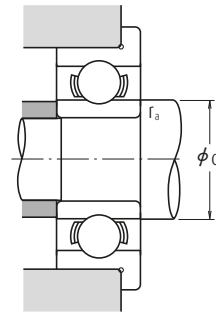
Metric Design With Flange  
Bore Diameter 1 – 4 mm



Open Type



Shielded Type  
ZZ · ZZ1



Boundary Dimensions (mm)										Basic Load Ratings (N)		Limiting Speeds (min <sup>-1</sup> )	
d	D	D <sub>1</sub>	D <sub>2</sub>	B	B <sub>1</sub>	C <sub>1</sub>	C <sub>2</sub>	r <sup>(1)</sup> min.	r <sub>1</sub> <sup>(1)</sup> min.	C <sub>r</sub>	C <sub>0r</sub>	Grease Open Z · ZZ	Oil Open Z
1	3	3.8	—	1	—	0.3	—	0.05	—	80	23	130 000	150 000
	4	5	—	1.6	—	0.5	—	0.1	—	140	36	100 000	120 000
1.2	4	4.8	—	1.8	—	0.4	—	0.1	—	138	35	110 000	130 000
1.5	4	5	5	1.2	2	0.4	0.6	0.05	0.05	112	33	100 000	120 000
	5	6.5	6.5	2	2.6	0.6	0.8	0.15	0.15	237	69	85 000	100 000
	6	7.5	7.5	2.5	3	0.6	0.8	0.15	0.15	330	98	75 000	90 000
2	5	6.1	6.1	1.5	2.3	0.5	0.6	0.08	0.08	169	50	85 000	100 000
	5	6.2	6.2	2	2.5	0.6	0.6	0.1	0.1	187	58	85 000	100 000
	6	7.5	7.5	2.3	3	0.6	0.8	0.15	0.15	330	98	75 000	90 000
	6	7.2	—	2.5	—	0.6	—	0.15	—	330	98	75 000	90 000
	7	8.2	8.2	2.5	3	0.6	0.6	0.15	0.15	385	127	63 000	75 000
	7	8.5	8.5	2.8	3.5	0.7	0.9	0.15	0.15	385	127	63 000	75 000
2.5	6	7.1	7.1	1.8	2.6	0.5	0.8	0.08	0.08	208	74	71 000	80 000
	7	8.5	8.5	2.5	3.5	0.7	0.9	0.15	0.15	385	127	63 000	75 000
	8	9.2	—	2.5	—	0.6	—	0.2	—	560	179	60 000	67 000
	8	9.5	9.5	2.8	4	0.7	0.9	0.15	0.15	550	175	60 000	71 000
3	6	7.2	7.2	2	2.5	0.6	0.6	0.1	0.1	208	74	71 000	80 000
	7	8.1	8.1	2	3	0.5	0.8	0.1	0.1	390	130	63 000	75 000
	8	9.2	—	2.5	—	0.6	—	0.15	—	560	179	60 000	67 000
	8	9.5	9.5	3	4	0.7	0.9	0.15	0.15	560	179	60 000	67 000
	9	10.2	10.6	2.5	4	0.6	0.8	0.2	0.15	570	187	56 000	67 000
	9	10.5	10.5	3	5	0.7	1	0.15	0.15	570	187	56 000	67 000
	10	11.5	11.5	4	4	1	1	0.15	0.15	630	218	50 000	60 000
	13	15	15	5	5	1	1	0.2	0.2	1 300	485	36 000	43 000
4	7	8.2	—	2	—	0.6	—	0.1	—	310	115	60 000	67 000
	7	—	8.2	—	2.5	—	0.6	—	0.1	255	107	60 000	71 000
	8	9.2	9.2	2	3	0.6	0.6	0.15	0.1	395	139	56 000	67 000
	9	10.3	10.3	2.5	4	0.6	1	(0.15)	(0.15)	640	225	53 000	63 000
	10	11.2	11.6	3	4	0.6	0.8	0.2	0.15	710	270	50 000	60 000
	11	12.5	12.5	4	4	1	1	0.15	0.15	960	345	48 000	56 000
	12	13.5	13.5	4	4	1	1	0.2	0.2	960	345	48 000	56 000
	13	15	15	5	5	1	1	0.2	0.2	1 300	485	40 000	48 000
	16	18	18	5	5	1	1	0.3	0.3	1 730	670	36 000	43 000

Note (1) The values in parentheses are not based on ISO 15.

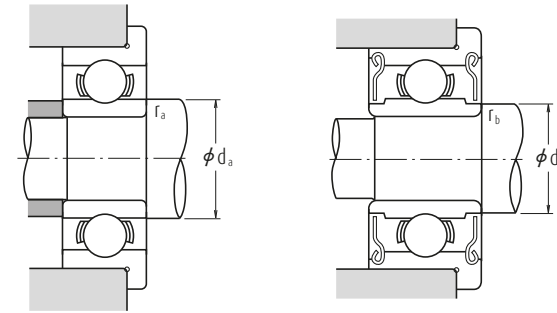
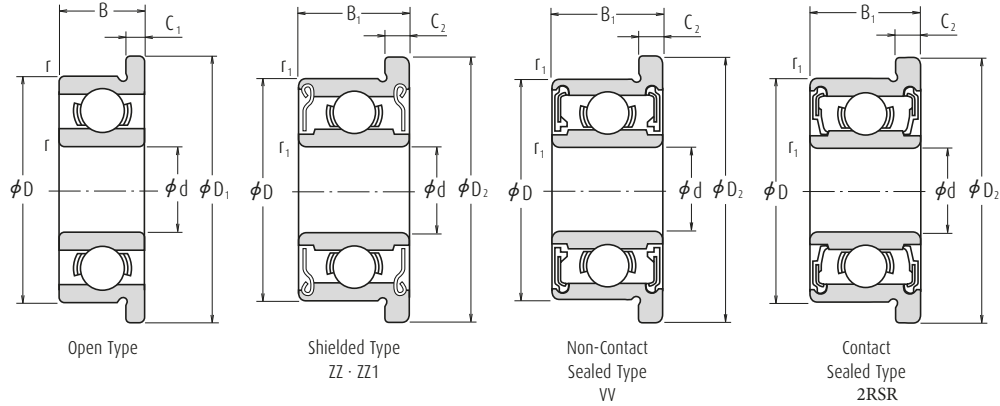
Remark When using bearings with a rotating outer ring, please contact OID if they are sealed or shielded.

Bearing Numbers			Abutment and Fillet Dimensions (mm)				Mass (g)	
Open	Shielded	Sealed	d <sub>a</sub> min.	d <sub>b</sub> max.	r <sub>a</sub> max.	r <sub>b</sub> max.	Open	Shielded
F 681	—	—	1.4	—	0.05	—	0.04	—
F 691	—	—	1.8	—	0.1	—	0.14	—
MF 41 X	—	—	2.0	—	0.1	—	0.12	—
F 681 X	F 681 ZZ	—	1.9	2.1	0.05	0.05	0.09	0.14
F 691 X	F 691 ZZ	—	2.7	2.5	0.15	0.15	0.23	0.28
F 601 X	F 601 ZZ	—	2.7	3.0	0.15	0.15	0.42	0.52
F 682	F 682 ZZ	—	2.6	2.7	0.08	0.08	0.16	0.22
MF 52 B	MF 52 BZZ	—	2.8	2.7	0.1	0.1	0.21	0.27
F 692	F 692 ZZ	—	3.2	3.0	0.15	0.15	0.35	0.48
MF 62	—	—	3.2	—	0.15	—	0.36	—
MF 72	MF 72 ZZ	—	3.2	3.8	0.15	0.15	0.52	0.56
F 602	F 602 ZZ	—	3.2	3.1	0.15	0.15	0.60	0.71
F 682 X	F 682 ZZ	—	3.1	3.7	0.08	0.08	0.25	0.36
F 692 X	F 692 ZZ	—	3.7	3.8	0.15	0.15	0.51	0.68
MF 82 X	—	—	4.1	—	0.2	—	0.62	—
F 602 X	F 602 ZZ	—	3.7	3.5	0.15	0.15	0.74	0.98
MF 63	MF 63 ZZ	—	3.8	3.7	0.1	0.1	0.27	0.33
F 683 A	F 683 AZZ	—	3.8	4.0	0.1	0.1	0.37	0.53
MF 83	—	—	4.2	—	0.15	—	0.56	—
F 693	F 693 ZZ	—	4.2	4.3	0.15	0.15	0.70	0.97
MF 93	MF 93 ZZ	—	4.6	4.3	0.2	0.15	0.81	1.34
F 603	F 603 ZZ	—	4.2	4.3	0.15	0.15	1.0	1.63
F 623	F 623 ZZ	—	4.2	4.3	0.15	0.15	1.85	1.86
F 633	F 633 ZZ	—	4.6	6.0	0.2	0.2	3.73	3.59
MF 74	—	—	4.8	—	0.1	—	0.29	—
—	MF 74 ZZ	—	—	4.8	—	0.1	—	0.35
MF 84	MF 84 ZZ	—	5.2	5.0	0.15	0.1	0.44	0.63
F 684	F 684 ZZ	—	4.8	5.2	0.1	0.1	0.70	1.14
MF 104 B	MF 104 BZZ	—	5.6	5.9	0.2	0.15	1.13	1.59
F 694	F 694 ZZ	—	5.2	5.6	0.15	0.15	1.91	1.96
F 604	F 604 ZZ	—	5.6	5.6	0.2	0.2	2.53	2.53
F 624	F 624 ZZ	—	5.6	6.0	0.2	0.2	3.38	3.53
F 634	F 634 ZZ1	—	6.0	7.5	0.3	0.3	5.73	5.62

# Extra Small Ball Bearings - Miniature Ball Bearings



Metric Design With Flange  
Bore Diameter 5 - 9 mm



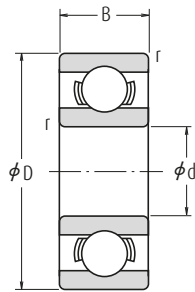
Boundary Dimensions (mm)											Basic Load Ratings (N)		Limiting Speeds (min <sup>-1</sup> )		
d	D	D <sub>1</sub>	D <sub>2</sub>	B	B <sub>1</sub>	C <sub>1</sub>	C <sub>2</sub>	r min.	r <sub>1</sub> min.	C <sub>r</sub>	C <sub>0r</sub>	Grease		Oil	
											Open Z · ZZ V · VV	D · 2RSR	Open Z		
5	8	9.2	—	2	—	0.6	—	0.1	—	310	120	53 000	—	63 000	
—	8	—	9.2	—	2.5	—	0.6	—	0.1	278	131	53 000	—	63 000	
—	9	10.2	10.2	2.5	3	0.6	0.6	0.15	0.15	430	168	50 000	—	60 000	
—	10	11.2	11.6	3	4	0.6	0.8	0.15	0.15	430	168	50 000	—	60 000	
—	11	12.5	12.5	3	5	0.8	1	0.15	0.15	715	281	45 000	—	53 000	
—	13	15	15	4	4	1	1	0.2	0.2	1 080	430	43 000	40 000	50 000	
—	14	16	16	5	5	1	1	0.2	0.2	1 330	505	40 000	38 000	50 000	
—	16	18	18	5	5	1	1	0.3	0.3	1 730	670	36 000	32 000	43 000	
—	19	22	22	6	6	1.5	1.5	0.3	0.3	2 340	885	32 000	30 000	40 000	
6	10	11.2	11.2	2.5	3	0.6	0.6	0.15	0.1	495	218	45 000	—	53 000	
—	12	13.2	13.6	3	4	0.6	0.8	0.2	0.15	715	292	43 000	40 000	50 000	
—	13	15	15	3.5	5	1	1.1	0.15	0.15	1 080	440	40 000	38 000	50 000	
—	15	17	17	5	5	1.2	1.2	0.2	0.2	1 730	670	40 000	36 000	45 000	
—	17	19	19	6	6	1.2	1.2	0.3	0.3	2 260	835	38 000	34 000	45 000	
—	19	22	22	6	6	1.5	1.5	0.3	0.3	2 340	885	32 000	30 000	40 000	
—	22	25	25	7	7	1.5	1.5	0.3	0.3	3 300	1 370	30 000	28 000	36 000	
7	11	12.2	12.2	2.5	3	0.6	0.6	0.15	0.1	455	201	43 000	—	50 000	
—	13	14.2	14.6	3	4	0.6	0.8	0.2	0.15	540	276	40 000	—	48 000	
—	14	16	16	3.5	5	1	1.1	0.15	0.15	1 170	510	40 000	34 000	45 000	
—	17	19	19	5	5	1.2	1.2	0.3	0.3	1 610	715	36 000	28 000	43 000	
—	19	22	22	6	6	1.5	1.5	0.3	0.3	2 340	885	36 000	32 000	43 000	
—	22	25	25	7	7	1.5	1.5	0.3	0.3	3 300	1 370	30 000	28 000	36 000	
8	12	13.2	13.6	2.5	3.5	0.6	0.8	0.15	0.1	545	274	40 000	—	48 000	
—	14	15.6	15.6	3.5	4	0.8	0.8	0.2	0.15	820	385	38 000	32 000	45 000	
—	16	18	18	4	5	1	1.1	0.2	0.2	1 610	710	36 000	30 000	43 000	
—	19	22	22	6	6	1.5	1.5	0.3	0.3	2 240	910	36 000	28 000	43 000	
—	22	25	25	7	7	1.5	1.5	0.3	0.3	3 300	1 370	34 000	28 000	40 000	
9	17	19	19	4	5	1	1.1	0.2	0.2	1 330	665	36 000	24 000	43 000	
—	20	23	23	6	6	1.5	1.5	0.3	0.3	1 720	840	34 000	24 000	40 000	

Remark When using bearings with a rotating outer ring, please contact OID if they are sealed or shielded.

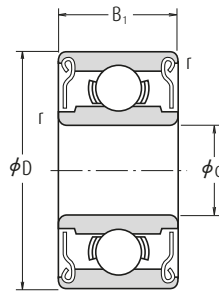
Bearing Numbers			Abutment and Fillet Dimensions (mm)				Mass (g)		
Open	Shielded	Sealed	d <sub>a</sub> min.	d <sub>b</sub> max.	r <sub>a</sub> max.	r <sub>b</sub> max.	approx.		
							Open	Shielded	
MF 85	—	—	5.8	—	0.1	—	0.33	—	
—	MF 85 ZZ	—	—	5.8	—	0.1	—	0.41	
MF 95	MF 95 ZZ1	—	6.2	6.0	0.15	0.15	0.59	0.66	
MF 105	MF 105 ZZ	—	6.2	6.0	0.15	0.15	1.05	1.46	
F 685	F 685 ZZ	—	6.2	6.2	0.15	0.15	1.37	2.18	
F 695	F 695 ZZ	VV 2RSR	6.6	6.6	0.2	0.2	2.79	2.84	
F 605	F 605 ZZ	—	2RSR	6.6	6.9	0.2	0.2	3.9	3.85
F 625	F 625 ZZ1	VV 2RSR	7.0	7.5	0.3	0.3	5.37	5.27	
F 635	F 635 ZZ1	VV 2RSR	7.0	8.5	0.3	0.3	9.49	9.49	
MF 106	MF 106 ZZ1	—	7.2	7.0	0.15	0.1	0.65	0.77	
MF 126	MF 126 ZZ	—	2RSR	7.6	7.2	0.2	0.15	1.38	1.94
F 686 A	F 686 AZZ	VV 2RSR	7.2	7.4	0.15	0.15	2.25	3.04	
F 696	F 696 ZZ1	VV 2RSR	7.6	7.9	0.2	0.2	4.34	4.26	
F 606	F 606 ZZ	VV 2RSR	8.0	8.2	0.3	0.3	6.58	6.61	
F 626	F 626 ZZ1	VV 2RSR	8.0	8.5	0.3	0.3	9.09	9.09	
F 636	F 636 ZZ	VV 2RSR	8.0	10.5	0.3	0.3	14.6	14.7	
MF 117	MF 117 ZZ	—	8.2	8.0	0.15	0.1	0.72	0.82	
MF 137	MF 137 ZZ	—	8.6	9.0	0.2	0.15	1.7	2.23	
F 687	F 687 ZZ1	VV 2RSR	8.2	8.5	0.15	0.15	2.48	3.37	
F 697	F 697 ZZ1	VV 2RSR	9.0	10.2	0.3	0.3	5.65	5.65	
F 607	F 607 ZZ1	VV 2RSR	9.0	9.1	0.3	0.3	8.66	8.66	
F 627	F 627 ZZ	VV 2RSR	9.0	10.5	0.3	0.3	14.2	14.2	
MF 128	MF 128 ZZ1	—	9.2	9.0	0.15	0.1	0.82	1.15	
MF 148	MF 148 ZZ	VV 2RSR	9.6	9.2	0.2	0.15	2.09	2.39	
F 688 A	F 688 AZZ	VV 2RSR	9.6	10.2	0.2	0.2	3.54	4.47	
F 698	F 698 ZZ	VV 2RSR	10.0	10.0	0.3	0.3	8.35	8.3	
F 608	F 608 ZZ	VV 2RSR	10.0	10.5	0.3	0.3	13.4	13.5	
F 689	F 689 ZZ1	VV 2RSR	10.6	11.5	0.2	0.2	3.97	4.91	
F 699	F 699 ZZ1	VV 2RSR	11.0	12.0	0.3	0.3	9.51	9.51	

# Extra Small Ball Bearings · Miniature Ball Bearings

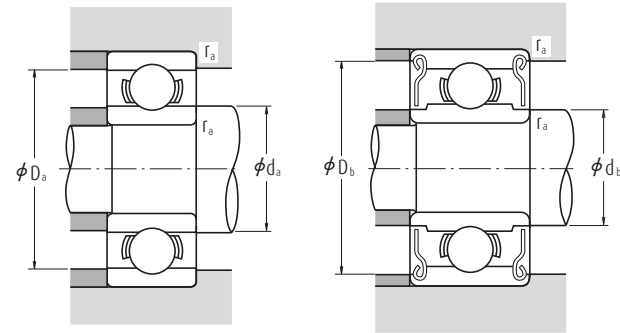
Inch Design  
Bore Diameter 1.016 – 9.525 mm



Open Type



Shielded Type  
ZZ · ZS



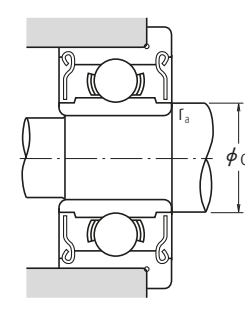
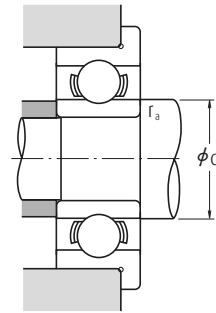
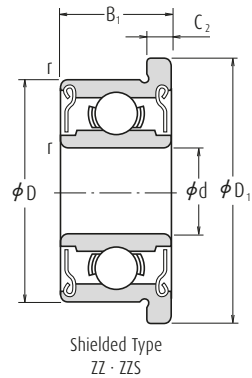
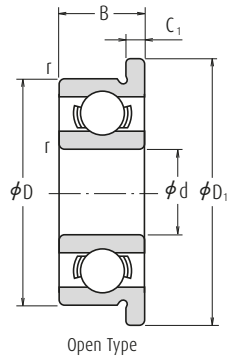
Boundary Dimensions (mm)					Basic Load Ratings (N)		Limiting Speeds (min <sup>-1</sup> )		Bearing
d	D	B	B <sub>1</sub>	r min.	C <sub>r</sub>	C <sub>0r</sub>	Grease Open Z · ZZ	Oil Open Z	
1.016	3.175	1.191	—	0.1	80	23	130 000	150 000	R 09
1.191	3.967	1.588	2.380	0.1	138	35	110 000	130 000	R 0
1.397	4.762	1.984	2.779	0.1	231	66	90 000	110 000	R 1
1.984	6.350	2.380	3.571	0.1	310	108	67 000	80 000	R 1-4
2.380	4.762	1.588	—	0.1	188	60	80 000	95 000	R 133
	4.762	—	2.380	0.1	143	52	80 000	95 000	—
	7.938	2.779	3.571	0.15	550	175	60 000	71 000	R 1-5
3.175	6.350	2.380	2.779	0.1	283	95	67 000	80 000	R 144
	7.938	2.779	3.571	0.1	560	179	60 000	67 000	R 2-5
	9.525	2.779	3.571	0.15	640	225	53 000	63 000	R 2-6
	9.525	3.967	3.967	0.3	630	218	56 000	67 000	R 2
	12.700	4.366	4.366	0.3	640	225	53 000	63 000	R 2A
3.967	7.938	2.779	3.175	0.1	360	149	53 000	63 000	R 155
4.762	7.938	2.779	3.175	0.1	360	149	53 000	63 000	R 156
	9.525	3.175	3.175	0.1	710	270	50 000	60 000	R 166
	12.700	3.967	4.978	0.3	1 300	485	43 000	53 000	R 3
6.350	9.525	3.175	3.175	0.1	420	204	48 000	56 000	R 168B
	12.700	3.175	4.762	0.15	1 080	440	40 000	50 000	R 188
	15.875	4.978	4.978	0.3	1 610	660	38 000	45 000	R 4B
	19.050	5.558	7.142	0.4	2 620	1 060	36 000	43 000	R 4AA
7.938	12.700	3.967	3.967	0.15	540	276	40 000	48 000	R 1810
9.525	22.225	5.558	7.142	0.4	3 350	1 410	32 000	38 000	R 6

- Remarks
1. When using bearings with a rotating outer ring, please contact OID if they are shielded.
  2. Bearings with double shields (ZZ, ZS) are also available with single shields (Z, ZS).

Numbers	Abutment and Fillet Dimensions (mm)					Mass (g)	
	d <sub>a</sub> min.	d <sub>b</sub> max.	D <sub>a</sub> max.	D <sub>b</sub> min.	r <sub>a</sub> max.	Open	approx. Shielded
—	1.9	—	2.3	—	0.1	0.04	—
R 0 ZZ	2.0	1.9	3.1	3.5	0.1	0.09	0.11
R 1 ZZ	2.2	2.3	3.9	4.1	0.1	0.15	0.19
R 1-4 ZZ	2.8	3.9	5.5	5.9	0.1	0.35	0.50
—	3.2	—	3.9	—	0.1	0.10	—
R 133 ZS	—	3.0	—	4.2	0.1	—	0.13
R 1-5 ZZ	3.6	4.1	6.7	7.0	0.15	0.60	0.72
R 144 ZZ	4.0	3.9	5.5	5.9	0.1	0.25	0.27
R 2-5 ZZ	4.0	4.3	7.1	7.3	0.1	0.55	0.72
R 2-6 ZS	4.4	4.6	8.3	8.2	0.15	0.96	1.13
R 2 ZZ	5.2	4.8	7.5	8.0	0.3	1.36	1.39
R 2A ZZ	5.2	4.6	10.7	8.2	0.3	3.3	3.23
R 155 ZS	4.8	5.5	7.1	7.3	0.1	0.51	0.56
R 156 ZS	5.6	5.5	7.1	7.3	0.1	0.39	0.42
R 166 ZZ	5.6	5.9	8.7	8.8	0.1	0.81	0.85
R 3 ZZ	6.8	6.5	10.7	11.2	0.3	2.21	2.79
R 168 BZZ	7.2	7.0	8.7	8.9	0.1	0.58	0.62
R 188 ZZ	7.6	7.4	11.5	11.6	0.15	1.53	2.21
R 4B ZZ	8.4	8.4	13.8	13.8	0.3	4.5	4.43
R 4AA ZZ	9.4	9.0	16.0	16.6	0.4	7.48	9.17
R 1810 ZZ	9.2	9.0	11.5	11.6	0.15	1.56	1.48
R 6 ZZ	12.6	11.9	19.2	20.0	0.4	9.02	11

## Extra Small Ball Bearings - Miniature Ball Bearings

Inch Design With Flange  
Bore Diameter 1.191 - 9.525 mm



Boundary Dimensions (mm)								Basic Load Ratings (N)	
d	D	D <sub>1</sub>	B	B <sub>1</sub>	C <sub>1</sub>	C <sub>2</sub>	r min.	C <sub>r</sub>	C <sub>0r</sub>
1.191	3.967	5.156	1.588	2.380	0.330	0.790	0.1	138	35
1.397	4.762	5.944	1.984	2.779	0.580	0.790	0.1	231	66
1.984	6.350	7.518	2.380	3.571	0.580	0.790	0.1	310	108
2.380	4.762	5.944	1.588	—	0.460	—	0.1	188	60
	4.762	5.944	—	2.380	—	0.790	0.1	143	52
	7.938	9.119	2.779	3.571	0.580	0.790	0.15	550	175
3.175	6.350	7.518	2.380	2.779	0.580	0.790	0.1	283	95
	7.938	9.119	2.779	3.571	0.580	0.790	0.1	560	179
	9.525	10.719	2.779	3.571	0.580	0.790	0.15	640	225
	9.525	11.176	3.967	3.967	0.760	0.760	0.3	630	218
3.967	7.938	9.119	2.779	3.175	0.580	0.910	0.1	360	149
4.762	7.938	9.119	2.779	3.175	0.580	0.910	0.1	360	149
	9.525	10.719	3.175	3.175	0.580	0.790	0.1	710	270
	12.700	14.351	4.978	4.978	1.070	1.070	0.3	1 300	485
6.350	9.525	10.719	3.175	3.175	0.580	0.910	0.1	420	204
	12.700	13.894	3.175	4.762	0.580	1.140	0.15	1 080	440
	15.875	17.526	4.978	4.978	1.070	1.070	0.3	1 610	660
7.938	12.700	13.894	3.967	3.967	0.790	0.790	0.15	540	276
9.525	22.225	24.613	7.142	7.142	1.570	1.570	0.4	3 350	1 410

Limiting Speeds (min <sup>-1</sup> )		Bearing Numbers		Abutment and Fillet Dimensions (mm)			Mass (g)	
Grease	Oil	Open	Shielded	d <sub>a</sub> min.	d <sub>b</sub> max.	r <sub>a</sub> max.	approx.	
Open Z · ZZ	Open Z	Open	Shielded				Open	Shielded
110 000	130 000	FR 0	FR 0 ZZ	2.0	1.9	0.1	0.11	0.16
90 000	110 000	FR 1	FR 1 ZZ	2.2	2.3	0.1	0.20	0.25
67 000	80 000	FR 1-4	FR 1-4 ZZ	2.8	3.9	0.1	0.41	0.58
80 000	95 000	FR 133	—	3.2	—	0.1	0.13	—
80 000	95 000	—	FR 133 ZZS	—	3.0	0.1	—	0.19
60 000	71 000	FR 1-5	FR 1-5 ZZ	3.6	4.1	0.15	0.68	0.82
67 000	80 000	FR 144	FR 144 ZZ	4.0	3.9	0.1	0.31	0.35
60 000	67 000	FR 2-5	FR 2-5 ZZ	4.0	4.3	0.1	0.62	0.81
53 000	63 000	FR 2-6	FR 2-6 ZZS	4.4	4.6	0.15	1.04	1.25
56 000	67 000	FR 2	FR 2 ZZ	5.2	4.8	0.3	1.51	1.55
53 000	63 000	FR 155	FR 155 ZZS	4.8	5.5	0.1	0.59	0.67
53 000	63 000	FR 156	FR 156 ZZS	5.6	5.5	0.1	0.47	0.53
50 000	60 000	FR 166	FR 166 ZZ	5.6	5.9	0.1	0.90	0.98
43 000	53 000	FR 3	FR 3 ZZ	6.8	6.5	0.3	2.97	3.09
48 000	56 000	FR 168B	FR 168 BZZ	7.2	7.0	0.1	0.66	0.75
40 000	50 000	FR 188	FR 188 ZZ	7.6	7.4	0.15	1.64	2.49
38 000	45 000	FR 4B	FR 4B ZZ	8.4	8.4	0.3	4.78	4.78
40 000	48 000	FR 1810	FR 1810 ZZ	9.2	9.0	0.15	1.71	1.63
32 000	38 000	FR 6	FR 6 ZZ	12.6	11.9	0.4	10.1	12.1

**Remarks** 1. When using bearings with a rotating outer ring, please contact OID if they are shielded.  
2. Bearings with double shields (ZZ, ZZS) are also available with single shields (Z, ZS).