



## Spherical Roller Bearings

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### • Design and configurations

Spherical Roller Bearings are particularly suitable for applications where misalignment can arise from error in mounting or from shaft deflection. NACHI Spherical Roller Bearings are manufactured in a number of design and

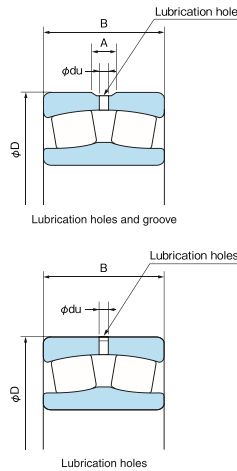
material configurations depending on the type of application and size of the bearing. See Table 1 for the roller, the guide ring and cage design for NACHI Spherical Roller Bearings. They can sustain radial and axial loads.

Table 1. Design and configurations

Series	Type	EX	EX1	E	E2	E	AEX	AX	A2X	AX
239						20, 26, 44~1060		28~40		
230				20~36		38~/1000		20~36	38~48	
240			24~36			38~/600, /670, /800				24~36
231			20~34			36~/800		20~34	36~48	
241			22~32			36~/500				22~34
222	05~30			32	32	34~68	05~30		32	
232			18, 20~30	16, 17, 19		32~/600		20~30	32~40	
213			11~22	04~10, 24				06~22		
223		08~26				28~60	07~26		28, 30	
Cross section										
Roller	Symmetric			Symmetric		Nonsymmetric		Nonsymmetric		
Center guide	Floating ring			Inner ring rib		Inner ring rib		Inner ring rib		
Cage	Pressed steel			Machined high strength brass		Machined high strength brass		Pressed high strength brass		

● Attention

- (1) For high axial load applications, the axial load  $F_a$  must not exceed 0.6 of the radial load  $F_r$ . If the axial load exceeds 0.6  $F_r$ , contact NACHI engineers for design assistance.
- (2) For applications where oscillating loads (such as shaker screen applications) or high speed is involved, contact NACHI for design assistance.
- (3) In very lightly loaded or no load conditions, sliding motion can occur which could damage the bearing.  
To prevent this, bearings must be subjected to a load greater than 0.02  $C_r$  (basic dynamic load rating).
- (4) The material coefficient number of the bearing is taken into consideration for the dynamic load rating.  
\* This only applies to spherical roller bearing.



● Lubrication Holes and Groove

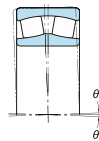
The outer ring of Spherical Roller Bearings are often made with lubrication holes and a groove for feeding lubricant. The outer ring may also be configured with oil holes only depending on fitting, mounting, or service conditions. Table 2 shows the symbols for lubrication holes and grooves. Hole diameter, groove width and hole count are according to the dimensions table. Improved heat treatment technology allows for operation at 200°C without change in dimensions.

Table 2. Lubrication holes and groove

Modification to outer ring	Suffix	Part No. Example
Lubrication holes and groove	W33	22330E W33
Lubrication holes	W20	22330E W20

● Misalignment

Maximum permissible misalignment angle is about 2° under general service conditions. But its angle will vary with the series, service condition and surrounding structure. As rotational speed increases, misaligned bearings will tend to generate more noise. Due to noise constraints, the practical maximum misalignment in a bearing may be considerably less than the maximum permissible misalignment.



● Mounting bearings with tapered bore

Mounting bearings with a tapered bore requires some experience and technique. Bearings with tapered bore are always mounted with an interference fit on the shaft. To measure the amount of interference fit on the shaft, the axial displacement of the inner ring or

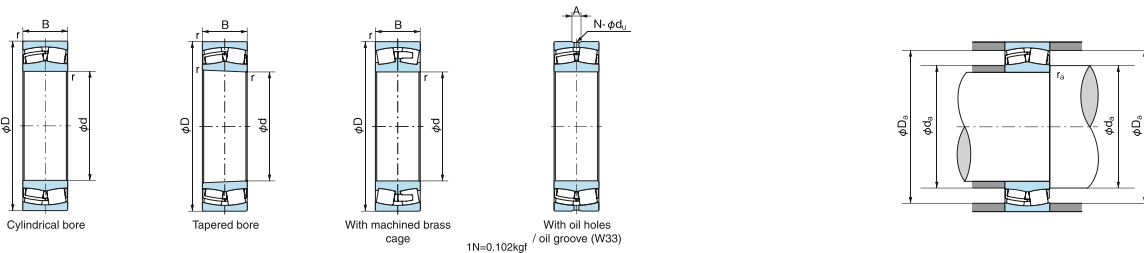
the reduction of radial internal clearance due to the interference fit can be used. Generally, the measurement of reduction in radial internal clearance is a more reliable method than measurement of the axial displacement of the inner ring.

Nominal bore diameter d	Incl.	Radial clearance reduction		Axial displacement (1)				Necessary minimum internal clearance after mounting (2) (for initial clearance range)		
				Taper		Normal				
				1 : 12	1 : 30	Min	Max	Normal	C3	C4
24	30	0.015	0.020	0.3	0.35	—	—	0.015	0.020	0.035
30	40	0.020	0.025	0.35	0.4	—	—	0.015	0.025	0.040
40	50	0.025	0.030	0.34	0.45	—	—	0.020	0.030	0.050
50	65	0.030	0.040	0.45	0.6	—	—	0.025	0.035	0.055
65	80	0.040	0.050	0.6	0.75	—	—	0.025	0.040	0.070
80	100	0.045	0.060	0.7	0.9	1.7	2.2	0.035	0.050	0.080
100	120	0.050	0.070	0.75	1.1	1.9	2.7	0.050	0.065	0.100
120	140	0.065	0.090	1.1	1.4	2.7	3.5	0.055	0.080	0.110
140	160	0.075	0.100	1.2	1.6	3.0	4.0	0.055	0.090	0.130
160	180	0.080	0.110	1.3	1.7	3.2	4.2	0.060	0.100	0.150
180	200	0.090	0.130	1.4	2.0	3.5	5.0	0.070	0.100	0.160
200	225	0.100	0.140	1.6	2.2	4.0	5.5	0.080	0.120	0.180
225	250	0.110	0.150	1.7	2.4	4.2	6.0	0.090	0.130	0.200
250	280	0.120	0.170	1.9	2.7	4.7	6.7	0.100	0.140	0.220
280	315	0.130	0.190	2.0	3.0	5.0	7.5	0.110	0.150	0.240
315	355	0.150	0.210	2.4	3.3	6.0	8.2	0.120	0.170	0.260
355	400	0.170	0.230	2.6	3.6	6.5	9.0	0.130	0.190	0.290
400	450	0.200	0.260	3.1	4.0	7.7	10	0.130	0.200	0.310
450	500	0.210	0.280	3.3	4.4	8.2	11	0.160	0.230	0.350
500	560	0.240	0.320	3.7	5.0	9.2	12.5	0.170	0.250	0.360
560	630	0.260	0.350	4.0	5.4	10	13.5	0.200	0.290	0.410
630	710	0.300	0.400	4.6	6.2	11.5	15.5	0.210	0.310	0.450
710	800	0.340	0.450	5.3	7.0	13.3	17.5	0.230	0.350	0.510
800	900	0.370	0.500	5.7	7.8	14.3	19.5	0.270	0.390	0.570
900	1000	0.410	0.550	6.3	8.5	15.8	21	0.300	0.430	0.640
1000	1120	0.450	0.600	6.8	9.0	17	23	0.320	0.480	0.700
1120	1250	0.490	0.650	7.4	9.8	18.5	25	0.340	0.540	0.770

Notes: (1) The values are applied for mounting on solid shaft. In case of hollow shaft, larger axial displacement should be applied.  
(2) In following cases, please make sure radial internal clearance after mounting. - Initial radial clearance is less than (bore diameter deviation) × 0.5 - Temperature difference exists between inner ring and outer ring under operation. - Internal clearance after mounting must be over these values.

**Spherical Roller Bearings**

Bore Diameter: 20~50mm



**Dynamic equivalent radial load**

$F_r = XFr + YFa$

$\frac{F_r}{Fr} \leq e$		$\frac{F_r}{Fr} > e$	
X	Y	X	Y
1	Y <sub>1</sub>	0.67	Y <sub>2</sub>

Values of Y<sub>1</sub>, Y<sub>2</sub> and e from table.

**Static equivalent radial load**

$P_0 = Fr + Y_0 Fa$

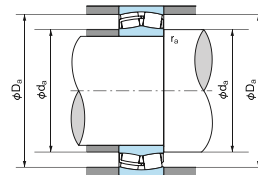
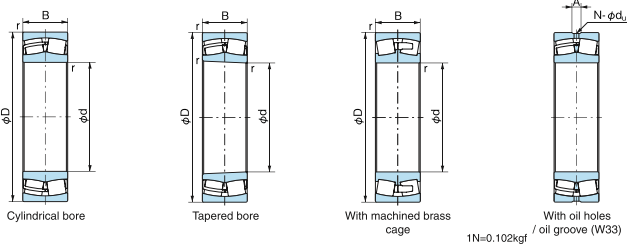
Values Y<sub>0</sub> from table.

Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min <sup>-1</sup> )		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant e	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.		
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter φ <sub>h</sub>	Groove width A	Hole count N	d <sub>a</sub> (min)	D <sub>a</sub> (max)	r <sub>a</sub> (max)		Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>		Cylindrical bore	Tapered bore	
20	52	15	1.1	21304E	21304EK	47000	33500	11,000	14,000														
	52	18	1	22205EX	22205EXK	63000	48000	10,500	13,000		3	5	4	27.0	45.0	1.0	0.31	2.20	3.27	2.15	0.18	21304E	21304EK
25	52	18	1	22205AEX	22205AEXK	48500	34500	13,300	16,500		3	5	4	30.5	46.5	1.0	0.43	1.57	2.33	1.53	0.18	22205AEX	22205AEXK
	62	17	1.1	21305E	21305EK	64000	47500	9,000	11,500		6	6	4	32.0	53.0	1.0	0.28	2.39	3.56	2.34	0.29	21305E	21305EK
30	62	20	1	22206EX	22206EXK	84500	65000	8,500	11,000		3	5	4	35.5	56.5	1.0	0.33	2.04	3.04	2.00	0.30	22206EX	22206EXK
	62	20	1	22206AEX	22206AEXK	68000	48500	11,200	14,400		3	5	4	35.5	56.5	1.0	0.40	1.70	2.53	1.66	0.29	22206AEX	22206AEXK
	72	19	1.1	21306E	21306EK	83000	62500	8,000	9,500		3	5	4	38.0	65.0	1.0	0.27	2.49	3.71	2.43	0.43	21306E	21306EK
	72	19	1.1	21306AX	21306AXK	73000	50900	9,700	12,700		3	5	4	38.0	65.0	1.0	0.35	1.95	2.90	1.90	0.43	21306AX	21306AXK
35	72	23	1.1	22207EX	22207EXK	112000	88500	7,500	9,500		3	6	4	42.0	65.0	1.0	0.32	2.10	3.13	2.06	0.46	22207EX	22207EXK
	72	23	1.1	22207AEX	22207AEXK	94500	70000	9,600	12,400		3	6	4	42.0	65.0	1.0	0.39	1.74	2.60	1.71	0.46	22207AEX	22207AEXK
	80	21	1.5	21307E	21307EK	96000	76000	7,000	8,500		3	5	4	44.0	71.0	1.5	0.27	2.49	3.71	2.43	0.57	21307E	21307EK
	80	21	1.5	21307AX	21307AXK	89000	63100	9,000	11,200		3	5	4	44.0	71.0	1.5	0.33	2.03	3.03	1.99	0.56	21307AX	21307AXK
40	80	31	1.5	22307AEX	22307AEXK	145000	107000	9,000	11,500		3	6	4	43.5	71.5	1.5	0.48	1.41	2.10	1.38	0.78	22307AEX	22307AEXK
	80	23	1.1	22208EX	22208EXK	126000	102000	6,700	8,500		3	6	4	47.0	73.0	1.0	0.28	2.37	3.53	2.32	0.56	22208EX	22208EXK
	80	23	1.1	22208AEX	22208AEXK	106000	81000	8,500	10,900		3	6	4	47.0	73.0	1.0	0.34	1.99	2.96	1.94	0.56	22208AEX	22208AEXK
	90	23	1.5	21308E	21308EK	119000	95500	6,000	7,500		3	5	4	50.0	81.0	1.5	0.26	2.55	3.80	2.50	0.78	21308E	21308EK
45	90	23	1.5	21308AX	21308AXK	116000	84400	7,500	9,750		3	5	4	50.0	81.0	1.5	0.32	2.09	3.11	2.04	0.79	21308AX	21308AXK
	90	33	1.5	22308EX	22308EXK	185000	151000	5,300	6,700		4	7	4	48.5	81.5	1.5	0.37	1.83	2.72	1.79	1.07	22308EX	22308EXK
	90	33	1.5	22308AEX	22308AEXK	172000	134000	7,800	10,000		4	7	4	48.5	81.5	1.5	0.43	1.55	2.31	1.54	1.05	22308AEX	22308AEXK
	85	23	1.1	22209EX	22209EXK	133000	110000	6,000	7,500		3	6	4	52.0	78.0	1.0	0.26	2.55	3.80	2.50	0.61	22209EX	22209EXK
	85	23	1.1	22209AEX	22209AEXK	113000	85500	7,900	10,200		3	6	4	52.0	78.0	1.0	0.31	2.15	3.21	2.11	0.60	22209AEX	22209AEXK
	100	25	1.5	21309E	21309EK	150000	124000	5,000	6,300		3	5	4	55.0	92.0	1.5	0.26	2.62	3.90	2.56	1.05	21309E	21309EK
	100	25	1.5	21309AX	21309AXK	143000	105000	6,750	9,000		3	5	4	55.0	92.0	1.5	0.31	2.16	3.22	2.11	1.05	21309AX	21309AXK
	100	36	1.5	22309EX	22309EXK	230000	182000	4,500	5,600		4	8	4	53.5	91.5	1.5	0.37	1.83	2.72	1.79	1.41	22309EX	22309EXK
50	100	36	1.5	22309AEX	22309AEXK	208000	157000	7,050	9,150		4	8	4	53.5	91.5	1.5	0.43	1.57	2.34	1.54	1.41	22309AEX	22309AEXK
	90	23	1.1	22210EX	22210EXK	142000	122000	5,600	7,100		3	6	4	57.0	83.0	1.0	0.24	2.79	4.15	2.73	0.65	22210EX	22210EXK
	90	23	1.1	22210AEX	22210AEXK	119000	93500	7,350	9,600		3	6	4	57.0	83.0	1.0	0.29	2.34	3.48	2.28	0.65	22210AEX	22210AEXK
	110	27	2	21310E	21310EK	178000	151000	4,500	5,600		3	5	4	61.0	101.0	2.0	0.25	2.71	4.04	2.65	1.36	21310E	21310EK
	110	27	2	21310AX	21310AXK	170000	127000	6,000	8,250		3	5	4	61.0	101.0	2.0	0.30	2.24	3.34	2.19	1.36	21310AX	21310AXK
	110	40	2	22310EX	22310EXK	280000	235000	4,300	5,300		4	8	4	60.0	100.0	2.0	0.36	1.85	2.75	1.81	1.92	22310EX	22310EXK
110	40	2	22310AEX	22310AEXK	254000	205000	6,300	8,250		4	8	4	60.0	100.0	2.0	0.42	1.62	2.42	1.59	1.88	22310AEX	22310AEXK	

Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

**Spherical Roller Bearings**

Bore Diameter: 55~75mm



Dynamic equivalent radial load

$F_r = XFr + YFa$

$\frac{Fa}{Fr} \leq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y <sub>1</sub>	0.67	Y <sub>2</sub>

Values of Y<sub>1</sub>, Y<sub>2</sub> and e from table.

Static equivalent radial load

$P_0 = Fr + Y_0 Fa$

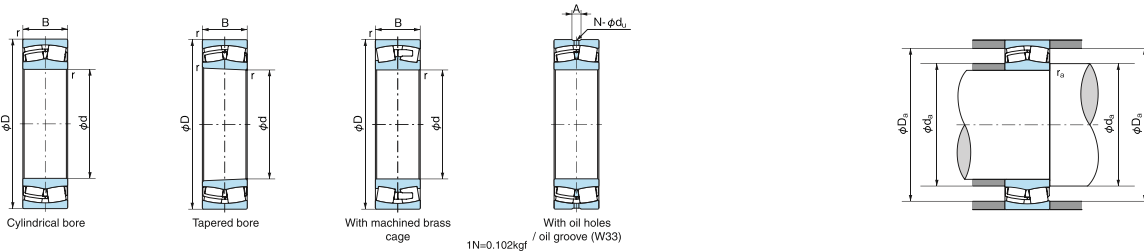
Values Y<sub>0</sub> from table.

Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min <sup>-1</sup> )		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant e	Axial factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.	
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter φ <sub>h</sub>	Groove width A	Hole count N	d <sub>a</sub> (min)	D <sub>a</sub> (max)	r <sub>a</sub> (max)		Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>		Cylindrical bore	Tapered bore
55	100	25	1.5	22211EX	22211EXK	171000	144000	5,300	6,700	3	6	4	63.5	91.5	1.5	0.24	2.84	4.23	2.78	0.88	22211EX	22211EXK
	100	25	1.5	22211AEX	22211AEXK	150000	118000	6,750	8,550	3	6	4	63.5	91.5	1.5	0.29	2.34	3.48	2.28	0.89	22211AEX	22211AEXK
	120	29	2	21311EX1	21311EX1K	200000	165000	4,500	5,600	3	5	4	65.0	110.0	2.0	0.25	2.71	4.03	2.65	1.70	21311EX1	21311EX1K
	120	29	2	21311AX	21311AXK	206000	171000	6,000	7,500	3	5	4	65.0	110.0	2.0	0.29	2.32	3.45	2.27	1.77	21311AX	21311AXK
	120	43	2	22311EX	22311EXK	325000	263000	3,800	4,800	4	8	4	65.0	110.0	2.0	0.36	1.85	2.75	1.81	2.40	22311EX	22311EXK
60	120	43	2	22311AEX	22311AEXK	294000	227000	6,000	7,650	4	8	4	65.0	110.0	2.0	0.43	1.56	2.33	1.53	2.39	22311AEX	22311AEXK
	110	28	1.5	22212EX	22212EXK	210000	179000	4,800	6,000	3	6	4	68.5	101.5	1.5	0.25	2.74	4.08	2.68	1.20	22212EX	22212EXK
	110	28	1.5	22212AEX	22212AEXK	179000	144000	6,150	7,800	3	6	4	68.5	101.5	1.5	0.29	2.29	3.41	2.24	1.22	22212AEX	22212AEXK
	130	31	2.1	21312EX1	21312EX1K	238000	193000	3,800	4,800	3	5	4	72.0	118.0	2.0	0.24	2.78	4.14	2.72	2.10	21312EX1	21312EX1K
	130	31	2.1	21312AX	21312AXK	228000	192000	5,250	6,750	3	5	4	72.0	118.0	2.0	0.29	2.36	3.52	2.31	2.19	21312AX	21312AXK
65	130	46	2.1	22312EX	22312EXK	390000	330000	3,600	4,500	4	8	4	72.0	118.0	2.0	0.36	1.86	2.77	1.82	3.05	22312EX	22312EXK
	130	46	2.1	22312AEX	22312AEXK	340000	275000	5,400	6,900	4	8	4	72.0	118.0	2.0	0.41	1.65	2.46	1.62	3.01	22312AEX	22312AEXK
	120	31	1.5	22213EX	22213EXK	246000	209000	4,300	5,300	3	6	4	73.5	111.5	1.5	0.25	2.69	4.00	2.63	1.56	22213EX	22213EXK
	120	31	1.5	22213AEX	22213AEXK	213000	169000	5,700	7,200	3	6	4	73.5	111.5	1.5	0.30	2.26	3.36	2.21	1.60	22213AEX	22213AEXK
	140	33	2.1	21313EX1	21313EX1K	270000	232000	3,600	4,500	3	6	4	77.0	128.0	2.0	0.24	2.83	4.21	2.76	2.60	21313EX1	21313EX1K
70	140	33	2.1	21313AX	21313AXK	261000	222000	5,100	6,400	3	6	4	77.0	128.0	2.0	0.28	2.40	3.57	2.35	2.69	21313AX	21313AXK
	140	48	2.1	22313EX	22313EXK	415000	355000	3,200	4,000	4	8	4	77.0	128.0	2.0	0.34	1.98	2.94	1.93	3.67	22313EX	22313EXK
	140	48	2.1	22313AEX	22313AEXK	380000	310000	4,950	6,450	4	8	4	77.0	128.0	2.0	0.39	1.72	2.55	1.68	3.64	22313AEX	22313AEXK
	125	31	1.5	22214EX	22214EXK	257000	220000	4,000	5,300	3	6	4	78.5	116.5	1.5	0.24	2.87	4.27	2.80	1.65	22214EX	22214EXK
	125	31	1.5	22214AEX	22214AEXK	225000	185000	5,400	6,900	3	6	4	78.5	116.5	1.5	0.28	2.39	3.55	2.33	1.69	22214AEX	22214AEXK
75	150	35	2.1	21314EX1	21314EX1K	310000	260000	3,200	4,000	3	6	4	82.0	138.0	2.0	0.24	2.84	4.23	2.78	3.10	21314EX1	21314EX1K
	150	35	2.1	21314AX	21314AXK	305000	268000	4,500	6,000	3	6	4	82.0	138.0	2.0	0.28	2.45	3.64	2.39	3.30	21314AX	21314AXK
	150	51	2.1	22314EX	22314EXK	480000	415000	3,000	3,800	5	10	4	82.0	138.0	2.0	0.34	1.98	2.94	1.93	4.45	22314EX	22314EXK
	150	51	2.1	22314AEX	22314AEXK	445000	365000	4,650	6,000	5	10	4	82.0	138.0	2.0	0.40	1.71	2.54	1.67	4.46	22314AEX	22314AEXK
	130	31	1.5	22215EX	22215EXK	265000	234000	4,000	5,000	3	6	4	83.5	121.5	1.5	0.22	3.07	4.58	3.01	1.74	22215EX	22215EXK
75	130	31	1.5	22215AEX	22215AEXK	234000	191000	5,100	6,600	3	6	4	83.5	121.5	1.5	0.27	2.51	3.73	2.46	1.76	22215AEX	22215AEXK
	160	37	2.1	21315EX1	21315EX1K	340000	298000	3,200	4,000	3	6	4	87.0	148.0	2.0	0.23	2.87	4.27	2.80	3.80	21315EX1	21315EX1K
	160	37	2.1	21315AX	21315AXK	325000	286000	4,350	5,550	3	6	4	87.0	148.0	2.0	0.27	2.50	3.72	2.44	3.95	21315AX	21315AXK
	160	55	2.1	22315EX	22315EXK	550000	475000	2,800	3,600	5	10	4	87.0	148.0	2.0	0.35	1.95	2.90	1.91	5.44	22315EX	22315EXK
160	55	2.1	22315AEX	22315AEXK	495000	415000	4,350	5,500	5	10	4	87.0	148.0	2.0	0.39	1.72	2.56	1.68	5.44	22315AEX	22315AEXK	

Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

**Spherical Roller Bearings**

Bore Diameter: 80~95mm



■ Dynamic equivalent radial load

$F_r = XFr + YFa$

$\frac{F_r}{Fr} \leq e$		$\frac{F_r}{Fr} > e$	
X	Y	X	Y
1	Y <sub>1</sub>	0.67	Y <sub>2</sub>

Values of Y<sub>1</sub>, Y<sub>2</sub> and e from table.

■ Static equivalent radial load

$P_0 = Fr + Y_0 Fa$

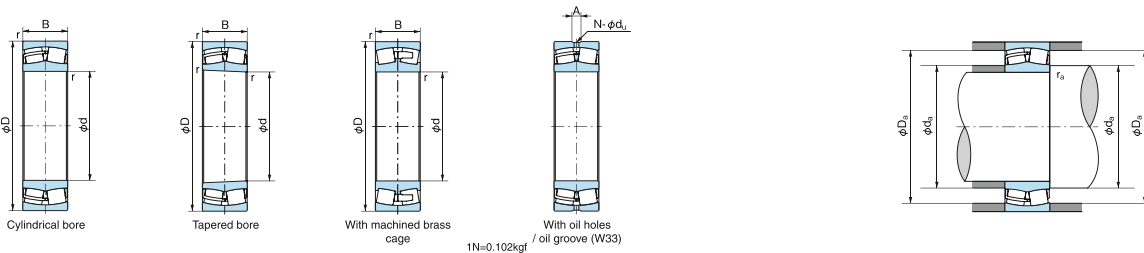
Values Y<sub>0</sub> from table.

Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min <sup>-1</sup> )		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant e	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.	
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter φs	Groove width A	Hole count N	da (min)	Da (max)	ra (max)		Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>		Cylindrical bore	Tapered bore
80	140	33	2	22216EX	22216EXK	299000	269000	3,600	4,500	3	6	4	90.0	130.0	2.0	0.22	3.07	4.58	3.01	2.19	22216EX	22216EXK
	140	33	2	22216AEX	22216AEXK	279000	230000	4,800	6,100	3	6	4	90.0	130.0	2.0	0.27	2.51	3.74	2.46	2.24	22216AEX	22216AEXK
	140	44.4	2	23216E	23216EK	335000	335000	3,300	4,350	4	8	4	90.0	130.0	2.0	0.29	2.35	3.50	2.30	2.95	23216E	23216EK
	170	39	2.1	21316EX1	21316EX1K	380000	339000	3,000	3,800	4	8	4	92.0	158.0	2.0	0.23	2.88	4.29	2.82	4.50	21316EX1	21316EX1K
	170	39	2.1	21316AX	21316AXK	355000	318000	4,200	5,250	4	8	4	92.0	158.0	2.0	0.26	2.55	3.80	2.50	4.67	21316AX	21316AXK
	170	58	2.1	22316EX	22316EXK	595000	520000	2,600	3,400	5	10	4	92.0	158.0	2.0	0.35	1.95	2.90	1.91	6.42	22316EX	22316EXK
85	150	36	2	22217EX	22217EXK	355000	320000	3,400	4,300	4	7	4	95.0	140.0	2.0	0.22	3.01	4.48	2.94	2.75	22217EX	22217EXK
	150	36	2	22217AEX	22217AEXK	310000	260000	4,200	5,700	4	7	4	95.0	140.0	2.0	0.27	2.47	3.67	2.41	2.82	22217AEX	22217AEXK
	150	49.2	2	23217E	23217EK	395000	405000	3,150	4,050	4	8	4	95.0	140.0	2.0	0.30	2.24	3.34	2.19	3.78	23217E	23217EK
	180	41	3	21317EX1	21317EX1K	415000	372000	3,000	4,000	4	8	4	99.0	166.0	2.5	0.23	2.89	4.30	2.83	5.30	21317EX1	21317EX1K
	180	41	3	21317AX	21317AXK	400000	364000	3,900	5,100	4	8	4	99.0	166.0	2.5	0.26	2.55	3.79	2.49	5.52	21317AX	21317AXK
	180	60	3	22317EX	22317EXK	665000	585000	2,400	3,200	6	11	4	99.0	166.0	2.5	0.33	2.02	3.00	1.97	7.46	22317EX	22317EXK
90	160	40	2	22218EX	22218EXK	410000	375000	3,200	4,000	4	7	4	100.0	150.0	2.0	0.24	2.79	4.15	2.73	3.50	22218EX	22218EXK
	160	40	2	22218AEX	22218AEXK	360000	310000	4,000	5,400	4	7	4	100.0	150.0	2.0	0.28	2.42	3.60	2.36	3.56	22218AEX	22218AEXK
	160	52.4	2	23218EX1	23218EX1K	470000	482000	3,100	4,200	5	10	4	100.0	150.0	2.0	0.32	2.14	3.19	2.09	4.57	23218EX1	23218EX1K
	190	43	3	21318EX1	21318EX1K	460000	410000	2,800	3,600	4	8	6	104.0	176.0	2.5	0.23	2.91	4.33	2.84	6.10	21318EX1	21318EX1K
	190	43	3	21318AX	21318AXK	460000	416000	3,700	4,800	4	8	6	104.0	176.0	2.5	0.26	2.55	3.80	2.50	6.45	21318AX	21318AXK
	190	64	3	22318EX	22318EXK	745000	660000	2,400	3,000	6	11	6	104.0	176.0	2.5	0.34	2.00	2.98	1.96	8.82	22318EX	22318EXK
95	170	43	2.1	22219EX	22219EXK	465000	420000	3,000	3,800	5	8	4	107.0	158.0	2.0	0.24	2.76	4.11	2.70	4.24	22219EX	22219EXK
	170	43	2.1	22219AEX	22219AEXK	410000	360000	3,900	5,100	5	8	4	107.0	158.0	2.0	0.28	2.38	3.55	2.33	4.35	22219AEX	22219AEXK
	170	55.6	2.1	23219E	23219EK	500000	510000	2,800	3,600	5	10	4	107.0	158.0	2.0	0.30	2.24	3.34	2.19	5.46	23219E	23219EK
	200	45	3	21319EX1	21319EX1K	500000	461000	2,700	3,400	4	8	6	109.0	186.0	2.5	0.23	2.92	4.35	2.86	7.10	21319EX1	21319EX1K
	200	45	3	21319AX	21319AXK	495000	450000	3,400	4,500	4	8	6	109.0	186.0	2.5	0.27	2.54	3.79	2.49	7.44	21319AX	21319AXK
	200	67	3	22319EX	22319EXK	815000	725000	2,200	2,900	6	12	6	109.0	186.0	2.5	0.33	2.02	3.00	1.97	10.2	22319EX	22319EXK
200	67	3	22319AEX	22319AEXK	755000	645000	3,450	4,500	6	12	6	109.0	186.0	2.5	0.39	1.74	2.59	1.70	10.3	22319AEX	22319AEXK	

Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

**Spherical Roller Bearings**

Bore Diameter: 100~110mm



Dynamic equivalent radial load

$$Fr = XFr + YFa$$

$\frac{Fa}{Fr} \leq e$	$\frac{Fa}{Fr} > e$
X	X
Y	Y
1	0.67
$Y_1$	$Y_2$

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

Static equivalent radial load

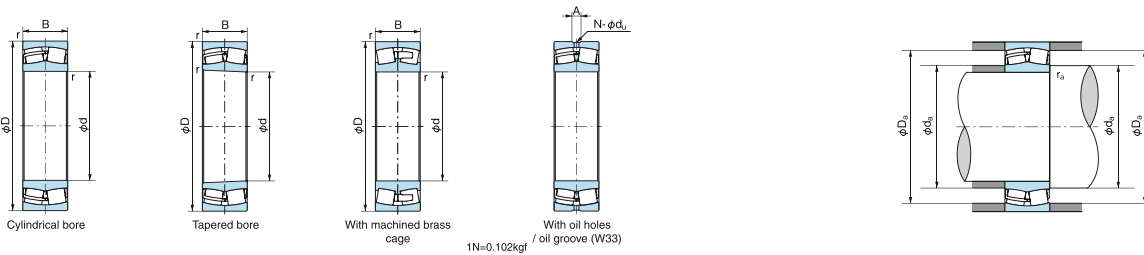
$F_0 = Fr + Y_0 Fa$   
Values  $Y_0$  from table.

Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating $C_r$ (N)	Basic static load rating $C_0$ (N)	Limiting speed (min <sup>-1</sup> )		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant $e$	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.	
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter $\phi_h$	Groove width A	Hole count N	$d_a$ (min)	$D_a$ (max)	$r_a$ (max)		$Y_1$	$Y_2$	$Y_0$		Cylindrical bore	Tapered bore
100	140	30	1.1	23920E	23920EK	197000	233000	3,400	4,500	3	8	4	107.0	133.0	1.0	0.20	3.42	5.08	3.34	1.46	23920E	23920EK
	150	37	1.5	23020E	23020EK	286000	325000	2,700	3,700	4	7	4	117.0	141.0	1.5	0.22	3.01	4.48	2.94	2.33	23020E	23020EK
	150	37	1.5	23020AX	23020AKK	267000	298000	4,200	5,400	4	7	4	117.0	141.0	1.5	0.26	2.64	3.93	2.58	2.40	23020AX	23020AKK
	165	52	2	23120EX1	23120EX1K	450000	500000	2,500	3,300	5	9	4	110.0	155.0	2.0	0.29	2.33	3.47	2.28	4.49	23120EX1	23120EX1K
	165	52	2	23120AX	23120AKK	450000	538000	3,300	4,500	5	9	4	110.0	155.0	2.0	0.34	1.98	2.94	1.93	4.70	23120AX	23120AKK
	180	46	2.1	22220EX	22220EXK	520000	480000	2,800	3,600	5	8	4	112.0	168.0	2.0	0.25	2.74	4.08	2.68	5.10	22220EX	22220EXK
	180	46	2.1	22220AEX	22220AEXK	465000	410000	3,700	4,800	5	8	4	112.0	168.0	2.0	0.29	2.37	3.52	2.31	5.24	22220AEX	22220AEXK
	180	60.3	2.1	23220EX1	23220EX1K	595000	629000	2,800	3,750	5	10	4	112.0	168.0	2.0	0.32	2.09	3.11	2.04	6.76	23220EX1	23220EX1K
	180	60.3	2.1	23220AX	23220AKK	575000	599000	3,100	4,200	5	10	4	112.0	168.0	2.0	0.36	1.88	2.80	1.84	6.88	23220AX	23220AKK
	215	47	3	21320EX1	21320EX1K	580000	524000	2,400	3,300	4	8	6	114.0	201.0	2.5	0.22	3.02	4.49	2.95	8.70	21320EX1	21320EX1K
110	140	30	1.1	23920E	23920EK	197000	233000	3,400	4,500	3	8	4	107.0	133.0	1.0	0.20	3.42	5.08	3.34	1.46	23920E	23920EK
	150	37	1.5	23020E	23020EK	286000	325000	2,700	3,700	4	7	4	117.0	141.0	1.5	0.22	3.01	4.48	2.94	2.33	23020E	23020EK
	150	37	1.5	23020AX	23020AKK	267000	298000	4,200	5,400	4	7	4	117.0	141.0	1.5	0.26	2.64	3.93	2.58	2.40	23020AX	23020AKK
	165	52	2	23120EX1	23120EX1K	450000	500000	2,500	3,300	5	9	4	110.0	155.0	2.0	0.29	2.33	3.47	2.28	4.49	23120EX1	23120EX1K
	165	52	2	23120AX	23120AKK	450000	538000	3,300	4,500	5	9	4	110.0	155.0	2.0	0.34	1.98	2.94	1.93	4.70	23120AX	23120AKK
	180	46	2.1	22220EX	22220EXK	520000	480000	2,800	3,600	5	8	4	112.0	168.0	2.0	0.25	2.74	4.08	2.68	5.10	22220EX	22220EXK
	180	46	2.1	22220AEX	22220AEXK	465000	410000	3,700	4,800	5	8	4	112.0	168.0	2.0	0.29	2.37	3.52	2.31	5.24	22220AEX	22220AEXK
	180	60.3	2.1	23220EX1	23220EX1K	595000	629000	2,800	3,750	5	10	4	112.0	168.0	2.0	0.32	2.09	3.11	2.04	6.76	23220EX1	23220EX1K
	180	60.3	2.1	23220AX	23220AKK	575000	599000	3,100	4,200	5	10	4	112.0	168.0	2.0	0.36	1.88	2.80	1.84	6.88	23220AX	23220AKK
	215	47	3	21320EX1	21320EX1K	580000	524000	2,400	3,300	4	8	6	114.0	201.0	2.5	0.22	3.02	4.49	2.95	8.70	21320EX1	21320EX1K
170	45	2	23022E	23022EK	415000	475000	2,700	3,600	5	9	4	120.0	160.0	2.0	0.24	2.84	4.23	2.78	3.84	23022E	23022EK	
170	45	2	23022AX	23022AKK	415000	478000	3,750	4,800	5	9	4	120.0	160.0	2.0	0.28	2.42	3.61	2.37	3.90	23022AX	23022AKK	
180	56	2	23122EX1	23122EX1K	540000	610000	2,700	3,600	5	9	4	120.0	170.0	2.0	0.29	2.36	3.51	2.31	5.70	23122EX1	23122EX1K	
180	56	2	23122AX	23122AKK	535000	605000	3,000	4,050	5	9	4	120.0	170.0	2.0	0.33	2.04	3.03	1.99	5.80	23122AX	23122AKK	
180	69	2	24122EX1	24122EX1K30	633000	743000	2,700	3,600	6	11	4	120.0	170.0	2.0	0.37	1.84	2.74	1.80	6.89	24122EX1	24122EX1K30	
180	69	2	24122AX	24122AKK30	620000	654000	2,700	3,600	6	11	4	120.0	170.0	2.0	0.37	1.80	2.69	1.76	6.85	24122AX	24122AKK30	
200	53	2.1	22222EX	22222EXK	680000	640000	2,600	3,200	5	10	6	122.0	188.0	2.0	0.26	2.64	3.93	2.58	7.36	22222EX	22222EXK	
200	53	2.1	22222AEX	22222AEXK	605000	550000	3,300	4,350	6	10	6	122.0	188.0	2.0	0.29	2.31	3.44	2.26	7.53	22222AEX	22222AEXK	
200	69.8	2.1	23222EX1	23222EX1K	750000	793000	2,550	3,300	6	11	6	122.0	188.0	2.0	0.34	1.99	2.96	1.94	9.60	23222EX1	23222EX1K	
200	69.8	2.1	23222AX	23222AKK	740000	801000	2,850	3,750	6	11	6	122.0	188.0	2.0	0.38	1.78	2.65	1.74	10.0	23222AX	23222AKK	
240	50	3	21322EX1	21322EX1K	675000	635000	2,100	2,850	4	8	6	124.0	226.0	2.5	0.21	3.19	4.75	3.12	11.6	21322EX1	21322EX1K	
240	50	3	21322AX	21322AKK	655000	601000	3,000	3,750	4	8	6	124.0	226.0	2.5	0.24	2.78	4.14	2.72	12.2	21322AX	21322AKK	
240	80	3	22322EX	22322EXK	1150000	1040000	1,950	2,700	6	12	6	124.0	226.0	2.5	0.33	2.03	3.02	1.98	18.1	22322EX	22322EXK	
240	80	3	22322AEX	22322AEXK	1030000	940000	3,000	3,750	6	12	6	124.0	226.0	2.5	0.38	1.77	2.63	1.73	18.2	22322AEX	22322AEXK	

Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

**Spherical Roller Bearings**

Bore Diameter: 120~130mm



Dynamic equivalent radial load  
 $F_r = XFr + YFa$

$\frac{F_a}{Fr} \leq e$		$\frac{F_a}{Fr} > e$	
X	Y	X	Y
1	Y <sub>1</sub>	0.67	Y <sub>2</sub>

Values of Y<sub>1</sub>, Y<sub>2</sub> and e from table.

Static equivalent radial load  
 $P_0 = Fr + Y_0 Fa$

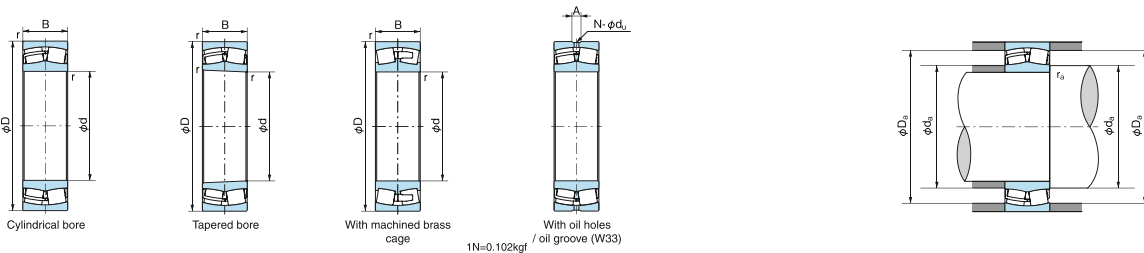
Values Y<sub>0</sub> from table.

Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min <sup>-1</sup> )		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant e	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.	
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter φ <sub>h</sub>	Groove width A	Hole count N	d <sub>a</sub> (min)	D <sub>a</sub> (max)	r <sub>a</sub> (max)		Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>		Cylindrical bore	Tapered bore
120	180	46	2	23024E	23024EK	430000	515000	2,550	3,300	5	9	4	130.0	170.0	2.0	0.23	2.95	4.39	2.89	4.20	23024E	23024EK
	180	46	2	23024AX	23024AXK	430000	516000	3,450	4,500	5	9	4	130.0	170.0	2.0	0.27	2.52	3.76	2.47	4.20	23024AX	23024AXK
	180	60	2	24024EX1	24024EX1K30	540000	683000	2,550	3,450	5	9	4	130.0	170.0	2.0	0.30	2.23	3.32	2.18	5.36	24024EX1	24024EX1K30
	180	60	2	24024AX	24024AXK30	540000	627000	2,550	3,450	5	9	4	130.0	170.0	2.0	0.31	2.21	3.29	2.16	5.26	24024AX	24024AXK30
	200	62	2	23124EX1	23124EX1K	675000	720000	2,400	3,300	5	9	6	130.0	190.0	2.0	0.29	2.34	3.49	2.29	7.90	23124EX1	23124EX1K
	200	62	2	23124AX	23124AXK	645000	734000	2,700	3,600	5	9	6	130.0	190.0	2.0	0.34	2.00	2.99	1.96	8.10	23124AX	23124AXK
	200	80	2	24124EX1	24124EX1K30	815000	970000	2,400	3,300	6	11	6	130.0	190.0	2.0	0.38	1.78	2.65	1.74	10.1	24124EX1	24124EX1K30
	200	80	2	24124AX	24124AXK30	780000	850000	2,400	3,300	6	11	6	130.0	190.0	2.0	0.39	1.73	2.58	1.69	9.90	24124AX	24124AXK30
	215	58	2.1	22224EX	22224EXK	785000	765000	2,400	3,000	5	10	6	132.0	203.0	2.0	0.26	2.60	3.87	2.54	9.28	22224EX	22224EXK
	215	58	2.1	22224AEX	22224AEXK	700000	650000	3,150	4,050	5	10	6	132.0	203.0	2.0	0.30	2.28	3.40	2.23	9.35	22224AEX	22224AEXK
	215	76	2.1	23224EX1	23224EX1K	860000	956000	2,250	3,150	6	13	6	132.0	203.0	2.0	0.34	1.97	2.94	1.93	12.0	23224EX1	23224EX1K
	215	76	2.1	23224AX	23224AXK	860000	962000	2,550	3,450	6	13	6	132.0	203.0	2.0	0.39	1.73	2.57	1.69	12.3	23224AX	23224AXK
130	260	55	3	21324E	21324EK	790000	765000	1,950	2,400	5	12	6	134.0	246.0	2.5	0.21	3.17	4.72	3.10	15.3	21324E	21324EK
	260	86	3	22324EX	22324EXK	1250000	1130000	1,800	2,600	8	14	6	134.0	246.0	2.5	0.33	2.03	3.02	1.98	22.6	22324EX	22324EXK
	260	86	3	22324AEX	22324AEXK	1180000	1040000	2,700	3,450	8	14	6	134.0	246.0	2.5	0.38	1.77	2.64	1.73	22.2	22324AEX	22324AEXK
	180	37	1.5	23926E	23926EK	284000	355000	2,700	3,450	4	8	4	138.5	171.5	1.5	0.18	3.66	5.46	3.58	2.87	23926E	23926EK
	200	52	2	23026E	23026EK	555000	660000	2,400	3,000	5	10	6	140.0	190.0	2.0	0.24	2.87	4.27	2.80	6.14	23026E	23026EK
	200	52	2	23026AX	23026AXK	560000	664000	3,150	4,050	5	10	6	140.0	190.0	2.0	0.27	2.50	3.72	2.44	6.10	23026AX	23026AXK
	200	69	2	24026EX1	24026EX1K30	710000	900000	2,400	3,150	6	11	6	140.0	190.0	2.0	0.32	2.14	3.18	2.09	7.93	24026EX1	24026EX1K30
	200	69	2	24026AX	24026AXK30	680000	803000	2,400	3,150	6	11	6	140.0	190.0	2.0	0.33	2.04	3.04	2.00	7.77	24026AX	24026AXK30
	210	64	2	23126EX1	23126EX1K	690000	799000	2,200	3,000	5	9	6	140.0	200.0	2.0	0.28	2.42	3.61	2.37	8.60	23126EX1	23126EX1K
	210	64	2	23126AX	23126AXK	827000	2,500	3,300	5	9	6	140.0	200.0	2.0	0.30	2.25	3.34	2.20	8.90	23126AX	23126AXK	
	210	80	2	24126EX1	24126EX1K30	840000	1030000	2,200	3,000	6	11	6	140.0	200.0	2.0	0.36	1.90	2.83	1.86	10.7	24126EX1	24126EX1K30
	210	80	2	24126AX	24126AXK30	815000	918000	2,200	3,000	6	11	6	140.0	200.0	2.0	0.37	1.83	2.72	1.79	10.5	24126AX	24126AXK30
	230	64	3	22226EX	22226EXK	910000	915000	2,200	2,600	5	10	6	144.0	216.0	2.5	0.26	2.55	3.80	2.50	11.6	22226EX	22226EXK
	230	64	3	22226AEX	22226AEXK	815000	765000	2,800	3,700	5	10	6	144.0	216.0	2.5	0.30	2.22	3.30	2.17	11.6	22226AEX	22226AEXK
	230	80	3	23226EX1	23226EX1K	980000	1090000	2,100	2,800	6	13	6	144.0	216.0	2.5	0.33	2.05	3.05	2.00	14.2	23226EX1	23226EX1K
	230	80	3	23226AX	23226AXK	965000	1070000	2,400	3,100	6	13	6	144.0	216.0	2.5	0.38	1.78	2.65	1.74	14.5	23226AX	23226AXK
	280	93	4	22326EX	22326EXK	1450000	1340000	1,700	2,500	8	16	6	148.0	262.0	3.0	0.33	2.03	3.02	1.98	28.4	22326EX	22326EXK
	280	93	4	22326AEX	22326AEXK	1370000	1220000	2,500	3,300	8	16	6	148.0	262.0	3.0	0.38	1.77	2.64	1.73	27.3	22326AEX	22326AEXK

Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

**Spherical Roller Bearings**

Bore Diameter: 140~150mm



■ Dynamic equivalent radial load

$$Fr = \sqrt[3]{XFr + YFa}$$

$\frac{Fa}{Fr} \leq e$		$\frac{Fa}{Fr} > e$	
X	Y	X	Y
1	Y <sub>1</sub>	0.67	Y <sub>2</sub>

Values of Y<sub>1</sub>, Y<sub>2</sub> and e from table.

■ Static equivalent radial load

$F_{0r} = Fr + Y_0 Fa$

Values Y<sub>0</sub> from table.

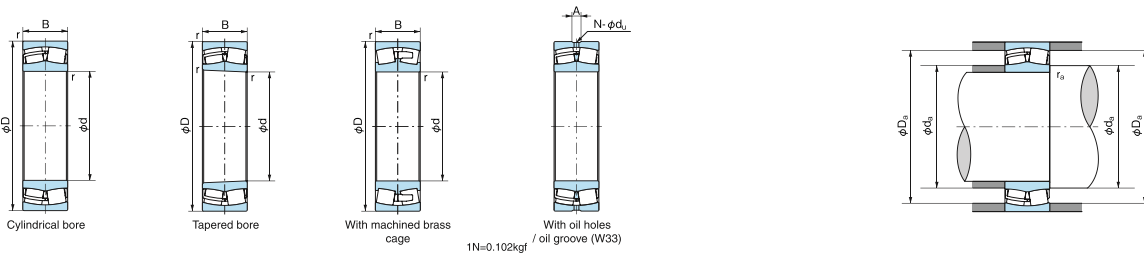
Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min <sup>-1</sup> )		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant e	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.	
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter φ <sub>h</sub>	Groove width A	Hole count N	d <sub>a</sub> (min)	D <sub>a</sub> (max)	r <sub>a</sub> (max)		Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>		Cylindrical bore	Tapered bore
140	190	37	1.5	23928AX	23928AXK	345000	466000	2,550	3,300	4	7	6	148.5	181.5	1.5	0.18	3.79	5.65	3.71	3.13	23928AX	23928AXK
	210	53	2	23028E	23028EK	585000	710000	2,400	2,800	5	10	6	150.0	200.0	2.0	0.23	2.98	4.44	2.91	6.61	23028E	23028EK
	210	53	2	23028AX	23028AXK	580000	711000	3,000	3,900	5	10	6	150.0	200.0	2.0	0.25	2.75	4.10	2.69	6.70	23028AX	23028AXK
	210	69	2	24028EX1	24028EX1K30	720000	920000	2,200	3,000	6	11	6	150.0	200.0	2.0	0.30	2.28	3.39	2.23	8.40	24028EX1	24028EX1K30
	210	69	2	24028AX	24028AXK30	720000	819000	2,200	3,000	6	11	6	150.0	200.0	2.0	0.31	2.15	3.20	2.10	8.22	24028AX	24028AXK30
	225	68	2.1	23128EX1	23128EX1K	790000	940000	2,100	2,850	6	11	6	152.0	213.0	2.0	0.28	2.45	3.65	2.40	10.5	23128EX1	23128EX1K
	225	68	2.1	23128AX	23128AXK	790000	934000	2,200	3,100	6	11	6	152.0	213.0	2.0	0.30	2.27	3.37	2.22	10.8	23128AX	23128AXK
	225	85	2.1	24128EX1	24128EX1K30	950000	1180000	2,100	2,800	8	14	6	152.0	213.0	2.0	0.36	1.87	2.79	1.83	13.0	24128EX1	24128EX1K30
	225	85	2.1	24128AX	24128AXK30	930000	1030000	2,100	2,800	8	14	6	152.0	213.0	2.0	0.36	1.87	2.79	1.83	12.7	24128AX	24128AXK30
	250	68	3	22228EX	22228EXK	1050000	1030000	1,900	2,500	6	12	6	154.0	236.0	2.5	0.26	2.60	3.87	2.54	13.9	22228EX	22228EXK
	250	68	3	22228AEX	22228AEXK	945000	890000	2,700	3,400	6	12	6	154.0	236.0	2.5	0.30	2.26	3.37	2.21	14.8	22228AEX	22228AEXK
	250	88	3	23228EX1	23228EX1K	1130000	1290000	1,900	2,500	8	15	6	154.0	236.0	2.5	0.34	1.99	2.96	1.95	18.8	23228EX1	23228EX1K
	250	88	3	23228AX	23228AXK	1120000	1270000	2,200	2,800	8	16	6	154.0	236.0	2.5	0.38	1.78	2.65	1.74	19.3	23228AX	23228AXK
	300	102	4	22328E	22328EK	1540000	1520000	1,600	2,200	10	22	6	158.0	282.0	3.0	0.37	1.82	2.72	1.78	35.9	22328E	22328EK
300	102	4	22328A2X	22328A2XK	1560000	1540000	2,200	3,000	10	22	6	158.0	282.0	3.0	0.40	1.69	2.52	1.65	34.5	22328A2X	22328A2XK	
150	210	45	2	23930AX	23930AXK	465000	622000	2,400	3,000	5	9	6	200.0	160.0	2.0	0.20	3.44	5.12	3.36	5.01	23930AX	23930AXK
	225	56	2.1	23030E	23030EK	640000	790000	1,900	2,500	5	11	6	162.0	213.0	2.0	0.22	3.04	4.53	2.97	8.01	23030E	23030EK
	225	56	2.1	23030AX	23030AXK	640000	791000	2,700	3,600	5	11	6	162.0	213.0	2.0	0.24	2.79	4.16	2.73	8.20	23030AX	23030AXK
	225	75	2.1	24030EX1	24030EX1K30	815000	1060000	2,100	2,700	6	11	6	162.0	213.0	2.0	0.30	2.23	3.32	2.18	10.5	24030EX1	24030EX1K30
	225	75	2.1	24030AX	24030AXK30	815000	924000	2,100	2,700	6	11	6	162.0	213.0	2.0	0.32	2.10	3.13	2.06	10.4	24030AX	24030AXK30
	250	80	2.1	23130EX1	23130EX1K	1000000	1230000	1,900	2,500	6	13	6	162.0	238.0	2.0	0.30	2.24	3.34	2.19	16.2	23130EX1	23130EX1K
	250	80	2.1	23130AX	23130AXK	1030000	1310000	2,100	2,800	6	13	6	162.0	238.0	2.0	0.35	1.95	2.91	1.91	16.7	23130AX	23130AXK
	250	100	2.1	24130EX1	24130EX1K30	1230000	1520000	1,900	2,500	8	14	6	162.0	238.0	2.0	0.38	1.77	2.64	1.73	19.6	24130EX1	24130EX1K30
	250	100	2.1	24130AX	24130AXK30	1120000	1340000	1,900	2,500	8	14	6	162.0	238.0	2.0	0.38	1.76	2.62	1.72	19.5	24130AX	24130AXK30
	270	73	3	22230EX	22230EXK	1200000	1200000	1,800	2,400	6	14	6	164.0	256.0	2.5	0.25	2.69	4.00	2.63	18.9	22230EX	22230EXK
	270	73	3	22230AEX	22230AEXK	1060000	1020000	2,400	3,100	6	14	6	164.0	256.0	2.5	0.29	2.30	3.42	2.25	18.1	22230AEX	22230AEXK
	270	96	3	23230EX1	23230EX1K	1340000	1540000	1,800	2,400	8	15	6	164.0	256.0	2.5	0.34	1.96	2.93	1.92	24.2	23230EX1	23230EX1K
	270	96	3	23230AX	23230AXK	1320000	1530000	1,900	2,700	8	15	6	164.0	256.0	2.5	0.40	1.70	2.53	1.66	24.8	23230AX	23230AXK
	320	108	4	22330E	22330EK	1770000	1740000	1,500	2,100	10	22	6	168.0	302.0	3.0	0.37	1.82	2.70	1.78	43.3	22330E	22330EK
320	108	4	22330A2X	22330A2XK	1720000	1710000	2,100	2,800	10	22	6	168.0	302.0	3.0	0.40	1.67	2.49	1.63	41.5	22330A2X	22330A2XK	

Note: Suffix K or K30 means tapered bore (1/12 or 1/30).



**Spherical Roller Bearings**

Bore Diameter: 160~170mm



■ Dynamic equivalent radial load

$$Fr = XFr + YFa$$

$\frac{Fa}{Fr} \leq e$	$\frac{Fa}{Fr} > e$
X	Y
1	Y <sub>1</sub>
	0.67
	Y <sub>2</sub>

Values of Y<sub>1</sub>, Y<sub>2</sub> and e from table.

■ Static equivalent radial load

$$F_0 = Fr + Y_0 Fa$$

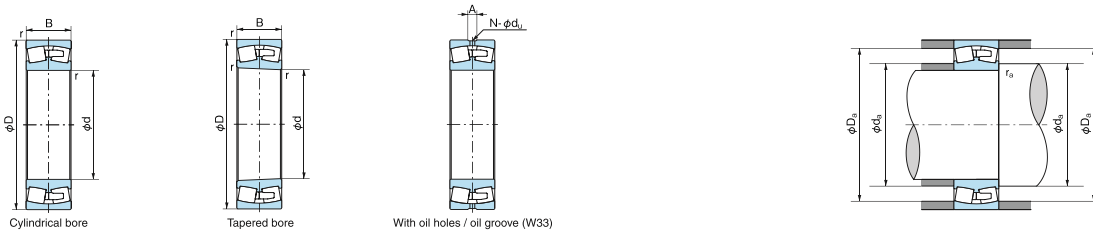
Values Y<sub>0</sub> from table.

Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min <sup>-1</sup> )		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant e	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.		
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter φ <sub>h</sub>	Groove width A	Hole count N	d <sub>a</sub> (min)	D <sub>a</sub> (max)	r <sub>a</sub> (max)		Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>		Cylindrical bore	Tapered bore	
160	220	45	2	23932AX	23932AXK	475000	649000	2,250	2,800		5	10	6	170.0	210.0	2.0	0.19	3.60	5.37	3.52	5.29	23932AX	23932AXK
	240	60	2.1	23032E	23032EK	735000	915000	1,800	2,400		5	11	6	172.0	228.0	2.0	0.22	3.01	4.48	2.94	9.74	23032E	23032EK
	240	60	2.1	23032AX	23032AXK	735000	917000	2,500	3,300		5	11	6	172.0	228.0	2.0	0.24	2.79	4.16	2.73	9.90	23032AX	23032AXK
	240	80	2.1	24032EX1	24032EX1K30	950000	1280000	1,900	2,500		6	11	6	172.0	228.0	2.0	0.30	2.24	3.34	2.19	12.7	24032EX1	24032EX1K30
	240	80	2.1	24032AX	24032AXK30	915000	1110000	1,900	2,500		6	11	6	172.0	228.0	2.0	0.32	2.12	3.15	2.07	12.4	24032AX	24032AXK30
	270	86	2.1	23132EX1	23132EX1K	1180000	1430000	1,800	2,400		8	16	6	172.0	258.0	2.0	0.30	2.22	3.30	2.17	20.5	23132EX1	23132EX1K
	270	86	2.1	23132AX	23132AXK	1200000	1460000	1,900	2,500		8	16	6	172.0	258.0	2.0	0.34	1.96	2.91	1.91	21.2	23132AX	23132AXK
	270	109	2.1	24132EX1	24132EX1K30	1450000	1810000	1,800	2,400		10	17	6	172.0	258.0	2.0	0.39	1.74	2.59	1.70	25.5	24132EX1	24132EX1K30
	270	109	2.1	24132AX	24132AXK30	1340000	1610000	1,800	2,400		10	17	6	172.0	258.0	2.0	0.39	1.74	2.59	1.70	25.5	24132AX	24132AXK30
	290	80	3	22232E	22232EK	1230000	1330000	1,500	2,100		6	14	6	174.0	276.0	2.5	0.26	2.57	3.83	2.52	23.7	22232E	22232EK
	290	80	3	22232E2	22232E2K	1230000	1320000	1,800	2,400		6	14	6	174.0	276.0	2.5	0.28	2.37	3.53	2.32	24.0	22232E2	22232E2K
	290	80	3	22232A2X	22232A2XK	1210000	1300000	2,200	3,000		6	14	6	174.0	276.0	2.5	0.31	2.20	3.27	2.15	23.8	22232A2X	22232A2XK
	290	104	3	23232E	23232EK	1500000	1710000	1,300	1,800		10	22	6	174.0	276.0	2.5	0.37	1.82	2.71	1.78	30.4	23232E	23232EK
	290	104	3	23232A2X	23232A2XK	1460000	1650000	1,900	2,400		10	22	6	174.0	276.0	2.5	0.39	1.72	2.56	1.68	30.7	23232A2X	23232A2XK
340	114	4	22332E	22332EK	1950000	1950000	1,400	1,900		10	22	6	178.0	322.0	3.0	0.36	1.85	2.75	1.81	51.4	22332E	22332EK	
170	230	45	2	23934AX	23934AXK	490000	691000	2,100	2,700		5	10	6	180.0	220.0	2.0	0.18	3.78	5.63	3.70	5.58	23934AX	23934AXK
	260	67	2.1	23034E	23034EK	880000	1080000	1,600	2,200		6	13	6	182.0	248.0	2.0	0.23	2.89	4.31	2.83	13.1	23034E	23034EK
	260	67	2.1	23034AX	23034AXK	880000	1080000	2,400	3,100		6	13	6	182.0	248.0	2.0	0.27	2.51	3.74	2.45	13.1	23034AX	23034AXK
	260	90	2.1	24034EX1	24034EX1K30	1120000	1480000	1,800	2,400		8	14	6	182.0	248.0	2.0	0.32	2.11	3.15	2.07	17.3	24034EX1	24034EX1K30
	260	90	2.1	24034AX	24034AXK30	1030000	1320000	1,800	2,400		8	14	6	182.0	248.0	2.0	0.34	2.00	2.97	1.95	17.0	24034AX	24034AXK30
	280	88	2.1	23134EX1	23134EX1K	1260000	1530000	1,600	2,200		8	16	6	182.0	268.0	2.0	0.29	2.30	3.43	2.25	21.6	23134EX1	23134EX1K
	280	88	2.1	23134AX	23134AXK	1260000	1500000	1,800	2,400		8	16	6	182.0	268.0	2.0	0.34	2.01	3.00	1.97	22.2	23134AX	23134AXK
	280	109	2.1	24134AX	24134AXK30	1360000	1650000	1,600	2,200		10	17	6	182.0	268.0	2.0	0.37	1.82	2.70	1.78	26.4	24134AX	24134AXK30
	310	86	4	22234E	22234EK	1390000	1510000	1,400	1,900		8	18	6	188.0	292.0	3.0	0.29	2.33	3.47	2.28	30.0	22234E	22234EK
	310	110	4	23234E	23234EK	1720000	1970000	1,300	1,800		10	22	6	188.0	292.0	3.0	0.36	1.85	2.75	1.81	37.0	23234E	23234EK
310	110	4	23234A2X	23234A2XK	1680000	1910000	1,800	2,250		10	22	6	188.0	292.0	3.0	0.39	1.71	2.54	1.67	37.6	23234A2X	23234A2XK	
360	120	4	22334E	22334EK	2150000	2200000	1,300	1,800		10	22	6	188.0	342.0	3.0	0.36	1.85	2.75	1.81	60.6	22334E	22334EK	

Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

**Spherical Roller Bearings**

Bore Diameter: 180~200mm



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

$\frac{F_r}{Fr} \leq e$		$\frac{F_r}{Fr} > e$	
X	Y	X	Y
1	Y <sub>1</sub>	0.67	Y <sub>2</sub>

Values of Y<sub>1</sub>, Y<sub>2</sub> and e from table.

■ Static equivalent radial load  
 $P_0 = Fr + Y_0 Fa$

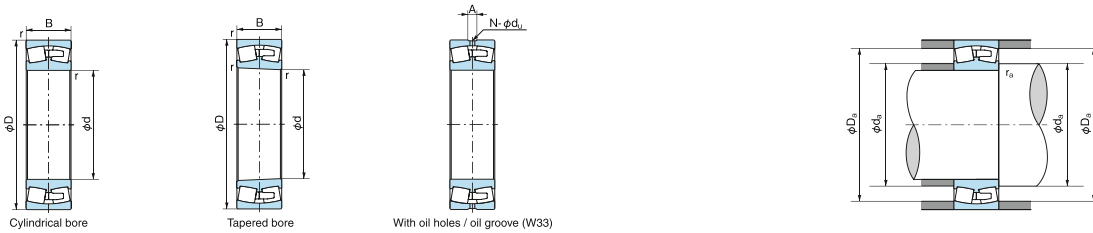
Values Y<sub>0</sub> from table.

Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min <sup>-1</sup> )		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant e	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.	
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter φ <sub>h</sub>	Groove width A	Hole count N	d <sub>a</sub> (min)	D <sub>a</sub> (max)	r <sub>a</sub> (max)		Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>		Cylindrical bore	Tapered bore
180	250	52	2	23936AX	23936AXK	665000	939000	1,900	2,500	6	10	6	190.0	240.0	2.0	0.19	3.55	5.29	3.48	8.10	23936AX	23936AXK
	280	74	2.1	23036E	23036EK	1070000	1330000	1,500	2,200	8	15	6	192.0	268.0	2.0	0.24	2.84	4.23	2.78	17.4	23036E	23036EK
	280	74	2.1	23036AX	23036AXK	1040000	1280000	2,200	2,800	8	15	6	192.0	268.0	2.0	0.27	2.47	3.67	2.41	17.5	23036AX	23036AXK
	280	100	2.1	24036EX1	24036EX1K30	1330000	1760000	1,600	2,100	8	16	6	192.0	268.0	2.0	0.33	2.04	3.03	1.99	22.7	24036EX1	24036EX1K30
	280	100	2.1	24036AX	24036AXK30	1230000	1580000	1,600	2,100	8	16	6	192.0	268.0	2.0	0.32	2.12	3.15	2.07	22.5	24036AX	24036AXK30
	300	96	3	23136E	23136EK	1490000	1810000	1,300	1,800	8	18	6	194.0	286.0	2.5	0.32	2.12	3.15	2.07	27.9	23136E	23136EK
	300	96	3	23136A2X	23136A2XK	1450000	1740000	1,800	2,200	8	18	6	194.0	286.0	2.5	0.33	2.04	3.04	2.00	28.2	23136A2X	23136A2XK
	300	118	3	24136E	24136EK30	1640000	2040000	1,350	1,800	10	22	6	194.0	286.0	2.5	0.39	1.73	2.57	1.69	33.7	24136E	24136EK30
	320	86	4	22236E	22236EK	1460000	1610000	1,400	1,900	8	18	6	198.0	302.0	3.0	0.28	2.43	3.61	2.37	30.9	22236E	22236EK
	320	112	4	23236E	23236EK	1790000	2100000	1,200	1,600	10	22	6	198.0	302.0	3.0	0.36	1.87	2.79	1.83	39.4	23236E	23236EK
190	320	112	4	23236A2X	23236A2XK	1750000	2070000	1,800	2,200	10	22	6	198.0	302.0	3.0	0.39	1.75	2.61	1.71	39.0	23236A2X	23236A2XK
	380	126	4	22336E	22336EK	2380000	2400000	1,200	1,600	12	26	6	198.0	362.0	3.0	0.36	1.87	2.78	1.83	70.5	22336E	22336EK
	260	52	2	23938AX	23938AXK	675000	969000	1,800	2,400	6	10	6	200.0	250.0	2.0	0.18	3.69	5.50	3.61	8.46	23938AX	23938AXK
	290	75	2.1	23038E	23038EK	1080000	1330000	1,400	1,900	6	14	6	202.0	278.0	2.0	0.25	2.69	4.00	2.63	18.4	23038E	23038EK
	290	75	2.1	23038A2X	23038A2XK	1080000	1310000	2,100	2,800	6	14	6	202.0	278.0	2.0	0.26	2.55	3.80	2.50	17.8	23038A2X	23038A2XK
	290	100	2.1	24038E	24038EK30	1420000	1920000	1,300	1,800	8	18	6	202.0	278.0	2.0	0.34	1.98	2.94	1.93	24.6	24038E	24038EK30
	320	104	3	23138E	23138EK	1720000	2120000	1,200	1,600	10	22	6	204.0	306.0	2.5	0.32	2.09	3.11	2.04	35.0	23138E	23138EK
	320	104	3	23138A2X	23138A2XK	1710000	2090000	1,600	2,100	10	22	6	204.0	306.0	2.5	0.34	1.96	2.92	1.92	33.5	23138A2X	23138A2XK
	320	128	3	24138E	24138EK30	1900000	2380000	1,200	1,600	12	26	6	204.0	306.0	2.5	0.40	1.68	2.50	1.64	42.0	24138E	24138EK30
	340	92	4	22238E	22238EK	1590000	1740000	1,300	1,800	8	18	6	208.0	322.0	3.0	0.28	2.39	3.56	2.34	37.2	22238E	22238EK
200	340	120	4	23238E	23238EK	2070000	2450000	1,200	1,500	10	22	6	208.0	322.0	3.0	0.36	1.87	2.79	1.83	48.0	23238E	23238EK
	340	120	4	23238A2X	23238A2XK	2000000	2370000	1,600	2,100	10	22	6	208.0	322.0	3.0	0.39	1.72	2.56	1.68	47.5	23238A2X	23238A2XK
	400	132	5	22338E	22338EK	2600000	2670000	1,200	1,600	12	26	6	212.0	378.0	4.0	0.36	1.89	2.81	1.85	81.8	22338E	22338EK
	280	60	2.1	23940AX	23940AXK	840000	1190000	1,800	2,200	6	11	6	212.0	268.0	2.0	0.20	3.44	5.13	3.37	11.9	23940AX	23940AXK
	310	82	2.1	23040E	23040EK	1270000	1560000	1,400	1,900	8	18	6	212.0	298.0	2.0	0.26	2.64	3.93	2.58	23.4	23040E	23040EK
	310	82	2.1	23040A2X	23040A2XK	1270000	1570000	1,900	2,500	8	18	6	212.0	298.0	2.0	0.28	2.45	3.64	2.39	23.3	23040A2X	23040A2XK
	310	109	2.1	24040E	24040EK30	1640000	2230000	1,200	1,600	10	22	6	212.0	298.0	2.0	0.35	1.95	2.90	1.91	31.2	24040E	24040EK30
	340	112	3	23140E	23140EK	1950000	2390000	1,200	1,500	10	22	6	214.0	326.0	2.5	0.33	2.06	3.06	2.01	42.7	23140E	23140EK
	340	112	3	23140A2X	23140A2XK	1900000	2330000	1,600	2,100	10	22	6	214.0	326.0	2.5	0.35	1.94	2.83	1.89	42.5	23140A2X	23140A2XK
	340	140	3	24140E	24140EK30	2220000	2820000	1,200	1,500	12	26	6	214.0	326.0	2.5	0.41	1.63	2.43	1.60	52.9	24140E	24140EK30
360	98	4	22240E	22240EK	1810000	1990000	1,200	1,600	8	18	6	218.0	342.0	3.0	0.29	2.35	3.50	2.30	44.8	22240E	22240EK	
360	128	4	23240E	23240EK	2290000	2750000	1,200	1,500	12	26	6	218.0	342.0	3.0	0.37	1.85	2.75	1.80	57.7	23240E	23240EK	
360	128	4	23240A2X	23240A2XK	2240000	2680000	1,500	1,900	12	26	6	218.0	342.0	3.0	0.39	1.71	2.54	1.67	57.0	23240A2X	23240A2XK	
420	138	5	22340E	22340EK	2890000	3000000	1,200	1,500	12	26	6	222.0	398.0	4.0	0.35	1.93	2.87	1.88	93.7	22340E	22340EK	

Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

**Spherical Roller Bearings**

Bore Diameter: 220~260mm



■ Dynamic equivalent radial load

$$F_r = XFr + YFa$$

$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y <sub>1</sub>	0.67	Y <sub>2</sub>

Values of Y<sub>1</sub>, Y<sub>2</sub> and e from table.

■ Static equivalent radial load

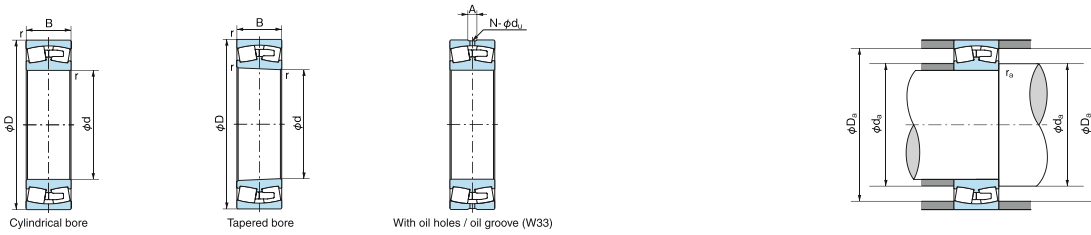
$P_0 = Fr + Y_0 Fa$   
Values Y<sub>0</sub> from table.

Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min <sup>-1</sup> )		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant e	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.	
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter φ <sub>h</sub>	Groove width A	Hole count N	d <sub>a</sub> (min)	D <sub>a</sub> (max)	r <sub>a</sub> (max)		Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>		Cylindrical bore	Tapered bore
220	300	60	2.1	23944E	23944EK	840000	1190000	1,300	1,800	6	12	6	232.0	288.0	2.0	0.18	3.75	5.59	3.67	12.6	23944E	23944EK
	340	90	3	23044E	23044EK	1470000	1880000	1,200	1,600	8	18	6	234.0	326.0	2.5	0.26	2.64	3.93	2.58	30.7	23044E	23044EK
	340	90	3	23044A2X	23044A2XK	1460000	1860000	1,800	2,400	8	18	6	234.0	326.0	2.5	0.27	2.51	3.74	2.45	30.5	23044A2X	23044A2XK
	340	118	3	24044E	24044EK30	1950000	2670000	1,200	1,500	10	22	6	234.0	326.0	2.5	0.34	1.98	2.95	1.94	40.3	24044E	24044EK30
	370	120	4	23144E	23144EK	2250000	2870000	1,000	1,300	10	22	6	238.0	352.0	3.0	0.33	2.06	3.07	2.02	54.3	23144E	23144EK
	370	120	4	23144A2X	23144A2XK	2210000	2780000	1,500	1,800	10	22	6	238.0	352.0	3.0	0.34	1.98	2.94	1.93	54.6	23144A2X	23144A2XK
	370	150	4	24144E	24144EK30	2530000	3250000	1,100	1,400	12	26	6	238.0	352.0	3.0	0.41	1.66	2.47	1.62	66.3	24144E	24144EK30
	400	108	4	22244E	22244EK	2140000	2380000	1,200	1,500	10	22	6	238.0	382.0	3.0	0.29	2.36	3.52	2.31	61.9	22244E	22244EK
	400	144	4	23244E	23244EK	2920000	3500000	1,000	1,200	12	26	6	238.0	382.0	3.0	0.37	1.83	2.72	1.79	81.4	23244E	23244EK
	460	145	5	22344E	22344EK	3350000	3600000	1,000	1,300	12	26	6	242.0	438.0	4.0	0.34	2.00	2.98	1.95	119	22344E	22344EK
240	320	60	2.1	23948E	23948EK	870000	1260000	1,200	1,600	6	12	6	252.0	308.0	2.0	0.17	3.95	5.87	3.86	13.7	23948E	23948EK
	360	92	3	23048E	23048EK	1530000	2000000	1,200	1,500	8	18	6	254.0	346.0	2.5	0.24	2.76	4.11	2.70	33.5	23048E	23048EK
	360	92	3	23048A2X	23048A2XK	1570000	2090000	1,600	2,200	8	18	6	254.0	346.0	2.5	0.27	2.53	3.77	2.47	33.5	23048A2X	23048A2XK
	360	118	3	24048E	24048EK30	1990000	2800000	1,000	1,300	10	22	6	254.0	346.0	2.5	0.32	2.10	3.13	2.05	43.3	24048E	24048EK30
	400	128	4	23148E	23148EK	2610000	3350000	1,000	1,200	12	26	6	258.0	382.0	3.0	0.32	2.13	3.17	2.08	66.6	23148E	23148EK
	400	128	4	23148A2X	23148A2XK	2540000	3250000	1,300	1,600	12	26	6	258.0	382.0	3.0	0.33	2.02	3.00	1.97	68.5	23148A2X	23148A2XK
	400	160	4	24148E	24148EK30	2850000	3700000	1,000	1,200	12	26	6	258.0	382.0	3.0	0.40	1.69	2.51	1.65	81.6	24148E	24148EK30
	440	120	4	22248E	22248EK	2630000	2930000	1,000	1,300	10	22	6	258.0	422.0	3.0	0.28	2.37	3.53	2.32	82.8	22248E	22248EK
	440	160	4	23248E	23248EK	3400000	4100000	945	1,200	12	26	6	258.0	422.0	3.0	0.37	1.80	2.68	1.76	109	23248E	23248EK
	500	155	5	22348E	22348EK	3850000	4100000	1,000	1,200	12	26	6	262.0	487.0	4.0	0.34	2.00	2.98	1.96	151	22348E	22348EK
260	360	75	2.1	23952E	23952EK	1240000	1780000	1,200	1,500	8	14	6	272.0	348.0	2.0	0.19	3.54	5.27	3.46	23.7	23952E	23952EK
	400	104	4	23052E	23052EK	1950000	2530000	1,100	1,400	10	22	6	278.0	382.0	3.0	0.25	2.66	3.97	2.61	48.9	23052E	23052EK
	400	140	4	24052E	24052EK30	2630000	3700000	940	1,200	12	26	6	278.0	382.0	3.0	0.34	1.98	2.94	1.93	65.7	24052E	24052EK30
	440	144	4	23152E	23152EK	3100000	4000000	900	1,100	12	26	6	278.0	422.0	3.0	0.33	2.06	3.06	2.01	92	23152E	23152EK
	440	180	4	24152E	24152EK30	3550000	4650000	900	1,100	15	32	6	278.0	422.0	3.0	0.42	1.59	2.37	1.56	113	24152E	24152EK30
	480	130	5	22252E	22252EK	3100000	3500000	1,000	1,200	12	26	6	282.0	458.0	4.0	0.28	2.40	3.57	2.34	107	22252E	22252EK
	480	174	5	23252E	23252EK	3950000	4800000	840	1,000	15	32	6	282.0	458.0	4.0	0.38	1.78	2.65	1.74	142	23252E	23252EK
	540	165	6	22352E	22352EK	4350000	4750000	900	1,100	15	32	8	288.0	512.0	5.0	0.33	2.04	3.03	1.99	187	22352E	22352EK

Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

**Spherical Roller Bearings**

Bore Diameter: 280~340mm



**Dynamic equivalent radial load**

$F_r = XFr + YFa$

	$\frac{F_a}{F_r} \leq e$	$\frac{F_a}{F_r} > e$
X	Y	X
1	$Y_1$	$0.67 Y_2$

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

**Static equivalent radial load**

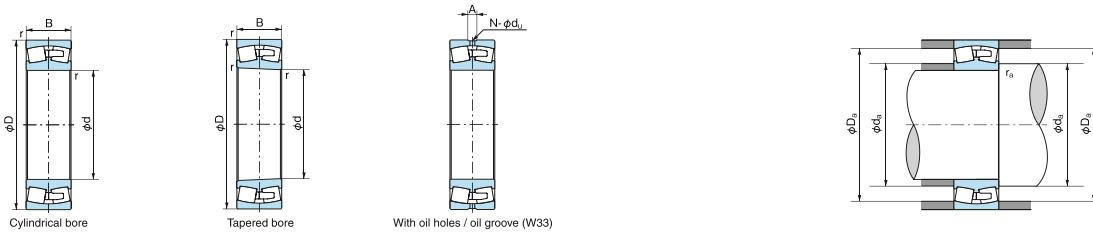
$P_0 = Fr + Y_0 Fa$   
Values  $Y_0$  from table.

Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating $C_r$ (N)	Basic static load rating $C_0$ (N)	Limiting speed (min <sup>-1</sup> )		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant $e$	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.		
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter $\phi_s$	Groove width A	Hole count N	$d_a$ (min)	$D_a$ (max)	$r_a$ (max)		$Y_1$	$Y_2$	$Y_0$		Cylindrical bore	Tapered bore	
280	380	75	2.1	23956E	23956EK	1260000	1840000	1,100	1,400		8	14	6	292.0	368.0	2.0	0.18	3.75	5.59	3.67	24.9	23956E	23956EK
	420	106	4	23056E	23056EK	2030000	2720000	1,000	1,300		10	22	6	298.0	402.0	3.0	0.24	2.79	4.15	2.73	52.7	23056E	23056EK
	420	140	4	24056E	24056EK30	2680000	3900000	900	1,100		12	26	6	298.0	402.0	3.0	0.32	2.09	3.11	2.04	69.6	24056E	24056EK30
	460	146	5	23156E	23156EK	3200000	4200000	840	1,000		12	26	6	302.0	438.0	4.0	0.32	2.12	3.15	2.07	98.4	23156E	23156EK
	460	180	5	24156E	24156EK30	3550000	4800000	840	1,000		15	32	6	302.0	438.0	4.0	0.39	1.74	2.59	1.70	120	24156E	24156EK30
	500	130	5	22256E	22256EK	3200000	3700000	940	1,200		12	26	6	302.0	478.0	4.0	0.27	2.53	3.77	2.47	113	22256E	22256EK
300	500	176	5	23256E	23256EK	4150000	5200000	790	1,000		15	32	6	302.0	478.0	4.0	0.36	1.87	2.79	1.83	152	23256E	23256EK
	580	175	6	22356E	22356EK	4950000	5450000	840	1,000		15	32	8	308.0	552.0	5.0	0.33	2.07	3.09	2.03	228	22356E	22356EK
	420	90	3	23960E	23960EK	1740000	2520000	1,000	1,200		10	18	6	314.0	406.0	2.5	0.20	3.42	5.08	3.34	39.7	23960E	23960EK
	460	118	4	23060E	23060EK	2500000	3300000	940	1,200		10	22	6	318.0	442.0	3.0	0.25	2.71	4.04	2.65	72.8	23060E	23060EK
	460	160	4	24060E	24060EK30	3350000	4850000	840	1,000		12	26	6	318.0	442.0	3.0	0.34	1.99	2.96	1.94	98.7	24060E	24060EK30
	500	160	5	23160E	23160EK	3650000	4750000	790	1,000		12	26	6	322.0	478.0	4.0	0.33	2.06	3.06	2.01	129	23160E	23160EK
320	500	200	5	24160E	24160EK30	4450000	6100000	790	1,000		15	32	6	322.0	478.0	4.0	0.40	1.68	2.50	1.64	160	24160E	24160EK30
	540	140	5	22260E	22260EK	3700000	4300000	900	1,100		12	26	8	322.0	518.0	4.0	0.27	2.49	3.71	2.43	144	22260E	22260EK
	540	192	5	23260E	23260EK	4950000	6250000	720	900		15	32	8	322.0	518.0	4.0	0.37	1.84	2.73	1.80	196	23260E	23260EK
	620	185	7.5	22360E	22360EK	5500000	6050000	780	970		15	32	8	336.0	584.0	6.0	0.32	2.09	3.11	2.04	279	22360E	22360EK
	440	90	3	23964E	23964EK	1770000	2610000	940	1,200		10	18	6	334.0	426.0	2.5	0.19	3.58	5.33	3.50	41.8	23964E	23964EK
	480	121	4	23064E	23064EK	2590000	3500000	900	1,100		12	26	6	338.0	462.0	3.0	0.24	2.76	4.11	2.70	78.6	23064E	23064EK
340	480	160	4	24064E	24064EK30	3400000	5100000	790	1,000		12	26	6	338.0	462.0	3.0	0.32	2.09	3.11	2.04	104	24064E	24064EK30
	540	176	5	23164E	23164EK	4350000	5700000	720	900		15	32	8	342.0	518.0	4.0	0.33	2.03	3.02	1.98	168	23164E	23164EK
	540	218	5	24164E	24164EK30	5050000	6900000	720	900		15	35	4	342.0	518.0	4.0	0.41	1.65	2.46	1.61	206	24164E	24164EK30
	580	150	5	22264E	22264EK	4250000	4900000	820	1,000		12	26	8	342.0	558.0	4.0	0.27	2.51	3.73	2.45	179	22264E	22264EK
340	580	208	5	23264E	23264EK	5600000	7200000	670	840		20	40	8	342.0	558.0	4.0	0.37	1.83	2.72	1.79	244	23264E	23264EK
	460	90	3	23968E	23968EK	1830000	2790000	900	1,100		10	18	6	354.0	446.0	2.5	0.18	3.80	5.66	3.72	44.1	23968E	23968EK
	520	133	5	23068E	23068EK	3150000	4300000	840	1,000		12	26	8	362.0	498.0	4.0	0.25	2.74	4.08	2.68	104	23068E	23068EK
	520	180	5	24068E	24068EK30	4100000	6050000	720	900		15	32	8	362.0	498.0	4.0	0.34	1.98	2.94	1.93	141	24068E	24068EK30
	580	190	5	23168E	23168EK	5150000	6750000	670	840		15	32	8	362.0	558.0	4.0	0.33	2.03	3.02	1.98	212	23168E	23168EK
	580	243	5	24168E	24168EK30	6050000	8300000	670	840		20	40	8	362.0	558.0	4.0	0.42	1.62	2.42	1.59	267	24168E	24168EK30
340	620	165	6	22268E	22268EK	5600000	6850000	750	930		15	32	8	368.0	592.0	5.0	0.27	2.49	3.71	2.43	224	22268E	22268EK
	620	224	6	23268E	23268EK	6300000	8000000	600	790		20	40	8	368.0	592.0	5.0	0.37	1.82	2.70	1.78	299	23268E	23268EK

Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

**Spherical Roller Bearings**

Bore Diameter: 360~440mm



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

	$\frac{F_a}{F_r} \leq e$	$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	$Y_1$	0.67	$Y_2$

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

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

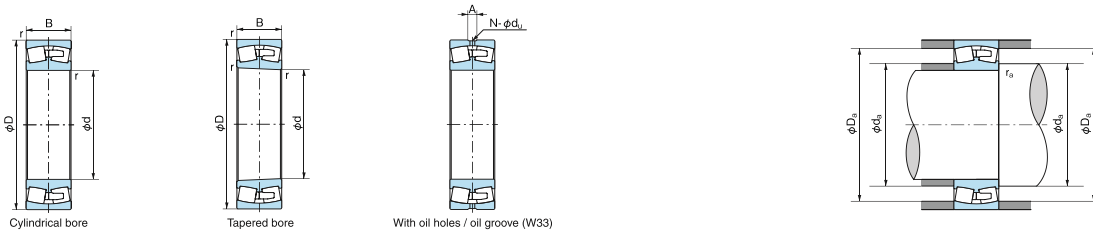
Values  $Y_0$  from table.

Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min <sup>-1</sup> )		Dimensions of lubrication holes and grooves	Abutment and fillet dimensions (mm)			Constant e	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.			
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication		Hole diameter $\phi_s$	Groove width A	Hole count N		$d_a$ (min)	$D_a$ (max)	$r_a$ (max)		$Y_1$	$Y_2$	$Y_0$	Cylindrical bore
360	480	90	3	23972E	23972EK	1890000	2960000	900	1,100	10	18	6	374.0	466.0	2.5	0.17	4.05	6.03	3.96	46.2	23972E	23972EK
	540	134	5	23072E	23072EK	3200000	4500000	790	1,000	12	26	8	382.0	518.0	4.0	0.24	2.84	4.23	2.78	110	23072E	23072EK
	540	180	5	24072E	24072EK30	4250000	6350000	670	840	15	32	8	382.0	518.0	4.0	0.33	2.06	3.06	2.01	148	24072E	24072EK30
	600	192	5	23172E	23172EK	5350000	7250000	640	790	15	32	8	382.0	578.0	4.0	0.33	2.07	3.09	2.03	225	23172E	23172EK
	600	243	5	24172E	24172EK30	6250000	8750000	640	790	20	40	8	382.0	578.0	4.0	0.42	1.60	2.39	1.57	279	24172E	24172EK30
	650	232	6	23272E	23272EK	6950000	9000000	570	750	20	40	8	388.0	622.0	5.0	0.37	1.82	2.70	1.78	342	23272E	23272EK
380	520	106	4	23976E	23976EK	2390000	3650000	790	1,000	12	24	8	398.0	502.0	3.0	0.19	3.58	5.33	3.50	68.2	23976E	23976EK
	560	135	5	23076E	23076EK	3300000	4700000	750	940	12	26	8	402.0	538.0	4.0	0.23	2.92	4.35	2.86	116	23076E	23076EK
	560	180	5	24076E	24076EK30	4300000	6650000	670	840	15	32	8	402.0	538.0	4.0	0.31	2.15	3.20	2.10	154	24076E	24076EK30
	620	194	5	23176E	23176EK	5400000	7400000	600	750	15	32	8	402.0	598.0	4.0	0.32	2.13	3.17	2.08	236	23176E	23176EK
	620	243	5	24176E	24176EK30	6450000	9300000	600	750	20	40	8	402.0	598.0	4.0	0.40	1.70	2.53	1.66	290	24176E	24176EK30
	680	240	6	23276E	23276EK	7500000	9800000	540	720	20	40	8	408.0	652.0	5.0	0.36	1.86	2.77	1.82	383	23276E	23276EK
400	540	106	4	23980E	23980EK	2470000	3900000	750	940	12	24	8	418.0	522.0	3.0	0.18	3.75	5.59	3.67	71.4	23980E	23980EK
	600	148	5	23080E	23080EK	3900000	5500000	720	900	12	26	8	422.0	578.0	4.0	0.24	2.81	4.19	2.75	151	23080E	23080EK
	600	200	5	24080E	24080EK30	5000000	7650000	600	750	15	32	8	422.0	578.0	4.0	0.33	2.03	3.02	1.98	204	24080E	24080EK30
	650	200	6	23180E	23180EK	5750000	7900000	570	720	15	32	8	428.0	622.0	5.0	0.31	2.18	3.24	2.13	266	23180E	23180EK
	650	250	6	24180E	24180EK30	6900000	9850000	570	720	20	40	8	428.0	622.0	5.0	0.39	1.73	2.57	1.69	330	24180E	24180EK30
	720	256	6	23280E	23280EK	8500000	11100000	510	670	20	45	8	428.0	692.0	5.0	0.36	1.86	2.77	1.82	461	23280E	23280EK
420	560	106	4	23984E	23984EK	2520000	4000000	720	900	12	24	8	438.0	542.0	3.0	0.18	3.85	5.73	3.76	74.4	23984E	23984EK
	620	150	5	23084E	23084EK	4050000	5850000	670	840	12	26	8	442.0	598.0	4.0	0.23	2.92	4.35	2.86	158	23084E	23084EK
	620	200	5	24084E	24084EK30	5150000	8000000	570	720	15	32	8	442.0	598.0	4.0	0.32	2.09	3.11	2.04	212	24084E	24084EK30
	700	224	6	23184E	23184EK	6800000	9250000	540	670	20	40	8	448.0	672.0	5.0	0.33	2.06	3.06	2.01	354	23184E	23184EK
	700	280	6	24184E	24184EK30	8350000	12000000	540	670	20	45	8	448.0	672.0	5.0	0.40	1.68	2.50	1.64	437	24184E	24184EK30
	760	272	7.5	23284E	23284EK	9400000	12500000	490	640	20	45	8	456.0	724.0	6.0	0.37	1.84	2.74	1.80	548	23284E	23284EK
440	600	118	4	23988E	23988EK	3100000	4900000	670	840	12	24	8	458.0	582.0	3.0	0.18	3.66	5.46	3.58	101	23988E	23988EK
	650	157	6	23088E	23088EK	4300000	6250000	640	790	12	26	8	468.0	622.0	5.0	0.24	2.87	4.27	2.80	183	23088E	23088EK
	650	212	6	24088E	24088EK30	5750000	9000000	540	670	20	40	8	468.0	622.0	5.0	0.32	2.09	3.11	2.04	247	24088E	24088EK30
	720	226	6	23188E	23188EK	7150000	10000000	510	640	20	40	8	468.0	692.0	5.0	0.32	2.13	3.17	2.08	371	23188E	23188EK
	720	280	6	24188E	24188EK30	8550000	12700000	510	640	20	45	8	468.0	692.0	5.0	0.39	1.73	2.58	1.69	460	24188E	24188EK30
	790	280	7.5	23288E	23288EK	10000000	13300000	480	600	20	45	8	476.0	754.0	6.0	0.36	1.86	2.77	1.82	605	23288E	23288EK

Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

**Spherical Roller Bearings**

Bore Diameter : 460~600mm



■ Dynamic equivalent radial load

$$F_r = X F_r + Y F_a$$

$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y <sub>1</sub>	0.67	Y <sub>2</sub>

Values of Y<sub>1</sub>, Y<sub>2</sub> and e from table.

■ Static equivalent radial load

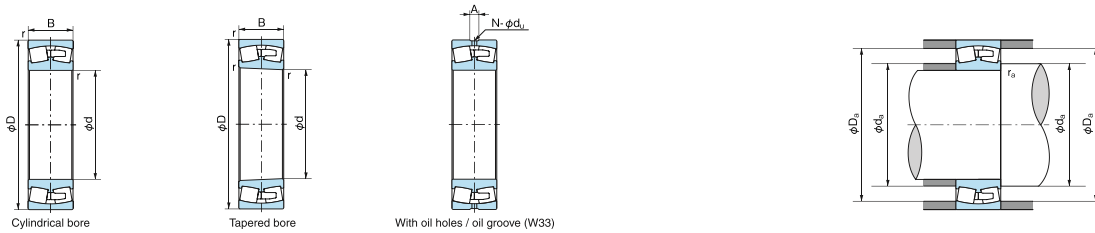
$P_0 = F_r + Y_0 F_a$   
Values Y<sub>0</sub> from table.

Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating Cr (N)	Basic static load rating Cor (N)	Limiting speed (min <sup>-1</sup> )		Dimensions of lubrication holes and grooves	Abutment and fillet dimensions (mm)			Constant e	Axial load factor			Mass (kg) Cylindrical bore (Reference)	Bearing No.			
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication		Hole diameter φs	Groove width A	Hole count N		da (min)	Da (max)	ra (max)		Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	Cylindrical bore
460	620	118	4	23992E	23992EK	3050000	4900000	640	790	12	24	8	478.0	602.0	3.0	0.18	3.85	5.73	3.76	105	23992E	23992EK
	680	163	6	23092E	23092EK	4700000	6850000	600	750	15	32	8	488.0	652.0	5.0	0.23	2.92	4.35	2.86	208	23092E	23092EK
	680	218	6	24092E	24092EK30	6100000	9650000	510	640	20	40	8	488.0	652.0	5.0	0.32	2.12	3.15	2.07	279	24092E	24092EK30
	760	240	7.5	23192E	23192EK	8000000	11200000	480	600	20	40	8	496.0	724.0	6.0	0.32	2.12	3.15	2.07	446	23192E	23192EK
	760	300	7.5	24192E	24192EK30	9450000	13900000	480	600	20	45	8	496.0	724.0	6.0	0.40	1.69	2.52	1.65	550	24192E	24192EK30
480	830	296	7.5	23292E	23292EK	10600000	14500000	450	570	20	45	8	496.0	794.0	6.0	0.36	1.85	2.75	1.81	709	23292E	23292EK
	650	128	5	23996E	23996EK	3300000	5450000	645	790	15	32	8	502.0	628.0	4.0	0.18	3.75	5.59	3.67	126	23996E	23996EK
	700	165	6	23096E	23096EK	4850000	7250000	570	720	15	32	8	508.0	672.0	5.0	0.22	3.01	4.48	2.94	217	23096E	23096EK
	700	218	6	24096E	24096EK30	6300000	10100000	510	640	20	40	8	508.0	672.0	5.0	0.31	2.20	3.27	2.15	290	24096E	24096EK30
	790	248	7.5	23196E	23196EK	8500000	12000000	450	570	20	40	8	516.0	754.0	6.0	0.32	2.12	3.15	2.07	495	23196E	23196EK
500	790	308	7.5	24196E	24196EK30	9950000	14800000	450	570	20	45	8	516.0	754.0	6.0	0.39	1.71	2.54	1.67	625	24196E	24196EK30
	870	310	7.5	23296E	23296EK	11300000	15400000	420	540	20	45	8	516.0	834.0	6.0	0.37	1.82	2.70	1.78	820	23296E	23296EK
	670	128	5	239500E	239500EK	3400000	5700000	600	750	15	28	8	522.0	648.0	4.0	0.18	3.85	5.73	3.76	130	239500E	239500EK
	720	167	6	230500E	230500EK	5050000	7650000	570	720	15	32	8	528.0	692.0	5.0	0.22	3.07	4.57	3.00	228	230500E	230500EK
	720	218	6	240500E	240500EK30	6450000	10500000	480	600	20	40	8	528.0	692.0	5.0	0.30	2.26	3.37	2.21	300	240500E	240500EK30
530	830	264	7.5	231500E	231500EK	9300000	13000000	420	540	20	45	8	536.0	794.0	6.0	0.32	2.09	3.11	2.04	584	231500E	231500EK
	830	325	7.5	241500E	241500EK30	11000000	16200000	420	540	25	50	8	536.0	794.0	6.0	0.40	1.70	2.53	1.66	718	241500E	241500EK30
	920	336	7.5	232500E	232500EK	13200000	17800000	390	510	25	50	8	536.0	884.0	6.0	0.38	1.78	2.65	1.74	1000	232500E	232500EK
	710	136	5	239530E	239530EK	4100000	6800000	540	670	15	28	8	552.0	688.0	4.0	0.18	3.85	5.73	3.76	156	239530E	239530EK
	780	185	6	230530E	230530EK	6250000	9450000	550	670	15	32	8	558.0	752.0	5.0	0.23	2.98	4.44	2.91	308	230530E	230530EK
560	780	250	6	240530E	240530EK30	7800000	12500000	450	550	20	40	8	558.0	752.0	5.0	0.32	2.12	3.15	2.07	417	240530E	240530EK30
	870	272	7.5	231530E	231530EK	10200000	14600000	390	510	20	45	8	566.0	834.0	6.0	0.32	2.13	3.17	2.08	640	231530E	231530EK
	980	355	9.5	232530E	232530EK	15300000	21000000	330	450	25	60	8	574.0	936.0	8.0	0.37	1.80	2.69	1.76	1215	232530E	232530EK
	750	140	5	239560E	239560EK	4250000	6950000	510	640	15	28	8	582.0	728.0	4.0	0.17	3.90	5.80	3.81	177	239560E	239560EK
	820	195	6	230560E	230560EK	7000000	10800000	510	640	15	32	8	588.0	792.0	5.0	0.23	2.95	4.39	2.89	359	230560E	230560EK
600	820	258	6	240560E	240560EK30	8350000	13500000	420	520	20	45	8	588.0	792.0	5.0	0.31	2.21	3.29	2.16	468	240560E	240560EK30
	920	280	7.5	231560E	231560EK	11000000	15800000	360	480	20	45	8	596.0	884.0	6.0	0.31	2.20	3.27	2.15	732	231560E	231560EK
	1030	365	9.5	232560E	232560EK	16000000	22000000	280	400	25	50	8	612.0	992.0	8.0	0.37	1.82	2.70	1.78	1390	232560E	232560EK
	800	150	5	239600E	239600EK	4800000	8050000	480	600	20	35	8	622.0	778.0	4.0	0.17	3.95	5.87	3.86	214	239600E	239600EK
	870	200	6	230600E	230600EK	7650000	12000000	480	600	15	32	8	628.0	842.0	5.0	0.22	3.10	4.62	3.03	408	230600E	230600EK
600	870	272	6	240600E	240600EK30	9050000	14900000	390	490	20	45	8	628.0	842.0	5.0	0.31	2.20	3.27	2.15	551	240600E	240600EK30
	980	300	7.5	231600E	231600EK	12100000	17500000	300	420	20	45	8	636.0	944.0	6.0	0.31	0.22	3.27	2.15	887	231600E	231600EK
	1090	388	9.5	232600E	232600EK	17900000	25100000	240	360	25	50	8	654.0	1048	8.0	0.37	1.82	2.70	1.78	1640	232600E	232600EK

Note: Suffix K or K30 means tapered bore (1/12 or 1/30).

**Spherical Roller Bearings**

Bore Diameter : 630~1,060mm



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

	$\frac{F_a}{F_r} \leq e$	$\frac{F_a}{F_r} > e$
X	Y	X
1	$Y_1$	0.67
		$Y_2$

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

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

Values  $Y_0$  from table.

Boundary dimensions (mm)				Bearing No.		Basic dynamic load rating $C_r$ (N)	Basic static load rating $C_0$ (N)	Limiting speed (min <sup>-1</sup> )		Dimensions of lubrication holes and grooves			Abutment and fillet dimensions (mm)			Constant $e$	Axial load factor				Mass (kg) Cylindrical bore (Reference)	Bearing No.	
d	D	B	r (min)	Cylindrical bore	Tapered bore			Grease lubrication	Oil lubrication	Hole diameter $\phi_s$	Groove width $A$	Hole count $N$	$d_a$ (min)	$D_a$ (max)	$r_a$ (max)		$Y_1$	$Y_2$	$Y_0$	Cylindrical bore		Tapered bore	
630	850	165	6	239/630E	239/630EK	5750000	9700000	420	540		20	35	8	658.0	822.0	5.0	0.18	3.71	5.52	3.62	273	239/630E	239/630EK
	920	212	7.5	230/630E	230/630EK	8350000	13100000	430	570		20	40	8	666.0	884.0	6.0	0.22	3.07	4.57	3.00	487	230/630E	230/630EK
	1030	315	7.5	231/630E	231/630EK	13500000	19800000	280	390		20	45	8	666.0	994.0	6.0	0.31	2.20	3.27	2.15	1070	231/630E	231/630EK
670	900	170	6	239/670E	239/670EK	6200000	10500000	390	510		20	35	8	698.0	872.0	5.0	0.17	3.90	5.80	3.81	316	239/670E	239/670EK
	980	230	7.5	230/670E	230/670EK	9650000	15300000	400	510		20	40	8	706.0	944.0	6.0	0.22	3.01	4.48	2.94	603	230/670E	230/670EK
	1090	336	7.5	231/670E	231/670EK	15300000	23000000	270	360		25	50	8	706.0	1054	6.0	0.31	2.18	3.24	2.13	1260	231/670E	231/670EK
710	950	180	6	239/710E	239/710EK	6950000	12100000	360	480		20	35	8	738.0	922.0	5.0	0.17	3.90	5.80	3.81	369	239/710E	239/710EK
	1030	236	7.5	230/710E	230/710EK	10300000	16600000	370	480		20	40	8	746.0	994.0	6.0	0.22	3.10	4.62	3.03	676	230/710E	230/710EK
	1150	345	9.5	231/710E	231/710EK	16800000	25300000	250	330		25	50	8	754.0	1106	8.0	0.30	2.24	3.34	2.19	1432	231/710E	231/710EK
750	1000	185	6	239/750E	239/750EK	7500000	13200000	330	450		20	35	8	778.0	972.0	5.0	0.17	4.00	5.95	3.91	417	239/750E	239/750EK
	1090	250	7.5	230/750E	230/750EK	11700000	18900000	340	450		20	40	8	786.0	1054	6.0	0.22	3.10	4.62	3.03	803	230/750E	230/750EK
	1220	365	9.5	231/750E	231/750EK	18100000	27700000	220	280		25	50	8	794.0	1176	8.0	0.30	2.25	3.34	2.20	1710	231/750E	231/750EK
800	1060	195	6	239/800E	239/800EK	8150000	14500000	300	420		20	35	8	825.0	1032	5.0	0.17	4.00	5.96	3.91	470	239/800E	239/800EK
	1150	258	7.5	230/800E	230/800EK	12200000	20900000	310	400		20	45	8	836.0	1114	6.0	0.21	3.20	4.77	3.13	910	230/800E	230/800EK
	1150	345	7.5	240/800E	240/800EK30	15400000	27200000	300	370		25	50	8	836.0	1114	6.0	0.28	2.43	3.61	2.37	1200	240/800E	240/800EK30
850	1280	375	9.5	231/800E	231/800EK	20000000	31000000	240	310		25	50	8	844.0	1236	8.0	0.29	2.32	3.45	2.26	1910	231/800E	231/800EK
	1120	200	6	239/850E	239/850EK	8600000	15600000	280	390		20	40	8	878.0	1092	5.0	0.16	4.16	6.20	4.07	546	239/850E	239/850EK
	1220	272	7.5	230/850E	230/850EK	13600000	22500000	285	360		20	40	8	886.0	1184	6.0	0.21	3.20	4.77	3.13	1059	230/850E	230/850EK
900	1180	206	6	239/900E	239/900EK	9300000	17000000	270	360		20	40	8	928.0	1152	5.0	0.16	4.22	6.28	4.13	618	239/900E	239/900EK
	1280	280	7.5	230/900E	230/900EK	14600000	25400000	270	330		20	45	8	936.0	1244	6.0	0.21	3.27	4.87	3.20	1200	230/900E	230/900EK
	1250	224	7.5	239/950E	239/950EK	10800000	19900000	250	330		20	40	8	986.0	1214	6.0	0.16	4.11	6.12	4.02	763	239/950E	239/950EK
950	1360	300	7.5	230/950E	230/950EK	16100000	27200000	240	300		20	45	8	986.0	1324	6.0	0.21	3.23	4.82	3.16	1450	230/950E	230/950EK
	1320	236	7.5	239/1000E	239/1000EK	11600000	21300000	220	300		25	48	8	1036	1284	6.0	0.17	4.05	6.03	3.96	895	239/1000E	239/1000EK
1000	1420	308	7.5	230/1000E	230/1000EK	17200000	29700000	220	280		20	45	8	1036	1384	6.0	0.21	3.27	4.87	3.20	1610	230/1000E	230/1000EK
	1060	1400	250	7.5	239/1060E	239/1060EK	13200000	24500000	210	270		25	48	8	1096	1364	6.0	0.17	4.05	6.03	3.96	1077	239/1060E

Note: Suffix K or K30 means tapered bore (1/12 or 1/30).