



# Single-row angular-contact ball bearings

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## Angular-contact bearings high precision MachLine® Range 248

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## Single-row angular-contact ball bearings

### Definition and capabilities

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Always mounted in opposition to another bearing of same type, they offer high mounting stiffness, especially when preloaded.

#### → Definition

##### ■ Cage

Standard dimension bearings are equipped with either a metal cage or a synthetic material cage. In the latter case the maximum continuous operating temperature is 120°C or 248°F (150°C peak or 302°F peak).

Large-sized bearings are equipped with a machined brass cage.

##### ■ Contact angle

Angular-contact ball bearings of normal precision have a contact angle of 40° (suffix B). Some bearings have a contact angle of 30°, in which case the bearing reference does not have the B suffix.

#### → Capabilities

##### ■ Load and speed

These bearings are designed to:

- withstand combined loads with a predominant axial component
- withstand loads in one direction only (they must be mounted in opposition with bearings of the same type)
- accept relatively high speeds of rotation

$$F_a / F_r \geq 1$$

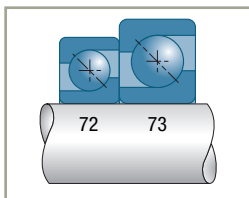
##### ■ Misalignment

#### Assembly made up of a single bearing

Slight misalignment between the shaft and housing is acceptable. The value depends on the assembly clearance: from 0.10° to 0.15° if the assembly clearance is 0.06° in the case of a preloaded assembly.

#### Assembly made up of two bearings

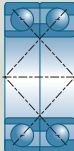

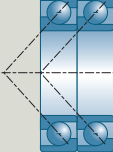
In this case, the assembly is similar to a double-row ball bearing and the acceptable misalignment values are very low, in the range of 0.06°.



## Variants

### ■ Bearings for universal matching (suffix BG)

The bearings in the 72 ... BG, 73 ... BG series can be assembled in pairs to form a single pillow block. They are supplied individually and can be matched in either an X, O or Tandem arrangement.

Arrangement	Characteristics
<b>Face-to-face or X arrangement (type DF)</b> 	This arrangement constitutes a single assembly. Another bearing is needed to form the second pillow block of the shaft.
<b>Back-to-back or O arrangement (type DB)</b> 	Good rigidity under tilting torque. This assembly can in some cases ensure shaft retention on its own thanks to the distance between the load application point.
<b>Tandem (type DT)</b> 	For very high axial loads but in one direction only. This arrangement constitutes a single assembly; another bearing must be mounted in the opposite direction to form the second assembly of the shaft.

Other variants can give assemblies with a greater or lesser amount of preload (suffix BGL or BGO); they requires usually a prior technical study.

On request these bearings are supplied with a maximum runout mark on the inner ring. When the two bearings are assembled, their respective markings must be aligned.

## Single-row angular-contact ball bearings *(continued)*

### Tolerances and clearances

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#### ■ Tolerances

Usually manufactured in the normal tolerance class.

Single-row ball bearings can be supplied on request with all or specified characteristics in tolerance classes 6 and 5 (e.g. bore or axial run-out in tolerance class 6).

#### ■ Axial clearance on assembly with two separate bearings

These bearings are always assembled in opposition, and their internal clearance is determined by adjusting the axial clearance of the shaft at the time of assembly.

For information, the relationship between the axial clearance and the radial clearance is given by the formula:

$$J_r = 0.83 J_a$$

These bearings can be installed preloaded if needed to increase the axial rigidity of an assembly. The maximum speed of rotation is then reduced, and depends on the value of the preload. Consult SNR.

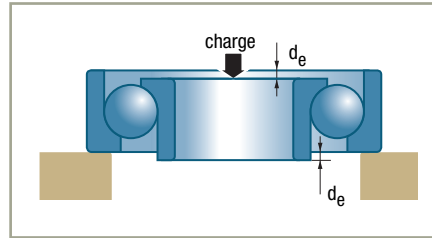
The aim of adjusting an assembly comprising two angular-contact ball bearings is to adjust the axial clearance, that is to say the initial relative position of the inner rings with respect to the outer rings, so that the bearings are positioned in the best possible operating conditions, while at the same time satisfying the specific assembly requirements (precision of rotation, rigidity, vibration, heating, etc.). The adjustment is defined either by an axial clearance or a preload.

The optimum preload of an assembly is determined according to the application specifications (rigidity, precision, temperature, vibration, etc.). Whatever the case, consult SNR.

The assembly and adjustment conditions affect the clearance of the assembly. Type BG bearings usually have reduced residual clearance after assembly.

### ■ Axial clearance of a BG assembly

The clearance of an assembly (X or O arrangement) is defined by the protrusion  $d_e$  of one ring with respect to the other.



Bearing bore		Protusion value in $\mu\text{m}$
from	to	
10	30	8 - 19
35	50	8 - 20
55	80	11 - 23
85	110	17 - 29
115	180	20 - 32

The axial clearance of the assembly is calculated as follows:

- mean theoretical axial clearance:

$$2 d_e$$

- radial reduction of clearance due to interference fits:

$$\Delta J_r$$

- mean axial clearance of the assembly:

$$J_a = 2 d_e - (\Delta J_r / 0.83)$$

By applying this formula to the calculation of probable tolerances, one obtains a minimum clearance value close to zero with a conventional assembly (interference fit on shaft with a  $j6/k6$  tolerance and clearance fit in the housing with an  $H7/J7$  tolerance).

## Single-row angular-contact ball bearings (continued)

### Design criteria

#### ■ Bearing life

#### ■ Shaft mounted on two single bearings

##### Equivalent dynamic load

The axial equilibrium of the shaft depends not only on the external forces applied to it, but also on the forces induced by the radial loads applied to each bearing.

##### Equivalent static load

Its value  $P_0$  is the greater of the two values obtained using the following formula:

$$P_0 = F_r$$

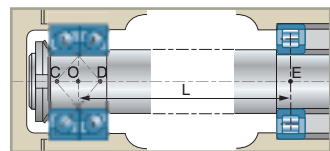
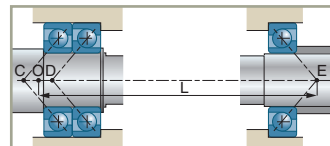
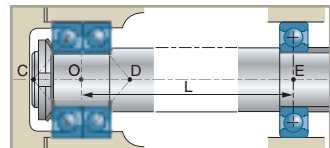
$$P_0 = 0.5 F_r + 0.26 F_a$$

#### ■ Shaft with one of its two assemblies made up of two matched bearings in the 72...BG or 73...BG series

This assembly is considered as being made up of a single double-row ball bearing whose centre O is the midpoint of the distance CD between the load application points.

The arrangement of this type of assembly is hyperstatic. (3 seating points: E, C, D) and can only be likened approximately to an arrangement on two assemblies (seating points E and O) if the distance CD is less than  $L/5$  and the rigidity of the assembly is satisfactory (misalignment  $< 0.06^\circ$ ).

In all other cases, consult SNR.





### ■ Equivalent dynamic load of the double assembly (ISO 281 Standard)

Arrangements assembled in an O or X	$P = F_r + 0.55 F_a$	if	$F_a / F_r \leq 1.14$
	$P = 0.57 F_r + 0.93 F_a$	if	$F_a / F_r > 1.14$
Tandem assemblies	$P = F_r$	if	$F_a / F_r \leq 1.14$
	$P = 0.35 F_r + 0.57 F_a$	if	$F_a / F_r > 1.14$

### ■ Basic dynamic capacity of the double assembly

Basic dynamic capacity of an assembly of two identical matched bearings:

$$C_e = 1.625 C$$

### ■ Equivalent static load of a double assembly

For an O or X assembly:

$$P_0 = F_r + 0.52 F_a$$

For a tandem assembly, the value of  $P_0$  is the greater of the two values obtained using the following formula:

$$P_0 = F_r$$

$$P_0 = 0.5 F_r + 0.26 F_a$$

### ■ Basic static capacity of the assemblies

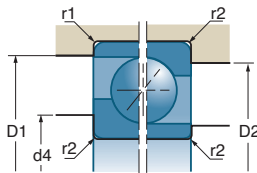
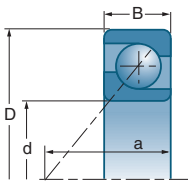
The static capacity of the assembly of two identical bearings is twice that of a single bearing.

$$C_{0e} = 2 C_0$$

## Suffixes

<b>A</b>	Optimised internal design with polyamide cage
<b>B</b>	Contact angle of 40°
<b>BG</b>	Contact angle of 40° and non-preloaded universal pairing
<b>M</b>	Machined brass cage centred on the balls

## Single-row angular-contact ball bearings (continued)



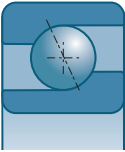
d		D	B	a				
					10 <sup>6</sup> N	10 <sup>7</sup> N	rpm*	rpm*
mm	References	mm	mm	mm	C	C <sub>0</sub>		
15	7202 BA	35	11	16.0	8.0	4.4	16000	22000
17	7203 B	40	12	18.0	9.9	5.5	14000	20000
	7203 BGA	40	12	18.0	16.1	11.0	14000	19000
20	7204 BA	47	14	21.0	13.3	7.6	12000	17000
	7204 BGA	47	14	21.0	21.6	15.3	11000	16000
	7304 B	52	15	22.5	17.3	9.7	11000	16000
	7304 BGA	52	15	22.6	30.5	20.9	11000	15000
25	7205 BGA	52	15	24.0	15.8	9.4	10000	14000
	7305 BGA	62	17	26.8	42.5	30.0	9100	12000
30	7206 BGA	62	16	27.0	20.5	13.5	8700	12000
	7306 BGA	72	19	31.0	32.5	20.1	7800	10900
35	7207 BGA	72	17	31.0	27.0	18.4	7400	10400
	7307 BA	80	21	35.0	39.5	25.0	6900	9700
	7307 BGA	80	21	35.0	39.5	25.0	6900	9700
40	7208 BA	80	18	34.0	32.0	23.0	6600	9300
	7208 BGA	80	18	34.0	32.0	23.0	6600	9300
	7208 BGM	80	18	34.0	32.0	23.0	6600	9300
	7308 BA	90	23	39.0	49.5	32.5	6100	8600
	7308 BGA	90	23	39.0	49.5	32.5	6100	8600
	7308 BGM	90	23	39.0	46.5	29.5	6100	8600
45	7209 BA	85	19	37.0	36.0	26.5	6100	8600
	7209 BGA	85	19	37.0	36.0	26.5	6100	8600
	7209 BGM	85	19	37.0	34.5	24.4	6100	8600
	7309 BA	100	25	43.0	69.0	47.0	5500	7700
	7309 BGA	100	25	43.0	69.0	47.0	5500	7700
	7309 BGM	100	25	43.0	56.0	36.0	5500	7700
50	7210 BGA	90	20	39.0	37.5	28.5	5700	8000
	7210 BGM	90	20	39.0	35.5	26.5	5700	8000
	7310 BA	110	27	47.0	69.0	47.0	5000	7000
	7310 BGA	110	27	47.0	69.0	47.0	5000	7000
	7310 BGM	110	27	47.0	69.0	47.0	5000	7000

\* These are the speed limits according to the SNR concept (see pages 85 to 87).



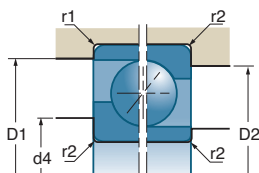
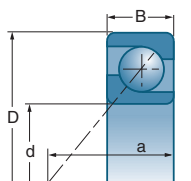
# Characteristics




## ■ Single-row angular-contact ball bearings



References	d4 min	D2 max	D1 max	r2 max	r1 max	kg
7202 BA	19	31	32.0	0.6	0.3	0.045
7203 B 7203 BGA	20.5 20.5	36.5 36.5	36.5 36.5	0.6 0.6	0.6 0.3	0.064 0.065
7204 BA 7204 BGA 7304 B 7304 BGA	26 26 26 26	41 41 46 46	43.0 43.0 48.5 48.5	1.0 1.0 1.0 1.1	0.6 0.6 0.6 0.6	0.107 0.104 0.150 0.143
7205 BGA 7305 BGA	31 32	46 55	48.0 58.0	1.0 1.1	0.6 0.6	0.131 0.223
7206 BGA 7306 BGA	36 37	56 65	58.0 68.0	1.0 1.0	0.6 0.6	0.210 0.349
7207 BGA 7307 BA 7307 BGA	42 44 44	65 71 71	68.0 75.0 75.0	1.0 1.5 1.5	0.6 1.0 1.0	0.287 0.457 0.475
7208 BA 7208 BGA 7208 BGM 7308 BA 7308 BGA 7308 BGM	47 47 47 49 49 49	73 73 73 81 81 81	76.0 76.0 76.0 85.0 85.0 85.0	1.0 1.0 1.0 1.5 1.5 1.5	0.6 0.6 0.6 1.0 1.0 1.0	0.373 0.373 0.373 0.626 0.626 0.626
7209 BA 7209 BGA 7209 BGM 7309 BA 7309 BGA 7309 BGM	52 52 52 54 54 54	78 78 78 91 91 91	81.0 81.0 81.0 95.0 95.0 95.0	1.0 1.0 1.0 1.5 1.5 1.5	0.6 0.6 0.6 1.0 1.0 1.0	0.414 0.414 0.414 0.835 0.835 0.835
7210 BGA 7210 BGM 7310 BA 7310 BGA 7310 BGM	57 57 61 61 61	83 83 99 99 99	86.0 86.0 104.0 104.0 104.0	1.0 1.0 2.0 2.0 2.0	0.6 0.6 1.0 1.0 1.0	0.466 0.466 1.080 1.080 1.080

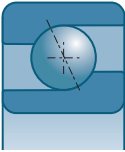
## Single-row angular-contact ball bearings (continued)





d		D	B	a				
					10 <sup>3</sup> N	10 <sup>3</sup> N	rpm*	rpm*
mm	References	mm	mm	mm				
55	7211 BA	100	21	43.0	46.5	36.0	5100	7200
	7211 BGA	100	21	43.0	46.5	36.0	5100	7200
	7211 BGM	100	21	43.0	44.0	33.5	5100	7200
	7311 BA	120	29	51.0	79.0	56.0	4500	6400
	7311 BGA	120	29	51.0	79.0	56.0	4500	6400
	7311 BGM	120	29	51.0	79.0	56.0	4500	6400
60	7212 BA	110	22	47.0	56.0	44.5	4700	6500
	7212 BGA	110	22	47.0	56.0	44.5	4700	6600
	7212 BGM	110	22	47.0	54.0	41.5	4700	6600
	7312 BA	130	31	55.0	90.0	65.0	4200	5900
	7312 BGA	130	31	55.0	90.0	65.0	4200	5800
	7312 BGM	130	31	55.0	85.0	60.0	4200	5800
65	7213 BA	120	23	50.5	64.0	53.0	4300	6000
	7213 BGA	120	23	50.5	64.0	53.0	4300	6000
	7213 BGM	120	23	50.5	61.0	49.5	4300	6000
	7213 BM	120	23	50.5	61.0	49.5	4300	6000
	7313 BGA	140	33	60.0	102.0	75.0	3900	5400
	7313 BGM	140	33	60.0	102.0	75.0	3900	5400
70	7214 BA	125	24	53.0	69.0	58.0	4100	5700
	7214 BGA	125	24	53.0	69.0	58.0	4100	5700
	7214 BGM	125	24	53.0	66.0	54.0	4100	5700
	7314 BGA	150	35	64.0	114.0	86.0	3600	5000
	7314 BGM	150	35	64.0	114.0	86.0	3600	5000
75	7215 BA	130	25	56.0	69.0	58.0	3900	5400
	7215 BGA	130	25	56.0	69.0	58.0	3900	5500
	7215 BGM	130	25	56.0	69.0	58.0	3900	5400
	7315 BGM	160	37	68.0	128.0	100.0	3400	4700
80	7216 BGM	140	26	59.0	80.0	69.0	3600	5000
	7316 BGM	170	39	72.0	140.0	114.0	3200	4400
85	7217 BGM	150	28	63.0	90.0	80.0	3400	4700
	7317 BGM	180	41	76.0	151.0	127.0	3000	4200
90	7218 BGM	160	30	67.0	107.0	94.0	3200	4400
	7318 BGM	190	43	80.0	162.0	140.0	2800	4000

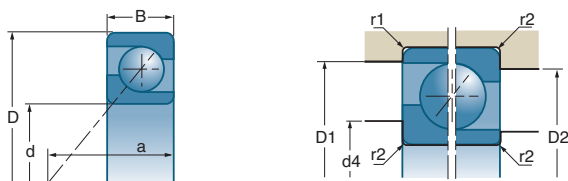
\* These are the speed limits according to the SNR concept (see pages 85 to 87).

■ Single-row angular-contact ball bearings (continued)



	d4 min	D2 max	D1 max	r2 max	r1 max	
References	mm	mm	mm	mm	mm	kg
7211 BA	64	91	95.0	1.5	1.0	0.633
7211 BGA	64	91	95.0	1.5	1.0	0.633
7211 BGM	64	91	95.0	1.5	1.0	0.633
7311 BA	66	109	114.0	2.0	1.0	1.410
7311 BGA	66	109	114.0	2.0	1.0	1.410
7311 BGM	66	109	114.0	2.0	1.0	1.410
7212 BA	69	101	105.0	1.5	1.0	0.798
7212 BGA	69	101	105.0	1.5	1.0	0.798
7212 BGM	69	101	105.0	1.5	1.0	0.798
7312 BA	72	118	123.0	2.1	1.0	1.810
7312 BGA	72	118	123.0	2.1	1.0	1.810
7312 BGM	72	118	123.0	2.1	1.0	1.810
7213 BA	74	111	115.0	1.5	1.0	1.030
7213 BGA	74	111	115.0	1.5	1.0	1.030
7213 BGM	74	111	115.0	1.5	1.0	1.100
7213 BM	72	113	115.0	1.5	1.0	1.100
7313 BGA	77	128	133.0	2.1	1.0	2.160
7313 BGM	77	128	133.0	2.1	1.0	2.324
7214 BA	79	116	120.0	1.5	1.0	1.140
7214 BGA	79	116	120.0	1.5	1.0	1.140
7214 BGM	79	116	120.0	1.5	1.0	1.185
7314 BGA	82	138	143.0	2.1	1.0	2.650
7314 BGM	82	138	143.0	2.1	1.0	2.800
7215 BA	84	121	125.0	1.5	1.0	1.190
7215 BGA	84	121	125.0	1.5	1.0	1.190
7215 BGM	84	121	125.0	1.5	1.0	1.291
7315 BGM	87	148	153.0	2.1	1.0	3.170
7216 BGM	91	129	134.0	2.0	1.0	1.460
7316 BGM	92	158	163.0	2.1	1.0	4.280
7217 BGM	96	139	144.0	2.0	1.0	1.920
7317 BGM	99	166	173.0	2.5	1.0	4.580
7218 BGM	101	149	154.0	2.0	1.0	2.350
7318 BGM	104	176	183.0	2.5	1.0	5.320

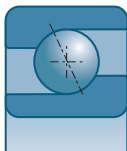
## Single-row angular-contact ball bearings (continued)

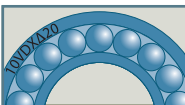



d		D	B	a				
							10°N	10°N
mm	References	mm	mm	mm				
<b>95</b>	7219 BGM 7319 BGM	170	32	72.0	116.0	101.0	3000	4200
		200	45	84.0	172.0	154.0	2700	3800
<b>100</b>	7220 BGM 7320 BGM	180	34	76.0	130.0	114.0	2800	4000
		215	47	90.0	194.0	181.0	2500	3500
<b>105</b>	7321 BGM	225	49	94.0	241.0	230.0	2400	3400
<b>110</b>	7222 BGM 7322 BGM	200	38	84.0	154.0	144.0	2500	3600
		240	50	98.0	226.0	225.0	2200	3200
<b>120</b>	7224 BGM 7324 BGM	215	40	90.0	161.0	165.0	2400	3300
		260	55	108.0	250.0	260.0	2100	2900
<b>130</b>	7226 BGM 7326 BGM	230	40	96.0	177.0	180.0	2200	3100
		280	58	115.0	275.0	300.0	1900	2700
<b>140</b>	7228 BGM 7328 BGM	250	42	103.0	197.0	212.0	2100	2900
		300	62	123.0	300.0	340.0	1800	2500
<b>150</b>	7230 BGM 7330 BGM	270	45	111.0	225.0	255.0	1900	2600
		320	65	131.0	330.0	390.0	1700	2300
<b>160</b>	7232 BGM 7332 BGM	290	48	118.0	238.0	280.0	1700	2400
		340	68	139.0	360.0	450.0	1600	2200
<b>170</b>	7234 BGM 7334 BGM	310	52	127.0	265.0	325.0	1600	2300
		360	72	147.0	390.0	510.0	1500	2100

\* These are the speed limits according to the SNR concept (see pages 85 to 87).

■ Single-row angular-contact ball bearings (continued)



	d4 min	D2 max	D1 max	r2 max	r1 max	
References	mm	mm	mm	mm	mm	kg
7219 BGM 7319 BGM	107 109	158 186	163.0 193.0	2.1 2.5	1.0 1.0	2.780 6.180
7220 BGM 7320 BGM	112 114	168 201	173.0 208.0	2.1 2.5	1.0 1.0	3.410 7.650
7321 BGM	119	211	218.0	2.5	1.0	9.460
7222 BGM 7322 BGM	122 124	188 226	193.0 233.0	2.1 2.5	1.0 1.0	4.720 10.400
7224 BGM 7324 BGM	132 134	203 246	208.0 253.0	2.1 2.5	1.0 1.0	6.210 14.400
7226 BGM 7326 BGM	144 147	216 263	223.0 271.0	2.5 3.0	1.0 1.5	6.920 17.500
7228 BGM 7328 BGM	154 157	236 283	243.0 291.0	2.5 3.0	1.0 1.5	8.910 21.600
7230 BGM 7330 BGM	164 167	256 303	263.0 311.0	2.5 3.0	1.0 1.5	11.600 26.000
7232 BGM 7332 BGM	174 177	276 323	283.0 331.0	2.5 3.0	1.0 1.5	28.000 30.500
7234 BGM 7334 BGM	187 187	293 343	301.0 351.0	3.0 3.0	1.5 1.5	35.000 34.342

## 4-point angular-contact bearings

### Definition and capabilities

---

4-point angular contact bearings accept axial loads in both directions. They are often associated with a radial contact bearing.

#### → Definition

The design of this bearing results from the theoretical superposition of the two sections of matched angular-contact bearings in an X or O arrangement. The curvature of the raceways is consequently elliptical and displays two loading lines (contact angle 35°) which gives four points of contact on the balls.

The two-part inner ring can be filled with more balls than radial ball bearings.

#### ■ Cage

The cage is usually made in machined brass centred on the inner or outer ring, joining the ring of balls to the outer ring.

#### → Capabilities

##### ■ Load and speed

These bearings are designed to:

- withstand combined loads with a predominant axial component

$$F_a / F_r \geq 1.25$$

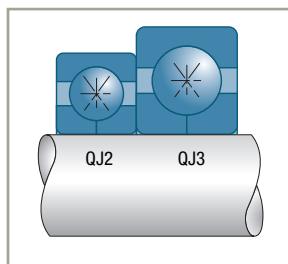
- withstand axial loads in both directions
- accept relatively high speeds of rotation

##### ■ Misalignment

The construction of these bearings limits them to very small misalignment values, in the range of 0.06°.

### Series

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## Tolerances and clearances

### → Tolerances

These bearings are supplied in normal tolerance classes.

### → Clearance

#### ■ Axial clearance

The axial clearance is not standardised.  
The values are communicated by SNR on request.

#### ■ Radial clearance

The relation between the axial clearance  $J_a$  and the corresponding radial clearance  $J_r$  can be calculated using the following approximation formula

$$J_r = 0.7 J_a$$

## Design criteria

#### ■ Bearing life

$$P = F_r + 0.66 F_a \quad \text{if } F_a / F_r \leq 0.95$$

#### ■ Equivalent dynamic load

$$P = 0.6 F_r + 1.07 F_a \quad \text{if } F_a / F_r > 0.95$$

#### ■ Equivalent static load

$$P_0 = F_r + 0.58 F_a$$

## Installation/assembly criteria

The axial clearance of this bearing is determined for conventional mounting on a rotating shaft with an interference fit j6 or k6 type.

The fit of the housing must be loose (H7), hence the need to prevent the ring from rotating in certain applications (version suffix N2).

The two inner half-rings must be held tight axially against a shoulder.

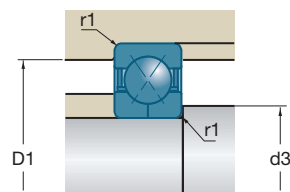
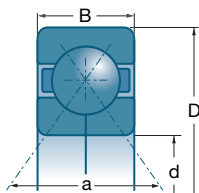
In most applications, this bearing is considered like a single assembly. It can sometimes be used like a double assembly playing the role of two bearings, thanks to the distance between the load application points.

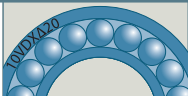




## Suffixes

<b>MA</b>	Machined brass cage centred on the outer ring
<b>N2</b>	Two retention slots on the outer ring



## 4-point angular-contact bearings (continued)



d		D	B	a				
mm	References	mm	mm	mm	10 <sup>3</sup> N	10 <sup>3</sup> N	rpm*	rpm*
30	QJ 306 MA	72	19	36	55.0	38.5	7900	11000
35	QJ 307 MA	80	21	41	59.0	46.5	7100	9500
40	QJ 308 MA	90	23	46	86.0	69.0	6300	8400
45	QJ 309 MA	100	25	52	95.0	75.0	5600	7500
50	QJ 310 MA	110	27	56	110.0	92.0	5100	6900
55	QJ 311 MA	120	29	61	127.0	109.0	4600	6200
60	QJ 312 MA	130	31	67	145.0	126.0	4300	5700
65	QJ 313 MA	140	33	72	164.0	145.0	4000	5300
70	QJ 314 MA	150	35	77	184.0	165.0	3700	5000
75	QJ 315N2 MA	160	37	82	212.0	204.0	3400	4600
80	QJ 316N2 MA	170	39	88	222.0	215.0	3200	4400
85	QJ 317N2 MA	180	41	93	246.0	255.0	3000	4100
90	QJ 318N2 MA	190	43	98	265.0	285.0	2900	3900

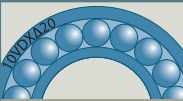

\* These are the speed limits according to the SNR concept (see pages 85 to 87).



# Characteristics

## ■ 4-points angular-contact bearings



	d3 min	d3 max	D1 min	D1 max	r1 max	
References	mm	mm	mm	mm	mm	kg
QJ 306 MA	37	45.5	62.3	65	1.1	0.406
QJ 307 MA	44	50.5	68.4	71	1.5	0.550
QJ 308 MA	49	52.9	77.6	81	1.5	0.696
QJ 309 MA	54	59.2	86.7	91	1.5	1.050
QJ 310 MA	61	69	95.1	99	2	1.330
QJ 311 MA	66	75	103.4	109	2	1.675
QJ 312 MA	70	81	110	120	2.1	2.200
QJ 313 MA	78	90.5	120.3	127	2.1	2.700
QJ 314 MA	83	96	128.7	137	2.1	3.150
QJ 315 N2 MA	85	102	135	149	2.1	3.960
QJ 316 N2MA	93	110	145.6	157	2.1	4.500
QJ 317 N2 MA	95	114	155	167	3	5.540
QJ 318 N2 MA	102	121	163	177	3	6.440

## Angular-contact bearings high precision MachLine® Range SNR

### Definition and capabilities

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Current machining integrates a whole series of properties which result from constant technological evolution and progress: high speed machining, downtime reduction, higher stiffness, integral sealing, maintenance cost-savings, ...

Machines provide increasingly higher performance levels in a context where productivity and environmental-friendliness must be paired.

The MachLine® range offers precise answers to all these issues.

### Series and variations

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#### ■ High precision

- **SNR 71900V and 7000V series**, with excellent performance data to balance the need for speed, rigidity, capacity and precision.
- **7200G1 series**, specially designed to meet specifications set by applications with large, predominantly axial loads.
- **Variations** according to contact angle (C for 15° and H for 25°) and preload (light, medium or heavy).

#### ■ Hybrid, ceramic balls CH

- **Possible variation** for all ranges, all series and all dimensions with Silicon Nitride balls and steel rings, combining the best qualities of the two materials.
- **Reduced operating temperature** and increased top speed. Reduced lubrication requirements as compared to a « conventional steel » bearing.
- **Increased rigidity and longer life.**



### ■ High speed ML

- Family made up of **series 71900 and 7000**, designed and developed by SNR to meet the increasingly stringent requirements in high speed mechanization.
- **Specially designed geometry**: reduction in ball diameter, increase in number of balls and optimization of cage guidance on outer ring.
- **Different variations** according to contact angle (C for 17° and H for 25°) and preload.

### ■ High speed sealed bearing MLE

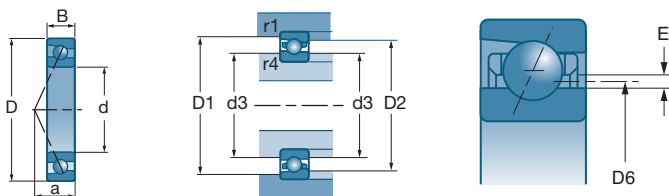
- When oil lubrication is not required and grease lubrication is sufficient, SNR has a technically appropriate solution which is also economically attractive – the MLE family of bearings, **series 71900 and 7000**.
- **With nitrile rubber seals** on the outer ring, not in contact with the inner ring, the same top speed can be attained as with an open bearing lubricated with grease.
- **Variations** according to contact angle (C for 17° and H for 25°) and preload.


## Design criteria

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Consult our machine tools catalog MachLine®.

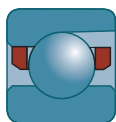
## Angular-contact bearings high precision MachLine® Range SNR (continued)



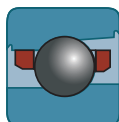
d	D	B		Kg	References	D2 max	d3 min	D1 max	r4 max	r1 max	D6	E	Balls	
													Diameter	Nb
mm	mm	mm				mm	mm	mm	mm	mm	mm	mm	mm	
10	22	6	0.010	71900	17.8	13.6	18.8	0.3	0.1	14.7	1.10	3.175	11	
	26	8	0.018	7000	21.4	14.7	22.7	0.3	0.1	16.5	1.85	4.762	10	
	30	9	0.030	7200	24.5	16.0	25.5	0.6	0.3	18.2	2.25	5.556	10	
12	24	6	0.011	71901	19.6	15.4	20.6	0.3	0.1	16.5	1.30	3.175	13	
	28	8	0.020	7001	23.4	16.7	24.7	0.3	0.1	18.5	1.65	4.762	11	
	32	10	0.037	7201	26.0	18.3	27.9	0.6	0.3	20.5	1.85	5.953	10	
15	28	7	0.015	71902	24.3	18.7	25.4	0.3	0.1	20.0	1.40	3.969	13	
	32	9	0.028	7002	26.9	20.2	28.2	0.3	0.1	22.0	1.65	4.762	13	
	35	11	0.044	7202	29.0	21.1	31.3	0.6	0.3	23.3	2.10	5.953	11	
17	30	7	0.017	71903	26.6	21.0	27.7	0.3	0.1	23.0	1.45	3.969	14	
	35	10	0.037	7003	29.4	22.7	30.7	0.3	0.1	24.4	1.75	4.762	14	
	40	12	0.065	7203	33.0	24.1	35.2	0.6	0.3	26.5	2.45	6.747	11	
20	37	9	0.036	71904	31.9	25.1	33.2	0.3	0.15	26.8	1.78	4.762	15	
	42	12	0.063	7004	35.5	26.6	37.3	0.6	0.3	29.0	2.40	6.350	13	
	47	14	0.105	7204	38.6	28.5	41.4	1.0	0.3	31.4	2.80	7.938	11	
25	42	9	0.041	71905	37.4	30.6	38.7	0.3	0.15	32.3	1.75	4.762	17	
	47	12	0.076	7005	40.1	32.2	42.3	0.6	0.3	34.2	2.05	6.350	15	
	52	15	0.128	7205	44.5	34.0	46.9	1.0	0.3	36.8	2.80	7.938	13	
30	47	9	0.047	71906	41.9	35.1	43.2	0.3	0.15	36.8	1.73	4.762	18	
	55	13	0.112	7006	47.0	38.1	49.5	1.0	0.3	40.4	2.35	7.144	16	
	62	16	0.200	7206	52.1	40.4	55.4	1.0	0.3	43.5	3.15	9.525	13	
35	55	10	0.075	71907	48.6	41.4	50.4	0.6	0.15	43.2	1.85	5.556	18	
	62	14	0.150	7007	53.1	43.2	56.3	1.0	0.3	46.0	2.85	7.938	16	
	72	17	0.290	7207	61.0	47.4	64.5	1.1	0.3	50.9	3.50	11.112	13	
40	62	12	0.110	71908	55.2	46.8	57.2	0.6	0.15	49.0	2.18	6.350	19	
	68	15	0.185	7008	59.0	49.2	61.8	1.0	0.3	51.8	2.55	7.938	18	
	80	18	0.370	7208	67.6	52.8	71.8	1.1	0.6	56.9	4.05	11.906	13	
45	68	12	0.128	71909	60.7	52.3	62.7	0.6	0.3	54.5	2.15	6.350	20	
	75	16	0.238	7009	65.0	54.7	68.6	1.0	0.3	57.5	2.85	8.731	18	
	85	19	0.416	7209	72.5	57.4	77.5	1.1	0.6	61.7	4.30	12.700	14	

# Characteristics











## ■ MachLine, high precision standard bearing for machine tools



Standard

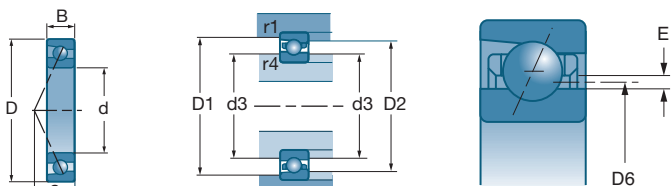


CH

 Serie C	a	 c	 c <sub>0</sub>	 rpm*	 rpm*	 Serie H	a	 c	 c <sub>0</sub>	 rpm*	 rpm*
71900 CV	5	3 050	1 520	71 000	108 000	71900 HV	7	2 900	1 450	67 000	103 000
7000 CV	6	5 700	2 750	60 000	95 000	7000 HV	8	5 500	2 650	53 000	82 000
7200 CG1	7	7 500	3 700	53 000	82 000	7200 HG1	9	7 200	3 550	46 000	72 000
71901 CV	5	3 400	1 860	64 000	97 000	71901 HV	7	3 250	1 770	61 000	93 000
7001 CV	7	6 200	3 200	54 000	85 000	7001 HV	9	6 000	3 050	48 000	72 000
7201 CG1	8	8 600	4 300	48 000	74 000	7201 HG1	10	8 300	4 200	42 000	65 000
71902 CV	6	5 100	2 850	52 000	79 000	71902 HV	9	4 850	2 750	49 000	75 000
7002 CV	8	7 000	4 000	46 000	72 000	7002 HV	10	6 700	3 850	42 000	62 000
7202 CG1	9	9 400	5 000	42 000	65 000	7202 HG1	11	9 100	4 850	37 000	57 000
71903 CV	7	5 300	3 150	46 000	70 000	71903 HV	9	5 100	3 000	44 000	68 000
7003 CV	8	7 400	4 450	41 000	65 000	7003 HV	11	7 000	4 250	37 000	56 000
7203 CG1	10	11 600	6 400	37 000	58 000	7203 HG1	13	11 200	6 200	32 000	50 000
71904 CV	8	7 700	4 900	39 000	60 000	71904 HV	11	7 300	4 650	37 000	57 000
7004 CV	10	11 800	7 100	35 000	55 000	7004 HV	13	11 300	6 800	31 000	47 000
7204 CG1	11	15 600	8 900	32 000	49 000	7204 HG1	15	15 000	8 500	28 000	43 000
71905 CV	9	8 300	5 800	33 000	50 000	71905 HV	12	7 800	5 500	31 000	47 000
7005 CV	11	13 000	8 600	30 000	47 000	7005 HV	14	12 400	8 200	26 000	40 000
7205 CG1	13	17 600	11 100	27 000	42 000	7205 HG1	16	16 900	10 600	24 000	37 000
71906 CV	10	8 400	6 300	29 000	44 000	71906 HV	13	8 000	5 900	27 000	42 000
7006 CV	12	16 700	11 700	25 000	40 000	7006 HV	16	15 900	11 200	22 000	34 000
7206 CG1	14	24 400	15 900	23 000	35 000	7206 HG1	19	23 400	15 200	20 000	31 000
71907 CV	11	11 100	8 500	25 000	38 000	71907 HV	15	10 500	8 100	23 000	36 000
7007 CV	13	21 000	15 500	23 000	35 000	7007 HV	18	20 000	14 800	21 000	31 000
7207 CG1	16	32 500	21 700	20 000	31 000	7207 HG1	21	31 000	20 700	17 000	27 000
71908 CV	13	14 700	11 800	21 000	33 000	71908 HV	18	13 900	11 100	20 000	31 000
7008 CV	15	21 600	16 800	21 000	33 000	7008 HV	20	20 500	16 000	20 000	30 000
7208 CG1	17	36 500	25 000	18 500	29 500	7208 HG1	23	35 000	24 100	16 500	25 500
71909 CV	14	15 400	10 700	20 000	30 000	71909 HV	19	14 500	10 100	18 000	26 000
7009 CV	16	27 400	19 200	19 000	28 000	7009 HV	22	26 000	18 100	18 000	24 000
7209 CG1	18	45 900	29 900	16 500	26 000	7209 HG1	25	43 800	28 500	15 000	22 500

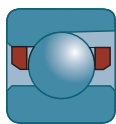
\* These are the speed limits according to the SNR concept (see pages 85 to 87).

## Angular-contact bearings high precision MachLine® Range SNR (continued)

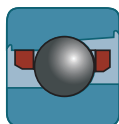


d	D	B	Kg	References	D2 max	d3 min	D1 max	r4 max	r1 max	D6	E	Balls	
												Diameter	Nb
50	72	12	0.129	71910	65.2	56.8	67.2	0.6	0.3	58.9	2.13	6.350	21
	80	16	0.256	7010	70.0	59.7	73.6	1.0	0.3	62.5	2.80	8.731	19
	90	20	0.486	7210	76.9	62.5	82.7	1.1	0.6	66.7	4.20	12.700	15
55	80	13	0.181	71911	72.5	62.1	75.8	1.0	0.3	65.4	2.25	7.144	21
	90	18	0.390	7011	80.0	65.0	84.0	1.1	0.6	69.0	2.00	9.525	19
	100	21	0.620	7211	87.0	68.0	92.5	1.5	0.6	72.5	2.10	14.288	14
60	85	13	0.195	71912	77.5	67.1	80.8	1.0	0.3	70.4	2.25	7.144	23
	95	18	0.420	7012	85.0	70.0	89.0	1.1	0.6	73.8	2.00	9.525	21
	110	22	0.810	7212	95.0	75.0	101.5	1.5	0.6	79.5	2.30	15.875	14
65	90	13	0.210	71913	82.5	72.5	86.0	1.0	0.3	74.5	1.25	7.144	27
	100	18	0.440	7013	90.0	75.0	94.0	1.1	0.6	78.8	2.00	9.525	22
	120	23	1.140	7213	104.0	81.0	109.0	1.5	0.6	87.0	2.30	15.875	15
70	100	16	0.340	71914	91.0	79.0	95.0	1.0	0.3	81.5	1.50	8.731	24
	110	20	0.610	7014	98.5	81.5	103.0	1.1	0.6	85.8	2.50	11.112	21
	125	24	1.100	7214	109.0	86.0	116.0	1.5	0.6	91.4	2.60	17.462	14
75	105	16	0.360	71915	96.0	84.0	100.0	1.0	0.3	86.3	1.50	8.731	26
	115	20	0.650	7015	103.5	86.5	108.0	1.1	0.6	90.7	2.50	11.112	22
	130	15	1.200	7215	114.0	91.0	121.0	1.5	0.6	96.4	2.60	17.462	15
80	110	16	0.380	71916	101.0	89.0	105.0	1.0	0.3	91.2	1.50	8.731	27
	125	22	0.850	7016	112.0	93.0	117.5	1.1	0.6	98.0	3.50	13.494	20
	140	26	1.470	7216	122.5	97.5	130.0	2.0	1.0	103.4	2.80	19.050	15
85	120	18	0.550	71917	110.0	95.0	114.0	1.1	0.6	98.6	1.80	9.525	27
	130	22	0.900	7017	117.0	98.0	122.5	1.1	0.6	102.8	3.50	13.494	21
	150	28	1.810	7217	131.0	104.0	140.0	2.0	1.0	110.3	3.10	20.638	15
90	125	18	0.580	71918	115.0	100.0	119.0	1.1	0.6	103.5	1.80	9.525	29
	140	24	1.160	7018	125.5	104.5	131.5	1.5	0.6	110.0	3.80	15.081	20
	160	30	2.240	7218	139.0	111.0	149.0	2.0	1.0	117.2	3.30	22.225	15
95	130	18	0.590	71919	120.0	105.0	124.0	1.1	0.6	108.3	2.00	10.319	28
	145	24	1.210	7019	130.5	109.5	136.5	1.5	0.6	114.8	3.80	15.081	21
100	140	20	0.820	71920	128.5	111.5	133.5	1.1	0.6	115.6	2.10	11.112	28
	150	24	1.270	7020	135.5	114.5	141.5	1.5	0.6	119.7	3.80	15.081	22
	180	34	3.230	7220	155.5	124.5	167.0	2.1	1.1	131.0	3.80	25.400	14











■ MachLine, high precision standard bearing for machine tools (continued)



Standard

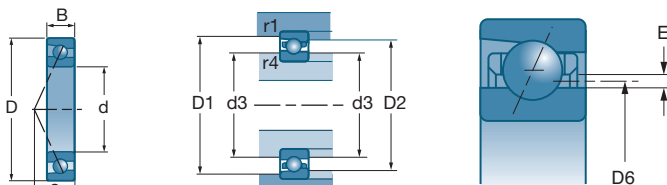


CH

 Serie C	a	 c	 C <sub>0</sub>	 rpm*	 rpm*	 Serie H	a	 c	 C <sub>0</sub>	 rpm*	 rpm*
71910 CV 7010 CV 7210 CG1	14 17 19	15 600 28 200 48 000	11 300 20 200 32 600	19 000 18 000 15 500	28 000 26 000 24 500	71910 HV 7010 HV 7210 HG1	20 23 26	14 700 26 600 45 700	10 600 19 300 30 800	16 000 14 500 13 500	24 000 22 000 20 500
71911 CV 7011 CV 7211 CG1	16 19 21	18 700 30 500 53 000	13 700 26 000 40 000	16 500 16 000 14 500	25 000 24 000 21 500	71911 HV 7011 HV 7211 HG1	22 26 29	17 600 29 000 51 000	12 900 24 900 38 000	13 500 14 000 12 500	21 500 22 000 19 500
71912 CV 7012 CV 7212 CG1	16 19 22	19 500 32 500 65 000	15 000 29 500 49 000	14 500 15 000 12 500	23 500 23 000 19 500	71912 HV 7012 HV 7212 HG1	23 27 31	18 400 30 500 62 000	14 200 28 000 47 000	13 500 14 000 11 000	20 000 21 000 17 500
71913 CV 7013 CV 7213 CG1	17 20 24	21 700 33 000 67 000	21 900 31 000 54 000	14 500 14 000 11 500	22 000 21 000 17 500	71913 HV 7013 HV 7213 HG1	25 28 33	20 400 31 500 64 000	20 400 29 500 52 000	14 000 13 000 10 000	21 000 19 000 16 500
71914 CV 7014 CV 7214 CG1	19 22 25	29 500 43 000 77 000	29 000 40 000 60 000	13 000 13 000 11 000	20 000 20 000 16 500	71914 HV 7014 HV 7214 HG1	28 31 35	28 000 40 500 73 000	27 500 37 500 57 000	12 500 12 500 9 700	19 000 19 000 15 000
71915 CV 7015 CV 7215 CG1	20 23 26	30 500 44 000 80 000	31 500 42 000 65 000	12 500 12 000 10 000	19 000 19 000 16 000	71915 HV 7015 HV 7215 HG1	29 32 36	29 000 41 500 76 000	29 500 40 000 62 000	12 000 11 000 9 100	18 000 17 000 14 500
71916 CV 7016 CV 7216 CG1	21 25 28	31 000 59 000 94 000	33 000 55 000 78 000	12 000 11 000 9 400	18 000 17 000 15 000	71916 HV 7016 HV 7216 HG1	30 35 39	29 500 56 000 89 000	30 500 53 000 74 000	11 000 10 500 8 500	17 000 16 000 13 000
71917 CV 7017 CV 7217 CG1	23 25 30	36 500 61 000 108 000	39 000 59 000 91 000	11 000 10 500 8 700	17 000 16 000 14 000	71917 HV 7017 HV 7217 HG1	33 36 41	34 500 58 000 103 000	36 500 56 000 86 000	9 900 9 900 7 800	15 000 15 000 12 000
71918 CV 7018 CV 7218 CG1	23 27 32	38 000 73 000 124 000	41 500 69 000 105 000	10 500 10 000 8 100	16 000 15 000 12 500	71918 HV 7018 HV 7218 HG1	34 39 44	35 500 69 000 118 000	39 000 66 000 100 000	9 900 9 200 7 300	15 000 14 000 11 000
71919 CV 7019 CV	24 28	43 000 74 000	47 500 73 000	9 900 9 700	15 000 14 500	71919 HV 7019 HV	35 40	40 500 71 000	44 000 69 000	9 200 8 900	14 000 13 500
71920 CV 7020 CV 7220 CG1	26 29 36	49 000 76 000 150 000	55 000 77 000 127 000	9 500 9 300 7 200	14 500 14 000 11 000	71920 HV 7020 HV 7220 HG1	38 41 50	46 000 72 000 143 000	51 000 73 000 121 000	8 600 8 600 6 400	13 000 13 000 9 800

\* These are the speed limits according to the SNR concept (see pages 85 to 87).

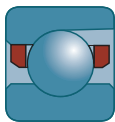
## Angular-contact bearings high precision MachLine® Range SNR (continued)



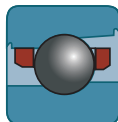
d	D	B	Kg	References	D2 max	d3 min	D1 max	r4 max	r1 max	D6	E	Balls	
												Diameter	Nb
105	145	20	0.860	71921	133.5	116.5	138.5	1.1	0.6	120.5	2.10	11.112	29
	160	26	1.610	7021	144.5	120.5	150.0	2.0	1.0	127.0	4.00	15.875	22
110	150	20	0.890	71922	138.5	121.5	143.5	1.1	0.6	125.5	2.10	11.112	30
	170	28	2.000	7022	153.0	127.0	160.0	2.0	1.0	134.0	4.50	17.462	21
	200	38	4.530	7222	172.5	137.5	185.5	2.1	1.1	145.0	4.30	28.575	14
120	165	22	1.190	71924	151.5	133.5	157.5	1.1	6.0	137.7	3.30	13.494	28
	180	28	2.150	7024	163.0	137.0	170.0	2.0	1.0	144.0	4.50	17.462	23
	215	40	5.600	7224	185.5	149.5	197.5	2.1	1.1	157.5	4.30	28.575	16
130	180	24	1.570	71926	165.0	145.0	172.0	1.5	0.6	149.8	3.70	15.081	27
	200	33	3.180	7026	179.5	150.5	189.0	2.0	1.0	158.0	5.30	20.638	21
140	190	24	1.680	71928	175.0	155.0	182.0	1.5	0.6	159.8	3.70	15.081	29
	210	33	3.420	7028	189.5	160.5	199.0	2.0	1.0	168.0	5.30	20.638	23
150	210	28	2.620	71930	192.5	167.5	199.0	2.0	1.0	174.0	4.10	16.669	29
	225	35	4.160	7030	203.0	172.0	213.0	2.1	1.0	180.0	5.70	22.225	23
160	220	28	2.760	71932	202.5	177.5	209.0	2.0	1.0	184.0	4.10	16.669	30
	240	38	5.130	7032	216.0	184.0	227.0	2.1	1.0	192.0	6.20	23.812	23
170	230	28	2.910	71934	212.5	187.5	219.0	2.0	1.0	194.0	4.10	16.669	32
	260	42	6.980	7034	232.5	197.5	246.0	2.1	1.1	206.4	6.60	25.400	23
180	250	33	4.260	71936	229.0	201.0	237.5	2.0	1.0	208.3	4.70	19.050	30
	280	46	9.000	7036	249.5	210.5	264.0	2.1	1.1	219.8	7.80	30.163	21
190	260	33	4.480	71938	239.0	211.0	247.5	2.0	1.0	218.3	4.70	19.050	32
	290	46	9.400	7038	259.5	220.5	274.0	2.1	1.1	229.8	7.80	30.163	22
200	280	38	6.160	71940	255.5	224.5	266.0	2.1	1.0	232.0	5.50	23.812	27
	310	51	12.150	7040	276.5	233.5	292.0	2.1	1.1	243.6	8.60	33.338	21
220	300	38	6.770	71944	275.5	244.5	286.0	2.1	1.0	252.0	5.50	22.225	31
	340	56	16.280	7044	304.0	256.0	321.0	3.0	1.1	268.6	8.60	33.338	23
240	320	38	7.270	71948	295.5	264.5	306.0	2.1	1.0	272.0	5.50	22.225	33



■ MachLine, high precision standard bearing for machine tools (continued)



Standard



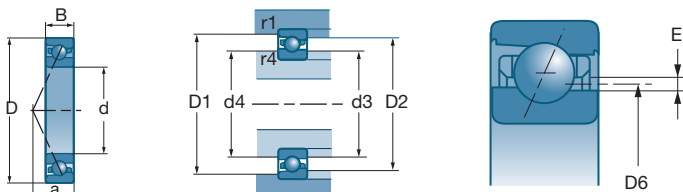
CH

Serie C	a mm	c N	C <sub>0</sub> N		
				rpm*	rpm*
71921 CV 7021 CV	27 31	50 000 84 000	57 000 86 000	9 200 8 800	14 000 13 500
71922 CV 7022 CV 7222 CG1	27 33 40	51 000 97 000 177 000	59 000 98 000 160 000	8 900 8 300 6 300	13 500 12 500 9 700
71924 CV 7024 CV 7224 CG1	30 34 42	70 000 102 000 193 000	81 000 109 000 187 000	8 200 7 700 5 700	12 500 11 500 8 700
71926 CV 7026 CV	33 39	84 000 131 000	98 000 137 000	7 500 7 000	11 500 10 500
71928 CV 7028 CV	34 40	87 000 138 000	105 000 152 000	7 200 6 600	11 000 10 000
71930 CV 7030 CV	38 43	105 000 158 000	128 000 176 000	6 500 6 200	9 000 9 300
71932 CV 7032 CV	39 46	106 000 179 000	132 000 202 000	6 200 5 800	9 400 8 800
71934 CV 7034 CV	41 50	107 000 200 000	140 000 230 000	5 800 5 400	8 900 8 100
71936 CV 7036 CV	45 54	135 000 244 000	173 000 290 000	5 400 5 000	8 300 7 600
71938 CV 7038 CV	47 55	139 000 250 000	183 000 305 000	5 200 4 800	7 900 7 300
71940 CV 7040 CV	51 60	192 000 280 000	243 000 355 000	4 800 4 500	7 400 6 900
71944 CV 7044 CV	54 66	180 000 295 000	242 000 395 000	4 400 4 100	6 800 6 200
71948 CV	57	185 000	255 000	4 200	6 400

Serie H	a mm	c N	C <sub>0</sub> N		
				rpm*	rpm*
71921 HV 7021 HV	39 44	47 000 79 000	53 000 81 000	8 600 7 900	13 000 12 000
71922 HV 7022 HV 7222 HG1	40 47 55	47 500 92 000 169 000	55 000 93 000 153 000	8 200 7 600 5 600	12 500 11 500 8 700
71924 HV 7024 HV 7224 HG1	44 49 59	66 000 96 000 184 000	76 000 103 000 178 000	7 500 6 900 5 100	11 500 10 500 7 800
71926 HV 7026 HV	48 55	79 000 124 000	92 000 130 000	6 900 6 500	10 500 9 800
71928 HV 7028 HV	50 57	82 000 130 000	98 000 144 000	6 400 6 100	9 800 9 200
71930 HV 7030 HV	56 61	99 000 149 000	120 000 167 000	5 900 5 700	9 000 8 600
71932 HV 7032 HV	58 66	100 000 169 000	123 000 191 000	5 600 5 300	8 500 8 100
71934 HV 7034 HV	61 71	103 000 189 000	131 000 218 000	5 300 5 000	8 100 7 500
71936 HV 7036 HV	67 77	127 000 231 000	161 000 275 000	4 900 4 600	7 500 7 000
71938 HV 7038 HV	69 79	131 000 237 000	171 000 290 000	4 700 4 400	7 200 6 700
71940 HV 7040 HV	75 85	181 000 265 000	229 000 335 000	4 400 4 200	6 800 6 300
71944 HV 7044 HV	77 93	170 000 280 000	226 000 375 000	4 000 3 700	6 200 5 700
71948 HV	84	174 000	238 000	3 800	5 800

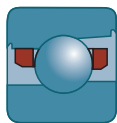
\* These are the speed limits according to the SNR concept (see pages 85 to 87).

## Angular-contact bearings high precision MachLine® Range SNR (continued)

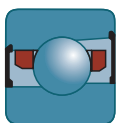


d	D	B	Kg	References	D2 max	d3 min	d4	D1 max	r4 max	r1 max	D6	E	Balls	
													Diameter	Nb
10	22	6	0.010	ML 71900	17.2	13.3	13.6	17.8	0.3	0.1	14.4	1.05	2.381	14
	26	8	0.018	ML 7000	19.5	14.2	14.7	20.1	0.3	0.1	15.7	1.53	3.175	11
12	24	6	0.011	ML 71901	19.0	15.1	15.4	19.6	0.3	0.1	16.2	1.05	2.381	14
	28	8	0.020	ML 7001	21.5	16.2	16.7	22.1	0.3	0.1	17.7	1.58	3.175	13
15	28	7	0.015	ML 71902	23.3	18.3	18.7	23.7	0.3	0.1	19.7	1.35	2.778	16
	32	9	0.028	ML 7002	25.7	19.4	20.2	26.8	0.3	0.1	21.3	1.85	3.969	13
17	30	7	0.017	ML 71903	25.6	20.6	21.0	26.0	0.3	0.1	22.0	1.35	2.778	18
	35	10	0.037	ML 7003	28.4	22.0	22.7	29.5	0.3	0.1	23.9	1.85	3.969	15
20	37	9	0.036	ML 71904	30.7	24.5	25.1	31.8	0.3	0.2	26.3	1.75	3.969	16
	42	12	0.063	ML 7004	34.3	25.3	26.6	35.7	0.6	0.3	27.9	2.63	5.556	14
25	42	9	0.041	ML 71905	36.2	30.0	30.6	37.3	0.3	0.2	31.8	1.75	3.969	19
	47	12	0.076	ML 7005	39.9	30.9	32.2	41.3	0.6	0.3	33.5	2.63	5.556	17
30	47	9	0.047	ML 71906	40.7	34.5	35.1	41.8	0.3	0.2	36.2	1.73	3.969	22
	55	13	0.112	ML 7006	45.8	36.8	38.1	47.2	1.0	0.3	39.4	2.63	5.556	20
35	55	10	0.075	ML 71907	47.1	40.8	41.4	48.2	0.6	0.2	42.7	1.90	3.969	26
	62	14	0.149	ML 7007	51.5	41.5	43.2	53.6	1.0	0.3	44.6	3.10	6.350	20
40	62	12	0.109	ML 71908	53.1	45.3	46.8	54.4	0.6	0.2	47.6	2.25	4.762	25
	68	15	0.185	ML 7008	57.5	47.5	49.2	59.6	1.0	0.3	50.5	3.00	6.350	22
45	68	12	0.128	ML 71909	58.6	50.8	52.3	59.9	0.6	0.3	53.0	2.23	4.762	28
	75	16	0.238	ML 7009	63.0	53.0	54.7	65.0	1.0	0.3	56.1	3.05	6.350	22
50	72	12	0.129	ML 71910	63.1	55.3	56.8	64.4	0.6	0.3	57.5	2.23	4.762	30
	80	16	0.256	ML 7010	68.0	58.0	59.7	70.0	1.0	0.3	61.0	3.00	6.350	25
55	80	13	0.177	ML 71911	73.5	60.5	62.5	76.5	1.0	0.3	65.0	1.28	6.350	25
	90	18	0.396	ML 7011	79.5	65.5	66.5	83.5	1.1	0.6	69.5	1.70	7.938	22
60	85	13	0.190	ML 71912	78.5	65.5	67.5	81.5	1.0	0.3	70.0	1.28	6.350	27
	95	18	0.426	ML 7012	84.5	70.5	71.5	88.5	1.1	0.6	74.4	1.67	7.938	24
65	90	13	0.202	ML 71913	83.5	70.5	72.5	86.5	1.0	0.3	75.0	1.25	6.350	29
	100	18	0.445	ML 7013	89.5	74.0	76.5	93.5	1.1	0.6	79.4	1.67	7.938	26

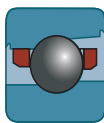
■ MachLine, high speed and precision bearing for machine tools



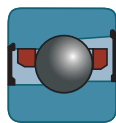
ML



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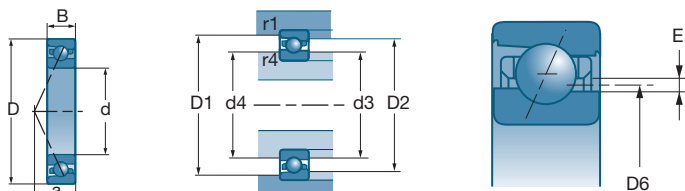
MLECH

Serie C	a mm	C N	C <sub>0</sub> N		
				rpm*	rpm*
ML 71900 CV	5	1 430	680	101 500	135 000
ML 7000 CV	6	2 040	920	94 000	125 000
ML 71901 CV	5	1 490	705	90 000	120 000
ML 7001 CV	7	2 280	1 110	82 500	110 000
ML 71902 CV	6	2 030	1 030	75 000	100 000
ML 7002 CV	8	3 450	1 710	69 000	92 000
ML 71903 CV	7	2 170	1 180	67 500	90 000
ML 7003 CV	8	3 750	2 020	61 500	82 000
ML 71904 CV	8	3 900	2 080	56 500	75 000
ML 7004 CV	10	6 550	3 600	52 500	70 000
ML 71905 CV	9	4 300	2 550	47 500	63 000
ML 7005 CV	11	7 450	4 500	44 500	59 000
ML 71906 CV	10	4 650	3 000	41 500	55 000
ML 7006 CV	12	8 300	5 150	37 500	50 000
ML 71907 CV	11	5 100	3 600	35 500	47 000
ML 7007 CV	13	10 500	6 700	33 000	44 000
ML 71908 CV	13	6 950	4 950	31 500	42 000
ML 7008 CV	15	11 000	7 500	29 500	39 000
ML 71909 CV	14	7 350	5 550	28 500	38 000
ML 7009 CV	16	10 900	7 600	27 000	36 000
ML 71910 CV	14	7 600	6 000	26 500	35 000
ML 7010 CV	17	11 700	8 700	25 000	33 000
ML 71911 CV	16	16 400	16 100	23 000	34 000
ML 7011 CV	19	23 300	21 700	22 000	30 500
ML 71912 CV	16	17 000	17 200	20 000	32 500
ML 7012 CV	19	24 400	24 000	19 000	28 500
ML 71913 CV	17	17 600	18 400	19 000	30 500
ML 7013 CV	20	25 500	26 000	18 000	27 000

Serie H	a mm	C N	C <sub>0</sub> N		
				rpm*	rpm*
ML71900 HV	7	1 360	645	94 000	125 000
ML 7000 HV	8	1 950	870	82 500	110 000
ML71901 HV	7	1 410	670	82 500	110 000
ML 7001 HV	9	2 180	1 050	75 000	100 000
ML71902 HV	9	1 930	980	67 500	90 000
ML 7002 HV	10	3 300	1 630	62 500	83 000
ML71903 HV	9	2 060	1 110	61 500	82 000
ML 7003 HV	11	3 600	1 820	55 500	74 000
ML71904 HV	11	3 700	1 970	51 000	68 000
ML 7004 HV	13	6 300	3 400	47 500	63 000
ML71905 HV	12	4 100	2 400	43 000	57 000
ML 7005 HV	14	7 100	4 050	40 000	53 000
ML71906 HV	13	4 400	2 850	37 500	50 000
ML 7006 HV	16	7 800	4 900	34 500	46 000
ML71907 HV	15	4 800	3 400	32 500	43 000
ML 7007 HV	18	10 000	6 350	30 000	40 000
ML71908 HV	18	6 550	4 650	28 500	38 000
ML 7008 HV	20	10 500	7 100	27 000	36 000
ML71909 HV	19	6 950	5 250	25 500	34 000
ML 7009 HV	22	10 300	7 200	24 000	32 000
ML71910 HV	20	7 150	5 650	24 000	32 000
ML 7010 HV	23	11 100	8 200	22 500	30 000
ML71911 HV	22	15 500	15 000	20 800	30 000
ML 7011 HV	26	22 000	20 600	19 000	27 000
ML71912 HV	24	16 000	16 100	19 000	28 700
ML 7012 HV	27	23 000	22 600	17 000	25 500
ML71913 HV	25	16 600	17 200	17 500	26 000
ML 7013 HV	28	23 900	24 400	16 000	24 500

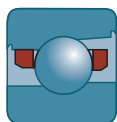
\* These are the speed limits according to the SNR concept (see pages 85 to 87).

## Angular-contact bearings high precision MachLine® Range SNR (continued)

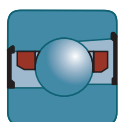


d	D	B	Kg	References	D2 max	d3 min	d4	D1 max	r4 max	r1 max	D6	E	Balls	
													Diameter	Nb
70	100	16	0.330	ML 71914	92.0	76.5	79.0	95.5	1.0	0.3	81.9	1.63	7.938	26
	110	20	0.625	ML 7014	98.0	81.5	83.0	102.5	1.1	0.6	86.4	2.07	9.525	24
75	105	16	0.349	ML 71915	97.0	81.5	84.0	100.5	1.0	0.3	86.9	1.63	7.938	28
	115	20	0.658	ML 7015	103.0	86.5	88.0	107.5	1.1	0.6	91.4	2.07	9.525	25
80	110	16	0.370	ML 71916	102.0	86.5	89.0	105.5	1.0	0.3	91.9	1.63	7.938	30
	125	22	0.874	ML 7016	111.5	93.0	94.5	116.5	1.1	0.6	98.4	2.49	11.113	23
85	120	18	0.535	ML 71917	110.0	93.0	96.0	114.0	1.1	0.6	99.2	1.94	8.731	29
	130	22	0.927	ML 7017	116.5	98.5	99.5	121.5	1.1	0.6	103.4	2.49	11.113	25
90	125	18	0.562	ML 71918	115.0	98.5	101.0	119.0	1.1	0.6	104.2	1.94	8.731	31
	140	24	1.192	ML 7018	124.5	103.0	106.5	130.0	1.5	0.6	110.5	2.64	11.906	25
95	130	18	0.591	ML 71919	120.0	103.5	106.0	124.0	1.1	0.6	109.2	1.94	8.731	32
	145	24	1.263	ML 7019	129.5	109.5	111.5	135.0	1.5	0.6	115.5	2.64	11.906	26
100	140	20	0.796	ML 71920	128.5	109.5	112.5	133.0	1.1	0.6	115.9	2.02	10.319	29
	150	24	1.313	ML 7020	134.5	114.5	116.5	140.0	1.5	0.6	120.5	2.61	11.906	27
105	160	26	1.602	ML 7021	143.0	119.0	123.0	149.0	2.0	1.0	127.5	3.02	13.494	25
110	150	20	0.868	ML 71922	138.5	119.5	122.5	143.0	1.1	0.6	125.9	1.98	10.319	32
	170	28	2.019	ML 7022	150.5	126.0	130.0	149.0	2.0	1.0	134.7	3.23	14.288	25
120	165	22	1.204	ML 71924	151.5	131.0	134.5	156.5	1.1	6.0	138.1	2.18	11.113	33
	180	28	2.167	ML 7024	160.5	136.0	140.0	167.5	2.0	1.0	144.7	3.23	14.288	27
130	180	24	1.572	ML 71926	165.0	142.0	146.0	170.5	1.5	0.6	150.0	2.56	12.700	31
	200	33	3.306	ML 7026	177.0	148.5	154.0	185.0	2.0	1.0	158.9	3.84	16.669	26

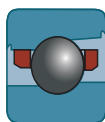
■ MachLine, high speed and precision bearing for machine tools (*continued*)



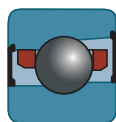
ML



MLE



MLCH



MLECH

Serie C	a mm	c N	C <sub>0</sub> N			Serie H	a mm	c N	C <sub>0</sub> N		
				rpm*	rpm*					rpm*	rpm*
ML 71914 CV	19	25 000	26 000	17 000	27 000	ML 71914 HV	28	23 700	24 300	15 000	23 500
ML 7014 CV	22	34 000	34 500	16 500	25 000	ML 7014 HV	31	32 000	32 500	15 000	21 800
ML 71915 CV	20	26 000	28 000	16 500	26 000	ML 71915 HV	29	24 600	26 000	14 000	21 700
ML 7015 CV	23	34 500	36 000	15 500	23 750	ML 7015 HV	32	32 500	34 000	13 500	21 000
ML 71916 CV	21	27 000	30 000	15 500	24 500	ML 71916 HV	30	25 500	28 000	13 700	21 000
ML 7016 CV	25	44 000	44 500	14 000	21 500	ML 7016 HV	35	41 500	42 500	12 500	19 000
ML 71917 CV	23	31 500	35 000	14 500	22 500	ML 71917 HV	33	29 500	32 500	12 500	20 000
ML 7017 CV	26	46 000	49 000	13 500	20 500	ML 7017 HV	36	43 500	46 000	11 500	18 500
ML 71918 CV	23	32 500	37 000	13 500	21 000	ML 71918 HV	34	30 500	34 500	11 700	18 700
ML 7018 CV	28	52 000	56 000	12 500	19 100	ML 7018 HV	39	49 000	53 000	10 500	17 200
ML 71919 CV	24	33 000	38 000	12 700	20 000	ML 71919 HV	35	31 000	35 500	11 000	17 700
ML 7019 CV	28	53 000	59 000	12 000	18 400	ML 7019 HV	40	50 000	55 000	10 000	16 500
ML 71920 CV	26	42 500	49 000	11 700	18 500	ML 71920 HV	38	40 000	45 500	10 500	16 700
ML 7020 CV	29	54 000	61 000	11 500	18 000	ML 7020 HV	41	51 000	57 000	9 500	15 900
ML 7021 CV	31	65 000	72 000	10 500	16 500	ML 7021 HV	44	61 000	68 000	9 000	14 900
ML 71922 CV	28	44 500	53 000	10 500	17 000	ML 71922 HV	41	42 000	50 000	9 300	14 700
ML 7022 CV	33	72 000	81 000	10 000	15 800	ML 7022 HV	47	68 000	76 000	8 500	13 900
ML 71924 CV	30	52 000	64 000	9 500	15 500	ML 71924 HV	44	49 000	60 000	8 600	13 500
ML 7024 CV	34	75 000	88 000	9 000	14 000	ML 7024 HV	49	70 000	82 000	8 000	12 500
ML 71926 CV	33	64 000	79 000	8 500	14 000	ML 71926 HV	48	60 000	73 000	7 500	11 500
ML 7026 CV	39	97 000	115 000	8 000	12 500	ML 7026 HV	55	92 000	108 000	7 000	10 500

\* These are the speed limits according to the SNR concept (see pages 85 to 87).