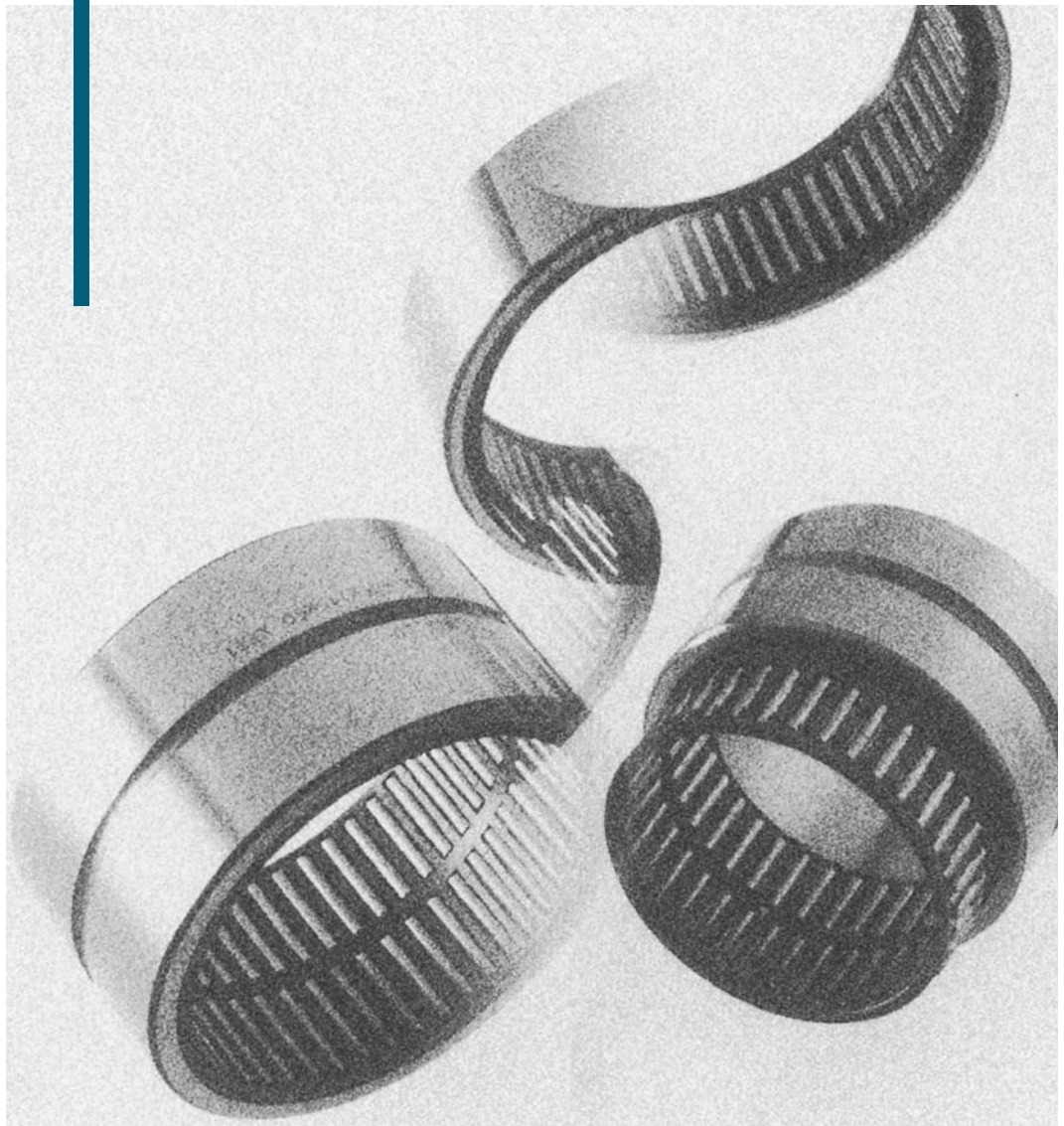


Machined Ring Needle Roller Bearings, Separable Type



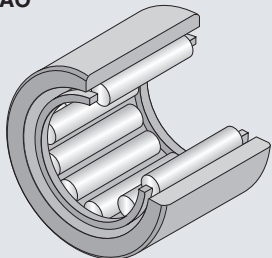
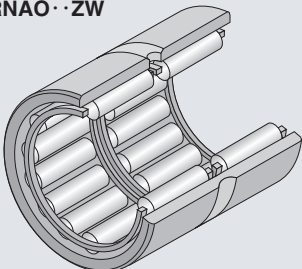
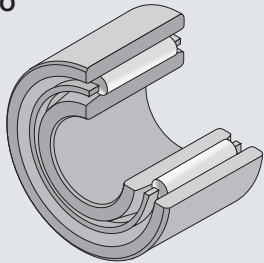
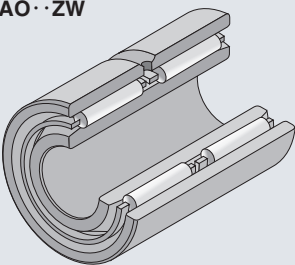
Machined Ring Needle Roller Bearings, Separable Type

The machined ring of this bearing type has no rib or side plate and, hence, the outer ring and the needle roller and cage assembly are separable from each other.

The outer ring can't regulate axial displacement of the needle roller and cage assembly and, therefore, the bearing construction must be designed so that the needle roller and cage assembly can be guided by a shaft or a housing. Furthermore, the needle roller and cage assembly can be separated from the outer ring so that the

cage and roller assembly, and the outer and the inner ring can be mounted on a shaft or a housing independent. This could facilitate the bearing mounting work.

This bearing type is suitable for an application requiring high running accuracy because the radial clearance can be selected to a narrow range by combining appropriate inner ring, outer ring and needle roller and cage assembly.

Bearing type	Applicable shaft diameter (mm)	Composition of bearing number	Remarks
Type RNAO 	$\phi 5 - \phi 100$	RNAO-10×17×10 T2 Type code Roller set bore diameter Outer diameter Width Suffix	Bearing with suffix T2 uses a polyamide resin cage and, therefore, it shall be used at allowable temperature 120°C and, under continuous running, at 100°C and less. For applications required high running accuracy, manufacture of the bearings conforming to JIS Class-6, -5 and -4 is also available on special request.
Type RNAO·ZW 	$\phi 8 - \phi 80$	[Suffix] T2 : Resin cage ZW: Double-row type	
Type NAO 	$\phi 8 - \phi 90$	NAO-10×17×10 ZW Type code Bore diameter Outer diameter Width Suffix	
Type NAO·ZW 	$\phi 10 - \phi 70$	[Suffix] T2 : Resin cage ZW: Double-row type	

Accuracy of bearing

The dimensional accuracy, profile accuracy and running accuracy of machined ring needle roller bearing, separable type (with inner ring) are specified in JIS B 1514 (Accuracy of Rolling Bearings). (Refer to **Table 4.3** of Section 4. "Bearing Tolerances" on page A-26.) Although the accuracy of NTN standard bearings conforms to JIS Class-0, NTN can also supply bearings conforming to JIS Class-6, -5 and -4. Feel free to contact NTN for the further detail of these bearings.

The dimensional tolerances for the roller inscribed circle diameters (F_w) of the bearing type without inner ring conform to ISO Tolerance Range Class-F6. The outer ring and the needle roller and cage assembly are supplied in set and, therefore, the bearing must be installed with the combination of these two in set remained unchanged.

For applications that need particularly high running accuracy, certain bearing users install the inner ring onto the shaft and then grind the raceway surface to targeted accuracy. To fulfill this type of request, NTN will supply a special inner ring whose raceway surface includes a grinding allowance. For details, contact NTN Engineering.

Radial internal clearance and bearing fits

For information about radial internal clearance of NTN machined ring needle roller bearings, separable type (with inner ring), refer to **Table 5.1** in Sec. 5.1 "Bearing radial internal clearance" (page A-30). Because of the narrow non-interchangeable clearance range, the bearings shipped after adjusted to a specific non-interchangeable clearance must be installed with the clearance remained unchanged.

The dimensional tolerances (fits) of a shaft and housing bore to which the bearing with inner ring is installed should be in accordance with type and magnitude of load, and dimensions of the shaft and housing bore. For information about the dimensional tolerances of a shaft and housing bore, refer to Sec. 6.4 "Recommended internal fits" (page A-33). For the profile accuracy and surface roughness of the shaft and housing bore corresponding to the recommended internal fits in Table 8.3 in Sec. 8.3 "Shaft and housing accuracy" (page A-40).

A bearing not having an inner ring directly uses the shaft as raceway surface, and the dimensional tolerances of the shaft diameter (raceway diameter) can vary depending on the operating internal clearance of the bearing as summarized in **Table 1** in page B-57. For this type of bearing usage, the dimensional tolerance class for the housing bore is K7, which is most commonly adopted tolerance class. When wishing to adopt a dimensional tolerance class other than K7 for the housing bore, contact NTN Engineering for technical assistance.

For the profile accuracy, surface roughness and surface hardness of the shaft that functions as raceway surface, refer to Sec. 8.4 "Raceway surface accuracy" (page A-40) and Sec. 8.5 "Material and hardness of raceway" (page A-40).

Oil hole dimension of the outer ring

The outer ring of bearing Type ZW is provided with an oil hole and an oil groove to facilitate oil lubrication to bearing.

Table 1 shows the oil hole dimension.

Table 1 Oil hole dimension

Outer ring outer diameter		Oil hole dia. (mm)	Number of oil hole
over	incl.		
—	20	2.0	1
20	40	2.5	1
40	80	3.0	1
80	200	3.5	1

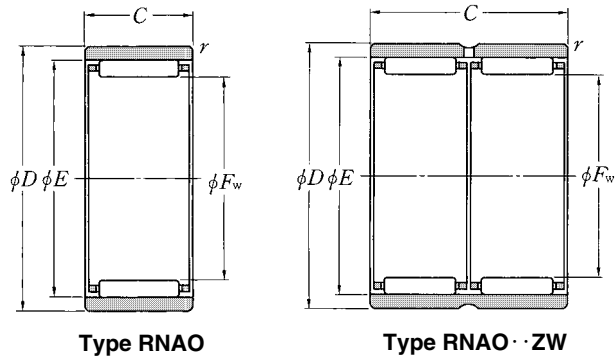
Mounting relations

The inner ring and outer ring of any machined ring needle roller bearing, separable type must be positioned in axial direction by shoulder or a snap ring.

The mounting relation dimensions about the shaft and housing bore for this case are found in the relevant dimension table. The cage must be guided by the shaft or the side face of the housing shoulder, but the guide surface must be finished by, at least, grinding for deburring.

Without inner ring

Type RNAO
Type RNAO · ZW

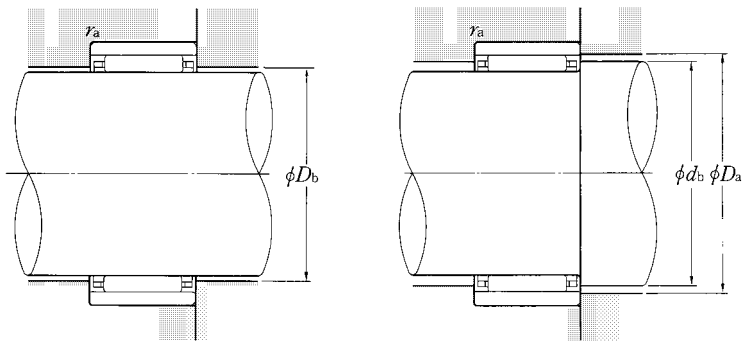


F_w 5~20mm

	Boundary dimensions				Basic load ratings				Limiting speeds		Bearing numbers										
	mm				dynamic	static	dynamic	static	min ⁻¹												
	F_w	D	C	r_s min ¹⁾	E	N	kgf	N	kgf	grease		oil									
5	+0.018 +0.010	10	8	0.15	8	2 640	2 190	269	224	27 000	40 000	RNAO- 5×10×8T2									
6	+0.018 +0.010	13	8	0.3	9	2 660	2 280	272	233	25 000	37 000	RNAO- 6×13×8T2									
7	+0.022 +0.013	14	8	0.3	10	2 670	2 350	272	239	23 000	34 000	RNAO- 7×14×8T2									
8	+0.022 +0.013	15	10	0.3	11	4 000	4 100	410	420	21 000	32 000	RNAO -8×15×10T2 RNAO- 8×16×20ZWT2									
													16	20	0.3	12	7 950	8 350	810	850	21 000
10	+0.022 +0.013	17	10	0.3	13	4 550	5 100	460	520	19 000	28 000	RNAO-10×17×10T2 RNAO-10×20×12									
													20	12	0.3	16	7 100	5 950	720	610	19 000
12	+0.027 +0.016	19	13.5	0.3	15	6 000	7 700	615	785	17 000	26 000	RNAO-12×19×13.5 RNAO-12×22×12									
													22	12	0.3	18	8 650	8 000	880	815	17 000
14	+0.027 +0.016	22	13	0.3	18	8 300	10 100	845	1 030	16 000	24 000	RNAO-14×22×13 RNAO-14×22×20ZW RNAO-14×26×12									
			20										0.3	18	11 800	16 000	1 210	1 630	16 000	24 000	
			26										12	0.3	20	9 350	9 150	955	930	16 000	24 000
15	+0.027 +0.016	23	13	0.3	19	8 250	10 200	840	1 040	15 000	23 000	RNAO-15×23×13 RNAO-15×23×20ZW									
			20										0.3	19	11 700	16 100	1 200	1 640	15 000	23 000	
16	+0.027 +0.016	24	13	0.3	20	9 050	11 800	925	1 200	15 000	23 000	RNAO-16×24×13 RNAO-16×24×20ZW RNAO-16×28×12									
			20										0.3	20	12 900	18 500	1 310	1 890	15 000	23 000	
			28										12	0.3	22	11 700	12 500	1 190	1 280	15 000	23 000
17	+0.027 +0.016	25	13	0.3	21	9 400	12 600	960	1 280	15 000	22 000	RNAO-17×25×13 RNAO-17×25×20ZW RNAO-17×25×26ZW									
			20										0.3	21	12 800	18 600	1 300	1 900	15 000	22 000	
			26										0.3	21	16 100	25 200	1 640	2 570	15 000	22 000	
18	+0.027 +0.016	26	13	0.3	22	8 900	11 900	910	1 210	14 000	21 000	RNAO-18×26×13 RNAO-18×26×20ZW RNAO-18×30×12 RNAO-18×30×24ZW									
			20										0.3	22	12 700	18 800	1 290	1 910	14 000	21 000	
			30										12	0.3	24	12 300	13 800	1 250	1 410	14 000	21 000
			30										24	0.3	24	21 100	27 700	2 150	2 820	14 000	21 000
20	+0.033 +0.020	28	13	0.3	24	10 000	14 300	1 020	1 460	13 000	20 000	RNAO-20×28×13 RNAO-20×28×26ZW RNAO-20×32×12									
			26										0.3	24	17 100	28 600	1 750	2 910	13 000	20 000	
			32										12	0.3	26	12 900	15 100	1 320	1 540	13 000	20 000

Note 1) Allowable minimum chamfer dimension r_s .

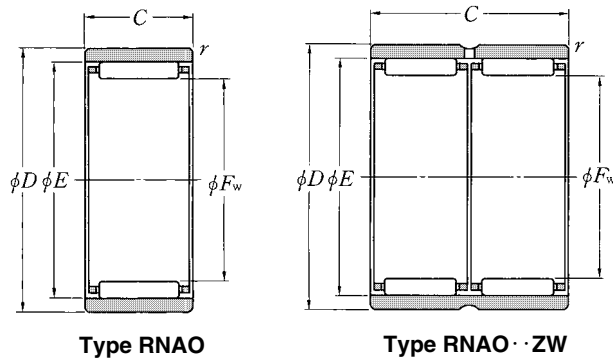
2) Max. allowable dimension of radius r_a for corner roundness on shaft/housing.



d_b	Abutment dimensions mm			Mass kg (approx.)
	D_a max	D_b	$r_{as}^{(2)}$ max	
7.7	8.8	5.3	0.15	0.003
8.7	11	6.3	0.3	0.006
9.7	12	7.3	0.3	0.006
10.7	13	8.3	0.3	0.008
11.7	14	8.3	0.3	0.017
12.7	15	10.3	0.3	0.010
15.7	18	10.3	0.3	0.018
14.7	17	12.3	0.3	0.015
17.6	20	12.3	0.3	0.019
17.6	20	14.4	0.3	0.018
17.6	20	14.4	0.3	0.027
19.6	24	14.4	0.3	0.029
18.6	21	15.4	0.3	0.020
18.6	21	15.4	0.3	0.031
19.6	22	16.4	0.3	0.021
19.6	22	16.4	0.3	0.032
21.6	26	16.4	0.3	0.032
20.6	23	17.4	0.3	0.022
20.6	23	17.4	0.3	0.034
20.6	23	17.4	0.3	0.044
21.6	24	18.4	0.3	0.022
21.6	24	18.4	0.3	0.033
23.6	28	18.4	0.3	0.035
23.6	28	18.4	0.3	0.069
23.6	26	20.4	0.3	0.025
23.6	26	20.4	0.3	0.050
25.6	30	20.4	0.3	0.038

Without inner ring

Type RNAO
Type RNAO · ZW

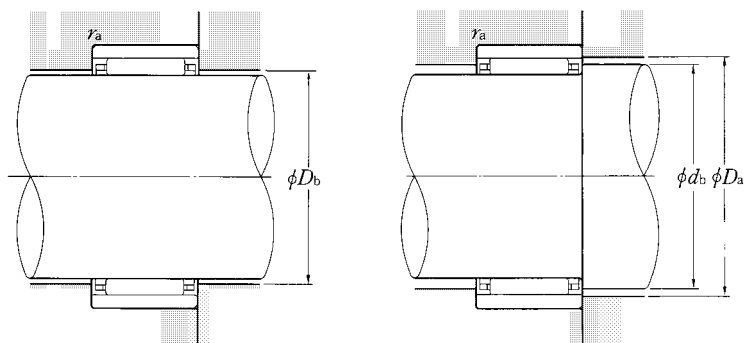


F_w 20~40mm

	Boundary dimensions					Basic load ratings				Limiting speeds		Bearing numbers
	mm					dynamic	static	dynamic	static	grease	oil	
	F_w	D	C	$r_s \min^1)$	E	N		kgf				
					C_r	C_{or}	C_r	C_{or}				
20	$\begin{matrix} +0.033 \\ +0.020 \end{matrix}$	32	24	0.3	26	22 100	30 000	2 260	3 100	13 000	20 000	RNAO-20×32×24ZW
22	$\begin{matrix} +0.033 \\ +0.020 \end{matrix}$	30	13	0.3	26	10 200	15 200	1 040	1 550	12 000	18 000	RNAO-22×30×13
		30	26	0.3	26	17 500	30 500	1 790	3 100	12 000	18 000	RNAO-22×30×26ZW
		35	16	0.3	29	18 700	22 700	1 910	2 310	12 000	18 000	RNAO-22×35×16
		35	32	0.3	29	32 000	45 500	3 300	4 650	12 000	18 000	RNAO-22×35×32ZW
25	$\begin{matrix} +0.033 \\ +0.020 \end{matrix}$	35	17	0.3	29	14 200	24 000	1 450	2 450	11 000	16 000	RNAO-25×35×17
		35	26	0.3	29	18 400	33 500	1 880	3 450	11 000	16 000	RNAO-25×35×26ZW
		37	16	0.3	32	19 500	24 700	1 990	2 520	11 000	16 000	RNAO-25×37×16
		37	32	0.3	32	33 500	49 500	3 400	5 050	11 000	16 000	RNAO-25×37×32ZW
26	$\begin{matrix} +0.033 \\ +0.020 \end{matrix}$	39	13	0.3	30	11 800	19 200	1 200	1 960	10 000	15 000	RNAO-26×39×13
28	$\begin{matrix} +0.033 \\ +0.020 \end{matrix}$	40	16	0.3	35	21 200	28 400	2 160	2 900	9 500	14 000	RNAO-28×40×16
		40	32	0.3	35	36 500	57 000	3 700	5 800	9 500	14 000	RNAO-28×40×32ZW
30	$\begin{matrix} +0.033 \\ +0.020 \end{matrix}$	40	17	0.3	35	19 400	32 500	1 970	3 350	9 000	13 000	RNAO-30×40×17
		40	26	0.3	35	25 200	46 000	2 570	4 650	9 000	13 000	RNAO-30×40×26ZW
		42	16	0.3	37	21 900	30 500	2 230	3 100	9 000	13 000	RNAO-30×42×16
		42	32	0.3	37	37 500	60 500	3 850	6 200	9 000	13 000	RNAO-30×42×32ZW
32	$\begin{matrix} +0.041 \\ +0.025 \end{matrix}$	42	13	0.3	37	14 500	23 000	1 480	2 350	8 500	13 000	RNAO-32×42×13
35	$\begin{matrix} +0.041 \\ +0.025 \end{matrix}$	45	13	0.3	40	15 200	25 100	1 550	2 560	7 500	11 000	RNAO-35×45×13
		45	17	0.3	40	20 000	36 000	2 040	3 650	7 500	11 000	RNAO-35×45×17
		45	26	0.3	40	26 100	50 000	2 660	5 100	7 500	11 000	RNAO-35×45×26ZW
		47	16	0.3	42	24 100	36 000	2 450	3 650	7 500	11 000	RNAO-35×47×16
		47	18	0.3	42	24 700	37 000	2 510	3 750	7 500	11 000	RNAO-35×47×18
		47	32	0.3	42	41 500	71 500	4 200	7 300	7 500	11 000	RNAO-35×47×32ZW
37	$\begin{matrix} +0.041 \\ +0.025 \end{matrix}$	47	13	0.3	42	15 900	27 100	1 620	2 770	7 000	11 000	RNAO-37×47×13
		52	18	0.3	44	26 300	41 000	2 680	4 150	7 000	11 000	RNAO-37×52×18
40	$\begin{matrix} +0.041 \\ +0.025 \end{matrix}$	50	17	0.3	45	21 800	41 500	2 220	4 250	6 500	10 000	RNAO-40×50×17
		50	34	0.3	45	37 500	83 000	3 800	8 500	6 500	10 000	RNAO-40×50×34ZW
		55	20	0.3	47	31 000	51 500	3 150	5 250	6 500	10 000	RNAO-40×55×20

Note 1) Allowable minimum chamfer dimension r_s .

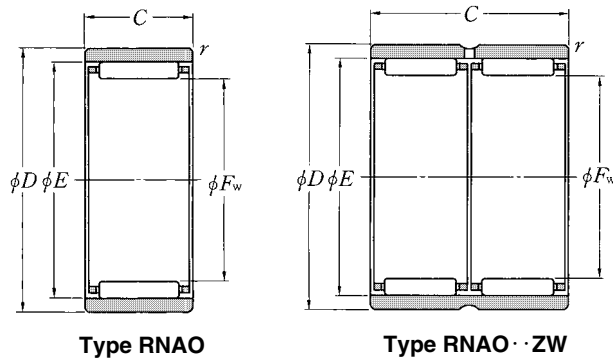
2) Max. allowable dimension of radius r_a for corner roundness on shaft/housing.



d_b	Abutment dimensions mm			Mass kg (approx.)
	D_a max	D_b	$r_{as}^{(2)}$ max	
25.6	30	20.4	0.3	0.080
25.6	28	22.4	0.3	0.027
25.6	28	22.4	0.3	0.054
28.4	33	22.4	0.3	0.059
28.4	33	22.4	0.3	0.118
28.4	33	25.6	0.3	0.053
28.4	33	25.6	0.3	0.076
31.4	35	25.6	0.3	0.060
31.4	35	25.6	0.3	0.119
29.4	37	26.6	0.3	0.060
34.4	38	28.6	0.3	0.061
34.4	38	28.6	0.3	0.122
34.4	38	30.6	0.3	0.060
34.4	38	30.6	0.3	0.094
36.4	40	30.6	0.3	0.069
36.4	40	30.6	0.3	0.137
36.4	40	32.6	0.3	0.049
39.4	43	35.6	0.3	0.053
39.4	43	35.6	0.3	0.069
39.4	43	35.6	0.3	0.091
41.4	45	35.6	0.3	0.078
41.4	45	35.6	0.3	0.089
41.4	45	35.6	0.3	0.156
41.4	45	37.6	0.3	0.056
43.4	50	37.6	0.3	0.125
44.4	48	40.6	0.3	0.074
44.4	48	40.6	0.3	0.152
46.2	53	40.6	0.3	0.145

Without inner ring

Type RNAO
Type RNAO · ZW

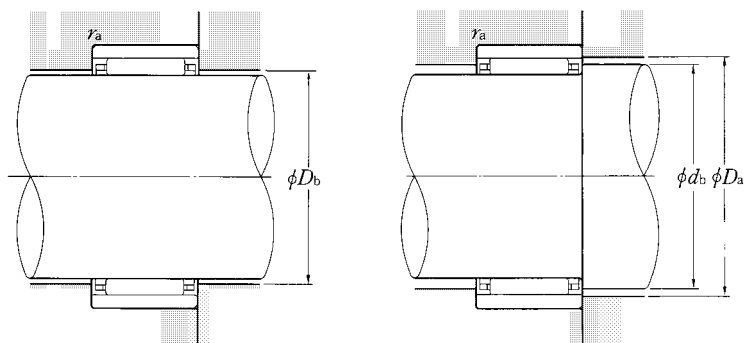


F_w 40~85mm

	Boundary dimensions					Basic load ratings				Limiting speeds		Bearing numbers
	mm					dynamic	static	dynamic	static	grease	oil	
	F_w	D	C	$r_s \min^1)$	E	N		kgf				
					C_r	C_{or}	C_r	C_{or}				
40	$+0.041$ $+0.025$	55	40	0.3	48	56 500	102 000	5 750	10 400	6 500	10 000	RNAO-40 × 55 × 40ZW
45	$+0.041$ $+0.025$	55	17	0.3	50	22 300	44 500	2 280	4 550	6 000	9 000	RNAO-45 × 55 × 17
		55	34	0.3	50	38 500	89 500	3 900	9 100	6 000	9 000	RNAO-45 × 55 × 34ZW
		62	20	0.3	53	36 000	59 000	3 650	6 000	6 000	9 000	RNAO-45 × 62 × 20
		62	40	0.3	53	61 500	118 000	6 250	12 000	6 000	9 000	RNAO-45 × 62 × 40ZW
50	$+0.041$ $+0.025$	62	20	0.3	55	27 900	62 000	2 850	6 300	5 500	8 000	RNAO-50 × 62 × 20
		62	40	0.3	55	48 000	124 000	4 900	12 600	5 500	8 000	RNAO-50 × 62 × 40ZW
		65	20	0.3	58	38 500	67 500	3 950	6 850	5 500	8 000	RNAO-50 × 65 × 20
		65	40	0.6	58	66 500	135 000	6 750	13 700	5 500	8 000	RNAO-50 × 65 × 40ZW
55	$+0.049$ $+0.030$	68	20	0.6	60	28 800	66 500	2 940	6 750	4 800	7 500	RNAO-55 × 68 × 20
		68	25	0.6	63	50 500	97 500	5 150	9 950	4 800	7 500	RNAO-55 × 68 × 25
		68	40	0.6	60	49 500	133 000	5 050	13 500	4 800	7 500	RNAO-55 × 68 × 40ZW
		72	20	0.6	63	39 000	70 000	3 950	7 100	4 800	7 500	RNAO-55 × 72 × 20
60	$+0.049$ $+0.030$	72	40	0.6	63	66 500	140 000	6 800	14 200	4 800	7 500	RNAO-55 × 72 × 40ZW
		75	46	1	68	76 000	170 000	7 750	17 400	4 400	6 500	RNAO-60 × 75 × 46ZW
		78	20	1	68	40 000	75 000	4 100	7 650	4 400	6 500	RNAO-60 × 78 × 20
65	$+0.049$ $+0.030$	78	40	1	68	69 000	150 000	7 050	15 300	4 400	6 500	RNAO-60 × 78 × 40ZW
		85	30	1	73	61 000	132 000	6 200	13 400	4 100	6 000	RNAO-65 × 85 × 30
70	$+0.049$ $+0.030$	85	60	1	73	104 000	263 000	10 600	26 800	4 100	6 000	RNAO-65 × 85 × 60ZW
		90	30	1	78	65 500	149 000	6 700	15 200	3 800	5 500	RNAO-70 × 90 × 30
75	$+0.049$ $+0.030$	90	60	1	78	112 000	297 000	11 500	30 500	3 800	5 500	RNAO-70 × 90 × 60ZW
		95	30	1	83	67 500	157 000	6 850	16 100	3 600	5 500	RNAO-75 × 95 × 30
80	$+0.049$ $+0.030$	95	60	1	83	115 000	315 000	11 800	32 000	3 600	5 500	RNAO-75 × 95 × 60ZW
		95	30	1	86	57 000	159 000	5 800	16 200	3 300	5 000	RNAO-80 × 95 × 30
		95	56	1	88	105 000	284 000	10 700	29 000	3 300	5 000	RNAO-80 × 95 × 56ZW
		100	30	1	88	69 000	166 000	7 050	17 000	3 300	5 000	RNAO-80 × 100 × 30
85	$+0.058$ $+0.036$	100	60	1	88	119 000	335 000	12 100	34 000	3 300	5 000	RNAO-80 × 100 × 60ZW
		105	25	1	93	61 500	146 000	6 250	14 900	3 100	4 700	RNAO-85 × 105 × 25

Note 1) Allowable minimum chamfer dimension r_s .

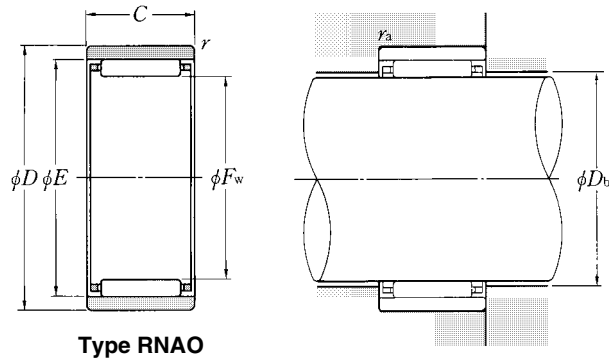
2) Max. allowable dimension of radius r_a for corner roundness on shaft/housing.



d_b	Abutment dimensions			Mass kg (approx.)
	D_a max	D_b	$r_{as}^{(2)}$ max	
47.2	53	40.6	0.3	0.275
49.2	53	45.6	0.3	0.083
49.2	53	45.6	0.3	0.165
52.2	60	45.6	0.3	0.175
52.2	60	45.6	0.3	0.377
54.2	60	50.6	0.3	0.140
54.2	60	50.6	0.3	0.295
57.2	63	50.6	0.3	0.168
57.2	61	50.6	0.6	0.355
59.4	64	55.8	0.6	0.166
62.4	64	55.8	0.6	0.200
59.4	64	55.8	0.6	0.310
62.4	68	55.8	0.6	0.216
62.4	68	55.8	0.6	0.425
67.2	70	60.8	1	0.461
67.2	73	60.8	1	0.255
67.2	73	60.8	1	0.500
72.2	80	66	1	0.464
72.2	80	66	1	0.951
77.2	85	71	1	0.499
77.2	85	71	1	1.00
82.2	90	76	1	0.520
82.2	90	76	1	1.04
85.2	90	81	1	0.405
87.2	90	81	1	0.755
87.2	95	81	1	0.580
87.2	95	81	1	1.10
92.2	100	86	1	0.459

Without inner ring

Type RNAO

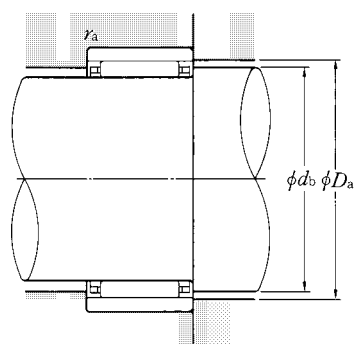


F_w 85~100mm

Boundary dimensions					Basic load ratings				Limiting speeds		Bearing numbers	
mm					dynamic	static	dynamic	static	grease	oil		
F_w	D	C	$r_s \min^1)$	E	N		kgf				min ⁻¹	
					C_r	C_{or}	C_r	C_{or}				
85	$\begin{matrix} +0.058 \\ +0.036 \end{matrix}$	105	30	1	93	71 000	175 000	7 200	17 900	3 100	4 700	RNAO- 85×105×30
90	$\begin{matrix} +0.058 \\ +0.036 \end{matrix}$	105	26	1	98	64 000	157 000	6 550	16 000	3 000	4 400	RNAO- 90×105×26
		110	30	1	98	72 500	184 000	7 400	18 800	3 000	4 400	RNAO- 90×110×30
95	$\begin{matrix} +0.058 \\ +0.036 \end{matrix}$	115	30	1	103	74 000	193 000	7 550	19 600	2 800	4 200	RNAO- 95×115×30
100	$\begin{matrix} +0.058 \\ +0.035 \end{matrix}$	120	30	1	108	76 000	201 000	7 700	20 500	2 700	4 000	RNAO-100×120×30

Note 1) Allowable minimum chamfer dimension r .

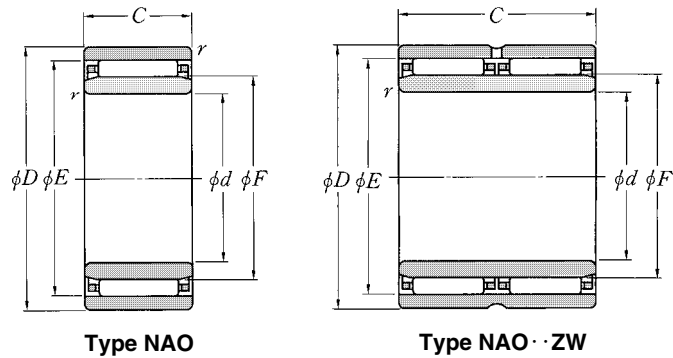
2) Max. allowable dimension of radius r_a for corner roundness on shaft/housing.



d_b	Abutment dimensions mm			Mass kg (approx.)
	D_a max	D_b	$r_{as}^{2)}$ max	
92.2	100	86	1	0.585
97.2	100	91	1	0.373
97.2	105	91	1	0.610
102.2	110	96	1	0.640
107.2	115	101	1	0.694

With inner ring

Type NAO
Type NAO · · ZW

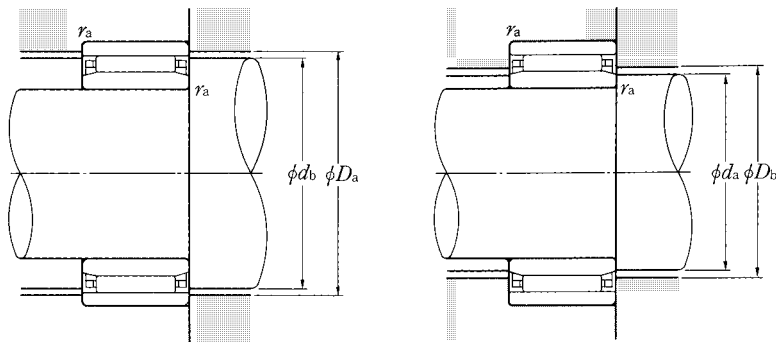


d 6~30mm

Boundary dimensions						Basic load ratings				Limiting speeds		Bearing numbers
mm						dynamic	static	dynamic	static	grease	oil	
d	D	C	r _{s min} ¹⁾	F	E	N		kgf				min ⁻¹
						C _r	C _{or}	C _r	C _{or}			
6	17	10	0.3	10	13	4 550	5 100	460	520	19 000	28 000	NAO- 6×17×10T2
7	20	12	0.3	10	16	7 100	5 950	720	610	19 000	28 000	NAO- 7×20×12
9	22	12	0.3	12	18	8 650	8 000	880	815	17 000	26 000	NAO- 9×22×12
10	22	13	0.3	14	18	8 300	10 100	845	1 030	16 000	24 000	NAO-10×22×13
	22	20	0.3	14	18	11 800	16 000	1 210	1 630	16 000	24 000	NAO-10×22×20ZW
	26	12	0.3	14	20	9 350	9 150	955	930	16 000	24 000	NAO-10×26×12
12	24	13	0.3	16	20	9 050	11 800	925	1 200	15 000	23 000	NAO-12×24×13
	24	20	0.3	16	20	12 900	18 500	1 310	1 890	15 000	23 000	NAO-12×24×20ZW
	28	12	0.3	16	22	11 700	12 500	1 190	1 280	15 000	23 000	NAO-12×28×12
15	28	13	0.3	20	24	10 000	14 300	1 020	1 460	13 000	20 000	NAO-15×28×13
	28	26	0.3	20	24	17 100	28 600	1 750	2 910	13 000	20 000	NAO-15×28×26ZW
	32	12	0.3	20	26	12 900	15 100	1 320	1 540	13 000	20 000	NAO-15×32×12
17	30	13	0.3	22	26	10 200	15 200	1 040	1 550	12 000	18 000	NAO-17×30×13
	30	26	0.3	22	26	17 500	30 500	1 790	3 100	12 000	18 000	NAO-17×30×26ZW
	35	16	0.3	22	29	18 700	22 700	1 910	2 310	12 000	18 000	NAO-17×35×16
	35	32	0.3	22	29	32 000	45 500	3 300	4 650	12 000	18 000	NAO-17×35×32ZW
20	35	17	0.3	25	29	14 200	24 000	1 450	2 450	11 000	16 000	NAO-20×35×17
	35	26	0.3	25	29	18 400	33 500	1 880	3 450	11 000	16 000	NAO-20×35×26ZW
	37	16	0.3	25	32	19 500	24 700	1 990	2 520	11 000	16 000	NAO-20×37×16
	37	32	0.3	25	32	33 500	49 500	3 400	5 050	11 000	16 000	NAO-20×37×32ZW
25	40	17	0.3	30	35	19 400	32 500	1 970	3 350	9 000	13 000	NAO-25×40×17
	40	26	0.3	30	35	25 200	46 000	2 570	4 650	9 000	13 000	NAO-25×40×26ZW
	42	16	0.3	30	37	21 900	30 500	2 230	3 100	9 000	13 000	NAO-25×42×16
	42	32	0.3	30	37	37 500	60 500	3 850	6 200	9 000	13 000	NAO-25×42×32ZW
29	42	13	0.3	32	37	14 500	23 000	1 480	2 350	8 500	13 000	NAO-29×42×13
30	45	13	0.3	35	40	15 200	25 100	1 550	2 560	7 500	11 000	NAO-30×45×13
	45	17	0.3	35	40	20 000	36 000	2 040	3 650	7 500	11 000	NAO-30×45×17
	45	26	0.3	35	40	26 100	50 000	2 660	5 100	7 500	11 000	NAO-30×45×26ZW

Note 1) Allowable minimum chamfer dimension r.

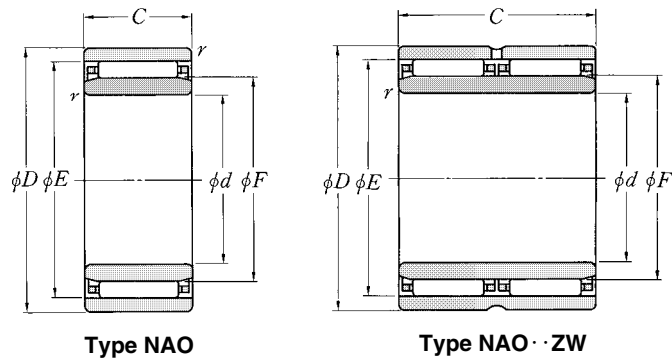
2) Max. allowable dimension of radius r_a for corner roundness on shaft/housing.



d_a min	Abutment dimensions mm				$r_{as}^{(2)}$ max	Mass kg (approx.)
	d_b	D_a max	D_b			
8	12.7	15	10.3	0.3	0.014	
9	15.7	18	10.3	0.3	0.022	
11	17.6	20	12.3	0.3	0.024	
12	17.6	20	14.4	0.3	0.026	
12	17.6	20	14.4	0.3	0.039	
12	19.6	24	14.4	0.3	0.036	
14	19.6	22	16.4	0.3	0.030	
14	19.6	22	16.4	0.3	0.044	
14	21.6	26	16.4	0.3	0.040	
17	23.6	26	20.4	0.3	0.029	
17	23.6	26	20.4	0.3	0.075	
17	25.6	30	20.4	0.3	0.050	
19	25.6	28	22.4	0.3	0.042	
19	25.6	28	22.4	0.3	0.081	
19	28.4	33	22.4	0.3	0.078	
19	28.4	33	22.4	0.3	0.148	
22	28.4	33	25.6	0.3	0.076	
22	28.4	33	25.6	0.3	0.112	
22	31.4	35	25.6	0.3	0.082	
22	31.4	35	25.6	0.3	0.155	
27	34.4	38	30.6	0.3	0.088	
27	34.4	38	30.6	0.3	0.130	
27	36.4	40	30.6	0.3	0.086	
27	36.4	40	30.6	0.3	0.190	
31	36.4	40	32.6	0.3	0.062	
32	39.4	43	35.6	0.3	0.077	
32	39.4	43	35.6	0.3	0.102	
32	39.4	43	35.6	0.3	0.157	

With inner ring

Type NAO
Type NAO · ZW

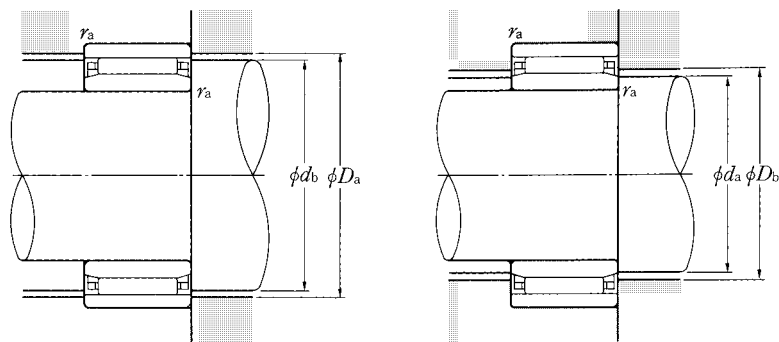


d 30~65mm

Boundary dimensions						Basic load ratings				Limiting speeds		Bearing numbers
mm						dynamic	static	dynamic	static	min ⁻¹		
d	D	C	r _{s min} ¹⁾	F	E	N		kgf		grease	oil	
						C _r	C _{or}	C _r	C _{or}			
30	47	16	0.3	35	42	24 100	36 000	2 450	3 650	7 500	11 000	NAO-30×47×16
	47	18	0.3	35	42	24 700	37 000	2 510	3 750	7 500	11 000	NAO-30×47×18
	47	32	0.3	35	42	41 500	71 500	4 200	3 700	7 500	11 000	NAO-30×47×32ZW
	52	18	0.3	37	44	26 300	41 000	2 680	4 150	7 000	11 000	NAO-30×52×18
33	47	13	0.3	37	42	15 900	27 100	1 620	2 770	7 000	11 000	NAO-33×47×13
35	50	17	0.3	40	45	21 800	41 500	2 220	4 250	6 500	10 000	NAO-35×50×17
	50	34	0.3	40	45	37 500	83 000	3 800	8 500	6 500	10 000	NAO-35×50×34ZW
	55	20	0.3	40	47	31 000	51 500	3 150	5 250	6 500	10 000	NAO-35×55×20
	55	40	0.3	40	48	56 500	102 000	5 750	10 400	6 500	10 000	NAO-35×55×40ZW
40	55	17	0.3	45	50	22 300	44 500	2 280	4 550	6 000	9 000	NAO-40×55×17
	55	34	0.3	45	50	38 500	89 500	3 900	9 100	6 000	9 000	NAO-40×55×34ZW
	62	20	0.3	45	53	36 000	59 000	3 650	6 000	6 000	9 000	NAO-40×62×20
	62	40	0.3	45	53	61 500	118 000	6 250	12 000	6 000	9 000	NAO-40×62×40ZW
	65	20	0.3	50	58	38 500	67 500	3 950	6 850	5 500	8 000	NAO-40×65×20
45	62	20	0.3	50	55	27 900	62 000	2 850	6 300	5 500	8 000	NAO-45×62×20
	62	40	0.3	50	55	48 000	124 000	4 900	12 600	5 500	8 000	NAO-45×62×40ZW
	72	20	0.6	55	63	39 000	70 000	3 950	7 100	4 800	7 500	NAO-45×72×20
	72	40	0.6	55	63	66 500	140 000	6 800	14 200	4 800	7 500	NAO-45×72×40ZW
50	68	20	0.6	55	60	28 800	66 500	2 940	6 750	4 800	7 500	NAO-50×68×20
	68	40	0.6	55	60	49 500	133 000	5 050	13 500	4 800	7 500	NAO-50×68×40ZW
	78	20	1	60	68	40 000	75 000	4 100	7 650	4 400	6 500	NAO-50×78×20
	78	40	1	60	68	69 000	150 000	7 050	15 300	4 400	6 500	NAO-50×78×40ZW
55	85	30	1	65	73	61 000	132 000	6 200	13 400	4 100	6 000	NAO-55×85×30
	85	60	1	65	73	104 000	263 000	10 600	26 800	4 100	6 000	NAO-55×85×60ZW
60	90	30	1	70	78	65 500	149 000	6 700	15 200	3 800	5 500	NAO-60×90×30
	90	60	1	70	78	112 000	297 000	11 500	30 500	3 800	5 500	NAO-60×90×60ZW
65	95	30	1	75	83	67 500	157 000	6 850	16 100	3 600	5 500	NAO-65×95×30
	95	60	1	75	83	115 000	315 000	11 800	32 000	3 600	5 500	NAO-65×95×60ZW

Note 1) Allowable minimum chamfer dimension r.

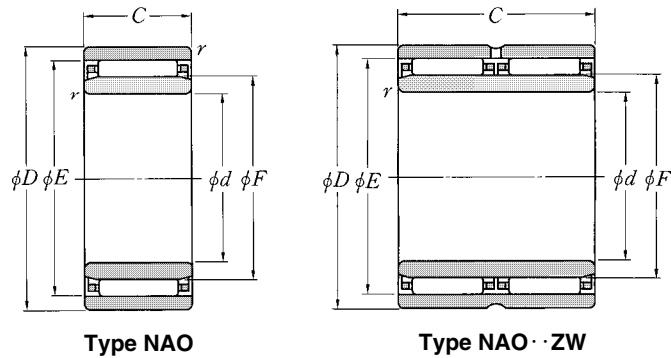
2) Max. allowable dimension of radius r_a for corner roundness on shaft/housing.



d_a min	Abutment dimensions mm				$r_{as}^{(2)}$ max	Mass kg (approx.)
	d_b	D_a max	D_b			
32	41.4	45	35.6	0.3	0.109	
32	41.4	45	35.6	0.3	0.119	
32	41.4	45	35.6	0.3	0.205	
32	43.4	50	37.6	0.3	0.177	
35	41.4	45	37.6	0.3	0.085	
37	44.4	48	40.6	0.3	0.113	
37	44.4	48	40.6	0.3	0.225	
37	46.2	53	40.6	0.3	0.190	
37	47.2	53	40.6	0.3	0.360	
42	49.2	53	45.6	0.3	0.127	
42	49.2	53	45.6	0.3	0.250	
42	52.2	60	45.6	0.3	0.230	
42	52.2	60	45.6	0.3	0.385	
42	57.2	63	50.6	0.3	0.279	
47	54.2	60	50.6	0.3	0.192	
47	54.2	60	50.6	0.3	0.385	
49	62.4	68	55.8	0.6	0.335	
49	62.4	68	55.8	0.6	0.660	
54	59.4	64	55.8	0.6	0.230	
54	59.4	64	55.8	0.6	0.440	
55	67.2	73	60.8	1	0.410	
55	67.2	73	60.8	1	0.755	
60	72.2	80	66	1	0.680	
60	72.2	80	66	1	1.35	
65	77.2	85	71	1	0.720	
65	77.2	85	71	1	1.45	
70	82.2	90	76	1	0.770	
70	82.2	90	76	1	1.54	

With inner ring

Type NAO
Type NAO··ZW

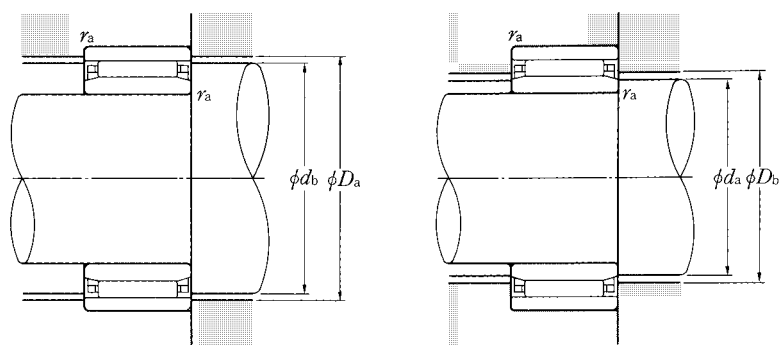


d 70~90mm

Boundary dimensions						Basic load ratings				Limiting speeds		Bearing numbers
mm						dynamic	static	dynamic	static	grease	oil	
d	D	C	r _{s min} ¹⁾	F	E	N	N	kgf	kgf			min ⁻¹
						C _r	C _{or}	C _r	C _{or}			
70	95	30	1	80	86	57 000	159 000	5 800	16 200	3 300	5 000	NAO-70× 95× 30
	95	56	1	80	88	105 000	284 000	10 700	29 000	3 300	5 000	NAO-70× 95× 56ZW
	100	30	1	80	88	69 000	166 000	7 050	17 000	3 300	5 000	NAO-70× 100× 30
	100	60	1	80	88	119 000	335 000	12 100	34 000	3 300	5 000	NAO-70× 100× 60ZW
75	105	25	1	85	93	61 500	146 000	6 250	14 900	3 100	4 700	NAO-75× 105× 25
	105	30	1	85	93	71 000	175 000	7 200	17 900	3 100	4 700	NAO-75× 105× 30
80	110	30	1	90	98	72 500	184 000	7 400	18 800	3 000	4 400	NAO-80× 110× 30
85	115	30	1	95	103	74 000	193 000	7 550	19 600	2 800	4 200	NAO-85× 115× 30
90	120	30	1	100	108	76 000	201 000	7 700	20 500	2 700	4 000	NAO-90× 120× 30

Note 1) Allowable minimum chamfer dimension r.

2) Max. allowable dimension of radius r_a for corner roundness on shaft/housing.



d_a min	d_b	Abutment dimensions mm		$r_{as}^{(2)}$ max	Mass kg (approx.)
		D_a max	D_b		
75	85.2	90	81	1	0.675
75	87.2	90	81	1	1.26
75	87.2	95	81	1	0.850
75	87.2	95	81	1	1.70
80	92.2	100	86	1	0.700
80	92.2	100	86	1	0.880
85	97.2	105	91	1	0.920
90	102.2	110	96	1	0.960
95	107.2	115	101	1	1.04