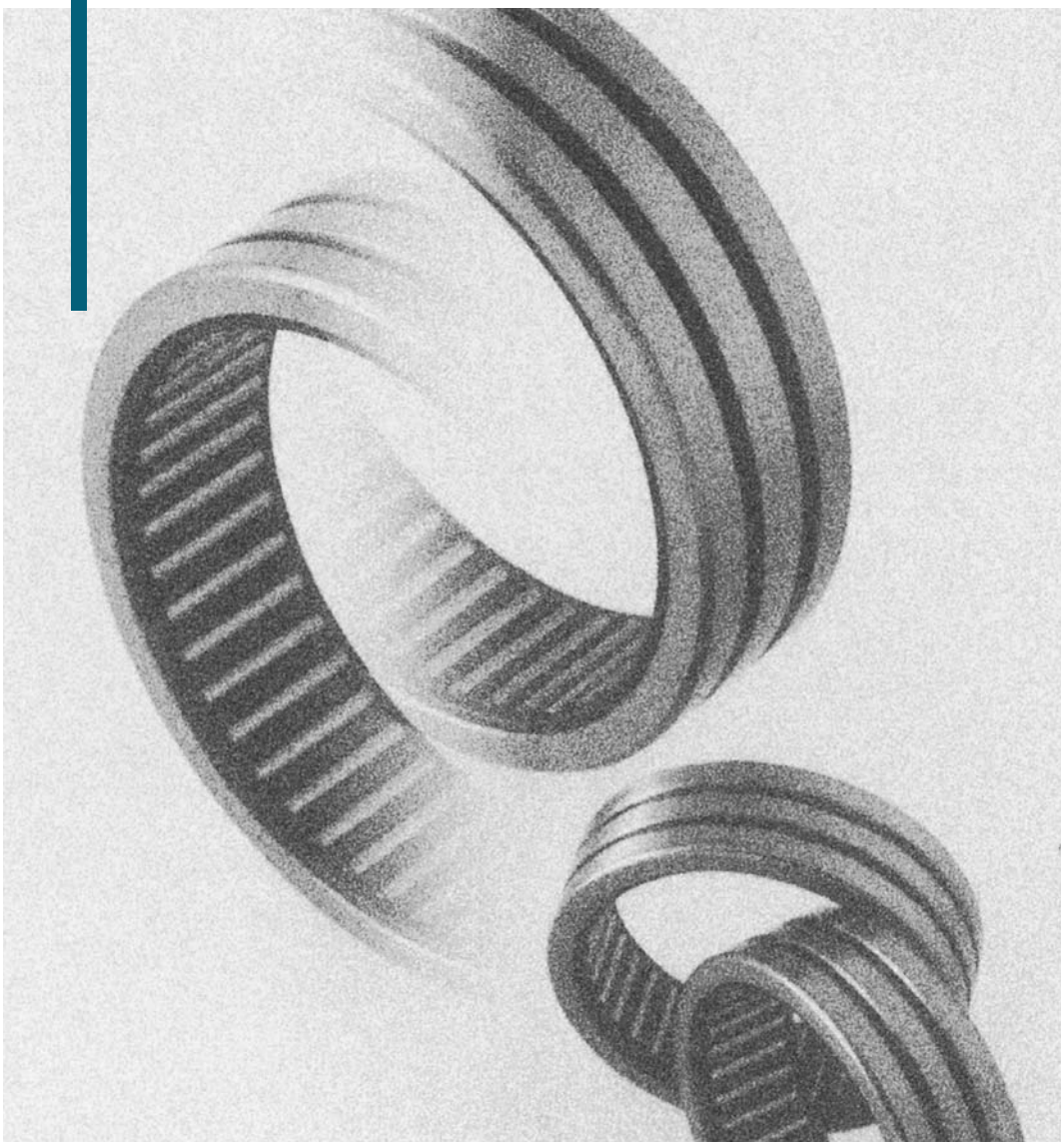
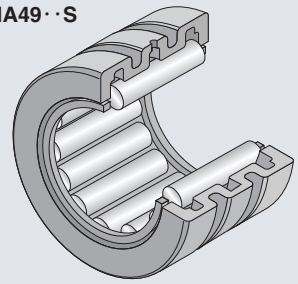
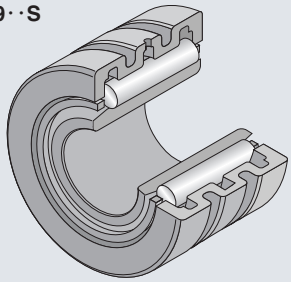
Adjustable-Clearance Needle Roller Bearings



Clearance-Adjustable Needle Roller Bearings

This bearing type comprises a solid outer ring with a unique cross-sections shape and needle rollers and cage built in the outer ring. The outer ring, needle rollers and cage are inseparable from each other. The outer ring raceway diameter is reduced by clamping the outer ring axially, which then reduces the roller inscribed circle diameter (F_w).

Axial clamping force on the bearing can be adjusted to alter the reduction on outer ring raceway diameter so that the radial clearance can be finely adjusted. The bearing is used on machine tools main spindle and other similar which require high speed rotational accuracy of JIS Class-4.

Bearing type	Applicable shaft diameter (mm)	Composition of bearing number	Remarks
Type RNA49··S 	ϕ30～ϕ125	**RNA 49 05 S** Type code Dimension series Roller set bore diameter code Suffix **[Suffix]** S: Clearance-adjustable type	The dimensional accuracy, profile accuracy and running accuracy conform to JIS Class-4 so as to be available for applications requiring high running accuracy. Another inner ring type with grinding allowance for its raceway surface can also be supplied upon request.
Type NA49··S 	ϕ25～ϕ110		

Bearing accuracy

Application of this bearing type is limited to the portions of a machine which require high running accuracy. Therefore, the dimensional accuracy, profile accuracy and running accuracy of this bearing type conform to JIS Class-4. 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.

Radial internal clearance and bearing fits

The radial internal clearance of Type **RNA49··S** with inner ring is smaller than ordinary clearance. While the tolerance of roller set bore diameter (F_w) of Type **NA49··S** without inner ring is listed in the relevant dimension table, the radial internal clearance of the bearing is determined once the applicable shaft diameter has been selected.

To be able to force the outer ring in the axial direction to shrink the raceway diameter, the fit of the outer ring to the housing bore needs to be “transition fit” or “interference fit” (interference of approximately 5μm).

Bearing fit on a shaft and in a housing shall be per **Table 1.**

Table 1 Bearing fit in shaft and housing (recommended)

Bearing type	Shaft	Housing
RNA49··S NA49··S	m5 k5	K4

Shaft and housing accuracy

This bearing type which is applied to the portions of a machine requiring high running accuracy is clamped with the outer ring inclination in installing restrained as less as possible. Therefore, the profile accuracy of the shaft and the housing must be made higher than that for general machined ring needle roller bearings. (**Table 2**)

Table 2 Shaft and housing accuracy (recommended)

Characteristics	Shaft	Housing
Roundness (max)	IT2	IT3
Cylindricality (max)	IT2	IT3
Tolerance of shoulder runout (max)	IT3	IT3

Method for adjusting radial internal clearance

The ratio of outer ring axial shrinkage to shrinkage of roller inscribed circle diameter (F_w) is nearly 3:1. In other words, to be able to decrease the radial internal clearance of the bearing by 1 μm, it is necessary to tighten the outer ring by 3 μm in the axial direction.

When adjusting the radial internal clearance of a bearing, be careful to uniformly tighten its outer ring along the centerline of the shaft.

In the case of adjustment by the method illustrated in **Fig. 1**, the spacer is put between the housing and the lid. Changing the thickness of the spacer by wrapping the spacer width or replacing the spacer, a certain amount of axial clamping can be obtained.

In **Fig. 2**, the fixed ring is fitted in the housing and, thereafter, the threaded lid is screwed in until it comes in contact with the outer ring for zero setting. Then, the threaded lid is further screwed in by the required value, after the fixed ring was loosened, and thereafter the fixed ring is retightened. Further, it is recommended to use a saw-toothed tightening screw as illustrated in **Fig. 3** because accuracy-down can be minimized by use of such a screw.

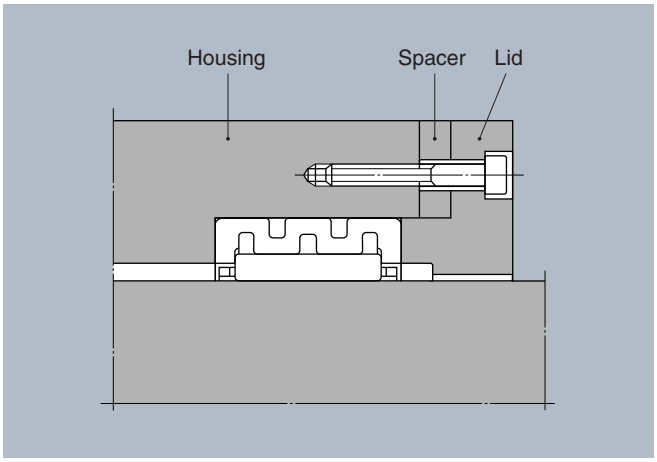


Fig. 1

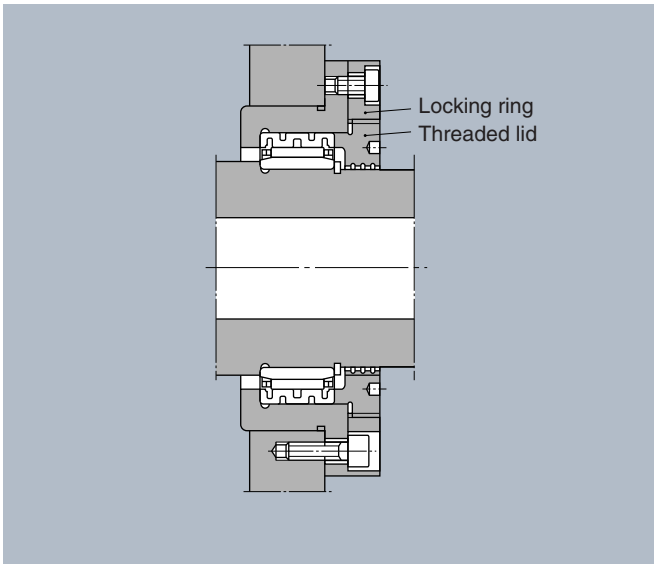


Fig. 2

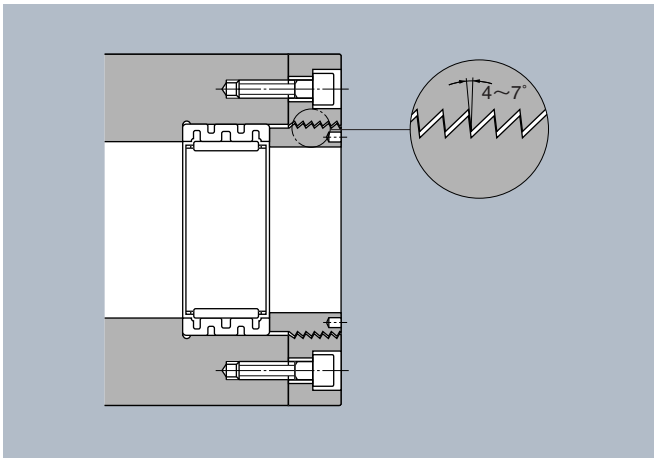
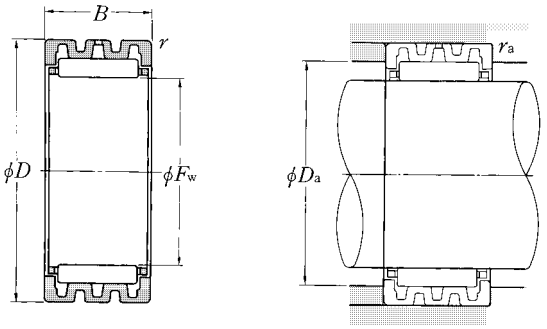


Fig. 3

Without inner ring

Type RNA49··S



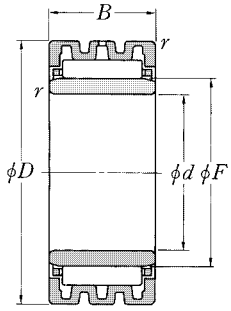
F_w 30～125mm

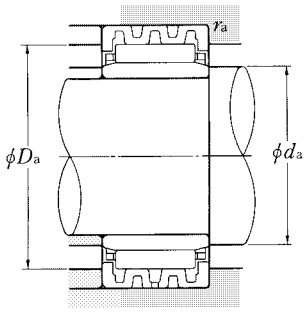
Boundary dimensions mm				Basic load ratings dynamic N	static N	dynamic kgf	static kgf	Limiting speeds min^{-1} grease	oil	Bearing numbers	Abutment dimensions mm		Mass kg
F_w	D	B	$r_{s\,min}$ [1]	C_r	C_{or}	C_r	C_{or}				D_a max	r_{as} [2] max	(approx.)
30 $^{+0.031}_{+0.022}$	42	17	0.3	12 300	16 000	1 260	1 630	8 700	13 000	**RNA 4905S**	36	0.3	0.070
35 $^{+0.038}_{+0.028}$	47	17	0.3	14 900	21 600	1 520	2 200	7 300	11 000	**RNA 4906S**	41	0.3	0.086
40 $^{+0.038}_{+0.028}$	52	20	0.6	17 600	27 800	1 790	2 830	6 700	10 000	**RNA49/32S**	46	0.6	0.088
42 $^{+0.038}_{+0.028}$	55	20	0.6	18 300	29 800	1 870	3 050	6 300	9 500	**RNA 4907S**	48	0.6	0.099
48 $^{+0.038}_{+0.028}$	62	22	0.6	22 500	40 500	2 300	4 150	5 700	8 500	**RNA 4908S**	54	0.6	0.134
52 $^{+0.045}_{+0.035}$	68	22	0.6	23 100	43 500	2 360	4 400	5 000	7 500	**RNA 4909S**	58	0.6	0.168
58 $^{+0.045}_{+0.035}$	72	22	0.6	24 700	49 000	2 520	5 000	4 700	7 000	**RNA 4910S**	64	0.6	0.189
63 $^{+0.045}_{+0.035}$	80	25	1	33 000	65 500	3 350	6 650	4 300	6 500	**RNA 4911S**	70	1	0.212
68 $^{+0.045}_{+0.035}$	85	25	1	34 000	69 000	3 450	7 050	4 000	6 000	**RNA 4912S**	75	1	0.257
72 $^{+0.045}_{+0.035}$	90	25	1	34 000	70 500	3 450	7 200	3 700	5 500	**RNA 4913S**	79	1	0.286
80 $^{+0.045}_{+0.035}$	100	30	1	44 500	94 000	4 550	9 600	3 300	5 000	**RNA 4914S**	88	1	0.422
85 $^{+0.055}_{+0.040}$	105	30	1	45 500	99 000	4 650	10 100	3 100	4 700	**RNA 4915S**	93	1	0.451
90 $^{+0.055}_{+0.040}$	110	30	1	46 500	104 000	4 750	10 600	2 900	4 400	**RNA 4916S**	98	1	0.468
100 $^{+0.055}_{+0.040}$	120	35	1.1	57 000	140 000	5 800	14 300	2 700	4 000	**RNA 4917S**	108	1	0.594
105 $^{+0.055}_{+0.040}$	125	35	1.1	58 500	146 000	5 950	14 900	2 500	3 800	**RNA 4918S**	113	1	0.617
110 $^{+0.055}_{+0.040}$	130	35	1.1	59 500	152 000	6 050	15 500	2 400	3 600	**RNA 4919S**	118	1	0.735
115 $^{+0.055}_{+0.040}$	140	40	1.1	72 000	168 000	7 350	17 100	2 300	3 500	**RNA 4920S**	125	1	0.980
125 $^{+0.065}_{+0.050}$	150	40	1.1	75 500	184 000	7 700	18 800	2 100	3 200	**RNA 4922S**	135	1	1.04

Note 1) Allowable minimum chamfer dimension r.
2) Max. allowable dimension of radius r_a for corner roundness on shaft/housing.

With inner ring

Type NA49··S





d 25～110mm

Boundary dimensions mm					Basic load ratings dynamic N	static N	dynamic kgf	static kgf	Limiting speeds min-1 grease	Limiting speeds min-1 oil	Bearing numbers	Bearing clearanc before installation	Abutment dimensions mm			Mass kg
d	*D*	*B*	$r_{s\,min}$ 1)	*F*	C_r	C_{or}	C_r	C_{or}				μm	d_a min	D_a max	r_{as} 2) max	(approx.)
25	42	17	0.3	30	12 300	16 000	1 260	1 630	8 700	13 000	**NA 4905S**	10～25	27	36	0.3	0.084
30	47	17	0.3	35	14 900	21 600	1 520	2 200	7 300	11 000	**NA 4906S**	12～25	32	41	0.3	0.099
32	52	20	0.6	40	17 600	27 800	1 790	2 830	6 700	10 000	**NA49/32S**	12～25	36	46	0.6	0.157
35	55	20	0.6	42	18 300	29 800	1 870	3 050	6 300	9 500	**NA 4907S**	15～30	39	48	0.6	0.164
40	62	22	0.6	48	22 500	40 500	2 300	4 150	5 700	8 500	**NA 4908S**	15～30	44	54	0.6	0.227
45	68	22	0.6	52	23 100	43 500	2 360	4 400	5 000	7 500	**NA 4909S**	15～35	49	58	0.6	0.257
50	72	22	0.6	58	24 700	49 000	2 520	5 000	4 700	7 000	**NA 4910S**	15～35	54	64	0.6	0.271
55	80	25	1	63	33 000	65 500	3 350	6 650	4 300	6 500	**NA 4911S**	15～35	60	70	1	0.382
60	85	25	1	68	34 000	69 000	3 450	7 050	4 000	6 000	**NA 4912S**	20～40	65	75	1	0.410
65	90	25	1	72	34 000	70 500	3 450	7 200	3 700	5 500	**NA 4913S**	20～40	70	79	1	0.427
70	100	30	1	80	44 500	94 000	4 550	9 600	3 300	5 000	**NA 4914S**	20～40	75	88	1	0.689
75	105	30	1	85	45 500	99 000	4 650	10 100	3 100	4 700	**NA 4915S**	25～45	80	93	1	0.740
80	110	30	1	90	46 500	104 000	4 750	10 600	2 900	4 400	**NA 4916S**	25～45	85	98	1	0.774
85	120	35	1.1	100	57 000	140 000	5 800	14 300	2 700	4 000	**NA 4917S**	25～45	91.5	108	1	1.18
90	125	35	1.1	105	58 500	146 000	5 950	14 900	2 500	3 800	**NA 4918S**	25～50	96.5	113	1	1.23
95	130	35	1.1	110	59 500	152 000	6 050	15 500	2 400	3 600	**NA 4919S**	25～50	101.5	118	1	1.40
100	140	40	1.1	115	72 000	168 000	7 350	17 100	2 300	3 500	**NA 4920S**	25～50	106.5	125	1	1.91
110	150	40	1.1	125	75 500	184 000	7 700	18 800	2 100	3 200	**NA 4922S**	30～60	116.5	135	1	2.12

Note 1) Allowable minimum chamfer dimension *r*.
2) Max. allowable dimension of radius r_a for corner roundness on shaft/housing.