THRUST BEARINGS

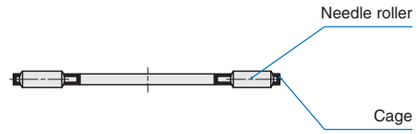
●Thrust Needle Roller Bearings
●Thrust Roller Bearings

Structure and Features

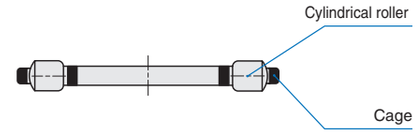
IKO Thrust Bearings consist of a precisely made cage and rollers. They have high rigidity and high load capacities and can be used in small spaces.
Thrust Needle Roller Bearings incorporate needle rollers, while Thrust Roller Bearings incorporate cylindrical rollers. Various types of raceway rings are available, and suitable bearings can be selected according to the operating conditions.
When the bearing mounting surfaces of a machine are heat-treated and finished by grinding as raceways, Thrust Bearings can be used without raceway rings allowing the machine to be made more compact. They are most suited to applications where high accuracy is required at high speeds and under fluctuating heavy loads, such as driving mechanisms for automobiles, machine tools, and high-pressure pumps.

Structures of Thrust Bearings

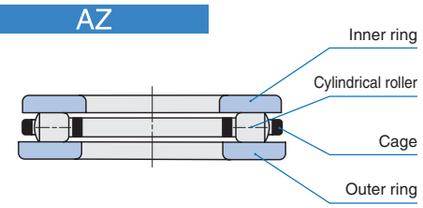
NTB



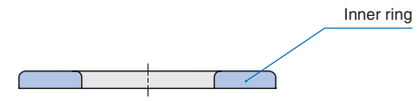
AZK



AZ

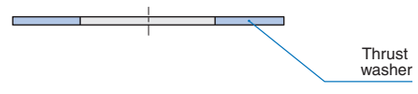


WS



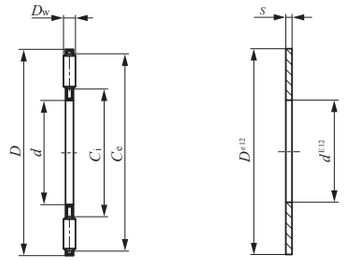
GS

AS



THRUST BEARINGS

Thrust Needle Roller Bearings



NTB AS WS GS

Shaft dia. 10 — 85mm

Shaft dia. mm	Identification number: Thrust needle roller bearing	Mass (Ref.) g	Thrust washer	Mass (Ref.) g	Inner ring	Outer ring	Mass (Ref.) g
10	NTB 1024	3.3	AS 1024	2.9	WS 1024	GS 1024	8
12	NTB 1226	3.8	AS 1226	3.2	WS 1226	GS 1226	8.9
15	NTB 1528	4.1	AS 1528	3.4	WS 1528	GS 1528	9.3
16	NTB 1629	4.3	AS 1629	3.6	WS 1629	GS 1629	9.8
17	NTB 1730	4.5	AS 1730	3.7	WS 1730	GS 1730	10.2
18	NTB 1831	4.7	AS 1831	3.9	WS 1831	GS 1831	10.7
20	NTB 2035	6.1	AS 2035	5	WS 2035	GS 2035	13.8
25	NTB 2542	8.2	AS 2542	6.9	WS 2542	GS 2542	21
30	NTB 3047	9.4	AS 3047	7.9	WS 3047	GS 3047	24
35	NTB 3552	10.6	AS 3552	8.9	WS 3552	GS 3552	31.5
40	NTB 40603	22	AS 4060	12.1	WS 4060	GS 4060	42.5
45	NTB 4565	24.5	AS 4565	13.3	WS 4565	GS 4565	53.5
50	NTB 5070	26.5	AS 5070	14.5	WS 5070	GS 5070	58.5
55	NTB 5578	33.5	AS 5578	18.5	WS 5578	GS 5578	93
60	NTB 6085	38.5	AS 6085	22	WS 6085	GS 6085	105
65	NTB 6590	41.5	AS 6590	23.5	WS 6590	GS 6590	124
70	NTB 7095	61	AS 7095	25	WS 7095	GS 7095	132
75	NTB 75100	65	AS 75100	26.5	WS 75100	GS 75100	153
80	NTB 80105	68.5	AS 80105	28	WS 80105	GS 80105	162
85	NTB 85110	72	AS 85110	29.5	WS 85110	GS 85110	170

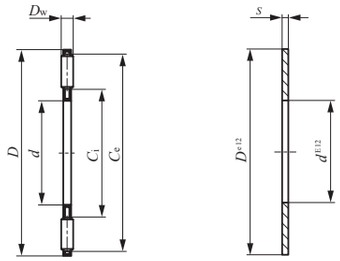
Boundary dimensions mm d	D	D_w	s	B	$r_{s\,min}$ (1)	C_i	C_e	Basic dynamic load rating C N	Basic static load rating C_0 N	Allowable rotational speed(2) min^{-1}
10	24	2	1	2.75	0.3	14	22	7 820	23 900	15 000
12	26	2	1	2.75	0.3	16	24	8 340	26 900	13 000
15	28	2	1	2.75	0.3	18	26	8 830	29 900	12 000
16	29	2	1	2.75	0.3	19	27	9 070	31 400	11 000
17	30	2	1	2.75	0.3	20	28	9 320	32 900	11 000
18	31	2	1	2.75	0.3	21	29	9 550	34 400	10 000
20	35	2	1	2.75	0.3	23	33	11 700	46 500	9 000
25	42	2	1	3	0.6	29	40	14 400	64 700	7 500
30	47	2	1	3	0.6	34	45	15 400	73 300	6 500
35	52	2	1	3.5	0.6	39	50	16 300	81 900	5 500
40	60	3	1	3.5	0.6	45	57	24 200	108 000	5 000
45	65	3	1	4	0.6	50	62	25 900	121 000	4 500
50	70	3	1	4	0.6	55	67	27 600	135 000	4 000
55	78	3	1	5	0.6	61	75	32 400	171 000	4 000
60	85	3	1	4.75	1	66	82	38 200	219 000	3 500
65	90	3	1	5.25	1	71	87	40 100	237 000	3 000
70	95	4	1	5.25	1	75	91	47 400	244 000	3 000
75	100	4	1	5.75	1	80	96	48 400	256 000	3 000
80	105	4	1	5.75	1	85	101	49 500	267 000	2 500
85	110	4	1	5.75	1	90	106	50 300	279 000	2 500

Notes(1) Minimum allowable value of chamfer dimension r
(2) Allowable rotational speed applies to oil lubrication. For grease lubrication, a maximum of 25% of this value is allowable.

1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

THRUST BEARINGS

Thrust Needle Roller Bearings



NTB AS WS GS

Shaft dia. 90 — 130mm

Shaft dia. mm	Identification number						
	Thrust needle roller bearing	Mass (Ref.) g	Thrust washer	Mass (Ref.) g	Inner ring	Outer ring	Mass (Ref.) g
90	**NTB 90120**	92	**AS 90120**	38	**WS 90120**	**GS 90120**	250
100	**NTB 100135**	119	**AS 100135**	50	**WS 100135**	**GS 100135**	350
110	**NTB 110145**	129	—	—	**WS 110145**	**GS 110145**	380
120	**NTB 120155**	139	—	—	**WS 120155**	**GS 120155**	410
130	**NTB 130170**	225	—	—	**WS 130170**	**GS 130170**	660

Boundary dimensions mm								Basic dynamic load rating C	Basic static load rating C_0	Allowable rotational speed(2)
d	D	D_w	s	B	$r_{s\,min}$ (1)	C_i	C_e	N	N	min^{-1}
90	120	4	1	6.5	1	96	116	64 500	394 000	2 500
100	135	4	1	7	1	107	131	80 300	541 000	2 000
110	145	4	—	7	1	117	141	83 200	578 000	2 000
120	155	4	—	7	1	127	151	87 900	634 000	1 800
130	170	5	—	9	1	137	165	120 000	839 000	1 700

Notes(1) Minimum allowable value of chamfer dimension r
(2) Allowable rotational speed applies to oil lubrication. For grease lubrication, a maximum of 25% of this value is allowable.

1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Types

In IKO Thrust Bearings, the types shown in Table 1 are available.

Table 1.1 Type of bearing

Type	Thrust needle roller bearings	Thrust roller bearings	
		Without inner and outer rings	With inner and outer rings
Model code	NTB	AZK	AZ

Table 1.2 Type of bearing ring

Type	Inner ring	Outer ring	Thrust washer
Model code	WS	GS	AS

Thrust Needle Roller Bearings

These bearings consist of a cage made from a steel plate, which is precisely press formed and surface-hardened, and needle rollers with a diameter variation within 2 μ m. They have a rigid structure and a high lubricant-retaining capacity.
As they have the lowest sectional height compared with other thrust bearings, they can be used instead of conventional thrust washers and can withstand high-speed rotations with a low coefficient of friction.
Specially designed thin inner rings (WS) and outer rings (GS), and especially thin (1 mm thick) thrust washers (AS), are available for use in various applications.
These bearings are generally used by utilizing their inner surface as the guide surface.

Thrust Roller Bearings

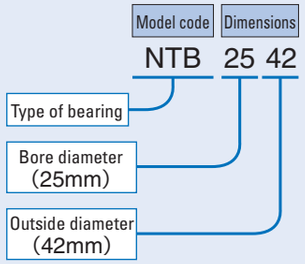
In this series, the caged cylindrical rollers AZK and the complete bearings AZ in which AZK are combined with an inner ring (WS) and an outer ring (GS) are available.
The cage has a special precise structure which is highly rigid, and cylindrical rollers are outwardly arranged and guided by the cage with exact precision to enable them to withstand heavy loads even at high rotational speeds.
Owing to the high accuracy of the bearing height T, they are suitable for use in machine tools, ultra-high pressure pumps, etc.
These bearings are generally used by utilizing their inner surface as the guide surface.

Identification Number

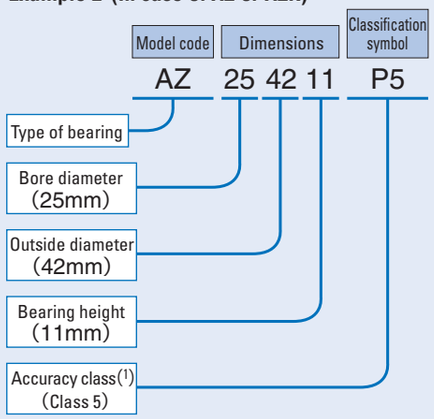
The identification number of Thrust Bearings consists of a model code, dimensions and a classification symbol. Some examples are shown below.

Examples of identification number

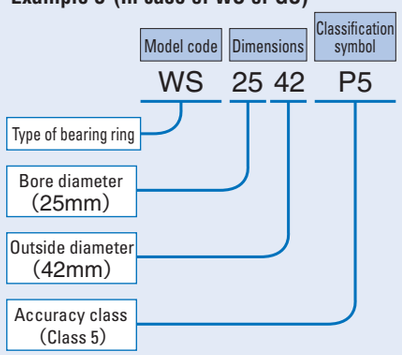
Example 1 (In case of NTB or AS)



Example 2 (In case of AZ or AZK)



Example 3 (In case of WS or GS)



Note(1) Not applicable to the model AZK.

Accuracy

The accuracy of Thrust Bearings is based on JIS B 1514-2, -3 as shown in Table 2.

Table 2.1 Tolerances unit: μ m

Type of bearing \ Item		Dimension	Dimension symbol	Tolerance	
Thrust needle roller bearings	NTB	Bore diameter	d	E11	
		Outside diameter	D	c12	
		Width	D_w	Equivalent to JIS B 1506 Class 2	
Thrust roller bearings	AZK	Bore diameter	d_c	As per Table 2.2	
		Outside diameter	D_c		
		Width	D_w	$1 \leqq D_w \leqq 10$	Equivalent to JIS B 1506 Class 2
				$10 < D_w \leqq 30$	Equivalent to JIS B 1506 Class 3
	AZ	Height	T	As per Table 2.3	
Inner rings	WS	Bore diameter	d	As per Table 2.4	
		Outside diameter	D	b12	
		Width	B	h11	
Outer rings	GS	Bore diameter	d	B12	
		Outside diameter	D	As per Table 2.4	
		Width	B	h11	
Thrust washers	AS	Bore diameter	d	E12	
		Outside diameter	D	e12	
		Width	s	± 50	

Table 2.2 Tolerances of bore and outside diameters for AZK series unit: μ m

Nominal dimension mm		Δ_{dc} Cage bore diameter deviation		Δ_{Dc} Cage outside diameter deviation	
Over	Incl.	High	Low	High	Low
—	50	+ 100	0	0	− 300
50	100	+ 200	0	0	− 400
100	200	+ 300	0	0	− 500
200	300	+ 500	0	0	− 700
300	400	+ 700	0	0	− 1000
400	500	—	—	0	− 1200

Table 2.3 Tolerances of height for AZ series unit: μ m

d Nominal bearing bore dia. mm		Δ_{Ts} Deviation of an actual bearing height	
Over	Incl.	High	Low
—	18	0	− 75
18	30	0	− 75
30	50	0	− 100
50	80	0	− 125
80	120	0	− 150
120	180	0	− 175
180	250	0	− 200
250	315	0	− 225
315	400	0	− 300
400	500	0	− 400

1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

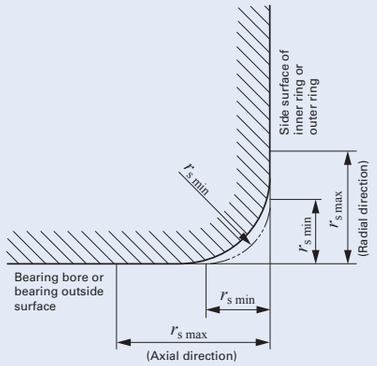
Table 2.4 Tolerances and allowable values for WS and GS

unit: μm

d or D (1) Nominal bearing bore dia. or outside dia. mm		Inner ring			Outer ring			Inner ring or outer ring		
		Δ_{dmp} Single plane mean bore diameter deviation		V_{dsp} Bore diameter variation in a single radial plane	Δ_{Dmp} Single plane mean outside diameter deviation		V_{Dsp} Outside diameter variation in a single radial plane	S_i or S_e (2) Bearing ring thickness variation		
								Class 0	Class 6	Class 5
Over	Incl.	High	Low	Max.	High	Low	Max.	Max.		
—	18	0	− 8	6	0	− 11	8	10	5	3
18	30	0	− 10	8	0	− 13	10	10	5	3
30	50	0	− 12	9	0	− 16	12	10	6	3
50	80	0	− 15	11	0	− 19	14	10	7	4
80	120	0	− 20	15	0	− 22	17	15	8	4
120	180	0	− 25	19	0	− 25	19	15	9	5
180	250	0	− 30	23	0	− 30	23	20	10	5
250	315	0	− 35	26	0	− 35	26	25	13	7
315	400	0	− 40	30	0	− 40	30	30	15	7
400	500	0	− 45	34	0	− 45	34	30	18	9

Notes(1) d for Δ_{dmp} and V_{dp}, and D for Δ_{Dmp} and V_{Dp}, respectively.
d for thickness variations of inner and outer rings .
(2) d_i for thickness variations of rings for NAX(I) and NBX(I) .

Table 2.5 Permissible limit values for chamfer dimension



unit: mm

$r_{s\,min}$	Radial and axial directions $r_{s\,max}$
0.3	0.8
0.6	1.5
1	2.2
1.1	2.7
1.5	3.5
2	4
2.1	4.5
3	5.5
4	6.5
5	8

Fit

The recommended fits for Thrust Bearings are shown in Table 3.

Table 3 Recommended fits

Type of bearing		Tolerance class	
		Shaft	Housing bore
Thrust needle roller bearings	NTB	h8	——
Thrust roller bearings	AZK	h6	——
	AZ		H7
Inner rings	WS	h6	——
Outer rings	GS	——	H7
Thrust washers	AS	h8	——

Mounting

When mounting Thrust Bearings, the following items should be considered.

❶When inner and outer rings are not used, the hardness of the raceway surfaces should be 58 ～ 64HRC, the effective hardening depth should be adequate, and the surface roughness should be less than 0.2μmR_a.

❷When mounting inner and outer rings to shaft and housing bore, dimensions related to mounting should be based on the dimension tables.
Also, the mounting surfaces should be finished at right angles to the center axis and they should be sufficiently rigid.

❸To avoid elastic deformation, the thrust washer AS must be seated uniformly on its mating surface.
A small warp in an AS washer will be corrected automatically when an axial load is applied.

❹Thrust Roller Bearings are combinations of a copper alloy component and cylindrical rollers. When handling the AZK itself, care should be taken to prevent deformations, blemishes, etc.

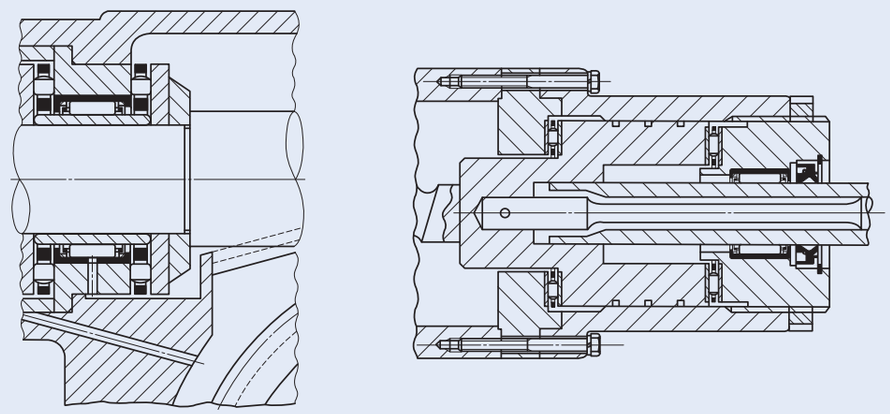


Fig.1 Mounting examples