

THRUST BEARINGS

- Thrust Needle Roller Bearings
- Thrust Roller Bearings



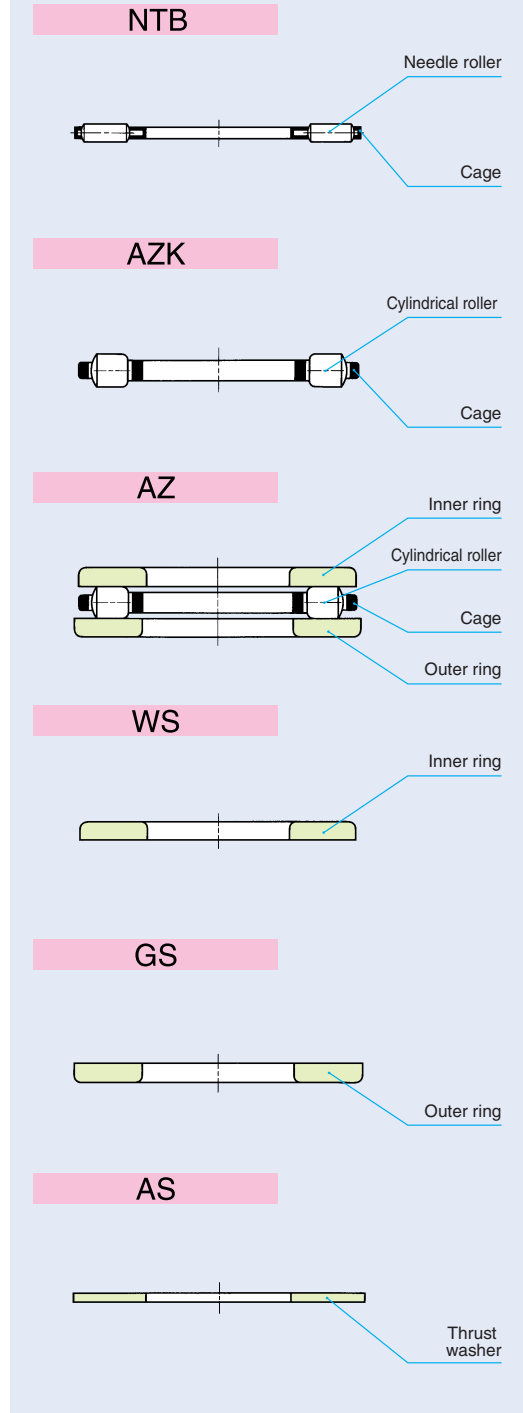
Structure and Features

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



F

NTB
AS
AZK
WS·GS

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 $2\mu\text{m}$. 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.

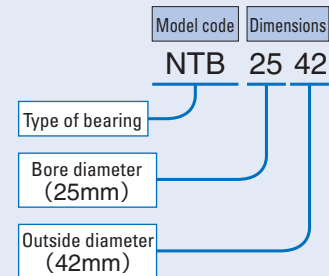
These bearings are generally used by utilizing their inner surface as the guide surface.

Identification Number

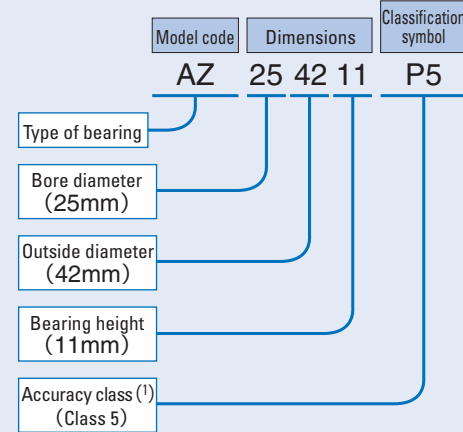
The identification number of Thrust Bearings consists of a model code, dimensions and a classification symbol. Some examples are shown below.

Examples of identification number

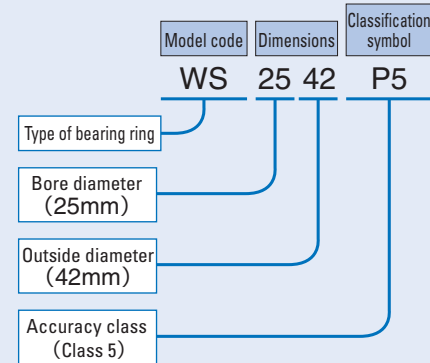
Example 1 (In case of NTB or AS)



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 1514:2000 as shown in Table 2.

Table 2.1 Tolerances

Type of bearing	Item	Dimension	Dimension symbol	Tolerance		
				unit: μm		
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	As per Table 2.2		
		Width	D_w	$1 \leq D_w \leq 10$	Equivalent to JIS B 1506 Class 2	$10 < D_w \leq 30$
	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

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

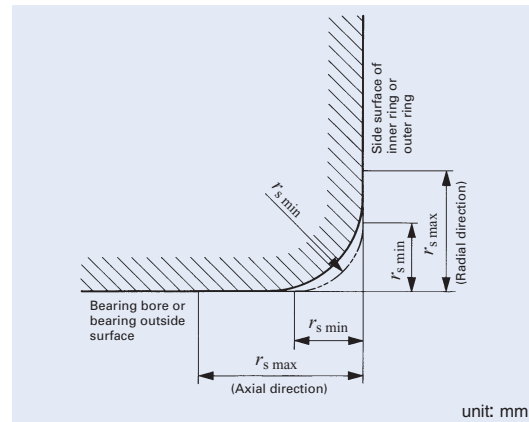
Nominal bearing bore dia. mm		Δ_{Ts} Deviation of an actual bearing height	
Over	Incl.	High	Low
—	18	0	— 75
18	30	0	— 75
30	50	0	— 100
50	80	0	— 125
80	120	0	— 150
120	180	0	— 175
180	250	0	— 200
250	315	0	— 225
315	400	0	— 300
400	500	0	— 400

Table 2.4 Tolerances and allowable values for WS and GS unit: μm

Nominal bearing bore dia. or outside dia. mm		Inner ring			Outer ring			Inner ring or outer ring		
		Δ_{dmp}		V_{dsp}	Δ_{Dmp}		V_{Dsp}	S_i or S_o (2)		
		Single plane mean bore diameter deviation			Single plane mean outside diameter deviation			Bearing ring thickness variation		
Over	Incl.	High	Low	Max.	High	Low	Max.	Class 0	Class 6	Class 5
—	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_{dsp} , and D for Δ_{Dmp} and V_{Dsp} , 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 min	r_s max
0.3	0.3	0.8
0.6	0.6	1.5
1	1	2.2
1.1	1.1	2.7
1.5	1.5	3.5
2	2	4
2.1	2.1	4.5
3	3	5.5
4	4	6.5
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(h10)	—
	AZK	h6(h8)	—
Thrust roller bearings	AZ		H7(H9)
Inner rings	WS	h6(h8)	—
Outer rings	GS	—	H7(H9)
Thrust washers	AS	h8(h10)	—

Mounting

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

- When 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 $0.2 \mu\text{m} R_a$.
- When 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.
- To 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.
- Thrust 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.

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NTB
AS
AZK
WS·GS

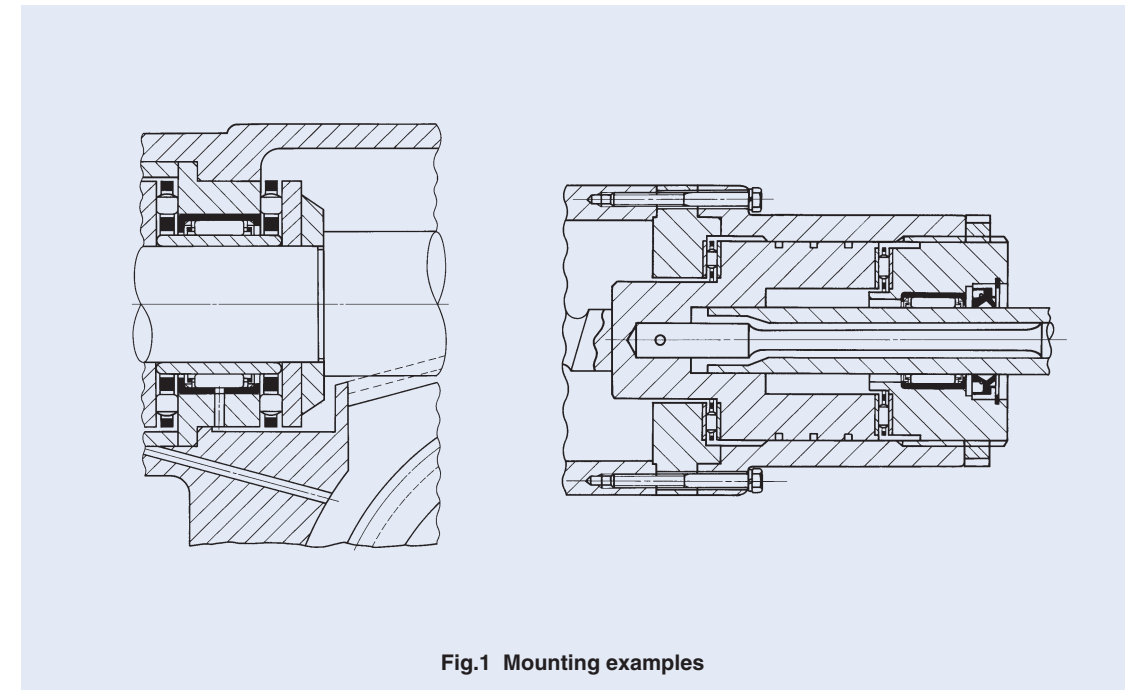


Fig.1 Mounting examples

THRUST BEARINGS

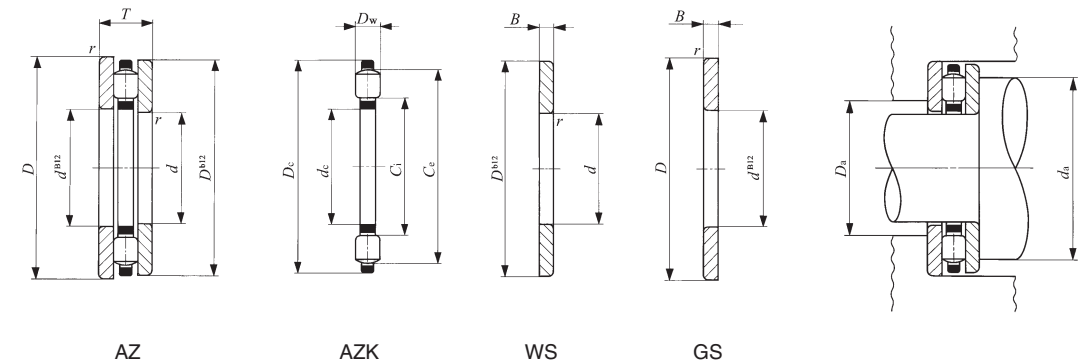
Thrust Roller Bearings



Shaft dia. 70 – 130mm

Shaft dia. mm	Identification number						
	Thrust roller bearing	Mass (Ref.) g	Thrust roller bearing	Mass (Ref.) g	Inner ring	Outer ring	Mass (Ref.) g
70	AZ 709518	420	AZK 70957.5	156	WS 7095	GS 7095	132
	AZ 7010527	905	AZK 7010511	325	WS 70105	GS 70105	290
	AZ 7014026	2 250	AZK 7014010	890	WS 70140	GS 70140	680
75	AZ 7510019	465	AZK 751007.5	159	WS 75100	GS 75100	153
	AZ 7511027	960	AZK 7511011	340	WS 75110	GS 75110	310
80	AZ 8010519	495	AZK 801057.5	171	WS 80105	GS 80105	162
	AZ 8011528	1 060	AZK 8011511	370	WS 80115	GS 80115	345
	AZ 8015026	2 500	AZK 8015010	920	WS 80150	GS 80150	790
85	AZ 8511019	530	AZK 851107.5	190	WS 85110	GS 85110	170
	AZ 8512531	1 460	AZK 8512512	510	WS 85125	GS 85125	475
90	AZ 9012022	790	AZK 901209	290	WS 90120	GS 90120	250
	AZ 9013535	2 040	AZK 9013514	750	WS 90135	GS 90135	645
	AZ 9016026	2 710	AZK 9016010	1 000	WS 90160	GS 90160	855
100	AZ 10013525	1 190	AZK 10013511	490	WS 100135	GS 100135	350
	AZ 10015038	2 720	AZK 10015015	980	WS 100150	GS 100150	870
	AZ 10019039	5 960	AZK 10019015	2 120	WS 100190	GS 100190	1 920
110	AZ 11014525	1 350	AZK 11014511	590	WS 110145	GS 110145	380
	AZ 11016040	3 220	AZK 11016017	1 320	WS 110160	GS 110160	950
	AZ 11020039	6 400	AZK 11020015	2 280	WS 110200	GS 110200	2 060
120	AZ 12015525	1 450	AZK 12015511	630	WS 120155	GS 120155	410
	AZ 12017542	4 020	AZK 12017518	1 640	WS 120175	GS 120175	1 190
	AZ 12022039	7 730	AZK 12022015	2 730	WS 120220	GS 120220	2 500
130	AZ 13017030	2 180	AZK 13017012	860	WS 130170	GS 130170	660
	AZ 13018542	4 300	AZK 13018518	1 760	WS 130185	GS 130185	1 270
	AZ 13023039	8 240	AZK 13023015	2 940	WS 130230	GS 130230	2 650

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.



Boundary dimensions mm											Standard mounting dimensions mm		Basic dynamic load rating C N	Basic static load rating C ₀ N	Allowable rotational speed ⁽²⁾ rpm
<i>d</i>	<i>D</i>	<i>T</i>	<i>d_c</i>	<i>D_c</i>	<i>D_w</i>	<i>B</i>	<i>r_{s min}</i> ⁽¹⁾	<i>C_i</i>	<i>C_e</i>	<i>d_a</i> Min.	<i>D_a</i> Max.				
70	95	18	70.05	94.5	7.5	5.25	1	75	91	91	76	72 000	269 000	3 500	
70	105	27	70.05	104.5	11	8	1	78	100	99	78	114 000	379 000	3 500	
70	140	26	70.05	139.5	10	8	1.1	89	129	129	90	169 000	713 000	3 000	
75	100	19	75.05	99.5	7.5	5.75	1	80	96	96	81	71 100	269 000	3 500	
75	110	27	75.05	109.5	11	8	1	83	105	104	83	123 000	427 000	3 000	
80	105	19	80.05	104.5	7.5	5.75	1	85	101	101	86	74 500	292 000	3 000	
80	115	28	80.05	114.5	11	8.5	1	88	110	109	88	122 000	427 000	3 000	
80	150	26	80.05	149.5	10	8	1.5	99	139	139	100	180 000	792 000	2 500	
85	110	19	85.05	109.5	7.5	5.75	1	90	106	106	91	77 800	314 000	3 000	
85	125	31	85.05	124.5	12	9.5	1	95	119	118	95	145 000	513 000	3 000	
90	120	22	90.05	119.5	9	6.5	1	97	116	115	97	99 700	390 000	3 000	
90	135	35	90.05	134.5	14	10.5	1.1	100	129	128	101	181 000	626 000	2 500	
90	160	26	90.05	159.5	10	8	1.5	109	149	149	110	189 000	871 000	2 500	
100	135	25	100.05	134.5	11	7	1	108	130	129	108	136 000	522 000	2 500	
100	150	38	100.05	149.5	15	11.5	1.1	112	143	142	113	219 000	796 000	2 500	
100	190	39	100.1	189.3	15	12	1.5	119	179	177	120	333 000	1 420 000	2 000	
110	145	25	110.1	144.5	11	7	1	118	140	139	118	142 000	569 000	2 500	
110	160	40	110.1	159.5	17	11.5	1.1	120	154	153	121	282 000	1 030 000	2 000	
110	200	39	110.1	199.3	15	12	2	129	188	187	130	388 000	1 770 000	2 000	
120	155	25	120.1	154.5	11	7	1	128	150	149	128	149 000	617 000	2 000	
120	175	42	120.1	174.5	18	12	1.1	132	168	167	133	313 000	1 160 000	2 000	
120	220	39	120.1	219	15	12	2.1	141	207	206	142	415 000	1 980 000	1 800	
130	170	30	130.1	169.5	12	9	1	140	164	163	140	176 000	741 000	2 000	
130	185	42	130.1	184.5	18	12	1.5	142	178	177	143	333 000	1 290 000	1 900	
130	230	39	130.1	229	15	12	2.1	151	217	216	152	440 000	2 180 000	1 700	

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NTB
AS
AZK
WS-GS