

# THRUST BEARINGS

- Thrust Needle Roller Bearings
- Thrust Roller Bearings



## Structure and Features

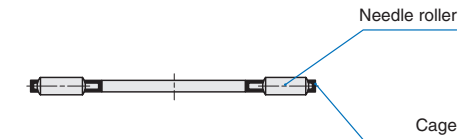
IKO Thrust Bearings consist of a precisely made cage and rollers. They have high rigidity and high load capacities and can be used in small spaces.

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.

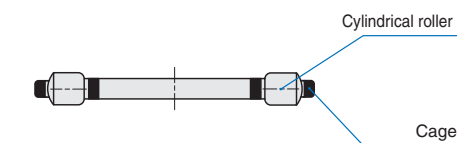
When the bearing mounting surfaces of a machine are heat-treated and finished by grinding as raceways, Thrust Bearings can be used without raceway rings allowing the machine to be made more compact. They are most suited to applications where high accuracy is required at high speeds and under fluctuating heavy loads, such as driving mechanisms for automobiles, machine tools, and high-pressure pumps.

### Structures of Thrust Bearings

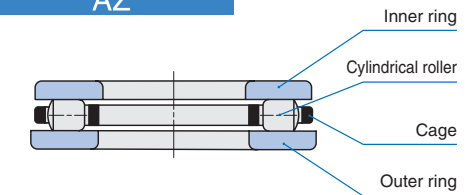
#### NTB



#### AZK



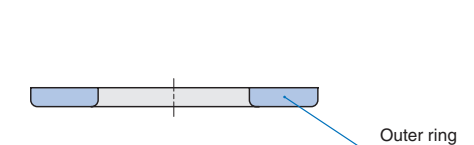
#### AZ



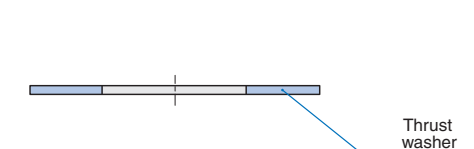
#### WS



#### GS



#### AS



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.

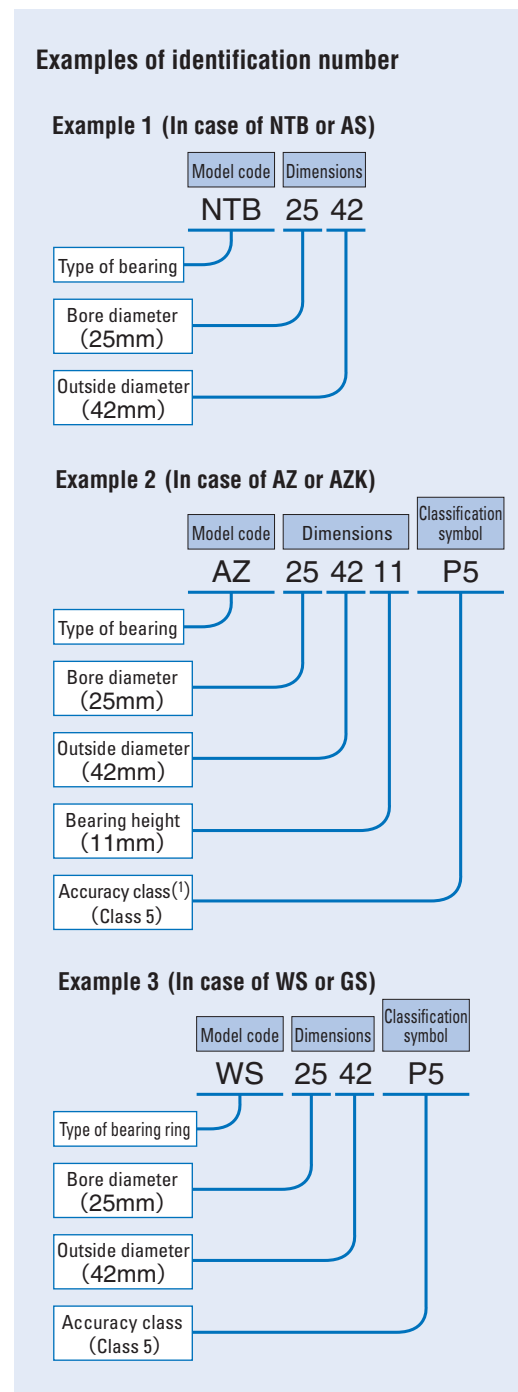
The cage has a special precise structure which is highly rigid, and cylindrical rollers are outwardly arranged and guided by the cage with exact precision to enable them to withstand heavy loads even at high rotational speeds.

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.



Note<sup>(1)</sup> 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:  $\mu\text{m}$

| 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 | $D_c$            |                                  |                                  |
|                               | AZ   | Width            | $D_w$            | $1 \leq D_w \leq 10$             | Equivalent to JIS B 1506 Class 2 |
|                               |      |                  |                  | $10 < D_w \leq 30$               | Equivalent to JIS B 1506 Class 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            | $s$              | $\pm 50$                         |                                  |

Table 2.2 Tolerances of bore and outside diameters for AZK series

unit:  $\mu\text{m}$

| Nominal dimension mm | $\Delta_{dc}$<br>Cage bore diameter deviation |       | $\Delta_{Dc}$<br>Cage outside diameter deviation |     |
|----------------------|---|-------|--|-----|
|                      | Over  | Incl. | High   | Low |
| —                    | 50  | —     | + 100  | 0   |
| 50                   | 100   | —     | + 200  | 0   |
| 100                  | 200   | —     | + 300  | 0   |
| 200                  | 300   | —     | + 500  | 0   |
| 300                  | 400   | —     | + 700  | 0   |
| 400                  | 500   | —     | —  | 0   |

Table 2.3 Tolerances of height for AZ series

unit:  $\mu\text{m}$

| Nominal bearing bore dia. mm | $\Delta_{Ts}$<br>Deviation of an actual bearing height |       |
|------------------------------|--|-------|
|                              | Over   | Incl. |
| —                            | 18   | 0     |
| 18                           | 30   | 0     |
| 30                           | 50   | 0     |
| 50                           | 80   | 0     |
| 80                           | 120  | 0     |
| 120                          | 180  | 0     |
| 180                          | 250  | 0     |
| 250                          | 315  | 0     |
| 315                          | 400  | 0     |
| 400                          | 500  | 0     |

**Table 2.4 Tolerances and allowable values for WS and GS**

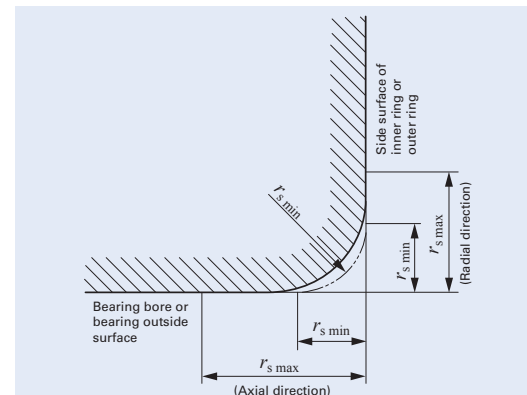
unit:  $\mu m$

| Nominal bearing bore dia. or outside dia.<br>mm |       | Inner ring  |      |   | Outer ring   |      |  | Inner ring or outer ring                               |         |         |
|---|-------|---|------|---|--|------|--|--|---------|---------|
|   |       | $\Delta_{dmp}$<br>Single plane mean bore diameter deviation |      | $V_{dsp}$<br>Bore diameter variation in a single radial plane | $\Delta_{Dmp}$<br>Single plane mean outside diameter deviation |      | $V_{Dsp}$<br>Outside diameter variation in a single radial plane | $S_i$ or $S_o$ (2)<br>Bearing ring thickness variation |         |         |
|   |       | High  | Low  | Max.  | High   | Low  | Max.   | Class 0  | Class 6 | Class 5 |
| Over  | Incl. |   |      |   |  |      |  | 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  $\Delta_{dmp}$  and  $V_{dsp}$ , and  $D$  for  $\Delta_{Dmp}$  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 |  |
|-----------|-----------------------------|--|
|           | $r_s$ 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              | —            |
|                               | AZK | h6              | —            |
| Thrust roller bearings        | AZ  | h6              | H7           |
|                               | WS  | h6              | —            |
| Outer rings                   | GS  | —               | H7           |
| Thrust washers                | AS  | h8              | —            |

**Mounting**

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

① 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  $0.2 \mu m R_a$ .

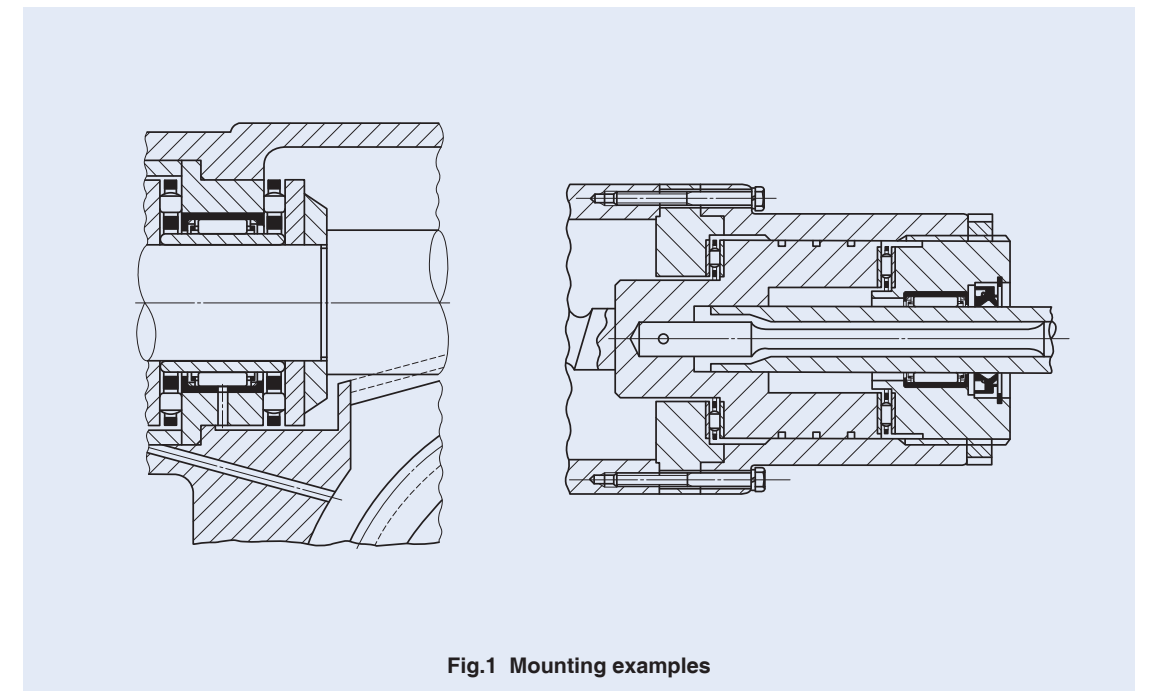
② When mounting inner and outer rings to shaft and housing bore, dimensions related to mounting should be based on the dimension tables.

Also, the mounting surfaces should be finished at right angles to the center axis and they should be sufficiently rigid.

③ 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.

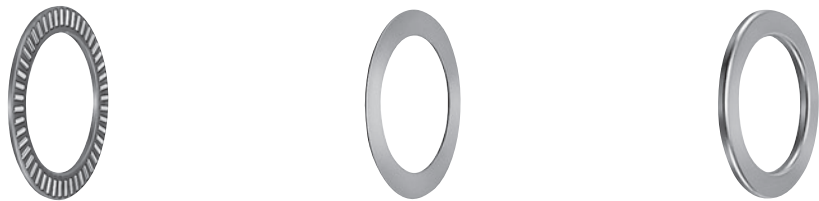
④ Thrust Roller Bearings are combinations of a copper alloy component and cylindrical rollers. When handling the AZK itself, care should be taken to prevent deformations, blemishes, etc.



**Fig.1 Mounting examples**

**THRUST BEARINGS**

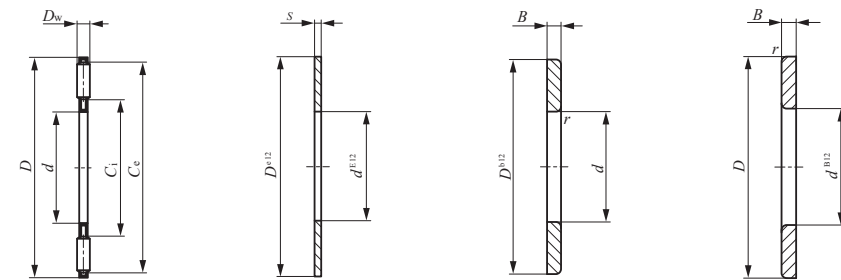
Thrust Needle Roller Bearings



Shaft dia. 10 – 85mm

| Shaft dia.<br>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           |

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



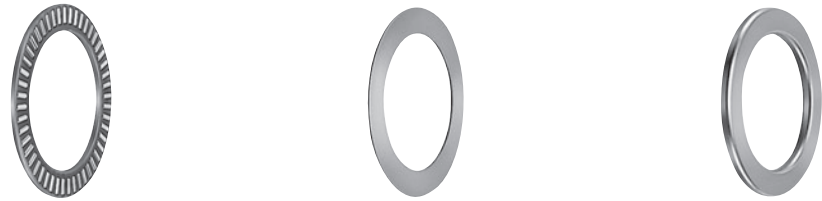
NTB AS WS GS

| d  | Boundary dimensions mm |                |   |      |                                   |                |                | Basic dynamic load rating C N | Basic static load rating C <sub>0</sub> N | Allowable rotational speed <sup>(2)</sup> min <sup>-1</sup> |
|----|------------------------|----------------|---|------|-----------------------------------|----------------|----------------|-------------------------------|---|---|
|    | D                      | D <sub>w</sub> | s | B    | r <sub>s min</sub> <sup>(1)</sup> | C <sub>i</sub> | C <sub>e</sub> |                               |   |   |
| 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   |

F  
 NTB  
 AS  
 AZK  
 WS-GS

**THRUST BEARINGS**

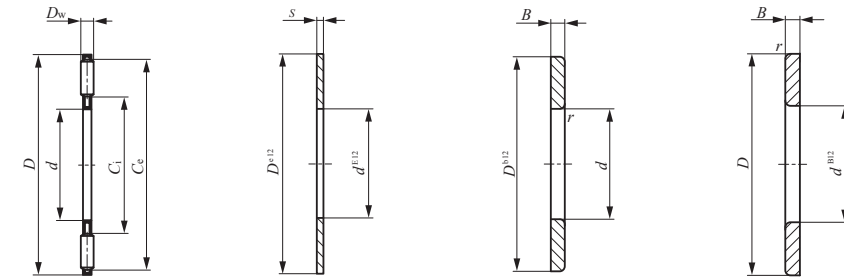
Thrust Needle Roller Bearings



Shaft dia. 90 – 130mm

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

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



NTB AS WS GS

| Boundary dimensions mm |     |       |     |     |                    |       |       | Basic dynamic load rating<br>$C$<br>N | Basic static load rating<br>$C_0$<br>N | Allowable rotational speed <sup>(2)</sup><br>min <sup>-1</sup> |
|------------------------|-----|-------|-----|-----|--------------------|-------|-------|---------------------------------------|--|--|
| $d$                    | $D$ | $D_w$ | $s$ | $B$ | $r_{s\ min}^{(1)}$ | $C_i$ | $C_e$ |                                       |  |  |
| 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  |

**F**

NTB  
AS  
AZK  
WS-GS

**THRUST BEARINGS**

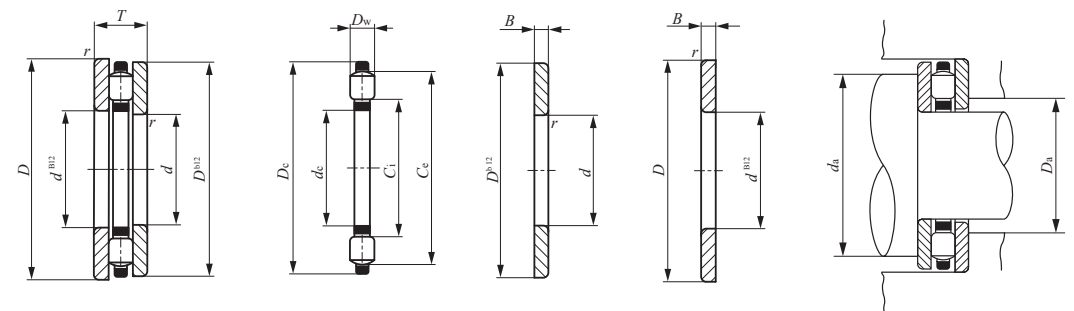
Thrust Roller Bearings



Shaft dia. 10 – 65mm

| Shaft dia. mm | Identification number |               |                       |               |                 |                 |               |  |
|---------------|-----------------------|---------------|-----------------------|---------------|-----------------|-----------------|---------------|--|
|               | Thrust roller bearing | Mass (Ref.) g | Thrust roller bearing | Mass (Ref.) g | Inner ring      | Outer ring      | Mass (Ref.) g |  |
| 10            | <b>AZ 10249</b>       | 24.6          | <b>AZK 10243.5</b>    | 8.6           | <b>WS 1024</b>  | <b>GS 1024</b>  | 8             |  |
| 12            | <b>AZ 12269</b>       | 26.5          | <b>AZK 12263.5</b>    | 8.7           | <b>WS 1226</b>  | <b>GS 1226</b>  | 8.9           |  |
| 15            | <b>AZ 15289</b>       | 28            | <b>AZK 15283.5</b>    | 9.4           | <b>WS 1528</b>  | <b>GS 1528</b>  | 9.3           |  |
| 17            | <b>AZ 17309</b>       | 30.5          | <b>AZK 17303.5</b>    | 10.1          | <b>WS 1730</b>  | <b>GS 1730</b>  | 10.2          |  |
| 20            | <b>AZ 203510</b>      | 45.5          | <b>AZK 20354.5</b>    | 17.9          | <b>WS 2035</b>  | <b>GS 2035</b>  | 13.8          |  |
| 25            | <b>AZ 254211</b>      | 70            | <b>AZK 25425</b>      | 28            | <b>WS 2542</b>  | <b>GS 2542</b>  | 21            |  |
| 30            | <b>AZ 304711</b>      | 79            | <b>AZK 30475</b>      | 31            | <b>WS 3047</b>  | <b>GS 3047</b>  | 24            |  |
|               | <b>AZ 305216</b>      | 160           | <b>AZK 30527.5</b>    | 70            | <b>WS 3052</b>  | <b>GS 3052</b>  | 45            |  |
| 35            | <b>AZ 355212</b>      | 99            | <b>AZK 35525</b>      | 36            | <b>WS 3552</b>  | <b>GS 3552</b>  | 31.5          |  |
|               | <b>AZ 356218</b>      | 260           | <b>AZK 35627.5</b>    | 98            | <b>WS 3562</b>  | <b>GS 3562</b>  | 81            |  |
| 40            | <b>AZ 406013</b>      | 139           | <b>AZK 40606</b>      | 54            | <b>WS 4060</b>  | <b>GS 4060</b>  | 42.5          |  |
|               | <b>AZ 406819</b>      | 310           | <b>AZK 40689</b>      | 132           | <b>WS 4068</b>  | <b>GS 4068</b>  | 89            |  |
| 45            | <b>AZ 456514</b>      | 169           | <b>AZK 45656</b>      | 62            | <b>WS 4565</b>  | <b>GS 4565</b>  | 53.5          |  |
|               | <b>AZ 457320</b>      | 360           | <b>AZK 45739</b>      | 144           | <b>WS 4573</b>  | <b>GS 4573</b>  | 108           |  |
| 50            | <b>AZ 507014</b>      | 185           | <b>AZK 50706</b>      | 68            | <b>WS 5070</b>  | <b>GS 5070</b>  | 58.5          |  |
|               | <b>AZ 507822</b>      | 430           | <b>AZK 507811</b>     | 194           | <b>WS 5078</b>  | <b>GS 5078</b>  | 118           |  |
| 55            | <b>AZ 557816</b>      | 275           | <b>AZK 55786</b>      | 89            | <b>WS 5578</b>  | <b>GS 5578</b>  | 93            |  |
|               | <b>AZ 559025</b>      | 725           | <b>AZK 559011</b>     | 275           | <b>WS 5590</b>  | <b>GS 5590</b>  | 225           |  |
| 60            | <b>AZ 608517</b>      | 345           | <b>AZK 60857.5</b>    | 135           | <b>WS 6085</b>  | <b>GS 6085</b>  | 105           |  |
|               | <b>AZ 609526</b>      | 770           | <b>AZK 609511</b>     | 290           | <b>WS 6095</b>  | <b>GS 6095</b>  | 240           |  |
|               | <b>AZ 6013026</b>     | 2 090         | <b>AZK 6013010</b>    | 790           | <b>WS 60130</b> | <b>GS 60130</b> | 650           |  |
| 65            | <b>AZ 659018</b>      | 380           | <b>AZK 65907.5</b>    | 132           | <b>WS 6590</b>  | <b>GS 6590</b>  | 124           |  |
|               | <b>AZ 6510027</b>     | 860           | <b>AZK 6510011</b>    | 310           | <b>WS 65100</b> | <b>GS 65100</b> | 275           |  |

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



AZ AZK WS GS

| Boundary dimensions mm |          |          |                      |                      |                      |          |   |                      |                      |                           | Standard mounting dimensions mm |         | Basic dynamic load rating C N | Basic static load rating C <sub>0</sub> N | Allowable rotational speed <sup>(2)</sup> min <sup>-1</sup> |
|------------------------|----------|----------|----------------------|----------------------|----------------------|----------|---|----------------------|----------------------|---------------------------|---------------------------------|---------|-------------------------------|---|---|
| <i>d</i>               | <i>D</i> | <i>T</i> | <i>d<sub>c</sub></i> | <i>D<sub>c</sub></i> | <i>D<sub>w</sub></i> | <i>B</i> | <i>r<sub>s min</sub></i> <sup>(1)</sup> | <i>C<sub>i</sub></i> | <i>C<sub>e</sub></i> | <i>d<sub>a</sub></i> Min. | <i>D<sub>a</sub></i> Max.       |         |                               |   |   |
| 10                     | 24       | 9        | 10.04                | 23.6                 | 3.5                  | 2.75     | 0.3                                     | 13                   | 21                   | 21                        | 13                              | 8 990   | 19 100                        | 18 000                                    |   |
| 12                     | 26       | 9        | 12.04                | 25.6                 | 3.5                  | 2.75     | 0.3                                     | 15                   | 23                   | 23                        | 16                              | 10 400  | 23 900                        | 16 000                                    |   |
| 15                     | 28       | 9        | 15.04                | 27.6                 | 3.5                  | 2.75     | 0.3                                     | 17                   | 25                   | 25                        | 18                              | 10 200  | 23 900                        | 14 000                                    |   |
| 17                     | 30       | 9        | 17.04                | 29.6                 | 3.5                  | 2.75     | 0.3                                     | 19                   | 27                   | 27                        | 20                              | 11 400  | 28 600                        | 13 000                                    |   |
| 20                     | 35       | 10       | 20.04                | 34.6                 | 4.5                  | 2.75     | 0.3                                     | 22                   | 33                   | 33                        | 23                              | 19 000  | 48 700                        | 11 000                                    |   |
| 25                     | 42       | 11       | 25.05                | 41.6                 | 5                    | 3        | 0.6                                     | 28                   | 39                   | 39                        | 28                              | 22 700  | 60 700                        | 9 000                                     |   |
| 30                     | 47       | 11       | 30.05                | 46.5                 | 5                    | 3        | 0.6                                     | 33                   | 44                   | 44                        | 33                              | 27 400  | 81 000                        | 8 000                                     |   |
|                        | 52       | 16       | 30.05                | 51.5                 | 7.5                  | 4.25     | 0.6                                     | 35                   | 49                   | 48                        | 36                              | 38 400  | 95 700                        | 7 500                                     |   |
| 35                     | 52       | 12       | 35.05                | 51.5                 | 5                    | 3.5      | 0.6                                     | 38                   | 49                   | 49                        | 39                              | 29 100  | 91 100                        | 7 000                                     |   |
|                        | 62       | 18       | 35.05                | 61.5                 | 7.5                  | 5.25     | 1                                       | 42                   | 58                   | 57                        | 43                              | 47 900  | 135 000                       | 6 500                                     |   |
| 40                     | 60       | 13       | 40.05                | 59.5                 | 6                    | 3.5      | 0.6                                     | 44                   | 57                   | 57                        | 44                              | 41 700  | 133 000                       | 6 000                                     |   |
|                        | 68       | 19       | 40.05                | 67.5                 | 9                    | 5        | 1                                       | 45                   | 64                   | 64                        | 46                              | 68 700  | 195 000                       | 5 500                                     |   |
| 45                     | 65       | 14       | 45.05                | 64.5                 | 6                    | 4        | 0.6                                     | 49                   | 62                   | 62                        | 49                              | 40 800  | 133 000                       | 5 500                                     |   |
|                        | 73       | 20       | 45.05                | 72.5                 | 9                    | 5.5      | 1                                       | 50                   | 69                   | 69                        | 51                              | 75 700  | 227 000                       | 5 000                                     |   |
| 50                     | 70       | 14       | 50.05                | 69.5                 | 6                    | 4        | 0.6                                     | 54                   | 67                   | 67                        | 54                              | 43 300  | 148 000                       | 5 000                                     |   |
|                        | 78       | 22       | 50.05                | 77.5                 | 11                   | 5.5      | 1                                       | 55                   | 74                   | 73                        | 56                              | 84 300  | 232 000                       | 4 500                                     |   |
| 55                     | 78       | 16       | 55.05                | 77.5                 | 6                    | 5        | 0.6                                     | 59                   | 75                   | 75                        | 60                              | 51 700  | 192 000                       | 4 500                                     |   |
|                        | 90       | 25       | 55.05                | 89.5                 | 11                   | 7        | 1                                       | 63                   | 85                   | 84                        | 63                              | 108 000 | 332 000                       | 4 000                                     |   |
| 60                     | 85       | 17       | 60.05                | 84.5                 | 7.5                  | 4.75     | 1                                       | 65                   | 81                   | 81                        | 66                              | 64 600  | 224 000                       | 4 000                                     |   |
|                        | 95       | 26       | 60.05                | 94.5                 | 11                   | 7.5      | 1                                       | 68                   | 90                   | 89                        | 68                              | 106 000 | 332 000                       | 4 000                                     |   |
|                        | 130      | 26       | 60.05                | 129.5                | 10                   | 8        | 1.5                                     | 79                   | 119                  | 119                       | 80                              | 158 000 | 634 000                       | 3 000                                     |   |
| 65                     | 90       | 18       | 65.05                | 89.5                 | 7.5                  | 5.25     | 1                                       | 70                   | 86                   | 86                        | 71                              | 68 300  | 247 000                       | 4 000                                     |   |
|                        | 100      | 27       | 65.05                | 99.5                 | 11                   | 8        | 1                                       | 73                   | 95                   | 94                        | 73                              | 116 000 | 379 000                       | 3 500                                     |   |

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**THRUST BEARINGS**

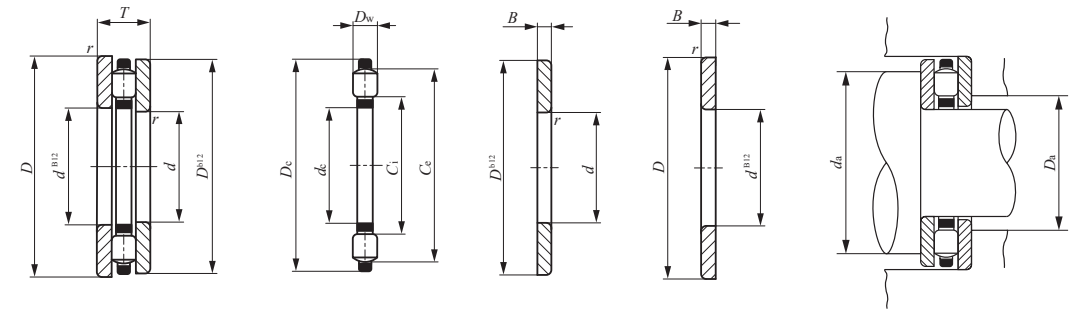
Thrust Roller Bearings



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



AZ AZK WS GS

| Boundary dimensions mm |          |          |                      |                      |                      |          |   |                      |                      |                           | Standard mounting dimensions mm |            | Basic dynamic load rating | Basic static load rating | Allowable rotational speed <sup>(2)</sup> |
|------------------------|----------|----------|----------------------|----------------------|----------------------|----------|---|----------------------|----------------------|---------------------------|---------------------------------|------------|---------------------------|--------------------------|---|
| <i>d</i>               | <i>D</i> | <i>T</i> | <i>d<sub>c</sub></i> | <i>D<sub>c</sub></i> | <i>D<sub>w</sub></i> | <i>B</i> | <i>r<sub>s min</sub></i> <sup>(1)</sup> | <i>C<sub>i</sub></i> | <i>C<sub>e</sub></i> | <i>d<sub>a</sub></i> Min. | <i>D<sub>a</sub></i> Max.       | <i>C</i> N | <i>C<sub>0</sub></i> N    | min <sup>-1</sup>        |   |
| 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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**THRUST BEARINGS**

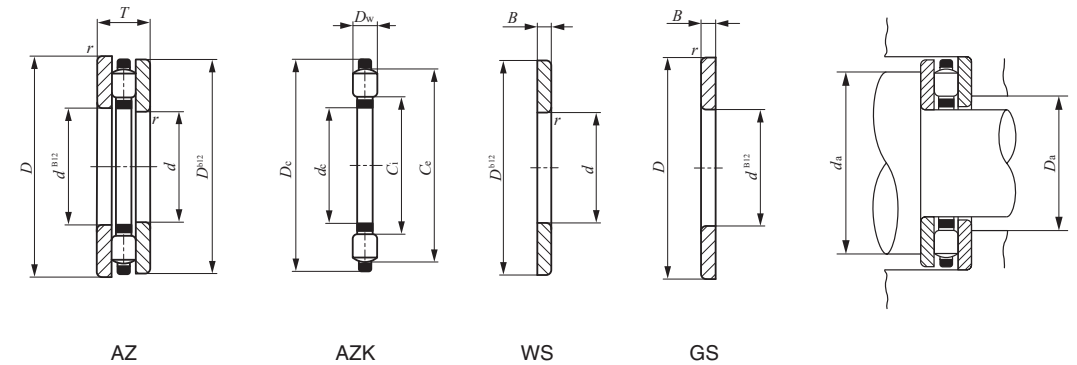
Thrust Roller Bearings



Shaft dia. 140 – 280mm

| Shaft dia. mm | Identification number |               |                       |               |            |            |               |
|---------------|-----------------------|---------------|-----------------------|---------------|------------|------------|---------------|
|               | Thrust roller bearing | Mass (Ref.) g | Thrust roller bearing | Mass (Ref.) g | Inner ring | Outer ring | Mass (Ref.) g |
| 140           | AZ 14018031           | 2 410         | AZK 14018012          | 920           | WS 140180  | GS 140180  | 745           |
|               | AZ 14019542           | 4 560         | AZK 14019518          | 1 860         | WS 140195  | GS 140195  | 1 350         |
|               | AZ 14024039           | 8 680         | AZK 14024015          | 3 100         | WS 140240  | GS 140240  | 2 790         |
| 150           | AZ 15019031           | 2 560         | AZK 15019012          | 980           | WS 150190  | GS 150190  | 790           |
|               | AZ 15020542           | 4 840         | AZK 15020518          | 1 980         | WS 150205  | GS 150205  | 1 430         |
|               | AZ 15025039           | 9 140         | AZK 15025015          | 3 260         | WS 150250  | GS 150250  | 2 940         |
| 160           | AZ 16020031           | 2 710         | AZK 16020012          | 1 030         | WS 160200  | GS 160200  | 840           |
|               | AZ 16027039           | 10 800        | AZK 16027015          | 3 840         | WS 160270  | GS 160270  | 3 480         |
| 170           | AZ 17023045           | 6 220         | AZK 17023019          | 2 420         | WS 170230  | GS 170230  | 1 900         |
|               | AZ 17028039           | 11 300        | AZK 17028015          | 4 020         | WS 170280  | GS 170280  | 3 640         |
| 180           | AZ 18024045           | 6 540         | AZK 18024019          | 2 540         | WS 180240  | GS 180240  | 2 000         |
|               | AZ 18031039           | 14 600        | AZK 18031015          | 5 200         | WS 180310  | GS 180310  | 4 700         |
| 190           | AZ 19025548           | 8 060         | AZK 19025520          | 3 100         | WS 190255  | GS 190255  | 2 480         |
|               | AZ 19032039           | 15 000        | AZK 19032015          | 5 280         | WS 190320  | GS 190320  | 4 860         |
| 200           | AZ 20026548           | 8 430         | AZK 20026520          | 3 250         | WS 200265  | GS 200265  | 2 590         |
|               | AZ 20034039           | 17 200        | AZK 20034015          | 6 120         | WS 200340  | GS 200340  | 5 540         |
| 220           | AZ 22029050           | 10 400        | AZK 22029022          | 4 280         | WS 220290  | GS 220290  | 3 060         |
|               | AZ 22036052           | 24 000        | AZK 22036020          | 8 000         | WS 220360  | GS 220360  | 8 000         |
| 240           | AZ 24031554           | 13 200        | AZK 24031524          | 5 520         | WS 240315  | GS 240315  | 3 840         |
|               | AZ 24038052           | 26 500        | AZK 24038020          | 9 440         | WS 240380  | GS 240380  | 8 530         |
| 260           | AZ 26034055           | 15 400        | AZK 26034025          | 6 600         | WS 260340  | GS 260340  | 4 400         |
|               | AZ 26042080           | 51 600        | AZK 26042030          | 18 200        | WS 260420  | GS 260420  | 16 700        |
| 280           | AZ 28044080           | 54 600        | AZK 28044030          | 19 200        | WS 280440  | GS 280440  | 17 700        |

Notes<sup>(1)</sup> Minimum allowable value of chamfer dimension *r*  
<sup>(2)</sup> 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 <sub>0</sub> N | Allowable rotational speed <sup>(2)</sup> min <sup>-1</sup> |
|------------------------|----------|----------|----------------------|----------------------|----------------------|----------|---|----------------------|----------------------|---------------------------|---------------------------------|-----------|-------------------------------|---|---|
| <i>d</i>               | <i>D</i> | <i>T</i> | <i>d<sub>c</sub></i> | <i>D<sub>c</sub></i> | <i>D<sub>w</sub></i> | <i>B</i> | <i>r<sub>s min</sub></i> <sup>(1)</sup> | <i>C<sub>i</sub></i> | <i>C<sub>e</sub></i> | <i>d<sub>a</sub></i> Min. | <i>D<sub>a</sub></i> Max.       |           |                               |   |   |
| 140                    | 180      | 31       | 140.1                | 179.5                | 12                   | 9.5      | 1                                       | 150                  | 174                  | 173                       | 150                             | 184 000   | 798 000                       | 1 900                                     |   |
| 140                    | 195      | 42       | 140.1                | 194.5                | 18                   | 12       | 1.5                                     | 152                  | 188                  | 187                       | 153                             | 353 000   | 1 420 000                     | 1 800                                     |   |
| 140                    | 240      | 39       | 140.1                | 239                  | 15                   | 12       | 2.1                                     | 161                  | 227                  | 226                       | 162                             | 435 000   | 2 180 000                     | 1 600                                     |   |
| 150                    | 190      | 31       | 150.1                | 189.5                | 12                   | 9.5      | 1                                       | 160                  | 184                  | 183                       | 160                             | 181 000   | 798 000                       | 1 800                                     |   |
| 150                    | 205      | 42       | 150.1                | 204.5                | 18                   | 12       | 1.5                                     | 162                  | 198                  | 197                       | 163                             | 349 000   | 1 420 000                     | 1 700                                     |   |
| 150                    | 250      | 39       | 150.1                | 249                  | 15                   | 12       | 2.1                                     | 171                  | 237                  | 236                       | 172                             | 459 000   | 2 380 000                     | 1 500                                     |   |
| 160                    | 200      | 31       | 160.1                | 199.5                | 12                   | 9.5      | 1                                       | 170                  | 194                  | 193                       | 170                             | 189 000   | 855 000                       | 1 700                                     |   |
| 160                    | 270      | 39       | 160.1                | 269                  | 15                   | 12       | 3                                       | 183                  | 256                  | 255                       | 184                             | 519 000   | 2 850 000                     | 1 400                                     |   |
| 170                    | 230      | 45       | 170.1                | 229                  | 19                   | 13       | 1.5                                     | 183                  | 221                  | 220                       | 184                             | 406 000   | 1 730 000                     | 1 500                                     |   |
| 170                    | 280      | 39       | 170.1                | 279                  | 15                   | 12       | 3                                       | 193                  | 266                  | 265                       | 194                             | 543 000   | 3 070 000                     | 1 300                                     |   |
| 180                    | 240      | 45       | 180.1                | 239                  | 19                   | 13       | 1.5                                     | 193                  | 231                  | 230                       | 194                             | 426 000   | 1 870 000                     | 1 400                                     |   |
| 180                    | 310      | 39       | 180.1                | 308                  | 15                   | 12       | 3                                       | 204                  | 294                  | 293                       | 205                             | 619 000   | 3 710 000                     | 1 200                                     |   |
| 190                    | 255      | 48       | 190.1                | 254                  | 20                   | 14       | 2                                       | 205                  | 245                  | 244                       | 206                             | 470 000   | 2 080 000                     | 1 300                                     |   |
| 190                    | 320      | 39       | 190.1                | 318                  | 15                   | 12       | 4                                       | 214                  | 304                  | 303                       | 215                             | 647 000   | 3 980 000                     | 1 200                                     |   |
| 200                    | 265      | 48       | 200.15               | 264                  | 20                   | 14       | 2                                       | 215                  | 255                  | 254                       | 216                             | 465 000   | 2 080 000                     | 1 300                                     |   |
| 200                    | 340      | 39       | 200.15               | 338                  | 15                   | 12       | 4                                       | 227                  | 323                  | 322                       | 228                             | 710 000   | 4 580 000                     | 1 100                                     |   |
| 220                    | 290      | 50       | 220.15               | 289                  | 22                   | 14       | 2                                       | 236                  | 280                  | 278                       | 237                             | 557 000   | 2 530 000                     | 1 300                                     |   |
| 220                    | 360      | 52       | 220.15               | 358                  | 20                   | 16       | 4                                       | 246                  | 343                  | 342                       | 247                             | 943 000   | 5 520 000                     | 1 000                                     |   |
| 240                    | 315      | 54       | 240.15               | 314                  | 24                   | 15       | 2                                       | 256                  | 304                  | 302                       | 257                             | 695 000   | 3 250 000                     | 1 100                                     |   |
| 240                    | 380      | 52       | 240.15               | 378                  | 20                   | 16       | 4                                       | 266                  | 363                  | 362                       | 267                             | 977 000   | 5 910 000                     | 1 000                                     |   |
| 260                    | 340      | 55       | 260.15               | 339                  | 25                   | 15       | 2.1                                     | 278                  | 328                  | 326                       | 279                             | 739 000   | 3 510 000                     | 1 000                                     |   |
| 260                    | 420      | 80       | 260.15               | 418                  | 30                   | 25       | 5                                       | 289                  | 402                  | 400                       | 291                             | 1 430 000 | 7 490 000                     | 900                                       |   |
| 280                    | 440      | 80       | 280.15               | 438                  | 30                   | 25       | 5                                       | 309                  | 422                  | 420                       | 311                             | 1 420 000 | 7 490 000                     | 800                                       |   |

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