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Single direction thrust ball bearings

Spherical roller thrust bearings

These bearings are designed primarily to support axial loads at contact angles between 30° and 90°. Just as with radial bearings, these bearings differ according to the type of rolling element they use: there are thrust ball bearings that use balls and thrust roller bearings that use rollers.

The configuration and characteristics of each type of bearing are given.

With thrust bearings, it is necessary to supply an axial preload in order to prevent slipping movement between the bearing's rolling elements and raceways. For more detailed information on this point, please refer to the material concerning bearing preload on page A-62.

1. Single direction thrust ball bearings

As shown in **Diagram 1**, the steel balls of single direction thrust ball bearings are arranged between a pair of shaft housing washers (bearing shaft washer and housing shaft washer), and the normal contact angle is 90°. Axial loads can

Table 1 Standard cage types for single direction thrust ball bearings

Bearing series	511	512	513	514
Molded resin cage	51100 ~51107	51200 ~51207	—	—
Pressed cage	51108 ~51152	51208 ~51224	51305 ~51320	51405 ~51415
Machined cage	51156 ~511530	51226 ~51260	51322 ~51340	51416 ~51420

Note: Due to their material properties, molded resin cages can not be used in applications where temperatures exceed 120°C.

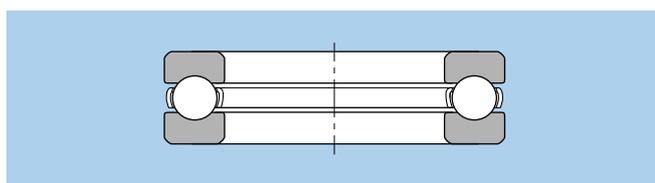


Diagram 1. Single direction thrust ball bearing (with pressed cage)

be supported in only one direction, radial loads can not be accommodated, therefore these bearings are unsuitable for high speed operation.

Table 1 lists the standard cage types for single direction thrust ball bearings.

2. Spherical roller thrust bearings

Just like spherical roller bearings, the center of the spherical surface for spherical roller thrust bearings is the point where the raceway surface of the housing raceway washer meets the center axis of the bearing. Since spherical roller thrust bearings incorporate barrel-shaped rollers as rolling elements, they also have self-aligning properties. (See **Diagram 2**)

Under normal load conditions, the allowable misalignment is 1° to 2°, although this will vary depending upon the bearing's dimension series.

These bearings use machined copper alloy cages and a guide sleeve is attached to the inner ring to guide the cage. The axial load capacity of these bearings is high, and a certain amount of radial load can also be accommodated when the ring is in an axially loaded state. However, it is necessary to operate these bearings where the load condition meet $F_r/F_a \leq 0.55$.

These bearings have some spots where lubricant cannot enter such as the gap between the cage and guide sleeve. It is necessary to use oil lubrication even in low speed operation.

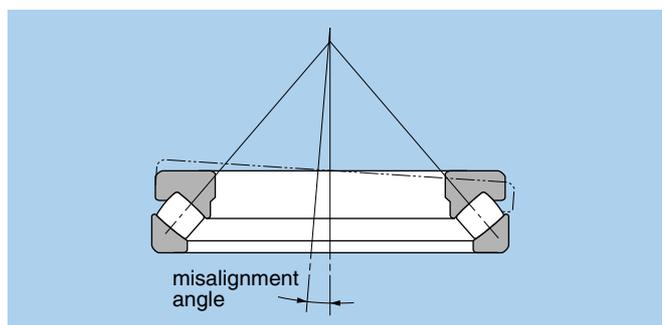


Diagram 2. Spherical roller thrust bearings

3. Cylindrical roller thrust bearings

Thrust bearings incorporating cylindrical rollers are available in single row, double row, triple row, and four row varieties. (See **Diagram 3**) NTN Engineering offers the 811, 812 and 893 series of standard series bearings that conform to dimension series 11, 12 and 93 prescribed in JIS, as well as other special dimensions.

Cylindrical roller thrust bearings are able to receive axial loads only, and have high axial rigidity which makes them well suited for heavy axial loads. Needle roller bearing information for series 811, 812, and 893 is also listed in the dimension tables.

Furthermore, bearings with dimensions not listed in the dimension tables are also manufactured. Contact **NTN Engineering** for more information.

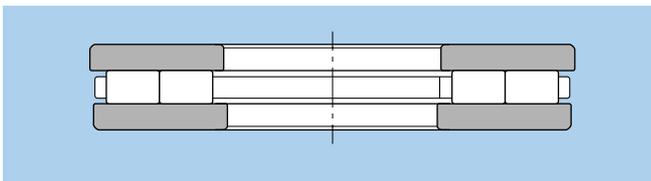


Diagram 3. Double row cylindrical roller thrust bearings

4. Tapered roller thrust bearings

Although not listed in the dimension tables, tapered roller bearings like those in **Diagram 4** are also manufactured. Contact **NTN Engineering** for more detailed information.

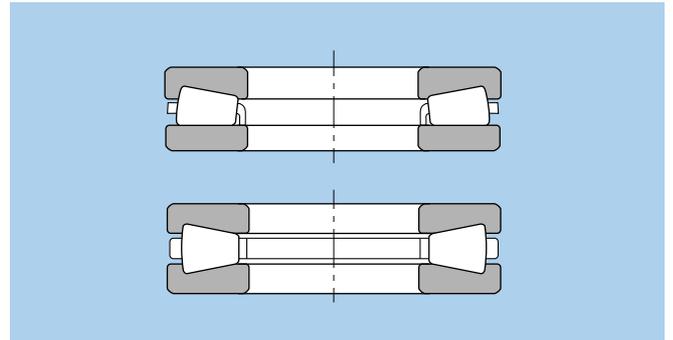


Diagram 4. Tapered roller thrust bearings



