Flanged Housings

Detail Introduction :

Flange bearing is a motion system that can be used without the use of bearing base, it is very popular in the application because of its light weight and low cost. And flanged housings also use small steel balls, which not only can make the rotary accuracy more fine, but also can obtain the low friction torque of the bearing, and the application is still very convenient.

In the general industrial field, NTN flanged housings are easy to install because they come with their own housing and the housing has sealed the bearing well, so even people who don't know much about bearings can install the housed outer spherical bearings onto the shaft well. Its design is compact, easy to operate and very practical.

Usually, NTN flanged housings come with bolts for easy fixing where they should be, slider type and frame type, which are fixed by clamping, and overhanging and suspension type, which are usually threaded for easy fixing on the rod end or hanging in the air.

Features of NTN flanged housings.

NTN flanged housings with double bearings can withstand higher loads than single bearings, and the snap ring type is easy to assemble. When a normal bearing is used, it requires a connector at both ends, but flanged housings can be used without a connector at one end, which is a unique advantage of flanged housings and thus expands the range of use of the bearing.

NTN flanged housing no longer requires a housing, making it more economical. In order to obtain low friction torque, high rigidity, and good slewing accuracy of the bearing, a small outer diameter steel ball is used. The use of hollow shaft ensures light weight and space for wiring. The biggest feature is that the flange is integrated with the bearing. The flanged housings are advantageous when there is no articulation at one end of the shaft and it is necessary to fix it on a flat surface such as a plate or a wall.

Applications of NTN flanged housings.

Flanged housings are mainly used in all kinds of industrial equipment, small rotary motors, office equipment, micro motor soft drives, pressure rotors, dental dental drills, hard disk motors, stepper motors, VCR magnetic drums, toy models, fans, pulleys, rollers, transmission equipment, recreational equipment, robots, medical equipment, office equipment, testing instruments, speed reducers, variable speed installations, motor optics, card readers, electromechanical, precision machinery, power tools and toys, etc.

Because the design of different machinery is very different, with seat bearing applications and more extensive, so the flange bearing types are quite a lot, according to rough statistics, NTN flanged housing structure there are nearly a hundred different materials, four different materials, sealing methods and five or six kinds, which arranged a combination of more than a thousand types, each type and a lot of bearing models, so the flange bearing models, can be said to be Infinitely many.

NTN flanged housings are produced under standard size and accuracy requirements, and can meet general purpose products. From printers and fax machines to monitors, there is room for flanged housings to demonstrate their technology in everyday household items.

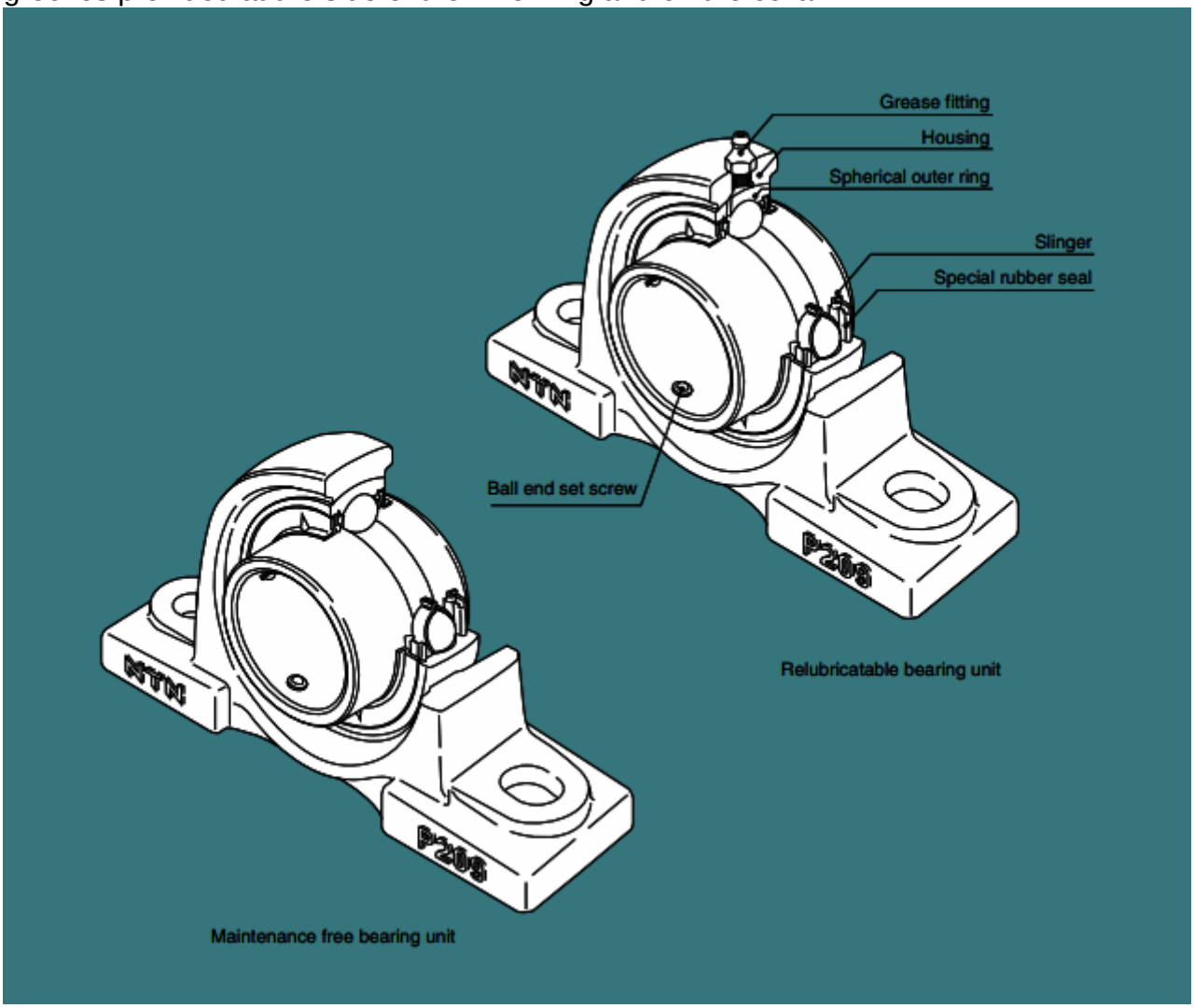
More details about NTN flanged housings are as follows.

1.Construction

The NTN bearing unit is a combination of a radial ball bearing, seal, and a housing of high-grade cast iron or pressed steel, which comes in various shapes. The outer surface of the bearing and the internal surface of the housing are spherical, so that the unit is self-aligning.

The inside construction of the ball bearing for the unit is such that steel balls and retainers of the same type as in series 62 and 63 of the NTN deep groove ball bearing are used. A duplex seal consisting of a combination of an oilproof synthetic rubber seal and a slinger, unique to NTN, is provided on both sides.

Depending on the type, the following methods of fitting to the shaft are employed:
(1)The inner ring is fastened onto the shaft in two places by set screws.
(2)The inner ring has a tapered bore and is fitted to the shaft by means of an adapter.
(3)In the eccentric locking collar system the inner ring is fastened to the shaft by means of eccentric grooves provided at the side of the inner ring and on the collar.



2.Design Features and Advantages
1.Maintenance free type
The NTN Maintenance free bearing unit contains a highgrade lithium-based grease, good for use over a long period, which is ideally suited to sealed-type bearings. Also provided is an excellent sealing device, unique to NTN, which prevents any leakage of grease or penetration of dust and water from outside.
It is designed so that the rotation of the shaft causes the sealed-in grease to circulate through the inside space, effectively providing maximum lubrication. The lubrication effect is maintained over a long period with no need for replenishment of grease.
To summarize the advantages of the NTN maintenance free bearing unit:
(1)As an adequate amount of good quality grease is sealed in at the time of manufacture, there is no need for replenishment. This means savings in terms of time and maintenance costs.
(2)Since there is no need for any regreasing facilities, such as piping, a more compact design is possible.
(3)The sealed-in design eliminates the possibility of grease leakage, which could lead to stained products.
2.Relubricatable type
The NTN relubricatable type bearing unit has an advantage over other simillar units being so designed as to permit regreasing even in the case of misalignment of 2? to the right or left. The hole through which the grease fitting is mounted usually causes structural weakening of the housing.

However, as a result of extensive testing, in the NTN bearing unit the hole is positioned so as to minimize this adverse effect. In addition, the regreasing groove has been designed to minimize weakening of the housing.
While the NTN maintenance free type bearing unit is satisfactory for use under normal operating conditions indoors, in the following circumstances it is necessary to use the relubricatable type bearing unit:
(1)Cases where the temperature of the bearing rises above 100?C, 212?F: *- Normal temperature of up to 200?C, 392?F heatresistant bearing units.
(2)Cases where there is excessive dust, but space does not permit using a bearing unit with a cover.
(3)Cases where the bearing unit is constantly exposed to splashes of water or any other liquid, but space does not permit using a bearing unit with a cover.
(4)Cases in which the humidity is very high, and the machine in which the bearing unit is used is run only intermittently.
(5)Cases involving a heavy load of which the Cr/Pr value is about 10 or below, and the speed is 10 rpm or below, or the movement is oscillatory.
(6)Cases where the number of revolutions is relatively high and the noise problem has to be considered; for example, when the bearing is used with the fan of an air conditioner.
3.Special sealing feature
(1) Standard bearing units?The sealing device of the ball bearing for the NTN bearing unit is a combination of a heat-resistant and oil-proof synthetic rubber seal and a slinger of an exclusive NTN design.
The seal, which is fixed in the outer ring, is steelreinforced, and its lip, in contact with the inner ring, is designed to minimize frictional torque.
The slinger is fixed to the inner ring of the bearing with which it rotates. There is a small clearance between its periphery and the outer ring.
These two types of seals on both sides of the bearing prevent grease leakage, and foreign matter is prevented from entering the bearing from outside.

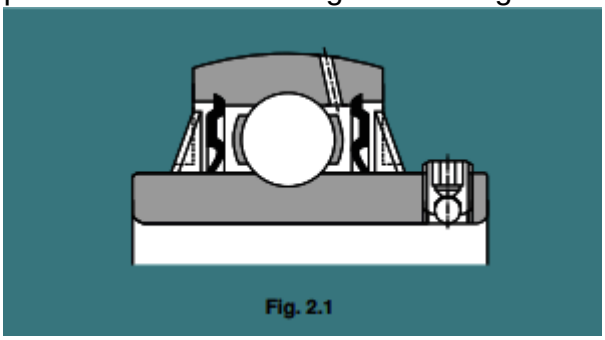


Fig. 2.1

Bearing units with covers?The NTN bearing unit with a cover consists of a standard bearing unit and an outside covering for extra protection against dust. Special consideration has been given to its design with respect to dust-proofing.
Sealing devices are provided in both the bearing and the housing, so that units of this type operate satisfactorily even in such adverse environments as flour mills, steel mills, foundries, galvanizing plants and chemical plants, where excessive dust is produced and/or liquids are used. They are also eminently suitable for outdoor environments where dust and rain are inevitable, and in heavy industrial machinery such as construction and transportation equipment.
The rubber seal of the cover contacts with the shaft by its two lips, as shown in Fig. 2.2 and 2.3. By filling the groove between the two lips with grease, an excellent sealing effect is obtained and, at the same time, the contacting portions of the lips are lubricated. Furthermore, the groove is so designed that when the shaft is inclined the rubber seal can move in the radial direction.

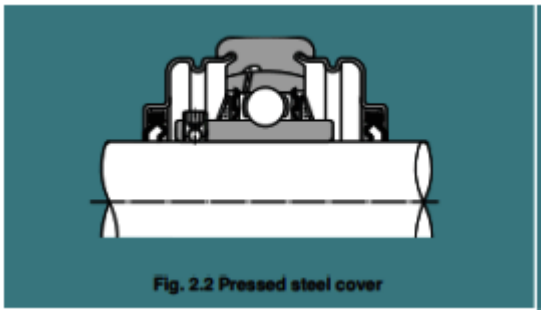


Fig. 2.2 Pressed steel cover

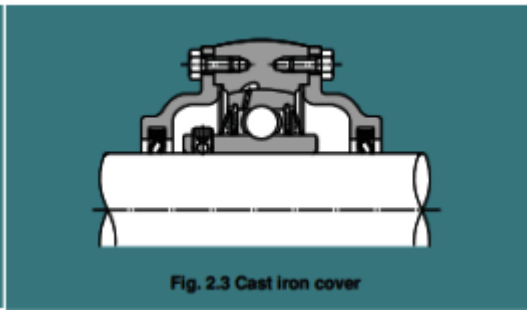


Fig. 2.3 Cast iron cover

When bearing units are exposed to splashes of water rather than to dust, a drain hole (5 to 8 mm, 0.2 to 0.3 inches in diameter) is provided at the bottom of the cover, and grease should be applied to the side of the bearing itself instead of into the cover.

4.Secure fitting

Fastening the bearing to the shaft is effected by tightening the ball-end set screw, situated on the inner ring. This is a unique NTN feature which prevents loosening, even if the bearing is subjected to intense vibrations and shocks.

5.Self-aligning

With the NTN bearing unit, the outer surface of the ball bearing and the inner surface of the housing are spherical, thus this bearing unit has self-aligning characteristic. Any misalignment of axis that may arise from poor workmanship on the shaft or errors in fitting will be properly adjusted.

6.Higher rated load capacity

The bearing used in the unit is of the same internal construction as those in NTN bearing series 62 and 63, and is capable of accommodating axial load as well as radial load, or composite load. The rated load capacity of this bearing is considerably higher than that of the corresponding self-aligning ball bearings used for standard plummer blocks.

7.Light weight yet strong housing

Housings for NTN bearing units come in various shapes. They consist of either high-grade cast iron, one-piece casting, or of precision finished pressed steel, the latter being lighter in weight. In either case, they are practically designed to combine lightness with maximum strength.

8.Easy mounting

The NTN bearing unit is an integrated unit consisting of a bearing and a housing. As the bearing is prelubricated at manufacture with the correct amount of high-grade lithium base, it can be mounted on the shaft just as it is. It is sufficient to carry out a short test run after mounting.

9.Accurate fitting of the housing

In order to simplify the fitting of the pillow block and flange type bearing units, the housings are provided with a seat for a dowel pin, which may be utilized as needed.

10.Bearing replaceability

The bearing used in the NTN bearing unit is replaceable. In the event of bearing failure, a new bearing can be fitted to the existing housing.

3.Allowable rotating speed

The allowable speed while ensuring the safety and long life of ball bearings used in the unit is limited by their size, the circumferential speed at the point where the seal comes into contact, and the load acting on them. To indicate the allowable speed, it is customary to use the value of dn or dmn (d: bore diameter of the bearing; dm: diameter of the pitch circle ? (I.D. + O.D.)/2, n: number of revolutions).

Problems connected with the lubrication of bearings are the generation of heat and seizures occurring at the sliding parts inside the bearing, in particular at the points where the ball is in contact with the cage, inner ring and outer rings. The contact pressure at the points where friction occurs on the cage is only slightly affected by the load acting on the bearing; the amount of heat generated there is approximately in proportion to the sliding velocity. Therefore, this sliding velocity serves as a yardstick to measure the limit of the rotating speed of the bearing. In the case of a bearing unit, however, there is another large factor that has to be taken into account – the circumferential speed at the part where the seal is in contact.

The graph in Fig. 9.1 indicates the allowable speed, taking into account the aforementioned factors.

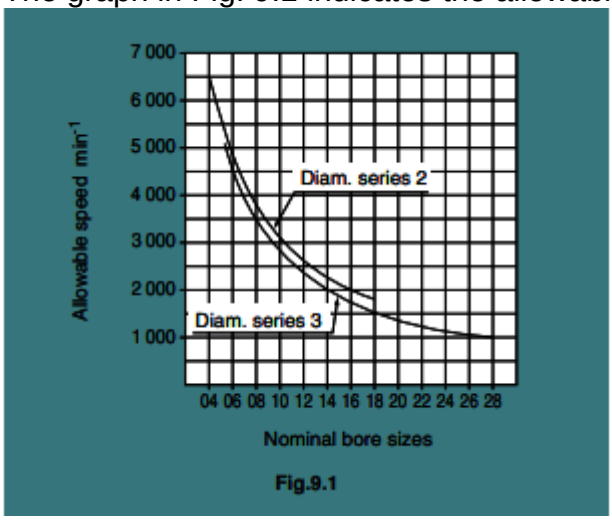


Fig.9.1

There are two common methods of locking the bearing unit onto the shaft – the set screw system and the eccentric color system. However, in both of these systems, high-speed operation will cause deformation of the inner ring, which may result in vibration of the bearing. For high-speed operation, therefore, it is recommended that an interference fit or a clearance fit with a near-zero clearance be used, with a shaft of the larger size as shown in Fig. 11.1 and Fig. 11.5. For standard bearing units with the contact type seal, the allowable speed is 120,000/d. Where a higher speed is required, bearing units with the non-contact type seal, are recommended. Please contact NTN regarding the use of the later type.

4.Material

1.Raceway and rolling element materials

Materials with high hardness and appropriate toughness are used for the inner rings, outer rings and balls of the insert bearings since large compression forces and repetitive stresses are applied to a small contact. In general Coldrolled steel is used for the cages. For special applications, stainless steel is also available for use in the insert bearings.

2.Housing materials

The most common materials used in NTN bearing unit housings are cast iron or steel plate, with cast iron being the standard.

For special applications, materials such as spheroidal graphite iron, structural steel, stainless steel cast iron or plastic resin are also available for use in the housings. The chemical resistance properties of glass-fiber reinforced resin are shown in Table 3.5.

(1)Cast iron housing

NTN uses gray cast iron as the standard material for cast iron housings. Among metallic materials cast iron has a high damping capacity, which is an ideal characteristic for mechanical components. This means cast iron, exhibits superior performance when absorbing vibration, compared with other materials. Additionally cast iron is suitable for high temperatures of up to 300C?.

(2)Steel plate housing

Cold-rolled steel sheet or hot-rolled mild steel sheet is used for steel plate housings.

Table 3.5 Water and chemical resistance of glass fiber reinforcing resin housing (PBT)

	Chemicals	Temperature ℃	Deterioration ratio[1] % Number of days soaked 30 days	90 days
Acid	Hydrochloric acid, 10%	23	89	85
	Sulfuric acid, 36%	23	97	97
		60	84	60
	Acetic acid 10%	23	88	88
Alkaline	Potassium hydroacid, 5%	23	88	10
	Sodium hydroacid, 10%	23	※	※
	Ammonia hydroacid, 10%	23	96	87
Oil	Motor oil	23	100	100
	Brake oil	23	100	100
	Gasoline (Regular)	23	100	100
		60	93	90
Organic solven	Ethyl alcohol	23	99	96
	Methyl alcohol	23	91	82
	Isopropyl alcohol	23	100	100
	Acetone	23	86	74
	Methyl Ethyl Keton	23	90	80
	Ethyl acetate	23	96	86
	Methylene chloride	23	54	54
	ethylene grycole	23	100	100
Sodium	Zinc chrolide 10%	23	97	94
	Calcium chrolide 10%	23	98	98
	Sodium chrolide 5%	23	97	97

Remarks 1)Deterioration (%) is the strength after test divided by the strength before test. The ? symbol indicates that results could not be measured as the test piece dissolved.
Remarks 2)The values listed in the table are not guaranteed as they are the result of soaking without operating stresses on the sample. Because this strength data is general, it does not apply under all operating conditions. Actual housing strength will vary depending on the type and concentration of liquid, temperature, load, etc.

A complete guide to NTN flanged housings.

Flanged housings are a kind of practical bearing with a wide range of uses. This guide provides detailed information about NTN flanged housings, which is believed to be helpful to you.

1?What kinds of bearing housings are there?

(1) Pillow shaped vertical housing bearing

Pillow-shaped vertical housing bearing is the most common shape of the bearing housing, with two set screws, suitable for use in the transmission and general machinery.

(2) Flanged housing bearing

Bearing seat shape is square or round, bolts have two, three or four, through the bolt mounted on the side wall of the machinery and other places, plus the flange mounted flange seat bearing with cover suitable for use in outdoor conveyors such as wind and rain, blowing sand and rocks in the harsh environment.

(3) Sliding block type housing bearing

This type of bearing seat with sliding groove, in the axial through the groove clamping, in the radial direction can be bi-directional movement, thus very suitable for will occur in the scene of jumping, such as conveyor, transport machine, etc..

(4) Annular housing bearing

The outer circumference of this type of housing is circular, so it has a certain degree of alignment, when the shaft occurs non-axial, non-radial movement, that is, rotational runout, this type of housing bearing can still operate normally.

(5) Frame type housing bearing

This type of bearing structure is similar to the sliding block type housing bearing, because of the external frame, so it is easier to install, do not need to set another sliding groove.

(6) Overhanging type bearing with seat

This type of bearing is overhanging, as the name implies, fixed at the end of the rod, so with threads, ideal for use in screw conveyor.

2?What are NTN flanged housings?

Flanged housings are the most typical and commonly used type, suitable for all transmissions and machinery where the shaft is parallel to the mounting surface. When used with full strength and steel. There are many types of flange bearing housings from the shape of: square, round, diamond, tab square, tab round, ring type, slider type, etc..

The above types of flanged housing mounting holes, four holes, three holes, two holes and without mounting holes, without mounting holes belong to the slider type with two slots up and down, in the rack can move back and forth, so the most suitable for the need to adjust the distance between the shaft occasions, machinery in operation axis can also move, mostly used for belts, chains and other transmission shafts.

3?What are the characteristics of NTN flanged housings?

(1) The flanged housings mainly bear radial load, and can also bear both radial load and axial load.
(2) By using FEM analysis, the strength of the retainer is improved by optimizing the shape and plate thickness.
(3) In order to prevent the surface damage caused by the reduction of lubricating oil, a guide groove is designed in the bearing ring.
(4) The internal structure was improved so that the clearance in the radius direction between the bearing retainer and the bearing ring could be set larger than the eccentricity.
(5) The most important feature is that the flange and the bearing are integrated. When there is no connection at one end of the shaft and it needs to be fixed on a flat surface such as a plate or a wall, the flange bearing shows its unique advantages.

4?How to extend the service life of NTN flanged housings?

(1) Installation of spindle bearing
The correct installation of spindle bearings affects the accuracy, life and performance of the bearings.
(2) The basic condition monitoring of spindle bearing
During use, the basic external conditions of spindle bearing operation should be monitored frequently, such as temperature, vibration and noise measurement. These regular checks will identify potential problems early and will prevent unexpected machine stoppage, so that the production plan can be realized and factory productivity and efficiency can be improved.
(3) Re-lubrication of spindle bearings
In the process of operation, the bearing requires proper re-lubrication to perfect its performance. Bearing lubrication method, divided into grease lubrication and oil lubrication. In order to make the bearing perform well, first of all, to choose the appropriate use conditions, the use of the purpose of the lubrication method. If only lubrication is considered, the lubricity of oil lubrication is dominant, but grease lubrication has the advantage of simplifying the structure around the bearing.

5?How to install NTN flanged housings correctly?

(1) Installation site requirements: If the flanged linear bearing surface cleanliness is not enough, easy to make the bearing in operation vibration and noise, and even serious wear. So ensure that the installation environment is clean before installation, and the surface of the bearing is also well cleaned.
(2) before installation requirements: before installing the flange linear bearing to clean its work, and then coated with clean high-quality lubricating oil, to know the cleanliness of the bearing life and vibration noise has a lot to do with, so the use of more attention.
(3) the choice of lubricant: lubrication has a great impact on the operation of the bearing as well as service life, so the choice of lubricant should pay more attention to different types and the same type of different brands of lubricant lubrication performance varies greatly, allowing the rotational limit is different, so the choice of lubricant should be based on the base oil to decide.
(4) lubricant add: flange linear bearing lubricant is not add more the better, this is a wrong concept, too much lubricating oil electric cause grease excessive stirring produce extremely high temperature, easy to cause damage to the bearing, so add the right amount of lubricant can.

6?Does the flange of NTN flanged housings rotate with the outer ring or the inner ring?

The bearing is set on the shaft, there is no relative movement between the inner ring and the shaft, the outer ring rotates relative to the shaft. Who rotates is relative. If you let the outer ring be fixed, the inner ring rotates with the shaft; if you let the inner ring be fixed with the shaft, the outer ring rotates. Regardless of who rotates, the inner ring and the shaft are theoretically fixed, and there is no relative motion. This is the ideal situation, in practice, if the inner ring and the shaft are not fixed by the interference fit, there is a possibility of friction.

7?What are the causes of temperature rise of NTN flanged housings?

(1) Bearing assembly is too tight will lead to bearing temperature rise.
(2) Bearing load is too large will also lead to bearing temperature rise.
(3) Bearing seat ring in the shaft or shell rotation will also lead to bearing temperature rise.
(4) If the bearing cage or rolling body is broken, it will also lead to the bearing temperature rise.
(5) whether the quality of the lubricant becomes bad, if the lubricant viscosity will lead to bearing temperature rise.
(6) bearing mechanism assembly if too tight, insufficient clearance will also lead to flange bearing temperature rise.

8?How to do the assembly work of NTN flanged housings?

Because flanged housings are high-precision products, if improperly assembled, it is easy to cause damage to the bearing groove, resulting in bearing damage. The bearings should be assembled with special molds, not knocked at will, and only small circles can be stressed when pressing into the shaft, and only large circles can be stressed when pressing large circles. When assembling, air pressure or hydraulic pressure should be used, and the upper and lower die should be horizontal when press-fitting. Any tilting will cause the bearing groove to be damaged due to the force and cause the bearing to produce guide ring.

Bearings in the installation to the rotor to do dynamic balancing is easy to dynamic balancing when the iron chips into the internal bearing, so it is best to do dynamic balancing before installing imported bearings. There are some manufacturers in order to facilitate assembly, assembly in the bearing room coated with some oil or grease lubrication effect, but often the operator is difficult to control the amount of good, if the oil or grease in the bearing room to accumulate more, in the bearing rotation is easy along the shaft into the flange bearing inside. It is better not to apply oil or grease in the bearing room, if it is necessary to apply it, then it should be controlled that there is no accumulation in the bearing room.

Lacquer rust characteristics are mostly found in the sealed motor, the motor in the assembly sound is very good, but in the warehouse after some time, the motor noise becomes very large, remove the bearing has a serious rust phenomenon. Most of them used to think that it is the problem of flange bearing, but now the motor factory has realized that it is mainly the problem of insulating paint. The problem is mainly because the insulating paint volatile acid in a certain temperature, humidity, the formation of corrosive substances, the bearing groove corrosion leads to bearing damage. At present, the problem can only be solved by using good insulating paint and assembling after drying and ventilating for a period of time.

The bearing should be rotated flexibly without blocking feeling after pressing into the bearing. If there is obvious rotation inflexibility, it indicates that the size of the shaft is too large and the tolerance should be adjusted downward. If there is obvious rustling feeling after the imported bearing is pressed into the shaft and rotated by hand, it may be that the tolerance of the shaft is too big or the roundness of the shaft is not good, so the roundness should also be controlled when the tolerance of the shaft and bearing chamber is controlled.