DN-3ZW216

INSTRUCTION MANUAL

Rolling Bearing

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TO THE END USER SURELY.

TOSHIBA MITSUBISHI-ELECTRIC INDUSTRIAL SYSTEMS CORPORATION

CONTENTS

1. Handling care during transportation

All motors using rolling bearings are protected against fretting corrosion induced by fine vibration during transit, with a temporarily mounted protection unit. Before starting a motor, be sure to remove this protection unit following the instruction given on the attached caution card, to bring the motor into normal condition for operation. As there is case that this protective devices are not only attached on the load side bearing but also on the opposite load side bearing, confirm certainly that the protective devices on the both bearings are removed before trial run.
An example of the caution card is shown in Fig. 1.

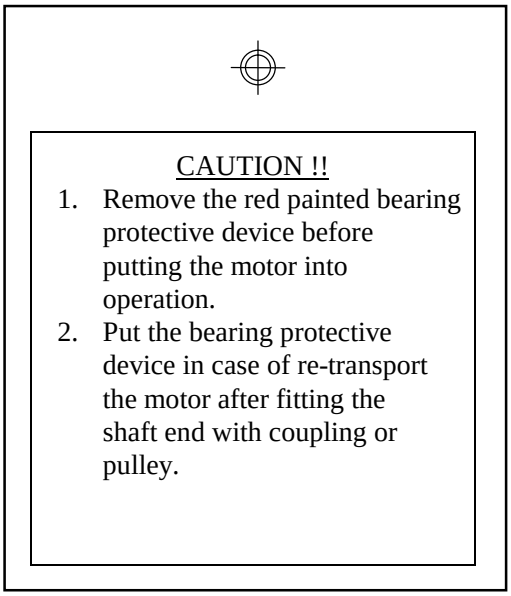


Fig. 1 An example of the caution card

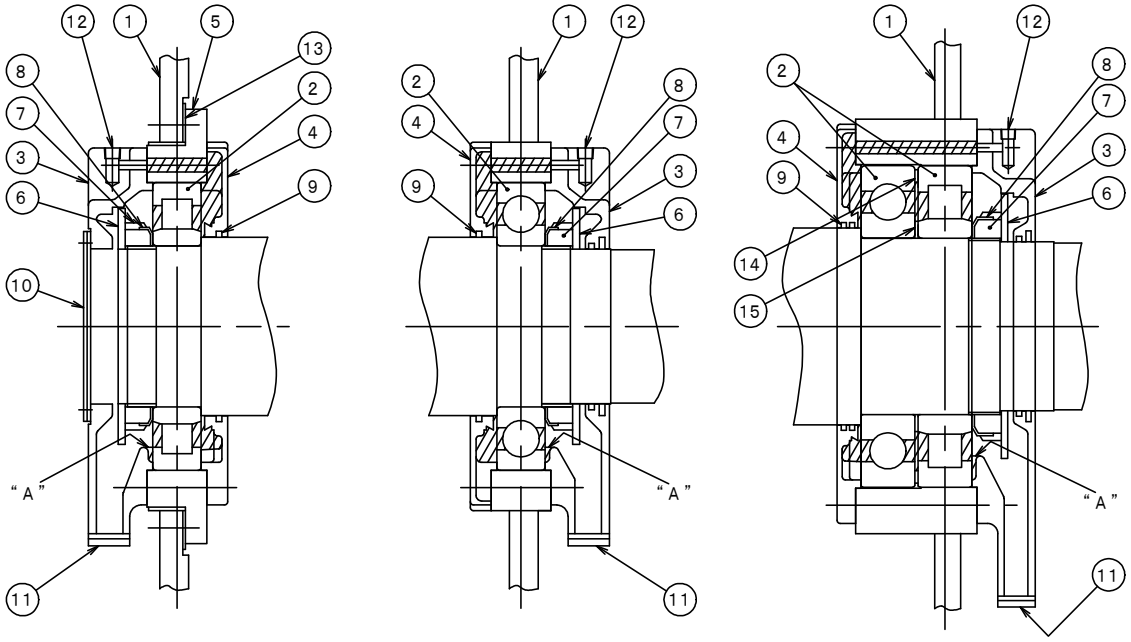
2. General cautions before formal operation

(1) Grease-up
The bearing of grease-lubricated motors are fully filled at our factory before shipping.
However, since usually long time lapses after shipping till the start of operation at the user's plant, grease-up is required at trial operation. For the type and amount of grease required by the bearings, refer to the bearing nameplate attached to the motor.

(2) Make sure that the inner and the outer bearing covers are tightly closed and firmly installed, without any dust-entering gap.

(3) Turn the rotor slowly and check for abnormal noise.

3. Construction of rolling bearing assembly



Opposite load side　　Load side (1)　　Load side (2)

Part No.	Part name
1	Bearing bracket
2	Rolling bearing
3	Outside oil shield
4	Inside oil shield
5	Insulated bearing support
6	Grease valve
7	Lock nut
8	Lock washer
9	Felt seal
10	End cover
11	Grease drain cover
12	Grease filler
13	Insulation
14	Spring
15	Spacer

Fig. 2　Grease-lubricated rolling bearing structure

4. Maintenance

The maintenance of rolling bearings are outlined in the Maintenance Section of the General Instruction Manual, but they are described in more detail below.

The rolling bearings must be maintained and checked on proper schedules adapted to the operation conditions of the machine. For the grease-up interval, refer to Section 5.

4.1 Daily maintenance

4.1.1 Bearing noise during operation

Defects in rolling bearings can most conveniently be detected by their running noise. Listen to carefully to the bearing noise with a stethoscopic rod. Typical bearing noise types are as follows:

(1) Squeak
The tone is like squeaking metallic materials and it is generated in the case of bad lubrication condition or adhesion condition, or excess radial bearing clearance.
They generate more frequent in winter, and tend to temporarily disappear of faint when grease is added. It has been confirmed that bearing temperature does not rise and there is no problem for bearing or grease life when the noise is judged to squeak noise.

(2) Sliding noise
Sliding noise causes from the minor irregularity on the raceway surface of the outer ring or on the rolling element's surface. As long as it is simple and soft noise, it is harmless.

(3) Knocking noise
Knocking vibration noise is produced when the radial bearing clearance is excessive, or the outer ring is installed in misalignment.

(4) Muddy noise
Intermittent muddy noise indicates the presence of dust or magnetized metal particles in the bearing. Continuous muddy noise indicates early flaking on the rolling elements or raceway surfaces, or electrolytic erosion. It occurs at high speeds.

(5) Buzzing noise
(a) Reverberating vibration noise resulting from abnormal deformation in the bearing housing by the rotor weight occurs when its amplified deformation is conducted to the outer ring of the bearing.
(b) When the grease lubrication effect is faulty, the rolling elements locally slip relative to the raceway surfaces of the inner and outer rings, and produce roaring noise.
(c) When the shaft is eccentric or not accurately square, vibration and squeaking roar are produced.
This noise is especially loud with roller bearings. At low speeds, the noise is loud, and at high speeds, fine high-frequency noise is produced.

(6) Roller dropped out noise, ball dropped out noise
These dropped out noises are produced when the bearing is subject only to radial load at low speed. When the rolling elements leave the loaded position and enter the unloaded position, they become free to move, and drop under gravity to collide with the cage or the raceway, producing noise.

4.1.2 Bearing temperature

Rolling bearings may not be in abnormal conditions even when the temperature is high, and individual study is required to evaluate their conditions. When grease with low cone penetration is used in a high speed bearing, the bearing temperature rises, but this is because of the intensive stirring of the grease, and as long as the temperature is within the allowable range of the grease, no special measure is required. However, temperature rise in a manner significantly different from normal can be an indication of some faults such as excess grease, deteriorated grease and flaking, so that daily recording of the bearing temperature is necessary.

The temperature of rolling bearings can be measured with a dial thermometer, a thermocouple, or a R.T.D, but a bar thermometer attached to the bearing housing with a putty is also satisfactory.

Daily monitoring and recording of the temperature will enable the detection of bearing faults.

4.1.3 Grease leakage

Inspect the bearing area for grease leakage.

4.1.4 Bearing vibration

Daily recording of the vibration on bearings can discover abnormal vibration. Faults such as flaking, abrasion, denting, galling, breaking and electrolytic erosion produce loud noise, heating and vibration, and demand bearing replacement, but when proper measures are taken at the early stage of faults, accidents are avoided.

The following are representative diagnostic guidelines:

(1) When vibration and noise increase in relatively short time, the load condition should be checked.
   (a) Excessive load such as belt tension
   (b) Excessive thrust load due to the heat expansion of motor or the directly coupled machine.
   (c) Excessive thrust load due to the inadequacy in direct coupling, etc.
   (d) Excessive radial load to distorted foundation or introduced in the course of installation.

(2) With a ball bearing, axial vibration in an abnormally high frequency is observed sometimes. This is a resonance of the natural frequency of the vibration system consisting of the mass of the bearing outer ring and the axial elasticity of the rolling elements with the random waving. In this case, vibration occurs and fades very irregularly. Occasionally, the bearing area of the bearing housing produces abnormal beat resonance.
   In this case, the following counter measures must be taken:
   (a) Replacing the bearing
   (b) Applying some preload to the thrust direction of the outer ring.
   (c) Changing the grease with one of better lubrication effect

4.1.5 Cautions in daily checks

When opening the bearing drain cover, take great care not to allow the entry of dust or metal powder, etc. to prevent damage to the bearing. Also take care not to allow foreign matter entry when storing grease for refill or injecting grease with a grease gun. Unless some sign of fault is evident, the bearing should not be opened.

4.1.6 Long-period out of operation and storage

Motors left out of operation for a long period of time, or stand-by motors should be greased once in 6 months while turning.

Spare bearings must be coated with rust-preventive oil, oil-resistively packed, sealed in a case, and stored in a dust-free, cool and moisture-free place. Large bearings should be placed on a flat shelf.

4.2 Yearly maintenance

4.2.1 Grease change or grease-up (see Fig. 1)

Bearing grease has definite service life, and after its life, it deteriorates and decreases. If the motor is run with the bearing filled with deteriorated grease, the bearing becomes heated and eventually burns. Replace the old grease with new grease. The grease change or replenish intervals are given in Table 1, as well as on the bearing name plate. Add grease as follows:

When running the motor, remove grease drain cover ⑪ in Fig. 1, clean the area around grease filler ⑫ by wiping, removing dirt, and inject grease into grease filler ⑫ with a grease gun. The old grease is pushed out of the drain port. When the injection volume according to the bearing nameplate has been injected, stop injecting, and let the motor run a while, with the cover of the grease drain port open to allow excess grease to flow out. If the drain cover is closed without discharging the excess grease, the bearing may heat abnormally. When no more grease is discharging, close the drain cover.

4.3 Maintenance at periodical overhauling

In the course of the periodical overhauling, various parts of the motor are checked, and as far as the bearing is concerned, the check is the same as the “yearly maintenance”, with the addition of the following.

4.3.1 Cautions is removing bearing

When removing the bearing, pay attention to the following cautions:

(1) When a bearing is removed, be sure to install a new bearing, without re-using the removed bearing.

(2) Carefully wash and clean the area around the bearing, including the shaft, the bearing housing and the oil shield, and carefully keep the interior of the grease feed pipe clean.

(3) When disassembling and reassembling the motor, be careful in handling the insulation for blocking shaft current, inserted in the opposite load side bearing housing. Take care also not to allow current conducting dust to deposit in this area.
For the exact location of the insulation, refer to Fig. 1, the bearing structural drawing. Where a bearing thermometer is installed, the element is also insulated, and due caution is required in handling it.

4.3.2 Measuring insulation resistance

To evaluate the shaft current blocking insulation, measure its insulation resistance in the course of trial run after reassembling the motor, with a 500V megger. At least 0.5MΩ at the time of motor disassembly shall be acceptable.

5. Lubricant

5.1 Selection of grease

(1) Recommended grease

Unless otherwise designated, fill with the following grease.

Manufacture	Product	Soap
JX Nippon Oil & Energy	・Multinoc Super Deluxe	Lithium complex
Kyodo Yushi	・Raremax Super	Polyurea

The following types of grease can be recommended particularly for use in motors. Please contact a Toshiba Mitsubishi – Electric Industrial Systems Corporation customer service representative if you are considering the use of other types of grease.

Table 1 Types of grease

Manufacture	Product
JX Nippon Oil & Energy	・Multinoc Deluxe No.1 (Lithium base) ・Multinoc No.1, No.2 (Lithium base) ・Multinoc Urea No.2 (Urea base)
Kyodo Yushi	・Multemp SRL, SRH (Lithium base) ・Unilube No.2 (Lithium base) ・Raremax Super (Urea base)
Showa Shell Sekiyu	・Shell Alvania RL2 (Lithium base) ・Shell Stamina Grease RL2(Urea base)
Exxon Mobil	・BEACPM325（Lithium based for low temperature) ・Mobilith SHC 100 (Lithium complex base) ・Unirex N2 (Lithium complex base) ・Polyrex EM (Urea base)
Cosmo Oil Lubricants Co.,LTD.	・Dynamax No.2 (Lithium base) ・Cosmo Wide Grease WR
SKF	・LGHP2 (Urea base)

(2) Selection criteria according to the purposes

- For use in a high speed bearing, use grease with high pressure resistance. Choose a high consistency type concerning noise, and a low consistency type in terms of stirring loss. Generally, No.1 or No.2 grease is used.
- For low speed and high load service, use grease with high pressure resistance and low consistency.

- For long-period oil less service, use grease containing antioxidant and that is high in restorability (the property to return to the previous state while the bearing is stopped).
- For a high temperature bearing in particular, grease with a nonmetallic soap base (nonsoap) may be used.
- For damp places, use a water resistant type.
- For the standard motor of this series, the following grease is used:
  Li + Na soap base, consistency 265 to 295.
  The grease must be selected basically according to the conditions mentioned above, but other grease may be also used. However, do no mix different greases.
  When changing the grease, completely wash away the old grease, and supply new grease.
  However, in the case of a similar soap base (Li + Na) grease to Li soap base grease, a slightly larger volume may be required to force out the old grease.

- The following greases are used for heat resistant, water resistant, or cold resistant requirements.
- Heat resistant (up to 150℃) : heat resistant silicone grease (not suitable for high-speed rotating bearings)
- Water resistant, chemical resistant (other than caustic soda) : silicone grease (not suitable for high-speed rotating bearings)
- Cold resistant (up to -60℃) : cold resistant silicone grease (not suitable for high-speed rotating bearings)

NOTICE

- During operation, the bearing temperature will generally be several degrees higher than the measured temperature of the bearing housing.
  Be sure to select a grease with temperature specifications that enable it to handle this higher bearing temperature.

5.2 Grease-up

Since the grease will deteriorate with use, and lose lubrication function, the bearings must be replenished with grease periodically, according to the bearing nameplate attached on the motor. The grease-up interval should be within 1 year or 3000 running hours.

Note (1) When starting to run the motor after purchasing, of after 2 months or longer stoppage, be sure to add grease immediately after starting.
(2) After starting operation, add grease in the quantity and at the interval indicated on the bearing caution plate on the motor.
(3) While injecting grease, keep the motor running or turn it by hand, with the grease drain port open.
(4) “Initial quantity” is the quantity for filling the bearing after disassembly cleaning.
(5) “Regrease quantity” is the quantity to be injected at each “refill interval”.
(6) Do not think of adding more quantity so as to extend refill interval.
(7) On the basis of the refill interval indicated on the caution plate, calculate the equivalent interval days, assuming 24-hour daily operation, and inject grease accordingly. This will extend bearing life and keep the bearing running in good condition. When the motor is irregularly operated, e.g., running 12 hours a day, then, 8 hours or 3 hours a day, calculate the refill interval assuming daily 12-hour operation to maintain good lubrication conditions.

(8) Since a 4-pole or a 6-pole motor tends to develop failures such as abnormal noise, abnormal wear and bearing burning at high probability, when the specified grease injection after the installation of the motor, after 2 months or longer stoppage, or at the specified period under operation is neglected, rigorous maintenance (greasing) is particularly important with these bearings.
(9) Since excess grease causes bearing overheating, prolonged high temperature, or grease leakage, and too little grease causes local lack of grease in the bearing and consequential burning. Be sure to keep the specified add quantity.

5.3 Grease discharge

When the outside oil shield is filled with grease, the stirring resistance creates heat to overheat the bearing or forces out grease. When adding grease, remove the grease drain cover and positively discharge grease and positively discharge grease.

6. Troubleshooting

6.1 Causes of problems that can be found during operation, and their remedial actions.

Check antifriction bearings for troubles in regard to sounds, vibrations, and heating to preclude any major accident that may result from the troubles. If you discover any problems, consult the table below and take the appropriate corrective action.

Trouble		Possible cause	Remedial action
Abnormal sounds	1. Pronounced retainer sound (jingling)	This sound is generated as the retainer vibrates to collide with the balls or rollers. It is normal unless it is excessively large. The sound will increase as the grease is undersupplied or the retainer is worn.	Replenish the grease (into the cage riding clearance to the extent possible). If the sound recurs, replace the bearing.
	2. Shrieking sound (high-pitched metallic sound)	Underlubrication, grease with poor lubrication performance or excessive radial clearance. (This sound can occur abruptly and its cause may not be readily identified at times.)	The sound is of no problem and has no effect on bearing life unless it is so large as to cause vibrations. Replenish the grease, use the grease that is soft and has good oiliness, or replace the bearing with a one having a smaller clearance.
	3. Remedial action	Scratches on the raceway surface or rolling elements. (Rust sometimes may cause a continuous noise to occur.)	Inject the grease. Replace the bearing if the sound recurs after a short time interval.
	4. Dust sound (intermittent jarring sound)	Presence of dust or magnetized iron chips	Clean or replace the bearing. If the sound is left unattended, it may develop into bearing damages.
	5. Howling and resonant sound	Grease with poor lubrication performance, shaft out of center, or improper perpendicularly.	Replace the grease with one having good oiliness, or correct for optimal preload or fit.

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Trouble		Possible cause	Remedial action
Bearing vibrations	1. The vibration of the bearing section under continuous study has increased.	Scratched or worn bearing, presence of foreign matter, defective lubrication due to under lubrication or degraded grease.	Replace the bearing. Inject a new grease, or discharge the old grease.
	2. Vibration has pronounced after disassembling.	Improperly mounted bearing (improper perpendicularly or twisted assembly.)	Reassemble the bearing assembly or readjust the mounting after confirming the radial clearance rating.
Excessive temperature rise in the bearing section	Temperature has increased since installation	Presence of scratches or dust on the bearing.	Replace or clean the bearing.
		Defective lubrication due to under lubrication or degraded grease.	Inject a new grease or discharge the old grease.
		Excessive grease injection (The temporary temperature rise following injection is not a problem.)	If an over greasing protective device is installed, inject the grease with the discharge port open while running the machine.
		Improperly mounted bearing (twisted or bent).	Correct the mounting.
		Increased bearing loads (increased belt tension, defective direct coupling, increased thrust from loads, etc.).	If the temperature rise still persists after a new grease is injected, examine the sound and vibration considerations as a whole and take appropriate action, such as reassembling or bearing renewal, as required in the circumstances.
		Temperature rise in the rotor due to increased loads.	Remove the overloads.
		Oil bath lubrication	
		Faulty oil ring rotation (warping, wear, loose mating surfaces, misalignment)	
		Insufficient oil supply (insufficient fill amount or oil leakage)	Replace in the event of warping due to wear or reduction in weight.
		Faulty lubricant	Fill with oil.
		Inappropriate oil type (excessive or insufficient viscosity)	Wrong oil type
		Degeneration or deterioration	Check color and oxidation
		Oil temperature too high (room temperature too high)	
		Oil contaminated by foreign matter (water or solids such as dirt or metal powder)	Check the route by which the foreign matter entered

6.2 Causes of problems that may be found by disassembling inspection, and their remedial actions

It is extremely important to check bearings for their damaged conditions after they are isolated for reasons of abnormal noises, abnormal vibration, breakage, etc., and identify the causes of the faults in order to prevent recurrence of the accidents. Use the following table as a general guide.

Item	Damaged condition	Possible cause	Remedial action
Early flaking (local peeling of metallic surfaces)	1. One-side flaking on the groove of a radial ball bearing.	Increased thrust loads Excessive thrust from loads or poorly adjusted assembly after inspection.	Examine thrust loads Adjust the preload at mounting properly
	2. Flaking at symmetrical positions on the outer ring raceway surface of self-aligning bearings and the like.	Outer ring pressed by foreign matter in the split housing assembly.	When it is necessary to remove the top half for purposes of inspection, be sure to clean the mating surfaces of the housing before reassembling.
	3. Slanted flaking on the raceway surface of a radial ball bearing.	(1) The opposite bearing centers are misaligned due to a defective bracket or stand assembly. Inclined bearing installation.	Perform assembly properly. Use a bearing with a lager bearing clearance.
	4. Flaking on the raceway surface at intervals of the rolling element pitch.	(1) Scratches caused by excessive force applied via rolling elements at installation.	Review the mounting method
		(2) Flaking resulting from scratches caused during mounting of a cylindrical roller bearing and the like.	Prevent mounting scratches by ensuring a proper internal clearance after mounting and by following proper mounting procedures.
	5. Local flaking on the raceway surfaces	(1) Foreign matter caught in fit surfaces. (2) Local deformation of the bearing ring associated with scratches on the fit surfaces.	Clean or correct the fit surfaces of the shaft and housing
	6. Other early flaking	(1) Increased loads (2) Increased vibration and Impact loads (3) improper bearing clearance (4) Defective mounting (5) Defective lubrication (6) Rusting	

Continued on the next page.

Item	Damaged condition	Possible cause	Remedial action
Cracks	1. Cracked rolling elements 2. Cracked raceway surface	The rolling elements were subjected to an abnormal impact load due to excessive bearing clearance (1) Foreign matter caused at mounting time. (2) Friction cracks occurred because the fit was loosened to due to over correcting of the shaft or other causes. (3) Rolling element end-face cracks occurred because the retainer, tightened loosely, slid on the rolling element end surfaces.	Replace the bearing as promptly as possible whenever it is found worn to have an excessive clearance. Recheck when mounting the bearing. Repair properly.
Chips	Chipped rib of a roller bearing inner ring	The rib was directly hit when the bearing was mounted.	Take care when mounting to avoid undue force to the rib
Bruises	Bruises on the raceway surface at intervals of the rolling element pitch. Spotted bruises	(1) The rolling elements were subjected to excessive force at time of mounting. (2) The bearing was subjected to excessive loads when halted. The raceway surface or rolling elements were bruised as foreign matter entering the bearing unit was rolled by the rolling elements.	Take care when mounting the bearing. Handle the bearing with care during transit or mounting. Prevent entry of foreign matter at time of mounting. Keep the grease free from contamination by foreign matter.
Fretting	Wear on the raceway surface at intervals of the rolling elements pitch.	The wear occurred as a result of continued inching friction between the raceway surface and the rolling elements caused by following conditions; 1) Vibrations during transit, or under similar conditions 2) Vibrations form other machine during motor without running on the week base conditions.	Take action to secure the rotating part of the bearing during transit. Make stiffen base. Minimize external machine vibration level.

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Item	Damaged condition	Possible cause	Remedial action
Galling	Galling on the roller bearing raceway surface, rib surface, or roller rolling contact surface.	(1) The rollers fail to perform normally or they slide due to abrupt acceleration or deceleration. (2) Defective lubrication, e.g., grease too solid or oil films liable to breakage. (3) Abnormal contact due to mounting errors.	Avoid abrupt acceleration or deceleration. Use a soft, pressure-resistant grease. Improve the contact by eliminating the mounting errors.
Abnormal wear and rusting	Abnormal wear on the rolling contact surface, rolling elements or rib surface.	Foreign matter such as cement powder, acts as an abrasive to cause abnormal wear on the friction surfaces. Any rust on the rolling contact surface or rolling elements can also act as an abrasive causing the same trouble as above. Insufficient, improper or degraded lubricant.	Take care in mounting the bearing to prevent entry of foreign matter or contamination of the grease by foreign matter. Check the sealing device, or improve the operating atmosphere. Prevent rusting due to moisture or acids. Improve the operating atmosphere. Normalize lubrication.
Creep	Wear or galling on the fit parts	(1) Fit loosened as a result of overcorrecting of the shaft or housing. (2) Vibration or impact	Repair properly Check mounting and linkage
Contact corrosion	Wear or galling on the fit parts	(1) Fit parts are in local contact due to their defective correction. (2) Inching slides occurred as a result of elastic deformation due to excessively large loads.	Repair properly
Electrolytic corrosion	Pitched pits or corrugations on the rolling contact surface or rolling elements.	A current sparked, flowing through the bearing	Clean the shaft current preventive insulation device.
Damaged cage	Damaged or worn cage	(1)Defective cage (2)Defective lubrication (3)Mounting damage	With a large cage in use, inject a suitable lubricant into the cage riding clearance.

7. Disassembly and reassembly of rolling bearings

Disassemble and reassemble horizontal shaft, bracket type rolling bearings as follows.

7.1 Bearing disassembly

(1) Disconnect the load machine from the motor.

(2) Remove the thermometer and other accessories.

(3) Remove the parts in the bearing area, referring to Fig. 1.
Take care not to damage the parts during removing.

(4) Remove the bearing using a puller as shown in Fig. 3 or commercial rolling bearing puller. When pulling, heat the inner ring.

7.2 Reassembly procedure and cautions

(1) Preparation
- (a) Clean the reassembly area, bench, tools, etc. and hands, and prepare clean and lint-free cloth.
- (b) Check the fit surfaces of the shaft and the bearing housing for damage, rust, etc., chamfer the edge of the fit surface slightly, remove metal powder, dust, etc. completely, clean in benzene, and dry them.
- (c) When using a new bearing, unpack it only immediately before assembling, and install without washing.
- (d) Check the fit part dimensions for correct interference.

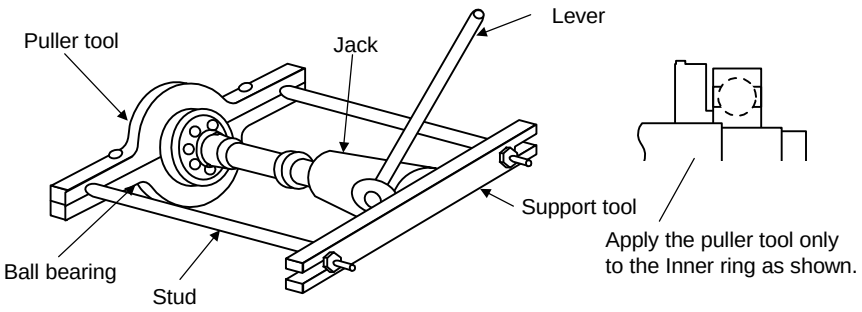

Fig. 3 Example of bearing pulling

(2) Insertion

Mount the bearing squarely with the side of engraved bearing number facing out, as follows:

In shrinkage fitting, uniform heating is important, and never use a torch burner for heating. Heat the bearing in oil at a temperature below 120℃. Since the bearing steel starts to get tempered at 150℃, take care not to heat the oil above 120℃. Take great care to keep the oil clean free from foreign matter by filtering. Where drying oven is available, heat the bearing sealed in a can, placing the can in the oven maintained at 100 - 120℃. After mounting the heated bearing on the shaft, finger-tighten the clamping nut, let the bearing cool to the room temperature, and then firmly tighten the nut at the room temperature.

7.3 General cautions in replacing bearings

(1) Make sure that the types of replacing bearings are same as the ones in the bearing nameplate.

(2) In mounting a bearing, always tightly fit to the shaft, and loosely fit to the housing, to avoid rolling member pressure concentration on small areas of the raceway, and to allow thermal expansion sliding. Too tight fit induces undue force in the raceway, and compression of the rolling elements may cause excessive wear and early destruction. Too slack fit causes slip under load, leading to erosion, loss of bearing function, and excessive short bearing life. The fit classes for ordinary radial rolling bearings are as follows:

(a) Fit between bearing and bearing housing (Inner ring turning)
Bearing housing bore tolerance J6
Bearing OD tolerance ..... Medium; See bearing maker's catalog.

(b) Fit between bearing and shaft (Inner ring turning)
Bearing bore tolerance: ..... Medium, See bearing maker's catalog.
Shaft OD tolerance:
m5 ..... Ball bearing, for shaft OD > ϕ100 mm
m5 ..... Roller bearing, (with lock nut)
m6 ..... Roller bearing, (without lock nut)

(3) After mounting a bearing, make sure that the nut locking washer tongue is firmly folded, and the washer is free from cracks.

(4) After the checking, cover the bearing area with clean paper or cloth to prevent dust entry.

(5) Make sure the inner and outer bearing covers are tightly closed without space for dust entry.

(6) Turn the rotor slowly to check for abnormal noise.

(7) Grease injection
Fill the hatched area in Fig. 3 with grease. The space to be filled with grease includes the supply sector of the inside oil shield, 2/3 of the other sector, the feed route from the grease nipple, the bearing interior, and portion A in the drain area.

When reassembling the bearing after disassembling for periodical overhauling and replacing, first fill the bearing side of inside oil shield ④, and the inside of rolling bearing ②with grease, and then reassemble the bearing area, apply grease to portion A, and finally install grease valve ⑥and outside oil shield ③.

The initial grease quantity is given on the bearing name plate. In injecting grease, take care not to allow foreign matter entry, and not to overfill to avoid heating.

(8) For an outdoor motor, apply sealant after assembling the bearing area, as shown in Fig. 4.
With an outdoor type motor, after disassembling for periodical overhauling, be sure to coat sealant on the peripheral areas shown below.
(Sealant coating areas are indicated by hatching.)
Since the motor is already sealed with sealant in all the required parts before shipping, the received new motor need no disassembly and sealing.
Use the sealant of Three Bond 1208D or equivalent.

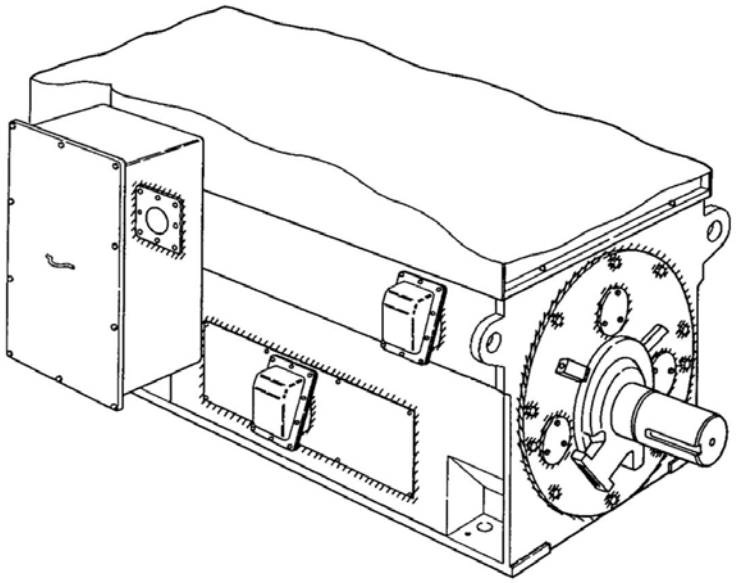

Fig. 4 Sealant application areas

Toshiba Mitsubishi - Electric Industrial Systems Corporation