

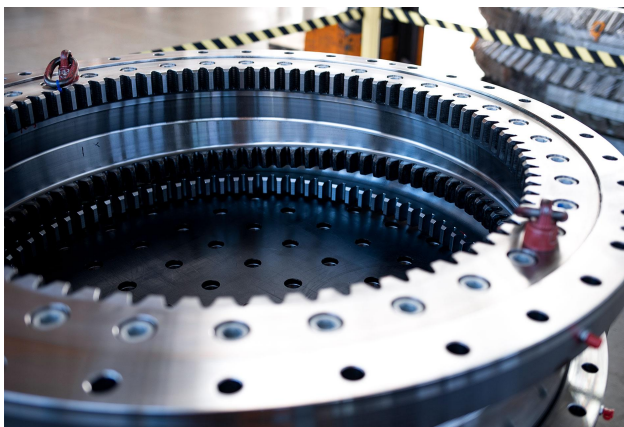
Slewing Bearings

installation and operating instructions



Installation of slewing bearing

1. Before Installation



- (1) Please confirm that the received slewing bearing matches the requirements specified in the contract order.
- (2) Please confirm that the received slewing bearing was not damaged during transportation, especially by radial impacts, to prevent any performance alterations.
- (3) Please confirm that the sealing strip is not damaged.
- (4) Please confirm that the slewing bearing model matches the main machine it will be installed on.
- (5) Please confirm that the installation of the slewing bearing does not cause any collateral safety issues, such as:
 - The rotational speed not exceeding the calculated value.
 - There are no objects obstructing its rotation.
 - Safety measures have been implemented between it and the pinion gear, ensuring no danger to people or property.

2. Mounting bracket requirements

- (1) The mounting surface and platform for installing the slewing bearing must be thoroughly cleaned, free of debris, welding slag, and corrosion.
- (2) The mounting bracket must have sufficient rigidity to prevent deformation of the slewing bearing and to maintain its performance.
- (3) The mounting bracket is recommended to be constructed using a cylindrical welding structure. After welding, it should undergo stress relief heat treatment and be machined. For slewing bearings with a diameter greater than 3 meters, if mechanical machining of the mounting bracket is not feasible, installation can be achieved using filling and molding methods. If a cylindrical structure is used for the mounting bracket, its cylindrical wall dimensions should match the installation dimensions of the slewing bearing. Particularly, the bolt holes of the bracket should align with the mounting holes (bolt or threaded holes) of the slewing bearing to avoid installation deformation.
- (4) The flatness of the mounting surface of the bracket, including angular deviations from horizontal, should be controlled within a certain range during installation.
- Refer to the table below.

Diameter of the center circle of the raceway DL(mm)	The flatness deviation $\Delta(P)$ of the mounting bracket within a 100 mm range. (mm)		
	Single row four-point bearing	Double row angular contact ball bearing	Roller-type bearing
~ 1000	0.15	0.20	0.10
> 1000 ~ 1500	0.19	0.25	0.12
> 1500 ~ 2000	0.22	0.30	0.15
> 2000 ~ 2500	0.25	0.35	0.17
> 2500 ~ 4000	0.30	0.40	0.20
> 4000 ~ 6000	0.40	0.50	0.30
> 6000 ~ 8000	0.50	0.60	0.40

- (5) Within the sectorial surface areas of 0° to 90° to 180°, only one peak is allowed to reach this value, and its deviation must decrease or increase gradually without sudden changes to avoid peak loads.

(6) The distortion deformation of the mounting surface under maximum working load should be controlled within the range specified in the table below. .

Diameter of the center circle of the raceway DL(mm)	~ 1000	> 1000 ~ 1500	> 1500 ~ 2000	> 2000 ~ 2500	> 2500 ~ 3000	> 3000 ~ 3500	> 3500 ~ 4000	> 4000 ~ 4500	> 4500 ~ 5000	> 5000 ~ 5500	> 5500 ~ 6000	> 6000 ~ 7000	> 7000 ~ 8000
Maximum flatness deviation of the bracket. Amax (mm)	0.6	0.8	1	1.3	1.6	2	2.5	3	3.6	4.2	4.8	5.8	7

3. Installation

(1) Place the slewing bearing horizontally suspended on the mounting seat and use a feeler gauge to check the contact between the bearing surface and the mounting surface. If there is any gap, it can be filled with filler material or supplemented with localized shims to prevent deformation of the bearing after tightening the bolts.

(2) During installation, the quenched and tempered soft zone of the slewing bearing (located externally marked with "S" and at the plug hole) should be positioned in non-load-bearing or non-frequently loaded areas.

(3) The three teeth with the largest backlash in the ring gear should be marked with green paint. The clearance between the teeth of the driving pinion gear must be adjusted at these marked positions.

(4) The installation bolts for the slewing bearing should be high-strength bolts, and the appropriate strength grade should be selected based on the bearing's load conditions. .

(5) For the installation bolts, use hardened flat washers. Elastic washers are prohibited. .

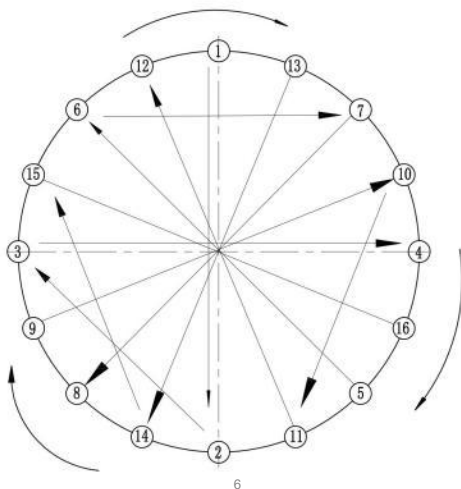
(6) When the mounting holes of the slewing bearing are threaded, before using pneumatic tools to tighten the bolts, manually insert and rotate the bolts into the holes by at least three threads to prevent damage to the mounting threads.

(7) The installation bolts should have sufficient preload force, which is 70% of the yield limit of the bolt material. Torque wrenches should be used during installation. The actual preload torque or preload force for installation bolts, rigorously calculated based on load, specifications, and quantity, can be found in the table below. :

The specifications of the bolts. GB5782-86 GB5783-86	The installation hole diameter. (mm)	The bolt strength grade. GB3098.1-82		
		8.8	10.9	12.9
		The ultimate strength of the bolt material. 0 smin(N/m m ²)		
		640	900	1080
		Preload torque MA (Nm)		
M10	11	44	62	75
M12	13.5	77.5	110	130
M14	15.5	120	170	210
M16	18	190	265	320
M18	20	260	365	435
M20	22	370	520	620
M22	24	500	700	840
M24	26	640	900	1080
M27	30	950	1350	1620
M30	33	1300	1800	2160
		Preload force FA (10 ³ N)		
M33	36	293	412	495
M36	39	344	484	581
M39	42	414	581	698
M42	45	473	665	798
M45	48	553	777	932
M48	52	623	876	1050
M52	56	749	1054	1265
M56	62	863	1214	1457
M60	66	1008	1418	1621

- $MA=0.9M_{sp}$ (Allowable clamping torque)
 - $FA=0.9F_{sp}$ (Allowable clamping force)
 - When the bolt dimensions do not comply with GB5782 or GB5783, the values in the table need to be calculated separately.
 - The total coefficient of friction (μ) between the bolt head and the clamped surface is 0.14. Apply a light coating of oil to the threads.
 - The clamping length of the bolt $LK=5d$ (The bolt diameter).
 - According to the GB3098.2-82 standard, the strength grade of the nut can be one level lower than that of the bolt.
- (8) Before tightening the installation bolts, conduct a gear mesh inspection to ensure that the backlash at the highest point of gear engagement (marked with green paint on three teeth of the large gear ring) meets the design accuracy requirements.
- (9) Tighten the installation bolts symmetrically in 180° increments around the circumference, completing one full circle, to ensure equal preload force on bolts along the circumference.

Tighten the bolts in the sequence shown in the diagram:



4. After Installation

- (1) Ensure that installation does not cause deformation or affect the slewing bearing.
- (2) Verify that there is no deformation reducing the lifespan of the slewing bearing.
- (3) Prohibit overlapping ground wires, welding near the slewing bearing, and welding other components.
- (4) Rotate the slewing bearing for more than 3 revolutions after tightening all bolts. Check for any interference with other components during rotation, ensure the integrity of the sealing ring, and listen for any abnormal noises. After rotation, recheck the clearance values on the tooth side and record these values..

5. Usage and Maintenance

- (1) When the slewing bearing leaves the factory, a small amount of No. 2 extreme pressure lithium-based grease (GB7323-1994) is applied inside the raceway. Upon commissioning, users should refill with new lubricating grease according to different operating conditions.
- (2) Under normal operating conditions, ball-type slewing bearings should be lubricated every 100 hours of operation, while roller-type slewing bearings should be lubricated every 50 hours of operation. In tropical, high humidity, dusty, and highly variable humidity regions, or under continuous operation, lubrication should be performed weekly. Before and after long periods of machine shutdown, new lubricating grease must also be applied. Each lubrication session should completely fill the raceway with grease until it begins to seep out from the seals. Slowly rotate the slewing bearing during grease injection to ensure even distribution of the lubricating grease.

(3) The tooth surface should be cleaned of debris and lubricated every 10 days of operation. Lubricating grease can be selected according to the table below.:

The structure of a slewing bearing	The working conditions		Lubrication points	Lubricating grease		
				Name	Quality indicators	Standard number
Nylon isolation block and rubber seal	Low temperature, room temperature, humid: -20°C ~ +60°C		Raceway	Extreme pressure lithium-based grease	No. 1 No. 2	GB7323-1994
			Gear	Graphite-based lubrication	ZG-S	SH/T0369-1992
Metal isolation block Maze-type seal	High temperature, humid	40°C ~ 120°C	Raceway	Extreme pressure lithium-based grease	No. 1 No. 2	GB7323-1994
				MoS ₂ Complex calcium-based grease	No. 2	
		80°C ~ 180°C	Gear	No. 4 High-Temperature Lubricating Grease	No. 4	SH0376-1992
			Raceway	MoS ₂ Complex calcium-based grease	No. 2	
		Gear	No. 4 High-Temperature Lubricating Grease	No. 4	SH0376-1992	
	Room temperature, resistant to seawater corrosion ~ 50°C		Raceway	No. 2 Complex Aluminum-Based Lubricating Grease	No. 2	
			Gear	No. 4 Aluminum-Based Lubricating Grease	No. 4	SH0378-1992

Due to various factors in comprehensive working conditions, users may choose the optimal grease according to specific requirements..

(4) After 100 hours of operation, check the preload force of the bolts on the slewing bearing. Subsequently, perform checks every 500 hours to ensure sufficient preload force is maintained. Typically, bolts should be replaced every 7 years or after 14,000 hours of operation..

(5) During use, monitor the operation of the slewing bearing closely. If noise, impacts, or sudden increases in power are noticed, stop immediately for inspection and troubleshooting. If necessary, disassemble and inspect the bearing.

(6) During use, prevent direct exposure of the slewing bearing to sunlight. Avoid directly spraying the slewing bearing with water to prevent water from entering the raceways. Take care to prevent hard foreign objects from approaching or entering the gear meshing area.

(7) Regularly inspect the integrity of the seals. If any damage to the sealing strip is found, replace it promptly. If a seal is found to be displaced, reposition it promptly.

6. Storage

(1) The slewing bearing is oil-sealed and packaged at the factory. Packaged slewing bearings can be stored under suitable conditions for 6 months. Idle slewing bearing raceways should be lubricated every 12 months (refer to the previous section “Slewing Bearing Maintenance and Lubrication”); idle slewing bearings need to be re-sealed with rust-proofing oil every 6 months..

(2) The method for oil-sealed packaging is as follows.:

- 1. Remove the slewing bearing from the wooden crate.
- 2. When unpacking, be careful not to damage the sealing strip; unwrap layer by layer from the outermost layer.
- 3. After unwrapping, first inject lubricating grease into the raceway of the slewing bearing, and degrease the surface before performing oil-sealed packaging.
- 4. When degreasing, do not use chlorinated solvents, and prevent solvents from entering the sealing strip and flowing into the raceway.
- 5. After degreasing, clean the outer surface and apply an even layer of rust-preventive grease (F20-1) or industrial petroleum jelly (SY1607-77).
- 6. Then, repackage according to the original method and place it back into the wooden crate. It is best to nail a layer of oil felt inside the wooden crate for moisture and rain protection. If there is no wooden crate for storage after oil-sealed packaging, the bearings can be stacked.
- Note: When stacking, place at least three evenly distributed wooden blocks of equal height along the circumference between each bearing, and ensure that the blocks in the upper and lower layers are aligned.

(3) When storing the slewing bearing, it should be placed in a dry, flat location and stored horizontally. Ensure it is kept away from water pipes and steam pipes to avoid rust caused by temperature changes.

7. Packing and Shipping

(1) Packaging for Automobile Transportation**

Depending on the distance of transport, use wooden crates or wrap with plastic film and plastic woven fabric. Do not allow collisions or rolling. The stacking height must not exceed the height of the truck's side panels. If wooden crates are not used, place at least two wooden boards between the bearing and the truck bed to prevent scratching the bearing end face.

(2) Packaging for Train Transportation**

Use wooden crates for packaging. The bearings must be laid flat and must not be subjected to collisions.

(3) Packaging for Ship Transportation**

After applying rust-preventive grease to the surface of the slewing bearing, wrap it in wax-coated plastic film or asphalt paper with a 50% overlap for one to two layers, then wrap it with plastic woven fabric for one to two layers and place it in a wooden crate. The bearings must be laid flat and must not be subjected to collisions.

(4) Packaging for Air Transportation

- Packaging should be determined based on specific conditions.
- The wooden crates must be sturdy and reliable. In principle, one wooden crate should contain one set of slewing bearings. After placing the bearing in the crate, nail three or more wooden blocks evenly distributed along the circumference of the inner or outer ring to prevent the bearing from moving.
- The documentation accompanying the product when it leaves the factory includes the product quality certificate, installation and operation manual, and packing list (the installation and operation manual can be provided as per the user's request). All documents should be placed in a plastic film bag and wrapped within the inner packaging of the bearing.

- On the packaging wooden crate, it must clearly indicate the slewing bearing's model specifications, quantity, shipping unit, receiving unit, and include markings such as "Handle with Care", "Do Not Drop", and others.
- During lifting, it must be hoisted horizontally, and never vertically on the circumference of the slewing bearing.
- Avoid collision or impact to the inner and outer rings as well as the teeth surface.
- For slewing bearings larger than 3 meters in diameter, use three or more lifting eye bolts to ensure stable and safe lifting (see diagram below).



- When lifting slewing bearings, it is advisable to use lifting eye bolts to prevent damage to the bearings and ensure safety.



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