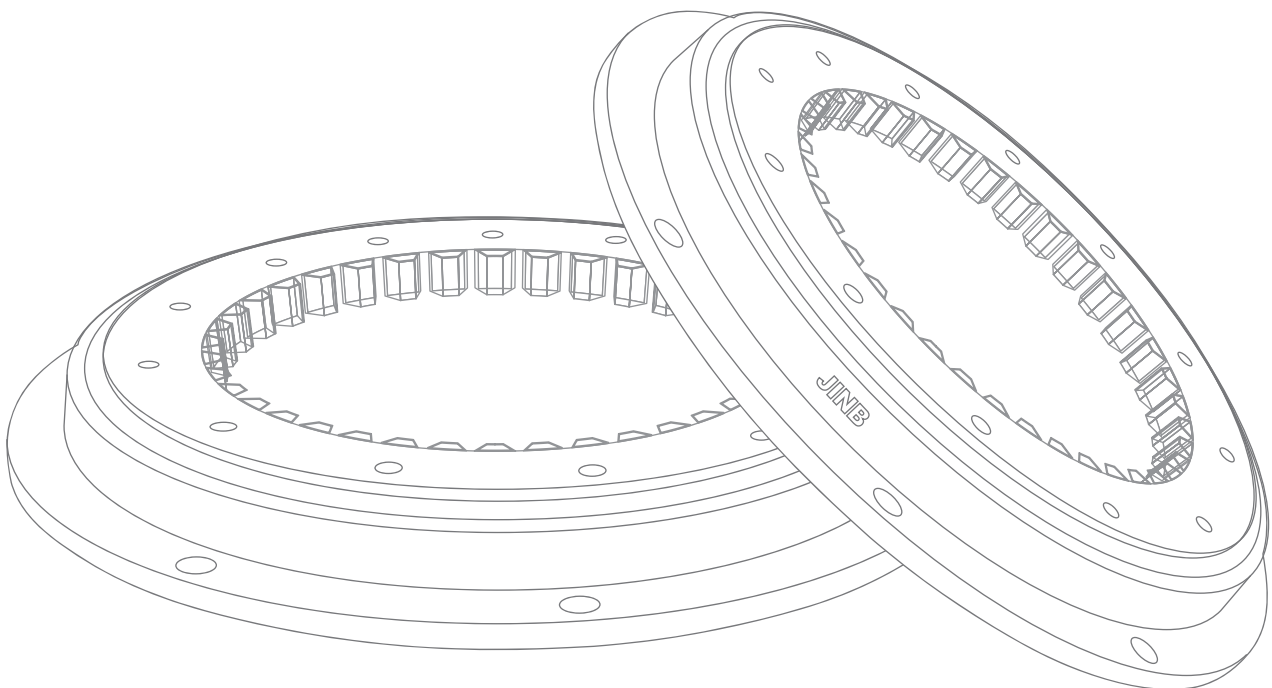


# JINB<sup>®</sup>

## Slewing Rings Operating Manual





*This operating manual provides important instructions for working with the component (slewing ring or gear ring). The specified instructions must be precisely followed, to protect yourself and others.*

*Inform yourself of the locally applicable accident prevention regulations and the general safety regulations.*

*The operating manual must be carefully read prior to starting any work!*

*It is a component of the product and must be kept in the immediate vicinity of the component. It must be accessible to personnel at all times.*

*If this component is provided to a third party ensure that the operating manual is provided with the component.*

*The illustrations in this manual are provided for the purpose of better understanding. They are not necessarily true to scale and can deviate from the actual design of the component.*



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# 1. Slewing Rings

## 1.1. Introduction of Slewing Rings :

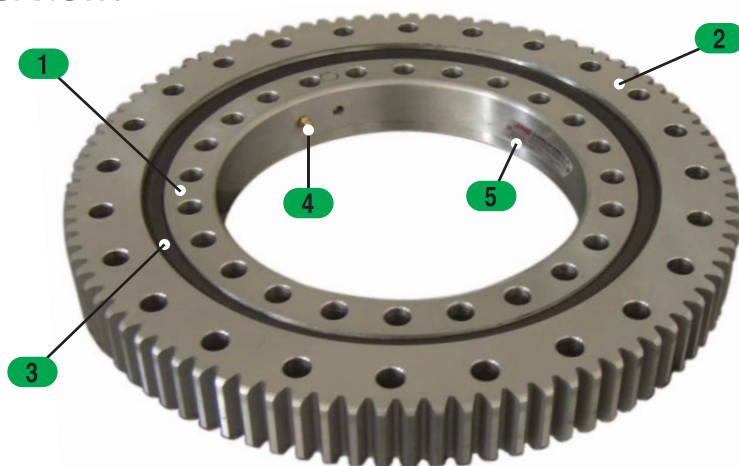
Slewing rings are large-scale ball or roller bearings which can bear comprehensive load. Also, slewing rings can bear relatively large axial and radial load and tilting moment.

As a professional manufacturer of slewing rings in China, based on PRC machinery industry standard JB/T2300-2011 and construction industry standard JG/T66-1999, JINB introduces and adopts domestic and overseas advanced technology of slewing rings, designs and manufactures all types and series slewing ring products with diameters ranging from 90mm to 6000mm. Also, JINB designs and manufactures nonstandard slewing ring products for clients to meet clients' special requirements.

The application range of slewing rings now is continuously extending because of its special designing and manufacturing. They are mainly used in crane (autocrane, tower crane, harbor crane, offshore operation crane, etc. ), engineering machinery ( excavator, loading machine, winding machine, etc.), transport machinery, material processing machinery, metallurgical equipment, foodstuff processing machinery, and military and astronautic enterprise equipment ( tank, antiaircraft gun, rocket launching pad, radar, satellite terrestrial receiver, etc), medical machinery, scientific research equipment, etc.

Slewing rings are generally subjected to axial force load and radial force load as well as axial and radial forces load at the same time. Slewing rings also bear relatively large tilting moment. The operating speed of slewing rings is very low. Normally, it is below 10 rotations/minute. If you want slewing rings with faster rotating speed and higher load bearing, please contact us. Our engineers will design and customized for your equipment.

## 1.2. Overview:



- 1. Inner ring
  - 2. Outer ring
  - 3. Seal
  - 4. Lubricating nipple
  - 5. Name plate
-

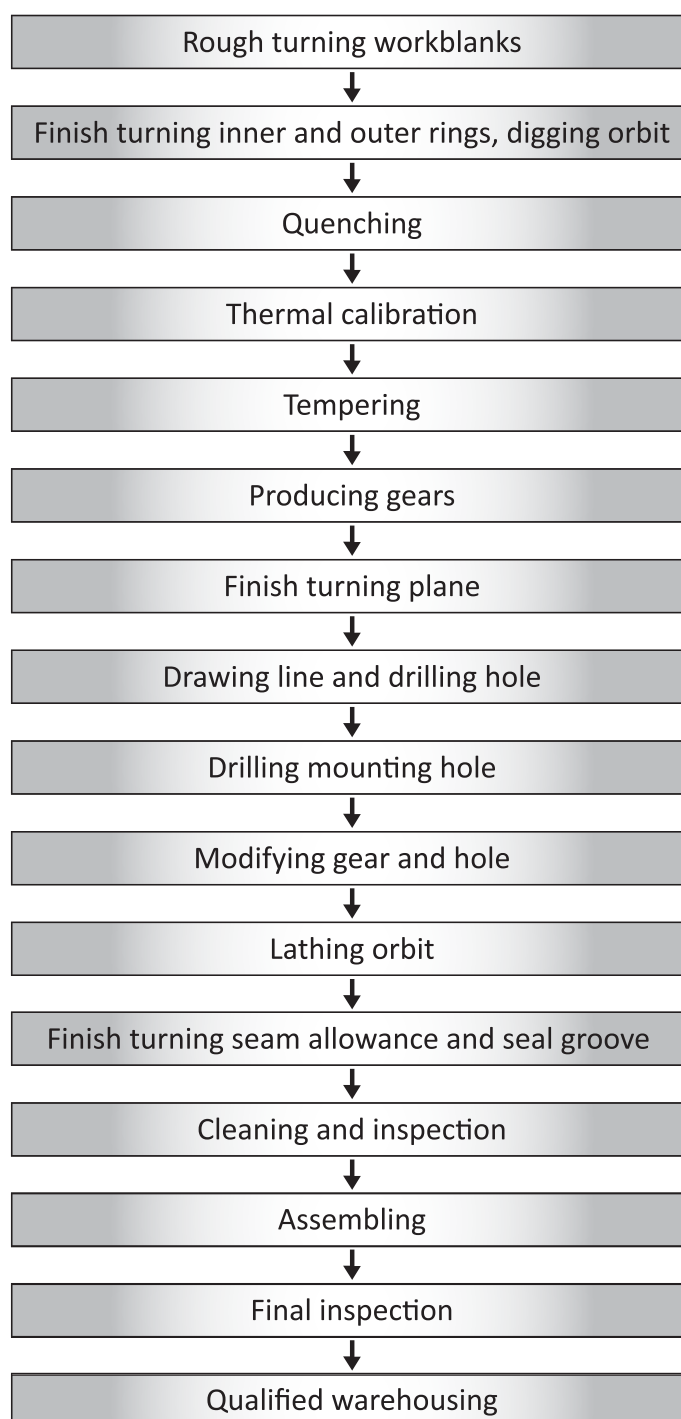
## 2. Raw Material

### 2.1. Choice of Raw Material for Slewing Rings :

Slewing rings produced by JINB are made from workblanks and forging pieces provided by domestic forging manufacturers of superior alloy steel, which guarantees the quality of products and improves the operating performance of products.

## 3. Production of Slewing Rings

### 3.1. Production Process :



## 4. Movement, Transport and Storage of Slewing Rings

### 4.1. Movement of Slewing Rings :

After slewing ring is finished manufacturing, it should be placed in a horizontal and capacious site, waiting for next operation. When moving slewing ring, please pay attention to following matters:

**4.1.1.** Before carrying slewing ring, install more than three lifting bolts on product (Figure 1), or confirm according to product type, use lifting belts to link more than three lifting bolts, then use crane to hoist and put product in an ideal position.

**4.1.2.** When using crane to hoist and put slewing rings, slewing ring should be softly lifted and put down, avoiding colliding or falling and hurting, for fear that raceway and surface of product might be damaged, product might be damaged or service life of product might be reduced.



Figure 1

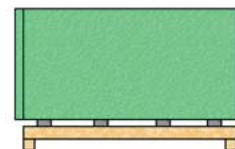


Figure 2

### 4.2. Packaging :

Product should be placed in a horizontal and capacious site to pack. Before packing products, factory nameplate should be installed. Also, factory inspection must be made and antirust grease must be coated before packing products.

#### 4.2.1. Installing Nameplate:

After slewing ring is finished manufacturing, factory nameplate should be installed on inner ring or on outer ring. Nameplate should contain information such as model no., serial no., production date, etc.

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				Model No.: SE.6.20.1094 G1
				Serial No.: J001108      Date: 2014/05/16

#### **4.2.2. Product Inspection:**

When producing slewing ring, each procedure must be inspected. After product is finished manufacturing, finished product should be inspected in time. All inspecting procedures and data should be detailedly, completely, and correctly recorded in documents.

#### **4.2.3. Export Package:**

The export package style of product is non-fumigation wooden box package(Figure 2). After product is finished manufacturing and passes inspection, clean product's surface with cleaning cloth to remove surface spot, then use anti-rust oil paper to wind slewing ring. Later, use plastic film to wind. Use take-up strap to pack product externally, place product into non-fumigation wooden box, fasten it, then nail up the wooden box.

#### **4.2.4. Domestic Consumer Package:**

Normally, domestic package does not use wooden box package. If clients require wooden box package, please contact our salesman in advance and arrange to customized wooden box.

### **4.3. Loading and Unloading of Slewing rings:**

Please refer to the matters need attention when carrying slewing rings.

### **4.4. Transport of Slewing Rings:**

#### **4.4.1. Export Transportation:**

Our export package of slewing rings is wooden box stationary type (Figure 2) and annular wooden box package, which can protect products from damage during long time transportation. The transportation of products exported by our company can be carried out according to the contracts between clients and our company.

#### **4.4.2. Domestic Transportation:**

Domestic transportation of our products normally is truck transportation. When transporting, if products are not packed in wooden box, then several products can be stacked together. Before products are stacked in the truck, place at least 3 sturdy wood blocks of same height in the place where products will be put in the truck. Those wood blocks should be sturdy and will not easily damage products. Then goods are stacked in the truck. When stacking goods, we need to place at least 3 wood blocks of same height (or cushion blocks of other material) between goods and goods to space them. Those wood blocks should be ones that will not easily damage products. Stacked height of products should not be more than the height worked out as per the diameter of slewing ring. After goods are stacked, further strengthening should be made.

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## 4.5. Storage of Slewing rings:

### 4.5.1. Site:

No matter slewing rings are packed in wooden box or not, they should be placed in a horizontal, capacious, ventilated site. They must not be placed near water pipe, steam pipe, or heating radiator; they must not be caught in the rain or exposed to blazing sun; and they must be far away from those chemicals that are harmful to slewing rings. Products not packed in wooden box can be stacked. Methods of stacking goods and matters need attention are referred in above Domestic Transportation in Transport of Slewing Rings.

### 4.5.2. Humidity, Temperature:

The relative humidity of the site where slewing rings are placed should not be more than 60%. The normal temperature variation should be between 8 °C to 30 °C .

### 4.5.3. Inspection:

If slewing rings are stored in the warehouse for a long time, then inspect them regularly to prevent products from rust and corrosion.

All of our slewing rings are made antirust treatment before leaving factory. The period of validity of our antirust oil is 3 months to 6 months. If goods are kept in warehouse complying strictly with temperature standard and warehouse is dry and ventilated, then the period of validity of antirust grease can be 8 months to 12 months. In order to avoid antirust grease losing efficacy, when slewing rings are stored in warehouse, antirust grease should be repainted every 4 months. For those slewing rings stored in warehouse more than 6 months, goods should be made antirust package again or other measures should be adopted for storage.

## 5. Installation and Debugging of Slewing Rings

**5.1.** Before installing slewing rings, slewing rings should be placed in a capacious site. Firstly, open the package box. Use unpacking tool to clear away packaging bag or packaging paper starting from the internal of inner ring or the external of outer ring. When doing this, must pay attention to protecting products. Remember, do not use unpacking tool to gash packaging bag or packaging paper from the front on the anti-dust device lest anti-dust device might be damaged.

**5.2.** Use standard industrial solvent. Chlorinated solvent is absolutely forbidden. Pay attention, do not let solvent flow into sealing device or raceway (Figure 3) . Before installing grease nipple or joint pipe, take out obstructions from the mounting hole of oilhole (Figure 4).



Figure 3

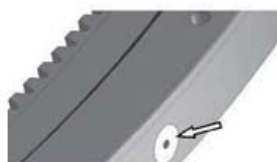


Figure 4



Figure 5



**5.3.** Before installing, make sure that supporting seat structure coincides with technical requirements. Check if supporting seat has metal filing, welding particle, corrosion mark, etc. Examine if slewing ring and supporting seat fit well. Make sure that supporting seat and slewing ring are kept at the same horizontal level.

**5.4.** Installing datum plane and bracket mounting plane of slewing ring must be cleaned up. Wipe out grease dirt, burr, oil paint and other foreign materials(Figure 5). In order to prevent slewing ring from partial overloading and ensure flexible operation, mounting bracket should be subjected to relieving of internal stress treatment after all welding sequences. And mounting plane should be subjected to machining, its flatness (including angular deviation of horizontal plane ) should be controlled with a certain range (Table 1).

**Table 1.**

Raceway Center Circle Diameter	Mounting Bracket Plane Deviation P (mm)		
DL (mm)	Single-row Ball Type	Double-row Ball Type	Roller Type
to 1000	0.15	0.2	0.1
1000 to 1500	0.19	0.25	0.12
1500 to 2000	0.22	0.3	0.15
2000 to 2500	0.25	0.35	0.17
2500 to 4000	0.3	0.4	0.2
4000 to 6000	0.4	0.5	0.3
6000 to 8000	0.5	0.6	0.4

Note: Corresponding numerical values of dimensions in above table are limit values. In 180°fan section, only one peak of wave can be allowed to reach that value. And, in 0°~90°~180°area, values ascend or descend steadily. Suddenly ascending or descending are forbidden in order to avoid peak load.

**5.5.** When locating, quenching connection point is marked in red on gear ring. Quenching point on no gear ring is located in the place where grease nipple is. This quenching connection point must be set on the location where the main load bearing shaft and load bearing arm form an angle of 90 degrees. When load are mainly radial load and especially when bearing is vertically installed, it must be forced centering.

**5.6.** Bolt dimensions used in slewing rings should comply with the relevant regulations of PRC National Standard GB/T5782-2000 and GB/T5783-2000. And the strength grade should not be lower than grade 8.8 which is formulated by PRC National Standard GB/T3098.1-2000.

Washer dimensions should comply with the relevant regulations of PRC National Standard GB/T97.1-1985 and PRC National Standard GB/T97.2-1985 and should be subjected to quenching and tempering. Spring washer is forbidden. Flat washer after heat treatment should be adopted. Choose appropriate strength grade according to the force situation of slewing rings.

Screw nut dimensions should comply with the relevant regulations of PRC National Standard GB/T6170-2000 and PRC National Standard GB/T6175-2000. Their mechanical property should comply with the relevant regulations of PRC National Standard GB/T3098.2-2000.



According to main engine design regulations for the tightening methods of bolts, a certain pretightening force should be guaranteed. Unless there are other special regulations, normally, the pretightening force should be 0.7 times of the bolt yield limit. When tightening, coating a little grease on thread is permitted. Bolt clamping length is  $LK \geq 5d$  (  $d$  is diameter of bolt ).

Table 2.1								
Bolt Strength Grade GB38			8.8			10.9		
Bolt Yield Strength N/mm <sup>2</sup>			640			900		
Thread Specification	Thread Effective Cross Sectional Area	Thread Minimum Sectional Area	Clamping Force	Theoretical Pretightening Torque	Practical Pretightening Torque $M_A=0.9$	Clamping Force	Theoretical Pretightening Torque	Practical Pretightening Torque $M_A=0.9$
	As	As	Fsp	Msp	Msp	Fsp	Msp	Msp
	(mm <sup>2</sup> )	(mm <sup>2</sup> )	(N)	(Nm)	(Nm)	(N)	(Nm)	(Nm)
M5	14.2	12.7	6350	6	5.5	8950	8.5	7.5
M6	20.1	17.9	9000	10	9	12600	14	12.5
M8	36.6	32.8	16500	25	22.5	23200	35	31.5
M10	58	53.3	26200	49	44	36900	69	62
M12	84.3	76.2	38300	86	77.5	54000	120	110
M14	115	105	52500	135	120	74000	190	170
M16	157	144	73000	210	190	102000	295	265
M18	192	175	88000	290	260	124000	405	365
M20	245	225	114000	410	370	160000	580	520
M22	303	282	141000	550	500	199000	780	700
M24	353	324	164000	710	640	23000	1000	900

Table 2.2		
12.9		
1080		
Clamping Force	Theoretical Pretightening Torque	Practical Pretightening Torque $M_A=0.9$
Fsp	Msp	Msp
(N)	(Nm)	(Nm)
10700	10	9
15100	17	15
27900	41	36
44300	83	75
64500	145	130
88500	230	210
123000	355	320
148000	485	435
192000	690	620
239000	930	840
276000	1200	1080



**5.7.** Bolt holes of mounting bracket should be subjected to intermediate precision machining complying with PRC National Standard GB/T5277-1985 and align with mounting holes of slewing rings. When installing, put quenching soft area(external Marking “S”, Figure 7) and blocking place of inner and outer rings into non-loaded area or light load area. Also, soft belt and blocking place should be 180°staggered with each other to install. Installation platform and the base should be level and have enough rigidity.



Figure 6



Figure 7

**5.8.** Before hoisting slewing ring, make sure that quenching soft belt (location of external Marking“S” or blocking place ) of slewing ring raceway is located in non-loaded area or in light load area. When slewing ring is hoisted to the specific location, use filler gauge to check if the fitting surfaces of supporting seat and slewing ring fit well (Figure 8). If there is clearance, supporting seat should be subjected to machining again. If it really can not be machined, then adopt filling (plastic) method to make up, which is normally not recommended. Or else, slewing ring will be deformed after tightening bolt, which will reduce the performance of slewing ring.

Above and below soft area of rolling ring should be 180°staggered to install. Tempering zone of machineries, such as crane, excavator, etc, should be located in the 90°location from the direction of the same arm rest. Fix the tempering zone of rolling (gear) ring.

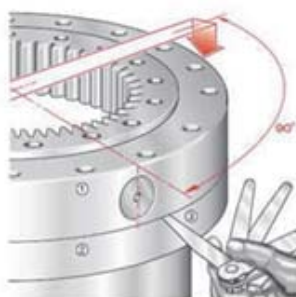


Figure 8

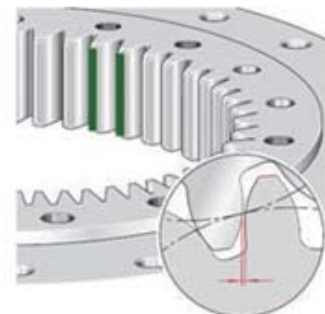


Figure 9

**5.9.** Before tightening bolt, according to gear pitch circle radial runout peak( Green Marking, Figure 9), adjust gear backlash, ensure that meshing backtash value of slewing ring big gear wheel is 1.5 times of this slewing ring axial clearance. When tightening bolt, coat grease on the end faces of thread and

screw nut. Use torque wrench to symmetrically and continuously tighten bolt in the 180°direction within the circumference of a circle. Finally, use torque wrench to check torque of each screw nut, avoiding missing and ensuring that all srew nuts have same pretightening force. After tightening bolt, examine gear backlash on all the circumference of a circle (Figure 11), avoiding large and small gear wheels contact not being parallel to cause partial stress. After slewing ring finishes installing, forbid welding operation on slewing ring and supporting seat to avoid deformation of slewing ring.



Figure 10



Figure 11

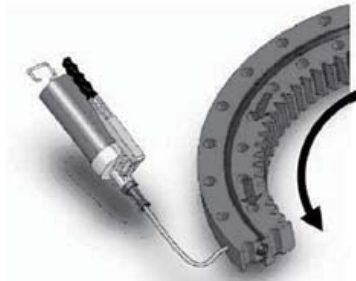


Figure 12

**5.10.** In order to ensure slewing ring operates steadily, rotating drive pinion and gear ring gear teeth should reach rated operating accuracy, working stationarity, contact accuracy and meshing backtash.

**5.11.** After all installations are finished, clean up dirt and dust on slewing ring in time. Coat antirust paint on the exposed parts. Coat lubricating grease on raceway and gear.

## 6. Care and Maintenance of Slewing Rings

**6.1.** Before our slewing rings leaving factory, according to the relevant regulations of PRC National Standard GB/T7324-1994, fill a small quantity of lithium-based grease into raceway. After clients receive our products and start to use them, they should refill new lubricating grease according to different working conditions.

**6.2.** Slewing rings should be filled with lubricating grease regularly. According to different types of slewing rings, exact filling time of lubricating grease is as follows.

- a.** Ball type: filling once per 100 hours of operation
- b.** Roller type: filling once per 50 hours of operation

If the working environment is special, such as tropicality, high humidity, dustiness, large temperature difference and continuous working hours, filling cycle of lubricating grease should be shortened. It should be ensured as filling once per 50 hours of operation. When gear works regularly, ensure as coating lubricating grease once per 150 hours of operation. When operating violently, coat lubricating grease once per 75 hours of operation. Attention, before coating lubricating grease, gears must be cleaned. Before and after machine long-term stagnation and operation, new lubricating grease must be refilled. Each filling should fill the raceway until lubricating grease overflows from sealing device. When filling lubricating grease, slowly rotate slewing

ring(Figure 12), make lubricating grease fill in the raceway evenly.

**6.3.** During the process of using slewing ring, regularly clean up sundries on the surface of slewing ring. Check if slewing ring sealing strip is aging, suncrack, damaged or detached. If one of those situation happens, change the sealing strip in time, avoiding sundries entering raceway and lubricating grease running off. After changing sealing strip, coat corresponding lubricating grease to avoid sgraffito, block or corrosion of rolling element and raceway.

**6.4.** Because of the comprehensive factors in the process of using, clients can choose the best lubricating grease by themselves according to specific situation. For example, raceway can adopt No.3 and No.4 graphite grease, industrial grease, No.203 grease, No.7002 high low temperature bearing grease and No.2 aluminium-base grease, etc.

Since installation, after slewing ring rotates 100 hours for the first time, examine the pretightening force of bolt. Afterwards, examine once within each 500 hours of operation to ensure enough pretightening force.

**6.5.** After device has been working for accumulative total 2,000 hours, if there is one bolt found to be loose below 80% of specified torque, then that bolt and those two bolts near it should be replaced by new bolts. If 20% of bolts are found to be loose below 80% of specified torque, then all bolts should be replaced by new bolts. When device has been working for accumulative total 14,000 hours, all bolts should be replaced by new bolts. (Suggestion: after using slewing ring for 2 to 4 months, tighten all fasteners again, then transit to annual systematic examination )

**6.6.** During the process of using slewing ring, pay special attention to the operating situation of slewing ring. If noise, impact or power suddenly increases, turn off the machine and examine at once until all malfunctions are cleared. If necessary, take the machine apart to examine.

**6.7.** During the process of using slewing ring, forbid using water directly to wash slewing ring, avoiding water entering raceway to be rusty. Forbid relatively hard foreign matters getting close or entering meshing zone to avoid the damage to gear or unnecessary troubles.

Above are the operation instructions of our slewing rings. If there is any problem, you can contact directly with our company.

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Finally, thank you again for choosing our JINB products. Thank you!

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**JINB**  
SLEWING BEARING & SLEWING DRIVE

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