

**GTW7、 GTW8**

**Operation And Service Manual**

**S2015.1**



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# **1 General-usage to intended purpose**

Thank you for purchasing our GTW7、GTW8、 series gearless PMS elevator traction machines. In order to enable users to make clear about our product's function, characteristic most and ensure users' safety, please read this operation and service manual carefully. When any problem beyond this manual is found during using, please contact local sales agency or our technicians of engineering department. Our professional technicians delight in service for you.

## **1.1 Safety declaration**

Only qualified personnel are allowed to perform any planning, installation or maintenance work to GTW7、GTW8、 series gearless PMS elevator traction machines. The personnel must be trained for the job and must be familiar with the installation, assembly, commissioning and operation of the

product. Sufficient knowledge in lift construction is essential. Their commissioning is prohibited until the requirements of the directive are satisfied by or upon integration of the motor into the final product.

The regulations concerning operation, maintenance and inspection in accordance with the applicable safety regulations in lift construction such as GB 7588-2003 “Safety rules for the construction and installation of electric lifts” (equal to EN81-1: 1998) and other relevant. Regulations shall be strictly observed.

The operator is responsible for the proper installation of the gearless PMS elevator traction machines with regard to safety requirements as well as for its inspection and maintenance as specified in the applicable regulations. No liability can be assumed for any damage caused by improper handling or any other acts, which are not in conformity with these operating instructions and thus deter from the qualities of the product.

In this manual, the following pictographs are used to mark warnings and important notes. These pictographs must be observed.



Mean that death or serious injury to persons or serious damage to property will occur unless the appropriate precautions are taken.



Mean that death or serious injury to persons or serious damage to property may occur unless the appropriate precautions are taken.



Mean that injuries to persons or damage to property may occur unless the appropriate precautions are taken.

The operator must observe the safety item in this manual strictly.

## 1.2 Checking before usage

Before you start to use the machine, you should check the



following item earnestly first.

- a. Check up whether the packages is integrity or not before opening it, and make sure there is no injured or affected with damp;
- b. Check up whether the machine documents and other related accessories is well-found or not;
- c. Check up the nameplate data seriously, and make sure the this type of machine is accords with your desires;
- d. Check up whether the traction machine structural is integrated or not, whether the bolt fix tight or not, and whether the brake system is working agile or not;
- e. Measure the insulation resistances of the PMS motor windings and brake windings. If the insulation resistances dropped below 3 M $\Omega$  the winding needs to be dried (insulation meter voltage: 500V DC);
- f.** Check up whether the brake system work effective and brake manual handle device work agile and effective or no.

## 1.3 Operating conditions

GTW Series Gearless PMS elevator traction machines must be ensured on following ambient conditions:

- a. Altitude: max. 1000 m (If the altitude bigger than 1000m, please connect our technical department);
- b. Ambient temperature: +5~+40 °C;
- c. Max. Relatively humidity: 90% at 25 °C (no moisture condensation);
- d. Circumstance air without causticity and combustible gases or pungent gases;
- e. No lubricant and sundries on rope surface;
- f. The power supply voltage fluctuation and ratings deviation should be no more than  $\pm 7\%$ ;

## 1.4 Installation

Check the permissible base frame or foundation loads by

calculation before installing the lift machine.

Place the machine on a plane surface with a permissible deviation from planeness not exceeding 0.1 mm.。



**Warning**

Fasten the machine on the frame with four M20 bolts of strength class 8.8.

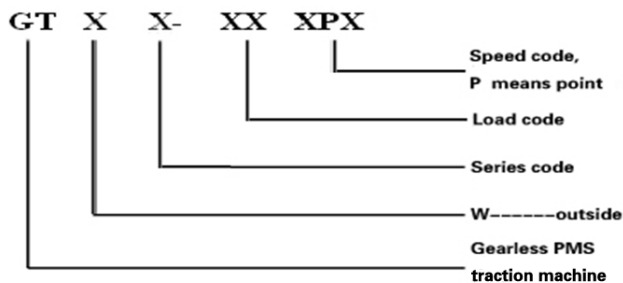
Traction machines are generally provided with rope slip-off guards. After putting the ropes in place, adjust them so that the distance between the rope and the rope slip-off guard :  $\leq 2.5$  mm.

Install the machine only in an enclosed machine room and take care to observe the relevant safety precautions.

Traction machines are designed with degree of protection IP 41. Make sure that the cable entries to the terminal boxes are sealed properly when making the electrical installation.

The revolving parts must be defend according to GB 7588-2003 “Safety rules for the construction and installation of electric lifts”.

## 1.5 Type code



For example: GTW8-101P0A type means this machine is type outside rotor gearless PMS elevator traction machine, rated load is 1000Kg, and rated speed is 1.0m/s.

Customer can chose our gearless PMS elevator traction machine by rated load, rated speed and series code (you can also see our gearless PMS elevator traction machine cataloger for detail).

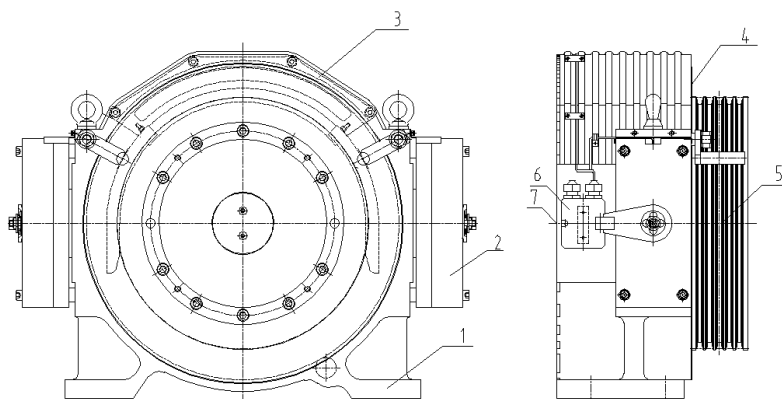
## 1.6 Nameplate

The nameplate will be rivet on the machine seat, it include some necessary parameters in setting frequency inverter.

**Caution**

Please refer to the given parameters to do the setting frequency inverter work.

## 1.7 Product description



- 1. PMS motor
- 2. Protection plate
- 3. Sheave
- 4. Encoder(option)

- 5. Brake system
- 6. Brake drum
- 7. Junction box

## 1.8 Usage regulation

**Warning**

The Gearless PMS elevator traction machines are not designed for direct connection to the three-phase system but are to be operated via an electronic frequency inverter. Direct connection to the system may destroy the motor.

Due to use high-frequency inverter the surface of machine may induce some faradism voltages during the operation of synchronous motors. So the Earthing should be connect at terminal connection box .

High voltages occur at the terminal connections during the operation of synchronous motors, so the installation or maintenance work is forbid when the power is not take off.

Check the proper functioning of the motor and the brake after installing the machine.

**Caution**

High surface temperatures may occur on

the external parts of the machine. Therefore, no temperature-sensitive parts may contact these parts or be attached to them. Protection against accidental contact should be provided, if required.

## 1.9 Transport and storage

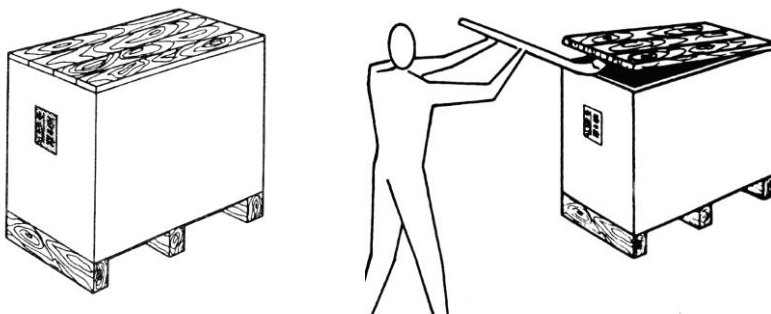
The PMS elevator traction machines leave factory in a faultless condition after being tested. Make a visual check for any external damage immediately upon their arrival on site. If any damage incurred in transit is found, make a notice of claim in the presence of the forwarder. If necessary, do not put these machines into operation.



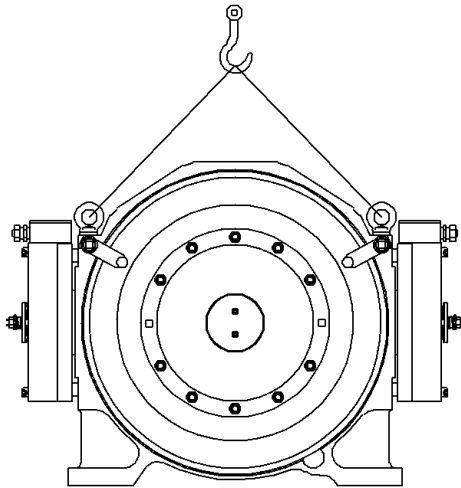
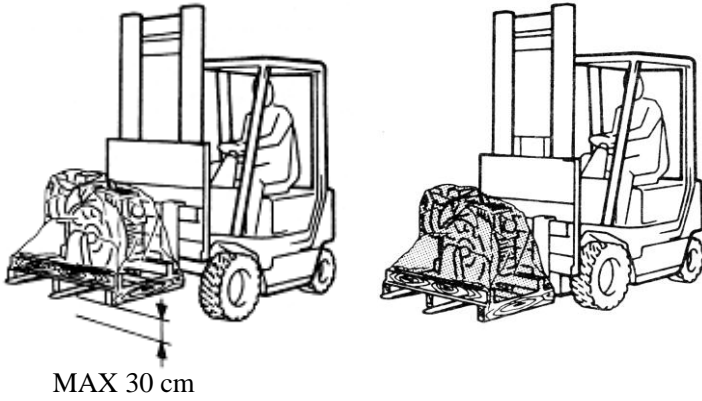
The eyebolts are designed for the specified machine weight, i.e. it is not permitted to suspend additional loads. And the machine must be suspend in a right method (see following picture for detail).

Store the machine only in closed, dry, dust-free, well ventilated and vibration-free rooms.

After prolonged storage (>3 months), rotate the motor in both directions at a low speed (about 20rpm) to allow the grease to distribute evenly in the bearings.







**Suspend Sketch Map**

## 2 Electrical connection

### 2.1 General



**Danger**

The electrical connection of the motor should be done by qualified electric technician.

There must be no foreign bodies, dirt or moisture in the terminal box. In order to keep the connection is safety and credible, please thought the cable from the water joint in connection box. Do not forget to cover the connection box cover after connection, which can keep out to get an electric shock.

### 2.2 Motor connection



**Warning**

Direct connection to three-phase power is forbid it may destroy the motor.



Connect the frequency inverter output and earthing terminal to motor terminal show in the picture. The connection cable diameter is decide by motor rated current ( can refer to frequency inverter instruction manual ) .

Check the short-circuiting between windings and ground after connection.

## 2.3 Thermal resistance connection

In order to control the motor temperature rise and avoid the motor temperature became too high. GTW series gearless PMS elevator traction machine install a motor thermal protection

resistance, customer can connect the “R1,R2”terminal to their control system.. The following table is the specification of the PTC thermal resistance our factory use:

PTC Technical Characteristics		Three in series	Unit
Max work voltage	U max	25	V
Rated acting temperature	T K	120	℃
Resistance at T=25 ℃±1 ℃ (V≤2.5V)	R 25 ℃	≤300	Ω
Resistance at given temperature (V≤2.5V)	T k -5℃	≤1650	Ω
Resistance at given temperature (V≤2.5V)	T k +5℃	≥3990	Ω
Resistance at given temperature (V≤2.5V)	T k +15℃	≥12	KΩ
Tk acting time	T D	<5	s

## 2.4 Brake connection

The brake system of GTW series gearless PMS elevator traction machines is new type, the parameter of the single brake:

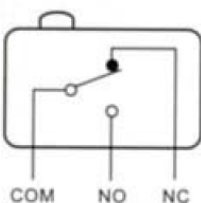
Brake type	Voltage	Current	Power
FZD12	DC220V	0.88A	97W
FZD12A	DC220V	0.88A	97W
FZD10	DC220V	0.84A	92W



Due to release circle installed in the brake system of PMS elevator traction machine, user has to differentiate between BK+ and BK- on the connection end, when connect the power supply of the brake, preventing release circle burning.

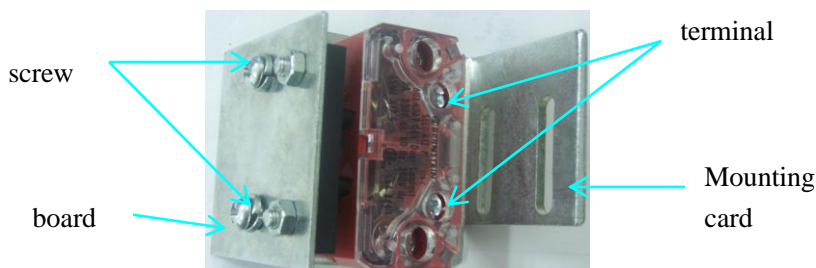
## 2.5 Microswitch connection

There are two microswitch installed in the brake system used to feed back the acting of brake. Customers can connect it according you control system requests. There are 2 different contacts NC is normal closed contact, NO is normal open contact.



## 2.6 Jigger switch connection

According to correlative standard requests there must have a jigger switch for the machine room. Following picture is the jigger switch. When the maintainer want to use the jigger switch, please loose the M5 screw with Phillips screwdriver and lay down the board, make sure normal closed contacts disconnect, that is, cut off safety circuit. Please safekeeping the spares which laid down, in order to restore the device when the lift runs normally.



## 2.7 Encoder connection

### **Warning**

Our PMS elevator traction machine must work with the special frequency inverter, which can control the PMS motor. And the inverter it must work in close-loop mode, so there must be a speed/position feed back device (we call it encoder in the following page).

The measuring system of the PMS elevator traction machines is matched to the associated converter.

Our factory can provide some different measuring systems on request. You can select it according to the inverter request. If you have other measuring systems please connect our technical

department. We recommend the use of an appropriate cable set to connect the measuring system to the converter system. Cable sets can be supplied as accessories.

Following page is introducing the two types' encoder we use now. And you can see the detail in the encoder instruction manual.

## 2.7.1 Pulse encoder

You can connect the inverter with the inverter instruction manual and the cable color/markers in the ending of cable.

TAMAGAWA OIH 100-8192P20-L6-5V

Electric parameter:

- Supply voltage: DC5V  $\pm$ 5
- Current consumption:  $\leq$ 200mA
- Resolution: 8192 C/T
- Output mode: Line Drive





## 2.7.2 Sin/Cos encoder

Alternatively, the machines can be equipped with the sine-cosine encoder types. It connected with a 15-pole signal coupling fitted to the frequency inverter.

HEIDENHAIN ERN 1387

Electric parameter:

- Supply voltage: DC5V  $\pm$ 5%
- Current consumption:  $\leq$ 150mA
- Resolution: 2048 C/T
- Output mode: Sin/Cos



## 2.8 Earthing



For safety reasons, it is very important that the motor be properly and carefully

earthed.

Use the earthing screw provided on the housing! In addition, connect the protective or earthing conductor in the terminal box as specified respectively.

## 3 Operation and maintenance

### 3.1 General

The lift operator is responsible for regular checks of the brake safety components and the traction main sheave, and must include these components in his visual inspection schedules.



The regulations concerning operation, maintenance and inspection in accordance with the applicable safety regulations in lift construction such as GB 7588-2003 "Safety rules for the construction and installation

of electric lifts", and other relevant regulations shall be strictly observed.

The operator is responsible for the requirements, which are with regard to applicable safety regulations.

## 3.2 Maintenance intervals

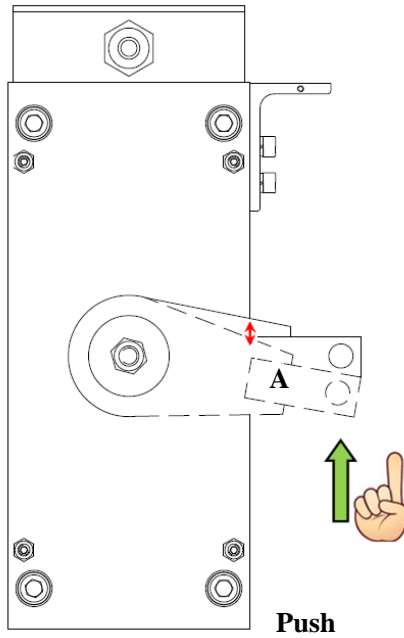
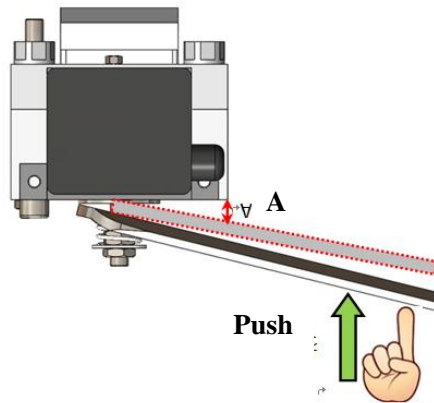
The following maintenance activities are recommending to be performed:

Check item	Criterion	Cycle	Remark
Brake system	Work effective braking	Three months	Note 1
Brake lining thickness	Total abrasion<1mm	Three months	Note 2
Bearing noise	No abnormal noise	Three months	
Load current	Lower than the rated current value	Three months	

Sheave fix state	No loose、damnification	Six months	
sheave	No serious abrasion	Six months	Note 3
Slip-off guard	Keep originality state no displacement	Six months	
Winding insulation resistance	$\geq 3M\Omega$	Six months	
Connection cable	No aging	Six months	
Clean machine surface	No dust	As required	

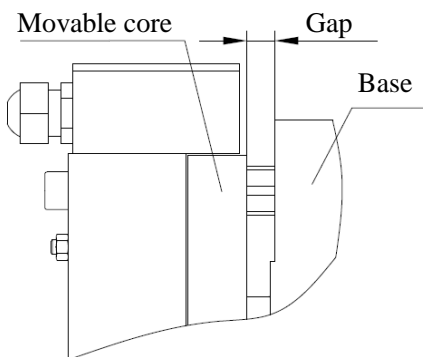
Note1: Check the brake stroke.

Stop elevator, check the stroke of the brakes for both sides of the machine (A: about 10mm), as shown, after you release your finger can automatically reset.



If the brakes do not have stroke, contact the factory processing.

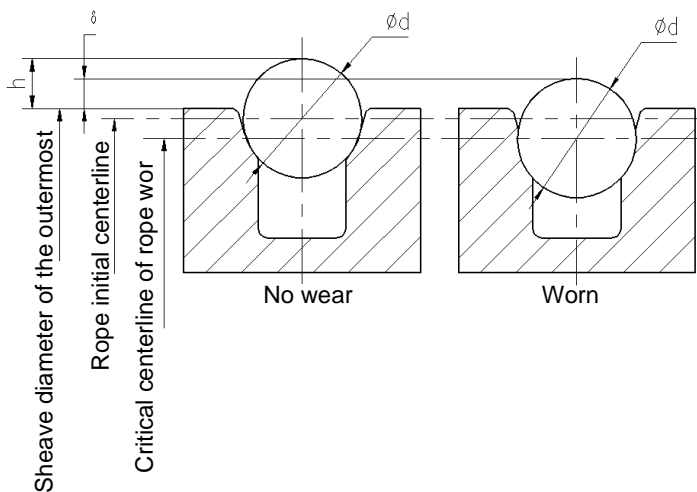
Note2: Because the product structure restrictions, the amount of brake wear is not easy to detect. Shown below, the gap between movable core and base reduce when the brake lining thickness worn. When this gap is less than 10mm (GTW7、GTW8) or 9.5mm(GTW9), you need to replace the brake lining.



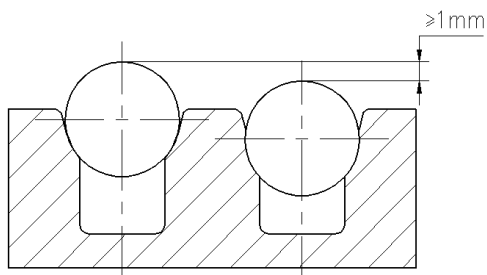
Note3: Sheave rope groove wear and replacement sheave determination reference.

Our standard groove figure:





(2) Due to uneven wear the rope, the ropes has more than 1mm difference in height:



(3) Rope cracks can be seen, there is significant wear deviation groove.



When the elevator moves up and down in the hoistway, if there is slippage between the ropes and the sheave, need to identify the cause and resolved then run the elevator properly, otherwise groove will be greater wear.

### 3.3 Maintenance regulation



Only qualified personnel are allowed to perform any maintenance work. The person who do the maintenance work must take care due to some work must done when the machine running.

### 3.4 Lubricating instructions

The main bearing of GTW7、GTW8 or GTW9 series PMS elevator traction machine is self-lubricating, so it will not be re-lubricating during the working.

## 3.5 Brake operation device



Each PMS elevator traction machine has a manual brake handle device, which is used to escape the person in emergency states.

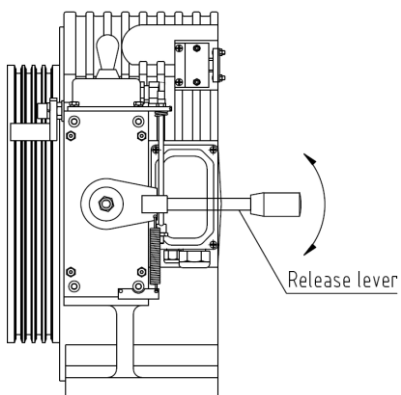
And it is forbid to in normal states.

Brakes are safety devices! Only qualified personnel are allowed to perform any assembly, adjusting or maintenance work!

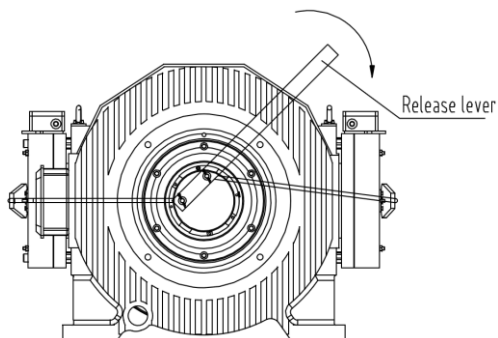
The brake manual handle just can be used in escapes person in emergency states and be operating by professional.

The manual brake release of the gearless traction machine divides two types: with machine room and without machine room:

1. In the case of with machine room, the traction machine will be configured the manual brake release, see picture below:



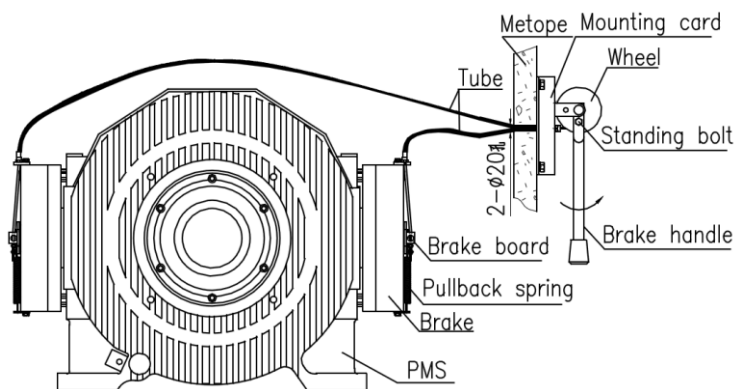
GTW7 manual brake release



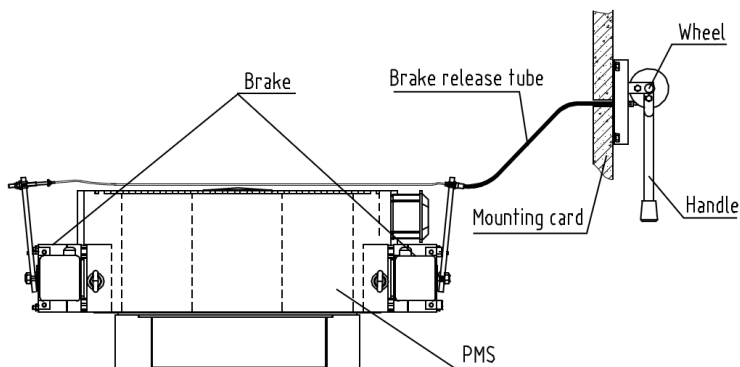
GTW8、9 manual brake release

Remove the manual brake release lever when the traction machine is in normal using conditions, proper arrangements to prepare for emergency use.

2. In the case of without machine room, the traction machine will be configured the remote manual brake release, see picture below:



GTW7 remote manual brake release



GTW8、9 remote manual brake release

Brake line bending radius must be greater than 250 millimeters.

## 3.6 Emergency escape method



If the lift needs to be moved manually in case of breakdown or power cuts, the person who must get the maintenance certificate can carry out the rescue work following the method below.

For machine room customer can use the gear in dustproof radiator ring and for roomless customer can use the roomless brake operation device to do the rescue work.

- a. Cut off the elevator power to prevent it unintentional restarting, but must keep the car illumination.
- b. Try to make clear the position of car (you may open the hall door by mechanical key to check it).
- c. When the elevator stop at the place where have about  $\pm 500\text{mm}$  distance to hall door level, the maintain person can open the hall door by mechanical key and

open the car door, then help the passengers out of the car safety.

- d. If the elevators stop at other position, you must move the car by mechanical method to help the passengers out of the car safety. You can do the rescue according to the following steps:
  - I. Keep the car door closed. If the car door is opened already, you must let the passengers to close the door by hand. Notice the passengers in the car that the car will move to help them out, ask them keep calm in the car and don't move away( if the elevator had installed intercommunication telephone, make the best of it).
  - II. Take off the protective casing away, and then fix the jigger wheel.
  - III. There must be two person to hold the jigger wheel to prevent the elevator from quickly move unexpected when the brake is opened. Then the third person to

open the brake only when the car needs move, otherwise close brake immediately.

- IV. Move the car slowly and stop it at the position where have about  $\pm 150\text{mm}$  distance to hall door level.

Notes: If car is not overstepping level place of top floor or bottom floor, you may move the car in a saving labor direction. But if car is overstep level place of top floor or bottom floor you must move car to top floor (bottom floor) direction, you can move car by jigger wheel if needed.

- V. Let brake return to normal work state, then open the hall door outside of correspondence level by special key, and pull the car door open, then help the passengers out of the car safety.

## 3.7 Sheave replace



The safety precautions to be taken when working in the lift well are to be strictly observed for roomless customer.

When removing the old traction sheave, secure it against falling down. Four M12 holes for forcing screws (GB/T 5783 M12×50-8.8) are provided in the traction sheave to facilitate disassembly.

When fitting the new traction sheave be sure to assemble all components of the connection in the same manner as those on the old traction sheave. And the normal impulse of the sheave-trough's surface should be test after assemble, it must lower than the GB/T24478-2009 standard requests.

Notes: The sheave and the drum is connected use fast engagement and use the elasticity pin, you can install it according to following steps:



- a. Tighten a pairs of dowel screw into the thread hole at opposite direction in brake drum as guide bolt. Use a lifting device to suspend the heated main sheave and then cover it by the guide bolt, and to aim at the pinhole in the brake drum at same time.
- b. Install the elasticity pin and connecting bolts.
- c. To use a tightening torque of 115 Nm to tighten the 12 connecting bolts between the traction sheave and the brake drum (M12x50-8.8).

## 3.8 Trouble shooting



Repairs other than those described in this operating manual are not permitted to perform. The proper maintenance of the gearless lift machines requires adequately trained specialist personnel and specific devices and auxiliaries.

Following table is presentation and countermeasure of faults:

Fault	Possible cause	Remedy
PMS not work	a. Power cut	Check whether the connection cable is connect credibility The interlocking device whether relief
	b. Inverter misconnection	Check the connection diagram to correct it
	c. Over load or brake not open	Brake not open completely Inverter is over max. Limit Reduce load
	d. Inverter fault	Deal with it according to inverter instruction
	e. Wrong inverter	Change the inverter to PMSM inverter
Protect after start	a. Wrong inverter capability	Change the higher capability

	b.Inverter setting fault	Prolong the accelerate and decelerate time
	c. Over load	Prolong the accelerate and decelerate time
	d.Short-circuiting in winding	Check the winding resistance
	e.Short-circuiting to earthing	Take off the connection cable to recheck it, if still short-circuiting exchange the machine
	f.Short-circuiting in control system	Exchange the fault parts
Abnormal noise or vibration	a.Friction noise	Brake not open complete

	b.Inverter setting fault	Change the inverter PI or operating frequency value
	c.Encoder output single interfered Encoder not fixed credibility	Connect the encoder shield Fix it again firm
	d. Bearing fault	Replace the broken bearing
Electricity in machine seat	a. Not connect the earthing	Find out the problem and correct it
	b. Winding affected with damp Insulation broken Dirt in earthing connection	Desiccation the winding Repair the broken insulation parts Clean the earthing connection

	c. Connection cable insulation	Repair or exchange the connection cable
The temperature. too high	Aeration, radiator not well	Remove the obstruction and the dirt

## 4 Brake system

### 4.1 General



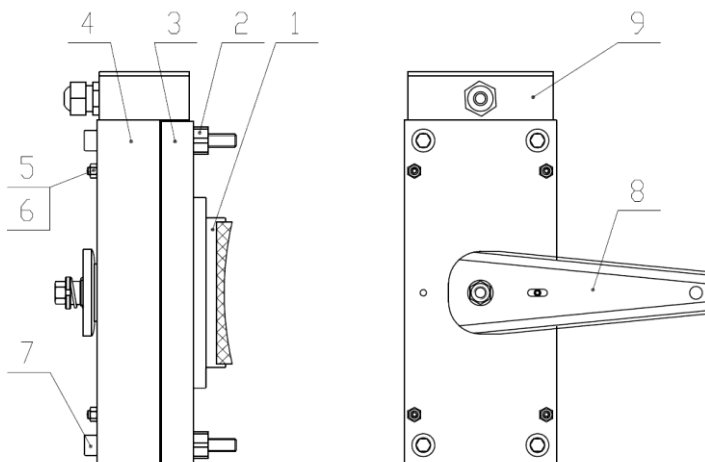
Brakes are safety devices! Only qualified personnel are allowed to perform any assembly, adjusting or maintenance work.

The braking torque data listed in our documents are based on the following operating conditions:

- a. Protect the friction surfaces from oil or grease, rain, splash water, snow and ice;

- b. Ensure that the brake linings do not come into contact with solvent-containing media;
- c. Wire must not be taut, under pressure;
- d. Follow the instructions on the label, connect voltage accurately;
- e. Ambient temperature:  $+5^{\circ}\text{C} \sim +50^{\circ}\text{C}$ . If the temperature is lower or below freezing because the moisture, the brake torque is severely decreased, must provide appropriate countermeasures.
- f. Brakes normal operating voltage range of the reference GB/T 12325-2008 "Power quality-Deviation of supply voltage"  $4.2 \pm 7\%$  required.

## **4.2 Brake system declaration**



Number	Name	Number	Name
1	Friction piece	2	Spacer
3	Movable core	4	Fixed core
5	locknut	6	Adjusting screw A
7	Adjusting screw B	8	Brake handle
9	Junction Box		

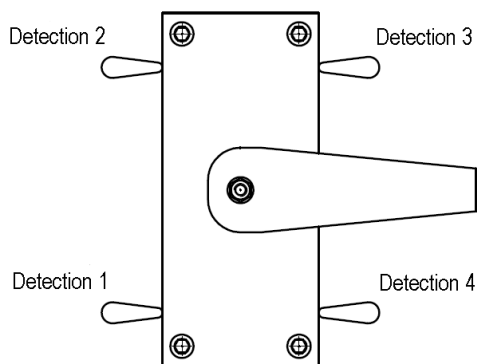
### 4.3 Brake clearance adjustment



In the braking system of inspection and maintenance, make sure that:

- a. No inadvertent starting of the motor is possible;

- b. No load moment is acting on the brake drum or on the motor;
- c. After completion of the inspection and maintenance work, the interlocking preventing inadvertent starting of the motor is cancelled;
- d. All surfaces providing friction are free from oil or grease ,it is not possible to clean an oily or greasy brake lining.



Gap adjustment method:

- a. Detection: Check the brake gap at detection 1,2,3,4. The gap should be  $<0.45\text{mm}$ , otherwise the gap must be adjusted.
- b. Adjustment: Use allen wrench to loose the adjusting screw B,



so that the connected sets of brakes and brake plane did not contact. Repeatedly adjust sleeve, make the gap between movable core and fixed core is 0.3-0.4mm, (Note: The detection position as shown, first detection of the position of No. 1,4, and then No. 2,3.) Tighten the Adjusting screw B on the cross to 45-55Nm. Recheck the gap between movable core and fixed core, ensure that it meets the requirements;

- c. If the noise of the brake is big (>65 dB). First adjustment and confirm the gap between movable core and fixed core within the provisions, and make sure the brake release circuit is intact, then adjust the adjustment screws in accordance with the following procedure. Wrench tightening the adjusting screw A slowly when the brake is on. And examining the open voltage after adjusting the screw A, we control the open voltage is the 70% percentage of the rated voltage, and locking the locknut.

## 4.4 Brake state monitored

The state of the brake can be monitor by micro-switch. The contact has two types, one is normal closed contract and the other is normal open contract. Customers can connect it according to your control system requests.



Before micro-switch adjustment, make sure that:

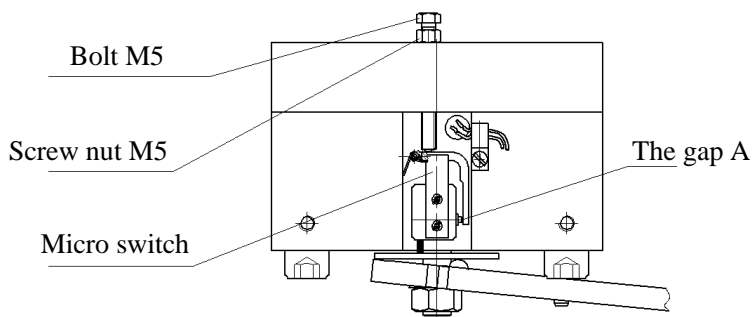
Brake is a braking state.

GTW7 micro-switch adjustment method:

- a. Detection: Check the break gap between movable and fixed core is 0.3-0.4mm. The gap A is between micro switch contact and lever. When the gap A is 0.65mm, the switch work; and when the gap A is 0.85mm, the switch doesn't work; otherwise, the switch needs adjustment.
- b. Adjustment: Use a wrench (8mm) to loosen screw nut M5.  
If the switch work at the gap A  $< 0.65\text{mm}$ , then use

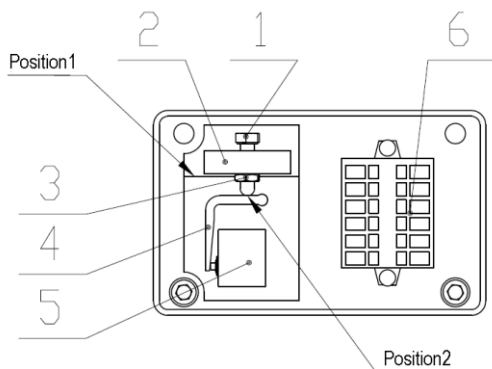
wrench (8mm) loosen the bolt M5; If the switch do not work at the gap  $A > 0.85\text{mm}$ , then use wrench (8mm) screw the bolt M5; when the gap A meet the above requirements, use a wrench (8mm) to lock screw nut M5. The brake is energized; check the switch lever is not in contact with the micro switch.

- c. Repeatedly turn on and off the brake, confirm micro switch operation, and ensure the electrical testing is normal after the adjustment.



GTW8 、 GTW9 micro-switch adjustment method:

- a. Detection: Check the break gap between movable and fixed core is 0.3-0.4mm.
- b. Adjustment: Measure the gap A of the position 1 in Figure; use a feeler (the thickness is 0.1mm less than that gap A) to inserted into the position 2 in Figure (between the bolt M5 and the lever), adjust the bolt M5, until the micro switch work; use a feeler (the thickness is 0.15mm less than that gap A) to inserted into the position 2, the micro switch should not trigger, then lock the nut M5.
- c. Repeatedly turn on and off the brake, confirm micro switch operation, and ensure the electrical testing is normal after the adjustment.



Number	Name	Number	Name
1	Bolt M5	2	Adjust seat
3	Nut M5	4	Lever
5	Micro switch	6	Terminal block

## 4.5 Start-up

Make sure that the functional test of the brake is only carried

out when the motor is at rest, has been disconnected from the supply and is secured against inadvertent restarting.

**Warning**

Surface temperatures of  $>80\text{ }^{\circ}\text{C}$  may occur in the braking system. For this reason, no temperature-sensitive parts such as normal cables or electronic components may be routed to or fixed to the braking system. Provide appropriate protection against accidental contact, if necessary. If the motor shaft needs to be turned during adjusting work release the braking system by electric or by means of manual release, if necessary.

## 4.6 Maintenance

**Danger**

- When doing any inspection or maintenance work, make sure that:
- No inadvertent starting of the motor is possible;
  - No load moment is acting on the brake drum or on the motor;

- c. After completion of the inspection and maintenance work, the interlocking preventing inadvertent starting of the motor is cancelled

All surfaces providing friction are free from oil or grease, it is not possible to clean an oily or greasy brake lining.

## 4.7 Trouble shooting

Fault	Possible cause	Remedy
Braking system do not work	Braking system voltage applied at excitation winding too low	Check brake supply voltage electrical connection
	Braking torque set too large	Reduce brake torque setting
	Braking open distance is too small	Readjust the brake open distance
	Brake winding broke	Replace the broken winding
Braking torque cannot meet request	Oil or grease on brake disk	Remove the oil
	The distance between mobile-core and brake cap setting too big	Change the brake lining
Braking	The brake open distance	Readjust the brake

noise too big	setting too big	open distance
Braking system no feed back	Micro switch broken	Replace the broken winding
	The position of micro switch broken is install not correct	Readjust the micro switch install position

## 5 Commissioning with inverter

### 5.1 General

The commissioning with the inverter work must be done by qualified electric technician.



Due to there may be have shake in running-in work, please fix the PMS elevator traction machine in a fixed frame.



## 5.2 Checking before usage



Before start work make sure that the traction machine, encoder and brake is connect correct. And do not forget the insulation and earthing.

Check the power capability and the earthing cable are correct. The temporarily support power is not recommend, and it must have the safe isolation from supply.

## 5.3 Motor parameter setting

Usually when running in with inverter divided into two parts: PMS parameters and system position (PG) learning. You may need same necessary parameters to set into the inverter on this process.

There are two different methods to set the parameters into the inverter:

- a. Set the factory value in nameplate or in operation manual to the inverter direct.

- b. Setting the basic parameters then use the inverter motor learning function to lean the other parameters.

Because there are so many different inverter in the market, and them have different name, expressive manner or unit to one parameter. You can see the detail of the motor learning method in the inverter instruction manual.

## **5.4 Inverter self-learning condition and method**

Inverter self-learning is a very important part in running in work, and it will have much matter with the traction machine running steady and safe in future.

Following condition must be insure before start the self-learning work:

- a. No load in sheave (before hang up the rope);
- b. Electrify the brake and the sheave can running free;

- c. Encored mechanical install and signals connection correct;
- d. Familiar with the performance of the inverter you use.

In order to make the commissioning work process successfully, please do it according to following steps:

- a. Electrify the inverter, set the parameter of PMS elevator traction machine and encoder. Then turning the sheave in both directions to check whether the inverter speed feed back is correct. If the inverter court failure, please check the connection and the setting.
- b. Start the self-learning function then read out the parameter, and do is about 10~15 times the tolerance must with 10%.



**Caution**

The motor speed abnormal or vibration too big may happen during this process.

This may be cause by the wrong connection of motor phase. You can do it again after replace the discretional two phases.

There may have some difference in different inverter self-learning process, you can do it according to the inverter instruction manual requests.

- c. Set the motor run at both direction at a low speed to check whether it running steady. And it can start and stop under the inverter commands.
- d. Set the inverter parameter to final state and let it running in the rated speed to check the no-load current is normal.

## 6 Encode installation

### 6.1 General



Installation, checking and replace of the encoder must be down by qualified maintainer at power cut state.

If the customer ordered the encoder when order the PSM elevator traction machine, the encoder will be installed and tested before it

leaving factory.

If the customers buy the encoder yourself, you can install it according to following step:

## 6.2 Installation regulation

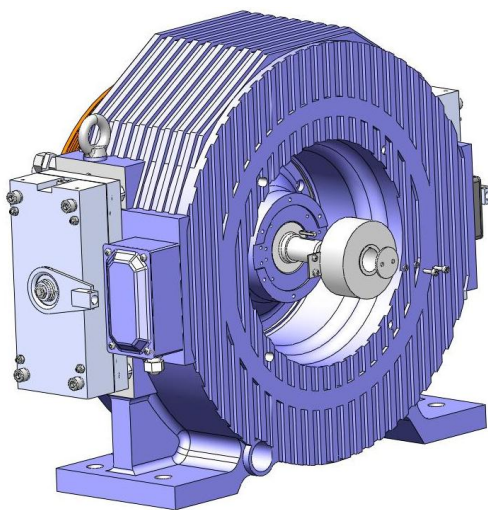


Encoder is a very exact equipment part so it must be take care during installation.

## 6.3 Installation method

### 6.3.1 Hollow shaft

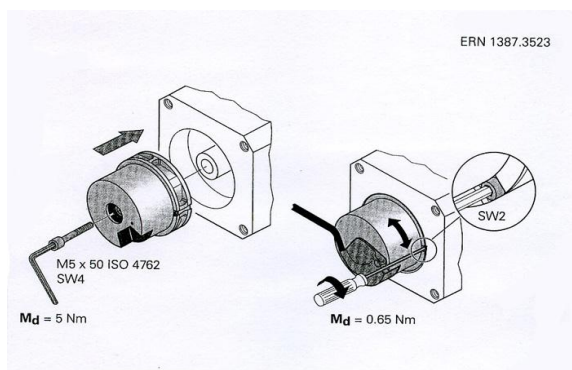
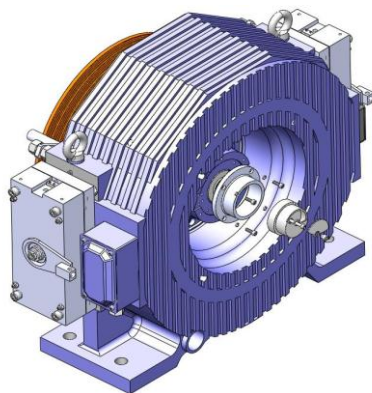
Fit for OIH100/SBH100 (Φ30 hollow-shaft、key、reed) :



- a. Take off the burr on the connection shaft;
- b. Check the shaft jerk value with centesimal meter, the tolerance should within 0.05mm;
- c. Install the key in the shaft, and smear some lubricates oil in the shaft.
- d. Install the encoder in the shaft (reed must in rear);
- e. Fix the connection plate in the rear cover, and then fix the reed in the connection plate.

## 6.3.2 Cone shaft

Fit for HEIDENHAIN ERN 1387 (cone shaft, screw, expansion shell bolt), HENGSTLER S21-8192, RF53 8192 (cone shaft, screw, reed):

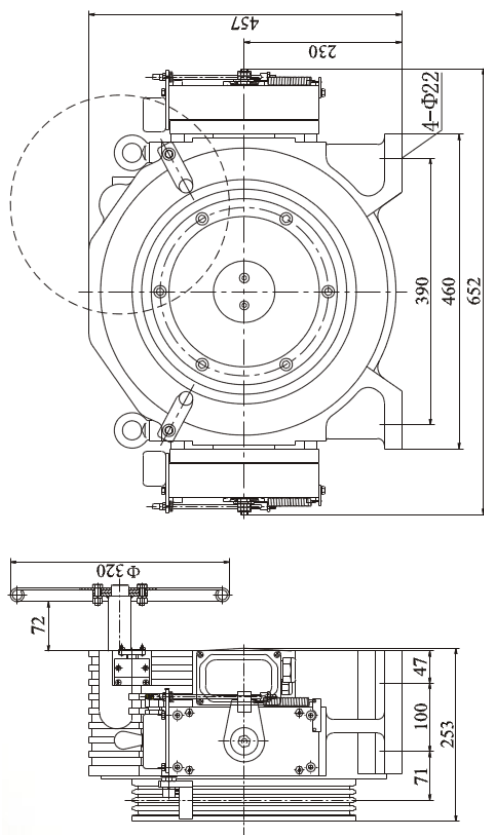


- a. Open the rear cover;
- b. Take off the burr in connection cone hole;
- c. Open the encoder cover then pull the cone shaft into the cone hole. Use the fix bolt accessory of encoder through the encoder to fix the encoder in the shaft. Finally connect the signal cable and cover the rear cover;
- d. Open the rear cover;
- e. Take off the burr in connection cone hole;
- f. Open the encoder cover then pull the cone shaft into the cone hole. Use the fix bolt accessory of encoder through the encoder to fix the encoder in the shaft. Finally connect the signal cable and cover the rear cover;
- g. Refer to ERN1387, it has an expansion cover on the rear side, fix it with expansion shell bolt shown in the picture;
- h. Refer to S21/RS53, you should fix the reed in the connection plate.

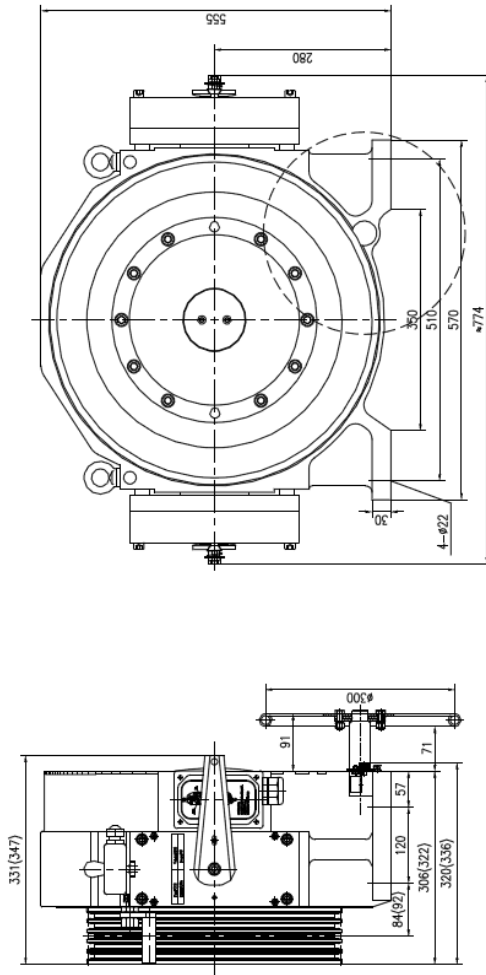


## 7 Machine's dimension

### 7.1 GTW7 dimension



## 7.2 GTW8 dimension





## 8 Technical data

### 8.1 GTW7 technical data

Type	Load kg	Speed m/s	Ratio	Sheave mm	Voltage V	Current A	Torque Nm	Frequency Hz	Speed rpm	Power Kw	Poles	Rating
GTW7-31P0	320	1		φ325 3*φ8*12		5.8	200	19.6	118	2.5		
GTW7-31P5	320	1.5		φ325 3*φ8*12		9.2	200	29.5	177	3.7		
GTW7-31P6	320	1.6		φ325 3*φ8*12		9.2	200	31.5	189	4		
GTW7-31P7	320	1.75		φ325 3*φ8*12		9.9	200	34.3	206	4.3		
GTW7-41P0	450	1		φ325 4*φ8*12		7.9	265	19.6	118	3.3		
GTW7-41P5	450	1.5		φ325 4*φ8*12		12.2	265	29.5	177	4.9		
GTW7-41P6	450	1.6		φ325 4*φ8*12	380	12.2	265	31.5	189	5.3		
GTW7-41P7	450	1.75	2:1	φ325 4*φ8*12		13.1	265	34.3	206	5.7	20	SS-40%
GTW7-50P6	550	0.63		φ325 5*φ8*12		6.4	290	12.3	74	2.3		
GTW7-50P7	550	0.75		φ325 5*φ8*12		9.3	290	14.6	88	2.7		
GTW7-51P0	550	1		φ325 5*φ8*12		9.3	290	19.6	118	3.6		
GTW7-60P6	650	0.63		φ325 5*φ8*12		7.1	322	12.3	74	2.5		
GTW7-60P7	650	0.75		φ325 5*φ8*12		10.3	322	14.6	88	3.0		
GTW7-61P0	650	1		φ325 5*φ8*12		10.3	322	19.6	118	4.0		

## 8.2 GTW8 technical data

Type	Load kg	Speed m/s	Ratio	Sheave mm	Voltage V	Current A	Torque Nm	Frequenc y	Speed rpm	Power Kw	Poles	Rating
GTW8-61P0A	630	1		φ400 4*φ10*16	380	10.6	450	16	96	4.5	20	S3-40%
GTW8-61P5A	630	1.5		φ400 4*φ10*16								
GTW8-61P6A	630	1.6		φ400 4*φ10*16								
GTW8-61P7A	630	1.75		φ400 4*φ10*16								
GTW8-62P0A	630	2		φ400 4*φ10*16								
GTW8-81P0A	800	1		φ400 5*φ10*16								
GTW8-81P5A	800	1.5		φ400 5*φ10*16								
GTW8-81P6A	800	1.6		φ400 5*φ10*16								
GTW8-81P7A	800	1.75		φ400 5*φ10*16								
GTW8-82P0A	800	2	2:1	φ400 5*φ10*16								
GTW8-101P0A	1000	1		φ400 5*φ10*16								
GTW8-101P5A	1000	1.5		φ400 5*φ10*16								
GTW8-101P6A	1000	1.6		φ400 5*φ10*16								
GTW8-101P7A	1000	1.75		φ400 5*φ10*16								
GTW8-102P0A	1000	2		φ400 5*φ10*16								
GTW8-111P0A	1150	1		φ340 8*φ8×12								
GTW8-111P5A	1150	1.5		φ340 8*φ8×12								
GTW8-111P6A	1150	1.6		φ340 8*φ8×12								
GTW8-111P7A	1150	1.75		φ340 8*φ8×12								
GTW8-112P0A	1150	2		φ340 8*φ8×12								





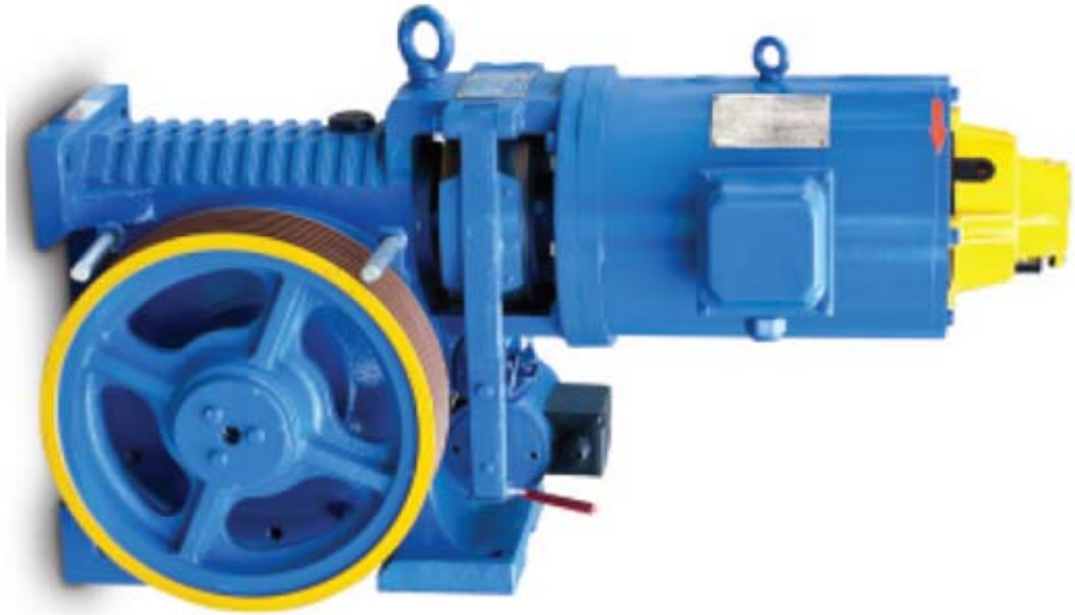
**YJ140**  
**Geared traction machine**

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**Spare parts replacement manual**

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S2014.10





# Catalogue

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# 1. Preface

## 1.1. Safety declaration



Only qualified personnel are allowed to perform any planning, installation or maintenance work to YJ140 geared traction machines. The personnel must be trained for the job and must be familiar with the installation, assembly, commissioning and operation of the product. Sufficient knowledge in lift construction is essential. Their commissioning is prohibited until the requirements of the directive are satisfied by or upon integration of the motor into the final product.

The regulations concerning operation, maintenance and inspection in accordance with the applicable safety regulations in lift construction such as GB 7588-2003 “Safety rules for the construction and installation of electric lifts” (equal to EN81-1:1998) and other relevant. Regulations shall be strictly observed.

The operator is responsible for the proper installation of the escalator drive machines with regard to safety requirements as well as for its inspection and maintenance as specified in the applicable regulations. No liability can be assumed for any damage caused by improper handling or any other acts, which are not in conformity with these operating instructions and thus deter from the qualities of the product.

## 1.2. YJ140 geared traction machine spare parts list

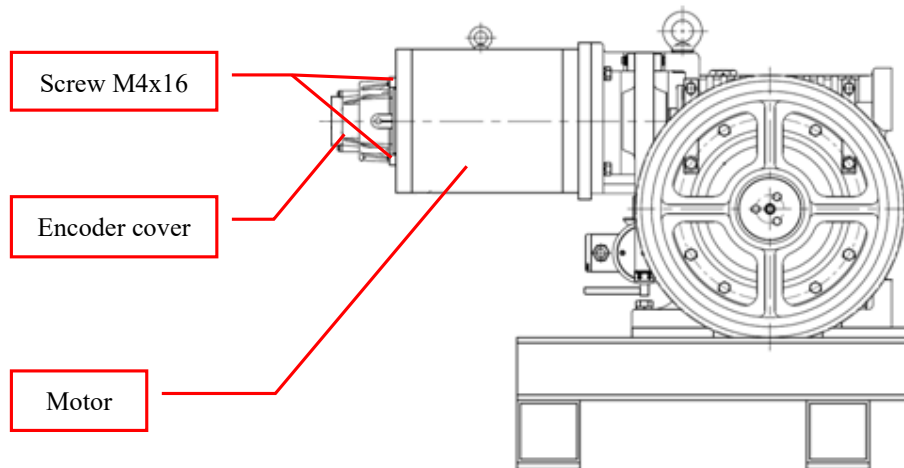
No.	Type	Description	Quantity	Remark
1	GB/T276	Bearing 6208ZZ	1	For worm (rear)
2	GB/T276	Bearing 6206ZZ	1	For worm (front)
3	GB/T294	Bearing QJ306	1	For worm (front)
4	GB/T297	Bearing 33215	1	Main shaft bearing
5	GB/T297	Bearing 33310	1	Main shaft bearing
6	GB/T13871	Oil seal TC $\phi$ 40 $\times$ $\phi$ 55 $\times$ 8	1	For worm
7	GB/T13871	Oil seal TC $\phi$ 75 $\times$ $\phi$ 95 $\times$ 10	1	For main shaft
8	GB/T 1235	O-ring $\phi$ 70 $\times$ $\phi$ 75 $\times$ 2.5	1	For worm bearing cap
9	GB/T 1235	O-ring $\phi$ 80 $\times$ $\phi$ 85 $\times$ 2.5	1	For worm bearing cap
10	GB/T 1235	O-ring $\phi$ 250 $\times$ $\phi$ 260 $\times$ 5.7	2	For main shaft bearing cap
11	GB 1160	Oil pointer M27 $\times$ 1.5	2	For gearbox
12	QB-06	Elastic connection	4	For coupling
13	YJ140.2.1	Brake	1	DC220V/AC220
14	YJ140.1-5	Traction sheave	1	
15	YJ140.1-8/8A	Worm gear	1	
16	KW7-2	Micro switch	1	
17	XY-06	Travel switch	1	
18	NEIMICON	Encoder	1	
19	YJ140.2-1	Brake arm	2	

## 2. Spare parts replacement

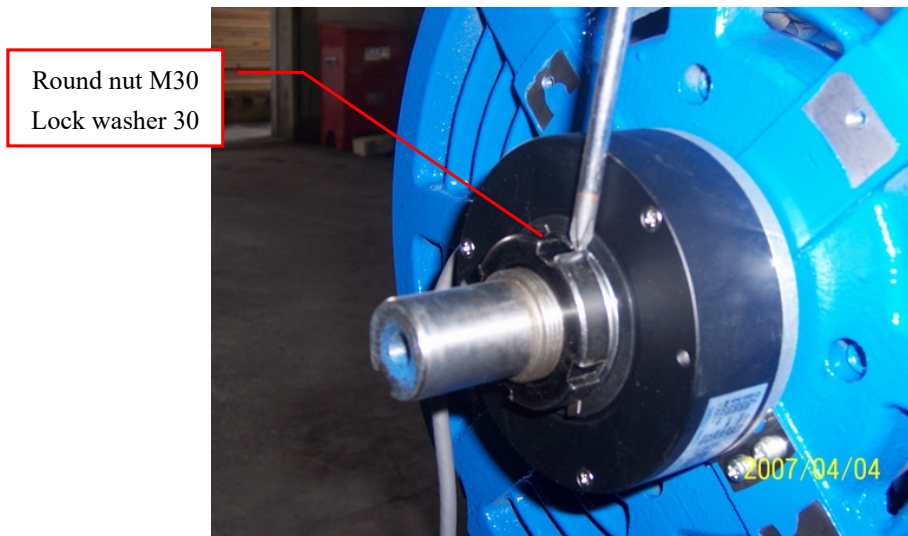
### 2.1. Motor replacement

#### 2.1.1. Remove the motor

1. Turn off the power of the traction machine, screw out the screws M4x16 with cross screwdriver, then remove the encoder cover.

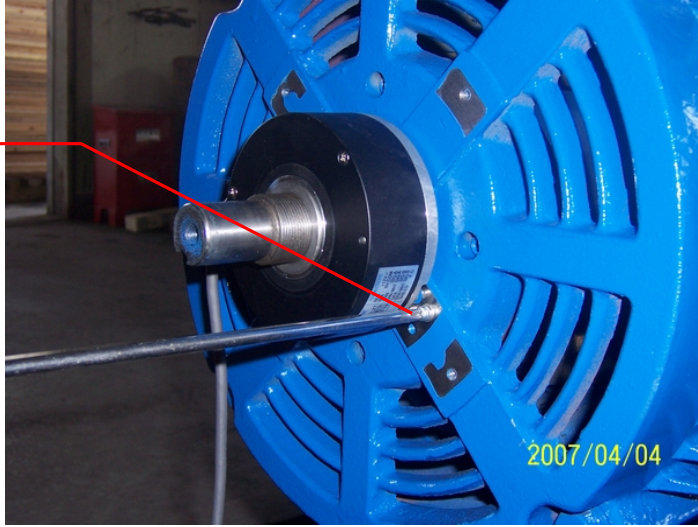


2. Remove the safety catch of the lock washer 30 with screwdriver, then screw out the round nut M30, and remove the lock washer 30.



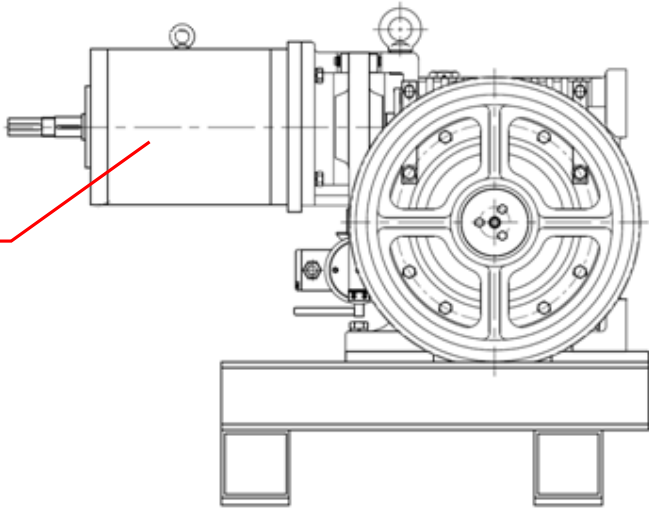
3. Screw out four screws M4 with cross screwdriver, then remove the encoder.

Screw M4

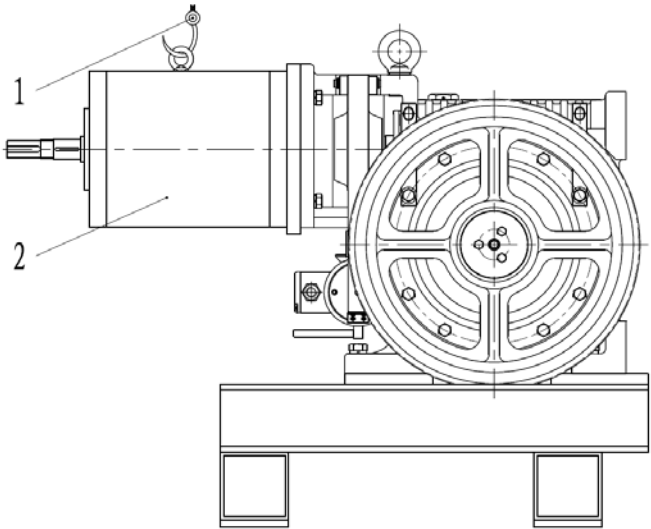


4. Remove the power wires of the motor.

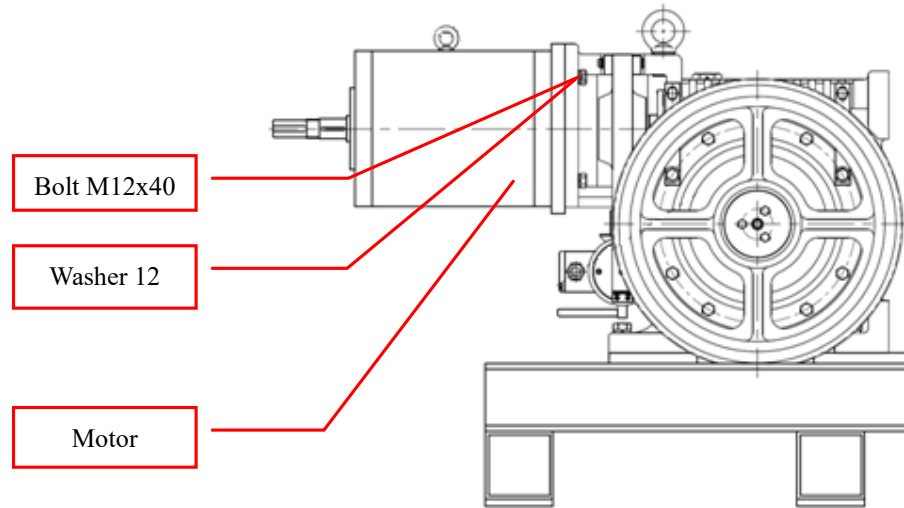
Motor



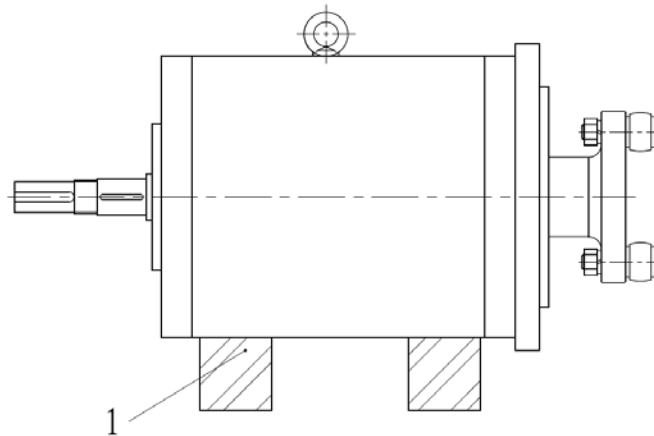
5. Hang the motor with lifting equipment.



- Screw out the bolts M12x40 and washers 12 with open-end spanner (18mm), then remove the motor.



- Put the motor onto the wood board.

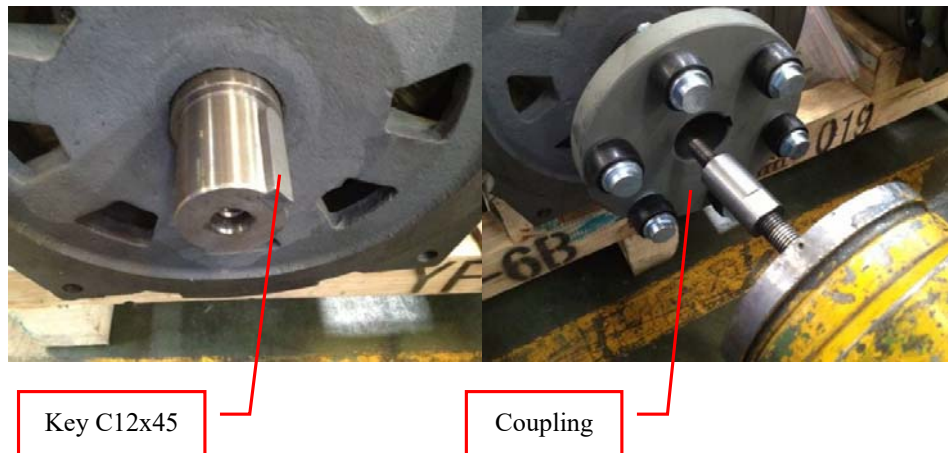


- Pull out the coupling with hydraulic puller, and tap out the key C12x45.

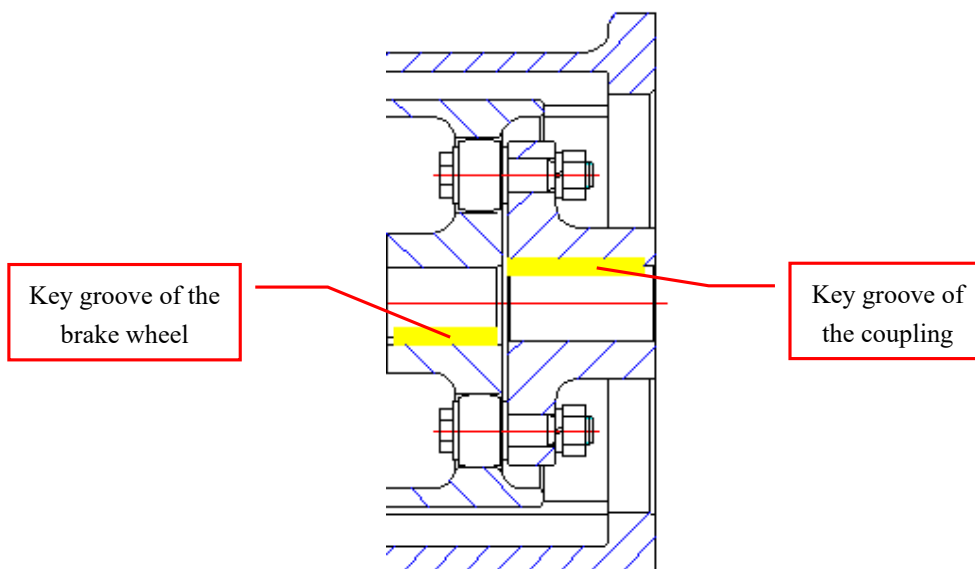
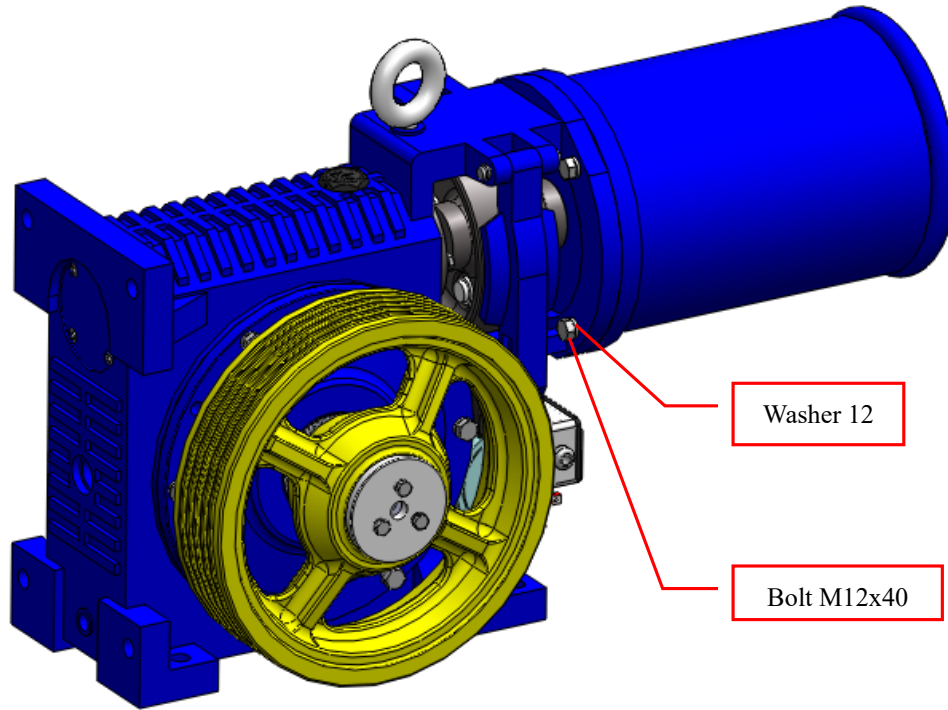


## 2.1.2. Install the motor

1. Install the key C12x45 into the key groove of the motor shaft (drop two drops of threaded glue into the key groove), then smear little lubricating oil onto the surface of the motor shaft, and then install the coupling onto the motor shaft and press it in place with hydraulic jack.



2. Smear little lubricating oil onto the surface of the elastic rings, then hoist the motor, observe and turn the motor shaft to make the elastic connections align the holes on the brake wheel, and make sure that the key grooves of the coupling and brake wheel are opposite (notice: the junction boxes of the motor and brake are at the same side). Turn the motor shaft one lap and above, make sure that the motor has been installed in place, then screw into four bolts M12x40 and washers 12 to fix the motor.



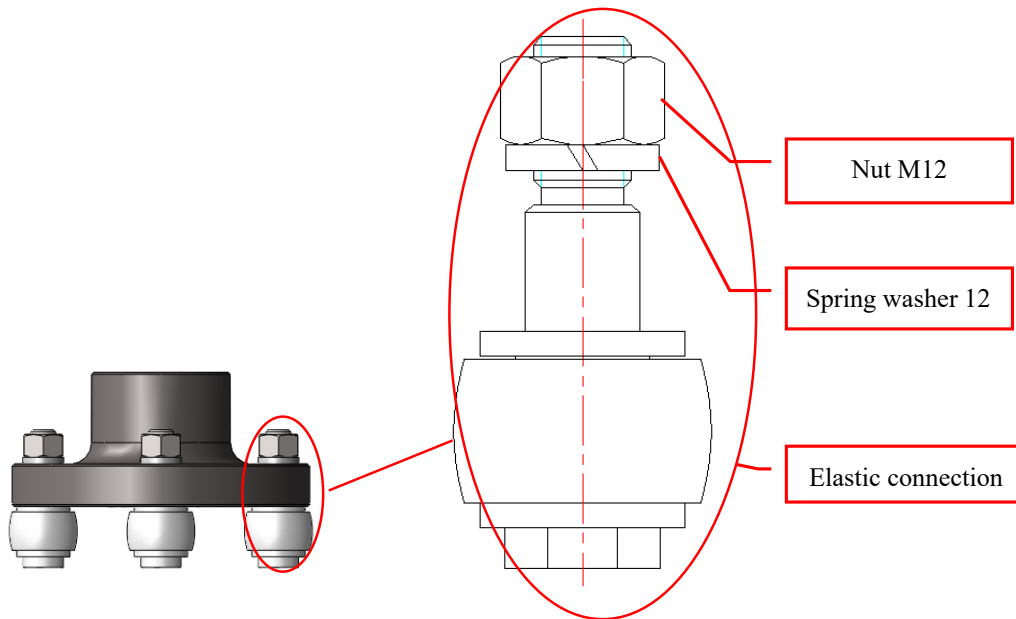


3. Clean the motor shaft, then install the encoder onto the shaft and fix it with screws M4 and washers.
4. Install the round nut M30 and lock washer 30 onto the shaft to fasten the encoder, and clasp the safety catch of the lock washer 30.
5. Install the encoder cover and fix it with the screws M4x16.
6. Turn on the power of the traction machine, and test run.

## 2.2. Elastic connection replacement

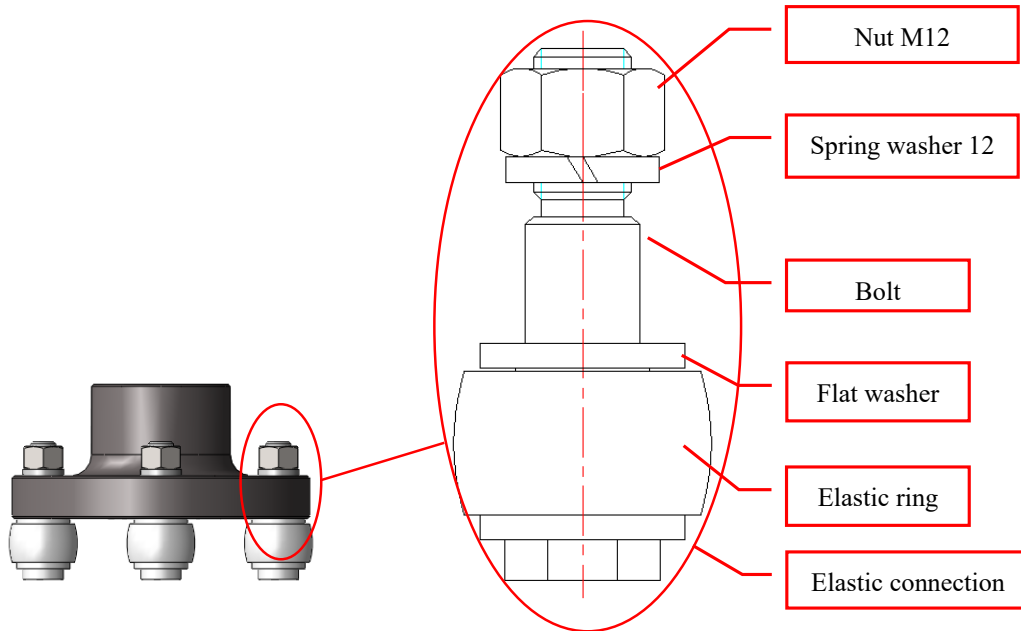
### 2.2.1. Remove the elastic connection

1. Remove the motor (Refer to YJ140 geared traction machine spare parts replacement manual—motor replacement)
2. Screw out the nut M12 and spring washer 12 with open-end spanner (18mm), then remove the elastic connection from the coupling.



## 2.2.2. Install the elastic connection

1. Clean the coupling.
2. Install the elastic ring and flat washer onto the bolt, then install the bolt onto the coupling, and then screw on the nut M12 and spring washer 12, tighten the nut M12.

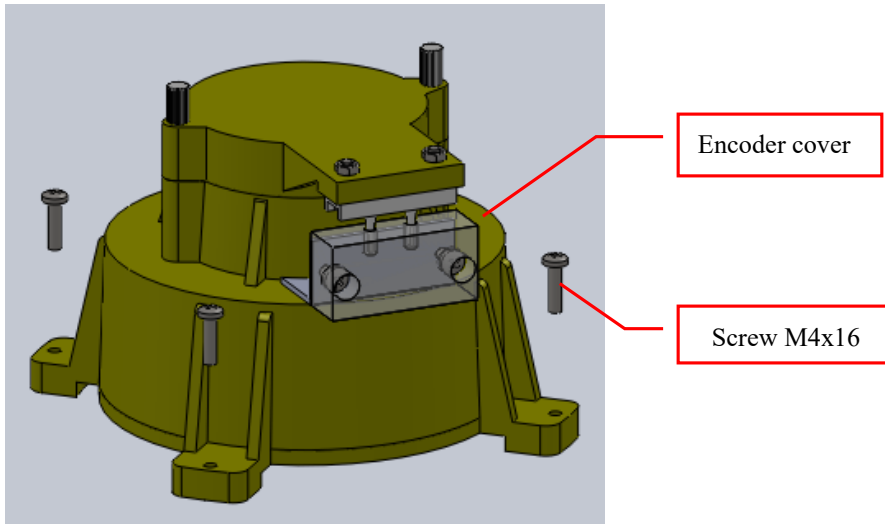


3. Install the motor (Refer to YJ140 geared traction machine spare parts replacement manual—motor replacement)

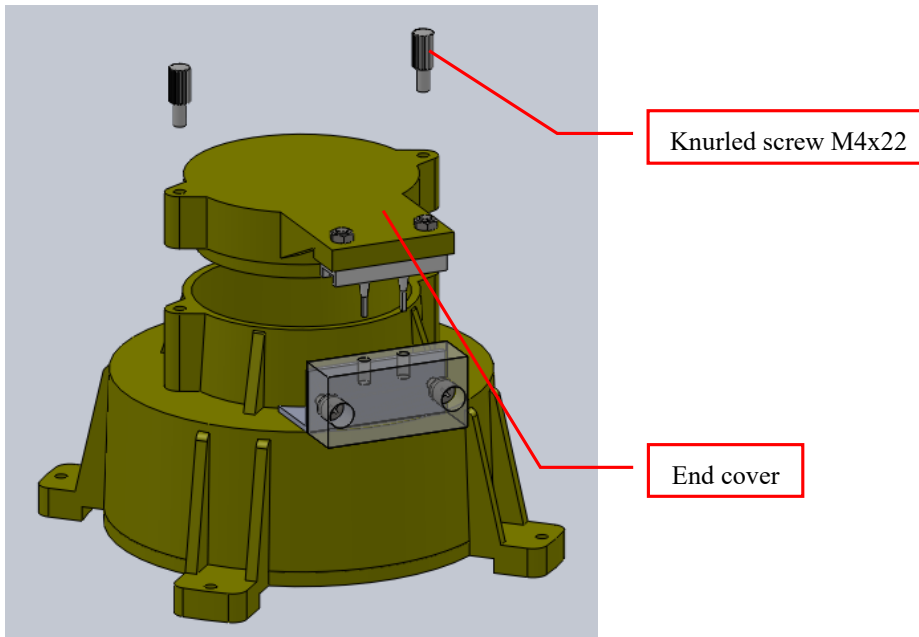
## 2.3. Travel switch replacement

### 2.3.1. Remove the travel switch

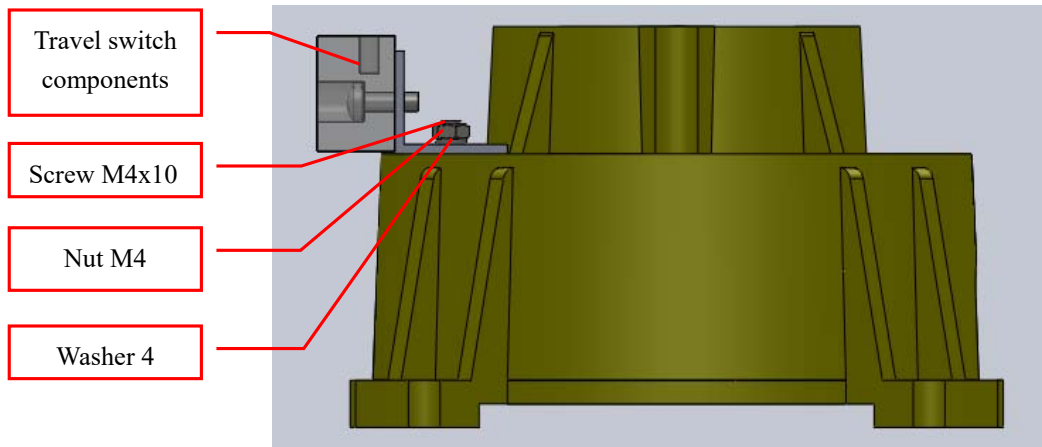
1. Remove the connecting wires of the travel switch (suggest connecting normally-closed contact when installing).
2. Screw out the screws M4x16 with cross screwdriver, then remove the encoder cover.



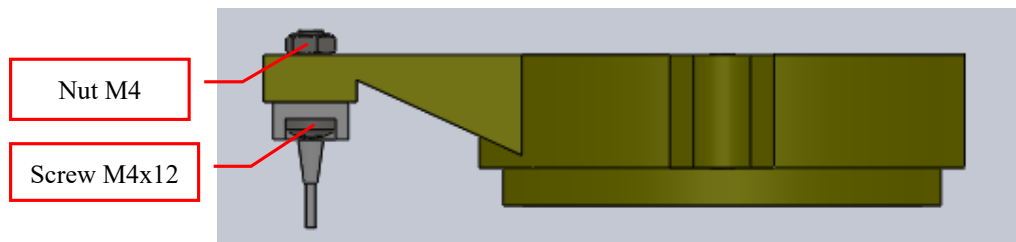
3. Loosen the knurled screws M4x22, and then remove the end cover.



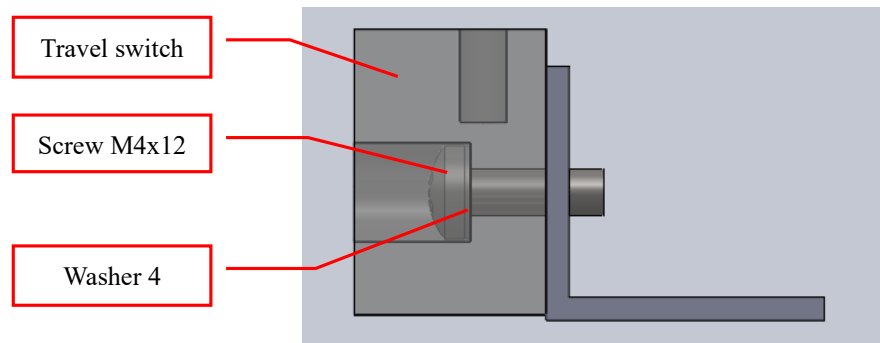
4. Screw out the nuts M4, then remove the screws M4x10 and washers 4, and then remove the travel switch components.



5. Screw out the nuts M4, then remove the screws M4x12 and travel switch contact.

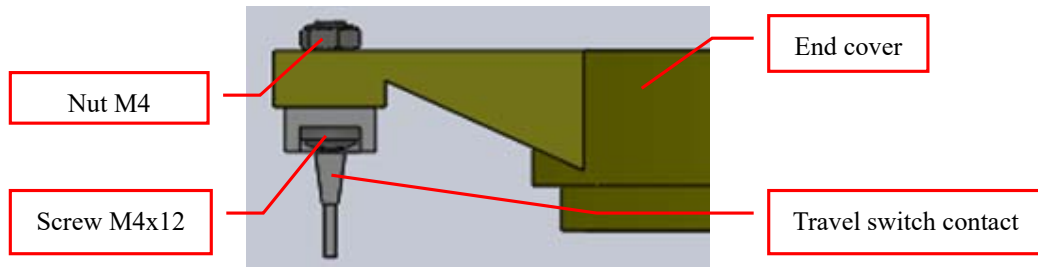


6. Screw out the screws M4x12 and washers 4, then remove the travel switch.

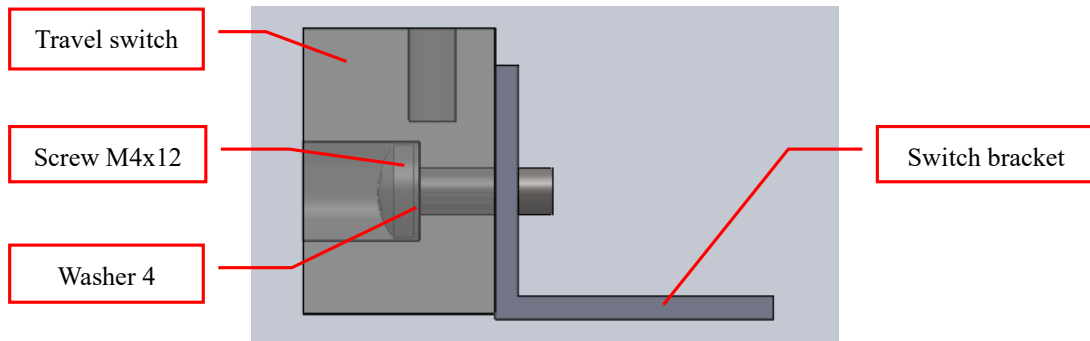


### 2.3.2. Install the travel switch

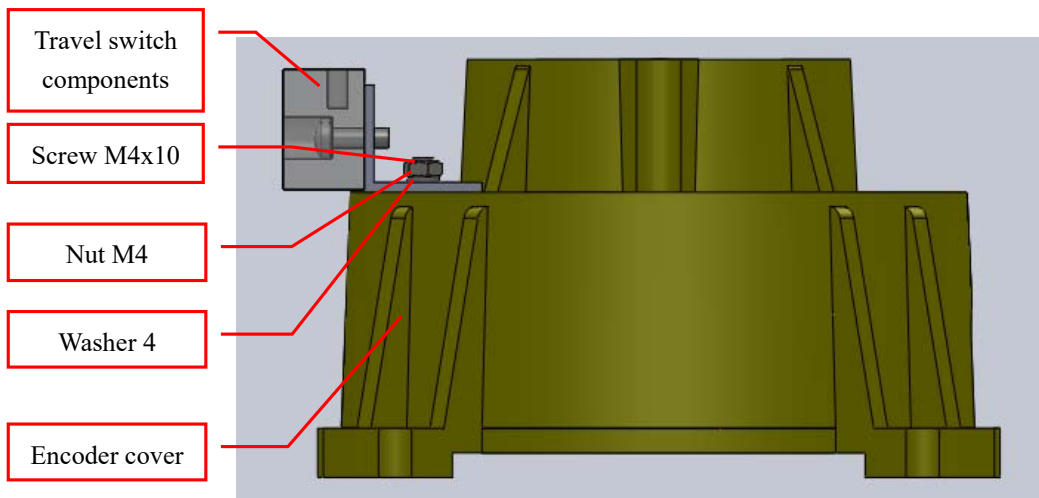
1. Install the travel switch contact onto the end cover and fix it with screws M4x12 and nuts M4.



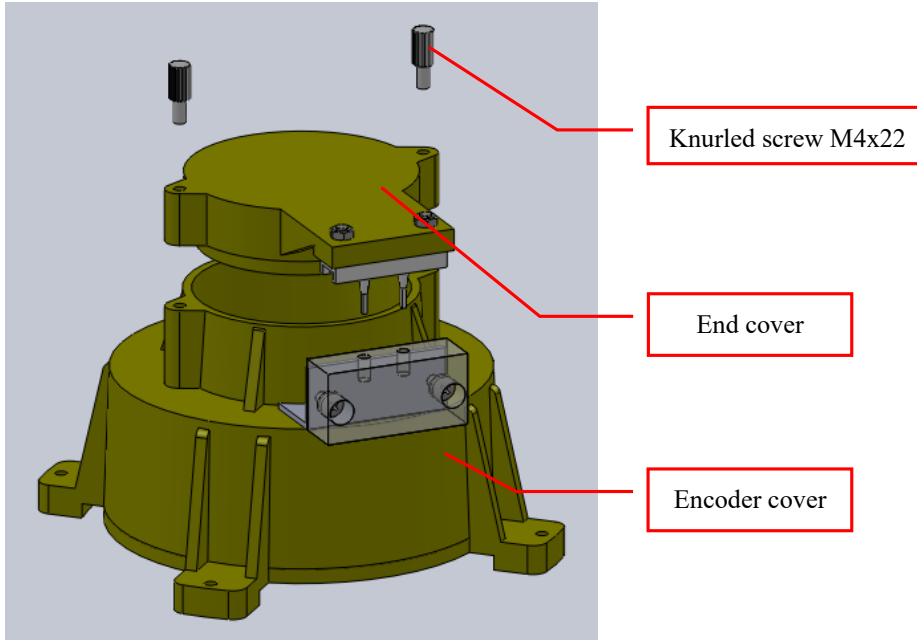
2. Install the travel switch onto the switch bracket, then screw into screws M4x12 and washers 4 to fix.



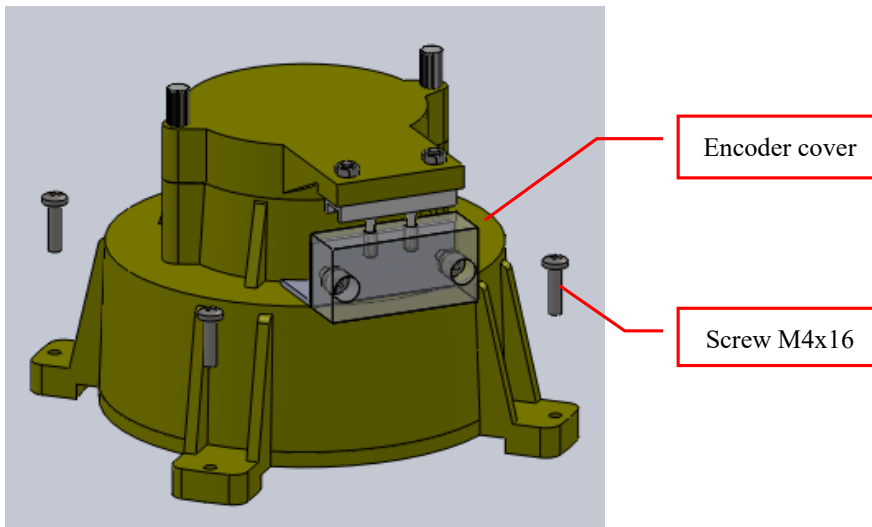
3. Install the travel switch components onto the encoder cover, then fix the components with screws M4x10, nuts M4 and washers 4.



4. Install the end cover onto the encoder cover and tighten the knurled screws M4x22, make sure that the end cover is fixed and the metal part of the travel switch contact is not exposed.



5. Install the encoder cover onto the motor, then screw into screws M4x16 to fix.

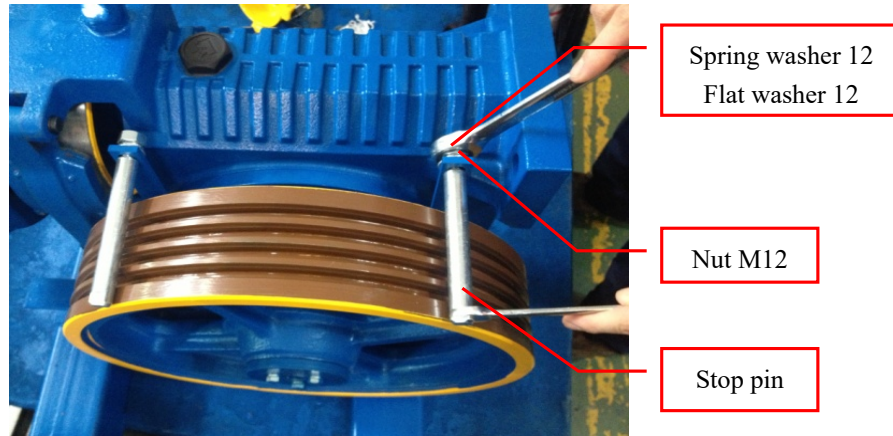


6. Connect the connecting wires of the travel switch (make sure that the travel switch is on state)
7. Turn on the power of the traction machine, and test run.

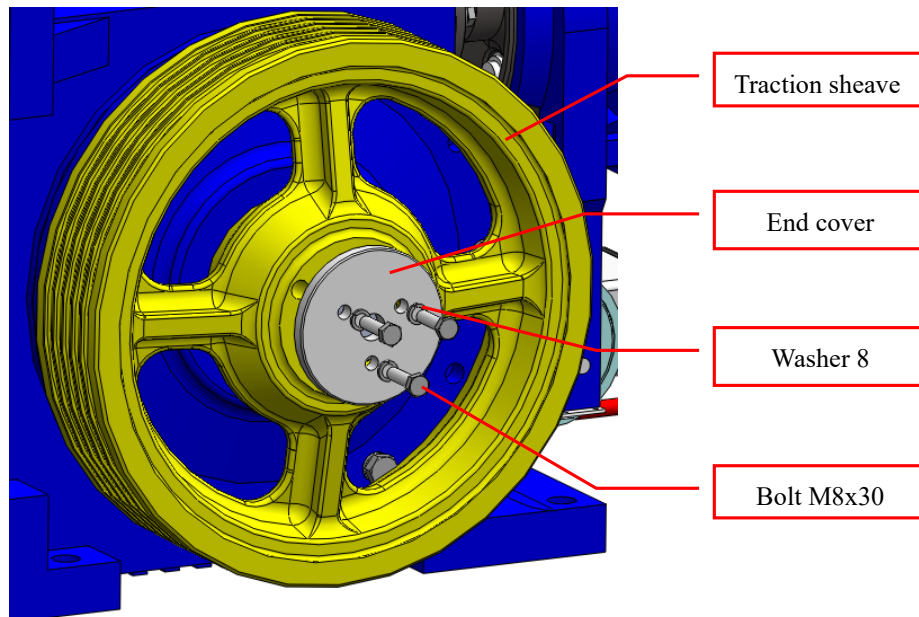
## 2.4. Traction sheave replacement

### 2.4.1. Remove the traction sheave

1. Remove the power wires, screw out the nut M12 with open-end spanner (12,18mm), then remove the spring washer 12, flat washer 12 and stop pin.

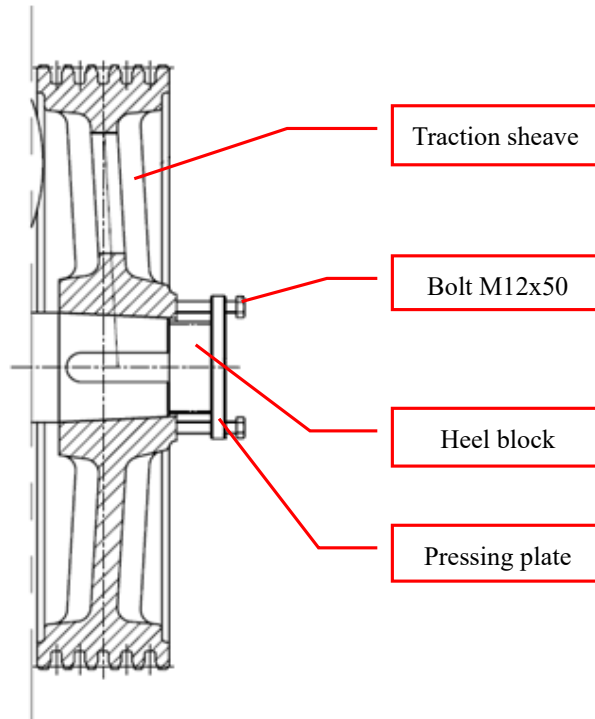


2. Screw out the bolts M8x30 and washers 8 with inner hexagon spanner (13mm), then remove the end cover.



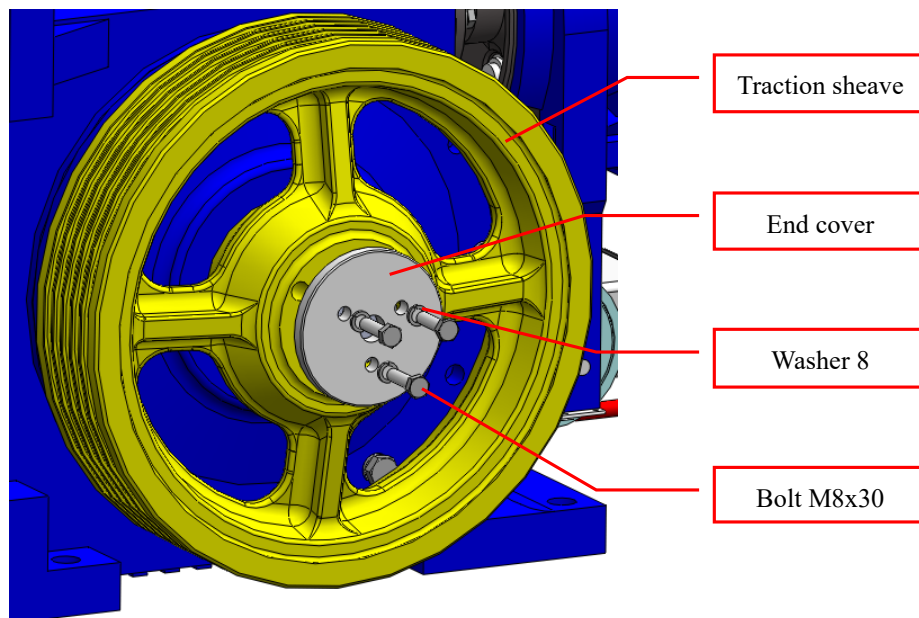
3. Install the heel block and pressing plate onto the end of the main shaft, then make three bolts M12 pass through the pressing plate and screw them into the traction sheave, tighten the bolts M12 slowly and uniformly to pull out the traction sheave.



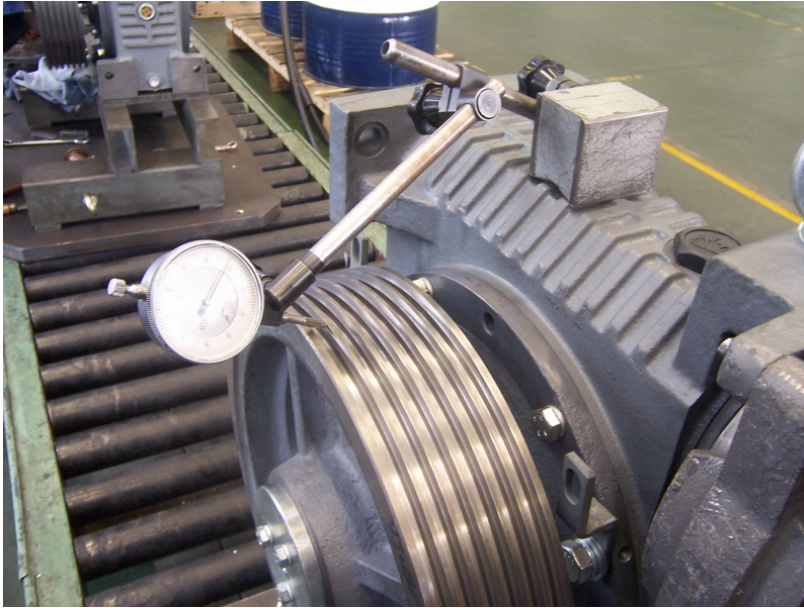


## 2.4.2. Install the traction sheave

1. Check and clean the traction sheave and the main shaft, align the key and key groove, and then install the traction sheave onto the main shaft, then install the end cover onto the end face of the traction sheave and screw into bolts M8x30 and washers 8 to fix.



2. Turn on the power of the brake, then detect radial runout of the rope groove, and the radial runout  $\leq 0.17\text{mm}$  (turn the traction sheave one lap and above).

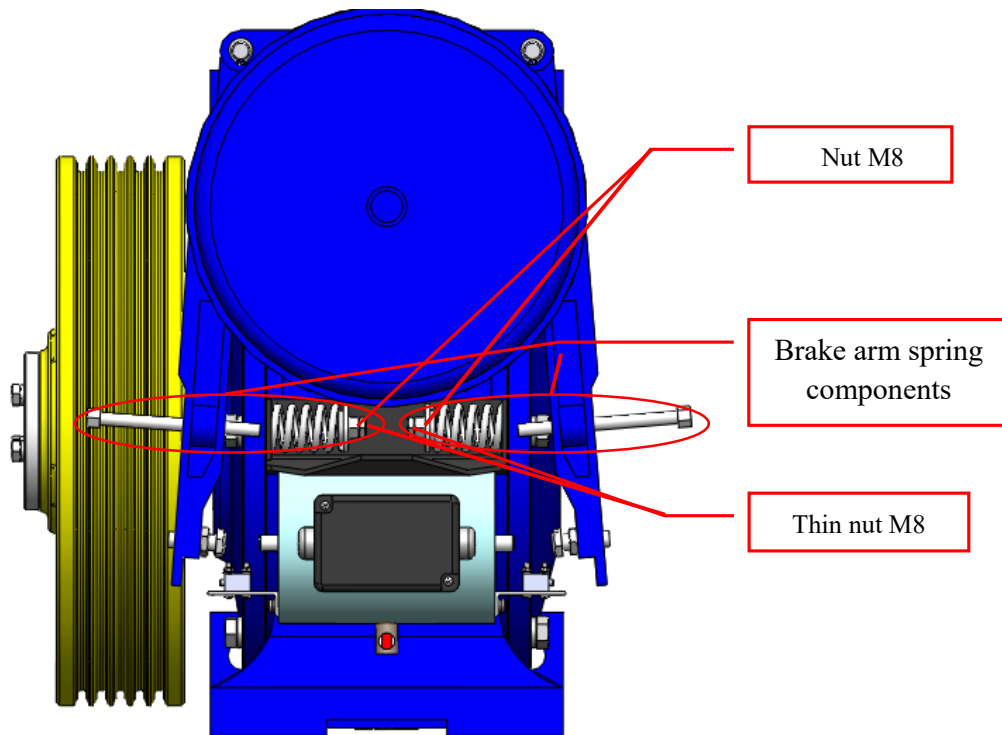


3. Turn on the power of the traction machine, and test run.
4. Install the stop pin after passing the test, and screw on nut M12 and washers 12 to fasten.

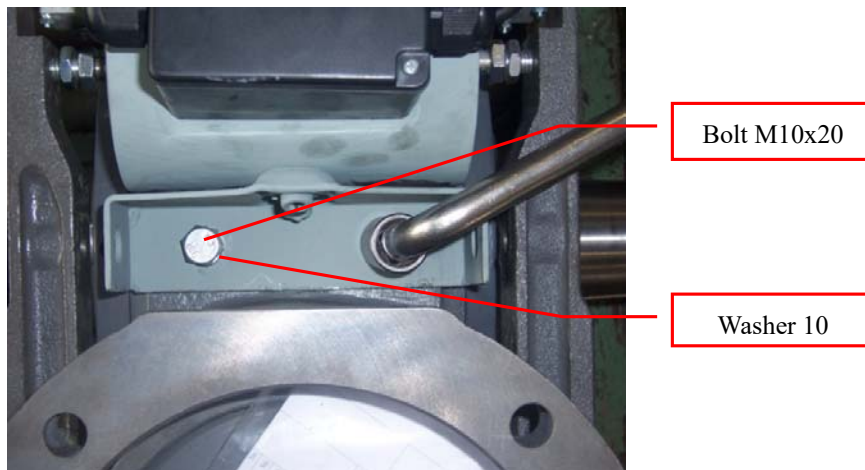
## 2.5. Brake replacement

### 2.5.1. Remove the brake

1. Screw out the nuts M8 and thin nuts M8 with open-end spanner (13mm), then remove the brake arm spring components, and then open the brake arm.

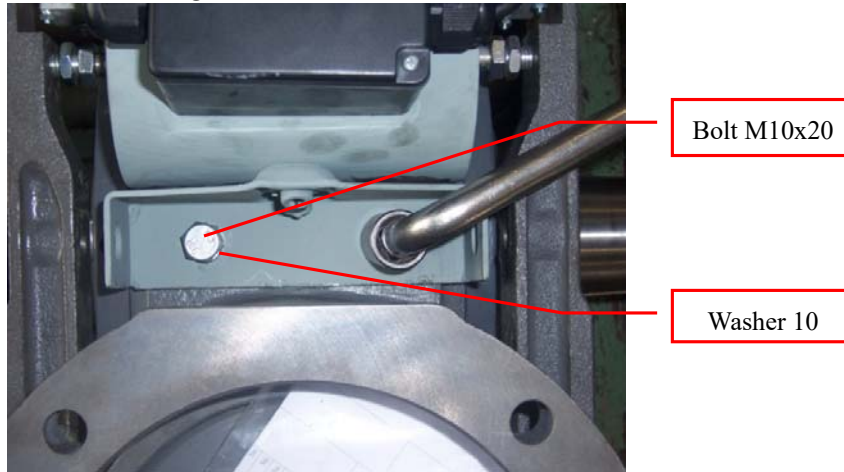


2. Screw out the bolts M10x20 and washer 10 with socket spanner, then remove the brake.



## 2.5.2. Install and adjust the brake

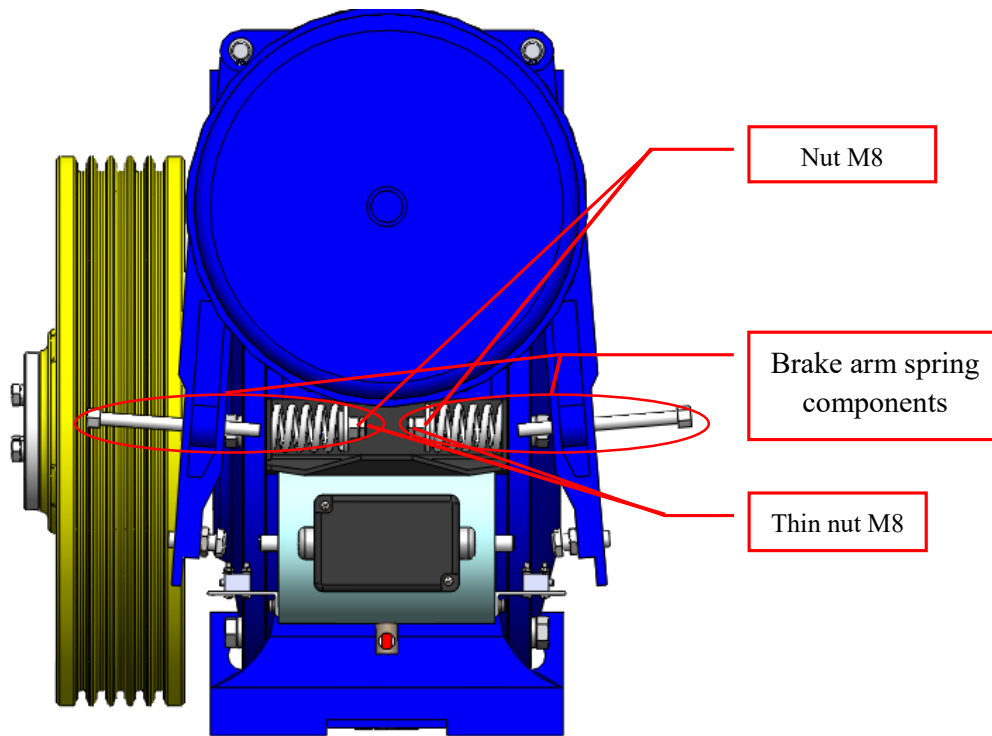
1. Smear some threaded glue into the threaded holes (for the bolts M10x20), then install the brake onto the gearbox and screw into the bolts M10x20 and washers 10 to fix, don't tighten the bolts.



2. Close the brake arm, adjust the position of the brake, make sure that the brake and both stop screws are on the same axis, then tighten the bolts M10x20 to fasten the brake.



3. Make the bolt M8x100 pass through the brake arm and brake bracket, then install the brake spring, spring seat and scale plate onto the bolt, and then screw on the nut M8 and the thin nut M8.



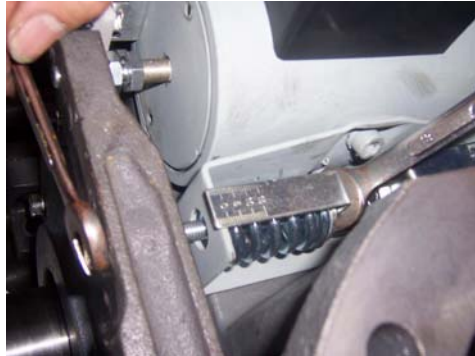
4. Screw the nut M8 to make the brake spring forced lightly, then record the reading of the scale plate, and then go on screwing the nut M8 to compress the brake spring, meanwhile observe the reading of the scale plate, according to the required amount of compression to compress the brake spring, make the brake arm get enough braking torque, then tighten the thin nut M8.

Power (kW)	amount of compression (mm)	Braking torque (N.m)
≤4.5	5~7	≥50
5.6(double speed)	7~9	≥60
7.5-6P	13~15	≥120
9-4P	12~13	≥100

5. Turn on the power of the brake, adjust the stop screw to make it touch the guide shaft of the brake, then screw the stop screw into 1mm, observe the clearance between the brake strap and the brake wheel, make sure the clearance is 0.1mm-0.5mm and uniform, then tighten the nut M10.



6. Turn on and turn off the power of the brake repeatedly, observe synchronism of both the brake arms, if the action of one side is faster than another side, then loosen the nut M8 of slow side to reduce the pressure on the brake arm, or tighten the nut M8 of fast side to increase the pressure on the brake arm, until the action of both brake arms is synchronous, and then tighten the nuts M8 (record the reading of the scale plate before adjusting, make sure that the brake arms have enough braking force).

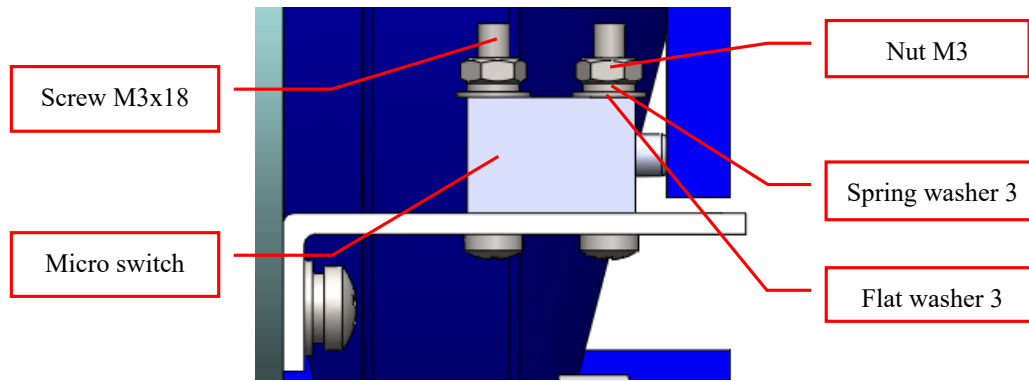


7. Release the brake manually. Turn the brake handle to left or right can release the brake and the brake handle can reset automatically.
8. Turn on the power of the traction machine, and test run.

### **2.5.3. Remove the micro switch**

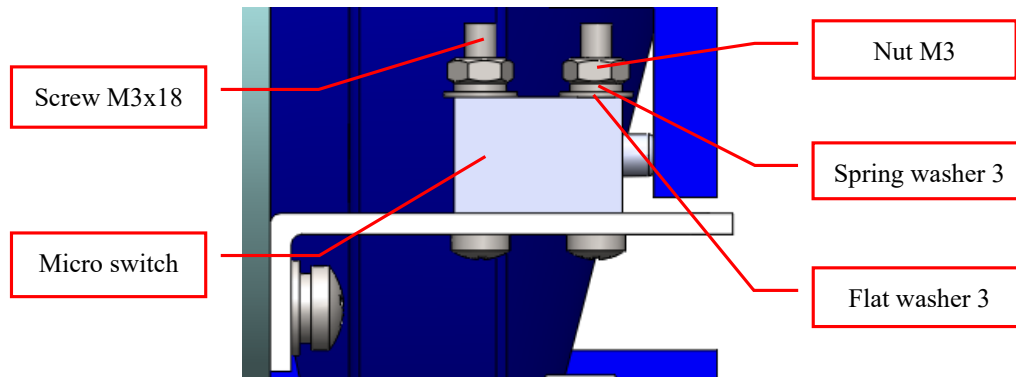
1. Screw out the nuts M3, then remove the screws M3x18, spring washers 3 and flat washers 3, and then remove the micro switch.





### 2.5.4. Install and adjust the micro switch

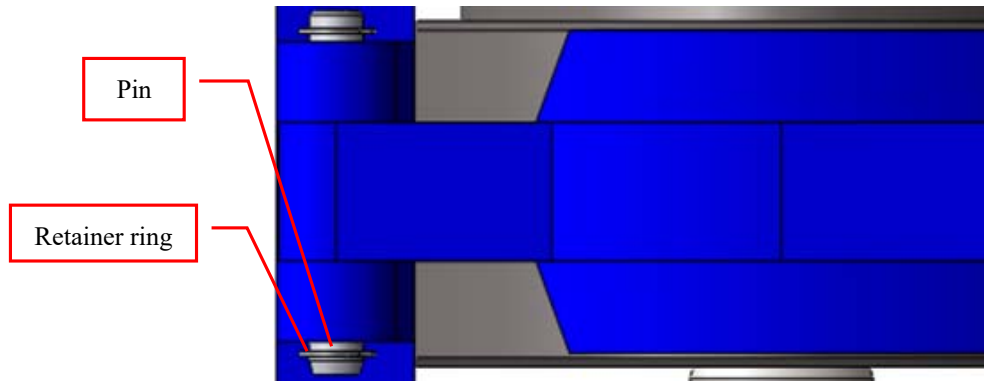
1. Install the micro switch onto the switch bracket and fix it with screws M3x18, nuts M3, spring washers 3 and flat washers 3, don't tighten the nuts.



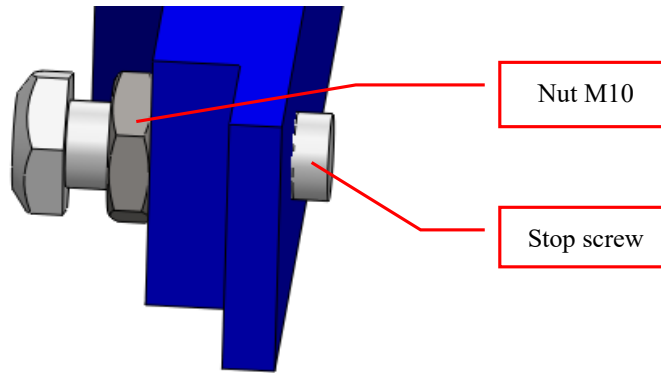
2. Turn on the power of the brake, then adjust the position of the brake, the position is subject to the action of the micro switch contact, then tighten the nuts M3 to fix the micro switch.
3. Turn on the power of the traction machine, and test run.

### 2.5.5. Remove the brake arm

1. If the brake strap wears badly, then the brake arm needs to be replaced. Remove the retainer ring 12 with retainer pliers, then tap out the pin, and remove the brake arm.

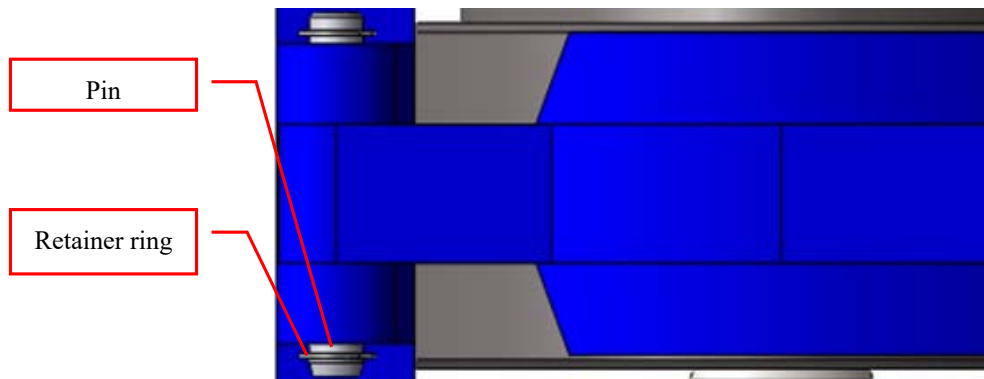


2. Loosen the nut M10 with open-end spanner (16mm), and then remove the stop screw.



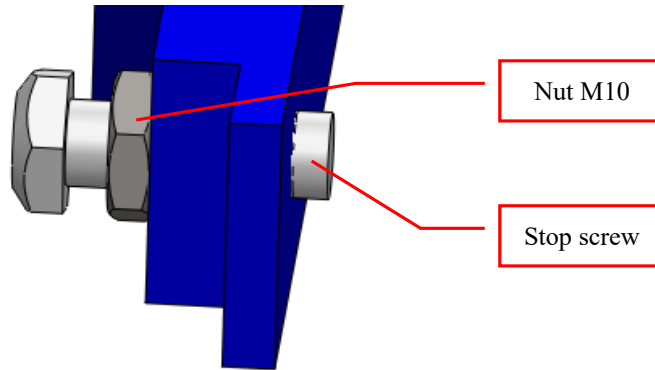
## 2.5.6. Install the brake arm

1. Install the brake arm, then insert the pin to fix the brake arm, and then install the retainer ring 12 onto the pin.





2. Screw the nut M10 onto the stop screw, then screw the stop screw into the brake arm (don't tighten the nut).

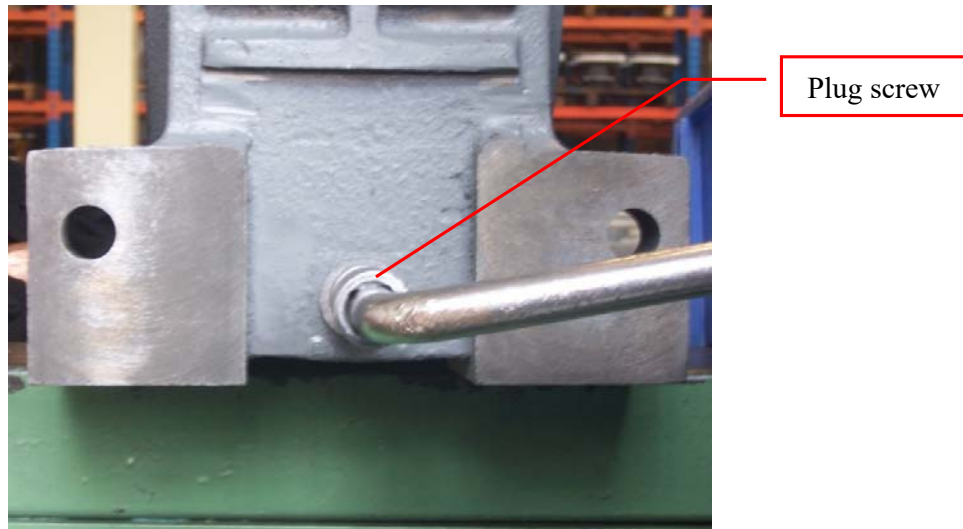


3. Install the brake arm spring components and adjust the brake (Refer to YJ140 geared traction machine spare parts replacement manual—brake replacement)
4. Adjust the micro switch (Refer to YJ140 geared traction machine spare parts replacement manual—micro switch replacement)
5. Turn on the power of the traction machine, and test run.

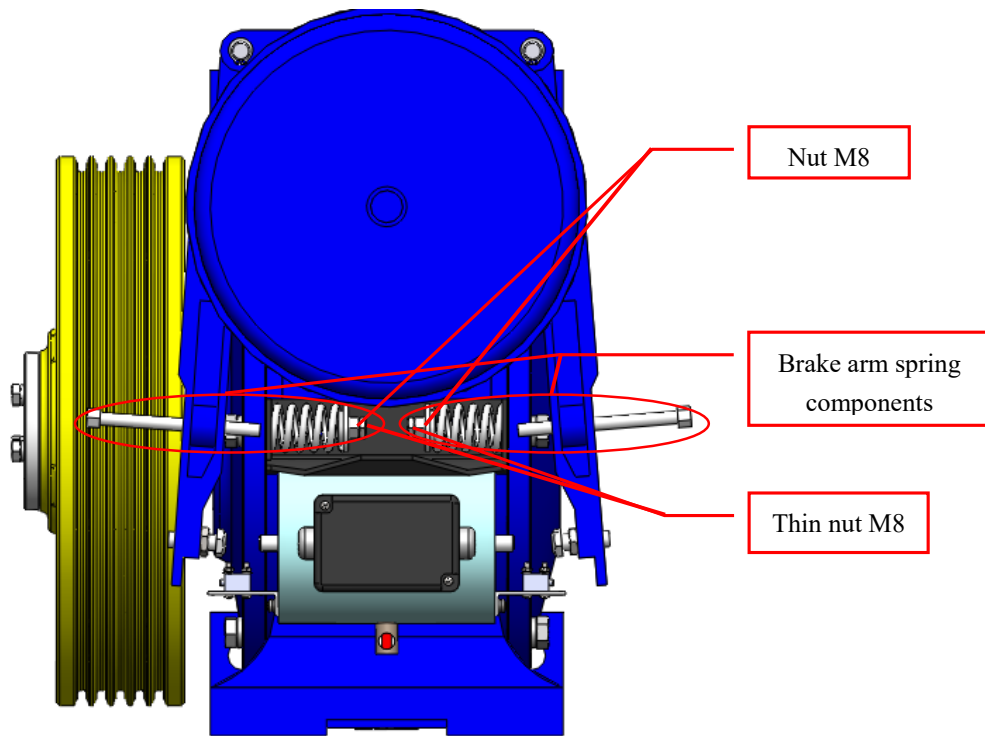
## 2.6. Worm bearing replacement

### 2.6.1. Remove the worm bearing

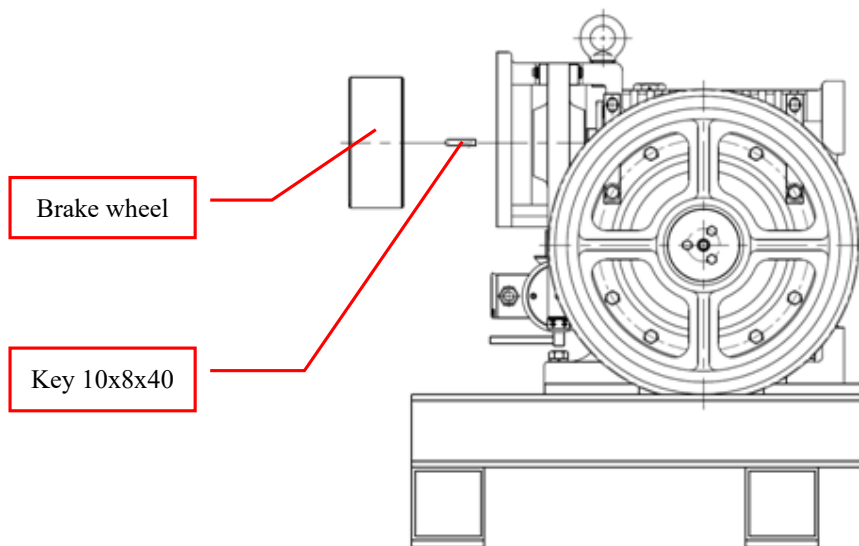
1. Remove the encoder cover, encoder and motor (Refer to YJ140 geared traction machine spare parts replacement manual—motor replacement)
2. Put a container under the gearbox (the volume of the container should be more than 6L), then screw out the plug screw to drain the elevator oil.

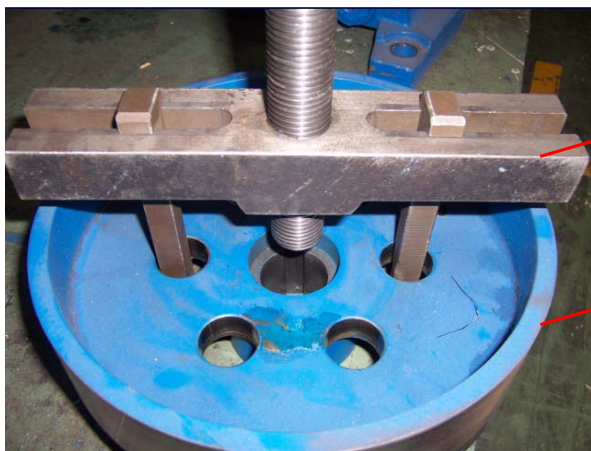


3. Screw out the nuts M8 and thin nuts M8 with open-end spanner (13mm), then remove the brake arm spring components, and then open both the brake arms.



4. Remove the brake wheel with special tool, and then remove the key 10x8x40.





Special tool

Brake wheel

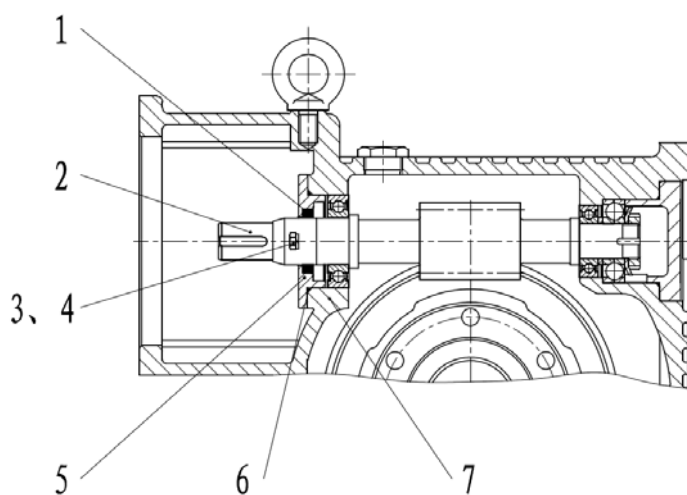
- Screw out the bolts M8 and washers 8 with open-end spanner (13mm), then remove the front bearing cap of the worm, pay attention to protect the O-ring and oil seal when removing.



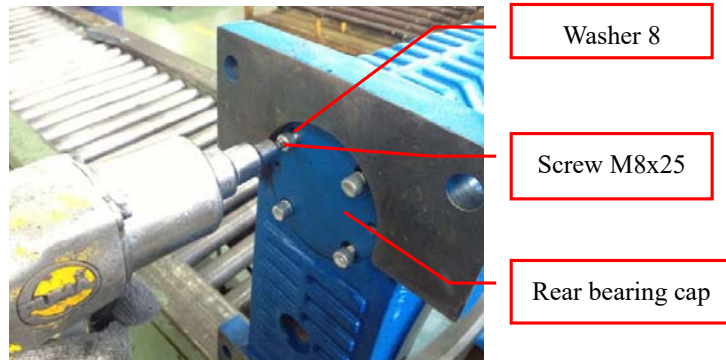
Front bearing cap

O-ring

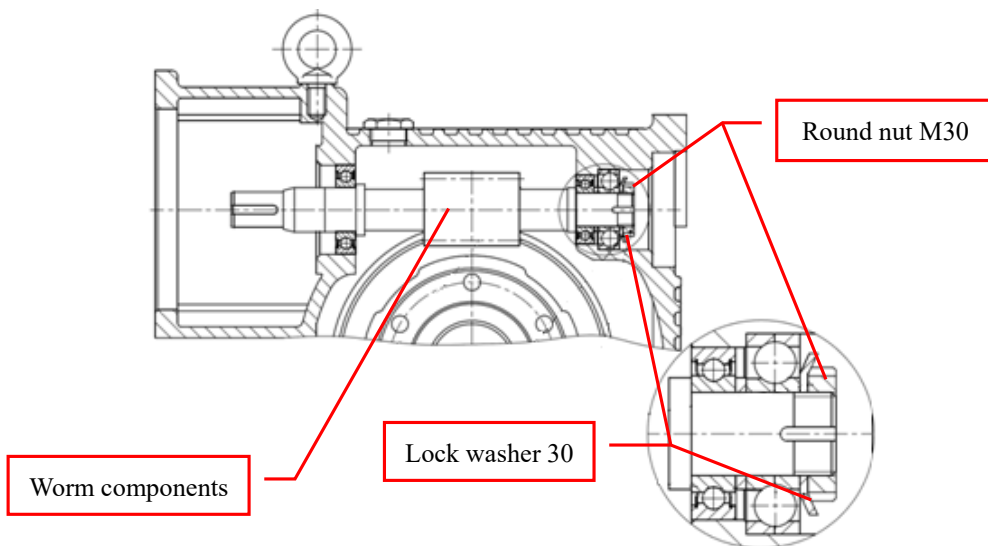
Oil seal  
TCΦ40xΦ55x8



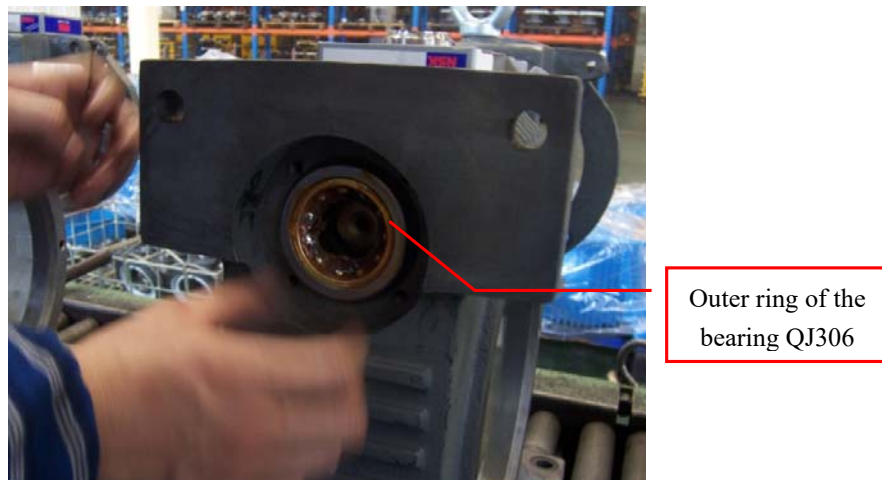
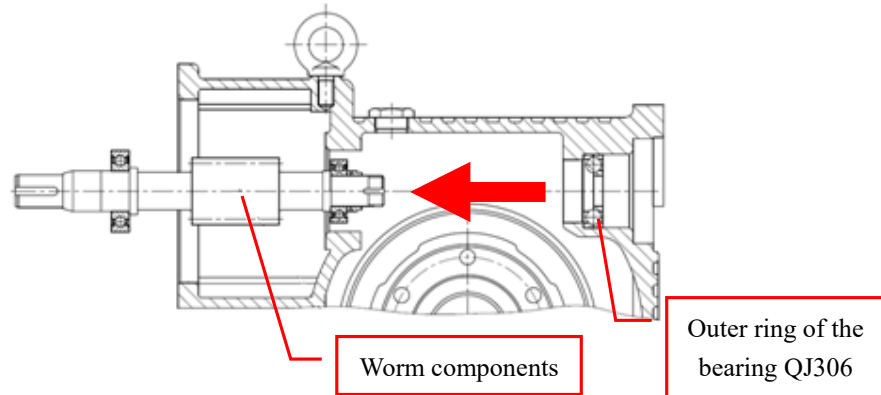
6. Screw out the screws M8x25 and washers 8 with inner hexagon spanner (6mm), then remove the rear bearing cap of the worm, pay attention to protect the O-ring when removing.



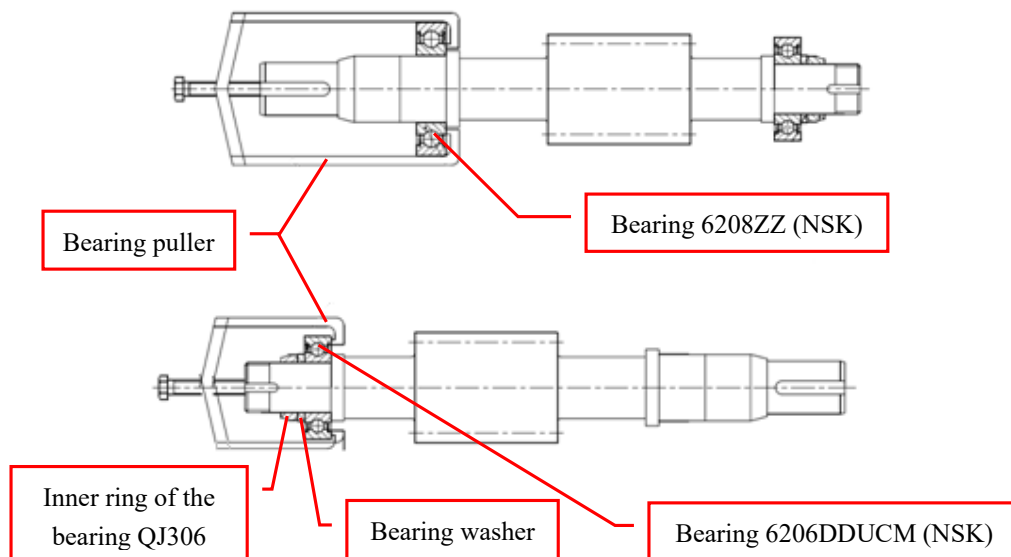
7. Remove the safety catch of the lock washer 30 with screwdriver, then screw out the round nut M30, and then remove the lock washer 30.



8. Turn the traction sheave, meanwhile pull out the worm components from the gearbox, then remove the outer ring of the bearing QJ306.

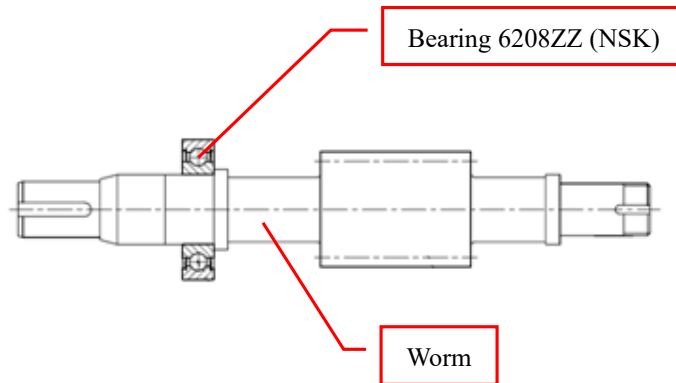


9. Remove the bearing 6208ZZ with bearing puller, then remove the inner ring of the bearing QJ306, bearing washer and bearing 6206DDUCM with bearing puller.

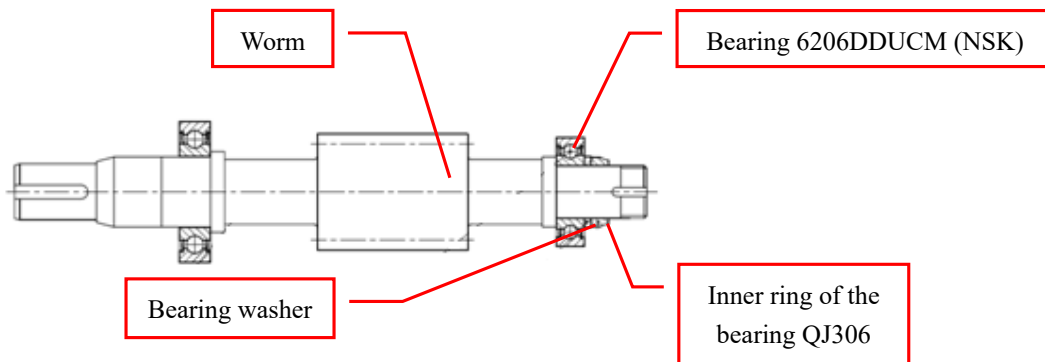


## 2.6.2. Install the worm bearing

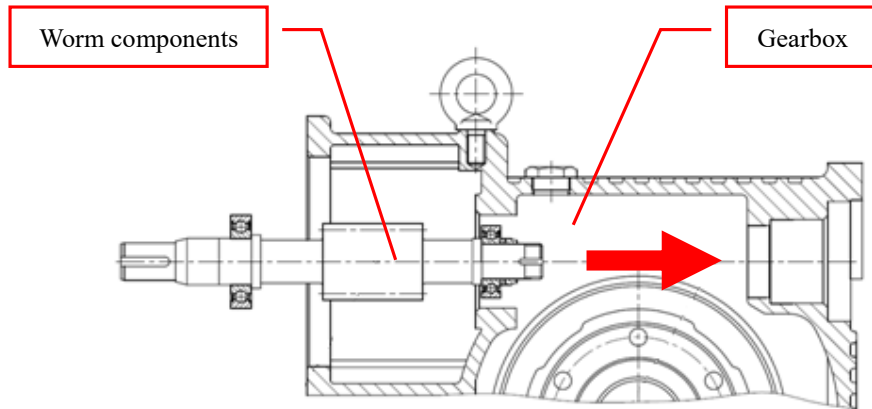
1. Clean the worm and blow-dry.
2. Heat the bearing 6208ZZ to  $80\pm 15$ ° and install it onto the worm rapidly, make sure that the bearing is installed in place.



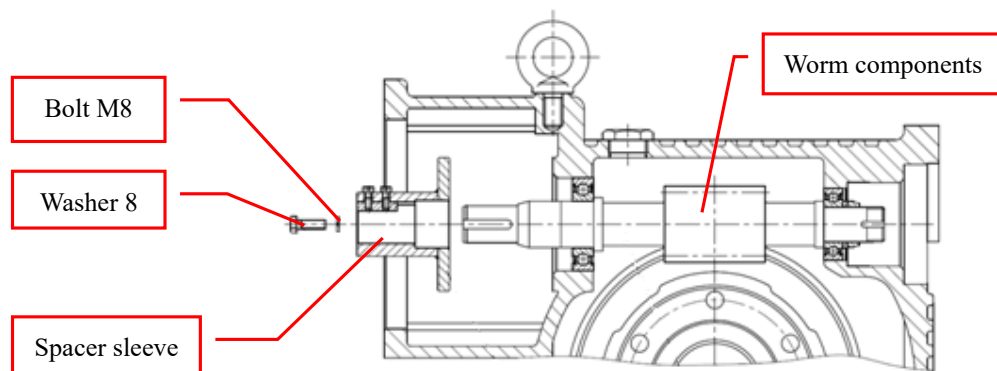
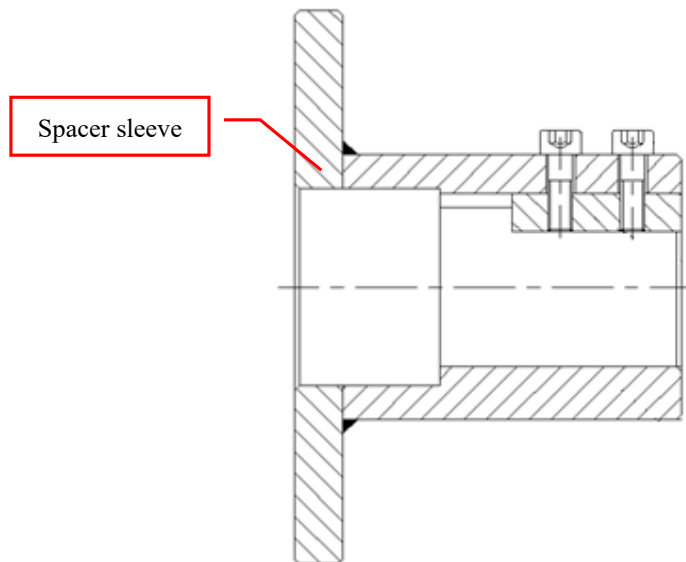
3. Heat the bearing 6206DDUCM to  $80\pm 15$ ° and install it onto the worm rapidly, make sure that the bearing is installed in place. Install the bearing washer onto the worm, and then press the inner ring of the bearing QJ306 onto the worm.



4. Turn the traction sheave, meanwhile install the worm components into the gearbox slowly.

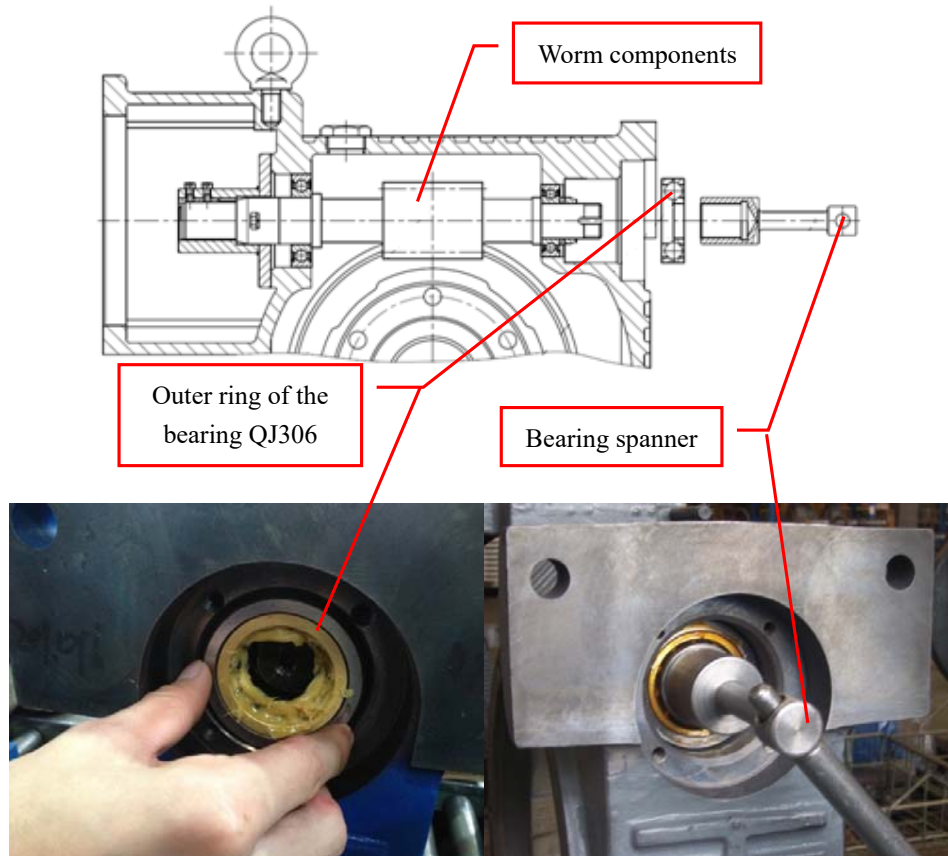


5. Install the spacer sleeve onto the worm, then screw into bolts M8 and washers 8 to fix the spacer sleeve (the spacer sleeve is used for fixing the worm).

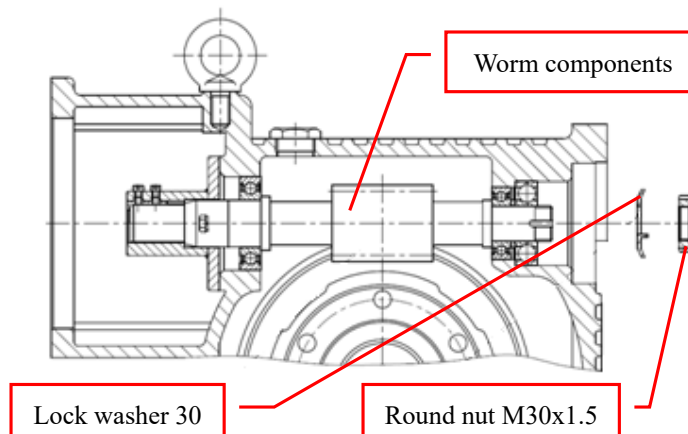




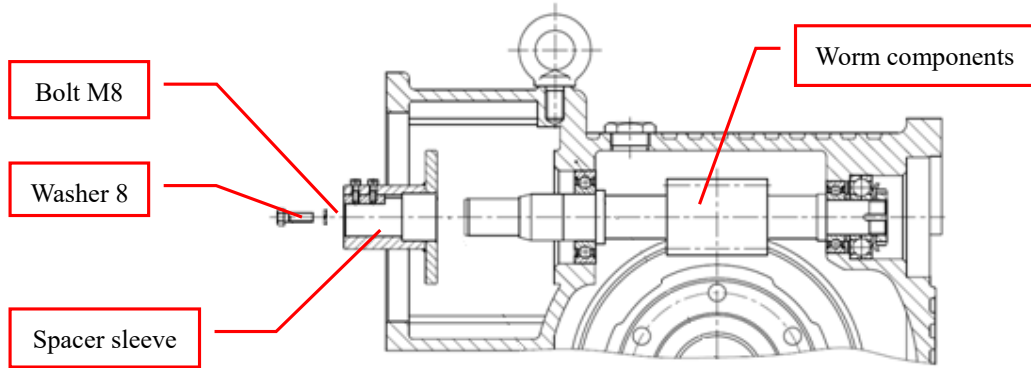
- Smear some lubricating grease onto the outer ring of the bearing QJ306, then press it onto the worm with bearing spanner. Pay attention to protect the teeth surface of the worm when installing the outer ring.



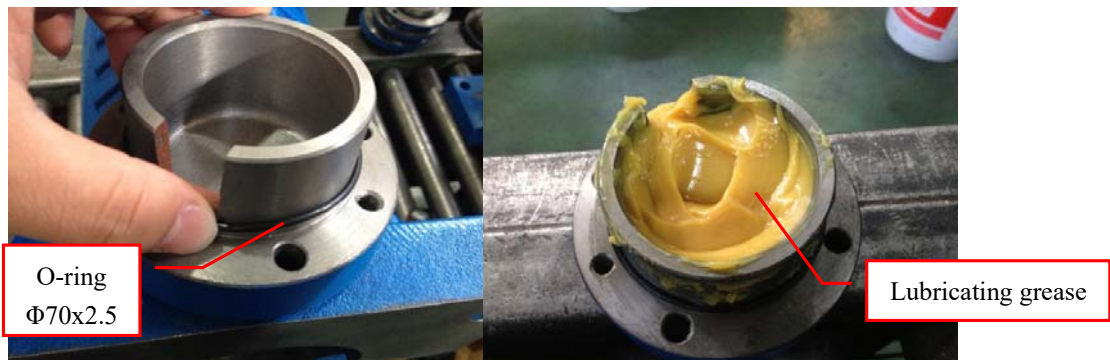
- Install the lock washer 30 and round nut M30 to fasten the inner ring of the bearing, then clasp the safety catch of the lock washer.



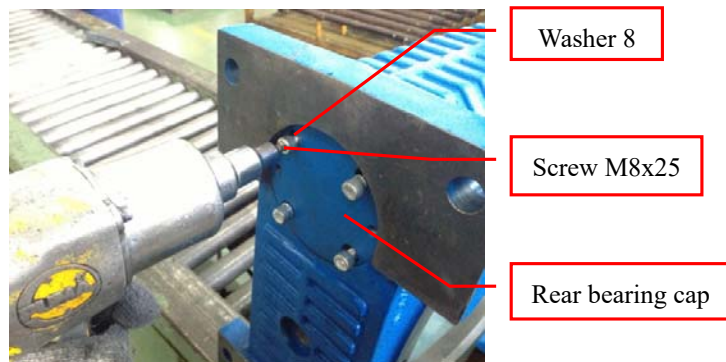
- Screw out the bolts M8 and washers 8, then remove the spacer sleeve.



- Install the O-ring  $\Phi 70 \times 2.5$  onto the rear bearing cap of the worm, then fill some lubricating grease into the cavity of the bearing cap (the amount of the lubricating grease is about  $3/5$  of the cavity).

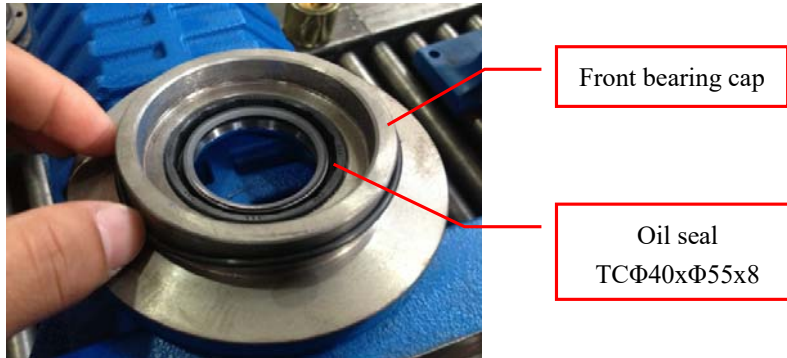


- Install the rear bearing cap of the worm into the gearbox, then screw into screws M8x25 and washers 8 to fix, the tightening torque is 20Nm.

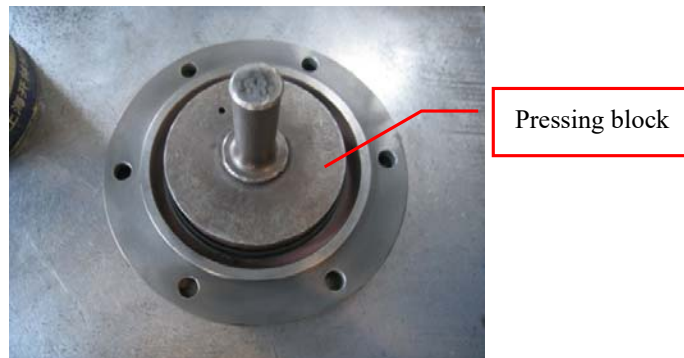


## ➤ Worm oil seal replacement

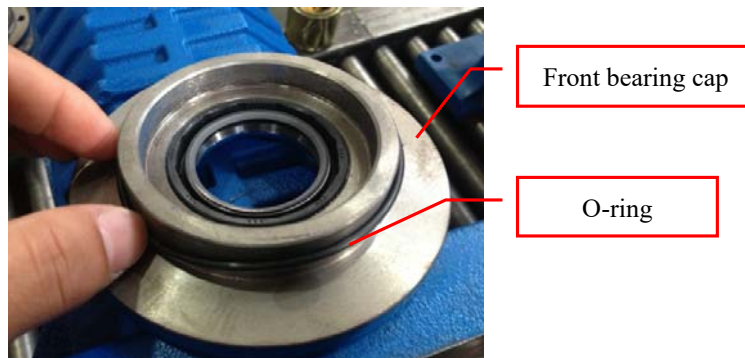
Remove the oil seal TCΦ40xΦ55x8 from the front bearing cap of the worm with screwdriver.



Clean the inner bore of the front bearing cap, then put the oil seal onto the orifice of the inner bore, and then use hammer and pressing block to press the oil seal into the bore.



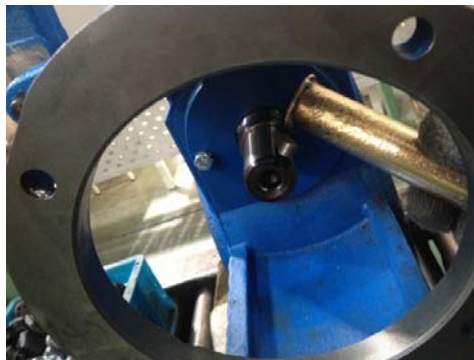
11. Smear some lubricating grease onto the O-ring and install it onto the front bearing cap of the worm.



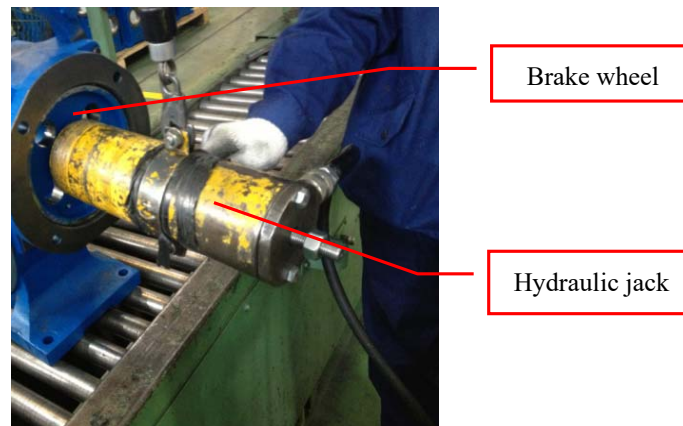
12. Install the protective jacket onto the worm, then make the front bearing cap pass through the protective jacket and cooperate with the gearbox, then screw into the bolts M8x25 to fix. Remove the protective jacket.



13. Install the key 10x8x40 into the key groove of the worm (drop two drops of threaded glue into the key groove)

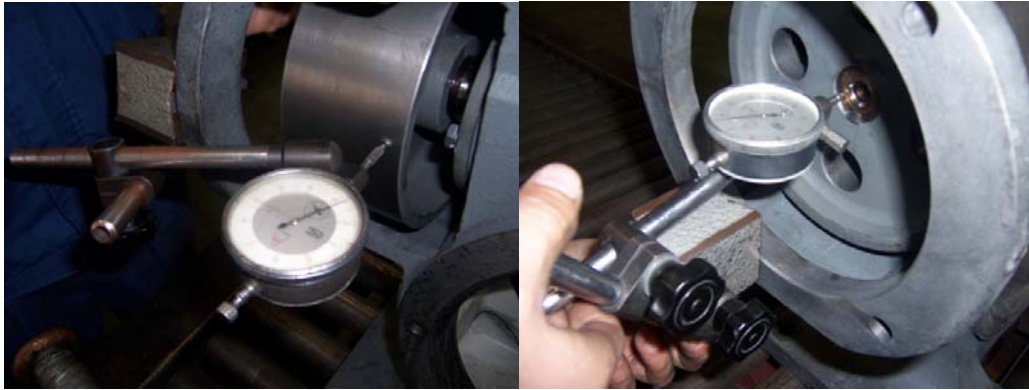


14. Install the brake wheel onto the worm, then press it into place with hydraulic jack, and then mark the position of the key groove of the brake wheel (in order to install the motor).

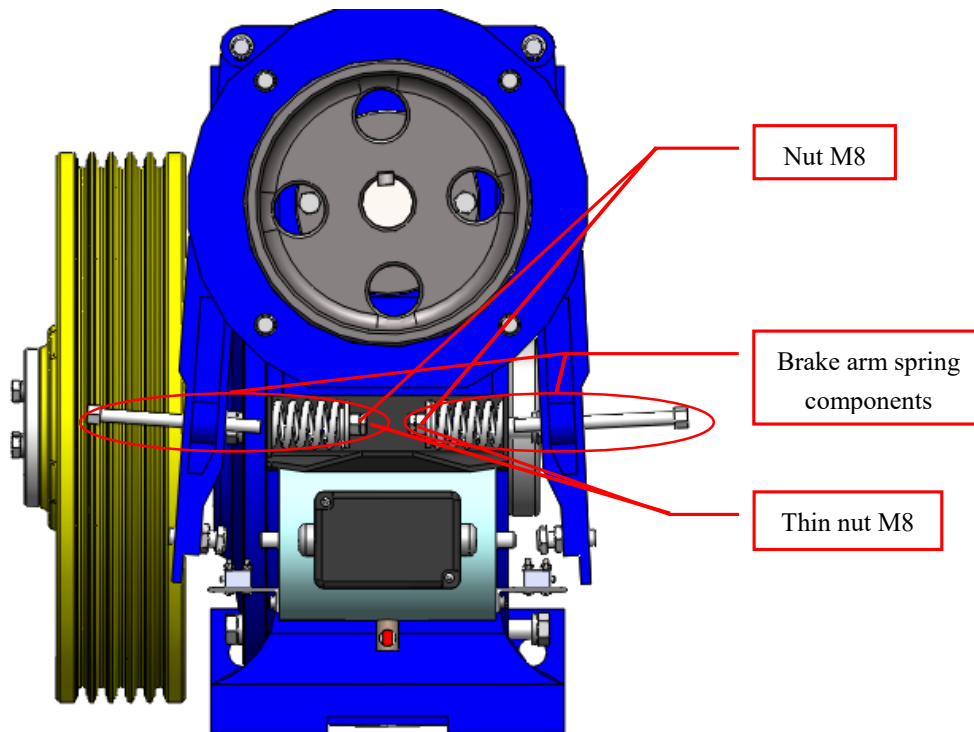


15. Detect radial run-out of the brake wheel with dial indicator, and the radial run-out should be less than 0.05mm. Detect axial clearance of the worm, and the axial clearance is 0.025~0.065mm.

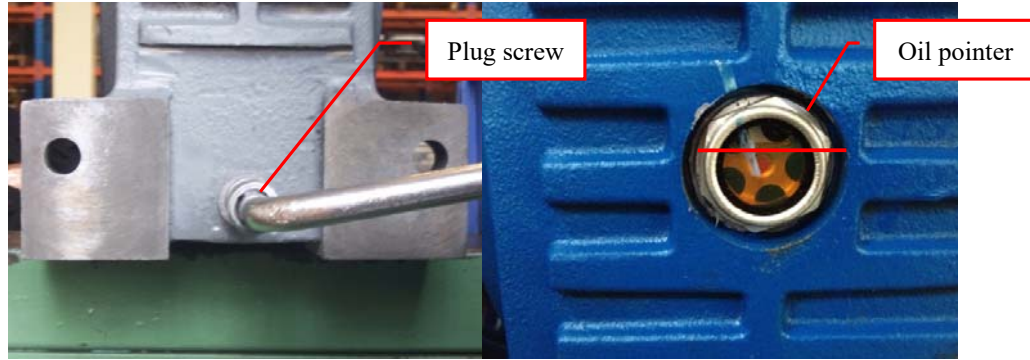




16. Close the brake arm, make the bolt M8x100 pass through the brake arm and brake bracket, then install the brake spring, spring seat and scale plate onto the bolt, and then screw on the nut M8 and the thin nut M8.



17. Adjust the brake system (Refer to YJ140 geared traction machine spare parts replacement manual—brake replacement)
18. Adjust the micro switch (Refer to YJ140 geared traction machine spare parts replacement manual—micro switch replacement)
19. Screw the plug screw into the gearbox, then screw out the oil plug at the top of the gearbox and refuel (about 5.5L Shell Omala S2 G460 elevator oil), the oil level should be at the middle to upper of the oil pointer, and then screw in the oil plug after finishing refueling.

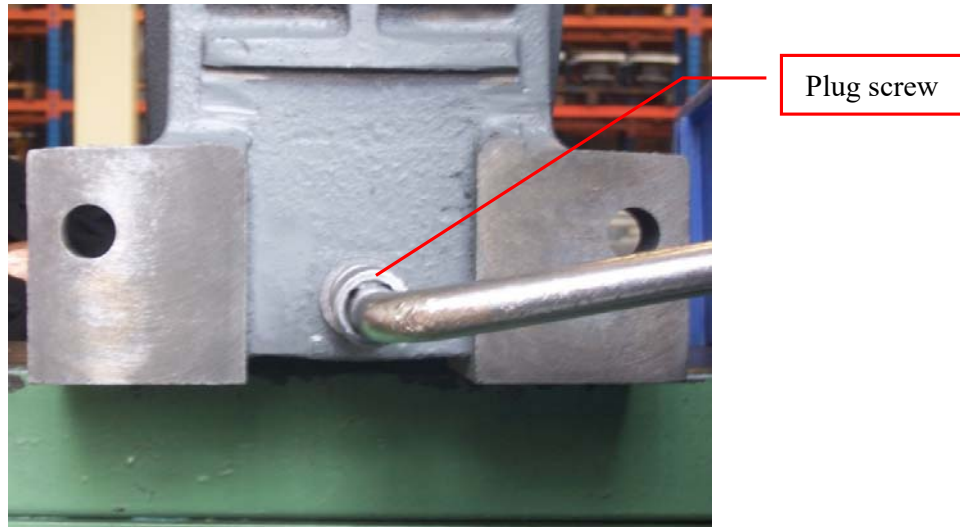


20. Install the motor, encoder and encoder cover (Refer to YJ140 geared traction machine spare parts replacement manual—motor replacement)
21. Turn on the power of the traction machine, and test run.
22. Install the steel wire ropes and protective cover after passing the test.

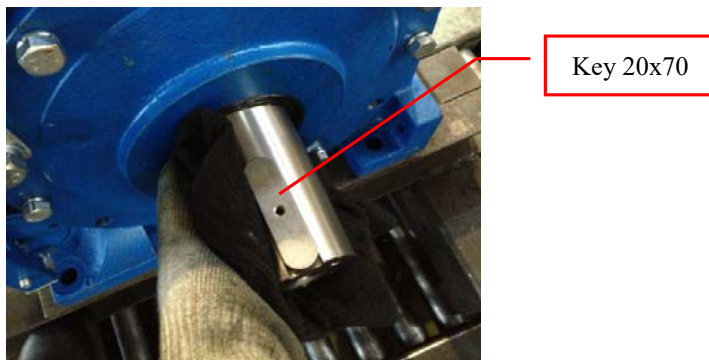
## 2.7. Worm wheel and bearing replacement

### 2.7.1. Remove the worm wheel and bearing

1. Put a container under the gearbox (the volume of the container should be more than 6L), then screw out the plug screw to discharge the oil.

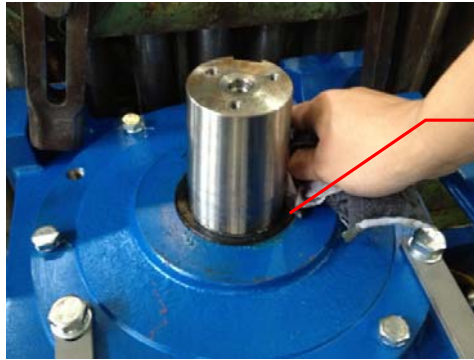


2. Remove the traction sheave (Refer to YJ140 geared traction machine spare parts replacement manual—traction sheave replacement)
3. Screw one bolt into the key 20x70, and tighten the bolt to push out the key.



### ➤ Remove the main shaft oil seal

Remove the oil seal TCΦ75×Φ95×10 with screw driver (avoid scratching the main shaft when removing the oil seal)



Oil seal  
TCΦ75xΦ95x10

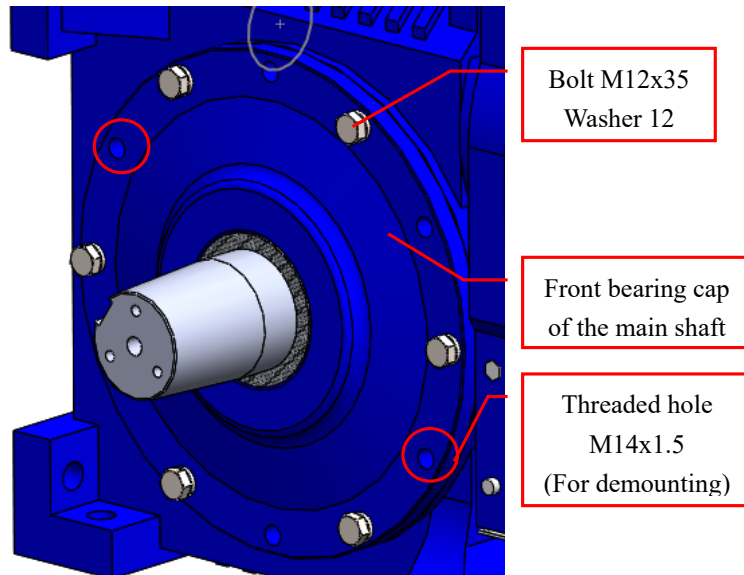
### ➤ Install the main shaft oil seal

Clean the oil seal and install the protective jacket onto the main shaft, smear some lubricating grease onto the lip of the oil seal TCΦ75xΦ95x10 and smear some Pattex glue onto the outer surface of the oil seal, and then put the oil seal onto the protective jacket and press it into place with pressing sleeve.

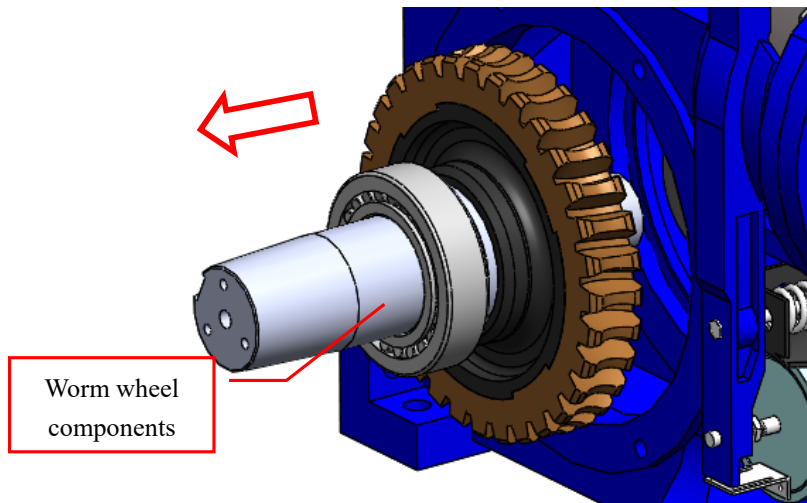


4. Screw out bolts M12x35 and washers 12 with open-end spanner (18mm), then screw the special tools into the corresponding threaded holes M14x1.5, tighten the special tools to push out the front bearing cap of the main shaft (avoid scratching the main shaft when removing the oil seal).

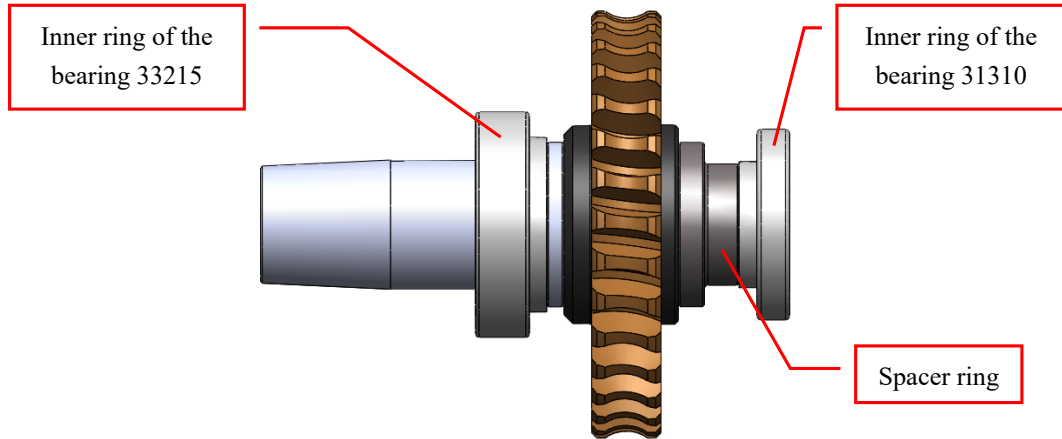




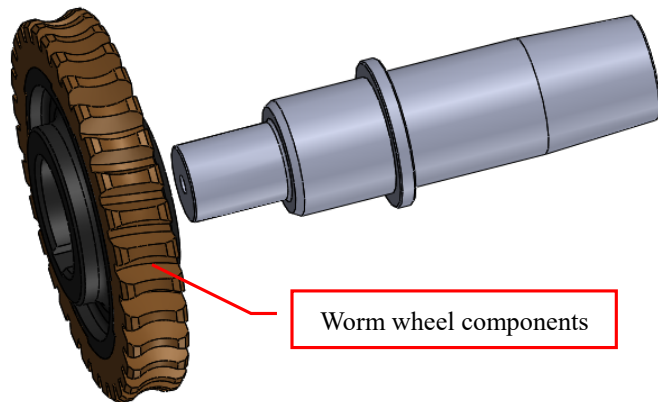
5. Take out the worm wheel components, and then take out the outer rings of the bearings and the spacers in the front bearing cap and gearbox (pay attention to place both kinds of the spacers separately).



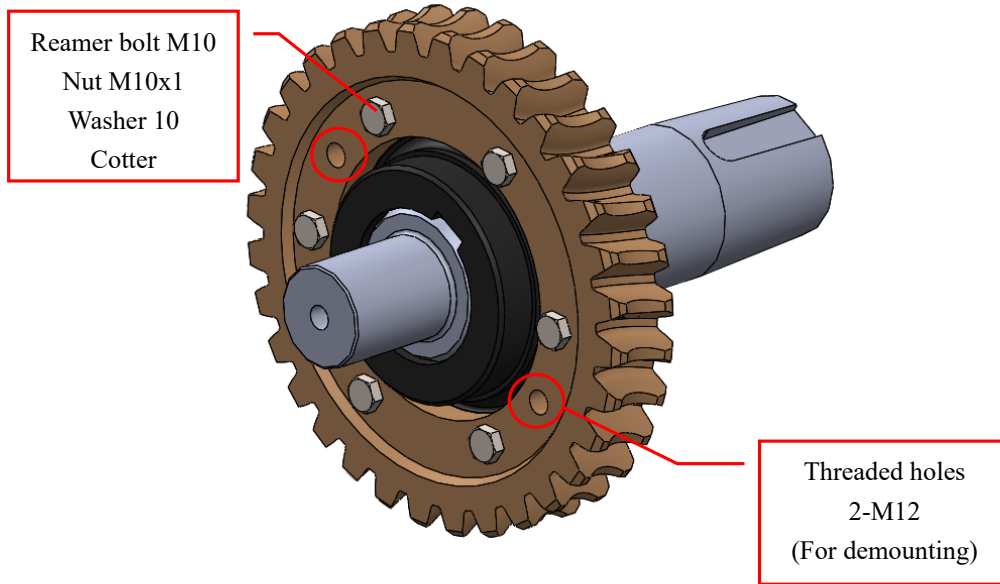
6. Remove the inner rings of the bearing 33215 and bearing 31310 with hydraulic puller, and then remove the spacer ring.



7. If the worm wheel is integral type, then remove the worm wheel components with hydraulic puller.

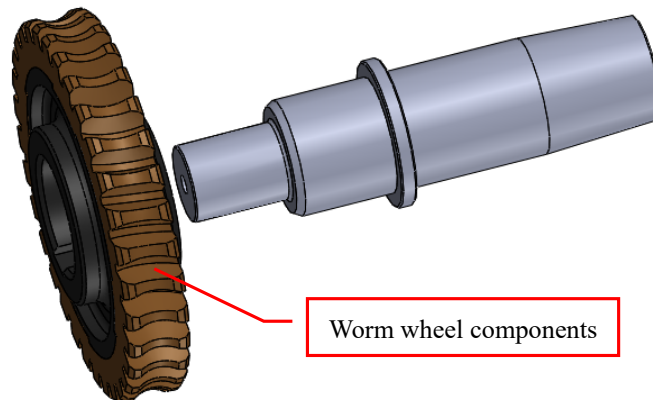


8. If the worm wheel is split type, then remove the cotters and nuts M10 on the reamer bolts M10, and then remove the reamer bolts M10. Next screw two bolts M12 into the corresponding threaded holes M12, tighten the bolts to push out the worm wheel.

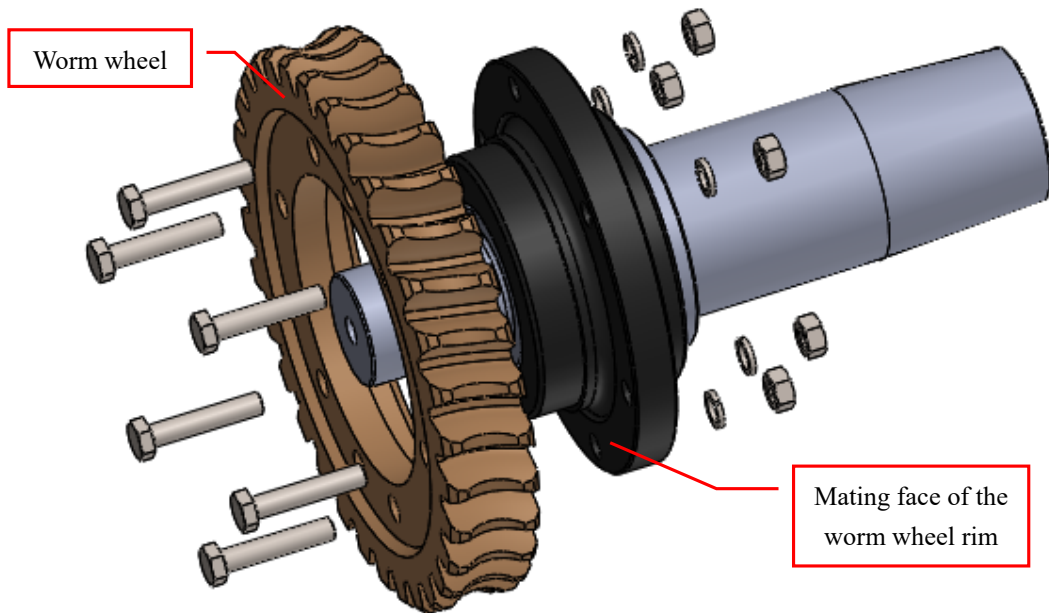


### 2.7.2. Install the worm wheel and bearing

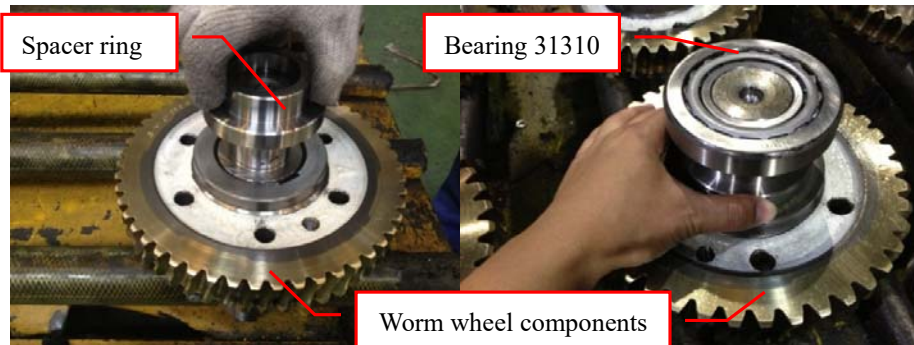
1. **Integral type:** clean the worm wheel components and the main shaft, then press the worm wheel components onto the main shaft with special fixture.



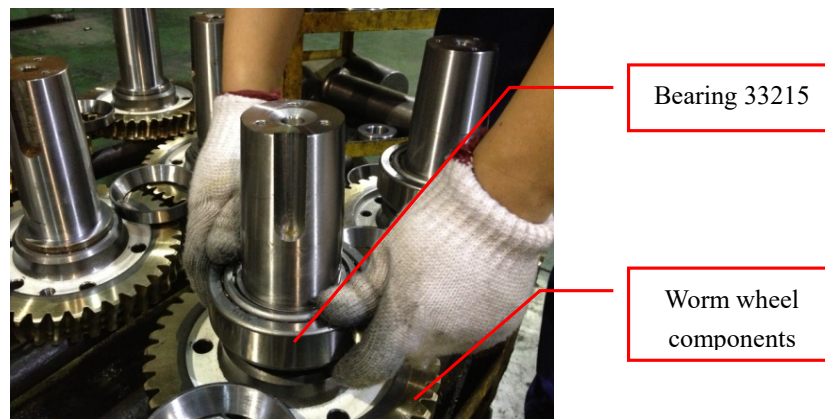
2. **Split type:** clean the mating faces of the worm wheel and worm wheel rim. Heat the inner bore of the worm wheel to  $70 \pm 15^\circ\text{C}$  (4min), then install the worm wheel onto the worm wheel rim and make sure that the holes on the worm wheel and worm wheel rim are aligned, wait for the worm wheel to cool, and then ream the holes to  $\Phi 11\text{H}7$ . Tap the reamer bolts M10 into the holes and screw on the washers 10 and nuts M10 to fasten, then install the cotters into the reamer bolts and lock the cotters.



3. Clean the main shaft, then install the spacer ring onto the main shaft. Heat the inner ring of the bearing 31310 to  $80 \pm 15^\circ\text{C}$  (3min) and install it onto the main shaft, make sure that the inner ring is installed in place and wait for it to cool.



4. Turn over the main shaft (the key groove is upward), then heat the inner ring of the bearing 33215 to  $80 \pm 15^\circ\text{C}$  (3min) and install it onto the main shaft, make sure that the inner ring is installed in place and wait for it to cool.



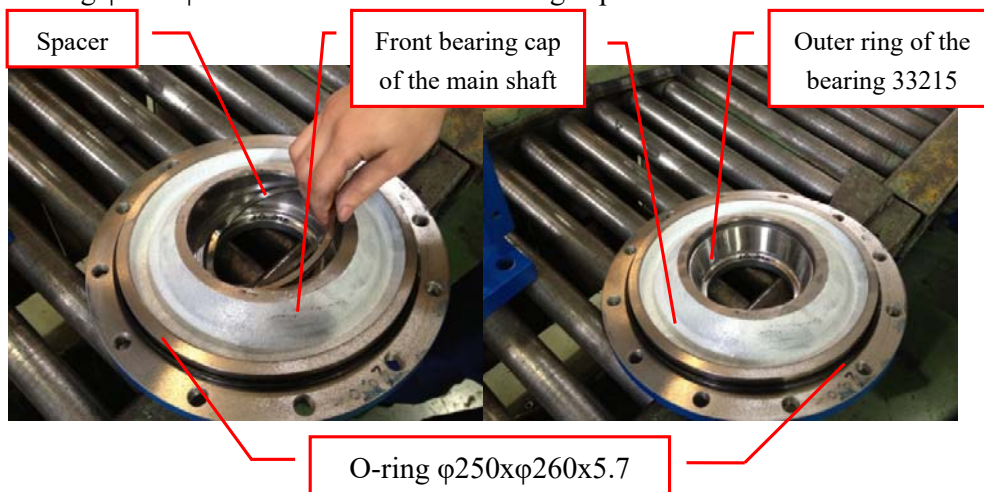
5. Clean the bearing hole at the bottom of the gearbox and smear some lubricating oil onto the bore surface, then put the corresponding spacers into the bearing hole, and then install the outer ring of the bearing 31310 and tap it into place with copper rod.



6. Smear some red ink onto the teeth surface of the worm wheel, then put the worm wheel components into the gearbox, make the worm wheel mesh with the worm and the inner ring of the bearing fit the outer ring.

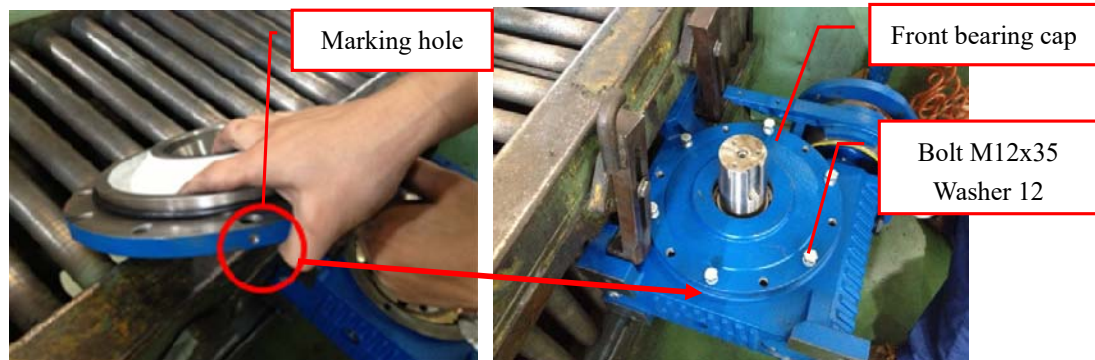


7. Smear some lubricating oil onto the bore surface of the front bearing cap of the main shaft, then put the corresponding spacers into the bore, and then install the outer ring of the bearing 33215 and tap it into place with copper rod. Install the O-ring  $\phi 250 \times \phi 260 \times 5.7$  onto the front bearing cap.





8. Install the front bearing cap onto the gearbox, make the bearing fit, notice that the position of the marking hole corresponds to the highest point of the worm wheel, and make the position of the marking hole is in the horizontal direction (correspond with the rear bearing cap), then screw into the bolts M12x35 and washer 12 to fix.



9. Turn the worm with special handle and observe the meshing spots (the positions of the meshing spots are better at 30% of the tooth width direction and 55% of the tooth depth direction), adjust the number of the spacers in the front bearing cap and rear bearing cap to make the positions of the meshing spots meet the requirement.



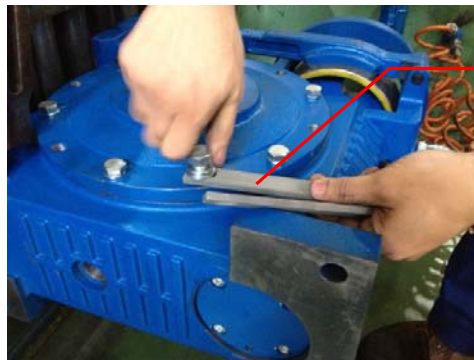
10. Install the gear backlash checking fixture onto the main shaft, turn the main shaft and detect the gear backlash with dial indicator: the gear backlash of three positions is 0.05-0.1mm. If the gear backlash does not meet the requirement, then adjust the eccentric positions of the front bearing cap and rear bearing cap to meet the requirement (notice that the front bearing cap and rear bearing cap should be adjusted synchronously, turned a bolt hole, the gear backlash changes about 0.1mm).



11. Tighten the bolts M10x35 and washers 10 to fix the front bearing cap (the bolts should be tightened diagonally).



12. Install the connecting plate and fix it with bolt M14x1.5x25, spring washer 14 and flat washer 14.

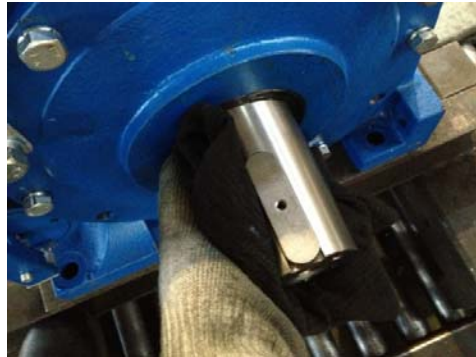


Connecting plate

13. Tighten the plug screw with inner hexagon spanner (14mm), then screw out the oil plug at the top of the gearbox and refuel (about 5.5L Shell Omala S2 G460 elevator oil), the oil level should be at the middle to upper of the oil pointer, and then screw in the oil plug after finishing refueling.



14. Install the key 20x70.



15. Install the traction sheave (Refer to YJ140 geared traction machine spare parts replacement manual—traction sheave replacement)
16. Turn on the power of the traction machine, and test run.



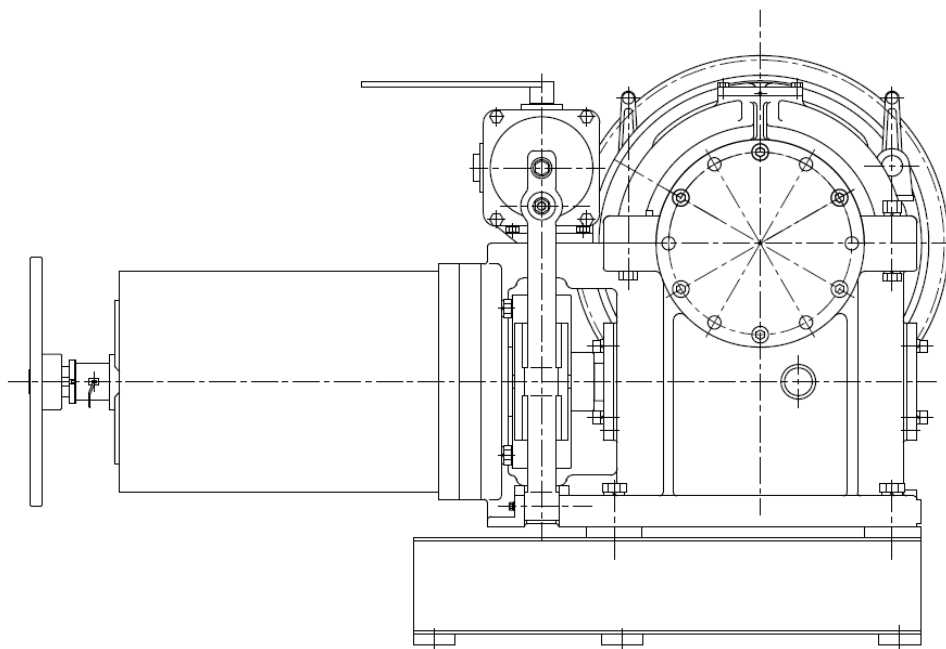
# FYJ180 Series

## Geared Traction Machine

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# Spare parts Replacement Manual

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## 1.Replacement Notes



Only qualified person are allowed to perform the replacement operation. The person who performs the replacement operation must make sure that the machine power is off and that the elevator will not move unexpectedly.



Please refer to the troubleshooting procedure at first and make sure that the component is actually damaged before performing this replacement operation.

### Sheave Replacement

**Tools :** Inner hexagon wrench (6mm), Hex wrench (10mm, 18mm,24mm,), Dial indicator, Torque Wrench

**Materials:** Sealant

## 2.Spare Parts List

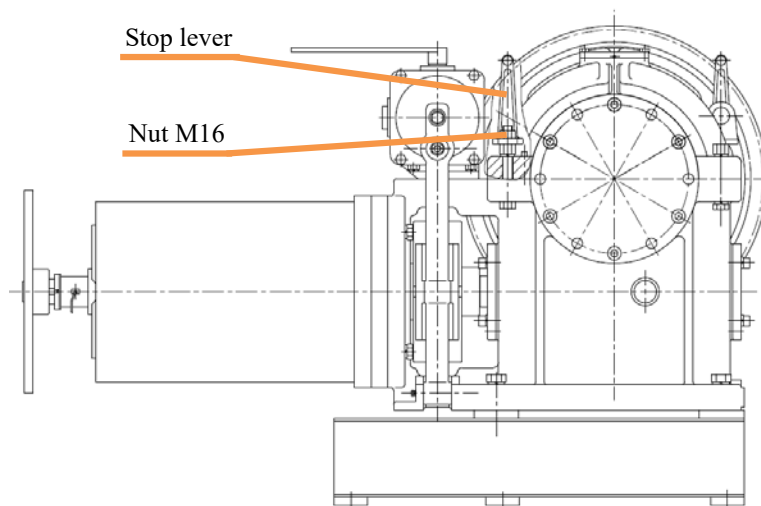
No	Code	Name	Q'TY	Remarks
1	FYJ180-7/7A	<a href="#"><u>Sheave</u></a>	1	
2	YJ240B.1-11F/ 12/12A/B/C/D/E	<a href="#"><u>Worm Wheel</u></a>	1	
3	GB/T297	<a href="#"><u>Bearing 33218</u></a>	1	Bearing of Main Shaft Output End
4	GB/T297	<a href="#"><u>Bearing 33218</u></a>	1	Bearing of Main Shaft Back End
5	GB/T13871	<a href="#"><u>Oil Seal TC90 120 12</u></a>	1	Bearing Oil Seal for Main Shaft
6		<a href="#"><u>Encoder</u></a>	1	
7		<a href="#"><u>Motor</u></a>	1	
8	QB-06	<a href="#"><u>Rubber Cushion</u></a>	1	
9	GB/T276	<a href="#"><u>Bearing 30310</u></a>	1	Bearing of Worm Input End
10	GB/T294	<a href="#"><u>Bearing 30310</u></a>	1	Bearing of Worm Back End

## 3.Spare Parts Replacement

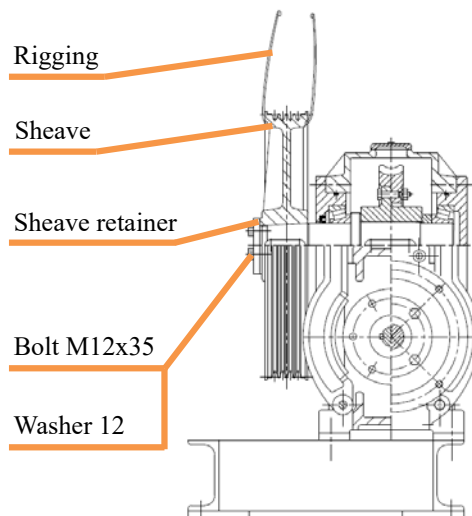
### 3.1.Sheave Replacement

#### 3.1.1.Sheave Removal

1. Remove the nut M16 by the hex wrench (24mm).
2. Remove the stop lever.
3. Remove the wire rope from the sheave.

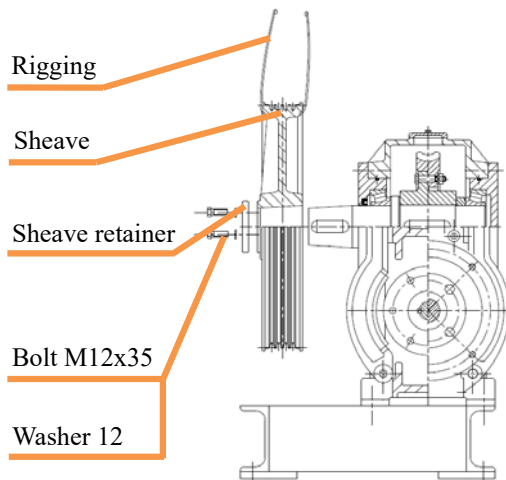


4. Set the rigging across the sheave and hold the sheave tightly.
5. Remove the bolt M12×35 and the washer 12 by the hex wrench (18mm), and remove the sheave retainer.
6. Remove the sheave and the key 22x80 from the machine.

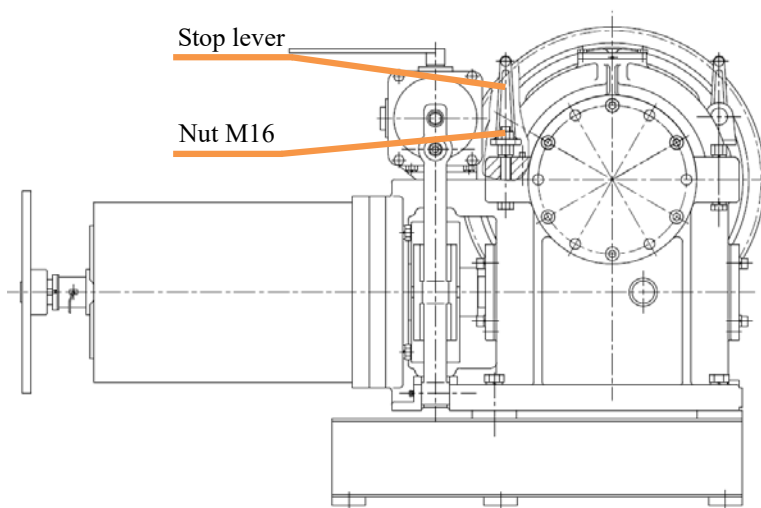


## 3.1.2. Sheave Installation

1. Clean the fitting surface of the main shaft and the sheave. Make sure that there's no rust and grease.
2. Set the key 22x80 on the main shaft.
3. Pull the new sheave close to the main shaft by the rigging. Tighten the bolt M12x35 and the washer 12 by the hex wrench (18mm) through the sheave retainer in order to fix the sheave.



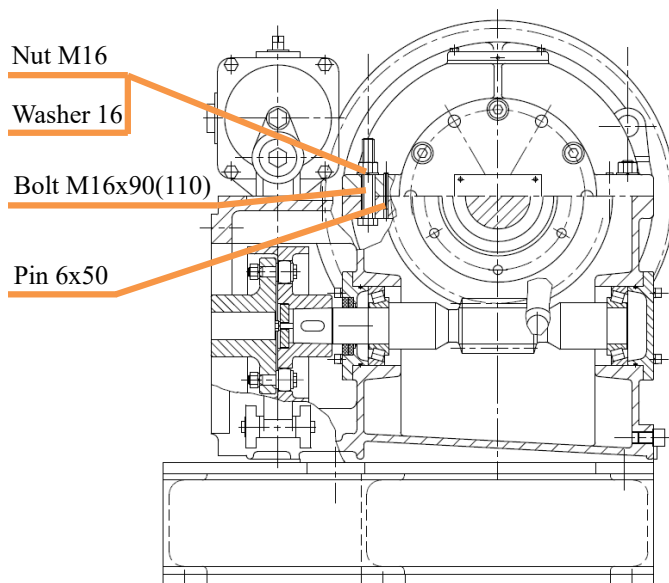
4. Power on the braking system. Check the T.I.R of the sheave, which should satisfy  $\leq 0.2\text{mm}$ , by the dial indicator (the sheave must be rotated more than one whole circle).
5. Retighten the bolt M12x35 with the torque 60Nm.
6. Load the wire rope on the sheave, install the stop lever, fixed by the nut M16.
7. Non-load test.



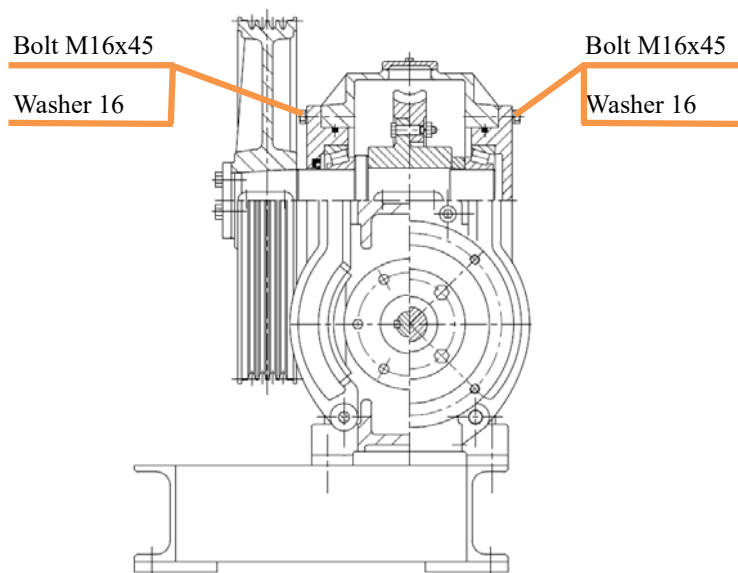
## 3.2.Worm Wheel Replacement

### 3.2.1.Worm Wheel Removal

1. Remove the stop lever and the wire rope from the machine, refer to the step 1~3 of [Sheave Removal](#).
2. Loosen the oil plug to drain the oil into a container, whose capacity is more than 9L.
3. Loosen the nut M16, remove the nut, washer 16 and the bolt M16x90(110) by the hex wrench(24mm). Knock out the pin 6x50 by the hammer.

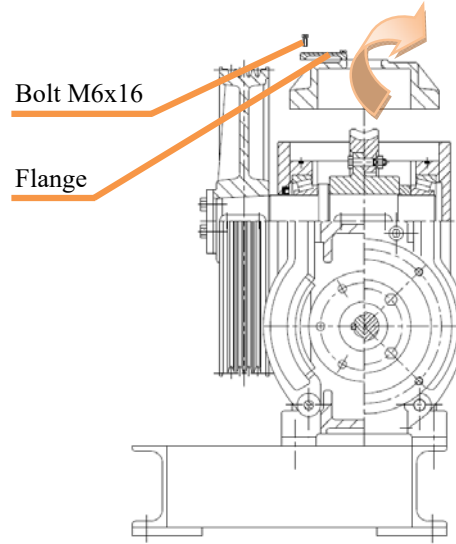


4. Remove the bolt M16x45 and the washer 16 by the hex wrench(24mm).

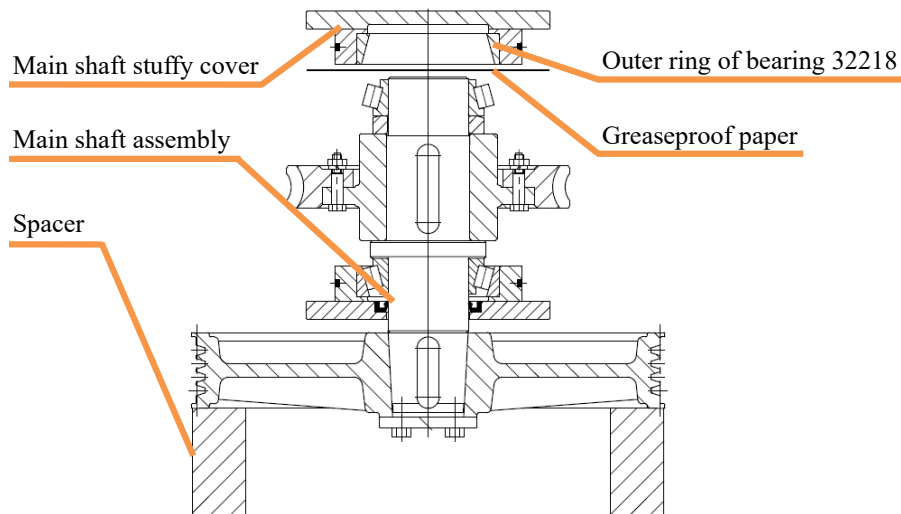


## FYJ180 Series Geared Traction Machine Spare Parts Replacement Manual

- Remove one of the bolt M6x16 by the hex wrench (10mm). Rotate the flange as shown below.  
Pull out the gear case cover from the machine by the hoisting.

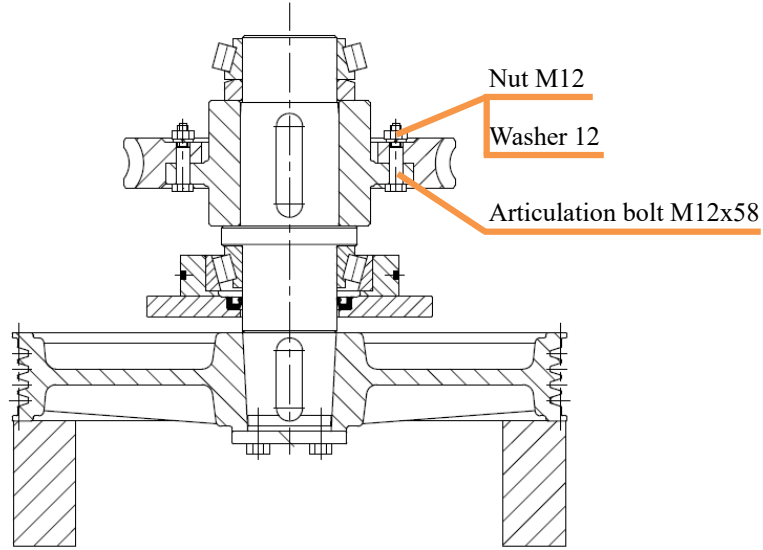


- Pull out the main shaft assembly from the machine, and put the spacer approximately 60x120mm under the surface of the sheave, shown as below.
- Remove the main shaft stuffy cover and the outer ring of the bearing 32218. Keep the greaseproof paper carefully.



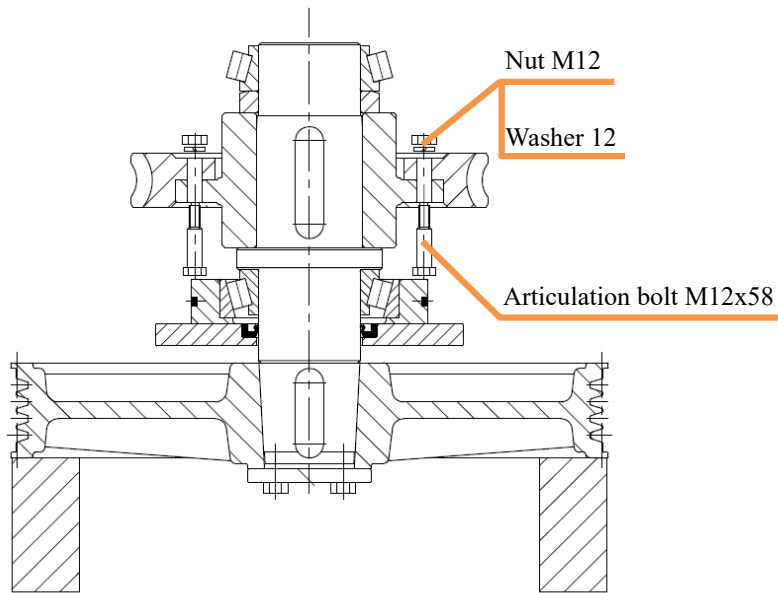
- Loosen the nut M12 by the hex wrench (18mm), remove the nut, washer 12 and the articulation bolt M12x58. Screw the bolt M12 into the thread hole of the worm wheel until the worm wheel is pulled out away from the worm felloe. Remove the bolt M12.



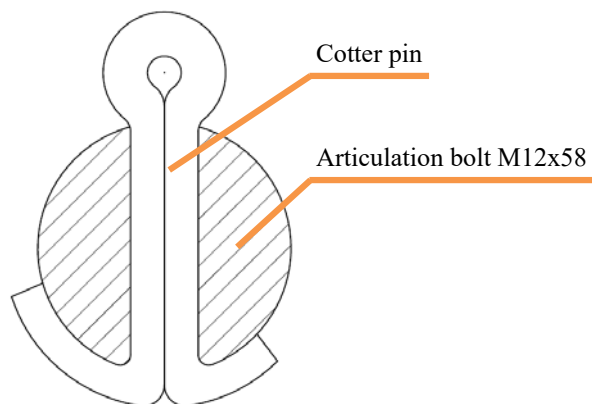


### 3.2.2. Worm Wheel Installation

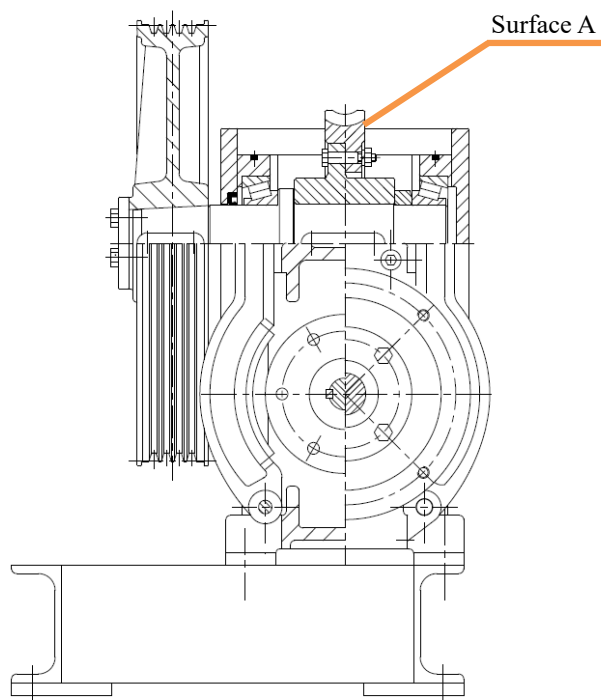
1. Check and clean the fitting surface of the new worm wheel and the worm felloe.
2. Heat the new worm wheel up to approximately  $70 \pm 15^{\circ}\text{C}$ , install it into the worm felloe immediately, wait the worm wheel cools down completely.
3. Ream the articulation hole on the worm wheel by the reamer  $\Phi 14\text{H}6$  through the articulation hole of the worm wheel felloe. Clean the iron scraps from the assembly. Insert the new articulation bolt M12x58, tightened by the washer 12 and nut M12 with torque 50-60Nm.



4. Insert the cotter pin into the bolt, and then lock it by the needle nose plier as shown below.



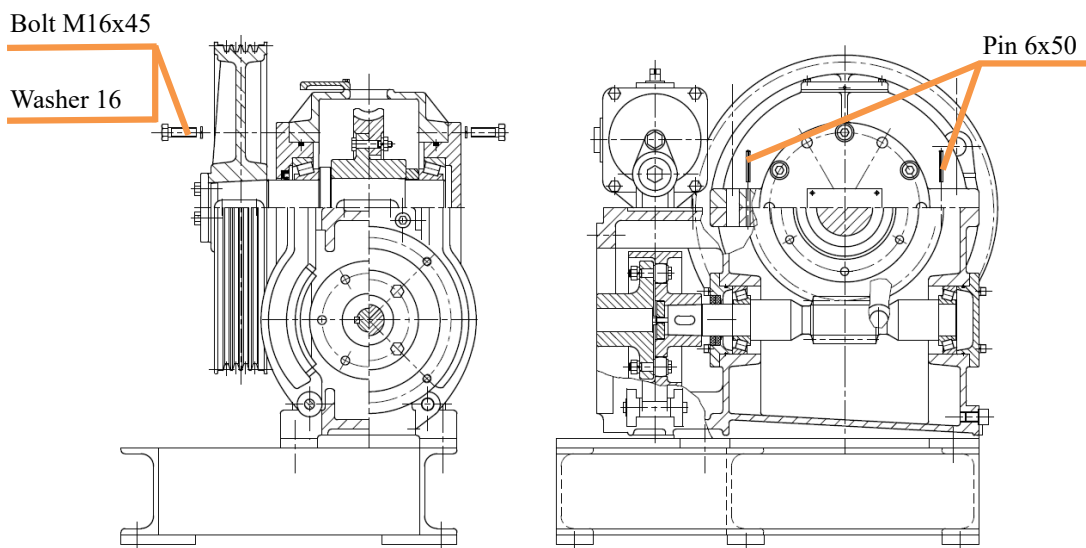
5. Coat the bearings of the worm wheel assembly with grease. Install the worm wheel assembly into the gear case. Rotate the worm in order to make the worm and the worm wheel mat well. Fix the main shaft stuffy cover and the main shaft output end cover by tightening two of the bolt M16x45 and the washer 16 on the gear case. Check the surface A runout, which should satisfy  $\leq 0.06\text{mm}$ .



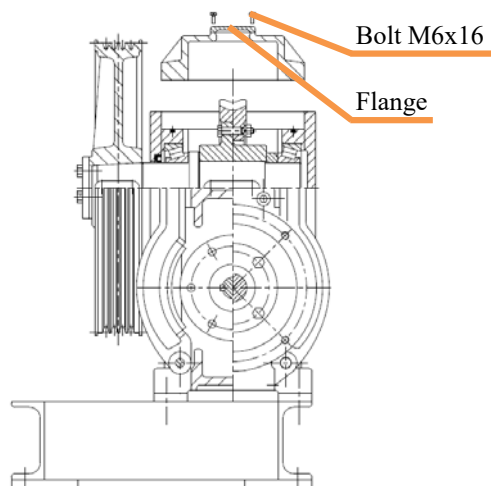
6. Coat the worm wheel tooth with red ink. Rotate the worm, check the matting spot of the worm wheel: it's better that the matting spot width is about 30% of the tooth face width; the matting spot height is about 55% of the tooth face height; the matting spot is in the latter matting direction.



7. Check the clearance between the worm and the worm wheel: the three (random but even distribution around a circle) of the clearance must satisfy 0.10-0.18mm.
8. Clean the fitting surface of the gear case cover and the gear case, apply the sealant on them. Pull up the gear case cover by the hoisting, and then install it on the gear case, fix it by knocking the pin 6x50 into the pin hole.
9. Tighten the bolt 16x45 and the washer 16 by the hex wrench(24mm) with the torque 125-150Nm.



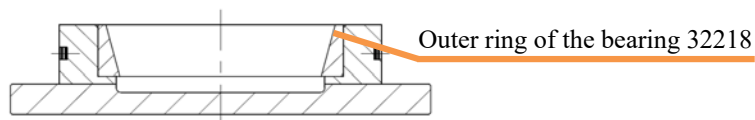
10. Pour in 8.3L of Kunlun 33# oil for elevator.
11. Rotate back the flange, fixed by tightening the bolt M6x16.



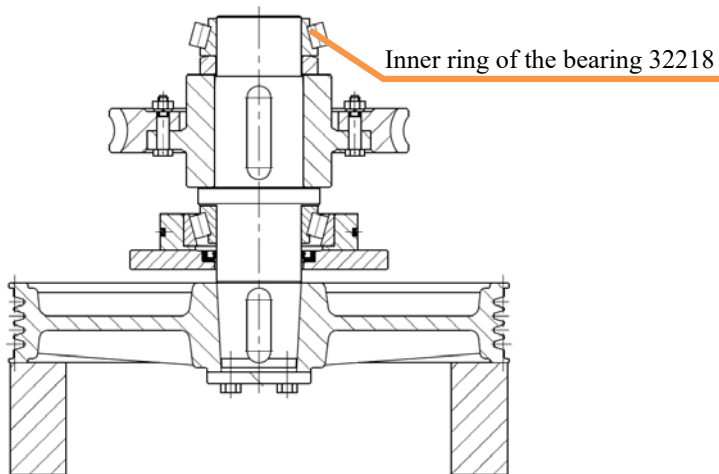
12. Install the stop lever, non-load test. Refer to the step 6~7 of the [Sheave Installation](#).

## 3.3.Main Shaft Bearing Replacement

1. Take the worm wheel assembly out from the machine, refer to the step 4~6 of [Sheave Removal](#).
2. If the bearing 32218 of the main shaft back end is required to be changed, pull out the outer ring of the bearing 32218 from the main shaft stuffy cover by the puller.



3. Pull the inner ring of the bearing 32218 from the main shaft by the puller.



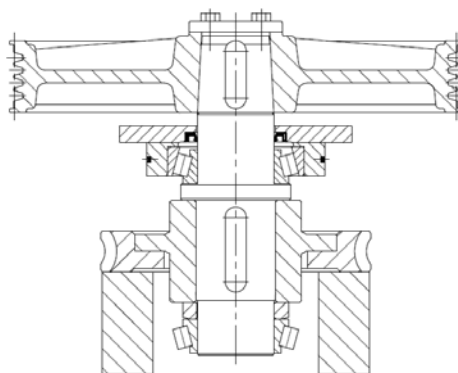
## FYJ180 Series Geared Traction Machine Spare Parts Replacement Manual

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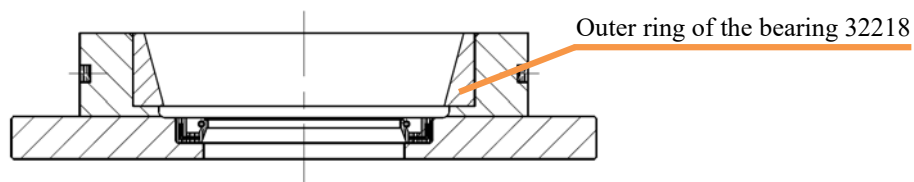
4. Heat the inner ring of the bearing 32218 up to approximately  $80 \pm 10^{\circ}\text{C}$ , and install it into the main shaft immediately. Press the outer ring of the bearing 33218 into the main shaft stuffy cover. Wait the bearing cools down completely.

**Attention:** Please wear the glove to avoid the scald, while the bearing installation operation.

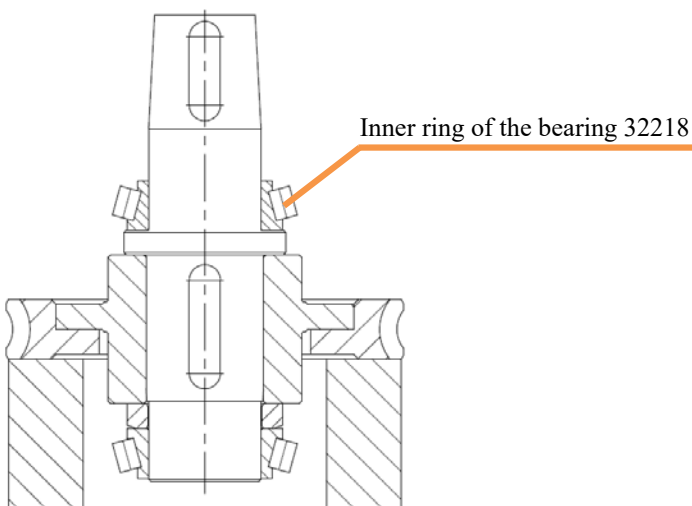
5. If the bearing 32218 of the main shaft output end is required to be changed, reverse the worm wheel assembly, and remove the sheave at first, refer to the step1~7 of [Sheave Removal](#).
6. Take out the main shaft output end cover. Avoid damaging the oil seal.



7. Pull out the outer ring of the bearing 32218 by the puller.



8. Pull out the inner ring of the bearing 32218 from the main shaft by the puller.

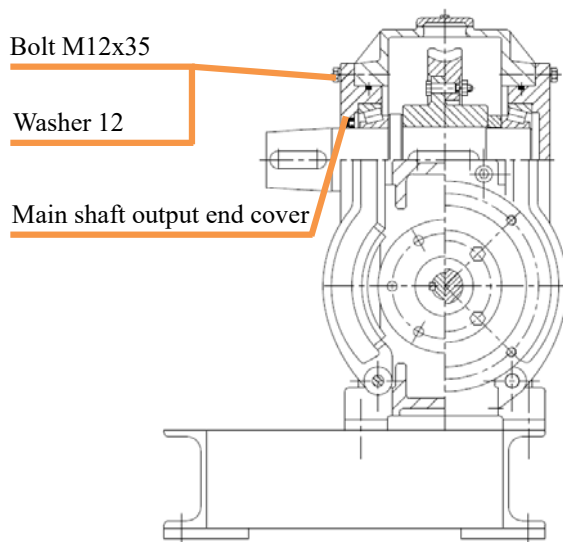


9. Heat the inner ring of the bearing 32218 up to approximately  $80 \pm 10^{\circ}\text{C}$ , and install it into the main shaft immediately. Press the outer ring of the bearing 33218 into the main shaft output end cover. Wait the bearing cools down completely.
10. Install the sheave into the main shaft, refer to the step 1~3 of the [Sheave Installation](#).
11. Install the worm wheel assembly into the machine, refer to step 5~12 of the [Worm Wheel Installation](#).

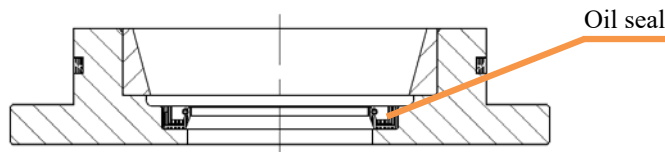
### 3.4.Main Shaft Oil Seal Replacement

#### 3.4.1.Main Shaft Oil Seal Removal

1. Remove the stop lever and the sheave, refer to the step 1~6 of the [Sheave Removal](#).
2. Loosen the oil plug to drain the oil into a container, whose capacity is more than 9L.
3. Loosen the bolt M12x35 by the hex wrench (18mm), remove the bolt, washer 12 and the main shaft output end cover.



4. Remove the oil seal from the main shaft output end cover.

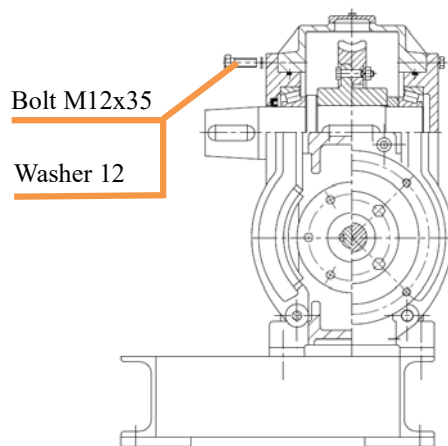


#### 3.4.2.Main Shaft Oil Seal Installation

1. Coat the lip of the oil seal with grease, press the new oil seal into the main shaft output end

cover.

2. Insert the main shaft output end cover through the main shaft gently, avoid damaging the oil seal.
3. Fix the main shaft output end cover by tightening the bolt M12x35 and the washer 12.

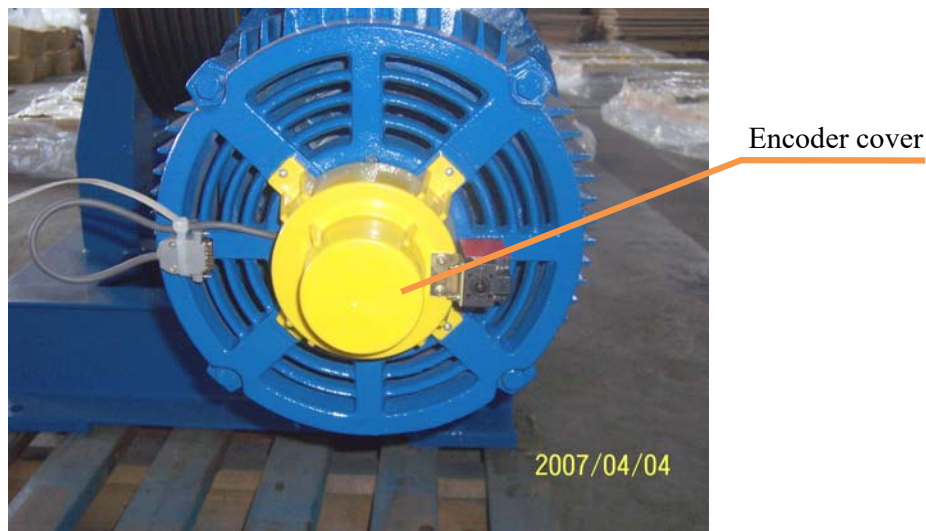


4. Install the sheave and the stop lever, refer to the step 1~7 of the [Sheave Installation](#).

## 3.5.Encoder Replacement

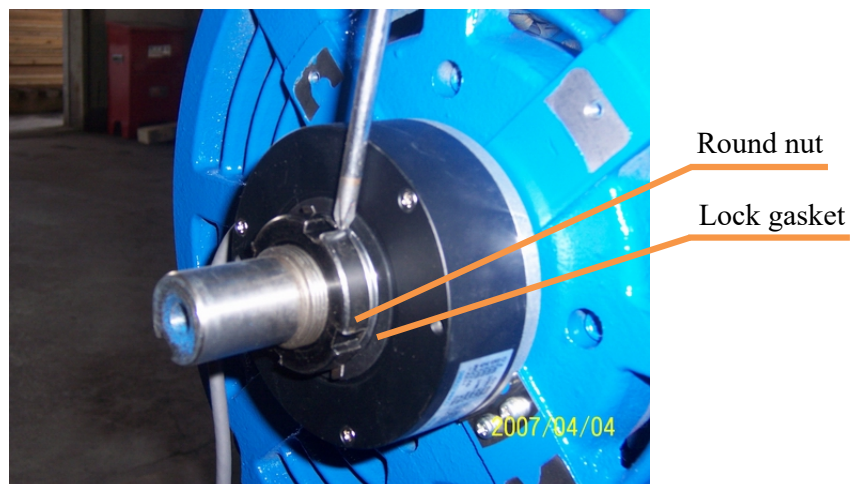
### 3.5.1.Encoder Removal

1. Remove the encoder cover.

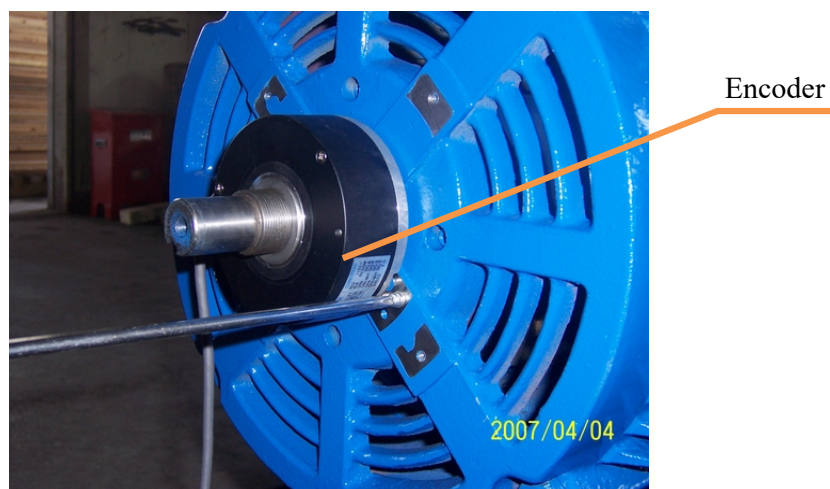


2. Unlock the lock gasket, remove the round nut and the lock gasket.





3. Loosen the bolt M2 and remove the washer and the encoder.



### 3.5.2.Encoder Installation

1. Check the encoder, tighten the bolt M2, fix the connect reed on the encoder.



2. Fit the encoder into the shaft.

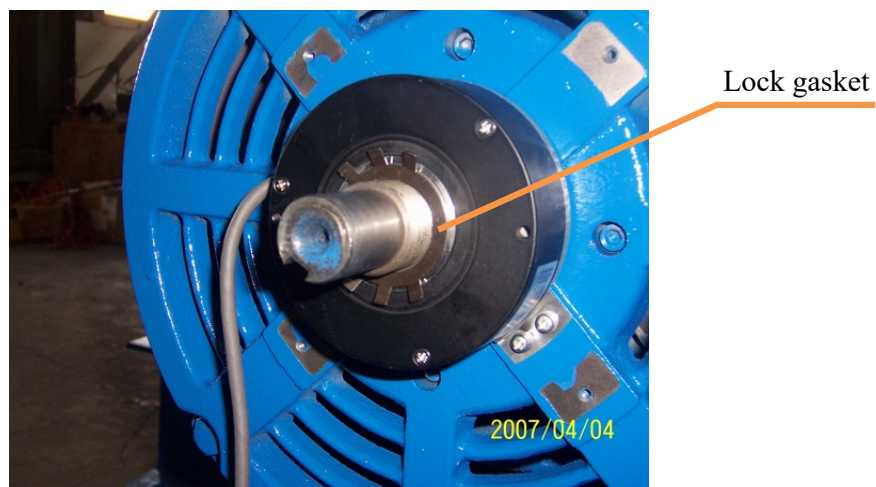




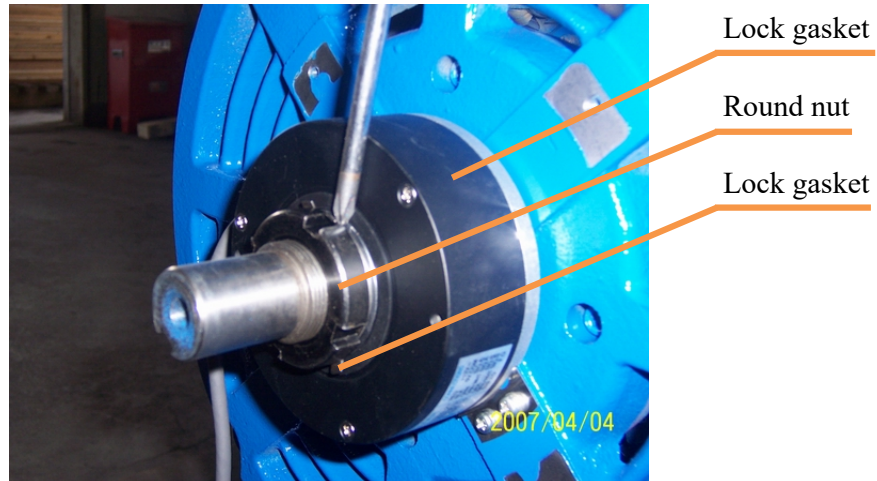
3. Tighten the bolt M2 and the washer with the torque 1.8-2Nm.



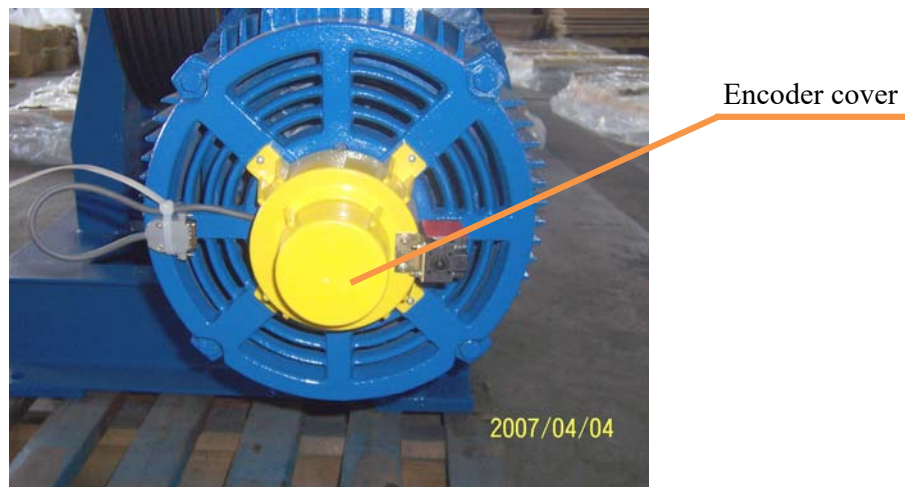
4. Fit the lock gasket into the shaft.



5. Tighten the round nut, and lock the lock gasket.



6. Make the encoder line through the hole on the encoder cover, and set the encoder cover on the motor, tighten the Bolts.



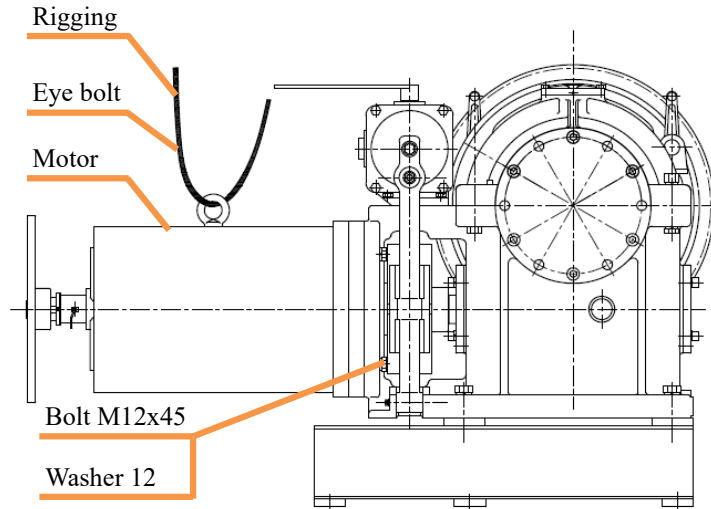
### 3.6.Motor Replacement

#### 3.6.1.Motor Removal

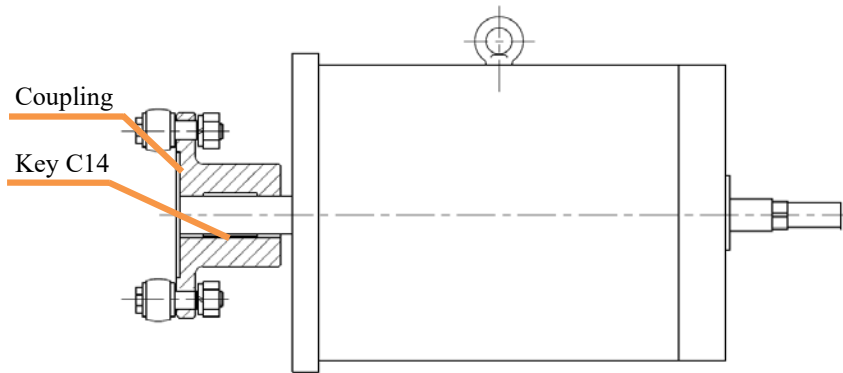
1. Open the junction box by the screw driver, remove the power cable connector and the encoder connector.

**Attention:** Please power off the controller before the cable removal operation.

2. Pass the rigging through the eye bolt of the motor, and pull the motor tightly. Remove the bolt M12x45 and the washer 12 by the hex wrench (18mm). Remove the motor horizontally.

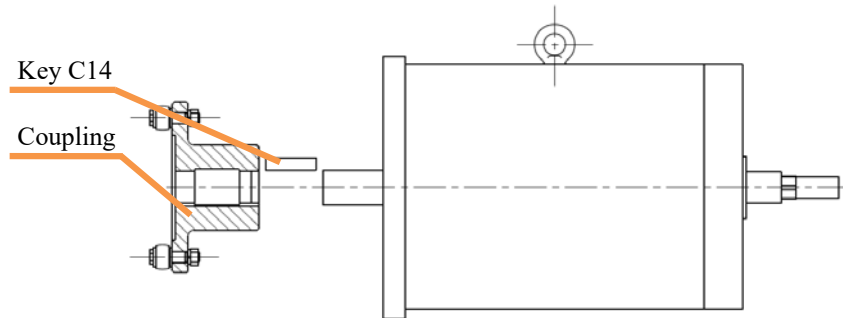


3. Remove the encoder from the motor, refer to the step 1~3 of the [Encoder Removal](#).
4. Remove the coupling from the motor by the Hydraulic puller. Remove the key.



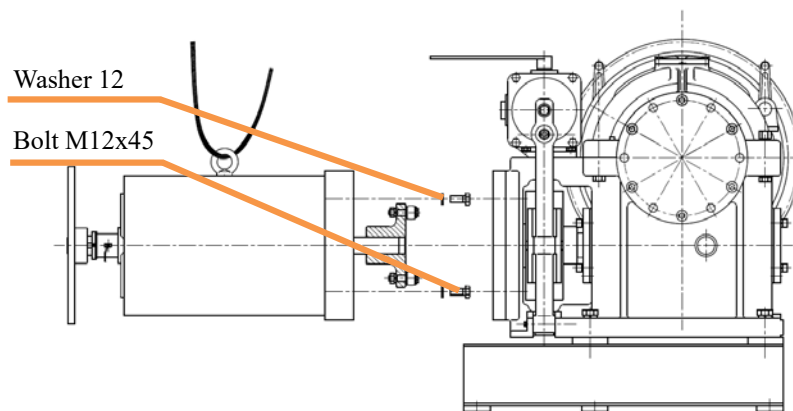
## 3.6.2. Motor Installation

1. Set the key on the motor shaft, install the coupling into the motor shaft.



2. Pull the motor by the jack and the hanger, and keep the motor horizontal. Coat the rubber

cushion with grease. Adjust the key slot position of the motor opposite to the key slot of the brake wheel. Install the motor by tightening the bolt M12x45 and the washer 12.

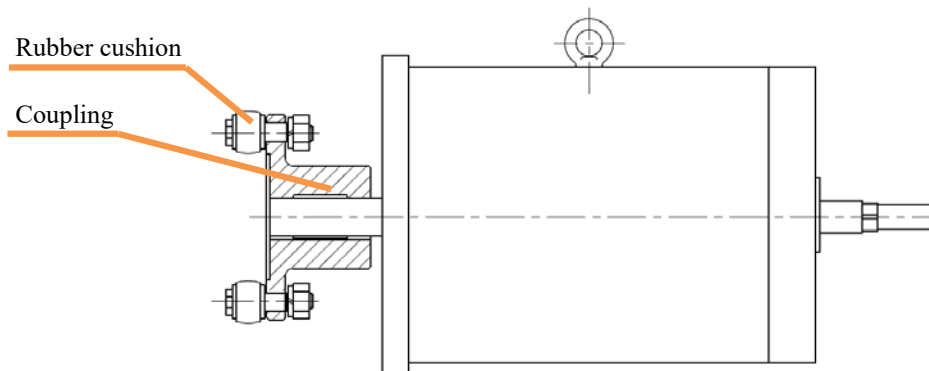


3. Install the encoder, refer to the step 1~6 of the [Encoder Installation](#).
4. Install the power cable connector and the encoder connector into the junction box. Close the junction box.

### 3.7. Rubber Cushion Replacement

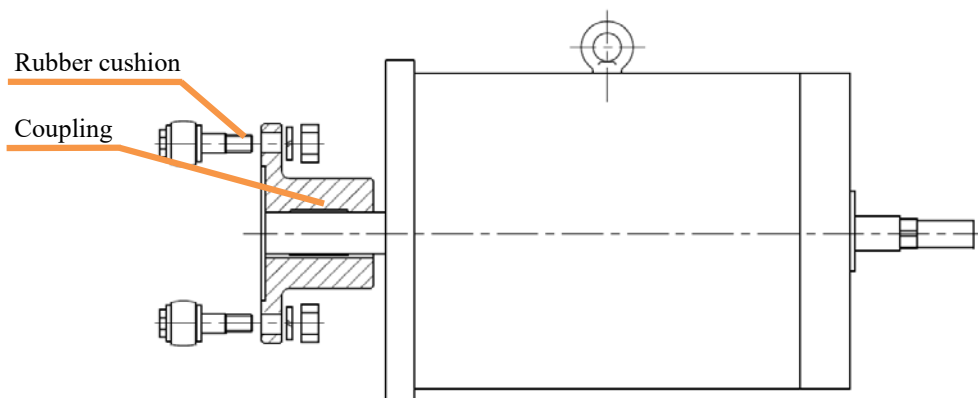
#### 3.7.1. Rubber Cushion Removal

1. Remove the motor from the machine, refer to the step 1~3 of [Motor Removal](#).
2. Remove the rubber cushion from the coupling by loosening the nut.



#### 3.7.2. Rubber cushion Installation

1. Install the new rubber cushion into the coupling.



2. Install the motor on the machine, refer to the step 2, 4 of the [Motor Installation](#).

### 3.8.Worm and Worm Bearing Replacement

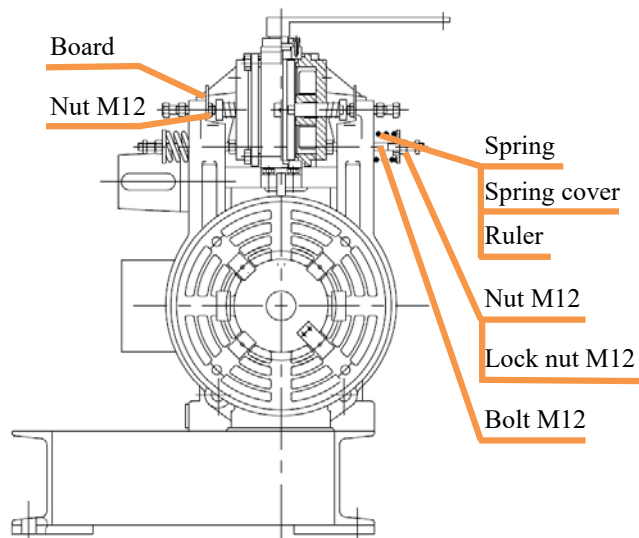
#### 3.8.1.Worm and Worm Bearing Removal

1. Remove the oil plug by the hex wrench (22mm), drain the lubricating oil of the gear case into a container, whose capacity is larger than 9L.Tighen the oil plug.

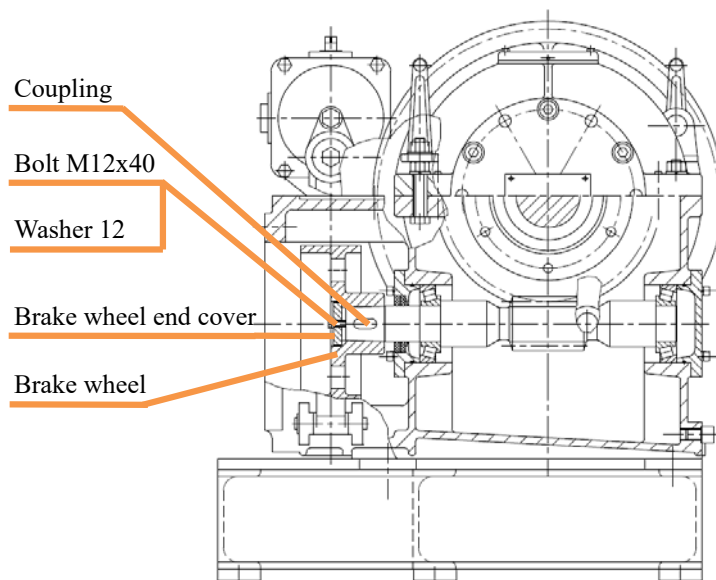


2. Remove the motor from the machine, refer to the step 1~2 of the [Motor Removal](#).
3. Loosen the lock nut M12 and the nut M12 by the hex wrench (18mm). Remove spring cover, spring and the bolt M12. Loosen the Nut that locking the board, rotate the board in order to separate from the micro switch.

## FYJ180 Series Geared Traction Machine Spare Parts Replacement Manual



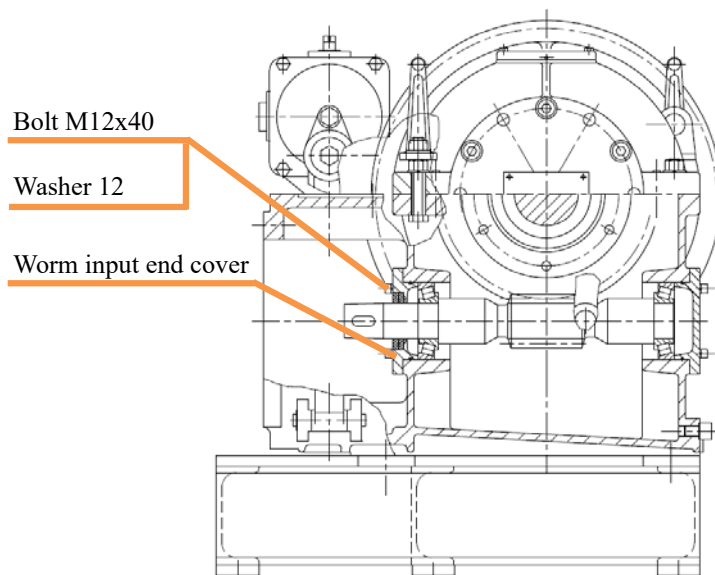
4. Loosen the bolt M12x40 by the hex wrench (18mm), remove the bolt, the washer 12 and the brake wheel end cover. Pull out the brake wheel by the hydraulic puller. Keep the key carefully.



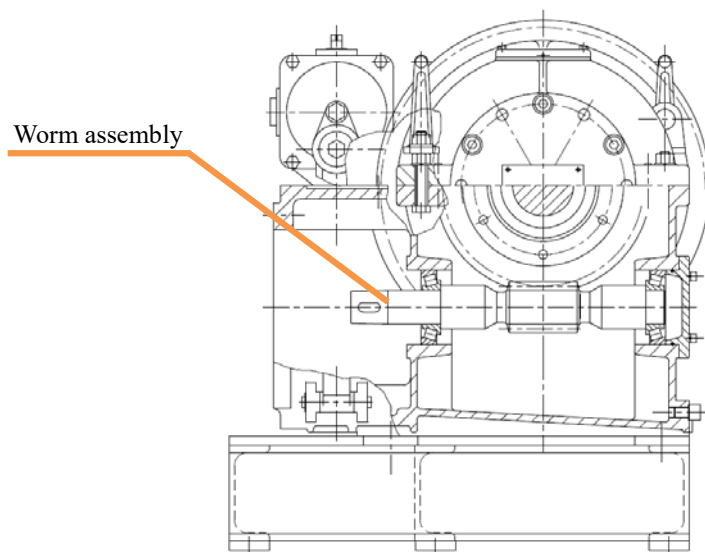
5. Loosen the bolt M12x40 by the hex wrench (18mm), remove the bolt, the washer 12 and the worm input end cover.

**Attention:** Avoid damaging the o-ring and the oil seal.





6. Rotate the worm wheel so as to push out the worm from the gear case.

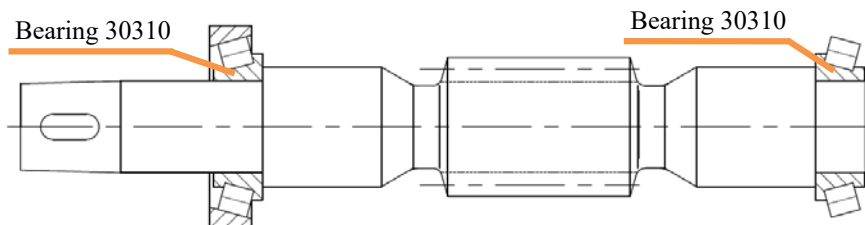


### 3.8.2 Worm and Worm Bearing Installation

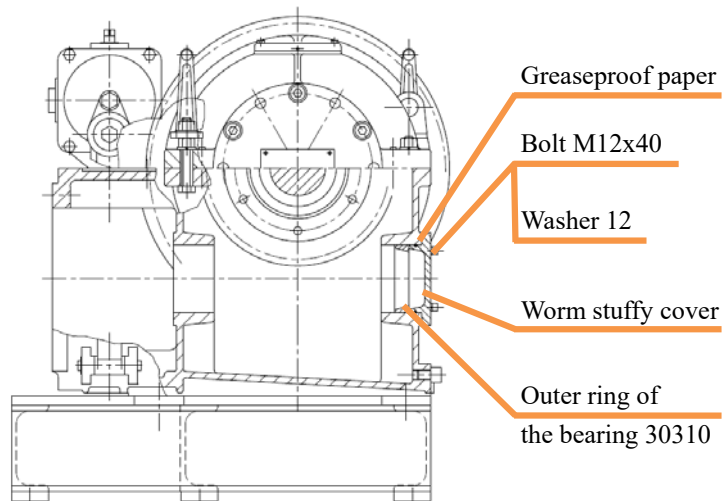
1. If the bearing 30310 of the worm input end is required to be changed, pull out the bearing 30310 by the puller.
2. Clean the bearing installation part of the worm. Heat the inner ring of the bearing 30310 up to  $80 \pm 15^\circ\text{C}$ , install it into the worm immediately. Wait the inner ring cools down completely, and then install the outer ring.

**Attention:** Please wear the glove to avoid the scald, while the bearing installation

operation.

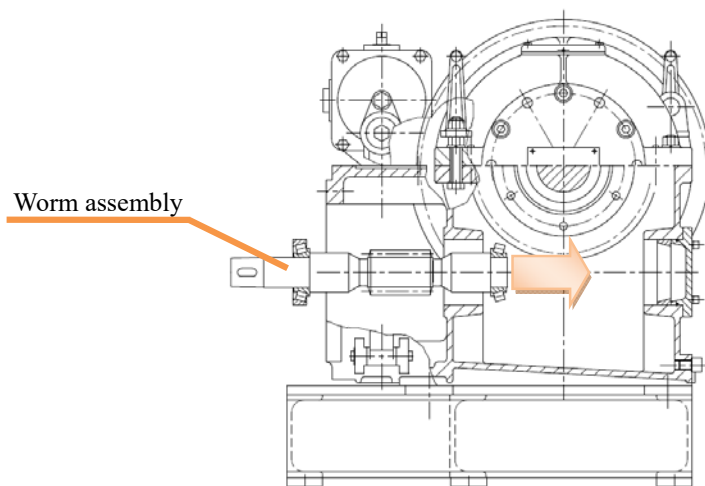


3. If the bearing 30310 of the worm back end, pull out the inner ring of the bearing 30310 from the worm assembly by the puller.
4. Loosen the bolt M12x40, remove the bolt, the washer 12 and the worm stuffy cover. Keep the greaseproof paper carefully. Pull out the outer ring of bearing 30310 by the puller.
5. Press the new outer ring of the bearing 30310 into the gear case. Screw the bolt M12x40 through the washer 12, the worm stuffy cover and the greaseproof paper into the thread hole of the gear case, but don't tighten the bolt.

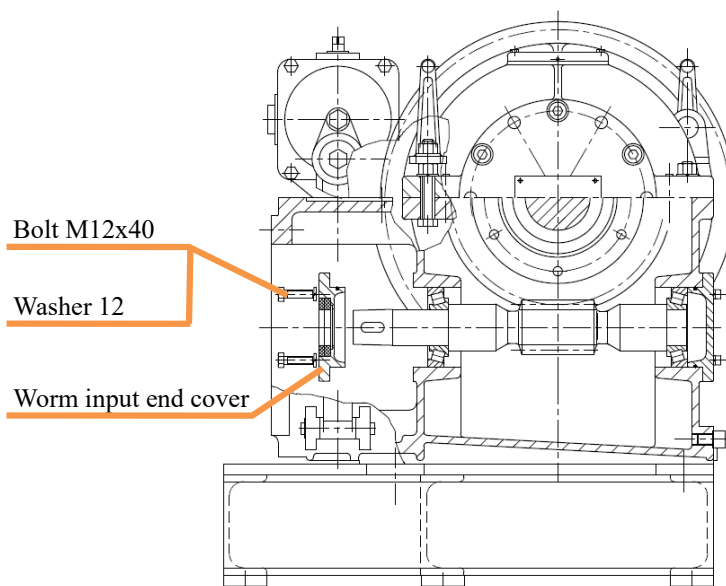


6. Install the worm assembly into the machine.

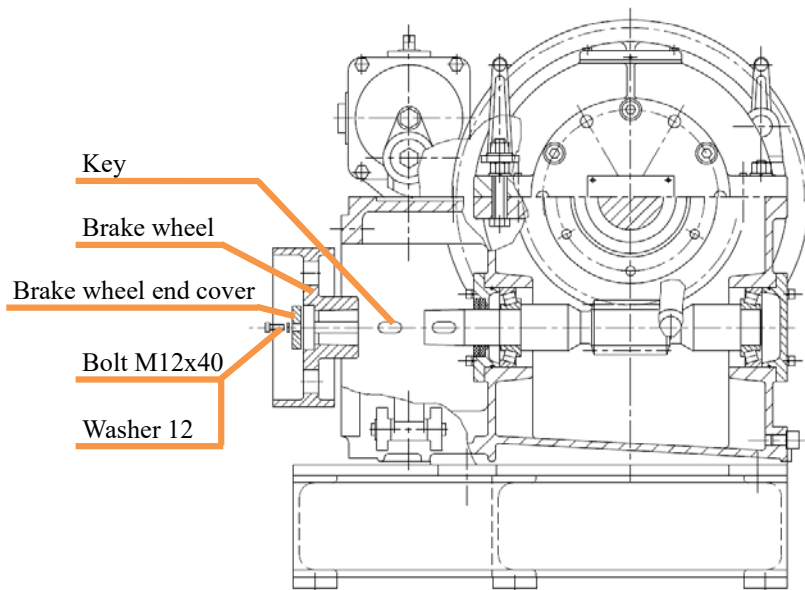




7. Tighten the bolt M12x40 and the washer 12 with the torque 70Nm, fix gently the worm input end cover. Avoid damaging the oil seal and the o-ring.



8. Set the key on the worm, press the brake wheel onto the worm. Set the brake wheel end cover on the brake wheel, fixed by the bolt M12x40 and the washer 12.



7. Check the radial runout of the brake wheel, which should satisfy  $\leq 0.06\text{mm}$ . Check the axial runout of the worm, which should satisfy  $0.03\text{-}0.08\text{mm}$ . Adjust the quantity of the greaseproof paper to satisfy the requirement.

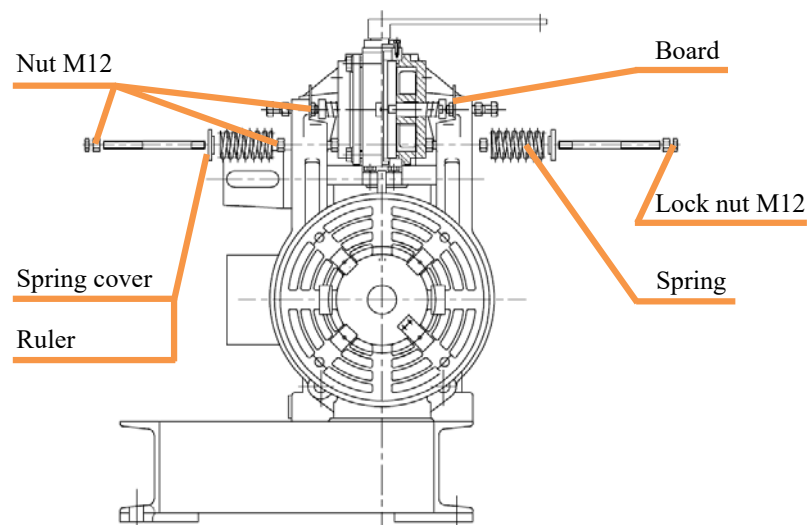


Radial runout of the brake wheel



Axial runout of the worm

8. Screw one nut M12 into the bolt M12x130, and then screw it into the machine. Put the spring and the spring cover through the bolt, and then screw the nut M12 and the lock nut M12. Rotate back the board, and then tighten the nut M12 to lock the board.



9. Check the brake torque of the worm output end (shown as the table 1). Adjust the brake torque by tightening or loosening the nut M12, locked by tightening the lock nut M12.

Motor Power	Brake torque
$\leq 7.5\text{kW}$	$\geq 80\text{Nm}$
$\geq 11\text{ kW}$	$\geq 120\text{Nm}$

10. Install the motor, refer to the step 2, 4 of the Motor Installation.