



Service Manual

Permanent Magnet Traction Machine Version 1

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Introduction

On the road of business developing of KDS, customer service has become our “Brand Promotion Project”. We insist on “Advance technology, Top quality, Customer First, Reputation Horizon”. And hold the service tenet of “Timely, Considerate, Professional, Premium Quality”, we are doing our utmost to provide best service to our customers.

The mother company of KDS, Kinetek Group has 105 years business history. In the past 105 years, Kinetek Group has dedicated to the development and improvement to the top elevator companies like Otis, ThyssenKrupp, Kone, Mitsubishi, Hitachi & Schindler, etc. We are full of experiences in elevator industry with outstanding design capability. We have 16 R & D centers around the world, and 29 global service centers which enable to provide after-sales service within 24 hours and offer development motion to customers in all aspects.

KDS traction machine ranges from the speed of 0.4m/s to 8m/s, and capacity from 400kg to 4000kg. This service handbook tries to illustrate the operation principles, swinging and installation, maintenance and the faults & remedy. We hope it can give a better understanding of KDS PM gearless traction machine to our customers.

Since this service handbook is special use to KDS traction machine, some of the technology should keep secret, we sincerely hope users can keep this handbook privately. Legal responsibility will be affixed if any company or person sell or copy this handbook without the agreement of KDS.

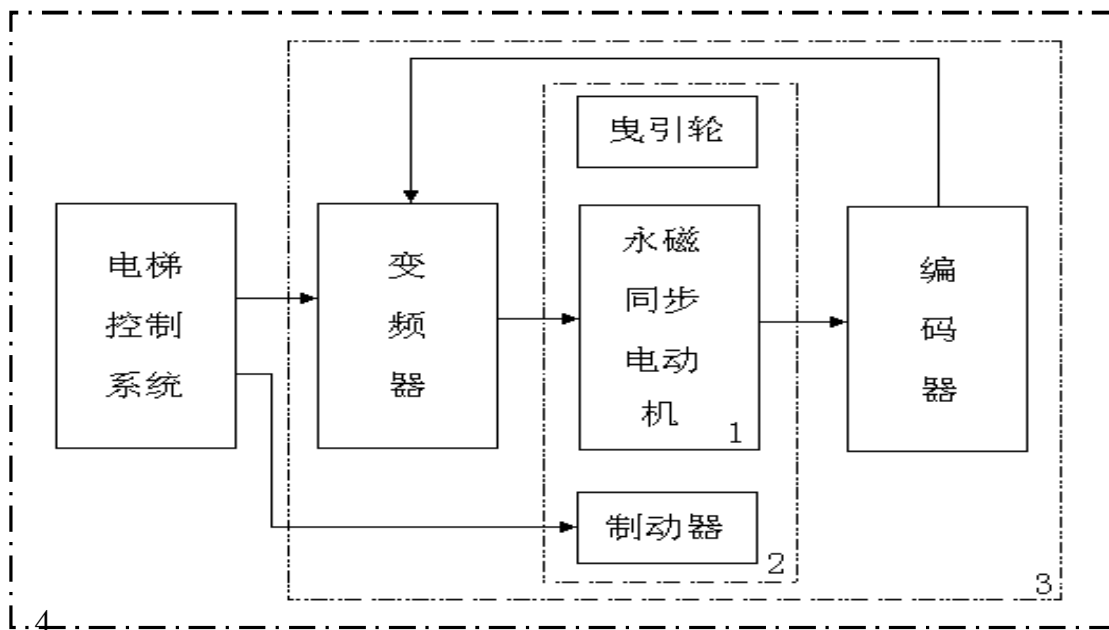
Due to the short time of the edition, the collection of materials maybe not complete, please forgive our mistakes and the oversight, you are really appreciated for your valuable opinions. Here we would like to give special thanks for the great support from our customer service team and engineering dept.

KDS

1st Part: Operation Principles

The permanent-magnet synchronous machine is consist of the permanent-magnet synchronous motor, brake system, traction sheave and so on. The operation principle of PM gearless machine is that: the inverter will provide rotation magnetic field from the signal feedback of encoder that supplying three phases varied frequency, varied voltage. The magnet field will make the rotor rotate at synchronous speed, and drive the traction sheave and make the car move up and down through the friction between the traction sheave and rope.

The design and manufacture of our gearless traction machine are complied with requirements of elevator standard EN81-1:1998 and GB7588-2003, each machine will have strict inspection before ship out from factory, to make sure quality and performance comply with these standards.



Picture 1 Permanent Magnet Synchronous Traction System

2nd Part: Hoisting and Installation

2.1 Out of box and lifting

When opening the box, check the nameplate and make sure the model meet with your requirement. Refer to the packing list and check whether all the components are inside. Please inform us if components defective.

The traction machine should be stored in the dry indoor place. When store the machine outdoor,

should take necessary measures to waterproof and dustproof.

In the lifting hook sleeve eye bolts, with soft rope and maintain a steady, there should no collision. The lifting capacity is limited to the traction machine, no additional weight on it.

Attention: make sure eye bolts fully tightened on machine and the base surface gapless. The angle between two hooks must be less than 60°

2.2 Installation of the traction machine

2.2.01 Before installation, should use the 500V Megger to measure the insulation resistance of winding, the value not less than 1 MΩ, otherwise dry treatment to the machine. the installation should comply with the layout arrangement of machine room. It is not allow to disassemble machine parts, if necessary, by the professional operator, also should maintain the site clean.

2.2.02 Permanent magnet synchronous traction machine installation location must have special terminal to the earth, grounding resistance $\leq 10\Omega$. Machine should be well grounded, when necessary, use bottom fasten bolt grounding.

2.2.03 Installation must strictly accordance with factory provided materials, to ensure elevator traction conditions meet the design requirements.

2.2.04 The traction machine must be integral hoisting and installation, no disintegration.

2.2.05 The traction machine should be kept level after installation, and have the corresponding vibration damping measure.

2.2.06 The wrap angle between car & CWT device and hoist rope should meet the prevision of GB7588 9.3.1b.

2.2.07 The treatment of machine short winding

Short winding diagram means while permanent magnet synchronous traction shut down, short wire three phases, to make traction machine regenerative braking, elevator will more safe and reliable braking.

Here are common short windings methods:

- a. Shoring winding circuit and inverter using the same contractor for open and closed contact, no delaying process. This method has some security hidden dangers. For example, while elevator running high speed, safety circuit open or no emergency supply when sudden power off, at the same time mini boar inverter stop to output, output relay power off and short winding work. Then machine induced voltage will be high with small impedance and high current, generate big torque, which will cause serious loss to mechanical equipment, operator and machine. In order to prevent above dangers, can add a UPS device.

- b. Separate inverter output contactor and short winding contactor, make certain delay process. While elevator running in high speed, safety circuit open or no emergency supply when sudden power off, machine deceleration by braking, after delay circuit, short winding relay work, which prevent the danger to machine, and reliability of elevator.

Attention: due to traction machine rotor with permanent magnet, the machine is not able to next to iron or other small sundries, to avoid being sucked into the motor.

2.2.2 Installation and usage of brake release device

Such as faults or trap people because of power off situation while elevator in the process of operation, can use brake release device for emergency escape. The implement of the operation should be with two professional qualifications at the same time. Firstly, make sure the main power supply be cut off already, after verification, one people insert a small gear into bracket on the machine frame, make the small gear and big gear joggle, another people use a releasing lever to open the brake, turning the traction sheave slowly to a level position by hand, then open the door and car door to release people.

Attention: Should make sure main power supply is cut off before operation; two people should keep cooperation and follow with above instructions to avoid personal injury.

2.2.2.1 Installation of the remote release device

A1 Installation of WTY1 series (Picture 3)

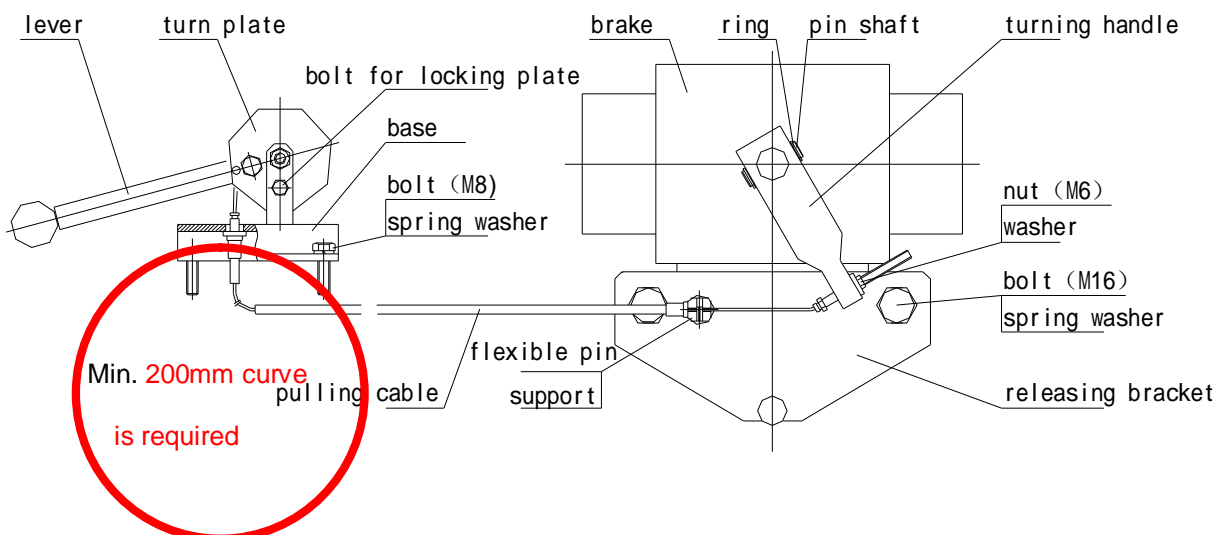
- 1, Expansion the cable.
2. Remove the original rope guard(the shape is almost the same as brake bracket),replacing the brake bracket, adjust the brake bracket and the traction sheave external distance (about 5mm), tighten the bolts (M16) and spring washer.
3. Remove the rotating lever on the brake and let two rings standby, put the pin into the brake exposed shaft hole, fixed by a pin shaft, the standby two rings lock the circlip.
4. According to the schematic structure, put the cable with the side of screw into bracket supporting column, and the elastic pin into the support column hole, blocking the cable can't emerge from support column.
5. Cable screw pull into the pin, with the washer, tighten the nuts (M6). Through the adjusting nuts (M6) to tighten the cable.
6. Use screws (M8) and spring washer to fix bracket fixing seat on the mounting seat of sufficient strength.

Warning:

1. Remote release device must ensure that the cable layout arrangement is reasonable, smooth, no wound, knotted or turn the effects of cable torque transfer while installation. Such as the layout of cables needed to turn, suggest cable bending minimum bending radius not less than 400mm.
2. The user to install the brake release fixity base must ensure adequate space, to avoid the cable bend radius too small. Cable in this position should ensure that the turning radius not less than 200mm. Otherwise there will be phenomenon as like as hard to release the brake cannot fully open brake or even brake broken.
3. In order to be able to release the brake and does not affect the brake torque, cable preload cannot be stressed too large. If too much may offset the brake stroke and decrease braking torque, or may cause brake failure if seriously.



Picture 2: WTY1 remote release device layout



Picture 3: Installation diagram of WTY1 remote release device.

A2、WJ Series installation (Picture 4)

1. Expansion both two cables
2. Used M10 bolts with washer support the two pillars fixed in notch groove which on the machine frame back side.
3. Then two cables with screw steel wire are respectively embedded in the holes of two pillars, the cable is fixed on a support with nut, use M4 bolt screw into the inner hole, blocking the cable cannot pull out from pillar.
4. The cable screw penetrates into brake turning handle, cover the washer, screw the nuts (M6), through the nut (M6) adjustment to tighten the cable.
5. Then 2 cables (cable must be straight, cannot twisted) penetrate into the fixed seat on the disc, string lever, disc and fixing seat with bolt (M8) and nut together.
6. Last, the brake fixing seat by screws (M8) and spring washer is fixed on the mounting seat with sufficient strength.



Picture 4: WJ machine installation layout

b、Usage

1. Remove the locking disc screws.
2. Upward or downward to turn the lever, rotate turn handle then brake action, promote brake arm, traction

shave can be rotate.

3. While complete the release device operation, use lock plate screw to lock the disc to prevent accidental release.

The third part: Traction machine maintenance

3.1 Bearing maintenance

3.1.1 Open bearing is adopted for WTY1 series machine working side(sheave side), as well as all the bearings for WTY2 series working side and encoder side. Therefore, periodic maintenance is required for those machine bearings. Other series traction machines should refer to our instruction manual.

3.1.2 The bearing of traction machine was injected by Shell grease when out of our factory. Some grease may have changes per customers special request. Customer should inject the same brand grease according to the labels stick on the machine.

3.1.3 Customers can inject grease through grease cup. When injecting grease, should remove the screw plug on oil vent hole and protect from dust inside the cup. Each time injects 45g grease (advised) for WTY1 series and 110g for WTY2 series, which can last about 1 year. For special models, pls. refer to the label stick on the machines.

3.1.4 Capacity 630kg at roping 2:1(capacity 320kg at roping 1:1) and the machines using both seal end bearing and seal front bearing, no need to inject greases.

Please refer to Picture 5 for grease injection of bearing



1、 Use the grease gun to infuse the lubricant as our previous requirement. Please make sure the operating environment is clean.

2、 Before injecting grease, please remove the bolt of the oil drainage hole (take WTY1 series as example). Please lock down the bolt when finish operation.

Picture 5



3、For WTY2 and WTYF2 series, the lube fitting is behind traction sheave, at the upper end.

4. The oil drainage hole is at the below end. Please unscrew it first and lock down after injecting grease

Picture 6



5. Injecting and draining places, type and amount of lubricant of some special models should be subject to the label on machines. (see picture 7)

Picture 7

3.2 Speed sensor (Encoder)

We use worldwide famous brands of encoder: Heidenhain & Tamagawa. Please refer to below picture for the encoder installation and disassembly procedure:

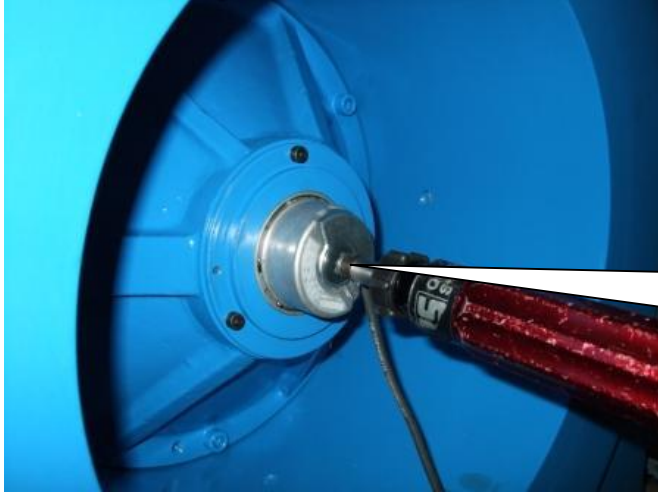


Warning:

1. **Don't remove the encoder except for special situation.**
2. **The electricity must be cut off at least 3 minutes before pull out or insert the encoder terminal; otherwise it will cause damage to the encoder and the PG card.**
3. **Before starting traction machine, make sure the machine is adequately earthed, otherwise, static caused by machine may destroy the encoder so that it can't work normally.**

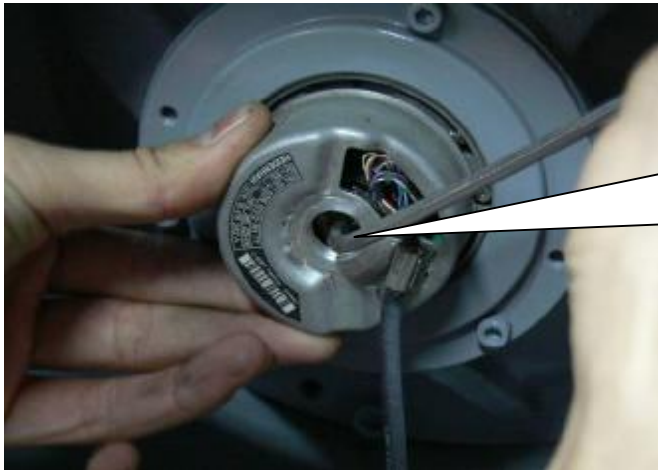
3.2.1 Removal and installation of Heidenhain encoder:

a. Removal:



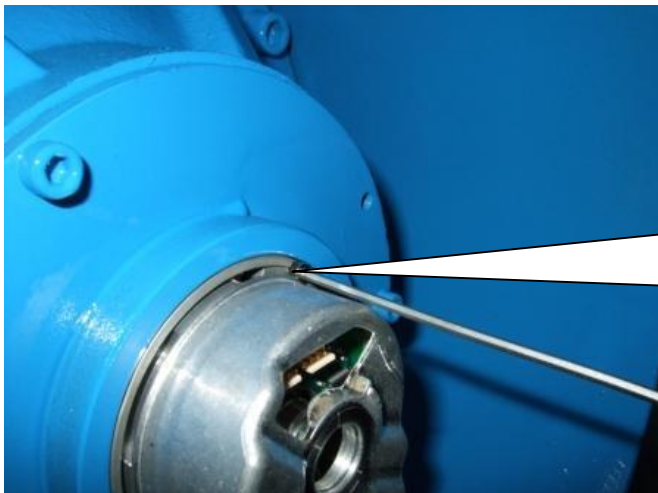
1. Use 4.0mm Allen Key to loosen the screw anticlockwise and take off the cover plate.

Picture 8



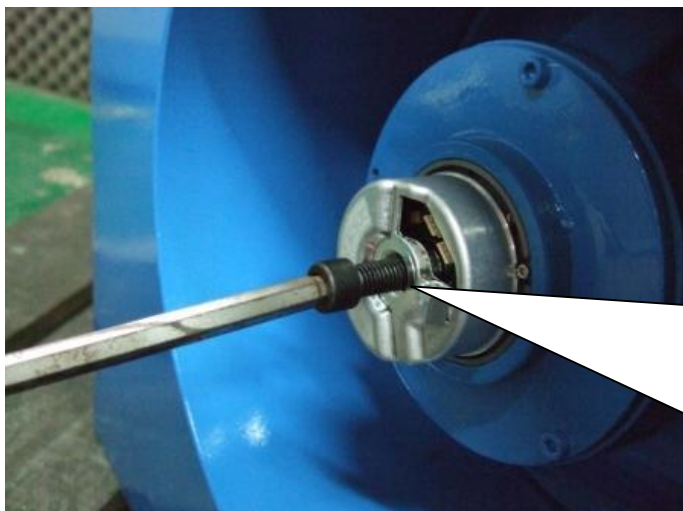
2. Pull out the cable plug carefully. Use 4.0mm Allen Key to loosen the screw anticlockwise for two turns. But don't pull out the fixing screw.

Picture 9



3. Use 2.0mm Allen Key to loosen this screw anticlockwise, until the encoder can rotate easily in the mounting plate.

Picture 10



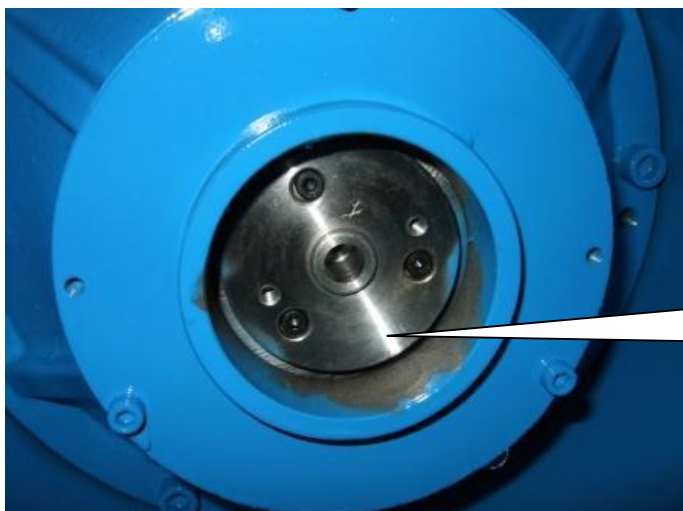
Picture 11



Warning: When installing the M10 bolt, please make sure the M5 bolt inside hole is still in, if it is removed, please tight screw 3-4 circles, but don't be too tight.

4. Use a M10 six hexagon bolt to screw clockwise, slowly, forced, until you feel the encoder can be removed. Take out the M10 bolt, and loosen the bolt M5X50, then you can take out the encoder with hand.

b. Installation:



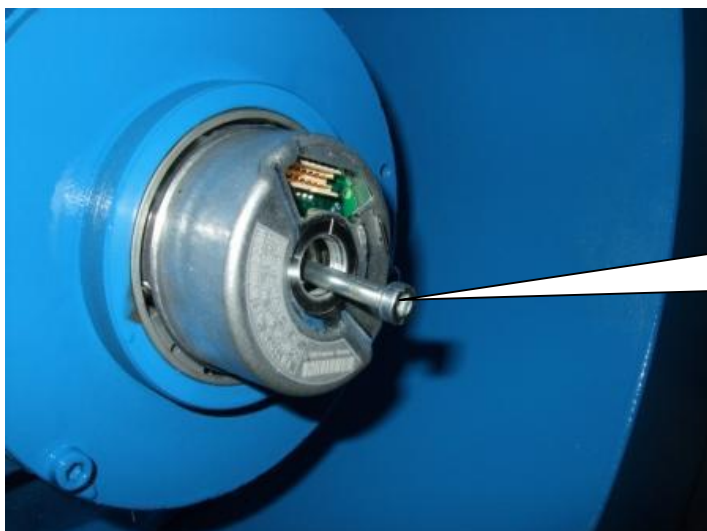
Picture 12

1. Clean the mounting hole, to ensure installation precision.



Picture 13

2. Put the encoder into the mounting hole correctly.



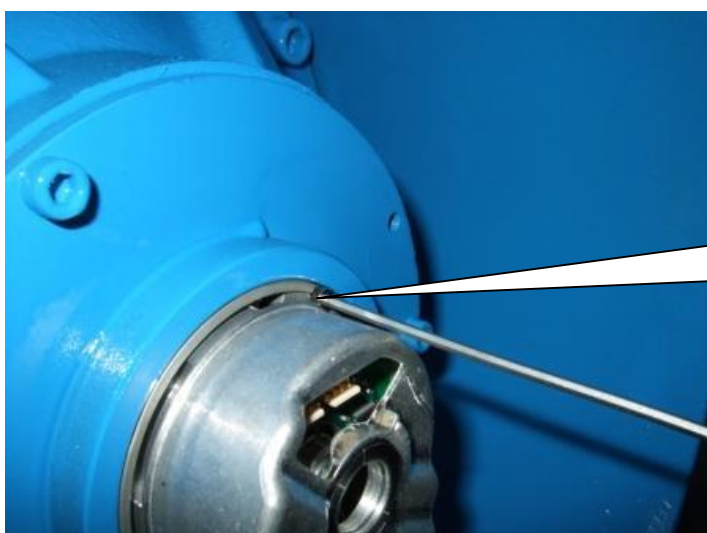
3. Please put the special M5X50 bolt into the mounting hole. This bolt should be replaced after using three times.

Picture 14



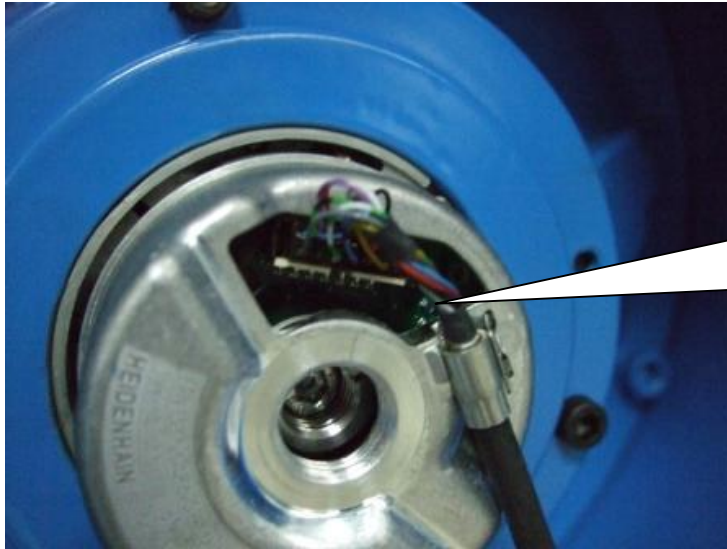
4. Use 4.0mm Allen Key to lock this bolt equally with $Md=5+0.5Nm$ torque.

Picture 15



5. Use 2.0mm Allen Key to lock this bolt equally with $Md=1.25-0.2Nm$ torque.

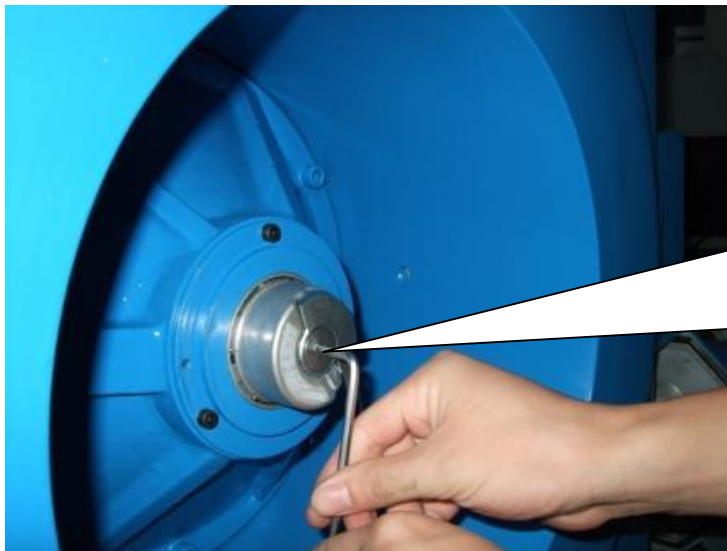
Picture 16



6. Insert the signal cable plug according to the marks.

Snap the metal ring of this cable into the fixing seat.

Picture 17



7. Put on the encoder cover properly, use a 4.0mm Allen Key to lock this bolt equally with $Md=5+0.5Nm$ torque.

Interference will be caused if it does not be covered well.

Picture 18

3.2.2 Removal and installation of Tamagawa encoder:

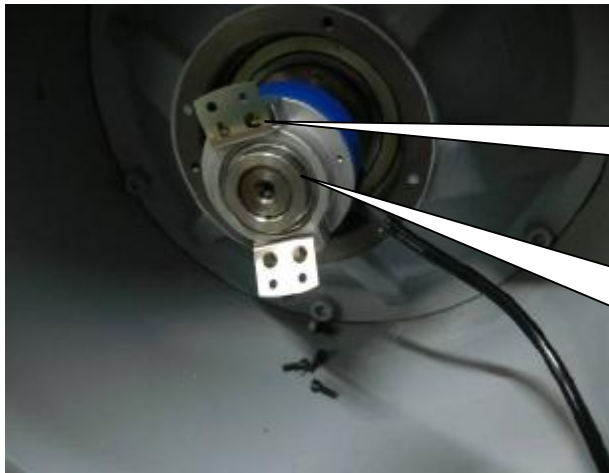
a. Removal:



Picture 19

1、 Use Phillips screwdriver to counterclockwise unscrew these four fixed screws.

2、 Use a 4.0mm Alley Key to counterclockwise unscrew the three M5 bolts. Remove protective cover.

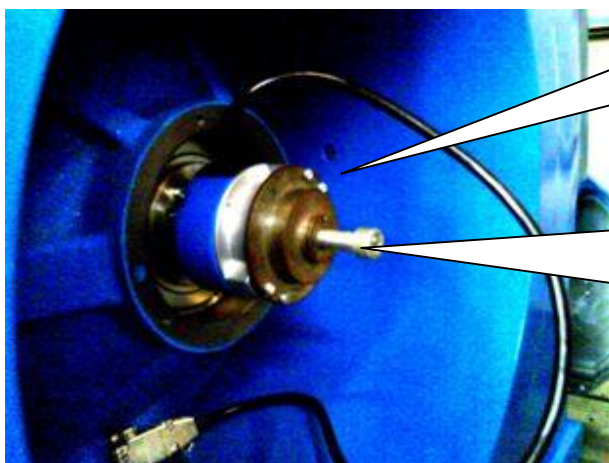


Picture 20

3、 Use Phillips screwdriver to counterclockwise unscrew these four fixed screws.

4、 Use a 1.0mm Alley Key to counterclockwise loosen these two fixed bolts, but please do not take them out.

5、 Place KDS special disassembly fixture over the encoder, and use 4 longer bolts to fix this fixture in right position.



Picture 21

6、 Tighten M8X30-40mm blot into thread hole in CCW to push the encoder out. Warning: Too much force is not allowed in order to avoid encoder damage.

b. Installation:



Sheathe encoder on the small shaft, use a 1.0mm Alley Key to fasten two hexagon screws on the connection shaft with screw locking agent at a ninety degree angle, do make sure one screw is fixed in the groove of connecting shaft.

Picture 22



Put on the encoder cover and fasten it with screw and locking agent. The encoder connection piece should also be fixed on the cover.

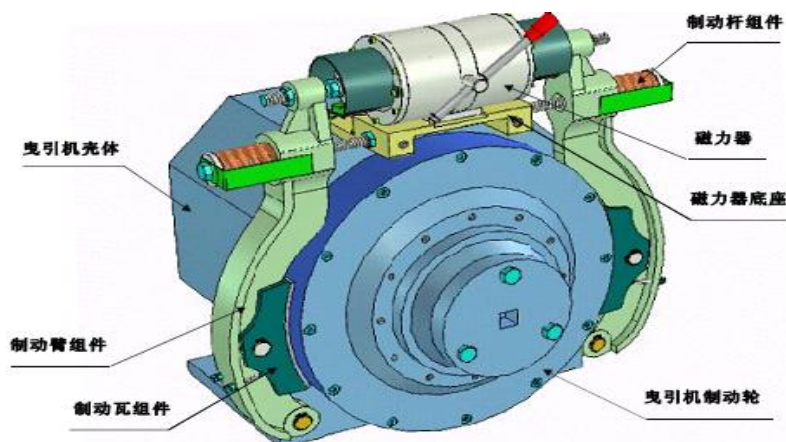
Then fix cable and installation is complete.

Picture 23

3.3 Brake maintenance

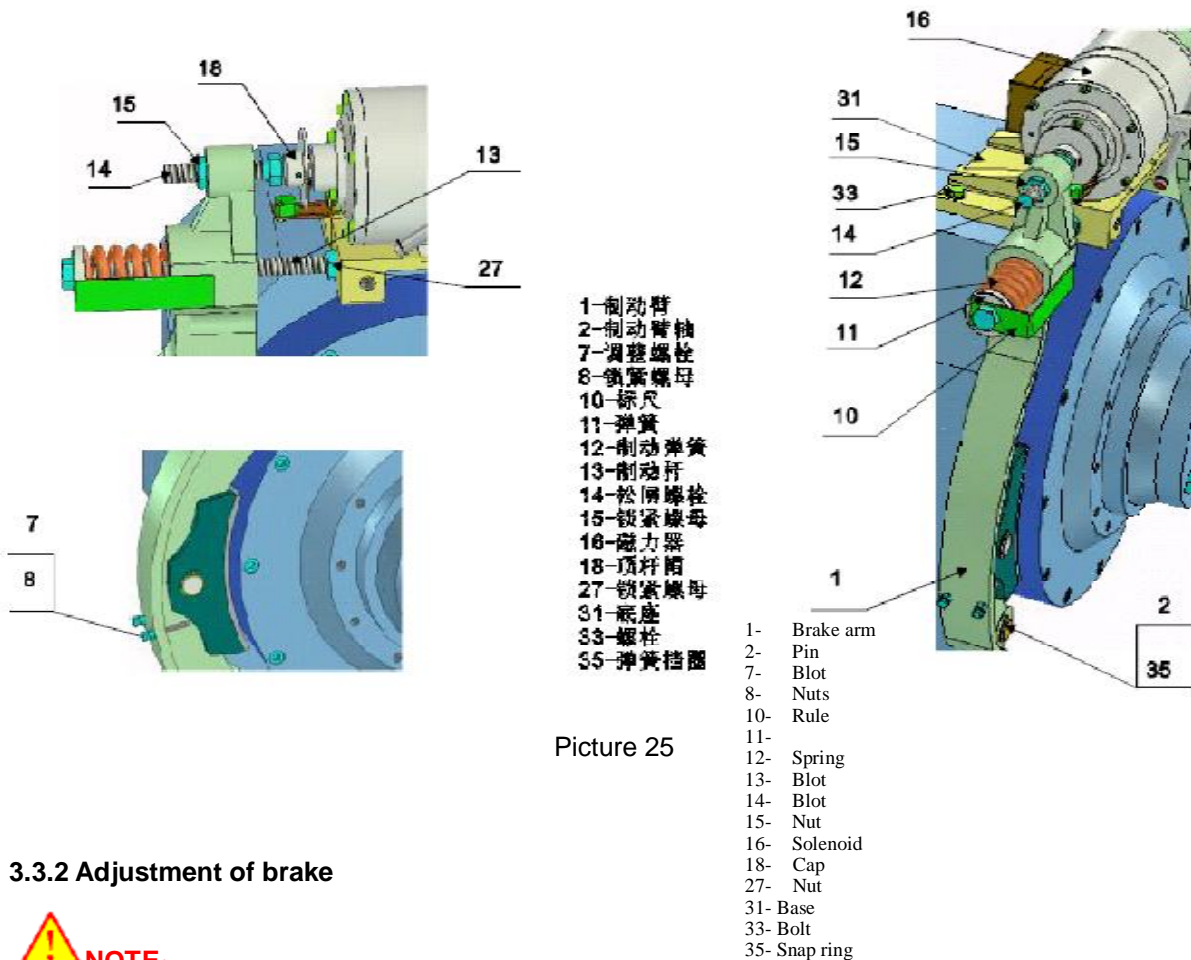
3.3.1 Double driving drum brake

a、Brake Outline Sketch



Picture 24

b、Structure diagram



Picture 25

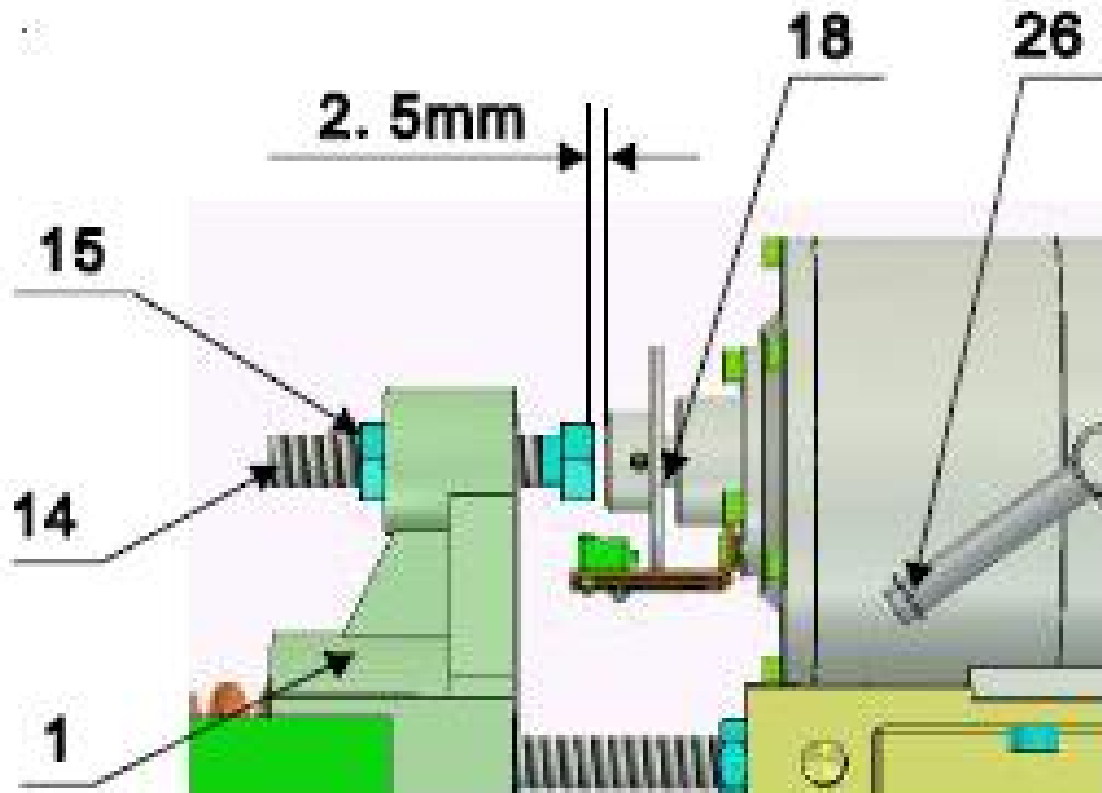
3.3.2 Adjustment of brake



NOTE:

- 1、 When adjust the brake on both sides at the same time, please move elevator non-load to the top and counter-weight on the buffer, in order to avoid slipping accident.
- 2、 When counter-weight is not on the buffer, please adjust brake force and brake clearance respectively on two sides. Before adjusting one side, press firmly brake spring (12) on the other side, to make it have enough brake force and then adjust. Please lock all relevant components after adjustment. The adjustment method is the same for both sides.
- 3、 Before normal operation or power-on test, please replace brake handle and remove handle lever, connected with thread (don't need to remove handle lever, connected with circlip)

- 1) Adjusting the travel of solenoid (see Picture 26)



Picture 26

Under de-energized condition, push cap (18) and core shaft of solenoid inwards, until they can't move any more. Rotate the release bolt(14), so that the gap between release bolt (14) and cap(18) is around 2.5mm (measure with feeler gauge).This dimension is the no loading travel.

The design travel of solenoid is 5mm.

Effective travel= design travel- no loading travel.

The release gap should be adjusted according to article 2 if it can be measured directly.

When release gap can't be measured directly, use the feeler gauge to measure the gap between release bolt(14) and cap(18), which should be 1.5~2mm, then switch on and do brake release experiment: if the noise is too loud, means the release gap is big, and should loosen the release bolt(14) outwards along the brake arm. If there is a drag brake noise, means the release gap is small. Should tighten bolt (14) to make it is closer cap (18). Each rotation can't exceed 30 degrees, until the friction disk just doesn't rub with (6) brake wheel. Lock the nut (15) under power-on-release condition when the gaps of both sides are identical.

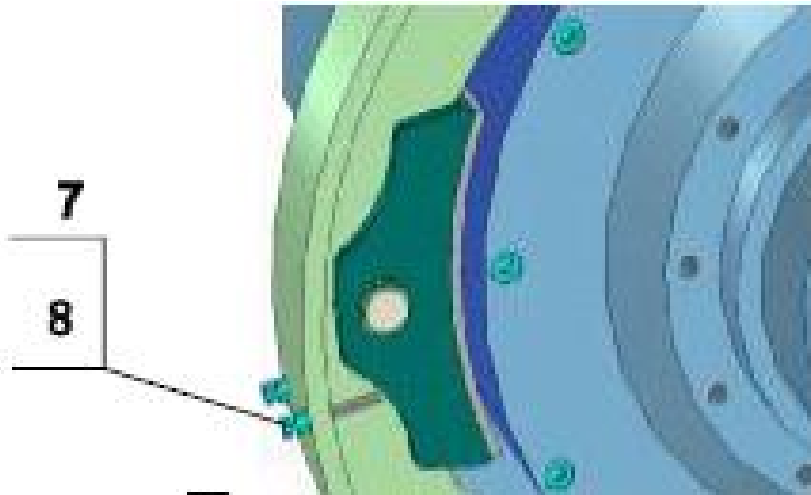
2) Adjustment of release gap (see picture 27、 28)



Picture 27

When release gap can be measured directly, release when power is switched on or by hand, use feeler gauge to measure the gap between the friction disc (6) and brake wheel, which should be 0.08-0.15mm. It would be better if the value is as small as possible or as long as no friction between friction disc (6) and brake wheel. If the gap is too big, brake noise will increase. If the gap is too small, friction disc will rub with brake wheel, in this case, tighten the release bolt (14) inwards along the brake arm to near cap (18); otherwise, loosen the release bolt (14) outwards along the brake arm. Each rotation can't exceed 30 degrees, until the friction disk just doesn't rub with (6) brake wheel. Lock the nut (15) under power-on-release condition when the gaps of both sides are identical.

3) Adjustment for brake shoes (see picture 28)



Picture 28

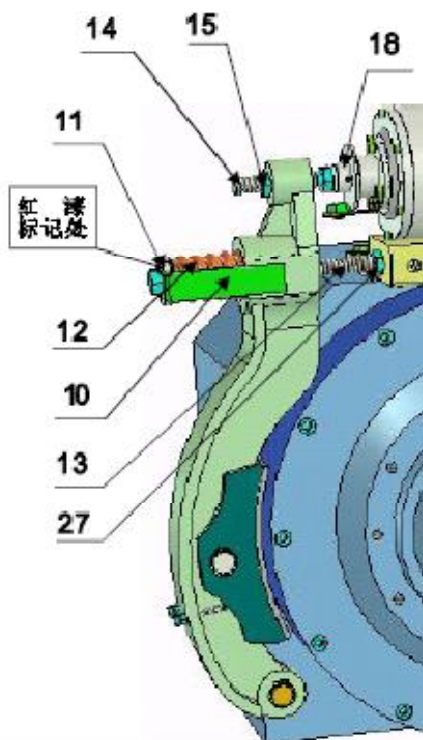
When the brake shoes and brake wheel are completely attached, adjust bolt (7) and let it touch brake shoes (3) slightly. Measure the gap between brake shoes and brake wheel under power-on release. The gap should be even 0.08-0.15mm in both upper and lower positions. Lock nut (8) after adjustment.

1) Adjustment of brake torque (see picture 29)

⚠ NOTE: Without KDS permission, customer should not make any adjustment of brake force, to avoid safety accidents!

Loosen nut (15), unscrew bolt (14) and loosen nut (8). When brake shoes and brake wheel are completely attached, adjust bolt (7), until it touch brake shoes slightly, but bolt (14) can't press cap (18). Referring to below corresponding table between spring compressed length and brake torque on the brake arm, screw brake lever (13) inwards, or screw the nut on the brake lever to compress the spring to get required brake torque. You can also measure the torque with torque measuring device (e.g. with a torque wrench, according to required brake torque). Here, the brake spring lengths on both sides should be equal. After finishing adjustment for brake torque, mark with red paint all the contact positions on torque rod (10), brake lever (13) and spring base (11).

2) Adjustment of pick synchronization of brake (see picture 27)



Picture 29

Observe the lock-brake synchronization on both brake arms: when locking brake with enough brake torque, if two sides are not synchronal, increase the spring pressure on slow side and decrease the spring pressure on fast side until achieve synchronization. After adjustment, account the brake torque and lock all fasteners. Then do the brake torque test or elevator static load test. If the test fails, please readjust the synchronization.



Note: Without KDS permission, don't adjust the amount of spring compression.

6)、Adjusting the lag time of brake picking

a、The brake with over-excitation rectifier

For the brake with over-excitation rectifier, when the brake torque meets the requirements, if there is reversing phenomenon and the problem can't be solved by adjusting inverter, the lock-brake selecting wire between terminal 3 and 4 of excitation rectifier can be removed that will fast the lock-brake speed and increase the noise. (Remark; there are two kinds of brake speed; slow locking speed is with little noise when terminal 3 and 4 of excitation rectifier are short. Whereas fast locking time is with much noise.)

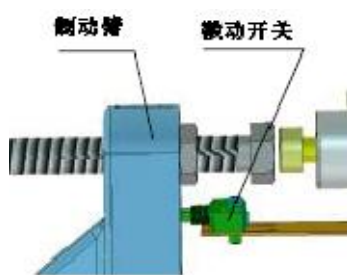
Check whether the brake is repeatedly, or the continued flow resistance is not match. Remove the continued flow resistance in control cabinet or in the over-excitation rectifier, to increase brake speed.

b、The brake without over-excitation rectifier

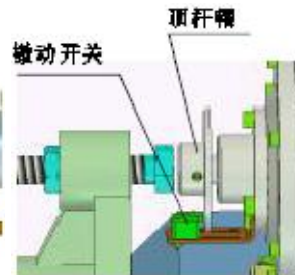
If sliding accident will be exited under operation, please properly adjust bleeder resistance brake circuit in the Control cabinet till meets requirement.

 **Note: Please operate under de-energized condition!**

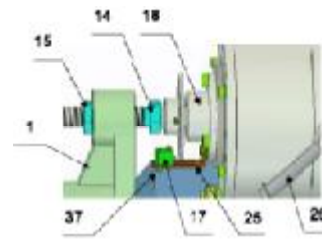
7)、Installation and adjustment for micro switch (see picture 30,31,32)



Picture 30



Picture 31



Picture 32

1、As shown in figure 30, the micro switch will touch the brim of lever cap on the brake coil shaft (18) and send signal when release.

2 、As shown in figure 31, the micro switch will touch brake arm and send signal when release. Micro switch (17) is mounted on the bracket (25) with screw (37). Loose the screw (37); pull the manual release handle (26). After release the brake (operate by hand or by power), when Cap(18) (48) is pushed out, its cap brim will extrude micro switch(17), so that the micro switch can be turned to “ON “ or “OFF” according to the core shaft of solenoid movement, push out or return. Fasten micro switch with screw (37). It's the same way for left and right side. (The lead wire has already been set in the terminal box. When brake coil is de-energized, micro switch is “on”; when energized, it is ”off”



Alarm: Before connecting circuit, please make sure the system has already disconnected with power.

3.3.3 Connection of brake coil and step-down circuit of control cabinet

A. Installation illustration

1. When solenoid is with excitation rectifier is mounted in



Picture 33

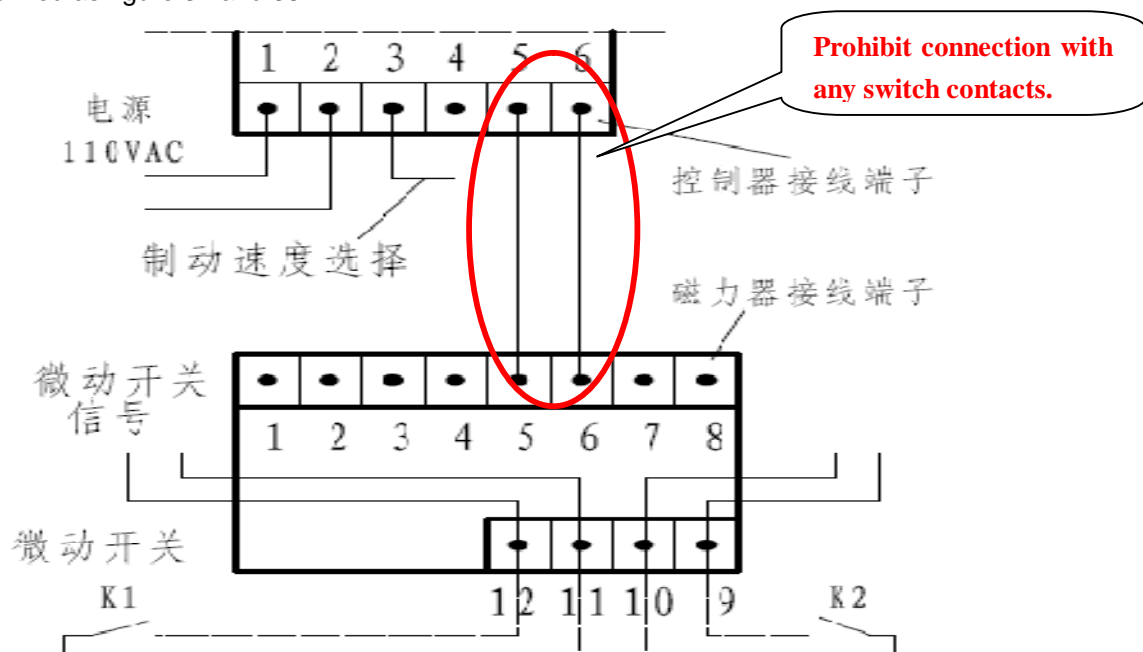
control cabinet.

- (1) To install the excitation rectifier in the electric control cabinet, fix it with clamp-rail and then push it into the rail and fix it.
- (2) . The clamp-rail for fixing excitation rectifier is 35mm DINU rail.
- (3) . Over-long lead wire will affect the parameters of excitation rectifier.

If the installation distance between brake coil and excitation rectifier is more than 5m, please mention in the order.

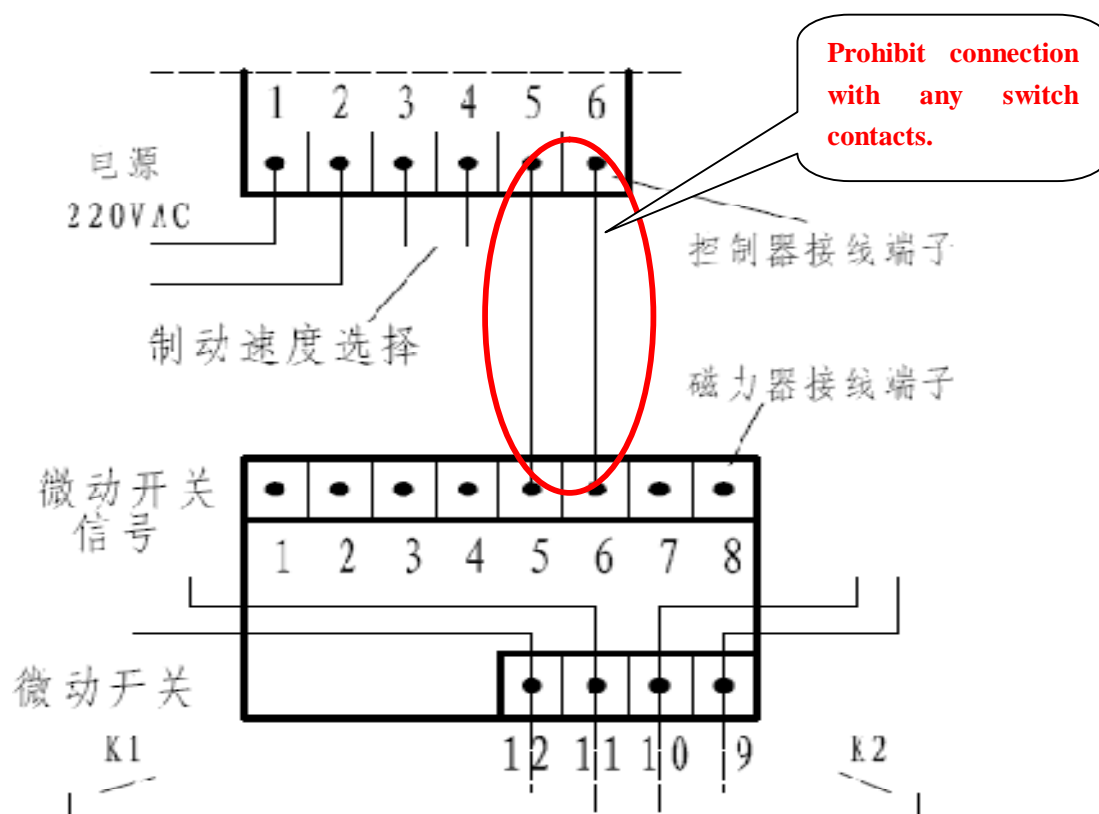
B. connections

- 1) When power is AC220V or AC110V, the connection between excitation rectifier and brake coil is defined as figure 34 and 35.



注：磁力器接线端子1、2、7、8为内部接线，勿拆动。

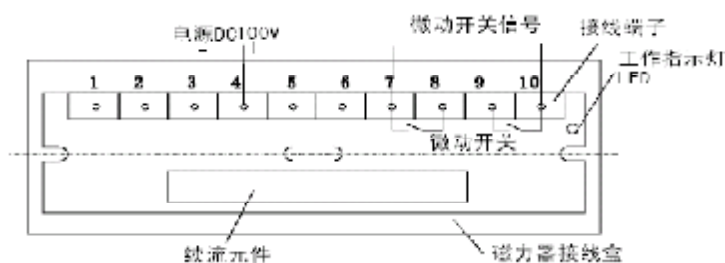
Picture 34 AC110V



注：磁力器接线端子1、2、7、8为内部接线，勿拆动。

Picture (35) AC220V

2) When power is DC 110V or DC200V without excitation rectifier, the connection of brake coil is defined as figure 36 and 37.



Picture (36) DC110V



Picture (37) DC200V

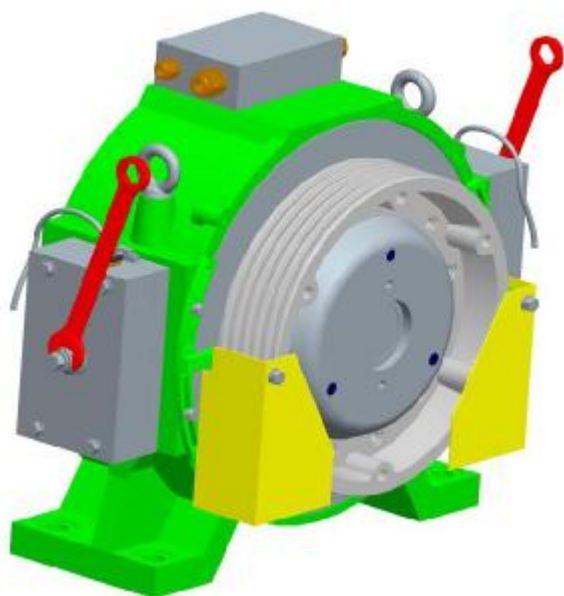


NOTE: 1、 for DC powered brake, positive and negative pole can't be reversed, otherwise, the green indicator light does not shine and brake coil does not work. Electronic elements in terminal box are easy to be burnt out.

2、 If use DC type brake from KDS, the starting voltage is full and 50% voltage reduction for maintaining.

3.3.4 Maintenance for block brake of WJ series.

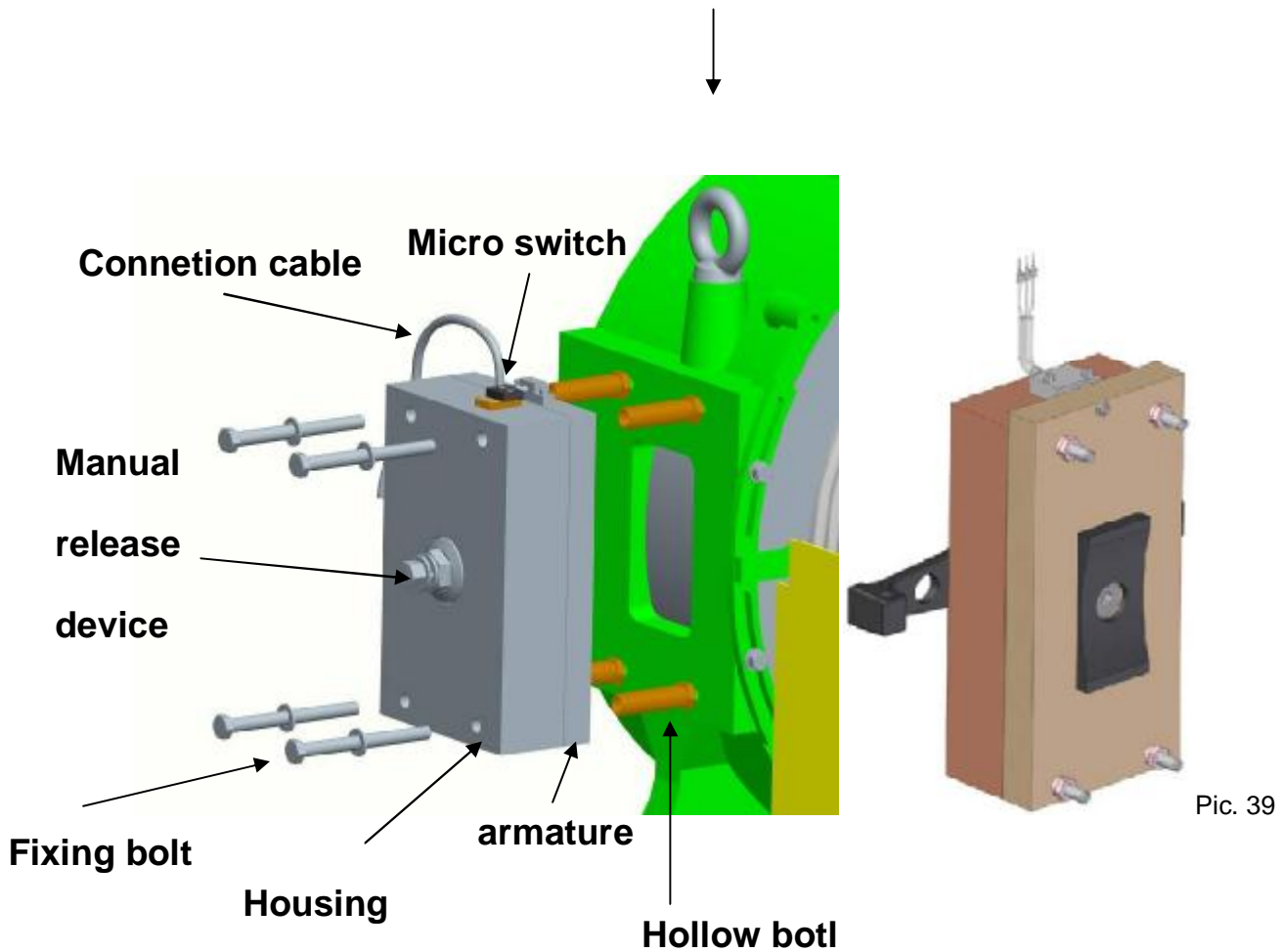
Outline Sketch of WJ series machines. (see picture 38)



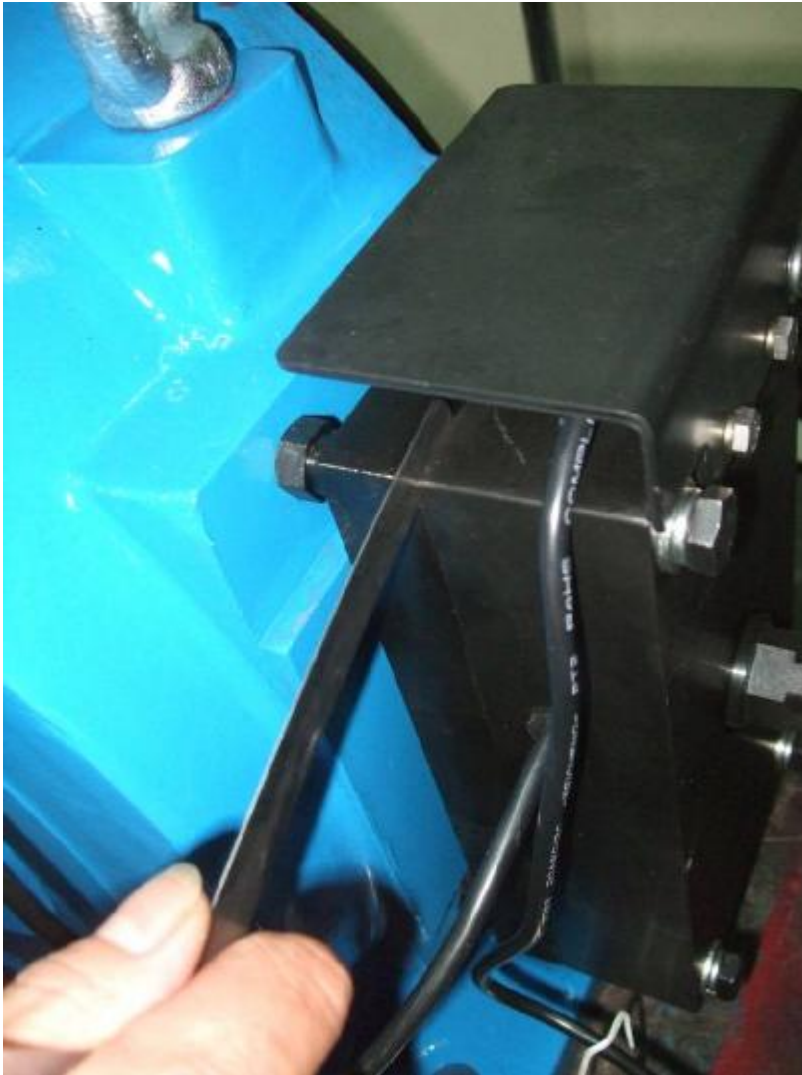
Picture 38

Exploded view of block brake (Picture 39)

Permanet magnet traction machine

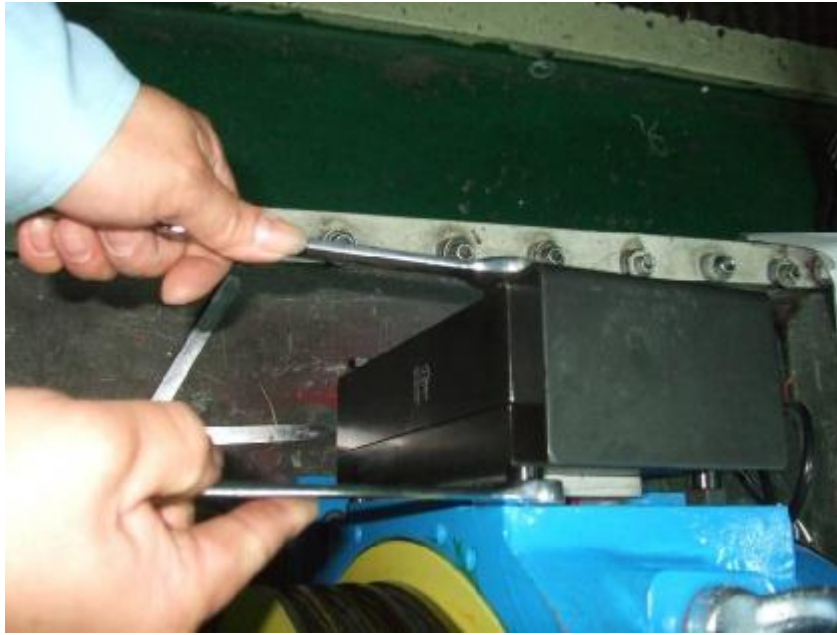


- **(NOTE): Friction disc wears after long-time use and air gap becomes larger. When the air gap changes to 0.5, need to adjust the hollow bolt to reduce the air gap to $0.35 \pm 0.05\text{mm}$. Debugging method is as follows:**
- **• tighten the mounting bolts with 15-20Nm torque. Then use a feeler to measure the gap between the armature and the housing as shown in picture (40):**
- **1) If the gap value is too large, use a 16mm wrench to rotate the fixing bolt counter-clockwise 30 degrees, to loosen mounting bolts a little, and then use a 18mm open-end wrench to counterclockwise rotate the hollow bolt, to screw the hollow bolts into the housing Then clockwise rotate the fixing bolts that they are tightened, as shown in picture (41). Check the air gap with a feeler to meet the requirements**
- **2) If the gap is too small, use a 16mm wrench to rotate the fixing bolt counter-clockwise 30-45 degrees, to loosen mounting bolts a little , and then use a 18mm open-end wrench to clockwise rotate the hollow bolt to move it out a little from frame. Then clockwise rotate the fixing bolts so that they are tightened. Check the air gap with a feeler to meet the requirements.**



Picture 40

Measure this gap with a standard feeler. The gap on four corners of the brake should be evenly between 0.3-0.4mm



Picture 41

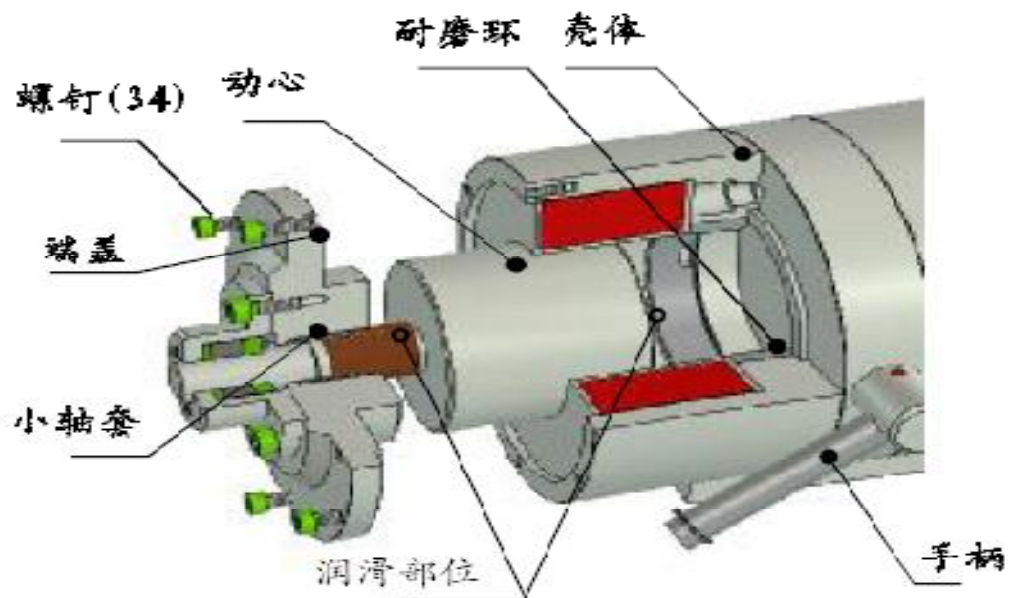


NOTE: The air gap adjustment must be carried out in a clean environment.

The air gap must be checked in every maintenance inspection.

Any debugging of the brake must be carried out under de-energized situation!

3.3.5 Maintenance

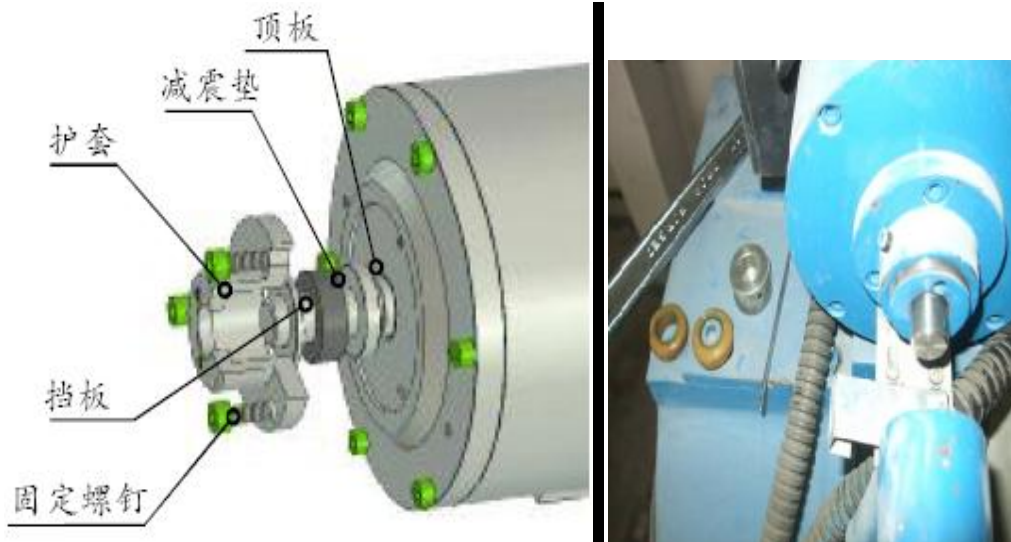


Picture 42

1 If brake coil is overheating,

(1) Check if the brake coil is turn-to-turn short circuit, if yes, replace it.

(2) Check relay in control cabinet and see if any burns out, if yes, repair or replace it in time。



Picture (43)

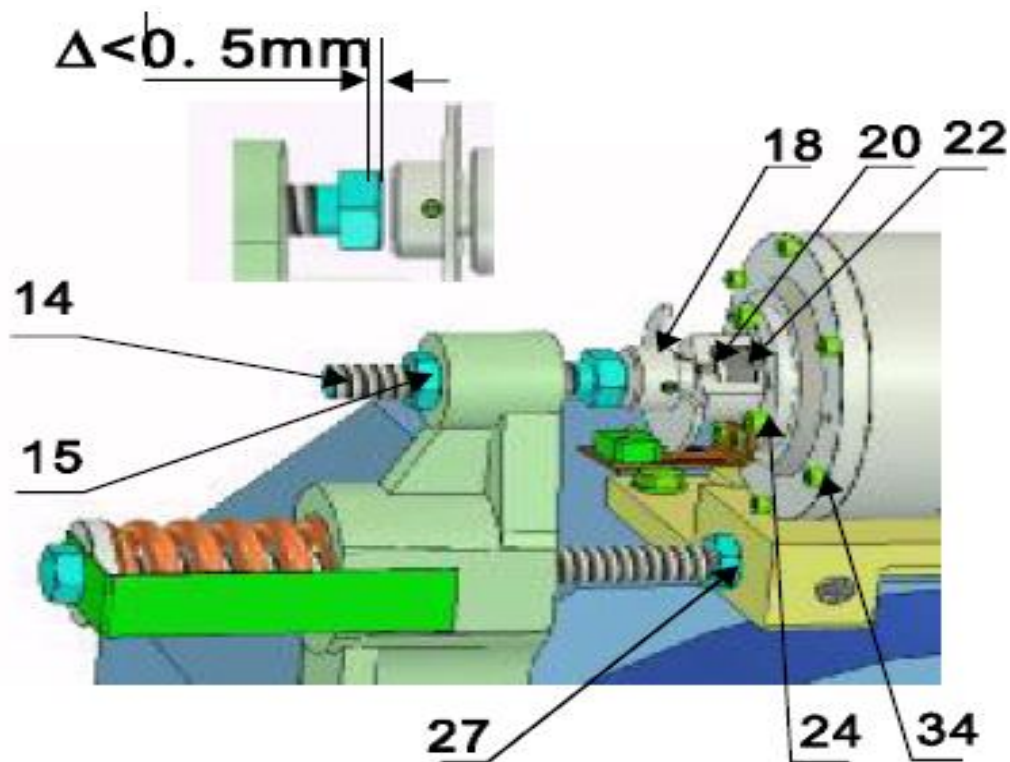
2、 Replace shock pad

The shock pads should be replaced when the brake coil is used for more than 500,000 times or the noise increases.

Replacement method is as follows: remove the screw, take out the sheath and the rubber pad of baffle. Then replace the shock pad. (See picture 39)

(Note: Shock pads are specially designed components, please purchase spare parts.

3、 Regularly check the gap between friction disc (6) and the brake wheel , If there is friction on brake wheel, loosen the locked nut (15), rotate the release bolt (14) inwards by a certain degree, The gap should be 0.05~0.15mm. If the gap is too big, the noise of locking brake will increase. Screw bolt(14) outwards 30 degree orderly until the gap is small and there is no friction. After adjustment, lock nut (15) and mark with red paint.



Picture 44

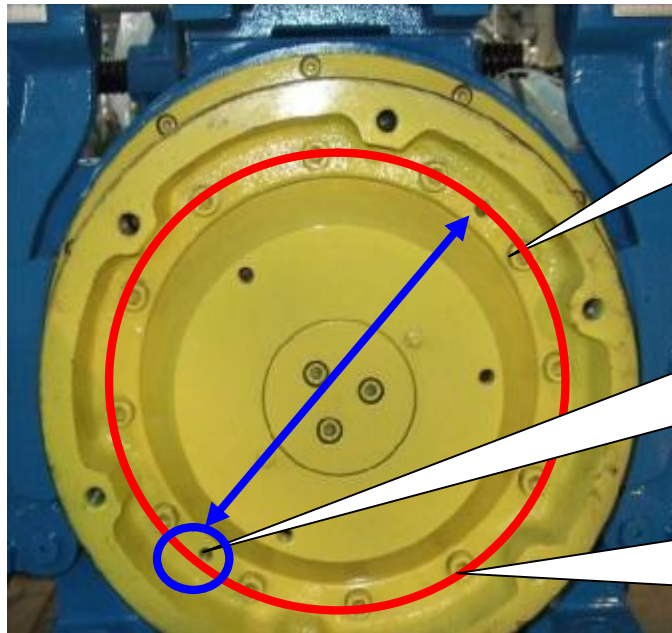
4、 Regularly check the gap Δ between the release bolt (14) and cap (18). After locking the brake when switch off, push the core shaft of solenoid inwards until reaches the innermost of solenoid. Use a feeler to measure the gap, which is not allowed less than 0.5mm, otherwise, brake can not be released normally.

5、 Shoes or block brake should be replaced in time when friction pad is thinner than 3mm.

6、 If the brake coil can not be released when power on, check whether the spring is too tight, or the relay in control cabinet is pasted, burnt or virtually connected. If yes, please fix it in time.

7、 When the noise of brake coil is large, adjust the gap between brake wheel and friction disc until minimal and no friction. For a coil which has been used or after overhauled for more than one year, the noise can't meet the requirements, even if the gap has already adjusted to minimal value. Please loosen screw (24) and replace shock pad (22).

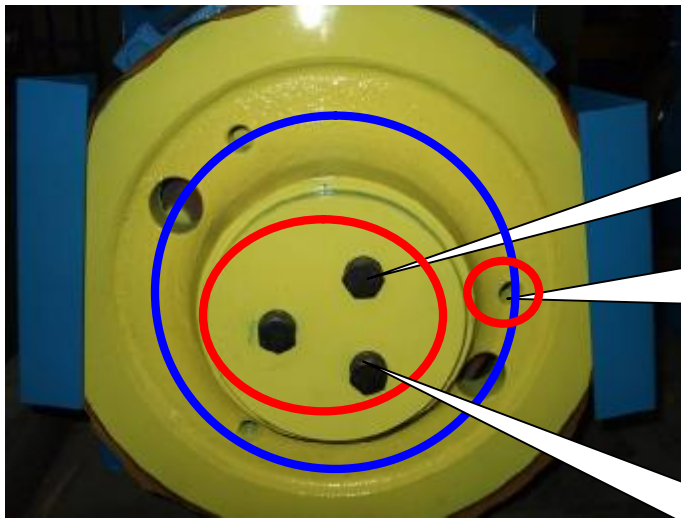
3.4、Removal and installation of traction sheave



1、Use a Alley Key to remove all the bolts in this circle from counterclockwise

2、Symmetrically screw 2 bolts from counterclockwise to push the sheave out. Please make sure two people operate together to avoid any injury to the operator.

3 、 While installation, please insert the sheave properly, and add some screw glue when fix the bolts in this circle.



1、Unscrew these 3 bolts from counterclockwise, and take off the bracket.

2 、 Screw 3 bolts from counterclockwise to push the sheave out Please make sure two people operate together to avoid any injury to the operator.

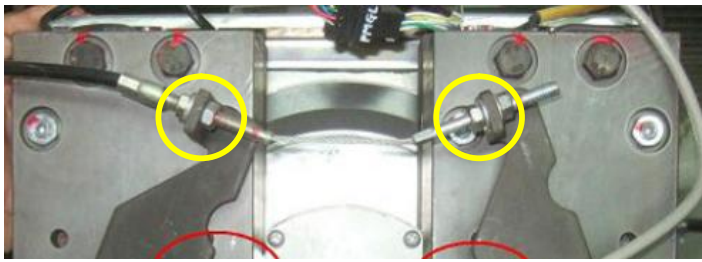
3 、 While installation, put the sheave fixed with the key, then put the bracket on and screw those 3 bolts.

3.5、The instruction of dismantling and assembling WR series brake

First cut off the power, remove the brake power cord in the terminal box and the wire of brake detector switch.

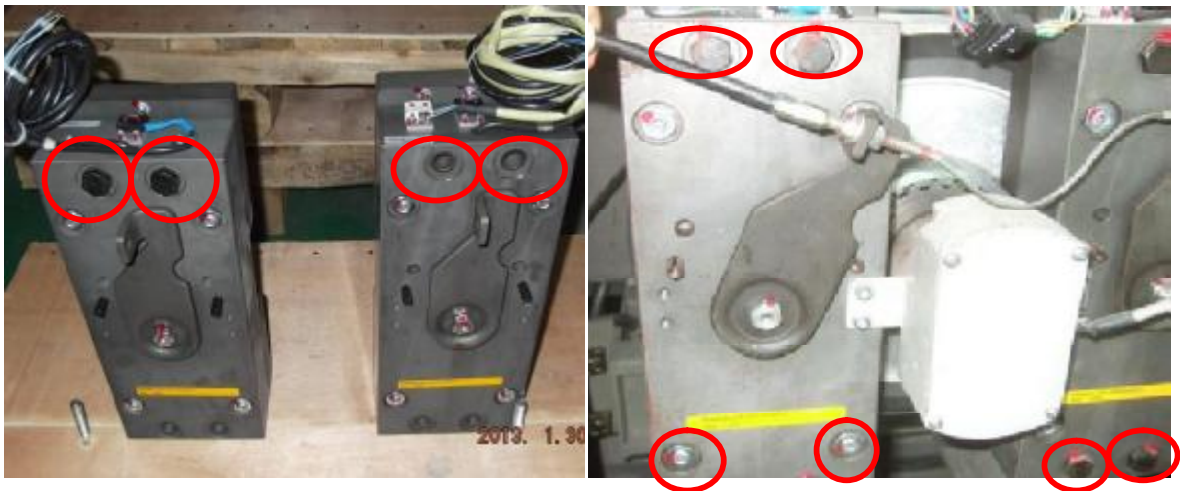
If the ropes haven't been remove from machine, please put the counterweight on the buffer, and lock the ropes to avoid car slip. **Note:** We suggest to de-rope before operations:

Unscrew the bolts of long-distance release device (as shown in below picture), first loosen right side, then the left side, and remove the release cable completely.



There are 8pcs symmetrical screws to lock the brake. By loosening 4pcs on one side can remove the same side brake, and by loosening the other 4pcs can take down the brake of the other side.

Note: the screws should be loosened diagonal uniformly, it is wrong to loosen a screw completely before loosening others.



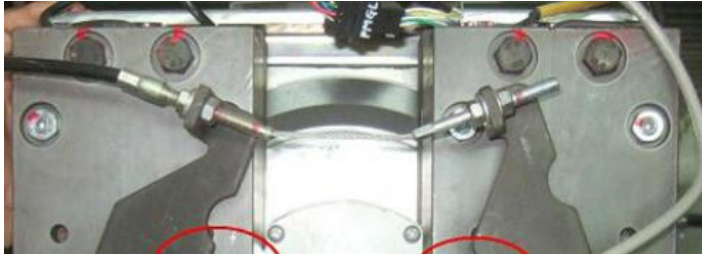
3.6 Instruction of brake installation of WR series machines.

Follow above steps in turn when install brake. Use $\leq 42\text{N.m}$ torque to lock 8pcs screws.

Note: screws should be locked diagonal uniformly. It is wrong to lock one screw completely before others. There is no need for gap adjustment.



Assemble brake release cable and adjust to the appropriate position.



3.7、Troubleshooting

3.7.1

No.	Fault description	Solution
1	Brake cannot be released	Check whether the brake is energized or voltage is correct or not
		Check whether the spring pressure of brake arm is too large
		Check whether the brake gap is too small, if yes, adjust the travel of magnetic plug
		Check whether the brake coil is broken (broken circuit)
2	Brake arms are not synchronized when picking and releasing	Check whether the brake spring pressure is even, and if so, increase the spring force in faster one when picking, try to make the pressure even on both sides, as far as make sure sufficient brake torque.
		Check the both brakes and make sure the travel of brakes is acceptable
3	Abnormal brake sound	Check whether the gap between brake shoe and brake wheel is appropriate.
		Check damping apron whether they are worn out or not
4	Brake torque is not enough after braking	Check whether the brake spring pressure is sufficient.
		Clean up the debris between the brake wheel and brake shoes to avoid reduction of friction
5	brake coil voltage overheating	Check if the coil voltage is too high
		Check whether the time of brake exciting voltage is too long, if yes, pls. add the step-down circuit in control system to reduce the runtime coil voltage
6	machine overheating	Check the inverter input current is normal or not
		Check whether the environment temperature is too high
7	the machine	check whether the encoder mounting position changed, do the initial data

	current is too large, higher than rated value obviously	self-learning after re-fix the encoder,
		Check whether the machine overload and find the cause
8	machine vibrate abnormal, loud noise	check whether the controller system work normal
		check whether the 3-phase balance or not
		check whether the terminal is loose
		check whether the encoder position changed
9	traction sheave abnormal	check whether the traction sheave match with the hoist rope, whether the wrap angel abnormal or not
		Check whether the hoist rope tension uneven
10	The traction machine with a slight vibration	recalculate the traction machine frame strength
		check the controller system parameter settings

3.7.2 Driver carry out failure protection once machine working

- Exchange machine U, V, W two phase power.(need do machine Auto-turning again)
- Check whether the connection lined is loose
- Check whether the control system parameter and switch device work normal
- Check whether the brake work in normal situation

3.7.3 Machine non-load working in high current

After machine auto-tuning with driver is success, you will find inverter output current used in 0.5A-1A in average through inverter monitor data (below 1600kg, the current is about 1 to 2 A for above 2000kg) If current data very high, pls. re-auto-tuning, and check the whole closed controller system, whether every parts are work in normal situation

Check the machine three-phase winding insulation is in standard. (Standard: cool 25MΩ)

3.7.4. The elevator stop ladders, brake hold the machine, there are still a sound of "boom" sound came out form the machine inside

Adjust the parameter, for example: use Monarch inverter, change the F6-11 to 304 to resolve it.

If use step inverter, change the F233 to 120 to resolve it.

If use step inverter, increase H67, the original data is 0.01,

3.7.5. The elevator have a abnormal noise when start, the brake open completely, there are also obvious shaking in the car, check if the abnormal noise have regular pattern or not, and if exist the abnormal noise in normal operation.

Use the Fuji inviter, adjust F23(start speed), change the start speed to 0, then return to normal.

3.7.6. Use Yasakawa inverter, there are electromagnetic "creak" abnormal sound when machine in

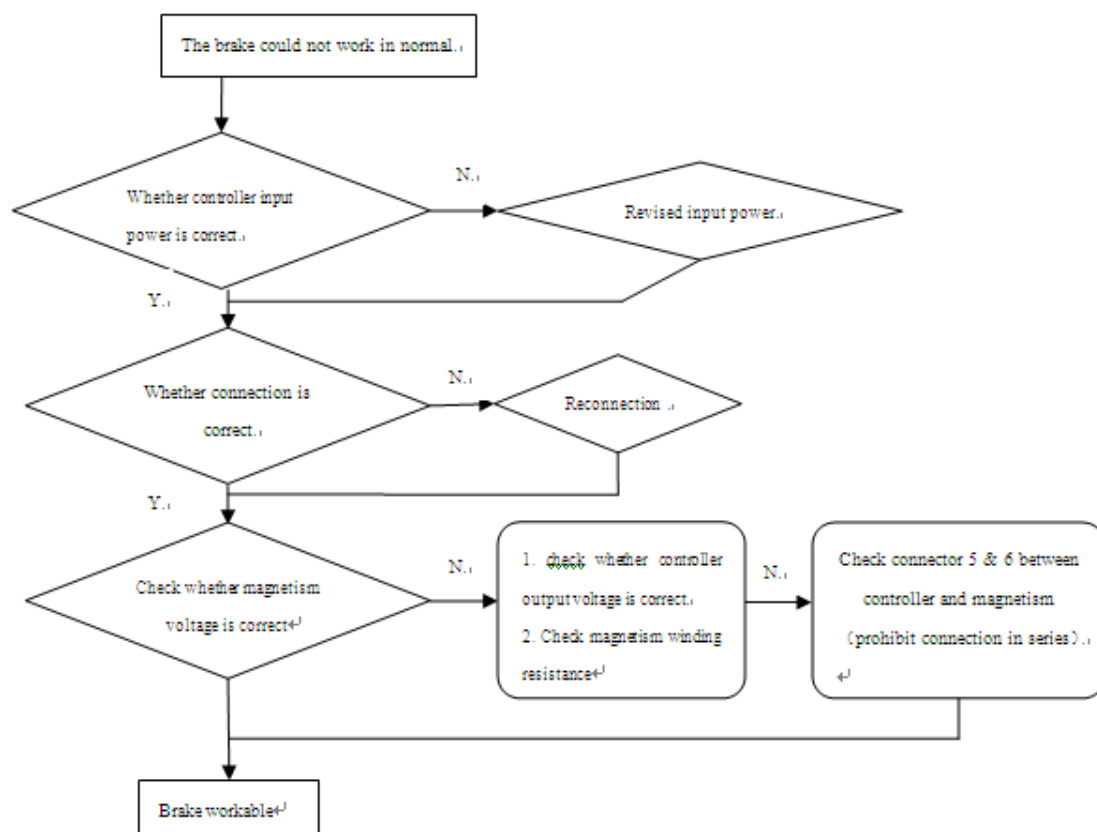
operation

Adjust carrier frequency, increase from 8K to 12K gradually; it can reduce the abnormal noise

3.7.7、At the elevator start moment, there are about 5cm upward some time, use Mico control system

Extend the time of the zero speed keeping when start, extend the brake release time a little at the same time, it can improve

3.7.8、The brake could not work in normal



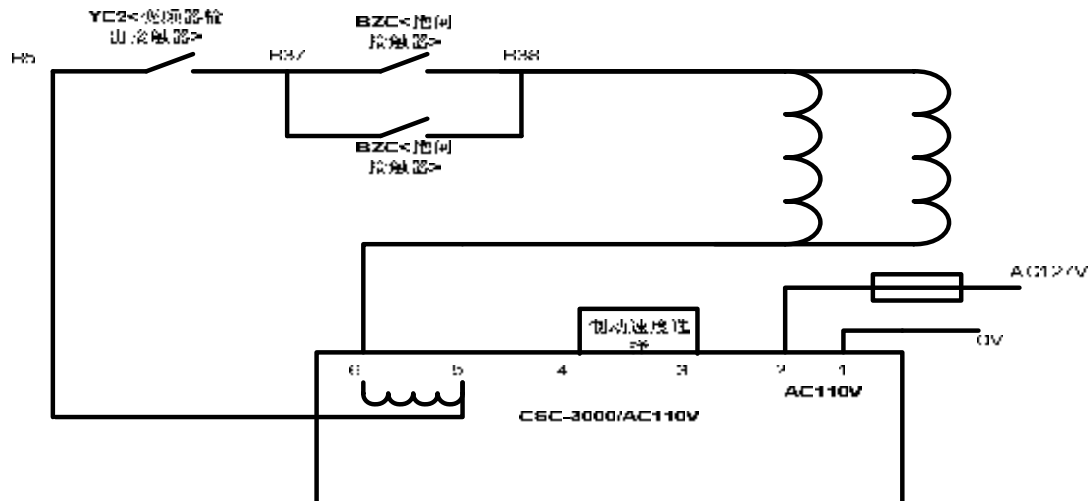
Part 4 Analyses in specific cases

Brake

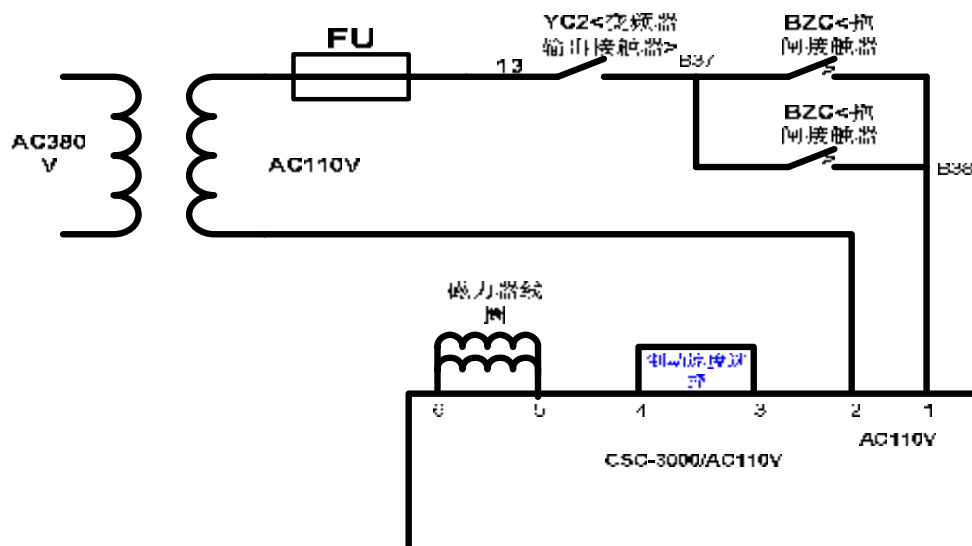
1) Customer feedback brake could not open.

Through electric controller system closed loop on the spot, we found that customer didn't follow our instruction to design closed loop, however, brake become workable after change circuit. It is not allowed to connect any switch between the excitation rectifier box and excitor, see below:

a、Wrong electric circuit



b、correct electric circuit



- 2、Couldn't test traveling result when in slow car debugging. (Customer still couldn't resolve the problem after changing encoder, cable and driver)

Resolve method: We changed a new inverter to drive the machine independently, it is OK (the current and voltage parameters is normal when in operation), but it still couldn't work when connect control system. After checking the output connector of control system, we found that one of the connector is oxidation, after changing a new connector, it was workable.

Main reason: the oxidation of connector cause poor contact.

- 3、Speed is out of control sometimes when the synchronization elevator move fast

Analyze: encoder feedback signal abnormal will cause split, the screw thread which is for installing the encoder was too shallow after checking on the spot, the encoder slipped after machine running fast, elevator will split when phase angle deviation is too large. Reinstall the encoder, add one washer in the clamping screw, the elevator work normal.

4. KEB-F4 Inverter, the elevator has when stop, this caused uncomfortable.

Analyze: it means the inverter output was turn off before brake. KEB inverter has a parameter LF70 (the time for brake), this value will not only affect the start comfortable, but also the stop comfortable, after the brake signal (X3.15) resetting, two times of LF70, the inverter output turn off. If facing such phenomena, pls. increase the LF70 value.

Part Five Appendix

KDS PM AC machine driver and encoder PG signal collation sheet

Sheet 1: ERN1387 (Id.nr.332199 or 332200) PG signal (SIEI driver) DB15 male plug

(DB15) (PG) Driver connector	Signal	Cable color	0.3mm ² short wire	
			15 core connector	14 core PCB connector
5	A	Orange	5	6b
6	A-	Yellow	6	2a
8	B	Yellow	8	3b
1	B-	Blue	1	5a
3	R	Pink	3	4b
4	R-	Pink blue	4	4a
11	C	Purple	11	7b
10	C-	Grey	10	1a
12	D	Grey	12	2b
13	D-	Brown	13	6a
9	5V	Red	9	1b
7	0V	Black	7	5b

ERN1387 (Id.nr.332199 OR 332200) PG signal (STEP driver)DB15

(DB15) (PG) Driver connector	Signal	Cable color	0.3mm ² short wire	
			15 core connector	14 core PCB connector
5	A	Orange	5	6b
6	A-	Yellow	6	2a
8	B	Green	8	3b
1	B-	Blue	1	5a

3	R	Pink	3	4b
4	R-	Pink blue	4	4a
10	C	Purple	10	7b
11	C-	Grey	11	1a
12	D	White	12	2b
13	D-	Brown	13	6a
9	5V	Red	9	1b
7	0V	Black	7	5b



Sheet 2: ERN1387 match Kobe driver

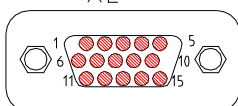
(PG) Driver connector	Signal	Cable color	0.3mm ² short wire	
			15 core connector	14 core PCB connector
8	A	Orange	8	6b
3	A-	Yellow	3	2a
9	B	Green	9	3b
4	B-	Blue	4	5a
15	R	Pink	15	4b
14	R-	Pink blue	14	4a
6	C	Purple	6	7b
1	C-	Gray	1	1a
7	D	White	7	2b
2	D-	Brown	2	6a
12	5V	Red	12	1b
13	0V	Black	13	5b

Sheet 3: ERN1387 match to Emerson EV3100: (Part number will be the same with sheet 2)

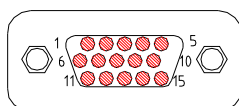
(PG) Driver connector(PG)	Signal	cable color	0.3mm ² short wire	
			15 core connector	14 core PCB connector

8	A	Orange	8	6b
3	A-	Yellow	3	2a
9	B	Green	9	3b
4	B-	Blue	4	5a
15	Empty			
14	Empty			
6	C	Purple	6	7b
1	C-	Gray	1	1a
7	D	White	7	2b
2	D-	Brown	2	6a
12	5V	Red	12	1b
13	0V	Black	13	5b

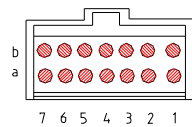
DB15三排公头接口排列
XE



15芯连接器端口排列

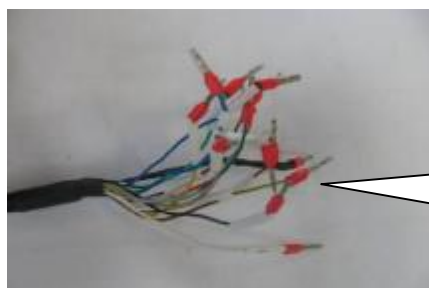


14芯PCB接头端口排列



Sheet 4: ERN1321 match to Yasakawa1000A

Driver connector core signal	Cable color	0.3mm ² short wire	
		15 core connector	12 core PCB connection (refer to 14 core)
0V	Blank	1	1a
5V	Red	2	2a
Ua1(A)	Orange	3	6b
*Ua1(A-)	Yellow	4	6a
Ua2(B)	Green	5	5b
*Ua2(B-)	Blue	6	5a
Ua0(Z)	Purple	7	4b
*Ua0(Z-)	Gray	8	4a



cable with terminal

Sheet 5: ECN 1313 match to FUJI LIFT, Yasakawa L1000A

drive connector core signal	cable color	0.3mm ² short wire	
		15 core connector	12 core PCB connector(refer to 14 core)
0V	Blank	1	4b
5V	Red	2	1b
A	Orange	3	2a
A-	Yellow	4	5b
B	Green	5	4a
B-	Blue	6	3b
CLOCK	Purple	7	2b
CLOCK -	Gary	8	5a
DATE	White	9	6b
DATE-	Brown	10	1a

Sheet 6: ECN 1313 match to CT driver:

(DB15) Driver connector	Signal	cable color	0.3mm ² short wire	
			15 core connector	12 core PCB connector(refer to core)
14	0V	Blank	1	4b
13	5V	Red	2	1b
1	A	Orange	3	2a
2	A-	Yellow	4	5b
3	B	Green	5	4a
4	B-	Blue	6	3b
11	CLOCK	Purple	7	2b
12	CLOCK -	Gray	8	5a
5	DATE	White	9	6b

Sheet 7: ERN1387 match to STEP driver:

(DB15)	signal	Cable color	0.3mm ² short wire
--------	--------	-------------	-------------------------------

(PG) Diverter connector			15 core connector	14 core PCB connector
5	A	Orange	5	6b
6	A-	Yellow	6	2a
8	B	Green	8	3b
1	B-	Blue	1	5a
3	R	Pink	3	4b
4	R-	Pink blue	4	4a
11	C	Purple	11	7b
10	C-	Gray	10	1a
12	D	White	12	2b
13	D-	Brown	13	6a
9	5V	Red	9	1b
7	0V	Black	7	5b

KDS PM Gearless machine driver and encoder collation sheet

Drive	Encoder
SIEI、MODORL Monarch fusion KV inverter STEP Z XK fusion	Heidenhain 1387
Emerson EV3100	Tamagawa TS5246N469
	Heidenhain 1387
FUJI VG7	Tamagawa TS5246N469
	Heidenhain 1313
FUJI LIFT	Heidenhain 1313
	Heidenhain 1387
	Tamagawa TS5246N469
Yasakawa	Heidenhain 1387
	Heidenhain 1313
	Tamagawa TS5246N469
C T	Heidenhain 1313
KEB	Heidenhain 1387
	Heidenhain 1313
	Tamagawa TS5246N469
Lust	Heidenhain 1313

Sheet 8、Elevator comfort sense cause analyzing and debugging

A、Elevator comfort sense standard

- a、Whether elevator is stable while started, without step shake and vibration, etc
- b、Whether elevator is stable while traveling (shaking, horizontal and vertical vibration are under standard)
- c、Whether elevator stop is stabled (braking sense、vibration)

- d、If acceleration and reduction is urgently, you could improve it by adjusting curve data.
 - e、Whether you will hear resonance noise when elevator traveling, this problem is relating to car airproof density、 machine assembly and hoist way.
- B、The factors influence elevator comfort sense
- a、Machinery reasons: guide rail vertical situation、 surface smooth situation、 connector, guide shoe slack situation, rope tension situation, etc.
 - b、Traveling curve related reasons: acceleration and reduction speed, curve angel time, started and stop closed delay, etc.
 - c、Driver related data: vector control related data (PI), machine data, inertia data, filter time, etc.



Attention: The key reason to decide elevator comfort sense is machinery system match condition. Electric data adjustment is only to coordinate with machinery system to better improvement of elevator comfort sense.

If there is some problem in machinery system and influence comfort sense, adjust main board and driver data could only have a better improvement, but could not resolve the problem absolutely

C、How to check and resolve elevator machinery problems

a、Guide rail

1. Guide rail Vertical orientation and two guide rails parallel need to meet standard request (car track 0.5/5000,+2mm; counter weight track 0.8/5000,+4mm), if tolerance is too big, elevator will shake or vibrate in travelling, car will sway-right or left in some position.

2. The connector of guide rail need to meet standard requirement (parts car track cap $\leq 0.5\text{mm}$, step $\leq 0.03\text{mm}$; counter weight connector with non-safety gear, the gap $\leq 0.5\text{mm}$, step $\leq 0.1\text{mm}$), if deal with improper, some location in cage will fell step vibration.

b、Guide shoe tension and release degree

If guide shoe is too tight, you will feel step vibration when start and system dynamic when stop, will feel shaking if guide shoe is too release.

It should have few gaps between sliding guide shoe and guide rail, if it is too tight, you will feel vibration and step shaking when start and stop.

When do the test, you could stand at the top of car, shake the car by feet, make the car a few shift to left and right direction, that's ok.



Attention! It is necessary to check counter guide shoe and guide rail, because most of elevator installation workers won't pay attention to this aspect.

c、Hoist rope

If the ropes tension and release degree is not in the same level, it will make several ropes in tighten, and several ropes in loose when traveling, this will influence comfort sense of elevator start and stop and high speed traveling.

Examination method: put the car at the centre or little above of the building, people stand on car roof, used the same power to pull every rope, if pull distances are similar, that means ropes tension and release are in equably, or else need to adjustment.

Enlace in circle before install the ropes, it has torsion power by response, pls. be noted it will easy to shake when elevator traveling if install the ropes directly, therefore, you'd better release this torsion power fully.

d、Car

The influence of car tighten and airproof degree.

The car will bear a big force while high speed traveling, if a part of elevator like car shelf or car walls didn't tension installation enough, this part will be moved and cause elevator vibration.

It will be easy to cause resonance noise while elevator travel with high speed if the car in poor tension and airproof or unreasonable hoistway design.

e、Check the absorber rubber

1. Check machine sound insulation rubber pad installation correct or not, warp or not, and screw down or not, etc.
2. Check car roof, car platform, vibration absorber spring or rubber installation correct or not.
3. For the hoist rope thread from the bottom of the car, Pls. pay attention to the screw which connect car platform and girder, if it is in wrong installation will cause car shake.
4. If the car is too empty, it will easy to cause machinery vibration, especially in high speed elevator,

you could add some load to change frequency and resolve the problem.

f..PM gearless machine

Due to poor machinery or installation will cause traction sheave and brake drum jerk too much, and you will feel elevator shake obviously when traveling

Examination method: sling the car, unload the ropes, power up the brake independently, used emery cloth to clean traction sheave groove surface, try to move traction sheave by hand equably, then measure the jerk whether accord with standard (traction sheave standard: 0.20mm below, brake drum standard: 1.10mm below)

If in large tolerance, need to change traction sheave or brake drum

g. The influence of poor car balance

If motion balance and silent balance are not in the right way will cause guide shoe collided track surface while traveling, you will feel shaking or vibration. If balance coefficient in big different will also cause poor comfort sense or failure.