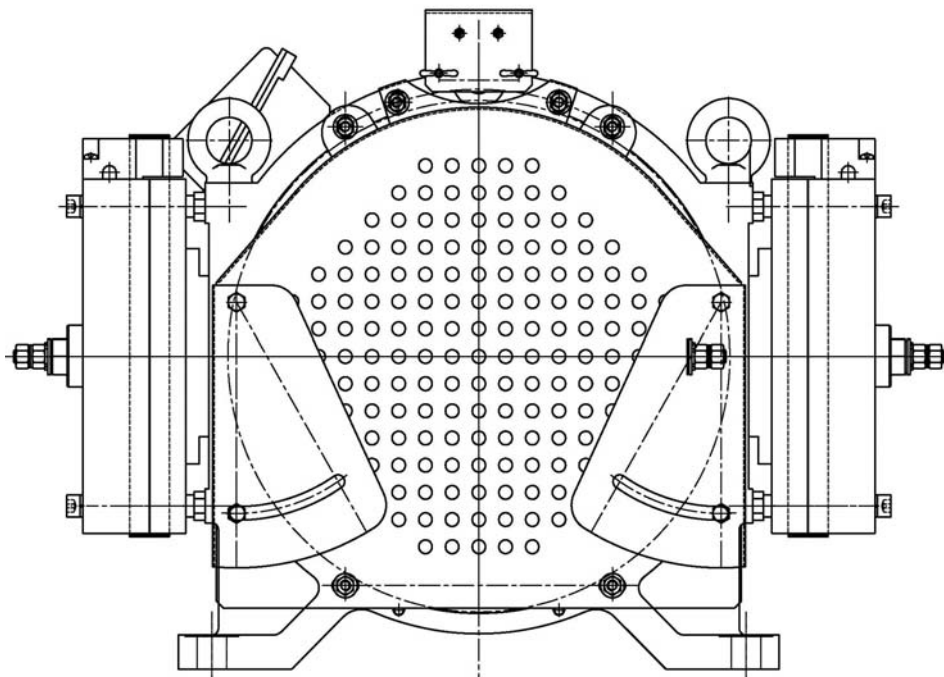


## Operation and Maintenance Manual for WYJ 103-08 Gearless Permanent Magnet Synchronous Traction Machine



Manufacturer: NBSL Elevator Components Co., Ltd.



KONE Elevator India Pvt. Ltd

# Operation and Maintenance Manual for WYJ 103-08 Gearless Permanent Magnet Synchronous Traction Machine

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## 1. General Safety Instructions



### 1.1. General information

This Manual describes the correct method of operating Gearless Permanent Magnet Synchronous Traction Machine using block brake. Before carrying out operations (including transportation, installation, maintenance and inspection), be sure to read this Manual carefully and understand well the safety instructions for operating this traction machine.


The design and production of NBSL product comply with the relevant provisions in GB7588-2003-Safety Rules for the Construction and Installation of Electric Lifts and GB/T24478-2009 Traction Machine of Electric Lifts and respect the requirements of Special Equipment Safety Law People's Republic of China.

### 1.2. Warning symbols used in this manual and their explanations

Table 1. Warning symbols used in this manual and their explanations

Meaning	Legend	Description
Notes:		This symbol is an important instruction to operators. It may help you use the traction machine better.
Warning		This symbol represents a requirement that an operator must follow closely. Any

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g		violation of this requirement is likely to result in the potential risks of personal injury or property loss. This symbol also tells you how to avoid such problems.
Danger		This symbol represents a requirement that an operator must follow closely. Any failure to comply is likely to result in the risks of personal injury or property loss. The operator must strictly follow this requirement to prevent personal injury or death from occurring.
Qualified staffs		Qualified staffs must receive the training related to what is stated in this requirement. Qualified staffs must be equipped with appropriate tools and effective aids, and should understand the potential harms to the staffs themselves and others.
Installation staffs		While installing elevators, assembling elevator components or replacing elevator brake system, installation staffs must be qualified persons and shall bear the responsibility of correctly installing components.

### 1.3. Warranty and Responsibility

The components and services provided by our Company are applicable to the "Terms of Sales and Delivery". The Warranty period is within 18 months upon the date of delivery or 12 months upon the operation of such product (however, the warranty is subject to a contract or agreement, if any). For the personal injury or property loss arising out of one or more of the following reasons, our Company will not assume any warranty or responsibility. These reasons are as follows:

1. using the product for the unintended purpose;
2. faults due to the installation, debugging, operation or maintenance that is not carried out in accordance with requirements;
3. operating the traction wheels with the safety protection devices that are faulty and/or cannot be used;
4. using the product not in accordance with the terms and conditions as specified in the product specification and this Manual;
5. using the product by the specification that is modified or changed without prior authorization;
6. Consumables;
7. Improper maintenance
8. emergencies arising out of external forces or forces majeure

### 1.4. Safety considerations

All work concerning planning, installation and maintenance shall be implemented by qualified staffs only. The staffs for maintenance and operation must be well trained and acquainted with the methods of installing, assembling, debugging and operating this Product . The traction machine mentioned in this Manual is used in a closed and lockable machine room. Only qualified staffs and persons authorized by customers are allowed to access such room.



- Be sure to follow the instructions provided for in this Manual in order to avoid danger and damage;
- The traction machine mentioned in this Manual Models is not ready to use. It cannot be operated unless it has been installed into the elevator system. Besides, appropriate measures are required to ensure its operational safety;



- It can only be repaired or maintained by the Manufacturer or authorized maintenance service providers. Unauthorized starting-up and intervention will lead to persona injury and property loss;
- External components of the traction machine is likely to suffer a higher surface temperature; therefore, it must be ensured that temperature-sensitive components shall not contact or connect to these components. Measures must be taken to avoid accidental contact, if any.
- The traction machine mentioned in this Manual shall not be directly connected to three-phase power system. Instead, an inverter shall be used as a medium; otherwise the traction will be damaged.

## 2. Product Description

Gearless Permanent Magnet Synchronous Traction Machine includes internal rotor structure and external rotor structure. The structures are compact and can be used in a room without or with machine. The traction machine is characterized by eco-friendliness, low noise, constant torque, high efficiency, small size, smooth operation, energy conservation, safety and reliability. The traction machine mentioned in this Manual can accommodate several rated speeds. The operator may adjust such speeds to suit specific needs of customers.

The traction machine works this way: (1) use the VF device capable of rapid current tracking and high-precision speed sensor (encoder) capable of examination, feedback and control to synchronically rotate the traction machine; (2) stably drive the traction machine with an electric motor offering the same linearity and constant torque as provided by DC motor and adjustable speed; (3) make use of the friction between the traction wheel and steel wire to realize the vertical movement of the lift car. This traction machine combines the advantages of both AC motor and DC motor and exploits the functions of simple DC VF devices to actualize the functions peculiar to DC motors.

### 2.1. Operational Conditions and Environment



- Unless otherwise specified, the traction machine shall conform to the following conditions of field operations and the deviations in field conditions are corrected in accordance with relevant provisions in GB 755-2008;
- Altitude shall not exceed 1,000m and the traction machine's altitude shall lie between 1,000m and 4,000m. The temperature is compensated to reach the maximum ambient temperature as shown in Table 2 on P3. The maximum of temperature raise will not be revised. When the altitude exceeds 4,000m, it will be subject to the agreement;

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- The ambient air temperature within the machine room should be kept at 5 °C-40 °C;
- The deviation of supply voltage fluctuation from rated value shall not go beyond ± 7%;
- The ambient air shall not contain any corrosive or inflammable gases;
- The relative ambient humidity in the most wettest month shall not exceed 90%, and the lowest temperature in that month shall be no more than 25 °C;
- No lubricant or any other impurities that affect traction function shall exist on the surfaces of steel ropes for traction and rope grooves of traction wheels;
- The surrounding environment at the installation location shall not affect the normality of ventilation of the traction machine;
- The angles of lift car and counterweight device and steel rope on a traction wheel shall meet the relevant provisions in GB7588.

Table 1 Assumed maximum ambient temperature

Altitude/m	Thermal fractionation <sub>155</sub> (F)
1000	40 °C
2000	30 °C
3000	19 °C
4000	9 °C

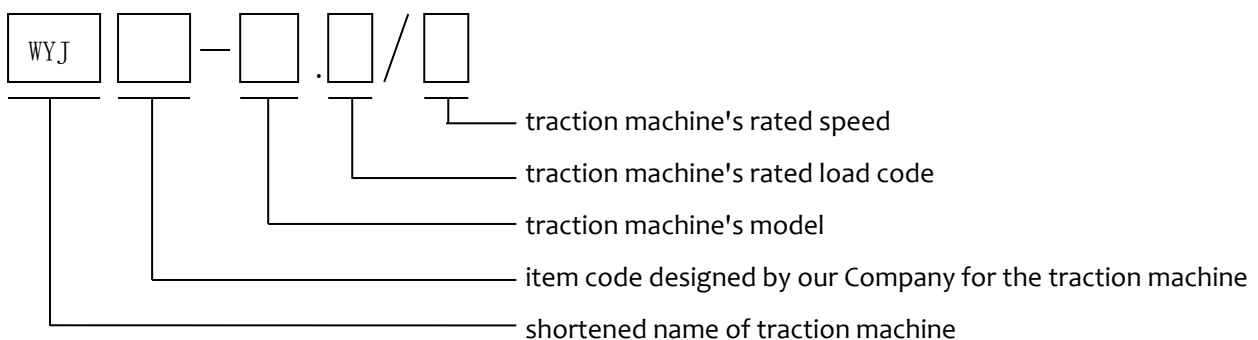
## 2.2. Model Illustration

The model illustration covers Product Code, Item, and model, rated load and lift speed of traction machine.

### 2.2.1. Traction Machine Model Coding Rule

The code of traction machine is comprised of five parts: product code WYJ (the shortened name of gearless permanent magnet synchronous traction machine), item, model name, rated load and lift speed.

General formula is provided below:



### Encoding rule explanation

The number of digits of the model is constant. Here are the meanings for all digits.

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--"WYJ" means Gearless Permanent Magnet Synchronous Traction Machine;

--"Design serial number" corresponds to the current model, expressed with two digits. For example, 02, 04, 05, 08, 09, and 10 represent different models. The numbers will be added for new models;

--"Code for rated load" means the load of a traction machine. Specifically, 3 represents the load of 1,000 kg;

--"Rated speed" means the linear speed of a traction wheel's pitch diameter;

**Symbol example:**WYJ103-08.7/0.63

where, WYJ103-08 means the product model. -08 represents Gearless Permanent Magnet Synchronous Traction Machine, whose rated load is 554kg and lift speed is 0.63m/s.

Table 2 block brake type tractor machine's rated load code

Code	1	2	3	4	5	6	7
Load (kg)	630	800	1000	1350	1600	408	554

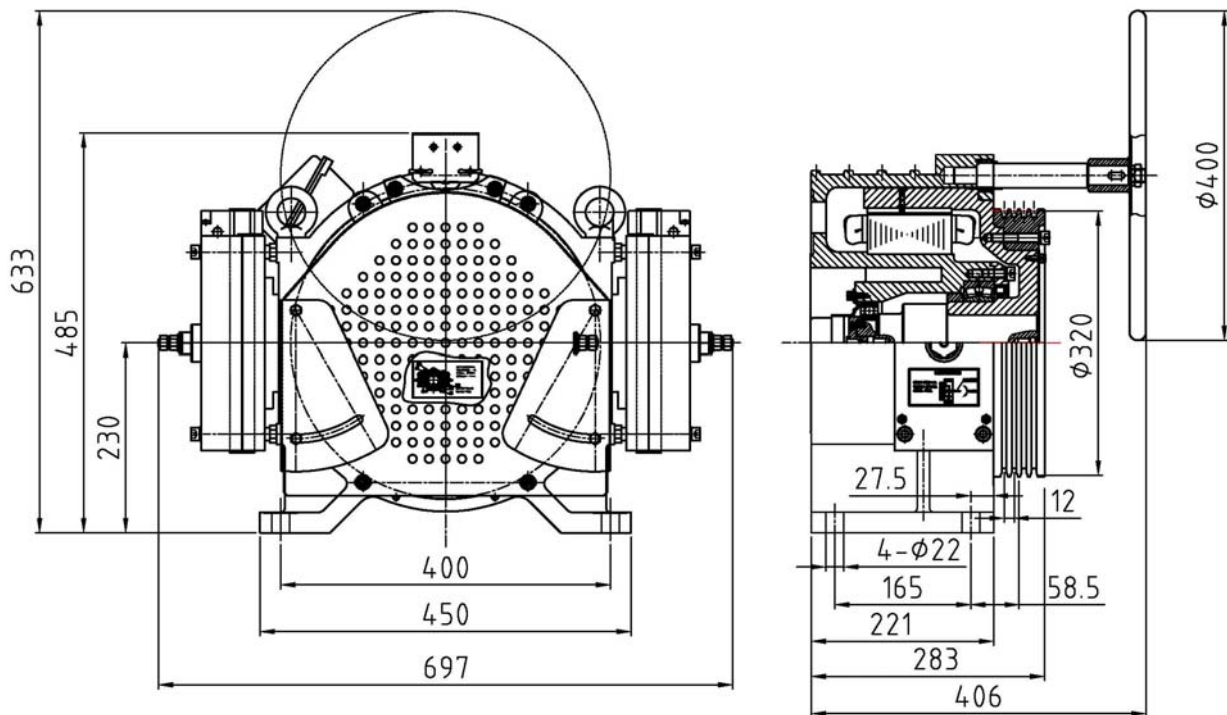
**Rated speeds (m/s)** available: 0.4, 0.63, 1.0, 1.5, 1.6, 1.75, 2.0 and 2.5.

## 2.3. External Dimensions and Parameters

Table 4. Size Parameter

Load (kg)	Traction percentage	Rated speed (m/s)	Rated rotation speed (r/min)	Rated torque (N.m)	Stage number (Pole)	Rated current (A)	Rated power (kW)	Rated frequency (Hz)	Traction wheel's pitch diameter (mm)
554	2:1	0.63	75.2	290	20	6.5	2.3	12.53	φ320
408	2:1	0.63	75.2	210	20	4.7	1.7	12.53	φ320

Fig.1 Installation Dimensions



### 3. Transportation, Packaging and Storage



- The traction machine has been tested before delivery and are found in a good condition;
- The traction machine shall not be kept in storage for a period of more than 6 months. If such period is exceeded, the operator must unpack the case and examine whether the machine is intact or not;
- The traction machine should be stored in a dry and well ventilated room. When stored outdoors, the machine must be protected by rain prevention measures. Support must be used at the bottom to keep the machine from being soaked in the water;
- Upon the arrival of goods at the site, a visual inspection must be carried out to examine whether the external part of the machine is damaged. In the event of any damage to the machine during transportation, a notification on the claim for such damage must be issued in the presence of a carrier. Prohibit the machine from being put in use, if necessary;
- In the unpacking process, check the components against the packing list carefully. In the event of any inconsistency or insufficiency, or damage of the components, promptly contact suppliers or notify our Company of the identified problems directly.



- Since the traction machine's rotor consists of permanent magnet substance, ferrous substances like iron filings shall not be placed by the traction machine in order to keep such ferrous substances from being absorbed into the machine;
- Keep the installation site clean and prevent any silt or sediment from entering brakes;



- The difference in the tensile forces of different steel ropes shall be kept within 5%; otherwise the traction wheel will suffer abnormal friction, which may decrease the operator-friendliness of the machine;
- The traction machine must be installed in compliance with the requirements on the layout of a machine room. The components of a traction machine shall not be dismantled without prior authorization during the installation process. Such dismantling, if necessary, should be operated by qualified staffs. In the meantime, the installation site should be kept clean.

### 3.1. Transportation and Hoisting



- Please observe the relevant safety requirements, and consider the center of gravity while handling the traction machine;
- While lifting goods with the hoisting ring, make sure that the bolts on the hoisting ring be completely fastened to allow no air gaps between bolts and machine's base;
- Use two hoisting rings to lift the traction machine and ensure that  $\alpha$ , the loading angle between the nooses of lifting hooks be no more than  $45^\circ$ ;
- The holes of hoisting rings can only be used to lift the traction machine, without being allowed to hang extra loads;
- Insert the hoisting hooks on a soft rope into the hoisting ring before hoisting goods. The hoisting shall be kept stable and collision shall be avoided.

### 3.2. Packaging

Use metal bolts to fasten the traction machine onto the crate's pedestal as indicated on Fig.2 and Fig.3; then apply anti-rust paint to traction wheels and rotor's interior side as indicated on Fig.4.



Fig.2 Exterior side of package



Fig.3 Interior side of package



Fig.4 Method of applying anti-rust paint

### 3.3. Storage

Upon the delivery of traction machine and when the machine will be kept in custody for a long time or be shelved for installation, please act on the following points for storage and maintenance.

#### 3.3.1. Storage when traction machine is kept in package



- The goods will be treated to fight against rust and packaged in the way as indicated on Fig.2 and Fig.4 so that the goods can be kept intact when they are unpacked 6 months upon the delivery (even though the external surfaces are not damaged, the internal anti-moisture fabric may experience the reduced anti-moisture capacity as a result of the damage that arises from weight shift);
- Do not store the traction machine in any place where rainwater, water droplets, harmful gases and liquid exist;
- Don't store the machine on the ground directly;
- Please keep the traction machine away from direct exposure to sunlight or keep it within the required temperature range ( $20^{\circ}\text{C} \sim + 50^{\circ}\text{C}$ , and relative humidity (RH) is below 90% to avoid condensation);
- When the machine is held in custody for more than 1 year, please get the traction machine in idle operation before formal operation to confirm the absence of abnormal vibrations or sounds;
- When the machine is held in custody for more than 1 year, test the insulating resistance of stator winding before operation. In cold state, the insulating resistance shall not be less than  $5\text{M}\Omega$ ; otherwise the machine should be dried;
- The traction machine should be well grounded, and anchor bolts may be used to ensure the grounding of the machine, if necessary.

#### 3.3.2. Confirmation at the moment of unpacking

1. Examine whether the package is complete, intact or free from any signs of moisture when the traction machine is unpacked for an inspection;

2. Confirm the absence of any abnormality of the machine's appearance, and apply paint to the places where the painted surfaces nicking or peeling;
3. Measure the insulating resistance of stator winding and confirm that the resistance is more than  $5M\Omega$ ;
4. When the machine is in idle operation, confirm that the bearing doesn't suffer any abnormal vibrations or sounds;

### 3.3.3. Maintenance and check during the period from installation to operation

1. Use plastic covering to maintain well the whole traction machine before installation;
2. Keep in custody the installed machine within the required temperature range (See P3-2.1);
3. Make sure that the traction machine is kept level upon the installation and ensure the sufficient mechanical strength and the use of vibration damping measures;
4. When the machine is held in custody for a long period (more than 1 month), use plastic covering to protect the machine and use drying agent to prevent the machine from moisture;
5. Measure the insulating resistance of traction machine and confirm that the resistance is more than  $5M\Omega$ ;
6. If the insulating resistance is sharply reduced to approach the above-said benchmark, dry the machine through energization with low-voltage current, or improve insulating resistance through hot air drying;
7. Please check brake wheels and traction machine to confirm that no grease is attached to the wheels and the machines;
8. Make sure the appropriate air gap of brake system and make adjustments if such gap is inappropriate (See Appendix B on **PFel! Bokmärket är inte definierat.** for adjustment methods).

## 4. Installation of Main Frame

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### 4.1. Requirements on Basic Installation



- The protection class for the traction machine's shell in this Manual is IP41;
- Before installation, ensure that the machine frame or basic load satisfies safety requirements;
- The traction machine can be installed only when relevant safety considerations have been respected;
- The traction machine can be applied to the elevator system with or without machine room. The machine can only be vertically installed.
- The traction machine should be fixed to the frame. A rubber pad is used as a shock damping device between the machine's frame and stand;
- The fixation of traction machine requires the use of 4 bolts. Tightening torque meets the required value;

- The traction machine must be installed and operated by qualified staffs;
- Installation process must meet the requirements provided for in this Manual on installation and debugging. The flatness is required to be no more than 0.2mm;
- No welding operation shall be done on the traction machine; otherwise the bearing and magnet steel will be damaged;
- Cover the traction machine, especially brakes, before processing work or the work that generates dust occurs in the shaft or machine room;
- When the encoder (which is located at the rear side of the traction machine) and brakes (which are located at the both sides of the machine) need repairing or maintenance, please reserve sufficient space (recommended size: 600-800mm) between the wall, both sides and rear side of the traction machine, or ensure that the traction machine can be moved away from the wall.

### 4.2. Electrical Wiring and Inspection



- Electrical connections can be implemented by qualified staffs only.
- Before operating traction machine, ensure that the insulation of the traction machine is satisfactory;
- Before the wiring of traction machine, use a megohmmeter to measure the insulating resistance between traction machine's stator winding, thermal resistor and the machine shell. Ensure that the aforesaid resistance is  $5M\Omega$ ;
- The cables of the traction machine must be protected by insulating measures;
- U, V and W, three phases of the traction machine, must be properly connected with the VF device. The phases shall not be wrongly connected;
- The thermal resistors in control system or VF device must be monitored.



Before making any connections, please check the machine to ensure that:

- the connecting lines are suitable for specific applications and voltage and current;
- sufficiently large connecting lines are provided and necessary protection is provided;
- the ground wire is connected to ground terminal;
- No foreign bodies, dirt or moisture is found in a junction box;
- The cable lead-in and junction box that are left unused shall be sealed so tightly as to prevent dust or water from entering them;
- The insulation system of the traction machine can be connected to the inverter with the maximum busbar voltage of DC 620V;
- Busbar voltage is only an instantaneous value and is approximately equivalent to the initial voltage of brake's signal carrier or energy recovery device. The maximum voltage raise speed allowable at

the terminal of traction machine can reach 4kV/ms;

- The overvoltage at the terminal of the traction machine shall not exceed 1.3kV;
- The current wave filter or impedor of the traction machine are recommended to be used to satisfy the above-mentioned requirements.



- The main components of main frame of the traction machine include: motor, thermal resistor, micro switch, encoder, block brake, and safety device. The motor and thermal resistor are wired within the junction box;
- When the brake's power is connected, pay attention to the anode and cathode of the diode.

#### 4.2.1. Wiring of traction machine

The monitors of the traction machine and windings are wired within the traction machine's junction box. For details about connections of main frame, see Appendix A on P16. For details about connections of brakes, see Fig.6 on Page 10;

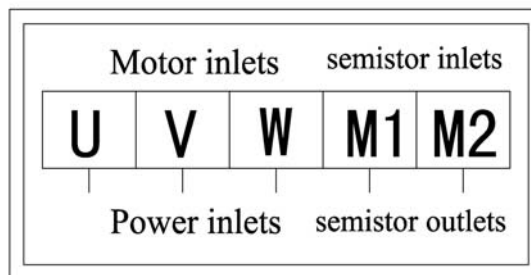


Fig.5 Wiring diagram of main frame

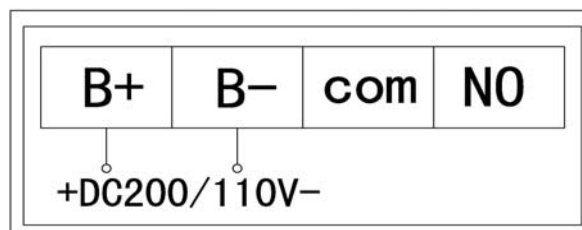


Fig.6 Wiring diagram for 200/110V brake

- For more details about the capacitances of different switches, see Table 6 on P11.
- The wiring for the above-said brake can serve to control a single brake. If the anode and cathode of the power line are wrongly connected, it may damage discharge diode or power and the brake will not work normally;
- Encoder's connecting lines are connected by special plug-in. The connecting lines of the brake are

placed within the junction box;

- Thermal protector must be monitored by the elevator's control system so as to prevent the traction machine from high temperature;
- The traction machine's pedestal provides itself with grounding bolts. These bolts are connected with protective leads and grounding leads according to VDE0100 and VDE0141 or corresponding national standards. Onto The brake system used respectively in accordance with VDE0100 and VDE0141 or the standard connection, protection and grounding wire brakes are installed on a delay element, namely, diodes resistors in series. IN5408 + 150 Ω resistor is comprised of IN 5408 diode resistor and 5W105Ω cement resistor in series, as shown in Fig.7. It is designed to reduce the inverse voltage that occurs when the brake's inductive coil suddenly blacks out;
- For details about the electric resistances of various brakes, see Table on P11. The use of exciter, AC input terminal and DC input terminal requires the switching on/off;
- If the models not listed in Table on P11 are actually used, and the time-delay elements are added into the client's control cabinet, please contact the sales department of our Company without any delay;
- If the resistance in the delay circuit is shielded, such serious consequences may occur, including the brake's release delay and car sliding.


Table5. Delay elements of various brakes

Brake model	Rated voltage	Time-delay element	Matching main frame
ZLZ-08	DC200V/110V	IN5408+150Ω	WYJ103-08, etc

Table 6. Electric capacities of various electrical devices or elements

Switch type	Thermal resistor	Rolling gear switch	Micro switch
Electric capacity	2.5V/2mA	230V/2A	250V/15A

#### 4.2.2. Brake test

 In the case of a block brake type traction machine,

- the brake's voltage is DC200/110V. Before operation, measure the supply voltage of the brake within the control cabinet, and the voltage within the junction box shall be no less than 80% of the brake's rated voltage to ensure the brake's operational normality;

- There is a stringent requirement on the polarity of the brake's terminals within the junction box.

### 4.2.3. Wiring of encoder



- Before the operation of permanent magnet synchronous traction machine, a zero position needs to be identified by the inverter and stored as a parameter. If the zero position is incorrectly adjusted, the inverter can hardly control the traction machine and even make the elevator out of control. Therefore, in the case of an elevator using synchronous traction machine, the encoder's phase shall be adjusted after the self-learning of the traction machine;

- When the encoder is replaced, self-learning must be repeated in accordance with the requirements specified on P14-**Fel! Hittar inte referenskälla;**

- HEIDENHAIN's encoders like ERN1321, ERN1387 and ECN1313 can be installed onto the traction machine. Attention shall be paid to the matching between such encoders and the inverter.



- The machine must be shut down and power be turned off when an encoder is installed, examined or replaced. Moreover, qualified staffs are required to carry out operations. Measures such as wearing effectively grounded wrist strap (3M recommended), as indicated in Fig.7 on P12;

- Since the traction machine is not driven by reduction gearbox, or encoder's line may break or connection is incorrect, the traction machine may run away or fault prompts like spdfbk loss may appear on the inverter. At such moment, check the correctness of the connection of the encoder's line or check the breaking of the line. While installing and dismantling the encoder, don't use any tools like screwdriver and hammer to strike or pry up the encoder.

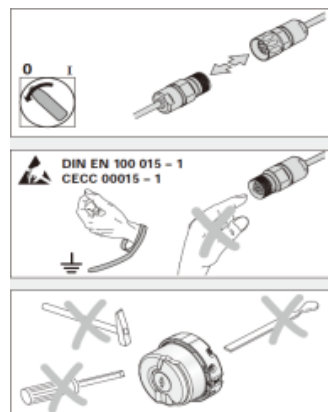


Fig.7 Precautions for encoder's installation and dismantling

#### 4.2.3.1. Encoder's installation and dismantling:

1. Encoder's installation (Encoder's regular position-rear position)

HEIDENHAIN's encoders are installed by shaft hole. Before installation, clean the encoder's cone axis and traction machine's shaft hole/shaft. The front end of the encoder's shaft is of some conicity. The encoder's cone axis is mounted into the tapered hole of rotation shaft. The accessory penetration bolt is

used to connect the encoder and rotation shaft. Then use Allen wrench to fix the encoder onto the rotation shaft with the torque of  $M_d=5+0.5\text{Nm}$ ;

- A. Check the condition of the encoder's tightening mechanism to ensure that the tightening mechanism is released; use a straight screwdriver to unscrew the encoder's rear cover.
- B. Turn the encoder (if rotation is not smooth, check whether the bolt is installed inaccurately), and then use Allen wrench to screw up the tightening bolt of the encoder with the torque of  $M_d=1.25\text{ Nm}$ . It is required that the tightening torque  $M_d= 1.25\text{Nm}-0.2\text{Nm}$  so that the external part of the encoder cannot be turned manually, as shown in Fig.9.
- C. Follow the method as shown in Fig.8 to install the short wire of the encoder and mount the encoder onto the rear cover of the encoder. Insert the encoder's line and use M4 bolt and line to fasten it. Then use a screwdriver to screw up the bolt on the cover plate (Note: the iron ring of the shielding line must be inserted into the cover plate's groove). Don't contact the plug pin with hands. Insert the cable plug carefully into the encoder's PCB socket to avoid the problems like inaccurate insertion, loosening and pin bending. (Note: when unplugging the PCB cable, hold the plastic part rather than pulling the cables directly)

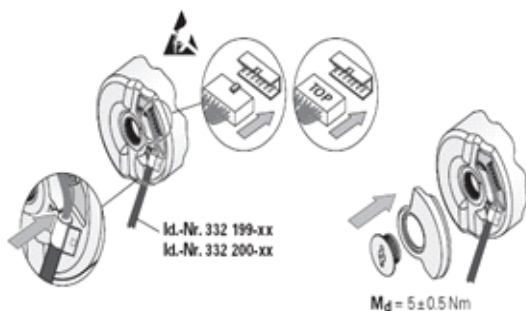


Fig.8 Wiring of encoder

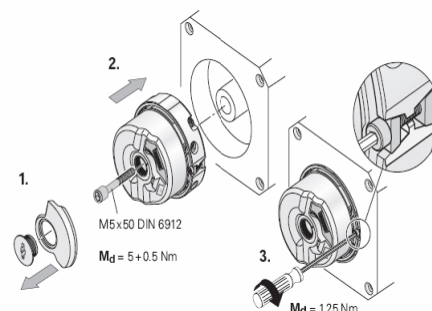


Fig.9 Assembling of encoder

### 2. Installation of shielded power cord

- A. Push the stirrup of the cable into notch by the angle of  $20^\circ$  to  $30^\circ$ , as shown in Fig.10 and Fig.11 on P12;
- B. After the cable's stirrup has been pushed into the groove, press down the stirrup to ensure complete congruence between the whole stirrup and the groove, as shown in Fig.12 on P11;
- C. If the angle is not correct, it is likely that the stirrup will not be pushed into the groove. For the dimensions of the stirrup, see Fig.13 on P11;
- D. It must be noted that after the encoder's cord grip has been transformed into a unitary groove, if the original encoder's cable is outsourced by the customer, the customer needs to confirm whether the cable's stirrup accommodates the cable's dimensions or not.





Fig.10 Shielded cable groove

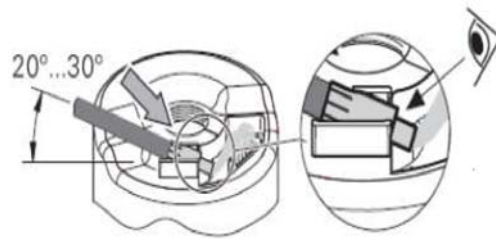


Fig. 11 Stirrup's installed angle



Fig.12 Diagram of stirrup pressing

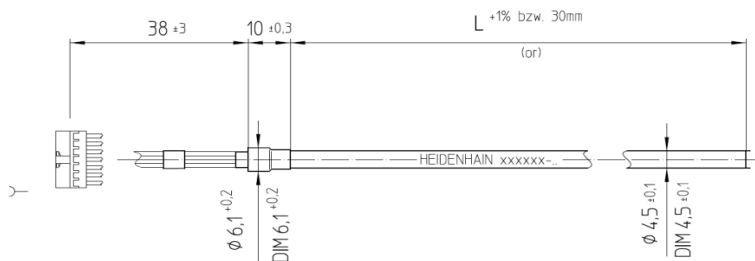


Fig.13 Diagram of cable size

1. Encoder's dismantling

Before dismantling the encoder, be sure to use Allen wrench to unscrew M2.5 x 5 bolt of the tightening ring and unscrew the penetration bolt (generally by unscrewing for the distance of two rings) and then push out the encoder with M10 bolt, as shown in Fig.13.

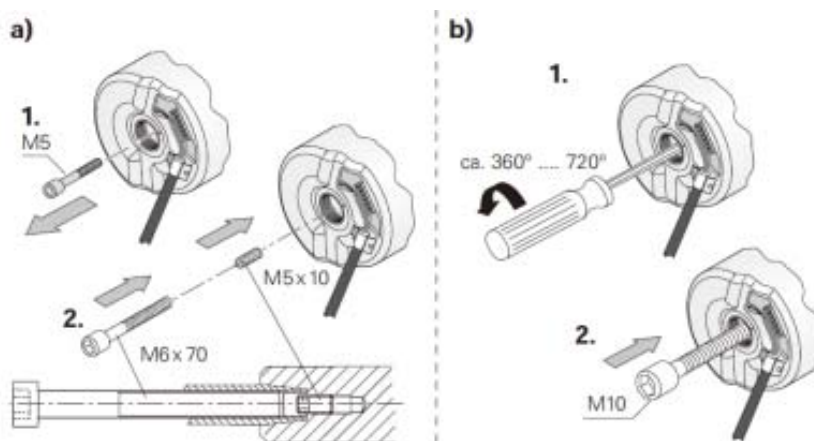


Fig.14 Screwing up the tightening bolt



- The bolts must be screwed up by the torque requirement in Fig.14, otherwise it will result in the error of the encoder. and such error may lead to the elevator's runaway or excessive current; the iron ring and cover plate must be kept in reliable contact, otherwise it may lead to some interference. The encoder's line must be fixed with clamps, otherwise the encoder's line will probably fall off or break.

## 5. Test Run

---

### 5.1. Traction machine's self-learning

In the case of SIEI Inverter,

If there is any change in the parameters on Drive data menu, self-learning must be done. Since the traction machine's rotor is permanently magnet, self-learning in the magnet field is unnecessary and only the self-learning in current is required. In the self-learning, first enable band-type brake (use the output contactor to pull in if such contactor is available) and set the enabling signal, that is to say, connecting Terminal 12 and Terminal 19 on the inverter, then the traction machine will start self-learning. It is advisable to do self-learning more than twice. Upon the completion of self-learning, first cut off the enabling signal and turn off the band-type brake (contactor), then save parameters according to relevant prompts.

### 5.2. Test Run

In the test run, give full consideration to the relevant requirements in GB7588-9.3 Steel Wire Traction. In TRAVEL/Speed profile, set Multi speedo to be 100mm/s (or maintenance speed), ENABLE inverters to get the traction machine in rotation. If the machine doesn't rotate or rotates only a while before stoppage, adjust the traction machine's phase position and then the encoder's phase position. If there is a runaway or an excessive current, adjust the encoder's phase position again.

## 6. Treatments to Common Faults

Table 7. Treatments to Common Defaults

Serial No.:	Fault	Reason for fault	Treatment
1	Traction machine is not initialized	Inverter reports encoder's fault	Check whether the long line and grounding wire of the encoder are reliably connected. If reliably, replace encoder or long line
		The resistances of traction machine's three phases are not balanced	Use a multimeter to measure the consistency of three-phase coils
		Brake cannot be opened	Use a multimeter to measure whether the brake voltage within junction boxes 3 and 4 are kept within $\pm 5\%$ of brake's rated voltage
		Phase loss and phase dislocation of three-phase lines of traction machine	Swap any two phases and check whether the three-phase lines of control cabinet and host machine are reliably connected
		Mismatching of traction machine parameters	Check the consistency between traction machine parameters and inverter setup parameters
2	Traction machine produces abnormal vibrations or big noises	Brake's friction	Check the normality of brake's power and air gap
		Steering wheel generates abnormal noise	Monitor noise to judge whether it comes from steering wheel
		Control the inverter of system drive	Modify drive parameters, or replace drive inverter
		Rotate encoder to check whether it is properly installed or it wobbles	Re-install the encoder and check whether the encoder's soft spring breaks. If the encoder wobbles within 0.22mm, it will be deemed as normal
		Shock absorbing pad of traction machine frame	Checks whether the shock absorbing pad of the frame is seriously deformed

**Operation and Maintenance Manual for WYJ 103-08 Gearless Permanent Magnet Synchronous Traction Machine**

		Installation and fixation of traction machine	Check whether traction machine and frame are connected and bolts are fully tightened; use a cone to check perpendicularity. The perpendicularity shall not go beyond $\pm 2\text{mm}$
		Parallelism between traction machine and guide wheel	Measure the parallelism between guide wheel and traction machine and check whether the parallelism is within 1-1.5mm;
3	Traction machine suffers overheat	Phase loss and lack of overload protection	Check whether the setup of inverter's temperature is correct and whether brake is subjected to friction Measure whether the elevator's equilibrium coefficient is acceptable; Measure whether traction machine operates in the condition of phase loss or whether three-phase lines are reliably connected
		Check whether the inverter's current is significantly greater than the rated current of traction machine	Check whether the inverter's output voltage is too low
4	Braking torque is insufficient	Brake air gap is not uniform	Brake's air gap is adjusted to the range as described on the brake's label
		Brake's surface suffers grease or oil stain	Clean the braking wheel's surface, dismantle the brake and use sandpaper to abrade the braking lining
		Brake lining is heavily worn	Check whether dark dust exists on the machine base below the brake, and replace the brake if such dirt exists
5	Brake cannot be opened or is not synchronic	Open circuit of brake coil	Check the wiring and electric resistance of the coil
		Low voltage/current when powered on	Check the brake's input voltage and restore it to the rated value
		Air gap is too small or too large after the brake is released	Adjust the brake's air gap to the required range
		Locking of movable plate	Check whether the movable plate works when the brake is in the action. If the plate doesn't work, check whether the bolts are excessively tightened. If excessively tightened, adjust bolts.
		Excessive temperature rise	Check whether the brake's input voltage is too high. If it is too high, restore it to the rated value

## Appendix A. Schematic map for wiring of host machine

## Appendix B.

---

### Schematic map for wiring of host machine

Electrical wiring of host machine is as follows:

Traction machine's power lines - three-phase lines: u, v and w

Traction machine's grounding wire-Yellow-Green line: G

Traction machine's overheat protection PTC lines: M1 and M2

Brake's power supply line (host machine)-power lines: 3 and 4

Brake's grounding wire -Yellow-Green line: G

Brake's micro switch #1-2 power cord (DC10-30V) and a switch output terminal: 1 and 2

Brake's micro switch #2-2 power cord (DC10-30V) and a switch output terminal: 1 and 2

In all the electrical connections between host machine and brake, the areas and boxes of connectors and connecting terminals are shown in Fig15-Fig.19. The brake's connecting lines are on the left and right sides.

The quantity of the brake's cables required is 2.

Motor's  
junction  
box

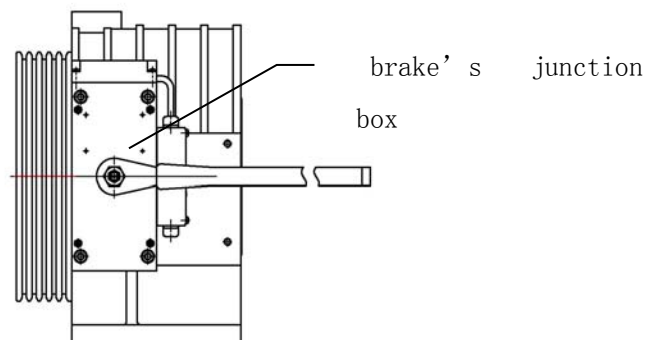
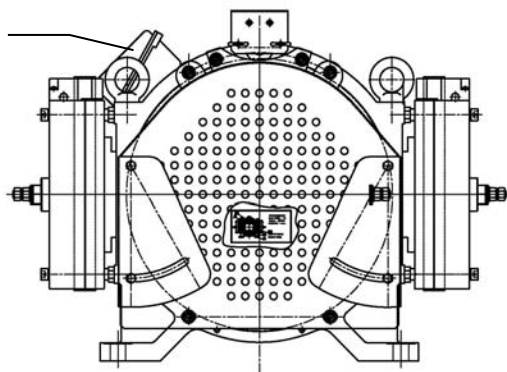


Fig.15 Wiring diagram of host machine's motor

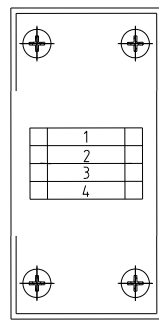


Fig.16 Wiring of brake

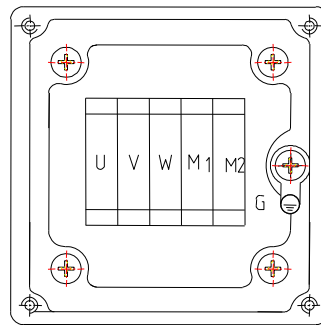


Fig.17 Wiring of motor

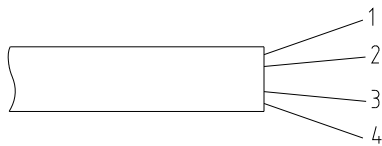


Fig.18 Connecting cables of brake

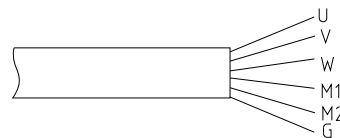
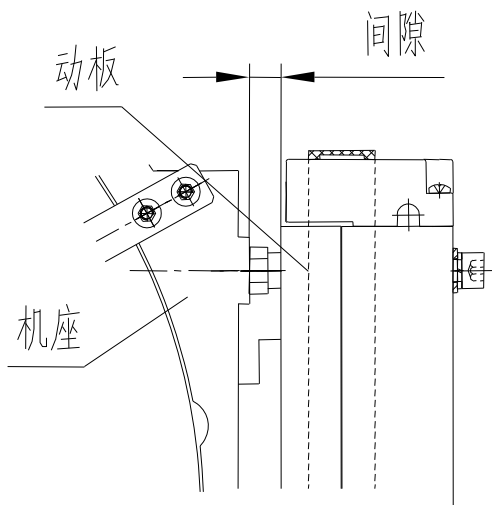


Fig.19 Connecting cables of motor

## Appendix C. Brake maintenance

### 1. friction of brake shoe

Due to structural constraints, the brake shoe's friction is hard to be examined. The brake shoe's friction is indirectly measured by checking the change in the gap between brake's movable plate and machine base. As shown in the following figure, the gap between brake's movable plate and machine base decreases in accordance with the friction of brake's shoe. When the gap is less than 10mm, it is necessary to replace the brake's shoe.



## 2. Brake adjustment and explanation (ZLZ-08)



- Before the installation, operation and maintenance of traction machine, please read this Manual carefully to avoid equipment damage, personal injury or even death;
- During the installation, operation and maintenance, please follow this Manual to ensure personal safety and equipment's operational normality;
- Only the qualified staffs can regulate the brake. Be sure to ensure personal safety before regulating the brake;
- Before operating the elevator, examine the brake's air gap and ensure the gap is within the range described on the nameplate;
- Brake must be repaired and maintained with reference to TSG/T5001 Elevator Service Management and Daily Maintenance Regulation;
- The components that are not stated in this Manual shall not be adjusted.



- After the brake has been adjusted, each bolt shall be in the locked status (tightening torque is required to be 45~55N.m) and red paint be applied to the bolt;
- If the aforesaid air gap exceeds the range described on the nameplate, it is required to adjust the brake's air gap; if the value described on the nameplate cannot be reached, contact after-sale service staffs;
- Without prior permission, hexagon socket-head cap screws shall not be used to replace the bolts that are designed for installing various brakes.

### 2.1. Components and overall appearance

The air gap between brake lining and rotator can be adjusted by adjusting the brake's air gap ⑥ as shown in Fig.20 to Fig.21 on P16. Rotor ⑤ and magnetic yoke ⑦ are connected with four installation bolts ④ and fixed onto machine base ① with four supporting screw tubes ③ (installation bolts are threaded through screw tubes). Regulate the brake's air gap ⑥ by adjusting the supporting screw tubes and installation bolts; use the rubber sleeve ② to protect the brake's air gap; control the brake's noise through tightening bolt ⑧ and adjustment bolt ⑨.

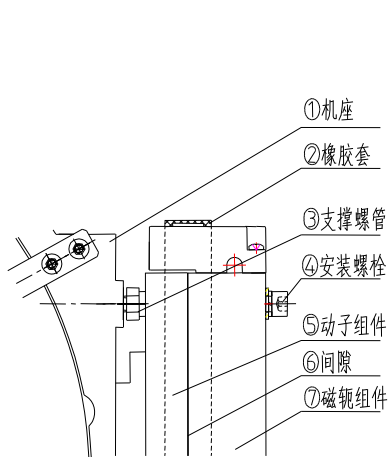


Fig. 20 Brake's components

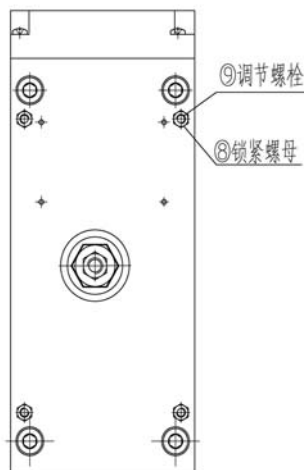


Fig. 21 Noise reducing mechanism of brake

## 2.2. Air gap adjustment



- Adjustment must be diagonal (that is to say, 4 installation bolts and 4 supporting screw tubes are diagonally adjusted);
- Before adjustment, confirm the braking capacity (see Appendix B-Fel! Hittar inte referenskälla. on P18);
- Both brakes must be adjusted separately, with the rotating degree of adjusting wrench being  $\leq 30^\circ$ ;
- The brake's air gap, if not within the required range, needs to be adjusted.

### 2.2.1. Adjustment tool

As shown in Fig.20-Fig.21, when the brake's air gap is not within the required range, the gap needs to be adjusted with an open-end wrench 19# (for adjusting supporting screw tubes), feeler gauge, and Allen wrench 8# (for adjusting installation bolts).

### 2.2.2. Air gap adjustment procedures

#### 2.2.2.1. Detection

1. Move the rubber sleeve to rotor so that the air gap is exposed for examination;
2. Use a feeler gauge to test the brake's air gaps at four corners of the brake and check whether the relevant requirement is satisfied (for example, if the required gap is 0.3~0.35mm, use a 0.33mm feeler gauge to pass through the gap. The 0.35mm gauge will not pass through the gap));
3. If the requirement is met, there will be no adjustment to the brake. It must be ensured that supporting screw tubes, installation bolts and tightening bolts are kept in a locked state;



4. Restore the rubber sleeve to its original position;
5. If the brake's air gap exceeds the standard range, adjust the gap to the standard range by the following steps (Fel! Hittar inte referenskälla.~2. 2.2.3).

#### **2.2.2.2. Confirmation of braking capacity before adjustment**

Use the accompanying the wrench to manually release the left brake (the brake on the left side of the encoder is left brake and that on the right side of the encoder is right brake) (operation methods are provided in Appendix B-4 on P23). After the release, observe whether the traction wheel is in rotation (mark may be made). If the wheel doesn't rotate, the right brake's braking capacity is sufficient and the left brake can be adjusted, and vice versa.

If rotation occurs, take the following steps:

1. If rotation occurs when the left brake is released and rotation doesn't happen when the right brake is released, adjust the right brake, and vice versa;
2. If rotation occurs when either left or right brake is released, adjust the lift car and repeat the above steps. If it is still ineffective, contact the Manufacturer's after-sale service staffs.

#### **2.2.2.3. Adjustment steps**

1. Loosen installation bolt: counterclockwise turn the installation bolts as shown in Fig.22 on P18 (The supporting screw tubes can be loosened after installation bolts are released);
2. Loosen support screw tube: rotate supporting screw tubes clockwise or counterclockwise as shown in Fig.23 on P18, and use a feeler gauge to confirm air gap;
3. Pre-tighten installation bolts as shown in Fig.24 on P18;
4. Use a feeler gauge to examine the air gap on one corner as shown in Fig.25 on P18, and confirm whether the gap is within the standard range;
  - A. If the requirement is met, tighten clockwise installation bolts and supporting screw tubes;
  - B. If the requirement is not met, repeat the adjustment steps as shown in 1-4 to adjust the gap to the standard range of air gap, and then tighten installation bolts and supporting screw tubes;
5. After the air gap on one corner of the brake is completed, following the steps as shown in 1-4 First adjust the diagonal air gap as shown in Fig.26 on P18 and then adjust the remaining two air gaps as shown in Fig. 27 on P18;
6. Use a feeler gauge to examine the sizes of air gaps on four corners of the brake to check whether they are within the standard range;

## Operation and Maintenance Manual for WYJ 103-08 Gearless Permanent Magnet Synchronous Traction Machine

A. When the air gaps on four corners are within the standard range, examine/lock all installation bolts, supporting screw tubes and tightening bolts and then use a torque wrench to verify the torque (45~55N • m);

B. When the air gaps are not within the standard range, follow the steps in 1-5 to adjust gaps until the air gaps on four corners are within the standard range, and then repeat Step A;

7. Use a wrench to manually release the brake that is not regulated, and confirm that the regulated braking capacity is sufficient;
8. Restore the rubber sleeve to the original position and apply red paint onto the adjusted positions;
9. Follow steps 1-8 to adjust the other brake.

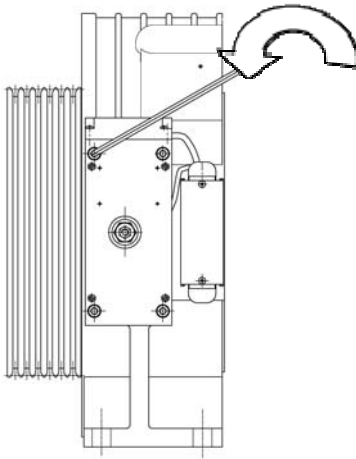


Fig.22 Rotation of installation bolt

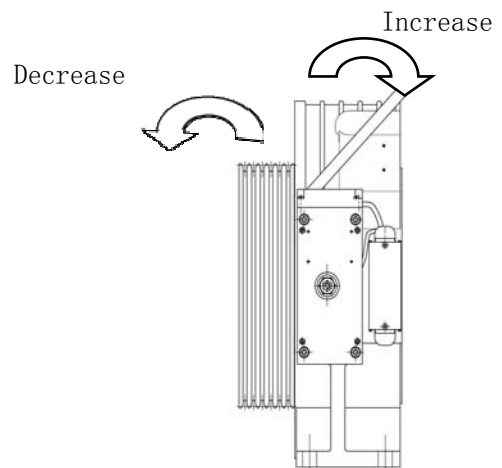


Fig. 23 Rotation of supporting screw

4

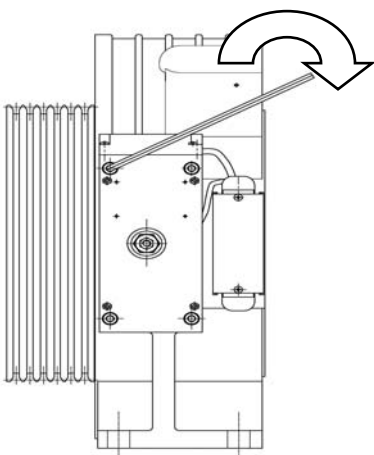


Fig.24 Pre-tightening of installation bolt

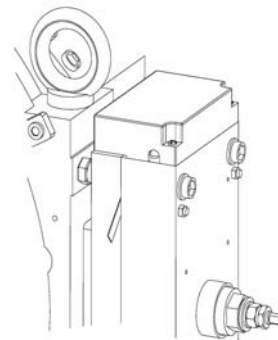


Fig.25 Detecting the air gap between rotor and magnetic yoke with a feeler gauge

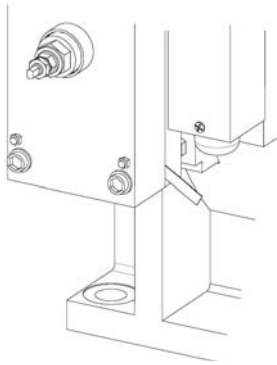


Fig.26 Diagonal clearance

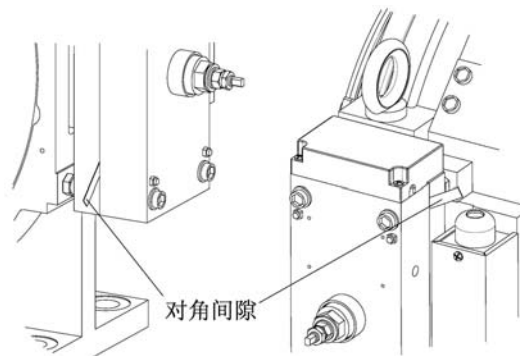


Fig.27 Remaining diagonal clearances

#### 2.2.2.4. Adjustment to noise reducing mechanism



- Before adjustment, be sure to ensure the operational safety of the mechanism;
- Tightening bolts are adjusted while the machine is powered or powered off. The appropriate adjustment method shall be taken in accordance with the reality of the site;
- Follow the steps as shown in Appendix B 2.2.2.2. on P18 to confirm braking capacity before adjustment;
- Excessive adjustment to muting mechanism will put the brake in the danger of incomplete closing. Therefore, after muting mechanism has been adjusted, power on the machine to confirm the complete closing of the brake.

##### 1. Adjustment to brake while powered on (in the case of the adjustment to left brake)

- A. Supply rated voltage to left brake while the right brake can brake the elevator.
- B. Loosen tightening bolt: use 10# open-end wrench to release the tightening bolt counterclockwise, and use 5# Allen wrench to release adjustment bolt counterclockwise;
- C. Fix adjustment bolt: use 10# open end wrench to turn and lock adjusting bolt clockwise, with the torque of 0.9~1.1Nm;
- D. Fix tightening bolt: use 10# open end wrench to turn and lock tightening bolt clockwise, while using a torque wrench to fix adjustment bolt;
- E. Follow **Fel! Hittar inte referenskälla.~Fel! Hittar inte referenskälla.** steps to adjust the right brake and complete the adjustment;

##### 2. Adjustment to brake while powered off (in the case of the adjustment to left brake)

- F. Adjust the air gap of the left brake to 0.15~0.2mm.

- G. Loosen tightening bolt: use 10# open-end wrench to release the tightening bolt counterclockwise, and use 5# Allen wrench to release adjustment bolt counterclockwise;
- H. Tighten adjustment bolt: use a torque wrench to turn and lock adjusting bolt clockwise, with the torque of 0.2Nm;
- I. Fix tightening bolt: use 10# open end wrench to turn and lock tightening bolt clockwise, while using a torque wrench to fix adjustment bolt;
- J. Follow F-I steps to adjust the right brake and complete the adjustment.

### 3. Adjustment to push rod



- Before the installation, operation and maintenance of traction machine, please read this Manual carefully to avoid equipment from damage and elevator user from lockup;
- The brake's push rod has been adjusted when the brake is shipped. Adjustment shall be prohibited when there is no fault with micro switch;
- Any adjustment, if required, should be implemented by qualified staffs.

#### 3.1. Components of push rod mechanism

The brake's push rod mechanism is comprised of protective cover①, push rod②, fixing block③, micro switch④, spring⑤, bracket⑥, and butterfly lockwasher⑦, as shown in Fig. 28 on P20. After the bracket with micro switches and spring has been fixed, the reliable operation of the micro switch is ensured, by adjusting the push rod's position to change the rod's travel.

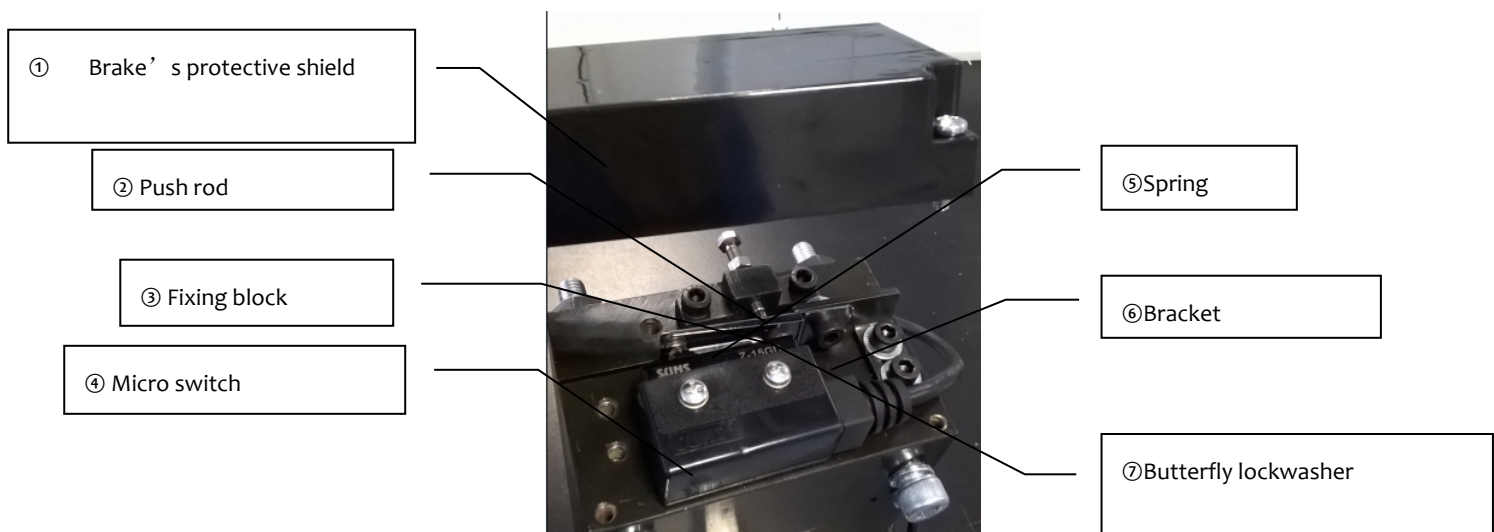


Fig.28 Components of push rod mechanism

## 3.2. Adjustment and maintenance

### 3.2.1. Confirmation of braking capacity before adjustment

For more details, see Appendix B on P17.

### 3.2.2. Examination of actions of push rod mechanism



- The left and right brakes shall be examined separately. These two brakes shall not be examined simultaneously.
- The amount of adjustment each time shall not exceed 0.1mm, otherwise the spring will be deformed. The maximum travel of the push rod shall not exceed 0.3mm.
  - A. Insert a 0.1mm feeler gauge between dynamic and static plates (below the switch) and power on to close one brake in operation to check the action signals of the brake's micro switch.
  - B. Insert a 0.15mm feeler gauge between dynamic and static plates (below the switch) and power on to close one brake in operation to check the action signals of the brake's micro switch.

### 3.2.3. Signal judgment

- A. When the push rod mechanism works properly, and when 3.2.2-A operation is done, micro switch signal will switch over and when 3.2.2-B operation is done, the signal of micro switch doesn't switch over.
- B. When the push rod mechanism doesn't work properly, it indicates that 3.2.3-A operation is not done.

### 3.2.4. Adjustment to push rod mechanism

When the travel of the push rod is not enough or is excessive, the push rod mechanism must be adjusted.

#### 3.2.4.1. Insufficient travel of push rod mechanism

When 3.2.3 is done and signal doesn't switch over, the following adjustments shall be made:

- A. Unscrew the hexagon nuts that lock push rod and rotate the rod to make it slightly move forwards (clockwise);
- B. Tighten hexagon nuts, and implement 3.2.3 operation to check whether micro switch signal switches over or not (this test must be carried out 3 to 4 times);
- C. If micro switch signal does not switch over, repeat steps **Fel! Hittar inte referenskälla.** ~B until the switchover occurs;
- D. Lock hexagon nuts after ensuring that the switch acts reliably.

#### 3.2.4.2. Excessive travel of push rod mechanism

When the 3.2.3 step is taken and micro switch signal switches over, the push rod mechanism shall be adjusted as follows:

- A. Unscrew the hexagon nuts that lock push rod and rotate the rod to make it slightly move backwards (clockwise);
- B. Tighten hexagon nut and take step **Fel! Hittar inte referenskälla.** to see whether the micro switch signal switches over or not (this test must be taken 3-4 times);
- C. If micro switch signal switches over, take steps **Fel! Hittar inte referenskälla.~Fel! Hittar inte referenskälla.** until the switchover doesn't occur;
- D. Lock hexagon nuts after ensuring that the micro switch acts reliably.
- E. After steps **Fel! Hittar inte referenskälla.** and **Fel! Hittar inte referenskälla.** are followed, adjust the push rod mechanism of every single brake. This method applies to the adjustment of the other brake.

#### 4. Instructions for manual release device



- Before operation, confirm the disconnection of main power supply;
- The manual release must be implemented by qualified staffs;
- In operation, two operators shall cooperate well with each other and follow correct procedures so as to avoid personal injury;
- In operating the manual release device, the operator shall use the accompanying wrench. Other tools shall not be used because they may affect the normal release;
- When an elevator is in operation, if any fault arises or the elevator user is locked up in the lift car as a result of power failure, the operator may use manual rolling gear to rescue the persons entrapped, as shown in Fig. 29 below.

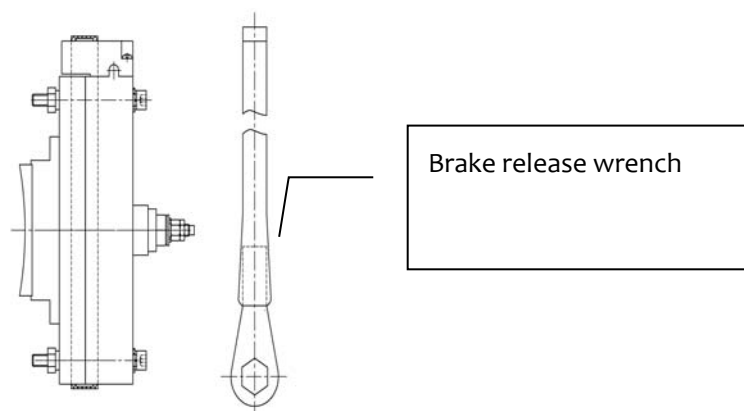


Fig.29 Schematic map of manual release device

#### 4.1. Operational methods

Use two accompanying wrenches to connect them with left and right brakes as shown in Fig.30; loosen the handle in the left or right direction as shown in Fig.31 before the brake is opened. The other operator inserts the small gears on the rolling gear device into the stand behind the traction machine, to make small gears engage well with big gears. Then use manual hand wheels to slowly move the lift car to the landing position.

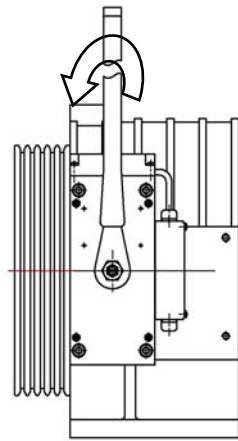


Fig.30 Schematic map of release handle connection

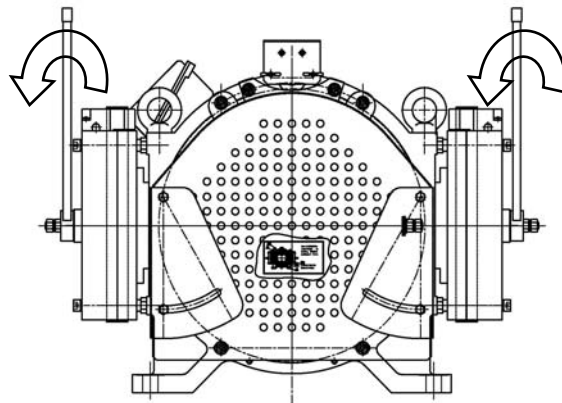
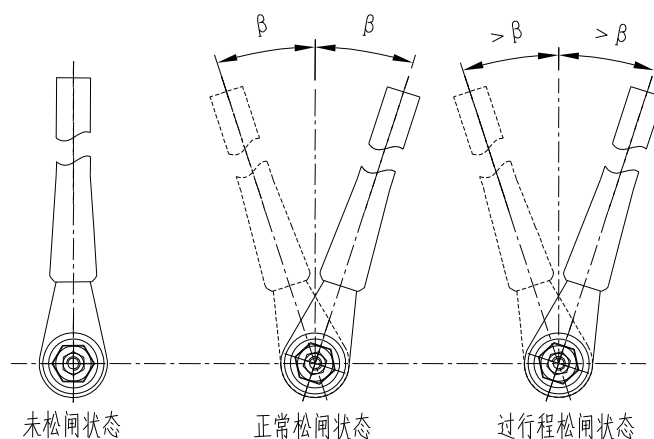


Fig. 31 Schematic map of release handle connection



- Confirm the openness of the brake: when the clicking sound of the micro switch is heard, it means the brake has been opened;
- When brake release is used,  $\beta$ , the rotation angle of the release wrench for the brake is controlled within no more than  $25^\circ$  as shown in Fig. 32.
- If the aforesaid angle  $\beta$  is more than  $25^\circ$ , excessive travel may occur and the wrench cannot be restored to its original position.
- If such restoration to the original position cannot be achieved, the site staffs need to restore the wrench to the Unreleased Status as shown in Fig.32 and notify the situation to the Manufacturer's after-sale service staffs.



## 5. Operation instructions for manual rolling gear



- Before operation, confirm the disconnection of main power supply;
- The manual rolling gear must be implemented by qualified staffs;
- In operation, two operators shall cooperate well with each other and follow correct procedures so as to avoid personal injury;



- In operating the manual rolling gear device, the operator shall use the accompanying handle, rolling gear handwheel, and rolling gear small gears. Other tools shall not be used because they may affect the normal rolling.

### 5.1. Rolling gear device at the rear side of the host machine (upper part of the traction machine)

1. Insert the small gears of rolling gear device into handwheel as shown in Fig.33 to Fig.35 and place them on one side;
2. Unscrew out the connecting bolts and take out the switch contacts to expose the installation holes of the rolling gear as shown in Fig.35;
3. Insert the assembled rolling gear into the installation hole. Then two operators collaborate with each other in operation, with one operator releasing the brake and the other operator controlling the handwheel at the even speed until the lift car is at the landing position as shown in Fig.36 on P23;
4. Restore various components to their original status in accordance with the assembly order and ensure that switch contacts and main bodies of switches are connected in the previous status as shown in Fig.37 on P23.



Fig.33 Small gear

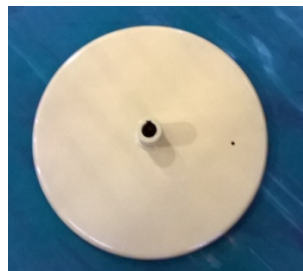


Fig.34 Handwheel

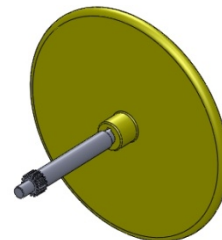


Fig.35 Rolling gear



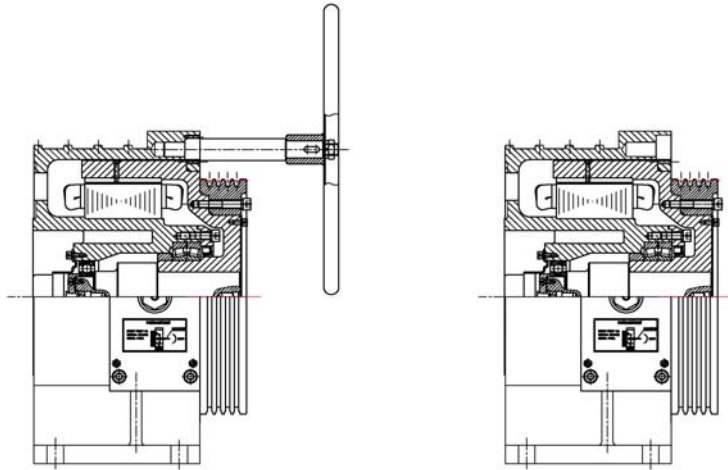


Fig.36 Inserting rolling gear into machine base      Fig.37 Status before rolling operation

## 6. Manual remote brake release(if any, please take the following steps)



- Before using the manual remote brake release with the traction machine not installed in a machine room, read this Manual carefully and understand well various precautions to prevent personal injury or equipment damage;
- Before operation, confirm the disconnection of main power supply;
- The instructions here apply to the traction machine equipped with manual remote brake release device;
- When installing manual remote brake release device onto the traction machine not installed in a machine room, the operator is prohibited from adjusting the brake;
- When installing manual remote brake release device onto the traction machine installed in a machine room, the operator is prohibited from adjusting the brake that has already been fixed onto the traction machine;
- When using a manual remote brake release device, it is required that the curvature radius at the curve of brake cable is more than 500mm, otherwise the brake will not be released;
- It is required that some allowance (generally 3mm-5mm, which may be adjusted to suit real conditions) shall be set for the rope of the brake cable at the moment of installation;
- While brake cable is set and used, the brake cable's protective cover shall be prohibited from damage. The damage, if any, is likely to result in the failure of the rope of brake cable;
- When a brake cable is set, exclusive cable grip (grip piece or grip belt) must be used to fix the cable. However, such fixation shall not be too tight, otherwise it is likely to result in the failure of the rope;
- After the assembly has been completed, test run shall be carried out several times to ensure that the device works flexibly and can be reset. If any problem arises, adjust connections to meet connection requirement; otherwise, it must be prohibited.

## 6.1. Manual remote brake release device

This device is applicable to brake release of the remote brake of the traction machine not installed in a machine room. It is used to speed up the process of rescuing the elevator user who is entrapped in the lift car in an emergency. Manual remote brake is comprised of remote release rod①, pin②, split pin③, axial flexible retainer ring④, lanyard assembly⑤, hand rod sleeve⑥, hand rod⑦, guide wheel⑧ and installation wheel⑨, etc. The schematic map is shown in Fig.38 on P24.

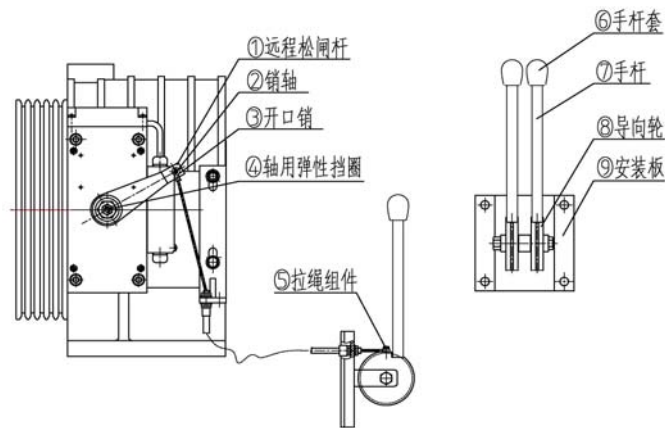


Fig.38 Remote manual brake release device control mechanism

## 6.2. Operation instructions

The components of a manual remote brake release device fixed onto the traction machine that is not installed in a machine room are divided by control mechanism and brake release mechanism.

1. The original drawing of a brake release handle is referred to in Fig.39;
2. Pull a brake release handle to make it rotate around its support point as shown in Fig.40. At this moment, the brake release action is completed. Pay attention to car sliding speed and the leveling of lift car to floors at the moment of brake release. After the leveling is completed, immediately release brake handle to stop brake release.
3. After brake release is completed, reset all components to their original positions and put the release handle to the required position.

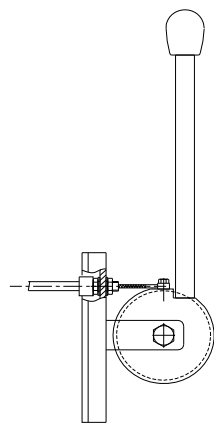


Fig. 39 Original brake release handle

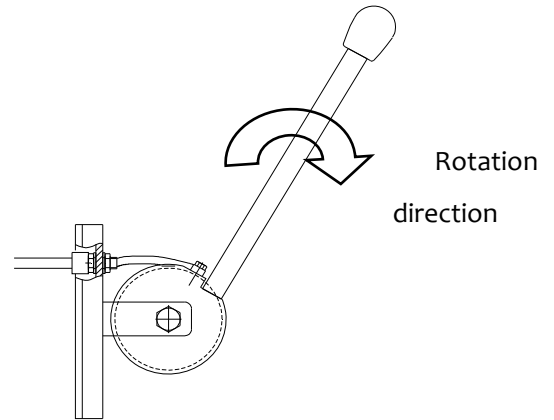


Fig.40 Released brake handle

## Appendix D. Instructions for site maintenance

### 1. Instructions for adding (replacing) bearing lubricating grease



- This operation must be implemented by qualified staffs alone;
- During the installation, operation and maintenance, please follow the required procedures to ensure personal safety and equipment's operational normality;
- Please properly dispose of used grease to avoid environmental pollution;
- The grade of the grease is Shell S3 T150J2 lubricating grease. The input amount is 60g.

The bearing on the side of the traction wheel of the traction machine is a non-sealed bearing. After the traction machine runs for a period (generally 2 years or specific period required by reality), lubricating grease needs to be added (replaced). The bearing on the side of the encoder is a sealed bearing, which doesn't require the addition (replacement) of lubricating grease.

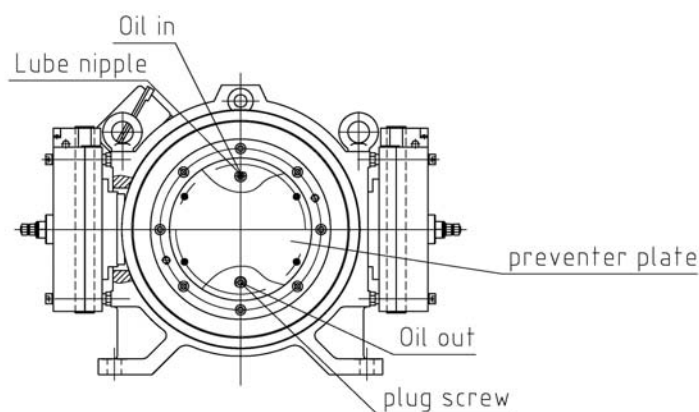


Fig.41 Oiling diagram

As shown in Fig.41, when the grease for the bearing is replaced (added), oil injection gun will feed 60g Shell S3 T150J2 lubricating grease while slowly turning the traction machine's rotor so that the grease can be

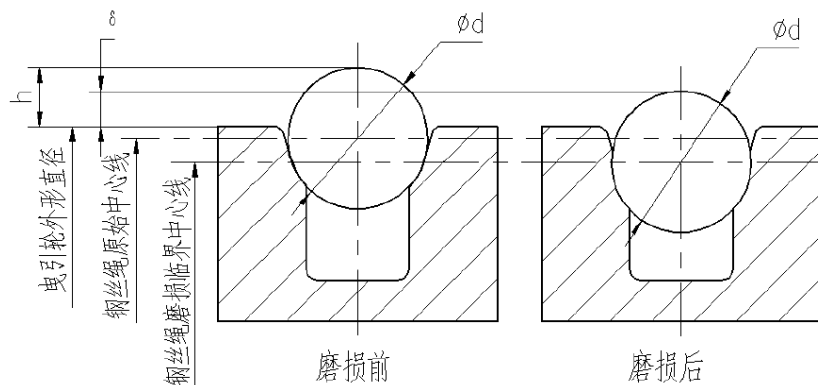
evenly distributed within the cavity of the bearing. Meanwhile, the used grease will flow out through outlet. After the oiling has been completed, clean up the used grease.

## 2. Friction of rope groove of traction wheel

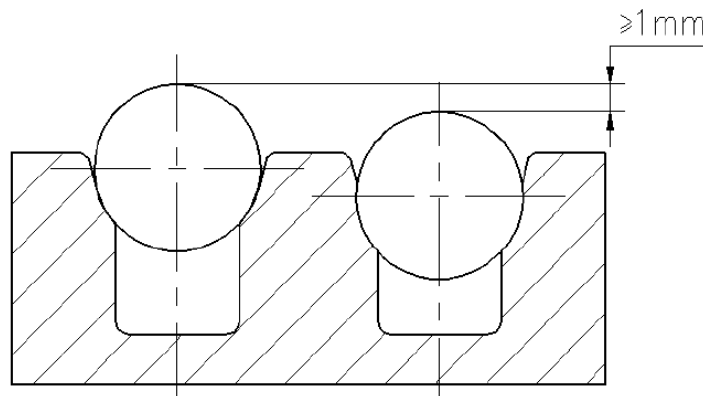
The traction wheel's standard groove is a U-shaped undercut groove. In any of the following three circumstances, the traction wheel must be replaced:

① The friction of the groove reaches the critical condition, as shown in the table below:

Steel rope diameter $\Phi d$	Distance $h$ before operation	Distance $\delta$ when key check is implemented	Critical range of friction
8	1.5	0	$\delta \leq 0$



② As a result of uneven wear, the height difference between steel ropes is more than 1mm:



③ The crack on a steel rope can be observed with naked eyes. Obvious friction deviation is found in the groove.

When the elevator travels up and down in the shaft, if sliding is found between steel rope and traction wheel, the reason for such sliding must be ascertained. Only when the problem is solved, can the elevator be allowed to operate; otherwise a more serious friction may happen to the traction wheel's groove.

## 3. Instructions for replacing traction wheel at site

- Turn off the general power supply to the elevator before traction wheel is replaced;



## Operation and Maintenance Manual for WYJ 103-08 Gearless Permanent Magnet Synchronous Traction Machine

- The elevator equipped with a machine room shall not be operated by one operator only;
  - The elevator without a machine room requires the operation by at least 4 persons;
  - This Appendix applies to the replacement of the WYJ 103-08 traction machine manufactured by our Company.
- ☞
- Confirm the models of host machine and traction wheel and correct components before traction wheel replacement;
  - Use a clean fabric to remove the dust on the surfaces of traction wheels and the connections and clean them up;
  - Clean surrounding environment so as to facilitate the laying of traction wheel, tools and equipments when they are dismantled;
  - When pushed out, the bolts for push rods at both ends shall be symmetrically screwed up.

### 3.1. Equipment and tools

fabric, gloves, 1 x Allen wrench, adjustable wrench, lubricating grease, fine sandpaper, 4 x M12\*190 bolts, 18 x socket wrenches, and dial indicator.

### 3.2. Operation process

#### 3.2.1. Traction wheel dismantling

1. use M10 Allen wrench to unscrew all bolts (8 bolts) on traction wheel as shown in Fig. 42;
2. Screw up 4 x M10 bolts into 4 dismantling holes and use 10# wrench to turn the push rod's bolts until the traction wheel is pulled out.

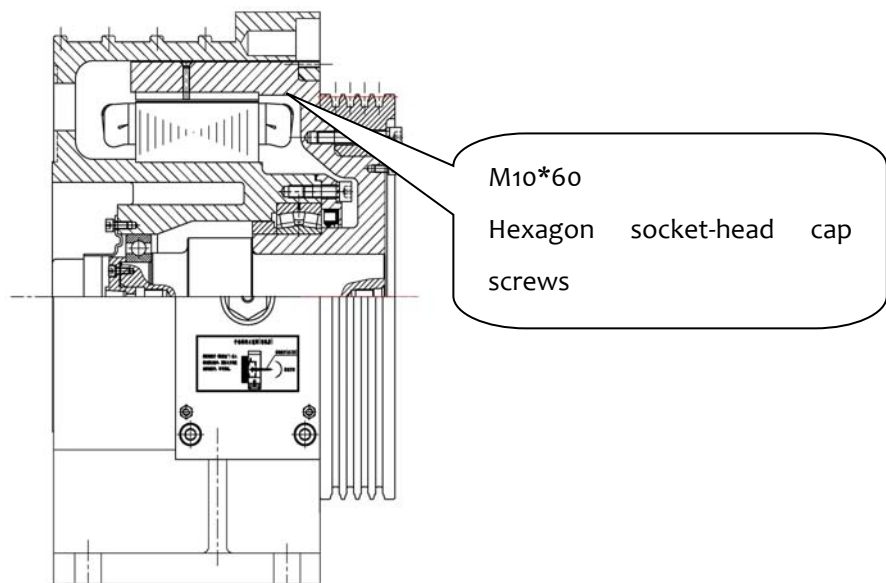


Fig.42 Removal of traction wheel bolts

### 3.2.2. Installing traction wheel

1. After the traction wheel has been pulled out, use fine sandpaper to clean the locations which rotors may contact as shown in Fig.43 and which traction wheel may contact as shown in Fig.44. These contact parts must be cleaned several times to ensure the absence of foreign bodies and protrusions (it is advisable to apply lubricating oil after cleanup).
2. Put the cleaned and oiled traction wheel into rotor and ensure that it is perfectly aligned with bolt holes as shown in Fig.45;
3. Use M10\*190 full threaded bolts to install the traction wheel; then screw up nuts to press the traction wheel against rotor;
4. Insert bolts into threaded holes and use M12 Allen wrench to screw up all bolts (12 bolts) on the traction wheel as shown in Fig.46.



Fig.43 Rotor cleanup



Fig.44 Traction wheel cleanup

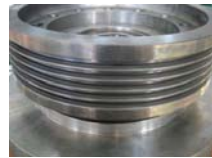


Fig.45 Inserting traction wheel into rotor

Fig.2 Key groove alignment



Fig.46 M10 bolt

### 3.3. Elevator operation







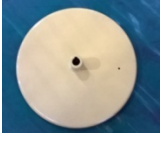













1. Host machine's parameters are self-learned again and the encoder's angle is re-positioned;
2. Hang up the lift car and run the elevator after it has been debugged

## Appendix E. Spare parts list

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Table3 Spare parts list

## Operation and Maintenance Manual for WYJ 103-08 Gearless Permanent Magnet Synchronous Traction Machine

Component name	Photo		Quantity/unit	Component name	Photo		Quantity/unit
Brake			2	Brake release handle			2
Encode			1	Handwheel			1
Encoder cable			1	Rolling gear switch			1
Bearing			2	Wire retaining rod			2
Brake release cable			1	Traction wheel			1
Motor's junction box			1	Brake's junction box			1
Shield			1	Shock absorbing pad			4



Spare parts are obtained through purchase





# Operation and Maintenance Manual for WYJ 103-08 Gearless Permanent Magnet Synchronous Traction Machine

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Address:

Postal code:

Service hotline:

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Customer service mail: