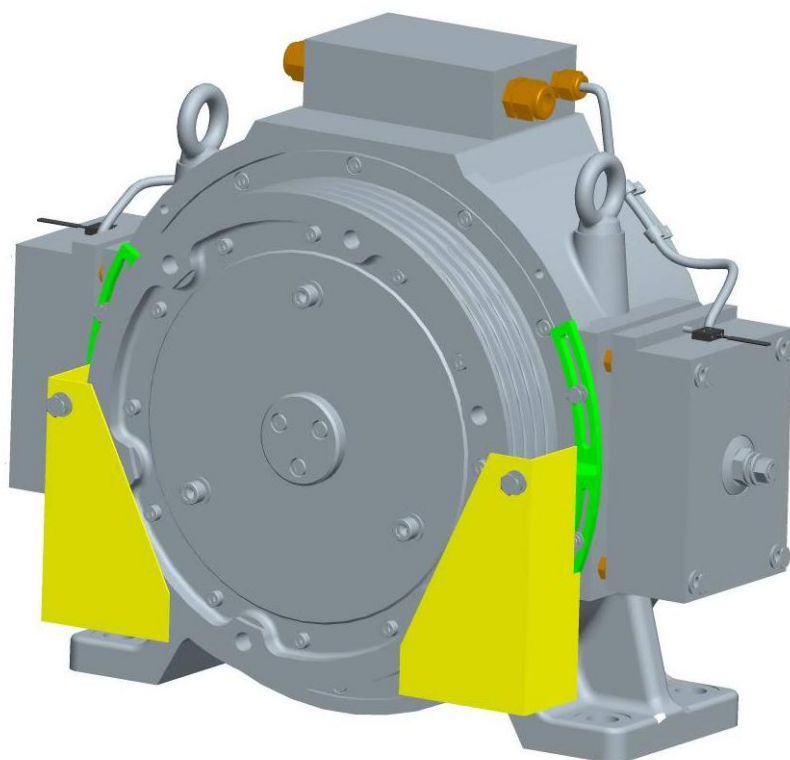


BRUSHLESS GEARLESS TRACTION MACHINES
OPERATING INSTRUCTIONS
WJ SERIES



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• 1.Statement

Only qualified personnel are allowed to perform any planning, installation or maintenance work. The personnel must be trained for this job and must be familiar with the installation, assembly, commissioning and operation of the product. Sufficient knowledge in lift construction is essential.

The regulations concerning operation, maintenance and inspection in accordance with the applicable safety regulations in lift construction such as EN 81 "Safety rules for the construction and installation of lifts", Part 1: "Electric lifts", and other relevant regulations shall be strictly observed.

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

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



(Danger) means that death or serious injury to persons or serious damage to property will occur unless the appropriate precautions are taken.



(Warning) means that death or serious injury to persons or serious damage to property may occur unless the appropriate precautions are taken.



(Caution) means that injuries to persons or damage to property may occur unless the appropriate precautions are taken.

The three-phase traction machine are intended for use in an enclosed, lockable machine room to which only qualified personnel and personnel authorized by the client have access.



(Danger) • The instructions given in this manual or any other instructions supplied must always be observed to avoid dangers or damage.

- Check the proper functioning of the motor and the brake after installing the machine.
- Any adjustment and repair may only be carried out by the manufacturer or an authorized repair agency, unauthorized opening and tampering may lead to injuries to persons and property.
- The rope traction conditions should be checked according to EN 81.1 Clause 9.3 at site after installing the machine onto the lift it serves.



(Warning) • The machines are not designed for direct connection to the three-phase system but are to be operated via a driver.

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

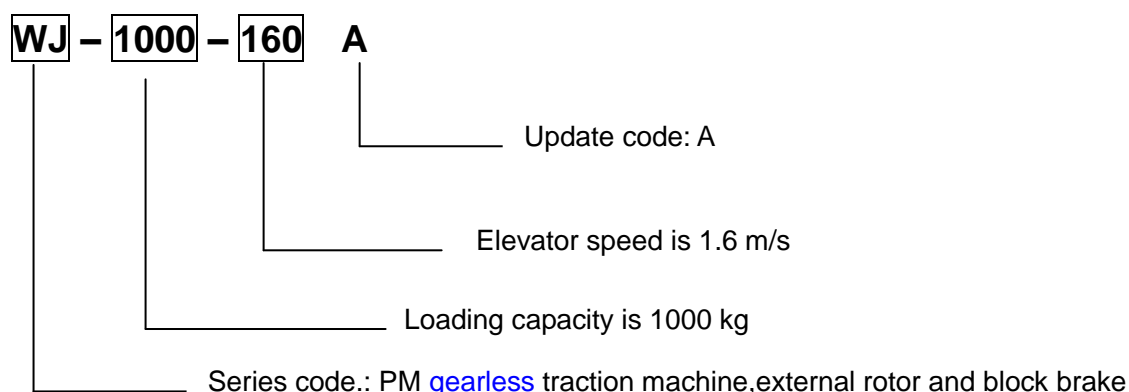
- The proper ability of the brake system should be tested after installing the machine to the lift it serves

and after it's adjustment every time.

- High voltages occur at the terminal connections during the operation of synchronous motors.
- Strictly prohibit from shorting circuit
- Customers in the purchase of the former must be based on actual operating conditions to confirm the use of tractor capacity and safety factor is to meet the standards

• 2. Type code

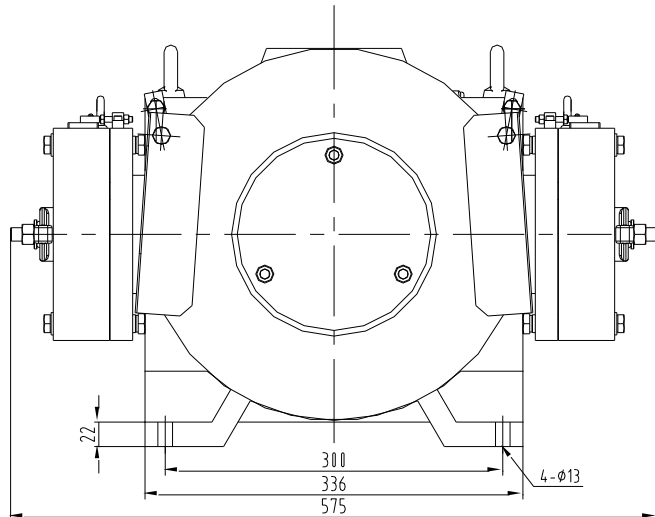
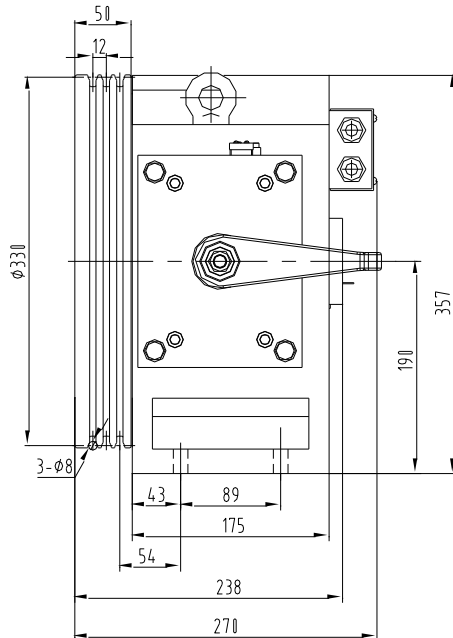
The code of traction machine is composed of 4 parts, the meaning of each parts is as follows:



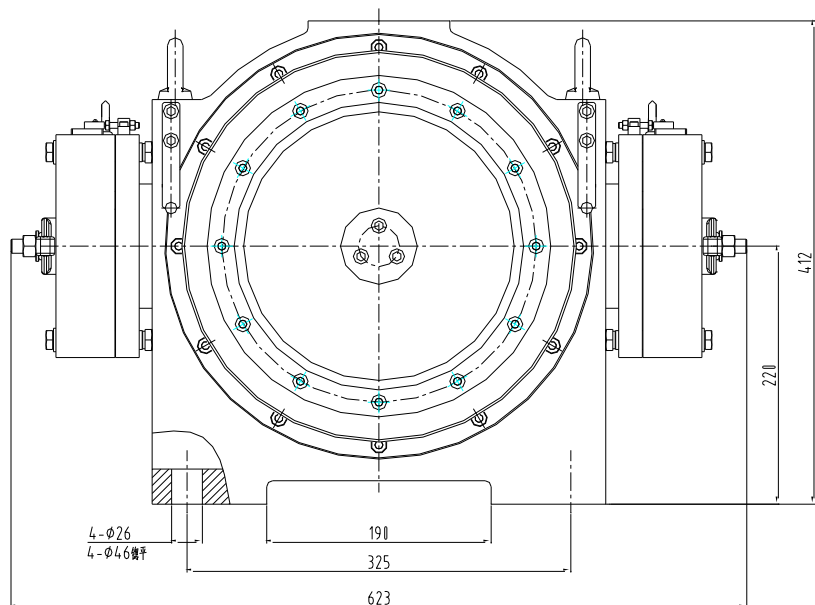
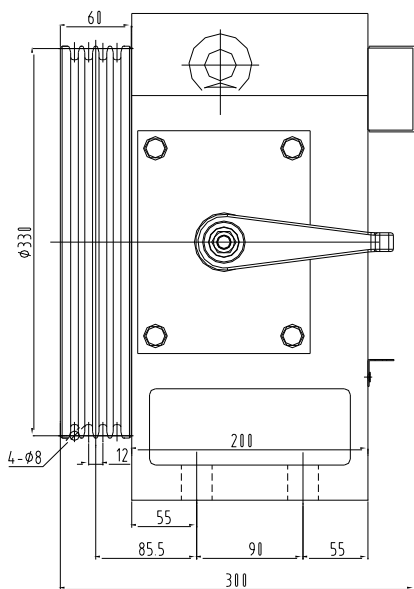
• 3. Specification and technical data

| Model | Model | WJ-320- | WJ-450- | WJ-630- | WJ-800- | WJ-1000- |
|------------------------------|-------|------------------------|---------|---------|---------|----------|
| Loading Capacity (kg) | | 320 | 450 | 630 | 800 | 1000 |
| Sheave Diameter(mm) | | 330 | | 400 | | |
| Poles | | 20 | | | | |
| Rope | | 3-Φ8 | 4-Φ8 | 4-Φ10 | 5-Φ10 | |
| Distance(mm) | | 12 | | 16 | | |
| Groove | | U model with cut angle | | | | |
| Cut Angle(β) | | 90° | | 95° | | |
| Groove Angle(γ) | | 30° | | | | |
| Traction Ratio | | 2:1 | | | | |
| Wrap | | Single | | | | |
| Inertia (kg m ²) | | 0.5 | 0.93 | 2.25 | 2.55 | 2.74 |
| Capacity(kg) | | 900 | 1500 | 2000 | 3000 | 3000 |

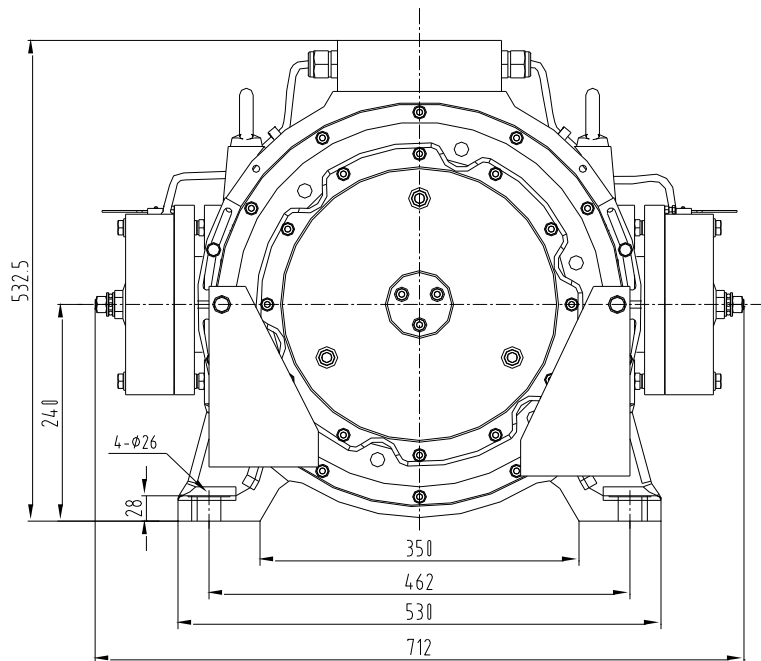
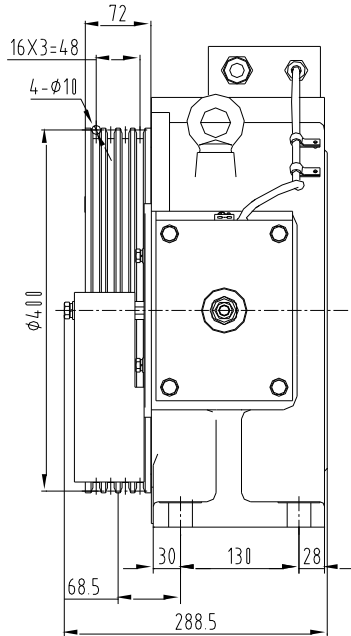
Structure and installation dimensions are as follows:



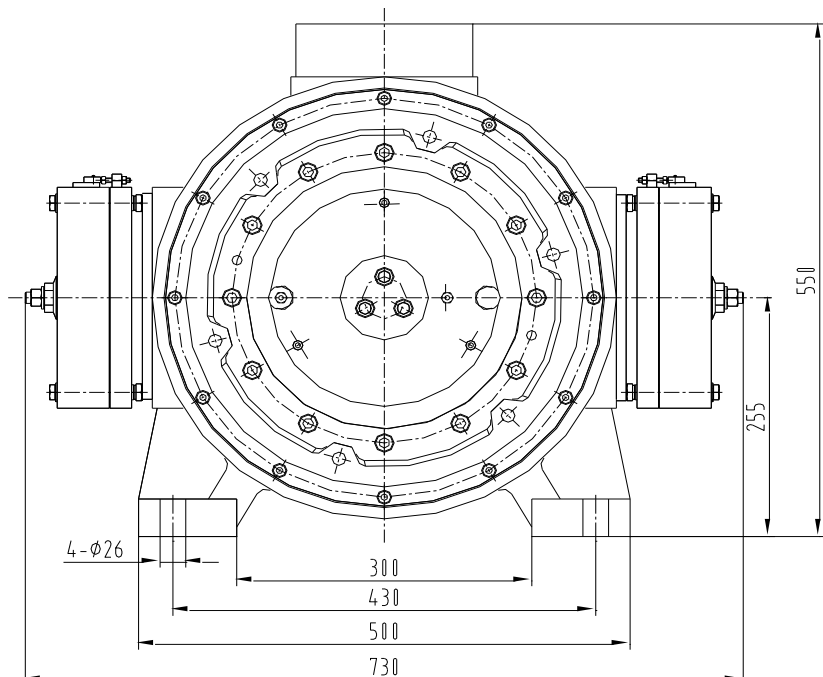
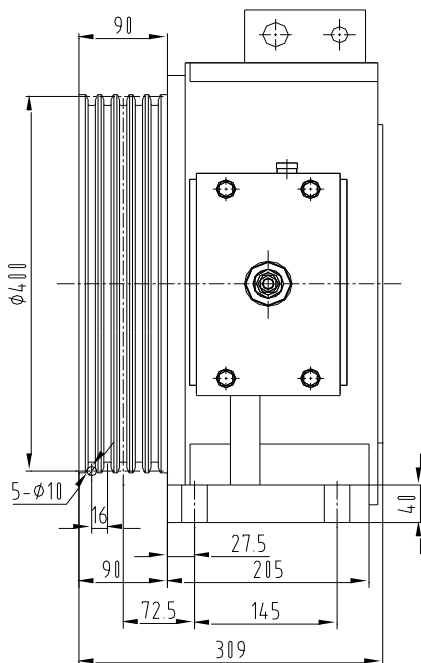
Traction ratio 2:1, loading capacity 320kg, speed 0.5~1.5m/s



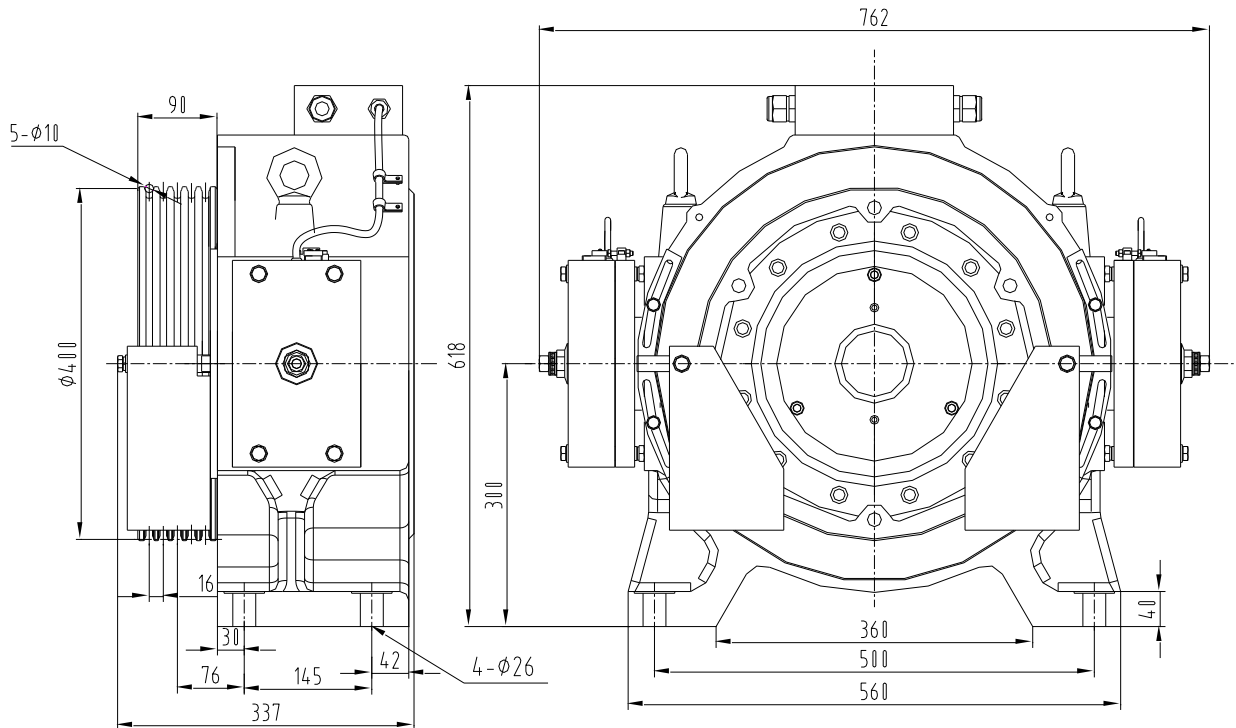
Traction ratio 2:1, loading capacity 400-450kg, speed 0.5~1.6m/s



Traction ratio 2:1, loading capacity 544-630kg, speed 0.5~1.6m/s (Traction ratio 1:1, loading capacity 320kg, speed 1.0~2.5m/s)



Traction ratio 2:1, loading capacity 800kg, speed 0.5~2m/s (Traction ratio 1:1, loading capacity 1000kg, speed 1.0~2.5m/s)



Traction ratio 2:1, loading capacity 1000kg, speed 0.5~2m/s (Traction ratio 1:1, loading capacity 450kg, speed 1.0~2.5m/s)

• 4. Product description

Main advantages of the product as follows:

- Environmentally Sensitive;
- Low Noise;
- Constant Torque;
- High Efficiency;
- Small Volume;
- Running steadily;
- Power Saving;
- Avoid maintenance;
- Safety and Reliable



(Warning) • All of our gearless traction machines are designed solely for use with a driver.

The synchronous motor has been designed for various Capacities and speeds to adapte to individual customer requirements.

The traction machine is combinations of electrical and mechanical components, outer rotors structure and both sides installation a block brake.The traction machine comprises a motor,a sheave,a set of brake and an encoder.

The stator of the traction machine is cold silicon steel,insulation classF,magnet material is Nd FeB,natural Cooling.The sheave is QT700-2 cast iron, the motor protection is IP40,noise is less than 55dB(No-load) and vibration is less than 0.45mm/s(No-load).

The traction machine is composed by frame,stator,rotor,sheave,brake wheel and encoder.

The frame carries the stator core, the sheave and brake wheel are assembled on the rotor. There are 20

poles permanent magnet fixing to the inner surface of the rotor. The rotor which is assembled on the shaft through the bearing be installed on the frame. There is a uniform air gap between the rotor inner surface and the stator outer surface. The sheave is installed to the front-end of the shaft to carry the weight. The encoder is installed to the back-end of the shaft.

The electrical connection of the motor is made in terminal box where the temperature monitoring device is also connected.

The brake is assembled on the frame and and brake friction plate through contact with the brake wheel to brake the machine.

• 5. Nameplates

The nameplate of the traction machine is on the frame. Content as follows:

| | | | | | |
|-------------------|--------|-------------------------|-------|---------------|-------------------|
| Type | | Car Speed | m/s | Capacity | kg |
| Roping | | Sheave Diameter | mm | Rope | mm |
| Power | kW | Voltage | V | Current | A |
| Frequency | Hz | Rotate Speed | r/min | Pole | |
| Torque | N•m | Insulation Class | F | Protect Class | IP40 |
| Duty | S5-40% | Phase Induced Voltage | V | | |
| D-Axis Inductance | mH | Q-Axis Inductance | mH | Inertia | kg•m ² |
| Phase Resistance | Ω | Standard Q/KDS 003-2005 | | Weight | kg |
| Number | | | | Date | |

• 6. Scope of supply

- Traction machine according to of order the specification
- Complete operating instructions.
- Delivery note.

• 7. Transport and storage

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



(Danger) the eyebolts are designed for the specified machine weight, i.e. it is not permitted to suspend additional loads.

Store the motors only in closed, dry, dust-free, well ventilated and vibration- free room..

The time of reserve does not exceed 6 months. Once be exceeded, you should inspect it.

No liability is assumed for any damage resulting from improper handling of the machine.

Transportation and storage ambient temperature required: $-25^{\circ}\text{C} \sim 55^{\circ}\text{C}$, and the duration of 24 hours on 70°C is supported.

· Make sure the carton is undamaged before opening. Check the nameplate and traction machine is qualified for using.


· Check the packing list first to make sure if all the components are ready after opening the cartoon, whether the machine is damaged, eroding or not.

· Traction machine must be structural-integrity installed, disassemble installation is forbidden.

· Make rope hook clasp the ring on the machine before suspending, and keep steady and no crash during suspending.

· Avoid to damage equipment when suspension.

· The Carrying Capacity of the Rope for uprising the Traction Machine must be $\geq 1500\text{Kg}$. The Rope for uprising the Traction Machine must be hooked eye screw.

 **Note:** The eyebolts should be fully tightened while lifting, without any gap with frame surface. The angle α between both the eyebolts should be less than 60° .

• 8. Installation

8.1 General



(Warning) Check the permissible frame or foundation loads by calculation before installing the machine. The frame must be sufficiently rigid to accommodate the bending and torsional forces occurring over the whole load range, Place the machine on a plane surface with a permissible deviation from planeness not exceeding 0.1mm.

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



(Danger) Fasten the machine on the frame with four bolts of strength class 12.9

Traction machines are generally provided with rope slip-off guards. After putting the ropes in place, adjust them so that the distance between the rope and the rope slip-off guard does not exceed 1.5mm.

8.2 Degree of protection

Traction machines are designed with degree of protection IP 40, Make sure that the cable entries to the terminal boxes are sealed properly when making the electrical installation.

8.3 Ambient conditions

The following ambient conditions must be ensured on site:

· Altitude: max. 1000 m

· Ambient temperature: $5^{\circ}\text{C} \sim 40^{\circ}\text{C}$

· The deviation between voltage fluctuation and rated voltage does not exceed $\pm 7\%$

· There is no corrosive and flammable gas in environment.

· There are no lubricant and others on the surface of steel wire rope and groove

· The angle of car and counterweight, the angle of wheel wire rope on the traction, must meet the

regulation 9.3.1.b in EN 81-1.

·Max.rel.humidity:90%

Install a ventilation equipment to ensure adequate cooling

The Technical data apply to the above ambient temperatures and altitudes.

• 9. Electrical connection

9.1 general

Make the electrical connection after having installed the motor. Have this done by a qualified electrician.

Before starting any work on the motor, and particularly before opening any covers of active parts, make sure that the motor and plant have been properly isolated.

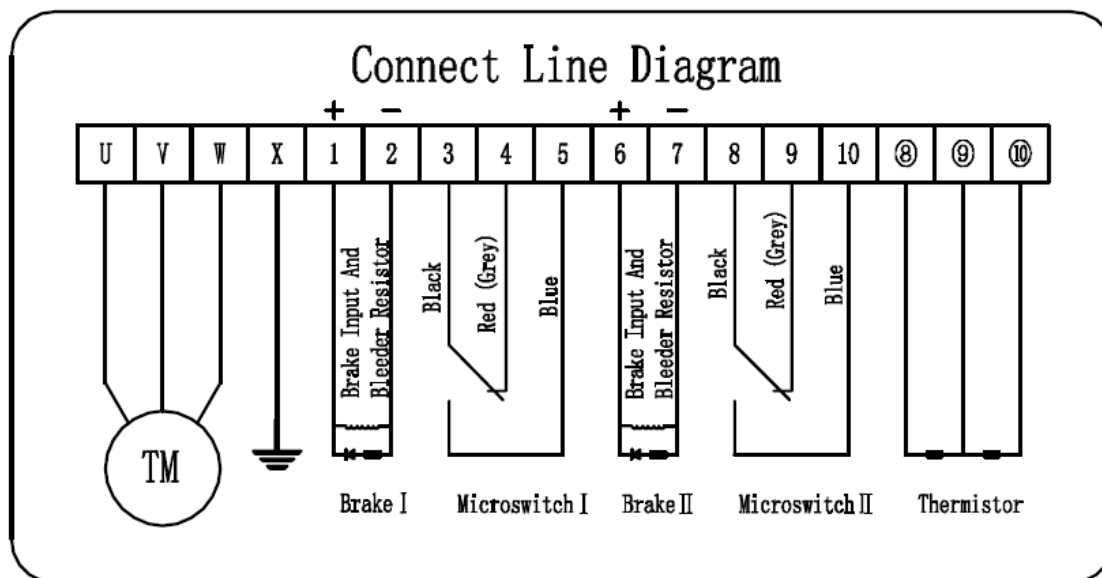


(Warning) Inspection and preparation before the operation:

- Disconnect the traction machine from the power supply.
- Check if the electrical connection is right or not
- Affirm there is no short circuit of exposed parts and no short circuit to ground
- Earth and short (with voltages above 1,000V)
- Affirm the connection of terminals, inserting connections and bolts are firm enough

9.2 The traction machine and brake connection

The machine electrical connection component as follows: electrical, grounding, thermal resistance, brakes (including micro-switches), all of them in the terminal box. The terminals' connection is as below:



Motor connection

The power of the traction machine is supplied by driver, and the U、V、W terminals should be connected with the output terminals of driver. If the machine can not rotate, change any two terminals between U、V、W. The shield of driver and the traction machine should have good earthing.

Connections of brake

The brake standard supply voltage is DC110V.

The brake micro switch connection diagram as above.

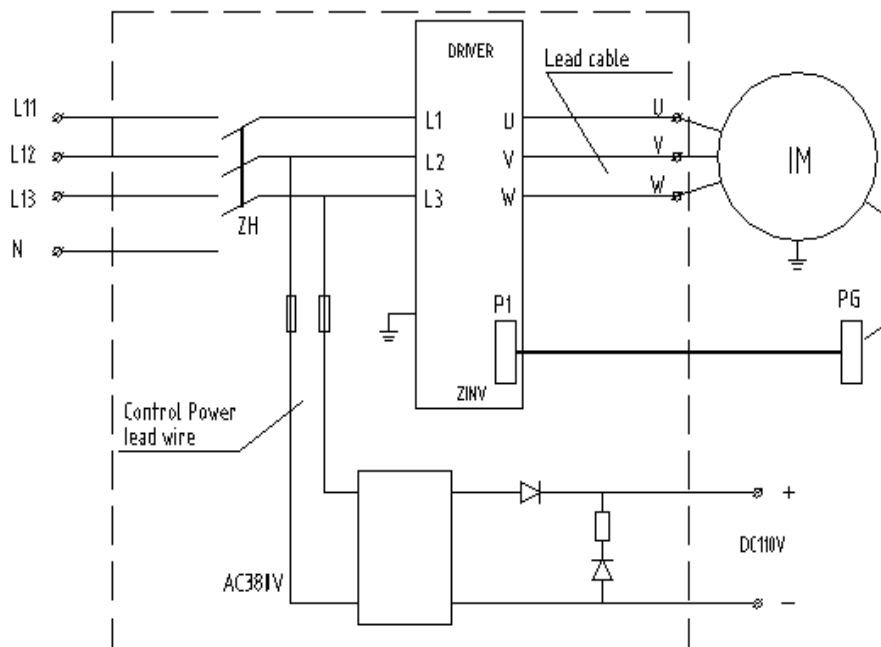
NTC-thermistor



(Caution): The thermocouples installed in the winding such as NTC thermistor detectors and thermostatic switches must be evaluated in the control system or frequency converter to protect the motor from overtemperature. The operating voltage of the NTC thermistors is not allowed to exceed 15VDC.

9.3 Circuit diagram

The following figure is the electric connection of the Traction Machine:



-The box in dotted line means the component should be provided by user

9.4 Earthing

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



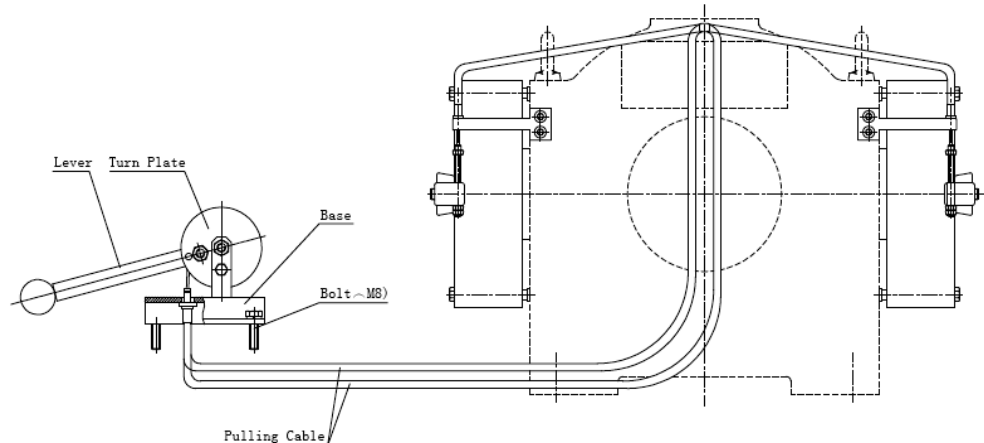
(Warning) Use the earthing screw provided on the housing! In addition, connect the protective or earthing conductor in the terminal box.

• 10. Installation and application of long-distance releasing device

The elevator can be lifted through long distance releasing device to save passengers if the power is off or other faults happen. There should be two qualified people to do this. First of all, make sure the power is off, and then do as the following methods.

10.1 Installation

- 1) Spread the steel cable.
- 2) Install the supporting bar
- 3) According to the above drawing, put the steel cable inside the support of the bracket, and put flexible pin into one small round through hole, to stop the steel cable from slip off the support.
- 4) Put the pulling cable through the lever, enclose with washer, screw nut(M6), frap the steel cable.
- 5) Use screw(M8) and spring washer to fix the base on a adequate strength seat



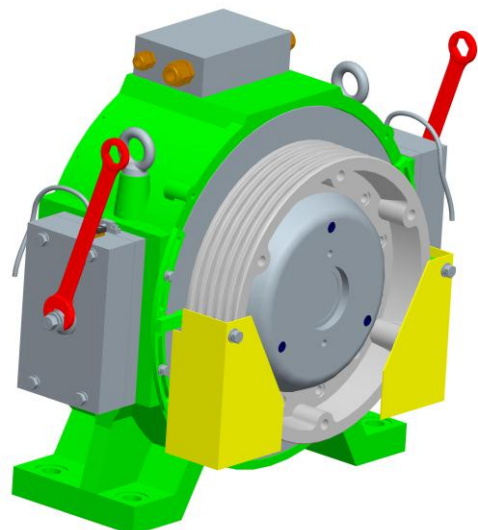
(Warning) There should be some space leaving for curvature of pulling cable on fixing base (bending radius not less than 200mm)

10.2 application

- 1) Remove bolt for locking plate.
- 2) Pull the lever upward, the lever rotates and the brake acts then the traction sheave can be rotated.
- 3) After releasing operation, lock the turn plate with bolt for locking plate in case of suddenness releasing. If releasing results is not as expected, adjust nut(M6) little by little to get releasing function.

10.3 Notice

- 1) When fixing the long-distance releasing device, make sure the pulling cable arranged reasonably and glidingly, with no twist and knot or other situations affect torque transporting. If there need curve the cable, curved radius less than 400mm is advised.
- 2) The user should leave enough space for avoiding the curved radius too small when fixing the releasing base. The curved radius of pulling cable in this place should be less than 200mm, otherwise the release will be hard or even can not release and the cable broken.
- 3) The early fasten force of pulling cable cannot be too high, which can release but won't affect brake torque is ok. If it is too high, this may reduce the brake torque even makes the brake out of work.



Notice: If no especial request ,the PM gearless traction machine which model is above WJ-630 without long distance release device. In emergency relief you can use the two 27th wrench which were randomly taken to turn the brake as the follow diagram.It can open the brake,and also you can use UPS spare power to release brake, slowly roll back and make the car to leveling location.



(Warning): When emergency relief please ensure the system power is off.

When emergency relief make the PM traction winding at the short circuit stage.

• 11. Motor maintenance

11.1 Bearing Maintenance

The traction which is above the WJ-800 model and traction ratio 2:1, adopt open bearing, need customers do maintenance work periodically.

- 1) The bearing of traction sheave end was injected by Shell Gadus S3 V220C 2 grease, when doing maintenance work; customers should inject the same kind of grease.
- 2) Customers can inject grease through grease cup. When injecting grease, customers should remove the screw plug on oil vent hole and protect from dust inside the cup. Each time injects 45g grease (advised), which can last about 1 year.
- 3) The back bearing is double sealed bearing, which does not need to maintain.

Traction machines of 630kg, 2: 1(320kg, 1: 1) and below the traction sheave end bearings are double sealed bearings too, which do not need to maintain.

11.2 Dealwith short circuit of traction machine

Short circuit is that short the winding when the machine stops running. Which makes the machine more safety and reliable when stopping.

General short circuits as follows:

- 1) The circuit and the driver use the same connector's usually open contact and usually close contact respectively, without delay circuit. This kind of short circuit contains some safety hidden trouble. For example, when the elevator is running at high speed, the safety circuit is turned off or the electric power is sudden off but without emergency source, at this time the driver has no output, then the short circuit will be on work, and the current inside the machine will be very high. This high current will then produce high torque, which will cause serious damage to the machine or operator. In case of such serious situation, UPS emergency power is advised on elevator.



(Warning):**Prohibit to use this short circuit**

- 2) The output of the driver connector and the short circuit connector separated, and with some delay circuit. When the elevator is running at high speed, the safety circuit is turned off or the electric power is sudden off but without emergency source, the brake will act then the machine's speed is slower, after that delay, the connector for short circuit will act. This will avoid the serious damage to the machine, and ensure the safety of the elevator.

11.3 Notice

- 1) Keep the machine room clean and dry.

- 2) Keep the traction machine clean.
- 3) Affirm the brake system is reliable and fray or not.

• 12.Install and adjust the brake

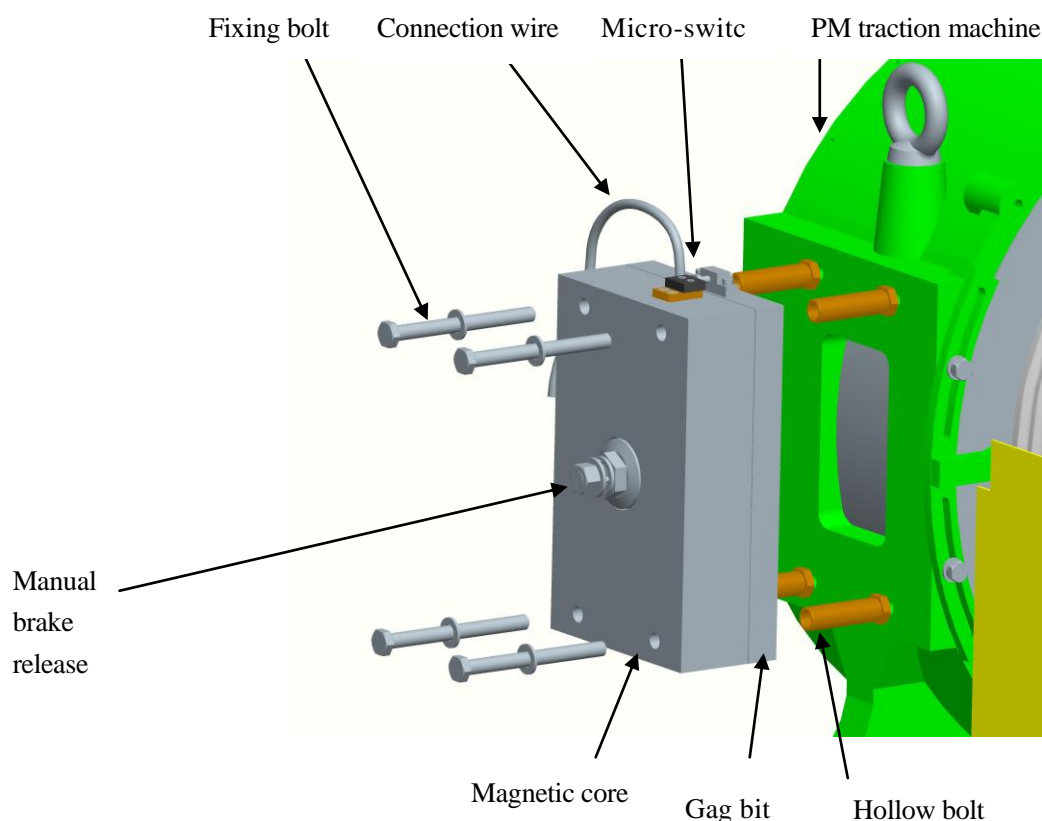
12.1 Notice

- 1) Before you instal, use and maintain brake, pls. read this manual be carefully to avoid wound or damage equipment, it is necessary to ask qualified trainer to operate this part.
- 2) According to model number and label instruction to connect power and voltage correctly.
- 3) Prohibit to install or maintain brake while power on.
- 4) Prohibit to maintenance while machine running.
- 5) Tension is prohibited between the connections wires.
- 6) Please avoid any grease or oil onto brake pads, otherwise, the brake torque will be dropped dramatically.
- 7) The temperature of brake surface is pretty high, be care to scald.

12.2 Working conditions and environment

- 1) The air temperature of machine room need to keep between 0 to 40℃
- 2) The biggest frequency allow to swift is 240F/h
- 3) Insulation temperature is F class, 155℃.

12.3 Configuration of the brake



12.4 Type and parameter

Brake main parameter

| Specification Item | Brake model | | | | |
|-------------------------------|-------------|-------------|-------------|-------------|-------------|
| | DB1-310-200 | DB1-360-300 | DB1-445-500 | DB1-445-600 | DB1-495-750 |
| Traction model | WJ-320- | WJ-450- | WJ-630- | WJ-800- | WJ-1000- |
| Single arm brake torque | 200Nm | 300Nm | 500Nm | 600Nm | 750Nm |
| Brake wheel max. speed | 5m/s | | | | |
| Adjust air gap | 0.3-0.4mm | | | | |
| Tear limit air gap | 0.5mm | | | | |
| Torque for fixing bolt | 35-40Nm | | | | |
| Mechanism protection grade | IP10 | | | | |
| Coil protection grade | IP54 | | | | |
| Micro switch protection class | IP67 | | | | |
| Environment temperature | 0-40°C | | | | |



(Notice): The friction pad would abrasion after using for sometime, when air gap comes to 0.5, pls. adjust hollow bolt to make air gap reach to $0.35 \pm 0.05\text{mm}$.

12.5 Adjust the brake

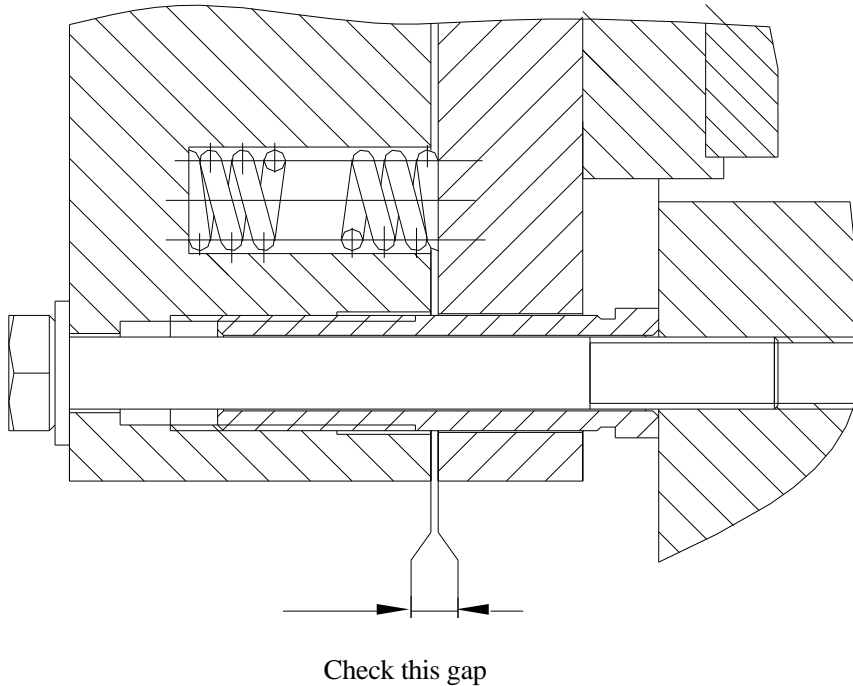
1. Air gap adjustment

Install brake to machine, it need to adjust air gap, instruction as below:

Screw bolt, torque is about 15-20Nm, use feeler to check between gag bit and iron core, see below drawing:

- 1) If the gad is little too big, use the 16mm spanner anticlockwise rotate the fixed blot of about 30° to make the blot a little bit loose, then use the 18mm spanner to rotate the blot anticlockwise to make the blot turn into the coil iron core, then rotate the fixed blot clockwise to make it fixed. Use feeler to exam the gad and see whether it meet the standard.
- 2) If the gap is too small, use the 16mm spanner to rotate the fixed blot 30°-- 40 °to make the blot a little

loose, then use the 18mm spanner to rotate the blot clockwise to make the blot withdraw from the coil iron core, then rotate the fixed blot clockwise to make it fixed. Use the feeler to exam the gad and see whether it meet the standard.

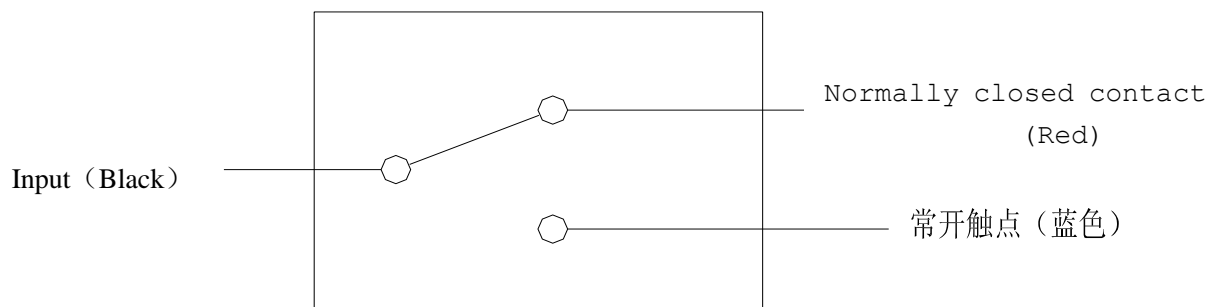


(Notice): Rotate the hollow blot slightly, screw down the 4 fixed blots.

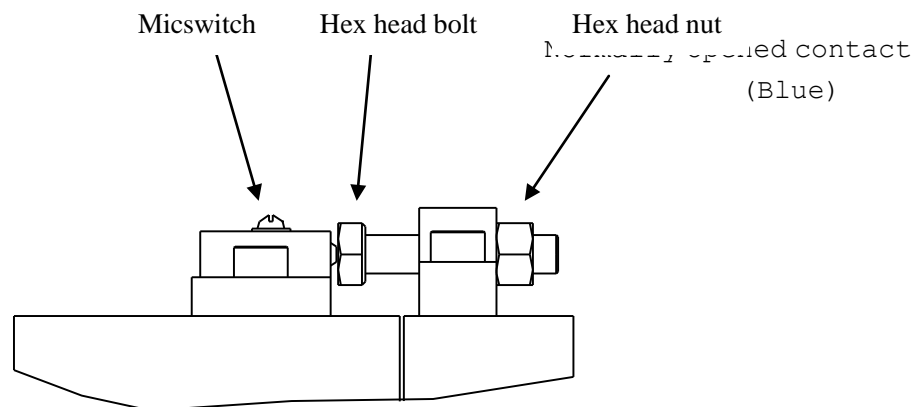
The friction pad may have the abrasion after using for sometime, the air gap will be larger, when the air gap comes to 0.5, please adjust the air gap and make it reach to $0.35 \pm 0.05\text{mm}$.

2. Adjustmetn to the micro switch

1) Micro switch connetction diagram



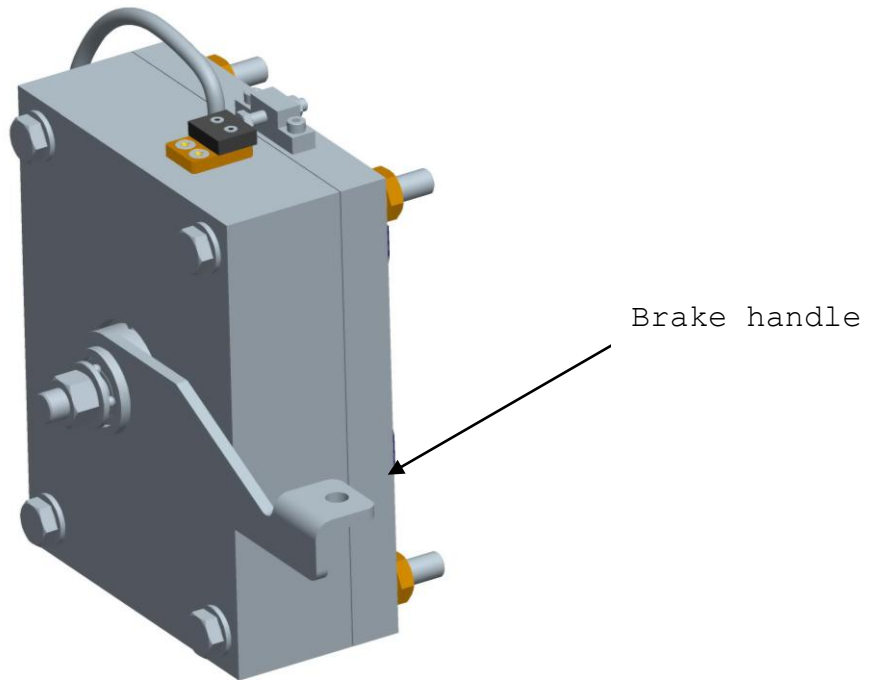
2) Micro switch adjust and function test
see the below picture:



- 2.1). If it is the first time to adjust the micro switch, please rotate the hex head blot to the switch side, until it touch the contactor of micro switch.
- 2.2). Put the 0.12mm feeler between the switch contactor and the hex head blot.
- 2.3). use the luminotron to test and see whether the black wire and the blue wire is connected, if the light is un-light, then rotate the hex head blot to the switch side to make it light, then turn to the other side to make the light un-light, screw down the hex head nuts to fix the hex head blots.
- 2.4). Electrify the brake, make sure the indicator light is power on, when the brake electricity is cut off, the light is power off.
- 2.5). Take out 0.12mm feeler, put the 0.16mm feeler between the micro switch and the hex head blot, then electrify the brake→ indicator light power on, cut off the electricity→ indicator light un-lihgt.
- 2.6). Take out 0.16mm feeler, and use the 0.12mm feeler to exam, electrify the brake→ the indicator light power on, cut off the electricity of the brake→ indicator light is power off.
- 2.7). Put the 0.25mm feeler between gag bit and iron core frame, electrify the brake→ indicator light.
- 2.8). Lacquer every fixed parts with the safety lacquer.


12.6 Application of long-distance releasing device


- 1) For item DB1-360-300 below brake, could collocate long distance release device, see below picture, outline drawing as below, Insert the steel cable into the hand lever of the remote releasing device, move the hand releasing lever to achieve the brake release.
- 2) For item DB1-445-500 above brake, didn't provide long distance release device, therefore, you could use two "27" spanners which with machine when we sold, rotate and open two brakes separately while in emergency rescue, you could also use UPS spare power to release brake, slowly roll back and make the car to leveling location.




12.7 Maintenance

- 1) Fixed check the air gap between brake gag bit and electric magnetic core, if the gap bigger than 0.5, need to adjust it.
- 2) At least remove brake coil and check 5 years a time.
- 3) Fixed check brake job time.

 (Notice): If adjust brake both sides at the same time, should put up the car in empty loading and sit on the buffer to avoid roll back!

 (Notice): If the car didn't sit on the buffer and would like to adjust brake torque and open brake gap, should adjust brake each side separately.

 (Notice): Before normal working or electrify testing, should put open brake spanner in place.

12.8 Testing the brake system to EN81-1

1) Overload

The brake system should be tested by interrupting the power supply to the motor and brake system with the car moving downward at rated speed and 1.25 times the rated load. The brake system must be capable of

decelerating the car. (According to EN 81-1 clause 12.4.2.1)

2) Failure of one half brake

If one half brake fails, the brake system must still be capable of decelerating the car sufficiently during its downward travel at rated load and rated speed.

When simulating the failure of one brake, the other brake must be kept open separately, even if the safety circuit is open. This should preferably be done using suitable electric circuitry, but also be performed manually. (According to EN 81-1 clause 12.4.2.1)

This state must not be maintained in long term.

Note: Observe the lift during this test. If it does not decelerate, close the open brake circuit immediately.

12.9 Trouble shooting

1). Brake coil over heat

1.1). Check whether inter-turn is short-circuit, if so, change a new brake.

1.2). Check whether relay contact in controller burnt out or not, if so, handle it in time due to brake working duty is S5-40% which unable to electrify in a long time.

2). Brake friction rotor

2.1) Check whether hollow bolt is closed to frame or not

2.1.1) If not, please use 18mm spanner clockwise rotate hollow bolt and make it closed and fasten. Using feeler to check whether air gap could meet the requirement, please refer to 11.5 items which show you how to adjust air gap, then electrify, problems used to resolve.

2.1.2) Hollow bolt closed to machine frame without loosen, need to check whether air gap is too narrow, if so, adjust it and refer to 11.5 item which show you how to adjust air gap, then electrify and check again.

3). Brake over noise

3.1) Check whether air gap is too large, if so, adjust it and refer to 11.5 item which show you how to adjust air gap, then electrify and check again.

3.2) Check the continued flow loop resistance R whether it is too large, if the release time is meet, the resistance can be reduced under the premise, the noise can be reduced.

4). Brake unable to closing.

4.1) Check whether input voltage is rated voltage, if lower than rated voltage, adjust input voltage.

4.2) Check whether there is magnetism after electrify, could use spanner etc. some tools to check it.

4.3) Check whether air gap is too large, if so, adjust it and refer to 11.5 item which show you how to adjust air gap, then electrify and problems used to resolve.



(Notice): **Adjust and maintain hollow bolt and fixing bolt at the same time**