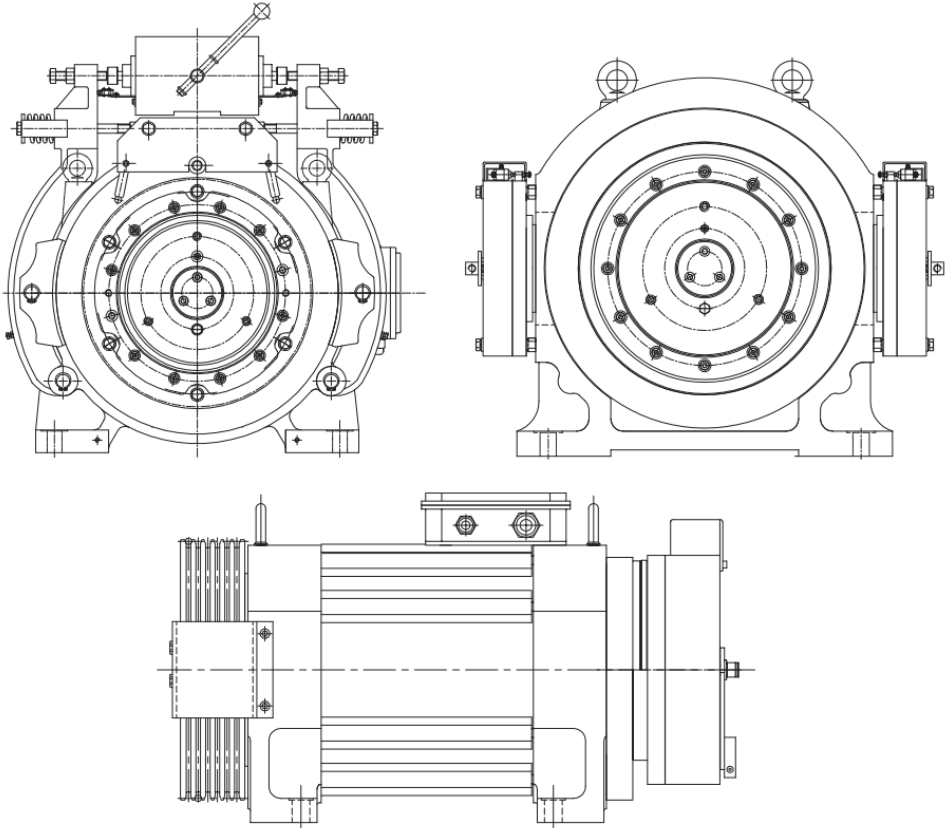


OMARLIFT

PM GEARLESS TRACTION MACHINE USERS MANUAL



Thank you for choosing our gearless traction machine.

- Please read this manual carefully before using the product.
- Wrong operation may cause reduction of machine lifetime, property loss or casualties.
- Please keep this manual well.

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Foreword

Thank you for choosing our gearless traction machine.



Please read this manual carefully before use this product. Wrong operation may cause reduction of machine lifetime, property loss or casualties. Any operation must refer to this manual.

In addition, any emend of this manual will not be notified.

General Safety Instructions

Please read this manual carefully before transportation, installation, connection, maintenance and know well with the safety instructions.

There are two safety attention grades in this manual.

 Caution	Wrong operation may cause property loss or injuries.
 Danger	Wrong operation may cause property loss or casualties.

Danger

Only qualified personnel who must be trained for the job and must be familiar with the installation, assembly, commissioning and operation of the product are authorized to perform any planning, installation or maintenance work and this must be done in accordance with the relevant instructions such as EN81.1 (Safety rules for the construction and installation of lifts).

We do not accept any warranty or liability claim for personal injury, property loss and product quality problem caused by improper operation.

Features and Working Principle

The advantage of our traction machine :

- Eco-friendly
- Low Noise
- Constant Torque
- High Efficiency
- Smart Size
- Widely Used
- Stable Operation
- Energy Saving
- Safe and Reliable

■Features of PM Gearless Traction Machine

Our gearless traction machine has been designed for various capacity and speed which meet different customer's requirements.

It is a mechatronics product which can be divided to internal rotor structure and external rotor structure. It consists of stator, rotor, brake and encoder.

The traction machine is assembled with silicon-steel lamination which insulation is F class. We use Neodymium iron boron (NdFeB), the best material for magnet.

The traction sheave is cast by nodular iron and which type is QT700-2.

The protection class of traction machine is IP41 for WTD1 and WTD1-B series, IP40 for WTD2-P series; Noise class ≤ 55 dB; Acceleration vibration ≤ 0.45 mm/s.

The traction machine mainly consists of stator frame, stator core, rotor, traction sheave, brake pad, brake and encoder. The stator core is fixed to the stator frame.

The traction sheave is assembled into the rotor and there are 20 poles of magnets are evenly distributed to the rotor.

To fix the rotation shaft and the rotor together and fix to the stator frame through the bearing. The traction sheave is assembled to the front of the rotation shaft which is the critical part to bear the whole weight of the lift. Encoder will be assembled to the back of the shaft. Power supply wiring and temperature controller are fixed inside the traction wiring connection box.

It achieves the brake function through the contact between friction plate and brake wheel.

■Working Principle of Traction Machine

The working principle of gearless traction machine is that to output the torque to traction sheave through the permanent-magnet synchronous motor, and then to drive the cabin through the friction between traction sheave and ropes. When the elevator needed to be stopped, the brake will stop the brake wheel through the brake pad to keep the cabin from moving.

Working Condition of Traction Machine

Caution

To make sure machines must be used under below working conditions.

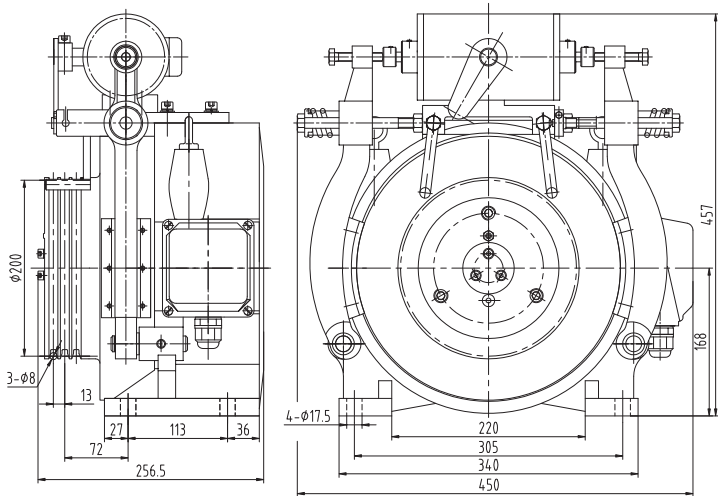
- The height above sea level no more than 2000 meters.
- Working temperature 5~40°C, relative humidity under 90%.
- Deviation between supply voltage fluctuation and rated voltage should within $\pm 7\%$.
- No corrosive, flammable and explosive gas in the working environment.
- Ropes and traction sheave grooves must keep clean.
- Wrap angle and counter weight must meet the requirement of rules 9.3.1 of EN81.1.
- Traction machine power should be supplied by control system and its rated parameter should be subjected to the machines nameplate. Do not supply the power to the traction machine directly in case machines damage.

We do not accept any compensation for machines damage caused by not use the machines under the above working condition requirements.

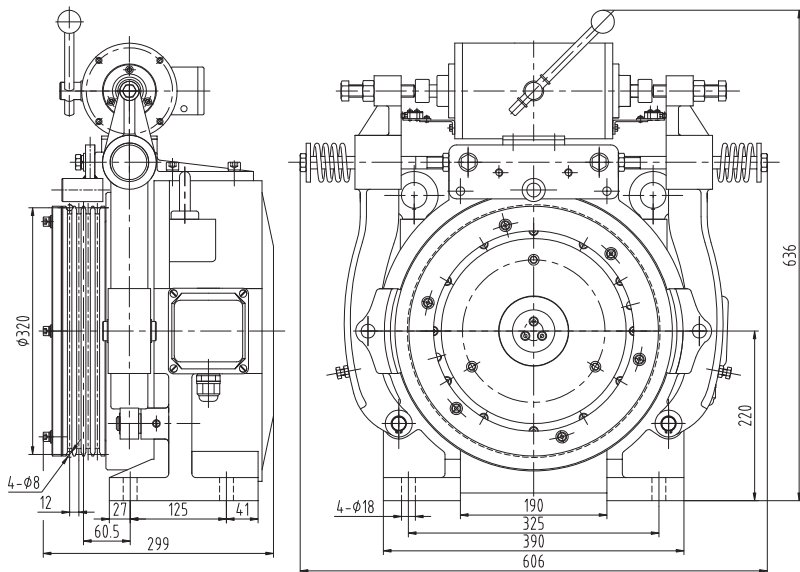
Product and Parameter

Please contact our sales personnel or read the traction machines nameplate for the relevant model number and technical parameter.

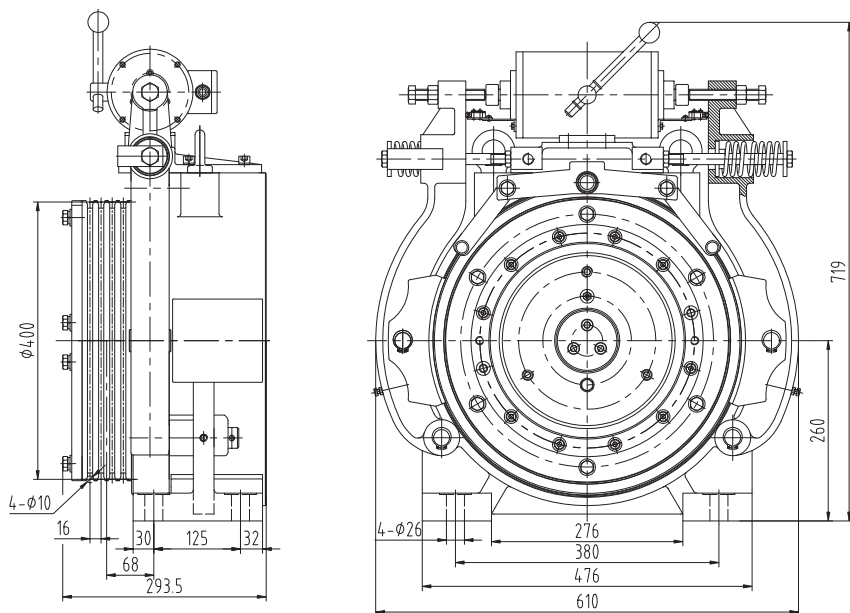
Dimension Drawing of G Series Machine



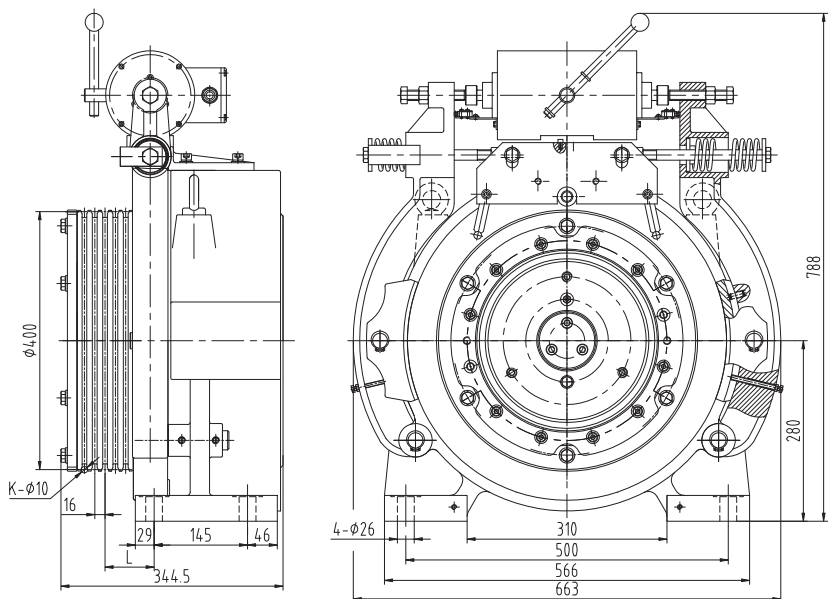
320~450KG Home Lift Series



320~450KG Series

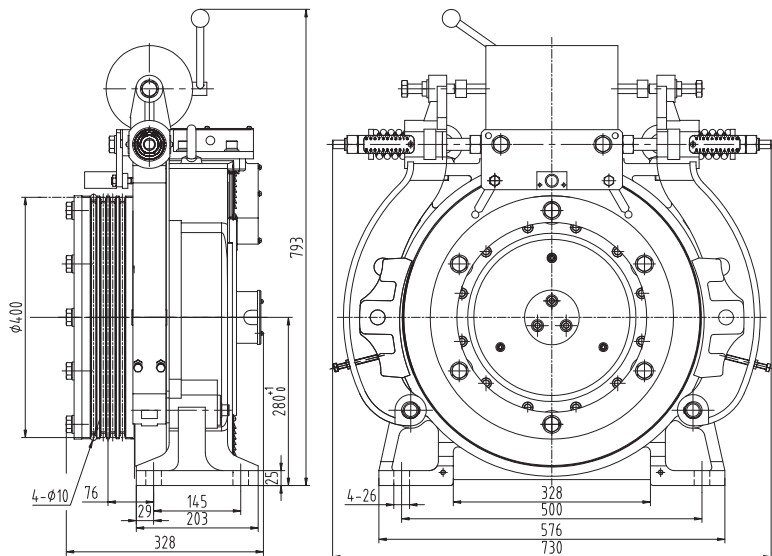


630KG Series

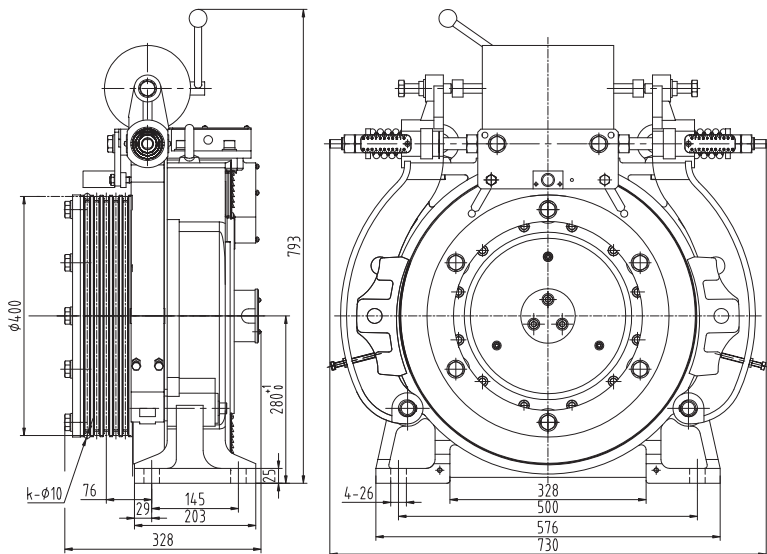


Notice: when K=5, L=76 ; when K=6, L=84

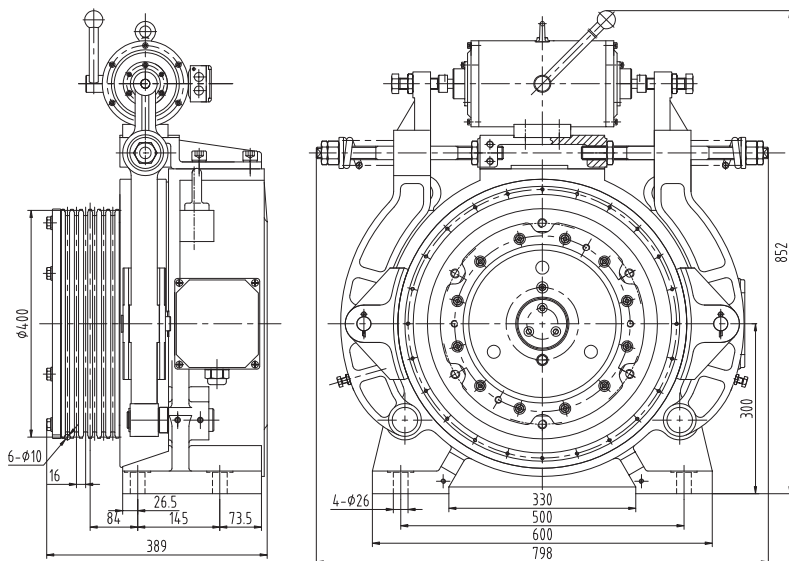
800~1000KG Series



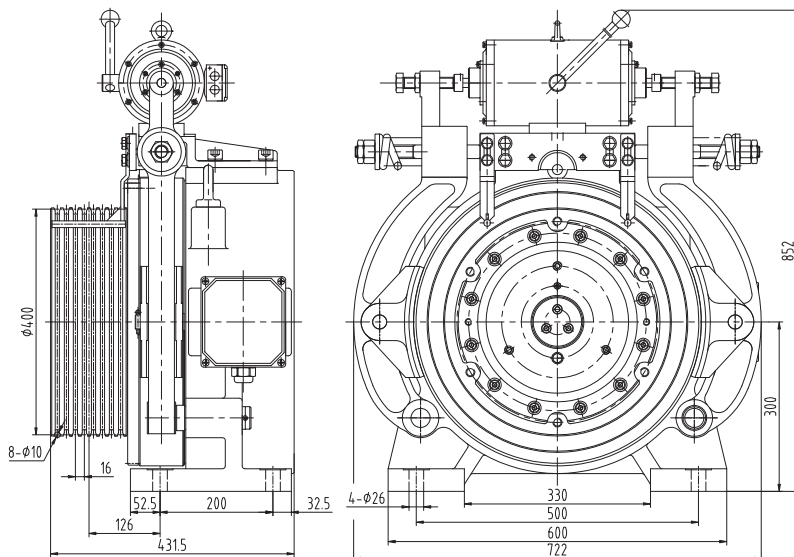
630KG (G1) Series



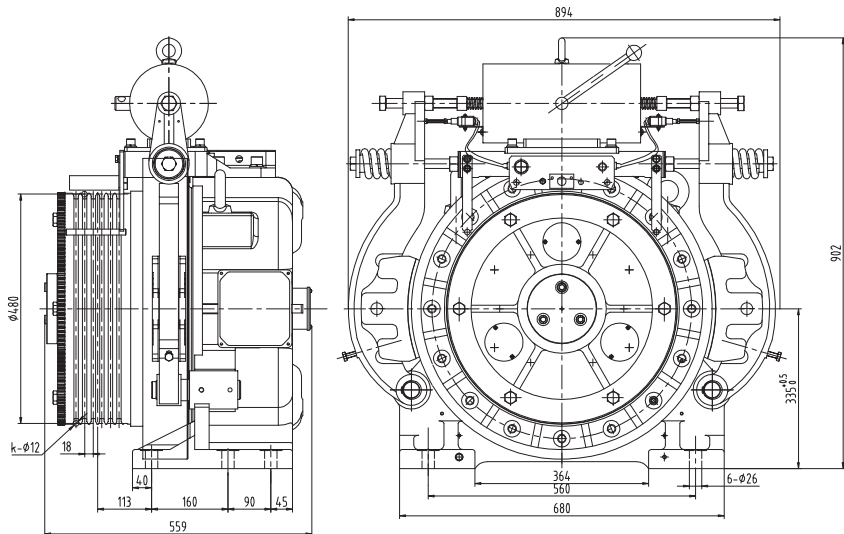
Notice: when K=5, L=76 ; when K=6, L=84
800~1000KG (G1) Series



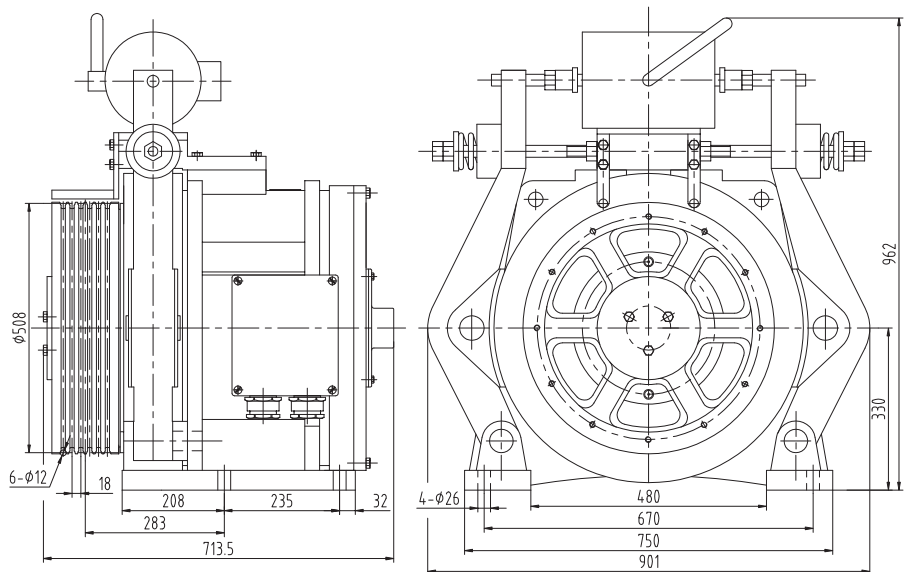
1150~1250KG Series



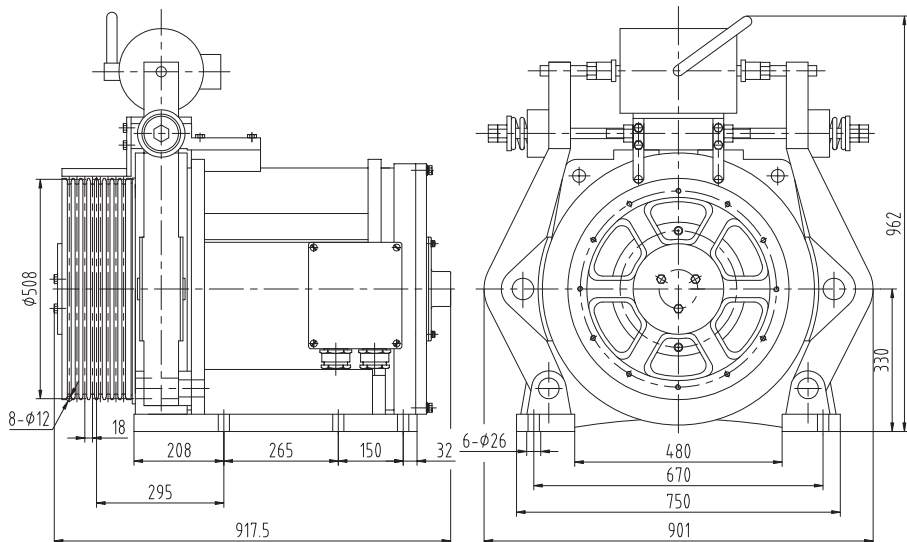
1350~1600KG Series



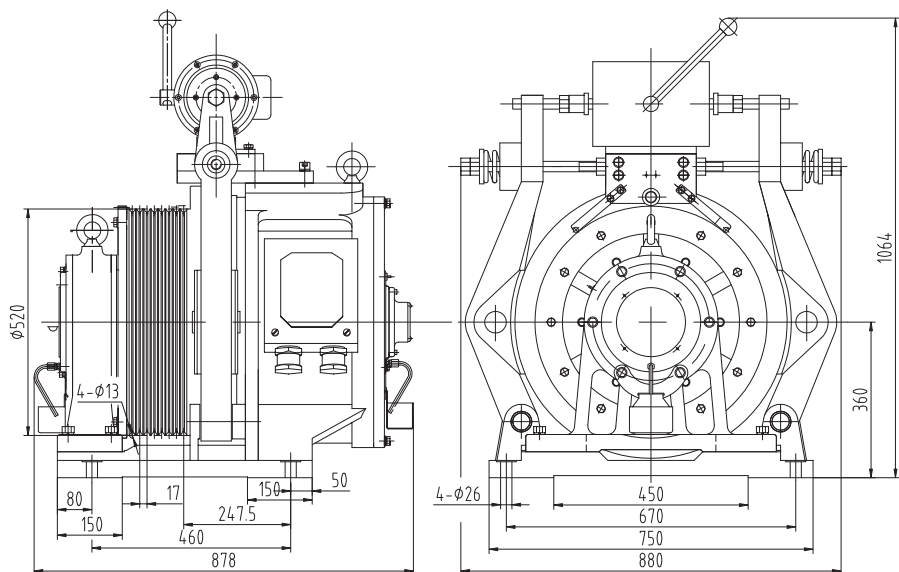
1600~2500KG Series ($\phi 480$ mm)



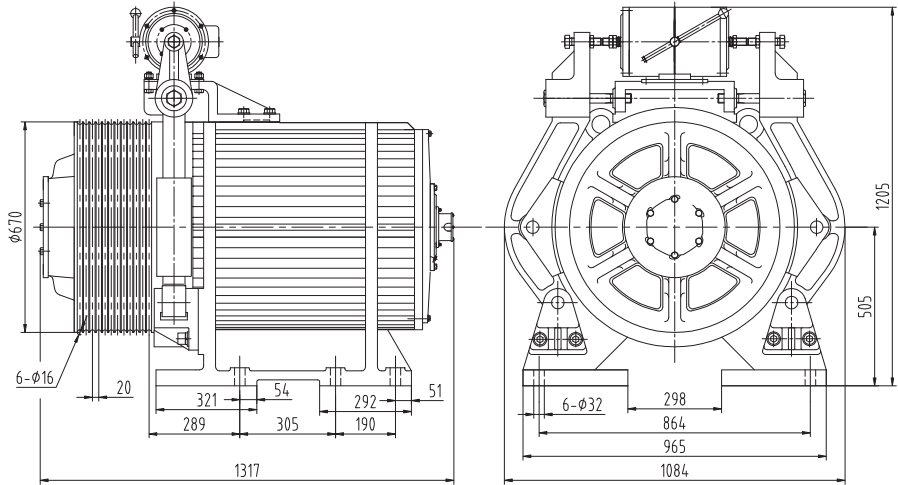
1600~2000KG Series ($\phi 508$ mm)



2500~3000KG Series



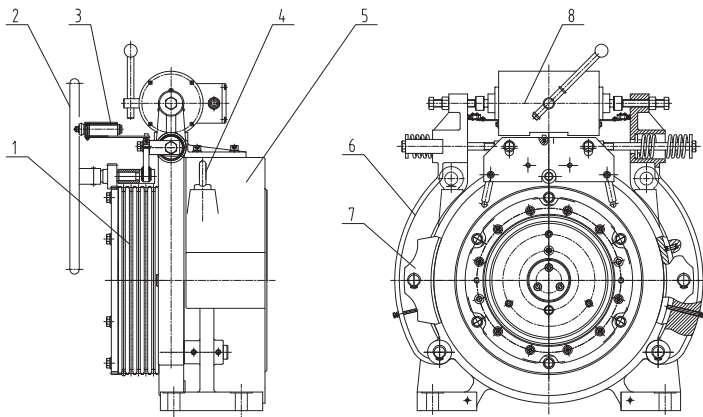
1000~1600KG High Speed Series



1600~2000KG High Speed Series (1:1)

Notice: Please contact our sales personnel for unlisted models and drawings.

Parts of G Series Traction Machine



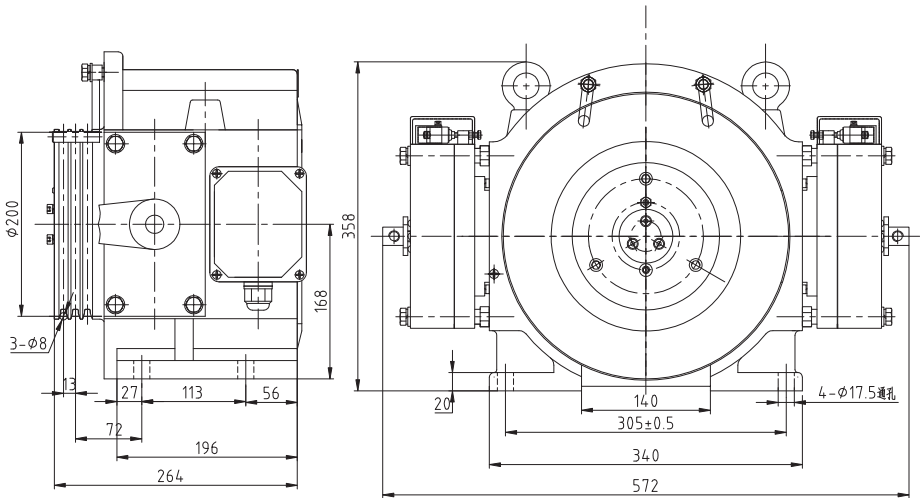
1. Traction Sheave
5. PM Traction Machine

2. Hand Wheel
4. Lifting Bolt

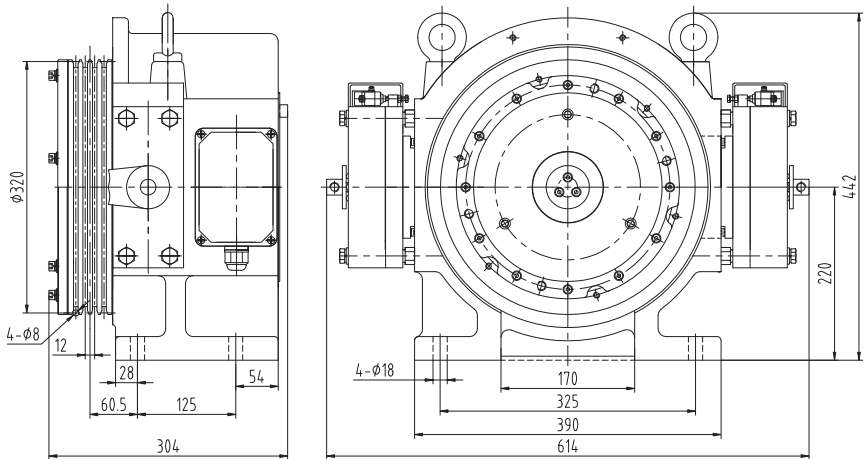
3. Handle Switch
6. Brake Arm

7. Brake Shoes
8. Brake

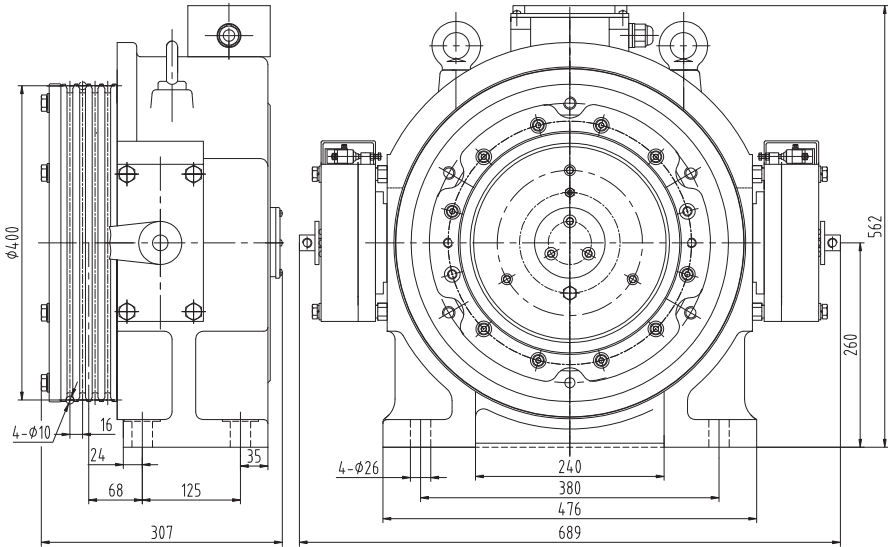
Dimension Drawing of K Series Machine



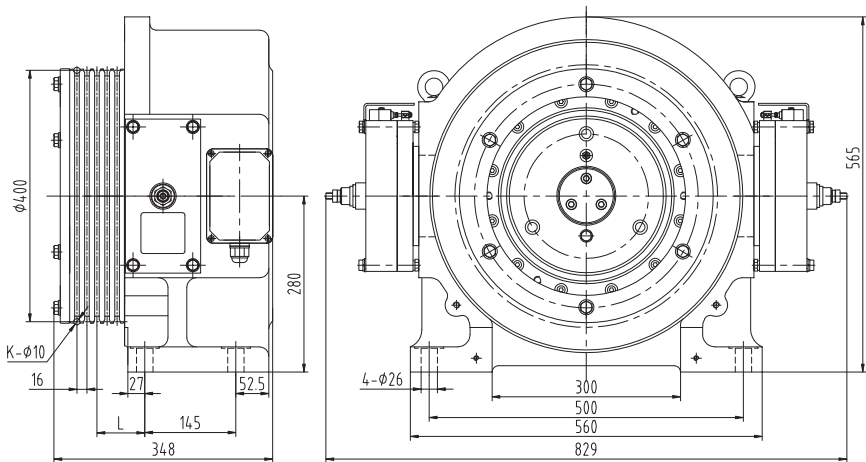
250~450KG Home Lift Series



320~450KG Series

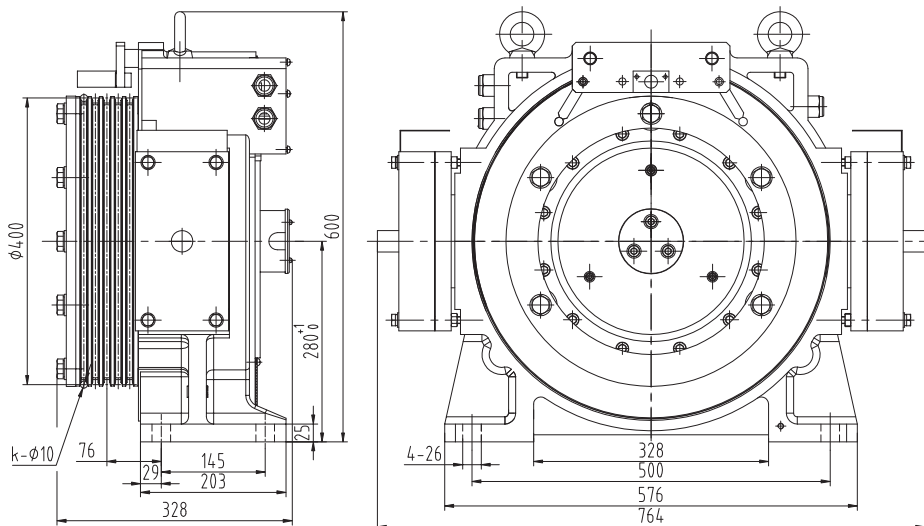


630KG Series

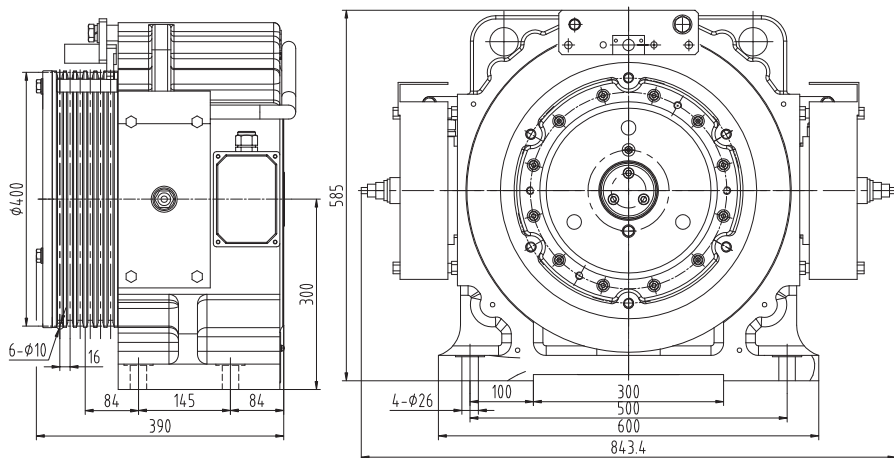


Notice: when K=5, L=76; when K=6, L=84

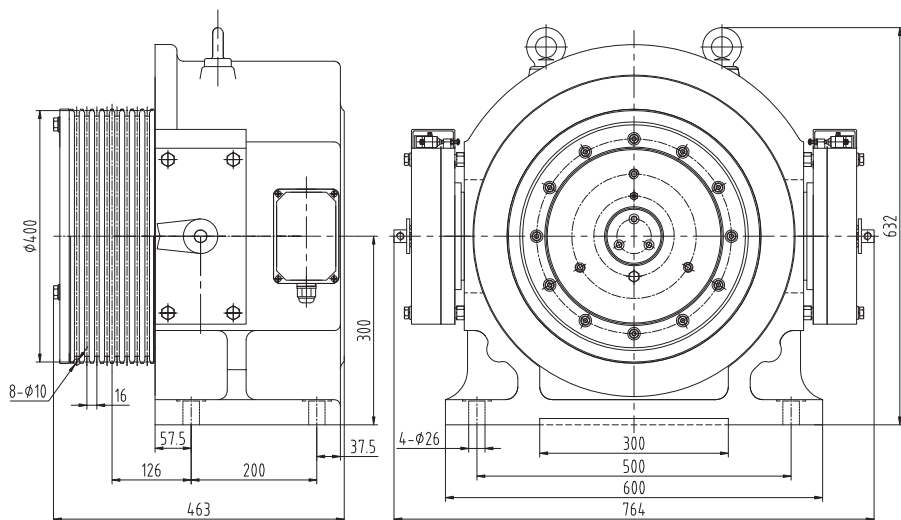
800~1000KG Series



Notice: when K=5, L=76 ; when K=6, L=84
800~1000KG (G1) Series



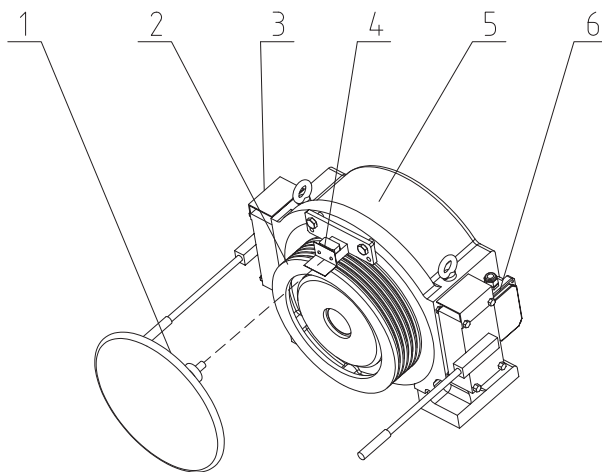
1150~1250KG Series



1350~1600KG series

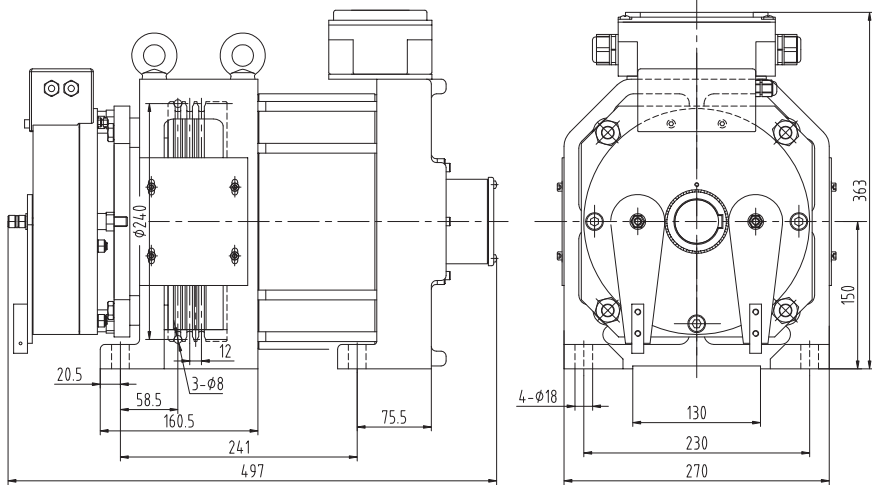
Notice: Please contact our sales personnel for unlisted models and drawings.

Parts of G Series Traction Machine



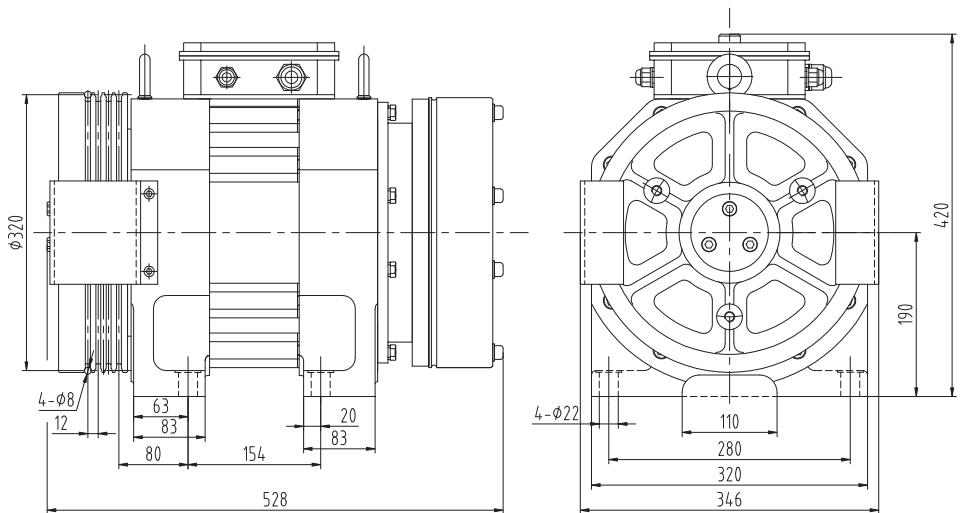
- | | | |
|------------------|------------------------|-----------------|
| 1. Hand Wheel | 2. Traction Sheeve | 3. Brake |
| 4. Handle Switch | 5. PM Traction Machine | 6. Terminal Box |

Dimension Drawing of Disk Brake Machine

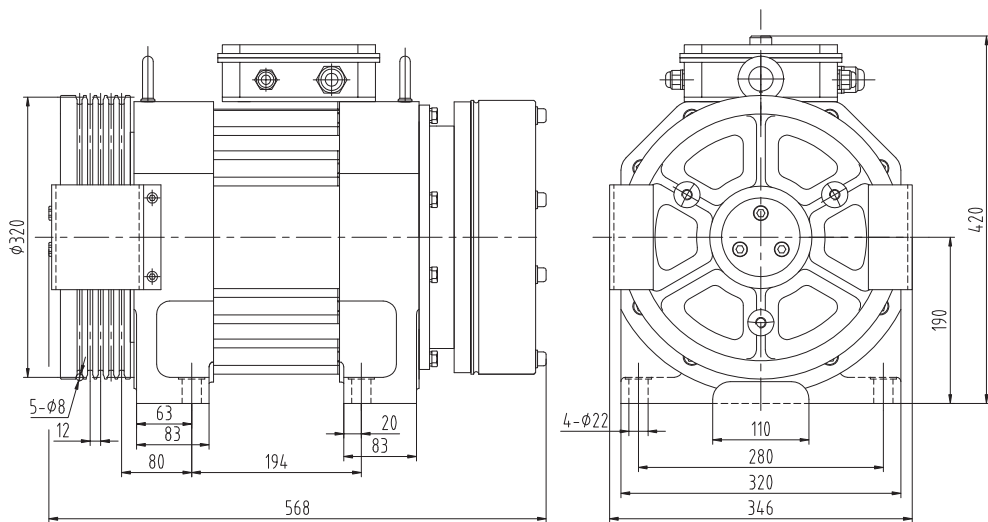


Notice: traction sheave could change to 200mm.

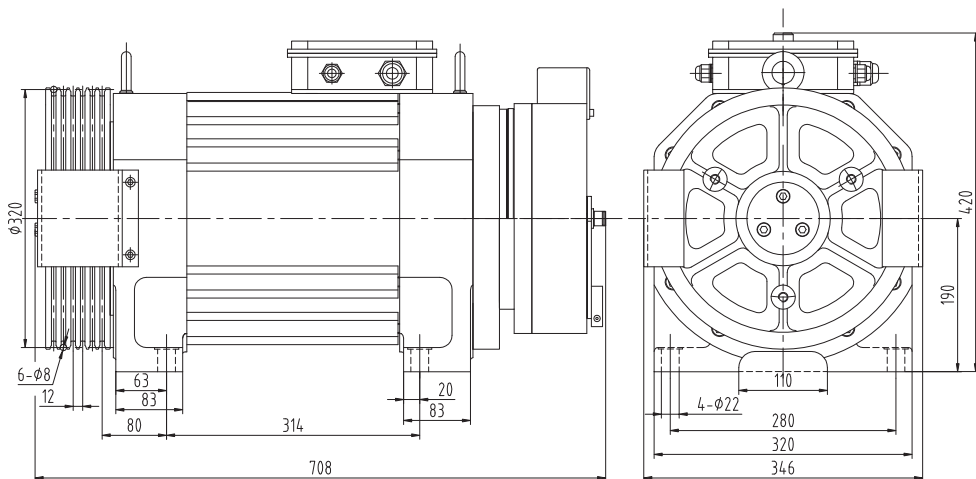
250~400KG Home Lift Series



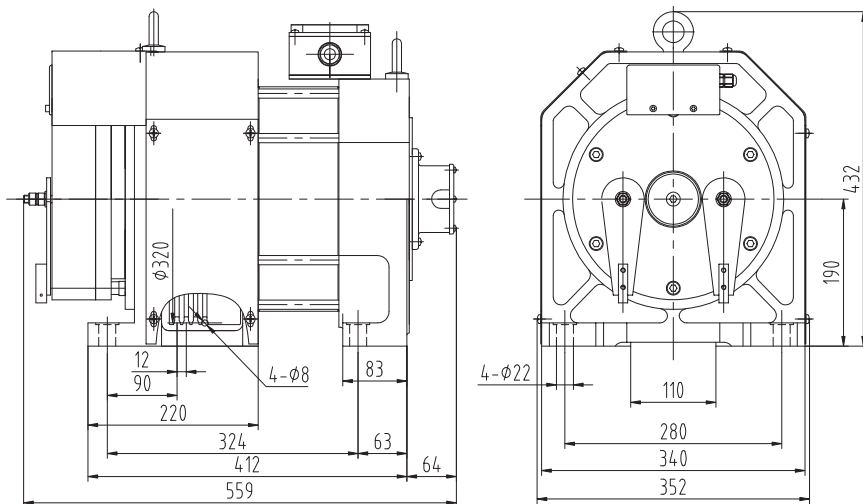
320~450KG Series



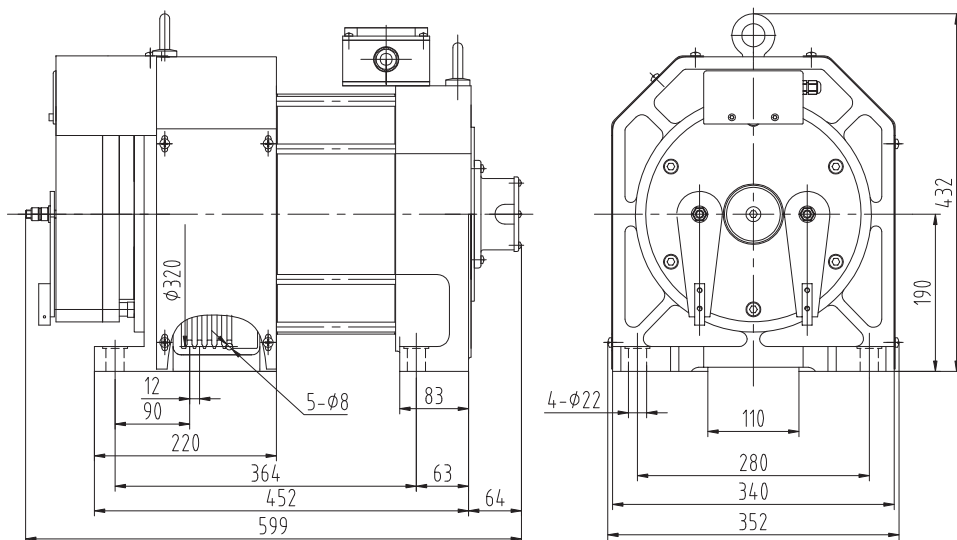
630KG Series



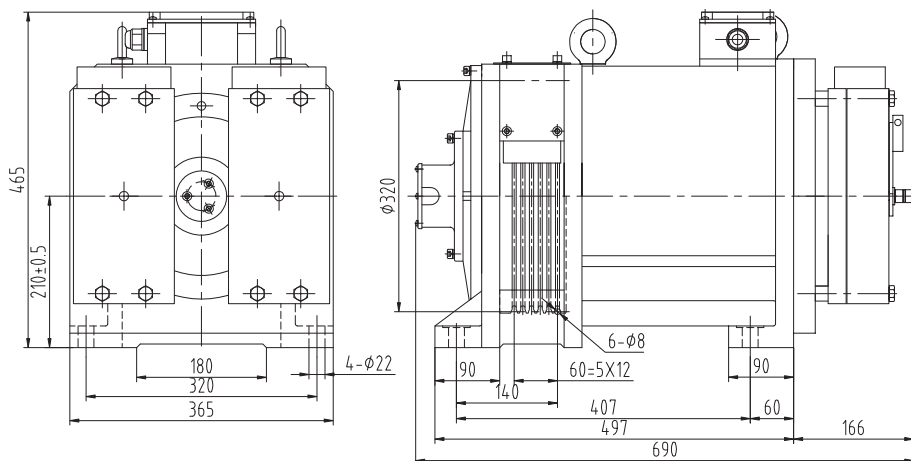
800~1000KG Series



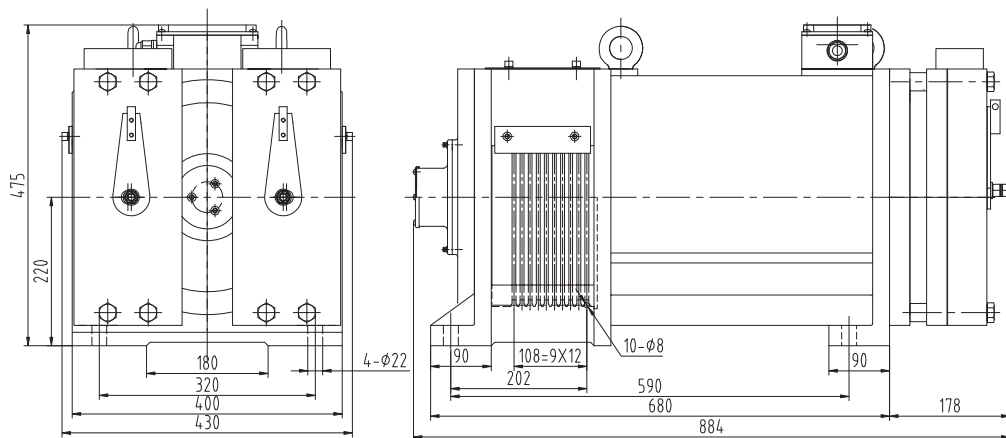
320~450KG (P1) Series



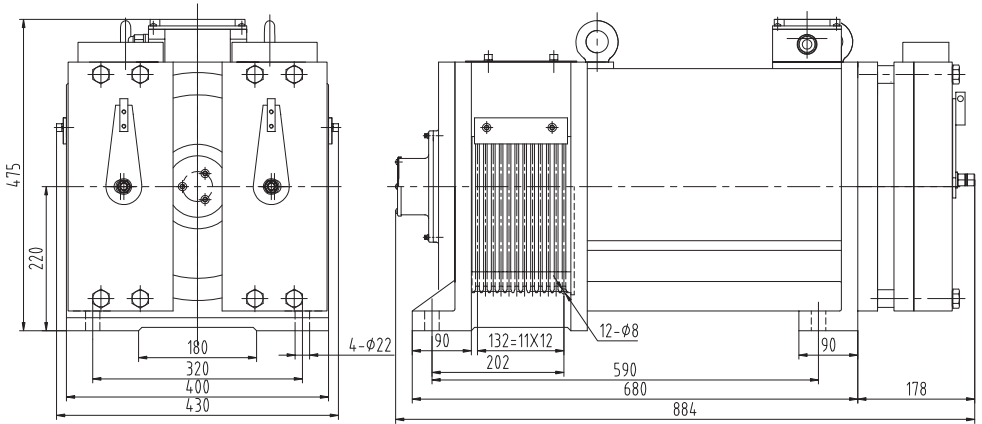
630KG (P1) Series



1000KG (P1) Series



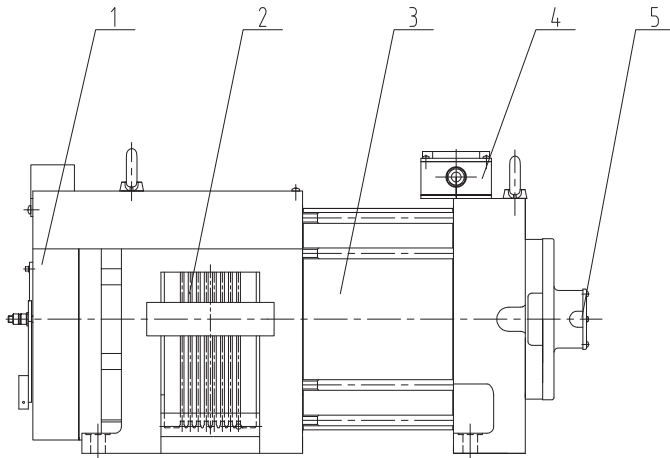
1150~1350KG Series



1600~2000KG Series

Notice: Please contact our sales personnel for unlisted models and drawings.

Parts of P Series Traction Machine



1. Brake

4. Terminal Box

2. Traction Sheeve

5. Encoder

3. PM Traction Machine

Transportation, Storage and Installation

Caution

Please arrange the transportation, storage and installation of the traction machines according to the following rules.

- Please transport the machines according to the shipping/transportation marks.
- Machine should be stored in sealed, dry, dust-free and ventilated place.
- Storage period no over than 6 months and inspection is needed if over than 6 months.
- Transportation and storage temperature $-25^{\circ}\text{C}\sim 55^{\circ}\text{C}$.

We do not accept any compensation for machines damage caused by improper transportation operation and storage.

Danger

Please lift and install the machines according to following rules strictly.

- Lifting bolt is designed according to the machines weight, please do not add extra load.
- Keep the machine steady while lifting and moving the machine.
- Be carefully while lifting and moving machines to avoid collision.
- The hoisting machines should be able to lift 1.5 times weight of the machine.

Cautions before Usage

Caution

All the machines must pass strict inspection before delivery. User should check is there any damage caused by transportation when machines arrive at the site.

Please contact our customer service immediately if there is any damage of the machines. Do not install the damage machines before our customer service confirmation. **Please inspect the machines as following rules before usage.**

- To check the nameplate is accord with the ordered machines or not.
- To check the accessories are not damaged or not.
- To check fasteners on the machines is being fastened well or not.
- To check the insulation resistance of the machines with 500V meg-ohmmeter, should be no less than $1\text{M}\Omega$.

We remark red color on the machines after we adjusted the brake torque well, if the red remark has been moved, please contact our customer service for adjustment.

Traction Machine Installation Instructions

Danger

Please check and calculate the carrying capacity of the machines frame and groundwork to make sure that can bear the load of the working traction machine. The machines frame should be strong enough to carry the weight. The groundwork should be flat and flatness no over than 0.1mm.

Please install the traction machines according to the following rules.

- Use four screws (strength grade no less than 12.9) to install machines on the frame.
- Adjust the distance of ropes-prevent pole and ropes are no more than 1.5mm after ropes are hanged to the sheave.
- Traction machines must be installed according to EN81.1 requirement.
- Traction machines should work in a ventilation environment.
- Traction machines should work in the environment according to the relevant requirements of protection class.

Electrical Connection

1. Electrical Connection Instruction

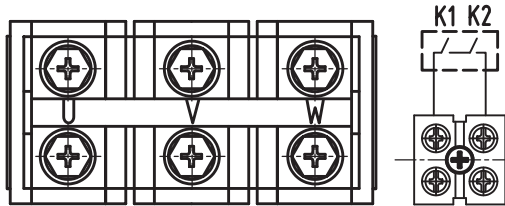
Danger

The electrical connection may only be made by a qualified electrician. All electrical connection must be done according to the following rules.

- Keep the connection box clean and dry.
- The connection terminals (wires) should be provided by our company.
- Make sure there is no short circuit of all the electrical parts.
- Make sure the terminals, connector and bolts are fastened.
- Please cover the connection box after finished electrical connection.

2. Circuit Connection

Traction machine must be earthed and there is earthed device inside the connection box. The power supply to the traction machines should be from transducer. Terminals U, V, W of the traction machines should connect to the transducer accordingly. Please select the correct connecting wire diameter according to traction machine rated current (Please refer to transducer instruction manual). Terminals K1 and K2 connected to a thermal switch in the stator coil and it can monitor the temperature raise of the stator.



Connection Diagram

3. Brake Connection

Caution

Please provide the power to the brake and connect the wires according to the brake nameplate and the requirements on the connection box. Any wrong connection might result in serious consequence such as brake burned and insufficient power.

4. Earthed Connection

Caution

The traction machines must be earthed. Please connect the earthed screws to the earthed wire in the connection box.

5. Encoder Connection

Caution

The traction machines must be supplied power by a transducer and it must work under closed-cycle control. And an encoder is need. The selection of encoder is different according to different transducer. Our company provides different encoders for customer selection.

Below are two kinds of encoders in common use.

5. 1 Sin-Cos Encoder

Sin-Cos Encoder as below picture is a standard configuration of our traction machines and we provide different connection wire to different transducers.

Heidenhain ERN 1387 Encoder
WETON EI58C9.25-2048-SA5N4T Encoder

Rated voltage: $DC5V \pm 5\%$

Rated current: $\leq 130mA$

Pulse count: 2048

Output type: sine and cosine



Heidenhain ERN 1387 Encoder

5.2. Impulse Type Encoder

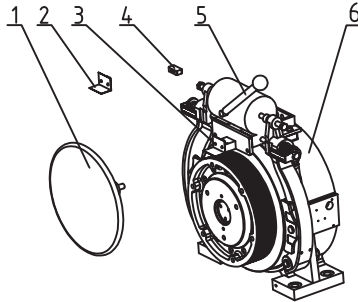
Impulse encoder is non-standard of our products. Please contact our sales personnel for more detailed information if needed.

Installation and Usage of Barring Device

1. Installation of Barring Device

According to standard requirements, our company will provide the barring device for MR type traction machines. It has been adjusted well before delivery. Users only need to fix the hand wheel to the required place. We had matched a micro-switch. User need to connect to the control system to cut off the power when need to use the barring device.

- 1.) Hand Wheel
- 2.) Micro-switch
- 3.) Fixed Bolt
- 4.) Micro-switch
- 5.) Release Handle
- 6.) Traction Machine



2. Usage of Barring Device

When person trapped in the lift due to control system error of power off, we should rescue the trapped person by well trained professional personnel according to following instructions.

- 1.) Cut off the main power supply in case of elevator moving and ensure the lighting in the cabin.
- 2.) Confirm the detailed location of the car.
- 3.) Remove the cover plate of barring wheel gear on the protection cover and fix the hand wheel.
- 4.) In order to prevent the car moving, two people should hold the hand wheel. And the third people give pressure to the release handle. In the process of releasing the brake, two people turn the hand wheel according to the direction the car need to go until the car moves to the nearest floor and then loosen the release handle to process the rescuing.
- 5.) Please take out the hand wheel and recover the cover plate after rescued.

Danger

Prohibited to use this device when not emergency rescue or maintenance by professional personnel.

- Should ensure the power system is off
- Please make the U, V, W to be a short circuit while emergency rescuing.
- We not match barring device for the traction machines that capacity is over than 2000KG (Roping 2:1) or capacity is over than 1000KG (Roping 1:1).

Installation and Usage of Release Device

1. Installation of Release Device

Our company will provide the release device for MRL type traction machines. It has been adjusted well before delivery and users do not need to adjust. Users can choose the release cable length according to its project situation.

Please follow the below instructions while used need to install the release device.

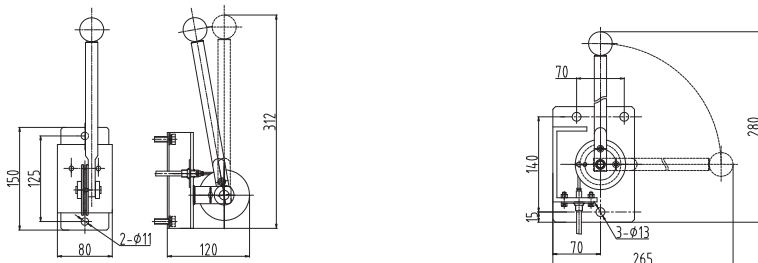
- 1) To ensure there is no twisting, knotting and quarter turn which might affect the release cable torque while installing the release device. If the cable needs to be turn, we suggest the minimum bending radius of the cable is not less than 400mm.
- 2) Adequate space is needed when install the brake release holder. To avoid the release cable bending radius is too small. Should ensure the release cable is at the place that the bending radius is not less than 200mm, otherwise it will difficult or even not able to achieve release function.
- 3) Release device can not be too stressed which is better to achieve releasing but not affect the traction machines brake torque function. Or it will counterbalance the brake torque which leads to the brake lose efficiency.
- 4) Please keep the brake release holder out of unprofessional people.

1. Usage of Release Device

When person trapped in the lift due to power off, we should rescue the trapped person by well trained professional personnel according to following instructions.

- 1). Cut off the main power supply in case of elevator moving.
- 2). Ensure the lighting in the cabin and confirm the detailed location of the car.
- 3). Demount thumbscrew on the remote release device.
- 4). Pull down the release handle and turn the release handle. When the brake works, and then turn the traction sheave to rescue.
- 5). After release operation finished, please lock the thumbscrew again.
- 6). If the release function is no good, please work on the screw (M6) to adjust the tighten to achieve releasing.

3. Dimention of Brake Release Holder



Maintenance of Traction Machine

1. Maintenance of Bearing

For external rotor traction machines:

- The front bearing was injected with Shell EP2 grease before leaving factory. Please use the same type of grease when it needed.
- Grease should be added from the traction machines front oil hole and keep the oil hole clean from dust. 45g of grease is needed for each time and one time for a year.
- The back bearings and the traction machines which capacity below 1600kg are using the sealed bearing which no need for maintenance.

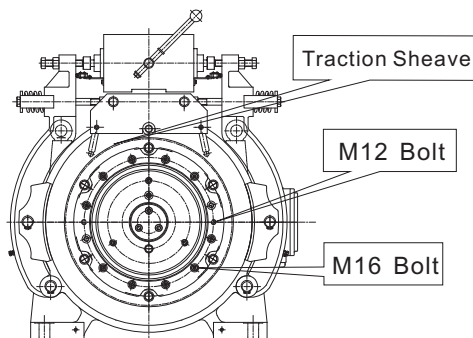
For internal rotor traction machines:

- The front bearing was injected with No.3 lithium base grease before leaving factory. Please use the same type of grease when it needed.
- Grease can be added from the traction machines' front or back bearing cap and keep the oil hole clean from dust. 110g of grease for working side and 31g of grease for back side is needed for each time and one time for a year.

2. Change of Traction Sheave

To take strict safety precautions while change the traction sheave. To fix the traction sheave with two or three M12 screws before disassembly the traction sheave incase it fall down.

- Use two M16 bolts to push the sheave out from the whole machines.
- Hang up the new traction sheave and use two poles to guide it into the mounting place.
- Use the screw to secure the traction sheave.
- Take out the guide pole.
- Install the other parts.



3. Short Circuit of Traction Machine

To make short circuit with U, V, W terminals when the gearless traction stop running is to avoid the traction machines start to run again while do maintenance. It make the elevator is more safe and being stop in a reliable way. In order to avoid the machines damage caused by short circuit in fast time, please follow the below instruction if needed.

The output connector of the transducer and short circuit connector are separated and delay the connection if needed. When the elevator is running at high speed, the safety circuit is turn off or the electric power is suddenly off without emergency source, the traction machines will reduce its speed through the brake start to work. After delay, the short circuit connector will work. This will avoid the serious damage to the machines and ensure the safety of elevator.

Our company does not accept any compensation for machines damage caused by wrong operation of short circuit.

4. Maintenance Instruction

- Keep the machines working environment clean and dry;
- Keep the traction machines clean;
- Pay attention to the reliability and abrasion of the braking system.

Installation and Adjustment of Drum Brake

1. Instruction

Please read this manual before installation, usage and maintenance of the brake. Only qualified and well trained personnel are allowed to operate this component.

- Connect the power correctly according to the model and instructions on the label.
- Do not maintain while power is on.
- Do not maintain while machines is working.
- Do not make the machines power wire in tension.
- Keep grease from brake lining.
- Keep away from hot brake surface.

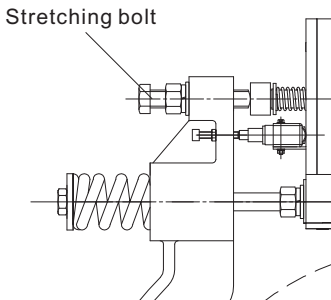
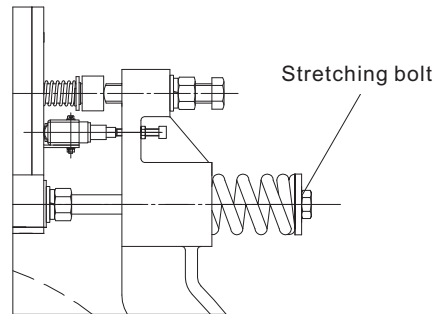
2. Working Condition of Brake

- Machine room temperature should be between 0~40°C
- The maximum switching frequency is 240F/h
- Temperature resistance grade is F class, 155°C

1. Adjustment of Drum Brake

Adjustment of the brake torque

If the torque is not enough, under ensure of safety, please adjust the brake screw to press the brake spring in a clockwise direction as right picture. If the situation is opposite, then loose the brake screw in anticlockwise direction. Brake torque should not be too large in case of the maintaining voltage exceed standard.

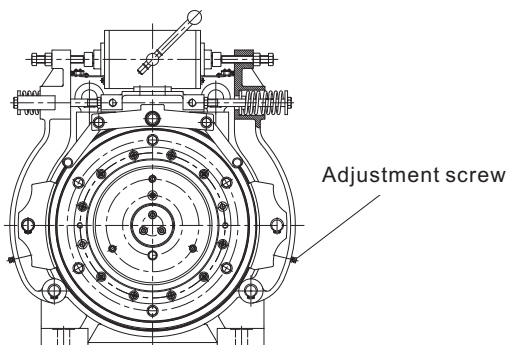


Adjustment of the brake gap

If the brake gap is less please adjust the brake shoe and brake screw in clockwise direction as the left picture to enlarge the gap. If the brake gap is too big and lead to brake noise, please adjust the brake shoe and the brake screw in anticlockwise direction.

Adjust the uniformity of the brake gap

If the brake gap is nonuniform, please use the fine adjustment screw to adjust the gap both up and down until its gap is uniform.



Installation and Adjustment of Block Brake

1. Instruction

Please read this manual before installation, usage and maintenance of the brake.

Only qualified and well trained personnel are allowed to operate this component.

- Connect the power correctly according to the model and instructions on the label.
- Do not maintain while power is on.
- Do not maintain while machines is working.
- Do not make the machines power wire in tension.
- Keep grease from brake lining.
- Keep away from hot brake surface.

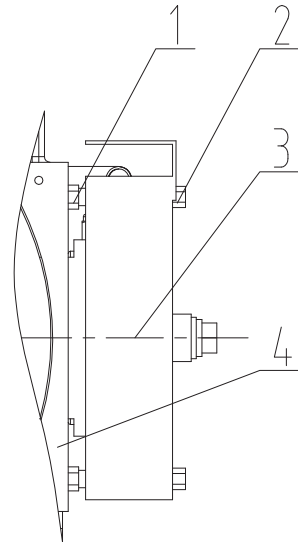
2. Working Condition of Brake

- Machine room temperature should be between 0~40°C
- The maximum switching frequency is 240F/h
- Temperature resistance grade is F class, 155°C

3. Adjustment of Block Brake

Adjust the brake gap when the brake makes big noise or the brake pad presses the machines while machine running.

- Use internal hexagonal wrench to loosen the mounting bolts (2).
- If need to enlarge the gap, please adjust four hollow bolts (1) in clockwise direction. The suggested brake gap is 0.35-0.4mm;
- If need to narrow the gap, please adjust four hollow bolts (1) in anticlockwise direction. The suggested brake gap is 0.35-0.4mm;
- After adjustment, use torque wrench to secure the bake mounting bolts.
The suggested tightening torque is 45N.m.



1. Hollow Bolt
2. Mounting Bolt
3. Block Brake
4. PM Traction Machine

Installation and Adjustment of Disk Brake

1. Instruction

Please read this manual before installation, usage and maintenance of the brake. Only qualified and well trained personnel are allowed to operate this component.

- Connect the power correctly according to the model and instructions on the label.
- Do not maintain while power is on.
- Do not maintain while machines is working.
- Do not make the machines power wire in tension.
- Keep grease from brake lining.
- Keep away from hot brake surface.

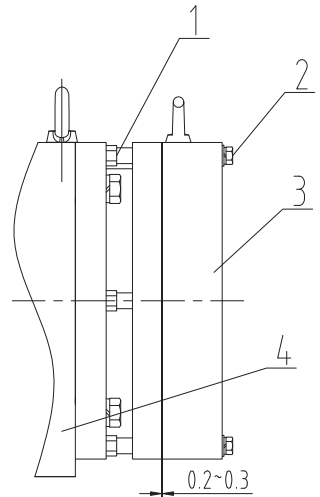
2. Working Condition of Brake

- Machine room temperature should be between 0~40°C
- The maximum switching frequency is 240F/h
- Temperature resistance grade is F class, 155°C

3. Adjustment of Disk Brake

Adjust the brake gap when the brake makes big noise or the brake pad presses the machines while machine running.

- Use internal hexagonal wrench to loosen the mounting bolts (2).
- If need to enlarge the gap, please adjust six hollow bolts (1) in clockwise direction. The suggested brake gap is 0.2-0.3mm;
- If need to narrow the gap, please adjust six hollow bolts (1) in anticlockwise direction. The suggested brake gap is 0.2-0.3mm;
- After adjustment, use torque wrench to secure the bake mounting bolts. The suggested tightening torque is 45N.m.



1. Hollow Bolt
2. Mounting Bolt
3. Disk Brake
4. PM Traction Machine

Instruction of Sin-Cos Encoder

1.Tools

- Torque Spanner
- M10 Bolt
- Wrist Strap
- Clean Duster

2.Notice of Installation

- Wear the wrist strap and static-free shoes before operation;
- Keep the encoder from shaking and collision. Do not knock on the encoder with hammer or screwdriver.
- Please do not pull the encoder cable in a rude way in case of the encoder cable damage.

3.Instruction of Installation

- Clean the encoder connecting part and the mounting hole on the traction machine.
- Make sure the tension sleeve is unstuck.
- Loosen the back cover bolts and dismount it.
- Install the encoder to the traction machine encoder mounting hole and use M5X50 hexagon socket screw to fix the encoder. Suggest torque is 5N.m.
- Make sure the encoder can turn smoothly, if not, please check and install again if needed. After confirm it can be turn smoothly, please fix the tension sleeve with the torque spanner. Suggest torque is 1.05~1.25N.m.
- Connect the encoder cable and mount the encoder back cover.

4.Disassembly of Encoder

- Loosen the M2.5X5 bolt of tension sleeve.
- Loosen the back cover bolts and dismount it.
- Loosen the M5X50 bolt and keep M10 hole with 2~3 thread.
- Use M10 bolt to push the M5X50 bolt until the encoder has been pull out.

Faults and Solutions

Malfunction	Causes	Solution
Machine will not start	Power is off	Check the wiring and the barring switch
	Brake does not release	See brake faults
	Transducer faults	Check transducer settings
	Use incorrect transducer	Change a correct transducer
Transducer Faults	Use incorrect transducer	Change a correct transducer
	Incorrect transducer parameter setting	Extend the acceleration time of transducer
	Overload	Extend the acceleration time of transducer
	Machine coils short circuit	Check phase resistance
	Motor earthed short circuit	Change resistance to earth
	External wiring short circuit	Check and maintain the wiring
Runing noise and Overproof vibration	Mechanical friction	Check and adjust the brake gap
	Incorrect transducer parameter setting	Reconfigure the transducer
	Encoder output signal Interference	Shield the encoder cable and fasten encoder cable connection
	Bearing defective	Change the bearing
Current Leakage	Imperfect earthed	Check the earth connection
	Stator coil in wet condition, Insulation damage or wiring board is dring	Drying treatment to stator coil; Repair insulation damage and clean the wiring board
	Stator cable damaged	Repaire or change the cable
High Temperature Rise	Bad ventilation	Improve ventilation condition