

WATER RING PUMP SYSTEM — AN INSTRUCTION MANUAL

PROVIDE HIGH-QUALITY PRODUCTS AND SERVICES FOR GLOBAL AUTOMATION EQUIPMENT ENTERPRISES



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01. PRODUCT OVERVIEW

1.1 Product Introduction

The water ring vacuum pump system is a pioneering product developed by our company based on years of research and production experience, combined with similar international products. A high-performance product developed through market research and analysis, utilizing advanced technology. The overall system consists of a 2BV water ring vacuum pump, a stainless steel water tank, and a vacuum pump. It is composed of an empty buffer tank, an electrical control box, a cooling fan, pipelines, and pipeline accessory valve system.

1.2 Application Fields

2BV forms a vacuum after continuous operation, suitable for extracting dry and wet gases, mainly used for non flammable, non corrosive gases, and steam mixtures and the atmosphere. The working fluid is usually water. This device is widely used in fields such as petroleum, chemical, pharmaceutical, food, and industry. At work widely used in many production processes, such as vacuum filtration, vacuum water diversion, vacuum feeding, vacuum evaporation, and vacuum Concentration, vacuum rehydration, and vacuum degassing, etc.

1.3 Working fluid connection and supply mode

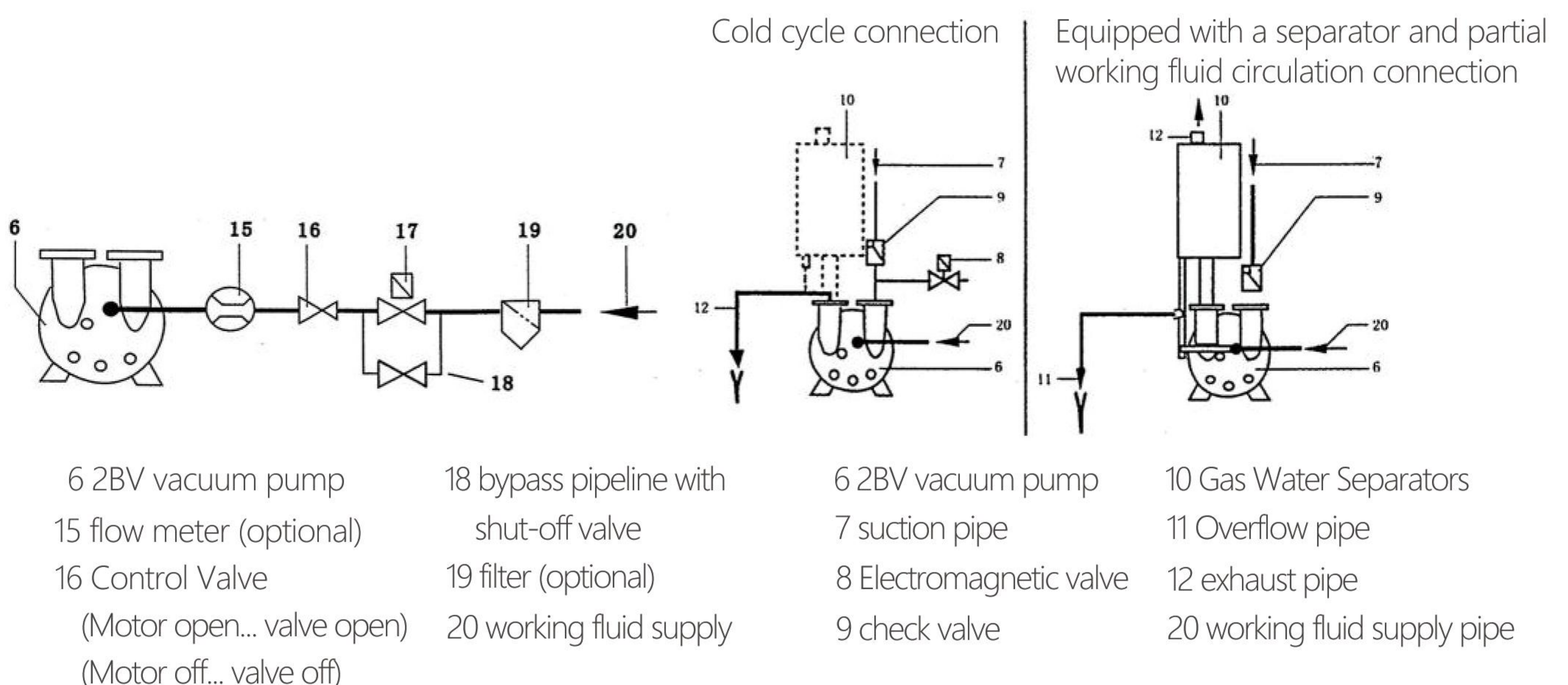


Figure 1 Working fluid connection (recommended)

Figure 2 Working fluid supply method (schematic diagram)

1.4 Working principle of 2BV water ring pump

As shown in Figure (3) on the right, the eccentric impeller is installed inside the pump body. Inject a certain height of water into the pump when starting, so that when the impeller rotates. When water is subjected to centrifugal force, it forms a rotating water ring on the inner wall of the pump body. The lower inner surface of the water ring is tangent to the wheel hub and rotates in the direction of the arrow. During the first half of the rotation, the inner surface of the water ring gradually separates from the wheel hub. This forms a closed space between the impeller blades and the water ring.

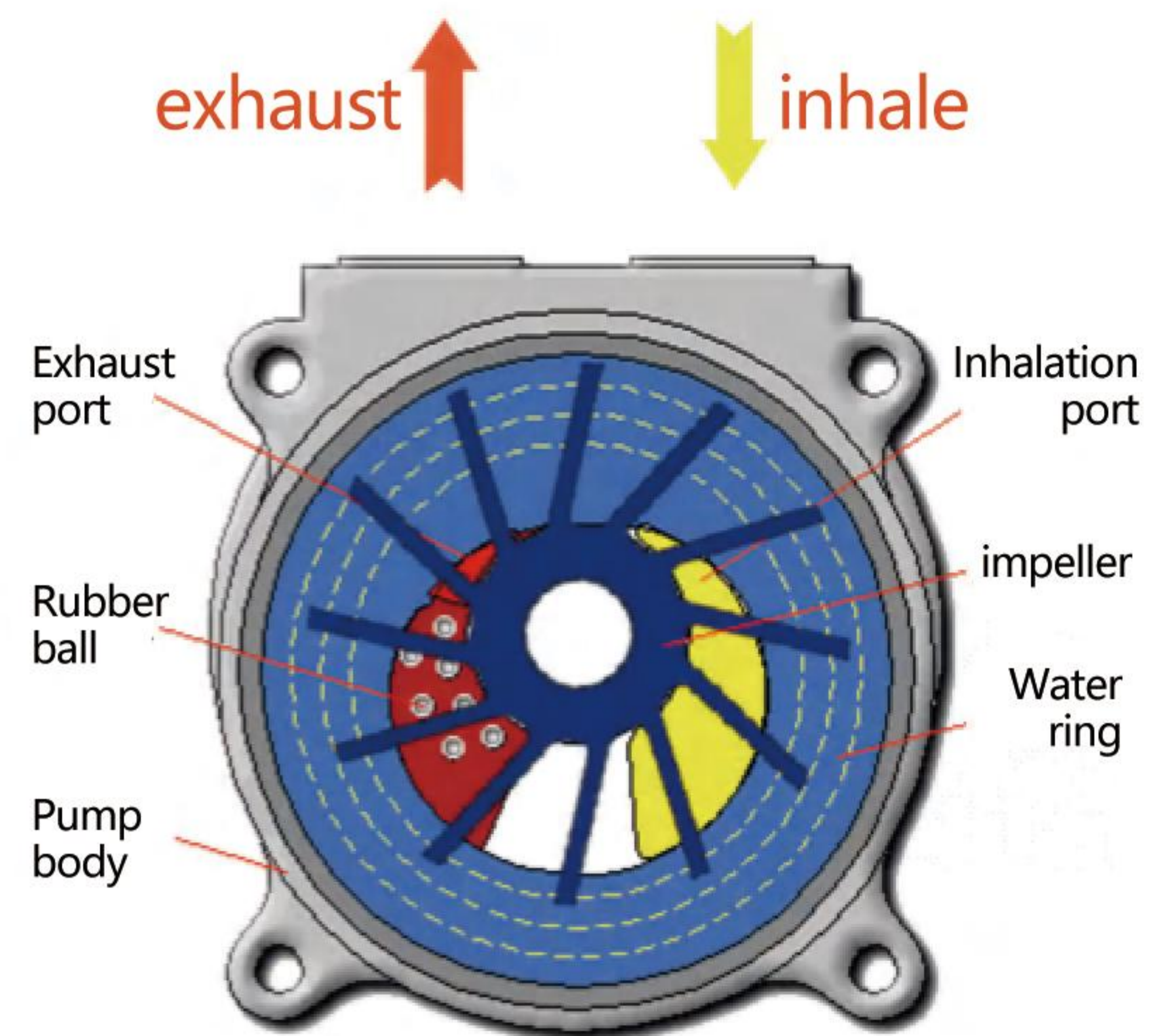


Figure (3) Working principle diagram

As the impeller rotates, the space gradually expands, and the gas in the space. The pressure decreases and gas is drawn in from the disc suction port. Turn around in the back half. During the process, the inner surface of the water ring gradually approaches the wheel saddle, creating a space between the blades. Gradually shrinking, the gas pressure in the space increases, and when it exceeds the pressure at the exhaust port, the gas between the blades is discharged from the disc exhaust port. In this way, every time the impeller rotates, the space between the blades sucks and exhausts once, and many spaces work continuously. The pump continuously sucks or compresses gas.

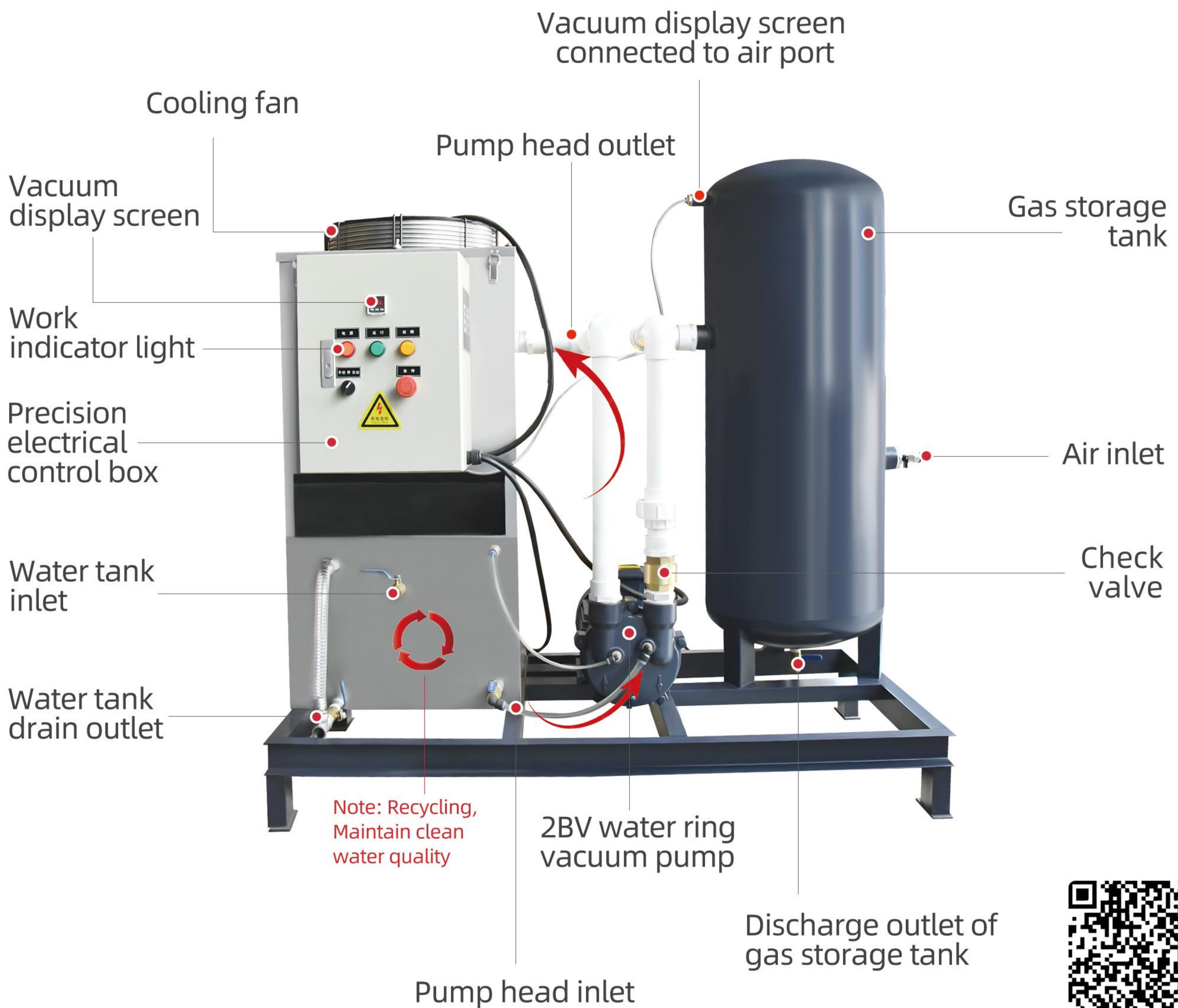
During the work process, the heat generated by the work will cause the working water ring to heat up, and a portion of the water and gas will be discharged together. Therefore, it is necessary to continuously supply water to the pump during the working process to cool and replenish the water consumed in the pump, in order to meet the working requirements of the pump.

When the gas discharged by the pump is no longer used, a gas water separator is connected to the pump exhaust port, and the exhaust gas and some of the carried water are discharged into the gas water. After the separator, the gas and water are separated, and the gas is discharged through the exhaust pipe. The remaining water is supplied to the pump through the return pipe for continued use. With working hours, the extension of the working water temperature will continuously increase, and cold water needs to be supplied from the water supply pipe to reduce the temperature of the working water and ensure that the pump can meet the required technical requirements and performance indicators.

02. EQUIPMENT DESCRIPTION OF WATER RING VACUUM PUMP SYSTEM

The water ring vacuum system consists of a 2BV water ring vacuum pump, a stainless steel water tank, a vacuum buffer tank, an electrical control box, and a cooling fan. The pipeline and pipeline accessory valve system are combined.

Product Installation Diagram



Installation video

2.1 Wiring operation of power supply (380V)



N R S T PE Protect the grounding wire
 Zero line
 Phase line
 Phase line
 Phase line

(Figure 4) Schematic diagram of electrical control cabinet wiring

Danger!

Electrical hazards require professional personnel to operate.

1. Open the electrical control cabinet and find the power input terminal, prepare a three-phase five Wire and cable.
2. Connect three phase wires, one neutral wire, and one ground wire separately.

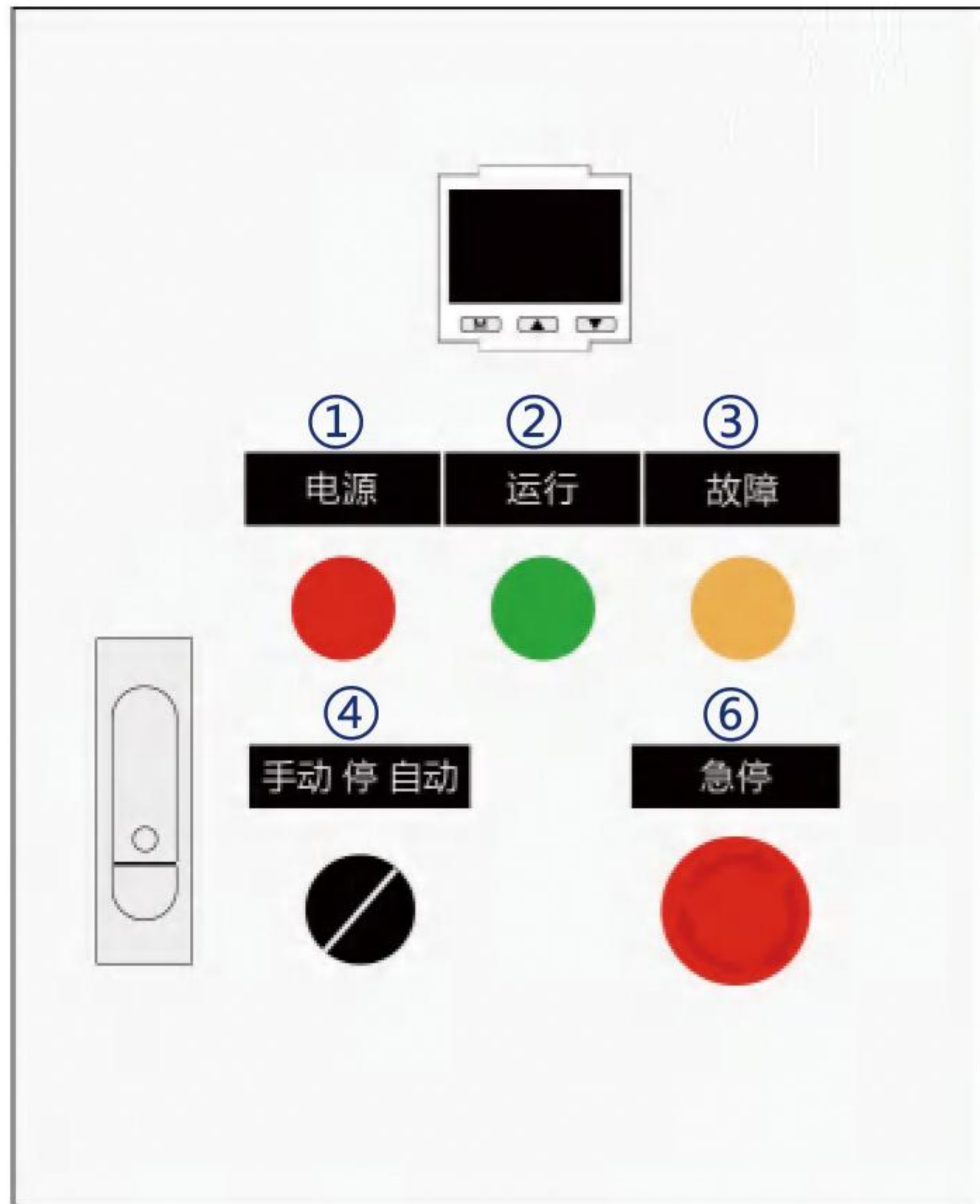
Matters needing attention:

1. Ensure to be in the power-off phase during operation.
2. Check if the wiring is correct. If the wiring is correct, disconnect the phase and phase The indicator light of the sequence protection relay will turn green. If not If the green light is on, you can swap any two of the three phase wires.

2.2 Instructions for using the electrical control cabinet

Be careful! Electricity hazard, please have professional personnel perform the operation.

Warning! When repairing the pump unit, the circuit breaker inside the control cabinet should be disconnected.



(Figure 5) Schematic diagram of indicator lights in the electrical control cabinet

- ① Power Supply ② Function ③ Fault ④ Manual, stop, automatic ⑤ Emergency stop

Manual stop automatic three gear switch:

Turn left - manual mode: no limit set, pump keeps running.

Twist to the middle position - stop: stop the operation of the water ring pump

Turn to the right - Automatic mode: Set the upper and lower limits of the vacuum degree through the vacuum display screen, so that The vacuum degree inside the vacuum tank is always maintained between the upper and lower limits.

Emergency stop button: Stop in case of emergency.

2.3 Startup operation steps

! Be careful!

Please connect the wires correctly. The water tank must be filled with water and cannot operate without water

Vacuum display screen:

Adjust the vacuum limit when using automatic mode, "M key" - switch "▲ Key" - Up" ▼ Key" - Down

Power indicator light:

The electrical control cabinet lights up after being powered on.

Operation indicator light:

Lights up when the water ring pump is running.

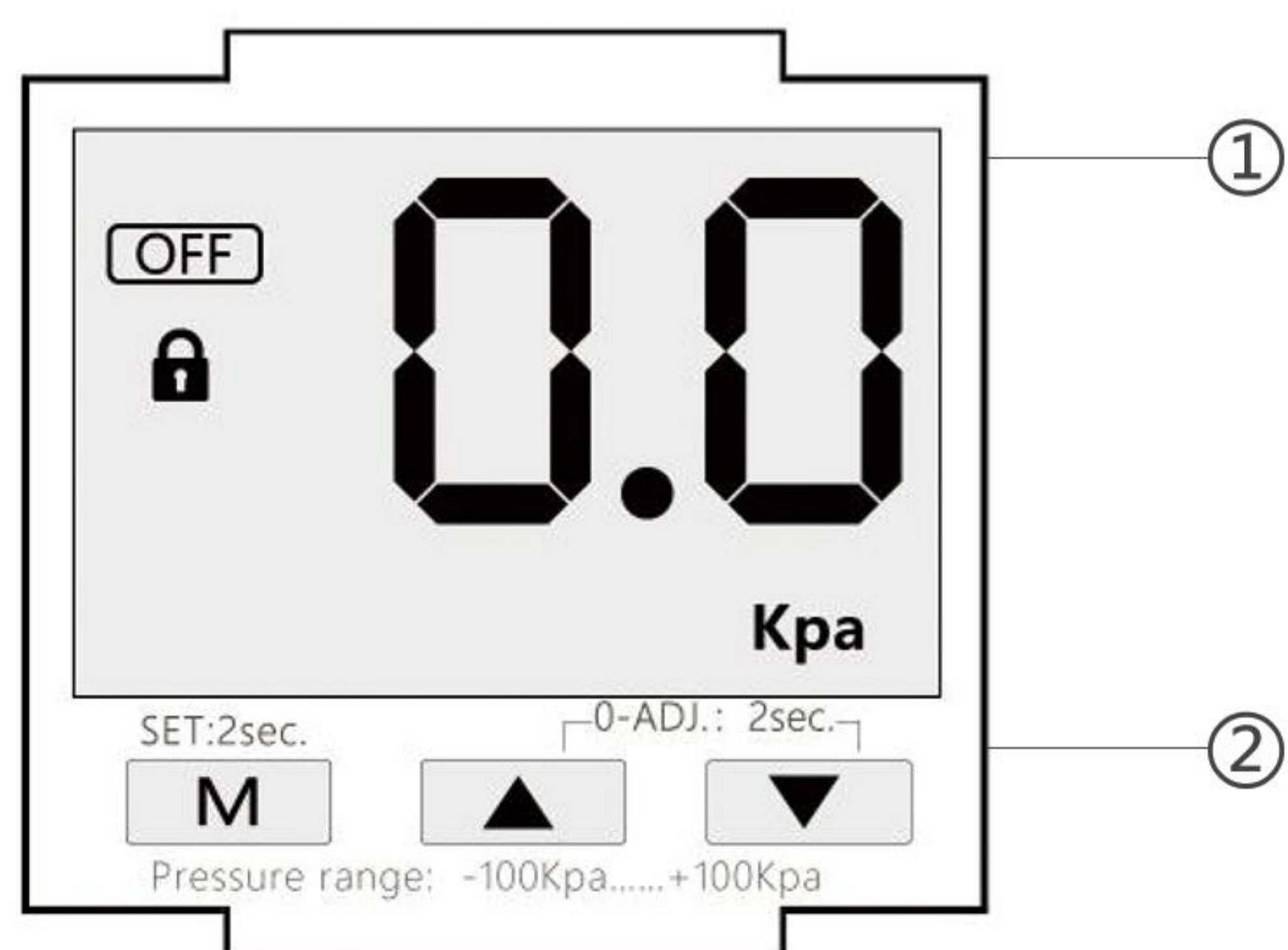
Fault indicator light:

When the motor overheats/overloads and the water ring pump is blocked and unable to operate, it lights up.

1. Manual mode: Connect the power, fill the water tank with water, turn the "Manual Stop Auto" three speed switch on the operation panel to the left to "Manual",The vacuum pump can work continuously.

2. Automatic mode: First, turn on the power, fill the water tank with water, and then set the upper and lower limits of the vacuum system through the vacuum display screen (such as the upper limit) The limit value is set to -0.08MPa, and the lower limit value is set to -0.06MPa. After the system starts, the vacuum pump starts working untilWhen the vacuum degree inside the vacuum tank is higher than the set upper limit value of -0.08MPa, the vacuum pump will automatically stop running. Due to work requirements When the vacuum degree inside the vacuum tank drops below the lower limit of -0.06MPa, the vacuum pump automatically starts until the vacuum degree inside the vacuum tank is reached The upper limit value is -0.08MPa, and the automatic operation is repeated in this cycle to maintain the vacuum degree in the vacuum tank at the upper and lower limits Between values (refer to Figure 6 on the vacuum display screen for adjustment instructions)

2.4 Instructions for Adjusting Vacuum Display Screen



(Figure 6) Vacuum display screen

① Display

Display current pressure: displayed when setting parameters;
Display set parameters; display Output status "OFF" " " " " " " " "

② Button area

M key: used to determine the parameters for switching and setting; **Press up:** increase number; **Press down:** decrease the number; **Pressing several keys simultaneously has the function of combining keys.**

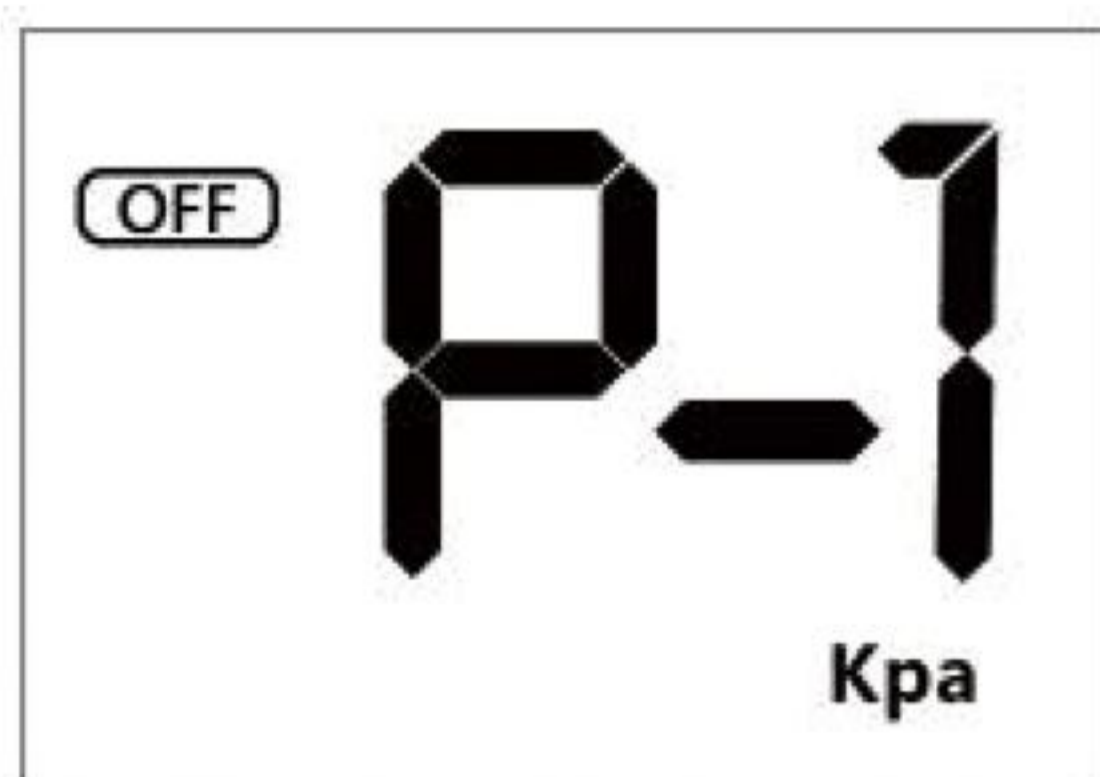
Operation method of vacuum display screen

Range of upper and lower limits of vacuum degree

The maximum upper limit value is 100Kpa, and the minimum lower limit value is -100Kpa

Adjust vacuum degree - upper limit value

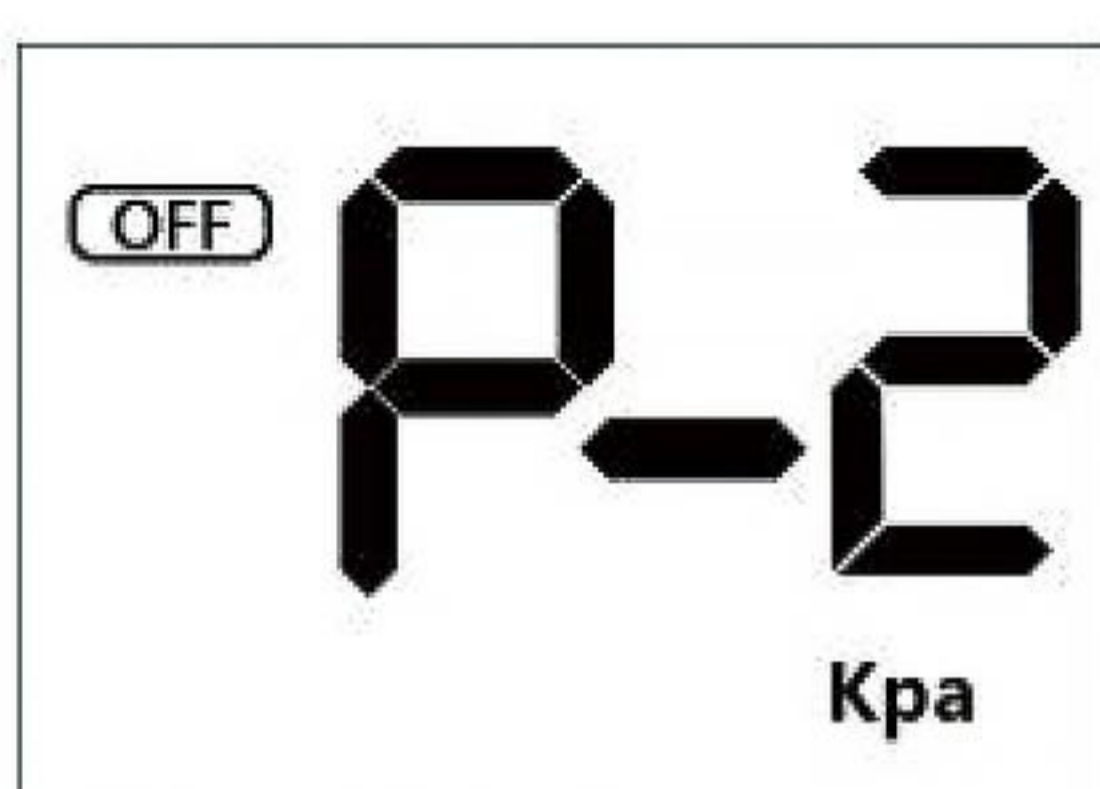
The vacuum display screen has a button lock function, which needs to be unlocked before adjusting the meter. Remember to lock it after setting it up. Avoid accidentally touching it Change the numerical value.



Press the **M** and **▼** keys simultaneously for about 3 seconds to set it to unlock mode. Press and hold the **▼** key again to bring up "P-1" (upper limit value) Press and hold **▲** **▼** to adjust the value size. Long press to quickly adjust.

Adjust vacuum degree - lower limit value

The vacuum display screen has a button lock function, which needs to be unlocked before adjusting the meter. Remember to lock it after setting it up. Avoid accidentally touching it Change the numerical value.



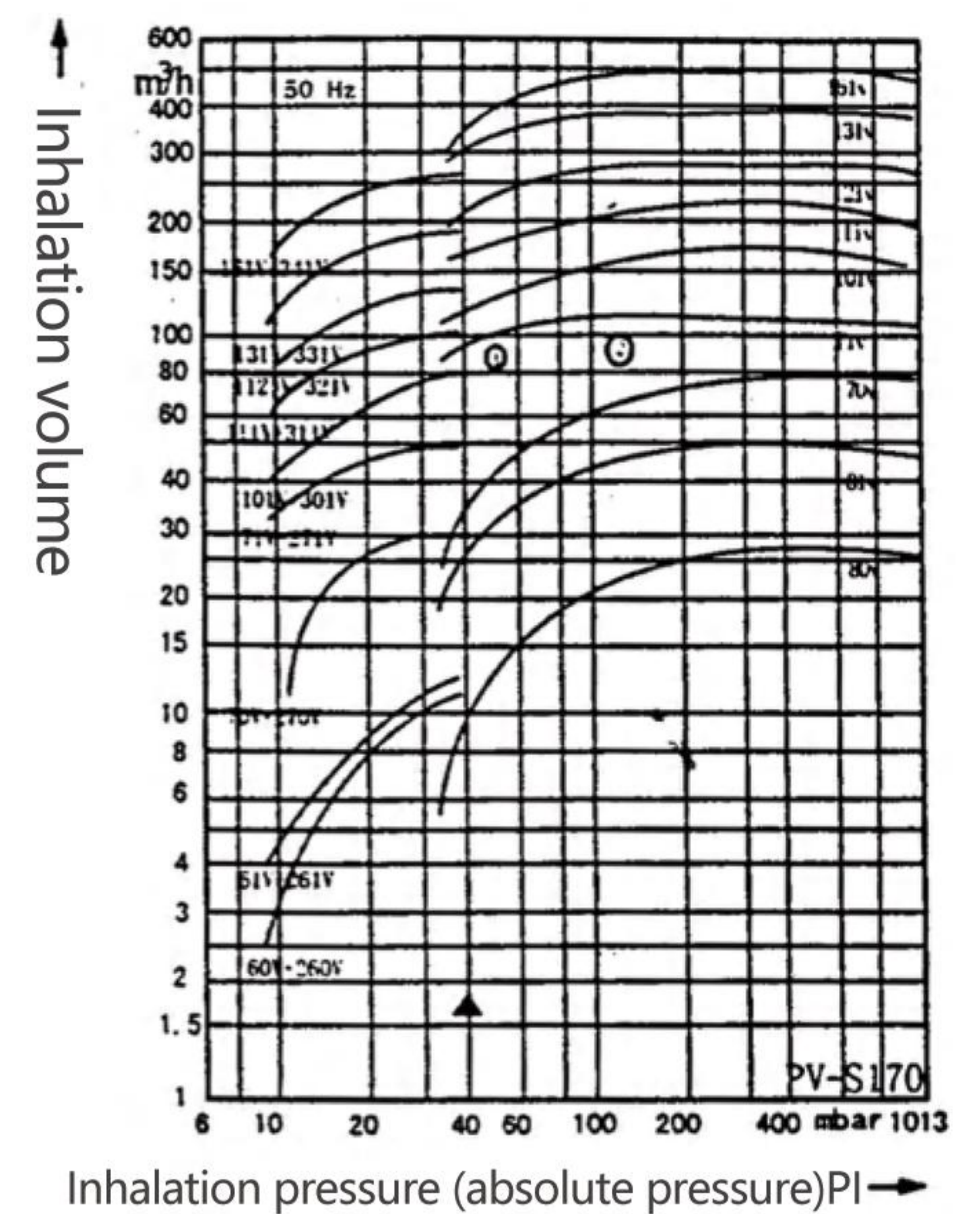
First press the **M** key to switch the status of the table to "P-2" (lower limit value), then hold down **▲** **▼** to adjust the integerValue size. Long press to quickly adjust. If the upper and lower limits have been adjusted, they need to be locked. meanwhile Press the **M** and **▼** keys for about 3seconds to lock.

03. TECHNICAL PARAMETERS OF WATER RING PUMPING STATION

Model	Paired with a gas storage tank	Extreme pressure (pa)	Maximum pumping speed (m ³ /h)	Power	Voltage	Speed (r/min)
FSH-2.35	100L	3300	80	2.35KW	380V	2850
FSH-3.85	200L	3300	110	3.85KW	380V	2860
FSH-4.0	300L	3300	165	4KW	380V	1450
FSH-5.5	600L	3300	230	5.5KW	380V	1450
FSH-7.5	1.0m ³	3300	280	7.5KW	380V	1450
FSH-11	1.0m ³	3300	400	11KW	380V	1450
FSH-15	2.0m ³	3300	500	15KW	380V	970

Attention: The above technical parameters are for reference only. No further notice will be given if there are any upgrades!

During the operation of the 2BV vacuum pump, it is necessary to continuously replenish the working fluid. If it contains solid particles (such as sand, etc.), a filter should be added if necessary. The picture shows the necessary amount of working fluid to replenish when removing dry air. To ensure sufficient working fluid should flow in, and the supply pressure should be 1 bar higher than the suction pressure. Working fluid is accompanied by extract gas and discharge it together. The separator is used as an accessory to separate gas and water. At the same time, the separator allows for the circulation of some working fluid.



04. INSTALLATION AND COMMISSIONING

1. According to the engineering requirements, the exhaust pipeline is connected, and this device is uniformly installed on the steel chassis and securely fastened with bolts through the holes at the bottom corners. Check for any damage to all equipment during transportation.
2. The water ring vacuum system is equipped with an electrical control cabinet. Connect the motor, parallel connection, and vacuum gauge according to the terminal numbers in the electrical schematic diagram.
3. Inject tap water into the water tank, which has an automatic water replenishment port. When the water level reaches a certain position, the automatic water replenishment port will close. Before starting the water ring pump, it is necessary to test the motor first. When not in use for a long time, the water inside the pump should be drained to prevent rusting.
4. Before powering on the electrical control cabinet, the insulation resistance of the equipment should be measured to be less than 10MQ, and there should be good grounding.
5. The device should be checked for airtightness by closing the intake valve, and the vacuum gauge should reach -0.08MPa after pumping.
6. Regularly discharge residual water from the vacuum tank and set the interval for discharge according to usage.

05. PRE START INSPECTION WORK

1. Before starting the power supply, check the correct position of the pipelines and valves before starting the power supply.
2. To ensure that the circulating water level of the water tank meets certain requirements.
3. The inlet pipeline of the vacuum pump should have smooth water flow. Confirm if the pipeline is secure and avoid damage caused by vibration.
4. The intake valve of the vacuum tank should be closed.
5. The coupling of the vacuum pump must not have any offset.
6. The voltage requirement for the control cabinet is normal.

06. PRECAUTIONS

1. Vacuum pumps cannot operate without water
2. Ensure the cleanliness of the water, without impurities or solid particles (such as sand), and add a filter if necessary
3. The temperature of the working fluid cannot exceed 40 °C
4. Open the back cover of the motor and turn the fan. If it is not used for a long time (10-15 days) and gets stuck/stuck, the motor needs to be checked Do not rotate to ensure normal operation.

07. MAINTENANCE AND UPKEEP

Before all maintenance work, cut off the power and exhaust the air pressure.

1. Regularly check the entrances and exits to prevent foreign objects from blocking and causing the motor to run idle.
2. Keep the machine clean and regularly clean and maintain it.
3. Regularly update parts.
4. Check whether various equipment, instruments, and meters are working properly.
5. The gas storage tank should be pressure tested every 2 years.

08. COMMON FAULTS AND TROUBLESHOOTING METHODS

Fault Phenomenon	Possible Reasons	Processing Method
The motor does not start and there is no sound	Two power cords are broken	Check the wiring
There is a buzzing sound when the motor does not start	<ol style="list-style-type: none"> 1. One wire breaks, causing the motor rotor to stall 2. Impeller malfunction 3. Motor bearing failure 	<ol style="list-style-type: none"> 1. Drain and clean the pump if necessary 2. Adjust the impeller clearance or replace the impeller 3. Replace the bearing
When the motor is started Current circuit breaker tripped	<ol style="list-style-type: none"> 1. Winding short circuit 2. Motor overload 3. Excessive exhaust pressure 4. Excessive working fluid 	<ol style="list-style-type: none"> 1. Check the motor winding 2. Reduce the flow rate of the working fluid 3. Reduce exhaust pressure 4. Reduce working fluid
The pump does not generate vacuum	<ol style="list-style-type: none"> 1. No working fluid 2. Serious system leakage 3. Incorrect rotation direction 	<ol style="list-style-type: none"> 1. Check the working fluid 2. Repair the leakage area 3. Replace two wires and change the direction of rotation
The vacuum degree is too low	<ol style="list-style-type: none"> 1. The pump is too small 2. The flow rate of the working fluid is too low 3. The working fluid temperature is too high 4. There is wear and corrosion 5. Mild system leakage 6. Sealing leakage 	<ol style="list-style-type: none"> 1. Use a larger pump 2. Increase the flow rate of the working fluid 3. Cool the working fluid and increase the flow rate 4. Replace parts 5. Repair the leak 6. Check the seal
Sharp noise	<ol style="list-style-type: none"> 1. Generate gas turbidity 2. High flow rate of working fluid 	<ol style="list-style-type: none"> 1. Connect the air turbidity protection component 2. Check the working fluid and reduce the flow rate
Pump leakage	Damaged sealing gasket	Check all seals

The above methods cannot solve your difficulties. Please consult our after-sales customer service.

09. PRODUCT AFTER-SALES WARRANTY CARD

1、 To purchase this product, please fill out this card carefully and read the following warranty terms carefully to ensure that the product receives effective warranty.

- (1). Users should carefully keep this card when purchasing products and ask the seller to stamp and confirm.
- (2). This warranty card must be provided at the same time as the warranty.
- (3). The information added to this warranty card is true, otherwise it is invalid.
- (4). The product warranty period is one year. If the product malfunctions during the warranty period due to poor quality of the original components or manufacturing problems, free repair and component replacement will be provided.

2、 The product is damaged and cannot be used normally due to the following reasons, which are not covered by the warranty.

- (1). Damage caused by failure to use and install according to the instructions.
- (2). Any product damage caused by human or accidental factors.
- (3). Repairs, modifications, or product seal stickers that have not been approved by our company.
- (4). Aging, scratches, and dents on the surface shell of the product.

3、 After the warranty period expires, users can still receive repair services provided by our company, but they need to pay the corresponding fees.

User Profile			
Product Name		Product model	
Product Code		Purchase quantity	
Purchase date		Purchase unit	
Customer Name		contact information	

Warranty Record			
Warranty Date	Fault handling methods	Completion date	Customer Signature



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