

# INSTRUCTION MANUAL

## ZD AUTOMATIC DRAINAGE SYSTEM



Please read this manual carefully before using this device. If there are any technical changes, no further notice will be given!

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## PRODUCT OVERVIEW

This product has a fully automatic drainage function, which can prevent customers from generating excessive waste liquid due to water vapor condensation during use, allowing you to automatically discharge wastewater under normal working conditions of the equipment.

A fully automatic vacuum drainage system that uses a single-stage rotary vane vacuum pump or oil-free vacuum pump to provide negative pressure power, and vacuum storage tanks and liquid storage tanks as carriers; Compared with other similar products, it has the advantages of high vacuum degree, easy operation, low maintenance rate, low noise, and simple cleaning and maintenance.

## PRODUCT INTRODUCTION

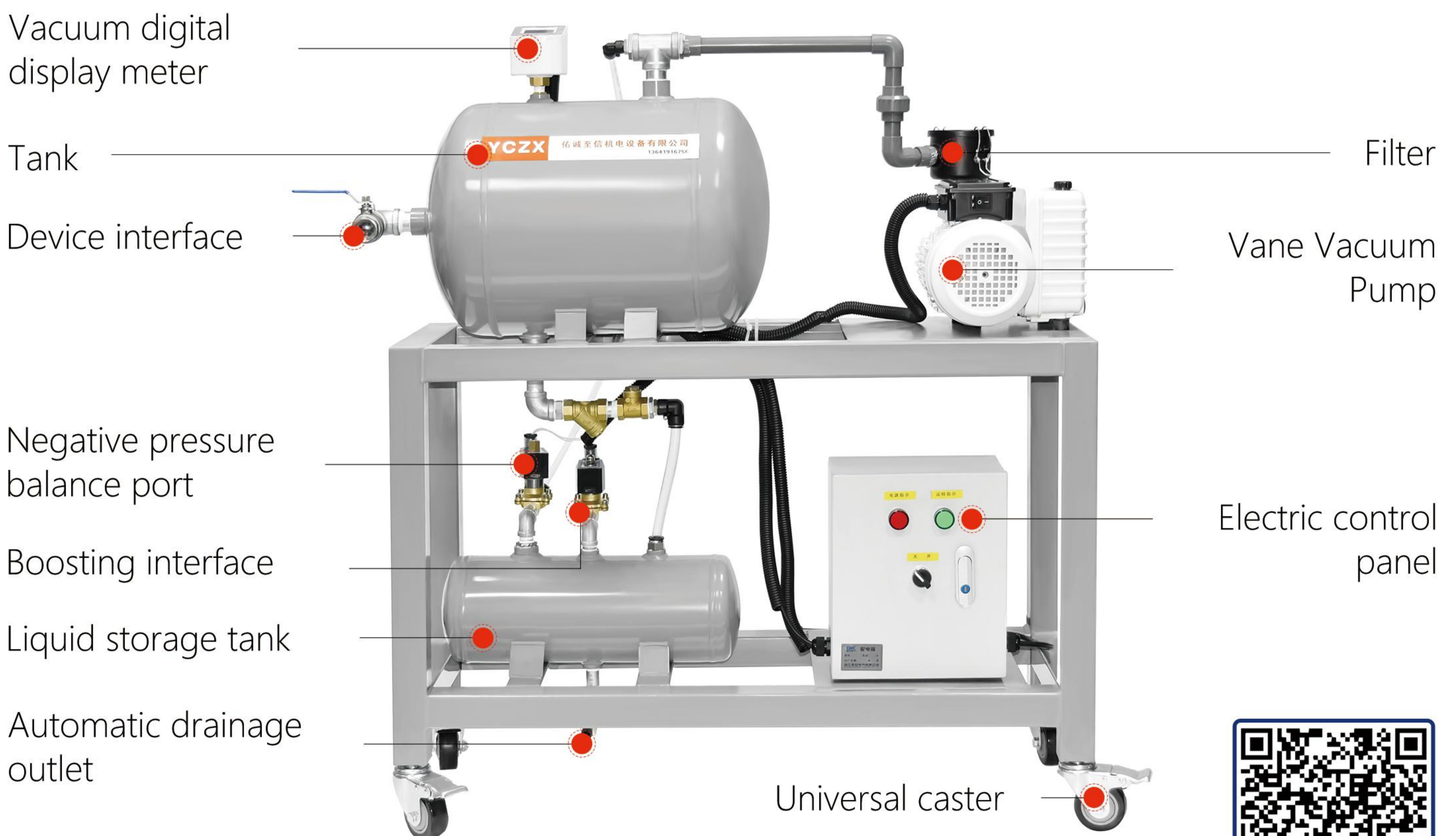
### 2.1 Composition of fully automatic vacuum drainage system

① Vacuum pump: Choose a single-stage rotary vane vacuum pump or oil-free vacuum pump as the pump body to provide a vacuum source. ② Vacuum gas storage tank: made of carbon steel material, used to store the vacuum gas extracted by the vacuum pump. ③ Liquid storage tank: It stores the liquid attached to the air during the movement of the vacuum pump to remove gas. ④ Electric control box: It realizes intelligent control of the start, stop, and corresponding protection functions of the vacuum pump, as well as switching the constant pressure of the vacuum solenoid valve for liquid discharge. ⑤ Air filter: It contains a precision air filter element to prevent the vacuum pump from inhaling dust and filtering out a small amount of moisture in the air, which can affect the service life of the vacuum pump. ⑥ Corresponding pipeline accessories: used to connect the corresponding interfaces and achieve pipeline connection. ⑦ Universal casters: The overall platform adopts universal brake casters for easy movement. ⑧ Main ball valve: used to control the on/off of the main pipeline. ⑨ Intelligent digital display meter: This meter can automatically turn on or off the relay output according to the pressure status inside the container to ensure the pressure condition inside the container. (Only 220V is available)

## 2.2 Working principle

The suction port of the vacuum storage tank is connected to the device that needs to be evacuated during work, and the exhaust port is connected to the vacuum pump; Gas enters the vacuum pump through the suction port and is then discharged through the vacuum pump outlet. The liquid, on the other hand, is balanced in pressure between the upper and lower pipes due to the one-way valve on the isolation plate inside the storage tank being in an open state. During the movement of the gas, the liquid attached to the air will adhere to the isolation plate and the inner wall of the storage tank due to tension, and the inhaled liquid will flow downward under the action of gravity, and then flow into the storage tank through the discharge port and connected pipelines. After being stored in the storage tank for a certain period of time, the inhaled liquid is finally discharged from the discharge port in the storage tank through the constant pressure switching effect.

## 2.3 Appearance structure diagram (Different models may have differences in appearance)



(This schematic diagram is FVN-0025ZD)



## 2.4 Application scope

This product has a wide range of applications in many fields: it is suitable for vacuum processing of various food vacuum packaging machinery, skin packaging machinery, vacuum forming boxes for vacuum forming machines, pharmaceutical machinery, and vacuum adsorption for printing machinery; It is also suitable for vacuum drying processing in the light chemical industry, vacuum fixtures in mechanical manufacturing processes, and vacuum suction equipment for hospital surgeries. With the continuous development of vacuum technology and the continuous innovation of process level, vacuum pump station, as an ideal vacuum equipment, will be more widely recognized and referenced.

## TECHNICAL REQUIREMENT

### 3.1 Application environment

Project	Work environment	Operation temperature	Gas temperature
Temperature range	-40°C~50°C (Amorphous state)	-30°C~50°C (Amorphous state)	-30°C~50°C (Amorphous state)
Relative humidity range	60%rh	60%rh	60%rh

### 3.2 Technical parameters of automatic drainage system

Model	Pumping speed (m <sup>3</sup> /h)	Vacuum degree (Kpa)	Motor power (Kw)	Voltage (V)	Motor speed (Rpm)	Piping interface (pump head)	Inhalation caliber (air receiver)	Tank capacity(L)	Liquid storage tank capacity(L)	Oil quantity (L)
FVN-0020-ZD	20	-100	0.9	220	2800	G1/2	G1	45	10	0.5
FVN-0025-ZD	25	-100	0.75	220	2800	G3/4	G1	45	10	0.5
FVN-0040-ZD	40	-100	1.5	380	1440	G1-1/4	G1-1/4	157	23	1.5
FVN-0063-ZD	63	-100	1.5	380	1400	G1-1/4	G1-1/4	157	23	1.5
FVN-0063-ZD大	70	-100	2.2	380	1400	G1-1/4	G1-1/4	157	23	2.5
FVN-300-ZD	300L/Min	-91	1.5	220	-	G1/2	G1	45	10	No need to refuel
FVN-500-ZD	480L/Min	-91	0.8	220	-	G1/2	G1/2	45	10	No need to refuel

Note: The above technical parameters are for reference only. If there is an upgrade, no further notice will be given. The product is subject to the actual product!

## 3.3 Vacuum pump oil selection

Vacuum pump oil	VM068	VM100	VS100
Base oil	Mineral oil	Mineral oil	Mineral oil
Density(g/cm <sup>3</sup> )	0.884	0.888	0.96
Ambient temperature°C	0~12	12~30	> 30
100°Ckinematic viscositynWs	8.5	11.5	9.5
Flash point. C	235	260	255

## PRODUCT STRUCTURE DESCRIPTION

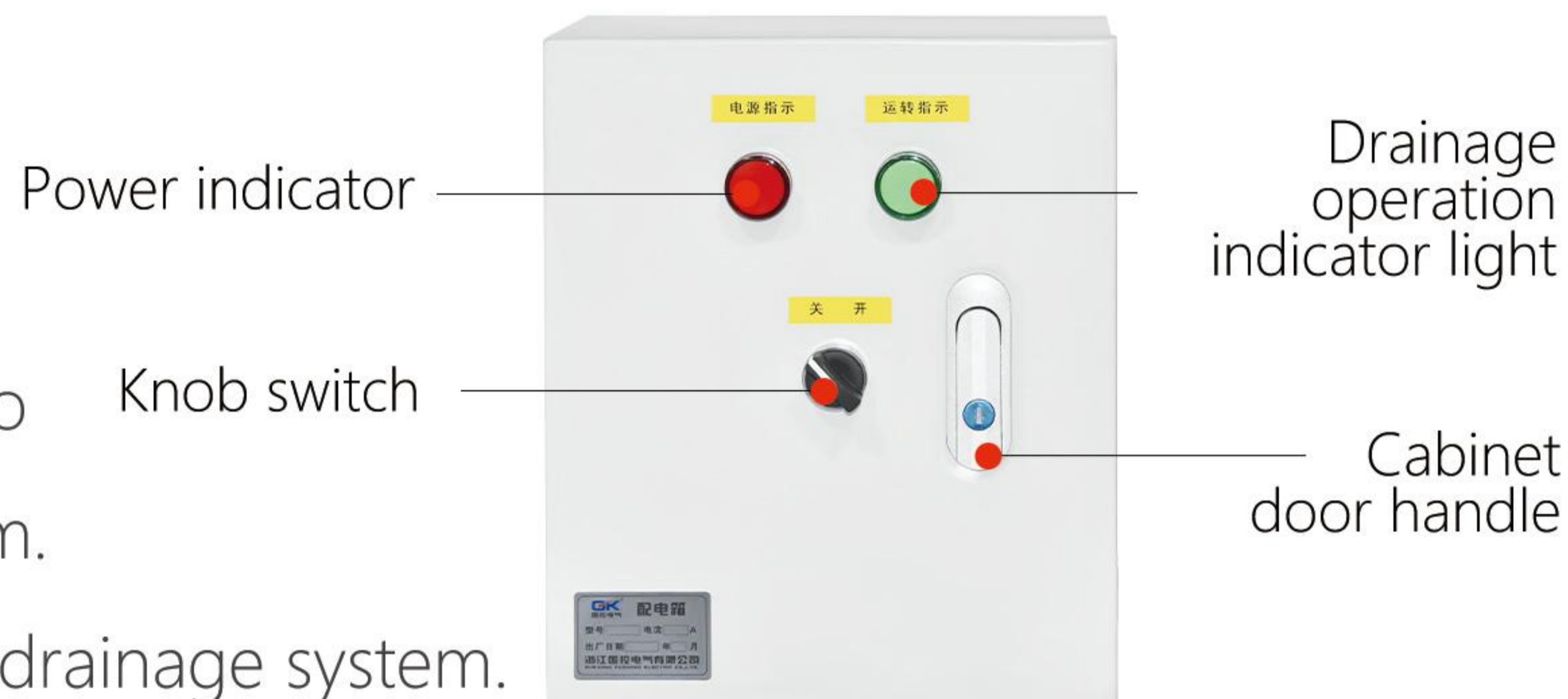
### 4.1 Instructions for using 220V electrical control cabinet

#### 4.1.1 Operation panel

① Power indicator light: used to indicate whether the entire system is powered on.

② Drainage operation indicator light: used to indicate the operation of the drainage system.

③ Knob switch: a switch used to control the drainage system.



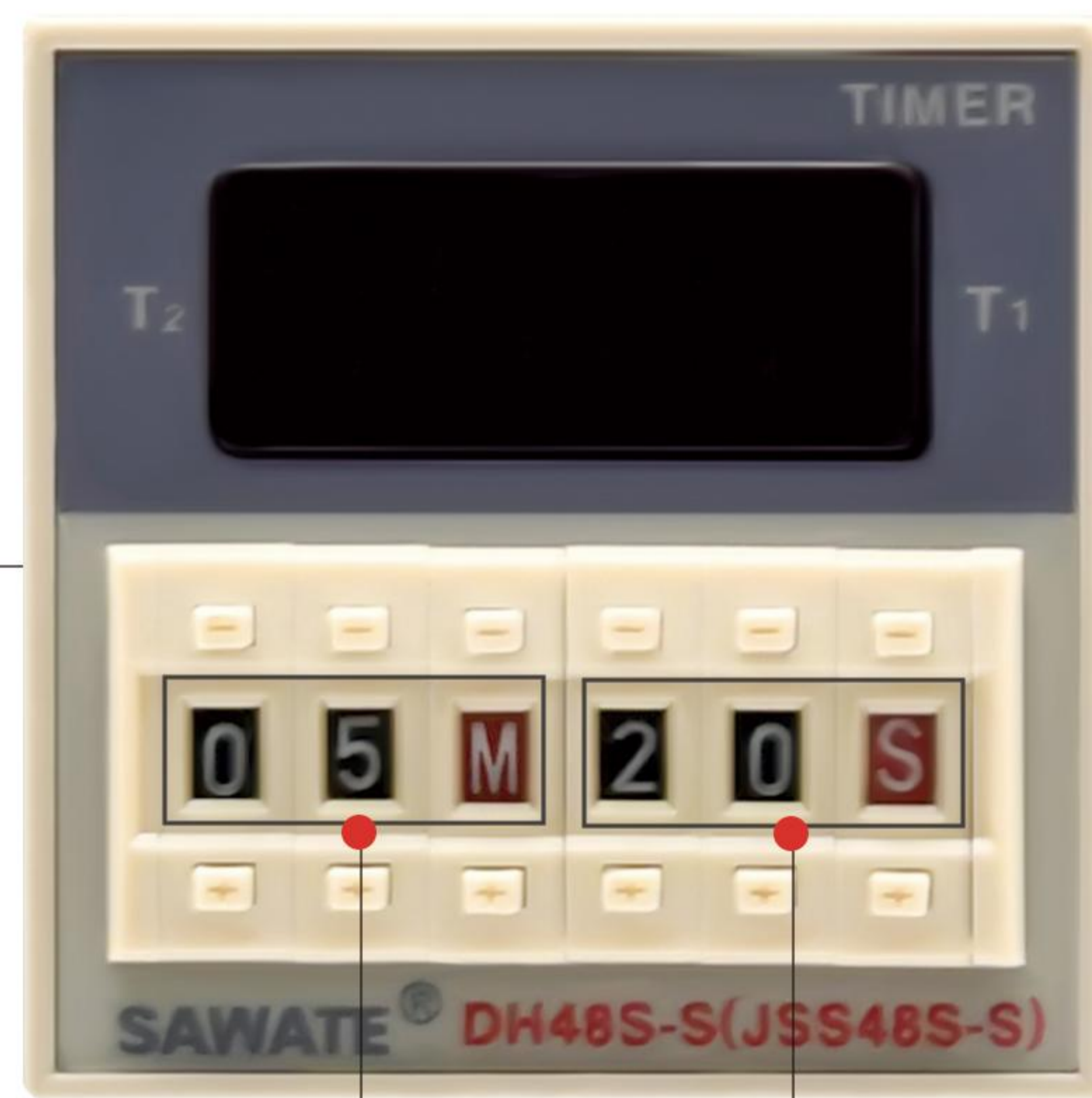
#### 4.1.2 Internal instructions of the electrical control cabinet

220V Drainage terminal block



Circuit breaker Intermediate relay

Drainage relay



Setting of drainage interval time

Drainage time setting

**Circuit breaker:** Control the main power switch of the electrical control box.

**Drainage time setting:** Press the time relay button to set the drainage time and drainage interval time in sequence. **The time units are:** S (seconds), M (minutes), H (hours) **Suggested**

**time setting:** Set a 5-minute drainage interval and a 20 second drainage time under pressure.

Set a 5-minute drainage interval and a 2-minute drainage time without pressurization.

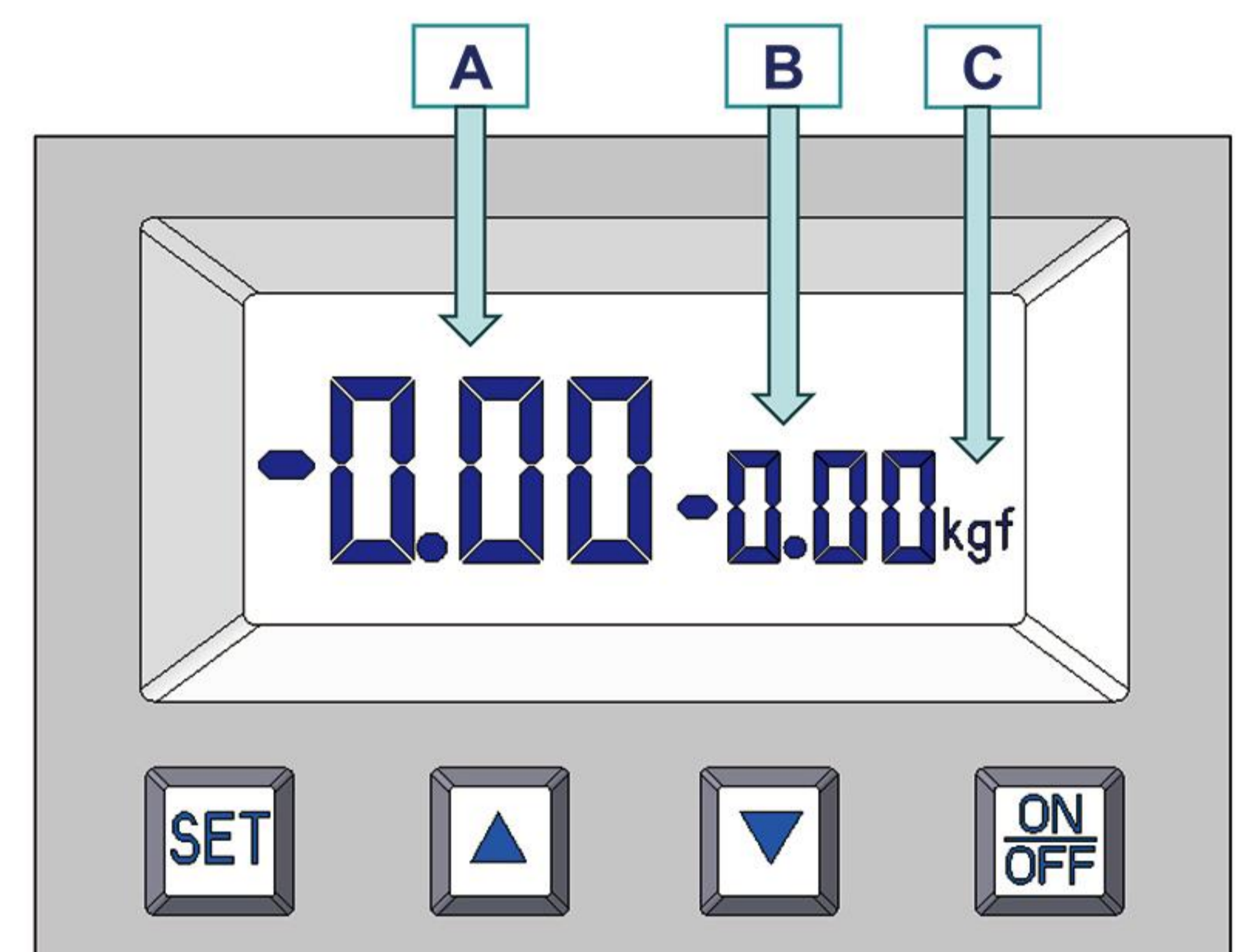
**Attention:** The set drainage time is subject to actual usage.

### 4.1.3 Instructions for setting up vacuum digital display meter

**Setting sequence:** Power on - Measurement mode - Function setting - Measurement mode

1、 When the device is powered on, the digital display will light up (entering measurement mode by default).

2、 As shown in the figure, there are three areas A, B, and C. The following is an explanation: A: Display the pressure inside the tank in measurement mode, and display the F1, F2, F3, and F4 functions in function setting mode. B: Press the ▲▼ keys in measurement mode to display the set upper and lower pressure limits, and press the ▲▼ keys in function



setting mode to set the desired pressure value. C: Display pressure unit, default is Kgf.

3、 **Pressure setting:** Press the SET button in measurement mode, and the numbers in zone B will flash. Press ▲▼ to set the value, where Hi represents the upper limit and Lo represents the lower limit.

4、 **Function settings:** Press and hold the SET button for 3 seconds in measurement mode to enter the function settings, and press ▲▼ to set the desired different functions. The specific explanation is as follows: F1 : AUTO (Automatic mode) F2 : EASY (Simple mode) F3 : UNIT (Unit setting) F4 : ROFF (Function Expansion)

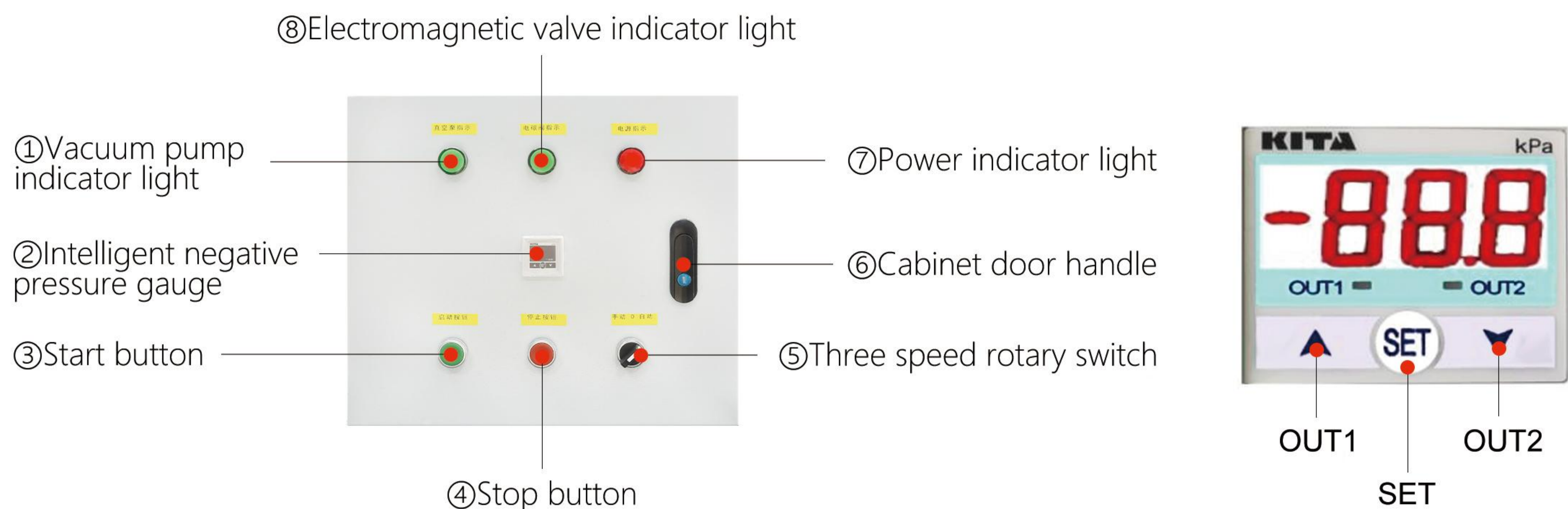
The functional settings have been set and debugged before leaving the factory, so it is not recommended for customers to make modifications.

5、 According to usage requirements, the default negative pressure value is -0.7 Kgf to -0.9 Kgf.

6、 The ON/OFF button is used to manually start the vacuum pump, and the pump body motor is working at this time.

## 4.2 Instructions for using 380V electrical control cabinet

### 4.2.1 The 380V operation panel is shown in the following figure

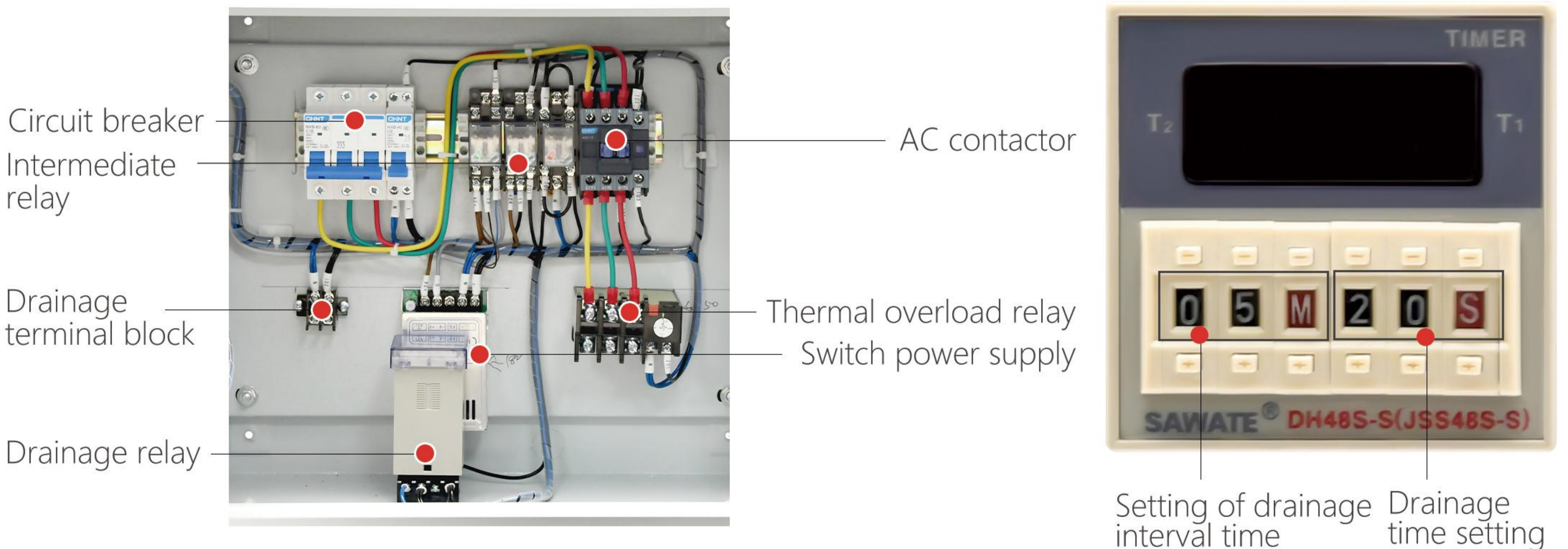


### Instructions for using the control panel

- ① **Vacuum pump indicator light:** Used to indicate the status of the vacuum pump being powered on for operation.
- ② **Intelligent negative pressure gauge:** Used to display negative pressure values and control the automatic start stop of vacuum pumps.
- ③ **Start button:** Used to manually control the start and operation of the pump in manual mode.
- ④ **Stop button:** Used to manually control the stop operation of the pump in manual mode.
- ⑤ **Three level rotary knob switch:** The third gear is used to switch between manual, automatic, and neutral modes.
  - **In manual mode:** The vacuum pump can only be manually started and stopped, and its operating status cannot be automatically controlled.
  - **In neutral mode:** Both manual and automatic modes fail, and panel operation is ineffective.
  - **In automatic mode:** In automatic mode, the vacuum pump is controlled by an intelligent negative pressure gauge, and manual mode is disabled at this time.
- ⑦ **Power indicator light:** Used to indicate whether the entire system is powered on.
- ⑧ **Electromagnetic valve indicator light:** Used for the working status of solenoid valves.

Power on → Press and hold the SET key for 3 seconds to enter measurement mode → Press the ▲ (OUT1) and ▼ (OUT2) keys to set the appropriate negative pressure value (The factory default setting range is -70KPa to -90KPa) → Press the SET key to confirm

4.2.2 The interior of the 380V electrical control cabinet is shown in the diagram



**Power circuit breaker:** controls the main power switch of the electrical control box.

**Drainage time setting:** Press the time relay button to set the drainage time and drainage interval time in sequence. **The time units are respectively:** S (seconds)、M(minutes)、H (hours)

**Suggest setting a time:** Set a 5-minute drainage interval and a 20 second drainage time under pressure. Set a 5-minute drainage interval and a 2-minute drainage time without pressurization.

**Attention:** The set drainage time is subject to actual usage.

## OPERATING INSTRUCTIONS

- 1、 Preparation: Please ensure that the power wiring is good and fully connected before using the machine; Prepare the liquid storage tank with a drainage device (please close the equipment interface if not connected).
- 2、 Connect the power supply, open the electric control cabinet door, and push the power circuit breaker upwards.
- 3、 Drainage time setting: Press the time relay button to sequentially set the drainage interval time and drainage time, and then close the cabinet door.

- 4、 Set the pressure range limit of the vacuum pump on the digital display meter.
- 5、 Turn the knob switch to automatic, the machine starts working, the operation indicator light lights up, and the vacuum pump motor runs.

## Shutdown procedure:

- 1、 Turn off the rotary switch and the machine will stop working.
- 2、 Turn off the power.

## MAINTENANCE

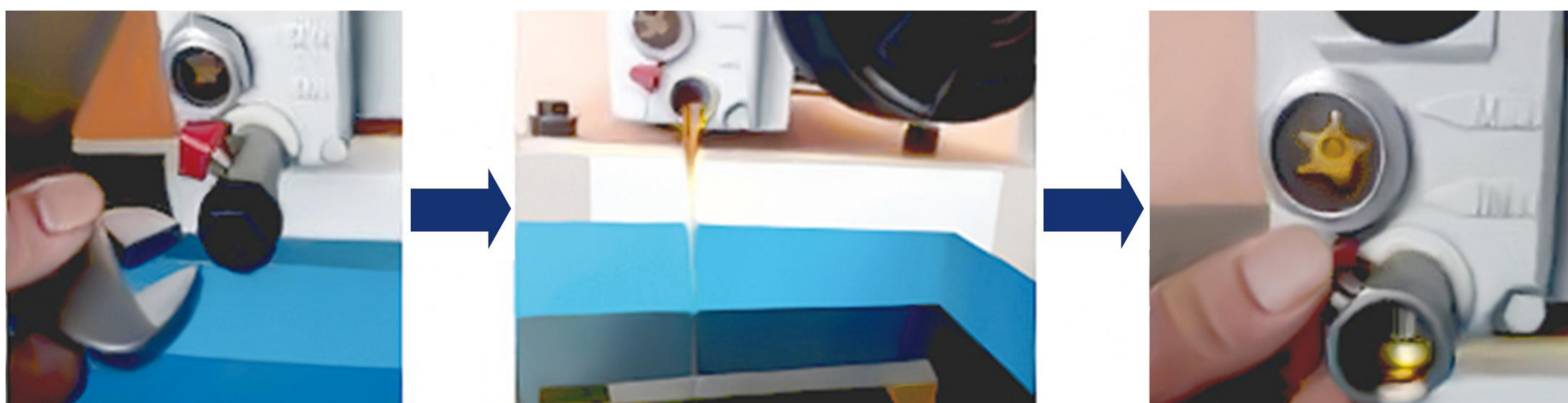
### 6.1 Observe the vacuum pump oil

In daily use, we can regularly observe the oil level through the oil level window to determine whether to add vacuum pump special oil. By observing the oil level window and the oil circulation pipe, we can confirm the color and condition of the vacuum pump oil. If the color of the vacuum pump special oil is too dark or viscous, it is necessary to replace the vacuum pump special oil and filter element in a timely manner, clean the vacuum pump, and perform vacuum pump maintenance.

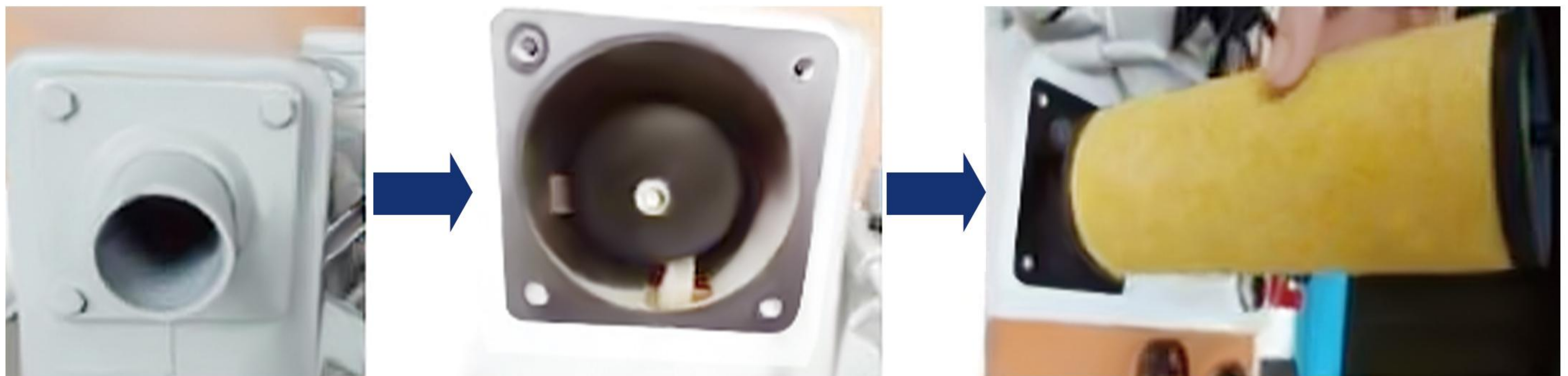
### 6.2 Maintenance process of rotary vane vacuum pump:

Drain the oil → Filter disassembly → Air intake cleaning → Cleaning of mechanical pump chamber → Oil filter replacement → Replacement of specialized oil for vacuum pump

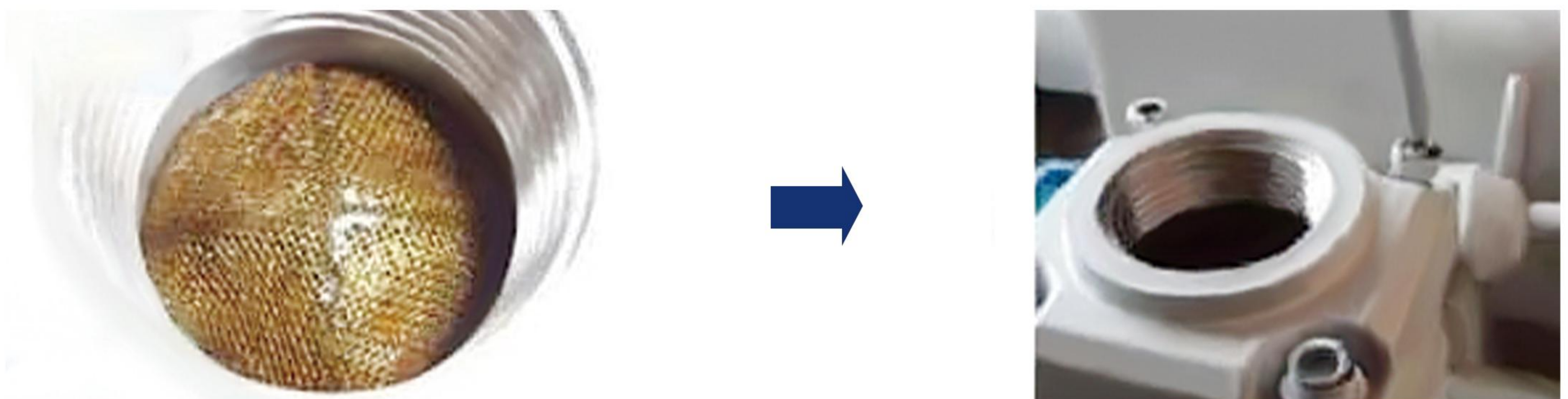
**6.2.1 Drain the oil:** When draining oil, it is necessary to use a wrench to open the sealing cover of the oil drain port, and then open the oil drain valve. When the vacuum pump oil in the oil tank is basically drained, tilt the vacuum pump to release more waste oil from the pump.



**6.2.2 Filter disassembly:** To disassemble the filter, you need to use a wrench to remove the fixing screws of the exhaust port, and then remove the exhaust port cover plate. At this point, you can see the oil filter. Finally, remove the oil filter and see the oil filter positioning hole and return valve in this pump chamber. Install a new filter.



**6.2.3 Air intake cleaning:** If the inlet of the vacuum pump experiences a situation similar to that shown in Figure 1 (which is very serious), it is necessary to remove the four screws of the inlet and then remove the upper cover. Next, remove the connecting flange under the filter screen, and then you can see the filter screen and check valve (both can be removed). Finally, clean the filter screen and check valve with alcohol or degreasing water.



( picture1 )

( picture2 )

**6.2.4 Oil filter replacement:** The oil filter is a component that is not frequently replaced. If regular maintenance is done, this component can be replaced once a year; But if the mechanical pump is not maintained for more than 6 months and the pump is dirty or viscous, the oil filter needs to be replaced.

**6.2.5 Replacement of specialized oil for vacuum pump:** After draining the waste oil, close the oil drain valve and install the sealing cover of the oil drain valve; Finally, add new vacuum pump specific oil from the oil injection port. When adding vacuum pump specific oil, pay attention to the oil level window and do not add too much vacuum pump specific oil, otherwise oil leakage may occur during use.

## PRECAUTIONS

- 1、 Before using three-phase (380V), it is necessary to confirm the direction of motor rotation: observe whether the direction of motor rotation is consistent with the direction of the motor arrow; If the motor rotates in the opposite direction, immediately cut off the power and exchange any two phase wires (any two of L1, L2, L3) to correct the motor rotation.
- 2、 The lubricating oil used for vacuum pumps should be standard grade vacuum pump oil, and users should use other grades of vacuum pump oil with caution. When injecting oil, the oil should not exceed 3/4 of the height of the oil window and should not be less than 1/2 of the height of the oil window.
- 3、 If moisture, dust, and other media are found in the vacuum pump oil, the oil should be replaced in a timely manner.
- 4、 The vacuum pump must be filled with oil when it is stopped, and the exhaust cover of the oil storage tank must not be opened during operation to prevent oil mist from spraying out.
- 5、 The service life (validity period) of the oil mist filter should not exceed one year, and it should be replaced in a timely manner to ensure the normal operation of the vacuum pump.

## TROUBLESHOOTING

### 8.1 Troubleshooting of electrical control box

Fault	Reason	Troubleshooting
The power indicator light of the electrical control box is not on	Not connected to the main power cord	Check that the power bus is properly connected
	The power circuit breaker has not been turned on	Check and open the power circuit breaker
	Circuit breaker burnt out	Replace the circuit breaker
Pressing the start button does not turn	Not in manual mode	Use the start button in manual mode
	Not connecting the power cord properly	Check and connect the power cord properly
	The neutral wire of the power supply incoming line is incorrect	Check if the incoming neutral wire is correct
The digital display meter does not have digital data	Not properly connected to the main power supply	Check and connect the power cord properly
	Report on High Vacuum Pressure	Replace the digital display meter
	The digital display is broken	Pressure relief determination
	The DC power supply is broken	Replace the DC power supply
The motor works intermittently	The thermal protector has been turned down	Adjust the thermal protector
	The thermal protector is broken	Replace the thermal protector
	Poor contact of power cord	Check the power cord
	Motor malfunction	Repair and replace the motor
	The start stop pressure interval of the vacuum gauge is small	Increase interval pressure

## 8.2 Troubleshooting of fully automatic drainage system

Fault	Reason	Troubleshooting
The vacuum pump cannot reach the working pressure, the current of the motor is too high, and the vacuum pumping time of the system is too long	Vacuum system or intake pipeline leakage	Check whether there are leaks in the pipelines and eliminate them
	The vacuum pump oil is contaminated and deteriorated	Replace the vacuum pump oil
	Exhaust filter clogged	Replace the exhaust filter
	Oil filter clogged	Replace the oil filter
	The intake filter is clogged	Clean the intake filter. If the intake filter is frequently clogged, please install it at the intake port
	The intake filter is clogged	Clean or replace the intake filter cartridge
	Blockage of intake or exhaust pipes	Remove blockages and unclog pipelines
	The suction valve is completely closed or partially opened due to being stuck by dirt	Clean the intake valve or intake filter screen

Fault	Reason	Troubleshooting
The vacuum pump cannot reach the working pressure, the current of the motor is too high, and the vacuum pumping time of the system is too long	The intake and exhaust pipes are too long or the diameter is too small	Replace the pipeline that meets the requirements
	Oil pipe leakage or damage	Tighten the joint, replace the oil pipe or joint
	Leakage of sealing ring or shaft seal	Replace the sealing ring or shaft seal (operated by professionals)
	The exhaust valve is stuck or not installed properly	Disassemble and reinstall (operated by professionals)
	The rotor blade is stuck in the rotor slot or damaged	Disassemble to allow the rotor to slide freely or replace the rotor (operated by professionals)
	The radial clearance between the rotor and the pump body is incorrect	Adjust the vacuum pump clearance again (operated by professionals)
	Internal parts of the vacuum pump are damaged	Repair vacuum pump (operated by professionals)
	Leakage in intake pipeline or vacuum system	Check for leaks in the system and pipelines
After the vacuum pump is turned on, there is abnormal noise or excessive load	Electric motor operates in phase loss mode	Tighten or replace the cable
	Vacuum pump steering error	Correct steering
	Discontinued for several weeks or months	Close the air inlet of the vacuum pump and operate it to heat up the pump
	Environmental temperature, high oil temperature	If necessary, use synthetic oil with slightly lower viscosity Attention: Using oil with low viscosity can cause scratches inside the pump body
	The quality of the oil is not good	Use our company's vacuum pump oil
	The exhaust filter is clogged and the oil turns black	Clean the vacuum pump, replace the oil filter, and exhaust the filtered air
	Long term non oil change	Replace the oil, replace the oil filter
	Foreign substances enter the pump body, damaging the rotor and bearings	Repair vacuum pump (operated by professionals)
The vacuum pump cannot operate normally	Drive motor voltage too low	Provide normal voltage
	The motor overload protector is too small	Please compare the set value of the overload protector with the nameplate data of the motor, and replace the overload protector if necessary
	Fuse blown	Identify the cause of the blown fuse
	If the vacuum pump is equipped with a DC motor, The capacitor of the electric motor is damaged	Repair the electric motor (operated by professionals)
	Voltage drop caused by cable diameter being too small or cable length being too long	Use appropriate cables and reduce length
	Vacuum pump head or motor stuck	Inspect and repair the vacuum pump head or motor separately
	Electric motor burnt out	Replace the electric motor (operated by professionals)

Fault	Reason	Troubleshooting
Vacuum pump blockage	Foreign substances enter the vacuum pump	Foreign substances enter the vacuum pump for repair (operated by professionals) Check the intake filter screen. If it is damaged, please replace and install the intake filter
	Residual condensate causes corrosion of vacuum pump	Repair vacuum pump (operated by professionals) Check the process flow and use the vacuum pump correctly according to the user manual
	After shutdown, due to the vacuum effect of the vacuum system, a large amount of oil was sucked into the vacuum pump chamber from the oil separator. After restarting, the oil could not be compressed, causing damage to the rotor blades	Repair vacuum pump (operated by professionals)
	The vacuum pump is equipped with a three-phase motor, and the motor rotates in the wrong direction, causing damage to the rotor	Repair vacuum pump (operated by professionals)
The motor is running, but the vacuum pump cannot operate	The connection between the drive motor and the vacuum pump coupling is damaged	Replace the coupling
There is abnormal noise	Bearing damage	Repair vacuum pump (operated by professionals)
	The coupling is damaged	Replace the coupling
	Damaged rotor	Repair vacuum pump (operated by professionals) Vacuum pump oil needs regular maintenance and replacement
When the vacuum pump emits smoke or gas, oil sprays out	Incorrect installation of exhaust filter The exhaust filter needs to be replaced	Reinstall the exhaust filter, Replace the exhaust filter
Abnormal decrease in oil level	O-ring damaged	Replace O-ring
	The exhaust filter has cracks	Replace the exhaust filter
	Foreign substances clog the exhaust filter	Replace the exhaust filter
	The oil return pipe is blocked Oil accumulates on the oil separator and, when it reaches a certain amount, it will be ejected from the inlet along with the gas	Check if the return pipe is blocked, clean and unclog the return pipe
	Float valve does not work flexibly	Repair the float valve and replace it if necessary
Oil blackening	Oil usage time is too long	Clean the vacuum pump, replace the exhaust filter, replace the oil filter, and inject new vacuum pump oil

Fault	Reason	Troubleshooting
The working temperature of the vacuum pump is too high, and the oil temperature in the oil tank is greater than 100 °C	The ambient temperature is too high	Comply with the requirements of the ambient temperature for the use of vacuum pumps
	The intake temperature is too high	Comply with the requirements of vacuum pump inlet temperature
	Partial blockage of exhaust filter	Replace the exhaust filter
	Poor ventilation	Only install and use after confirming sufficient ventilation in the environment. Clean the fan blades and the annular oil pipe of the fan blade cover
	Oil filter clogged	Replace the oil filter
	Insufficient oil in the fuel tank	Infuse with oil
	Oil overheating and deterioration	Clean the vacuum pump, replace the exhaust filter, Replace the oil filter and inject new vacuum pump oil
	Abnormal power frequency and voltage	Provide normal power supply
	The inner diameter of the intake and exhaust pipes is too small and the length is too long	Replace the pipeline that meets the requirements
	Filter, filter screen clogged intake, exhaust pipe clogged	Clean up blockages
Oil thinning and turbid oil foam	The vacuum pump absorbs water, which is severely dampened and mixed with incompatible oil	Clean the vacuum pump, replace the exhaust filter, replace the oil filter, inject new vacuum pump oil, and change the operating mode

Note: If your issue has not been resolved according to the above instructions, please consult our online customer service.

## AFTER SALES WARRANTY CARD

ONE、 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 filled in 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. Electronic components are covered by a three-month warranty.

**TWO、 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.

**THREE、 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 number		Purchase quantity	
Purchasing date		Purchasing unit	
Customer Name		Contact information	

## Warranty Record

Warranty Date	Fault handling methods	Completion date	Customer signature



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