

Lubricated Rotary Vane Medical Vacuum System Operation Manual

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1 Preface

This operating manual will provide installation, operation, and basic maintenance instructions for medical vacuum system equipment. This manual is applicable to our oil-lubricated rotary vane vacuum pump system. Before starting the vacuum pump, the user must read the following.

Operators of this unit should have relevant knowledge of vacuum systems and be able to identify and avoid potentially threatening conditions associated with vacuum pumps. Improper operation will cause injuries and serious accidents. Before installing and operating this unit, users should understand the structure, operating procedures, and hazards of the vacuum unit. If you have any questions about the operation, safety, maintenance, etc. of the vacuum unit, please contact us.

2. System Overview

Medical vacuum systems are designed to provide medical vacuum to medical gas piping systems in medical facilities.

Amcaremed medical vacuum system consists of main components such as electric control box, vacuum pump, gas tank, pipeline, and pressure sensor. The electric control box monitors the pressure in the gas tank in real time through the pressure sensor, and controls the start and stop of the vacuum pump through the logic program, so that the vacuum degree in the vacuum system is always balanced within the preset vacuum range. The touch screen home screen will display real-time system pressure values and the status of each pump.

3.Safety guidance

Operators should read the entire contents of this manual carefully before installing, wiring, starting up, operating, adjusting, and maintaining the system.

Operators should use common sense safety precautions, good workmanship practices and follow any relevant local safety precautions.

This manual contains information that is very important to know and understand. For safety and to prevent equipment problems, please pay special attention to the following information:

- Before starting any installation or maintenance procedures, all power to the equipment must be disconnected and pre-power-on inspections must be performed.
- This is a high-speed rotating machine. Do not attempt to service any parts while the machine is running.
- All electrical procedures must comply with all national, state, and local codes and requirements.
- All wiring should be connected by a certified electrician.
- The waste discharge and scrapping procedures of the vacuum unit should be in accordance with local environmental protection regulations.
- When using a vacuum system to absorb toxic gases, in addition to the pump, the vacuum pump oil is also toxic, so please pay special attention during maintenance.
- The hot surface of the vacuum pump can cause burns. Please wait for the surface of the pipe or vacuum pump to cool before performing repairs and maintenance.

- Wire sizes should be able to handle the peak load of all operating units and motors. Please read the wiring dimensions for full motor load and full system load on the electrical wiring diagram.
- Before removing, loosening, or servicing any cover, guard, fitting, connection, or other device, release all vacuum in the affected components.
- If repairs or maintenance affect available vacuum levels, notify appropriate hospital staff.

4. System introduction

4.1 Configuration instructions

The vacuum system complies with CE requirements and consists of two or more oil-lubricated rotary vane vacuum pumps. This system is suitable for three-phase four-wire power supply, 220V/380V, 50Hz/60Hz working environment. The remaining accessories include a 5um filter element, precision air intake filter element, three precision butterfly valves, stainless steel pipes, electric control box, carbon steel vacuum tube, etc.

4.2 Parameter list

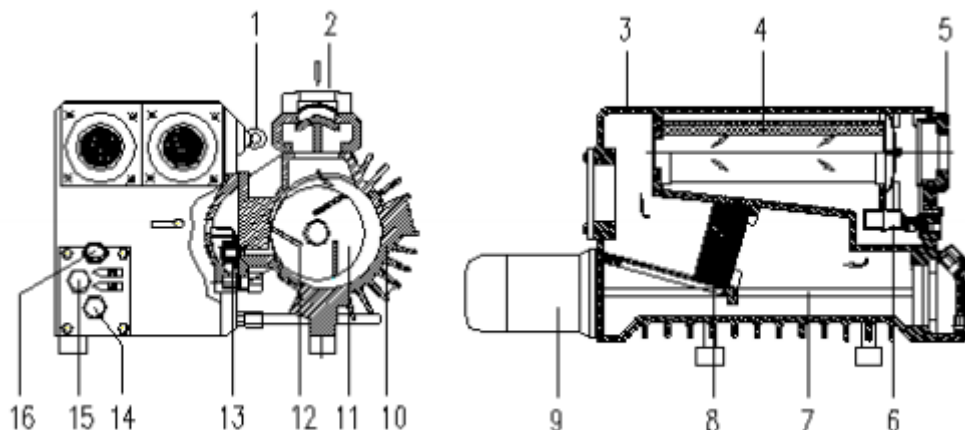
Model	VOL15	VOL20	VOL30	VOL50	VOL65	VOL100	VOL250
Single pump flow rate (m ³ /hour)	40	63	100	160	200	300	630
Single pump power (KW)	1.1	1.5	2.2	4	4.8	7.5	18.5
Motor speed (rpm)	1450	1450	1450	1450	1450	1450	1450
Noise	62	62	65	65	72	72	75

4.3 Component introduction

4.3.1 Vacuum pump

Form: single-stage, direct connection, air-cooled, oil-sealed rotary vane vacuum pump.

The equipment operates without failure for no less than 50,000 hours.



The vacuum pump works according to the rotating vane principle, in which an eccentrically mounted rotor (11) rotates inside the pump body (10), and centrifugal force forces the vanes (12) to slide along the grooves in the rotor (11) against the inner wall of the pump body (10). The blade (12) divides the spherical space between the pump body (10) and the rotor (11) into several working rooms. When the working chamber is connected to the air inlet, gas is sucked in. As the rotor continues to rotate, the sucked gas is compressed and discharged into the oil separator (3). A constant pressure difference allows the oil from the vacuum pump to enter the compression chamber.

The lubricating oil and the extracted gas are discharged into the oil separator (3) together. That is, the oil and gas are separated under the action of the exhaust filter (4). The lubricating oil falls back to the bottom of the oil separator (3) and passes through the float. The valve (6) again enters the working chamber (oil circulation), while the unoled gas is discharged to the atmosphere and discharged through the exhaust nozzle (5).

4.3.2 Air intake filter

Dust filter: Imported 0.01 micron precision air intake filter

Bacterial filter: imported 0.02-micron precision air intake filter

Paper filter elements are mainly used to filter impurities in the process to prevent them from entering the vacuum pump and causing unnecessary damage. There are two gas inlet filters in the vacuum system, which are located at the inlet of the vacuum pump.

4.3.3 Check valve

Imported copper check valve G1-1/4" or G1-1/2" or G2.

Each vacuum pump is configured (built-in) so that gas can only pass in one direction and reverse in the other direction, blocking the flow of gas and effectively preventing the vacuum pump from running in reverse.

4.3.4 Valve

Two-piece manual ball valve G1-1/4" or G1-1/2" or G2.

The valve can be closed manually to cut off the vacuum pump and process for maintenance or inspection of a single vacuum pump.

4.3.5 Air inlet

Equipped with 3 manual imported carbon steel butterfly valves to control the vacuum tank and process continuity. Used for maintenance and repair of pipelines and vacuum storage tanks.

4.3.6 Vacuum pressure sensor and vacuum pressure display

The vacuum pressure display can display the pressure in the vacuum tank in numerical form, allowing the operator to know the measurement results in simple digital form. At the same time, the vacuum pressure sensor detects the vacuum value in the vacuum tank and pipeline. The operator only needs to input the vacuum pressure range value, and the vacuum pump will automatically work within this range.

4.3.7 Vacuum pump working timer

Record the running time of each vacuum pump to facilitate operators to maintain the vacuum pump.

4.3.8 High temperature corrugated pipe and high temperature transparent hose

Connect the vacuum pump to the stainless steel pipeline to prevent the vibration generated by the vacuum pump from being transmitted to the pipeline and vacuum tank, balance the equipment, reduce vibration damage to the pipeline and accessories, and reduce the overall vibration of the system and the vibration caused by system resonance.

4.3.9 Vacuum storage tank

Material: carbon steel

The vacuum storage tank is designed to be cylindrical and compact, making it easy to move and transport. It is equipped with a drain valve so that the operator can simply drain the condensed liquid in the vacuum storage tank.

4.3.10 Electric control box

(1) The low-voltage electrical components and controller PLC used in the electrical control box are mainly Siemens and ABB brands. TCP/TP communication is used to connect the host computer touch screen with the PLC, so as to operate the system on the touch screen;

(2) Using a thin film capacitive vacuum sensor, it has high measurement accuracy, good corrosion resistance, and the measurement results are not affected by the measurement gas;

(3) Achievable: ① Reliable protection of vacuum pumps ② Automatically or manually control the start and stop of the vacuum pump ③ The pressure working range can be set freely

(4) Manual control mode: Any vacuum pump can be started and stopped by pressing the button and is not affected by the vacuum degree.

(5) Automatic control mode: The vacuum system automatically operates within the pressure range set by the operator. When the system pressure is lower than the set value, the vacuum pump stops working; when the system pressure is higher than the set pressure point, the vacuum pump automatically starts running to reduce the operating time of the vacuum pump and save energy and consumption. Vacuum pumps can be started in polling to balance the service life of each pump.

(6) Sound and light alarm: When the vacuum value reaches the set parameter value or the pump reaches the maintenance time, a sound and light alarm will be issued, indicating that the vacuum system now requires maintenance or inspection.

(7) The control system is equipped with protection devices such as overvoltage and overload, and each vacuum pump circuit is equipped with protective components such as door circuit breakers, low-voltage circuit breakers, and thermal relays.

5. Receipt inspection

Upon receipt of the medical vacuum system, immediately inspect it for any damage during shipping.

Please repair or replace damaged items before use. The nameplate should be checked to verify the correct model number and voltage.

WARNING: During all moves, use appropriate load-rated lifting equipment and follow safe lifting procedures.

WARNING: Do not operate equipment if damaged during transportation, handling, or use. Damage could result in an unsafe condition and result in personal injury or damage.

6. Installation

6.1 Installation location

1. The vacuum system must be installed in a clean, well-lit, and well-ventilated area.
2. The area should be free of excessive dust, toxic or flammable gases and moisture.
3. Never install the vacuum system in a place where the ambient temperature is higher than 40° or the humidity is high.
4. Clearances must allow for safe and efficient inspection and maintenance.
5. For maintenance and ventilation of the system, it is recommended to leave 24 inches (60.96 cm) of clearance around the system and 36 inches (91.44 cm) in front of the control panel. Provide vibration-damping pads for the system to reduce noise caused by system vibration. The system should be leveled and placed on a concrete pad suitable to support the weight of the system.
6. If necessary, use metal shims or leveling pads to level the system. Never use wood shims.
7. The system should be located as close as possible to the point of use to prevent excessive loss of working vacuum due to pressure drops.

6.2 Pipeline

1. When assembling system pipes, ensure that the pipes are arranged neatly and are not strained or twisted.
2. The exhaust pipe should be as short as possible and the restrictions should be as small as possible.

6.3 Wiring

WARNING: Always disconnect all power from the system before performing any electrical work.

Before starting any installation or maintenance work, please refer to the electrical diagrams provided with the equipment.

Do not operate the system at voltages other than those specified on the system panel.

All user wiring shall comply with the National Electrical Code and any other applicable state or local codes.

CAUTION: All voltage will be disconnected from the pump module using a circuit breaker.

Closing the corresponding circuit breaker will disconnect the control power supply, and closing the corresponding motor circuit breaker will disconnect the pump power supply.

Electrical service must be as specified on the nameplate or damage to the equipment may occur.

Before starting the electrical installation, check the control voltage, phase and current ratings and make sure the voltages supplied by the hospital are the same.

Vibration during transportation can cause electrical terminals, fuse inserts, and mechanical connections to loosen. Tighten all electrical connections before applying power to the control panel.

Only qualified electricians should connect power to the control panel and any other connected circuits.

Ensure that the power supply of the emergency power generation system is consistent with the requirements of the vacuum system.

The three-phase power supply provided by the emergency generator must match the normal power supply to ensure that the motor always maintains the correct direction of rotation.



After all inspections are completed, connect the three-phase four-wire power supply (380V) to the vacuum negative pressure unit, or connect the three-phase power supply (220V) to the vacuum negative pressure unit, and observe the indicator light of the phase sequence protector. When L1, L2, and L3 are powered on, the Un light (green light) is on. If the R light (yellow light) is not on, adjust the two phase lines at will until the R light (yellow light) is on. At this time, the phase sequence protector is working normally (both All lights must be on), otherwise the vacuum pump will not work.

7.Run

7.1 Preparation before starting

1. Make sure you have read and understood all safety warnings, labels, and instructions before proceeding.
2. Remove any shipping materials, brackets, etc.
3. Make sure all fuses, circuit breakers, etc. are the correct size.
4. Verify that all pumps have the proper amount of operating oil.
5. Make sure the power and ground wires are securely connected. Make sure the electrical control box door is closed and locked.

6. Make sure the inlet filter is installed correctly and all pipes are connected. Open the isolation valve of each vacuum pump. Open the receiver valve and close the receiver drain valve and bypass valve.

WARNING: Risk of injury. Make sure no one comes into contact with any moving parts during the spin check.

7.2 Startup and operation

1. Before attempting to operate the vacuum pump, follow all steps under " Preparation before starting".
2. Turn on the power supply.
3. Fully open the connection valve.
4. Use the pump work selection switch in the system parameter settings to turn on each pump-motor in "automatic" mode to ensure that the pumps are all running in automatic mode.
5. Use the system pressure gauge to check the vacuum. When the vacuum degree remains unchanged and the stop condition is met, the control system will turn off the vacuum pump motor.
6. Check for excessive vibration, abnormal noise or leakage during operation.

8.Control system

8.1 Overview of control system

Medical vacuum control systems are based on vacuum sensors. Each vacuum control system has a color touch screen with the ability to adjust alarm set points during use; monitor system faults; monitor the vacuum level of the vacuum system as well as the operating status and run time of each pump. All pumps have a gate breaker that switches the pump on and off.

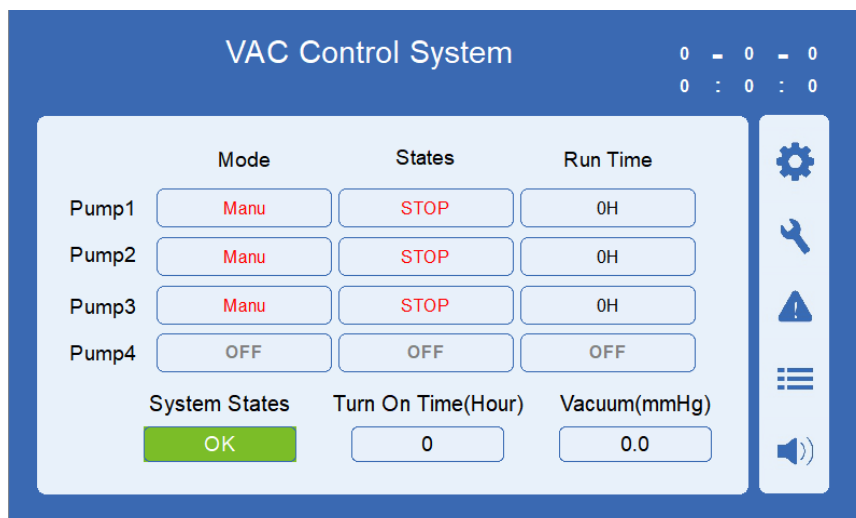
8.2 Electronic control cabinet interface



1. Display: displays the working status and fault monitoring of the vacuum system, and is used to change different settings of the vacuum negative pressure system
2. Door circuit breaker: controls the power on and off of each pump
3. Power indicator light: displays the on-off status of the control power supply
4. Sound and light alarm: When the vacuum system fails, it emits red light and sounds.
5. Button switch: start and stop the vacuum pump in manual mode
6. Infrared sensor: The touch screen automatically lights up when a human body is detected.

8.3 Touch screen interface

Main interface



Operating mode

- If the vacuum system is in the manual state, the red font **Manu** is displayed. To start and stop the pump, you need to click the manual start and stop button.
- If the vacuum system is in the automatic state, the green font **Auto** is displayed, and the pump automatically starts and stops based on the set air pressure start and stop set points.
- If the pump is inactive, gray font **OFF** is displayed, indicating that there is no pump status for the unit
- Regardless of the mode, as long as the pump is running, the green font **RUN** is displayed.
- Regardless of the mode, the pump stops and the red font **STOP** is displayed.

Pump run time display

The operating time of each pump is shown in hours.

System status

- If the system is running normally, "OK" is displayed.
- If any pump fails, "FAULT" is displayed.


Boot time

The system's power-on time is displayed in hours.

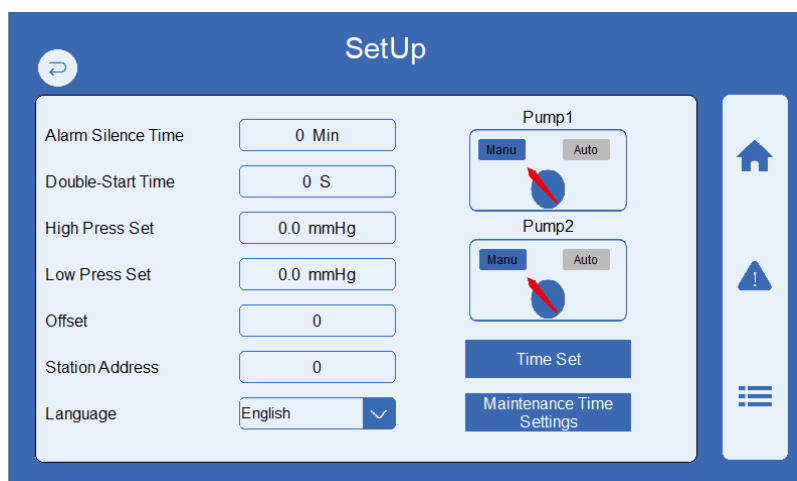
Vacuum level display


The current vacuum level is displayed in mmHg.

Sound and light alarm off

When an alarm occurs, the audible and visual alarm will sound and flash. Click the icon  , the sound and light alarm will be turned off within the set time.

Parameter setting interface



Enter the parameter setting interface by clicking on the right side of the home screen  icon, you need to select "Operator" among the users in the password interface and enter the permission password 123456.

- Alarm Silence Time: Turn off the sound and light alarm according to this time, unit Min, maximum value 54Min.

- Double-Start Time: Start the second pump according to this time, unit S.
- High Press Set: High pressure starting point setting in automatic mode, negative value, unit mmHg.
- Low Press Set: Low pressure stop point setting in automatic mode, negative value, unit mmHg.
- Offset: Under non-standard atmospheric pressure, correct the pressure value under normal air detected by the pressure sensor (Vacuum value on the home interface).
- Station Address: This device acts as a slave station. Set the RS485 slave station address to communicate with the master station.
- Language: Language selection, currently Chinese and English conversion, can also be set according to needs
- Pump1/Pump2: Manual/automatic selector switch for pump 1 and pump 2. Only when both pump 1 and pump 2 are set to manual can you press the Start/Stop button to start the pump manually.

Time setting interface

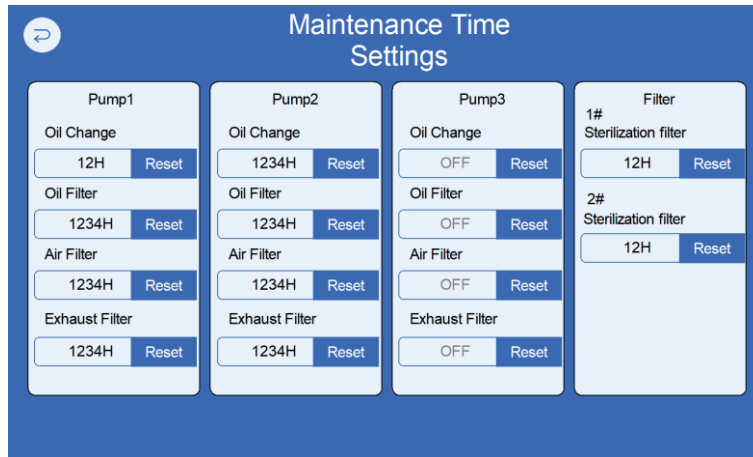
Enter the time setting interface by clicking the "Time Set" button.

The screenshot shows a 'Time Set' dialog box with a blue header and a light blue background. It contains six input fields arranged in a 3x2 grid: Year, Month, Day, Hour, Minute, and Second. Each field contains the number '0'. Below the grid is a blue 'OK' button. A back arrow icon is visible in the top left corner of the dialog box.

Input the local time in the year, month, day, hour, minute, second and other input boxes. After clicking OK, the time setting is completed. You can see the set local time in the upper right corner of the main interface.


Maintenance time settings interface

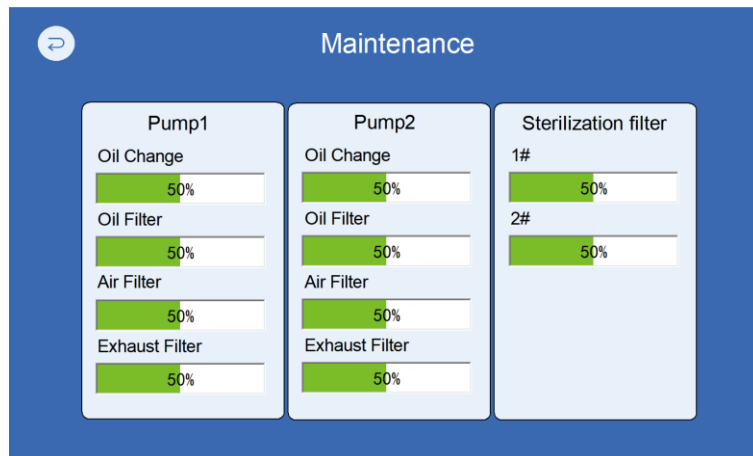
Enter the maintenance time setting interface by clicking the "Maintenance Time Setting". To enter this interface, you need to select "Engineer" among the users in the password interface and enter the permission password.



- Set the maintenance time for each pump, such as oil change, oil filter, air intake filter, exhaust filter and sterilization filter. The factory default setting is 2000H, the factory default setting is 4000H for exhaust filter, and the factory default setting is 8000H for sterilizing filter. If you want to change the maintenance time, you can directly enter it in the input box.
- If the maintenance of the pump has been completed and the maintenance time needs to be re-timed, please click the "Reset" button and confirm the operation. The maintenance time will be re-timed.


Maintenance viewing interface

Enter the maintenance viewing interface by clicking on the right side of the home screen  icon.



- The maintenance time for oil change, oil filter, air intake filter, exhaust filter, sterilization filter of each pump is timed and displayed as a percentage. When it reaches 100%, the vacuum system will issue an audible and visual alarm and maintenance is required.
- After the maintenance time is restarted, it will be 0% and start timing.

Alarm recording interface

Enter the alarm recording interface by clicking on the right side of the home screen  icon.



- You can view the specific time when the alarm was generated and the specific description of the alarm.
- Click the "Clear Alarm Records" button in the lower right corner to clear existing alarm records.

Company information interface

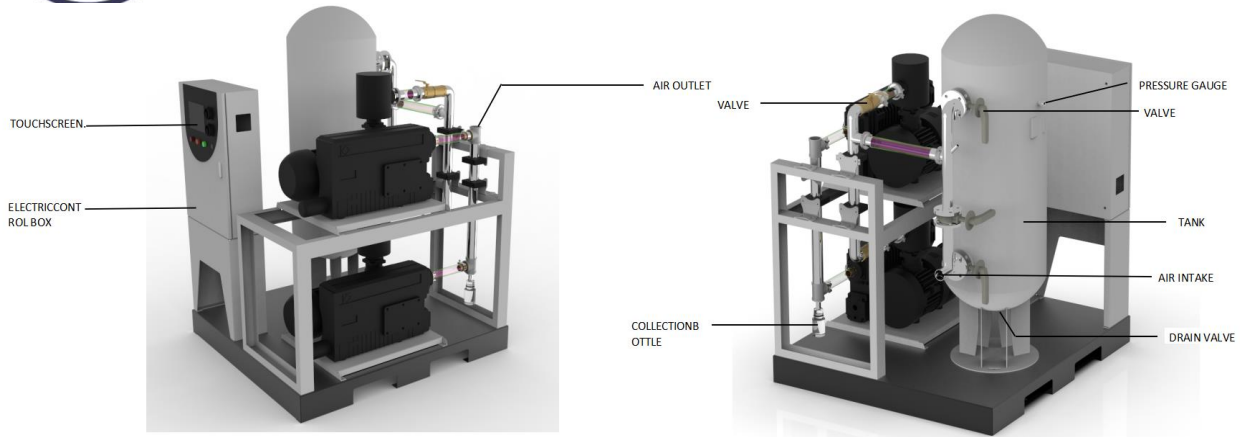
You can enter the company information interface by clicking on the right side of the home screen icon.



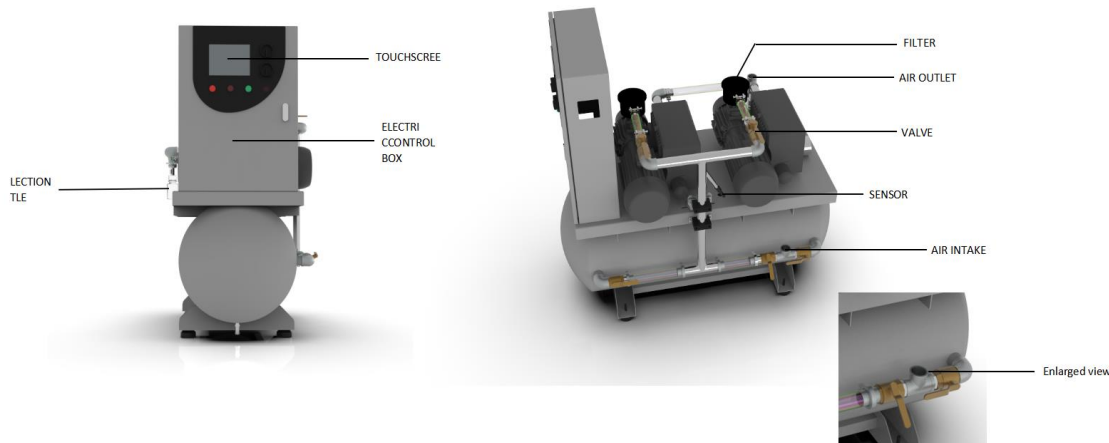
- View company name, address, phone number, email, and other information
- Click anywhere to return to the main interface

8.4 Installation method introduction

- (1) Vertical



(2) Horizontal



8.5 Summary

The electric control cabinet is a control device that controls the manual and automatic start and stop of the two vacuum pumps. Through the measurement of the pressure sensor on the stainless steel pipe, the working pressure can be displayed on the touch screen, and the start and stop pressure can also be changed to achieve constant pressure range control requirements.

- (1) Timer: used for the operation timing of the vacuum pump and the power-on timing of the vacuum system. When the vacuum pump is running, the timer starts timing, and the minimum display unit is hours (H). When the running time of the pump reaches the set maintenance time, please perform maintenance; when the vacuum system electrical control cabinet is powered on, the timer starts timing, and the minimum display unit is hours (H). The display unit is hour (H), which shows the time the current vacuum system has been started and running.
- (2) Electronic pressure sensor: used to display the current pressure value of the system. Start and stop pressure setpoints can be changed by setting parameters within the vacuum system.
- (3) Manual control function: After the power is turned on, switch the selector switches of all pumps in the vacuum system to the manual position. After pressing the green start-stop button, the pump can start normally; after pressing the green start-stop button again, the pump stops immediately.
- (4) Automatic control function: After the power is turned on, switch the pump selector switch to the

automatic position in the vacuum system, and the controller will automatically start according to the set value (default -300mmHg). When the vacuum reaches the set stop value (default value - 525 mmHg), it automatically stops. If both pump selector switches are in the automatic state, the two pumps will start in turn, and the second pump will start after the set time is reached, but the vacuum value has not reached the set stop value; the vacuum value reaches After the set stop value, both pumps will stop simultaneously.

9. System maintenance and repair

If there are pollutants harmful to health and the environment in the exhaust gas, the pollutants will stay in the oil, oil filter, vacuum pump pores and inside. Therefore, vacuum pumps contaminated with contaminants are harmful to human health. Operators should be equipped with protective devices when maintaining the pump. Oil, exhaust filters, and oil filters should be managed by professional environmental protection departments. Oil replaced from vacuum pump maintenance should be managed according to regulations.

9.1 Replacement of lubricating oil

9.1.1 Lubricating oil mainly has the following four functions:

- Lubrication: Lubricating oil can form an oil film between the pump cover, rotor (11), blade (12), and pump body (10) to reduce the wear of these parts when the vacuum pump is running.
- Sealing: The lubricating oil passes through the oil film to make the pump more sealed.
- Cooling: The lubricating oil absorbs a large amount of compression heat, so the compression process equals isothermal compression and reduces the power of the pump.
- Noise Reduction: The lubricant reduces the noise generated by high frequency vacuum pumps.

9.1.2 Usage standards of lubricating oil and recommended oil replacement

The performance of lubricating oil has a decisive impact on the vacuum pump. If the oil is replaced inappropriately or even the wrong oil is replaced, it will cause serious damage to the vacuum pump.

Recommendation: Please use our recommended special vacuum pump oil to ensure the service life of the vacuum pump.

Oil model	temperature	type
VM068	0-12°C	mineral oil
VM100	12-30°C	mineral oil
VS100	>30°C	synthetic oil

9.1.3 Pay attention to the use of lubricating oil

(1) Lubricating oil replacement time

- When the set oil change time is reached, the vacuum system will alarm
- Depending on the working environment of the vacuum pump, the service life of the lubricating oil will be affected. It is recommended to observe the oil level observation hole of the vacuum pump during

inspection. If the lubricating oil deteriorates or the oil level decreases below the warning line, timely maintenance is required.

(2) In order to avoid exceeding the service life of the lubricating oil, the lubricating oil should be replaced in time. Otherwise, the quality of the lubricating oil will decrease, the lubrication performance will decrease, and the ignition point of the lubricating oil will also decrease, making it easy for the vacuum pump to spontaneously ignite.

(3) After the vacuum pump has been used for one year, it is best to clean the working chamber of the vacuum pump with lubricating oil. The method is: when new lubricating oil is replaced, the lubricating oil should be replaced immediately after the vacuum pump has been running for 6 to 8 hours, so that the residues of various organic components can be cleaned, so that the vacuum pump can achieve better operating conditions.

9.1.4 Lubricating oil replacement steps

(1) First, start the vacuum pump and let it run for a period until the oil temperature rises to completely discharge the exhaust gas in the vacuum pump; then stop the vacuum pump and cut off the power supply.

(2) After confirming that there is no pressure in the vacuum pump and the oil temperature has cooled slightly, slowly open the oil drain plug to prevent the lubricating oil in the pump from scattering.

(3) After the waste lubricating oil in the vacuum pump has completely flowed out, tighten the oil drain plug.

Note: When disassembling and tightening the oil plug, make sure the sealing ring is not damaged to prevent oil leakage.

(4) Open the oil filling plug, add new lubricating oil into the vacuum pump, the oil level should be slightly lower than "MAX", and then tighten the oil filling plug.

Note: The oil level cannot be higher than "MAX" to prevent the lubricant from overflowing when the vacuum pump is running; the oil level cannot be lower than "MIN", otherwise the lubricant will have no good effect.

9.2 Exhaust filter element replacement

The exhaust filter element has a super-separation function, so its quality is important to the cleanliness of the exhausted air. Filters not provided by our company cannot guarantee the function of our original filter, and may shorten the service life of the vacuum pump and reduce the working efficiency of the vacuum system.

When white smoke (oil mist) flows out of the exhaust port, the exhaust filter must be replaced. A contaminated filter will increase the power consumption of the motor and we recommend replacing the filter every 2000 hours of operation.

The replacement steps are as follows:

(1) After the vacuum pump stops running, make sure there is no pressure in the vacuum pump.

(2) Remove the screws on the air cover of the exhaust filter element and discharge the exhaust gas in the vacuum pump.

(3) Remove some parts on the top.

- (4) Take out the used filter from the vacuum pump and replace it with a new one.
- (5) Assemble the top and close the lid

NOTE: Make sure to place the new exhaust filter with a new O-ring into the oil separator according to the arrow on the exhaust filter.

9.3 Oil filter replacement

- (1) After the vacuum pump stops running, make sure there is no pressure in the vacuum pump.
- (2) Open the oil drain plug, drain and replace the lubricating oil, and then tighten the oil drain plug.
- (3) Remove the used oil filter in the vacuum pump and replace it with a new one.

Recommendation: It is best to change the lubricating oil, exhaust filter and oil filter at the same time.

9.4 Replacement of air intake filter

The air intake filter should be checked regularly.

When you find water in the collection bottle, please drain the collection bottle and gas tank immediately, and clean the collection bottle!

Please keep the drain valve open.

The indicator meter needs to be checked regularly. If it is found that the pointer of the indicator meter points to the red zone, the filter element needs to be replaced in time.

The replacement steps are as follows:

- (1) After the vacuum pump stops running, make sure there is no pressure in the vacuum pump.
- (2) Unscrew the buckle on the air inlet filter, and then open the air inlet filter cover.
- (3) Remove the old filter element from the air intake filter, and then place the new filter element.
- (4) Install the air inlet filter cover and tighten the three buckles of the air inlet filter.

9.5 Replacement of sterilization filter

The sterilization filter should be checked regularly.

When removing the filter housing, be sure to close the air inlet valve at the front end, open the vent valve or other exhaust device at the back, and open the housing only after confirming that the pressure is fully relieved to ensure the safety of the dismantling personnel. When removing the filter housing, use belt pliers or pipe pliers to clamp it and twist it counterclockwise. Do not use a hammer or other tools to hit the filter. When replacing the filter element, the matching sealing ring should also be replaced at the same time.

9.6 Routine maintenance

9.6.1 Daily inspection

Same checks as before starting the machine.

- (1) Look through the oil sight hole and note the color of the lubricant. Observe whether the vacuum pump oil is static, has turbidity, sediment or black oil, and the vacuum pump oil must be replaced.
- (2) Use the transparent hose in front of the air intake filter to observe whether there is water vapor,

residue, or dirt in the incoming air.

- (3) Check the vacuum system for leaks.
- (4) When you find water in the collection bottle, please drain the collection bottle and fuel tank immediately, and clean the collection bottle!
- (5) Please keep the drain valve open!
- (6) The indicator meter needs to be checked regularly. If it is found that the pointer of the indicator meter points to the red zone, the filter element needs to be replaced in time!

9.6.2 The new machine runs for 2000 hours

- (1) Change lubricating oil.
- (2) Replace the oil filter.
- (3) Clean the air intake filter. Low compressed air can be used to blow the filter core from the inside to the outside.

Suggestion: After the equipment is produced and put into operation, there will be a period of rest. During this period of rest, the lubricating oil will precipitate. It is best to replace the equipment after the first 500 hours of operation.

9.6.3 After the new machine has been running for 4000 hours

Check the equipment and clean or change the air intake filter

10. Troubleshooting

Fault	Reason	Method of exclusion
The vacuum pump cannot reach the vacuum level and the pump runs for too long	Vacuum system or air intake pipe clogged or leaking	Check whether the pipe is blocked or leaking and eliminate it
	Vacuum pump oil is contaminated or deteriorated	Replace vacuum pump oil
	The sealing ring or shaft seal is damaged	Replace sealing ring or shaft seal
	Blades stuck or damaged	Clean the rotor or blades
	Damage to internal components of the vacuum pump	Repair vacuum pump
Abnormal noise or overload alarm occurs when the vacuum device is turned on.	Motor phase loss	Check power cable
	vacuum pump reverse	Adjust phase sequence
	Long term placement	Close the air inlet and run the pump to allow the

		pump body to heat up
	Foreign objects enter the pump	Disassemble and clean foreign matter
	Blades stuck or damaged	Clean the rotor or blades
Vacuum pump system not working	The wire is too thin or the voltage is too low	Check power supply and cables
	Motor overload protection device rating is too small	Replace the matching overload protector
	Motor damaged	Repair or replace motor
Vacuum pump temperature is too high	Exhaust filter clogged	Replace exhaust filter
	Oil filter clogged	Replace oil filter
	Lubricant is aging or insufficient	Add or replace lubricant
	Air intake or exhaust vents are too long or too thin	Replace pipes that meet requirements
Oil turns dark, thin and foams	Wrong oil added	Clean the vacuum pump, replace the exhaust filter, oil filter, and replace with the correct oil
	High humidity	Change lubricant

11. Service and Warranty

1. This product is strictly inspected by the company's internal warehouse. If a transportation accident occurs or is caused by our company's failure, our company can repair and replace it free of charge.
2. The warranty period is 2 years from the date of purchase.
3. The content of this article is subject to change without prior notice.