

Instructions for the Use of JZB Series High Vacuum Dry Pump



TYPE: JZB-63/180 ☒ JZB-160/500 ☒

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Safety Warning Instructions



Instructions for use:

- Before installing and debugging the pump, please carefully read these operating instructions and follow this information to ensure the stable operation of the pump!
- For correct, safe, and efficient operation, users must carefully read and strictly follow the safety precautions described in the operating instructions!
- The molecular pump must be operated under the conditions described in the operating instructions!
- Must be operated and maintained by trained personnel!

Dangerous



1. When lifting or manually handling pumps, avoid the danger caused by slipping and falling!
2. Electrical connection operations must be performed by trained personnel!
3. Before starting any maintenance and repair work, disconnect the power supply first!

Caution



1. If the pump is heated during use, please be careful not to touch it to avoid burns!
2. Transport pumps and connecting cables must use their original packaging.

Attention



Avoid scratching the outer edges during operation.

CBVAC has the final interpretation right of the content of this manual, and any changes related to product improvements in the future will not be notified separately!

1. Product Introduction

1.1 Product Overview

Dry vacuum pump, is capable of operating within a pressure range of 10^5 Pa (one atmosphere) to 10^{-2} Pa. There is no oil or sealing liquid in the pumping channel of the pump, and the exhaust port is connected to the atmosphere, allowing for direct exhaust to the atmosphere. Conventional dry pumps have poor ultimate pressure (usually ranging from a few Pa to several tens of Pa) and low resistance to dust particles (especially dry pumps). In addition, they have disadvantages such as low pumping speed, large volume, heavy weight, and high power consumption.

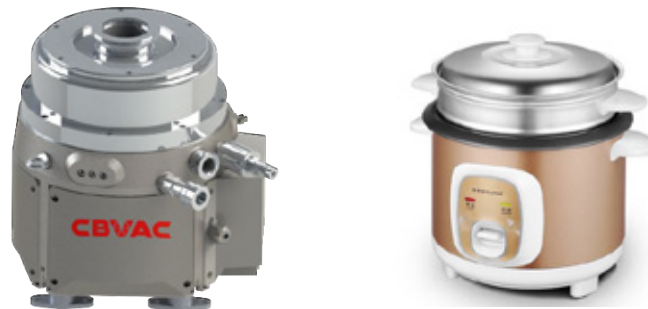
JZB Series High Vacuum Dry Pump,

also known as **high limit dry vacuum pump**,

has a maximum pressure of up to **10^{-6} mbar (10^{-4} Pa)!**

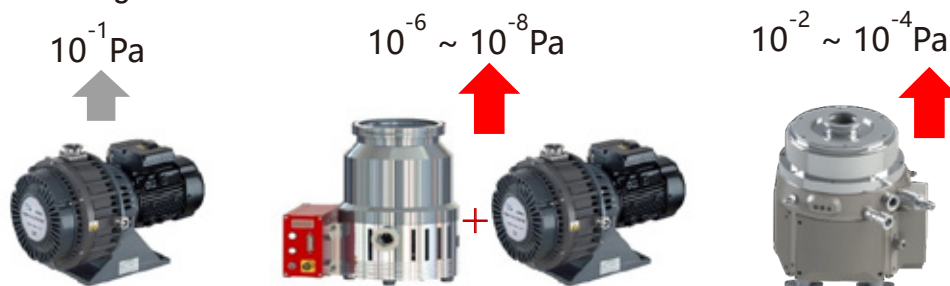
1.2 Product Advantages

- ✓ Small size



Picture 1: Comparison of volume with household rice cookers

- ✓ Limit advantage



Picture 2 (Group): Comparison of limits of different vacuum obtaining devices

✓ Frequent exposure to atmospheric and airborne fluctuations

The probability of internal component damage in general dry pumps is relatively high, which affects their lifespan. The CBVAC JZB Series High Vacuum Dry Pump can easily withstand it and maintain continuous stability.

✓ Working conditions of water vapor, low corrosive vapor, and particulate matter

Generally, dry pumps can cause channel blockage, component corrosion, and product failure. The CBVAC JZB Series High Vacuum Dry Pump can easily cope with such harsh working conditions.

1.3 Application

Semiconductor and electronics industry, optics and laser technology, mass spectrometer, analytical instrument, aerospace technology, vacuum freezing technology, vacuum Science Research, etc.

1.4 Product Code Explanation**J Z B - □ / □ - □ □**

Local control: "None" or "E"

Nitrogen purging:

L without nitrogen configuration,

N with nitrogen configuration

Pumping speed: 180/500

Currently available in two options (Unit: m³/h)

Inlet caliber: 63, 160

Currently available in two options, both in LF form

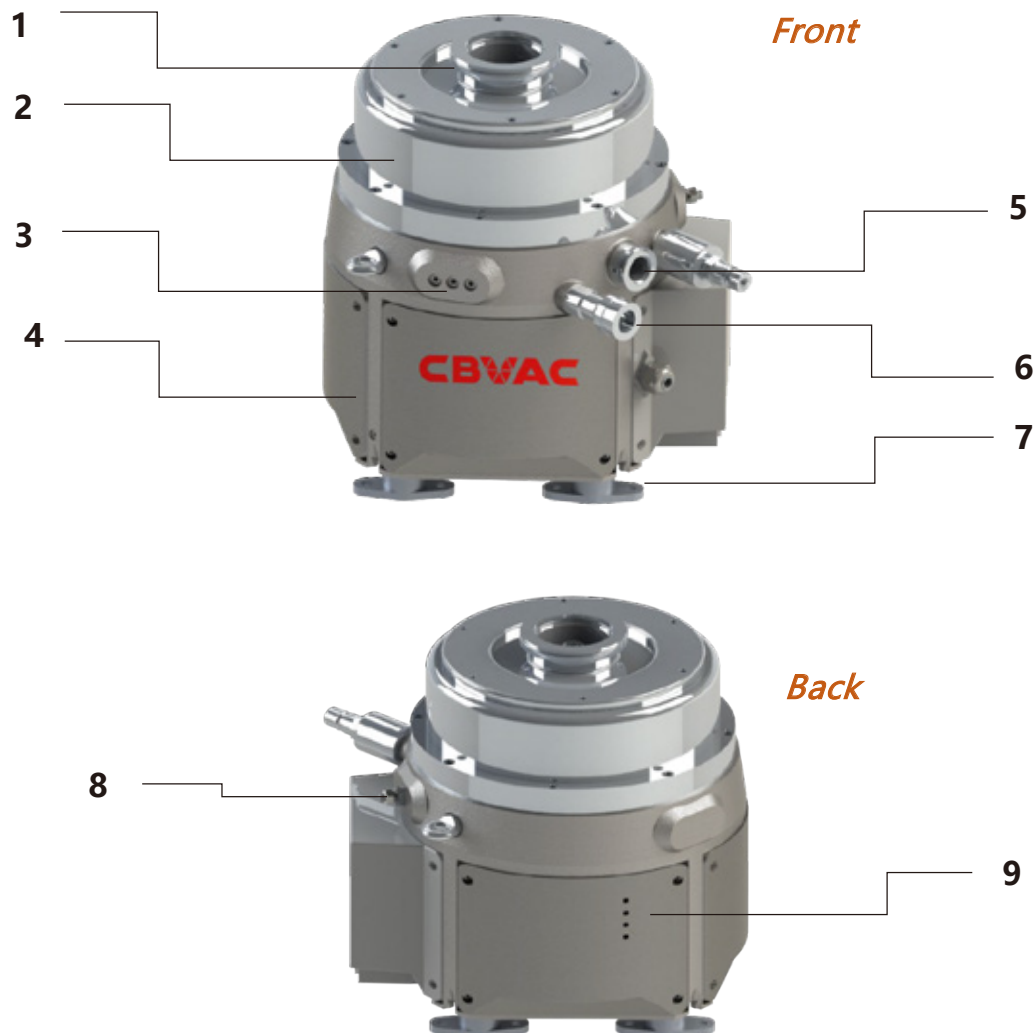
No.	Type	Nitrogen Purging	Local Control
1	JZB-63/180-L	×	×
2	JZB-63/180-N	√	×
3	JZB-63/180-LE	×	√
4	JZB-63/180-NE	√	√

5	JZB-160/500-L	×	×
6	JZB-160/500-N	√	×
7	JZB-160/500-LE	×	√
8	JZB-160/500-NE	√	√

Table: Configuration Table

Example: JZB-63/180-LE——Without blowing, with local control function, inlet LF63, and pumping speed 175m³/h.

1.5 Structural Unit



Picture 3: Schematic diagram of structural composition

- 1- Air inlet 2- Pump casing 3- Oil injection port 4- Pump body 5- Exhaust port
6- Water nozzle 7- Legs 8- Grounding 9 Status indicator light

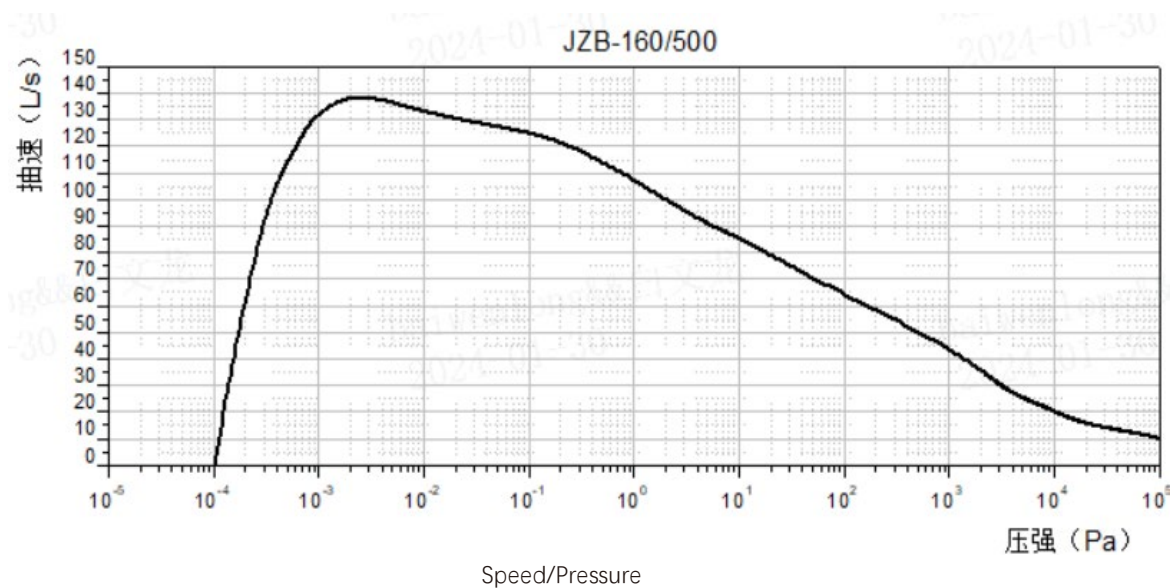
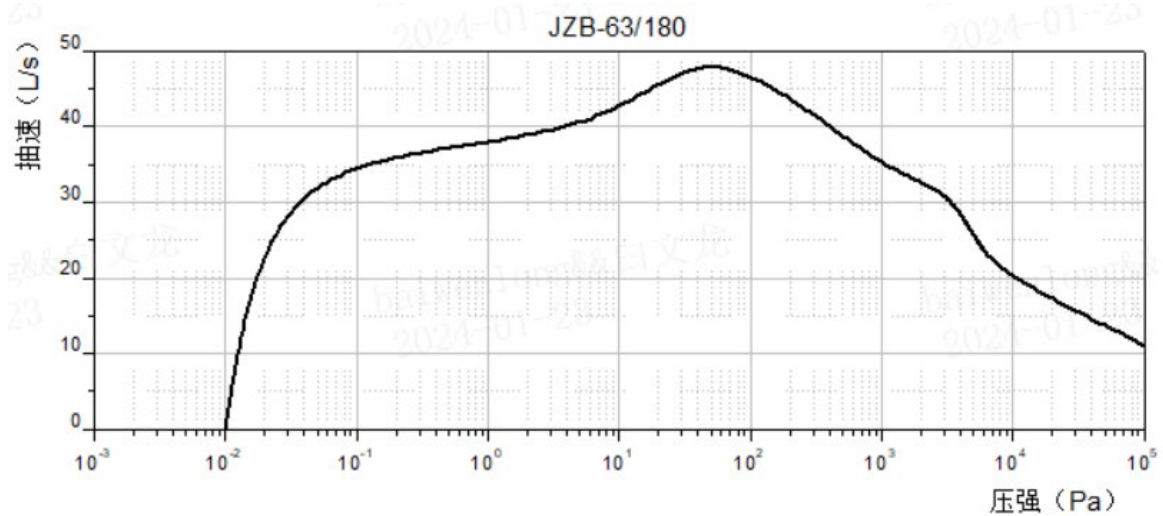
1.6 Technical Parameter**1.6.1 Parameter List**

Type	JZB-63/180	JZB-160/500
☑ Vacuum parameters		
Peak pumping speed	175m3/h	500m3/h
Vacuum limit	< 1.0E-4mbar	< 1.0E-6mbar
Maximum exhaust pressure	< 1200mbar	
Minimum exhaust pressure	> 500mbar	
☑ Physical parameters		
Inlet flange	LF63	LF160
Outlet flange	KF25	
Weight	45kg	47kg
Noise	≤56dB	
Bearing	Ceramic ball bearings	
Installation angle	Vertical±5°	
Vibrate	< 0.25g	
Operation temperature range	5 - 40 °C	
Maximum working environment humidity	90%RH	
Cooling method	Water-cooling	
Cooling water parameters	Pressure 0.2-0.7MPa, Temperature 15-35℃, Volume of flow > 2L/min	
☑ Electrical parameters		
Supply voltage	Three-phase 200~240V AC	
Power frequency	50/60Hz	
Start/stop control mode	Remote I/O control	
Pump control mode	Remote IO interface/RS232	
Communication interface	RS232 (Refer to the E module description details)	
Rated speed	18000rpm	
Idle speed	6000rpm	
Maximum power	~3kW	
Rated power	1.4kW	1.6kW

Maximum starting current	13A	14A
Normal operating current	≤6A	≤6.5A
Acceleration time	~2min	~3min
Downtime	~4min	~4min

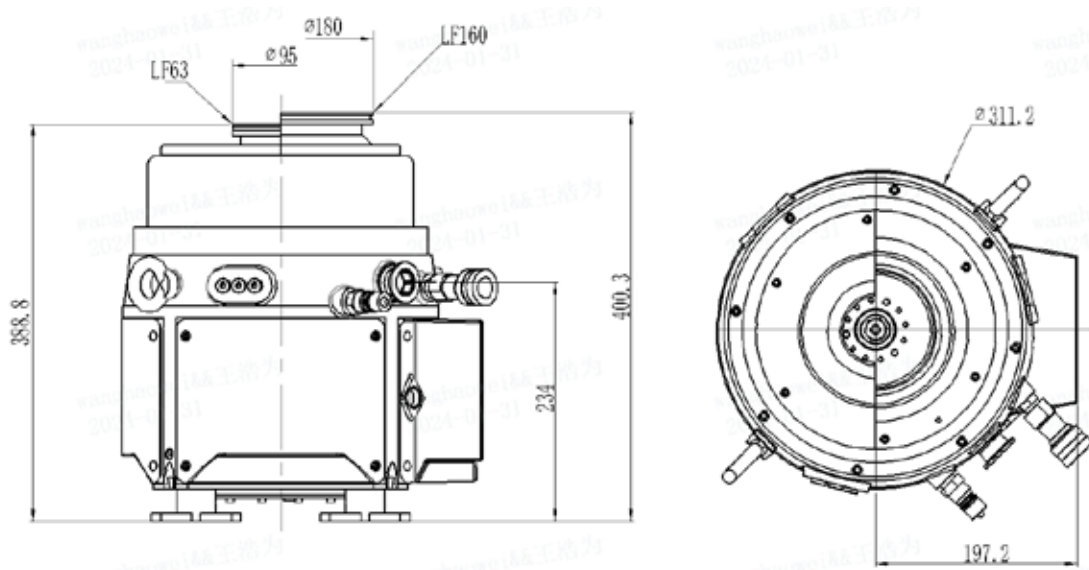
Table 1: List of parameters for JZB Series High Vacuum Dry Pump

1.6.2 Pumping Speed Curve



Picture 4: Pumping Speed Curve

1.6.3 External Dimensions



Picture 5: External Dimensions

1.6.4 Environmental Requirements for Installation

Description	Value
Installation position	Indoor
Environmental temperature (°C)	+ 5 ~ + 40
Relative humidity	≤ 85%
Environmental pressure ($\times 10^5$ Pa)	0.75 ~ 1.06
Installation altitude (m)	≤ 3000
Magnetic field environment (mT)	≤ 3 (Radial) ; ≤ 5 (Axial)
Pollution degree	2 (Complies with the pollution level requirements of IEC 61010)
Radiation environment (rad)	≤ 10^5

2. Installation Instructions

2.1 Precautions Before Use

- a) Ensure that the pump is not disassembled without authorization under any circumstances (if any quality issues are found, please contact our after-sales technical personnel);
- b) Damage caused by incorrect use will not be eligible for free repair during the warranty period;
- c) Cooling water must be connected as required. Damage caused by insufficient cooling conditions will not be eligible for free repair during the warranty period;
- d) Product performance damage or mechanical failure caused by abnormal handling, falling, collision, etc. cannot enjoy free repair and treatment during the warranty period.

2.2 Fixation and Connection

- a) Be sure to install and fix the pump on the machine or building structure to ensure a firm and reliable connection and reduce the potential risk of personal injury to the pump;
- b) Fix the pump through the fixing holes on the legs (connecting M8 bolts/screws) to ensure that the fixed position of the machine can withstand a torque of not less than 1000N · m;
- c) After installing the pump into the vacuum system, connect the power supply (pay attention to the sequence);
- d) Before connecting to the vacuum system, ensure that the front end of the chamber and other components have been thoroughly cleaned and cleared to prevent metal particles (including but not limited to these) and other debris from entering the pump;
- e) Do not install check valves or one-way valves at the exhaust outlet.

2.3 Connect Cooling Water

- a) Do not operate or run the pump without connecting the water supply, as it may cause permanent damage to the equipment;
- b) The list of cooling water supply requirements is as follows:

Description	Value
Water pressure	0.2-0.7MPa
Inlet/outlet pressure difference	$\geq 0.2\text{MPa}$
Water temperature	15-35°C
Discharge of water	$\geq 2\text{L/min}$
Allowable particle size in cooling water	$< 0.03\text{mm}^2$
Inlet and outlet connectors	Hydraulic quick connector 3/8"

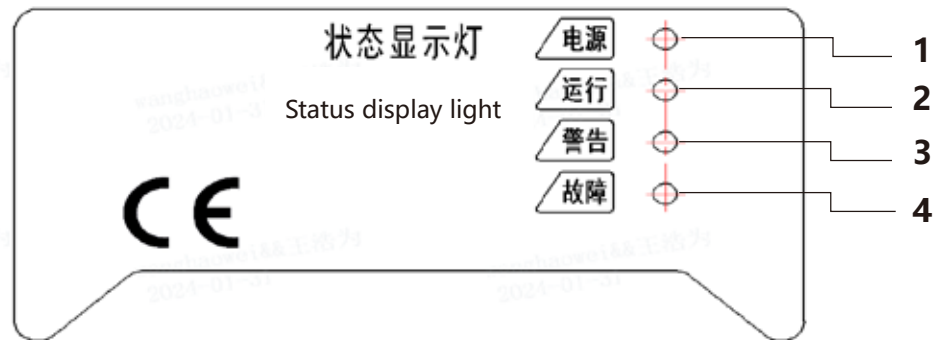
Table 2: Cooling water data list

2.4 Precautions for Connecting Power Supply

- a) Provide stable and reliable power supply according to the requirements of the direct discharge pump power supply parameters (consistent with the rated voltage on the label);
- b) Before operating the pump, it is essential to confirm that the protective grounding bolt is properly grounded;
- c) The power switch (circuit breaker or air switch) shall comply with all the following regulations:
 - The power switch must be provided by the user and located in a location that meets SEMI S8 requirements and is easily accessible;
 - The power switch should not be located in areas where personnel may trip, block, or be exposed to other hazards due to cables;
 - The power switch should not be located in areas where personnel may trip, block, or be exposed to other hazards due to cables;
 - The power switch must be connected between the power supply and the main power cable entering the direct discharge pump;
 - The power switch must have locking/hanging facilities of the type specified in SEMI S2-0200.

3. Electrical Control

3.1 Indicator Light Status



Picture 6: Status indicator light label

The meaning of the status indicator light is shown in the table below:

No.	Indicator light name	Description
1	电源 Power	The green light is constantly on, indicating that the pump is powered on normally.
2	运行 Operation	The green light appears and stays on when the pump is starting/running, and flashes when it is idle.
3	警告 Warn	Only used for - N type pumps, the yellow light remains on when in low flow state.
4	故障 Malfunction	When the protection sensor is working or the frequency converter is malfunctioning, the red light will turn on.

Table 3: Meaning of status display light

3.2 Power Saving Mode Operation

When in idle state, power-saving mode reduces system energy consumption. If the tool interface module used is available, use the tool interface module input to activate the green mode (see Table 4). Entering power-saving mode, the operation indicator LED will flash. The pump speed will decrease to 33.3% (6000 rpm). Note that the speed of power-saving mode is not configurable.

Function	Signal type	Stitch	Operation
Pump on/off	No voltage contact input	1-9	Pump operation when contacts are closed
Power saving mode	No voltage contact input	2-8	When the contact is closed, the pump is set to power-saving mode

Table 4: Tool input signal for pump system

Be careful:

- The input signal limit is 24V/5mA, and it is prohibited to connect these input pins together;
- Voltage input includes AC or DC voltage, with 15-24V being active input and below 5V being passive;
- To ensure the correct operation of the pump, there must be at least a 10 second interval between consecutive operations of the input signal.

3.3 Electric Data

No.	List of Projects			Reference data
1	Power input			Three-phase 200~240V, 50/60Hz
2	Voltage error			200~240V
3	Power supply	Maximum power		3.0kW
		Rated power	No blowing	1.4kW
			With blowing	1.6kW
4	Rated value of fuses/insulators			17.5A current limiting delay type CC fuse, rated at 600V
5	Installation (overvoltage) category			Class II
6	Pollution degree			2
7	Minimum protective grounding cable grade			32A
8	Power interface			On-demand
9	Power cables			4-core 2.5-square cable
10	External control module		Pump control interface	DB15
			Nominal rated voltage value	24V
11	Thermal relay switch protective value		Open circuit temperature	70℃
			Closing temperature	59℃

Table 5: Electric data

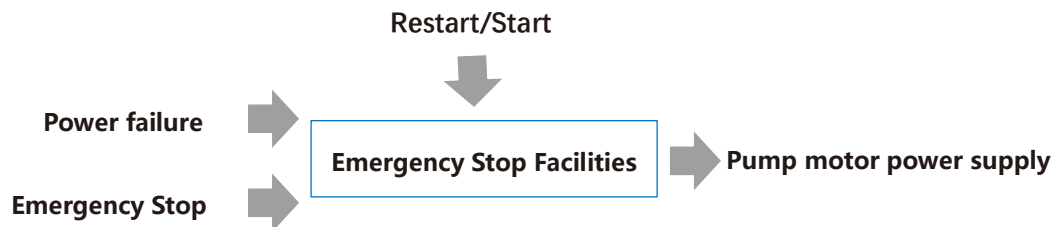
Be careful:

- Recommended fuse rating, with a minimum gap of 3mm for multi-stage insulators;
- The rated value of the main disconnect device AIC must be $\geq 10A$.

3.4 Connect the Emergency Stop Circuit

The pump must be connected to an emergency stop facility, which should be located near the pump. When operating the emergency stop control device, the emergency stop function should immediately disconnect the power supply of the pump. Restoring the emergency stop control device to its normal operating position should not cause the pump to be re-energized. Therefore, separate startup or reset control should be used.

The emergency stop control must comply with the provisions of Article 12 of SEMI S2-0200.



Picture 7: Schematic diagram of emergency stop facilities

3.5 Connecting the Power Supply

Use the following steps to connect the pump to the power source:

3.5.1 Use a suitable grounding cable to connect the M8 protective grounding (grounding) stud on the pump to a suitable grounding point.

3.5.2 If the power plug is not installed

3.5.2.1 Connect the four core power cable directly to the control box with isolation device, and connect it to the ground (green/yellow) and three-phase (1, 2, 3 respectively) through a four pin connector with appropriate IP rating:

- If the power supply is connected to the pump through an ELCB relay, it must be suitable for the protection of equipment with DC components in fault currents and for short-term surge and high leakage currents (e.g. according to prEN50178, Type B);
- If a plug is used to connect the pump to the power disconnect device, provide locking/tagging in accordance with Section 17 of SEMI S2-0200.

3.5.2.2 The power switch should comply with all the following regulations, refer to 2.4-C.

3.6 Connect Control Devices

- The external control interface control signal is only used for control purposes and does not involve safety related functions.
- Do not connect power sources greater than 30V to the control device interface of the pump, as it may cause equipment damage.
- It can be connected to the control device through the external control interface module connector. The external control module is equipped with a plastic protective cover: before connecting, remove the protective cover, observe the identification/label, and determine the external control interface.

Identify	Part number	Tool side connector	Tool connector parts
External control module		15 pin D-type plug	

Table 6: Tool connectors and matching tool connector parts

Note: The name of the plug/socket refers to the pins of the connector.

3.6.1 Input

For the definition of input signals for pump systems, refer to Table 4

3.6.2 Output

Defined the output signals of the pump system, all signals are voltage free contacts. See the table below:

Function	Signal type	Stitch	Operation
Pump operation	Electric relay dry contact output	3-11	Contact closure during pump operation
Warning	Electric relay dry contact output	5-13	Contact closure (no warning message on pump)
Fault Alarm	Electric relay dry contact output	6-14	Turn off when there is no alarm status on the drive inverter
Remote/Local Control Status	Electric relay dry contact output	7-15	Close when remote control is provided through the tool interface

Table 7: Tool output signal of pump system

Be careful:

- Voltage limit value 24V/1A;
- All pump status outputs will be maintained through a 1-second power outage;
- If the power is disconnected, all status contacts are open.

3.6.3 Start

Do not operate the pump when the exhaust pipe is blocked or obstructed. Otherwise, a pressure of up to 16 atmospheres will be generated internally, causing damage to the pump.

- Check the protective grounding connection of the pump;
- Check if the power and control connectors of the pump are connected;
- Turn on the cooling water supply and check for leaks;
- Turn on the power of the direct discharge pump and check if the power LED is on;
- Check whether the exhaust extraction system is unobstructed or closed;
- Use the control device to set the pump operation signal to the interface connector, and check if the operation LED is on and if the pump operation status output is turned off.

3.6.4 Stop

- Do not remove the inlet connection before the pump stops rotating and the power is cut off;
- It takes about three minutes for the pump to completely stop;
- If a direct discharge pump with purging is selected, it must be purged with nitrogen for 30 minutes before turning off the operation signal;
- Use the control device to turn off the running signal of the pump (the running LED will turn off, and the pump running status output signal will turn on).

3.6.5 Status and Fault Indication

During normal operation, only the power and running LED lights up, and the pump running, pump warning, and pump alarm status outputs are turned off. If one or two other LEDs light up, or if one or both of the pump warning and pump alarm status output signals are turned on, a problem investigation is required.

No.	Problem description	Checkpoints	Solution suggestions
1	When the power is turned on, the power indicator light does not light up.	Is the power supply connected correctly?	Ensure that the power supply is correctly connected to the pump
2	When setting the start signal, the running LED does not light up or the pump running status output signal	Is the direct discharge pump not properly connected to the control equipment?	Ensure proper connection between control devices and interface connectors

	is turned on.		
3	The pump alarm status output signal is turned on, and the alarm LED is turned off	Is the pump improperly connected to the control equipment?	Ensure that the connection between the control device and the interface connector complies with
4	The pump alarm status output signal is turned on, and the alarm LED lights up	Is there a malfunction in the cooling water supply?	Let the pump cool down for at least 20 minutes. Ensure that the cooling water supply is correctly connected to the pump, turned on, and meets the flow and pressure requirements
5	When the pump decelerates, a whistling sound will be heard.	Has the running signal been deleted and reapplied before the pump stops?	Removing and reapplying the running signal may cause low volume noise, but it is harmless to the pump. It is recommended to stop the pump before reapplying the running signal.
6	The pump warning status output signal is turned on, and the warning LED lights up	Is nitrogen flowing?	Check if the nitrogen purge gas flows into the gas module. If gas flows and the warning is not cleared, please contact the nearest Edwards service center.
7	Others	—	Contact CBVAC after-sales service center

Table 8: Troubles checking**3.6.6 Unexpected shutdown and alarm**

- In the event of an unexpected shutdown, the pump must not be restarted unless the cause is identified and corrected. If the cause is not identified on site, seal the inlet and outlet of the pump and contact our technical personnel.
- When the pump protection sensor is working, or if the frequency converter driver fails, the direct discharge pump will automatically shut down. When the direct discharge pump automatically shuts down, the alarm LED lights up and the pump alarm status output signal is turned on.

- If the direct discharge pump enters an alarm state, the power supply of the pump must be completely turned off and then reconnected to clear the alarm. Before re powering on, pump faults must be identified and corrected.

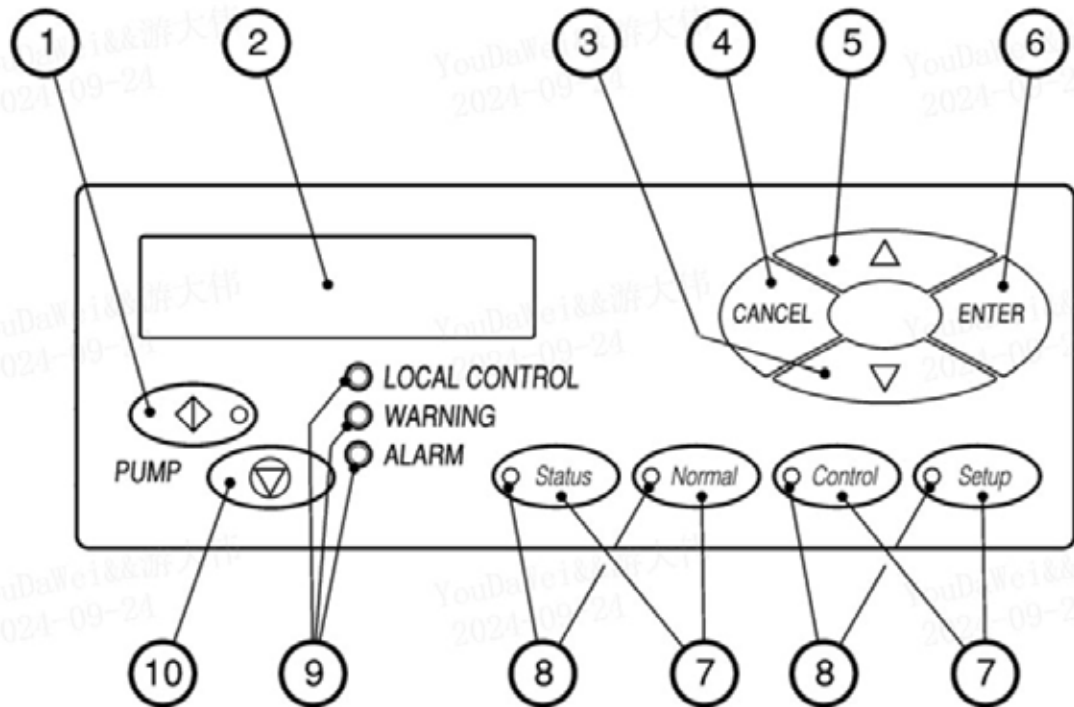
3.6.7 Maintenance

- There are no user repairable parts inside the pump. During normal operation, there is no need to remove the pump cover. Removing the cover may result in personal injury or equipment damage;
- There may be toxic, flammable, or corrosive chemicals inside the pump. Ensure to wear personal protective equipment during maintenance;
- Before disconnecting the pump from the system, perform a 30 minute external purge for applications where there may be hazardous process by-products or gases trapped in the pump body. Before removal, the nitrogen supply should be locked and marked.
- It is prohibited to remove the metal cover from the pump. While the warranty is invalid, it may also cause damage to the pump and personal injury;
- Before removing the power supply, blow the pump with nitrogen for 30 minutes;
- It is prohibited to remove the pump rotor, separate or dismantle the motor from the pump, as it may cause personal injury or equipment damage;
- It is recommended that all maintenance and repair operations be carried out by qualified professional maintenance personnel, except for routine inspections and maintenance.

3.7 End User Controller (E Module)

3.7.1 Introduction

The display and control buttons used by the end-user controller (E module) are shown in the following figure:



Picture 8: Troubles checking

- | | |
|-----------------|----------------------|
| 1. Run Button | 2. Monitor |
| 3. Down button | 4. Cancel Button |
| 5. Up Button | 6. Confirm Button |
| 7. Menu Buttons | 8. Menu Selected LED |
| 9. Status LED | 10. Stop Button |

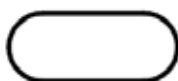
The menu diagrams in Pictures 9 to 16 describe the menus used and the display messages displayed on the end-user controller (E module). The following symbols and conventions are used in the menu diagram:



This symbol is a streamline. The arrow on the line displays the flow direction through the menu.



This symbol is used to connect different menus and display the starting point (or continuation point) of the menu.



This symbol is used to represent 8 buttons including run, stop, confirm, cancel, normal, status, control, and settings.



This symbol is used to represent the up and down buttons.



This symbol serves as a prompt and is not part of the menu, but further describes the operation of the menu.

3.7.2 General operation

When the end-user controller (E module) is first opened, the screen displays a status menu display: refer to Picture 13. Press the 'Run' or 'Stop' button, or any of the four menu buttons, to exit the current menu and enter the corresponding new menu. Picture 9 shows the menu logic.

3.7.3 Cancel button

During the menu operation, the cancel button can be pressed at any time. Therefore, the use of the cancel button is not displayed on all menu images, but in the absence of any other obvious way to cancel the current menu option and enter the previous menu option, the specific use will be displayed. When the 'Cancel' button is pressed, the current menu option will be cancelled and the status menu option will be displayed.

3.7.4 Display text and variable text

- In the menu diagrams from Picture 10 to Picture 16, the text without "<>" in the double line display symbol is the actual text that will be displayed on the monitor. Here, the "-" symbol is used to indicate the display position of numbers; The numerical value depends on sensor data or information.
- Define variable text enclosed in V-shaped parentheses; The content displayed on the screen depends on the menu or system. The following variable text markers are used on the menu diagram:<Device Model>.

3.7.5 Cycle

When using the up and down buttons to change a number or character on the display, the number or character will 'loop' between its minimum and maximum values. For example, when entering a password number, if the number is "0", pressing the down button will change the number to "9"; If the number is "9" and the "up" button is pressed, the number will change to "0".

3.7.6 Menu structure

The display screen and control buttons are shown in Picture 8.

The menu structure is shown in Table 9.

Menu Name	Figure No
Menu logic	Picture 8
Pump on menu	Picture 9
Pump off menu	Picture 10
Normal menu	Picture 11
Status menu	Picture 12
Control menu	Picture 13
Set menu	Picture 14
Fault reset menu	Picture 15

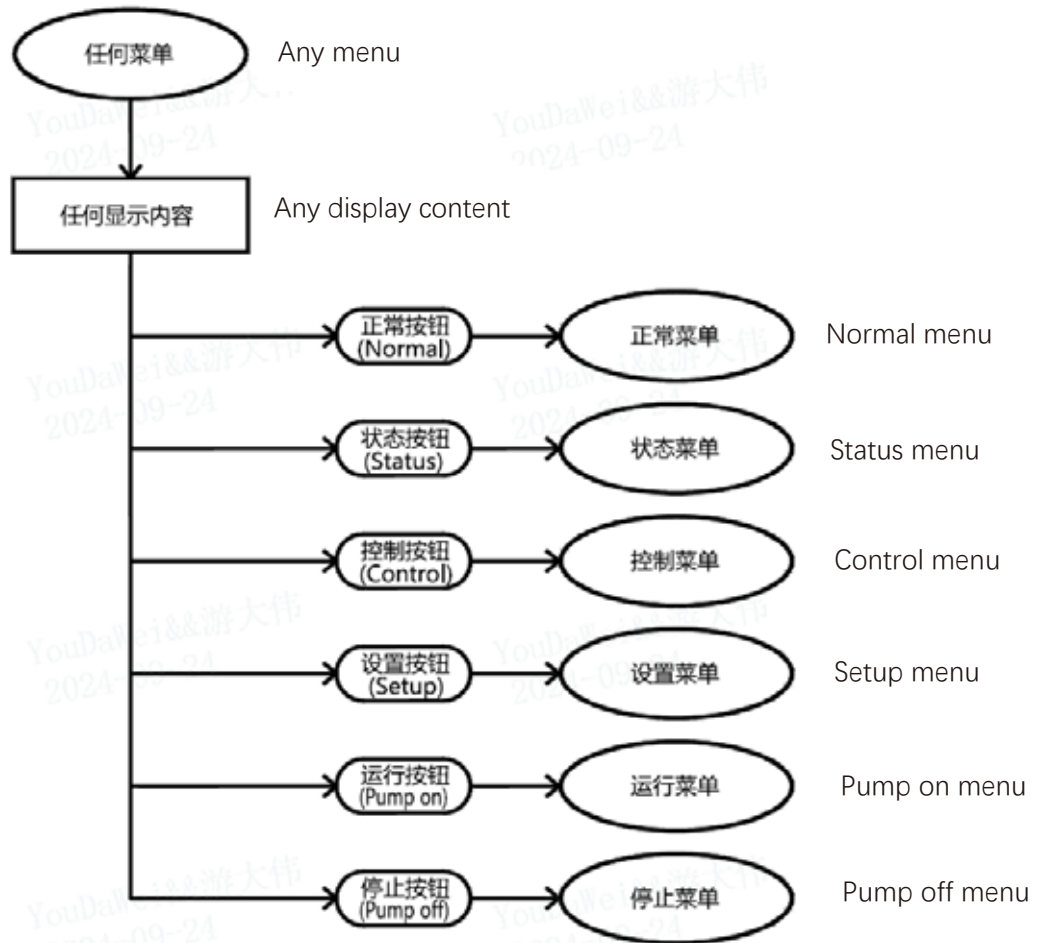
Table 9: End user controller (E module) menu structure table

3.7.7 Example

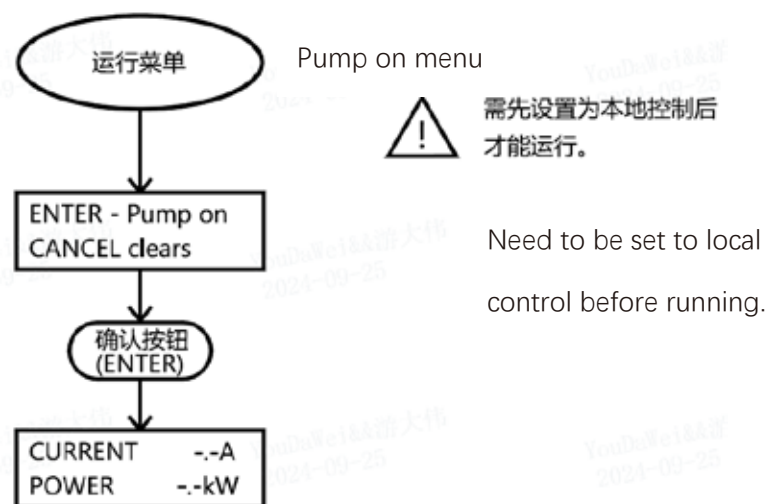
Here is an example of how to explain a menu diagram.

The following steps describe how to enter the fault reset menu.

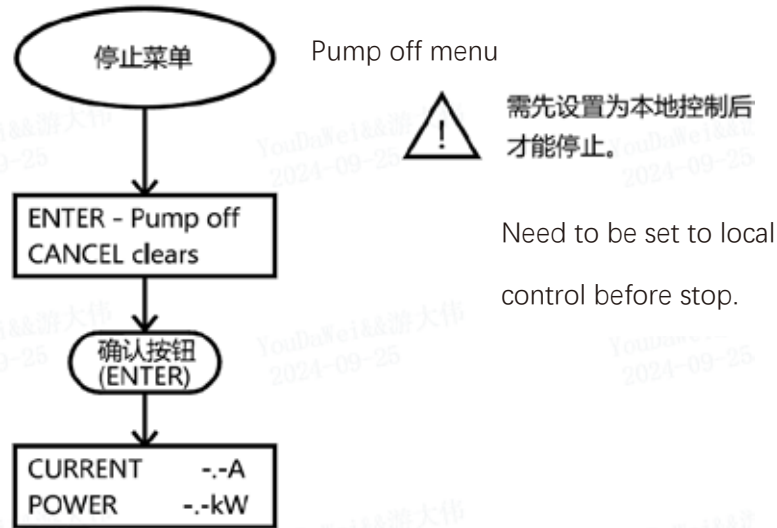
- 1) Press the settings button to enter the settings menu (Picture 15).
- 2) Use the up and down buttons to change the first digit of the password to the correct value, and then press the ENTER button.
- 3) Use the up and down buttons to change the second digit of the password to the correct value, and then press the ENTER button.
- 4) Use the up and down buttons to change the third digit of the password to the correct value, and then press the ENTER button.
- 5) If the correct password is entered, the display screen will enter the fault reset menu, otherwise it will return to the status menu.



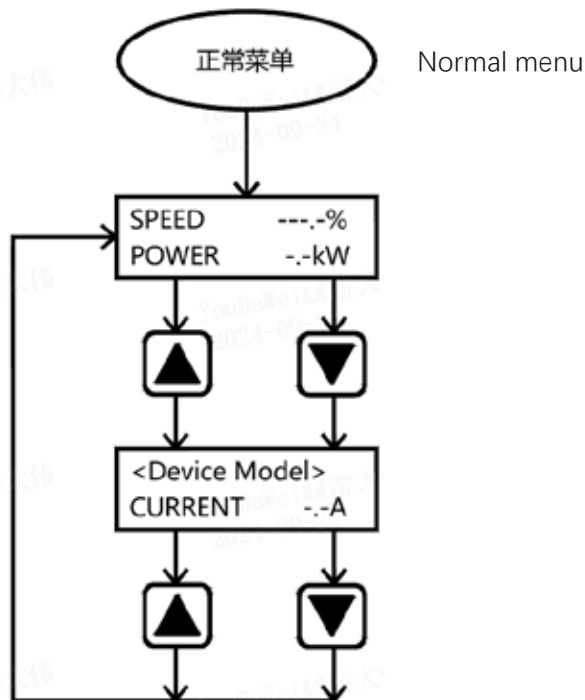
Picture 9: Module E menu logic



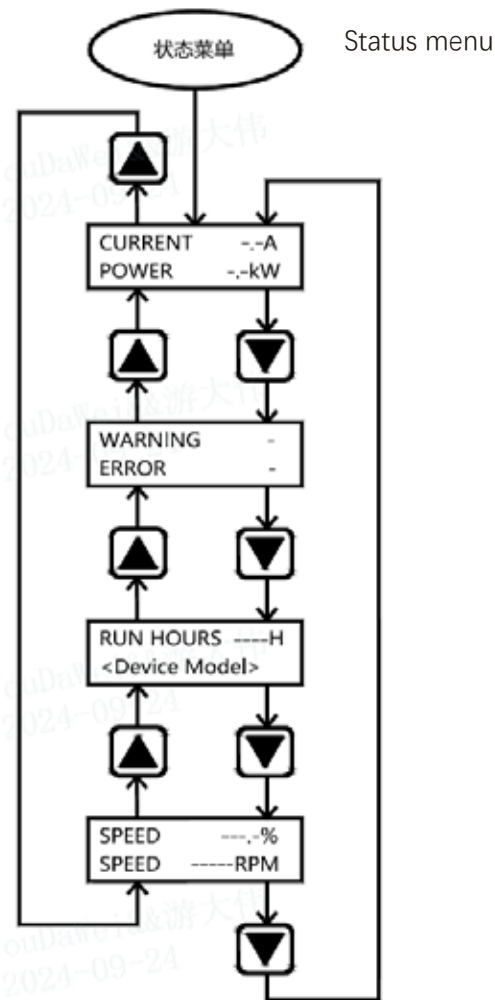
Picture 10: Pump on menu



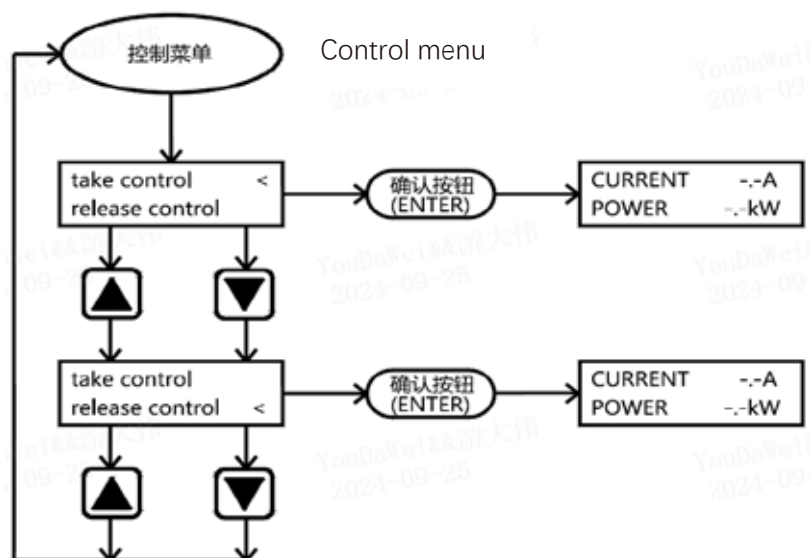
Picture 11: Pump off menu



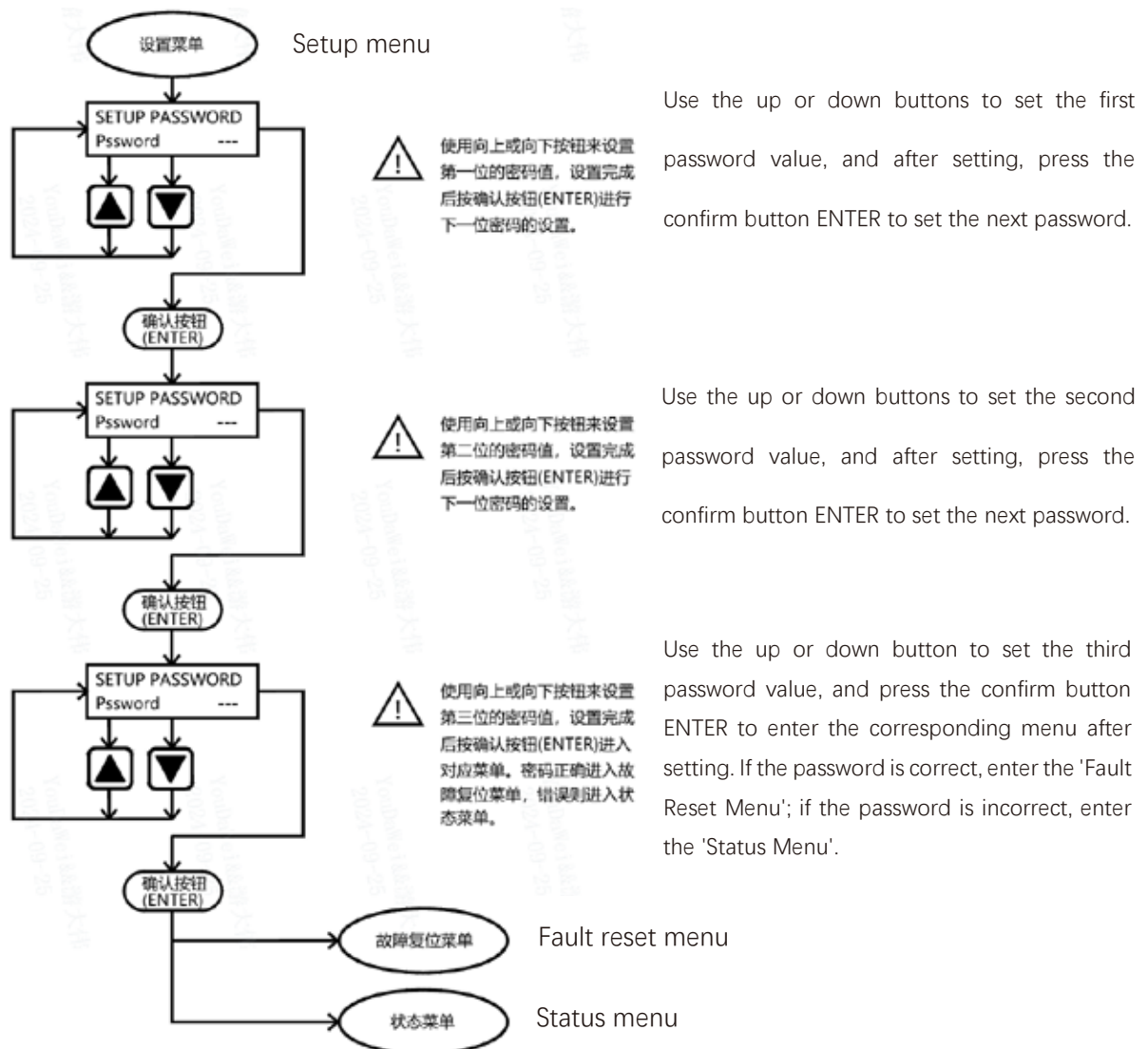
Picture 12: Normal menu



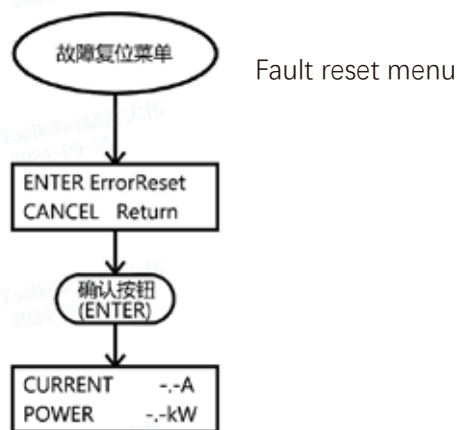
Picture 13: Status menu



Picture 14: Control menu



Picture 15: Setup menu

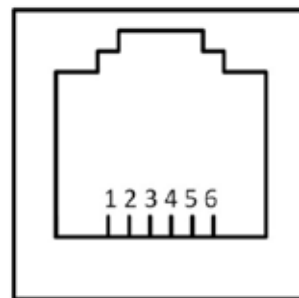


Picture 16: Fault reset menu

3.7.8 Communication interface

The end user controller (E module) provides an RJ12 interface for controlling the monitoring of the direct discharge atmospheric molecular pump by the device. The communication level standard for this interface is RS232, and the pin definitions for the communication interface are as follows:

Pin number	Definition
1	GND
2	RXD1
3	TXD1
4	RXD2
5	TXD2
6	-



Picture 10: Definition Table of Communication Interface Pins

Picture 17: Communication interface pin diagram

Note: The two serial ports in the communication interface have the same function, and users can choose one of them to use according to the situation.

3.7.9 Communication protocol

The instruction content in this communication protocol is in plaintext format, and each message sent by the control device to the serial interface must be an ASCII string terminated by <CR> (ASCII code 13). When the serial interface receives a query or command message, it will send a reply message to the control device. The reply message is an ASCII string <CR><LF> terminated by two control characters (carriage return and line break, ASCII codes 13 and 10).

The content of the reply message for the query command depends on the query message sent. If the query command is invalid (this is an incorrect format), the reply message will be in the form of "ERR<_>n<CR><LF>", where "<_>" specifies a space and "n" specifies the error number, which represents the meaning in Table 10.

The reply message for control commands always reads "ERR<_>n<CR><LF>". If the control command is valid, then 'n' (error number) is 0. If the message is invalid, 'n' specifies the error number, which represents the meaning in Table 10.

Error number	Explanation
0	No errors
1	Invalid command
2	Parameter not found in command
3	Invalid parameters in control command
4	Unable to retrieve the content of the query
5	Illegal operation

Table 11: Reply message error number comparison table

Command name	Command content	Reply content	Control parameters
Control permission settings	!C{0:1}<CR>	ERR<_>n<CR><LF>	0: Release control 1: Obtain control
Pump operation	!P{0:2}<CR>	ERR<_>n<CR><LF>	0: Pump stop (free shutdown) 1: Pump on 2: Pump stop (rapid braking)
Reply format setting	!F{0:1}<CR>	ERR<_>n<CR><LF>	0: Short format 1: Long format

Table 12: Control command table

Command name	Command content	Short format reply content	Long format reply content
Control status	?C<CR>	{on/off}<CR><LF>	{on/off}<CR><LF>
Message reply format	?F<CR>	{on/off}<CR><LF>	{on/off}<CR><LF>
Pump status	?P<CR>	{status level} <CR><LF>	{status level}, {priority level}, {alarm type}, {0}, {0}, {0}, {control object}<CR><LF>

Table 13: Query command table

Status level	Explanation
0	Stop Status
1	Acceleration state from stop to start
2	Deceleration state from start to stop (stop after fault)
3	Deceleration state from start to stop (free shutdown)
4	Open - Full RPM Running Status

Table 14: Status level parameter table

Priority level	Explanation
0	Only indicating, no warning or alarm
1	Warning exists
2	If there is an alarm, stop the pump immediately unless it is set to run until it crashes
3	There is an alarm, stop the pump immediately

Table 15: Priority level parameter table

Alarm type	Explanation
0	No alarm information
1	There is an alarm message present

Table 16: Alarm type parameter table

Control object	Explanation
0	None
101	Pump local display module (E module)
181	Serial device

Table 17: Control object parameter table

4. Maintenance

4.1 JZB Series High Vacuum Dry Pump Maintenance Plan

The maintenance cycle is shown in the table below. In addition, the main maintenance tasks need to be carried out by our professional after-sales personnel.

No.	Item	Maintenance cycle	Content
1	Inspect pipelines and joints	Annual (or as part of daily preventive maintenance plan)	① Check all cooling water pipes and connections for corrosion or damage; Check if all cooling water connections are secure; ② Check all cables for damage and overheating; Check if all electrical connections are secure; ③ Check all processes and exhaust pipes for corrosion or damage; Check if all processes and exhaust connections are secure.
2	Cleaning pump	Annual (or as part of daily preventive maintenance plan)	① Cleaning materials that do not use strong alkali, corrosive or chlorinated solvents; ② Do not use cleaning materials containing abrasives; ③ Can be wiped with soft lint free cloth and specialized cleaning materials, or with desalinated water or isopropanol
3	Repair pump	2-5 Years	The usage requirements of a pump largely depend on its working environment and application scenario, and it is recommended to maintain it at intervals of 2 to 5 years.

4.2 Maintenance Precautions

- Anyone who purchases pumps and their supporting products can enjoy the high-value maintenance and upkeep services provided by our company for life;
- Under normal use, the free warranty period is 12 months (calculated from the date of shipment). However, our company has the right to charge corresponding after-sales fees during the free repair period for damages caused by violent assembly and disassembly,

long-term failure to replace lubricating oil, poor working conditions without normal maintenance, improper/incorrect human operation, and other reasons (not limited to).

Product Warranty Form

Product Name: _____

Product Number: _____

Date of Production: _____

Customer Name: _____

Date	Repair Content	Repair Personnel

Warranty Statement

Any purchase of JZB Series High Vacuum Dry Pump products produced by our company will strictly follow the maintenance terms.

Warranty or warranty fees will not be provided due to any of the following circumstances:

1. Users dismantle or modify the process structure of the product without authorization.
2. Improper storage or use by users.
3. Damage caused by other reasons attributable to the user.

.....**Cutting and Stamping Area**.....

Please provide detailed information and send it back to our company for future reference:

Product Name: _____

Contacts: _____

Product Number: _____

Contact Number: _____

Purchase Date: _____

Post Code: _____

Customer Name: _____

Customer Address: _____