Operation Manual

BAHZ-401-A & BAHZ-402-A

Horizontal Autoclave

Thank you for Choosing Biolab products. Please read the “Operating Instructions” and “Warranty” before operating this unit to assure proper operation.

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01 Precaution on Safe Operation

• To ensure the safe and correct use of the instrument, please read this manual carefully before use and operate according to the instructions in the manual. If it is not used according to the method specified by the manufacturer, the protection provided by the instrument may be damaged.

• In addition to sterilization, drying and agar melting, the instrument shall not be used for other purposes; it shall not be used for sterilization of inflammable, explosive, oxide prone or strong acid, alkali, salt water and other substances, or it may cause corrosion of sterilization chamber and pipeline, or even explosion.

• During installation, it is required to connect correctly according to the power requirements on the instrument nameplate; if the voltage fluctuates too much, it is required to use a regulated power supply to ensure the best performance of the instrument; if other types of voltage are used, it is required to use a transformer, otherwise the instrument will be damaged.

• The instrument must be reliably grounded. Do not connect the ground wire of the instrument to the plastic pipe, gas pipe, telephone ground wire, lightning rod, etc.

• Do not let the object block the exhaust port on the safety valve, so as to avoid that the safety valve can not exhaust and relieve the pressure in case of abnormal situation.

• Before opening the chamber cover, make sure that the reading of the pressure gauge is "0 MPa"; when the pressure in the sterilization chamber is higher than "0 MPa", do not open the chamber cover and drain valve, otherwise it will cause high-pressure steam to spray out and hurt people.

• When adding distilled water into the sterilization chamber, do not leak the water into the control circuit, so as to avoid electric shock accident or other faults.

• When using cleaning or other bags, please put the bag in the stainless steel basket first, and then put it into the sterilization chamber, otherwise the accuracy of temperature may be affected.

• Pay attention to observe the temperature in the sterilization chamber. The temperature is high at the end of operation. When opening the cover, pay attention not to put your face and hands close to the sterilization chamber to prevent scalding caused by steam spraying. When taking out the articles from the sterilization chamber, wear heat insulation gloves. Since the liquid needs to be cooled for a certain time, when the sterilized liquid material is taken out from the sterilization chamber, it is necessary to confirm that the temperature has dropped to a sufficiently low level to avoid scalding.

• Distilled water must be used as sterilization water to avoid affecting the service life of

sterilizer. When the instrument works continuously, it shall be ensured that there is an interval of more than 15 minutes for the instrument to cool down. Otherwise, the instrument will not be able to produce enough saturated steam.

• In case of any abnormal situation (such as abnormal sound, smell, smoke), turn off the power supply immediately, pay attention to observation, and contact the local dealer or our after-sales service department after the abnormal situation no longer continues.

• It is recommended to place a pressure steam sterilization chemical prompt card (hereinafter referred to as the chemical indicator card) on the sterilized substance for each sterilization. After a sterilization cycle, when the color change of the chemical indicator card coincides with the temperature and temperature duration to be represented, it indicates that the temperature and temperature duration reached have met the requirements of the sterilization Institute If necessary, sterilization can be carried out; otherwise, sterilization requirements are not met.

• If the instrument is used in China, it shall comply with the relevant provisions of "Regulations on safety supervision of special equipment" and "TSG 21-2016 Safety Technical Supervision Specification for stationary pressure vessels".

• Precautions for instrument operation

• The user shall read and understand the contents specified in the operation manual before the first use;

• The user must receive correct and complete training related to work safety and accident prevention or complete training on operation guidance of autoclave;

• Users should follow the safety, maintenance and maintenance regulations in the manual;

• Explanation of relevant marks in the manual

 This symbol indicates the need to pay attention to safety signs during operation.

02 About the Instrument

1. Application

• This series of products are used for sterilization of scientific research institutions, laboratory utensils, culture media and unsealed liquids or preparations.

2. Types of microorganisms killed

• Using hot and humid high pressure steam as sterilization factor to kill loaded microorganisms, including spores of bacteria, spores of fungi, etc.

3. Normal working conditions

- Ambient temperature: 5 ˚C ~ 40 ˚C
- relative humidity not greater than 85%.
- Atmospheric pressure: 70kPa~106kPa.
- Suitable for power supply AC380V ±38V, (50 60) Hz ±1Hz.

4. Transportation requirement

Instruments are not allowed to stand upside down, overlap, below is not allowed to put items, avoid rain, carefully handle, there should be anti-movement measures.

5. Storage requirement

- Ambient temperature:-20 ˚C ~ 55 ˚C.
- Relative humidity not greater than 93%.
- An indoor or sheltered place free of corrosive gas and well ventilated

6. Service life

Production date:

Service life: 8 years. It is not allowed to use it after the service life, so as to avoid danger.

7. Technical specifications

Model	BAHZ-401-A	BAHZ-402-A
Capacity(L)	180L	280L
Dimension(L*W*H,mm)	1450*800*1500	1450*800*1500

Chamber dimension(Dia*H,mm)	φ508*1130	φ608*1130
Net weight	650kg	720kg
Total power	16kW	
Chamber material	S30408	
Sterilization temperature	115℃ ~ 135℃	
Rated working pressure	0.25MPa	
Display range of pressure gauge	-0.1 ~ 0.5MPa	
Set pressure of safety valve	0.29MPa	
Sterilization time range	1min ~ 6000min	
Preset range of drying time	0min ~ 300min	
Pulsation times	1-99times	
Cooling time	10min ~ 20min	
controller	Programmable intelligent logic system	
Cavity door opening mode	Automatic door	
Operation Mode	Fabric mode: standby - preheating - pulsation - heating - sterilization - Exhaust - drying - balance pressure - end Device mode: standby - preheating - pulsation - heating - sterilization - Exhaust - drying - balance pressure - end Liquid mode: standby - preheating - cooling - heating - sterilization - Exhaust - balance pressure - end B-D experimental mode: standby preheating pulsation heating sterilization exhaust balance pressure end Vacuum test mode: stand by - vacuum - Leak Detection - balance pressure - end. Self-defined program: 1) Vacuum sterilization procedure: standby - preheating - pulsation - heating - sterilization - Exhaust - drying - balance pressure - end 2) Liquid program: standby - preheating - cooling - heating - sterilization - Exhaust - balance pressure - end 3) Special lower arrangement procedure: standby - preheating -	

Safety device	Pressure safety interlock, safety valve, over-current and short-circuit protection, automatic fault detection, dry burning protection, water level detection, over temperature protection and leakage protection
Standard spare parts	Stainless steel baskets, storage board
Optional spare parts	Article thermometer, stainless steel cover, printer, water pressure sensor (optional), back pressure system

Note 1: the material of sterilization chamber can be purchased s31603, and the model is equipped with - L, for example: BAHZ-401-A becomes BAHZ-401-A-l;

8. Introduction to the main structure of the product

It is mainly composed of shell (shell decoration cover), sterilization chamber, sterilization chamber door, built-in steam generator, pipeline system, temperature control system, pressure detection, safety interlock device and pulsating vacuum pumping device.
It is summarized as follows:

●Sterilization chamber container part:

The design, manufacture and acceptance of pressure vessels shall be carried out in accordance with GB / t150-2011 pressure vessels, and shall be supervised by tsg21-2016 Supervision Regulation on safety technology of stationary pressure vessels. It is mainly composed of cylinder body and door body. The cylinder body forms a limited sterilization chamber, which is composed of an inner cavity, a front sealing plate and a container fixing frame;

●Steel structure part:

The utility model is composed of a chassis and a frame, the chassis supports the main body of the container, and the frame connects the outer decorative cover plate;

●Exterior decoration part (cover plate):

It is made of 304 steel plate or cold rail plate by spraying and pressing, which can not only decorate the equipment, but also prevent the influence of thermal radiation on the environment;

●Control system:

It is composed of programmable intelligent controller (PLC) / intermediate relay, pressure transmitter, temperature transmitter, travel switch and other auxiliary devices. PLC processes temperature, pressure, some switches and other input information, and outputs different

control signals to automatically complete the control process;

●Built in steam generator unit:
The electric heating generator is a device that can automatically generate steam, and has the functions of automatic control of water inlet, heating, dry burning prevention and overpressure protection;

●Piping system:
It is composed of solenoid valve, filter, check valve, vacuum pump, booster pump, pressure gauge, steam filter, air filter and other pipe fittings,
According to its function, it is mainly divided into the following branches:
1. Steam inlet branch 2. cooling water branch 3.water inlet branch
4. drainage branch 5. Booster pump water inlet branch 6. evaporator water inlet branch
7. drainage steam exhaust branch 8. steam outlet branch
9. Inner chamber steam inlet branch 10. evaporator drainage branch
11.general exhaust branch

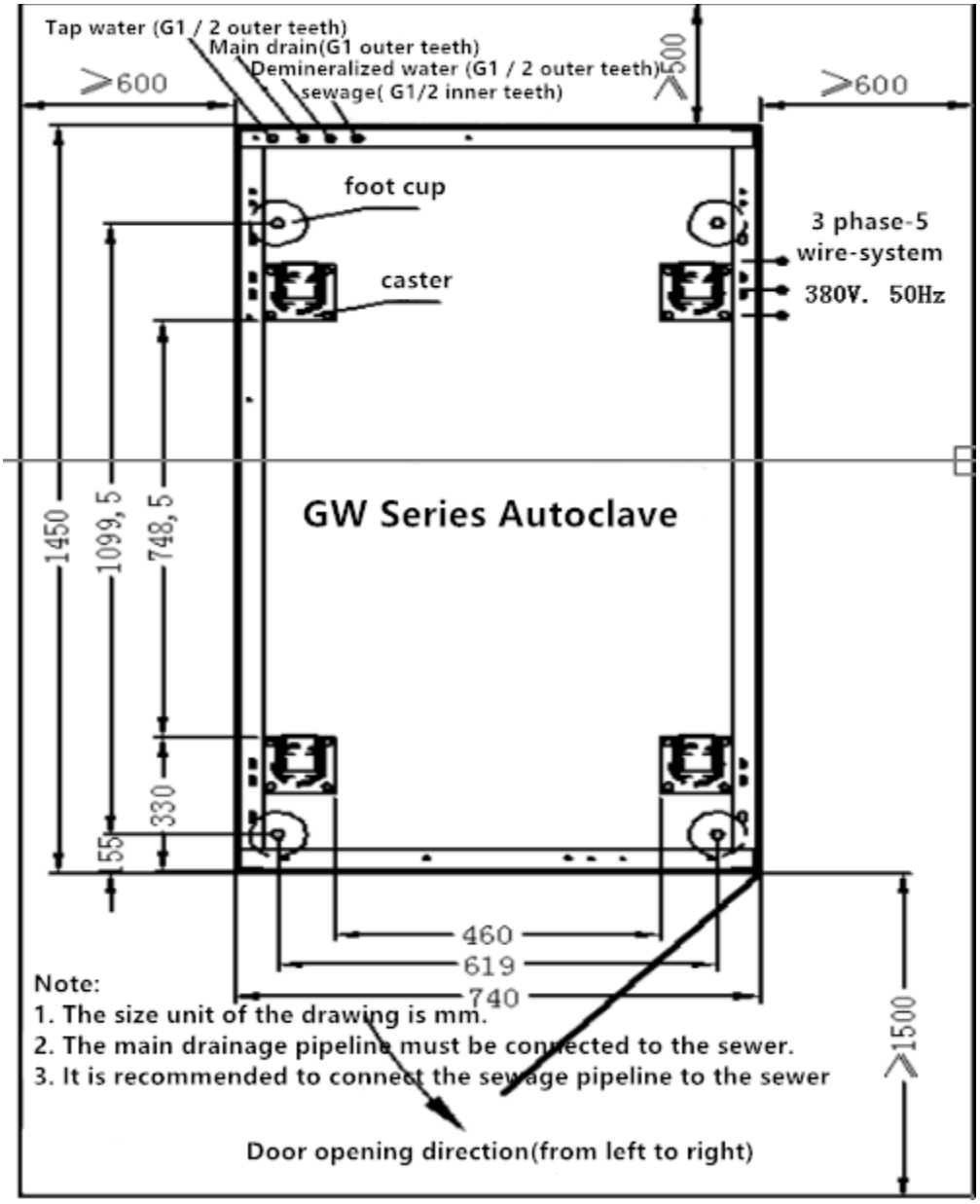
●Safety interlock
As the protective device of the instrument in the sterilization process, the interlock device will be triggered as long as the instrument is in the working state, and the interlocking status will be displayed on the touch screen. When the interlock fails, click "start program" to run the program.

9.Description of the working principle of the product

●Principle description:
The steam sterilizer can be used as a combination of the temperature of the steam sterilizer and the temperature of the steam sterilizer after the sterilization.

03 Installation of Autoclave

1.Placement of Autoclave
Lift the instrument to the installation site. For the convenience of heat dissipation and maintenance of the equipment, it is necessary to follow the installation drawing (as shown in the figure below). It can be fixed after determining the orientation. If forklift is used, the forklift should be between two sets of foot cups.



1.Preparation before installation

●According to the installation drawing provided by our company, under the guidance of professionals, professional construction personnel are responsible for it;
●Location and environmental requirements:
1) According to the size of the instrument's installation drawing, reserve the installation space of the instrument to meet the convenience of instrument installation, maintenance and use;
2) The selected sterilizer space needs good ventilation and heat dissipation;
3) Avoid installation in heavy dust, oil mist containing conductive particles, corrosive gas,

combustible gas environment.
4) Avoid installation where electric shock or vibration may occur.
5) Avoid installation in places with high temperature and humidity or easy to be wet by rain.
6) Avoid installation in strong magnetic field.

● **Energy requirements:**
A. Water source inspection:
Tap water source requirements: pressure 0.15 ~ 0.3MPa;
Suggestions:
●If the water source pressure exceeds 0.3MPa, a pressure reducing valve shall be installed; otherwise, if the water source pressure is lower than 0.15Mpa, a booster pump shall be installed.
●It is suggested to install a water source pressure gauge for the tap water source, so as to monitor the pressure of the water source and ensure the normal use of the instrument.
Requirements for source of demineralized water: demineralized water / softened water / pure water or ultra pure water with pressure of 0-0.3 MPa.
Suggestion: if the barreled demineralised water (without pressure water source), the outlet pipe should be installed at the bottom of the barrel, and a minimum water level should be drawn above the water outlet of the barrel to ensure that there is water at the minimum water level. At the same time, for the first start-up, the demineralization water pipe (including booster pump head) should be filled with water without air.
B. Power supply check:
1) It is required to install a power switch box on the right or right rear wall of the sterilizer. A three-phase air switch and an over-current protection device must be installed in the switch box to realize the function of power on-off and over-current protection. Make sure the switch box is close to the equipment and accessible to the operator. The switch box should be marked as special for sterilizer. In order to ensure the safety of personnel and equipment, it is necessary to ensure the reliable connection between the ground wire of the equipment and the ground wire in the power switch box. The pipelines and lines should be horizontal and vertical and effectively fixed.
2) The power supply is 380V 50 / 60Hz 40A three-phase AC. according to the relevant international electrical equipment regulations, the conductor color is yellow for phase a (u.l1), green for phase B (v.l2), red for phase C (w.l3), light blue for neutral line (n), yellow and green for grounding wire PE.

2.Arrival inspection instructions

2.1 after receiving the goods, the customer should check the appearance of the packing box immediately. If there is any damage, take a picture and mark it on the delivery note. Contact the distributor, inform the manufacturer and prepare for claim.
2.2 after the outer package of sterilizer is opened, check whether there is mechanical damage, remember the packaging method and keep the packaging materials until the instrument is accepted. The mechanical inspection includes whether there are traces of physical damage,

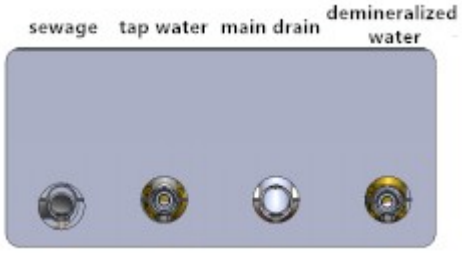
such as whether there are scratches on the surface of the panel, whether the knob is broken, etc. if you find any problems, please contact our company immediately.

3.Instrument installation

●After the instrument is hoisted or transported in place, adjust the height of the foot cup to make the instrument adjust to the horizontal position (based on the storage plate inside the container) and make the sealing door open and close freely.

⚠When adjusting, prepare tools, such as a 300 mm spanner, a small jack (bearing 1000kg), and a stainless steel plate (thickness of 1 mm / 2 mm) of 80 * 80 size. The instrument cannot be fixed by casters.

●The surface of instrument installation base should be solid and flat. If installed on the second floor of the user, consider whether the floor strength is reasonable or not, even strengthen the floor.



●Nozzle installation:
According to the mark of the drain valve cover, connect the inlet branch of vacuum pump (as shown in the right figure of tap water), the main discharge branch (main drain) of booster pump inlet branch (as shown in the right figure of demineral water mark) and the evaporator drainage branch (sewage) marks. The distance between the equipment drain outlet and the connecting pipe of drainage pipe shall not be more than 0.5m, and the drainage pipe shall not have reverse pressure.
Note: Chapter 7 piping diagram for reference.
●Pipe size:
Sewage, distilled water, tap water connection 1 / 2 joint, the total discharge is 1 inch joint.
●The power supply is installed according to the electrical wiring diagram.
Remarks: Chapter 6 electrical wiring diagram for reference.

Instrument cleaning
●Remove the protective package of the power plug and connect the power supply.
●Open the sterilization chamber door and remove the foam from the container. Clean the container and put it into the storage plate and stainless steel basket in turn.
Be careful to clean up the foam and other miscellaneous items in the sterilization cavity so as not to jam the pipes.

Instrument debugging

Some programs have been set in advance before the instrument leaves the factory. In the process of equipment debugging, users (technicians) can set the sterilization parameters according to the use of sterilization materials.

●Before debugging, check whether the electrical parts are loose and fall off; whether the pipeline connection is reasonable; whether the main switch of the circuit breaker is damaged;

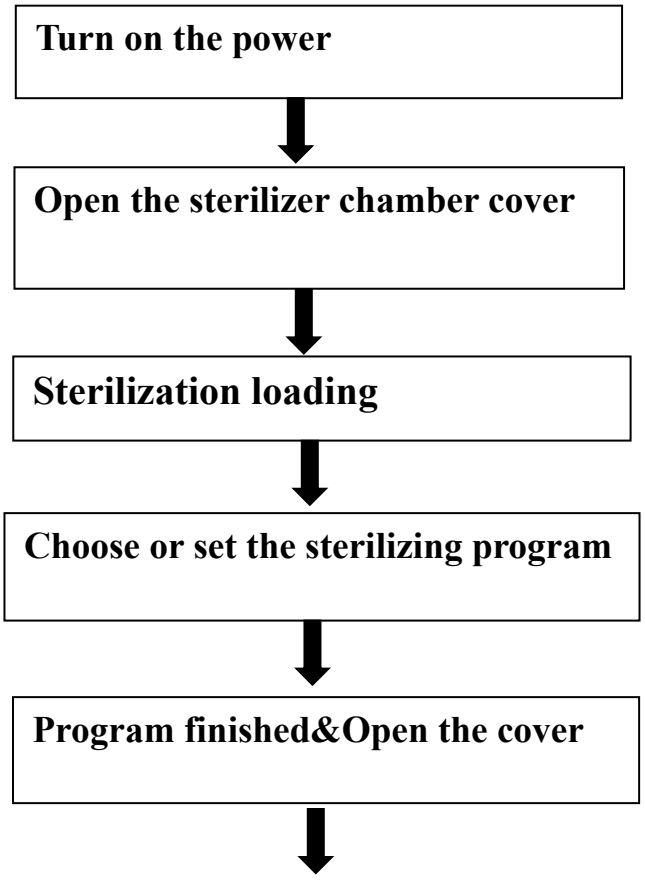
●Open the cut-off valve of distilled water and tap water, close the blow down stop valve, turn on the power supply, and observe whether the pressure gauge meets the use requirements;

●Adjust the rotation direction of vacuum pump:

Specific operation: turn on the power switch, click the "open door" button on the display screen to check whether the pressure drops, and the value becomes smaller (atmospheric pressure 100KPA). If the pressure value does not change, it indicates that the power line is connected in reverse; if the pressure value will drop, the wiring is correct.

03 Operation Instruction

I. Basic Sterilization Illustration & Operation Instruction



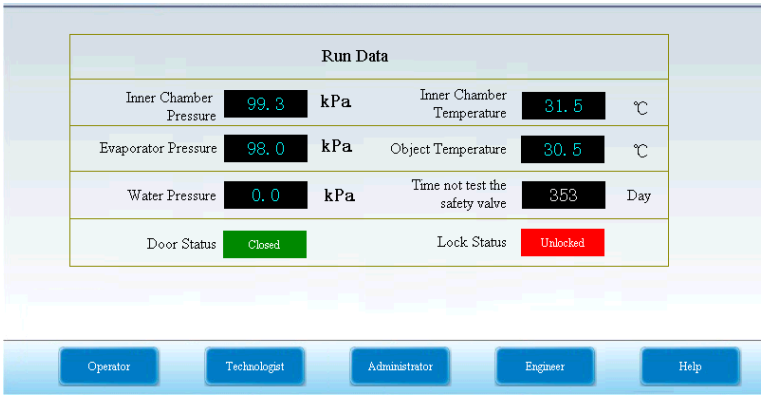
Turn off the power

⚠ It is strictly forbidden for non operators to touch the control screen at will

1.Turn on the power supply and water source switch

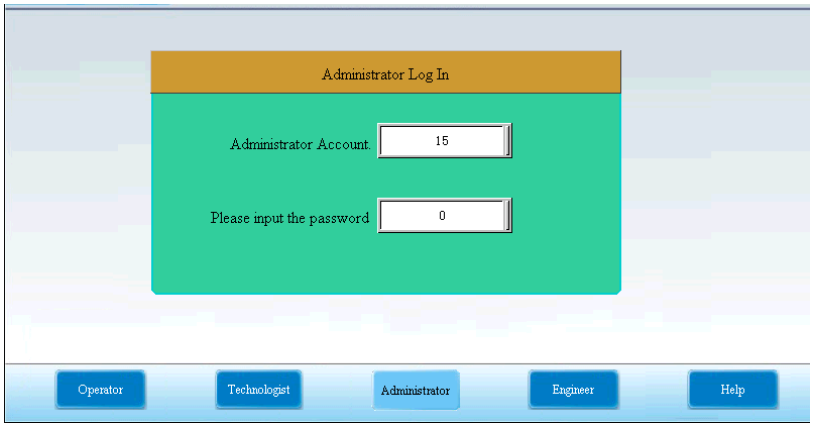
Turn on the water source and main power switch of the equipment (first close the small blue handle, then the 4P handle), and then turn on the key switch and emergency stop switch on the left side of the pressure gauge. After a period of self inspection, the instrument enters the self inspection interface, as shown in the following figure: If there is a fault display in the self-test completion screen, please remove the fault according to Chapter 5 "fault guide" and click "confirm" to exit the fault.

Note: If you want to enter the training interface, you need to enter the training interface after power on self-test. After the training interface is started, the steam generator will stop heating (method: click "Administrator" to enter the administrator interface after entering the number and password, and the administrator's authority can enter the training interface)



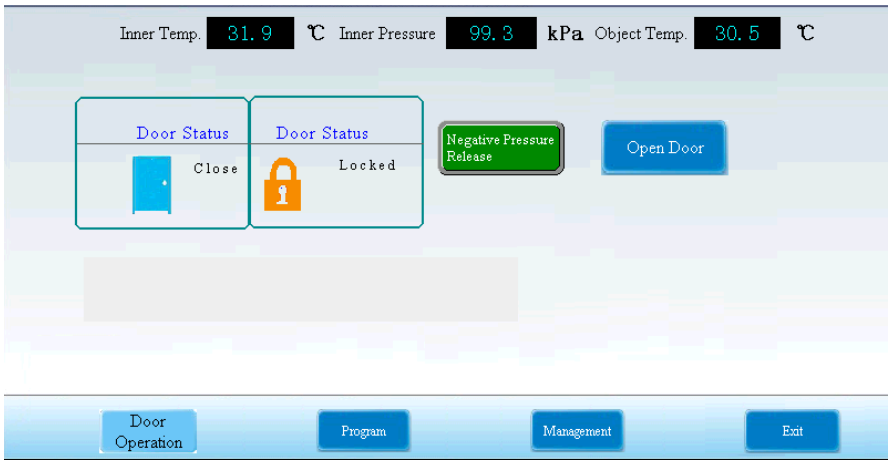
2.Open the chamber door of sterilizer

2.1.In the system login interface, click the "operator" in the next line and enter the corresponding operator number and password according to the prompt to enter the operator interface (the operator number and password are provided by the administrator, and the password and authority can be set in the administrator management interface, and the password is composed of at least 6 digits and is composed of numbers)

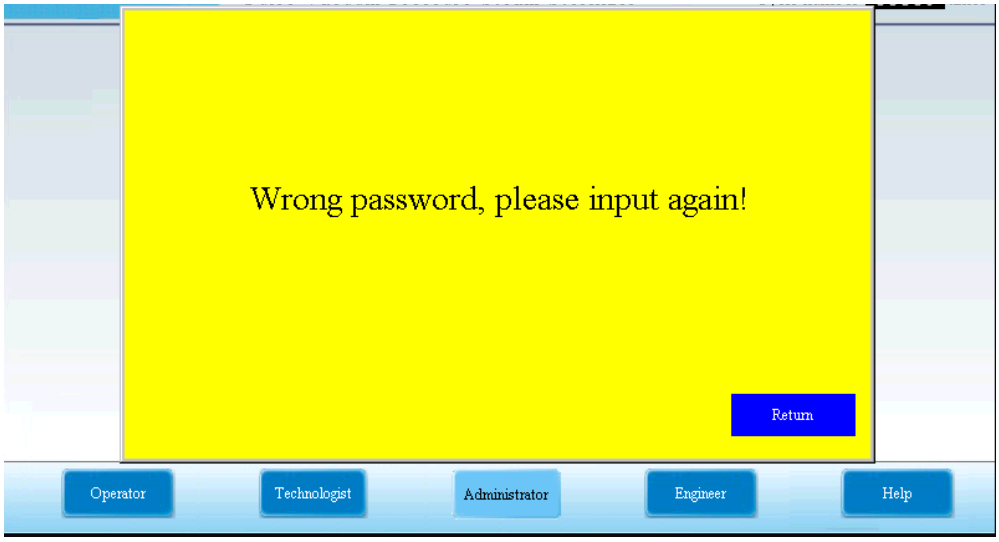


Note: When the machine leaves the factory, the administrator number is set as 15; the password of the administrator is 1234567; the password of the operator (No. 1-10) and the technician (No. 11-14) is set by the administrator, and the user without password is the user who is not enabled.

2.2. After entering the number and password, the door operation interface as shown in the figure below will pop up under the correct condition:

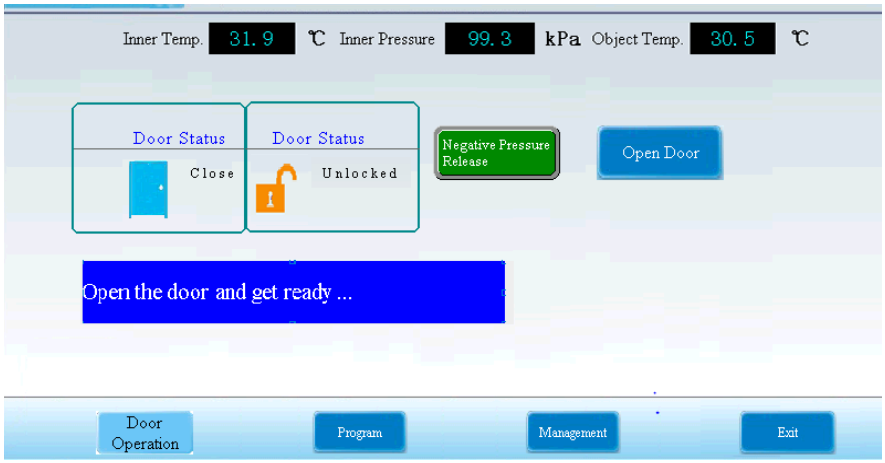


If you input the wrong password, a dialog box will pop up to remind you that the password is wrong. Please re-enter it, as shown in the following figure:

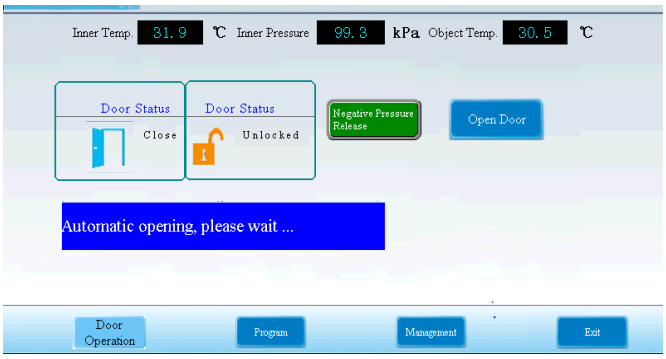


Press OK to return to the operation login interface.

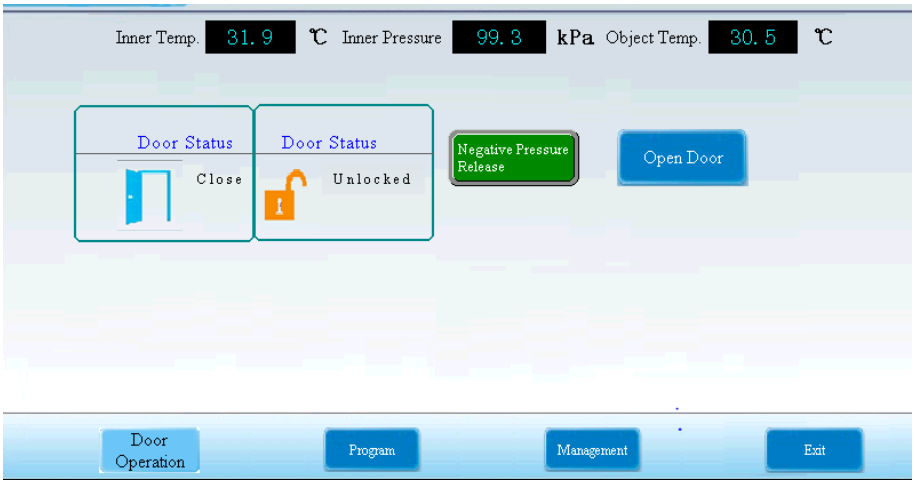
2.3. Click "open door" to display the following screen:



After the interlock is opened, the following interface appears:



When the inner chamber pressure returns to atmospheric pressure, the chamber door will automatically pop open, indicating the following interface:



Note: If the system can not automatically restore to atmospheric pressure, please click "negative pressure release" to manually restore.
The system shows absolute pressure

3.Loading of articles to be sterilized

1> Open the chamber door, take out the stainless steel basket, and put the sterilized material into the basket
2> Put the basket into the sterilization chamber again after placing the sterilized materials
3> Preparation of instrument sterilization
The equipment must be cleaned and then put into the sterilizer to avoid the harm of residual substances on the equipment to the sterilizer and the equipment itself. For example, blood and other impurities.

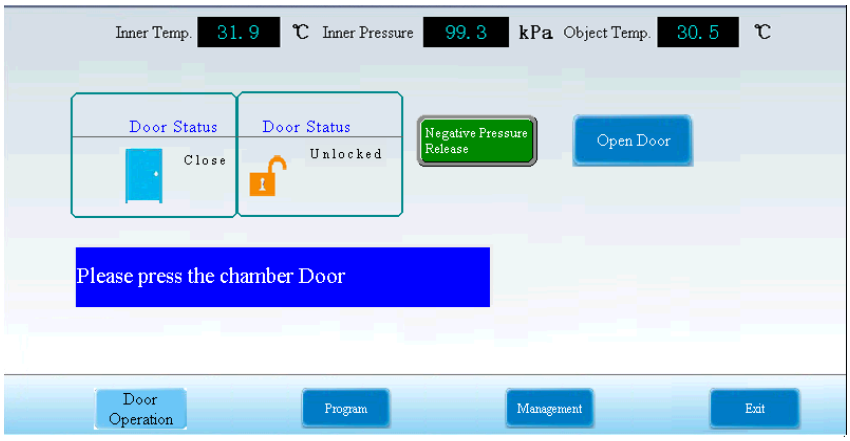
The following cleaning plan is for your reference:
For instruments that need to be sterilized after use, the residues attached to the instruments should be cleaned in time. Cleaning machine, cleaning agent and distilled water are recommended. After cleaning, it is recommended to rinse with water again to ensure its cleanness.
When putting the instrument into the sterilizer storage board, please pay attention to: Instruments should be evenly arranged and spaced without overlapping. Otherwise, it will cause insufficient sterilization. Different types of instruments should be placed in different storage boards, such as stainless steel, carbon steel, etc. If carbon steel instruments are stored in the storage board, the storage board should be padded with several layers of disinfection paper or kapok paper to avoid direct contact between carbon steel and stainless steel. Packaging materials with good air permeability should be selected for the instruments to be wrapped, such as sterilization bags, sterilized paper, gauze fabric and other containers. The sterilization should be placed with the opening downward or side.

Preparation before sterilization of rubber tube:
Please clean the rubber tube with warm water first, and then place it on the sterilizer storage board. At the same time, make sure that the pipe is a hollow pipe with open ends, and there is no sharp turning, twisting or kinking.
Preparation before sterilization of dressing package:
Put the dressing bag vertically on the tray, and pay attention to avoid contact with the inner wall of the sterilizer, and there should be enough space between the packages.

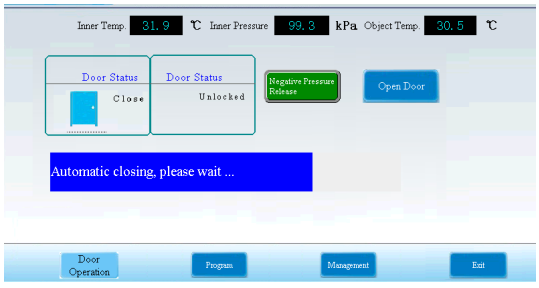
4) Preparation before liquid sterilization
It is only limited to heat-resistant glass bottles. When loading, it should not exceed 1 / 2 of the volume, so as to avoid liquid overflow. Vent plug should be used to seal the container, and the cover should be fully relaxed. As the sterilizer is stainless steel, it is sensitive to chloride ionic liquids and easy to be corroded. Therefore, sterilize such liquids (such as normal saline, etc.) carefully

4.Close the chamber door of the sterilizer

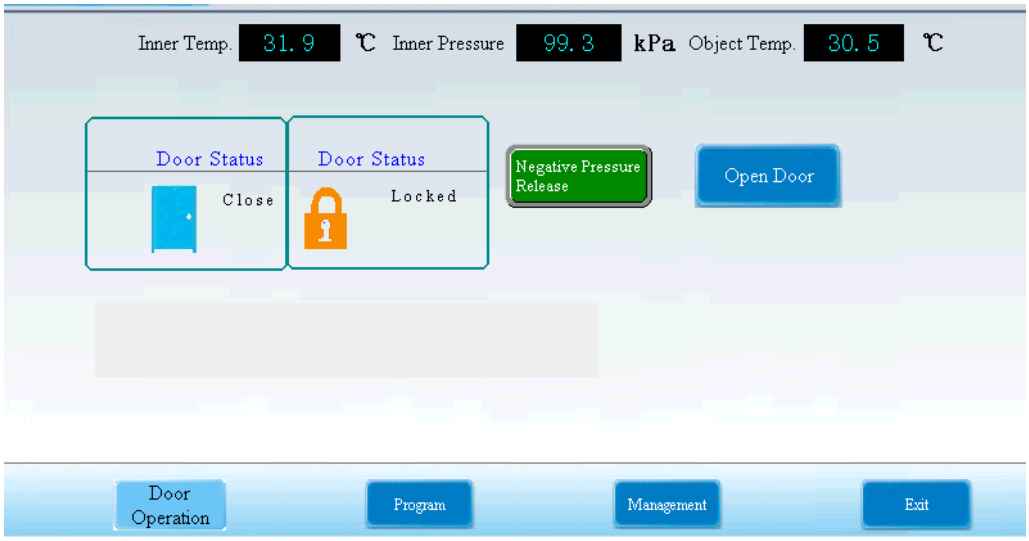
After closing the cavity door, the following prompt interface appears, and operate according to the prompt:



After the prompt "please press the chamber door" disappears, the hand can leave the cavity door, and the prompt interface is as follows:



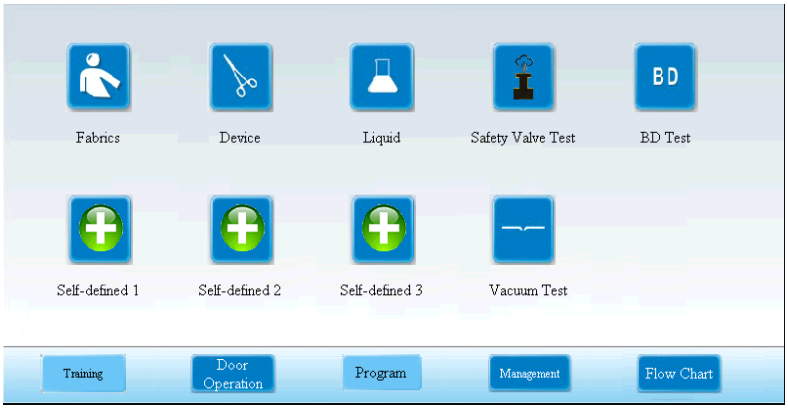
After the prompt disappears, the following screen appears:



When the door lock is locked, the prompt will disappear after a few seconds. (Note: the dooroperation cannot be performed when the sterilization program is started)

5.Select program

Click "program" on the main interface to enter the following figure:



There are three sterilization procedures, two test procedures, three self-defined programs and one new program. Sterilization procedures are: fabric program, device program, liquid program; test procedures are: BD test, vacuum test ; self defined programs are according to user's own needs.

Note: the operator account has no authority to set parameters, and the administrator account can set parameters.

5.1 Fabric program:

Sterilization process: standby → preheating → pulsation → heating → sterilization → exhaust → drying → balance pressure → end

Sterilization purpose: fabric sterilization, drying after sterilization
Click the fabric program to pop up the following screen:

Parameter setting range:

Name	Default parameters	Program parameter range
Sterilizing Temp.	134°C	115°C ~ 135°C
Sterilizing Time	4min	1min ~ 6000min
Sterilization pressure setting	It changes automatically with the change of sterilization temperature	No modification is recommended
Chamber cover opening temperature	99°C	40°C ~ 99°C
Exhaust speed setting	Level 5	Level 0 ~ 5
Negative pressure pulsation times	3times	2 ~ 99times
Times of cross pressure pulsation	1time	1 ~ 99times
Positive pressure pulsation times	3time	1 ~ 99times
Drying time setting	10min	0~300min(0 means to cancel the drying function)
Drying pressure setting	330kPa	200-330kPa

Note: 1) exhaust speed setting Description: stage 0 means exhaust closing, stage 1, 2, 3 and 4 exhaust time is lengthened in turn, and stage 5 is exhaust normally open.
2) When the administrator sets "print setting" to be controlled by "operator", the operator can start and stop printing

5.2 Device program:

Sterilization process: standby → preheating → pulsation → heating → sterilization → exhaust → drying → balance pressure → end

Sterilization purpose: instrument sterilization and drying after sterilization

Click the device program to pop up the following screen:

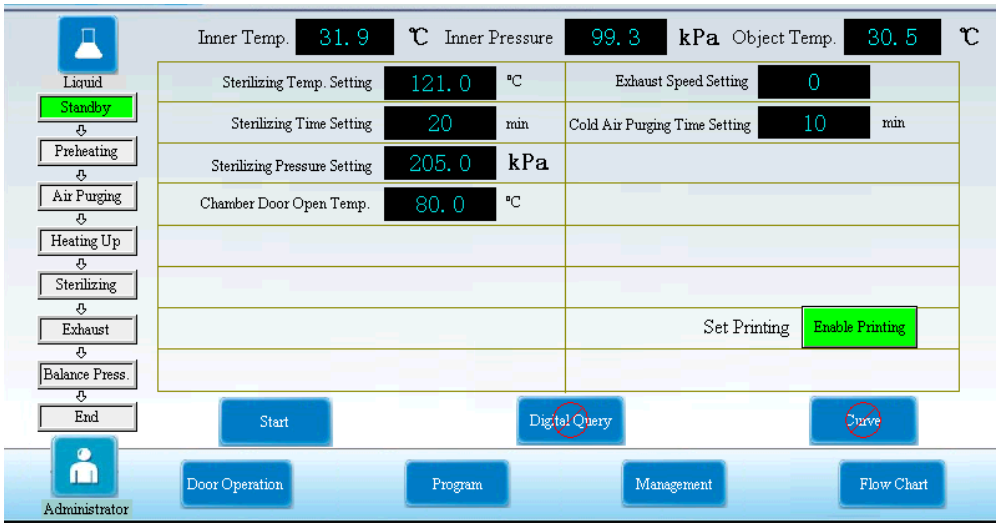
Parameter setting range:

Name	Default parameters	Program parameter range
Sterilizing Temp.	126°C	115°C ~ 135°C
Sterilizing Time	15min	1min ~ 6000min
Sterilization pressure setting	It changes automatically with the change of sterilization temperature	No modification is recommended
Chamber cover opening temperature	99°C	40°C ~ 99°C
Exhaust speed setting	Level 5	Level 0 ~ 5
Negative pressure pulsation times	3times	2 ~ 99times
Times of cross pressure pulsation	1time	1 ~ 99times
Positive pressure pulsation times	3time	1 ~ 99times
Drying time setting	10min	0~300min(0 means to cancel the drying function)
Drying pressure setting	330kPa	200-330kPa

Note: 1) exhaust speed setting Description: stage 0 means exhaust closing, stage 1, 2, 3 and 4 exhaust time is lengthened in turn, and stage 5 is exhaust normally open.
3) When the administrator sets "print setting" to be controlled by "operator", the operator can start and stop printing

5.3 Liquid procedure:

Sterilization process: standby → preheating → cooling → heating → sterilization → steam exhaust → balance pressure → end
Purpose: liquid sterilization
Click the liquid program to pop up the following screen:



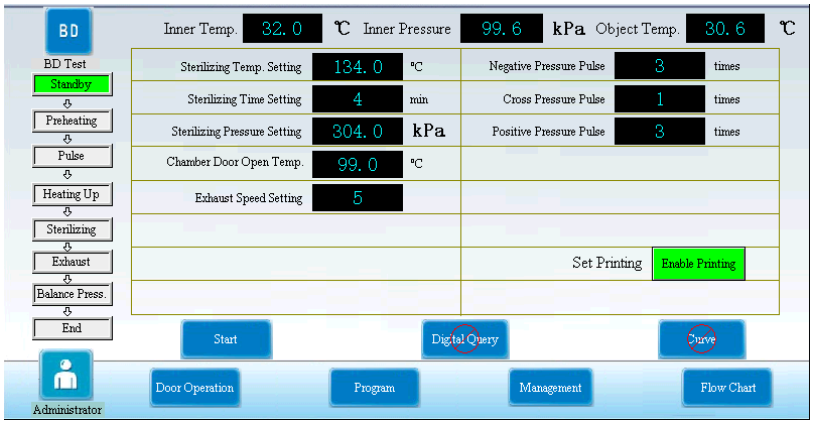
Parameter setting range:

Name	Default parameters	Program parameter range
Sterilizing Temp.	121°C	115°C ~ 135°C
Sterilizing Time	20min	1min ~ 6000min
Sterilization pressure setting	It changes automatically with the change of sterilization temperature	No modification is recommended
Chamber cover opening temperature	80°C	40°C ~ 99°C
Exhaust speed setting	Level 0	Level 0 ~ 5
Cold Air Purging Time	10min	10min~20min

Note: 1) exhaust speed setting Description: stage 0 means exhaust closing, stage 1, 2, 3 and 4 exhaust time is lengthened in turn, and stage 5 is exhaust normally open.
2) When the administrator sets "print setting" to be controlled by "operator", the operator can start and stop printing

5.4 BD Program

It is suggested that the verification should be carried out once a week according to the provisions of 6.8.1.1 in gb8599-2008 standard.



Parameter setting range:

Name	Default parameters	Program parameter range
Sterilizing Temp.	134°C	115°C ~ 135°C
Sterilizing Time	4min	1min ~ 6000min
Sterilization pressure setting	It changes automatically with the change of sterilization temperature	No modification is recommended
Chamber cover opening temperature	99°C	40°C ~ 99°C
Exhaust speed setting	Level 5	Level 0 ~ 5
Negative pressure pulsation times	3times	2 ~ 99times
Times of cross pressure pulsation	1time	1 ~ 99times
Positive pressure pulsation times	3time	1 ~ 99times

Note: 1) description of exhaust speed setting: level 0 means no exhaust, stage 1, 2, 3 and 4 exhaust speed increases in turn, and level 5 means exhaust normally open.
2) When the administrator sets "print setting" to be controlled by "operator", the operator can start and stop printing

5.5 vacuum test program

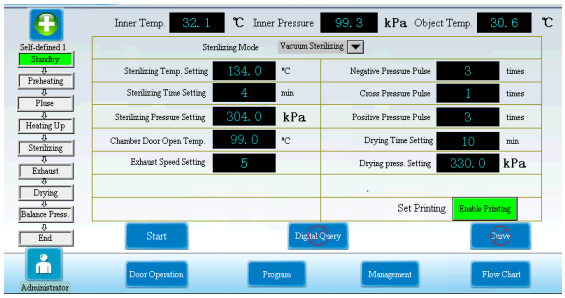
3) Vacuum test process: standby → vacuum pumping → leak detection → pressure balance → end Purpose: sealing test

Parameters do not need to be set.
Note: 1) when the administrator sets "print setting" to be controlled by "operator", the operator can start and stop printing

5.6 Self-defined program

Click the user-defined program (user defined 1, user defined 2, user defined 3) to enter the program. There are four modes to select, which are as follows:
Sterilization process:

5.6.1、Vacuum sterilization procedure: standby → preheating → pulsation → heating → sterilization → steam exhaust → drying → pressure balance → end
(application: solid sterilization and drying, also applicable without drying)

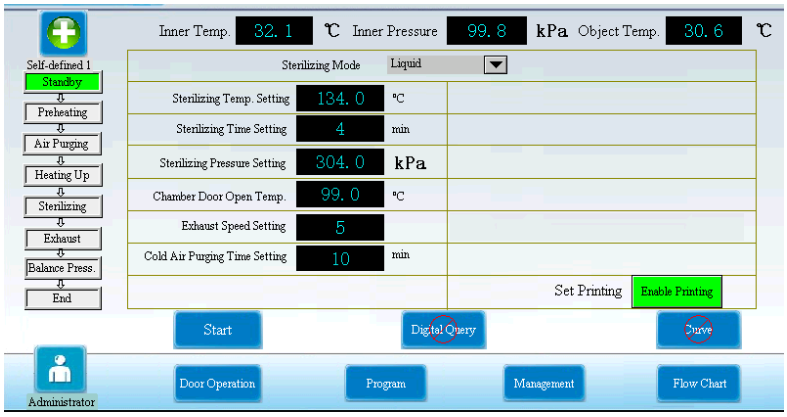


Parameter setting range:

Name	Default parameters	Program parameter range
Sterilizing Temp.	134℃	115℃ ~ 135℃
Sterilizing Time	4min	1min ~ 6000min
Sterilization pressure setting	It changes automatically with the change of sterilization temperature	No modification is recommended
Chamber cover opening temperature	99℃	40℃ ~ 99℃
Exhaust speed setting	Level 5	Level 0 ~ 5
Negative pressure pulsation times	3times	2 ~ 99times
Times of cross pressure pulsation	1time	1 ~ 99times
Positive pressure pulsation times	3time	1 ~ 99times
Drying time setting	10min	0~300min(0 means to cancel the drying function)
Drying pressure setting	330kPa	200-330kPa

Note: exhaust speed setting Description: stage 0 means exhaust closing, stage 1, 2, 3 and 4 exhaust time is lengthened in turn, and stage 5 is exhaust normally open.

5.6.2.Liquid program: standby → preheating → cooling → heating → sterilization → steam discharging → pressure balancing → end
Purpose: liquid sterilization



Parameter setting range:

Name	Default parameters	Program parameter range
Sterilizing Temp.	134℃	115℃ ~ 135℃
Sterilizing Time	4min	1min ~ 6000min
Sterilization pressure setting	It changes automatically with the change of sterilization temperature	No modification is recommended
Chamber cover opening temperature	99℃	40℃ ~ 99℃
Exhaust speed setting	Level 5	Level 0 ~ 5
Cold Air Purging Time	10min	10min~20min

Note: exhaust speed setting description: stage 0 means exhaust closing, stage 1, 2, 3 and 4 exhaust time is lengthened in turn, and stage 5 is exhaust normally open.

5.6.3.Special lower arrangement procedure: standby → preheating → cooling → heating → sterilization → steam discharging → drying → pressure balancing → end
Application: solid sterilization, drying after sterilization

Parameter setting range:

Name	Default parameters	Program parameter range
Sterilizing Temp.	134℃	115℃ ~ 135℃
Sterilizing Time	4min	1min ~ 6000min
Sterilization pressure setting	It changes automatically with the change of sterilization temperature	No modification is recommended
Chamber cover opening temperature	99℃	40℃ ~ 99℃
Exhaust speed setting	Level 5	Level 0 ~ 5
Cold Air Purging Time	10min	10min~20min
Drying time setting	10min	0~300min(0 means to cancel the drying function)
Drying pressure setting	330kPa	200-330kPa

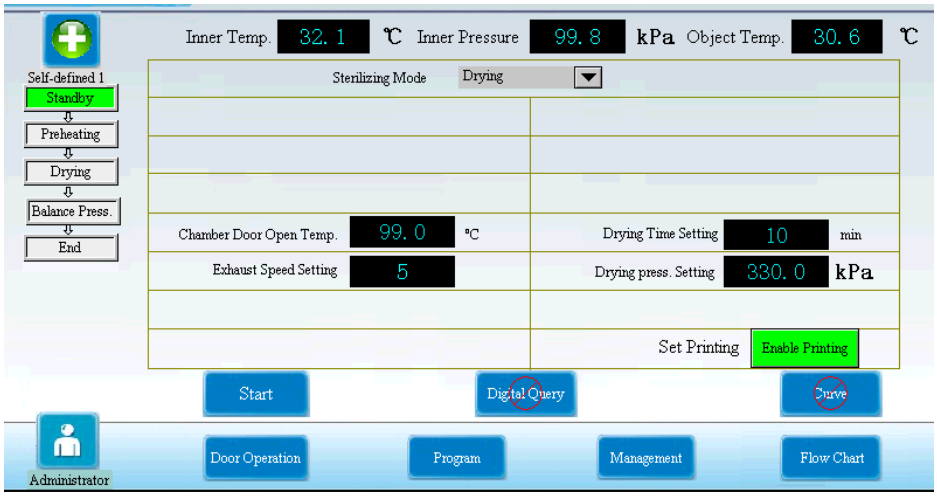
Note: description of exhaust speed setting: level 0 means no exhaust, stage 1, 2, 3 and 4 exhaust speed increases in turn, and level 5 means exhaust normally open.

Positive pressure procedure (applicable to items that cannot be pre vacuum and need to be dried, and need multiple positive pressure)

(Realization function: articles that cannot be used for pre vacuum sterilization and need to be dried. If the vacuum drying is not possible, this mode can also be used when encountering the liquid that needs positive pressure. Only when the drying time is set to 0, the program will skip the drying stage and realize atmospheric pressure drying; you can also set the drying time not to 0 and run the drying stage until the end of the program.)

5.6.4.Auxiliary drying: standby → preheating → drying → ending

Application: suitable for fabrics or instruments which is no need of sterilization

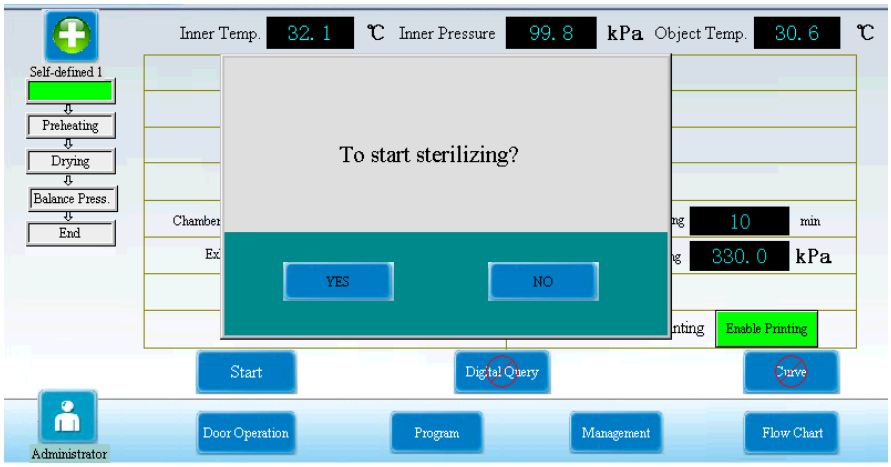


Note: In the program, if the item is 0, such as 0 times of positive pressure pulsation, the next function will be automatically entered in order not to perform this function.
Drying is atmospheric pressure drying, that is, drying under the same internal chamber pressure and external pressure.

Parameter setting range:

Name	Default parameters	Program parameter range
Chamber cover opening temperature	99℃	40℃～99℃
Exhaust speed setting	Level 5	Level 0～5
Drying time setting	10min	0~300min(0 means to cancel the drying function)
Drying pressure setting	330kPa	200-330kPa

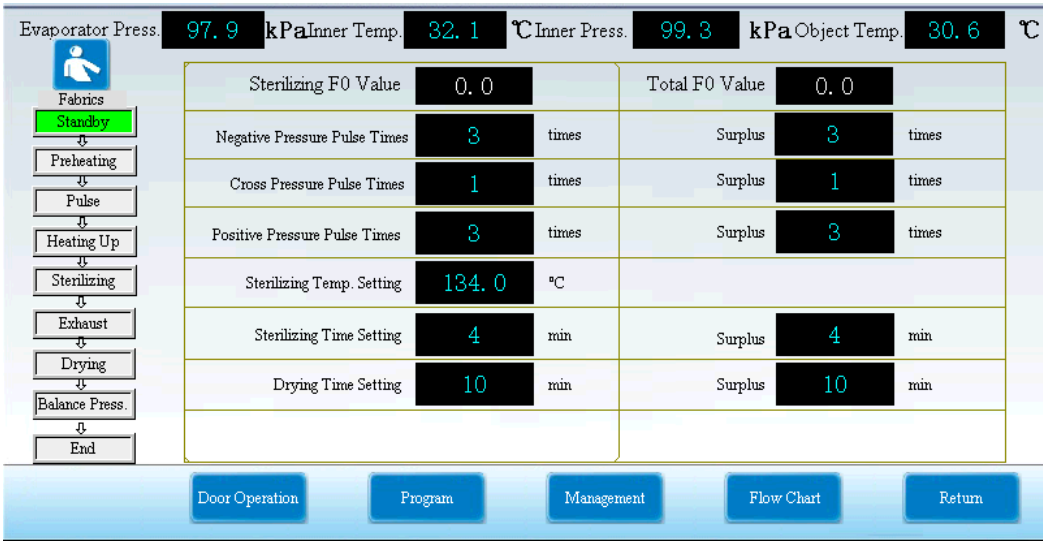
6.Start sterilization
Click the "start program" button, the system will pop up with the following prompt:



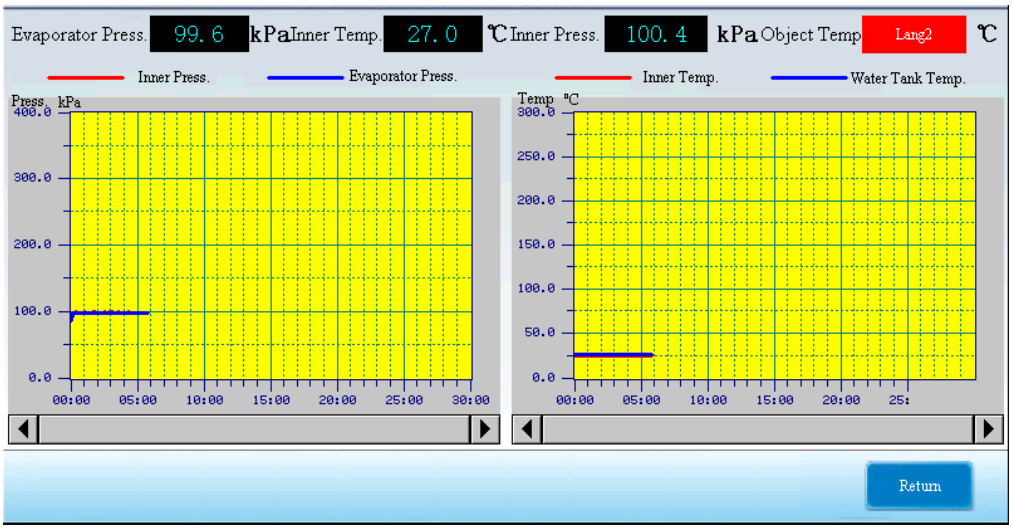
6.1 According to the prompt, click "confirm" to exit the prompt and start the program directly.
6.2 Click "Cancel" to stop, the system will return to the parameter interface
Note: please confirm the current inner chamber pressure before starting the program. If the inner chamber pressure is greater than 110kpa, there will be a "cavity pressure is too high" prompt, and the program cannot be started directly.

6.3 Click program to return to the program interface

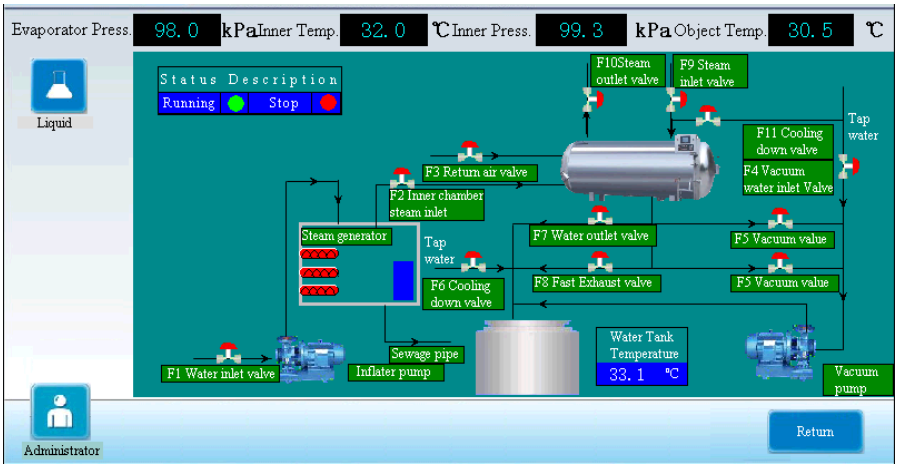
6.4 After the sterilization is started, the interface will jump to the digital query interface (after the sterilization is started, the default is the digital query screen)



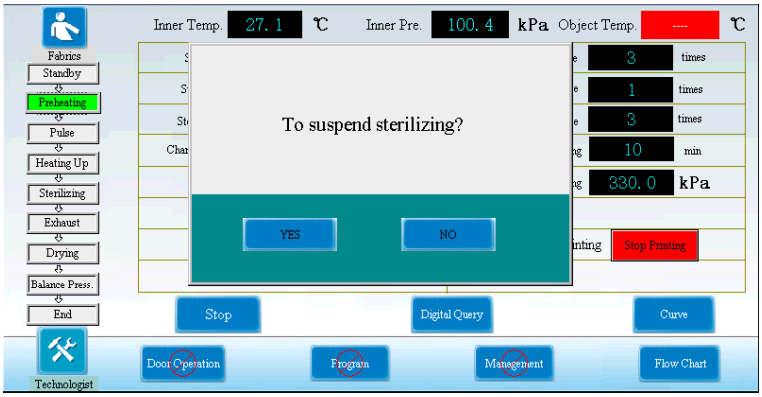
6.5 Click the curve to pop up the following interface:



6.6 click the working condition to open the following interface:



6.7 Click stop program to pop up the following interface:
Selection confirmation: stop sterilization, return to program interface (if the original fabric program is returned to the fabric program interface), select Cancel and maintain the original.



7. Program end and cover opening

7.1 After the end of the program, it will automatically jump to the "door operation" interface. See operation in "2". The door opening mode is "open sterilization room door".

8.Take out the sterilized articles

1) Heat insulating gloves should be worn when taking out sterilized articles from the sterilization chamber, and hands can be put into the sterilization chamber after the steam disperses.

2) When sterilizing liquid articles, due to the slow cooling speed of liquid, it is necessary to confirm that the temperature has dropped to low enough before taking out, otherwise scalding may occur.

3) When taking out the basket with the thermometer, it should be noted that the thermometer can only be taken out if it is not jammed.

9.Turn off the Power

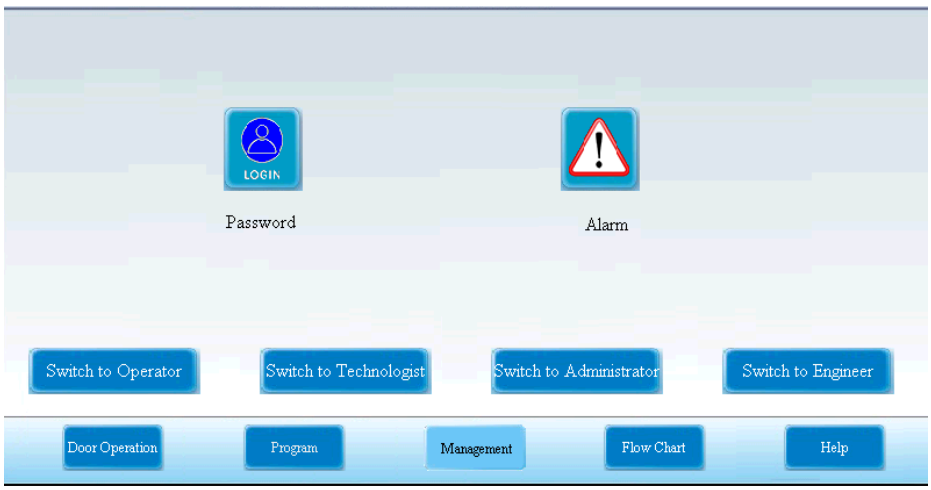
If the end of the day's sterilization work or not used for a long time, the power supply and water source switch should be turned off.

Description of each function management interface:

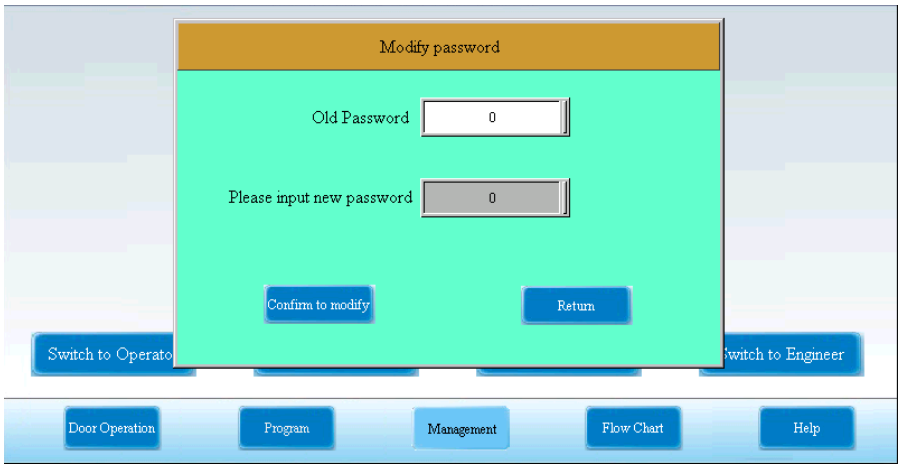
1.Operator management interface:

In operator mode, click manage to open the operator management interface, as shown in the following figure:

Note: the operator has no authority to modify parameters or set new program functions, but allows to view program parameters.



1.1.Click password setting to open the following interface:



The operator modifies his / her password. After the modification, click confirm to modify and click back to return to the operator management interface

1.2 .Click the alarm information to pop up the following interface:

It can query the fault information that has occurred up to the current time

1.3.Click switch to technologist, administrator and engineer in the following line to switch to the corresponding function interface.

2.Technician management interface:

In the case of technologist, click manage to open the technician management interface, as shown in the following figure:

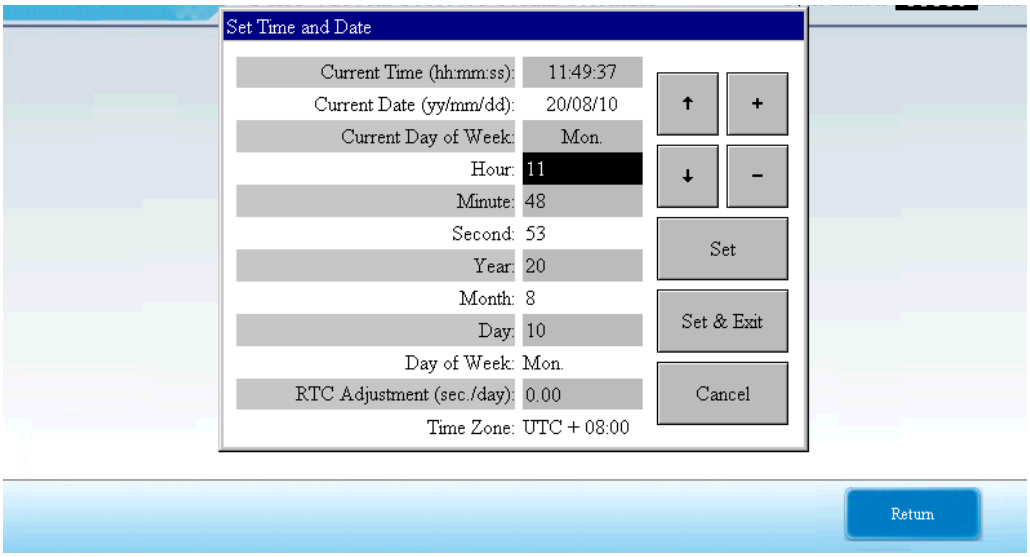
2.1. Click parameter setting to open the following interface:

Set the parameters related to sterilization (it is recommended not to set this parameter). The setting range is as follows:

Name	Default parameters	New program parameter range
Inner chamber fast exhaust switch on	1 second	1 ~ 9seconds
Upper limit of positive pressure pulse drying	115kPa	100 ~ 145kPa
Upper limit value of negative pressure fluctuation	80kPa	3 ~ 99kPa
Upper limit value of pressure	120kPa	100 ~ 170kPa

fluctuation		
Upper limit value of positive pressure fluctuation	140kPa	100 ~ 170kPa
Water tank temperature on	45℃	45 ~ 65℃
Rapid ventricular septum	50 second	30 ~ 90 seconds
Lower limit of positive pressure pulse drying	102kPa	100 ~ 110kPa
Lower limit value of negative pressure fluctuation	10kPa	5 ~ 90kPa
Lower limit value of cross pressure fluctuation	60kPa	5 ~ 100kPa
Lower limit value of positive pressure fluctuation	110kPa	100 ~ 170kPa

2.2. When you click the password setting, it is the same as the password setting in the operator interface.
2.3. When clicking the alarm information, it is the same as the alarm information in the operator interface.
2.4. When you click time setting, the following interface will pop up:

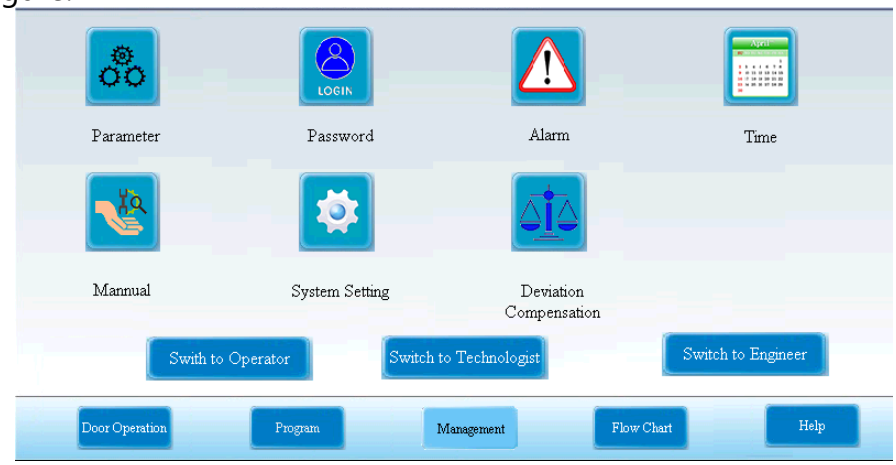


The time can be changed to the current time

2.5. Click the following line to switch to technologist, administrator and engineer to switch to the corresponding function interface.

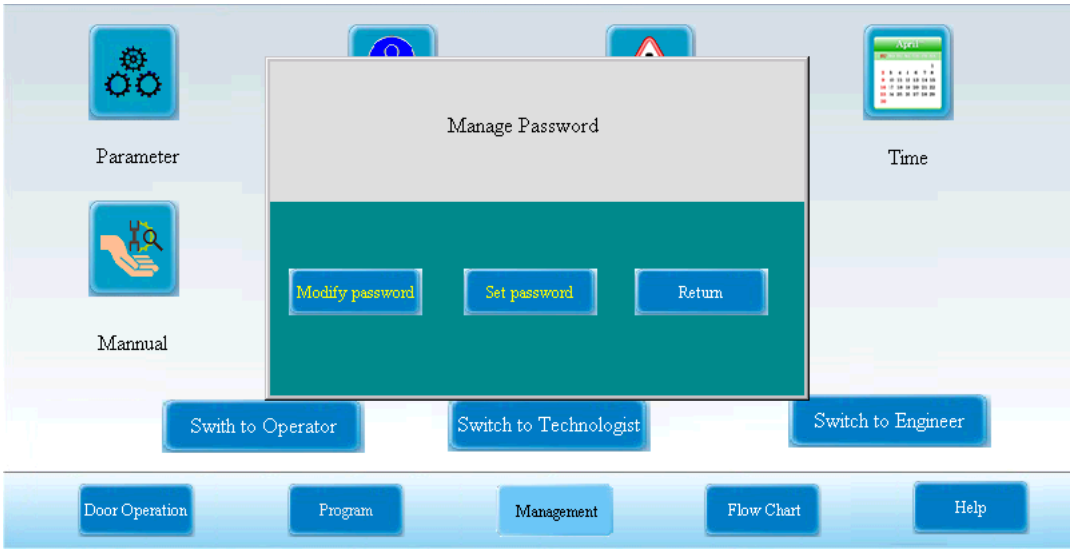
3. Administrator management interface:

In administrator, click manage to open the administrator management interface, as shown in the following figure:

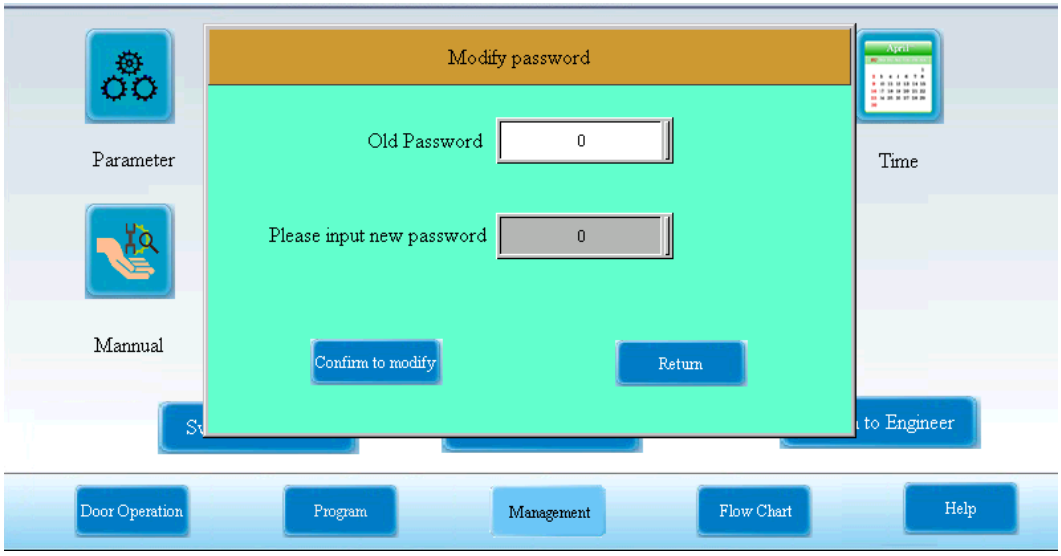


3.1. When you click parameter setting, it is the same as the parameter setting in the technician interface.

3.2. When you click password management, the following interface will pop up:



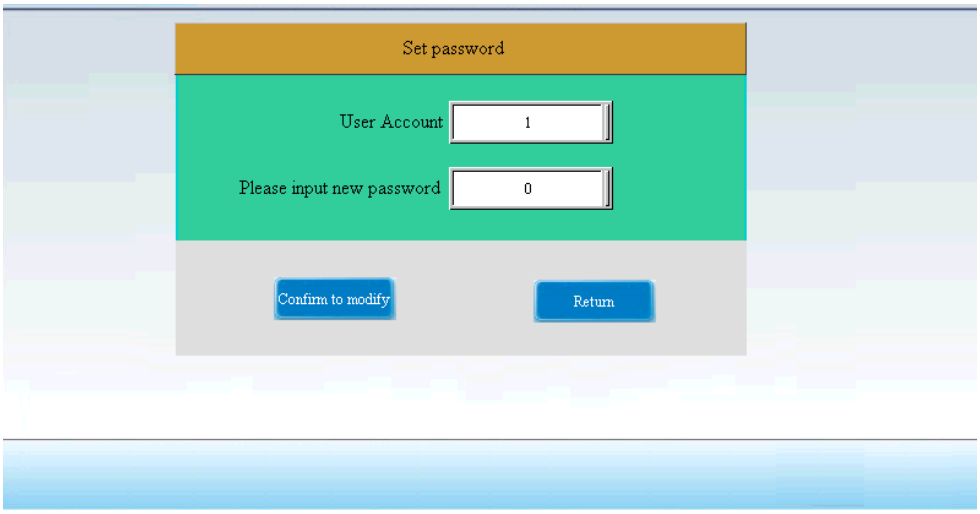
3.2.1. When you click modify password, the following interface will pop up (only change the password of the administrator himself)



If the number of digits is wrong or the password is wrong, there will be a corresponding prompt;

3.2.2. Click back to return to the management interface;

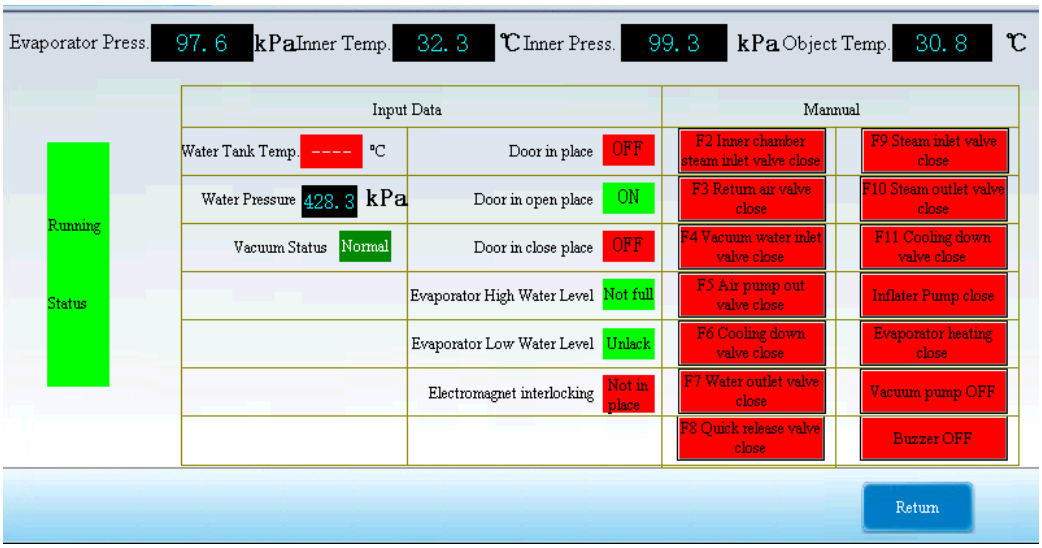
3.2.3. Click set password to pop up the following interface (user number and password of technologist and operator can be modified);



3.3 when the alarm information is clicked, it is the same as the alarm information in the operator interface.

3.4. When you click time setting, it is the same as the time setting in the technician interface.

3.5. When you click system manual, the following interface will pop up:



The corresponding solenoid valve can be opened and closed manually

3.6. When you click system settings, the following interface will pop up:

It can modify the language, touch prompt tone, article temperature selection, water source pressure selection, print temperature type, print batch number, printer function, pressure unit, date format and altitude

3.6.1 when setting the printer function, the authority control includes closing, opening and operator control; the printing cycle is added and subtracted once for 30 seconds, and the minimum is 30 seconds

3.7. Click switch to technologist, administrator and engineer in the following line to switch to the corresponding function interface.

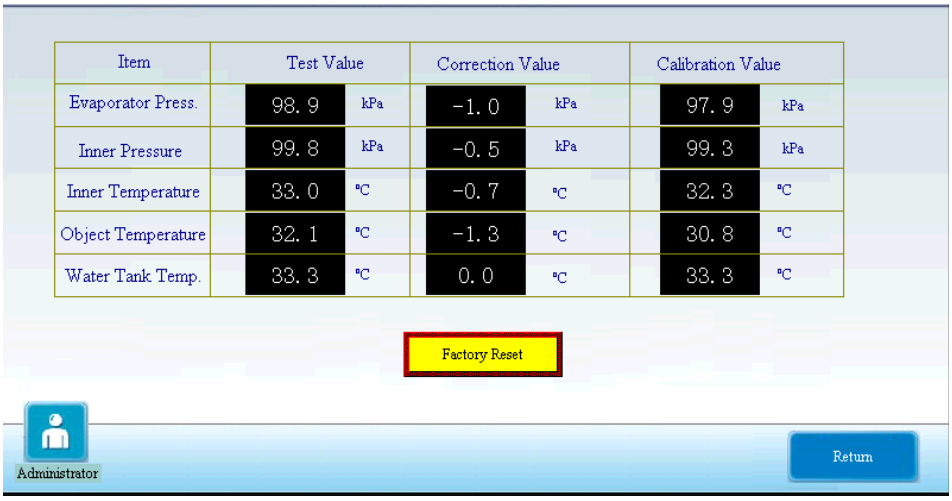
3.8. Help interface

Click the "help" button in the system login interface to enter the help interface:

This interface has the company's after-sales contact information, you can seek help from the company through the above methods

Welcome to scan the two-dimensional code, pay attention to the official account of the micrometer.

3.9 When you click the deviation compensation setting, the following interface will pop up:



3.9.1 Click the correction value in the middle of the above figure to modify, with the correction range of - 5 ~ + 5. For example, if the measured value is 320.7kpa and the correction value is -0.7kpa, the corrected value will display 320kpa and take effect. Press to return to exit the interface.

Options

Note: only administrators have permission to set this item.

1) Selection of water source pressure sensor or pressure gauge:

●If the machine needs to monitor the water source pressure in real time, the water source pressure sensor can be selected and the "management" in the "Administrator" interface can be selected

In the parameter setting of the interface, the water source pressure sensor is enabled and the corresponding pressure unit (kPa, bar or PSI) is set.

●If it is necessary to observe the water source pressure, it is recommended to install a water source pressure gauge for the tap water source, so as to observe the water source pressure and ensure the normal use of the instrument.

2）Load thermometer (object temperature sensor)

●When the cavity temperature reaches the preset sterilization temperature, the temperature of the articles has not reached the preset sterilization temperature. In order to obtain the ideal sterilization effect, it is suggested to use the article thermometer to monitor the actual temperature of the articles in real time. In this case, the sterilization timer starts only when the actual temperature of the article reaches the preset sterilization temperature.

★Note: 1. After the item thermometer is installed, enter the administrator settings menu and

set the item thermometer to enable. After use, the article thermometer should be placed on the storage board and properly kept. If it is not used for a long time, the article thermometer can be set to not be enabled in the user administrator settings menu.

●It is recommended to test once a month. The test method is as follows: fix the stainless steel tube of the article thermometer in the grid close to the temperature sensor (filter screen position), set the sterilization temperature at 121 ℃ and the sterilization time for 20 minutes. When the sterilization reaches 5 minutes, confirm that the error between the display temperature of the article thermometer and the temperature sensor is 0 ℃ ~ + 0.2 ℃. If it is no longer in this range, modify the thermometer compensation value of the article (enter the "deviation compensation" of "Administrator" to modify).

Note: after installing the item thermometer, you should enter the "system settings" interface of "Administrator" to set the item thermometer to

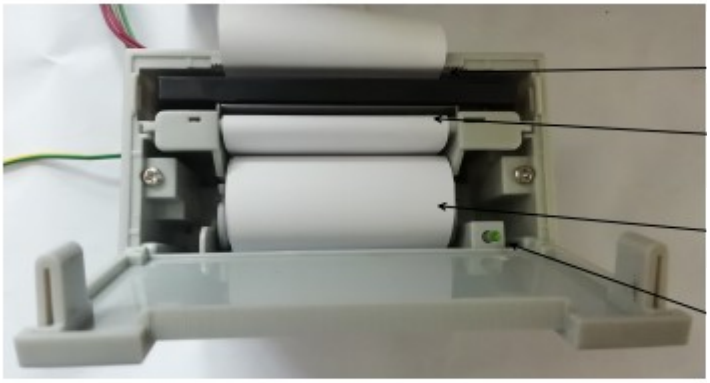
Enable. After use, the thermometer should be placed on the water level board and kept properly. If it is not used for a long time, it should not be turned on Use.

3）Printer

●If you need to record the sterilization process parameters, you can choose a printer. To enable, you need to enter the "system settings" interface of "Administrator", set the printer to enable, and you can select the printing language (English or Chinese) and the display mode of date (day / month / year or year / month / day) according to the needs.

●Install the roll

○Put the paper roll into the paper inlet, press the paper in and out button to confirm that the paper roll comes out of the paper outlet, and then press the paper in and out button, and the paper roll will stop automatically.



●The printer prints the F0 value
A total of 2 F0 values are printed, one of which is in sterilization state, and the other is F0 value of heating process, sterilization process and cooling process in the program process.
The contents of the printer are as follows:
F0 value in sterilization stage: XX
Total F0 value: XX (excluding F0 value of steam stage after sterilization)
The F0 value is displayed with 1 decimal point. If an article thermometer is used, the calculation shall be based on the value recorded by the article thermometer, otherwise, it shall be calculated
According to the cavity temperature value.

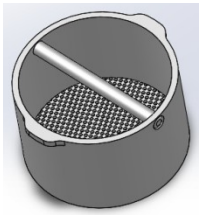
4) Selection of back pressure system:
Ensure that there is no negative pressure in the chamber during the rapid cooling process after sterilization in liquid mode. Even if the liquid loading is more than 80% of the container, the sterilization liquid will not overflow during the sterilization process
●Back pressure system: pipeline diagram of air compressor

04 Maintain&Management

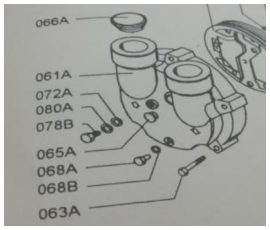
1. The correct use and routine maintenance of sterilizer equipment are necessary conditions for prolonging the service life of the equipment and reducing failures. This chapter will briefly introduce the precautions and maintenance work in use.

2. Before maintenance, please cut off the power supply and confirm that the sterilization chamber is cooled before maintenance or maintenance.

Instrument maintenance
1. Daily maintenance of main parts and components
●Sterilization room and storage board: when the temperature of sterilization room and storage board drops to close to room temperature, scrub with neutral detergent, then rinse with tap water, and finally dry it with soft cloth.
When cleaning the inner room, effective measures should be taken to prevent the door from closing automatically, so as to avoid danger from harming people's life.
●Filter screen: clean the filter attached to the filter screen at the front of the sterilization room to ensure the vacuum rate and condensate flow, and the temperature indication is consistent with the pressure.



filter screen

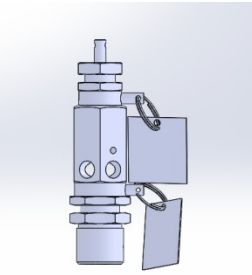


Plug

●Vacuum pump: If the working fluid used is harmful to the human body or the environment, for the sake of safety, clean the pump with clean water before emptying.
When emptying, open the screw plug (068a) on the pump cover (061a) to let the liquid flow out. Rotate the pump by hand until no liquid flows out.
By tilting the pump cover 45 degrees, the pump can be basically emptied, so that even if the pump is stopped for a long time or in the mist, the pump will not be damaged.
1) Treatment method for long-term pump shutdown:
2) If the pump stops conveying for about 4 weeks, the liquid in the pump should be drained first. For cast iron pump, the pump should be preserved with 1 / 2 l anticorrosive oil, and the oil should be poured into the suction port and exhaust port. If the impeller is stuck after stopping the pump for a long time due to the use of hard water, the pump cavity should be filled with 10% oxalic acid for about 30 minutes.
3) If the pump is stopped for about 4 weeks, remove the inlet and outlet of the pump and blow the water inside with an air gun. If the water in the inlet and outlet pipes is not drained, it is easy to stink or scale, causing impurities to affect the normal use of the pump chamber.

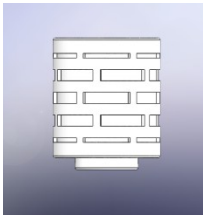
●Drain valve (water vapor separator): the normal operation of a drain valve in the drain pipe directly affects the sterilization effect. If the accumulated water can not be discharged normally, the drain valve should be opened for cleaning. During operation, it is normal to have a small amount of steam discharged, but the exhaust volume should not be too much. The drain valve should be cleaned once every three months.

●Safety valve: it is installed on the sterilizer to protect equipment and personal safety. It is installed on the top of the container. Its opening pressure has been adjusted before delivery. It is forbidden to adjust it at will to avoid accidents due to improper adjustment. However, it is necessary to lift the handle several times every half a year and wash it with steam to avoid its action failure.

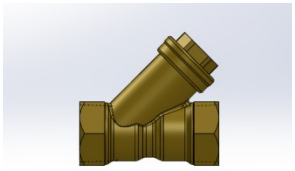


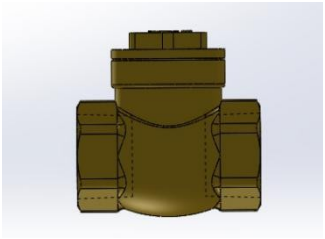
⚠Please do not touch the handle of safety valve directly by hand to avoid steam scald. Screw driver or other strip-shaped objects can be inserted into the pull ring to lift the handle.

●Sterilization filter: the filter works when the air enters into the room. After the gas is filtered, it can effectively prevent the air entering the inner room from polluting the sterilized articles. The filter is required to be replaced regularly. For details, see the list of consumables in Chapter 4, Part 5.



●**Filter**: a filter is installed on the water inlet and exhaust pipe, which is used to filter out the impurities in the exhaust pipe and water inlet pipe. Ensure the smooth pipeline and reliable action of each valve. Therefore, regular cleaning is required to prevent blockage. When cleaning, screw out the screw below, clean the filter screen, and then tighten the screw plug.





●Check valve: the vacuum pipeline and water inlet pipeline are equipped with check valve, which should be checked regularly to avoid foreign matters affecting its one-way sealing.

●Electric heating tube: the electric heating tube is located at the back end of the steam generator. Once it is damaged, it will affect the normal use of the whole equipment. Therefore, the electric heating pipe should be inspected regularly. If it is damaged, it should be replaced in time. After replacement, it should be ensured that there is no steam leakage and water leakage under the working pressure, and the grounding should be firm and reliable.
b: The parts of pressure gauge shall be assembled firmly without looseness;
c: The pressure gauge indexing plate shall have the following marks: manufacturer, product

name, measuring unit and number of digital measuring instruments; vacuum gauge shall have "negative" sign, accuracy grade and factory number.
d: The pressure gauge shall be equipped with safety hole, and dust-proof device shall be installed on the safety hole.
e: The pointer indicating end should cover 1 / 3 of the shortest dividing line length, and the pointer width should not be greater than the dividing line width.
f: In the reading part, the pressure gauge glass shall be colorless and transparent, and there shall be no defect hindering the reading.
In case of any discrepancy, please stop sterilization immediately and contact the distributor.

2、Maintenance of electrical components:

●Electrical components and connecting wires are strictly prohibited from contacting with water. If water is accidentally stained, the power supply can be connected only after treatment.
●Electrical components should be dustproof. It is recommended to remove dust once a season
●All connecting wires, plugs and sockets, and components should be checked for looseness frequently. If they are loose, they should be plugged and locked immediately.

Instrument maintenance

1. Inspection of leakage protection circuit breaker (main power switch)
●Press the test button of the leakage protection circuit breaker. If the leakage protection circuit breaker trips, it indicates that it is normal. Otherwise, please close the leakage protection circuit breaker and contact the dealer.

2.Safety valve working condition test
●Enter the technologist interface, enter the "process parameter setting", click the safety valve test, press "start safety valve", the instrument will automatically jump to the safety valve interface and start the safety valve test, and press "stop" to terminate the safety valve test.
●When the temperature rises to 142 ~ 145 ℃, the pressure rises to 0.275 MPa ~ 0.30 MPa. The safety valve will trip to exhaust steam. At this time, the pressure will no longer rise or slowly fall back, indicating that the safety valve is normal.●If the temperature exceeds 145 ℃, the safety valve does not trip, then the safety valve is abnormal. Must stop immediately and contact the dealer.

3.Replace the sealing ring

●Open the chamber door → Click to open the door. The vacuum pump starts to extract steam. When the air pressure is less than 100KPA, the valve will open automatically.

○Pull the corner of the seal ring to take it off directly

○Clean the dirt on the sealing ring and the contact part between the cavity and the sealing ring with a cloth.

○Wet the seal ring with water, the thick side of the seal ring faces inward, and then press the seal ring into the groove in an average section

○Operate the instrument according to the conventional method and observe the air tightness of the sealing ring.

4.Parts list that must be checked or provided by the manufacturer or its agent

Number	Part name	Number	Part name
1	Temperature switch (for heating pipe)	14	Air filter
2	Cavity temperature sensor	15	Water level sensor
3	Article temperature sensor	16	Interlocking microswitch
4	Pressure sensor	17	Power switch
5	Electric heating tube	18	Vacuum pump
6	Seal ring	19	Booster pump
7	Pressure gauge	20	Safety valve
8	Stainless steel basket	21	Leakage protector
9	AC contactor (for heating	22	Touch screen
10	Solid state relay	23	Key switch
11	PLC	24	Emergency stop switch
12	Solenoid valve	25	Small relay of distribution box
13	Printer		

5.List of consumables:

Number	Part name
1	Electric heating tube
2	Seal ring
3	Sterilizing filter
4	Article temperature sensor (optional)

05 Troubleshooting

Equipment alarm information table:

Number	Alarm information	Possible causes	Handling suggestions
1	E01	Sterilization chamber door not locked or chamber door interlock failure	Check whether the switch handle is in place; check whether the door is closed in place; check whether the electromagnet mandrel top is in place; check the 24 V and 15 V power supply
2	E02	Heating pipe damaged	Check the working state of heating controller; Check the working indicator of solid state relay
3	E03	Temperature switch or pressure switch failure	Turn off the temperature control switch and the pressure switch. Check whether the tap water is sufficient
4	E04	Abnormal fluctuation of	The chamber temperature is

		power supply	higher than the boiling point temperature during start-up operation; The temperature of sterilization is higher than that of sterilization
5	E06	Inner chamber temperature control probe failure	Plug in the temperature sensor again
6	E10	Sterilization is not normally interrupted	Re sterilization
7	E11	Abnormal water inflow	Confirm whether the stop valve of demineralised water of drain valve seat is open; Whether the booster pump is overloaded; Check whether the tap water is sufficient.
8	E12	Micro pressure switch failure	Contact local dealer
9	E16	Temperature control probe failure	Plug in the temperature sensor again
10	E19	Dirty level sensor	Check and clean the liquid level sensor in the cavity for dirt
11	E21	The leakage of the instrument exceeds the standard	Check whether there are foreign matters in the vacuum pump; Replacement of sealing ring
12	E22	The leakage of the instrument exceeds the standard or there is water	Remove the water in the inner chamber; Replace the door sealing ring
13	E23	Temperature and pressure do not reach the set value	Contact local dealer
14	E24	The safety valve is unqualified	Replace the safety valve
15	E26	Inner chamber pressure sensor failure	Replace the pressure sensor
16	E36	Water source pressure sensor failure	When selecting the water source pressure sensor, replace the water source
17	E46	Interlayer pressure sensor failure	Replace the sandwich pressure sensor
		Evaporator pressure sensor failure	Replace the evaporator pressure sensor

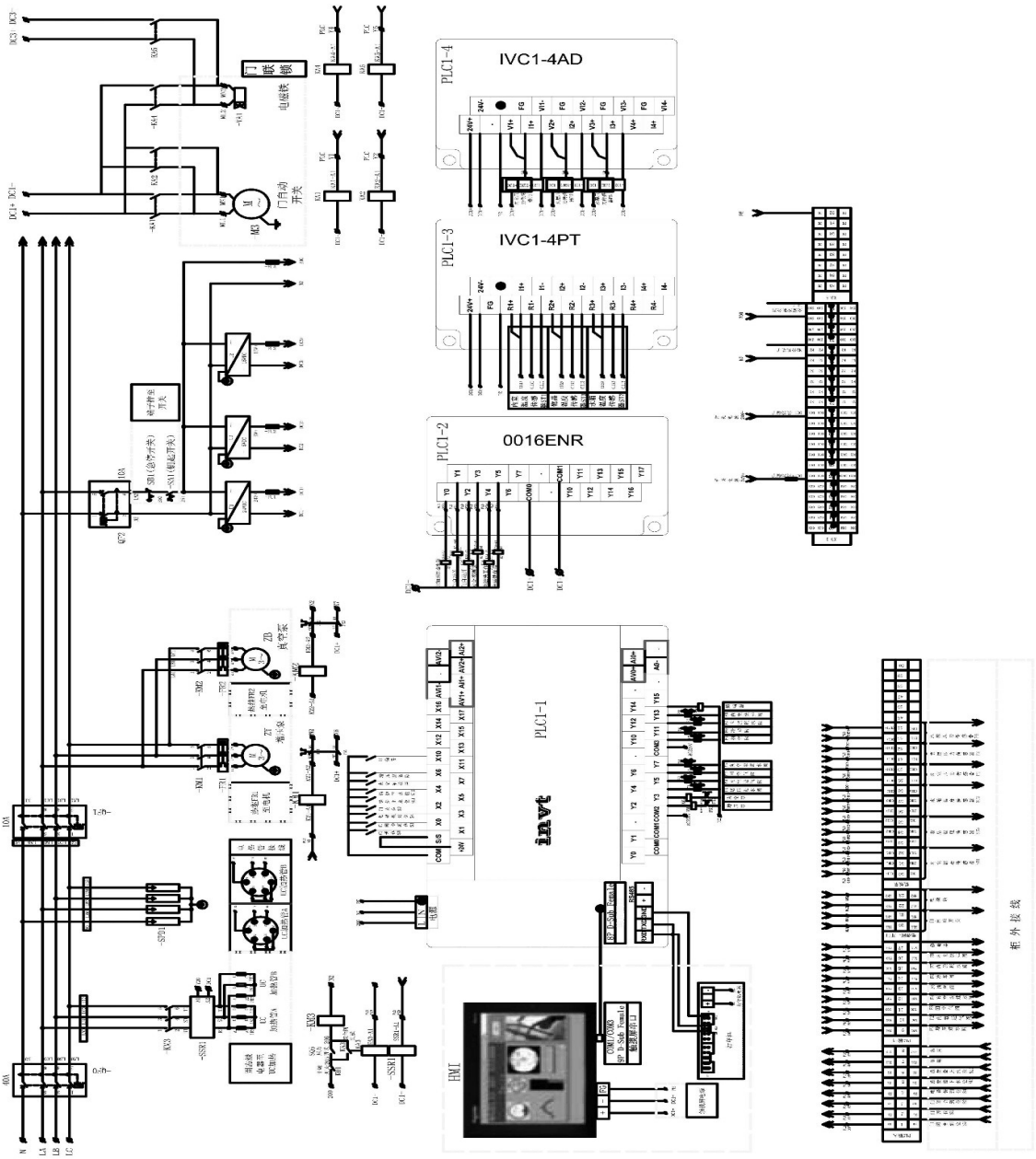
2.Analysis and elimination of common faults

Instrument failure	Possible causes	Handling suggestions
1. After the power is turned on, the touch screen does not light up	1. Check whether 380V power supply is normal 2. Touch screen power not connected 3. No 24 V power supply	1. Check touch screen power supply 2. Check the 24 V power supply
2. The program does not start	1. The door is not closed 2. In detection state	1. Please close the cavity door 2. Please switch to the running state, which can be switched in the detection interface
3. Communication interruption	1. The interface in communication is burnt out by hot plug 2. Poor contact	1. Replace the communication line and check whether the interface is burnt out
4. Touch screen black screen	1. Enter screen saver 2. Touch screen failure	2. Reconnection after power failure
5.Pumping vacuum is too slow, negative pressure can not reach the standard	1. Whether the water source pressure is satisfied 2. There is a leak in the line 3. Is there dirt on the surface of the sealing ring 4. No water source 5. Pressure transmitter failure 6. Vacuum valve not open	1. Check water source pressure 2. Check the connecting parts of each pipeline and conduct pressure maintaining test 3. Check for water supply 4. Replace the pressure feeder 5. Check whether the vacuum valve is powered on 6. Check the sealing ring
6. The vacuum pump is noisy	1. No water supply 2. Reversal of vacuum pump 3. Serious scaling of vacuum pump	1. Check the water source 2. Adjust any two power lines 3. Descaling for vacuum pump and vacuum pipeline
7. Solenoid valve does not operate	1. Solenoid valve coil damaged 2. The solenoid valve is not powered	1. Replace the solenoid valve 2. Check the power supply of solenoid valve
8. There is no water in the steam generator	1. Poor insulation or short circuit of floating ball level gauge 2. The water inlet solenoid valve	1. Cleaning the surface dirt of float ball level gauge 2. Repair or replace the water inlet

	does not work when it is powered on 3. Water pump damaged	solenoid valve 3. Repair or replace the water inlet pump
9. The water in the steam generator is not stopped	1. Floating ball level gauge failure 2. Water inlet solenoid valve not closed tightly	1. Replace or repair the float level gauge 2. Repair or replace the water inlet solenoid valve
10. Heating tube not heated	1. Heating pipe damaged 2. Solid state relay failure 3. Protect AC contactor from power failure	1. Replace the heating pipe 2. Repair or replace the solid state relay 3. Check the power supply of AC contactor

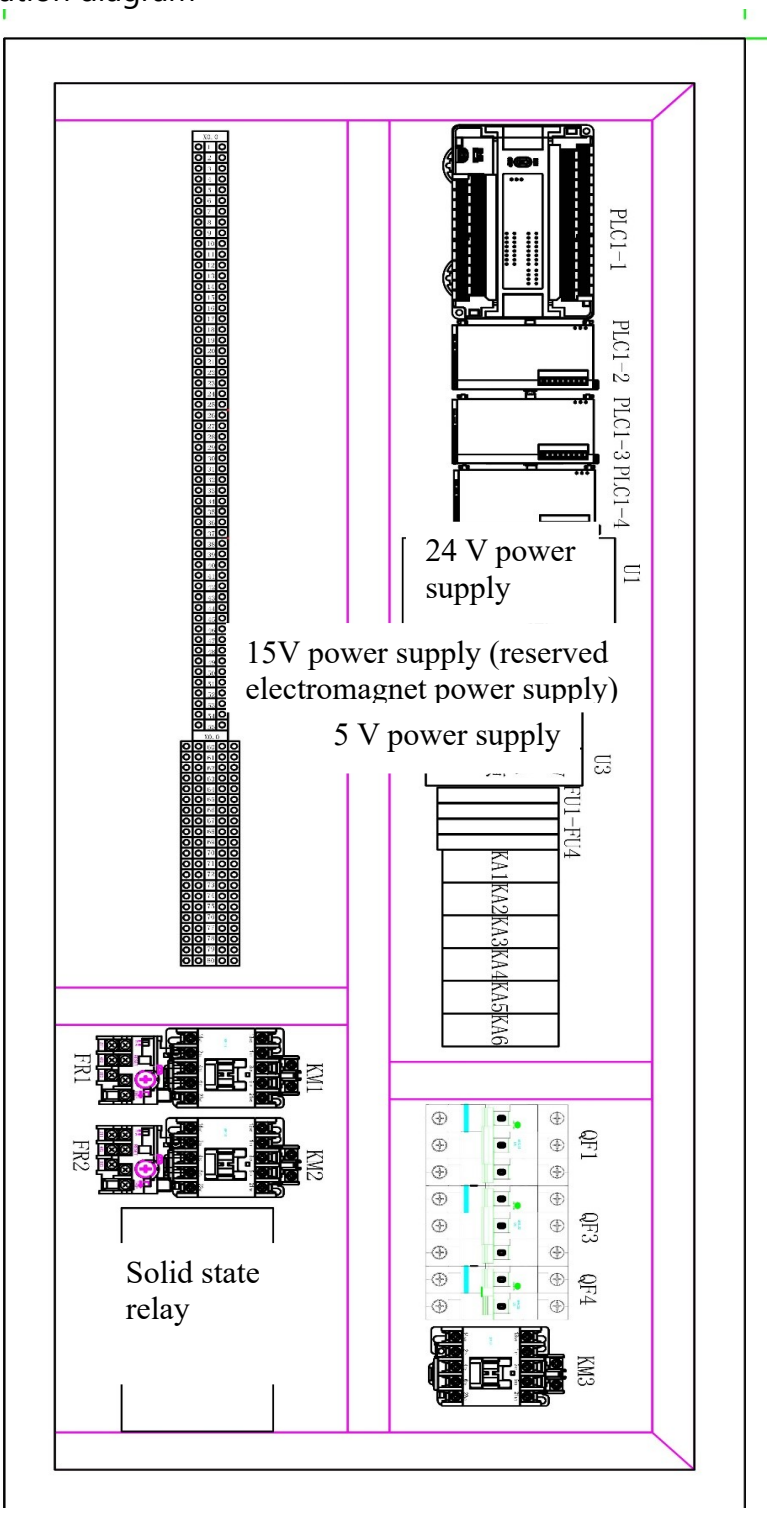
06 Electrical Wiring Diagram and Component Distribution Diagram

1. Electrical wiring diagram

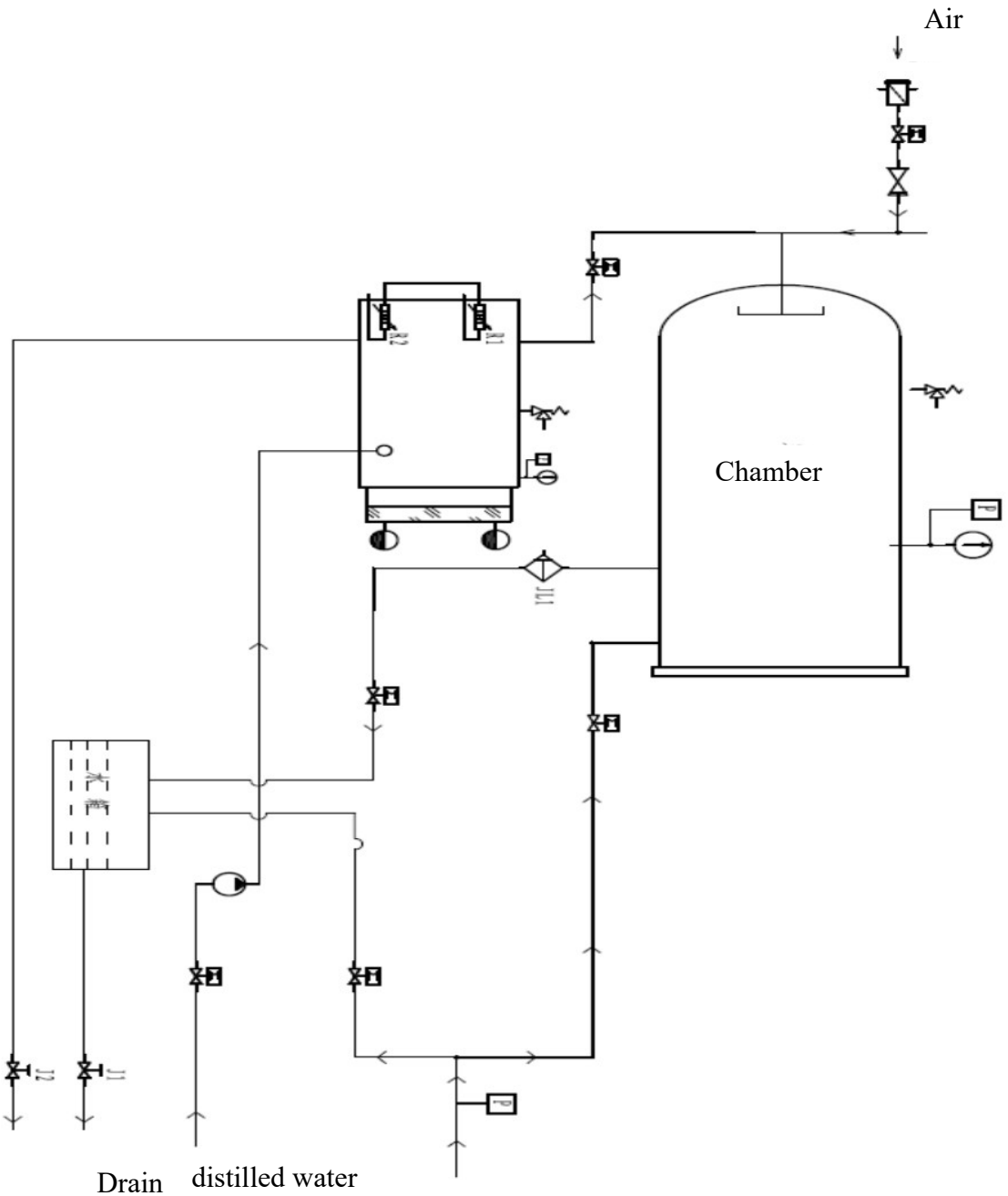


Symbol description					
Number	**Symbol**	**Name**	**Number**	**Symbol**	**Name**
1	QF0	Total power supply	15	KA4	Electromagnet pull in relay
2	QF1	Motor and control power supply	16	KA5	Electromagnet protection relay
3	QF2	Control power supply	17	HMI	Touch screen
4	SPD1	Surge protective device	18	PLC1-1	PLC IVC1-1614MAR6
5	PBU1	Buzzer	19	PLC1-2	PLC IVC1-0016ENR
6	KM1	Booster pump contactor	20	PLC1-3	PLC IVC1-4PT
7	KM2	Vacuum pump contactor	21	PLC1-4	PLC IVC1-4AD
8	KM3	UC heating contactor	22	U1	DC24 V power supply
9	FR1	Booster pump thermal relay	23	U2	DC15V power supply (printer power supply)
10	FR2	Vacuum pump thermal contactor	24	U3	DC5V power supply (electromagnet holding power supply)
11	SSR1	UC heating solid state relay	25	FU1	24 V power supply protection fuse
12	KA1	Automatic door closing relay	26	FU2	5V power supply protection fuse
13	KA2	Automatic door opening relay	27	FU3	15V power supply protection melting
14	KA3	Safety valve switch relay	28	FU4	AC220 protective fuse

2. Component distribution diagram



07 Pipeline Diagram



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