CO_2 Incubator

(UV Sterilization)

User Manual

Preface

Dear respected users:

Thanks for choosing our products!

CO_2 incubator is widely used in the research and production of medicine, immunology, oncology, genetics, microbiology, agricultural science, and pharmacology, and has become one of the most commonly used conventional instruments in laboratories in the above-mentioned fields. The CO2 incubator is a kind of device for in vitro incubation of cells/tissues by simulating the growth environment of a similar cell/tissue in the incubator chamber, such as constant pH (pH:7.2-7.4), stable temperature (37°C), and high relative humidity (90%) , stable CO2 level (5%).

We sincerely hope that our products will bring the greatest help for your work.

In order to make you have a better understanding of the CO_2 incubator, please be sure to carefully read the user manual before use. The content of this manual is very important for you to use this machine safely and correctly!

After you have read the user manual carefully, please keep it in a convenient place for future reference

Statement

For your safe and convenient use and reasonable maintenance of this product, please read the instruction manual carefully before use and keep it for reference.

For any damage to the instrument caused by the user not following the "instrument operating environment" stated in this manual, or the injury caused by the individual's failure to follow the requirements of the "safety tips", we are not responsible for it.

Users must do the following three things in use:

1. Always use protective equipment correctly (including clothing, gloves, goggles, etc.).

2. Always adopt good hygienic habits and operate in strict accordance with product instructions.

3. Everyone is responsible for their own safety.

Due to the rapid update of our instruments, if there are differences between the functions described in this manual and the functions of the product you purchased, please refer to the actual functions.

Safety Tips

1. When using this product for the first time, please read this manual carefully.

2. The CO_2 incubator can only be operated by trained and authorized personnel.

3. The maintenance of the equipment can only be done by the company's technical engineers or the company's authorized agents.

4. If the operator encounters a situation that is not mentioned in this manual, please contact the company's technical engineer or the company's authorized agent to ask for the correct handling method.

5. The CO_2 incubator must be inspected and maintained at specified time intervals.

6. The CO_2 incubator heats up through the back to achieve the purpose of constant temperature of the box. In order to ensure the normal operation of the machine and ventilation and heat dissipation, the back and left and right sides of the incubator are at least 30cm away from the wall, and the air inlet and outlet must not be blocked by obstacles.

7. The temperature in the CO_2 incubator will fluctuate in case of machine failure or power failure. If it cannot be repaired in a short time, please take out the medium and transfer it to another place that meets the temperature requirements of the medium for storage to avoid damage to the medium.

8. Where the equipment is marked with a symbol ⚠, you need to consult this manual when using it, so as to find out the potential nature of the danger and the countermeasures that must be taken.

9. Please use the equipment according to the method specified in this manual. If the equipment is not used according to the method specified by the manufacturer, the protection provided by the equipment may be damaged.

I. Installation &Debugging

1.Security Operation & Preventive Measures

1.1 This manual includes important safety regulations, please be sure to follow the instructions.

All of the matters and procedures described here are designed to allow the users to use this equipment properly and safely. If the users follow the precautions described here, they and the other person will be protected from possible harm.

1.1.1 ！Warning (May Cause Serious Property Damage or Casualties)

I. This product must be reliably grounded and away from sources of electromagnetic interference (Zero line cannot be used as grounding line).

II. Use a power source that matches the electrical parameters indicated on the nameplate of this device.

III. Do not insert metal objects such as nails or iron wires to any openings or gaps in the device or any vents used for internal air circulation, otherwise electric shock or injury may occur due to accidental contact of the above objects and moving parts.

IV. Do not allow the product to be unplugged or plugged in without turning off the power switch during operation.

V. Do not damage the power plug or power cord. If the user wants to remove the plug from the power socket, he should hold the power plug rather than pull the power cord lead. If the plug connection is loose, do not use the power plug again, do not allow to lengthen or shorten the power cord, otherwise it may cause fire or electric shock.

VI. Users must not disassemble, repair or modify the equipment by themselves. If any of the above operations is performed by an unauthorized person, fire or personal injury may result from improper operation.

VII. The user-provided carbon dioxide cylinders are pressure vessels and must comply with the National Pressure Vessel Management Code.

VIII. Do not store volatile or flammable items in this device, otherwise, an explosion or fire may be caused.

IX. There must be no obstruction of the air circulation hole in the use process, and the circulation of the air duct must be smooth.

1.2.1！Warning (Be Likely to Cause Serious Property Damage or Casualties)

I. Operations can be done after having fully read and understand the product instructions.

II.304 stainless steel liner cannot resist acid, please pay attention to anti-corrosion measures, do not use acidic media in the cabinet.

III. The product power cord must be unplugged when performing the following operations:
a. Replace the fuse;
b. Product has failure and needs to be repaired;
c. The product has not been used for a long time;
d. The product is moved to other places.

IV. Please use a grounded power socket to prevent electric shock. If the power socket is not grounded, it must be installed by a qualified technician.

V. Avoid direct glaring at the UV light, because UV light may cause temporary or permanent damage to eyes.

VI. When the product is placed on a workbench, the feet should be fixed to prevent the product from falling, and causing personal injury.

1.3.1 ！Warning (Be Likely to Cause the Product Can Not Work Normally or Affect the Service Life)

I. When handling the product, care should be taken to avoid damage to the vulnerable components such as the meter on the panel.

II. This equipment should be installed on a solid ground to keep it level. If the ground is not solid enough or the installation site is not suitable, personnel may be injured due to overturning of the equipment.

III. After each test, the product should be wiped off the water inside the liner to avoid corrosion of the liner and affect its service life.

IV. Do not open or close the cabinet door by gravity, otherwise it may cause the door to fall off and the product to be damaged.

V. Do not apply extra pressure to the glass door or scratch the glass surface with sharp objects, otherwise the door may be broken or have scratches.

VI. Do not place water-containing containers or heavy objects on the product, to avoid water is splashed on the product thus, causing a short circuit or electric shock hazard, or heavy objects falling down.

VII. This product must not be placed outdoors.

1.2 Installation Site

For proper operation and optimal performance, the equipment should be installed in a location that meets the following conditions:

●A location that will not be directly affected by direct sunlight or air flow from the air conditioner.

●A place with clean air and adequate ventilation (do not install in a tightly closed room).

Note: The ambient temperature must be at least 5°C lower than the set temperature.

⚠ Warning

If the device is used in a small, closed room, the concentration of CO_2 in the air may increase and it may have harmful effects on the human body.

When the device uses CO_2 control, it is necessary to ventilate the room frequently. Concentrations of gases in closed room will gradually increase and high concentration of CO_2 gas will be dangerous to humans. In addition, when CO_2 is used, direct intake of air from the cabinet should be avoided when opening the door.

●A place away from heat source.

●A place with a solid, level surface.

⚠ Warning

Please choose a flat, solid ground for installation to prevent the device from tipping over. Improper installation may cause water leakage or personal injury due to the device tipping over.

●A place where there is no flammable or corrosive gas.

⚠ Warning

Do not use this device outdoors. If the device is exposed to rain, it may cause electric leakage or electric shock.

Do not place the device in a damp location or where it may be exposed to water splashes. Otherwise, leakage or electric shock may occur due to low insulation level.

● Places that are not prone to high humidity.

⚠ Warning

Do not install the device where flammable or volatile gases are present, otherwise it may cause an explosion or fire.

Do not install the device in a place with acidic or corrosive gases, otherwise it may cause leakage or electric shock due to corrosion.

2. Requirements on Working Air Pressure

During the using, the high-pressure gauge should not less than 2Mpa and the output pressure of low-pressure gauge should not more than 0.08Mpa

Once inlet pressure exceeds 0.08 Mpa, it will destroy CO_2 sensor and HEPA filter. At first, the damage may be too slight to perceive, but if this mis-operation happen many times, it will accumulate damage to the CO2 sensor, and will damage the whole CO2 sensor, make it out of function. In addition, the HEPA filter is easily damaged due to pressure overload, resulting in CO2 gas leakage. Therefore, the life of the carbon dioxide sensor and HEPA filter is related to the intake pressure of carbon dioxide. As long as the intake pressure is well adjusted, the carbon dioxide sensor and HEPA filter can be effectively protected. CO2 sensor/HEPA high-efficiency filter are all consumables, expensive and difficult to replace, so it is necessary to adjust the intake pressure (0.04~0.08Mpa, the best price adjustment pressure is 0.05Mpa) to prolong the service life of carbon dioxide sensor/HEPA high-efficiency filter.

When the machine was used for the first time, please set the secondary pressure of CO_2 to 0.05MPa, in order to the secondary pressure is too high to lead to the fall of the tube connected to the CO2 inlet of the machine, in this condition it will cause the leakage of the CO_2 and the damage of the Used for the first time When use Excessive high secondary pressure may cause tube separate from incubator air inlet port and CO_2 leakage. When air was flowed into the incubator for the first time, CO_2 secondary pressure should be set as 0.05MPa, which can avoid the damage of gas path.

Increasing concentrations of the CO_2 gas is harmful for health, could even result serious consequences like asphyxia and death. Once gas leakage is detected, timely maintenance is necessary.

3. Equipment technical parameters

Model	CU-80	CU-160	CU-270
Chamber Volume	80L (2.82 Cu. Ft.)	160L (5.65 Cu. Ft.)	270L (9.53 Cu. Ft.)
Temperature Range	Ambient+5°C ~65°C		
Electrical Requirement	220V 50Hz / 110V 60Hz		
Power Consumption	450W	720W	900W
Ambient Temperature	+5~30 °C		
Heating Method	Air-jacketed, PID Control		
Temperature Resolution	0.1		
Temperature Stability	±0.1°C		
Temperature Uniformity	±0.3°C		
CO2 Range	0~ 20% Infrared Sensor		
CO 2 Control Resolution	±0.2% (IR sensor)		
CO 2 Recovery	(Door open 30s, recovery to 5%) ≤ 3min		
Temperature Recovery	(Door open 30s, recovery to 37 °C) ≤ 8min		
Humidity Method	Natural Evaporation 0-95%RH		
Shelves	2	3	3
Interior Dimension (W×D×H) mm	400*400*500	500*500*650	600*650*700
Exterior Dimension (W×D×H) mm	570*580*820	660*680*950	700*750*1100
Net Weight (kg)	60	80	100

1. Insert the U flash drive when the power is turned on. Press the U flash drive button, and that the U flash drive is connected successfully or U flash drive is not connected will be displayed. If the connection is successful, the system enters the next step.

2. After the U flash drive is connected successfully, it will display the data being stored. Once every minute, the data will be stored (every time when the data is stored, a buzzer will be sounded once). During the data storage process, an EXCEL table of WD01 will be created. A table can store 120 temperature values and the corresponding time values. When these 120 data are stored a WD02 EXCEL table will be automatically created, and so on.

3. After the data is stored, the user can unplug the U flash drive when the display shows that it is successfully removed, and then insert the U flash drive into the computer to read the data (it is recommended to use WPS2003 to open it, since other software may cause data to be garbled).

3.1 Precautions for U flash drive:

1.Please do not press the U flash drive button and pull out the U flash drive frequently.

2.If a USB flash drive is inserted, if that the connection fails display, please reinsert the USB flash drive, and press the USB flash drive button again. If the connection still fails, check if the U flash drive interface is loose, the user can also try to reboot the device or format the USB flash drive.

3.It is recommended to cut each read data into the computer to save and clear the USB flash drive to avoid the next time you insert the USB flash drive, data cannot be stored, or data can be disturbed.

4.Please avoid to cut off the power during the use, the previous data cannot be lost after the device is powered off or the device is restarted, and the U flash drive needs to be re-operated after the power is on.

3.2 Alarm description:

The mute button only clears the alarm sound but does not eliminate the alarm message unless the device returns to normal operation status.

4. Attention for Use

4.1 Special attention: When carrying out the culture test on the medium, wait for the incubator to reach the corresponding temperature environment before putting the medium into the medium for cultivation operation, and never put the medium in when the box is just powered on!

4.2 Remove all packaging components (including the protective foam in the box and the base of the box) before use, and check the accessories and materials according to the packing list, and use alcohol to clean the product once.

4.3 Power supply voltage: This equipment uses 220V/50Hz AC power supply. If the operating voltage is lower than 198V or higher than 242V, a suitable automatic voltage stabilizer must be installed to cooperate with it.

4.4 To use this carbon dioxide incubator, the power supply is required to have a low-voltage air circuit breaker and leakage protection device.

4.5 A dedicated independent socket must be used and reliably grounded to ensure that the equipment is well grounded after being connected. The length of the power cord must not be extended at will. If you really need to extend the length, you must use a copper core wire of more than 2.5mm², and the cross-sectional area of the copper core wire in the wall connected to the power socket must also be guaranteed to be more than 4mm².

4.6 It is strictly forbidden to put flammable and explosive dangerous goods and highly corrosive acids and alkalis into the carbon dioxide incubator.

4.7 Do not connect the neutral wire (N terminal) and the ground wire (E terminal) together on the socket, otherwise the carbon dioxide incubator shell will be electrified and an electric shock accident will occur.

4.8 The power cord cannot be used in bundles, cannot be pressed under heavy objects, and cannot be close to heat sources such as compressors.

4.9 Do not place the device in a position where it is difficult to access the disconnecting device.

4.10 The equipment should be placed in a dry, flat, non-toxic, harmful, strong electromagnetic field and indoor place without radiant energy, and should avoid direct sunlight. There should be a certain space around the equipment for easy maintenance. In order to ensure the accuracy of temperature control, it is recommended to use it in an environment of (18~30) ºC.

4.11 To use this equipment, you must be equipped with a cylinder containing 99.9% high-purity carbon dioxide gas and install a carbon dioxide pressure reducing valve. The cylinder should be placed near the incubator and connected to the "carbon dioxide inlet" at the rear of the incubator with a hose. After the connection, the joint is fixed with a spring clip.

4.12 When the incubator is in use, set the minimum temperature at least higher than the ambient temperature (5-7) ℃. When the ambient temperature and the set temperature are less than (RT+5ºC), use the air conditioner to reduce the ambient temperature. It is recommended to use it in an environment of 18ºC-30ºC to ensure the accuracy of the temperature control of the carbon dioxide incubator.

4.13 If humidity is required, please inject a proper amount of distilled water into the bottom of the inner chamber and close the door.

4.14 When the pressure of the carbon dioxide cylinder is lower than 2MP, the gas cylinder should be replaced in time.

4.15 Use alcohol to clean the working chamber of the carbon dioxide incubator.

4.16 In units with unstable power supply, it is best to equip them with high-performance voltage stabilizers (UPS) to reduce failures caused by voltage instability.

4.17 Do not open the box door to look directly at the ultraviolet lamp during ultraviolet disinfection to avoid damage to the eyes.

4.18 In the case of abnormal shutdown or manual shutdown under normal use, the water vapor in the inner tank needs to be wiped clean before restarting, and the glass door should be opened to ventilate and dry.

4.19 The product shall not operate the display screen during the cultivation process.

4.20 Please use a non-metallic USB flash drive for data storage or export.

4.21 When the equipment is in use, the displayed temperature and carbon dioxide concentration should be calibrated regularly.

4.22 In order to ensure the effectiveness of the cultivation when the equipment is in use, please put it into the culture dish after the equipment is running stably, and close the door of the chamber immediately after putting in the culture dish.

4.23 The cultivation effect of the equipment should be verified before use.

4.24 Check the service life of the filter before use, please use a HEPA high-efficiency filter.

4.25 When the petri dish is placed inside the equipment, the ultraviolet light disinfection function shall not be used.

Use the equipment in the manner specified by the manufacturer, otherwise the protection provided by the equipment may be impaired.
Solemnly declare: The company will not be responsible for the risks caused by the operation not in accordance with the regulations!

5. Maintenance

5.1   Check the CO_2 tank regularly to ensure it is not empty.

5.2   Check if there is any leakage in the CO_2 intake pipe and connector.

5.3   Wipe the dust on the machine regularly, to prevent the dust blocking the airway and electromagnetic valve.

5.4   Be sure to add sufficient deionized or distilled water to the bottom of the humidification pan/inner chamber.

5.5   The incubator should be stored in a room where the relative humidity is not more than 80%, and no corrosive gas.

5.6   There should be shockproof, moisture proof and other necessary protective measures during transportation. Do not transport upside down, handle with care.

5.7   Cleaning of working chamber and sealing strip.

Use a cotton cloth or towel soaked in distilled water to clean the entire interior (including ladder frames/partitions) and inner/outer door seals, Wipe the polluted inner cavity and the surface of the sealing strip with a cotton cloth soaked in alcohol (alcohol concentration is 75%), wipe off all foreign matter, and then wipe off the moisture on the inner cavity and sealing strip with a clean dry cotton cloth or towel, let it stand for half an hour before it can be used normally.

⚠ Use protective gear (clothes, gloves, goggles, etc.) when cleaning with alcohol;

Please use designated reagents for cleaning, and do not use cleaning agents or disinfectants that may cause danger due to chemical reactions with equipment components or materials contained in the equipment. If in doubt about the compatibility of disinfectants or cleaning agents with equipment components or materials contained in equipment, please contact a technical engineer or agent dealer;

If hazardous substances leak on the surface of the device or enter the interior of

the device, it should be thoroughly cleaned with alcohol, and then the residual moisture should be dried with a clean dry cotton cloth or towel before continuing to use.

5.8 Cleaning of exterior surfaces and glass doors

After cleaning contaminated surfaces with alcohol or thinner, wipe with a soft cotton cloth or towel.

5.9 Period of comprehensive maintenance

The recommended cycle for comprehensive maintenance is one week or 100 working hours.

5.10 Maintenance method

a) Daily or weekly maintenance

Disinfection and cleaning of the operating area (refer to the instructions in Article 7);

Clean the external surface and glass door around the operating area (refer to the instructions in Article 8);

Check whether the various functions of the equipment are abnormal;

Record this maintenance.

b) Monthly maintenance

Cleaning of exterior surfaces and glass doors (refer to Section 7 for instructions);

The surface of the inner cavity of the equipment box and the inner surface of the glass door must be wiped with 75% alcohol.

After wiping, use a cotton cloth soaked in distilled water for a second cleaning. After cleaning, use a dry cotton cloth to absorb the residual moisture and ventilate to dry.

Check whether the various functions of the equipment are abnormal;

Check the displayed temperature and displayed carbon dioxide concentration of the device, and calibrate as required.

Check the service life of the high-efficiency air filter and replace it in time.

Document this maintenance.

C) Annual maintenance

Check whether the hinge height of the tempered glass inner door is consistent;

Check the high-efficiency air filter for aging and air leakage, and replace it if

necessary, usually every six months;

Check whether the sealing strip of the outer door is aging, shrinking or not tightly sealed, and replace it if necessary, generally every 1-3 years;

Check that the non-self-resetting thermal cutout is working properly:

1. Open the rear cover of the equipment, take out the insulation layer behind, and expose the thermostat to the air;

2. Disconnect the temperature sensor, simulate the failure of the temperature sensor, and place a temperature detection device inside the box to make it display the actual temperature of the equipment;

3. Adjust the setting temperature of the equipment to 60ºC, so that the equipment is in a full-power heating state.

4. When the measured temperature of the equipment rises to 75ºC, start to observe the temperature change. After the measured temperature rises to a certain level, it will drop. Therefore, it is determined that the thermostat can work normally. If the displayed temperature has been rising above 90ºC and still continues to rise, it is determined that the thermostat is invalid.

⚠️After moving the box each time, it can be used normally after standing for 24 hours.

⚠️Every time you move the box, try to keep the box parallel to the ground, and the inclination angle should not be greater than 45º

CONTROLLER PANEL Manual

1. Installation and wiring

1.1 Installation dimensions

1. PCB Size: mm 205*130

2. hole spacing mm :195*120

3. aperture size :4 mm

4. Maximum height: 48mm

5, display size:

(1) Model TCRHP-T1106-T, 5-inch touch screen

Display panel size: 154.5*83mm

Opening size: 143*75mm

(2) The model TCRHQ-T1106-T has a 7-inch touch screen

Display panel size: 205*126mm

Opening size: 196*112mm

1.2 Wiring instructions

1, AC100~245V power line 8, 9 end;

2, PT100 box temperature sensor connected to 24~26 end, PT100 door temperature sensor connected to 27~29 end;

3. The output signal of the concentration sensor is connected to 32 ends, and the signal ground is connected to 30 ends. If the signal power supply is 5V, it is connected to 33 ends, and if it is 12V, it is connected to 34 ends.

4. The humidity sensor output signal is connected to 31 ends, and the signal ground is connected to 30 ends. If the signal power supply is 5V, it is connected to 33 ends, and if it is 12V, it is connected to 34 ends.

5. The heating pipe of the bottom plate of the box temperature is connected with 1 and 3 ends, and the other heating pipes are connected with 2 and 3 ends;

6. The door temperature heating pipe is connected with 4 and 5 ends;

7. Fan is connected with 14 and 15 ends, lighting is connected with 11 and 12 ends, sterilization is connected with 6 and 7 ends, inflation is connected with 13 and 14 ends (contact capacity: 240VAC/1A (inductive load));

8, 18, 19, 20 for the alarm output, there is an alarm closed conduction, can be used to access the SMS alarm;

9, touch screen signal cable access display interface;

10. 10-core printer signal cable, connecting the printer; Printer needs 5V/4A switch power supply alone;

11, RS485 communication line 35, 36 end;

12, gating signal connected to 39, 40 end, low water level signal connected to 37, 38 end;

2. Performance indicators

2.1. Temperature indicators:

1.   Temperature sensor: PT100; measurement range: -20.0~220.0℃;

2.   Control range :0~100.0℃;(range maximum can be modified); Control accuracy: ±0.1℃;

3.   Heating Control Mode: Intelligent Fuzzy PID Control

2.2. Concentration indicators:

1.   Sensor :(0~5 V signal) infrared type; measuring range :0.0~21.0%

2.   Scope :0.0~20.0%; control accuracy: ±0.2%

3.   Concentration Control Mode: Intelligent Fuzzy PID Control

2.3. Humidity indicators:

1. Sensor type :(0~5 V signal) voltage signal humidity transmitter;

2. .9Measuring range :0~99.9 % RH; error :<±0.3%

3. Installation conditions

3.1 Environmental conditions

1. Ambient temperature: -10~60℃;

2. humidity: ≤90% RH (no dew);

3. power supply :220 VAC or 110 VAC (only choose one voltage, please specify when ordering) ±10%,50/60 Hz;

4. environment location: indoor;

5. please do not install this product in the following environment:

Environment with corrosive gases; environment with frequent temperature changes or direct light; environment with more electromagnetic waves, more flammable materials and more dust or salt;

## 3.2 Anti-jamming treatment

1. Be sure to separate the strong power line (e.g. power supply, load line, etc.) from the weak current circuit (e.g. data connection, sensor, communication line, etc.

2. communication line please choose shielded twisted pair wire.

Interface and Operation

4. Main interface
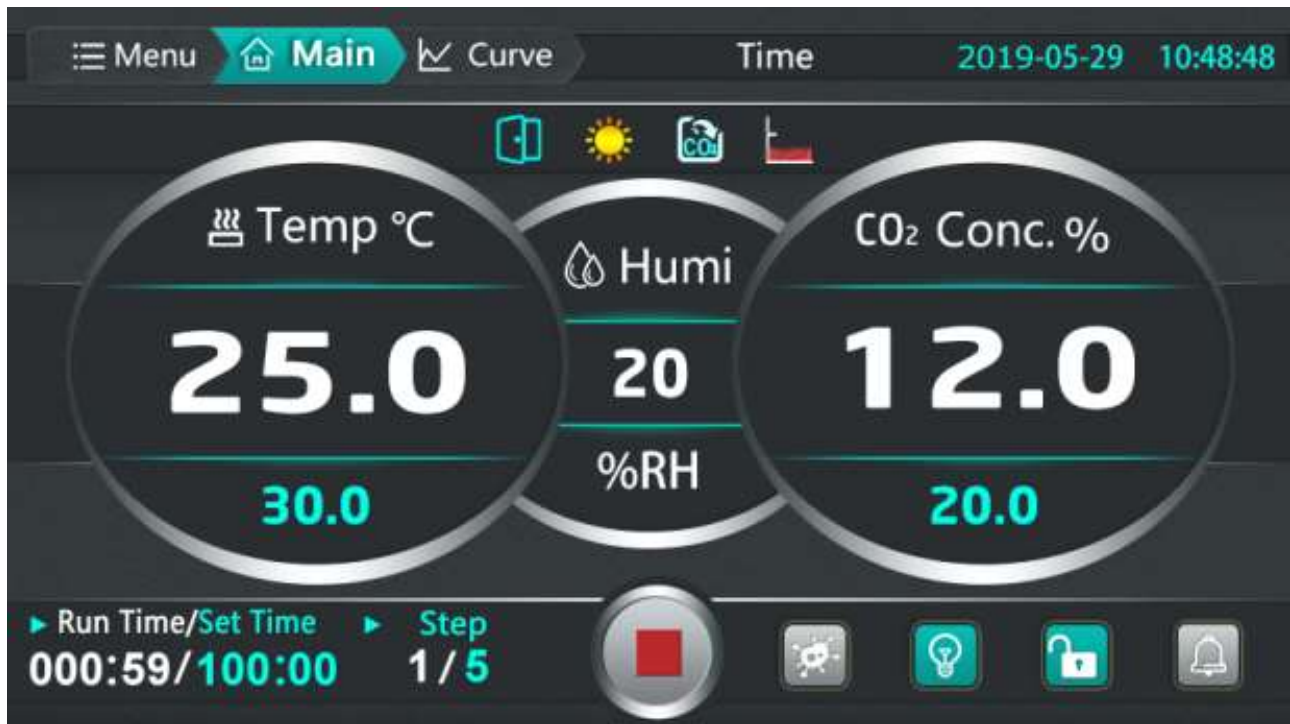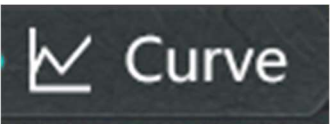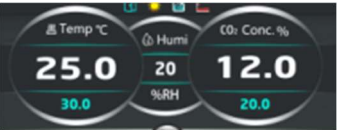
To log in to the [lock screen], click [unlock] or [login box] to enter the user login screen. The initial password of level 3 users is 0. If you enter the password incorrectly, the password error box will be displayed. If you enter the password correctly, you will return to the [lock screen]. Click the unlock button again to enter
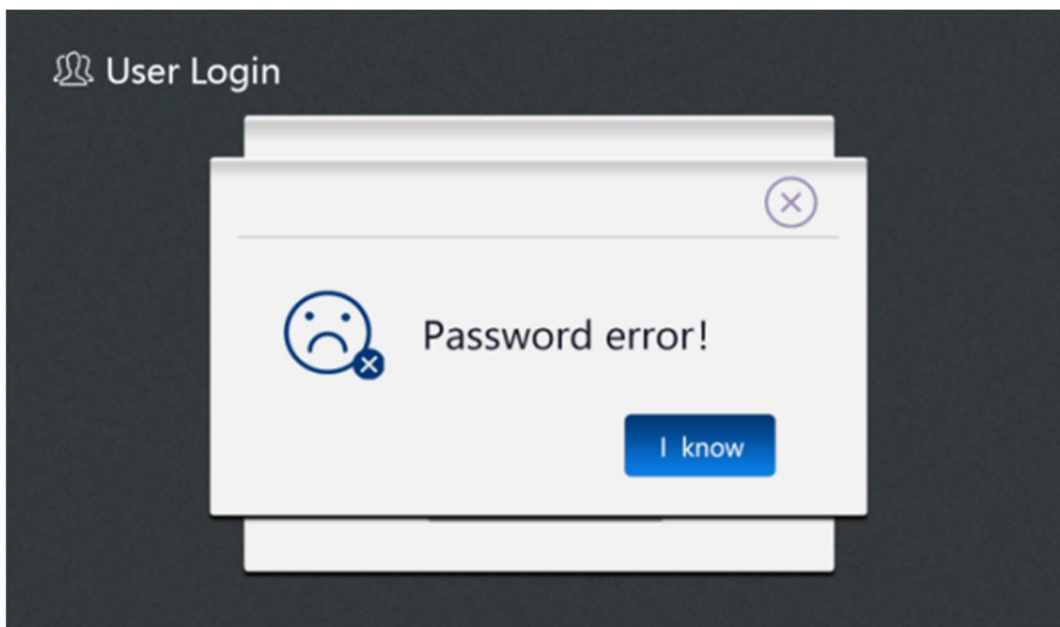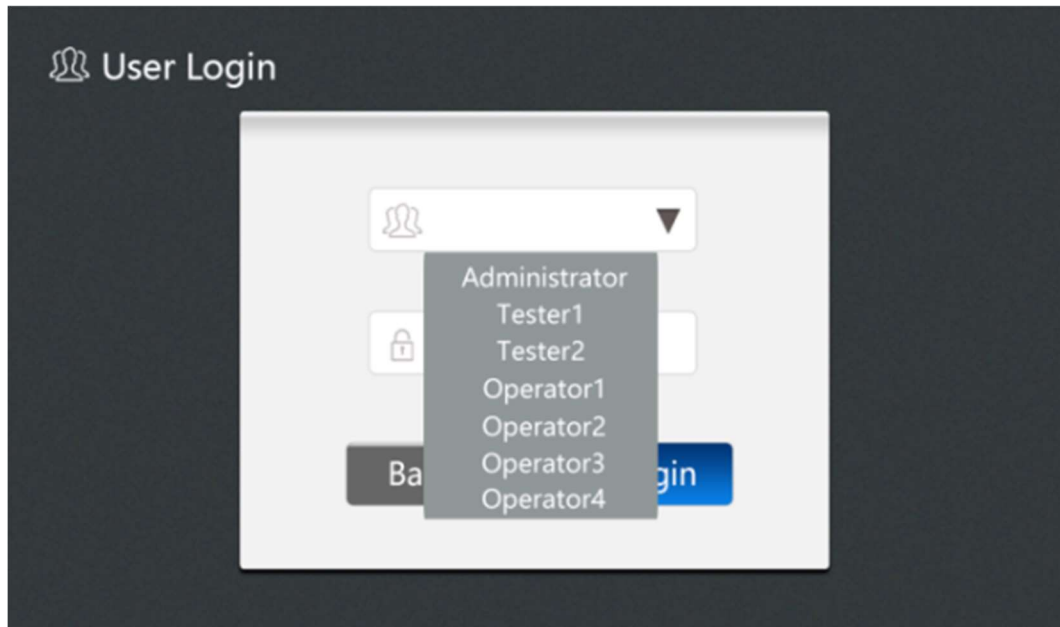
5. Main interface Operation

5.1 Key Description

Icon	Name	Description
	[Start]	Click the pop-up dialog box to make the system run;
	[Stop]	Click the pop-up dialog box to make the system stop;
	[Catalogue]	Click to enter the directory interface;
	[Curve]	Click to enter the real-time curve interface;
	[Sterilization set]	In the running stop state, click on the sterilization setting key, will enter the sterilization setting interface;
	[Lighting]	Turn on or off lighting;
	[Mode set]	Click Enter Mode Set interface

2019-05-29 10:48:48	[Real time]	Click to enter the real-time modification interface;
	[Alarm]	When there is an alarm, the icon flashes red; Click to enter the alarm record interface;
	[Lock]	Click to enter the lock screen interface;

5.2 Operational status

The four running states of the system are displayed above the main interface, namely [stop], [reservation waiting], [running] and [timing];

5.2.1 Reservation

At the [parameter set]->[time parameter] interface, the user can set the reservation time, if the reservation time is greater than the current time, in the [monitor interface], click the [run] key, the system will first enter the [reservation waiting] state; when the system time reaches the reservation time, the system automatically enters the [running] state;

Input settings

Booking time

5.2.2 Running

When the system time reaches the reservation setting time, the system enters the [running] state from the [reservation waiting] state, or the user does not set the reservation time, then click the [running] key system to enter the [running] state directly.

At this time, the system will be selected;

A user can set [select] in the [parameter set]->[time parameter] interface, as shown in the following figure:

Click Select

Timing

Input set constant temperature timing deviation

Start time: the system directly skipped the [running] state, directly into the [in] state;

Thermostatic timing: when "set temperature-therm timing deviation value ≤ temperature measurement value ≤ set temperature + constant temperature timing deviation value ", the system from [running] state, into [middle] state;

5.2.3Timing

When the condition of timing judgment is satisfied, the system enters the [middle] state from [running], and the timing time begins to change. According to different control mode and mode conditions (reference mode setting), the system automatically converts in [running] and [middle] states. When the running stop condition is satisfied, enter the [stop] state;

5.2.4 Operation Stop

After the running time is over, the system closes all outputs and enters the stop state;

5.3 Sterilization function

Users can choose sterilization methods in [system set]->[temperature & sterilization parameters]. There are three sterilization methods: ultraviolet sterilization, humid heat sterilization and high temperature sterilization. Click the sterilization icon to enter the sterilization password interface at the monitoring interface and enter password 1 into the sterilization interface.

5.3.1 UV sterilization

Use ultraviolet lamp to sterilize, after the user opens sterilization, sterilization relay closes, sterilization lamp opens.

5.3.2 Damp-heat sterilization

A total of 5 stages of damp-heat sterilization:

1) heating stage: heating until 90.0℃, heating tube open ,90.0℃ after jumping to disinfection stage;

2) disinfection stage: maintain 90.0℃,6 hours long, heating tube open;

3) condensation stage: maintain 90.0℃,10 hours, bottom heating pipe closed;

4) cooling stage: when the temperature drops to 37.0℃, jump to the end stage, the bottom heating pipe is closed;

5) end stage: the whole process of damp-heat sterilization is completed.

5.3.3 High Temperature Sterilization

High temperature sterilization, high temperature sterilization temperature can be set in [system setting]-> [temperature] sterilization parameters.

5.4 Alarm function

When an alarm occurs in the system, the buzzer calls and prompts, and the [alarm] button surface in the monitoring interface is red flashing. Click to enter the alarm list interface to view the latest 20 alarm contents, as shown in figure:

Alarm Log		⊘ Delete	� Back
Alarm Time	End Time	Alarm Content	
19 - 8 -6 8 : 45 : 52		Door_ALM	
19 - 8 -5 13 : 20 : 50	19 - 8 -5 13 : 30 : 50	Com_Fault	
19 - 8 -5 11 : 13 : 12		CO2_L	
19 - 8 -5 10 : 20 : 50	19 - 8 -5 13 : 30 : 50	CO2_H	
1/2			❯

5.4.1 Temperature alarm

Temperature alarm includes [main temperature overflow] [door temperature overflow] [main temperature over-temperature] [main temperature under temperature] [door temperature over-temperature] five types, as follows:

Alarm type	Alarm Description
Main temperature overflow	When the temperature of the main temperature sensor fails, the main temperature overflow alarm is generated, the system stops running, and the buzzer calls (click on any interface to mute);
Door temperature overflow	When the temperature of the door temperature sensor fails, the door temperature overflow alarm is generated, the system stops running, and the buzzer calls (click on any interface to mute);
Over temperature of main temperature	When "main temperature measurement value > main temperature setting value + over temperature alarm deviation ", there is a main temperature over temperature alarm, buzzer calls (click on any interface to mute), cut off the main temperature heating circuit;
Main temperature	When "under-temperature alarm deviation" is zero, no main temperature under-temperature alarm; When "main temperature measurement value < main temperature setting value + under temperature alarm deviation ", there is main temperature under temperature alarm, buzzer calls (click on any interface to mute);
Door temperature over temperature	When "door temperature measurement value > door temperature setting value + door temperature over temperature alarm deviation ", there is door temperature over temperature alarm, buzzer calls (click on any interface can be silenced), cut off the door temperature heating circuit;

The user can set the value of [over temperature alarm deviation] [under temperature alarm deviation] in [user set]-> [temperature & sterilization parameter], and set the value of [door temperature over temperature alarm] in [system setting]- [temperature & sterilization parameter] in [system setting]-;

5.4.2 concentration alarm

Concentration alarms include three types of [concentration overflow] [over concentration] [under concentration], as follows:

Alarm type	Alarm Description
Concentration spill	When the temperature of the concentration sensor fails, the concentration overflow alarm is generated, the system stops running, and the buzzer calls (click on any interface to mute);
Excess concentration	When "**concentration measurement value > concentration setting value + super concentration alarm deviation** ", there is super concentration alarm, buzzer calls (click on any interface to mute), cut off the inflatable circuit;
Under concentration	When "**concentration measurement value < concentration set value-1.0**" start timing, if after 120 seconds" **concentration measurement value ≤ before the concentration measurement value +0.2%**", there is an under-concentration alarm

Available to set the value of [overconcentration alarm deviation] in [user set]-> [temperature & concentration parameter].

5.4.3 Other alarms

Other alarms include [low water level failure] [gated alarm] [communication failure], as follows:

Alarm type	Alarm Description
Low water level alarm	Detect low water level switch quantity, stop running, buzzer calls (click on any interface to mute);
Gated alarm	In the running state, the continuous opening time exceeds the door alarm delay time, there is a gated alarm, buzzer calls (click on any interface can be silenced);
Communication alarm	The communication between the current computer and the touch screen is blocked for more than 20 seconds, and there is a communication fault alarm

5.5 Real-time curves

Click on [curve] or slide the screen to the left to enter the [real-time curve] interface. In the real-time curve interface, the temperature and speed curves can be viewed in the last 2 hours. The vertical coordinate range is 20.0℃ and 5.0.

6. Menu interface
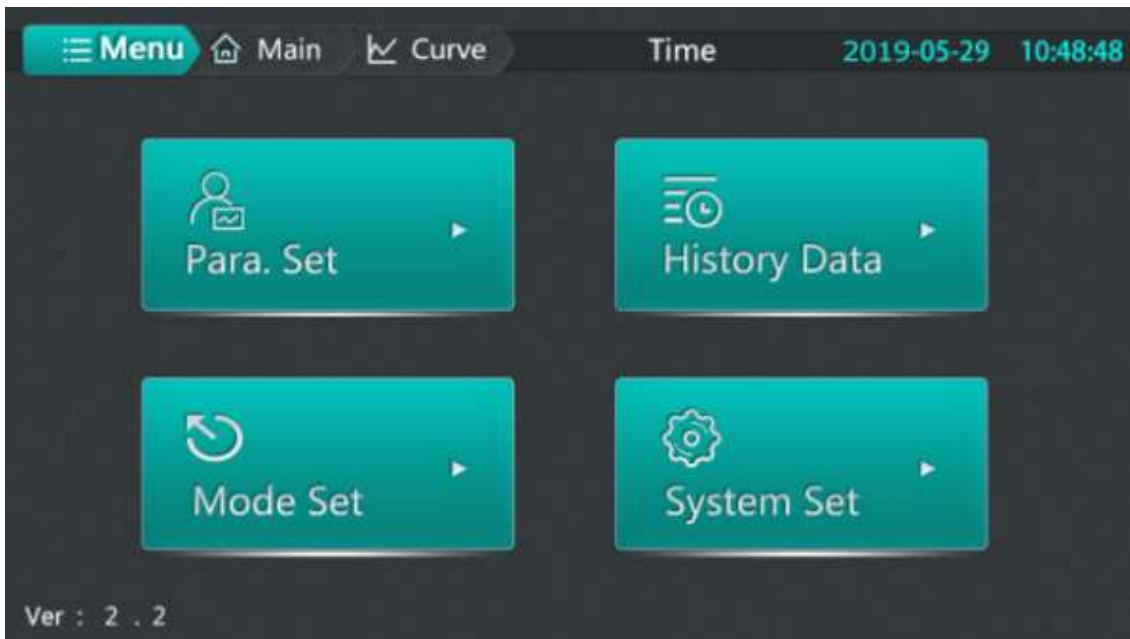
Access the [parameter set], [history data], [mode set], [system set] interfaces in the menu interface; the version number of the upper and lower computers can be viewed in the lower left corner (version :2.2, the first value is the control board version number, the second value is the touch screen version number)

7. Mode selection

There are two ways to enter the mode setting interface :1, in the monitoring interface click on the set value to enter the mode setting interface quickly ;2, in the [menu interface] click on the "mode setting" to enter the mode setting interface;

The system has two control modes: fixed value mode and program mode; A user can edit the number of segments in each mode (1~5), and time (0~999:59), temperature (according to [system set]–" temperature setting upper limit "in > [temperature & sterilization] determines setting range), concentration (0.0~20.0%));

7.1 Fixed value pattern

According to the choice of timing mode in [user set]-> [time parameter] and whether the time setting value is 0, the following working mode can be realized:

Time set value	Timing	Description
0	——	Timing time is always 0, continuous operation does not stop;
Not 0	Start time	Click on the running system to start timing, timing time to set time, stop running;
	Constant temperature timing	Click on the operating system to control the temperature and concentration, after reaching the range of constant temperature timing start timing, timing time to the set time, stop running;

7.2 Procedure model

In program mode, multiple temperature, concentration control steps and control time of each step can be set;

Time set value	Timing	Description
0	Running time	Step time is not timed, the system directly jumps to the next set value to continue running, if the last paragraph, the operation stops;
	Constant temperature timing	Step time is not timed, the system controls the temperature and concentration, after reaching the constant temperature timing range, jump to the next set value to continue to run, if the last section, the operation stops;
Not 0	Running time	Click run, step time start timing, step time to set time, jump to the next set value to continue running, step time to start the timing again, if the last paragraph, the operation stops;
	Constant temperature timing	Click on the operation, the system controls the temperature and concentration, after reaching the constant temperature timing range, the step time begins to time, after the step time reaches the set time, jump to the next set value to continue to run, the temperature still needs to reach the constant temperature range after the step time starts again, if the last paragraph, the operation stops;

7.3 Operational examples

Fixed value mode

For example: set temperature 35.0℃, set concentration 10.0%, run 1 hour 30 minutes, set the operation flow as follows: in [monitor interface] click the set value to enter [mode setting] interface (when the current running mode is fixed mode, directly enter [fixed mode] setting interface; when the current running mode is program mode, enter [program mode] setting interface, then click mode selection button to enter [fixed mode] setting interface), after setting the correct set value in [fixed mode] setting interface, click return, if the current mode is not fixed mode, will prompt whether to modify the mode, and then click [confirm] to complete the determination of fixed value mode.

No. number	Content	Description
1	Time set	Click the Time Textbox (Time: Points) to set to 1:30
2	Temperature set	Click to set the set value mode to set the temperature value
3	Concentration set	Click to set the set value mode to set the concentration value

Programmatic pattern

When the temperature rises to 25.0±0.5℃ for 1 hour and 30 minutes, then to 35.0℃ for 1 hour, set as follows:

Number of steps	Set time	Set temperature	Set concentration
Paragraph 01	1.30(1 hour 30 minutes)	25.0℃	10.0%
Paragraph 02	1:00(1 hour and 0 minutes)	35.0℃	12.0%

Action flow as follows: determine [user set]->[time parameters] timing mode selection [constant temperature]; in [monitor interface] click on the set value to enter the [mode set] interface (when the current running mode is program mode, Go directly to the program mode setting interface; When the current running mode is fixed mode, enter the [fixed mode] setting interface, then click the mode selection button to enter the [program mode] setting interface), after setting the correct setting value in the [program mode] setting interface, click return, If the current mode is not program mode, you will be prompted to modify the mode, and then click confirm to complete the program mode determination, such as the following figure:

Mode Set

Mode Prog   **Step** 2

No.	Time (H)	Time (M)	Temp ℃	CO₂ %
01	1	30	25.0	10.0
02	1	0	35.0	12.0
03	0	0	0	0
04	0	0	0	0
05	0	0	0	0
	(0 ~ 999)	(0 ~ 59)	(0.0~ 60.0)	(0.0 ~ 20.0)

No.	Content	Description
1	Paragraph set	Click on the text box, pop up the numeric keyboard, set to 2
2	Time set	Click 01- and 02-time boxes respectively to set 1:30 and 1:00
3	Temperature set	Click on section 01 and section 02 temperature text boxes to set to 25.0 and 35.0
4	Concentration set	Click on the 01 and 02 concentration text boxes to set to 10.0 and 12.0, respectively

8. History data

8.1.1 Interface description

The user enters the [history data] interface, can view the system automatically saved temperature measurement, set value, concentration measurement, set value, humidity measurement value and running, alarm state of historical data, save interval can be set.

8.1.2 Key Description

No. number	Content	Description
1	[Return] Key	Click to return to [Directory Interface];
2	[History Curve] Key	Click to enter the history curve interface;
3	[Data Delete] Key	Click the pop-up Clear Data Confirmation dialog box; click Yes to delete the data
4	[Data Export] Key	U the disk is connected, click the data export button to pop up the export data confirmation dialog box, and then click Yes to export the data
5	[Up] [Next page] key	Click to view historical data on the previous or next page;

8.1.3 Export data

Users need to export historical data with U disk, can click on the [export] button, pop up to confirm whether to export dialog box, the user should confirm that the U disk has been inserted, to avoid system errors, click OK to complete the data guide operation as shown below;

Click OK

Data export

8.2 History curves

8.2.1 interface description

In the history curve interface, the user can view the trend of the historical data curve for a period of time, which corresponds to the data stored in the history data.

8.2.2 key description

No.	Content	Description
1	[Return] Key	Click to return to the directory interface
2	[Historical Data] button	Click to enter the History Data interface
3	Does the temperature and concentration curve show	Click to set the temperature curve and concentration curve respectively
4	Upward and downward curves	Click on the vertical coordinates of the up or down curves

5	Zoom in and narrow the curve	Click on the zoom or zoom curve
6	Left shift, right shift	Click the left or right curve

9.Parameter set

Under the permission of the administrator and the tester, you can enter the [parameter setting] through the [menu interface].

9.1 Temperature & concentration

Name	Function	Initial value (set range)
Temperature ratio P	Time ratio regulation.	(0.1 ~ 30.0) 10.0
Temperature integration I	Integral action regulation.	(1~2000 s)500
Differential D of temperature	Differential action regulation.	(0~1000 s)300
Temperature cycle T	Heating control cycle.	(1~60 s)5
Concentration ratio P	Time ratio regulation.	(0.1 ~ 30.0) 2.0
Concentration integral I	Integral action regulation.	(1~2000 s)200
Concentration differential D	Differential action regulation.	(0~1000 s)100
Concentration cycle T	Heating control cycle.	(1~60 s)10
ALH over temperature alarm deviation (T-H-ALM)	Temperature deviation alarm, when measuring temperature > setting temperature +ALH, buzzer calls," monitoring interface "has over temperature alarm state indication, the system cut off heating alarm relay;	(0 ~ 20.0℃) 1.0℃
ALL of under temperature	Temperature deviation alarm, when measuring temperature < setting temperature +ALL, buzzer	(−20.0 ~

alarm deviation (T-L-ALM)	calls," monitoring interface "has under temperature alarm state indication; this parameter is 0, there is no under temperature alarm function;	0℃）0.0℃
Main temperature deviation Amendment (REV-T)	Usually used to correct errors in low temperature measurements. Deviation value =(main temperature) actual temperature value -(main temperature) current measurement value	(-20.0 ~ 20.0℃）0.0℃
Main temperature slope Amendment (REV(S)-T)	It is usually used to correct the error caused by high temperature measurement. Slope value =1000*(actual temperature-main temperature measurement)/main temperature measurement	(-999 ~ 999）0
Concentration deviation Alarm (CO2-H-ALM)	When "concentration measurement value >= concentration set value + concentration deviation alarm value ", disconnect the inflatable, replenish the gas output, and the buzzer calls.	(0.0 ~ 3.0%) 1.0%
Concentration deviation Amendment (REV-CO2)	Usually used to correct zero concentration measurements. Correction value = actual concentration value-current concentration measurement value.	(-3.0 ~ 0.0%）0.0%
Concentration slope Amendment (REV(S)-CO2)	It is usually used to correct the error caused by high concentration measurement. Slope value =1000*(actual concentration - current concentration measurement)/ current concentration measurement	(-999 ~ 999）0
Current door temperature	Displays current gate temperature (only)	

Humidity deviation Amendment (REV-H)	Correction value = actual humidity value - current humidity measurement	(-30.0~ RH 30.0 per cent)0.0%

9.2 Time parameters
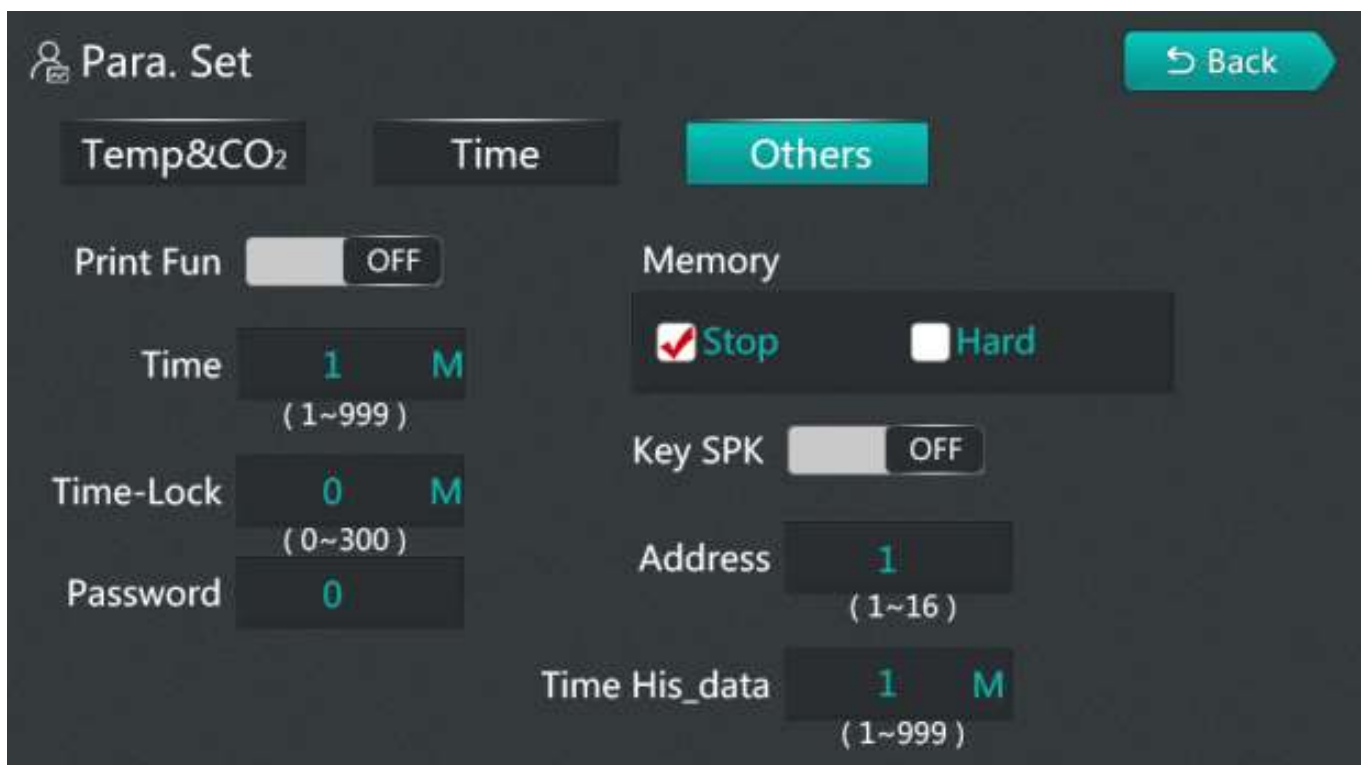
Name	Function	Initial value (set range)
Booking time	Year, month, day, hour, minute When the current time is less than that time, the system enters the reservation waiting state until the current time is greater than or equal to that time, and the system enters the running state; When the current time at startup is greater than or	1 December 2010

	equal to that time, the system enters the running state;	
Time Mode	Start time: from the running state can directly jump into the timing state; Constant temperature timing: when the system is in operation, and when "main temperature setting value-thermal timing deviation ≤ main temperature measurement value ≤ main temperature setting value + constant temperature timing deviation ", the system can enter the timing state;	Start time
Constant temperature timing Deviation (Temp Bias)	Within this parameter, the system enters the "timing" state from the "running" state and starts the timing.	(0 ~ 10.0℃) 0.5
End of operation Prompt time (Time-SPK)	Buzzing prompt time after running. Note :0 means continuous call.	(0~300 s)60
Lighting time (Time LI)	After the lighting is turned on, the lighting time is automatically turned off. (Lighting function can be set in system settings) Note :0 means that the lighting must be manually turned off.	(0~9999 min)1

9.3 Other parameters
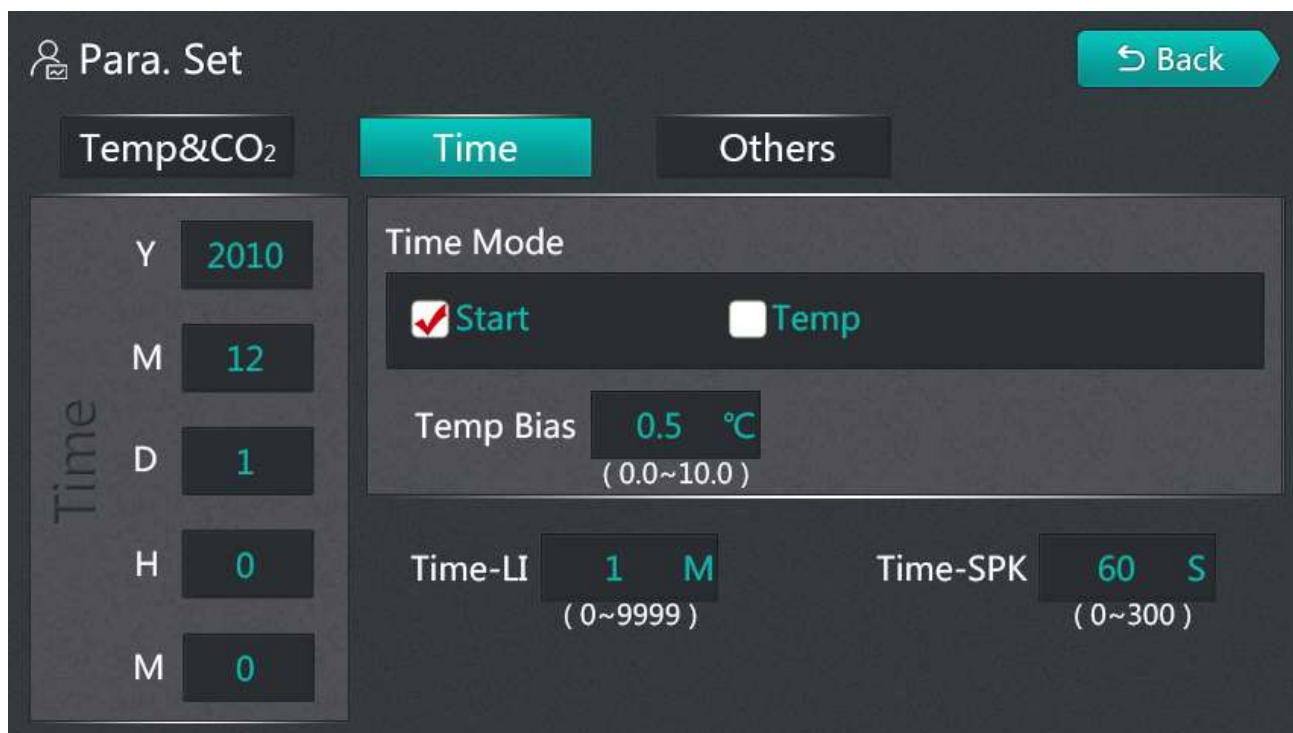
Name	Function	Initial value (set range)
Print function	Off: Print function is off On: Print function is on	Closed
Print interval	Every time this parameter is timed, print out, current temperature measurement, temperature setting, concentration measurement, concentration setting Print header and current date for the first time or whenever the date changes	(1~999 min)1
Lock time	Automatic lock screen time 0 time no automatic lock screen.	(0~300 min) 0
Lock screen	When the lock screen time is 0, click the unlock key to	0

password	enter the monitor interface directly	
Button	Touch the touch screen with a buzzer	Closed
Power down Mode of operation (Memory)	Do not start: after boot state is stopped state; Hard start: when the system is non-stop before power down, turn on again to run state, otherwise it is stopping state;	Not started
Address	Local address.	(1~16) 1
Data recording interval (Time His data)	Interval of historical data storage	(1~999 min)1

10.System set

Enter [system set], you need to enter **password 9** to enter, otherwise pop-up error prompt dialog box;

10.1 Temperature & Sterilization

Name	Function	Initial value (set range)
sterilization ratio	Time ratio regulation.	(0.1 ~ 50.0) 10.0
sterilization integral I	Integral action regulation.	(1~2000 s)300
Differential D of sterilization	Differential action regulation.	(0~1000 s)200

Temperature Set upper limit (Temp-UP)	The maximum value of a temperature set value.	(0 ~ 100.0℃) 60.0
Heating Turnoff Deviation (Heat-Off)	Turn off the heating output when [temperature measurement value ≥ temperature setting value + heating turn off deviation]; and	(-5.0 ~ 5.0℃) 0.3
Temperature insensitive zone (T-F Show)	Insensitive areas of main and gate temperatures	(0.0 ~ 0.5℃) 0.1
Door temperature Set deviation (T-D-Bias)	Door temperature setting value =(main temperature) temperature setting value + door temperature setting deviation value	(-10.0 ~ 10.0℃) 2.0
Door temperature Over temperature alarm AH (T-D-H-ALM)	When [door temperature measurement value >(door temperature setting value +AH)], there is door temperature over temperature alarm	(0.0 ~ 20.0℃) 5.0
Door temperature Deviation correction (REV-T-D)	Usually used to correct errors in low temperature measurements. Deviation value = actual temperature value - current measurement value	(-20.0 ~ 20.0℃) 0.0
Door temperature	It is usually used to correct the error caused by high temperature measurement. Slope value =1000*(actual	(-999 ~ 999) 0

Slope modification (REV(S)-T-D)	temperature-gate temperature measurement)/gate temperature measurement	
Method of sterilization	1: UV sterilization ;2: Wet heat sterilization ;3: High temperature sterilization	UV sterilization
High temperature Sterilization temperature (Temp-Ste)	The sterilization method is the setting value of sterilization temperature during high temperature sterilization	(0.0 ~ 200.0℃) 140.0
High temperature sterilization output (Out-Ste-H)	When the sterilization mode is high temperature sterilization, when the output of high temperature sterilization is 0, the output of sterilization is the main temperature heating, and when the output of high temperature sterilization is 1, the output of sterilization is the output of sterilizing relay	(0 ~ 2) 0

10.2 Concentration & Humidity

Name	Function	Initial value (set range)
Inflatable Turnoff (CO2-Off)	When [concentration measurement value ≥ concentration setting value + inflatable turn off deviation], turn off the inflatable relay output.	(-5.0 ~ 5.0%) -0.1%
Concentration Voltage ceiling (V-UP-CO2)	Maximum output voltage signal of concentration sensor	(Concentration Voltage Limit ~5000)5000
Concentration Lower voltage (V-DN-CO2)	Minimum output voltage signal of concentration sensor	(0~ concentration voltage upper limit)0
Insensitive concentration	Insensitive areas of concentration	(0.0 ~ 0.5℃) 0.1

4

zone (C-F Show)	measurements	
Door Alarm Delay (Door Delay)	When the gating is opened, after waiting for the delay time of the door alarm, the gating alarm is triggered. This value is set to 0 when the function is invalid, no gated alarm.	(0~60 min)0
Fan opening time (Fan-Open)	When the temperature measurement value reaches the set value (SP-0.3℃≤PV≤SP+0.3℃) and lasts for 5 minutes, the fan can be set to open or close intermittently. In seconds. Go beyond this range and continue	(20~600s) 60
Wind time (Fan-Close)	Work with fan opening time, when this value is set to 0, the fan continues to run.	(0~600s) 0
Humidity voltage upper limit (V-UP-Humi)	Maximum output voltage signal of humidity sensor	(Humidity Voltage Limit ~5000)5000
Lower limit of humidity voltage (V-DN-Humi)	Minimum output voltage signal of humidity sensor	(0~ humidity voltage upper limit)0
Low water signal	Normally open: low water level alarm when the low water level signal is disconnected; Normally closed: low water level alarm when the low water level signal is closed;	Normally open

10.3 Other set

Name	Function	Initial value (set range)
Lighting function	Close: monitor interface without lighting button; Open: monitor interface without lighting button;	Open
Water level function	Closed: no low water level detection; Open: low water level detection;	Open
Open door heating	Open door heating and closing: the door alarm is monitored in operation, the controller stops heating output; after the door is closed, the controller automatically maintains for 2 minutes and continues to heat the output;	Closed

	Open door heating open: in operation monitoring door alarm, the controller can continue to heat the output;	
Humidity display	Humidity display: do not display humidity measurements at the monitoring interface; Humidity display: display humidity measurement value in monitoring interface;	Closed
Printer model	Type of printer used	Ribbon printer
Language display	Display in Chinese or English	Chinese Display
Open door fan	Is the fan closed when the door opens	Open
Auto-tuning temperature	Auto-tuning setting temperature	(0.0 ~ 100.0℃) 60.0
Auto-tuning	Auto-tuning open/closed	
User management	Three-level user rights management	
Save factory values	Save factory values	
Restore Factory Defaults	Restore factory values	