



华粤行医疗
HARIOMED

IBI-D101

CO₂ Incubator

Instruction Manual

General Information

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■ Instruction for users

Thank you very much for choosing CO₂ incubator from Hua Yue Medical Technology Co., LTD. Please read this manual carefully before operating the product. This manual covers all important information and data about operating the product. Users must strictly abide by its provisions to ensure the normal operation of the incubator. At the same time, attention and warning messages can help users use the instrument correctly and obtain accurate results.

■ Overview

To ensure the quality of the CO₂ incubator, these products are strictly inspected before shipping. In order to ensure its safe and reliable operation and obtain correct analysis results, users must strictly follow the operation method described in this manual. In addition, proper transportation, storage and installation as well as reasonable operation and maintenance are conducive to the safe and normal operation of the system.

This manual provides the information of routine operation, the composition and maintenance of the incubator, along with the parameters and performance characteristics. It provides an accurate reference for technicians who have been specially trained or have knowledge of the instrument. Operators must correctly understand the safety and warning information mentioned in this manual before operation.

■ Cautions

This manual describes the specific application of the incubator, and how to start, operate and maintain the equipment. Note, tips and warnings in this manual are crucial to avoid incorrect operations.

Safety first principle was carried out during the whole process of development, manufacture, test and documentary. Keep these instructions manual close to the device which ensure you have easy access to the safety instructions and important information.

Please note these tips and warning information in the manual which can help you avoid being at risk and equipment damage. This type of information is displayed in a specific icon with the corresponding explanatory text. The ICONS used in this manual are shown in the following table:

ICONS	DESCRIPTION
	Notice info: general information that reminds the user during the use of the product, or parts of this manual that require general attention.
	Caution info: important information to be paid attention to during the use of the product, or parts of this manual that require special attention.
	Warning info: if the product is not used in accordance with the correct safety measures, it will lead to the equipment damage, there will be a potential risk of serious injury or even death.

■ Supply and Transportation

The specific shipping requirements shall be in accordance with the corresponding clauses in the order contract

When unpacking, please carefully read the relevant information on the packaging materials, to ensure the integrity and undamaged of unpacking goods. Please try to keep all product packaging for use in case the equipment is needed to be returned.

■ Statement of Abuse

If the equipment is not used in the manner specified by the company, the protection provided by the equipment itself may be compromised. The company is not responsible for any misuse of equipment or neglect of the safety guidelines outlined in the manual.

■ Warranty and Maintenance

The specific warranty and maintenance requirements are in accordance with the relevant provisions of the purchase contract.

Within the warranty period and the warranty scope, free maintenance service will be provided, mainly including spare parts maintenance, replacement, technical support and regular on-site services within warranty.

Any of the following faults that exceed the warranty period or occur within the warranty period shall be subject to out-of-warranty maintenance, and no free warranty service shall be provided, including but not limited:

- Incorrect use—water ingress, corrosion, fire, strong electric inrush, etc.
- Damage caused by the user who opens or disassembles the equipment without authorization
- Damage caused by force majeure (earthquake, lightning, flood, etc.).
- Interior part of equipment can't be changed without permission.
- Damage caused by failure use of product in accordance with the instruction manual and training.
- Regarding the products developed and manufactured by the company, the company strictly abides by the relevant national regulations in the disposal of waste products.

■ Technical Support

Please contact the manufacturer or local authorized representative.

■ Version Declaration

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1 Equipment Overview

■ 1.1 Equipment Introduction

- 1.1.1 Product Name: CO₂ Incubator
- 1.1.2 Model: IBI-D101
- 1.1.3 Main structure: culture chambers, temperature control system, gas control system and interactive display system.
- 1.1.4 Scope of application: used for culture of biological samples.

This incubator is mainly constituted of culture chambers, temperature control system, gas control system and interactive display system. The incubator has 10 independent culture chambers with attaching heating unit which provides an appropriate temperature environment for cell culture. 100% N₂ and 100% CO₂ which pass through the solenoid valve are fully mixed with culture chamber backflow gas, then these mixed gas are sterilized and filtered which can provide suitable and clean gas environment for cell culture; according to the set point of temperature and gas concentration, incubator controller automatically control heating power and gas solenoid valve switch and adjust the controller to control the temperature and gas concentration of each chamber through the sensor measurement results.



Figure 1.1 Appearance of CO₂ incubator

This product provides preset external connection for alarm, gas calibration, etc. Users can connect related equipment according to their own needs (see Chapter 5 for details).

■ 1.2 Product Performance

Table 1.1 Specification of CO₂ Incubator

Items	Parameters
Power supply	AC 220V, 50Hz, 450W
Weight	38KG
Exterior dimension	721×586×143mm (length×width×height)
Work pattern	continuous running
Shell and chamber materials	ABS engineering plastics, aluminum
Number of culture chambers	10
Types of petri dishes	φ35mm(4x)/φ50mm(2x)/66×66mm(2x)
Working environment	Temperature range from 18 – 30°C, relative humidity ≤80%
Gas supply pressure of CO ₂ and N ₂	1 bar
HEPA filter	Efficiency>99.9%
Temperature control range and accuracy	25°C- 42.0°C(starting 7°C above ambient temperature); ± 0.1°C
CO ₂ control range and accuracy	2.0%-10.0%, ±0.1%
O ₂ control range and accuracy	2.0-20.0%, ±0.1%
Start-up time	At least 30 minutes, 1 hour is recommended
Standards	GB 4793.1-2007、GB/T 18268.1-2010、GB/T 14710-2009

■ 1.3 Products Features

CO₂ Incubator is a device designed to provide a controlled temperature and suitable gas environment for the culture of biological samples. Its precise control for stable temperature and gas concentration provides a reliable environment for the growth and development of biological cells. For specific performance is as follows:

- Homogeneous and stable temperature: heated chamber from top to bottom could prevent condensation effectively; accurate temperature control, temperature accuracy is less than ±0.1°C, uniformity is less than 0.2°C; Fast heating up, temperature can be stabilized in 30 minutes after startup of the incubator.
- Accurate and stable gas concentration: O₂ concentration range from 2%-20%, CO₂ concentration from 2%-10%; gas concentration accuracy is less than ±0.1%; gas concentration can be stabilized within 30 minutes after startup.
- Excellent air cleanliness: fore-end of gas system is sterilized by long-life Ultraviolet LED (275nm), and rear end is filtered by HEPA/VOC to achieve class 5 cleanliness.
- Human-computer interaction module: Android touch screen can monitor the parameters of the device in real time, draw curves, and set various parameters; Comprehensive and reliable alarm management system can provide visual and audio alarm when opening the lid and exceeding the limited values of temperature and gas concentration, and record detailed alarm information.

2 Prepared by users

In order to ensure the normal operation of the incubator, users should provide the following items:

- 1、Medical pure gas supply: CO₂, N₂.
- 2、Gas pressure reducing valve: gas pressure reducing valve, measuring range of 1-2 bar (1bar is equal to about 0.1mpa), optional.
- 3、Power supply: voltage 220VAC, power frequency 50Hz, power not less than 450W.

3 Equipment Composition

The incubator is mainly composed of culture chambers, temperature control system, gas control system and interactive display system. The appearance of the instrument is shown in Figure 3.1.



Figure 3.1 Appearance of CO₂ incubator

■ 3.1 Culture Chambers

Culture chambers comprise chamber modules and petri dish trays.

The ten culture chambers are arranged in two rows and five columns. Any chamber is isolated from each other, heated independently and supplied with uniform gas distribution to achieve accurate and stable temperature and gas control, providing a stable and reliable environment for the growth and development of gametes and embryonic cells. The forepart of the chamber lid is attached with the main body depended on magnets which improves seal of chambers. The forepart of the lid is non-slip, hence users can open the lid with one hand.

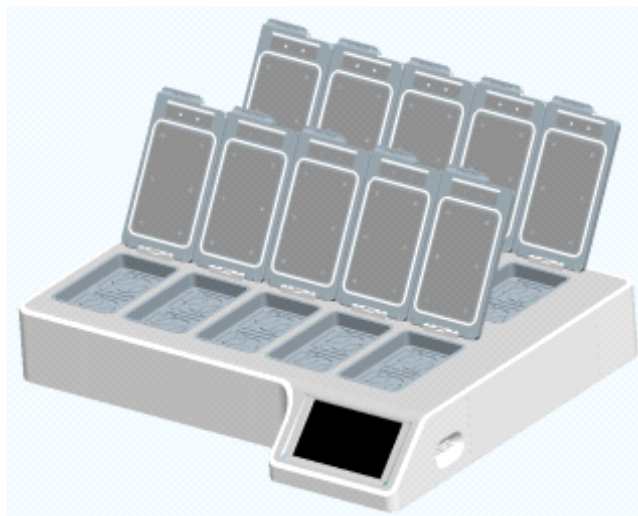


Figure 3.2 Appearance of CO₂ incubator with opened lids

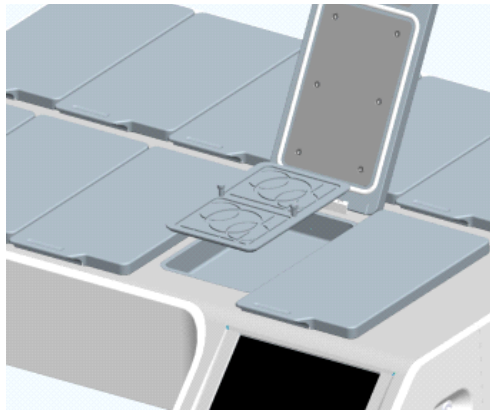


Figure 3.3 Petri dish tray placement

■ 3.2 Interactive display system

The interactive display device is a 7-inch LCD screen which is used to display the temperature, gas concentration and state of each chamber during the operation of the incubator. The temperature of each chamber, gas concentration control of the whole machine and patient information can be set meanwhile. When the device is abnormal, the display screen will give an alarm to the user.



Figure 3.4 Interactive Display Device

There is an Android reset button under the display, which, although this rarely happens, can be pressed to restart the Android system when the screen crashes, freezes, or system death. Please note that the restart of the Android system will not affect the temperature and gas control of the instrument.

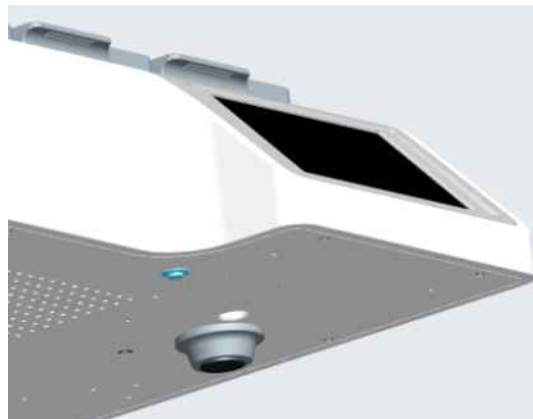


Figure 3.5 Screen Reset Button

■ 3.3 Internal Control System

Internal control system includes temperature control system and gas control system.

Temperature control system composes of temperature sensor, heating unit, overtemperature protector, micro-processor etc. Heating temperature of each chamber was controlled by fuzzy PID control method and dynamically adjusting each chamber heating power according to target value set by the user.

Gas control system composes of gas mixing, UV sterilization, gas fertilization, gas concentration measurement and micro-processor control unit etc. The gas control module mixes external N₂, CO₂ with the backflow gas sterilized by ultraviolet light in the gas mixing chamber. Gas concentration was controlled by adjusting flow rate of N₂ and CO₂ based on the gas concentration in the gas loop measured in real time by O₂ and CO₂ sensor. Finally stable and clean gas was supplied via HEPA/VOC filtration.

The gas calibration ports are located on the right side of the incubator, near the screen. There are two connectors, which are used to connect the gas inlet and outlet of the measuring device. Before gas detection or calibration, connect and plug two gas pipes, and then click the gas detection port [Open] button on the screen. For details, see section 5.6 to start the measuring device. When the detection is completed, firstly shut down the measuring device, then click the [Close] button of the gas detection port on the screen, and finally unplug the two air pipes connecting with the measuring device.



Figure 3.6 Gas Calibration Port of CO₂ Incubator

Gas HEPA filter and O₂ sensor are located on the right side of the incubator. Opening the right-side cover, users could see the HEPA filter and O₂ sensors. In order to ensure the optimal environment for embryo development, please replace O₂ sensor and HEPA filter right before reaching the end of their service life.

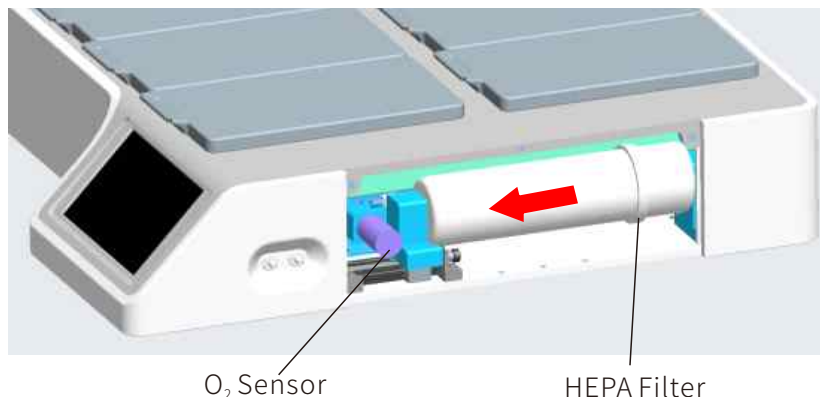


Figure 3.7 HEPA filter and O₂ sensor

Replacement of O₂ sensor:

1. All culture dishes should be removed from the incubator and the power of the incubator should be turned off before replacing the O₂ sensor.
2. Open the right-side cover and unplug the connector of the sensor.
3. Rotate O₂ sensor counterclockwise and remove the O₂ sensor.
4. Rotate a new O₂ sensor clockwise into the threaded hole.
5. Plug in the O₂ sensor and arrange the wires.
6. Start incubator and calibrate O₂ sensor at two-point calibration mode according to section 6.6.
7. Refer to Section.8 to reset the sensor service life, the life shall be the nominal life of the sensor minus its time from the factory date to the current time.
8. Set the desired values of temperature and gas concentration and put the petri dish into the incubator after stabilizing the temperature and gas concentration.

Replacement of HEPA filter:

1. The power supply of the incubator should be turned off before replacing the HEPA filter. Although the time of replacing the HEPA filter is short, it is recommended to remove the petri dish from the incubator when the power supply is turned off.
2. Counterclockwise rotation will loosen the screw completely.
3. Use your right hand to pull the filter backwards until the forepart of the filter disconnect the front fixed mount.
4. Use your left hand to hold the fixed seat behind the filter which limits the slide mount to move forward. Use the right hand to hold the filter to push forward and remove the HEPA filter. Release the left hand, and the slide mount is reset forward under the spring force.
5. Take one new filter, hold the filter in your right hand, and insert one side of the filter into the slide seat hole according to the arrow direction of the filter.
6. Push the filter forward again, and insert the other side of the filter into the fixed mount hole under the action of spring force with right hand thrust.
7. Rotate the screw clockwise to tighten it.
8. Refer to section 8 to reset filter life.
9. Turn on the incubator and move the culture dish into the incubator back when the temperature and gas concentration are stable.

The back of the instrument mainly includes power interface switch and CO₂ and N₂ gas inlets, alarm port, ethernet port and warning label.

NOTICE

When the O₂ sensor reaches the end of its service life, its accuracy and stability will be worse, which will seriously affect the gas control of the incubator. When the HEPA filter reaches the end of its service life, cleanliness of gas could not be assured.

4 Installation Requirements

Installation requirements for CO₂ incubator

To ensure successful installation and normal operation of the CO₂ incubator, please install the incubator according to the following:

- 1、Confirm the installation space of the incubator.
 - 1.1 The width of the installation table must be larger than 590mm.
 - 1.2 The length of the installation table must be larger than 730mm.
 - 1.3 20cm gap should be reserved at the rear of the CO₂ incubator for connecting power cables and gas pipes and subsequent equipment maintenance.
- 2、The installation site of the equipment should be far away from the vibration center.
- 3、The installation environment should be 100,000 grade cleaning-room, with ambient temperature ranging from 18°C to 30C, humidity no more than 80%, environmental pressure ranging from 80kPa to 101.3kpa.
- 4、External CO₂ and N₂ supply are medical grade with a concentration of 99.995%.
- 5、When the incubator is connected to the external gas supply, it must be confirmed that the pressure of the gas is between 1-1.5bar. Recommended gas pressure is 1bar.
- 6、Power supply confirmation: voltage is 220VAC, power frequency is 50Hz, output power is not less than 450W.
- 7、During the installation, please be careful to avoid damage caused in the process of transport.
- 8、In order to ensure safety, 2 adults are required to carry the incubator during installation.
- 9、After installation, it is necessary to clean the inside and surrounding environment of the incubator with ultra-clean vacuum cleaner or tools that do not produce fiber.

5 Preparations (Installation)

■ 5.1 Description of Software icons

1. Put the CO₂ incubator on a flat tabletop and place the dish trays in the chambers.
2. Operation environment confirmation: 100,000 grade cleaning-room, ambient temperature ranging from 18°C to 30°C, humidity does not exceed 80%, environmental pressure ranging from 80kPa to 101.3kpa.
3. Connect the gas inlet of the rear panel of the instrument to CO₂ and N₂ gas source using a medical silicone hose with gas pressure at 1bar.
4. Connect the power groove on the rear panel of the instrument to the 220V power grid with 220VAC/10A power cord.



Figure 4.1 Connectors of power supply and gas supply

CAUTION

Ensure that the power supply and gas supply meet the requirements in the instructions above when power supply and gas supply are connected, otherwise, the CO₂ incubator may not work or be damaged.

6 Instruction

6.1 Startup and pre-heating

- 1.Please check and prepare the incubator basic working conditions according to Chapter 4 before starting the incubator.
- 2.Turn on the power switch on the rear panel of the incubator, and the touch screen on the right front of the instrument will light up, displaying the following picture.

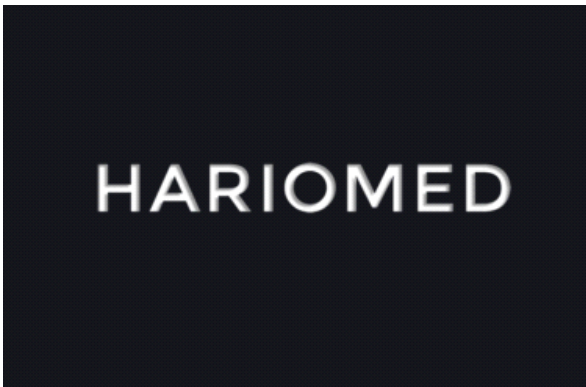


Figure 6.1 Loading page of the screen

3.After starting the instrument, the user interface will be displayed as shown in Figure 6.2. The navigation bar is designed at the top of the interface. Clicking a button will display the specified page, and the current date and time are displayed on the right side. The middle part of the interface is the content bar, which presents the information of 10 chambers, including the number of chambers, real-time temperature of chambers, patient names, etc. The lower part of the interface is the status bar, including the left side to display the current alarm information, click , the icon is switched to . When the speaker is muted, click,  the icon is switched to , cancel the speaker muteness; The real time value of CO₂ and O₂ is displayed on the right. If there is an alarm, click the alarm button to open the alarm interface, and see the alarm information according to Section 6.9 and take corresponding measures.

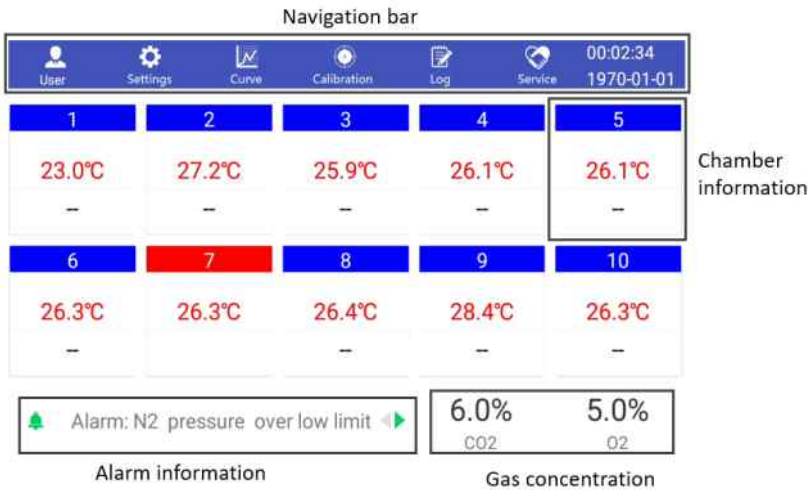


Figure6.2 User interface

4. After startup, the incubator will automatically control the temperature and gas in each chamber to the pre-set value. Normally, this process takes about half an hour, but it is recommended to start cell culture one hour after startup. For changes in temperature and gas concentration, refer to Section 6.4.

■ 6.2 Chamber operation

After the incubator is preheated and the gas concentration reaches the setpoint, culture dishes can be placed in each chamber. Click a chamber panel to enter the corresponding chamber information editing interface, as shown in Figure 6.3. Edit patient name, ID and panel color and click "OK" button to save. The color of the panel can be used to indicate the date of the embryo placed in the incubator (Monday, Tuesday...Sunday) or unoccupied state.

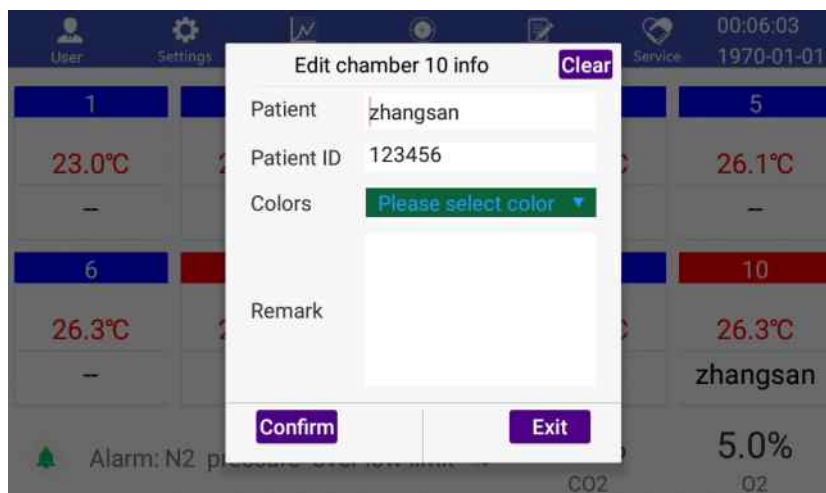


Figure 6.3 Editing interface of chamber information

When a chamber is opened, display screen will pop up as Figure 6.4, and the speaker will sound. Normally, the pop-up page will be automatically closed after the chamber lid is closed. If it is not automatically closed, click the "Close" button to close it. It is recommended that the opening time of the chamber lid should be less than 10 seconds, longer opening duration will affect the gas control of the entire equipment and the current temperature of the chamber.



Figure 6.4 Popup interface of opening chamber lid

■ 6.3 User Login

By default, you can log into the CO₂ incubator as a common user (no password required). When it is necessary to replace gas HEPA filter and O₂ sensor, set temperature and upper and lower gas limits, you need to switch to advanced user. Click the "Login" button in the user interface to enter the login interface as shown in Figure 6.5. Choose advanced user, enter the password and click "Login" button to switch to advanced user. When the incubator is delivered, the default password of advanced user is "000000".

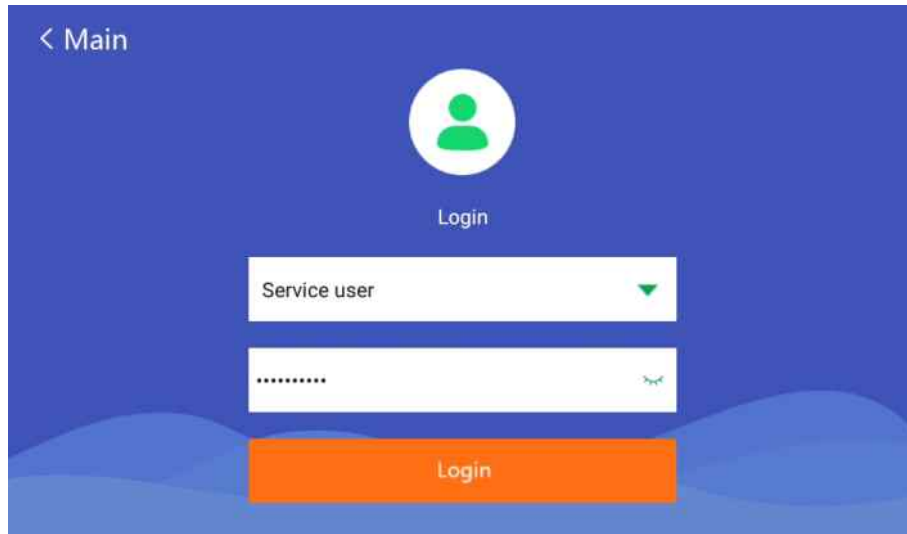


Figure 6.5 Login interface

Advanced users can also click "Change Password" to change their password, as shown in Figure 6.6. Similarly, switching from advanced user to common user needs to click the Switch to Normal button.

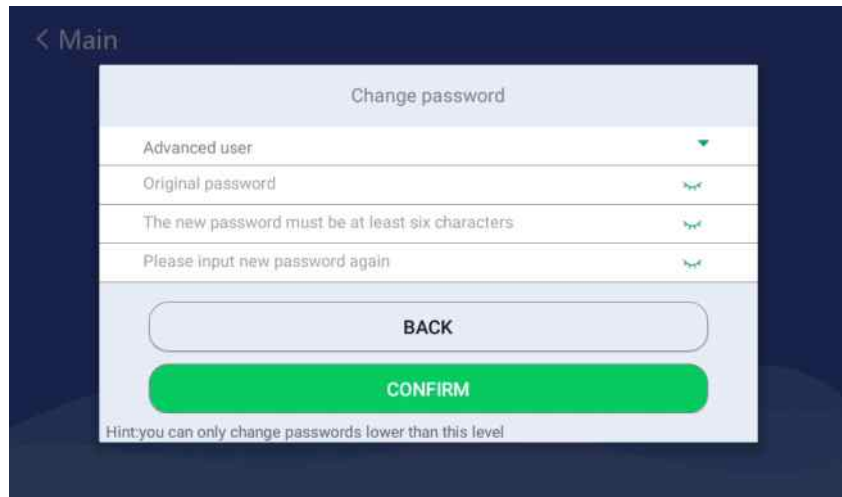


Figure 6.6 Change Password

6.4 Settings

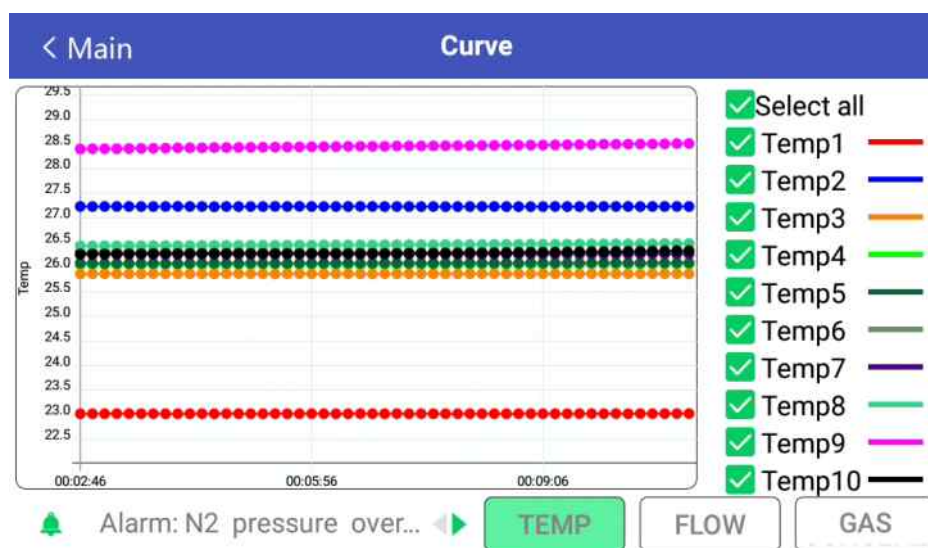
When gas concentration or the temperature of each chamber needs to be adjusted, click the “Setting” button in user interface to enter the setting interface as shown in figure 6.7. Common users can set target values of O₂ concentration, CO₂ Concentration and the temperature of 10 chambers. In addition, advanced users can set the corresponding high and low limits of each item. Click the "Save" button to save the set point. The high and low limits determine the greatest and smallest value respectively.



Figure 6.7 Setting interface

6.5 The curves

To view the temperature variation of each chamber within a certain period of time, click the “Curve” button on the user interface, as shown in Figure 6.8. Click the check box on the right side of the temperature curve to select or cancel the temperature display of a specific chamber, or select the temperature display of all chambers. Similarly, gas flow and concentration curves can be displayed by clicking the corresponding buttons in the lower right corner, as shown in figure. 6.9 and 6.10 respectively. Please note that the gas flow rate will be changed with the gas concentration fluctuation and the seal of the chamber lid.



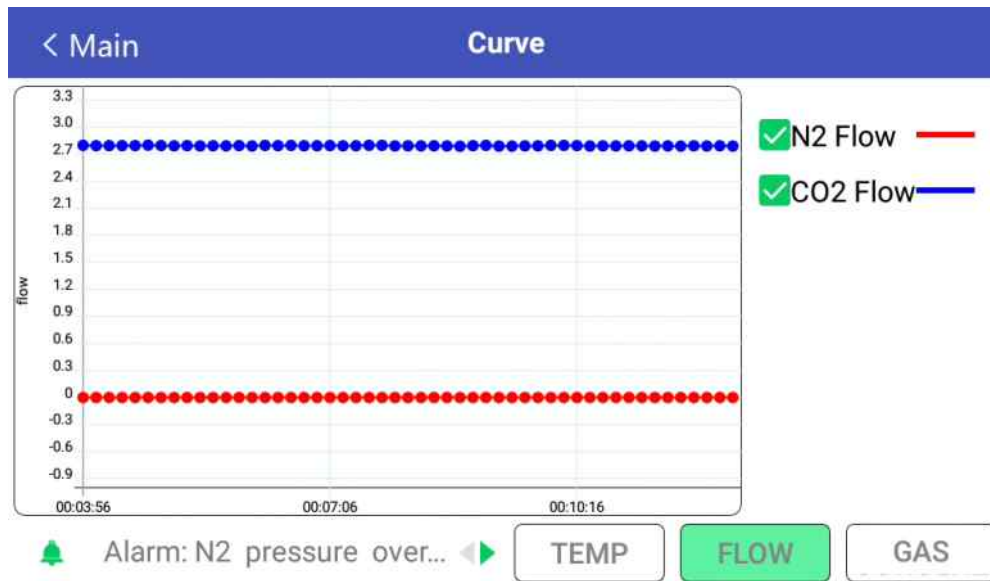


Figure 6.9 Gas flow rate curves

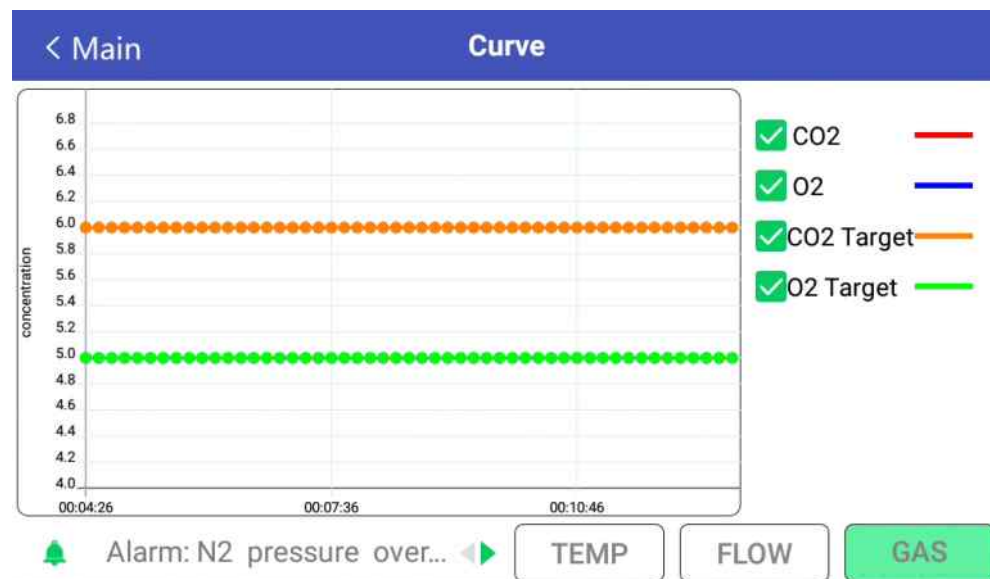


Figure 6.10 Gas concentration curves

■ 6.6 Calibration

When the incubator was used for a period of time, the sensor may produce small deviations due to natural attenuation, environmental changes, or other reasons. Therefore it requires a third party testing instrument (calibrated) to do the calibration. Normally, the concentration of O₂ and CO₂ can be approximately calculated by the following formula: concentration value = $K \times V + b$ (5.1)

V is the signal output by the sensor, K and B are the parameters. Therefore, in order to determine the values of K and B, it is necessary to obtain the values of two sets of concentration and electrical signal V. To reduce deviation, the two calibration points should cover a greater range than O₂ (CO₂) actual set range, such as 3% (3%) and 12% (10%). This method, which requires two calibration points to fully determine the values of K and B, is called two-point calibration method, and its specific operation steps are summarized as follows:

1. Before calibration, ensure that all petri dishes in the chamber have been taken out;
2. Set the O₂ (CO₂) concentration as the first calibration point value, e.g. 3% (3%).
3. Connect the gas detection device to the gas monitoring port of the CO₂ incubator with two gas tubes. For details, please refer to Section 3.3 to build a bypass detection system.
4. Click the “Calibration” button in the user interface to enter the interface as shown in figure. 6.11, and then click the “Open” button behind the “Gas detection port” to open the gas solenoid valve in the detection pipe.
5. Open the diaphragm pump of the detecting device and wait for the gas concentration value to be stable.
6. Enter O₂ (CO₂) value from the third-party detection device in the calibration box, and click the "two-point calibration" button, then the "calibration count" changes from 2 to 1.
7. Set O₂ (CO₂) concentration as the second calibration point value, such as 12% (10%).
8. Wait for the gas concentration value to be stable.
9. Enter O₂ (CO₂) value from the third-party detection device in the calibration box, and click the "two-point calibration" button. Then the "calibration count" changes from 1 to 0. If "two-point calibration succeeded" is displayed in the [Result] column, the calibration process is over; otherwise, calibration needs to be started again. Although the two-point gas concentration calibration method is more accurate in a wide range, the whole process is time-consuming and it doesn't allow any embryos in the chamber. In addition to the two-point calibration method, a single point calibration method can be used to calibrate only the B value in Equation of (5.1), so that concentration accuracy can be improved in the proximity of the calibration value. The single point calibration method can be carried out without taking out the petri dish and without changing the current gas concentration, which is the same as step 3-5 of the two-point calibration method. Only step 6 needs to be performed which enters O₂(CO₂) value from the third-party detection device in the calibration box, and click the "Calibration" button. The "Result" column shows "single point calibration successful", indicating the end of the calibration process.

< Main		Calibration			
Types	Current	Setpoint			
O ₂ (%)	5.0	0.0	Cal	Gas sample	Open
CO ₂ (%)	6.0	0.0	Cal		
Temp1(°C)	23.0	0.0	Cal		
Temp2(°C)	27.2	0.0	Cal		Other paras
Temp3(°C)	25.9	0.0	Cal		
Temp4(°C)	26.1	0.0	Cal		
Temp5(°C)	26.1	0.0	Cal		

Alarm: N2 pressure over low limit

Figure 6.11 Calibration interface

The procedure of temperature calibration are as follows: 1. Before calibration, ensure that the chamber space is big enough to place temperature probe of the third-party detection device; 2. Place the temperature probe of the third party device in the chamber, then close the lid and ensure that the chamber is well sealed (flat cable temperature probe is recommended); 3. Click the "Calibration" button in the user interface; 4. Wait patiently for the temperature reading in the device to be stable; 5. Enter the reading of the third-party device into the temperature calibration box of the corresponding chamber, and then click the "Calibration" button on the same line. The current value will be changed to be consistent with the calibration value, and the calibration is successful.

■ 6.7 Logs

In daily maintenance management of the incubator, you can click the [Log] button in the user interface to enter the interface as shown in figure. 6.12 to view all kinds of operation records of the instrument. You can also enter the time range for querying logs in the upper right corner of the log page, as shown in figure 6.13.

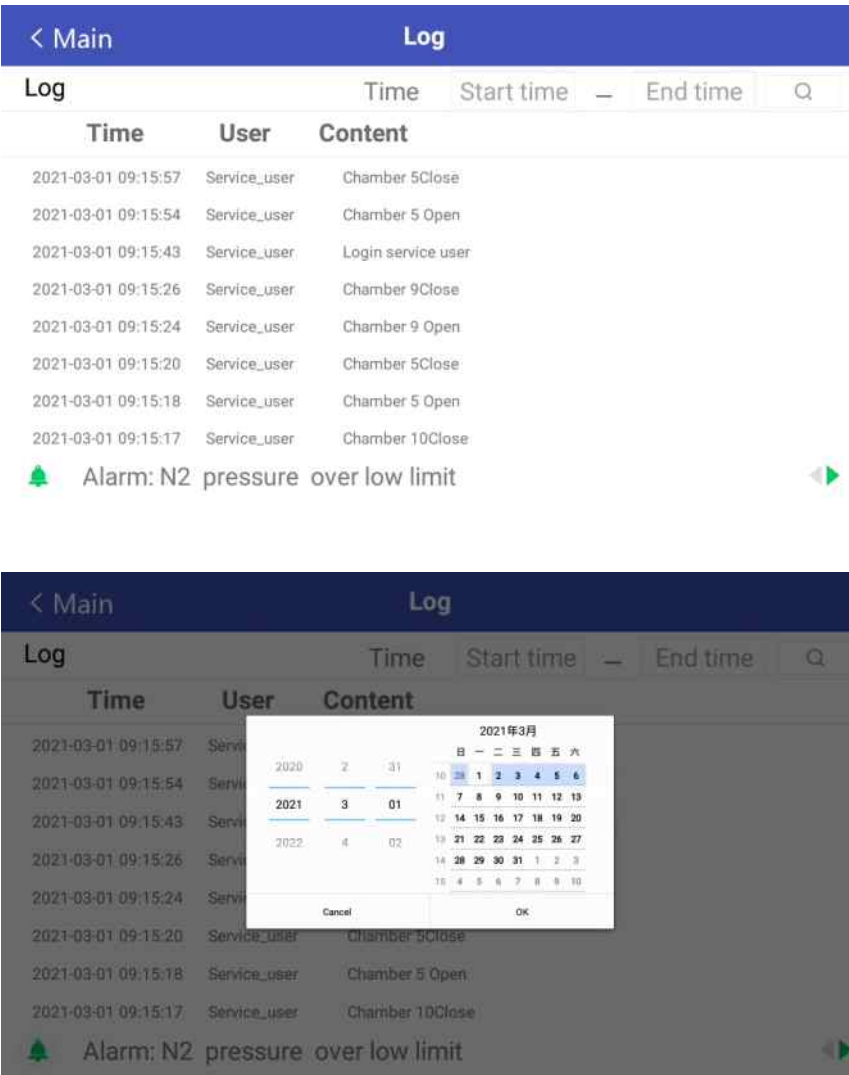


Figure 6.13 Entering the logs inquiry time

■ 6.8 Service

Advanced users can click the "Service" button in the user interface to enter the interface as shown in figure 6.14, where they can check the remaining life of wearing parts and reset the life time after replacing a new one. In addition, you can view the instrument model, serial number, software and UI version information.

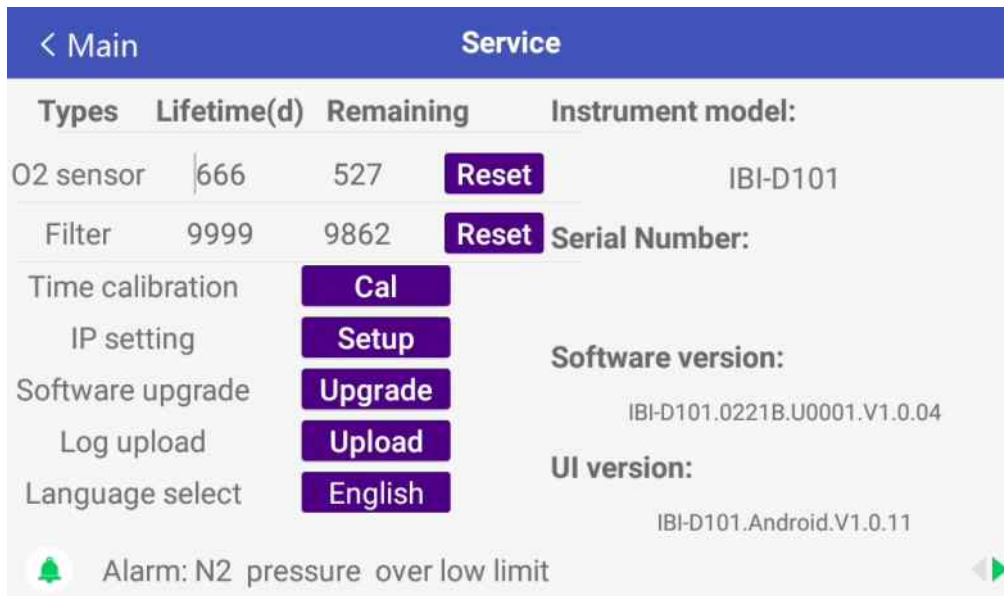


Figure 6.14 Service interface

■ 6.9 Alarms

When there is an alarm message, you can click the [Alarm] on the bottom of the user interface to enter the alarm interface, as shown in figure 6.15. Table 6-1 lists the alarm messages and solutions of the faults of each functional module.

< Main		Alarm			
Current Alarm		Alarm history		2021-03-01	
Alarm code	Alarm name	First alarm time	Last alarm time	Alarm description	
0x82	Pressure over limit	2021-03-01 10:02:19	2021-03-01 10:02:46	N2 pressure over low limit	

Figure 6.15 Alarm interface

Functional module	Alarm message	Corrective Action
Chamber temperature	Chamber Temp over high limit	Verify that whether the setpoint has been changed for a short time and that the ambient temperature is between 18 ° C and 30 ° C.
Chamber temperature	Chamber Temp less than low limit	Verify that whether the setpoint has been changed for a short time or the incubator has just been turned on. Check that the ambient temperature is between 18 ° C and 30 ° C.
CO ₂ (O ₂) concentration	CO ₂ (O ₂) concentration over high limit	Confirm whether the setpoint has been changed in a short time or the incubator just started, check whether the gas supply is abnormal, and whether the seal of the chamber lid is normal.
CO ₂ (O ₂) concentration	CO ₂ (O ₂) concentration less than low limit	Confirm whether the setpoint has been changed in a short time or just started, check whether the gas supply is abnormal, and whether the seal of the chamber lid is normal.
CO ₂ (O ₂) pressure	CO ₂ (O ₂) pressure over high limit	Check whether the gas supply is abnormal and whether the pressure is near 1bar.
CO ₂ (O ₂) pressure	CO ₂ (O ₂) pressure less than low limit	Check whether the gas supply is abnormal, whether the gas pressure is near 1bar, and whether the gas pipe is blocked or leaking.
Gas HEPA	HEPA out of service life	Check whether the gas HEPA expires and replace it with a new one.
O ₂ sensor	O ₂ sensor out of service life	Check Whether O ₂ sensor expires, replace the sensor with a new one.
others	-	Equipment failure

NOTICE

If the fault still cannot be rectified and the device cannot work normally, cut off the power supply and contact the manufacturer or authorized representative for repair. Do not repair the incubator by yourself.

■ 6.10 Power off

1. Make sure all culture dishes are removed from the incubator before shutting down.
2. Shut down all gas supply.
3. Turn off the power switch and pull out the power plug.
4. If the equipment needs to be moved or transported after shutdown, it is recommended to remove all trays in the incubator to avoid damage to the incubator due to friction.

7 Contraindications, precautions and warnings

■ 7.1 Contraindications

None

■ 7.2 Precautions

- Read the user manual carefully before using the device. Place the user manual near the CO₂ incubator.
- Operators should wear work clothes and rubber gloves to operate.
- Do not use the device outdoors. If the device is exposed to rain, it may cause electric leakage or electric shock.
- Only qualified engineers and professional maintenance personnel can install the equipment. Unauthorized personnel may cause electric shock or fire.
- The incubator should be installed on a flat table. When the table is not stable or the site is not suitable for installation, the equipment may turn over and cause injury.
- Do not install the incubator in humid environment where water may spatter. It may cause the insulation measures of the device cannot achieve the expected effect, which may lead to electric leakage or electric shock.
- Do not install the incubator in the presence of combustible or volatile substances. It could cause an explosion or a fire.
- Do not install the incubator where there is acid or corrosive gas. This will lead to electric leakage or electric shock due to corrosion.
- Do not insert metal objects such as nails and cables into the holes, gaps, or sockets on the device. May cause electrical shock or accidental injury due to contacting with moving parts.
- To avoid electric shock or injuries, turn off the power supply before repairing or maintaining the equipment.
- Do not touch electrical components or operate switches with wet hands. It could cause an electric shock.
- Do not bind, handle or trample the electric wires. Do not damage or destroy the power plug. Damaged power cables may cause fire or electric shock.
- Do not dismantle, repair or alter the equipment without authorization. Unauthorized operations may cause a failure that could result in fire, electric shock, or injury.
- Unplug the incubator when it is not in use for a long time. If not removed, this power connection may cause electrical shock, leakage, or fire due to aging of the insulation.
- Do not replace the fuse in the power interface without authorization. It should be replaced by a professional. The fuse specifications are T3.15A and H250V.
- The external power supply must be grounded for protection. Otherwise, the internal components may be damaged if there is instrument failure.
- If hazardous substances leak on the surface of the equipment or into the equipment, appropriate disinfection and cleaning should be carried out.
- Do not use cleaning agents or disinfectants that may cause chemical reactions with equipment components or materials contained in the equipment.
- If there is doubt about the compatibility of disinfectants or cleaning agents with equipment components or materials contained in equipment, consult the manufacturer or authorized representative.

■ 7.3 Warnings

Advanced users can click the "Service" button in the user interface to enter the interface as shown in figure 6.14, where they can check the remaining life of wearing parts and reset the life time after replacing a new one. In addition, you can view the instrument model, serial number, software and UI version information.

CAUTION

Do not use the CO₂ incubator in a manner not mentioned in the manual that may endanger the operator's life and cause equipment failure.

WARNING

A potential hazard that could result in serious injury or death, if not avoided.

CAUTION

A potential hazard that could result in injury if not avoided.

NOTICE

Used to attract the attention of the operator avoiding causing injury.

* Do not use CO₂ incubators when the alarm system is faulty and not repaired.

After turning off the power switch, check the settings before re-operating after a power failure. Improper Settings may result in components damaged.

8 Cleaning and maintenance

■ 8.1 Cleaning: Keep the incubator exterior clean.

- Exterior clean: Use a dry soft wipe dipped in water to wring it out and wipe it clean and dry. Be careful not to clean any internal parts or internal surfaces to prevent liquid leakage into the machine.
- Disinfection method: Wipe the surface of the equipment carefully with a wet wipe dipped in 70% to 75% medical alcohol, and then wipe it with a clean wet cloth.

■ 8.2 Maintenance: the equipment shall be maintained once every year.

- It's necessary to contact the manufacturer or agent for maintenance inspection once a year. Check the function modules inside the instrument, calibrate the internal sensors, and verify the internal protection device and system to ensure the normal operation of the equipment.

9 Storage/Transportation

■ 9.1 Storage

The CO₂ incubator should be stored in a warehouse where the relative humidity does not exceed 80%, the temperature is below 40°C, the ventilation is good, and there is no acid, alkali and other corrosive gases.

The storage period of CO₂ incubator shall not exceed one year. The incubator that exceeds the storage period shall be inspected during unpacking. Only the incubator that passes the inspection can be circulated and used.

■ 9.2 Transportation

During transportation, the CO₂ incubator shall be prevented from direct exposure of rain and snow, sun and strong vibration, and shall not roll or fall. The transportation shall be careful. Normal land, sea and air vehicles can be used for transportation in accordance with the contract.

10 Package (accessories) list

■ 10.1 Accessories list

To ensure that you receive all the products you ordered, please check the contents of the packing boxes according to the packing parts list below. If something is missing or damaged, please contact the supplier immediately.

Bladder-type filter	2	Power cord	1
Plastic ribbon	10	Delivery inspection report	1
Certificated label	1	Gas HEPA filter	2
Culture dish tray	10	Gas source silicone tube	2

■ 10.2 Replacement cycle and method of accessories, inspection methods

- a) Gas HEPA: every 3 months.
- b) O₂ sensor: every 1 year, authorized engineers are recommended to handle it.
- c) See Section 3.3 for replacement method.
- d) After replacement, relevant calibration should be carried out according to Section 6.6. After running for a period of time, observe whether the adjustment of gas concentration on the instrument has been stabilized.

11 Disposal of waste and residues



When the device is no longer used, the user is responsible for disposal with observation of the local requirements.

12 Description of package labels

	Remove carefully
	Keep straight up during transportation
	Be free from exposure to rain
	Flipping is forbidden during the transportation

13 EMC



Note:

The CO₂ incubator conforms to the electromagnetic compatibility requirements of GB/T 18268.1 standard, including the requirements of emission and disturbance immunity.



Warning:

Model: IBI-D101

Device Name: CO₂ incubator

CO₂ incubator is designed and tested according to class A equipment in GB 4824. In the home environment, this device may cause radio interference and need to take protective measures.

Do not use the CO₂ incubator near strong radiation sources (such as unshielded radio frequency sources). Otherwise, normal operation of the device may be affected.

[Registrant/Manufacturer]

Name: Hua Yue Medical Technology Co., Ltd

Address: 1st Floor, C2 Building, No. 11 Kaiyuan Avenue, Huangpu District, Guangzhou

Production Address: 1st Floor, C2 Building, No. 11 Kaiyuan Avenue, Huangpu District, Guangzhou

Tel: +86-020-34821111

[Aftersales service]: Please contact manufacturer or its local authorized representative

[Production date] see product label

[Product validity] 10 years



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