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Our company is ISO9001 certificated.

LAI-3 Anaerobic Incubator

(User manual)

DRAWELL
Artist of Science

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I: Overview

LAI-3 (YQX-II upgraded product) anaerobic incubator is a special device for bacterial culture and operation under anaerobic conditions. It provides an anaerobic and constant temperature culture conditions.The device makes the culture of most difficult anaerobic organisms growing possible and avoid the risk of anaerobic organisms dying when contact with oxygen in the air. The device is an ideal device for anaerobic biological detection research and a good instrument with multi-purpose use.The product has won the “Excellent New Product” achievement award (Golden Dragon Award) which issued by the National Economic Council.

II: Features

1.Equipped with large LCD screen display,high-precision microcomputer control (with timing function), it can accurately and visually reflect the actual temperature inside the incubator, over heating alarm adopted, safe and reliable.

2.UV Sterilizer,effectively prevent bacterial contamination.

3.Switch control for solenoid valve, it can accurately adjust the flow and input any necessary gas.

4. Stainless steel cultivation and operation room,transparent impact-resistant glass front window for easy observation. Latex gloves are comfortable and reliable,easy to use.

5. Operation room is equipped with deoxidization catalyst.

6.The incubator is designed with a double widen door,it can put more petri dishes.

7.Equipped with leakage protection.

Ⅲ: Technical Parameters

Model	DW-LAI-3
Time for creating anaerobic state in sample chamber	＜5 minutes
Time for creating anaerobic state in operation chamber	＜1hr
Anaerobic environment maintenance time	＞12hrs(when no supply of mixed gas)
Temperature Range	RT+3~60℃
Temperature Stability	＜±0.3℃

Temperature Uniformity	＜±1℃
Display Resolution	0.1℃
Timing Range	1~9999min
Power Rating	600W
Power Supply	AC 220V,50HZ
Net/Gross Weight (kg)	240/320
Interior Chamber Size (W×D×H)cm	30×19×29
Operation Chamber Size (W×D×H)cm	82×66×67
Exterior Size (W×D×H)cm	126×73×138
Package Size (W×D×H)cm	139×92×156
Net/Gross Weight(KG)	240/320

Ⅳ:Installation

1. The instrument should be placed in a place with small temperature difference and convenient operation. Avoid direct sunlight and away from heating equipment. Place it to be smooth.

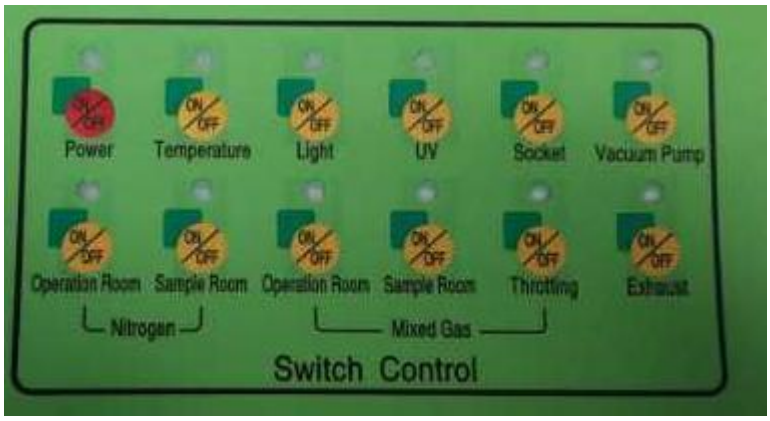
2. Install the mixed gas and the nitrogen cylinder with pressure reducing valve (including the pressure gauge) and smoothly placed on the right side of equipment.

3. Attach the hose clamp to the air pipe and check the leakage. If necessary, Seal with sealant.

Ⅴ:Operation instructions

※Formation of anaerobic environment in the operation room: (equipped with meter: YLAO-100-2)

Operation panel



1. Place the necessary accessories and tools as required and put two non-toxic plastic bags into the operating room.

2. Open the nitrogen and mixed gas cylinder switch valves (check whether the pressure reducing valve handle is closed or in loose before opening). Slowly adjust the pressure reducing valve handle to make the output pressure achieving 0.05~0.08Mpa.

3.Connect the ~220V/50Hz power supply,  the power socket should be reliably grounded. Turn on the power switch on the back of the unit to power up the unit. Press the “Power” button on the operation panel to make the controller work. (All the operation buttons are pressed once for on and then pressed again for off, the corresponding indicator lights when the switch is turned on, otherwise the light is off)

4.The operation room should filled with 1000g palladium particles(sealed)) dried at 180℃-200℃ and 500g of desiccant (sealed) and placed in an Methylene blue strip.

5.Close the indoor and outdoor of sample room and start vacuum. (Press the “vacuum pump” button on the operation panel)

6. **The first air replacement of the operating room (nitrogen replacement):**

1) First insert the rubber tube into the air inlet of the operating room, insert the other end into the plastic bag and pinch the bag.

2) Press the “ON/OFF button for Operation Room” in the nitrogen valve area to open the nitrogen gas path solenoid valve. After making the two plastic bags full of nitrogen, tighten the bag and press the “ON/OFF button for operating room”in the nitrogen valve area to close the solenoid valve.

3) Put the latex gloves on the flange ring of the observation window and tighten with a rubber strip.

4) Gradually discharged the nitrogen in the plastic bag into the operating room until it is completely discharged.

7**. The Second air replacement of the operating room (nitrogen replacement):**

1) Close the aisle door and outer door of sampling room.Press the “vacuum pump” button, first vacuum the sampling chamber and then turn off.

2) Repeat the first air replacement of the nitrogen filling process and press the “Exhaust” button at any time to open and close the solenoid valve (Note :There is no need to remove the glove in this operation). If the anaerobic environment requirement is high, repeat this operation several times.

8**. The third air replacement of the operating room (replacement of mixed gas)**

Mixing gas ratio: N2↑90%, H2↑5%, CO2↑5%.

1)Insert the rubber tube into the air inlet of the operating room and insert the other end into the plastic bag and then pinch the bag.

2) Press the “ON/OFF button of Operation Room” in the mixed gas valve area to open the mixed gas path solenoid valve. After the two plastic bags are full of mixed gas and then tighten the bag and press the “ON/OFF of operating room” button in to close the solenoid valve.

3) Gradually discharged the mixed gas in the plastic bag into the operating room until it is completely discharged.

4) After the above replacement, the oxygen content in the operating chamber is already in a trace state.

5) Press the “ON/OFF button of throttling”in the mixed gas valve area to turn on the mixed gas throttling solenoid valve and adjust the flow rate of the flow meter to about 10 ml/ minute and make the mixed gas constantly flowed into the operating chamber through the flow stabilizer and the flow meter.

9. Open the palladium deoxidizer particle and desiccant in the operation room, pour them into the container of the deaerator catalyst (put the desiccant in the lower container).Plug in the plug, press the "socket" button to turn on the deaerator catalytic converter for catalytic deoxygenation. Drop a little clean water on the reaction zone of the Methylene blue strip and insert it into the palladium pellet box. Observe the changes after 1~2 hours, if the reaction part changes from dark blue to light blue that the operation room reached an anaerobic environment.The strip indicator bar can be used repeatedly, don’t contact the blue reaction zone and store in a sealed tube and placed in a dry place.

Note: If the indicator is not blue Methylene blue strip, please consult the manufacturer for the specific operation.

10. Press the “ON/OFF button of sterilization” to turn on the UV lamp for the chamber, the sterilization time is self-determined.

Temperature control of the incubator: (Meter used: YLGS-201G0)

Temperature control panel

1. **Layout instructions:**

1) PV display: display the measured temperature or display various prompts according to the status of the meter;

2) SV display: display the set temperature or display the timing time and various parameters according to the status of the instrument;

3) Light column display: display the percentage of the heating control output;

4) Running indicator: always on during operation;

5) Self-tuning lamp: flashing at self-tuning;

6) Heating lamp: bright when there is heating output;

7) Alarm light: It is an over temperature alarm, which lights up when the temperature exceeds the set temperature;

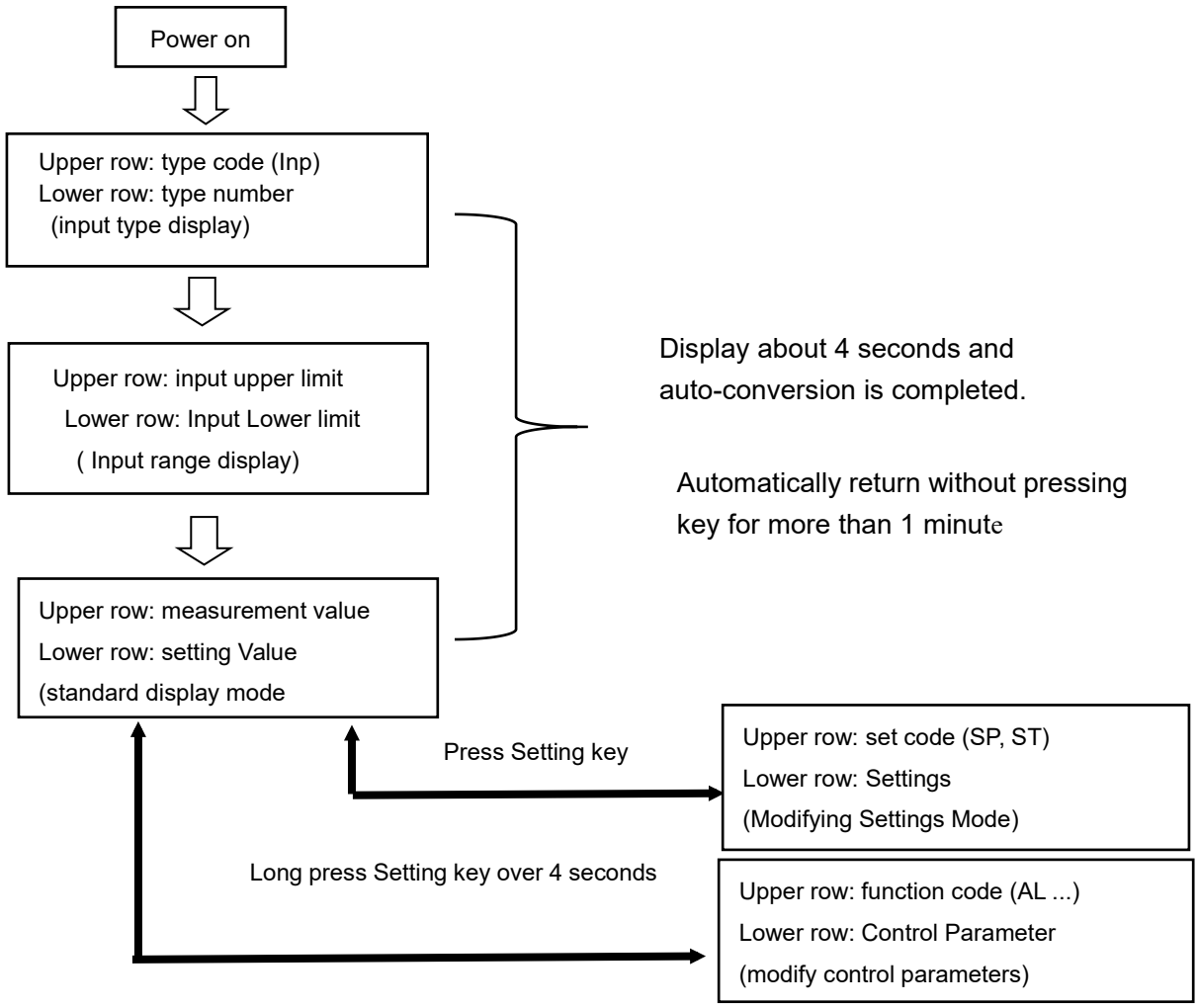
8) Set button: used for modification of setting value , parameter recall and parameter modification confirmation;

9) Add key: used to query the running status,modification of setting or control parameter ;

10) Reduction key: used for modification of setting or control parameter or change the operating state;

11) Shift key: used to shift of set value and control parameters or enter auto-tuning.

The order of function callout:



Detailed description of each function:

1）If “ ” is displayed on the upper row of V zone, it means the sensor is open circuit or the input signal exceeds the upper limit of the measurement; if the lower row of the PV zone displays “ ”, it means the sensor is short-circuited or the input signal is lower than the lower limit of the range. When the input signal of the meter is not within the range, will send out beep sound, press any key to stop beeping.

2)Change the setting value and timing time: Press the setting button, displays SP in the PV area , by pressing shift, increase and decrease keys to get the required set temperature. Press the set button again, displays St in the PV area , by pressing the shift, increase and decrease keys to get required timing time. Press the set button again to return to the standard mode.

3）Timing function: When ST is set to 0, the instrument cancels the timing function and the instrument runs all the time; when ST is not set to 0, the instrument has the timing

function. When the running time over, SV displays END, buzzer beeps, the instrument stops working, press any key to stop beeping.

4） Self-correction function: After long press shift key for 4 seconds in the standard state, the instrument starts to self-correction and then the self-tuning lamp lights up; obtain a set of rapid temperature rise PID parameters and the instrument will be controlled by the new PID parameters. The new PID parameters can be checked on the instrument.

5) Parameters setting:

When the LK parameter code appears in the menu, ① adjust LK=18 and then long press the set key to enter the parameter setting; ②adjust LK=28 and long press the set key,the controller will enter the PID parameter setting menu.

Parameter menu as follows:

Prompt	Name	Setting range	Description	Initial value
AL	Alarm settings	-60~full scale	When AL is set to positive, the upper deviation alarm, when AL is set to negative, the lower deviation alarm.	50.0
Pb	Zero adjustment	-100.0 ～ 100.0	When the zero error of the controller is large and the fullness error is small, adjust the value. Generally, Pt100 rarely adjusts the value.	0.0
Pk	Full scale adjustment	-1000 ～ 1000	When the zero error of the controller is small and the fullness error is large, adjust the value. Pk = 4000 × (mercury thermometer readings - current temperature measurement) / current temperature measurement	0

PID level menu as follows:

P	Proportion	2～100	proportional effect adjustment, the larger the P, the smaller the proportional effect, the lower the system gain,only acting in the heating side.	15.0
I	Integration time	20～3600S	The integration time constant.The larger I, the weaker the integral action.	400
d	Differential time	0～3600S	The differential action time constant, the larger d, the stronger the differential action and can overcome overshoot, (d=0 PI control)	100
Ar	Overshoot suppression	0～100%	Used to suppress overshoot (Ar is determined as: 1.5~2 times of the steady-state output duty cycle)	100
t	Control cycle	1～100S	The output of the thyristor is generally 2 to 3 seconds. For equipment with large power, adjust T value to reduce the static difference of the PID control.	3

Implantation and cultivation of bacteria:

1. Check the aisle of the sampling room and close it.
2. Open the outdoor of the sampling room, put the strain into the sampling room and close the outdoor.
3. Three times of nitrogen replacement in sampling chamber:
   1) Press the “vacuum pump” button for vacuum and stop the vacuum above 500 mm Hg (66Kpa).
   2) Press the “ON/OFF button of sampling chamber” in the nitrogen valve area to open the solenoid valve and fill in the nitrogen gas. After the vacuum meter returns to zero, stop the nitrogen filling.
   3) Repeat the above operation for the second time.
   4) After the third vacuum operation, press the” ON/OFF button of sample room” to turn on the solenoid valve to charge the mixed gas. After the vacuum meter returns to zero, stop air filling.

4. After three times of air replacement, the sampling room door can be opened and the bacterium can be transferred into the operating room.

5. After sampling indoor and outdoor open and close, it will need pump low vacuum 100mm mercury column (13Kpa) to help operation.

6. Conditions for long-term continuous maintenance of anaerobic chambers.

1) Open Methylene blue strip indicator every day in the operation room. If it is not normal, it must be replaced.

2) It is necessary to continuously input a small amount of mixed gas for a long period of time, so that the hydrogen can be combined with a trace amount of oxygen to ensure an indoor anaerobic state. The flow rate of the mixed gas to be replenished was selected to be about 10 ml/min.

3) One day of continuous culture operation, the deoxidizer (palladium particles) and desiccant should be replaced. After being replaced, it can be dried in a 200 ° C drying oven for 2 to 3 hours for recovery and next use.

7. When using the incubator, please press the “Temperature” key on the panel and set the temperature and parameters as needed.

Ⅵ: Notes

1.The equipment should be installed in a place where air is clean and the temperature change is small.

2. Carefully read the instruction manual before operation.

3. The power socket should be reliably grounded to ensure safety.

4. The fuse is equipped on the rear of the control box.If the incubator can not power on, first check whether the fuse tube is normal, please cut off the power supply before checking and replacing the fuse tube. Replace the fuse tube with same specification.

5. The operating room is equipped with lighting,UV lamp and power socket. Please turn off the power before replacement.

6. In order to maintain the appearance of the equipment, please do not use acid or alkali and other corrosive materials to wipe the surface, the box can be cleaned

regularly with a dry cloth.

7. The culture must be placed after the operating chamber reaches the anaerobic environment. Regularly check if there leakage of the gas path

8. In case of malfunction (such as gas stoppage), the operating room can maintain anaerobic state for 12 hours, the culture need to be removed and treated if the malfunction last over than 12 hours.

9. Do not put inflammable, explosive or toxic materials in the instrument chamber.

10. When changing the cylinder, be careful to tighten the air tube to avoid entering oxygen-containing gas.

11. Use the vacuum pump correctly and check the oil and refueling regularly.

12.  Details on the nameplate, please refer to technical parameters in this manual.

13. Turn of power when stop using .

Ⅶ: Troubleshooting

Phenomenon	Reason	Solution
1.No power	1.Socket without power	1.Check socket
	2.The plug is not plugged in or disconnected	2.Plug in or connect the cable
	3.Fuse open circuit	3. Replace the same type of fuse tube
	4.Power switch not closed	4.Close the power switch
2.Large temperature error in the incubator	1.sensor damaged	1.change sensor
	2.fan broken	2.change the fan
	3.meter is not corrected	3.correct the meter
3.The temperature in the incubator does not rise or fall	1.Setting temperature is not correct	1.Adjust setting temperature
	2.Failure of temperature controller	2.Change the temperature controller
	3.Loose connection	3. Tighten connection
4.Leakage in the operation room and sampling room	1.Sealing is not good	1. Check by soap water and seal with 704 sealant
	2.Aging of rubber rings	2.change rubber rings
5. The gas path is not available	1. Controller broken	1. Replace
	2. Failure of solenoid valve	2.Replace
	3. The air pipe leaks or falls off	3.Check and replace the special air pipe

	4.Gas exhaustion of cylinders	4. Replace by new cylinders

⚠Note: The above maintenance operations should be carried out by qualified engineer Please turn off the power before maintenance!

Ⅷ:Transportation and storage

Hand with care.Do not tilt more than 45° and transport it upside down. Store the equipment in a room where the relative humidity does not exceed 80%, free of corrosive gases and well ventilated.

Ⅸ:After-sales service

The warranty for the incubator is 14 months from delivery(except for the heating elements). If damaged due to non-human factors or can not work normally during warranty period,, our company is responsible for free repair or replacement of product parts. Beyond the warranty, we try our best to provide convenience for users

Packing List

Item	Name	Category	Qty.	Remark
1	LAI-3 Anaerobic Iucubator	Machine	1 Set	
2	Latex gloves	Accessories	1pair	Including 2 straps
3	Inflatable plastic bag	Accessories	2pcs	Including air tube
4	Methylene blue strip	Accessories	Random	
5	Fuse tube	Spare parts	1pc	
6	User Manual	Document	1pc	
7	This packing list	Document	1 pc	
8	Installation kit	Accessories	1 Set	Split device with

				installation kit

The items listed in this list match the contents contained in the box.

Packing inspector：No.3

Packing Date：

Preparation before adjustment of Anaerobic Incubator

1. One bottle of mixed gas: 5% carbon dioxide; 5% hydrogen; 90% high purity nitrogen.

The other bottle of gas is: 99.99% high-purity nitrogen, and then equipped with a cylinder pressure reducing valve (Note:The output pressure of the pressure reducing valve is about 0.1Mpa; the cylinder capacity is more than 40L).

2. 1 pack of palladium molecular sieve and 1 pack of desiccant are required for adjustment(Note: We can provide recyclable palladium molecular sieve,it will be charged USD 78.00/pc)

We reserve the right to change the data in the manual without prior notice. The company has the final interpretation right.

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