# OPERATING MANUAL



# DRY BATH INCUBATOR

BDIB-121

CE ISO9001 CERTIFIED

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# 1. Safety Warnings and Guidelines

## 1.1 Important operation information of the security

Before using the instrument, user need have a complete understanding how to operate it safety. Before running the instrument, please read this manual carefully.

 Forbid anyone to operate the instrument before reading the manual.
If operate not in accordance with the tips on the manual ,the heat generated by the instrument at runtime may cause severe burns, and electric shock accident. Please read the following safety tips and guidance, and implementation of all precautions.

## 1.2 Safety

when operation, maintenance and repair of this instrument, it must subject to the following basic safety precautions. if you don't abide by the warnings pointed in the manual , may affect the protection and intended use scope of the instrument.

 The instrument is for indoor use.

 Before operating this equipment please read this manual carefully, otherwise it may cause personal injury.
Only in the aspect of how to use electrical equipment installation trained qualified inspection personnel to operate the equipment.

 Operators do not attempt to open or repair equipment, doing so will make you lose the warranty qualification, also may be limited by electric shock. If you need repair, please contact our company. In order to avoid electric shock accident, the instrument input power cord must be reliable grounding. This instrument uses three core grounding plug, of which the third feet for grounding, which should be used with grounding type power socket.

 Before connecting the power supply, ensure the power supply voltage and the instrument voltage required the same. And make sure that the power outlet rated load no less than the instrument requirements.
If the power cord damaged, replace it according to the same type and specifications. Don't press anything on the power cord when it be used, don't put the power cord in place where people often walk. When insert the power cord plug, must hand-hold the plug and ensure that the plug is completely inserted into the socket, when pull out the plug, must hand-hold the plug as well and don't pull the power cord.

 During operation, the temperature of metal module may become very high and have the

possibility cause burns or the liquid boiling out, therefore, in the process of the whole operation, it is forbidden any part of the body contact, in order to avoid scald!

 The instrument should be put in lower humidity and less dust and away from water and avoid direct sunshine and strong light, indoor should be well ventilated, no corrosive gas or strong magnetic field interference, away from heat, stoves and other heat sources. Don't take equipment in wet or dusty places. In order to avoid temperature overheating ,do not block or cover the vent holes on the instrument. when several equipment be used at the same time, the more the distance between each instrument shall be not less than 30 cm.

 Shutting off the power when stop working. unplugging the plug and using soft cloth or plastic cover to prevent dust from entering the instrument when long time no use.

 When happened as following listed cases, it should be pulled the power socket immediately and contact the supplier or trained maintenance personnel:
Liquid into instrument;
Instrument damaged by rain or water;
Instrument don't work properly, especially appear any abnormal Sound or smell;
Instrument drops or shell damage;
Instrument functions have obvious changes;

## 1.3 The maintenance of Instrument

In order to make sure the test tube and the taper hole wall contact fully, good thermal conductivity and avoid pollution, the instrument cone hole on the modules should be cleaned regularly use a clean soft cloth with a small amount of anhydrous alcohol.

 Cutting off power supply while cleaning the instruments. Strictly prohibit dripping detergent into the taper hole when clean the modules. Strictly prohibit using corrosive cleaning agent to clean instrument surface.

# 2. Introduction

Dry bath incubator is a sample incubation equipment based on film heating and PID automatic temperature control technology. Flexible timing, constant temperature function and unique multi-point operating mode improve the efficiency of the laboratory work, which is the ideal equipment for samples incubation, catalytic reaction process, saving and etc.
Features:
1.Easy to set up and use, all information real-time display and showing set up operation, convenient to observe equipment running status.
2. high temperature control precision.
3. Wide time range from 1min to 99h59min.
4. Different blocks for choice.
5. Multi points mode function and multi cycle times can be set.
6. Automatic preheating function.
7. Automatic power recovery function
8. Automatic running function.
9. Temperature calibration function.
10. Built-in software and hardware over temperature protection device, will use more reliable.
11. Support customized block classification calibration function.

## 2.1 Normal Operating Conditions

Ambient temperature:0oC ~ 35oC
Relative humidity:≤70%
Power supply:AC220V/50-60HZ

## 2.2 Parameters

| Project | Parameters |
|---|---|
| Temp setting range | 0°C~100°C |
| Temp range | RT+5°C~100°C |
| Time range | 1min~99h59min/∞ |
| Temp accuracy | ≤ ±0.3°C* |
| Display accuracy | 0.1°C |
| Temp uniformity | ≤ ±0.3°C* |
| Heating time | ≤ 12min(from 25°C to 100°C)* |
| Multi points running | Yes(Max 5 points) |
| Multi cycle | Yes(Max 99 times) |
| Automatic heating | Yes |
| Automatic running | Yes |

| | |
|---|---|
| Automatic resume to run | Yes |
| Capacity | See optional block |
| Power | 150W |
| Power supply | AC220V/50-60HZ |
| Fuse | 250V 3A Φ 5x20 |
| Size(mm) | 260x195x150 |
| Weight | 2.5kg |

Table 1

Test condition:RT 25°C±2°C , block is 1.5mlx35, use mercurial thermometer, accuracy is ±0.1°C

## 2.3 Optional block

| Type | Capacity | Temp range |
|---|---|---|
| TMB-P | 96x0.2mL PCR plate | RT+5°C~100°C |
| TMB-05 | 54x0.5mL centrifuge tube | RT+5°C~100°C |
| TMB-15 | 35x1.5mL centrifuge tube | RT+5°C~100°C |
| TMB-20 | 35x2.0mL centrifuge tube | RT+5°C~100°C |
| TMB-0515 | 20x1.5mL+15x0.5mL | RT+5°C~100°C |
| TMB-M | 96 x 0.2mL elisa plate | RT+5°C~100°C |

Table 2

*If you have special requirements on block, please contact to supplier to customized blocks.

# 3. Structure of Instrument

## 3.1 Structure description

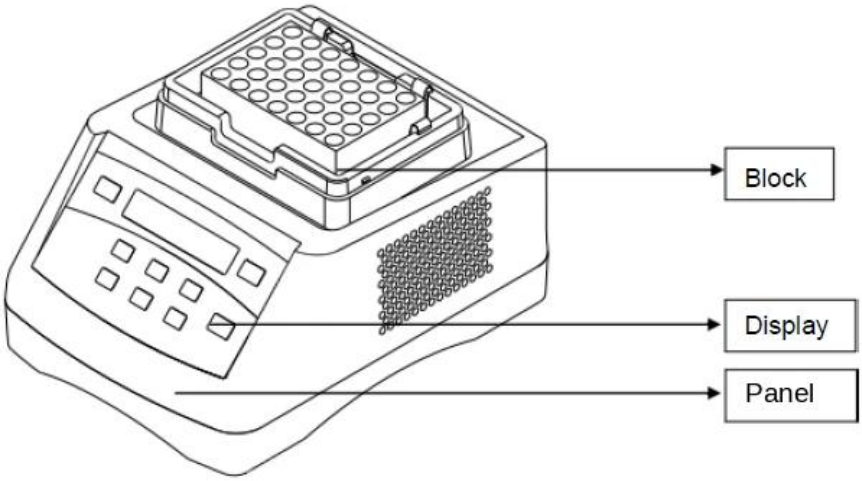



Figure 1

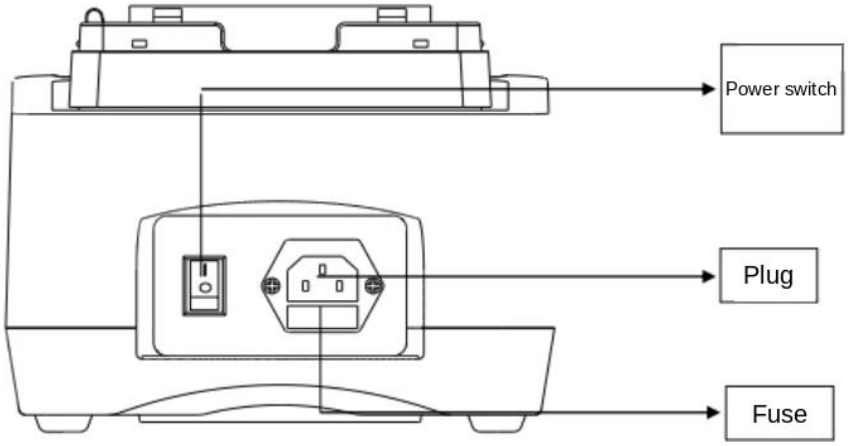



Figure 2

## 3.2 Display panel and key function

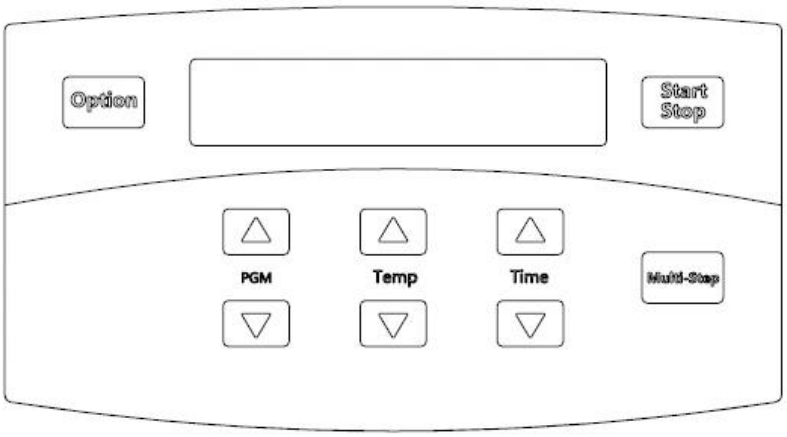



Figure 3

| Key | Function |
|---|---|
| Option | Press this key to enter and exit system menu. |
| Start/Stop | Press momentary to start, press continuously(2 seconds) to stop. |
| PGM▲▼ | Press this key to select procedure. |
| Temp▲▼ | Press this key to set temperature. |
| Time▲▼ | Press this key to set time. |
| Multi-Step | Press this key to enter and exit multi points mode. |

Table 3

# 4. Operation Guide

## 4.1 Single point mode setting

4.1.1 Parameters in display

```
PV 25.0° Stop
S1 37.0°
01:30
```

Figure 4

"PV" this row displays current temperature and running status.
"S" this row displays procedure No., setting temp and time.

4.1.2 Procedures selecting
In Stop status, you can press PGM's "▲"or "▼" to select procedure. In single point mode, five standalone procedures can be selected (S1-S5).

4.1.3 Temp setting
In Stop status, please press Temp's "▲" or "▼" to set temperature, press continuously (2 seconds) to set temperature rapidly.
Note: Temp setting range: RT+5°C~100°C. If room temp is higher than setting temp, instrument can not

run normally.

4.1.4 Time setting
In Stop status, please press Time's "▲" or "▼" to set time, press continuously (2 seconds) to set temperature rapidly.
If you want to keep setting temperature, please press Time's "▼" to "Keep" . Note: "Keep" means procedure will keep setting temperature, unless it is outage or you stop running.

4.1.5 Start/Stop running
After finishing setting, please press Start/Stop, system will run automatically. Then status will display "Wait", system will be heating to setting temperature.

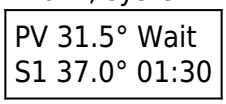


Figure 5

When temperature reaches, system will display your setting time and start to count down.

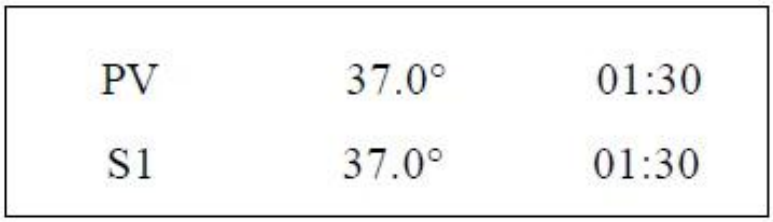


Figure 6
During running, press Start/Stop continuously (2 seconds) to stop running and system will be back to setting interface.

4.1.6 Finishing running
When finished running, system will stop running automatically, and displays current temperature.

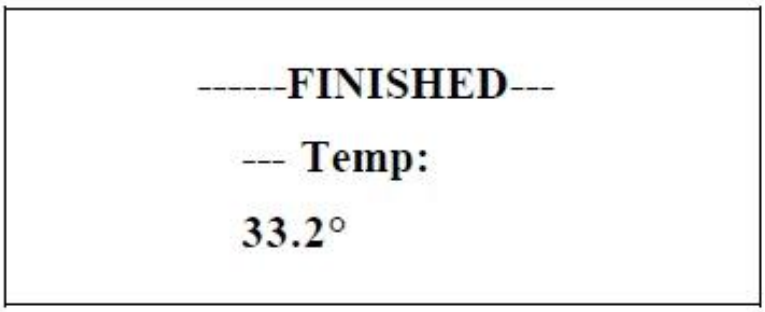


Figure 7
System will be back to setting interface with pressing any key.
Note: After running, heating plate will be very hot for a while, please be careful.

## 4.2 Multi points mode setting

4.2.1 Parameters in display:

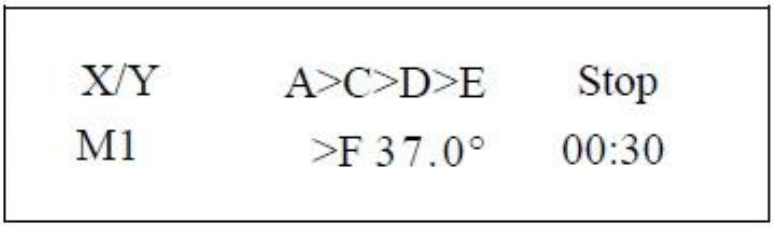



Figure 8
"X/Y" X: cycle times Y: setting cycle times " A>C>D>E>F": Multi points running list
" Stop"/"Run": System status
"M" this row displays procedure, setting temperature and time.

4. 2.2 Procedures selecting
In Stop status, please press PGM's "▲" or "▼" to select procedure. In multi points mode, at most five procedures can be selected (M1-M5).

4.2.3 Temperature Setting
In Stop status, please press Temp's "▲" or "▼" to set temperature, press continuously (2 seconds) to set temperature rapidly.
Note: the temperature range of Settings: room temperature + 5°C~100°C . If the room temperature is higher than the present value, the instrument will not be able to run normally.

4.2.4 Time setting
In Stop status, you can press Temp's "▲" or "▼" to set temperature, press continuously (2 seconds) to set temperature rapidly.
Note: In multi points mode, please do not set Time to "Keep".

4.2.5 Add/remove procedures in running list
Press Temp key to "OFF", the setting temp is invalid, this procedure will remove from running list. Otherwise, procedure will add to running list.
E.g. the setting temp of M1 is 37°C , it will displays 1 in running list, if setting temp is "OFF", it displays X , this procedure will remove from list.

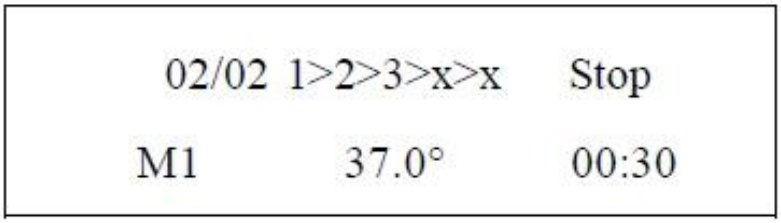



Figure 9

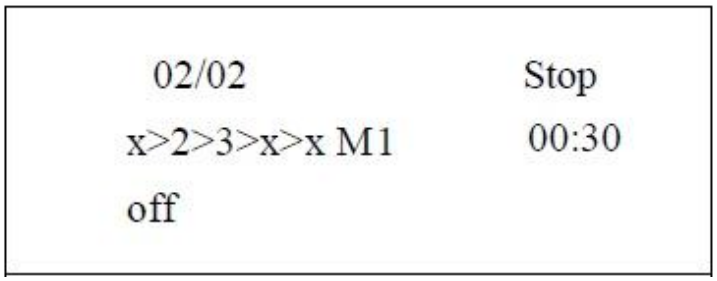


Figure 10

When start multi points, system will run according to M1,M2,M3,M4,M5.

4.2.6 Start/Stop multi points mode
When finishing selecting procedures, please press Start/Stop key, system will run automatically. Then it will display "Run" instead of "Stop" . It means instrument is heating or cooling to setting temp.

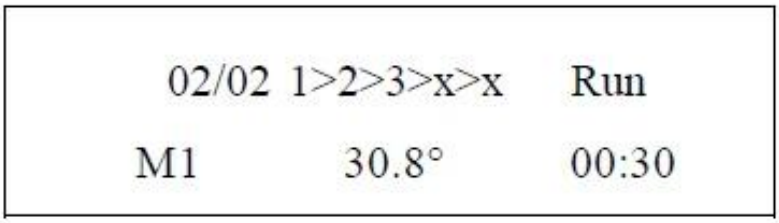


Figure 11

When finishing running one procedure, instrument will run to next procedure .When the last procedure finishes running, it will stop running automatically.
During running, press Start/Stop continuously (2 seconds) to stop running and system will be back to setting interface.
Note: Before start multi points mode, please make sure the setting of temp and time for each procedure through PGM's "▲" or "▼".

## 4.3 System setting

Press Option key to enter into system setting interface.
Press continuously (more than 2 seconds) to save parameter and exit.
4.3.1 Block selecting
In order to insure the temp accuracy, please set right block type when exchange block. Please press PGM's "▲" or "▼" in system setting interface, then it turns into block setting interface as follows.

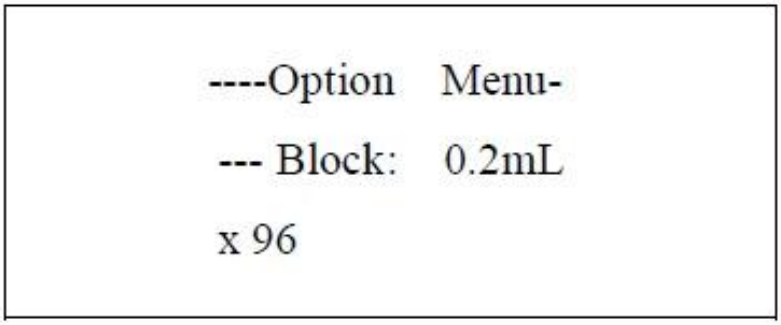


Figure 12

Press Temp's "▲" or "▼" to select right block type, make sure the type in display is the same as that in use.
Block: CUSTOM 01 02 03
Above three types are for customized blocks, in order to insure temperature accuracy, please set type according to block list.

4.3.2 Automatic constant temp function (RTF)
Press PGM's "▲" or "▼" in system setting interface, it turns into RTF setting interface.

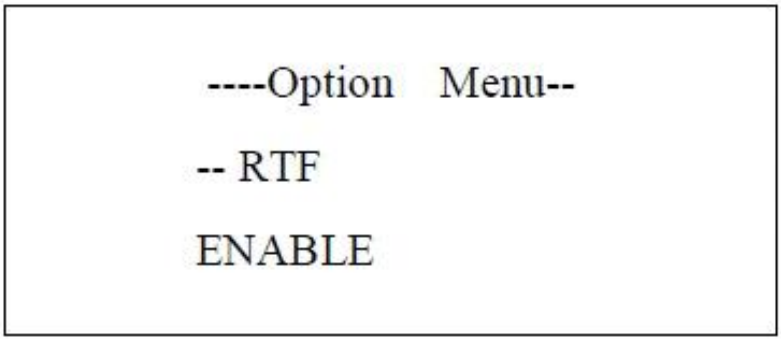


Figure 13

Starting(ENABLE) RTF, system will keep block's temperature after finishing running.
Canceling RTF, system will start cooling after finishing running.
Press Temp's "▲" or "▼" to start/stop RTF.

4.3.3 Automatic resume to run function (ORF)
Press PGM's "▲" or "▼" in system setting interface, it turns into ORF setting interface.

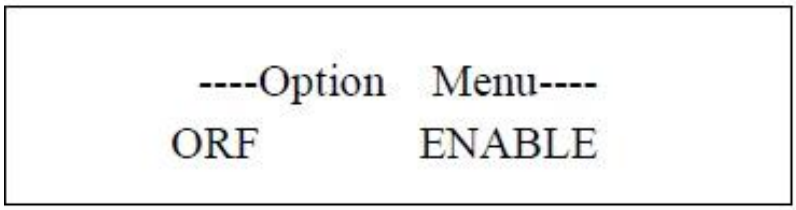


Figure 14

Starting(ENABLE) ORF, if power is outage during running, system will automatically run again after power on.
Canceling(DISABLE) ORF, users need to select procedure to run by manual after power on.
Press Temp's " ▲" or "▼" to start/stop ORF.

4.3.4 Automatic running function (APF)
Press PGM's "▲" or "▼" in system setting interface, it turns into APF setting interface.

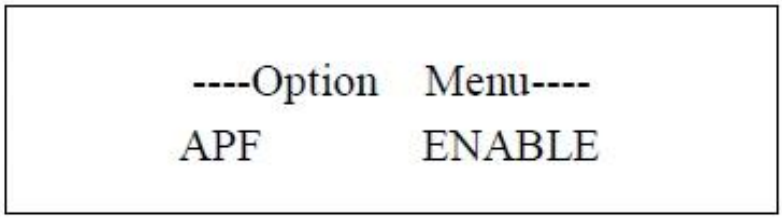


Figure 15

Starting(ENABLE) APF, instrument will run last procedure automatically when start up.
Canceling(DISABLE) APF, users need select procedure to run by manual when start up.
Press Temp's "▲" or "▼" to start/stop APF.
4.3.5 Automatic heating function (FPH)
Press PGM's "▲" or "▼" in system setting interface, it turns into FPH setting interface.

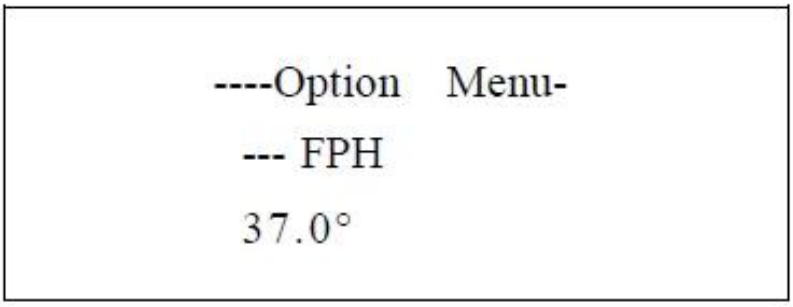


Figure 16

Starting(ENABLE) FPH, system will heat to setting temperature when startup. Canceling(DISABLE) FPH, system will not heat when startup. Press Temp's "▲" or "▼" to set temperature.
Press Temp's "▼" continuously to cancel FPH.
Starting FPH, system will keep setting temperature when stop running, please be careful in case of scald.
4.3.6 Multi cycle setting(Multi Cycle)
Press PGM's "▲" or "▼" in system setting interface, it turns into Multi Cycle setting interface.

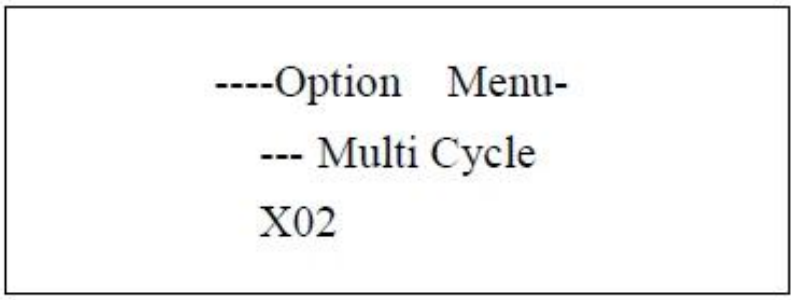


Figure 17
Press Temp's "▲" or "▼" to set multi cycle times. Multi cycle times: Running times of multi points procedures.

4.3.7 Temp calibration (Calibration)
Press PGM's "▲" or "▼" in system setting interface, it turns into Calibration setting interface.

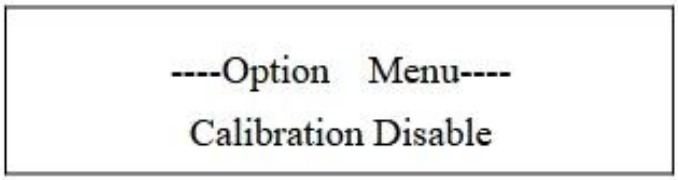



Figure 18

Press Temp's "▲" or "▼" to start(ENABLE) or cancel(DISABLE) Calibration function.
Press Start/Stop key continuously (2 seconds) to start temp. calibration. Press Option key to cancel current setting then exit. Temp calibration instruction, please refer to the temperature calibration section.

4.3.8 Reset function setting (Reset)
Press PGM's "▲" or "▼" in system setting interface, it turns into Reset All setting interface.

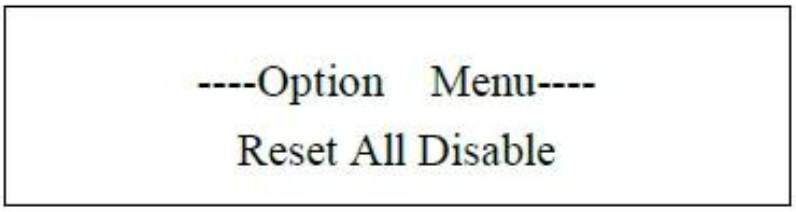



Figure 19

Press Temp's "▲" or "▼" to start or cancel Reset function.
Press Start/Stop key continuously (2 seconds) to reset all setting then system will reboot.
Press Option key to cancel current setting then exit.

 Pay special attention to! After reset, all calibration data and configuration information will be reset, so you need to calibrate the temperature, detail operation please see temperature calibration section.

Note:
1. ORF factory default is forbidden.
2. APF factory default is forbidden.
3. The setting of Multi Cycle factory default is X1.
4. RTF factory default is forbidden.
5. FPH factory default is forbidden.
6. When ORF, APF and FPH are used in same time, ORF is priority.
7. FPH is only started in single point mode and stop status.
----Option Menu---- Reset All Disable

# 5. Temperature Calibration

The temperature of the instrument has been calibrated before it is sold out. But if there is deviation between the actual temperature and the displayed temperature due to some reasons, you can do as follows to correct the error.

Please make sure the block type is the same as that in display. Both the circumstances and the block temperature should be
lower than 35°C .
Adjustment methods as follows:
1 .Inject olefin oil into one of the cone-shaped wells, and then put a thermometer into this well (Make sure the precision of the thermometer should be within 0.1°C and the temperature ball should be absolutely immerged into the cone-shaped well). Heat insulation material is needed on the block to separate it from the circumstance. Seeing from chart a.

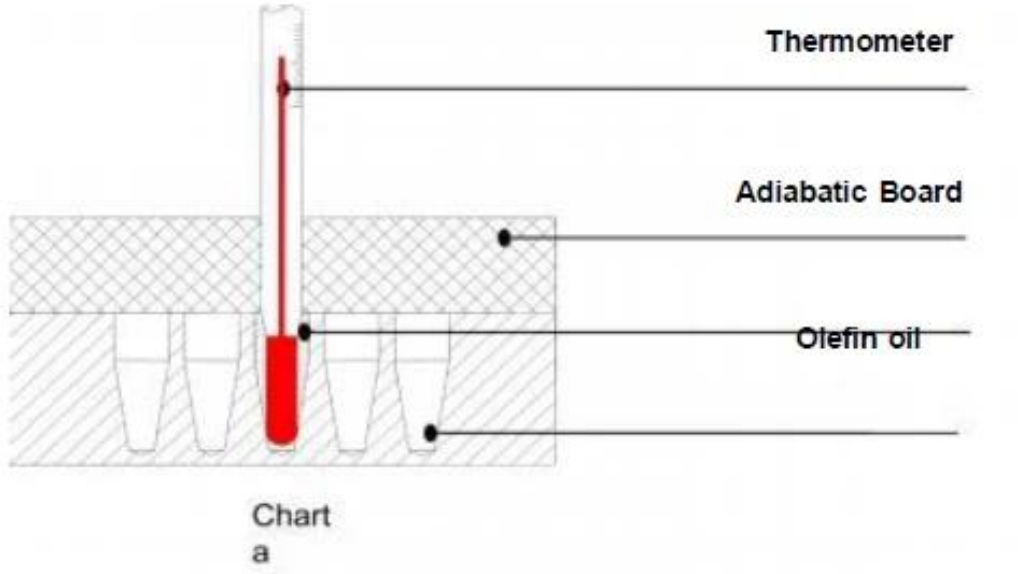



Figure 20

2. Press PGM's "▲" or "▼" in system setting interface, it will turn to Calibration, start calibration function. Then press Start/Stop key continuously, system will heating up to 40.0°C .
3. When the temperature reach 40.0°C , the decimal place will flicker and display "USER", the thermometer shows actual temperature.

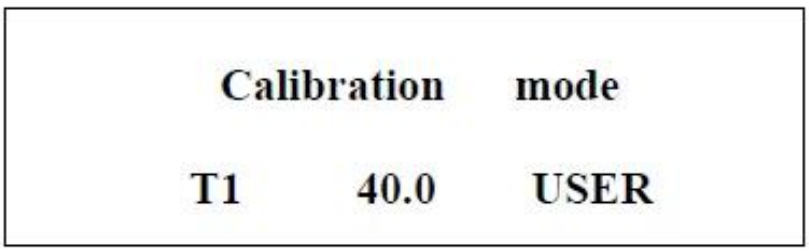


Figure 21
4. If the actual temperature of thermometer is 39.8°C . Press Temp'sű▲" or ű▼" key, amend temperature to reach 39.8°C , then press Start/Stop key to confirm.
Note: In order to insure temperature accuracy, please amend it when temperature reaches after 25 min..

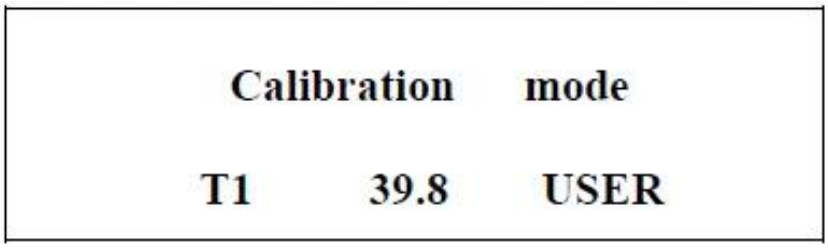



Figure 22
5. Then system will automatically heat up to next calibration. Users need to repeat above steps and input data at each calibration. After calibration, screen shows succeed and remind users to reboot system.

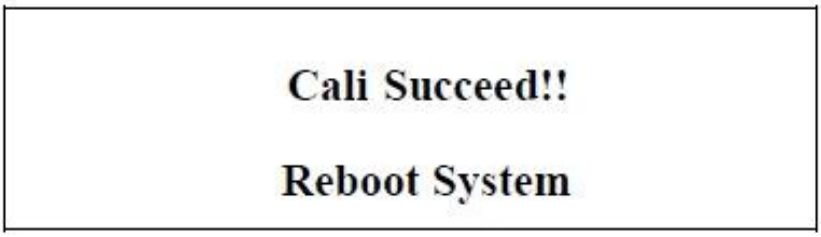



Figure 23

Note: If users want to exit calibration, please power off then restart instrument.
If power off or power outage during calibration, so this calibration is invalid.

# 6. Exchange of block

Note: Please amend block type in OPTION menu after exchanging block.
1) Pull out the three screws by counterclockwise which fix the block with the cross screwdriver.

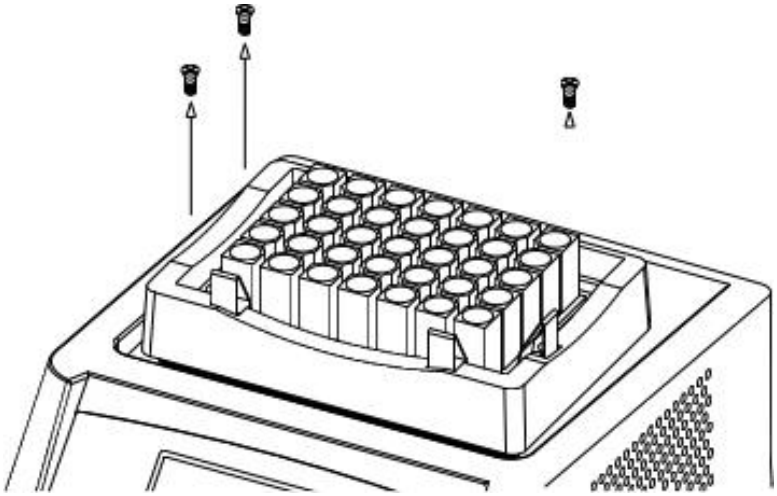


Figure 24

2) Put 2 pieces of M5 to threaded hole by clockwise and screw up, you can pull out block.

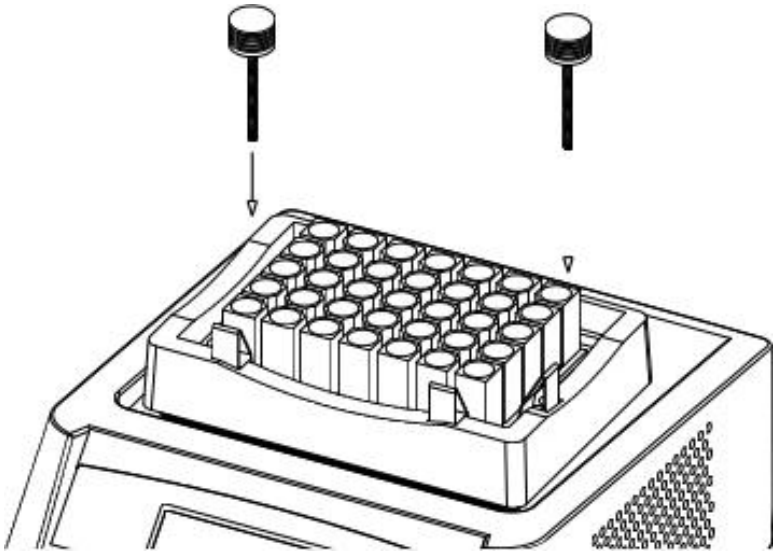


Figure 25

Note: Use screw fittings provided by manufacture to fix block, if lost, please contact with supplier.

# 7. Failure analysis and processing procedures

| Phenomenon | Processing Procedure |
|---|---|
| No response after power-on | No connection of power (a) |
| No response after power-on | Broken fuse (b) |
| No response after power-on | Broken switch (c) |
| The actual and displayed temperatures are quite different | Broken sensor (c) |
| No heating/cooling | Broken temp control system (c) |
| Press invalid | Keyboard failure (c) |
| System: ERROR TEMP HIGH! | Over temperature (c) |
| System: ERROR ADC DAT! | Error of sensor data (c) |
| System: ERROR ADC INT! | Sensor initialize failure (c) |
| System:An unknown error | Unknown failure (c) |

Table 4

a) Check connection of power.
b) Exchange fuse, then reboot instrument, if this problem persists, please contact with supplier.
c) Reboot instrument, if this problem persists, please contact with supplier.

 High voltage in product, please do not detach it.

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