Operation Manual

BSTH-103

Thermo Shaker Incubator

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

Index

00 Safety Warnings and Guidelines

1 Important Operation Information for Security

Users should have an entire conception of how to use the instrument properly before operating it. Please do read this operation manual carefully before using the instrument.

Notice:

It is not recommended to operate before reading the operation manual. Please read the guidelines and directions below and carry out the countermeasure according to them.

2 Security

To operation, maintenance and repair the instrument, please comply with the basic guidelines and the remarked warnings below. Otherwise, the instrument will suffer effect on the scheduled working life and also on the protection provided.

Notice:

- This product is a normal and an indoor using instrument.
- Read the manual carefully before operation. Only the expert of wiring equipment can operate this instrument.
- The operator should not open or repair the instrument by himself. Otherwise, the instrument will lose the qualification of repair guarantee or cause accidents. The company will repair the instrument based on warranty description.
- A.C. power's grounding should be reliable to safeguard against an electric shock. The 3-pin plug supplied with thermo-shaker's power cable is a safety device that should be matched with a suitable grounded socket.
- The temperature of metal block will be very high during the normal operation. There will be scald or boiling of the liquid. It is strictly prohibited; any part of the body touching the instrument may cause scald.
- Close the test tube lid before placing the tube into the block. Liquids may spill out in the block or onto the device if the lid is opened, which will damage the block or the device.
- Make sure the voltage used is complying with the voltage required, and the rated electrical outlet load no lower than the demand before power on. Power line should be replaced with the same type if it does any damage. Please ensure nothing is on the power line. Hold the jack when pull out the power line. Do not pull the power line. Do not put the power line in ambulatory place.
- The instrument should be put in the place where the temperature is low, little dust, no water, no sunshine or hard light, and of good aeration, no corrosive gas or strong disturbing magnetic field, and far away from central heating, camp stove and other hot resource.

Do not put the instrument in wet and dusty place. The vent on the instrument is designed for aeration. Do not wall up or cover the vent. The distance between each device should be more than 100cm when there is more than one instrument.

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Main switch is on the rear of the device. Push “I” to power on the device, and push “O” to power off the device.
- Power off when operation finished. If the instrument is not in the use for long period then pull off the connector plug, cover a cloth on the instrument to prevent from dust.
- Pull the connector plug from the jack at once in the following case, and contact the vendor.

1. There is some liquid flowing into the instrument;
2. Drenched or fire burned;
3. Abnormal operation: such as abnormal sound or smell;
4. Instrument dropping or outer shell damaged;
5. The function has obviously changed.

3 Instruments Maintenance

The well in the block should be cleaned by the cloth stained with alcohol to assure good heat translation between the block and the test tube and no pollution.

If there are smutches on the instrument, clean them with cloth.

Notice:

- Power off when cleaning the instrument.
- Do not drop the clean fluid in the well when cleaning.
- Corrosive clean fluid is strongly prohibited.

NOTES:

01 Introduction

The Thermo Shaker for Micro-tubes BSTH-103 is an ideal instrument for intensive mixing of samples in the regulated temperature conditions.

Mixing and thermo modes (heating or cooling) can be used simultaneously and independently as well as time setting. It is a shaker while it is a thermostat. The main body of the mixing block can be used with different kinds of blocks. BSTH-103 is applicable for DNA analysis, extraction of lipids and other cell components, DNA library creation, PCR amplification, pre-denaturation in electrophoresis, serum solidification etc.

Features:

1. Optimized 2D mixing control, over 3mm mixing orbit.
2. LCD display. Easy to setup and use
3. Accurately control and display time, temperature and speed
4. Over heating protection device
5. Temperature can be calibrated to meet users needs
6. Low noise and stable working even up to the speed at 1,600rpm
7. Conforms to CE safety standard
8. Custom blocks are available to satisfy experimental requirement
9. Can be used for micro test tubes, PCR plates, deep-well plates and MTPs
10. Gentle, reliable mixing with long-life brushless motor

02 Specifications

1. The Normal Operation Condition

Ambient Temperature: 5°C ~ 30°C

Relative Humidity: ≤70%

Power: 200-240V ~ 1.5A 50-60Hz

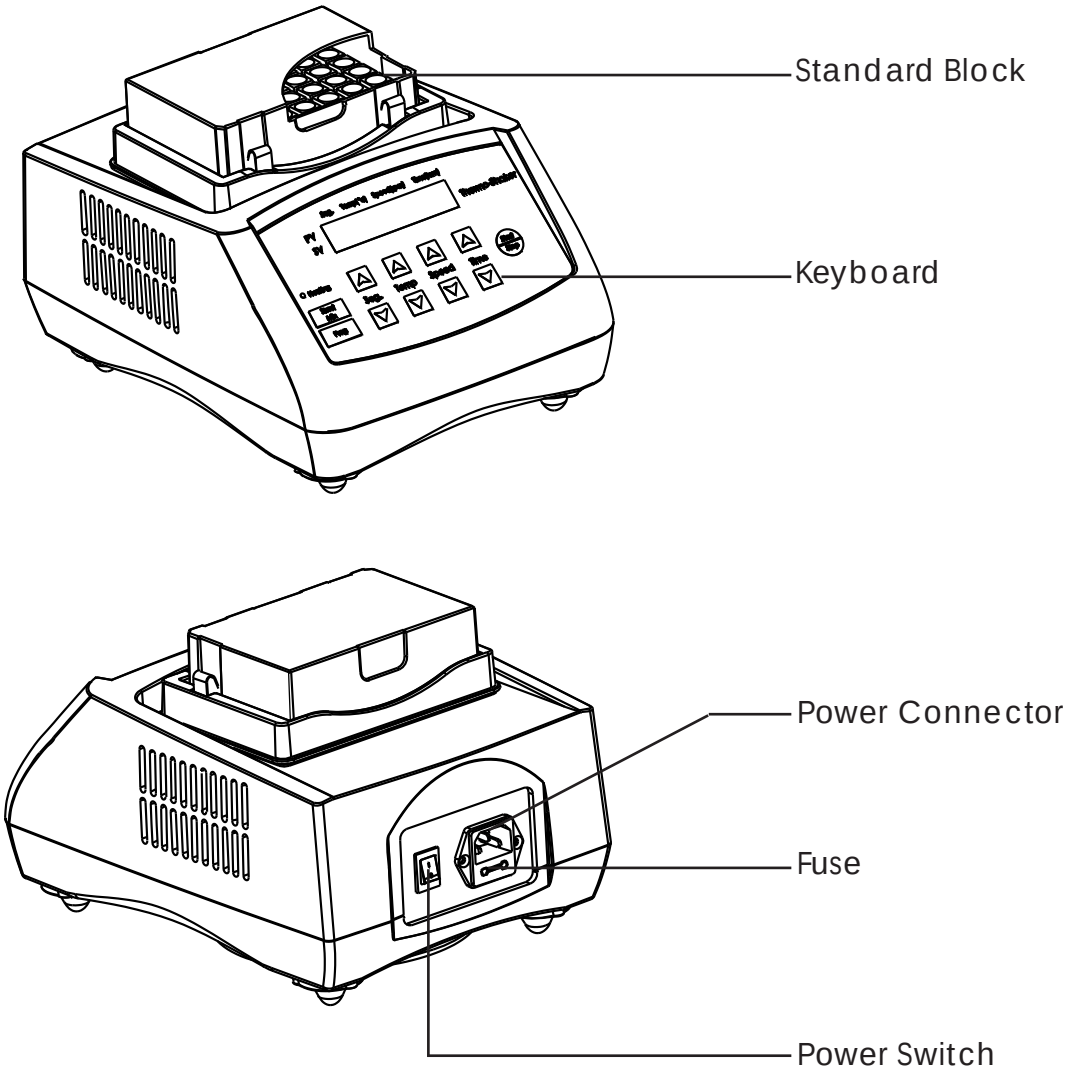
2. The Basic Parameters and Specifications

Model	BSTH-103
Mixing Rate	300~1600rpm
Orbit	3mm
Temperature Setting Range	0~100°C
Temperature Controlling Range	0°C ~100°C @ R.T. ≤20°C 4°C ~100°C @ R.T. ≤25°C 10°C ~100°C @ R.T. ≤30°C
Timing Range	1min ~ 99h59min
Temperature Accuracy	≤ ± 0.5°C
Display Accuracy	0.1°C
Heating Time	≤15min (20°C to 100°C)
Cooling Time	≤30min (R.T. to R.T.- 20°C)
Tube Stand	A: PCR96x0.2ml B: 24x0.5ml C: 24x1.5/2.0ml
Standard Block	A-BLOCK: 96x0.2ml E-BLOCK: 20x1.5ml + 15x0.5ml B-BLOCK: 54x0.5ml F-BLOCK: 32x1.5ml + 15x0.5ml D-BLOCK: 35x2.0ml G: Customized
Power	90-230V 250W
Fuse	250V 3A Φ5×20
Dimension (D x W x H)	273×195×180 mm
Net Weight	8.1kg

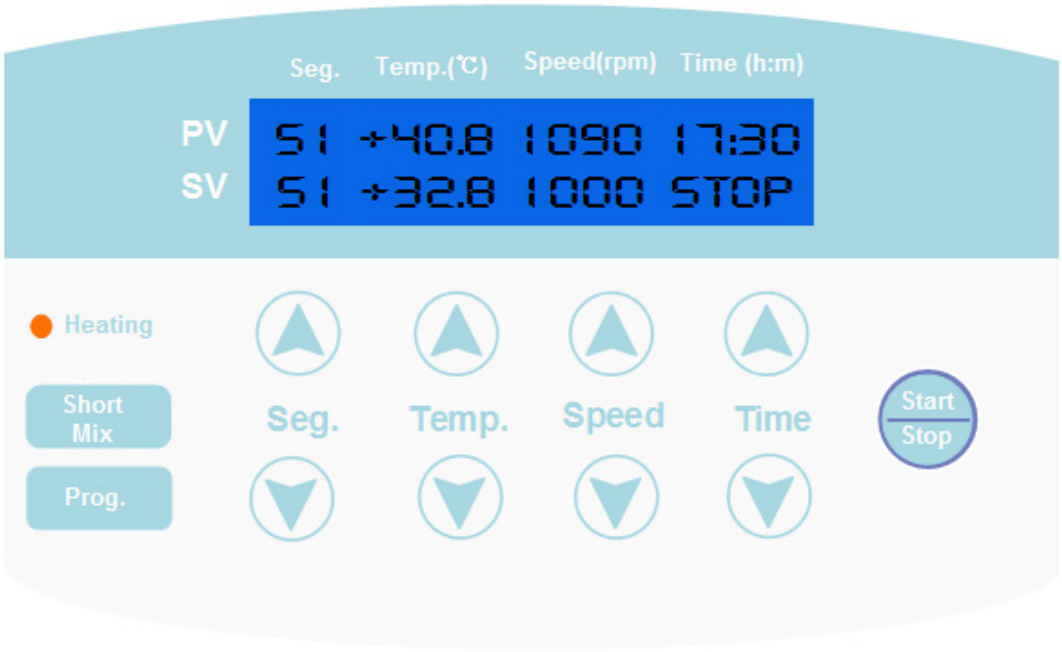
03 Preparation

This chapter mainly describes the instruments mechanical structure, the keyboard and functions of each key, as well as preparations before power on. Please learn this chapter well before the operating Thermo Shaker for the first time.

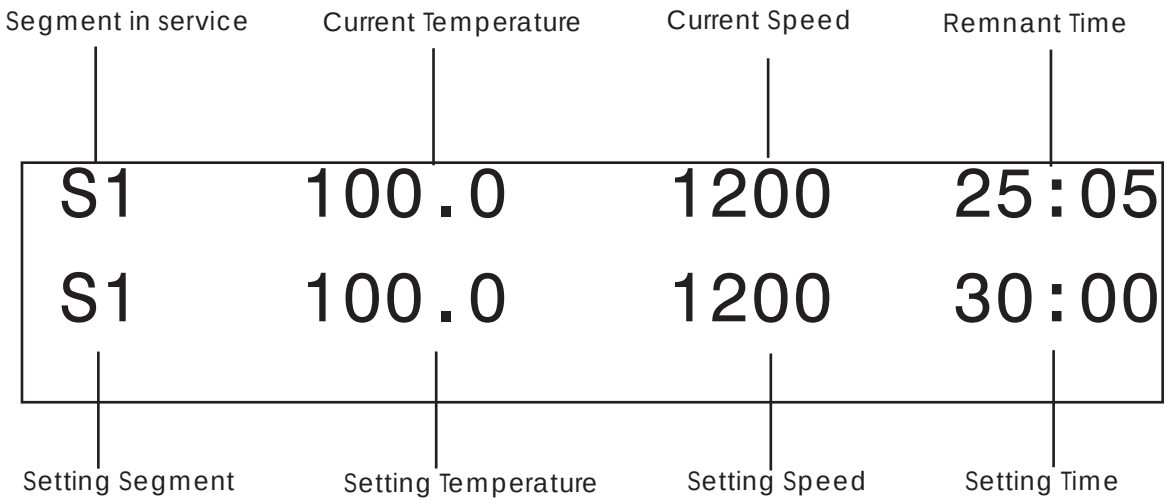
1. Structure Description



2. Keyboard and Display Panel



Display Panel:



3. Key Function

- **Seg.** ▲▼: Key for selecting procedure segment. Five segment points can be selected as S1, S2, S3, S4, S5.
- **Temp.** ▲▼: Key for setting temperature. Press "▲" or "▼" to set the target temperature. Pressing "▲" or "▼" continuously can quickly set the temperature conveniently with x10 speed. Continuously press "▼" till it displays "OFF" on the LCD, shut the thermo function.
- **Speed** ▲▼: Key for setting speed. Press "▲" or "▼" to set the target speed. Pressing "▲" or "▼" continuously can quickly set speed conveniently with x10 speed. Continuously press "▼" till it displays "OFF" on the LCD, shut the shaking function. Speed setting unit is 1rpm.
- **Time** ▲▼: Key for setting time. Press "▲" or "▼" to set target timing hours. Pressing "▲" or "▼" continuously can quickly set timing conveniently with x10 speed. Continuously press "▼" till it displays "OFF" on the LCD, shut the timing function.
- **Prog.** : Key for programming. Press "PROG" to select segment. Starting point is S1 as default. It can implement 4 programs as S1-S2, S1-S2-S3, S1-S2-S3-S4, S1-S2-S3-S4-S5.
- **Short Mix**: Key for short mix. The device mixes at the frequency visible in the display for as long as the "Short Mix" key is held down. The time is counted in seconds until 999s has expired.
- **Start/Stop**: Key for start or stop. Press Start/Stop key to start or stop the program. Momentary pressing is to start the program while continuously pressing is to stop the program.
- **Heating:** Indicator light. The indicator light is flickered when heating or cooling. The indicator light is normally on when it is thermostatic.

04 Operation Guide

1. Setting Single Temperature, Speed and Timing

a) The instrument enters into the initial program as the chart on the right appears with a beep when power on.

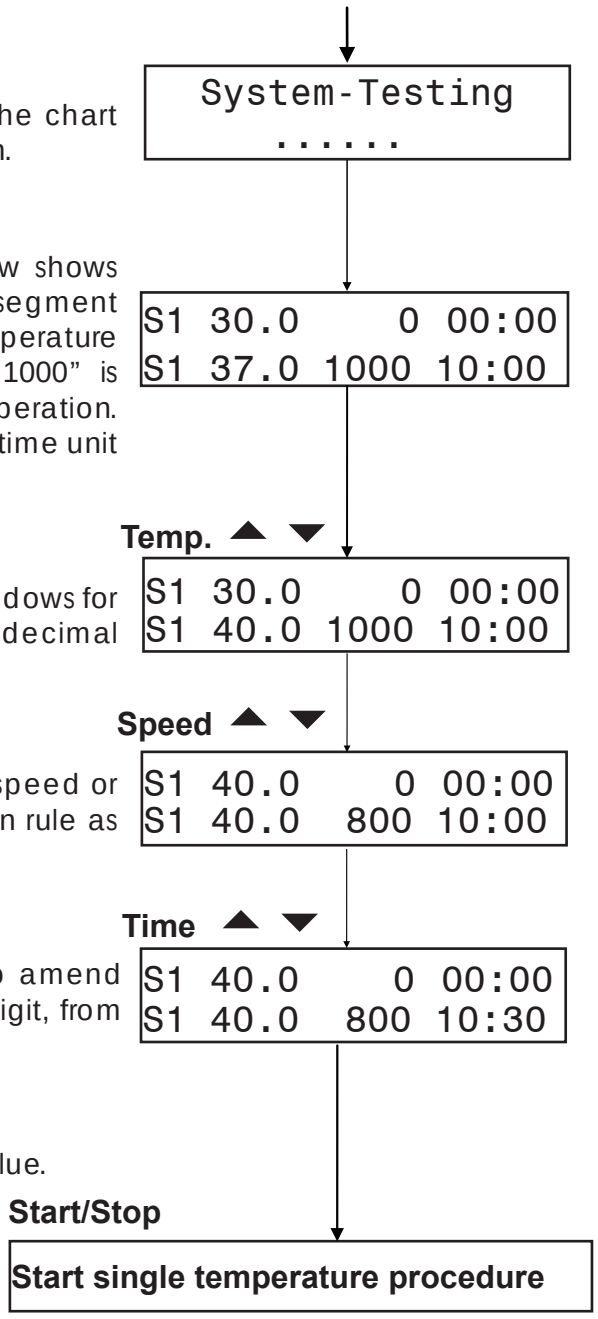
b) After about 6 seconds, the LCD display window shows new information, e.g. as right chart. “S1” is the segment run in last operation. “30.0” indicates current temperature of block. And “37.0” is setting temperature, “1000” is setting speed, while “10:00” is timing time in last operation. Temperature unit is “°C”, speed unit is “rpm”, while time unit is “hour:minute”.

c) Press “▲” or “▼” of Temp, the value of display windows for termperature setting will increase or redue from decimal digit, unit digit, tens digit to hundreds digit.

Press “▲” or “▼” of Speed or Time to set mixing speed or timing time according to the same transformation rule as above.

Continuously press “▲” or “▼” for 2 seconds to amend the digit from decimal to unit, from unit to tens digit, from tens digit to hundreds digit quickly.

Instrument confirms and autosaves the setting value.



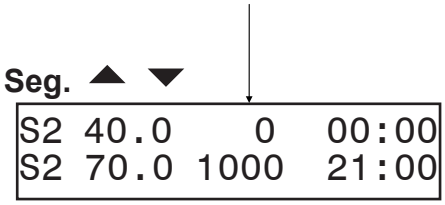
After finishing setting program S1, press “Start/Stop” to run S1.

It beeps the alarms for five times when the program is finished. Mixing will be stopped while temperature kept at the setting value.

NOTICE: Press “▲” or “▼” of Temp will autostart instrument operating to setting temperature. Without pressing “▲” or “▼”, press “Start/Stop” to start operation.

d) Press "▲" or "▼" of Seg. to select Segment S1, S2, S3, S4 or S5. Then to set the values of its temperature, speed and time accordingly.

e) Total five segments could be set whenver you want to operate to save your setting time.



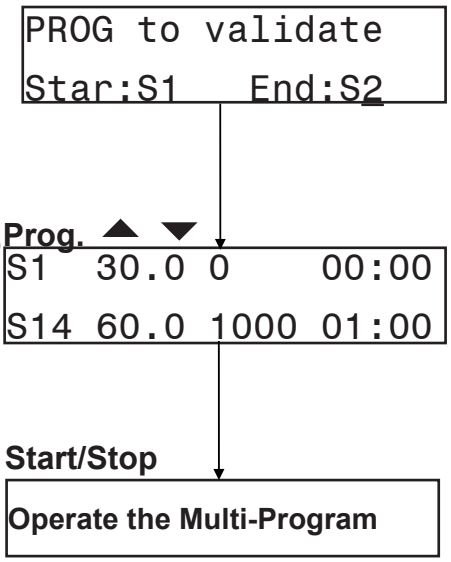
2. How to Set Multi-program Connecting

a) Press "Prog." could connect segment S1, S2, S3, S4, S5 to operate as S1-S2, S1-S2-S3, S1-S2-S3-S4, S1-S2-S3-S4-S5.

NOTICE: Multi-program operates from S1 only.

b) E.g., to connect programs as S1-S2-S3-S4, press "Prog.", LCD will display as right chart. "S1" is the starting segment which could not be changed. "S2" is the ending segment. Press "r" of Seg. till it shows "S4". Then press "Prog." to confirm the value. "S1" changes to "S14". Multi-program set as S1-S2-S3-S4.

c) Press "Start/Stop" to operate the multi-program S1-S2-S3-S4.

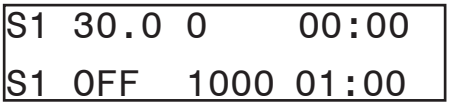


NOTICE: After fixing the segment, press "Start/Stop" to operate the multi-program.

3. How to Shut off the Temperature, Speed and Timing Function

a) Press "▲" or "▼" of Seg. to select one segment of the S1, S2, S3, S4, S5.

b) Press "▼" of Temp. till it displays "OFF" on the LCD, shut the thermo function. Similarly, press "▼" of Speed or Time till it displays "OFF" on the LCD, shut the shaking or timing function.



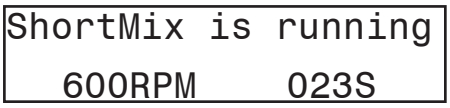
NOTICE:

1) Shut off timing function, the timing time is ∞. "CON" displayed on the LCD in this case.

2) In multi-program operating, if timing function is shut off in one segment, program will operate at that segment continuously. Press "Start/Stop" to stop the segment, operate after re-timing.

4. Short Mix

Press “Short Mix”, the instrument starts to shake. Release “Short Mix”, shaking stops. When short mix, LCD displays as the right chart. “600RPM” is the shaking speed. “023S” is operated time; to be precise the instruments already operated 23 seconds. The time is counted in seconds until 999 seconds has expired.



NOTICE:

1) The maximum short mix speed can be set according to your requirement at the current segment.
2) After multi-program complete, the maximum short mix speed is the speed of S1 segment.

5. Temperature Calibration

The temperature of the instrument has been adjusted already. If there is deviation between the actual temperature and the displayed temperature due to some reasons, you can do as follows to calibrate it.

NOTICE:

1) The instrument uses three temperatures adjustment to ensure its veracity. It is linearly adjusted on 10°C, 40°C, and 100°C. The temperature veracity will be within ±0.5°C after the double temperature adjustment.
2) Both the circumstances and the block temperature should be lower than 30°C when calibration.

Adjustment Methods:

a) After the startup of the instrument, it enters waiting interface. Make sure the temperature in display is below 30°C. If the temperature is higher than 30°C, wait until it comes down below 30°C.

b) 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 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.

Please refer to below Figure A.

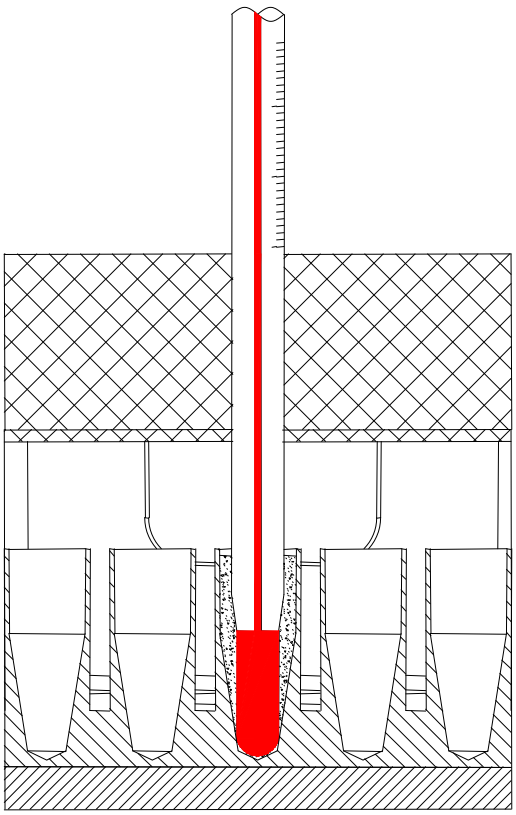


Figure A

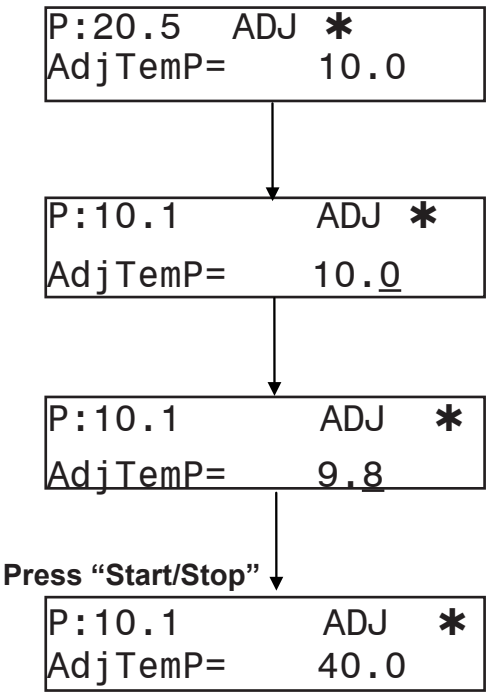
NOTICE: To ensure the adjustment precision, please read the actual value after 20 minutes' constant temperature.

c) Press "▲" and "▼" of Seg. simultaneously when the instrument is not operating. The program turns to interface as shown in the right chart. Practical temperature is behind "P:" which shows 20.5, and the program auto control temperature to 10°C. At the meantime, the sign "✱" flickers ceaselessly. The value behind "AdjTemP" is calibration temperature.

When temperature achieves 10°C, the value behind "P:" is still practical temperature while "ADJ" and "✱" flicker ceaselessly together.

d) After 20 minutes, the actual temperature of thermometer is 9.8°C. Press "▲" or "▼" of Temp. to amend the value of "AdjTemP" to 9.8.

Press "Start/Stop" to confirm.



Program saves the value and temperature rises to 40°C automatically.

The sign "✱" flickers ceaselessly.

e) When practical temperature reaches 40°C, "ADJ" and "✱" flicker ceaselessly together.

f) After 20 minutes, the actual temperature of the thermometer is 38°C. Press "▲" or "▼" of Temp. to amend the value of "AdjTemP" to 38.

Press "Start/Stop" to confirm.

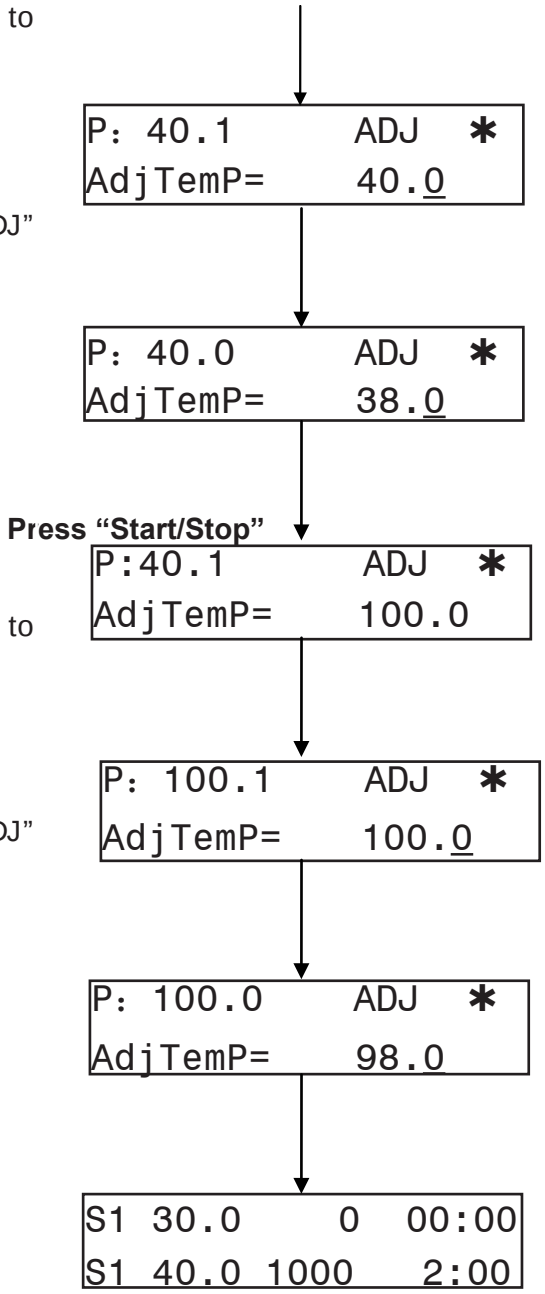
Program saves the value and temperature rises to 100°C automatically.

The sign "✱" flickers ceaselessly.

g) When practical temperature reaches 100°C, "ADJ" and "✱" flicker ceaselessly together.

h) After 20 minutes, the actual temperature of thermometer is 98°C. Press "▲" or "▼" of Temp. to amend the value of "AdjTemP" to 98.

i) Press "Start/Stop" to confirm. Program turns to interface for operating as the right chart.



After temperature calibration, the temperature display is the same as the practical temperature of block.

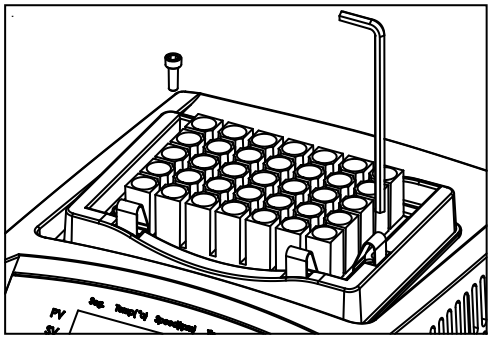
NOTICE:

1) During temperature calibration, press "▲" and "▼" of Seg. simultaneously to cancel the calibration. The system keeps the former calibration.

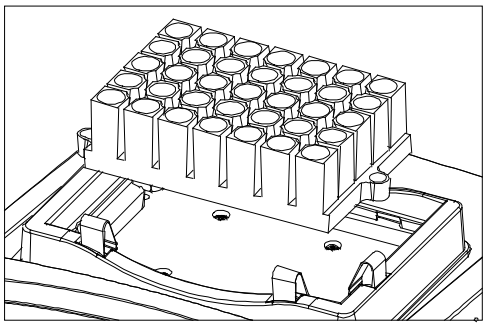
2) Do not press "▲" and "▼" of Seg. simultaneously unless calibration of the temperature is really needed.

6. Block Replacement

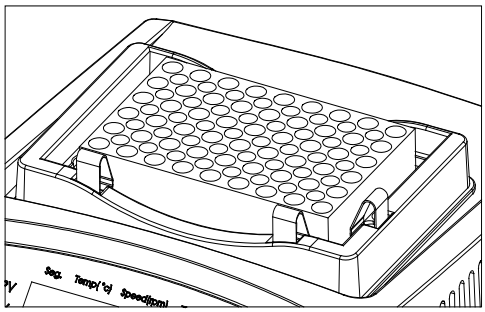
a) Open the transparent lid and pull out the three screws which fix the block to the heating board with the screwdriver.



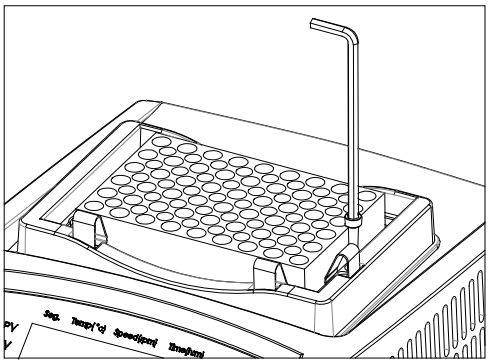
b) Take out the screws, close the lid, remove the block from the main engine.



c) Take another model block, steadily lay aside on the main engine. The block installment holes aim consistently at the main engine installment holes.

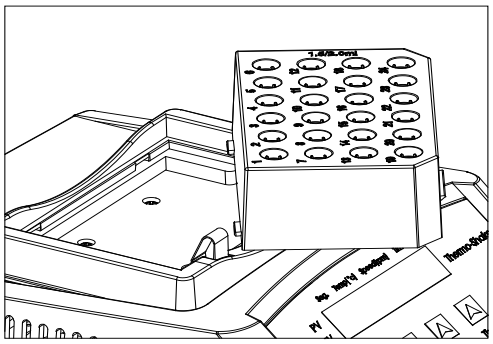


d) Put the screws into the installment hole, fix the metal block on the instrument with the spanner.

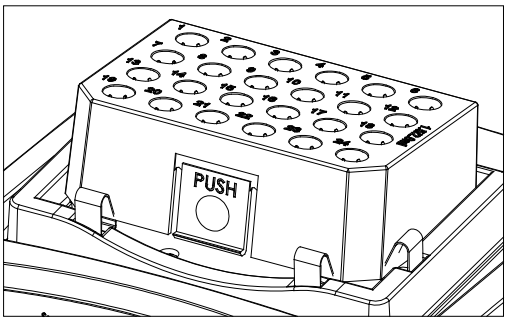


7. Tube Stand Fixing

a) Remove the block according to "Block Replacement" as above item 6 first. Push the two bulges at rear of the stand to corresponding hollows of base frame.
Refer to the right chart a).

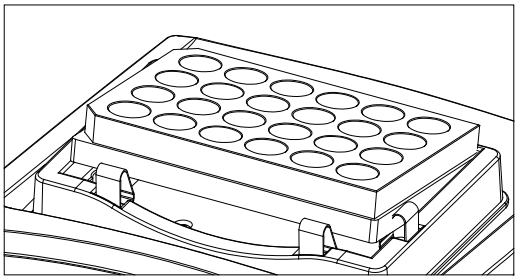


b) Push and press the front part of the stand till the "PUSH" trip locks in the base frame.
Refer to the right chart b).



8. Plate fixing

Press one of the long side into the base frame. Press another side as the arrowhead in the right chart c) indicates till the spring locks the plate. Make sure the plate is fastened.



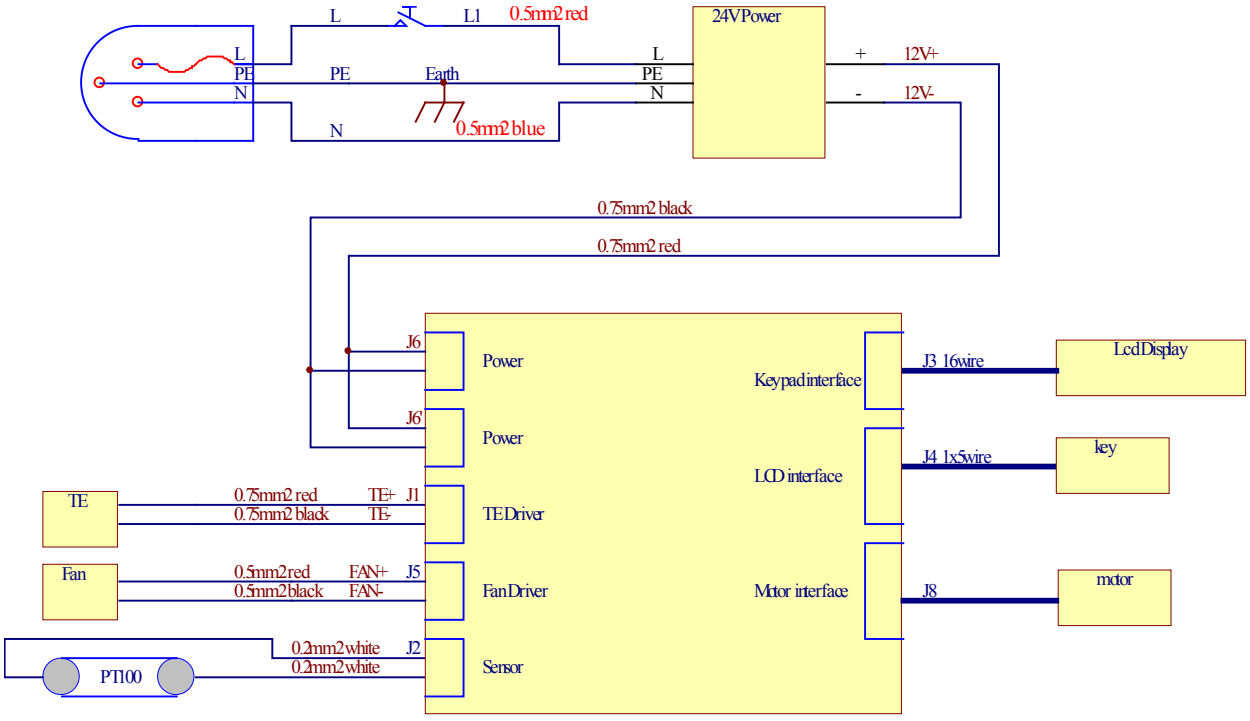
05 Failure Analysis and Trouble Shooting

Failure Analysis and Processing Procedures

No.	Phenomenon	Possible Causes	Processing Procedure
1	No signals on the display when power on.	No power	Check the power
		Broken fuse	Exchange fuse (250V 3A Φ5x20)
		Broken switch	Exchange the switch
		Others	Contact with the seller
2	The actual and displayed temperatures are much different.	Broken sensor	Contact with the seller
3	“OPEN” in the temperature display with the alarm of beep.	Temperature sensor is broken or ambient temperature is below 0°C	Contact with the seller
4	“SHORT” in the temperature display with the alarm of beep.	Temperature sensor is broken or ambient temperature is below 0°C	Contact with the seller
5	“ERR” in the temperature display with the alarm of beep.	Temperature sensor is broken or ambient temperature is below 0°C	Contact with the seller
6	No hearing or cooling	Broken sensor or broken TE module	Contact with the seller
7	Press invalid	Broken film switch	Contact with the seller
8	Very slow cooling or cooling temperature cannot reach the target in range.	Ambient temperature too hot	Bring down ambient temperature
		Broken fan	Contact with the seller
		Broken TE module	
9	“ERR” in the speed display continuously with alarm of beep.	Engine blocked	Contact with the seller
10	“ERR” in the speed display intermittently with alarm of beep.	Engine unstuck	Contact with the seller

Appendix A: Wiring Diagram of BSTH-103

(Below diagram is just for reference. It is subject to change without prior notice.)



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