



THERMO SHAKER INCUBATOR

BSTH-102

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1. Introduction

The thermo shaker incubator is best designed with fast mixing speed and integrates 3 functions of mixing, shaking and incubating. Combined with intelligent operation, it can mix not only various tubes, PCR plates, deep-well plates, micro plates and other laboratory supplies, but also equipped the function of vortexing and heating all kinds of tubes to meet different needs of different users.

Features:

1. Perfect radius and excellent dimensional technology blend with adjustable mixing speed.
2. Programmable. Efficient shaking and temperature control.
3. Microprocessor controlled incubator. Good linearity of temperature control. Accurate controlling of the shaking speed.
4. Timing function. Time range is from 0 to 100hours.
5. Various blocks to exchange, convenient for replacement.
6. Built-in temperature calibration function and short mixing function.
7. DC brushless motor drive, long life and free of maintenance.
8. Multiple safety protection function. Conform to CE safety standards, safe and reliable.

2. Specifications

2.1 The Normal Operation Condition

Ambient Temperature: 5°C ~ 30°C

Relative Humidity: ≤70%

Power: 220V / 110V 50-60Hz

2.2 The Basic Parameters and Specifications

Type Parameter	BSTH-102
Mixing Rate	300 ~ 2000rpm; 300 ~ 1600rpm
Orbit	3mm
Temperature Setting Range	5~100°C
Temperature Controlling Range	R.T.+ 5°C ~ 100°C
Timing Range	1min ~ 99h59min
Temperature Accuracy	≤ ± 0.5°C
Display Accuracy	0.1°C
Heating Time	≤20min (20°C to 100°C)
Heating Part	HEATER

Power	220V / 110V 200W
Fuse	250V 3A $\Phi 5 \times 20$
Dimension (D x W x H)	270×196×170 mm
Net Weight	8.2kg

Table 1

3. Preparation

This chapter mainly describes the instrument's mechanical structure, the keyboard and functions of each key, as well as preparations before power on. Please learn this chapter well before the Thermo Shaker to be operated the first time.

3.1 Structure Description

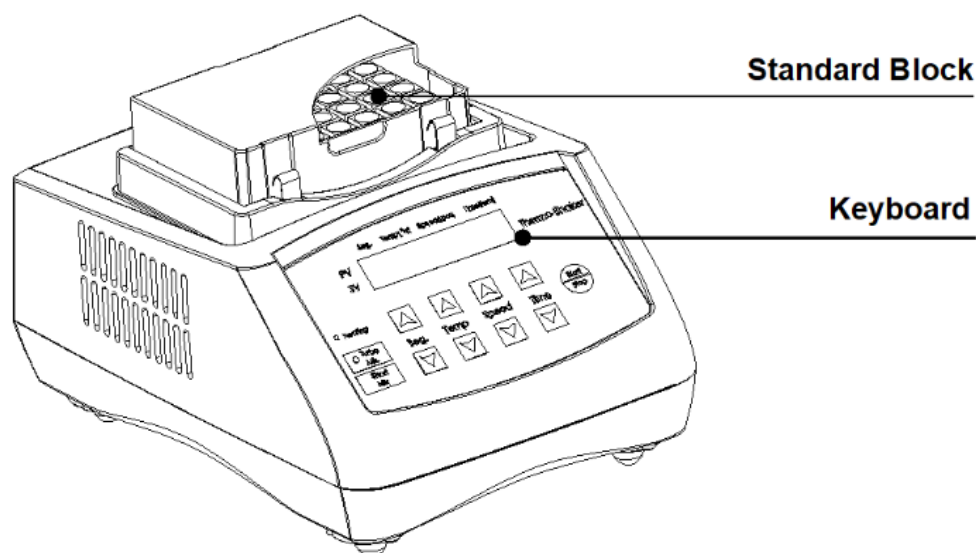


Figure 1

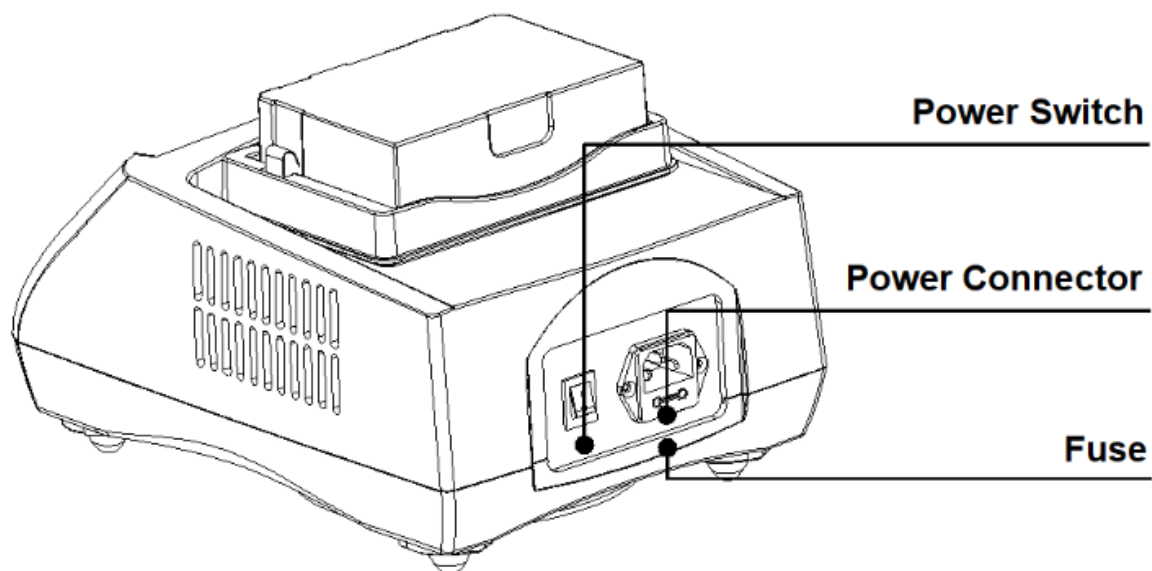


Figure 2

3.2 Keyboard and Display Panel



Figure 3
Keyboard

Segment in service	Current Temperature	Current Speed	Remnant Time
S1	100.0	1200	25:05
S1	100.0	1200	30:00
Setting Segment	Setting Temperature	Setting Speed	Setting Time

Figure 4
Display Pannel

3.3 Key Function

Seg. ▲▼ : Key for selecting procedure segment. Five segments S1, S2, S3, S4, S5 can be selected.

Temp. ▲▼ : Key for setting temperature. Press “▲” or “▼” to set the target temperature. Press “▲” or “▼” continuously can quickly set 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. Press “▲” 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 timing. Press “▲” or “▼” to set target timing hours. Press “▲” or “▼” continuously can quickly set timing conveniently with x10 speed. Continuously press “▼” till it displays “OFF” on the LCD, shut the timing function.

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.

Turbo Mix: Key for Turbo Mix. The indicator light on side is on and off while the highest setting speed changing between 2000rpm and 1600rpm when press key of Turbo Mix. When the highest setting speed can set at 2000rpm, the light is burning. When the highest speed can be set at 1600rpm, the light is off.

Heating: Indicator light. The indicator light is flickered when heating or cooling. The indicator light is normally on when it is thermostatic.

4. Operation Guide

4.1 Setting Single Temperature, Speed and Timing

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

b) After 6 seconds, the LCD display program, e.g. as the right chart. "S1" is the segment run in last operation. "30.0" indicates current temperature of the block. "37.0" is setting temperature, "1000" is setting speed, "10:00" is setting time in last operation. Temperature unit is °C, speed unit is rpm, and time unit is hour:minute.

c) Press ▲ or ▼ of Temp, the temperature setting value will increase or decrease from decimal digit, unit digit, tens digit to hundreds digit.

Press ▲ or ▼ of Speed or Time to set shaking speed or time.

Continuously press ▲ or ▼ to increase or decrease the value from unit to tens digit, to hundreds digit quickly.

Instrument confirms and autosave the setting value.

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

When program finished, it will alarm a beep five times. Shaking will be stopped while temperature kept at the setting value.

d) Press ▲ or ▼ of Seg. to select Segment. Set the segment's values according to c). Total five segments can be set for operation.

↓
System-Testing
.....

↓
S1 30.0 0 00:00
S1 37.0 1000 10:00

Temp. ▲ ▼

↓
S1 30.0 0 00:00
S1 40.0 1000 10:00

Speed ▲ ▼

↓
S1 40.0 0 00:00
S1 40.0 800 10:00

Start/Stop

Start single temperature procedure

Seg. ▲ ▼

↓
S2 40.0 0 00:00
S2 70.0 1000 21:00

4.2 How to Shut off the Temperature, Speed and Timing Function

- Press “▲” or “▼” of Seg. to select one segment of the S1, S2, S3, S4, S5.
- 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 the timing function, LCD display “∞”, the program continue forever.
2) When the device is in operating, “CON” is displayed.

S1	30.0	0	00:00
S1	OFF	1000	01:00

4.3 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. The time is counted in second until 999 seconds has expired.

NOTICE:

The maximum short mix speed can be set according to requirement at the current segment.

Short Mix is running
600RPM 023S

4.4 Temperature Calibration

The temperature of the instrument has been adjusted before it is sold out. If there is deviation between the actual temperature and the displayed temperature, you can do as follows to calibrate it.

NOTICE:

- The instrument has 2 calibration temperature points to ensure the veracity. It is linearly adjusted on 40C and 100C. The temperature accuracy will be within $\pm 0.5C$ after temperature calibration.
- Both the environmental and the block temperature should be lower than 35C when calibration.

Adjustment Methods:

- Power on the instrument, it enters into waiting interface. Make sure the current temperature in display is below 35C. If the temperature is higher than 35C, please wait until it down below 35C.
- Inject olefin oil into one of block well, and then put a thermometer into this well (the precision of the thermometer should be 0.1C and the temperature ball should be absolutely immersed into the olefin oil in the block well). Adiabatic material is needed on the block to separate it from the circumstance. (refer to below Figure 5)

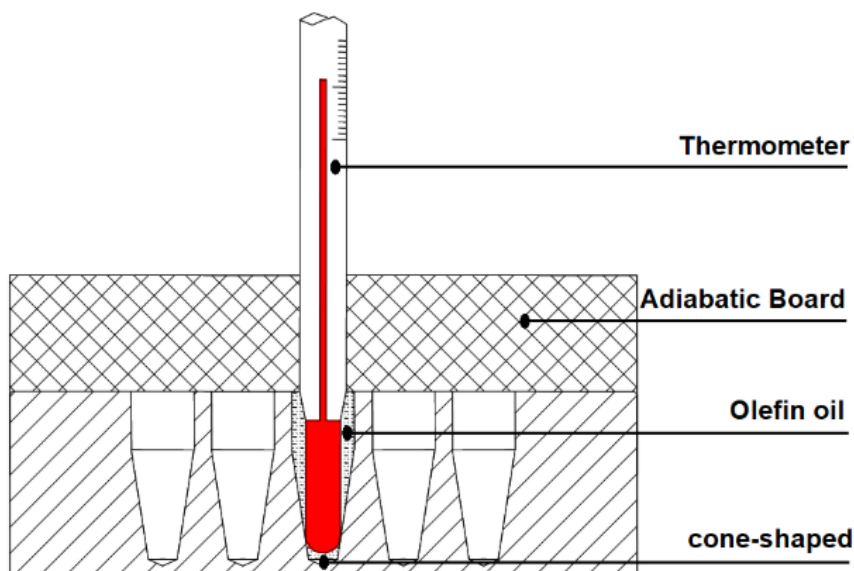


Figure 5

NOTICE: To ensure the calibration precision, read the actual temperature value after the temperature reaches calibration points for at least 20 minutes.

c) Press ▲ and ▼ of Seg. simultaneously when the instrument is not operating. The program turns to the interface as the right chart. Practical temperature is behind "P:" which shows 20.5, and the program auto controls the temperature to 40C. At the same time, the sign " " flickers ceaselessly. The value behind "AdjTemp" is the calibration temp. When temperature achieves 40C, "ADJ" and " * " flicker ceaselessly together, the value behind "P:" is still the practical temperature.

d) Wait for 20 minutes, the actual temperature of thermometer is 38.8C. Press ▲ or ▼ of Temp. to amend the value behind "AdjTemp" to 38.8.

Press "Start/Stop" to confirm.

The program saves the value.

The temperature rises to 100C automatically.

The sign " " flickers ceaselessly.

e) When practical temperature reaches 100C, "ADJ" and "*" flicker ceaselessly together.

f) Wait for 20 minutes, the actual temperature of the thermometer is 98°C. Press ▲ or ▼ of Temp. to amend the value behind "AdjTemp" to 98.0.

Press "Start/Stop" to confirm

g) Program turns to interface for operation as the right chart.

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

P: 20.5	ADJ *
AdjTemp=	40.0



P:40.1	ADJ *
AdjTemp=	40.0



Press "Start/Stop"

P:40.1	ADJ *
AdjTemp=	38.8



P:45.1	ADJ *
AdjTemp=	100.0



P: 100.1	ADJ *
AdjTemp=	100.0



Press "Start/Stop"

P: 100.0	Adj *
AdjTemp=	98.0



S1	30.0	00:00
S1	40.0	02:00

NOTICE:

- 1) During temperature calibration, press ▲ and ▼ of Seg. simultaneously to cancel the celebration. The system keeps the former calibration.
- 2) Do not simultaneously press ▲ and ▼ of Seg. unless calibrate is really needed.

4.5 Block Replacement

a) Open the cover. Pull out the three screws which fix the block to the heating board with the screwdriver.

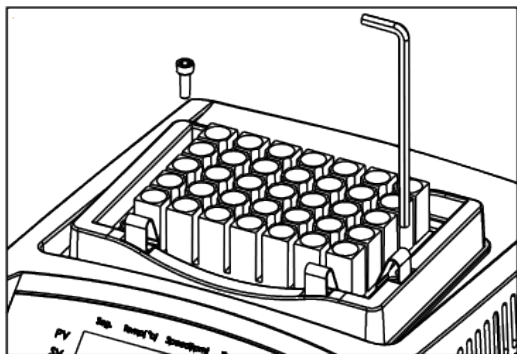


Figure 6

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

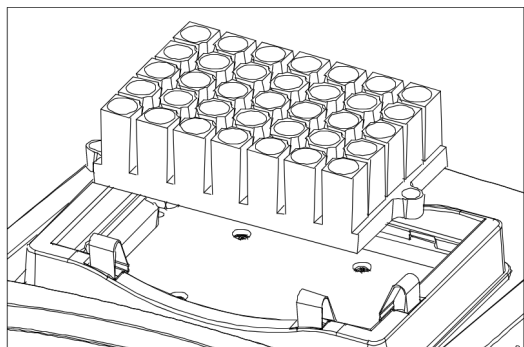


Figure 7

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

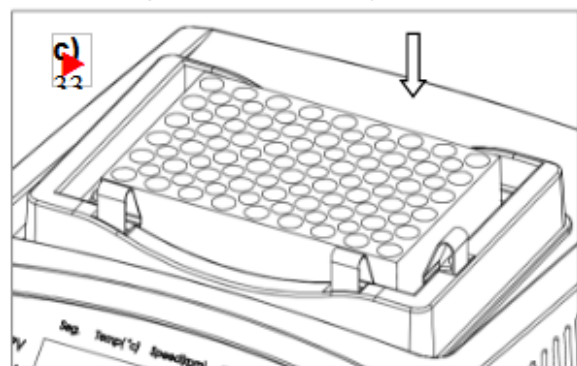


Figure 8

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

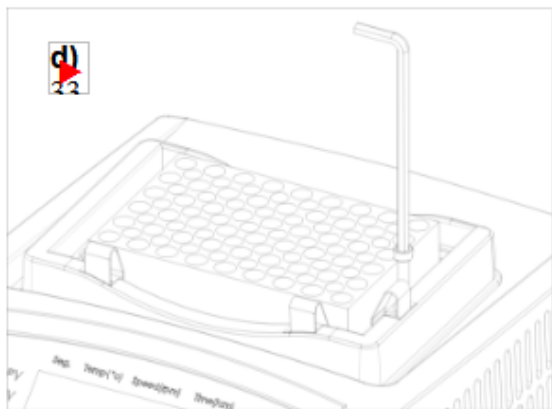


Figure 9

4.6 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).



Figure 10

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).

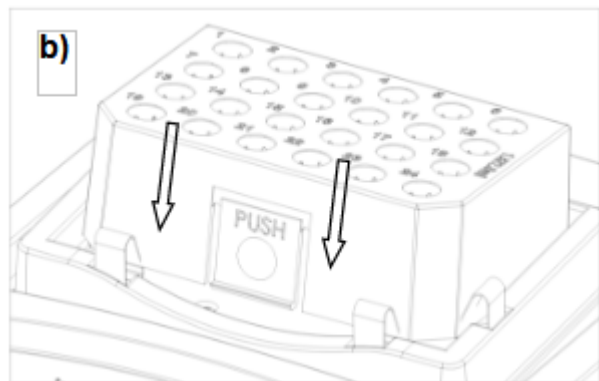


Figure 11

4.7 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.

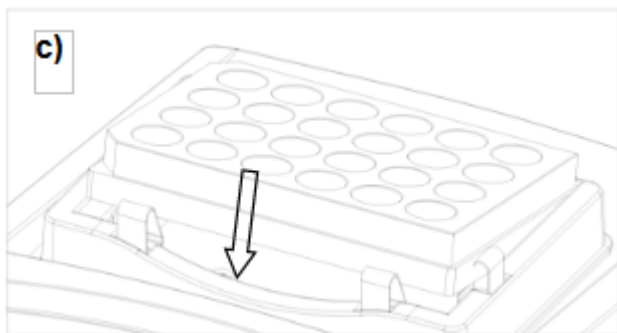


Figure 12

5. Failure Analysis and Trouble Shooting

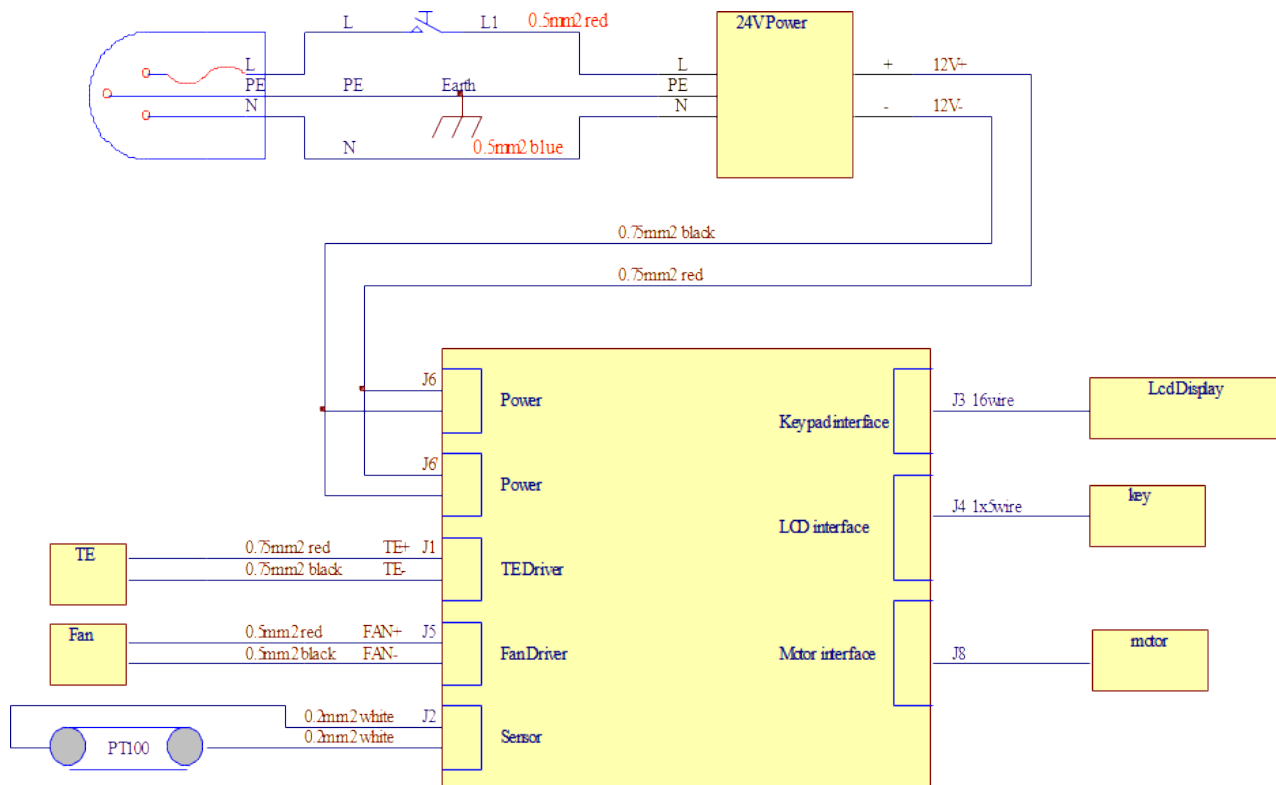
Failure Analysis and Processing Procedures

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 $\Phi 5 \times 20$)
		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 alarm of beep.	Temperature sensor is divided or ambient temperature below 0C	Contact with the seller
4	"SHORT" in the temperature display with alarm of beep.	Temperature sensor is short or ambient temperature below 0C	Contact with the seller
5	No heating	Broken sensor	Contact with the seller
6	Press invalid	Broken press button	Contact with the seller

Table 2

Appendix A: Wiring Diagram of MTH-100

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



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