

# Incubating Shaker with Cooling

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**Cat. No. BT916**

Thanks for choosing BT Lab Systems' BT916 Incubating Shaker with Cooling. This operation manual describes the function and operation of the instrument. In order to use the instrument properly, please read this manual carefully.

### **IMPORTANT SAFETY INFORMATION**

Users should understand how to use the instrument properly before operating it. Please read this operation manual carefully before using the instrument.

The operation, maintenance and repair of the instrument should comply with the basic guidelines and warnings below. Ignoring these instructions will affect the life of the instrument and safety precautions.

- This product is an indoor Instrument.
- These units are designed for laboratory use by persons knowledgeable in safe laboratory practices.
- The operator should never open or repair the instrument. Opening or repairing the instrument will void the guarantee and can cause accidents.
- The power plug should safeguard against an electric shock. The 3-pin plug supplied with the instrument should be matched with a suitable grounded socket.
- The temperature of the metal block will be very high during the normal operation. This will produce scalding or boiling liquid. Do not touch any part of the body to the instrument to avoid scalding.
- Close the test tube lid before putting the tube into the block. Liquids may spill out in the block or onto the device if the tube lid is opened, which will damage the block or the device.
- Make sure the outlet voltage complies with the voltage required. Make sure there is nothing else plugged into the same outlet. Hold the plug when pulling out the power line. Do not plug the cord in where it is a tripping hazard.
- The instrument should be used in an area with low temperature, little dust, no water, no sunshine or hard light and with good air circulation. Do not use where there is corrosive gas or a strong magnetic field. Keep far away from central heating, camp stove and other hot sources. Do not put the instrument in a wet and dusty area. 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.
- The main switch is on the rear of the device. Turn to "I" to power on the device, and Turn to "O" to power off the device. Power off when not in use. If the instrument will not be used for a long period, unplug, and cover with a piece of cloth to protect it from dust.
- In case of the following, unplug the instrument at once and contact BT Lab Systems.
  - The instrument comes into contact with liquid
  - The instrument gets soaked or burned
  - The instrument emits an abnormal sound or smell
  - The instrument is dropped or the outer shell damaged
  - The instrument functions abnormally.

## **MAINTENANCE**

The well in the block should be cleaned with a cloth dampened by alcohol to assure good heat conduction between the block and the test tube. If there are smudges on the instrument, clean it with a dry cloth.

Power off when cleaning the instrument. Do not drop the cleaning fluid in the well. Do not corrosive cleaning fluid.

## **INTRODUCTION**

The Incubating Shaker with Cooling is an ideal instrument for intensive mixing of samples with regulated temperature conditions.

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

## **KEY FEATURES**

- Optimized 2D mixing control, over 3mm mixing orbit
- LCD display. Easy to set and use
- Accurately control and display time, temperature and speed
- Overheating protection device
- Temperature can be calibrated to meet user's needs
- Low noise and stable
- Conforms to CE safety standard
- Customized blocks are available
- Can be used for micro test tubes, PCR plates, deep-well plates and MTPs
- Gentle, reliable mixing with long-life brushless motor

## **NORMAL OPERATING CONDITIONS**

Ambient Temperature: 5°C ~30°C

Relative Humidity: ≤70%

Power: AC100-230V~ 1.5A 50-60HZ

## TECHNICAL SPECIFICATIONS

Mixing Rate: 300 ~1500rpm

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:  $\leq \pm 0.5$  C

Display Accuracy: 0.1 C

Heating Time:  $\leq 20$ min in (20 C to 100 C)

Cooling Time:  $\leq 25$ min (R.T. to R.T.- 20 C)

Tube Stand: PCR96x0.2ml 24x0.5ml 24x1.5/2.0ml

Power: 90 ~230V 250W

Fuse: 250V 3A  $\Phi 5 \times 20$

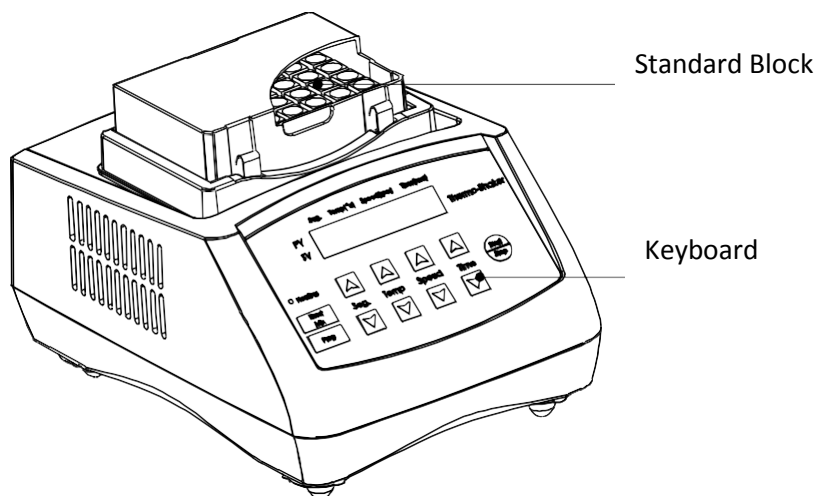
Dimension (DxWxH): 270 x 196 x 170 (mm)

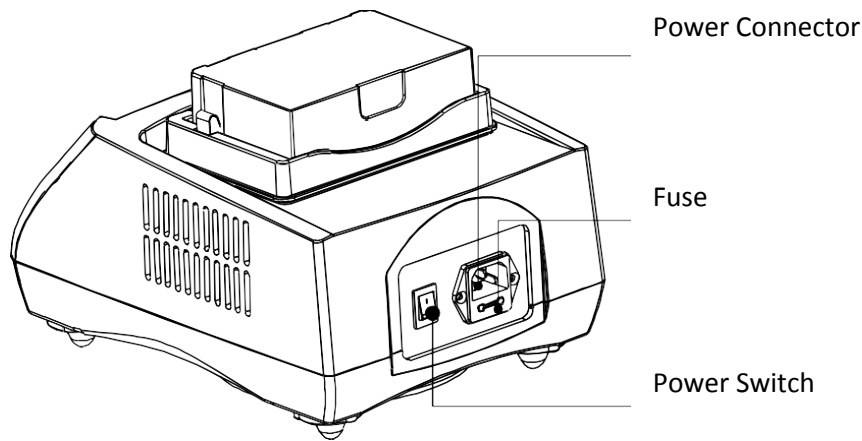
Net Weight: 8.3kg

## INTRODUCTION

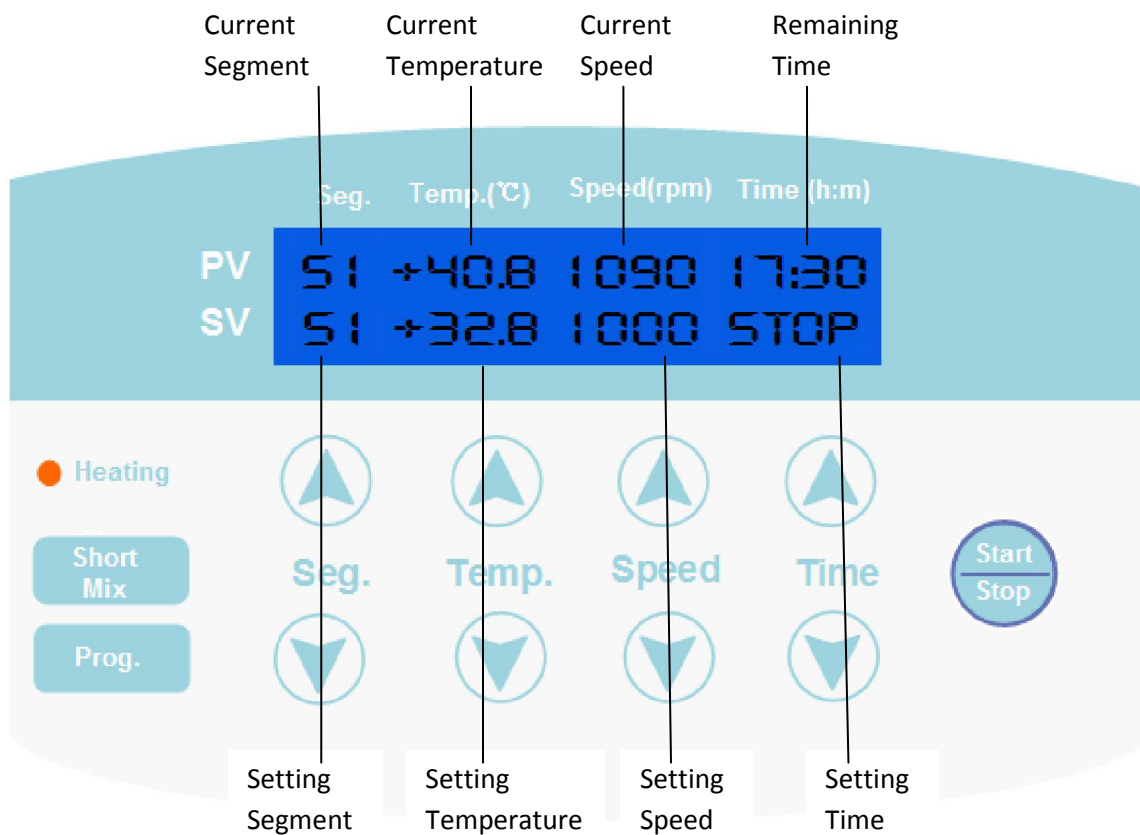
This section mainly describes the instrument's mechanical structure, the keyboard and functions of each key. Please learn this chapter well before the instrument is operated for the first time.

## EQUIPMENT OVERVIEW





## KEYBOARD AND DISPLAY PANEL



### KEY FUNCTION

SEG “UP” and “DOWN” arrow

Key for selecting procedure segment. Five segments can be Selected: (S1, S2, S3, S4, S5).

TEMP “UP” and “DOWN” arrow

Key for setting temperature. Press “UP” or “DOWN” arrow to set the target temperature. Holding “UP” or “DOWN” arrow can quickly set the temperature. Hold the “DOWN” arrow key until it displays “OFF” on the LCD to shut the temperature function off.

SPEED“UP” and “DOWN” arrow	Key for setting speed. Press “UP” or “DOWN” arrow to set the target speed. Hold “UP” or “DOWN” arrow to quickly set speed. Hold “DOWN” arrow key until it displays “OFF” on the LCD to shut off the shaking function. Speed setting unit is 1rpm.
TIME“UP” and “DOWN” arrow	Key for setting time. Press “UP” or “DOWN” arrow to set the target time. Hold “UP” or “DOWN” arrow to quickly set time. Hold “DOWN” arrow key until it displays “OFF” on the LCD to shut off the timing function.
PROG.	Key for programming. Press “PROG” to select segment. Default starting segment is S1. The instrument can implement 4 programs S1-S2, S1-S2-S3, S1-S2-S3-S4, S1-S2-S3-S4-S5.
SHORT MIX	Press to shake. Release to stop. The device shakes at the speed of current selected segment.
START/STOP	Key to start or stop. Press Start/Stop key to start or stop the program. To stop the program while in operation, hold the start/stop key for around 2 seconds.
HEATING	The indicator light flickers when the instrument is heating or cooling. The indicator light stays on when it reaches the temperature.

***Setting Single Temperature, Speed and Timing***

1. When powered on the instrument enters into the initial program with a beep.
2. After 6 seconds, the LCD displays the program. Temperature unit is ° C, speed unit is rpm, and time unit is hour:minute.
3. Press “UP” or “DOWN” arrow of Temp. The temperature setting value will increase or decrease. Press “UP” or “DOWN” arrow of Speed or Time to set shaking speed or time.

Hold “UP” or “DOWN” arrow to quickly increase or decrease the value.

Instrument confirms and autosaves the setting value.

After setting the program S1, press “Start/Stop” to run S1. When the program is finished, an alarm will beep five times. Shaking will be stopped. Temperature is kept at the setting value.

NOTICE: Pressing “UP” or “DOWN” arrow of Temp will autostart the instrument to the setting temperature. If not pressing “UP” or “DOWN” arrow, press “Start/Stop” to start operation.

4. Press “UP” or “DOWN” arrow of Seg. to select Segment. Set the segment’s values according to 3 above. A total of five segments can be set for operation.

### **How to Set Connecting Multi-program**

1. Press "Prog." to 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-programs start from S1.

2. Example: to connect programs S1-S2-S3-S4. Press "Prog.", LCD displays "S1" which is the starting segment which could not be changed. "S2" is the ending segment. Press "UP" arrow of Seg. until it shows "S4". Then press "Prog." to confirm the value. "S1" changes to "S14". Multi-program set is S1-S2-S3-S4.
3. Press "Start/Stop" to operate the multi-program S1-S2-S3-S4.

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

### **How to Shut off the Temperature, Speed and Timing Function**

1. Press "UP" or "DOWN" arrow of Seg. to select one segment from S1, S2, S3, S4, S5.
2. Press "DOWN" arrow of Temp. until it displays "OFF" on the LCD to shut off the thermo function. Similarly, press "DOWN" arrow of Speed or Time to shut off the shaking or timing function.

NOTICE:

- a) Shut off timing function, the timing is  $\infty$ . "CON" is displayed on the LCD.
- b) In multi-program operating, if timing function is shut off in one segment, program will operate at that segment continuously. Hold "Start/Stop" to stop the segment, operate after re-timing.

### **Short Mix**

Hold "Short Mix" key, the instrument starts to shake, release "Short Mix" key, shaking stops. In the short mix mode, LCD displays "600RPM" which is the shaking speed. "023S" is the time, which means the instrument already operated 23 seconds. The time is counted in seconds. More than 999 seconds display is 999S.

NOTICE:

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

### **Temperature Calibration**

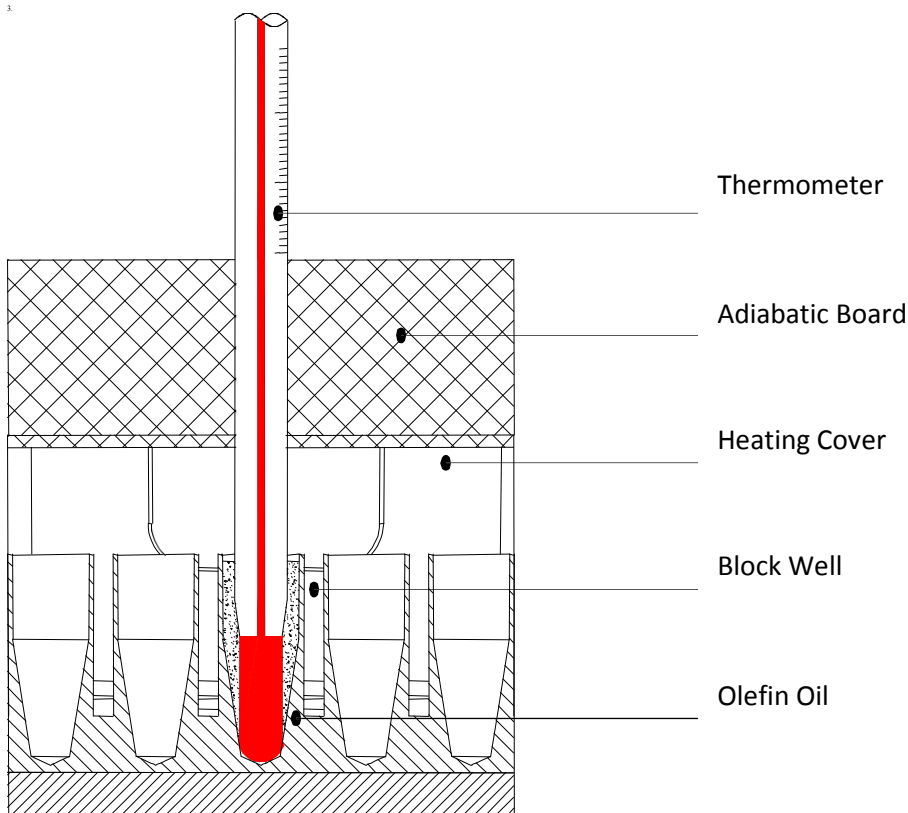
The temperature of the instrument has been adjusted before it is sold. If there is deviation between the actual temperature and the displayed temperature, you can do as follows to calibrate it.

NOTICE:

1. The instrument has 3 calibration temperature points. It is linearly adjusted on 10 ° C, 40 ° C and 100 ° C. The temperature accuracy will be within  $\pm 0.5$  ° C after temperature calibration.
2. Both the environmental and the block temperature should be lower than 30 ° C when calibrating.

**Adjustment Methods:**

1. Power on the instrument, it enters into waiting interface. Make sure the current temperature in display is below 30 ° C. If the temperature is higher than 30 ° C, please wait until it is down below 30 ° C.
2. Inject olefin oil into one of the block wells, and then put a thermometer into this well (the precision of the thermometer should be 0.1 ° C 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 below. (refer to figure below)



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

3. Press “UP and “DOWN” of Seg. simultaneously when the instrument is not operating. The program turns to interface. Practical temperature is behind “P:” which shows example 20.5, and the program auto control the temperature to 10 ° C. The sign “\*” flickers. The value behind “AdjTemp” is the calibration temperature.

When the temperature achieves 10 ° C, “ADJ” and “\*” flicker together, the value behind “P:” is still practical temperature.

4. Wait for 20 minutes, the actual temperature of thermometer is example: 9.8 ° C. Press “UP” or “DOWN” arrow of Temp. to amend the value behind “AdjTemp” to 9.8.



Press “Start/Stop” to confirm.

Program saves the value. Temperature rises to 40 ° C automatically. The sign “\*” flickers.

5. When practical temperature reaches 40 ° C, “ADJ” and “\*” flicker together.
6. Wait for 20 minutes, the actual temperature of thermometer is (example) 38 ° C. Press “UP” or “DOWN” arrow of Temp. to amend the value of “AdjTemp” to 38.0. Press “Start/Stop” to confirm.

Program saves the value. Temperature rises to 100 ° C automatically. The sign “\*” flickers.

7. When practical temperature reaches 100 ° C, “ADJ” and “\*” flicker together.
8. Wait for 20 minutes, the actual temperature of thermometer is (example) 98 ° C. Press “UP” or “DOWN” arrow of Temp. to amend the value behind “AdjTemp” to 98.0. Press “Start/Stop” to confirm.
9. Program turns to interface for operation.

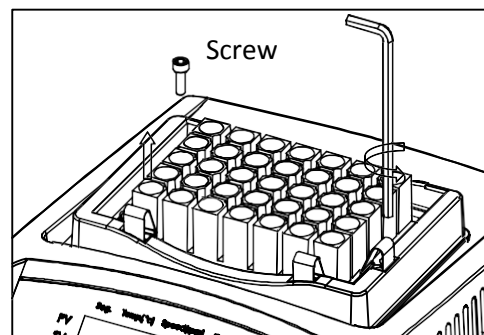
After temperature calibration, the temperature display is the same as the practical temperature of block.

**NOTICE:**

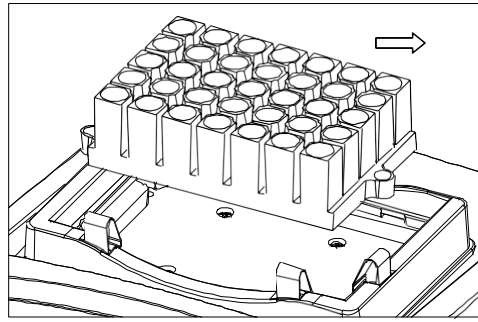
1. During temperature calibration, press “UP” and “DOWN” arrow of Seg. simultaneously to cancel the calibration. The system keeps the former calibration.
2. Do not simultaneously press “UP” and “DOWN” of Seg. unless calibration is really needed.

**Block Replacement**

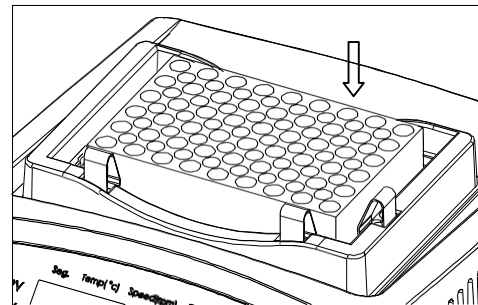
1. Open the cover and pull out the three screws which fix the block to the heating board with the screwdriver.



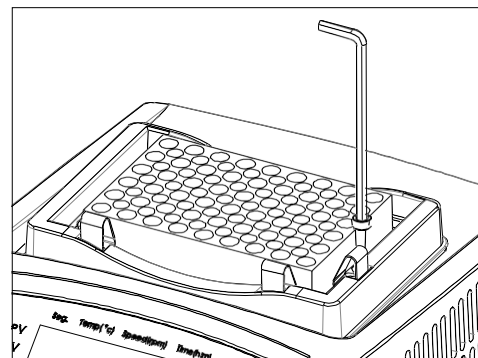
2. Take out the screws pull out the block from the main instrument.



3. Take another block and lay it on the heating board. The block installment holes should line up with the holes in the main instrument.

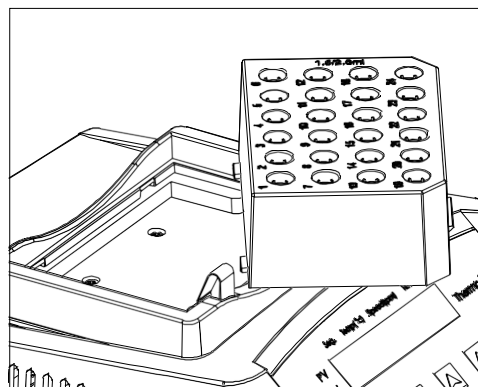


4. Put the screws into the installment holes. Attach the block on the heating board of the instrument with the screwdriver.

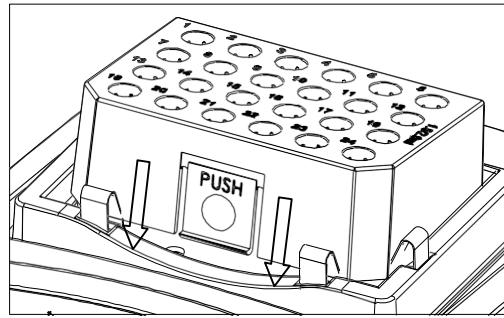


### ***Attaching Tube Stand***

1. Remove the block according to Block Replacement in above. Push the two bulges at rear of the stand to corresponding hollows of the base frame.

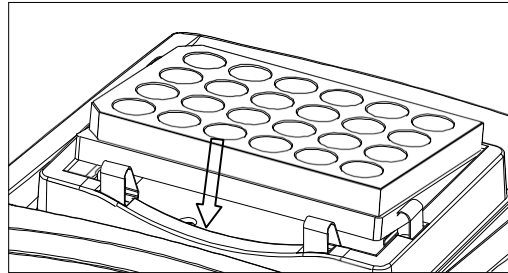


2. Push and press the front part of the stand until the “PUSH” button locks in the base frame.



### ***Attaching Plates***

Press one long side of the plate into the base frame. Press another side until the spring locks the plate. Make sure the plate is fastened.



## TROUBLE SHOOTING

Issue	Possible Causes	Solution
No signals on the display when power on.	No power	Check the power
	Broken fuse	Contact BT Lab Systems
	Broken switch	Contact BT Lab Systems
	Other	Contact BT Lab Systems
The actual and displayed temperatures are much	Broken sensor	Contact BT Lab Systems
“OPEN” in the temperature display with a beep alarm.	Temperature sensor is broken or ambient temperature is below 0°C	Contact BT Lab Systems
“SHORT” in the temperature display with a beep alarm.	Temperature sensor is broken or ambient temperature is below 0°C	Contact BT Lab Systems
“ERR” in the temperature display with a beep alarm.	Temperature sensor is broken or ambient temperature is below 0°C	Contact BT Lab Systems
No heating or cooling	Broken sensor or broken TE module	Contact BT Lab Systems
Button does not work	Broken switch	Contact BT Lab Systems
Very slow cooling or cooling temperature cannot reach the target.	Ambient temperature too high	Bring down ambient temperature
	Broken fan	Contact BT Lab Systems
	Broken TE module	Contact BT Lab Systems
“ERR” in the speed display continuously with a beep	Engine blocked	Contact BT Lab Systems
“ERR” in the speed display intermittently with a beep alarm	Engine stuck	Contact BT Lab Systems

## TECHNICAL SUPPORT

BT Lab Systems offers technical support for all of its products. If you have any questions about the product’s use or, operation, please contact BT Lab Systems at the following:

E-Mail: [info@BTLabSystems.com](mailto:info@BTLabSystems.com)