MiniTurbo
Thermal Cycler
TCMI-0810

Operation Manual

Ver 1.0

BLUE-RAY BIOTECH

Table of Contents

1. Safety Precautions

Before using the **MiniTurbo**, please read this operation manual carefully and pay attention to the safety information. To guarantee problem free operation, please follow the instructions and safety precautions to ensure safe operation of the **MiniTurbo**. It is essential to observe the following:

1. Do not use the device in a potentially explosive environment or with potentially explosive chemicals.
2. Avoid the device in direct sunlight.
3. Choose a flat, stable surface capable of supporting the weight of the device.
4. Make sure the power source conforms to the required power supply specifications.
5. To avoid electric shock, make sure the device is plugged into a grounded electrical outlet.
6. Do not allow water or any foreign objects to enter the various openings of the device.
7. Switch off the device and unplug the mains cable before cleaning or performing service on the device, for instance when replacing the fuses.
8. Repairs should be carried out by authorized service personnel only.
9. Safety label

High Temperature Label: Please be aware of the heated components.

2. General Description

The **MiniTurbo** is a simple, portable and affordable thermal cycler. It is easy to move around the laboratory and allows a Polymerase Chain Reaction (PCR) to be run immediately. This portable instrument provides the same precise test results as a normal sized instrument. It is a well-designed, reliable and convenient thermal cycler that can be used anywhere.

2.1 Features

- The instrument is compact in size and portable
- Light, handy and modern design
- 8 x 0.2ml PCR tube capacity
- One button operation makes it easy to operate
- The heated lid prevents the formation of condensation
- Precise temperature control
- Fast ramping rate
- Open system
- Fully programmable

2.2 Product Overview

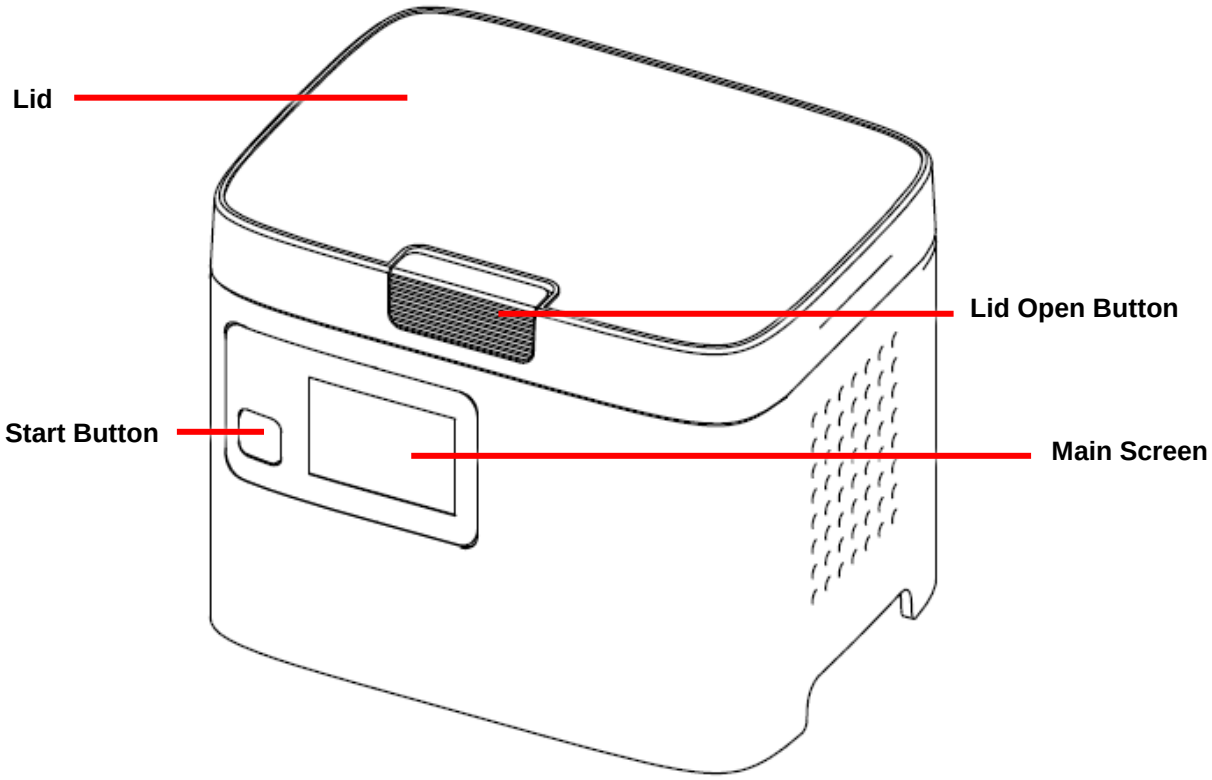

Figure 1. Front view.

Table 1. Detailed description for front view

Name	Function
Main Screen	The main screen displays the temperature before the protocol is run and the count-down time while the protocol is being run.
Start Button	Starts the protocol running or switches a routine.
Lid	The heated lid is designed to prevent condensation inside the reaction vessels during PCR temperature cycling.
Lid Open Button	Press the button and the lid will open easily.
Air Vents	For air output. Do not block the vents during operations.

Note
Please do not touch or press the main screen when moving or lifting the device which may damage it.

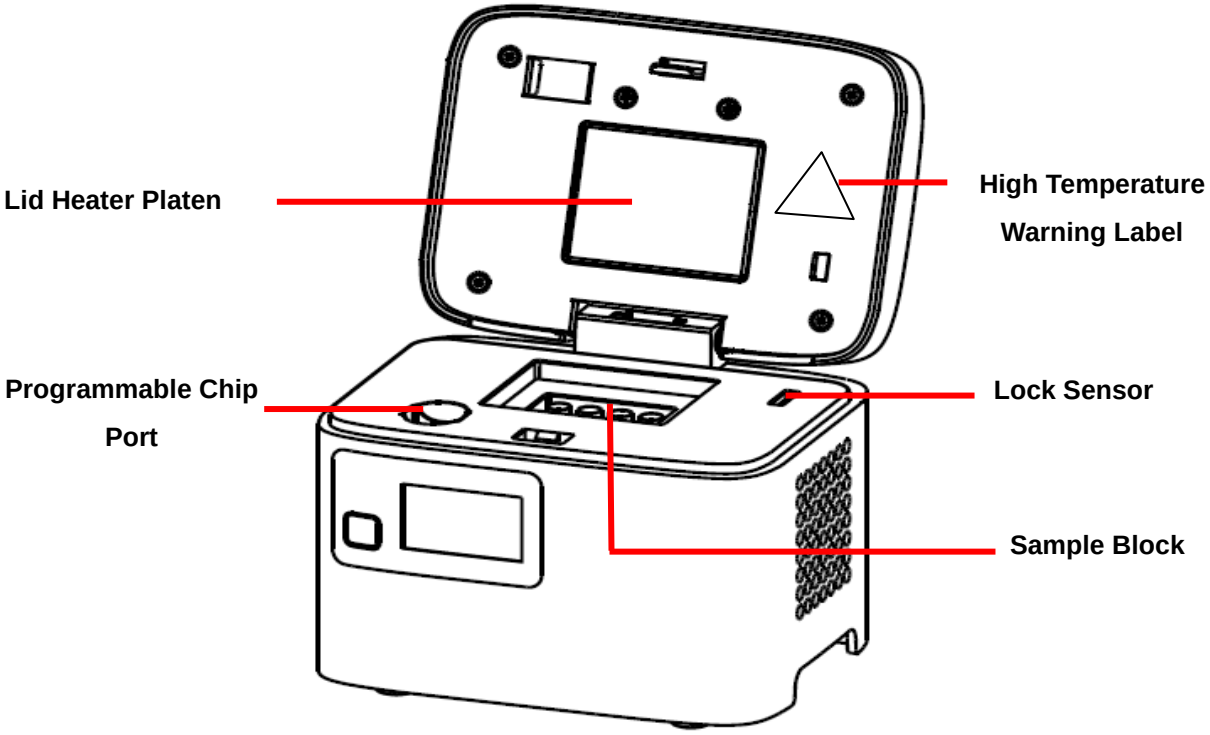

Figure 2. Front view with lid open.

Table 2. Detailed description for front view with lid open

Name	Function
High Temperature Warning Label	During and after PCR operation, the lid heater platen and the sample block may become very hot (up to 105°C). Please be aware of the high temperature.
Lid Heater Platen	The heater platen is designed to prevent condensation inside the reaction vessels and apply consistent pressure to the top of the reaction vessels. This ensures appropriate contact between the reaction vessels and the sample block for better heat conduction. It will also help prevent the leakage of sample vapor caused by weak vessel caps or poor sealing.
Sample Block	The sample block holds the reaction vessels.
Protocol Chip Port	The programmable chip port recognizes and loads the setting protocol automatically when the programmable chip is inserted.
Lock Sensor	The lock sensor will detect the condition of the lid. The function of the lock sensor can be changed in the protocol. There are two possible conditions if the lid is opened while a protocol is running: Lock sensor function is on: When lid opens, the running protocol will pause. Lock sensor function is off: When lid opens, the running protocol will continue.

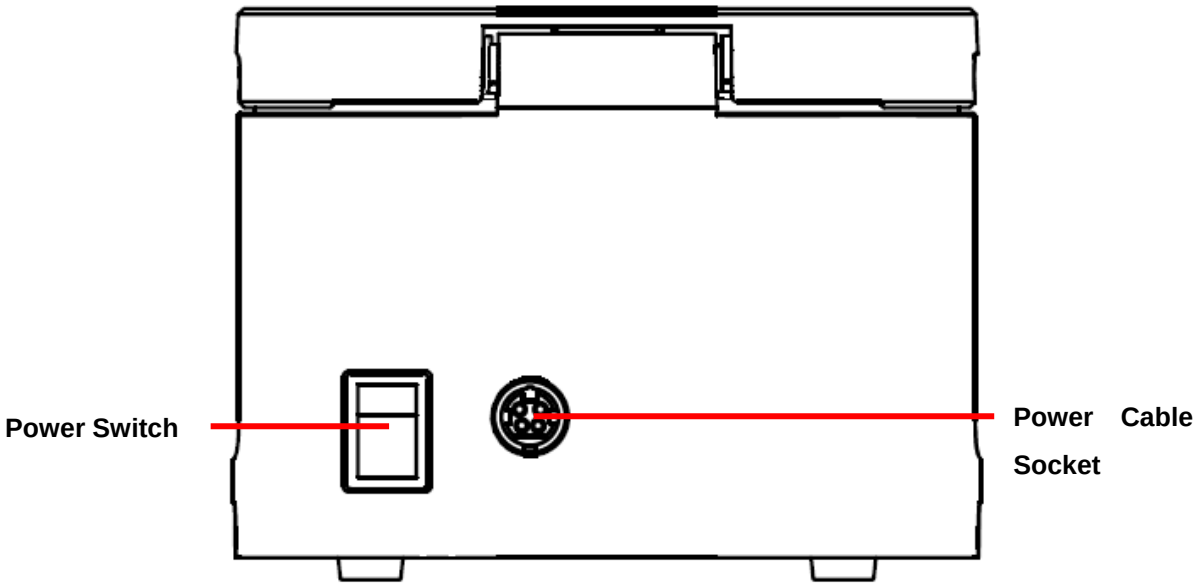

Figure 3. Rear view.

Table 3. Detailed description for rear view

Name	Function
Power Cable Socket	Power cable socket compartment.
Power Switch	Power On/Off switch.

3. Unpacking

3.1 Unpacking List

Open the **MiniTurbo** package and confirm that all the listed items are included:

- **MiniTurbo** unit x 1
- Programmable Chip x 1
- **MiniTurbo** Writer x 1
- **MiniTurbo** Writer USB connector x 1
- USB Flash Drive x 1
- AC power adapter x 1
- AC power cord x 1

If there are any items missing, damaged, or there are incorrect items in the package, please contact your distributor or sales representative immediately.

4. Operation

4.1 Initial Operation

Place the device on a steady and flat table. Check the power source is compatible then connect the DC-in plug to the DC-in jack at the rear of the device.

Turn on the device by using the power switch at the rear of the unit. The main screen will light up for 2 seconds and there will be a “beep”. This indicates that the power is on. Switch off the device when not in use.

4.2 Lid Opening/Closing

To open the lid, push the lid open button inwards and lift the lid to the upright position, as shown in Figure 4.

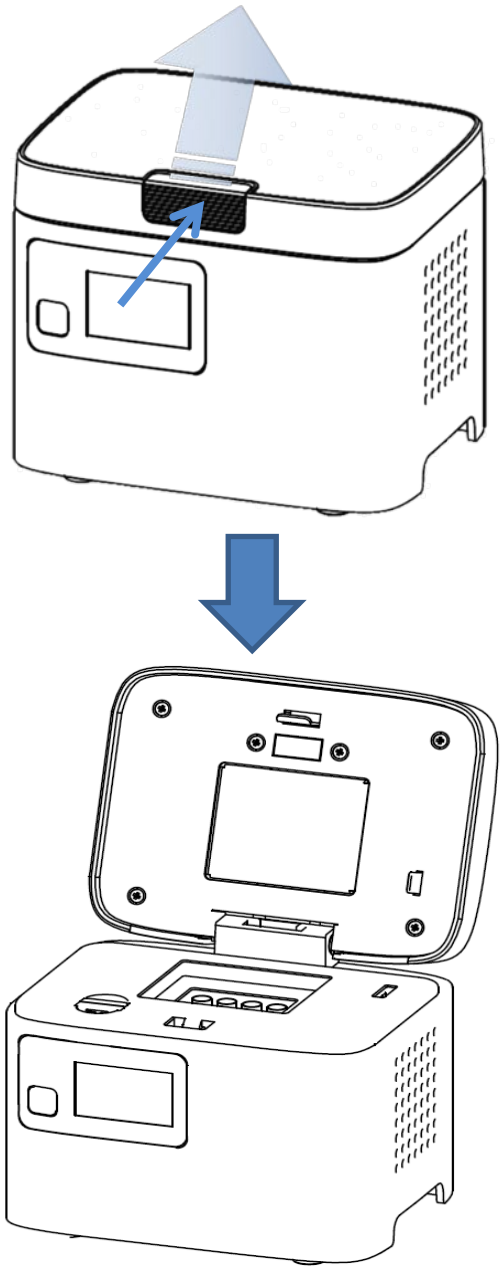

Figure 4. Opening the lid.

To close the lid, push the lid downwards to the lock position. Make sure the lid is right down as show in **Figure 5**.

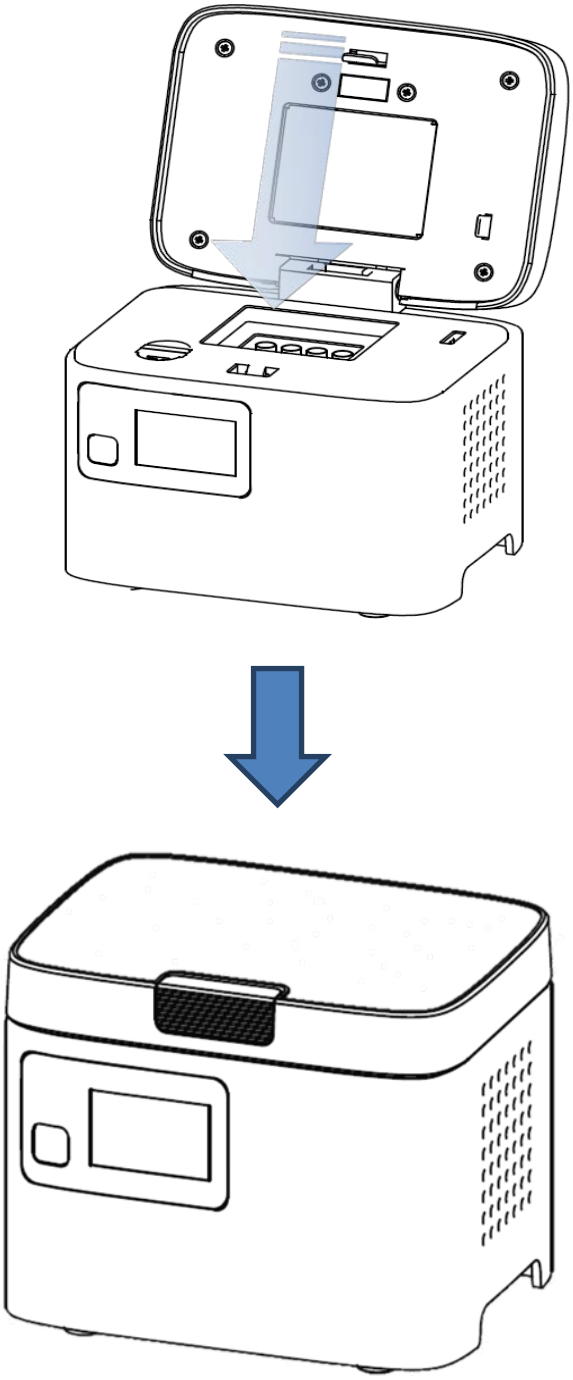

Figure 5. Closing the lid.

4.3 Protocol Chip

The protocol chip has stored protocols and there is no need to enter any protocols by hand. This prevents setting errors and makes sure that the target nucleic acid will be amplified properly. When

the protocol chip is placed into the port, the **MiniTurbo** will recognize it automatically.

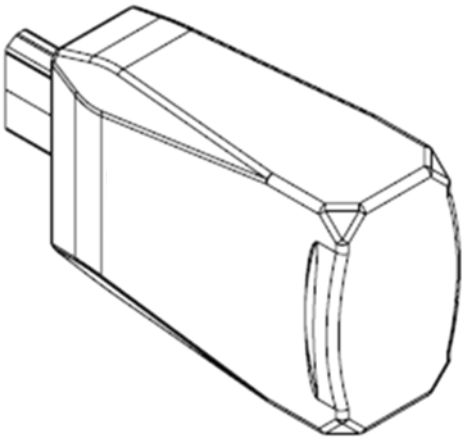

Figure 6. Protocol Chip.

4.4 Heated Lid

The heated lid heats the air in the upper part of the sample vessels to a temperature higher than the reaction mixture. This prevents condensation of the evaporated water vapor on the vessel walls and keeps the concentration of the reaction mixture unchanged during the heating and cooling cycles. The heater platen also applies pressure to the caps or sealing film on the vessels to prevent vapor loss and cross contamination between samples.

4.5 Loading the Reaction Vessel

For optimal performance of the **MiniTurbo**, the recommended sample volume for 0.2 ml tubes is 20-50 µl. Please make sure the tube caps are sealed tightly to prevent evaporation and overflow of liquid. Make sure the tubes are pushed straight down into the well so that they are all at the same level when the lid is closed.

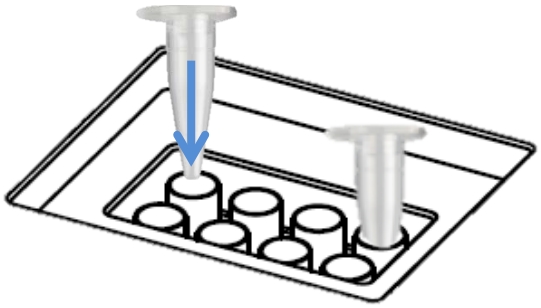

Figure 7. Loading the reaction vessels.

4.6 Main Screen

The information displayed on the main screen will include the protocol number, the temperature of the heater, and the protocol remaining time as in the figure below.

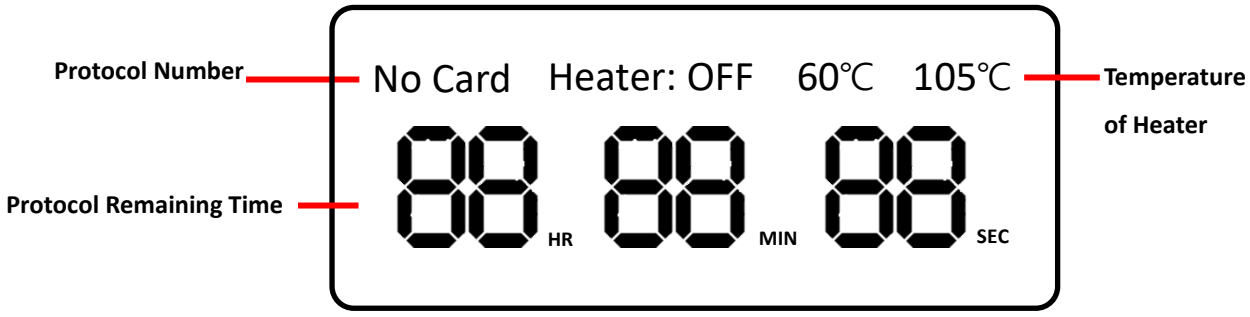

Figure 8. Main screen overview.

4.7 Start Running

After the **MiniTurbo** has recognized the protocol in the Protocol Chip, please push the start button to run the protocol. While the protocol is running, the start button acts as a change-over switch that toggles the main screen display between remaining time and heater temperature. If necessary, the start button can be pressed for 3 seconds to stop the protocol.

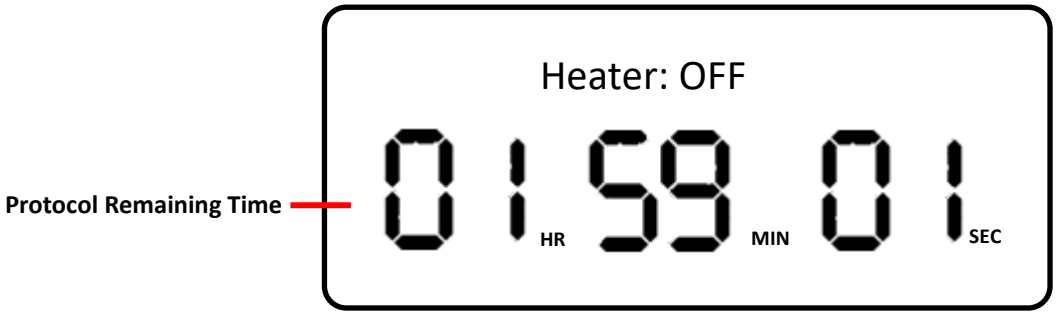

Figure 9. Main screen shows remaining time during running.

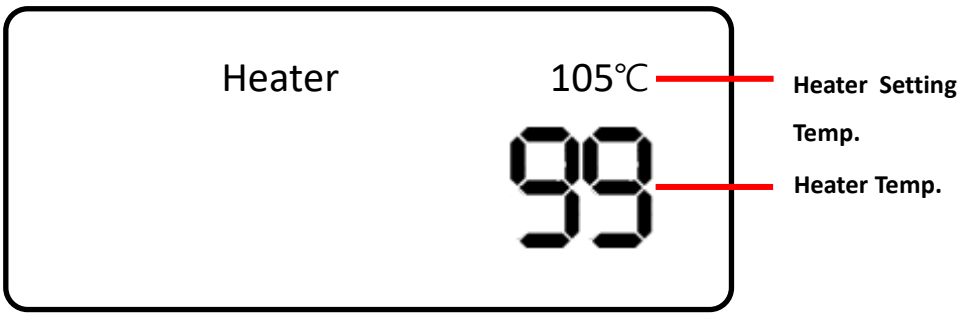

Figure 10. Main screen shows heater temperature during running.

5. Preventative Maintenance

5.1 Cleaning the Unit

Please ensure that no liquid is spilled onto or into the unit. In addition, periodically apply soft lint-free cloth and deionized water on the unit, which is to remove dust and other residue that comes with normal operation of the unit. A vacuum cleaner can be used to remove dust from the air vents.

5.2 Cleaning the Heated Lid

Make sure the **MiniTurbo** is turned off, unplugged and cooled down. Use mild detergents to clean material from the lid. A Kimwipe™ dipped in 70% ethanol will help remove residue from the sealing tape. Make sure the lid is dry prior to plugging in the power cable.

6. Troubleshooting

6.1 General Problems

Problem	Cause	Action
The display remains off even when power is switched on.	Power is not reaching the system.	Check power source voltage.
	The power cord is not properly plugged into the socket.	Reconnect the power cord.
	Faulty power switch.	Return the unit for service.
Lid will not open or close.	Foreign object between lid heater and sample block.	Remove the foreign object or matter.
	Faulty lid lock mechanism.	Return the unit for service.
The display goes off.	Faulty backlight.	Return the unit for service.
	Faulty LCD panel	Return the unit for service.
Cycle time is too long.	Operating environment temperature may be unsuitable.	Make sure the temperature of the operating environment is between 15 and 30°C.
	The electronic cooling element may be damaged or aged.	Return the unit for service.
	Faulty temperature sensor.	Return the unit for service.
Lid heater does not work.	Lid heater is set to off.	Check Lid Temperature setting in protocol.
	Lid sensor problem.	Return the unit for service.

6.2 Error Messages

The instrument will show an error message on the main screen and stop working until the problem has been solved. Please see the table below.

Message	Cause	Action
Er01- Heater overheat	Heater over 120˚C	Reboot the unit.
Er02- Heater cannot reach the setting temperature.	Faulty heater.	Reboot the unit.
Er03- Heater has lost temperature accuracy	The heater temperature has been over ±3˚C for 30 seconds.	Reboot the unit.
Er04- Heater temperature sensor error.	Heater temperature sensor problem.	Reboot the unit.
Er05- Block temperature sensor error.	Block temperature sensor problem.	Reboot the unit.

Er06- Block temperature abnormal	Cannot reach set temperature in 1 minute.	Reboot the unit.
Er07- Block overheating.	The block temperature is over the set temperature by 20°C.	Reboot the unit.
Er08- Block has lost temperature accuracy.	The block temperature has gone over ±3.0°C for 10 seconds.	Reboot the unit.
Er09- Cannot read the protocol even when Protocol Chip is correctly inserted.	Faulty Protocol Chip.	Return the Protocol Chip for service.
	Faulty protocol running port	Return the unit for service.
	Protocol Chip is not properly plugged into the port.	Check the unit and reconnect the Protocol Chip.
Er10- Abnormal interruption of power supply.	Instrument shut down while a protocol was running.	Push the start button to reset and start a new protocol.
	Power supply was interrupted while a protocol was running.	

If the same error message appears after rebooting, please return the unit for service.

Appendix A: Technical Specifications

Sample Block	
2*4 well Block	0.2 ml PCR tube /w flat or dome cap
Block Temperature	
Block Temperature Range	4 to 99°C
Max Heating Rate	5.5 °C/sec
Max Cooling Rate	3.4 °C/sec
Temperature Accuracy	+/- 0.4°C
Temperature Uniformity Across Block	+/- 0.4°C
General	
Display	A group of 6-digits display
Heated Lid	Yes, fixed 105°C (pre-heat to 60°C)
Footprint Dimensions (H x W x D)	104 mm x 136 mm x 102 mm
Weight	1 kg
Adapter	VAC 100-240, 50/60 Hz, 120 W
Standard	CE, RoHS
Operating Temperature	15 ~ 30°C
Operating Humidity	65% or less RH

Appendix B: CE Declaration

CE

BLUE-RAY BIOTECH CORP.
4F., No. 31, Sec. 2, Chang-An E. Rd.,
Zhong-Shan Dist., Taipei City 10456,
Taiwan (R.O.C.)

Declaration of Conformity

Product Name: Thermal Cycler

Model Names: MiniTurbo

All models comply with the following European standards:

EMC: EN 61326 (Group 1, Class A)

Safety: EN 61010-1 and EN 61010-2-101

To the best of my knowledge and belief, these units conform to these standards.

Name: Jimmy Kuo
Position: Quality Assurance Manager
Issue Date: 2018.08.03

Blue-Ray Biotech Corp.

4F., No. 31, Sec. 2, Chang-An E. Rd., Zhong-Shan Dist.,

Taipei City 10456, Taiwan (R.O.C.)

P/N: 401-MPBO03-10