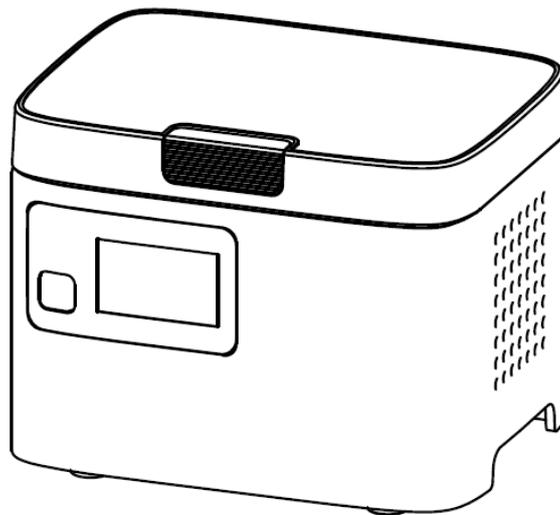


# MiniTurbo Thermal Cycler TCMI-0810

## Operation Manual

Ver 1.0



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# Table of Contents

<b>1. Safety Precautions .....</b>	<b>1</b>
<b>2. General Description .....</b>	<b>2</b>
2.1 Features .....	2
2.2 Product Overview .....	3
<b>3. Unpacking .....</b>	<b>6</b>
3.1 Unpacking List .....	6
<b>4. Operation .....</b>	<b>7</b>
4.1 Initial Operation .....	7
4.2 Lid Opening/Closing .....	7
4.3 Programmable Chip .....	8
4.4 Heated Lid .....	9
4.5 Loading the Reaction Vessel .....	9
4.6 Main screen .....	9
4.7 Start Running .....	10
<b>5. Preventative Maintenance .....</b>	<b>11</b>
5.1 Cleaning the Unit .....	11
5.2 Cleaning the Heated Lid .....	11
<b>6. Troubleshooting .....</b>	<b>12</b>
6.1 General Error .....	12
6.2 Error Messages .....	12
<b>Appendix A: Technical Specifications .....</b>	<b>14</b>
<b>Appendix B: CE Declaration .....</b>	<b>15</b>

# 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 be moved around and allows a Polymerase Chain Reaction (PCR) to be run immediately. This portable instrument provides the same precise test results as a normal benchtop thermal cycler. It is a well-designed, reliable and convenient thermal cycler that can be used anywhere.

### 2.1 Features

- The small size makes the instrument very easy to move about.
- Light, handy and modern design.
- 8 x 0.2ml PCR tube capacity.
- Easy-to-operate. One button to operate.
- The heated lid prevents the formation of condensation.
- Precise temperature control.
- Fast Ramping Rate.
- Open system. Fully programmable

## 2.2 Product Overview

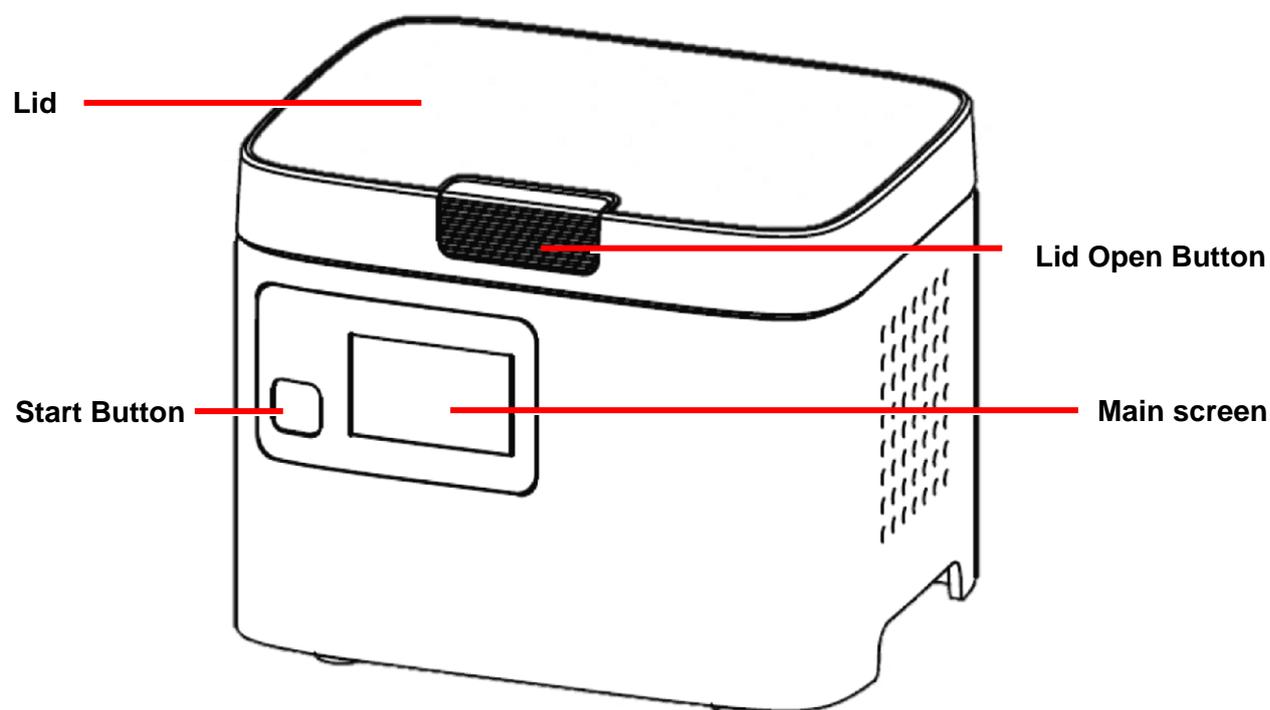


Figure 1. Front view

Table 1. Detailed description for front view

Name	Function
<b>Main screen</b>	The main screen displays the heater temperature and the count-down time during the protocol running.
<b>Start Button</b>	Start the protocol running or switch count-down time and heater temperature during the protocol running.
<b>Lid</b>	The heated lid is designed to prevent condensation inside the reaction vessels during PCR temperature cycling.
<b>Lid Open Button</b>	Press the button to open the lid.

### Note

Please do not touch, or put pressure, on the main screen when moving or lifting the instrument, this might damage it.

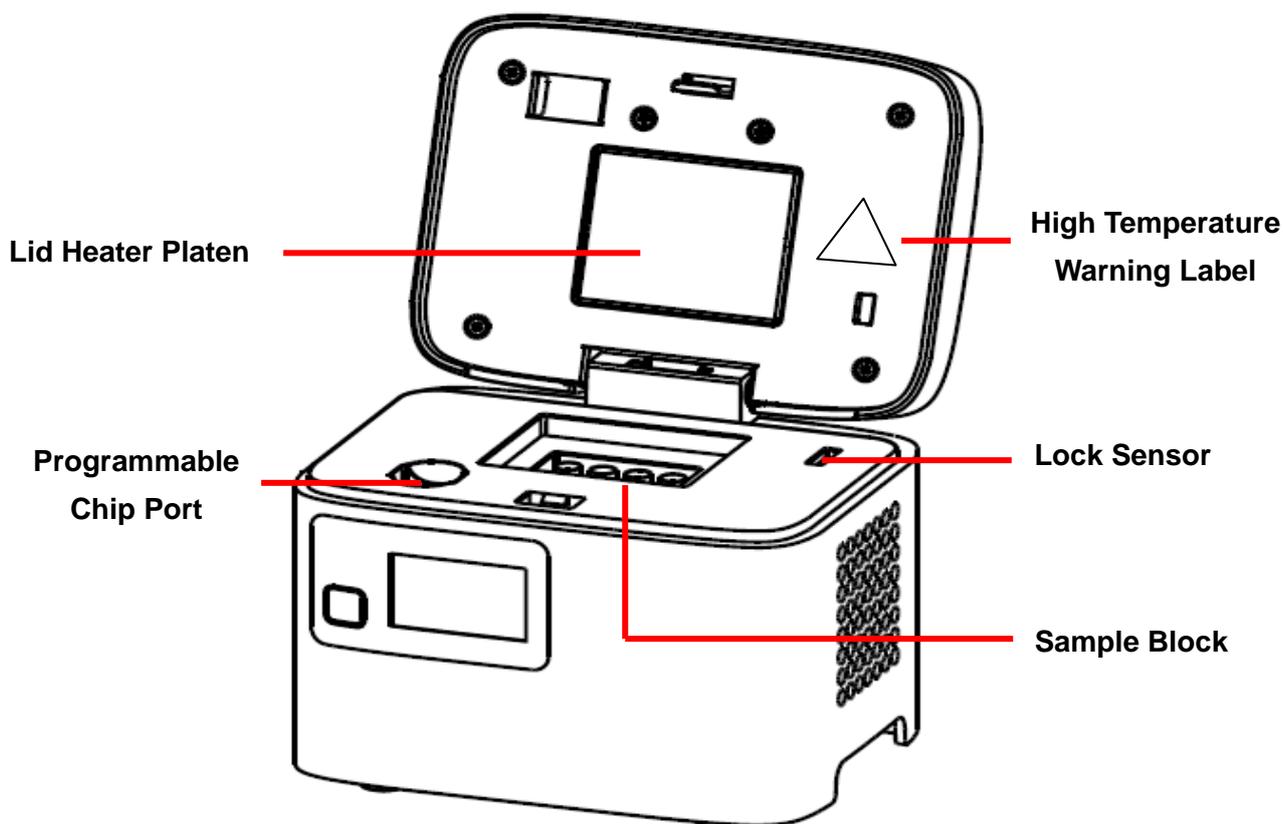


Figure 2. Front view with lid open

Table 2. Detailed description for front view with lid open

Name	Function
<b>High Temperature Warning Label</b>	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.
<b>Lid Heater Platen</b>	The heater platen is designed to prevent condensation inside the reaction vessels and to apply consistent pressure to the top of the reaction vessels. This ensures good 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.
<b>Sample Block</b>	The sample block holds the reaction vessels.
<b>Programmable Chip port</b>	The Programmable Chip Port recognizes the different protocols automatically when the Programmable chip is inserted.
<b>Lock Sensor</b>	The lock sensor will detect the condition of the lid. The function of the lock sensor can be changed in the protocol.

	<p>With lock sensor function: The running protocol will be paused during the run.</p> <p>Without lock sensor function: The running protocol will not be paused even when lid is opened.</p>
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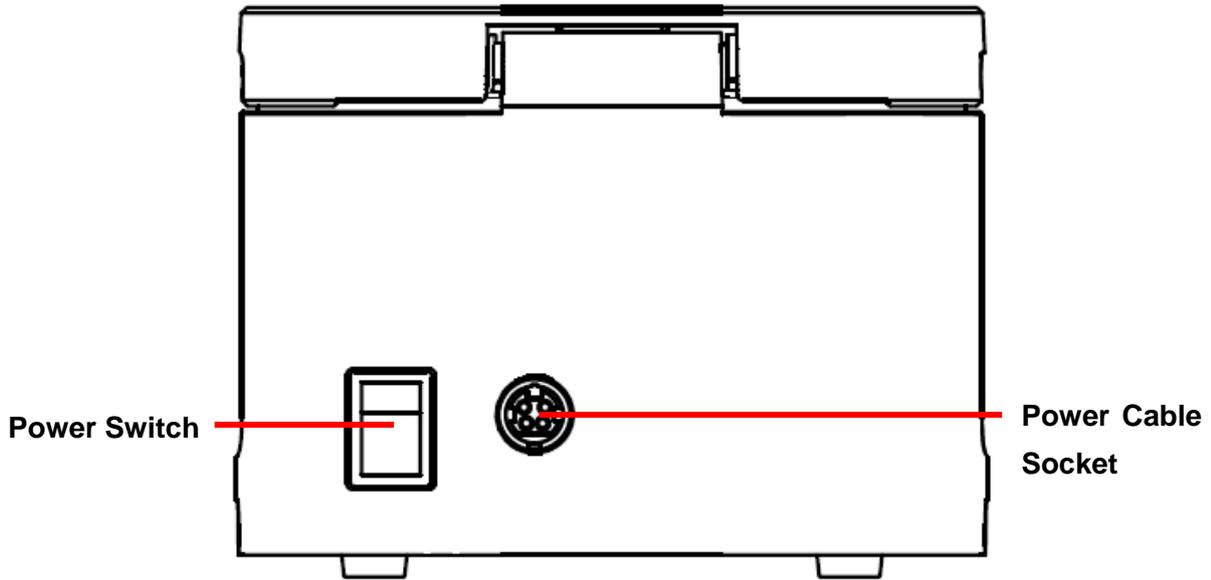


Figure 3. Rear view

Table 3. Detailed description for rear view

Name	Function
<b>Power Cable Socket</b>	Power cable socket compartment.
<b>Power Switch</b>	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
- Software Operation manual 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, flat table. Check that the power source is compatible. Connect the DC-in plug to the DC-in jack at the rear of the device.

Switch the device on 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 power is on. Switch off the device when stop using.

### 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.

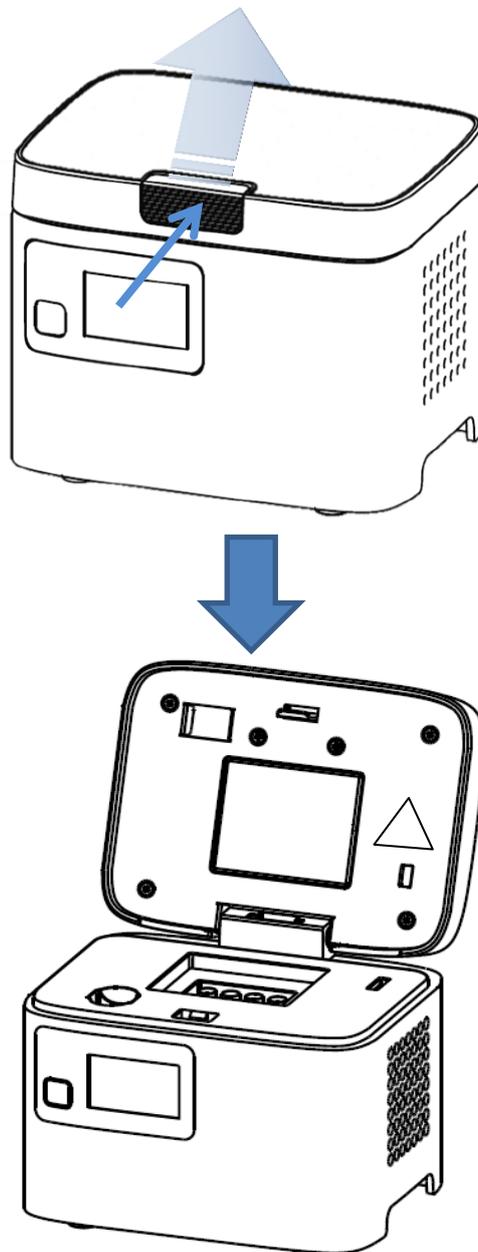


Figure 4. Opening the lid

To close the lid, push the lid downwards until the catch clicks into position. Make sure the lid is right down as show in Figure 5

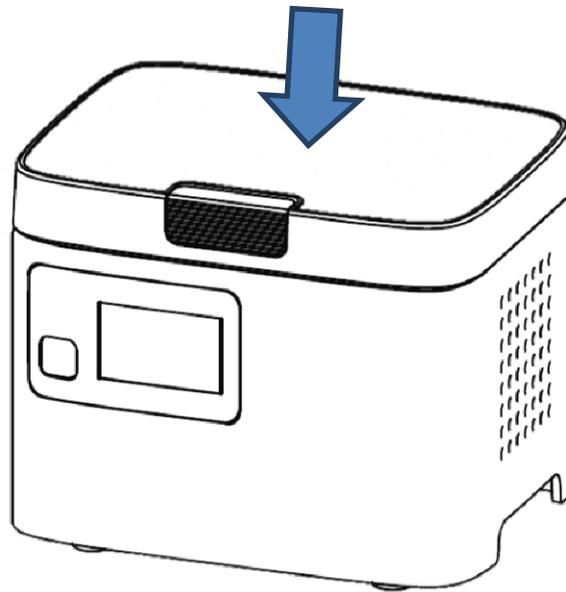


Figure 5. Closing the lid

### 4.3 Programmable Chip

The protocol has been programed via PC software. The protocol has been storage in the Programmable Chip. There is no need to do any protocol setting process on the machine. This prevents setting errors and makes sure that the target nucleic acid will be amplified properly. When the Programmable Chip is placed into the port, the MiniTurbo will recognize it automatically.

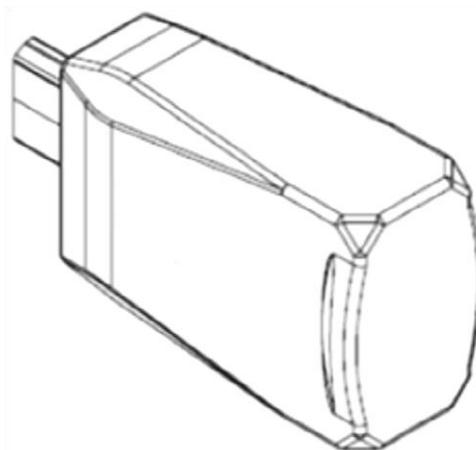


Figure 6. Programmable Chip

#### 4.4 Heated Lid

The Heated Lid raises the temperature of the air in the upper part of the sample vessels to a higher temperature 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 0.2ml tubes is 20-50 $\mu$ l. 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.

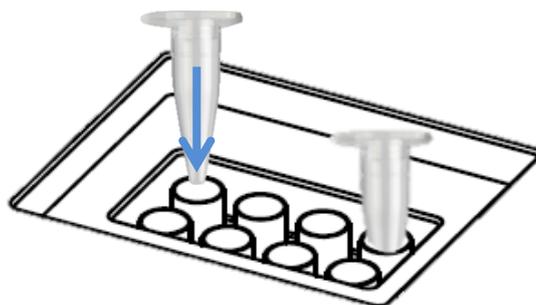


Figure 7. Loading the Reaction Vessel

#### 4.6 Main screen

The information displayed on the **Main Screen** includes the protocol number, the temperature of the heater and the protocol running time as in the figure below.

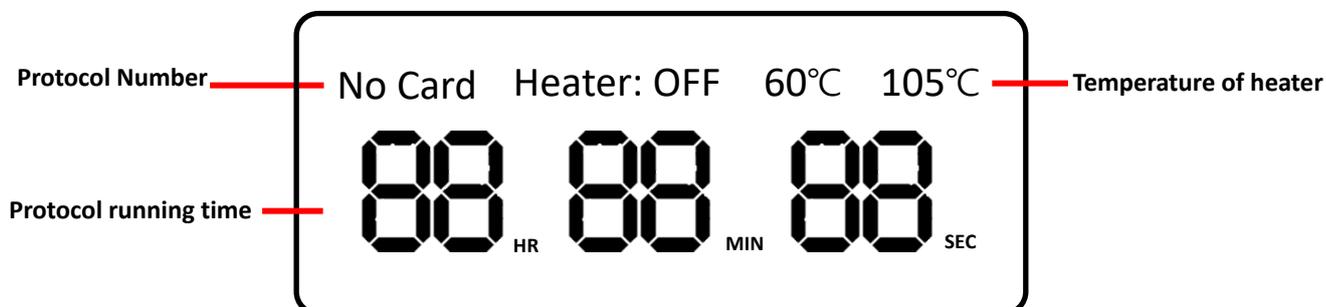


Figure 8. Main Screen Overview

## 4.7 Start Running

After the MiniTurbo has recognized the protocol in the Programmable 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 countdown time and heater temperature. If necessary, the start button can be pressed for 3 seconds to stop the protocol.

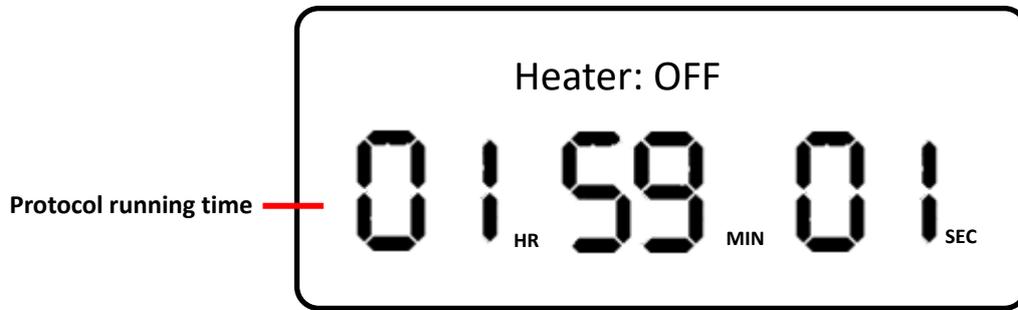


Figure 8. Main Screen shows countdown time during running

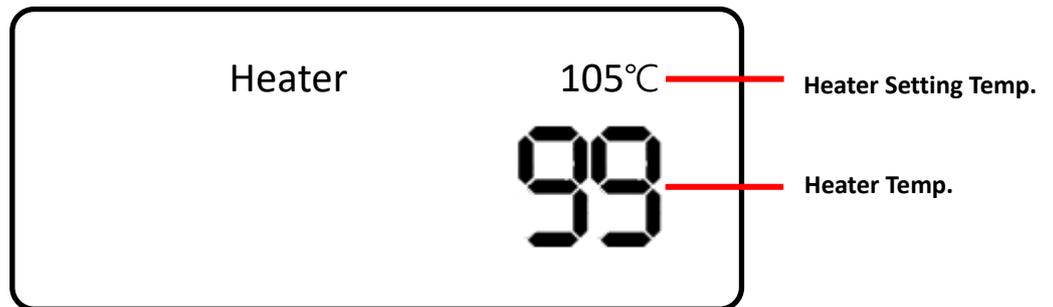


Figure 9. Main Screen shows heater temperature during running

## 5. Preventative Maintenance

### 5.1 Cleaning the Unit

Please ensure that no liquid is spilled onto or into the unit. In addition, periodically use a soft lint-free cloth and a little de-ionized water to wipe the unit clean and remove dust and other residue that comes with normal operation of the unit. Use a vacuum on the air vents to remove dust.

### 5.2 Cleaning the Heated Lid

Make sure the **MiniTurbo** is turned off, unplugged from the mains and has cooled down. Use a mild detergent to clean any material residue from the lid. A Kimwipe™ dipped in 70% ethanol will help to remove residue from the marker paint from the tube. Make sure the lid is completely dried before replacing the power cable.

## 6. Troubleshooting

### 6.1 General Error

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 can't not be opened or closed.	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 setting software.
	Lid sensor problem.	Return the unit for service.
Error messages.	Refer to list of error messages in <b>Section 6.2</b> below.	Check the nature of the error and take the suggested action.

### 6.2 Error Messages

The instrument will show an error message on the main screen and stop working until the problem has been solved, 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 $\pm 3^{\circ}\text{C}$ for 30 seconds.	Reboot the unit.

<b>Er04- Heater temperature sensor error.</b>	Heater temperature sensor problem.	Reboot the unit.
<b>Er05- Block temperature sensor error.</b>	Block temperature sensor problem.	Reboot the unit.
<b>Er06- Block temperature abnormal</b>	Cannot reach set temperature in 1 minute.	Reboot the unit.
<b>Er07- Block overheat.</b>	The block temperature is 20 °C over the set temperature.	Reboot the unit.
<b>Er08- Block has lost temperature accuracy.</b>	The block temperature has gone over $\pm 3.0^{\circ}\text{C}$ for 10 seconds.	Reboot the unit.
<b>Er09- Cannot read the protocol even when Programmable chip is correctly inserted.</b>	Faulty Programmable chip.	Return the Programmable chip for service.
	Faulty protocol running port	Return the unit for service.
	Programmable chip is not properly plugged into the port.	Check the unit and reconnect the Programmable chip.
<b>Er10- Abnormal interruption of power supply.</b>	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	
2x4 well Block	0.2 ml PCR tube w/ flat or dome cap
Block Temperature	
Block Temperature Range	25 to 99 °C
Max Heating Rate ( °C/sec.)	5.5
Max Cooling Rate ( °C/sec.)	3.4
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(HxWxD)	104mm x 136mm x 102mm
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



**BLUE-RAY BIOTECH CORP.**  
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Taiwan (R.O.C.)

**Declaration of Conformity**

**Product Name:** Thermal Cyclers

**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.**

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