



## Operational Manual

# Gradient PCR Machine LMGP-502

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## 1. Safety Measures

The following fundamental safety precautions must be followed during all handling, maintenance, and repair of this instrument. Ignoring these instructions or the warnings found elsewhere in this manual may compromise the instrument's safety features and intended functionality.

- This instrument is designed for normal indoor use only.
- Users should not attempt to open or repair the instrument themselves, as this may lead to electric shock. All repairs should be carried out by professional personnel.
- Before connecting the power supply, ensure the supply voltage matches the instrument's rated voltage. Also, confirm that the power outlet's load capacity is not less than what the instrument requires.
- If the power cord is damaged, it must be replaced with one of the same type and specifications. Do not place heavy objects on the power cord during operation and avoid positioning the cord in high-traffic areas.
- Always grasp the plug itself when plugging in or unplugging the power cord. Ensure the plug is fully inserted into the socket. Never pull the cord to unplug it.
- The instrument should be installed in an environment with low humidity and minimal dust, away from water sources, direct sunlight, and strong light. The area should be well-ventilated and free from corrosive gases or electromagnetic interference. Keep the device away from heat sources such as stoves and heaters. Do not operate the instrument in damp or dusty environments.
- Turn off the power when the instrument is not in use. If the device will not be used for an extended period, unplug it and cover it with a soft cloth or plastic sheet to prevent dust accumulation.

Immediately unplug the instrument from the electrical outlet if the following occurs

- Liquid has spilled inside the instrument
- The instrument has been exposed to rain or water
- The instrument is malfunctioning, particularly if unusual noises or odors are detected.
- The instrument has been dropped, or its casing is damaged.
- There is a significant change in the instrument's performance or functionality.

## 2. Introduction

**Gradient PCR Machine LMGP-502** works within range of 4 to 99.9°C. Its high-speed heating and cooling rates ensure efficient thermal cycling. Its user-friendly interface enables real-time monitoring and seamless operation management. It features multiple login management and large data storage, for secure access and protocol retrieval. Our Gradient PCR Machine is ideal for molecular biology, diagnostics, and research settings.

## 3. Features

- Semiconductor technology
- Touchscreen Display
- Block/Tube Temperature Control
- Program Pause Function
- USB Connectivity

## 4. Specifications

<b>Model No</b>	<b>LMGP-502</b>
<b>Single Step Time</b>	1 to 59m59s
<b>Temperature Range</b>	4 to 99.9°C
<b>Sample Capacity</b>	0.2ml × 96
<b>Gradient</b>	12
<b>Gradient Temperature Uniformity</b>	±0.3°C
<b>Gradient Temperature Accuracy</b>	±0.3°C
<b>Gradient Temperature Range</b>	30 to 99.9°C
<b>Gradient Temperature Difference Range</b>	0.1 to 30°C
<b>Maximum Heating Rate</b>	4.5°C/s
<b>Maximum Cooling Rate</b>	4°C/s
<b>Temperature Uniformity</b>	±0.25°C
<b>Temperature Accuracy</b>	±0.20°C
<b>Temperature Display Resolution</b>	0.1°C
<b>Hot Cover Temperature Range</b>	30 to 110°C
<b>Maximum Steps of the Program</b>	30
<b>Program Max. Cycle Number</b>	99 to 599
<b>Time Increment/Decrement</b>	599s
<b>Temperature Increase/Decrease</b>	-9.9 to 9.9°C
<b>Insulation Temperature</b>	16°C
<b>Program Storage Quantity</b>	Greater than 100
<b>Power Consumption</b>	600W
<b>Power Supply</b>	100 to 240V, 50/60Hz
<b>Dimensions</b>	205 × 280 × 160 mm
<b>Net Weight</b>	4.3kg

## 5. Applications

Gradient PCR Machine LMGP-502 is ideal for Molecular Biology, Genetics, Clinical Diagnostics, Biotechnology & Research Labs for DNA/RNA amplification, sequencing, genetic disorder analysis, gene expression studies and mutation analysis.

## 6. Instrument Introduction

### Structure



Figure-1

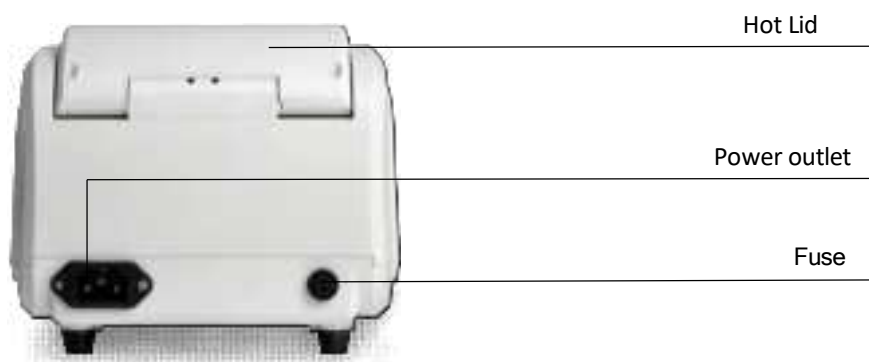


Figure-2

## 7. Installation

### Working Condition

Ambient temperature: 5°C ~ 30°C

Relative humidity: ≤70%

Power Supply: 100~240V AC 6.6~3.1A 50/60Hz

## 8. Operations

### 8.1 Operation Guide

#### 8.1.1 Start Up

After powering on the instrument, press the power switch to illuminate the LCD screen, which will display the welcome screen (see **Figure 3**). During this screen, the product name appears on the display. Once the welcome screen is complete, the instrument proceeds to the main menu interface (see **Figure 4**).



**Figure-3**



**Figure-4**

#### 8.1.2 Run File Operation

The running file refers to the PCR amplification program, which is composed of temperature steps and cycle steps. Each file can include up to 30 steps.

##### 1) File Library

Click the “**File**” icon on the main interface to open the file library screen. The file list appears in the left column, while the right side displays detailed information and a preview of the selected file. Functional buttons are located at the bottom of the screen. When a file is selected, it can be edited, deleted, or renamed (see **Figure 5**).

To export a file, insert the USB disk before powering on the instrument. Once the interface shows "USB Storage," select the file and press this button to export it to the USB disk. Kindly restart the instrument after completing the operation.



**Figure-5**

## 2) Create a New File

Click "New" to enter the new file editing interface. The temperature values are displayed above the temperature curve, and the time values are shown below it. Click on either the temperature or time to set their parameters using the numeric keypad (see **Figure 6**). Use the "+Step" button to add temperature steps and the "+Cycle" button to add cycle steps. (A maximum of 30 steps is allowed per file.)



**Figure-6**



Once the parameter settings are completed, click the **“Return”** button to open the save dialog box. Click **“OK”** to proceed, as shown in **Figure 7(1)**. Enter the file name in the **“Name”** field, then click **“OK”** again (see **Figure 7(2)**). The system will return to the file library interface, and the new file will now be created and saved.



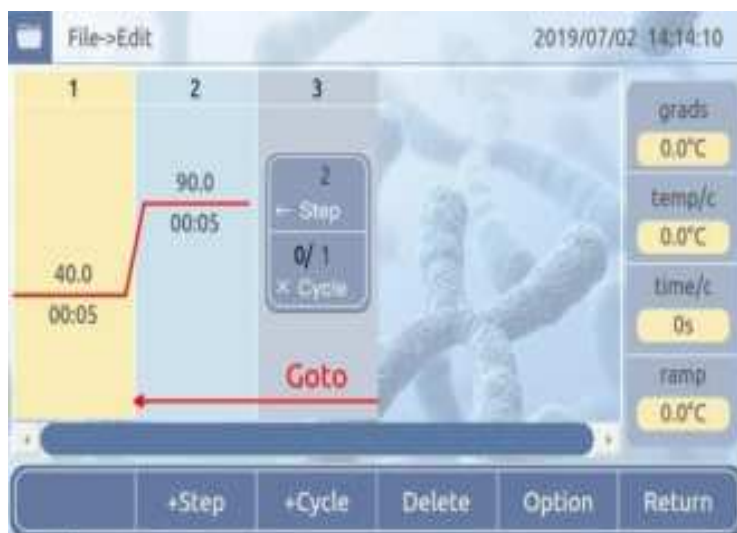
**Figure-7(1)**



**Figure-7(2)**

### 8.1.3 Edit File

- 1) In the file library, select the file you wish to edit and click the **“Edit”** button to enter the editing interface. The temperature values appear above the temperature curve, and the time values are displayed below it. Click on the temperature or time to set their parameters using the numeric keypad. To add temperature or cycle steps, click the **“+Step”** or **“+Cycle”** buttons. (The total number of steps cannot exceed 30).



**Figure-8**

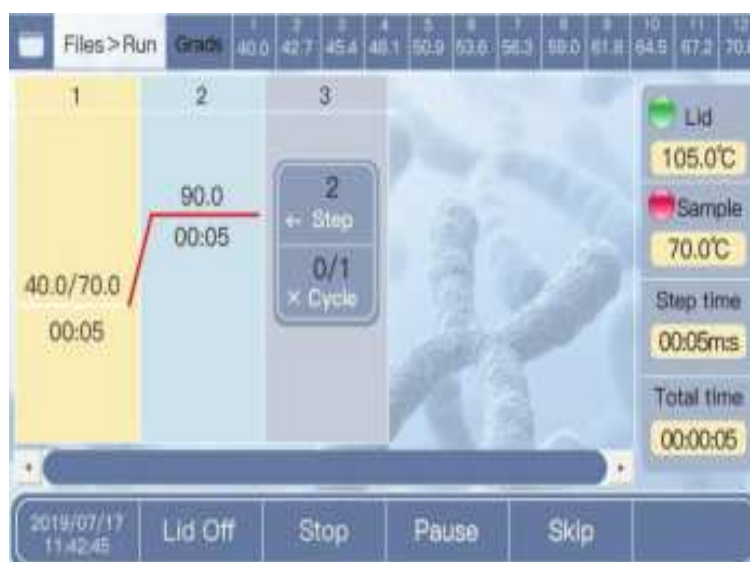
- 2) To configure detailed settings for a specific temperature step, select the step and click the **“Option”** button. You can adjust parameters such as “Temp,” “Time,” “+Temp/c,” “+Time/c,” and “Grads.” After completing the settings, **click “OK”** to return to the editing interface (see **Figure 9**). If you click “Return,” the interface will return without saving the updated parameters.



**Figure-9**

## 8.1.4 Running File

- 1) In the file library, select the desired file and click **“Run”** to enter the running interface. Use “Lid Off” or “Lid On” to control the hot cover. The panel on the right side of the graph displays the hot lid and module temperatures, the current step time, and the total run time. Click **“Run”** again to start executing the file (see **Figure 10**).



**Figure-10**

- 2) While the file is running, a flashing temperature curve indicates the active step. During the run, you can click **“Pause”** to temporarily halt the operation, **“Continue”** to resume, **“Skip”** to bypass the next step, or **“Stop”** to end the run.
- 3) Once the file completes its run time, the system will enter a low-temperature storage mode, and the **“Total Time”** will show as complete. Click **“Stop”** to end the operation.

## 8.2 Gradient Calculation

- 1) Click the **“Calculator”** icon on the main interface to access the gradient calculation screen (see **Figure 11**).

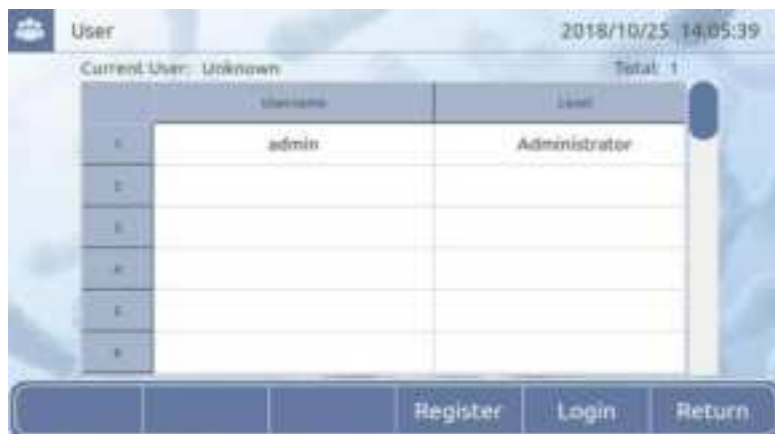


**Figure-11**

- 2) Click on the designated input fields to enter the module temperature and the gradient range. Once the information is entered, click **“OK”** to automatically calculate the temperature for each sample well. Click **“Return”** to go back to the main interface.

## 8.3 User Management

click the “**User**” icon on the main interface to access the user list within the user management screen (see **Figure 12**).



**Figure-12**

Click “**Register**” to open the registration interface. Enter the username, password, and other required details, then click “**OK**” to complete the registration process.

Click “**Login**” to access the login screen. Enter the appropriate credentials to log in successfully.

**Note:** Logging in as "Admin" allows the user to delete other user accounts.

## 8.4 System Settings

Click the “**System**” icon on the main interface to access the system settings screen (see **Figure 13**). Once the settings are configured, click “**OK**” to save them, or click “**Return**” to go back to the main interface.



**Figure-12**

## 8.5 Accessing Help and Importing Files

Click the “**Help**” icon on the main interface to open the help screen (see **Figure 13**). Insert the USB drive before powering on the instrument. The interface will then display an “Import File” button—click it to switch to the import screen. Select the desired file and click the “Import” button to upload it to the current user. Use the “**Refresh**” button to update the file library. After completing the operation, restart the instrument.



**Figure-13**



**Figure-14**



**Figure-15**

## 9. Maintenance

### Regular Cleaning

- 1) Clean the holes in the base using a neutral soap solution. (Avoid using strong alkalis, concentrated alcohol, or organic solvent solutions.)
- 2) Ensure there are no objects placed beneath the machine or near the left and right cooling vents. Over time, dust may accumulate on the heat dissipation vents and should be removed promptly. This is essential for proper operation.
- 3) The module should be cleaned regularly. Accumulated reactant residues in the module cavity can affect temperature accuracy. It is recommended to wipe the cavity with a cotton cloth on a regular basis.

## 10. Troubleshooting

Error message	Possible causes and corresponding counter measures
Display Error Open:x Short:x	Sensor open circuit or short circuit
Display screen not bright and abnormal	Hardware failure
Touch failure	
Block is not heated	
Block temperature is too high / too low	
Hot cover is not heated	
Hot cover temperature is too high	
Fan cannot rotate	



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