Please read this manual carefully before operating Thermal Cycler !

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Chapter 1 Safety Guidelines

1. Instrument Safety Warning Labels

Icon	Meaning
	High temperature warning: To avoid burning, please don't touch directly all areas labeled with safety warning and the hot areas described in manual.
	Electric shocks Warning: To avoid electric shock accidents, please operate strictly according to the request of electric Shocks warning.
	Note: Please note that reminder contains important information and be sure to read them carefully. Otherwise it will cause the instrument to not work properly or even damage the instrument.

2. Safe Use

Please read the following information before using the instrument and be sure to comply with the following basic security measures. Failure to follow the measures or the other warnings in the manual will affect the normal work of the instrument, even damage the equipment and hurt people.

1). Prohibit using the instrument in humid, dusty, high temperature, magnetic environment.

2). Prohibit opening the cover of instrument or touching the inner device of instrument.

3). Prohibit blocking the air flow vents and be aware of gloves or rags sucked into air flow vent in the bottom of instrument.

4). Please keep instrument clean, and maintain it regularly.

Note: Please disconnect the power immediately and contact the supplier or consult certified mechanic for assistance when any of the following occurs.

1). Instrument be moistened by rain or water, or any other liquid..

2). Instrument can't work properly, especially any abnormal sound or odor appears.

3). Instrument's function changes obviously.

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Chapter 2 Installation

2.1 Package Contents Verification

Please open box and check the following list when you receive the RePure-D(B) PCR instrument.

Name	Quantity
Instrument	1
Power Line (single-phase 3-wire)	1
Spare fuse（10A ， 250V）	2
Operation manual	1
Certificate	1

In the event of discrepancy, please keep the original box and contact with us immediately.

2.2 Normal Operating Conditions

1). Used indoors.
2). Temperature 10℃-30℃.
3). Relative Humidity 10%—85%.
4). Please keep it stay away from heat sources to avoid liquid soaked in the instrument.
5). Do not block the air flow vent in the side and bottom of the instrument, and keep the air flow vents of the instrument smoothly.

2.3 Transportation and Storage Requirements

1). Ambient temperature: -20℃- +55℃.
2). Relative humidity ≤90%.

2.4 Power Requirements

The instrument has switching power supply with PFC function. The range of writable voltage is wide, it can run normally during voltage AC 100-240V and frequency 50-60HZ, 3 single wires for power cord, and it must be fitted with a reliable grounding.

Warning: To avoid electric shock accident, instrument must be fitted with a reliable grounding.

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Chapter 3 Instrument Characteristics

3.1 Instrument Construction

A.The front of the machine

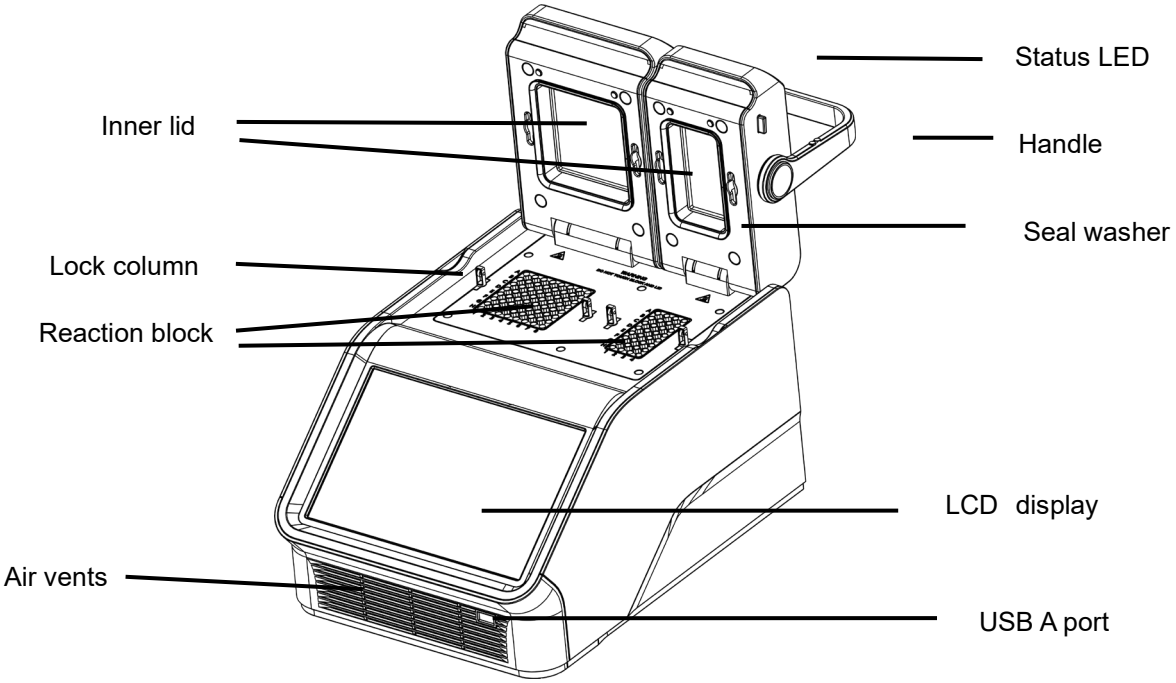

Figure 1. Frontal view of the thermal cycler.

- Lock column — locks hot lid
- Status LED — indicates status of reaction module
- Inner lid — maintains the lid temperature to prevent condensation and evaporation
- Seal washer — sealed reaction zone
- Reaction block — holds reaction vessels, including tubes
- Air vents — allows the thermal cycler to cool quickly
- LCD display — displays operating status
- USB A port — connects to a USB key, computer mouse, or other USB devices , for update UI software

B. The back of the machine

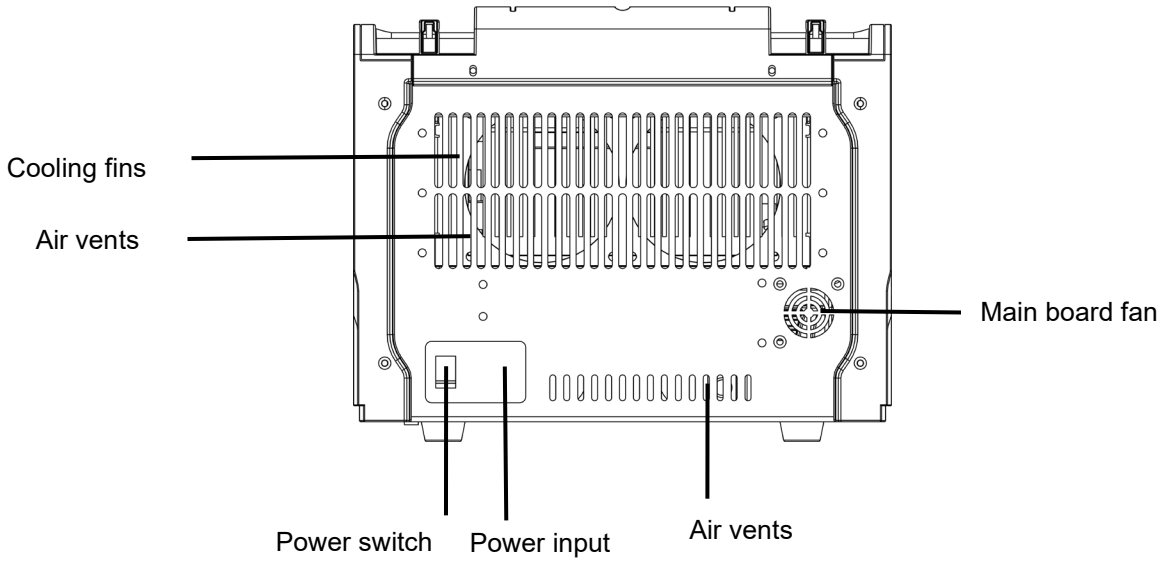

Figure 2. Back view of the thermal cycler.

- Cooling fins — allows the thermal cycler to cool quickly
- Air vents — allows the thermal cycler to cool quickly
- Main board fan — allows the main board to cool

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3.2 Specialty

1. Long service life Peltier heating units.
2. Reinforced aluminum module with anodizing technology can keep rapid heating-conducting property and have enough corrosion resistance.
3. High heating and cooling rate, max. Ramping rate 6 ℃/s, can save your precious time.
4. Double blocks design, 64 well block on the left can set two-dimensional gradient, 32 well module on the right can set conventional gradient.
5. Self-adapting pressure hot lid makes closing lid and tightening lid in one step.
6. Air channel is in front and back and it allows machine placed side by side.
7. It has Android operation system and 10.1 inch capacitive touch screen. It has graphical menu navigation interface and operation is very simple.
8. Built-in 11 standard program file template, can quickly edit the required files.
9. The running program and left time can be displayed in real time , allow to edit file when program is running.
10. One-click quick incubation function can meet experiment's needs such as denaturation, enzyme cutting/enzyme-link and ELISA.
11. Hot lid temperature and hot lid work mode can be set to meet different experiment's need.
12. Automatic restart after power failure. When power is restored it can continue to run unfinished program.
13. Support USB to store and copy PCR data, user can control PCR by USB mouse.
14. Update software by USB and LAN.
15. WIFI module built-in, one unit can control multiple PCR machine through computer or cell phone with internet connection.
16. Email notification after experiment is over.

3.3 Performance

Capacity	64×0.2ml (A Block) + 32×0.2ml (B Block)	
Tube	0.2ml tube, 8 strips	
Reaction Volume	5-120μl	
Temperature Range	0-105℃	
Max. Ramp Rate	6℃/s	
Uniformity	≤±0.2℃	
Accuracy	≤±0.1℃	
Display Resolution	0.1℃	
Temperature Control	Block\Tube	
Ramping Rate Adjustable	0.1-6℃	
Gradient Temp. Range	30-105℃	
Gradient Type	Normal Gradient (A BLOCK)	Normal Gradient (B BLOCK)
Gradient Spread	Vertical：1-30℃	Vertical：1-30℃
Hot Lid Temperature	30-115℃	
Number of Programs	20000 +(USB FLASH)	
Max. No. of Step	40	
Max. No. of Cycle	200	
Hold Time	1 Sec - 18 Hour	
Time Increment/Decrement	1 Sec - 600 Sec	
Temp. Increment/Decrement	0.1-10.0℃	
Pause Function	Yes	
Auto Data Protection	Yes	
Hold at 4℃	Forever	
Computer Software	Yes	
Mobile phone APP	Yes	
LCD	10.1inch，1280×800 Pixels, TFT	
Communication	USB2.0 , WIFI	
Dimensions	385mm×270mm×255mm (L×W×H)	
Weight	11kg	
Power Supply	100-240VAC , 50/60Hz , 600 W	

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Chapter 4 Operation instruction

4.1 Power on

Connect power cord to the back of instrument then plug into power source and switch to "-". . When the instrument is on, the buzzer should be heard and the LCD screen lights up to show the **Boot** screen (Figure5). After that, the operating system starts up and then goes to the **Self-Test** screen (Figure6).During this phase, the LCD screen displays the product name, company LOGO. When it's over, the system performs the **Home** screen (Figure7) as shown below.

Figure 5. The boot screen.

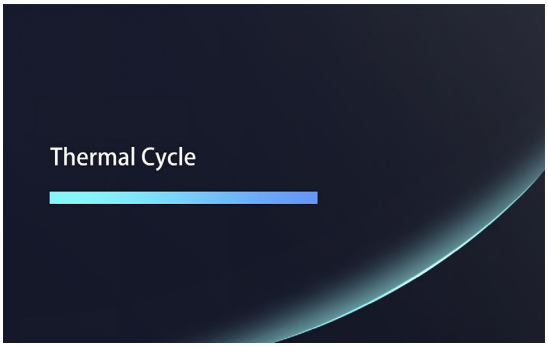

Figure 6. The self-test screen.

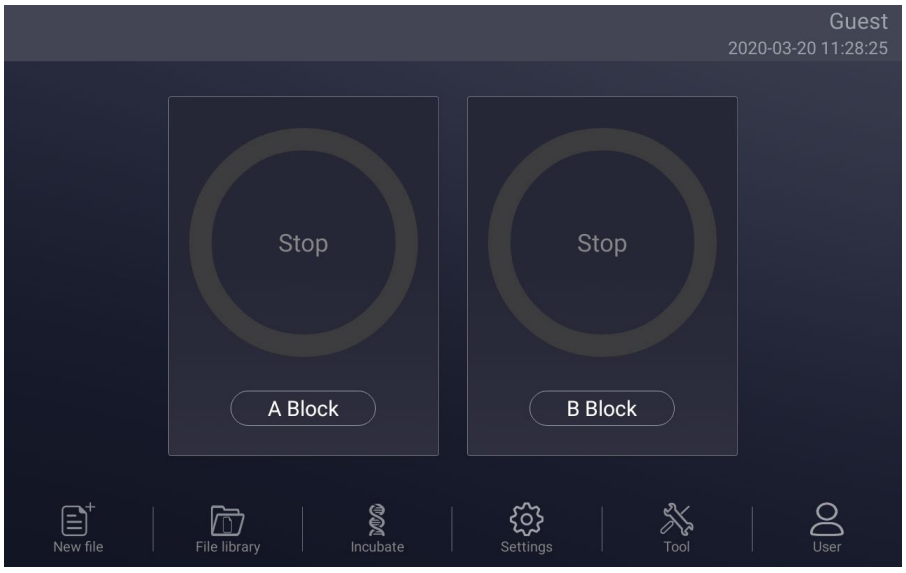

Figure 7. The home screen.

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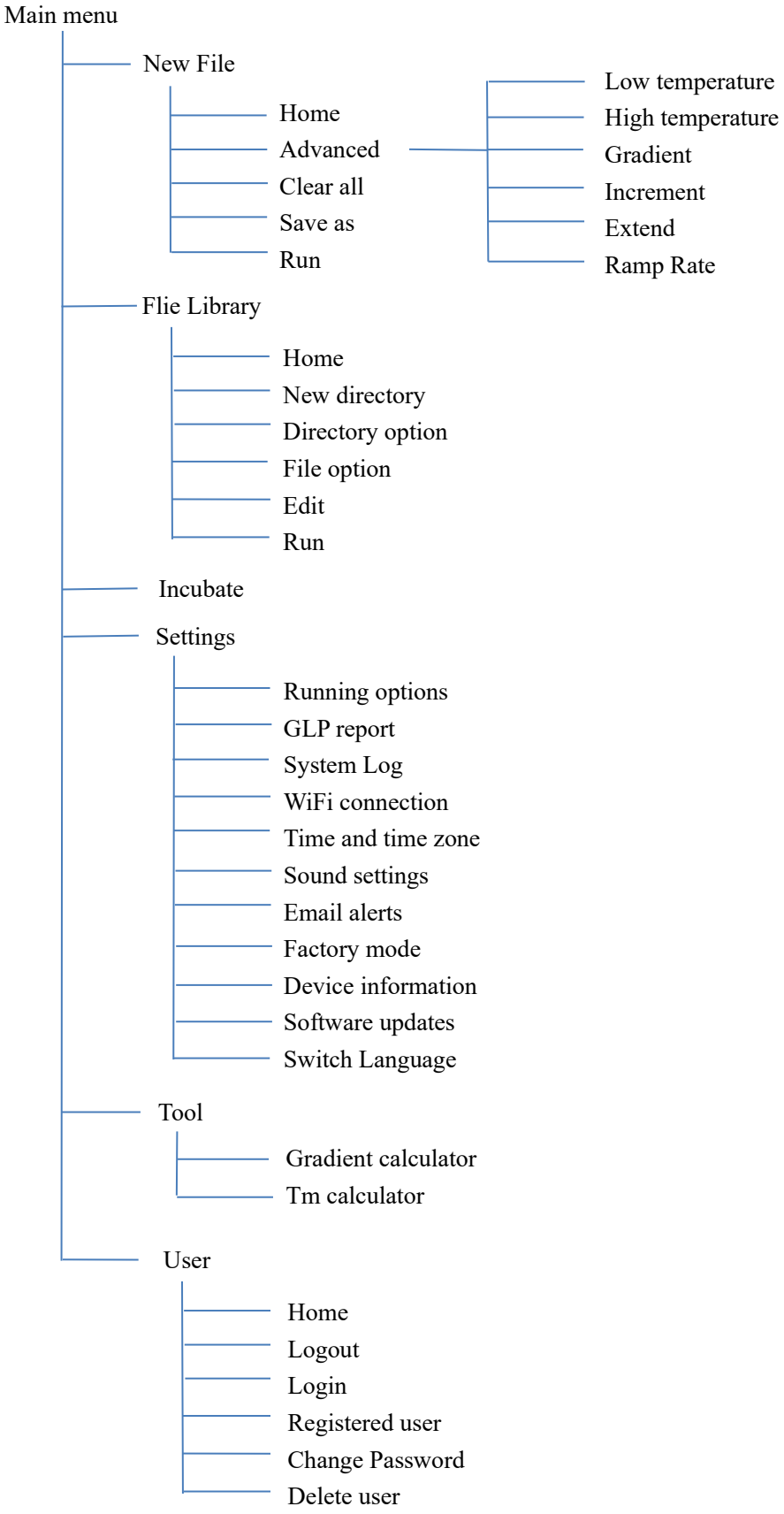
4.2 Menu structure



4.3 File instructions

File is composed by **Temperature Step** and **Cycle Step.** Each **File** can hold up to 40 **Steps**, **Temperature Step** contains **Temperature**, **Time**, **Gradient**, **Ramp Rate, Temperature Increment** and **Time Extend.** The maximum number of **Cycles** is 199 times.

4.3.1 Create or edit file

1). Change Target Temperature and Hold Time

- From a new file

  Touch "**New File"** button in the **Home** screen (Fig. 7) to create new file (Fig. 8).

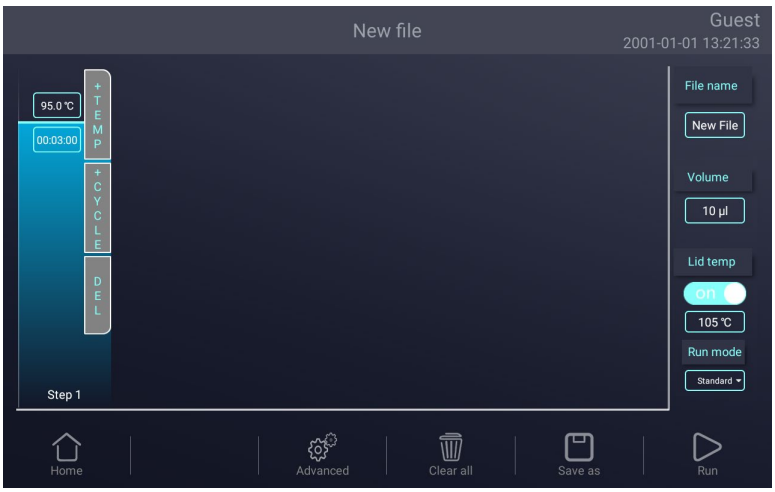


Figure 8. Create a new file

In the **New File** screen, touch **"+Temp"** button to add a **Temperature Step**, touch **"+Cycle"** button to add **Cycle Step (GOTO step)**, use the pop-up numeric keypad to enter a new value for the target temperature or hold time.

- From an existing file

  In the **Home** screen (Figure 7), touch "**File Library"** button to enter **File Library** screen (Fig. 9),then Select a file in the **File Library** screen (Fig. 9), touch "**Edit"** button to enter Edit File screen (Fig. 10).

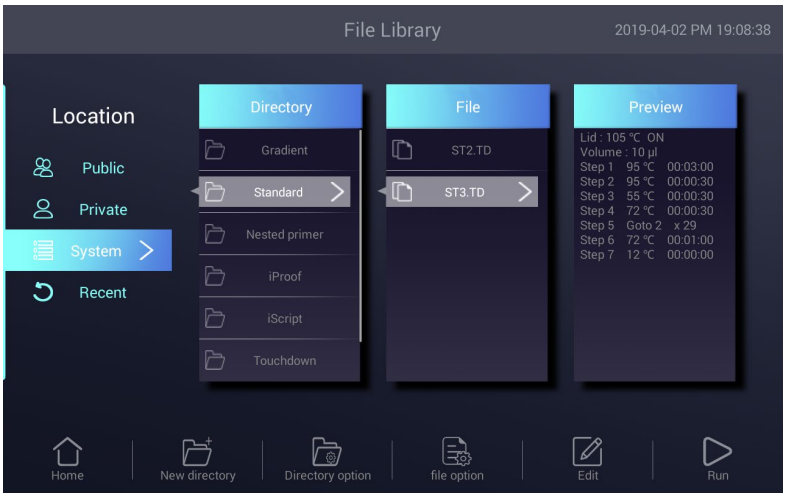


Figure 9. File Library

Figure 10. Edit an old file

In the **Edit File** screen (Fig. 10), select a desired step by touching anywhere in the step. Change a time or temperature by touching the desired field and entering a value using the pop-up numeric keypad. To enter an infinite hold, fill time field with 00:00:00.

Note: GOTO structure is adopted for editing this program, and the total number of cycles = the number of repetitions of **GOTO** steps + 1;

For example, the total number of cycles in steps 2-3-4 in Figure 4 is 29 + 1 = 30.

2). Run mode

There are two Run modes: standard mode and fast mode. Users can choose the mode according to their actual needs. The fast mode takes less experimental time than the

standard mode.

3). Edit Step

Select a desired step, touch **"Advanced"** button to enter **Advanced** screen (Figure 11). Parameters can be edited by selecting among **Gradient**, **Ramp Rate**, **Temperature Increment** or **Time Extend**. Table 1 lists the parameters for temperature and gradient steps with the limits of those parameters.

After entering **Gradient** values the gradient distribution table (Figure 11) will be shown at bottom of the screen. Touch "**OK"** to save changes and return **Edit File** screen (Figure 10).

Figure 11. Set the Vertical Gradient

Table 1. List of parameters for temperature and gradient steps

Parameter	Ranges	Description
Lower temperature	**Temperature in ℃:** The target temperature between 0.0 and 105.0℃ in tenths of a degree	Instructs the thermal cycler to ramp to the target temperature.
	Hold time: The hold tine between 1 sec and 18 hour in the format of hour : min : sec. To enter an infinite hold, touch 0 button, the symbol ∞ (infinite) will come out.	
High temperature	The high temperature in the gradient. The max. temperature is 105.0℃. Enter a temperature within 30.0℃ of	Instructs the thermal cycler to ramp to the target temperature gradient across the block and

	the lower temperature. **Hold time:** The hold tine between 1 sec and 18 hour in the format of hour : min : sec. To enter an infinite hold, touch 0 button, the symbol ∞ (infinite) will come out.	hold that temperature gradient for the specified amount of time.
Gradient	The vertical gradient temperature range between 0.0 and 30℃.	The gradient temperature range
Increment	A temperature from -10.0℃ to 10.0℃ per cycle in tenths of a degree.	Applies only to a temperature step. Instructs the thermal cycler to increment (change) the target temperature of a step with each cycle, where a positive number increases the temperature and a negative number decreases the temperature.
Extend	A time from -600 sec to 600 sec per cycle.	Applies to both temperature and gradient steps. Instructs the thermal cycler to extend the hold time with each cycle. A positive number increases the hold time and a negative number decreases the hold time.
Ramp rate	A number from 0.1 to 5℃ per sec	Applies only to a temperature step. Instructs the thermal cycler to ramp to the target temperature at the specified ramp rate in that step.

4). Insert a Step

Insert a step if a new temperature, Cycle (GOTO), or gradient step is needed. Follow these instructions to insert a step to the right of a preexisting step.

I. Touch a step to the left where the new step will be inserted.

II. Touch the **"+Temp"** button to insert a step or the **"+Cycle"** button to insert a Cycle (GOTO)

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III. Touch the time or temperature field to edit the parameter in the new step, or touch the step or times field to edit the parameter in the new Cycle (GOTO).

5). Delete a Step

To permanently remove a step from file.

I. Select the step to be deleted.

II. Touch **"Delete"** button to delete the selected step.

6). Save file

In the **Edit File** screen , select the file name edit box, input volume of reagent , lid temperature, as shown in Fig.12, input the "**Save as**" button after completion, select the save path as shown in Fig.13, or click the "**Run**" button to run the file directly.

Figure 12. Name file

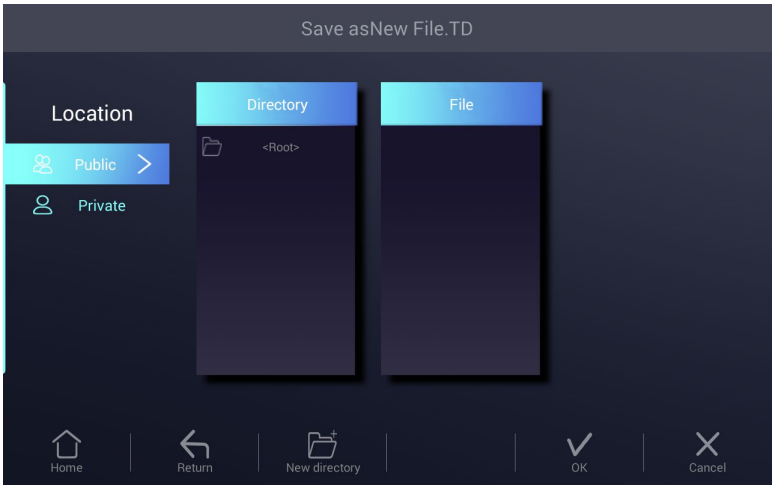

Figure 13. Select path

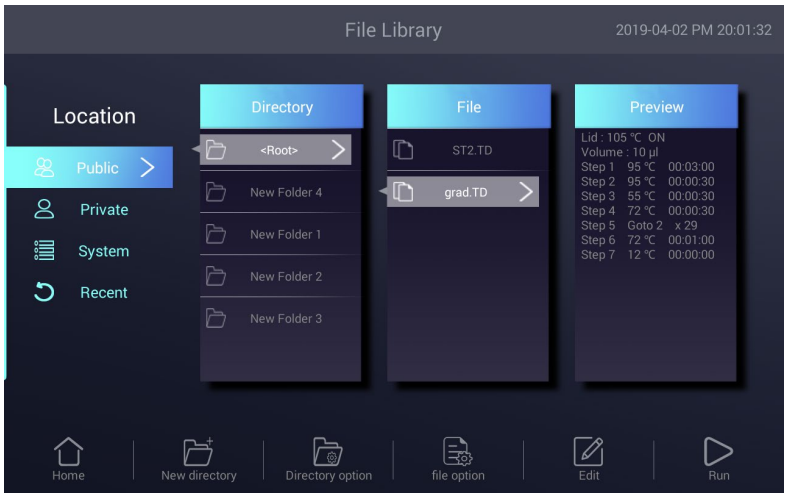

Figure 14. New file in the library.

4.3.2 Delete file

In the **File Library** screen (Fig.9), touch **File Option** button to select the file to delete, and the query dialog window will pop up when touching "**Delete file"** button, and delete this file by touching OK(Fig.15). Only one delete per time is allowed to prevent any files being mistakenly deleted.

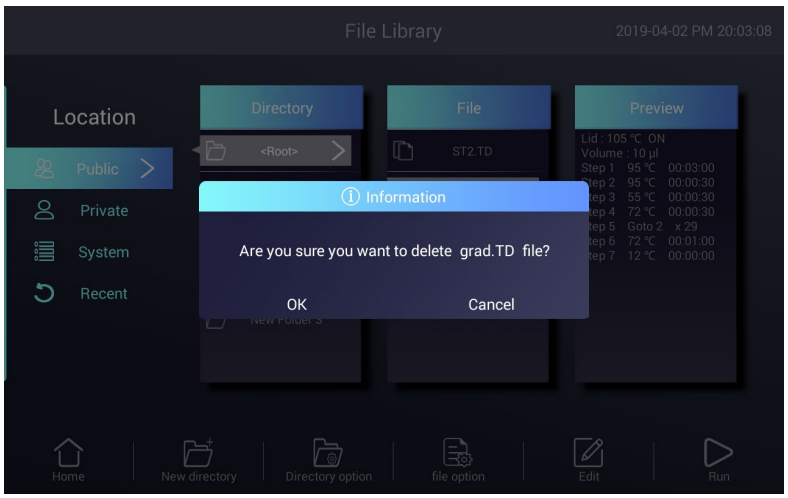

Figure 15. Delete a file.

4.3.3 Copy file

In the **File Library** screen (Fig.9), touch **File Option** button to select the file to copy and touch **Copy file** button. Then enter the save path and touch **Paste file** button to finish copy.

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4.3.4 Rename file

In the **File Library** screen (Fig.9), touch **File Option** button and select the file to rename. Then touch **Rename file** button and enter new file name in the dialog window to rename files

4.3.5 Run file

In the **File Library** screen (Fig.9), select the file needed and touch **Run** button or touch the "**Run**" button on the new file/edit file screen to pop up the prompt dialog box (Fig.16). Then press the "**OK**" button to enter the running file screen (Fig.17-1).In the running file screen (Fig.17-1) can press the "**Edit**" button to enter the Edit the running file screen (Fig.17-2).

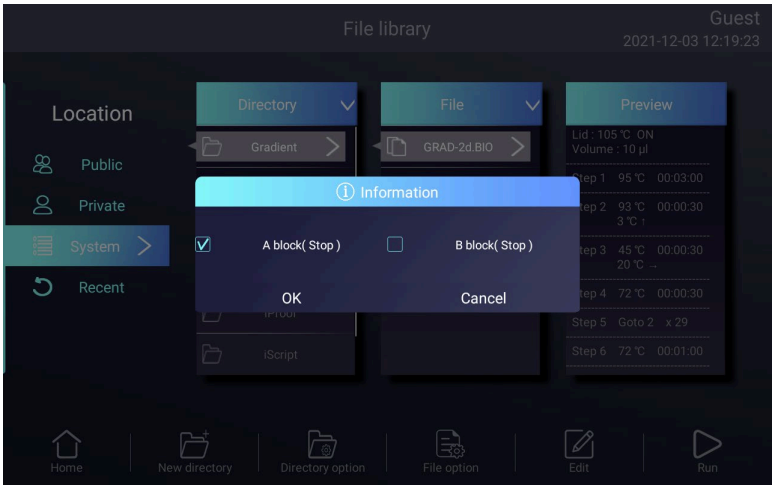

Figure 16. Run file confirmation.

Figure 17. File running.

1). Parameter

● Start Time — system time when file starts to run.

● Remain Time — remaining time for the experiment.

● Lid Temp — current hot lid temperature.

● Step — current step.

● Step Time — current step time.

● Block Temp — current block temperature.

2). Pause

Touch “**Pause”** button to pause running file and touch ”**Resume”** button to restore running**.**

3). Stop

Touch “**Stop” button** to stop a running file**.**

4). Skip

Touch” **Skip”** button to jump to next step.

5) . Go to other screen

6). Edit

Touch "**Edit**" button to enter the Edit the running file screen.

Touch **Home** button to back the **Home** screen, or touch Circle in the middle of the screen(Fig.18) to enter the running file screen (Fig.17).

Figure 18. The file is running of home screen.

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4.4 Setting

In the **Home** screen, touch **Setting** button to enter the **Setting** screen (Figure19).

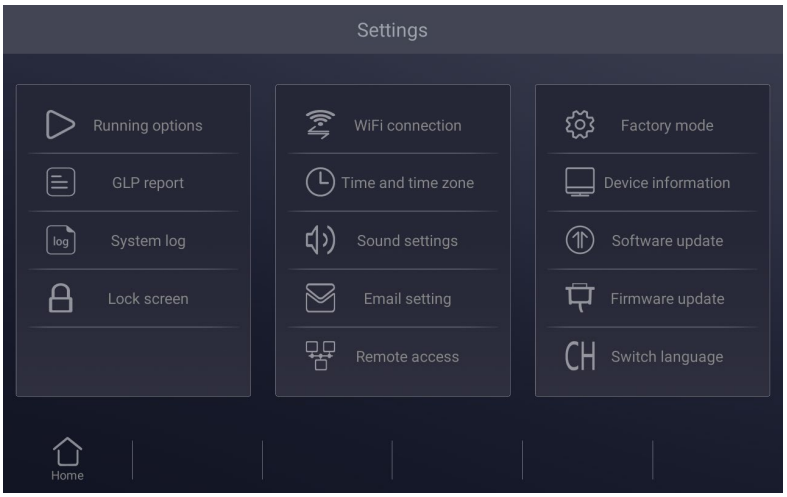

Figure 19. Setting menu

4.4. 1 Run Setting

In the **Setting** screen (Figure19), select the **Run Setting** to enter the **Run Setting** screen (Figure20).

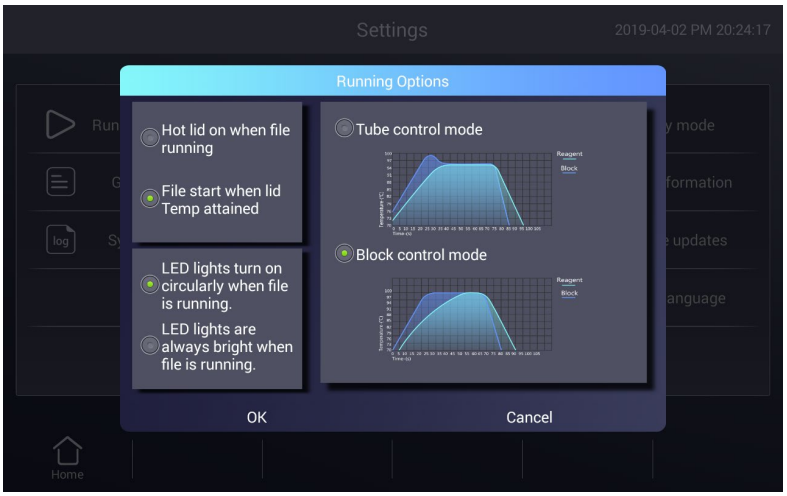

Figure 20. Run parameter s**etting**.

1). Hot lid work mode setting

In total there are 2 working modes and default mode is that the hot lid will be on when file running.

2). LED lights setting

In total there are 2 LED lights work modes and default mode is LED lights turn on circularly when file is running.

3). Temperature control mode

The temperature control mode contains block control mode and tube control mode. The block control mode is suitable for performing normal PCR and the tube control mode is for experiments that require higher environment conditions. the system default is block control mode.

4.4.2 System Setting

In the **Setting** screen (Fig.19), can set time and date,sound,WiFi connection.

1). Time and date

Set the system time and date.

2). Sound

● Keyboard sound — sound when touch button.

● Alarm sound — sound when system error occurs.

● File end sound — sound when file running is complete..

● Temp to reach sound — sound when the target temperature reaches.

3).WiFi connection

If you need to open WiFi function, touch "Open WiFi" button.

4.4.3 E-mail Setting

In the **Setting** screen (Figure19), select **E-mail alerts** to enter the **E-mail Setting** screen (Figure21).

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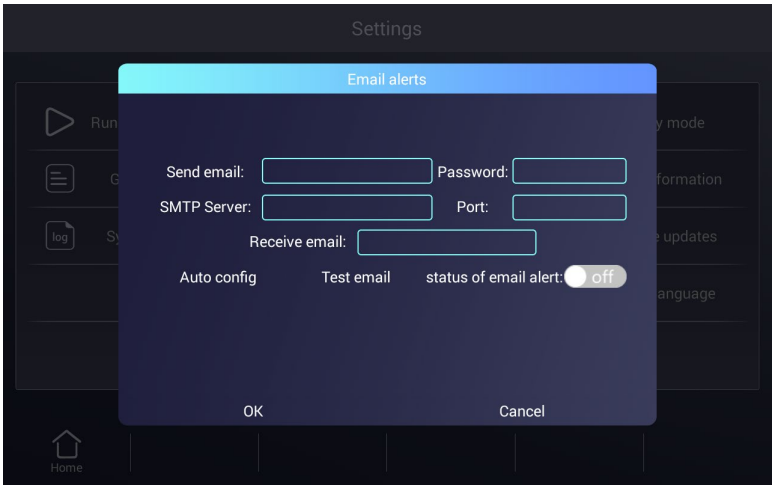

Figure 21. E-mail setting.

1). Status of email alert

After program is over it will automatically send email if chose Enable.

2). Test email

Test email function is to test whether email can send or not.

3). Save

Touch “OK” to save information and email setting record.

4.4.4 GLP Report

Record of every file name, time of start run this file, block number, source files path (Figure22).

● GLP Report — Record the time and temperature for each step.

Figure 22. GLP Report.

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4.4.5 Device information

Show the machine name, the SN., the control version and UI version (Figure23).

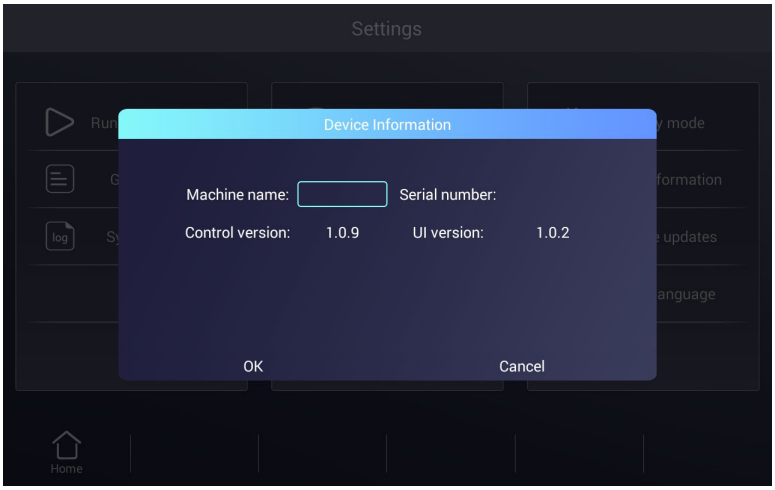

Figure 23. Local information.

4.5.6 Software update

Copy the new software to the root directory; insert the USB flash disk into the USB port, then touch “Software update”, return to Android desktop when updating, and immediately reopen the updated App .

4.5 Tool

In the **Home** screen, touch **Tool** button to enter the **Tool** screen (Figure22).

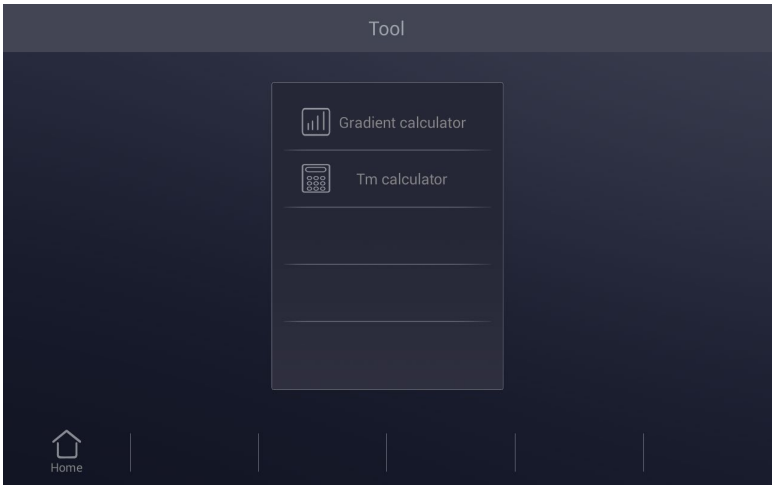

Figure 22. Tool menu.

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4.5.1 Gradient calculator

The temperature value for each column is shown after entering the block target temperature and gradient range (Fig.23).

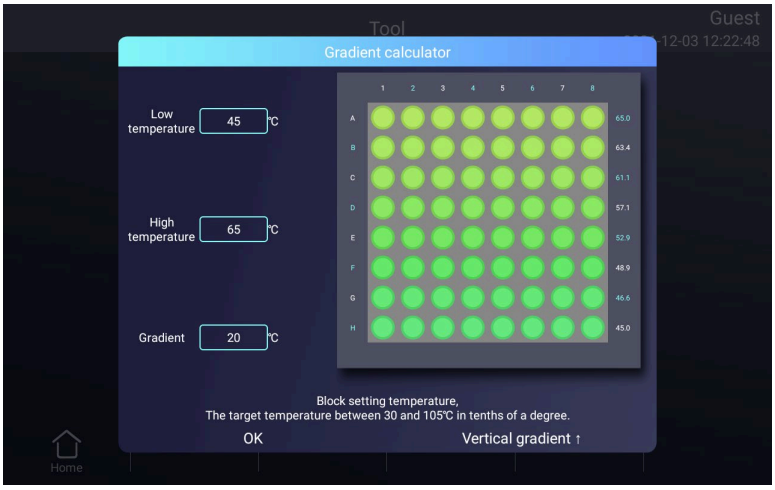

Figure 23. Vertical gradient calculator.

4.5.2 Tm Calculator

Touch the fields to enter concentrations and the primer sequences,then touch Calculate Tm (Fig.24) to calculate the melting temperatures,Maximum input for each primer sequence is 30 .

Figure 24. Tm Calculator.

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4.6 Incubate

In the **Home** screen, touch **Incubate** button to enter the **Incubate wizard** screen (Fig.25).

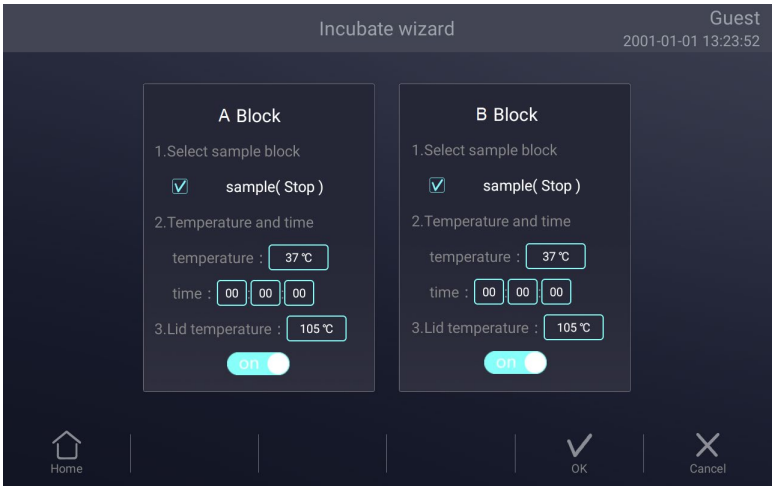

Figure 25. Incubate wizard.

In the **Incubate wizard** screen (Fig.25), select the desired block and enter the block temperature and the hold time. Then touch **Start** button to enter **Incubate Running** screen (Fig.26).

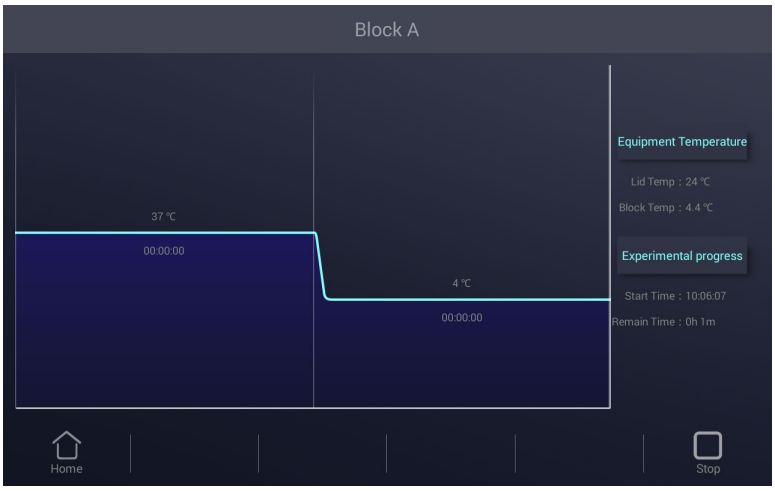

Figure 26. Incubate running.

4.7 Log In

In the **Home** screen, touch **User** button to enter the **User** screen (Fig.27).

NOTE: Administrator user's initial password is “123456”, you can change the password

after logged in.

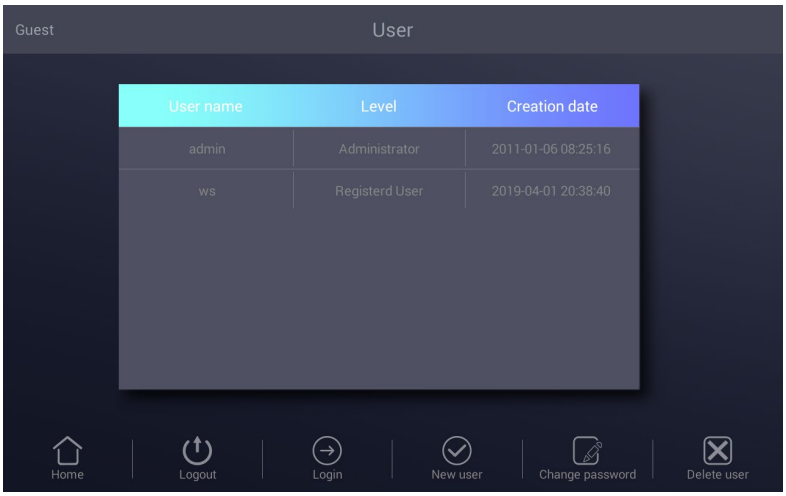

Figure 27. User management.

4.7.1 New User

In the **User** screen (Fig.27), touch **New user** button to enter the **New User** screen (Fig.28).Enter user name and password, then touch **OK** button to enter the **User** screen. In the **User** screen,select the Registered user who needs to log in and press the "Login" button.

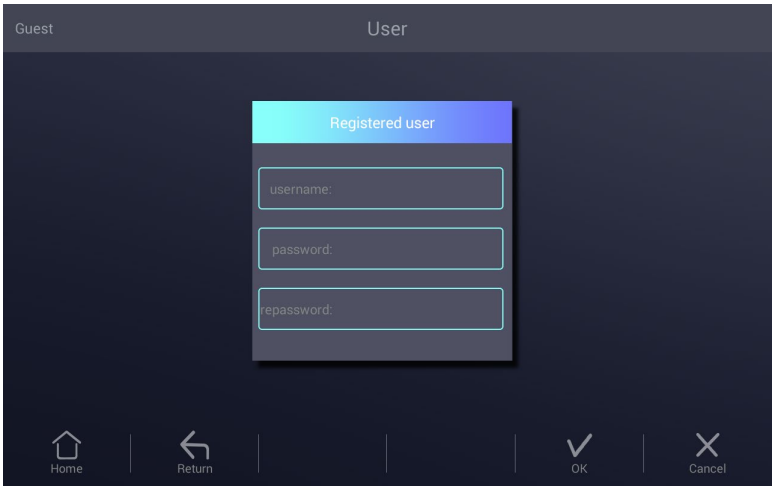

Figure 28. New user.

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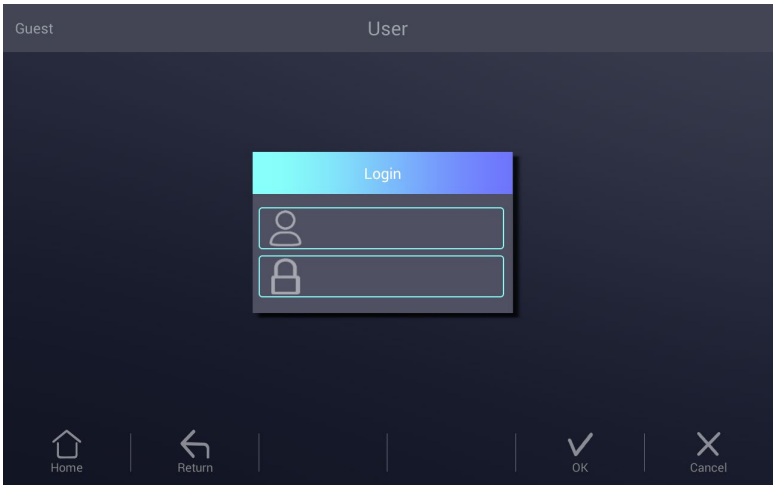

Figure 29. Login

4.7.2 Change Password and Delete User

Only after login can passwords be changed and users be deleted, can other users be deleted from the login administrator account.

Chapter 5 Maintenance and Troubleshooting

5.1 Machine Maintenance

1). Regular cleaning

A. Clean the holes on reaction block with neutral soap solution (Do not use any solvent containing strong alkali, strong alcohol and organic solution)

B.Spaces near the left, right air vents and under the machine should be always kept free. It is very important to clean the dust around air vents regularly.

C. Clean the reaction block regularly and remove any residue inside cavities to prevent any affects to the temperature control. (we suggest to use soft cloth).

2).Replace fuse

The machine has two fuses. Replace it according to the following once damage occurs.

A. Turn off the machine and unplug power source.

B. Unscrew the fuse box with flat screwdriver and replace the damaged fuses with new 10A 250V fuses. After replacement, screw back in the fuses box.

Note: Please contact your supplier for repair when encountering any problem replacing fuses.

5.2 Troubleshooting

1).Dissatisfactory Results

Biological, programmatic and hardware problems may contribute to any unsatisfied results of experiment. In order to distinguish the hardware problems from other possible problems, the machine is equipped with built-in self-test hardware and self-diagnosis software. Below is the detailed description. According to the experiences, most problems are related to biological and programmatic factors.

FAQ as follows:

A. Incorrect or insufficient reactants.

B. Denaturation temperature is too high or too low. It is suggested to set the temp. within range of 90-95℃ for 40 seconds. The duration can be adjusted in accordance with reaction volume.

C. Annealing temperature is too high or too low; It should be between 55-70 ° C and 20 to 30 chains

D. Reactant concentration is too high or too low.

E. Preparation process without special treatment.

F. Time and temperature value in progress are not appropriate.

G. The temperature of sample is slightly too low while the temperature of block is slightly too high.

H. Check whether the PCR tubes are well placed. Smearing little mineral oil on the surface of holes will increase the thermal conductivity.

2). Machine's self-test and self-diagnosis function

The machine will run the self-test program when booting. The software and hardware of machine will show the results so as to inform users the potential problems, minimize the failure of experiment and display the error message when problem occurs.

5.3 Notes

1). Power

A. No special requirement for the power supply. Any AC power source within range of 85V~264V is applicable. However, to prevent from causing any damage to the machine, it is better to apply low voltage fluctuation power sources, Otherwise please consider to install power supply regulator.

B. It's prohibited to cut off the power to terminate a running experiment. It's very harmful to the machine.

2).LCD screen

Avoid using UV disinfection to clean the machine to prevent any damage.

Avoid any bump or scratch to the LCD screen while using.

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3). Note about cleaning

Avoid any liquid getting inside the machine while cleaning the base of machine. Due to the possible usage of radioactive substance during experiment, please carefully handle cleaning..

It is not suitable to use the machine in moisture or hot environment.

Note:	Please do read the notes carefully! you may damage the machine if don't operate according to the above requirements.

5.4 Error messages and correspond solutions

No.	error message	Cause and correspond solution
1	File name can not be empty	File name does not support null character
2	If have same file name, Please re-name	Don't support multiple files with the same name's file.
3	Module sensor 1,short circuit	Hardware problem, need to repair
4	Module sensor 1,open circuit	Hardware problem, need to repair
5	Module sensor 2 ,short circuit	Hardware problem, need to repair
6	Module sensor 2,open circuit	Hardware problem, need to repair
7	Module sensor 3 short circuit	Hardware problem, need to repair
8	Module sensor 3,open circuit	Hardware problem, need to repair
9	Module sensor 4,short circuit	Hardware problem, need to repair
10	Module sensor 4,open circuit	Hardware problem, need to repair
11	Module sensor 5 ,short circuit	Hardware problem, need to repair
12	Module sensor5,open circuit	Hardware problem, need to repair
13	Module sensor6 short circuit	Hardware problem, need to repair
14	Module sensor 6,open circuit	Hardware problem, need to repair
15	Radiator sensor short circuit	Hardware problem, need to repair
16	Radiator sensor open circuit	Hardware problem, need to repair
17	Lid sensor short circuit	Hardware problem, need to repair
18	Lid sensor open circuit	Hardware problem, need to repair
19	Power output short circuit	Hardware problem, need to repair
20	Module temperature too high	Air flow vent is blocked or circuit problem, need to repair if latter
21	Module temperature too low	Temperature of environment is too low or circuit problem, need to repair if latter
22	Radiator temperature too high	Air flow vent is blocked or fan problem, need to

		repair if latter
23	Radiator temperature too low	Temperature of environment is too low or circuit problem, need to repair if latter
24	Lid temperature too high	circuit problem, need to repair

5.5 Cause of the unnormal phenomenon and correspond solution

No.	Description of problem	Cause and correspond solution
1	No any display after opening the machine	Check whether plug inserted correctly and power output has electricity , pull out the plug while turning off ,and check the fuse
2	Turn on, the machine start running according to the program	The power was off before ending the last program
3	The fan run fast some time, slow sometimes	Normal. fan is used dissipating heat while pump is working, not for reaching the sited temp.
4	Have Slight pat or squeaking sound while machine is working	Normal. When need large power for intense or cold, the switch power supply is adjusted automatically causing the sound of pat or squeaking
5	Increasing or decreasing module temperature too slow	Check whether the setting of rate of variable temperature and fan is normal or not
6	Wrong display appears in the screen	Caused by electrostatic pulse or power surge. please turn off and open, does not affect program running

Note: If the above problems can't be solved, please contact the supplier in time.

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Chapter 6 After-sales Service

1. This product is warranted under normal usage to the original purchaser for five years from the date of purchase.

2. Lifetime service guarantee. The local dealer, maintenance station and regional offices will provide you excellent after-sales service.

3. The foregoing maintenance free service is only applicable to products sold as new. Free maintenance, product return and exchange shall not be provided under any one of the following circumstances even in the warranty period:

1). Damage caused by natural disasters factors (such as fire, earthquake, flood, wind disaster, thunderbolt etc.) and failure conditions caused by abnormal voltage, public nuisance and chemical substance.

2). Failure or damage caused by use this product under abominable conditions (such as oil fume, dust, damp and direct sunlight etc.) or inappropriate use according to the instruction book.

3). Damage caused by drop, move, transport, entry of foreign matter and other factors unrelated to manufacture process.

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Appendix 1 Warranty

Origin				Model		NO.	
User	Name			Telephone			
	Address					Postcode	
Vendor	Name			Postcode		Vendor Seal	
	Address			Telephone			
	Sale Date			Invoice number			
Maintenance records	Carry-in date	Repair tickets Number	Fault conditions	Cause of the malfunction	Disposition	Produce for examination dates	Repairer Signature