

Instructions for Use of PCR Thermal Cycler

Applicable to C320

Important Information

★ **This equipment is intended for scientific research only, but not for clinical diagnosis.**

Contents

Introduction

How to use this manual3

Instructions on Safety and Use

Operation Safety4

Maintenance Safety.....5

Section I - Instrument Description

Unpacking and check6

Locating the Instrument7

Overview.....8

Section II - Instrument Appearance and Internal Components

Overview9

Construction & Function Description10

Overview of Module Unit.....13

Section III - Working Conditions

Instrument Performance Properties 14

Operating Environment and Storage Condition 16

Section IV - Use and Installation of Software

Installation Instructions 17

Start Installation18

Interface Introduction 20

Section V - Test Introduction and Description

Test steps28

Section VI - Other function introduction

Function introduction	41
Test considerations	44

Appendix I - Equipment Maintenance

Repair and Maintenance	45
Test result deviation analysis	46
Trouble Shooting	47

Appendix II - Warranty

Warranty Statement	49
Coverage of Warranty	49

How to use this manual

About this manual

This manual is intended to solve your any question and technical problem in installation, operation and maintenance of this equipment, and provides instructions on proper installation, use and maintenance of this instrument.


Safety Cautions


Before installation, use and maintenance of this instrument, read and observe any cautions and considerations in this guide to ensure normal operation of the equipment and user's personal and property safety.


Instructions on Safety and Use


Considerations for Use

Operation Safety


 The power supply for this instrument must be earthed reliably. A three-pole plug is provided for this instrument, with the additional pole connected to earthing wire, which shall be used with an earthed power socket. Before connecting power supply, ensure it meets the voltage requirement for this instrument, and make sure rated load of the power socket is not lower than the load requirement for this instrument.


 In case of any damage to the power cable, replace it with a new one of the same model and specification. No object shall be placed onto the power cable. The cable shall not be located at area subject to busy traffic of persons. Connect/disconnect the power cable by holding the plug rather than any portion of the cable itself.

 As high heat will be generated during operation of the instrument, do not touch any metal module of the instrument with any part of body to prevent burn.

 No object shall be located within an area of 30cm around the instrument to ensure good heat dissipation during operation.

Maintenance Safety

 Modules of this instrument shall be maintained to ensure precision of testis is recommended to clean the instrument with clean soft cloth soaked with absolute alcohol. Do not use any corrosive detergent or make any detergent enter the instrument to prevent any damage to it.

 Immediately switch off the power supply, stop test and contact your supplier or any professional service personnel in any of the following cases:

- 1) Any reagent, water or other liquid enters the instrument.
- 2) The instrument falls down from an elevation or the enclosure is damaged.
- 3) The instrument generates any abnormal noise or pungent smell during operation.
- 4) Functions of the instrument vary substantially, such as failure to start/shut down or operate it normally.

This equipment is powered with wide voltage of 220V or 110V, which can be changed over with a selector switch located at the front end of the bottom according to your local supply voltage. Improper supply voltage may cause damage to the equipment!

Section I - Instrument Description

Unpacking and check

After receiving our C320 PCR unit, please unpack it and check the following items in the case:

Name	Quantity
C320 Thermal Cycler	1
Three-phase power cable	1
Network cable	1
User manual	1
Warranty card	1
Testing certificate	1
Packing list	1
Standby fuse (AC250V 10A)	2

For any discrepancy in the items to the packing list, please contact us immediately. We will solve your problem as soon as possible.



C320 Thermal Cycler



Network cable



User manual



Three-phase power cable



Warranty card



Testing certificate



Packing list



Standby fuse (AC250V 10A)

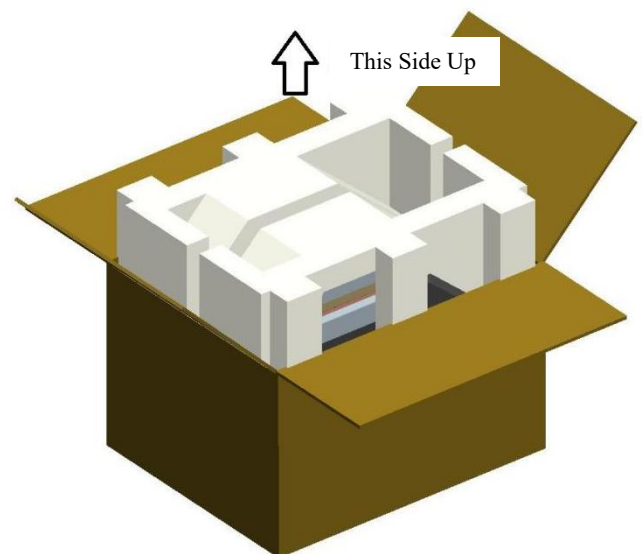
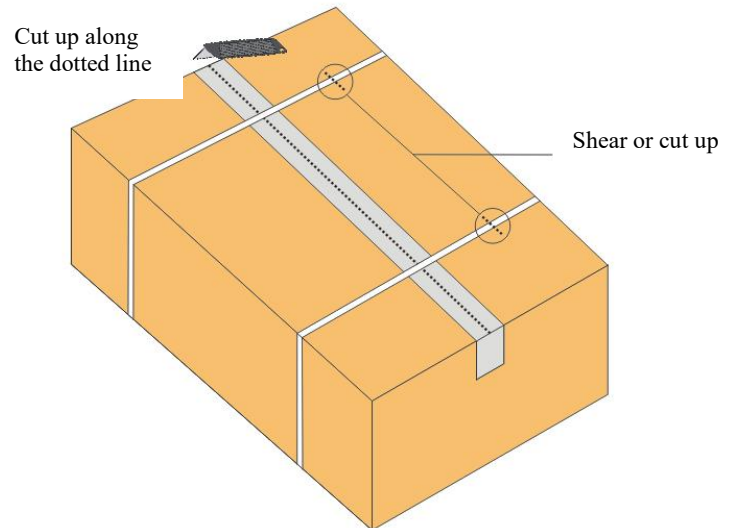
Locating the Instrument

- After checking the items in the case, you have to locate your C320 thermal cycler.
- Place the packing case upright in horizontal position, cut off the packing strip around the case and the adhesive tape sealing the case.
- Take out the accessories of the case and store them in a secure place for future use.
- Remove the foam covering the instrument, put the equipment out by holding the bottom of it and lifting it up, and then place it on a proper test desk. Handle the instrument with caution.

Remove any obstacle within 15cm around the sides of and above the equipment.

- Store the packing case properly for containing in future.

Risk of personal injury! Unless you have been trained properly, do not attempt to lift the instrument or any heavy component of it. Lifting the packing case in any improper way may cause ache in or permanent injury to body, or fall of the instrument. Lift or move the instrument with proper handling tool or in a correct way. It is better to lift the equipment up with two persons.



Overview

[Product Name]

C320 Thermal Cycler

[Product Model]

C320

[Construction]

Consists of temperature-variable metal module, switching power supply module, Android OS, LCD screen, display and thermal lid.

[Application Range]

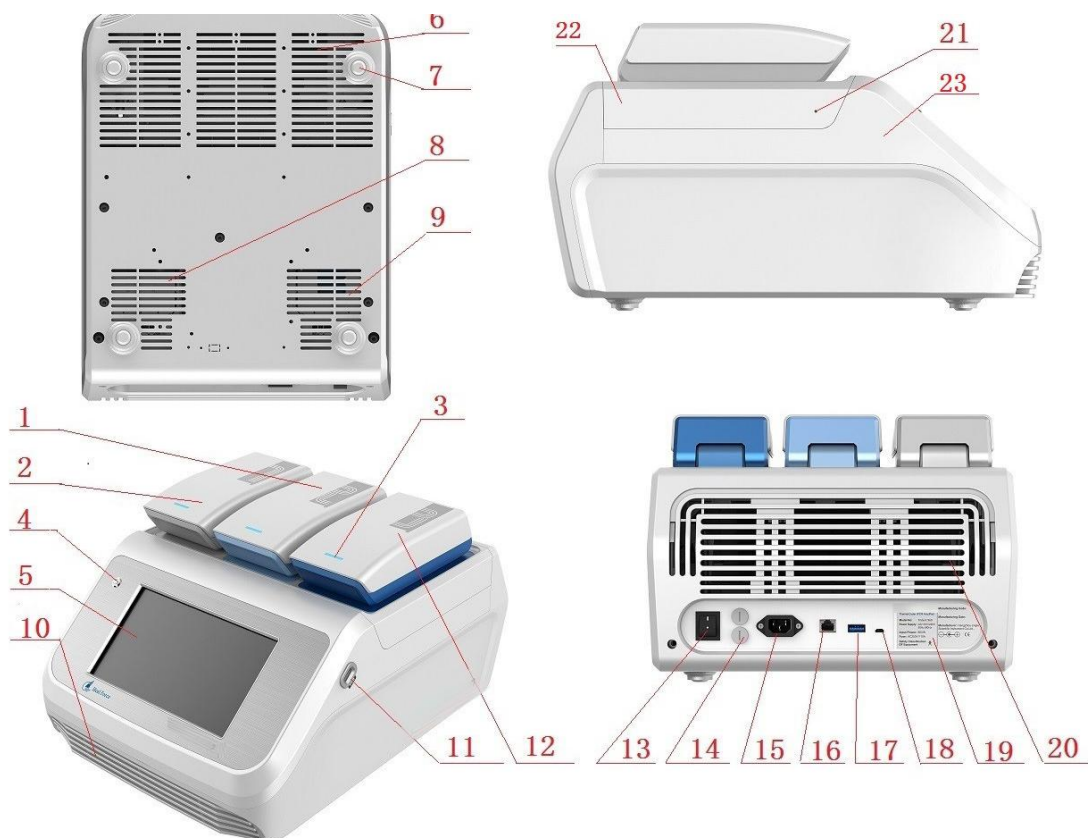
Intended for polymerase chain reaction (PCR) in scientific research.

[Contraindication]

NA.

Section II - Instrument Appearance and Internal Components

Overview



(1) No.2 module unit (2) No.1 module unit (3) Indicator light (4) Soft switch (5) Touch screen

(6) Air inlet (7) Foot pad (8) Power cooling air outlet (9) Power cooling air inlet
(10) Air outlet

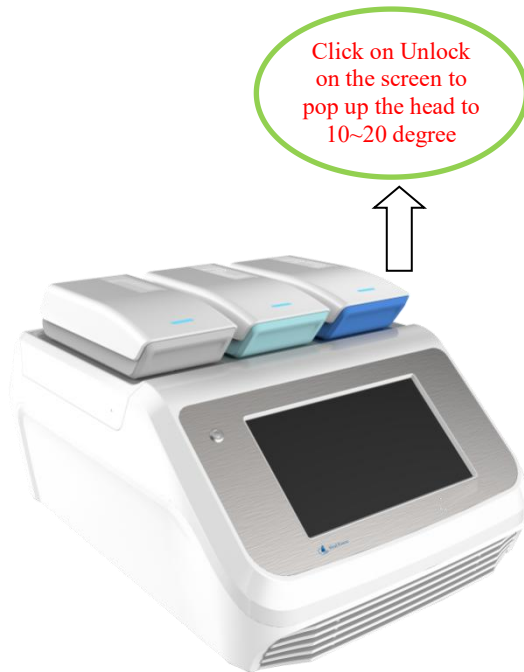
(11) USB port (12) No.3 module unit (13) Power switch (14) Fuse holder (15) Power socket

(16) Network port (17) USB port (18) Mini-USB port (19) Name plate (20) Air outlet

(21) Emergency switch (22) No.3 module unit holder (23) Upper lid

Construction & Function Description

After the equipment is powered on, the thermal lid is handled with a pull-out electromagnet, plat-type shaft and torsional spring. To open the lid initially, you have to press the Opening button on the screen, and the lid will be opened by an angle of around 10°, and then you can adjust the angle within 20°~100°, as shown at the left side.

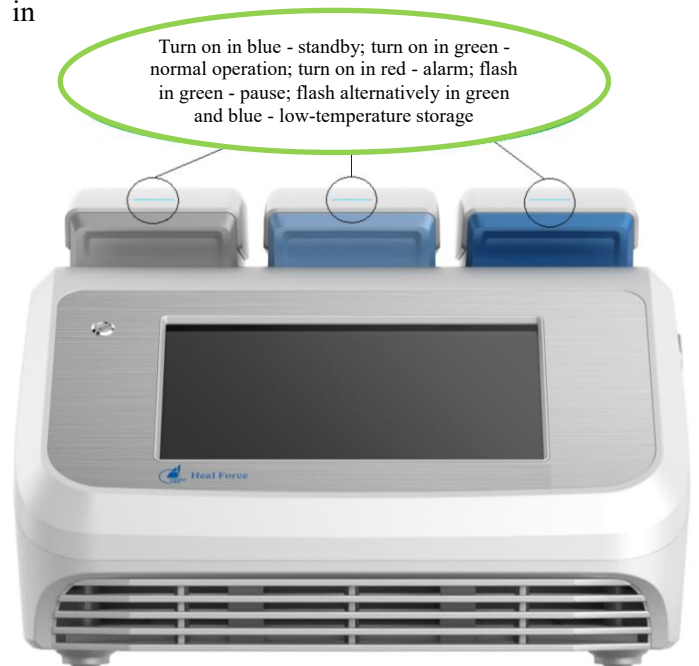


For this instrument, the lid can turn within range of 0°~90° to the enclosure, so do not move the lid out of this range, or otherwise it can be damaged.

In case of power outage or any other emergency, you have to take out the agent inside the module by inserting the tool provided into the hole at the left side of the equipment to unlock the module unit.

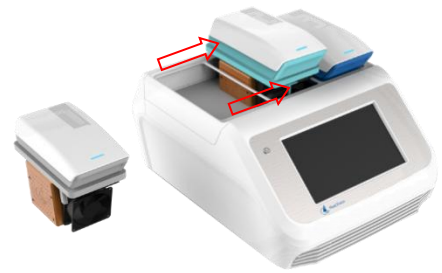


Each module unit is furnished with an indicator light, which will operate in five statuses: turn on in blue - standby; turn on in green - normal operation; turn on in red - alarm; flash in green - pause; flash alternatively in green and blue - low-temperature storage.



These three module units are interchangeable and independent of each other, where programs can be run without interference with each other, so that user can easily replace related parts. The module units and their holder are removable and the units are fixed to the holder with clasp and self-locked. The user-friendly design will facilitate user's operations.

Figure 1



(1) No.1 module unit

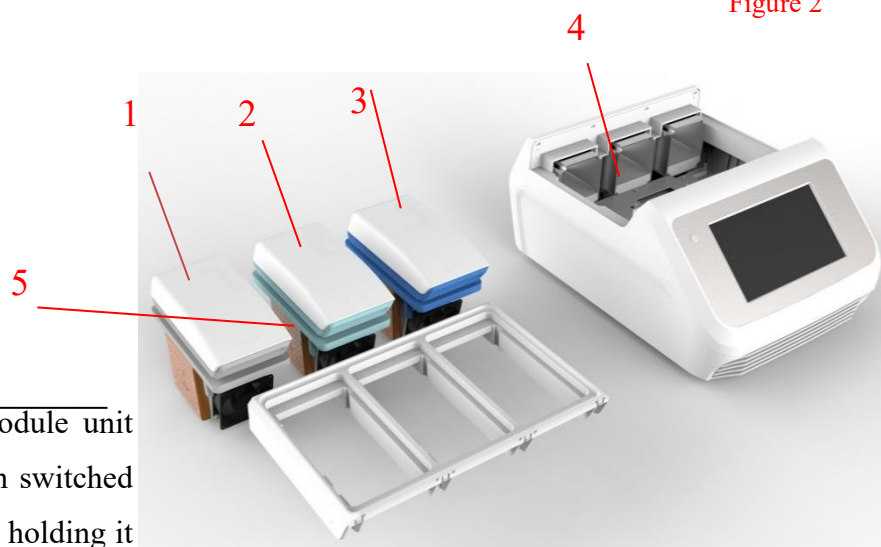
(2) No.2 module unit

(3) No.3 module unit

(4) Chamber

(5) Module unit holder

Figure 2



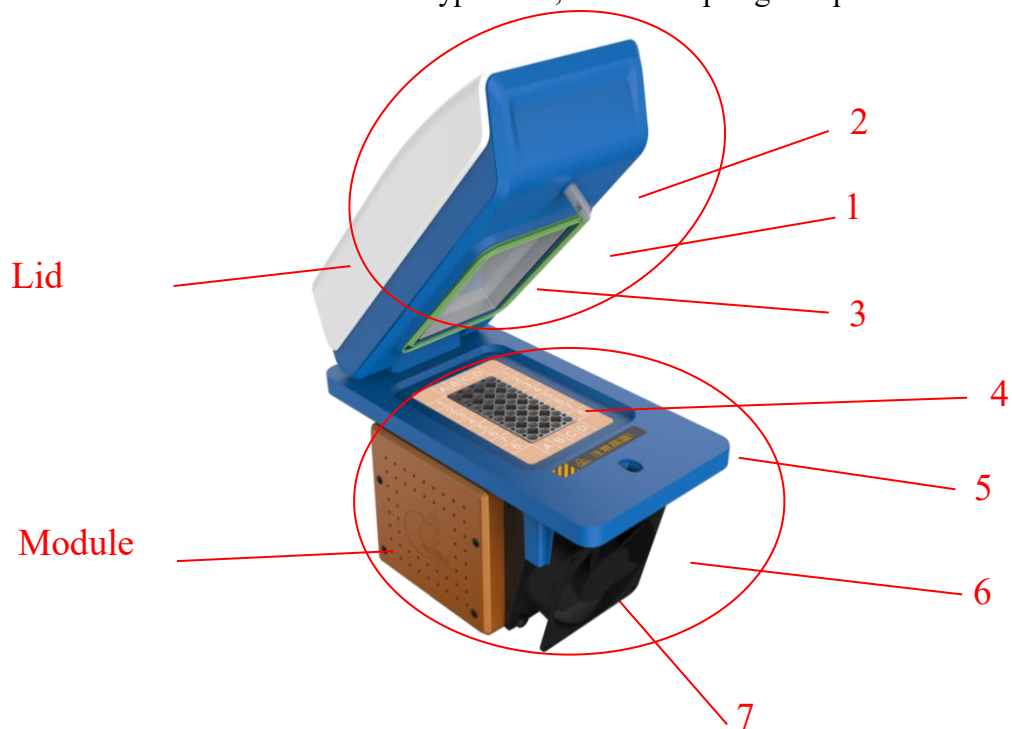
Be sure to mount/remove the module unit only when power supply has been switched off. Remove the module unit only holding it with both hands and pulling it upwards.

Overview of Module Unit

The C320 is adapted to two types of modules, the normal (Type A) and the Performance (Type B). Compared with the A-type module, the B-type module has a faster rising and cooling rate and more excellent performance indicators. The high efficiency copper-aluminum heat sink and semiconductor thermoelectric cooling plate are selected to increase the module gradient function.

The module unit consists of thermal lid and module.

The lid is linked to the module with a flat-type shaft, torsional spring and pull-out electromagnet.



- | | | | |
|--------------------|----------|-----------------|------------|
| (1) Sealing ring | (2) Hook | (3) Thermal lid | (4) Module |
| (5) Module presser | (6) Fan | (7) Cooler | |

Do not touch the module or lid during operation and within one hour after end of operation.

Section III - Working Conditions

Instrument Performance Properties

Product Name:	C320 Thermal Cycler	
Product Model:	C320	
System:	In architecture of ARM Cortex-A7 and Android operating	
Bits:	64/32 bus architecture, 32/32KB primary cache, 1M secondary	
Minimum Memory:	2G	
Display Unit:	GC2000	
CPU:	Operating frequency up to 1.2GHz	
Overall Dimensions:	502mmx394mmx293mm (L×W×H)	
Weight:	16kg (net weight);	18kg (gross weight)
Communication interface:	USB2.0/ LAN/ WiFi	
Power Supply:	AC85V-AC264V 50/60HZ	
Input Power:	1100w	
Fuse:	AC 250V 10A	
Sample Capacity:	3*32 hole x 0.2ml	
Temperature Range:	1°C~100°C	
Maximum temperature	BLOCK A ≥ 6° C/sec	BLOCK B ≥ 8° C/sec
Average temperature rise rate (50°C~99°C):	BLOCK A ≥ 3° C/sec	BLOCK B ≥ 4.5C/sec
Maximum temperature	BLOCK A ≥ 5° C/sec	BLOCK B ≥ 6° C/sec
Average temperature fall rate (50°C~99°C):	BLOCK A ≥ 2.5° C/sec	BLOCK B ≥ 3.5° C/sec
Temperature Control	BLOCK A ≤ ±0.3°C	BLOCK B ≤ ±0.2°C
Temperature Accuracy:	≤±0.15°C	
Gradient Temperature	Not Supported	BLOCK B 1°C~30°C
Gradient Temperature	Not Supported	BLOCK B 30°C~100°C

Thermal lid temperature	RT—110°C
Temperature Control	block; calculated-tube;pid
Temperature Control	Max. 999 cycles
Networking function	Yes
Adjustable temperature	0.1~5°C
Program halt	Yes
Power-down data	Yes
Hold at 4°C	Forever
Language setting	Chinese/English
Storage	USB/SD storage/on-board
Display interface	10.1-inch 1024*600 colored TFT capacitor-type touch screen
Soft start button	Environment-friendly low-carbon
Special Functions:	Operations based on Android OS

Operating Environment and Storage Condition

Operating Environment	Ambient temperature	10°C~30°C
	Relative humidity	<70%
Storage Condition	Ambient temperature	-20°C—55°C
	Relative humidity	<80%

To ensure Normal Operation of the instrument and accuracy of test result, be sure to operate/store the instrument in accordance with the specified operating/storage conditions; or otherwise the instrument may be damaged or personal injury may be caused to the operator.

Section IV - Use and Installation of Software

Installation Instructions

Preparations

This product is furnished with built-in App to facilitate user's operations. In case of version change or update, contact your dealer to obtain the latest program.

Installation Environment

Android v7.1

Installation Considerations

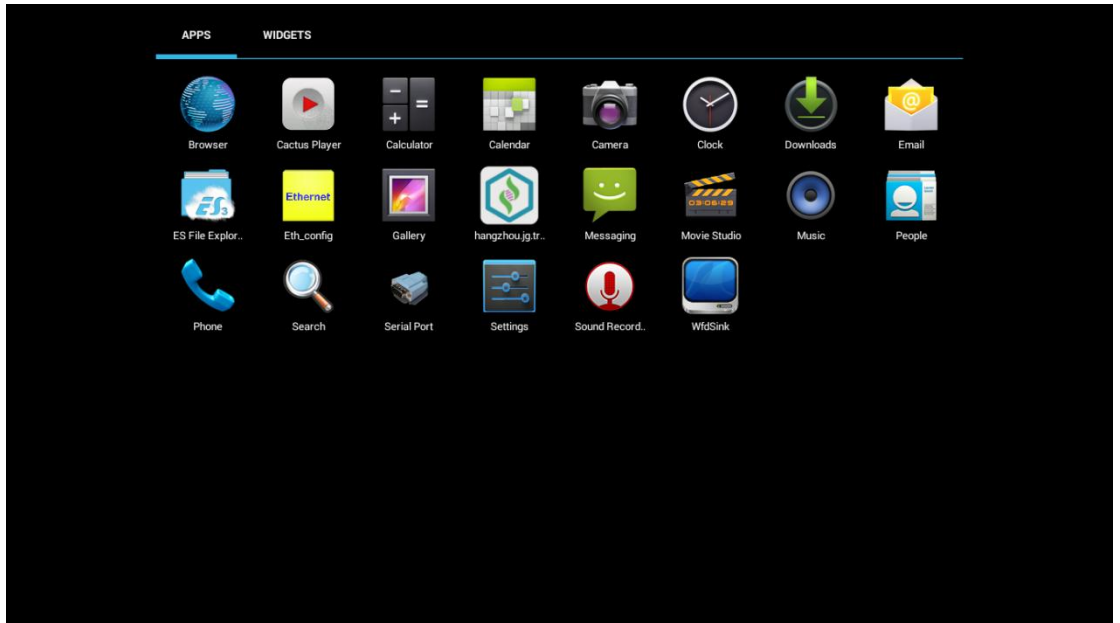
Prior to update or change to the program, make sure that no third-party App which may change system authority has been installed in the equipment.

Before Start

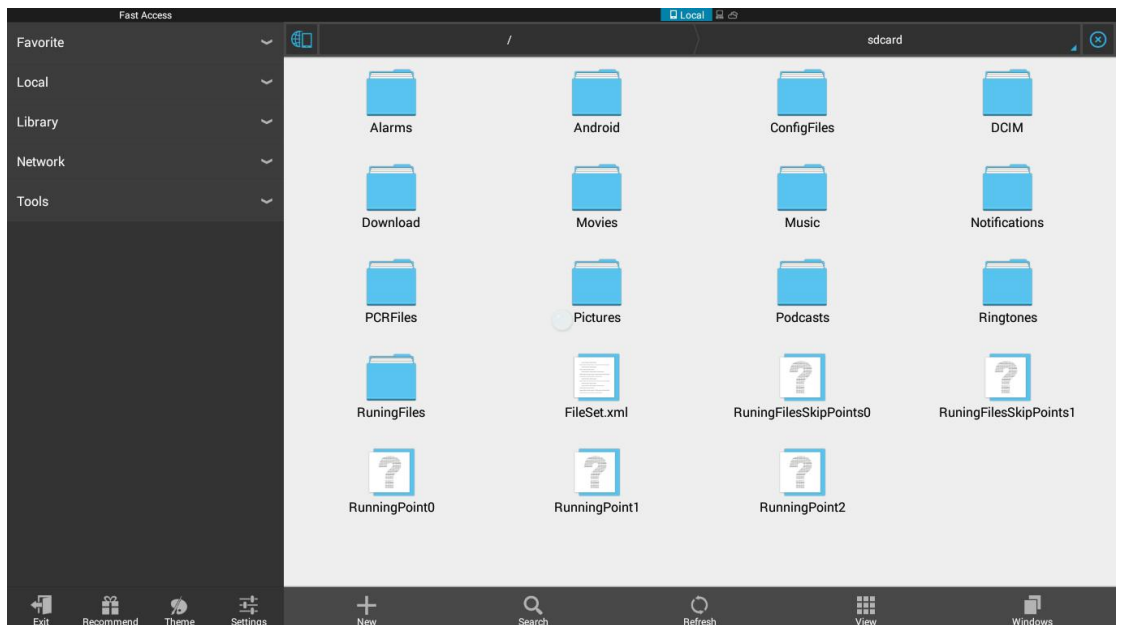
Please read installation procedure carefully.

Start Installation

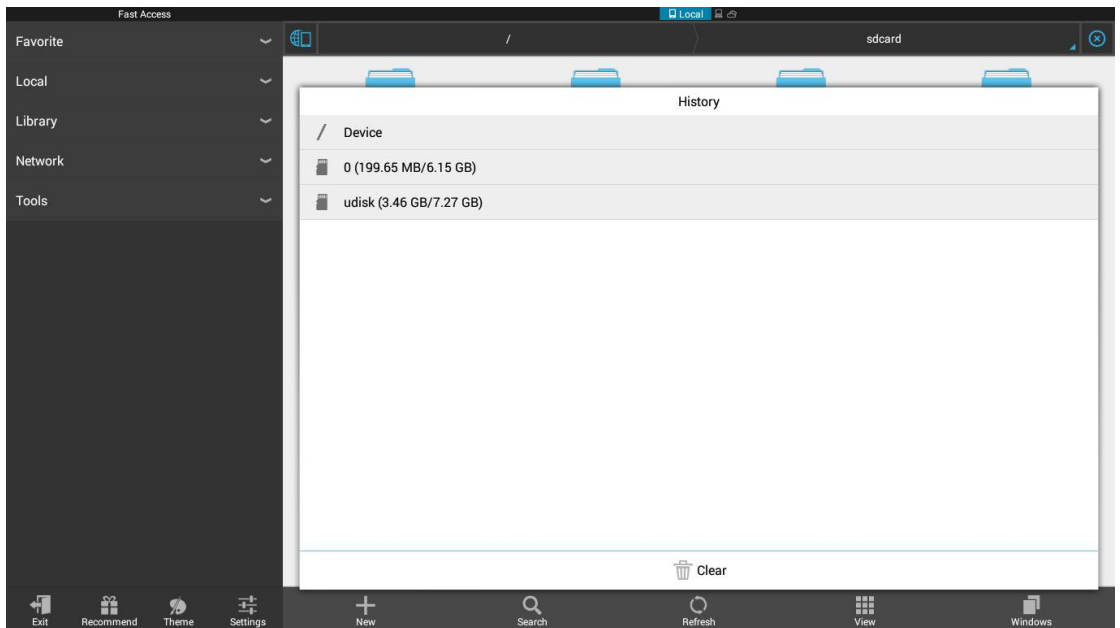
- 1) Obtain the latest installation package suitable to the equipment from your dealer.
- 2) Copy the package to a removable storage.
- 3) Start the equipment and run ES File Browser as shown below.



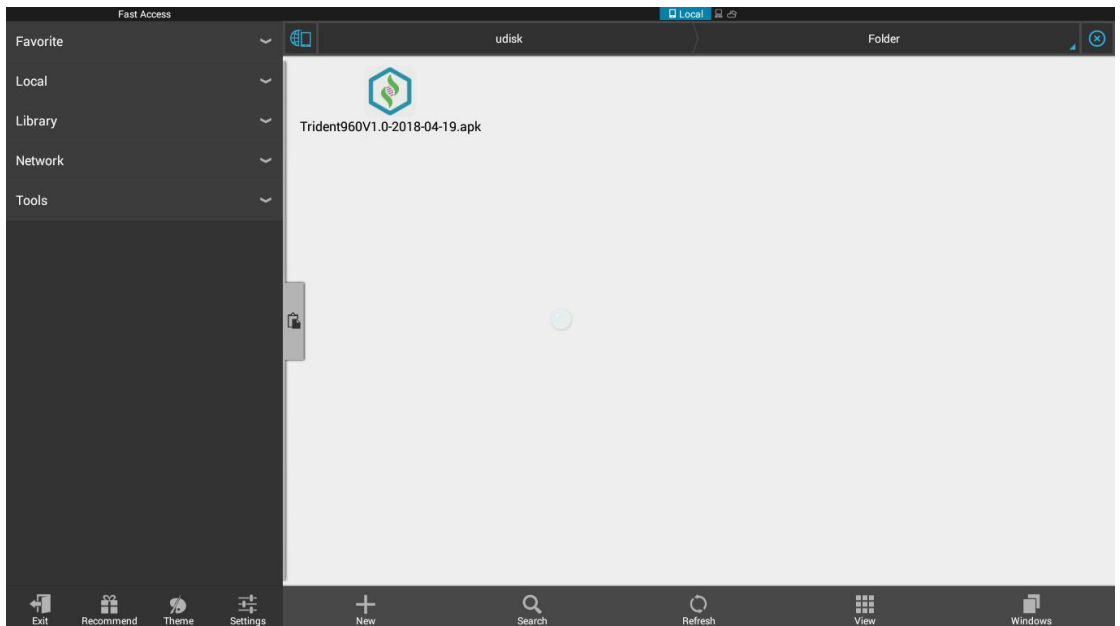
- 4) Navigate to directory "sdcard" by clicking on the icon at the upper right corner as shown below.



- 5) And then navigate to the directory "udisk" by clicking on the icon as shown below.



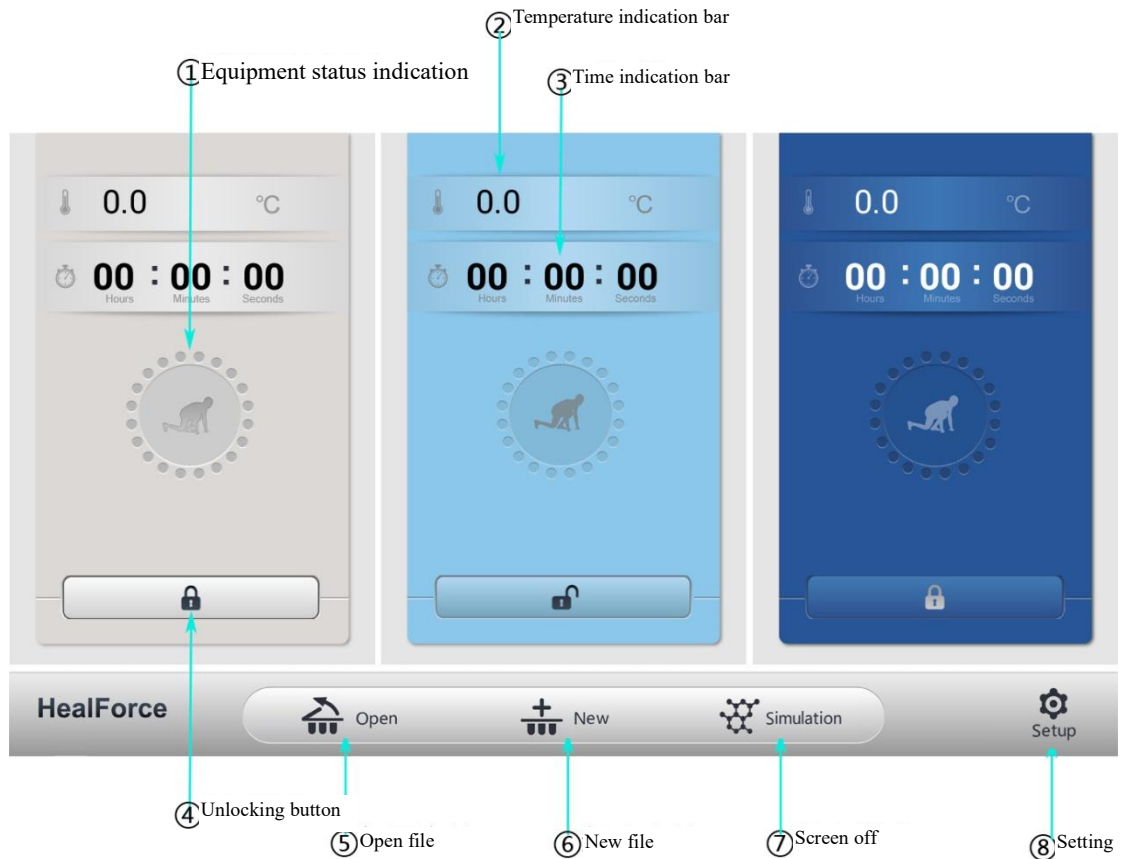
6) Perform installation by clicking on the App icon.



Tip: upon completion of installation, restart the equipment.

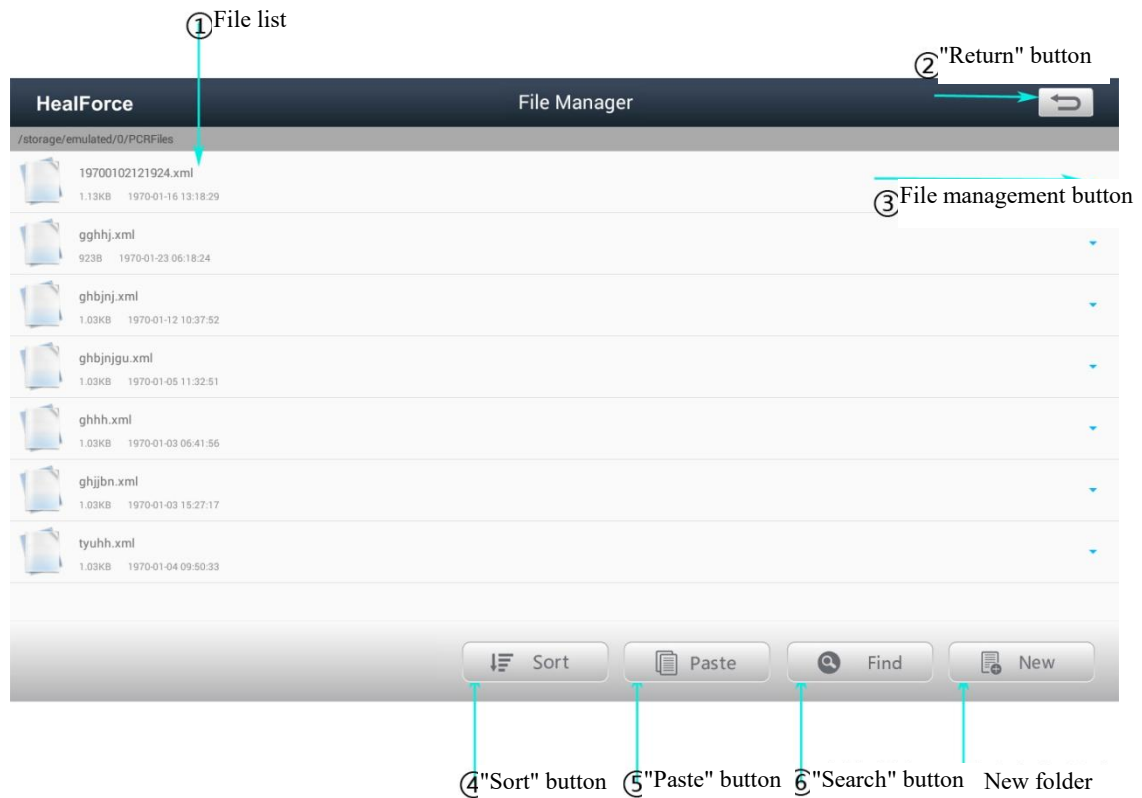
Interface Introduction

Main interface:



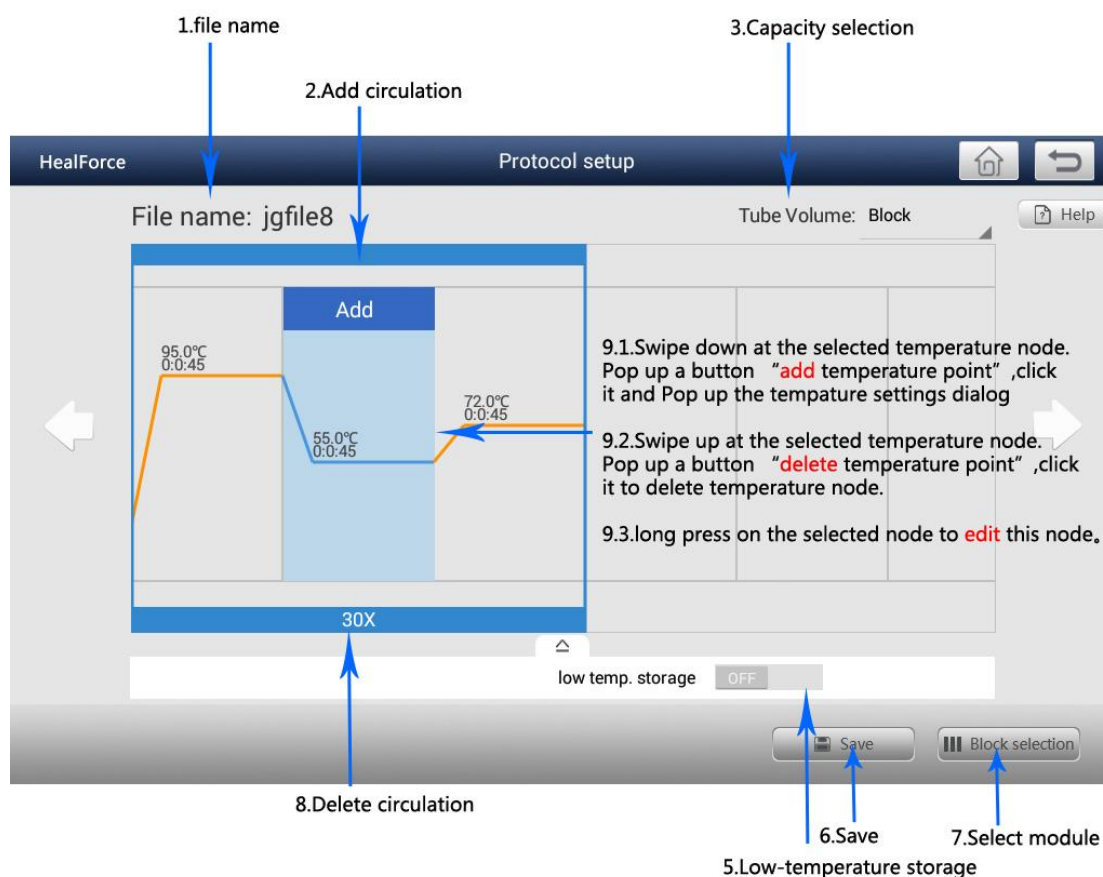
- ① Display current module status (operation/stop). Click on this button to view operation of the equipment.
- ② Display module operating temperature.
- ③ Display count-down throughout test.
- ④ Display whether current module has been locked; click on this button to start the module.
- ⑤ Open file management page
- ⑥ Create a new PCR file
- ⑦ Turn off the screen.
- ⑧ System Settings

File management page:



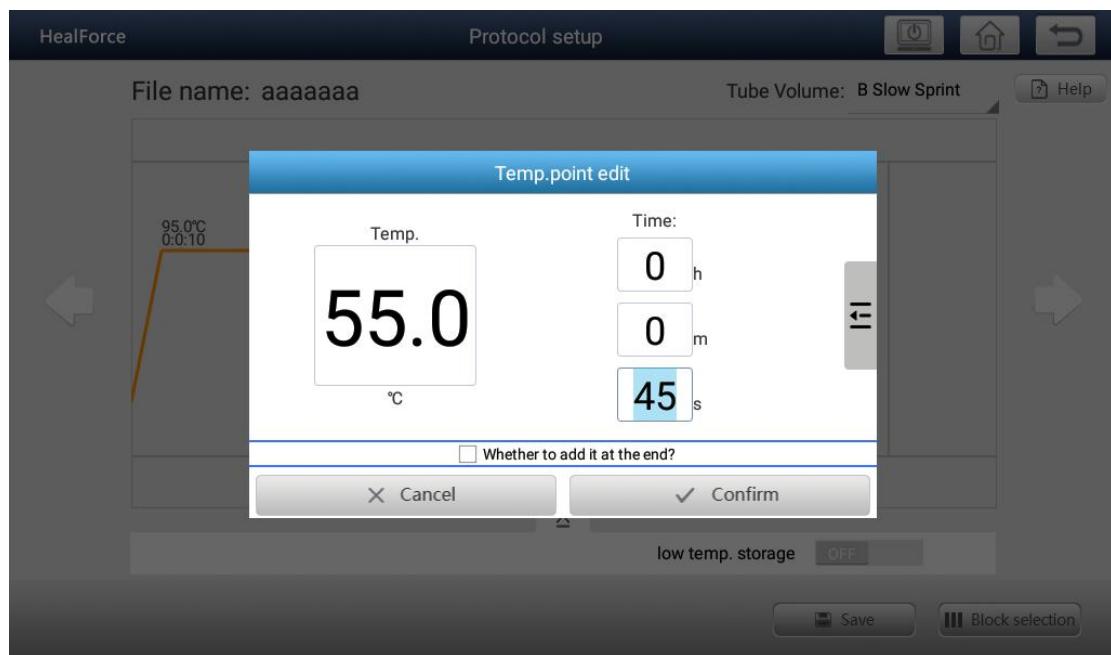
- ① View brief information on files
- ② Return to the last page (the same as below).
- ③ Click on the file button (inverted triangle) to rename/delete/copy any file.
- ④ Click on it to sort files in the sequence as chosen.
- ⑤ Paste the file copied.
- ⑥ Search files
- ⑦ New folder

Program setting page -1:



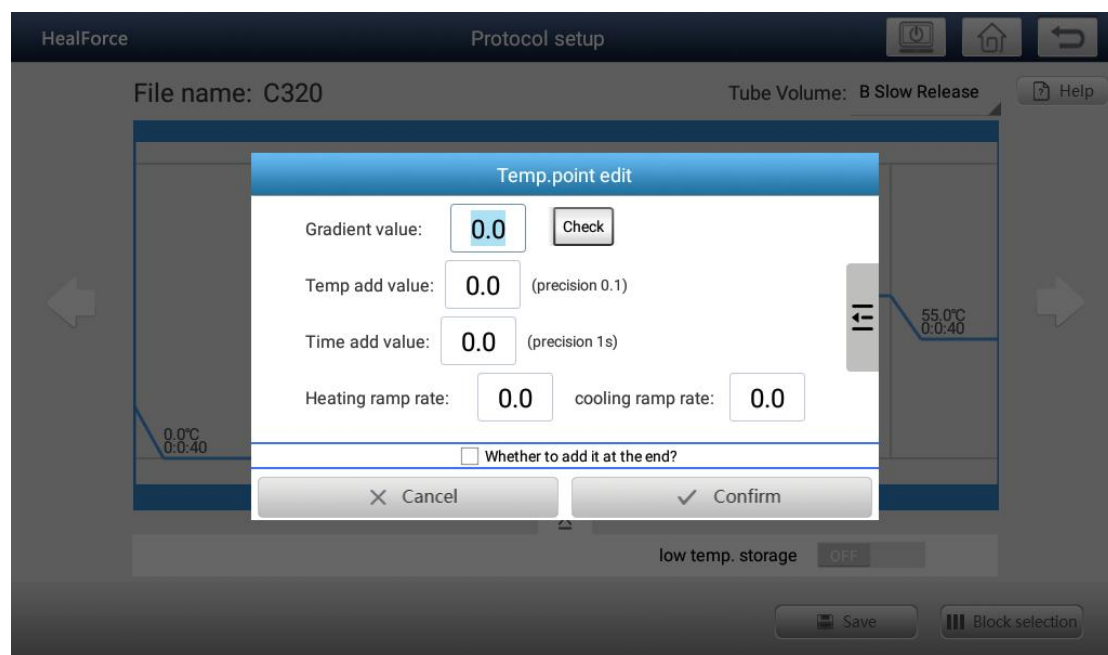
- ① File name.
- ② Click on the upper part of the display box to add a circulation.
- ③ Choose tube capacity (it is recommended to use sample seat mode and block mode).
- ④
- ⑤ Check this box to determine whether low temperature storage is enabled and to set storage temperature.
- ⑥ Save any option which has been set.
- ⑦ Choose a module to run.
- ⑧ Click on the lower part of the display box to delete a circulation.
- ⑨ 9.1.Swipe down at the selected temperature node. Pop up a button “add temperature point”. click it and Pop up the temperature settings dialog
 9.2.Swipe up at the selected temperature node. Pop up a button “delete temperature point”, click it to delete temperature node.
 9.3.long press on the selected node to edit this node

Program setting page -2:



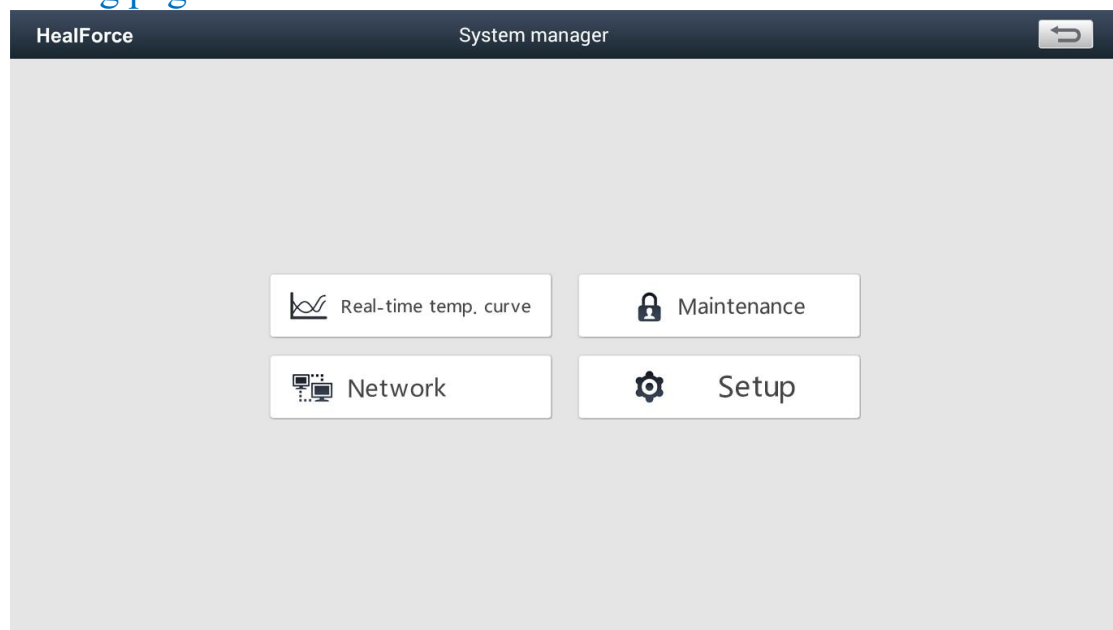
- ① Temperature: Edit current temperature point temperature.
- ② Time: Edit the time of the current temperature point

Program setting page -3:



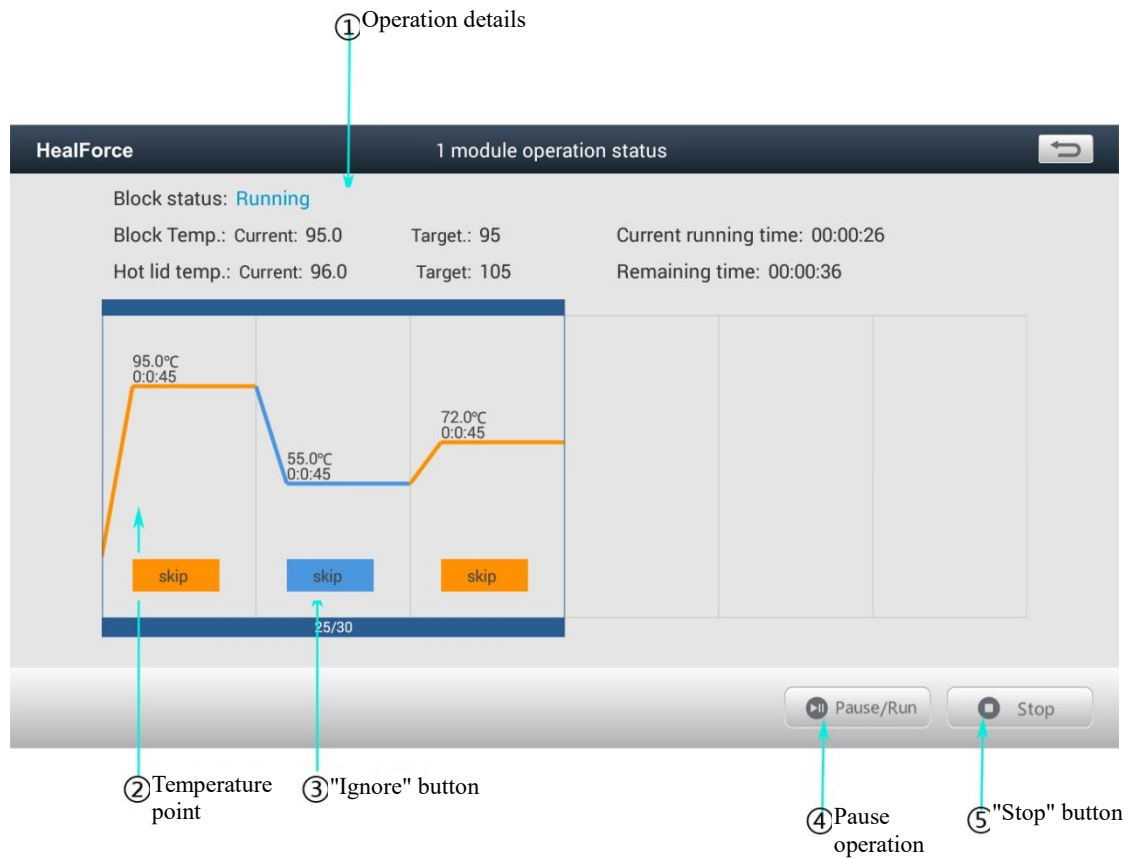
- ① Temperature gradient: Edit the current temperature point temperature gradient (used with temperature points). (ps:only block B)
- ② Query: Query the temperature gradient table that needs to be specified. (ps:only block B)
- ③ Temperature increase: The temperature value that increases or decreases (enter a negative number) per run cycle is often used in touchdown experiments.
Time increment: The time value that increases or decreases (enter a negative number) with each run cycle.
- ⑤ Heating rate: unit ° C /S.
- ⑥ Cooling rate: Unit °C/S.

Setting page:



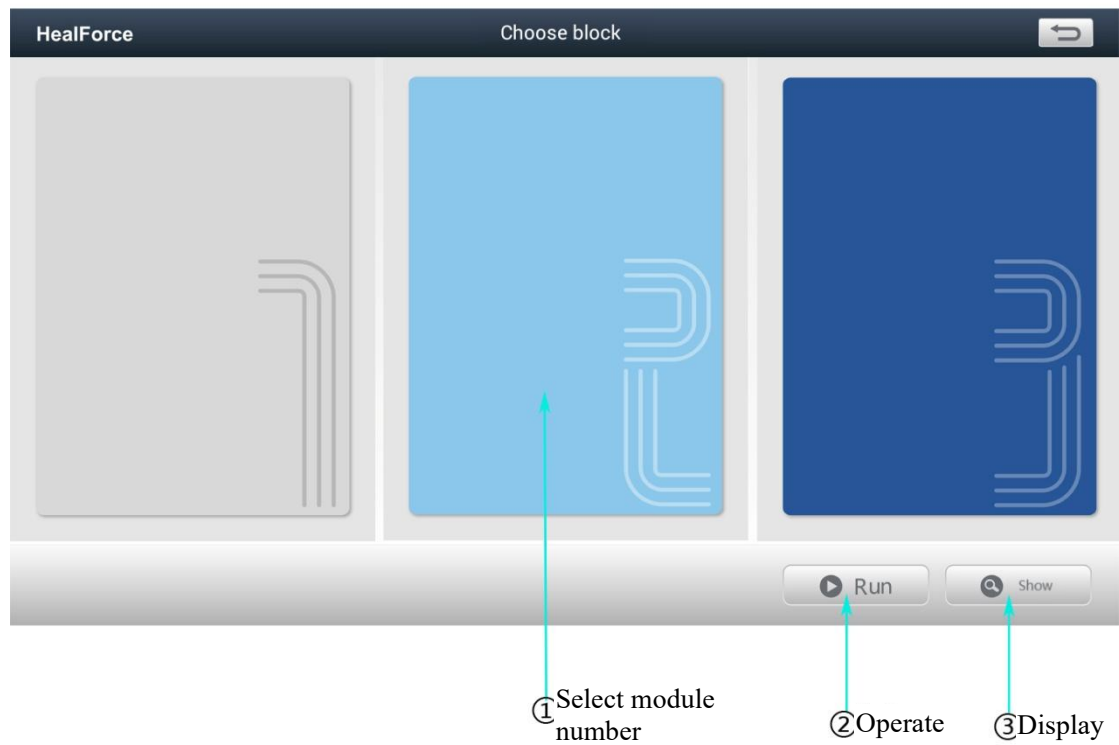
- ① Real-time temperature curve: Click on the button to view real-time temperature in the equipment.
- ② Internal: Internal management page which can be accessed only with super password.
- ③ Network: Network function is unavailable currently.
- ④ Setting: Set prompt sound. TM calculator.

Operation interface:



- ① Display operation status of individual module and detailed operation data.
- ② Temperature point progress diagram - flashing segment is a point currently in operation.
- ③ During operation you can click on Ignore button to jump a section (other than section currently in operation).
- ④ Pause/Run button - during operation click on Pause to suspend program and the indicator light keeps flashing in green color; click on it again to resume operation.
- ⑤ Double click on it to stop operation of the program.

Module selection page:



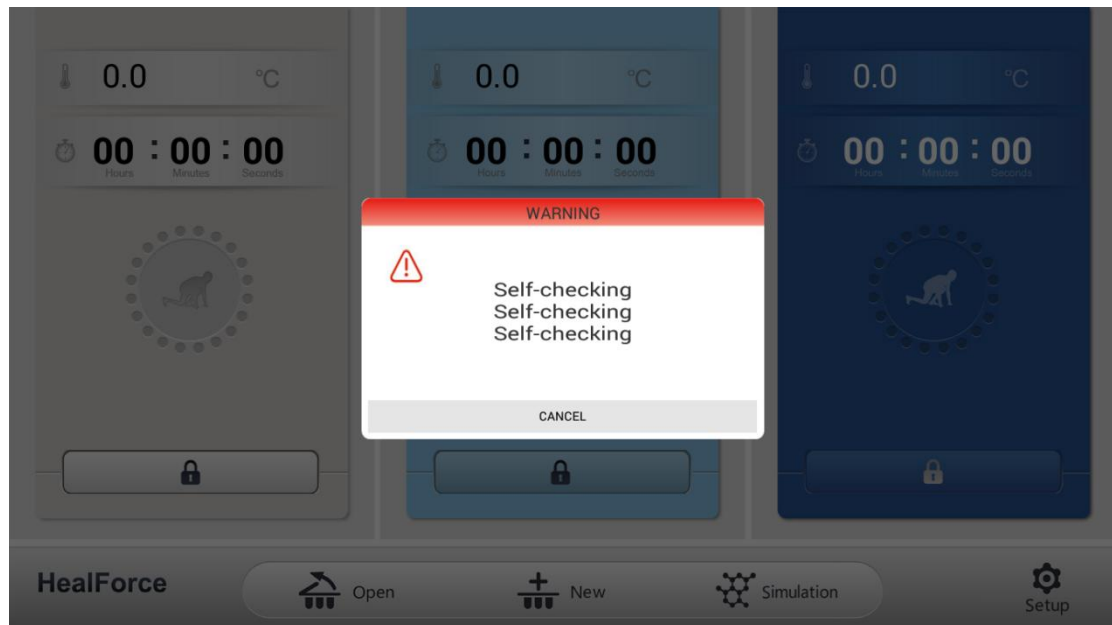
- ① Choose a module to run
- ② Confirm your choice and then click on Run button
- ③ Jump to operation page of No.1 module.

Section V - Test Introduction and Description

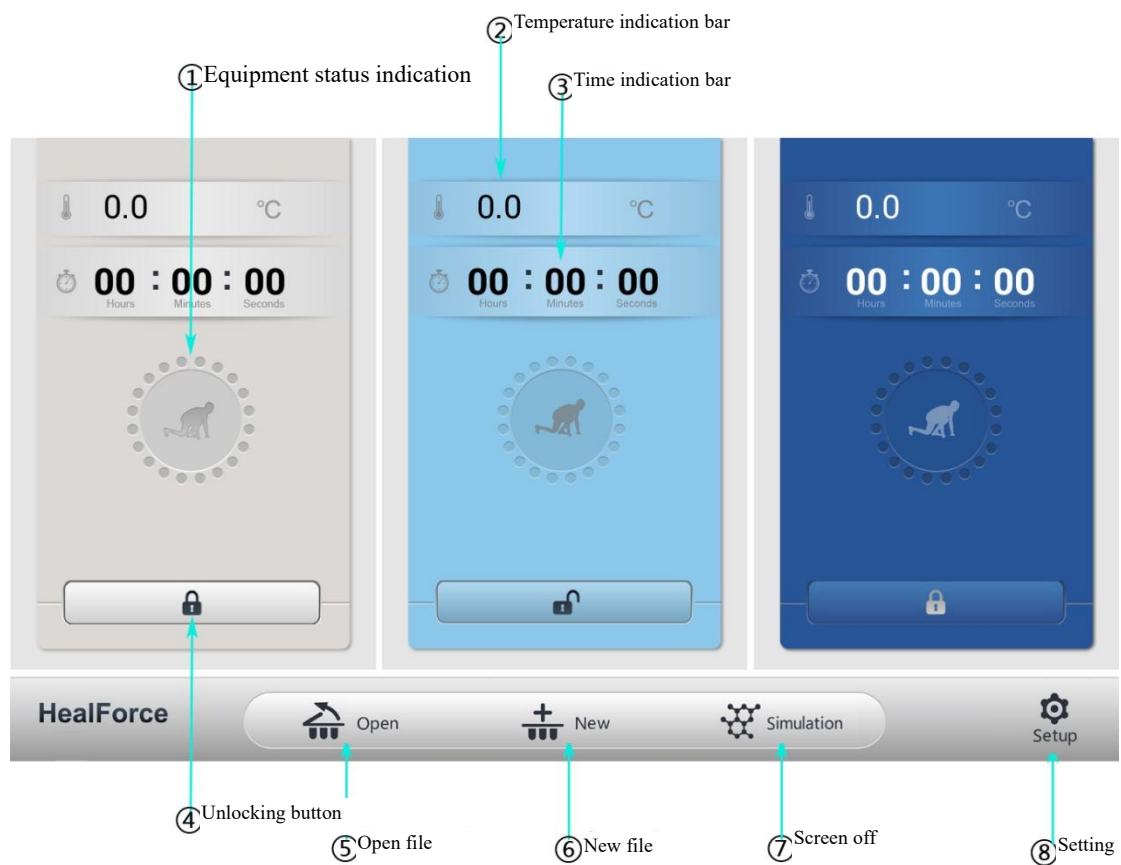
Before test: Check and ensure that there is no object which may block air outlet in the equipment around it. Check whether there is any foreign object which enters the hole in the module.

After preparations have been made, finish test settings in accordance with the following sections.

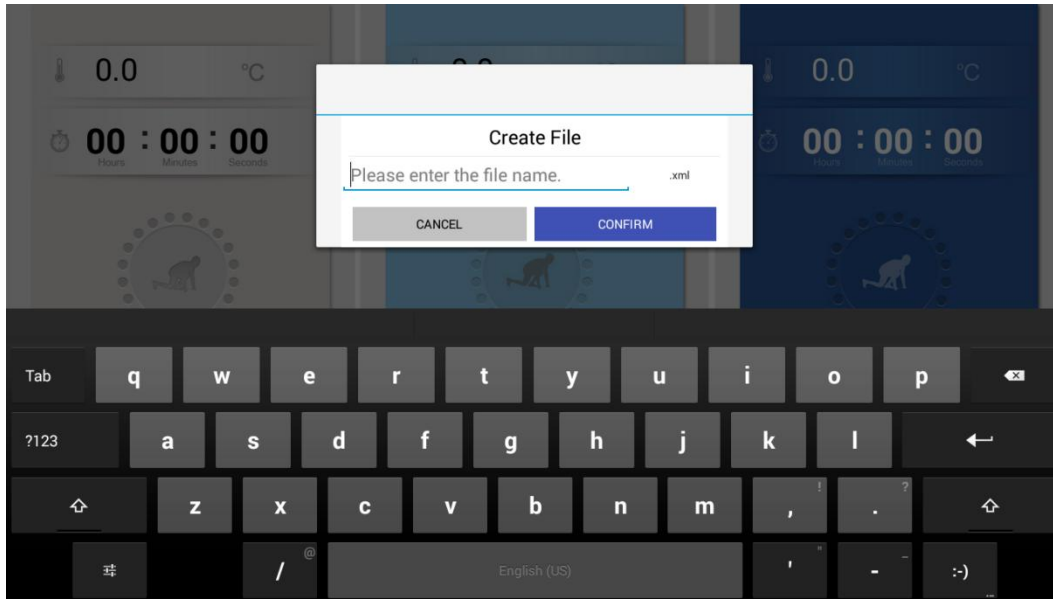
Firstly start the equipment and a prompt box pops up on the interface; the equipment starts preheating.



As shown above, the equipment is preheating so as to maintain the module and cooler temperatures within a relatively stable range and thereby to ensure quick and smooth test temperature variation subsequently. Be sure to put agent in and proceed with related operations only after **the preheating process is finished**.



Firstly create a new file by click on "(6) New" on the page, and a dialog box pops up as shown below.



Enter a file name and **click on OK** to finish creating a new file and **turn to program setting page**.

HealForce Protocol setup

File name: jgfile8 Tube Volume: Block

95.0°C 0:0:45

55.0°C 0:0:45

72.0°C 0:0:45

30X

low temp. storage OFF

Save Block selection

9.1.Swipe down at the selected temperature node. Pop up a button "add temperature point",click it and Pop up the tempature settings dialog

9.2.Swipe up at the selected temperature node. Pop up a button "delete temperature point",click it to delete temperature node.

9.3.long press on the selected node to edit this node.

1.file name

2.Add circulation

3.Capacity selection

4. 30X

5.Low-temperature storage

6.Save

7.Select module

8.Delete circulation

For example, to set: constant temperature at 95 °C for 45 seconds; **constant temperature at 55 °C for 45 seconds; constant temperature at 72 °C for 45 seconds;** and maintain 30 circulations, we will firstly configure external testing conditions. As stated above, the highest temperature is 95°C, and the agent contains no component which tends to evaporate, so we set "**(3) Lid Temperature**" to 105°C, which is suitable.

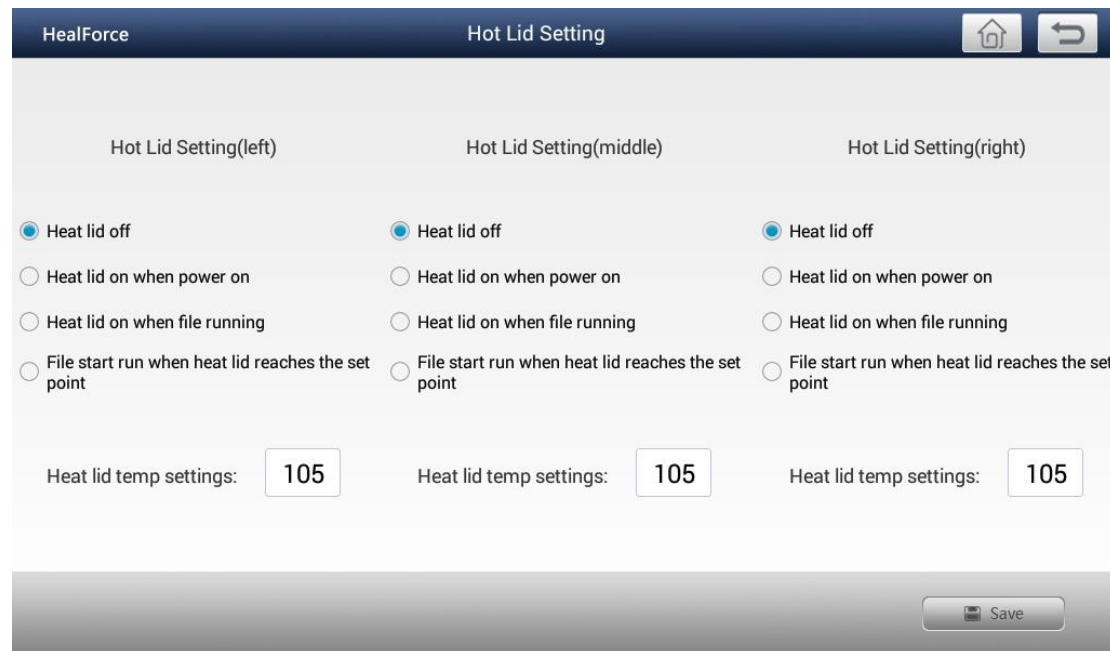
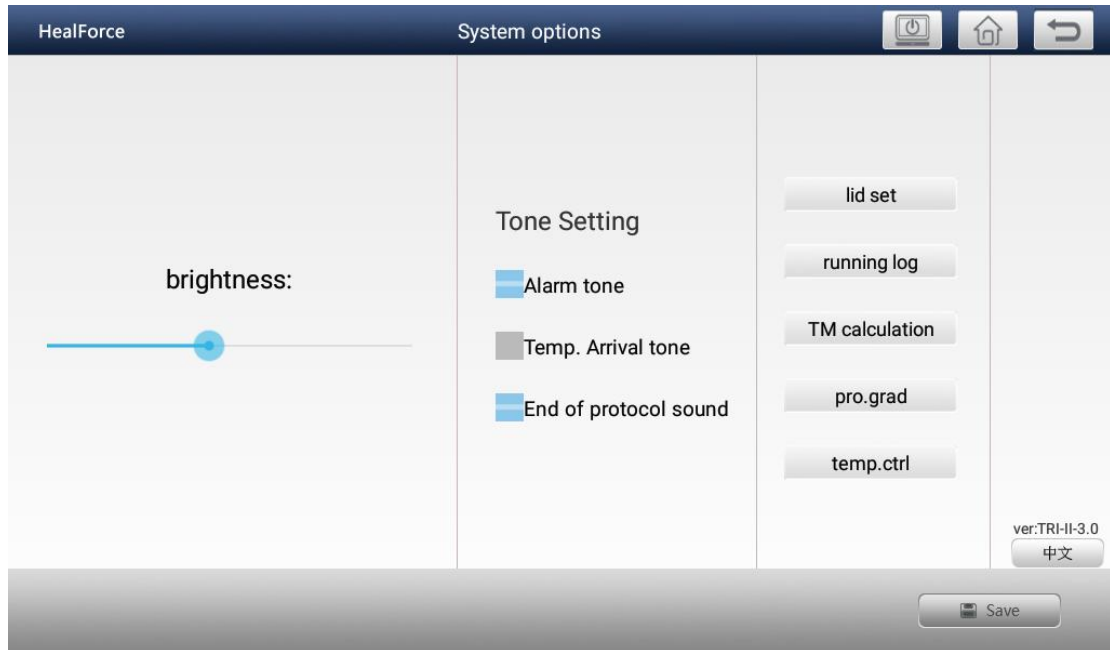
Next set "**(4) Tube Capacity**" to "block" mode, which is recommended currently. Since the test will last for a short time and low-temperature storage is unnecessary, "**(7) Low-Temperature Storage**" is unchecked.

Check and make sure all external testing conditions have been configured properly, and then start setting specific test temperature control conditions:

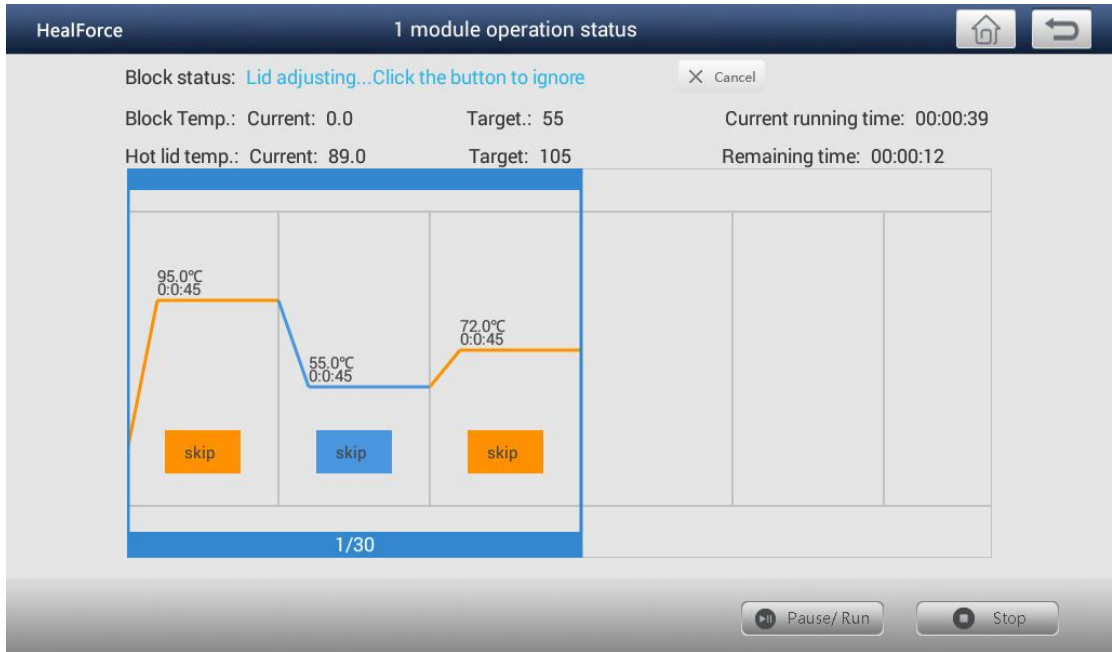
If our case : 95 °C constant temperature for 45 seconds; 55 °C constant temperature for 45 seconds; 72 °C constant temperature 45 seconds; maintain 30 cycles

According to the experimental requirements, we first configure the external experimental conditions: first set "3. Test tube capacity" to block mode, it is recommended to use block mode;

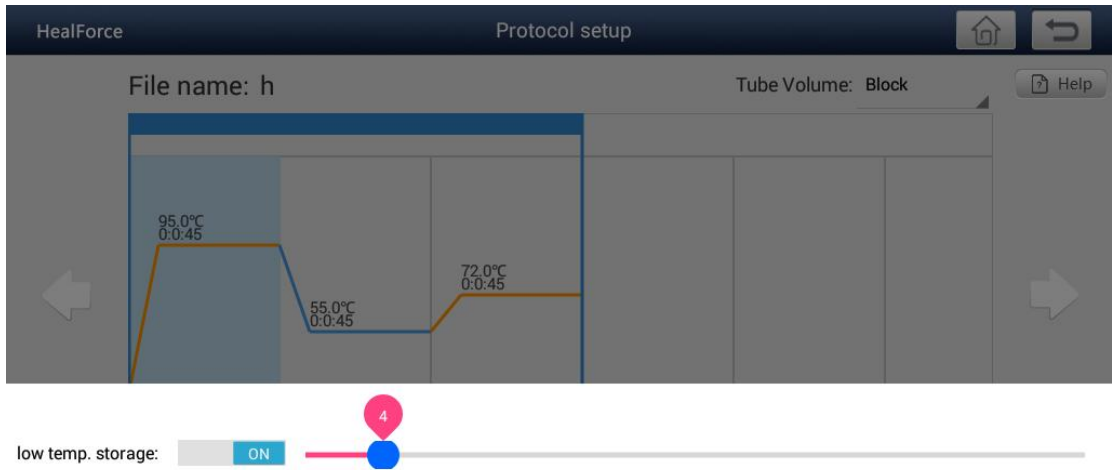
We saw that the highest temperature point in the case was 95 °C, and our reagents did not prevent evaporation, so we clicked "Settings" in the main interface "8. Settings" and then clicked the "hot cover" and set it to 105 degrees (most suitable), as follows (don't forget to save):

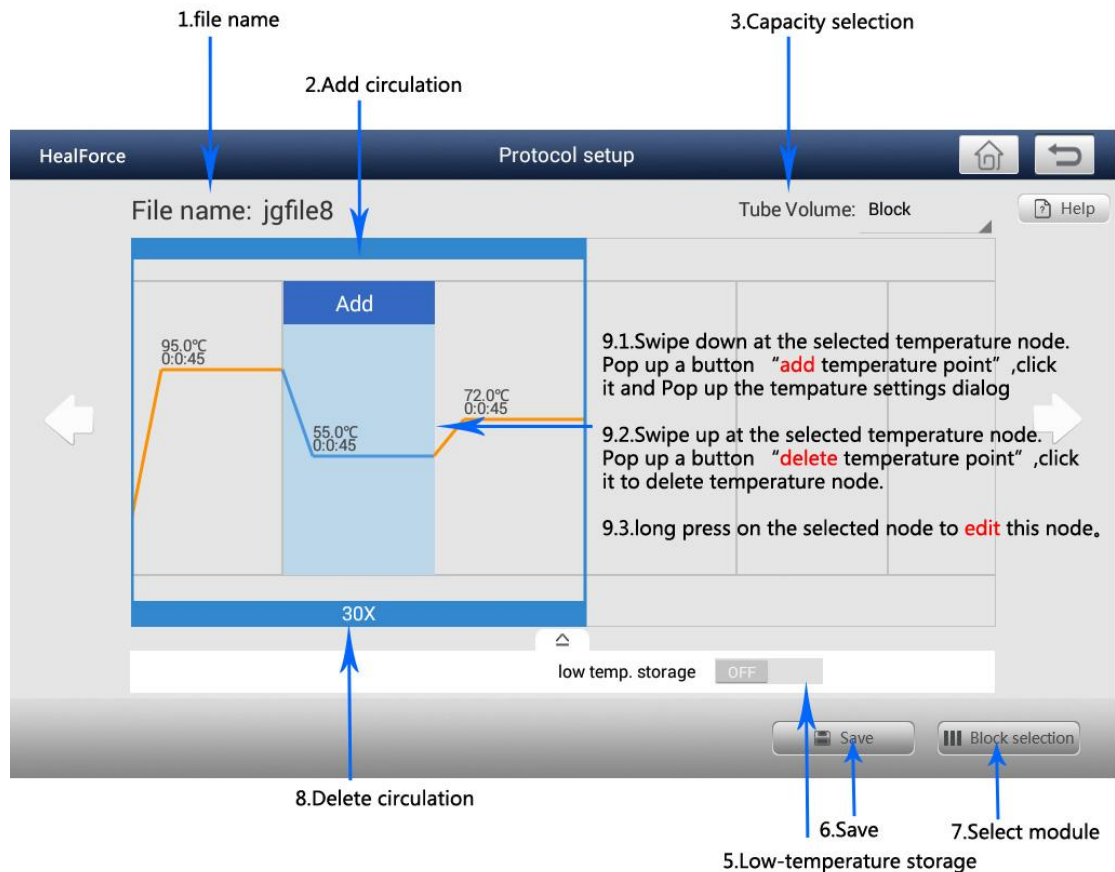


(if choose the “file start run when heat lid reaches the set point.” Please wait a moment or click the “cancel” button)



Click "5. Cryopreservation" to preserve the reagent when necessary;



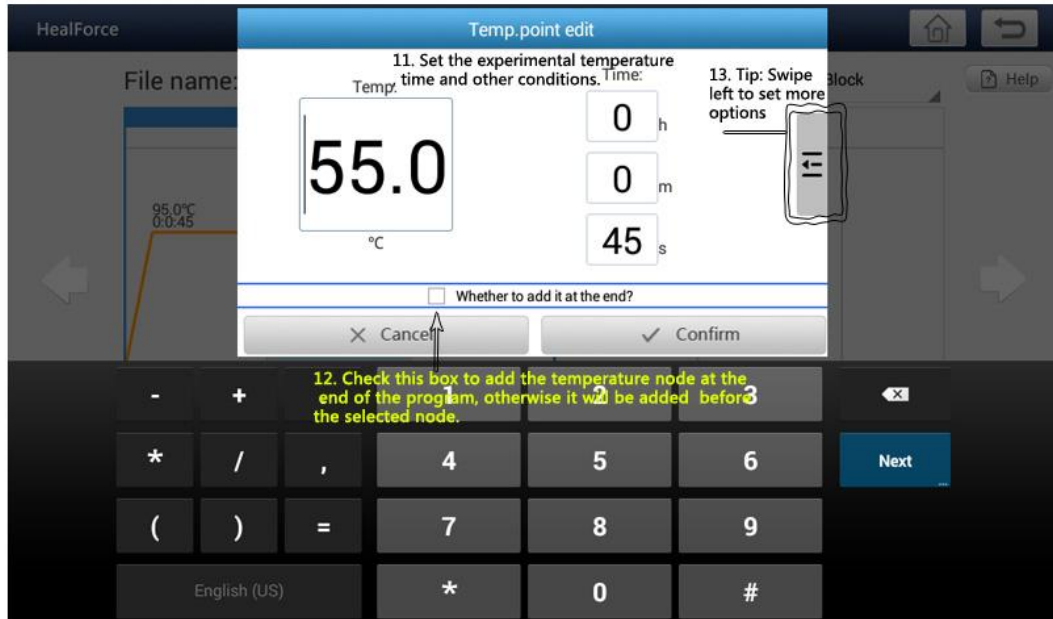


Review the Edit temperature point the test case: constant temperature at 95 °C for 45 seconds; constant temperature at 55 °C for 45 seconds; constant temperature at 72 °C for 45 seconds; and maintain 30 circulations; Increase or reduce temperature points to three by clicking on "(6) Add/delete temperature point".

Long press "(10) Edit temperature point" to pop up the following dialog box:

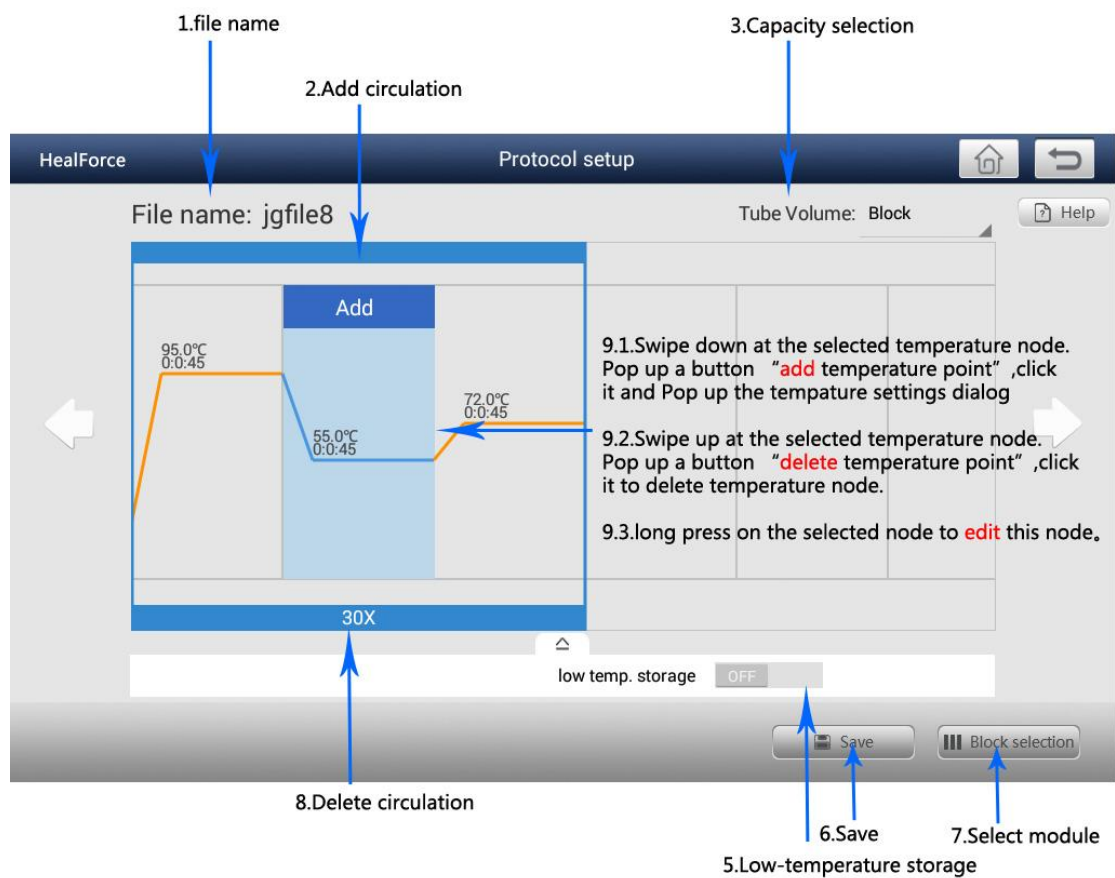
According to the operation steps of 9.1 and 9.2, the temperature points are added or deleted to 3, and then the temperature requirements of the corresponding temperature points are edited according to the 9.3 operation steps.

Long press the temperature points (9.3), the following dialog box pops up:

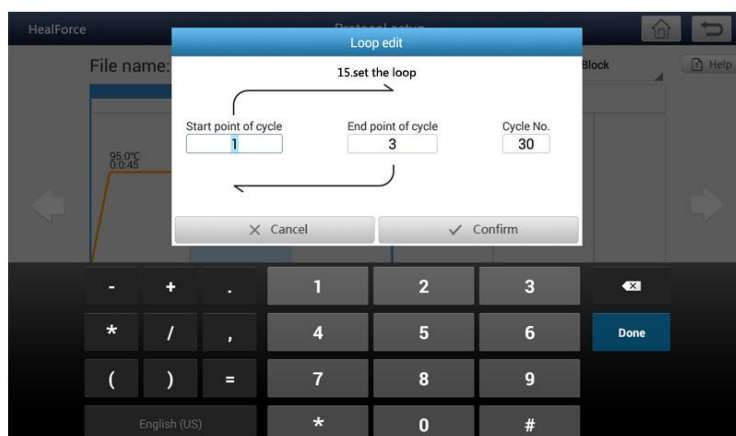


Specify temperature as 95°C and duration as 45 seconds (the same as the other two points).

Click on OK to return program setting page.

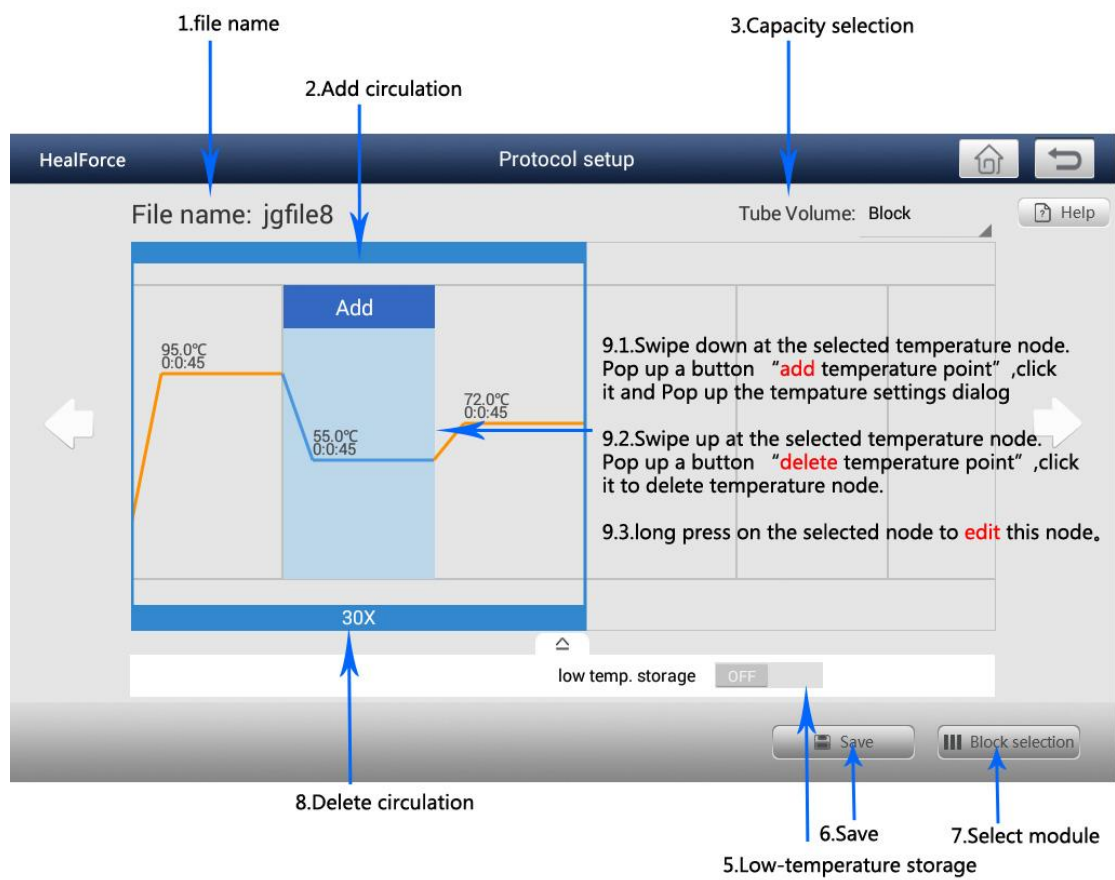


Click on "(2) Add circulation" to pop up the following dialog box.

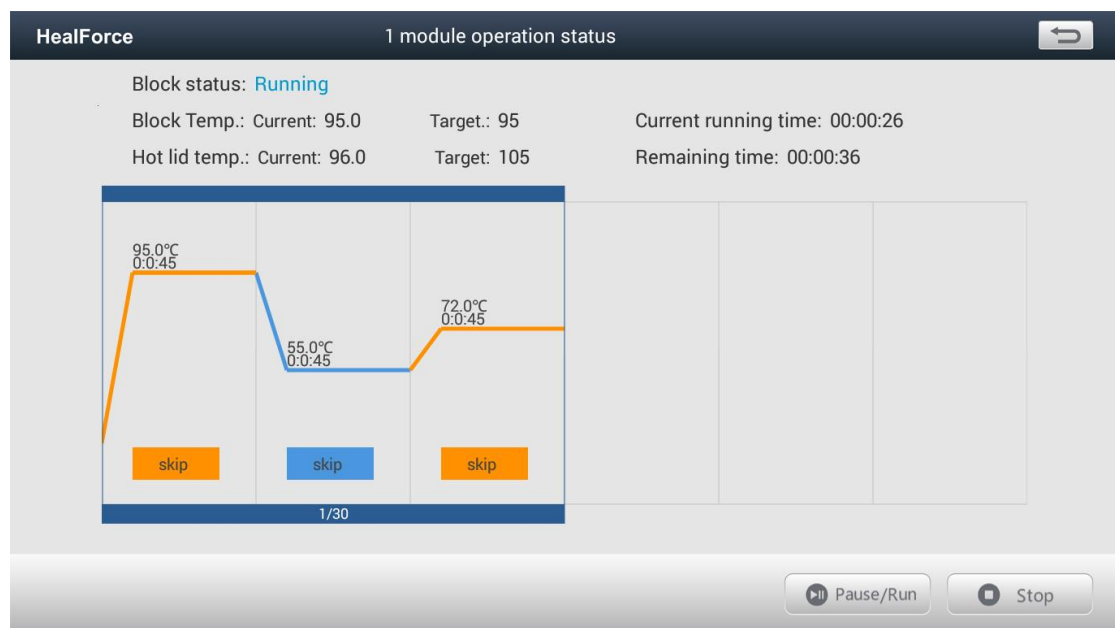


Set starting point of circulation to "1" and ending point to "3" and number of circulations to "30".

Click on OK to return program setting page.

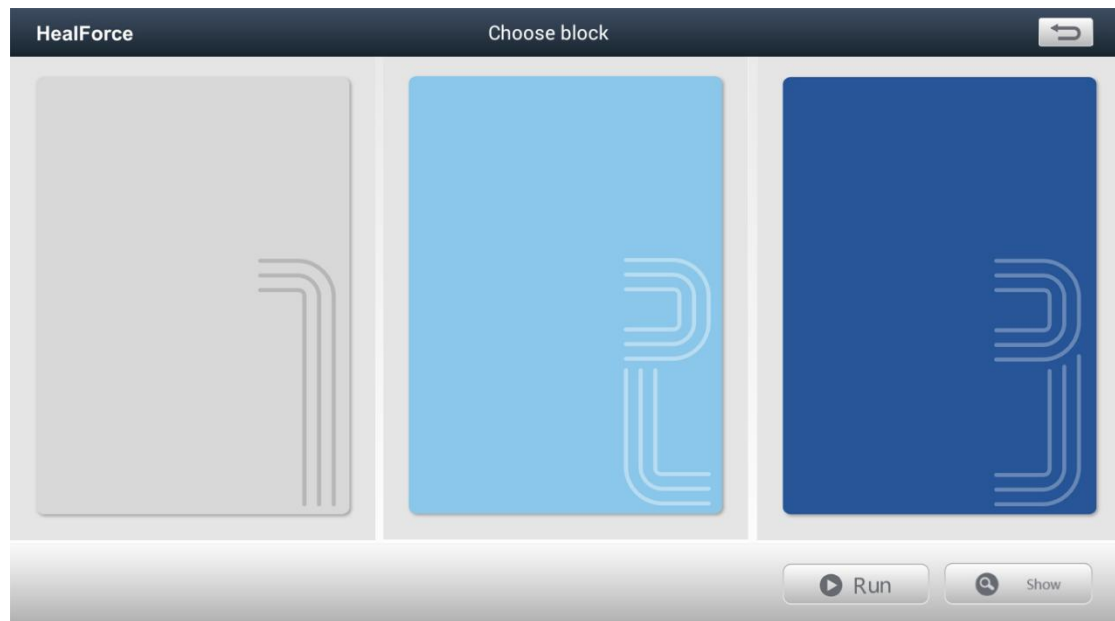


Check the program against the test case and then **be sure to click on "(8) Save" button.**

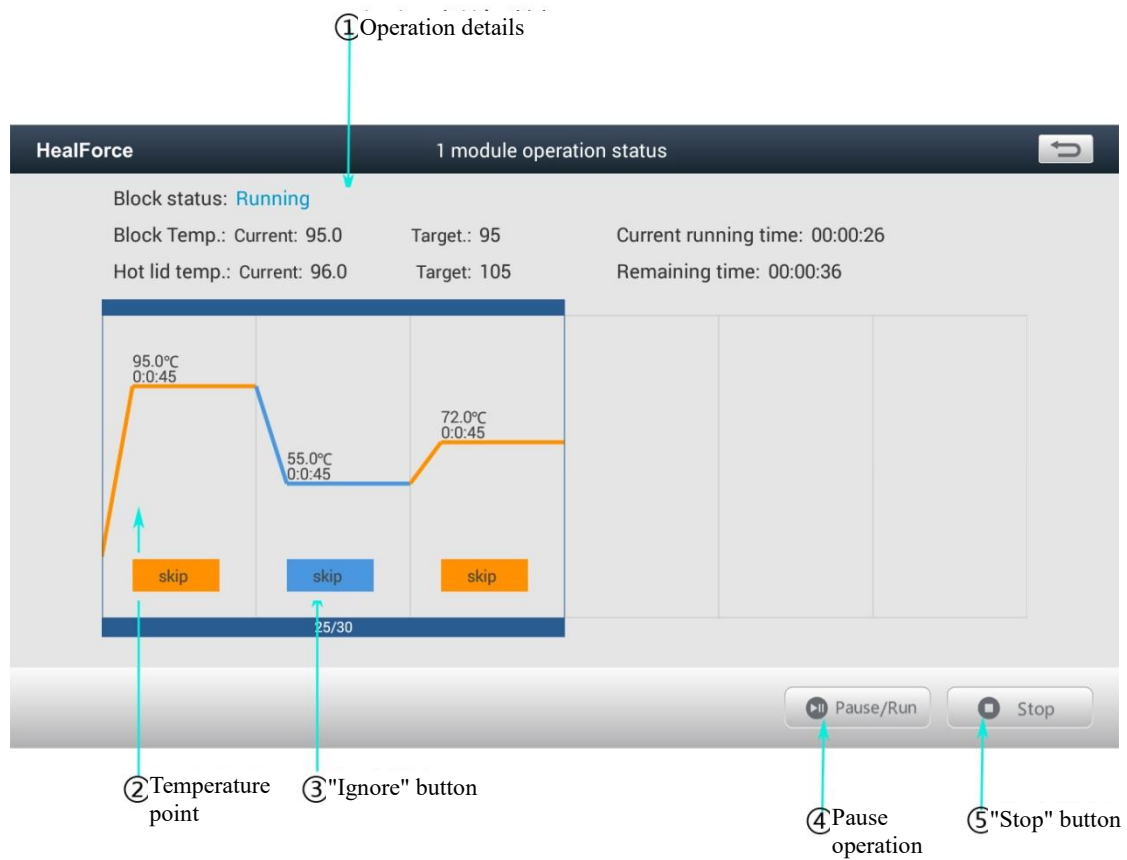


After saving it successfully, **click on "Choose module" to turn to module selection**

page.

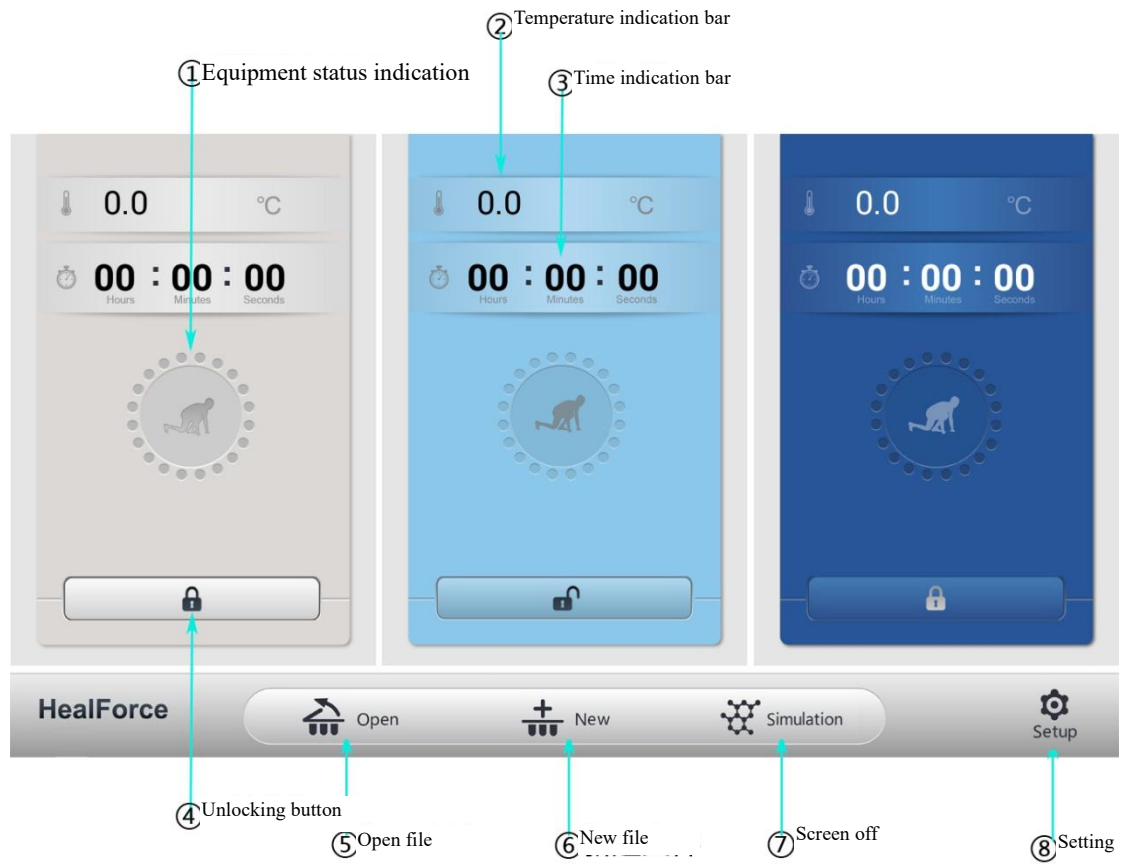


Choose a module and then click on "Run"; the indicator light turns from blue (stop) to green (operation). Then click on "**Display**" to go to status indication page.



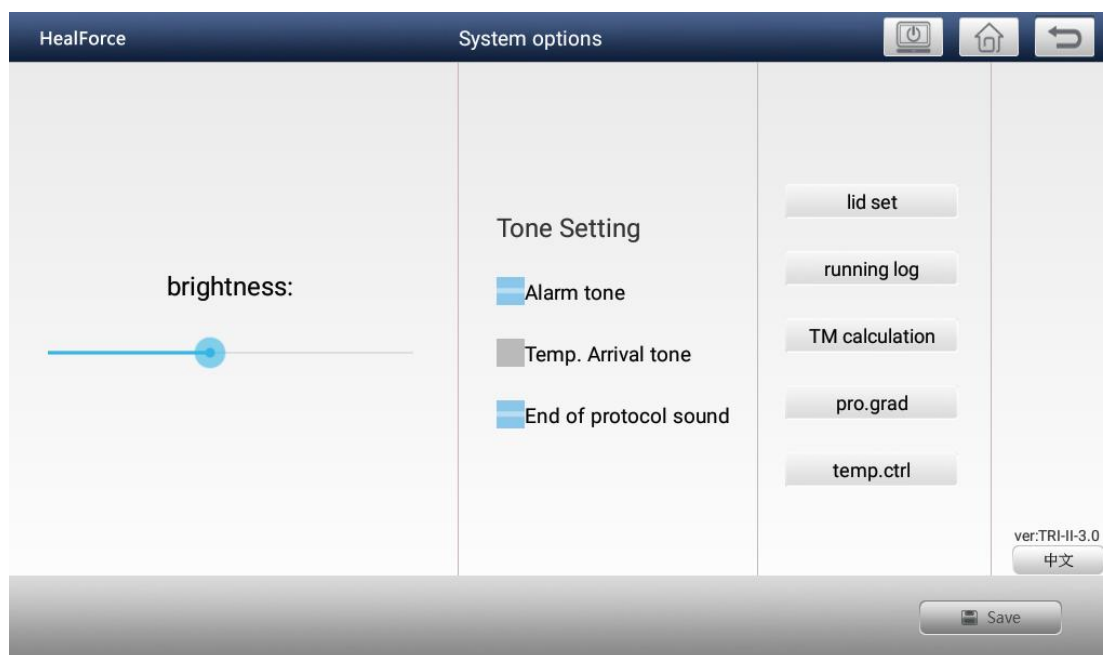
- ① Display operation status of individual module and detailed operation data.
- ② Temperature point progress diagram - flashing segment is a point currently in operation.
- ③ During operation you can click on Ignore button to jump a section (other than section currently in operation).
- ④ Pause/Run button - during operation click on Pause to suspend program and the indicator light keeps flashing in green color; click on it again to resume operation.
- ⑤ Double click on it to stop operation of the program;

or return to main interface and click on **"(1) Display equipment status"** to view operation of individual module.

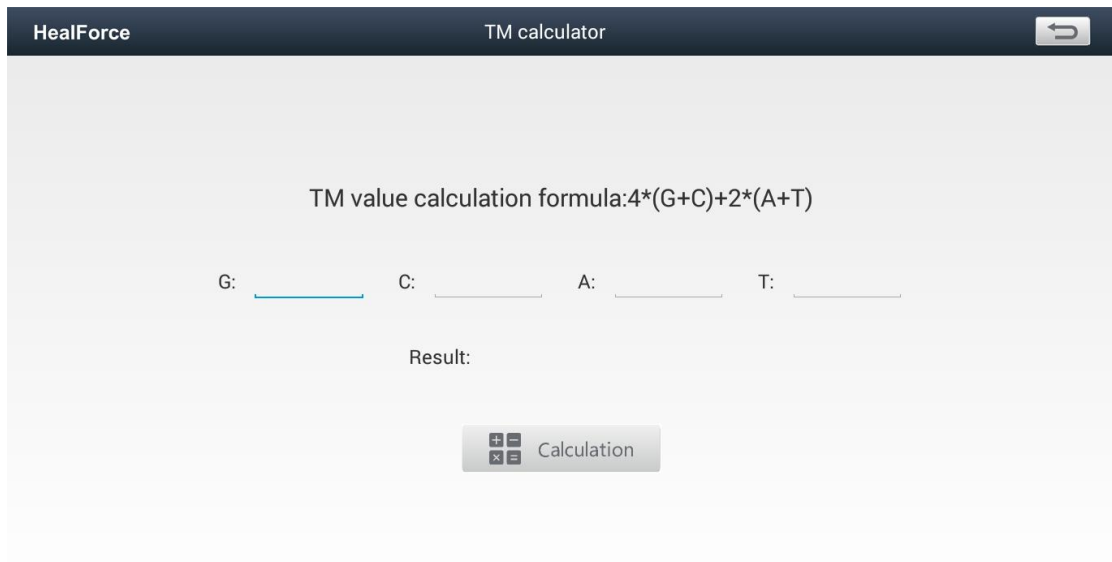


Auxiliary Function Description

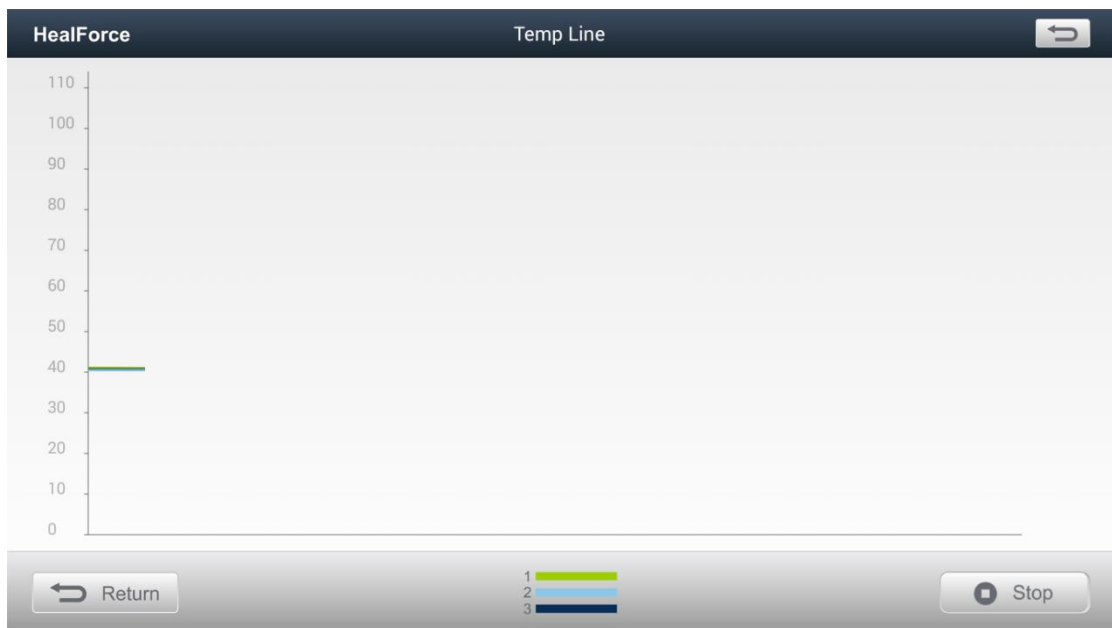
Tone, TM calculator, brightness adjustment, and run history



TM calculator: a tool to facilitate user's calculation.



Real-time temperature curve: a tool truly reflecting equipment operation data.



Two-dimensional gradient function: not yet open, stay tuned!

Analog temperature control: Simulate various temperature control modes (overshoot, buffer, slow release). You need to use the super password (jgc320ab) to enter, and you can select different temperature control modes on the setting screen after opening.

Chinese/English switch: The button for switching between Chinese and English.

More tools are still to be developed to facilitate user's operations.

Test Considerations

- ❖ Rules and regulations issued by the authorities shall be complied with by the laboratory.
- ❖ Fluorescent material-free disposable gloves, disposable dedicated centrifugal tube, self-removing pipette and suction head with filter element shall be used.
- ❖ Proper measure shall be taken to avoid air bubble in sub-dosing of reaction fluid. Prior to testing check whether the reaction tubes have been sealed properly.
- ❖ During loading sample soak the sample entirely into the reaction fluid and prevent attachment of any sample onto the tube wall; seal the tube after loading.
- ❖ Take the reaction tube out immediately after completion of amplification, and seal it in dedicated plastic bag and keep the bag at specified location for approval and treatment.
- ❖ Suction head used in test shall be put in waste jug containing sodium hypochlorite of 1%, and reject it after sterilization with other waste.
- ❖ The test platform and all test appliances shall be disinfected with sodium hypochlorite of 1%, alcohol of 75% or UV lamp.
- ❖ PCR reaction mixed liquor shall be stored at low temperature and protected from sunlight.
- ❖ The test platform shall be cleaned after completion of test to avoid contamination.

Appendix I - Equipment Maintenance

Repair and Maintenance

This equipment shall be stored at a dry and well-ventilated location free of direct sun and damp.



Remove any dirt or dust with cloth soaked with clear water, other than organic solvent, alcohol, strong acid/alkali or any other corrosive agent to avoid damage to surfaces of equipment.











Regularly clean the bored hole in module to remove any test residue to avoid influence on test accuracy. Do not clean the equipment with any corrosive solvent or agent. It is recommended to clean this product with cotton swab soaked with absolute alcohol, and then to clean each air vent with air blower.



After completion of test, clean and inspect the equipment, turn all switches off, remove any water, reaction liquid, impurity and test residue, and keep the equipment dry and tidy. If the equipment is left idle for a period, cover it with a proper protective enclosure.

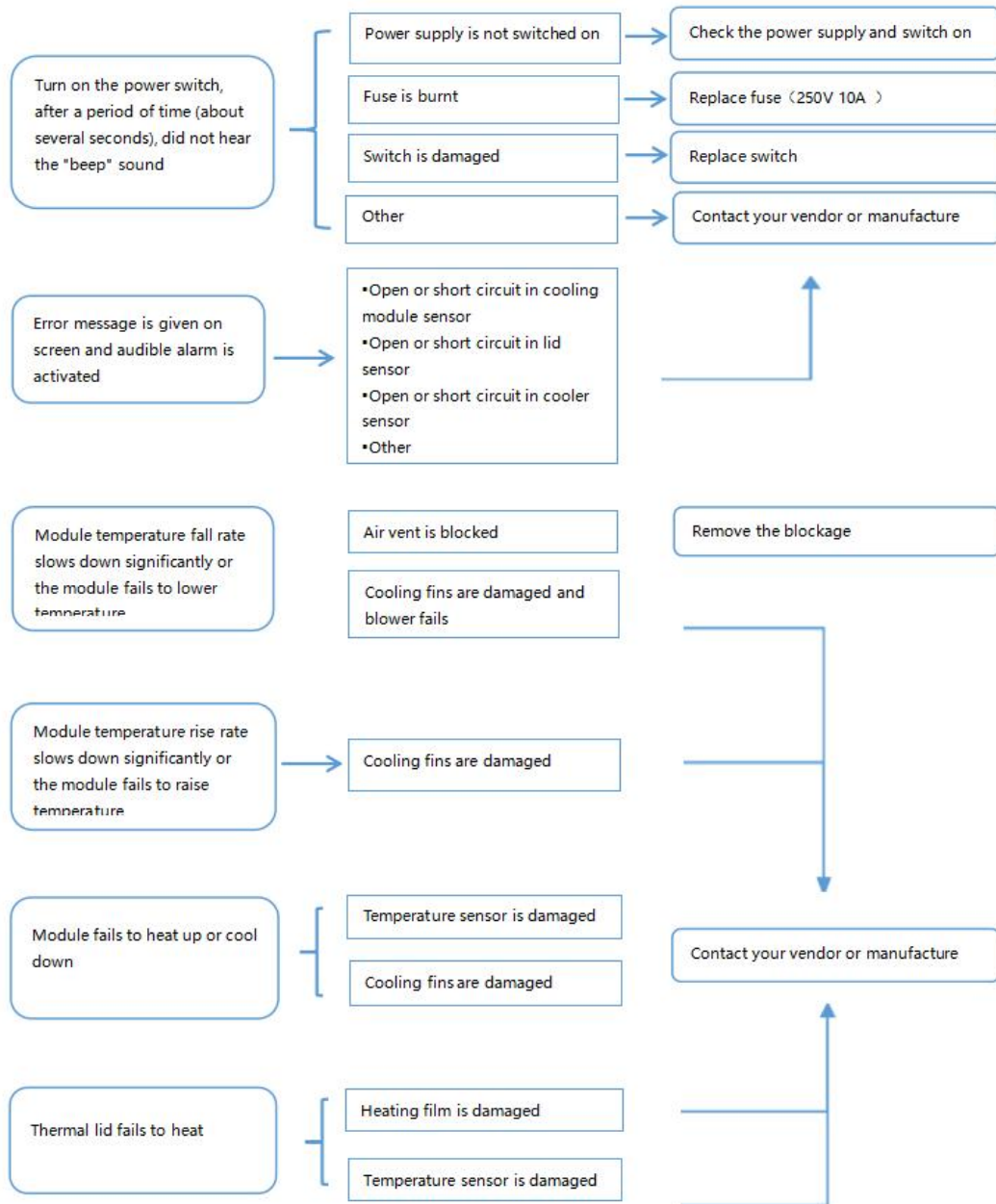
Test result deviation analysis

In case of any deviation in reaction result obtained in use of this equipment, it may result from the following problem (for reference only).

-  The reactant is improper, or in insufficient quantity or purity, or the micro single-core chain area is improper.
-  Denaturation temperature is too high or low. Test duration should be increased or reduced based on reaction quantity.
-  "Annealing" temperature is too high or low.
-  Reactant is in too high or low concentration.
-  Preparation process has not be subjected to special treatment.
-  Time and temperature values in program are improper.
-  Sample or sample pole temperature is temperature while base plate temperature is high.
-  Check whether reaction tube is placed properly. Attach a little mineral oil to bored hole to facilitate thermal conduction.

Temperature control in the equipment may deteriorate over time, and need to be re-calibrated by the manufacturer. Such re-calibration shall not be carried out by user on its own.

Trouble Shooting



Special Parts

The following parts shall be inspected or supplied only by the manufacturer or dealer to prevent any accident resulting from use of improper parts.

SN	Name	Model
1	Power Cable	D1-3+D003-4
2	Power Connector	DB-14
3	Power Switch	RA
4	Fuse	F10AL250V
5	Fuse Holder	FH1-S-M-2

Appendix II - Warranty

Warranty Statement

1. This equipment is common equipment of Class I, Type B for indoor applications under GB9706.1, **and has obtained CE certification.**
2. Within one (1) month from the date of delivery, we will be liable for replacement in case of any failure resulted from defect in material or workmanship.
3. Within twenty-four (24) months from the date of delivery, we will liable for repair in case of any failure resulted from defect in material or workmanship. Within the warranty period we will be liable for selective repair or replacement in case of any defect in the equipment as proved.
4. The equipment must be sent by user to the repair department as specified by us for repair. The freight to our repair department shall be paid by the user, while the freight back to user will be paid by us.
5. We will charge for any repair after expiration of the warranty period.

Coverage of Warranty

1. We will be liable for any damage or failure resulting from any defect in material, assembly or workmanship of the equipment on condition that the equipment has been used properly.
2. We will not be liable for any damage or failure resulting from user's operations in breach of related instructions or unauthorized dismantling of the equipment.