TC-96 Turbo™ Thermal Cycler

User Manual

Document Version 1.3

Phone 908-769-5555
Email info@benchmarkscientific.com
Web www.benchmarkscientific.com

Contents

About This Manual 4

A Instrument Overview 5
1. Instrument Components 5
2. Menu Overview 6
3. Guideline for Using Strip-Tube Frame. 8
B Getting Started 9
1. Install the Thermal Cycler 9
1.1 Site Requirements 9
1.2 Unpack 9
1.3 Power On and Power Off 9
1.4 Open and Close Lid 10
1.5 Block Module Exchange 11
2. Introduce the Home Screen 12

C Manage Folder and Program 14
1. Introduce the Saved Programs Screen 14
2. Manage Folder 16
2.1 Add Folder 16
2.2 Rename Folder 16
2.3 Delete Folder 16
3. Manage Program 17
3.1 Copy Program 17
3.2 Rename Program 17
3.3 Delete Program 17
3.4 Edit Program 17
3.5 View Last Run Programs 17

D Create and Edit Program 18
1. Create New Program 18
1.1 Introduce the Edit Program Screen 18
1.2 Add Steps 19
1.3 Changing Temperature and Hold Time in a Constant Step 19
1.4 Changing Temperature and Hold Time in a Gradient Step 20
1.5 Temp. Increment, Time Extend, Ramp Rate and Pause/Forever 21
1.6 Exchange between Constant Step and Gradient Step 22
1.7 Set Cycle 22
1.8 Sample Volume and Lid Temperature 23
1.9 Delete Step 24
1.10 Save Program 24
2. Edit Program 24

E Perform Run 25
1. Load Samples 25
2. Select Program to Run 25
3. View Run State and Control Run 27
3.1 View Run State 27
Introduce the Run Status Screen 27
View Run Time 28
View Run Record 28
View Sample Block Temperature 28
3.2 Control Run 29
Pause Run 29
Skip Run Step 29
Stop Run 29
Run Program Again 29

F Tools 30
1. Introduce the Tools Screen 30
2. About 30
3. Run Record 30
4. Run Set 31
5. Tm Value 32
6. Service 32
7. Admin Options 33
7.1 Manage Users 33
7.2 Reset Settings 34
7.3 Commini Settings. 34
7.4 Configure Network Connection 35
Set IP address 35
Set Wi-Fi connection 36
7.5 System Set 36
7.6 Upgrade 37
7.7 Cloud login 37
Troubleshooting 38

Please read the manual carefully before using the TC-96 Turbo Thermal Cycler!

Purpose of This Manual

This manual provides instructions on how to set up and use the Thermal Cycler. We reserve the right to modify this manual at any time without prior notice.

Writing Conventions

This manual uses the following conventions:

• **Bold** text indicates user operation.

For example:

Touch **OK** to accept changes and return to last screen.

• Note: Provides instructions that draw your attention or may be helpful.

For example:

> Note:
> When the instrument is set aside for a long time, disconnect the power cable from the socket.

• **IMPORTANT!** Provides information that must be read carefully. Failure to follow the information will possibly result in damage to the instrument or injury to the user. For example:

> **IMPORTANT!**
> **To prevent electric shock, please turn off the power and disconnect the power supply prior to cleaning.**

A Instrument Overview

1. Instrument Components



Figure 1 Front View of Thermal Cycler

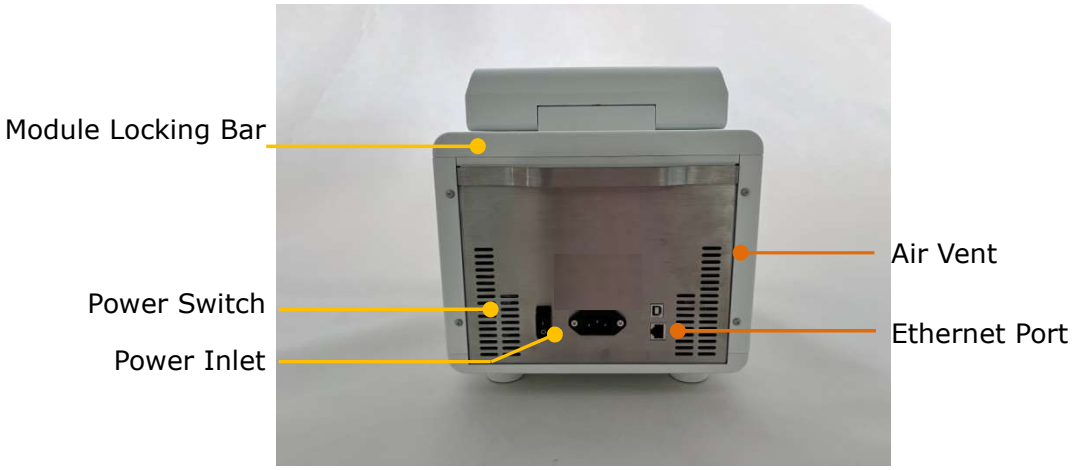


Figure 2 Rear View of the Thermal Cycler



Figure 3 Strip-Tube Frame

Table 1 Function of the Thermal Cycler Components

Component	Function
Lid	Heats the top surface of reaction vessels to prevent reaction sample evaporation and condensation.
Lid Handle	Open and close the lid.
Sample Block	Holds reaction vessels (tubes or microplates).
Air Vents	Allows for ventilation.
Touchscreen	Views and controls the instrument. For optimum screen performance and visibility, the angle of the touchscreen can be adjusted.
USB - A Port	Connects to a USB.
Ethernet Port	Network control multiple Thermal Cyclers by a computer.
Module Locking Bar	Locks the block module in place.
Power Switch	Powers on (1) and powers off (0) the instrument.
Power Inlet	Connects the instrument to a socket via supplied power cable.

2. Menu Overview

Table 2 and Figure 3 describe buttons and virtual keyboard common to many of the screens.

IMPORTANT!

Do not use any sharp object (e. g., a pencil) to touch the touchscreen as it may cause damage.

Table 2 Buttons on the screens

Button	Function
	Closes current screen without changing any parameters and returns to previous screen.
	Accepts present parameters setting and closes the screen.
Swipe your finger left or right in the corresponding area of the screen.	Scroll left and right
Swipe your finger up or down on the corresponding area of the screen.	Page up and down

You can enter letters or numbers by using the virtual keyboard:



Figure 4 Virtual keyboard in the screens of the Thermal Cycler

To...	Touch...
Enter a letter/number	A letter/number button.
Switch the keyboard, enter capital letters / lowercase letters	abc / ABC
Switch the keyboard, enter numbers or special symbols	123#
Delete the last character in an input field	←

3. Guideline for Using Strip-Tube Frame

To using tubes on our thermal cyclers with 96-well sample block, the frame is essential. The frame prevents the heated lid from crushing strip-tubes. When using the 96-well multiwell plate, remove the frame from the thermal cycler.

The frame is compatible with: Individual 0.2 ml PCR tubes with flat caps or domed caps.

【Steps】

1. Choose proper frame orientation.

The correct orientation depends on the type of tubes (with flat caps or domed caps). Check icons on sides of the frame when loading tubes (refer to the following pictures).

2. Align the frame with the center of the sample wells of the sample block and place the frame at the edge of the sample wells. Verify the frame is placed firmly without significant shaking.

3. Place strip-tubes into the sample wells of the sample block.

4. Close the lid.

【Strip-Tube Frame Pictures】

PCR tubes (Strip tubes) with flat caps:





Please pay attention to the signs on the front of the Strip-Tube Frame (dome caps prohibited, flat caps tube allowed)

PCR tubes (Strip tubes) with domed caps:





Please pay attention to the signs on the front of the Strip-Tube Frame (flat caps prohibited, dome caps tube allowed)

B Getting Started

1. Install the Thermal Cycler

1.1 Site Requirements

The Thermal Cycler is intended for indoor use. Ensure that the installation site meets conditions below.

Power supply

The Thermal Cycler has a universal, 100-240V power supply and is supplied with an appropriate plug. Be sure that the instrument is connected to a reliable power outlet that is rated to handle the load of the thermal cycler.

Environmental Conditions

Table 1 Temperature and humidity conditions:

Condition	Acceptable range
Ambient temperature	10 to 30°C (50 to 86°F)
Relative humidity	20 to 80%, non-condensing

Place the Thermal Cycler on a level table or bench. Avoid placing the instrument adjacent to heaters, cooling instruments, water supplies, sinks or in direct sunlight. Keep away from any equipment that vibrates, such as a refrigerator or centrifuge. The recommended distance between the instrument and the back wall or another instrument is 10 cm (3.9 in), respectively.

1.2 Unpack

1. Remove the packaging materials and store them in case of shipping damage to the unit.
2. Inspect the instrument for shipping damage.
3. Included in the box should be:
   - The Thermal Cycler and module
   - Appropriate power cable
   - User Manual (this manual) including warranty certificate
   - Performance Test Statement or pass card (if have)

IMPORTANT! If the Thermal Cycler is damaged or some items are missing or damaged, contact Benchmark Scientific.

4. Move the unit to the desired installation site.

1.3 Power On and Power Off

1. Connect the power cable to the power inlet in the rear of the instrument.
2. Connect the plug of the power cable to the socket. Make sure the power cable is connected to both power inlet and socket firmly.

To power on: Turn the power switch to position '1'.

To power off: Turn the power switch to position '0'.

Note: When the Instrument is not used for extended periods of time, disconnect the power cable from the wall socket.

1.4 Open and Close Lid

The lid of the Thermal Cycler can be adjusted to come into contact with and apply pressure to the tops of the reaction vessels to prevent evaporation. Heating of the lid protects reaction samples from condensation.

IMPORTANT!
Temperature of the lid can be very high (112°C/234°F or higher). Never touch the inner surface of the lid when the temperature is above 50°C.

To open the lid:



Pull up the lid handle to open the lid



Continue pulling the lid handle to place the lid at a vertical position
Pull up the lid handle, and the lid opens following the handle movement.

To close the lid:

Grip the lid handle and continue to press the handle until it is at a horizontal position.

1.5 Block Module Exchange

Block module exchange can be performed within seconds without the need for tools.

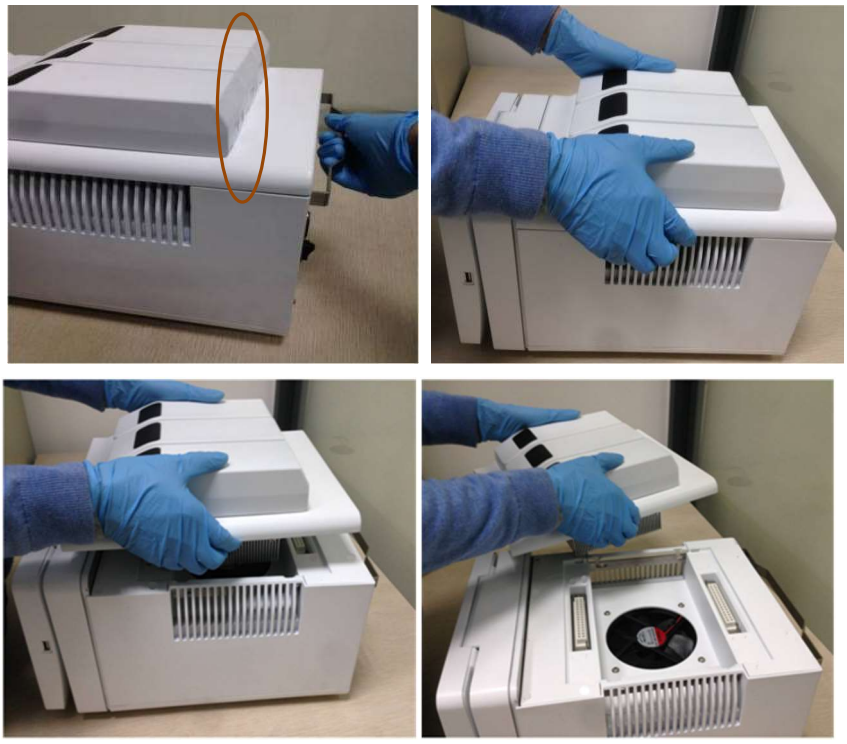
> **IMPORTANT!**
> **If a program is running, stop the program run first. Then power off and disconnect the power cable from the socket before replacement of the block.**

To remove the block module (Take the three module PCR instrument as an example):

1. Pull the module locking bar backwards to unlock and release the block module.
2. Put your hand on the left and right side of the block module and lift it up vertically.
3. Store the block module in a clean, secure box.

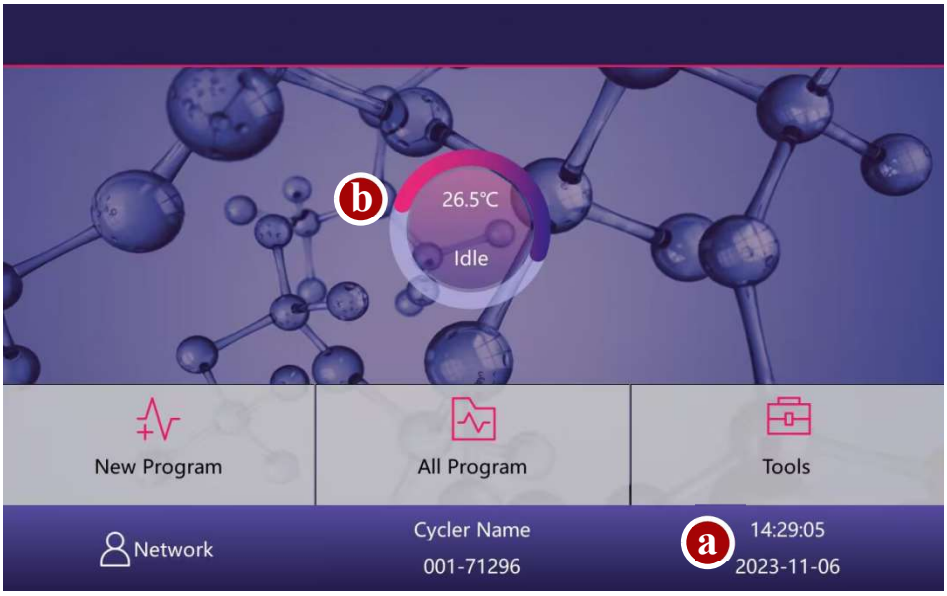
To insert the block module (Take the three module PCR instrument as an example):

1. Pull the module locking bar backwards. Put your hand on the left and right side of the block module, with the lid button of the block module pointing to the front. Place the block into the hollow cavity of the chassis and press tightly and evenly.
2. Push the module locking bar forward to lock the block module in place.



2. Introduce the Home Screen

When the instrument powers on, the boot screen is displayed for several seconds.



The Home screen is then displayed after a user login the system (see below).

Items in the Home screen:

a. Shows date and time.

b. Status ring: The number of rings appearing on the Home screen varies with the block module in use.

When a program is running, the status ring displays the sample temperature, the estimated remaining run-time, and the current run status (Lid Preheat, Running, and Pause).

When the block(s) is running another user's program, the corresponding ring(s) will show the sample temperature, the estimated remaining run-time, and the “Lock” icon. The ring(s) cannot be used until the run is finished, the original user logs in and stops to run, or the ADMIN user logs in and stops the programmed run.

When no program is running, the status ring will show 'Idle'.

When an error arises, the status ring will show 'Error'.

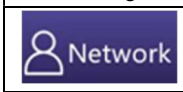
Touch a status ring to open the Run Status screen, see “Chapter E, Perform Run” for details.

ATTENTION:

If the administrator sets "Use after logging in", you will need to enter the username and password after turning on the device to access the main interface.

Buttons of Home Screen

Button	Function
New Program	Creates new programs.
All Program	Open and view all saved programs.

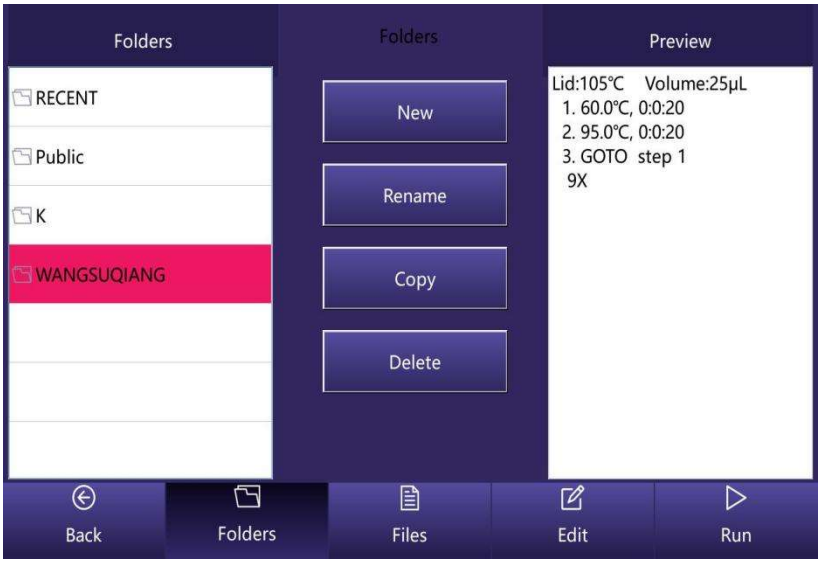
Tools	Sets instrument parameters and uses other tools.
The ring in the center of the screen	Displays the current running status (idle or remaining time) and sample temperature. Touch it to open Run Status screen.
 Login	Switch another user and login system.
 Network	Network User is displayed when using the PC software to control the instrument.

C Manage Folder and Program

1. Introduce the Saved Programs Screen

In the Home screen, touch **Saved Programs**.

The Saved Programs screen opens.



Click All Program in the main interface to open the saved program window.

This window lists all available folders, click the page up and down keys to switch pages. The following folders are system folders:

RECENT (recently run program folder), displays the most recently run programs for easy viewing and running again.

Public (public folder) is the default folder when saving programs. All users can use the programs saved in the Public folder after logging in.

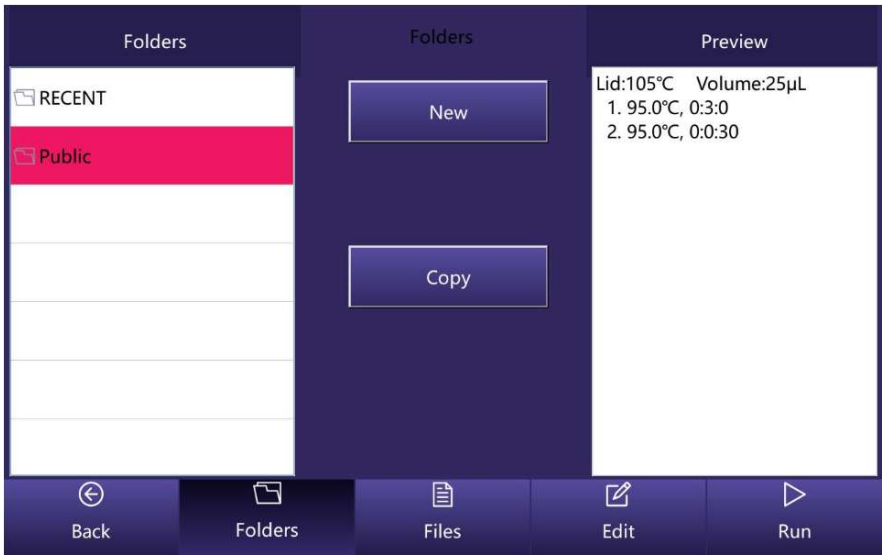
USB_disk (U disk folder). This folder will appear after inserting a U disk into the USB port on the front of the instrument. This folder displays the programs stored in the USB flash drive, and you can copy programs between the USB flash drive and the instrument. The screen lists all available folders.

Note: System folders cannot be renamed or deleted.

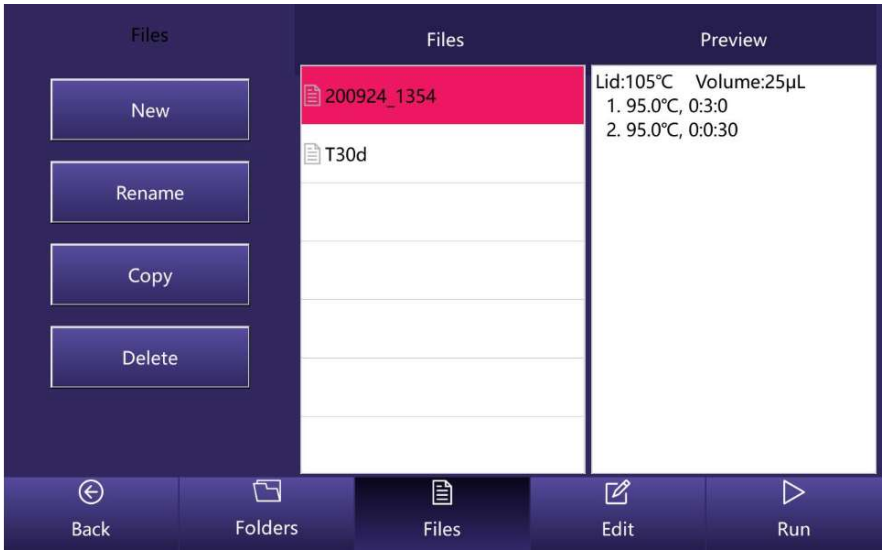
Buttons of Folders Screen

Button	Function
Back	Returns to the Home screen.
Folder Options	Includes three buttons: New Folder, Rename, and Delete. Used to create a new folder, to rename a selected folder or to delete a selected folder.
File Option	Includes three buttons: Copy, Rename, and Delete. Used to copy program file between folders, to rename a selected program file or to delete a selected program file.
USB	Open and view programs stored on a U disk. Program files can be copied to and from the U disk.
Edit	Views and/or edits program steps.
Run	Runs a selected program.

Folder Options:



File Option



2. Manage Folder

2.1 Add Folder

To add a folder:

1. In the Saved Program screen, touch **Folder Options**, and then touch **New Folder**.
2. Enter a folder name up to eight characters in the pop-up keyboard and then touch **OK**.

2.2 Rename Folder

1. In the Saved Program screen, select a folder, touch **Folder Options**, and then touch **Rename**.
2. Enter a new name in the pop-up keyboard and then touch **OK**.

2.3 Delete Folder

1. In the Saved Program screen, select a folder, touch **Folder Options**, and then touch **Delete**. A pop-up window appears.
2. Touch **Yes** in the displayed pop-up window to confirm.

IMPORTANT!

When you delete a folder, all programs saved in the folder will be deleted at the same time.

3. Manage Program

3.1 Copy Program

1. In the Saved Program screen, select a program file to be copied, touch **File Option**, and then touch **Copy** to open the Paste screen.
2. In the Paste screen, Touch **Select Folder**, select a target folder in the folder list screen, and then touch **OK** to copy the program file.

If you want to:

a. Rename the program before copy - enter a new name in the New Name field.

b. Create a new target folder to copy the program to - Touch **New Folder** to open the pop-up keyboard, enter a folder name, and then touch **OK** to return the Paste screen.

c. Insert a U disk, touch USB button, you can save the program to the U disk.

3.2 Rename Program

1. In the Saved Program screen, select a program file, touch **File Option**, and then touch **Rename**.
2. Enter a new name in the pop-up keyboard and then touch **OK** to accept changes.

3.3 Delete Program

1. In the Files screen, select a program file and then touch **Delete**. A pop-up window appears.
2. Touch **Yes** in the displayed pop-up window to delete the program.

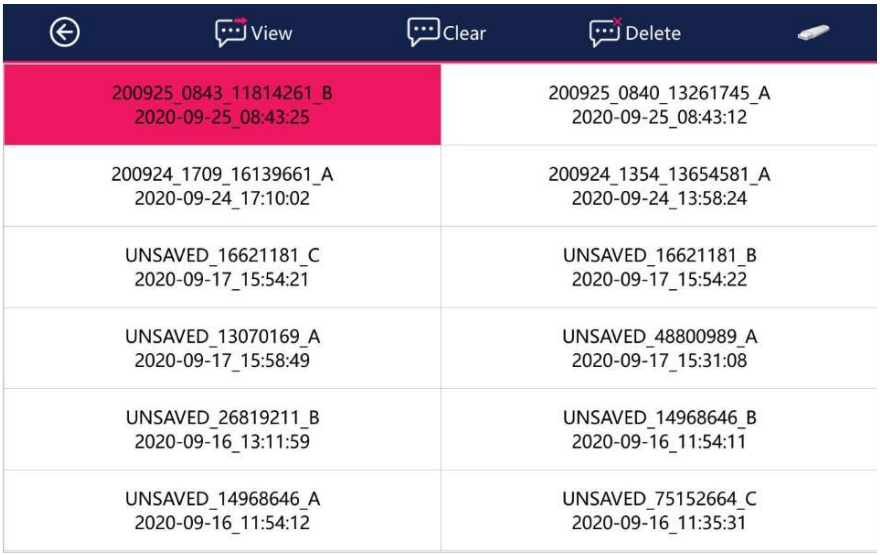
3.4 Edit Program

For editing program, please see chapter D for details.

3.5 View Last Run Programs

In the Home screen, touch **Last Run**.

The Last Run screen opens.



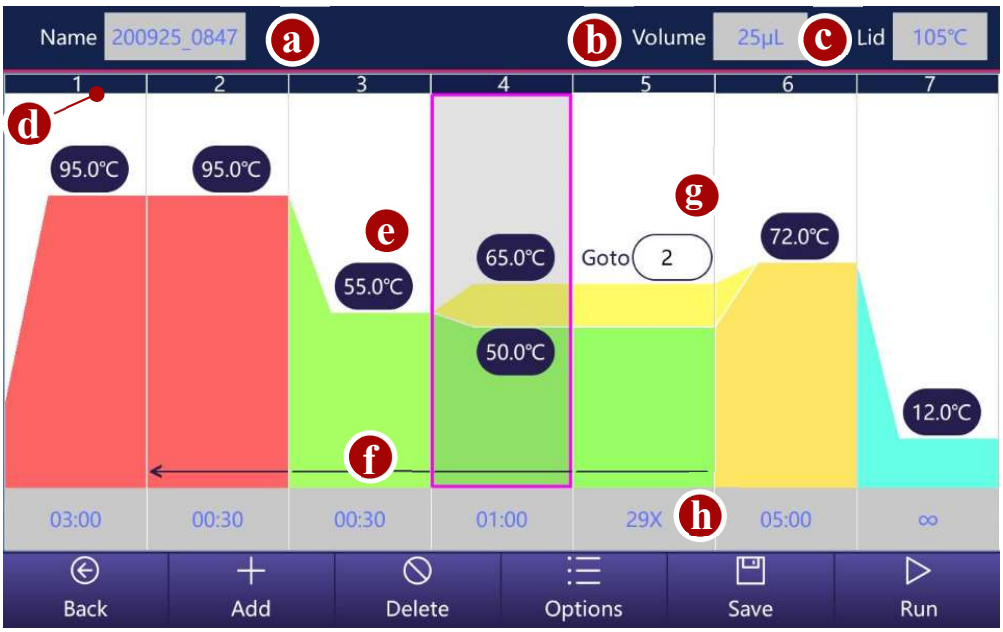
The Last Run screen shows the recently run eight programs for quickly viewed and run again. You can touch **Clear** to clear program list.

D Create and Edit Programs

1. Create New Program

1.1 Introduce the Edit Program Screen

1. In the Home screen, touch **New Program**, open the Edit Program screen.



Items in the Edit Program screen:

a: Program name

b: Sample volume

c: Lid temperature

d: Step number

e: Temperature for a constant temperature step or a gradient temperature step

f: Step holding time (hour: min: sec)

g&h: The start step number and amounts of additional repeats for cycles

Buttons of Edit Program Screen

Setting steps of a program are carried out via the buttons:

Button	**Function**
Back	Returns to the Home screen.
Save	Saves the program.
Run	Runs the program.
When you select a step, three buttons appear on the step:	
Options	Edits temperature and time of a selected step; Sets additional parameters for the step.
Add step	Adds a constant temperature step, a gradient temperature step or a goto step after the selected step.
Delete Step	Deletes a step.

1.2 Add Steps

A PCR program comprises several steps. Step types include Constant, Gradient and Goto steps.

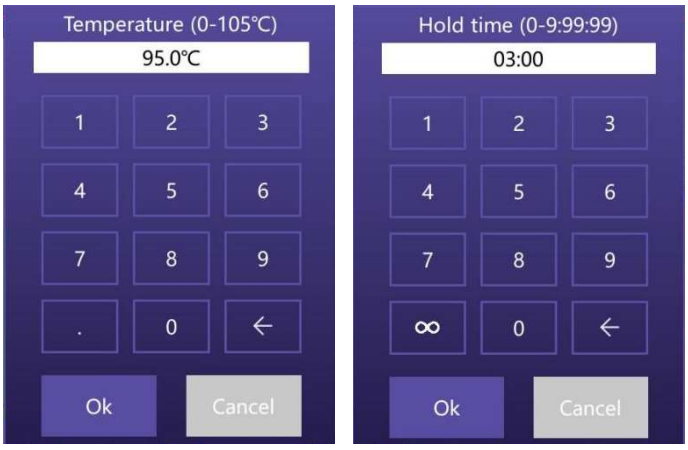
1. In the Edit Program screen, touch anywhere in the column for a step to select it.
2. Touch **Add Step** and the Step N screen opens.



3. To add a constant temperature step, touch **Constant** label;
   To add a gradient temperature step, touch **Gradient** label;
   To add a goto step, touch **Goto** label.
4. Touch **OK** to add the corresponding step.

1.3 Changing Temperature and Hold Time in a Constant Step

1. Select a constant temperature step in the Edit Program screen and then touch **Options**. The Step N screen appears, and the Constant label is selected.
2. Touch Temperature field or Time field.
3. Enter a value in the pop-up keyboard and then touch **Ok**

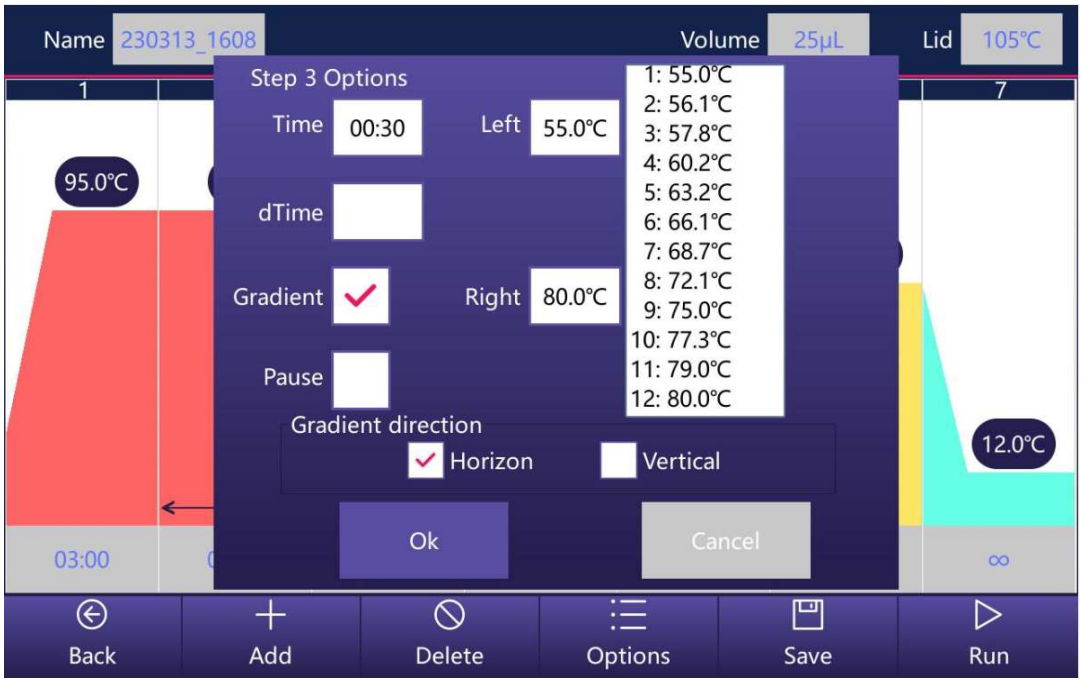


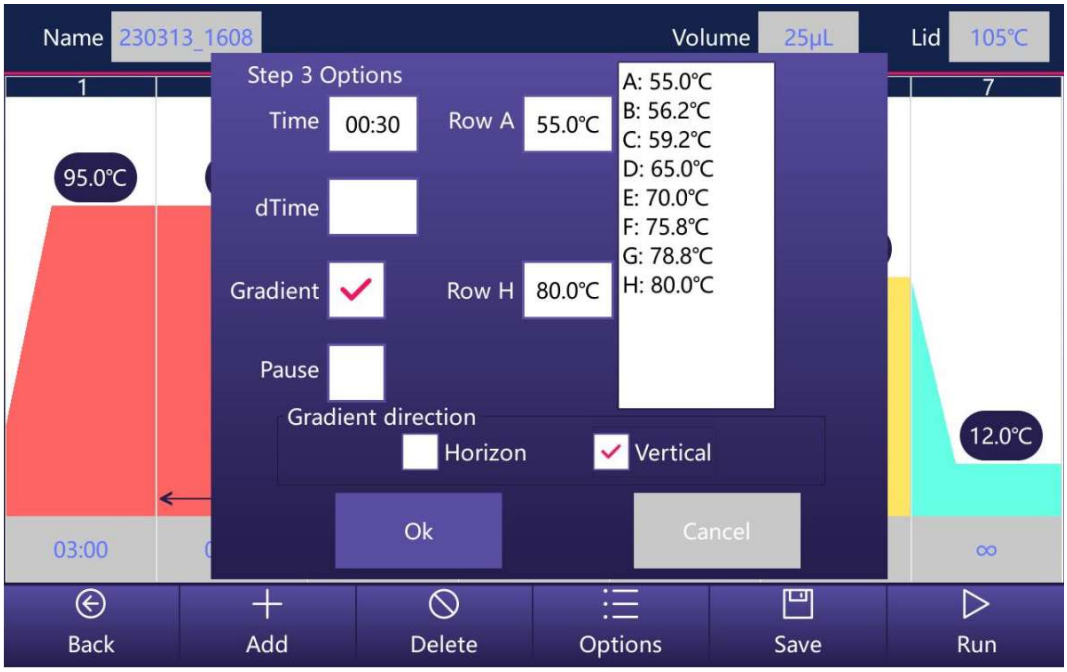
> Note:
> Touching ∞ **(Forever)** in the keyboard will cause the program to hold indefinitely after reaching this step until it stopped manually.

1.4 Changing Temperature and Hold Time in a Gradient Step

Gradient Temperature Step is only available with Gradient Type Thermal Cycler.

1. Select the gradient temperature step in the Edit Program screen and then touch **Options**. The Step N screen appears and the Gradient label is selected.
2. Click on **Horizon** or **Vertical** to switch between different types of temperature gradient settings.





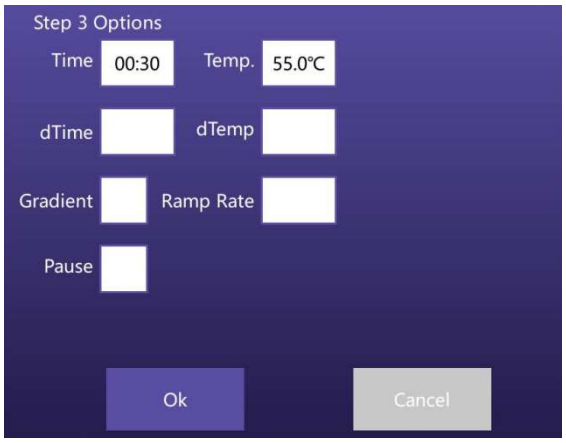
To change temperature value:

In the Step N screen, touch Gradient Temp. field to open Gradient screen.

1.5 Temp. Increment, Time Extend, Ramp Rate and Pause/Forever

To add dTemp, dTime, Ramp Rate and Pause to a constant temperature step:

1. In the Edit Program screen, selects a constant temperature step. Touch **Options** to open the Step N screen and the Gradient label is selected.



2. To edit an item, touch the appropriate field.
3. Enter a value in the pop-up keyboard and then touch **OK**.

• **Temp Increment (ΔTemp)**: adds temperature increments to step with each cycle.

Touch ± in the keyboard to shift between "+" and "–" (to increase or decrease temperature for each cycle), and then enter the number of degrees of temperature.

> Note: Parameters cannot be set that would cause a step to fall outside of the operating range of the instrument.

• **Time Extend (ΔTime)**: adds time increments to the holding time within the step for each cycle.

Touch ± in the keyboard to shift between "+" and "–" (to increase or decrease time for each cycle), and then enter the seconds.

> Note:
> Parameters cannot be set that would allow the dwell time to fall below zero.

• **Ramp Rate**: Adjust the average heating or cooling rate.

To set the Ramp Rate function:

Enter the value of ramp rate in the keyboard.

> Note: The actual maximum average heating or cooling rate varies with block module type. Refer to the instrument specifications for the maximum value. If a value larger than the block's maximum average rate is entered, the block's maximum average rate will be used. If you do not want to slow the running, leave this option empty.

• If you touch **Pause/Forever**, the program will automatically pause as soon as the desired step temperature is reached and the instrument will beep twice. Touch **Resume** will continue the program running. Pause can be used to add reagents (i.e. hot start) or when adding or removing tubes during a step. **Forever** is used

to hold indefinitely at low temperature after real PCR reaction.

> Note: You can also add Pause or dTime as you need to a gradient temperature step.

4. Touch **OK** to accept changes and close the Step N screen.

To remove the dTemp, dTime, Ramp Rate and Pause,

1.1 In the Step N screen, touch one of these fields. Delete the old value in the pop-up keyboard or enter "0" and then touch √.

1.2 Uncheck the **Pause** check box.

2. Touch **OK** to accept changes and close the Step N screen.

1.6 Exchange between Constant Step and Gradient Step

Gradient Temperature Step is only available with Gradient Type Thermal Cycler.

To change a constant step to a gradient step:

1. In the Edit Program screen, selects a constant temperature step. Touch **Options** to open the Step N screen.
2. Switch to the **Gradient** label.
3. Chang front row and back row temperature value and hold time value as you need. See section 1.4 "Changing Temperature and Hold Time in a Gradient Step" for details.
4. Touch **OK** to accept changes and close the screen.

To change a gradient step to a constant step:

1. In the Edit Program screen, selects a gradient temperature step. Touch **Options** to open the Step N screen.
2. Click on the gradient label and uncheck it.
3. Change the temperature value and hold time value as you need.
4. Touch **OK** to accept changes and close the screen.

1.7 Set Cycle

1. In the Edit Program screen, select a goto step. Touch **Options** to open the Step N screen and the Goto label is selected.



2. Touch Goto Step field, enter the start step number of the cycle in the pop-up keyboard and touch **Ok**.

   The steps between the last step and the start step will run repeatedly for the specified cycle numbers.

3. Touch Number of Repeats field, enter additional cycle numbers in the pop-up keyboard and then touch **Ok**.

> Note:
> The actual cycle numbers will be 'N+1' where N stands for the entered cycle numbers. To perform a PCR reaction with 30 cycles, you should enter 29 as the number of repeats.

4. Touch **OK** to accept changes and close the screen.

1.8 Sample Volume and Lid Temperature

1. In the Edit Program screen, touch **Volume** or **Lid** text box.
2. Enter new value in the pop-up keyboard and then touch **Ok**.

Temperature control mode:

Sim-tube mode: This mode will control the sample temperature to the target temperature as fast as possible without sample temperature overshoot.

Block mode: This mode will control the block temperature to the target temperature as fast as possible without block temperature overshoot..

> Note:
> When a sample volume is greater than 0 μ L is entered , the Sim-tube mode will be used.
> When a sample volume of 0μL is entered, the Block mode will be used.

Sim-tube mode is the preferred control method, especially when steps hold time is 30 seconds or less. It is important to input correct sample volumes for the most accurate dwell time.

For lid temperature control, it is recommended to select a temperature five to ten Celsius degrees above the highest temperature of the program steps (e. g., the pre-denaturation step) to protect sample from evaporation and condensation.

> Note:
> Setting a lid temperature below ambient will cause the program to not start.

1.9 Delete Step

1. In the Edit Program screen, touch a step to select it.
2. Touch **Delete Step** to delete this step.

1.10 Save Program

1. In the Edit Program screen, touch **Save** to display the Save screen.



2. The current date and time are used as a default name. A new name up to eight characters can be entered.
3. Touch Select Folder field to select a folder to save the program to.
   - To create a new folder to save the program, touch **New Folder** button, and enter a folder name up to eight characters.
   - Touch **USB** to export the program file to a U disk after inserting a U disk.
4. Touch **OK** to save the program.

2. Edit Program

To edit a program:

1. In the Home screen, touch **Saved Programs**.
2. In the Saved Program screen, select a folder and then select a program to be edited, touch **Edit**.
4. In the Edit Program screen, you can edit the program and then save and/or run it following the instructions described above.

E Perform Run

1. Load Samples

1. Place PCR tubes or microplate in the sample wells of the sample block.

IMPORTANT!

Do not touch the surface of the sample block or lid surface because they may be very hot (112°C/234°F or higher)!

Note:

• The cap of tubes or film on microplate must be sealed tightly to prevent sample evaporation. Tubes or microplate should have heat resistance of up to about 120°C.

• For best results, use thin walled tubes designed for PCR.

• The sample wells of the sample block should keep clean.

• The height of tubes should be the same so that the lid can keep stable and gives even pressure on each tube.

2. Close the lid.

2. Select Program to Run

To create a new PCR program or Incubation program to run,

• Touch **New Program**, create a new program and then touch **Run**.

To select a recent run program to run,

• From the Home screen, touch **Last Run**, select a program and touch **Edit**, and then touch **Run**.

To select a program saved in a folder to run,

• From the Home screen, touch **Saved Programs** to open Saved Program screen. Select a folder and then select a program file, touch **Edit**. In the edit program screen, touch **Run**.

1. After you touch **Run**, the Run Options screen opens.



2. In the Run Options screen, edit sample volume and lid temperature.

Sample Volume:

The maximum volume of samples that can be accommodated is determined by the depth of the sample wells of each type of sample block.

When a sample volume is greater than 0 µL is entered, the Sim-tube mode will be used. When a sample volume of 0 µL is entered, the Block mode will be used.

> Note: Temperature control mode
> **Sim-tube mode**: This mode controls the process of heating the sample block to include the sample volume factor in the equation (i.e. a larger sample volume requires a longer time to reach temperature).
> **Block mode**: This mode does not consider sample volume factor and simply heats the block to the set temperature.

Sim-tube mode is the preferred control method, especially when steps hold time is 30 seconds or less. It is important to input correct sample volumes for the most accurate dwell time.

Lid Temperature:

For lid temperature, it is recommended to select a temperature five to ten Celsius degrees above the highest temperature of the program steps (e. g., the pre-denaturation step) to protect samples from evaporation and condensation.

> Note:
> The lid heating will automatically turn off when block temperature is below 30°C. The lid will heat to the specified temperature before the actual program starts running. Setting a lid temperature below ambient will cause the program to stall.

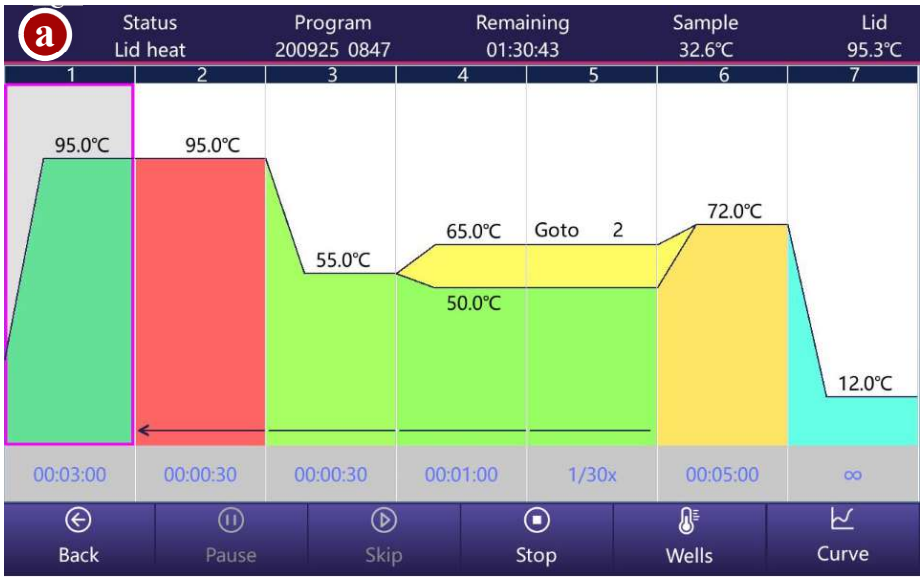
3. Choose to run the program using Fast mode or Standard mode. For the same program, using Fast mode can save total run time. When the denaturation and annealing time of a PCR program is less than 10 seconds, Standard mode is recommended.
4. Run the program:
   Touch the ring corresponding to each block which you want to perform the run on. Only blocks that are available (not running a program now) can be selected.
5. Touch **Start** to begin the run. The Run Status screen opens.

3. View Run State and Control Run

3.1 View Run State

Introduce the Run Status Screen

You can view the status of run using the Run Status screen below.



The items displayed on the Run Status screen:

a: Name: the program name;

Status: the current status: Running, Pause, Idle;

Time Remaining: the estimated remaining time;

Volume: the sample volume;

Lid: the lid temperature;

Sample: the sample temperature (when the Sim-tube mode is used) or the block temperature (when the Block mode is used).

*: Options symbol: indicating that a step has been set with some options (ΔTemp, ΔTime, Ramp Rate, and Pause) other than the temperature and time value. Touch this symbol to show options for the step.

Buttons on the Run Status screen:

Button	**Function**
Pause/Resume	Pauses and Resumes run.
Skip	Skips run step.
Stop/Run	Stops run/Runs program again.
Wells	Views temperature value of each row of sample block.
Curve	Views real-time fluorescence curve at the end of the program.

View Run Time

1. In the Run Status screen, touch **Time Remaining** field to view the run time.





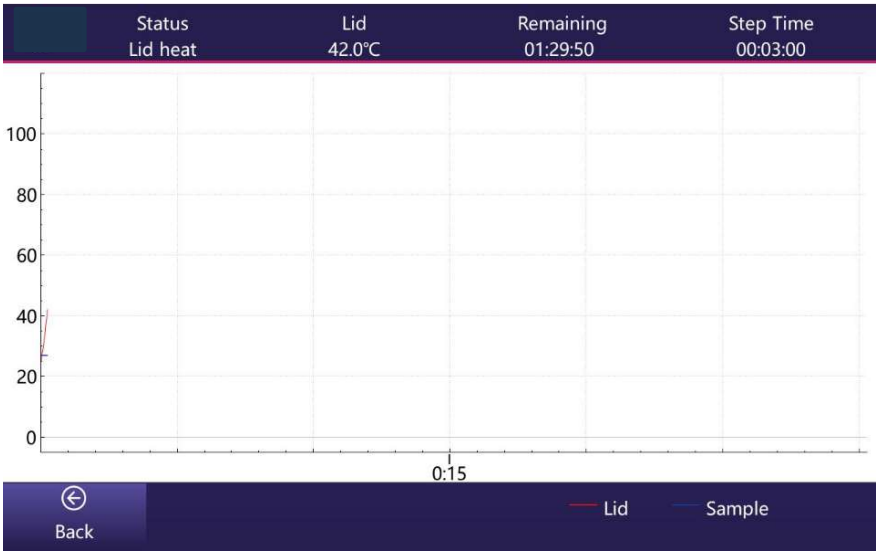
2. Touch **Back** to return to the Run Status screen.

View Run Record

1. In the Run Status screen, touch **Record** to view the run record.
2. Touch **Back** to return to the Run Status screen.

View Sample Block Temperature

1. In the Run Status screen, touch **Wells** to view the temperature of each sample well in real-time.
2. Touch **Back** to return to the Run Status screen.



3.2 Control Run

Pause Run

In the Run Status screen, touch **Pause** and the system will beep twice.

> Note:
> The temperature will continue increase or decrease until it reaches the setting temperature of a step.
> After paused, the Pause button changes to Resume button, and you must touch Resume to continue the program.

Skip Run Step

In the Run Status screen, touch **Skip** to skip the current running step and run the next step.

Stop Run

In the Run Status screen, touch **Stop** and then touch **Yes** in the displayed pop-up window.

Run Program Again

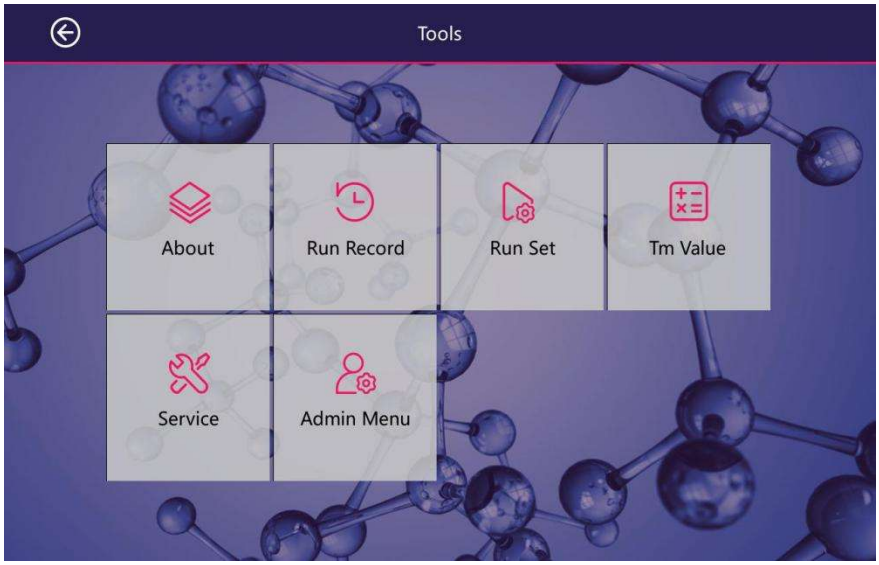
In the Run Status screen, if the running program stopped, touch **Run** to run it again.

F Tools

1. Introduce the Tools Screen

In the Home screen, touch **Tools**.

The Tools screen opens.



Buttons of Tools Screen

Button	Function
About	Views product information about the Thermal Cycler.
Run Records	Views stored run records.
Run Set	Configure parameters for run.
Tm Value	Calculates the Tm values and Ta value of a pair of primers.
Service	This function is reserved for service.
Admin Menu	When "Admin" login, the Admin Menu's icon appears. Use this function to manage users, reset to factory settings, set cycler name, configure network connection, calibrate the background and dye and upgrade software.

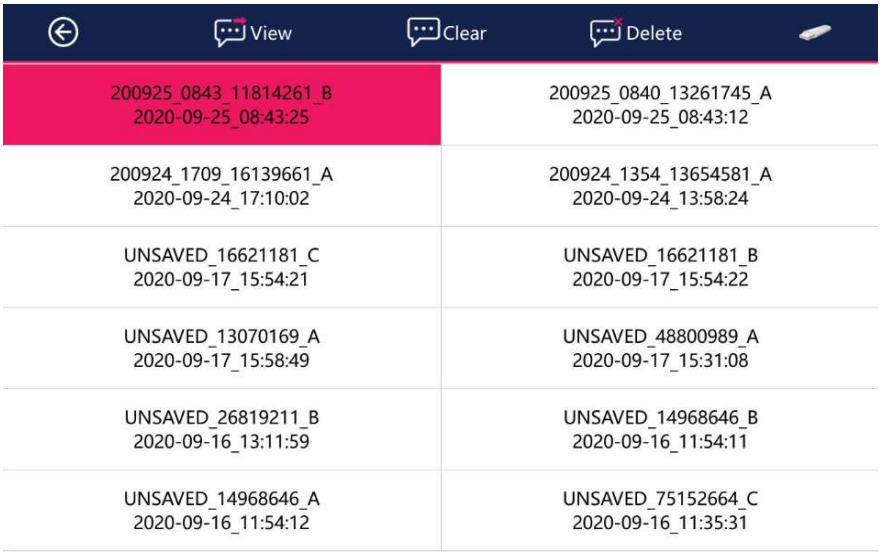
2. About

To view product information about the Thermal Cycler:

1. In the Home screen, touch **Tools**.
2. In the Tools screen, touch **About** and the About screen appears.
3. When you finish, touch **Back** to return to the Tools screen.

3. Run Record

1. In the Tools screen, touch `Run Records` to open the screen:

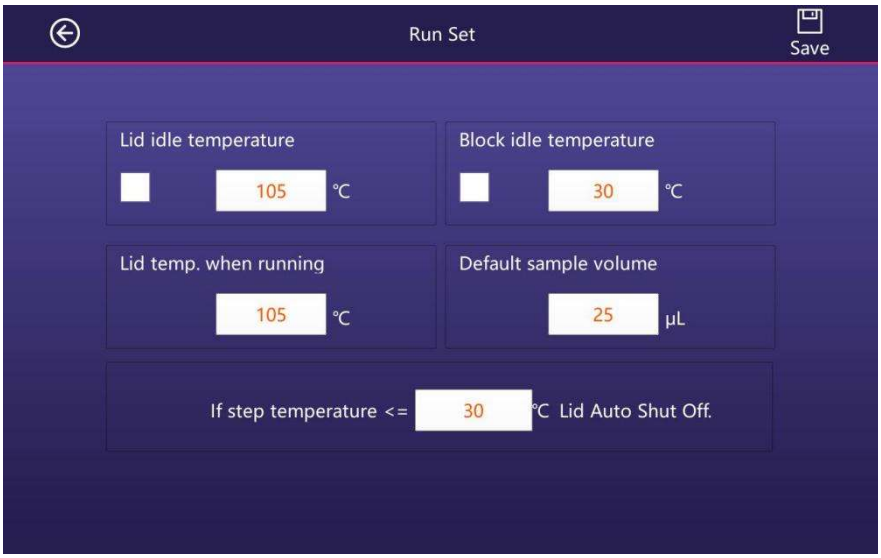


2. Select a record and touch **Open** to open the Run Record screen.
3. After you are finished, touch **Back** to return to the Run Records screen.
4. In the Run Records screen, you can touch **Clear** to clear all records, touch **Delete** to delete a selected record.
5. After you are finished, touch **Back** to return to the Tools screen.

4. Run Set

This function is used to set parameters for run.

1. In the Tools screen, touch **Run Set** to open the screen:



- Enter 'Lid Temp. when running' to pre-heat lid to a desired temperature when running a program. We recommend you select a temperature five to ten Celsius above the highest temperature of the program steps (e. g., the denaturation step) to protect sample from evaporation and condensation. If you deselect 'On', the lid heating function will be disable when a program is running.
- Enter most frequently used sample volume value in the 'Default Sample Volume' field.
- Enter 'Lid Idle Temperature' to let the lid heating to the desired temperature when no program is running. If you deselect 'On', the lid heating function will

be disable when no program is running.

- Enter ‘Block Idle Temperature’ to let the block heating or cooling to the desired temperature when no program is running. If you deselect ‘On’, the block heating or cooling function will be disable when no program is running.

  For ‘Block Idle Temperature’, we recommend you select a temperature below 20°C so that when a program starts run, the block temperature will maintain below 20°C while the lid is heating to the specified temperature before the actual program starting running. Because the sample temperature does not increase, the activity of DNA polymerase is inhibited, the likelihood of nonspecific primer binding and the yield of unwanted products such as primer dimers are decreased.

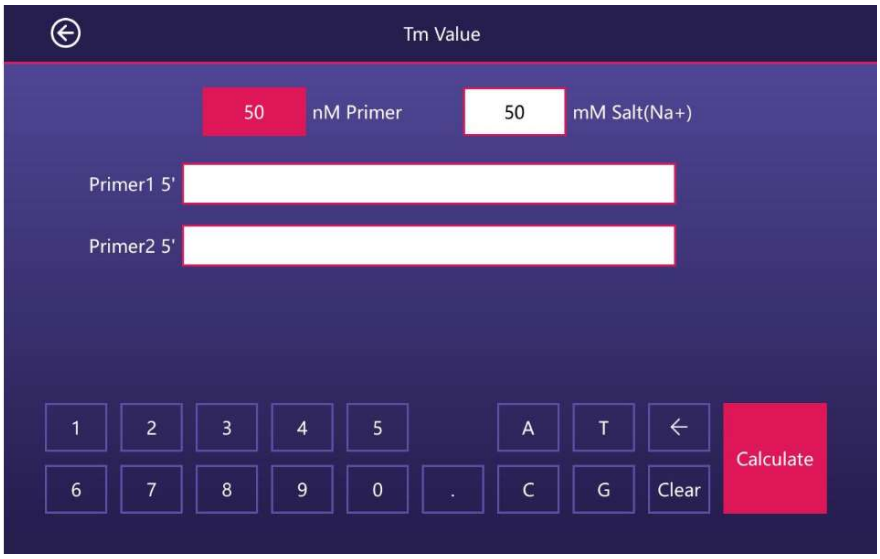
- Enter ‘If Step Temp. below: Lid Auto Shut Off” to automatically turn off the lid heating function when block temperature below a value.

Touch  to accept changes.

5. Tm Value

The Tm Value is used to calculate the Tm (melting temperature) and Ta (annealing temperature) for a primer pair.

1. In the Tools screen, touch **Tm Value** to open the screen.



2. Enter the salt concentration and the primer concentration.
3. Enter each primer sequence and then touch **Calculate** to view the Tm value of each primer, the average Tm value and the Ta value.
4. After you finish, touch **Back** to return to the Tools screen.

6. Service

This function is reserved for service.

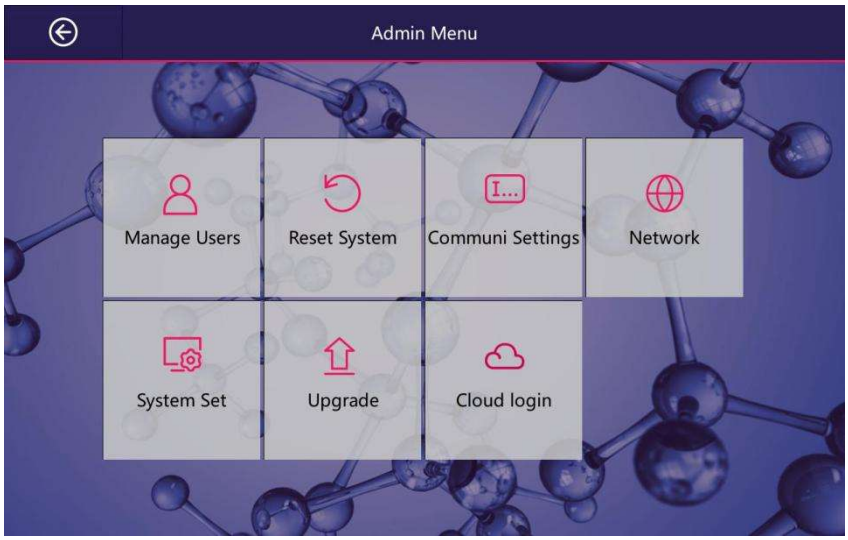
7.Admin Menu

The Admin Options is used to manage user accounts, reset to factory settings, backup and restore data. This function is only available when login as 'ADMIN'.

To use Admin Menu functions:

In the Home screen, touch **Tools**, then **Admin Options**.

The Admin Options screen opens.



7.1 Manage Users

The User Management function is used to manage user accounts.

To manage user accounts, login as "ADMIN":

1. In the Admin Options screen, touch **User Management**.
2. The User Management screen lists all accounts currently available.



Account authority:

- "ADMIN": control all functions in the Admin Options screen. The default password for ADMIN is ADMIN.
- Normal user account: can create, rename and delete non system folders; can create, rename, copy, modify, save, delete and run programs; can modify his or her login password (in the Tools>Login Password screen after login).
- "Guest": has the same levels of user account privileges as normal user but can login system without entering password.

In the User Management screen:

a. To create a new user account, touch **Add** to open the New User screen. Enter username and password of no more than eight characters.

b. To edit user, select a user and then touch **Edit** to open the Edit User screen. Enter new user password and touch **OK**.

c. To delete a user account, select a user and then touch **Delete**. Touch **Yes** in the displayed pop-up window to delete the user.

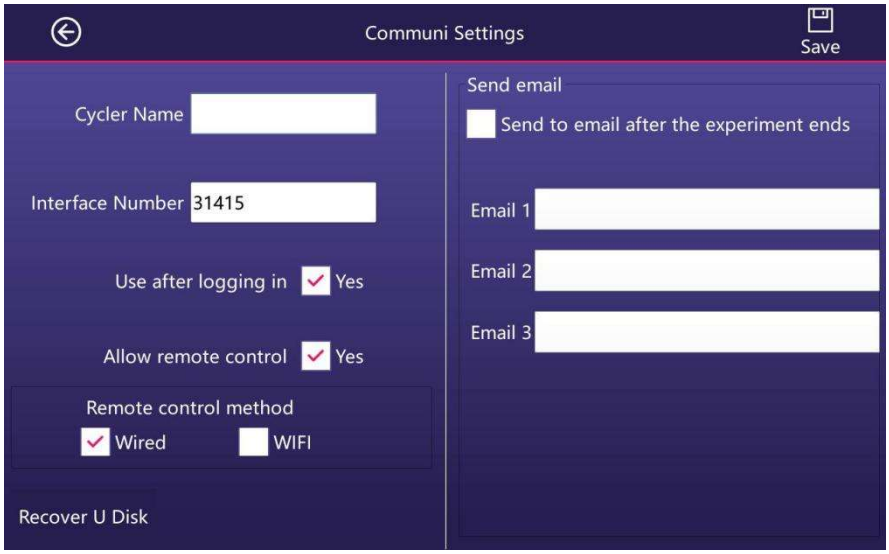
7.2 Reset Settings

Use this function to reset system to factory settings.

7.3 Commini Settings

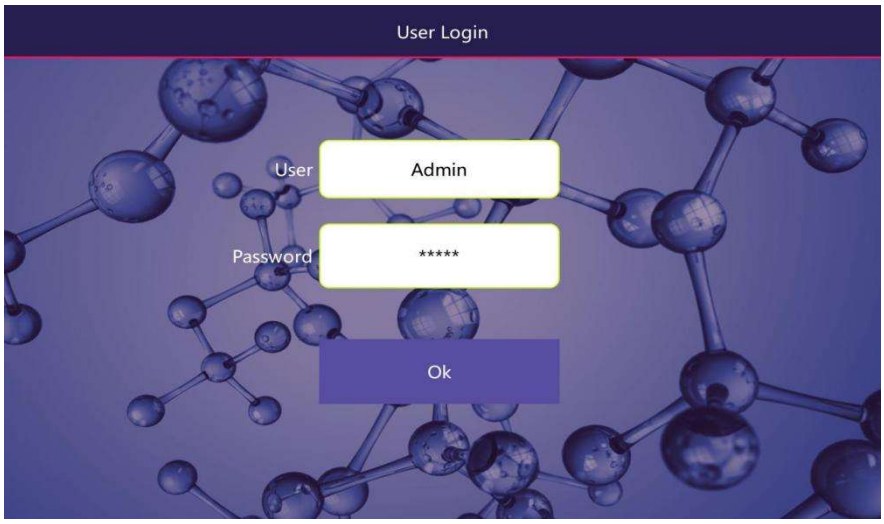
The communi settings is used for identifying the instrument when it is controlled via network by a computer. By default the cycler name is set to the instrument's serial number. You can change it as needed.

1. In the Admin Menu screen, touch **Commini Settings**.



2.In the Commini Settings screen, set a new Cycler Name.

3.Select whether to "Use after logging in." If you check "Yes," after saving and restarting the device, the login interface will appear directly. By default, the admin account is used, with the username as "Admin" and the password as "ADMIN."



4. 【Extra Option】Enable 'Allow remote control' to make the instrument can be controlled via network. If you need to control the instrument through the CyclerLink Software on your computer, select "Yes".
5. After the experiment is completed, the running records can be automatically sent to the email (Wi Fi connection is required to use this function, as shown in 7.4.2 Setting Wi Fi Connection)
6. When you finish, touch  to accept changes and return to the last screen.

7.4 Configure Network Connection

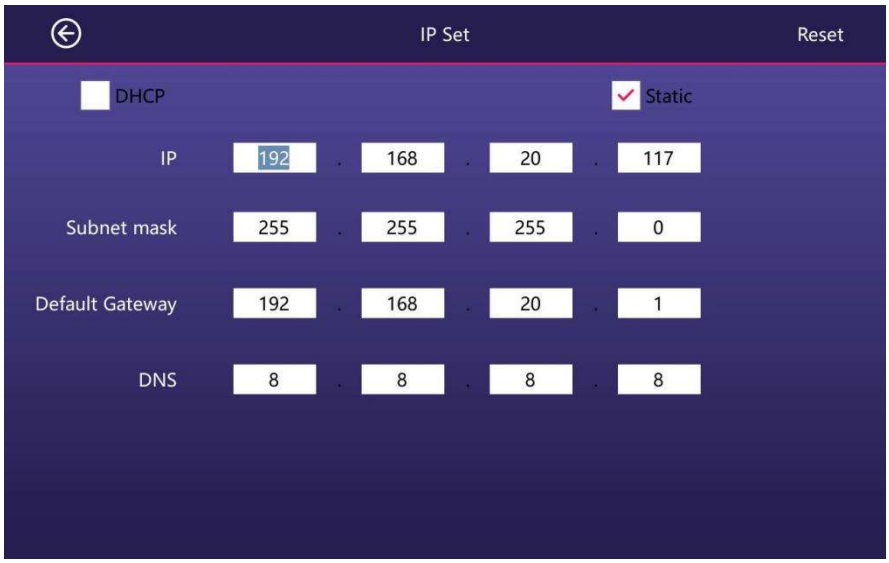
If your want to control the instrument via network, you need to configure network connection. You can set Wi-Fi (wireless connection) or you can also choose to set an IP address for wired connection (wired connections need optional).

7.4.1 Set IP address:

When connecting the instrument to the computer through a network cable, set the IP address of the instrument and the computer to be the same network segment.

To set the IP address of the instrument.

1. In the Network screen, touch **IP Set**.



2. Modify the IP address, subnet mask, and default gateway.

7.4.2 Set Wi-Fi connection:

Before set Wi-Fi connection, insert a USB wireless adapter (additional purchase) in the USB-A port of the instrument.

1. In the Network screen, touch **Wi-Fi**.



2. Enter a Wi-Fi access hotspot name (case sensitive) and touch **Connect**.

Enter the Wi-Fi password if required.

7.5. System Set

The System Set is used to set system parameters.

To use System Set functions:

1. In the Tools screen, touch System Set to open the screen:



To set date/time:

1. In the System Set screen, touch Date/Time field.
2. Enter today's date and current time in the pop-up keyboard.
2. Touch Save to accept changes and return to the System Set screen.

To adjust the screen luminance:
Select "High", "Medium", and "Low" to set high, medium and low luminance.
Touch OK to accept changes.

7.6. Upgrade

When the instrument needs to be upgraded with software, insert the USB drive that has been copied into the software package, and click the Upgrade button to proceed with the software upgrade.

7.7. Cloud login

This function is under R&D, unavailable to overseas users at present.

[APPENDIX I] Troubleshooting

Problem	Cause	Possible Remedies
No display and no fan moving sound when power on	No line voltage	Wait for power restore
	Power cord unreliable	Check power cord and plug
Abnormal vibrating noise	Unstable bench	Move to a stable bench
	Uneven foot	Move to a stable foot
	Loose case screw	Fasten the screw
Normal display but can't heat or cool	Heat pump fails or no current is supplied	Shut off the power and call service
No display but fan is moving when power on	LCD fails or LCD related circuit fails	Shut off the power and call service
When power on, a message: "Power failure during running!"	Lost power or power off the cycler when the last program is still running	Touch **OK** to cancel the message. Stop the last program
Water accumulated in sample wells	The cycler is running under 4°C for a long time while the ambient humidity is high	Running the block temperature above 90℃ for at least 30 minutes. Recommended to raise the storage temperature to 10°C.
U disk is not recognized	The U disk is incompatible with the cycler	Try another U disk.
Tubes are deformed	Tubes are poor in quality, too soft or bad heat resistance.	Use good quality PCR tubes.
Sample loss because of evaporation	Heat lid didn't heat or the set temperature of lid is too low.	Turn on the heating of lid and set the temperature to above 105°C.
	Tubes, strips or microplate are poor in quality	Changes tubes, strips or microplate.
	Sample volume is too small	Sample volume should above 10μl
Sample block temperature (view via Wells screen of run status screen) is abnormal	Heat pump fails	Shut off the power and call service
System clock is abnormal	System clock should be reset	Adjust date and time via Tools>System Set screen
	The battery in the cycler should be changed	Shut off the power and call service
Warning message: "Instrument failure! Error code: xx"		Shut off the power and call service