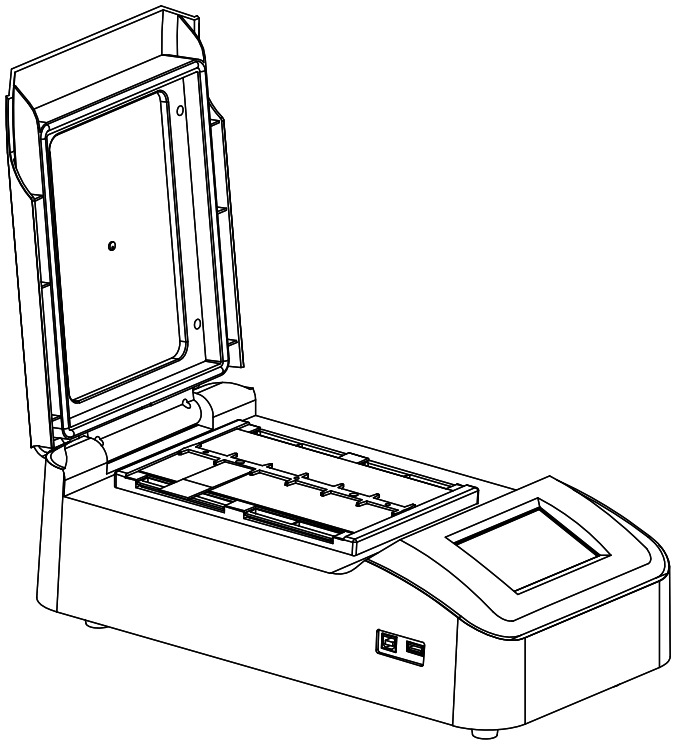
Laboratory Equipment Manufacturer
www.mrclab.com

Operations Manual

SDH-12

Denaturation & Hybridization System



PLEASE READ THIS MANUAL CAREFULLY BEFORE OPERATION

3, Hagavish st. Israel 58817 Tel: 972 3 5595252, Fax: 972 3 5594529 mrc@mrclab.com

MRC.2.16

Digitally signed by Potînga Stela
Date: 2023.09.20 13:39:30 EEST
Reason: MoldSign Signature
Location: Moldova

Thank you for purchasing Denaturation & Hybridization System.

In order to use the instrument properly, please read this instruction manual carefully before operating the unit and keep it for future reference.

Opening Check

Please check the instrument and Appendix with the packing list when you first open the package. If you find anything missing or incorrect, please contact the distributor.

MRC, LTD.

Add： HAGAVISH 3 ST., HOLON, ISRAEL

Tel.： +972-3-5595252 Fax: +972-3-5594529

E-mail: mrc@mrclab.com

Website: www.mrclab.com

Safety Warnings and Guidelines

1 Warning

Please read this Manual carefully before operation.

Operation without reading the manual may cause damage or even electrical shock.

2 Safety Tips

The operation, maintenance and repair of the Instrument should comply with the basic guidelines and cautions as below. Improper use of the instrument may cause damage to the system, inaccurate results, or potentially nullify warranties.

Indoor use only

Read the Manual carefully before operation, only qualified and trained staff can operate this Instrument.

The operator should not open or repair the Instrument without Vendor's authorization, if not, there might be cause potential damages or injuries and affect the warranty.

Before connecting to power, make sure the voltage used is same as the instrument required, and the maximum rated load should be sufficient for the instrument.
Please replace the power cord with same specs if the power cord is damaged. Please make sure there's nothing covered the power cord and keep it away from crowds when in use.
When plug in and plug out, make sure to hold the plug firmly and not to pull with power cord only.

The Instrument should be placed in a position with low humidity, less dust, and keep it away from water, sunshine and strong light source. Make sure of adequate ventilation, no corrosive gases, no strong magnetic interference and to avoid any heat sources.
When operating more than one Instrument simultaneously, the spacing distance should be no less than 100 cm.

Power off the instrument after operation and please disconnect the plug if long time no use of the instrument and cover it with something to prevent from dust.

During operation, the surface temperature of metal plate and the heating lid could be very high. To avoid possible scald or boiling of the liquid, do not touch the metal part when operating.

Under the following circumstances, please disconnect the power immediately and contact with your distributor.

- **Liquids into the Instrument;**
- **Drenched by rain or water**
- **Abnormal operation especially like abnormal sound or smell**
- **Instrument fell or outer shell damaged.**
- **Malfunction**

3 The maintenance of Instrument

The Metal plate and heating lid should be cleaned periodically by the cloth with alcohol to assure good heat transmission. If there are any stains on the Instrument, clean them with cleansing cream.

Contents

Chapter 1 Introduction

The Denaturation and Hybridization System SDH-12 is a product designed to use MCU with PID control method, ideal for maximum 12 slides denaturation and hybridization. Hermetic heating lid together with heated water tank to assure perfect experiment results and four operation modes (Denaturation/hybridization, Hybridization, Custom and In-situ PCR) are suitable for various kinds of denaturation & hybridization experiments.

Features:

- **Touch screen/mouse operating allows for easy reading and programming**
- **Power recovery function: The device able to recover the original set programme when the power is back**
- **Heating lid make the temperature more consistent and accurate**
- **Real-time display for temperature curve.**
- **60 programmable memory settings**
- **Data export function**

Chapter 2 Specifications

1. The normal operating condition

Ambient temperature: 5°C ～30°C

The relative humidity: ≤ 70%

Power supply: AC220V~ 50-60Hz 2.0A

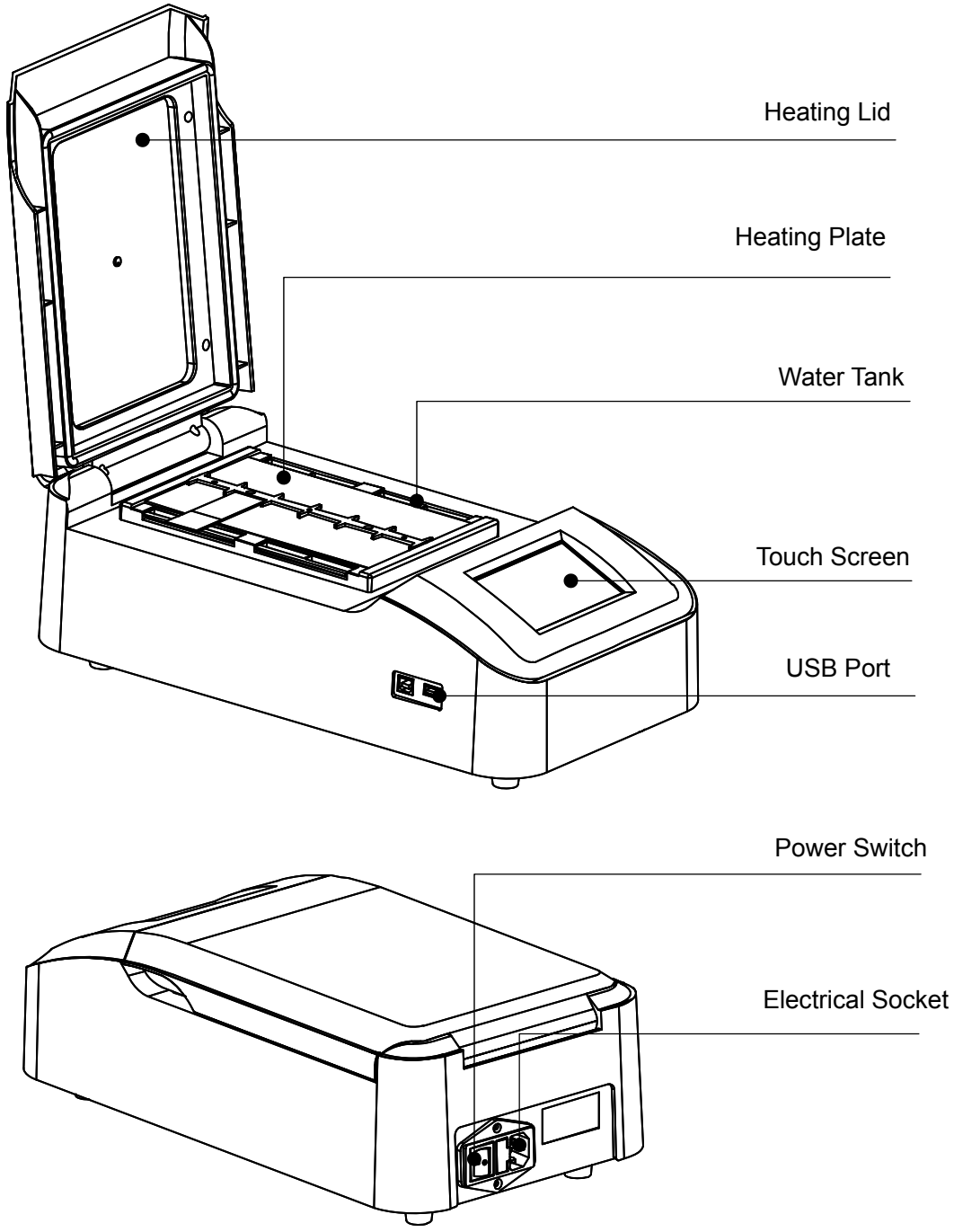
2. The basic parameters and performance

Model / Parameter	SDH-12
Temperature control range	RT+5 ~ 99.9□
Timing range	1min ~ 99h 59min or 1sec~99min59sec
Temperature control accuracy	≤ ±1□
Temperature uniformity	≤±1□
Heating time (30 - 95□)	≤ 3min
Cooling time (95 - 45□)	≤ 7min
Sample Capacity	12 Slides
Max. Input power	350W
Dimension (mm)	420 × 225 ×143
Net weight (kg)	5.8

Chapter 3 Preparations

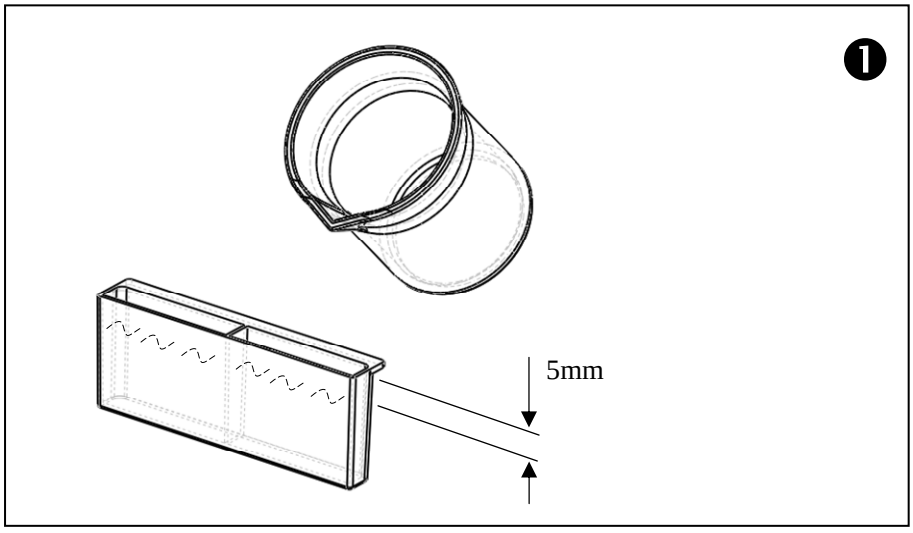
This chapter introduces SDH-12's mechanical structure, touch screen and some preparations before start. Please read this chapter carefully before operation, especially for the first time user.

1. Structure Description

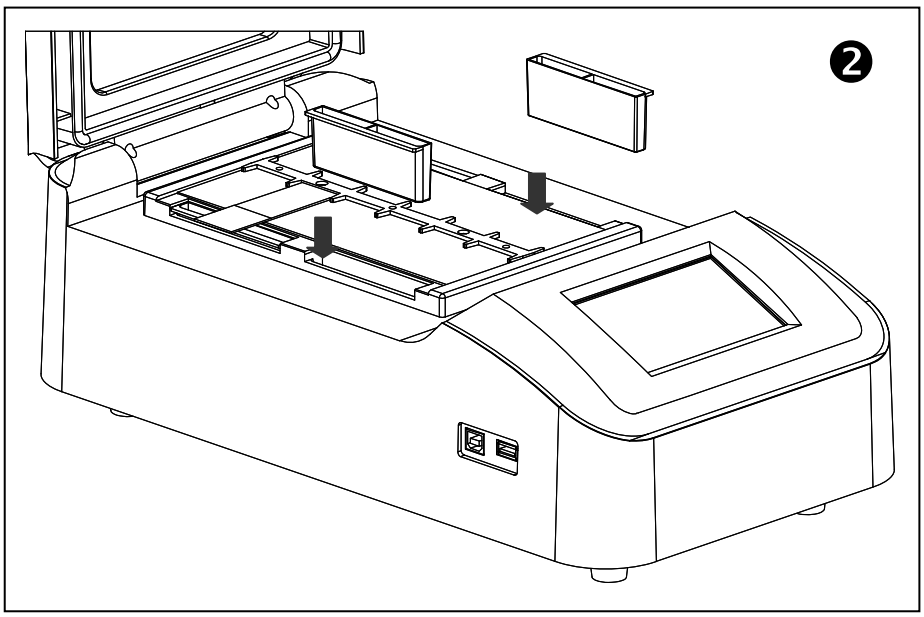


2. How to humidify

This instrument is equipped with 4 water tank at two sides of heating plate.
Before starting experiment, please add 12ml purified water to each tank and make sure the water surface is 5mm lower than top of tank. (Refer to fig 1)



Put the tank (with purified water) at two sides of heating plate.



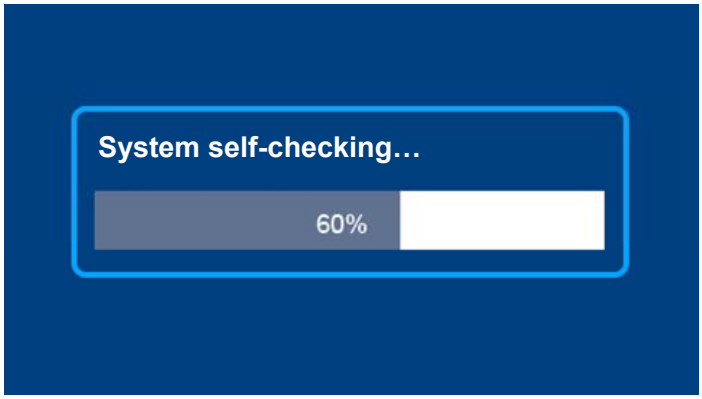
Remarks:

1. To assure enough humidity during experiments, please make sure four tanks are filled with water before turning on the instrument.
2. Fill the water in tank only but not in anywhere else.
3. “**Humidifying plus function”** is available for better humidity, details please refer to Page 15.
4. Check water level before each experiment and add water when the level is lower than half of the tank.

Chapter 4 Operation Guide

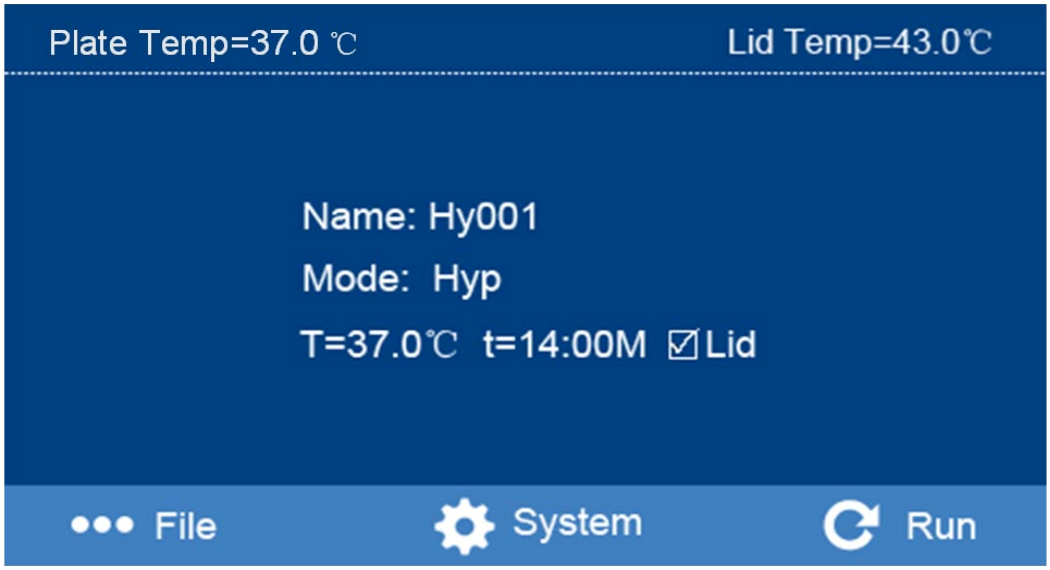
1. System self-checking

Connect the instrument with power and turn on the power switch, the LCD will display the System self-checking page.



2. Main menu function

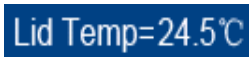
After self-checking, it enters into the main menu



Enter into file menu

Current temp. for heating plate

Enter into system menu



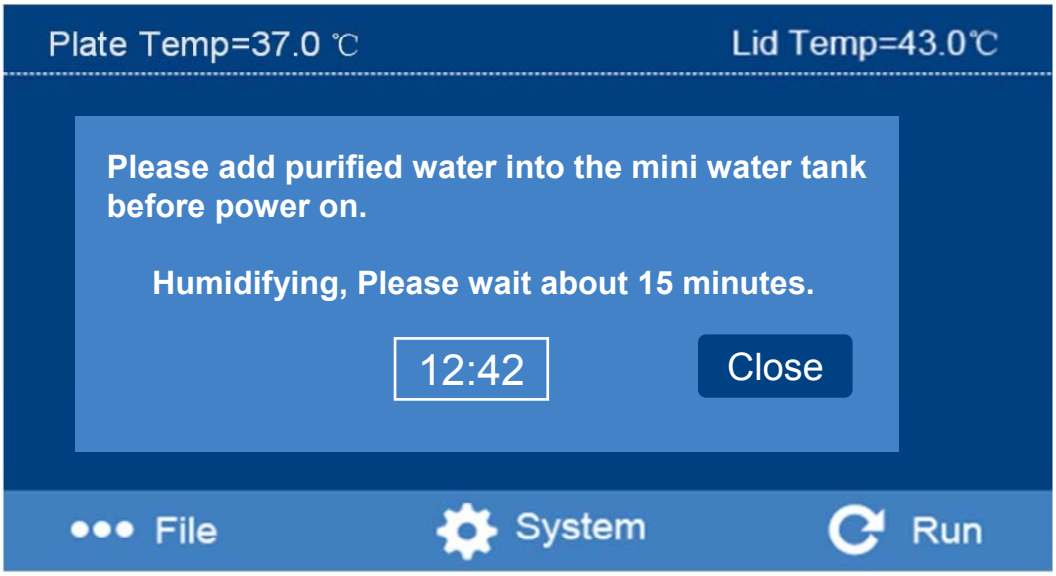
Current temp. for heating lid

Fast running current program

When the **"Humidifying plus function" i**s on, the four water tanks will start to be heated, a dialog window will appear as below (Details refer to page 15).

Remarks:

1. Before connect to the power, make sure the four tanks are filled with water already
2. Once turn on **"Humidifying plus function"**, please wait 15 minutes to make sure enough humidity before operating, there will be time count down during the heating up and the remind dialogue will disappear after 15 minutes.

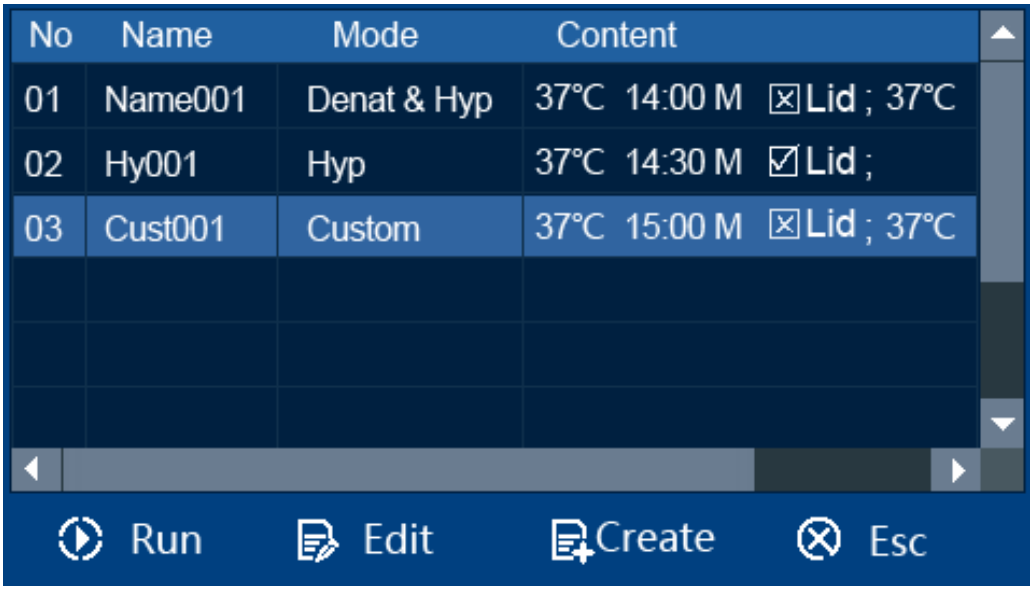


3. During process of humidifying, click "close" to close the dialog window but **"Humidifying plus function"** is still effective.
4. When the dialogue window appears, operate instrument by pressing "File", "System", "Run"if needed.
5. **"Humidifying plus function"** will be memorized by the system and will automatically run for future experiments unless turn off this feature.
6. In case of no need **"Humidifying plus function"**, please turn off it in "system parameter setting", and the dialogue window will no longer appear.

3. How to create and edit file

In the main menu, press 

to enter file menu



Run file

Create new file

Edit file

Exit file menu

3.1 Create new file

In file menu, press 

to create new file menu.

Number key

Clear Error


Enter key, to confirm current input


Confirm and return to file menu


Cancel and return to main menu

Program selection mode

Input the file name

Set cycle numbers

Select the time unit, M: minutes, S: seconds, e.g.:

14:30 M---14 Hours 30 Minutes
00:20 M---20 Minutes
13:30 S----13 Minutes 30 Seconds
00:20 S----20 Seconds

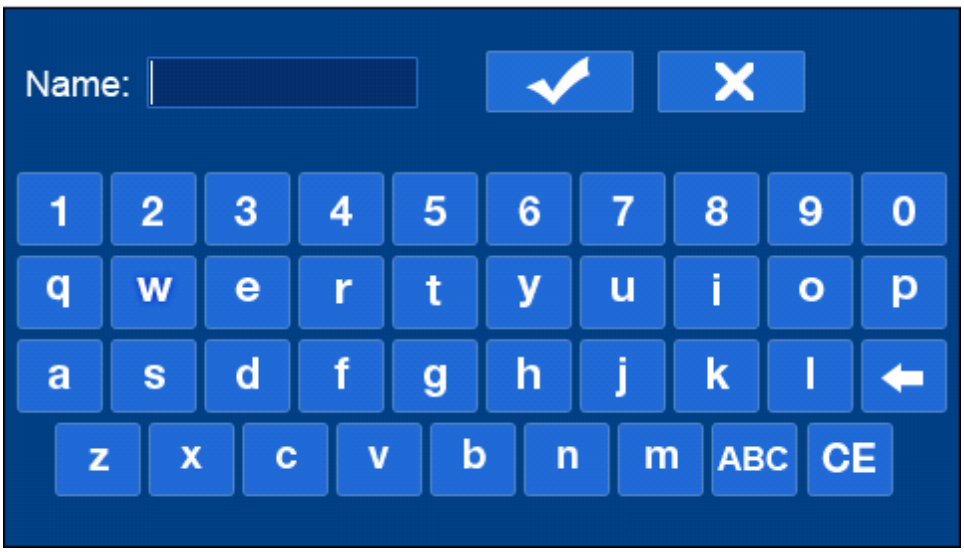

Turn on heating lid function during operation


Turn off heating lid function during operation

3.1.1 Input the file name

Click 

, there will be display below interface, the maximum input is 8 characters



3.1.2 Parameter Setting

Click 

to choose program mode.

There are four programs available, i.e.: Hyb, Denat&Hyb , Custom and In-situ PCR.

Hyb mode: Hybridization mode

HT: Hybridization temperature

Ht: Hybridization time

Lid: Select to “turn on” or “turn off” heating lid

Denat & Hyb mode

Denaturation

DT: Denaturation temperature

Dt: Denaturation time

Lid: Not available

Hybridization

HT: Hybridization temperature

Ht: Hybridizaton time

Lid: Select to “turn on” or “turn off” heating lid

Note: Under the Denat&Hyb mode,if you select (√) **“Heating up reminder”** on screen, there will be displaying a heating up reminder dialogue, If you select (×), the instrument will also run into heating up mode but without remind dialogue. Details please refer to Page 13.

Custom mode: User defined mode

T1: The first temperature point, t1: The first run time, lid1:Select to “turn on” or “turn off” heating lid

T2: The second temperature point, t2: The second run time, lid2:Select to “turn on” or “turn off” heating lid

T3: The third temperature point, t3: The third run time, lid3:Select to “turn on” or “turn off” heating lid

T4: The fourth temperature point, t4: The fourth run time, lid4:Select to “turn on” or “turn off” heating lid

Cycle: 1-99 cycles, when cycle number more than 1, the program will be cycled by the order of T1-T2-T3-T4 automatically.

If you only need T1 and T2 temperature points, just set time of t3 as 00:00

Remark: When selecting “turn on” heating lid, the heating lid temperature will be same as the setting temperature.

In-situ PCR mode: Able to apply simple In-situ PCR experiments by linking multiple set programs

In the In-situ PCR mode, the maximum is to link 6 programs. However, the programs can’t link the set In-situ PCR program. When linking, its following the file numbers (such as No.01, No.02, No.03, etc.). If the display shows No.00, it means the link was terminated.

Remarks: After setting linking programs, please press  to confirm. If displayed “Input error, please re-enter”, cursor key will on the incorrect file No., indicating that the selected file can not be linked or the selected program does not exist. At this time, please re-select the file number.

3.2 Edit file

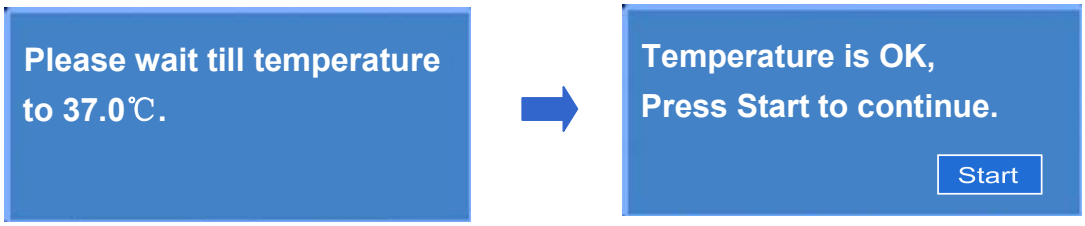
Click 

to edit the existing files. The parameters such as file name, mode, temperature, time and heating lid are all editable. The operating interface please refer to 3.1.

4. How to run and stop file

4.1 In the main menu or in the file menu, press “**Run**” to enter into the “run program”.

Press “Run”, the instrument will heat up to the setting temperature and the waiting notice window showed on screen, after the temperature reaches, click Start to continue.



When running, this key is not available
After running, press this key to re-start the current program.

When running, press this key to stop the current program.

View the set parameters and real-time temperature of heating lid

Exit the run menu

Cooling indication

Heating indication

The instrument has already enter into constant temperature and it's start to countdown

Running complete

Real-time temperature

Running time countdown

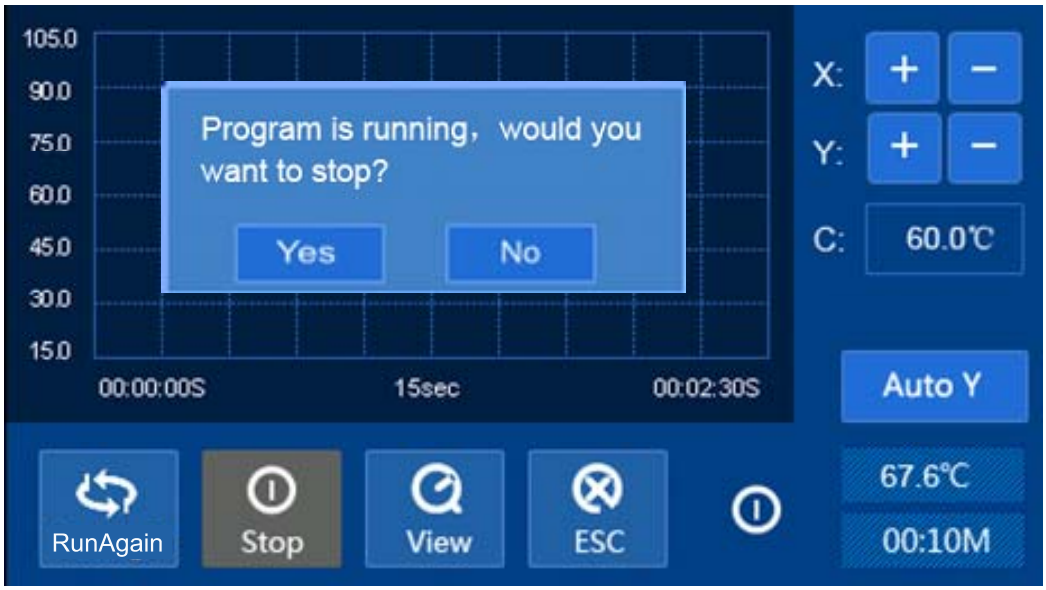
Adjust the time for each lattice in X axis of the chart

Adjust the temperature for each lattice in Y axis of the chart

Adjust the central temperature of the temp. curve

Press "Auto Y" to automatically zoom in and zoom out the temperature of Y axis

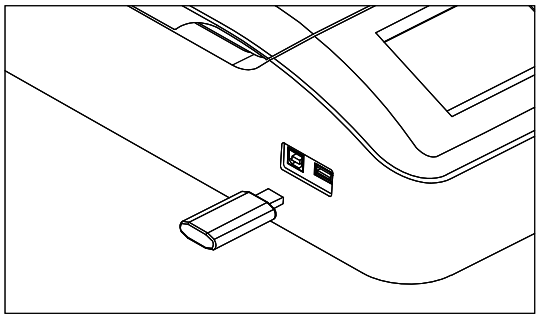
4. 2 Press Stop key, the "Stop Program" dialog box comes out. Then, press "Yes" key to confirm and stop the program running.



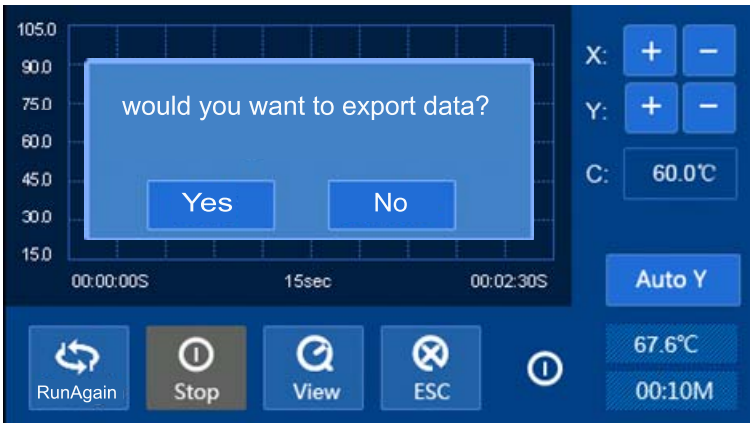
After stopping program, "RunAgain" key can be pressed to run program again. Press "ESC" to exit the program running interface and returns to main menu.

5. How to export data

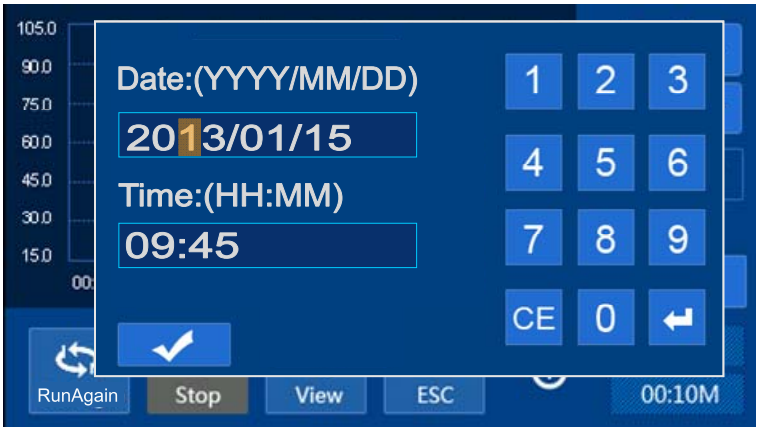
5.1 The experiment data of the current run can be exported. Please insert the U disk into USB port on left side of instrument before running .（The capacity of U disk should be within 4GB）.



After run finished, the dialog box will display as below.

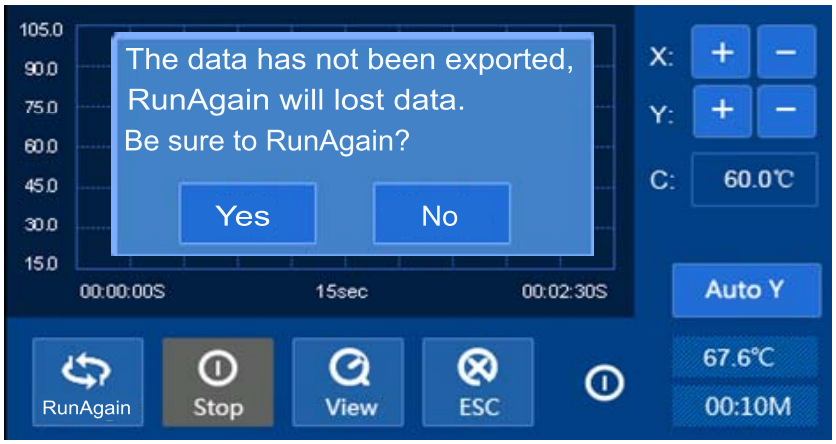


Press “No” to cancel and Press “Yes” to export data. In the meantime, input the date and time of the current experiment and then press “ ” to confirm, data will be exported to the U disk.

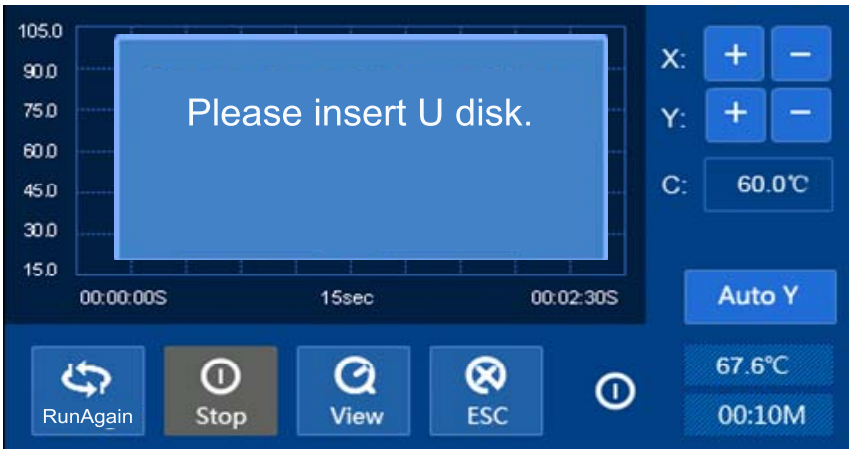


5.2 If no U disk inserted into the USB port before running, press " 

" key, instrument will remind user to export data, as below:



Press "Yes" to run again the current program, the data saved in the instrument will be deleted permanently (replaced by new running data). Press "No" to quit running, instrument will remind user to insert U disk and export data.



Insert U disk and following the steps to export data.

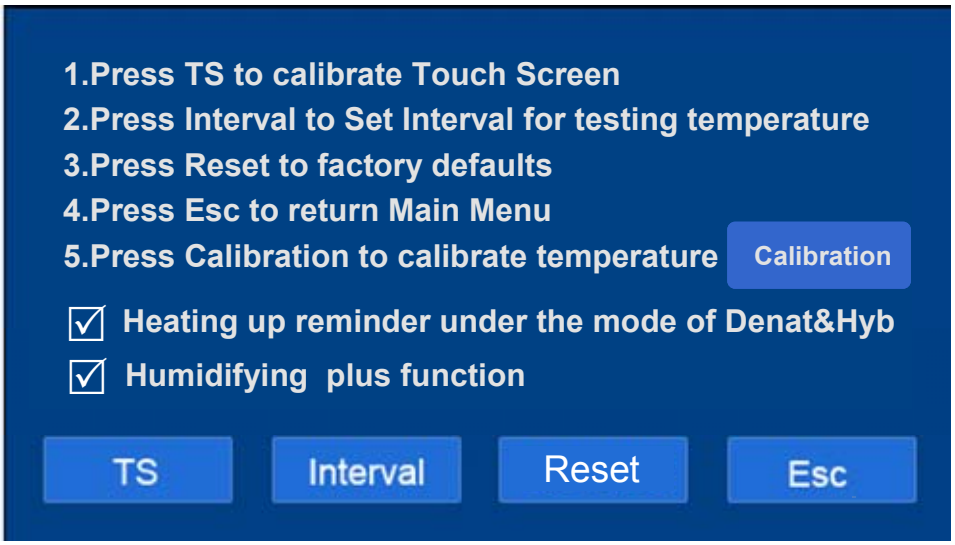
When user pulled out the U disk and insert again, instrument will remind user export data again. Please operate according to actual requirements.
If user run again or quit operation, the data saved in the instrument will be deleted permanently.

Meanwhile, on this operation interface, press " 

" to return to main menu, instrument will remind user that data has not been exported. Please refer to step 5.2 to export data or return to main menu.

6. How to set System parameters

In the interface of main menu, click System to enter into System parameters setting.



TS	Calibrate the touch screen, please use the touch pen to click the displayed cross cursor. Confirm after calibrate the four points.
Interval	Check test time interval, able to set 1-99s interval, the default value is 5s
Reset	Reset to factory defaults, the time interval will be set at 5 seconds and all created file will be deleted
Esc	Exit system parameters setting, and return to main menu.
Calibration	Temperature calibration, the temperature has been calibrated before factory. Please don't double calibrate unless necessary

Heating up reminder function:

Under the Denat&Hyb mode, if you choose " ✓""**Heating up reminder under the mode of Denat & Hyb"**on screen, the instrument will have a heating up reminder dialogue, and If you choose "×", the instrument will heating up but without reminder box.

Humidifying plus function:

Choose "✓"**Humidifying plus function**", the interface show "Humidifying, please wait...". It will be disappear after time out. Choose "×" : not to run this function.

Chapter 5 Failure analysis and troubleshooting

No.	Phenomenon	Possible Causes	Solutions
1	No signals on the display after powered on.	No power	Check the power
		Switch failure	Replace the switch
		Fuse failure	Replace fuse (5x20 250V4A）
		Others	Contact distributor
2	Big gap between actual and displayed temp.	Sensor failure	Contact distributor
3	“ERR01” in the display and with beep alarm	Open circuit of plate heater	Contact distributor
4	“ERR02” in the display and with beep alarm	Short circuit of plate heater	Contact distributor
5	“ERR04” in the display and with beep alarm	Temperature control failure on plate	Contact distributor
6	“ERR10” in the display and with beep alarm	Open circuit for lid heater	Contact distributor
7	“ERR20” in the display and with beep alarm	Short circuit for lid heater	Contact distributor
8	“ERR40” in the display and with beep alarm	Temperature control failure on heating lid	Contact distributor
9	“ERR08” in the display and with beep alarm	Clock circuit damage	Contact distributor
10	No heating in the plate	Temp. Sensor or heater failure	Contact distributor
11	No heating in the heating lid	Temp. Sensor or heater failure	Contact distributor
12	The key of touch screen is not working	Touch positioning failure	Re-positioning touch screen
		Touch screen failure	Contact distributor

Annex 1 Wiring Diagram of SDH-12

(For reference only, the vendor reserve the right to update the diagram without prior notice)