

# User Manual

PCR Thermo Cycler  
(TC1000-G/TC1000-S)



Please carefully read this user manual in advance to use the instrument at its full potential safely.



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## COPYRIGHT

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*VERSION201904*

## SAFETY NOTICE

### Common safe type cautions

Carefully read the following safety precautions for a thorough understanding.

- Follow the instructions and procedures described in this manual to operate this instrument safely.
- Carefully read all safety messages in this manual and the safety instructions on the instrument.
- Safety messages are labeled as indicated below. They are in combination with signal words of “WARNING” and “CAUTION” with the safety alert symbol  to call your attention to items or operations that could be dangerous to you or other persons using this instrument. The definitions of signal words are as follows:

 **WARNING: Personal Danger**

Warning notes indicate any condition or practice, which if not strictly observed, could result in personal injury or possible death.

 **CAUTION: Possible damage to instrument**

Caution notes indicate any condition or practice, which if not strictly observed or remedied, could result in damage or destruction of the instrument.

**NOTE:** Notes indicate an area or subject of special merit, emphasizing either the function of the product or common errors in operation or maintenance.

- Do not operate this instrument in any manner not described in this manual. When encounter trouble with this instrument, ASK FOR HELP from original manufacturer or authorized distributors.
- The precautions described in this manual are carefully developed in an attempt to cover all the possible risks. However, it is also important that you are alert for unexpected incidents. Please operate with care.

 **WARNING:**

- This instrument is not explosion-proof. Never use explosive or flammable samples.
- Do not install the instrument in or near places where inflammable gases are generated, or chemicals are stored.
- Do not place dangerous material within 30cm around the instrument.
- Make sure to prepare necessary safety measures before using samples that are toxic, radioactive or contaminated with pathogenic micro-organisms at your own responsibility.
- If the instrument, rotor and/or accessories that has been contaminated by solutions with toxic, radioactive or pathogenic materials, clean it according to the decontamination procedure accordingly.
- If you require services at site, please sterilize and decontaminate it in advance, and then describe the details of the hazardous substance to the service center involved in.
- Do not handle the power cord or turn on or off the POWER switch with wet hands to void electrical

shocks.

- Do not repair, disassemble the instrument or carry out other maintenance without proper authorization. Please contact the service center of the manufacturer or nearest distributor if you need such service.
- Do not operate the product in any manner not described in this User Manual.
- This product contains heating components, please avoid scalding injury.

 CAUTION

- This instrument must be located on solid and level workbench top for indoor use.
- Ensure the distance with the surrounding and the air circulation of the vent.
- When close the cover, do not put your hands between the upper cover and the casing, preventing the pinch.
- Do not move or relocate the product when it is running.
- If fluid spills out, please promptly clean and dry with a dry cloth to avoid sample contamination.
- When the experimental operation, keep the machine cover open, or arbitrary open the cover will affect the experiment results.
- When the experimental operation, the sudden loss of power will affect the results.
- When in doubt or have any troubles with this product, ASK FOR HELP.
- Vibrations are likely to damage the product, contact our service center if abnormality observed.

# 1 INTRODUCTION

## 1.1 Intended use

PCR Thermo cycler is widely used in biology, medicine, food industry, forensic science, biotechnology, environmental science, microbiology, clinical diagnosis, epidemiology, genetics, gene chips, genetic testing, gene cloning, and other fields that need gene expression instrument. Operator should be trained before using the product. Detailed operation, please refer to the User Manual below.

## 1.2 Specifications

Specifications	TC1000-G	TC1000-S
Sample Capacity	0.2ml PCR tubes×96, 8×12PCR strips or 96 well plate ×1	
Heating Temperature Range [°C]	4~105°C	
Lid Temperature Range [°C]	30~110°C	
Temperature Display Accuracy [°C]	0.1°C	
Temperature Accuracy [°C@55°C]	±0.3°C	
Temperature Uniformity [°C@55°C]	< 0.3°C	
Max. Heating/Cooling Rate [°C /sec]	5°C/Sec	
Gradient Temperature Setting Range	30~99°C	--
Gradient Range	1~42°C	--
Display	7"800×480mm LCD	
Touch Operation	Yes	
Power-off Protection	Yes	
Power Supply	AC 220V (±10%) 50/60Hz; AC 110V (±10%) 50/60Hz	
Dimension[W×D×H]	280×270×250mm	
Weight	11kg	



## 2 DECLARATION OF CONFORMITY

<b>In compliance with the following safety standards:</b>
EN 61010-1
EN 61010-2-020
EN 61010-2-101
<b>In compliance with the following EMC standards:</b>
EN 61326-1/FCCPart15Subpart B/IECS 001
EN 61326-2-6:2006
<b>Associated EU guidelines:</b>
EMC guidelines: 2004/108/EC
LVD guidelines: 2006/95/EC
This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme à la norme NMB-001 du Canada.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authorization granted by the manufacturer to operate the equipment.

NOTE: This instrument has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the instrument is operated in a commercial environment. The instrument generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the user manual, may cause harmful interference to radio communications. Operation of instrument in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his or her own expense.

## 3 REQUIRED OPERATIONAL CONDITION

### 3.1 Basic operational condition

- 1) Power: 200V-240V, 50Hz/60Hz.
- 2) Ambient temperature: 10°C ~ 30°C.
- 3) Relative humidity:  $\leq 70\%$ .
- 4) No vibration and airflow around.
- 5) No airborne dust with charge, explosive and corrosive gases around.

### 3.2 Transport and storage condition

- 1) Storage temperature: -20°C ~ 55°C.
- 2) Relative humidity:  $\leq 80\%$ .

## 4 INSTALLATION

This section describes the instructions that you should abide when install the instrument to ensure your safety and the optimum performance.

**WARNING:**

- Improper power supply may damage instrument.
- Make sure the power source conforms to the requirement before connecting.

### 4.1 Location

- 1) Place the instrument on a firm, flat and level bench top, ensure the four feet of this instrument stand on the table firmly. Avoid slippery surface or surface prone to vibration.
- 2) The recommended ambient temperature is  $20^{\circ}\text{C}\pm 5^{\circ}\text{C}$ . Avoid temperature over  $30^{\circ}\text{C}$  or direct exposure to sunlight.
- 3) Keep clear of the instrument at least 10cm on both sides and at least 30cm behind it to guarantee the cooling efficiency.
- 4) Keep away from heat source or liquid.

### 4.2 Connection of the power cord and grounding

**WARNING:**

- To avoid electrical shocks, ensure your hands are dry when touching the power cord.
- This instrument must be grounded properly.

A power outlet rated for 10A or above, with proper earth protection and in compliance with municipal safety requirements is compulsory.

## 5 STRUCTURE



Figure 5- 1 Front view of the instrument

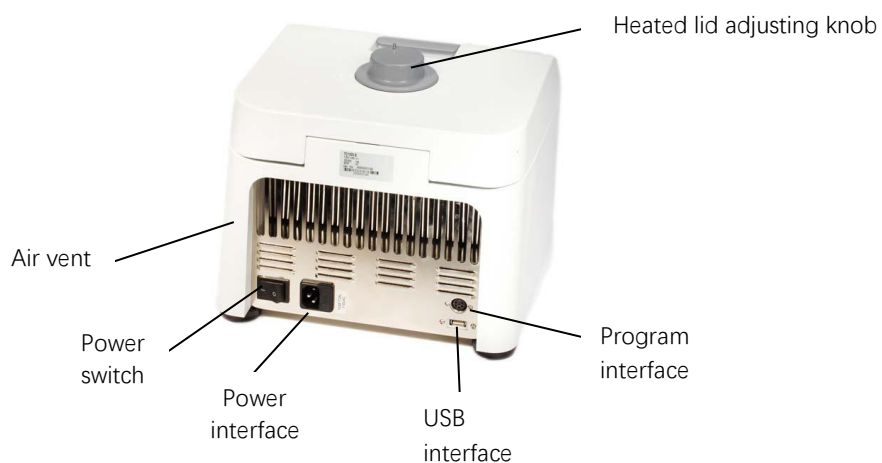


Figure 5- 2 Back view of the instrument

**Heated lid adjusting knob:** Adjust the height of heated lid to accommodate different reaction tubes.

**LCD touch screen:** Parameters setting and display

**Door lock:** Open or lock the cover

**Air vents:** Ventilation

**Power switch:** Turn on /off the power

**Power interface:** Connect the power cord

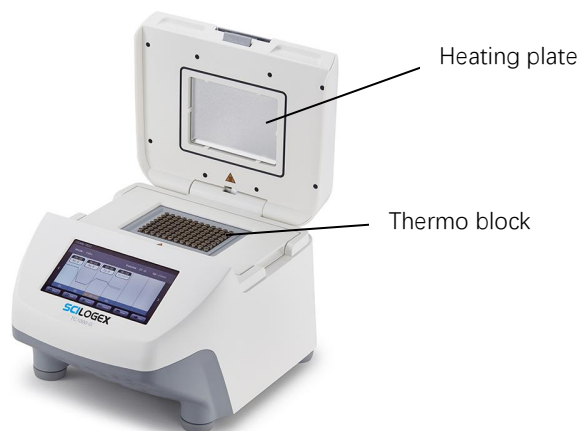
**Program Interface:** For service

**USB Interface:** For service

## 5.1 Installing the thermo block

Before power on, please make sure the thermo block has been installed correctly.

Installing methods: put the thermo block vertically into the main unit and ensure good contact between the Thermo block and the main unit.



**Heating plate:** Heat for the heated lid

**Thermo block:** Load the sample tubes or a PCR plate

### CAUTION!

Risk of burns from the hot surface.

Risk of burns from hot thermo block and hot heating plate when the heated lid is open.

## 5.2 Initial steps

Before the PCR thermo cycler is commissioned for the first time, ensure that the following requirements are met:

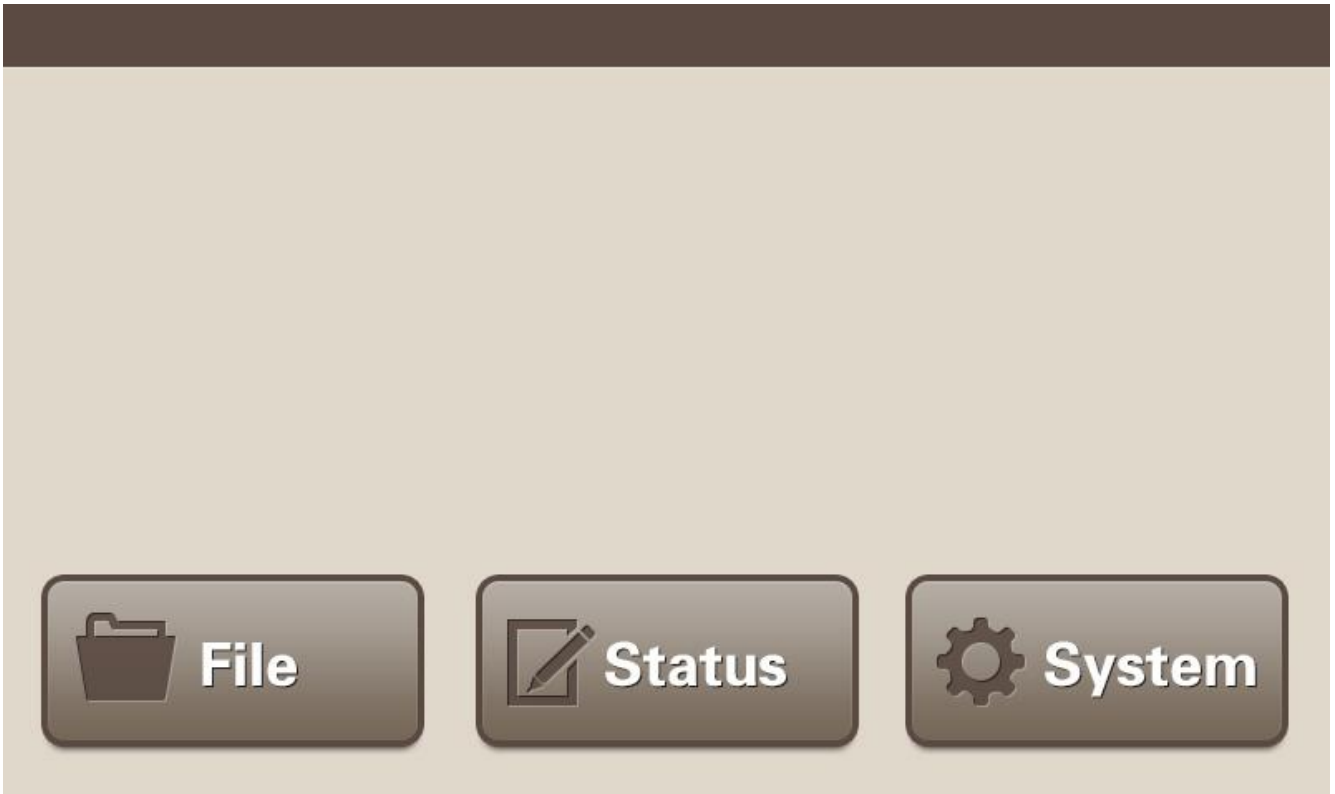
- 1) The device is correctly connected.
- 2) The device is free of damage.
- 3) Free circulation of air around the ventilation slots.

Before power on, please ensure:

- 1) The power supply is consistent with the instrument required voltage.
- 2) Make sure the power cord is securely plugged into a power outlet.
- 3) Power cord grounding reliable.

## 5.3 Power on

- 1) Turn on the power switch, the instrument will issue a "beep" sound, indicating that power is on.
- 2) The instrument starts a self-inspection which will take about 1-2 minutes, please be patient.



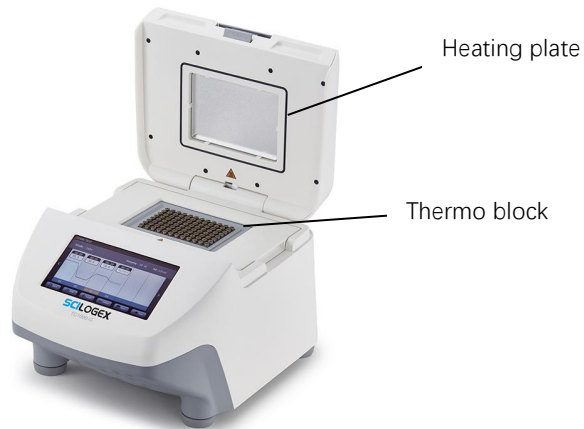
NOTE: When the self-inspection passed, "TEST pass!" will be shown on the display, you can go on next steps. If not, please turn off the power immediately and contact the manufacturer immediately.

## 5.4 Heated lid

NOTE:

- 1) Before close the heated lid, please make sure thermo block loaded with sample tubes or a PCR plate.
- 2) Before start the program, please make sure the heated lid is closed.



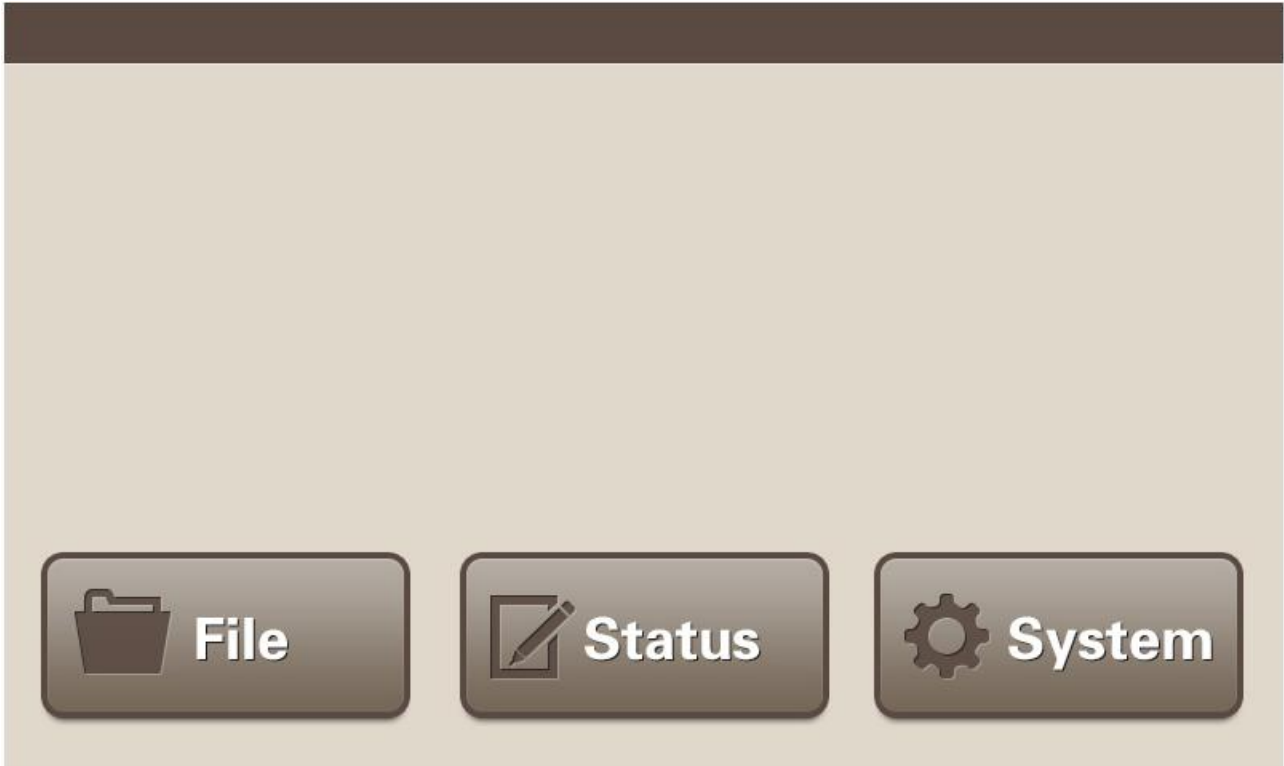


**Heated lid adjusting knob:** Adjust the height of heated lid to accommodate different reaction tubes. Rotate it clockwise, the heating plate will down, rotate it counterclockwise, the heating plate will be lift up.

**CAUTION!**

When you close the heated lid, do not place your fingers between the heated lid and the machine, which will cause a hand nipping.

## 6 OPERATION MANUAL



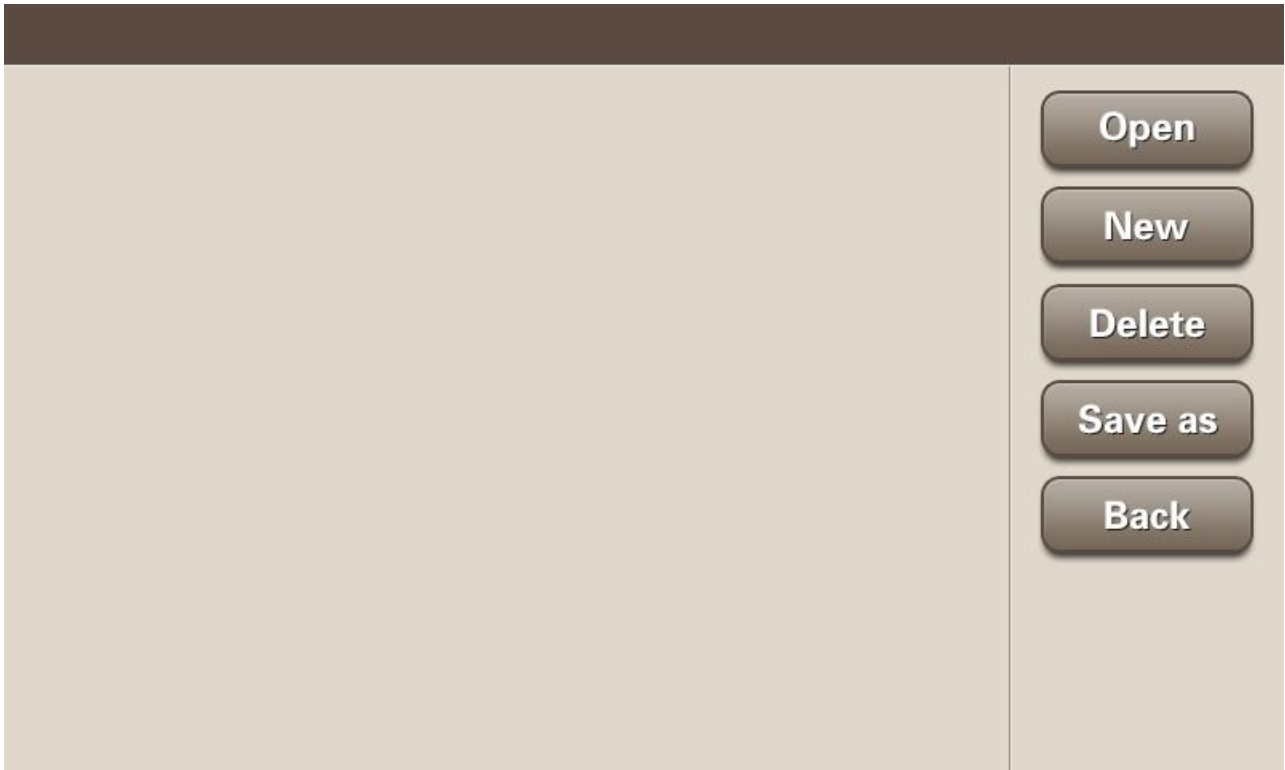
When successfully pass the self- inspection, you can:

- 1) Click "File" button to enter the file management interface to create e file, edit the file, run a program, etc.
- 2) Click "Status" button to enter program executing interface directly.
- 3) Click "System" button to enter the system setting interface.

### 6.1 File management

Click "File" button, you can enter the interface below.





**Open:** Open a folder. Choose the target folder, click “Open” to open the folder.

**New:** Create a folder. Click “New”, input the file name through the keyboard, then press the Enter key.

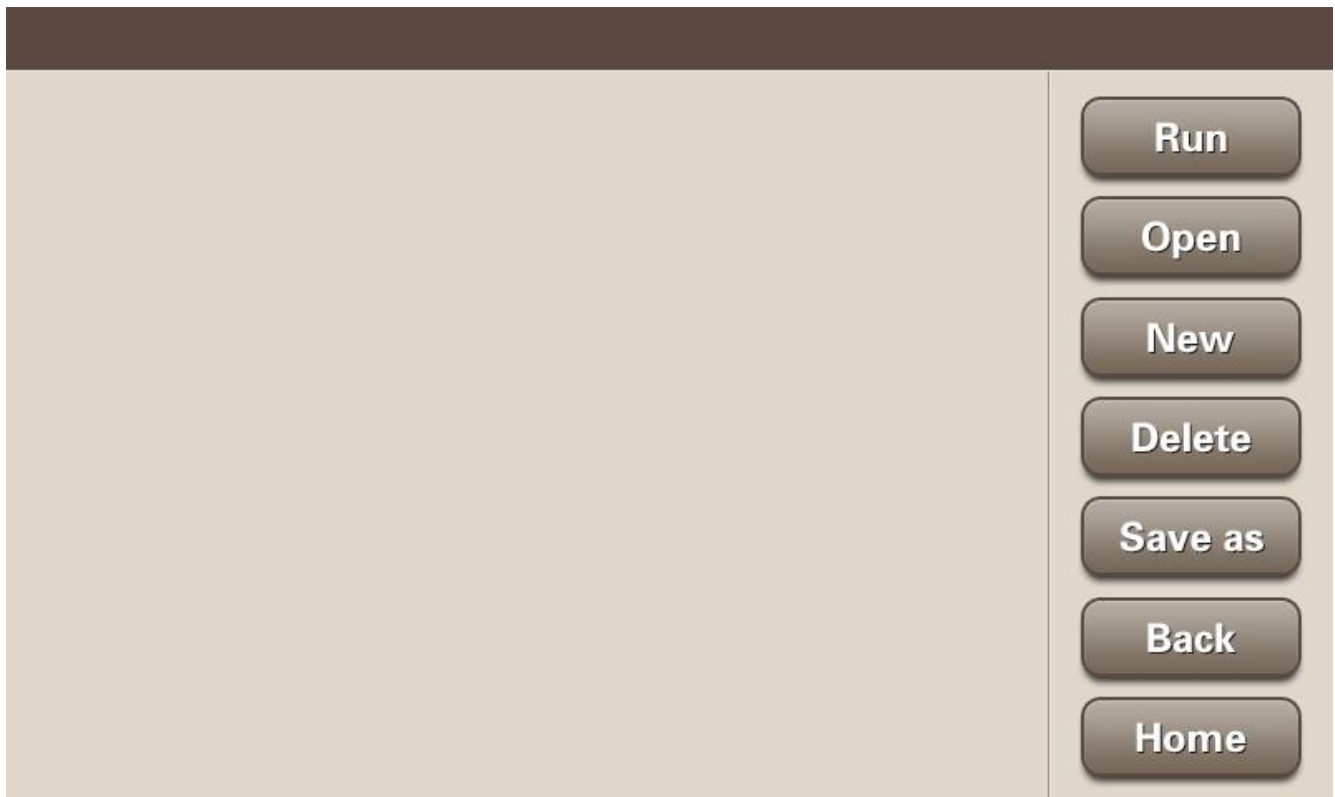
**Delete:** Delete the folder. Select a folder, click the “Delete” button. Attention will pop up, you can select “Yes” to delete the folder. Otherwise, click the No button, cancel the delete order.

**Save as:** Save folder as a new name. Select the folder, click the “Save as” button, enter the new folder name through the pop-up keyboard and press the “Enter” key.

**Back:** Return to the main menu.

#### 6.1.1 Create an experiment method

Select a folder (which will turn to blue color), click “Open” button, or double-click the folder, you can enter the interface below.



**Run:** Execute the program defined in the selected file.

**Open:** Open the selected file to edit the program.

**New:** Create a new file to define a new program. **Delete:** Delete the selected file.

**Save as:** Rename the selected file.

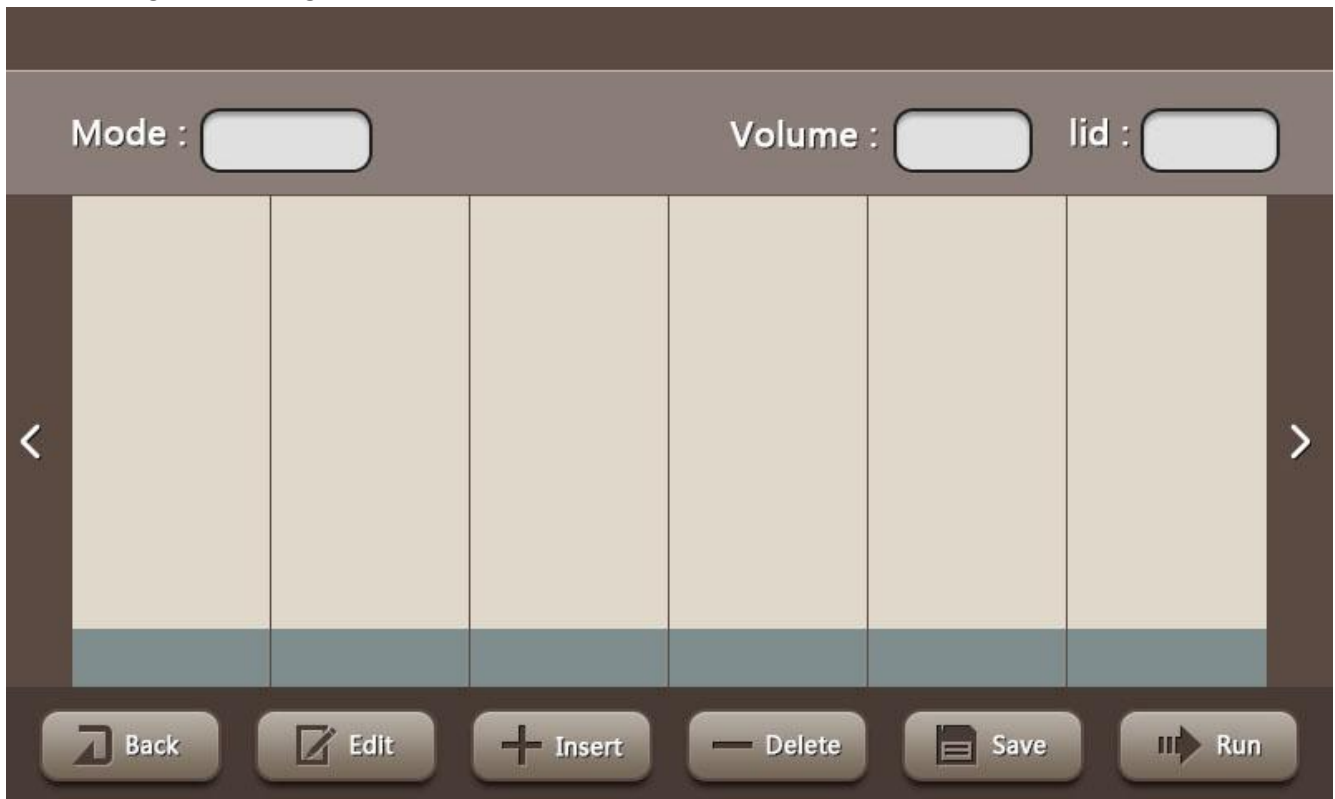
**Back:** Return to up level interface.

**Home:** Return to main menu.

**NOTE:** When you want to create or save a file, you need to do it in a selected folder. By clicking "New" or "Open" button, you can create a new file or edit a selected file.

- 1) Create a new file. Click "New" button, input the file name via the pop-up keyboard, press "Enter" key, the new file will be created. If you press "ESC" key, you can cancel the new file creation.
- 2) Edit a selected file. Select the target file, click "Open" button, and enter the program edit interface.

## 6.1.2 Program settings



**Back:** Return to folder interface

**Edit:** Selecting the STEP which you want to do edit from area of blue block, then click the Edit button into the temperature setting interface

**Run:** Run the program (check part 6.1.6)

**Save:** Save the program

**Insert:** Create a new STEP

**Delete:** Delete the selected STEP

**Arrow button:** Scroll backward (left arrow)/forward (light arrow)

### 6.1.3 Temperature settings (TC1000-S)



Input Parameters

**Temp:** The temperature of this STEP.

**Time:** The execution time for this STEP (0 ~ 99min59s).

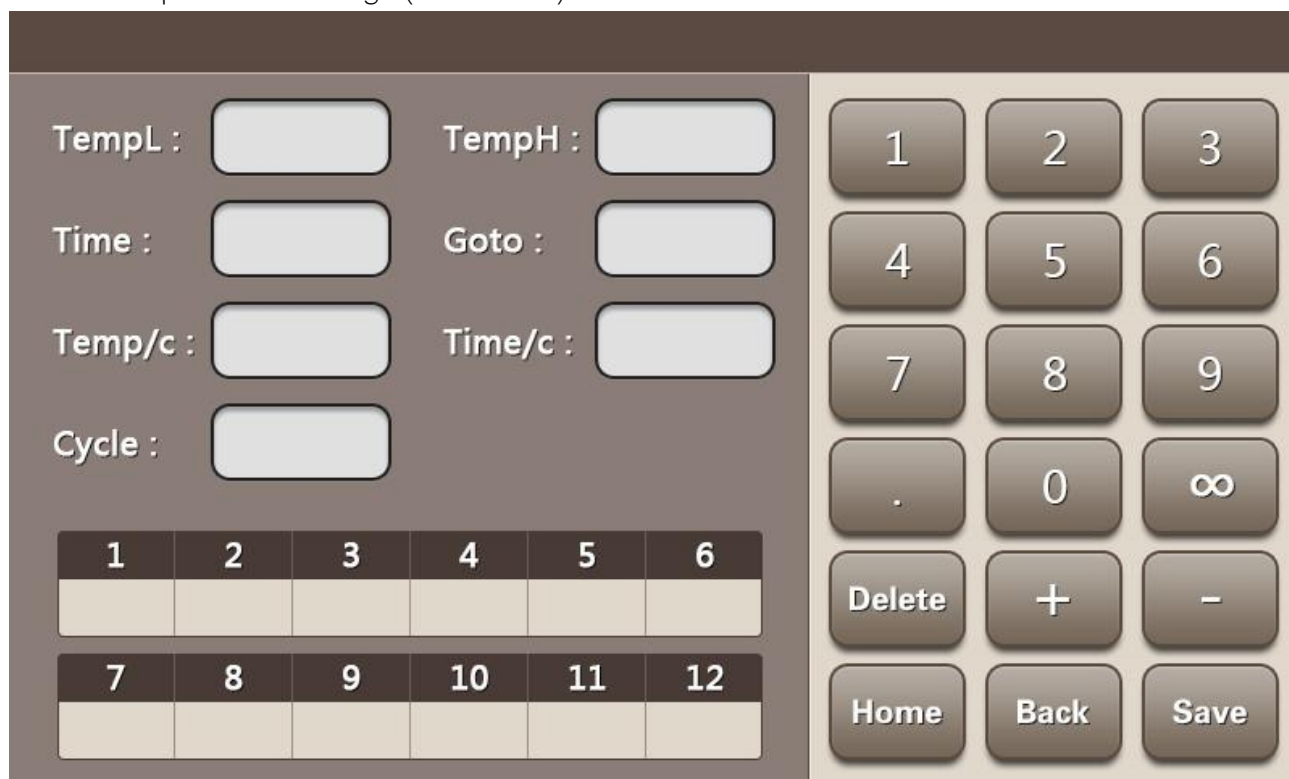
**Goto:** Go to the STEP set in this program after the current STEP execution complete

**Cycle:** Set the times needed to repeat.

**+Temp/c:** Temperature modify value for each cycle, could be plus or minus (range-4°C~4°C) For example, when the Temp L is 50°C, the Temp H is 60°C, if you set "0.1°C" in Temp/c at Item3, then every time, the program running to Item3, the Temp L and Temp H will both increase 0.1°C. After 30 cycles, the Temp L will reach to 53°C, and the Temp H will reach to 63°C.

**+Time/c:** Time modify value for each cycle, could be plus or minus(range -120~120s) For example, when the Time is 60s, if you set "1s" in Time/c at Item3, then every time, the program running to Item3, the Time will increase 1. After 30 cycles, the Item 3 running time will reach to 90s.

6.1.4 Temperature settings (TC1000-G)



Input Parameters

Display each column temperature of Heating block

**Temp L:** Lowest temperature

**Temp H:** Highest temperature

**Time:** The execution time for this STEP (0 ~ 99min59s)

**Goto:** Go to the STEP set in this program after the current STEP execution complete

**Cycle:** Set the times needed to repeat.

**+Temp/c:** Temperature modify value for each cycle, could be plus or minus (range -9.9°C~+9.9°C) For example, when the Temp L is 50°C, the Temp H is 60°C, if you set "0.1°C" in Temp/c at Item3, then every time, the program running to Item3, the Temp L and Temp H will both increase 0.1°C. After 30 cycles, the Temp L will reach to 53°C, and the Temp H will reach to 63°C.

**+Time/c:** Time modify value for each cycle, could be plus or minus(range±9min59s) For example, when the Time is 60s, if you set "1s" in Time/c at Item 3, then every time, the program running to Item3, the Time will increase 1. After 30 cycles, the Item 3 running time will reach to 90s.

NOTE: Gradient range: 30 ~ 99 °C, gradient span: 1 ~ 42 °C.

## 6.1.5 Configure setting



**Heated lid:** Open by default, and the default temperature is 105 °C. If needed, you also can set the temperature of the heated lid

NOTE:

- 1) The heated lid setting range is 30-110°C. Please don't exceed the parameters setting range.
- 2) If click "off", the heated lid will close. But closing the heated lid may impact the experiment result.
- 3) When the block temperature is below 15 °C, the headed lid will also close itself.

**Control mode:** default tube, you can also choose Block

NOTE:

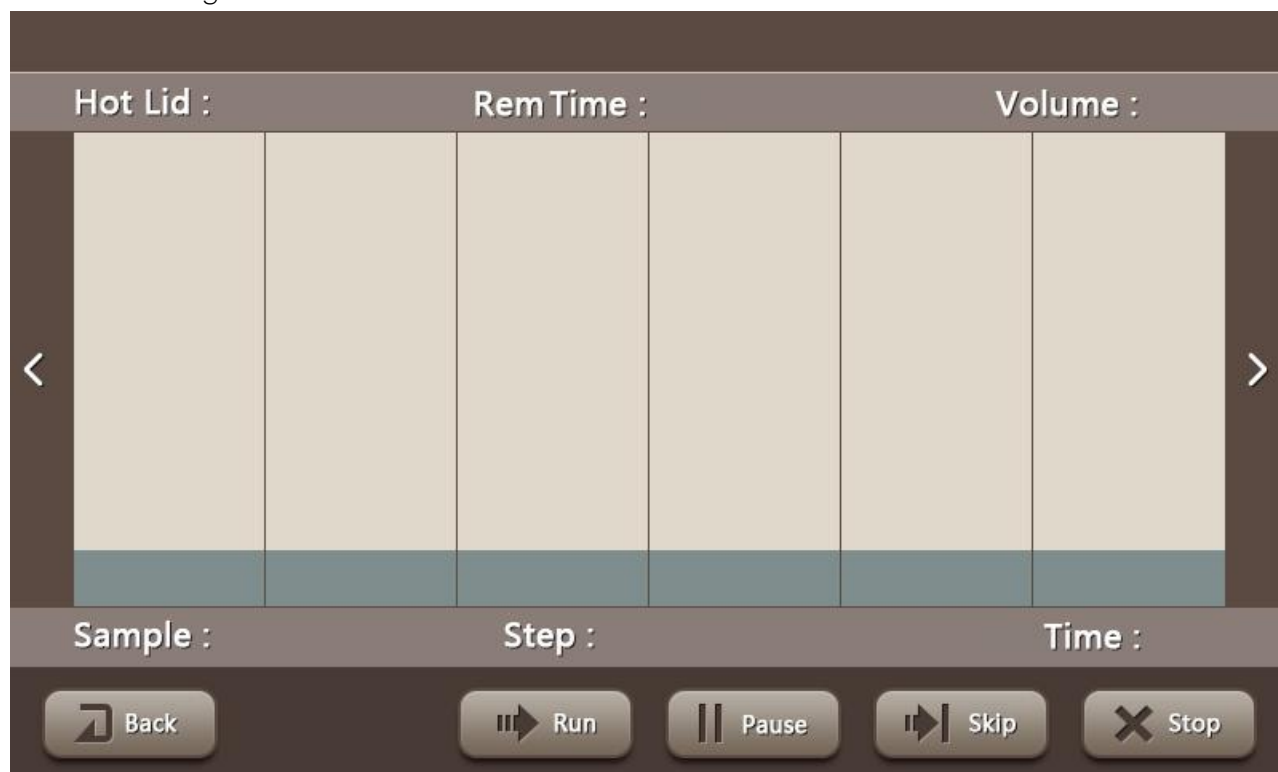
The recommended setting model is the tube model. Because when you choose block, that means the sensor measures the temperature of the aluminum block. If you choose tube, the temperature is calculated temperature of the liquid. Relatively speaking, tube is more intelligent and accurate.

**Sample Volume:** Please fill in the real reaction system according to the actual situation

**Back:** Return to up level interface

**Home:** Return to main menu.

### 6.1.6 Running Interface



**Hot Lid:** Temperature of the heated lid

**Rem Time:** Remaining time of this program

**Volume:** Sample volume

**Sample:** Temperature of sample

**Step:** Current steps to run

**Time:** Running time

**Run:** Running

**Pause:** Pausing the program

**Skip:** Skipping the step which running

**Stop:** Stopping the program

**Back:** Return to up level interface

When the program is finished or being stopped, the instrument will issue two "beeps" sound, click the Back button can return to the main menu.

### 6.1.7 Normal PCR program setting

- 1) Initial denaturation: 95°C, 5 minutes: In column Item1, input 95 in "Temp", input 0500 in "Time", this STEP completes.

Input skills: Time is displayed in min: sec format. For example if you want 5 minute then input 0500, if you want 5 minutes 30 seconds then input 0530.

- 2) Denaturation 95°C: 30 seconds: Click “Add” button to create Item2. Input 95 in “Temp”, input 0030 in “Time”, this STEP completes.
- 3) Primer annealing: 55°C 30 seconds: Click “Add” button to create Item3. Input 55 in “Temp”, input 0030 in “Time”, this STEP completes.
- 4) Extension: 72°C 30 seconds, from step2 to step4 repeat 30 times: Click “Add” button to create Item4. Input 72 in “Temp”, input 30 in “Time”, input 02 in “Goto”, input 30 in “Cycle”, this STEP completes. When step 4 was finished, it will go to step 2, then run 30 cycles.
- 5) Continue extension: 72°C 10 minutes: Click “Add” button to create Item5. Input 72 in “Temp”, input 1000 in “Time”.This STEP completes.
- 6) Click Save: After all the above STEPs, the Normal PCR program setting is completed. After 95°C initial denaturation 5minutes, running (2)-(5) PCR cycles 30 times, at last continue extension at 72°C in 10 minutes.



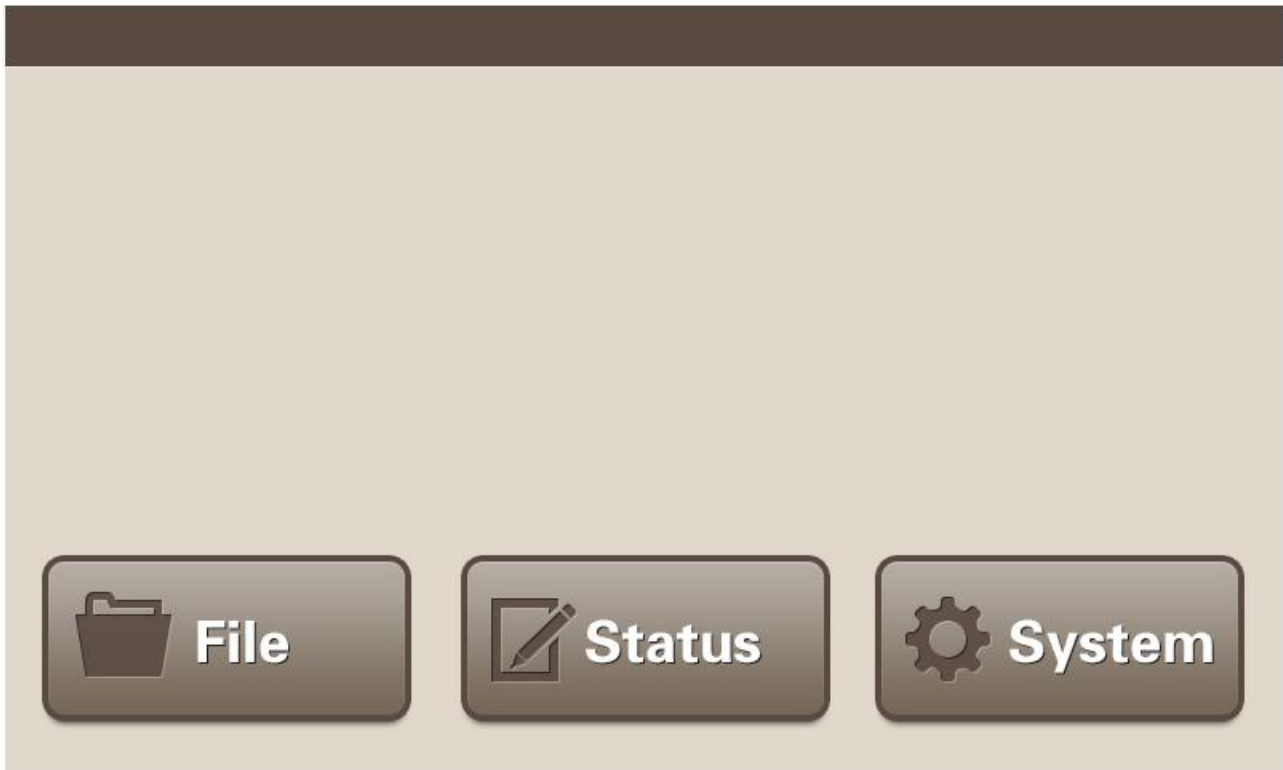
NOTE:

Because the instrument of different brands has its own temperature control features (including: heating and cooling speed, stability, volatility, etc), and the biological experiments are inherently uncertain, vulnerable to outside influence, so although a program can run successfully in one instrument, it does not mean you can get the same result in another instrument. Please adjust the program to suit different instruments in order to achieve the ideal state.

## 6.2 Quick operation

Click “Status”, can enter the program running interface. The system default execute the last running program.





### 6.3 System setting

Click the "system" in the main menu, enter the system setting interface below.

The image shows the system setting interface. It has a dark brown header and a dark grey background. On the left side, there are several labels and input fields: 'SN :', 'Test Info :', 'Date :', and 'Time :', each followed by a light grey rectangular input field. Below these are two rows of buttons. The first row has 'Key Sound :' followed by 'on' and 'off' buttons. The second row has 'En / 中 :' followed by 'English' and '中文' buttons. On the right side, there are two buttons stacked vertically: 'Auto Test' and 'Home'.

**SN:** Serial number. Each product has its own SN number

**Test Info:** Show the information of the self-test

**Auto Test:** Self-test again. The item can be shown in the Test Info. When the self-test passed, the TEST pass will be shown in the window.

**Date:** Can input or adjust the current data. Click it, enter the number in the keyboard. When you want to input 2014, October 15th, you just need to input 20141015

**Time:** Can input or adjust the current time. Click it, enter the time in the keyboard. When you want to input 13:40:48, just input the number 134048

**KEY Sound:** Can open or close the key sound.

**Home:** Return to main menu.

## 7 TROUBLE SHOOTING

Caution:

When Power on, if you find the phenomenon of abnormal sound, abnormal display, failure alerts, fail in self-test, etc, please turn off the power and contact the manufacturer immediately.

Index	Symptom	Cause	Measure
1	Instruments can't be power on	The power line is unplugged	(1) Check whether the power line is unplugged (2) Check whether the fuse is broken or loose.
		Others	Contact the manufacturer
2	Self-test, Connect --error	The thermo block is not installed	Install the thermo block
		The thermo block is not contact well with the main unit.	Power off, Install the thermo block again, then power on.
		Others	Contact the manufacturer
3	Self-test, Sensor1, Sensor2, Sensor3 --error	Thermo block sensor damaged or bad contacted	Power off, Install the thermo block again, then power on.
			Contact the manufacturer
4	Self-test, Fan Sensor --error	Heat sink damaged or bad contacted	Power off, Install the thermo block again, then power on.
			Contact the manufacturer
5	Self-test, Cap Sensor --error	Heated lid damaged or bad contacted	Contact the manufacturer
6	Self-test, TE1 Ref, TE2 Ref, TE3 Ref--error	Ventilation holes are blocked	Clear blockage of ventilation holes
		Cooling chip damaged	Contact the manufacturer
7	Self-test, TE1 Heat, TE2 Heat, TE3 Heat --error	Heating parts of the thermo block damaged.	Contact the manufacturer
8	Self-test, Cap Heat -- error	Heating part of Heated lid damaged	Contact the manufacturer
9	Heated lid cannot heat	The heated lid is closed at the system setting interface.	Open the heated lid, Set a temperature.
		The heated lid damaged	Contact the manufacturer
10	The reagent in the reaction tube evaporates	The heated lid is closed	Open the heated lid, Set a temperature.
		The reaction tube was placed unevenly	Try to place symmetrically
		The cap of the reaction tube is not tight fit	Fit tightly before put into the instrument

# 使用说明书

PCR 基因扩增仪  
TC1000-G/TC1000-S



在操作使用之前，请认真阅读本使用说明书，充分理解与安全有关的注意事项。



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*版本201904*



## 安全警示

### 常见安全注意事项

请仔细阅读并充分理解下面的安全细则：

- 遵守说明书的操作要求，确保正确、安全地使用仪器。
- 仔细阅读所有安全信息和安全提示。
- 安全信息作一下标记，安全符号 $\triangleleft$ 分别同警告和告诫组合，提示用户潜在的危險。这两种组合以及提示符号的具体定义如下：

$\triangleleft$ 警告：人身危險。

警告潜在的危險，如不严格遵守说明书的要求，可能会导致人身伤亡。

$\triangleleft$ 告诫：仪器损坏危險或实验失败。

警告潜在的仪器损坏危險，如不严格遵守说明书的要求，可能会导致仪器损坏或实验失败。


注：通常需要注意的事项。包括具有特殊优点的区域和部件，强调产品的功能或操作或维护中的常见错误。

- 不要以本说明书没有提及的方式使用该仪器，若遇到任何问题请与厂家制造商/供应商联系。
- 本说明书对潜在的危險已经作了比较完整的提示，然而，用户对不可预测的事情还须有必要警惕，小心使用该仪器。

$\triangleleft$ 警告

- 该仪器是非防爆型，不要用于易燃、易爆样品。
- 不要将该仪器安装在易燃气体、易燃化学物质附近。
- 该仪器 30cm 范围内不要放置危險品。
- 在对具有毒性、辐射性、致病有机体进行实验时，必须采取必要的安全措施，并自行承担不良后果。
- 如果仪器及其它附件受到污染，请严格按照去污程序清洗消毒。
- 如果需要我们的现场帮助，需事先对该仪器进行消毒、去污，并告知服务中心所涉及的特殊物质详情。
- 不要用湿手接触电源线和电源开关，以防电击。
- 除本公司的维修人员外，禁止非授权单位或个人维修、拆卸该仪器。

- 使用过程中，请严格遵守使用说明中的操作要求
- 本产品包含有加热部件，请注意防止烫伤

 告诫

- 本产品只适用于室内环境
- 确保该仪器置于坚实而平整的水平桌面上。
- 使用过程中，请保证与周边部件的距离，保证通风口空气流通。
- 使用过程中，请不要在机器及周边覆盖其他物品
- 当关上盖时，不要将手放在上盖和机壳之间。
- 当仪器运行时不要移动仪器，也不要倚靠仪器。
- 当有液体溅出，请及时用干布擦干，以避免污染样品，损坏机器。
- 在实验操作中，不盖机器上盖，或开启上盖都将会实验结果产生影响。
- 突然断电会影响程序的运行，从而影响实验结果。
- 在运行过程中出现奇怪噪音等异常现象，请马上停机，与服务中心联系，并告知所显示的故障码。
- 地震有可能对仪器造成损坏，如果出现不正常情况，请与服务中心联系。

## 1 基本介绍

### 1.1 说明

PCR 基因扩增仪适用于分子生物学、医学、食品工业、司法科学、生物技术、环境科学、微生物学、临床诊断、流行病学、遗传学、基因芯片、基因检测、基因克隆、基因表达等领域以聚合酶链式反应（Polymerase Chain Reaction, PCR）为特征的、以检测 DNA/RNA 为目的的各种病原体检测及基因分析。使用本仪器前请进行专业培训，并严格按照说明书指导进行操作。

### 1.2 性能指标

参数	TC1000-G	TC1000-S
样品容量	0.2mL PCR 管×96, 8 联管×12 或 1 个 96 孔 PCR 板	
温度范围 [°C]	4~105°C	
热盖温度 [°C]	30~110.°C当模块设定温度<30°C后, 热盖自动关闭。	
显示精度 [°C]	0.1°C	
温度准确性 [°C@55°C]	±0.3°C	
温度均一性 [°C@55°C]	< 0.3°C	
最大变温速率 [°C /s]	5°C/Sec	
梯度范围 [°C]	30~99°C	无
梯度跨度 [°C]	1~42°C	无
屏幕大小	7 英寸 800×480mm LCD	
触摸屏操作	是	
断电保护	有（无时间限制）	
输入电压	AC 220V (±10%) 50/60Hz; AC 110V (±10%) 50/60Hz	
尺寸[宽×深×高]	280×270×250mm	
重量	11 千克	

## 2 符合标准

<b>仪器结构符合以下安全标准：</b>
EN 61010-1
EN 61010-2-020
EN 61010-2-101
<b>仪器结构符合以下电磁兼容标准：</b>
EN 61326-1/FCCPart15Subpart B/ IEC61010-1
EN 61326-2-6:2006
<b>符合以下欧盟标准：</b>
EMCguidelines:2004/108/EC
LVD guidelines: 2006/95/EC
This ISM device complies with Canadian ICES-001.

未经负责合规的一方明确批准的更改或修改可能会使制造商授予的用户操作设备的授权失效。

注：根据 FCC 规则第 15 部分，本仪器已经过测试，符合 A 级数字设备的限制。当仪器在商业环境中运行时，这些限制旨在提供合理的保护，防止有害干扰。仪器生产、使用能辐射射频能量，如果不按照用户手册安装和使用，可能对无线电通信造成有害干扰。在居民区操作仪器可能会造成有害干扰，在这种情况下，用户需要自费纠正干扰。

## 3 环境条件

### 3.1 基本运行条件

- 1) 电源: 200-240V 50/60Hz
- 2) 环境温度: 10-30°C
- 3) 相对湿度:  $\leq 70\%$
- 4) 周围无影响性能的振动和气流存在
- 5) 周围空气中无导电尘埃、爆炸性气体和腐蚀性气体存在。

### 3.2 运输贮存条件

- 1) 环境温度:  $-20^{\circ}\text{C} \sim 55^{\circ}\text{C}$
- 2) 相对湿度:  $\leq 80\%$

## 4 安装

为确保您的安全以及仪器的最佳性能，用户必须严格遵守本章的安装说明。

### 警告

- 不正确的电源连接会损坏仪器。
- 在连接电源前请检查供电电源是否满足要求。

### 4.1 安装位置

- 1) 该仪器必须安装在坚实、平整和水平的台面上，且保证仪器四个脚与台面接触。不要将仪器安装在滑动台面上。
- 2) 推荐环境温度为  $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ 。避免温度超过  $30^{\circ}\text{C}$  或直接暴露在阳光下。
- 3) 仪器四周必须留有一定的空间，两侧至少 10cm，后面至少 30cm，以保证冷却效率。
- 4) 远离热源或液体。

### 4.2 电源线与地线的连接

#### 警告

- 不要用湿手接触电源线，以防止电击。
- 该仪器必须良好地接地。

电源插板额定电流应为 10A 以上，并且要满足地方电气安全要求，保证具有良好的保护地端。

## 5 仪器结构



图 5- 1 仪器正面



图 5- 2 仪器背面

热盖调节旋钮：可调节热盖的不同高度，以适应不同的反应管。

LCD 液晶触屏：参数显示、程序运行显示及参数设定

门锁：打开或锁紧上盖

通风口：通风散热

电源开关：打开或关闭电源

电源接口：连接电源线

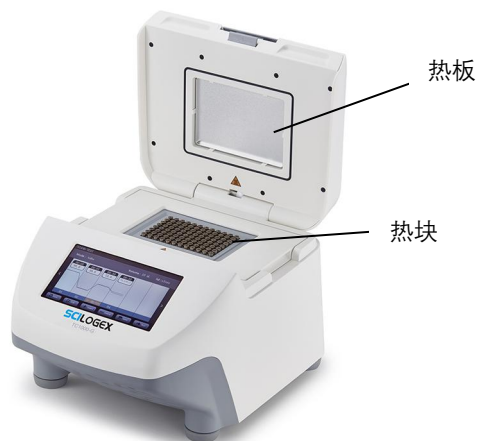
程序接口：程序升级及服务使用

USB 接口：出厂校准，服务使用

## 5.1 加热模块安装

通电前，请确保加热模块已安装，并压紧。

安装方法：将加热块垂直放入主机槽中，向下压紧，确保接触紧密。



**热板：** 加热热盖。

**热块：** 加热样品管或 PCR 板。

### 警告！

热表面有烧伤的危险。

打开加热盖时，热的热块和加热板有灼伤的危险。

## 5.2 开机前检查

在首次使用 PCR 热循环仪之前，确保满足以下要求：

- 1) 设备连接正确
- 2) 装置无损坏
- 3) 通风槽周围空气自由流通

在插上插头将仪器通电以前，应先确认以下内容：

- 1) 电源是否与仪器要求的电压相符合
- 2) 确认电源线插头已可靠插入电源插座中
- 3) 电源线接地可靠
- 4) 模块接触良好

## 5.3 开机

- 1) 打开电源开关，仪器会发出“嘟”一声，表明电源已接通；
- 2) 仪器开始自检。自检大约需要 1-2 分钟，请耐心等待；
- 3) 自检通过后，显示“TEST pass!”可进行下一步的运行操作。





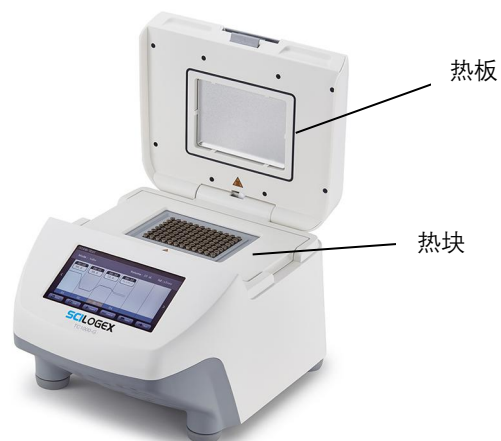
如果仪器在开机后，出现异常声音、显示不正常，或者在仪器自检中出现故障警报和提示，请您立即关闭电源并与厂家联系。

## 5.4 热盖

注意：

- 1) 在关闭热盖之前，请确保加热块装有样品管或 PCR 板。
- 2) 启动程序前，请确保热盖已关闭，确保门锁锁好。





**热盖调整旋钮：**通过热盖调节旋钮，可以调节热盖的不同高度，以更好匹配不同的样品管。顺时针旋转，热盖向下压紧，逆时针旋转该钮，热盖向上抬起。

注意！

关闭加热盖时，请不要将手指放在加热盖和仪器之间，这可能会导致手指受伤。

## 6 操作指南

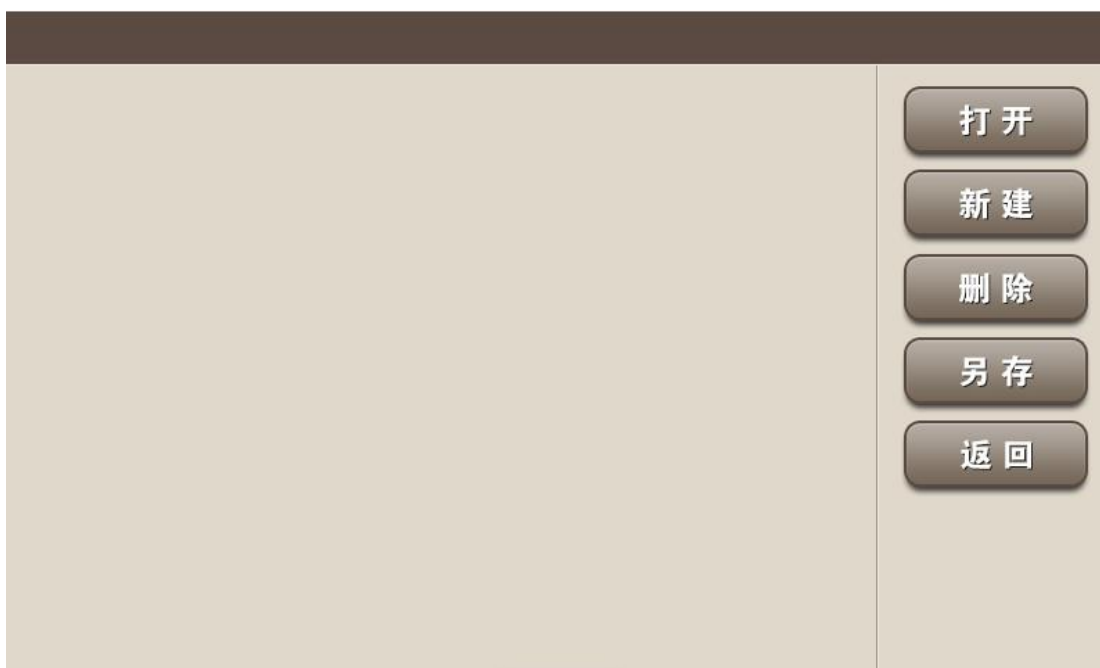


自检通过后,

- 1) 通过按“文件”键进入文件管理界面, 可以进行文件夹及文件的创建、编辑等操作;
- 2) 按“状态”键进入程序运行界面, 可以查看正在运行的程序状态;
- 3) 按“系统”键进入系统设置界面。

### 6.1 文件管理

点按“文件”键, 进入下图界面:



打开: 打开文件夹。选中文件夹，点按打开，打开该文件夹。

新建: 新建文件夹。点按新建，在键盘中输入文件名，按回车键，则新建一个文件夹。

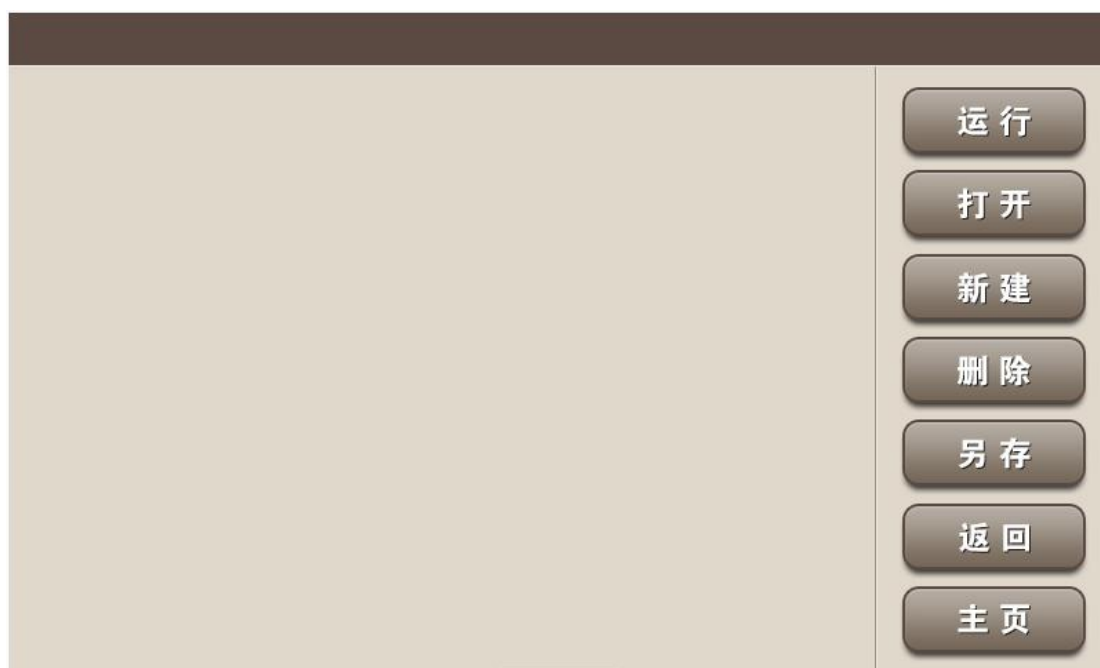
删除: 删除文件夹。选中文件夹，点按删除键，弹出注意界面，选择是/否。

另存: 文件夹另存。选中文件夹，在弹出键盘中输入新文件夹名，按回车键，执行另存命令。

返回: 返回开机主菜单。

### 6.1.1 实验方法的创建

选中文件夹（颜色变为蓝色），点击打开，或双击文件夹，进入以下界面：



运行: 运行选中文件

打开: 打开选中文件

新建: 创建新文件

删除: 删除选中文件

另存: 将选中文件另存为不同名称

返回: 返回上一级界面

主页: 返回主界面

注意!

通过点按“新建”或“打开”可创建一个新文件或编辑选中文件。

- 1) 创建一个文件。点按“新建”键，在弹出的键盘中输入文件名，点按回车键，新建一个文件。点按返回，退出新建界面。
- 2) 在文件创建界面中，选中所需文件。点按打开，进入程序编辑界面。

### 6.1.2 程序设置



返回：返回上一级界面

编辑：从蓝色块区域选择要编辑的步骤，然后点击编辑按钮进入温度设置界面

运行：运行文件(查询 6.1.6)

保存：保存文件

添加：在当前选中步骤后插入一个新的步骤

删除：删除当前选中步骤

左右箭头：可向前或向后翻看 3 个步骤

## 6.1.3 温度设置 (TC1000-S)

参数输入项:

温度: 当前步骤的温控设定值

时间: 当前步骤的运行时间

跳转: 程序返回至设定的步骤

循环: 返回的步骤数与当前步骤之间的总循环次数

±温度/次: 每循环当前步骤温度修饰值, 可以为正值或负值。例如: 设置某一步的温度为 50°C, 设置±温度/次为 0.1°C, 则 30 个循环后, 该步骤温度变为 53°C。

±时间/次: 每循环当前步骤时间修饰值, 可以为正值或负值。例如, 若设置某一步的时间为 60s, 设置±时间/次为 1s, 则 30 个循环后, 该步骤时间为 90s。

## 6.1.4 温度设置 (TC1000-G)

温度-低：	<input type="text"/>	温度-高：	<input type="text"/>
时间：	<input type="text"/>	跳转：	<input type="text"/>
±温度/次：	<input type="text"/>	±时间/次：	<input type="text"/>
循环：	<input type="text"/>		

1	2	3	4	5	6
7	8	9	10	11	12

1	2	3
4	5	6
7	8	9
.	0	∞
删除	+	-
主页	返回	保存

### 输入参数项

#### 显示加热块各列温度

温度-低：梯度最低温度设定值，为最左列温度

温度-高：梯度最高温度设定值，为最右列温度

时间：当前步骤的运行时间

跳转：程序返回至设定的步骤

循环：返回的步骤数与当前步骤之间的总循环次数

±温度/次：每循环当前步骤温度修饰值，可以为正值或负值（-9.9℃~+9.9℃）。当梯度最低温度为 50℃，梯度最高温度为 60℃，如果在第 3 步设置“0.1℃/循环”，那么每次运行到第 3 步时，梯度最低温度和最高温度都会增加 0.1℃。30 个循环后，梯度最低温度达到 53℃，梯度最高温度达到 63℃。

±时间/次：每循环当前步骤时间修饰值，可以为正值或负值（±9min59S）。例如，当时间为 60s 时，如果在第 3 项设置为“1s/循环”，那么每次运行到第 3 步的程序，时间都会增加 1s。30 个循环后，第 3 步的运行时间将达到 90s。

注意：梯度范围：30~99℃，梯度跨度：1~42℃。

## 6.1.5 配置设置



热盖温度：默认打开，默认温度为 105℃，根据需要，也可以进行热盖温度修改。

注意：

- 1) 热盖温度设定范围为 30~110℃，请不要超出参数设置范围。
- 2) 点击“关闭”后，热盖将关闭，但是热盖关闭可能影响实验结果。
- 3) 如果模块温度低于 15℃，热盖也将自行关闭。

控制模式：默认为“样品”，也可以选择“模块”模式。

注意：

推荐设置为样品模式。因为如果选择模块模式，传感器以测量加热铝块的温度为准。如果选择样品模式，则温度指反应管内液体的温度。相对而言，样品模式更智能、更准确。

样品体积：请根据实际情况填写真实的反应体系。

返回：返回文件显示界面

主页：返回开机主界面

保存：设定完成后，点击“保存”，进入运行界面。

## 6.1.6 运行界面

点击“状态”，可直接进入程序运行界面。此时默认读取最后一次执行的程序。





热盖：显示热盖温度

剩余时间：显示本次程序运行剩余时间

体积：显示样品体积

样品：显示样品温度

步骤：表示运行到的当前步骤

时间：表示已运行的时间

运行：可运行最近一次运行过的程序

暂停：暂停按钮，点击后系统保留当前步骤的温度不变。

下步：跳跃按钮，可直接跳过目前的步骤进入下一个步骤的温度。

停止：停止按钮，点击后程序停止运行。在弹出提示中点击确定后，则程序停止。

返回：回到主菜单

当程序完成或停止运行时，仪器会发出“嘟嘟”两声，单击返回按钮可返回主菜单。

#### 6.1.7 典型 PCR 输入方法举例

- 1) 预变性 95°C，5 分钟：在步骤 1 列，温度输入 95，Time 设定输入 0500，该步骤设定完成。注：时间显示为分钟：秒的形式，如需输入 5 分钟，则输入 0500，如需输入 5 分 30 秒，则输入 0530。
- 2) 变性 95°C 30S：点按“添加”键增加一个步骤 2。温度对应单元格输入 95，时间对应单元格输入 0030，该步骤设定完成。

- 3) 退火 55°C 30S: 点按添加键增加一个步骤 3。温度对应单元格输入 55, 时间对应单元格输入 0030, 该步骤设定完成。
- 4) 延伸 72°C 30S: (2) ~ (4) 步骤循环 30 次: 点按“添加”键增加一个步骤 4。温度对应单元格输入 72, 时间对应单元格输入 0030。“跳转”对应的单元格输入 02, 即执行完 (4) 步骤返回到 (2) 步骤继续执行流程。在“循环”对应单元格键入 30。
- 5) 继续延伸 72°C 10min: 点按“添加”键增加一个步骤 5。温度对应单元格输入 72, 时间对应单元格输入 1000。该步骤设定完成。
- 6) 点击保存。

以上完成一个 PCR 程序的设定。95°C 预热 5 分钟后, 完成 30 个 PCR 循环过程后, 72°C 继续延伸 10 分钟。

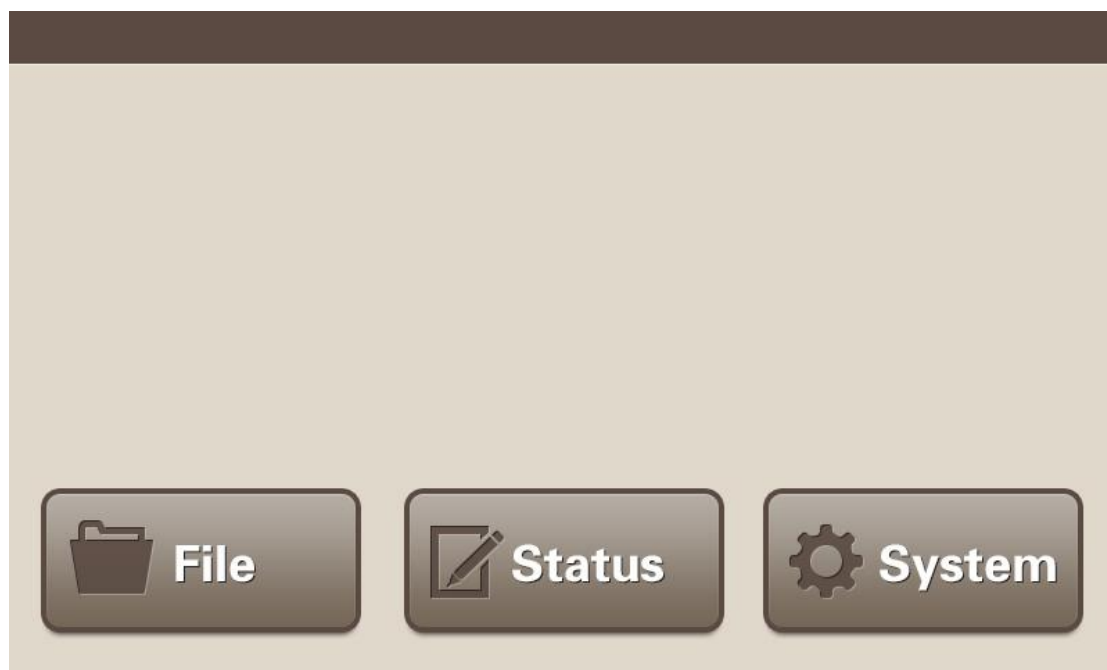


注意!

由于不同品牌的仪器都有自己的温度控制特性（包括：加热和冷却速度、稳定性、挥发性等），另外，生物实验存在本身的不稳定性，容易受到其他因素的影响，所以虽然同样的程序在一个仪器上可以成功运行，但并不意味着在另一台仪器上能得到相同的结果。因此，为达到理想的实验结果，请调整程序以适应不同的仪器。

## 6.2 快速操作

点击“状态”进入程序运行界面，系统默认执行上次运行的程序。



### 6.3 系统设置

在主界面点击“系统”键后，可进行系统配置参数设置界面。

The image shows a system configuration interface. On the left, there are five input fields labeled '序列号:' (Serial Number), '测试信息:' (Test Information), '日期:' (Date), '时间:' (Time), and '按键音:' (Keypress Sound). Below the '按键音:' field are two buttons labeled '开' (On) and '关' (Off). Below the 'En / 中:' (English / Chinese) field are two buttons labeled 'English' and '中文'. On the right side, there are two buttons labeled '自动检测' (Auto Check) and '主页' (Home).

序列号：产品序列号。每个产品出厂会自带其序列号。

测试信息：显示自检信息。

自动检测：可在开机后再次自检。自检项目将在测试信息逐条显示。

日期：可输入或调整当前日期。点击该项可在弹出键盘上输入当前日期。如 2016 年 10 月 1 日，输入 161001。

时间：可输入或调整当前时间。点击该项可在弹出键盘上输入当前时间。如 13:40:48，输入 134048

按键音：可开启或关闭按键音

主页：返回主界面

## 7 故障处理

注意：

如果仪器在开机后，出现异常声音、显示不正常，或者在仪器自检中出现故障警报和提示（error 项），请您立即关闭电源并与厂家联系。

保修期内严禁用户打开仪器外壳自行检查，如果发生表中需打开外壳检查的故障应及时与厂家联系。

序号	故障现象	原因分析	处理方法
1	打开电源开关后显示屏不亮，也未听见“嘟”声	电源未接通	检查电源并接通
		其他	请与厂家联系
2	开机自检过程中，Connect 项显示 error	模块未安装	安装模块
		模块与主机接触不良	断电后拉出模块重新推入，再次开机
		其他	与厂家联系
3	开机自检过程中，Sensor1，Sensor2, Sensor3 项显示 error	模块传感器损坏或接触不良	断电后拉出模块重新推入，再次开机
			与厂家联系
4	开机自检过程中，Fan Sensor 项显示 error	散热器传感器损坏或接触不良	断电后拉出模块重新推入，再次开机
			与厂家联系
5	开机自检过程中，Cap Sensor 项显示 error	热盖传感器损坏或接触不良	与厂家联系
6	开机自检过程中，TE1 Ref，TE2 Ref，TE3 Ref 项显示 error	通风孔被阻塞 制冷片损坏	清除通风孔的阻塞物
			与厂家联系
7	开机自检过程中，TE1 Heat, TE2 Heat, TE3 Heat 项显示 error	模块加热部件损坏	与厂家联系
8	开机自检过程中，Cap Heat 项显示 error	热盖加热部件损坏	与厂家联系
9	热盖无法加热	在系统参数设置界面中热盖状态设置为“OFF”	将热盖状态设置为某一温度值
		部件损坏	与厂家联系
10	反应管内试剂蒸发	未设置热盖温度，热盖设置为“OFF”	请参阅本说明相关章节
		反应管放置不均匀	调整反应管孔位，尽量保证对称摆放。
		反应管盖合不严密	请将反应管盖合严密后放入仪器