



# MultiGene Mini

## Thermal Cycler

**TC020-24 /TC020-24-230V**  
**TC050-18 /TC050-18-230V**

**Operation Manual**  
Ver.1.2  
Labnet International

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# CHAPTER 1 SPECIFICATIONS

This chapter describes the MultiGene Mini Thermal Cycler's operation, transportation and storage conditions, basic parameters, performance and functions.

## 1 Normal Operating Conditions

Ambient operating temperature:	10°C ~ 30°C
Relative humidity:	≤70%
Power supply:	~100-120V, 200W, 50/60Hz ~220-240V, 200W, 50/60Hz

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**Note:** Before powering on, please confirm that the above operating conditions are satisfied. The unit must be plugged into a grounded outlet.

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## 2 Transportation and Storage Conditions

Ambient temperature:	-20 °C~+55 °C
Relative humidity:	≤80%

## 3 Basic Specifications

<b>Model Parameters</b>	<b>TC050-18</b>	<b>TC020-24</b>
<b>Sample Capacity</b>	18	24
<b>Tube Volume (ml)</b>	0.5	0.2
<b>Dimensions (mm)</b>	297×212×200 (L×W×H)	
<b>Display Screen</b>	320×240 Backlit LCD	
<b>Weight (kg)</b>	3.2	
<b>Fuse</b>	250V 2.5A (Φ5×20mm)	
	125V 5A (Φ5×20mm)	
<b>Computer Interface</b>	RS232	

## 4 Specifications

Temperature range:	4°C ~ 99°C
Maximum Heating rate:	≥5.0°C/sec(max)
Maximum Cooling rate:	≥4.0°C/sec(max)
Temperature Resolution	± 0.1°C
Block Temperature accuracy:	≤±0.3°C
Temperature display accuracy:	≤±0.5°C
Block temperature uniformity:	≤±0.5°C
Heated lid work temperature range:	105°C±5°C

**Note:** □ These performance specifications can be met when the unit is operated in Ambient temperature: 23±5°C, humidity≤70%  
□ Temperature control accuracy and block temperature uniformity are tested at the following temperature settings: 55°C, 72°C, 95°C

Max. number of cycles:	99
Max. Segments within a cycle:	9
Max. temperature time:	99 min. 59 sec.
Max. incubation and in situ time:	99 hour 59 min.
Program storage capacity:	100

## 5 Software Functions

File editing and saving  
File accessing, modifying and deleting  
Automatic file link  
Heating/cooling rate setting  
Automatic temperature and time increments/decrements during cycling  
Real-time display of data at each phase of program execution  
Pause  
Stop  
Auto-restart in case of power failure  
Audible alarm  
Run time estimation  
Remaining time estimate  
Date and time (year, month, day, hour, minute, second) display  
Audible alarm in the event of failure

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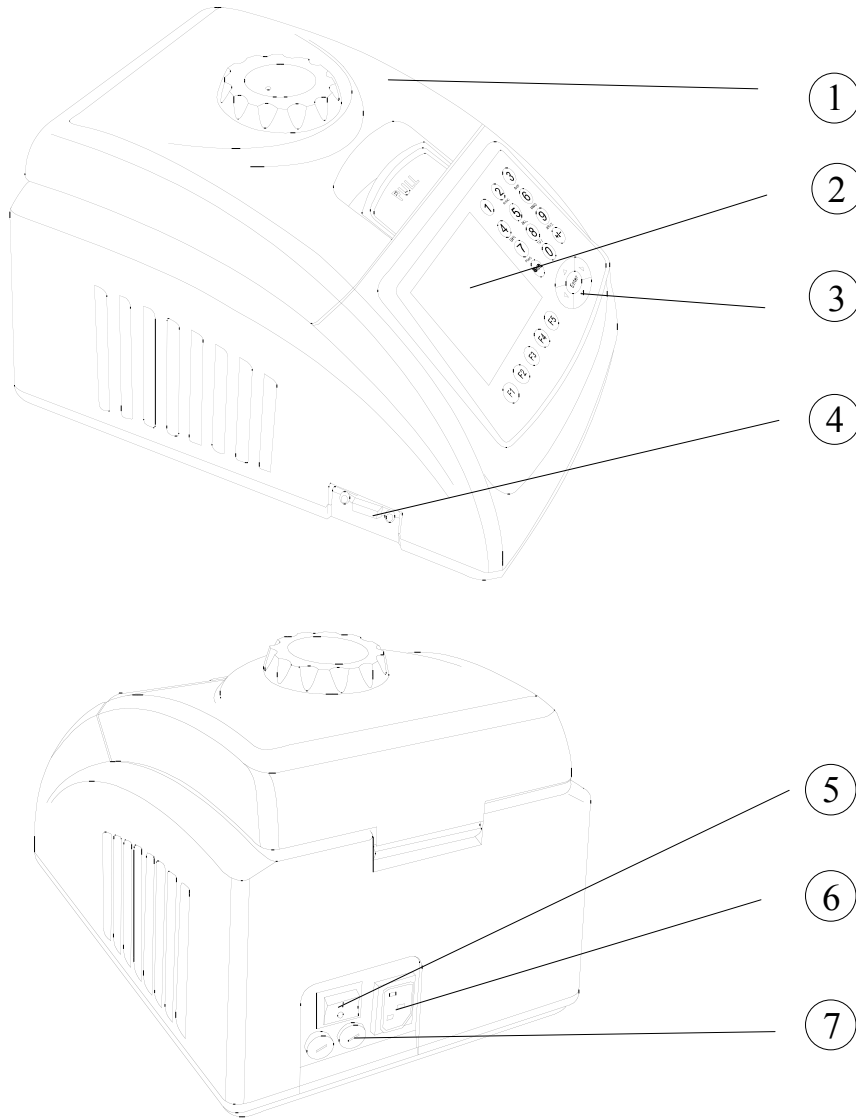
**Note:** The above software functions are listed for reference only. Labnet reserves the right to modify the software without notice.

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## CHAPTER 2 Features

This chapter covers the MultiGene Mini Thermal Cycler's mechanics, the keyboard and each key's function, and preparations before power-on.

### 1 Description



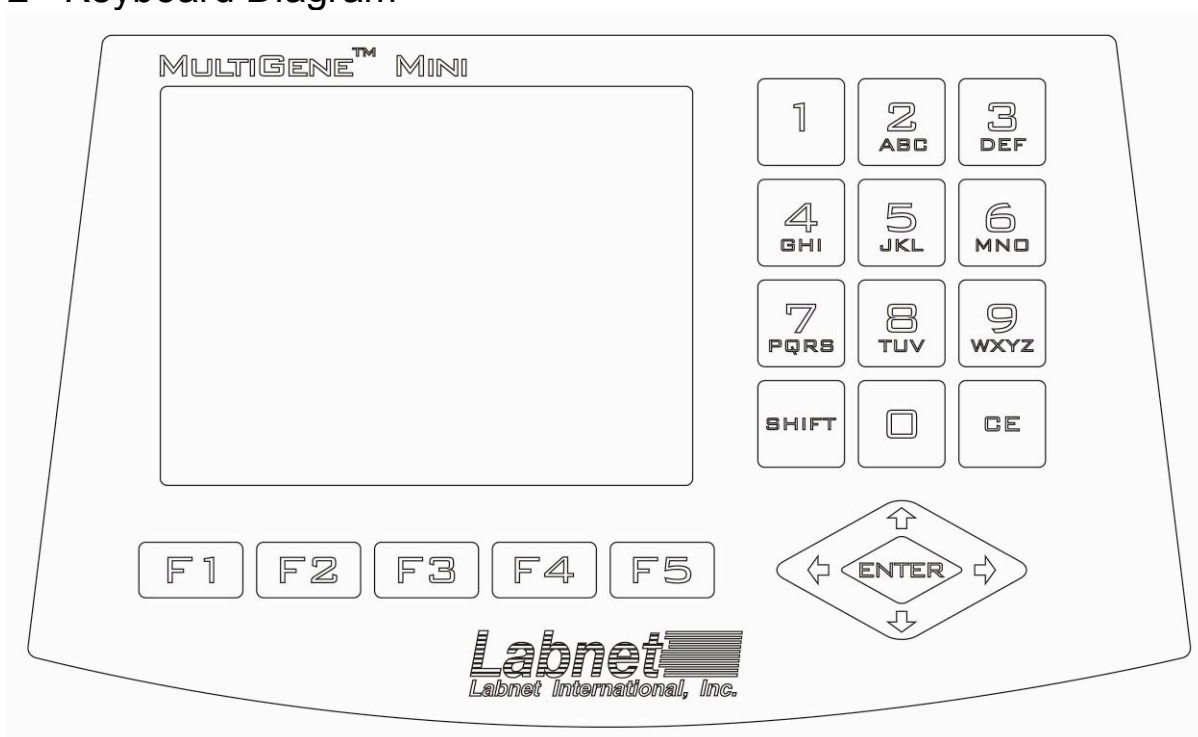
- |                      |                   |               |                   |
|----------------------|-------------------|---------------|-------------------|
| ① Heated lid & Block | ② LCD Display     | ③ Keyboard    | ④ RS232 interface |
| ⑤ Power switch       | ⑥ Power connector | ⑦ Fuse Socket |                   |

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**Note:**

- 1 The fuse specifications are as follows: 250V:2.5A / 125V:5A, Ø5×20mm. The fuse should be replaced with one that meets these specifications.
  - 2 Contact your distributor or Labnet's service department if you need proper fuses.
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## 2 Keyboard Diagram



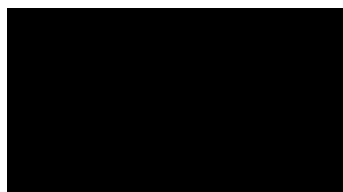
## 3 Key Functions



**“Numbers & Letters”**, select the letter by pressing the key until your selection appears on the screen.



**“CE”**, can be used to change “+ , -” when editing temperature and time.



**“Right/Left”**, moves the cursor one position to the left or right during file parameter setting.

**“Up/Down”**, moving the cursor one position up or down during file parameter setting.



**“Enter”**, press it to accept the present parameter settings displayed on the screen.


**“Function”**, press any button to accept the current items displayed above the buttons.

## 4 Inspection before Power-up

Before switching the power on, please ensure that:

- 1) Supply voltage matches the voltage rating label on the instrument. (refer to Chapter 2);
- 2) The plug has been inserted into the power socket;

## 5 Power-on Procedures

Turn on the power (i.e. turn the power switch to position '1'), the MultiGene Mini Thermal Cycler will beep 4 times, and the LCD will display . This means the device is self-testing, which takes about 1-2 minutes. After the self-test is complete, the main menu will be displayed, and the device is ready for the following operations, editing, accessing, modifying, or deleting a file.

## CHAPTER 3 OPERATION GUIDE

There are eight menu selections for the MultiGene Mini Thermal Cycler. In this chapter, we will explain operation, for example, how to edit, access, modify, delete, or run a protocol file and how to set parameters.

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**Warning!** If an abnormal sound or display appears on start up or if a failure error during the Self Test mode, Turn off the power immediately and contact Labnet or your distributor

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**Note:** If the number of samples is less than the number of wells in the block, the sample tubes should be evenly distributed over the block, in order to ensure that the heated lid will evenly press on the tops of the sample tubes. This also ensures that both the block's load and the temperature distribution to each tube are even.

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**Note:** Before closing the cover, turn the knob counter-clockwise according to the knob diagram until there is a "click...." Please note that the knob can be tightened by turning it clockwise, After closing the cover but before power on, turn the knob clockwise until you hear a click, then turn the knob one more turn.  
When the knob is turned clockwise or counter-clockwise, you will hear a "click" sound, To open pull the release latch with your finger; and turn the knob counter-clockwise.

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### 1 How to Run a Program

Switch on the power, the MultiGene Mini Thermal Cycler will beep 4 times. The screen will display "██████████", and the instrument will carry on self test. The self test takes about 1~2 minutes. If the self test is successful, the screen will display the main Menu.

On the left top corner of the main screen the Hot lid status is displayed.

The center of the screen displays Labnet, the software version number, block model, default file, default user, control mode and sample volume.

- ✧ Press "**File**" to enter file list interface.
- ✧ Press "**System**" to enter system parameter setting menu.

**Main Screen**

Hotlid=020C	2009-04-01 10:05:00	
<h1>Labnet</h1>		
MultiGene Mini		
Version: 2001-1.0		
Default User: Labnet		
Default File: 1		
Module Select: 24*0.2		
Control Mode: Block		
File	System	Run



If the default user does not have a password, press “**Run**” to run the default file. You will be prompted to enter sample volume(if the unit is set for Tube Mode) in the pop up window. If the unit is set for block mode, the unit will begin running the default file.

If the default user does have a password, you will be prompted to enter it before you can run the default file.

✧ Password Prompt

Enter password  
-

Use the keypad to enter the password. Press “**Back**” to go back the main menu. Press “**Accept**” to confirm the password and enter file running interface or sample volume input window. If the password is incorrect, a dialog box will be displayed as below:

Password error. Try again.  
-

Hotlid=off 2009-04-01 10:05:00

**Labnet**

MultiGene Mini  
Version: 2009-1.0  
Default User: Labnet  
Default File: 1  
Module Select: 24\*0.2  
Control Mode: Block

Enter password  
-

Back Accept

✧ If the current Control Mode is Block mode, press “**Accept**” button to enter file running interface. If the current Control Mode is Tube mode, press “**Accept**” button, a dialog box will be displayed to input the sample volume.

Please enter sample volume:  
020µl

Enter sample volume used. By using Tube mode, the temperature overshoot and time will be adjusted for different sample volumes.

- ✧ Press “**Back**” to go back the main menu.
- ✧ Press “**Run**” to enter the file running menu.

Hotlid=020C 2009-03-24 10:05:00

**Labnet**

MultiGene Mini  
Version: 2009-1.0  
Default User: Labnet  
Default File: 1  
Module Select: 24\*0.2  
Control Mode: Block

Please enter sample volume:  
020µl

Back Run

## 1.1 How to Edit a Program

Press F1 “**File**” on the main screen to enter the file list menu. There are 3 files listed as shown in the image. When the flashing bar is in the User Column, select users with the up/down keys; The File Name Column will display the files of the selected

user. Shift to the File Name Column, using the “right” arrow button, then select the user’s file using the up/down keys.

- ✧ Press “**Edit**” to edit the file indicated by the cursor.
- ✧ Press “**New File**” to create a new file.
- ✧ Press “**Delete**” and you will be prompted “Do you want to delete the file? Please select ‘F3’ or ‘F4’”, Select (Delete) or (Back) .
- ✧ Press “**Back**” to go back to the main menu.

### File List Menu

Hotlid=off		2008-07-28 10:05:00	
No.	User	File Name	Save Time
1	Jeff1*	Amp1	2008-07-28
2	Mike2	Amp2*	2008-07-28
3	Sue3	Amp3	2008-07-28

- ✧ If the file has no password, press “**Edit**” to enter file editing interface; If the file has a password, press “**Edit**”, a dialog will be displayed to indicate the user to enter the password.

Enter password  
 -

Enter the password. Press “**Accept**” to confirm the password, and the system will enter the file editing menu; or press “**Back**” to go back to the file list interface.

Hotlid=off		2008-07-28 10:05:00	
No.	User	File Name	Save Time
1	Jeff1*	AMP1	2007-07-28
2	Mike2	AMP2*	2007-07-28
3	Sue3	AMP3	2007-07-28

Enter password  
 -

- ✧ If the file has no password, press “**Run**” to enter file run menu or enter the sample volume. If the file is password protected, press “**Run**”, a dialog box will be displayed to input the password. Press “**Back**” to go back the file list interface. Press “**Accept**” to confirm the password.

After pressing “Run” in the file list interface, and entering the password (If Password protected):

- ✧ If the current Control Mode is Block mode, Press “**Accept**” to enter the file running interface; If the current Control Mode is Tube mode, press “**Accept**”, and a dialog box will be displayed to input sample volume.

Please enter sample volume:  
 020µl

Hotlid=off		2008-07-28 10:05:00	
No.	User	File Name	Save Time
1	Jeff1*	AMP1	2008-07-28
2	Mike2	AMP2*	2008-07-28
3	Sue3	AMP3	2008-07-28

Please enter sample volume:  
 020µl

Use **the key pad** to input the sample volume. Press “Back” to go back to the file list menu. Press “Run” to enter file running menu.

**Note:** The symbol “\*” at the top of User and File indicates the default User and file. The Default User name is **LABNET** and the default file is **1**. *The default file cannot be renamed, but it can be edited.*

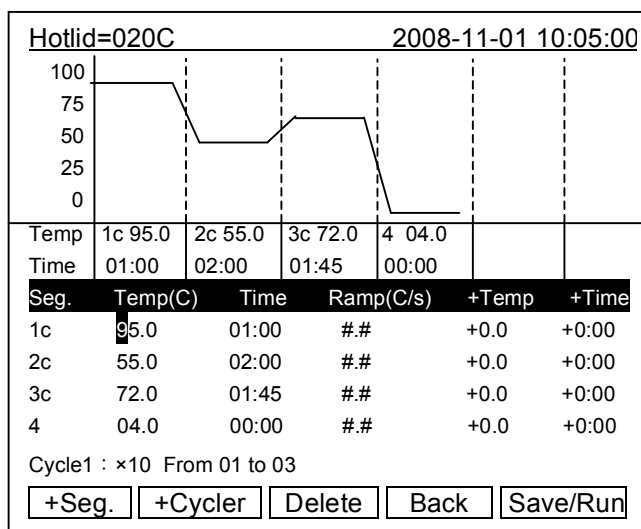
### File Editing Screen

In this screen, you can add and edit cycles and segments of the file. A File is comprised by cycles and segments. The cycles contain the segments, which are repeated. Move the cursor by pressing “Up/Down” and “Right/Left”. Press the keys to modify parameter settings. Press “CE” to change +/-.

✧ Press “+Seg.” to add a segment. In every segment, you can set temperature (Temp), duration (Time), Ramping rate (Ramp), temperature increment of every cycle (+Temp) and time increment of every cycle (+Time). Press “Delete” to delete the present segment.

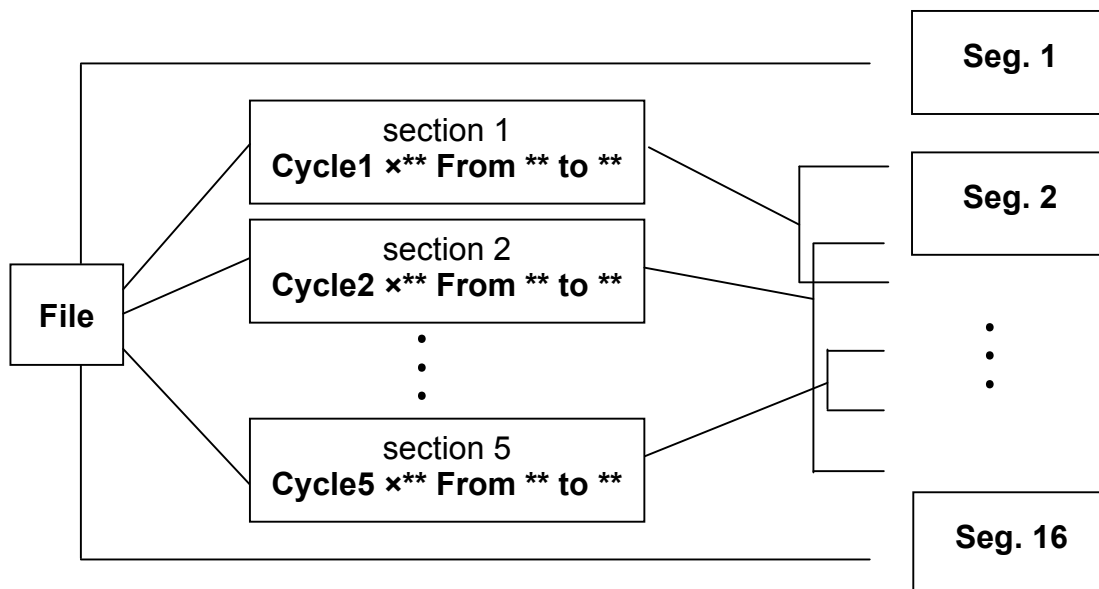
*NOTE: setting ramp to ## provides the maximum ramping rate.*

- ✧ Press “+Cycle” to set cycle number and choose cycle segments to be included in the cycle. The figure shows a cycle including the first segment to the third one, and the cycle is set to repeat 10 times (x10).
- ✧ Press “+Cycle” repeatedly to add cycles (max.: 5 sections ). Press “Delete” to delete the present segment. Move cursor by pressing “Up/Down” to enter the former segment or the latter.
- ✧ Press “Save” to enter the file save menu.
- ✧ Press “Back” to go back to the File List menu.



### Please Note:

1. After editing a program, save it first before running.
2. When setting “Time” as “--:--” (i.e. ∞), the hot lid will automatically turn off when the block reaches the set temperature.



Relation of cycle and segments in a file

### File Saving Screen

In this screen use the keypad to enter the file name. Press **“Enter”** to move the cursor down one position. Select User and File Name through the pop-up character selection box. Click left button to delete characters while clicking right button to move the cursor. Press the **“Caps”** key to shift from a capital to lowercase letter, and on the top left a capital or small letter indication will appear. (example: abc)

Hotlid=off		2009-07-28 10:05:00		
abc				
User:	Labnetl			
File Name:	1			
Password:	*****			
Password confirm:	*****			
Main		Caps	Save	Run

- ✧ Press **“Main”** to go back to the main interface.
- ✧ Press **“Save”** to save the file. When the file is normally saved, “File has been saved. Please continue another operation” will appear. Press **“Enter”** to close the reminder window. If the file name was already in use, the system will display ( Rename ) or continue to save (Save).
- ✧ If the current Control Mode is Block mode, press **“Run”** to enter the file running interface; if the current Control Mode is Tube mode, pressing **“Run”** will open, a dialog box to input the sample volume.

Please enter sample volume:  
050µl

Enter the sample volume. Press “Back” to go back to the file save menu. Press “Run” to start running the file.

In the file save menu, if you press “Run” without pressing “Save”, the system will display “The modifications will be lost after running. Do you still want to run?”

- ✧ Press “No” to go back file save interface.
- ✧ Press “Yes” to enter the file running menu and sample volume input screen. (Note: the modification here cannot be saved after the program is run.

Hotlid=off 2007-07-28 10:05:00

abc

User: Labnet

File Name: Num1

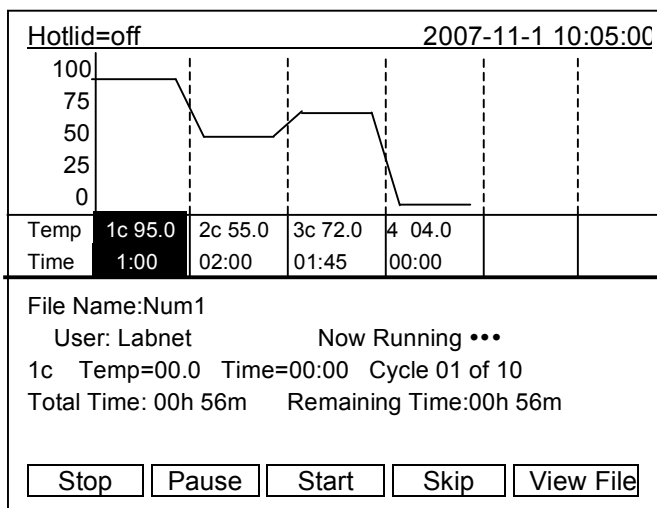
Password:           

Password confirm:

### File running interface

When the file is running, “Now Running...” will continuously flash. When the protocol is complete, “File running is over is displayed, Press ‘Enter’ to return to the main menu.”

- ✧ Press “Stop” and “Do you want to stop running?” will be displayed. Select ‘F1’ or ‘F3’. You can then select either “Stop” or “Start”.
- ✧ Press “Pause” and the display will show “Pause state now. Press ‘F3’ to continue running.” You can then select “Start” to continue.
- ✧ Press “View File” to view the file in the editing format.  
*Note: the file cannot be edited while running*
- ✧ Press “Skip” to stop current temperature segment and run the next segment.



## 1.2 How to Set System Parameters

In the main screen press “**System**” to enter the system parameter settings menu. Press “**Enter**” to move the cursor to the next item. This operation is followed by the symbol “ $\updownarrow$ ”. Press “**Up/Down**” to scroll to an option, and information can be entered by using the keyboard. Press “**Right/Left**” to move cursor’s position.

- ✧ Press “**Back**” to go back to the main menu.
- ✧ Press “**Save**” to save parameters.

**System Parameter Setting**

Hotlid=off	2009-02-28 10:06:00
Date(yy-mm-dd):	09-02-28
Time(hh-mm-ss):	10:06:19
Module Select:	24*0.2 $\updownarrow$
Control Mode:	Block $\updownarrow$
Hotlid Temp:	OFF $\updownarrow$
Block Temp:	10C
Key Sound:	OFF $\updownarrow$
Run End Sound:	ON $\updownarrow$
<input type="button" value="Back"/> <input type="button" value="Save"/>	

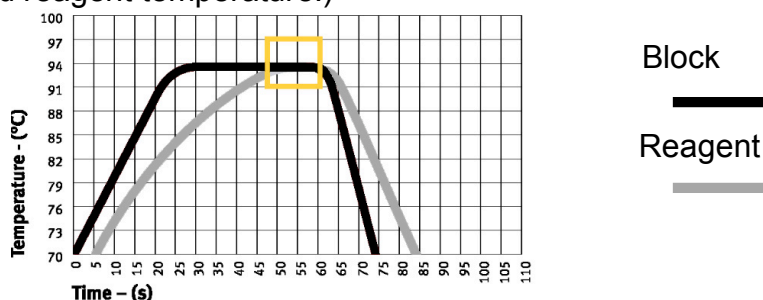
**Note:** When setting a parameter, press the “Save” button, otherwise the changes will be lost.

### 1.2.1 “Date” and “Time” indicate the system time and date.

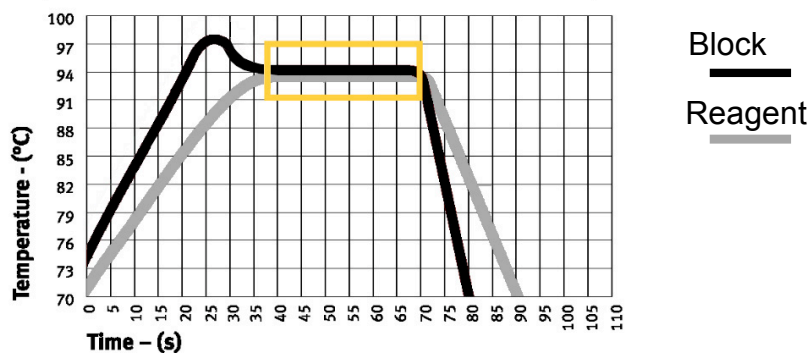
**1.2.2 “Module Select” stands for module type, including two optional modes, named “18\*0.5” and “24\*0.2”. The Module type will be preset for the type of unit you purchased. If a different size block is later installed, this setting will need to be changed.**

**1.2.3 “Control Mode” stands for default control model after power-on, including two optional modes, named “Block” and “Tube”.**

“**Block**” mode offers basic temperature control during the course of cooling & heating only. Compared to the block, the cooling & heating rate of the samples in the block are a little slower, therefore, the actual rate of change of the sample temperature is different from the block temperature. The actual time for the sample to reach the block temperature is longer than the time it takes for the block to reach the set temperature. Therefore the dwell time of the sample at the set temperature can be shorter than the dwell time of the block at the set temperature.(Please refer to the following figure: relation between block temperature and reagent temperature.)



**“Tube mode”** controls the cooling & heating rate of the block, inconsideration of the sample temperature changing at a slower rate. In tube mode, there is an overshoot after reaching the set temperature, which allows the sample to reach the set temperature faster, and will help the stay at the set temperature for a longer period. (Please refer to the following figure: relation between block temperature and reagent temperature.)



**1.2.4 “Key Sound” and “Run End Sound”** stand for an audible key tone when pressing a key and an audible alert at the end of a run, respectively.

## CHAPTER 4 TROUBLE SHOOTING

### 1 Failure Analysis and Processing Procedures

No.	Phenomenon	Failure Analysis	Troubleshooting
1	No display and the two beeps missed when power on	Disconnected power supply	Check power supply for correct connection
		Bad fuse	Replace it (250V 2.5A, $\Phi 5 \times 20$ mm or 125V 5A, $\Phi 5 \times 20$ mm )
		Switch failure	Replace switch
		Others	Contact Labnet or your distributor
2	Abrupt change in heating speed or bad temperature control accuracy	Ventilation blocked	Clear the airflow blockage
		Bad connection	Open the device, check the connectors for reliable connection
		Cooling module failure	Contact Labnet or your distributor
3	Significant change in cooling speed, or unavailable temperature below ambient	Cooling module failure	Contact Labnet or your distributor
		Fan failed or stopped	
4	Heating and cooling terminated	Bad sensor	Contact Labnet or your distributor
		Malfunction of all cooling modules	
5	Lid cannot be heated	Bad contact between connectors	Contact Labnet or your distributor
		Loose connection between connectors	
		Lid heater failure	
		Lid sensor failure	
6	Abnormal characters displayed	Bad contact of chip with its socket	Contact Labnet or your distributor
		Chip malfunctioning	
7	Inactive keys	Membrane panel damaged	Contact Labnet or your distributor



## 2 Error Messages

No.	Error Message	Possible Reasons
1	Error Message when running <b>"Please contact the distributor"</b> , with <b>"AD1213 failure"</b>	The microchip can not communicate with the AD1213. AD1213 broken or circuit board trouble.
2	Error Message when running <b>"Please contact the distributor."</b> , with <b>"Heatsink temperature is too high"</b>	Heat sink temp. higher than 70°C, the temperature sensor is broken, there is a short circuit or the fan is not working.
3	Error Message when running <b>"Please contact the distributor."</b> , and <b>"Heatsink sensor is disconnected."</b>	Heat sink temp. less than 5°C, the sensor broken, there is a short circuit or the fan is not working.
4	Error Message when running <b>"Please contact the distributor."</b> , and <b>"Temperature sensor No.1 is disconnected."</b>	Block sensor No.1 reports an open circuit
5	Error Message when running <b>"Please contact the distributor."</b> , and <b>"Temperature sensor No.1 is short-circuited."</b>	Block sensor No.1 reports a short circuit
6	Error Message when running <b>"Please contact the distributor."</b> , and <b>"Hotlid sensor is disconnected"</b>	Hot-lid sensor reports an open circuit
7	Error Message when running <b>"Please contact the distributor."</b> , and <b>"Hotlid sensor is short-circuited."</b>	Hot-lid sensor reports a short circuit

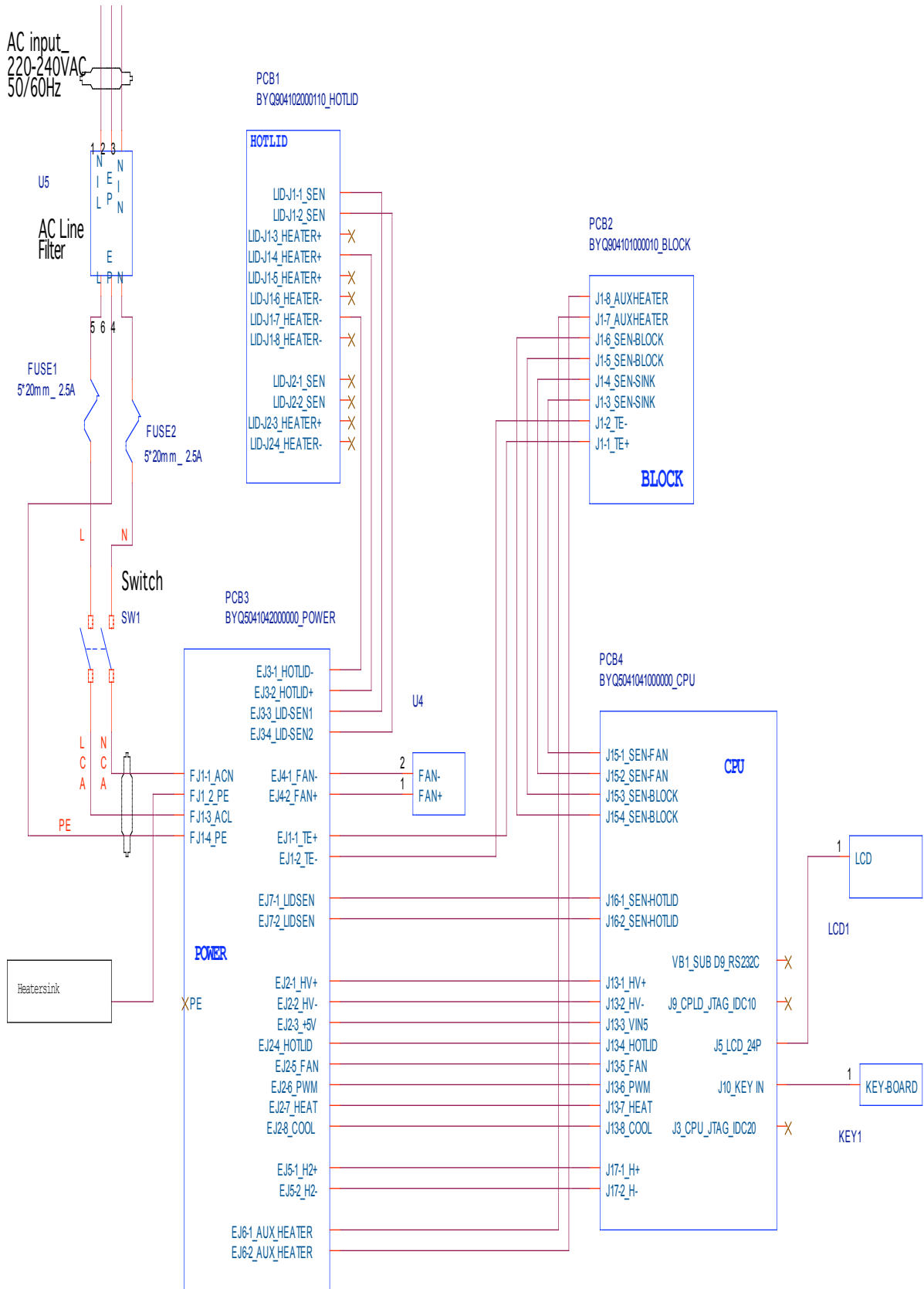
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**Note:** During the warranty term, please contact Labnet or your distributor. If the instrument is opened by an unauthorized individual the warranty is void.

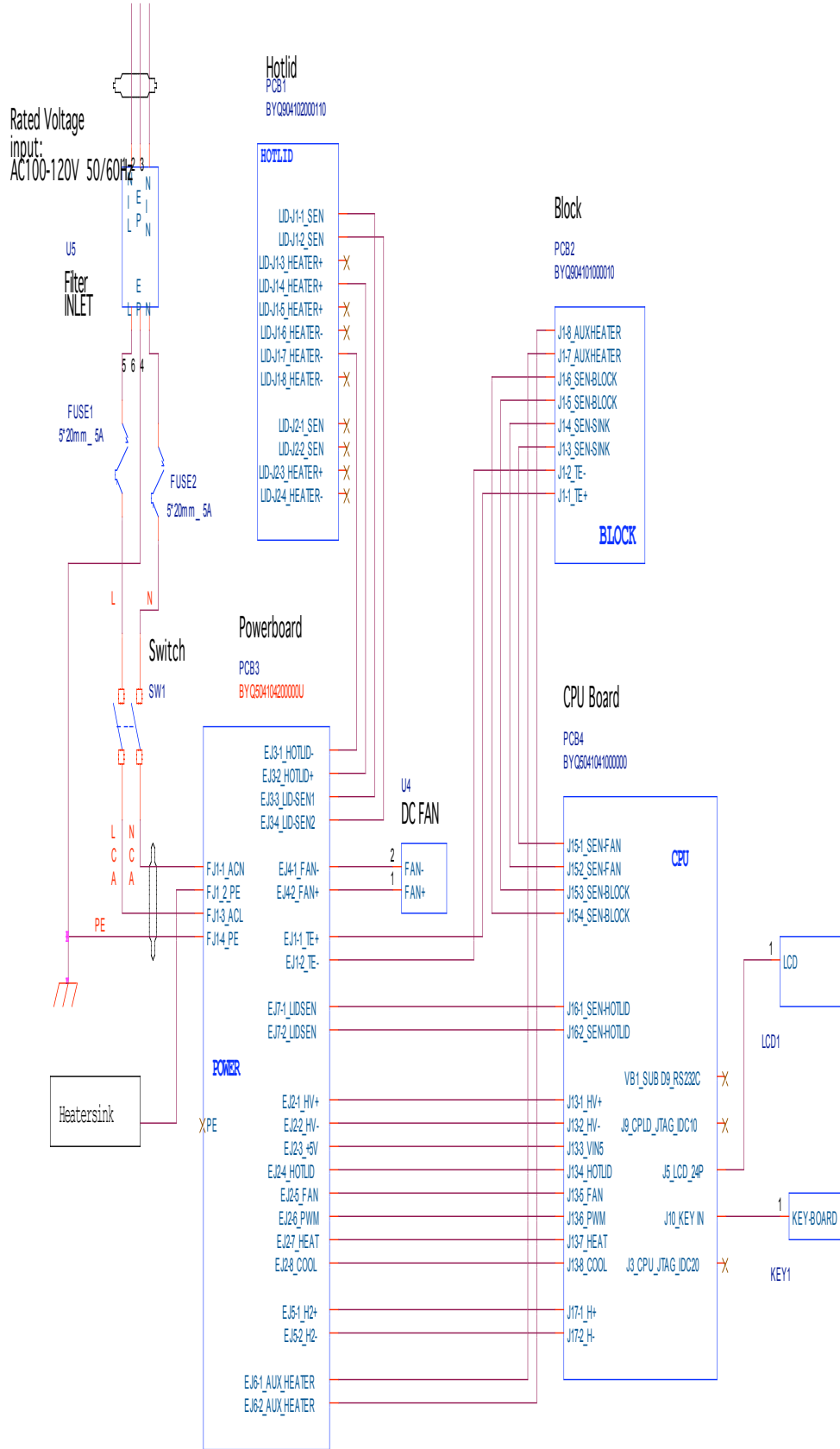
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# APPENDIX 1

## Wiring Diagram (1 of 2)



# Wiring Diagram (2 of 2)



## APPENDIX 2 Parameter Values

Item	Parameter	Scale	Range	Note
1	Temp(°C)	Temp. Control point	4.0~99.0	
2	Time	Time of Temp. Control (mm:ss)	--:-- (set the value before " : "through "Function" key.)	The time of Temp. control is infinite, meanwhile, the hotlid turned off.
			00 : 00~59 : 59	
3	Ramp(C/S)	Ramping Rate (°C/Second)	0.1 ~5.0	Maximum of Ramping Rate
			##	
4	+Temp	Temp. Gain of Every Cyclor	0.0~9.9	
5	+Time	Time Gain of Every Cyclor (mm:ss)	0:00~9:59	
6	Cycle1	Section Numbers	1~5	Cycle1 : ×00 From 00 to 00
	×00	Cyclor Numbers from beginning to the end	1~99	
	From 00	The start segment of the section	X (and existed segment no.)	
	to 00	The end segment of the section.	≤ X+15	
7	Grad.	Gradient Temp. Difference (□)	0 ~30	
8	Date	Date(YY-MM-DD)	00 (~99) -01 (~12) - 01 (~31)	year-month-date
9	Time	Time(HH:MM:SS)	00:00:00~23:59:59	hour : minute : second
10	Default File	The default file name	Max. length is 11 characters.	
11	Default User	The default user name	Max. length is 11 characters.	
12	Control Mode	Control Mode	Block	Under this mode (once reaching target temperature namely entering into the thermostable state), the time for reagent's temperature under target temperature is less than setting time (see Fig. 1).
			Tube	Under this mode (once entering into the thermostable state after reaching target temperature and decreasing about 3°C), reagent's temperature can be close to target temperature very fast (see Fig. 2).
13	Sample Volume	Sample Volume (ul)	10~200	
14	Hotlid Temp	State of Hotlid: OFF	OFF	
		State of Hotlid: Open (□)	30~99	
15	Block Temp	State of Block Temp during the heating of Hotlid (°C)	0~99	
16	Key Beep	Key Sound (ON or OFF)	OFF/ON	Humming
17	Run End Beep	Run End Sound (ON or OFF)	OFF/ON	Humming continuously

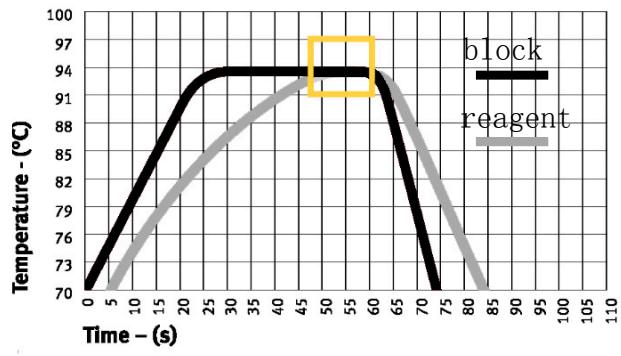


Image1

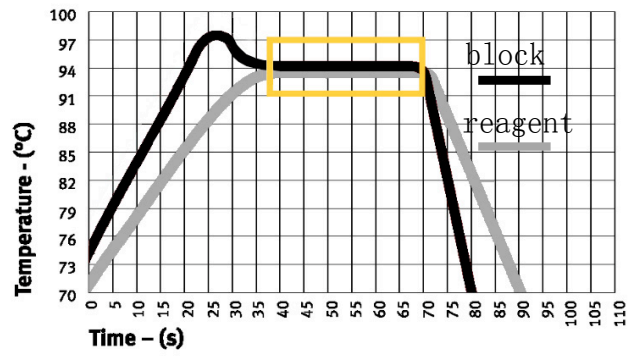


Image 2

## **Limited Warranty**

**Labnet International, Inc.** warrants that this product will be free from defects in material and workmanship for a period of 18 months from date of purchase. This warranty is valid only if the product is used for its intended purpose and within the guidelines specified in the supplied instruction manual.

Should this product require service, contact Labnet International, Inc.'s Service department at 732-417-0700 to receive a return authorization number and shipping instructions. Products received without proper authorization will be returned. All items returned for service should be sent postage prepaid in the original packaging or other suitable carton, padded to avoid damage. Labnet International, Inc. will not be responsible for damage incurred by improper packaging. Labnet International, Inc. may elect for onsite service for larger equipment.

This warranty does not cover damage caused by accident, neglect, misuse, improper service, natural forces or other causes not arising from defects in original material or workmanship. This warranty does not cover motor brushes, fuses, light bulbs, batteries or damage to paint or finish. Claims for transit damage should be filed with the transportation carrier.

ALL WARRANTIES INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED IN DURATION TO 18 MONTHS FROM THE ORIGINAL DATE OF PURCHASE.

LABNET INTERNATIONAL, INC.'S SOLE OBLIGATION UNDER THIS WARRANTY IS LIMITED TO THE REPAIR OR REPLACEMENT, AT LABNET INTERNATIONAL, INC.'S DISCRETION, OF A DEFECTIVE PRODUCT. LABNET INTERNATIONAL, INC. IS NOT LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGE, COMMERCIAL LOSS OR ANY OTHER DAMAGES RESULTING FROM THE USE OF THIS PRODUCT.

Some states do not allow limitation on the length of implied warranties or the exclusion or limitation of incidental or consequential damages. This warranty gives you specific legal rights. You may have other rights which vary from state to state.

No individual may accept for, or on behalf of Labnet International, Inc., any other obligation of liability, or extend the period of this warranty.

*For research and development use only. Not intended for any animal or human therapeutic or diagnostic use.*