

Clontech PCR Thermal Cycler GP

Cat. #WN400

Product Manual



Clontech

[Product covered in this Manual]

This manual covers the Clontech PCR Thermal Cyclers GP.

- Clontech PCR Thermal Cyclers GP (Cat. #WN400)

[Introduction]

⚠ Note: Our products are to be used for Research Use Only. They may not be used for any other purpose, including, but not limited to, use in humans, therapeutic or diagnostic use, or commercial use of any kind.

- This instrument must not be used by any person other than those with special knowledge.
- When this instrument is used for experiments, individual conditions must be carefully examined. Takara Bio Inc. shall not be liable to the results of such experiments and the consequences thereof.
- The product specifications, appearance, and this product manual may be subject to change without notice for improvement.
- If the instrument is used in a condition other than those specified in this manual, it may malfunction or be damaged.
- Takara Bio Inc. shall not be liable for any obligations under the warranty provisions nor any damages resulting therefrom when the instrument is repaired, disassembled or modified (including the use of software other than that included with the instrument, infection by computer virus) or when the instrument is used in neglect of the requirements described in this manual, including "Safety Precautions for Takara Bio Instrument."
- All trademarks are the property of their respective owners. Certain trademarks may not be registered in all jurisdictions.

[Warranty]

For the warranty period concerning failure, damage, etc., check the contents of the warranty document included with the product.

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Safety Precautions for Takara Bio Instrument

- Before opening the package, setup and operation of the instrument purchased, please read this manual carefully to fully understand the contents.
- After you have read it, keep it in a location that can be accessed at any time when you use the instrument.
- Pay particular attention to the precautions for safety and against possible danger (Danger, Warning, and Caution) described in this manual.
- If the instrument is used in neglect of the Danger, Warning, and Caution requirements, serious personal injury or damage to the product may result.

1. Precaution Symbols

Various precaution symbols are provided on the instrument and in the manual to ensure safe use of the instrument and to prevent hazards to the customer and other people as well as property damage.

Read the descriptions after fully understanding the meanings of these symbols.



DANGER

May cause death or serious injury of the user.



WARNING

If the instrument is operated incorrectly while neglecting this symbol, a serious accident may result.



CAUTION

If the instrument is operated incorrectly while neglecting this symbol, an accident may result.

2. Precautions for Takara Bio Instruments

When using this product, the following precautions must be followed to ensure the performance of the instrument and to prevent the risk of fire and electric shock. Read this manual carefully to ensure correct use.

2.1. Precautions Regarding the Place of Installation

Follow the instructions below for setup.



WARNING

- Do not place the instrument on an unstable place, such as on a wobbly table or on a tilted surface.
- If the instrument falls to the floor or is damaged, immediately turn off the power of the instrument and the peripheral instrument connected to it, then disconnect the power plug from the outlet.
- Do not block the ventilation holes on the instrument if provided. Blocking the holes can cause heat to accumulate inside the instrument, resulting in burns or a fire.



CAUTION

- Keep the instrument away from humid and dusty places. Do not place the instrument in a location subject to vibrations.
- Do not expose the instrument to direct sunlight or high temperatures. The internal temperature may rise, resulting in burns or a fire.
- Do not place any object on the instrument.
- Do not install the product in a location other than a research facility or the equivalent.

2.2. Electrical Precautions

Follow the precautions below when using an electricity powered instruments.



DANGER

- The unit, power cable, and AC adapter carry high voltage. Do not insert metal or inflammable objects in the instrument or touch it with wet hands. There is a risk of fire or electric shock.



WARNING

- Do not use the instrument at a voltage other than the specified voltage.
- Do not damage, break, modify, excessively bend or twist the power cable or AC adapter. In addition, do not place any object on or apply heat to the cable, and do not pull it forcibly.
- To prevent electric shock due to electric leakage, make sure to ground the unit.
- Before connecting the instrument to the outlet, always make sure that the maximum current indicated on the instrument does not exceed the allowable current of the outlet. When connecting multiple instrument, be careful that the total power consumption of the instrument to be connected does not exceed the allowable current.



CAUTION

- Before moving the instrument, make sure to unplug the power cable from the outlet and disconnect the cables from the external instrument.
- Before cleaning, unplug the power cable from the outlet for safety.

2.3. Other Precautions

Follow the following precautions:



DANGER

- Do not attempt repairs of any electrical, mechanical, or tubing components inside the instrument on your own.



WARNING

- Do not insert foreign objects like metal or flammable materials into the instrument through the opening.
- Do not modify or disassemble the instrument. Doing so may impair the unit's intended performance. Additionally, electric shock or damage may result, or the internally stored settings may be lost.
- If you notice smoke, a strange smell, or other abnormal conditions, immediately stop operation, turn off the power, and disconnect the power cable from the outlet. Wait until the abnormal condition has settled before contacting your distributor.
- If foreign objects or water enters the instrument, stop operation immediately, turn off the power, disconnect the power cable from the outlet, and then contact the distributor.






CAUTION

- Do not step on the instrument.
- Do not disassemble the instrument.
- Do not open the instrument during analysis.
- Make sure to use the reaction tubes and reaction plates for this instrument listed at the end of this manual.

3. Warning Labels



Warning symbol labels are affixed to the body to ensure safe operation. Check the details of the associated hazards before use.

Warning Symbol	Hazard Section	Details of Danger
	Power supply	Warning: Electrical shock! Do not open the power supply. There is a danger of electric shock due to the high voltage of the power supply.
	Power cable	Warning: Make sure to connect the ground wire. To prevent electric shock, this instrument must be grounded. Electric shock or fire may be caused due to electrical leakage.
	Heat block Heat lid	Caution: High temperature! Be careful not to burn your skin as the heat block and heat lid become hot.

4. Symbols




4.1. Electrical Symbols

Symbols used for the power switch.

-  Power ON status
-  Power OFF status

4.2. Warning Symbols

These symbols are shown in "3. Warning Labels".

-  Indicates hazards or cautions
-  Indicates prohibited actions
-  Follow the product manual.

1. Overview of the Product

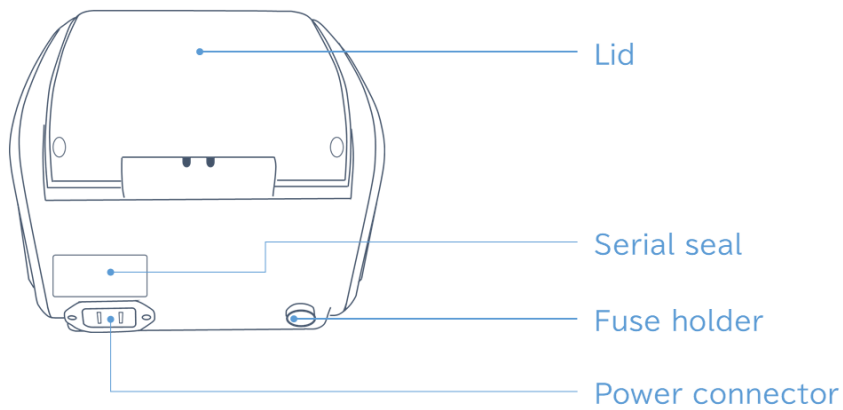
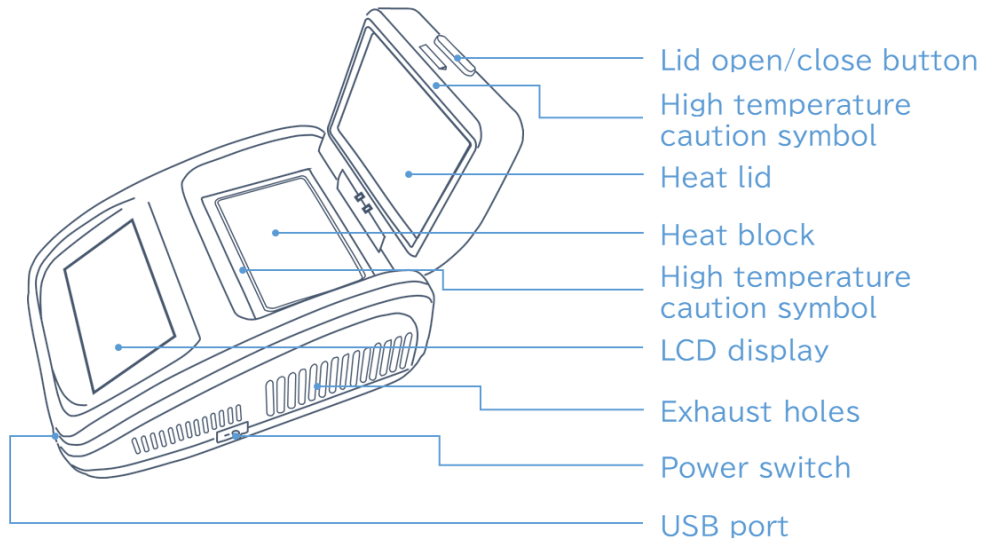
Clontech PCR Thermal Cycler GP is a compact PCR Product. The 5 inch High-Definition Full Touch TFT LCD color display allows you to view the entire program graphically in real time and to control parameter changes intuitively. In addition, the latest semiconductor technology provides excellent temperature accuracy and uniformity, which provides stable experimental results.

1.1. Features of the Instrument

- Compact size and simple user interface for easy and comfortable operation.
- The latest semiconductor technology provides high temperature uniformity throughout the heat block, making temperature control of the program more accurate.
- The system has a built-in temperature gradient calculation function, which can be set up easily. Precise annealing temperatures can be calculated to help optimize PCR reaction conditions for a variety of experimental samples.
- The flexible heat-lid construction allows use of tubes of different length to maintain optimal temperature conditions for testing.

1.2. Structure of the Instrument

The structure of the instrument is shown below. Check the descriptions of each part before using the instrument for the first time.



1.3. Specifications of the Product

• External dimensions	: 280 mm (D) x 185 mm (W) x 165 mm (H)
• Weight	: 4.3 kg
• Power supply	: AC 100 - 240 V, 50/60 Hz, 6.6 - 3.1 A
• Preset temperature range	: 4 to 99.9°C
• Sample volume	: 96 x 0.2 ml
• Maximum heating rate	: 4.5°C/s
• Maximum cooling rate	: 4°C/s
• Temperature uniformity	: ±0.5°C at 50°C
• Temperature accuracy	: ±0.5°C
• Temperature indication resolution	: 0.1°C
• Temperature gradient range	: 30 to 99.9°C
• Temperature gradient difference range	: 0.1 to 30°C
• Heat lid temperature range	: 30 to 110°C
• Maximum number of steps	: 30
• Maximum number of cycles	: 99
• Time increment/decrement	: -599 to +599 s
• Temperature increase/decrease	: -9.9 to +9.9°C
• Program pause function	: Available
• Display	: 5 inch color touch panel, 800 x 480 pixels
• Number of programs saved	: < 500
• Communication port	: USB 2.0

2. Setup Instructions

The setup instructions of the instrument are shown below. Read this section carefully before using the instrument for the first time.

2.1. Unpacking

As soon as you receive the instrument, check it and its accessories according to the packing list. Contact your distributor if there is any discrepancy with the packing list.

2.2. Setup

<Setup procedure>

1. Check that the power supply specification satisfies the requirements.
2. Make sure that the Power Switch of the instrument is OFF.
3. Connect the power cable to the instrument and insert the power plug into the grounded power outlet.
4. Turn on the power to the instrument.

⚠ Caution 1: When handling the instrument, follow the instructions below.

- This instrument is designed for use in an indoor environment.
- Connect or disconnect the power cable by holding the plug with your hand. When inserting the plug, make sure that the plug is fully inserted into the outlet. Do not pull the power cable to unplug the instrument.
- Keep the instrument away from moisture and avoid direct sunlight or intense light sources. Use in a well-ventilated room without corrosive gas nor strong magnetic field interference. Keep away from heat sources like heaters, stoves, and the like. Do not place the instrument in a humid or dusty environment.
- Turn off the power once the instrument stops operating. If the instrument is not used for an extended period of time, remove the power plug and protect the instrument with a soft cloth to prevent dust from entering.

⚠ Caution 2: In the following cases, immediately unplug the cable from the outlet and contact your distributor.

- If any liquid enters the instrument
- If an abnormal sound or smell is detected inside the instrument
- If the instrument becomes wet with water or rain
- If the instrument falls from the table or its enclosure is damaged
- If the function of the instrument is abnormal

2.3. Setup Conditions

- Ambient temperature : 10 - 30°C
- Humidity : $\leq 70\%$
- Power supply : AC 100 - 240 V, 50/60 Hz, 6.6 - 3.1 A

3. Protocol

The basic operations are as follows. Read this section carefully before using the instrument for the first time.

3.1. Start Up

1. When the power switch is turned on, the display screen lights up and the following welcome screen appears.

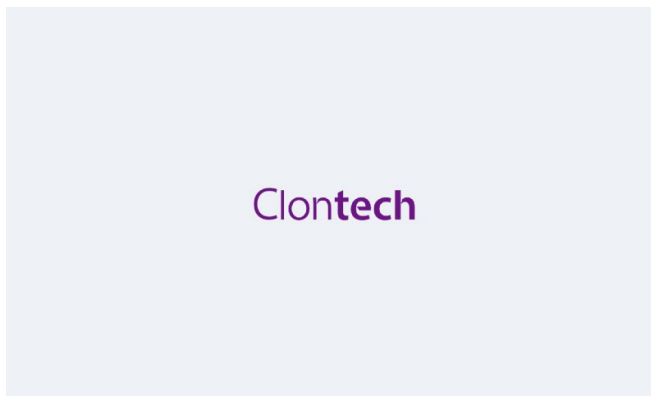


Fig 1. Welcome screen

2. The main screen is displayed after a moment.

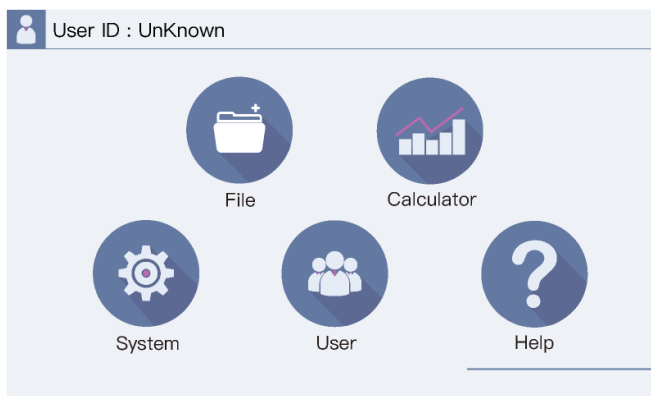


Fig 2. Main Screen

3.2. Program Operation

The PCR reaction program consists of thermal steps and cycling steps. Up to 30 steps can be set in a single program.

3.2.1. File Library

Click the <File> icon on the main screen to enter the file library screen.

- * As shown in Figure 3, this screen shows the file list in the left column and a preview of the selected file on the right side.
- * The selected file can be edited, renamed, deleted, or executed using the buttons at the bottom of the screen.

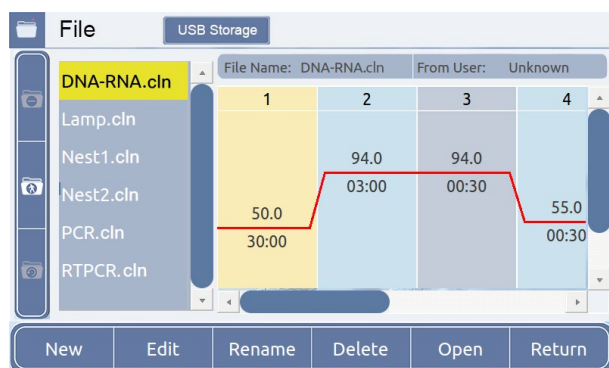


Fig 3. File Library Screen

3.2.2. Create a New File

1. In the File Library screen, click <New> and create a new reaction program. (Figure 4)
 - * Enter the temperature and time by using the numeric keys. Set the number of steps and cycles by using the <+Step> button and the <+Cycle> button. The maximum number of steps that can be set is 30.



Fig 4. Reaction Program Setting Screen

2. After completing the reaction program setting, click <Return> and select <Ok>.
3. After entering the filename in <Name> as shown in Figure 5-1, select <Ok> to return to the File Library screen.
 - * A new file is created at this point.

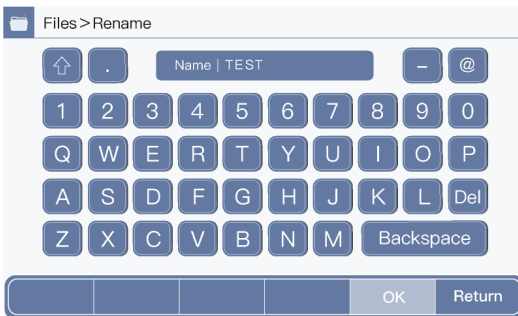


Fig 5-1. File Name Input Screen

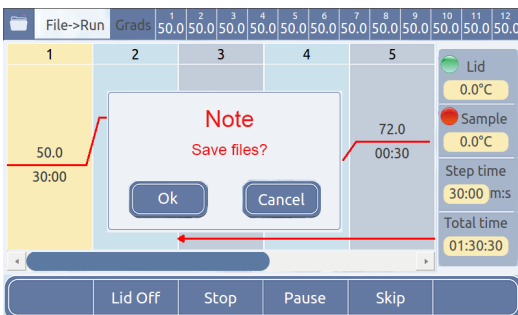


Fig 5-2. Edit File Name Confirmation Screen

3.2.3. Setting of Options

Settings for the gradient function and the temperature change for each cycle can be adjusted.



Fig 6. Reaction Program Edit Screen

1. With a step selected in the Reaction Program Edit screen, click the <Option> button. Then, set the parameters of the steps (Figure 7).

Items of each parameter are as follows:

- Temp : Temperature setting
- Time : Reaction time
- +Temp/c : Set this when you want to change the temperature for each cycle, such as when performing a touch-down PCR. If you want to reduce the temperature by 1°C for each cycle, enter -1.0°C.
- +Time/c : Set this when you want to change the reaction time for each cycle.
- Grads : Set this when the gradient function is used. Enter the range of the gradient. The setting temperature is adapted to the 1st column at the left end of the heat block, and the temperature obtained by adding the gradient range is adapted to the 12th column at the right end of the heat block. Gradient is automatically calculated.
- Ramp : The default temperature control is adapted when the ramp rate is 0.0°C/s. If you want to set a heating and/or cooling rate that is slower than the default temperature control, enter the value you want in “ramp”. You can enter 0.1 to 5.0°C, but the value cannot exceed the maximum heating/cooling rate of the instrument.

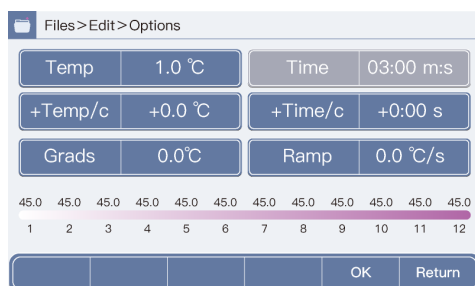


Fig 7. Optional Parameter Setting Screen

2. After completing the required optional settings, press <Ok> to return to the Edit screen.

* To return to the Edit screen, click the <Return> button. However, the option setting is not updated unless you click <Ok>.

3.2.4. Running the Reaction Program

1. In the File Library screen, select the reaction program, and then click <Run> to execute the program (Figure 8).

The File Library screen contains the following items:

- Lid Off : Select this when the heat lid is not heated. In the column to the right of the graph, the heat lid and heat block temperature, elapsed time, and total time of heating are displayed.
- Stop : The reaction program stops.
- Pause : Suspends the running reaction program. The program can be resumed when the <Start> button is clicked.
- Skip : Skip the program to the next step.

* The executed step of the reaction program blinks when the program is running.

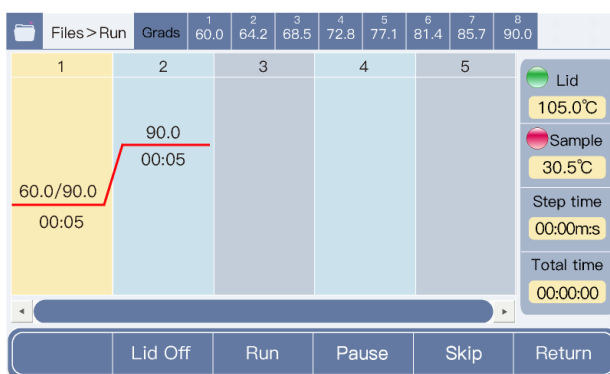


Fig 8. Screen of the running program

2. The Completion screen is displayed when the reaction program running is finished.
 - * The heat block temperature after the reaction program is finished is set to 16°C. Remove the sample immediately after completion of the reaction.
3. After the 2. above is confirmed, stop the reaction program by clicking <Stop>.

3.3. Calculation of the Temperature Gradient

The Gradient Calculation screen shows the heat block temperature of each column when the gradient range is set. To set the gradient function in the reaction program, use <Option> in 3.2.3. Setting of Options.

1. Click <Calculator> on the main screen to enter the gradient calculation screen (Figure 9).



Fig 9. Gradient Calculation Screen

2. Enter the heat block temperature in the “Temp” box and the gradient range in the “Grads” box.
 - * The heat block temperature entered is applied to the 1st column on the left of the heat block.
 - * The range of the gradient entered is added to the heat block temperature entered and applied to the 12th column of the heat block.
3. Click <OK> after the entry is completed to calculate the temperature setting of respective column.
 - * The calculation is executed automatically.
4. Press <Return> to return to the main screen.

3.4. User Registration

1. Click the <User> icon on the main screen to enter the user management screen (Figure 10).

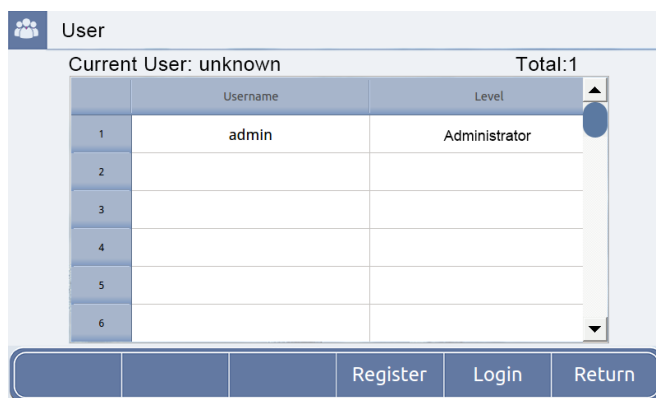


Fig 10. User Setting Screen

2. Click <Register> and enter your username, password, and other information in the user registration screen, then click <Ok> to complete registration.
 3. Click <Login> and enter the registered information on the login page in 2. above to log in.
- * To remove the registered user, you must log in as the <Administrator>.

3.5. System Settings

1. Click <System> on the Main screen to enter the System screen (Figure 11).

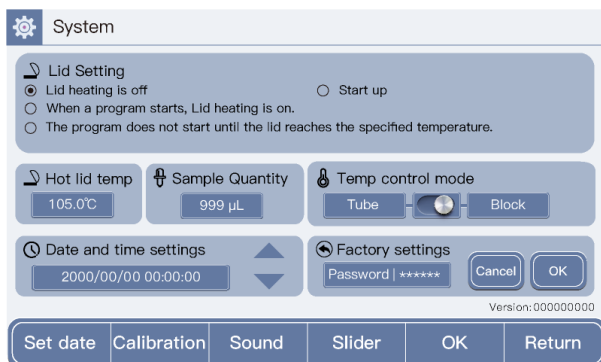


Fig 11. System Settings Screen

The System Settings includes the setting for the timing of heat lid heating, settings for the heat lid temperature, settings for the temperature control, settings for the date and time, and login function to the factory settings. The details of respective items are as follows:

- Lid Setting : Set the timing of heat lid heating.
- Hot lid temp : Set the heat lid temperature.
- Sample Quantity : Enter the quantity of the liquid in the sample tube according to the calculated value when the temperature is reached at the tube temperature. When <Tube> is selected in the next <Temp control mode> step, the temperature control is performed taking the entered quantity of the reaction liquid into consideration.
- Temp control mode : When controlling the temperature, select whether the set temperature is reached by attainment of the heat block temperature or by attainment of the tube temperature. When <Tube> is selected, the time required to reach the set temperature is calculated taking the value entered in Sample Quantity into consideration.
- Date and time settings : Used to set the date and time of the instrument.
- Factory settings : Used to log in to the Factory mode. The Factory mode should be exclusively used by the service engineer where the settings at the time of shipment from the factory are stored.
- Version : Version of the operating software of the instrument.

2. After completing the settings, click <Ok> to save them, then click <Return> to return to the Main screen.

3.6. Import/Export of the Reaction Program

3.6.1. Import of the Reaction Program

1. Turn off the instrument, connect a USB flash drive containing the reaction program you want to import to the instrument.
2. Turn on the instrument and press <Help> on the main screen to enter the help screen (Figure 12).

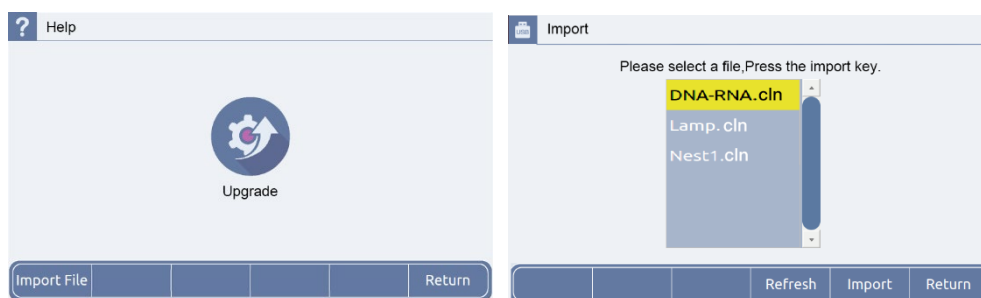


Fig 12. Reaction Program Import Screen

3. Click <Import File> on the help screen to switch to the import screen, select the reaction program you want to import, then click <Import> to import the program to the current user.

* To cancel selection of the selected file, press <Refresh>. After completing the procedure, restart the instrument.

3.6.2. Export of the Reaction Program

1. Turn off the instrument, connect the USB flash drive to which the reaction program is exported to the instrument, then turn on the instrument.
2. Select the reaction program to be exported and export the reaction program to the USB flash drive by clicking <USB Storage> on the screen.
3. Remove the USB flash drive and restart the instrument after completing the procedure.

4. Maintenance and Troubleshooting

4.1. Daily Maintenance

- Keep the heat block clean. Dirt accumulated on the heat block can affect the temperature control.
- Cool the heat block to a temperature that will not cause skin burns before wiping it with a diluted neutral detergent (Do not use a solution of strong bases, alcohol exceeding 70% concentration, or organic solvent).
- Do not place any object around the exhaust holes located at the left and right sides of the instrument.
- Keep the air intake holes located at the bottom of the instrument. Dust will attach to the holes after the instrument is used for certain period of time.

4.2. Replacement of the Fuse

1. Identify the location of the fuse.
 - * The fuse is located in the fuse holder on the right side of the rear of the instrument.



2. Loosen the fuse holder with a flathead screwdriver by turning it 90° counterclockwise.



3. Remove the fuse holder.

* The holder consists of two pieces and the inner holder can be pulled out.



4. Replace the old fuse in the holder with the new one*¹.

*¹ The current rating of the fuse is 5A. A spare fuse comes with the instrument you purchased. However, when you need to purchase a new fuse, contact your distributor.



5. After installing the holder into the position, lock it by turning it 90° clockwise with a flathead screwdriver.

4.3. Error Message

If any of the following error messages appears, checks and repairs are required. Contact your distributor.

No	Error Message
1	Display Error Open:x Short:x
2	Display screen not bright and abnormal
3	Touch failure
4	Block is not heated
5	Block temperature is too high/too low
6	Hot cover is not heated
7	Hot cover temperature is too high
8	Fan can not rotate

5. Related Products

[0.2 ml Single Tube]

0.2 ml Hi-Tube Dome Cap (Cat. #NJ200)

0.2ml Single-Tube Dome Cap (Cat. #NJ204)

0.2ml Single-Tube Flat Cap (Cat. #NJ205)

[0.2 ml 8-Tube & 8-Cap]

0.2 ml Hi-8-Tube (Cat. #NJ300)

0.2 ml Hi-8-Dome Cap (Cat. #NJ301)

0.2 ml Hi-8-Flat Cap (Cat. #NJ302)

[0.2 ml Plate & Cap]

0.2ml 96well-plate for Real Time (Frosted) (Cat. #NJ401)

Flat Cap for PCR Plate (Cat. #NJ402)

96 well snap plate (Cat. #NJ710)

Flat cap for snap plate (Cat. #NJ720)

⚠ Note:

- Please be aware that recommended caps must be used for each tube and plate.
- Use of other caps or seal might decrease reaction volume by vaporization.

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v202303