USER MANUAL

HyperCOOL

HC9090PLUS

hanil

Product info

- Research Use Only.

- Product : Freeze Dryer

- Model : HyperCOOL HC9090PLUS

- Manufacturer: Hanil Scientific Inc.

- 5F, 16 Arayuk-ro, Gimpo-si, Gyeonggi-do, KOREA

- Tel:+82-2-3452-7736 / Fax: +82-31-985-9158

- sales@ihanil.com

- http://www.ihanil.com

Table of Contents

1. Safety Warnings and Precautions 5

1.1. Safety Labels 5

1.2. Safety Precautions 6

2. Product Configuration and Information 7

2.1. Product Configuration 7

2.2. Accessories 7

2.3. Technical Specifications 8

3. Product Assembly and Installation 9

3.1. Unpacking the Product and Installation 9

3.2. Power Connection 9

3.3. HC9090PL Configuration 10

4. How to Use 12

4.1. Drying Method 12

4.1.1. Before Starting Drying 12

4.1.2. Freezing 12

4.1.3. Main Drying 12

4.1.4. Secondary Drying (Option) 13

4.1.5. Defrost 13

4.2. Control Panel 13

4.2.1. Main (Normal Mode) 14

4.2.2. Main (Shelf Mode) 15

4.2.3. Vacuum / Warm-Up 16

4.2.3.1. Warm-Up 16

4.2.3.2. Start Vacuum (Vacuum Pump Power On) 18

4.2.3.3. Vacuum Pump Power Off 18

4.2.4. Defrost 19

4.2.4.1. Start Defrost 19

4.2.4.2. End Defrost 20

4.2.5. Chart 21

4.2.6. Program 22

4.2.6.1. Add Program 23

4.2.6.2. Start Program 26

4.2.7. History 26

4.2.7.1. Operation History 26
4.2.7.2. Event History 28
4.2.8. Setting / Lock 30
4.2.8.1. Calibration 30
4.2.8.2. Heating Shelf 31
4.2.8.3. End Point 31
4.2.8.4. Warm-Up Pump 32
4.2.8.5. Unit 33
4.2.8.6. Sound 33
4.2.8.7. Real-Chart Interval 34
4.2.8.8. Date / Time 35
4.2.8.9. Information 36
4.2.9 Screen Lock 36
4.2.10 Error 37
5. Maintenance 40
5.1. Inside the Trap 40
5.2. Condenser Dust Removal 40
6. Troubleshooting 41
6.1. Checklist before reporting a malfunction 41
6.2. Other 41
7. Accessories 42

1. Safety warnings and precautions

1.1. Safety label

Symbol	Meaning
	Mark indicating danger and warning
	Attention and warning for electric shock
	Mark indicating Biohazard warning
	Mark indicating earth grounding
	Mark indicating low temperature warning
	Mark indicating Flammable material warning

1.2. Safety Precautions

These precautions can prevent malfunctions during use.

1. The freeze dryer must be installed horizontally on a flat surface;

the device shouldn't move [or be moved] during operation

2. Install it at least 10 cm away from the wall as there must be a free space for air circulation.

3. Before connecting the lyophilizer to power, check the voltage to be used. Incorrect voltage can damage the device.

4. Only use accessories provided by Hanil; we are not responsible for problems caused by using other accessories.

5. Remove any foreign objects from inside the product before operation.

6. Do not use flammable substances, hazardous substances, radioactive substances, etc. as samples.

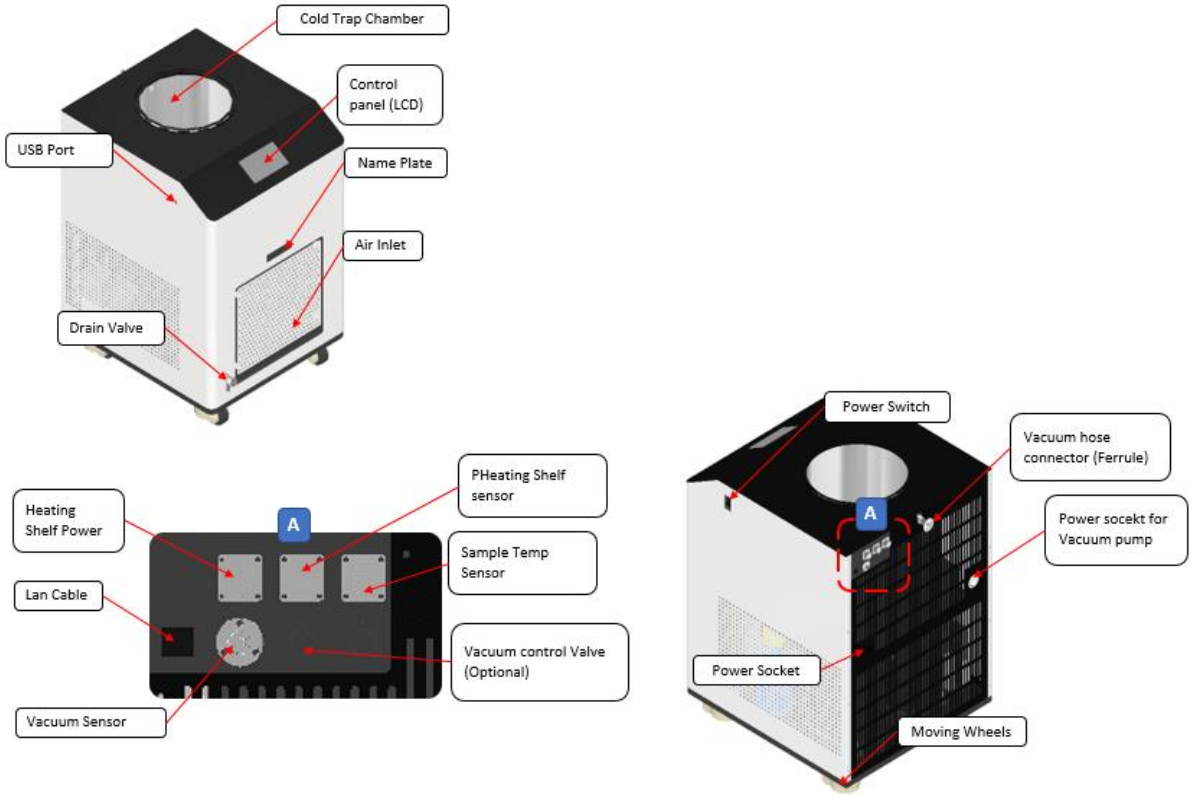
7. Place samples on a flat surface to prevent them from falling out of the container during drying.

8. Repairs not mentioned in the user manual must be performed by qualified technicians who have completed the necessary training

9. When requesting repair and maintenance from a technician, the user must thoroughly remove the contaminants in advance.

10. Accessories and trays must be kept dry at all times before operating the equipment to ensure long-term use.

2. Product Configuration and Information



2.1. Product Configuration

2.2. Accessories

User manual | AC Power Cord | Vacuum Hose | Clamps | Vacuum Sensor

※ When ordering HyperCOOL, the above accessories and connecting parts are provided.

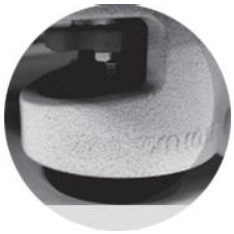
※ Vacuum Pump is not included in the basic components and is sold separately.

2.3. Technical Specifications

Model	HC9090PL
Ultimate Chamber Temp. (at RT) (℃)	-90
Chamber Volume (L)	25.9
Trap (Chamber) Size (Ø x H)	305 X 349
ICE Condensing (L / 24h)	9
Power Requirement (VA)	1500
Dimension (W x D x H, mm)	600 x 708 x 885
Weight (kg)	149.5
Digital Readout	Temperature, Time, Vacuum, Duration
Function	Defrost, Chart, Program, History, Setting / Lock Vacuum / Warm-up, Heating Shelf (Option)

3. Product Assembly and Installation

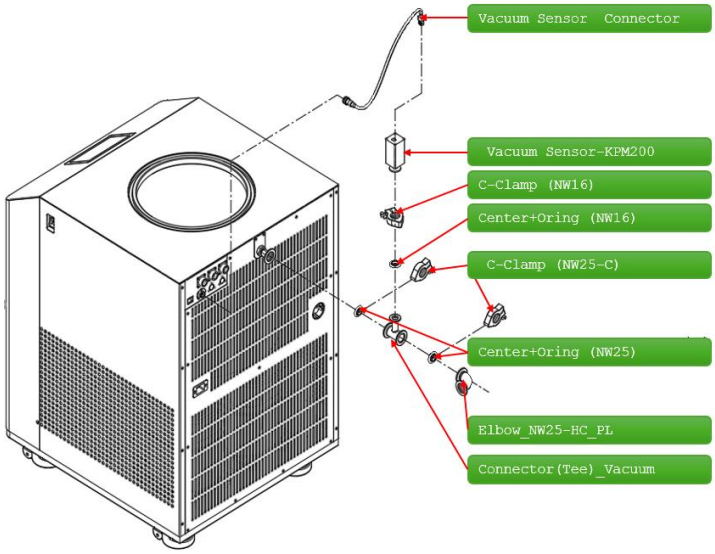
3.1. Unpacking the Product and installation



1. After purchasing the freeze dryer, open the packaged box and check the components.

   ▶Components : Freeze Dryer(HyperCOOL 9090PLUS) / User Manual / Accessories Box (included Power Cord, Vacuum Hose, Clamp, vacuum sensor and connecting part)

2. Place the unit on a flat, level surface and turn the wheel locking lever at the bottom of the unit counter-clockwise to lock the wheels.



3. To Connect the vacuum sensor, connect in the order shown in the picture on the side

4. Then, connect the vacuum hose and install the vacuum pump.

3.2. Power Connection

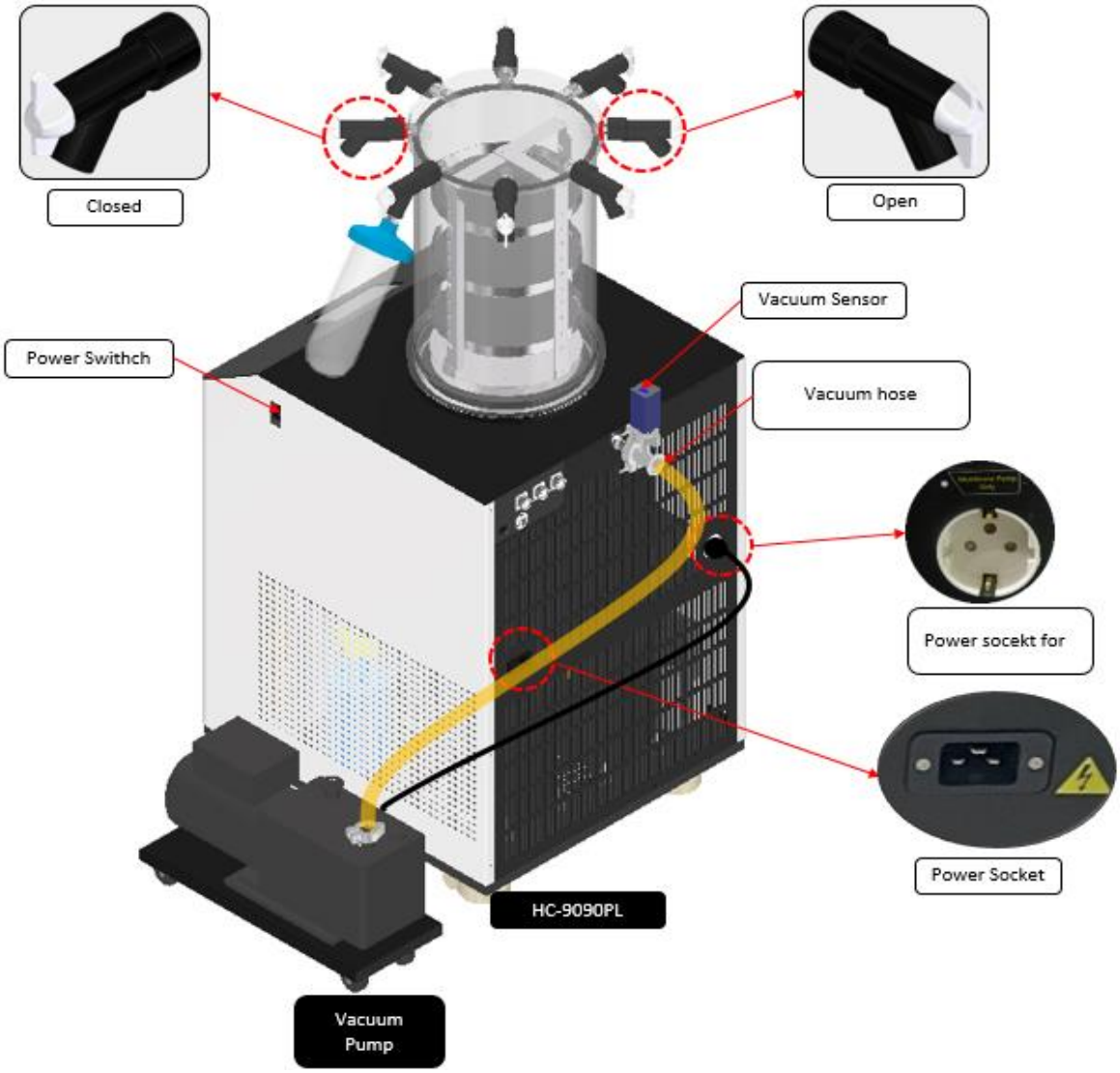
1. Connect the AC power cord to the power socket located on the lower right side of the main unit's rear, then connect the power plug to an outlet.

▶ Check the rated voltage to be used (220V, 50~60 Hz).

2. Turn the power switch located on the right side of the main unit to the ON position (↑).

3.3. HC9090PLUS Configuration

HC9090PLUS Basic Configuration



▶ **Check before operation**

1. Make sure all vacuum valves are closed.

2. Place the chamber on the body. Make sure the chamber is well closed and that all connections are secured.

3. Check if there is any water left in the drain.

4. Make sure that both the drain valve and the vacuum release knob are closed.

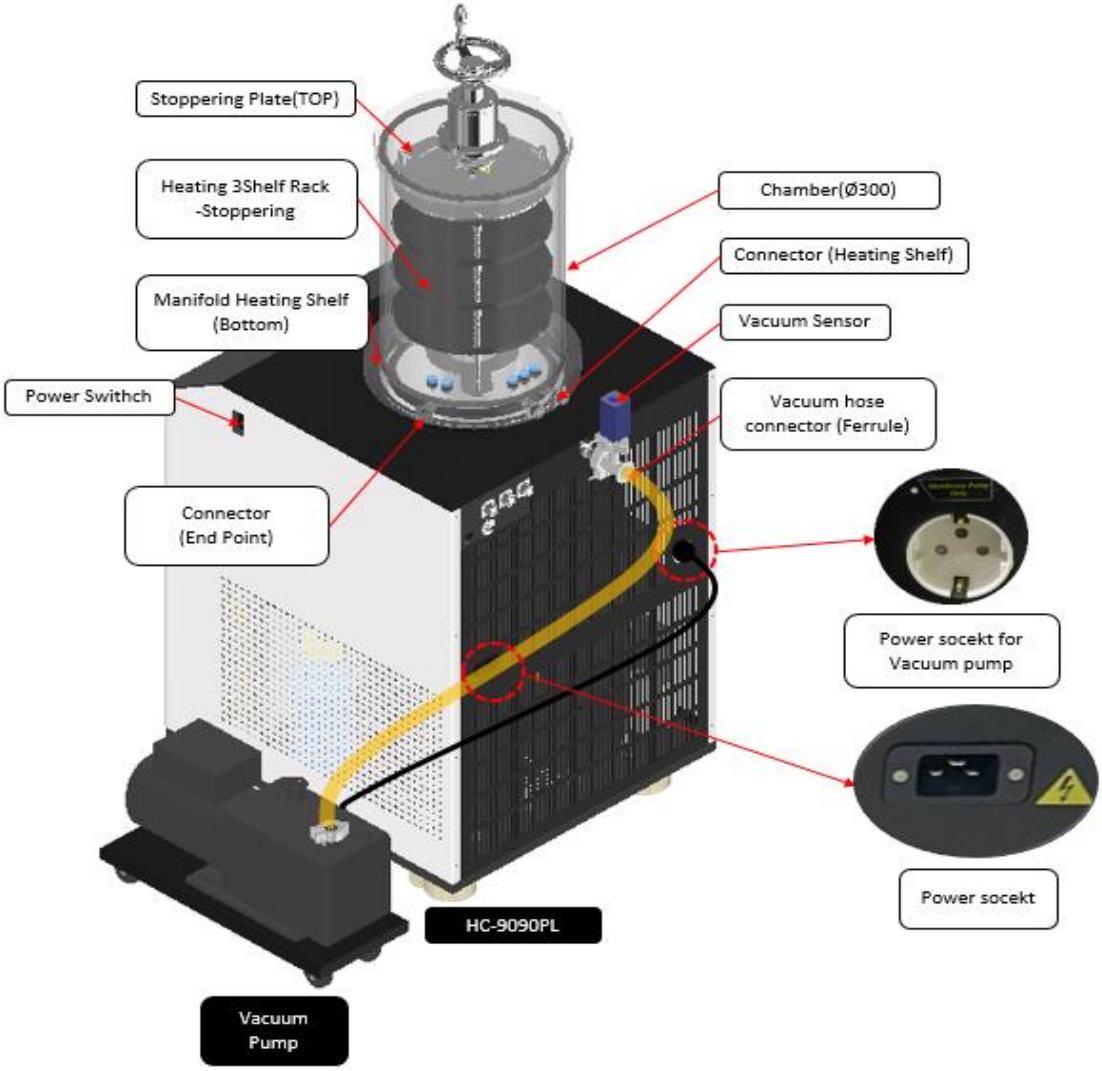
5. Check that the valve handle of the manifold plate is 'closed'.

Open
Vacuum staste

Closed
Vacuum released

6. When connecting a manifold or chamber, always make sure that all connections are tight..

Heating Shelf Configuration



4. How to use

4.1. Drying Method

4.1.1. Before Starting Drying

Before operating the equipment, clean the Trap Chamber thoroughly to remove any moisture. Ensure the Drain Valve and the valve connected to the Vacuum Pump are closed. Before starting drying, warm up the Vacuum Pump sufficiently. (When you touch the "Vacuum" button on the control panel, Warm-Up is always configured to operate, and you can specify the time through the settings menu. Refer to "4.2.8.4. Warm-Up Pump" on page for time setting method.)
Start drying after the Trap Chamber has sufficiently cooled down (preferably when the equipment reaches its maximum cooling temperature).. This will extend the life of the Vacuum Pump.

4.1.2. Freezing

First, sufficiently cool and freeze the samples to be dried.

Cool the equipment's Trap Chamber. (When the equipment power is turned on, the Trap Chamber automatically starts cooling.) Once the Trap Chamber is sufficiently cooled (ideally when the equipment reaches its maximum cooling temperature), place the samples to be dried into the Dry Chamber. (If the Vacuum Pump Warm-Up has not been performed, perform Warm-Up first, then place the samples into the Dry Chamber. Warm-Up can be performed by long-pressing the "Vacuum / Warm-Up" button on the control panel.)

4.1.3. Main Drying

Once the Vacuum Pump Warm-Up is complete, create a vacuum in the Dry Chamber. (Touch the "Vacuum / Warm-Up" button on the control panel and open the valve connected to the Vacuum Pump to create a vacuum.)
As the pressure in the Dry Chamber decreases, the ice bonded to the sample can be removed through sublimation, and the sublimated gas attaches to the Trap Chamber, forming frost.
Continue drying until the sample is completely dry after the Dry Chamber reaches its lowest pressure point.

4.1.4. Secondary Drying (Option)

After Main Drying is complete, all ice will have sublimated, but residual moisture may still be present in the sample. To remove this residual moisture, Secondary Drying can be performed by increasing the shelf temperature.
Control the shelf temperature by specifying it on the control panel or by starting a drying method saved in the Program.
Complete drying by controlling the shelf temperature to remove all moisture.

4.1.5. Defrost

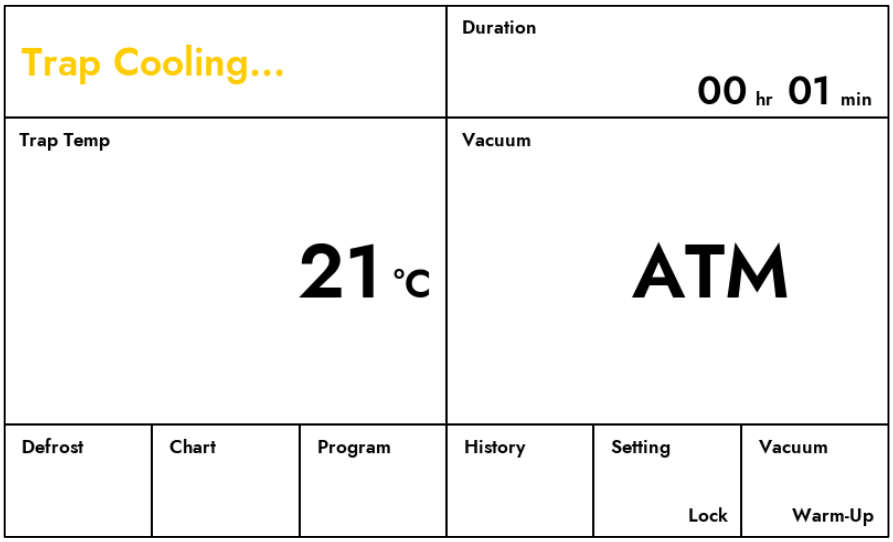
After drying is complete, remove frost from the Trap Chamber.
Frost accumulated in the Trap Chamber can affect refrigeration performance, and moisture entering the Vacuum Pump can affect the pump's lifespan.

4.2. Control Panel

The HyperCOOL 9090PLUS can be operated via the 7-inch Control Panel. The 7-inch Control Panel is a touch panel that operates the equipment by touching buttons.
Pressing a button either activates the related function or displays a dialog box depending on the function.

4.2.1. Main (Normal Mode)

This is the Main screen displayed when the Shelf is not in use



[Figure 1. Main (Normal)]

① Status Display : Displays the current status of the HyperCOOL

- Ready : HyperCOOL is ready for use (booting complete).
- Trap Cooling... : Cold Trap is cooling.
- Warm-Up... : Vacuum Pump Warm-Up s in progress.
- Run Vacuum... : Chamber vacuum is in progress.
- Drying... : Drying is in progress.
- Finished Dry. : Drying is complete.
- Defrost. : Defrost operation is in progress.

② Duration : Displays the time since the equipment was turned on.

③ Trap Temp : Displays the temperature of the Cold Trap.

④ Vacuum : Displays the vacuum value of the Chamber. (ATM refers to 1 atmosphere.)

⑤ Defrost : Touching this button initiates the Defrost operation.

⑥ Chart : Touching this button moves to the Chart screen.

⑦ Program : Touching this button moves to the Program screen.

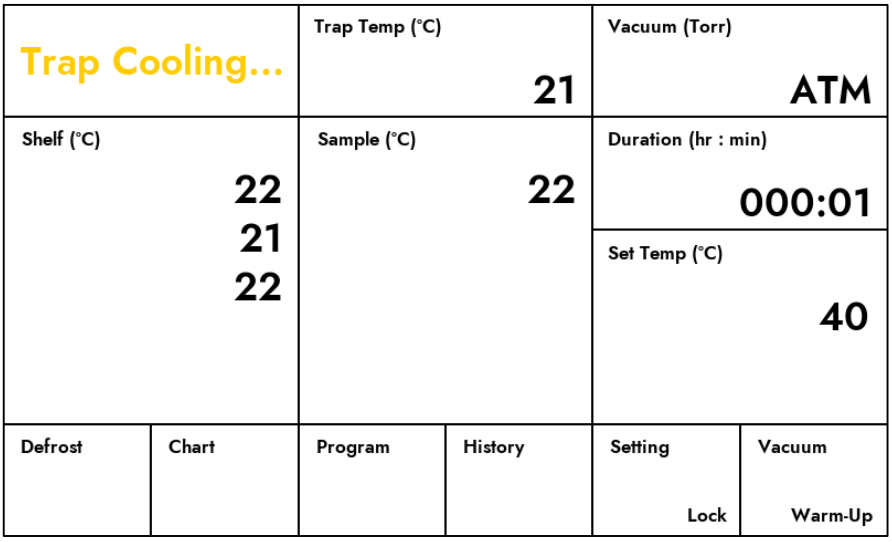
⑧ History : Touching this button moves to the History screen.

⑨ Setting / Lock : Touching this button moves to the equipment settings screen. Long-pressing this button displays a dialog box to set the screen.

⑩ Vacuum / Warm-Up : Touching this button turns the Vacuum Pump On / Off. Long-pressing this button initiates the Vacuum Pump Warm-Up.

4.2.2. Main (Shelf Mode)

This is the Main screen displayed when the Shelf is in use. (For Shelf usage, refer to "4.2.8.2. Heating Shelf" Page.)



[Figure 2. Main (Shelf Mode)]

① Status Display: Displays the current status of the HyperCOOL

- Ready : HyperCOOL is ready for use (booting complete).
- Trap Cooling... : Cold Trap us cooling.
- Warm-Up... : Vacuum Pump Warm-Up is in progress.
- Run Vacuum... : Chamber vacuum is in progress.
- Drying... : Drying is in progress.
- Finished Dry. : Drying is complete.
- Defrost. : Defrost operation is in progress..

② Trap Temp : Displays the temperature of the Cold Trap.

③ Vacuum : Displays the vacuum value of the Chamber. (ATM refers to 1 atmosphere.)

④ Shelf Temperature : Displays the shelf temperature. (Shelf numbers are 1, 2, 3 from top. If there are only 2 shelves, only 2 are displayed.)

⑤ Sample 온도 : Displays the sample temperature.

⑥ Duration : Displays the time since the equipment was turned on.

⑦ Set Temp : Displays the set temperature of the Shelf during drying. (When a Program is running, Program information is displayed. For Program execution, refer to "4.2.6. Program Button" Page.)

⑧ Defrost : Touching this button initiates the Defrost operation.

⑨ Chart : Touching this button moves to the Chart screen.

⑩ Program : Touching this button moves to the Program screen.

⑪ History : Touching this button moves to the History screen.

⑫ Setting / Lock : Touching this button moves to the equipment settings screen. Long-pressing this button displays a dialog box to set the screen.

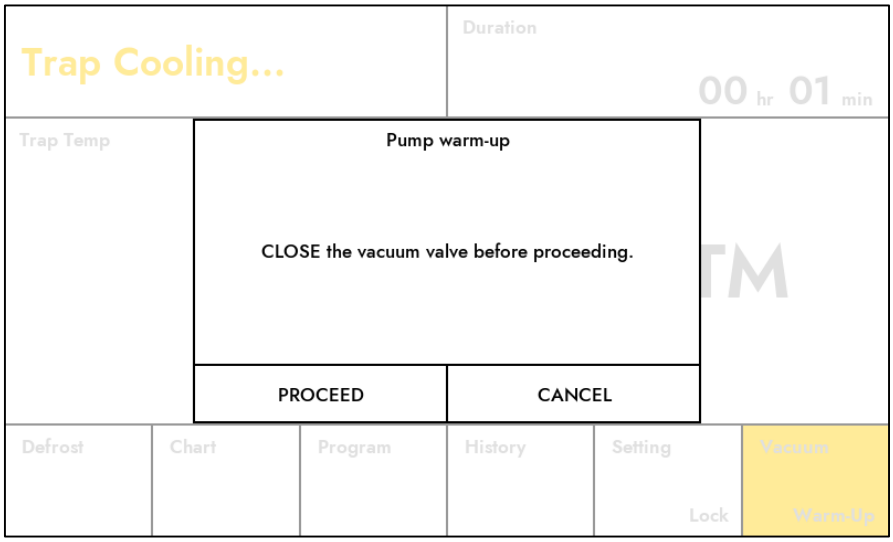
⑬ Vacuum / Warm-Up : Touching this button turns the Vacuum Pump On / Off. Long-pressing this button initiates the Vacuum Pump Warm-Up.

4.2.3. Vacuum / Warm-Up

This button allows you to turn the Vacuum Pump On / Off.
A short press displays a dialog box to proceed with chamber vacuum. A long press displays a dialog box to proceed with Vacuum Pump Warm-Up.

4.2.3.1. Warm-Up

When the Chamber is in a vacuum-released state, you can hold several seconds the "Vacuum / Warm-Up" button to start the Warm-Up operation, and a pop-up like the one below will be displayed.



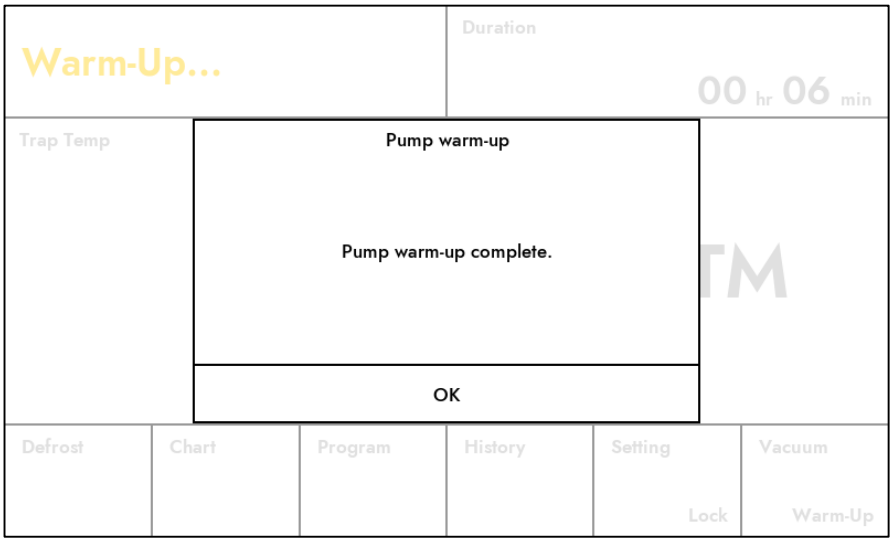
[Figure 3. Vacuum Warm-Up Pop-up]

[PROCEED] : Turns on the Vacuum Pump to start the Warm-Up operation and closes the Pop-up

[CANCEL] : Cancels the Warm-Up operation and closes the Pop-up.

The Vacuum Pump always performs a Warm-Up operation first before evacuating the Chamber. The Warm-Up operation proceeds for a set time. (Refer to "4.2.8.4. Warm-Up Pump" Page for Warm-Up time.)

When the Warm-Up operation is complete, a pop-up like the one below will be displayed.



[Figure 4. Warm-Up Complete Pop-up]

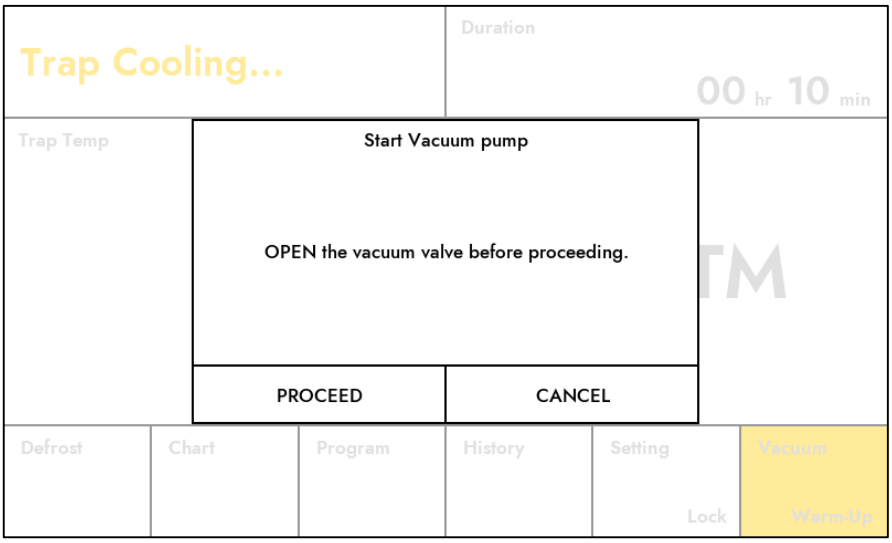
[OK] : Closes the pop-up.

When the pop-up disappears, the Vacuum Pump turns Off..

- After Warm-Up is complete, proceed with chamber vacuum before the Vacuum Pump oil cools down.

4.2.3.2. Start Vacuum (Vacuum Pump Power On)

After Vacuum Pump Warm-Up, start Chamber vacuum. (However, if the Chamber temperature is -40℃ or higher, a dialog box will appear indicating that it cannot be started.)
Touch the "Vacuum / Warm-Up" button to display a Pop-up as below.



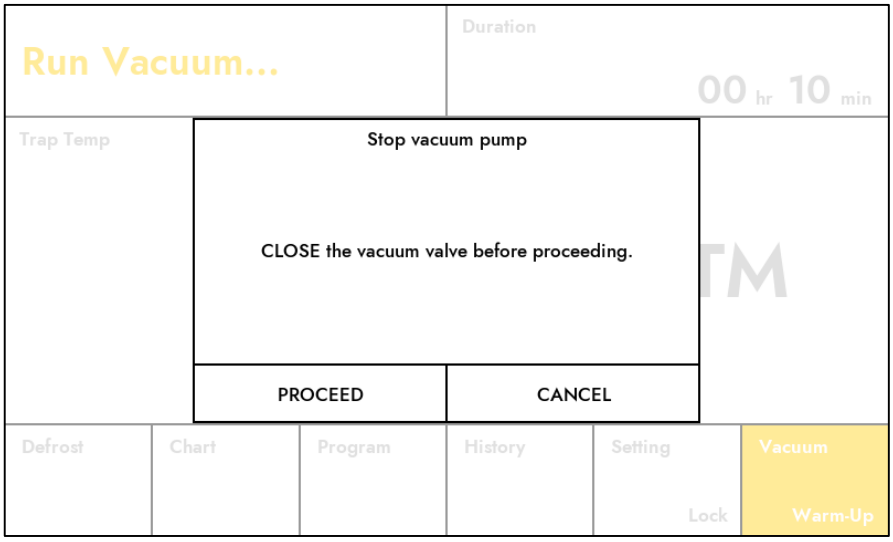
[Figure 5. Start Vacuum pop-up]

[PROCEED] : Turns on the Vacuum Pump to enter the Chamber vacuum standby state and closes the Pop-up.

[CANCEL] : Cancels the Chamber vacuum operation and closes the Pop-up

4.2.3.3. Vacuum Pump Power Off

After drying is complete or when releasing vacuum, the activated Vacuum button must be touched.
When you touch the Vacuum button to release the vacuum, a Pop-up like the one below will be displayed. (The message in the dialog box may vary depending on the status of the equipment.)



[Figure 6. Vacuum pump power off Pop-up]

[PROCEED] : Turns off the Vacuum pump and closes the Pop-up

[CANCEL] : Closes the Pop-up

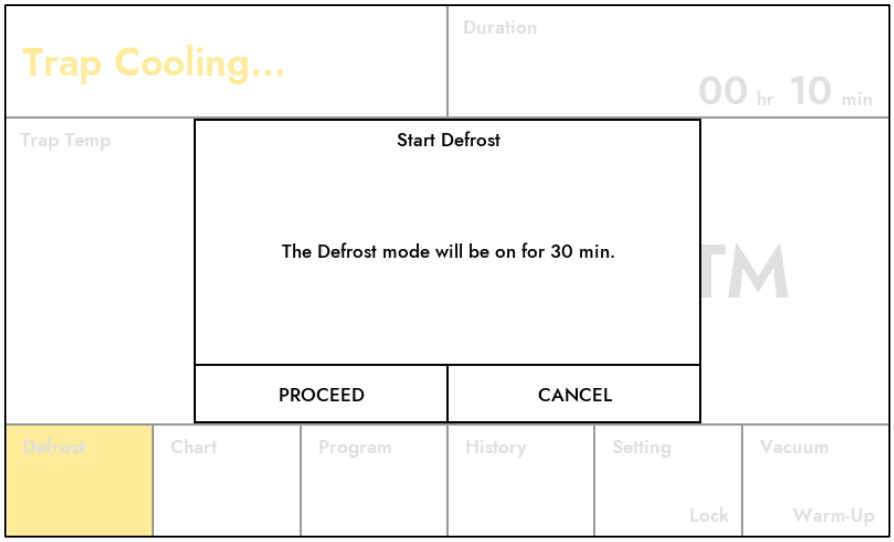
When the Vacuum pump stops, the valve connected to the Vacuum pump is also closed.
To release the vacuum from the Chamber after the Vacuum pump stops, the Drain Valve must be opened.

4.2.4. Defrost

To remove frost from the Chamber, you must touch the Defrost button to activate the frost removal function.
The Defrost function can only be activated when the vacuum is released; the Defrost button is inactive and cannot be touched in a vacuum state..

4.2.4.1. Strat Defrost

Touching the Defrost button displays a Pop-up as below.



[Figure 7. Strat Defrost Pop-up]

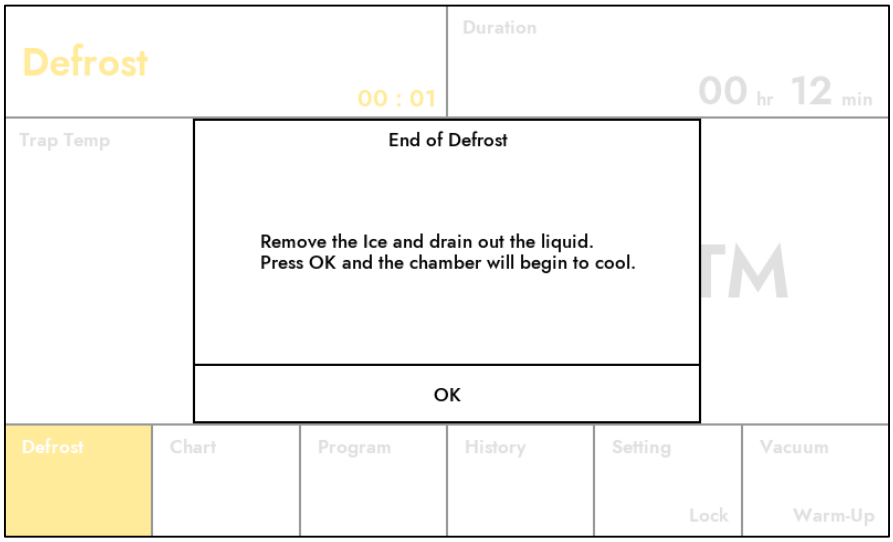
[YES] : Starts the Defrost function and closes the Pop-up

[NO] : Cancels the Defrost function and closes the Pop-up

When the Defrost function operates, the Chamber is heated to 60℃ for 30 minutes to remove frost.

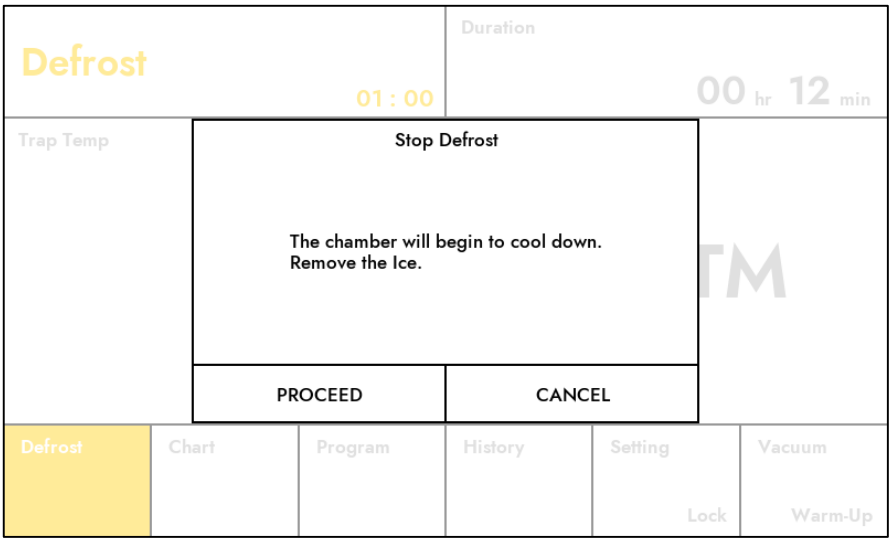
4.2.4.2. End Defrost

The Defrost function ends when the set time is complete or when the user cancels it.
When the Defrost function ends, the equipment's status automatically changes to Trap Cooling



[Figure 8. End Defrost Pop-up]

[OK] : Ends the Defrost function and closes the Pop-up.



[Figure 9. Defrost Cancel Pop-up]

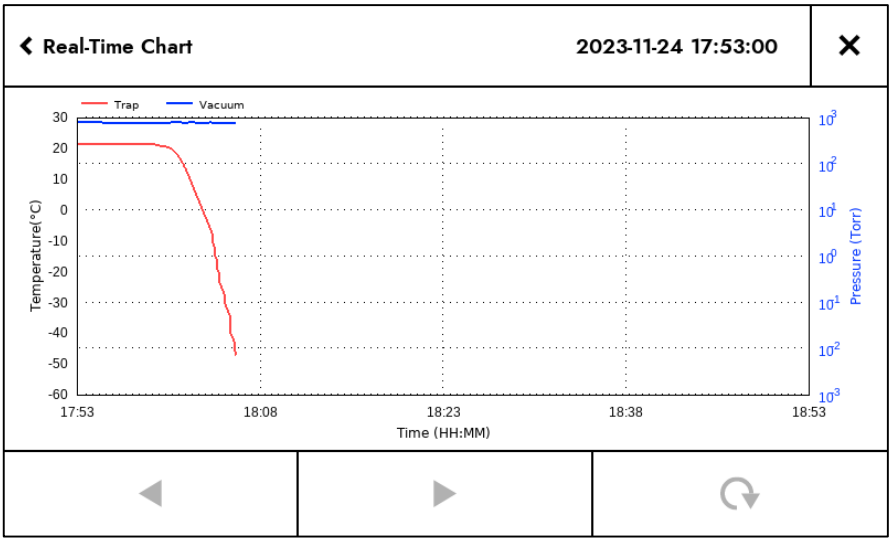
[PROCEED] : Ends the Defrost function and closes the Pop-up

[CANCEL] : Maintains the Defrost function and closes the Pop-up

4.2.5. Chart

Touching the Chart button moves to a screen that displays the current values of sensors as a Graph.

When entering the Graph screen, real-time data is displayed. Touching the Previous or Next button displays data from 1 hour ago or 1 hour later, respectively.



[Figure 10. Chart Screen]

① Legend : Displays the graph legend. (If Shelf use is selected, Shelf and Sample temperatures are displayed.)

② Start Time : Displays the start time of the data shown on the graph. Touching it displays a dialog box where you can input the desired time. After setting the time and touching the "Enter" button, 1 hour of data from the entered time will be displayed.

③ Previous Button: Touching this button displays data from the previous time. The button is deactivated if there is no previous data to display.

④ Next Button: Touching this button displays data from the next time. The button is deactivated if there is no next data to display.

⑤ Refresh Button: Touching this button displays real-time data. It is activated after touching the Previous or Next button.

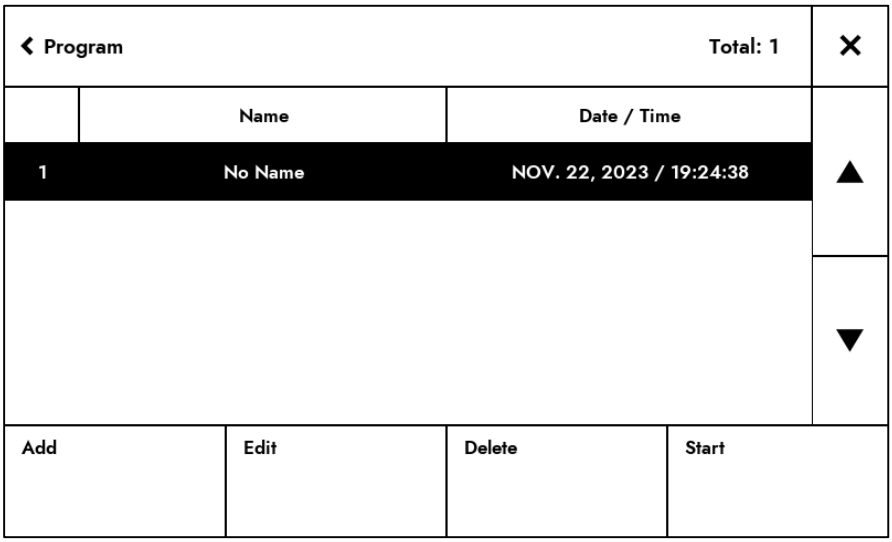
4.2.6. Program

Moves to the Program List screen.

On the Program List screen, you can add / modify / delete Programs.

Programs allow you to preset the shelf temperature and heating duration for drying, providing convenience for users when performing drying under the same conditions.

Up to 99 Programs can be saved



[Figure 11. Program List 화면]

① Count : Displays the number of saved Programs

② List : Displays the list of saved Programs. (Name and added date are displayed.)

③ Up / Down : Clicking this button moves the list. (Long-pressing moves the list quickly.)

④ Add : Touching this button moves to the screen where you can add a Program.

⑤ Edit : Touching this button moves to the screen where you can modify the selected Program from the list. (The button is deactivated if no Program is selected from the list.)

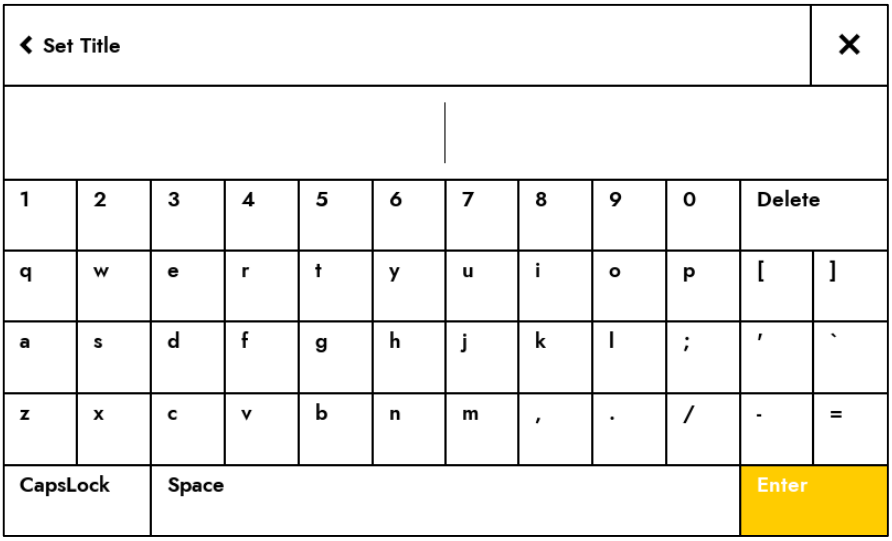
⑥ Delete : Touching this button deletes the selected Program from the list. (The button is deactivated if no Program is selected from the list.)

4.2.6.1. Add Program

Adding a Program proceeds in the following order:

1) Add Program name

A keyboard screen is displayed to add the Program name.



[Figure 12. Keyboard Screen]

① Name Input Field : Displays the name entered when touching keyboard buttons..

② Delete : Touching this button deletes the last character of the entered name.

③ CapsLock : Touching this button displays uppercase letters and special characters. Touching it again displays lowercase letters and numbers.

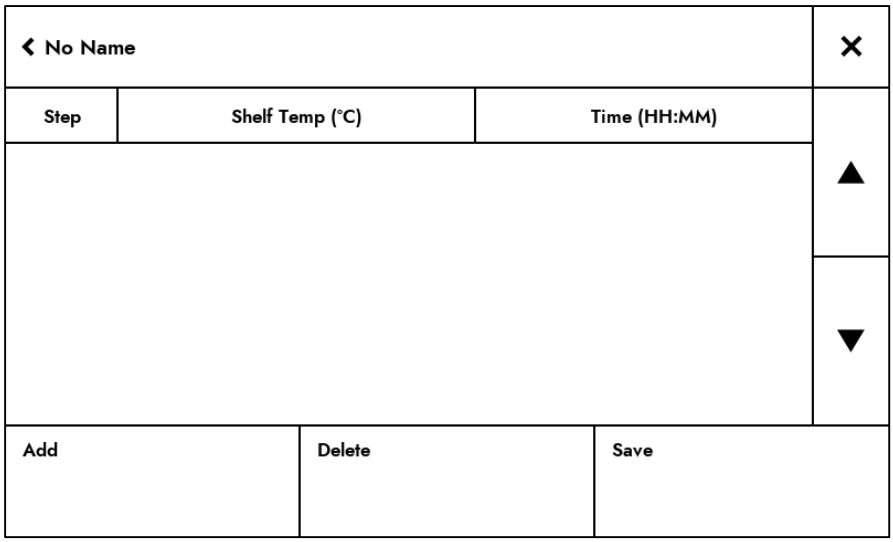
④ Space : Touching this button adds a space.

⑤ Enter : Touching this button completes the name input.

Maximum 25 characters can be entered. If nothing is entered and the "Enter" button is touched, it will be saved with the default name ("No Name")..

2) Step List

After the name is added, the Step List screen is displayed.



[Figure 13. Step List Screen]

① List : Displays the saved Step List..

② Up / Down : Touching this button moves the Step List. (Long-pressing moves the list quickly.)

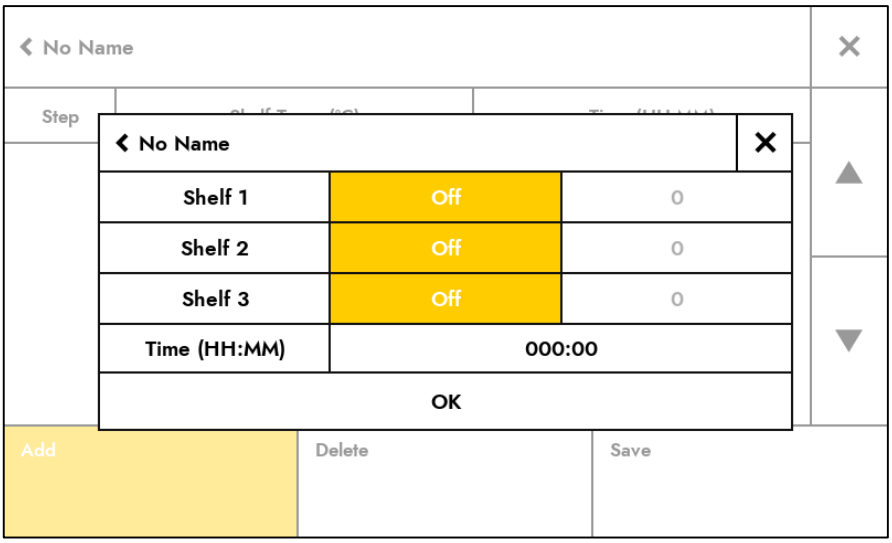
③ Add : Touching this button moves the Step List. (Long-pressing moves the list quickly.)

④ Delete : Touching this button deletes the selected Step from the Step List..

⑤ Save : Touching this button saves the current settings to the Program. The Program will not be saved if no Step is set..

3) Step Add

On the Step List screen, touching the "Add" button displays the screen to set a Step



[Figure 14. Add Step Screen]

① List : Displays the Shelf List..

② Shelf Status : Displays the Shelf status. Shelves with no sensor connected are displayed as inactive. Active buttons can be touched, and touching them repeatedly toggles between On / Off display. (However, if there are only 2 shelves, only 2 are displayed.)

[On] : The Shelf temperature can be set. The Shelf is controlled at the set temperature during drying.

[Off] : The Shelf temperature cannot be set, and the temperature of that Shelf is not controlled during drying.

③ Temperature Setting Display : Displays the temperature to control the Shelf during drying. Touching it displays a screen to set the temperature.

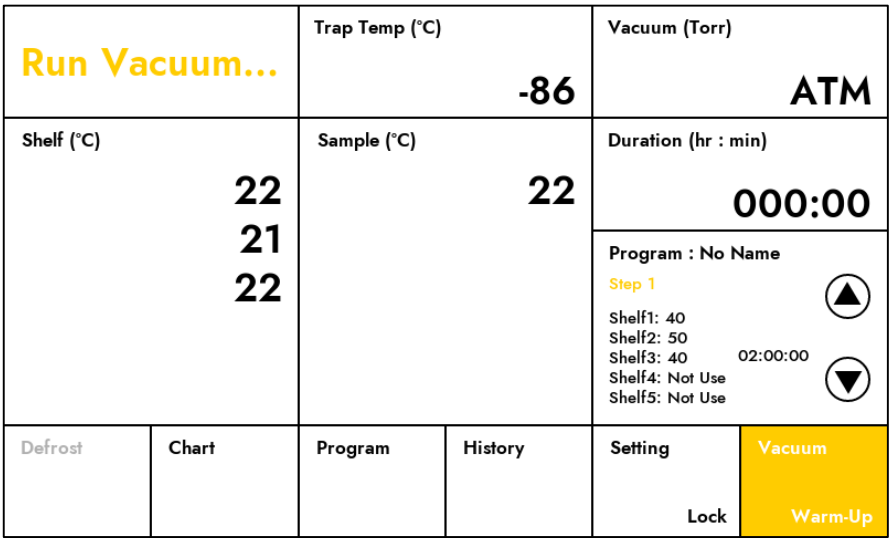
④ Time Display: Sets the hold time for the current Step. However, it cannot be set to "000:00".

⑤ OK : When the Step setting is complete, you can touch the button to complete the setting. If the time is set to "000:00", touching the OK button will not complete the setting.

4.2.6.2. Start Program

On the Program List screen, select the Program you want to use for drying.

Touch the "Start" button at the bottom to move to the Main screen and display the information of the selected Program. (However, if Shelf use is Off, a dialog box will appear indicating that the Program cannot be started.)
Once the Chamber vacuum is complete, drying proceeds according to the Program information.



[Figure 15. Main Screen when Program Starts]

① Program information : Displays the Program name and Step number (the active Step is shown in yellow, and pending or completed Steps are shown in white), the set temperature for the Shelf, and the operating time. The Program Step time starts counting when all Shelves reach the set temperature.

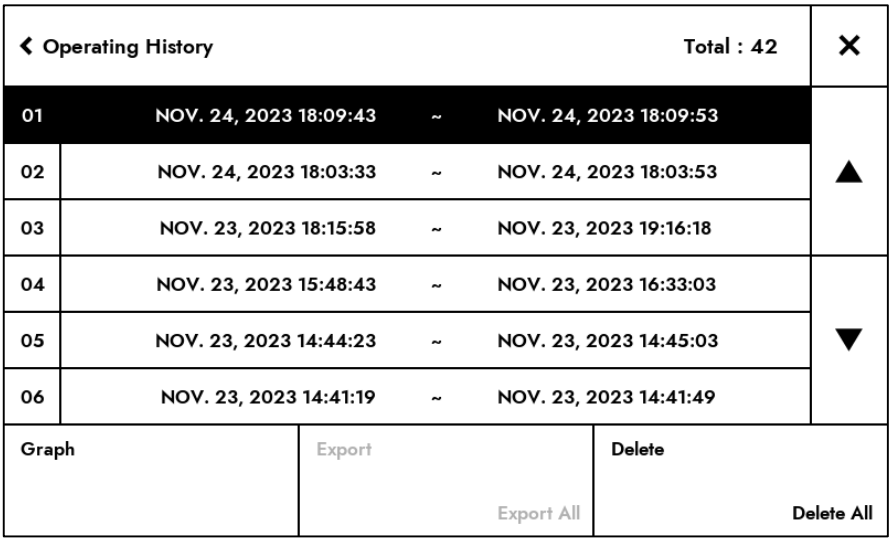
② Up / Down : Touching this button displays information for the previous / next Step.

4.2.7. History

Moves to the screen where you can check the History

4.2.7.1. Operation History

Touching the button moves to the screen where you can check the operation history.



[Figure 16. Operating History]

① Count : Displays the number of operation history records.

② Up / Down : Touching this button moves the operation history list. (Long-pressing moves the list quickly.)

③ List : Displays the operation history list. (Start time and end time are displayed.)

④ Graph : Touching this button moves to the screen that displays the data of the selected item from the history list as a Graph.

⑤ Export : Activated only when a USB is connected. Touching this button copies the log file of the selected item from the history list to the USB. (When copying to USB, it is saved in the "OperatingHistory" folder on the USB.)

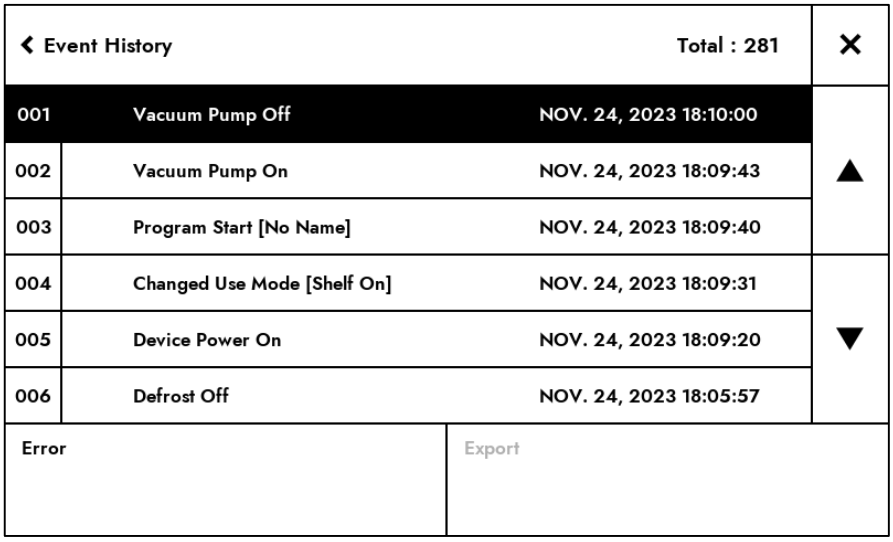
⑥ Export All : Activated only when a USB is connected. Touching this button copies the log files of all operation history records to the USB. (When copying to USB, it is saved in the "OperatingHistory" folder on the USB.)

[Operation History Log File]

When the Vacuum Pump is turned On, temperature sensor and Vacuum values are saved as a file (CSV format, named with the start time) at 10-second intervals. Log saving ends when the Vacuum Pump is turned Off.

4.2.7.2. Event History

Touching the button moves to the screen where you can check the Event history.



[Figure 17. Event History]

① Count : Displays the number of Event history records.

② Up / Down : Touching this button moves the Event history list. (Long-pressing moves the list quickly.)

③ List : Displays the Event history list. (Event message and time are displayed.)

④ Error : Touching this button displays only Events related to equipment Errors. When only Error-related Events are displayed, the text on the Error button changes to "All", and touching the All button changes it to display all Events.

⑤ Export : Activated only when a USB is connected. Touching this button copies the Event history list in log file format to the USB.

[Additional Event List]

#	Type	String	Comment
1	ERROR	ERR-00 : Comm Fail	Event added when an Error occurs. (Error number and message change according to the error situation.)
2	EVENT	Program Done [Program Title]	Event added when Program operation is completed.
3	EVENT	Drying Finished	Event added when drying operation is completed

4	EVENT	Drying Start	Event added when drying starts.
5	EVENT	Vacuum Pump On	Event added when the Vacuum Pump operates
6	EVENT	Vacuum Pump Off	Event added when the Vacuum Pump stops.
7	EVENT	Defrost On/Off	Event added when Defrost operation is turned On/Off
8	EVENT	Program Start [Program Title]	Event added when the Program Start button is clicked.
9	EVENT	Program Stop [Program Title]	Event added when the Program Stop button is clicked.
10	EVENT	Program Re-Start [Program Title]	Event added when another Program Start button is clicked during Program operation..
11	EVENT	Program Delete [Program Title]	Event added when a Program is deleted.
12	EVENT	Program Add [Program Title]	Event added when a Program is added.
13	EVENT	Changed Use Mode [Shelf On/Off]	Event added when Use Mode is changed.
14	EVENT	Changed Shelf Set Temp [XX ℃/ ℉]	Event added when Shelf temperature set value is changed.
15	EVENT	Changed Calibration [Item – XX]	Event added when the Calibration Offset value of the temperature sensor is changed. (Chamber / Shelf Heater 1~5 , Shelf Sample 1~5)
16	EVENT	Changed End Point [XX ℃/℉]	Event added when End Point setting value is changed.
17	EVENT	Changed Sound Mode [On/Off]	Event added when Sound Mode is changed.
18	EVENT	Changed Sound Volume [XX]	Event added when Sound Volume is changed.
19	EVENT	Changed Unit [Item – Unit]	Event added when the unit of the value displayed on the screen is changed. (Item can be Temp / Vacuum.)
20	EVENT	Device Power On	Event added when equipment power is turned On.
21	EVENT	Changed Real-Chart Interval Time [X sec]	Event added when Real-Chart screen Update time is changed.

22	EVENT	Start Warm-up Pump	Event added when Vacuum Pump Warm-up starts.
23	EVENT	Start Vacuum	Event added when vacuum starts.
24	EVENT	Changed Warm-up Time [XX:XX]	Event added when Vacuum Pump Warm-up time is changed.

[Event History Log File]

Event history is saved in CSV file format. When exported, it is saved in the USB Root folder with the prefix "EventData_" followed by the time.

4.2.8. Setting / Lock

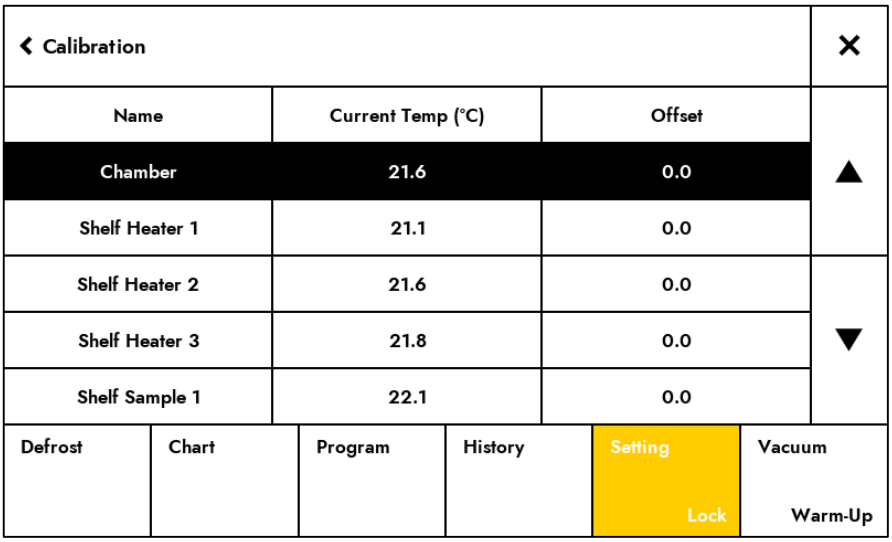
Touching the "Setting / Lock" button moves to a screen where various equipment settings can be changed.

4.2.8.1. Calibration

Menu for temperature sensor calibration.

If the current sensor temperature differs from the standard temperature sensor, the temperature sensor can be calibrated. (Calibrate by changing the Offset value.)

(If there are only 2 Shelves, only 2 are displayed.)



[Figure 18. Calibration]

① Displays the temperature sensor name.

② Displays the current sensor value (temperature value).

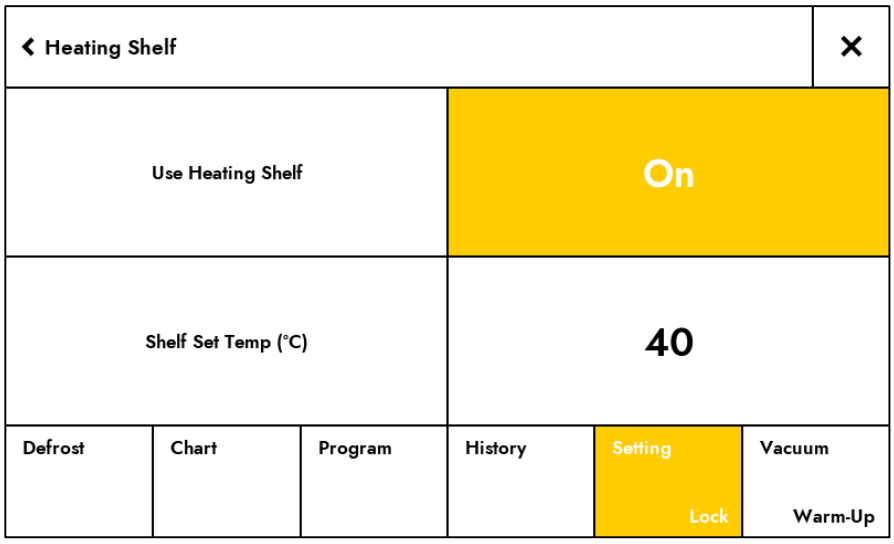
③ Displays the Offset value. Touching it displays a screen to set the Offset.

4.2.8.2. Heating Shelf

Menu to change the setting for Shelf usage

Setting to ON means Shelf is used, and Off means Shelf is not used. (The Main screen changes depending on Shelf usage.)

When set to ON, the "Shelf Set Temp" item is activated, and touching the right number area displays a screen to set the Shelf temperature. (If a Program is not started, all Shelves are controlled based on the temperature of this item.)



[Figure **19. Heating Shelf Screen]**

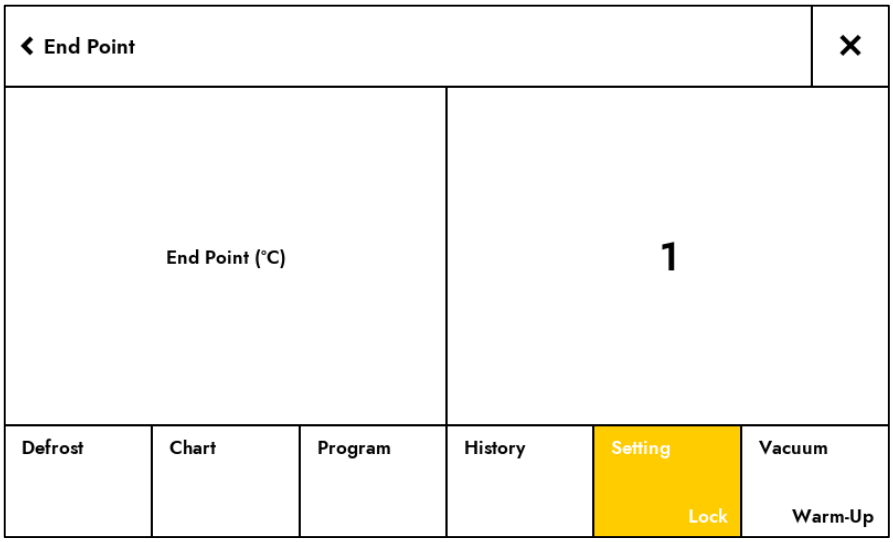
① Displays menu items.

② Displays the setting value of the item. Touching the area displays a screen to change the setting value.

4.2.8.3. End Point

Menu to set the End Point to determine the completion of drying.
The End Point (℃) is set by the difference between the Shelf temperature and the Sample

temperature. Drying is completed when the Sample temperature reaches within the End Point. (Requires Shelf and Sample thermometers connected to the equipment.)



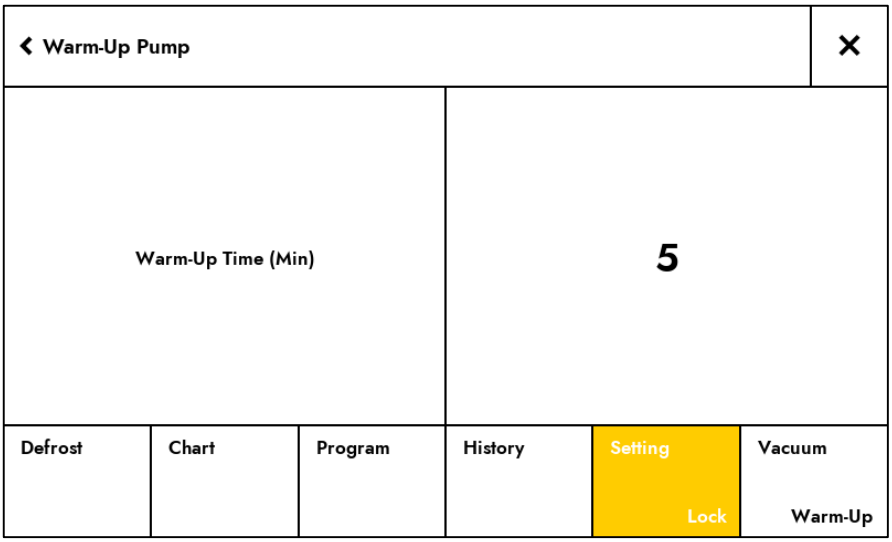
[Figure 20. End Point]

① Displays menu items.

② Displays the setting value of the item. Touching the area displays a screen to change the setting value.

4.2.8.4. Warm-Up Pump

Menu to set the Warm-Up time of the Vacuum Pump..



[Figure 21. Warm-Up Screen]

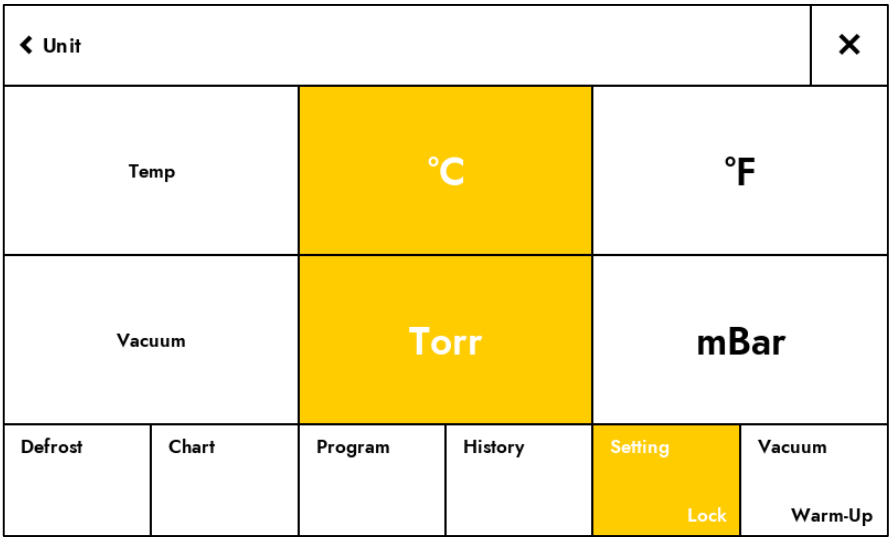
① Displays menu items.

② Displays the setting value of the item. Touching the area displays a screen to change the setting value.

4.2.8.5. Unit

Menu to change the display units for temperature and vacuum.

Temperature can be displayed in Celsius (℃) or Fahrenheit (℉), and vacuum can be displayed in Torr or mBar.



[Figure 22. Unit Screen]

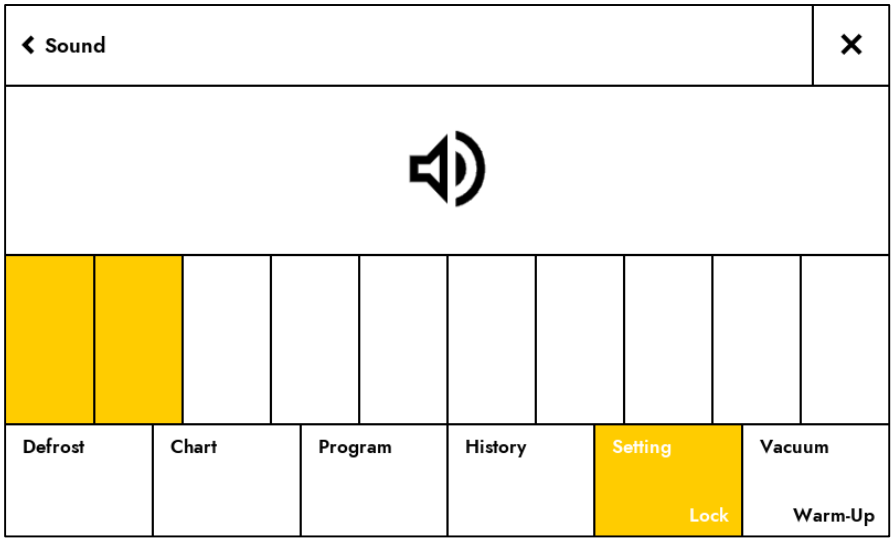
① Displays menu items.

② The selected unit is displayed in yellow. Touching the desired unit changes the unit.

4.2.8.6. Sound

Menu to change sound-related settings. (An alarm sounds when an Error occurs, and settings for the alarm sound are changed here.)

Sound can be set to Mute / Unmute. When Unmute, the sound level is adjusted.



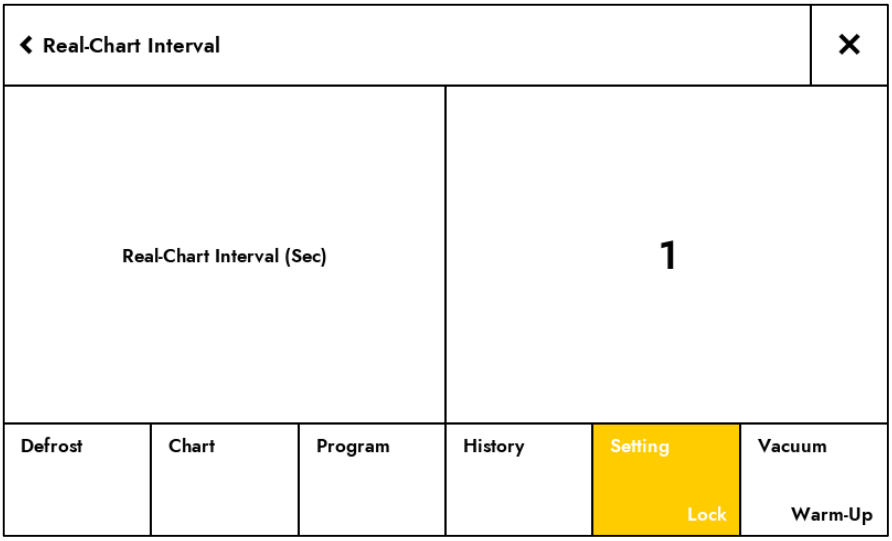
[Figure 23. Sound Screen]

① Displays sound settings. Touching it repeatedly toggles between Mute / Unmute to change sound settings

② Displays sound level. Touching it changes the level setting.

4.2.8.7. Real-Chart Interval

"Menu to change the data refresh rate setting for the Graph screen displayed by touching the "Chart" button.



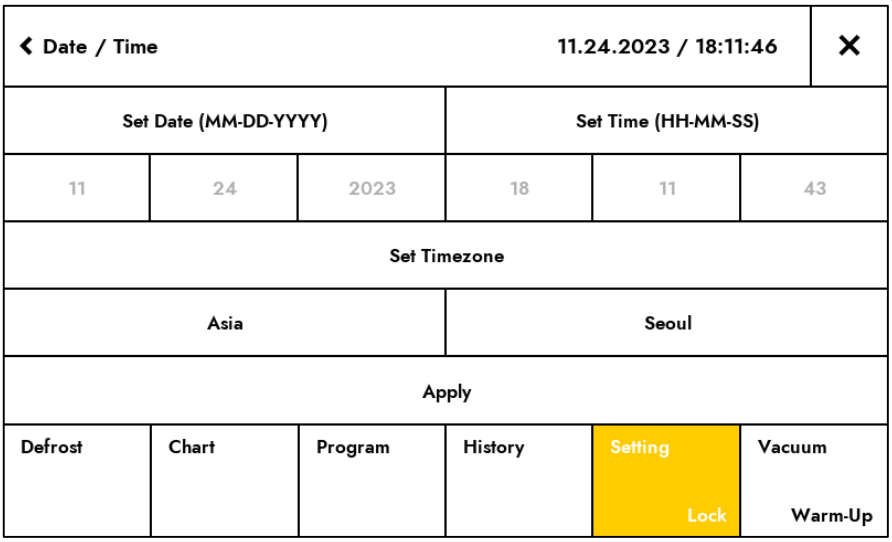
[Figure 24. Real-Chart Interval Screen]

① Displays menu items.

② Displays the Graph refresh rate. Touching it displays a screen to change the rate.

4.2.8.8. Date / Time

Menu to change the equipment time.



[Figure 25. Date / Time Screen]

① Displays the current time

② Displays the date (MM-DD-YYYY). Touching it displays a screen to change it.

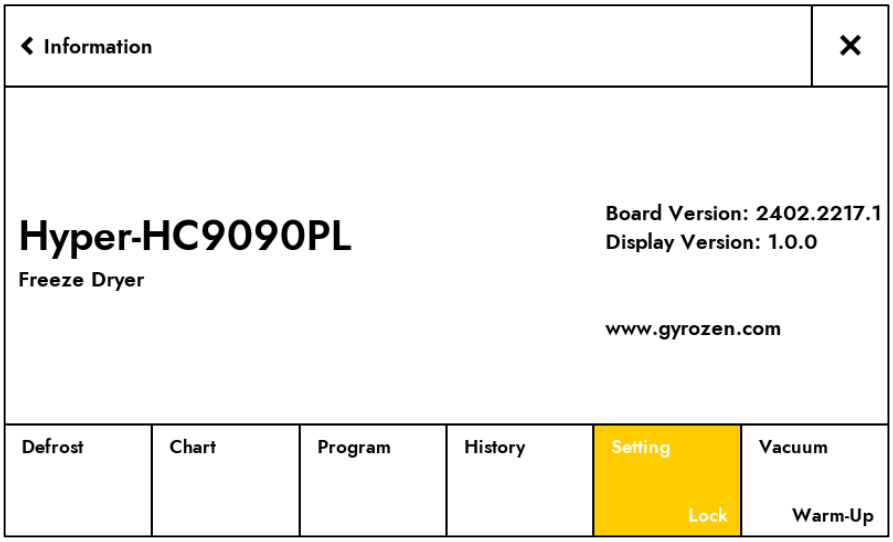
③ Displays the time (HH-MM-SS). Touching it displays a screen to change it.

④ Displays the Timezone. Touching it displays a screen to change Area / Location.

⑤ Touching this applies the set time to the equipment. The equipment will reboot upon application.

4.2.8.9. Information

Menu displaying HyperCOOL information.



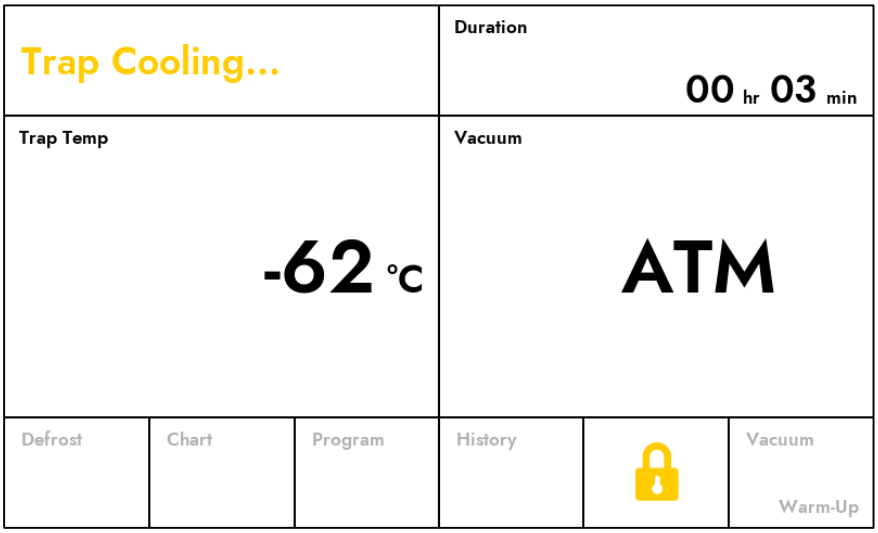
[Figure 26. Information Screen]

① Displays the model name.

② Displays S/W version and Serial Number.

4.2.9 Screen Lock

This function allows you to lock the screen. Long-pressing the "Setting / Lock" button displays a dialog box asking to set the lock function. Selecting the function setting changes the screen to the Main screen, and the screen is locked

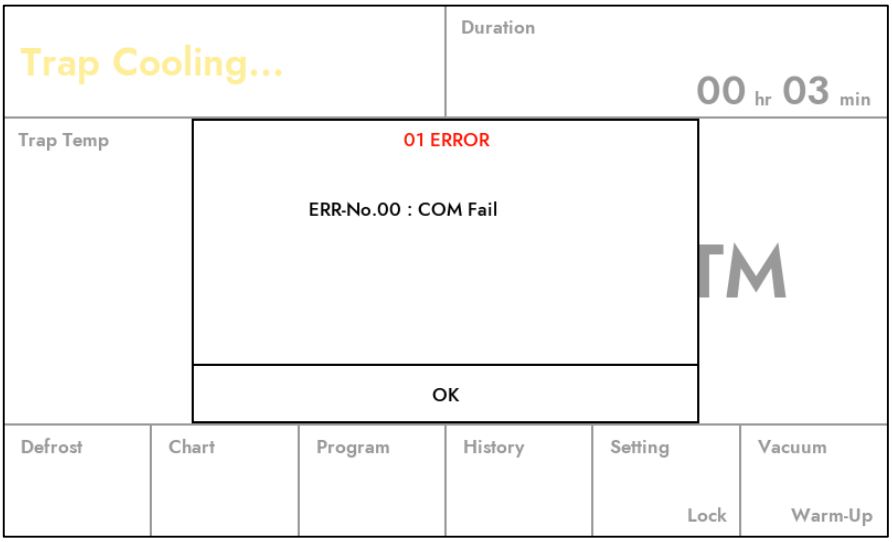


[Figure 27. Lock Screen]

When locked, no buttons can be touched. To unlock the screen, long-press the padlock button, and a dialog box asking to release the lock function will appear. Selecting release will unlock the screen

4.2.10 Error

When an Error occurs, a Pop-up displays the Error number and Error message.



[Figure 28. Error]

[OK] : Closes the pop-up.

Even if the pop-up is closed, the number of occurring Errors is displayed in the equipment status message area on the Main screen.

[Error List]

#	Error Code	Error String	Cause	Action
1	E0	Comm Fail	This error is occurred when communication between the Display and the Main Board is lost.	Please reboot the machine. If the error persists, contact the service center.
2	E1	Chamber Temp Sensor	This error is occurred when there is a problem with the Chamber temperature sensor.	Please reboot the machine. If the error persists, contact the service center.
3	E2	Shelf1 Temp Sensor	This error is occurred	Please reconnect the

			when there is a problem with the Shelf 1 temperature sensor.	Shelf 1 temperature sensor. If the error persists, contact the service center.
4	E3	Shelf2 Temp Sensor	This error is occured when there is a problem with the Shelf 2 temperature sensor.	Please reconnect the Shelf 2 temperature sensor. If the error persists, contact the service center.
5	E4	Shelf3 Temp Sensor	Please reconnect the Sample 1 temperature sensor. If the error persists, contact the service center.	Please reconnect the Shelf 3 temperature sensor. If the error persists, contact the service center.
6	E7	Sample1 Temp Sensor	This error is displayed when there is a problem with the Sample 1 temperature sensor.	Please reconnect the Sample 1 temperature sensor. If the error persists, contact the service center.
7	E8	Sample2 Temp Sensor	This error is displayed when there is a problem with the Sample 2 temperature sensor.	Please reconnect the Sample 2 temperature sensor. If the error persists, contact the service center.
8	E9	Sample3 Temp Sensor	This error is displayed when there is a problem with the Sample 3 temperature sensor.	Please reconnect the Sample 3 temperature sensor. If the error persists, contact the service center.
9	E13	Condensor Temp Sensor	This error is displayed when there is a problem with the Condenser temperature sensor.	Please reconnect the Condenser temperature sensor. If the error persists, contact the service center.
10	E14	Condensor High Temp	This error is displayed when the condenser overheats due to FAN operation or malfunction.	Please reboot the machine. If the error persists, contact the service center.

11	E17	Vacuum Sensor	This error is displayed when there is a problem with the Vacuum sensor.	Please reconnect the Vacuum sensor. If the error persists, contact the service center.

5. Maintenance

5.1. Inside the Trap

1. If the inside of the trap is contaminated, clean it with a soft cloth moistened with soapy water, then wipe it with a dry cloth, taking care to leave no moisture.

2. Do not use chemicals such as alcohol, benzene, benzol, or thinner, as they may cause damage.

3. Be careful not to scratch the surface when cleaning or moving.

▶ If the trap surface is scratched, rust may occur.

▶ If rust occurs due to prolonged exposure to moisture, remove the rust with a neutral detergent and wipe with a dry cloth.

5.2. Condenser Dust Removal

The air intake panel at the front can be detached by pulling its lower part with both hands.

If foreign matter or dust is found on the condenser surface, remove it.

6. Troubleshooting

6.1. Checklist before reporting a malfunction

If a malfunction occurs with the freeze dryer, please check the following before contacting the service center.

Symptom	Check
No Power	Refer to 3.2 Power Connection to check if the power plug is unplugged, the outlet's ground connection, and the ON/OFF button position of the power switch.
No Vacuum	Check if the silicone packing attached to the accessories is in place.

6.2. Other

1. Always comply with the warnings and instructions on the labels attached to the main unit.
2. Use genuine equipment and parts from the designated purchase location.
   Using non-genuine parts may degrade the performance of the main unit and may result in not receiving proper customer service.
3. The power is connected to the power socket at the lower left rear of the main unit. To cut off the power to the main unit, disconnect the power cord
4. Do not open or disassemble this unit arbitrarily.

7. Accessories

Essential Accessories for Full System Configuration

Description		Cat.No.
	Glass base plate for HyperCOOL to connect manifold accessories to the main body.	HHC-CPB-G HHC-CPB(9)-G (for HHC-9090PL)
	Acrylic base plate for HyperCOOL to connect chamber type accessories to the main body.	HHC-CPB HHC-CPB(9) (for HHC-9090PL)
	Rotary vane pump Pumping speed: 50Hz – 200 L/min Ultimate pressure: 1 x 10-3 torr	GVP-W2V20
	Oil mist trap for rotary vane pump	GVP-WOF150

Standard Manifold for Freeze Drying

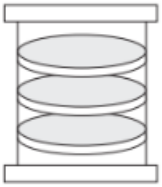
Manilfold (4, 6, 8, 12)

Manifold type accessory designed for freeze drying samples in a Flask. Depending on the number of samples per run, (4, 6, 8 or 12) valve manifold can be selected. Configured with Glass base plate.

Description	No. of Valve	Cat.No.
Tree-type mamifod	4	HHC-MF-4V
	6	HHC-MF-6V
T-type mamifod	8	HHC-MF-8V
Doubl (6+6) mamifod	12	HHC-MF-12V
Glass Base plate for 3055/3110		HHC-CPB-G
Glass Base plate for 9090PL		HHC-CPB(9)-G

Chamber

Chamber type accessory designed for freeze drying samples in vials. Configured Basic SUS Rack with 3 x ø25cm trays (HC-CR25) and Acrylic base plate.

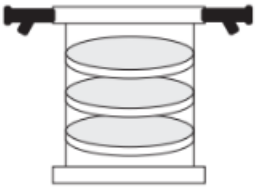


Description	Cat.No.
Acrylic chamber with top	HHC-CH30P
Acrylic Base plate for 3055/3110	HHC-CPB
Acrylic Base plate for 9090PL	HHC-CPB(9)
SUS rack with 3 trays	HHC-CR25
Additional tray (1EA)	HHC-CR-TS

Chamber + Manifold (4, 8)

Chamber type accessory designed for freeze drying samples in vials and also in flasks through the integrated manifold (4 or 8). Configured with Basic SUS Rack with 3 x ø25cm trays (HC-CR25)

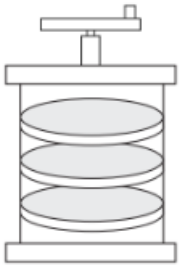
and Acrylic base plate,



Description	Cat.No.
Acrylic chamber with 4 valve top	HHC-CH30-4V
Acrylic chamber with 8 valve top	HHC-CH30-8V
Acrylic Base plate for 3055/3110	HHC-CPB
Acrylic Base plate for 9090PL	HHC-CPB(9)
SUS rack with 3 trays	HHC-CR25
Additional tray (1EA)	HHC-CR-TS

Stoppering Chamber

Stoppering Chamber type accessory designed for freeze drying samples in vials and to seal them under vacuum state.



Description	Cat.No.
Stoppering Acrylic chamber including rack & trays	HHC-SP30M
Acrylic Base plate for 3055/3110	HHC-CPB
Heating shelf stoppering chamber for secondary drying only for 9090PL model.	HHC-HSM6003

Compatible Accessories for Manifolds

	Description	Cat.No.
	Freeze drying flask for manifold drying. ø60 (150 / 300 mL) ø90 (300W ~ 1,200 mL)	HHC-AGF150 HHC-AGF300 HHC-AGF300W HHC-AGF600 HHC-AGF900 HHC-AGF1200
	2 mL tube holder for (900 / 1,200) mL flasks, 3 x 20 x 2 mL	HHC-TR9-2 / HHC-TR12-2
	15 mL tube holder for (900 / 1,200) mL flasks, 12 x 15 mL conical	HHC-TR9-15 / HHC-TR12-15
	50 mL tube holder for (900 / 1,200) mL flasks, 4 x 50 mL conical	HHC-TR9-50 / HHC-TR12-50
	Ampoule pod for 16 x ø13.5 mm Ampoules, incl. 2 tubing clamps and 16 tube caps	HHC-APC-16
	Vacuum Box for 6 x MTP or 3 x DWP (Max. height 25/51 mm)	HHC-VBOX-SET

hanil