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## **Operation Manual / Controller Guide**

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# **Highly Accelerated Stress Test System (HAST) / EHS**

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**EHS- 212, 222, 412,  
212M, 222M, 412M,  
212MD, 222MD, 412MD**

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ESPEC CORP.

- Read this manual thoroughly before operating the chamber.
- Carefully read and familiarize yourself with the "Safety precautions" section before using this product.
- Keep this operation manual handy for future reference.

#### Liability

Always observe the handling instructions detailed in this manual when using the product. ESPEC CORP. assumes NO responsibility whatsoever for accidents or chamber trouble arising from the failure to observe handling instructions contained herein. Do not perform any operation or handle the chamber in any way or form that is not described in this manual or which is herein specifically prohibited. Careless usage of this sort may result in unexpected damage to the chamber or accidents.

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**! Read this chapter before using the chamber.**

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## Introduction

**! Read this chapter before using the chamber.**

### For restricted use

This test chamber should be operated only by experienced engineers or persons who have received training in proper usage from an experienced engineer.

#### ■ Definition of an experienced engineer

A person who understands the purpose of the product; who has received training in operation methods, daily maintenance and checks, etc.; and who can foresee and prevent risks associated with inherent dangers such as electricity.

### Safety indications

The following safety indications are used throughout this manual.

#### ■ Labels that indicate danger to people

|                                                                                                  |                                                                                                                                                  |
|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
|  <b>DANGER</b>  | Improper handling of the chamber can create extremely dangerous conditions that create the risk of death or serious personal injury to the user. |
|  <b>WARNING</b> | Improper handling of the chamber can create dangerous conditions that create the risk of death or serious personal injury to the user.           |
|  <b>CAUTION</b> | Improper handling of the chamber can create dangerous conditions that create the risk of minor or slight personal injury to the user.            |

#### ■ Labels that instruct the user to avoid danger

|                                                                                                                       |                                                                                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <b>PROHIBITED</b>                 | This symbol means that specific actions are prohibited in order to prevent a dangerous situation from arising.                                       |
|  <b>Imperative Action Required</b> | This symbol means that it is imperative for the user to take specific actions (instructions) in order to prevent a dangerous situation from arising. |

#### ■ Label that indicates information on physical damage and environmental contamination

|               |                                                                                                                                                                                                 |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Notice</b> | This label means that dangerous consequences may arise, with the possibility of physical damage to equipment and facilities, or environmental pollution, if the chamber is handled incorrectly. |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Keywords

#### ■ The following keywords are used throughout this manual.

|                  |                                                                                                                                     |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <b>Note</b>      | Provides information necessary for gaining full performance from the chamber or information for preventing damage to the equipment. |
| <b>Procedure</b> | Explains how to operate the chamber on a step-by-step basis.                                                                        |
| <b>Reference</b> | Indicates reference information necessary for gaining full performance from the chamber.                                            |

**CAUTION**

**When performing operations in the test area or around the chamber, always ensure that the chamber is not remotely operated over the LAN or other communication interface.**

**If there is any possibility the chamber will be remotely operated, take necessary precautions such as turning remote operation protection on.**

Sudden operation of the chamber can result in injury.



**Ensure the chamber clearly displays that it is being remotely operated, and also properly notify all workers.**

## Manuals

The manuals are organized as follows. Refer to the appropriate manual according to the information required.

|                              |                                                                                                                    |
|------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Installation guide (booklet) | Describes how to carry in, move, and install the chamber.<br>Provided with the chamber. (Also provided on the CD.) |
| CD operation manual          | Contains the following contents.                                                                                   |

### CD operation manual content

| Name             |                    | Description                                                                                                                                                                                                                                                                            |
|------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operation manual | Installation guide | Describes how to carry in, move, and install the chamber.                                                                                                                                                                                                                              |
|                  | Basic guide        | Describes the basic operations of the chamber.<br>* For operations of options, read the contents of the appropriate option manual.                                                                                                                                                     |
|                  | Controller guide   | Describes the operations of the controller.<br>* For operations of options, read the contents of the appropriate option manual.                                                                                                                                                        |
|                  | Network guide      | <ul style="list-style-type: none"> <li>• Web application</li> </ul> Describes how to use a web browser to monitor the chamber operation, configure settings, record data, and send email alerts. <ul style="list-style-type: none"> <li>• Communication function (Ethernet)</li> </ul> |
|                  | Options            | Describes how to operate the optional equipment and functions.                                                                                                                                                                                                                         |
|                  | Circuit diagram    | Electric circuit diagram, parts list, option drawings                                                                                                                                                                                                                                  |



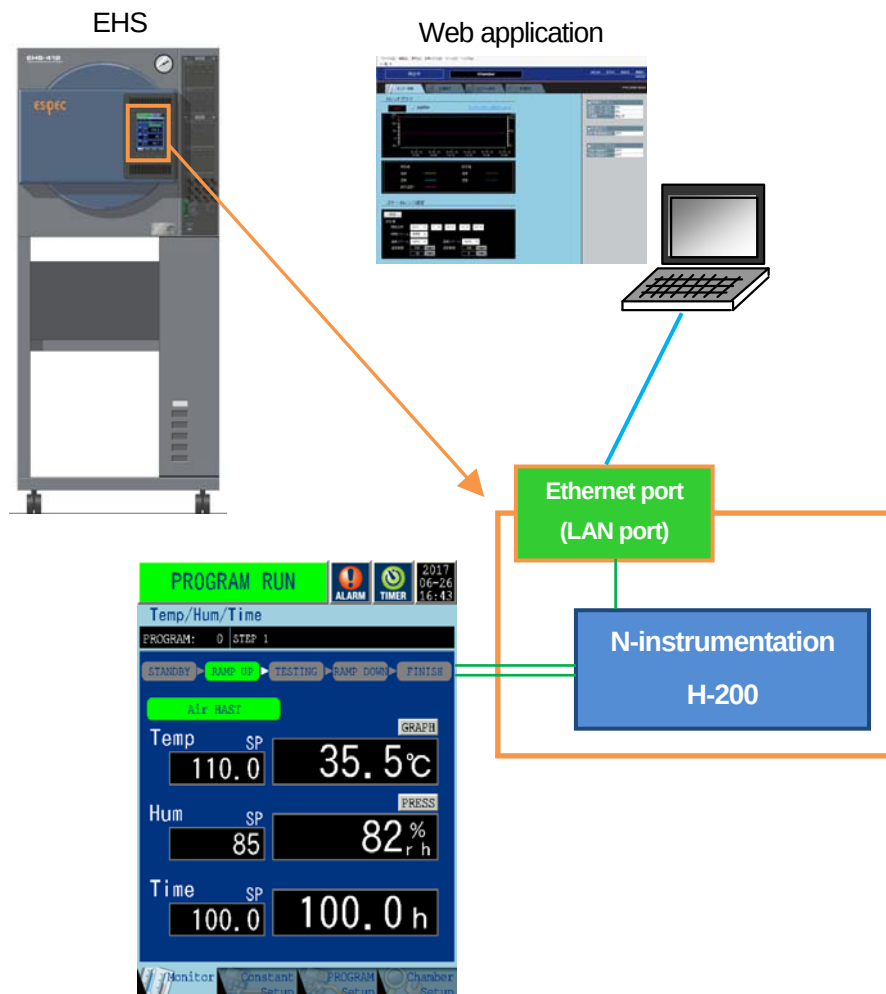


## Chapter 1 Function overview

This chapter provides an overview of the functions and describes the specifications and operation methods of the instrumentation.

### N-instrumentation configuration

The N-instrumentation is network instrumentation equipped with controller functions (constant operation and program operation) and network functions.



Controller : Explained in this manual.

Web function : See "Web application" in Operation Manual/Network Guide.

\* CAUTION: When performing remote operation with a PC, set the instrumentation screen to monitor information.

Operation commands cannot be received from the PC when set to an other screen.

## 1.1 Instrumentation organization

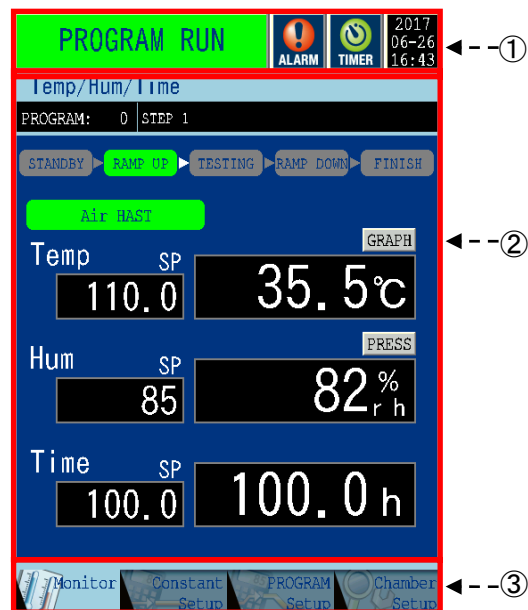
The organization of the instrumentation screen is shown in Figure 1.1.

|                       |                                                     |                               |
|-----------------------|-----------------------------------------------------|-------------------------------|
| <b>Monitor</b>        | Information                                         |                               |
|                       | Test process                                        |                               |
|                       | Temperature/humidity/time                           |                               |
|                       | Trend Graph                                         |                               |
| <b>Constant Setup</b> | Unsaturated control                                 | Temperature                   |
|                       |                                                     | Humidity                      |
|                       |                                                     | Time                          |
|                       | Saturated control                                   | Temperature                   |
|                       |                                                     | Time                          |
|                       | Dry & wet-bulb control                              | (Same as unsaturated control) |
| <b>Program Setup</b>  | Edit                                                |                               |
| <b>Chamber Setup</b>  | Set Protection                                      |                               |
|                       | RS-485 communications settings (optional function)  |                               |
|                       | RS-232C communications settings (optional function) |                               |
|                       | Set Date/Screen                                     |                               |
|                       | ROM Information                                     |                               |
|                       | Service                                             |                               |

Figure 1.1 Instrumentation overall configuration

## 1.2 Screen configuration

The instrumentation screen is composed of the following three areas.



|   | Name           | Function and purpose                                                                           |
|---|----------------|------------------------------------------------------------------------------------------------|
| ① | Common area    | Displays and is used to set the operation state (operation mode), alarm, timer, and date/time. |
| ② | Display screen | Displays and sets the main menu screens.                                                       |
| ③ | Tabs           | Displays tabs for switching menus.                                                             |

### 1.2.1 Common operations area



This area displays the status of the following functions as display functions and key functions.

|   | Icon | Function name              | Display function                                                     | Function when key is pressed                                      |
|---|------|----------------------------|----------------------------------------------------------------------|-------------------------------------------------------------------|
| ① |      | Operation display area     | Indicates the chamber operation state.                               | Displays the Operation Mode screen.*                              |
| ② |      | Alarm                      | Indicates that an alarm has occurred<br>Blinks when an alarm occurs. | Displays the alarm screen.*                                       |
| ③ |      | Timer                      | Displays the timer scheduling state.                                 | Displays the timer screen.                                        |
| ④ |      | Date and Time Display Area | Shows the current date and time.                                     | Displays the Set Date/Screen screen.<br>Language<br>Volume/Dimmer |

|                        |              |                                                     |
|------------------------|--------------|-----------------------------------------------------|
| Operation display area | STOP         |                                                     |
|                        | READY        |                                                     |
|                        | CONSTANT RUN | ☞ For details, see "Chapter 4 Constant operation".* |
|                        | PROGRAM RUN  | ☞ For details, see "Chapter 5 Program operation".*  |
|                        | CONSTANT END | ☞ For details, see "Chapter 4 Constant operation".* |
|                        | PROGRAM END  | ☞ For details, see "Chapter 5 Program operation".*  |

\* For details about using a web browser to monitor, setup, and operate the chamber: See "Web application" in the Network Guide.

## Alarm



Displays the alarm output status of the chamber.

There are two types of notifications issued by the chamber:

ALM: When a chamber error is detected, and the chamber stops operation.

WAR: When a minor chamber error is detected, and the chamber continues operation.

If an alarm occurs, the ALARM icon blinks and a buzzer sounds.

Press the alarm icon to display the Alarm screen and stop the alarm sound on the chamber. Press [Stop Beep] on the alarm screen for the alarm sound of the status indicator lights (option).

| Type | Alarm                    | Date                |
|------|--------------------------|---------------------|
| ALM  | OVERHEATING (VARIABLE)   | 2017-06-26 16:42:30 |
| WAR  | FAN ROTATION TROUBLE (3) | 2017-06-26 16:40:00 |
|      |                          |                     |
|      |                          |                     |
|      |                          |                     |
|      |                          |                     |
|      |                          |                     |

See "6.2 List of alarms" in Basic Guide.

For details on the buzzer sound setting, see "1.6 Setting the buzzer and dimmer".

[CLEAR] key on an alarm

If you eliminate the cause of the alarm while the alarm is occurring and the chamber has stopped operating, the chamber returns to normal operation automatically. The event remains in the Alarm screen's history, so press and hold [CLEAR] for one second to delete the history.

## Timer



This screen is used to configure the start timer function and to turn the timer on and off.

When the timer is turned on, the icon changes to green.

Set Timer screen

For the setting method, see "3.5.4 Auto start operation".

|                                                                                                                |                                                                                                                                                                                                                                                                               |
|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Date and time display</p>  | <p>Displays the current date and time.<br/>Press this part of the screen to display the Set Date/Screen screen.</p>  <p>☞ For the setting method, see "1.7 Setting the date and screen".</p> |
|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 1.2.2 Tab area

Monitor, Constant Setup, Program Setup, and Chamber Setup can be selected from the tabs at the bottom of the screen.



|                |                                                                                                                                                                                                                                                                                   |                                                                                      |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Monitor        | This tab allows you to check the status of the chamber. The items that can be monitored differ depending on the operation state.                                                                                                                                                  | ☞ For details, see "Chapter 4 Constant operation" and "Chapter 5 Program operation". |
| Constant Setup | This tab allows you to configure constant operation.<br>Constant operation can be set as 10 patterns in each control mode: unsaturated control, saturated control, and dry & wet-bulb control.                                                                                    | ☞ For details, see "Chapter 4 Constant operation".                                   |
| Program Setup  | This tab allows you to configure program operation.<br>Programs can be set as 10 patterns with up to 30 steps in each control mode: unsaturated control, saturated control, and dry & wet-bulb control.                                                                           | ☞ For details, see "Chapter 5 Program operation".                                    |
| Chamber Setup  | This tab allows you to check and set functions necessary for chamber operation, such as the protection settings, RS-485 communications settings (optional function), RS-232C communications settings (optional function), date/time and screen settings, and version information. | ☞ For details, see "Chapter 6 Chamber setup".                                        |

### 1.2.3 Instrumentation power switch area

|                                                                                                                          |                                                                                                                                                                                                            |  |
|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Instrumentation<br>power switch<br><br> | When the primary<br>power supply is off : Off<br>When the primary<br>power supply is on : On (orange)<br>(when receiving electricity)<br>When the instrumentation<br>screen power supply is on: On (green) |  |
|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

- Pressing and holding the operation button for one second

In order to prevent mistaken operation, the instrumentation power button, buttons to change the operation state (such as the start and stop operation buttons), and buttons to change settings will not work unless they are pressed and held for one second.

Buttons that must be pressed and held on the screen have been colored green for easy identification.





## 1.3 Turning the power on/off

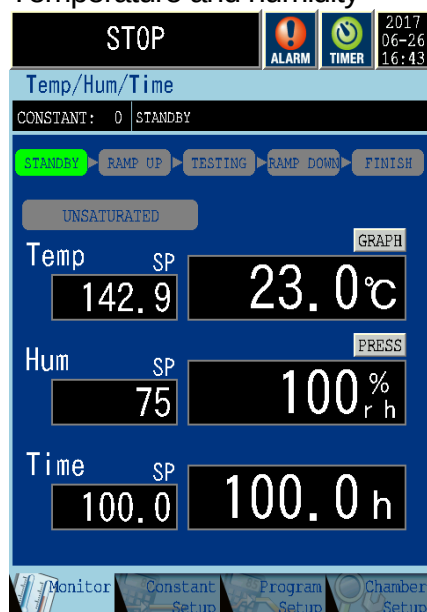
### 1.3.1 Turning on the power

Turn on the chamber's power supply with the following procedure.

#### <Procedure>

- 1) Turn on the chamber's circuit breaker.
- 2) Check that the lamp of the instrumentation power switch  lights up (in orange), and then press and hold the instrumentation power switch for one second. After the opening screen appears, the monitor information (temperature and humidity) is displayed.

Temperature and humidity



- 3) Press a tab to move to the desired screen.

### 1.3.2 Turning off the power

#### <Procedure>

- 1) Press and hold the instrumentation power switch  for one second.

| Notice                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• <b>Note that pressing the instrumentation power switch during operation will cancel the test and turn off the power of the instrumentation. In order to prevent mistaken operation, the instrumentation power button will not work unless it pressed and held for one second.</b></li> <li>• <b>Chamber/system protection</b><br/>Do not repeatedly turn the circuit breaker on and immediately turn it off. Also, do not turn off the circuit breaker while the chamber is starting.</li> </ul> |

## 1.4 Touch panel keys

This section describes the primary keys displayed on the touch panel.

### ◆ Reference ◆

- Using the touch panel with a pointed or hard object may damage the touch panel and cause malfunctions. Only use your fingers to operate the touch panel.
- Do not press the touch panel in two or more places at the same time. Doing so may cause malfunctions.

### 1.4.1 Keys used to advance operations

| Key name | Usage                                                                      |
|----------|----------------------------------------------------------------------------|
| EDIT     | Press these keys to update data.                                           |
| SAVE     |                                                                            |
| END      |                                                                            |
| APPLY    |                                                                            |
| CANCEL   | Press this key to cancel updating data.                                    |
| BACK     | Press this key to close the open screen and return to the previous screen. |

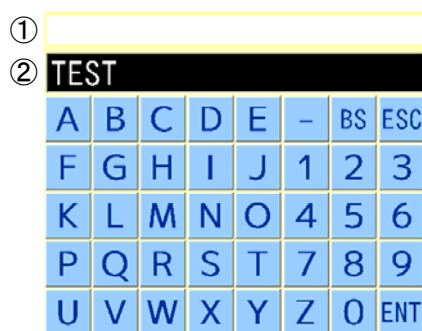
### 1.4.2 Keys for making selections from multiple items

Press the desired item key from the multiple items that make up the setting.

Example: 

The item that is set is highlighted in yellow.

### 1.4.3 Keys displayed on the character input screen



① : Displays a message about the content to enter.

② : Displays the characters being entered.

[BS] : Deletes the character at the cursor position.

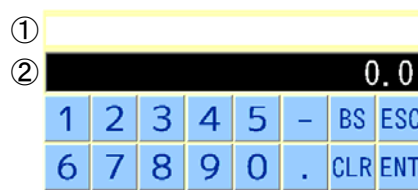
[ESC] : Discards the entered characters, cancels input, and returns to the previous screen.

[ENT] : Confirms the entered characters, exits input, and returns to the previous screen.

Note: When the character input screen is displayed, keys other than those for the input screen cannot be used.

### 1.4.4 Numeric keypad

Numeric keypad popup screen



- ① : Displays a message about the content to enter, such as the range that can be set.
- ② : Displays the number being entered.
- [CLR] : Clears all numbers in the display area.
- [BS] : Deletes the last number that was entered.
- [ENT] : Confirms the entered numbers and closes the numeric keypad.
- [ESC] : Cancels the entered numbers and closes the numeric keypad.

### 1.5 Setting the language

Select the display language.

The text will be displayed using the language you select.

You can set the language to English or Japanese.



## 1.6 Setting the buzzer and dimmer

These settings are for the volume of alarm and warning beeps, volume of key touch sounds, and brightness of the screen.

Press [Set Date/Screen] on the Configuration screen.

The Set Date/Screen screen can also be displayed by pressing the date and time section in the common operations area.



Table 1.1 Buzzer sound settings

|   |        |                                                                  |
|---|--------|------------------------------------------------------------------|
| ① | Volume | Sets the volume of alarm and warning beeps and key touch sounds. |
| ② | Dimmer | Sets the brightness of the screen.                               |

**CAUTION**

**Do not set the volume to the lowest value whenever possible to prevent any delay in the detection of an alarm or warning.**

Alarms and warnings are only indicated by a flashing red operation lamp and an on-screen warning when the volume is set to the lowest value. They are not indicated by sounding an alert.

**Set the beep volume in accordance with the local environment. Lowering the beep volume level affects the volume of both the key touch sound and the beep for indicating alarms and warnings.**

## 1.7 Setting the date and screen

These settings set the date.

Press [Set Date/Screen] on the Configuration screen.

The Set Date/Screen screen can also be displayed by pressing the date and time section in the common operations area.



Table 1.2 Date and screen settings

|   |               |                                                                                                                                            |
|---|---------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| ① | Date settings | Set the date.<br>Set the year, month, day, hour, and minute.<br>Press and hold APPLY for one second to confirm the settings when finished. |
|   |               |                                                                                                                                            |
|   |               |                                                                                                                                            |
|   |               |                                                                                                                                            |
|   |               |                                                                                                                                            |
|   |               |                                                                                                                                            |
|   |               |                                                                                                                                            |

|        | Input range  |
|--------|--------------|
| Year   | 2001 to 2099 |
| Month  | 1 to 12      |
| Day    | 1 to 31      |
| Hour   | 00 to 23     |
| Minute | 00 to 59     |

### ◆ Reference ◆

- The accuracy of the clock is within 60 seconds per month.  
This clock is built into the instrumentation, and you should periodically adjust the time.
- The input range for the day depends on the current month setting. Be sure to specify the month first, and then specify the day.  
Example: If the current setting is “03-31” (March 31) and you change the month to 02(February), the date will automatically change to “03-03” March 3 because February does not have 31 days.



## Chapter 2 Preparing for operation

This chapter explains the preparation required for conducting tests and checking items. Be sure to perform the operations in this chapter for each test.

### 2.1 Configuring specimen protection device settings

The chamber is equipped with protection devices to protect specimens against damage due to abnormally high temperatures.

#### 2.1.1 Setting the overheat protector

##### Notice

- **Be sure to set the overheat protector appropriately for the specimen before conducting a test.**

Improperly setting the overheat protector may cause the specimen to be damaged if the chamber malfunctions.

☞ For configuration details, see "1.4 Safety devices for specimen protection" in Basic Guide.

- **The overheat protector should be set before starting operation.**

Changing settings during operation may cause a false alarm.

- **Do not press the  $\Delta$  (up) and  $\nabla$  (down) keys of the setter at the same time for five seconds or more.**

If the keys are pressed at the same time for five or more seconds, the setter enters maintenance mode and the thermocouple range, temperature range, and warning mode settings of the setter are displayed. If these settings are changed, the chamber may malfunction or not operate even if the temperature setting is reached.

- **If a change of setting error occurs, "Err" is displayed and the program returns to the setting display mode.**

Set the overheat protector.

**<Procedure>**

- 1) In Set Point Display mode, press the  $\Delta$  (up) or  $\nabla$  (down) key.  
The current alarm setting is displayed and "A" is displayed in the display area.
- 2) Specify the desired temperature.  
Each time you press the  $\Delta$  (up) or  $\nabla$  (down) key (for about 0.5 seconds), the temperature is increased or decreased by 1°C.  
Holding down the key for two seconds or more sets the ones digit to "0" and the value is increased/decreased by 10°C.
- 3) Leave the device as it is without pressing  $\Delta$  (up) or  $\nabla$  (down) for five seconds or more to set the specified temperature. If the temperature is set normally, the setter returns to Set Point Display mode.  
(When five or more seconds have elapsed without pressing any key, the displayed temperature is set.)

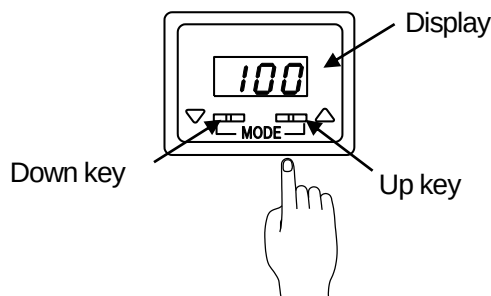


Fig 2.1 Overheat protector

Table 2.1 Alarm settings and safety actions

| Safety devices and functions | Setting<br>(Value that meets the following conditions)                                                                                                               | Safety action                                                                                                                                                                                                                                             |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Overheat protector           | <ul style="list-style-type: none"> <li>• Set to temperature setting of test area + 20°C</li> <li>• At or below the specimen's heat-resistance temperature</li> </ul> | <ul style="list-style-type: none"> <li>• Alarm display</li> <li>• Buzzer sound</li> <li>• Heater control stops</li> <li>• Humidifier control stops</li> <li>• Air circulator stops</li> <li>• Specimen power supply control terminal shuts off</li> </ul> |



## 2.2 Convenient functions

---

### 2.2.1 Using alarm output

The alarm output can be used as a contact to provide external notification of a chamber error. The contact signal is turned on when an alarm occurs.

### 2.2.2 Drainage function

The following function is available for draining the humidifying tray.

Manual drain: Drains water when [EXEC] next to Manu Drain is pressed.

The amount of drained water is about 1L for the EHS-212(M,MD) and EHS-412(M,MD) and 1.5L for the EHS-222(M,MD) per drainage cycle.



## Chapter 3 Chamber monitor/operation mode

This chapter describes the content displayed on the monitor screens.

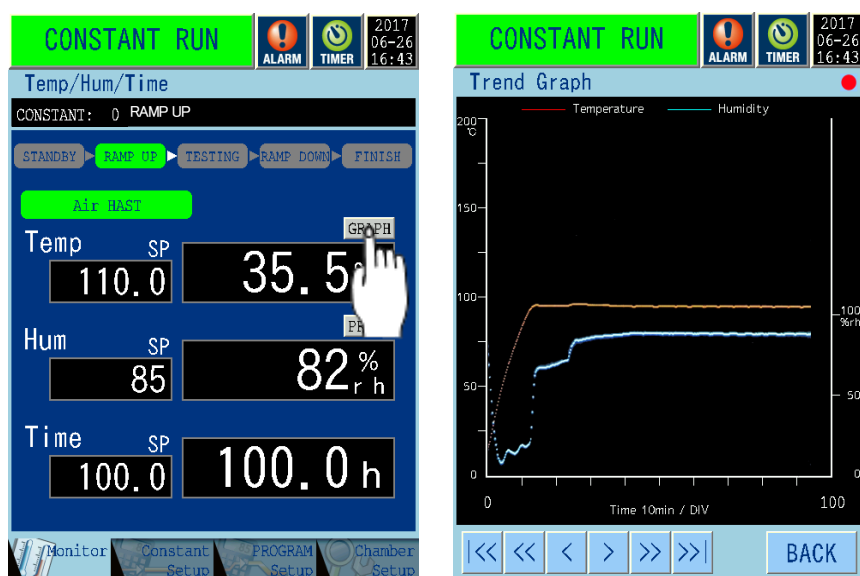
### 3.1 Chamber monitor display

Press the **Monitor** tab to display the chamber monitor.

#### ■ Graph display

Press the GRAPH button on the monitor to switch to the Trend Graph screen.

Press the BACK button on the Trend Graph screen to return to the monitor.



## 3.2 Temperature/humidity

This screen allows you to monitor the temperature and humidity in the test area.

Temp/Hum screen

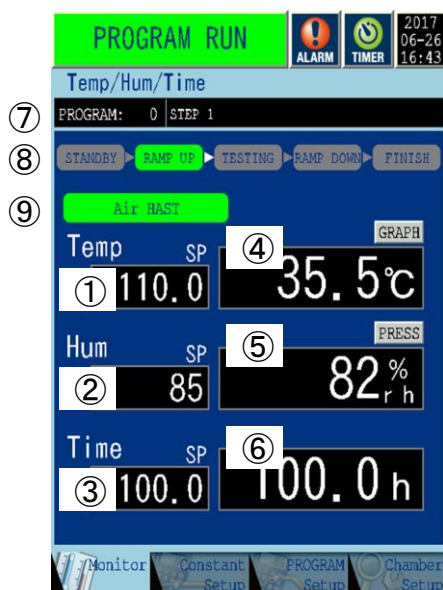
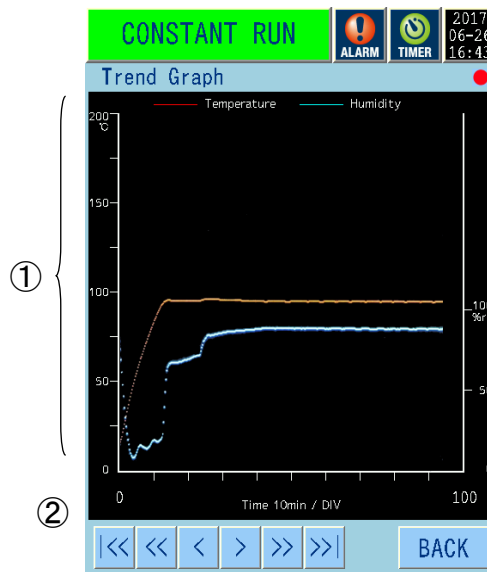


Table 3.1 Temperature/humidity

|   | Displayed content                                                    |
|---|----------------------------------------------------------------------|
| ① | Displays the temperature setting                                     |
| ② | Displays the humidity setting                                        |
| ③ | Displays the time setting                                            |
| ④ | Displays the measured temperature in the test area                   |
| ⑤ | Displays the measured humidity in the test area                      |
| ⑥ | Displays the remaining test time                                     |
| ⑦ | Displays the constant operation or program operation number and name |
| ⑧ | Displays the progress of the test process                            |
| ⑨ | Displays the selected control mode                                   |

### 3.3 Trend graph

The trend graph displays the measured values in the test area as a graph.  
Press the GRAPH button.



|   |                                                                                                                         |
|---|-------------------------------------------------------------------------------------------------------------------------|
| ① | This is the graph display frame.                                                                                        |
| ② |  : Moves the time axis of the graph. |

#### ◆ Reference ◆

- The recorded data displayed in the graph is not erased even if the circuit breaker is turned off (including momentary power failures) because the data is backed up to the internal memory.
- If the circuit breaker is turned off (including power failures) during data logging, the data during logging will be lost.
- When a new test is started, the old data will be lost because it is overwritten with new data.
- The amount of data that can be saved in the chamber is one test's worth of data. If you need to save the recorded data, do so via the Ethernet connection after the test has ended.
- The sampling cycle is fixed at 15 seconds, and up to 999.9 hours of data (limit of the setting) can be recorded.

### 3.4 Switching to the pressure display (option)

When the chamber is equipped with the optional pressure monitoring function, press the PRESS button on the monitor to switch the humidity display to the pressure display.

The pressure display will automatically switch back to the humidity display after 10 seconds.



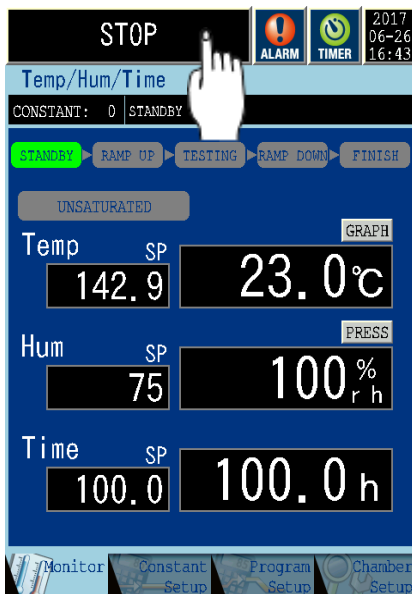
## 3.5 Operation mode

### 3.5.1 Opening and closing doors

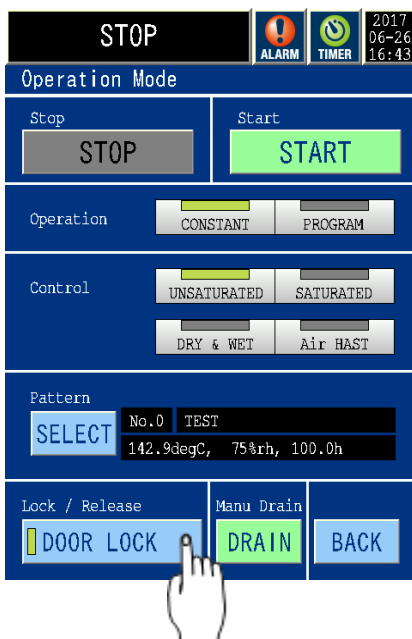
#### ■ Opening doors

##### <Procedure>

- 1) Turn on the circuit breaker. (Rear of chamber)
- 2) Press and hold the instrumentation power switch for one second.
- 3) Press the operation mode button at the top of the operation screen.



- 4) Press the DOOR LOCK button. The door is unlocked when the lamp on the button turns off.

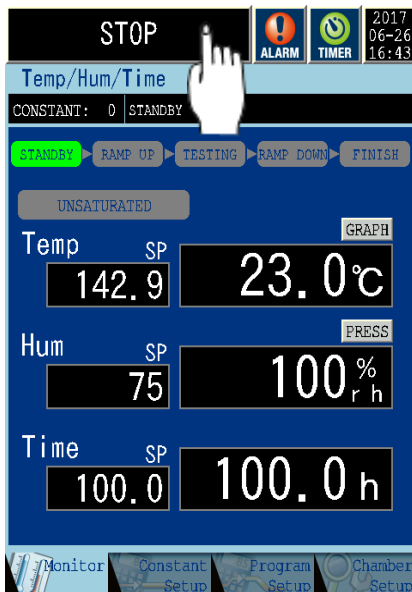


- 5) Confirm that the door is unlocked, and then open the door.

## ■ Closing doors

### <Procedure>

- 1) Confirm that the circuit breaker has been turned on. (Rear of chamber)
- 2) Confirm that the instrumentation power switch has been turned on and that the screen is displayed.
- 3) Close the door. (Push the door into the chamber.)
- 4) Press the operation mode button at the top of the operation screen.



- 5) Press the DOOR LOCK button.  
The door is locked when the lamp on the button turns on.





### 3.5.2 Starting operation

Press the operation mode button to display the Operation Mode screen.

Select the options for Operation, Control, and Pattern.

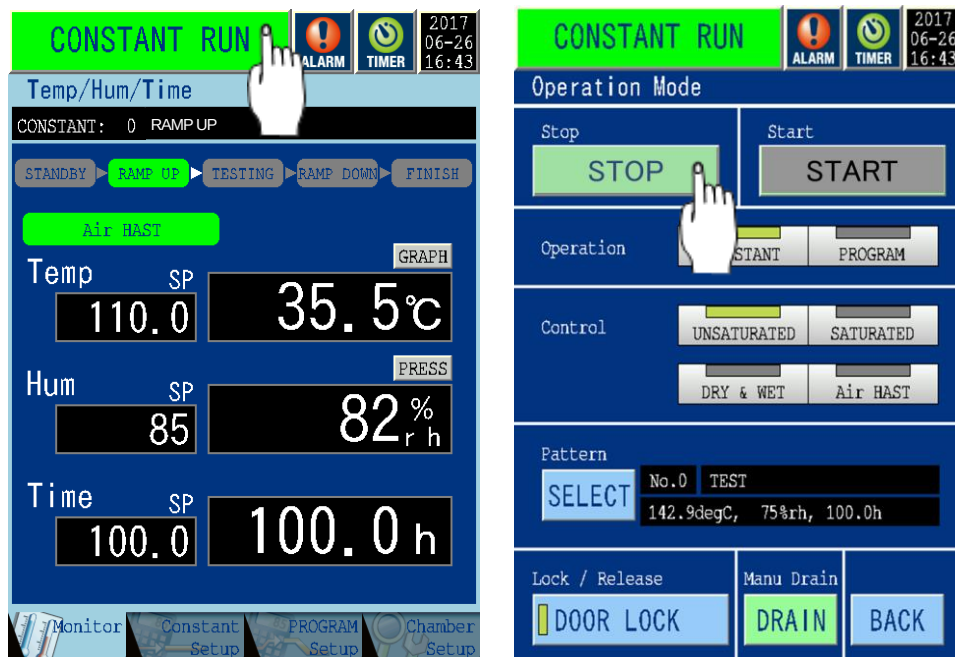
Press and hold the START for one second. This is a mechanism to prevent mistaken operation.



### 3.5.3 Ending operation

Press the operation mode button to display the Operation Mode screen.

Press and hold STOP for one second. This is a mechanism to prevent mistaken operation.



### 3.5.4 Auto start operation

Press the TIMER icon to display the Start Timer screen.

Select constant or program operation.

Select unsaturated, saturated, or dry & wet-bulb control.

Select the pattern.

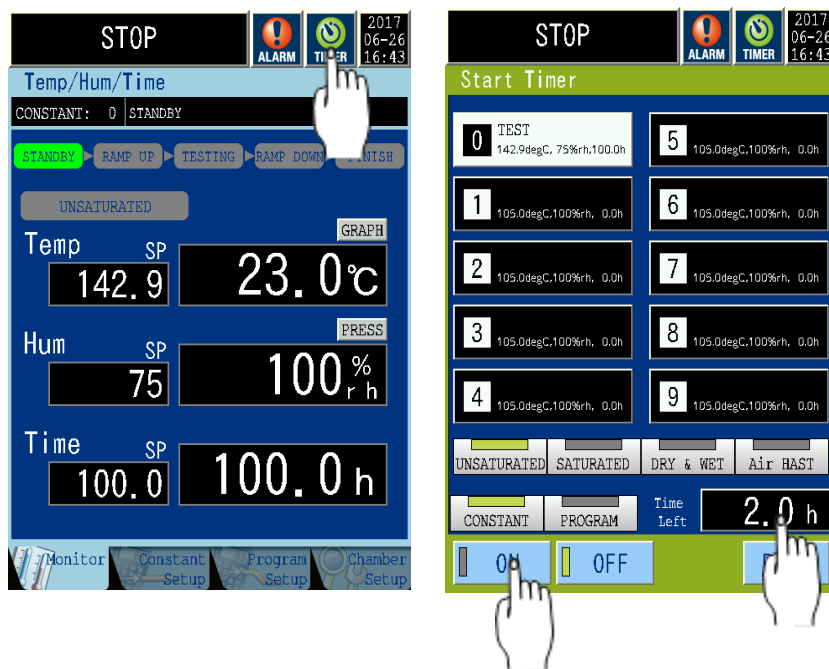
Set the time left.

Press ON.

When the timer starts, water will start to be supplied to the chamber, and after the time left has elapsed, operation will start with the specified settings.

The operation state is displayed as run during the start timer.

Press OFF to turn off the start timer. The start timer can also be turned off by pressing STOP under Operation Mode.



### 3.5.5 Manual drain

You can manually drain the chamber when cleaning or forcibly end draining during operation.

Press the operation mode button to display the Operation Mode screen.

Press and hold DRAIN under Manu Drain for one second.



## Chapter 4 Constant operation

This chapter explains the configuration method for performing constant operation and the method of starting and ending operation.

- \* During constant operation, only the settings used in operation can be changed. Other constant operation settings and program operation settings cannot be edited. Edit these settings after operation ends.

### ◆ Reference ◆

- You can configure, run, and monitor constant operation from a remote point by using the web function. For details, see "Web application" in Network Guide.
- The settings given in this chapter cannot be configured when protection is on. See "6.2 Setting protection" in "Chapter 6 Chamber setup".

### 4.1 What is constant operation?

Constant operation is a method to set the chamber to a constant temperature and humidity and then to maintain the test area temperature and humidity at those values.

This is called constant operation because the chamber operates with the settings at constant values.

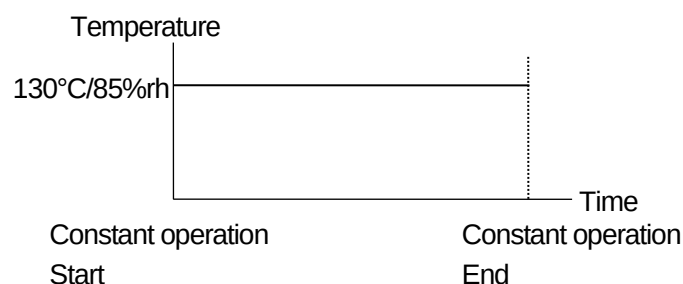


Figure 4.1 Example of constant operation

## 4.2 Entering temperature, humidity, and time

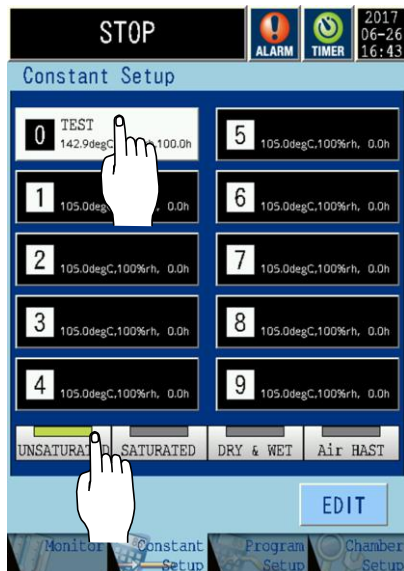
Set the control settings (temperature, humidity, and time) for performing constant operation. Constant operation can be saved as 10 patterns of settings in each control mode: unsaturated control, saturated control, and dry & wet-bulb control.

### <Procedure>

- 1) Press the Constant Setup tab to display the Constant Setup screen.



- 2) Select the control mode to configure, and then select the constant operation number to edit.  
Press the EDIT button after selecting a number.

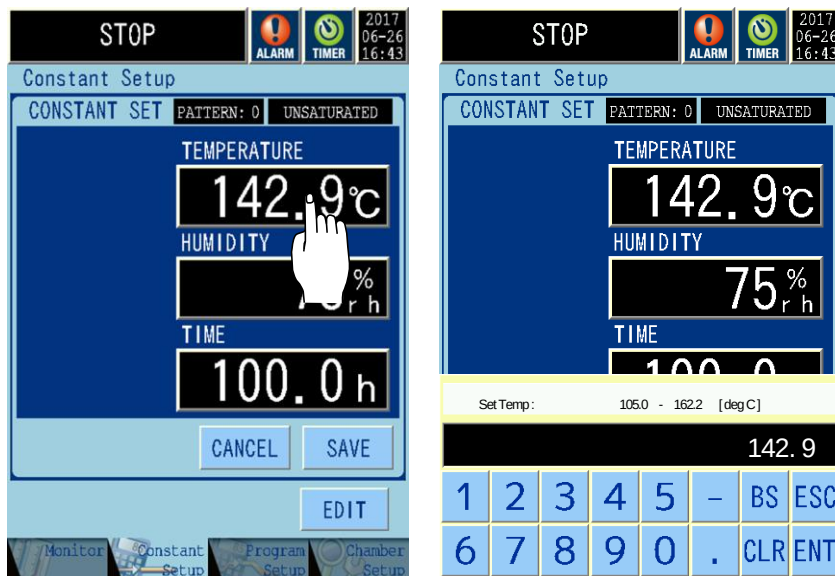


## 3) Set the temperature, humidity, and time.

The input screen will be displayed when you press a displayed number.

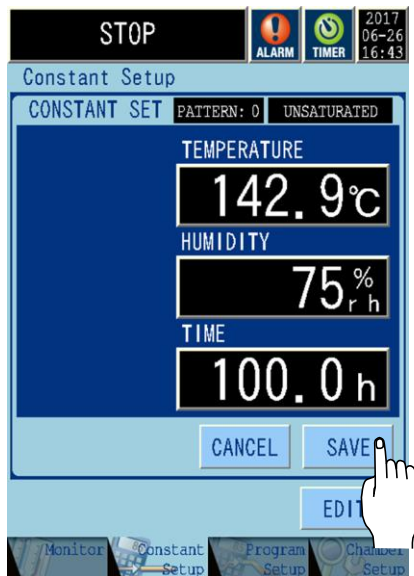
The input range will be displayed at the top of the popup screen.

Clear the displayed value, enter the numbers, and confirm them with the ENT button.

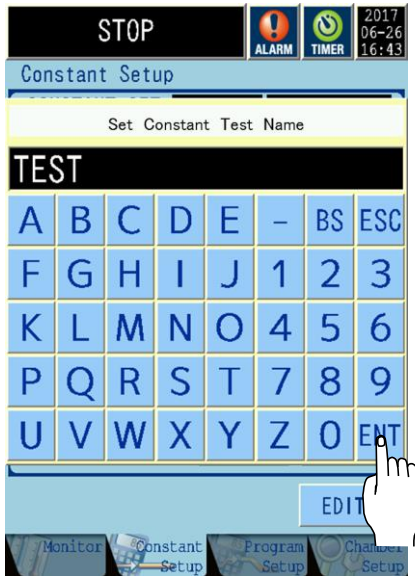


## 4) Save the settings.

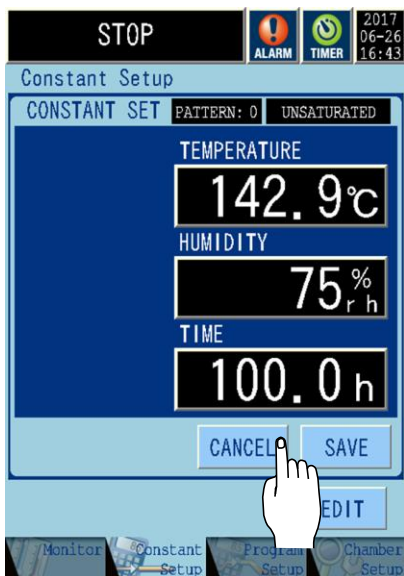
Press the SAVE button when you have finished configuring the settings.



- 5) Enter a name for the constant operation settings.  
Enter the name and press ENT to complete the settings.



- 6) To cancel the settings, press CANCEL on the setup screen.  
The entered settings will be discarded, and the settings will be restored to the original settings.

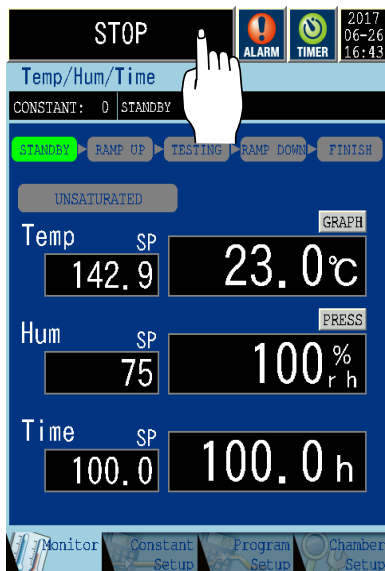


### 4.3 Starting/ending operation

Before starting operation, check that the following work has been correctly performed: "2.1 Configuring specimen protection device settings" in "Chapter 2 Preparing for operation".

Use the Operation Mode screen to start and stop operation.

Press the operation display area at the upper left of the screen to display the Operation Mode screen.



#### 4.3.1 Starting constant operation

##### <Procedure>

- 1) For Operation, select CONSTANT.
- 2) For Control, select the control mode to use.



- 3) For Pattern, select the constant operation pattern to use.



- 4) Press the START button.  
Press and hold the START button for one second. (This is a mechanism to prevent mistaken operation.)  
The chamber will start operation.

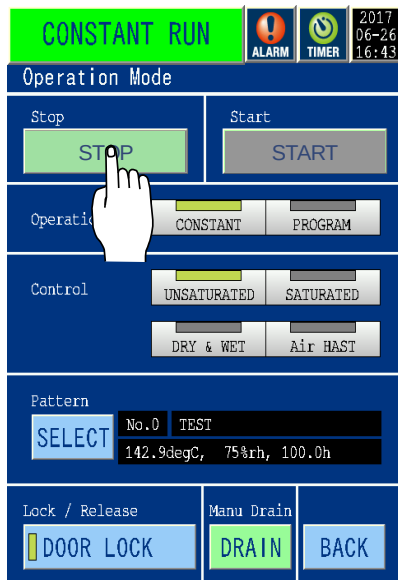




### 4.3.2 Ending constant operation

#### <Procedure>

- 1) Press [Stop] under Stop Operation.  
Press and hold the STOP button for one second. (This is a mechanism to prevent mistaken operation.)  
The chamber will stop operation.



- 2) If you will not use the chamber for a long time, turn off the circuit breaker as well.



## Chapter 5 Program operation

This chapter explains the configuration method for performing program operation, the method of starting and ending operation, and the displayed content on the monitors.

- \* During program operation, no constant operation settings or program operation settings can be edited. Edit these settings after operation ends.

### ◆ Reference ◆

- You can configure, run, and monitor program operation from a remote point by using the web function. For details, see "Web application" in Network Guide.
- The settings given in this chapter cannot be configured when protection is on. See "6.2 Setting protection" in "Chapter 6 Chamber setup".

### 5.1 What is program operation?

Program operation changes the settings of the temperature and humidity in the test area in accordance with the program that you create by combining temperature and humidity steps. 10 program patterns can be registered for each control mode, and up to 30 steps of operation data can be registered per program pattern.

Time, temperature, and humidity settings can be specified for each step, which allows for chamber operation that follows specific time control, as shown below.

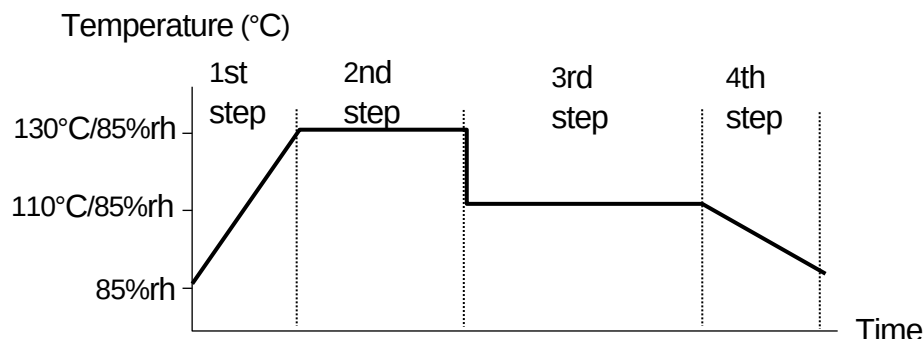


Figure 5.1 Example of program operation

## 5.2 Configuring program settings

Enter the temperature, humidity, and time setting for each step to create or edit an operation pattern.

\* Programs can be created in 10 patterns with up to 30 steps for each control mode.

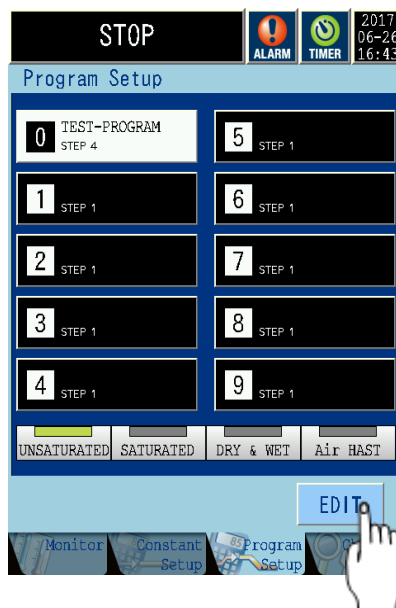
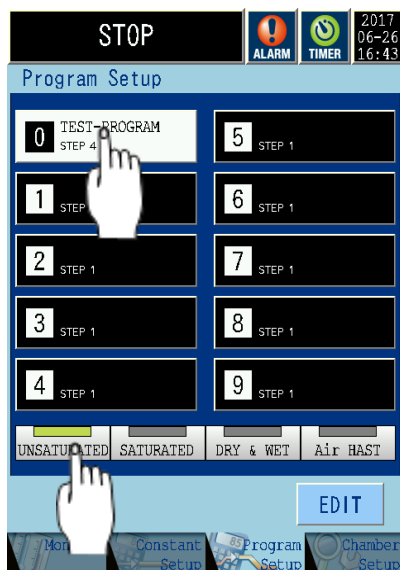
### 5.2.1 Procedure for editing programs

#### <Procedure>

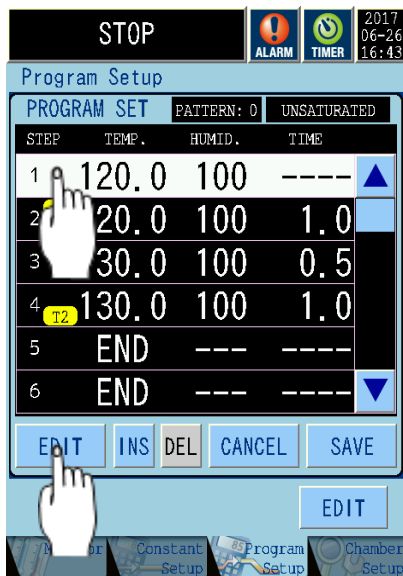
- 1) Press the Program Setup tab.



- 2) Select the control mode to configure, and then select the program operation number to edit.  
Press the EDIT button after selecting a number.



- 3) Select the step to edit, and then press the EDIT button.



- 4) Edit the settings for the step.  
 Set the temperature, humidity, and time.  
 The input screen will be displayed when you press a displayed number.  
 The input range will be displayed at the top of the popup screen.  
 Clear the displayed value, enter the numbers, and confirm them with the ENT button.



If 0 is set for the time setting, that step is skipped and the program moves to the next step.

Press ENTER when finished entering the step, and then set the next step.

## ① SKIP setting

This setting skips an unnecessary step in the program and moves to the next step.

Press the SKIP button on the edit screen for the step settings.

SKIP will be displayed for the temperature.

When you finish configuring the settings, press ENTER.

## ② LOOP setting

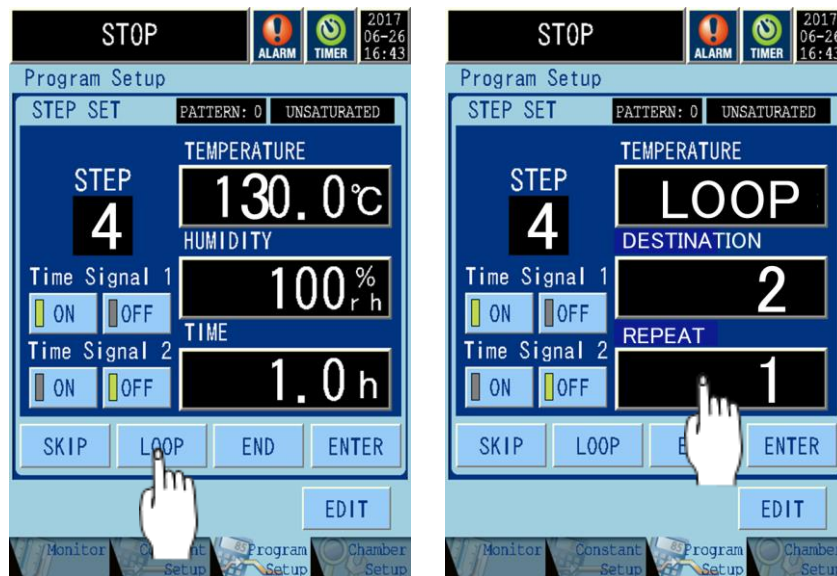
You can set the number of repetitions to loop steps.

Use LOOP to repeat one or multiple steps.

Press the LOOP button on the edit screen for the step settings.

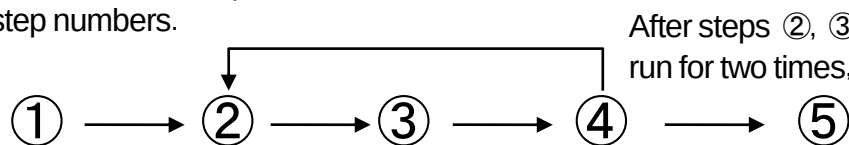
LOOP will be displayed for the temperature.

Specify the step number to be the starting point of the loop. Set the number of repetitions.



Example of loop settings:

To loop from step 2 to step 4 for two times. Enter DESTINATION: 2 and REPEAT CYCLE: 1. The loop will function as shown below. The circled numbers indicate the step numbers.



When you finish configuring the settings, press ENTER.

## 5) Program END step setting

Press the END key.

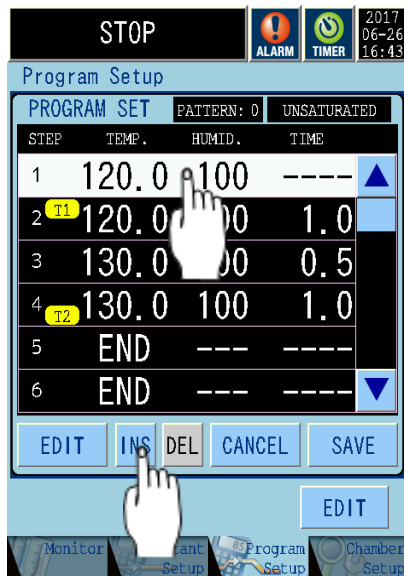
END will be displayed for the temperature.

When you finish configuring the settings, press ENTER.

## 6) Inserting and deleting steps

## 1. Inserting a step

First select the program to edit, and then select the location to insert the step.  
Press INS to insert a step. The selected step will move to the next step.



## 2. Deleting a step

First select the program to edit, and then select the step to delete.  
Press DEL to delete the step. The next step will move up.  
Step 1 cannot be deleted.



## 7) Special settings during dry &amp; wet-bulb control

## 1. H step setting

When dry & wet-bulb control is selected, the humidity can be set for the ramp up process with the initial H step. However, the temperature and time cannot be set.

## 2. Ramp settings

Ramp control is performed for settings that involve a change in temperature or humidity from the previous step.

## 3. Save process settings

The save process can be set with the temperature, humidity, and save time to maintain for the step after the step that is set with the temperature, humidity, and time of the ramp down process.

If the time is set as a - (dash), the save process will be maintained until the test is stopped.

Example settings:

| Step No. | Temperature | Humidity | Time | Process   |
|----------|-------------|----------|------|-----------|
| H        | —           | 85%rh    | —    | RAMP UP   |
| 1        | 130°C       | 85%rh    | 2.0  | RAMP UP   |
| 2        | 130°C       | 85%rh    | 1.0  | TESTING   |
| 3        | 85°C        | 85%rh    | 2.0  | RAMP DOWN |
| 4        | 85°C        | 85%rh    | —    | RAMP DOWN |
| 5        | END         |          |      | END       |

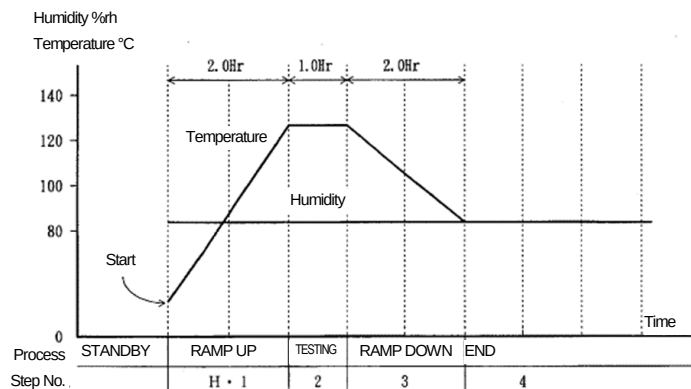
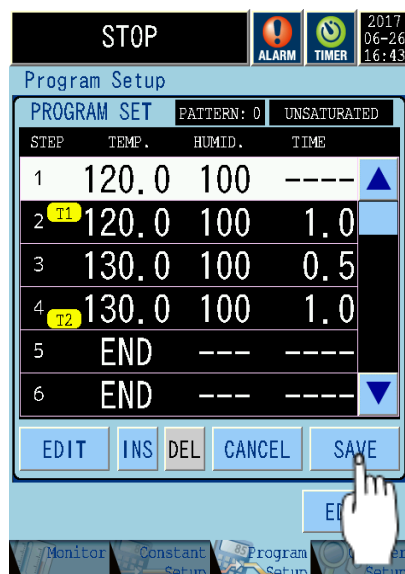


Fig. 6.3 Program example

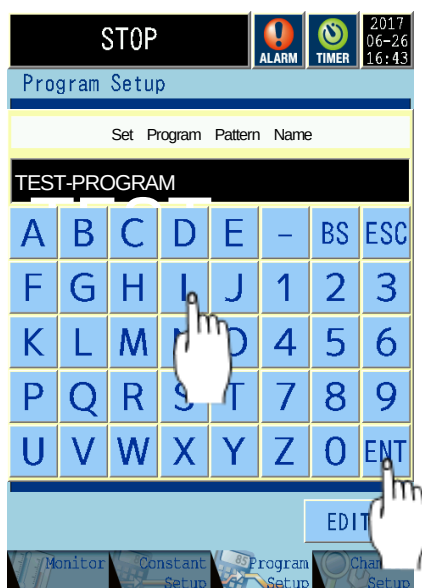
## 8) Save the settings.

Press the SAVE button when you have finished configuring all of the settings.

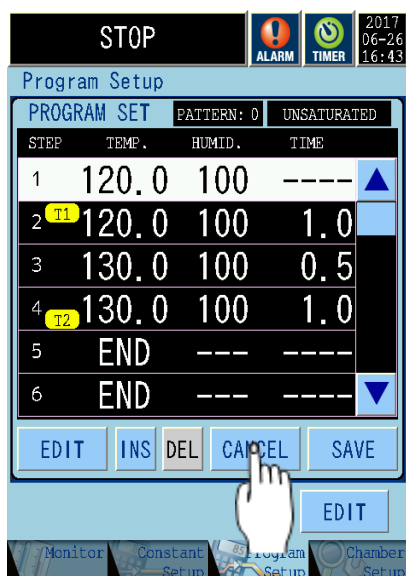




- 9) Enter the program pattern name.  
Enter the name and press ENT to complete the settings.



- 10) To cancel the settings, press CANCEL on the setup screen.  
The entered settings will be discarded, and the settings will be restored to the original settings.



## 5.3 Starting/ending operation

Before starting operation, check that the following work has been correctly performed: "2.1 Configuring specimen protection device settings" in "Chapter 2 Preparing for operation".

Operation is started/ended or paused/resumed from the Operation Mode screen.

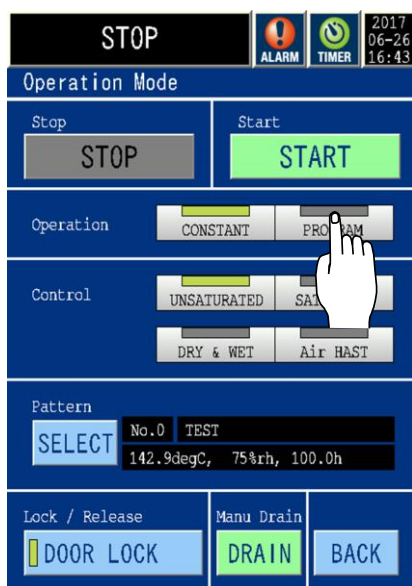
Press the operation display area at the upper left of the screen to display the Operation Mode screen.



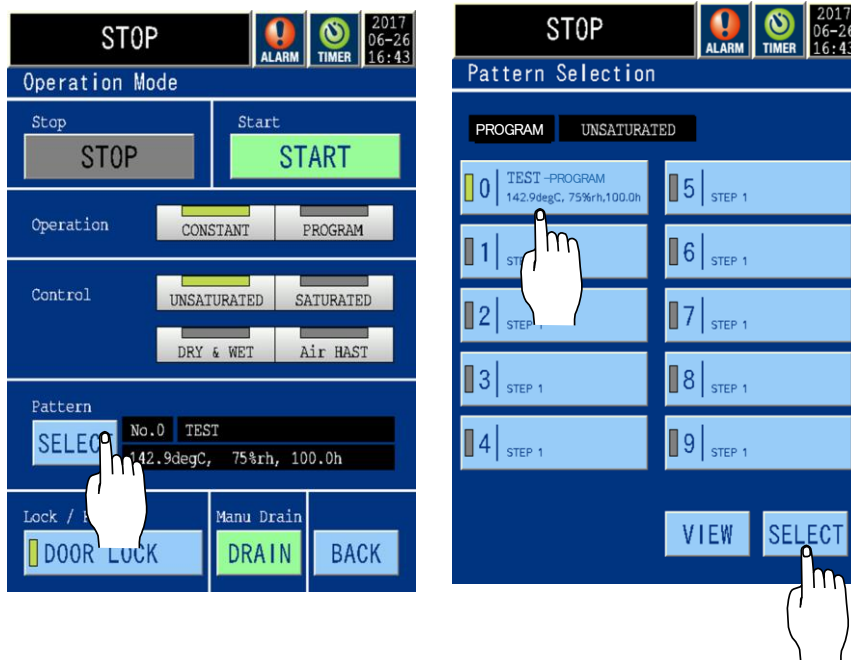
### 5.3.1 Starting program operation

#### <Procedure>

- 1) For Operation, select PROGRAM.
- 2) For Control, select the control mode to use.



- 3) For Pattern, select the program pattern to run.  
Select VIEW to display the settings of the selected program pattern in a list.



- 4) Press the START button.  
Press and hold the START button for one second. (This is a mechanism to prevent mistaken operation.)  
The chamber will start operation.



### 5.3.2 Ending program operation

#### <Procedure>

- 1) Press [Stop] under Stop Operation.  
Press and hold the STOP button for one second. (This is a mechanism to prevent mistaken operation.)  
The chamber will stop operation.



- 2) If you will not use the chamber for a long time, turn off the circuit breaker as well.

## Chapter 6 Chamber setup

This chapter describes configuration methods for the various control items.

### 6.1 Chamber setup organization

Chamber setup is where you configure the chamber settings and the operation (control) settings.

Table 6.1 shows the organization of chamber setup.

Table 6.1 Chamber Setup organization

|                                                                                                               |                                                     |
|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| Set Protection<br>(Settings for preventing malfunctions and limiting functionality)                           | Screen Operation Security                           |
|                                                                                                               | Prevent Remote CTRL (general communication and LAN) |
| RS-485 communications settings (option)                                                                       |                                                     |
| RS-232C communications settings (option)                                                                      |                                                     |
| Set Date/Screen                                                                                               | Date/time                                           |
|                                                                                                               | Language                                            |
|                                                                                                               | Volume                                              |
|                                                                                                               | Dimmer                                              |
| ROM Information (system version information, chamber serial number, operation hour meter, optional functions) |                                                     |
| Service (unavailable for user)                                                                                |                                                     |

## 6.2 Setting protection

By setting protection, you can prevent erroneous operations during setup and when setting operation. You can also use these settings to limit the functionality of the chamber. Configure the protection settings as required.

Press [Set Protection] on the Chamber Setup screen.

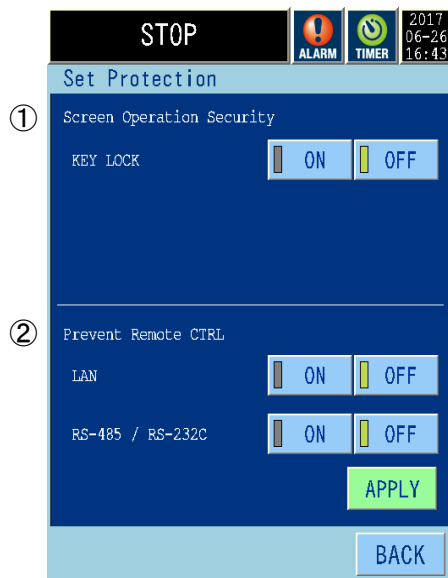


Table 6.2 Protection settings

|   |                                             | When protection is set to [ON]                                                              |
|---|---------------------------------------------|---------------------------------------------------------------------------------------------|
| ① | Screen Operation Security                   | Disables operations to change settings or chamber operation.                                |
| ② | Prevent Remote CTRL LAN                     | Disables changes to data and requests to change the operation state via LAN.                |
|   | Prevent Remote CTRL RS-485/RS-232C (option) | Disables changes to data and requests to change the operation state via RS-485 and RS-232C. |

Press and hold APPLY for one second after selecting the protection settings.

### ◆ Reference ◆

- If the circuit breaker is turned on again when Screen Operation Security is set to ON, the chamber will automatically enter the power on state while maintaining protection.
- If an alarm occurs, Screen Operation Security and Prevent Remote CTRL are canceled automatically in order to allow emergency stop of the chamber and to change settings.

## 6.3 Setting the date and screen

Set the date and time.

Press an item to change and update the value using the numeric keypad.

Press and hold APPLY for one second to confirm the change.

If not changing the settings, press BACK. The changes will not be applied and the previous settings will be restored.

Set the language.

You can set the language to English or Japanese. The language will change immediately after it is selected.

Set the volume and dimmer.

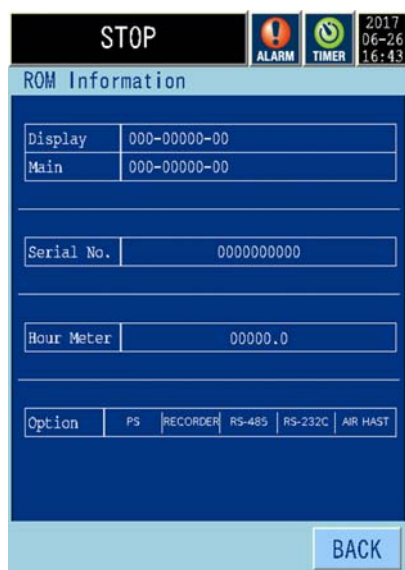
These can be set with the left and right keys.



The date and screen settings can also be displayed by pressing the date at the top right of the screen.

## 6.4 Displaying the version information

You can check the system version information, chamber serial number, operation hour meter, and options.









MEMO

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