Operation manual / Basic guide

Temperature (and humidity) chamber
Platinous J series

PR/PL/PU/PSL/PG/
PHP/PDR/PDL/PCR (N-instrumentation)

40015040003F0
October 24, 2019

ESPEC CORP.

■Read this operation 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 use the chamber by observing the usage and handling methods described in this manual. 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 specifically prohibited. Careless usage of this sort may result in unexpected damage to the chamber or accidents.

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Read this section before using the equipment.

Chapter 1 Safety precautions

Read this section before using the equipment.

Chapter 2 Overview

Chapter 3 Part names and functions

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Introduction

Read this section before using the equipment.

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**

DANGER	**Means that extremely dangerous consequences may arise, with the risk of death or serious injury to the user, if the chamber is handled improperly.**
WARNING	**Means that dangerous consequences may arise, with the risk of death or serious injury to the user, if the chamber is handled improperly.**
CAUTION	**Means that dangerous consequences may arise, with the risk of minor injury or light wounds to the user, if the chamber is handled improperly.**

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

PROHIBITED	**This mark means that specific actions are prohibited in order to prevent a dangerous situation from arising.**
Imperative Action Required	**This mark 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**

Notice	**This mark means dangerous consequences may arise, with the possibility of damage to equipment and facilities or environmental pollution, if the equipment is handled incorrectly.**

Keywords

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

Note	**Provides information necessary for gaining full performance from the chamber or to prevent damage to the equipment.**
Procedure	**Explains how to operate the chamber on a step-by-step basis.**
Reference	**Offers additional information.**

List of remaining risks (instructions for avoiding danger)

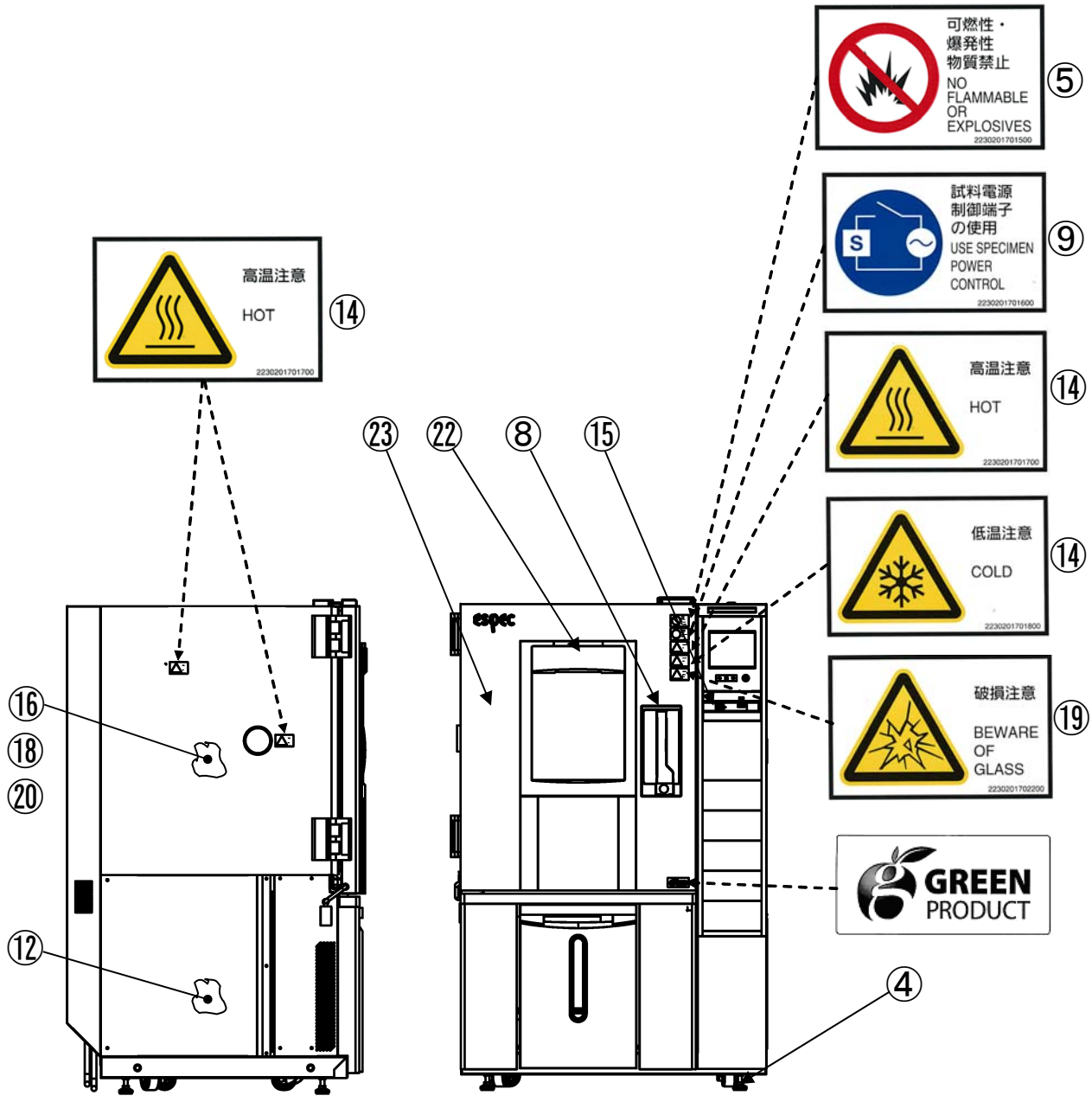
To ensure the safe and correct use of the chamber, this section gives a list of the items that pose the threat of danger and instructions for avoiding said danger. For details, see the pages indicated for the items. Also, the locations corresponding to each item are written on the following pages, so be sure to read all of these pages together.

	Risks and countermeasures during transportation and installation			For details, see
①	WARNING	❗	Use appropriate methods to remove the chamber from the truck and to carry the chamber to its installation location. Failing to do so can result in injury.	Page 6 in the Installation guide
②	WARNING	🚫	Do not install the chamber in an inappropriate location such as outdoors or a highly humid location. Doing so can result in fire and electric shock.	Section 1.8, page 5 in the Installation guide
③	WARNING	❗	Be sure to provide suitable grounding for the chamber. Failing to do so can result in electric shock.	Section 1.8, pages 19 and 20 in the Installation guide
④	WARNING	❗	Use the adjustable feet to fix the chamber in place. Failing to do so can result in injury caused by the chamber falling down or overturning.	Pages 8 and 9 in the Installation guide
	Risks and countermeasures during usage			For details, see
⑤	DANGER	🚫	Do not place explosive or flammable substances in the chamber. Doing so can result in explosion and fire.	Section 1.1
⑥	WARNING	🚫	Do not disassemble, modify, or repair this chamber. Doing so can result in fire, electric shock, and injury.	Section 1.8
⑦	WARNING	🚫	Do not insert into the chamber a specimen whose conductivity will cause it to be dispersed. Doing so can result in electric shock.	Section 1.1
⑧	CAUTION	❗	Use appropriate operation methods to lock the chamber door. Failing to do so can result in injury caused by fingers being pinched in the door or by the door opening suddenly.	Section 1.3
⑨	DANGER	❗	When supplying power to a specimen, be sure to use the specimen power supply control terminals. Failing to do so can result in fire.	Section 4.2
⑩	WARNING	🚫	Do not enter the test area. Doing so creates the risk of being accidentally trapped inside.	Section 1.2
⑪	WARNING	❗	If you have no choice but to enter into the test area, carry out in advance countermeasures to avoid danger. Failing to do so creates the risk of being accidentally trapped inside.	Section 1.2
⑫	WARNING	🚫	If the refrigeration circuit becomes damaged, avoid exposure to flame and stop using the chamber. Failing to do so can result in choking and suffocation.	Section 1.8
⑬	WARNING	❗	Perform a trip test on the leakage breaker and check that it is operating normally before starting chamber operation. Failing to do so can result in electric shock.	Sections 1.8 and 5.3
⑭	CAUTION	❗	Note that during operation and immediately after operation parts of the area inside of the test area and parts of the exterior of the chamber become extremely hot or cold. Touching these areas can result in burns and frostbite.	Sections 1.8 and 5.4
⑮	WARNING	❗	Before starting chamber operation, correctly set the safety device for overheat protection and check that this device is operating normally. Failing to do so can result in fire.	Sections 1.4 and 5.3
⑯	WARNING	❗	Set the shelves correctly, and use these shelves within their allowable load capacities. Failing to do so can result in injury caused by the shelves falling down.	Section 4.1
⑰	WARNING	❗	When operating the chamber remotely, confirm the safety in and around the test area, and then operate the chamber correctly. Failing to do so can result in accidents caused by unexpected operations.	Section 1.7
⑱	CAUTION	❗	When performing operations within the test area, such as when replacing the wick, pay attention to the fact that the floor may be slippery. Failing to do so can result in injury.	Section 4.3
⑲	CAUTION	🚫	Do not subject the viewing window, optional wide-view window, or inner door to impacts or strong force. Shards of broken glass from the viewing window, wide-view window, or inner door create the risk of personal injury.	Section 1.3
	Risks and countermeasures during cleaning and maintenance			For details, see
⑳	WARNING	❗	Use appropriate methods to periodically clean parts of the chamber such as the electrical compartment, water circuit box, and humidifying tray. Failing to do so can result in burns, electric shock, and other injuries.	Sections 5.2, 5.4, and 6.1
㉑	WARNING	❗	Use appropriate methods to replace and inspect the fuse. Failing to do so can result in burns, electric shock, and other injuries.	Section 6.7
㉒	CAUTION	❗	Use appropriate methods to clean the decorative viewing window glass. Failing to do so can result in burns.	Section 5.4
	Risks and countermeasures during chamber disposal			For details, see
㉓	WARNING	❗	Have two or more people work together to remove and dispose of the door. Failing to do so can result in injury and in an individual becoming trapped in the test area.	Section 1.6

Map of remaining risks and positions on the product where safety labels are affixed

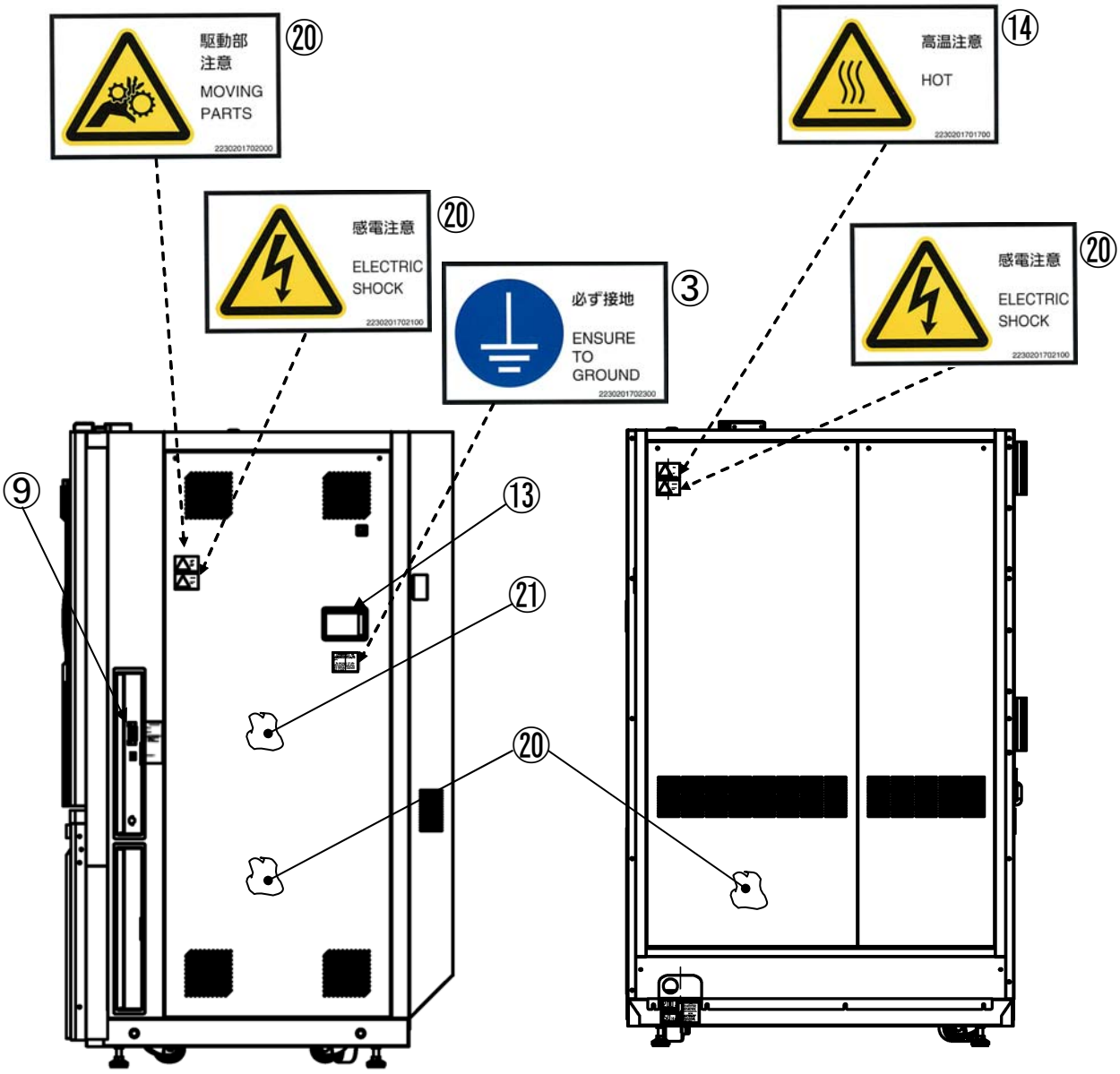
The numbers in the following figures are the item numbers written in the "List of remaining risks".

Types 1 and 2



Left side Front

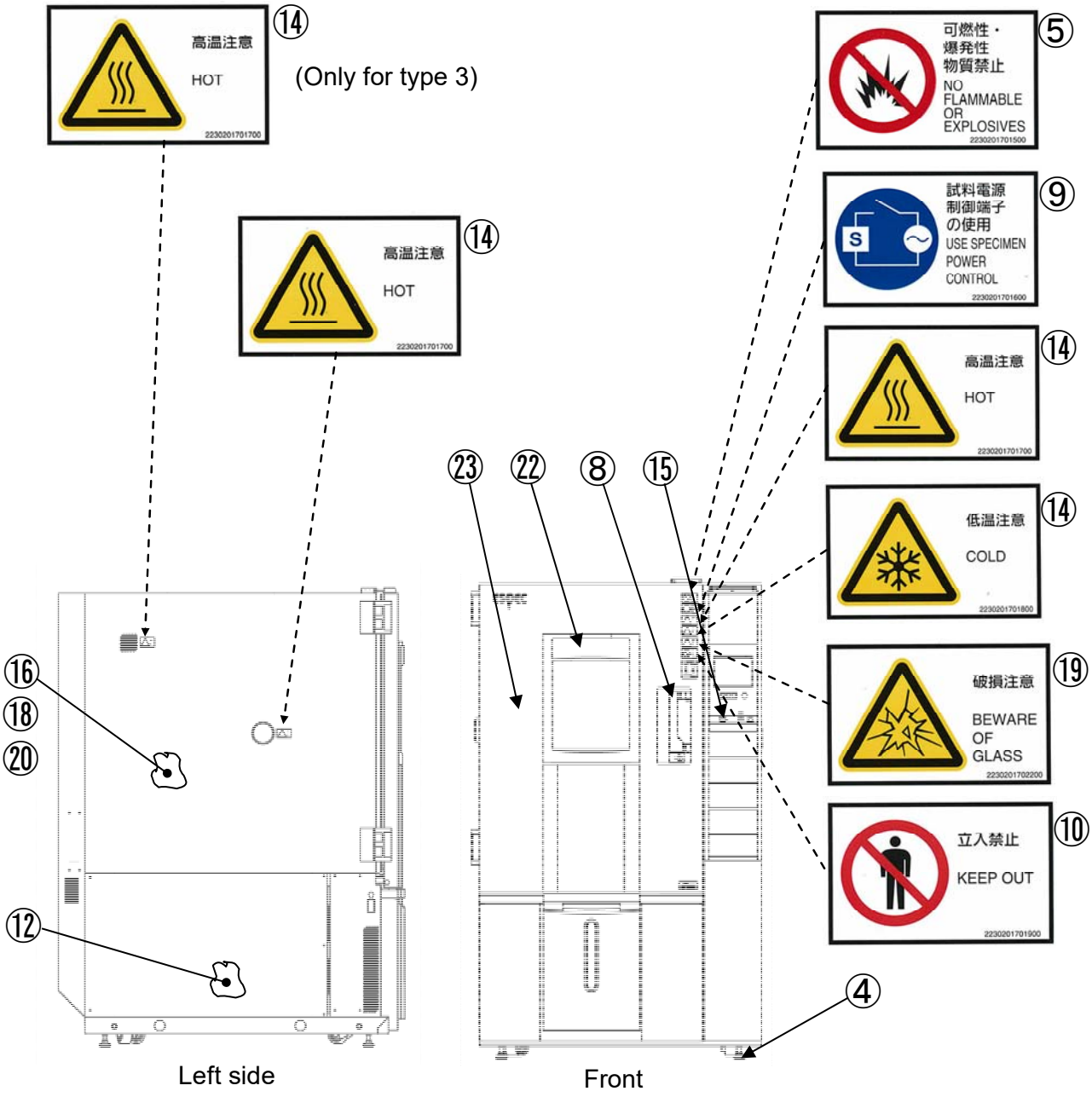
Remaining risks and positions on the product where safety labels are affixed (1)



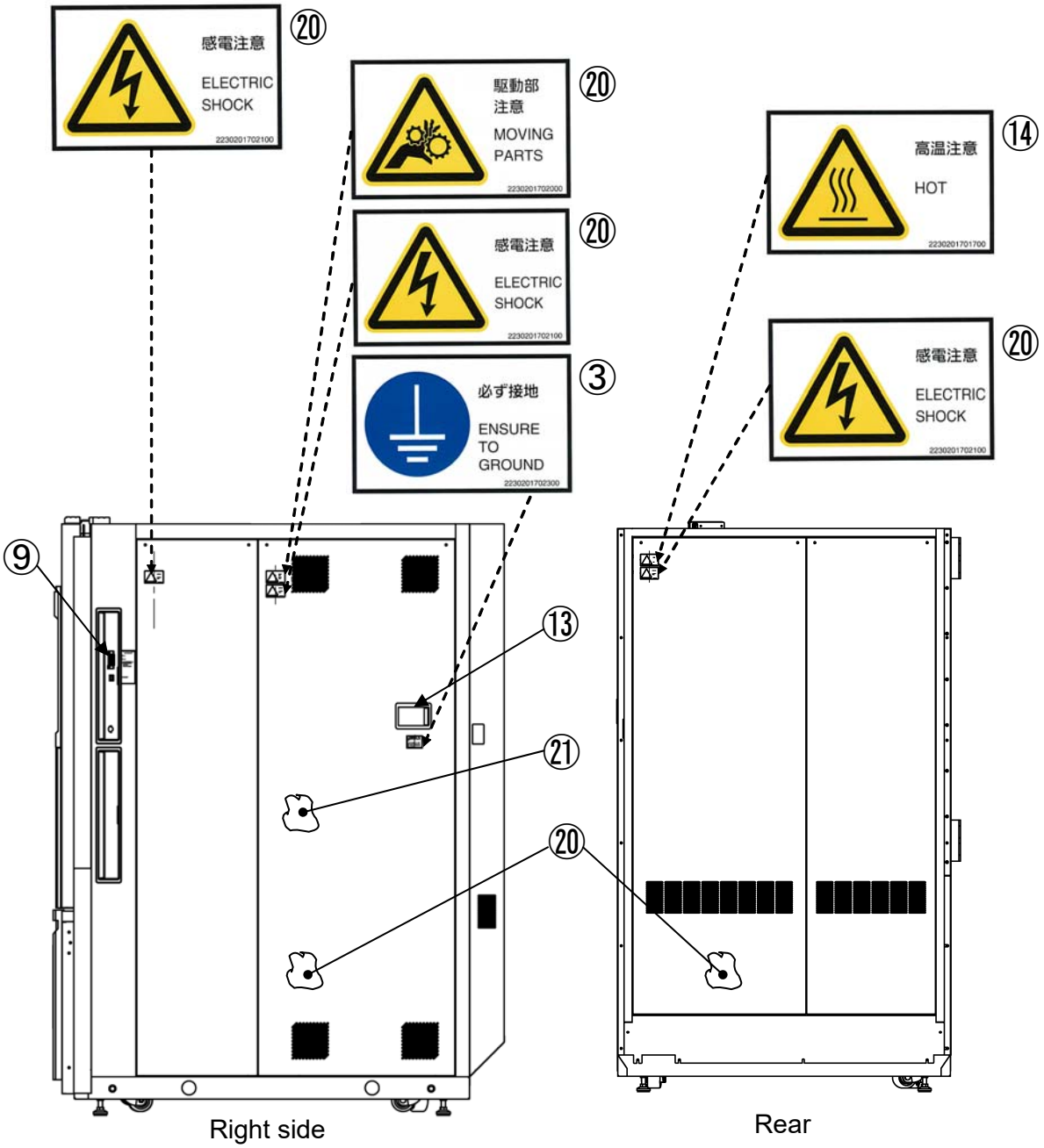
Right side Rear

Remaining risks and positions on the product where safety labels are affixed (2)

Types 3 and 4

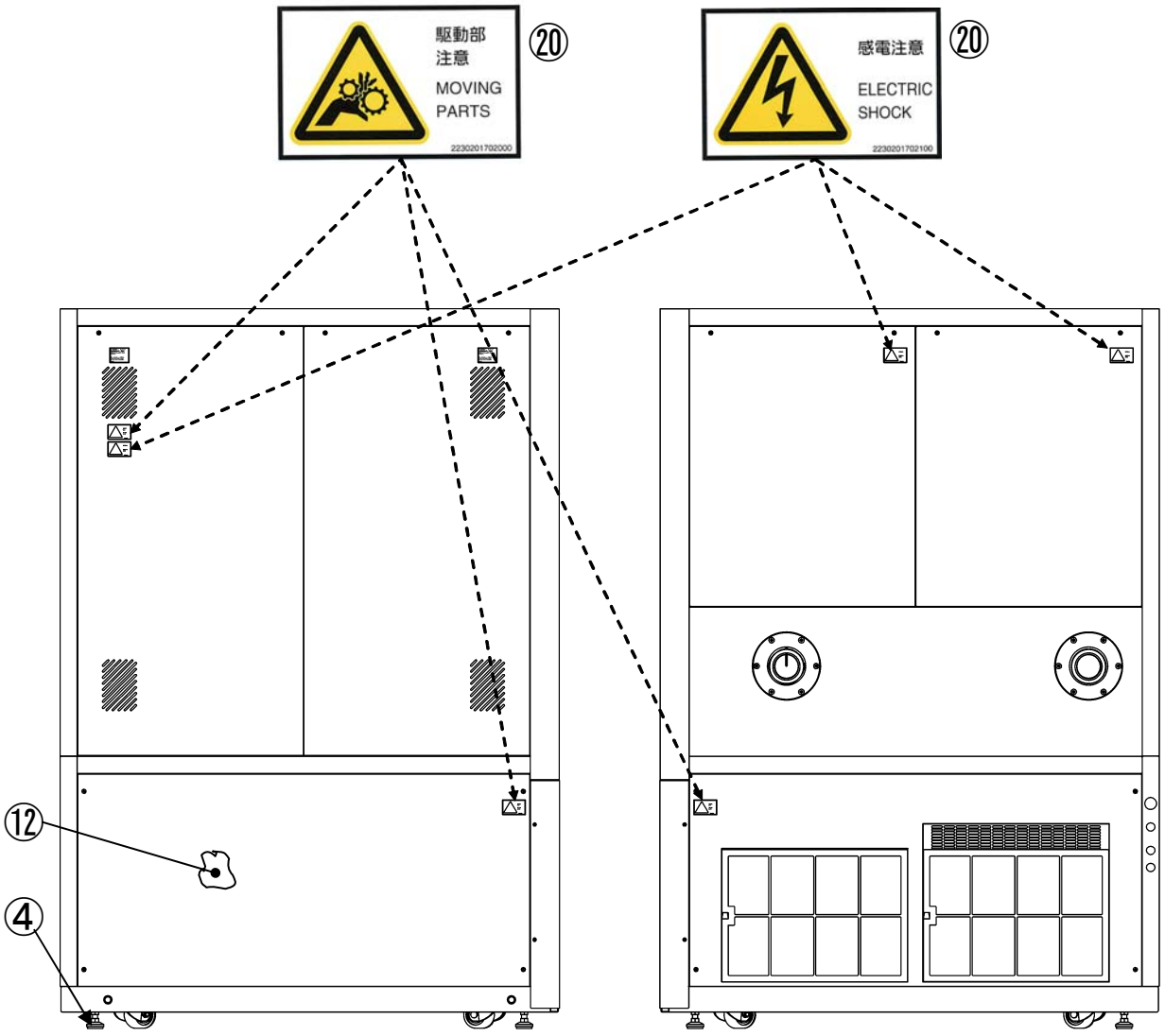


Remaining risks and positions on the product where safety labels are affixed (3)



Remaining risks and positions on the product where safety labels are affixed (4)

Dehumidifier (PDL/PDR only)



Left side Right side

Remaining risks and positions on the product where safety labels are affixed (5)

Purchasing new product safety labels

If a product safety label becomes damaged, lost, or the warning display is no longer legible, contact your distributor or ESPEC. A replacement product safety label will be shipped for a fee.

ESPEC's environmental labeling "GREEN PRODUCT Label"

ESPEC has been striving for the development of eco-friendly products by establishing an environmentally conscious design and development guidelines for the prevention of global warming and pollution and the promotion of resource recycling.
As part of these efforts, in April 2009, we instituted the "GREEN PRODUCT Label" certification system for the products intended for the Japanese market.
The "GREEN PRODUCT Label" is equivalent to the environmental label for self-declared environmental claims "Type II" established by the International Organization for Standardization (ISO).

The certification criterion for green product labeling is as follows.

Products that are intended for the Japanese market and that satisfy the following requirements:

Area of environmentally conscious activity	Certification criterion
Energy-saving	In comparison with the former model regarding power consumption, 15% energy saving or more is achieved. (When the operation pattern specified by ESPEC is used and compared with the former model.)

Energy Saving Advice: Provides tips for energy-saving operation.

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. Provided with the chamber. (Also provided on the CD.)
CD operation manual	Contains the following contents.

Recorded contents of CD operation manual

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. * For operations of options, read the contents of the appropriate option manual.
	Controller guide	Describes the operations of the controller. * For operations of options, read the contents of the appropriate option manual.
	Network guide	• Web application Describes how to check the operating states, set operation patterns, store data and make alert mail settings via web browser. • Communication functions (Ethernet)
	Option	Describes how to operate the optional equipment and functions.
	Circuit diagram	Electric circuit diagram, parts list, option drawings

Understanding the chamber model code

The model name of the chamber is constructed as shown below. See the rating plate (on the front) for the model of the chamber being used.
This manual describes multiple chamber models. Read the sections that are applicable to the chamber that you are using.

P□—□J

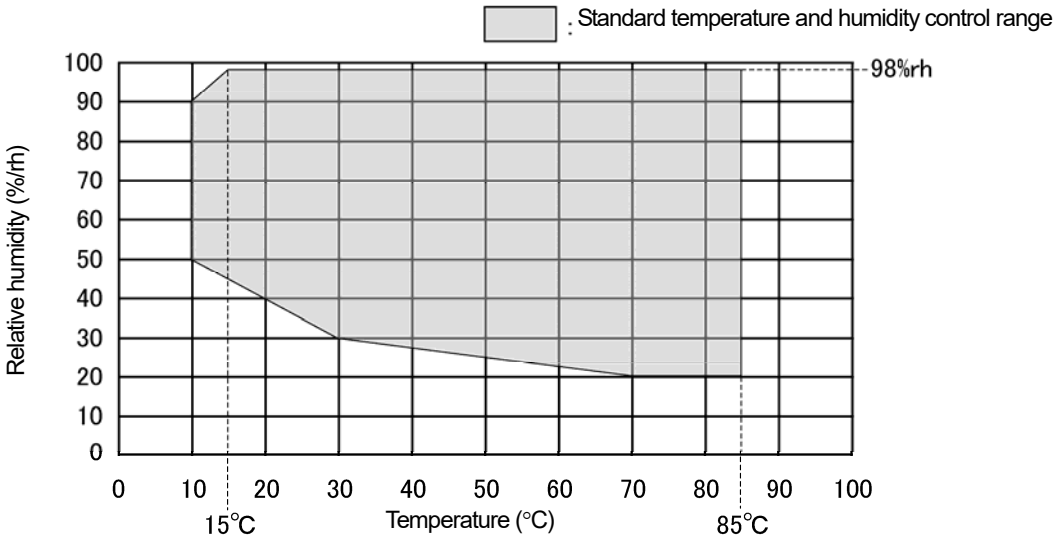
- Series name
- Inside capacity

	PR/PL/PU	PSL/PG	PHP	PDR/PDL	PCR
1 (type 1)	120 L	---	---	---	---
2 (type 2)	225 L	306 L	219 L	---	---
3 (type 3)	408 L	---	398 L	408 L	312 L
4 (type 4)	800 L	800 L	784 L	800 L	---

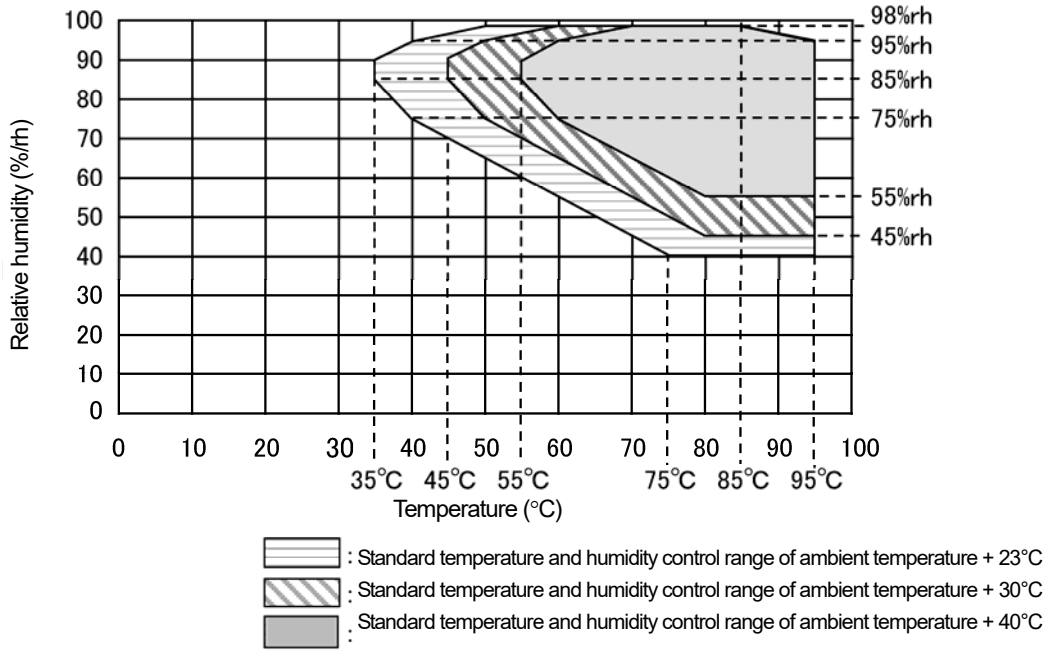
- Product name (temperature/humidity range, values for 150°C spec. given in [ ])
  - PR: -20°C to +100°C/20%rh to 98%rh [-20°C to +150°C/20% rh to 98%rh]
  - PL: -40°C to +100°C/20%rh to 98%rh [-40°C to +150°C/20%rh to 98%rh]
  - PU: -40°C to +100°C [-40°C to +150°C]
  - PSL: -70°C to +100°C/20%rh to 98%rh [-70°C to +150°C/20%rh to 98%rh]
  - PG: -70°C to +100°C [-70°C to +150°C]
  - PHP: Ambient temperature: +10°C to +100°C [40°C and 98%rh]
  - PDR: -20°C to +100°C/5%rh to 98%rh
  - PDL: -40°C to +100°C/5%rh to 98%rh
  - PCR: -20°C to +100°C/30%rh to 90%rh

  *PR, PL, PSL, PHP, PDR, PDL, and PCR are called temperature and humidity types, and PU and PG are called temperature types.

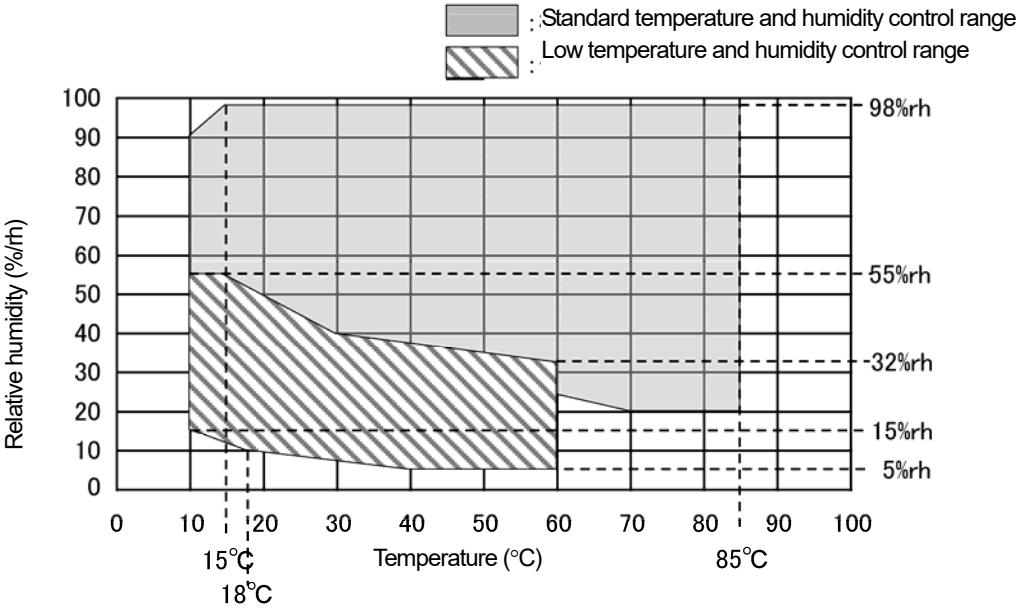
- PR/PL/PSL



• PHP


Relative humidity (%/rh)
100
90
80
70
60
50
40
30
20
10
0
0 10 20 30 40 50 60 70 80 90 100
35℃ 45℃ 55℃ 75℃ 85℃ 95℃
Temperature (°C)
98%rh
95%rh
85%rh
75%rh
55%rh
45%rh
: Standard temperature and humidity control range of ambient temperature + 23°C
: Standard temperature and humidity control range of ambient temperature + 30°C
: Standard temperature and humidity control range of ambient temperature + 40°C

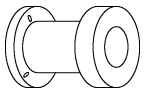
• PDL/PDR


: Standard temperature and humidity control range
: Low temperature and humidity control range
Relative humidity (%/rh)
100
90
80
70
60
50
40
30
20
10
0
0 10 20 30 40 50 60 70 80 90 100
15℃
18℃
Temperature (°C)
85℃
98%rh
55%rh
32%rh
15%rh
5%rh

Accessories and spare parts

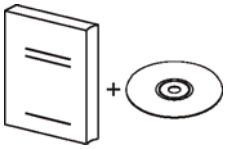
1) Cable port plug

2) Connecting duct



(PDL/ PDR only)

3) Operation manual

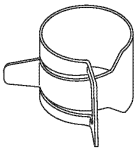


4) Breaker handle stopper

200/ 220V

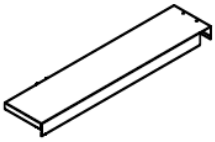
380/ 400V

5) Hose band



(PDL/ PDR only)

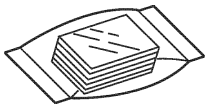
6) Slit cover



(PHP only)

7) Wet-bulb wick (Fine)

8) Wet-bulb wick (Cloth)



(PDL/ PDR only)

9) Glass tube fuse

10) Warranty card

11) Key

No.	Name	Use	Quantity	Check
Accessories				
1	Cable port plug	Used to seal the cable port. (Ø 50mm)	1 piece	
2	Connecting duct	Connects chamber and dehumidifier. (PDL/PDR only)	2 pcs	
3	Operation manual	Provides the instructions for correct operation of the chamber. (Installation guide, CD Operation manual)	1 piece	
4	Breaker handle stopper	Protects against erroneous operation. Attaches to the breaker (main power switch) when OFF.	1 piece	
5	Hose band	Connects chamber and dehumidifier (PDL.PRD only)	1 piece	
6	Slit cover	Used for economy operation. (PHP only)	2 pcs	

No.	Name	Use	Quantity	Check
Spare parts				
7	Wet-bulb wick (Fine)	24 wet-bulb wicks and 1 dropper (not for temperature-only chambers)	1 box	
8	Wet-bulb wick (Cloth)	Box of 20 cloth wicks (for PDL/PDR only)	1	
9	Glass tube fuse	7A Used for the protection of electric components. AC200V PR/PL/PU/PHP/PCR/PDL/PDR PSL/PG AC220V PR-1,2,3/PL-1,2,3/PU-1,2,3/PHP-2,3 & PSL-4/PG-4 PR-4/PL-4/PU-4/PHP-4/PCR/PDL/PDR PSL-2/PG-2	 2 pcs 3 pcs 3 pcs 2 pcs 4 pcs	
Other parts				
10	Warranty card	Warranty information for the product.	1	
11	Key	For the door (except wide-view door option)	2 pcs	

Chapter 1 Safety precautions

Read this section before using the equipment.

This chapter describes important precautions that must be followed to ensure safe use of the chamber. Be sure to read this chapter and follow the instructions to prevent the occurrence of accidents involving the user, the chamber, and specimens.
Read this chapter before using the equipment.

1.1 Materials not to be placed in the test area

The chamber includes heaters and other components capable of causing fire. Use the Safety Data Sheet (SDS) to confirm the physical and chemical properties, etc. of the material contained in the specimen before testing.

DANGER

Never place the following explosive or flammable substances, or materials containing them, in the test area. Also, do not store these materials near the chamber.

Doing so can result in explosion or fire.

Explosive substances

Explosive items

- Nitroglycol, nitroglycerin, nitrocellulose, and other explosive nitric esters
- Trinitrobenzene, trinitrotoluene, picric acid, and other explosive nitro compounds
- Peracetic acid, methyl ethyl ketone peroxide, benzoyl peroxide, and other organic peroxides
- Sodium azide and other metal azides
- Other explosive items

Flammable substances

Ignitable items

- Lithium metal, potassium metal, sodium metal, yellow phosphorus, phosphorus sulfide, red phosphorus, celluloids, calcium carbide ("carbide"), lime phosphide, magnesium powder, aluminum powder, other metallic powder, and sodium dithionite ("hydrosulfite")
- Other ignitable items

Continued on the next page

DANGER

Continued from the previous page

Flammable substances

Oxidizing items

- Potassium chlorate, sodium chlorate, ammonium chlorate, and other chlorates
- Potassium perchlorate, sodium perchlorate, ammonium perchlorate, and other perchlorates
- Potassium peroxide, sodium peroxide, barium peroxide, and other peroxides
- Potassium nitrate, sodium nitrate, ammonium nitrate, and other nitrates
- Sodium chlorite, and other chlorites
- Calcium hypochlorite, and other hypochlorites
- Other oxidizing items

Flammable items

- Ethyl ether, gasoline, acetaldehyde, propylene oxide, carbon disulfide, and other substances with an ignition point less than -30°C
- N-hexane, ethylene oxide, acetone, benzene, methyl ethyl ketone, and other substances with an ignition point between -30°C and 0°C
- Methanol, ethanol, xylene, pentyl acetate ("amyl acetate"), and other substances with an ignition point between 0°C and 30°C
- Kerosene, gas oil, oil of turpentine, isopentyl alcohol ("isoamyl alcohol"), acetic acid, and other substances with an ignition point between 30°C and 65°C
- Other flammable items

Combustible gases

- Hydrogen, acetylene, ethylene, methane, ethane, propane, butane
- Other combustible gases

The above shows typical examples in reference to the Appended Table 1 of Article 6 of the Industrial Safety and Health Act of Japan.

WARNING

Do not insert into the chamber a specimen whose conductivity will cause it to be dispersed.

Such dispersed particles entering into the air-conditioning section of the chamber can cause electric leakage of the heater.

Notice

- **When inserting a specimen into the test area, be careful that the specimen does not disperse.**

  Place small, lightweight specimens into a mesh container with a lid. Specimens wrapped in aluminum foil, for example, will receive blown air over a wider area, making dispersion more likely to occur. Should the specimen in the aluminum box disperse, turn off the breaker of the chamber, and then turn off the primary power supply. Next, contact your distributor or ESPEC. Particles of aluminum foil entering the heater can cause malfunctions.

- **Do not place corrosive substances into the test area.**

  If corrosive substances are generated by the specimen, the life of the chamber may be significantly shortened specifically because of the corrosion of stainless steel and copper and because of the deterioration of resin and silicon.
  Corrosive substances include chlorine, chloride, and acids. Substances that become corrosive at high temperature or humidity, even when not corrosive at room temperature, are also included.

1.2 Do not enter the test area

WARNING

Never enter the test area for type 1 to type 3 models.

Doing so creates the risk of being accidentally trapped in the test area because the door cannot be opened from the inside.

Never enter the test area for type 4 models.

If the test area must be entered, to replace the wet-bulb wick for example, prepare for an emergency and confirm the position and operation of the push-rod used to unlock the door in advance. Be sure to have at least two people present when confirming operations, with one person waiting outside the chamber. When entering the test area, take precaution so as not to become trapped in the test area, such as by propping the door open so it does not close completely.
Do not step on the tank front cover. The test area is slippery, so be careful.

Never lock the door with the key when entering the test area of a type 4 model.

Unlocking the door from inside the test area

Type 4 models have a lock release mechanism. If you become trapped in the test area, use the following procedure to open the door and escape.

<Procedure>

1) Slowly push the unlocking push-rod with your hand or foot in the axial direction.
When seen from inside the test area, the unlocking push-rod is located on the left edge.

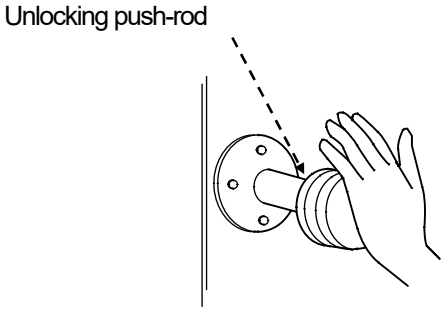


Fig. 1.1 Unlocking push-rod

- If shelf brackets are located nearby, remove them before operation.
- If the unlocking push-rod stops with the door halfway open, push the unlocking push-rod again.

1.3 Precautions when opening and closing the door

CAUTION

When opening and closing the door, do not hold the handle with your fingers near the openings between the handle and the door.

Doing so may lead to injury from your hand or fingers being pinched between the door and the handle.

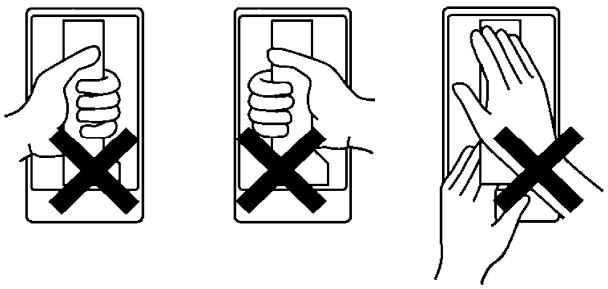


Fig. 1.2 Be careful when operating the handle

When closing the door, do not push the handle to latch the door until it is completely closed.

The recoil from the handle can injure your wrist.

Do not subject the viewing window, optional wide-view window, or inner door to impacts or strong force.

Shards of broken glass from the viewing window, wide-view window, or inner door create the risk of personal injury.

Install the chamber securely.

Opening and closing the door can cause the chamber to move, creating a dangerous situation.

Opening the door

<Procedure>

1) Place your fingers around the middle of the handle, and then pull it gently toward you.

2) To work with the door open, open the door up to 60 or 120 degrees.

The stopper mechanism will activate, preventing the door from closing by its own weight.

Closing the door

<Procedure>

1) Push the door until it is completely closed (the door is not open but the test area door switch detects that the door is open).

2) Push in the handle to lock it securely.

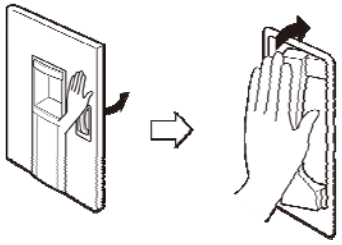


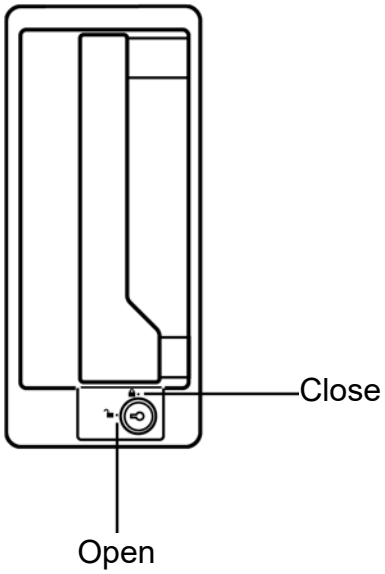
Fig. 1.3 Closing the door

Locking the door

The door can be locked to ensure test security and to prevent interruption of the test.

⚠ WARNING

Never lock the door with the key when entering the test area of a type 4 model.



◆ Note ◆

Store the key in a safe location so it does not become lost.
If the key becomes lost, contact your distributor or ESPEC.

1.4 Safety devices for specimen protection

WARNING

Before starting chamber operation, correctly set the safety device for overheat protection and check that this device is operating normally.

If the safety device is not set properly, the specimen may be damaged and, in the worst case, fire may occur if a malfunction occurs.

The chamber operates at the temperature and humidity set by the temperature (humidity) controller, but the temperature and humidity may not be properly controlled for some reason. (The humidity cannot be set on temperature-only chambers.) To protect the specimen from becoming damaged due to the effects of temperature and humidity, the chamber is equipped with a safety device called an overheat protector and a safety function in the temperature (humidity) controller.

Table 1.1 List of safety devices and functions

<table>
<tr><th colspan="3">Safety devices and functions</th><th>Setting
(value that meets the following conditions)</th><th>Safety action</th><th>Remarks</th></tr>
<tr><td colspan="3">Overheat protector</td><td>・Set temperature of test area +20°C
・At or below the specimen's heat-resistance temperature</td><td rowspan="4">・Alarm indication
・Buzzer sound
・Heater control stop
・Humidifier control stop
(not available on temperature-only chambers)
・Refrigerator stop
・Air circulator stop
・Specimen power supply control terminals interrupted</td><td rowspan="4">-</td></tr>
<tr><td rowspan="4">Built-in to the temperature and humidity controller</td><td rowspan="3">Temperature alarm</td><td>Upper limit absolute value</td><td>・Set temperature of test area +15°C
・At or below the specimen's heat-resistance temperature
・110°C or lower
(160°C or lower for the 150°C specifications)</td></tr>
<tr><td>Lower limit absolute value</td><td>・Set temperature of test area -5°C or lower
・At or above the specimen's cold-resistance temperature
・The setting lower limit temperatures are characteristic to the different chambers.
PR/PDR/PCR -25˚C
PL/PU/PDL -45˚C
PSL/PG -75˚C
PHP 0˚C</td></tr>
<tr><td>Upper deviation</td><td>At +10°C</td><td>・Alarm indication
・Buzzer sound*1
・Heater control stop</td><td rowspan="3">When the internal chamber temperature returns to within the range of the upper and lower settings, the alarm is canceled automatically.</td></tr>
<tr><td rowspan="2">Humidity alarm (not available on temperature-only chambers)</td><td>Upper limit absolute value</td><td>・Test area set humidity + 10%rh or higher
・At or below the upper limit humidity allowable for the specimen</td><td>・Alarm indication
・Buzzer sound*1
・Humidifier control stop</td></tr>
<tr><td>Lower limit absolute value</td><td>・Test area set humidity - 10%rh or lower
・At or above the lower limit humidity allowable for the specimen</td><td>・Alarm indication
・Buzzer sound*1</td></tr>
</table>

*1: Can be enabled or disabled.

■ **Absolute upper/lower limits of temperature (humidity) warning and temperature warning upper limit deviation**

The upper/lower absolute values are the absolute temperatures (humidities) and are independent of the set temperature (humidity) of the test area. These are fixed regardless of changes to the test area temperature (humidity) setting.
The upper limit deviation is the temperature relative to the test area set temperature.
When the internal chamber temperature setting is changed, the upper limit deviation changes accordingly.

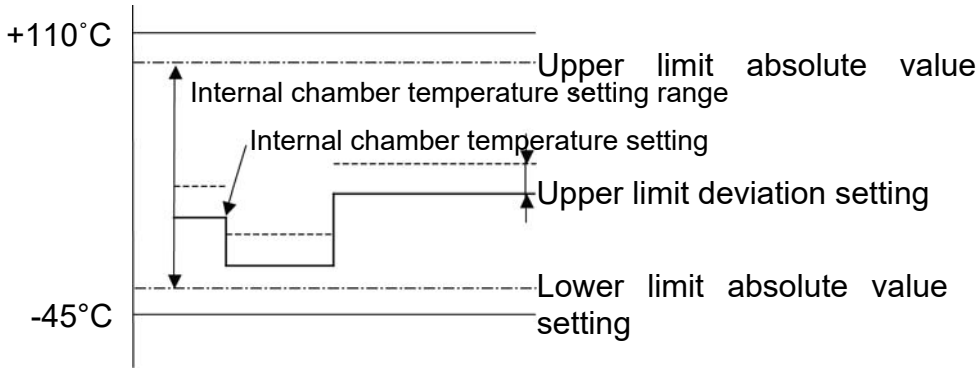


Fig. 1.4 Upper/lower limit temperature alarm setting

Example of safety function settings

■ **Temperature upper limit**

The following describes examples when the set temperature of the test area is 60°C and the heat-resistance temperature of the specimen is 80°C.
Safety devices and safety functions are set as shown below.

Table 1.2 Setting example for overheat protector and upper temperature limit alarm function

Overheat protector		+80°C	・▪ Set temperature of test area + 20°C ・Specimen heat-resistance temperature
Temperature (humidity) controller	Upper limit absolute value	+75°C	・Set temperature of test area + 15°C ・Specimen heat-resistance temperature - 5°C
	Upper deviation	+10°C	Activates at +70°C

The internal chamber temperature increasing abnormally in this state is detected in the order of the upper deviation limit temperature, temperature alarm upper limit absolute value, and overheat protector, as shown in
Fig 1.5, and protective action is taken. The chamber is equipped with multiple safety devices and functions, so if one should malfunction, the other devices and functions detect the abnormal temperature increase and take protective action.

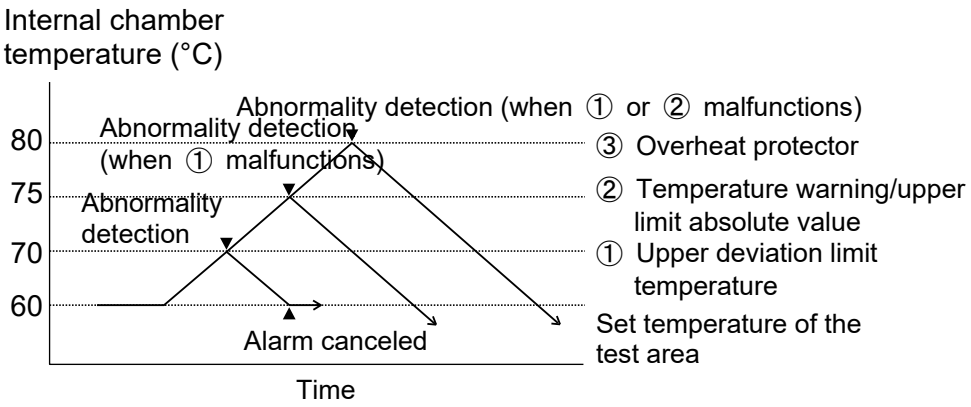


Fig 1.5 Action when the internal chamber temperature increases

1.5 Breaker handle stopper

Install the breaker handle stopper as shown in the diagram when the breaker is off so the power supply does not turn on due to erroneous operation of the breaker.
Do not lose the breaker handle stopper when it is removed.

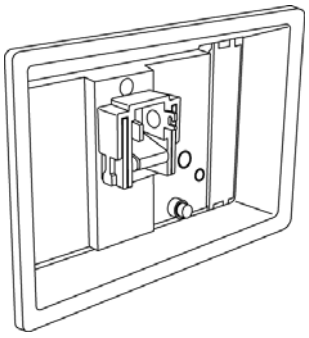


Fig. 1.6 200/220V

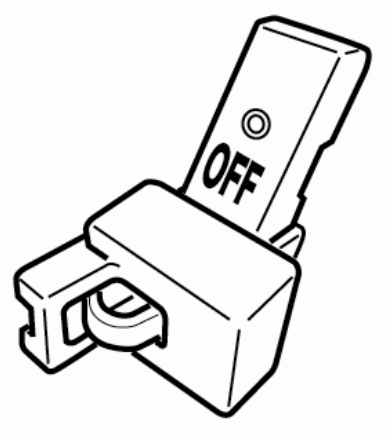


Fig. 1.7 380/400V

1.6 Disposing of this product

When disposing of this product, treat it as industrial waste.
For safety reasons, remove the door until the product is disposed of.
To promote resource recycling, ESPEC received certification in a wide-area certification system from Japan's Department of the Environment on July 3, 2007.
If you no longer need this product, ESPEC can pick up the product and recycle it for a fee.
Contact your distributor or ESPEC when disposing of this product.

Notice

The following items are considered hazardous substances and must be disposed of separately. (Depending on the product, some items may not have been used in the construction of the product.)

- **Refrigerant**
- **Compressor oil**
- **Electronic components**

Dispose of this product in accordance with local and national disposal regulations.

This chamber uses a CFC substitute as the refrigerant. Contact your distributor or ESPEC when disposing of this product. CFCs must be collected, as stipulated by the Act on Ensuring the Implementation of Recovery and Destruction of Fluorocarbons concerning Designated Products.

Removing the door

WARNING

Before disposing of this product, remove the door.

Leaving the chamber alone with its door attached poses a suffocation hazard because an individual may become trapped inside the test area by mistake.
During transportation, the door may fling open, resulting in injury.

Although type 4 models have lock release mechanism, its operation cannot be confirmed, so also remove the door from type 4 models before disposing of them.

At least two people should work together when removing the door, and the door should be supported by a hand lift.

The door falling or tipping over can result in injury.
The door weight is shown below.
Type 1: 26kg, type 2: 28.5kg, type 3: 37kg, type 4: 57kg

Prepare pliers, a slotted screwdriver, and an M5 box wrench.

<Procedure>

1) Using pliers, disconnect the electrical wires connecting the chamber and door.

2) Use a slotted screwdriver to remove the hinge cover on the door side.

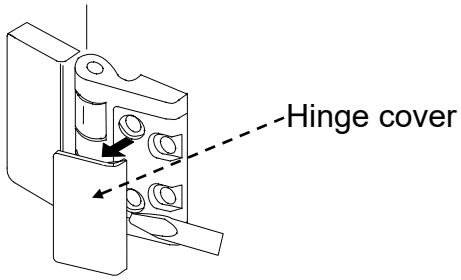


Fig. 1.8 Removing the hinge cover

3) Open the door slightly, support it with a hand lift or a similar tool, and then use a box wrench to remove the bolts securing the hinge and door.

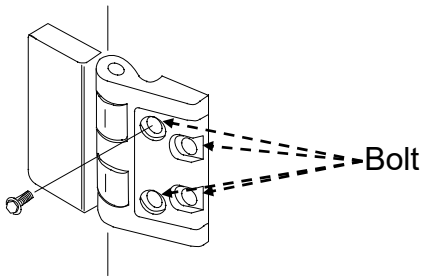


Fig. 1.9 Removing the bolts

4) Remove the door.

Notice

When disposing of the door, do so in accordance with local regulations based on the Waste Disposal Act (Waste Management and Public Cleansing Act). This product does not contain asbestos.

1.7 Remote operation

Pay attention to the precautions below when using the chamber.

Remote operation

WARNING

Do not perform remote operations when operating in and around the test area and when working with the test area such as inserting and removing specimens.

When supplying power to the specimen by using the specimen power supply terminal, there is a risk of electric shock by suddenly supplying power to the specimen when operation starts.
When service personnel are performing maintenance, there is a risk of injury from touching rotating bodies and a risk of electric shock. ESPEC CORP. accepts no responsibility for damage or injury in these situations.

For safety, ensure that the chamber clearly displays it is being operated from a remote location, and also properly notify the operator.

Indicate on the chamber in some manner that it is being operated from a remote location.

When performing operations in the test area or vicinity, do not perform remote operation over a LAN or other network. In particular, if there is a possibility of operation, implement countermeasures such as enabling remote operation protection.

Sudden operation of the chamber can result in injury.

When operating the chamber from a remote point, fully ensure safety in and around the test area.

1.8 Other precautions

Pay attention to the precautions below when using the chamber.

⚠ WARNING

Do not install or use this product outdoors.

Doing so will adversely affect the performance and functionality, and if the electrical components become wet, they will short-circuit, creating the risk of fire, electric shock, or malfunction.

Do not disassemble, modify, or repair this chamber.

Doing so creates the risk of abnormal operation, fire, electric shock, injury, and malfunction. For repairs, contact your distributor or ESPEC.

Be sure to ground this chamber.

If this chamber is not grounded, the leakage breaker will not activate even if leakage occurs, which creates the risk of electric shock. See the Installation guide for details about how to ground this product.

Test the breaker and confirm normal operation before starting chamber operation.

If the breaker does not operate normally, turn off the primary power supply, and then contact your distributor or ESPEC.
Continued usage of the chamber in this state creates the risk of electric shock. For the test method, see ☞ "5.3 Inspection".

If the refrigeration circuit becomes damaged, do not expose the refrigeration circuit to flame and do not use the chamber. Provide sufficient ventilation to prevent suffocation, and then contact your distributor.

For modifications or repairs to the refrigeration circuit, contact your distributor or ESPEC. CFCs must be collected, as stipulated by the Act on Ensuring the Implementation of Recovery and Destruction of Fluorocarbons concerning Designated Products.
This chamber uses HFC refrigerant. HFC is a refrigerant with zero ozone depletion potential. This refrigerant has no effect on the depletion of the ozone layer.
The refrigeration circuit is sealed and normally does not leak.

⚠ CAUTION

Do not open the door during high-temperature, high-humidity operation or immediately after finishing the operation.

High-temperature and high-humidity air may blow out and cause burns.

Do not touch high-temperature parts with your bare skin.

During operation at 55°C and above and immediately after such operation, the temperature inside the test area (the specimen, the shelf, the inside of the door, and the test area interior) is extremely high. Touching these parts with your bare skin may lead to burns, so use heat-resistant gloves to touch them.

Do not touch low-temperature parts with your bare skin.

During operation at 0°C and below and immediately after such operation, the temperature inside the test area (the specimen, the shelf, the inside of the door, and the test area interior) is extremely low. Touching these parts with your bare skin may lead to frostbite, so use cold-resistant gloves to touch them.

Notice

- **Do not open or close the chamber door during high temperature and high humidity operation or immediately after the end of operation.**

  Water vapor discharged from the upper part of the drain pipe of the water circuit room may cause dew condensation on the periphery due to the internal pressure difference, causing water to drip inside and outside the chamber.

- **If the humidity exceeds 90%, condensation may form on the walls of the test area. Do not allow condensation to form on the specimen.**

  For details about the anti-condensation function, contact your distributor or ESPEC.

- **Operations during startup**

  This chamber is equipped with flash memory as recording media for saving the sampling data and email settings.
  One of the characteristics of flash memory is that its data may be corrupted if the power is turned off while memory is being accessed.
  This chamber is equipped with a recovery function that checks the flash memory during startup and restores corrupted data to the factory default values.
  When the recovery function is operating, the startup time (the time that the Booting screen is displayed) becomes longer.
  If the startup state (when the Booting screen is displayed) is maintained for 15 minutes without the display changing, contact your distributor or ESPEC.

Notice

- **Screen system maintenance**

  This chamber has a mechanism for automatically restarting the instrumentation display unit in order to perform maintenance on the screen system. Only the display unit is restarted. Even if this is performed during testing, operations continue.

- **Chamber/system protection**

  Do not repeatedly turn the breaker (main power switch) on and immediately turn it off.
  Do not turn off the breaker (main power switch) during startup (when the Booting screen is displayed).
  Before turning the breaker off, check that "Booting" and "ALARM" are not displayed on the instrumentation screen for at least 20 seconds after the breaker (main power switch) is turned on.

◆ Note ◆

Changing the orientation of the air register blade can cause details such as the temperature (humidity) distribution and calibration data of the tester to differ from the initial data.
During control of the chamber, operation sounds may be heard regularly from the refrigeration circuit.

1.9 Chamber component materials

Table 1.3 Chamber component materials

Material name (some items use generic terms)	Operating weight	Main area of application
Metals		
Stainless steel SUS430	120kg	Outer shelf
SUS304	55kg	Interior
SUS316L	0.3kg	Heater
Iron	115kg	Chamber stand, machinery compartment, others
Copper	10kg	Refrigeration lines, condenser, evaporator
Brass	1kg	Pipe joints
Aluminum	4kg	Instrumentation frame, lock handle
Zinc	2kg	Hinges
Chemicals (Resin molded items have a materials display on the actual item.)		
Plastics	18kg	Door frame, viewing window frame, water tank
Rubbers	2.5kg	Packing, line tubes, bushings
Urethane	15kg	Insulation
Glass wool	4.2kg	Insulation
Refrigerant*1, refrigeration oil	3kg	Refrigeration circuit
Other		
Glass	5kg	Viewing window
Electrical equipment, electrical components, electrical wires, refrigeration parts, air circulator, etc.	70kg	Electric parts chassis, refrigeration circuit

(For the PL-3)

*1: Uses HFC refrigerant.

Chapter 2 Overview

This chapter provides an overview of the chamber and instrumentation, and describes how to control the temperature (and humidity).

2.1 Main features

The equipment, parts, and their components can become physically damaged if the chamber is operated or installed in a location subject to extreme high or low temperatures (or humidity).
The Platinous J series is a chamber used for testing the operation and endurance of products and equipment under various temperature and humidity conditions.
This chamber is used to investigate the effects of temperature and humidity on products and equipment from development to the production stage, delivery, and disposal.

The Platinous J series can be used to perform the following tests:

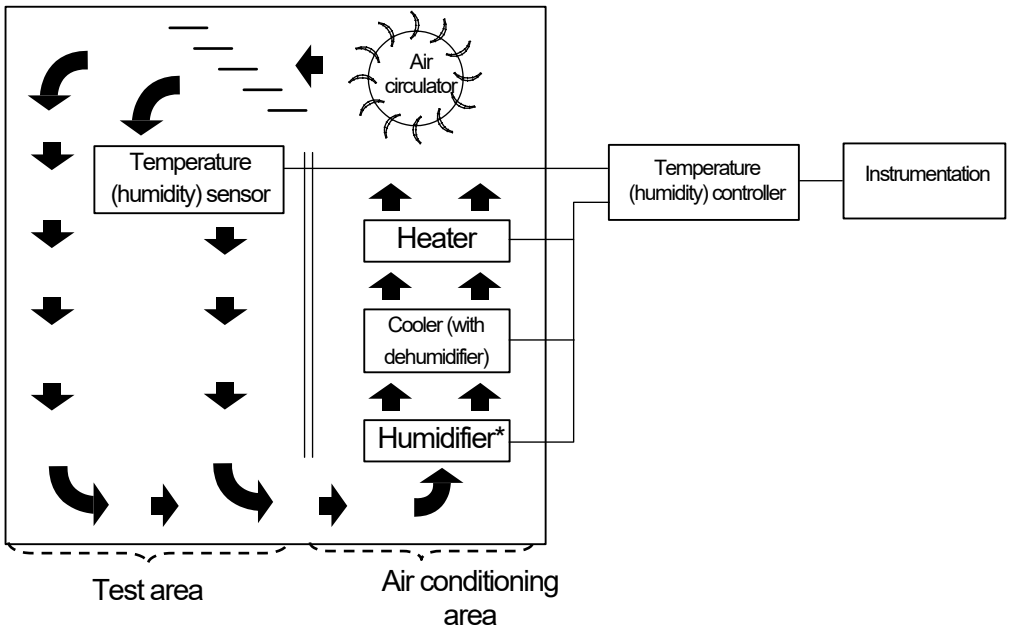
- Heat resistance testing (high-temperature properties testing)
- Cold resistance testing (low-temperature properties testing)
- Humidity resistance testing (high humidity) (not available in temperature-only chambers)
- Low-humidity testing (not available in temperature-only chambers)
- Preservation (shelf) testing
- Life testing
- Degradation (severe) testing

2.2 Temperature (humidity) control

2.2.1 Controlling the temperature (humidity)

The Platinous J series uses the BTHC system to control the temperature (humidity). The letters BTHC stand for "Balanced Temperature and Humidity Control".

The BTHC system creates a balanced overall temperature (humidity) and the desired temperature (humidity) by using the temperature (humidity) controller to constantly control the low heat-capacity heater and humidifier (temperature-only chambers are not equipped with a humidifier) while constantly operating the high heat-capacity cooler (with dehumidifier) and by controlling the performance of both controllers in real-time. In addition, it constantly changes the performance of the cooler to control the heat load of the specimen with minimum energy.



*: Not equipped on temperature-only chambers.

Fig 2.1 BTHC system principle diagram

■ Dehumidification system (PDL/PDR only)

A dry-type absorption dehumidification system is used.
The dry-type absorption dehumidifier consists of a process zone and a recovery zone. The moist air within the chamber is sent to the process zone in which a rotating dehumidifying rotor is present. Dehumidification is performed when moisture is absorbed by the rotor element as the air passes the dehumidifying rotor. The dehumidified air becomes the dry air supplied to the test area.
Meanwhile, the dehumidifying rotor, which has absorbed the moisture, moves to the recovery zone where heated air is used to remove the absorbed moisture. After that the rotor moves back to the process zone. Dehumidification is performed by repeating this absorption-removal cycle. The process zone is also equipped with a cooler, which performs sensible heat removal and supplements dehumidification.

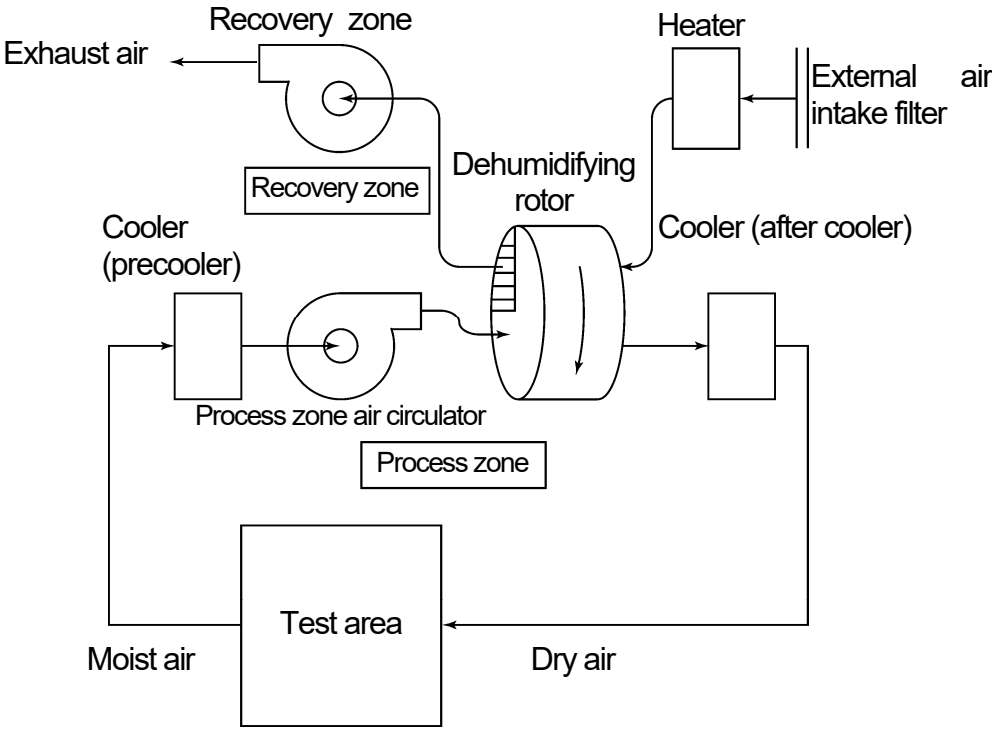
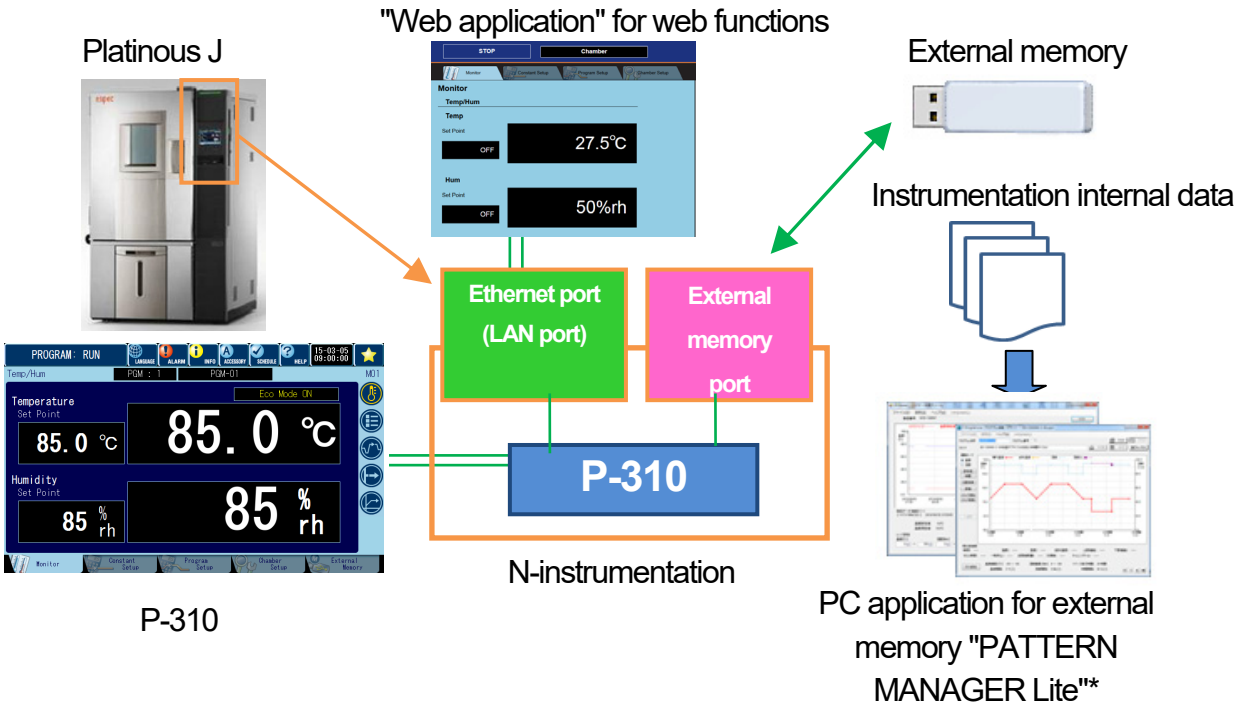


Fig. 2.2 Dehumidification system principle diagram

2.2.2 N-instrumentation

N-instrumentation is a network device with constant operation, program operation, external memory, and Web application functions.



* Can be downloaded from ESPEC Test Navi, the reliability testing information

Constant operation

Constant operation is a method for setting the temperature, humidity, or other setting to a constant value and maintaining the temperature (humidity) of the test area. This is called "constant operation" because the setting is set to a constant value.

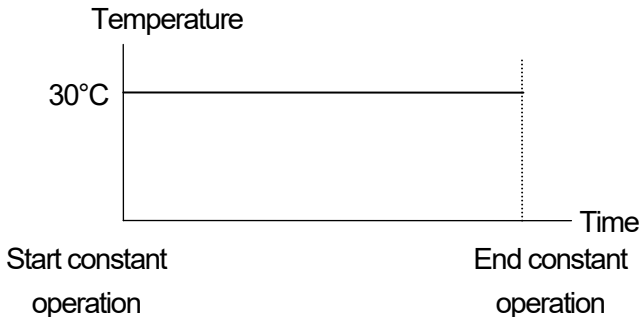


Fig. 2.3 Constant operation

■ **Program operation**

Program operation is a method for changing the temperature, humidity, and other settings in the test area according to a program created in advance.
There are several steps within the program. Each step is made up of temperature, humidity, and other settings, similar to the settings of constant operation. During each step, settings can be maintained and changed at a constant speed.

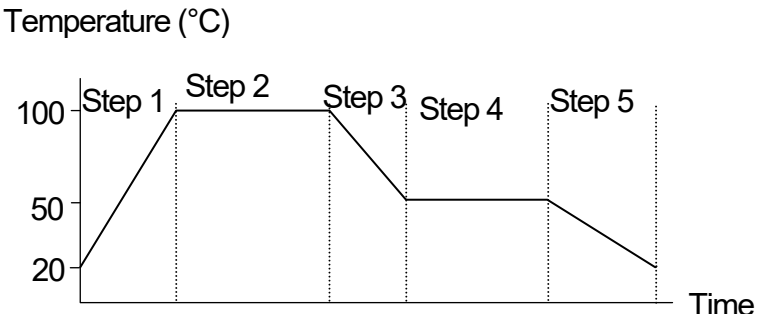


Fig. 2.4 Program operation

■ **External memory function**

The following operations can be performed using a USB memory device and the PATTERN MANAGER Lite computer application (which can be downloaded from Test Navi).

(1) Graph data recording: Trend graph data can be written to a USB memory device. The written graph data can then be viewed using PATTERN MANAGER Lite.

(2) Program pattern copying and editing: Program pattern data can be copied between and used by different chambers. PATTERN MANAGER Lite can be used to edit, display, and print pattern data.

(3) Back trace function: Back trace data is recorded. By providing recorded data you can take advantage of our Online Diagnostics Service for analyzing problems.

☞ For procedures and detailed information, see "Chapter 7 Using external memory" in the controller guide.

■ **Web function**

Web function lets you monitor operation and configure settings from a remote computer or mobile terminal connected to the chamber over a LAN. The operations below can be performed using Web application.

(1) Chamber operation monitoring and data recording
(2) Constant setup
(3) Program setup
(4) Operation
(5) Email notification

☞ For procedures and detailed information, see "Web application" in the Network guide.

Chapter 3 Part names and functions

This chapter describes the part names of the chamber and their functions. Confirm the part names and locations.

3.1 Chamber

■ **Front**

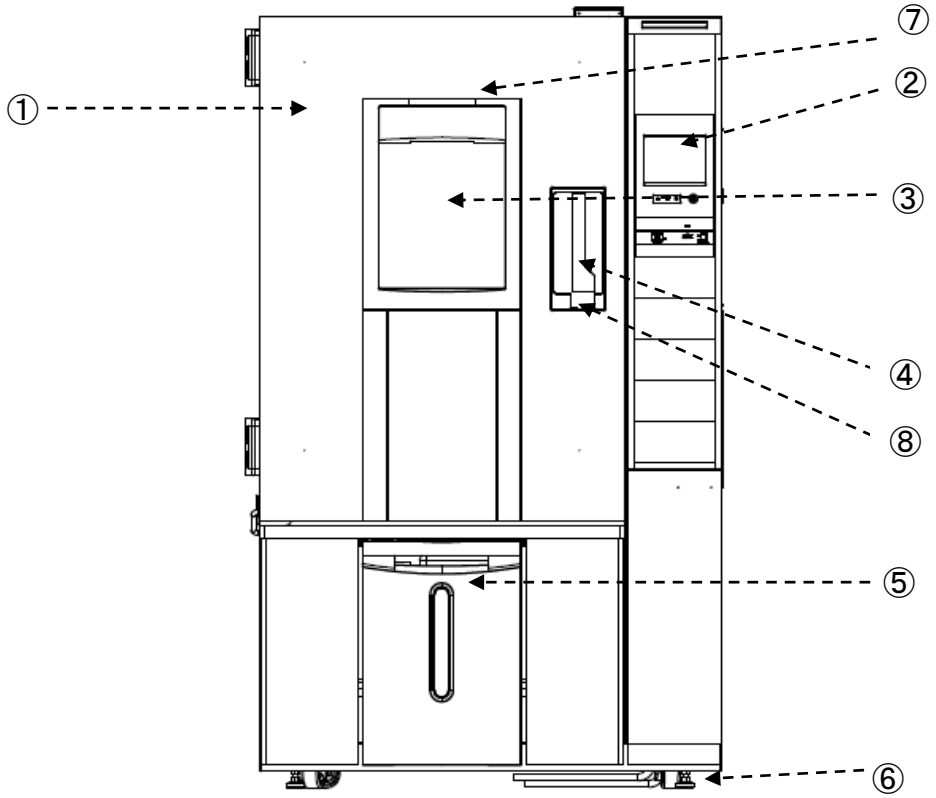


Fig. 3.1 Part names and functions (front)

Table 3.1 Part names and functions (front)

	Name	Function/application
①	Chamber door	Door to the test area where specimens are placed.
②	Instrumentation (LCD panel)	Used to set and monitor the temperature (humidity) controller.
③	Viewing window	Window for viewing the status of the specimen in the test area. As an option, the chamber can be fitted with a wide-view window or no window.
④	Door handle	Handle of the chamber door. Has a two-stage lock that can be locked by lightly closing the door and by forcibly pushing the door closed.
⑤	Water tank storage unit	Stores a fixed tank. Pull this toward you to expose the water supply port.
⑥	Adjuster	Fixes the chamber in place and uses a level to keep the chamber level.
⑦	Chamber lamp cover	Remove this to clean the viewing window.
⑧	Keyhole	Open and close with a key, so that the chamber door cannot be opened.

■ **Left side**

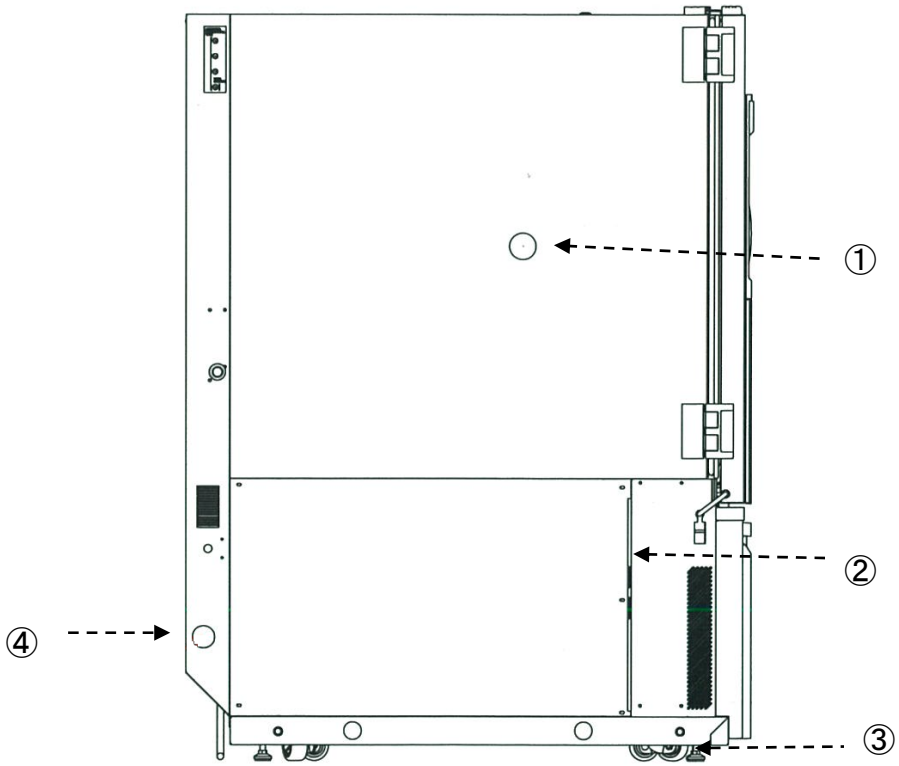


Fig. 3.2 Part names and functions (left side)

Table 3.2 Part names and functions (left side)

	Name	Function/application
①	Cable port	Port for a cable with a diameter of 50 mm. For an added cost, this can be changed to a port with a diameter of 100 mm or another size.
②	Condenser filter	Filter covering the front of the condenser. This filter must be cleaned regularly.
③	Caster	Used to move the chamber.
④	Drain port	Pass the drain hose through this port. Use this when it is not possible for the drain hose to protrude from the rear of the chamber.

■ **Left side (PDL/PDR)**

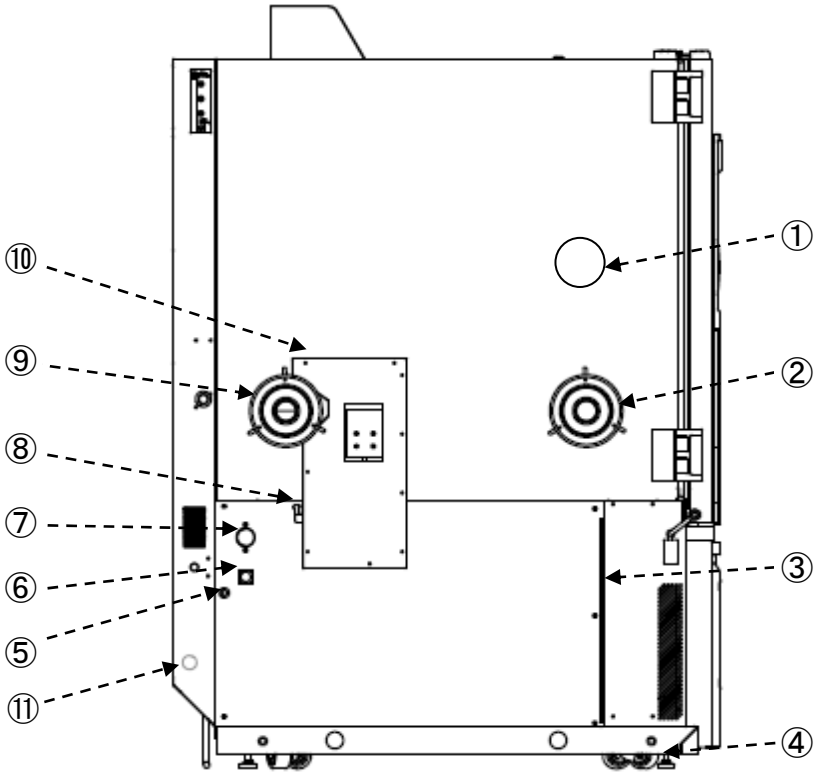


Fig. 3.3 Part names and functions (PDL/PDR left side)

Table 3.3 Part names and functions (PDL/PDR left side)

	Name	Function/application
①	Cable port	Port for a cable with a diameter of 50 mm. For an added cost, this can be changed to a port with a diameter of 100 mm or another size.
②	Air exhaust port	Discharges air from the chamber to the dehumidifier.
③	Condenser filter	Filter covering the front of the condenser. This filter must be cleaned regularly.
④	Caster	Used to move the chamber.
⑤	Drain connector (for connecting the dehumidifier)	Connected to the drain tube of the dehumidifier.
⑥	Dehumidifier control connector	Signal terminal for operating the dehumidifier. Connect the signal plug of the dehumidifier to this connector.
⑦	Dehumidifier power supply connector	Supplies power from the chamber to the dehumidifier. Connect the power plug of the dehumidifier to this connector.
⑧	Drain cock for compact humidifier	Drains water from the compact humidifier. Close the drain cock after draining the water.
⑨	Air inlet	Admits dry air from the dehumidifier.
⑩	Compact humidifier protection box	Protects the water supply tank and other components for the compact humidifier.
⑪	Drain port	Pass the drain hose through this port. Use this when it is not possible for the drain hose to protrude from the rear of the chamber.

■ **Right side**

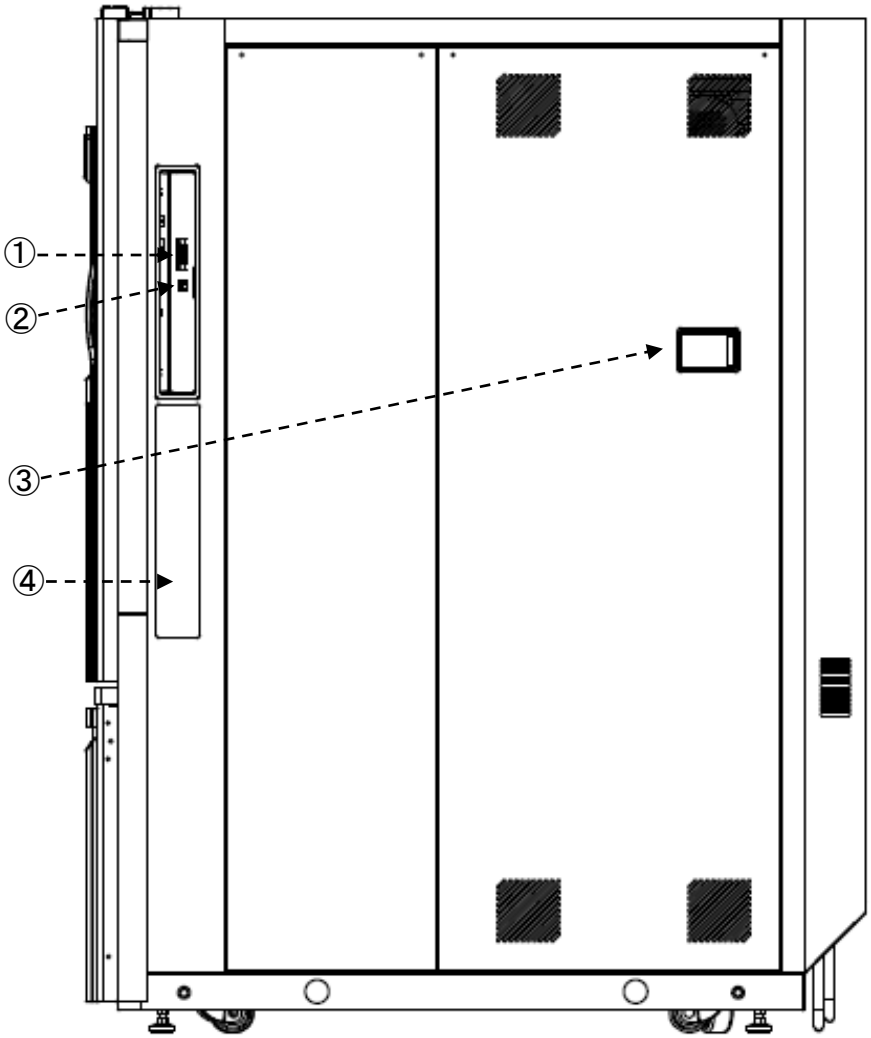


Fig. 3.4 Part names and functions (right side)

Table 3.4 Part names and functions (right side)

	Name	Function/application
①	Specimen power supply control terminals/time signal terminals	Terminals that are used to supply power to the specimen. When chamber operation stops due to a problem, the contact is opened and power to the specimen is interrupted. These terminals output signals (relay contact output) during interlock operation.
②	Ethernet port (LAN port)	LAN cable connection port. Used as the interface to Web function and the communication function when performing chamber tasks such as control monitoring, data management, and operations from a remote computer.
③	Breaker	Cuts off the power supply. Cuts off the power supply when overcurrent occurs.
④	Blank panel	Space for installing optional equipment.

■ **Rear**

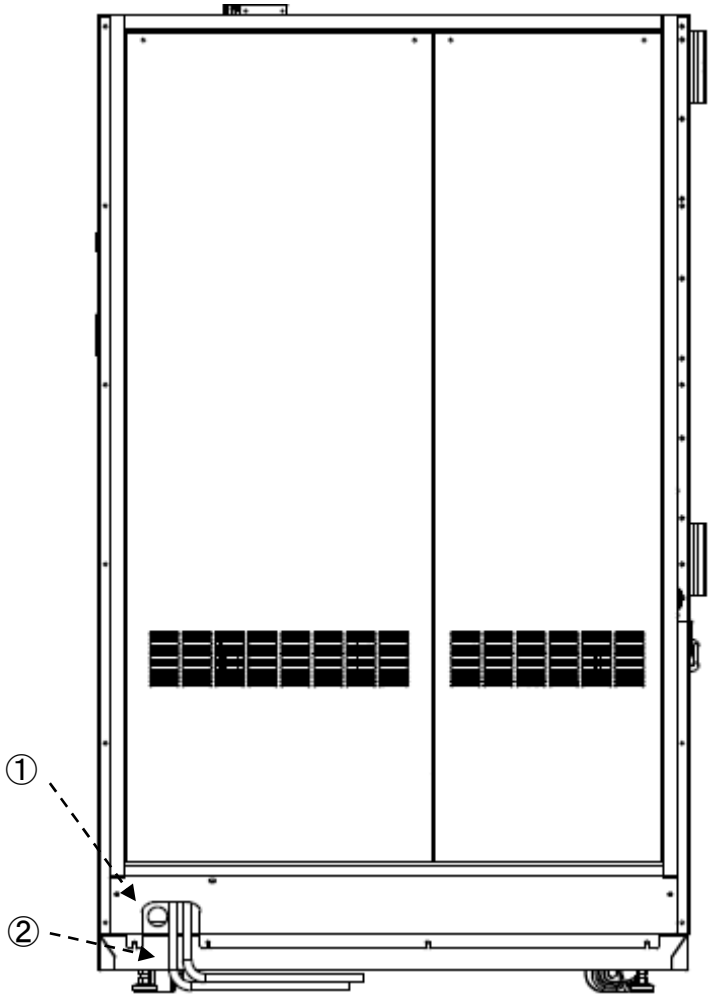


Fig. 3.5 Part names and functions (back)

Table 3.5 Part names and functions (back)

	Name	Function/application
①	Power connection port	Power supply cable port. Normally, the power supply cable passes through this port.
②	Drain hose	Drains water from the test area, door dew tray, etc. One drain hose is equipped as standard and two drain hoses are equipped when the continuous water supply option is selected.

■ **Top**

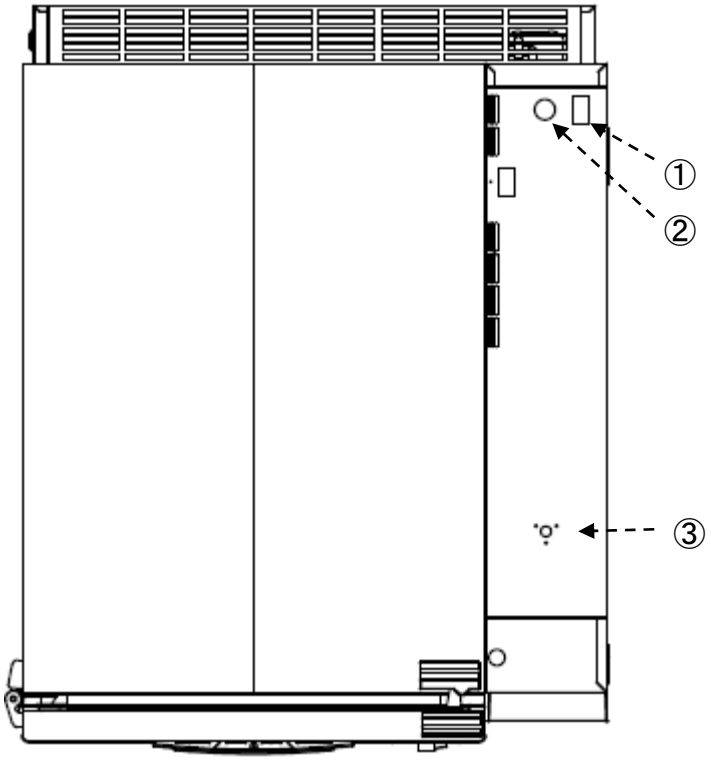


Fig. 3.6 Part names and functions (top)

Table 3.6 Part names and functions (top)

	Name	Function/application
①	Communication cable port	Port for passing a cable from the optional terminal added to the electrical compartment to an external device
②	Power connection port	Power supply cable port. Used to pass the power supply cable through the top of the chamber.
③	Option wire port	Used to wire equipment such as a status indicator light.

■ **Dehumidifier (right side; PDL/PDR only)**

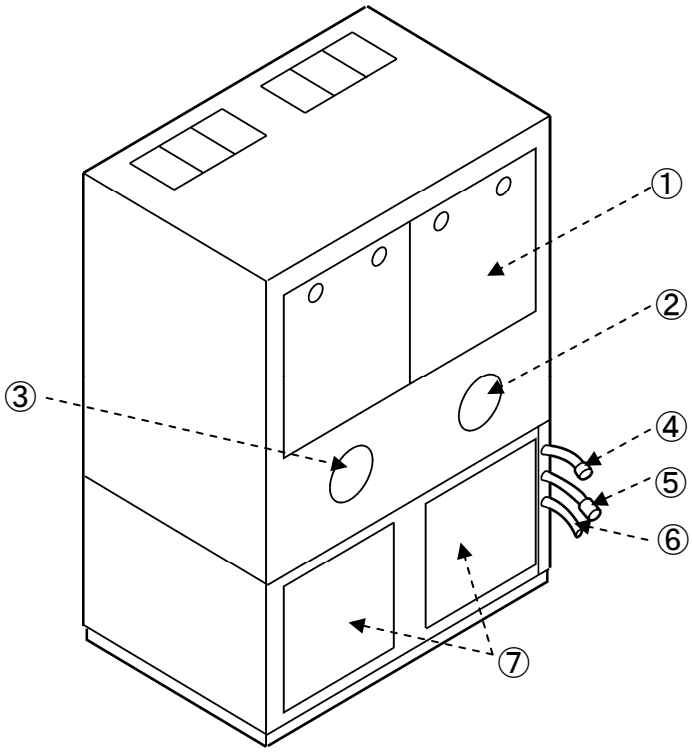


Fig. 3.7 Part names and functions (dehumidifier right side)

Table 3.7 Part names and functions (dehumidifier right side)

	Name	Function/application
①	Inspection door	Remove this door when inspecting the inside of the dehumidifier.
②	Air outlet	Blows out dry air. (Connected to the chamber unit.)
③	Air inlet	Inlet for air from the test area. (Connected to the chamber unit.)
④	Power plug	Connected to the chamber to supply power to the dehumidifier.
⑤	Signal plug	Connected to the chamber to send and receive signals.
⑥	Drain tube	Connected to the chamber to drain water from the dehumidifier.
⑦	Condenser filter	Keeps the condenser from becoming dusty. This filter must be cleaned regularly.

■ **Dehumidifier (left side; PDL/PDR only)**

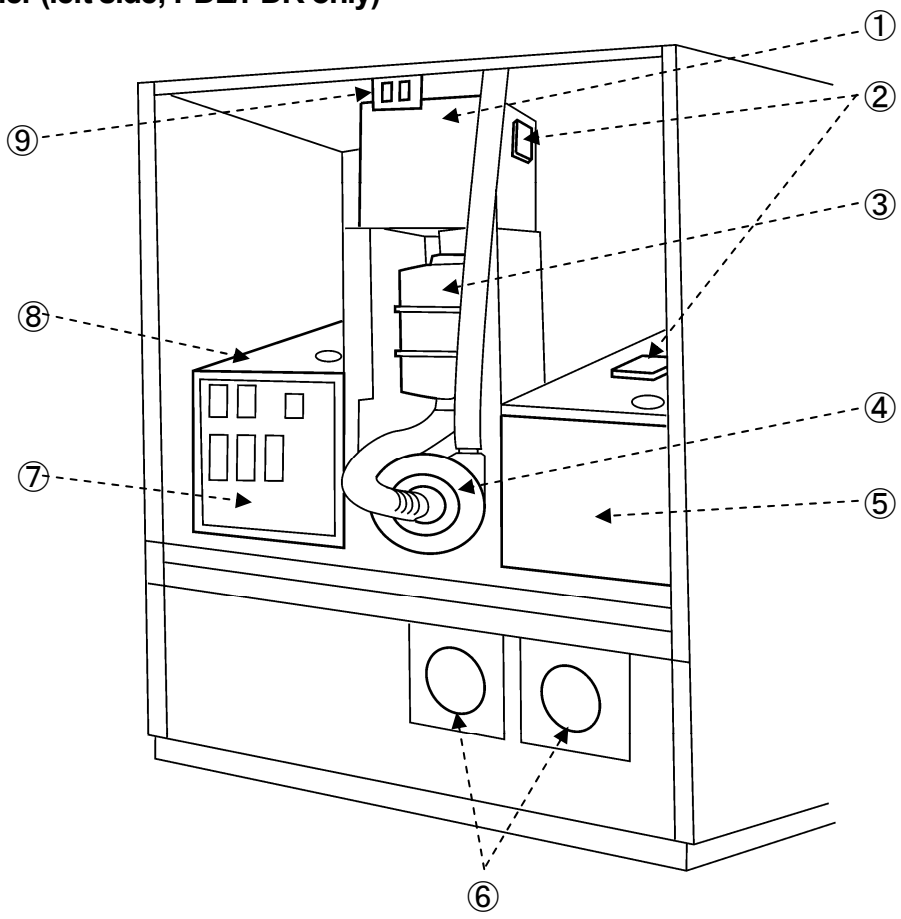


Fig. 3.8 Part names and functions (dehumidifier left side)

Table 3.8 Part names and functions (dehumidifier left side)

	Name	Function/application
①	Heater box	Used to dry the dehumidifying rotor.
②	Air filter	Prevents dust from entering the boxes.
③	Dehumidifying rotor	Generates dry air.
④	Air circulator	Circulates processed air.
⑤	Cooler (precooler)	Removes sensible heat from and assists in the dehumidification of processed air.
⑥	Air circulator (for heat exhaust)	Releases heat exhaust from the refrigerator in an upward direction.
⑦	Electric parts chassis	Distributes electricity to the dehumidifier control parts.
⑧	Cooler (after cooler)	Removes sensible heat from processed air.
⑨	Electrical compartment door switch	Detects the open state of the electrical compartment door.

■ **Test area**

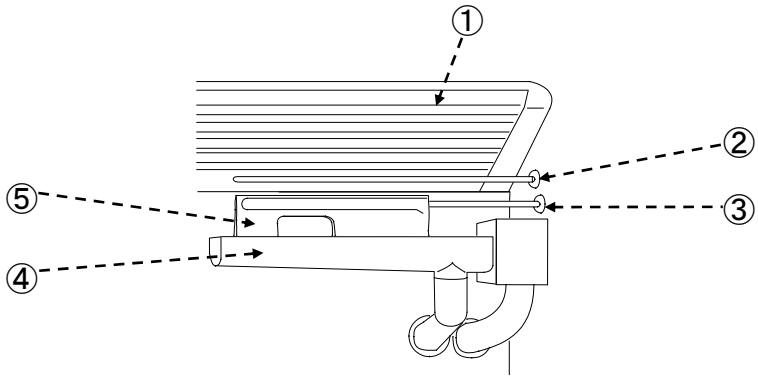


Fig. 3.9 Part names and functions (upper part of test area)

Table 3.9 Part names and functions (upper part of test area)

	Name	Function/application
①	Air register	Adjusts the direction of air in the test area.
②	Dry-bulb temperature sensor	Detects the dry-bulb temperature in the test area.
③	Wet-bulb temperature sensor (not available on temperature-only chambers)	Detects the wet-bulb temperature in the test area.
④	Wick pan (not available on temperature-only chambers)	Supplies water to the wet-bulb wick.
⑤	Wet-bulb wick (not available on temperature-only chambers)	Used to detect the wet-bulb temperature in the test area.

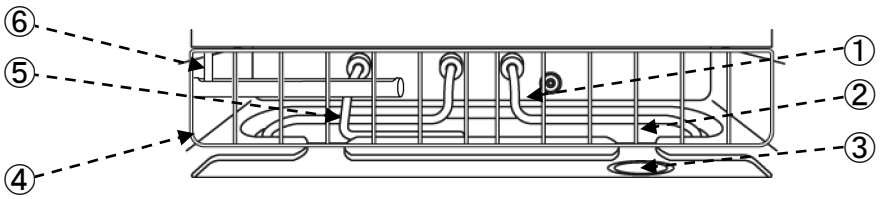


Fig. 3.10 Part names and functions (lower part of test area)

Table 3.10 Part names and functions (lower part of test area)

	Name	Function/application
①	Humidifying heater (not available on temperature-only chambers)	Causes water to evaporate from the humidifying tray.
②	Humidifying tray	Tray for collecting humidifying water. Also discharges moisture after defrosting.
③	Drain port	Relieves pressure from the test area to the outside and discharges water overflowing from the humidifying tray.
④	Protective grille	Prevents the operator and specimen from directly touching the humidifying heater.
⑤	Boil-dry protector (not available on temperature-only chambers)	Prevents the heater from boil-drying when the humidifying water is low.
⑥	Compact humidifying heater (PDL/PDR only)	Used for humidification while operating in a low-humidity environment.

■ Inside chamber top (PCR/PHP)

PCR

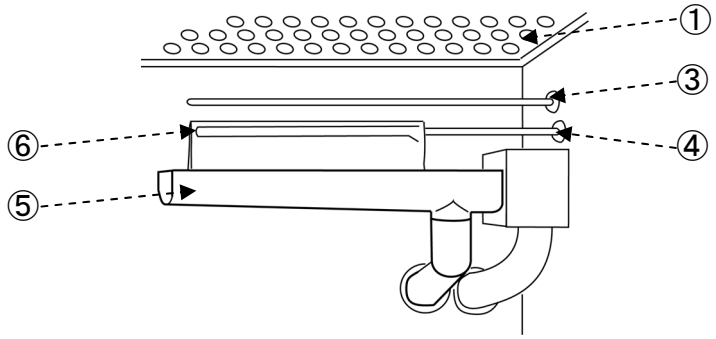


Fig. 3.11 Part names and functions (inside PCR chamber top)

PHP

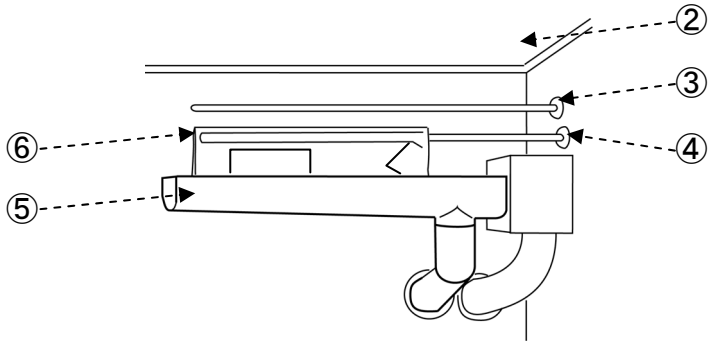


Fig. 3.12 Part names and functions (inside PHP chamber top)

Table 3.11 Part names and functions (inside PCR/PHP chamber top)

	Name	Function/application
①	Decorative sheet (PCR only)	Protects the HEPA filter.
②	Dew dripping preventive board (PHP only)	Prevents dew condensation water from dripping.
③	Dry-bulb temperature sensor	Detects the dry-bulb temperature in the test area.
④	Wet-bulb temperature sensor	Detects the wet-bulb temperature in the test area.
⑤	Wick pan	Supplies water to the wet-bulb wick.
⑥	Wet-bulb wick	Used to detect the wet-bulb temperature in the test area.

3.2 Operation panel

■ **Operation panel**

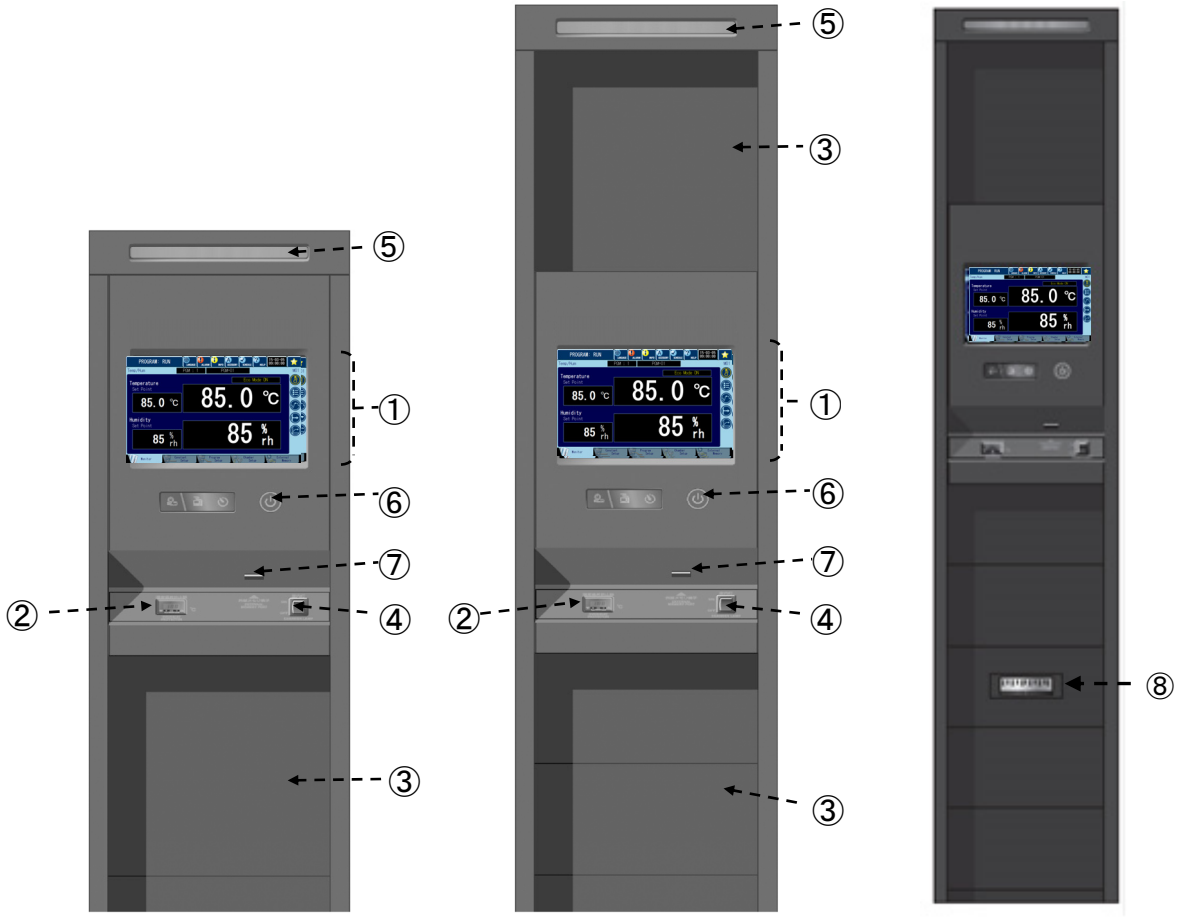


Fig. 3.13 Part names and functions (operation panel)

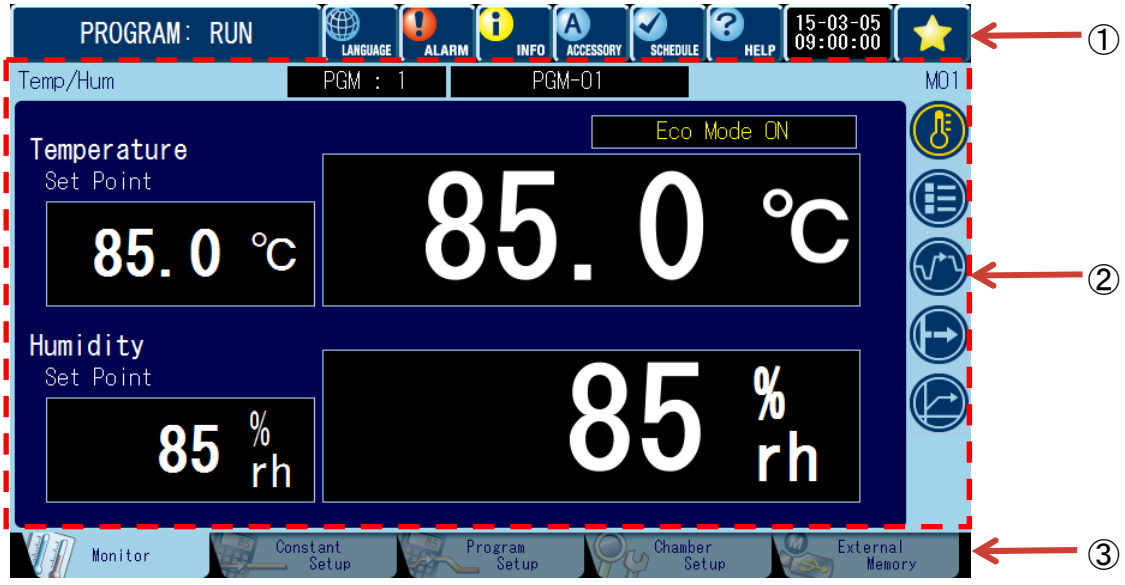
Table 3.12 Part names and functions (operation panel)

	Name	Function/application
①	Instrumentation	User interface unit. Used to set the temperature (humidity), start/stop the chamber, etc. See the next section for details.
②	Overheat protector	Stops operation to prevent the allowable upper limit temperature of the specimen from being exceeded.
③	Option panel	Panel for installing optional equipment
④	Chamber lamp switch	Turns the chamber lamp on and off.
⑤	Operation lamp	Lights during operation.
⑥	Instrumentation power switch	Turns the instrumentation on and off.
⑦	External memory terminal (USB)	Used to insert a USB memory device to enable data exchange between the chamber and a PC (or other chamber).
⑧	Clean meter (PCR only)	Shows the total pressure of the flow rate of the air circulator, which is used to determine when to replace the HEPA filter.

■ Operation lamp

Operation state	Operation lamp (indicator color)	Instrumentation power switch (display color)
①No power	Off	Off
②Instrumentation panel power off	Off	Lit (orange)
③Stopped	Off	Lit (green)
④Constant operation in progress	Lit (green)	Lit (green)
⑤Program operation in progress	Lit (green)	Lit (green)
⑥Program paused	Flashing (green)	Lit (green)
⑦Alarm	Lit (red)	Lit (green)
⑧Error	Flashing (red)	Lit (green)
⑨Screen off	① to ⑧ depending on the operation state	Flashing (green)

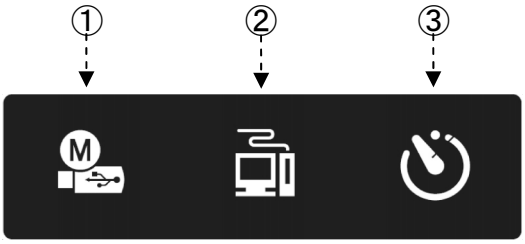
■ Instrumentation



	Name	Function/application
①	Common area	Displays and sets the operation state (operation), language setting, alarm, information, accessories, schedule,* help, date, and quick access.
②	Contents	Displays and sets the main menu screens.
③	Tabs	Displays various tabs of menu items.

* You can only enter schedule memos through Web application.
For details on how to enter schedule memos, see "Web application" in the "Network guide".

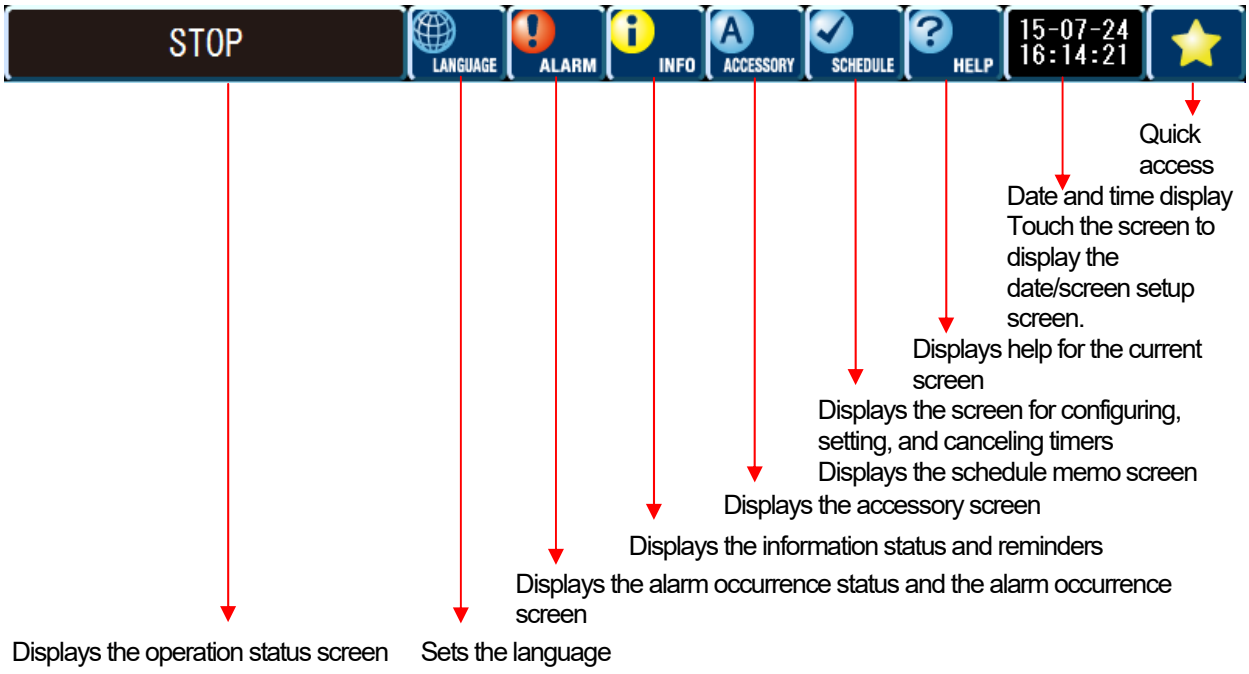
■ External LED indicators



	LED name	Display status	Usage status
①	USB memory lamp	Lit	External memory recognized
		Flashing (every second)	Preparing external memory (mount)
		Flashing (every second)	Accessing external memory
		Flashing rapidly (every 250ms)	External memory error
		Off	External memory not connected
		Off	Unsupported USB device connected
②	Communication lamp	Flashing	Communicating*
		Off	Not communicating
③	Timer lamp	Lit	Timer set

* When a connection has been established for Ethernet or (optional) RS-485/RS-232C/GPIB communication.

■ Common area



◆ **Energy Saving Advice** ◆

- **Eco operation setting**
  When "Set Eco Mode" is set to [On] on the Chamber Setup screen, "Eco Mode ON" is displayed in yellow on the Monitor screen and Operation Mode screen. During eco operation, the chamber operates in a way such that its power consumption is reduced.
- **Economy logo display (green)**
  The background of the display part of the operation control screen showing the economy logo (green) indicates that the chamber is performing eco operation.
  (However, this display is not available on PHP model chambers and chambers equipped with the DC inverter refrigeration circuit system option.)

◆ **Reference** ◆

Switching to and from the eco operation circuit may temporarily destabilize the measured temperature (or humidity). If you want to avoid this instability, set "Set Eco Mode" to [Off].

■ Ten-key operations

CLR: Clears all characters in the character string box
DEL: Deletes the last character entered
ENT: Confirms the input value and closes the ten-key window.
QUIT: Discards the input value and closes the ten-key window.

3.3 Electrical compartment

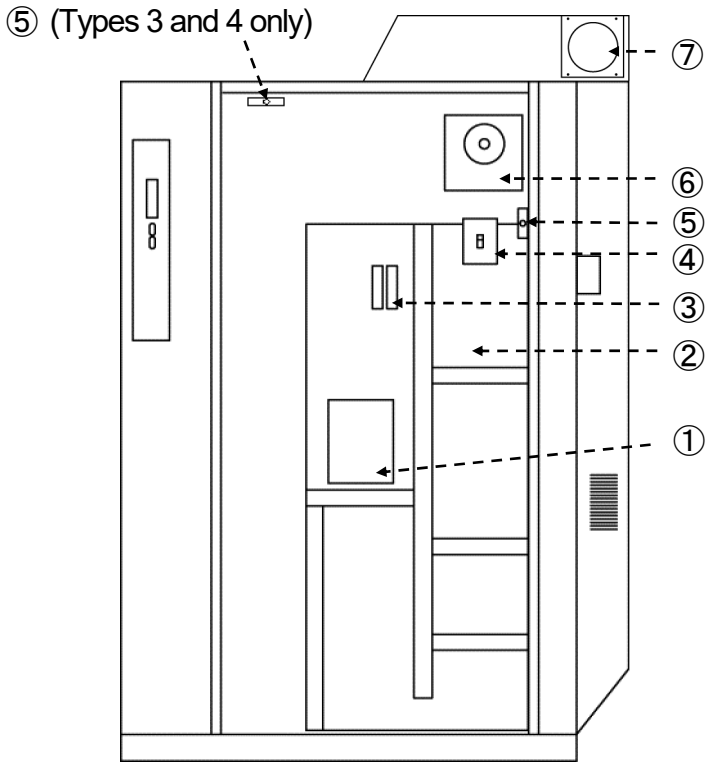


Fig. 3.14 Part names and functions (electrical compartment)

Table 3.13 Part names and functions (electrical compartment)

	Name	Function/application
①	Temperature (humidity) controller	Controls the temperature (humidity) set for the test area.
②	Electric parts chassis	Distributes electrical power to the heater, refrigerator, etc.
③	Fuse	Prevents and protects against burnout when an overcurrent occurs.
④	Breaker	Turns power to the chamber on and off. Also prevents electric leakage, electric shock, and overloads.
⑤	Electrical compartment door switch	Detects whether the door is open or closed.
⑥	Test area air circulator	Circulates air in the test area. (Types 1 to 3) (Installed on the chamber ceiling in the PDL/PDR/PCR Type 3 models and in all Type 4 models.)
⑦	Exhaust duct port	Connect this to an exhaust duct to process heat exhaust from the refrigerator and the dust generated by the refrigerator and air circulator motor. (This is only available on the PCR.)

3.4 Water circuit box (heat exhaust chamber*)

*: Temperature-only chambers do not have a water circuit, so this is called a "heat exhaust chamber".

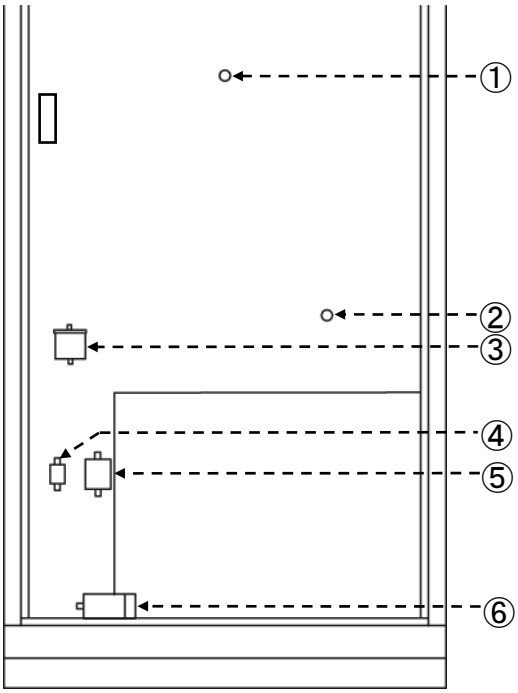


Fig. 3.15 Part names and functions (water circuit box, heat exhaust chamber)

Table 3.14 Part names and functions (water circuit box, heat exhaust chamber)

	Name	Function/application
①	Thermal fuse	Stops chamber operation when the area near the air circulator becomes abnormally hot.
②	Boil-dry protector (not available on temperature-only chambers)	Prevents the heater from boil-drying when the water in the humidifying tray is low.
③	Humidifying tray water level controller (not available on temperature-only chambers)	Maintains a constant water level in the humidifying tray.
④	Wick pan water supply pump (not available on temperature-only chambers)	Supplies water to the wick pan.
⑤	Humidifying tray water supply pump (not available on temperature-only chambers)	Supplies water to the humidifying tray.
⑥	Drain pump (not available on temperature-only chambers)	Drains water from the humidifying tray.

Chapter 4 Operation preparation

This chapter describes the preparation and confirmation steps that must be taken before operating the chamber.
For details about how to operate the chamber, see the Controller guide.

4.1 Setting the specimens in place

Set each specimen with a gap in between to prevent poor air circulation in the test area. If the air circulation in the test area becomes poor, the temperature (humidity) distribution also becomes poor, resulting in test results with large margins of error.

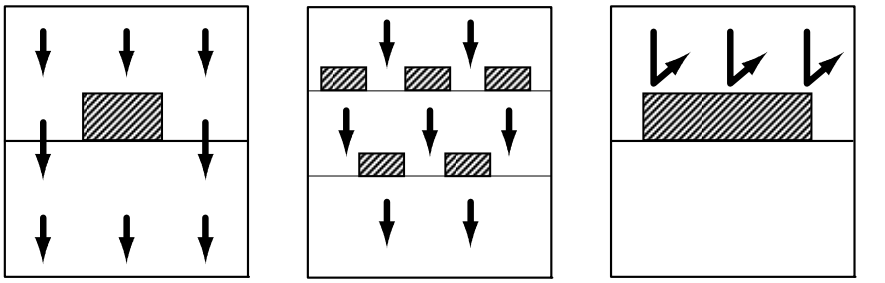


Fig. 4.1 Specimen positioning

The position of the shelves in the test area can be changed depending on the size and number of specimens. Set the shelves in their appropriate positions while keeping in mind air circulation in the test area.

<Procedure>

1) Install the shelf brackets at the appropriate height.
   Install shelf brackets according to the order specified by the numbers.

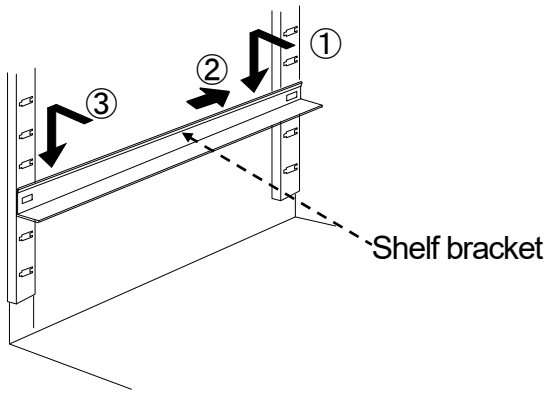


Fig. 4.2 Installing the shelf brackets

2) Place the shelf on the shelf brackets.
Install each shelf with the hook at the back. Slide the shelf so that the hook catches on the shelf bracket.

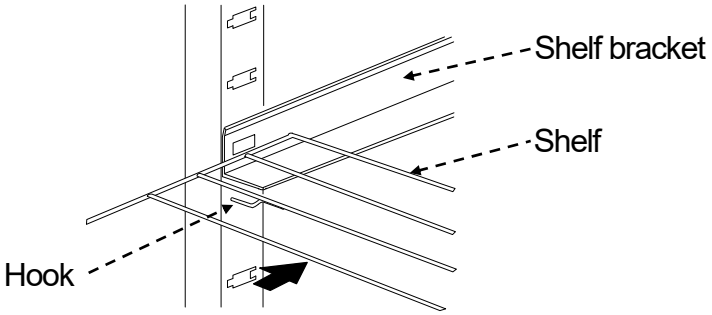


Fig. 4.3 Installing the shelf

WARNING

Set the shelves correctly, and use these shelves within their allowable load capacities.
Failing to do so can result in injury caused by the shelves falling down.

◆ Note ◆ (PDL/PDR only)

If the shelf ends up covering an air exhaust port, use small shelf brackets (which are included accessories). A shelf bracket that blocks an air exhaust port can result in loss of performance.

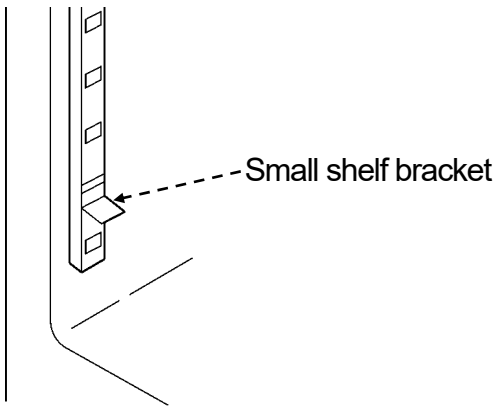


Fig. 4.4 Installing the small shelf brackets

4.2 Supplying power to a specimen (only when supplying power to a specimen is required)

Use the specimen power supply control terminals to supply power to a specimen.
The rated capacitance of the specimen power supply control terminals is 250VAC 3A, and the applicable electrical wire diameter is 0.3 to 2.0 mm^2.

DANGER

When supplying power to a specimen, be sure to use the specimen power supply control terminals.

If the specimen power supply control terminals are not used, the heat generated from the specimen can raise the temperature inside the test area, damaging the specimen. In the worst case, it can result in fire.

WARNING

Be sure to turn off the power before removing the terminal plug with the electrical wire connected to the specimen power supply control terminals.

Performing operations with the power on can result in electric shock.

Before performing tests in which power is supplied to the specimen, be sure to cause a problem with the chamber (such as overheating) to check that the supplying of power to the specimen is stopped when a problem occurs.

In case that the specimen power supply control terminals do not operate, the power will continue to be supplied to the specimen. This will cause the chamber temperature to increase and, in the worst case, a fire may occur.

Notice

Keep the wires of the test area (both inside and outside) slack and in a U-shape.

If condensation forms on a wire, this condensation can run into a specimen or terminal and cause damage to the specimen.

◆ **Note** ◆

In order to protect the specimen, we recommend that you implement a second layer of protection in addition to that provided by the chamber by installing, in the vicinity of the specimen, a thermal fuse or other device that can directly interrupt the supply of power without going through the chamber.

■ Wiring when supplying less than 3A to a specimen

Be sure to insert a fuse of the appropriate specifications.

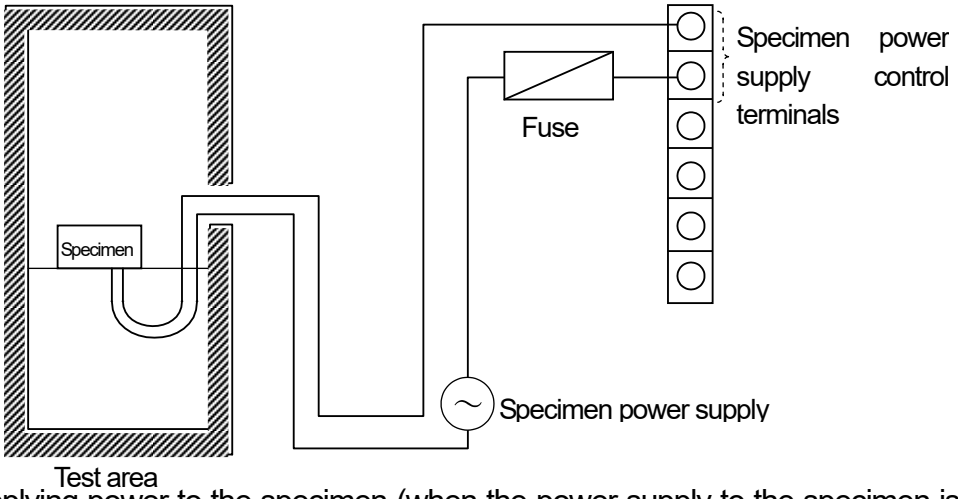


Fig. 4.5 Wiring for supplying power to the specimen (when the power supply to the specimen is less than 3A)

■ Wiring when supplying 3A or more to a specimen

Be sure to insert an electro-magnetic contactor and fuses of appropriate specifications.

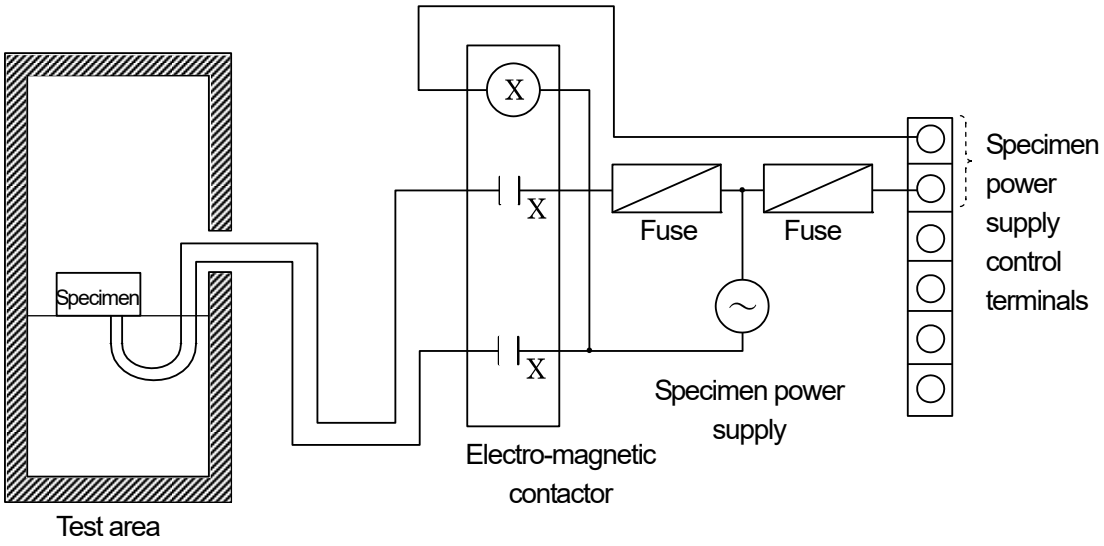


Fig. 4.6 Wiring for supplying power to the specimen (when the power supply to the specimen is 3A or more)

<Procedure>

1) Remove the cable port cover.
2) Extend the electrical wire from the specimen through the cable port and use the supplied rubber plug to plug the port.

3) Remove the terminal plug from the connector on the right side of the chamber.

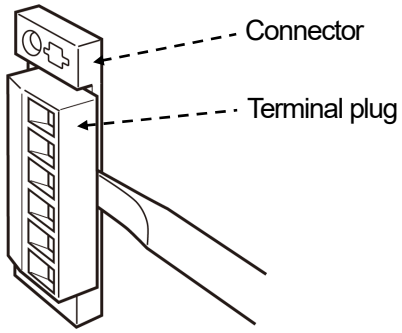


Fig. 4.7 Removing the terminal plug

4) Connect the electrical wires to the specimen power supply control terminals.
Insert the electrical wires into the two top terminal plugs and use a slotted screwdriver to tighten the screws.

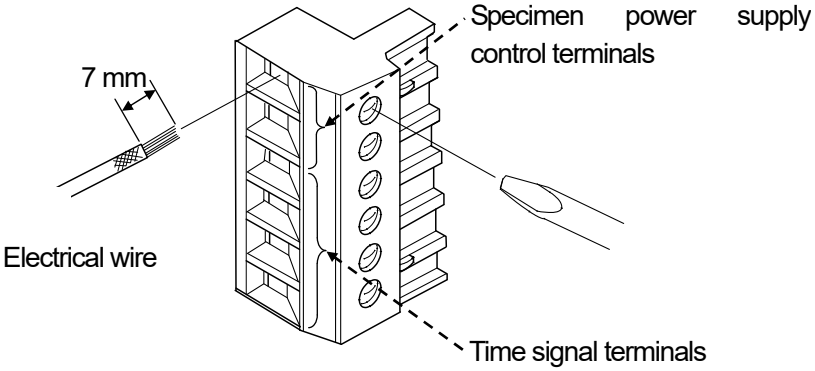


Fig. 4.8 Connecting electrical wires to the specimen power supply control terminals

5) Attach the terminal plug to the connector on the chamber.

◆ Reference ◆

When passing an electrical wire from the specimen through the cable port, be sure to use the supplied cable port rubber plug to plug the cable port. Otherwise, external air will enter the test area, preventing the test area from reaching the set temperature (humidity).
If the electrical wire is thick, use a knife to make a notch in the rubber plug, and then close the notch around the electrical wire.

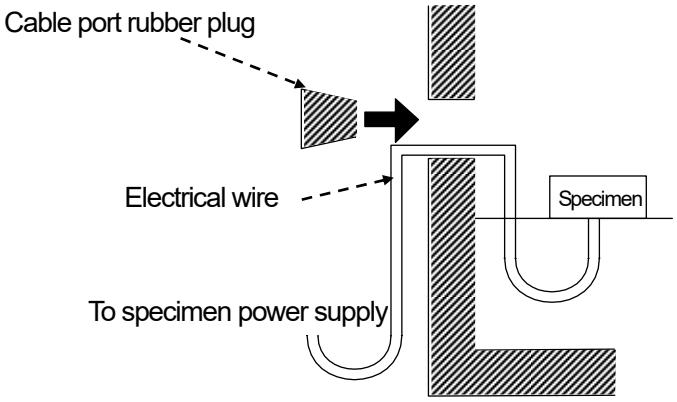


Fig. 4.9 Passing an electrical wire through the cable port

• Refer to the following table for the type of electrical wire to use according to the testing temperature.

Table 4.1 Electrical wire types and heat-resistance temperatures

Electrical wire type	Heat-resistance temperature
Vinyl wire	55˚C
Vinyl heat-resistant wire	100˚C
Styrene-butadiene cabtyre cable	70˚C
Electron beam cross-linked heat-resistant plastic wire	100˚C
Glass-woven silicon coated wire	200˚C

• If no wire is passed through the cable port, install the rubber plug from the inside and install the cable port cap on the outside.

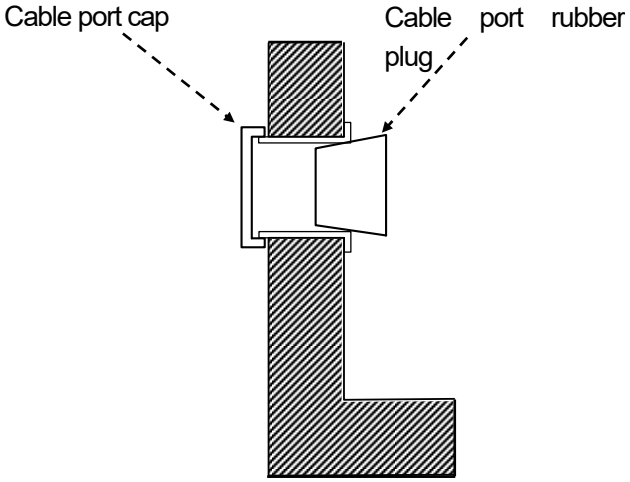


Fig. 4.10 When not using the cable port

◆ Note ◆

In case of long-term high temperature and high humidity or low temperature (below 0°C) operation, the included rubber plug (made of silicon sponge) may shrink. In this situation, purchase a new "silicon rubber plug" from your distributor or ESPEC.

4.3 Checking the wet-bulb wick (not available on temperature-only chambers)

When performing humidity operations, a wet-bulb wick (supplied) must be installed. If a wet-bulb wick is already installed, check whether it is wet. Replace it if it is dry.
There are two types of wet-bulb wicks, so use them separately according to the temperature and humidity control range.
Fine wick (made of non-woven nylon): For standard temperature and humidity range (PL/PR/PSL/PDL/PDR/PHP/PCR)
Cloth wick (made of cotton cloth): For low-humidity range (PDL/PDR only)

◆Note ◆

- **Insert the wet-bulb wick into the center wick pan.**
  If it is placed into the outside groove, it will not absorb the water sufficiently, resulting in uneven control.

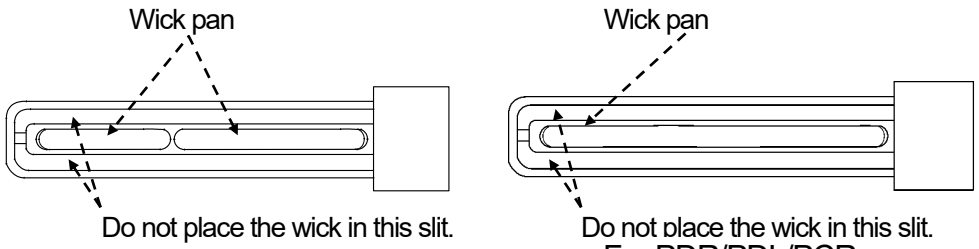
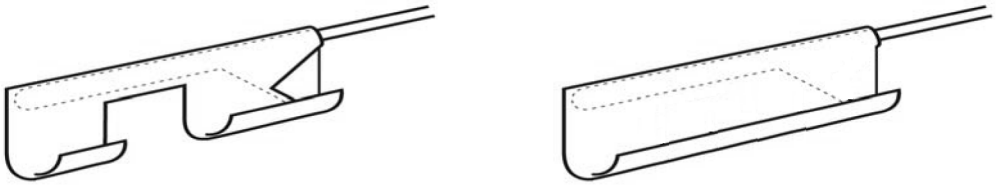


Fig. 4.11 Wick pan (viewed from above)

- **If the wet-bulb wick contains bacteria, the bacteria can propagate during testing, reducing water absorption. Clean your hands by washing with soap before handling the wet-bulb wick.**

<Procedure>

1) Remove the wet-bulb wick from the bag.
2) Insert the wet-bulb wick into the wet-bulb temperature sensor at the top of the test area. The wet-bulb wick can be more easily inserted by folding it first.



For PDL/PDR

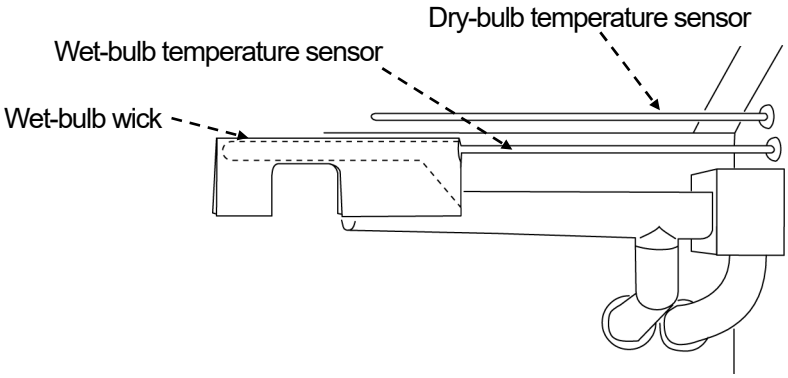
Fig. 4.12 Wet-bulb wick

⚠ CAUTION

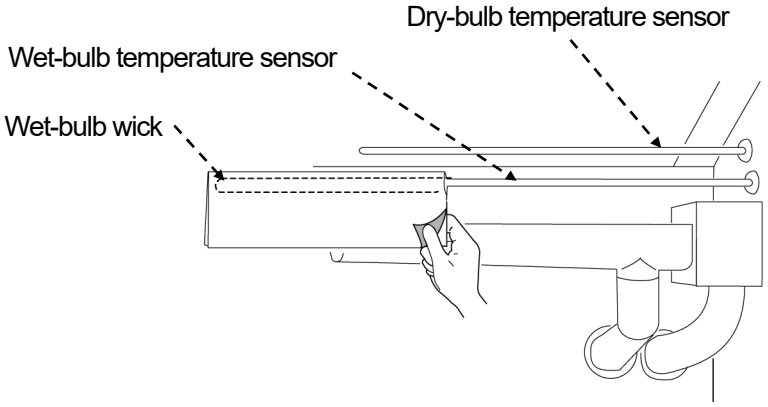
If the test area is dark when checking or replacing the wet-bulb wick, use a flashlight or other light source to provide sufficient lighting.

Be careful not to step or climb on the chamber dew tray or water tank drawer, and do not take any unnecessary actions.

If your feet are wet or the floor of the test area is wet, this can result in slipping.



For PL/PR/PSL/PHP



For PDL/PDR/PCR

Fig. 4.13 Installing the wet-bulb wick

◆ Note ◆

Insert the wet-bulb wick all the way to the end of the wet-bulb temperature sensor. If it is not inserted correctly or the sensor is in the incorrect position, control may be uneven.

When operating a program with both temperature and humidity control, set the operation so that the wick is constantly supplied with water. When water is supplied only for humidity control operation and operation is migrated from temperature control to humidity control, the wick may not absorb water and testing may not be able to continue.

◆ Reference ◆

When performing temperature control operation (especially at or above room temperature), remove the wet-bulb wick. The wet-bulb wick will dry out, making it difficult to absorb water and reducing the accuracy of humidity measurement the next time humidity control operation is performed.
The wick can be constantly supplied with water to prevent it from drying out even during temperature control operation. ☞ See the continuous water supply to wick setting in "6.11.7 Setting chamber details" of the Controller guide.

4.4 Checking the water level of the water tank (not available on temperature-only chambers)

Check the water level of the water tank. If the water level is low, add water while referring to "11. Supplying water" in the Installation guide.

◆ Reference ◆

The water tank holds approximately 20L (types 1 to 3) or approximately 37L (type 4) of pure water.
When the amount of pure water remaining in the water tank falls to approximately 4.4L (types 1 to 3) or approximately 8.5L (type 4), a water tank low alarm will occur. If the water level falls to approximately 1.3L (types 1 to 3) or approximately 2.6L (type 4), a water tank empty alarm will occur.
For details about the alarms, see "6.5 List of alarms" in chapter 6.

4.5 Checking the water level of the humidifying tray during continuous operation (not available on temperature-only chambers)

Before starting long-time continuous program or high-humidity operation, check that the water level of the humidifying tray is sufficient.
• The water level should be above the humidifying heater.
• The water level must not overflow from the humidifying tray.

4.6 Automatic switching of humidification tray water

There is a function for automatically switching the water in the humidifying tray. For details about setting this function, see ☞ "Auto Refresh Hum Tray" in "6.11.7 Setting chamber details" of the Controller guide.

4.7 Water consumption volume during low-humidity operation (PDL/PDR)

The table below shows guidelines for the main water consumption volumes for humidification and the wet-bulb wick.

Table 4.2 Water consumption volumes

Setting	Consumption volume [mL/h]	
	Type 3	Type 4
10°C 55%	150	500
30°C 40%	300	1000
60°C 32%	910	3000

The above values are provided for reference only and are not guaranteed.

4.8 Using the slit covers for energy saving operation (PHP only)

You can use these parts to operate the chamber with even lower power consumption when certain conditions are met (no high temperature and high humidity control operation and no heat generation loads). When the slit covers are attached, the chamber may suffer a loss in performance during temperature and humidity control operation and during heat generation load operation. Test the use of the slit covers in advance to check that there are no problems before using the slit covers during actual operation. Also, the pressure inside the test area that occurs when the humidity increases is released from the back of the chamber, so condensation may form temporarily on the slit covers and rear of the chamber. Therefore, attach the slit covers to the chamber after the temperature and humidity stabilize.

Table 4.3 Performance data (85°C and 85%rh)

Model	Power consumption	
	Without slit covers	With slit covers
PHP-2J	560Wh	480Wh
PHP-3J	560Wh	460Wh
PHP-4J	1090Wh	885Wh

* Variations between different products may occur.

There are left and right slit covers, and they are fixed in place with magnets.

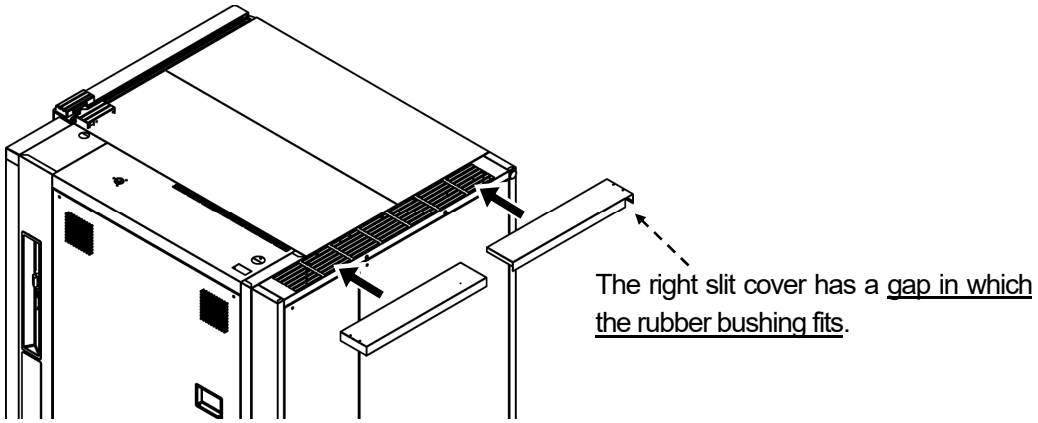


Fig. 4.14 Slit covers

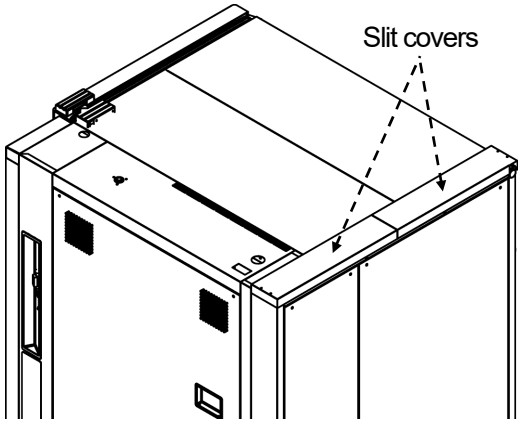


Fig. 4.15 Attaching the slit covers

4.9 Refrigerator warm up (not available on the PHP)

To prevent refrigerator trouble, warm up the refrigerator according to the following procedure.

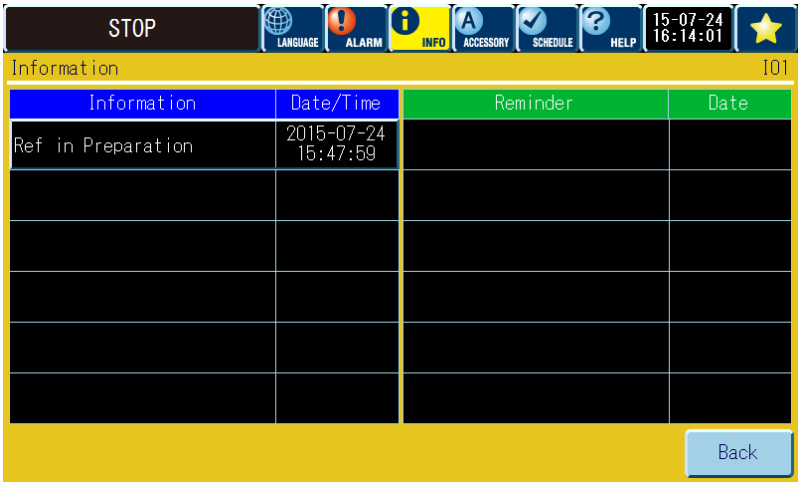
<Procedure>

1) Turn on the primary power supply.

2) Turn on the breaker (main power switch) on the right side of the chamber.
When you turn on the breaker (main power switch), power will be supplied to the compressor oil heater, and warming up will start. After the predetermined warm-up time elapses, the refrigerator operation can start.

◆ **Note** ◆

- This chamber is equipped with a heater for warming up the refrigerator. Turn on the breaker one hour before the start of operation to supply power to the heater. If the test is started immediately after the breaker is turned on, the initial temperature pull-down time may be lengthened. In addition, the refrigerator may be adversely affected.
- Do not turn on the breaker again within five minutes after the breaker is turned off. Doing so significantly shortens the life of the refrigerator.
- For up to 15 minutes after the breaker is turned on or up to five minutes after the refrigerator stops, the refrigerator is carrying out operation preparations, so even if you start operation, the refrigerator will not start. When the refrigerator completes its operation preparations, it will automatically begin operating. While the refrigerator is carrying out operation preparations, "Ref in Preparation" is displayed on the Information screen.



Chapter 5 Inspection and maintenance

This chapter describes how to perform regular inspection and maintenance to ensure the long operating life of the chamber.

5.1 List of consumables and regular replacement parts

The following parts must be replaced regularly. Replace the parts as soon as the replacement period is reached.
ESPEC also provides inspection and maintenance services.
To request a part, contact your distributor or ESPEC.

Table 5.1 List of consumables

Part	Recommended replacement period	Replacement method
Wet-bulb wick	After temperature control operation or one month	☞ See "4.3 Checking the wet-bulb wick (not available on temperature-only chambers)".

Table 5.2 List of regular replacement parts

Part	Recommended replacement period	Replacement method
Door packing (inside/outside)	Once every seven years	Contact your distributor or ESPEC.
Humidifying heater (temperature and humidity type only)		Contact your distributor or ESPEC.

* The operating life of the humidifying heater depends on the temperature and humidity control operation time and the water quality.
Using water with high conductivity can reduce the operating life.
To extend the operating life of the heater, replace the water in the humidifying tray before a temperature and humidity control operation and regularly clean the inside of the test area. (☞ See "5.4 Maintenance".)

* About the battery (lithium battery)
The chamber's controller is equipped with a lithium battery as a backup.
If power is not supplied to the chamber (the breaker is off) for a long time the lithium battery will die, and the chamber will not be able to start. The operating life of the lithium battery is approximately 10 years, although this varies depending on the chamber's storage environment. If you expect that the battery has died, contact ESPEC.

■ Reminder function

The inspection and maintenance periods can be set from the instrumentation.
For details, see the Controller guide.

5.2 Inspection and maintenance items

WARNING

Use appropriate methods to periodically clean parts of the chamber such as the electrical compartment, water circuit box, and humidifying tray.
Failing to do so can result in burns, electric shock, and other injuries.

■Inspection items

For a description of each item, see ☞ "5.3 Inspection".

If the inspection items listed below do not operate properly, contact your distributor or ESPEC.

Table 5.2 Inspection items

Operation inspection item	Inspection period
Primary breaker trip test	• Once a month • Before long-time continuous operation
Overheat protector trip test	• Before starting operation
Checking the water level of the humidifying tray and humidifying tray water level controller	• Once every three months • Whenever the chamber is moved

■Maintenance items

For a description of each item, see ☞ "5.4 Maintenance".

Table 5.3 Maintenance items

Maintenance item	Maintenance period
Wet-bulb wick check	When the chamber humidity gradually rises past the setting or when water cannot be absorbed
Cleaning the condenser filter	Once a month
Cleaning the water tank (not for temperature-only chambers)	Once a month
Cleaning the water supply pump filter element (not for temperature-only chambers)	Once a month
Cleaning the humidifying tray	Once a month
Cleaning inside the test area	Before starting operation
Cleaning the electrical compartment and water circuit box (heat exhaust chamber)	Once a year
Preparations before an extended period of non-use	Before an extended period of non-use
Cleaning the dehumidifier's air filter (PDL/PDR only)	Before starting low-humidity control operation
Draining the clean meter circuit (PCR only)	Once every three months
HEPA filter mold prevention (PCR only)	Once every two months

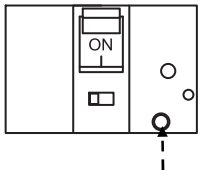
5.3 Inspection

Primary breaker trip test

WARNING

Perform a trip test on the leakage breaker and check that it is operating normally before starting chamber operation.
Failing to do so can result in electric shock.

Test the breaker operation once a month or before starting long-term continuous operation.
With the breaker on, gently press the test button Pressing the test button should cause the breaker lever to lower.



Test button

Fig. 5.1 Test button

◆ Reference ◆

When the breaker lever lowers, it stops at a point halfway between on and off. To turn on the power, lower the lever to the off position, and then raise it to the on position.

Overheat protector trip test

WARNING

Before starting chamber operation, check that the overheat protector is operating normally.
Failing to do so can result in fire.

Before starting chamber operation, perform a trip test on the overheat protector.

<Procedure>

1) Check that the breaker is in the on position.

2) Press the instrumentation power switch to turn on the chamber.
A menu appears.

3) Set the constant values and start constant operation.
Set the temperature close to room temperature or the current monitor temperature, and then turn off the humidity setting.

4) Set the overheat protector to a temperature that is approximately 5°C lower than the test area temperature.
If the overheat protector is operating normally, a buzzer will sound and an alarm will appear on the instrumentation screen. All digits of the adjuster display will flash.
If the buzzer does not sound, it means an error has occurred. Contact your distributor or ESPEC.

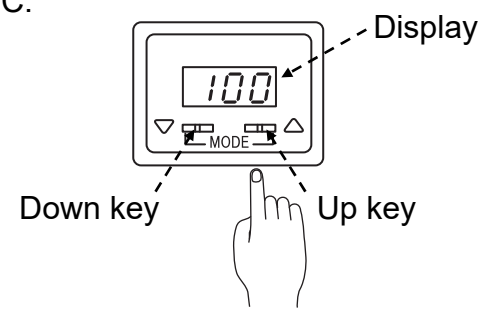


Fig 5.2 Overheat protector

5) To stop the buzzer, press Stop Beep on the alarm screen.
This will cause the overheat protector setting to return to its original value.

Periodic inspection related to the Fluorocarbon Emissions Control Law (Japan only)
This chamber is not subject to these periodic inspections.

As stipulated by the Fluorocarbon Emissions Control Law, products having a rated compressor motor output of 7.5kW or more must undergo periodic inspections at least once a year and have records of these inspections maintained. These inspections must be carried out by an individual with sufficient knowledge of the properties and handling methods of fluorocarbons as well as of the construction and operating methods of freezers and refrigerators.

Simple inspection related to the Fluorocarbon Emissions Control Law (Japan only)
The parts included in this chamber's refrigerator are Class-1 Specified Equipment. As stipulated by the Fluorocarbon Emissions Control Law, a simple inspection of these parts at least once every three months and a record of these inspections are both required with the purpose of early detection of leaking fluorocarbons. Perform a simple inspection by following the procedure shown below and keep a record of the results of this inspection. Note that ESPEC can also perform these simple inspections. Contact your distributor or ESPEC.

Keep separate records of each product and manage these records by recording the product's history such as inspections, repair, refrigerant collection, and refrigerant filling until you dispose of the product. There is no set style for the records. You can keep the records either on digital media or paper.

You can download simple inspection sheets from Test Navi, ESPEC's reliability website for engineers. Use these sheets as an example. (Only Japanese)
https://www.test-navi.com/jp/index.html

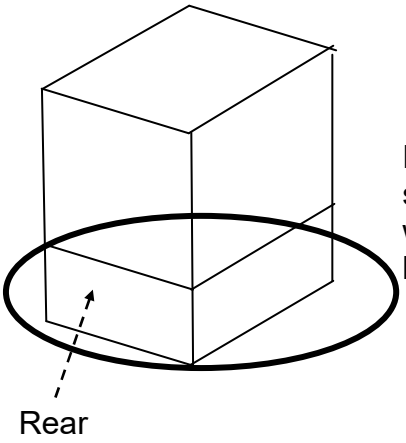
■ Simple inspection details
You have to perform a simple inspection of the chamber once every three months regardless of whether the chamber is in operation or stopped.
Even if the chamber has been stopped for 3 months or longer, you still have to perform the simple inspection.
The details of the simple inspection are those recommended by ESPEC. Add and remove inspection details according to the judgment of the chamber's administrator.
For details on the Fluorocarbon Emissions Control Law, see the website of Japan's Department of the Environment.

<Procedure>

1) Check the set temperature and the internal chamber temperature.
   On the Monitor screen, check whether the test area temperature (humidity) has been controlled to the set temperature (humidity) and is stable. Record the result of this check. If, once 20 minutes or more have elapsed after the set temperature (humidity) was reached, the test area temperature (humidity) cannot be controlled to a value within ±5C/5%rh of the set temperature (humidity) or is unstable, fluorocarbons may be leaking.
   If the chamber is not in use when it is time for its inspection, you may omit this procedure.

2) Check for abnormal vibrations and operating noises.
Check for chamber vibrations and operating noises.
Check the chamber's outer panel for vibrations and the chamber's vicinity for noises such as chattering noises. Record the result of this check. If vibrations or noises that you have not detected before are present, fluorocarbons may be leaking.
If the chamber is not in use when it is time for its inspection, you may omit this check.

3) Check the chamber's vicinity for oil leaks.
Check the chamber's vicinity for oil leaks. Record the result of this check.
If oil leaks are present, fluorocarbons may be leaking.



Focus on the rear and sides of the chamber when checking for oil leaks.

Fig. 5.3 Checking for oil leaks

4) Check the chamber's appearance for damage, corrosion, and rust.
Check the chamber's appearance for damage, corrosion, and rust. Record the result of this check.
If damage, corrosion, or rust is present on the chamber's appearance, fluorocarbons may be leaking.

The simple inspection is limited to cases in which it can be performed safely, easily, and visually. If you cannot guarantee user safety or the chamber's continued performance due to the carrying out of the inspection or if each of the details of the inspection indicate the possibility of fluorocarbons leaking, contact your distributor or ESPEC.

5.4 Maintenance

Wet-bulb wick check

The wet-bulb wick is used during humidity control operation.
For details such as the installation and replacement procedures, see "4.3 Checking the wet-bulb wick (not available on temperature-only chambers)".

Cleaning the condenser filter

Clean the condenser filter, which keeps the condenser from becoming dusty.

<Procedure>

1) Remove the condenser filter.
   Remove it from the left side of the chamber, as shown below.
   The condenser filter of the dehumidifier (PDL/PDR only) is held in place by a magnet.

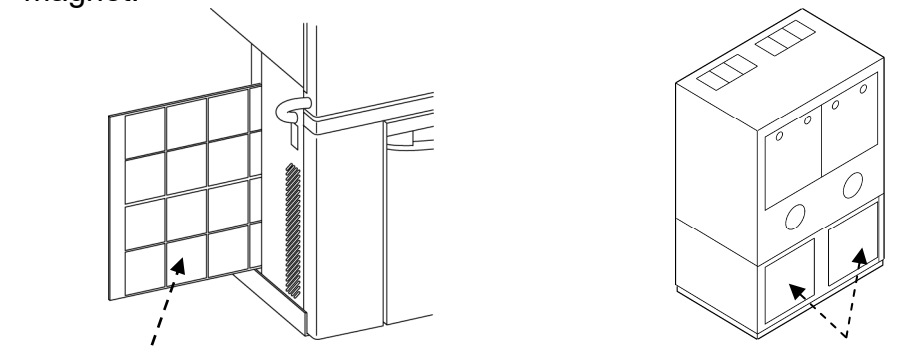


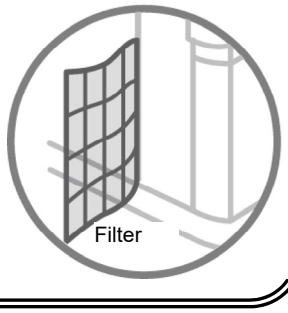
Fig 5.4 Removing the condenser filter

2) Rinse the filter with water to remove dust and debris.
3) After rinsing the filter with water, dry it in the shade.
   The condenser filter is made of resin material. It may be deformed if subjected to direct sunlight.
4) Return the condenser filter to its original location.

◆ **Energy Saving Advice** ◆

IMPORTANT **Clean the condenser filter and fins once a month.**

The condenser is equipped with a condenser filter and fins to prevent the accumulation of dust. Regular cleaning of the filter and fins can prevent lower refrigeration capacity and reduce the load on the exhaust fan.



Cleaning the water tank and water supply pump filter element

If water is left in the water tank for more than one month, the water may become contaminated. Continued use can reduce the operating life of the humidifying heater and wet-bulb wick.
Clean the water tank and water supply pump filter element once a month.

◆ Note ◆

- **Stop chamber operation before cleaning. Add water to the humidifying tray after cleaning.**
  Adding water removes air from the water circuit automatically, keeping the water supply at an appropriate level.
- **All parts that were removed to perform cleaning must be returned to their original locations after cleaning.**
- **Open and close the water tank drawer slowly and securely.**
  Opening and closing the water tank drawer with force can break it.
- **Clean your hands and the cleaning cloth beforehand to prevent propagation of bacteria in the water tank.**

<Procedure>

1) Slowly pull out the water tank drawer and open the tank.

2) Remove the water tank upper cap (with the water intake and sensor unit) and the water filling filter.

3) Remove the water tank from the drawer.

4) Use a nylon brush or cloth to clean the inside of the water tank, and then wipe away any remaining water with a cloth.

5) Rinse any debris from the water supply pump filter element with water.

6) Return the water tank upper cap (with water intake and sensor unit) and water filling filter to their original positions on the water tank.

7) Slowly close the water tank drawer.

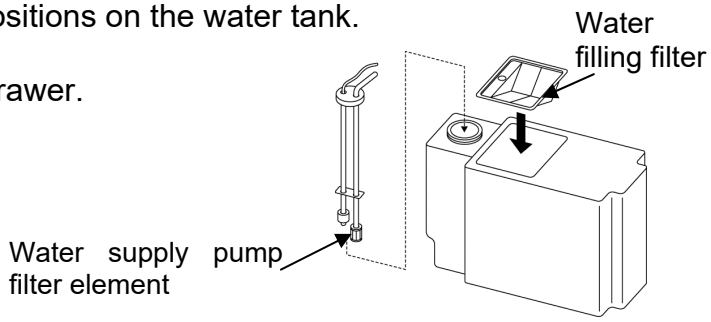


Fig. 5.5 Cleaning the water

Cleaning the humidifying tray

⚠ CAUTION

For your safety, be sure to wear gloves.

The test area has protruding parts and sharp parts, so be careful of cuts.

Allow the test area to sufficiently cool down before cleaning the humidifying tray.

Immediately after operation, the test area may be hot and humid.

During operation, debris and impurities adhere to the humidifying tray and humidifying heater. These should be cleaned once a month to extend the operating life of each part. Discharging the water from the humidifying tray after each test is completed can prevent the adhering of debris and impurities. The automatic humidifying tray switching function is useful for this.

<Procedure>

1) Open the test area door.

2) Pull the bottom of the protective grille toward you and then lift up to remove it.

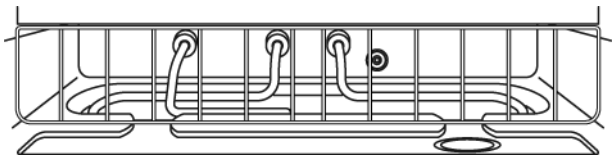


Fig. 5.6 Removing the protective grille

3) Use a brush to clean the surfaces of the humidifying tray and humidifying heater.

4) Install the protective grille and close the test area door.

◆ **Energy Saving Advice** ◆

IMPORTANT Clean the humidifying heater and humidifying tray once a month.

Removing scale adhering to the humidifying heater can improve heating efficiency and reduce the load on the humidifying heater.

Cleaning inside the test area

The adhering of dust and impurities to the inside of the chamber can prevent accurate test results. Clean the test area before starting operation.

<Procedure>

1) Open the test area door.

2) Use a soft cloth to wipe the test area.

3) Close the test area door.

Cleaning the electrical compartment and water circuit box (heat exhaust chamber)

The collection of dust in the electrical compartment and water circuit box (heat exhaust chamber) can lead to malfunction. Clean the electrical compartment and water circuit box (heat exhaust chamber) once a year.

<Procedure>

1) Check that the breaker is turned off.

2) Open the electrical compartment door and the water circuit box door (heat exhaust chamber door).

3) Use a vacuum cleaner to remove any dust in the electrical compartment and water circuit box (heat exhaust chamber).

4) Close the electrical compartment door and the water circuit box door (heat exhaust chamber door).

WARNING

Be sure to turn off the breaker before cleaning.

A safety device protects against electric shock by turning off the breaker with a door switch on the electrical compartment; however, be sure to turn off the breaker without relying on the safety device. Failing to do so can result in electric shock.

Cleaning the viewing window glass

Clean the viewing window glass with alcohol and a soft cloth.

Notice

- **Chambers with a viewing window**
  - In rare cases, the glass surface of the viewing window on the side of the test area may become clouded due to temperature and humidity control operation. This phenomenon occurs when moisture adheres to the glass surface for a long time, creating a chemical effect and causing the glass surface to become clouded. If moisture adheres to the glass surface of the viewing window on the side of the test area, such as after humidity control operation, use a soft cloth to wipe away the moisture before starting the next operation.
  - If the viewing window or glass becomes clouded, making operations difficult, glass window exchange is available with charge, contact an ESPEC sales or service representative.

Cleaning the decorative viewing window glass

CAUTION

Make sure the glass of the viewing window is at room temperature before cleaning.
The temperature of the glass may be extremely hot or cold during operation and immediately after high- or low-temperature control operation.

Support the viewing window glass with your hand when removing the screws.
The viewing window glass is secured with two screws at the top. When the screws are removed, the glass may fall out toward you.

<Procedure>

1) Use a Phillips screwdriver to unscrew and remove the mounting plate of LED illumination lamp.

2) Remove the viewing window glass by lifting it up slightly.

3) Clean the decorative viewing window glass with alcohol and a soft cloth.

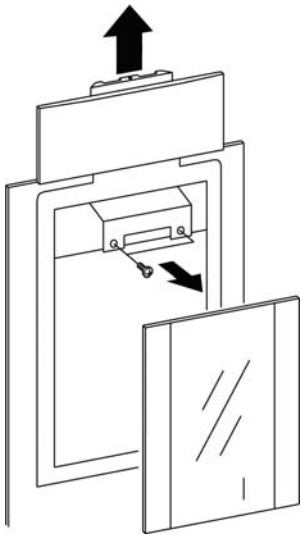


Fig. 5.7 Cleaning the decorative viewing window glass

4) Put the viewing window glass back into place. Reattach and screw the mounting plate of LED illumination lamp to its original location.

Preparations before an extended period of non-use

If the chamber will not be used for an extended period of time, be sure to perform the steps shown below. Failure to do so may result in inaccurate testing and reduce the operating life of the chamber.

- Change the water in the water circuit (not for temperature-only chambers).
- Drain the water from the wick pan and humidifying tray (not for temperature-only chambers).
- Perform a dry operation.
- Turn off the breaker.
- Clean the dehumidifier air filter (PDL/PDR only).

■Changing the water in the water circuit (not for temperature-only chambers)

Set the temperature of the test area to 70°C and the humidity to 90%rh, and then operate the chamber in constant mode for approximately 10 minutes.

<Procedure>

1) Check that the breaker is in the ON position.

2) Set the temperature of the test area to a constant setting of 70°C and the humidity to a constant setting of 90%rh.

3) Start operation from the operation control screen.

4) Perform operation for approximately 10 minutes with the test area door closed.

◆ Energy Saving Advice ◆

IMPORTANT **Turn off the instrumentation power switch and the breaker on the chamber.**

Reduce the standby power.
If the chamber will not be used for an extended period of time, turn off the breaker to reduce the standby power.

Turn on the breaker one hour before using the chamber.
(When the ambient temperature is 20°C.)

■Draining the water (not for temperature-only chambers)

<Procedure>

1) Check that the breaker is in the ON position.

2) Press the instrumentation power switch to turn on the chamber.

3) Press the ACCESSORY icon.
Press [EXEC] next to Manu Drain under Set Drain.
To stop water drainage, press [STOP].

4) In the case of a PDL or PDR chamber, you also need to drain the water from the compact humidifier.
Open the water drain cock of the compact humidifier protection box and drain the water.
Close the drain cock after draining the water.

■Performing a dry operation

◆ Note ◆

Under certain ambient conditions, suddenly stopping operation following low-temperature operation can cause condensation to form on the chamber surface. In some cases, this can result in water leakage in the chamber installation location.
Return the temperature in the test area to room temperature before stopping operation.

Dry out the test area according to the Controller guide “Chapter 5 Dry operation”.

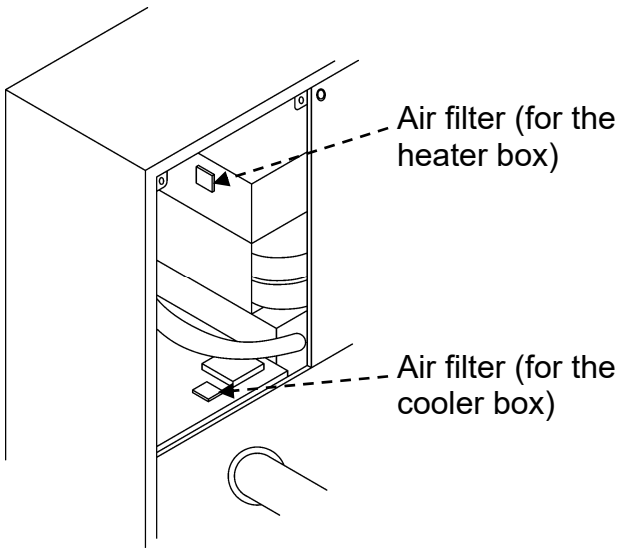
■Cleaning the dehumidifier air filter (PDL/PDR only)

Use the procedure below to clean the heater box and cooler box air filters.

<Procedure>

1) Perform the dehumidifier connection procedure in reverse to remove the dehumidifier from the chamber.

2) Remove the inspection door on the right side of the dehumidifier, and then remove the filter.



Right side of dehumidifier

Fig. 5.8 Removing the air filters

3) Rinse the filters with water to remove dust and debris.

■Draining the clean meter circuit (PCR only)

Condensed water accumulates inside the clean meter circuit. Drain the circuit once every three months.

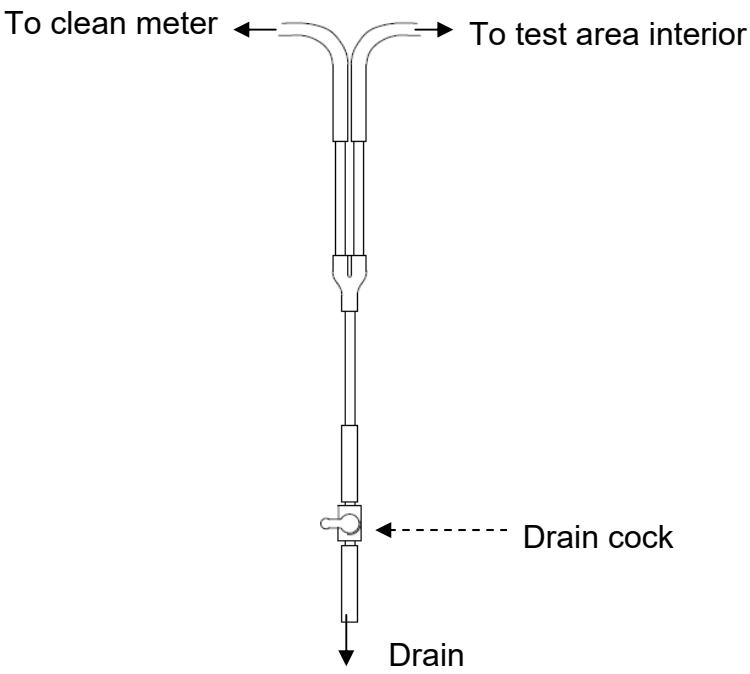
<Procedure>

1) Check that the breaker is turned off.

2) Open the water circuit box door.

3) Open the clean meter circuit drain cock and drain the water.

4) Close the drain cock, and then close the water circuit box door.



■HEPA filter mold prevention (PCR only)

To prevent mold from forming on the HEPA filter, be sure to perform dry operation periodically (once every two months) and after you finish using the chamber in temperature and humidity control operation.
The HEPA filter used by this chamber has not been treated to protect against mold formation from the matter picked up by the filter. Therefore, if you leave the chamber in temperature and humidity control operation, it is easy for mold to develop in the filter and the chamber. The same information applies to the case in which you will not use the chamber for a long time.
If you will stop using the chamber after performing temperature and humidity control operation, be sure to drain the water from the humidifying tray, perform dry operation at 100°C for approximately 30 minutes, and then stop using the chamber.

Chapter 6 Alarms and Troubleshooting

This section describes alarms, other problems, their possible causes, and required actions.
Contact your distributor or ESPEC in the following cases.

- When the chamber does not operate properly even after taking the actions listed here
- When a malfunction occurs for which a "service call" is listed as the solution in the table

6.1 Alarms and actions

WARINING

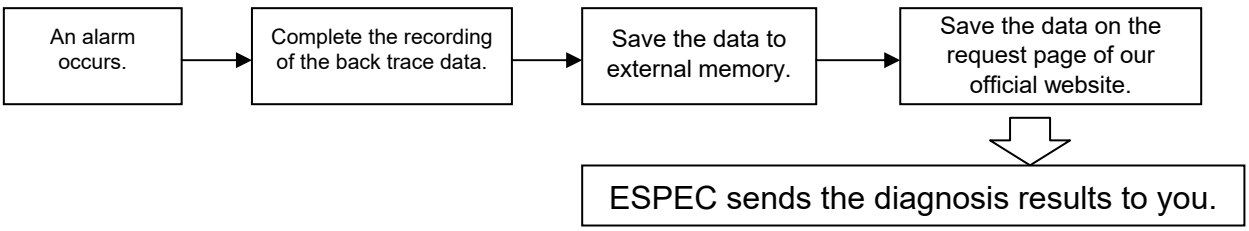
When taking action on the primary side of the breaker (main power switch), be sure to turn off the main power supply switch at your facility. Also, use caution to ensure that power is not supplied accidentally.
Attempting to solve a problem with the power on can result in electric shock. Use the supplied breaker handle stopper to prevent the breaker from being turned on accidentally.

Be sure to turn off the breaker (main power switch) before opening the electrical compartment door or the water circuit box door (heat exhaust chamber door).

This chamber has functions to sound a buzzer if a problem occurs; perform a self-diagnostic for major malfunctions; and display the malfunction details, cause, and action to take on the instrumentation screen.
The details of the displayed problem are described in the alarm list. Take the appropriate action according to the details listed.
To troubleshoot problems that cannot be detected using the self-diagnostic, see "6.6 Troubleshooting". If the chamber does not operate properly even after taking the actions listed here, contact your distributor or ESPEC.
This chamber is equipped with a back trace function.
You can use the Online Diagnostics Service by sending back trace data to the request page of our official website.

* The Online Diagnostics Service is designed to analyze the cause of failure and provide the customer with the diagnosis result for customers who send the internal data (back trace data) of the chamber before and after the occurrence of an alarm.

Flow of the back trace function

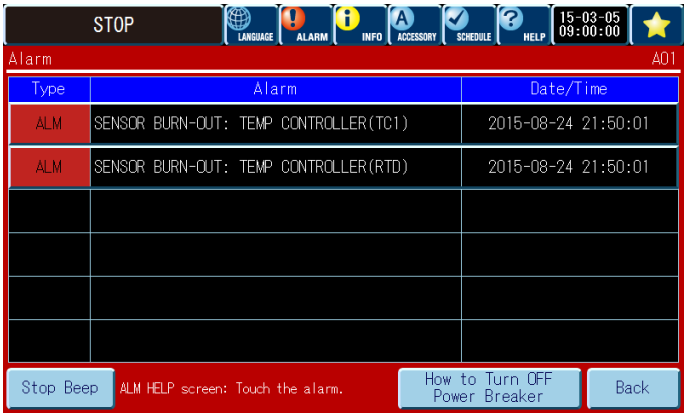


If an alarm occurs, the alarm screen below appears automatically and a buzzer sounds. The alarm icon continues to flash until the alarm is canceled.

Press [Stop Beep] to stop the buzzer.

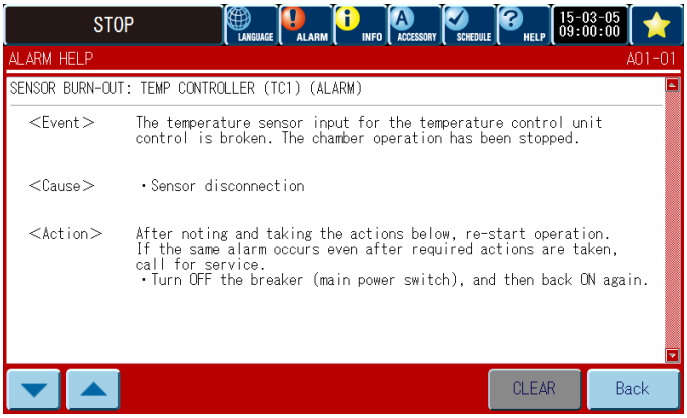
Pressing the alarm on the alarm screen displays the alarm details.

Alarm screen



Pressing an alarm displays the alarm help (details), as shown below.

ALARM HELP screen



Notice

Disabling the error buzzer sound or alarm buzzer prevents audible notification and may delay discovery of the error or alarm. Therefore, do not disable these sounds whenever possible.

If the buzzer sounds are disabled, notification is only provided by the red flashing operation lamp and alarm screen display, so be careful.

◆ **Reference** ◆

The operation of the alarm and error buzzers can be set using the maintenance settings and sound settings on the management setting screen.

Alarms and actions to take

Take the following actions when an alarm occurs.
Alarms are divided into errors and alarms, and the action to take can vary.

Error: When the chamber malfunctions or component devices malfunction resulting in an error status
Alarm: When there is no malfunction but operation may become affected, such as a maintenance announcement

◆ **Reference** ◆

- Even if an error occurs, backup operation may enable operation to continue. Operation continues during an alarm.
- For details about the alarms, see ☞ "6.5 List of alarms".
- For the program number and step number when an alarm occurs, check the Program Operation Details screen before pressing the controller's Power OFF switch. Once you press the Power OFF switch, the history of the program number and step number that were being executed when the alarm occurred will not be displayed.

① If an error occurs

<Procedure>

1) Press [Stop Beep] to stop the buzzer.

2) Refer to the operation manual or the alarm help screen to determine the required action and then perform the action accordingly.

② If an alarm occurs

<Procedure>

1) Press [Stop Beep] to stop the buzzer.

2) Refer to the operation manual or the alarm help screen to determine the required action and then perform the action accordingly.

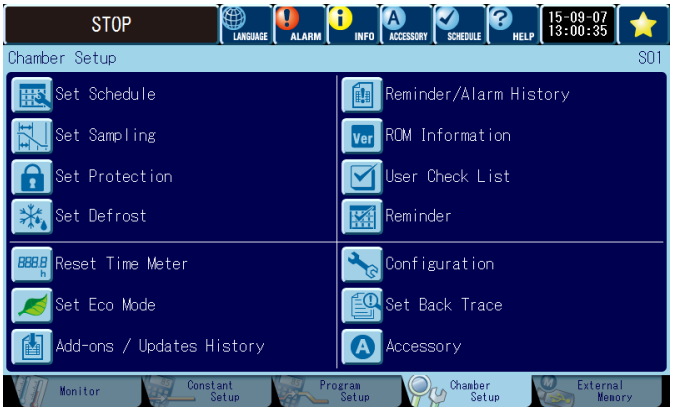
3) Press [Clear] on the alarm help screen.
Although operation does not stop when an alarm occurs, the alarm cannot be cleared from the alarm screen until the clear operation is performed or the breaker is turned off.

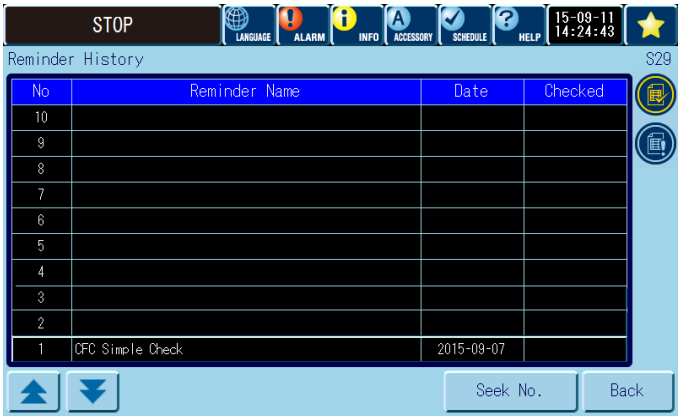
6.2 Alarm history display

The history of alarms that occur can be displayed on the management settings screen. The current alarm can be viewed on the alarm screen, but once the alarm is canceled, the alarm display disappears. To display a history of alarms that occurred, use the alarm history display below.

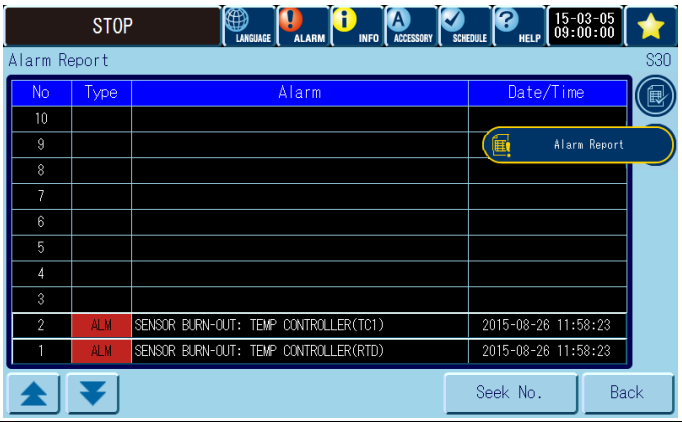
<Procedure>

1) Press the Chamber Setup tab.
On the management settings selection screen, press [Reminder/Alarm History]. Use the icon on the side menu to select the "Alarm Report" slide label.





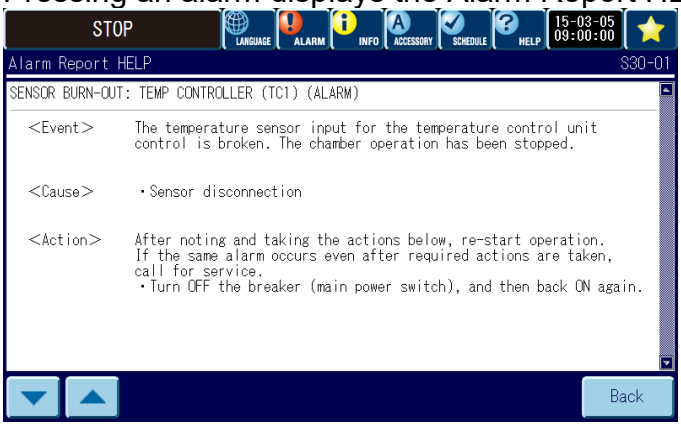
2) The alarm history is displayed.



No : Displays the history number (1 to 100).

Type : Displays whether the event is an alarm or warning.

Alarm : Displays the name of the alarm or warning that occurred.
Pressing an alarm displays the Alarm Report HELP screen.



Date : Displays the date and time the alarm occurred.

 : Use these buttons to select a page.

Seek No. : Enter a number to jump directly to that alarm or warning.

◆ Reference ◆

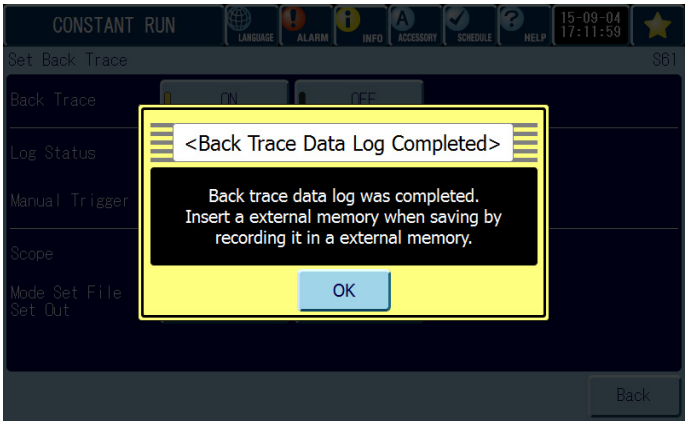
- Up to 10 alarms are displayed on a page in order of occurrence, starting with the latest one.
- The history stores up to 100 alarms. If an alarm occurs when there are already 100 alarms in the history, the oldest alarm in the history will be deleted to make room for the new one.

6.3 Back trace function

This chamber automatically records back trace data during operation.
The back trace data contains the temperature/humidity settings, temperature/humidity process values, and control value information of the control items required to control the equipment. If an alarm occurs, the chamber automatically completes the recording of back trace data.
By saving this data on the request page of our official website, you can use our Online Diagnostics Service.

<Procedure>

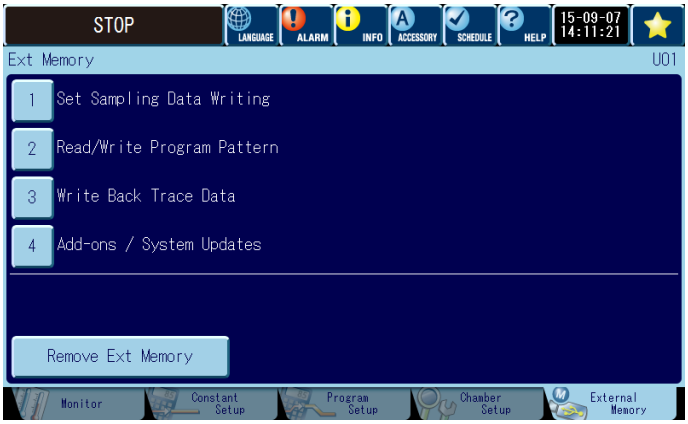
1) When an error occurs, the chamber automatically stops the recording of the back trace data. When stopping of recording is complete, the following message appears.



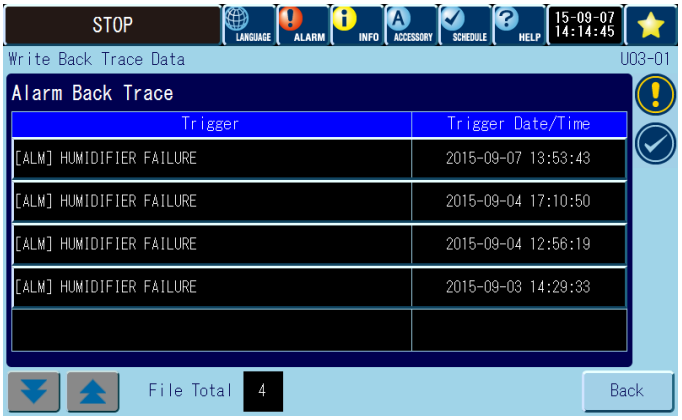
◆ Reference ◆

Resuming back trace recording
Even when data is not saved, if the back trace setting is set to on, recording of back trace data is resumed automatically.

2) Insert external memory (a USB device) into the external memory port below the instrumentation panel and then press [Write Back Trace Data] on the External Memory tab.



3) On the Write Back Trace Data screen, you can check the [Trigger Time] and [Trigger] details.
Select the data you want to save.
* If more than one error occurs, the name of the first error detected by the chamber is displayed.



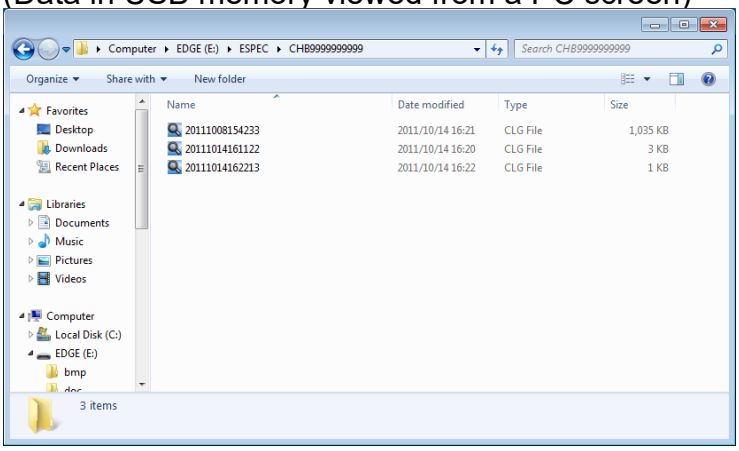
4) Press [Back]. On the External Memory screen, press [Remove Ext Memory]. Remove the external memory device after the message "Remove the memory" appears.

Notice
Removing the external memory device without pressing [Remove Ext Memory] first may damage the recorded data saved to the external memory.

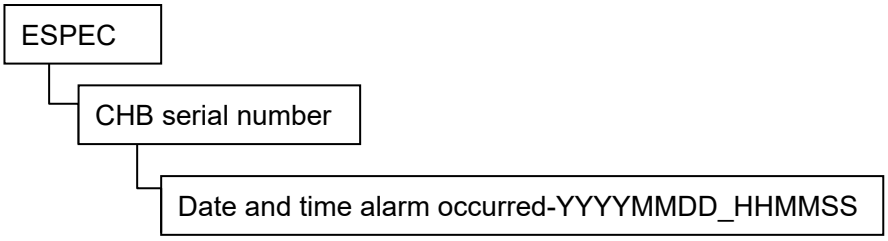
■ **Directory of external memory storage**

In the directory that is automatically created in the external memory, three files are stored.

(Data in USB memory viewed from a PC screen)



Folder configuration:



■ **Created files**

Unzipping the ZIP file creates the following files.

Back trace data:
Date and time alarm occurred-YYYYMMDD_HHMMSS_t.btd
Chamber setup and service information:
Date and time alarm occurred-YYYYMMDD_HHMMSS_c.bts
Operation setup information (constant and program setup):
Date and time alarm occurred-YYYYMMDD_HHMMSS_p.bts

The numeric part of the file name indicates the date and time.

■ **Using the Online Diagnostics Service**

Save the files stored in the external memory to the request page of our official website.
ESPEC will send you the diagnosis result.

◆ **Reference** ◆

All constant operation and program operation data set on the chamber is saved in the operation settings information.
If you cannot submit the "operation settings information" to ESPEC, please send the back trace data (date and time alarm occurred-YYYYMMDD_HHMMSS_t.btd) and the management settings and manufacture maintenance information (date and time alarm occurred-YYYYMMDD_HHMMSS_c.bts).
Or set Mode Set File Set Out of Set Back Trace in Chamber Setup to Off. Operation settings information will not be output.

6.4 Backup operation

This chamber is equipped with a backup function. When the chamber operation setting screen of maintenance settings is set to [On], operations will continue on other normal devices even if an error occurs.
When this is set to [Off], the chamber stops if an error occurs.
Although performance may not be satisfied during backup operation, this function is provided to prevent specimen damage due to a full operation stop and to reduce any lost time due to stopping chamber operation to switch to another test.
The operations of this function when an error occurs are described below so you can understand the backup operation and use the chamber properly.
For details about which error statuses are backed up, see ☞ "6.5 List of alarms".

Backup operations

Error type	When backup operation is [On]	When backup operation is [Off]
Humidifier error	The chamber switches to temperature control operation. Operation continues.	The chamber stops. (The operation state is "program paused" or "constant operation".)
Refrigerator error	The chamber continues operation with the remaining refrigerators. However, the chamber stops when there is only one refrigerator or when all refrigerators stopped abnormally. Depending on the conditions, the refrigerator may not operate.	
Other errors	The chamber stops.	

◆ Reference ◆

To set the backup operation mode for when an alarm occurs, see ☞ "Chapter 6. Chamber setup" in the Controller guide.

6.5 List of alarms

Alarms detected by the chamber are categorized as "Warning" and "ALARM".
After taking the recommended action for an alarm categorized as a "Warning," you can use the [Clear] button on the help screen to clear the alarm indication.
When an alarm occurs, view the actions required, perform these actions, and then restart or continue operations.
If an alarm or warning occurs again even after taking action, contact a service representative.

The <option name> is listed for the alarms that occur when the chamber is equipped with an option as well as for the causes and actions to perform for these alarms.
The possible cause and the action vary depending on the equipped options, so check the possible causes and actions for the different options.
For the numbers of alarms that occur with the communication function, see the Operation manual, Network guide.
The entries in the following table are listed alphabetically according to the names of the alarms.

Alarm name	Event	Possible cause	Action
ABSOLUTE HIGH LIMIT: HUMIDITY (WARNING)	Humidifier control is stopped because the test area humidity is greater than the absolute high limit of the humidity alarm. It will remain stopped until the humidity returns within range.	• Inappropriate absolute high limit setting • Dry wet-bulb wick	• Check the absolute high limit setting. • Replace the wet-bulb wick • Auto recovery
ABSOLUTE HIGH LIMIT: TEMPERATURE (ALARM)	Chamber operation is stopped because the test area temperature is greater than the absolute high limit of the temperature alarm.	• Inappropriate absolute high limit setting • Heat generation by products	• Check the absolute high limit setting. • Turn OFF the breaker (main power switch). • Confirm that heat generation by the product is reduced. • Turn ON the breaker (main power switch).
ABSOLUTE LOW LIMIT: HUMIDITY (WARNING)	Heater and refrigerator control are stopped because the test area humidity is less than the absolute low limit of the humidity alarm. It will remain stopped until the humidity returns within range.	• Inappropriate absolute low limit setting	• Check the absolute low limit setting. • Auto recovery
ABSOLUTE LOW LIMIT: TEMPERATURE (ALARM)	Chamber operation is stopped because the test area temperature is lower than the absolute low limit of the temperature alarm.	• Inappropriate absolute low limit setting • Inappropriate cooling ability setting	• Check the absolute low limit setting. • Check the cooling ability setting. • Turn OFF the breaker (main power switch), and then back ON again.

Alarm name	Event	Possible cause	Action
AIR CIRCULATOR FAILURE	Air circulator area on the chamber became abnormally hot and temperature switch inside the air circulator has tripped. The chamber operation has been stopped.	• Problem due to air circulator motor overload.	• Turn OFF the breaker (main power switch). • Stop operation for at least one hour to allow for cooling. • Turn ON the breaker (main power switch).
COOLING FAN FAILURE (PHP)	Cooling fan motor area on the chamber became abnormally hot and temperature switch inside the cooling fan tripped. The chamber operation has been stopped.	• Problem due to cooling fan motor overload	• Turn OFF the breaker (main power switch). • Clean the filter. • Stop operation for at least one hour to allow for cooling. • Turn ON the breaker (main power switch).
CURRENT VALUE ALARM: CONDENSER FAN	The operating current of condenser fan is high and a temperature switch or a motor breaker tripped. The chamber operation has been stopped.	• Problem due to condenser fan motor overload	• Turn OFF the breaker (main power switch). • Clean the condenser filter. • Stop operation for at least one hour to allow for cooling. • Turn ON the breaker (main power switch).
CURRENT VALUE ALARM: CONDENSER FAN <DC Inverter Refrigeration Circuit System Option>	The operating current of condenser fan is high and a temperature switch or a motor breaker tripped. The chamber operation has been stopped. If the backup mode is ON and the chamber has multiple refrigerators, only the affected refrigerator stops while all others continue running.	• Problem due to condenser fan motor overload	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch). • Clean the condenser filter. • Stop operation for at least one hour to allow for cooling. • Turn ON the breaker (main power switch).
DEHUMIDIFIER FAILURE	Chamber operation is stopped due to any one of the following causes: dehumidifier refrigerator abnormality (abnormal high pressure, abnormal current value, abnormal surface temperature), an abnormal condenser fan motor current value, or a recovery heater abnormal temperature rise or abnormal current value.	• Dehumidifier internal refrigerator problem • Dehumidifier internal recovery heater problem • Dehumidifier problem	• Turn OFF the breaker (main power switch). • Clean the dehumidifier condenser filter. • Clean the dehumidifier air filter. • Turn ON the breaker (main power switch).
Door Open (PAUSE) (WARNING)	Open chamber door detected during chamber operation. Pause Control is set to ON, so chamber operation is paused.	• Open chamber door • Improperly closed door	• Re-consider the Hold Time. • Push in the door handle to lock the door. • Recovery will be automatic after the door is closed.

Alarm name	Event	Possible cause	Action
DOOR OPEN (RUNNING) (WARNING)	Open chamber door detected during chamber operation. Pause Control is set to OFF, so operation continues with the door open, but normal operation may not be possible and other alarms may be generated.	• Open chamber door • Improperly closed door	• Re-consider the Hold Time. • Push in the door handle to lock the door. • Recovery will be automatic after the door is closed.
DRY WICK (WARNING)	During humidity operation, the wet-bulb (for measuring relative humidity) temperature rose above the specified temperature. The operation will continue but proper humidity control is impossible and another humidity alarm might be triggered.	• Dry wet-bulb wick	• Replace the wet-bulb wick • Recovery will be automatic after replacement.
EMPTY WATER (WARNING)	The water tank is empty. The humidifier operation has been stopped but temperature-only operation continues.	• Water tank out of water (Type 1, 2, 3: Approximately 1.3 liters or less; Type 4: Approximately 2.6 liters or less) < Optional Additional Supply Water Tank> • Connection pipe problem < Optional Continuous Water Supply > • Continuous water supply circuit problem	• Replenish water tank water. • Recovery will be automatic after water is supplied. < Optional Additional Supply Water Tank> • Perform water supply work on the portable tank. • Check the supply water circuit switch valve. < Optional Continuous Water Supply > • Check the instrumentation supply water setting. • Check the supply water circuit switch valve. • Check the continuous water supply piping. • Check the supply water source.
EXTERNAL EQUIPMENT: 1 <Optional Input Terminal for External Equipment Errors>	Trouble was detected in the external unit. The chamber operation has been stopped.	• Problem detected in connected external unit	• Turn OFF the breaker (main power switch). • Check for problems in external unit. • Turn ON the breaker (main power switch).

Alarm name	Event	Possible cause	Action
HEATING FAILURE	The chamber temperature exceeded the thermal fuse temperature, or rose above the overheat protector (instrument panel's option) setting, or the heater's circuit protector tripped because of overcurrent in the heater. The chamber operation has been stopped.	• Inappropriate overheat protector setting • Heat generation by products	• Check the overheat protector setting. • Turn OFF the breaker (main power switch). • Confirm that heat generation by the product is reduced. • Turn ON the breaker (main power switch).
HUMIDIFIER DRAINAGE FAILURE	Humidifier water level did not lower during drainage operations. If the backup mode is ON, humidity operation has been suspended, but temperature-only operation continues.	• Humidifier water drainage circuit problem	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch). • Check for water circuit box problems. • Turn ON the breaker (main power switch).
HUMIDIFIER FAILURE	The humidifier's circuit protector tripped because operating current was high. Or the boil-dry protector tripped. The chamber operation has been stopped. If the backup mode is ON, humidity operation has been suspended, but temperature-only operation continues.	• Water level adjustment failure	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch). • Check that the chamber is horizontally placed. • Turn ON the breaker (main power switch).
HUMIDIFIER LEAD-OFF WATER SUPPLY	The humidifier did not fill within the specified time at the start of humidity operation. The chamber operation has been stopped. If the backup mode is ON, humidity operation has been suspended, but temperature-only operation continues.	• Humidifier water supply circuit problem	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch). • Check for water circuit box problems. • Turn ON the breaker (main power switch).
HUMIDIFIER NORMAL WATER SUPPLY	The humidifying tray did not fill within the specified time during humidity operation. The chamber operation has been stopped. If the backup mode is ON, humidity operation has been suspended, but temperature-only operation continues.	• Humidifier water supply circuit problem	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch). • Check for water circuit box problems. • Turn ON the breaker (main power switch).

Alarm name	Event	Possible cause	Action
LOW WATER (WARNING)	Water in the water tank is low. Humidity operation can continue at the present level, but it will eventually stop unless more water is added.	• Low water tank level (Type 1, 2, 3: Approximately 4.4 liters or less; Type 4: Approximately 8.5 liters or less) < Optional Additional Supply Water Tank> • Connection pipe problem < Optional Continuous Water Supply > • Continuous water supply circuit problem	• Replenish water tank water. • Recovery will be automatic after water is supplied. < Optional Additional Supply Water Tank> • Perform water supply work on the portable tank. • Check the supply water circuit switch valve. < Optional Continuous Water Supply > • Check the instrumentation supply water setting. • Check the supply water circuit switch valve. • Check the continuous water supply piping. • Check the supply water source.
OUT-OF-RANGE: TEMP CONTROLLER SENSOR (TC5 to TC12) (ALARM)	The refrigerator sensor input to the controller is out of specified range. The chamber operation has been stopped. If the backup mode is ON and the chamber has multiple refrigerators, only the affected refrigerator stops while all others continue running.	• Refrigerator problem	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch), and then back ON again.
OVERCOOLING <Overcool Protector Option>	Chamber operation is stopped because the test area temperature is below the overcool protector setting (installed on the instrumentation panel).	• Inappropriate overcool protector setting • Inappropriate cooling ability setting	• Check the overcool protector setting. • Check the cooling ability setting. • Turn OFF the breaker (main power switch), and then back ON again.
OVERCURRENT : INTERNAL DC POWER <Optional Internal Power Supply for Applying Voltage>	Overcurrent was detected at internal DC power supply for applying voltage. The chamber operation has been stopped.	• Product capacity overload	• Turn OFF the breaker (main power switch). • Reduce the loaded capacity to 300W or lower. • Turn ON the breaker (main power switch).

Alarm name	Event	Possible cause	Action
POWER PHASE FAILURE	A reverse or open phase was detected in the 3-phase primary power supply connection. The chamber operation has been stopped.	• Connection problem in cable from primary power supply	• Turn OFF the breaker (main power switch). • Turn OFF the primary power supply. • Check the power cable connection. • After turning ON the primary power supply, turn ON the breaker (main power switch).
RECORDING DATA DELETED (WARNING)	Some of the following recording data has been deleted. • Sampling data • Back trace data • Add-ons / System updates history The chamber is capable of operation.	• Recording data corruption	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch), and then back ON again.
RECORDING DATA FORMATTED (WARNING)	Some of the following recording data has been lost because of formatting. • Sampling data • Back trace data • Add-ons / System updates history The chamber is capable of operation.	• Recording data corruption	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch), and then back ON again.
REFRIG-1 CURRENT VALUE ALARM: COMPRESSOR	The chamber operation has been stopped because refrigerator current value is high. If the backup mode is ON and the chamber has multiple refrigerators, only the affected refrigerator stops while all others continue running.	• Condenser error < Refrigeration Circuit Water Cooling System Option > • Cooling water problem	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch). • Clean the condenser filter. • Turn ON the breaker (main power switch). < Refrigeration Circuit Water Cooling System Option > • Clean the strainer. • Check the cooling water temperature and flow rate.
REFRIG-1 FROSTED OVER (WARNING)	Frost was detected on the evaporator. The chamber continues the operation, however, proper operation is impossible in this situation, and another alarm might be triggered.	• Frost on evaporator	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Perform the defrost operation.

Alarm name	Event	Possible cause	Action
REFRIG-1 PRESSURE ALARM: HIGH PRESSURE	Refrigeration pressure is high. The chamber operation has been stopped. If the backup mode is ON and the chamber has multiple refrigerators, only the affected refrigerator stops while all others continue running.	• Condenser error • Evaporator problem < Refrigeration Circuit Water Cooling System Option > • Cooling water problem	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch). • Clean the condenser filter. • Perform the defrost operation. • Turn ON the breaker (main power switch). < Refrigeration Circuit Water Cooling System Option > • Clean the strainer. • Check the cooling water temperature and flow rate.
REFRIG-1 PRESSURE ALARM: LOW PRESSURE	Refrigeration pressure is low. The chamber operation has been stopped. If the backup mode is ON and the chamber has multiple refrigerators, only the affected refrigerator stops while all others continue running.	• Evaporator problem	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch). • Perform the defrost operation. • Turn ON the breaker (main power switch).
REFRIG-1 TEMPERATURE ALARM: COMPRESSOR SURFACE	The chamber operation has been stopped because compressor surface temperature is high. If the backup mode is ON and the chamber has multiple refrigerators, only the affected refrigerator stops while all others continue running.	• Condenser error < Refrigeration Circuit Water Cooling System Option > • Cooling water problem	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch). • Stop operation for at least one hour to allow for cooling. • Clean the condenser filter. • Turn ON the breaker (main power switch). < Refrigeration Circuit Water Cooling System Option > • Clean the strainer. • Check the cooling water temperature and flow rate.

Alarm name	Event	Possible cause	Action
REFRIG-1 TEMPERATURE ALARM: DISCHARGE LINE	The discharge temperature of refrigeration has exceeded the standard value. The chamber operation has been stopped. If the backup mode is ON and the chamber has multiple refrigerators, only the affected refrigerator stops while all others continue running.	• Condenser error < Refrigeration Circuit Water Cooling System Option > • Cooling water problem	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch). • Stop operation for at least one hour to allow for cooling. • Clean the condenser filter. • Turn ON the breaker (main power switch). < Refrigeration Circuit Water Cooling System Option > • Clean the strainer. • Check the cooling water temperature and flow rate.
REFRIG-2 CURRENT VALUE ALARM: COMPRESSOR	The chamber operation has been stopped because refrigerator current value is high. If the backup mode is ON and the chamber has multiple refrigerators, only the affected refrigerator stops while all others continue running.	• Condenser error < Refrigeration Circuit Water Cooling System Option > • Cooling water problem	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch). • Clean the condenser filter. • Turn ON the breaker (main power switch). < Refrigeration Circuit Water Cooling System Option > • Clean the strainer. • Check the cooling water temperature and flow rate.
REFRIG-2 FROSTED OVER (ALARM)	Frost was detected on the evaporator. The chamber has been stopped. If the backup mode is ON, the chamber continues the temperature (humidity) operation with setpoint.	• Frost on evaporator	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch). • Perform the defrost operation. • Turn ON the breaker (main power switch).
REFRIG-2 FROSTED OVER (WARNING)	Frost was detected on the evaporator. The chamber continues the operation, however, proper operation is impossible in this situation, and another alarm might be triggered.	• Frost on evaporator	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Perform the defrost operation.

Alarm name	Event	Possible cause	Action
REFRIG-2 PRESSURE ALARM: HIGH PRESSURE	Refrigeration pressure is high. The chamber operation has been stopped. If the backup mode is ON and the chamber has multiple refrigerators, only the affected refrigerator stops while all others continue running.	• Condenser error • Evaporator problem < Refrigeration Circuit Water Cooling System Option > • Cooling water problem	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch). • Clean the condenser filter. • Perform the defrost operation. • Turn ON the breaker (main power switch). < Refrigeration Circuit Water Cooling System Option > • Clean the strainer. • Check the cooling water temperature and flow rate.
REFRIG-2 PRESSURE ALARM: LOW PRESSURE	Refrigeration pressure is low. The chamber operation has been stopped. If the backup mode is ON and the chamber has multiple refrigerators, only the affected refrigerator stops while all others continue running.	• Evaporator problem	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch), and then back ON again. • Perform the defrost operation.
REFRIG-2 TEMPERATURE ALARM: COMPRESSOR SURFACE	The chamber operation has been stopped because compressor surface temperature is high. If the backup mode is ON and the chamber has multiple refrigerators, only the affected refrigerator stops while all others continue running.	• Condenser error < Refrigeration Circuit Water Cooling System Option > • Cooling water problem	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch). • Stop operation for at least one hour to allow for cooling. • Clean the condenser filter. • Turn ON the breaker (main power switch). < Refrigeration Circuit Water Cooling System Option > • Clean the strainer. • Check the cooling water temperature and flow rate.

Alarm name	Event	Possible cause	Action
REFRIG-2 TEMPERATURE ALARM: DISCHARGE LINE	The discharge temperature of refrigeration has exceeded the standard value. The chamber operation has been stopped. If the backup mode is ON and the chamber has multiple refrigerators, only the affected refrigerator stops while all others continue running.	• Condenser error < Refrigeration Circuit Water Cooling System Option > • Cooling water problem	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch). • Stop operation for at least one hour to allow for cooling. • Clean the condenser filter. • Turn ON the breaker (main power switch). < Refrigeration Circuit Water Cooling System Option > • Clean the strainer. • Check the cooling water temperature and flow rate.
REFRIG-3 CURRENT VALUE ALARM: COMPRESSOR	The chamber operation has been stopped because refrigerator current value is high. If the backup mode is ON and the chamber has multiple refrigerators, only the affected refrigerator stops while all others continue running.	• Condenser error < Refrigeration Circuit Water Cooling System Option > • Cooling water problem	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch). • Clean the condenser filter. • Turn ON the breaker (main power switch). < Refrigeration Circuit Water Cooling System Option > • Clean the strainer. • Check the cooling water temperature and flow rate.
REFRIG-3 PRESSURE ALARM: HIGH PRESSURE	Refrigeration pressure is high. The chamber operation has been stopped. If the backup mode is ON and the chamber has multiple refrigerators, only the affected refrigerator stops while all others continue running.	• Condenser error • Evaporator problem < Refrigeration Circuit Water Cooling System Option > • Cooling water problem	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch). • Clean the condenser filter. • Perform the defrost operation. • Turn ON the breaker (main power switch). < Refrigeration Circuit Water Cooling System Option > • Clean the strainer. • Check the cooling water temperature and flow rate.
REFRIGERATOR SYSTEM ERROR <DC Inverter Refrigeration Circuit System Option>	Refrigerator system has an error. The chamber operation has been stopped.	• Refrigerator system control problem	• Turn OFF the breaker (main power switch), and then back ON again.

Alarm name	Event	Possible cause	Action
REFRIGERATOR : COOLING WATER FAILURE <Refrigeration Circuit Water Cooling System Option>	Cooling water pressure for the condenser is low. The water suspension relay tripped and the chamber operation has been stopped.	• Cooling tower (cooling water pump) stop • Closed water supply valve • Clogged strainer • Cooling water problem	• Turn OFF the breaker (main power switch). • Check cooling tower operation. • Check the water supply valve opening. • Clean the strainer. • Check cooling water piping. • Turn ON the breaker (main power switch).
SENSOR BURN-OUT: EXT ANALOG BOARD (RTD1) (ALARM) <Specimen Temperature Control Option>	The sensor input for the extended analog board is broken. The chamber operation has been stopped.	• Sensor disconnection	• Turn OFF the breaker (main power switch), and then back ON again.
SENSOR BURN-OUT: PRODUCT TEMPERATURE SENSOR (ALARM) <Specimen Temperature Control Option>	Trouble was detected in a product temperature sensor input. The chamber operation has been stopped.	• Sensor disconnection	• Turn OFF the breaker (main power switch), and then back ON again.
SENSOR BURN-OUT: PRODUCT TEMPERATURE SENSOR (WARNING) <Specimen Temperature Control Option>	Trouble was detected in a product temperature sensor input.	• Sensor disconnection	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch), and then back ON again.
SENSOR BURN-OUT: TEMP CONTROLLER (DC) (ALARM) <Electrostatic Capacity Type Humidity Sensor Control System Option> <Stability Test Specifications Option>	The sensor input for the temperature control unit is broken. The chamber operation has been stopped. If the backup mode is ON, humidity operation has been suspended, but temperature-only operation continues.	• Sensor disconnection	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch), and then back ON again.

Alarm name	Event	Possible cause	Action
SENSOR BURN-OUT: TEMP CONTROLLER (TC1, RTD) (ALARM)	The temperature sensor input for the temperature control unit control is broken. The chamber operation has been stopped.	• Sensor disconnection	• Turn OFF the breaker (main power switch), and then back ON again.
SENSOR BURN-OUT: TEMP CONTROLLER (TC11, TC12) (WARNING) <Wide-view Door, Wide-view Door Reach-in Port Option>	The sensor input for the temperature control unit is broken. The chamber operation continues.	• Sensor disconnection	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch), and then back ON again.
SENSOR BURN-OUT: TEMP CONTROLLER (TC2) (ALARM)	The humidity sensor input for the temperature control unit control is broken. The chamber operation has been stopped. If the backup mode is ON, humidity operation has been suspended, but temperature-only operation continues.	• Sensor disconnection	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch), and then back ON again.
SENSOR BURN-OUT: TEMP CONTROLLER (TC5 to TC12) (ALARM)	Trouble was detected in a refrigerator sensor input to the controller. The chamber operation has been stopped. If the backup mode is ON and the chamber has multiple refrigerators, only the affected refrigerator stops while all others continue running.	• Sensor disconnection	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch), and then back ON again.
STORAGE MEDIUM UNRECOGNIZED (WARNING)	Storage medium is unrecognized. The following items malfunction. • Saving of sampling data to the internal memory • Recording of back trace data • Writing of back trace data to the external memory • Download of back trace data (via Web) • Add-ons / System updates Above items are not functioning but the chamber is capable of operation.	• Storage medium failure	• If testing requires priority, resume operation. • If re-start is possible, stop operation. • Turn OFF the breaker (main power switch), and then back ON again.

Alarm name	Event	Possible cause	Action
SYSTEM ERROR	Instrumentation system error (Detected even when chamber is stopped.)	• Instrumentation system problem	• Turn OFF the breaker (main power switch), and then back ON again. • If the same alarm occurs again, request a service call with the number of the system error.
UPPER DEVIATION LIMIT: TEMPERATURE (WARNING)	The heater and humidifier are stopped because the test area temperature is greater than the upper deviation limit of the temperature alarm. They will remain stopped until the temperature returns within range.	• Inappropriate upper deviation limit setting • Heat generation by products	• Check the upper deviation limit setting. • Confirm that heat generation by the product is reduced. • Auto recovery

6.6 Troubleshooting

⚠ WARNING

When taking action on the primary power supply to which the chamber breaker is connected, be sure to turn off the main power supply switch at your facility before de-energizing. Also, use caution to ensure that power is not supplied accidentally.
Attempting to solve a problem with the power on can result in an electric shock and create a very dangerous situation.

Use the supplied breaker handle stopper to prevent the breaker from being turned on accidentally.

Be sure to turn off the breaker before opening the electrical compartment door or the water circuit box door (heat exhaust chamber door).

This section describes problems that the chamber cannot self-diagnose and operations that can be easily mistaken for malfunctions.
If the chamber does not operate properly even after taking the actions listed here, contact your distributor or ESPEC.

Table 6.5 Troubleshooting

Problem	Cause	Solution
Nothing is displayed when the instrumentation power switch is pressed.	The main power supply switch at your facility is off.	Turn on the main power supply switch at your facility.
	The breaker (main power switch) is not on.	Turn on the breaker (main power switch).
	The electrical compartment door or water circuit box door (heat exhaust chamber door) is open.	Close the door.
	The power supply is in open phase.	Make the proper connection. See the Installation guide.
	The fuse has blown.	Replace fuse F2. See ☞ "6.7 Maintenance". If the fuse blows immediately after replacement, request a service call.
	Battery for backup is exhausted.	The life of the backup battery is about 10 years. Request a service call.
Display immediately turns off or is operating abnormally.	System error or internal board error	Turn the chamber's breaker (main power switch) back on. If this occurs again after resuming operation, request a service call.

Continued on the next page

Problem	Cause	Solution
External memory tab contents are not displayed.	The function is being suppressed by the external memory protect setting.	Check with the chamber administrator or check the protect setting.
The message "Remove the memory" is displayed even while external memory is inserted.		
The door is difficult to close.	An object is blocking the door.	Remove the object.
	Frost has accumulated on the packing, hardening it.	Defrost the chamber. See ☞ "6.7 Maintenance".
	The test area has become hot and humid, creating strong internal pressure.	This is not a malfunction. Continue operation.
The door is difficult to open.	The test area is under negative pressure.	This is not a malfunction. Continue operation.
	Frost has accumulated on the packing, hardening it.	Defrost the chamber. See ☞ "6.7 Maintenance".
During operation at freezing temperatures, frost columns taller than 5 cm formed on the drain port in the test area or frosting occurs inside the test area.	External air entered from the cable port.	Block the cable port with the cable port cap and cable port plug.
	The door packing stopper has a defect or the door packing has deteriorated.	Request a service call.
Condensation has formed around the internal door packing, leaking water from the front of the chamber.	The door packing stopper has a defect or the door packing has deteriorated.	Request a service call.
Strange noises are heard.	The fuse of the anti-frost heater has blown, and frost has accumulated on the air circulator.	Replace fuse F3. If the fuse blows immediately after replacement, request a service call. See ☞ "6.7 Maintenance".
	The condenser filter is clogged.	Clean the filter. See ☞ "5.4 Maintenance".
Strange odors are detected.	A strange odor remains in the chamber.	Clean the test area. See ☞ "5.4 Maintenance".
	Specimens are emitting strange odors.	This is not a malfunction. Continue operation.
The chamber vibrates.	The adjustable feet are not installed properly.	Adjust the adjustable feet. See the Installation guide.

Continued on the next page

Problem	Cause	Solution
Viewing window is clouded or frosted.	The humidity has increased rapidly.	This is not a malfunction. Continue operation.
	The fuse of the anti-frost heater has blown.	Replace fuse F3. See ☞ "6.7 Maintenance".
The outside of the chamber is wet.	A high ambient humidity is present.	This is not a malfunction. Continue operation. To end operation, allow the test area to return to room temperature before ending operation.
The wet-bulb wick has dried out.	Bacteria are growing in the water tank.	Clean the water tank and water supply pump filter element. See ☞ "5.4 Maintenance".
The temperature (humidity) is unstable.	The door is not closed.	Close the door.
	The cable port rubber plug is not installed.	Install the rubber plug.
	The ambient temperature has changed 5°C or more in a few minutes.	Resume testing after the ambient temperature has stabilized.
	The power source of a device with a large heat generation load was turned on/off.	Reduce the heat generation load.
	The water supply pump filter element is clogged.	Clean the water supply pump filter element. See ☞ "5.4 Maintenance".
The temperature has gradually increased above the set temperature.	The specimen heat generation load is high.	Reduce the specimen heat generation load.
	Frost has accumulated on the cooler.	Defrost the chamber. See ☞ "6.7 Maintenance".
Settings cannot be changed.	The key lock is enabled.	Disable the key lock.
The temperature does not decrease immediately.	Due to the characteristics of the compressor, it takes 3 to 15 minutes to begin cooling.	This is not a malfunction. Continue operation.
It takes a long time to increase (decrease) the temperature.	The door is open.	Close the door.
	The specimen heat load is high.	Reduce the amount of specimens.
	The ambient temperature is too low (high).	Increase (decrease) the ambient temperature.
During warming, warming stops or the temperature decreases midway.	Frost has accumulated on the cooler and dehumidifier.	This is not a malfunction. Continue operation or defrost the chamber. See ☞ "6.7 Maintenance".

Continued on the next page

Problem	Cause	Solution
The temperature uniformity is poor.	The air flow inside the test area is poor.	Improve the air flow.
	The specimen heat load is high.	Reduce the amount of specimens.
	Frost has accumulated on the cooler.	Defrost the chamber. See ☞ "6.7 Maintenance".
The chamber lamp does not light.	The fuse has blown.	Replace fuse F2. If the fuse blows immediately after replacement, request a service call. See ☞ "6.7 Maintenance".
The humidity does not decrease.	The refrigeration capacity is set to [Manual (stop)], so the test area cannot be dehumidified.	Set the refrigeration capacity to [Auto] or [Manual (stop or one of 3 values between max. and min.)]. See ☞ "Chapter 4 Constant value operation" or "Chapter 5 Program operation" in the Controller guide.

6.7 Maintenance

Replacing a fuse

When a fuse blows, replace it with a supplied fuse.

WARNING

Use appropriate methods, as shown below, to replace the fuse.
Failing to do so can result in electric shock.

◆ **Note** ◆

If the new fuse blows as soon as the power is turned back on, contact your distributor or ESPEC.

<Procedure>

1) Turn off the breaker.

2) Remove the electrical compartment door.

3) Replace the blown fuse with a new fuse.

Fuse capacity
F1: 7A
F2: 7A
F3: 7A (PSL/PG only)
F4:7A(PR/PL/PU-1,2,3
PHP-2,3
PG/PSL-2(220/380
/400 VAC only)

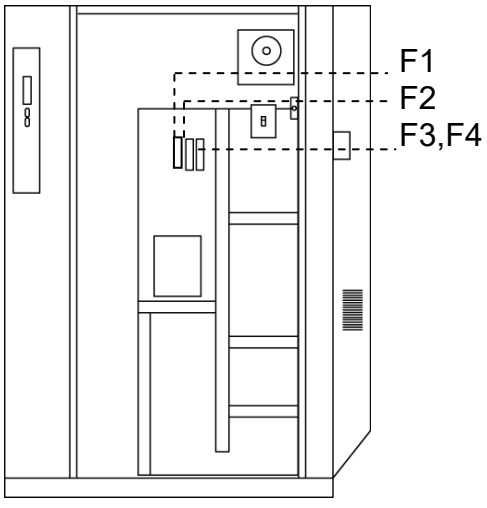


Fig. 6.1 Fuse replacement

4) Attach the electrical compartment door.

Defrosting

CAUTION

Periodically defrost the cooler. An excessive amount of frost forming on the cooler will lead to symptoms such as it taking a long time to decrease the temperature and notably poor chamber control.

In this situation, do not perform defrost operations. Too much frost on the cooler prevents the defrosting procedure because air does not flow inside the chamber. On the contrary the thermal fuse may blow in order to protect the chamber.

If an excessive amount of frost forms on the cooler, stop operations, open the door, and then leave the chamber at room temperature until the chamber defrosts naturally (which will take from half a day to about a full day).

Operating the chamber continuously for a long time with frost on the cooler can lead to malfunctions. Be sure to defrost the cooler.

Frost may form on the cooler in temperature (and humidity) operations below 30 to 40°C. Perform defrosting:

- If temperature (and humidity) inside the chamber is uncontrollable or rises slowly
- If the air blown from the chamber is weak (when the door is opened)
- If frost or ice forms on the test area walls
- If the "DRY WICK (WARNING)" alarm is displayed and frost forms on the front wall of the test area during the temperature and humidity control operation

Use this procedure to defrost packing as well.

■How to defrost the chamber

<Procedure>

1) Check that the breaker is in the on position.

2) Turn refrigerator control off.
For an explanation on how to set refrigerator control, see "2.4 Convenient functions" in the Controller guide.

3) Change settings so that the operation is not interrupted or an alarm generated if the chamber is run with the door cracked slightly. Make the following settings. For details on settings, see Controller guide.
   - Set [Pause Control] to OFF.
   - Set [Hold Time] to OFF.

4) Set the internal chamber temperature to 70°C or higher and turn off humidity control (not necessary with temperature-only chambers).

5) Display the Operation Mode Selection screen.
Press the chamber operating status box on the common area.

6) Press the START key to start operation.
Run the chamber for about 60 minutes with the door closed, then for 15 minutes with the door slightly cracked.

7) Return the settings made in step 3 to their original values.

◆ **Note** ◆
As necessary, drain the humidifying tray manually during operation (not necessary with temperature-only chambers).

Replacing the HEPA filter (PCR only)

Accumulation of dirt on the HEPA filter makes it difficult for air to pass, which results in a drop in air velocity and air volume. The needle of the clean meter, which is used to judge whether the filter should be replaced, initially points in the vicinity of 0.2 kPa (20 mmAq). The needle will move to the right as the filter becomes clogged. Replace the HEPA filter whenever the clean meter reading is in the vicinity of 0.3 kPa (30 mmAq). The life of the HEPA filter is around three years.

<Procedure>

1) Remove the decorative plate (1) under the filter.

2) Remove the duct face plate (2).

◆ Note ◆
The duct face plate (2) is not secured by a screw, so be careful not to drop it.

3) Loosen the filter anchor bolt (3).

4) Pull the filter (4) toward you.

5) Install a new filter.

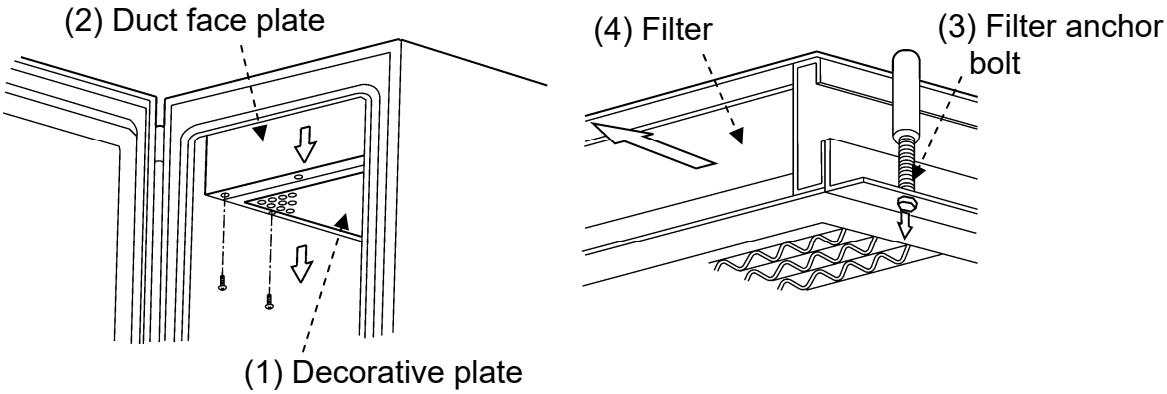
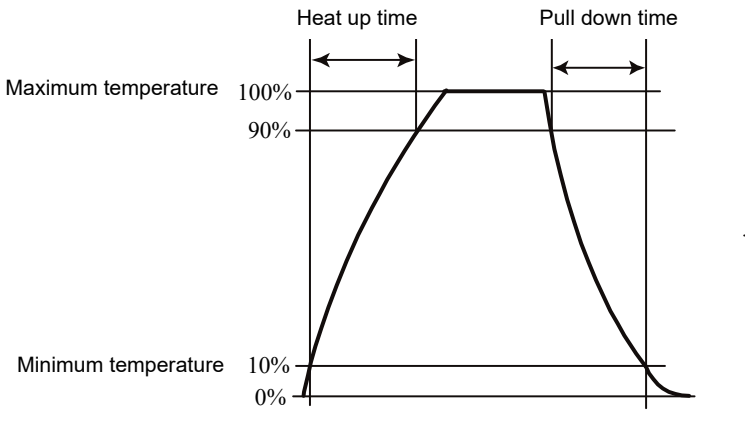


Fig. 6.2 Replacing the HEPA filter

Appendix

Operation manual glossary

	Term	Description
A	Air-cooled	The method of using air to cool the condenser of the refrigeration circuit. Normally, an air-blowing fan is used to blow air to reduce the heat generated by the condenser (or air-cooled condensation system).
B	Boil-dry protector	A device that prevents abnormal heating of the humidifying heater when there is little or no water for chambers that use a humidifier by heating water.
C	Condensation	The phenomenon whereby water vapor in the air changes from a gas to a liquid and condenses to water. This is determined by the air temperature and humidity. Condensation occurs when the air temperature is lower than the dew point. For example, the dew point temperature when the air has a temperature of 85°C and a humidity of 85%rh is 80.9°C.
	Constant setting control	The method of controlling the temperature or humidity to a constant value.
D	Dry-bulb temperature	The air temperature measured using a dry-bulb thermometer.
H	Heat load	The generation of heat from a specimen in the test area. It is called this because it is the heat load from the perspective of the chamber.
	Humidifying water	Water that is used to humidify the test area. The humidifying water is evaporated by the humidifying heater to generate humidity.
	Humidity fluctuation	Difference, after stabilization between the maximum and minimum humidity at any point in the effective area during a specified interval of time.
	Humidity gradient	The maximum value of the average humidity variation between two points in the working space at any given instant in time after stabilization.
	Humidity variation in space	Difference in mean value after stabilization, at any moment in time between the humidity at the center of the working space and any other point in the working space.
M	Maximum current	The maximum current is the maximum value of the current flowing to the primary power cable when the chamber is operating. In the case of a three-phase power supply, this is the maximum current value in the three wires. The unit of measurement is amperes (A). In the case of a three-phase power supply, this is the maximum current value flowing to one wire. The unit of measurement is amperes (A).

	Term	Description
M	Minimum temperature	The minimum temperature that can be reproduced in the test area.
O	Overheat protector	A hardware safety device that prevents the test area from becoming abnormally hot due to chamber trouble or specimen heat generation.
P	Program operation	The method of changing the air and specimen temperature according to a program created in advance.
S	Specimen power supply control terminal	The terminal that interrupts the power supply of the specimen when an error occurs and the chamber operation stops during a current test of the specimen.
	Specimen temperature control	The control of the test area temperature according to the temperature of the sample placed in the test area.
T	Temperature and humidity control range	The range of temperature and humidity that can be reproduced in the test area. This is normally expressed with a diagram, whereby the vertical axis is humidity, the horizontal axis is humidity, and the horizontal axis is temperature.
	Temperature extreme achievement time	The time it takes for the center of the working space in the test area to go from a stable room temperature to an extreme temperature value (maximum or minimum temperature prescribed in the test area).
	Temperature fluctuation	Difference, after stabilization between the maximum and minimum temperatures at any point in the working space during a specified interval of time.
	Temperature gradient	Maximum difference in mean temperature between 2 points in the working space at any point in time after the temperature has stabilized.
	Temperature range	The range of temperatures that can be reproduced in the test area. 

	Term	Description
	Temperature rate of change	The rate of change between two specified temperatures that are measured in the center of the working space. This is expressed as temperature per unit of time (1 minute).
	Temperature variation in space	Difference in mean value after stabilization, at any moment in time between the temperature at the center of the working space and any other point in the working space.
	Test area	The space partitioned to obtain the desired temperature or humidity.
W	Wet-bulb temperature	The temperature measured by wrapping a thermometer with a wet cloth to measure the humidity. The relative humidity can be obtained from the air temperature (dry-bulb temperature) and this wet-bulb temperature.
	Wet-bulb wick	A cloth used for the wet-bulb thermometer. It moistened with water when in use. Although gauze is used for meteorological purposes, in an environmental testing device, a non-woven fabric with superior heat and cold resistance is used.
	Working space	The space within the test area wherein prescribed temperature (and humidity) conditions can be maintained within the allowable range. This is the internal space excluding one-tenth between the surfaces opposite the test area from each wall surface in the test area.

Main specifications

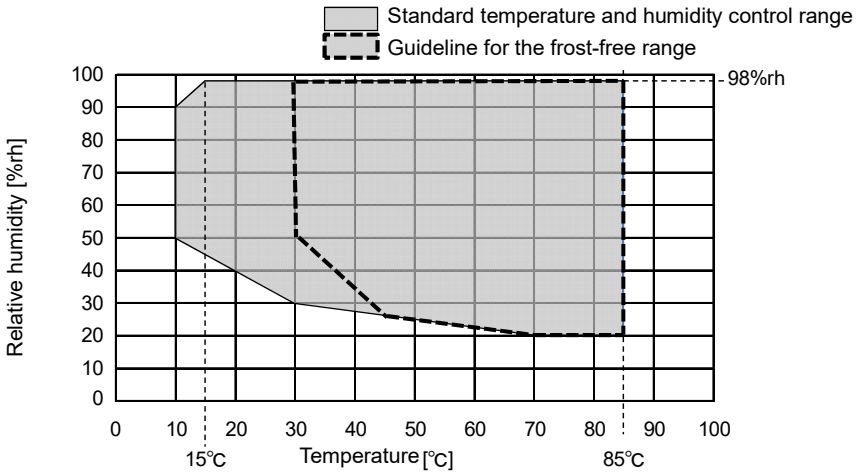
PU Low temperature chamber (-40°C to +100°C)

Model			PU-1J	PU-2J	PU-3J	PU-4J
Power supply			200VAC 3Ø 3W 50/60Hz (voltage variation: 190V to 220V)			
Temperature control system			Balanced temperature control (BTC) system			
Ambient operating temperature			0˚C to +40˚C/75%rh max.			
Performance*1	Temperature range		-40˚C to +100˚C (lowest attainable temperature in an ambient temperature of 0˚C to +30˚C)			
	Temperature fluctuation		±0.3˚C			
	Temperature gradient		3.0˚C			
	Temperature variation in space		1.5˚C			
	Temperature rate of change	Temperature range	-26˚C to +86˚C			
		Heat up rate	3.0˚C/minute			
		Pull down rate	2.0˚C/minute			
	Temperature extreme achievement time		Heating up from +20˚C to +100˚C: 30 minutes Pulling down from +20˚C to -40˚C: 45 minutes			
Permissible heat generation load (during temperature operation)			850W	1400W	1500W	2850W
Inside capacity (L)			120	225	408	800
Dimensions*2	Inside dimensions (W × H × D; mm)		500×600×400	500×750×600	600×850×800	1000×1000×800
	External dimensions (W × H × D; mm)		910×1440×873	910×1590×1073	1010×1690×1273	1410×1840 (1970)×1273
Weight (kg)			260	330	410	600

*1 Temperature chamber based on JIS C60068-3-5:2006 and JTM K07:2007, ambient temperature of +23°C, relative humidity of 65 ± 20%rh, rated voltage, no specimen.

*2 Excluding protruding parts. Dimensions including protruding parts are indicated in parentheses ().

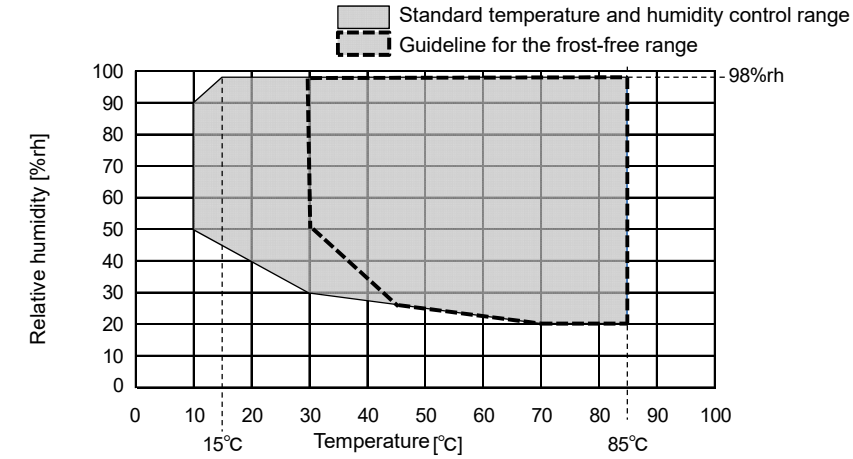
PR Temperature and humidity chamber (-20°C to +100°C/20%rh to 98%rh)

Model			PR-1J	PR-2J	PR-3J	PR-4J
Power supply			200VAC 3Ø 3W 50/60Hz (voltage variation: 190V to 220V)			
Temperature and humidity control system			Balanced temperature and humidity control (BTHC) system			
Ambient operating temperature			0˚C to +40˚C/75%rh max.			
Performance*1	Temperature/humidity range		-20˚C to +100˚C/20%rh to 98%rh (lowest attainable temperature in an ambient temperature of 0˚C to +30˚C)  Note: When the chamber is operated to attain a temperature of 40˚C or lower, continuous operation may be limited due to the frost formed on the cooler (which works as a dehumidifier).			
	Temperature/humidity fluctuation		±0.3˚C/±2.5%rh			
	Temperature/humidity gradient		3.0˚C/10%rh			
	Temperature/humidity variation in space		1.5˚C/5%rh			
	Temperature rate of change	Temperature range	-8˚C to +86˚C			
		Heat up rate	3.0˚C/minute			
		Pull down rate	2.0˚C/minute			1.0˚C/minute
	Temperature extreme achievement time		Heating up from +20˚C to +100˚C: 30 minutes Pulling down from +20˚C to -20˚C: 40 minutes			
Permissible heat generation load (during temperature operation)			800W		1100W	1250W
Inside capacity (L)			120	225	408	800
Dimensions*2	Inside dimensions (W×H×D; mm)		500×600×400	500×750×600	600×850×800	1000×1000×800
	External dimensions (W × H × D; mm)		910×1440×873	910×1590×1073	1010×1690×1273	1410×1840 (1970)×1273
Weight (kg)			260	305	365	480

*1 Temperature and humidity chamber based on JIS C60068-3-5:2006, JTM K07:2007, JIS C60068-3-6:2008, and JTM K09:2009; ambient temperature of +23°C; relative humidity of 65 ± 20%rh; rated voltage; no specimen.

*2 Excluding protruding parts. Dimensions including protruding parts are indicated in parentheses ().

PL Low temperature and humidity chamber (-40°C to +100°C/20%rh to 98%rh)

Model			PL-1J	PL-2J	PL-3J	PL-4J
Power supply			200VAC 3Ø 3W 50/60Hz (voltage variation: 190V to 220V)			
Temperature and humidity control system			Balanced temperature and humidity control (BTHC) system			
Ambient operating temperature			0˚C to +40˚C/75%rh max.			
Performance*1	Temperature/humidity range		-40˚C to +100˚C/20%rh to 98%rh (lowest attainable temperature in an ambient temperature of 0˚C to +30˚C)  Note: When the chamber is operated to attain a temperature of 40˚C or lower, continuous operation may be limited due to the frost formed on the cooler (which works as a dehumidifier).			
	Temperature/humidity fluctuation		±0.3˚C/±2.5%rh			
	Temperature/humidity gradient		3.0˚C/10%rh			
	Temperature/humidity variation in space		1.5˚C/5%rh			
	Temperature rate of change	Temperature range	-26˚C to +86˚C			
		Heat up rate	3.0˚C/minute			
		Pull down rate	2.0˚C/minute			
	Temperature extreme achievement time		Heating up from +20˚C to +100˚C: 30 minutes Pulling down from +20˚C to -40˚C: 45 minutes			
Permissible heat generation load (during temperature operation)			850W	1400W	1500W	2850W
Inside capacity (L)			120	225	408	800
Dimensions*2	Inside dimensions (W × H × D; mm)		500×600×400	500×750×600	600×850×800	1000×1000×800
	External dimensions (W × H × D; mm)		910×1440×873	910×1590×1073	1010×1690×1273	1410×1840 (1970)×1273
Weight (kg)			270	340	420	610

*1 Temperature and humidity chamber based on JIS C60068-3-5:2006, JTM K07:2007, JIS C60068-3-6:2008, and JTM K09:2009; ambient temperature of +23°C; relative humidity of 65 ± 20%rh; rated voltage; no specimen.

*2 Excluding protruding parts. Dimensions including protruding parts are indicated in parentheses ().

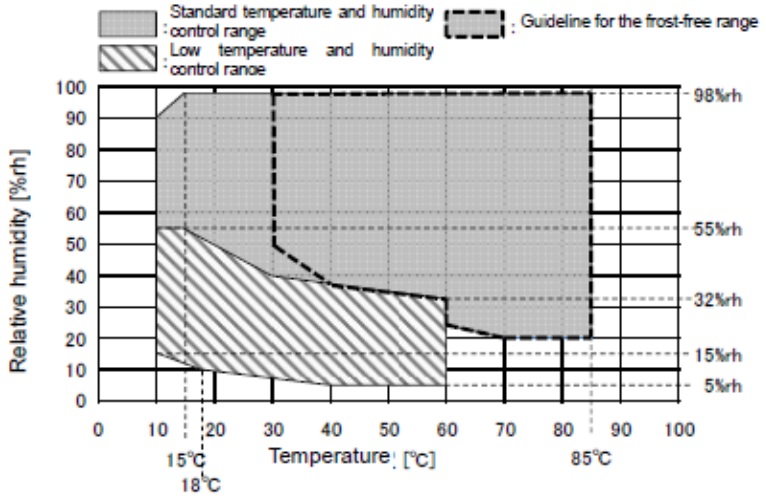
PG Ultra low temperature chamber (-70°C to +100°C)

Model			PG-2J	PG-4J
Power supply			200VAC 3Ø 3W 50/60Hz (voltage variation: 190V to 220V)	
Temperature control system			Balanced temperature control (BTC) system	
Ambient operating temperature			0˚C to +40˚C/75%rh max.	
Performance*1	Temperature range		-70˚C to +100˚C (lowest attainable temperature in an ambient temperature of 0˚C to +30˚C)	
	Temperature fluctuation		±0.3˚C	
	Temperature gradient		3.0˚C	
	Temperature variation in space		1.5˚C	
	Temperature rate of change	Temperature range	-53˚C to +83˚C	
		Heat up rate	5.0˚C/minute	
		Pull down rate	2.0˚C/minute	1.0˚C/minute
	Temperature extreme achievement time		Heating up from +20˚C to +100˚C: 30 minutes Pulling down from +20˚C to -70˚C: 65 minutes	
Permissible heat generation load (during temperature operation)			700W	2200W
Inside capacity (L)			306	800
Dimensions*2	Inside dimensions (W × H × D; mm)		600×850×600	1000×1000×800
	External dimensions (W × H × D; mm)		1010×1690×1273	1410×1853(1983)×1593
Weight (kg)			460	695

*1 Temperature chamber based on JIS C60068-3-5:2006 and JTM K07:2007, ambient temperature of +23°C, relative humidity of 65 ± 20%rh, rated voltage, no specimen.

*2 Excluding protruding parts. Dimensions including protruding parts are indicated in parentheses ().

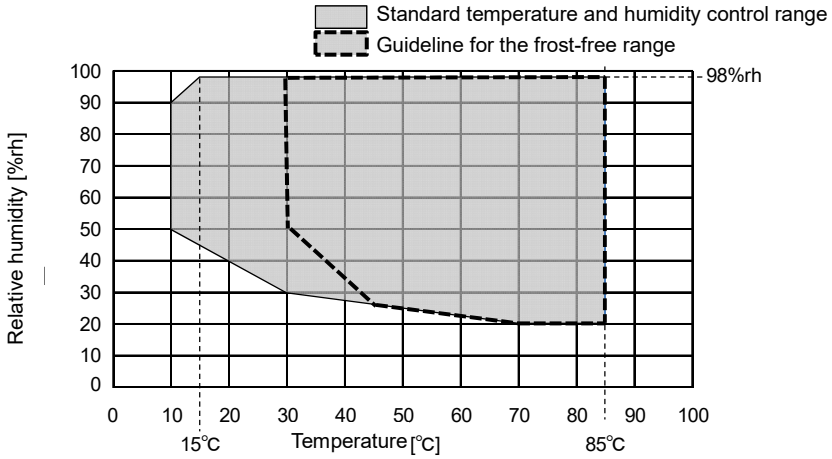
PDL Low humidity type low temperature and humidity chamber (-40°C to +100°C/5%rh to 98%rh)

Model			PDL-3J	PDL-4J
Power supply			200VAC 3Ø 3W 50/60Hz (voltage variation: 190V to 220V)	
Temperature and humidity control system			Balanced temperature and humidity control (BTHC) system	
Ambient operating temperature			0˚C to +40˚C/75%rh max.	
Performance*1	Temperature/humidity range		-40˚C to +100˚C/5%rh to 98%rh (lowest attainable temperature in an ambient temperature of 0˚C to +30˚C)  Note: When the chamber is operated to attain a temperature of 40˚C or lower, continuous operation may be limited due to the frost formed on the cooler (which works as a dehumidifier).	
	Temperature/humidity fluctuation		±0.3˚C/±2.5%rh	
	Temperature/humidity gradient		3.0˚C/10%rh	
	Temperature/humidity variation in space		1.5˚C/5%rh	
	Temperature rate of change	Temperature range	-26˚C to +86˚C	
		Heat up rate	3.0˚C/minute	
		Pull down rate	2.0˚C/minute	
	Temperature extreme achievement time		Heating up from +20˚C to +100˚C: 30 minutes Pulling down from +20˚C to -40˚C: 50 minutes	
Permissible heat generation load (during temperature operation)			1500W	2850W
Inside capacity (L)			408	800
Dimensions*2	Inside dimensions (W × H × D; mm)		600 × 850 × 800	1000 × 1000 × 800
	External dimensions (W × H × D; mm)		1885 × 1690 (1820) × 1273	2285 × 1840 (1970) × 1273
Weight (kg)			735	930

*1 Temperature and humidity chamber based on JIS C60068-3-5:2006, JTM K07:2007, JIS C60068-3-6:2008, and JTM K09:2009; ambient temperature of +23°C; relative humidity of 65 ± 20%rh; rated voltage; no specimen.

*2 Excluding protruding parts. Dimensions including protruding parts are indicated in parentheses ().

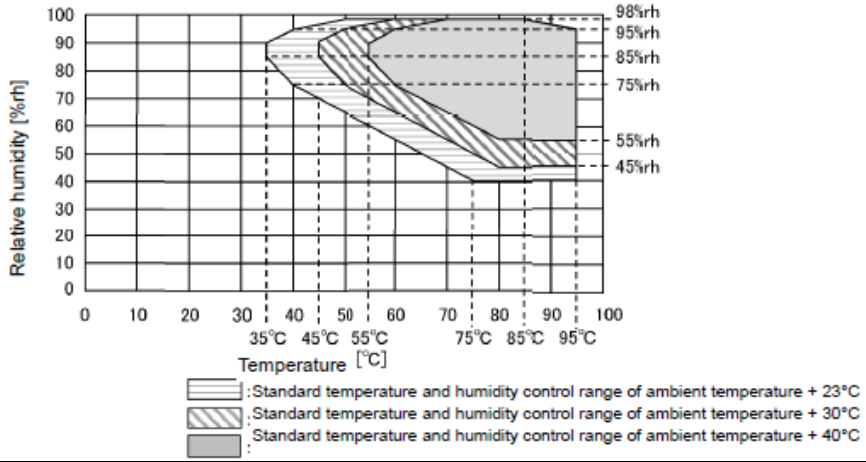
PSL Ultra low temperature and humidity chamber (-70°C to +100°C/20%rh to 98%rh)

Model			PSL-2J	PSL-4J
Power supply			200VAC 3Ø 3W 50/60Hz (voltage variation: 190V to 220V)	
Temperature and humidity control system			Balanced temperature and humidity control (BTHC) system	
Ambient operating temperature			0˚C to +40˚C/75%rh max.	
Performance*1	Temperature/humidity range		-70˚C to +100˚C/20%rh to 98%rh (lowest attainable temperature in an ambient temperature of 0˚C to +30˚C)  Note: When the chamber is operated to attain a temperature of 40˚C or lower, continuous operation may be limited due to the frost formed on the cooler (which works as a dehumidifier).	
	Temperature/humidity fluctuation		±0.3˚C/±2.5%rh	
	Temperature/humidity gradient		3.0˚C/10%rh	
	Temperature/humidity variation in space		1.5˚C/5%rh	
	Temperature rate of change	Temperature range	-53˚C to +83˚C	
		Heat up rate	5.0˚C/minute	
		Pull down rate	2.0˚C/minute	1.0˚C/minute
	Temperature extreme achievement time		Heating up from +20˚C to +100˚C: 30 minutes Pulling down from +20˚C to -70˚C: 65 minutes	
Permissible heat generation load (during temperature operation)			700W	2200W
Inside capacity (L)			306	800
Dimensions*2	Inside dimensions (W × H × D; mm)		600 × 850 × 600	1000 × 1000 × 800
	External dimensions (W × H × D; mm)		1010 × 1690 × 1273	1410 × 1853 (1983) × 1593
Weight (kg)			470	705

*1 Temperature and humidity chamber based on JIS C60068-3-5:2006, JTM K07:2007, JIS C60068-3-6:2008, and JTM K09:2009; ambient temperature of +23°C; relative humidity of 65 ± 20%rh; rated voltage; no specimen.

*2 Excluding protruding parts. Dimensions including protruding parts are indicated in parentheses ().

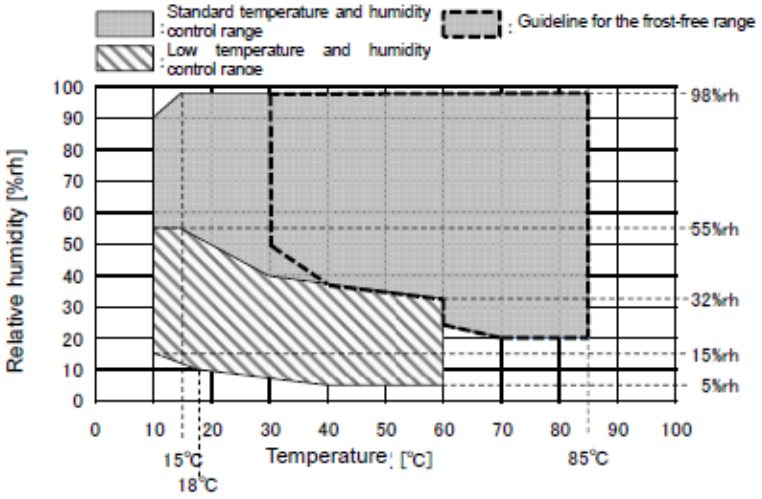
PHP High temperature and high humidity chamber (ambient temp. +10°C to +100°C/40%rh to 98%rh)

Model		PHP-2J	PHP-3J	PHP-4J
Power supply		200VAC 3Ø 3W 50/60Hz (voltage variation: 190V to 220V)		
Temperature and humidity control system		Balanced temperature and humidity control (BTHC) system		
Ambient operating temperature		0˚C to +40˚C/75%rh max.		
Performance*1	Temperature/humidity range	Ambient temperature: +10°C to +100°C/40%rh to 98%rh 		
	Temperature/humidity fluctuation	±0.3˚C/±2.5%rh		
	Temperature/humidity gradient	3.0˚C/10%rh		
	Temperature/humidity variation in space	1.5˚C/5%rh		
Permissible heat generation load (during temperature operation)		300W		600W
Inside capacity (L)		219	398	784
Dimensions*2	Inside dimensions (W × H × D; mm)	500 × 730 × 600	600 × 830 × 800	1000 × 980 × 800
	External dimensions (W × H × D; mm)	910 × 1590 × 1073	1010 × 1690 × 1273	1410 × 1840 (1970) × 1273
Weight (kg)		275	335	490

*1 Temperature and humidity chamber based on JIS C60068-3-5:2006, JTM K07:2007, JIS C60068-3-6:2008, and JTM K09:2009; ambient temperature of +23°C; relative humidity of 65 ± 20%rh; rated voltage; no specimen.

*2 Excluding protruding parts. Dimensions including protruding parts are indicated in parentheses ().

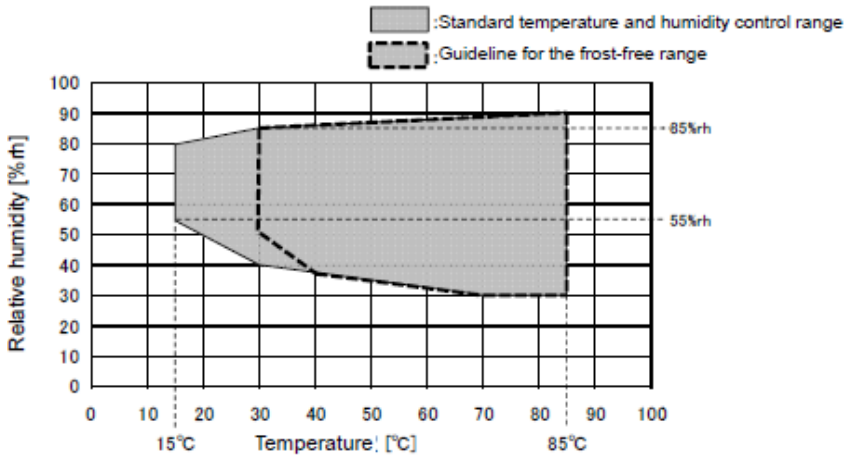
PDR Low humidity type temperature and humidity chamber (-20°C to +100°C/5%rh to 98%rh)

Model			PDR-3J	PDR-4J
Power supply			200VAC 3Ø 3W 50/60Hz (voltage variation: 190V to 220V)	
Temperature and humidity control system			Balanced temperature and humidity control (BTHC) system	
Ambient operating temperature			0˚C to +40˚C/75%rh max.	
Performance*1	Temperature/humidity range		-20˚C to +100˚C/5%rh to 98%rh (lowest attainable temperature in an ambient temperature of 0˚C to +30˚C)  Note: When the chamber is operated to attain a temperature of 40˚C or lower, continuous operation may be limited due to the frost formed on the cooler (which works as a dehumidifier).	
	Temperature/humidity fluctuation		±0.3˚C/±2.5%rh	
	Temperature/humidity gradient		3.0˚C/10%rh	
	Temperature/humidity variation in space		1.5˚C/5%rh	
	Temperature rate of change	Temperature range	-8˚C to +88˚C	
		Heat up rate	3.0˚C/minute	
		Pull down rate	2.0˚C/minute	1.0˚C/minute
	Temperature extreme achievement time		Heating up from +20˚C to +100˚C: 30 minutes Pulling down from +20˚C to -20˚C: 40 minutes	
Permissible heat generation load (during temperature operation)			1100W	1250W
Inside capacity (L)			408	800
Dimensions*2	Inside dimensions (W × H × D; mm)		600 × 850 × 800	1000 × 1000 × 800
	External dimensions (W × H × D; mm)		1885 × 1690 (1820) × 1273	2285 × 1840 (1970) × 1273
Weight (kg)			680	800

*1 Temperature and humidity chamber based on JIS C60068-3-5:2006, JTM K07:2007, JIS C60068-3-6:2008, and JTM K09:2009; ambient temperature of +23°C; relative humidity of 65 ± 20%rh; rated voltage; no specimen.

*2 Excluding protruding parts. Dimensions including protruding parts are indicated in parentheses ().

PCR Clean temperature and humidity chamber (-20°C to +100°C/30%rh to 90%rh)

Model			PCR-3J
Power supply			200VAC 3Ø 3W 50/60Hz (voltage variation: 190V to 220V)
Temperature and humidity control system			Balanced temperature and humidity control (BTHC) system
Ambient operating temperature			0˚C to +40˚C/75%rh max.
Performance*1	Temperature/humidity range		-20˚C to +100˚C/30%rh to 90%rh (lowest attainable temperature in an ambient temperature of 10˚C to +30˚C)  Note: When the chamber is operated to attain a temperature of 40˚C or lower, continuous operation may be limited due to the frost formed on the cooler (which works as a dehumidifier).
	Temperature/humidity fluctuation		±0.5˚C/±2.5%rh
	Temperature/humidity gradient		5.0˚C/10%rh
	Temperature/humidity variation in space		5.0˚C/10%rh
	Temperature rate of change	Temperature range	-8˚C to +88˚C
		Heat up rate	1.5˚C/minute
		Pull down rate	1.0˚C/minute
	Temperature extreme achievement time		Heating up from +20˚C to +100˚C: 55 minutes Pulling down from +20˚C to -20˚C: 45 minutes
Cleanliness*2			Class 5 (particle diameter: 0.5μm)
Inside capacity (L)			312
Dimensions*3	Inside dimensions (W × H × D; mm)		600 × 650 × 800
	External dimensions (W × H × D; mm)		1010 × 1880 × 1273
Weight (kg)			445

*1 Temperature and humidity chamber based on JIS C60068-3-5:2006, JTM K07:2007, JIS C60068-3-6:2008, and JTM K09:2009; ambient temperature of +23°C; relative humidity of 65 ± 20%rh; rated voltage; no specimen.

*2 Cleanliness is at a stable temperature based on JIS B 9920:2002.

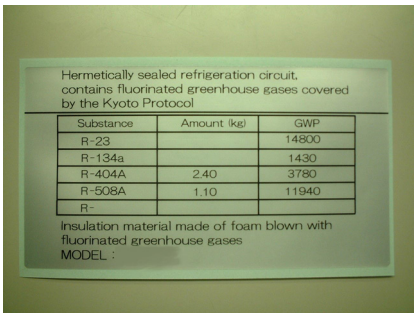
*3 Excluding protruding parts. Dimensions including protruding parts are indicated in parentheses ().

ESPEC

Information on the fluorinated greenhouse gases for the operator

In regard to the global warming and decisions made by the Kyoto Protocol,
the European Union released Regulation (EC) No. 842/2006 on the use of certain fluorinated greenhouse gases.
This product contains the refrigerant gas HFC, which is one of the fluorinated greenhouse gases covered by the Kyoto Protocol:

Information on the fluorinated greenhouse gases and their global warming potentials is indicated on the products with a label shown below:



(The label is attached either on the side or on the rear of the equipment.)

Further to the Information responsibility of the manufacturer the Operator has the following responsibilities per article 3 of the Regulation:

1. Operators responsibility - leakage check -
   Operators of the products shall ensure that they are checked for leakage by certified personnel which complies with the requirements of each member state of the

   European Union, according to the following:
   (a) applications containing 3 kg or more of fluorinated greenhouse gases shall be checked for leakage at least once every 12 months.
   This shall not apply to equipment with hermetically sealed systems, which are labeled as such and contain less than 6 kg of fluorinated greenhouse gases.
   (b) applications containing 30 kg or more of fluorinated greenhouse gases shall be checked for leakage at least once every six months.
   (c) applications containing 300 kg or more of fluorinated greenhouse gases shall be checked for leakage at least once every three months.

2. Operators responsibility - keeping the records -
   Operators of the products containing 3 kg or more of fluorinated greenhouse gases, shall maintain records on the quantity and type of fluorinated greenhouse gases installed, any

quantities added and the quantity recovered during servicing, maintenance and final disposal. They shall also maintain records of other relevant information including the identification of the company or technician who performed the servicing or maintenance, as well as the dates and results of the checks carried out under above paragraphs and relevant information.
These records shall be made available on request to the competent authority and to the European Commission.

Further information with reference to regulation no. 842/2006 can be found at:
http://eur-lex.europa.eu/

ESPEC CORP

No. 4000104001500
Optional manual
PREP: 26.June 2008

MEMO

Edited and Published by:
ESPEC CORP.
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530-8550, Japan
Tel: 81-6-6358-4741
Fax: 81-6-6358-5500

Printed in Japan