

Faster Temperature (& Humidity) Chamber

SML - 2 • SMU - 2
SMS - 2 • SMG - 2

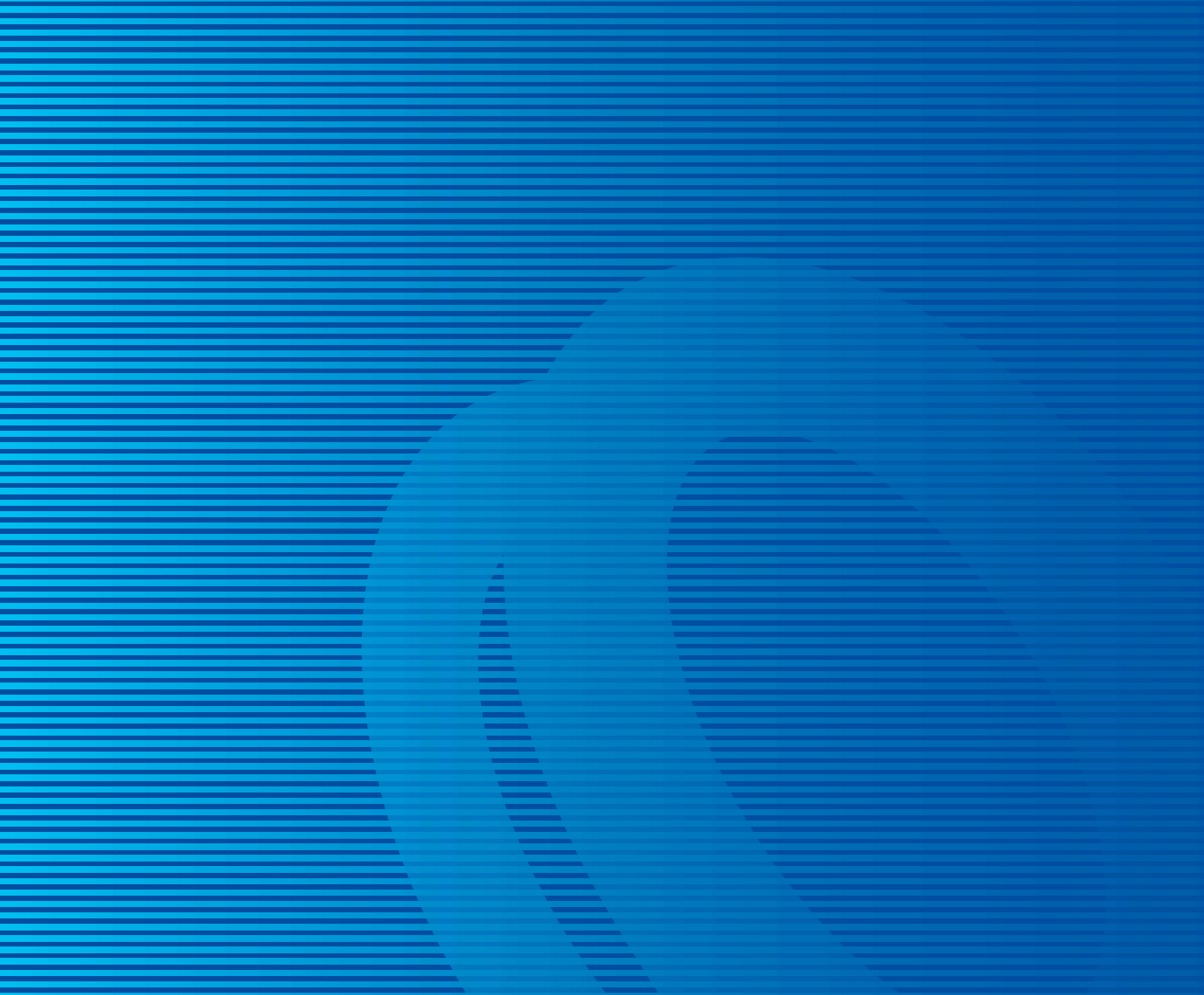


Stress of 5 °C/min. or more achieved with the large-capacity 1800L models.

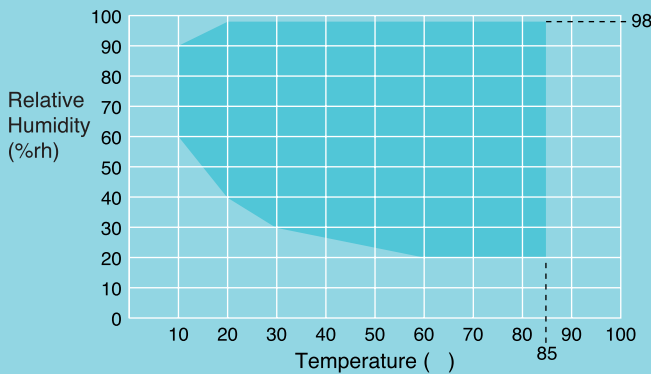
A faster temperature and humidity chamber with 1800 L capacity has been developed for reliability testing of increasingly large display devices to be used in automotive components, in car electronics systems, and more.

This marks the arrival of a long-awaited large-capacity temperature and humidity chamber capable of providing a temperature change rate of 5 °C/min. or more. The chamber is packed with numerous features, including a shorter time of delivery, thanks to its standardized component units. Lower power consumption, proper height for specimen setting, and other features.





Temperature & Humidity Controllable Range



*When the chamber is operated below +30 to +40 , continuous operation is restricted due to the dew condensation in the cooler (also functions as a dehumidifier).



Installation of wick (Testarea)



External view of wick (Right side)



Right side

Application of high stress of 5°C/min. or more now possible

This faster temperature (& humidity) chamber enables the application of high stress to the specimen at a steep temperature change rate of 5 /min. or more. A temperature change rate of 5 /min. or more has been achieved from - 45 + 155 with models SMG and SMS, and from - 18 + 158 with models SML and SMU (without specimens loaded), thanks to the larger refrigeration systems in this model series. The device features operation within wide temperature ranges: - 70 to + 180 and - 40 to + 180 .

Power consumption slashed

An improvement in the refrigeration system has resulted in lower power consumption in the large-capacity model temperature and humidity chamber.

Simple replacement of wick

The wick located at the upper rear of the test area must be replaced periodically in order to maintain high precision of humidity measurement at all times. To this end, the wick has been designed for easy replacement from the exterior.

Free use of the right and left sides of the device

Since the machine room comprising part of the device is situated in the back of the test area, virtually no maintenance space is required on either side of the equipment, which enables access either from the right or the left.

Door unlocked from inside the chamber

A door unlocking handle installed inside the chamber, so that the door can be opened from the inside in the event someone is locked in by mistake.

● Easy to set specimens

For cases in which specimens are set in the chamber using a hand-lift, an insertion section has been provided at the bottom of the device, and the test area has also been lowered, so that large-sized specimens and heavy articles can easily be inserted or withdrawn.

● Large viewing window for specimen observation

A large viewing window measuring 380mm wide by 590mm high has been adopted that allows inspection of the interior of the test area. A lamp installed above the test area allows easy observation of the specimen.



Inside the chamber (one set of shelves and shelf supports standard equipped)

● New shelves structure (patent pending)

Due to the large size (1200mm wide × 1500mm deep) of the chamber interior, the shelves are relatively heavy. With this in mind, shelves have been designed in a two-piece structure. Moreover, storage space is provided at the bottom of the device to hold the shelves.



Viewing window

Pocket

● Pocket for printed material

A pocket is provided at the lower front of the device to store printed material such as the operation manual.

● Four models with 1800L capacity

Two models are available for each of the temperature ranges from - 40 to + 180 / - 70 to + 180 , with a humidity model (from 20 to 98%rh) also available for each model. Thus, a chamber model can be selected from four models that is best suited for the intended application.

● Paperless recording (Optional)

The paperless recorder makes it easy to record the temperatures of different components, such as the chamber temperature, on a memory card (CompactFlash).

*External dimensions change when attaching the paperless recorder. (see p.9)



Shelves storage space

Control operation



Instrumentation panel

Instrumentation integrated into the door

To minimize the required installation space for the device, the instrumentation section has been integrated into the door. The instrumentation produces indications on a bright, easy-to-view color LCD, which features an interactive touch-screen system.

Temp. & Humid. Program Indicator controller

Operating mode	Program operation, Constant operation
Display	TFT Color LCD display (6.5in)
Setting	Analog touch-screen method
Program capacity	User's pattern: 20 program patterns <ul style="list-style-type: none"> • 99 steps per one pattern • pattern linking possible ROM pattern: 10 program patterns
Setting and indication ranges	Temp.: - 75 to + 185 Humid.: 0 to 100%rh Time : 0 to 999 hours 59 minutes
Setting and indication resolution	Temp.: 0.1 Humid.: 1%rh Time : 1 minute
Input	Thermocouple type T (Copper/Copper-Nickel)
Control	PID control
Communication function	RS - 485
Auxiliary functions	<ul style="list-style-type: none"> • Time signal function • Input burn-out detection function • Upper and lower temperature & humidity limit alarm function • Self-diagnostic function • Alarm indication function • Power failure protection function • Timer function (automatic start/stop) • Refrigerator capacity automatic control function • Trend graph display function • Help function

Program monitoring



Program setting



Alarm



Service guide

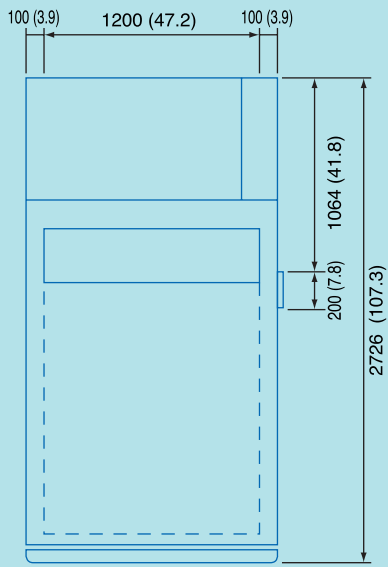


Network System E-PILOT 21 (Optional)

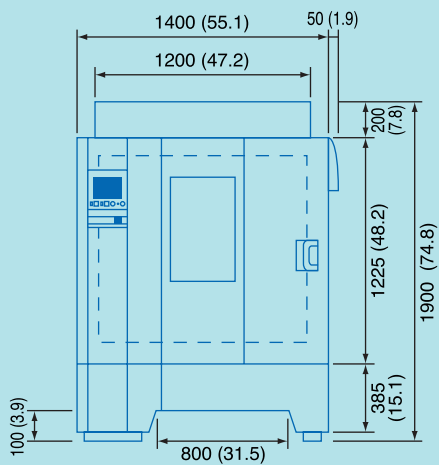
E-PILOT 21 is ESPEC's suite of networking tools for communicating between a computer and our environmental testing chambers. It enables the management of chamber operation and test settings from a remote location. Additionally, measurement data and system status can be constantly monitored and recorded on the computer.

DIMENSIONS

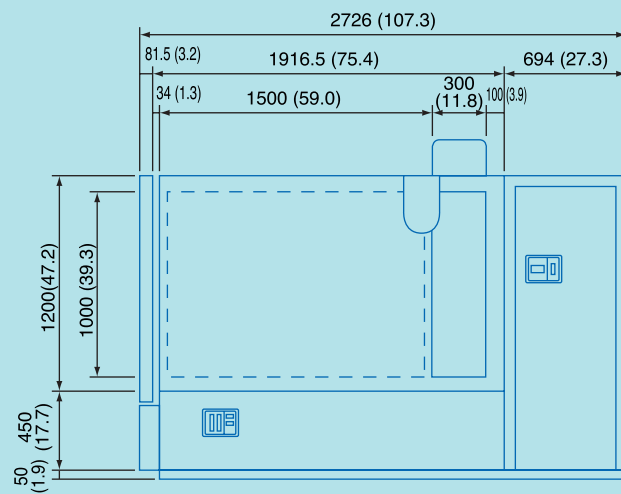
unit : mm (inch)



upside



front



side

SPECIFICATIONS

Model		SML-2	SMU-2	SMS-2	SMG-2
Power supply		200V AC 3 3W 50/60Hz, 220V AC 3 3W 60Hz, 380V AC 3 4W 50Hz and 400 VAC 3 4W 50Hz Power supply variation: Within $\pm 10\%$ of rated voltage			
Maximum current (A)	200V AC	109	86	120	
	220V AC	97	75	109	
	380V AC	56	45	63	
	400V AC	57	45	64	
Temperature & humidity control system		Balanced Temperature (& Humidity) Control system (BT(H)C system)			
Operable ambient temperature range		Ambient temperature range: 0 to +40 (+32 to +104°F) Cooling water temperature range: +5 to +32 (+41 to +89.6°F)			
Performance ^{*1}	Temperature range ^{*2}	-40 to +180 (-40 to +356°F)		-70 to +180 (-94 to +356°F)	
	Humidity range ^{*2}	20 to 98%rh	—————	20 to 98%rh	—————
	Temperature fluctuation ^{*2}	± 0.5 (-40 to +100) [$\pm 0.9^\circ\text{F}$ (-40 to +212°F)] ± 0.7 (+101 to +180) [$\pm 1.26^\circ\text{F}$ (+213 to +356°F)]		± 0.5 (-70 to +100) [$\pm 0.9^\circ\text{F}$ (-94 to +212°F)] ± 0.7 (+101 to +180) [$\pm 1.26^\circ\text{F}$ (+213 to +356°F)]	
	Humidity fluctuation ^{*2}	$\pm 3\%$ rh	—————	$\pm 3\%$ rh	—————
	Temperature uniformity ^{*2}	± 1.5 ($\pm 2.7^\circ\text{F}$)			
	Humidity uniformity ^{*2}	$\pm 5\%$ rh	—————	$\pm 5\%$ rh	—————
	Temperature cycling rate ^{*3}	-18 +158 (-0.4°F +316.4°F) 5 /min. or more without specimen (Average)		-45 +155 (-49°F +311°F) 5 /min. or more without specimen (Average)	
	Lowest attainable temperature ^{*2}	-40 (-40°F)		-70 (-94°F)	
Construction	Noise ^{*4}	65dB			
	Exterior material	Painted steel			
	Interior material	18-8 Cr-Ni stainless steel plate (2B polish)			
Insulation		Glass wool			
Heater		Fin-type sheathed heater			
Humidifying boiler		18-12-2.5 Cr-Ni-Mo stainless steel sheathed heater	—————	18-12-2.5 Cr-Ni-Mo stainless steel sheathed heater	—————
Cooler		Plate fin cooler (Also functions as a dehumidifier)			
Refrigeration system	Refrigeration system	Mechanical single-stage refrigeration system		Mechanical type cascade refrigeration system	
	Refrigerator capacity	7.5kW		7.5kW + 7.5kW	
	Refrigerator	Scroll-type refrigerator, Water-cooled condenser, Cascade condenser (SMS, SMG only), Refrigeration capacity controller (Electronic-type automatic-expansion valve system), Coolant (R404A, R23 SMS, SMG only)			
Blower for in-chamber agitation		Sirocco fan (Direct-coupled electric motor type, 100W x 4)			
Humidifying water supply	water quality	Electrical conductivity 0.1 to 10 $\mu\text{s/cm}$	—————	Electrical conductivity 0.1 to 10 $\mu\text{s/cm}$	—————
	Supply water pressure	0.07 to 0.5MPa	—————	0.07 to 0.5MPa	—————
Fittings		Viewing window (380W x 590H mm), Chamber lamp, Integrating hour meter (0 to 99999 hours), Cable port (50 mm, one each on right and left sides)			
Load capacity of floor in chamber		100kg			
Inside dimensions (mm) ^{*5}		1200W x 1000H x 1500D (47.2W x 39.3H x 59.0D inch)			
Outside dimensions (mm) ^{*5}		1400W x 1900H x 2726D (55.1W x 74.8H x 107.3D inch)			
Capacity (L)		1800			
Weight (kg)		1250		1400	
Utility requirements	Cooling water pressure	0.2 ~ 0.5MPa			
	Cooling water flow rate	2350 L/h (Reference temperature +25 / +77°F), 4400 L/h (Reference temperature +32 / +89.6°F)			
	Diameter of pipe joint	32A			

*1 Measured when the refrigeration-capacity setting is for automatic control at an ambient temperature of +23 , with no specimen loaded and the volume of the contents is within the capacity.

*2 The performance specifications conform to JTM K01-1998.

*3 The measurement point is in the center of the chamber, in compliance with IEC60068-3.5.

*4 The measurement is conducted in a room with minimal echo, such as an anechoic chamber, and the value (A-characteristic) is measured at a point 1 meter from the front of the equipment, at a height of 1.2 meters. Compliant with JIS-Z-8731.

*5 Excluding protrusions

TMODEL

SM -2

Temperature & humidity range

L : - 40 / 20 to 98%rh

U : - 40

S : - 70 / 20 to 98%rh

G : - 70

ACCESSORIES

Cable hole rubber plug (Silicone sponge rubber, 50mm)	2
Shelf support, 18-8 Cr-Ni stainless steel (Class CP)	1 set
Shelf, 18-8 Cr-Ni stainless steel plate	1 set
Load capacity of shelf	50kg
Cartridge fuse, Class A, 250V	
For SML, SMS, SMG	
200, 380, 400V AC spec	5
220V AC spec	6
For SMU	
200, 380, 400V AC spec	4
220V AC spec	5
Wet-bulb wick (For SML, SMS)	1 box
User's Manual	1 copy

SAFETY DEVICES

Leakage breaker for power supply (200 to 380V AC spec.)
Circuit breaker for power supply (400V AC spec.)
Circuit breaker for refrigerator
Boil dry protector (SML, SMS only)
SSR overload and short circuit protecting circuit breaker
Air circulator temperature switch
Control circuit overload and short circuit protection fuse
Electric parts compartment panel switch
Refrigerator high pressure switch
Thermal fuse
Temperature switch for compressor
Specimen power supply control terminal
Reverse-prevention relay
Upper and lower temperature (& humidity) limit alarms
(built-in temperature (& humidity) controller)
Burn-out circuit (built-in temperature (& humidity) controller)
Watchdog timer (built-in temperature (& humidity) controller)
Overheat protector (independent type)
Water suspension relay
Circuit breaker for heater
Circuit breaker for humidifying heater (SML, SMS only)
Switch for humidifying boiler water level detection
(SML, SMS only)
Wick insertion port switch (SML, SMS only)



DANGER

Do not use specimens which are explosive or inflammable, or which contain such substances. To do so could be hazardous, as this may lead to fire or explosion.

Do not place corrosive materials in the chamber. If corrosive substances or liquid is used, the life of the unit may be significantly shortened specifically because of the corrosion of stainless steel, resin and silicone materials.

Do not place life forms or substances that exceed allowable heat generation.



CAUTION

Be sure to read the instruction manual before operation.

OPTIONS

Paperless recorder

Records temperature of each section such as the temperature inside the chamber.

- Recorder location: Top or Left side
- Size: 220W × 210H mm

*External dimensions change when attaching the recorder. (Please refer to the recorder location.)

[Temperature type]

Temperature range: - 100 to + 200

Number of inputs (Initial setting):

Temperature 1

(5 more channels can be turned ON)

Data saving cycle: 5 sec.

External recording media:

CF memory card (32MB)

Language support: ENG, JPN

[Temperature and humidity type]

Temperature range: - 100 to + 200

Humidity range: 0~100%rh

Number of inputs (Initial setting):

Temperature 1 / Humidity 1

(4 more channels can be turned ON)

Data saving cycle: 5 sec.

External recording media:

CF memory card (32MB)

Language support: ENG, JPN



Temperature recorder (digital)

- RJ25 - 100 to + 200
6 dots
- Recorder location: Top or Left side
- Size: 220W × 210H mm

*External dimensions change when attaching the recorder. (Please refer to the recorder location.)

Temperature and humidity recorder (digital)

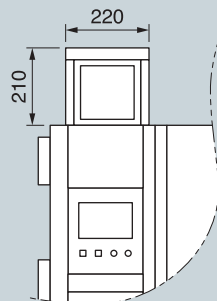
- RJ15 - 100 to + 200
0 to 100%rh
6 dots
- Recorder location: Top or Left side
- Size: 220W × 210H mm

*External dimensions change when attaching the recorder. (Please refer to the recorder location.)

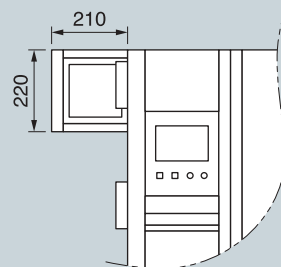


Recorder location unit:mm

Top



Left side



Thermocouple

Thermocouple measures the temperature of specimens.

- 2, 4, 6m
- Thermocouple type T
(Copper/ Copper-Nickel)

Connecting terminal for temp. and humid. recorder

Output terminals for chamber temperature and humidity.

*Cannot be installed in conjunction with a recorder



Temperature sensor terminal

Terminal boards for a dry-bulb temperature detection are fitted.
(SMU, SMG only)

Product temperature monitor

When temperature measurement is performed on the specimen by the temperature sensor, the results are displayed on the instrumentation monitor screen. In programmed operation, the exposure time can be controlled, provided that the specimen temperature is within the available set temperature specifications.

- Measurement point: 1
- Sensor in use: Thermocouple, Type T
- Appurtenances: Terminal board 1
- Connecting position:
Right side of the main unit (front)
- Accessories:
Thermocouple, Type T 1
(0.32mm, 6m)
Connector 1

OPTIONS

Expansion of relay contacts

Nine relay contacts (time signals) added.
(Two contacts standard equipped)



External alarm terminal

If the safety device of the chamber activates, the alarm is notified to a distance via the external alarm terminal.

Emergency stop switch

Stops the chamber immediately.

Additional overheat protector

To prevent overheating inside the chamber and prevent the specimens from being damaged, an upper temperature limit alarm and overheat protector have been incorporated in the chamber as standard. An additional overheat protector can be installed.

Overcool protector

If the temperature inside the chamber decreases excessively, the chamber stops operating to prevent the specimens from being damaged.

Integrating hour meter with reset

This integrating hour meter can be reset if necessary.
(Added to the integrating hour meter of standard device)



Water supplier

Water supply circuit to supply pure water for humidification.
*200V AC only.

Defrost circuit

Quickly defrosts the refrigeration circuit (dehumidifier).

Frost-free circuit

Prevents the refrigeration circuit (dehumidifier) from frosting, thus enabling continuous chamber operation.

Shelf, Shelf bracket

Standard specification shelves and shelf brackets are added as required.

Fixture for securing body

Fastens the equipment on the floor surface with bolts.

Cable port

A through hole of 25, 50, or 100mm dia. is provided on the wall (top plate or side) of the chamber to allow electrical cables to be introduced into the chamber.

*Equipped with rubber plug.

Cable port rubber plug

The additional silicon sponge rubber port plug.

Communication functions

Connects chamber to a personal computer, enabling operation control of the chamber.

- E-BUS
- GPIB
- RS-232C

Communication cable

- RS-485 cable 5, 10m
- E-BUS cable 5, 10m
- GPIB cable 2, 4m
- RS-232C cable 1.5, 3, 5m

Power cord

- 5, 10m (200, 220V AC only)

*The chamber does not come with a power cable.