

Quality is more than a word

ESPEC

Faster Temperature (& Humidity) Chamber

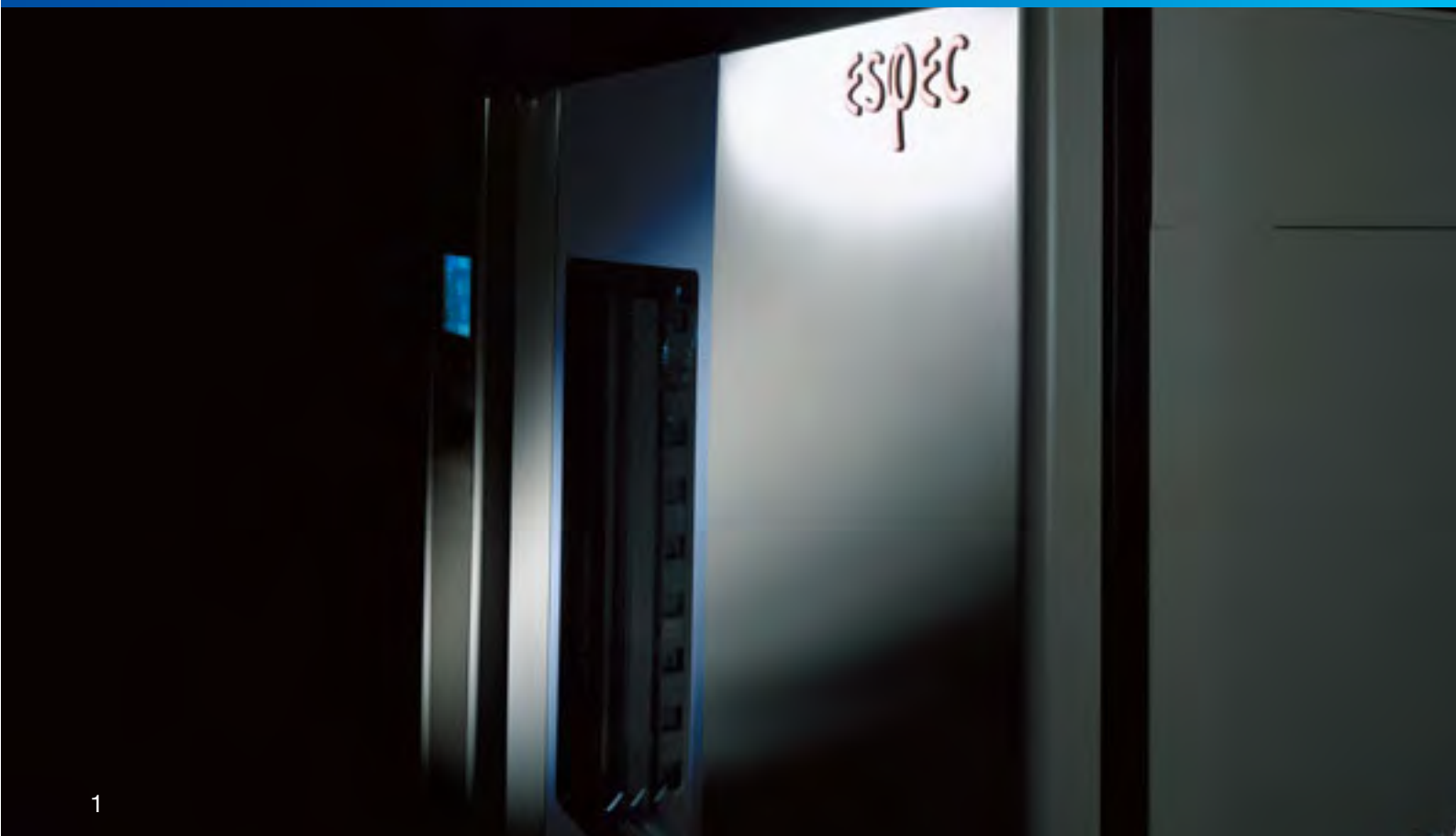
SML-2 · SMU-2
SMS-2 · SMG-2



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

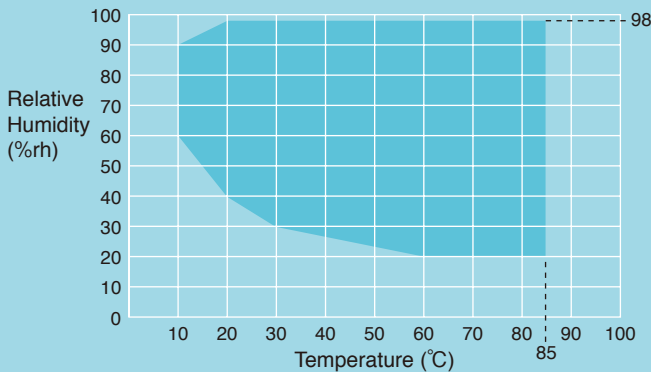
A faster temperature and humidity chamber with 1800 L capacity has been developed for reliability testing of increasingly large display devices to be used in automotive components, in car electronics systems, and more.

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°C to +40°C, 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°C/min. or more. A temperature change rate of 5°C/min. or more has been achieved from -45°C ⇔ +155°C with models SMG and SMS, and from -18°C ⇔ +158°C 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°C to +180°C and -40°C to +180°C.

● 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.

● New shelves structure (Japanese patent no.4418691)

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.



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

● 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°C to $+180^{\circ}\text{C}$ / -70°C to $+180^{\circ}\text{C}$, 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.



Viewing window

Pocket

● 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 (Compact Flash).

*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.

● Remote control from your PC

Please contact us for details on using a PC to monitor and remotely control the equipment.

Temp. & Humid. Program Indicator controller

Operating modes	Program operation, Constant operation
Display	Color TFT LCD display (6.5in.)
Setting	Analog touchpanel method
Program capacity	User's patterns: 20 program patterns · 99 steps per one pattern · pattern linking possible ROM patterns: 10 program patterns
Setting and indication ranges	Temp. : -75 to +185°C Humid. : 0 to 100% rh Time : 0 to 999 hours 59 minutes
Setting and indication resolution	Temp. : 0.1°C Humid. : 1% rh Time : 1 minute
Input	Thermocouple type T (Copper/ Copper-Nickel)
Control	PID control
Communications	RS-485 function
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 cut protection function · Timer function (automatic start/stop) · Refrigerator capacity automatic control function · Trend graph display function · Help function

● Program monitoring



● Program setting



● Alarm

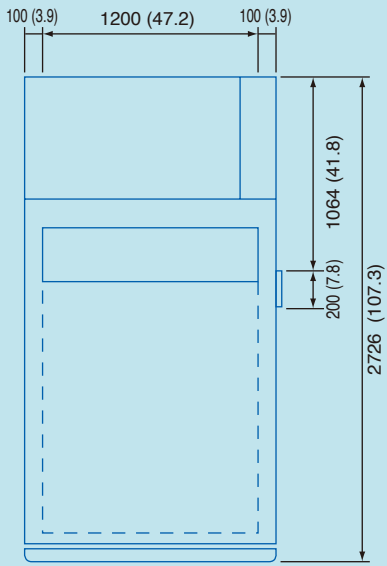


● Service guide

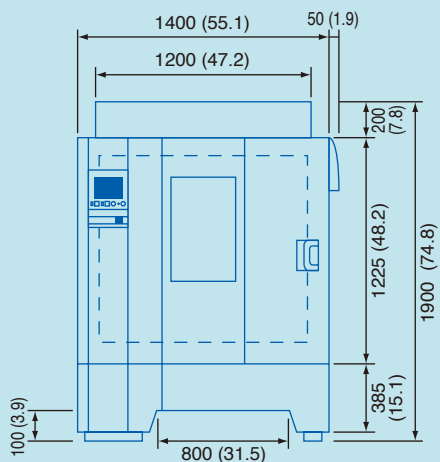


DIMENSIONS

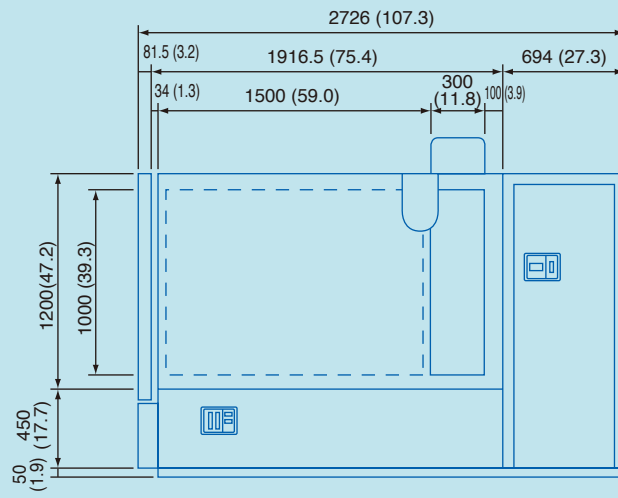
unit : mm (inch)



⟨upside⟩



⟨front⟩



⟨side⟩

SPECIFICATIONS

Model		SML-2	SMU-2	SMS-2	SMG-2
Power supply		200V AC 3 φ 3W 50/60Hz, 220V AC 3 φ 3W 60Hz, 380V AC 3 φ 4W 50Hz, 400 VAC 3 φ 4W 50Hz Power supply voltage fluctuation: Within ±10% of rated value			
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°C (+32 to +104°F) Cooling water temperature range: +5 to +32°C (+41 to +89.6°F)			
Performance *1	Temperature range *2	-40 to +180°C (-40 to +356°F)		-70 to +180°C (-94 to +356°F)	
	Humidity range *2	20 to 98% rh	—	20 to 98% rh	—
	Temperature fluctuation *2	±0.5°C (-40 to +100°C)(±0.9°F (-40 to +212°F)) ±0.7°C (+101 to +180°C)(±1.26°F (+213 to +356°F))		±0.5°C (-70 to +100°C)(±0.9°F (-94 to +212°F)) ±0.7°C (+101 to +180°C)(±1.26°F (+213 to +356°F))	
	Humidity fluctuation *2	±3% rh	—	±3% rh	—
	Temperature uniformity *2	±1.5°C (±2.7°F)			
	Humidity uniformity *2	±5% rh	—	±5% rh	—
	Temperature cycling rate *3	-18°C ⇄ +158°C (-0.4°F ⇄ +316.4°F) 5°C/min. or more without specimen (Average)		-45°C ⇄ +155°C (-49°F ⇄ +311°F) 5°C/min. or more without specimen (Average)	
	Lowest attainable temperature *2	-40°C (-40°F)		-70°C (-94°F)	
	Noise *4	65dB			
Construction	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	7.5 kW		7.5 kW+7.5 kW	
	Refrigerator	Scroll-type refrigerator, Water-cooled condenser, Cascade condenser (SMS, SMG only), Refrigeration capacity controller (Electronic auto-expansion valve system), Refrigerant (R404A, R23 (SMS, SMG only))			
Blower for in-chamber agitation		Sirotco fan (Direct-coupled electric motor type, 100 W×4)			
Humidifying water supply	water quality	Electrical conductivity 0.1 to 10 μs/cm	—	Electrical conductivity 0.1 to 10 μs/cm	—
	Supply water pressure	0.07 to 0.5MPa	—	0.07 to 0.5MPa	—
Fittings		Viewing window, Chamber lamp, Integrating hour meter (0 to 99999 hours), Cable port (φ 50 mm, one each on right and left sides)			
Load capacity of floor in chamber		100kg			
Inside dimensions (mm) *5		1200W×1000H×1500D (47.2W×39.3H×59.0D inch)			
Outside dimensions (mm) *5		1400W×1900H×2726D (55.1W×74.8H×107.3D inch)			
Capacity		1800 L			
Weight		1250 kg		1400 kg	
Utility requirements	Cooling water pressure	0.2~0.5MPa			
	Cooling water flow rate	2350 L/h (Reference temperature +25°C/ +77°F), 4400 L/h (Reference temperature +32°C/ +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°C, 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.

*5 Excluding protrusions

MODEL

SM□-2

Temperature & humidity range

L : -40°C / 20 to 98%rh

U : -40°C

S : -70°C / 20 to 98%rh

G : -70°C

ACCESSORIES

- Cable port rubber plug (Silicone sponge rubber, ϕ 50mm) 2
- Shelf support, 18-8 Cr-Ni stainless steel (Class CP) 1 set
- Shelf, 18-8 Cr-Ni stainless steel plate
 - (front: 1160×700mm) 1
 - (back: 1160×700mm) 1
- 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 set

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 /low 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 user's 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: 220 × 210 mm

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

Data saving cycle: 5 sec.

External recording media:

CF memory card (128MB)

Language support: ENG, JPN

[Temperature type]

Temperature range: -100 to +200°C

Number of inputs (Initial setting):

Temperature 1

(5 more channels can be turned ON)

[Temperature and humidity type]

Temperature range: -100 to +200°C

Humidity range: 0~100% rh

Number of inputs (Initial setting):

Temperature 1 / Humidity 1

(4 more channels can be turned ON)



Temperature recorder (digital)

- RJ25 -100 to +200°C
- 6 dots

Recorder location: Top or Left side

Size: 220 × 210 mm

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

Temperature and humidity recorder (digital)

- RJ15 -100 to +200°C
- 0 to 100%rh
- 6 dots

Recorder location: Top or Left side

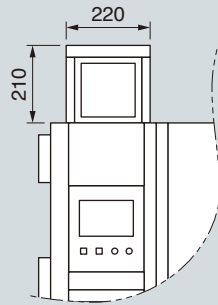
Size: 220 × 210 mm

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

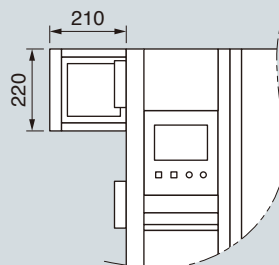


● Recorder location unit:mm

Top



Left side



Thermocouple

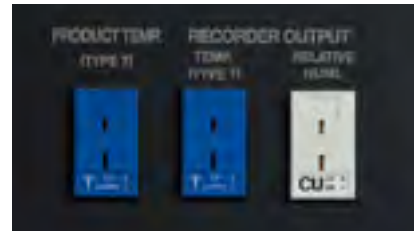
Thermocouple measures the temperature of specimens.

- 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 board1
- Connecting position: Right side of the main unit (front)
- Accessories: Thermocouple, Type T1 (φ 0.32mm, 6m)
- Connector1

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.

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.

- GPIB
- RS-232C

Power cable

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

*The chamber does not come with a power cable.

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ISO 14001 (JIS Q 14001)
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