Faster Temperature (& Humidity) Chamber
SM series
Stress of 5°C/min. achieved with the large-capacity 1800L models.

The faster 1800L temperature and humidity chamber can handle the reliability testing of large display devices used in automotive components, car electronics systems and other devices. The chamber can achieve a temperature change rate of 5°C/min, and in addition to making specimen setting easier, it now allows for central control and remote monitoring via an internet browser.
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 rate of change of 5°C/min. or more based on IEC60068-3-5, IEC60068-3-6 (without specimens loaded), thanks to the larger refrigeration systems installed in this series.

The chamber features operation within wide temperature ranges: −70°C to +180°C and −40°C to +180°C.

Four models with 1800L capacity

Two models are available for each of the temperature ranges from −40°C to +180°C/−70°C to +180°C, with a humidity model (from 20 to 98%rh) also available for each type. Thus, a chamber model can be selected from four models to suit the intended application at best.

Easy to set specimens

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and the test area has also been lowered, so that large-sized specimens and heavy articles can easily be inserted or withdrawn.

Shelves structure

(Japanese patent no.4418691)

Due to the large size (1200mm wide×1500mm deep) of the test area, 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.

Free access of the chamber

Since the machinery compartment is located in the back of the test area, virtually no maintenance space is required on either side of the equipment, enabling access either from the right or the left.
Viewing Windows as Standard
Equipped with viewing windows as standard, and chamber lamp (LED lamps) provide greater visibility.

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

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.

Pocket for printed material
A pocket is provided at the lower front of the chamber to store printed material such as the operation manual.
N instrumentation P-310

**Color LCD Touch Panel**
A 7-inch wide color LCD fitted with LED backlight. Tabs are displayed at the bottom of the screen to help access to other screens.

**Multilingual support**
The language used by the instrumentation can be changed with the screen settings (Japanese / English).

**Information notification**
The INFO icon will blink when chamber information requiring attention.

**Registering test patterns**
Program operation: 40 patterns (99 steps per program)
Constant operation: 3 patterns

**Test data records**
Temperature & humidity settings and measurement values can be recorded on the internal memory and external memories.

**Copy test profiles**
Share the test profiles among chambers via USB memory* instead of PC.
* USB memory not included.

* Some items may not be copied between different models and chambers with different options.
Chambers can be operated from PC and tablet

Remote monitoring and control (Ethernet connection)
The chambers are equipped with unique web applications that enable chamber status to be confirmed and operated from a web browser screen (PC or tablet terminal). It is also possible to start operations with a PC or other device from a remote location.

Editing test profiles with a browser
It is possible to edit the test profiles registered in the chamber through a web browser.

Displaying data in trend-graph
Settings and measured data saved in the chamber can be displayed in graphs on a web browser.

E-mail notifications
Details on alarms that have been triggered will be sent to pre-registered e-mail addresses. It is also possible to transmit e-mails when testing has finished.
* An Intranet environment is required to transmit e-mails.

Login privileges

<table>
<thead>
<tr>
<th>Privileges</th>
<th>Screen</th>
<th>Chamber monitor</th>
<th>Constant/Program setup</th>
<th>Run/Stop</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Operator</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>User</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Email alert

ESPEC OnlineCore

OnlineCORE (Sold separately)
Central control system recommended for multiple environmental test chambers installations

*Please contact ESPEC for more information about which products can be connected.
# SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>SML-21</th>
<th>SMU-21</th>
<th>SMS-21</th>
<th>SMG-21</th>
</tr>
</thead>
<tbody>
<tr>
<td>System</td>
<td>Balanced Temperature (&amp; Humidity) Control system (BT(H)C system)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Performance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Temperature range</strong></td>
<td>−40 to +180°C (−40 to +356°F)</td>
<td>−70 to +180°C (−94 to +356°F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Humidity range</strong></td>
<td>20 to 98%rh</td>
<td>—</td>
<td>20 to 98%rh</td>
<td>—</td>
</tr>
<tr>
<td><strong>Temperature fluctuation</strong></td>
<td>±0.5°C (−40 to +100°C)</td>
<td>±0.5°C (−70 to +100°C)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Humidity fluctuation</strong></td>
<td>±5%rh</td>
<td>—</td>
<td>±5%rh</td>
<td>—</td>
</tr>
<tr>
<td><strong>Temperature variation in space</strong></td>
<td>3°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Temperature rate of change</strong></td>
<td>5°C/min. no specimen (Average)</td>
<td>5°C/min. no specimen (Average)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Most attainable temperature</strong></td>
<td>−40°C</td>
<td>—</td>
<td>−70°C</td>
<td></td>
</tr>
<tr>
<td><strong>Exterior material</strong></td>
<td>Cold-rolled rust-proofed treated steel plate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test area material</strong></td>
<td>18-8 Cr-Ni stainless steel plate (2B polish)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Insulation</strong></td>
<td>Glass wool</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Heater</strong></td>
<td>Fin-type sheathed heater</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Humidifying boiler</strong></td>
<td>18-12-2.5 Cr-Ni-Mo stainless steel sheathed heater</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cooler</strong></td>
<td>Plate fin cooler (Also works as a dehumidifier)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Air circulator</strong></td>
<td>Sirocco fan (Direct-coupled electric motor type, 100 W×4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Refrigerator unit</strong></td>
<td>Mechanical single stage refrigeration system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Refrigerator</strong></td>
<td>Scroll-type compressor, Water-cooled condenser, Cascade condenser (SMS, SMG only), Electronic expansion valve system, Refrigerant (R404A, R23 (SMS, SMG only))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chamber total load resistance</strong></td>
<td>100 kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Inside dimensions (mm)</strong></td>
<td>W1200×H1000×D1500 (W47.2×H39.3×D59.0 inch)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Outside dimensions (mm)</strong></td>
<td>W1400×H1900×D2737 (W55.1×H74.8×D107.7 inch)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Capacity</strong></td>
<td>1800 L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>1250 kg</td>
<td>1400 kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Equipment</strong></td>
<td>Drain hose, Cable port×2 (φ50 mm, each side), Chamber lamp, Time signal terminal, Specimen power supply control terminal, Ethernet port (LAN), USB memory port, Viewing window (W295×H380 mm),</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Accessories</strong></td>
<td>Cable port rubber plug (Silicone sponge rubber, φ50mm), Shelf brackets, Shelf (front, back), Strainer, Strainer element, Nipple, Spacer for frame, Cartridge fuse, Wet-bulb wick, Operation Manual *Power cable is not included.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Allowable conditions</strong></td>
<td>Ambient temperature range: 0 to +40°C (+32 to +104°F) Cooling water temperature range: +5 to +32°C (+41 to +89.6°F)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
<td>200V AC 3φ 3W 50/60Hz</td>
<td>109 A</td>
<td>86 A</td>
<td>120 A</td>
</tr>
<tr>
<td></td>
<td>220V AC 3φ 3W 50Hz</td>
<td>97 A</td>
<td>75 A</td>
<td>109 A</td>
</tr>
<tr>
<td></td>
<td>380V AC 3φ 4W 50Hz</td>
<td>56 A</td>
<td>45 A</td>
<td>63 A</td>
</tr>
<tr>
<td></td>
<td>400V AC 3φ 4W 50Hz</td>
<td>57 A</td>
<td>45 A</td>
<td>64 A</td>
</tr>
<tr>
<td><strong>Cooling water supply pressure</strong></td>
<td>0.2 to 0.5MPa</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cooling water supply rate</strong></td>
<td>2350 L/h (Reference temperature +25°C), 4400 L/h (Reference temperature +32°C)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Piping connection size</strong></td>
<td>32 A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Humidifying water supply</strong></td>
<td>Electrical conductivity 0.1 to 10μs/cm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supply water pressure</td>
<td>0.07 to 0.5MPa</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Noise level</strong></td>
<td>Max. 65dB</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

*1 The performance values are based on IEC 60068-3-5:2001, and IEC 60068-3-6:2001. Performance figures are given for a +23°C ambient temperature, a +25°C refrigerator cooling water temperature, no specimens inside the test area and refrigerator capacity set to auto.

*2 Excluding protrusions

*3 Voltage fluctuation: ±10% of rated value.

*4 Noise level was measured in an anechoic room at a height of 1.2 m from the floor and a distance of 1 m from the chamber front panel (ISO 1996-1:2003 A-weighted sound pressure level).
**MODEL**

SM□−21

Temperature & humidity range
- L: −40°C / 20 to 98%rh
- U: −40°C
- S: −70°C / 20 to 98%rh
- G: −70°C

*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).*

**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
- Temperature switch for air circulator
- Control circuit overload and short circuit protection fuse
- Electrical compartment door 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)

**DIMENSIONS / FITTINGS LOCATION**

*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).*
**Options**

**Power cable**
- 5m
- 10m
*AC 200V only
*The chamber does not come with a power cable.

**Shelf, Shelf bracket**
Equivalent to standard accessory.

**Additional cable port**
Provided in addition/replacement of the standard cable port (left-side).
*Equipped with rubber plug.
  - ø25 mm
  - ø50 mm
  - ø100 mm

**Cable port rubber plug**
Comes with the cable port.

**Interface**
- RS-485
- RS-232C
- GPIB

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**Frost-free circuit**
Prevents frost from accumulating on the refrigeration circuit to allow long-term continuous operation.
With models SMS and SMG, it is applicable with all chambers except those equipped with cascade refrigeration.

**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
  - Connector — 1

**Time signal terminals**
Nine relay contacts (time signals) added.
(Two contacts standard equipped)

**Paperless recorder**
Records temperature of each section such as the temperature inside the chamber.
Recorder location: Top or Left side
Size: 144×144 mm
*External dimensions change when attaching the recorder. (Please refer to the recorder location.)
Display: 5.7 inch color touch panel
Data saving cycle: 5 sec.
Internal recording media:
  - Flash memory: 8MB
External recording media:
  - CF memory card (256MB)
  - USB memory port
Language support: ENG, JPN

[Temperature type]
Number of inputs (Initial setting):
  - Temperature 1
  (5 more channels can be turned ON)

[Temperature and humidity type]
Number of inputs (Initial setting):
  - Temperature 1 / Humidity 1
  (4 more channels can be turned ON)
OPTIONS

Recorder output terminal

- Temperature, humidity
  Output terminals for chamber temperature and humidity.
  *Cannot be installed in conjunction with a recorder

- Dew-point temperature
  Terminal boards for dry-bulb sensor in the chamber.
  (SMU, SMG only)

Thermocouple

Attached to specimen to measure specimen temperature.
*Thermocouple type T (Copper/Copper-Nickel)
  • 2m
  • 4m
  • 6m

Anchoring fixtures

Used to bolt the chamber to the floor.

Overcool protector

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

Additional overheat protector

Additional preventive measures can be taken for excessive temperature rise in the chamber, in addition to the standard equipped overheat protector.

External alarm terminal

If the safety device of the chamber is activated, the external alarm terminal will notify it to a remote point.

Emergency stop push button

Stops the chamber immediately.

Operation manual

- CD
- Booklet

Reports & certificates

- Testing and inspection report
- Test data
- Temperature (& humidity) uniformity measurement
- Calibration report
- Calibration certificate
- Traceability certificate
- Traceability system chart

Safety precautions

- 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 substances in the chamber. 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.
- Do not place life forms or substances that exceed allowable heat generation.
- Be sure to read the operation manual before operation.
ESPEC CORP. http://www.espec.co.jp/english

Head Office
3-5-6, Tenjinbashì, Kita-ku, Osaka 530-8550, Japan
Tel: 81-6-6338-4741  Fax: 81-6-6338-9500

ESPEC NORTH AMERICA, INC.
Tel: 1-616-896-6100  Fax: 1-616-896-6150

ESPEC EUROPE GmbH
Tel: 49-89-1893-9630  Fax: 49-89-1893-96379

ESPEC ENVIRONMENTAL EQUIPMENT (SHANGHAI) CO., LTD.
Head Office
Tel: 86-21-51036677  Fax: 86-21-63372237
BEIJING Branch
Tel: 86-10-64627025  Fax: 86-10-64627036
TIANJIN Branch
Tel: 86-22-26210366  Fax: 86-22-26282186
GUANGZHOU Branch
Tel: 86-20-83317826  Fax: 86-20-83317825
SHENZHEN Branch
Tel: 86-755-83674422  Fax: 86-755-83674228
SUZHOU Branch
Tel: 86-512-68028890  Fax: 86-512-68028860

ESPEC TEST TECHNOLOGY (SHANGHAI) CO., LTD.
Tel: 86-21-68798008  Fax: 86-21-68798088

ESPEC ENGINEERING (THAILAND) CO., LTD.
Tel: 66-3-810-9353  Fax: 66-3-810-9356

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