Power-saving feature and quick and economical program customization

Under low pressure environment, specimens dry at lower temperature and boiling point is also lower, which reduces stress on specimens.
The new instrumentation achieves excellent usability and advanced functionality. For example, program operation can be selected for precise, automated control of pressure and temperature. Furthermore, extensive safety designs complying to globalization trend have been added to meet the CE certification requirements.
Based on the achieved temperature and pressure control capabilities for testing equipment, in which high reliability and high accuracy are expected, ESPEC further refines the capacities required for manufacturing equipment.
A broad array of energy-saving mechanisms and support for wider range of vacuum drying treatments

- **Vacuum drying treatment for a wider array of uses**
  A vacuum (low-pressure) environment has a lower boiling point, allowing drying treatments at a lower temperature. The vacuum oven enables drying treatment at a lower temperature for specimens that cannot be treated by conventional high-temperature drying. Furthermore, the vacuum and N₂ gas exchange modes enable drying of oxidation-averse specimens, as well as drying and heat treatment within a clean environment by eliminating impurities in the chamber through repeated heat treatments or gas exchanges.

- **A versatile equipment**
  The ovens are ideal for many applications, especially in electronic component production: defoaming when mixing silicone rubber or resins in LED production, deaerating during resin forming, hardening when injecting epoxy for hybrid ICs, or drying electronic components after washing.

- **Uncompromising energy-saving mechanisms**
  Power consumption was reduced through improved air-tightness and insulation achieved by using superior insulation materials and by changing both the door locking mechanism and the enclosure construction. Air-tightness and insulation capacity have a significant impact not only on temperature control but also on pressure control. Through improvement of these properties, the VAC-101 achieves up to 40% energy savings. In addition, the enhanced air-tightness helps prevent a temperature rise in the surrounding area of the chamber.
Excellent temperature uniformity and ease of operation

**Double-layered interior construction for great temperature uniformity**

The vacuum chamber features double-layered construction. A heater on the exterior of the test area minimizes heat loss and improves temperature uniformity. This allows even more uniform heat treatment and improves machine efficiency by reducing heat up time.

**International safety standard compliance**

Complies with safety of Machinery (ISO 12100), Low Voltage (IEC 60204), EMC (EN 61000-6-2, 55011).

<table>
<thead>
<tr>
<th>#</th>
<th>Point</th>
<th>Temp. (℃)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>1+198.6</td>
<td>+194.2</td>
</tr>
<tr>
<td>2</td>
<td>+197.2</td>
<td>+197.1</td>
</tr>
<tr>
<td>3</td>
<td>+197.6</td>
<td>+197.6</td>
</tr>
<tr>
<td>4</td>
<td>+190.4</td>
<td>+194.7</td>
</tr>
<tr>
<td>5</td>
<td>+198.4</td>
<td>+196.0</td>
</tr>
<tr>
<td>6</td>
<td>±1.9</td>
<td></td>
</tr>
</tbody>
</table>

Test area (The shelves and hermetic terminals are optional.)

**Double-layered construction of the test area**

- Heater
- Exterior
- Viewing window
- Reinforced glass
- Internal chamber
- Anchor material

**Test area temperature uniformity measurement example**

- Model: VAC-301P
- Temperature setting: +200℃
- Pressure setting: 1×10⁻¹¹Pa
- Ambient temperature: +23℃
- Measurement point: 9
- Number of measurement: 10

<table>
<thead>
<tr>
<th>Point</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>Uniformity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temp. (℃)</td>
<td>+193.6</td>
<td>+194.2</td>
<td>+196.9</td>
<td>+197.2</td>
<td>+197.6</td>
<td>+190.4</td>
<td>+194.7</td>
<td>+198.4</td>
<td>+196.0</td>
<td>±1.9</td>
</tr>
</tbody>
</table>
Quick and economical customization

- Variety of options for greater usability
  There are 20 options available. Product will be factory-customized to best suit your application.

- Viewing window for specimen observation (option)
  The viewing window is slightly curved to eliminate exterior reflections.

- Simple design for improved scalability
  The construction of the main chamber unit adopts a simple design in order to accommodate requests for major modifications and achieve shorter treatment time, by adding -for example- a refrigeration unit to reduce recovery time to ambient temperature.

---

Characteristics

Vacuum Oven VAC

- Temperature range: +30 to +250°C
- Pressure range: 933×10^2 to 1×10^2 Pa
- Internal volume: 500 to 2000L
- Operating mode: Program: 20patterns 99-steps Constant

Custom-made Equipment

LIB Electrode Oven

The chamber can perform heat treatment of a high-volume specimen using the vacuum or gas exchange mode. The product also features a refrigeration system and fan to decrease the specimen’s recovery time to ambient temperature.
Vacuum control modes suitable for a wide range of applications

Pressure operation modes to choose for flexible programming

There are five operation modes available to select the pressure control. A wide variety of programs can be designed by combining constant-temperature operation and programmed operations. There are 40 pattern settings available, in which up to 99 steps can be programmed for each pattern of operation.

Gas exchange operation mode prevents oxidation and eliminates impurities inside the chamber

Oxygen inside the chamber can be eliminated by replacing it with N₂ gas, preventing oxidation during the drying operation. In addition, a high-precision environment can be created by repeatedly performing the exchanges. This mode also removes organic substances in addition to preventing oxidation, reducing the impact on specimens.

Expert Mode demonstrates its capabilities in repeated high-volume processing (option)

The depressurization schedule used is stored and can be called up for subsequent operations to ensure accurate processing. Expert Mode eliminates the fussing with valve controls for each process, and is ideally suited for repeated high-volume processing of identical specimens.

<table>
<thead>
<tr>
<th>mode</th>
<th>Details</th>
<th>Program and Typical pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automated operation</td>
<td>Enables constant operation at a fixed pressure and ramp operation with programmed pressure increase and decrease times. ON/OFF of vacuum pump and atmosphere inlet valve are controlled automatically.</td>
<td></td>
</tr>
<tr>
<td>Continuous operation</td>
<td>Enables continuous operation in a vacuum. The vacuum pump runs continuously.</td>
<td></td>
</tr>
<tr>
<td>Open to atmosphere</td>
<td>Introduces atmospheric air into the chamber. Stops the vacuum pump and opens the atmosphere-inlet valve.</td>
<td></td>
</tr>
<tr>
<td>Gas exchange</td>
<td>Repeatedly performs continuous operation and N₂ gas introduction. Pressure value and number of replacements can be set for the exchange operation.</td>
<td></td>
</tr>
<tr>
<td>Ventilation operation</td>
<td>Outside air can be introduced using the automated operation. The vacuum pump runs continuously.</td>
<td></td>
</tr>
</tbody>
</table>

Pressure setting can be adjusted using a controller with learning function. Temperature and pressure settings can be saved and replicated in programmed operations.
**High-speed processing Instrumentation features improved operability and legibility**

- **Tabbed user interface**
  Controller’s new layout includes tabs at the bottom of the screen to easily activate any section. Calculating and processing performances have been improved, and the screen layout optimized.

- **Register test patterns**
  Up to 40 patterns for program operation and 3 patterns for constant operation can be registered.

- **Program editing from a PC (option)**
  The chamber is equipped with an optional USB port, allowing you to program its operations on a PC using the dedicated application software. Programs created on a PC can be copied to the chamber using a USB memory stick.

- **Multi-lingual display**
  A simple operation changes display text to Japanese and Chinese (simplified). Select the language that suits your needs.

<table>
<thead>
<tr>
<th>Operating mode</th>
<th>Constant operation, Program operation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operation settings</strong></td>
<td></td>
</tr>
<tr>
<td>Constant mode settings</td>
<td>Available settings 3 patterns  Settings range and resolving power  Temperature 40 to 200°C, 1°C units  Pressure 0 to 1013×10² Pa, 1×10² Pa units</td>
</tr>
<tr>
<td>Program mode settings</td>
<td>Available settings 40 patterns (max. 99 steps per pattern)  Settings range and resolving power  Temperature 40 to 200°C, 1°C units  Pressure 0 to 1013×10² Pa, 1×10² Pa units  Time 0 hr 0 min. 1 sec - 999 hrs 59 min. 59 sec, 1 sec units</td>
</tr>
<tr>
<td><strong>Language</strong></td>
<td>English, Japanese, Chinese</td>
</tr>
<tr>
<td><strong>Auxiliary functions</strong></td>
<td>Basic functions  Operation control, alarm, information, accessory (integrating hour meter, feed valve/ventilation setting), help, chamber monitor (temperature pressure, external output, trend graph)  Control setting functions  Timer setting (start timer, end timer, quick timer), sampling setting, protection, alarm history display, version display, hour meter with reset, announcement  Maintenance function  Equipment operation settings (power outage recovery operation setting), settings criteria setting, time signal name entry, equipment details settings (external alarm, output setting), user password, date and time setting</td>
</tr>
</tbody>
</table>
### SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>VAC-101P</th>
<th>VAC-201P</th>
<th>VAC-301P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pressure control system</strong></td>
<td>PID control</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Temperature range</strong></td>
<td>+40 to +200°C (+104 to +392°F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Temperature constancy</strong></td>
<td>±0.5°C (vacuum), ±1°C (atmospheric)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Time to reach extreme temperature value</strong></td>
<td>Within 50 min.</td>
<td>Within 70 min.</td>
<td>Within 80 min.</td>
</tr>
<tr>
<td><strong>Pressure range</strong></td>
<td>933×10² to 1×10⁵ Pa</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ambient pressure</strong></td>
<td>Less than 133 Pa</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pull-down time</strong></td>
<td>Within 7 min.</td>
<td>From atmospheric pressure to 133 Pa</td>
<td>Within 15 min.</td>
</tr>
<tr>
<td><strong>Atmospheric pressure recovery time</strong></td>
<td>Within 4 min.</td>
<td>Inlet open to atmosphere</td>
<td>Within 8 min.</td>
</tr>
<tr>
<td><strong>Construction</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Exterior material</strong></td>
<td>Cold-rolled steel with baked finish</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vacuum chamber</strong></td>
<td>Stainless steel sheet (SUS430)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Internal chamber</strong></td>
<td>Stainless steel sheet (NSS432)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Insulation</strong></td>
<td>Glass wool</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Heater</strong></td>
<td>Mica heater</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Inlet</strong></td>
<td>R 1/4 inch, max. pressure 0.05 MPa (0.5 kg/cm²) or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Exhaust port</strong></td>
<td>OD φ28 mm, rubber hose connection port</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Motor</strong></td>
<td>200V AC 1φ 50/60Hz 550W</td>
<td>200V AC 3φ 50/60Hz 550W</td>
<td></td>
</tr>
<tr>
<td><strong>Pumping speed</strong></td>
<td>200L/min. (50Hz), 240L/min. (60Hz)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ultimate pressure</strong></td>
<td>6.7×10⁻¹ Pa</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Auxiliary functions</strong></td>
<td>Gas ballast valve, oil mist trap</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fittings</strong></td>
<td>Leveling feet and casters (free wheel) 4pcs each, Time signal terminals × 2pcs</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Effective internal volume</strong></td>
<td>91 L</td>
<td>216 L</td>
<td>512 L</td>
</tr>
<tr>
<td><strong>Effective internal dimensions</strong></td>
<td>W450×H450×D450 mm (W17.7×H17.7×D17.7 inch)</td>
<td>W600×H600×D600 mm (W23.6×H23.6×D23.6 inch)</td>
<td>W800×H800×D800 mm (W31.5×H31.5×D31.5 inch)</td>
</tr>
<tr>
<td><strong>Outside dimensions</strong></td>
<td>W902×H1392×D782 mm (W35.5×H54.8×D30.7 inch)</td>
<td>W1052×H1532×D1130 mm (W41.4×H60.3×D44.5 inch)</td>
<td></td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>320 kg</td>
<td>400 kg</td>
<td>610 kg</td>
</tr>
<tr>
<td><strong>Shelf support load resistance</strong></td>
<td>up to 100kg (30kg/ stage, Total load of 5 stages)</td>
<td>up to 100kg (20kg/ stage, Total load of 5 stages)</td>
<td></td>
</tr>
<tr>
<td><strong>Test area load resistance</strong></td>
<td>up to 100kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Allowable ambient conditions</strong></td>
<td>+12 to +35°C (+41 to +95°F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200V AC 1φ</td>
<td>14.2 A</td>
<td>18.9 A</td>
<td></td>
</tr>
<tr>
<td>200V AC 3φ</td>
<td>10.7 A</td>
<td>13.9 A</td>
<td>14.2 A</td>
</tr>
<tr>
<td>220V AC 1φ</td>
<td>13.2 A</td>
<td>17.5 A</td>
<td></td>
</tr>
<tr>
<td>220V AC 3φ</td>
<td>—</td>
<td>—</td>
<td>13.2 A</td>
</tr>
<tr>
<td>230V AC 1φ</td>
<td>12.8 A</td>
<td>16.9 A</td>
<td></td>
</tr>
<tr>
<td>380V AC 3φ</td>
<td>—</td>
<td>—</td>
<td>8.2 A</td>
</tr>
<tr>
<td>400V AC 3φ</td>
<td>—</td>
<td>—</td>
<td>7.9 A</td>
</tr>
</tbody>
</table>

*1 Performance figures are given for a +23°C ambient temperature, rated voltage, and no specimen inside the test area.

*2 Set point is 200°C. Time it takes for the center of the chamber’s temperature to increase from 40°C to 200°C under vacuum.

*3 Fixed temperature inside the chamber, vacuum pump connected with exhaust speed of more than 200L/min. and ultimate pressure of 13×10⁻² Pa or less, no gases emitted from specimen.

*4 Recovery time to atmospheric pressure (1013×10⁵ Pa) to 1010×10⁵ Pa, recovery time may fluctuate depending on atmospheric pressure.

*5 Excluding protrusions.

*6 Includes shelf weight.
SAFETY DEVICES

- Leakage breaker
- Control panel door switch
- Back cover switch
- Control circuit overcurrent protection
- Control circuit short circuit protection cartridge fuse
- System error (error)
- System error (caution)
- Room temperature compensation burnout detection circuit
- Temperature sensor burnout detection circuit
- Pressure sensor burnout detection circuit
- Reverse-prevention relay
- Thermal fuse
- Heater overcurrent protector
- Vacuum pump overload protector
- Motor valve operation failure alarm function (built-in temperature/pressure controller)
- Alarm function that indicates pressure has not been reached (with built-in temperature/pressure controller)
- Absolute upper/lower temperature limit alarm (built-in temperature/pressure controller)
- Absolute upper/lower pressure limit alarm (built-in temperature/pressure controller)
- Overheat protector
- Absolute upper/lower temperature deviation alarm function (temperature/pressure controller)
- Absolute upper/lower pressure deviation alarm function (temperature/pressure controller)
- Specimen power supply control terminal

ACCESSORIES

- Cartridge fuse (3A) 1
- User's manual 1
* Shelves and power cables are not included.

OPTIONS (VAC)

Expert Mode

The jog dial can be used to precisely control, record, and reproduce depressurization.

Atmospheric pressure recovery time reduction

An atmospheric release valve with larger piping port is added. The valve opens and closes manually. Atmospheric pressure recovery time: within 2 min.* The optional air filter cannot be fitted.

Pirani vacuum gauge

Pressure is displayed digitally, while this gauge is used to measure pressure accurately below 2700 Pa. Measurement range: 0.4 to 2700 Pa Measurement precision: within ±3% of full-scale (converted to linear scale)

Hermetic terminals for voltage application

Used when applying voltage to specimens. Specifications: Hermetic terminal (four-core) Max. current: 6 A Max. voltage: 200V AC, 250V DC Mounted location: Oven rear side* Maximum 4 (total quantity of both thermocouple and impressed voltage combined).

Hermetic terminals for thermocouples

Used for connection to thermocouples from specimens or chamber interior. Specifications: Hermetic terminal (eight-core, four pairs) Mounted location: Oven rear side* Maximum 4 (total quantity of both thermocouple and impressed voltage combined).

Recorder output terminal

This terminal outputs the test area temperature and pressure via 1 to 5V DC linear output. Temperature: +20°C to +220°C Pressure: 0 to 106.7 kPa
### OPTIONS (VAC)

**Paperless recorder**

Records temperature and pressure inside the chamber. Additional inputs may also be recorded.
- Display: 5.7 inch color touch panel
- Temperature range: +20 to +220°C
- Pressure range: 0 to 106.7 kPa
- Number of inputs:
  - Temperature 1
  - Pressure 1
  - (4 more channels can be turned ON)
- Scan interval: 5 sec
- Internal memory: 8 MB
- External memory media: CF memory card
  - (Includes a 256 MB CF card)
- External memory function: USB port

**Temperature and pressure recorder**

Records the oven internal temperature and pressure.
- Temperature range: +20 to +220°C
- Pressure range: 0 to 106.7 kPa
- Input: Temperature (×1), Pressure (×1)
- Recording method: Dot

**Absolute pressure sensor**

The standard gauge pressure is replaced by absolute pressure sensor as pressure indication method.

**External alarm terminal**

If the safety device of the chamber is activated, external alarm terminal will notify it to a remote point.
- Power capacity: 250 V AC, 3 A
- Operation: Connection output when error occurs (closed)
- Mounted location:
  - Oven rear side (above inlet)

**Time up output**

A contact signal is sent when a step in the program changes, or when the program ends.

**External device alarm input terminal**

When the chamber is interlocked with an external device, this option is used to stop chamber operation when an error is issued from the external device.

**Status indicator light**

Illuminates to indicate errors when the safety device activates.

**Emergency stop pushbutton**

Stops the chamber immediately.

**Operation status indicator**

The LED light above the instrumentation panel indicates the chamber status.

**Door with viewing window**

Used for observation of the specimens inside the chamber.
- Size: W324 × H336 mm

**Power meter**

Displays the integral power consumption for the chamber.

**Floor reinforcement**

To enhance the floor load capacity inside the chamber. Machinery compartment is also reinforced.
OPTIONS (VAC)

Air filter
Filtering air introduced into the chamber.
Port size: 0.2 μm
Pressure resistance: 4.2 kg/cm²
Connector port: NPT 1/8, male screw
Location: Air inlet

Vacuum pump oil
Model: SMR-100 (500mL × 2)

Cold trap
Cools and removes moisture and organic solvents contained in the outside air before being drawn into the vacuum pump. (Separate from oven)
Outside dimensions: W300×H835×D350 mm

Vacuum pump exhaust port
Exhaust gas from vacuum pump outside.
External connection port: NW25 (ISO standard)
Connection: Quick coupling
Center ring with O-ring (not provided)
Location: Rear side

Removal of pump
The standard fitted vacuum pump is removed. Terminal block for vacuum pump power supply and pump intake port connection hose are prepared inside the chamber.
* the chamber main unit weight, electric current, and power supply voltage will be changed.

Stainless steel shelf
Stainless steel punching plate
Max. allowable number of shelves:
Up to 5 shelves

<table>
<thead>
<tr>
<th>Model</th>
<th>W (mm)</th>
<th>D (mm)</th>
<th>Load resistance (kg)</th>
<th>Shelf weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAC-101P</td>
<td>435</td>
<td>435</td>
<td>30</td>
<td>1.6</td>
</tr>
<tr>
<td>VAC-201P</td>
<td>585</td>
<td>585</td>
<td>30</td>
<td>2.7</td>
</tr>
<tr>
<td>VAC-301P</td>
<td>785</td>
<td>785</td>
<td>20</td>
<td>4.8</td>
</tr>
</tbody>
</table>

* Shelf load resistance : Equally distributed load
Total load weight : Up to 100 kg

Heavy-duty shelf
Used to hold heavy specimens exceeding the load capacity of the standard shelf.
Load resistance: 40 kg/level
Shelf weight: 2.7kg (VAC-201P)
5.6kg (VAC-301P)
Max. allowable number of shelves:
up to 4 shelves
Test area load resistance : 160kg (includles shelf weight)
* VAC-201P and 301P only

USB external memory port
Logging, and program reading & writing are available.

Interface
Communication ports to connect the chamber to a PC.
- RS-485
- RS-232C
- GPIB

Communication cables
- RS-485 5m/ 10m/ 30m
- GPIB 2m/ 4m

Power cable
- 2.5m
- 5m
- 10m
* 200V/ 220V/ 230V AC only

CE marking
VAC-101P: 200V 1φ 200V 3φ
220V 1φ 230V 1φ
VAC-201P: 200V 1φ 200V 3φ
220V 1φ 230V 1φ
VAC-301P: 200V 3φ 220V 3φ
* This CE marking option is not necessary for the VAC-301P with 380V 3φ or 400V 3φ option which is already including CE marking.

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.
- Be sure to read the operation manual before operation.
Direct heating system for fast vacuum-dry

In addition to the gas exchange function, it can treat specimens in oxygen-free atmospheres using nitrogen or other gases, and supports baking, degassing, hardening, deaeration and numerous other applications.

Color LCD touch panel

N-Instrumentation with 4.3-inch touch panel display comes with originally designed human-machine-interface that allows easy navigation throughout its functions. The touch panel is pressure sensitive resistive type which allows you to operate even with gloves on.

Remote monitoring and control (Ethernet connection)

Taking advantage of an Ethernet connection makes it possible to check the operation status from a remote location. Web browser access allows users to edit program patterns registered to the chamber and to monitor temperatures.

*Vacuum control requires operation of a valve on the chamber.

Copy test profiles

Share the test profiles among chambers via USB memory* instead of PC.

* USB memory not included.

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.
## SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>LCV-234</th>
<th>LCV-244</th>
</tr>
</thead>
<tbody>
<tr>
<td>System</td>
<td>Direct PID control</td>
<td></td>
</tr>
<tr>
<td>Vacuum control</td>
<td>Manual LEAK-VACUUM balance system</td>
<td></td>
</tr>
<tr>
<td>Temperature range</td>
<td>Ambient +20°C to +200°C (±392°F)</td>
<td></td>
</tr>
<tr>
<td>Pressure range</td>
<td>0 to −101kPa (Gauge)</td>
<td></td>
</tr>
<tr>
<td>Temperature fluctuation</td>
<td>±1.0°C</td>
<td></td>
</tr>
<tr>
<td>Performance heat-up time</td>
<td>(at atmospheric pressure) Ambient temperature +23°C to +200°C (±392°F) (set: +210°C) Within 70 min.</td>
<td>Within 110 min.</td>
</tr>
<tr>
<td>Temperature</td>
<td>145±1.0°C</td>
<td></td>
</tr>
<tr>
<td>heat-up time</td>
<td>2 Within 70 min.</td>
<td>Within 110 min.</td>
</tr>
<tr>
<td>Internal material</td>
<td>18-8 Cr-Ni stainless steel plate</td>
<td></td>
</tr>
<tr>
<td>Vacuum gauge</td>
<td>Bourdon tube vacuum gauge</td>
<td>Vacuum indication accuracy: ±1.6kPa</td>
</tr>
<tr>
<td>Heater</td>
<td>Mica heater</td>
<td></td>
</tr>
<tr>
<td>Equipment</td>
<td>Power cable, Ethernet port (LAN port), External memory port, Viewing window, Shelf bracket</td>
<td></td>
</tr>
<tr>
<td>Volume</td>
<td>90 L</td>
<td>165 L</td>
</tr>
<tr>
<td>Inside dimensions</td>
<td>W450×H450×D450 mm (W17.7×H17.7×D17.7 inch)</td>
<td>W550×H550×D550 mm (W21.7×H21.7×D21.7 inch)</td>
</tr>
<tr>
<td>Outside dimensions</td>
<td>W670×H890×D735 mm (W26.4×H35.0×D28.9 inch)</td>
<td>W770×H990×D835 mm (W30.3×H39.0×D32.9 inch)</td>
</tr>
<tr>
<td>Weight</td>
<td>170 kg</td>
<td>250 kg</td>
</tr>
<tr>
<td>Shelf support load resistance</td>
<td>30 kg</td>
<td>25 kg</td>
</tr>
<tr>
<td>Test area load resistance</td>
<td>30 kg</td>
<td>25 kg</td>
</tr>
<tr>
<td>Power supply</td>
<td>AC200V 3φ 50/60Hz</td>
<td></td>
</tr>
<tr>
<td>Maximum current</td>
<td>8A</td>
<td>9A</td>
</tr>
</tbody>
</table>

*1 Figures for an ambient temperature of +23°C relative humidity 65%rh, rated voltage and with no specimen in the chamber.

*2 Based on IEC 60068-3-5:2006

*3 Excluding protrusions

### Vacuum Oven with vacuum pump

(Specification for Vacuum Oven is the same as stated above.)

<table>
<thead>
<tr>
<th>Model</th>
<th>LCV-234P</th>
<th>LCV-244P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacuum pump performance</td>
<td>Direct coupled oil—sealed vacuum pump 6.7×10⁻² Pa (abs) with gas ballast valve closed</td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td>AC200V 3φ 50/60Hz</td>
<td></td>
</tr>
<tr>
<td>Exhaust speed (effective)</td>
<td>200/240L/min.</td>
<td></td>
</tr>
<tr>
<td>Outside dimensions</td>
<td>W670×H1540×D735 mm (W26.4×H60.6×D28.9 inch)</td>
<td>W770×H1640×D835 mm (W30.3×H64.6×D32.9 inch)</td>
</tr>
<tr>
<td>Weight</td>
<td>240 kg</td>
<td>320 kg</td>
</tr>
</tbody>
</table>

*1 Individual performance rate of vacuum pump.

*2 Excluding protrusions
SAFETY DEVICES

- Leakage breaker
- Cartridge fuse for control circuit short-circuit protection
- System error (Error)
- System error (Alarm)
- Room temperature compensation burnout detection circuit
- Dry bulb temperature burnout detection circuit
- Thermal fuse
- Absolute upper/lower temperature limit alarm (with built-in temperature controller)
- Overheat protector
- Temperature upper limit deviation alarm (with built-in temperature/humidity controller)

ACCESSORIES

- Shelf (Stainless steel) 3
- Cartridge fuse (B type 250V 5A) 1
- Breaker handle stopper 1
- Stylus pen 1
- Operation manual 1

OPTIONS (LCV)

Hermetic terminals for voltage application
Used when applying voltage to specimens.
Specifications: Hermetic terminal (four-core)
Max. current: 6 A
Max. voltage: 200V AC, 250V DC
Mounted location: Oven rear side
* Maximum 5 (total quantity of both thermocouple and impressed voltage combined).

Reverse flow prevention valve
The valve prevents lubricating oil inside vacuum pump from reverse flow when chamber is under vacuum state.
* LCV-234P, 244P models only.

Shelf, Shelf bracket
Equivalent to standard accessory.

Chamber stand
The stand is equipped with casters enabling the chamber to move easily.
* Standard equipment in LCV-234P, 244P models.

Specimen power supply control terminal
Terminals that are used to supply power to the specimen. When chamber operation stops due to a problem, power to the specimen is interrupted.
* This option is always used when the power is supplied to specimen placed inside the chamber.

Interface
Communication ports to connect the chamber to a PC.
- RS-485
- RS-232C
- GPIB

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.
- Be sure to read the user’s manual before operation.

Some photographs listed in this catalog contain Japanese display.
VACUUM OVEN

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