Quality is more than a word

ESPEC

# High-performance Clean Oven

## PVHC-232MS・332MS
## PV(H)C-212・232・332

CAT.No.E87197-U903

# Ideal for heat treatment requiring air condition of Class 5 cleanliness. The high cleanliness is assured during the temperature heat-up and pull-down.

ESPEC's Clean Ovens are used extensively for heat treatment of specimens and drying components in stringent clean air requirements of Class 5 cleanliness.
A space-saving upright design, and a large LED display for improved visibility are some of the user-friendly features.
Eight models to choose from, including high-performance models which ensure automated operation and dedicated cleanliness even throughout temperature heat-up or cooling procedures.

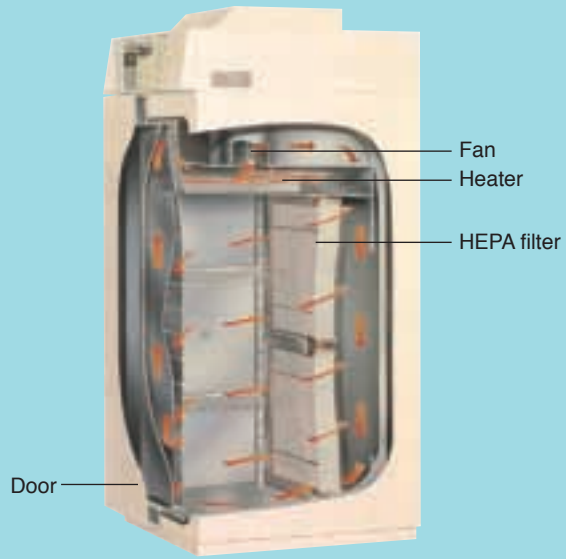
PVHC-332

PVHC-232

PVHC-212

# Utility

## Horizontal laminar circulation system




## Class 5 cleanliness level

Class 5 cleanliness level is achieved by employing HEPA filters and a back-to-front horizontal laminar circulation system which produces uniform high-temperature airflow.
Distance of airflow in the chamber is shortened, resulting in smooth air delivery in between specimens and uniform heat treatment. Additionally, it prevents dust generated from specimens placed upstream from flowing downstream.
The upright design with instrumentation, heater, and other mechanisms gathered on the upper side saves installation space.

## Airtight structure ensures zero contamination

All internal seams are welded to create an airtight structure. This prevents leakage of insulation materials from joints which would lead to chamber contamination. Vibration is also eliminated from affecting the specimens.

## Installation in a clean room

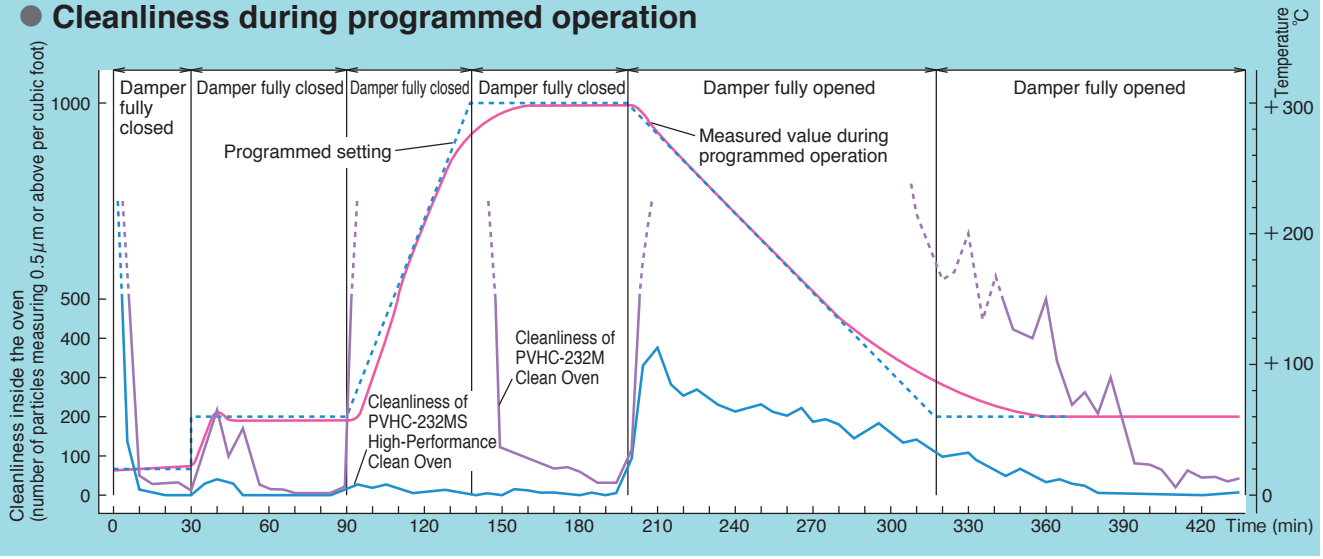
Any dust generated by the oven mechanism is expelled via exhaust duct to prevent accidental infiltration into the clean room. (optional/ please be prepared with your own exhaust duct)
The exterior material of the chamber can also be exchanged with an optional stainless steel material.

## Highly precise non-oxidative environment

Heat treatment and temperature characteristic tests in any desired non-oxidized environment are possible thanks to an $O^2$ concentration indication adjuster with oxygen sensor (optional) and an $N^2$ gas injector (optional).

# Performance

## Cleanliness during programmed operation




*The performance levels are given as representative examples.

### Automated operation throughout heat treatment process (High-performance model)

An automatic damper is provided as standard for automation in all processes from temperature heat-up to heat treatment and temperature pull-down. To reduce pull-down time, an optional external atmosphere introducing blower forces air into the chamber to supple-ment cooling.

### High level of cleanliness during temperature heat-up and pull-down (High-performance model)

The high-performance model delivers dedicated cleanliness throughout wide temperature ranges by employing HEPA filters which provide stable filtering even during temperature changes above +150℃. Useful for heat treatment in liquid crystal production lines.

### Total safety design

The temperature controller automatically prevents the temperature rising by +10℃ above the set temperature, and includes a warning function for user-defined upper and lower temperature limits. The chamber also features an independent device for preventing abnormal temperature increases. If a malfunction occurs, an alarm number is displayed on the instrumentation panel and a warning buzzer sounds.

### Safety devices

- Leakage breaker
- Electrical compartment cover switch
- Door switch
- Thermal fuse
- Air circulator themal switch
- Heater wiring breaker
- Upper and lower temperature limit alarm function (built inside temperature controller)
- Ovenheat protector
- Cartridge fuse
- Specimen power supply control terminal

# Control operation

## Two types of program instrumentation to suit different applications. Standard Instrumentation and M-Instrumentation.


● **Constant operation mode**


● **Alarm**


### User-friendly Standard Instrumentation

Standard Instrumentation features programmed operation with operational settings such as constant mode and automatic start/stop. Suitable for heat treatment, drying, and similar production-line applications.

### M-Instrumentation features programs with up to 20 steps

Suitable for a range of applications from temperature-characteristics testing to heat treatment and drying. Programmed operation now allows storing ten patterns, each up to twenty steps. Provides a wide range of functions, including temperature ramp settings and a maximum of 999 repeat cycles.

### Easy setup with on-screen display

Employs interactive settings for ease of use. Text can be displayed and entered in Japanese or English alphanumeric characters.

### Three optional functions

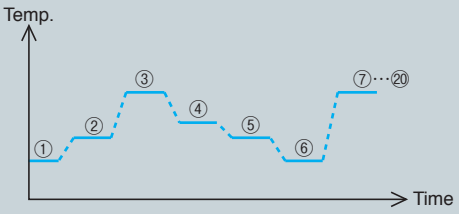
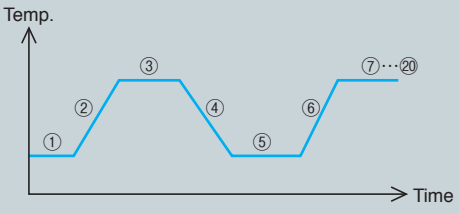
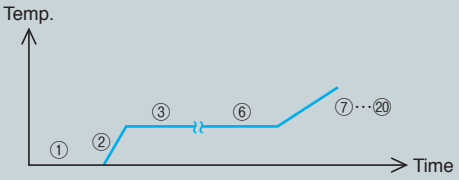
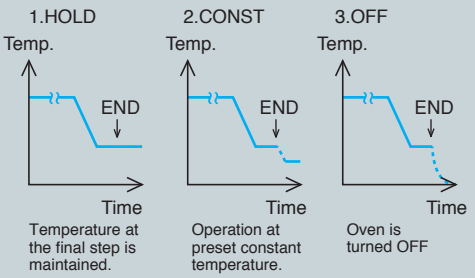
Three optional functions, namely, automatic damper, integrating hour meter, and calendar timer can be included in the instrumentation. These functions can be set by using main panel instrumentation keys.

### Network compatible (Optional)

Also available with three communication interfaces: RS-485, GPIB, and RS-232C

# Control operation

### Example of programmed operation (M-Instrumentation)

| | |
|---|---|
| Step program* |  |
| Ramp program* |  |
| Automatic start* |  |
| End of program |  |

* The number of repetitions of a program can be preset between 1 and 999.
Stepwise damper setting is possible.
(optional automatic damper required for PVC/PVHC).
Guarantee soak function can be set, whereby the timer is activated upon achieving set temperature.

### Instrumentation Specifications

| Instrumentation | Standard Instrumentation | M-Instrumentation |
|---|---|---|
| Operationmode | Constant operation, programmed operation and remote operation through communication interface | |
| Setting and indication ranges | Temperature:<br>0 to+210℃ (PVC)<br>(+32 to +410°F)<br>0 to+360℃ (PVHC)<br>(+32 to +680°F) | Temperature:<br>0 to+210℃ (PVC)<br>(+32 to +410°F)<br>0 to+310℃ (PVHC-MS)<br>(+32 to +590°F)<br>0 to+360℃ (PVHC)<br>(+32 to +680°F) |
| | Time: 0 to 9999 hours 59 minutes | |
| Setting and indication resolution | Temperature: 1°C Time: 1 minute | |
| Programming function | One-pattern, tow-steps program entry is possible. | 10-patterns, 20-steps program entry is possible. |
| | **Ramp setting** :<br>Step or ramp temperature changes possible.<br>**OFF mode** :<br>The oven can be turned off during programmed operation.<br>**Automatic start** :<br>Timed start-up is possible by setting the first step to 0℃ (i.e. oven OFF).<br>**Automatic stop** :<br>Timed termination is possible by setting the oven to turn OFF upon completion of a program.<br>**Completion** :<br>The operating status upon completion of a program can be set to HOLD, CONST or OFF.<br>**Repetition** :<br>Up to 999 times. | |
| Auxiliary functions | Input burnout detection function<br>Upper and lower temperature limit alarm function<br>Upper deviation limit temperature function<br>Buzzer alarm function<br>Automatic overheat prevention function<br>Fault indication function<br>Alarm indication function<br>Self diagnosis function<br>Guarantee soak function<br>Select power failure recovery operation function<br>Power failure protection function<br>Quick timer function<br>Quick operation function | |

## SPECIFICATIONS

| Model | | PVC-212 | PVC-232 | PVC-332 | PVHC-212 | PVHC-232 | PVHC-332 | PVHC-232MS | PVHC-332MS |
|---|---|---|---|---|---|---|---|---|---|
| System | | Back-to-front horizontal laminar circulation system | | | | | | | |
| Power supply | | 200 / 220 / 230V AC, 3 $\phi$ , 3W, 50/60Hz 380V AC, 3 $\phi$ , 4W, 50/60Hz | | | | | | | |
| Max power consumption (kVA) | | 4.1 | 6.4 | 7.0 | 4.1 | 6.8 | 9.0 | 6.8 | 9.0 |
| Ambient operating conditions | | Temperature: 0 to +40℃ Humidity: to 75%rh | | | | | | | |
| Performance *1 | Temperature range | (Ambient temp. +60)℃ to +200℃ | | | (Ambient temp. +60)°C to +350°C | | | (Ambient temp. +60)°C to +300°C | |
| | Temperature constancy | ±0.5℃ | | | | | | | |
| | Temperature uniformity | ±1.5℃ at +100℃<br>±2.0℃ at +200℃ | | | ±1.5℃ at +100℃ ±2.0℃ at +200℃<br>±4.0℃ at +300℃ ±5.0℃ at +350℃ | | | ±1.5℃ at +100℃<br>±2.0℃ at +200℃<br>±4.0℃ at +300℃ | |
| | Temperature heat-up time | Ambient temp. to +200℃<br>within 60 min. | | | Ambient temp. to +350℃<br>within 90 min. | | | Ambient temp. to +300℃<br>within 80 min. | |
| | Cleanliness | At stable temp.: Class 5 *2<br>(Particle size: 0.5μm) | | | | | | At stable temp.: Class 5 *2<br>At temp. change: Class 6 *3<br>(Particle size: 0.5μm) | |
| Construction | Exterior matterial | Painted steel (Melamine resin coating) | | | | | | | |
| | Interior material | Stainless steel plate | | | | | | | |
| | Insulation material | Glass wool | | | | | | | |
| Filter | | Heat-resistant HEPA filter | | | | | | High-temperature HEPA filter | |
| Heater | | Sheathed heater | | | | | | | |
| Air circulator | | Stainless steel sirocco fan | | | | | | | |
| Damper | | Circulation/ Ventilation (manual switching) *4 | | | | | | Circulation/ Ventilation<br>(automatic switching) | |
| Fittings | | Power cable (approx 2m from chamber), Specimen power supply control terminal,<br>Clean meter (for indicating filter service-life), Cable port $\phi$ 25mm (1 on the left side, with cap) | | | | | | | |
| Inside dimensions W×H×Dmm | | 580×530×580 | 580×1130×580 | 800×1130×750 | 580×530×580 | 580×1130×580 | 800×1130×750 | 580×1130×530 | 800×1130×700 |
| Outside dimensions *5 W×H×Dmm | | 770×1280×1025 | 770x1880x1025 | 1030×1880×1210 | 770×1280×1025 | 770×1880×1025 | 1030×1880×1210 | 770×1880×1025 | 1030×1880×1210 |
| Inside capacity (L) | | 178 | 380 | 678 | 178 | 380 | 678 | 347 | 633 |
| Weight (kg) | | 220 | 300 | 400 | 220 | 300 | 400 | 300 | 400 |

*1 PV(H)C-211, 231, 331—Based on no-load circulation operation at +20°C ambient temperature.
PVHC-231MS, 331MS—Based on no-load circulation operation at +20°C ambient temperature, in class 6 clean room.
Conforms to Japan Testing Machinery standard K05:2000.
*2 Indicated cleanliness levels are compliant with JIS B9920:2002 (equivalent to FED-STD-209D, Class 100).
However, with the doors open a cleanliness level of class 5 cannot be maintained.
*3 Indicated cleanliness levels are compliant with JIS B9920:2002 (equivalent to FED-STD-209D, Class 1000).
*4 PVC and PVHC can be provided without a damper.
*5 Excluding protrusions.

## SAFETY DEVICES

- Leakage breaker
- Electrical compartment cover switch
- Door switch
- Thermal fuse
- Air circulator themal switch
- Heater wiring breaker
- Upper and lower temperature limit alarm function (built inside temperature controller)
- Ovenheat protector
- Cartridge fuse
- Specimen power supply control terminal

## ACCESSORIES

- Shelves (stainless steel wire) ..... 2
- Shelf bracket (stainless steel plate) ..... 2 sets (4)
- Cartridge fuse ..... 2
- User's manual ..... 1 set

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 humidifying water is used, the life of the unit may be significantly shortened.

CAUTION
Be sure to read the user's manual before operation.

# OPTIONS

## Modification for clean-room compatibility

Prevention of particle and dust scattering from control console and heater vents.
・Flange diameter: $\phi$ 87mm
・Air discharge system:
Forced discharge
・Exhaust volume: Approx. 5m$^3$/min.
*Please be prepared with your own facility for exhaust fan.

## Pre-filter

Removes large particles from external air. Recommended when installing the oven in a location other than a clean room. (for oven with damper)
・Where located:
Air intake on rear of chamber

## Automatic damper

Automatically provides ventilation according to the open/ close pattern determined by programmed operation.
Standard on PVHC-232MS/ 332MS
・Damper opening and closing range:
0 to 99%
・Setting resolution: 1%

## Exhaust port flange

Flange for discharging hot air from the oven. Installed on rear of chamber.
(for oven with damper)
・Material: Cold rolled steel plate
Unichrome plated finish
・Dimensions: External diameter 87mm
・Where located: Rear of chamber
*When connecting to exhaust duct, the length of duct must be less than 4m.

## Exhaust duct

Discharges hot air towards the ceiling.
(for oven with damper)
・Diameter dimension: 87mm
・Where located: Rear of chamber
*Exhaust port flange is located at end of exhaust duct.

## $O_2$ concentration indication adjuster

This controls the oxygen concentration inside the oven.
・Oxygen concentration range
5%-15% oxygen concentration (v/v)
* Without damper
・Injection gas
$N_2$ gas (Normal temperature, dry gas)
* Except PVHC-232MS/332MS

## Nitrogen gas injector

Used for reducing specimen oxidation and saving temperature pull-down time.
・Input pressure:
0.05MPa (max flow rate 30L/ min.)
0.10MPa (max flow rate 100L/ min.)
0.20MPa (max flow rate 200L/ min.)
・Flow meter:
Floating flow meter

*Photo shows max flow rate 30L/min

# OPTIONS

## Paperless recorder

Records temperature inside the chamber.
Additional inputs may also be recorded.
Temperature range: 0 to +200℃
0 to +300℃
0 to +400℃
Number of inputs: Temperature 1
(5 more channels can be turned ON)
Data saving cycle: 5 sec
External recording media:
CF memory card (128MB)
Language support: ENG, JPN

## Temperature recorder

Temp. range: 0 to +200℃
0 to +300℃
0 to +400℃
Recording system:
Pen recorder (1 pen)
or multi-point recorder (6 dots)

## Temperature recorder terminal

Outputs chamber temperature through thermocouple type K (JIS C 1602).
Where located:
Rear of electrical compartment


## Time-up output signal

Outputs contact signals at the end of programmed operation.
Power supply capacity 250V AC 1A
Action: Outputs "close" contact output after time-up
Where located: Right side of chamber

## Calendar timer

Automatically starts and stops chamber operation.
Setting range:
Sunday to Saturday
(Possible to set multiple days)
0:00 to 23:59
(Setting resolution 1 minute)
Margin of error per month: ± 1 minute

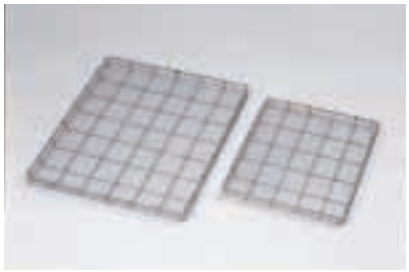

## Integrating hour meter

Displays cumulative chamber operation time.
Available with or without reset feature.
*Operating time is not accumulated when operation is stopped due to malfunction or for other reasons.
Measuring time: 999,999 hr

# OPTIONS

## Mesh shelf

For testing small specimens.
Material: 18-8 Cr-Ni stainless steel
$\phi$5 wire
$\phi$0.8 5 mesh

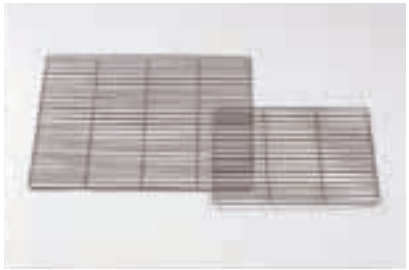


| Model | Max loadcapacity* |
|---|---|
| PV(H)C-212·232<br>PVHC-232MS | 10kg |
| PV(H)C-332<br>PVHC-332MS | 15kg |

*Uniformly distributed load.

## Load resistant shelf and shelf bracket

Used to test specimens exceeding weight of the maximum allowable for standard shelves.
Material:
18.8 Cr-Ni stainless steel plate
Total allowable shelf load: Max 200kg



| Model | Max load capacity (uniformly distributed load) |
|---|---|
| PV(H)C-212·232<br>PVHC-232MS | 40kg |
| PV(H)C-332<br>PVHC-332MS | 80kg |

## Shelf and shelf bracket

Equivalent to those supplied as accessories.

## Stand

・Exterior
Cold rolled and rust-proof steel plate with melamine baked finish.

**＜for PV(H)C-212＞**

| Type | Outside dimension (W×H×Dmm) |
|---|---|
| MVC-23 | 770×300×960 |
| MVC-23C | 770×321×960 |
| MVC-26 | 770×600×960 |
| MVC-26C | 770×621×960 |

*MCV-23C/ 26C are equipped with casters with adjusters. Also equipped with door.

## Fixture for securiug body

Used to bolt the chamber to the floor.

## Caster

Installed on main unit stand.
・With level adjuster
Free wheel (4 casters)

## Emergency stop switch

Operation is shut down in case of emergency.

## External alarm terminal

Outputs alarm signals.
・Output point: 1 point
・Power supply capacity: 250V AC 1A
・Contact output at “close” in an emergency.
・Where located: Right side

## Communication functions

Computer interface.
・RS-485
・GPIB
・RS-232C

## Power cable

If the standard 2m is not long enough, 5m and 10m cables are available.

■ Some photographs listed in this catalog contain Japanese display.