

| Model Number | | MCO-170AIC-PK MCO-170AICUV-PK | MCO-170AICL-PE MCO-170AICUVL-PE MCO-170AICUVL-PA | MCO-170AICUVHL-PE MCO-170AICUVHL-PA | MCO-230AIC-PK MCO-230AICUV-PK | MCO-230AICL-PE MCO-230AICUVL-PE MCO-230AICUVL-PA |
|---|--------|---|--|--|---|--|
| External dimensions (W x D x H)*1 | mm | 620 x 730 x 905 | | | 770 x 730 x 905 | |
| Internal dimensions (W x D x H) | mm | 490 x 523 x 665 | | | 643 x 523 x 700 | |
| Volume | litres | 165 | | | 230 | |
| Net weight | kg | 80 | | | 90 | |
| Performance | | | | | | |
| Temperature control range | °C | ambient temperature +5 to 50*2 (AT 5°C to 35°C) | | | | |
| Temperature control uniformity*3 | °C | ±0.25*4 | | | | |
| CO ₂ control range and fluctuation*3 | % | 0 to 20 / ±0.15 | | | | |
| CO ₂ sensor platform | | Ceramic based, single beam infrared sensor, with dual wavelength measurement for continuous auto-zero calibration | | | | |
| CO ₂ sampling, patent pending | | No moving parts; airflow passes over in/out ports to sustain continuous sampling | | | | |
| CO ₂ calibration | | Automatic, continuous zero reference calibration. | | | | |
| Airflow | | Gentle vertical airflow, continuous with inner door closed | | | | |
| Interior humidity | % RH | 95 ±5 at 37°C by natural evaporation with humidifying pan | | | | |
| Control, monitoring, alarm | | | | | | |
| Temperature and CO ₂ control | | P.I.D. control system setpoint resolution 0.1°C, 0.1 % | | | | |
| Data acquisition | | Automatic log function of temperature, CO ₂ , Door opening/closing, Alarm and CSV file output | | | | |
| Communication | | Remote alarm contacts standard. Optional 4-20mA connection. Optional with RS-232C/ RS-485/LAN data ports*5 | | | | |
| Construction | | | | | | |
| Display | | Touch Panel (WVGA full color LCD) | | | | |
| USB data logging | | Standard | | | | |
| Exterior cabinet and door | | Galvanized steel with baked-on finish | | | | |
| Interior and shelves | | Copper-enriched stainless steel | | | | |
| Inner door | | Tempered glass | | | | |
| Outer door | | Field-reversible, Heated | | | | |
| Shelves | qty | 4 x standard (Maximum 10) | | | 4 x standard (Maximum 10) | |
| Shelf dimensions (W x D x H) | mm | 470 x 450 x 12, maximum load 7 kg/shelf | | | 628 x 450 x 12, maximum load 7 kg/shelf | |
| Insulation | | Styrene AcryloNitrile Copolymer | | | | |
| Access port | | Diameter 30mm port with non-VOC silicone stoppers (1 on back side) | | | | |
| Leveling feet | | 4, Adjustable | | | | |
| Energy and CO ₂ utilities | | | | | | |
| Maximum power consumption | W | 380 | | | 430 | |
| Maximum heat dissipation | kJ/h | 1,070 | | | 1,250 | |
| CO ₂ gas connection | mm | ID 4, OD 6 tubing | | | | |
| CO ₂ gas pressure | | 0.03 MPa [G] — 0.1 MPa [G] [0.3 kgf/cm ² [G] — 1 kgf/cm ² [G], 4.4 psi [G] — 14.5 psi [G]] from two stage CO ₂ regulator | | | | |
| Electrical | | MCO-170AIC-PK MCO-170AICUV-PK | MCO-170AICL-PE MCO-170AICUVL-PE MCO-170AICUVL-PA | MCO-170AICUVHL-PE MCO-170AICUVHL-PA | MCO-230AIC-PK MCO-230AICUV-PK | MCO-230AICL-PE MCO-230AICUVL-PE MCO-230AICUVL-PA |
| Power supply | V | 220 | 220 – 240 (PEI/110 – 120 [PA]) | | 220 | 220 – 240 (PEI/110 – 120 [PA]) |
| Frequency | Hz | 60 | 50/60 | | 60 | 50/60 |
| Quality Management System**4 | | | | | | |
| Certification | | ISO13485 | ISO9001 | | ISO13485 | ISO9001 |

*1 External dimensions of main cabinet only. See dimension drawings showing handles and other external projections. *2 When set temperature is 37°C, ambient temperature must be 32°C or less. Regardless of ambient temperature, the maximum of temperature control range is always 50°C. *3 Ambient temperature 23 °C, SV 37°C, CO₂: 5 %, no load. *4 The measurement condition complies with PHC Corporation specified measuring method. *5 For the data acquisition system MTR-5000 user only. *6 MCO-170AICL, MCO-170AICUVL, MCO-170AICUVHL, MCO-230AICL and MCO-230AICUVL are for laboratory use. • The optimum performance may not be obtained if the ambient temperature is not above 15°C.

Optional Accessories

| Model Number | MCO-170AIC MCO-170AICL | MCO-170AICUV MCO-170AICUVL | MCO-170AICUVHL | MCO-230AIC MCO-230AICL | MCO-230AICUV*7 MCO-230AICUVL |
|---|--------------------------------|-------------------------------|----------------|----------------------------------|---------------------------------|
| UV System Set | MCO-170UVS-PE MCO-170UVS-PA | Standard | | MCO-170UVS-PE MCO-170UVS-PA | Standard |
| H ₂ O ₂ Decontamination Control Board | MCO-170HB-PE/-PA | | | MCO-170HB-PE/-PA MCO-170EL-PW | |
| Electric Lock | MCO-170EL-PW | | | | |
| H ₂ O ₂ Generator | MCO-HP-PW | | | | |
| H ₂ O ₂ Reagent | MCO-H202-PV | | | | |
| Gas Regulator | MCO-010R-PW | | | | |
| CO ₂ Gas Auto Changer | MCO-216CP-PW | | | | |
| Tray (same as that of standard accessory) | MCO-170ST-PW | | | MCO-230ST-PW | |
| Half Tray | MCO-25ST-PW | | | MCO-35ST-PW | |
| Reinforced Additional Tray (inCu-saFe®) | MCO-170RT-PW | | | MCO-230RT-PW | |
| Double-stacking Bracket | MCO-170PS-PW | | | MCO-170PS-PW | |
| Stacking Plate | MCO-230SB-PW | | | MCO-230SB-PW | |
| Roller Base | MCO-170RB-PW | | | MCO-230RB-PW | |
| Small Door | MCO-170ID-PW | | | — | |
| Optional Communication Systems | | | | | |
| Interface Board*8; for LAN | MTR-L03-PW | | | | |
| Interface Board*8; for RS-232C/RS-485 | MTR-480-PW | | | | |
| Interface Board (4-20mA) | MCO-420MA-PW | | | | |

*7 Attaching the optional MCO-170HB and MCO-170EL to MCO-230AICUV will add the H₂O₂ decontamination function.

*8 For the data acquisition system MTR-5000 user only.

Double-stacking matching table

| Accessories needed for stacking 2 units | | Upper unit | |
|---|----------------|--------------|-------------------------------|
| | | MCO-230AIC | MCO-170AIC (M) MCO-170AICD |
| Lower unit | MCO-230AIC | MCO-170PS-PW | MCO-230SB-PW |
| | MCO-170AIC (M) | — | MCO-170PS-PW |
| | MCO-170AICD | — | MCO-170PS-PW |
| | MCO-20AIC | MCO-230SB-PW | MCO-230SB-PW |
| | MCO-5AC (M) | — | — |
| | MCO-50AIC (M) | — | — |

Field-reversible Door (select left/right opening)

• Appearance and specifications are subject to change without notice.
Caution: PHC Corporation guarantees this product under certain warranty conditions. However, please note that PHC Corporation shall not be responsible for any loss or damage to the contents of the product.



CO₂ Incubators



Enhance your cell growth with an intelligent CO₂ incubator designed for precise temperature and CO₂ control, efficient cleaning and rapid decontamination.



*1 Standard for Model No. including UV. *2 Standard for MCO-170AICUVHL



Preservation Equipment, Experimental Environment Equipment, Dispensary Equipment, Culturing Equipment and Drying & Sterilising Equipment for General Laboratory use
The management of the design, development, production and servicing of the above.

Freezers, Refrigerators, Incubators, and Drying and Sterilising Equipment for Medical use
The management of the design, development, production and distribution of the above.

PHC Corporation Biomedical Division is certified for:
Environmental management system: ISO14001

PHC Corporation, Biomedical Division 1-1-1 Sakada, Oizumi-machi, Ora-gun, Gunma 370-0596, Japan

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PHC Corporation, Biomedical Division

Life Science
Innovator
Since 1966

Next Generation Incubators for Optimum Cell Culture

PHCbi's CO₂ incubators with touchscreen control panels deliver superior usability, rapid cleaning, and effortless maintenance while keeping the tradition of outstanding environmental stability and precise performance.



Grow results,
not bacteria!

MCO-170AIC/MCO-230AIC Incubators

Optimized for high-value samples including hard-to-grow and contamination-sensitive media/reagents.

Applications:

- Stem cell research
- Autologous tissue regeneration
- Genomic and proteomic expression
- Esoteric plant and amphibian cell cultures
- Hyper-sensitive and transgenic cell cultures
- Low volume media microplate work

Integrated Tray Catches minimize cleaning time while LCD Panel enhances operation



Responds to gloved finger action.

LCD Touch Panel Controller

A WVGA color LCD touch panel delivers full control over different protocols. Control can be performed with gloved fingers as the controller is equipped with a resistive touch-screen.

USB Memory Data Transfer

Standard USB port provides convenient log data transfer to a USB memory stick and to a PC. Data log period is 1.5 months using 2-minute intervals.



Log screen example (CO₂ level)

Note: It is impossible to use a USB memory device which is password-protected.

Door Lock

Automatic door lock (Electric Lock) can be set on the MCO-170AICUVHL (standard equipped) and other models equipped with the optional Electric Lock (MCO-170EL).



The Auto-Lock set up screen



User-ID setting screen



Integrated Tray Catches

Tray catches are integral parts of the chamber, opening up more space for trays, allowing the incubator to accommodate more culture containers. (Comparison with MCO-20AIC/MCO-19AIC)



MCO-170AIC's/MCO-230AIC's interior components



MCO-170AIC's/MCO-230AIC's tray catches (integral part of the chamber)

MCO-170AIC's Tray Internal dimensions 470(W) x 450(D)mm



Up to 20 ø100 mm dishes (92 mm) can be arrayed (5 wide x 4 deep) *In-house comparison

16 dishes (MCO-19AIC) → 20 dishes (MCO-170AIC)

MCO-230AIC's Tray Internal dimensions 620(W) x 450(D)mm



Up to 24 ø100 mm dishes (92 mm) can be arrayed (6 wide x 4 deep) *In-house comparison

20 dishes (MCO-20AIC) → 24 dishes (MCO-230AIC)

Optimal Humidity Control

Stable humidity control not influenced by environmental conditions and frequent incubator door openings.



- Control Panel with single-user Key Lock (All models include as standard equipment.)
- Addition of user ID function for better traceability (able to register up to 99 user-IDs and passwords) (MCO-170AICUVHL includes it as standard. Or optional MCO-170EL to be installed for other models.)



- Multiple detailed activity logs exported to individual CSV files.

(*User Access log downloaded for MCO-170AICUVHL as standard. Or optional MCO-170EL to be installed for other models.)

| MCO-230AIC NO.1 | | | | | | Unlock User |
|-----------------|----------|------|-----|--------------|--|-------------|
| Date | Time | Temp | CO2 | Door | | |
| 2015/3/16 | 11:13:38 | 37 | | 0 Door Open | | |
| 2015/3/16 | 11:13:42 | 37 | | 0 Door Close | | |
| 2015/3/16 | 11:32:10 | 37 | | 0 Door Open | | Aa001 |
| 2015/3/16 | 11:32:25 | 37 | | 0 Door Close | | |
| 2015/3/16 | 13:40:58 | 37 | | 0 Door Open | | Bb002 |
| 2015/3/16 | 13:41:09 | 36.9 | | 0 Door Close | | |
| 2015/3/16 | 13:50:01 | 36.9 | | 0 Door Open | | Cc003 |
| 2015/3/16 | 13:51:19 | 35.6 | | 0 Door Close | | |
| 2015/3/16 | 15:27:40 | 37 | | 0 Door Open | | Aa001 |
| 2015/3/16 | 15:27:40 | 36.9 | | 0 Door Close | | |

User Access log*



inCu-saFe® Construction for Germicidal Protection

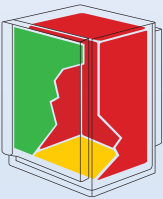
- PHCbi offers the exclusive use of inCu-saFe® copper- enriched stainless steel alloy interior surfaces within a technical design created to eliminate contamination sources and to mitigate the effect of airborne contaminants introduced through normal use.
- Chart summarizes test results with four strains of mycoplasma. Results demonstrate how PHCbi inCu-saFe® copper- enriched stainless steel alloy offers germicidal properties of conventional C1100 copper while maintaining both corrosion-proof and discoloration-resistant properties of conventional stainless steel 304.

| Mycoplasma Stain | Positive Control | Conventional Stainless Steel 304 | PHCbi inCu-saFe® | Conventional Copper C1100 |
|----------------------------|------------------|----------------------------------|------------------|---------------------------|
| Mycoplasma fermentans PG18 | YES | YES | NO | NO |
| Mycoplasma orale CH19299 | | | | |
| Mycoplasma arginini G230 | | | | |
| Mycoplasma hominis PG21 | | | | |

"YES" mycoplasma strains grew on the material.
"NO" no mycoplasma strain grew on the material.

Accurate Temperature Control

- The patented Direct Heat and Air Jacket conditioning system precisely regulates temperature through three independent heating zones under microprocessor PID* control. Uniform temperatures are further enhanced by gentle fan circulation.



*Proportional Integral Derivative

- The main heater provides precise temperature control.
- The bottom heater warms the distilled water and controls chamber humidity.
- The outer door heater prevents condensation on the inner door and facilitates quick temperature recovery after door openings.

Direct Heat and Air Jacket Conditioning System

- To avoid cell culture desiccation, the MCO-170AIC/MCO-230AIC maintains up to 90 % RH at 37°C.
- Humidification is achieved by reliable natural evaporation and forced-air circulation.



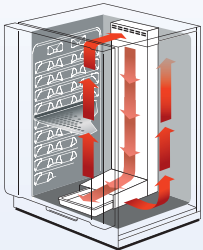
Precise CO₂ Control

- PHCbi proprietary single beam dual detector infrared CO₂ system offers unprecedented control accuracy and stability by simultaneously measuring two wavelengths for continuous zero calibration.
- Benefits include ultra-fast recovery without overshoot and accurate CO₂ averages during periods of frequent incubator access with multiple door openings.

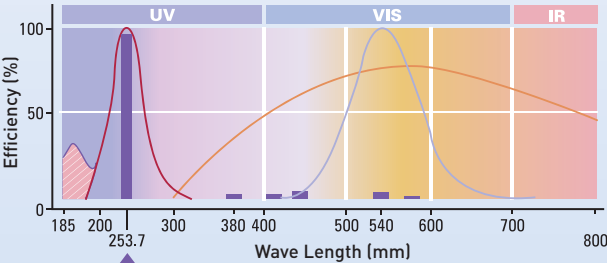


SafeCell UV Decontamination

- SafeCell UV includes a programmable ultraviolet lamp, isolated from cell cultures, that decontaminates conditioned air and humidity reservoir water to prevent contamination without affecting cell cultures in vitro.
- Contaminants trapped within the humidifying pan at the base of the plenum are destroyed by high intensity, ozone-free ultraviolet light.
- Decontaminated, humidified air is released from the lower plenum for vertical convection through and around the perforated shelves. Interior air motion is suspended when the door is opened, minimizing movement of room air contaminants into the chamber. The unique air duct system also improves temperature recovery characteristics.



Airflow and water pan decontamination using a UV system



Use of the MCO-170AICUVHL/MCO-170AICUV/MCO-170AICUVL/ MCO-230AICUV/MCO-230AICUVL ultraviolet lamp is a highly effective ozone-free contamination control technique.

■ PHCbi Lamp ■ Ozone Release ■ Germicidal Effect ■ Sunlight

The SafeCell UV lamp cycle is factory set for normal use, and can be re-programmed as desired by entering parameters through the central microprocessor control panel. Program parameters for the H₂O₂ decontamination cycle are non-adjustable for operator safety.

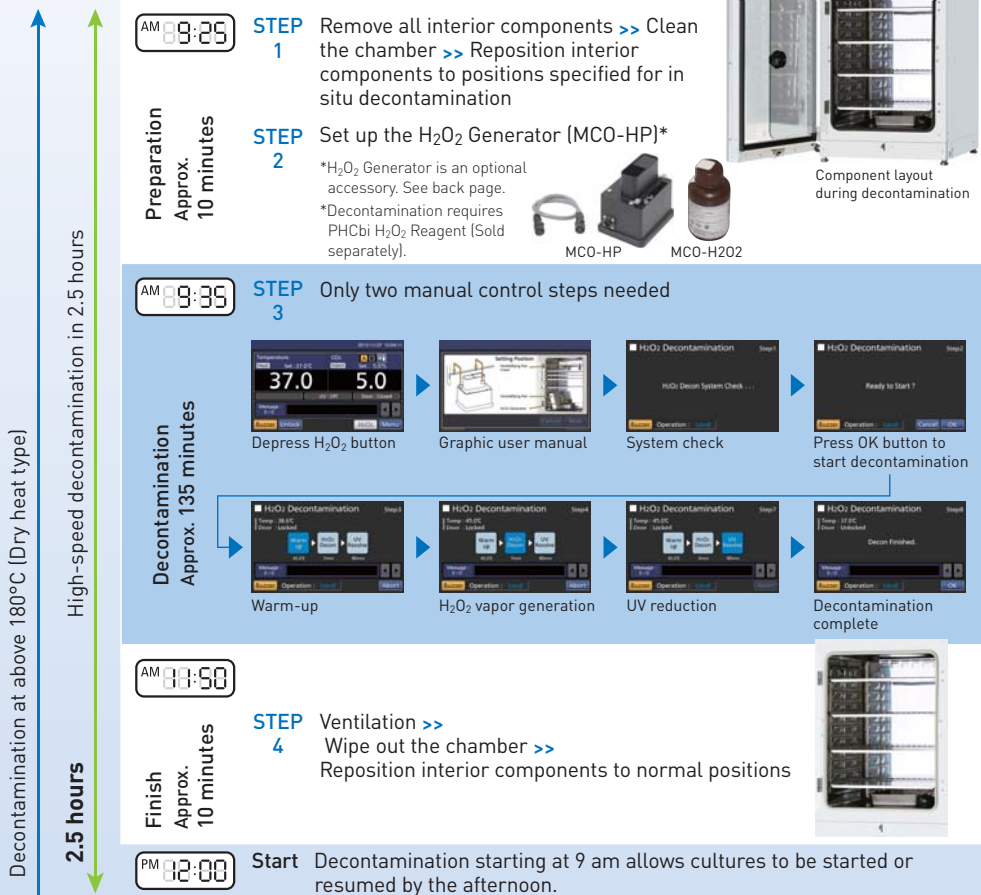


Rapid, Effective and Safe H₂O₂ Decontamination Cycle

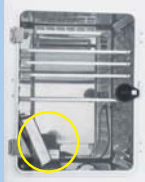
- Industry-first PHCbi unique high-speed decontamination system utilizing vaporized H₂O₂ offers time-saving and documented chamber decontamination with complete safety.
- Full decontamination process takes less than three hours, saving valuable time. For example, if the decontamination cycle is started at 9 am, the unit will be ready for use in the afternoon.
 - All interior components are decontaminated in situ. No need for time-consuming removal and autoclaving.
 - No high heat emission. No sensor removal necessary.

- After decontamination H₂O₂ vapor is decomposed to harmless water and oxygen by UV light.
- Outer door is locked automatically by the electric interlock system during the decontamination cycle to ensure operator safety.
- Unlike high-heat decontamination incubators, PHCbi's unique H₂O₂ decontamination cycle does not emit high heat. Therefore, when two MCO-170AIC/MCO-230AIC units are stacked, one incubator can be decontaminated without affecting the temperature of the other.

H₂O₂ decontamination process (example)



Chamber conditions during decontamination



Start of H₂O₂ solution vaporization
H₂O₂ solution in the H₂O₂ Generator (MCO-HP) is sprayed into the chamber by the ultrasonic transducer.



H₂O₂ fills up chamber
H₂O₂ mist is quickly gasified to thoroughly fill up the chamber.



UV radiation for H₂O₂ reduction
• UV lamp turns on.
• H₂O₂ gas is reduced to water and oxygen.

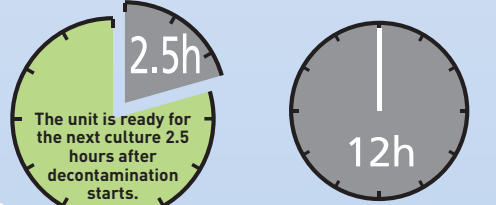
*Above H₂O₂ vaporization photos are concept images only.

* Above decontamination process is performed with standard interior items. Additional shelves and dishes may reduce decontamination effectiveness.

* Decontamination times shown above are for indication only. Actual process time may differ depending on chamber cleaning time and set-up time.

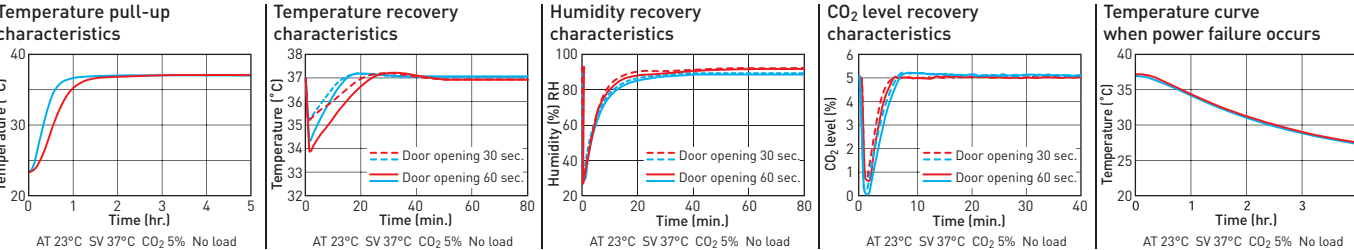
Time comparison between the H₂O₂ decontamination process and sterilization at above 180°C

MCO-170AIC/MCO-230AIC H₂O₂ decontamination Average time required for decontamination above 180°C



One-day cultures are not possible with dry heat type incubators.

Performance Data MCO-170AIC / MCO-230AIC



*Internal research as of November 2013

Dimensions

Unit: mm

