Specifications

	Model No.				
110 V – 120 V, 60 Hz*5	—	MCO-170AICUVL-PA	–	–	MCO-230AICUVL-PA
220 V, 60 Hz	MCO-170AIC-PK	MCO-170AICUV-PK	–	MCO-230AIC-PK	MCO-230AICUV-PK
220 V – 240 V, 50 Hz/60 Hz (CE) (Saudi Arabia only)	MCO-170AIC-PE	MCO-170AICUV-PE	MCO-170AICUVH-PE	MCO-230AIC-PE	MCO-230AICUV-PE
*5	MCO-170AICL-PE	MCO-170AICUVL-PE	MCO-170AICUVHL-PE	MCO-230AICL-PE	MCO-230AICUVL-PE
Contamination control					
H_2O_2 decontamination system	Optional		Standard	Optional	
SafeCell UV system	Optional	Standard		Optional	Standard
inCu saFe copper-enriched stainless steel interior	Standard				
Single beam, dual detector IR CO_2 sensor	Standard				
Direct Heat & Air Jacket (DHA) heating system	Standard				
Environmental performance					
Temperature control range	+5˚C above ambient to 50˚C*1 (Ambient temperature: 5˚C–35˚C)				
Temperature control uniformity	±0.25˚C (23˚C ambient, setting: 37˚C, CO_2: 5 %, no load)*2				
CO_2 control range and deviation	0 % to 20 % / ±0.15 % (23˚C ambient, setting 37˚C, 5 % CO_2, no load)				
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. Optional STD gas auto calibration				
Airflow	Gentle vertical airflow, continuous with inner door closed				
Interior humidity	95 % ±5 % R.H. 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 (For the data acquisition system MTR-5000 user only.)				
Cabinet design and construction					
Touch panel (WVGA full color LCD)	Standard				
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				
Insulation	Styrene AcryloNitrile Copolymer				
Outer door	Reversible heated				
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	Max. 380 W			Max. 440 W	
Maximum heat discharge	Max. 1,070 kJ/h			Max. 1,250 kJ/h	
CO_2 gas connection	4 mm to 6 mm inner diameter 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				
Dimensions, weights, capacities					
Internal dimensions (W x D x H)	490 x 523 x 665 mm /19.3 x 20.6 x 26.2 inch			643 x 523 x 700 mm / 25.3 x 20.6 x 27.6 inch	
External dimensions (W x D x H) *3	620 x 730 x 905 mm / 24.4 x 28.7 x 35.6 inch			770 x 730 x 905 mm /30.3 x 28.7 x 35.6 inch	
Volume	165 Liters (5.8 cu.Ft.)			230 Liters (8.1 cu.Ft.)	
Shelves	4 supplies as standard (Maximum 10), Exterior dimensions: 475 (W) x 450 (D) x 12 (H) mm, maximum load 7 kg/shelf			4 supplies as standard (Maximum 10), Exterior dimensions: 628 (W) x 450 (D) x 12 (H) mm, maximum load 7 kg/shelf	
Net weight	80 kg (176 lbs.)			90 kg (198 lbs.)	

*1 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.
*2 The measurement condition complies with PHCbi specified measuring method. *3 External dimensions of main cabinet only. See dimension drawings showing handles and other external projections.
*4 Attaching the optional MCO-170HB and MCO-170EL to MCO-230AICUV will add the H_2O_2 decontamination function. *5 Models MCO-170AICL/MCO-170AICUVL/MCO-170AICUVHL/MCO-230AICL/MCO-230AICUVL are for laboratory use. • The optimum performance may not be obtained if the ambient temperature is not above 15˚C.

Double-stacking matching table

Spacer for double-stacking		Upper unit: MCO-230AIC	Upper unit: MCO-170AIC (M) MCO-170AICD
Lower unit	MCO-230AIC	MCO-170PS	MCO-230SB
	MCO-170AIC (M)	—	MCO-170PS
	MCO-170AICD	—	MCO-170PS
	MCO-19AIC (M) MCO-18AC	—	MCO-170SB
	MCO-20AIC	MCO-230SB	MCO-170SB
	MCO-5AC (M)	—	—

*For positioning units on a roller base, please refer to "Optional Accessories".
*If configuring a double-stack, make sure the double-stacking dedicated securing hardware and spacer are used (see "Optional Accessories").

Field-reversible Door (select right/left opening)

Optional Accessories

	MCO-170AIC MCO-170AICL	MCO-170AICUV MCO-170AICUVL	MCO-170AICUVH MCO-170AICUVHL	MCO-230AIC MCO-230AICL	MCO-230AICUV *4 MCO-230AICUVL
UV system set	MCO-170UVS	Standard equipment		MCO-170UVS	Standard equipment
H_2O_2 decon board	MCO-170HB		Standard equipment	MCO-170HB	
Electric lock	MCO-170EL			MCO-170EL	
H_2O_2 generator	MCO-HP				
Double stacking bracket	MCO-170PS				
Stacking plate	MCO-170SB			MCO-230SB	
H_2O_2 reagent	MCO-H202				
Gas regulator	MCO-010R				
Gas auto changer	MCO-21GC				
STD gas auto calibration kit	MCO-SG				
Tray	MCO-170ST (same as standard accessory)			MCO-230ST (same as standard accessory)	
Half tray	MCO-25ST			MCO-35ST	
Roller base	MCO-170RB			MCO-230RB	
Small door	MCO-170ID			—	
Optional Software product					
Interface board*7; for LAN	MTR-L03				
Interface board*7; for RS-232C/RS-485	MTR-480				
Interface board	MCO-420MA				

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

TÜV SÜD ISO 9001 ISO 13485

Preservation (freezers, refrigerators) and Culturing (incubators) Equipment
The management of the design, development, production, sales support, and servicing of the above.
PHC Corporation, Biomedical Division
1-1-1 Sakada, Oizumi-machi, Ora-gun, Gunma 370-0596, Japan

JAB CM021 — ISO 14001 JACO EC97J1224 — UKAS MANAGEMENT SYSTEMS 051

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

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PHCbi

CO_2 Incubators

Enhance your cell growth with an intelligent CO_2 incubator designed for precise temperature and CO_2 control, efficient cleaning and rapid decontamination.

MCO-170AIC MCO-230AIC

inCu saFe — IR dual sensor — SafeCell UV (Option)*1 — H_2O_2 decontamination (Option)*2

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

CE 0123
EU only

PHC Corporation, Biomedical Division

Life Science Innovator Since 1966

Next Generation Incubators for Optimum Cell Culture

PHCbi's CO_2 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

Easy Use & Easy Maintenance

Integrated Tray Catches minimize cleaning time while **LCD Panel** enhances operation

Top Screen

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 (CO_2 level)

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

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
475(W) x 450(D)mm

Up to 20 ø100 mm dishes (92 mm) can be arrayed (5 horizontally x 4 vertically)
*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 horizontally x 4 vertically)
*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.

Japan and US patents pending

Security

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

The Auto-Lock set up screen

User-ID setting screen

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

MCO-230AIC	NO.1				
Date	Time	Temp	CO2	Door	Unlock_User
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	13:40:56	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	

User Access log*

Design & Technology

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 contaminates 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.

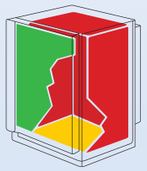
Mycoplasma Stain	Positive Control	Conventional Stainless Steel 304	PHCbi inCu-saFe	Conventional Copper C1100
Mycoplasma fermentans PG18	YES	YES	NO	NO
Mycoplasma orale CH19299				
Mycoplasma arginini G230				
Mycoplasma hominis PG21				

"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.

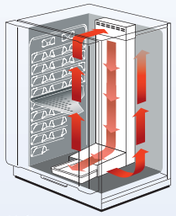
Direct Heat and Air Jacket Conditioning System

- 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 CO_2 Control

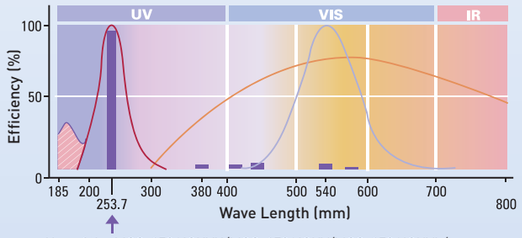
- PHCbi proprietary single beam dual detector infrared CO_2 system offers unprecedented control accuracy and stability by simultaneously measuring two wavelengths for continuous zero calibration.
- Benefits include ultra-fast recovery without overshoot and accurate CO_2 averages during periods of frequent incubator access with multiple door openings.
- An optional STD gas auto calibration kit is available.

SafeCell UV Decontamination



Airflow and water pan decontamination using a UV system

- 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.



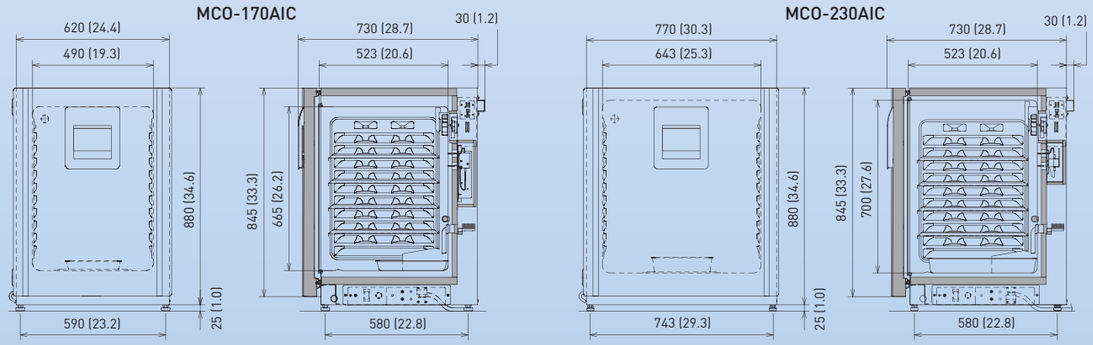
Use of the MCO-170AICUVH/MCO-170AICUV/MCO-170AICUVL/ MCO-230AICUV/MCO-230AICUVL ultraviolet lamp is a highly effective ozone-free contamination control technique.

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 H_2O_2 decontamination cycle are non-adjustable for operator safety.

Dimensions

Unit: mm (inch)



H_2O_2 Decontamination Cycle

Rapid, Effective and Safe H_2O_2 Decontamination Cycle

Industry-first PHCbi unique high-speed decontamination system utilizing vaporized H_2O_2 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 H_2O_2 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 H_2O_2 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.

H_2O_2 decontamination process (example)

Decontamination at above 180°C (Dry heat type) — High-speed decontamination in 2.5 hours — 2.5 hours — 12 hours

Preparation Approx. 10 minutes

AM 9:25 — **STEP 1** Remove all interior components >> Clean the chamber >> Reposition interior components to positions specified for in situ decontamination

Component layout during decontamination

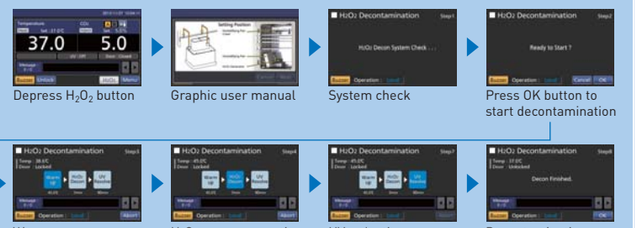
STEP 2 Set up the H_2O_2 generator (MCO-HP)*

*H_2O_2 generator is an optional accessory. See back page.
*Decontamination requires PHCbi H_2O_2 reagent (Sold separately).

MCO-HP MCO-H2O2

Decontamination Approx. 135 minutes

AM 9:35 — **STEP 3** Only two manual control steps needed



Finish Approx. 10 minutes

AM 11:50 — **STEP 4** Ventilation >> Wipe out the chamber >> Reposition interior components to normal positions

PM 12:00 — **Start/Resume culture** Decontamination starting at 9 am allows cultures to be started or resumed by the afternoon.

PM 9:25

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

Time comparison between the H_2O_2 decontamination process and sterilization at above 180°C

MCO-170AIC/MCO-230AIC H_2O_2 decontamination

Average time required for decontamination above 180°C

Chamber conditions during decontamination

Start of H_2O_2 solution vaporization
H_2O_2 solution in the H_2O_2 generator (MCO-HP) is sprayed into the chamber by the ultrasonic transducer.

H_2O_2 fills up chamber
H_2O_2 mist is quickly gasified to thoroughly fill up the chamber.

UV radiation for H_2O_2 reduction
- UV lamp turns on.
- H_2O_2 gas is reduced to water and oxygen.

*Above H_2O_2 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.

*Internal research as of November 2013

Performance Data — MCO-170AIC / MCO-230AIC