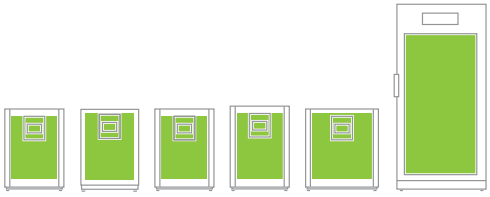
PHCbi

Life Science
Innovator
Since 1966

CO_2 AND CO_2/O_2 MULTIGAS LABORATORY INCUBATORS



MCO-170MP-PA | MCO-170ACL-PA
MCO-170AICUVL-PA | MCO-170AICUVHL-PA
MCO-170AICUVDL-PA | MCO-230AICUVL-PA
MCO-80ICL-PA

CO_2 and CO_2/O_2 multigas laboratory incubators are designed to sustain accurate *in vitro* models of *in vivo* environments for optimum cell growth and reproducibility.

PHC Corporation of North America

www.phchd.com/us/biomedical

Ideal for regenerative medicine, stem cell therapy, IVF, routine cell culture, microbiology and animal research applications.

Designed with Purpose

PHCbi brand CO_2 and multigas CO_2/O_2 incubators represent generations of successful product development in response to emerging cell culture protocols used around the world. Our incubators use innovative technology to fulfill a wide range of applications, from the most sophisticated, finely tuned and externally regulated processes in clinical medicine, to the widespread need for cell culture in mammalian investigations in academic, biotechnology, pharmaceutical and agricultural laboratories.

** FDA registered as a Class 2 Assisted Reproduction Device.*

For more than 50 years PHC Corporation has maintained a reputation for worldwide leadership in the design and manufacture of cell culture incubators and associated laboratory equipment used in biopharmaceutical, life sciences, academic, healthcare and government markets.

1969
The first incubator launched

1984
Water jacketed CO_2 incubator, MCO-165 later replaced with air jacketed designs

2001
Introduction of Active Background Contamination Control, inCu-saFe® copper enriched material, construction SafeCell™ UV decontamination

2009
Cell-IQ™ CO_2 and multigas CO_2/O_2 incubators with H_2O_2 decontamination

2014
Cell-IQ CO_2 and multigas CO_2/O_2 incubators with touchscreen interface

2017
High heat decontamination at 180°C extends product selection

PHCbi brand incubators are engineered to assure stability and accuracy required for reproducible results in the laboratory, from one day to the next, from one protocol to another.

Our product line offers the choices you need for gas control, single or multiple gas systems and decontamination methods to suit your preference. Standard cabinet sizes are configured for new and replacement installation with minimal site preparation.

Reproducibility and the Fundamentals of Critical Parameters

Reproducibility

PHCbi brand incubators include a suite of complementary operating systems designed to work together to achieve the highest level of reproducibility possible. Each incubator model uses a combination of essential technologies which share performance functions across the design platform. PHCbi brand incubators are designed to minimize uncertainty by providing stable, uniform and accurate conditions from one day to the next.

- Contamination Control
- Decontamination
- Automatic Gas Control
- Heat
- Humidification

Fundamentals

The primary purpose of a cell culture incubator is to provide accurate, repeatable and flexible environments essential to replication of the *in vivo* condition *in vitro*. Once the physiology of a specific *in vivo* condition is known, the investigator can create an *ex vivo* model inside the incubator chamber by managing a balance of temperature, CO_2, (and O_2 selected models) in a humidified atmosphere which prevents media desiccation.

The Cell-IQ and CytoGrow product groups represent a continuing evolution in incubator development to meet emerging demands of scientific and medical research.

Innovated designs, advancements in high performance sensors, contamination control methods, energy-efficient cabinet construction and creative material applications have earned PHCbi brand products a best-in-class reputation for clinical and research uses where reproducibility is critical.

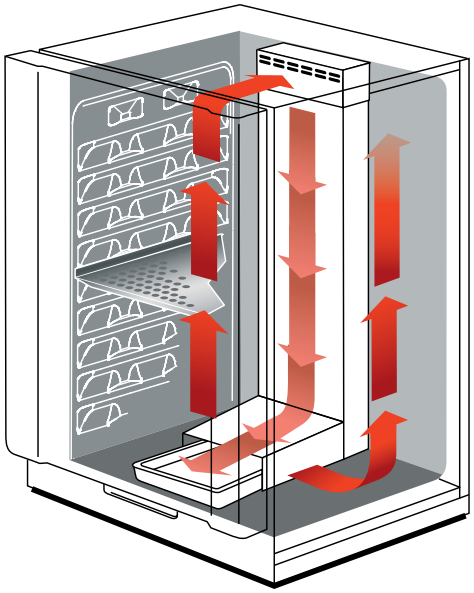
CO_2 and CO_2/O_2
Incubators

	MCO-170MP-PA*	MCO-170ACL-PA	MCO-170AICUVL-PA MCO-170AICUVHL-PA	MCO-170AICUVDL-PA	MCO-230AICUVL-PA	MCO-80ICL-PA
CONTAMINATION CONTROL						
InCu-saFe	■	■	■	■	■	■
SafeCell UV	□	□	■	■	■	□
Condensation Management	■	■	■		■	
DECONTAMINATION						
Manual	■	■	■	■	■	■
SafeCell UV	□	□	■	■	■	□
H_2O_2	□		◪		□	
High Heat 180˚C				■		
AUTOMATIC GAS CONTROL						
CO_2 Infrared						■
CO_2 Dual Infrared	■		■	■	■	
CO_2 Thermal Conductivity		■				
O_2 Zirconia	■					
HEAT						
Direct Heat, Air Jacket	■	■	■		■	
Direct Heat, Wall				■		
Airflow Plenum						■
HUMIDIFICATION						
Evaporation Indirect Heat Water Pan	■	■	■	■	■	
Elevated, Direct Heat Medium or High						■

*FDA registered as a Class 2 Assisted Reproduction Device, FDA Product Code MQG, approved for *in vitro* fertilization applications, Registration Number 9616263.

Active Background Contamination Control

The concept of Active Background Contamination Control was introduced by PHC Corporation as early as 2001. This approach to maintaining a safe interior environment is based on passive design attributes inherent to cabinet materials and systems, as well as user-initiated or programmed active control sequences that can be turned on when desired.

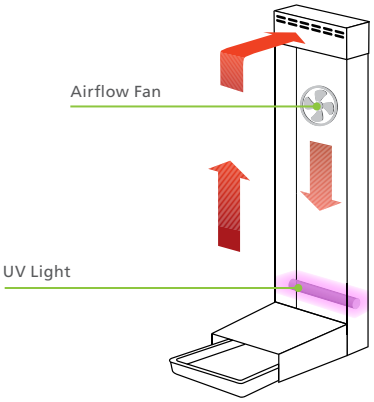


Active Background SafeCell UV

The primary components of this technique are found in copper enriched stainless steel interior protection and destruction of airborne contaminants by UV light exposure within the positive airflow plenum. Both work continuously to inhibit the growth of organisms on interior surfaces of walls and shelves, and by destroying the DNA of pathogens that enter the chamber through door openings or normal handling.

Serial dilution of the closed chamber atmosphere assures that all airborne organisms will be exposed to UV light within the gentle airflow.

All incubators are designed for easy removal of interior components, if a manual wipe down of interior surfaces using 70% ethanol is desired. This 70% solution is diluted to slow evaporation and provide time for the ethanol to be effective.



The interior airflow plenum gently directs air past the integral UV lamp before passing over the humidity pan. Any surface contaminants in the water are destroyed by UV exposure. The entire system is completely isolated from the active incubator chamber. When required, all components remove easily without tools.

Mycoplasma Survival Results

✓ Mycoplasma Growth ☒ Negative Growth

Mycoplasma Strain	Control	Conventional Stainless Steel	InCu-saFe	Conventional Copper C1100
Mycoplasma fermentans	✓	✓	☒	☒
Mycoplasma orale	✓	✓	☒	☒
Mycoplasma arginini	✓	✓	☒	☒
Mycoplasma hominis	✓	✓	☒	☒

Active Background Contamination Control

■ Standard Feature ☐ Optional Feature

CONTAMINATION CONTROL	MCO-170MP-PA*	MCO-170ACL-PA	MCO-170AICUVL-PA MCO-170AICUVHL-PA	MCO-170AICUVDL-PA	MCO-230AICUVL-PA	MCO-80ICL-PA
InCu-saFe	■	■	■	■	■	■
SafeCell UV	☐	☐	■	■	■	☐
Condensation Management	■	■	■		■	

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InCu-saFe Germicidal Protection

Copper enriched stainless steel is a hybrid Type 304 composite material that provides contact destruction of organisms while preventing growth of pathogens on interior surfaces.

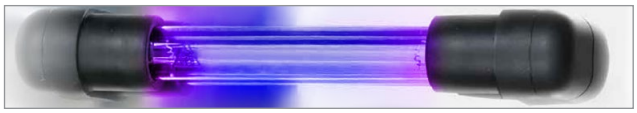
- Unlike conventional C100 copper interior designs, the inCu-saFe material does not discolor or corrode over time.
- All walls, floors, ceilings, shelves and other structural components in the chamber are fabricated from inCu-saFe material.
- InCu-saFe is standard on all Cell-IQ and CytoGrow incubators.

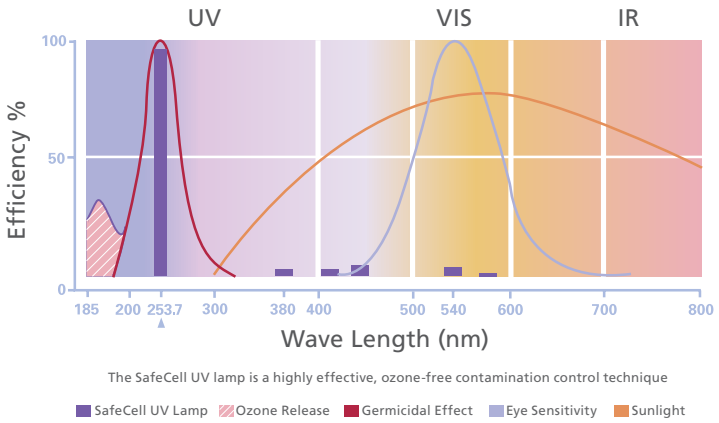
SafeCell UV

Patented SafeCell UV technology uses a programmable ultraviolet lamp to inhibit the growth of mycoplasma, bacteria, molds, spores, viruses, yeasts and fungi in the chamber atmosphere. Costly HEPA filter air scrubbers that simply trap contaminants are not required.

- Located away from active cell cultures and out of view, the SafeCell UV lamp operates on an automatic cycle that starts whenever an incubator is accessed. Once the door is closed, the circulation fan resumes a gentle serial airflow throughout the chamber, eventually passing all air over the humidity reservoir in the chamber base where UV light emitting a 253.7 nm wavelength kills airborne contaminants on the water surface without creating ozone. The timing of this passive sequence is adjustable from 0 to 30 minutes. The factory default setting is 10 minutes after each door opening.
- If an overnight decontamination process is desired, all interior components can be removed for autoclaving while the UV light is manually programmed for a timed 100% ON cycle extending for up to several hours. With interior components removed all remaining surfaces are exposed to the UV light where contaminants are destroyed.

A UV lamp hour counter automatically records ON time for all cycles and adjusts intensity to compensate for lamp life. The controller notifies the user when it is time to replace the lamp. Replacement is completed quickly and without tools. The useful life of the UV lamp is estimated in years, depending on frequency of use.





The SafeCell UV lamp is a highly effective, ozone-free contamination control technique

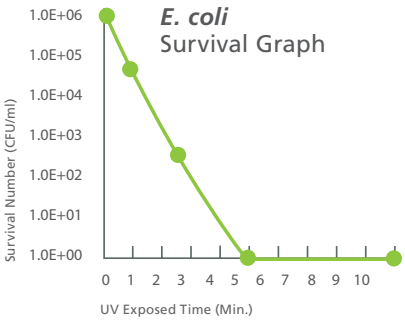
Summary Benefit of SafeCell UV Exposure

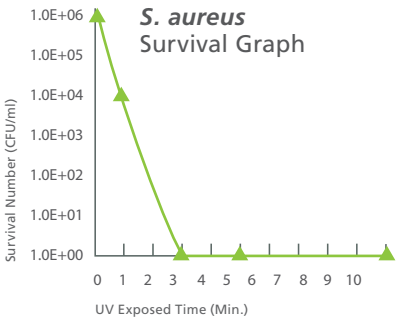
Method	UV
	PHC
Test Results, Maximum Log Reduction	
Bacteria	>4.5
Yeast	>2.9
Mold	>2.7
Decontamination Options	
Overnight	✓
Active Background Contamination Control	✓

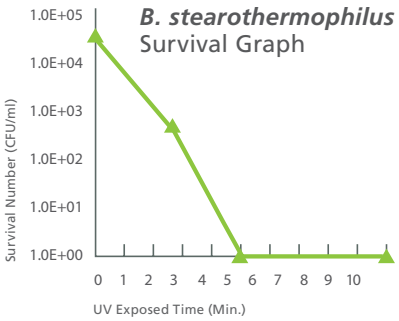
✓ Available Option

The SafeCell UV system is effective in destroying a broad range of bacteria, molds, yeasts, protozoa and viruses. Efficacy is based on incident energy at 253.7 nm necessary to inhibit colony formation in greater than 99.9% of tested microorganisms, measured in microwatt seconds/cm²

A representation is listed here. For a detailed listing contact PHC Corporation of North America.





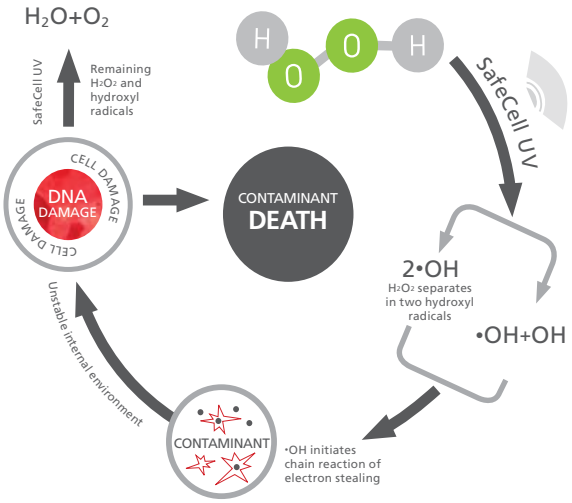


Decontamination methods are selected based on user preference, and are often ordained by approved GMP or other protocols that mandate continuity of process.

H_2O_2 Vapor Decontamination

Hydrogen peroxide vapor decontamination (H_2O_2) is standard on the Model MCO-170AICUVHL-PA, and optional on Models, MCO-170AICUVL-PA, MCO-170MP-PA and MCO-230AICUVL-PA.

- H_2O_2 is a safe, effective and environmentally friendly decontamination method that reaches all interior surfaces of the incubator.
- A nebulizer placed inside the chamber converts aqueous H_2O_2 to vapor which remains inside the chamber for approximately 30 minutes.
- Upon completion of the vapor exposure, the H_2O_2 is resolved to <1 ppm as benign water vapor in the presence of the UV light.
- There is no need to remove the integral CO_2 sensor or UV lamp.



High Heat Decontamination

High heat decontamination is a standard operating feature of the Model MCO-170AICUVDL-PA, which offers significant advantages over conventional high heat models.

- The high heat decontamination process elevates interior temperature to 180°C and is often initiated for overnight completion.
- After active cell cultures or other life forms are removed from the incubator, the decontamination sequence is manually initiated and automatically operated. The high heat process uses time and a higher temperature than conventional high heat incubators.
- A secondary heating system is energized to ramp up interior temperature to 180°C where it remains for a two-hour dwell to destroy any pathogens inside.
- Once the dwell is completed, the secondary heater is de-energized and temperature returns to the original setpoint. The entire process takes approximately 12 hours.
- High performance, heat-resistant melamine foam insulation minimizes heat transfer to the exterior cabinet surface, permitting the process to proceed without moving adjacent or stacked incubators or other laboratory equipment.
- There is no need to remove the integral CO_2 sensor or UV lamp.

■ Standard Feature ☐ Optional Feature ◪ Model Specific

DECONTAMINATION	MCO-170MP-PA*	MCO-170ACL-PA	MCO-170AICUVL-PA MCO-170AICUVHL-PA	MCO-170AICUVDL-PA	MCO-230AICUVL-PA	MCO-80ICL-PA
Manual	■	■	■	■	■	■
SafeCell UV	☐	☐	■	■	■	☐
H_2O_2	☐		◪		☐	
High Heat 180˚C				■		

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PHCbi brand cell culture incubators are available in a selection of CO_2 and multigas CO_2/O_2 models. Gas blends are managed by a microprocessor controller which calculates gas percentages based on input from CO_2 or O_2 sensors. Gas setpoints and actual levels are displayed on the main control panel for easy reference.

Automatic CO_2 Control

Cell-IQ incubators use high-performance infrared (IR) detectors to measure CO_2 concentration. CytoGrow incubators use a thermal conductivity sensor or infrared sensor, depending on model; see chart.

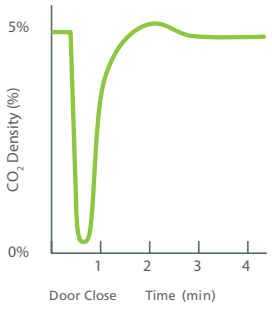
Infrared CO_2 Control System

The infrared CO_2 control system is designed for automatic gas control as well as real-time calibration to assure accuracy to setpoint and proper indication on the digital display to within 0.1%.

Sensitivity to CO_2 percentage, combined with gas input pressure regulators, achieves fast recovery following door openings without overshoot beyond setpoint.

The gas controller is based on a single light emitting source designed to split before passing through actual chamber and reference air concentrations where signals are measured by light filters and scored by sophisticated sensors. The infrared beam passes through with different values. The CO_2 concentration differential between sensors determines the flow of CO_2 to the chamber and provides continuous data to the controller. This process permits constant calibration and minimizes the need for periodic manual calibration which can be initiated whenever required.

Fast CO_2 Recovery After Door Opening



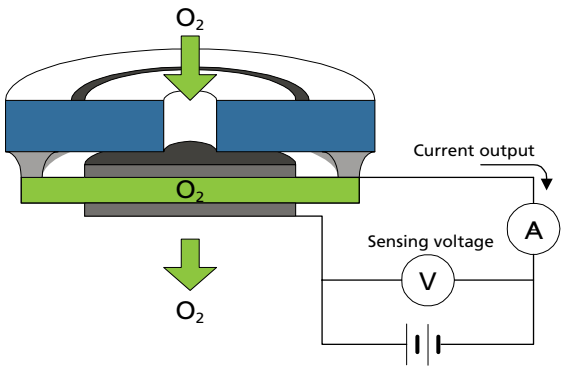
The infrared CO_2 control system is designed to establish, maintain and recover CO_2 concentration to the desired setpoint. This sensor provides accurate control and accuracy with fast recovery to setpoint following door openings. The PID control algorithm eliminates overshoot as CO_2 is restored, typically in less than 2 minutes.

Thermal Conductivity CO_2 Control

Thermal conductivity detects changes in resistance associated with the CO_2 percentage in the chamber air.

- The thermal conductivity method is accurate in a stable environment.
- Baseline references change over time based on temperature and humidity, and periodic calibration is recommended.

Conversion of O_2 Ions to Electrical Current



The O_2 molecules diffuse through the Zirconia layer in the sensor, causing a voltage build-up. The voltage then creates an electrical current flow which is detected by the sensing circuit in the incubator.

Oxygen Control Zirconia

Research into cell culture at below ambient oxygen levels is expanding exponentially as protocols are investigated, tested and published in professional journals. Oxygen levels below ambient are typical of mammalian cells *in vivo* and often range from near anaerobic to slightly below ambient. Normal oxygen is approximately 21% in air. When a 5% CO_2 level is introduced, O_2 levels reduce to 19.95%. Automatic control of both CO_2 and oxygen in the cell culture environment permits the most accurate *in vitro* replication of the *in vivo* physiology which can range from 1% to 18% or to near ambient O_2 levels.

- O_2 molecules diffuse through the zirconia layer in the sensor causing a voltage change. The electrical current flow is detected by the sensor, calculated into percentage and the O_2 or N_2 solenoid is opened or closed on demand. There is no impact on CO_2 percentage during this process.
- Because the initial O_2 setpoint may be hypothetical, the adjustable O_2 setpoint permits setpoint values to within 0.1%.
- If O_2 demand changes as the cell cultures mature, O_2 levels are easily changed to manage reproducibility.
- Nitrogen gas used to reduce the oxygen level in the incubator is controlled by an algorithm that calculates N_2 percentage as a reciprocal of O_2 detected by a zirconia sensor.
- Enriched O_2 levels can be established within the range of 22% to 80% O_2, but must be used with extreme caution and in accordance with local codes.

■ Standard Feature ☐ Optional Feature

AUTOMATIC GAS CONTROL	MCO-170MP-PA*	MCO-170ACL-PA	MCO-170AICUVL-PA MCO-170AICUVHL-PA	MCO-170AICUVDL-PA	MCO-230AICUVL-PA	MCO-80ICL-PA
CO_2 Infrared						■
CO_2 Dual Infrared	■		■	■	■	
CO_2 Thermal Conductivity		■				
O_2 Zirconia	■					

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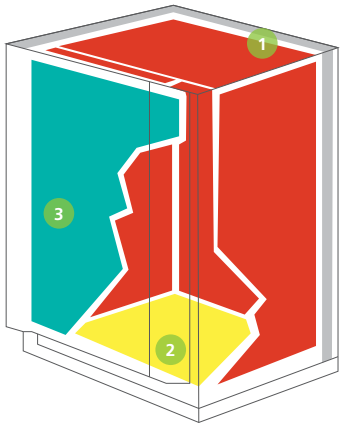
Direct Heat, Air

The patented Direct Heat and Air Jacket heating system surrounds the inner walls with a natural convection airflow which converts to radiant wall heat. This method achieves accurate, uniform and highly responsive temperature control within the chamber.

Positive Airflow Heating

The large-volume CytoGrow ReachIn Model MCO-80ICL-PA uses a horizontal laminar airflow to establish uniform conditions throughout the chamber. Positive airflow assures quick temperature, CO_2 and humidity recovery after door openings. Horizontal circulation across the solid, reinforced inCu-saFe shelves promotes even distribution at all shelf levels with larger loads.

1. Dominant Heat Source
2. Base Heater
3. Front zone



The patented Direct Heat and Air Jacket heating system distributes proportional energy to the interior chamber through a natural convection air jacket. High density insulation surrounds the chamber to protect against ambient temperature fluctuations while providing close internal temperature control. Three separate heating zones are energized according to demand as interpreted by the microprocessor controller. These zones can be energized together, in pairs or separately depending on where heat is required to assure uniformity and to minimize interior condensation points.

■ Standard Feature ☐ Optional Feature

HEAT	MCO-170MP-PA*	MCO-170ACL-PA	MCO-170AICUVL-PA MCO-170AICUVHL-PA	MCO-170AICUVDL-PA	MCO-230AICUVL-PA	MCO-80ICL-PA
Direct Heat, Air Jacket	■	■	■		■	
Direct Heat, Wall				■		
Airflow Plenum						■

Humidification

Cell culture environments must create humidified air to prevent desiccation of cell culture media. Most PHCbi brand incubators have removable humidity pans designed to hold clean, distilled water which evaporates naturally. Positive vapor pressure is sufficient to retard media desiccation in microplates with small media volumes.

- The stainless steel humidity pan is manually filled with distilled water. Heat from the incubator chamber floor evaporates the water to elevate humidity.
- Multi-zone heat sources designed to manage interior uniformity also offer flexibility in moderating elevated humidity from lower to higher levels.
- Unlike some larger cell culture incubators that use immersion heaters to supplement the natural humidification process, there are no heating elements exposed to water and there is no scaling or build-up over time.

Condensation Management

Condensation management used in selected PHCbi brand incubators is designed to remove excess chamber humidity. A condensation probe or "dew stick" made from antibacterial material uses a Peltier technique to condense moisture if the incubator nears 100% saturated humidity. The condensation drips into the humidity pan.

■ Standard Feature ☐ Optional Feature

HUMIDIFICATION	MCO-170MP-PA*	MCO-170ACL-PA	MCO-170AICUVL-PA MCO-170AICUVHL-PA	MCO-170AICUVDL-PA	MCO-230AICUVL-PA	MCO-80ICL-PA
Evaporation Indirect Heat Water Pan	■	■	■	■	■	
Elevated, Direct Heat Medium or High						■

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MCO-170MP-PA | MCO-170AICUVL-PA
MCO-170AICUVHL-PA | MCO-170AICUVDL-PA
MCO-230AICUVL-PA

MCO-170ACL-PA

MCO-80ICL-PA

Controller and Display	Touchscreen with Graphical Color LCD Display	Softkey 7 Button Menu with Triple LED Display	Softkey 7 Button Menu with Dual Display	Softkey 8 Button Menu with Dual LED Display
Cell-IQ				
MCO-230AICUVL-PA	■	—	—	—
MCO-170AICUVL-PA	■	—	—	—
MCO-170AICUVHL-PA	■	—	—	—
MCO-170AICUVDL-PA	■	—	—	—
MCO-170MP-PA	■	—	—	—
CytoGrow				
MCO-80ICL-PA	—	—	—	■
MCO-170ACL-PA	—	—	■ LCD	—
Incubator Information	All functions	All functions	All functions	All functions
Temperature Programming	Touchscreen	Softkey 7 Button	Softkey 7 Button	Softkey 8 Button
High Temperature Alarm	Alarm Indicator on Screen	Alarm Indicator Light	Alarm Indicator Light	Alarm Indicator Light
Gas Programming	Touchscreen	Softkey 7 Button	Softkey 7 Button	—
CO_2 Alarm	Alarm Indicator on Screen	Alarm Indicator Light	Alarm Indicator Light	—
Alarm Ring Back	Alarm Ring Back	Alarm Ring Back	Alarm Ring Back	Alarm Ring Back
Audible Silence	Alarm Silence	Alarm Buzzer	Alarm Buzzer	Alarm Buzzer
Remote Alarm Contacts	Normally Open, Normally Closed, Common DC 30V 2A	Normally Open, Normally Closed, Common DC 30V 2A	Normally Open, Normally Closed, Common DC 30V 2A	Normally Open, Normally Closed, Common DC 30V 2A
Data Download	USB Port	USB Port	USB Port	—
Display Brightness	Contrast Adjustment	—	—	—

SPECIFICATIONS

Models: MCO-170MP-PA | MCO-170ACL-PA | MCO-170AICUVL-PA | MCO-170AICUVHL-PA

Dimensions		MCO-170MP-PA	MCO-170ACL-PA	MCO-170AICUVL-PA	MCO-170AICUVHL-PA
External Dimensions (W × D × H) [1]	inches | mm	24.4 × 28.0 × 35.6 | 620 × 710 × 905	24.4 x 28.7 x 35.6 | 620 x 730 x 905	24.4 × 28.7 × 35.6 | 620 × 730 × 905	
Internal Dimensions (W × D × H)	inches | mm	19.3 × 20.6 × 26.2 | 490 × 523 × 665	19.3 x 20.6 x 26.2 | 490 x 523 x 665	19.3 × 20.6 × 26.2 | 490 × 523 × 665	
Volume	cu.ft. | liters	5.7 | 161	5.8 | 165	5.8 | 165	
Net Weight	lbs | kg	170 | 77	163 | 74	176 | 80	
Performance					
Warranty [3]		3 years parts and labor	3 years parts and labor	3 years parts and labor, 5 years CO_2 sensor	
Temperature Control Range and Fluctuation [4]	°C	+5 above ambient to +50, ± 0.1	+5 above ambient to +50, ± 0.1	+5 above ambient to +50, ± 0.1	
Temperature Uniformity [4]	°C	± 0.25	± 0.25	± 0.25	
CO_2 Control Range and Fluctuation [4]	%	0 to 20, ± 0.15	0 to 20, ± 0.15	0 to 20, ± 0.15	
O_2 Control Range and Fluctuation [4]	%	1 to 18 and 22 to 80, ± 0.2	—	—	
Humidity Level & Fluctuation	% RH	95 at 37°C ± 5	95 at 37°C, ± 5	95 at 37°C, ± 5	
Control					
Controller with Thermistor Sensor		Microprocessor	Microprocessor – softkey 7 button menu	Microprocessor	
Temperature Sensor		Thermistor	Thermistor	—	
Display	qty	Color LCD touchscreen - readable to 0.1 increments	White graphic OLED readable to 0.1 increments	Color LCD touchscreen readable in 0.1 increments	
Sensor	CO_2 | O_2	Dual filter IR | Stabilized zirconia	Thermal conductivity	Dual filter IR	
Construction					
Exterior Material		Painted steel (rear cover coated steel)	Painted steel (rear cover coated steel)	Painted steel (rear cover coated steel)	
Interior Material		Stainless steel copper enriched alloy	Stainless steel copper enriched alloy	Stainless steel copper enriched alloy	
Outer Door	qty	1	1	1	
Field Reversible Door		Included	Included	Included	
Inner Door	qty	1 (stainless steel frame sealing with positive latch + 4 tempered glass sealing with positive latches)	1 (sealing tempered glass with positive latch)	1 (sealing tempered glass with positive latch)	
Humidity Pan	qty	1 (stainless steel)	1 (stainless steel with ½ cover)	1 (stainless steel)	
Condensation Management		Included	Included	Included	
Shelves	qty	3 (stainless steel copper enriched alloy)	3 (stainless steel copper enriched alloy)	4 (stainless steel copper enriched alloy)	
Shelf Dimension (W × D × H)	inches | mm	18.5 × 17.7 × 0.5 | 470 × 450 × 12	18.5 x 17.7 x 0.5 | 470 x 450 x 12	18.5 × 17.7 × 0.5 | 470 × 450 × 12	
Max. Load per Shelf	lbs | kg	15.4 | 7	15 | 7	15.4 | 7	
Max. Total Load	lbs | kg	45.0 | 21	61 | 28	61.6 | 28	
Max. Shelf Capacity	qty	10	10	10	
Access Port / Position	qty	1; rear upper left	1; rear upper left	1; rear upper left	
Access Port Diameter	inches | mm	1.2 | 30 (with silicone (non-VOC) stopper)	1.2 | 30 (with silicone (non-VOC) stopper)	1.2 | 30 (with silicone (non-VOC) stopper)	
Leveling Feet and Casters	qty	4 leveling feet	4 leveling feet	4 leveling feet	
Decontamination Control					
InCu-saFe Chamber, Air Plenum and Shelves	passive	Included (stainless steel copper enriched alloy)	Included (stainless steel copper enriched alloy)	Included (stainless steel copper enriched alloy)	
SafeCell UV Light System	passive/active	Optional	Optional	Included	
Hydrogen Peroxide (H_2O_2) Vapor	active	Optional	—	Optional	Included
Alarms					
Power Failure		R	R	R	
Temperature or Gas Deviation	high	V-B-R	V-B-R	V-B-R	
CO_2 Supply Empty		V-B-R	V-B-R	V-B-R	
Door Open		V-B	V-B	V-B	
UV Lamp Fault (optional)		V-B-R	—	V-B-R	
Electrical and Noise Level					
Power Supply		115V, 1Ø, 60Hz, NEMA 5-15P requires NEMA 5-15R receptacle	115V, 1Ø, 60Hz, NEMA 5-15P requires NEMA 5-15R receptacle	115V, 1Ø, 60Hz, NEMA 5-15P requires NEMA 5-15R receptacle	
Noise Level [5]	dB(A)	29	29	29	
Options					
SafeCell UV Light System		MCO-170UVS-PA	MCO-170UVS-PA	—	
Hydrogen Peroxide (H_2O_2) Vapor Board		MCO-170HB-PA [6]	—	MCO-170HB-PA [5]	
Outer Door–Password Access Electronic Lock		MCO-170EL-PW [6]	—	MCO-170EL-PW [5]	
H_2O_2 Vapor Generator		MCO-HP-PW [6]	—	MCO-HP-PW [5]	
H_2O_2 Reagent	package of 6	MCO-H2O2-PV	—	MCO-H2O2-PV	
CO_2 Gas Pressure Regulator	psi	0 – 15; MCO-100L	0 – 15; MCO-100L	0 – 15; MCO-100L	
N_2 Gas Pressure Regulator	psi	0 – 60; MCO-100N	—	—	
Automatic CO_2 Cylinder Changeover System		MCO-21GC-PW	—	MCO-21GC-PW	
4-20mA Analog Output		MCO-420MA-PW	—	MCO-420MA-PW	
InCu-saFe Shelf		MCO-170ST-PW	MCO-170ST-PW	MCO-170ST-PW	
InCu-saFe Shelf–Reinforced		MCO-170RT-PW	MCO-170RT-PW	MCO-170RT-PW	
Double Stacking Bracket [6]		MCO-170SB-PW	MCO-170PS-PW	MCO-170SB-PW	
Stacking Plate [7]		MCO-170SB-PW	MCO-230SB-PW	MCO-170PS-PW	
Roller Base		MCO-170RB-PW	MCO-170RB-PW	MCO-170RB-PW	
Inner Door Kit		Included	—	MCO-170ID-PW	
LabAlert® Monitoring System		Optional	Optional	Optional	

[1] Exterior dimensions of main cabinet only, excluding handle and other external projections
[2] Exterior dimensions of cabinet excluding handle, rear stand-off brackets and other external projections. Consult sales rep for doorway entry instructions, less than 37.2"
[3] Current warranty offered at time of printing and may be subject to change; US and Canada only
[4] Ambient temperature 23°C, setting 37°C, CO_2 5%, no load, air temperature measured at incubator center
[5] Nominal value – Background noise 20 dB(A)
[6] MCO-170MP and MCO-230AIC series requires MCO-170HB-PA, MCO-170EL-PW, MCO-170UVS-PW and MCO-HP-PW for H_2O_2 Decontamination
[7] Allows for stacking MCO-170ACL onto any MCO-170 unit

SPECIFICATIONS

Models: | MCO-170AICUVDL-PA | MCO-230AICUVL-PA | MCO-80ICL-PA

Dimensions		MCO-170AICUVDL-PA	MCO-230AICUVL-PA	MCO-80ICL-PA
External Dimensions (W × D × H) [1]	inches | mm	24.4 × 29.7 × 35.6 | 620 × 755 × 905	30.3 × 28.7 × 35.6 | 770 × 730 × 905	38.6 × 37.2 × 80.3 | 986 × 945 × 2040 [2]
Internal Dimensions (W × D × H)	inches | mm	19.3 × 20.6 × 26.2 | 490 × 523 × 665	25.3 × 20.6 × 27.6 | 643 × 523 × 700	31.7 × 27.3 × 60.0 | 806 × 693 × 1524
Volume	cu.ft. | liters	5.8 | 165	8.1 | 230	30.1 | 851
Net Weight	lbs | kg	176 | 80	198 | 90	606 | 275
Performance				
Warranty [3]		3 years parts and labor, 5 years CO_2 sensor	3 years parts and labor, 5 years CO_2 sensor	3 years parts and labor
Temperature Control Range and Fluctuation [4]	°C	+5 above ambient to +50, ± 0.1	+5 above ambient to +50, ± 0.1	+5 above ambient to +50, ± 0.1
Temperature Uniformity [4]	°C	± 0.25	± 0.25	± 0.5 (9 point measurement)
CO_2 Control Range and Fluctuation [4]	%	0 to 20, ± 0.15	0 to 20, ± 0.15	0 to 20, ± 0.15
O_2 Control Range and Fluctuation [4]	%	—	—	—
Humidity Level & Fluctuation	% RH	95 at 37°C, ± 5	95 at 37°C ± 5	Normal mode: over 80 (high mode: over 90)
Control				
Controller with Thermistor Sensor		Microprocessor	Microprocessor	Microprocessor
Display	qty	Color LCD touchscreen readable to 0.1 increments	Color LCD touchscreen readable to 0.1 increments	2; LED (1 for temperature and 1 for CO_2) readable to 0.1 increments
Sensor	CO_2 | O_2	Dual filter IR	Dual filter IR	IR
Construction				
Exterior Material		Painted steel (rear cover coated steel)	Painted steel (rear cover coated steel)	Painted steel
Interior Material		Stainless steel copper enriched alloy	Stainless steel copper enriched alloy	Stainless steel copper enriched alloy
Outer Door	qty	1 with electronic password protected lock	1	1; Dual pane heated glass with latch (provision for padlock)
Field Reversible Door		Included	Included	—
Inner Door	qty	1 (sealing tempered glass with positive latch)	1 (sealing tempered glass with positive latch)	Optional
Humidity Pan	qty	1 (stainless steel)	1 (stainless steel)	—
Condensation Management		—	Included	—
Humidity Reservoir Drain	qty	—	—	Drain valve – lower side front (tray provided)
Humidity Reservoir Material		—	—	Stainless steel
Shelves	qty	4 (stainless steel copper enriched alloy)	4 (stainless steel copper enriched alloy)	5 (stainless steel copper enriched alloy)
Shelf Dimension (W × D × H)	inches | mm	18.5 × 17.7 × 0.5 | 470 × 450 × 12	24.4 × 17.7 × 0.5 | 620 × 450 × 12	30.6 × 25.9 × 0.4 | 776 × 659 × 10
Max. Load per Shelf	lbs | kg	15.4 | 7	15.4 | 7	66.1 | 30
Max. Total Load	lbs | kg	61.6 | 28	61.6 | 28	330.0 | 150
Max. Shelf Capacity	qty	10	10	18
Access Port / Position	qty	1; rear upper left	1; rear upper left	2; right side and left side
Access Port Diameter	inches | mm	1.2 | 30 (with silicone (non-VOC) stopper)	1.2 | 30 (with silicone (non-VOC) stopper)	1.6 | 40 (with silicone (non-VOC) stopper)
Leveling Feet and Casters	qty	4 leveling feet	4 leveling feet	4 leveling feet, 4 casters (swivel)
Decontamination Control				
InCu-saFe Chamber, Air Plenum and Shelves	passive	Included (stainless steel copper enriched alloy)	Included (stainless steel copper enriched alloy)	Included (stainless steel copper enriched alloy)
SafeCell UV Light System	passive/active	Included	Included	Optional
Hydrogen Peroxide (H_2O_2) Vapor	active	—	Optional	—
Alarms				
Power Failure		R	R	R
Temperature or Gas Deviation	high	V-B-R	V-B-R	V-B-R
CO_2 Supply Empty		V-B-R	V-B-R	V-B-R
Door Open		V-B	V-B	V-B
UV Lamp Fault (optional)		V-B-R	V-B-R	V-B-R
Electrical and Noise Level				
Power Supply		115V, 1Ø, 60Hz, NEMA 5-15P requires NEMA 5-15R receptacle	115V, 1Ø, 60Hz, NEMA 5-15P requires NEMA 5-15R receptacle	 115V, 1Ø, 60Hz, NEMA 5-20P requires NEMA 5-20R
Noise Level [5]	dB(A)	25	25	33
Outlet, Chamber Duplex – Vapor Proof Cover		—	—	1; 115V 3 amps max rating
Outlet, Cabinet Outlet		—	—	1; 115V 1 amps max rating
Options				
SafeCell UV Light System		—	MCO-170UVS-PA (included)	MCO-80UVS-PA
Humidity Reservoir–Auto Fill System		—	—	MCO-80AS-PW
Hydrogen Peroxide (H_2O_2) Vapor Board		—	MCO-170HB-PA [6]	—
Outer Door–Password Access Electronic Lock		—	MCO-170EL-PW [6]	—
H_2O_2 Vapor Generator		—	MCO-HP-PW [6]	—
H_2O_2 Reagent	package of 6	—	MCO-H2O2-PV	—
Semi-Automatic One Point Gas Calibration Kit		MCO-SG-PW	—	—
CO_2 Gas Pressure Regulator	psi	0 – 15; MCO-100L	0 – 15; MCO-100L	0 – 15; MCO-100L
Automatic CO_2 Cylinder Changeover System		MCO-21GC-PW	MCO-21GC-PW	MCO-80GC-PW
4-20mA Analog Output		MCO-420MA-PW	MCO-420MA-PW	MCO-420MA-PW
InCu-saFe Shelf		MCO-170ST-PW	MCO-230ST-PW	MCO-80ST-PW
InCu-saFe Shelf–Reinforced [6]		MCO-170RT-PW	MCO-230RT-PW	MCO80ICRSLF3 | MCO80ICRSLF4
Double Stacking Bracket [7]		MCO-170SB-PW	MCO-230SB-PW	—
Stacking Plate		MCO-170PS-PW	—	—
Roller Base		MCO-170RB-PW	MCO-230RB-PW	—
Inner Door Kit		—	—	MCO-80ID-PW
Cell Roller Mounting Ramp Kit		—	—	MCO-80RBS-PW

[1] Exterior dimensions of main cabinet only, excluding handle and other external projections
[2] Exterior dimensions of cabinet excluding handle, rear stand-off brackets and other external projections. Consult sales rep for doorway entry instructions, less than 37.2"
[3] Current warranty offered at time of printing and may be subject to change; US and Canada only
[4] Ambient temperature 23°C, setting 37°C, CO_2 5%, no load, air temperature measured at incubator center
[5] Nominal value – Background noise 20 dB(A)
[6] Choose from three or four reinforced shelf configurations. Shelf selection must be specified when ordering
[7] MCO-170MP and MCO-230AIC series requires MCO-170HB-PA, MCO-170EL-PW, MCO-170UVS-PW and MCO-HP-PW for H_2O_2 Decontamination

SERVICES

PHC Corporation of North America offers a full line of pre-delivery and on-site calibration and validation services. Validation services range from process/manufacturing audits, quality compliance, risk assessment and software qualification. Advanced technology is integrated with contemporary processes for turnkey solutions using NIST calibrated instrumentation for validation and qualification in accordance with all current GxP Regulations (GMP, GLP, GCP), ISO, FDA 21 CFR Part 11, CAP, AABB, CLIA, USDA, local standards and other regulations. Our calibration services are specially designed to verify quality compliance and ensure display accuracy to manufacturing and regulatory specifications. Procedures and documentation are designed to conform to NIST/ISO requirements. ISO/IEC 17025* calibration is available upon request.

We also offer installation and continued technical services.
Visit www.phchd.com/us/biomedical/services to learn more.

*Calibration, as well as IOQ/FAT documentation, are available upon request and quoted separately. ISO/IEC 17025.2005 specifies the general competence to carry out testing and/ or calibration including sampling. It covers testing and calibration preformed using standard methods, non-standard methods and laboratory-developed methods. (Ref: ISO Website, May 2016).

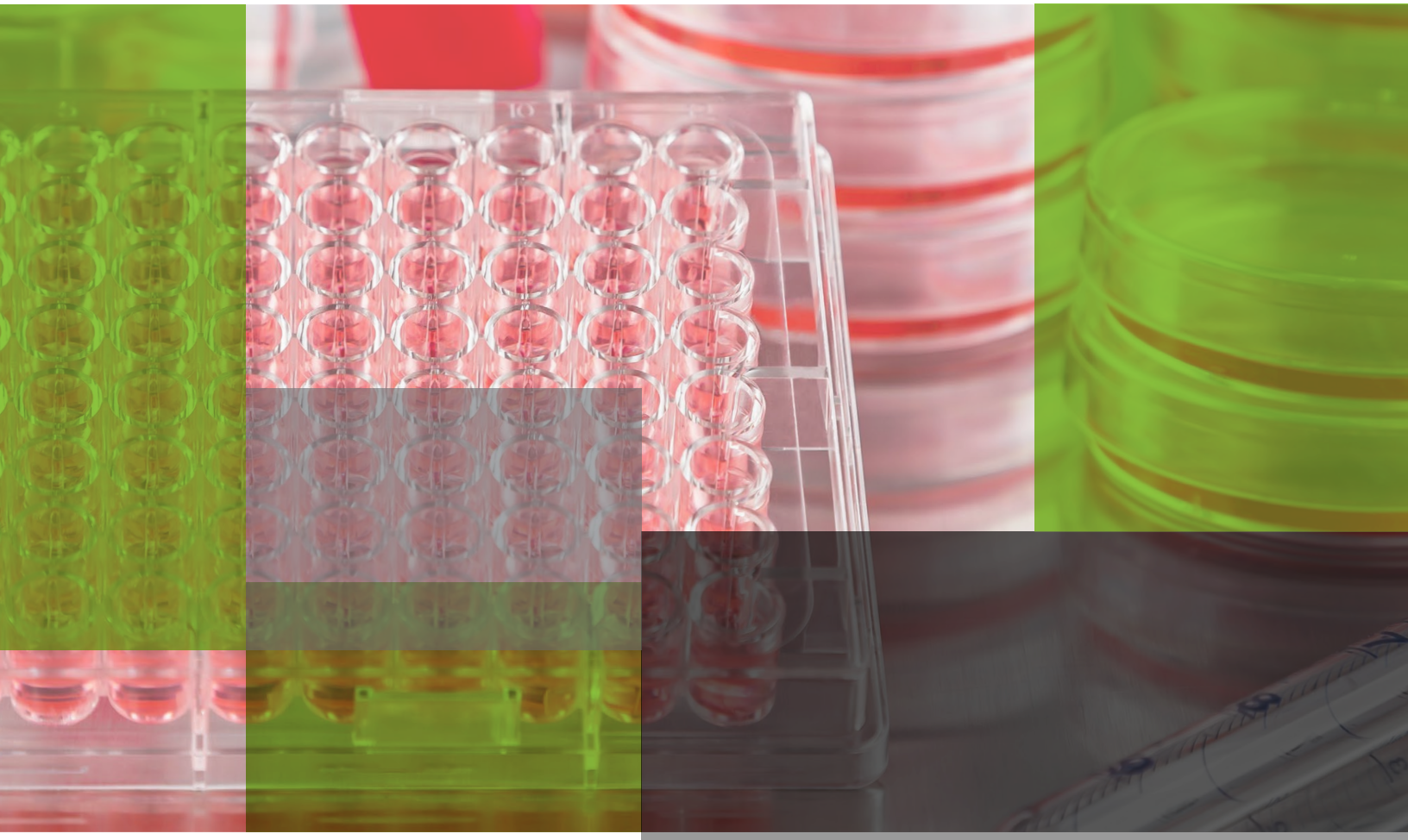
LABALERT MONITORING

A real-time monitoring and notification system will protect your process. LabAlert provides independent, wireless monitoring for a range of equipment. The secure, cloud-based solution offers comprehensive airflow monitoring with customizable dashboards for easy user interface. No software installation is required. Supports FDA 21 CFR Part 11 compliance. LabAlert is scalable to meet corporate enterprise standards for efficacy and safety. It works across multiple units, multiple locations and easily adapts to growing facilities.

ADDITIONAL PRODUCTS

Complementary product lines under the PHCbi brand include the space saving and energy efficient VIP® ECO and VIP Series ultra-low temperature freezers, cryogenic and biomedical freezers, pharmacy and high performance refrigerators, programmable heated and refrigerated microbiological incubators and Drosophila/Plant Growth Chambers.

For more information, please call PHC Corporation of North America at 800-858-8442, email info@us.phchd.com or visit http://www.phchd.com/us/biomedical.



Specifications are subject to change without notice.
For latest specification information contact PHC Corporation of North America at info@us.phchd.com.

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Printed in USA | 01 | 20 | 2021 | OW11027.1A | vf

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