Laboratory CO_2 & O_2 Incubators

PRODUCT FAMILY



LABORATORY CO_2 INCUBATORS
PROFESSIONAL RESEARCH & CLINICAL APPLICATIONS

MCO-20AIC MCO-40AIC	MCO-18AIC MCO-36AIC	MCO-5AC MCO-17AC MCO-34AC	MCO-5M MCO-18M

MCO-36AIC

safe cell UV

inCu saFe

IR sensor

Incubation for specific Temperature, CO_2 & O_2 control with Protection against Contamination

SANYO laboratory CO_2 & O_2 incubators are designed for a wide range of applications in biomedical, pharmaceutical and clinical laboratories, and represent years of research, development and laboratory testing. All SANYO CO_2 incubators feature exclusive inCu saFe™ copper-enriched stainless steel alloy interior construction with inherent germicidal protection against contamination, and patented Direct Heat and Air Jacket™ temperature control for accurate, uniform in vitro modeling of the in vivo environment.

innovation
performance
reliability
support

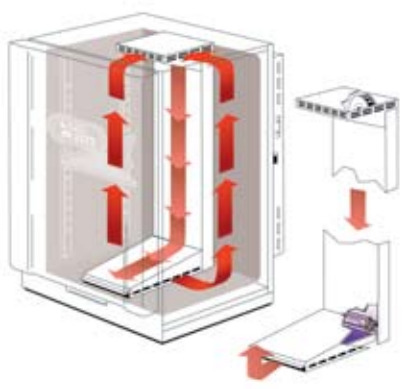
incubation

incubation

	SafeCell™ UV Series		Conventional Series			Low O_2 Series	
Description	Designed for the most demanding cell culture protocols, the SafeCell™ UV series offers significant economic benefits by avoiding costly interruptions for decontamination		Conventional models with infrared or thermal CO_2 systems offer cost effective alternatives with core functionality and features.			Designed for apoptosis, IVF or other research with low O_2 needs.	
Single Chamber	MCO-20AIC 7.6 cu.ft.	MCO-18AIC(UV) 6.0 cu.ft.	MCO-18AIC 6.0 cu.ft.	MCO-17AC 5.8 cu.ft.	MCO-5AC 1.7 cu.ft.	MCO-18M 6.0 cu. ft.	MCO-5M 1.7 cu.ft
Dual Chamber, Stacked	MCO-40AIC 15.2 cu.ft.	MCO-36AIC(UV) 12.0 cu.ft.	MCO-36AIC 12.0 cu.ft.	MCO-34AC 11.6 cu.ft.		MCO-36M 17.o cu.ft.	
Direct Heat and Air Jacket™ (Patented)	standard						
SafeCell™ UV Contamination Control (Patented)	standard		optional	n/a	optional	optional	
inCu saFe™ Copper-Enriched Stainless Steel Alloy Germicidal Protection	standard						
CO_2 Control	infrared	infrared with P.I.D./R™ recovery	infrared with P.I.D./R™ recovery	thermal conductivity		infrared with P.ID./R™ recovery	thermal conductivity
Door-Mounted Control Panel	standard						
SANYO-Built Microprocessor Controller	standard						
Warranty	Three years, parts and labor; contact SANYO for details						

SafeCell™ UV series

Designed for the most demanding cell culture protocols, the SafeCell™ UV series offers significant economic benefits by avoiding costly interruptions for decontamination.



(Above) At the base of the plenum, an isolated beam of high intensity, ozone-free ultraviolet light destroys contaminants in the air and in the humidity water reservoir, away from active cell cultures.

SafeCell™ UV series

SafeCell™ UV Series

CO_2 incubators include contamination control technology based on an integrated combination of narrow bandwidth, ozone-free ultraviolet light, inCu saFe™ copper-enriched stainless steel alloy interiors and Direct Heat and Air Jacket™ heating managed by a microprocessor controller. These incubators are useful for the most critical applications where continuous contamination control is essential to cell viability.

SafeCell™ UV Series CO_2 incubators offer significant economic benefits by avoiding costly interruptions for decontamination, by improving cell culture growth and expression under stable, repeatable conditions, and by minimizing the potential for product loss due to contamination, drift, overshoot or operator error.

- 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.
- SafeCell™ UV inhibits the growth of mycoplasma, bacteria, molds, spores, yeasts and fungi without costly HEPA filter air scrubbers which accumulate contaminants in the chamber air.
- High temperature decontamination systems are avoided, which can actually encourage in vitro growth of heat-resistant thermophilic and hyperthermophilic microorganisms.
- inCu saFe™ interior surfaces provide natural resistance to contamination.

Active Background Contamination Control™

A continuous Active Background Contamination Control™ process eliminates contamination without downtime. Contaminants trapped within the distilled water pan are destroyed by ultraviolet light.

- Sterile, 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.
- UV light is isolated by the plenum cover to protect cell cultures.
- Airborne contaminants are eliminated by an automatic, factory-set 5-minute UV cycle; the cycle is programmable from 0-30 minutes.
- Trace contaminants that attach to interior surfaces are destroyed by the passive germicidal properties of the inCu saFe™ surfaces.

SafeCell™ UV Function

Mode	Function
After Door Opening	UV lamp automatically ON for five minutes after door is closed; decontaminates incoming room air • The timer is factory-set, user programmable from 0-30 minutes • The UV lamp automatically cycles ON every 12 hours if no door opening
Cycled OFF	If UV protection is not desired
Continuous ON	Useful for overnight decontamination prior to first use, clinical decontamination protocols between patients, or following total chamber wipe-down after maintenance or service (requires setpoints)

(Above) 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.

Detailed information is available in the SANYO white paper publication, A Comparative Analysis of Ultraviolet Light Decontamination vs. High Heat Sterilization in the Cell Culture CO2 Incubator, with the Use of Copper-Enriched Stainless Steel Construction to Achieve Active Background Contamination Control™

Contact your SANYO sales representative or visit the SANYO web site at: www.sanyobiomedical.com/library

UV Decontamination vs. Heat Sterilization

METHOD	UV	HIGH HEAT	
	SANYO	(+140°C)	(+90°C)
TEST RESULTS, MAXIMUM LOG REDUCTIONS			
Bacteria	> 4.5	> 4.5	> 4.5
Yeast	> 2.9	> 2.9	> 2.9
Mold	> 2.7	> 2.7	> 2.7
DECONTAMINATION OPTIONS			
Overnight	✓	✓	✓
Active Background Contamination Control™	✓	⊘	⊘

Independent testing confirms that the UV decontamination technique employed by the SANYO incubator is equally effective against contamination as conventional high heat sterilization over a range of +90°C to +140°C. Whenever overnight or event sterilization of the SANYO incubator chamber is desired, all interior components are removed for autoclaving, exposing all interior surfaces to ultraviolet light. During normal operation when cells are being incubated within the chamber, the UV lamp is visibly isolated from the cell culture chamber by a plenum cover over the humidity pan, permitting UV decontamination of circulated, humidified air and humidity pan surface water to remain in process without damaging the cells.

inCu safe™ Construction for Germicidal Protection

inCu saFe™ copper-enriched stainless steel alloy interior surfaces eliminate contamination sources and mitigate the effects of airborne contaminants introduced through normal use.

Selected to provide natural germicidal protection without rust or corrosion, inCu saFe™ expresses a natural germicidal attribute to inhibit the growth of molds, fungi, mycoplasma and bacteria.

- Interior components, including the air management plenum, shelf supports, humidity pan and blower wheel assembly, easily removable without tools if required.
- When components are removed, all interior surfaces are exposed for conventional wipe down. Large coved corners and electropolished surfaces are easy to clean.

MYCOPLASMA SURVIVAL RESULTS

Mycoplasma Strain	Negative Control	Conventional Type 304 Stainless Steel	SANYO inCu saFe™	Conventional Copper C1100
Mycoplasma fermentans PG18	no survival	survival	no survival	no survival
Mycoplasma orale CH19299				
Mycoplasma arginini G230				
Mycoplasma hominis PG21				

Infrared CO2 Control System

The SANYO ceramic-based infrared CO_2 control system is impervious to moderate changes in temperature and relative humidity, and is highly stable during door openings.

The SANYO infrared CO_2 system is configured around a ceramic-based sensor linked to the microprocessor controller with a sophisticated P.I.D./R™ (propor-tional, integral and derivative) algorithm. New P.I.D./R™ CO_2 control technology accelerates standard CO_2 recovery cycle. Benefits include ultra-fast recovery without over-shoot and accurate CO_2 averages during periods of frequent incubator access with multiple door openings.

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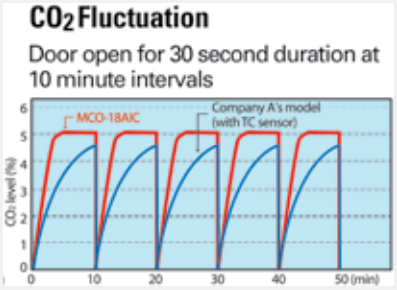
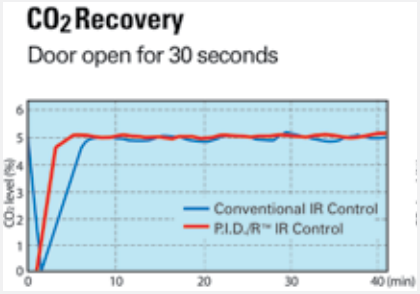
Infrared CO_2 Control System

- The sensor calibrates itself automatically every four hours.
- Actual CO_2 is displayed on the main control panel.





Direct Heat and Air Jacket™ Heating System

The patented Direct Heat and Air Jacket™ surrounds the inner walls with a natural convection airflow that converts to radiant wall heat through thermal conduction. This technique achieves accurate, uniform and highly responsive temperature control within the chamber.

- The microprocessor controller directs proportional distribution of power to independent heating sources surrounding the chamber.
- Arranged in three zones, these sources include the side, top and rear walls, the chamber base and the outer door.
- Each zone is controlled by the microprocessor which manages continuous feedback from the incubator chamber sensors via a P.I.D. algorithm.

The patented Direct Heat and Air Jacket™ heating system distributes proportional energy to the interior chamber through a natural convection air jacket surrounded by a low-density insulation to protect against ambient temperature fluctuations.

Zone	Location	Function	Energy	Microprocessor Controller
Main (Red)	side, top and rear walls	dominant heat source	variable	energizes any, all or a combination of heating elements as required
Base (Yellow)	floor	base heater elevates the humidity reservoir to achieve 95%RH at 37°C	variable	
Front (Green)	outer door	warms the inner glass in response to ambient conditions; eliminates condensation on glass and around the opening and promotes temperature uniformity	variable	
Air Jacket (White)	side, top and rear walls	sealed, surrounds interior chamber with natural air convection		
Insulation (Grey)	side, top and rear walls, door	promotes energy efficiency, mitigates effect of ambient temperature fluctuations on air jacket		

Elevated Humidity, Low Water Level Warning

To avoid cell culture desiccation, the SANYO SafeCell™ UV Series CO_2 incubator maintains ~95% RH at 37°C. Humidification is achieved by natural evaporation enhanced by the Direct Heat and Air Jacket™ base heater, and protected by an optical water level indicator to warn of low water in the removable humidity pan.

Low O_2 Control Technologies

Exceptional O_2 control achieved and maintained with a zirconia O_2 sensor, P.I.D. control is used for fast O_2 level control provides precisely controlled environment.

- The N_2 gas bubbler in the water pan creates bubbles and helps recover humidity level quickly after door openings.
- Water Level Sensor - The humidity pan has an optical water level sensor to warn of low water level.
- Automatic Gas Cylinder Switchover System - This system automatically switches from the primary to secondary gas cylinder when the O_2 gas level does not change while an injection valve is open. Optional switchover for CO_2 gas is available.

Control, Alarm & Monitoring

A range of setpoint, alarm and programmable inputs are established through the use of function keys. Extra-large digital displays are easy to read.

- Tactile feedback, touch pad data shift and entry keys simplify operation.
- Standard parameters are factory-set for quick start-up, and all parameters can be changed as required.
- A remote alarm terminal mounted at the rear of the cabinet can be connected to an external alarm system.

SANYO ERGOSTACK™
ERGONOMIC CABINET DESIGN

With reversible inner and outer doors, a single SANYO incubator offers the industry's most flexible installation options available and low profile design. Low-profile ErgoStack™ cabinets with door-mounted control panels permit easy access to controls and chamber interiors for users of all heights.

- *Outer door latches and door heater cables are easily switched if a reverse opening is required.*
- *Cabinet knock-outs are pre-drilled and tapped to eliminate drilling and to simplify re-mounting of door hardware.*
- *The outer door closes against a soft, easily cleaned magnetic gasket designed to eliminate ambient air shear across the glass inner door, minimizing condensation.*
- *A door ajar alarm provides an audible and visual warning if the outer door is left open.*

ErgoStack™ low-profile design

Patented Direct Heat and Air Jacket™ heating system

inCu saFe™ copper-enriched polished stainless steel alloy interior

Patented SafeCell™ UV system

Ceramic-based infrared CO_2 sensor with P.I.D./R™ microprocessor for accelerated CO_2 recovery without overshoot

The outer door heater is integrated with the Direct Heat and Air Jacket™ controller

Optional roller base

SANYO 6.0 cu.ft. MCO-18AIC(UV) incubators mounted on an optional roller base. The low-profile ErgoStack™ design places interior components and controls at eye level for convenience and safety.

The optional roller base offers mobility when required; front mounting pins extend to the floor to secure base during operation. When stacked, door-mounted controls remain easily accessible in comparison to conventional dual incubators.

Model	SafeCell™ UV Series	
Single Chamber	MCO-20AIC	MCO-18AIC(UV)
Dual Chamber, Stacked	MCO-40AIC	MCO-36AIC(UV)
Heating System		
Method	Patented Direct Heat and Air Jacket™	
Heating Elements	395 watts per chamber	314 watts per chamber
Temperature Control	microprocessor controlled P.I.D.	
Digital Temperature Display	resolution 0.1°C	
Temperature Range	5°C above ambient to +50°C	
Temperature Uniformity	± .25°C	
CO_2 System		
CO_2 Sensor	ceramic-based infrared (I.R.)	
CO_2 System Electronics	microprocessor	microprocessor P.I.D./R™
CO_2 Range and Variation	0-20%, ± 0.15	
CO_2 Setpoint and Resolution	± 0.1%	
CO_2 Inlet Connect/Pressure	5 PSIG, 0.03MpaG	
CO_2 Switchover System	optional	
Humidification System		
Method	natural evaporation	
Relative Humidity	95+/-5% (ambient temp. 37C, CO_2 5%)	
Water Level Sensor	optical, low water level alarm	
Capacity		
Gross Interior Volume Per Chamber (Nominal)	7.6 cu.ft./215 liters	6.0 cu.ft./170 liters
Chamber Interior Dimensions	24.4"W x 20.6"F-B x 26.2"H	19.3"W x 20.6"F-B x 26.2"H
Exterior Dimensions, Single	30.3"W x 27.9"F-B x 35.4"H	24.4"W x 28.0"F-B x 35.4"H
Exterior Dimensions, Stacked	30.3"W x 27.9"F-B x 70.8"H	24.4"W x 28.0"F-B x 70.8"H
Shelf Dimensions	22.8"W x 17.7"F-B, .05" lip	17.7"W x 17.7"F-B , 0.5" lip
Shelf Capacity Per Chamber	15, 5 standard	15, 4 standard
Contamination Control		
SafeCell™ UV System	standard	
inCu saFe™ Interior	standard	
Decontamination Method	programmable UV sterilization of air and water pan	
UV Lamp	4 watt, 253.7 nanometer narrow bandwidth, ozone-free	
Microbiological Filters	0.3 microns, 99.97% efficient, on air and CO_2 inputs	
Control, Alarm, Monitoring and Electrical		
Microprocessor Control	SANYO-built electronic components	
Control Position	door-mounted, eye-level location on dual stacked configuration	
Alarm System	overtemp, CO_2 and temperature deviation, low water level, door ajar	overtemp, CO_2 and temperature deviation, low water level, door ajar, lamp failure alarm
Remote Alarm Contacts	30V DC, 2 amps allowable	
Communications (Optional)	MCO-420MA data port available, 4 to 20 MA signal	
Electrical Service	115V, AC, 60Hz, NEMA 5-15	
Cabinet Construction		
Interior Surface	inCu saFe™ copper-enriched stainless steel alloy for germicidal protection	
Exterior Cabinet	polyester finished, baked-on zinc galvanized steel, reinforced for stacking	
Inner Door	tempered glass with positive latch	
Outer Door	left hand swing standard, reversible to right hand swing	
Accessories (Catalog #)		
CO_2 Switchover System	MCO-21GC	
CO_2 Cylinder Regulator	MCO-100L	
Roller Base	MCO-20RB	MCO-18RB
Independent Door Kit	MCO-20ID	MCO-18ID
inCu saFe™ Shelves & Brkts	MCO-58ST	MCO-46ST
Communications Port	MCO-420MA	
Stacking Brackets	included	
SafeCell™ UV System	included	

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Model	Low O2 Series		Conventional Series		
Single Chamber	MCO-18M	MCO-5M	MCO-18AIC	MCO-17AC	MCO-5AC
Dual Chamber, Stacked	MCO-36M		MCO-36AIC	MCO-34AC	
Heating System					
Method	patented Direct Heat and Air Jacket™				
Temperature Control		microprocessor controlled P.I.D.			
Temperature Range	5ºC above ambient to +50ºC, ± resolution 0.1ºC				
Temperature Uniformity	± .25ºC				
CO_2 System					
CO_2 Sensor	I.R. (Infrared)	TC (Thermal Conductivity)	I.R. (Infrared)	TC (thermal conductivity)	
CO_2 System Electronics	microprocessor P.I.D./R™	microprocessor		microprocessor	
CO_2 Range and Variation	0-20%, ± 0.15				
CO_2 Inlet Connect/Pressure	5 PSIG, 0.03MpaG				
CO_2 Switchover System	optional			n/a	optional
O_2 System					
O_2 Sensor	Zirconia		n/a		
O_2 System Electronics	microprocessor P.I.D./R™ with fast recovery algorithm		n/a		
O_2 Range and Variation	1-18%, 22-80%		n/a		
N_2 / O_2 Inlet Connect/Pressure	7 PSIG, 0.03MpaG		n/a		
N_2 / O_2 Switchover System	standard		n/a		
Humidification System					
Method	natural evaporation				
Relative Humidity	95+/-5% (ambient temp. 37C, CO_2 5%)				
Water Level Sensor	optical, low water level alarm			n/a	water level sensor
Capacity					
Gross Interior Volume Per Chamber (Nominal)	6.0 cu.ft./215 liters	1.7 cu.ft./49 liters	6.0 cu.ft./170 liters	5.8 cu.ft./164 liters	1.7 c.ft./49L
Chamber Interior Dimensions	19.3"W x 20.6"F-B x 26.2"H	13.8"W x 14.9"F-B x 14.8"H	19.3"W x 20.6"F-B x 26.2"H	19.2"W x 19.8"F-B x 26.2"H	13.8"W x 14.9"F-B x 14.8" H
Exterior Dimensions, Single	24.4"W x 28.0"F-B x 35.4"H	18.9"W x 21.6"F-B x 22.6"H	24.4"W x 28.0"F-B x 35.4"H	24.4"W x 24.0"F-B x 35.4"H	
Exterior Dimensions, Stacked	24.4"W x 28.0"F-B x 70.8"H	--	24.4"W x 28.0"F-B x 70.8"H	24.4"W x 24.0"F-B x 70.8"H	--
Shelf Capacity Per Chamber	15, 4 standard	6,3 standard	15, 4 standard	17, 5 standard	6, 3 standard
Contamination Control					
SafeCell™ UV System	optional			n/a	optional
inCu saFe™	standard				
Decontamination Method	optional programmable UV sterilization of air and water pan			manual	optional UV
UV Lamp	optional 4 watt, 253.7 nanometer narrow bandwidth, ozone-free			n/a	optional UV
Microbiological Filters	0.3 microns, 99.97% efficient, on air and CO_2 inputs				
Control, Alarm, Monitoring and Electrical					
Microprocessor Control	SANYO-built electronic components				
Control Position	door-mounted, eye-level location on dual stacked configuration				
Alarm System	overtemp, CO_2 and temperature deviation, low water level, door ajar			overtemp, CO_2 and temperature deviation, door ajar	overtemp, CO_2 and temp deviation, low water level, door ajar
Communications (Optional)	MCO-420-MA Temperature, CO_2 4 to 20 MA signal			n/a	MCO-420-MA
Electrical Service	115V, AC, 60Hz, NEMA 5-15				
Cabinet Construction					
Interior Surface	inCu saFe™ copper-enriched stainless steel alloy for germicidal protection				
Exterior Cabinet	polyester finished, baked-on zinc galvanized steel, reinforced for stacking				
Inner Door	tempered glass with positive latch				
Outer Door	left hand swing standard, reversible to right hand swing			left hand swing only	left and right swing
Accessories (Catalog #)					
CO_2 Back-Up System	MCO-21GC			n/a	MCO-21GC
CO_2 Cylinder Regulator	MCO-100L				
Roller Base	MCO-20RB	MCO-5RB	MCO-18RB		MCO-5RB
Independent Door Kit	MCO-20ID	n/a	MCO-18ID	n/a	n/a
inCu saFe™ Shelves & Brkts	MCO-58ST	MCO-30ST	MCO-46ST		MCO-30ST
Communications Port	MTR-420MA, 4 to 20 MA signal			n/a	MCO-420-MA
Stacking Brackets	built-in			MCO-18PS	built-in

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