

## Guide to Laboratory Equipment

Advanced Products and Technologies for  
Life Science, Pharmaceutical, Biotechnology,  
Clinical and Industrial Laboratories

Panasonic... the new name for SANYO

[www.panasonic.com/biomedical](http://www.panasonic.com/biomedical)



# Guide to Laboratory Equipment

Advanced Products and Technologies for  
Life Science, Pharmaceutical, Biotechnology,  
Clinical and Industrial Laboratories

## My Life, My Work, My Choice

Welcome to Panasonic Healthcare Company of North America. Known throughout the world as a leader in consumer electronics and appliances, Panasonic addresses global needs such as energy, food, housing, health and information technology. For over forty years, Panasonic Healthcare has established a reputation as a premier manufacturer of precision biomedical and laboratory equipment. As part of the worldwide Panasonic brand we benefit from our unique Vertical Component Integration approach to product development. This gives us the most advanced technology, controls, construction and performance attributes among many markets.

We combine ideas and innovations from our global network of industrial and consumer products into a complete line of biomedical laboratory products. Through this effort, we offer the industry's most sophisticated refrigeration compressor design and state-of-the-art electronics to ultra-low and cryogenic freezers, refrigerators, incubators and environmental chambers.

Panasonic products are extensively tested to meet the toughest quality standards in the world for performance, ergonomics and cost of ownership. Every product we build is designed to minimize its carbon footprint through energy savings and environmental stewardship. We understand that our products are used in the most critical applications on the leading edge of medicine, life science, pharmaceutical and agricultural research. We take this responsibility seriously, which is why you can turn to Panasonic laboratory equipment with confidence.



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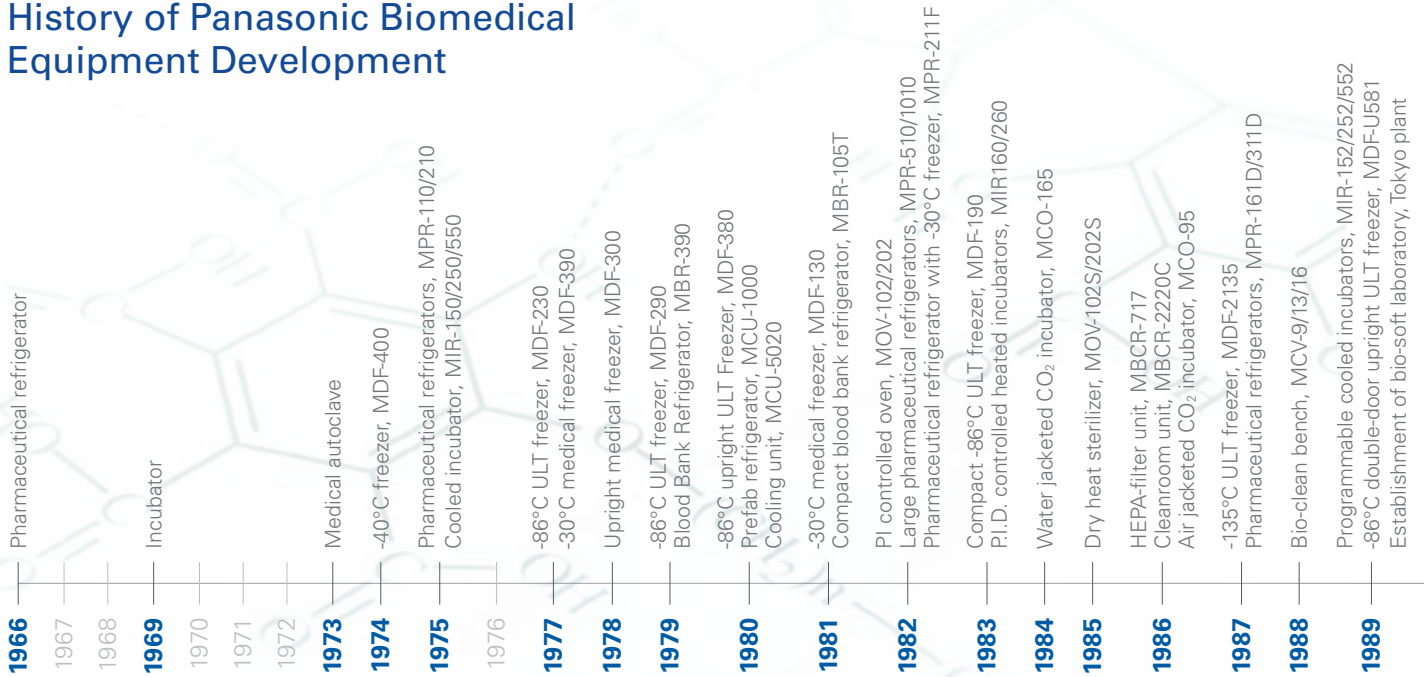
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# History of Panasonic Biomedical Equipment Development



## Core Technologies

Panasonic core technologies, patents and intellectual properties are represented in every product line. Core technologies apply to critical components and processes such as refrigeration compressors, microprocessor electronics and patented VIP® vacuum insulation panels engineered to exact specifications for important applications in the life science, pharmaceutical, biotechnology, clinical and industrial laboratories.

As a result, Panasonic products operate with dependability, safety, energy efficiency and ergonomic sensitivity. Look for these and other proprietary technologies and patents on Panasonic Biomedical laboratory products.



Patented VIP® vacuum insulation panel freezers, U.S. Patent No. 6260377



Twin Guard® Series -86°C independent ultra-low temperature refrigeration systems



SafeCell UV contamination control,



inCu-saFe® germicidal effective copper-enriched stainless steel incubator interior



P.I.D. infrared CO<sub>2</sub> system with rapid recovery, dual sensor on Sterisonic GxP Series (MCO-19AIC) only



Hydrogen Peroxide Vapor Decontamination, new feature for the Sterisonic GxP Series (MCO-19AIC) only

Direct Heat and Air Jacket (DHA) incubator heating technology,

Active Background Contamination Control cell culture environment

Panasonic-designed compressors specifically for laboratory refrigeration

Panasonic-brand battery technology

Panasonic-built electronic components



<b>1990</b>	Plant growth cabinet, MLR-350
<b>1991</b>	Multi-gas incubator, MCO-175M World's lowest temperature freezer, (-152°C), MDF-1155(ATN) Bench-top clean bench, MCV-711ATS
<b>1992</b>	Programmable high-temperature oven, MOV-313P Plasma blast freezer, MDF-U460B
<b>1993</b>	Four-door pharmaceutical refrigerator with -30°C freezer, MPR-411F/411FR
<b>1994</b>	ISO 9002 recognition
<b>1995</b>	CFC-free refrigerants recognized by ASHRAE (EPA Stratospheric Ozone Protection Award)
<b>1996</b>	ISO 9001
<b>1997</b>	Introduction of world's first vacuum insulated -86°C freezer, MDF-U70V
<b>1998</b>	Pharmaceutical refrigerator, MPR-512/1012 ISO 14001 (environmental recognition)
1999	
<b>2000</b>	Introduction of inCu-safe® active background contamination control in CO <sub>2</sub> incubators
2001	
<b>2002</b>	Introduction of SafeCell revolutionary UV decontamination in CO <sub>2</sub> incubators
<b>2003</b>	-86°C VIP® freezers, MDF-U32V/U54VC Multi-gas incubator, MCO-18M
2004	
2005	
<b>2006</b>	Introduction of -150°C freezer, MDF-C2156VANC
2007	
<b>2008</b>	Introduction of large capacity reach-in CO <sub>2</sub> incubator, MCO-80IC
<b>2009</b>	Introduction of Sterisonic GxP Series CO <sub>2</sub> incubator, with H <sub>2</sub> O <sub>2</sub> decontamination
<b>2010</b>	Introduction of Twin Guard® Series -86°C ULT Freezer, MDF-U500VX MCO-19M Cooled Incubator
<b>2011</b>	PRO Series Twin Guard® Series MDF-700VXC -86°C High efficiency energy saving ULT freezer MDF-U76VC
2012	

## Vertical Component Integration



As a leader in consumer electronics, refrigeration, energy and environmental products, Panasonic offers a robust source of proven technologies deployed throughout a range of biomedical and medical research products.

Pioneering developments in consumer and industrial products are applied to all Panasonic products through the development model of Vertical Component Integration. Because many of our key component parts are designed and built by Panasonic, we offer only the very best, accurately matched components in each Panasonic product.

As Panasonic draws on vast corporate resources to develop laboratory products to meet the needs of contemporary medical and scientific research, the Panasonic philosophy of Vertical Component Integration is expressed in human-oriented, easy-to-use ergonomic products.

## Environmentally Friendly Technology

Always a leader in environmentally friendly technology, Panasonic refrigerators use commercially available HFC refrigerants and CFC-free insulation.



Compliance of RoHS, Restriction of Hazardous Substance, on all units.



Panasonic is committed to developing green technologies that provide energy efficiency resulting in lower operational costs with less impact on the environment.





## Serving our Markets

Panasonic Biomedical products are designed for the most demanding applications in clinical, pharmaceutical, life science, biotechnology and research laboratory markets.

From incubation to preservation and sterilization, Panasonic products continue to evolve from basic laboratory equipment into the sophisticated yet user-friendly instruments used in critical cell management and leading-edge protocols. These include gene and cell therapeutics for *in vivo* treatments, stem and embryonic cell growth and storage, regenerative medicine, bio-manufacturing and more.

At the heart of this evolution are innovative applications of integrated electronics and digital acquisition systems developed to control, monitor, document and validate the performance of our products as well as the safety of the work inside. As multidisciplinary research reveals new solutions in cell manufacturing destined for clinical trials, Panasonic is collaborating with our customers to create products designed to satisfy strict third-party regulatory criteria such as AABB/ANRC, GMPs, GLPs and more.

## Thinking Green

Panasonic has established a corporate-wide initiative to emphasize the company's commitment to energy conservation and environmental integration. For Panasonic, thinking green is a threefold approach to environmental, energy and lifestyle considerations. Here, Panasonic is redefining conventional ideas and taking advantage of the company's expansive technological resources to propose environmentally friendly solutions.

Our commitment to the environment is illustrated by the company's early and aggressive efforts to revamp and redesign the refrigeration systems upon which so many of our products depend. We were among the first to adopt new, environmentally safe, non-ozone depleting refrigerants without compromising performance. We were the first ultra-low freezer manufacturer to use non-CFC R508 refrigerants, today recognized as the worldwide industry standard and now readily available as a non-proprietary recharge to refrigeration service professionals on the open market. Other Panasonic Biomedical refrigerants such as R134a, R410a (Puron®) and R404a are safe and sourced on the open market as well.

Panasonic Biomedical cabinets are insulated with high-performance HCFC-free insulation and new composite insulation techniques to minimize energy consumption and lower operating costs. Beyond highly competitive first costs, Panasonic Biomedical ultra-low freezers demonstrate the lowest operating costs per cu.ft. (liter) in the worldwide market.

Superior insulation technologies enable our exclusive High-Density Storage valuation to offer the most favorable ratio of useable storage volume per sq.ft. of floor space in the industry, maximizing laboratory space efficiency and reducing overall costs of ownership.





**Panasonic  
Preservation**

**World Class Design.** *Panasonic refrigeration systems offer superior performance and reliability, even in higher ambient temperatures and in response to frequent door openings. The cooling system also maintains uniform temperatures throughout the freezer, which is especially important when validation is required.*

# Panasonic Preservation Systems

Every day, laboratories around the world depend on Panasonic freezers for their ultra-low temperature storage, reassured by an industry-leading reputation for performance and reliability.

## VIP® PLUS Space Saving Series -80°C Ultra-Low Freezers

MDF-U56VC  
MDF-U76VC  
MDF-C8V1, Chest

## VIP® Space Saving Series -86°C Ultra-Low Freezers

MDF-U33V  
MDF-U53VA

## Twin Guard® Series -86°C Ultra-Low Freezers

MDF-U500VXC  
MDF-U700VXC

## PRO Series Conventionally Insulated -86°C Ultra-Low Freezers

MDF-U5486SC, Upright  
MDF-U7486SC, Upright  
MDF-594C, Chest  
MDF-794C, Chest



## VIP® PLUS Space Saving Series -150°C Cryogenic Freezer

MDF-C2156VANC

## -30°C/-35°C Biomedical Freezers

MDF-U333  
MDF-U5312  
MDF-U731  
MDF-U731M

## Laboratory Refrigerators

MPR-721  
MPR-721R  
MPR-1411  
MPR-1411R

## Pharmaceutical Refrigerators

MPR-311D(H)  
MPR-514  
MPR-514R  
MPR-1014  
MPR-1014R

## Blood Bank Refrigerators

MBR-107D(H)  
MBR-304GR  
MBR-704GR  
MBR-1405GR

## Biomedical Refrigerator with Freezer Combination

MPR-215F  
MPR-414F  
MPR-715F

## General Purpose Refrigerators

SRR-23GD-MED  
SRR-49GD-MED  
SRR-72GD-MED

## Under-Counter Refrigerators and Freezers

SR-L6111W  
SF-L6111W  
SR-L4110W  
SR-L4110WSEC  
HF-5017W  
HF-5017WSEC

## Preservation System Features



Cascade Cooling System



VIP® Vacuum Insulation Panel



VIP® PLUS Vacuum Insulation Panel



Insulated Inner Doors



CPU and Touch Pad



LCD Digital Display



Remote Alarm



Automatic Alarm System



Power Failure Alarm



Filterless Design



Air Filter



CFC-Free



Energy Savings



Quiet, Reliable Compressors



Service



Rechargeable Battery



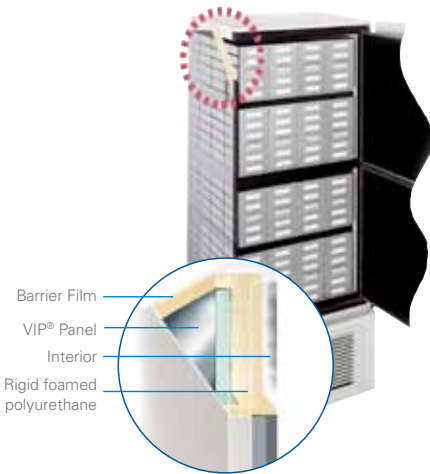
Patented Panasonic refrigerants are non-ozone depleting, non-flammable and environmentally safe in compliance with the Montreal Protocol.



## Innovation

Our reputation is built on world-class design and refrigeration systems developed specifically for ultra-low temperature applications. Panasonic has pioneered the development of new technologies for ultra-low temperature storage from the world's lowest temperature -150°C mechanical freezer, the introduction of application specific HCFC-free refrigerants and the first -86°C freezer with vacuum insulation panel (VIP®).

In 2006, Panasonic introduced the next generation of compressors for ultra-low freezers. Application-specific compressors provide new levels of durability with significantly reduced power consumption, heat output and noise.



*The Panasonic patented VIP® vacuum insulation panel thin-wall composite is a high-efficiency design that yields 25% more interior storage volume in a conventional freezer footprint.*

## Vacuum Insulation Panel (VIP®)

Panasonic was the first company to introduce vacuum insulation panels to ultra-low temperature freezers. The Panasonic range of VIP® freezers typically provide 25% more storage capacity for a given floor area saving valuable laboratory space.

The Panasonic patented VIP® vacuum insulation panel thin-wall composite is a high-efficiency design that yields more interior storage volume in a conventional freezer footprint. The VIP® minimizes energy transfer to and from the ultra-low temperature interior. The composite construction, complete with reflective barrier film and structural closed-cell foam, is used on all walls and the outer door.

This advanced insulation technology offers structural stability to eliminate distortion, and inhibits moisture accumulation that can lead to icing. Aggregate insulation efficiency minimizes compressor cycle run-time to lower energy costs.

## Cascade Cooling System

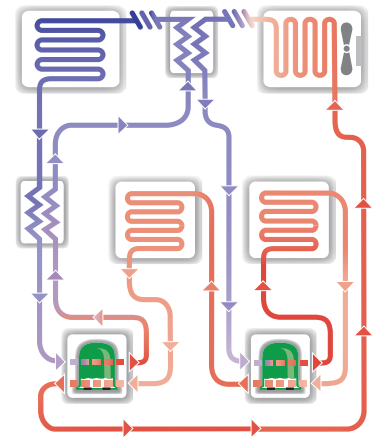
By apportioning the oil cooling function between specially designed Cool Safe compressors, and by cooling the compressor oil to minimize compressor operating temperatures, the Panasonic ultra-low temperature freezer refrigeration system is balanced to decrease component stress, increase system longevity and reliability, and improve temperature uniformity necessary for better cell viability regardless of where the specimen is stored within the chamber.

## Quality to Rely On

Panasonic's Quality Management System is certified to ISO9001 and every Panasonic freezer undergoes at least 100 checks throughout production to ensure the highest quality standards are maintained.



*Panasonic freezers are available with a variety of inventory racks to meet specific applications. Freezers can be ordered with full-load inventory systems by selecting one catalog number.*



*Panasonic-designed Cool Safe refrigeration compressors feature innovative refrigerant feedback processes to reduce compressor temperature, thereby extending compressor life and minimizing heat output.*

# VIP® Series Green Product Features

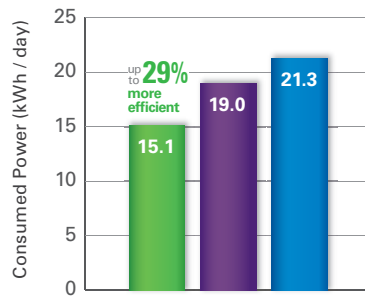
## Panasonic VIP® Green Initiative Advantages

With a capacity of up to 57,600 two-inch vials in fiberboard boxes, the energy-saving advantages of this efficient Panasonic system extend to lower per-unit storage costs regardless of the preferred inventory configuration.

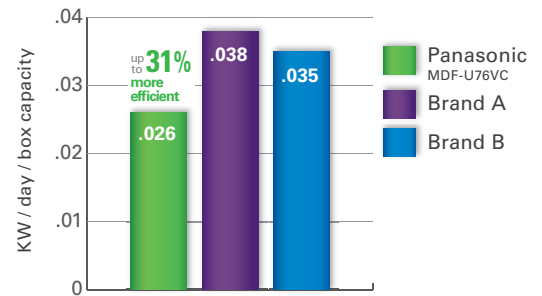
- Panasonic freezers are designed to support LEED certification associated with the U.S. Green Building Council recommendations.
- Components are compliant with RoHS directives on the use of hazardous materials in electrical and electronic equipment.
- The Panasonic VIP® vacuum insulated panel cabinet design offers high-density storage in a minimal footprint, optimizing available laboratory space and storage volume efficiencies.
- Noise reduction and operating cost efficiencies are integrated into the refrigeration system.
- Heat output is limited to minimize the impact on facility HVAC demands.
- A microprocessor controller oversees the refrigeration system to regulate cooling cycles, reducing energy consumption.
- Cool Safe compressor technology for lower compressor heat internally and externally lower HVAC loads.

Panasonic is conscious of the need to protect our environment and conserve energy. As a corporate pioneer in life science laboratory equipment and appliances, and as a global source of solutions ranging from energy management to solar power and alternative energies, Panasonic remains committed to providing the best possible laboratory equipment for research and clinical needs.

Consumed Power Amount  
kWh / Day – Actual Measurement

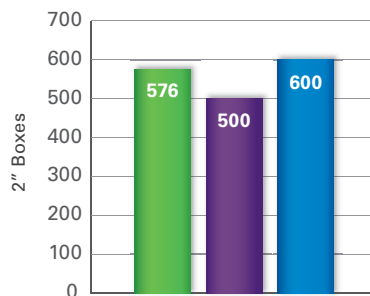


Power Consumption By Capacity  
(KW/day/box capacity)



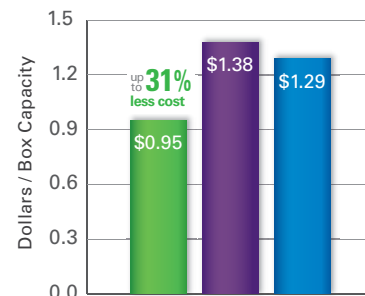
Power consumption data based on internal performance data. Tested in 25°C ambient environment. Freezer cycling at -80°C. Cabinet volume, 25.7 cu.ft. Average cabinet temperature based on temperature mapping (15 thermocouples). Panasonic freezers provide reduced operational cost for highly efficient sample storage.

2" Box Capacity



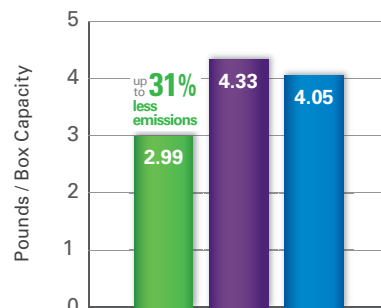
2" Box Capacity based on the amount of 2" boxes in standard racks that can be stored in an ultra low freezer. Panasonic freezers maximize your available space at a reduced footprint for maximized high density storage.

Total Annual Operating Cost  
by Box Capacity



Cost is an average for operating freezer. Panasonic freezers emit less heat into the laboratory, minimizing air conditioning costs.

Annual CO<sub>2</sub> Emissions  
by Box Capacity



MDF-U56VC



## Green Design and Performance

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### CFC Free Refrigerants

Panasonic was the first ultra-low freezer manufacturer to employ non-HCFC R508 low-stage refrigerant, now recognized as today's industry standard and widely available. This non-proprietary refrigerant is available to refrigeration service professionals on the open market.

The high stage refrigeration system is available to refrigeration professionals on the open market as well.

### RoHS Compliance

In 2006, RoHS (Restriction of Hazardous Substances) legislation (EU Directive 2003/95/EU) became effective. RoHS relates to the restriction of hazardous substances and reductions in environmental pollution.

Through RoHS legislation the EU and other participating countries are banning toxic substances in electrical equipment such as lead, cadmium, mercury, chromium 6+, PBB and PBDE.

### Electrical Standards

All Panasonic products including ultra-low temperature freezers are tested and certified by an NRTL (National Recognized Testing Laboratory) to assure compliance with US and International standards for electrical safety prescribed in 29 CFR 1910.7(c).

### Noise Reduction

Ultra-low freezers are often located within research and hospital laboratories or production facilities. Users prefer close proximity for easy access to valuable stored products.

If operating noise from refrigeration compressors is excessive, and/or compounded by installation of multiple freezers in adjacent locations, the working environment is severely compromised.

Panasonic has included advanced noise abatement in all contemporary ultra-low freezers and noise reduction levels are well below those of competitive freezers. Data is available upon request.

### Inventory Management

The concept of High Density Storage is enabled by advances in Panasonic Cool Safe compressor design. The cost per 2" box of interior storage space is significantly lower in a Panasonic ultra-low freezer, generating immediate return on investment based on first costs, operating costs and maintenance costs over time.

Additionally, the placement of evaporator surfaces within the cabinet walls achieve exceptional documented ultra-low temperature uniformity, thereby permitting investigators more freedom in placing valuable cell lines and biologicals within the interior cabinet, and assuring uniform cell viability when harvesting products from the ultra-low archive.

The Cool Safe compressor design extend to evaporator tubing surrounding the interior chamber, and the interior chamber is part of the thin-wall composite based on the patented VIP® vacuum insulation panel cabinet, Panasonic can offer more usable storage volume within the same sq.ft. of floor space than competitive models.

MDF-U76VC



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#### eco ideas

*Because modern laboratories are energy-intensive, Panasonic has developed a corporate-wide energy savings and environmental impact approach to new product development. VIP® Series freezers offer significant benefits through a balance of refrigeration power, cabinet construction and intelligent control over all functions.*

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## VIP® Series Space Saving -86°C Ultra-Low-Freezers

Panasonic VIP® / VIP® PLUS ultra-low temperature freezers offer the most advanced combination of low-temperature refrigeration, cabinet and control technology in the clinical and life science industry. Space-saving, high-density VIP® PLUS vacuum insulation panel construction allows up to 25% more storage volume in the same or less floor space than conventional freezers.

### VIP® / VIP® PLUS Upright Freezer Selection

Model Number	Interior Volume	Exterior (w x f-b x h)	Area Footprint, Nominal	Fiberboard Boxes, 2" high (2ml) in Panasonic Racks	Sample Vials, 2ml (2" box), 100-Cell Dividers	Electrical, 60Hz
MDF-U33V-PA	11.8 cu.ft. 334 L	26.4" x 34.1" x 73.2" 670 x 867 x 1860 mm	6.25 sq.ft. 0.58 m <sup>2</sup>	216	21,600	115V, AC, 15 amp
MDF-U53VA-PA	18.3 cu.ft. 519 L	30.3" x 34.4" x 78.3" 770 x 870 x 1990 mm	7.24 sq.ft. 0.68 m <sup>2</sup>	352	35,200	115V, AC, 20 amp
MDF-U56VC-PA	18.6 cu.ft. 526 L	30.3" x 34.4" x 78.3" 770 x 870 x 1990 mm	7.24 sq.ft. 0.68 m <sup>2</sup>	384	38,400	208/230V, AC, 15 amp
MDF-U76VC-PA	25.7 cu.ft. 728 L	39.8" x 34.4" x 78.3" 1010 x 870 x 1990 mm	9.51 sq.ft. 0.88 m <sup>2</sup>	576	57,600	208/230V, AC, 15 amp

VIP® units offer lower operational costs than conventionally insulated models. These units also offer high-density ultra-low storage solutions for the laboratory.

### Patented VIP® / VIP® PLUS Vacuum Insulation Panel

Combination of multiple high-performance vacuum panels with high-density foam insulation achieves thin-wall profile for maximum interior volume in a compact footprint. Increased cooling capacity improves temperature recovery after door openings.

### Inner Doors Improve Uniformity

Easy-In/Easy-Out Panasonic Eagle inner door latches feature ergonomic design to seal firmly against the cabinet with one hand. High-strength, insulated inner doors help minimize change in interior temperatures during routine door openings.

### Microprocessor

Comprehensive setpoint, alarm, monitoring and diagnostic functions supervised by Panasonic-built microprocessor controller with digital display of all input/output function.

### Panasonic Heat Exchanger Design Increases Energy Efficiency

Every traditional ultra-low freezer design utilizes a heat exchanger. By increasing the efficiency of the heat exchanger through an improved new design incorporating more surface area contact at critical points in the refrigeration system, we are able to improve the overall efficiency and reduce compressor running time. This along with other improvements to heat exchange in the refrigeration system translates to a substantial increase in energy efficiency.

### Panasonic-Designed Compressors

Cool Safe ultra-low temperature compressor employs a unique compressor design and oil cooling method reduce discharge temperatures and compressor heat.

### Smart Refrigeration Monitoring System

Status alert function uses predictive intelligence to determine if freezer is operating within specifications under existing environmental conditions.

### Water Cooled Option (MDF-WCL)

A water cooled condenser option is available for facilities equipped with water recirculation cooling systems. This option utilizes the cascade refrigeration design to reuse the energy produced by an ultra low freezer while delivering energy-savings and high performance cooling.

Ideal for material storage in repositories, hospitals, clinics and medical research facilities, the water cooled system is designed to significantly reduce energy consumption.

MDF-U76VC



## Twin Guard® Series -86°C Ultra-Low Freezers

The Panasonic Twin Guard® Series ultra-low freezers are designed for -86°C storage of high-value biologicals. Ideal for critical material storage in repositories, highly secure BSL4 labs, hospitals, clinics and medical research facilities. The Twin Guard® Series introduces the concept of dual, independent, autocascade refrigeration systems contained within a single cabinet.

### Twin Guard® Series -86°C Ultra-Low Upright Freezer Selection

Model Number	Temperature Range	Interior Volume	Area Footprint (nominal)	Storage (2"/51 mm boxes)	Storage (3"/76 mm boxes)	Storage (2ml vials in boxes)	Electrical, 60Hz
MDF-U500VXC-PA	-50°C to -86°C	18.3 cu.ft. 519 L	8.37 sq.ft. 0.78 m <sup>2</sup>	352	224	35,200	208/230V NEMA 6-15
MDF-U700VXC-PA	-50°C to -86°C	25.7 cu.ft. 728 L	9.51 sq.ft. 0.88m <sup>2</sup>	576	384	57,600	208/230V NEMA 6-15

The safest ultra-low freezers for long-term storage of ultra-critical biologicals.

#### Twin Guard® Series Refrigeration System

The Twin Guard® Series ultra-low freezers avoid conventional cascade refrigeration technology by using two completely independent one-compressor, autocascade cooling systems, each capable of maintaining ultra-low temperatures.



Panasonic VIP® Series freezers offer high-density storage that effectively reduces the volumetric unit costs of ultra-low storage.

#### Integrated LCD Control with Graphical Display

The Twin Guard® Series MDF-U500VXC and MDF-U700VXC are managed by an integrated microprocessor controller with LCD information center to simplify all freezer functions. Uniform ultra-low temperature is achieved through a combination of performance systems supervised by the controller complete with alarm, programming and diagnostic protocols.

#### Patented VIP® PLUS Vacuum Insulation Panel

Combination of multiple high-performance vacuum panels with high-density foam insulation achieves thin-wall profile for maximum interior volume in a compact footprint. Increased cooling capacity improves temperature recovery after door openings.

#### Inner Doors Improve Uniformity

Easy-In/Easy-Out Panasonic Eagle inner door latches feature ergonomic design to seal firmly against the cabinet with one hand. High-strength, insulated inner doors help minimize change in interior temperatures during routine door openings.

#### Reduced Power Consumption

The Panasonic Twin Guard® Series freezers can be set for Normal or EcoMode operation, depending on ambient temperature and load. EcoMode is recommended for 90-95% of applications. Although both refrigeration systems are completely independent, EcoMode establishes an overlapping cycle to significantly reduce energy consumption while optimizing interior uniformity from top-to-bottom and front-to-back for protection of high value materials.

MDF-U500VXC



MDF-U700VXC





# MDF-U500VXC MDF-U700VXC



## Twin Guard® Series -86°C Ultra-Low Freezers Featuring Panasonic Dual Independent Refrigeration Systems

The industry's safest ultra-low storage solution for high value biologicals.

The 18.3 cu.ft. (519 L) MDF-U500VXC and the 25.7 cu.ft. (728 L) MDF-U700VXC VIP® PLUS insulated, includes integrated LCD performance monitor and digital controller for comprehensive system management, data logging, remote communications, alarms, predictive performance and validation. Maintenance-free, filterless design.

- The innovative design utilizing two independent systems allows the unit to continue to run continuously at -65°C or colder in the unlikely event of one compressor failure.
- The combination of additional refrigeration intelligently managed by intuitive microprocessor controls and integrated into Panasonic's patented VIP® PLUS vacuum panel cabinet make the most efficient use of available floor space.
- Twin Guard® Series freezers significantly increase ultra-low protection while minimizing energy costs through a unique EcoMode function. EcoMode optimizes power consumption by orchestrating run times for each refrigeration system in response to cooling demands.



The Panasonic Twin Guard® Series -86°C ultra-low freezer with dual, independent refrigeration systems increases reliability.

Pictured: MDF-U700VXC

### Ultra-Critical Installations and Applications Overview

Application	Sensitivity	Benefit
Stem Cells, Cord Blood, T-Cells, Engineered Tissue, Organ/Tissue, Vaccines, Bone Marrow, Hybridomas, Lymphocytes, Cancer Cells, Clinical Specimens, Fibroblasts, Ova, Sperm	Highly sensitive to temperature fluctuations or uneven storage temperatures at different positions within the interior chamber.	Enhanced temperature uniformity, top-to-bottom, front-to-back, assures stability at all inventory locations.
BSL4 or Highly Secured Labs	Restricted access to the contained laboratory limits serviceability.	Twin Guard Series extends critical time necessary to react in the event of mechanical failure.

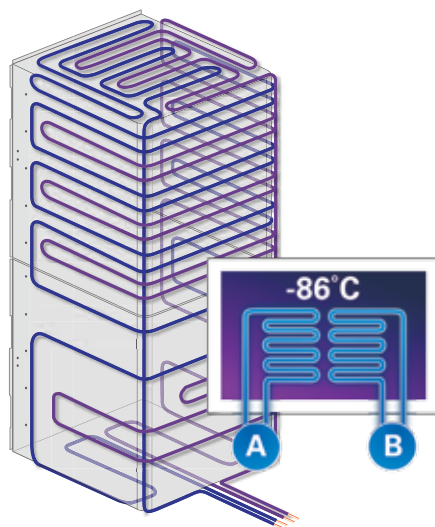
# Twin Guard® Series -86°C Ultra-Low Freezers



Integrated LCD control with graphical display. The Twin Guard® Series MDF-U500VXC & MDF-U700VXC are managed by an integrated microprocessor controller with LCD information center to simplify all freezer functions. Uniform ultra-low temperature is achieved through a combination of performance systems supervised by the controller complete with alarm, programming and diagnostic protocols.

## The Safest Ultra-Low Freezer for Long-Term Storage of Ultra-Critical Biologicals

The Panasonic Twin Guard® Series satisfies the industry demand for safe, long-term storage for the most high-valued materials. Two independent refrigeration systems, combined with optional liquid nitrogen or liquid CO<sub>2</sub> back-up systems, offer a circle of protection unmatched in the marketplace. Developed for use with conventional inventory racks and boxes, the Twin Guard® Series is ideal for storage of sensitive stem cells, embryos, cell lines, and other rare specimens.



Independent systems efficient ultra-low cooling is achieved through two independent evaporator circuits surrounding the interior chamber.

## Twin Guard Series -86°C Refrigeration System

The Twin Guard® Series Ultra-Low Freezers avoid conventional cascade refrigeration technology by using two completely independent one-compressor, autocas-cade cooling systems, each capable of maintaining ultra-low temperatures.

- Each refrigeration circuit includes a closed-loop cold-wall evaporator configured in parallel to the other.
- Independent evaporators and cooling fans assure back up status at all times, eliminating system failure due to sub-component failure in conventional cascade systems configured of mutually dependent high- and low-stage systems.

- In the unlikely event of a compressor failure in one system, the remaining system will automatically maintain a minimum of -65°C for an indefinite period.
- In the event of a facility power failure with optional CO<sub>2</sub> or LN<sub>2</sub> backup system installed, the freezer will maintain -65°C storage temperature for up to eight hours (CO<sub>2</sub> backup system) and -65°C storage temperature for up to 15 hours (LN<sub>2</sub> backup system).
- A unique EcoMode deploys both systems in overlapping cycles to maintain -86°C and to reduce energy consumption by as much as 15%.
- Evaporator coils embedded in the patented, high-tech, Panasonic VIP® vacuum-insulated thin-wall cabinet are strategically oriented to deliver the best temperature uniformity at all shelf levels, top-to-bottom and front-to-back.
- New Panasonic-designed Cool Safe refrigeration compressors feature innovative refrigerant feedback processes to reduce compressor temperature, thereby extending compressor life and minimizing heat output.

## Failure Mode Comparison

Event	Conventional Freezer No Backup	Conventional Freezer With Backup	Panasonic Twin Guard® Series
Fan Failure	Freezer Fails	Freezer fails, CO <sub>2</sub> or LN <sub>2</sub> backup system offers short-term protection until contents can be removed and repairs initiated.	If one fan fails, the second fan automatically maintains energy exchange.
High Stage Compressor Failure	Freezer Fails	Freezer fails, CO <sub>2</sub> or LN <sub>2</sub> backup system offers short-term protection until contents can be removed and repairs initiated.	No high or low stage used. Two refrigeration systems, each with a single compressor, operate independently in overlapping cycles during normal operation. If one compressor fails internal temperature is maintained indefinitely at -65°C. Optional LN <sub>2</sub> or CO <sub>2</sub> backup system offers additional protection.
Low Stage Compressor Failure	Freezer Fails		

## Conventionally Insulated PRO Series -86°C Ultra-Low Freezers (Upright)

Panasonic conventionally insulated PRO series ultra-low freezers provide energy savings while minimizing carbon footprint throughout the laboratory without compromising performance. The conventionally insulated series also maintains internal temperatures as low as -86°C. All models use Panasonic-designed compressors for ultra-low temperature applications. Manufactured with foam-in-place insulation to maximize interior temperature uniformity, they are ideally suited for use in hospitals and laboratories for long-term preservation and storage of blood, specimens and components, as well as material testing.

### Conventionally Insulated PRO Series -86°C Ultra-Low Freezers (Upright)

Model Number	Volume (cu.ft.)	Exterior Dimensions (w x f-b x h)	Storage (2"/51 mm boxes)	Storage (3"/76 mm boxes)	Storage (2ml vials in boxes)	Voltage, Power Connection
MDF-U5486SC-PA	17.1 487 L	35.0" x 34.4" x 78.3" 890 x 875 x 1990 mm	384	192	32,000	208/230V NEMA 6-15
MDF-U7486SC-PA	23.5 668 L	44.5" x 34.4" x 78.3" 1130 x 875 x 1990 mm	432	336	43,200	208/230V NEMA 6-15

Think Green, environmentally friendly refrigerants, RoHS compliant and low-noise operation.

#### Microprocessor Controls

Comprehensive setpoint, alarm, monitoring and diagnostic functions based on Panasonic-built microprocessor controller with digital display of all input/output functions.

#### Panasonic-Designed Refrigeration

Designed by Panasonic specifically for rugged ultra-low temperature applications in a laboratory environment; CFC-free refrigerants only. Panasonic refrigeration system delivers uniform temperatures with increased cooling capacity. High performance refrigeration system with foam-in-place cabinet insulation maximizes interior temperature uniformity and protects against fluctuating ambient temperatures.

#### Panasonic-Designed Compressors

Cool Safe ultra-low temperature compressor employs a unique orientation of conventional components to reduce discharge temperatures and compressor heat.

#### MDF-U7486SC

##### -86°C Ultra-Low Temperature Freezers:

- Ideal -86°C freezing environment by means of conventional insulated walls.
- Specially designed compressors for ultra-low temperature applications.
- Microprocessor temperature control with digital input for precise setting and control.
- Built-in temperature and power failure alarms (audible/visible).

#### Inner Doors Improve Uniformity

Double insulation polyurethane walls and easy open, easy close hinged outer door latch. Two independent and insulated inner doors ensure maximum interior chamber uniformity.



**Thinking Green:** Environmentally friendly refrigerants, RoHS compliant and low-noise operation.

## MDF Series -80°C to -86°C Ultra-Low Freezers (Chest)

Panasonic MDF series ultra-low temperature freezers maintain internal temperatures as low as -86°C (-123°F). All models use Panasonic-designed compressors for ultra-low temperature applications. Manufactured with foamed-in-place insulation, they are ideally suited for use in hospitals and laboratories for long-term preservation and storage of blood, specimens and components, as well as materials testing.

### Conventionally Insulated MDF Series -86°C Ultra-Low Freezers (Chest)

Model Number	Volume (cu.ft.)	Exterior Dimensions (w x f-b x h)	Storage (2"/51 mm boxes)	Storage (3"/76 mm boxes)	Storage (2ml vials in boxes)	Voltage, Power Connection
MDF-594C-PA	17.2 487 L	79.1" x 30.3" x 42.1" 2010 x 770 x 1070 mm	351	243	35,100	208/230V NEMA 6-15
MDF-794C-PA	24.8 702 L	101.2" x 30.3" x 42.1" 2570 x 770 x 1070 mm	507	351	50,700	208/230V NEMA 6-15

### VIP® PLUS Space-Saving Series, -80°C MDF Ultra-Low Freezer (Chest)

Model Number	Volume (cu.ft.)	Exterior Dimensions (w x f-b x h)	Storage (2"/51 mm boxes)	Storage (3"/76 mm boxes)	Storage (2ml vials in boxes)	Voltage, Power Connection
MDF-C8V1-PA	3.0 85 L	21.6" x 27.0" x 37.2" 550 x 685 x 945 mm	42	30	4,200	115V NEMA 5-15

Think Green, VIP® offers lower operational costs than conventionally insulated models.

#### Microprocessor Controls

Comprehensive setpoint, alarm, monitoring and diagnostic functions based on Panasonic-built microprocessor controller with digital display of all input/output functions.

#### Panasonic-Designed Refrigeration

Designed by Panasonic specifically for rugged ultra-low temperature applications in a laboratory environment; HCFC-free refrigerants only.

#### Panasonic-Designed Compressors

High-performance refrigeration system with foam-in-place cabinet insulation maximizes interior temperature uniformity and protects against fluctuating ambient temperatures.

#### MDF-C8V1

##### Ultra-Low Temperature VIP® PLUS Freezer:

- Patented revolutionary vacuum insulation cabinet construction reduces wall thickness and achieves greater storage capacity while decreasing the footprint.
- Comprehensive setpoint, alarm, monitoring and diagnostic functions based on Panasonic-built microprocessor controller with digital LED display.



Thinking Green: VIP® PLUS offers lower operational costs than conventionally insulated models.

MDF-794C



# -150°C Cryogenic Freezer

Panasonic MDF series cryogenic freezer maintains uniform temperature of -150°C for stable, long-term preservation of cells and tissue.

Panasonic VIP® PLUS Cryogenic -150°C ultra-low temperature freezer achieves more storage capacity than a conventionally insulated freezer without increasing footprint.

## -150°C VIP® PLUS Cryogenic Freezers

Model Number	Volume (cu.ft.)	Exterior Dimensions (w x f-b x h)	Storage (2"/51 mm boxes)	Storage (3"/76 mm boxes)	Storage (2ml vials in boxes)	Voltage, Power Connection
MDF-C2156VANC-PA	8.2 231 L	68.1" x 30.1" x 39.8" 1730 x 765 x 1010 mm	150	105	15,000	208/230V NEMA 6-15

The newly developed refrigeration system and freezer structure offers a quiet environment.

### Uniform Cryogenic Temperatures

Mechanically refrigerated design promotes better top-to-bottom uniformity than liquid nitrogen vapor-phase storage.

### VIP® PLUS Design

Patented revolutionary vacuum insulation cabinet construction reduces wall thickness and achieves more storage capacity than a conventionally insulated freezer without increasing the footprint.

### Panasonic-Designed Refrigeration

Designed by Panasonic specifically for rugged cryogenic temperature applications in a laboratory environment; CFC-free refrigerants only.

### Microprocessor Temperature Control with Digital Design

Precise setting and temperature control. The temperature inside the freezer can be set and monitored easily by means of precise microprocessor temperature control with an LCD graphic display. Adjustable high/low temperature alarm; power failure alarm; filter check alarm; door ajar alarm; part replacement time notification.

### LCD Control Panel

Alpha-numeric microprocessor controller features a full-alarm package with a status alert monitoring system. The monitoring system records internal temperature up to one month and history of door openings and closings.



Comparison of temperature distribution in a liquid nitrogen freezer (vapor phase) and Panasonic's MDF-C2156VANC mechanically refrigerated cryogenic freezer. Graph shows temperatures at different locations within the chamber. This data demonstrates that 100% of the MDF-C2156VANC storage space maintains uniform storage temperatures safely below -130°C, while temperature in LN<sub>2</sub> vapor system is dependent on storage location.

### Ideal Alternative to LN<sub>2</sub> Storage Mechanical Preservation

Freezer preservation provides users with numerous advantages; uniform cryogenic storage temperatures, no worries about sample contamination, no liquid supply problems, no danger of sudden liquid eruptions and low operational costs.

### Built-In LN<sub>2</sub> Backup System

Automatically injects LN<sub>2</sub> to maintain temperature during prolonged power outage, (LN<sub>2</sub> tank not included).

### Mechanical Refrigeration

Lowers LN<sub>2</sub> consumption and mitigates safety concerns, reduces cost of ownership, minimizes chance of cross-contamination among stored samples due to vial breakage at extreme temperatures.

MDF-C2156VANC





## -30°C/-35°C Biomedical Freezers (Chest and Upright)

Panasonic MDF series biomedical freezers include chest and upright models designed for short- or intermediate-term storage at temperatures as low as -30°C/-35°C. Constructed with high-performance laboratory and clinical-grade refrigeration systems, these freezers are used in medical, biotechnology and industrial labs for storage of blood components, enzymes, culture media, reagents, specimens and vaccines.

### -30°C Biomedical Freezers (Upright)

Model Number	Volume (cu.ft.)	Exterior Dimensions (w x f-b x h)	Defrost	Voltage, Power Connection
MDF-U333-PA	9.7 / 274 L single door, single chamber	24.2" x 28.9" x 63.8" 615 x 733 x 1620 mm	Manual	115V, NEMA 5-15
MDF-U5312-PA	17.0 / 482 L double door, single chamber	31.5" x 30.4" x 70.9" 800 x 772 x 1800 mm	Manual	115V, NEMA 5-15
MDF-U731*	22.0 / 623 L single door, single chamber	30.3" x 32.7" x 77.0" 770 x 830 x 1955 mm	Auto	115V, NEMA 5-15
MDF-U731M*	24.4 / 690 L single door, single chamber	30.3" x 32.7" x 77.0" 770 x 830 x 1955 mm	Manual	115V, NEMA 5-15

Designed for high-performance laboratory and clinical applications.

\*Certain models will retain the SANYO logo until further notice

#### MDF-U731M

##### Enzyme and Biologics Preservation:

- Storage at -30°C and -20°C easily with constant stable control.
- Uniform temperatures throughout chamber using full cold wall construction.
- Because there is no defrost cycle, the inner chamber temperature offers outstanding uniformity and stability.

#### Panasonic-Designed Refrigeration

Designed by Panasonic with compressors specifically for storage applications in a laboratory environment.

#### Microprocessor Controls

Comprehensive setpoint, alarm, monitoring and diagnostic functions supervised by Panasonic-built microprocessor controller with digital display of all input/output function.

#### High-Performance Refrigeration

Laboratory-quality refrigeration assures stable, uniform temperatures throughout the chamber.

#### Enzyme and Biologics Preservation (Manual Defrost Models)

Storage at -30°C and -20°C easily with constant stable control. Uniform temperatures are maintained throughout the chamber using full cold wall construction.

#### General Purpose Storage, Maintenance-Free (Auto-Defrost Models)

Storage at -30°C with auto-defrost and consistent temperature control below -20°C during defrost cycle. Maintenance-free storage with no end user intervention to defrost unit and clean up condensate. Precision temperature uniformity throughout chamber due to forced air circulation with dual fans.



MDF-U333



MDF-U5312



## Laboratory Refrigerators

Large capacity laboratory refrigerators offer stable and reliable refrigerated environments for exacting laboratory requirements in clinical, research, pharmaceutical and industrial applications.

### Laboratory Refrigerators

Model Number	Volume (cu.ft.)	Exterior Dimensions (w x f-b x h)	Door (glass)	Shelves (adjustable wire)	Drawers (solid roll-out)	Voltage, Power Connection
MPR-721-PA	24.2 685 L	30.3" x 32.7" x 77.0" 770 x 830 x 1955 mm	single, swinging	4	—	115V NEMA 5-15
MPR-721R-PA	23.7 671 L	30.3" x 32.7" x 77.0" 770 x 830 x 1955 mm	single, swinging	—	5	115V NEMA 5-15
MPR-1411-PA	48.2 1365 L	56.7" x 32.7" x 76.8" 1440 x 830 x 1950 mm	double, swinging	8	—	115V NEMA 5-15
MPR-1411R-PA	48.0 1360 L	56.7" x 32.7" x 76.8" 1440 x 830 x 1950 mm	double, swinging	—	10	115V NEMA 5-15

Lab-ready with microprocessor control, alarm and monitoring, casters, access ports and interior lights.



#### Forced Air Circulation

Interior blower fans quickly restore temperature uniformity following routine door openings.

#### Adjustable Temperature Control

Panasonic-built microprocessor controller, temperature range 2°C to 23°C, with comprehensive setpoint, alarm, monitoring and diagnostic functions with digital display of all input/output functions.

#### Inventory Control

Choice of stainless steel roll-out drawers or adjustable wire shelves.

#### Panasonic Cycle Defrost

Unique cycle defrost initiates only as required; maintains internal temperature uniformity during process.

#### Panasonic-Designed Compressors

Designed by Panasonic specifically for demanding laboratory applications.

MPR-721

MPR-1411R



# Pharmaceutical Refrigerators

Panasonic's MPR series pharmaceutical refrigerators offer a complete and integrated solution for the growing requirements for strict and exact storage temperatures for pharmaceuticals, medicines and temperature-sensitive biologicals. The slim design and optional sliding shelves allow for an ergonomic easy-reach retrieval of your product..

## Pharmaceutical Refrigerators

Model Number	Volume (cu.ft.)	Exterior Dimensions (w x f-b x h)	Door	Wire Shelves	Voltage, Power Connection
MPR-311DH-PA	12.0 340 L	31.4" x 17.7" x 70.8" 798 x 450 x 1796 mm	dual, sliding glass	adjustable	115V NEMA 5-15
MPR-514-PA	17.3 489 L	35.4" x 23.6" x 70.5" 900 x 600 x 1790 mm	dual, sliding glass	adjustable	115V NEMA 5-15
MPR-514R-PA	17.2 486 L	35.4" x 23.6" x 70.5" 900 x 600 x 1790 mm	dual, sliding glass	1/2 adjustable, 1/2 roll-out	115V NEMA 5-15
MPR-1014-PA	36.6 1037 L	70.9" x 23.6" x 70.5" 1778 x 600 x 1790 mm	dual, sliding glass	adjustable	115V NEMA 5-15
MPR-1014R-PA	36.5 1034 L	70.9" x 23.6" x 70.5" 1778 x 600 x 1790 mm	dual, sliding glass	1/2 adjustable, 1/2 roll-out	115V NEMA 5-15

Ergonomic design offers temperature stability with safe, secure and easy inventory management.

### Forced Air Circulation

Positive airflow quickly restores uniformity following routine door openings.

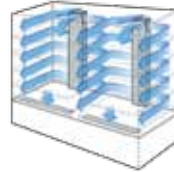
### Microprocessor Controls

Comprehensive setpoint, alarm, monitoring and diagnostic functions based on Panasonic-built microprocessor controller with digital display of all input/output functions, adjustable temperature range 2°C to 14°C.

### MPR-514

#### The Ideal +4°C Pharmaceutical Refrigeration in Capacities from 17.3 cu.ft. (489 L):

- Uniform storage is unaffected by ambient temperature.
- Remarkable cooling efficiency.
- Panasonic's cycle defrost system.
- Plenums direct airflow, essential for validated storage requirements.



### Panasonic Cycle Defrost

Unique cycle defrost initiates only as required; maintains internal temperature uniformity during process.

### Panasonic-Designed Compressors

Designed by Panasonic specifically for rugged ultra-low temperature applications in a laboratory environment; CFC-free refrigerants only.

### Inventory Control

Stainless steel interior construction with roll-out or adjustable wire shelves.

### MPR-1014R



# Blood Bank Refrigerators

Panasonic blood bank refrigerators are designed to create stable, reliable temperature control pre-set to 4°C with precise top-to-bottom temperature uniformity.

## Blood Bank Refrigerators

Model Number	Volume (cu.ft.)	Exterior Dimensions (w x f-b x h)	Bag Capacity (450 ml)	Drawers*	Shelves	Doors* (exterior)	Doors (interior)	Voltage, Power Connection
MBR-107DH-PA	2.8 79 L	15.7" x 19.5" x 59.6" 400 x 495 x 1514 mm	32	—	4	1	2	115V NEMA 5-15
MBR-304GR-PA	10.6 300 L	23.6" x 26.8" x 72.2" 600 x 681 x 1834 mm	120	5	—	1	2	115V NEMA 5-15
MBR-704GR-PA	21.8 617 L	30.0" x 32.7" x 77.0" 762 x 831 x 1955 mm	360	6	—	1	3	115V NEMA 5-15
MBR-1405GR-PA	45.9 1300 L	56.7" x 32.7" x 76.8" 1440 x 831 x 1950 mm	720	12	—	2	6	115V NEMA 5-15

Designed to meet AABB and ANRC criteria for safety and performance.

\*stainless steel roll-out

\*swinging glass dual pane w/ lock



### Inner Doors

Plexiglass inner doors offer additional interior chamber temperature protection during door openings.

### Forced Air Circulation

Interior blower fans quickly restore temperature uniformity following routine door openings.

### Temperature Recorder

Built-in recorder provides a permanent record of cabinet pressure.

### Microprocessor Temperature Control

Panasonic-built microprocessor controller with comprehensive alarm, monitoring and diagnostic functions with digital display.

### Panasonic-Designed Refrigeration

Designed by Panasonic with compressors specifically designed for blood bank storage.

### Panasonic Cycle Defrost

Unique cycle defrost initiates only as required; maintains internal temperature uniformity during process.

MBR-1405GR



MBR-704GR



MBR-107D(H)



# Biomedical Refrigerator with Freezer Combination

When space is at a premium, Panasonic refrigerator with freezer combination offers convenience and performance in an attractive, space-saving design.

Biomedical Refrigerator with Freezer Combination						
Model Number	Refrigerator Volume (cu.ft.)	Freezer Volume (cu.ft.)	Exterior Dimensions (w x f-b x h)	Temperature Range (forced air)	Temperature Range (cold air)	Voltage, Power Connection
MPR-215F-PA	6.2 176 L	1.4 40 L	21.3" x 21.9" x 70.5" 540 x 557 x 1790 mm	2°C to 14°C	-20°C to -30°C	115V NEMA 5-15
MPR-414F-PA	12.0 340 L	2.9 82 L	31.5" x 23.6" x 71.1" 800 x 600 x 1805 mm	2°C to 14°C	-20°C to -30°C	115V NEMA 5-15
MPR-715F*	14.7 415 L	6.2 176 L	35.4" x 28.1" x 75.2" 900 x 715 x 1910 mm	2°C to 14°C	-20°C to -30°C	115V NEMA 5-15

Designed for storage of vaccines and pharmaceuticals in the hospital, laboratory or medical office.

\*Certain models will retain the SANYO logo until further notice

## Panasonic Cycle Defrost

Unique cycle defrost (refrigerator only) initiates only as required; maintains internal temperature uniformity during cycle defrost. Freezer is manual defrost.

## Panasonic-Designed Refrigeration

Panasonic-designed compressors allow differential control of individual refrigerator and freezer compartments.

## Validatable Storage

Laboratory-grade integrated systems are designed to assure stored product safety.

## Microprocessor Controls

Comprehensive setpoint, alarm, monitoring and diagnostic functions based on Panasonic-built microprocessor controller with digital display of all input/output functions.

## MPR-414F

### Validated Storage of Reagents, Pharmaceuticals and Biological Samples:

- Ideal biologic storage environment for precise control and superior temperature and uniformity.
- Microprocessor controller and interior forced air circulation.
- Safe and secured storage behind a keyed locking door.
- Integrated alarm functions.
- One unit with dual temperature zone needs only minimal installation space.
- Four-door design reduces air loss during door openings.
- Double-pane windows with heat reflection film reduces the condensation.
- Calibration adjustment through the control panel is available.
- The MPR series combo units have two separate specially designed compressors and offers quiet operation.





## General Purpose Refrigerators

Panasonic general purpose refrigerators are designed for general purpose storage applications in life science and industrial laboratories. Feature reliable heavy-duty refrigeration systems for frequent door openings with optional duplex power outlet for chromatography applications.

### Pharmacy Refrigerators

Model Number	Volume (cu.ft.)	Exterior Dimensions (w x f-b x h)	Door	Wire Shelves	Voltage, Power Connection
SRR-23GD-MED*	21.0 595 L	29.1" x 31.7" x 79.25" 740 x 805 x 2013 mm	single glass, swing	4 adjustable	115V, NEMA 5-15
SRR-49GD-MED*	40.0 1133 L	49.6" x 31.7" x 79.25" 1260 x 805 x 2013 mm	double glass, swing	8 adjustable	115V, NEMA 5-15
SRR-72GD-MED*	61.0 1700 L	74.8" x 31.7" x 79.25" 1900 x 805 x 2013 mm	triple glass, swing	12 adjustable	115V, NEMA 5-15

Designed for general purpose storage applications in the laboratory.

\*Certain models will retain the SANYO logo until further notice

#### Heavy-Duty Refrigeration

Designed for frequent door opening applications.

#### Stainless Steel Construction

Durable exterior and interior surfaces. Large interior for greater flexibility.

#### Adjustable Temperature Control

Microprocessor temperature control with LED readout and alarm functions.

## Under-Counter Refrigerators and Freezers

Designed for the demanding standards of clinical, life science, pharmaceutical, biotechnology and industrial laboratories.

### Under-Counter Refrigerators

Model Number	Volume (cu.ft.)	Exterior Dimensions (w x f-b x h)	Temperature	Display	Lock	Voltage, Power Connection
SR-L6111W-PA	6.1 173 L	23.6" x 26.2" x 34.6"* 600 x 660 x 879 mm	1°C to 14°C Microprocessor	yes	yes	115V, NEMA 5-15
SR-L4110W-PA	4.9 139 L	21.4" x 22.8" x 33.8" 544 x 579 x 859 mm	4°C	no	no	115V, NEMA 5-15
SR-L4110WSEC-PA	4.9 139 L	21.4" x 22.8" x 33.8" 544 x 579 x 859 mm	4°C	no	yes	115V, NEMA 5-15

### Under-Counter Freezers

Model Number	Volume (cu.ft.)	Exterior Dimensions (w x f-b x h)	Temperature	Display	Lock	Voltage, Power Connection
SF-L6111W-PA	5.4 153 L	23.6" x 26.2" x 34.6"* 600 x 660 x 879 mm	-15°C to -20°C Microprocessor	yes	yes	115V, NEMA 5-15
HF-5017W-PA	5.0 142 L	21.4" x 25.4" x 33.6" 544 x 645 x 853 mm	-20°C	no	no	115V, NEMA 5-15
HF-5017WSEC-PA	5.0 142 L	21.4" x 25.4" x 33.4" 544 x 645 x 848 mm	-20°C	no	yes	115V, NEMA 5-15

Convenient compact refrigeration in a laboratory environment.

\*Cabinet depth measures 24" f-b without display and 26.2" f-b with display

Models SR-L4110WSEC and HF-5017WSEC offer additional hasp locks to accommodate a padlock.

#### Compact Design

Allows for easy installation under counter, counter top, or within the knee-well of laboratory cabinetry. Door shelves and standard shelving maximize product storage capacity. Some models are stackable.

#### Panasonic Refrigeration

Energy-efficient, whisper-quiet operation.

SF-L6111W



SR-L6111W

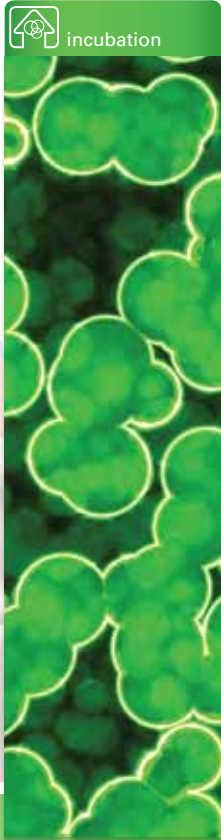


SRR-72GD-MED  
General Purpose Refrigerator





incubation



**Panasonic  
Incubation**

**World Class Design.** *Panasonic designs and manufactures a range of CO<sub>2</sub> and multi-gas incubators, refrigerated and heated environmental chambers to meet a variety of application and user needs.*

## Panasonic Incubators



Panasonic designs and manufactures a range of CO<sub>2</sub>, multi-gas, heated, and refrigerated incubators to meet a variety of application and user needs.

### CO<sub>2</sub> Laboratory Incubators

MCO-5AC  
MCO-18AC  
MCO-36AC  
MCO-18AC(UV)  
MCO-36AC(UV)  
MCO-19AIC  
MCO-38AIC  
MCO-19AIC(UV)  
MCO-38AIC(UV)  
MCO-19AIC(UVH)  
MCO-38AIC(UVH)  
MCO-20AIC  
MCO-40AIC  
MCO-80IC

### CO<sub>2</sub>/O<sub>2</sub> Laboratory Incubators

MCO-5M  
MCO-5M(UV)  
MCO-19M  
MCO-38M  
MCO-19M(UV)  
MCO-38M(UV)  
MCO-19M(UVH)  
MCO-38M(UVH)

### Heated and Refrigerated Incubators

MIR-162  
MIR-262  
MIR-154  
MIR-254  
MIR-554

### Plant Growth Chamber

MLR-351H



### Relative Humidity

A removable water pan combined with an independent heater at the base of the incubator provides an efficient, cost-effective method for maintaining elevated humidity levels. The humidifying pan can be easily removed and a water level sensor provides an easy maintenance system.

### Preventative Contamination Control

Panasonic's inCu-saFe® and SafeCell UV work in combination to provide effective protection against contamination during culturing without downtime or affecting cultures.

### inCu-saFe® Copper Stainless Steel Alloy

InCu-saFe® copper-enriched stainless steel alloy combines the corrosion resistance and durability of stainless steel with the germicidal properties of copper. The inCu-saFe® walls and shelves significantly reduce the risk of contamination developing on internal surfaces.

### H<sub>2</sub>O<sub>2</sub> Decontamination

The unique Sterisonic GxP H<sub>2</sub>O<sub>2</sub> decontamination system limits downtime to less than three hours when total chamber decontamination is desired. All interior components and CO<sub>2</sub> sampling loop are decontaminated *in situ*; no need for removal and autoclaving and no stress on sensitive electronic components.



H<sub>2</sub>O<sub>2</sub> decontamination vs. high heat decontamination  
■ = Uptime (Hours) ■ = Downtime (Hours)

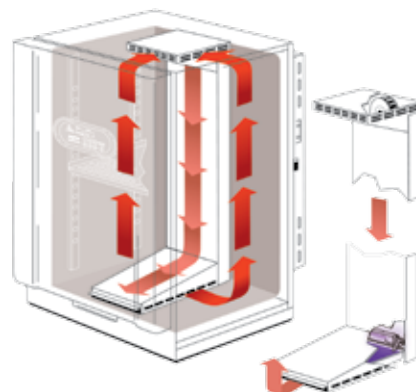
### dual sensor CO<sub>2</sub> Control

Panasonic proprietary single beam, dual detector infrared (IR2) CO<sub>2</sub> sensor delivers precise CO<sub>2</sub> control, quick recovery following door openings, and auto sampling with no moving parts.

### SafeCell UV

(U.S. Patent 6255103)

Panasonic's SafeCell UV system with programmable, ozone-free UV lamp decontaminates the chamber air and water in the humidifying pan.



The UV lamp is completely isolated from the cell cultures and unlike other methods, the SafeCell UV system does not trap contaminants inside the incubator or require the temporary removal of critical components.

MCO-80IC



MCO-18AC



MCO-20AIC



## CO<sub>2</sub> Laboratory Incubators

All Panasonic CO<sub>2</sub> incubators feature patented Direct Heat and Air Jacket temperature control for accurate, uniform temperature control and inCu-saFe® for continuous contamination control. Panasonic laboratory CO<sub>2</sub> incubators feature selected SafeCell UV with exclusive, patented Active Background Contamination Control.

Model Number	Volume (cu.ft.)	Exterior Dimensions (w x f-b x h)	Contamination Control	CO <sub>2</sub> Control	Chamber	Voltage, Power Connection
MCO-5AC-PA	1.7 49 L	18.9" x 21.6" x 22.6" 480 x 548 x 575 mm	Optional SafeCell UV with ultraviolet light, inCu-saFe® copper-enriched stainless steel interior	thermal conductivity	single	
MCO-18AC-PA MCO-18ACUV-PA	6.0 170 L	24.4" x 27.0" x 35.4" 620 x 686 x 900 mm	inCu-saFe® copper-enriched stainless steel interior (optional UV)	thermal conductivity	single dual	115V NEMA 5-15
MCO-36AC-PA MCO-36ACUV-PA	12.0 340 L	24.4" x 27.0" x 70.8" 620 x 686 x 1800 mm				
MCO-19AIC-PA	6.0 170 L	24.4" x 27.9" x 35.4" 620 x 710 x 900 mm	inCu-saFe® copper-enriched stainless steel interior	infrared with P.I.D./R recovery	single	115V NEMA 5-15
MCO-38AIC-PA	12.0 340 L	24.4" x 27.9" x 70.8" 620 x 710 x 1800 mm			dual	
MCO-19AICUV-PA	6.0 170 L	24.4" x 27.9" x 35.4" 620 x 710 x 900 mm	SafeCell UV with ultraviolet light, inCu-saFe® copper-enriched stainless steel interior	infrared with P.I.D./R recovery	single	115V NEMA 5-15
MCO-38AICUV-PA	12.0 340 L	24.4" x 27.9" x 70.8" 620 x 710 x 1800 mm			dual	
MCO-19AICUVH-PA	6.0 170 L	24.4" x 27.9" x 35.4" 620 x 710 x 900 mm	SafeCell UV with ultraviolet light, inCu-saFe® copper-enriched stainless steel interior, H <sub>2</sub> O <sub>2</sub> decontamination	infrared with P.I.D./R recovery	single	115V NEMA 5-15
MCO-38AICUVH-PA	12.0 340 L	24.4" x 27.9" x 70.8" 620 x 710 x 1800 mm			dual	
MCO-20AIC-PA	7.6 215 L	30.3" x 27.9" x 35.4" 770 x 710 x 900 mm	SafeCell UV with ultraviolet light, inCu-saFe® copper-enriched stainless steel interior	infrared with P.I.D./R recovery	single	115V NEMA 5-15
MCO-40AIC-PA	15.2 430 L	30.3" x 27.9" x 70.8" 770 x 710 x 1800 mm			dual	
MCO-80IC-PA	30.1 851 L	38.8" x 33.6" x 80.3" 986 x 853 x 2040 mm	Optional SafeCell UV with ultraviolet light, inCu-saFe® copper-enriched stainless steel interior	infrared with P.I.D./R recovery	single	115V NEMA 5-20

Combination H<sub>2</sub>O<sub>2</sub> decontamination, SafeCell UV Technology and inCu-saFe® interior construction for contamination control and no culturing downtime.

### InCu-saFe® Interior

Copper alloy stainless steel plenums, shelves and brackets extend contamination control to the chamber interior. Superior contamination control with an anti-bacterial copper alloy stainless steel interior provides germicidal protection and helps eliminate molds, spores and other contaminating spills, kills mycoplasma and provides a noncorrosive environment.

### Sterisonic GxP Series with H<sub>2</sub>O<sub>2</sub> Decontamination

The unique Sterisonic GxP H<sub>2</sub>O<sub>2</sub> decontamination system limits downtime to less than three hours when total chamber decontamination with verification is desired.

### P.I.D. Control Sophistication

Proportional, integral and derivative infrared CO<sub>2</sub> control accelerates recovery and prevents overshoot.

### SafeCell UV Contamination Control

Narrow bandwidth ultraviolet decontamination *in situ* to help reduce air and water pan contamination without downtime. Panasonic SafeCell UV system continues to protect against contamination during normal operation by combining the passive resistance of copper-enriched stainless steel with UV decontamination of circulated, humidified air. Independent testing confirms that exposure to ultraviolet light at 253.7nm and heat decontamination at +90°C and +140°C are equally effective in decontaminating an incubator interior chamber against organisms selected for testing.

### CO<sub>2</sub> Control Options

Available with high precision, quick recovery infrared or thermal conductivity CO<sub>2</sub> sensor.

### Direct Heat and Air Jacket Control

Patented, radiant-wall heating micro-processor controlled in three zones to maintain uniformity and optimum humidity. Unlike traditional water jacket units, the sealed air jacket and foam insulation maintains a uniform temperature and quick temperature recovery after door openings. Air jacket technology requires little maintenance and provides a lightweight unit for easier relocation or repositioning for cleaning.



# MCO-19AIC MCO-19AIC(UV) MCO-19AIC(UVH)



## Sterisonic GxP Series Cell Culture CO<sub>2</sub> Incubators

The industry's most complete cell culture solution for highly regulated applications or conventional incubation.

The Panasonic Sterisonic GxP incubator is designed for a wide array of demanding and highly regulated applications in the biomedical, pharmaceutical, medical research and clinical laboratory.

Representing years of research, development and component testing, the Sterisonic GxP incorporates a collection of mutually functional systems and design attributes to offer a holistic solution to cell culture protocols, from the most sophisticated to more familiar and conventional processes. These include but are not limited to:

- Stem cell research
- Autologous tissue regeneration & regenerative medicine
- *In vitro* fertilization
- Genomic and proteomic expression
- Esoteric plant and amphibian cell culture
- Genomic and proteomic expression
- Hypersensitive and transgenic cell culture
- Low media volume microplate work

### Sterisonic GxP Design

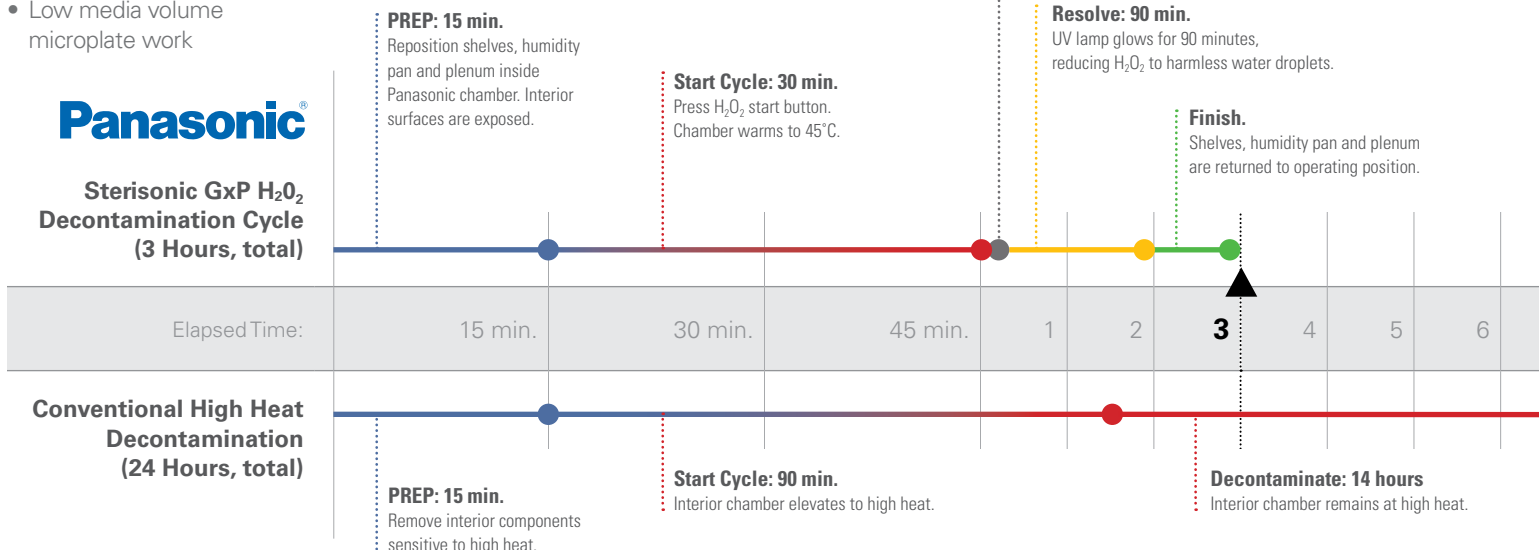
- **Elevated humidity, low water level warning.** To avoid cell culture desiccation, the Panasonic Sterisonic GxP CO<sub>2</sub> incubator maintains ~95% RH at 37°C.
- **Ergonomic cabinet design.** With reversible inner and outer doors, a single Panasonic incubator offers the industry's most flexible installation options.
- **Field reversible door.** The field-reversible door allows universal installation using the left-hand hinge (standard) or a right-hand hinge modification.
- **Inner door and gasket.** The inner design is critical to successful contamination control technique.



Panasonic Sterisonic GxP Model MCO-19AIC(UVH) with integrated H<sub>2</sub>O<sub>2</sub> decontamination system.

**Panasonic**

### Sterisonic GxP H<sub>2</sub>O<sub>2</sub> Decontamination Cycle (3 Hours, total)





## Control and Monitoring

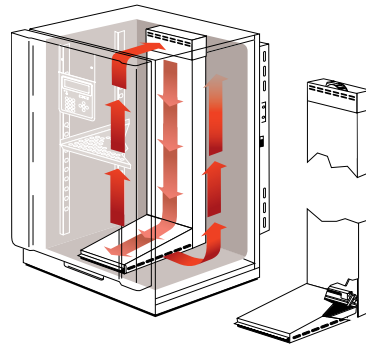
- The Sterisonic GxP control and information center includes an intuitive pop-up menu, high resolution LCD for inputs, outputs and performance at-a-glance.
- Multi-point data logging offers push-button graphical display. An optional PC or analogue interface permits remote transmission for GMP/GLP protocols as required.
- Precise P.I.D. logic controls and adjusts to all temperature and CO<sub>2</sub> setpoints and alarm parameters.



The Sterisonic GxP integrated microprocessor controller with LCD graphical display simplifies all incubator functions. Stable temperature and humidity conditions are achieved through a combination of performance systems supervised by the controller complete with alarm, programming, calibration and diagnostic protocols.

## Decontamination

- The unique Sterisonic GxP H<sub>2</sub>O<sub>2</sub> decontamination system limits downtime to less than three hours when total chamber decontamination with verification is desired.
- All interior components and CO<sub>2</sub> sampling loop are decontaminated *in situ*; no need for removal and autoclaving.
- Continuous Active Background Contamination Control fights contamination while cell culture protocols are in process.



A continuous Active Background Contamination Control process helps reduce contamination without downtime. 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.

## CO<sub>2</sub> Control

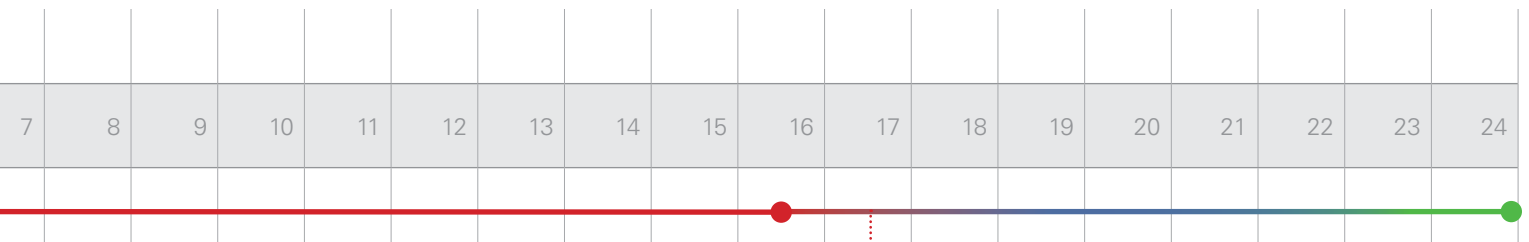
- Panasonic proprietary single-beam, dual detector infrared (IR2) CO<sub>2</sub> sensor delivers precise CO<sub>2</sub> control, quick recovery following door openings, and auto sampling with no moving parts.

## Temperature and Humidity Control

- The patented Direct Heat and Air conditioning system manages setpoint temperature through multiple, variable warming points under microprocessor control.
- The humidity pan is easy to fill, easy to clean; the automatic optical sensor advises of low water level.



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 high-density insulation to protect against ambient temperature fluctuations.



### Finish.

Incubator must cool from high heat temperatures to near ambient.

**MCO-18AC**  
**MCO-18AC(UV)**

**MCO-36AC**  
**MCO-36AC(UV)**



## CytoGROW Series Cell Culture CO<sub>2</sub> Incubator

Ideal for research and clinical microbiology, the Panasonic CytoGROW CO<sub>2</sub> incubator offers a high-performance solution for mainstream cell culture applications in the research and clinical environment where precise control and contamination resistance is critical.

### The CytoGROW Series Advantage At-A-Glance

System	Feature	Competitors	Panasonic Benefit
Contamination Resistance <i>In Situ</i>	Active Background Contamination Control with inCu-saFe® copper-enriched stainless steel interior	Stainless steel	InCu-saFe® forms integral germicidal barrier against airborne contaminants; stainless steel does not offer a similar latent protection.
Air and Water Decontamination <i>In Situ</i>	SafeCell UV Protection (Optional)	Not available	SafeCell UV protection located safely below the interior base helps reduce airborne contaminants as they pass over the humidity reservoir surface. Pathogens introduced during door openings are ultimately removed. The Panasonic combination of inCu-saFe® and SafeCell UV minimizes the need for time-consuming, disruptive heat decontamination. Panasonic minimizes downtime for total cleaning when required, with the benefit of continuous, preventive contamination control during normal operation.
Cabinet Construction	Ease-of-use Direct Heat and Air Jacket design	Composite direct heat or water jacket	The Panasonic CytoGROW series cabinet provides the stability and uniformity of a water-jacketed cabinet without the inconvenience. Panasonic uses sensitivity to ambient temperatures to permit the microprocessor-controlled, multi-zone Panasonic Direct Heat and Air Jacket system to work most efficiently. Panasonic maintains maximum temperature control and uniformity from three independent heating zones on all sides.

### Product Overview

CytoGROW series is part of the Panasonic MCO incubator product group that share proven control, construction and functional performance attributes. This relational product line extends the most sophisticated Panasonic operating systems, offering more range of application and better continuity among users in the research and clinical community.

The 6 cu.ft. (170 liter) CytoGROW cabinet integrates Panasonic's proven package of control, heating, gas control and construction features essential to all incubators. This design approach fulfills a broad range of common applications.

Additionally, the standard CytoGROW cabinet can be enhanced with a selection of options and accessories to meet specific end user needs, offering the industry's most flexible investment option for current and future incubator needs.

#### MCO-18AC

#### Ideal for Research and Clinical Microbiology

- Biotech Research and Production
- Hospitals and Clinics
- Public Health
- Medical Research
- Quality Control



## Panasonic Design and Construction

### InCu-saFe® Interior Surfaces for Germicidal Protection

The CytoGROW incubators incorporate inCu-saFe® copper-enriched stainless steel alloy interior surfaces within a comprehensive design created to reduce contamination sources and to mitigate the effect 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 prevent the growth of molds, fungi, mycoplasma and bacteria.
- All interior components, including the air management plenum, shelf supports, humidity pan and blower wheel assembly remove easily for autoclaving; no tools required.
- When components are removed, all interior surfaces are exposed for conventional wipe down.
- Large rounded corners and electropolished surfaces are easy to clean.



### Effectiveness of inCu-saFe® – Mycoplasma Survival Results

Mycoplasma Strain	Negative Control	Conventional Type 304 Stainless Steel	Panasonic InCu-saFe®	Conventional Copper C1100
Mycoplasma fermentans PG18	no survival	survival	no survival	no survival
Mycoplasma orale CH19299	no survival	survival	no survival	no survival
Mycoplasma arginini G230	no survival	survival	no survival	no survival
Mycoplasma hominis PG21	no survival	survival	no survival	no survival

*Chart summarizes test results with four strains of mycoplasma. Results demonstrate how Panasonic 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 Type 304 stainless steel. Detailed test results are available from Panasonic.*

### Ergonomic Cabinet Design

With a reversible outer door, a single Panasonic incubator offers the industry's most flexible installation options available in either single or dual (stacked) cabinet configurations.

- The low profile cabinet with door-mounted control panel permits easy access and display viewing.
- Cabinet knock-outs are predrilled and tapped to eliminate drilling and to simplify remounting of the field reversible door.
- The outer door heater cable is easily switched if a reverse opening is required.
- The heated outer door closes against a soft, easily cleaned magnetic gasket designed to eliminate ambient air shear across the glass inner door, minimizing condensation.
- The outer door includes a universal finger grip at each side.
- A door ajar alarm provides an audible and visual warning if the outer door is left open.
- Pass-through ports accommodate probes or instrumentation leads as required for specialized cell culture protocols. Each chamber includes a port positioned in the interior, upper-left rear wall, with dual silicone (non-VOC) stoppers inside and outside the cabinet for added protection.

#### MCO-36AC(UV)

##### ErgoStack Low Profile Design

The CytoGROW cabinet is designed for stacking, allowing one unit to be positioned on top of another, doubling interior volume without additional floor space.

- The low profile cabinet with door-mounted control panel permits easy access and display viewing.
- The combination of stacking and reversible doors offers the industry's most flexible installation options.
- An optional roller base is recommended for stacked installations to permit mobility if required; see Accessories.

## CO<sub>2</sub>/O<sub>2</sub> Laboratory Incubators

Panasonic models MCO-5M/19M/38M series CO<sub>2</sub>/O<sub>2</sub> incubators employ multiple sensor technologies to achieve *in vitro* simulation of the *in vivo* environment.

### CO<sub>2</sub>/O<sub>2</sub> Laboratory Incubators

Model Number	Volume (cu.ft.)	Exterior Dimensions (w x f-b x h)	Contamination Control	CO <sub>2</sub> Control	O <sub>2</sub> Control	Voltage, Power Connection
MCO-5M-PA	1.7 49 L	18.9" x 21.6" x 22.6" 480 x 548 x 575 mm	inCu-saFe® copper-enriched stainless steel interior, optional SafeCell UV with ultraviolet light.	thermal conductivity	Zirconia sensor with P.I.D./R recovery	115V NEMA 5-15
MCO-19M-PA	6.0 170 L	24.4" x 28.0" x 35.4" 620 x 710 x 900 mm		infrared with P.I.D./R recovery		
MCO-38M-PA	12.0 340 L	24.4" x 28.0" x 70.8" 620 x 710 x 1800 mm		infrared with P.I.D./R recovery		
MCO-5MUV-PA	1.7 49 L	18.9" x 21.6" x 22.6" 480 x 548 x 575 mm	inCu-saFe® copper-enriched stainless steel interior, optional SafeCell UV with ultraviolet light.	thermal conductivity	Zirconia sensor with P.I.D./R recovery	115V NEMA 5-15
MCO-19MUV-PA	6.0 170 L	24.4" x 28.0" x 35.4" 620 x 710 x 900 mm	inCu-saFe® copper-enriched stainless steel interior, optional SafeCell UV with ultraviolet light and hydrogen H <sub>2</sub> O <sub>2</sub> decontamination	infrared with P.I.D./R recovery		
MCO-38MUV-PA	12.0 340 L	24.4" x 28.0" x 70.8" 620 x 710 x 1800 mm	inCu-saFe® copper-enriched stainless steel interior, optional SafeCell UV with ultraviolet light.	infrared with P.I.D./R recovery		
MCO-19MUVH-PA	6.0 170 L	24.4" x 28.0" x 35.4" 620 x 710 x 900 mm	inCu-saFe® copper-enriched stainless steel interior, optional SafeCell UV with ultraviolet light and H <sub>2</sub> O <sub>2</sub> decontamination	infrared with P.I.D./R recovery	Zirconia sensor with P.I.D./R recovery	115V NEMA 5-15
MCO-38MUVH-PA	12.0 340 L	24.4" x 28.0" x 70.8" 620 x 710 x 1800 mm		infrared with P.I.D./R recovery		

For below ambient or enriched (above ambient) oxygen levels in addition to CO<sub>2</sub> control.

#### Infrared CO<sub>2</sub> Sensor

Precise CO<sub>2</sub> control, fast response to door openings. The Panasonic CO<sub>2</sub> IR sensor monitors and controls CO<sub>2</sub> level(s) over a range of 0% to 20%, with control of ±0.15%.

#### Inner Doors

Multiple chamber inner doors minimize loss of balanced interior atmosphere during routine door openings (available on selected models).

#### Zirconia O<sub>2</sub> Control

Non-depleting design for precise O<sub>2</sub> control with fast response to door openings. The maintenance-free zirconia solid-state sensor has a high degree of precision, a long service life and does not require fine adjustment. Through accurate determination of the chamber O<sub>2</sub> level the microprocessor injects either nitrogen gas or oxygen as required.

#### P.I.D. Control Sophistication

Proportional, integral and derivative infrared CO<sub>2</sub> control accelerates recovery and prevents overshoot.

#### MCO-19M

##### Professional Cell Culture Multi-Gas Incubator:

- Continuous contamination control with inCu-saFe® interior and SafeCell UV technologies.
- P.I.D. controls for fast recovery of temperature, CO<sub>2</sub> and O<sub>2</sub> levels.
- Fast humidity level recovery by N<sub>2</sub> gas bubbler.

MCO-5M  
(shown stacked)



MCO-5M



# Cooled Incubator | MCO-CL



## Sterisonic GxP Series Integrated Cooling Option

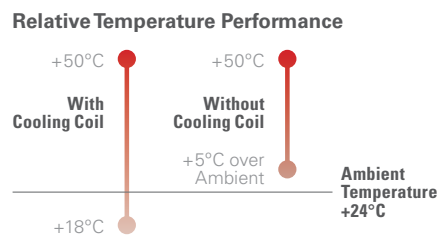
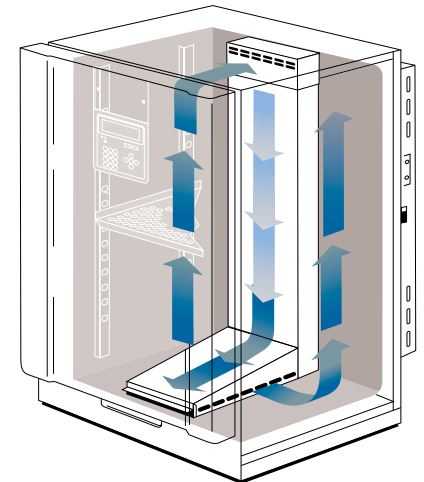
The industry's most complete cell culture solution for highly regulated applications or conventional incubation. Now with an integrated cooling option for +18°C to +30°C applications, while allowing for safe, effective two-hour in situ H<sub>2</sub>O<sub>2</sub> decontamination for fastest turn-around.

- Panasonic's integrated cooling option provides unmatched temperature stability and control which can only be achieved with our patented Direct Heat and Air Jacket that surrounds the inner walls with a natural convection airflow.
- This cooling option maintains high relative humidity and provides precise temperature control for a wide range of applications.
- The unique cooling coil design allows for superior temperature uniformity and temperature recovery during door openings. In addition, the MCO-CL permits H<sub>2</sub>O<sub>2</sub> decontamination of interior components for GMP applications and protocols. The internal cooling system can be decontaminated as well during the H<sub>2</sub>O<sub>2</sub> cycle for those units equipped with this option.

MCO-CL

**Research Applications for Integrated Cooling Option**

- Regenerative medicine
- Stem cell research
- Autologous tissue regeneration
- Organ Transplant Research
- Diabetes Research
- Food Research
- Mammalian Research
- Genomic and proteomic expression
- Esoteric plant and amphibian cell culture
- Hypersensitive and transgenic cell culture
- Low media volume microplate work



MCO-CL Airflow Diagram

- The integrated cooling option consists of a stainless steel cooling coil, interconnection lines and accompanied with an optional 6 liter refrigerated waterbath.
- Cooling system is strategically positioned above the water pan to prevent condensation build-up and is easily removable for decontamination or conversion to a standard CO<sub>2</sub> incubator

## Integrated Cooling Option Specifications

Feature	
Temperature Range	+18°C to +50°C, distribution ±0.25°C, variation ±0.1°C
Relative Humidity	5°C to +50°C, 95% ± 5%RH; 20°C to 25°C > 80%RH; 18°C > 70%RH Includes temperature mapping results for individual unit per serial number
Components	Stainless Steel Cooling Coil, Quick Interconnection Lines, 6 L, Refrigerated Water Bath & Circulator (Optional/Not Included)

*Applies to MCO-19AIC(UVH)-PA, MCO-19AIC(UV)-PA, MCO-19AIC-PA, MCO-19M(UVH)-PA, MCO-19M(UV)-PA, MCO-19M-PA*



# MCO-80IC



## Reach-In CO<sub>2</sub> Incubator

Panasonic's large capacity, reach-in CO<sub>2</sub> incubator has the capacity and flexibility to grow with your culturing needs while providing a precise and repeatable temperature, humidity and CO<sub>2</sub> environment.

The MCO-80IC is ideal for culturing large volumes of biological samples, performing short-term studies, and working with large volume cell culture apparatus. It includes Panasonic's exclusive incubator technologies such as inCu-saFe® interiors, UV decontamination option, infrared (IR) CO<sub>2</sub> sensor with P.I.D. control, and features exceptionally low CO<sub>2</sub> gas consumption.

### Usability

- 30.1 cu.ft. (851L) large capacity cabinet allows flexibility in usage.
- Cabinet will accommodate a roller bottle apparatus, 5 bottles wide x 7 bottles high (requires mounting ramp kit).

- Full view, double paned glass door allows easy observation of cultured samples (black-out tinting is also optional).
- Large LED digital display and keypad for greater visibility and ease of set-up.

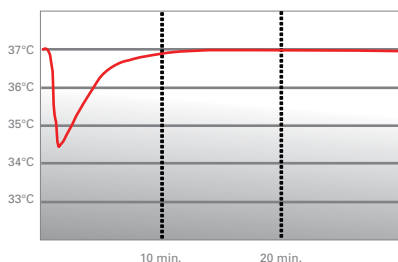
### Superior CO<sub>2</sub> and Temperature Control

- IR CO<sub>2</sub> sensor with P.I.D. micro-processor control and forced air circulation system delivers fast CO<sub>2</sub> recovery characteristics.
- Exceptionally low CO<sub>2</sub> gas consumption rates, less than half of similar competitive units.
- P.I.D. temperature control with deviation of  $\pm 0.1^{\circ}\text{C}$ .



MCO-80IC reach-in CO<sub>2</sub> incubator.

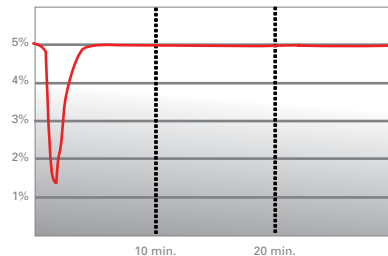
Temperature Recovery



### Panasonic MCO-80IC

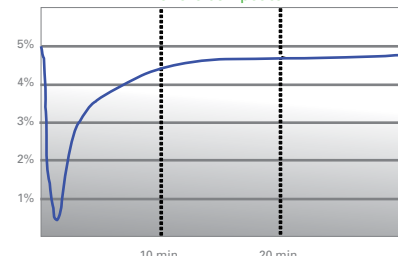
Recovery after a 30 second door opening for the Panasonic MCO-80IC.

CO<sub>2</sub> recovery after a 60 second door opening for the SANYO MCO-80IC



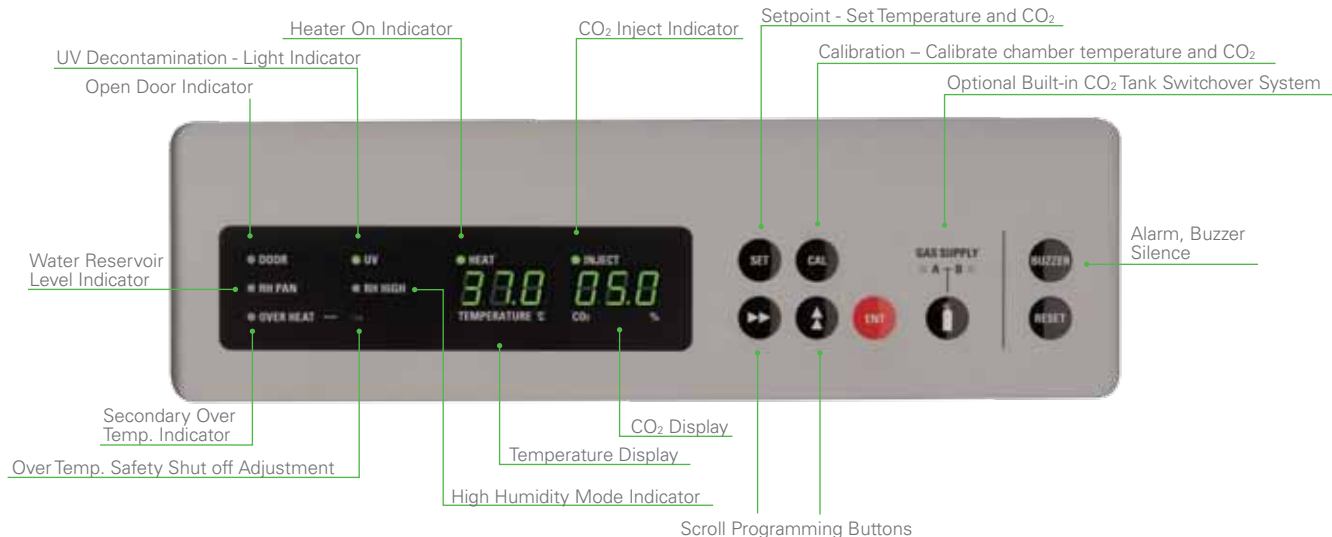
### Panasonic MCO-80IC

CO<sub>2</sub> recovery after a 60 second door opening for the competitor



### Competitor

Faster CO<sub>2</sub> recovery and lower CO<sub>2</sub> consumption after 60 second door opening.



### Anti-Contamination Measures

- Interior, plenums and shelving constructed of Panasonic's exclusive inCu-saFe<sup>®</sup>, germicidal, copper-enriched stainless steel.
- Optional UV decontamination system for humidity reservoir.
- Extra heaters positioned around the outer glass door to eliminate condensation.

### Horizontal Laminar Airflow System

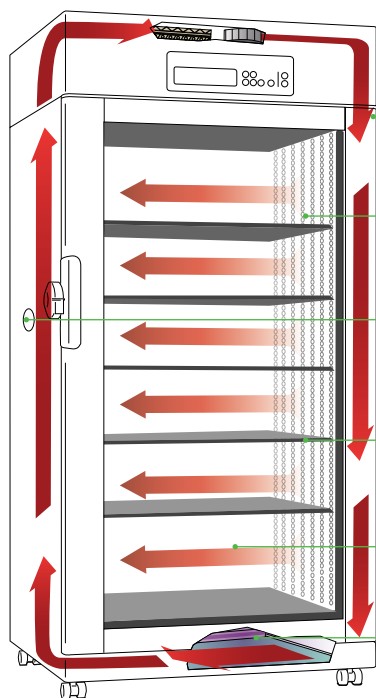
Panasonic's reach-in incubator's cross-shelf directed air flow system promotes optimum temperature uniformity throughout the chamber and contributes to quick temperature recovery after door openings. Utilizing Panasonic's exclusive inCu-saFe<sup>®</sup> chamber material in the perforated side plenums helps minimize contamination concerns and direct positive and negative pressure air flow.

### Optional UV Decontamination and Humidity Selection

Panasonic's patented Safe Cell UV decontamination system is employed to decontaminate the humidifying water reservoir and help eliminate contamination concerns. The unit can be set to both nominal (above 80% RH) and high humidity setpoints (above 90% RH).

Humidity reservoir heaters are located on the outside walls of the reservoir and are not as susceptible to corrosion and scaling from water as competitive systems are. An optional autofill secondary tank (Model MCO-80AS) system is also available to ensure continuous water supply to the humidity reservoir.

This system employs a large tank (4.8 gal./18 L), with electronic water level sensor and autofill solenoid valve.



Humidified air minimizes potential for cell culture media desiccation.

Perforated sidewall panels right (pressure) and left (negative pressure) assure a positive, gentle airflow from right to left.

Access ports (each side, 40mm).

Optional Shaker shelves with additional support available in 2 or 3 shelf configurations.

Horizontal airflow maintains accurate temperature and CO<sub>2</sub> control and uniformity at all shelf levels, top-to-bottom, front-to-back.

Optional SafeCell UV decontamination system provides decontamination of the humidity reservoir.

## Heated and Refrigerated Incubators

Panasonic MIR series incubators are designed for general laboratory applications requiring fixed setpoint or cycling temperature control. A selection of five cabinet sizes offers programmed operation and integrated alarms for a wide temperature range.

### Heated and Refrigerated Incubators

Model Number	Volume (cu.ft.)	Exterior Dimensions (w x f-b x h)	Heated	Refrigerated	Programmable Temperature	Voltage, Power Connection
MIR-162-PA	3.3 93 L	22.8" x 23.4" x 32.3" 580 x 595 x 820 mm	yes	—	5°C above ambient to 80°C	
MIR-262-PA	5.4 153 L	28.7" x 25.4" x 34.3" 730 x 645 x 870 mm	yes	—	5°C above ambient to 80°C	
MIR-154-PA	4.3 123 L	27.6" x 22.8" x 40.1" 700 x 580 x 1018 mm	yes	yes	-10°C to 60°C	115V NEMA 5-15
MIR-254-PA	8.4 238 L	27.6" x 22.8" x 63.7" 700 x 580 x 1618 mm	yes	yes	-10°C to 60°C	
MIR-554-PA	14.3 406 L	31.5" x 32.8" x 71.3" 800 x 832 x 1810 mm	yes	yes	-10°C to 60°C	

Programmable for multifunction laboratory applications.

### Programmable

Multiple setpoints and cycling of refrigerated incubators for a variety of laboratory functions.

### PI.D. Controller

Microprocessor-based PI.D. (proportional, integral, derivative) control with digital input, full-function alarm and monitoring.

### LCD Controller

The new LCD controller improves user interface for better programming and control.

### eco ideas

**Energy Savings:** In addition to a microprocessor-controlled high efficient heater output and compressor ON/OFF, a renewal control program and low-heat emission inner chamber fan are newly adopted to allow high-energy saving operation over a wider range of ambient environments.

### MIR-154 / MIR-254 / MIR-554

#### Refrigerated Incubators/Environmental Testing Chambers

- The Panasonic MIR series offers accurate temperature control and uniformity in a wide range of temperatures, making them suitable for various applications.
- Programmable with 12 step, 10 program capability and wide temperature range that goes from -10°C up to +60°C with excellent temperature uniformity.
- Improved usability with modern design and reversible door, improved gentle air circulation that reduces media drying and adjustable low vibration.



# Plant Growth Chamber

The model MLR series humidified plant growth chamber has a temperature range of 0°C to 50°C, with programmable lighting for diurnal protocols in plant and insect cell culture applications.

## Plant Growth Chamber

Model Number	Volume (cu.ft.)	Exterior Dimensions (w x f-b x h)	Temperature Range (lamp off)	Temperature Range (lamp on)	Humidity Control Range	Lighting Range	Voltage, Power Connection
MLR-351H-PA	10.4 294 L	29.9" x 27.6" x 72.2" 760 x 700 x 1835 mm	5°C to 50°C	10°C to 50°C	55% to 90% RH	0 to 20,000 lux	115V NEMA 5-20

For simulation of cyclical environment conditions.



### Microprocessor P.I.D. Control

Allows accurate, reproducible and flexible programming of all performance parameters with optimal energy management; comprehensive security monitoring and alarm functions are standard. The temperature inside the incubator can be set and monitored easily by means of precise microprocessor temperature control with an LCD graphic display.

### Programmable

Nine user programmable steps allow simulation of environmental conditions; 15 variable intensity fluorescent lamps create uniform lighting.

### Forced Air Circulation

Maximizes temperature uniformity at all shelf levels.

### Ergonomic Design

Slim-profile cabinet offers sophisticated performance in minimal space.

### LCD Controller

The new LCD controller improves user interface for better programming and control.

MLR-351H



## MHE-PF4025CW-PA (Positive Pressure System) MHE-UN4025CW-PA (Negative Pressure System)

The Panasonic CPWS features a cost effective, space-saving solution for GMP and GTP compliant regenerative medicine and cell therapy research. The CPWS also minimizes the expense of a cleanroom laboratory.

### Panasonic Integrated Cell Processing Work Station

- Minimizes Cleanroom Expense
- Self-Contained
- Space-Saving
- Quick to Acquire and Install
- GMP Compliant for Aseptic Process
- User Friendly
- Energy Efficient, Green Design

The Panasonic CPWS work station is designed to deliver efficient, cost-effective and GMP compliant cell therapy research and manufacturing capability without the expense and inconvenience of a class 10,000 cleanroom. The CPWS offers significant advantages over conventional hard wall cleanroom construction.

- The CPWS is less expensive than a cleanroom.
- It is quicker to acquire and place into operation.
- The small footprint increases options for location and orientation.
- The user-friendly glove box design eliminates gowning and improves operator comfort and convenience.
- Operating costs are lower than cleanroom costs
- Work is easily suspended and resumed without the need to de-gown and re-gown, improving user comfort.
- Fast decontamination and change-over improve productivity, increase throughput and deliver quicker return on investment.
- Recordkeeping and process documentation are easier to manage.



Components and operating systems are configured around a central work station with a HEPA filtration and air management system designed to deliver Class 100 air to the work surface within the glove box.

- Central barrier isolator
- Pass box interchange
- Integrated H<sub>2</sub>O<sub>2</sub> decontamination system
- Optional cell observation system with microscope and monitor
- Optional centrifuge integrated into the work surface
- Optional CO<sub>2</sub> incubator with docking collar
- The optional incubator and optional centrifuge operate within a Class 100 environment.

#### Applications

The Panasonic CPWS enables a broader access to cell therapy research related to both minimally manipulated and non-minimally manipulated cell products by lowering the cost of entry, extending the process to the widest range of applications, and minimizing operating expenses when compared to a conventional cleanroom environment.

- Minimally manipulated products are associated with cell washing, enrichment, selection, HSC (PB, BM, CB), cancer therapies and other under GTP requirements.
- Non-minimally manipulated products are associated with expanded, differentiated or transformed cells (DC, MSC, ESC, TC) in cancer centers, biotech labs, stem cell institutes and contract manufacturing facilities operating under GMP requirements.
- GMPs (Good Manufacturing Practices) are mandated to ensure that drug development and manufacturing is safe, quality controlled for repeatability and thoroughly documented.
- GMPs typically require expensive hard wall laboratories and laboratory suites using biological safety cabinets in Class 10,000 cleanrooms surrounded by a Class 100,000 room.



## Integrated Cell Processing Work Station (CPWS)

### Panasonic CPWS Benefit vs. Conventional Cleanroom (Closed System vs. Open System)

Comparison	Panasonic CPWS Barrier Isolator	Cleanroom with Biological Safety Cabinets
General	Closed system, requires only Class 100,000 air	Open system, requires significant investment and maintenance of background environment, Class 10,000 air
Planning and Lead Time	Minimal; Cost of Class 100,000 room plus CPWS	High; Cost of Class 10,000 cleanroom plus Class 100 one or more Class 100 biological safety cabinets
Space/Footprint Allowance	Minimal footprint in existing space	Dedicated new/retrofit facility with significant requirement for HVAC, filtration, air showers
Validation Costs	Minimal; Requires Class 100,000 only.	High; Requires both Class 100 and Class 100,000.
Operation Cost	Low	High; Repeated decontamination and maintenance costs. Higher consumables cost
Implementation	Weeks	Months or Years
Ergonomics and User Comfort	No second gowning required. Central barrier isolator with ergonomically angled front permits easy access through glove ports. Reduces stress on workforce.	Conventional first and second gowning, external air supply, interlock doors/air showers
Flexibility	Elimination of hazardous fumes for decontamination permits diverse applications. Elimination of depolymerizing formaldehyde, formalin and other toxic chemicals permits transition between applications seamlessly.	Inflexible
Throughput	Expanded. Quick changeover extends use, optimizes return on investment. Component integration streamlines workflow while enhancing aseptic processing.	Limited due to product changeover criteria
<b>Security</b>		
Decontamination	Two Hours	Up to Two Weeks
Equipment and Instrumentation	Microscopes and other instrumentation can be dedicated to the work station.	Shared instrumentation in an open system exposes processes to cross contamination.

#### Barrier Isolator

The barrier isolator forms the central component to the work station and contains the primary operating systems required to establish and maintain aseptic conditions to meet GMP criteria.

- The barrier completely isolates the interior work product from the operator.
- The barrier isolator creates a closed Class 100 environment, eliminating the need for biological safety cabinets in a cleanroom.
- Isolator interior air is 100% Class 100 total circulation; no recirculated air is used.
- The polished stainless steel glove box interior is designed for maximum exposure of all interior surfaces subject to H<sub>2</sub>O<sub>2</sub> decontamination.

- Before commissioning and initial use, the isolator front can be opened on a hinged frame for installation of instrumentation or other devices larger than the interchange pass box opening.
- The HEPA filter and airflow system is mounted on top of the isolator.
- The internal airflow system is designed to create a positive pressure to mitigate the possibility of inflow contamination.
- Viability of the containment area is not delegated to third-party cleanroom contractors who are hired to decontaminate.

#### Ergonomics and Safety

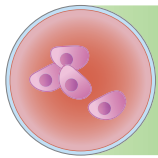
Because second gowning is not required, user comfort and productivity is significantly improved. The workplace routine, including breaks, are unencumbered by the need to leave and re-enter a cleanroom, bleach and/or shower.

- The inconvenience and expense of cumbersome containment suits with air and vacuum hoses is eliminated. If working with BL3 agents, the buddy system is not required.
- The barrier eliminates the potential for room contamination from blood or other aerosols. Workflow is not impacted by routine colds.
- Glove ports permit easier handling of red bag materials when required.
- A 6° angled front includes three glove ports to permit access to all interior surfaces.
- The interior cabinet includes independent interior fluorescent lamps to supplement ambient light.

## Panasonic CPWS Series Features

### Aseptic Environment Required for Cell Preparation

Usually, human derived cells must be guaranteed that they are prepared and cultured in an aseptic environment because they cannot be treated by heat or pressure.

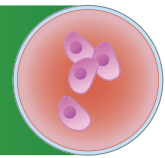


Extraction

Preparation

Culture

Administration



Original  
Cells

Prepared  
Cells

### H<sub>2</sub>O<sub>2</sub> Decontamination System

- The manually initiated, automatically sequenced H<sub>2</sub>O<sub>2</sub> decontamination system offers a fast, safe and proven decontamination process to enhance the performance of the CPWS by allowing more frequent turnover of segregated cell lines.
- The validated H<sub>2</sub>O<sub>2</sub> system generates an H<sub>2</sub>O<sub>2</sub> vapor that permeates all exposed surfaces from the central interchange pass box nebulizer containing a replaceable bottle of enriched hydrogen peroxide.
- When deployed, the H<sub>2</sub>O<sub>2</sub> vaporization sequence decontaminates the pass box, work station interior, centrifuge and CO<sub>2</sub> incubator exterior and docking gaskets.
- Once the vaporization is complete, the H<sub>2</sub>O<sub>2</sub> program implements a dwell period to ensure that proper exposure times are maintained for a wide range of pathogens (contact Panasonic for independent test results).
- At the end of the pre-programmed dwell period a resolution process eliminates fumes and toxic residuals.

### Isolator Interchange

- The interchange pass box allows safe access to the work area for supplies, instruments, devices, sterile media and labware.
- When materials are brought into the work station they are first positioned inside the interchange for H<sub>2</sub>O<sub>2</sub> decontamination.

- Decontamination is manually initiated and automatically sequenced once started.
- When the H<sub>2</sub>O<sub>2</sub> vaporization process is complete, the inner door is opened and the transfer is completed.
- Door interlocks permit simultaneous opening to protect the barrier isolator.

### CO<sub>2</sub> Incubator

The modular CO<sub>2</sub> incubator is an adaptation of the full-performance Panasonic MCO-5AC(IS). This incubator is designed for precise temperature and CO<sub>2</sub> control with elevated relative humidity to minimize cell desiccation.

- By using multiple, detachable CO<sub>2</sub> incubators, the CPWS can manage multiple protocols through complete product segregation, thereby assuring aseptic conditions and eliminating any possibility of cross-contamination or mishandling of patient-specific cells.
- The incubator attaches to a docking collar adjacent to the barrier isolator.
- Once attached, the barrier isolator undergoes a 2-hour H<sub>2</sub>O<sub>2</sub> decontamination process before the incubator door is opened. This process decontaminates the work area, incubator face, centrifuge and pass-thru interchange.
- The H<sub>2</sub>O<sub>2</sub> effectively decontaminates the CO<sub>2</sub> connection.
- When work is complete, the incubator is sealed, detached and moved to a user-defined staging location on a wheeled cart.

- The next incubator can be moved into position to repeat the process for another patient.
- There is no limit to the number of Panasonic MCO-5AC(IS) incubators that can be used with the work station.

### Centrifuge

The centrifuge is installed beneath the interior work surface and accessible under aseptic conditions without removing cells from the protected environment.

- The position and orientation of the centrifuge assures thorough decontamination during the H<sub>2</sub>O<sub>2</sub> vaporization cycle.
- The integrated design eliminates the requirement for additional floor space in a GMP environment.
- A variety of fixed and swinging rotors are available.
- Centrifuge controls are located external to the work area at the front of the centrifuge module.



**Panasonic  
Sterilization**

***World Class Design.** Accurate, high-temperature equipment for scientific research. Panasonic has always aimed to provide research support equipment that offers complete satisfaction to its users.*

## Panasonic Sterilization

Researchers waste valuable time and energy when limited to using a centralized building autoclave. Installation and maintenance of central autoclaves are not only costly but time consuming. The MLS autoclave series is designed for individual lab use and can be conveniently moved from one lab to another.

## Top-Loading Portable Autoclaves

Panasonic MLS series top-loading autoclaves are a popular method of sterilization for today's research laboratories. Self-contained and easy to use, these reliable energy-saving autoclaves are ideal for a wide range of applications, including liquid culture media preparation, labware and waste sterilization. Designed to meet good laboratory practice criteria in biotechnology, pharmaceutical and clinical laboratories. Panasonic MLS series portable autoclaves deliver high pressure steam with speed, efficiency and reliability, for research lab usage only.

### Top-Loading Portable Autoclaves

MLS-3751L  
MLS-3781L

### Top-Loading Portable Autoclaves

Model Number	Effective Capacity (cu.ft.)	Exterior Dimensions (w x f-b x h)	Maximum Temp.	Baskets (included)	Flask Capacity (1L)	Cross Section	Voltage, Power Connection
MLS-3751L-PA	1.8 50 L	18.8" x 24.9" x 29.4" 478 x 632 x 748 mm	135°C	2	8	14.6" (37cm) 371 mm	115V NEMA L5-30
MLS-3781L-PA	2.6 75 L	18.8" x 24.9" x 38.0" 478 x 632 x 965 mm	135°C	3	12	14.6" (37cm) 371 mm	208/230V NEMA L6-30

Easy mobility for sterilization on demand.



#### Microprocessor Controls

Assures correct temperature and is accurately maintained and easily operated with one-touch operation. Sterilizing temperature is controlled by the microprocessor within +2°C of the set temperature in the range of 115°C to 135°C.

#### Process Voice Notification

The MLS series includes a voice notification of the system process. Each step of the process is notified via a pre-recorded voice message, allowing the end user to hear the process as it is happening.

#### Programmable

Allows maximum flexibility in ramp up, dwell, ramp down and cool-off protocols.

#### Compact Design

Maximizes use of available lab floor space, stores easily when not in use.

#### Low-Profile and Ergonomic Design

Simplifies access, easy to load and unload.

#### Swing-Up Lid

Opens chamber for 100% access; eliminates side space requirement.

#### Printer

Optional process printer for batch documentation.

MLS-3751L

MLS-3781L





## Product Service and Uptime Assurance

Your Panasonic experience with product safety, reliability and performance is supported by a multi-national network of factory-trained service professionals located in all markets we serve. The serviceability of Panasonic Healthcare products is inherent to all Panasonic product designs and originates in our research and development department. Combined with customer feedback and detailed documentation of field performance, Panasonic product developers incorporate real-world applications into product systems and operating parameters.

From ambient temperature and humidity fluctuations to broad electrical voltage tolerances, Panasonic Healthcare products are expected to withstand demands in the newest of facilities as well as older labs. Central to our product development efforts is the concept of “predictive performance,” a matrix of electronics and control functions that sense component operation in real time, compare performance to accepted norms and report exceptions long before normal wear and tear causes an interruption. As a result, many Panasonic Healthcare products include self-diagnostics that permit authorized service technicians to determine how and when service calls are required.

As Panasonic continues to apply improvements in compressor and electronics to all products, life cycle costs can be extended and downtime minimized. Panasonic service specialists are trained to perform remote and on-site diagnostics, repair and replace worn components and offer preventative maintenance programs suitable to your needs and budget. Panasonic Healthcare also offers training to selected facility biomedical engineers and service staff for authorized in-warranty and post-warranty repairs.

Because Panasonic Healthcare products are sold and serviced worldwide, products acquired in one country under grant or facility-sharing programs are easily supported if moved to facilities in the next city or around the world.

## Validation Services

Panasonic offers a wide range of high-quality validation services for all our equipment. These services include on-site validation, custom validation support packages, factory acceptance testing, and NIST traceable calibration.

Choosing Panasonic as an equipment supplier and validation consultant can greatly reduce the time and cost involved with new equipment.

### Unique Services Panasonic Offers:

- On-site consultation
- Specialized documentation for each individual unit
- Customized testing procedures based on personalized customer requirements
- No charge for documentation when service is purchased
- Quality documents complying with 21 CFR traceable standards
- Free archiving of unexecuted testing protocols

### Pre-Delivery and On-Site Services

Pre-delivery services include factory acceptance testing, calibration, and temperature mapping. On-site services include installation qualification, operational qualification, performance qualification, calibration and temperature mapping.

### Panasonic Connect

Panasonic’s customer-driven service program guarantees local attention from qualified Panasonic service representatives, whenever and wherever you need it.

- New Unit Installation and Training
- Preventative Maintenance
- Warranty and Non-Warranty Repairs
- Calibration/Validation Services
- Refurbishment and Reconditioning
- Customized Service and Warranty Programs
- Loaner Units When Needed
- In-Stock Parts for Immediate Delivery

*Prices and conditions may vary by market.*





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