SANYO

Guide to Laboratory Equipment

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

www.sanyobiomedical.com

My Life. My Work. My Choice.

Guide to Laboratory Equipment

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Life Science, Pharmaceutical, Biotechnology,
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Welcome to SANYO Biomedical, a division of SANYO North American Corporation. Headquartered in suburban Chicago, SANYO Biomedical oversees marketing, sales, technical service and customer support for customers, sales representatives, service providers and facility managers throughout North, Central and South America.

Known throughout the world as a leader in consumer electronics and appliances, SANYO addresses global needs such as energy, food, housing, health and information technology. For over forty years, SANYO Biomedical has established a reputation as a premier manufacturer of precision biomedical and laboratory equipment. As part of the worldwide SANYO 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.

SANYO Biomedical 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 SANYO Biomedical with confidence.

Table of Contents

History of SANYO Biomedical Equipment Development

1966 Pharmaceutical refrigerator
1967
1968
1969 Incubator
1970
1971
1972
1973 Medical autoclave
1974 -40°C freezer, MDF-400
1975 Pharmaceutical refrigerators, MPR-110/210
Cooled incubator, MIR-150/250/550
1976
1977 -86°C ULT freezer, MDF-230
-30°C medical freezer, MDF-390
1978 Upright medical freezer, MDF-300
1979 -86°C ULT freezer, MDF-290
Blood Bank Refrigerator, MBR-390
1980 -86°C upright ULT Freezer, MDF-380
Prefab refrigerator, MCU-1000
Cooling unit, MCU-5020
1981 -30°C medical freezer, MDF-130
Compact blood bank refrigerator, MBR-105T
1982 PI controlled oven, MOV-102/202
Large pharmaceutical refrigerators, MPR-510/1010
Pharmaceutical refrigerator with -30°C freezer, MPR-211F
1983 Compact -86°C ULT freezer, MDF-190
P.I.D. controlled heated incubators, MIR160/260
1984 Water jacketed CO_2 incubator, MCO-165
1985 Dry heat sterilizer, MOV-102S/202S
1986 HEPA-filter unit, MBCR-717
Cleanroom unit, MBCR-2220C
Air jacketed CO_2 incubator, MCO-95
1987 -135°C ULT freezer, MDF-2135
Pharmaceutical refrigerators, MPR-161D/311D
1988 Bio-clean bench, MCV-9/13/16
1989 Programmable cooled incubators, MIR-152/252/552
-86°C double-door upright ULT freezer, MDF-U581
Establishment of SANYO bio-soft laboratory, Tokyo plant
1990 Plant growth cabinet, MLR-350
1991 Multi-gas incubator, MCO-175M
World's lowest temperature freezer, (-152°C), MDF-1155(ATN)
Bench-top clean bench, MCV-711ATS
1992 Programmable high-temperature oven, MOV-313P
Plasma blast freezer, MDF-U460B
1993 Four-door pharmaceutical refrigerator with
-30°C freezer, MPR-411F/411FR
1994 ISO 9002 recognition
1995 CFC-free refrigerants recognized by ASHRAE
(EPA Stratospheric Ozone Protection Award)
1996 ISO 9001
1997 Introduction of world's first vacuum insulated
-86°C freezer, MDF-U70V
1998 Pharmaceutical refrigerator, MPR-512/1012
ISO 14001 (environmental recognition)
1999
2000 Introduction of inCu saFe™ active background
contamination control in CO_2 incubators
2001
2002 Introduction of SafeCell™ revolutionary UV
sterilization in CO_2 incubators
2003 -86°C V.I.P.™ freezers, MDF-U32V/U54VC
Multi-gas incubator, MCO-18M
2004
2005
2006 Introduction of -150°C freezer, MDF-C2156VANC
2007
2008 Introduction of large capacity reach-in
CO_2 incubator, MCO-80IC
2009 Introduction of Sterisonic™ GxP Series CO_2 incubator,
with H_2O_2 sterilization
2010 Introduction of Twin Guard Series™
-86 DualºCool ULT Freezer, MDF-U500VX

Core Technologies

SANYO 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 V.I.P.™ vacuum insulation panels engineered to exact specifications for important applications in the life science, pharmaceutical, biotechnology, clinical and industrial laboratories.

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

- Patented V.I.P.™ vacuum insulation panel freezers, U.S. Patent No. 6260377
- Twin Guard Series™ -86 DualºCool independent ultra-low temperature refrigeration systems
- Patented SafeCell™ UV contamination control, U.S. Patent No. 6255103
- inCu saFe™ germicidal effective copper-enriched stainless steel incubator interior
- P.I.D./R™ infrared CO_2 system with rapid recovery, dual sensor on Sterisonic™ GxP Series (MCO-19AIC) only
- Hydrogen Peroxide Vapor Sterilization, new feature for the Sterisonic™ GxP Series (MCO-19AIC) only
- Patented Direct Heat and Air Jacket™ (DHA) incubator heating technology, U.S. Patent No. 5519188
- Active Background Contamination Control™ cell culture environment
- FDA clearance for *in vitro* fertilization, FDA K013703, October 30, 2001
- SANYO-designed compressors specifically for laboratory refrigeration
- SANYO-brand battery technology
- SANYO-built electronic components

Vertical Component Integration™

As a leader in consumer electronics, refrigeration, energy and environmental products, SANYO 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 SANYO products through the development model of Vertical Component Integration™. Because many of our key component parts are designed and built by SANYO, we offer only the very best, accurately matched components in each SANYO product.

As SANYO draws on vast corporate resources to develop laboratory products to meet the needs of contemporary medical and scientific research, the SANYO 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, SANYO refrigerators use commercially available HFC refrigerants and CFC-free insulation.

- Compliance of RoHS, Restriction of Hazardous Substance, on all units.
- SANYO is committed to developing green technologies that provide energy efficiency resulting in lower operational costs with less impact on the environment.

Serving our Markets

SANYO 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, SANYO 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, SANYO is collaborating with our customers to create products designed to satisfy strict third-party regulatory criteria such as FDA, AABB/ANRC, GMPs, GLPs and more.

Thinking Green

SANYO has established a corporate-wide initiative to emphasize the company's commitment to energy conservation and environmental integration. For SANYO, thinking green is a threefold approach to environmental, energy and lifestyle considerations. Here, SANYO 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 SANYO Biomedicalrefrigerants such as R134a and R410a (Puron®), are safe and sourced on the open market as well.

SANYO 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, SANYO 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.

SANYO Incubation

World Class Design. *SANYO designs and manufactures a range of CO_2 and multi-gas incubators, refrigerated and heated environmental chambers to meet a variety of application and user needs.*

SANYO Incubators

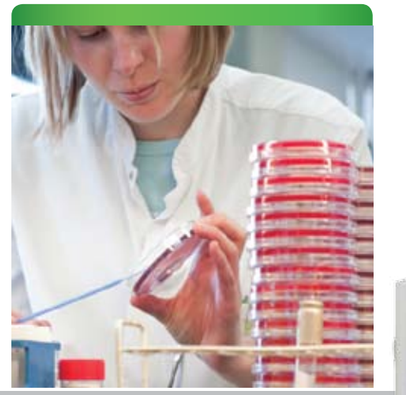
SANYO designs and manufactures a range of CO_2, multi-gas, heated, and refrigerated incubators to meet a variety of application and user needs.

CO_2 Laboratory Incubators
MCO-5AC
MCO-17AC
MCO-34AC
MCO-19AIC
MCO-38AIC
MCO-19AIC(UV)
MCO-38AIC(UV)
MCO-19AIC(UVH)
MCO-38AIC(UVH)
MCO-20AIC
MCO-40AIC
MCO-80IC

CO_2/O_2 Laboratory Incubators
MCO-5M
MCO-5M(UV)
MCO-18M
MCO-36M
MCO-18M(UV)
MCO-36M(UV)

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
SANYO's inCu saFe™ and SafeCell™ UV work in combination to provide the most effective protection against contamination during culturing without downtime or affecting cultures.

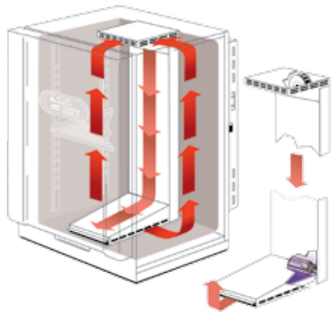
inCu saFe™ Copper Stainless Steel Alloy
InCu saFe™ copper-enriched stainless steel alloy combines the corrosion resistance and durability of stainless steel with the germicidal properties of copper. The inCu saFe™ walls and shelves significantly reduce the risk of contamination developing on internal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

H_2O_2 Sterilization
The unique Sterisonic™ GxP H_2O_2 sterilization system limits downtime to less than three hours when total chamber sterilization is desired. All interior components and CO_2 sampling loop are sterilized *in situ*; no need for removal and autoclaving.

H_2O_2 sterilization vs. high heat sterilization
= Uptime (Hours) = Downtime (Hours)

CO_2 Control
SANYO proprietary singlebeam, dual detector infrared (IR2) CO_2 sensor delivers precise CO_2 control, quick recovery following door openings, and auto sampling with no moving parts.

SafeCell™ UV
(U.S. Patent 6255103)
SANYO's SafeCell™ UV system with programmable, ozone-free UV lamp sterilizes 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.

CO_2 Laboratory Incubators

All SANYO CO_2 incubators feature patented Direct Heat and Air Jacket™ temperature control for accurate, uniform temperature control and inCu saFe™ for continuous contamination control. SANYO laboratory CO_2 incubators feature selected SafeCell™ UV with exclusive, patented Active Background Contamination Control™.

CO_2 Laboratory Incubators

Model Number	Volume (cu.ft.)	Exterior Dimensions (w x f-b x h)	Contamination Control	CO_2 Control	Chamber	Voltage, Power Connection
MCO-5AC	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	115V NEMA 5-15
MCO-17AC	5.8 164 L	24.4" x 27.0" x 35.4" 620 x 686 x 900 mm	inCu saFe copper-enriched stainless steel interior	thermal conductivity	single	
MCO-34AC	11.6 328 L	24.4" x 27.0" x 70.8" 620 x 686 x 1800 mm			dual	
MCO-19AIC	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	12.0 340 L	24.4" x 27.9" x 70.8" 620 x 710 x 1800 mm			dual	
MCO-19AIC(UV)	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-38AIC(UV)	12.0 340 L	24.4" x 27.9" x 70.8" 620 x 710 x 1800 mm			dual	
MCO-19AIC(UVH)	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_2O_2 sterilization	infrared with P.I.D./R recovery	single	115V NEMA 5-15
MCO-38AIC(UVH)	12.0 340 L	24.4" x 27.9" x 70.8" 620 x 710 x 1800 mm			dual	
MCO-20AIC	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	15.2 430 L	30.3" x 27.9" x 70.8" 770 x 710 x 1800 mm			dual	
MCO-80IC	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_2O_2 Sterilization, 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 eliminates molds, spores and other contaminating spills, kills mycoplasma and provides a noncorrosive environment.

Sterisonic™ GxP Series with H_2O_2 Sterilization
The unique Sterisonic™ GxP H_2O_2 sterilization system limits downtime to less than three hours when total chamber sterilization with verification is desired.

SafeCell™ UV Contamination Control
Narrow bandwidth ultraviolet sterilization *in situ* to eliminate air and water pan contamination without downtime. SANYO 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 sterilization at +90°C and +140°C are equally effective in decontaminating an incubator interior chamber against organisms selected for testing.

P.I.D./R™ Control Sophistication
Proportional, integral and derivative infrared CO_2 control accelerates recovery and prevents overshoot.

CO_2 Control Options
Available with high precision, quick recovery infrared or thermal CO_2 sensor.

Direct Heat and Air Jacket™ Control
Patented, radiant-wall heating microprocessor 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_2 Incubators

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

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

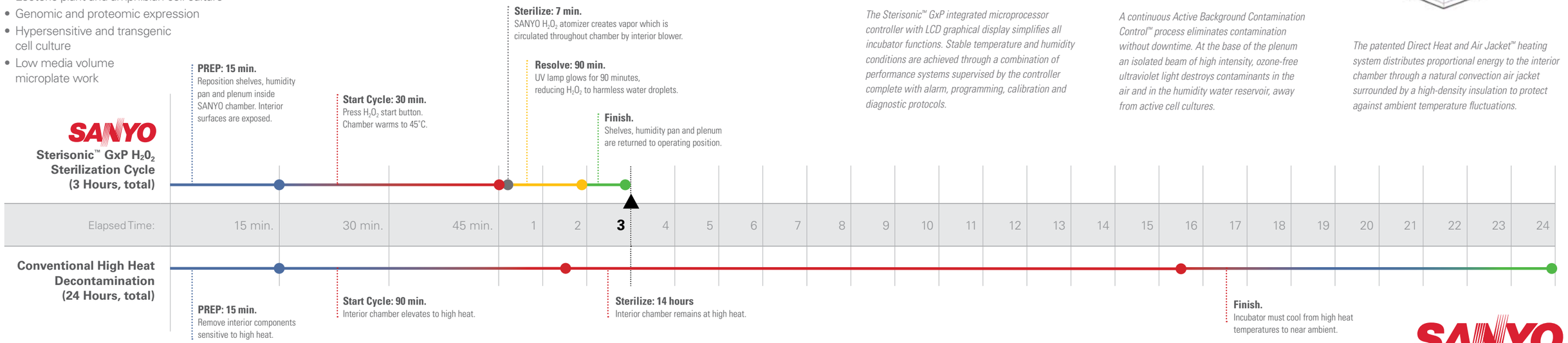
Representing years of research, development and component testing, the Sterisonic™ GxP incorporates a collective of mutually functional systems and design attributes to offer a holistic solution to cell culture protocols, from the most sophisticated to more familiar and conventional processes. These 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 SANYO Sterisonic™ GxP CO_2 incubator maintains ~95% RH at 37°C.
- **Ergonomic cabinet design**. With reversible inner and outer doors, a single SANYO 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.

SANYO Sterisonic™ GxP Model MCO-19AIC(UVH) with integrated H_2O_2 sterilization system.



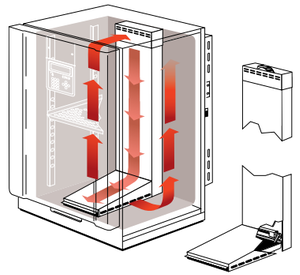
Control and Monitoring

- 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 interface permits remote transmission for GMP/GLP protocols as required.
- Precise P.I.D. logic controls and adjusts to all temperature and CO_2 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.

Sterilization and Decontamination

- The unique Sterisonic™ GxP H_2O_2 sterilization system limits downtime to less than three hours when total chamber sterilization with verification is desired.
- All interior components and CO_2 sampling loop are sterilized *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 eliminates 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_2 Control

- SANYO proprietary single-beam, dual detector infrared (IR2) CO_2 sensor delivers precise CO_2 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.

MCO-80IC

Reach-In CO_2 Incubator

SANYO's large capacity, reach-in CO_2 incubator has the capacity and flexibility to grow with your culturing needs while providing a precise and repeatable temperature, humidity and CO_2 environment.

MCO-80IC reach-in CO_2 incubator.

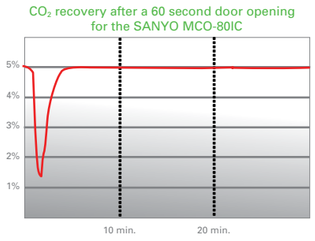
The MCO-80IC is ideal for culturing large volumes of patient samples, performing short-term studies, and working with large volume cell culture apparatus. It includes SANYO's exclusive incubator technologies such as inCu saFe™ interiors, UV decontamination option, infrared (IR) CO_2 sensor with P.I.D. control, and features exceptionally low CO_2 gas consumption.

Usability

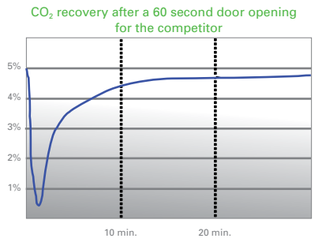
- 30.1 cu.ft. (851L) large capacity cabinet allows flexibility in usage.
- Cabinet will accommodate a roller bottle apparatus, 5 bottles wide x 7 bottles high (requires mounting ramp kit).
- Full view, double paned glass door allows easy observation of cultured samples.
- Large LED digital display and keypad for greater visibility and ease of set-up.

Superior CO_2 and Temperature Control

- IR CO_2 sensor with P.I.D. microprocessor control and forced air circulation system delivers fast CO_2 recovery characteristics.
- Exceptionally low CO_2 gas consumption rates, less than half of similar competitive units.
- P.I.D. temperature control with deviation of +/- 0.1°C.

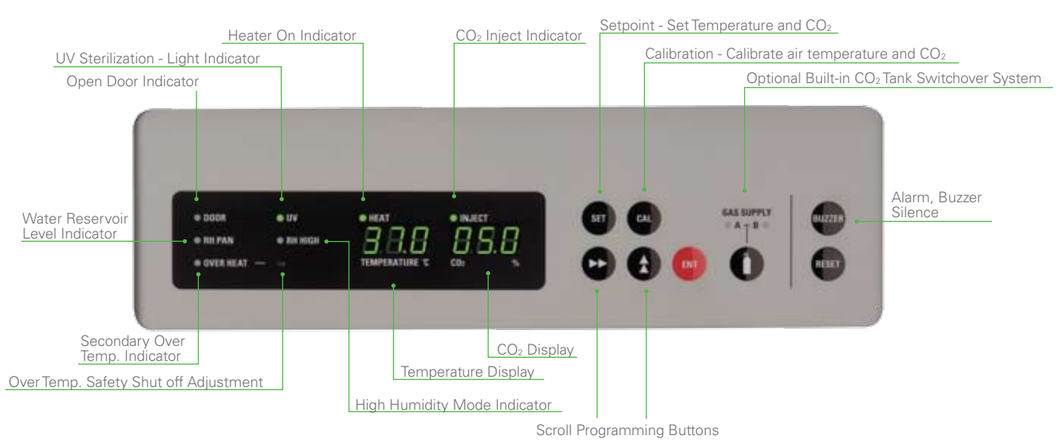


SANYO MCO-80IC



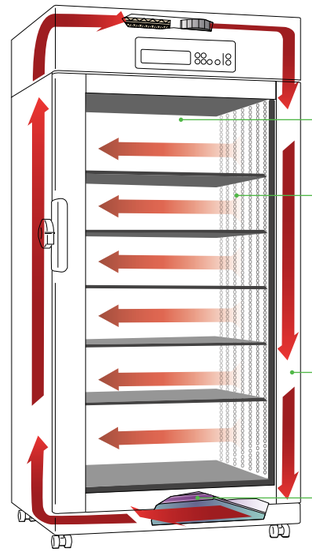
Competitor

Faster CO_2 Recovery and Lower CO_2 Consumption. SANYO's large capacity reach-in incubator was designed specifically for critical applications in pharmaceutical, biotechnology and clinical investigation.



Anti-Contamination Measures

- Interior, plenums and shelving constructed of SANYO's exclusive inCu saFe™, germicidal, copper-enriched stainless steel.
- Optional UV sterilization system for humidity reservoir.
- Extra heaters positioned on the outer glass door to eliminate condensation.



Horizontal airflow maintains accurate temperature and CO_2 control and uniformity at all shelf levels, top-to-bottom, front-to-back.

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

Humidified air minimizes potential for cell culture media desiccation.

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

Horizontal Laminar Airflow System

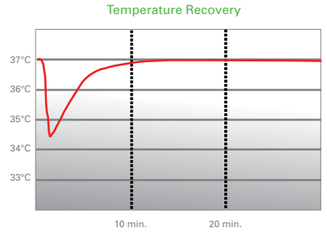
SANYO's reach-in incubator's cross-shelf directed air flow system promotes optimum temperature uniformity throughout the chamber and contributes to quick temperature recovery after door openings. Utilizing SANYO's exclusive inCu saFe™ chamber material in the perforated side plenums helps minimize contamination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

Optional UV Sterilization and Humidity Selection

SANYO's patented and laboratory proven Safe Cell UV™ sterilization system is employed to sterilize the humidifying water reservoir and help eliminate con-tamination concerns. The unit can be set to both nominal and high humidity setpoints.

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.



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

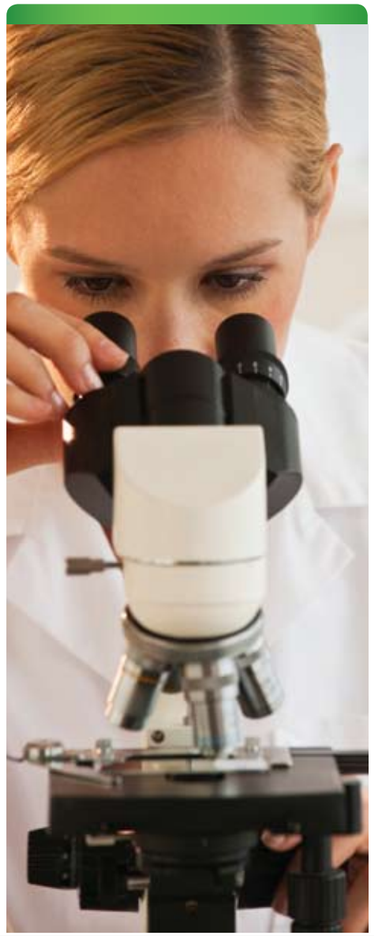
CO_2/O_2 Laboratory Incubators

*SANYO models MCO-5M/18M/36M series CO_2/O_2 incubators employ multiple sensor technologies to achieve in vitro simulation of the in vivo environment. MCO Series CO_2 and CO_2/O_2 incubators have received U.S. Food and Drug Administration 510(k) clearance for in vitro fertilization applications in accordance with the FDA Safe Medical Devices Act of 1990 and the Medical Device Amendments of 1992.**

CO_2/O_2 Laboratory Incubators

Model Number	Volume (cu.ft.)	Exterior Dimensions (w x f-b x h)	Contamination Control	CO_2 Control	O_2 Control	Voltage, Power Connection
MCO-5M	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-18M	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-36M	12.0 340 L	24.4" x 28.0" x 70.8" 620 x 710 x 1800 mm				

For below ambient or enriched (above ambient) oxygen levels in addition to CO_2 control.



Infrared CO_2 Sensor

Precise CO_2 control, fast response to door openings. The SANYO CO_2 IR sensor monitors and controls CO_2 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_2 Control

Non-depleting design for precise O_2 control with fast response to door openings. The maintenance-free zirconia solid-state electrolyte sensor has a high degree of precision, a long service life and does not require fine adjustment. Through accurate determination of the chamber O_2 level the microprocessor injects either nitrogen gas or oxygen as required.

P.I.D./R™ Control Sophistication

Proportional, integral and derivative infrared CO_2 control accelerates recovery and prevents overshoot.

** Reference Number: K013703*
Regulation Number: 21 CFR 884-6120, Assisted Reproduction Accessories, Regulatory Class II, Product Code 85MOG, October 30, 2001.

MCO-18M

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_2 and O_2 levels.
- Fast humidity level recovery by N_2 gas bubbler.

MCO-5M
(shown stacked)

MCO-5M

Heated and Refrigerated Incubators

SANYO 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	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	115V NEMA 5-15
MIR-262	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	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	
MIR-254	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	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.

P.I.D. Controller

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

SANYO-Brand Refrigeration

Built by SANYO for long-lasting, dependable operation in demanding laboratory environments.

LCD Controller

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

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 SANYO 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.

MIR-554

MIR-254

MIR-154

MIR-162

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	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 °50C	55% to 90% RH	0 to 20,000 lux	115V NEMA 5-15

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

SANYO Preservation

World Class Design. *SANYO 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.*

SANYO Preservation Systems

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

V.I.P.™ Space Saving Series
-86°C Ultra-Low Freezers

MDF-U33V
MDF-U53VA
MDF-U54VC
MDF-U74VC

Twin Guard™ Series -86 Dual°Cool
-86°C Ultra-Low Freezers

MDF-U500VXC

Conventionally Insulated MDF Series
-86°C Ultra-Low Freezers

MDF-U5386SC, Upright
MDF-U7386SC, Upright
MDF-594C, Chest
MDF-794C, Chest

V.I.P.™ PLUS Space Saving Series
-80°C Ultra-Low Freezers

MDF-C8V1, Chest

V.I.P.™ Space Saving Series
-150°C Cryogenic Freezer

MDF-C2156VANC

-30°C Biomedical Freezers

MDF-436
MDF-U333
MDF-U537
MDF-U730
MDF-U730M

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-214F
MPR-414F

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

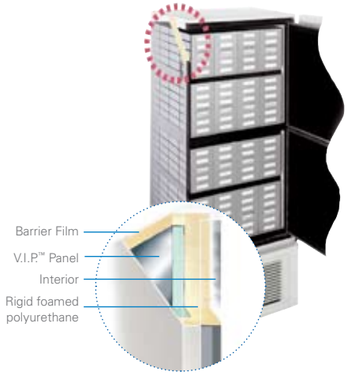
- Cascade Cooling System
- V.I.P.™ Vacuum Insulation Panel
- V.I.P. PLUS™ Vacuum Insulation Panel
- Insulated Inner Doors
- CPU and Touch Pad
- LCD Digital Display
- Remote Alarm
- Automatic Alarm System
- Power Failure Alarm
- Filterless Design
- Air Filter
- CFC-Free
- Energy Savings
- Quiet, Reliable Compressors
- Service
- Rechargeable Battery

Patented SANYO 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. SANYO 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 (V.I.P.™).

In 2006, SANYO 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 SANYO patented V.I.P.™ 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 (V.I.P.™)

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

The SANYO patented V.I.P.™ vacuum insulation panel thin-wall composite is a high-efficiency design that yields more interior storage volume in a conventional freezer footprint. The V.I.P.™ 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.

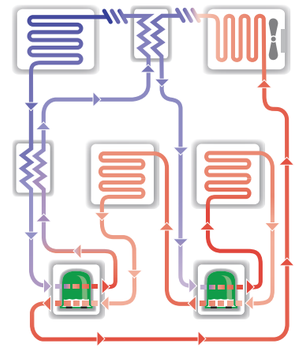
Cascade Cooling System

By apportioning the oil cooling function between specially designed SANYO Cool Safe™ compressors, and by cooling the compressor oil to minimize compressor operating temperatures, the SANYO 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

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

SANYO 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.



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

Because modern laboratories are energy-intensive, SANYO has developed a corporate-wide energy savings and environmental impact approach to new product development. The V.I.P.™ series freezers offer significant benefits through a balance of refrigeration power, cabinet construction and intelligent control over all functions.

V.I.P™ Series Space Saving -86°C Ultra-Low-Freezers

SANYO V.I.P.™ 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 V.I.P.™ vacuum insulation panel construction allows up to 25% more storage volume in the same or less floor space than conventional freezers.

V.I.P.™ -86°C Ultra Low 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-U33V	11.8 340 L	26.4" x 34.1" x 73.2" 670 x 867 x 1860 mm	216	144	21,600	115V NEMA 5-15
MDF-U53VA	18.3 510 L	30.3" x 34.4" x 78.3" 770 x 875 x 1990 mm	352	224	35,200	115V NEMA 5-20
MDF-U54VC	18.3 510 L	30.3" x 34.4" x 78.3" 770 x 875 x 1990 mm	352	224	35,200	208-230V NEMA 6-15
MDF-U74VC	25.7 736 L	39.8" x 34.4" x 79.1" 1010 x 875 x 2010 mm	576	384	57,600	208-230V NEMA 6-15

V.I.P.™ units offer lower operational costs than conventionally insulated models. These units also offer high-density ultra-low storage solutions for the laboratory.

Patented V.I.P.™ Vacuum Panel Insulation

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™ SANYO 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 set-point, alarm, monitoring and diagnostic functions supervised by SANYO-built microprocessor controller with digital display of all input/output function.

SANYO-Designed Compressors

SANYO's ultra-low temperature compressor employs a unique orientation of conventional components to 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.

MDF-U33V

MDF-U74VC

Twin Guard Series™ -86 Dual°Cool Ultra-Low Freezer

The SANYO MDF-U500VXC Twin Guard Series™ -86 Dual°Cool ultra-low freezer is 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 Dual°Cool Ultra-Low Freezer

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-U500VXC	18.3 519 L	30.3" x 34.3" x 78.3" 770 x 875 x 1990 mm	352	224	35,200	208-230V NEMA 6-15

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

Twin Guard Series™ -86 Dual°Cool Refrigeration System

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

Integrated LCD Control with Graphical Display

The Twin Guard Series™ MDF-U500VXC is 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 V.I.P.™ Vacuum Panel Insulation

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™ SANYO 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 SANYO Twin Guard Series™ Freezer 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

HIGH DENSITY
ULTRA-LOW STORAGE

SANYO V.I.P.™ Series freezers offer high-density storage that effectively reduces the volumetric unit costs of ultra-low storage.

MDF-U500VXC

Twin Guard Series™ -86°C Ultra-Low Freezer Featuring SANYO -86 Dual°Cool Independent Refrigeration Systems

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

The 18.3 cu.ft. / 519 L V.I.P.™ insulated MDF-U500VXC, 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 in the unlikely event of one compressor failure.
- The combination of additional refrigeration intelligently managed by intuitive microprocessor controls and integrated into SANYO's patented V.I.P.™ 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 SANYO Twin Guard Series™ -86°C ultra-low freezer with dual, independent refrigeration systems increases reliability. The 18.3 cu.ft./519 liter upright cabinet holds up to 352 2"/51mm boxes in standard inventory racks.

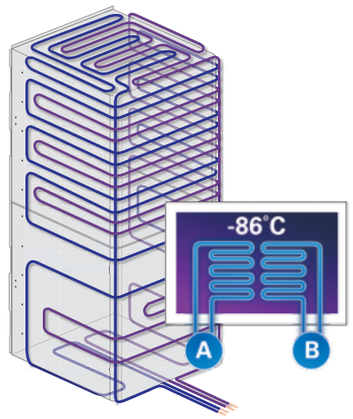
Ultra-Critical Installations and Applications Overview

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.

Integrated LCD control with graphical display. The Twin Guard Series™ MDF-U500VXC is 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 SANYO 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_2 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 Dual°Cool Refrigeration System

The Twin Guard Series™ Ultra-Low Freezer avoids conventional cascade refrigeration technology by using two completely independent one-compressor, autocascade 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_2 or LN_2 backup system installed, the freezer will maintain -65°C storage temperature for up to eight hours (CO_2 backup system) and -65°C storage temperature for up to 15 hours (LN_2 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, SANYO V.I.P.™ 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 SANYO-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	SANYO Twin Guard™ Series
Fan Failure	Freezer Fails	Freezer fails, CO_2 or LN_2 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		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_2 or CO_2 backup system offers additional protection.
Low Stage Compressor Failure	Freezer Fails		

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

SANYO conventionally insulated MDF 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 SANYO-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 MDF 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-U5386SC	17.1 487 L	35.0" x 34.4" x 78.3" 890 x 875 x 1900 mm	320	192	32,000	208/230V NEMA 6-15
MDF-U7386SC	23.5 668 L	44.5" x 34.4" x 78.3" 1130 x 875 x 1900 mm	480	366	48,000	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 SANYO-built microprocessor controller with digital display of all input/output functions.

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

SANYO-Designed Compressors
SANYO's ultra-low temperature compressor employs a unique orientation of conventional components to reduce discharge temperatures and compressor heat.

MDF-U7386SC

-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)

SANYO MDF series ultra-low temperature freezers maintain internal temperatures as low as -86°C (-123°F). All models use SANYO-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	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	24.8 702 L	101.2" x 30.3" x 42.1" 2010 x 770 x 1070 mm	507	351	50,700	208/230V NEMA 6-15

V.I.P.™ 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	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, V.I.P.™ offers lower operational costs than conventionally insulated models.

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

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

SANYO-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 V.I.P.™ 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 SANYO-built microprocessor controller with digital LED display.

Thinking Green: V.I.P.™ PLUS offers lower operational costs than conventionally insulated models.

MDF-594C

-150°C Cryogenic Freezers

SANYO MDF series cryogenic freezers maintain uniform temperature of -150°C for stable, long-term preservation of cells and tissue. SANYO V.I.P.™ PLUS Cryogenic Series -150°C ultra-low temperature freezers achieve more storage capacity than a conventionally insulated freezer without increasing footprint.

-150°C 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	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.

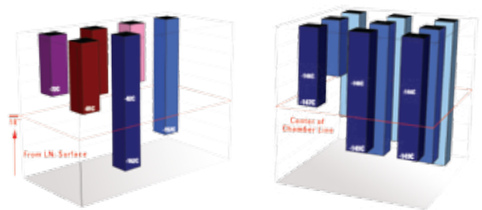
Uniform Cryogenic Temperatures
Mechanically refrigerated design promotes better top-to-bottom uniformity than liquid nitrogen vapor-phase storage.

V.I.P.™ 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.

SANYO-Designed Refrigeration
Designed by SANYO 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
LCD 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 SANYO'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_2 vapor system is dependent on storage location.

Ideal Alternative to LN_2 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_2 Backup System
Automatically injects LN_2 to maintain temperature during prolonged power outage, (LN_2 tank not included).

Mechanical Refrigeration
Lowers LN_2 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 Biomedical Freezers (Chest and Upright)

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

-30°C Biomedical Freezers (Chest)

Model Number	Volume (cu.ft.)	Exterior Dimensions (w x f-b x h)	Defrost	Voltage, Power Connection
MDF-436	15.0 426 L	49.8" x 31.8" x 35.6" 1265 x 807 x 905 mm	Manual	115V, NEMA 5-15

-30°C Biomedical Freezers (Upright)

Model Number	Volume (cu.ft.)	Exterior Dimensions (w x f-b x h)	Defrost	Voltage, Power Connection
MDF-U333	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-U537	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-U730	22.3 / 632 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-U730M	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.

MDF-U730M

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.

SANYO-Designed Refrigeration
Designed by SANYO with compressors specifically for storage applications in a laboratory environment.

Microprocessor Controls
Comprehensive setpoint, alarm, monitoring and diagnostic functions supervised by SANYO-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-537

MDF-436

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	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	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	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	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
SANYO-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.

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

SANYO-Designed Compressors
Designed by SANYO specifically for demanding laboratory applications.

MPR-721

MPR-1411

Pharmaceutical Refrigerators

SANYO'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-311D(H)	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	17.2 488 L	35.4" x 23.6" x 70.5" 900 x 600 x 1790 mm	dual, sliding	adjustable	115V NEMA 5-15
MPR-514R	17.2 488 L	35.4" x 23.6" x 70.5" 900 x 600 x 1790 mm	dual, sliding	1/2 adjustable, 1/2 roll-out	115V NEMA 5-15
MPR-1014	36.5 1034 L	70.0" x 23.6" x 70.5" 1778 x 600 x 1790 mm	dual, sliding glass	adjustable	115V NEMA 5-15
MPR-1014R	36.5 1034 L	70.0" 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 SANYO-built microprocessor controller with digital display of all input/output functions, adjustable temperature range 2°C to 14°C.

MPR-514

The Ideal +4° Pharmaceutical Refrigeration in Capacities from 17.2 cu.ft./488L:

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

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

SANYO-Designed Compressors
Designed by SANYO 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-1014

Blood Bank Refrigerators

SANYO 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-107D(H)	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	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	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	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
SANYO-built microprocessor controller with comprehensive alarm, monitoring and diagnostic functions with digital display.

SANYO-Designed Refrigeration
Designed by SANYO with compressors specifically designed for blood bank storage.

SANYO 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, SANYO 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-214F	6.2 176 L	1.4 40 L	21.3" x 21.9" x 70.5" 540 x 557 x 1970 mm	2°C to 14°C	-20°C to -30°C	115V NEMA 5-15
MPR-414F	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

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

SANYO Cycle Defrost
Unique cycle defrost (refrigerator only) initiates only as required; maintains internal temperature uniformity during cycle defrost.

SANYO-Designed Refrigeration
SANYO-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 SANYO-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.
- Triple-or double-pane windows with heat reflection film reduces the condensation.
- Calibration adjustment through the controlpanel is available.
- The MPR series combo units have two separate specially designed compressors and offers quiet operation.

MPR-214F

General Purpose Refrigerators

SANYO 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.

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	6.1 173 L	23.6" x 22.5" x 34.5" 600 x 571 x 876 mm	1°C to 14°C Microprocessor	yes	yes	115V, NEMA 5-15
SR-L4110W	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	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	5.4 153 L	23.6" x 22.5" x 34.5" 600 x 571 x 876 mm	-15°C to -20°C Microprocessor	yes	yes	115V, NEMA 5-15
HF-5017W	5.0 142 L	21.4" x 25.4" x 33.4" 544 x 645 x 848 mm	-20°C	no	no	208-230V, NEMA 6-15
HF-5017WSEC	5.0 142 L	21.4" x 25.4" x 33.4" 544 x 645 x 848 mm	-20°C	no	yes	208-230V, NEMA 6-15

Convenient compact refrigeration in a laboratory environment.
**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.

SANYO Refrigeration
Energy-efficient, whisper-quiet operation.

SF-L6111W

SR-L6111W

SRR-72GD-MED
General Purpose Refrigerator

SANYO Sterilization

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

SANYO 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

SANYO 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. SANYO 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	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	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 SANYO 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 SANYO Biomedical products is inherent to all SANYO product designs and originates in our research and development department. Combined with customer feedback and detailed documentation of field performance, SANYO product developers incorporate real-world applications into product systems and operating parameters.

From ambient temperature and humidity fluctuations to broad electrical voltage tolerances, SANYO Biomedical 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 SANYO Biomedical products include self-diagnostics that permit authorized service technicians to determine how and when service calls are required.

As SANYO continues to apply improvements in compressor and electronics to all products, life cycle costs can be extended and downtime minimized. SANYO 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. SANYO Biomedical also offers training to selected facility biomedical engineers and service staff for authorized in-warranty and post-warranty repairs.

Because SANYO Biomedical 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

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

Unique Services SANYO 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.

SANYO Connect

SANYO's customer-driven biomedical service program guarantees local attention from qualified SANYO 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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SALES and SERVICE NORTH AMERICA

SANYO Electric Co. Ltd. products are sold and serviced in North America by a network of factory-trained authorized independent sales and service representatives under the direction of SANYO Biomedical Solutions Division, Wood Dale, IL (Division of SANYO North America Corporation). Visit our website at www.sanyobiomedical.com for the latest sales and service information.