CRYOPRESERVATION AND ULTRA LOW TEMPERATURE SOLUTIONS

Model Ranges:
MDF Cryogenic Freezers
CBS Cryogenic preservation
Twin*Guard* ULT Freezers
ECO VIP ULT Freezers
VIP ULT Freezers

PHCbi's MDF Ultra Low Temperature Freezers and Cryogenic Freezers represent the industry's most complete combination of refrigeration technology, control, alarm, monitoring and accessibility for reliable sample preservation.

PHC Europe B.V.

www.phchd.com/eu/biomedical

The complete line of PHC Europe B.V. products includes an array of laboratory equipment with the most advanced technology, controls, construction and performance attributes in the industry. Today we apply the most sophisticated refrigeration compressor design and state-of-the-art electronics to ultra-low and cryogenic freezers marketed to life science, pharmaceutical, biotechnology, healthcare and industrial laboratory markets.

PHCbi core technologies, patents, and intellectual properties are represented in every product line. Core technologies apply to critical components and processes such as compressors, microprocessor electronics, and patented VIP vacuum insulation panels. These are engineered to exact specifications for important applications in life science, pharmaceutical, biotechnology, clinical, and industrial laboratories. As a result, PHCbi products operate with dependability, safety, energy efficiency, and ergonomic sensitivity.

Your innovative partner in ULTRA LOW TEMPERATURE solutions

Table of contents

Committed to Quality

We at PHC Europe B.V. are committed to providing our customers with first class biomedical and pharmacy automation products and supporting services. Our goal is to maintain our market-leading reputation for excellent standards and for consistently living up to our customers' expectations.

Therefore, we are very proud to that PHC Europe B.V's quality management system is certified (by TÜV Nederland) to **ISO9001:2015**

We hold the certification that covers the sales, distribution, service and validation of biomedical and pharmacy-automation equipment covering our sites in Etten-Leur (Netherlands), Avon (France) and Loughborough (UK).

Life Science Innovator Since 1966

Quality - It's a word that all are familiar with and one which many manufacturers claim to have or strive for. In the view of PHC, quality is a term that is ultimately defined by the customer. When quality becomes a customer-driven concept, quality includes meeting or exceeding our customers' needs or expectations. We focus on total quality which includes advanced processes and the culture of our organization. The result of our total quality initiatives involve many steps to provide our customers with superior value.

10 steps to guarantee superior value

Understanding Customer Demands

Our vision of total quality involves many face-to-face visits to customers to directly hear what they have to say about using the equipment we have supplied.

Creating a New Product Concept

Developing a concept for a new product is very similar to the "basic research" processes in life sciences. Technical staff and engineers develop various basic and innovative technologies to realize the concept for a new product.

Creating a New Product Designs

As soon as engineering personnel begin developing a technological element, the design staff sets out to work on images.

Checking Local Legislation

We manufacture products for use in approximately 110 countries and regions around the world. Obviously, different laws and regulations apply, so we are always working to ensure our products conform to the laws and regulations of the individual locations

Design Review

Beyond determining specifications, evaluation criteria and achievement levels affecting product quality such as reliability, durability and safety standards must be achieved in mass-production models.

Founded in 1990 as subsidiary of the PHC Holdings Corporation, it is our mission to become a leading, trusted brand for sustainable healthcare and biomedical product solutions, which support the work of our customers to improve the health and well-being of people around the world.

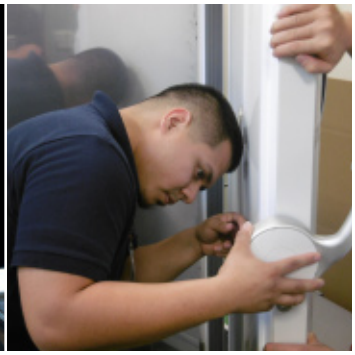
For more than 25 years now, we respond to the needs of our pharmaceutical, biotechnology, hospital/clinical and industrial customers, offering an unique perspective on scientific research in general. As a result we play a critical role in product development for worldwide applications and have established a reputation as a manufacturer of high-quality and innovative medical and laboratory equipment.

Long lasting relationships have been built with leading pharmaceutical, healthcare and biotechnology companies as well as with major academic and research institutes in Europe. PHC Europe B.V. has set the standard in many aspects. V.I.P. panels, Cool Safe compressors, Active Background Contamination Control and the world's first -152°C ULT freezer. Where PHC Europe B.V. took the initiative, the others followed. This made us a very important player in both the ultra-low temperature and the CO2 market.

PHC Europe BV, part of the PHC Corporation, Biomedical Division, manages sales, marketing, logistics and technical service of PHCbi laboratory products throughout Europe (including Russia and Turkey). Headquartered in the Netherlands with sales and service organizations in the UK, France and the Netherlands.

In the Dutch warehouse, about 1.000 units are waiting to be delivered directly from stock. Within a couple of days, spare parts can be delivered in every part of Europe. That's one of the strengths of PHC's European sales organization.



Quality Assurance

Under PHC standards, quality actions required in new product development must clear three hurdles: AQ-0 approval for design completion, AQ-1 decision for shifting to mass production and AQ-2 decision for shipping mass-produced units.

Mass Production

The Gunma factory was established in 1959 as the Tokyo manufacturing site for Sanyo Electric Co., Ltd. It is a core facility housing the Product Technology Development & Design Department, Quality Assurance Department and Production Department.

Transportation packaging design

Our product packaging is designed to fulfill various distribution challenges around the world. Using past accumulated lessons learned we focus on reducing and recycling materials to support environmental initiatives.

Installation

Product installations are often performed carefully by regional suppliers who are trained specialists. The path from facility entrance to the laboratory is measured and examined in advance to ensure precise, efficient installation. In some regions "white glove' service is also available to aid in installation and set-up.

Sales and After-Sales Service

We always strive to learn more about our products. Before new products go into mass production at the factory, our sales personnel receives extensive knowledge about the products through intensive sales training

Step into the world of **Cryopreservation**

Cryopreservation refers to the storage of a living organism, cell or tissue at ultra-low temperatures such that it can be restored to the same viable state as before it was frozen. Storage for an indefinite amount of time requires samples to be maintained below the glass transition temperature of aqueous solutions, approximately -130°C, the temperature at which frozen water no longer sublimes and recrystallizes. Therefore -150°C mechanical freezers or liquid nitrogen storage tanks are required for long-term preservation.

For years cryopreservation in liquid nitrogen at -196°C has been the standard for long term preservation.

Over the years it became clear that cross contamination was a real risk with this kind of preservation. Not only can samples be contaminated by the nitrogen itself, but also by other samples. Evidence of cross contamination has been documented in the past, including a well known example of Hepatitis B transmission.

For this reason, storage in vapour phase became more popular. Valuable samples were no longer stored in liquid phase nitrogen to eliminate the risk of cross contamination.

There are also disadvantages of storage in vapour phase though:

1. Loss of storage capacity; The bottom third of the vessel cannot be used as there is liquid phase nitrogen there.
2. The temperature provided by vapour phase storage is highly dependent on the level of liquid nitrogen in the bottom of the vessel.
3. Large vertical temperature gradients can put valuable samples at greater risk during long term storage.

Dry storage systems, like -150°C mechanical freezers and patented Isothermal storage systems, have been developed to offer the highest levels of protection for valuable samples, without the risks of cross contamination and vertical temperature gradients.

Select your Cryopreservation solution

	S-Series liquid	S-Series vapour	V-Series -190°C	Cryogenic Freezers -150°C / -152°C
Storage in ULT-Freezer				X
Storage in dry vapour of LN_2			X	
Storage in liquid phase of LN_2	X			
Storage in vapour phase of LN_2		X		
Risk of cross contamination through LN_2	X			
No risk of cross contamination through LN_2		X	X	X
Large temperature gradient risk		X		
Small temperature gradient risk	X[1]		X	X
Assured storage below critical temperature of -130°C	X[1]		X	X
Autofill and monitoring required	X	X	X	not applicable
No autofill and monitoring required				not applicable
Storage of more than 6000 2ml vials	X	X	X	X
Storage of less than 6000 2ml vials				
Ease of handling racks			X	X
Usage of LN_2	low	moderate	moderate	none
No special requirements needed in storage room				X

X[1] Only when the LN_2 level in the tank is maintained at the specified required level

Cryogenic ULT -150ºC freezers: **dry storage**

PHCbi has established a worldwide reputation as a manufacturer of high quality medical equipment over the past forty years. During this time we have become the leader in the European ultra-low temperature market. In this field PHCbi has set the standard in a number of ways including the introduction of VIP panels, application specific compressors and the world's first -152ºC ULT freezer. Where PHCbi took the initiative, the others followed. Together with the high standard of service we deliver it makes us a major player in the biomedical market.

Due to the extended operation of compressors within ultra-low temperature freezers, lubricant oil is essential to reduce wear, prevent abrasions and seizure and therefore maintain the highest levels of freezer performance. However, when lubricant oil circulates within the refrigeration circuit, it can cause piping to become clogged, resulting in compressor damage.

Incorporating a high-efficiency oil separator, **Cryo**genic -150ºC freezers effectively separate lubricant oil from refrigerant, increasing the durability of the compressors and offering a reliable ultra-low temperature environment. Highly efficient compressors have been specially developed and incorporated our **Cryo**genic -150ºC freezers.

Model: MDF-C2156VAN-PE

Model: MDF-1156-PE

-150ºC **Cryo**genic Freezers are already in use to store:

- Umbilical cord blood as a source of hematopoietic stem and progenitor cells.
- Stem cells for autologous transplants in patients who have undergone high dose chemotherapy.
- Adipose tissue, epithelial cells and bone marrow for stem cell therapy.
- Blood products for immunology analysis.
- Mesenchymal stromal cells for regenerative medicine and tissue engineering.
- Cancerous tissue samples.
- Semen for artificial insemination – used for breeding guide dogs and race horses.
- Oocytes and embryos for IVF.
- Ovarian tissue for preserved reproductive function in women undergoing treatments.
- Plant seeds/shoots for breeding.
- Components for shrink fitting of parts in industrial manufacturing.
- Temperature testing of parts in the automotive and aerospace industry.

MDF-C2156VAN **Cryo**genic Freezer

Cryogenic Freezers are well-known for maintaining uniform temperatures at -150ºC for the reliable, long-term preservation of cells and tissues. With thin vacuum insulation panel (VIP) walls, the MDF-C2156VAN **Cryo**genic Freezer can achieve more storage capacity than a conventionally insulated freezer without increasing footprint, while also maintaining superior temperature uniformity.

VIP PLUS INSULATION

VIP PLUS vacuum insulation

PHCbi's patented VIP PLUS technology has resulted in a revolutionary vacuum insulation cabinet construction with improved thermal properties for superior temperature performance.

CRYOGENIC FREEZERS PROVIDE SAMPLE STABILITY

A uniformity of +/-5ºC in our mechanically refrigerated **Cryo**genic Freezers is far superior to the top-to-bottom temperature uniformity provided by liquid nitrogen vapour phase storage, without the concern of cross-contamination often associated with liquid nitrogen (liquid phase storage).

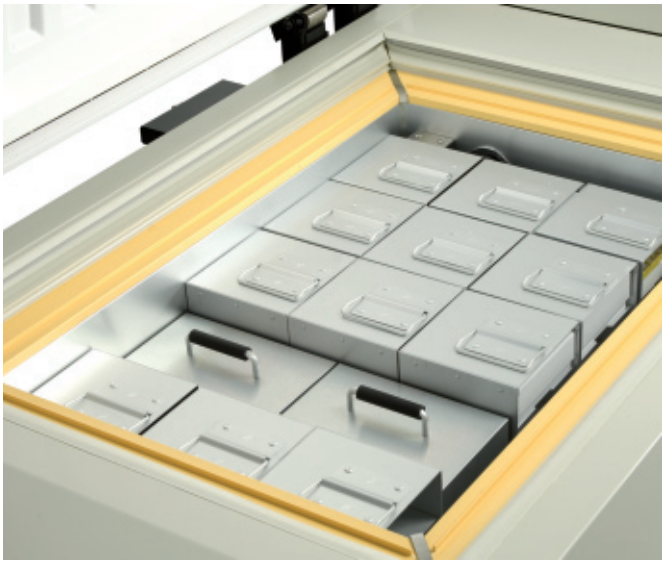
When you need long-term preservation at -150ºC, put your trust in PHC Cryogenic freezers.

- 230V / 50Hz connection supply for flexible use in the laboratory, without additional installations
- Low heat emission. Allows multiple devices to be placed in one room
- Cool-Safe compressors increase the reliability of long-term preservation
- High performance cooling with low noise level designed by PHCbi
- ALARM AND SAFETY FUNCTIONS
- Remote alarm contact (NO / NC)
- Multiple access ports allow independent probes- can be introduced
- Emergency cooling with liquid N_2 already standard on some models

Model: MDF-C2156VAN-PE

ULTRA-LOW -150ºC FREEZER WITH VIP PLUS INSULATION

Cryogenic Freezers with VIP PLUS vacuum insulation provide up to 30% more storage capacity than a conventionally insulated freezer, without increasing the footprint. A glass fibre core provides advanced thermal properties. This results in a large capacity -150ºC freezer for storage of up to 150 world standard 2" boxes with a minimal footprint.



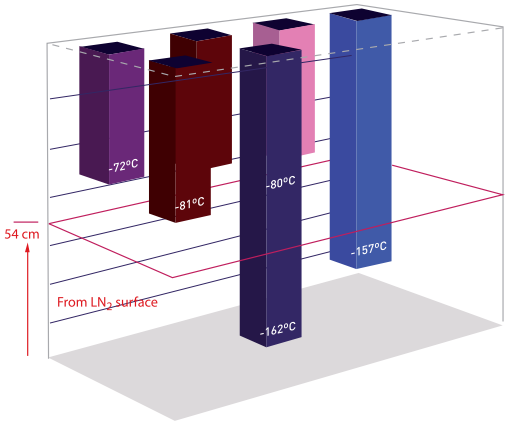
CONTROL PANEL WITH GRAPHIC LCD DISPLAY

All alarm functions, self-diagnostic notifications and a graphical display of temperature performance over time are available in the specially designed LCD control panel. The blue display provides a clear view of the temperature and gives a notification in the case of abnormalities in temperature, ambient temperature, power supply etc.

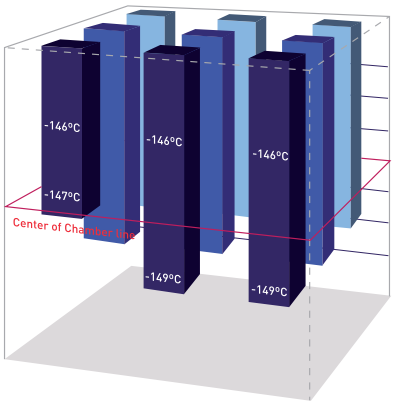
APPLICATION SPECIFIC COMPRESSORS

The MDF-C2156VAN is equipped with compressors that are specifically designed for ultra-low temperature applications. These compressors achieve a 10% reduction in energy consumption and the aerodynamically designed and placed components in the refrigeration compartment provide superior airflow, significantly reducing the stress to the freezer and contributing to excellent durability.

Liquid Nitrogen freezer
(Traditional vapour phase)



MDF-C2156VAN
mechanically refrigerated **Cryo**genic Freezer



Comparison of temperature distribution in a liquid nitrogen freezer (vapour phase) and our MDF-C2156VAN mechanically refrigerated **Cryo**genic Freezer. The graph shows temperatures at different locations within the chamber.
This data demonstrates that 100% of the MDF-C2156VAN storage space maintains uniform storage temperatures safely below -130ºC, while temperature in the LN_2 vapour system is dependent on storage location.

MDF-1156 **Cryo**genic Freezers

The **Cryo**genic MDF-1156-PE Ultra Low Temperature Freezer is a mechanically refrigerated cryogenic freezer without harmful CFCs. This Ultra Low Temperature Freezer achieves stable long-term preservation of cells and tissues. Highly efficient compressors have been specially developed and incorporated in the freezing unit. With a powerful low noise design afforded by traditional ultra-low temperature technology, this freezer delivers durable, stable cooling.

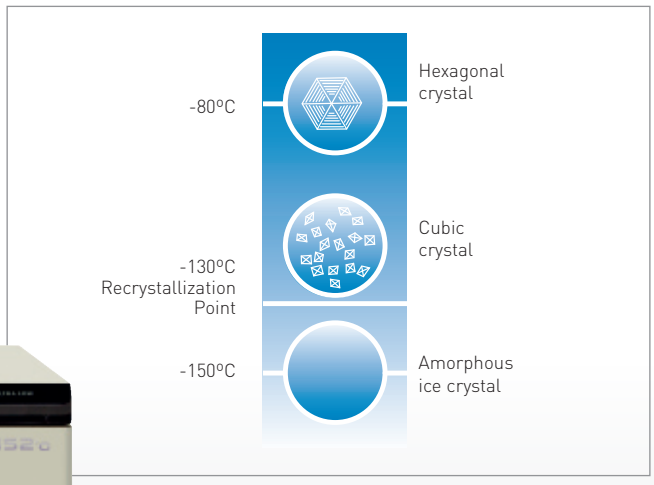
MICROPROCESSOR CONTROL WITH LED DIGITAL DISPLAY

Accurate temperature setting and a stable performance are provided by a microprocessor controller with an easy to use LED digital display and flat key data entry. The MDF-1156 maintains an ultra-low temperature of -152°C, far lower than the recrystallization point for pure water (-130°C). This low temperature provides the ideal preservation environment for long-term storage.

ALARM AND SAFETY DEVICES ENSURE HIGH LEVELS OF PROTECTION

A high temperature alarm alerts users when the temperature of the freezer deviates 10°C or 15°C above the set temperature and a power failure alarm is activated if power to the freezer is lost. As well as lamp and buzzer functions, a remote alarm contact can be set up to alert users to these abnormalities outside of working hours.

RECRYSTALLIZATION MECHANISM



Model: MDF-1156-PE

MDF-1156-PE / MDF 1156ATN-PE
128L / 81 2" Boxes

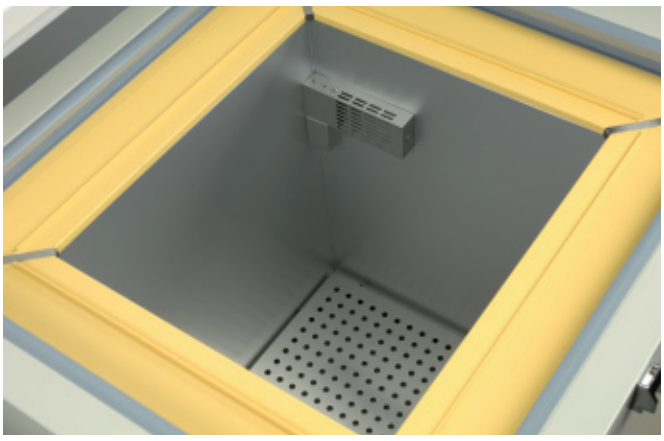
MDF-C2156VAN-PE
231L / 150 2" Boxes

Cryogenic Freezers			
Model Number		**MDF-1156-PE**	**MDF-C2156VAN-PE**
Temperature control range	°C	-150	-150
External dimensions (WxDxH)	mm	1400 x 800 x 945	1730 x 765 x 1010
Internal dimensions (WxDxH)	mm	500 x 450 x 572	760 x 495 x 615
Volume	litres	128	231
Capacity	2" boxes	81	150
Net weight (approx)	kg	265	318

* Complies with Art. 11, Annex III of F-Gas Regulation (EU) No 517/2014. Contains fluorinated greenhouse gases.

Optional accessories

OPTIONS		
Cryogenic Freezers		
Model Number	**MDF-1156-PE**	**MDF-C2156VAN-PE**
Liquid N_2 back-up		Supplied as standard
Temperature recorders		
- Continuous strip type	MTR-155H-PW	MTR-155H-PW
- Chart paper	RP-155-PW	RP-155-PW
- Ink pen	DF-38FP-PW	DF-38FP-PW
- Recorder housing	-	MDF-S30150-PW



CBS Isothermal Freezers:
No liquid nitrogen contact

Liquid nitrogen is, like all liquids, a possible transporter of contaminants. Contamination between samples, leakage of liquid nitrogen into sample vials during storage and contact of liquid nitrogen with skin are just some of the risks that can be eliminated with an Isothermal liquid nitrogen dry storage freezer from Custom BioGenic Systems (CBS).

CBS Isothermal freezers feature a patented liquid nitrogen jacket to provide uniform storage temperatures in the -190ºC range, free from liquid nitrogen contact.

In the year 2000 Custom Biogenic Systems patented the first -190ºC dry storage system. This new storage system uses the same vacuum insulated vessel as conventional LN2 freezers, but instead of the liquid nitrogen being in the sample storage space of the freezer, it is in a patented liquid nitrogen jacket in the wall of the freezer. This liquid nitrogen jacket produces a unique vapour circulation in the freezer. This vapour circulation, in combination with the convection from the freezer walls, produces a very stable temperature in the -190ºC range without the large vertical temperature gradients found in traditional vapour phase LN_2 storage tanks.

The minimal temperature gradient and lack of liquid nitrogen in the bottom of the vessel means that the full internal volume of each freezer is available for storing samples at liquid nitrogen temperatures, making the most efficient use of capacity.

Medical Device Directive

MDD medical device directive

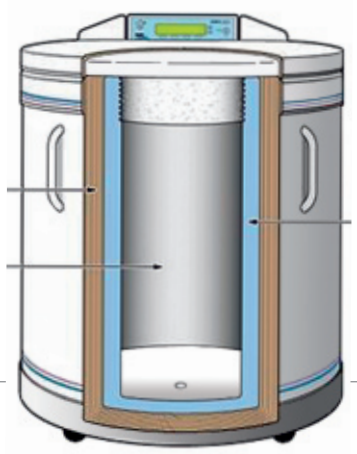
All Isothermal models are certified to Medical Device Directive 93/42/ECC: 1993 Class IIA

THE ISOTHERMAL CONCEPT

The sample storage area is cooled by a liquid nitrogen jacket surrounding the stainless steel interior, and by nitrogen vapour entering the freezer from the jacket via directional vents. This patented technology provides exceptional temperature uniformity in the -190ºC range, allowing the full freezer capacity to be used with confidence. The circulation of vapour within the freezer also results in less cold air loss during lid opening and improved visibility. This allows full-width lids to be used providing quick, unrestricted access to sample racks.

NO LIQUID NITROGEN CONTACT

With no liquid nitrogen in the storage area, samples can be stored safely in the -190ºC range without the risk of cross-contamination through liquid nitrogen. The Isothermal design also provides added user safety with no splashing or contact of liquid nitrogen when removing racks and samples from the freezer.



The innovative design of CBS Isothermal freezers eliminates a number of major risks of traditional LN_2 storage, including:

- **Cross contamination:** Studies have shown that viral, bacterial and fungal pathogens can survive after suspension in liquid nitrogen. Infected samples can cross contaminate other samples in the same liquid nitrogen tank.
- **Loss of samples:** Storage directly in liquid nitrogen can make vials shrink. This may cause liquid nitrogen to seep into the vials, which on rewarming, expand and subsequently explode as nitrogen vapourizes inside the vials.

CBS Isothermal freezers feature a patented liquid nitrogen jacket to provide uniform storage temperatures in the -190ºC range, free from liquid nitrogen contact.

- **Health and safety:** Traditional storage in liquid nitrogen exposes users to direct contact with LN_2 which can lead to cold skin burns.

AUTOMATIC OPERATION

Isothermal freezers feature the series 2301 auto-fill and monitor system, which controls the automatic filling of the liquid nitrogen jacket and provides the user with an easy to read overview of the freezer temperature and status.

SAMPLE SECURITY

A comprehensive alarm system with remote alarm contact constantly monitors all aspects of the freezer's operation. Samples are also protected by lid and control panel locks. The freezer can be monitored by a central BMS or monitoring system..

Rack configurations

Organizing the space in your freezer can help you to make your work more efficient. Good sample management can result in both cost and time savings. By choosing the right racks, not only will efficiency be increased, but the risk of sample degradation due to exposure to ambient temperatures will be significantly reduced. This is a fact, whether you store stem cells, cord blood, bone marrow or any other type of cell or tissue sample.

Whether your storage unit a chest freezer or even a liquid Nitrogen freezer, an organized freezer will provide you with:

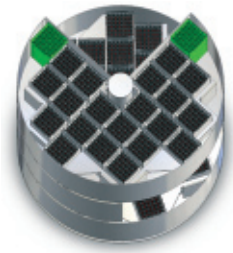
- Time efficiency because you can locate, retrieve and replace your samples easily and quickly.
- Cost efficiency because organized samples and cell lines might reduce the number of freezers.
- Safety because your samples are better protected.

Straw storage inventory system

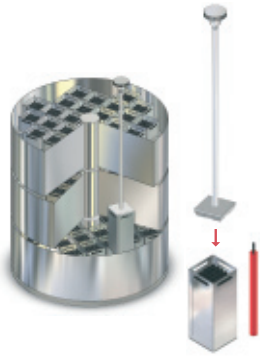
Designed for the CBS V-1500AB and V-3000AB Isothermal freezers, this patent-pending inventory system provides an efficient solution for storing and working with straws, free from liquid nitrogen contact.

Rotating carousels provide access to lower storage levels and maximise storage space.

The upper level provides a convenient workspace where canisters can be parked (shown in green) and samples inspected at -190°C.



Use the retrieval tool to place and retrieve canisters quickly and easily.



Isothermal carousel: easy access to samples from the front of the freezer

The Isothermal carousel liquid nitrogen vapour storage system combines the innovative -190°C Isothermal design with a small opening and an interior rotating carousel. The small opening provides low liquid nitrogen consumption, a lightweight, user-friendly lid and a consistently low temperature in the freezer. The interior carousel is rotated by a unique ratcheting handle on top of the freezer that will position samples to the front of the freezer, even with the lid on.

Each Isothermal carousel system includes the advanced 2301 auto-fill/monitoring controller to provide security and ease of operation. There are several Isothermal carousel models available and an extensive selection of inventory racks to store any size tube, vial, box, microplate, etc. to complete the system. Custom configurations can also be designed to meet any requirement.

V-1500AB
30L

V-3000ABEH
89L

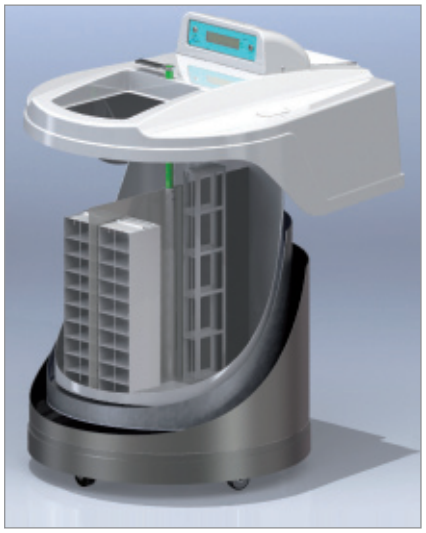
V-5000ABEH
140L

		Isothermal -190°C Dry Storage Freezers				
Model Number		**V-1500AB**	**V-3000AB**	**V-3000ABEH**	**V-5000AB**	**V-5000ABEH**
Liquid nitrogen capacity	litres	30	70	89	93	140
Dimensions						
External dimensions (W x D x H)	mm	660 x 939 x 1143	939 x 1219 x 1206	939 x 1219 x 1473	1219 x 1371x 1320	1219 x 1371 x 1473
Usable interior height	mm	736	736	940	736	864
Usable interior diameter	mm	534	787	787	1016	1016
Weight empty	kg	148	272	295	425	453
Weight full	kg	174	327	367	500	566
Maximum capacity						
Max. vial capacity (2ml)**	qty	9100	22100	25500	40300	46500
Max. blood bag capacity (50ml)**	qty	434	1120	1280	1936	2208

** Capacity is subject to rack type

V-3000AB/C
70L

V-5000AB/C
93L



		Isothermal Carousel			
Model Number		**V-3000AB/C**	**V-3000ABEH/C**	**V-5000AB/C**	**V-5000ABEH/C**
Liquid nitrogen capacity	litres	70	89	93	140
Dimensions					
External dimensions (W x D x H)	mm	939 x 1219 x 1130	939 x 1219 x 1384	1194 x 1372 x 1257	1194 x 1372 x 1384
Usable interior height	mm	686	889	737	813
Usable interior diameter	mm	736	736	978	978
Weight empty	kg	272	288	425	452
Weight full	kg	327	361	499	566
Maximum capacity					
Max. vial capacity (2ml)**	qty	16800	21000	36400	42000
Max. blood bag capacity (50ml)**	qty	852	1136	1722	1968

** Capacity is subject to rack type

S-1500AB
345L

S-3000AB
345L

S-5000AB / S-5000ABEH
615L / 720L

Standard LN_2 Freezers					
Model Number		**S-1500AB**	**S-3000AB**	**S-5000AB**	**S-5000ABEH**
Liquid nitrogen capacity	litres	145	345	615	720
Dimensions					
External dimensions (W x D x H)	mm	558 x 787 x 1041	863 x 1092 x 1066	1117 x 1320 x 1219	1117 x 1320 x 1397
Usable interior height	mm	736	736	736	863
Usable interior diameter	mm	508	787	1016	1016
Weight empty	kg	70	159	227	245
Weight full	kg	188	438	724	827
Maximum capacity					
Max. vial capacity (2ml)**	qty	9100	22100	40300	46500
Max. blood bag capacity (50ml)**	qty	434	1120	1932	2208

Optional accessories

Isothermals, LN_2 freezers & cryosystems

Cryo-Gloves	Made from state-of-the art fabrics, tempshield Cryo-gloves® use a flexible, multi-layered insulated construction that provides maximum thermal protection, yet offers comfort, flexibility, and dexterity so you can perform tasks effectively and safely.	LN_2 Level stick	• 1/2 Centimeter and 1/4 inch increments. • Can withstand temperatures up to -190°C. • Measures up to 36"(92cm).
"T" Valve	Solid brass cryogenic shut-off valve (rated for temperatures from -196° C to 74° C). • 2 Male 1/2" NPT brass fittings. • 1 Female 1/2" NPT stainless steel Flared fitting.	LN_2 Transfer hose	• Flexible stainless steel construction. • 1/2" NPT flared fitting on both ends. (3/8" I.D.) • 4', 6' lengths are available (custom lengths are available upon request).
"Y" Valve	• 2 Male 1/2" NPT brass fittings. • 1 Female 1/2" NPT stainless steel flared fitting. • Overall length approximately 6".	Cardboard sleeves	• 5 and 6 place sleeves for standard 2ml cane. • Cardboard construction.
LN_2 Phase separator	Designed to minimize hazardous splashing and vapourization, phase separators are available to use when transferring liquids into various open containers.	Canes	• 2ml cane. • 5 and 6 place vial canes. • Lightweight aluminum construction. • Overall length approximately 11.5" (6 place cane).
		Hose covers	• Water resistant fabric 4', 6' lengths are available.

2101 Controlled rate freezer

The 2101 controlled rate freezer meets the highest standards for the programmed freezing of biological samples. Computer controlled temperatures ensure your samples are frozen at precisely the same rate during each run. Freeze protocols can be controlled by either the chamber or the sample temperature. The freezing rate can be programmed at the optimum rate for each individual sample.

The 2101 controlled rate freezer comes equipped with a dedicated laptop and 2100 programming software as standard to provide the highest levels of flexibility and user convenience.

Benefits include:

- Unlimited programming capability.
- Multi-colour graph for sample, chamber and program temperature.
- Sample or chamber temperature set-point control.
- Continuous control status indication.
- Programs and freeze data saved to hard drive or disc.
- Password protected software.
- Selectable password levels.
- Searchable database for freeze run history.
- Freeze run graphs and data available via any standard computer printer.
- 30 data field available for each freeze run.
- Continuous digital and graphical display of time and temperature during operation.
- Audible and visual indicators for:
  - End of each freeze run.
  - Temperature probes.
  - Freeze run tracking.
- On screen help.

Standard system Includes:

- Laptop computer with 2100 software.
- Freezing chamber.
- Choice of sample rack.
- 1.2 m LN_2 transfer hose.

Options:

- Choice of sample racks for vials, tubes, straws, bags & canes.
- Temperature probes for different sample types.
- Roller cart.

Model: 2101 controlled rate freezer

2101 Controlled Rate Freezer					
Dimensions			**Control**		
External Dimensions (W x D x H)	mm	484 x 648 x 770	Controller		Laptop controller (included)
Internal Dimensions (W x D x H)	mm	356 x 243 x 349	Operating System		Windows based
Volume	litres	28	Temperature sensor		type T thermocouple (2 as standard, up to 8 with multi-probe)
Net Weight	kg	34,7			
Capacity	1.2-2ml vials	650	**Construction**		
	4-5ml vials	390	Exterior Material		Powder coated stainless steel
	bag canisters	10 - 20	Interior Material		Stainless steel
	canes	130	Max. load - total	kg	20
Performance			**Electrical and Noise Level**		
Programmable Temperature Range	°C	+50 to -180	Power Supply	V	230
Programmable Cooling Rate Range	°C / min	0.01 to 99.9	Frequency	Hz	50
			Noise Level	dB [A]	<66

Ultra Low Temperature Freezers

In response to the needs of leading pharmaceutical, biotechnology, hospital/clinical and industrial customers, PHC Europe B.V. offer a unique perspective on Ultra Low Temperature preservation. As part of PHC Corporation, Biomedical Division, PHC Europe B.V. plays a critical role in product development for worldwide applications.

As a result, PHCbi products incorporate the latest applied theories and ideas, refrigeration compressors, electronic components, energy efficiency, robotic manufacturing and economies-of-scale that directly benefit our customers. Furthermore, PHCbi products are extensively tested to meet the toughest quality standards in the world; our own! Through the vigorous application of our unique Vertical Component Integration™, PHCbi products offer tangible benefits - from performance and reliability to ergonomics and convenience, that no other manufacturer can provide.

PHCbi DESIGN & ULTIMATE RELIABILITY

VIP ultra low temperature freezers offer advanced cabinet design, reliable refrigeration systems and easy-to-use controllers making them ideal for the long-term secure storage of valuable samples. Every component is carefully selected and matched for optimum operation under demanding laboratory conditions, while the internal layout of the refrigeration system is meticulously designed for maximum heat removal, reducing stress on the system and therefore providing the highest levels of reliability and durability.

SUPERIOR PERFORMANCE

All PHCbi freezers are designed to provide the highest quality construction with superior performance. Key features such as strategically placed evaporator coils, VIP panels and insulated inner doors contribute to the unrivalled temperature uniformity and stability of VIP freezers, allowing the freezers to conform to the strictest standards and validation protocols.
Quieter operation is achieved through condenser fan blade design, noise reduction insulation, anti-vibration systems and internal compressor noise reduction.

EFFICIENT COOLING

Cascade refrigeration systems within the VIP upright freezers provide efficient cooling with optimized heat exchange pathways and increased cooling capacity for reliable sample protection and cost effective operation at ultra low temperatures.

ENHANCED USE & INTELLIGENT SECURITY

Our freezers are managed and monitored by an integrated microprocessor controller with a comprehensive alarm system and diagnostic functions. A Status Alert feature constantly monitors ambient and system conditions and notifies the user of any abnormalities before a problem occurs.
The MDF-DU900V is updated with a touch screen that allows full user control, even with gloved hands, and a USB port for convenient transfer of logged data to a PC.

Medical Device Directive

The MDF-DU302VX-PE, MDF-DU502VXPE, MDF-DU702VX-PE, MDF-DC500VXPE and MDF-DC700VX-PE series are certified as a Class IIa Medical Device (93/42/EEC and 2007/47/EC).

Applicable countries: Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Ireland, Italy, Liechtenstein, Luxembourg, Malta, the Netherlands, Spain, Switzerland and the United Kingdom only

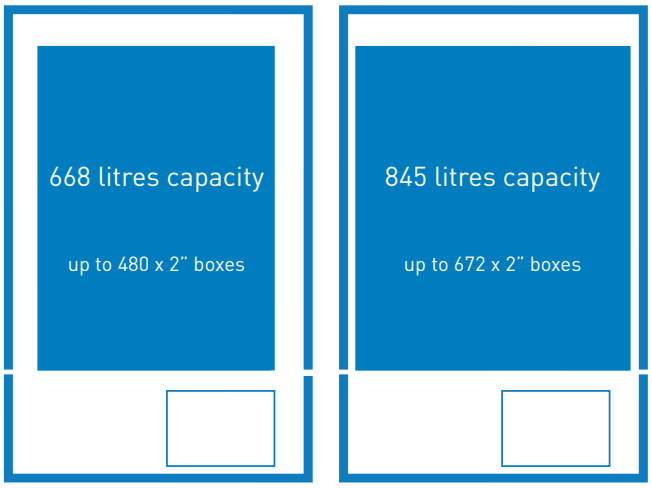
For laboratory use
Applicable countries: EEA countries, Switzerland and Turkey

VIP PLUS INSULATION

PHCbi's patented VIP PLUS technology has resulted in a revolutionary vacuum insulation cabinet construction with improved thermal properties for superior temperature performance.

SUPERIOR FOOTPRINT

PHCbi ultra low temperature freezers with space-saving VIP insulation offer outstanding energy efficiency, whilst delivering exceptional cooling performance and durability for storing valuable research and clinical samples.

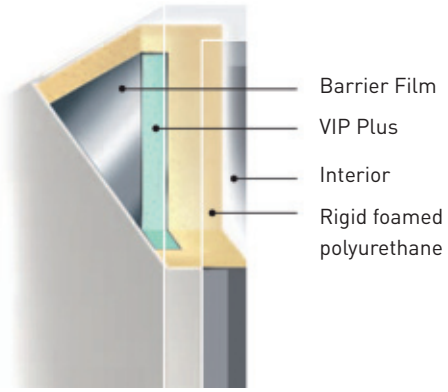


Conventional Freezer

VIP ULT Freezer With VIP Insulation

INNOVATIVE DESIGN

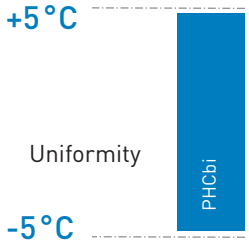
PHC was the first company to introduce vacuum insulation panels to ultra low temperature nd cryogenic freezers. The PHCbi patented VIP vacuum insulation panel thin-wall composite is a high-efficiency design that yields more interior storage volume in a conventional freezer footprint. The PHCbi VIP Freezer range typically provide 30% more storage capacity for a given floor area saving valuable laboratory space.



OPTIMUM UNIFORMITY

Uneven interior temperatures can lead to a loss in sample integrity. PHCbi freezers with uniform, stable temperatures and quick recovery times provide the best protection for your samples, ensuring reliable preservation while guarding against degradation.

Surpasses the customer preference of +/-5°C*



* Based on internal validation data tested at -80°C setpoint, in an empty chamber with 23°C ambient temperature.

* The data may vary depending on the use, circumstances and optional accessories. Validation documents can be provided for each serial number for an additional fee.

EXCELLENT RELIABILITY AND UNIFORMITY WITHIN AN OPTIMAL FOOTPRINT.

The refrigeration systems within PHCbi VIP freezers are designed specifically for demanding ultra low temperature applications to give proven durability. Manufactured with space-saving VIP vacuum insulation panels, they are ideally suited for use in laboratories and hospitals for long-term preservation of samples. Whatever your preservation needs are, PHCbi provides the right equipment for your application.

1. Multiple access ports permit insertion of independent probes, instrumentation or liquid CO_2 back-up injectors.
2. Universal keyed door lock offers added security.
3. A vacuum release port (available on the MDF-DU502VH-PE, MDF-DU702VH-PE and MDF-DU900V-PE) allows smooth door opening when the door seal is tightened by negative pressure generated from temperature difference between chamber and ambient.
4. Insulated and gasketed inner doors seal inside to offer additional protection, improve uniformity.
5. EZlatch for smooth, one-handed operation and positive gasket seal. Provision for padlock.
6. Temperature recorder (optional) mounts easily in pre-engineered mounting space.
7. PHCbi designed compressors are specifically designed for ultra low temperature applications.
8. High impact, recessed casters and leveling feet simplify installation.
9. An integrated microprocessor controller with LCD Touch Screen to simplify all freezer functions.
10. Front access to washable, electrostatic condenser filter for routine condenser air filter cleaning.
11. Heated outer door gaskets and a 'hot line' circulating hot refrigerant gas around the door frame ensure minimal ice build-up.

VIP SERIES MONITORING

TOUCH SCREEN LEGEND

1. **Present temperature display field:**
   The current chamber temperature is displayed.
2. **Set temperature value display field:**
   The set value of chamber temperature is displayed.
   Default setting: -80°C.
3. **Message display field:**
   Alarms, errors or messages are displayed when a fault occurs.
4. **Filter display:**
   Lights when the condenser filter has excessive dust accumulated on it and requires cleaning.
5. **Alarm display:**
   Normal condition: "Normal" is displayed.
   Alarm-activated, buzzer-delayed: "Alarm" is displayed.
   Alarm-activated, buzzer-sounding: "Warning" is displayed.
6. **Outer door (opening / closing display)**

VACUUM RELEASE PORT

A vacuum release port (available on the VIP ECO and TwinGuard upright series) allows smooth door opening when the door seal is tightened by negative pressure generated from temperature difference between chamber and ambient.

FLEXIBLE SHELF LAYOUT

Multiple shelf configurations in the upright models allow a variety of storage options. Organize your samples by using your existing inventory racks or select from the many different rack types we offer. PHCbi's racks are made of stainless steel or anodized aluminum. The aluminum racks are very light, yet sturdy and corrosion free.

EZlatch

EZlatch door handle

The EZ Latch door handle was developed based on human engineering.It is designed for secure door opening/closing with Minimum effort as the name suggests and make access to stored sample easier.

Twin*Guard* ULT Freezers

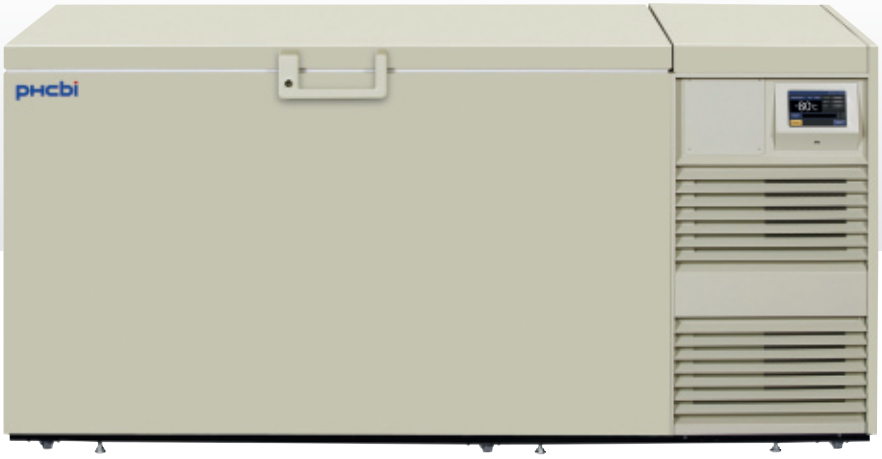
Twin*Guard* Ultra Low Temperature Freezers with Dual Cooling Technology offer the highest level of security for high-value samples. Alongside exceptional ease-of-use and data monitoring, the Dual Cooling System provides the highest level of protection through the use of two independent refrigeration systems. If one system unexpectedly fails, the other can maintain the freezer's temperature uniformly in the -70°C range. Developed for use with conventional inventory racks and boxes, the TwinGuard Series is ideal for storage of sensitive, high-value samples.

When sample security and peace of mind are of paramount importance, put your trust in Twin*Guard* ultra low freezers.

- An optimal Dual Cooling System provides an unparalleled level of safety and added peace of mind through the use of two independent refrigeration systems.
- ECO mode overlaps refrigeration cycles to reduce energy consumption.
- Advanced space-saving VIP PLUS technology (compared to our conventional models).
- Graphical LCD display with data monitoring and data log exported by USB.
- Available in Upright and Chest models.
- Filterless design reduces the time for routine maintenance
- Vacuum Release Port
- No icing on frame
- ALARM AND SAFETY FUNCTIONS

SCIENTIFIC APPLICATIONS

- Temperature sensitive samples such as therapeutics and biospecimens.
- Samples needing to retain viability such as stem cells,
  engineered tissue, organs, vaccines, hybrodmas, cancer cells or fibroblasts.
- Longitudinal study samples.
- Important medical research samples.
- Valuable pharmaceutical products.
- Clinical trial samples.
- Pathogenic samples within high security laboratories.



Model: MDF-DC700VX-PE

Model: MDF-DU702VX-PE

DUAL COOLING SYSTEM

Within **Twin***Guard*'s independent Dual Cooling System, efficient ultra-low cooling is achieved through two independent evaporator circuits surrounding the interior chamber.

Medical Device Directive

The MDF-DU302VX-PE, MDF-DU502VX-PE, MDF-DU702VX-PE, MDF-DC500VX-PE and MDF-DC700VX-PE series are certified as a Class IIa Medical Device (93/42/EEC and 2007/47/EC).

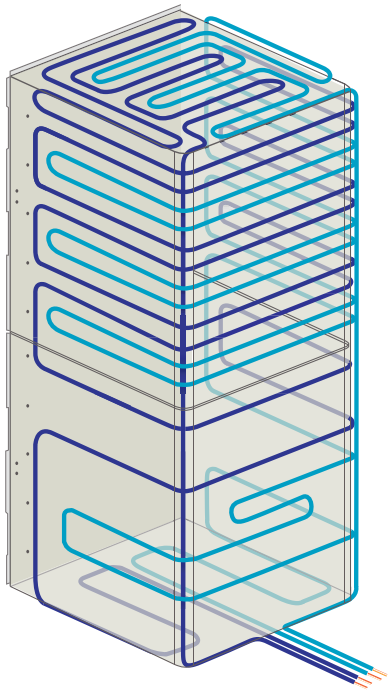
Applicable countries: Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Ireland, Italy, Liechtenstein, Luxembourg, Malta, the Netherlands, Spain, Switzerland and the United Kingdom only

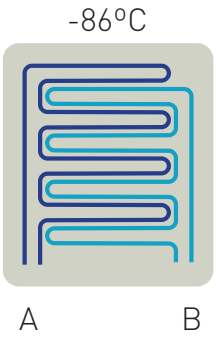
For laboratory use
Applicable countries: EEA countries, Switzerland and Turkey

DUAL COOLING SYSTEM

Within **Twin***Guard*'s independent systems, efficient ultra-low cooling is achieved through two independent evaporator circuits surrounding the interior chamber.

Two independent evaporator circuits





Dual Cooling System Upright freezers

ENHANCED USE & INTELLIGENT SECURITY

The freezers are managed and monitored by an integrated microprocessor controller with a comprehensive alarm system and diagnostic functions. Status and control of parameters are accessible via an LCD information centre.

The EZlatch, on the upright models, makes access to stored samples even easier. A colour LCD touch panel allows full user control, even with gloved hands, while the USB port makes transferring logged data to a PC convenient.

- The Dual Cooling System offers the highest level of security through the use of two independent refrigeration systems.
  If one system unexpectedly fails the other can maintain the freezer at the -70°C range.

In the case of unexpected failure of one of the cooling circuits, the other circuit will maintain the freezer continuously in the -70°C range.

MEETING YOUR FREEZER STORAGE NEEDS

An organized freezer will provide you with:

- Time savings - locate, retrieve and replace your samples easily and quickly.
- Cost savings - organized samples and cell lines can help to reduce the number of freezers.
- Added sample security and energy savings - samples are better protected and are less exposed to ambient temperatures as door opening times can be reduced when placing and retrieving samples, which also reduces energy use.

For an overview of the racks designed for the TwinGuard series see page 40-41.

FILTERLESS DESIGN

The filterless construction of the freezers reduces routine maintenance time by eliminating the need for regular cleaning of filters.

FLEXIBLE SHELF LAYOUT

Multiple shelf configurations in the upright models allow a variety of storage options. Organize your samples by using your existing inventory racks or select from the many different rack types we offer. PHCbi's racks are made of stainless steel or anodized aluminum. The aluminum racks are very light, yet sturdy and corrosion free.

- High quality racks – designed for safe working and easy access to samples.
- Affordable solutions – making freezer storage cost-effective as well as space-efficient.
- Large selection of products – additional rack types and boxes are available on request.

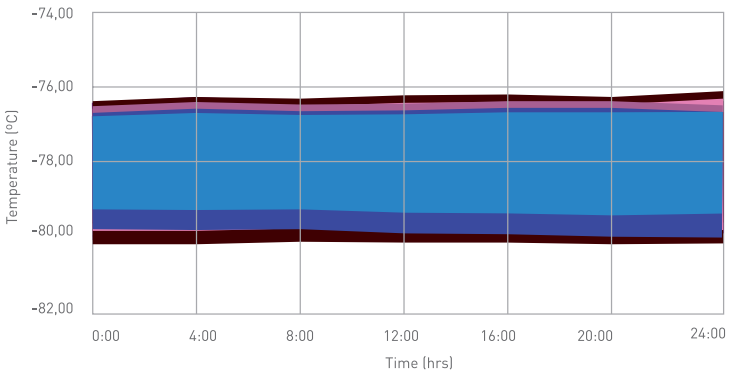
SUPERIOR FOOTPRINT

PHCbi ultra-low temperature freezers with space-saving VIP insulation offer outstanding energy efficiency, whilst delivering exceptional cooling performance and durability for storing valuable research and clinical samples.

PRESERVE SAMPLE INTEGRITY FOR BETTER END PRODUCTS

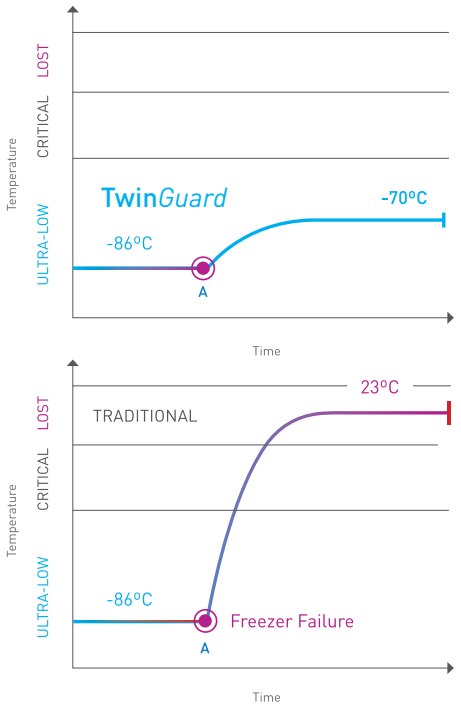
Uneven interior temperatures can lead to a loss in sample integrity. Freezers with uniform, stable temperatures and quick recovery times provide the best protection for your samples, ensuring reliable preservation while guarding against degradation.

FIGURE 2A - MDF-DU702VX; 9 POINT TEMPERATURE MAPPING



-86°C ULTRA-LOW FREEZERS (TwinGuard)

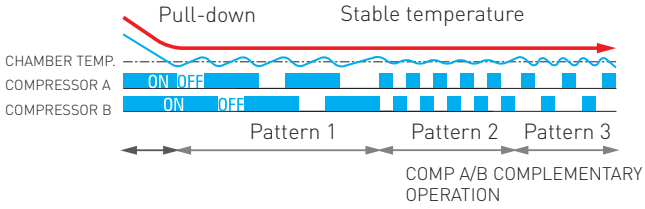
FIGURE 2B



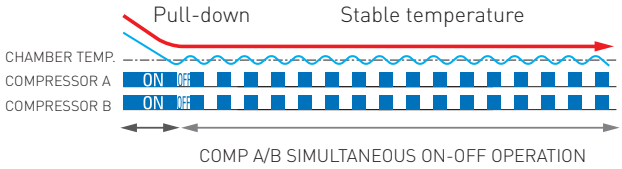
INDUSTRY FIRST INTELLIGENT ECO MODE OPERATION

The **Twin***Guard* series freezer can be set to Normal or ECO mode operation, depending on the requirements of the user. Although both refrigeration systems are completely independent, ECO mode establishes an overlapping cycle to significantly reduce energy consumption while maintaining optimum interior uniformity for protection of high value materials. Normal mode maintains the most repeatable, cycling wave form for the strictest of GMP applications.

ECO MODE OPERATION IMAGE



NORMAL MODE OPERATION IMAGE



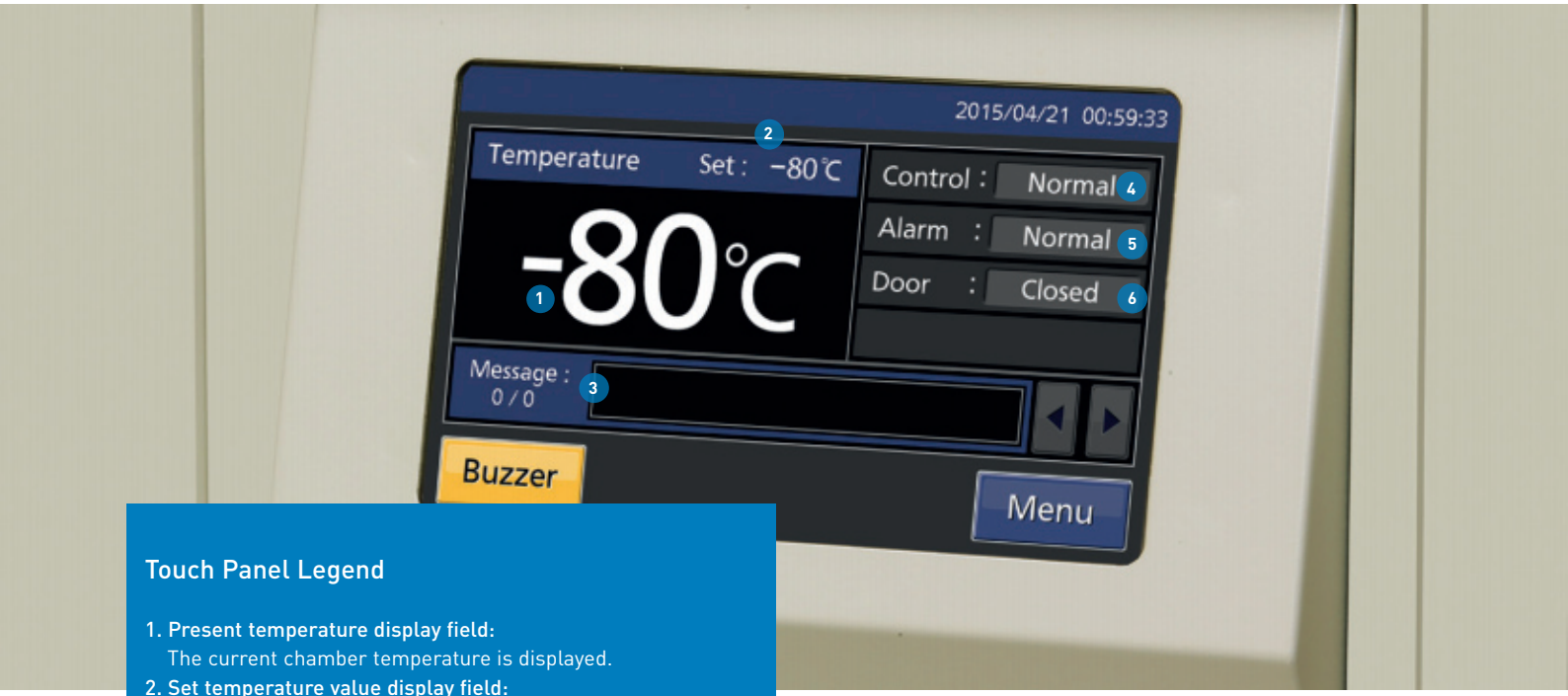
MDF-DU302VX-PE
360L / 240 2" Boxes

MDF-DU502VX-PE
528L / 384 2" Boxes

MDF-DU702VX-PE
729L / 576 2" Boxes

Twin*Guard* Upright Freezers			
Model Number	**MDF-DU302VX-PE**	**MDF-DU502VX-PE**	**MDF-DU702VX-PE**
Temperature control range	-50 ~-86		
External dimensions (WxDxH)	670 x 882 x 1840	790 x 882 x 1993	1030 x 882 x 1993
Internal dimensions (WxDxH)	490 x 600 x 1230	630 x 600 x 1400	870 x 600 x 1400
Volume	360	528	729
Capacity	240	384	576
Power Consumption	Normal Mode: 9,7 / Eco Mode: 8,3*	Normal Mode: 16,5 / Eco Mode: 15,3*	Normal Mode: 16,9 / Eco Mode: 15,7*

* (Set value temp. -80°C, Ambient temp. 23 °C, no load)
* Complies with Art. 11, Annex III of F-Gas Regulation (EU) No 517/2014. Contains fluorinated greenhouse gases.



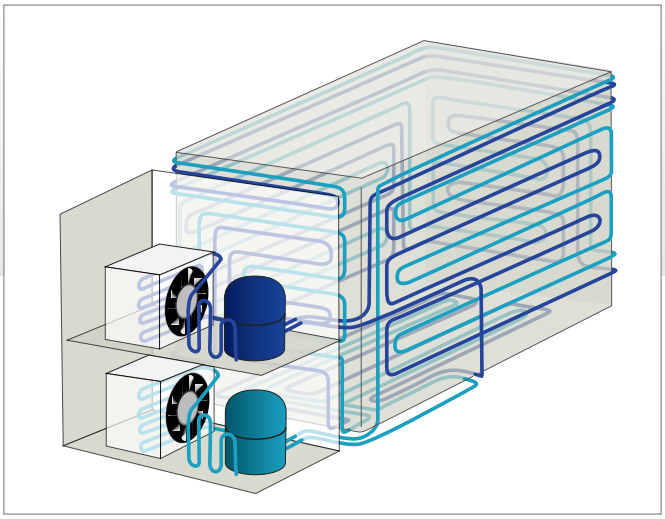
Touch Panel Legend

1. **Present temperature display field:**
   The current chamber temperature is displayed.
2. **Set temperature value display field:**
   The set value of chamber temperature is displayed.
   Default setting: -80°C.
3. **Message display field:**
   Alarms, errors or messages are displayed when a fault occurs.
4. **Control display:**
   The present operation control mode is displayed.
   Normal control: "Normal" is displayed.
   Eco control: "ECO" is displayed
5. **Alarm display:**
   Normal condition: "Normal" is displayed.
   Alarm-activated, buzzer-delayed: "Alarm" is displayed.
   Alarm-activated, buzzer-sounding: "Warning" is displayed.
6. **Outer door (opening / closing display)**

MICROPROCESSOR CONTROL WITH TOUCH SCREEN DISPLAY

The **Twin***Guard* series 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 **Twin***Guard* chest freezers feature a touchscreen display and a USB port which allows logged data to be easily transferred to a PC.

DUAL COOLING SYSTEM IN THE VX CHEST FREEZERS



MDF-DC500VX-PE
575L / 416 2" Boxes

MDF-DC700VX-PE
715L / 520 2" Boxes

TwinGuard Chest Freezers			
Model Number		**MDF-DC500VX-PE**	**MDF-DC700VX-PE**
Temperature control range	°C	-50 ~-86	
External dimensions (WxDxH)	mm	2010 x 845 x 1070	2300 x 845 x 1070
Internal dimensions (WxDxH)	mm	1190 x 640 x 756	1480 x 640 x 756
Volume	litres	575	715
Capacity	2" boxes	416	520
Power Consumption	kWh/day	Normal Mode: 15,5 / Eco Mode: 13,6*	Normal Mode: 16,3 / Eco Mode: 14,9*

* (Set value temp. -80°C, Ambient temp. 23 °C, no load)
* Complies with Art. 11, Annex III of F-Gas Regulation (EU) No 517/2014. Contains fluorinated greenhouse gases.

Optional accessories

TwinGuard ULT Freezers						
Model number		**MDF-DU302VX-PE**	**MDF-DU502VX-PE**	**MDF-DU702VX-PE**	**MDF-DC500VX-PE**	**MDF-DC700VX-PE**
Liquid CO_2 back-up		MDF-UB7-PW			MDF-UB7-PW	
Liquid N_2 back-up		-			-	
Temperature recorders						
- Circular type		MTR-G85C-PE			MTR-G85C-PE	
- Chart paper		RP-G85-PW			RP-G85-PW	
- Ink pen		PG-R-PW			PG-R-PW	
- Continuous strip type		MTR-85H-PW			MTR-85H-PW	
- Chart paper		RP-85-PW			RP-85-PW	
- Ink pen		PG-R-PW			DF-38FP-PW	
- Recorder housing		MDF-S3085-PW			MDF-S3085-PW	
Drawers	qty					
Small inner door kit	set of 2					
	set of 5	-	MDF-5ID5-PW	MDF-7ID5-PW	-	
	set of 4	-	MDF-5ID4-PW	MDF-7ID4-PW	-	

VIP ECO ULT FREEZERS

Cost-saving and environmentally friendly sample storage within an optimal footprint.

VIP ECO Ultra Low Temperature Freezers with natural refrigerants minimise energy consumption, reduce environmental impact and save money. Innovative technology provide secure storage of valuable research and clinical samples. The VIP vacuum insulation ensures an optimal footprint to storage capacity ratio.

Leveraging the power of natural hydrocarbon refrigerants also allows the VIP ECO ULT Freezers to use smaller compressors, and reduce energy consumption. The natural hydrocarbon refrigerants combined with VIP insulation technology also help the environment by reducing the carbon footprint with up to 40% fewer emissions.

Inverter Compressors

IC+ inverter compressor

The intelligent control of the inverter compressor optimizes running speed. When the inverter compressor is running as normal it will stay on for longer than a conventional compressor but at a minimal speed. This reduces the power consumption and keeps freezer temperatures stable.

Natural Refrigerants

ECO natural refrigerants

Naturally occurring hydrocarbon (HC) refrigerants improve performance and reduce running costs.

When low electrical running costs and environmental considerations are of paramount importance, put your trust in VIP ECO and PRO ECO ULT freezers.

- New heat exchanger design for greater surface area contact and overall efficiency.
- Advanced space-saving VIP PLUS Insulation (compared to our conventional models).
- Graphical LCD display with data monitoring and data log exported by USB (for MDF-DU502VH-PE, MDF-DU502VHW-PE, MDF-DU702VH-PE and MDF-DU702VHW-PE).
- VIP Plus Insulation
- Low heat emmission
- Vacuum Release Port
- No icing on frame
- Alarm and Safety functions

VIP PLUS INSULATION

PHCbi's patented VIP PLUS technology has resulted in a revolutionary vacuum insulation cabinet construction with improved thermal properties for superior temperature performance.

The VIP ECO Series also uses vacuum insulation panel (VIP) technology reducing wall thickness by around 50%, achieving 30% more storage capacity, and reducing the average cost per box stored. Leveraging the power of natural hydrocarbon refrigerants also allows the VIP ECO ULT freezers to use smaller compressors, due to their greater efficiency. The natural hydrocarbon refrigerants combined with VIP insulation technology also help the environment by reducing the carbon footprint with up to 40% fewer emissions.

REDUCED RUNNING COSTS

The use of highly efficient hydrocarbon refrigerants results in reduced energy consumption and lower running costs. With key equipment and instrumentation operating continuously laboratories are able to significantly reduce running costs by investing in energy efficient facilities. PHC designs and builds advanced preservation systems to deliver maximum cost efficiency while maintaining the reliability and performance necessary for reliable storage of valuable research and clinical samples.

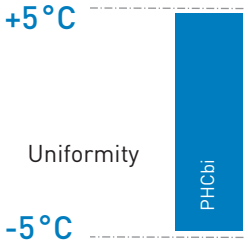
EXTREMELY LOW ENVIRONMENTAL IMPACT

Naturally occurring hydrocarbon (HC) refrigerants used within the VIP ECO ULT Freezers are non ozone depleting, have short atmospheric lifetimes and have extremely low global warming potentials (GWP's). This makes the freezers very environmentally friendly so they are an ideal solution for complying with objectives for reduced carbon footprints.

OPTIMUM UNIFORMITY

Uneven interior temperatures can lead to a loss in sample integrity. PHCbi freezers with uniform, stable temperatures and quick recovery times provide the best protection for your samples, ensuring reliable preservation while guarding against degradation.

Surpasses the customer preference of +/-5°C*

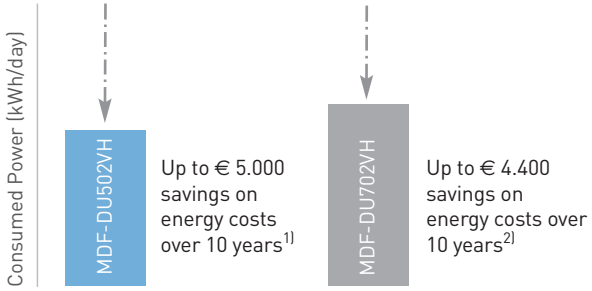


* Based on internal validation data tested at -80°C setpoint, in an empty chamber with 23°C ambient temperature.

* The data may vary depending on the use, circumstances and optional accessories. Validation documents can be provided for each serial number for an additional fee.

MDF-DU502VH up to **55%** more efficient

MDF-DU702VH up to **46%** more efficient



Up to € 5.000 savings on energy costs over 10 years[1)]

Up to € 4.400 savings on energy costs over 10 years[2)]

1) Model MDF-DU702VH-PE (728 litres) compared to MDF-U73V at set value -80°C, 23°C ambient, no load, 230V 50Hz, € 0.12/kWh. Actual energy use and savings will depend on operating conditions and price of electricity paid.

2) Model MDF-DU502VH-PE (526 litres) compared to MDF-U53V at set value -80°C, 23°C ambient, no load, 230V 50Hz, € 0.12/kWh. Actual energy use and savings will depend on operating conditions and price of electricity paid.

VACUUM RELEASE PORT

A vacuum release port (available on the VIP ECO and TwinGuard upright series) allows smooth door opening when the door seal is tightened by negative pressure generated from temperature difference between chamber and ambient.

FLEXIBLE SHELF LAYOUT

Multiple shelf configurations in the upright models allow a variety of storage options. Organize your samples by using your existing inventory racks or select from the many different rack types we offer. PHCbi's racks are made of stainless steel or anodized aluminum. The aluminum racks are very light, yet sturdy and corrosion free.

EZlatch

The EZ Latch door handle was developed based on human engineering.It is designed for secure door opening/closing with Minimum effort as the name suggests and make access to stored sample easier.

MEETING YOUR FREEZER STORAGE NEEDS

An organized freezer will provide you with:

- Time savings - locate, retrieve and replace your samples easily and quickly.
- Cost savings - organized samples and cell lines can help to reduce the number of freezers.
- Added sample security and energy savings - samples are better protected and are less exposed to ambient temperatures as door opening times can be reduced when placing and retrieving samples, which also reduces energy use.

For an overview of the racks designed for the VIP ECO series see page 40-41.

PHCbi racks* are made of stainless steel or anodized aluminum. The aluminum racks are very light, yet sturdy and corrosion free.

Meeting your freezer storage needs

- High quality racks – designed for safe working and easy access to samples.
- Affordable solutions – making freezer storage cost-effective as well as space-efficient.
- Large selection of products – additional rack types and boxes are available on request.

HCS-296 *SDR-434-N* *SDR-624-N*

MDF-DU502VH-PE
528L / 384 2" Boxes

MDF-DU702VH-PE
729L / 576 2" Boxes

MDF-DU901VHL-PE
845L / 672 2" Boxes

VIP ECO ULT Freezers				
Model Number		**MDF-DU502VH-PE**	**MDF-DU702VH-PE**	**MDF-DU901VHL-PE**
Temperature control range	°C	-40 ~-86		-50 ~-86
External dimensions (WxDxH)	mm	790 x 882 x 1993	1030 x 882 x 1993	1150 x 870 x 1993
Internal dimensions (WxDxH)	mm	630 x 600 x 1400	870 x 600 x 1400	1010 x 600 x 1400
Volume	litres	528	729	845
Capacity	2" boxes	384	576	672
Power Consumption	kWh/day	6,7*	7,7*	8,7*

* (Set value temp. -80°C, Ambient temp. 23 °C, no load). * Complies with Art. 11, Annex III of F-Gas Regulation (EU) No 517/2014. Contains fluorinated greenhouse gases.

Optional accessories

OPTIONS

VIP ECO ULT Freezers				
Model number		**MDF-DU502VH-PE**	**MDF-DU702VH-PE**	**MDF-DU901VHL-PE**
Liquid CO_2 back-up		MDF-UB7-PW		
Liquid N_2 back-up		-		
Temperature recorders				
- Circular type		MTR-G85C-PE		
- Chart paper		RP-G85-PW [8]		
- Ink pen		PG-R-PW		
- Continuous strip type		MTR-85H-PW		
- Chart paper		RP-85-PW [8]		
- Ink pen		DF-38FP-PW		
- Recorder housing		MDF-S3085-PW		
Drawers	qty	-	-	-
Small inner door kit	set of 2	-	-	MDF-9ID-PW (max 2)
	set of 5	MDF-5ID5-PW	MDF-7ID5-PW	-
	set of 4	MDF-5ID4-PW	MDF-7ID4-PW	-

VIP ULT / PRO ECO ULT FREEZERS

These ultra low temperature freezers offer advanced cabinet design, reliable refrigeration systems and easy-to-use controllers making them ideal for the long-term secure storage. Every component is carefully selected and matched for optimum operation under demanding laboratory conditions, while the internal layout of the refrigeration system is meticulously designed for maximum heat removal, reducing stress on the system and therefore providing the highest levels of reliability and durability.

When sample security and peace of mind are of paramount importance, put your trust in VIP ultra low freezers.

- Personal sized ult chest freezer
- User-friendly filterless design
- Quiet operation
- Excellent sample security
- Uniform sample storage
- VIP insulation maximizes storage capacity

Add minimising energy consumption and reducing environmental impact to sample security, you get PRO ECO ULT Freezers.

- Energy efficiency
- Lower running costs
- Reduced environmental impact
- Excellent sample security
- Natural Refrigerants
- Heat Exchanger Design

VIP PLUS INSULATION

VIP PLUS vacuum insulation

PHCbi's patented VIP PLUS technology has resulted in a revolutionary vacuum insulation cabinet construction with improved thermal properties for superior temperature performance.

Natural Refrigerants

Naturally occurring hydrocarbon (HC) refrigerants improve performance and reduce running costs.

ECO natural refrigerants

MDD medical device directive

Model: MDF-C8V1-PE

Model: MDF-DU300H-PE

MDF-C8V1-PE
84L / 42 2" Boxes

MDF-DU300H-PE
333L / 216 2" Boxes

		VIP ULT Freezers	PRO ECO ULT Freezers
Model Number		**MDF-C8V1-PE**	**MDF-DU300H-PE**
Temperature control range	°C	-86	-86
External dimensions (WxDxH)	mm	550 x 685 x 945	750 x 870 x 1830
Internal dimensions (WxDxH)	mm	405 x 490 x 425	490 x 600 x 1140
Volume	litres	84	333
Capacity	2" boxes	42	216
Power Consumption	kWh/day	4,2*	5,7*

* (Set value temp. -80°C, Ambient temp. 23 °C, no load) * Complies with Art. 11, Annex III of F-Gas Regulation (EU) No 517/2014. Contains fluorinated greenhouse gases.

MDF-C8V1-PE

The MDF-C8V1-PE VIP Ultra Low Temperature Freezer is ideal -80°C freezing environment using VIP PLUS technology maximizes storage capacity. The newly developed single-compressor system achieves higher energy efficiency and space saving construction.
Use of VIP PLUS material on the front, left, and right sides enables a smaller installation space with exceptional storage capacity to foot print ratio.

MDF-DU300H-PE

The PRO ECO -86°C Ultra-low Freezer, MDF-DU300H-PE, is part of our range ECO ultra-low freezers with natural refrigerants. They minimise energy consumption, reduce environmental impact and save money. Innovative technology and Class IIa medical device certification provide secure storage of valuable research and clinical samples.

Optional accessories

		VIP ULT Freezers	PRO ECO ULT Freezers
Model number		**MDF-C8V1-PE**	**MDF-DU300H-PE**
Liquid CO_2 back-up		CVK-UB4-PW	CVK-UB2-PW
Liquid N_2 back-up		CVK-UBN2-PW	CVK-UBN2-PW
Temperature recorders			
- Circular type		MTR-G85C-PE	MTR-G85C-PE
- Chart paper		RP-G85-PW	RP-G85-PW
- Ink pen		PG-R-PW	PG-R-PW
- Continuous strip type		MTR-85H-PW	MTR-85H-PW
- Chart paper		RP-85-PW	RP-85-PW
- Ink pen		DF-38FP-PW	DF-38FP-PW
- Recorder housing		MDF-S3085-PW	MDF-S3085-PW
Drawers	qty	-	MDF30RPW (max)2
Small inner door kit	set of 2	-	-
	set of 5	-	-
	set of 4	-	-

VIP HYBRID ULT FREEZERS

When a high-quality ultra low temperature or cryogenic freezer is equipped with a Hybrid water cooling option, the unit can handle a chilled water circuit to extract the generated heat from the condenser or use the traditional air-cooled way with a fan motor. With this new setup, the freezer can switch from water cooled to air cooled in case the water system is not operated. A Hybrid water cooled freezer will contribute to a significant reduction in power consumption and will also reduce the amount of heat dissipated into the air. Compared to an air cooled freezer a Hybrid water cooled freezer will also have an improved temperature stability.

When reduced running costs and environmental objectives are of paramount importance, put your trust in VIP HYBRID ULT freezers.

- Lower energy use
- Cost saving
- Re-use of energy
- Reduced heat dissipation
- Improved sample protection
- Faster recovery time
- Reduction of airconditioning

HYBRID TECHNOLOGY

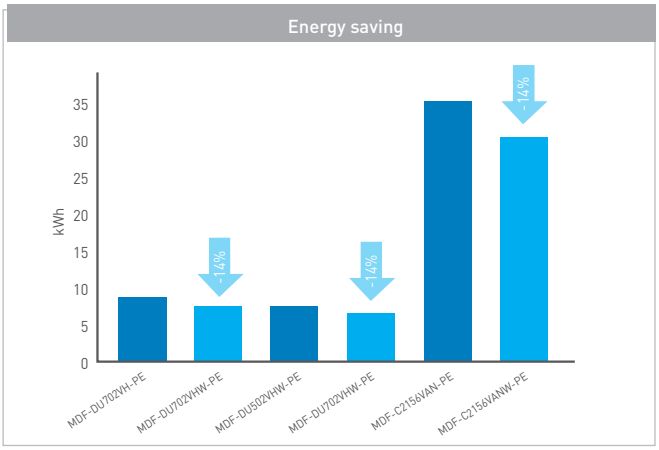
PHCbi's Hybrid water cooled technology on ECO VIP ultra low temperature and cryogenic freezers improves the compressor efficiency. The power consumption of a Hybrid ULT can be reduced by typically 10~12% compared to the equivalent air-cooled model. PHC offers a selection of ECO VIP and cryogenic freezers with hybrid water cooling technology.

Model: MDF-DU702VHW-PE

Model: MDF-DU502VHW-PE

LOWER ENERGY USE AND RUNNING COSTS

- Water has a greater heat absorption capacity than air. Therefore a water cooled condenser is more efficient than a conventional air cooled condenser. As a result, the compressor efficiency is improved, and the power consumption of a Hybrid ULT can be reduced by typically 10~12% compared to the equivalent air cooled model.
- Compared to an air cooled freezer a Hybrid water cooled freezer will reduce the heat dissipation into the air. This results in the reduction of air conditioning requirements for further cost savings.
- Potential to re-use the energy in the Hybrid water cooling system for other purposes within the facility to reduce site-wide energy costs.



IMPROVED FREEZER PERFORMANCE AND SAMPLE PROTECTION

- The greater cooling capacity of water compared to air improves the performance of the refrigeration system leading to reduced pull-down times. This provides faster temperature recovery after door opening and sample loading, thereby protecting samples by helping to maintain the correct temperature.
- Should the room air-conditioning fail, the room with Hybrid water cooled freezers will not warm up so quickly so samples in the freezers will remain safe for longer.
- The installation of a water cooled system to remove heat from ultra-low temperature and cryogenic freezers can assist organisations to reduce running costs and to meet environmental and energy reduction objectives.
- If the water system stops for any reason (failure or maintenance) the Hybrid water cooled freezer will start to work automatically on the air cooled condenser. This provides the best protection for your samples.
- The inverter compressors inside the MDF-DU502VHW-PE and MDF-DU702VHW-PE are developed for the best performance with the lowest energy consumption.

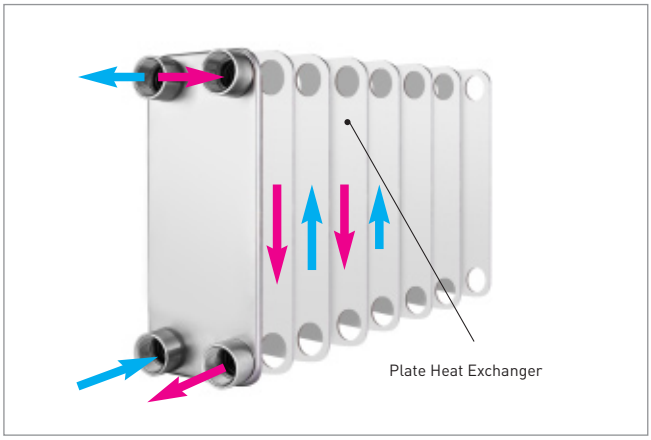
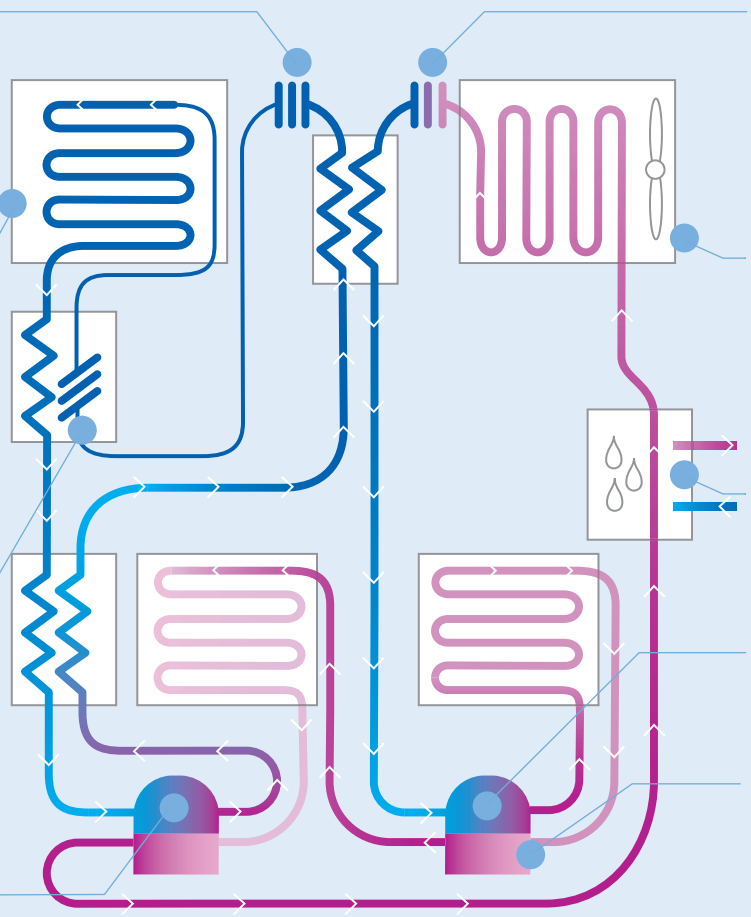


PLATE HEAT EXCHANGER

Heat energy from inside the freezer compartment is transferred by refrigerant gasses to a plate heat exchanger. Inside the plate heat exchanger, energy is transferred from the refrigerant to a closed water circuit. The greater cooling capacity of water compared to air improves the performance of the refrigeration system leading to reduced pull-down times. This provides faster temperature recovery after door opening and sample loading.

Model: MDF-C2156VANW-PE

HYBRID CASCADE COOLING SYSTEM



Low Stage Capillary Tube.
Liquid refrigerant under pressure is passed through the capillary tube where it evaporates in the low stage evaporator to absorb energy (heat) from the product stored in the freezer.

Freezer Cabinet with Evaporator.
The evaporator coil is strategically wrapped around to provide optimum temperature uniformity within the freezer cabinet.

Capillary tube between high and low stage
Low stage capillary tube heat exchanger provides optimum heat transfer between high and low temperature points in the low stage leading to greater energy efficiency (With the exception of MDF-U33V, MDF-C8V1).

Low Stage Compressor.
The compressor pumps refrigerant through the low stage circuit.

High Stage Capillary Tube.
Liquid refrigerant under pressure is passed through the capillary tube where it evaporates in the interstage heat exchanger to absorb energy (heat) from the low stage refrigerant circuit.

Main Condenser and Motor/Fan Assembly.
PHCbi's exclusive triple pass forced air condenser increases overall system efficiency by providing maximum surface area for heat rejection.

WATER CONDENSOR
In a plate heat exchanger energy is transferred from the refrigerant to a closed water circuit.

High Stage Compressor.
The compressor pumps refrigerant through the high stage circuit.

High Stage Oil Heat Exchanger.
PHCbi exclusive. High stage refrigerant passes through the high stage oil sump to cool the lubricating oil increasing the reliability of the high stage compressor.

Sensors (Not Shown).
Temperature sensors throughout the high and low stage circuits transmit information to the PHCbi controller for operation, monitoring, interpretation and component protection.

REDUCED HEAT DISSIPATION

COMPARISON MDF-DU702VH-PE VS MDF-DU702VHW-PE

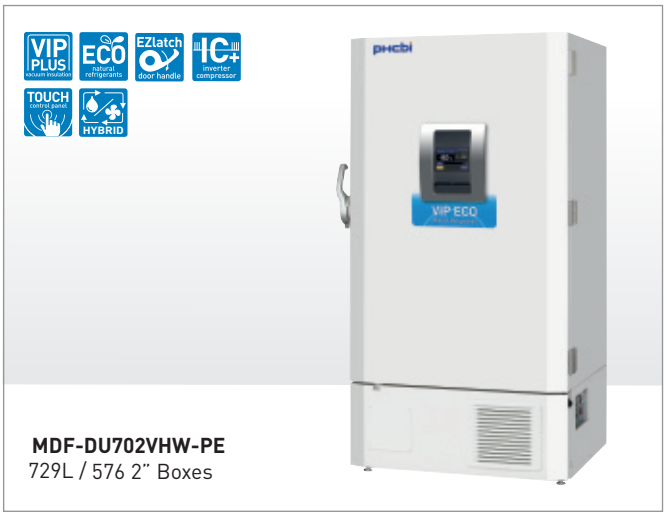
Model	Heat dissipation	Power consumption (kWh/day)	Power consumption (W/hour)	Heat dissipation (kcal/hour)	Percentage (%)
MDF-DU702VH-PE	Total (air)	9.4	391.7	336.8	100%
MDF-DU702VHW-PE	Total (air+water)	7.8	325.0	279.4	100%
	Air			105.4	38%
	Water			174.0	62%

Reduction of Heat Dissipation into the air (MDF-DU702VH-PE vs MDF-DU702VHW-PE)	69%
Reduction of Power Consumption (MDF-DU702VH-PE vs MDF-DU702VHW-PE)	17%

Data measured with freezers running at Setpoint -80°C, Ambient Temperature 27.2°C, No Load inside the freezers

Conclusion: The hybrid cooling system of a MDF-DU702VHW-PE contributes in the reduction of Power Consumption and Heat Dissipation to the air compared to a standard air cooled MDF-DU702VH-PE. Especially at high ambient temperatures like 27.2 °C the reduction in Power Consumption and Heat Dissipation into the air is significant.

MDF-DU502VHW-PE
528L / 384 2" Boxes



MDF-DU702VHW-PE
729L / 576 2" Boxes

VIP HYBRID ULT Freezers			
Model Number		**MDF-DU502VHW-PE**	**MDF-DU702VHW-PE**
Temperature control range	°C	-40 ~-86	
External dimensions (WxDxH)	mm	790 x 882 x 1993	1030 x 882 x 1993
Internal dimensions (WxDxH)	mm	630 x 600 x 1400	870 x 600 x 1400
Volume	litres	528	729
Capacity	2" boxes	384	576

* Complies with Art. 11, Annex III of F-Gas Regulation (EU) No 517/2014. Contains fluorinated greenhouse gases.

Cryogenic Hybrid Freezer		
Model Number		**MDF-C2156VANW-PE**
Temperature control range	°C	-150
External dimensions (WxDxH)	mm	1730 x 765 x 1010
Internal dimensions (WxDxH)	mm	760 x 495 x 615
Volume	litres	231
Capacity	2" boxes	150
Net weight (approx)	kg	318

MDF-C2156VANW-PE
231L / 150 2" Boxes

Optional accessories

OPTIONS

Hybrid ULT Freezers				
Model number		**MDF-DU502VHW-PE**	**MDF-DU702VHW-PE**	**MDF-C2156VANW-PE**
Liquid CO_2 back-up		MDF-UB7-PW		-
Liquid N_2 back-up		-		Supplied as standard
Temperature recorders				
- Circular type		MTR-G85C-PE		MTR-155H-PW
- Chart paper		RP-G85-PW [8]		RP-155-PW
- Ink pen		PG-R-PW		DF-38FP-PW
- Continuous strip type		MTR-85H-PW		MDF-S30150-PW
- Chart paper		RP-85-PW [8]		
- Ink pen		DF-38FP-PW		
- Recorder housing		MDF-S3085-PW		
Drawers	qty	-	-	
Small inner door kit	set of 2	-	-	
	set of 5	MDF-5ID5-PW	MDF-7ID5-PW	
	set of 4	MDF-5ID4-PW	MDF-7ID4-PW	

INVENTORY RACKS

Optimize and simplify access to stored materials with inventory racks suitable for your application.

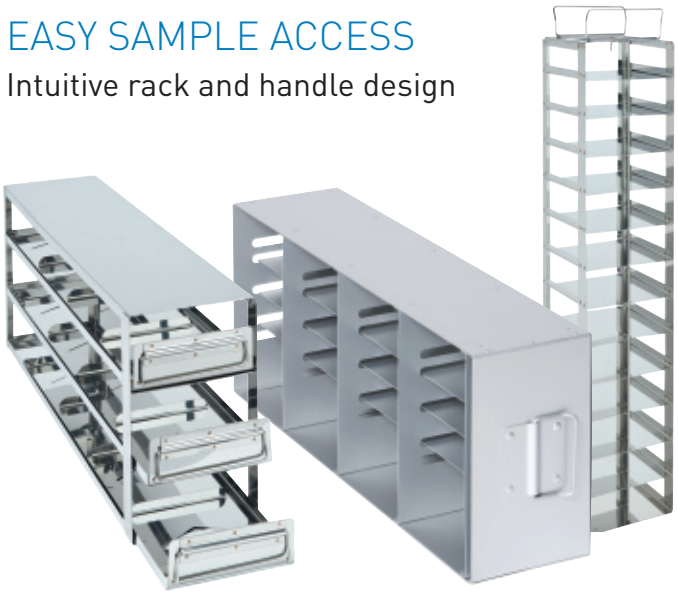
Organizing the space in your freezer can help you to make your work more efficient. Good sample management can result in both cost and time savings. By choosing the right racks, not only will efficiency be increased, but the risk of sample degradation due to exposure to ambient temperatures will be significantly reduced. This is a fact for any type of cell or tissue sample.

DURABLE LONG-TERM STORAGE

Racks are available in stainless steel and aluminium. Both racks types provide a durable and reliable long-term storage solution.

EASY SAMPLE ACCESS

Intuitive rack and handle design



MAXIMIZE FREEZER BOX STORAGE

Optimum freezer and footprint cost per box

EXCLUSIVELY DESIGNED FOR PHCbi

Made for upright and chest freezers

- Stainless steel or aluminium construction designed to withstand a lifetime of use.
- Racks are available for use with fibreboard or plastic boxes.
- Intuitive rack designs make it easy to access and return racks to the freezer.
- Maximum storage in freezer footprint.
- Sized to fit the PHCbi family of upright and chest freezers.
- Custom made racks to suit your unique storage requirements are available upon request.

Boxes and dividers

- Standard 2" and 3" boxes are available, in sturdy moisture resistant cardboard.
- For the XC series cryosystems we have the smaller 2" minibox including a 25 cell divider (B2CM + D25M).
- Sturdy cardboard cell dividers come in a wide selection of sizes to accommodate the storage of a variety of tubes and vials.

CRYOGENIC INVENTORY RACKS

Models: CBS

STANDARD SQUARE RACKS

Model number	Rack type	Description	Rack/quantity
V-1500AB	2001A-100S	Aluminium rack system with cardboard boxes + dividers.	7 racks x 13 boxes high. Max. cap. 9.100 2ml vials.
S-1500AB	2001S-C81	Aluminium rack system with cardboard boxes + dividers.	7 racks x 13 boxes high. Max. cap. 9.100 2ml vials.
V-3000AB	3101A-100S	Aluminium rack system with cardboard boxes + dividers.	17 racks x 13 boxes high. cap. 22.100 2ml vials.
S-3000AB	3101A-100S	Aluminium rack system with cardboard boxes + dividers.	17 racks x 13 boxes high. cap. 22.100 2ml vials.
V-5000AB	3301A-100S	Aluminium rack system with cardboard boxes + dividers.	28 racks x 13 boxes high. cap. 36.400 2ml vials.
S-5000AB	3301A-100S	Aluminium rack system with cardboard boxes + dividers.	28 racks x 13 boxes high. cap. 36.400 2ml vials.
V-5000ABEH	3325A-100S	Aluminium rack system with cardboard boxes + dividers.	28 racks x 15 boxes high. cap. 42.000 2ml vials.
S-5000ABEH	3325A-100S	Aluminium rack system with cardboard boxes + dividers.	28 racks x 15 boxes high. cap. 42.000 2ml vials.

VERTICAL RACKS

Model number	Rack type	Description	Rack/quantity
V-1500AB	RC-V1500-1209-VLR	Stainless steel rack system with cardboard boxes + dividers.	20 racks x 5 boxes high. cap. 10.000 2ml vials.
S-1500AB	RC-S1500-1209-VLR	Stainless steel rack system with cardboard boxes + dividers.	20 racks x 5 boxes high. cap. 10.000 2ml vials
V-3000AB	RC-V3000-1209-VLR	Stainless steel rack system with cardboard boxes + dividers.	48 racks x 5 boxes high. cap. 24.000 2ml vials.
S-3000AB	RC-S3000-1209-VLR	Stainless steel rack system with cardboard boxes + dividers.	48 racks x 5 boxes high. cap. 24.000 2ml vials.
V-5000AB	RC-V5000-1209-VLR	Stainless steel rack system with cardboard boxes + dividers.	80 racks x 5 boxes high. cap. 40.000 2ml vials.
S-5000AB	RC-S5000-1209-VLR	Stainless steel rack system with cardboard boxes + dividers.	80 racks x 5 boxes high. cap. 40.000 2ml vials
V-5000ABEH	RC-V5000EH-1208-VLR	Stainless steel rack system with cardboard boxes + dividers.	80 racks x 6 boxes high. cap. 48.000 2ml vials.
S-5000ABEH	RC-S5000EH-1208-VLR	Stainless steel rack system with cardboard boxes + dividers.	80 racks x 6 boxes high. cap. 48.000 2ml vials

CRYOGENIC MDF FREEZERS

Models: MDF-1156(ATN)-PE I MDF-C2156VAN-PE

ALUMINIUM RACK SOLUTIONS

Vertical rack type	Box type	Rack/quantity Aluminium	Freezer layout (Columns x Rows)	Total boxes	Rack dimensions*			Maximum box dimensions		
					Width	Depth	Height	Footprint of box max width*	Lid of box max width*	Box height max height*
MDF-1156(ATN)-PE										
side opening	2 inch	9 x NIR-209C	3x3	81	142	141	516	133	133	53
side opening	3 inch	9 x NIR-306C	3x3	54	142	141	516	133	133	75
MDF-C2156VAN-PE										
opening	2 inch	15 x NIR-210C	5x3	150	142	141	590	133	133	53
side opening	3 inch	15 x NIR-307C	5x3	105	142	141	590	133	133	78

STAINLESS STEEL RACK SOLUTIONS

Vertical rack type	Box type	Rack/quantity Stainless steel	Freezer layout (Columns x Rows)	Total boxes	Rack dimensions*			Maximum box dimensions		
					Width	Depth	Height	Footprint of box max width*	Lid of box max width*	Box height max height*
MDF-1156(ATN)-PE										
side opening	2 inch	9 x SCR-102-N	3x3	90	139.7	144	564.13	136	142	54
side opening	3 inch	9 x SCR-063-N	3x3	54	139.7	144	494.28	136	142	75
MDF-C2156VAN-PE										
side opening	2 inch	15 x SCR-102-N	5x3	150	139.7	144	564.13	136	142	54
side opening	3 inch	15 x SCR-073-N	5x3	105	139.7	144	575.31	136	142	75

* Unit: mm

TWINGUARD / VIP ECO INVENTORY RACKS

Models: MDF-DU302VX-PE | MDF-DU502VX-PE | MDF-DU702VX-PE | MDF-DU502VH-PE | MDF-DU702VH-PE | MDF-DU901VHL-PE

ALUMINIUM RACK SOLUTIONS

Vertical rack type	Box type	Rack/quantity Aluminium	Freezer layout (Columns x Rows)	Total boxes	Rack dimensions*			Maximum box dimensions		
					Width	Depth	Height	Footprint of box max width*	Lid of box max width*	Box height max height*
MDF-DU302VX-PE										
with trays	2 inch	12 x HCS-32-5584/143	3x4	240	143	560	280	133	136	52
side opening	2 inch	12 x NIR-220U	3x4	240	139	559	279	135	135	52
with trays	3 inch	12 x HCS-32-3804/143	3x4	144	143	560	232	133	136	71
side opening	3 inch	12 x NIR-312U	3x4	144	139	559	279	135	135	88
MDF-DU502VX-PE / MDF-DU502VH-PE / MDF-DU502VHW-PE										
with trays	2 inch	4 x HCS-296	2x2	384	280	560	685	133	136	52
with trays	2 inch	16 x HCS-6564	4x4	384	140	560	339	130	133	52
side opening	2 inch	16 x NIR-224U	4x4	384	139	559	334	135	135	52
with trays	3 inch	16 x HCS-4804	4x4	256	140	560	320	130	133	75
side opening	3 inch	16 x NIR-316U	4x4	256	139	560	334	135	135	75
MDF-DU702VX-PE / MDF-DU702VH-PE / MDF-DU702VHW-PE										
with trays	2 inch	6 x HCS-296	3x2	576	280	560	685	133	136	52
with trays	2 inch	24 x HCS-6564	6x4	576	140	560	339	130	133	52
side opening	2 inch	24 x NIR-224U	6x4	576	139	559	334	135	135	52
with trays	3 inch	24 x HCS-4804	6x4	384	140	560	320	130	133	75
side opening	3 inch	24 x NIR-316U	6x4	384	139	559	324	135	135	75
MDF-U901VHL-PE										
with trays	2 inch	14 x HCS-5584 + 14 x HCS-6564	7x2 + 7x2	616	140	560	290/339	130	133	52
side opening	2 inch	14 x NIR-220U + 14 x NIR-224U	7x2 + 7x2	616	139	559	279/334	130	133	52
with trays	3 inch	14 x HCS-4804 + 14 x HCS-3804	7x2 + 7x2	392	140	560	340/279	130	133	75
side opening	3 inch	14 x NIR-316U + 14 x NIR-312U	7x2 + 7x2	392	139	559	324/279	135	135	75

STAINLESS STEEL RACK SOLUTIONS

Vertical rack type	Box type	Rack/quantity Stainless steel	Freezer layout (Columns x Rows)	Total boxes	Rack dimensions*			Maximum box dimensions		
					Width	Depth	Height	Footprint of box max width*	Lid of box max width*	Box height max height*
MDF-DU302VX-PE										
with trays	2 inch	12 x SDR-524-N	3x4	240	139.45	565.4	288.79	134	138	54
side opening	2 inch	12 x SUR-524-N	3x4	240	139.7	569.72	279.65	137	138	54
with trays	3 inch	12 x SDR-334-N	3x4	144	139.45	565.4	250.69	134	138	78
side opening	3 inch	12 x SUR-334-N	3x4	144	139.7	569.72	244.85	137	138	78
MDF-DU502VX-PE / MDF-DU502VH-PE / MDF-DU502VHW-PE										
with trays	2 inch	16 x SDR-624-N	4x4	384	139.45	565.4	325.12	134	137	52
		16 x SDR-624-P	4x4	384	139.45	565.4	339.59	134	137	54,5
side opening	2 inch	16 x SUR-624-N	4x4	384	139.7	569.72	320.29	136	137	52
		16 x SUR-624-P	4x4	384	139.7	569.72	332.74	136	137	54,5
with trays	3 inch	16 x SDR-434-N	4x4	256	139.45	565.4	320.54	134	137	78
side opening	3 inch	16 x SUR-434-N	4x4	256	139.7	569.72	320.29	136	137	78
MDF-DU702VX-PE / MDF-DU702VH-PE / MDF-DU702VHW-PE										
with trays	2 inch	24 x SDR-624-N	6x4	576	139.45	565.4	325.12	134	137	52
		24 x SDR-624-P	6x4	576	139.45	565.4	339.59	134	137	54,5
side opening	2 inch	24 x SUR-624-N	6x4	576	139.7	569.72	320.29	136	137	52
		24 x SUR-624-P	6x4	576	139.7	569.72	332.74	136	137	54,5
with trays	3 inch	24 x SDR-434-N	6x4	384	139.45	565.4	320.54	134	137	78
side opening	3 inch	24 x SUR-434-N	6x4	384	139.7	569.72	320.29	136	137	78
MDF-DU901VHL-PE										
with trays	2 inch	28 x SDR-624-N	7x4	672	139.45	565.4	325.12	134	137	52
side opening	2 inch	28 x SUR-624-N	7x4	384	139.7	569.72	320.29	136	137	52
with trays	3 inch	14 x SDR-334-N	7x2	392	139.45	565.4	250.69	136	137	78
		14 x SDR-434-N	7x2	392	139.45	565.4	320.29	136	137	78
side opening	3 inch	14 x SUR-334-N	7x2	392	139.7	569.72	244.85	136	137	78
		14 x SUR-434-N	7x2	392	139.7	569.72	320.29	136	137	78

* Unit: mm

TWINGUARD CHEST FREEZER INVENTORY RACKS

Models: MDF-DC500VX-PE | MDF-DC700VX-PE

ALUMINIUM RACK SOLUTIONS

Vertical rack type	Box type	Rack/quantity Aluminium	Freezer layout (Columns x Rows)	Total boxes	Rack dimensions*			Maximum box dimensions		
					Width	Depth	Height	Footprint of box max width*	Lid of box max width*	Box height max height*
MDF-DC500VX-PE										
side opening	2 inch	32 x NIR-213C	8x4	416	139	137	745	133	133	52
side opening	3 inch	32 x NIR-309C	8x4	288	139	137	745	133	133	75
MDF-DC700VX-PE										
side opening	2 inch	40 x NIR-213C	10x4	520	139	137	745	133	133	53
side opening	3 inch	40 x NIR-309C	10x4	360	139	137	745	133	133	75

STAINLESS STEEL RACK SOLUTIONS

Vertical rack type	Box type	Rack/quantity Stainless steel	Freezer layout (Columns x Rows)	Total boxes	Rack dimensions*			Maximum box dimensions		
					Width	Depth	Height	Footprint of box max width*	Lid of box max width*	Box height max height*
MDF-DC500VX-PE										
side opening	2 inch	32 x SCR-132-N	8x4	416	139.7	144	725.93	136	142	54
side opening	3 inch	32 x SCR-093-N	8x4	288	139.7	144	738.63	136	142	75
MDF-DC700VX-PE										
side opening	2 inch	40 x SCR-132-N	10x4	520	139.7	144	725.93	136	142	54
side opening	3 inch	40 x SCR-093-N	10x4	360	139.7	144	738.63	136	142	75

* Unit: mm

PRO ECO / VIP INVENTORY RACKS

Models: MDF-DU300H-PE | MDF-C8V1-PE

ALUMINIUM RACK SOLUTIONS

Vertical rack type	Box type	Rack/quantity Aluminium	Freezer layout (Columns x Rows)	Total boxes	Rack dimensions*			Maximum box dimensions		
					Width	Depth	Height	Footprint of box max width*	Lid of box max width*	Box height max height*
MDF-DU300H-PE										
with trays	2 inch	6 x HCS-32-4584/143 + 6 x HCS-32-5584/143	3x2 + 3x2	216	143	560	232/280	133	136	52
side opening	2 inch	6 x NIR-216U + 6 x NIR-220U	3x2 + 3x2	216	139	559	232/279	135	135	52
with trays	3 inch	12 x HCS-32-3804/143	3x4	144	143	560	232	133	136	71
side opening	3 inch	12 x NIR-312U	3x4		144	139	559	279	135	135
MDF-C8V1-PE										
side openings	2 inch	6 x NIR-207C	3x2	42	142	141	403	133	133	53
side openings	3 inch	6 x NIR-305C	3x2	30	142	141	403	133	133	75

STAINLESS STEEL RACK SOLUTIONS

Vertical rack type	Box type	Rack/quantity Stainless steel	Freezer layout (Columns x Rows)	Total boxes	Rack dimensions*			Maximum box dimensions		
					Width	Depth	Height	Footprint of box max width*	Lid of box max width*	Box height max height*
MDF-DU300H-PE										
with trays	2 inch	6 x SDR-424-N + 6 x SDR-524-N	3x2 + 3x2	216	139.45	565.4	288.79 / 325.12	134	137	54
side opening	2 inch	6 x SUR-424-N + 6 x SUR-524-N	3x2 + 3x2	216	139.7	569.72	233.68 / 279.65	134	137	54
with trays	3 inch	12 x SDR-334-N	3x4	144	139.45	565.4	250.69	134	137	78
side opening	3 inch	12 x SUR-334-N	3x4	144	139.7	569.72	244.85	136	137	78
MDF-C8V1-PE										
side openings	2 inch	6 x SCR-072-N	3x2	42	139.7	144	397	136	142	54
side openings	3 inch	6 x NIR-305C	3x2	30	142	141	403	133	133	75

* Unit: mm

VALIDATION & QUALIFICATION SOLUTIONS

PHC Europe BV is a vertical component manufacturer that can provide turn-key solutions for validation and qualification in accordance with all current GMPs, GLPs, GCPs, 21 CFR Part 11, PAT, ISO and specific customer requirements and applications. Because many of our key component parts are designed and built by PHC Europe BV, we offer the most precise and in-depth validation resources specific to PHCbi laboratory products. Whatever your validation needs are, PHCbi provides comprehensive expertise in laboratory equipment to meet your exact compliance needs. PHCbi validation systems employ advanced technology coupled with the latest trends to insure compliance with accurate and time efficient completion.

Validation & Qualification Solutions for laboratory equipment

Turn key solutions available for:

- Ultra-Low Freezers
- Cryogenic Freezers
- Biomedical Freezers
- Bloodbank refrigerators
- Pharmaceutical refrigerators
- Incubators
- Ovens
- Autoclaves
- Environmental test chambers

Installation and Operational Qualification

Qualification IOQ
PHC Europe BV offer onsite validation of PHCBI supplied equipment via Installation and Operational Qualification Protocol IOQ.

Installation Qualification (IQ)
Verifies and documents the equipment installation is compliant with the manufacturer's requirements and specifications.

Operational Qualification (OQ)
Verifies and documents the full functional operation of the installed equipment (as specified by PHCBi or other OEM supplied equipment). Temperature performance will be mapped over a continuous 24hr period; also, a short open-door test included toward the end of this period. Data produced will be compared with manufacturers published equipment specification. Product specific parameters such as CO_2/O_2, %RH etc. are included within the relevant equipment IOQ protocol.

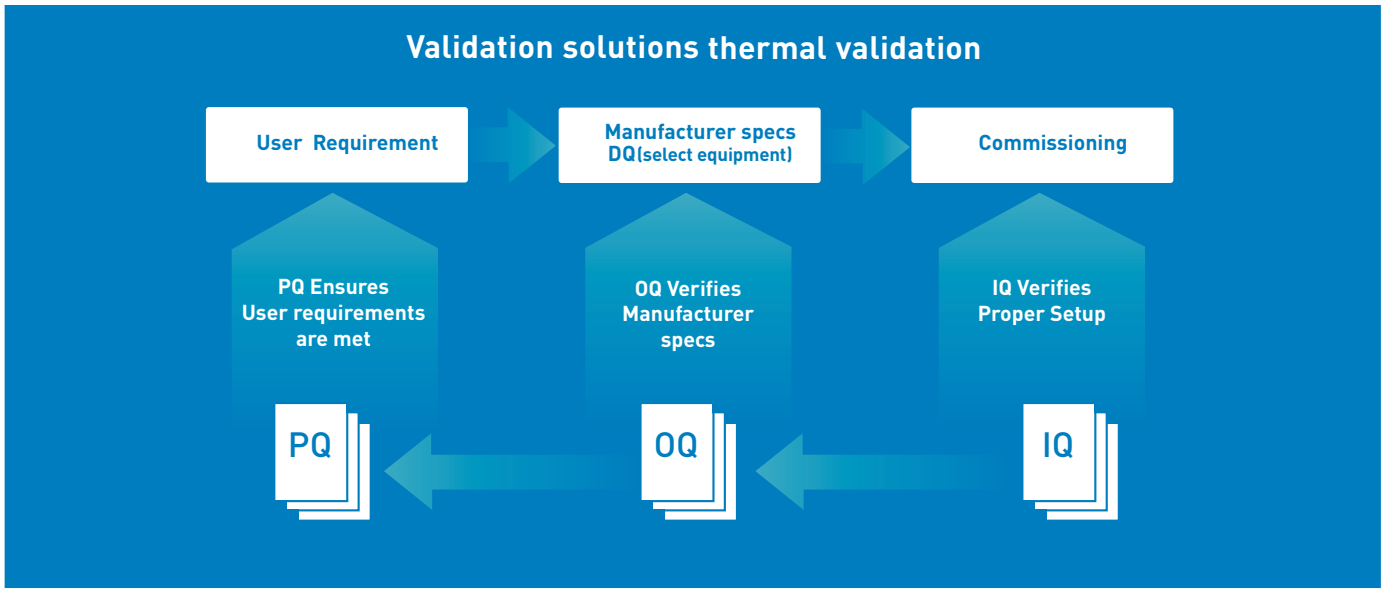
Additional options:
Additional temperature sensor positions, Extended logging period 48/72hrs, Simulated customer loaded mapping, Powerfail/ Recovery performance tests.

Process Qualification (PQ) is usually conducted and performed by customer/end-user as the equipment will be in an environment where specific user conditions and actual product is loaded, stored and accessed e.g. the customers actual production or product processing area. The PQ will probably refer to customer specific Standard Operating Procedures documents (SOPs).

PHCbi validation services by model						
	Temp.	CO_2	O_2	%RH	Lighting (Lux/Par)	Pressure
Validation by Model	✓					
MDF-150°C Freezers	✓					
MDF-86°C Freezers	✓					
MDF-30°C Freezers	✓					
MBR Blood Bank Refrigerators	✓					
MPR Pharmaceutical Refrigerators	✓					
MIR Incubator Series	✓					
MCO CO_2 & O_2/CO_2 Incubators	✓	✓	✓	✓		
MLS Top Loading Autoclaves	✓					✓
MLR Environmental Test Chamber	✓			✓	✓	
CBS Standard LN_2 Freezers	✓					

Example: product identification and specific storage requirements; loading patterns etc. therefore making the PQ a unique and customer specific document. PHC Europe however will provide assistance to customers where required in either the preparation or assisted execution of the Process Qualification.

PHC Europe BV is also able to offer a "Temperature Mapping Service" for customers wishing to verify actual equipment performance as installed, this service is also available for all NON PHCBI equipment.



PHC Europe B.V.
Nijverheidsweg 120 | 4879 AZ Etten-Leur | Netherlands
T: +31 (0) 76 543 3833 | F: +31 (0) 76 541 3732
www.phchd.com/eu/biomedical