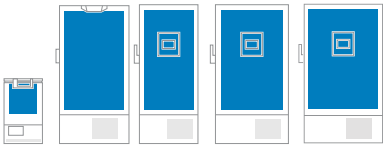
PHCbi

Life Science
Innovator
Since 1966

ULTRA-LOW TEMPERATURE FREEZERS



VIP® Series

VIP | VIP ECO

Engineered and proven for performance, reliability and uniform storage of critical biological specimens and other life forms.

PHC Corporation of North America

www.phchd.com/us/biomedical

The Global Scientific Refrigeration Solution.

VIP ECO | MDF-DU702VHA-PA
Natural Refrigerant
ENERGY STAR® Certified

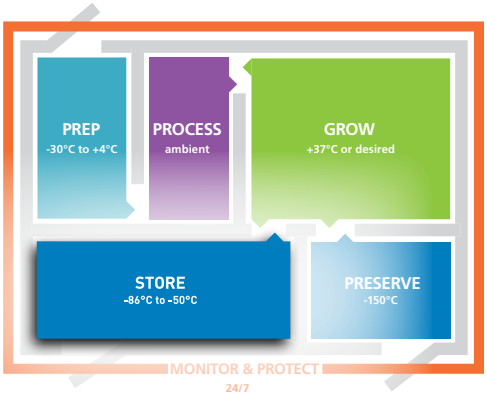
VIP ECO | MDF-DU901VHA-PA
Natural Refrigerant
Large Volume Biorepository
ENERGY STAR Certified

VIP | MDF-U76VC-PA and MDF-C8V1-PA
Upright and Chest

Fifty Years of Innovation.

For more than 50 years, we have earned a reputation for introducing next generation ultra-low temperature freezers with documented success, each better than the last, and each created and tested for reliability and performance. We empower our global marketing and sales teams to share ideas and real-world customer experiences with our research and development experts. Our manufacturing engineering group invests in the latest industrial design techniques for building better products.

We consult with our customers and we listen. As we continue this journey at your side, the PHCbi brand promise will remain the industry standard for performance, reliability and common-sense energy management - without compromise.



Ultra-low temperature freezers play a key role in the life science equation.

Facilities that use PHCbi brand ultra-low temperature freezers include pharmaceutical and biotech laboratories, biorepositories, medical research and academic institutions, government installations, blood and tissue banks, hospitals, clinics and industrial research.

Product Reliability is a Social Responsibility.

New product introductions based on insufficient life testing are without purpose. We believe innovation includes both a scientific and a social responsibility to the world. As new technologies are developed within and beyond our industry, we explore, evaluate, test and deliberate their benefits with respect to the high-value stored product you entrust us to protect with each product you purchase.

VIP Series Ultra-Low Temperature Freezer Applications:

- Cell Lines
- Tissues
- Specimens
- Subcellular Components

Other applications range from archive storage of broad scale epidemiology research and frozen samples for investigations spanning decades or generations.

Performance, Reliability and Energy Management

Our theory of ultra-low temperature freezer design is based on a three-point objective: performance, reliability and energy management.

PERFORMANCE

The primary purpose of an ultra-low temperature freezer is to protect a stored product by achieving and maintaining a uniform temperature that assures cell viability regardless of where samples are stored inside.

Our measure of performance extends to stability in the steady state, quick pull-down on initial startup or following a power outage, and quick recovery following routine door openings. Superior performance cannot be compromised ever for any reason.

RELIABILITY

While performance is the first test of our product, reliability over the life of the freezer is essential to the protection of your research, peace of mind in your work and return on your investment.

The PHCbi brand reputation for reliability in refrigeration system operation and predictive maintenance is second to none in the world. Our most popular upright ultra-low temperature freezer has earned a service rating of <1% major repair requests based on internal data generated over a typical lifespan.

ENERGY MANAGEMENT

While reducing power consumption remains a priority in our research and development efforts, the scientific community can be assured that performance and reliability come above all else in support of global scientific initiatives.

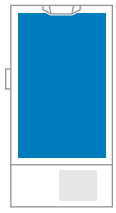
As refrigeration technology evolves in response to a global demand for biodegradable refrigerants and more efficient operating costs, we continue to invest in new generations of ultra-low temperature cooling systems.

NATURAL REFRIGERANTS

Natural refrigerants, smart compressors and integrated electronics combine to lower operating costs without putting reliability and ultra-low temperature performance at risk.

Standard on VIP ECO Series ultra-low temperature freezers.

VIP Series

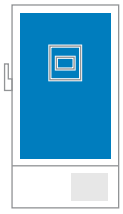


MDF-U76VA-PA
MDF-U76VC-PA
25.7 cu.ft. | 728 L

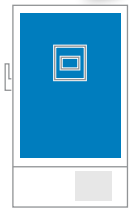
MDF-C8V1-PA
3.0 cu.ft. | 84 L

VIP ECO Series, ENERGY STAR Certified

MDF-DU502VH-PA
MDF-DU502VHA-PA
18.6 cu.ft. | 528 L



MDF-DU702VH-PA
MDF-DU702VHA-PA
25.7 cu.ft. | 729 L



MDF-DU901VHA-PA
29.8 cu.ft. | 845 L

Selection

PHCbi brand ultra-low temperature freezers are available in a range of orientations and sizes. Choose from eight models. Space-saving upright cabinets and low-profile chest cabinets are designed for both new laboratories and replacement installations. Larger upright cabinets are configured for high-volume storage in biorepository facilities.

A variety of common components shared across the product line include inventory management accessories and cloud-based alarm/monitoring systems that use the latest secure wireless technology.

VIP ECO and Sustainability

The VIP ECO ultra-low temperature freezer family delivers the most energy efficient performance of any other ultra-low temperature freezer on the market. ENERGY STAR Certified for performance and independently tested by a nationally recognized testing laboratory, the VIP ECO offers fast pull-down, quick recovery after door openings, tight interior temperature uniformity at all shelf levels, and robust tolerance for high ambient conditions.

Natural refrigerants minimize environmental impact while maintaining stable ultra-low temperature conditions required to protect valuable specimens.

A unique variable differential cascade system and proprietary internal heat exchanger increases the performance envelope to apportion cooling power to the cabinet on demand. Energy efficient reserve cooling power is substantiated by fast recovery after door openings.

5-YEAR
PARTS & LABOR
WARRANTY

Warranty

PHC Corporation of North America offers 5-year, parts and labor warranty protection on VIP Series ultra-low temperature freezers (North America only).

VERTICAL COMPONENT INTEGRATION

As a global company, PHC Corporation draws on vast corporate resources and worldwide engineering networks to develop new compressor designs, complementary refrigeration, electronic technologies and balanced energy efficiencies without trading off performance and reliability. Our ***vertical component integration*** initiative assures that PHCbi brand freezers include the latest high performance electronics and subsystems required to deliver sustainable outcomes.

VIP Series Refrigeration Platforms

	VIP Series, Uprights	VIP Series, Chest	VIP ECO, Uprights
Compressors	Cascade system, (two compressors)	Auto-cascade (single compressor)	Cascade system, (two compressors)
Refrigerant	HFC refrigerants	Blended refrigerants	Natural refrigerants

VIP Series Compressors

Refrigeration compressors are specifically designed and engineered to achieve and maintain ultra-low temperatures. Compressor attributes include apportionment of interior components for strength, lubricating efficiency, pressure and refrigerant flow ratios, motor temperatures and heat removal.

- Uniquely designed heat exchangers have ample surface area to move energy from one stage to another
- Internal lubrication pathways permit the use of the same energy twice in multiple sections of the cooling system
- Compressor operating temperatures are minimized to extend compressor life within designed operating parameters
- Compressors are engineered to tolerate broader voltage deviations typical of real-world installations
- Micro-lubrication within compressor housings and critical internal components are supplemented by a unique cooling oil spray to improve longevity
- Environmentally friendly, natural and non-CFC refrigerants are used throughout the product line
- Cabinets maintain reserve refrigeration power to assure fast temperature recovery following door and lid openings and for assurance of safe operating parameters during periods of high ambient temperatures or voltage fluctuations during area brown-out conditions
- Optional liquid CO_2 or LN_2 back-up systems provide an added measure of protection for stored samples

VIP ECO Upright Refrigeration System Platform

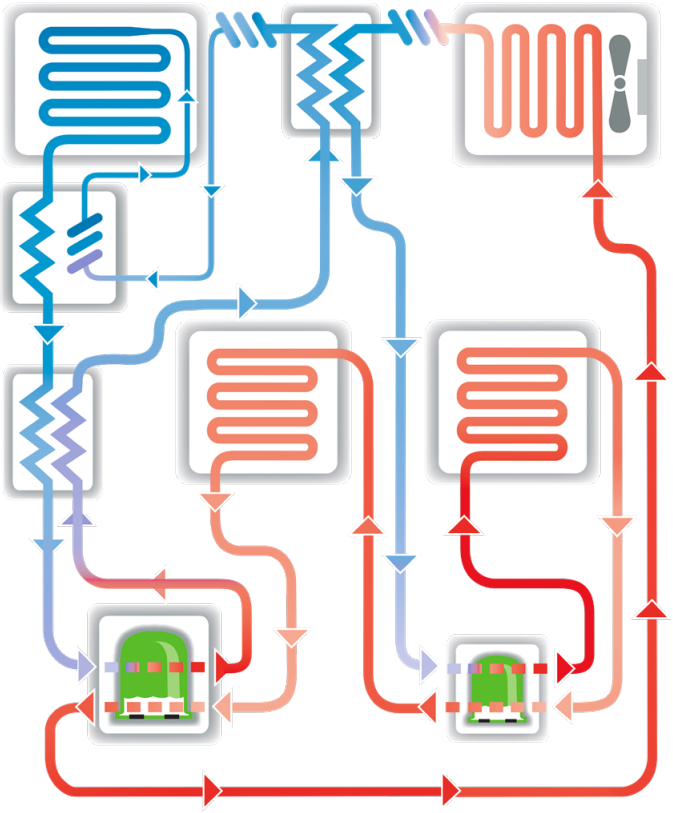
The VIP ECO upright ultra-low temperature freezer uses a variable differential cascade system powered by two variable speed inverter compressors with natural refrigerants. These compressors deliver balanced performance on demand through a proprietary system controller that reads multiple data points throughout the cooling circuit. The control algorithm optimizes individual compressor speed to match high and low-stage demands for cooling, saving energy and increasing responsiveness.

VIP Series Upright, Cascade Refrigeration Platform

The PHCbi cascade refrigeration platform is based on high performance compressors designed by PHC Corporation specifically for ultra-low temperature applications. The cascade system is used on VIP Series upright freezers for temperature storage preferences within a range of -50°C to -86°C and may be configured and set in one degree increments to meet strict SOP protocols.

Cascade Reliability

Refrigerants do the work of removing heat (cooling) through a process of expansion and condensation within the circuit. Compressors pump the refrigerant that circulates through the system, expanding and condensing as they absorb heat from the cabinet and reject heat through the condenser. Compressors not intended to tolerate the demands of ultra-low temperature cooling can overheat, diminish cooling performance and shorten compressor life leading to freezer failure. Our compressors are engineered and purpose built to enhance lubrication at all points within the system, a measure that reduces heat and improves reliability.



Using the Same Energy Twice

In the cascade system, both the high-stage and low-stage circuits work together to cool both the chamber and compressor operating components in the process. In this unique configuration, the high-stage compressor cools the low-stage circuit which, in turn, cools the cabinet. In the process, the high-stage compressor borrows and then reuses refrigerant flow through loops in both compressor oil reservoirs. Multiple lubrication pathways cool all internal bearings and the compressor discharge heads, reducing temperatures at critical points and extending compressor life.

While dependability and uptime remain the most important functions of the product line, improvements in energy management and sustainability, without compromising performance, remain central to our research and development program. The PHC refrigeration system has demonstrated a service repair rating of <1% for the company's installed base upright Model MDF-U76VC-PA.

VIP Series Chest, Refrigeration Platform

The VIP Series chest freezer is a low-profile design containing a space-saving auto-cascade cooling circuit. Powered by a single refrigeration compressor, the VIP Series cabinet maintains normal temperature within a setpoint range of -50°C to -80°C. Unique to the chest freezer design are attributes of the thermal mass within the freezer load and the physics of cold air movement during freezer access. Thus, the chest freezer offers a longer warm-up time in the event of a power failure.

(left) Compressors used in the PHCbi cascade refrigeration system use refrigeration flow within sump cooling loops to cool operating temperatures at critical points within the circuit, extending compressor life and optimizing operating efficiencies.

Compressor schematic for reference only. Schematic for VIP ECO ultra-low temperature freezer (not shown) varies in arrangement and function of individual components.

CONTROLLER PLATFORMS

VIP | VIP ECO

PHCbi ultra-low temperature and cryogenic freezers are managed by a variety of microprocessor-based digital controllers configured for setpoint security, temperature display, system status and alarm functions, and predictive performance advisories.

Local alarms with audible and visual alerts are standard. Remote alarm contacts are included on all freezers.

Model MDF-DU702VH-PA

Model MDF-U76VC-PA

Model MDF-C8V1-PA

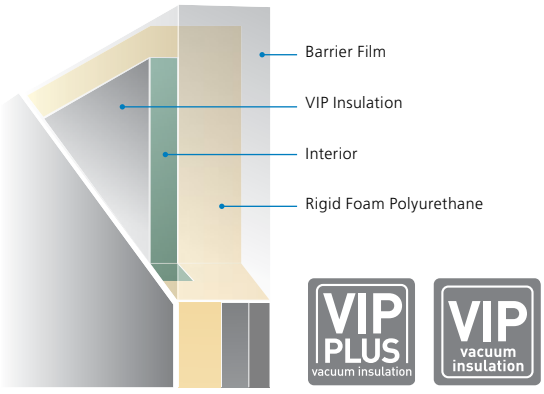
Controller	| A | Touchscreen with Graphical Color LCD Display	| B | Softkey 6 Button Menu with LED Display – Stacked	| C | Softkey 5 Button Menu with LED Display – Stacked
Models	VIP ECO MDF-DU502VH-PA MDF-DU502VHA-PA MDF-DU702VH-PA MDF-DU702VHA-PA MDF-DU901VHA-PA	VIP Series, Upright MDF-U76VA-PA MDF-U76VC-PA	VIP Series, Chest MDF-C8V1-PA
Location	Door mounted, eye level	Door mounted	Mechanical compartment, front
Information	LCD message center – all freezer functions	LED temperature display	LED temperature display
Programming	Touchscreen – menu – all functions	Softkeys	Softkeys
Temperature Alarms	Indicator on screen – visual message + audible	Indicator light + audible	Indicator light + audible
Power Failure	Visual message + audible	Indicator light + audible	Indicator light + audible
Door/Lid Ajar	Visual message + audible	Indicator light + audible	Indicator light + audible
Alarm Ring Back	Included	Included	Included
Audible Silence	Manual	Manual	Manual
Alarm Test	Manual	Manual	Manual
Deviation Alarm	Indicator and visual message	Indicator light	Indicator light
Clean Filter Alert	Indicator	Indicator light	Indicator light
Replace Battery Indicator	Visual message	Indicator light	Indicator light
Remote Alarm Contacts	NO/NC/Common, 30V, 2A DC	NO/NC/Common, 30V, 2A DC	NO/NC/Common, 30V, 2A DC
Data Download	USB Port	—	—
Display Brightness	Contrast Adjustment	—	—
Liquid Refrigerant Backup	Visual message	—	—
Battery	Rechargeable Ni-CAD	Rechargeable Ni-CAD	Rechargeable Ni-CAD

Our collection of cabinet sizes is strategically engineered to permit quick and easy replacement of older, less efficient freezers with minimal downtime. Existing inventory racks can be used on many models. Freezers are designed to fit through standard doorways of 38" (965 mm), stand-off brackets may be removed and reattached; removal not required for 40" (1016 mm) doorways.

Series and Model	Volume	Insulation	Frost Control	Door Handle	Vacuum Relief	Door Gasket	Mobility
VIP Series, Upright Model -50°C to -86°C, VIP ECO Natural Refrigerant							
MDF-DU502VH-PA, MDF-DU502VHA-PA	18.6 (528)	VIP Plus	Advanced	EZlatch	Auto	Quick change	Casters, leveling legs
MDF-DU702VH-PA, MDF-DU702VHA-PA	25.7 (729)	VIP Plus	Advanced	EZlatch	Auto	Quick change	Casters, leveling legs
MDF-DU901VHA-PA	29.8 (845)	VIP Plus	Advanced	EZlatch	Manual	Field replaceable	Casters, leveling legs
VIP Series, Upright Models -50°C to -86°C							
MDF-U76VA-PA, MDF-U76VC-PA	25.7 (728)	VIP Plus	Standard	Standard	Manual	Field replaceable	Casters, leveling legs
VIP Series, Chest Model -50°C to -80°C							
MDF-C8V1-PA	3.0 (84)	VIP Plus	Standard	–	–	Field replaceable	Casters

Cabinet Insulation and Finish

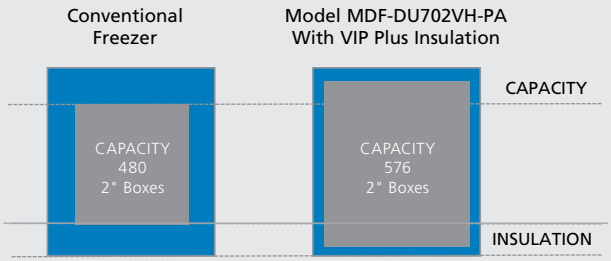
Freezer cabinets are constructed using three insulation techniques, each selected to maximize internal storage volume while maintaining stable interior temperatures over a range of ambient temperatures. Insulation methods include VIP Plus, VIP and foamed-in-place techniques. Freezer interiors and exteriors are constructed of heavy gauge galvannealed steel. All external surfaces are powder coated to resist scratches, rust or corrosion.



VIP Plus cabinet insulation offers a thin-profile with superior resistance to heat loss in higher ambient conditions.

VIP PLUS & VIP INSULATION

Cabinets with VIP Plus insulation are formed with a composite of thin-profile vacuum insulation panel substrates supported by foamed-in-place insulation within the exterior walls. VIP Plus cabinets offer additional interior storage volume and exceptional insulation value within a compact footprint. Smaller volume cabinets are constructed with VIP vacuum insulation panels to maintain a thin-wall profile with maximum interior temperature stability.



Simple and efficient access to your stored product enhances safety and comfort.

Opening the door or lid on an ultra-low temperature freezer is not an insignificant event. Because extreme inside/outside temperature differentials often exceed 116°C (212°F), careful planning is encouraged before accessing the interior.

To minimize the duration of the door opening, users should know the location of the stored product inside the freezer before accessing. Such best practices lead to better chamber uniformity, faster recovery of setpoint temperature and longer freezer life.

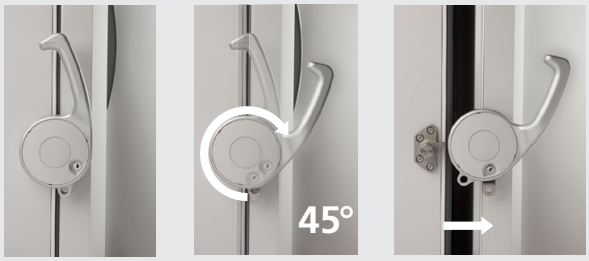
EZlatch

New and improved, the PHCbi EZlatch door handle spans an arc of 45 degrees in total movement for easy operation. Ergonomically designed for minimal effort and one-handed operation, the EZlatch includes a roller engage trigger with motion stopper to eliminate a false catch or over-torque. The EZlatch includes an integral key lock as well as a provision for a secondary padlock to restrict access.

EZlatch door handle

EZLATCH DOOR HANDLE

When opening, the handle gently pushes the door away from the face of the cabinet. When closing, it evenly draws the door to the cabinet face against the multi-point gaskets. Excess air trapped between the inner doors and outer door is displaced for enhanced frost reduction.



Standard on models MDF-DU502VH-PA, MDF-DU502VHA-PA, MDF-DU702VH-PA, MDF-DU702VHA-PA and MDF-DU901VHA-PA.

Frost Control, Upright Cabinets

The upright cabinet outer door is insulated and mounted on heavy duty oval fastened hinges to permit adjustment throughout the life of the freezer. The door incorporates a gentle, unobtrusive lift mechanism to resist sagging over time. When closed, the outer door design minimizes space between the outer door and inner doors, which diminishes trapped ambient air volume. This reduces ice buildup and nuisance vacuum which can complicate a quick additional door opening.

Frost Control, Chest Freezers

The chest freezer lid is insulated and attached to heavy-duty hinges supported by gas pistons. The hinges keep the lid in position when fully opened.

Hinges are mounted to the chest cabinet on flanges with oval holes to permit adjustment throughout the life of the freezer. Insulated sub-lids create additional protection against high ambient conditions.

Selected VIP ECO models feature a multi-point peripheral gasket, designed for field replacement without tools, while the freezer remains loaded and in operation.*

** Selected models only.*

- Insulated inner doors with gaskets minimize cold air loss during door openings and include positive latches to hold firmly against all compartments
- Multi-point door gaskets create micro air breaks around the face of the cabinet, restricting moisture migration into the cabinet and minimizing frost. Gasket composition withstands extreme relative temperature differentials ensuring a full peripheral door seal
- To minimize frost and protect the cabinet seal, all materials at the door/cabinet interface are engineered to minimize passive heat transmission from the outside to the inside and to reduce cold surfaces in contact with moist, ambient air
- Some heat output from the refrigeration system is diverted to the non-temperature conduction extrusion to resist mold and moisture accumulation, which can cause frost and ice buildup

Vacuum Relief

When the freezer is opened and closed, the temperature differential of cabinet air vs. ambient air creates a vacuum within the cabinet as the air cools and reduces volume. Although this vacuum is released slowly over time, immediate re-entry into the freezer requires a vacuum relief override to accelerate the process.

We use two vacuum relief processes, including a manually initiated relief, as well as a new automatic vacuum relief. Both simplify opening the door after a recent access. The manual vacuum port is conveniently located on the cabinet side wall.

The automatic vacuum relief is available on the following models and includes a supplemental manual vacuum relief port:

- VIP ECO Model MDF-DU502VH-PA
- VIP ECO Model MDF-DU502VHA-PA
- VIP ECO Model MDF-DU702VH-PA
- VIP ECO Model MDF-DU702VHA-PA

SPECIFICATIONS

VIP Series Upright -86°C

Model Number		MDF-U76VC-PA	MDF-U76VA-PA
External Dimensions (W × D × H) [1]	inches | mm	39.8 × 38.0 × 78.3 | 1010 × 966 × 1990	39.8 × 38.0 × 78.3 | 1010 × 966 × 1990
Internal Dimensions (W × D × H)	inches | mm	34.3 × 23.6 × 55.1 | 870 × 600 × 1400	34.3 × 23.6 × 55.1 | 870 × 600 × 1400
Volume	cu.ft. | liters	25.7 | 728	25.7 | 728
Net Weight	lbs | kg	805 | 365	805 | 365
Capacity (2" Boxes)	qty	576	576
Capacity (3" Boxes)	qty	384	384
Inventory Racks (2" Boxes)	qty	24	24
Inventory Racks (3" Boxes)	qty	24	24
Performance			
Warranty [2]		5 years parts and labor	5 years parts and labor
Cooling Performance [3]	°C	-86	-86
Temperature Setting Range [3]	°C	-50 to -90 in 1° increments	-50 to -90 in 1° increments
Temperature Control Range [3]	°C	-50 to -86 in 1° increments	-50 to -86 in 1° increments
Control			
Controller		Microprocessor, softkey data entry with display lockout	Microprocessor, softkey data entry with display lockout
Display		LED	LED
Temperature Sensor		Pt-1000	Pt-1000
Refrigeration			
Refrigeration System		Cascade	Cascade
Compressors	W	(1) 750 High-stage and (1) 1100 Low-stage	(1) 750 High-stage and (1) 1100 Low-stage
Refrigerant		CFC free R-404A and R-508B	CFC free R-404A and R-508B
Insulation Thickness, Material	inches | mm	2.8 | 70, foamed-in-place + VIP Plus vacuum insulated panels	2.8 | 70, foamed-in-place + VIP Plus vacuum insulated panels
Construction			
Exterior Material		Painted steel	Painted steel
Interior Material		Painted steel	Painted steel
Outer Door	qty	1 (key lock)	1 (key lock)
Inner Doors	qty	2 (insulated; ABS, with stainless steel frames, positive latches)	2 (insulated; ABS, with stainless steel frames, positive latches)
Shelves	qty	3 (adjustable)	3 (adjustable)
Shelf Dimensions (W × D)	inches | mm	33.4 × 21.0 | 848 × 533	33.4 × 21.0 | 848 × 533
Max. Load per Shelf	lbs | kg	110 | 50	110 | 50
Vacuum Release Port	qty	Standard	Standard
Manual Relief	qty	1: lower left side	1: lower left side
Access Ports [4]	qty	2: back wall and chamber floor	2: back wall and chamber floor
Access Port Diameter	inches | mm	0.6 | 17	0.6 | 17
Casters	qty	4 (2 leveling feet on front base)	4 (2 leveling feet on front base)
Alarms			
Power Failure		V-B-R	V-B-R
Temperature (High and Low)		V-B-R	V-B-R
Filter		V-B	V-B
Door Open		V-B	V-B
Remote Alarm Contacts		DC 30V 2A (normally open, normally closed, common)	DC 30V 2A (normally open, normally closed, common)
Electrical and Noise Level			
Power Supply		208V-230V, 1Ø, 60Hz, NEMA 6-15P, requires NEMA 6-15R receptacle	115V, 1Ø, 60Hz, NEMA 5-20P, requires NEMA 5-20R receptacle
Voltage Booster		Standard, automatic, built-in	Standard, automatic, built-in
Noise Level [5]	dB(A)	49	49
Options			
Inner Door Kit with 2 Smaller Doors [6]		MDF-7ID-PW; Max 2 kits per freezer	MDF-7ID-PW; Max 2 kits per freezer
Liquid CO_2 Back-up System		CKV-UB2I-PW	CKV-UB2I-PW
Temperature Recorder			
Circular Type	6", 7 day circular	MTRC954	MTRC954
Chart Paper	52 charts/box	C7100386REV	C7100386REV
Ink Pen	pack of 6	R252	R252
Optional Communication System			
Wireless, Cloud-Based, Automatic Data Management		LabAlert® Monitoring System	LabAlert® Monitoring System

[1] Exterior dimensions of main cabinet only, excluding handle and other external projections. Freezers are designed to fit through standard doorways of 38" (965 mm), stand-off brackets may be removed and reattached; removal not required for 40" (1016 mm) doorways.

[2] Current warranty offered at time of printing and may be subject to change; US and Canada only.

[3] Air temperature measured at freezer center, ambient temperature +30°C, no load.

[4] A chart recorder and a liquid CO_2 back-up system each occupy a separate access port.

[5] Nominal value, background noise 20dB(A).

[6] Installation of small inner door kit may affect usable storage capacity.

NEMA	Plug (P)	Receptacle (R)
5-20		
6-15		

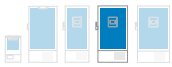
Model Number		MDF-C8V1-PA	MDF-DU502VH-PA	MDF-DU502VHA-PA
External Dimensions (W × D × H) [1]	inches | mm	21.7 × 27.0 × 37.2 | 550 × 685 × 945	31.1 × 34.7 × 78.5 | 790 × 882 × 1993	31.1 × 34.7 × 78.5 | 790 × 882 × 1993
Internal Dimensions (W × D × H)	inches | mm	15.9 × 19.3 × 16.7 | 405 × 490 × 425	24.8 × 23.6 × 55.1 | 630 × 600 × 1400	24.8 × 23.6 × 55.1 | 630 × 600 × 1400
Volume	cu.ft. | liters	3.0 | 84	18.6 | 528	18.6 | 528
Net Weight	lbs | kg	148 | 67	542 | 246	542 | 246
Capacity (2" Boxes)	qty	42	384	384
Capacity (3" Boxes)	qty	30	256	256
Inventory Racks (2" Boxes)	qty	6	16	16
Inventory Racks (3" Boxes)	qty	6	16	16
Performance				
Warranty [3]		5 years parts and labor	5 years parts and labor	5 years parts and labor
Cooling Performance [4]	°C	-80	-86	-86
Temperature Setting Range [4]	°C	-55 to -85 in 1° increments	-50 to -90 in 1° increments	-50 to -90 in 1° increments
Temperature Control Range [4]	°C	-60 to -80 in 1° increments	-50 to -86 in 1° increments	-50 to -86 in 1° increments
Control				
Controller		Microprocessor, softkey data entry with display lockout	Microprocessor, touchscreen data entry, password protected	Microprocessor, touchscreen data entry, password protected
Display		LED	LCD color touchscreen	LCD color touchscreen
Temperature Sensor		Pt-1000	Pt-1000	Pt-1000
Refrigeration				
Refrigeration System		Single compressor, auto-cascade	Synchronized variable speed cascade system	Synchronized variable speed cascade system
Compressors	qty	(1) 400	(2) 750, variable speed	(2) 750, variable speed
Refrigerant		CFC free mixed refrigerant	R-170 (ethane) R-290 (propane)	R-170 (ethane) R-290 (propane)
Insulation Thickness, Material	inches | mm	2.8 | 70, foamed-in-place + VIP vacuum insulated panels	3.1 | 80, rigid polyurethane foam (PUF) + VIP Plus vacuum insulated panels	3.1 | 80, rigid polyurethane foam (PUF) + VIP Plus vacuum insulated panels
Construction				
Exterior Material		Painted steel	Painted electrogalvanized steel	Painted electrogalvanized steel
Interior Material		Painted steel	Powder coated electrogalvanized steel	Powder coated electrogalvanized steel
Outer Door	qty	-	1 (key lock, with provision for optional pad lock)	1 (key lock, with provision for optional pad lock)
Inner Doors	qty	-	2 (insulated, ABS, with stainless steel frames, positive latches)	2 (insulated, ABS, with stainless steel frames, positive latches)
Shelves	qty	-	3 (adjustable)	3 (adjustable)
Shelf Dimensions (W × D)	inches | mm	-	24.2 × 21.0 | 615 × 534	24.2 × 21.0 | 615 × 534
Max. Load per Shelf	lbs | kg	-	110 | 50	110 | 50
Auto Vacuum Relief	qty	-	1: in door	1: in door
Manual Relief	qty	-	1: lower left side	1: lower left side
Access Ports [5]	qty	2: middle left back wall and right front chamber floor	3: upper back wall (back-up system), bottom left (recorder sensor), bottom right (access)	3: upper back wall (back-up system), bottom left (recorder sensor), bottom right (access)
Access Port Diameter	inches | mm	0.6 | 17	0.6 | 17	0.6 | 17
Casters	qty	4 (2 leveling feet on front base)	4 (2 leveling feet on front base)	4 (2 leveling feet on front base)
Alarms		(V = Visual Alarm, B = Buzzer Alarm, R = Remote Alarm)		
Power Failure		V-B-R	V-B-R	V-B-R
Temperature (High and Low)		V-B-R	V-B-R	V-B-R
Sensor Failure		-	V-B-R	V-B-R
Door Open		-	V-B	V-B
Battery Check		-	V	V
Fan Motor Check		-	V	V
Cooling Circuit Abnormality		-	V	V
Remote Alarm Contacts		DC 30V 2A (normally open, normally closed, common)	DC 30V 2A (normally open, normally closed, common)	DC 30V 2A (normally open, normally closed, common)
Electrical and Noise Level				
Power Supply		115V, 1Ø, NEMA 5-15P, requires NEMA 5-15R receptacle	220V, 1Ø, 60Hz, NEMA 6-15P, requires NEMA 6-15R receptacle	115V, 1Ø, 60Hz, NEMA 5-20P, requires NEMA 5-20R receptacle
Voltage Booster		Standard, automatic, built-in	N/A	N/A
Noise Level [6]	dB(A)	47	46	46
Options				
Inner Door Kit with Option of 4 or 5 Inner Doors		-	MDF-5ID4-PW (4 inner doors) MDF-5ID5-PW (5 inner doors)	MDF-5ID4-PW (4 inner doors) MDF-5ID5-PW (5 inner doors)
Liquid CO_2 Back-Up System		CVK-UB4I	MDF-UB7-PW	MDF-UB7-PW
Temperature Recorder				
Circular Type	6", 7 day	MTRC954	MTRC954	MTRC954
Chart Paper	52 charts/box	C7100386REV	C7100386REV	C7100386REV
Ink Pen	pack of 6	R252	R252	R252
Optional Communication System				
Wireless, Cloud-Based, Automatic Data Management		LabAlert® Monitoring System	LabAlert® Monitoring System	LabAlert® Monitoring System

[1] Exterior dimensions of cabinet excluding handle, rear stand-off brackets and other external projections.
[2] Consult product web page for doorway entry instructions, less than 36.8": www.phchd.com/us/biomedical/preservation/ultra-low-freezers/mdf-du702vhpa.
[3] Current warranty offered at time of printing and may be subject to change; US and Canada only.
[4] Air temperature measured at freezer center, ambient temperature +30°C, no load.
[5] A chart recorder and a liquid CO_2 back-up system each occupy a separate access port.
[6] Nominal value, background noise 20dB(A).

NEMA	Plug (P)	Receptacle (R)
5-20		
6-15		

SPECIFICATIONS

VIP ECO Upright -86°C, Natural Refrigerant Series



Model Number		MDF-DU702VH-PA	MDF-DU702VHA-PA
External Dimensions (W × D × H) [1]	inches | mm	40.6 × 36.8 × 78.5 | 1030 × 935 × 1993 [2]	40.6 × 36.8 × 78.5 | 1030 × 935 × 1993
Internal Dimensions (W × D × H)	inches | mm	34.3 × 23.6 × 55.1 | 870 × 600 × 1400	34.3 × 23.6 × 55.1 | 870 × 600 × 1400
Volume	cu.ft. | liters	25.7 | 729	25.7 | 729
Net Weight	lbs | kg	613 | 278	613 | 278
Capacity (2" Boxes)	qty	576	576
Capacity (3" Boxes)	qty	384	384
Inventory Racks (2" Boxes)	qty	24	24
Inventory Racks (3" Boxes)	qty	24	24
Performance			
Warranty [3]		5 years parts and labor	5 years parts and labor
Cooling Performance [4]	°C	-86	-86
Temperature Setting Range [4]	°C	-50 to -90 in 1° increments	-50 to -90 in 1° increments
Temperature Control Range [4]	°C	-50 to -86 in 1° increments	50 to -86 in 1° increments
Control			
Controller		Microprocessor, touchscreen data entry, password protected	Microprocessor, touchscreen data entry, password protected
Display		LCD color touchscreen	LCD color touchscreen
Temperature Sensor		Pt-1000	Pt-1000
Refrigeration			
Refrigeration System		Synchronized variable speed cascade system	Synchronized variable speed cascade system
Compressors	qty	(2) 750, variable speed	(2) 750, variable speed
Refrigerant		R-170 (ethane) R-290 (propane)	R-170 (ethane) R-290 (propane)
Insulation Thickness, Material	inches | mm	3.1 | 80, rigid polyurethane foam (PUF) + VIP Plus vacuum insulated panels	3.1 | 80, rigid polyurethane foam (PUF) + VIP Plus vacuum insulated panels
Construction			
Exterior Material		Painted electrogalvanized steel	Painted electrogalvanized steel
Interior Material		Powder coated electrogalvanized steel	Powder coated electrogalvanized steel
Outer Door	qty	1 (key lock, with provision for optional pad lock)	1 (key lock, with provision for optional pad lock)
Inner Doors	qty	2 (insulated, ABS, with stainless steel frames, positive latches)	2 (insulated, ABS, with stainless steel frames, positive latches)
Shelves	qty	3 (adjustable)	3 (adjustable)
Shelf Dimensions (W × D)	inches | mm	33.6 × 21.0 | 855 × 534	33.6 × 21.0 | 855 × 534
Max. Load per Shelf	lbs | kg	110 | 50	110 | 50
Auto Vacuum Relief	qty	1: in door	1: in door
Manual Relief	qty	1: lower left side	1: lower left side
Access Ports [5]	qty	3: upper back wall (back-up system), bottom left (recorder sensor), bottom right (access)	3: upper back wall (back-up system), bottom left (recorder sensor), bottom right (access)
Access Port Diameter	inches | mm	0.6 | 17	0.6 | 17
Casters	qty	4 (2 leveling feet on front base)	4 (2 leveling feet on front base)
Alarms			
Power Failure		V-B-R	V-B-R
Temperature (High and Low)		V-B-R	V-B-R
Sensor Failure		V-B-R	V-B-R
Door Open		V-B	V-B
Battery Check		V	V
Fan Motor Check		V	V
Cooling Circuit Abnormality		V	V
Remote Alarm Contacts		DC 30V 2A (normally open, normally closed, common)	DC 30V 2A (normally open, normally closed, common)
Electrical and Noise Level			
Power Supply		220V, 1Ø, 60Hz, NEMA 6-15P, requires NEMA 6-15R receptacle	115V, 1Ø, 60Hz, NEMA 5-20P, requires NEMA 5-20R receptacle
Voltage Booster		N/A	N/A
Noise Level [6]	dB(A)	46	46
Options			
Inner Door Kit with Option of 4 or 5 Inner Doors		MDF-7ID4-PW (4 inner doors) MDF-7ID5-PW (5 inner doors)	MDF-7ID4-PW (4 inner doors) MDF-7ID5-PW (5 inner doors)
Liquid CO_2 Back-Up System		MDF-UB7-PW	MDF-UB7-PW
Temperature Recorder			
Circular Type	6", 7 day	MTRC954	MTRC954
Chart Paper	52 charts/box	C7100386REV	C7100386REV
Ink Pen	pack of 6	R252	R252
Optional Communication System			
Wireless, Cloud-Based, Automatic Data Management		LabAlert® Monitoring System	LabAlert® Monitoring System

[1] Exterior dimensions of cabinet excluding handle, rear stand-off brackets and other external projections.
[2] Consult product web page for doorway entry instructions, less than 36.8": www.phchd.com/us/biomedical/preservation/ultra-low-freezers/mdf-du702vhpa.
[3] Current warranty offered at time of printing and may be subject to change; US and Canada only.
[4] Air temperature measured at freezer center, ambient temperature +30°C, no load.
[5] A chart recorder and a liquid CO_2 back-up system each occupy a separate access port.
[6] Nominal value, background noise 20dB(A).

NEMA	Plug (P)	Receptacle (R)
5-20		
6-15		

Model Number		MDF-DU901VHA-PA
External Dimensions (W × D × H) [1]	inches | mm	45.3 × 34.3 × 78.5 | 1150 × 870 × 1993
Internal Dimensions (W × D × H)	inches | mm	39.8 × 23.6 × 55.1 | 1010 × 600 × 1400
Volume	cu.ft. | liters	29.8 | 845
Net Weight	lbs | kg	723 | 328
Capacity (2" Boxes)	qty	672
Capacity (3" Boxes)	qty	448
Inventory Racks (2" Boxes)	qty	28
Inventory Racks (3" Boxes)	qty	28
Performance		
Warranty [2]		5 years parts and labor
Cooling Performance [3]	°C	-86
Temperature Setting Range [3]	°C	-50 to -90 in 1° increments
Temperature Control Range [3]	°C	-50 to -86 in 1° increments
Control		
Controller		Microprocessor, touchscreen data entry, password protected
Display		LCD color touchscreen
Temperature Sensor		Pt-1000
Refrigeration		
Refrigeration System		Synchronized variable speed cascade system
Compressors	W	(2) 1000, variable speed
Refrigerant		High-stage R-290 natural refrigerant Low-stage R-170 natural refrigerant
Insulation Thickness, Material	inches | mm	3.1 | 78, rigid polyurethane foam (PUF) + VIP Plus vacuum insulated panels
Construction		
Exterior Material		Painted electrogalvanized steel
Interior Material		Powder coated electrogalvanized steel
Outer Door	qty	1 (key lock with provision for optional padlock)
Inner Doors	qty	2 (insulated, ABS, stainless steel frames, positive latches)
Shelves	qty	3 (adjustable)
Shelf Dimensions (W × D)	inches | mm	38.9 × 20.9 | 988 × 533
Max. Load per Shelf	lbs | kg	110 | 50
Max. Load - Total Freezer	lbs | kg	1266 | 414.4
Manual Vacuum Relief	qty	1: lower left side
Access Ports	qty	2: back wall and chamber floor
Access Port Diameter	inches | mm	0.6 | 17
Casters	qty	4 (2 leveling feet on front base)
Alarms		(V = Visual Alarm, B = Buzzer Alarm, R = Remote Alarm)
Power Failure		V-B-R
Temperature (High and Low)		V-B-R
Sensor Failure		V-B-R
Door Open		V-B
Battery Check		V
Remote Alarm Contacts		DC 30V 2A (normally open, normally closed, common)
Electrical and Noise Level		
Power Supply		115V, 1Ø, NEMA 5-20P, requires NEMA 5-20R receptacle
Noise Level [4]	dB(A)	52
Options		
Inner Door Kit with 4 Smaller Doors [5]		MDF-9ID-PW
Liquid CO_2 Back-Up System		MDF-UB7-PW
Liquid Nitrogen Back-Up System		MDF-UB7-PW-LN2
Temperature Recorder		
Circular Type	6", 7 day circular	MTRC954
Chart Paper	52 charts per box	C7100386REV
Ink Pen	pack of 6	R252
Optional Communication System		
Wireless, Cloud-Based, Automatic Data Management		LabAlert® Monitoring System

[1] Exterior dimensions of cabinet excluding handle, rear stand-off brackets and other external projections.
Consult product web page for doorway entry instructions, less than 36":
www.phchd.com/us/biomedical/preservation/ultra-low-freezers/mdf-du901vhapa.

[2] Current warranty offered at time of printing and may be subject to change; US and Canada only.

[3] Air temperature measured at freezer center, ambient temperature +30°C, no load.

[4] Nominal value, background noise 20 dB(A).

[5] Installation of small inner door kit may affect usable storage capacity.

ACCESSORIES

A comprehensive list of inventory systems, temperature recorders, CO_2 back-up systems and other accessories are available. Contact PHC Corporation of North America for details.

Maximum Daily Energy Consumption (MDEC)

VIP ECO Model	MDEC (kWh/cu.ft.)	ENERGY STAR Certification
MDF-DU502VH-PA	**0.35**	4788321237
MDF-DU502VHA-PA	**0.37**	4788723268
MDF-DU702VH-PA	**0.31**	4787624502
MDF-DU702VHA-PA	**0.29**	4788723268
MDF-DU901VHA-PA	**0.30**	4789267856

SERVICES

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

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

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

LABALERT MONITORING

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

ADDITIONAL PRODUCTS

Complementary product lines under the PHCbi brand include the space saving and energy efficient VIP® ECO and TwinGuard®ultra-low temperature freezers, cryogenic and biomedical freezers, pharmacy and high performance refrigerators, cell culture CO_2 and multigas incubators, programmable heated and refrigerated microbiological incubators, Class II, Type A2 biological safety cabinets, portable autoclaves, cell processing work stations and Drosophila/Plant Growth Chambers.

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

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

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PHC Corporation of North America
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