



## INNOVATIVE CRYOPRESERVATION SOLUTIONS

### Model Ranges:

- Cryogenic Freezers
- Isothermal LN<sub>2</sub> freezers
- Isothermal carousel
- Standard LN<sub>2</sub> freezers
- 2101 Controlled rate freezer
- Cryosystems

The most uniform storage temperatures from a range of cryopreservation solutions. The advanced technologies within our Cryogenic freezers and liquid nitrogen storage systems offer unparalleled safety and reliability for optimum sample viability.



**PHCbi  
Cryopreservation  
Solutions offer:**

Precise  
uniformity

Temperature  
stability

Sample  
safety

Energy  
savings

Alarms &  
monitoring

Low operational  
costs

Service and  
support

# Solutions for stable long-term preservation of cells and tissues

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# Find the right cryopreservation



## Cryogenic Freezer

MDF-C2156VAN-PE  
-150°C ULT Freezers



## Cryogenic Freezers

MDF-1156-PE  
-152°C ULT Freezers



## Isothermal LN<sub>2</sub> freezers

-190°C Cryogenic Freezers

### Maximum storage capacity with optimum uniformity

- No cross contamination.
- Safe and convenient usability.
- Specially designed cascade refrigeration system.
- Standard LN<sub>2</sub> back-up.
- Low operational costs.
- Convenient control with LCD panel.
- VIP PLUS insulation: technology that maximises storage capacity.

### The most uniform storage temperatures for cryopreservation solutions

- No cross contamination.
- Safe and convenient usability.
- Specially designed cascade refrigeration system.
- Low operational costs.

### Significantly reduced risk of cross-contamination with dry storage

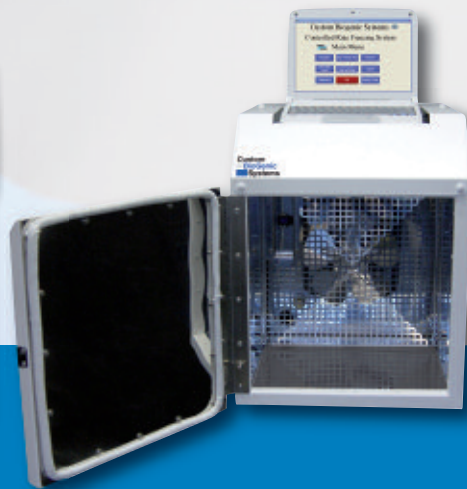
- Unique patented liquid nitrogen jacket allows for no liquid in sample storage space and improves user safety.
- Superior temperature uniformity.
- No risk of cross-contamination through liquid nitrogen contact.

# equipment for your needs



## Standard LN<sub>2</sub> freezers

-190°C Cryogenic Freezers



## 2101 Controlled rate freezer

28 litres



## Cryosystems - Liquid nitrogen storage

### Temperature, storage and security specifications required by laboratories

- Available ranging in sizes from 90 litres to 720 litres.
- Sample storage capacities up to 40,000 2 ml vials.
- An extensive selection of standard inventory racks.
- Freezers include the 2301 controller.

### The highest standards for the programmed freezing of biological samples

- 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.

### Cryosystems provide low cost sample storage at cryogenic temperatures

- 'XC', 'Classic' and 'Value Added' series fulfil a wide range of storage requirements.
- Capacities from 210 to 6,000 2ml vials.
- Advanced vacuum and insulation for maximum thermal performance.
- Storage solutions for vials and straws.

# 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  $-130^{\circ}\text{C}$ , the temperature at which frozen water no longer sublimates and recrystallizes. Therefore  $-150^{\circ}\text{C}$  mechanical freezers or liquid nitrogen storage tanks are required for long-term preservation.

In the late 19<sup>th</sup> century Sir James Dewar, a Scottish chemist and physicist, designed a vacuum jacketed vessel capable of effectively storing liquid gases, such as nitrogen, for long periods of time. This type of vessel is still being used today. For years cryopreservation in liquid nitrogen at  $-196^{\circ}\text{C}$  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  $-150^{\circ}\text{C}$  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.

## Liquid nitrogen storage or dry storage?

### 19<sup>th</sup> century

**Insulated vessels are first used for the storage and transport of liquid nitrogen**

Cross contamination became a real risk with this kind of preservation. Not only through existing ice, but from sample to sample as well.

**Storage in vapour phase became more popular**

Temperature highly dependent on liquid nitrogen levels. Large vertical temperature gradients.

### Dry storage system

No cross contamination risk through  $\text{LN}_2$ .  
No large vertical temperature gradients.

**Solution: Isothermals or Cryogenic Freezers**

# Cryogenic ULT -150°C 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 -152°C 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, **Cryogenic** -150°C 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 **Cryogenic** -150°C freezers. The cascade refrigeration system incorporating compressors that are specifically designed for ultra-low temperature applications offers enhanced reliability and increased sample security. With a powerful low noise design afforded by traditional ultra-low temperature technology, this freezer delivers durable, stable cooling.



Model: MDF-C2156VAN-PE

Model: MDF-1156-PE

## -150°C Cryogenic 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.

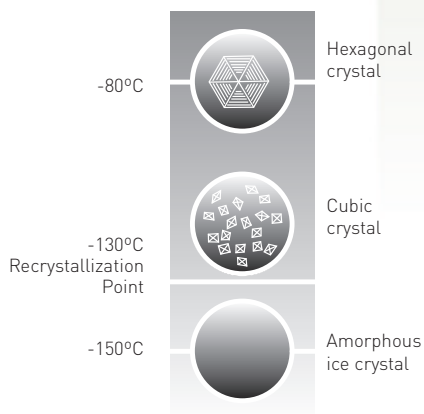
# MDF-C2156VAN Cryogenic Freezer

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



Model: MDF-C2156VAN-PE

## Recrystallization mechanism

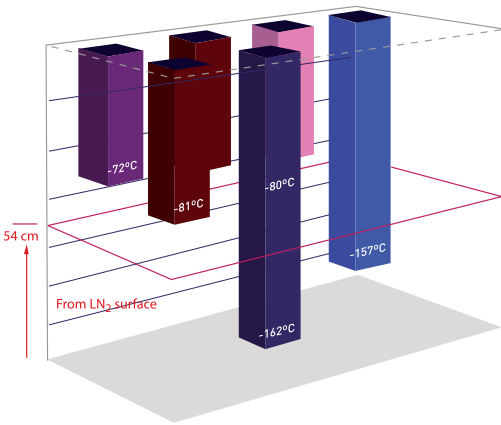


## CRYOGENIC FREEZERS PROVIDE SAMPLE STABILITY

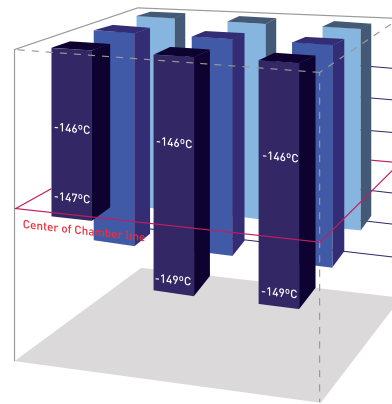
A uniformity of  $\pm 5^{\circ}\text{C}$  in our mechanically refrigerated Cryogenic Freezers is far superior to the top-to-bottom temperature uniformity provided by liquid nitrogen vapour phase storage, without the concern of cross-contamination often associated with liquid nitrogen (liquid phase storage).



## Liquid Nitrogen freezer (Traditional vapour phase)



## MDF-C2156VAN mechanically refrigerated Cryogenic Freezer



Comparison of temperature distribution in a liquid nitrogen freezer (vapour phase) and our MDF-C2156VAN mechanically refrigerated Cryogenic 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 -130°C, while temperature in the LN<sub>2</sub> vapour system is dependent on storage location.

## ULTRA-LOW -150°C FREEZER WITH VIP PLUS INSULATION

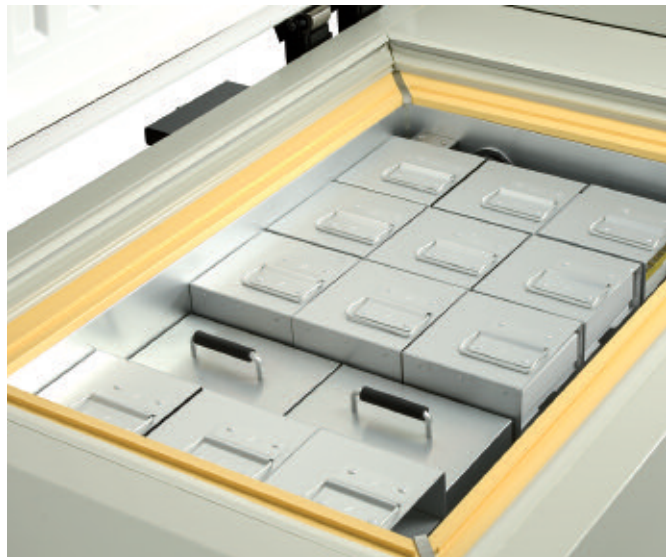
Cryogenic Freezers with VIP PLUS vacuum insulation provide up to 30% more storage capacity than a conventionally insulated freezer, without increasing the footprint. A glass fibre core provides advanced thermal properties. This results in a large capacity -150°C freezer for storage of up to 150 world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



# MDF-1156 Cryogenic Freezers

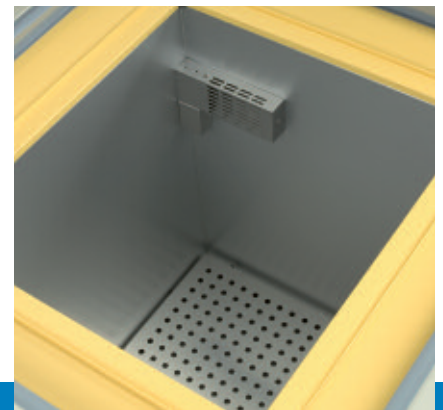
## MICROPROCESSOR CONTROL WITH LED DIGITAL DISPLAY

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.



Model: MDF-1156-PE

# 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  $-190^{\circ}\text{C}$  range, free from liquid nitrogen contact.

In the year 2000 Custom Biogenic Systems patented the first  $-190^{\circ}\text{C}$  dry storage system. This new storage system uses the same vacuum insulated vessel as conventional  $\text{LN}_2$  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  $-190^{\circ}\text{C}$  range without the large vertical temperature gradients found in traditional vapour phase  $\text{LN}_2$  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.

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



Model: V-3000AB

Model: V-5000AB



The innovative design of CBS Isothermal freezers eliminates a number of major risks of traditional LN<sub>2</sub> 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.
- **Health and safety:** Traditional storage in liquid nitrogen exposes users to direct contact with LN<sub>2</sub> 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.

## SAMPLE STORAGE

A wide selection of inventory systems for vials and bags are available to complete the system and optimize sample storage.



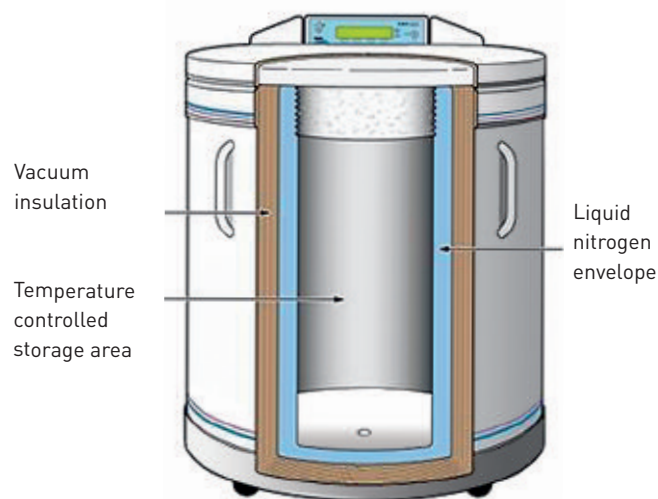
Standard square rack configuration V-1500AB

## 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 -190°C 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 -190°C 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.

# 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.



## KEY ADVANTAGES

- 1) Dry storage freezer.
- 2) Unique patented liquid nitrogen jacket allows for no liquid in sample storage space and improves user safety.
- 3) Superior temperature uniformity.
- 4) No risk of cross-contamination through liquid nitrogen contact.
- 5) Manufactured to ISO 13485 standards.



Model: V-1500AB

Model: V-5000ABEH

# 2301 Controller

## Features

- Compatible with all on site automated LN<sub>2</sub> supply systems.
- Available on all standard and Isothermal LN<sub>2</sub> freezers.
- Programming of LN<sub>2</sub> auto-fill levels and cycles.
- Sequential filling capabilities, one-fill-all-fill.
- Warm gas by-pass.
- Output data to PC / printer (USB port and printer port).
- RS-485 communication port.

- Cryomonitor software for freezer function and alarm download.
- System validation with print out.
- Key pad lock.
- Lid lock.

## Front panel display

- System status display.
- Liquid level inches / centimeters.
- Two level temperature display; at lid and inside storage space.
- System status start / stop fill.

## Alarms

- Visual, audible and remote.
- High and low LN<sub>2</sub> levels in jacket.
- Temperature deviation.
- Sensor and valve abnormality.
- LN<sub>2</sub> source / supply.
- Remote alarm contact.
- Overflow sensor/alarm (optional).

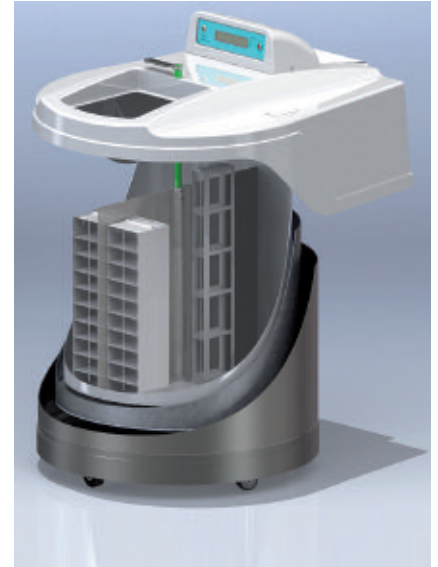


# Isothermal carousel

## Easy access to samples from the front of the freezer

The Isothermal carousel liquid nitrogen vapour storage system combines the innovative  $-190^{\circ}\text{C}$  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.



- No need to remove one rack to retrieve another rack.
- No unnecessary exposure to room temperatures.
- Carousel is rotated from the outside of the freezer eliminating the risk of injury or temperature fluctuations.
- Exceptional temperature uniformity.
- Easy access to samples from the front of the freezer.
- Removable console allows for complete access to the sample storage space if necessary.
- CBS Isothermal carousel freezers are cooled by a patented liquid nitrogen jacket, with no liquid in the sample storage space.
- No risk of cross-contamination through liquid nitrogen contact.
- No need for special packaging for vials.
- The isothermal design also provides added user-safety eliminating contact or splashing of liquid nitrogen.
- Manufactured to ISO 13485 standards.

# Standard LN<sub>2</sub> freezers

Standard liquid nitrogen freezers are designed to meet temperature, storage and security specifications required by laboratories storing frozen samples at cryogenic temperatures.

Five liquid nitrogen freezers are available ranging in sizes from 90 litres to 720 litres, with sample storage capacities up to 40,000 2 ml vials or over 3,500 blood bags. Each unit includes a liquid level auto-fill and alarm system to provide security, ease of operation, plus flexibility to operate as vapour storage, immersion

storage or a combination of both to store any type or size of sample. An extensive selection of standard inventory racks or canisters and frames are available to complete the system. Custom configurations can also be designed to fit any requirements.



Model: S-90AB

Model: S-5000ABEH



Model: S-1500AB



Model: S-3000AB



Standard square rack configuration S-1500AB



# 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:

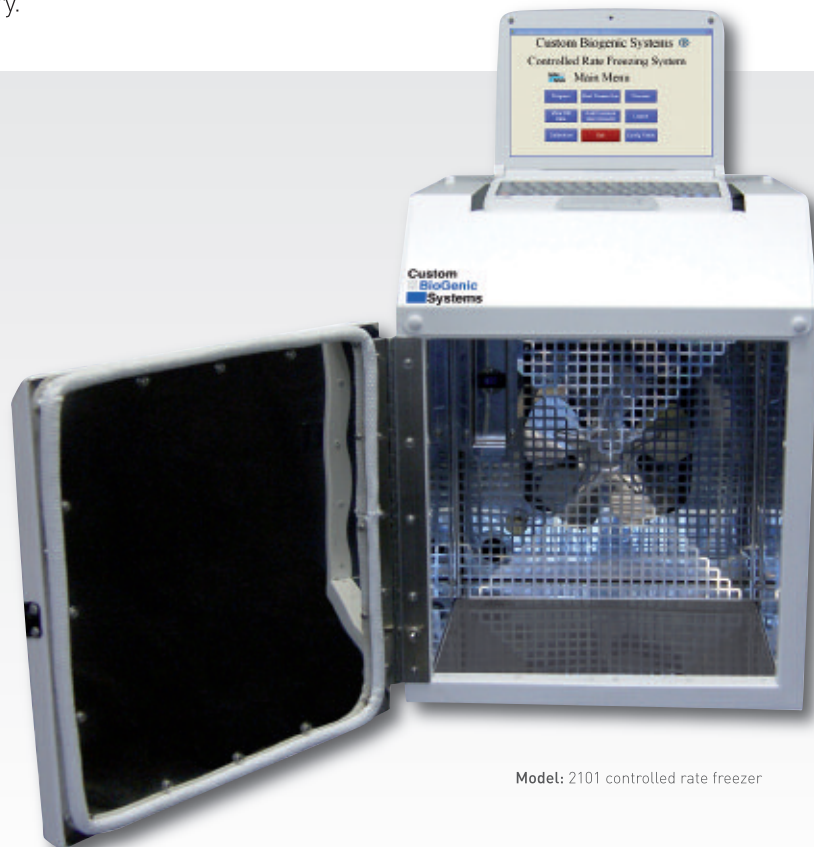
- Unlimited programming capability.
- Multi-colour graph for sample, chamber and program temperature.
- Sample or chamber temperature set-point control.
- Continuous control status indication.
- Programs and freeze data saved to hard drive or disc.
- Password protected software.
- Selectable password 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<sub>2</sub> 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

# Cryosystems - Liquid nitrogen storage

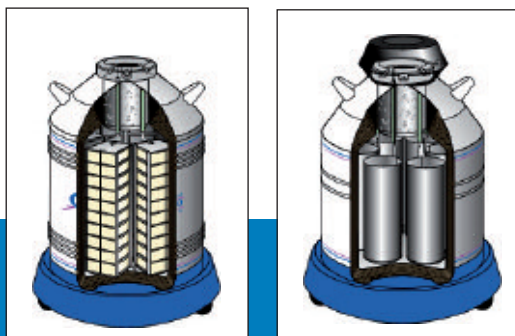
Manual-fill cryosystems provide versatile, low cost sample storage at cryogenic temperatures with maximum capacity and low liquid nitrogen consumption.

- XC', 'Classic' and 'Value Added' series fulfil a wide range of storage requirements.
- Capacities from 210 to 6,000 2ml vials.
- Advanced vacuum and insulation for maximum thermal performance.
- Durable, lightweight aluminium construction and roller bases for easy mobility.
- Storage solutions for vials and straws.
- Easy access to store and retrieve samples.
- Sample security with low-level alarm and lockable lids (padlock not supplied.)

**XC' series** – Compact cryosystems for vial or straw storage. With roller base and handle mounted low level alarm.

**'Classic' series** – Medium capacity storage for vials in standard cryogenic boxes. With roller base and handle mounted low level alarm.

**'Value Added' series** – Same as 'Classic' series but with the low level alarm built into a lid console.



Model: Value Added 2001



Model:  
Value Added 4002

## Vapour shippers

Vapour shippers are designed for the safe transportation of biological samples at cryogenic temperatures.

Manufactured from durable, lightweight aluminum, the shippers contain a compound which absorbs the liquid nitrogen to ensure dry, spill-free vapour-phase shipping. The absorbent also repels moisture and humidity, assuring the maximum holding time.

A protective shipping carton is available for all models which protects the container from being placed on its side and helps in withstanding the rigors of transportation. These containers can be used to ship your samples with a "non-hazardous" classification throughout the world.

# Lab-Tanks

The LAB series dewars use high efficiency super-insulation and aluminum construction to make them lightweight and the most efficient containers available. Their shape and handles make them easy to lift and pour. The LAB series dewars can also be fitted with pouring spouts, withdrawal devices, or dippers to aid in liquid nitrogen transfer.



The CF-9511 transport container is a high-quality unit, primarily for use in moving samples over shorter distances, such as from one lab to another.



Model: CS 4/3V



Model: DS-3

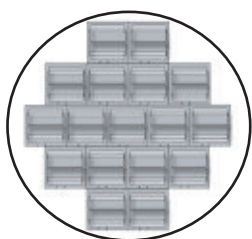


# Rack configurations

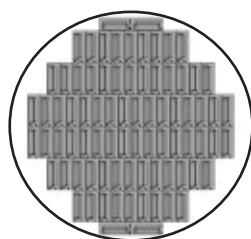
Organizing the space in your freezer can help you to make your work more efficient. Good sample management can result in both cost and time savings. By choosing the right racks, not only will efficiency be increased, but the risk of sample degradation due to exposure to ambient temperatures will be significantly 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 is a chest freezer or even a liquid Nitrogen freezer, an organized freezer will provide you with:

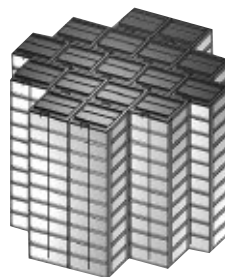
- Time efficiency because you can locate, retrieve and replace your samples easily and quickly.
- Cost efficiency because organized samples and cell lines might reduce the number of freezers.
- Safety because your samples are better protected.



Standard square rack configuration 3000AB



Vertical rack configuration 5000AB



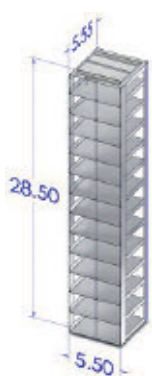
3101A-100S

## 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.

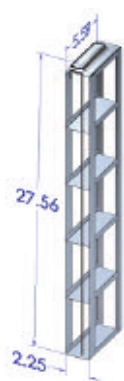


### Standard square racks



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

### Vertical racks



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

### Vertical racks for ULT -150 Freezers



MDF-1156-PE	NIR-209C	Aluminium rack system (cardboard boxes and dividers are optional) compromises 9 racks x 9 boxes high. Cap. 8.100 2ml. vials.
	TE-NIR-210COM	Stainless steel rack system (cardboard boxes and divider are optional) comprises 9 racks x 10 boxes high. Cap. 9000 2ml. vials.
MDF-C2156VAN-PE	NIR-210C	Aluminium rack system (cardboard boxes and dividers are optional) compromises 15 racks x 10 boxes high. Cap. 15.000 2ml. vials.
	TE-NIR-211COM	Stainless steel rack system (cardboard boxes and divider are optional) comprises 15 racks x 11 boxes high. Cap. 16,500 2ml. vials.

# Accessories for Isothermals, LN<sub>2</sub> freezers & cryosystems

## 1. 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. An additional stay-dry lining keeps you warm and comfortable. Cryogenic gloves protect your hands and arms when working in hazardous, ultra-cold environments. An essential feature when function is important and safety is critical. Styles include: shoulder, elbow, mid-arm, and wrist US sizes: small, medium, large, extra-large EN sizes: 8, 9, 10, 11.

## 2. "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.
- Overall length approximately 11".

## 3. "Y" Valve

- 2 Male 1/2" NPT brass fittings.
- 1 Female 1/2" NPT stainless steel flared fitting.
- Overall length approximately 6".

## 4. LN<sub>2</sub> Phase separator

Designed to minimize hazardous splashing and vapourization, phase separators are available to use when transferring liquids into various open containers.

## 5. LN<sub>2</sub> Level stick

- 1/2 Centimeter and 1/4 inch increments.
- Can withstand temperatures up to -190°C.
- Measures up to 36"(92cm).

## 6. LN<sub>2</sub> 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).

## 7. Cardboard sleeves

- 5 and 6 place sleeves for standard 2ml cane.
- Cardboard construction.

## 8. Roller base

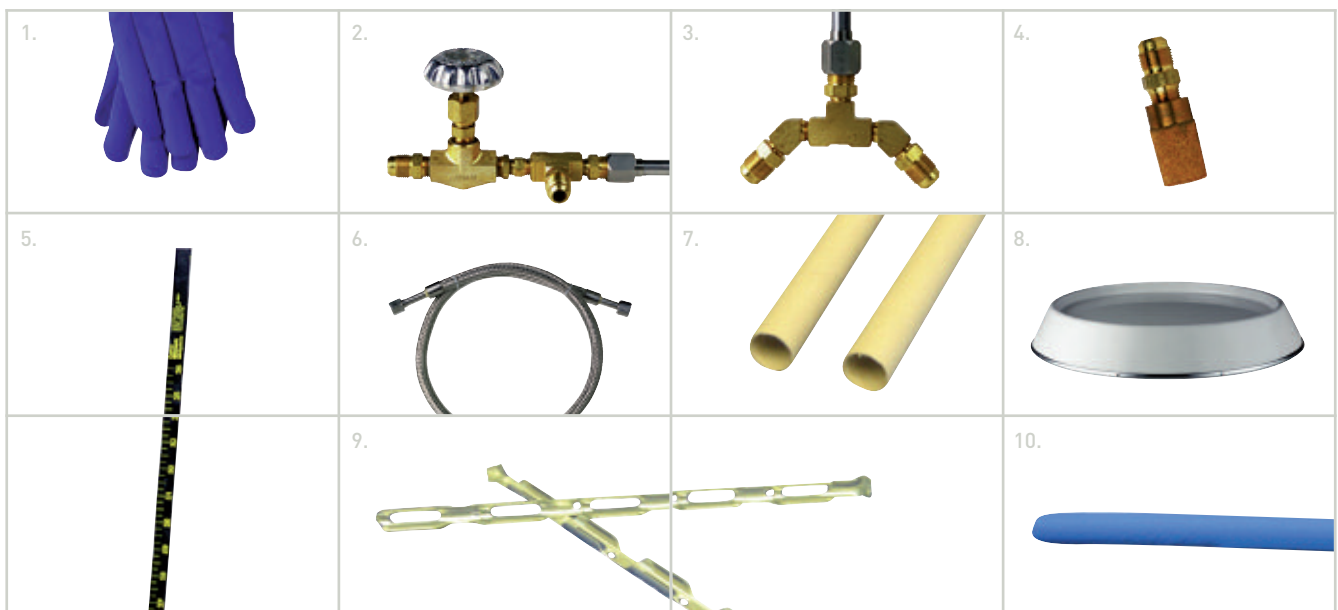
Cryosystem roller bases. Reinforced fiberglass construction with casters. 5 configurations available: 15" (magenta), 18" (blue), 18" (white, heavy duty), 20" (magenta), 22" (blue), 26" (blue)

## 9. Canes

- 2ml cane.
- 5 and 6 place vial canes.
- Lightweight aluminum construction.
- Overall length approximately 11.5" (6 place cane).

## 10. Hose covers

- Water resistant fabric 4', 6' lengths are available.



## Select your Cryopreservation solution

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

x<sup>1</sup> Only when the LN<sub>2</sub> level in the tank is maintained at the specified required level

# SPECIFICATIONS CRYOGENIC FREEZERS

Cryogenic Freezers			
Model Number		MDF-1156-PE	MDF-C2156VAN-PE
<b>Dimensions</b>			
External dimensions (WxDxH) <sup>1)</sup>	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
<b>Performance</b>			
Cooling performance <sup>2)</sup>	°C	-152	-150
Temperature setting range	°C	-125 ~ -155	-125 ~ -152
Temperature control range <sup>2)</sup>	°C	-130 ~ -152	-125 ~ -150
<b>Control</b>			
Controller		Microprocessor, non-volatile memory	Microprocessor non-volatile memory
Display		LED	LCD
Temperature sensor		Pt-100	Pt-1000
<b>Refrigeration</b>			
Refrigeration system		Cascade	Cascade with auto-cascade low-stage
High-stage compressor	W	1100	1100
High-stage refrigerant		HFC	HFC
Low-stage compressor	W	1100	1100
Low-stage refrigerant		HFC mixed	HFC mixed
Insulation material		PUF	PUF / VIP PLUS
Insulation thickness	mm	175	135
<b>Construction</b>			
Exterior material		Painted steel	Painted steel
Interior material		Aluminium	Aluminium
Outer door lock		Y	Y
Inner door/lid	qty	1	2
Max. load - total	kg	300	207
Access port	qty	1	1
- position		Left	Right
- diameter	Ø mm	40	40
Casters	qty	6 (2 levelling feet)	6 (3 levelling feet)
<b>Alarms</b> (R = Remote Alarm, V = Visual Alarm, B = Buzzer Alarm)			
Power failure		V-B-R	V-B-R
High temperature		V-B-R	V-B-R
Low temperature		-	V-B-R
Filter		V-B	V-B
Door open		-	V-B
<b>Electrical and Noise Level</b>			
Power Supply		230V 50Hz single phase	230V 50Hz single phase
Noise Level <sup>3)</sup>	dB(A)	61	51
<b>Options</b>			
Liquid CO <sub>2</sub> back-up		CVK-AT2-PW <sup>4,5)</sup>	-
Liquid N <sub>2</sub> back-up		CVK-ATN2-PW <sup>4)</sup>	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

1) Exterior dimensions of main cabinet only, excluding handle and other external projections  
- See dimensions drawings on website for full details

2) Air temperature measured at freezer centre, ambient temperature +30°C, no load

3) Nominal value. Background noise 20dB

4) Temperature recorder MTR-155H-PW provided with back-up system

5) CVK-A-PW may also be used



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
<b>Dimensions</b>						
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 1371 x 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
<b>Maximum capacity</b>						
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

Isothermal Carousel

Model Number		V-3000AB/C	V-3000ABEH/C	V-5000AB/C	V-5000ABEH/C
Liquid nitrogen capacity	litres	70	89	93	140
<b>Dimensions</b>					
External dimensions (WxDxH)	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
<b>Maximum capacity</b>					
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

# SPECIFICATIONS CRYOGENIC FREEZERS

Standard LN <sub>2</sub> Freezers						
Model Number		S-90AB	S-1500AB	S-3000AB	S-5000AB	S-5000ABEH
Liquid nitrogen capacity	litres	90	145	345	615	720
<b>Dimensions</b>						
External dimensions (W x D x H)	mm	457 x 457 x 965	558 x 787 x 1041	863 x 1092 x 1066	1117 x 1320 x 1219	1117 x 1320 x 1397
Usable interior height	mm	711	736	736	736	863
Usable interior diameter	mm	406	508	787	1016	1016
Weight empty	kg	36	70	159	227	245
Weight full	kg	109	188	438	724	827
<b>Maximum capacity</b>						
Max. vial capacity (2ml)**	qty	5832	9100	22100	40300	46500
Max. blood bag capacity (50ml)**	qty	266	434	1120	1932	2208

\*\* Capacity is subject to rack type

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	<b>Construction</b>	
Capacity	1.2-2ml vials	650	Exterior Material	Powder coated stainless steel
	4-5ml vials	390	Interior Material	Stainless steel
	bag canisters	10 - 20	Max. load - total	kg 20
canes	130	<b>Electrical and Noise Level</b>		
<b>Performance</b>			Power Supply	V 230
Programmable Temperature Range	°C	+50 to -180	Frequency	Hz 50
Programmable Cooling Rate Range	°C / min	0.01 to 99.9	Noise Level	dB [A] <66

Liquid Nitrogen Storage										
Model Number		Classic 2002	Classic 4002	Classic 6002	Value added 2001	Value added 4001	Value added 6001	XC Series 20/20	XC Series 34/18	XC Series 47/11
Liquid nitrogen capacity	litres	61	121	175	61	121	175	20.5	34.8	47.4
Static evaporation rate	ltr/day	0.85	0.99	0.99	0.85	0.99	0.99	0.09	0.18	0.39
Static holding time	days	38	70	104	38	70	104	140	123	76
Working volume	kg	51	111	165	51	111	165			
Weight empty	kg	26.3	36.7	46.7	26.3	36.7	46.7	11.8	15.4	16.4
Weight full		82.5	136	193	82.5	136	193	28.3	43.5	54.6
<b>Dimensions</b>										
Neck opening	mm	216	216	216	216	216	216	55.4	89	127
Overall height	mm	723	1003	1003	723	1003	1003	652	675	673
Outside diameter		559	559	665	559	559	665	368	464	508
<b>Canister dimensions</b>										
Canister height	mm	-	-	-	-	-	-	279	279	279
Canister diameter		-	-	-	-	-	-	41.9	71	102
<b>Maximum capacity</b>										
Maximum number of racks		4	4	6	4	4	6	-	-	6
Maximum vial capacity		2000	4000	6000	2000	4000	6000	-	-	750
Maximum number of canisters	qty	-	-	-	-	-	-	6	6	6
Maximum boxes per rack		5	10	10	5	10	10	-	-	-
Maximum number of 1/2cc straws (10/cane)		-	-	-	-	-	-	780	2100	4500
Maximum number of 1/2cc straws (1 level bulk)		-	-	-	-	-	-	1122	3000	6216
Maximum number of 1.2 & 2.0 ml vials (5/cane)		-	-	-	-	-	-	210	630	1320
<b>Alarm</b>										
Low-level alarm		standard	standard	standard	standard	standard	standard	standard	standard	standard

Lab tanks							
Model Number		Lab4	Lab5	Lab10	Lab20	Lab30	Lab50
Liquid nitrogen capacity	litres	4	5	10	21	32	50
Static evaporation rate	ltr/day	0.2	0.15	0.18	0.18	0.25	0.45
Static holding time	days	18	33.3	55.6	116.7	128	111
Weight empty	kg	2.7	4	6	9	12	15
Weight full	kg	6	8	14	26	38	56
Exterior dimensions							
Neck opening	mm	35.5	56	56	51	64	64
Overall height	mm	426	462	546	627	611	779
Outside diameter	mm	185	222	260	368	432	432
Interior dimensions							
Interior diameter	mm	139	165	210	289	356	356
Usable height	mm	198	266	343	348	378	559

Lab tanks						Shipper
Model Number		SC 2/1 V	SC 4/2 V	SC 4/3 V	DS-3	CF-9511
Liquid nitrogen capacity	litres	1.5	3.6	4.3	10	10.5
Static evaporation rate	ltr/day	0.19	0.26	0.20	0.7	3.3
Static holding time	days	8	13	21	14	3
Weight empty	kg	2.7	5.9	13.9	13.6	5.9
Weight full	kg	4	8.1	9.3	21.3	14.5
Number of canisters		1	1	1	-	-
Max vial capacity (2ml)		9	106	48	500	-
Unit dimensions						
Neck opening	mm	35	70	51	216	228.6
Overall height	mm	343	468	492	584	431.8
Outside diameter	mm	184	222	222	381	254
Usable interior dimensions						
Interior height	mm	-	-	-	317.5	228.6
Interior diameter	mm	-	-	-	216	228.6
Canister height	mm	127	278	278	-	-
Canister diameter	mm	31	67	46	-	-

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