SANYO

Cryopreservation

Extreme temperatures require the most reliable equipment

Your SANYO

- Total Cryopreservation solutions
- Best uniform storage temperatures
- Dry storage systems

The world of Cryopreservation

SANYO Biomedical Business Unit has established a worldwide reputation as a manufacturer of high quality medical equipment over the past forty years. In this period we became the leader in the European Ultra Low Temperature market. In this field SANYO has set the standard in many aspects. VIP panels, Cool Safe compressors and the world's first -152°C ULT freezer. Where SANYO 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.

SANYO is your ideal 'extreme low temperature' partner. By working in Europe with one of the leading brands Custom Biogenic Systems, we are able to offer complete solutions for -86°C and cryopreservation storage.

Cryopreservation refers to the storage of a living organism at ultra-low-temperature such that it can be revived and restored to the same living state as before it was stored. Indefinitely long storage times require that the organism be maintained below the glass transition temperature of aqueous solutions, approximately -130ºC, the temperature at which frozen water no longer sublimes and recrystallizes. Therefore -150°C freezers or liquid nitrogen are required for longer storage times.

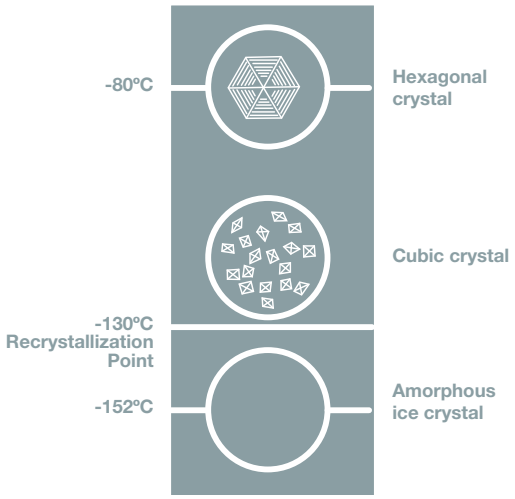
In order to make liquid out of gasses, scientists in the 19th century discovered insulated bottles for storage and transport. This type of vessel is still being used today.

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

During the years it became clear that cross contamination became a real risk for this kind of preservation. Not only through existing ice, but from sample to sample as well. Scientific evidence has been delivered in the past about examples of Hepatitis cross contamination.

That was the reason why storage in vapor phase became more popular. Valuable samples were not stored in the liquid nitrogen anymore, which eliminated the risks of cross contamination.

Recrystallization mechanism

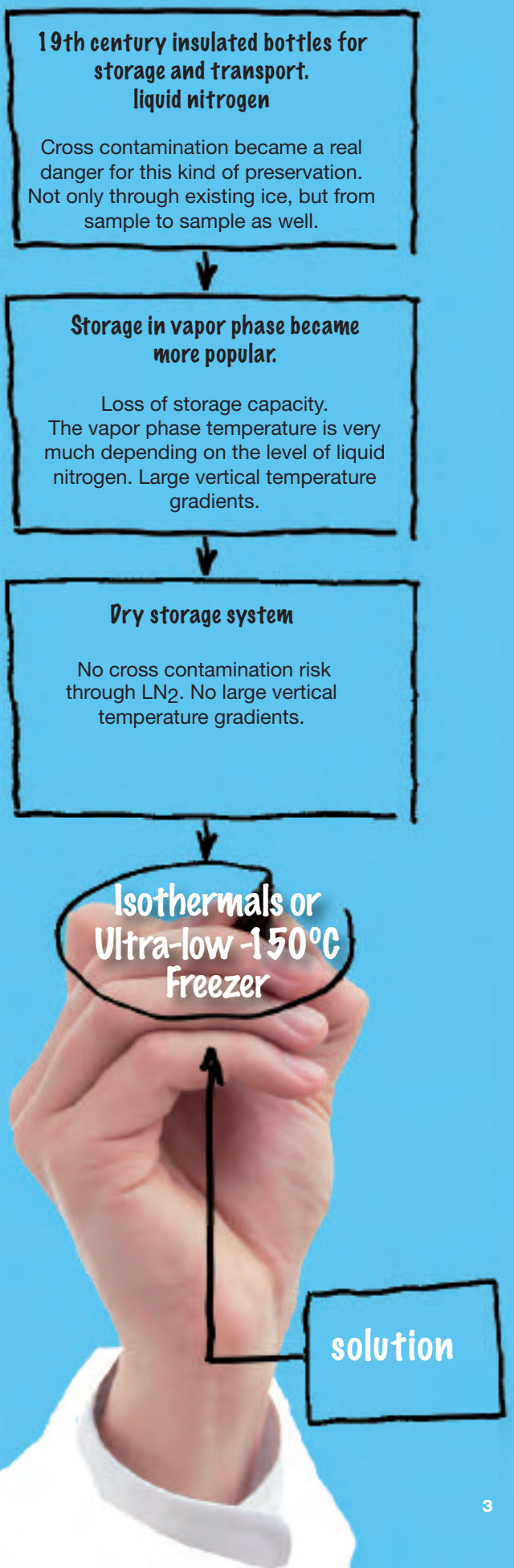


There are disadvantages of storage in vapor phase though:

1. loss of storage capacity; 1/3 of the vessel can not be used any more
2. the vapor phase temperature is very much depending on the level of liquid nitrogen
3. large vertical temperature gradients, can put valuable samples at greater risk during long term storage.

To protect long term sample storage from cross contamination and the risk of vertical gradients, dry storage systems like -150°C ultra low temperature freezers and the patented Isothermal Storage have been developed.

Liquid Nitrogen storage or Dry storage?



Isothermal LN_2 Freezers

V-1500AB V-3000AB V-5000AB

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.

Automatic Operation

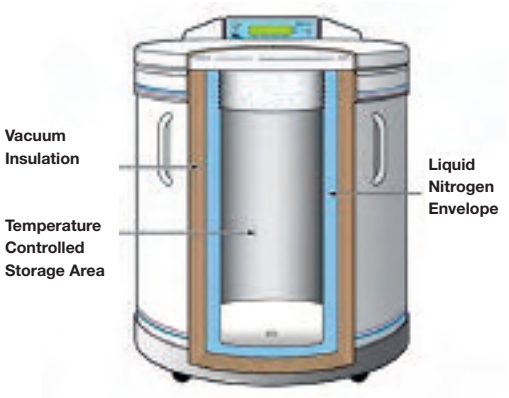
Isothermal Freezers feature the Series 2301 Auto-fill and Monitor System, which controls the automatic filling of the liquid nitrogen jacket and provides the user with an easy to read overview of the freezer temperature and status.

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.



Innovative Cryopreservation No Liquid Nitrogen Contact

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

Most important features of the 2301 controller

Features

- Programming of LN2 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

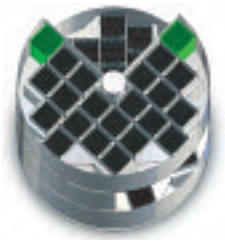
Alarms

- Visual, Audible and Remote
- High and Low LN_2 Levels in jacket
- Temperature deviation
- Sensor and valve abnormality
- LN_2 Source / Supply
- Remote Alarm Contact
- Overflow Sensor/Alarm (Optional)

Straw Storage Inventory System

Designed for the CBS V-1500AB Isothermal Freezer, 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.

Ultra-low -150ºC Freezers

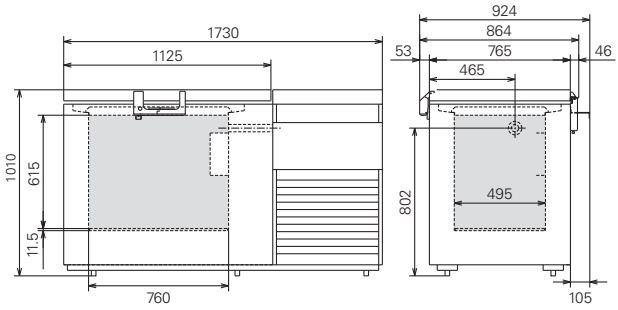
MDF-C2156VAN

The worlds largest capacity -150°C freezer. (231 litres)

VIP series
Vacuum Insulation Panel

Options

Temperature chart recorder (-170ºC to +30ºC)	MTR-155H
Chart paper	RP-155
Ink pen	DF-38FP
Mounting kit	MDF-S30150
Storage case	MDF-49SC
Inventory racks	see page 11



Ultra-low -150ºC freezer with third generation VIP insulation.

The freezer is equipped with SANYO developed third generation Vacuum Insulation Panels. This improved VIP insulation is extremely efficient and results in a -150ºC freezer with a capacity of 150 world standard 2" boxes, the largest capacity -150ºC freezer in the world!

New control panel with graphic LCD display

All the alarm functions, self-diagnostic notifications and a digital graph of the temperature are available in the new, specially designed LCD display. The blue display provides a clear image of the temperature and gives a notification in the case of abnormalities in temperature, ambient temperature, power supply etc.

New Cool Safe compressors

The MDF-C2156VAN is equipped with SANYO's new Cool Safe compressors. These compressors achieve a 10% higher energy conservation and the aerodynamically designed and placed components in the refrigeration compartment provide superior airflow, making it possible to significantly reduce the stress to the freezer and contributing to excellent durability.

Environmentally friendly

The MDF-C2156VAN utilises binary mixed non-HCFC refrigerants. The new Vacuum Insulation Panels and double door gaskets reduce the power consumption.

MDF-1156 / MDF-1156ATN

Small footprint
Low operational costs
(128 litres)

Options

LCO_2 backup system	CVK-A (MDF-1156)
LN_2 backup system with recorder	CVK-ATN2 (MDF-1156)
Temperature chart recorder (-170°C to +30°C)	MTR-155H
Chart paper	RP-155
Ink pen	DF-38FP
Storage case	MDF-49SC
Inventory racks	see page 11

Specially designed compressor and cascade refrigeration system for an ultra-low temperature of -152ºC

Highly efficient compressors have been specially developed and incorporated in the freezing unit. A refrigeration circuit with the Cool Safe compressor cascade refrigeration system enhances reliability of long-term preservation. With a powerful low noise design afforded by traditional ultra-low temperature technology, this freezer delivers durable, stable cooling.

Microprocessor temperature control with LED digital display allows accurate temperature control

Accurate temperature setting, confirmation and operation are all possible through microprocessor temperature control with a LED digital display and flat key data entry. The world's first electronically controlled freezer, this model maintains inner cabinet temperature at an ultra-low -152ºC (ambient temperature of 30ºC), far lower than the recrystallization point for pure water (-130ºC). This low temperature provides the ideal preservation environment for long-term storage.

ultra-low temperature environments

Compressors continuously repeat highly compressed operations, so lubricant oil is essential to prevent abrasion and seizure. But when lubricant oil circulates in the refrigeration circuit, piping becomes clogged and results in compressor damage. Incorporating a high-efficiency oil separator, the MDF-1156 effectively separates lubricant oil from refrigerant, offering a stable ultra-low temperature environment.

Various alarm and safety devices for protecting valuable samples

Microprocessor-controlled filter-clogged check function protects the refrigeration circuit.
High temperature warning equipment automatically indicates when the temperature deviates 15ºC from the set temperature. The power failure alarm lamp and buzzer are activated in case of power failure or irregular temperature change. A remote alarm contact is fitted.
ATN models are also equipped with an auxiliary back-up system for liquid nitrogen.

Standard LN_2 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 liters to 720 liters, 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 vapor 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.

S-90AB | S-1500AB | S-3000AB | S-5000AB | S-5000ABEH

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.

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.

Vapor Shipper

The DS-3 Vapor Shipper is designed for the safe transportation of biological samples at cryogenic temperatures.

Fabricated from durable, lightweight aluminum, the DS-3 contains a hydro-phobic absorbent which holds the liquid nitrogen. 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.

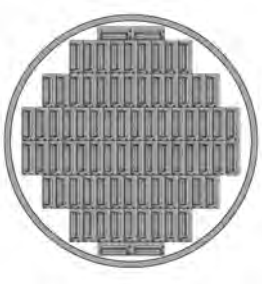
The CF-9511 Transport container is also a high-quality unit, primarily for use in moving samples over shorter distances, such as from one lab to another.

Model	DS-3	CF-9511
Liquid Nitrogen Capacity Litres)	10	10.5
Static Evaporation Rate (Litres/day)	0.7	3.3
Static Holding Time (Days)	14	3
Weight empty	13.6	5.9
Weight full	21.3	14.5
Max. vial capacity (2ml)	500	-
Overall opening (mm)	584	431.8
Outside opening (mm)	381	254
Interior diameter (mm)	216	228.6
Usable interior height (mm)	317.5	228.6

Rack configurations

Standard Square rack configuration 1500AB

3101A-100S



Vertical rack configuration 5000AB

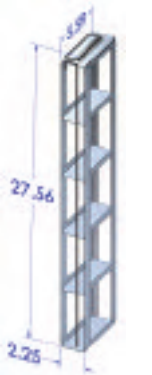
Boxes and dividers

- 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. Cap. 9.100 2ml Vials "
S-1500AB	2001A-100S	
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



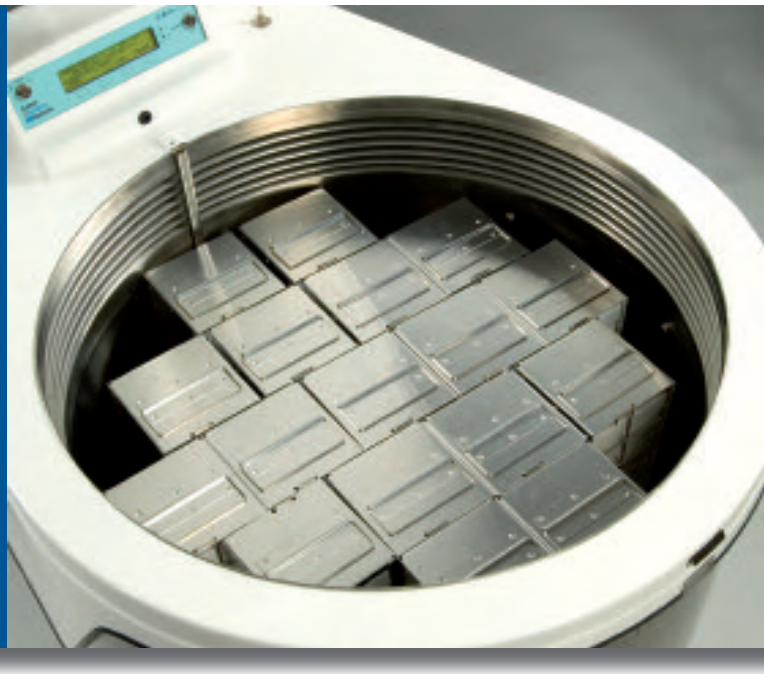
V-1500AB	RC-V1500-1209-VLR	Aluminium Rack System with Cardboard Boxes + Dividers "Comprises 20 Racks x 5 Boxes high. Cap. 10.000 2ml Vials "
S-1500AB	RC-S1500-1209-VLR	
V-3000AB	RC-V3000-1209-VLR	Aluminium Rack System with Cardboard Boxes + Dividers "Comprises 48 Racks x 5 Boxes high. Cap. 24.000 2ml Vials "
S-3000AB	RC-S3000-1209-VLR	
V-5000AB	RC-V5000-1209-VLR	Aluminium 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-1209-VLR	Aluminium Rack System with Cardboard Boxes + Dividers "Comprises 80 Racks x 6 Boxes high. Cap. 48.000 2ml Vials "
S-5000ABEH	RC-S5000EH-1209-VLR	

Vertical racks for ULT -150 Freezers

MDF-1156	NIR209C	Aluminium Rack System (Cardboard Boxes and Dividers are optional) compromises 9 racks x 9 boxes high. Cap. 8.100 2ml. Vials
MDF-C2156VAN	NIR210C	Aluminium Rack System (Cardboard Boxes and Dividers are optional) compromises 15 racks x 10 boxes high. Cap. 15.000 2ml. Vials

For other sizes racks and boxes, Canisters and Inventory Systems visit our website

Accessoires

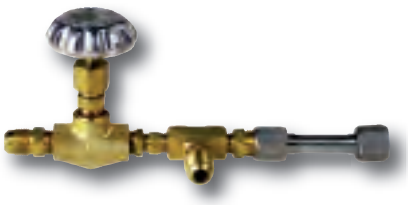


CRYO-GLOVES
Made from state-of-the art fabrics, Tempshield Cryo-Gloves® use a flexible, multi-layered insulated construction that provides maximum thermal protection, yet offers comfort, flexibility, and dexterity so you can perform tasks effectively and safely. An additional stay-dry lining keeps you warm and comfortable. Cryogenic Gloves protect your hands and arms when working in hazardous, ultra-cold environments. The innovative design offers superior thermal protection, while allowing for a maximum level of flexibility and dexterity—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

LN2 PHASE SEPARATOR
Designed to minimize hazardous splashing and vaporization, phase separators are available to use when transferring liquids into various open containers.

"Y" VALVE
- 2 Male 1/2" NPT Brass Fittings
- 1 Female 1/2" NPT Stainless Steel Flared Fitting
- Overall Length Approximately 6"

"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"



LN2 LEVEL STICK
- 1/2 Centimeter and 1/4 Inch Increments
- Can withstand Temperatures up to -190°C
- Measures up to 36"(92cm)

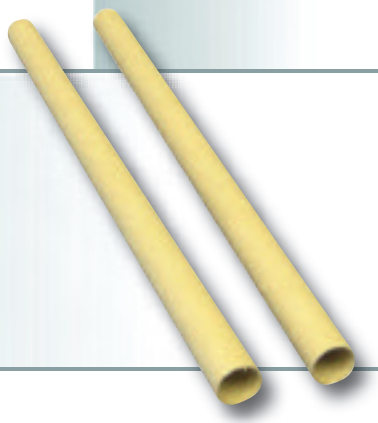
LN2 TRANSFER HOSE

- 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)

HOSE COVERS

CARDBOARD SLEEVES

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

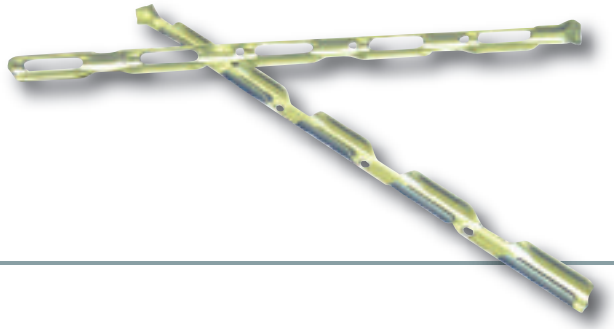


ROLLER BASE

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)

CANES

- 2ml Cane
- 5 and 6 place vial canes
- Lightweight aluminum construction
- Overall Length Approximately 11.5" (6 place cane)



Specifications*

Specifications Isothermal -190°C Dry Storage Freezers

Model	V-1500AB	V-3000AB	V-5000AB	V-5000ABEH
Liquid nitrogen capacity (litres)	30	70	93	140
Static evaporation rate (litres/day)	5	9	11	11
Static holding time (days)	6	8	8	12
External dimensions (W x D x H)	660 x 939 x 1143	939 x 1219 x 1206	1219 x 1371 x 1320	1219 x 1371 x 1473
Usable interior height (mm)	736	736	736	864
Usable interior diameter (mm)	534	787	1016	1016
Weight empty (kg)	148	272	425	453
Weight full (kg)	174	327	500	566
Max. vial capacity (2ml)**	9100	22100	40300	46500
Max. blood bag capacity (50ml)**	434	1120	1936	2208

Standard LN_2 Freezers

Model	S90-AB	S-1500AB	S-3000AB	S-5000AB	S-5000ABEH
Liquid nitrogen capacity (litres)	90	145	345	615	720
Static evaporation rate (litres/day)	2.75	4	7	9	9
Static holding time (days)	33	41	49	61	80
External dimensions (W x D x H)	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
Max. vial capacity (2ml)**	5832	9100	22100	40300	46500
Max. blood bag capacity (50ml)**	128	224	560	912	1140

Specifications Ultra-low freezer MDF-C2156VAN / MDF-1156

Model	MDF-C2156VAN	MDF-1156/1156ATN
Exterior dimensions (W x D x H)	1730 x 765 x 1010 mm	1400 x 800 x 945 mm
Interior dimensions (W x D x H)	760 x 495 x 615 mm	500 x 450 x 572 mm
Effective capacity	231 litres	128 litres
Outer lid	1 lid, Zinc galvanized steel with baked on acrylic paint (NB gray), 2 hinges	1 door, Painted steel, Acrylic finish baked
Inner lid	2 lids, Plastic and insulated	1 lid
Insulation	Rigid Polyurethane foam + new VIP (Vacuum Insulation Panels), HCFC free	Rigid polyurethane foam in place (HCFC Free)
Exterior material	Zinc galvanised steel with baked on acrylic paint (NB gray)	Acrylic finish baked on painted steel
Interior material	Aluminium plate	
Outer door latch	1 pc	
Outer door lock	1 pc (latch integrated lock)	
Casters	6 pcs (leveling leg 2pcs)	
Access Port	1pc (Dia. 40mm)	1 Left side (Dia. 40mm)
Cooling performance	-150°C (AT30°C, at 1/2 of chamber, air temperature)	-152°C (AT 30°C, Inner air temp.1/2h)
Refrigeration circuit	Binary cascade + Low side auto cascade refrigeration system	Secondary cooling system
Compressors	High side: 1100W (hermetic type) / Low side: 1100 W (hermetic type)	
Oil separator	SPK-OS02S3	SPK-0S02S2
Refrigerant	High side: HFC refrigerant (R407D + 6pt) / Low side: HFC refrigerant (Non-azeotropic mixed refrigerant)	
Refrigerant oil	Ze-NIUS32SA	Ze-NIUS22SA
Evaporator	High side: Cascade condenser / Low side: Tube on sheet (shared with interior)	
Condenser	High side: Fin and tube condenser Low side: Auto cascade condenser	High side: Fin and tube condenser Low side: cascade condenser
Net weight	Approx. 319 kg	Approx. 285 kg
Power supply	Local voltage	
Back-up system	standard (optional for the MDF-1156) (The back-up system does not include container for liquid nitrogen)	

* Specifications subject to change without notice.
** Capacity is subject to rack type

Specifications Classic, Value added

Model	Classic 2002	Classic 4002	Classic 6002	Value added 2001	Value added 4001	Value added 6001
Liquid Nitrogen Capacity (Liters)	61	121	175	61	121	175
Static Evaporation Rate (Liters/Day)	0.85	0.99	0.99	0.85	0.99	0.99
Static Holding Time (Days)	38	70	104	38	70	104
Working Volume (Liters)	51	111	165	61	111	165
Weight Empty (kg)	26.3	36.7	46.7	26.3	36.7	46.7
Weight Full (kg)	82.5	136	193	82.5	136	193
Exterior Dimensions						
Neck Opening (mm)	216	216	216	216	216	216
Overall Height (mm)	723	1003	1003	723	1003	1003
Outside Diameter (mm)	559	559	665	559	559	665
Maximum Capacity						
Maximum number of racks	4	4	6	4	4	6
Maximum vial capacity	2000	4000	6000	2000	4000	6000
Maximum boxes per rack	5	10	10	5	10	10
Alarm	standard low-level alarm					

Specifications XC series

Model	20/20	34/18	47/11
Liquid Nitrogen Capacity (Liters)	20.5	34.8	47.4
Static Evaporation Rate (Liters/Day)	0.09	0.18	0.39
Normal working days	140	123	76
Weight empty (kg)	11.8	15.4	16.4
Weight full (kg)	28.3	43.5	54.6
Exterior Dimensions			
Neck opening (mm)	55.4	89	127
Overall height (mm)	652	675	673
Outside diameter (mm)	368	464	508
Canister Dimensions			
Canister height (mm)	279	279	279
Canister diameter (mm)	41.9	71	102
Maximum Capacity			
Maximum number of racks	-	-	6
Maximum vial capacity	-	-	750
Maximum number of canisters	6	6	6
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
Alarm	standard low-level alarm		

Specifications Lab tanks

Model	Lab4	Lab5	Lab10	Lab20	Lab30	Lab50
Liquid Nitrogen Capacity (Liters)	4	5	10	21	32	50
Static Evaporation Rate (Liters/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	26	51	64	64
Overall Height (mm)	426	463	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

Select your Cryopreservation solution

	S-SERIES LIQUID	S-SERIES VAPOR	CRYO-SYSTEMS	V-SERIES -190C	ULT Freezers -150°C / -152°C
STORAGE IN ULT-FREEZER					X
STORAGE IN DRY VAPOR OF LN2				X	
STORAGE IN LN2	X		X		
STORAGE IN VAPOR OF LN2		X			
CROSS CONTAMINATION RISK THROUGH LN2	X		X		
NO CROSS CONTAMINATION RISK THROUGH LN2		X		X	X
LARGE TEMPERATURE GRADIENT RISK		X			
SMALL TEMPERATURE GRADIENT RISK	X1		X1	X	X
CRITICAL TEMPERATURE OF MATERIAL TO BE STORED -130°C	X1		X1	X	X
AUTOFILL AND MONITORING REQUIRED	X	X		X	Not applicable
NO AUTOFILL AND MONITORING REQUIRED			X		X
STORAGE OF MORE THAN 6000 2ML VIALS	X	X		X	X
STORAGE OF LESS THAN 6000 2ML VIALS			X		
STORAGE EFFICIENCY	X		X	X	X
EASE OF HANDLING RACKS				X	X
USAGE OF LN2	Low	Moderate	Low	Moderate	None
NO SPECIAL REQUIREMENTS NEEDED IN STORAGE ROOM					X

X1 This is only offered when the LN2 level in the tank is kept high at all times

innovative

dedicated

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