USER MANUAL

HIGH CAPACITY HIGH EFFICIENCY (HCHE) and HIGH CAPACITY (HC) SERIES FREEZERS

phasetwo®

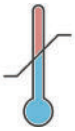
www.phasetwoCCS.com

Safety

This Operator Manual contains important warnings and safety instructions. Review the entire manual before using the device.

A replacement manual can be downloaded from the website or ordered from your supplier as needed at any point in time.

SYMBOLS GLOSSARY

	This User Manual contains important warnings and safety instructions.		General information.
	Wear face shield		Liquid nitrogen disposal.
	Wear safety gloves		Asphyxiating atmosphere
	General warning sign.		Use in well-ventilated areas.
	Low temperature warning. Exposure of skin or eyes to liquid or gaseous nitrogen or cold parts may result in frostbite.		Avoid pressure increase due to ice buildup or incorrect lid.
	Air humidity levels at which the freezer can operate without risk		Temperature range at which the freezer can be exposed without risk.
	Device Disposal		Name and Address of manufacturer Date of manufacture

WARNING: Liquid nitrogen is extremely cold. To avoid injury from frostbite, take extreme care whenever handling liquid nitrogen, liquid nitrogen storage or transfer vessels, or any objects which have come in contact with liquid nitrogen.

- Leave no area of skin exposed.
- Always wear proper PPE attire over clothing: face shield, cryogenic gloves, and cryogenic apron.
- Use extreme care to prevent spilling and splashing liquid nitrogen during transfer.
- Always keep freezer in the upright position. Do not tilt or lay the freezer on its side.
- Immediately remove any clothing or safety attire on which liquid nitrogen has spilled.
- Seek immediate medical attention for any frostbite injuries due to liquid nitrogen.

WARNING: The venting of nitrogen vapors may deplete oxygen in the air, possibly leading to asphyxiation or even death. Do not store or use containers in areas that are small and enclosed or have poor ventilation. The use of an oxygen monitoring system is recommended.

WARNING: Do not tightly seal liquid nitrogen container or prevent nitrogen gas from escaping. Also, excessive humidity levels or exposure to rainfall could result in freezing of the cap and possible failure.

WARNING: Never use a hollow tube to measure liquid nitrogen level. This could lead to personal injury.

Disposal of liquid nitrogen should only be done outdoors or in areas specifically designed for that purpose. Pour the liquid slowly on gravel or bare earth where it can evaporate without causing damage.

CAUTION: Handle the cryopreservation freezer with care.

- Never overfill freezers with liquid nitrogen. Overfilling can cause personal injury or damage to the freezer, voiding the limited warranty. The liquid nitrogen level should always be below the bottom of the neck tube. Overfilling the tank may cause immediate or premature vacuum failure to occur
- Never ship Liquid Nitrogen Dewars or Freezers on their side or upside down. This can lead to vacuum failure and loss of contents
- Remove and insert canisters carefully. Do not scratch neck tube area, scratches can cause premature vacuum failure and loss of contents
- Tampering with or removing the vacuum port will destroy vacuum and void warranty

- Never drop, hit, or strike the unit
- Never spill liquid nitrogen on or near vacuum port
- Never leave the vessel outdoors
- Keep the bottom of dear clean and away from chemicals, fertilizers, soil, and moisture
- Do not use phasetwo Liquid Nitrogen Dewars or Freezers for transportation
- All performance data published for these products is based on static conditions only

CAUTION: Not for liquid oxygen use.

CAUTION: Never ingest liquid nitrogen, serious harm or death may occur.

CAUTION: If cross-contamination of samples is a concern, vapor storage should be used.

CAUTION: In the event there is a serious incident occurring with this device, the user should immediately report the incident to the provider and/or the manufacturer. A serious incident is defined as an injury, death, or potential to cause injury/death should there be a re-occurrence of the incident.

CAUTION: Only use liquid nitrogen rated vials, bags, etc for sample containers. Seal them according to their manufacturer's instructions. Otherwise, liquid nitrogen can leak into them and expand upon sample retrieval.

Device Overview and Key Features

HCHE Series freezers from phasetwo are state-of-the-art cryogenic storage systems and include the following key features:

- Can be used in either liquid phase storage or vapor phase storage
- Stainless steel vacuum vessel with exceptional vacuum performance
- Full diameter stainless steel work surface and overall design for easy cleaning and disinfection
- Thermally insulated and lockable lid
- Liquid level measuring rod
- Stainless steel lockable casters
- Stainless steel 6-foot transfer hose

Unpacking And Inspection

HCHE Series freezers are supplied in new condition. Schedule time to check for any external damage upon delivery.

- Open the crate
- Use the packing list to check that all items are present while the unit is being unpacked
- Check the delivery for any damage
- Record all components on the packing list before disposing of any transportation material
- Contact your carrier and report any shipping damage promptly

Intended Use:

phasetwo's Aluminum and Stainless Steel Dewar families are designed for long term cryogenic storage and shipment of biospecimens contained in bags, vials, and similar containers. Biospecimens may be intended for research purposes or for possible re-introduction into humans.

Note: Any other use does not comply with manufacturer recommendations!

phasetwo cannot be held liable in the event, the use of the device does not comply with this Operator Manual.

Intended Location & User Groups

HCHE Series cryogenic freezers are intended for use in professional research environments by trained personnel, i.e. clinicians, medical and laboratory technicians, medical and laboratory assistants and other specialist healthcare personnel who have been trained to work with cryogenic liquids and devices.

Optional Equipment

- Non-PLC based controller with touch controls for liquid level, temperature monitoring and alarms, automated filling, logging of temperature, remote alarm, levels, fill activity etc.
- A variety of Inventory System(s) are available depending on the user needs and use case. Examples of standard rack configurations can be obtained by contacting phasetwo at the number or email noted below.

  Note: The end user will be responsible for verification and validation of the inventory system(s) used to ensure they meet their individual requirements.

Technical Specifications

HCHE Series High Capacity High Efficiency Cryogenic Freezers Specifications

Model	HCHE20	HCHE44	HCHE50	HCHE92	HCHE107
LN2 Capacity Vapor (L)	68.9	175.7	175.7	371.2	371.2
LN2 Capacity Liquid (L)	437.1	892.1	999.6	1802.4	2040.9
Outer Diameter (in/mm)	34(863.6)	46.2(1173.5)	46.2(1173.5)	63.5(1612.9)	63.5(1612.9)
Overall Height (in/mm)	55.7(1414.8)	56.8(1442.7)	61.8(1568.5)	55.8(1417.3)	60.7(1541.8)
Neck Opening (in/mm)	12.7(322.6)	18(457.2)	18(458)	27.1(688.3)	27.1(688.3)
Carousel ID (in/mm)	28.8(731.5)	41.1(1043.9)	41.1(1044)	59(1498.6)	59(1498.6)
Internal Height (in/mm)	30 (762)	30(762)	35(889)	30(762)	35(889)
Weight Empty (lbs/kg)	638(289.4)	1075(487.6)	1147(520)	1835(832.3)	1975(895.8)
Weight Full (lbs/kg)	1417(642.7)	2665(1208.7)	2928(1328)	5047(2289.2)	5612(2545.5)
Static Evaporation Rate (L/day)	5	7	7	13	13
Vapor Phase (days)	13.8	25.1	25.1	28.6	28.6
Standard Racks (100/81 Cell)/Levels 2 ml Vial Capacity	14/13 18,200	32/13 41,600	32/15 48,000	68/13 89,700	68/15 103,500
Vertical Racks (100/81 Cell)/Levels 2 ml Vial Capacity	42/5 21,000	88/6 45,000	88/6 54,000	185/5 92,500	185/6 111,000
Lift Over Height (in/mm)	40 (1016)	43.8 (1113)	38.5 (978)	42.9 (1090)	37.8 (960)
Step Height (in/mm)	12.9(327.7)	12.9(327.7)	11(279) 21.9(556.3)	12.9(327.7)	11(279) 21.9(556.3)

Actual NER and static holding time will be affected by application, atmospheric conditions, and manufacturing tolerances.

Note: For guidance regarding NER, please contact technical support or your suppier.

TECHNICAL DATA AND PERFORMANCE CHARACTERISTICS - Please refer to specific product specification sheet on www.phasetwoccs.com or contact phasetwo for additional information.

HC Series High Capacity Cryogenic Freezers Specifications

Technical Specification	HC14	HC32
LN2 Capacity, Liquid (L)	205	461
Outer Diameter (in/mm)	25 (635)	36 (914)
Overall Height (in/mm)	44.4 (1128)	46.31 (1176)
Neck Opening (in/mm)	23 (584)	34.25 (870)
Inner Usable Height (in/mm)	29 (737)	29 (737)
Weight Empty (lbs/kg)	220 (100)	480 (218)
Weight Full (lbs/kg)	335 (152)	739 (335)
Evaporation Rate (L/day)	6.5	10
Static Holding Time (days)	32	46

Storage Capacity, 2ml Vials	HC14	HC32
5-2 Vertical Racks, AL, 100/81-Cell Boxes	13,500 (27 each)	32,000 (64 each)
13-2 Horizontal Racks, AL, 100/81-Cell Boxes	11,700 (9 each)	28,600 (22 each)
Combination System	14,200	31,800
5-2 Vertical Racks, AL, 100/81-Cell Boxes	5 each	10 each
13-2 Horizontal Racks, AL, 100/81-Cell Boxes	9 each	21 each

Evaporation Rate and Static Holding Time are nominal. Actual Evaporation rate and static holding time will be affected by application, atmospheric conditions, container history and manufacturing tolerances.

Operations

CAUTION: Consider the value of stored samples when choosing freezers and distribution of samples among different freezers.

CAUTION: Appropriate liquid level and temperature monitoring equipment is recommended.

CAUTION: Failure to follow phasetwo's best operating practices as set forth in this manual can result in loss of contents.

Environmental Conditions

- Indoor use only
- Operating temperature: 0^0 deg C to 40^0 deg C
- Relative humidity: Non-condensing
- Storage temperature: -10^0 deg C. to $+50^0$ deg C.
- Storage relative humidity: 10% to 90%, non-condensing
- Atmospheric Pressure: 700 hPa to 1060 hPa
- Altitude: up to 2000m

To ensure maximum performance from your phasetwo Liquid Nitrogen Freezer follow the steps below:

1. Remove the freezer from the factory packaging, remove any accessories, and open the hinged lid.

WARNING:
Liquid nitrogen is extremely cold. Make sure to wear proper PPE before operation. Avoid spilling liquid nitrogen over the vacuum port as this can shrink the seal and allow air to leak into the vacuum space causing premature vacuum failure.

2. Fill the unit to the desired level. The liquid level should never be above the top of the rotating carousel partitions.

   a. If you are working with a warm freezer, it is phasetwo's recommendation to slowly add a small amount of liquid to the bottom of unit and allow it to sit until the liquid nitrogen stops rapidly boiling.

b. Follow established safety practices and procedures for transferring LN2.

c. Fill the vessel using the LN2 hose with phase separator by inserting the hose into the lid opening of the freezer.

d. If you are filling your vessel from a pressurized source, make sure it is a low-pressure source (22 psi / 1.5bar / 150kPa or below).

3. Close the lid and allow the unit to cool.

   a. If there is excessive frost or sweating after the first few hours, it would indicate a weak vacuum. Examine the unit carefully.

WARNING:
Do NOT disconnect the LN2 transfer hose when cold or frosted. Doing so will introduce moisture to the inside of the transfer hose, which can cause ice to form blocking the fill line &/or differential pressure line rendering the device inoperable.

WARNING:
When a freezer returns to room temperature water will condense inside the unit. The unit must be thoroughly dried and the water must be removed from the annular lines (fill and differential pressure) before the unit can be put back into service again. If the moisture is not removed an ice blockage in the lines is likely to occur.

Determining Liquid Level:

1. Always wear proper safety attire-face shield, cryogenic gloves, and cryogenic apron.

2. Use a plastic measuring rod for liquid level measurement inside a unit. Using a hollow tube can cause liquid nitrogen to flash through the tube and result in personal injury.

3. Locate the dipstick channel inside the carousel. It is located in section B of the carousel and is labeled dip here. Carefully insert the dipstick into the channel as far as possible, remove the dipstick after 5 -10 seconds. Wave the dipstick in the air and the level will be indicated by frost line. The frost line will be U-shaped; read the level at the bottom of the U. Because the heads of the units are curved, the actual level of the unit is determined by addingthe below values to the measured one.

Dip Stick Offsets for Dip Tube Location	
HCHE20	0.35 inch
HCHE44/50	1.06 inch
HCHE92/107	2.37 inch
HC14	0.2 inch From top of platform
HC32	0.2 inch From top of platform

Note: A dipstick must return to room temperature before being used again to measure the level.

WARNING: DO NOT OVERFILL.
Over-filling may result in personal injury due to liquid nitrogen spillage, and may void the limited warranty.

CAUTION: When filling the unit, avoid liquid nitrogen coming in contact with the vacuum plug.

CAUTION: It is imperative the liquid level is accurately detemined. A minimum liquid level of 10% is recommended to maintain temperatures below -150 degrees C.

WARNING: DO NOT OVERFILL.
Over-filling may result in personal injury due to liquid nitrogen spillage.

Operating Guidelines for Critical Storage

1. Written procedures should be maintained for monitoring and maintaining adequate liquid nitrogen levels and temperature for all critical storage.
2. Monitoring process must ensure the liquid level is never below 10% or the established minimum level.
3. Tanks should be filled at least weekly.
4. IQ/OQ is completed on all new tanks.
5. Tank liquid levels, temperatures, and visuals inspections for vacuum failure should be checked a minimum of 3 times a week.
6. A spare tank and enough liquid nitrogen to fill it should be maintained at all times.

Inserting or Removing Racks

The lid should remain closed when the stored material is not being accessed to prevent unnecessary loss of liquid nitrogen and accumulation of ice.

When removing material from the rack, withdraw the rack just far enough to remove contents, and do so as quickly as possible. Completely withdrawing the rack will expose the stored material to room temperature conditions.

When room temperature product is added, slowly lower the rack into the freezer to reduce the boiling of liquid nitrogen and the surge of cold nitrogen gas. When inserting the rack, keep the rack as vertical as possible to avoid dislodging stored material.

Care & Maintenance

Normal Evaporation Rate Test:

1. Fill the unit to approximately half full. Refer to OPERATION section step 1, 2 & 3 for details.
2. Allow the unit to stand for a minimum of 24 hours.
3. Weigh unit and record as First Weight [lb.].
4. Allow filled unit to sit undisturbed for another 24 (+/-0.25) hours.
    a. Consider the accuracy and resolution of your scale to determine if additional days are required between the first and second weights to obtain an accurate NER. Make sure to record the number of hours between the first and second weights.
5. Weigh a second time and record as Second Weight, [lb.].
6. Calculate evaporation rate by using equation below. The difference between the first weight and the second weight is the daily evaporation rate in lbs. This figure roughly signifies the normal evaporation rate, or N.E.R. [Liter/Day] NER = (First Weight – Second Weight) x 13.468/Number of Hours.

If there is major frost or condensation on the outside of the container during this time, it would indicate either a weak or bad vacuum. Refer to the static NER specifications on the applicable specification sheet for your model of tank on our website: www.phasetwoCCS.com. Factors such as age of unit, quantity of inventory, ambient environment, shipping condition, and use of accessories, etc. can negatively affect unit NER.

Device Disposal

HCHE Series cryogenic freezers by phasetwo are made of high-quality, recyclable materials and components.

Note: Do not dispose of HCHE Series Freezer with normal waste:

All materials from stainless steel, aluminum and aluminum foil can be reused as recyclable materials. All plastics, epoxy tube, glass paper and the molecular sieve must be disposed of as industrial waste or incinerated.

Dispose of this freezer and rejected samples in accordance with local regulations.

Returns

Limited warranty: Manufacturing defects are covered under the containers limited warranty.

Evidence of mishandling, such as dents on the outer vessel or misalignment of the inner vessel are not considered manufacturing defects.

If you would like to return goods to phasetwo for any reason, you must first obtain a Return Material Authorization (RMA) number for tracking purposes.

Please have the unit serial number and symptoms available.

Contact your supplier or call phasetwo's Customer Service Department at 770.985.1313 or email us at customerservice@phasetwoCCS.com

Accessories & Replacement Parts

Ordering Information: Order replacement parts and accessories from your local supplier.

For more information or the name of your local distributor, contact phasetwo at the phone number or email listed below.

HCHE Replacement Parts		
Strainer	P2-2020168	Strainer, 3/8 NPT, INLINE, 200 Mesh SS Screen
Relief Valve, Plumbing Assy.	P2-2020167	Cryogenic Relief Valve, 100 PSI, 1/4" NPT
Casters	P2-2014984	Caster, 3" DIA, 2' W, Swivel, Brake, 1000#
Lid Assembly		
HCHE20	P2-2024840	Replacement Lid, W/O Hinge
HCHE40 & 50	P2-2024842	Replacement Lid, W/O Hinge
HCHE92 & 107	P2-2024843	Replacement Lid, W/O Hinge
Lid Gasket	P2-2024994	EDPM Seal, 0.66" x 0.45", w/ ADH Backing
HCHE20		92", Wrapped Twice
HCHE40 & 50		125", Wrapped Twice
HCHE92		160", Wrapped Twice
HCHE107		96", Wrapped Once

HC Replacement Parts		
Strainer	P2-2020168	Strainer, 3/8 NPT, INLINE, 200 Mesh SS Screen
Relief Valve, Plumbing Assy.	P2-2020167	Cryogenic Relief Valve, 100 PSI, 1/4” NPT
Casters		Caster, 2” DIA, 7/16’ x 1-3/8’, Stem, W/Brake
Lid Assembly		
HC14	P2-2026014	Replacement Lid, W/O Hinge
HC32	P2-2028056	Replacement Lid, W/O Hinge
Lid Gasket	P2-2024994	EDPM Seal, 0.66” x 0.45”, w/ ADH Backing
HC14		80"
HC32		115”

Contact Us

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