

Operating Instructions

SAFETY

Before using any cryogenic refrigerator, read the *Handle with Care* booklet provided with the unit. It details safety precautions that must be understood before using the equipment. If a replacement booklet is needed, order publication TW-10 *Handle with Care* from your supplier.

Following are a few of the safety precautions described in the *Handle with Care* booklet. Please be sure to read the entire booklet.

Store and use these containers only in well ventilated areas. In a confined area, nitrogen gas from these units may cause suffocation by displacing air needed for breathing. Install a suitable oxygen monitor.

Do not touch liquid or cold metal surfaces with your bare skin. The liquid nitrogen refrigerant in these containers is **extremely cold**: -196°C (-320°F). Exposure of skin or eyes to liquid, cold gas or frosted parts could result in a severe frostbite-like injury. Because of the extremely low temperature, a face shield and gloves must be worn when transferring liquid nitrogen and material into or out of these containers.

OPERATION

Filling: Adding liquid nitrogen to a warm container may cause splashing and will generate a significant volume of nitrogen gas as cold liquid contacts warm refrigerator surfaces. Add liquid slowly to minimize these effects. Be sure there is adequate ventilation. Keep your head clear of the heavy volume of vapor that may be produced. It is extremely cold and could cause personal injury.

WARNING

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

DETERMINING LIQUID LEVEL. Liquid level must be checked at regular intervals – refrigeration depends on the presence of liquid nitrogen. The liquid level in the container can be determined with a dipstick. Insert the dipstick straight into the container so that it rests on the canister positioning fixture on the bottom of the unit. After 5 to 10 seconds, withdraw the dipstick and wave it back and forth in the air. A frost section will form representing the depth of liquid in the container.

WARNING

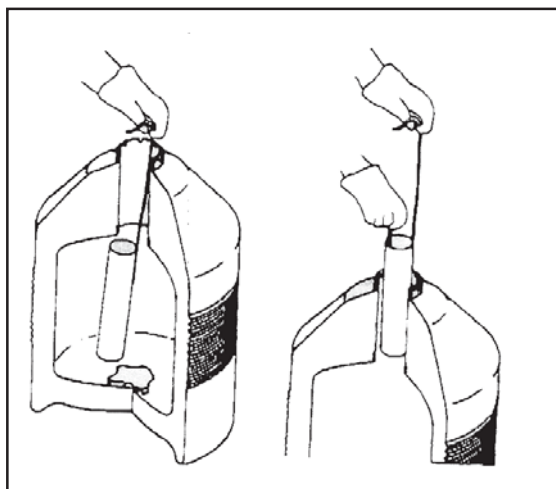
Never use a hollow rod or tube as a measuring rod. When a warm tube is inserted into liquid nitrogen, liquid will spout from the top of the tube and may cause personal injury.

The liquid level chart shows volume of liquid nitrogen vs. depth for HC Series refrigerators. These values are approximate and are based on a standard condition with no stored material in the container. With stored material, the liquid volume will be slightly less than the value of the chart.

Model(s)	Liters/inch	Liters/cm
HCL12/HC20	1.25	0.5
HCL21/HC34/ HC35/HC34	2.3	0.9

INSERTING OR REMOVING CANISTERS: To prevent unnecessary loss of liquid nitrogen and accumulation of ice, the necktube core (the stopper) should remain in the container when the stored material is not being accessed. When accessing stored material, the necktube core should be removed as briefly as possible.

When removing material from the canisters, withdraw the canister just far enough to remove contents. Completely withdrawing the canister will unnecessarily expose the stored material to warm, room temperature conditions.



WARNING

Some canisters have liquid drain openings; some do not. If canisters are completely removed from the container, liquid nitrogen may remain in the canister or drain from the bottom. When removing canisters, stop briefly at the necktube to allow liquid to drain completely, then handle the canister carefully to prevent personal injury. Avoid direct canister contact with bare skin. The use of proper personal protective equipment is strongly urged – cryogenic gloves, face shield and gown – to protect against splashing.

When room temperature product is added, slowly lower the canister into the refrigerator to reduce the boiling of refrigerant and the surge of cold nitrogen gas. When inserting the canister, tilt the bottom of the canister in the direction of the index ring notch.

SECURING CONTENTS: The contents of all models may be secured with a seal or lock through tabs on the edge of the lid opposite the hinge.

ROUTINE CARE & MAINTENANCE

If ice accumulates inside the necktube, a general cleaning of the refrigerator should be

TW-346

High Capacity Liquid
Nitrogen Refrigerators

HC SERIES

scheduled as soon as the stored material can be conveniently transferred to another refrigerator. To clean the unit, first remove stored material, then pour out the liquid, disposing of it out-of-doors where the cold liquid will not damage driveways and other surfaces. Warm the container by purging it with air even after the container has warmed to room temperature to evaporate any collected moisture. When the container is ice-free and dry, rinse the inner vessel with household bleach. Wash the inner vessel with a 40 to 1 ratio of water to laundry detergent solution. Rinse and dry inside and out thoroughly before placing the container back into service. Do not use sharp instruments to chip ice; permanent damage to the container could result. DO NOT attempt to fasten any device to the container. Welding, brazing, or piercing of the container in any manner will cause permanent damage.

Refrigeration depends on the presence of liquid nitrogen in the refrigerator. Be sure to maintain correct refrigerant levels to prevent loss of stored material. **Check liquid levels regularly.** If high evaporation rates are apparent under normal operating conditions, the refrigerator may be losing its vacuum. Sweating and the formation of frost on the outer casing are indications that the vacuum integrity of the refrigerator is not normal. All necessary steps should be taken to protect the refrigerator's contents. If these conditions persist, contact your supplier or Taylor-Wharton's Technical Response Department at 1-800-TW-TANKS (898-2657) or e-mail us at cryotanks@taylorwharton.com for information on how to conduct a normal evaporation rate (NER) test in the field.

TRANSPORTATION

Although these refrigerators are rugged, they can be damaged or abused if otherwise mishandled. When moving or transporting the refrigerator, take every precaution to prevent sliding, tipping, bumping, or dropping the unit. **All refrigerators must be kept upright.** Refrigerators containing liquid nitrogen must never be transported in sealed compartments. Ventilation must be assured to prevent the displacement of air and the related suffocation hazard.

RETURNS

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 manufacturing defects. If you would like to return goods to Taylor-Wharton for any reason, you must first obtain a Material Return Authorization (MRA) number for tracking purposes. Please have a description of your symptoms and

the refrigerator's serial number ready. Contact your supplier or call Taylor-Wharton's Technical Response Department at 1-800-TW-TANKS (898-2657) or email us at cryotanks@taylorwharton.com.

ACCESSORIES

The following accessories are available for HC Series refrigerators:

- **Roller Base** - with ball bearing swivel casters to provide convenience and portability within a working area where frequent container movement is necessary or desirable.
P/N R018-8C00 HCL12, HC20
P/N R033-8C00 HC34, HC35, VHC35
- **Liquid Level Measuring Rod** - is graduated in both inches and centimeters. This accessory is inserted into the cryogenic refrigerant in order to determine the actual liquid level
P/N R033-8C11 all units
- **A 7th Canister** is available to increase the vial or straw storage capacity of your container by 23% for the VAC35.
P/N R036-9C27 VHC35
- **Liquid Level Measuring Rod** - is graduated in both inches and centimeters. This accessory is inserted into the cryogenic refrigerant to determine the actual liquid level.
P/N R033-8C11 for all units
- **Low Liquid Level Alarm** - for all passive monitoring for refrigerant level. This battery-powered alarm is available for units that may be used for long-term storage, where an unusual low liquid could go unnoticed.
P/N R034-8C15 for the HC34
P/N R037-8C15 for the HC35
P/N R036-8C30 for the VHC35

Common Parts

Lid	R033-9C11
Lid Hinge Pin (2 required)	6550-1000
Lid Hinge Pin Retainer	8956-1013
Handle (HCL12)	R010-5C11
Handle Pin (HCL12)	8631-5000

REPLACEMENT PARTS

Refrigerators	HCL12	HC20	HC34	HC35	VHC35
Canister, Single	R012-9C24*	R020-9C24	R034-9C24	R037-9C24	R036-9C24
Necktube Core	R012-9C16*	R020-9C16	R034-9C16	R037-9C16	R036-9C16

*Replacement parts for nine canister version: R011-9C24/ canister; R011-9C16/Necktube core

Ordering Information

Order all replacement parts and accessories from your distributor. Please include the part and model number of your refrigerator, the part and model number, quantity, and description of each part requested. For more information or name of your local distributor, contact Taylor-Wharton at the address listed below.

Taylor-Wharton
4075 Hamilton Blvd.
Theodore, AL 36582
Phone: (251) 443-8680
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Taylor-Wharton

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