

# Instructions for XL-45HP, XL-50HP, XL-55HP and XL-50VHP with Dual Regulator



Do not attempt to use or maintain this unit until you read and understand these instructions. Do not permit untrained persons to use or maintain this unit. If you do not fully understand these instructions, contact your supplier for further information.



**Taylor-Wharton**

Harsco

## CONTAINER SAFETY

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### NOTE:

For detailed information on the handling of cryogenic liquids, refer to the Compressed Gas Association publication: P-12 "Safe Handling of Cryogenic Liquids" available from the Compressed Gas Association, Inc. 1235 Jefferson Davis Highway, Arlington, VA 22202.

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**Pressure Hazard** – The containers covered by this literature may contain pressures up to 350 psig (24 bar/2413 kPa) for the XL-45HP/50HP/55HP and pressures up to 500 psig (34 bar/3447 kPa) for the XL-50VHP. Sudden release of this pressure may cause personal injury by issuing cold gas or liquid, or by expelling parts during servicing. Do not attempt any repairs on these containers until all pressure is released, and the contents have been allowed to vaporize to ensure no pressure build-up can occur.

**Extreme Cold-Cover Eyes and Exposed Skin** – Accidental contact of the skin or eyes with any cryogenic liquid or cold issuing gas may cause a freezing injury similar to frost-bite. Protect your eyes and over your skin when handling the container or transferring liquid, or in any instance where the possibility of contact with liquid, cold gases and cold gas may exist. Safety goggles or a face shield should be worn when withdrawing liquid or gas. Long-sleeved clothing and gloves that can be easily removed are recommended for skin protection. Cryogenic liquids are extremely cold and will be at temperatures below -300°F (-184°C) under normal atmospheric pressure.

**Keep Equipment Well Ventilated** – Although some of the gases used in these containers are non-toxic and non-flammable, they can cause asphyxiation in a confined area without adequate ventilation. An atmosphere that does not contain enough oxygen for breathing will cause dizziness, unconsciousness, or even death. These gases cannot be detected by the human senses and will be inhaled normally as if they were air. Ensure there is adequate ventilation where these gases are used and store liquid containers outdoors or only in well ventilated areas.

**Replacement Parts Must be "Cleaned for Oxygen Service"** – Some materials, especially non-metallic gaskets and seals, can be a combustion hazard if used in oxygen or nitrous oxide service, although they may be acceptable for use with other cryogenic liquids. Use only Taylor-Wharton recommended spare parts, and be certain parts used on oxygen or nitrous oxide equipment marked "cleaned for oxygen service". For information on cleaning, consult the Compressed Gas Association (CGA) pamphlet G-4.1, "Cleaning for Oxygen Service" or equivalent industrial cleaning specifications.

**Install Relief Valves in Cryogenic Liquid Lines** - When installing piping of fill hose assemblies, make certain a suitable safety relief valve is installed in each section of plumbing between shut-off valves. Trapped liquefied gas will expand as it warms and may burst hoses or piping causing damage or personal injury.

## GENERAL INFORMATION

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### NOTE:

The XL-50VHP is not designed to store or transport cryogenic liquid nitrous oxide.

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The XL-45HP, XL-50HP, XL-55HP and XL50VHP are vacuum insulated, stainless steel containers designed to store and transport cryogenic liquid oxygen, nitrogen, argon, carbon dioxide, and nitrous oxide. Built to DOT 4L standards, these containers may be used for over the road transportation of cryogenic fluids, as well as on-site storage and supply in a wide range of applications.

As rugged, long holding time, self-contained gas supply systems, these cylinders are capable of providing continuous flow rates of up to 150 cfh (3.9 cu.m/h) in carbon dioxide service, up to 110 cfh (2.9 cu.m/h) in nitrous oxide service, up to 350 cfh (9.2 cu.m/h) in other gas services. The XL-45HP/50HP/55HP are designed to hold liquid with a relief valve setting of 350 psig (24 bar/2413 kPa) and the XL-50VHP with a relief valve setting of 500 psig (34 bar/3447 kPa), which provides greater holding times than lower pressure cryogenic containers.

# SPECIFICATIONS

	XL-45HP	XL-50HP	XL-55HP	XL-50VHP
Dimensions				
Diameter	20 in. (508 mm)	20 in. (508 mm)	20 in. (508 mm)	20 in. (508 mm)
Height	61 3/8 in. (1559 mm)	64 5/8 in. (1641 mm)	69 7/16 in. (1764 mm)	64 3/4 in. (1645 mm)
Weight				
Empty (Nominal)	272 lb. (123 kg)	284 lb. (129 kg)	287 lb. (130 kg)	310 lb. (141 kg)
Capacity, Gross	176 liters	188 liters	208 liters	188 liters
Capacity, Useable Liquid	165 liters	176 liters	198 liters	176 liters
Weight of Contents Maximum				
Based on DOT Rated Service Pressure				
Carbon Dioxide	387 lb. (176 kg)	414 lb. (188 kg)	458 (208 kg)	381 (173 kg)
Oxygen	360 lb. (163 lb.)	385 lb. (175 kg)	426 (193 kg)	364 lb. (165 kg)
Nitrogen	252 lb. (114 kg)	269 lb. (122 kg)	298 lb. (135 kg)	240 lb. (109 kg)
Argon	438 lb. (199 kg)	467 lb. (212 kg)	518 lb. (235 kg)	443 lb. (201 kg)
Nitrous Oxide	368 lb. (167 kg)	393 lb. (178 kg)	435 lb. (197 kg)	N/A
Normal Evaporation Rate*				
(% Capacity per Day)				
Carbon Dioxide	0.75%0.75%	0.75%	0.80%	
Oxygen	1.4%	1.2%	1.2%	1.5%
Nitrogen	2.2%	2.0%	1.9%	2.2%
Argon	1.4%	1.2%	1.2%	1.5%
Nitrous Oxide	0.75%	0.75%	0.75%	N/A
Gas Flow Rate @ NTP (STP)**				
Carbon Dioxide	150 cfh (3.9 cu.m/h)	150 cfh (3.9 cu.m/h)	150 cfh (3.9 cu.m/h)	150 cfh (3.9 cu.m/h)
Oxygen, Nitrogen, Argon	350 cfh (9.2 cu.m/h)	350 cfh (9.2 cu.m/h)	350 cfh (9.2 cu.m/h)	350 cfh (9.2 cu.m/h)
Nitrous Oxide	110 cfh (2.9 cu.m/h)	110 cfh (2.9 cu.m/h)	110 cfh (2.9 cu.m/h)	N/A
Relief Valve Setting	350 psig (24 bar/2413 kPa)	350 psig (24 bar/2413 kPa)	350 psig (24 bar/2413 kPa)	500 psig (34 bar/3447 kPa)
Inner Container Bursting Disc	525 psig (36 bar/3620 kPa)	525 psig (36 bar/3620 kPa)	525 psig (36 bar/3620 kPa)	750 psig (52 bar/5171 kPa)
Dual Pressure Building/ Economizer Regulator***				
Pressure Building Setting	300 psig (20.7 bar/2068 kPa)	300 psig (20.7 bar/2068 kPa)	300 psig (20.7 bar/2068 kPa)	400 psig (28 bar/2758 kPa)
Economizer Setting	320 psig (22 bar/2206 kPa)	320 psig (22 bar/2206 kPa)	320 psig (22 bar/2206 kPa)	420 psig (29 bar/2896 kPa)
Design Specifications				
TC	4LM	4LM	N/A	N/A
DOT	4LM	4LM	4LM	4LM
Gaseous Capacity				
Based on DOT Rated Service Pressure				
@ NTP (STP)				
Carbon Dioxide	3383 cu.ft. (89 cu.m)	3619 cu.ft. (95cu.m)	4003 cu.ft. (108 cu.m)	3330 cu.ft. (88 cu.m)
Oxygen	4350 cu.ft. (114 cu.m)	4651 cu.ft. (122 cu.m)	5146 cu.ft. (135 cu.m)	4397 cu.ft. (116 cu.m)
Nitrogen	3478 cu.ft. (91 cu.m)	3712 cu.ft. (98 cu.m)	4112 cu.ft. (108 cu.m)	3312 cu.ft. (87 cu.m)
Argon	4236 cu.ft. (111 cu.m)	4516 cu.ft. (119 cu.m)	5012 cu.ft. (132 cu.m)	4285 cu.ft. (113 cu.m)
Nitrous Oxide	3211 cu.ft. (84 cu.m)	3429 cu.ft. (90 cu.m)	3796 cu.ft. (106 cu.m)	N/A

Specifications are subject to change without notice.

\* Vented N.E.R. based on Useable Liquid Capacity.

\*\* Container pressure at or above factory Dual Pressure Building/Economizer Regulator setting.

\*\*\* Regulator has a pressure delta of 20 psig (1.4 bar/138 kPa).

## Handling the Container

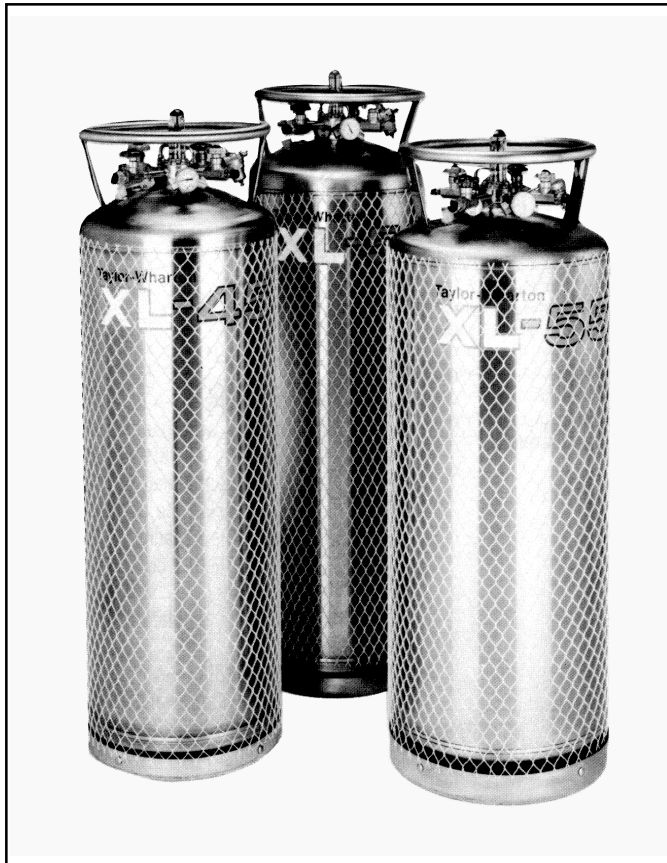
The XL Series containers are very rugged liquid cylinders. All cryogenic liquid containers have an inner container and an outer container with an insulated vacuum space between them. Any abuse (dents, dropping, tip-over, etc.) can effect the integrity of the containers insulation system.

When fully loaded, the XL-55HP in argon service will contain up to 518 lb (235 kg) of product. While moving a full container, you may be handling up to 805 lb. (365 kg), and you should treat the load accordingly. The attachment points provided on the XL-45HP/50HP/55HP/50VHP will allow you to use a hand truck or a hoist to handle these loads properly. Do not attempt to move these cylinders by any other means. While moving the cylinder, the following precautions should be observed:

- Never lay the container on its side. Always ship, operate, and store the unit in a vertical, or upright position.
- When loading or unloading the container from a truck, use a hand truck, lift gate, crane, or parallel loading dock. Never attempt to manually lift the unit.
- To move the container over rough surfaces, or to lift the container, attach an appropriate sling to the lifting points cut into the welded support posts, and use a portable lifting device that will handle the weight of the container and its contents.

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### **XL-45HP, XL-50HP XL-55HP, XL-50VHP Containers**



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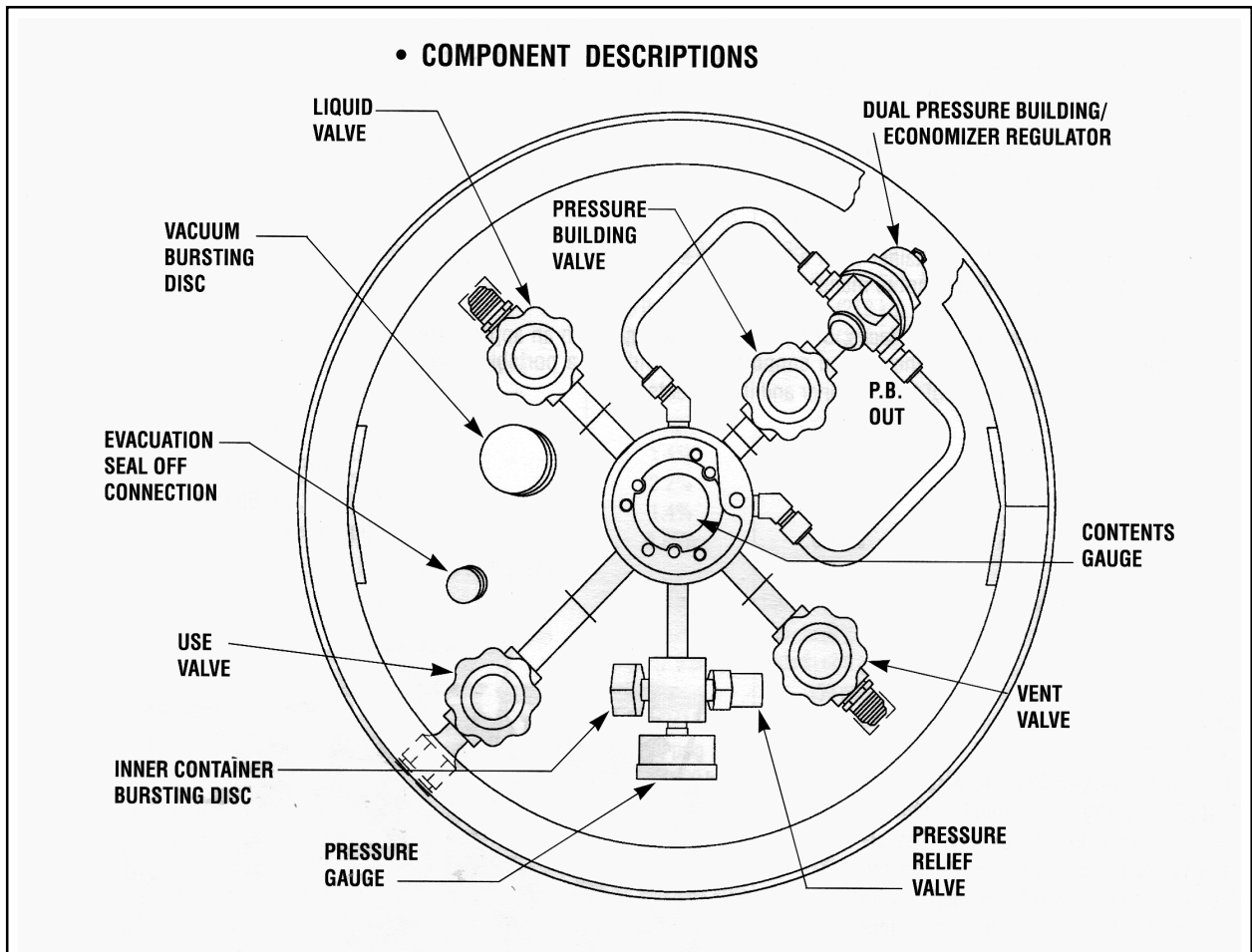
### **FREIGHT DAMAGE PRECAUTIONS**

ANY FREIGHT DAMAGE CLAIMS ARE YOUR RESPONSIBILITY. Cryogenic liquid containers are delivered to your carrier from Taylor-Wharton's dock in new condition. When you receive our product you may expect it to be in that same condition. For your own protection, take time to visually inspect each shipment in the presence of the carrier's agent before you accept delivery. If any damage is observed, make an appropriate notation on the freight bill. Then ask the driver to sign the notation before you receive the equipment. You should decline to accept containers that show damage which may affect serviceability.

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## OPERATION

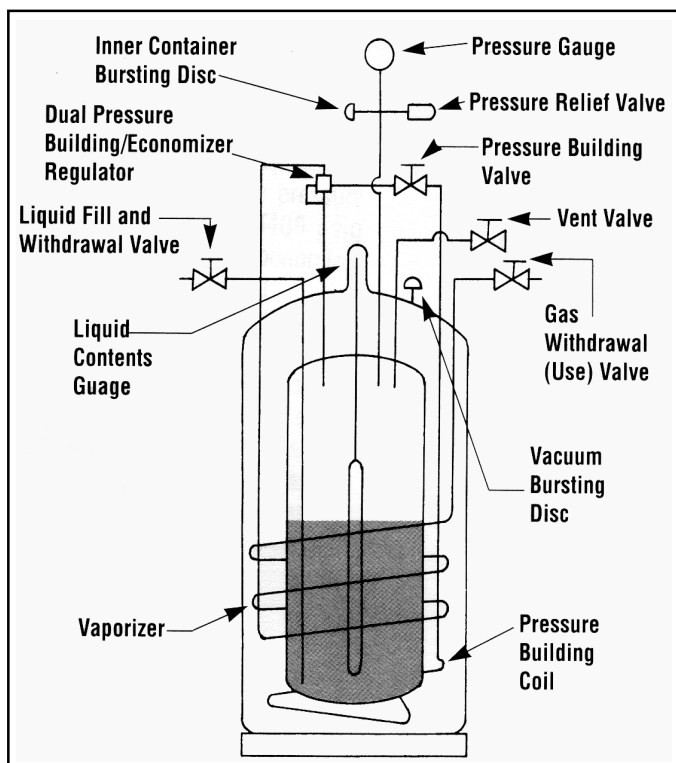
The XL-45HP will store up to 165 liters of product; the XL 50HP/50VHP up to 176 liters, and 196 liters for the XL-55HP. All four cylinders can deliver either liquid or gas. The following component and circuit descriptions are pertinent to the operation of all the containers and should be read before attempting operation. The components may be identified on the Component Location Illustration.



### XL-45HP/50HP/ 55HP/50VHP Component Locations

**Internal Vaporizer** – A liquid container for gas service must have an internal heat exchanger that functions as a gas vaporizer coil to convert liquid product to gas continuously during withdrawal. The XL-45HP/50HP/55HP/50VHP utilize an internal heat exchanger that is inside the vacuum space attached to the container's outer casing. It provides a mean of introducing heat from outside the container's insulated jacket, to vaporize liquid as gaseous product is withdrawn. The capacity of this circuit is sufficient to vaporize at flow rates up to 350 cfh @ NTP (9.2 cu.m/h @STP). If a greater continuous demand is put on the vaporizer, an external vaporizer should be added to properly warm the gas and avoid malfunction, or damage, to gas regulators, hoses, and other downstream components.

**Pressure Building** – A Pressure Building circuit is used to ensure sufficient driving pressure during high withdrawal periods. This function is actuated by opening a hand valve that creates a path from the liquid in the bottom of the container, through the Pressure Building Regulator, to the gas space in the top. When the pressure building valve is open, and the container pressure is below the pressure building regulator setting, liquid taken from the



inner container is vaporized in a heat exchanger which is inside the outer casing. The expanding gas is fed into the upper section of the container to build pressure. The resulting process will drive either the liquid or gas delivery system.

Pressure Building is not normally required unless container pressure drops below the gas output pressure desired. If, for example, the container pressure gauge reads 250 psig (17.2 bar/1724 kPa), and your gas pressure requirement is 270 psig (19 bar/1860 kPa), and the pressure building valve may be opened to build container pressure to 300 psig (20.7 bar/2068 kPa).

**Economizer** – An economizer circuit withdraws gas preferentially from the head space over the liquid container – gas that would otherwise be lost to venting. Excess pressure in the head space of the container is relieved by allowing gas to flow from this area directly to the USE valve outlets while gas is being withdrawn from the container; yet normal operating pressure is preserved to ensure uninterrupted product delivery. The economizer is automatic and requires no operator attention.

**The USE Valve** – This valve controls the gas outlet that allows product withdrawal through the internal vaporizer. It has the required CGA connection that matches the gas service for which the container is configured.

## XL-45HP/XL-50HP/ XL-55HP and XL-50VHP Flow Diagram

**The LIQUID Valve** – Liquid product is added or withdrawn from the container through the connection controlled by this valve. It has the CGA fitting that is required for liquid line connections. The valve is opened for fill or liquid withdrawal after connecting a transfer hose with compatible fittings to the LIQUID line connection.

### NOTE:

The economizer and pressure building functions are controlled by a single dual action regulator. The pressure delta between the pressure building setpoint and the economizer setpoint is approximately 20 psig (1.4 bar/138 kPa). This delta cannot be altered.

### WARNING:

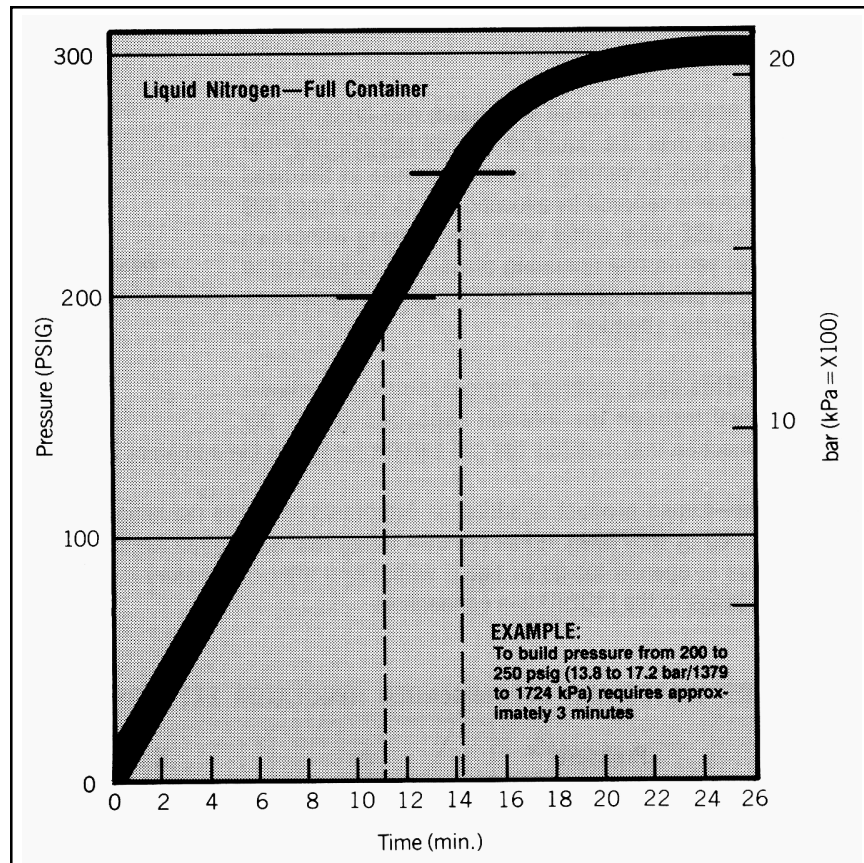
Never use the Dual Pressure Building/Economizer Regulator or Relief Valve for the XL-50VHP on any other container.

### RELIEF VALVES AND RECOMMENDED REGULATOR SETTINGS

Relief Valve Setting	Pressure Building Setting	Economizer Setting	Normal Operating Range
22 psig 1.5 bar 152 kPa	N/A N/A N/A	N/A N/A N/A	0-22 psig 0-1.5 bar 0-152 kPa
230 psig 16 bar 1586 kPa	125 psig 8.6 bar 862 kPa	145 psig 10 bar 1000 kPa	75-175 psig 5-12 bar 517-1207 kPa
350 psig 24 bar 2413 kPa	300 psig 20.7 bar 2068 kPa	320 psig 22 bar 2206 kPa	200-350 psig 13.8-24 kPa 1379-2413 kPa
500 psig 34 bar 3447 kPa	400 psig 28 bar 2758 kPa	420 psig 29 bar 2896 kPa	300-600 psig 20.7-41 bar 2068-4137 kPa

## Pressure Building Rates Graph

**CAUTION:** When withdrawing liquid gas from the cylinder, the capacity of the internal vaporizer can be exceeded. If gas is withdrawn at rates greater than the vaporizer capacity, liquid or very cold gas will be discharged. Severe damage to external equipment could result from the extreme cold.



**The Pressure Gauge** - The pressure gauge displays the internal container pressure in pounds-per-square-inch or in kiloPascals.

**The Full View Contents Gauge** – The container contents gauge is a float type liquid level sensor that indicates container liquid content through a magnetic coupling to a yellow indicator band. This gauge is an indication of approximate container contents only and should not be used for filling; liquid cylinders should be filled by weight.

**Relief Devices** – These cylinders have a gas service relief valve and inner container bursting disc with settings of 350 psig (24 bar/2412 kPa) and 525 psig (36 bar/3620 kPa) respectively for the XL-45HP/50HP/55HP and 500 psig (34 bar/3447 kPa) and 750 psig (52 bar/5171 kPa) for the XL-50VHP. Relief valves of 230 psig (16 bar/1586 kPa) and 22 psig (1.5 bar/152 kPa) are available if medium pressure operation is desired. Alternate pressure building regulator and economizer settings are required if medium-pressure relief valves are installed.

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**CAUTION:**

Internal orifices in pressure regulators used with CO<sub>2</sub> are subject to the formation of dry ice if excessively cold gas or high flow rates are used. If this condition occurs, an external vaporizer should be used to ensure the gas is warmed before it reaches the regulator.

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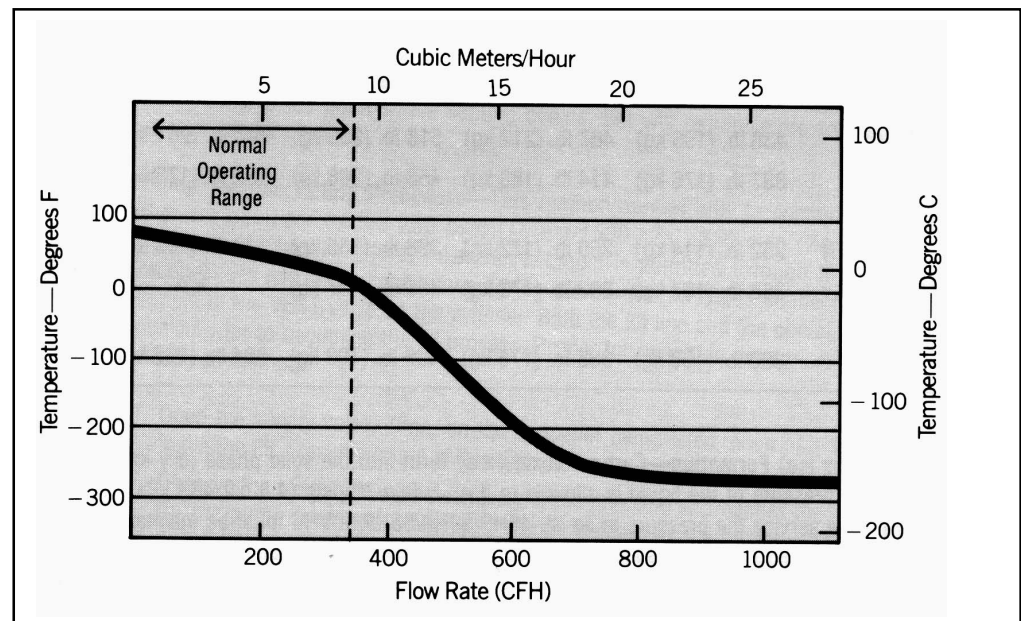
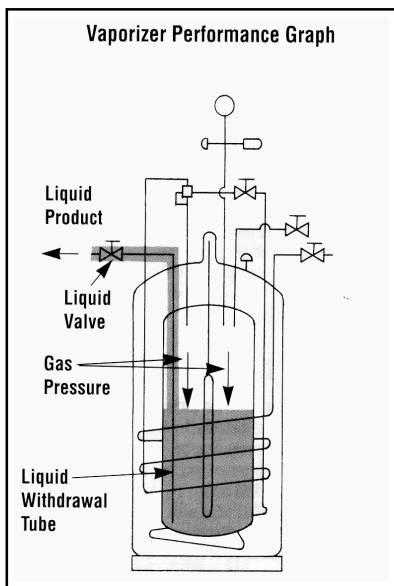
## WITHDRAWING GAS FROM THE CONTAINER

To withdraw gas from the XL-45HP/50HP/55HP/50VHP connect a suitable pressure regulator to the USE connection, and the output of the regulator to your external equipment. Then open the USE connection, and the output of the regulator to your external equipment. Then open the USE and the PRESSURE BUILDING valves. When the container pressure reaches 125 psig (8.6 bar/862 kPa), 300 psig (20.7 bar/2068 kPa) or 400 psig (28 bar/2758 kPa) if equipped with the higher valve Dual Pressure Building/Economizer regulator – set the pressure regulator for the desired delivery pressure.

**Increasing Gas Supply Capacity** – Two or more liquid containers may be manifolded together. Accessory manifolds are available for use in creating a higher capacity gas supply system. The XL-45HP/50HP/55HP/50VHP can supply gas at flow rates<sup>1</sup> up to 350 cfh @ NTP (9.2 cu. m/h @ STP) using only its internal vaporizer. At low flow rates, the gas supplied will be at near ambient temperature. As the flow demand is increased, the gas will become proportionately colder. If greater vaporizing capacity is required, an accessory external vaporizer is available. When an external vaporizer is used, it must be connected to the USE valve and the regulator moved to the output of the external vaporizer.

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### Vaporizer Performance Graph



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## Liquid Withdrawal

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**CAUTION:**

To avoid contamination, close the LIQUID valve on an empty container before disconnecting the transfer line.

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## WITHDRAWING LIQUID FROM THE CONTAINER

When a container is used to supply liquid product, such as in an application as portable distribution container for carbon dioxide, liquid may be withdrawn from the XL-45HP/50HP/55HP/50VHP.

Attach a transfer hose to the LIQUID connection and open the adjacent LIQUID valve. The pressure in the container will drive liquid product out through the valve as the container pressure exceeds that of the receiver.

The rate of liquid withdrawal from these containers is variable depending on the gas phase pressure and the saturation temperature of the liquid.

<sup>1</sup> See Specifications for your application.

## FILLING THE CONTAINER

Cryogenic liquid containers must always be filled by weight to ensure there is enough gas head space (ullage) for liquid to expand as it warms. Using the procedure bellow, first determine the proper filled weight of each container. The weight derived is then used in either the Pump Transfer or Pressure Transfer filling procedures that follow.

**NOTE:**  
The weight calculation includes the weight of residual liquid and is applicable to both Pressure Transfer and Pump Transfer filling methods.

**WARNING:**  
Filling operations should take place only in well ventilated areas. Accumulations of product gas can be very dangerous (refer to the safety precautions in the front of these instructions). Maintain adequate ventilation at all times.

**NOTE:**  
If the pressure in the container is somehow lost, the dry ice block that forms may be thawed by pressurizing the cylinder to 280 psig (19.3 bar/1931 kPa) with carbon dioxide liquid and gas from an external source, and allowing several days at this pressure to thaw the cylinder.

### Determining Proper Fill Weight

1. Visually inspect the container. Do not attempt to fill containers with broken or missing components.
2. Move the container to a filling station scale and weight it both with and without the fill hose attached to determine the weight of the fill line assembly. The difference is the fill line weight.
3. To determine the weight, at which the fill should be stopped, add the desired filling weight (from the table below), the transfer line weight, and the Tare Weight from the container's data plate.

FILLING WEIGHTS

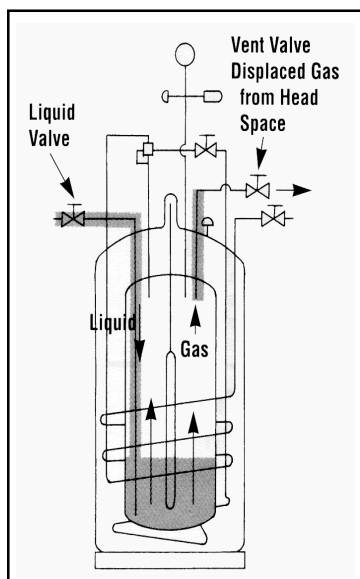
	XL-45HP	XL-50HP	XL-55HP	XL-50VHP
ARGON	438 lb. (199 kg)	467 lb. (212 kg)	518 lb. (235 kg)	443 (201 kg)
CARBON DIOXIDE	387 lb. (176 kg)	414 lb. (188 kg)	458 lb. (208 kg)	381 lb. (173 kg)
NITROGEN	252 lb. (114 kg)	269 lb.(122 kg)	298 lb. (135 kg)	240 lb. (109 kg)
NITROUS OXIDE	368 lb. (167 kg)	393 lb. (178 kg)	435 lb. (197 kg)	N/A
OXYGEN	360 lb. (163 kg)	385 lb. (175 kg)	426 lb. (193 kg)	364 lb. (165 kg)

**Solid CO<sub>2</sub> (Dry Ice) Formation - Carbon** dioxide may form into the solid phase (dry ice) if the saturated pressure of the liquid is allowed to drop below 70 psig (4.8 bar/483 kPa.) In carbon dioxide service, the pressure in a XL-45Hp/50HP/55HP/50VHP must be maintained above this pressure to ensure a solid block will not form inside the container. If a container is being filled with CO<sub>2</sub>, it may be necessary to pressurize the container with gaseous CO<sub>2</sub> before beginning the fill.

### Pressure Transfer Filling Method

Filling a liquid cylinder using the pressure transfer method is common for 22 psig (1.5 bar/ 152 kPa) service where the product is used for refrigerant purposes. This method may also be used for higher-pressure cylinders to increase liquid holding time. A fill is accomplished by first establishing a pressure difference between source vessel and the XL-45Hp/50HP/55HP/50VHP (higher pressure at the bulk vessel). The pressure differential will then push the liquid from the storage vessel to the container being filled. This method is employed when no transfer pump system is available, or if a greater control over liquid temperature is desired.

Filling the container is accomplished through the LIQUID valve while the VENT valve is open or partially open to control product pressure. Careful control of pressure will control the amount of heat retained in the liquid. Lower pressure results in colder liquid transferred to the container and increases, or lengthens, product holding time.



**Pressure Transfer Filling Procedure (Low Pressure Source)** - Once you have determined the proper full weight for a container, connect a transfer hose to the LIQUID fitting from a low-pressure source of liquid.

1. Open the supply valve. Then, on the XL-45HP/50HP/55HP/50VHP, open the LIQUID and VENT valves to begin the fill.
2. During the fill, monitor the container pressure and maintain a pressure of 10-15 psig (0.7-1 bar/69-103 kPa) by throttling the VENT valve. Not for CO<sub>2</sub> service.
3. When full weight is reached, close both the LIQUID and VENT valves.
4. Close the liquid supply valve and open the dump valve on fill line assembly.
5. Disconnect the fill line from the container and remove the container from the scale.

### Pump Transfer Filling Method

When a pump is used for filling liquid containers, the fill may be accomplished through either the VENT valve or the LIQUID valve. Filling through the VENT valve recondenses gas in the area over the liquid in the cylinder and reduces product loss during the fill. This method will also result in liquid near the saturation temperature of the supply vessel. Filling through the LIQUID valve may provide colder liquid and longer holding time before the liquid warms to the point where venting gas begins, but will require more frequent venting and greater product loss.

**Pump Transfer Filling Procedure** – This method applies only to containers in gas service that are equipped with a 230 psig (16 bar/1586 kPa), 350 psig (24 bar/2413 kPa) or 500 psig (34 bar/3447 kPa) relief valve. Liquid is admitted through the vent valve and recondenses gas in the head space during the fill. The fill line is connected from the liquid supply to the VENT valve on the cylinder. Both the fill line and the container should be pre-cooled prior to beginning the fill process. Proper full weight is determined by the previously explained method.

1. Open the supply valve. Then, on the container being filled, open only the VENT valve to begin the fill. Start the pump at this time.
2. Observe the container pressure closely. If the pressure approaches the relief valve setting (or the pump pressure rating) stop the fill process at the supply, and open the fill line dump valve to vent excess pressure. As soon as the pressure has dropped to a level that will allow you to resume the fill, close the dump valve and restart the pump (or reopen the supply valve.)
3. When full weight is reached, close the VENT valve. Stop pump (where applicable), close liquid supply valve and open the dump valve on fill line assembly to vent trapped liquid.
4. Disconnect the fill line from the container and remove the container from the scale.

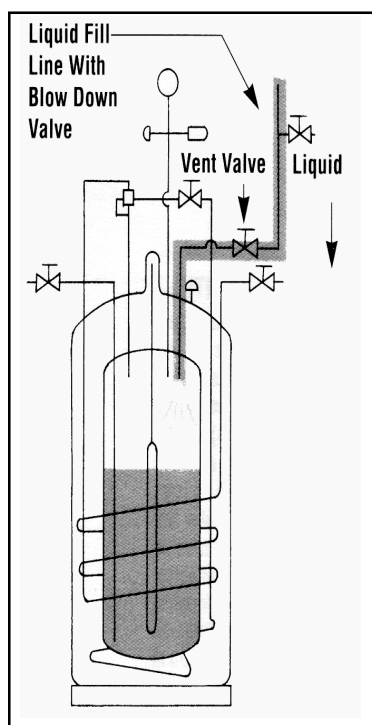
### Fill Hose Kits

Taylor-Wharton fill hose kits for the XL-45/50HP/55HP/50VHP are designed to transfer specific liquefied gases to, or from, the containers. These accessories are comprised of a Fill Tee Assembly and a Fill Hose. Cryogenic transfer hoses are constructed of stainless steel for the transfer of cryogenic liquids, and are available in four or six feet (1.2 or 1.8 m) lengths with a 3/8 in. NPT fitting on one end and CGA service-specific female fittings on the other. A Fill Tee Assembly consists of a cross fittings with a CGA end fitting, relief valve and manual dump valve.

## Pressure Transfer Filling From a Low Pressure Source

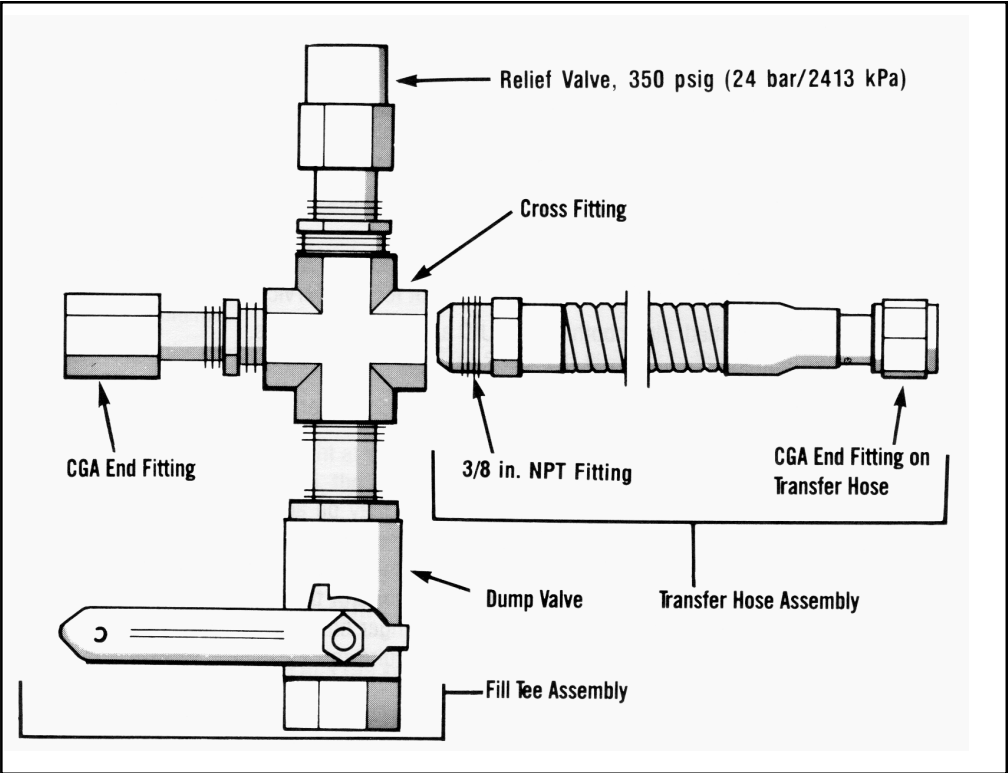
### CAUTION

With carbon dioxide, pressure in the container being filled must be above 70 psig (4.8 bar/483 kPa) before the fill begins and at all times during the fill to prevent the product from freezing into dry ice.



## Pump Transfer Liquid Fill Through Vent Valve

Fill Hose Kits



In use, the CGA Tailpiece couples to the fill connection on the container being filled. The Relief Valve vents pressure over 350 psig (24 bar/2413 kPa) that builds up in the fill line due to trapped liquid. The Dump Valve is used to allow the operator to blow-down the receiving container during a pump fill, or to relieve residual pressure from expanding liquid trapped in the line before disconnecting the fill line.

Fill kits are available with different combinations of hose length and fittings for a specific gas service. The following chart identifies the available transfer hoses and fill tee assemblies.

TRANSFER HOSE CHART

Description (Service/Hose Length)	Cylinder Connections(s)	End Fittings	Part Number
<b>Inert (N<sub>2</sub>,Ar) Service</b>			
4 ft. (1.2 m) Stainless Steel	LIQUID or VENT Valve	CGA 295 to 3/8 in. NPT	1700-9C65
6 ft. (1.8 m) Stainless Steel	LIQUID or VENT Valve	CGA 295 to 3/8 in. NPT	1600-9C66
6 ft. (1.8 m) Stainless Steel	USE Valve	CGA 580 to 3/8 in. NPT	GL50-8C51
<b>Oxygen Service</b>			
6 ft. (1.8 m) Stainless Steel	LIQUID or VENT Valve	CGA 440 to 3/8 in. NPT	GL50-8C53
6 ft. (1.8 m) Stainless Steel	USE Valve	CGA 540 to 3/8 in. NPT	GL50-8C56
<b>Carbon Dioxide Service</b>			
6 ft. (1.8 m) Stainless Steel	LIQUID or USE Valve	CGA 320 to 3/8 in. NPT	HP50-8C51
4 ft. (1.2 m) Stainless Steel	VENT Valve	CGA 295 to 3/8 in. NPT	1700-9C65
6 ft. (1.8 m) Stainless Steel	VENT Valve	CGA 295 to 3/8 in. NPT	1600-9C66
<b>Nitrous Oxide Service</b>			
4 ft. (1.2 m) Stainless Steel	VENT Valve	CGA 295 to 3/8 in. NPT	1700-9C65
6 ft. (1.8 m) Stainless Steel	VENT Valve	CGA 295 to 3/8 in. NPT	1600-9C66

## VENT TEE CHART

### **WARNING:**

Never put any liquid cylinder into another service once it has been in CO<sub>2</sub> service.

The vent tee chart connects to a transfer hose to complete a fill line kit. Each assembly includes a 3/8 in. pipe connector to CGA fitting with a 350 psig (24 bar/2413 kPa) relief valve, and a ball-type dump valve.

Service	CGA Connection	Part Number
Inert (N <sub>2</sub> , Ar)	CGA 295	GL50-8C60

## MAINTENANCE PROCEDURES

### **WARNING:**

For O<sub>2</sub> users: Residue of leak detectors solutions can be flammable. All surfaces to which the leak detector solutions have been applied must be adequately rinsed with potable water to remove all traces of residue. Reference CGA G-4, Section 5.9

### **CAUTION:**

Carbon dioxide may form into the solid phase (dry ice) if the pressure of the liquid is allowed to drop below 70 psig (4.8 bar/483 kPa). Pressure in the container must be maintained above this value to ensure a solid block of CO<sub>2</sub> will not form inside the container. Before performing maintenance on an XL-45HP/50HP/55HP/50VHP in CO<sub>2</sub> service, the contents must be transferred to another container so that container pressure can be released.

Read the Safety Precautions in the front of this manual before attempting any repairs on these containers. Also follow these additional safety guidelines while performing container maintenance.

**Never work on a pressurized container.** Open the vent valve as a standard practice during maintenance to guard against pressure build-up from residual liquid.

**Use only repair parts cleaned for oxygen service.** Be certain your tools are free of oil and grease. This is a good maintenance practice, and helps ensure you do not create a combustion hazard when working on containers for oxygen or nitrous oxide service.

**Leak test connections after every repair.** Pressurize the container with an appropriate inert gas for leak testing. Use only approved leak test solutions and follow the manufacturer's recommendations. "Snoop" Liquid Leak Detector is one approved solution, it is available from: Nupro Co., 4800 E. 345<sup>th</sup> St., Willoughby, Ohio, 44094 U.S.A.

## CONVERTING A CONTAINER TO A DIFFERENT GAS SERVICE

XL-45HP/50HP/55HP/50VHP cylinders may be converted from one service to another within the confines of the argon, carbon dioxide, nitrogen, nitrous oxide, and oxygen service for which the containers are designed. Conversion consists of changing end connections at the USE, LIQUID and VENT valves; then changing the liquid level gauge scale by changing its plastic cover; and revising product decals. Parts are available in kit form for each gas service as illustrated in the following table.

### Service Change Procedure

Before removing any parts, empty the container and open the vent valve to prevent any pressure build-up in the unit.

1. Remove the LIQUID, VENT and USE end fittings, one at a time, with standard wrenches. Install new fittings from the Gas Service Change Kit, using Teflon tape or another oxygen-compatible thread sealant.
2. Remove the protective cover over the liquid level gauge. Replace the contents scale with the scale for the new gas service from the service change kit, then replace the protective cover.
3. Install new fittings for the USE, VENT and LIQUID connections from the Gas Service Change Kit. Leak test the fittings you just replaced, and change the gas service decals to complete the conversion.

**CAUTION**

When changing gas service, install the proper fittings – DO NOT use adapters. The following procedures address the physical changes to the container only. For detailed procedures on the decontamination of the container itself, refer to CGA pamphlet C-10 “Changes of Service for Cylinders Including Procedures for Inspection and Contaminant Removal.”

**CAUTION**

Carbon Dioxide and Nitrous Oxide may contain contaminants such as hydrocarbons, that are not easily removed from cylinders, and associated with components by conventional oxygen service cleaning procedures. Once a cylinder is placed into CO<sub>2</sub> or N<sub>2</sub>O gas service, it should never be converted to another gas service. See CGA pamphlet C-10 for proper procedures.

**NOTE:**

One clockwise turn of the adjustment will raise the setpoint by approximately 30 psig (2 bar/207 kPa). See the chart below to determine the range of adjustment for the regulator you are servicing. Do not attempt to set the regulator to a pressure outside of its design range.

**GAS SERVICE CHANGE KITS**

Kit Part No.	Gas Service	Valve Name	Connection Designation
GL50-8C35	Oxygen	LIQUID VENT USE	CGA 440 CGA 440 CGA 540
GL50-8C30	Nitrogen	LIQUID VENT USE	CGA 295 CGA 295 CGA 580
GL50-8C31	Argon	LIQUID VENT USE	CGA 295 CGA 295 CGA 580
HP50-8C30	Carbon Dioxide	LIQUID VENT USE	CGA 320 CGA 295 CGA 320
HP50-8C35	Nitrous Oxide	LIQUID VENT USE	CGA 326 CGA 295 CGA 326

**REGULATOR MAINTENANCE**

A dual stage, spring loaded regulator is employed for the pressure building/economizer circuit. This regulator can be adjusted on the container, replaced or checked and adjusted off the container in a readily fabricated bench adjustment fixture.

**Regulator Adjustment – On Container**

1. Fill the container with the appropriate liquid product.
2. Open the Pressure Building Valve and allow the container pressure to stabilize for about an hour. Note the point where the pressure stabilizes.
3. Adjust the screw on the top of the regulator to raise or lower the pressure to the desired point. When decreasing the setting, the pressure building valve must be closed and the container vented to a lower pressure. Then repeat step 2 in order to observe the change.

**REGULATOR ADJUSTMENT RANGES**

Part No.	Normal Setting	Range	Delta
8816-1060	400 psig 28 bar 2758 kPa	300 to 600 psig 20.7 to 41 bar 2068 to 4137 kPa	20 psig 1.4 bar 138 kPa
6999-9018	300 psig 20.7 bar 2068 kPa	200 to 350 psig 13.8 to 24.1 bar 1379 to 2413 kPa	
6999-9015	125 psig 8.6 bar 862 kPa	75 to 175 psig 5 to 12 bar 517 to 1207 kPa	

### Regulator Removal or Replacement Procedure

1. Close manual Pressure Building valve.
2. Vent the container to atmospheric pressure.<sup>2</sup>
3. Loosen and remove both the tube connections on the pressure building and economizer output sides of the regulator.
4. Remove the regulator from the container by unscrewing the valve body and elbow from the output of the Pressure Building Valve.
5. Repair the regulator and readjust its setpoint using the bench test setup.
6. To install a replacement or readjusted regulator, apply Teflon tape to the elbow on the container and thread the valve body onto the elbow.
7. Reconnect the tube connections to the regulator and tighten.
8. Pressurize the container and check it for leaks.

#### NOTE:

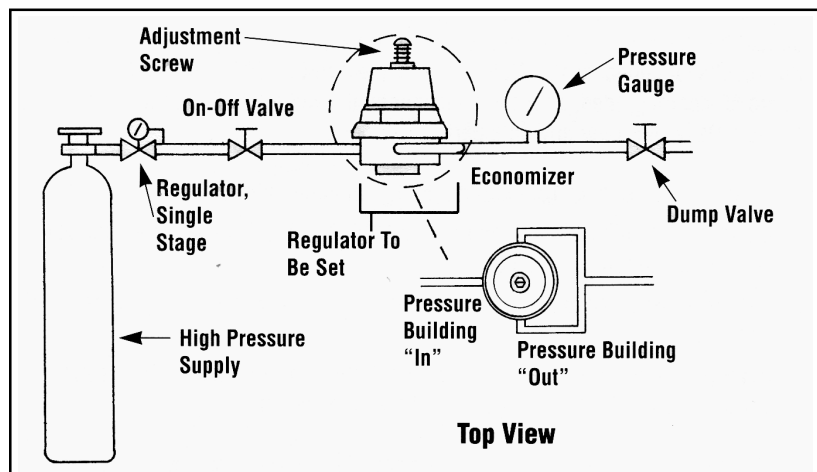
The regulator has directional gas flow. The arrow on the regulator body must put in the direction indicated in the Bench Adjustment Fixture illustration.

### Regulator Adjustment – Bench Procedure

Assemble the regulator adjustment fixture, and the regulator to be adjusted, as shown in the accompanying illustration.

1. Leak test joints between high pressure cylinder regulator and the dump valve. Joints must be leak free before proceeding.
2. Close the on/off valve and the Dump valve.
3. Slightly open the high pressure cylinder valve.
4. Set the high pressure regulator above the desired set point for the Pressure Building setpoint.
5. Slowly open the on/off valve and observe the downstream pressure gauge.

### Regulator Bench Adjustment Fixture



#### NOTE:

The economizer portion of the regulator has already opened approximately 20 psig (1.4 bar/138 kPa) below the pressure building setpoint.

6. When the regulator under test closes, the P.B. set point may be read on the downstream pressure gauge.
7. Close the on/off valve and open the Dump valve.
8. To reset the regulator, loosen the lock nut on the adjusting screw. Raise the set point by turning the adjusting screw clockwise; lower the setpoint by turning the screw counter clockwise. After adjustment, repeat steps 5 and 6 to check the setting before reinstalling the regulator on the liquid container.

<sup>2</sup> For units in CO<sub>2</sub> service, see caution for releasing pressure at the beginning of the Maintenance Section.

## CHECKING CONTAINER PERFORMANCE

Cryogenic containers are two containers, one within the other. The space between the containers acts as a highly efficient thermal barrier including high technology insulation, a vacuum, and a vacuum maintenance system. Each serves a very important part in the useful life of the container. The high technology insulation is very effective in preventing radiated heat from entering the inner container. The vacuum prevents heat convection or conduction from reaching the inner container. Unfortunately, the perfect vacuum cannot be achieved since trace gas molecules begin to enter the vacuum space from the moment of manufacture. The vacuum maintenance system can perform its function for years, but it has a limited capacity. When the vacuum maintenance system is saturated it can no longer maintain the vacuum integrity of the container. The change will be very gradual and may go unnoticed for several years. When the vacuum in the insulation space is no longer effective, the following symptoms may appear:

1. With liquid in the container and pressure building/vaporizer coil not in use, the outer casing will be much colder than comparative containers.
2. Frost, indicating the liquid level, may be visible on the outer casing of container.
3. The container may appear to "sweat" if the air surrounding the container is hot and humid.
4. The relief valve will open continuously until the container is empty.
5. The container will hold pressure for several days but will not hold liquid.

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**NOTE:**  
Fill through the LIQUID valve with the VENT valve open. The Pressure Building valve must be closed during the NER test or P.B. operation will increase evaporation and invalidate test results

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### NER Testing

If a loss of vacuum integrity is suspected, the container's Normal Evaporation Rate (NER) should be checked. The test measures the actual product lost over time so you can compare the results obtained to the NER value in the SPECIFICATIONS table. A test period of 48 hours is recommended, after the container is allowed to stabilize, but the formula given produces a Daily NER over any time period.

1. Fill the container with 150 pounds (68 kg) of liquid nitrogen.
2. Close the LIQUID valve and the PRESSURE BUILDING valve, leave the VENT valve open and allow it to remain open during test.
3. Allow the container to stabilize for 24 hours, then reweigh it. Record the weight, time, and date.
4. Reweigh 48 hours later. The test is most effective if container is not moved during this period. Record the second test date, time and weight.

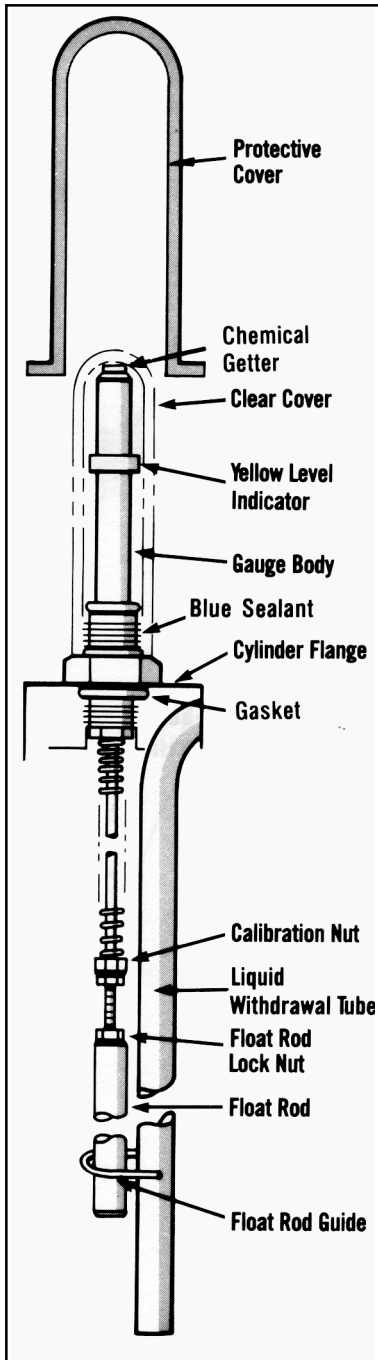
The following calculation will provide Normal Evaporation Rate in pounds-per-day. Daily normal evaporation is simply half the loss over 48 hours.

$$\text{Daily NER} = \frac{\text{Weight (Step 3)} - \text{Weight (Step 4)}}{\text{Time between Step 3 and Step 4 in hours}} \times 24$$

Compare the results of your test to the "as manufactured" NER value in the SPECIFICATIONS section of this manual. A container in service should maintain an NER value of less than two times the new specification. Any test result greater than two times the listed value is indicative of a failed, or failing, vacuum. If NER is found to be high, contact Taylor-Wharton Customer Service at (334) 443-8680 for disposition.

**WARNING:**

Cold surfaces should never be handled with bare skin. Use gloves and other protective clothing when performing this procedure.



## Full View Contents Gauge

## FULL VIEW CONTENTS GAUGE MAINTENANCE

The content of these containers is measured with the Full View Contents Gauge. The device consists of the gauge assembly beneath a clear plastic protective cover. When the gauge is assembled, a level indicator ring is magnetically coupled to the top of a float rod and moves up or down with the changing level of liquid in the container. The clear cover over the gauge body and level indicator is sealed at assembly to resist fogging of the gauge. This seal should never need to be broken.

### Removing the Full View Contents Gauge

1. Vent all pressure from the container.<sup>3</sup>
2. Remove the protective cover by removing three bolts from the base of the cover.
3. Unscrew the gauge body using a wrench on hex fitting as base of the indicator.
4. Lift the entire gauge assembly free of the container. The gauge assembly is long and may be very cold. Gloves should be used to protect your skin.

### Calibration Procedure for Liquid Level Contents Gauges

1. You will need a column of water approximately 4 ft. (1.2 m) tall. A clear plastic tube 2.0 in. (51 mm) dia. with a cap glued to one end is perfect. Place an oxygen service contents scale sleeve (P/N GL50-9C43) over the sight tube.
2. Support the gauge assembly by holding the base of the indicator tube. Care must be taken to prevent interference with the spring action or from misaligning the scale sleeve. Immerse the aluminum float rod below the water level as illustrated. The gauge assembly must be held vertically and the rod must not touch the side or bottom of the tube. The yellow level indicator of the gauge should indicate a full level reading with the oxygen scale.

If the gauge fails to indicate a full liquid level, the assembly is to be removed from the water, calibrated and retested.

To change calibration, loosen locking nut away from brass calibration nut and turn the threaded rod with respect to the calibration nut.

If the rod is turned clockwise (to the left) with respect to calibration nut, the exposed portion of rod becomes longer and the gauge yellow band will be lowered.

To raise the yellow band, turn rod counterclockwise. The exposed portion of rod becomes shorter. Once you have adjusted calibration, recheck for proper setting. (See illustration.) After proper setting has been obtained, lock down nut against calibration nut.

3. Once the gauge assembly has been calibrated to read full in water, it must be verified that it reads empty when the aluminum float rod is suspended in the air. The yellow indicator must be as close to the bottom as possible (inner rod will be firmly bottomed out).

If calibration is required to make the gauge read empty in air, it must be rechecked in water.

4. After calibration, you will need to follow contents gauge installation to reinsert gauge. Be sure to dry the assembly before reinserting into the cylinder to prevent ice build-up that could restrict movement to catch on the guide ring inside the cylinder.

<sup>3</sup> For containers in CO<sub>2</sub> service, see caution on releasing container pressure at the beginning of the Maintenance section.

**NOTE:**

The yellow band will move approximately  $\frac{1}{4}$  in. (6.4 mm) to each 10 turns of the rod.

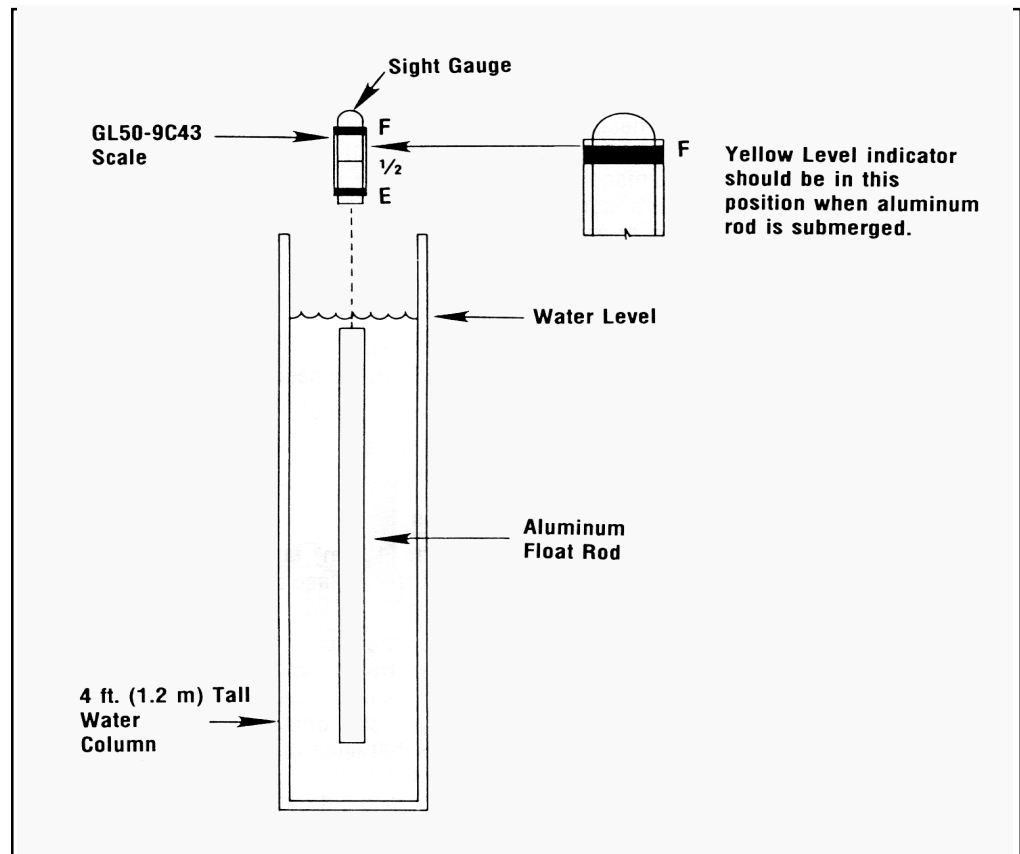
**NOTE:**

Remember this procedure is performed with gauge in an upright (vertical) position.

**Calibration  
for XL-45HP, XL-50HP,  
XL-55HP & XL50VHP**

**NOTE:**

Make sure that the Gauge Assembly is not bent or out of line before reinserting the gauge into the container.



**Contents Gauge Installation**

Before installing a new or repaired gauge, inspect the gasket seals. If any damage is apparent, replace the gasket. (See following page for illustration.)

1. When inserting the gauge assembly, lower the float rod through the gauge opening until about 8 in. (203 mm) of the float rod remains above the container.
2. Grasp the clear cover portion of the gauge assembly with two fingers so that the assembly hangs free and "plumb."
3. Lower the assembly about 4 in. (102 mm) slowly and try to keep the rod in the center of the threaded entrance hole as you do. If you are careful during this portion of insertion, you will drop the float rod straight through the guide ring inside the cylinder.
4. To confirm that the rod is correctly positioned in the cylinder, stop where you can still grasp the top of the rod (see illustration) and try to swing the lower end from side to side.
5. When rod is engaged in the guide ring, the rod will be restricted to lower end movement of about  $\frac{1}{2}$  in. (12.7 mm); if you can feel greater movement, withdraw the rod to the point where its top is 8 in. (203 mm) above the gauge opening and try again.

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**CAUTION:**

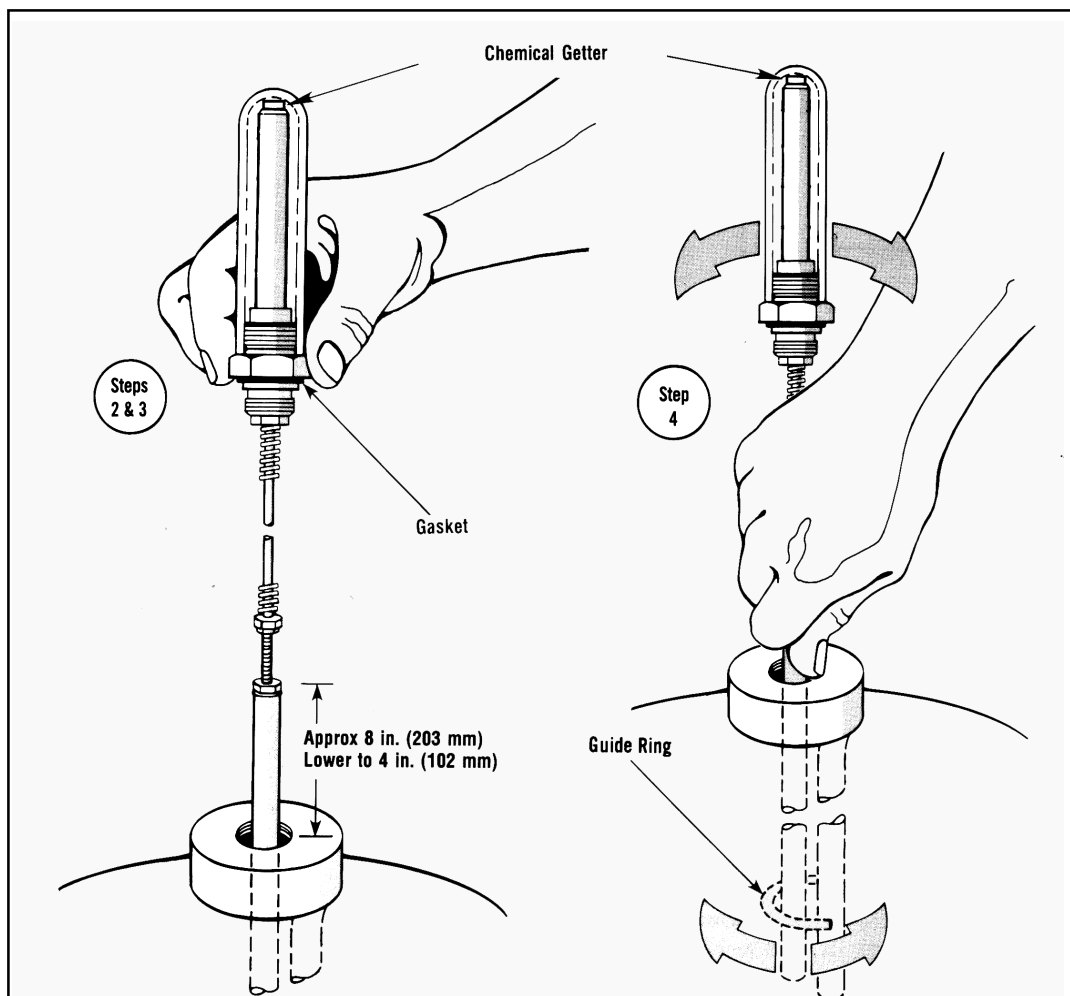
When installing the gauge assembly, care must be taken to ensure that the float rod is inserted through the “guide ring” located on the liquid withdrawal line inside the container. If the gauge does not engage this ring, the contents indication will be inaccurate, or the gauge may be damaged in use.

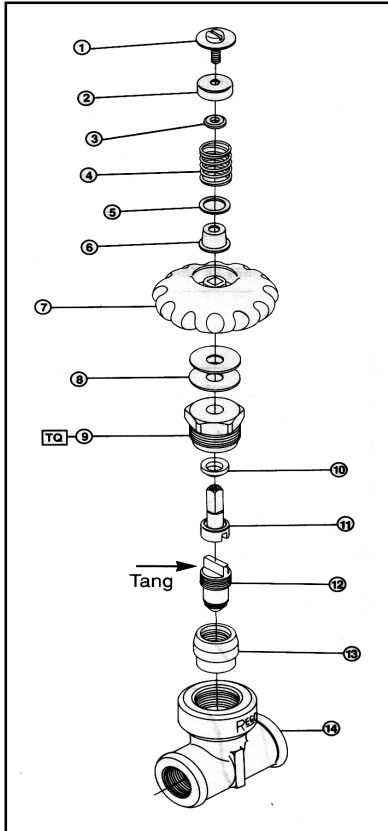
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**Contents Gauge Insertion**

6. When you are satisfied that the float rod is correctly installed, lower the assembly the rest of the way into the container until the top portion threads can be engaged.
7. Screw the gauge in place and hand torque to about 20 ft lbf (2.8 kgf m). Leak check the connection of gauge body to the flange.





## HAND VALVE REPAIR

Hand valves are an integral part of the container, and the valve bodies rarely need replacement. However, the handwheel and the internal parts of the valve are renewable. The illustration below are exploded views of the valves' replaceable parts used on Taylor-Wharton liquid containers.

### Valve Repair Kit

Fits 3/8 in. or 1/2 in. Rego Globe or 3/8 in. Sherwood valves.

#### KIT PARTS - KIT P/N 1750-9C35

Item No.	Description	Qty.
1	Screw and Washer	1
2	Spring Retainer	1
3	Retainer Washer	1
4	Spring	1
5	Seal Washer	1
6	Seal	1
7	Handwheel	1
8	Bonnet Washer	2
9	Bonnet	1
10	Stem Gasket	1
11	Stem	1
12	Seat Assembly	1
13	Bushing	1
14	Body	*
TQ	Torque 80 ft. lbf (11 kgf m)	1

\*Not available as a repair part

### Valve Disassembly Instructions

1. Open valve by turning handwheel counterclockwise as far as it will go to release any trapped gas in the system.
2. Using a screwdriver, remove Handwheel Screw and Washer by turning counterclockwise to allow removal of Spring Retainer, Washer, Spring, Seal Washer, Seal, Handwheel, and Bonnet Washers. Discard these parts.
3. Using a large adjustable wrench to hold valve body, remove Bonnet by turning counterclockwise with a 15/16 in. socket wrench that is capable of developing at least 80 ft lbf (11 kgf m) torque.
4. Remove the following parts from the valve body and discard – Stem, Stem Gasket, Seat Assembly and Bushing.
5. Inspect body and clean if necessary; be sure interior and seal areas are free from dirt, residue and foreign particles.

### Hand Valve - Exploded View

**CAUTION:**  
Do not apply force  
after valve is fully  
open

**CAUTION:**  
Do not scratch or mar  
internal surfaces of  
valve.

### **Valve Replacement Instructions**

1. Partially thread Seat Assembly (12) (seat disc first) into large end of Bushing (13) leaving tang of nipple assembly exposed about 1/8 in. beyond top of Bushing.
2. Insert Seat Assembly (seat disc first) with attached Bushing, into valve body until properly seated.
3. Place Stem Gasket (10) carefully over Stem (11) convex side facing downward.
4. Insert slotted end of Stem into valve body, making sure that slot fully engages tang of Seat Assembly.
5. Place Bonnet over Stem and while holding square end of Stem to keep it from turning, thread Bonnet (9) into valve body. Hold body with one wrench and using another wrench (15/16 in. socket), tighten Bonnet to 80 ft lbf (11 kgf m) torque.
6. Install Bonnet Washers over Stem on Bonnet.
7. Place Handwheel over Stem on Bonnet.
8. Install Seal (6) over Stem into recess of Handwheel.
9. Install Seal Washer (5) over Seal at the bottom of Handwheel recess shown.
10. With the flat side facing downward, place Retainer Washer (3) on top of Seal.
11. Align the holes of these parts and place Spring (4) over the Seal.
12. Place Spring Retainer (2) over assembly as shown, keeping center hole aligned with parts installed in steps 6-11.
13. Install Screw and Washer (1) over retainer. Tighten firmly with a screwdriver, turning clockwise.
14. Turn Handwheel completely clockwise to close valve. Re-pressurize container and leak check valve.

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#### **CAUTION:**

**Hex section of Bonnet must be free of burrs or raised edges, and top of Bonnet must be absolutely flat to provide an effective seal with Bonnet Gasket. (8)**

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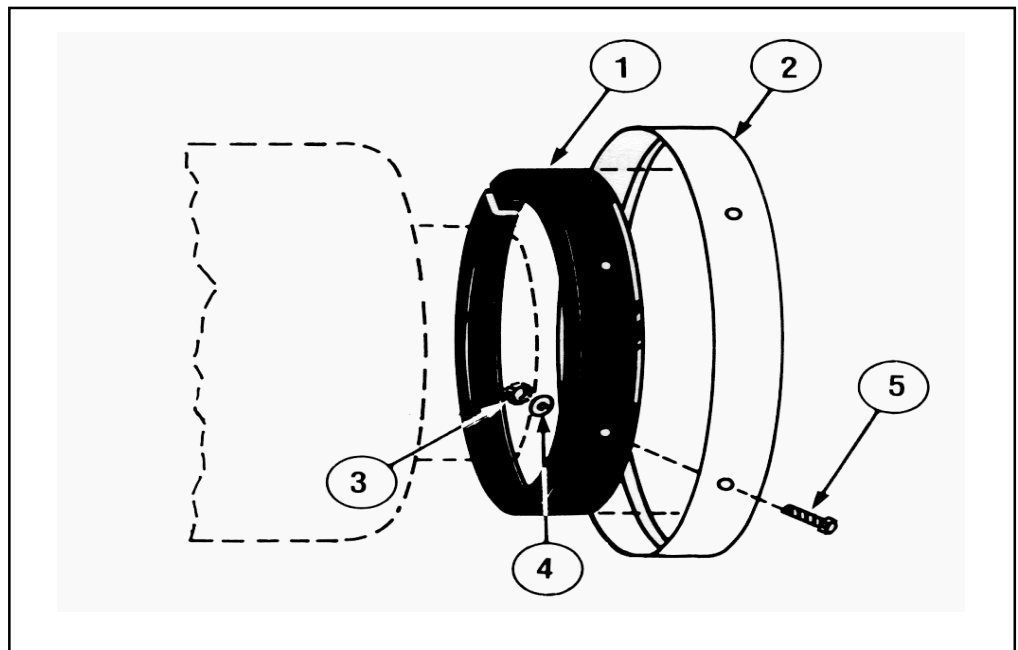
## SHOCK MOUNT FOOT RING

### NOTE:

If the original Shock Mount Ring is badly damaged we recommend that an NER test is performed to ensure that no internal damage has resulted from the impact of the shock mount ring.

Item No.	Description	Part No.	(XL-55 Only)	Qty.
1	Rubber Shock Ring	XL50-4C18	(GL55-4C21)	1
2	Foot Ring	XL50-4C19	(GL55-4C19)	1
3	Hex Nut	6310-0135		4
4	Washer	6430-0125		4
5	Carriage Bolt	6620-0401		4

### Shock Mount Foot Ring - Exploded View



### Replacement of Shock Mount Foot Ring

1. Empty or transfer all contents of tank. Vent to atmospheric pressure. <sup>4</sup>
2. Gently lay the container on its side and unbolt the four (4) carriage bolts that attach the foot ring and rubber shock ring to the tank.
3. Slide off the damaged foot ring and rubber shock ring.
4. Assemble rubber shock ring into new foot ring and force over shock mount ring on container. Use a rubber hammer to drive the rubber shock ring back into place.
5. Using a ½ in. drill bit, drill holes through the rubber so that the carriage bolt slides in smoothly.
6. The holes in foot ring must be positioned in alignment with holes in shock mount ring. Using the 4 bolts, washers and nuts, fasten the new parts of the container.

<sup>4</sup> For containers in CO<sub>2</sub> service, see caution on releasing container pressure at the beginning of the Maintenance section.

## TROUBLESHOOTING

7. After securing the shock mount ring, gently life the container to the upright position and inspect your work.

The following chart is provided to give you some guidance in determining the probable cause and suggested corrective action for some problems that may occur with cryogenic liquid containers. This chart is specifically tailored to your XL-45HP, XL-50HP, XL-55HP or XL-50VHP.

TROUBLESHOOTING CHART		
Symptom	Possible Cause	Corrective Action
Consistently low operating pressure.	<ol style="list-style-type: none"> <li>1. Relief valve open at low pressure.</li> <li>2. Economizer side of P.B./Economizer Regulator stuck open.</li> <li>3. Cold liquid.</li> </ol>	<ol style="list-style-type: none"> <li>1. Remove and replace relief valve.</li> <li>2. Remove and replace regulator.</li> <li>3. Open pressure building valve. With P.B. inoperative, the container will build pressure over time, or an external pressure source can be used to pressurize container.</li> </ol>
No pressure shown on container pressure gauge.	<ol style="list-style-type: none"> <li>1. Bad container pressure gauge.</li> <li>2. Open inner container bursting disc.</li> <li>3. Leaks in valves or plumbing.</li> <li>4. Cold liquid.</li> </ol>	<ol style="list-style-type: none"> <li>1. Remove and replace bad gauge.</li> <li>2. Remove and replace bursting disc. Pressurize container and check relief valve operation.<sup>5</sup></li> <li>3. Leak test and repair leaks. For valve repairs, see Maintenance section.</li> <li>4. Open pressure building circuit.</li> </ol>
No pressure showing but container is full by weight.	<ol style="list-style-type: none"> <li>1. Pressure drop to below 70 psig (4.8 bar/483 kPa) has caused contents to freeze solid. Check pressure gauge (CO<sub>2</sub> only).</li> <li>2. Broken pressure gauge.</li> <li>3. Vent valve open/P.B. valve closed.</li> <li>4. Faulty relief valve.</li> </ol>	<ol style="list-style-type: none"> <li>1. Re-pressurize with CO<sub>2</sub> gas and check for leaks. Repair leaks, re-pressurize to relief valve setting and allow to set until contents re-liquefy.</li> <li>2. Replace pressure gauge.</li> <li>3. Close vent valve, open P.B. valve.</li> <li>4. Replace relief valve.</li> </ol>
Container full by weight and Liquid Level Gauge but very	<ol style="list-style-type: none"> <li>1. Liquid too cold.</li> <li>2. Possible leak in vent valve.</li> </ol>	<ol style="list-style-type: none"> <li>1. Open P.B. valve or allow to stand.</li> <li>2. Rebuild valve.</li> </ol>

<sup>5</sup> For containers in CO<sub>2</sub> service, see caution on releasing container pressure at the beginning of the Maintenance section.

low pressure

3. Faulty relief valve.

3. Replace valve.

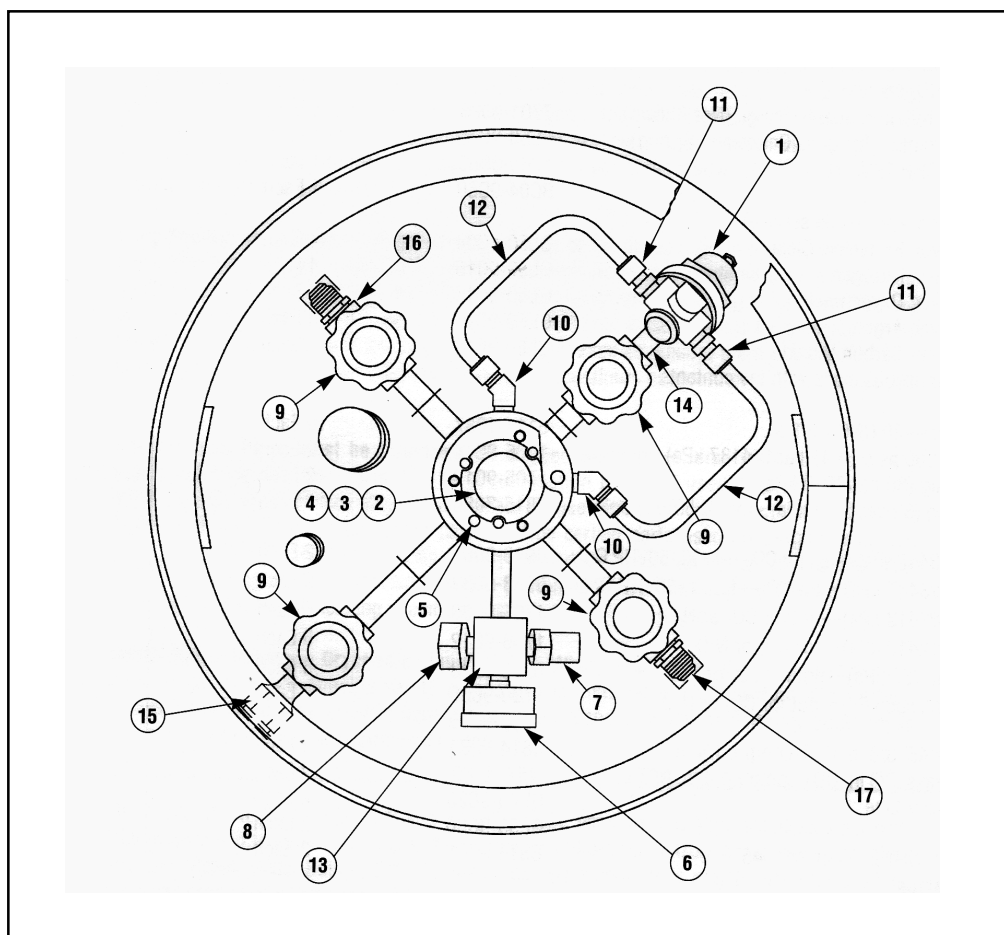
TROUBLESHOOTING CHART		
Symptom	Possible Cause	Corrective Action
Container is cold and may have ice or frost on outer casing. Will not hold liquid overnight. Relief valve is venting gas.	<ol style="list-style-type: none"><li>1. Vacuum loss. Check NER.</li><li>2. Defective P.B./Economizer regulator.</li></ol>	<ol style="list-style-type: none"><li>1. Consult with Taylor-Wharton for course of action. Do not attempt to put additional liquid in container.</li><li>2. Look for P.B. coil pattern in ice. Close P.B. valve. Replace or reset regulator.</li></ol>
Ice formation on bottom of container when P.B. valve is closed.	<ol style="list-style-type: none"><li>1. Pressure building valve not closing properly.</li><li>2. Leak in pressure building system topworks.</li></ol>	<ol style="list-style-type: none"><li>1. Replace or rebuild valve.</li><li>2. Leak test piping connections and tighten fittings if needed.</li></ol>
Container vents through relief valve when in use.	Pressure Building/Economizer Regulator set above relief valve setting. Economizer side of regulator clogged or stuck open.	Remove and reset or replace regulator.
Container vents after fill but quits after awhile.	This may be caused by residual heat vaporizing some liquid inside container and is a normal condition.	Symptom should go away once container reaches operating temperature and the liquid reaches its saturation point at container operating pressure.
Container vents gas continuously through relief valve.	Heat leak may be too great.	Perform container performance evaluation test per Maintenance section to determine if container vacuum is adequate.
Level indicator stuck 1/2 full. Yellow indicator ring will not move.	Float rod stuck on or in float rod guide.	Reinstall. See Contents Gauge Installation.
Level indicator at bottom of gauge. Container full of	Indicator disengaged from gauge rod. Caused by dropping the container.	Recouple indicator using engagement ring.

## REPLACEMENT PARTS

product.

This replacement part list include a recommended inventory quantity which allows you to order part on a timely basis to keep all your XL-45/50/55 containers in service. When placing orders, please use the nomenclature and part numbers in this section and send

### XL-45HP/50HP/ 55HP/50VHP Component Locations



written orders to:

## ACCESSORIES

Taylor-Wharton  
4075 Hamilton Blvd.  
Theodore, AL 36590-0568

Fax: 1-334-443-2209  
Call: 1-334-443-8680  
1-800-898-2657 in USA and Canada

Accessories available for use with Taylor-Wharton XL Series containers are:

- Manifolds, Automatic and Manual
- Vaporizers adding up to 250 cfh (6.6 cu.m/h) each
- Transfer Hoses (O<sub>2</sub>, N<sub>2</sub>, AR, CO<sub>2</sub> and N<sub>2</sub>O)
- Fill Tee Assemblies
- Container Hand Trucks
- Gas Service Changeover Kits
- Cryogenic Phase Separators

Index No.	Description	Part No.	Recommended For 10 Units
For additional information concerning the accessory of your choice, please consult the separate manuals on accessories or call Taylor-Wharton			
1.	Dual Regulator, Pressure Building/Economizer 400 psig (28 bar/2758 kPa) - for XL-50VHP Only	8816-1060	2 Each
	Dual Regulator, Pressure Building/Economizer 300 psig (20.9 bar/2068 kPa)	6999-9018	2 Each
	Dual Regulator, Alternate, Pressure Building/Economizer 125 psig (8.6 bar/862 kPa) - Not available for CO <sub>2</sub> service	6999-9015	2 Each
2.	Gasket, Glass Filled Teflon, Contents Gauge (Not Shown)	7701-0083	5 Each
3.	Contents Gauge Assembly (Includes Gauge and Spring) * Float Rod (45HP/50HP/50VHP) (55HP)	GL50-9C40 1700-9C60 BC04-9C60	1 Each 1 Each 1 Each
	(Use GL50-9C25 for nitrous oxide service)		
4.	Contents Gauge Cover, Protective Clear	GL50-9C04	4 Each
	Contents Gauge Cover, Nitrogen	GL50-9C15	4 Each
	Contents Gauge Cover, Oxygen	GL50-9C16	4 Each
	Contents Gauge Cover, Argon	GL50-9C17	4 Each
	Contents Gauge Cover, Carbon Dioxide (Use GL50-9C04 for nitrous oxide with the contents scale HP50-9C44.)	GL50-9C18	4 Each
5.	Screw, Brass 1/4 in. - 20 UNC x 5/8 in.	6114-1087	10 Each
6.	Gauge, Pressure 0-600 psig (0-41 bar/0-4137 kPa)	1706-9C14	2 Each
7.	Safety Head 525 psig (36 bar/3620 kPa)	1705-9C12	2 Each
	Safety Head 750 psig (52 bar/5171 kPa) - for XL-50VHP Only	7815-3085	2 Each
8.	Relief Valve 500 psig (34 bar/3447 kPa) - not for CO <sub>2</sub> - for XL-50VHP Only	6913-9061	2 Each
	500 psig (34 bar/3447 kPa) - for CO <sub>2</sub> - for XL50VHP Only	6913-9062	2 Each
	350 psig (24 bar/2413 kPa) - not for CO <sub>2</sub> or N <sub>2</sub> O	1705-9C39	5 Each
	350 psig (24 bar/2413 kPa) - for CO <sub>2</sub> or N <sub>2</sub> O	1706-9C12	5 Each
	**22 psig (1.5 bar/152 kPa) - not for CO <sub>2</sub> or N <sub>2</sub> O	6913-6223	5 Each
	**230 psig (16 bar/1586 kPa) - not for CO <sub>2</sub> or N <sub>2</sub> O	1700-9C39	5 Each
9.	Valve Repair Kit	1750-9C35	3 Each
10.	Elbow, Male, Brass 45° 3/8 in. ODT-comp x 1/4 in.	6814-9233	2 Each
11.	Connector, Male, Brass, 3/8 in. ODT-comp x 1/4 in. NPT-EXT	4570-1960	2 Each
12.	Tube, P.B./Economizer Line	GL45-9C20	2 Each
13.	Cross, Brass	GL55-9C30	2 Each
14.	Elbow, Male, 3/8 in. NPT x 1/4 in. NPT 45°	6814-9241	2 Each
<b>End Fittings for Hand Valves</b>			
15.	-USE (CGA 540) -oxygen	7114-0163	5 Each
	-USE (CGA 580) -argon/nitrogen	7114-0164	5 Each
	-USE (CGA 320) -carbon dioxide	7114-0181	5 Each
	-USE (CGA 326) -nitrous oxide	7114-0195	5 Each
16.	-LIQUID (CGA 440) -oxygen	6514-8992	5 Each
	-LIQUID (CGA 295) -argon/nitrogen	7355-4712	5 Each
	-LIQUID (CGA 320) -carbon dioxide	7114-0181	10 Each
	-LIQUID (CGA 326) -nitrous oxide	7114-0195	10 Each

<b>Index No.</b>	<b>Description</b>	<b>Recommended Part No.</b>	<b>For 10 Units</b>
17.	– VENT (CGA 440) – oxygen	6514-8992	5 Each
	– VENT (CGA 295) – argon/nitrogen	7355-4712	5 Each
	– VENT (CGA 295) – carbon dioxide	7355-4712	5 Each
	– VENT (CGA 295) – nitrous oxide	7355-4712	5 Each
*	Decal, Carbon Dioxide	GL55-9C54	A/R
*	Decal, Nitrogen	GL55-9C51	A/R
*	Decal, Oxygen	GL55-9C52	A/R
*	Decal, Argon	GL55-9C53	A/R
*	Decal, Nitrous Oxide	GL55-9C55	A/R
*	Decal, Warning	1700-9C07	4 Each
*	Decal, UN Number, Nitrogen	GL55-9C63	A/R
*	Decal, UN Number, Oxygen	GL55-9C64	A/R
*	Decal, UN Number, Argon	GL55-9C65	A/R
*	Decal, UN Number, Carbon Dioxide	GL55-9C66	A/R

\* Not illustrated.

\*\* Optional/Not illustrated

For more information on Taylor Wharton Products

Please contact:

Atmospheric Products and Services

Attn: Patrick McCarthy Sr.

17 Norris Run Court

Reisterstown, MD 21136

Phone: 410-833-7170

Email: [patrick@apsusa.biz](mailto:patrick@apsusa.biz)