NOVO750™ (Pool) TCM Operation & Maintenance Manual

Taylor-Wharton
Since 1742

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CARBON DIOXIDE SAFETY PRECAUTIONS

Keep Equipment Area Well Ventilated. Carbon Dioxide can cause asphyxiation by displacing oxygen needed for breathing, resulting in dizziness, unconsciousness, or death. Carbon dioxide cannot be detected by the human senses and will be inhaled like air. If adequate ventilation is not provided, the gas may displace normal air without warning that a life-threatening atmosphere is developing. Carbon Dioxide is heavier than air and can pool in low areas, use caution when working in pits or vaults near CO2. Store and use carbon dioxide container only in well ventilated areas.

Extreme cold can Injure Eyes and Skin. If released to atmosphere, liquid carbon dioxide will turn to carbon dioxide snow or dry ice. Accidental contact of carbon dioxide snow or cold gas with the skin or eyes may cause severe frostbite. If you are accidentally exposed to cold snow or gas, consult a physician at once. Warm affected areas with water that is near body temperature as a first aid measure.

For additional information on carbon dioxide, ask your supplier for a Material Safety Data Sheet on this gas. Material Safety Data Sheets contain complete hazard and first aid information for the product they cover. For more information on the principles of operation and safe practices for carbon dioxide equipment refer to the Compressed Gas Association Publication G-6 available from the Compressed Gas Association Inc. 1235 Jefferson Davis Highway, Arlington, VA 22202.

FREIGHT DAMAGE PRECAUTIONS

FREIGHT DAMAGE CLAIMS ARE YOUR RESPONSIBILITY. 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 might affect serviceability.

GENERAL INFORMATION

The NOVO750™ (Pool) TCM system consists of a vacuum-insulated liquefied gas container, and its associated plumbing. The system is designed for permanent installation as a source of gaseous carbon dioxide for aquatic application. The NOVO750™ unit is manufactured to the ASME pressure vessel code.

The NOVO750™ (Pool) TCM container is filled from an outside fill station without interrupting the flow of gaseous carbon dioxide to the points of use. Two lines are permanently attached between the NOVO750™ (pool) TCM and a lockable fill box outside the building. One line is used to transfer liquid to the system from a distribution vehicle, the other conducts gas vented by safety devices to the outside of the building. The fill box station must be located for easy access by the distribution vehicle. Filling is accomplished by connecting a delivery unit to the fill port in this box. Liquid CO2 is then transferred by pressure differential.

The NOVO750™ (Pool) TCM operates without the need for constant attention. Personnel working at the use site may need to call their distributor to make occasional output pressure regulator adjustments, but the other valves and controls on top of the container are normally operated only when it is necessary to turn off the gas flow for maintenance, or if the system is damaged by mishap.

An automatic pressure building system makes the NOVO750™ a self-contained gas supply system capable of providing gas at maximum continuous flow rates of up to 20.0 lb./hr. (9.0 kg/hr.) See Specification Chart below for desired NOVO-TCM Model.

The NOVO750™ (Pool)TCM is designed to supply gas from the pressurized space that is above the liquid inside the container. If high-demand applications cause the pressure in this space to drop below 125 psig (8.6 bar/862kPa), the pressure building system activates an electric heater rod that is submerged in the liquid container. Heat added to vaporize enough CO2 to maintain the pressure level and then automatically shuts off.

The gas supply line is equipped with a check valve to prevent back flow into the NOVO750™. Back flow could carry contaminants that could freeze in the cold plumbing parts, making the NOVO750™ inoperative.

Solid CO2 (dry ice) will form if the pressure in the NOVO750™ is allowed to drop below 70 psig (4.8bar/483 kPa). In service, the pressure is maintained well above this value to ensure that solid CO2 (dry ice) will not form inside the container.

SPECIFICATION

NOVO750™ TCM Specifications

Model	**NOVO750-TCM**
Part Number	EC75-OC33
Dimensions	
Diameter in. (mm)	26 (660)
Height in. (mm)	70.5 (1791)
Weight, Empty lb. (kg)	348 (158)
Capacity, CO_2 Saturated @ 125 psig (8.6 bar)	
Liquid lb. (kg)	790 (359)
Gaseous cu. ft. (cu. m) @ NTP (STP)	5756 (163)
Flow Rates	
lb./hr. (kg/hr)	20.0 (9.1) *
Minimum Usage (No Venting) Liquid lb./day (kg/day)	3.0 (1.4)
Pressure Building System	
Standard Operating Pressure psig (bar)	125 (8.6)
Safety Device Settings	
Inner Container Primary Relief Valve, psig (bar)	300 (20.7)
Inner Container Secondary Relief Valve, psig (bar)	330 (22.7)
Electrical Requirements**	
Heater Voltage	l20 VAC / 240 VAC
Heater Current	900 W / 1800 W

**Flow rate using 120 VAC power. Using 240 VAC power, flow rate is 30 lb./hr. (13.6 kg/hr).*

INSTALLATION INSTRUCTIONS

Taylor Wharton's NOVO750™ TCM carbon dioxide system is designed to be permanently installed. The system consists of a specifically designed container that stores carbon dioxide in the liquid state, and fill connection hardware to allow refilling from outside the building in which it is installed.

> *Note:*
> *If installation is to be operated in unison, the "NOVO-TCM Multi-Tank" module must be used in strict accordance with instructions furnished by Taylor-Wharton. Failure to do so will result in premature heater failure and shut down of the system.*

Planning the Installation Consult with your customer, and check local code restrictions, before determining a location for the unit. The container should be installed in a location away from day to day activity to minimize tampering. It should be accessible for maintenance and occasional monitoring.

> *Note:*
> *This container is manufactured to ASME pressure vessel specifications. It should not be used to transport liquid carbon dioxide. The NOVO750™ is intended to be transported to the installation site empty and filled after it is installed.*

The fill box should be readily accessible for CO2 deliveries 24 hours a day. A lockable fill box is part of the installation. The fill box location should be within 35-ft. (10.7m) of the delivery point, due to the limited reach of the delivery vehicle.

For safety and ASME code requirements, the length of the fill line and vent lines from the fill box to the NOVO750™ must not exceed 20-ft. (6m) in length. Consult Taylor-Wharton for technical assistance when installing longer lines to avoid problems.

A stainless steel surface mounted fill box is most commonly used as it minimizes modifications to the building and installation time. However, flush mounted fill boxes are available.

Plan the routing of fill and vent lines. These should be in an area well protected from accidental damage. If you can't conceal the lines, mount them to the interior walls, or secure them to overhead structural members as required by many local codes. Avoid hot areas if possible.

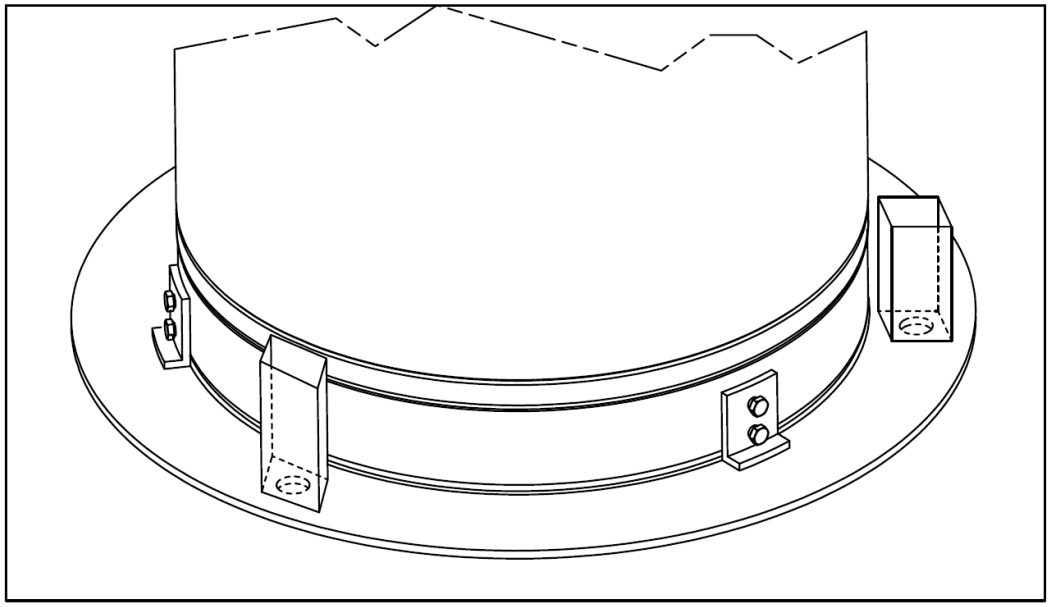
Do not route NOVO750™ lines near steam or hot water lines. For local regulations that require the cylinder to be elevated from the floor, we offer a platform base. If the platform base is used to elevate the cylinder; the cylinder must be anchored to a wall by its handling ring. Part numbers of the platform base and wall anchor can be found in the Replacement Parts List. It is recommended that appropriate local code approvals be reviewed prior to scheduling the installation.

> *Note:*
> *This container is manufactured to ASME pressure vessel specifications. It should not be used to transport liquid carbon dioxide. The NOVO750™ is intended to be transported to the installation site empty and filled after it is installed.*

Bolting a Tank to the Floor Place the tank in its position and mark three floor-anchor bolts through the holes in the bottom of the shipping ring. Move the tank. Drill holes with a masonry bit having the same diameter as the anchor. Make sure the hole depth exceeds the minimum embedment of the anchor.
Assemble each anchor with a nut and washer so the top of the nut is flush with the bolt. Drive each anchor into a floor hole until the nut is against the surface of the floor. Expand the anchor by tightening the nuts 3-5 turns until firmly tight. Remove and save the nuts and washers.

Move the tank back into position being careful that the hole in the bottom of each leg is over an anchor bolt. Place a washer and nut onto each bolt ang tighten.

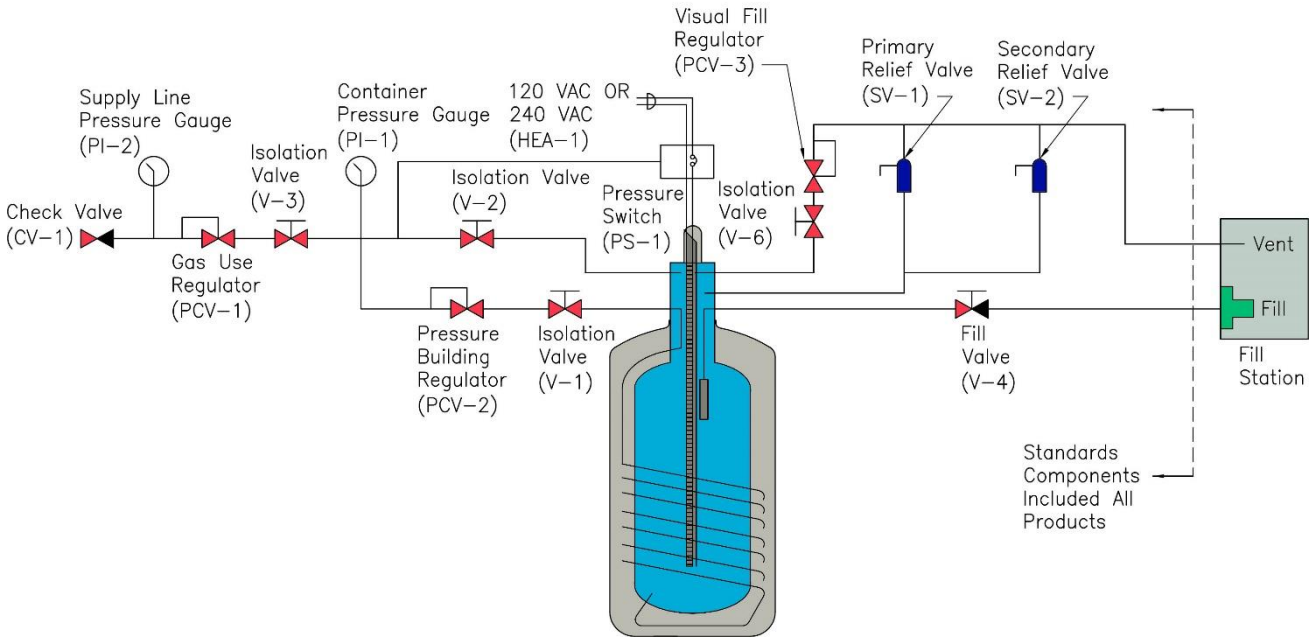
Foundation Ring



DIMENSION	EC75-OC33
SHIPPING LEG BOLT HOLE PCD (INCH)	30.1
SHIPPING LEG OD	34.1

The ***EC75-OC33*** has a foundation ring with 3 X 1-1/4" diameter holes. The customer should consult with a local Civil Engineer for bolt diameters and lengths for their local seismic conditions.

NOVO750™ Flow Diagram



Cylinder Handling

The NOVO750™ TCM cylinder can weigh upwards of 375 lb. (170 kg); but can easily be moved by using a properly designed hand truck. A special Harper cylinder truck (Model ULG 650A) is recommended. The container can also be lifted and moved with a crane or hoist by attaching a sling to the holes, provided in the ring supports on the top of the cylinder. **Do not attach lift hooks to ring.** Except for minor tipping on the hand truck, the container must always be kept upright, and should not be moved or transported full.

CAUTION:
If lifting by crane or hoist, insert hooks in both lifting lug openings on the cylinder ring support. Failure to do so could result in container damage or personal injury.

Installation Procedure

See page 16 for Component Identification.

1. Determine the location for the fill box on the outside wall.

SPECIAL NOTICE
Be sure and take the height of the fill box into consideration. Do not install box at face height (approx.5 ½ ft. /1.7 m). This can be dangerous during delivery. The suggested height of mounting is approx. 3 to 4 ft. (.9 to 1.2m) above the ground.

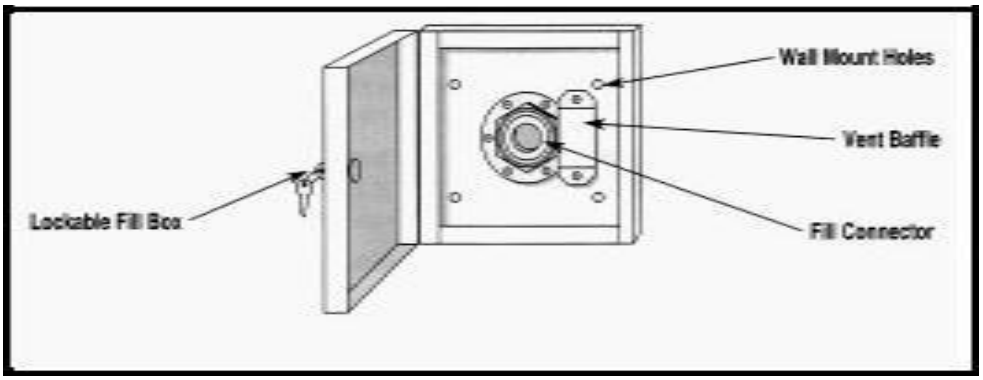
WARNING:
Be sure there are no hidden utility lines in the location selected for mounting. Consult the building plans or make a test opening to confirm the wall is clear of hidden hazards before drilling.

2. Measure the distance from the container to location where the fill box will be mounted to determine the length of fill and vent line material required. Be careful to allow for all routing and for thickness of the outside wall. Avoid sharp bends that may restrict liquid or gas flow.
3. Fabricate two lengths of ½ in. (12.7 mm) ODT copper or ½ in. (12.7 mm) I. D. nylon tubing.

4. Drill a small pilot hole through the outer wall surface first to confirm that there are no utility lines in the location selected, then enlarge the opening to a 2 ½ in. (64 mm) opening.

5. The fill box contains copper tube sections long enough to pass through the wall. The fill section is already coupled but you must attach the vent section to the bracket beneath the fill coupling using the strap clamp and screws provided.

Fill Station



6. Pass the fill line through the wall, and mark for cutting to length. Pull the fill box back off the wall. Cut fill line to length, then cut vent line to same length, and secure with screw to bracket at the back of fill box.

7. After cutting the fill box tube sections to length, install the box. Level the box, then mark four wall anchor holes and drill; secure with appropriate anchoring hardware. Weather seal between the box and the building exterior is recommended

   CAUTION:
   If the container is installed in an elevated location, it must be on a well-constructed platform that will support more than 1138 lb. (517 kg.) When installed this way, the NOVO750™ must be anchored to the wall from a point on the top of the container.

   Note:
   Nut and ferrule for vent line and liquid connection are attached to the plumbing to prevent loss during shipment.

8. Attach the two 90^{o} elbow compression unions to the tubing ends coming through the wall and direct them toward the fill/vent lines.

9. Carefully unload the NOVO750™ tank and move it to its permanent position. It is recommended that you securely anchor the top of the container to the wall or building structure with a suitable bracket that clamps the top handling ring.

10. Route and mount both lines using ½ in. (12.7 mm) O.D. lines inside the building, until they reach the NOVO750™ tank. Be sure to comply with all local building codes.

11. Cut the vent line to final length and connect it to the elbow fitting on the vent tube leading to the outside box.

WARNING:
Be careful to properly connect the vent and fill lines to the box. If the vent line is accidentally connected to the fill connection, the container relief device may be blocked, which will create a dangerous pressure build-up in the lines or the container.

12. Go to the container end of the vent line and test the line before attaching to the container by blowing through the line to confirm that is unrestricted.

13. Cut fill line to final length, couple it to the remaining fill box elbow, then connect it to the LIQUID connection on the NOVO750™.
Note:
Liquid connection fitting must be assembled to liquid line using pipe thread sealant, such as teflon tape, prior to attaching the liquid line connection.

14. Apply the NOVO750™ decal to the front of the container and post carbon dioxide storage identification in the general area as required by local code.

15. Locate power supply (preferably at dedicated outlet) and arrange the power cord to protect it if work area traffic. Do not plug in until system has been filled and ready to be put in service. Heater uses electrical resistance to generate heat and may falsely trip GFCI circuits. Please consult local codes.

Note:
After completing the tank installation, fill out the NOVO750™ Warranty Card and return to Taylor-Wharton.

Leak Checking the Installation

Open the LIQUID valve and close the USE and PB valves. Pressurize the system to 150 psig (10 bar/1034 kPa) with gaseous CO2 through the fill connection. Leaks test all joints using only approved leak test solutions. Follow the manufacturer's recommendations. Snoop Liquid Leak Detector is one approved solution; it is available from: Nupro Co. 4800 E. 345th St. Willoughby, Ohio 44094. Leak test all connections. If leaks are found, isolate the leaking plumbing from the tank pressure so all pressure may be released from the area under repair.

WARNING:
In case of any downstream leaks to the point of use, close the USE Valve and the PB Valve. Closing these valves will stop the flow of gaseous CO2 to the Supply Line Regulator and downstream piping so that repairs can be made to any leaks.

Supply Line Installation

1. Fill the NOVO750™ using the filling the container procedure. Install a gas supply line from the Supply Line connector, on the NOVO750™ to the use point and finger tighten to the use point and finger tighten.

2. Install a gas supply line from the Supply Line connector, on the NOVO750™ to the use point and finger tighten.

3. Open the gas USE valve and adjust the outlet regulator – normally 40 to 90 psig (2.8 bar/276 kPa to 6.2 bar/621 kPa).

4. Tighten the supply line fittings at the use point.

FILLING THE CONTAINER

These transfer procedures apply to the single hose filling of small insulated containers. The delivery vehicle can be any unit designed, manufactured, and approved for over-the-road liquid carbon dioxide transportation (TC/MC 331, MC 330, or under an appropriate DOT exemption) that has liquid withdrawal capability and minimum operating pressure of 250 psig (1720 kPa). See Title 49 of the U.S. *Code of Federal Regulations,* Parts 100-180 (49 CFR) [13].

Liquid transfers are accomplished with a single transfer hose. The transfer hose is equipped with a spring-loaded check valve in the discharge fitting. The hose assembly shall be protected from overpressurization by a PRD and shall be equipped with manual shutoff and blow-down valves.

Schedule delivery before the container contents drop below ¼ full. This will improve the filling characteristics as well as the gas withdrawal capabilities.

Note:
During first fill the NOVO750™ will be warm and pressure may equalize before tank is full. If this occurs, shut off liquid on transfer hose and vent pressure in NOVO750™ down to 125 psig (8.6 bar/862 kPa) through the equipped transfer hose blow-down valve. Repeat if necessary. If you are not sure if the NOVO750™ is full simply check liquid contents gauge on the NOVO750™ before venting.

1. Park delivery vehicle adjacent to the filling connection and set the parking brake.

2. Place chocks under the wheels to prevent unintended vehicle movement.

3. Inspect the NOVO750™ for proper vent, supply and fill line installation before attempting to fill the container. Check supply container valves to ensure they are open.

4. Check the pressure and contents of the supply container(s).

5. Extend the fill hose to the fill connection (fill box).

6. Inspect all connections for cleanliness. Any moisture that is present can freeze during liquid transfer. Use a clean, dry cloth to wipe connections if necessary.

7. Connect the transfer hose to the fill connection and purge as needed. Prior to starting product transfer, ensure that there is a positive pressure maintained between the fill source and the tank. This typically is accomplished by one of the following methods:

   – A functional pressure gauge equipped on the filling equipment connected to the fill box on the outside of the building or;

   – Opening the blow-down valve on the filling equipment to confirm that a positive pressure has been maintained inside the fill connection.

   Normally the delivery system (fill source) operate with greater than 300 psi (2068kPa).

8. Open the fill valve to start the transfer. The filling procedure as below:

– A container vents automatically, when the tank pressure reaches a filling regulator that operates at 200 psi (1380 kPa).

- The container becomes full, as a ball float that has been lifted by the rising liquid seats in the inlet to the filling regulator. When the container and delivery vehicle pressure equalize, the transfer is complete.

Verify that the venting gas is flowing from the vent line outlet in the fill box. If no vent flow is observed, stop filling and investigate why the vent gas is not flowing to the outside.

CAUTION: *Ensure vented carbon dioxide is directed to a safe location.*

9. Close the fill valve and bleed liquid from the hose.

MAINTENANCE

For specific maintenance procedures refer to the applicable paragraph that follows, and to the replacement parts list.

WARNING:
Isolate components and slowly depressurize the plumbing to be repaired before attempting repairs. The sudden release of pressure could cause personal injury. Observe safety precautions to prevent dangerous accumulation of gas. Safety devices and liquid level contents gauge cannot be isolated; therefore, all liquid must be removed and all pressure in vessel must be relieved before attempting to repair them.

CAUTION: *Carbon dioxide may form into the solid phase (dry ice) if the pressure over 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 solid CO2 will not form inside the container. Before performing maintenance, the contents of the NOVO750™ must be transferred to another container so that pressure can be released.*

CAUTION:
If the contents have solidified, the dry ice in the container may be thawed by pressurizing the container to 280 psig (19.3 bar/1931 kPa) with carbon dioxide gas from an external source. This may be accomplished by connecting a high-pressure cylinder with regulator to the fill line of the NOVO750™ (adapters will be required). Several days at this pressure may be required to thaw the container. For more information, consult CGA pamphlet G-6.7, "Safe Handling of Liquid Carbon Dioxide Containers that have Lost Pressure."

Parts Cleaning

Before installing, be sure to properly clean any replacement parts that are not packaged and marked for oxygen service. Keep all parts clean during installation to prevent contamination of the carbon dioxide. For more information on cleaning, consult the compressed Gas Association (CGA) pamphlet G-4.1, "Cleaning for Oxygen Service" or equivalent industrial cleaning specifications.

Leak Testing

After every repair, pressurize the container to about 280 psig (19.3 bar/1931 kPa) through the Liquid connection with a regulated source of clean dry carbon dioxide gas. Use only approved leak test

solutions and follows the manufacturer's recommendations. "Snoop" Liquid Leak Detector is one approved solution, it is available from: Nupro Co. 4800 E. 345th St. Willoughby, Ohio 44094. If leaks are detected, isolate container pressure and relieve pressure on the lines before repairing, then retest when repairs are completed.

Relief Valves[1]

Replace the relief valve when it fails to maintain its setting or when it leaks at pressures below its setting. If the relief valve functions properly, but operates too frequently, it may be an indication that the insulation space vacuum has deteriorated. Follow the instructions in the Evaporation Rate Test Procedure to check the condition of the vacuum. Never try to repair relief valves.

Supply Line Regulator

The supply line regulator reduces the pressure of the carbon dioxide gas from the easy**carb**™ container to the level required by the carbonation system. It provides a constant supply pressure. To adjust the supply line regulator:

1. Loosen the adjustment screw retaining nut.
2. Adjust the regulator (tee handle) on the Supply Line Pressure Gauge.
3. Tighten the adjustment screw retaining nut.

Pressure Building System Adjustments

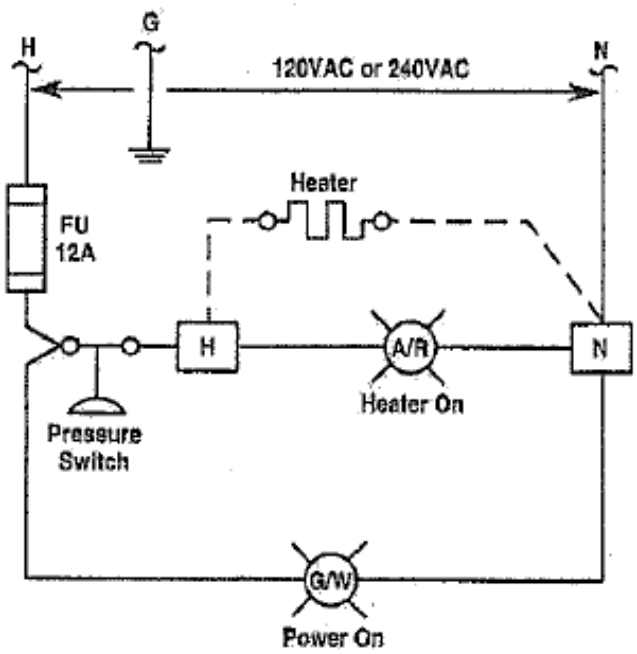
The pressure building system on NOVO750™ TCM consists of a heater in the container that controlled by a pressure switch in the top of the unit. The pressure switch responds to inner container pressure and turns the heater current on and off as required to maintain a pressure greater than 125 psig (8.6 bar/862 kPa). The following procedure is a detail adjustment of the set points (high and low) of the pressure switch.

Field Adjustment Procedure

The set point of the pressure switch that controls the heater element can be adjusted on pressure switch located on the top of the container. A ¼" (6.4mm) open end wrench is required.

[1] See warning on removing contents before releasing container pressure at the beginning of the Maintenance Section.

Pressure Switch Control Box Schematic:

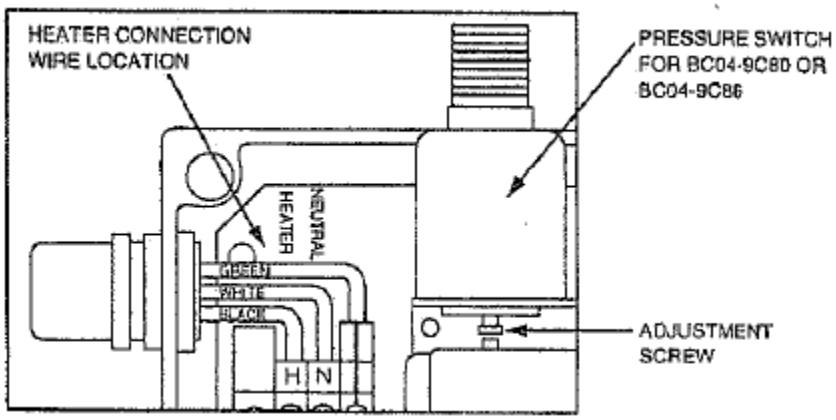


The switch should be set to turn on at pressure below 125 psig (8.6 bar/862 kPa) and turn off after a predetermined pressure rise. To check the setting, vent the container from a pressure greater than 125 psig (8.6 bar/862 kPa) where the HEATER lamp is off indicating the switch is open and the heater is not receiving power. As the container vents, observe the container pressure gauge. At approximately 125 psig (8.6 bar/862 kPa) the switch should close, and the HEATER lamp will light. Close the vent at this point and allow the heater to cycle until the pressure rises and the HEATER lamp goes out. Note the pressure rise on the pressure gauge as well as the time interval between 'heater on' and 'heater off.'

WARNING: The pressure switch contains live 120VAC or 240 VAC connections. Always disconnect the power from the wall receptacle before removing the cover from this box for adjustment or maintenance.

If adjustment is need, unplug the unit and unscrew four phillips-head screw on top of the pressure control box. The clockwise movement of the adjustment screw will raise the 'heater on' setting: counter-clockwise will lower it. The amount of pressure rises (or the 'heater off' setting) will adjust automatically. Move the set point adjustment a small increment in the desired direction and repeat the venting procedure to determine the new set point. Repeat the process as necessary until the set point is returned to 125 psig (8.6bar/862kPa).

Pressure Switch Adjustment Location:



Heater Replacement

CAUTION: Tank contents pressure must be a 0 (zero) PSI.

Instructions to replace heater.

1. Unplug the Power supply cord from power source.
2. Use a flat head screwdriver, unscrew the two screws on top of the Conduit Body and take off.
3. Loosen the wire cord grip on the inside of the Conduit Body that held the heater cord in place and pull the wires out through the cord grip orifice.
4. Pull the heater out. Replace with a new unit.
5. Slide the heater wires through the cord grip orifice and connect the wires as shown in the Pressure Switch Adjustment Location. Tighten wire cord grip.
6. Attach the top back on to the Conduit Body and tighten the (2) screws.

To put the NOVO750™ back into service, plug the power cord into the power source.

Note: Pressure in the container must be above the desired pressure building setting.

Note: For 240VAC Pressure Switch Control Box the fuse and power cord are not provided. A power cord with a fusible plug must be supplied by the end user.

CAUTION:
Internal orifices in pressure regulators used with CO2 are subject to the formation of dry ice if excessively cold gas or extremely high flow rates are used. If this condition occurs, it is usually an indication of a leak in the equipment or plumbing downstream of the NOVO750™ *system. Check for leaks and make repairs as necessary. If no leak is found, and ice formation continues, your application may require increasing system output by installing an external vaporizer or second* NOVO750™ *unit.*

Checking Container Performance

The NOVO750™ is basically two containers, one within the other. The space between the container acts as a thermal barrier because of high technology insulation and a vacuum. Each serves a very important part in the useful life of the container. The insulation is very effective in preventing radiated heat from entering the inner container; the vacuum prevents heat convection or conduction from reaching the liquid contents. When the vacuum in the insulation space is no longer effective, the following symptom may appear:

- The relief valve will open continuously until the container empties prematurely.

Note:
See the TROUBLE-SHOOTING Section for more detailed symptoms.

Normal Evaporation Rate (NER) Testing.

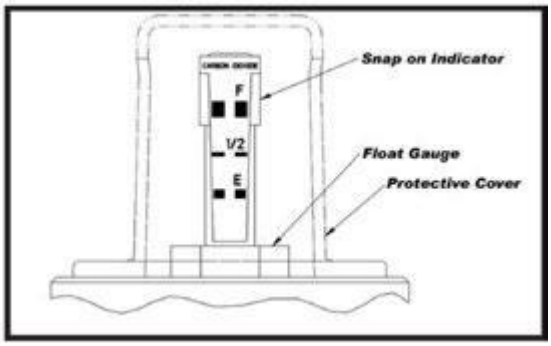
If a loss of vacuum integrity is suspected, the container's Normal Evaporation Rate should be checked. Take the container out of service and perform the following test:

The pressure building valve must be closed during the NER test. The container must be in a well-ventilated area where the temperature is approximately 70°F (21°C.)

1. Fill the container until it contains at least 125lb. (57 kg).
2. Allow the container to stabilize with all valves closed until it vents through the relief valve. Weigh the container. Record the weight, time, and date.
3. Reweigh the container after it is allowed to vent for 24 hours. Record the weight, time, and date.
4. If the weight of the carbon dioxide lost in 24 hours is greater than 8lb. (3.6 kg), the container may have lost its vacuum.
5. If the above test is inconclusive, reweigh again after 48 hours. The test is most affective if container is not moved during this period.
6. If the total amount of carbon dioxide lost in the 48 hours test exceeds 17 lb. (7.7 kg), the container may be considered defective.

Full View Contents Gauge

The content of these containers is measured with the Full View Contents Gauge. The device consisted of the gauge body and snap on level indicator. When the gauge is assembled, the indicator is magnetically coupled to the top of a float rod that moves up or down with the changing level of liquid in the container.



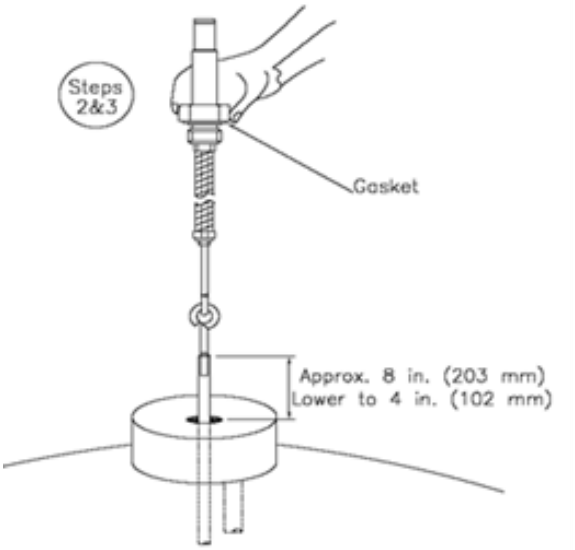
Replacing the Full View Contents Gauge
The NOVO750™ must be empty of liquid carbon dioxide before attempting to remove the contents gauge, or the contents will solidify. Remove all pressure from container and remove the clear protective cover by removing three (3) screws at its base. Un-screw gauge body using a wrench on the hex fitting at the base of indicator tube.
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.

CAUTION: Tank contents pressure must be at 0 (zero) PSI

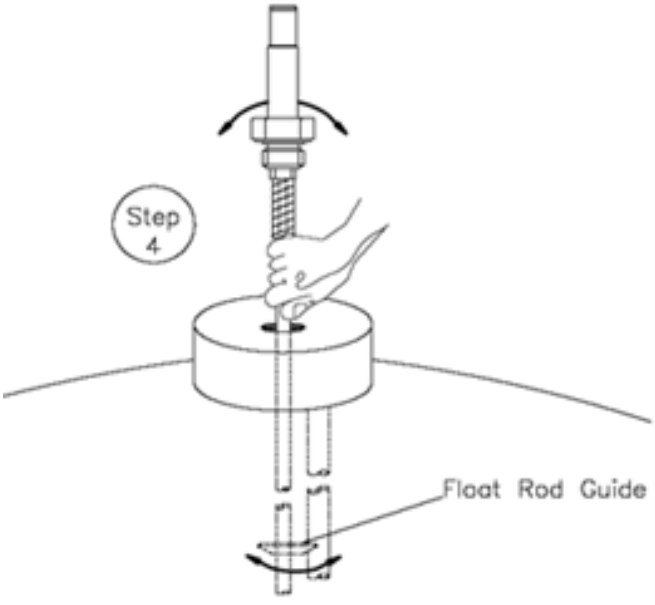
Contents Gauge Installation

Before installing a new or repaired gauge, inspect the gasket, if any damage is apparent replace.

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 upper portion of the float rod 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 centre 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 container.

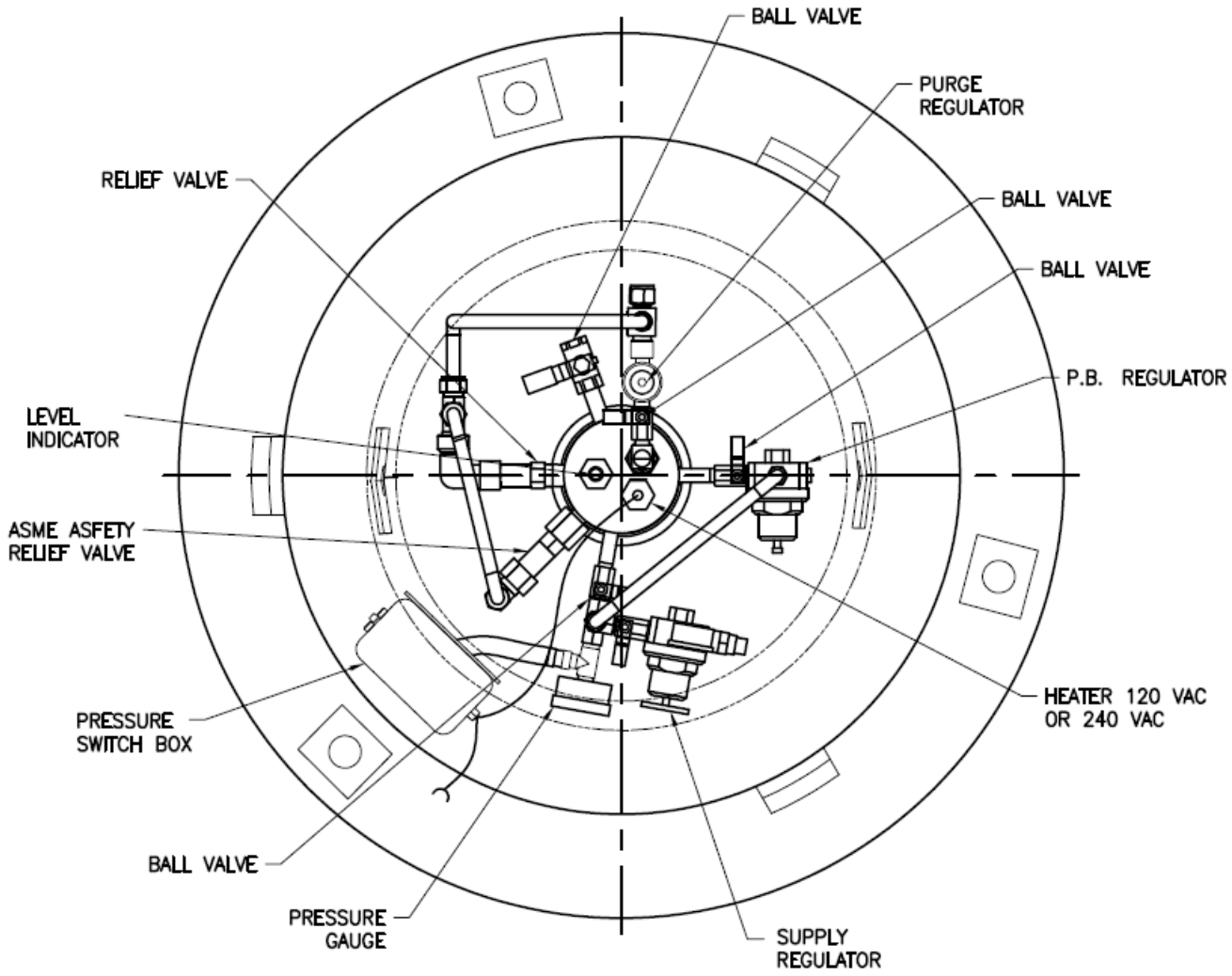


4. To confirm that the rod is correctly positioned in the container, stop where you can still grasp the top of the rod and try to swing the lower end from side to side.



5. When the rod is engaged in the guide ring, the rod will be restricted to lower end movement of about ½ 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.
6. When you are satisfied that the gauge 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 and replace the protective cover.



COMPONENT I.D.

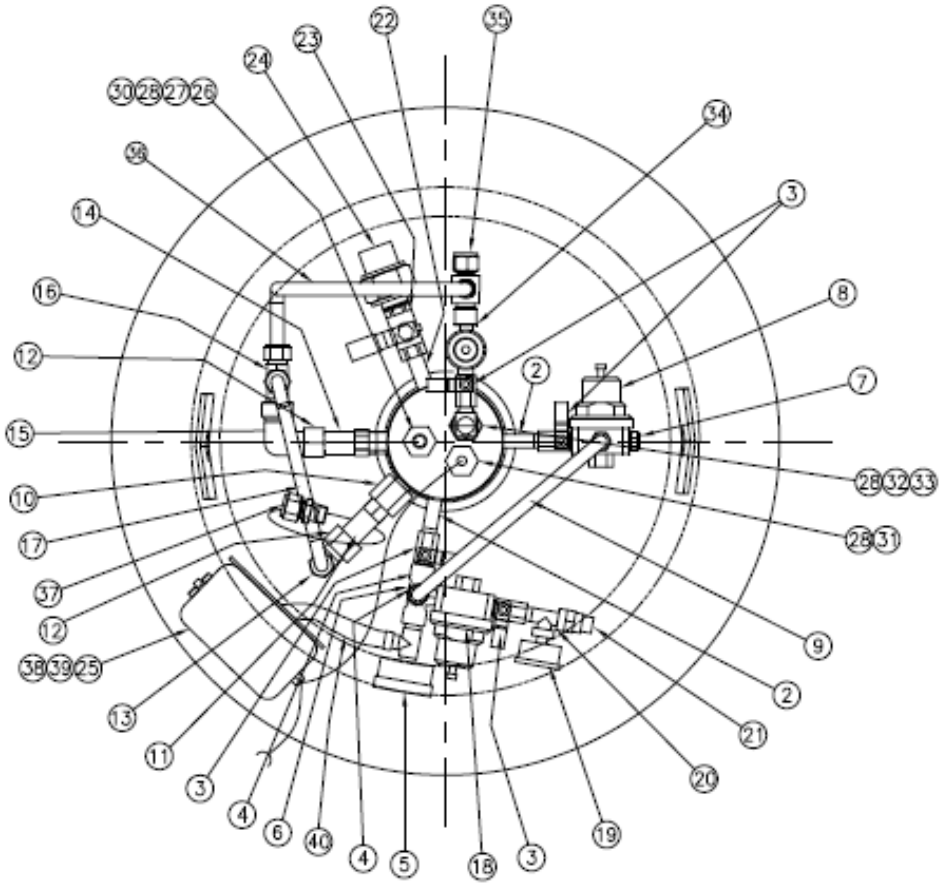
TROUBLESHOOTING

Symptom	Possible Cause	Corrective Action
Low tank pressure- Power light OFF.	1. Unit unplugged. 2. Blown fuse. 3. Bad lamp. 4. Tripped GFCI	1. Restore power. 2. Replace. 3. Replace. 4. Replace with non-GFCI component
Low tank pressure- Power light ON, heater OFF, tank over ¼ full.	1. Pressure switched set too low. 2. Pressure switch defective.	1. Adjust. 2. Replace.
Heater light ON for long period of time	1. Pressure switch set too low. 2. Massive down- stream leak. 3. Heater failure. 4. Isolation valve closed. 5. Tank below ¼ full.	1. Adjust 2. Locate and repair 3. Replace. 4. Open isolation valve. 5. Refill.
Low supply pressure - Container level gauge shows zero.	Out of CO2	Call supplier for fill.
Low supply pressure – NOVO750™ pressure OK.	1. Supply line regulator incorrectly set. 2. Supply line leaking 3. USE valve on tank closed 4. Leak in beverage system. 5. Restriction in gas supply line.	1. Reset to 90 psig (6.2bar/621 kPa) or required supply Pressure. 2. Repair leak. 3. Open Valve. 4. Repair leak. 5. Close USE and PB valve and open beverage line at a convenient point to isolation restriction.
Low tank pressure – below 125 psig (8.6 bar/862 kPa) No frost on unit.	1. Pressure building circuit set too low. 2. Isolation valves closed.	1. Readjust regulator (See Maintenance Section). 2. Open USE valve and P.B. valve. Handle should be parallel with line.

High carbon dioxide consumption.	1. Leak in system. 2. Pool total alkalinity is high (> 140 PPM)	1. Repair leaks. 2. Adjust pool total alkalinity to <120 PPM
Internal NOVO750™ Pressure too high – Container won't fill	1. Customer usage too low. 2. Pressure building circuit improperly adjusted. 3. Customer tank insulation system failure.	1. Vent customer tank through fill gun to 125 psig (8.6 bar/862 kPa). 2. Readjust regulator (See Maintenance Section). 3. See "Checking Container Performance" in Maintenance Section.
NOVO750™ venting – pressure 200 psig (13.8 bar/1379 kPa).	1. Isolate purge regulator to determine if regulator or pressure relief valves stuck open.	1. If purge regulator, adjust to 220 PSI stop venting. If not purge regulator, replace pressure relief valve(s).
NOVO750™ venting – pressure 300 psig (20 to 20.7 bar/ 1999 to 2068 kPa).	2. Normal relief valve operation. 3. Pressure building circuit not closing. 4. Loss of vacuum	1. None required. 2. See "Pressure Building Regulator" in Maintenance Section. 3. NER test.

REPLACEMENT PARTS

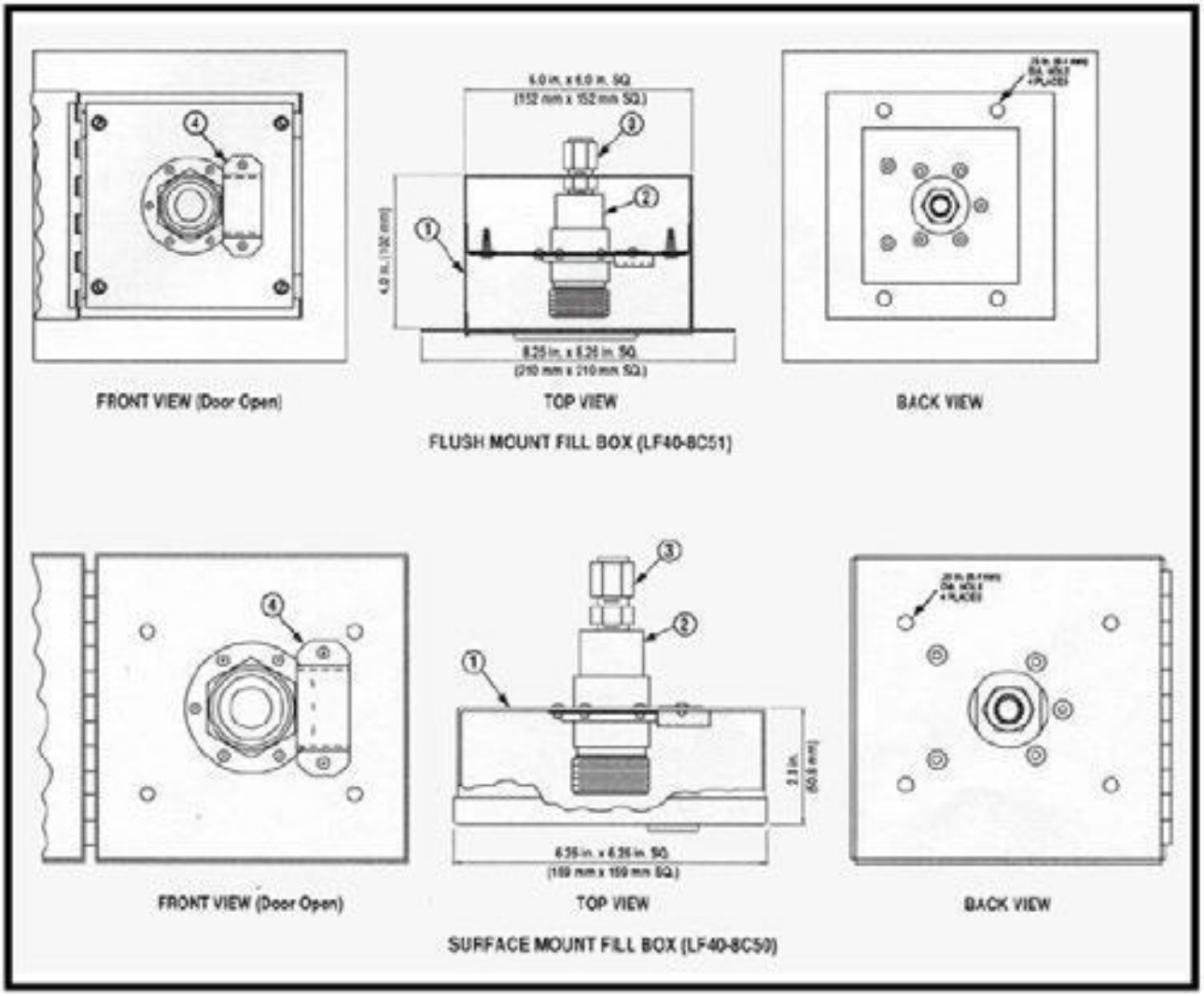
The following replacement parts list is keyed to the accompanying illustrations for parts identification purposes. All replacement parts should be purchased from Taylor-Wharton. When placing orders, please use the nomenclature and part numbers in this section.



NO	QTY	PART NUMBER	DESCRIPTIONS
2	2	1750-9C26	NIPPLE, 2"LG X 1/4"PS X 1/4"NPT, STN STL
3	4	6919-9085	BALL VALVE, 1/4" NPT X 1/4"MNPT BRASS
4	3	6816-0100	MALE BRANCH TEE, 1/4"X 1/4" X 1/4" NPT, BRASS
5	1	7702-6208	PRESSURE GAUGE, 1/4" BT, 0-400 PSIG, WIKA
6	2	7355-4780	MALE CONNECTOR, 3/8"ODT X 1/4"MNPT, S/S
7	1	6010-2075	PIPE PLUG, SQ. HEAD, 1/4", BRASS
8	1	8816-1057	REGULATOR, PB, 125 PSI, 1/4" NPT
9	1	EC75-9C02	TUBE, PB .375 O.D X .035 WALL SEAMLESS, S/S
10	1	7114-0193	REDUCING ADAPTER, 1/2"NPT X 3/8" NPT EXT., BRASS
11	1	6913-9089	RELIEF VALVE, 1/2"NPT, 330 PSIG
12	2	6913-9225	PIPE-AWAY FOR RELIEF VALVE, 1/2"FNPT, BRASS
13	1	6814-9017	MALE ELBOW, 1/2"ODT X 1/2"NPT, BRASS
14	1	6913-9083	ASME SAFETY RELIEF VALVE, 1/2"NPT, 300 PSIG
15	1	45255075	STREET ELBOW, 1/2" X 90 DEG., BRASS
16	1	6816-0200	MALE RUN TEE, 1/2" ODT X 1/2" MNPT, BRASS
17	1	EC00-9C18	SAFETY VENT TUBE, 1/2"OD, COPPER
18	1	8816-1040	REGULATOR, 90 PSI, 1/4" NPT
19	1	7702-6209	PRESSURE GAUGE, 0-200 PSIG, 1/4" NPT, WIKA
20	2	6816-9927	STREET TEE, 1/4"NPT, BRASS

NO	QTY	PART NUMBER	DESCRIPTIONS
21	1	6916-9352	CHECK VALVE, 1/4 "NPT, BRASS
22	1	BC04-9C28	HALF NIPPLE, .375 SCH.40S PIPE X 2.50 LG
23	1	6916-7123	CHECK BALL VALVE, 3/8" NPT
24	1	7114-0181	CGA 320 CO2 (LIQUID)
25	1	6814-3998	ELBOW, MALE 90°, 1/4" NPT
26	1	BC04-9C65	GAUGE, LIQUID LEVEL
27	1	BC04-9C75	INDICATOR SCALE
28	3	7701-0083	GASKET, GLASS FILLED TEFLON
29	1	6719-9994	SHORT NIPPLE, ¼", BRASS
30	1	GL45-9C97	FLOAT ROD, ALUMINUM
31	1	BC04-9C79	HEATER 120 VAC
32	1	4325-6422	ELBOW, 1/4"FNPT X 1/2" ODT, 90 DEG
33	1	EC30-9C12	VENTED FILL ASSY
34	1	6999-9024	SURE-FILL REGULATOR, 1/4" NPT, 200PSI
35	1	6816-9212	MALE RUN TEE, 1/4" ODT X 1/2"ODT X 1/2"NPT, BRASS
36	1	EC00-9C30	VENTED FILLED TUBE, 1/2"OD, COPPER
37	1	7355-4771	CONNECTOR, MALE, 1/2" ODT x 3/8" MNPT, BRASS
38	1	BC04-9C86	HEATER CONTROL BOX, 208/240 V.AC
39	1	0221-7327	HEATER CONTROL BOX BRACKET, STN STL
40	1	2002-2901	FLEXIBLE HOSE, 1/4"MNPT-1/4"FNPT

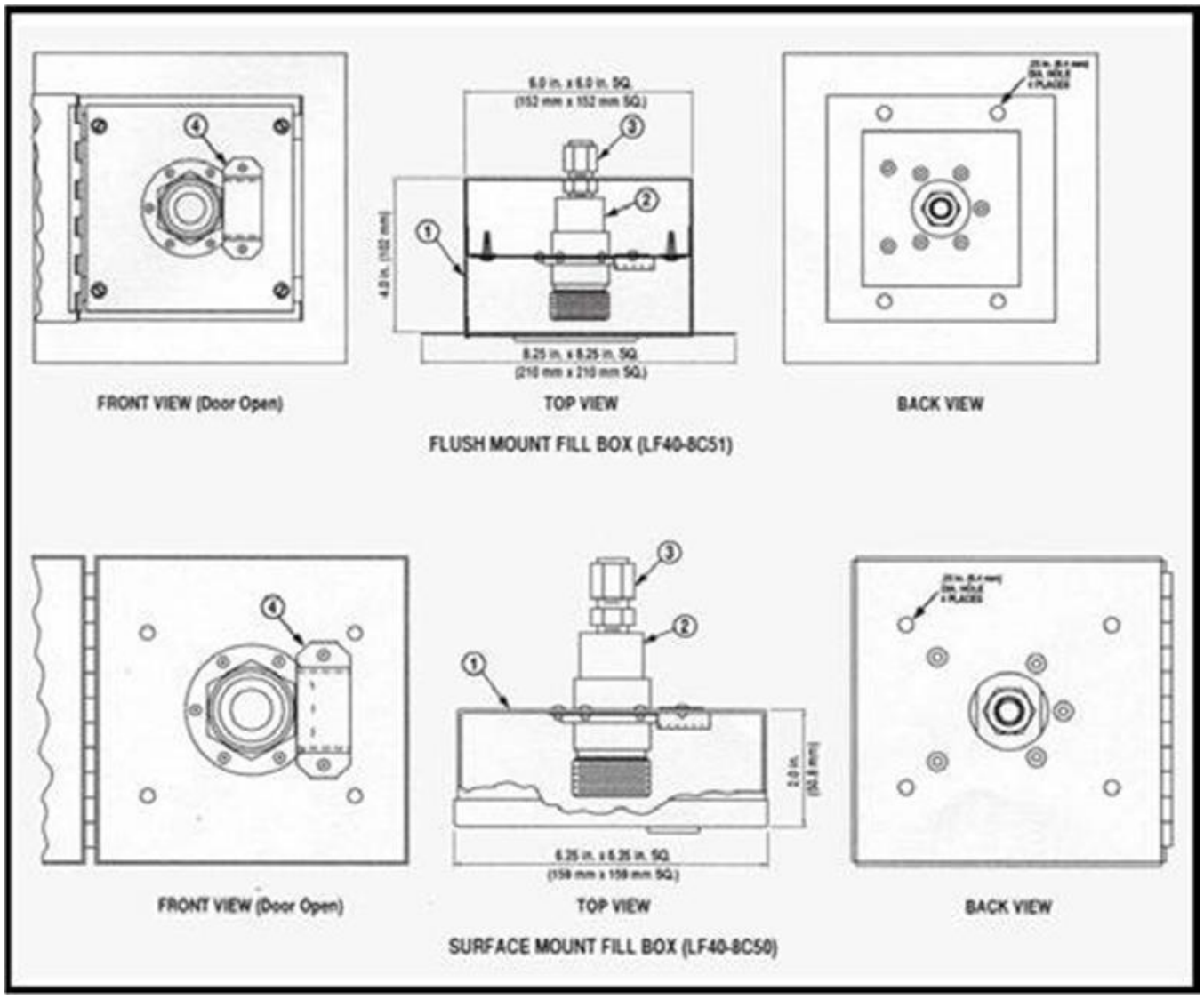
Fill Box Identification



Item	Part Number	Description
1	BC04-8C26	Fill Box, Surface Mount
	BC04-8C35	Fill Box, Flush Mount
2	6812-9412	Brass Coupling w/mounting flange
3	BC04-8C49	Fill Tube Assembly
*	BC04-8C21	Vent Tube Assembly
*	6814-9237	Elbow, Brass 1/2 in. ODT-COMP x 1/2 in ODT-COMP
6	BC04-8C45	Tube Clamp
7	BC04-8C22	Baffle, Vent Tube
8	BC04-8C20	Bracket, Vent Tube

* Not Illustrated

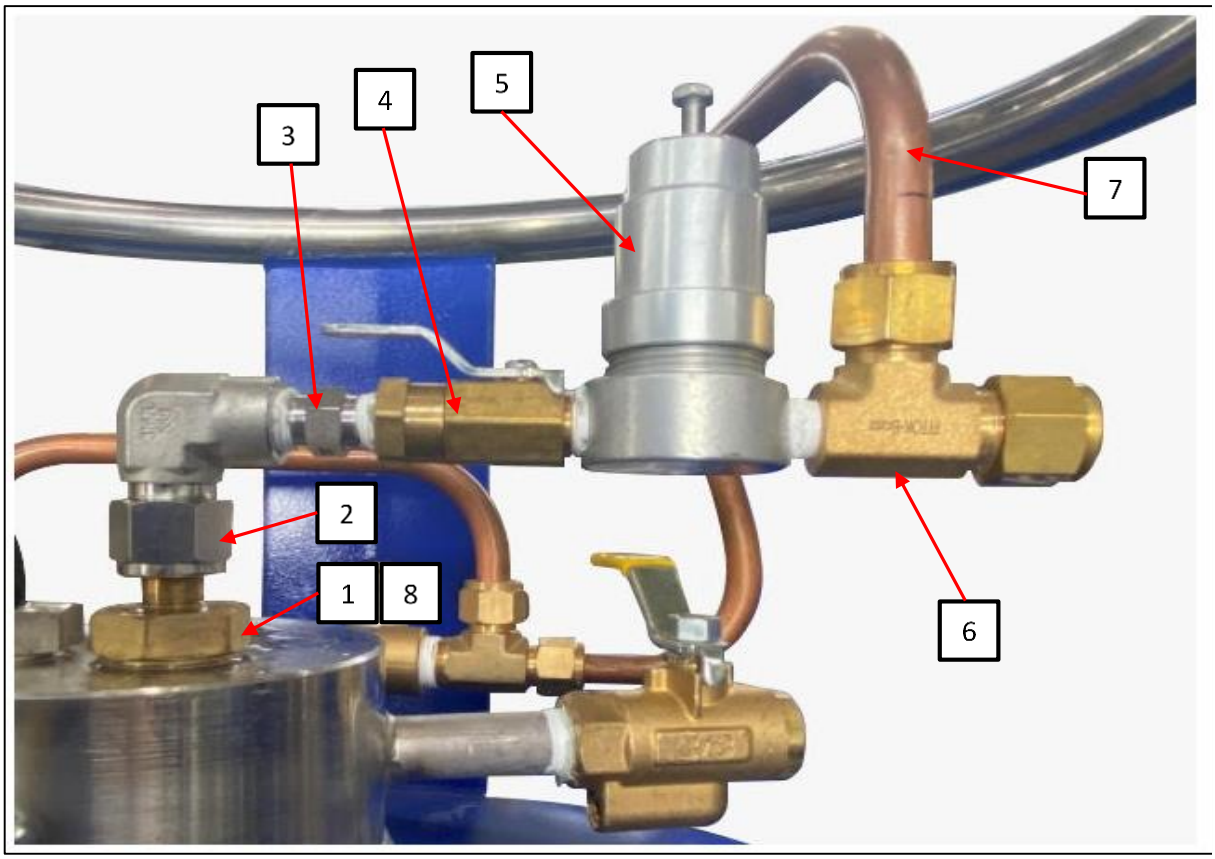
Optional Fill Box Identification



Item	Part Number	Description
1	BC04-8C26	Fill Box, Surface Mount
	BC04-8C35	Fill Box, Flush Mount
2	6812-9415	Brass Coupling w/mounting flange, Thread to Connect
3	45702030	Male Connector, 1/2 in. ODT x 1/2 in. NPT Brass
4	BC04-8C22	Baffle, Vent Tube
*	7854-6150	Fill Hose Assembly, 15 ft. (4.5 m)

* 7854-6155 Fill Hose Assembly, 6 ft. (1.8 m)

* Not Illustrated



Part List of Retro Kits for Visual-Fill

RETRO KITS FOR VISUAL-FILL: EC00-8C02				
No.	**Part No**	**Description**	**Qty**	**Remark**
1	EC30-9C13	VENTED FILL ASSEMBLY	1	
2	4325-6422	ELBOW, ¼" FNPT X ½" ODT	1	
3	3563-0205	HEX NIPPLE, ¼" MNPT X ¼" MNPT	1	
4	6919-9085	BALL VALVE, ¼" FNPT X ¼" MNPT	1	
5	6999-9024	MASTER PNEUMATIC REGULATOR, ¼"	1	
6	6816-0800	MALE RUN TEE, ½" OD X ½" OD X ¼" MNPT	1	
7	EC00-9C37	VENT LINE, TUBE ½" OD	1	Straight tube to be bend on site to connect directly to safety relief valve line.
8	7701-0083	GASKET, O-RING	1	
9	-	TEFLON TAPE	1	

INSTRUCTION PROCEDURE FOR RETRO KIT ASSEMBLY

1. Inspect the parts received for the Retro Fit Assembly.

2. Ensure the cylinder is in empty and no pressure condition.

3. Dismantle all parts installed on the existing vent fill assembly in the cylinder.

4. Place the gasket (Item #8) to the slotted hole on the flange. Install and screw in the vented fill assembly (Item #1).

5. Install the elbow (Item #2) on top of the vent-fill assembly part and tighten it at the compression part so that the ferrule hold this element.

6. Prepare all the parts in screw type with teflon tape.

7. Screw in the hex nipple (Item #3) to the elbow by using the compatible wrench.

8. Install the ball valve (Item #4) to the hex nipple followed by the master pneumatic regulator (Item #5) and male run tee (Item #6).

9. Using the straight 1 /2" OD copper tube (Item #7), measure and bend the copper tube so that the inner connection will match with the connection on the other side. Bend the copper tube in few direction to avoid any obstruction from other parts of the cylinder.

10. After making the bending, tighten both ends of the bend vent line at the compression side of the fitting.
11. Pressurize the cylinder to 275 psi and perform the leak test for every connections after completing the installation.