



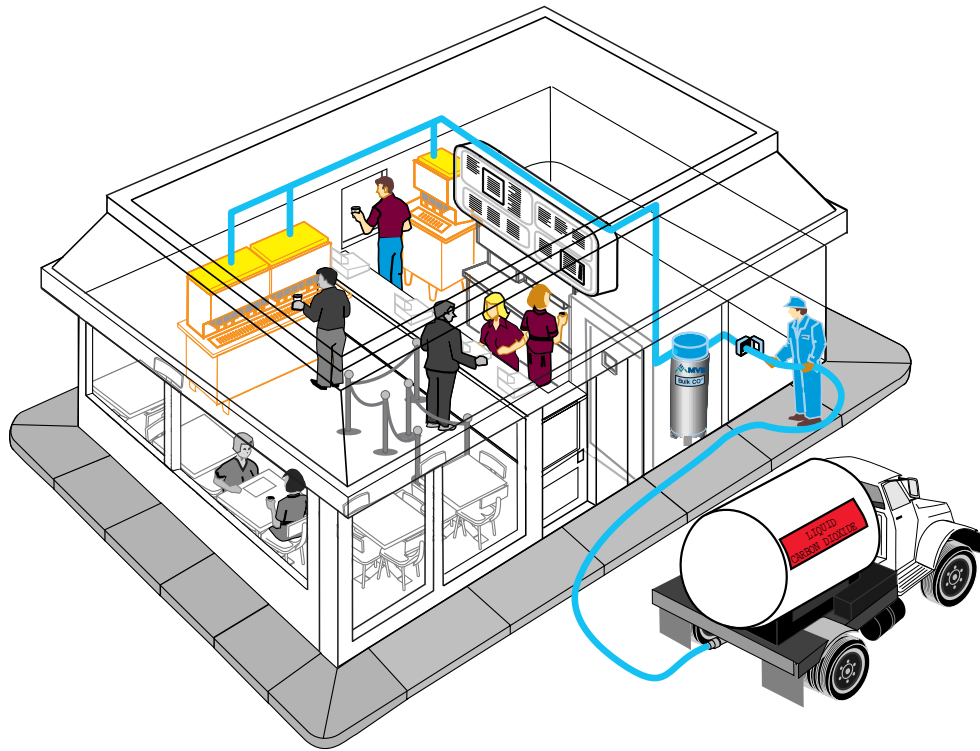
MVE[®]

Bulk CO₂ Storage Systems

Installation & Use



chartbeverage.com



Bulk CO₂ Storage Systems

Carbo-MAX 750

Carbo-MIZER 200 • Carbo-MIZER 300

Carbo-MIZER 450 • Carbo-MIZER 550 • Carbo-MIZER 750

Installation & Use

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Warranty

WARRANTY POLICY

Chart Inc. (“Chart”) warrants to the Purchaser that the MVE Bulk CO₂ Storage Systems equipment (the “Equipment”) shall be free from any defects in workmanship and materials; provided, however, that this warranty shall be limited to Equipment found to be defective within a period of one (1) year from initial use or eighteen (18) months from the date of shipment, whichever expires first, except that parts sold as a spare or for replacement are warranted for ninety (90) days from the date of shipment.

Chart also warrants the vacuum in the Equipment for five (5) years and **“Pool Coat” vessels for three (3) years** from the date of the original Chart invoice. Chart warrants that its services will be performed in a professional and workmanlike manner. All Chart services are warranted for a period of ninety (90) days from the date of their completion.

Purchaser agrees that as a pre-condition to any Chart liability hereunder, Purchaser or its appointed agents shall fully inspect all Equipment immediately upon delivery and shall give Chart written notice of any claim or purported defect within ten (10) days after discovery of such defect.

As a further pre-condition to any Chart liability hereunder, an approved Chart service company must supply both parts replacement and labor and Purchaser must strictly adhere to the Warranty Claims Procedure set forth below. Chart’s sole and exclusive liability under this limited warranty is to the original Purchaser only and is, at Chart’s sole option: (1) repair or replacement of the defective Equipment or parts thereof; or (2) refund the net purchase price of the defective Equipment or parts thereof paid by the original Purchaser; or (3) in the case of nonconforming services, provide equivalent services or refund the net price paid by the original Purchaser for such services. Chart shall not be responsible for providing working access to the defect, including disassembly and reassembly of Equipment or for providing transportation to and from Chart’s repair or factory facility, all of which shall be at Purchaser’s risk and expense.

This limited warranty does not apply to Equipment that Chart determines to have been caused by the effects of normal wear and tear, erosion, corrosion, fire, flood, explosion or other excessive external forces, misuse, abuse, negligence or accident.

Alterations or repairs by any party other than those designated and approved in writing by Chart, or installation, storage, maintenance or operation of such Equipment in a manner inconsistent with Chart accepted practices, normal operating instructions, specifications and drawings, or outside the specified design conditions, unless pre-authorized in writing by Chart, shall void this limited warranty. Modifications in any way to the Equipment without Chart’s prior written approval shall render this warranty void.

This limited warranty does not apply to Equipment comprised of materials provided or a design stipulated by Purchaser or to Equipment purchased used.

Negligent handling of the vacuum by the Purchaser or others, or testing of the vacuum levels by any party other than a Chart designated and approved party shall render the vacuum warranty void.

Repairs or replacements made pursuant to warranty shall not renew or extend the applicable original warranty period; provided however, that any such repairs or replacement of Equipment or parts thereof shall be warranted for the time remaining in the original warranty period or thirty days, whichever is longer.

Individual parts replacements under warranty and with a component list price less than \$50.00 will be replaced at no charge. Individual component costs exceeding \$50.00 that are replaced under warranty will be invoiced to the Purchaser and the Purchaser will be issued credit based on results of Chart’s evaluation of the returned component(s). The Return Material Authorization (RMA) process must be initiated prior to shipment of any replacement parts.

Chart is not liable for component replacement labor exceeding 2 hours for actual replacement and 2 hours travel time (4 hours @ \$65.00/hour maximum).

CHART SPECIFICALLY MAKES NO WARRANTIES OR GUARANTEES, EXPRESSED OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, OR WARRANTIES ARISING FROM COURSE OF DEALING OR USAGE OF TRADE, WHICH ARE ALL EXPRESSLY DISCLAIMED, OTHER THAN LIMITED WARRANTIES EXPRESSLY SPECIFIED HEREIN.

IN NO EVENT SHALL CHART BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF PROFITS, LOST OPPORTUNITY, LOSS OF USE OF THE EQUIPMENT, CO₂ LOSS, COST OF CAPITAL, COST OF SUBSTITUTE EQUIPMENT, DOWNTIME COSTS, COSTS OF DELAYS NOR FOR ANY PENALTIES, WHETHER ANY SUCH CLAIM FOR THE SAME IS BASED ON CONTRACT, WARRANTY, TORT, NEGLIGENCE, STRICT LIABILITY OR OTHERWISE. CHART'S LIABILITY FOR ANY SUCH CLAIMS WHETHER IN CONTRACT, WARRANTY, NEGLIGENCE, TORT, STRICT LIABILITY, OR OTHERWISE OR FOR ANY LOSS OR DAMAGE ARISING OUT OF, CONNECTED WITH, OR FROM ANY DESIGN, SALE, INSTALLATION, OPERATION OR USE OF THE EQUIPMENT OR PERFORMANCE OF ANY SERVICES RENDERED BY CHART, SHALL IN NO EVENT EXCEED THE PURCHASE PRICE PAID TO CHART BY PURCHASER FOR THE SPECIFIC EQUIPMENT OR PART THEREOF OR FOR THE SERVICES GIVING RISE TO THE CLAIM. PURCHASER AGREES TO DEFEND, INDEMNIFY AND HOLD CHART HARMLESS FROM ANY THIRD PARTY CLAIMS ARISING OUT OF THE USE, SALE, OR LEASE OF THE EQUIPMENT.

This Warranty Policy is not intended to replace or supersede the warranties, limitations, exclusive remedy and disclaimers set forth in Chart's Terms and Conditions of Sale. In the event of a conflict between Chart's Terms and Conditions of Sale and this Warranty Policy, this Warranty Policy shall control.

WARRANTY CLAIMS PROCEDURE

1. All warranty claims must be previously authorized by: Chart Inc. Telephonic / electronic approval may be obtained by contacting Chart's MVE Beverage Systems Technical / Customer Services at:

- Telephone: 800-247-4446
800-253-1769
(Toll free in U.S.)
 - Facsimile: 952-758-8275
- or by writing to:




Chart Inc.
MVE Beverage Systems
Storage Systems Division
407 Seventh Street N.W.
New Prague, MN 56071-1000
USA

2. Authorization must be obtained from Chart prior to shipping any Equipment to Chart facilities. In order to process the return of a vessel its model and serial number must be provided. If approved, a Return Material Authorization (RMA) number will be provided. The RMA number must be prominently indicated on the packing slip and any packaging that accompanies the goods being returned. The customer returning the goods is responsible for all freight, proper packing, and any damage incurred during shipment of the goods back to Chart.

Safety

IMPORTANT SAFETY PRECAUTIONS

The system described in this manual holds and dispenses carbon dioxide (CO₂) gas under pressure. All persons using this equipment must read and understand the operation and safety information contained in this manual and must be adequately trained to operate this equipment.

 WARNING	
	<p>SUFFOCATION HAZARD.</p> <p>CARBON DIOXIDE GAS can cause SERIOUS INJURY OR DEATH.</p> <p>DO NOT BREATHE CARBON DIOXIDE GAS.</p> <p>AVOID ENTERING canister area if a leak is suspected. THOROUGHLY VENTILATE area.</p>
	<p>FROSTBITE HAZARD.</p> <p>CONTENTS ARE EXTREMELY COLD and can cause FROSTBITE.</p> <p>DO NOT TOUCH liquid, ice, or ice crystals on or near canister.</p> <p>STAY AWAY from escaping gas.</p>

CO₂ gas is a colorless, odorless, tasteless gas that displaces oxygen and does not support life. The gas is difficult to detect without the assistance of special equipment. Avoid breathing or contacting CO₂ in gas, liquid or solid form.

EXPOSURE TO CONCENTRATIONS OF LESS THAN 5% FOR LESS THAN 15 MINUTES CAN CAUSE PHYSICAL SYMPTOMS INCLUDING UNCONSCIOUSNESS, INJURIES OR DEATH.

Even low concentrations of CO₂ can cause:

- Dizziness, headaches, nausea or disorientation
- Increased respiration or heart rate
- Shortness of breath or rapid suffocation.

CO₂ is heavier than air and can collect in low areas such as basements, stairwells, and confined spaces. Avoid entry into areas where CO₂ leaks or high concentrations of CO₂ are suspected. Enter those areas with caution only after they have been thoroughly ventilated.

Whenever the vessel is inside a building it's safety relief circuit must be connected to an outdoor vent typically in the fill box. The fill box and/or vent must never be located in or above any below-ground spaces or stairwells. The vessel must not block emergency exits, aisles, fire suppression equipment or utility boxes or accesses. CO₂ lines or hoses must be located away from traffic areas and heat sources and must be protected from potential causes of damage. All connections, lines, and components must be leak-free.

This equipment should be installed and serviced only by professional agents who are qualified to work with CO₂ and the mini-bulk liquid CO₂ storage vessels. They should be familiar with all pertinent safety procedures.

EQUIPMENT SAFETY AND HANDLING

Note: A bulk CO₂ storage vessel is ASME coded for permanent installation. It is not DOT regulated and must not be transported when it contains liquid CO₂. It must be shipped, stored and used in a vertical position to avoid structural damage. When loading a vessel onto or off of a truck use a power lift gate, crane, or an inclined ramp. Never attempt to manually lift or slide a vessel on or off a truck bed.

FIRST AID AND EMERGENCY ACTION

If inhaled:

- Move to fresh air immediately.
- If not breathing, give artificial respiration.
- If breathing is difficult, give oxygen.
- Get immediate medical attention.

In case of frostbite:

- End exposure immediately.
- Do not rub or pour water on the affected area.
- Get immediate medical attention.

Rescue:

- Do not attempt a rescue in areas of high CO₂ concentrations without proper life-support or rescue equipment. (Avoid being the next victim.)
- Thoroughly ventilate areas of possible high CO₂ concentration before entering them.

In case of spills or leaks:

- Evacuate all personnel immediately from affected areas.
- Thoroughly ventilate the area of the spill or leak before entering.
- CO₂ is heavier than air. It displaces oxygen and will collect in low or confined areas.

FOR MORE INFORMATION CONTACT:

Local CO₂ supplier

or

Compressed Gas Association

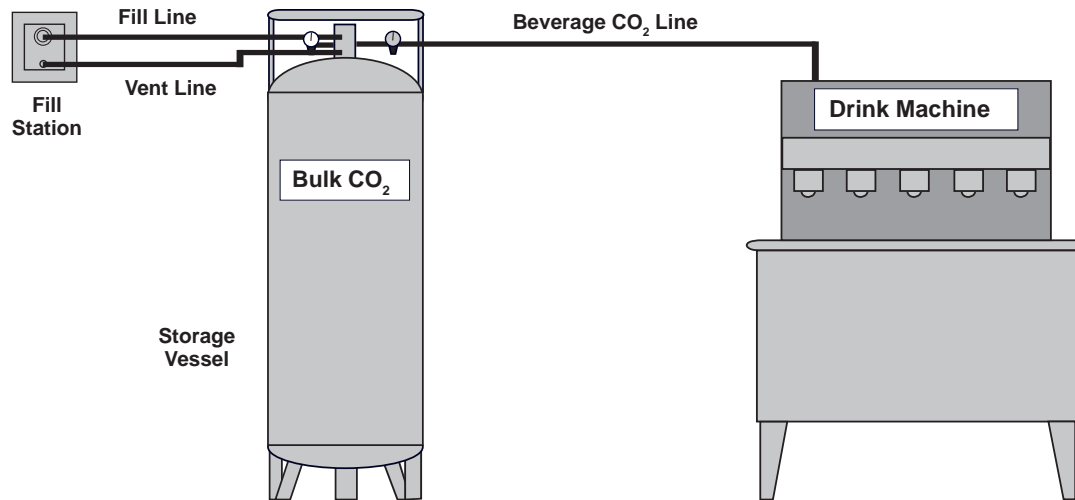
725 Jefferson Davis Highway, Suite 1004

Arlington, VA 22202-4100 USA

Telephone: (703) 412-0900

FAX: (703) 412-0900

General Description



System Overview

The Bulk CO₂ Storage System is designed to provide safe, convenient low pressure liquid storage and supply of carbon dioxide gas for purposes including beverage carbonation, beer dispensing, brewing, and pH control in swimming pools. The system consists of three primary elements; the CO₂ storage vessel, a CO₂ fill box (fill station), and connecting fill and vent hoses.

Storage Vessel

The storage vessel consists of an inner vessel and an outer vessel; much like a giant Thermos® bottle. The space between the two vessels contains a vacuum and additional insulating material. The vacuum and insulation minimize the entry of unwanted heat into the liquid CO₂ stored in the inner vessel.

The vessel construction includes an internal vaporizer (coil) and external plumbing configuration that performs to maintain adequate CO₂ gas supply rates. When CO₂ gas is needed, liquid CO₂ is drawn from the inner vessel and converted to gas. An adjustable line regulator supplies gas to the end use point at the desired pressure. The gas use or “final line” regulator is normally set between 90 and 115 psi.

In accordance with and exceeding ASME standards, primary and secondary relief valves protect the vessel in the event of excessive pressure. Excess pressure is vented safely to the outside.

Fill Station

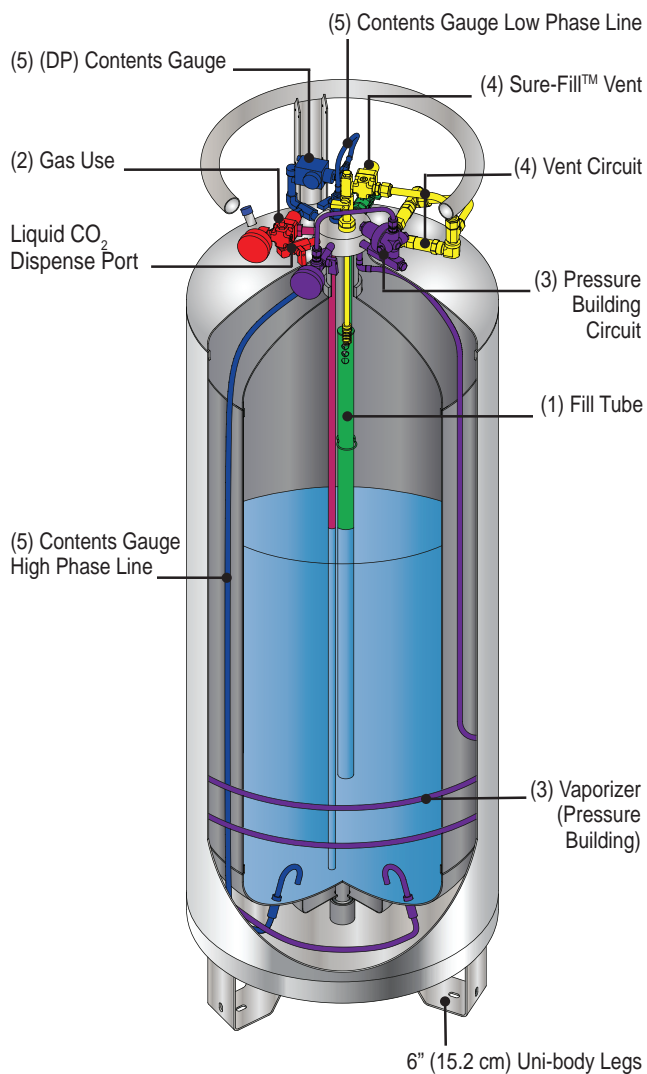
The stainless steel fill station (box) is the second major element of the bulk CO₂ storage system. The lockable remote fill box is permanently mounted on an outside wall. It contains a fitting for filling the storage vessel at any time of the day without entering the store. The fill box is also equipped with a vent connection through which CO₂ gas from the storage vessel’s safety or Sure-Fill® circuits can be released harmlessly outside. If a vessel is equipped with a direct fill fitting an alternate safety relief vent line is also required if the vessel is not used outdoors.

Fill Hose and Vent Line

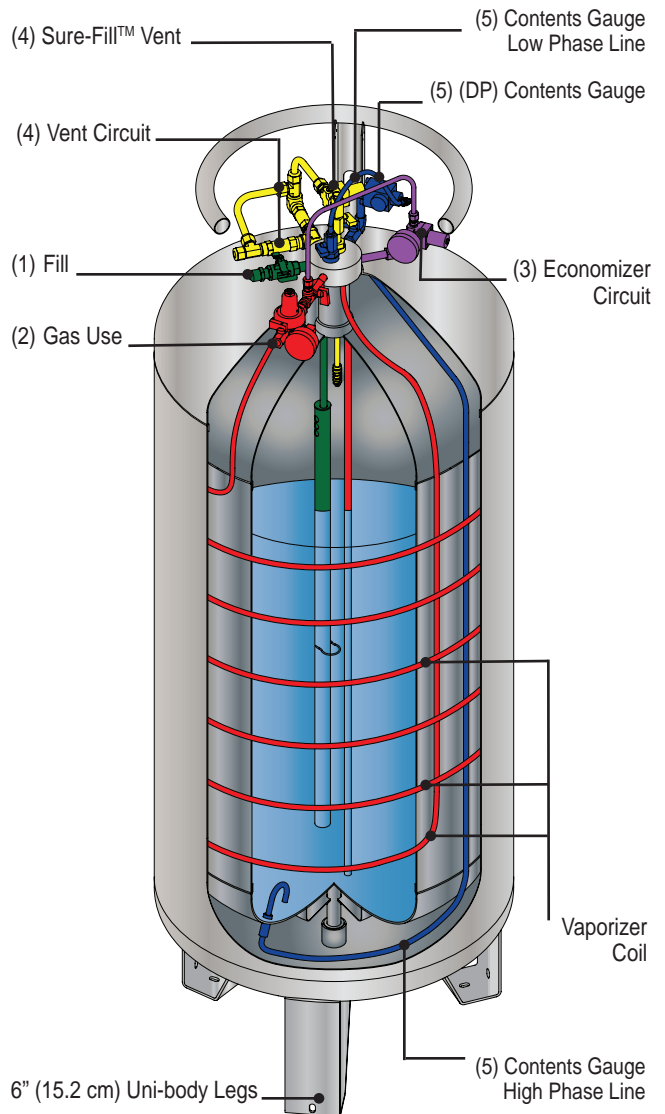
The third major element of the stationary bulk CO₂ system is comprised of a fill hose and vent line. These two lines join the outdoor fill box with the CO₂ storage vessel.

The fill-hose, constructed with FDA approved food grade materials, is a pressure rated line that connects the brass fill fitting in the fill box with the fill circuit on the vessel. The hose is available in standard lengths equipped with connector fittings. Common standard fill hose lengths are 5, 10, 15, 25, and 30 feet.

The vent line is as important as any component in the bulk CO₂ system. It connects the safety relief valves on the vessel to either the outdoor



Carbo-Mizer 300, 450, 550, 750



Carbo-Max 750 HF

fill box vent fixture or to an alternative outdoor vent tube. **Note: When used indoors a CO₂ storage vessel must always be connected with a vent line to the outdoors.**

Vessel Plumbing

Plumbing components on the liquid CO₂ storage vessel perform five functions:

1. The fill tube allows liquid CO₂ to be transferred into the vessel during the delivery process.
2. The gas-use circuit dispenses CO₂ gas to the end use system. (Carbo-Mizers also have a liquid CO₂ dispense port.)

3. The pressure control circuit (pressure building [PB] on Mizer vessels or pressure relief [Economizer] on Carbo-Max HF vessels) maintains optimal operating pressure and conserves gas for efficient system performance.
4. The relief/vent circuit allows excess pressure to safely exit the vessel and the building. The Carbo-Mizer 300, 450, 550, and 750, can be equipped with the optional Sure-Fill[®] assembly to optimize CO₂ fill efficiency and convenience. The Sure-Fill is a standard feature on the Carbo-Max 750.
5. Contents and pressure gauges monitor the status of the CO₂ inside the storage vessel.

Equipment Location

Site Survey

Prior to installation of the CO₂ system components a site survey should be performed to determine the best location for placing the bulk CO₂ vessel and the fill station. As a matter of safety, this would be a good time to determine proper location for a CO₂ monitor. (CO₂ is 1 1/2 times heavier than air and in the event of a leak is likely to collect in low-lying and confined spaces.)

A site survey form created by the installer should be used to plan, understand, and approve the best location for the equipment. The survey must be conducted with the store owner or their designated representative. Upon completion of the site survey the form should be signed by the store representative and the system installer. Any subsequent modifications to the installation should be noted on the form and signed by the store representative and the installer.

Fill Box Location

The fill box location must be determined before locating the CO₂ vessel. A fill box is typically mounted on a back wall at a height of 3 1/2 - 4 feet. It should be located out of the way of store customer operations if possible. It must be located within a distance allowing easy delivery access and considering the length of the fill hose from the delivery truck. The fill box may be located in a drive-thru lane and the fill hose may be driven over when it is pressurized during the filling operation.

While determining the best location for the fill box always check the inside wall of the proposed location to be sure the box installation will not interfere with appliances in the store and will not damage anything inside the wall such as plumbing and electrical conduits. In stores where the fill line between the fill box and the storage vessel must be sleeved, be sure to locate the box where it will allow the inside sleeve to have adequate radius for the fill hose to easily pass thru for installation and future maintenance. The sleeve must not interfere with store operations.

Storage Tank Location

Once the fill box location has been determined the location of the CO₂ storage tank can be determined. The primary considerations for placing the storage tank are space and distance from the fill box.

The storage tank must be placed as close to the fill box as possible to maximize filling efficiency; ideally within 25 feet. The distance from the storage tank to the beverage machine or other use point is not critical.

The storage tank should not be installed in hallways. It should be placed in locations out of the way of other fixtures such as electrical panels and sinks. Although the tank should be in the most out-of-the-way location available, it must be placed where it is accessible for service and in a manner that allows its gauges can be read.

Note: To prevent damage to the tank's plumbing components the tank's handling ring must never be used as a hanging rack or platform for storage.

Installation Tools and Supplies

Installation of the Bulk CO₂ System requires certain tools and installation materials. A supply of the following materials and tools should be maintained for most simple and economic installations though not all installations will require them:

(Note: Chart authorized distributors or installation agents have the installation tools and supplies necessary for proper installation.)

Installation Equipment

Tools

Warning: When using the following tools, suitable eye and ear protection must be worn. Failure to do so could result in serious personal injury.

Electric Hammer Drill for drilling holes and chiseling brick.

Accessories:

3/4" x 21" Scaling Chisel

3" Core Bit

1" x 21 Masonry Bit

1/4" x 13" Masonry Bit

1/2" Masonry Bit

7 1/4" Builder's Circular Saw for scoring brick and cutting wood exteriors.

Accessories:

Masonry Cut-Off Wheel

Combination Blade

Reciprocating Saw for cutting through wood walls.

Accessories:

Metal Cutting Blades

Wood Cutting Blades

Electric Hand Drill for drilling anchor holes.

Accessories:

1/4" and 3/8" Masonry Bits

Set of Twist Drills

3" Hole Saw

Oxyacetylene Torch for cutting rebar in poured concrete walls and floors.

Supplies

Hand Truck with Strapping Attachment

Torpedo Level

Carpenter Square

Extension Cord

Oetiker Clamp Pliers

Step Ladder

Caulk Gun

Assorted Hand Tools

Flashlight

Silicone Sealant (clear and white)

2" PVC Pipe and Elbows

1/4" Plastic Screw anchors

1/4" x 1" Self-Tapping Screws

9" Cable Ties

PVC Cement

Duct Tape

Teflon Tape

PVC Flanges

Chalk or other Marker

Leak Check solution

Hardware

Chart P/N

Clamps for 1/4" ID Tubing

3411321

1/4" Hose Barb Nipple

1611481

1/4" Female Flare Nut

1611471

1/4" Hose Barb x 1/4" Female Elbow

1611461

Flare Nut Connector

1111222

1/4" ID Beverage Tubing

2811416

Concrete Wedge Anchor

Hilti Kwik-Bolt® (3/8" x 3 3/8")

10559713

or

Red Head True Bolt®

11557752

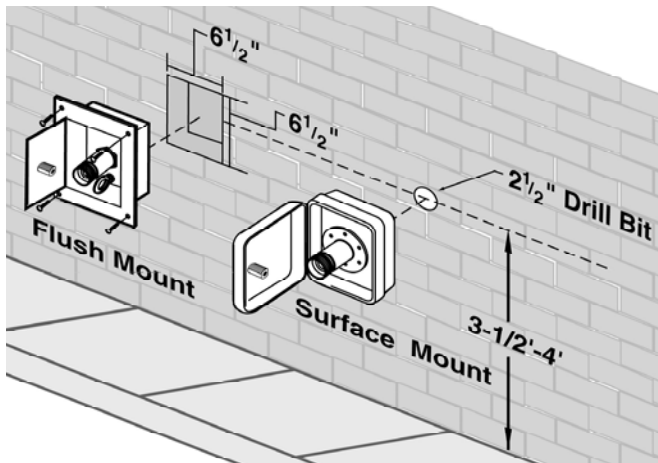
Note: Stainless steel fittings should be used.

Fill Station (Wall Box) Installation

General

Note: For fill-box diagrams and components identification refer to page 23.

If possible, select a fill station location that will not interfere with store / customer operations. A neat and clean installation is important since the fill station is visible to the general public.



Before marking the fill station location on the exterior wall, check to be sure the fill box will not interfere with any electrical, plumbing, or gas lines inside or outside the store.

Flush-Mount Fill Box (P/N 9723139)

1. Using a pre-cut template or carpenter's square and a level, mark a 6 1/2" square on the exterior wall making sure the marking is plumb. Match the fill box to the outline on the wall to make sure the outline is correct.
2. Using a circular saw, make a 1/2" to 1" perimeter cut along the inside of the outline. Use a masonry blade to cut brick, concrete or block wall.
Caution: Do not attempt to remove material from the wall without first making the perimeter cut.
Warning: To help prevent serious injury, always wear goggles, gloves, and a dust mask when making perimeter cuts.
3. Use a hammer drill and 3/4" scaling chisel to remove brick or concrete material within the perimeter of the cut. Begin chiseling near the bottom of the perimeter and work toward the top.

For easier separation of wall material from a poured concrete wall, drill 3/4" holes about 3" deep around the inside of the perimeter to perforate the material before chiseling.

Warning: Be very careful when handling the chisel. The chisel may have a tendency to "jump" and could cause personal injury or damage to the surrounding wall.

4. Remove debris from the hole.
Note: Some concrete walls contain reinforcing rods. Cut rebar with an oxyacetylene torch if necessary.
5. Slide the box into the opening and make sure its flange lies flat against the wall surface.
6. While holding the box in position mark the four corner mounting holes.
7. Drill the corner mounting holes about 1 1/2" deep using a 1/4" drill bit or masonry bit as necessary. Insert plastic screw anchors.
8. Drill a 3" "center hole" in the back of the fill box opening using a 3" core bit.
Caution: To prevent damage to the inside wall surface, the center hole may need to be drilled from inside to outside. To accomplish this, first drill a 1/4" pilot hole through from the outside; then drill the 3" hole from the inside using the pilot hole as a guide.
9. Insert the box into position and fasten it using sheet metal screws.

Surface-Mount Fill Box (P/N 9722279)

When the use of a surface mounted box is preferred, it will simply be mounted onto the outside surface of the store wall.

1. At the desired fill box location mark and drill the center hole using a 3" bit.
2. Place the box in position so its fill and vent fittings are within the 3" hole. Mark the four corner holes while using a carpenter's level to make sure the box is level.
3. Drill the four corner pilot holes. Use a 1/4" bit if necessary for screw anchors. Insert the anchors.
4. Fasten the box in place using sheet metal screws.

Fill Hose and Line Installation

General

Fill and vent lines will likely be routed differently in each store. By following basic recommendations, the lines should be run properly and as easily and simply as possible.

Distance from the outside fill box to the CO₂ storage tank should be as short as possible and typically varies from 1 to 30 running feet.

Fill line distances of longer than 30 feet are not recommended because longer fill hose length results in reduced CO₂ fill efficiency.

Note: When installing the fill and vent lines please be aware that they need to be accessible for inspection and service. The lines should be inspected at least once a year for leaks, damage or signs of wear. They should be replaced every eight years.

Fill and vent lines are generally secured together with cable ties about every 18 inches and attached to the wall using conduit straps about every 2 or 3 feet along the run. The lines should run either horizontally or vertically and as inconspicuously as possible. Excess line should be coiled and tied.

Running lines through a conduit sleeve is generally not necessary. However, if the lines were to be exposed in a high traffic area, it may be best to run them through a sleeve to ensure protection. Sleeve material generally used is 2" or 3" PVC piping.

Connect Lines to Fill Box

1. Gain access to the back of the fill box by temporarily removing the box from its mount.
Note: The fill fitting is fastened to the fill box by four lock-nuts on threaded studs. The fitting can be easily removed for service or for attaching the fill line.
2. Fasten the vent line simply by pushing the line onto the barbed fitting on the back of the fill box.
3. Fasten the flare connector on the end of the fill hose to the flare connection end of the fill fitting
Note: In the event that a fill hose needs to be

attached at a right angle to the fill box, a flare fitting 90° elbow (Chart P/N 11388573) may be used to connect the fill hose to the fill fitting.

Run Lines to Tank Location

1. Feed the fill and vent lines through the wall (or PVC wall flange if used) to the inside of the store.
2. Re-attach the fill box if necessary.
3. If sleeve material is not being used, route lines to the tank location according to plan and attach them to the wall with conduit straps about every 2 or 3 feet. Proceed to CO₂ storage tank installation.
4. If a sleeve is being used, size and cut the sleeve material to the proper length and with a bend radius toward the wall flange. Bond sleeves to elbows with PVC glue only if necessary. If the connections are not bonded they will be easier to separate when future service is required. If the connections are bonded the bend radius should allow the fill hose to slide freely within the sleeve for future maintenance and replacement.
Note: A fill hose should be replaced every eight years.
5. Feed the fill and vent lines through the PVC sleeve conduit and run the sleeve conduit to the CO₂ storage tank.
6. Attach the PVC sleeve to the wall with conduit straps. Proceed to CO₂ storage tank installation.

CO₂ Storage Tank Installation

General

The bulk CO₂ storage tank should be installed in compliance with local code requirements as applicable. It should be installed in an area having free flowing air space and out of the way of pedestrian traffic. It should be located away from chemical storage areas. The tank should be positioned so its plumbing components are accessible for service and so its gauges are facing “forward” and are readable.

Caution: The storage tank must be vented to the outside to prevent hazardous CO₂ concentrations from developing if a pressure relief valve should open.

A tank with (6") legs must be bolted to the floor.

Note: Anchor bolts such as HILTI Kwik Bolt® (Chart P/N 10559713) or RED HEAD Trubolt® (Chart P/N 11557752) wedge anchors may be used.

1. Place the tank in its best position and mark three floor-anchor holes through the holes in the bottom of the legs. Move the tank.
2. 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.
3. 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.
4. 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 and tighten.

Connect Lines to the CO₂ Storage Tank.

Bulk CO₂ storage tanks contain positive CO₂ gas pressure when they are shipped. Before installing the lines onto the tank, any residual pressure should be vented off by simply opening the gas-use valve.

1. Connect the liquid fill hose to the inlet flare fitting on the tank; then open the tank valve.
2. Squarely cut the vent tubing to the proper length and attach the tubing to vent circuit fitting of the tank.
3. Connect the supply line tubing to the tank's supply regulator. Note: Do not use copper tubing for CO₂ gas supply.

For best results, the tank should be filled at this time to ensure that the lines are properly purged before use with the beverage system. This is also the best time to check the system for leaks.

Filling the CO₂ Storage Tank

First Fill

The first fill of the tank cools the inner vessel of the storage system. Since the inner vessel of a new CO₂ storage tank is relatively “warm,” its first fill may take 20 to 30 minutes and a larger than normal amount of CO₂ gas will be vented during the fill. A higher-than-normal operating pressure can be expected for several days after the first fill.

1. Open the fill-box door and inspect the threaded fill-fitting for debris and damage. Wipe the fitting with a clean dry cloth if necessary.
2. Inspect the delivery hose quick-connect and wipe the fitting if necessary.
3. Connect the delivery hose to the fill box fill fitting. If filling a tank equipped with the **Sure-Fill**[®] option proceed to Step 7.
4. Open the liquid delivery valve to allow liquid CO₂ to flow into the vessel. CO₂ will stop flowing when the tank’s pressure equals the pressure of the delivery source. At this point the tank should be just over half full.
5. Close the liquid delivery valve; then open the vent valve on the delivery hose assembly to reduce pressure in the tank. Drop the tank pressure to between 100 and 125 psi. (Frost should be seen at the bottom of the tank.) Close the vent valve.
6. Repeat the liquid delivery and vent cycle as often as necessary to get the tank contents to about 350 lb. on the 450 lb. model.
Note: The initial fill will take considerably longer time than subsequent fills. If scheduling permits, it can be good idea to initially fill the tank about half way and then return in a day or two to complete the fill.
7. When filling a tank equipped with the Sure-Fill vent option, make sure the isolation valve in the Sure-Fill relief circuit is open.
8. Open the liquid delivery valve to allow liquid CO₂ to flow into the vessel. The Sure-Fill vent valve will open when the tank pressure reaches

approximately 200 psi. At that point a pressure relief venting noise will be heard from the vent fitting below the fill connection in the fill box. Continue filling.

9. When the venting stops the tank is full. Disconnect the fill hose from the fill station.
10. Using a leak-check solution check all connections and fittings on the tank and fill box for leaks. Tighten connections if necessary.

General CO₂ Delivery

To minimize delivery expense, delivery frequency should be scheduled to allow a 200-500 pound delivery; depending on vessel size. For most restaurants, this will be every 20-30 days. Delivery routes are typically planned to minimize travel time and “rush-hour” traffic situations.

1. Delivery vehicle pressure must be maintained at 280-300 psi for proper operation.
Low delivery pressure can cause 45-50 minute fill times.
2. A delivery pressure of 50 psi higher than the restaurant storage vessel pressure should be maintained during filling. A low pressure differential will cause long fill times.
3. Maintain a delivery log for each account to help detect irregularities in CO₂ consumption.
4. Adjust delivery program to longer intervals between deliveries as consumption justifies.

Connecting to the Beverage System

General

The gas-use line from the CO₂ storage tank to the beverage equipment or other end use point(s) will probably be run differently in each location.

The distance from the CO₂ tank to the equipment is not critical and can be several hundred feet.

Beverage tubing lines with 1/4" ID are generally adequate for service up to 50 ft. For longer runs a larger ID tubing may be desired to compensate for pressure drop. See the chart at the end of this section for recommended gas line sizes for various distances. For certain applications where several "stations" are supplied by a single CO₂ source, a larger diameter "header" or "trunk" line may be used while teeing 1/4" "drop" lines to supply individual stations. By following basic recommendations described in this section, CO₂ supply lines can be run as easily and as effectively as possible.

1. Run the gas use line in a manner that is as inconspicuous as possible.
2. The line should be attached along the run in horizontal or vertical orientation; level and plumb wherever possible to present a neat and careful installation. Never leave loose line hanging.

3. Cut the line to proper length.
4. Secure connections to the CO₂ storage tank's final line (supply) regulator and to the drink system equipment using appropriate fittings.
5. Open the gas-use isolation valve on the bulk CO₂ storage tank and check the supply regulator gauge for proper set pressure with in the range of 90 -115 psi while gas is flowing.
6. Perform a leak check with soap solution on all joints to the drink system and correct as necessary.

Note: Beverage systems consist of a variety of equipment functions. Each function may require a different CO₂ pressure. The bulk CO₂ storage system supplies a pre-set CO₂ pressure of about 110 psi. Therefore, secondary or "step-down" regulators should be used as necessary to meet the requirements of system functions. Since high pressure regulators normally used on high pressure cylinders are constructed to respond to very high inlet pressures, they may not perform properly in the low pressure bulk CO₂ system and their use is not recommended.

Gas-Use Tubing Size / Distance recommendations from a Single Supply Regulator

Tubing ID	To 1 Carbonator	To 2 Carbonators	To 3-5 Carbonators	To 6-8 Carbonators
1/4"	0' - 50'	0' - 20'	-	-
3/8"	51' - 250'	21' - 100'	0' - 20'	-
1/2"	251' - 500'	101' - 500'	21' - 100'	0' - 50'
5/8" * or (2) 1/2"	-	-	101' - 250'	51' - 100'
3/4" * or (3) 1/2"	-	-	251' - 500'	101' - 250'
* Non-standard tubing				

Operating the Bulk CO₂ System

Explain the System

The store operator should be familiar with basic elements of the system. The installer is responsible for explaining the CO₂ system to the store operator upon completion of the bulk CO₂ system installation. The following table describes functional elements of the system and is intended to assist with that explanation.

Component / Observation (Refer to pages 18, 19, 20)	Function / Indication
22a 22 CO ₂ Contents Gauge (pg. 18) 25 (pgs. 19, 20)	Indicates the approximate amount of liquid CO ₂ inside the tank.
41 CO ₂ Tank Pressure Gauge (pgs. 18, 19, 20)	Indicates tank pressure. Normal operation pressure is between 110 and 175 psi. Vessel pressure may be as high as 300 psi after a CO ₂ delivery.
43 Final Line (Supply) Regulator Note: Actual regulator may not match style shown in diagrams in this manual.	Controls pressure in supply line from tank to beverage equipment.
44 Final Line (Supply) Regulator Gauge	Indicates supply pressure in the gas-use line. Final line (gas use) pressure is normally 90 - 115 psi.
33e Gas-Use Valve	On / Off valve for gas supply.
32 Primary Relief Valve	Prevents tank pressure from exceeding 300 psi.
Vent Hose	Vents excess gas pressure to fill box outside.
Fill Hose	Transports liquid CO ₂ from fill box to tank during fill.
Fill Box	Connection point for liquid CO ₂ delivery and transfer line.
Filling Schedule	Should be established with supplier based on CO ₂ use. (Normally every 4-6 weeks)
Periodic Frost	Frost indicates that liquid CO ₂ is being converted to gas to meet a demand. Frost near the bottom of the vessel is normal during periods of high or continuous use.
Continuous Frost	Continuous presence of frost during non-business hours or in mornings before business hours indicates a demand for CO ₂ gas perhaps caused by a leak in the beverage system.

Carbon Dioxide Consumption

General

The amount of CO₂ that will be consumed in the variety of restaurant applications is almost impossible to predict. While primarily used for beverage carbonation, CO₂ is also used for carbonating frozen drinks and for driving pumps and automatic dispense systems.

A typical 16 oz. soft drink contains about 2.4 oz. of syrup and water carbonated with 0.0112 lb. of CO₂. (Approximately 1 lb. of CO₂ is required to carbonate one hundred 16 oz. drinks.)

The table below shows an estimate of CO₂ consumption just for beverage carbonation based on a use ratio of 0.6 lb. CO₂ per gallon of syrup.

Weekly Syrup Usage (Gallons)	Bag-In-Box Containers	CO ₂ Consumption for Carbonation (lb.)
10	2	6
20	4	12
30	6	18
40	8	24
50	10	36
60	12	42
70	14	48
80	16	54
90	18	60
100	20	66

CO₂ is also used to “push” beer from kegs. To push a “direct draw” beer dispense system, which dispenses directly from the keg, only the fresh-keg (rack) pressure of 12 to 15 psi needs to be maintained on the keg to pour the beer and prevent excessive foaming caused by over-carbonation.

Note: To push beer greater distances in common “long draw” dispense systems, higher gas pressures are required. However, to avoid over-carbonation and excessive foaming, that higher gas pressure must consist of a calculated blend of CO₂ and N₂ (Nitrogen). Blend gas equipment is available for this purpose.

The following table shows the approximate amount of CO₂ consumed to dispense beer.

16 Gallon Kegs	CO ₂ Consumption (lb.)
10	2.5
20	5.0
30	7.5
40	10.0
50	12.5
60	15.0

Vessel Specifications

	Mizer 200	Mizer 300	Mizer 450
Diameter	20 in (50.8 cm)	20 in (50.8 cm)	20 in (50.8 cm)
Height (with legs) (w/o legs, subtract 6 inches)	38.63 in (98 cm) (No legs)	55.63 in (141.3 cm)	71.88 in (162.6 cm)
Empty Weight	154 lb (70 kg)	216 lb (98 kg)	273 lb (124 kg)
Full Weight	341 lb (154.7 kg)	515 lb (233.6 kg)	750 lb (340.2 kg)
Net Storage Volume	20 gal (75.7 ltr)	32 gal (121 ltr)	48 gal (182 ltr)
CO ₂ Storage Capacity (saturated @ 125 psig [8.6 bar g])	187 lb (84.8 kg)	299 lb (135.6 kg)	477 lb (216.4 kg)
Gas Use Connection	1/4" 45° Flare	1/4" 45° Flare	1/4" 45° Flare
Fill Line Connection	5/8" Male 45° Flare	5/8" Male 45° Flare	5/8" Male 45° Flare
Vent Line Connection	1/2" OD Tubing	1/2" OD Tubing	1/2" OD Tubing
Rates and Pressures			
CO ₂ Gas Delivery (Continuous) (12 consecutive hrs. @ room temp.)	0.75 lb / hr (.34 kg / hr) (67 - 16 oz drinks / hr)*	1 lb / hr (.5 kg / hr) (89 - 16 oz drinks / hr)*	5.5 lb / hr (2.5 kg / hr) (489 - 16 oz drinks / hr)*
Peak CO ₂ Gas Flow Rate (4 consecutive hrs. @ room temp.)	1.5 lb / hr (0.68 kg / hr) (133 - 16 oz drinks)*	3 lb / hr (1.4 kg / hr) (267 - 16 oz drinks)*	10.0 lb / hr (4.5 kg / hr) (889 - 16 oz drinks)*
Liquid CO ₂ Delivery	On Demand	On Demand	On Demand
Evaporation Rate (No loss in normal use.)	1.2 lb / day 0.54 kg / day)	2.0 lb / day (0.91 kg / day)	2.5 lb / day (1.1 kg / day)
Max. Allowable Working Pressure (MAWP)	300 psig (20.7 bar g)	300 psig (20.7 bar g)	300 psig (20.7 bar g)
ASME Relief Setting	300 psig (20.7 bar g)	300 psig (20.7 bar g)	300 psig (20.7 bar g)
Additional. Relief Setting	450 psig (31.0 bar g)	450 psig (31.0 bar g)	450 psig (31.0 bar g)
Sure-Fill Relief Setting	N/A	200 psig (13.8 bar g)	200 psig (13.8 bar g)
Design Criteria			
All Vessels Above (unless noted otherwise)			
Design Specifications	ASME Section VIII, Division 1		
Design Specifications	Meets with US and Canadian approvals		
Fill System	Single line, pressure differential		
Sure-Fill® System	Recommended option / Not available on Mizer 200		
Patented Impurity Collection System	Recommended option / Not available on Mizer 200		
Insulation Type	Vacuum with Super Insulation		
Pressure Control	Pressure Building (PB) Circuit		
Liquid Level Gauge	Differential Pressure standard on Mizer 300 and 450 / not available on 200 (Float-type Magnetic Roto-Cal standard on 200 / optional on Mizer 300 and 450)		
Outer Vessel Material	Stainless Steel		
Inner Vessel Material	Stainless Steel		
Floor Mount Design (Meets NSF Standards)	Permanent Legs (not available on Mizer 200)		

* Based on 11.25 lb of CO₂ / 1000 16 oz drinks

Vessel Specifications

	Mizer 550	Mizer 750	Max 750 HF
Diameter	22 in (55.9 cm)	26 in (66.0 cm)	26 in (66.0 cm)
Height (with legs) (w/o legs, subtract 6 inches)	72.9 in (185.1 cm)	73.9 in (187 cm)	73.9 in (187.6 cm) (w/legs, add 5 1/2 inches)
Empty Weight	318 lb (144.3 kg)	430 lb (195 kg)	430 lb (195 kg)
Full Weight	902 lb (409.1 kg)	1219 lb (552.9 kg)	1219 lb (552.9 kg)
Net Storage Volume	62 gal (235 ltr)	82 gal (310 ltr)	82 gal (310 ltr)
CO ₂ Storage Capacity (saturated @125 psig [8.6 bar g])	584 lb (264.9 kg)	789 lb (357.9 kg)	789 lb (357.9 kg)
Gas Use Connection	1/4" 45° Flare	1/4" 45° Flare	1/4" 45° Flare
Fill Line Connection	5/8" Male 45° Flare	5/8" Male 45° Flare	5/8" Male 45° Flare
Vent Line Connection	1/2" OD Tubing	1/2" OD Tubing	1/2" OD Tubing
Rates and Pressures			
CO ₂ Gas Delivery (Continuous) (12 consecutive hrs. @ room temp.)	6.5 lb / hr (2.8 kg / hr) (551 - 16 oz drinks / hr)*	10 lb / hr (4.5 kg / hr) (889 - 16 oz drinks / hr)*	15 lb / hr (6.8 kg / hr) (1333 - 16 oz drinks / hr)*
Peak CO ₂ Gas Flow Rate (4 consecutive hrs. @ room temp.)	10 lb / hr (4.5 kg / hr) (889 - 16 oz drinks / hr)*	15 lb / hr (6.8 kg / hr) (1333 - 16 oz drinks/hr)*	18 lb / hr (8.2 kg / hr) (1600 - 16 oz drinks / hr)*
Liquid CO ₂ Delivery	On Demand	On Demand	N/A
Evaporation Rate (No loss in normal use.)	2.5 lb / day (1.1 kg / hr)	3.0 lb / day (1.4 kg / day)	3.0 lb / day (1.4 kg / day)
Max. Allowable Working Pressure (MAWP)	300 psig (20.7 bar g)	300 psig (20.7 bar g)	300 psig (20.7 bar g)
ASME Relief Setting	300 psig (20.7 bar g)	300 psig (20.7 bar g)	300 psig (20.7 bar g)
Addl. Relief Setting	450 psig (31.0 bar g)	450 psig (31.0 bar g)	450 psig (31.0 bar g)
Sure-Fill Relief Setting	200 psig (13.8 bar g)	200 psig (13.8 bar g)	200 psig (13.8 bar g)
Design Criteria			
All Vessels Above (unless noted otherwise)			
Design Specifications	ASME Section VIII, Division 1		
Design Specifications	Meets with US and Canadian approvals		
Fill System	Single line, pressure differential		
Sure-Fill® System	Recommended option		
Patented Impurity Collection System	Recommended option / N/A on Max 750 HF		
Insulation Type	Vacuum with Super Insulation		
Pressure Control	Pressure Building (PB) circuit on Mizers / Pressure Relief (Economizer) circuit on 750 Max HF		
Liquid Level Gauge	Differential Pressure standard (Float type Magnetic Roto-Cal optional)		
Outer Vessel Material	Stainless Steel		
Inner Vessel Material	Stainless Steel		
Floor Mount Design (Meets NSF Standards)	Permanent Legs		

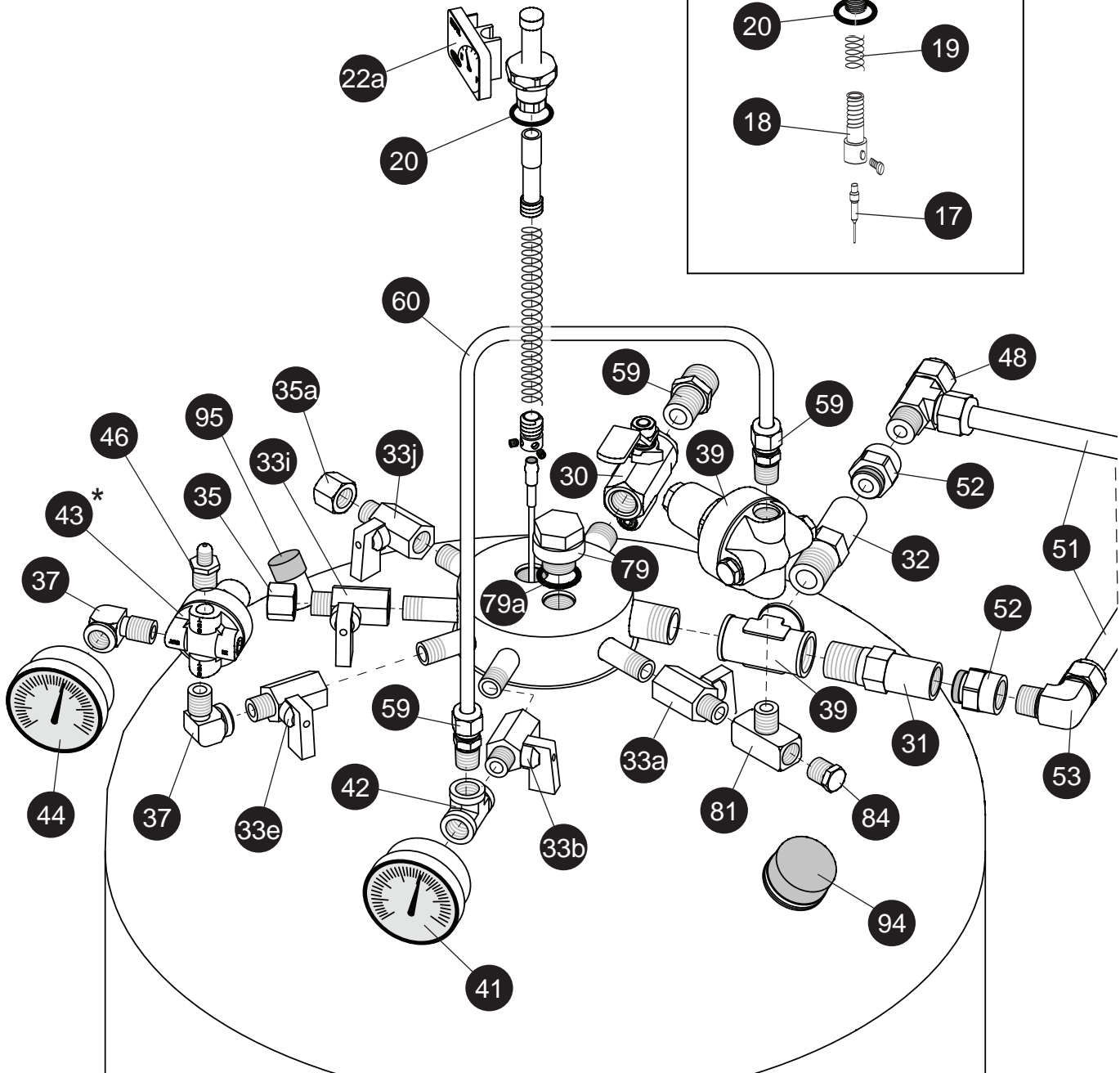
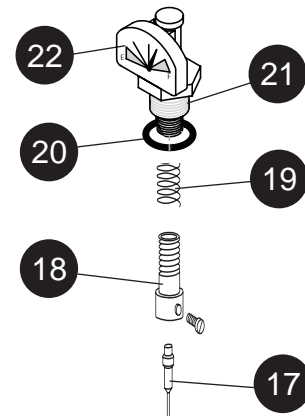
* Based on 11.25 lb of CO₂ / 1000 16 oz drinks

Parts Identification

Standard Carbo-Mizer 200

Also Mizers 300, 450, 550, 750 without Sure-Fill and equipped with Roto-Tel assembly contents measurement system (After November 1, 2010.)

Roto-Cal style contents measurement components.

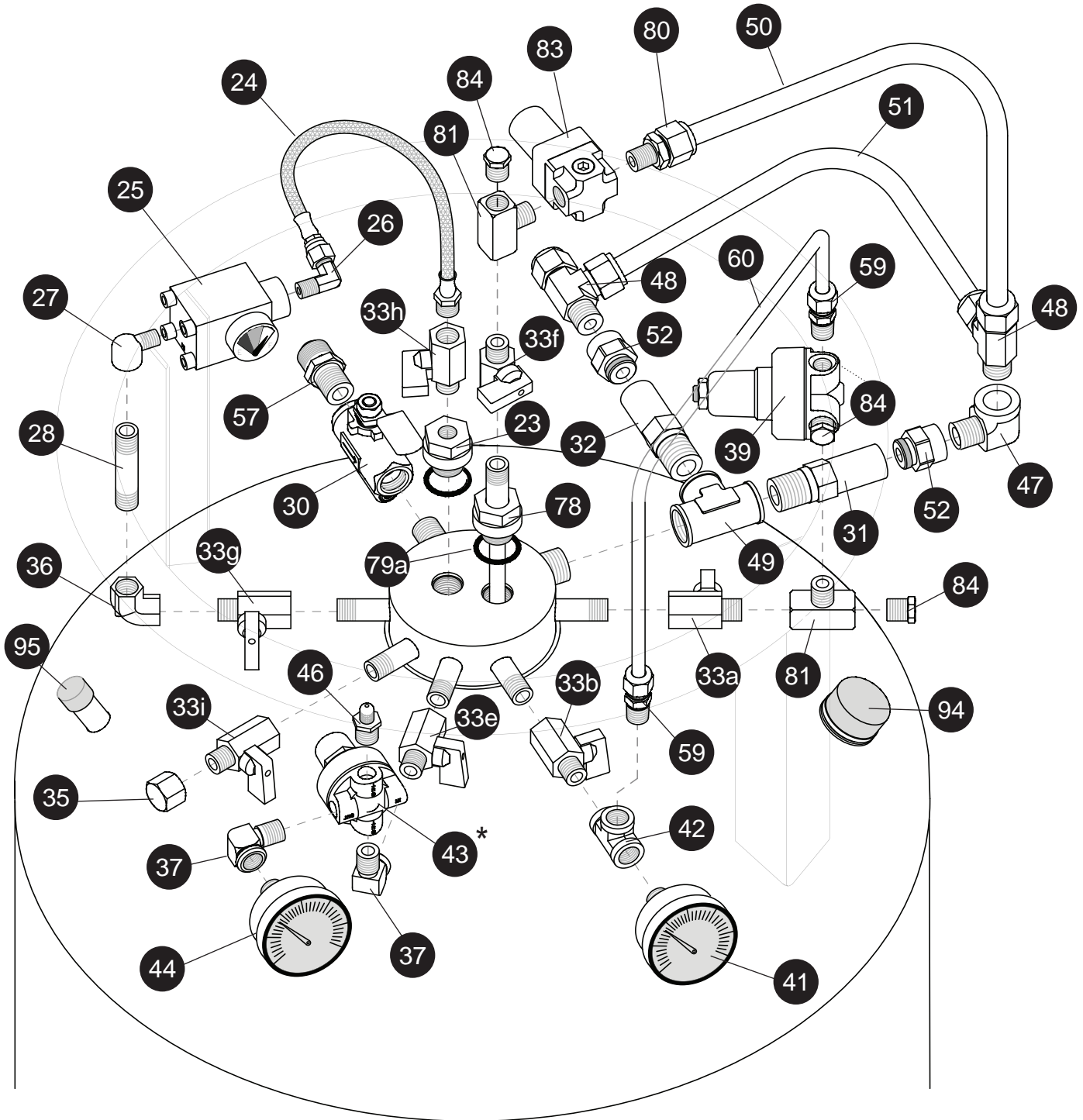


* Note: Regulator styles may vary from the style depicted in this diagram. Please refer to the descriptions in the parts list on pages 21 and 22.

Vessel Parts

Carbo-Mizer 300, 450, 550, 750

(Equipped with Sure-Fill and DP style contents gauge.)

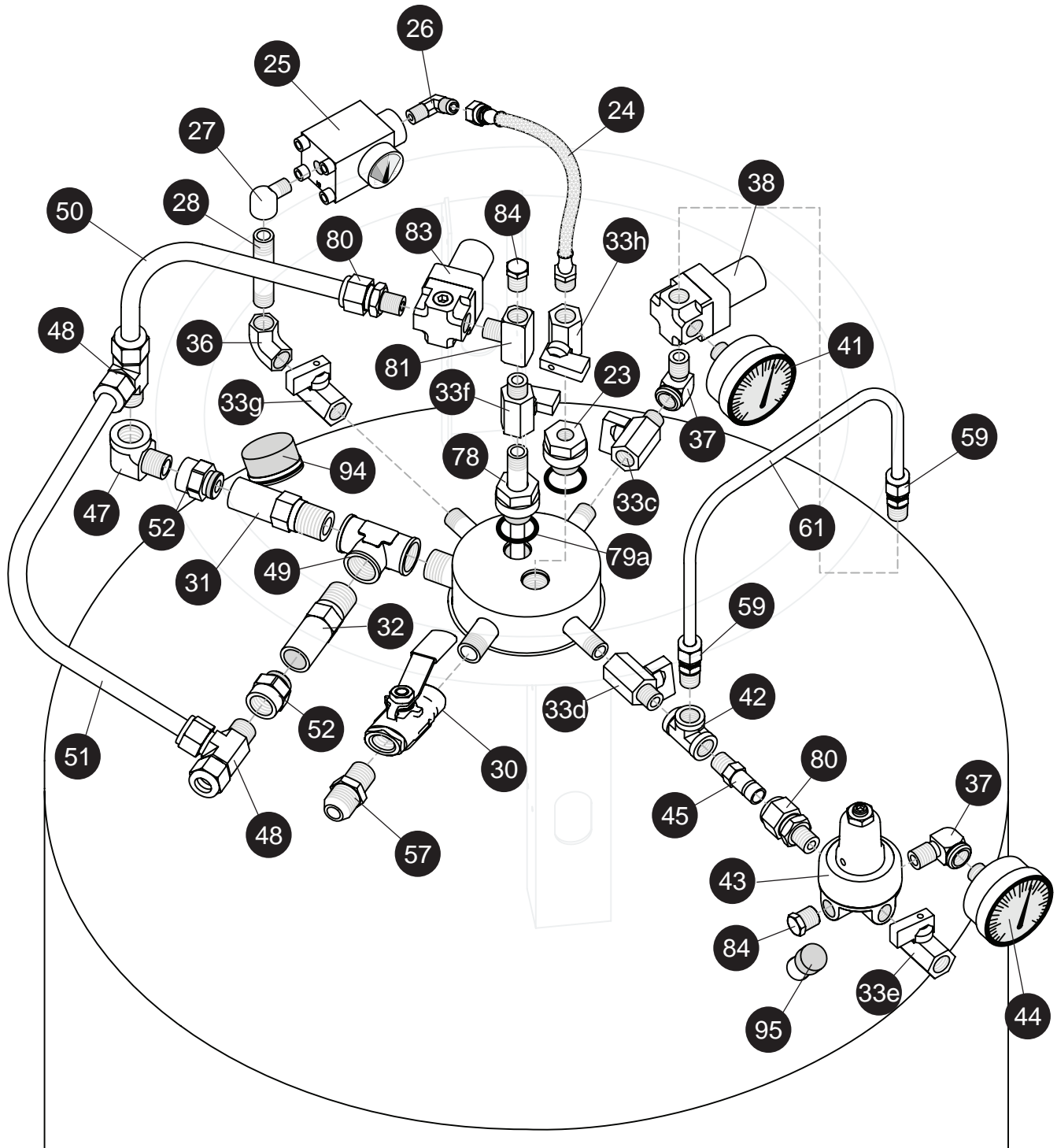


* Note: Regulator styles may vary from the style depicted in this diagram. Please refer to the descriptions in the parts list on pages 21 and 22.

Vessel Parts

Carbo-Max 750 HF

(Equipped with Sure-Fill and DP Style contents gauge.)



Vessel Parts

ITEM	PART NO.	DESCRIPTION	NOTES
17	10643106	(Mizer 200) Roto-Cal Float Rod (22")	Indicates liquid CO ₂ level in the vessel.
17	10464811	(Mizer 300) Roto-Cal Float Rod (32 1/2")	Indicates liquid CO ₂ level in the vessel.
17	9094119	(Mizer 450 / 550 / 750) Roto-Cal Float Rod (42 1/2")	Indicates liquid CO ₂ level in the vessel.
18	5411622	Spring Collar (Retainer) (Roto-Cal)	Secures spring to float rod for adjustment.
-	2952321	Set Screw, Spring Collar, SS (#8 - 32UNC x 3/16")	Secures spring collar to float rod.
19	5411029	Extension Spring (Roto-Cal)	Provides tension on float rod.
20	13832949	O-ring, Liquid Level Gauge (Roto-Cal / Roto-Tel)	Seals brass plug to vessel.
21	5411612	Plug, Brass, Liquid Level Gauge (3/4"-16) (Roto-Cal)	Secures Roto-Cal assembly to the vessel.
22	10591369	Roto-Cal Gauge Face, Liquid Level / Contents	Indicates approximate liquid CO ₂ contents
-	11833139	Roto-Cal Float-Rod Assembly (Mizer 200)	Includes Roto-Cal items 17, 18, 19, and 21.
-	11043268	Roto-Cal Float-Rod Assembly (Mizer 300)	Includes Roto-Cal items 17, 18, 19, and 21.
-	10601088	Roto-Cal Float-Rod Assembly (Mizer 450 / 550 / 750)	Includes Roto-Cal items 17, 18, 19, and 21.
22a	14049702	Roto-Tel Dial Capsule (Gauge Face), Liquid Level / Contents (Available after November 1, 2010)	Can be used to replace Roto-Cal gauge, if equipped, on tank represented by this manual. Will have the same accuracy as Roto-Cal.
-	13588376	Roto-Tel Float-Rod Assembly for Mizer 200 (Telemetry ready) (Includes dial capsule 22a) (Available after November 1, 2010)	Used to convert from Roto-Cal to Roto-Tel. Roto-Tel Assy. is not field-servicable and its components are not available individually.
-	13588368	Roto-Tel Float-Rod Assembly for Mizer 300 (Telemetry ready) (Includes dial capsule 22a) (Available after November 1, 2010)	Used to convert from Roto-Cal to Roto-Tel. Roto-Tel Assy. is not field-servicable and its components are not available individually.
-	13588350	Roto-Tel Float-Rod Assembly for Mizer 450 / 550 (Telemetry ready) (Includes dial capsule 22a) (Available after November 1, 2010)	Used to convert from Roto-Cal to Roto-Tel. Roto-Tel Assy. is not field-servicable and its components are not available individually.
-	14789840	Roto-Tel Float-Rod Assembly for Mizer / Max 750 (Telemetry ready) (Includes dial capsule 22a) (Available after November 1, 2010)	Used to convert from Roto-Cal to Roto-Tel. Roto-Tel Assy. is not field-servicable and its components are not available individually.
23	14275363	Plug, Boss DP Low Phase (3/4 - 16) 1/4" MPT	DP gauge low phase line connection to knuckle.
24	14339161	Hose, Flex (1/4" MPT) (12") SS	DP gauge low phase line.
25	14346985	Differential Pressure (Contents) Gauge For Mizers 450, 550, 750 and Max 750 (0-53") 1/8" FPT	Displays CO ₂ liquid level.
25	14346977	Differential Pressure (Contents) Gauge For Mizer 300 (0-36") 1/8" FPT	Displays CO ₂ liquid level.
26	14339136	Elbow, Brass, 90° (1/8" ODT x 1/8" MPT)	

Vessel Parts

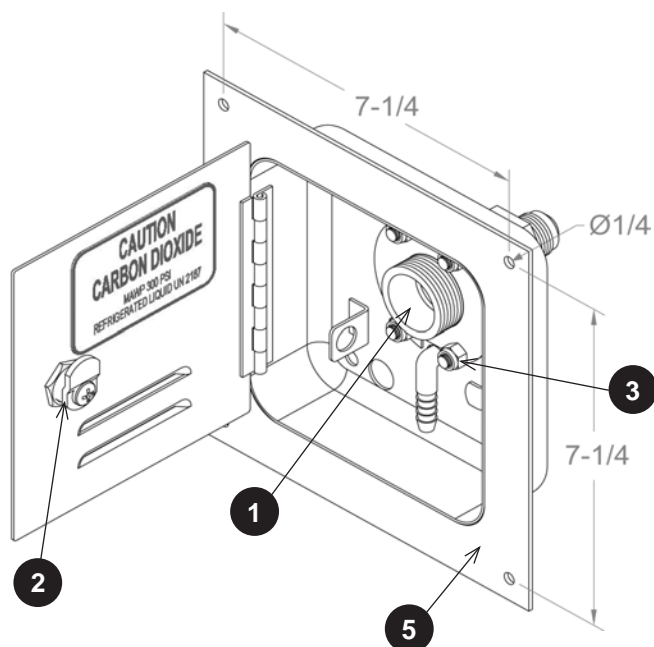
ITEM	PART NO.	DESCRIPTION	NOTES
27	14285481	Elbow, Street, Reducer, Brass, 90°	
28	1310152	Nipple, Brass, 1/4" NPT x 2 1/2"	High phase circuit component.
30	14422693	Ball Valve (3/8" NPT W / Check)	Isolates CO ₂ fill hose from vessel.
31	11708451	Relief Valve, 450 psig (1/2" MPT)	Secondary inner vessel safety relief valve.
32	11708400	Relief Valve, 300 psig (1/2" MPT)	Primary inner vessel safety relief valve.
33a	13282844	Isolation (Ball) Valve (1/4" MPT x 1/4" FPT)	Isolates liquid-side of PB regulator.
33b	13282844	Isolation (Ball) Valve (1/4" MPT x 1/4" FPT)	Isolates gas-side of PB regulator.
33c	13282844	Isolation (Ball) Valve (1/4" MPT x 1/4" FPT)	Isolates gas-side of Economizer regulator.
33d	13282844	Isolation (Ball) Valve (1/4" MPT x 1/4" FPT)	Isolates liquid (gas-use) side of Economizer reg.
33e	13282844	Isolation (Ball) Valve (1/4" MPT x 1/4" FPT)	On / off control for gas supply.
33f	13282844	Isolation (Ball) Valve (1/4" MPT x 1/4" FPT)	Opens / closes Sure-Fill circuit.
33g	13282844	Isolation (Ball) Valve (1/4" MPT x 1/4" FPT)	Isolates high phase side of DP contents gauge.
33h	13282844	Isolation (Ball) Valve (1/4" MPT x 1/4" FPT)	Isolates low phase side of DP contents gauge.
33i	13282844	Isolation (Ball) Valve (1/4" MPT x 1/4" FPT)	Opens / closes liquid dispense port.
33j	13282844	Isolation (Ball) Valve (1/4" MPT x 1/4" FPT)	Shut-off valve for unused "high phase" port.
35	1210752	Cap, Brass Hex, 1/4" FPT	Caps liquid port.
35a	1210752	Cap, Brass Hex, 1/4" FPT	Caps unused "high phase" DP gauge port.
36	1210402	Elbow, Brass 90° (1/4" FPT)	Connects isolation valve in high phase line.
37	1210462	Elbow, Street, Brass, 90° (1/4" MPT)	
38	13154842	Regulator, Economizer, 150 psi (1/4 NPT) SMC	Controls vessel pressure (relieving).
39	14373713 or 14743180	(Black dome) Regulator, Press. Bldg, 125 psi (1/4" NPT) (Harris) (Gold dome, color coded with green label)	Controls vessel pressure building (PB) circuit.
-	14858729	Rebuild Kit For PB Regulator #39 (Harris)	
41	13321014	Pressure Gauge, 0-400 psi (1/4" MPT CBM)	Displays internal vessel pressure.
42	13450730	Tee, Brass (1/4" FPT)	Joins pressure maint. and gas-use circuits.
43	14743163	Regulator, Final Line, 110 psi (1/4" FPT), (Harris) Current standard on Max and Mizers. (pictured)	Controls CO ₂ gas pressure to use-point.
-	14858729	Rebuild Kit For Final Line Regulator #43 (Harris)	
43	14037779	Regulator, Final Line, 110 psi (1/4" FPT), (SMC) (not pictured) Original equipment on some Mizers.	Controls CO ₂ gas pressure to use-point.
43	13833466	Regulator, Final Line, 110 psi (1/4" FPT), (Rego) (not pictured) Optional on request for Mizers.	Controls CO ₂ gas pressure to use-point.
44	13321006	Pressure Gauge, 0-160 psi (1/4" MPT CBM)	Indicates CO ₂ gas pressure to use-point.

Vessel Parts

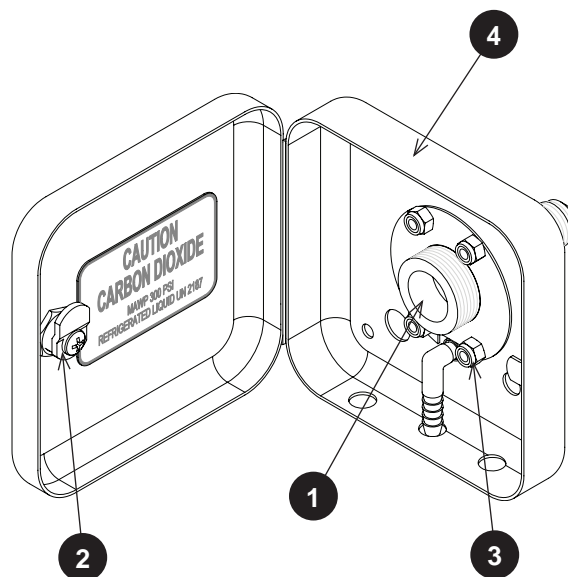
ITEM	PART NO.	DESCRIPTION	NOTES
45	11762975	Tube Stub, Brass (1/4" MPT x 1/2" ODT)	Gas-use line plumbing extension.
46	11741859	Check Valve, Gas Use	Protects vessel components from back-flow.
47	1210482	Elbow (1/2" OD x 3/8" MPT)	Joins vent circuit components.
48	13832906	Tee, Brass Run, (1/2" ODT x 3/8" MPT)	Joins vent circuit components.
49	13458820	Branch Tee, (1/2" FPT)	Manifolds primary & secondary relief valves.
50	14275419	Tube, Sure-Fill Vent (1/2" OD, Nominal .375")	Sure-Fill vent tubing.
51	13799843	Tube, Relief Valve Vent (1/2" OD, Nominal .375")	Primary / secondary relief valve vent tubing.
52	13833731	Adapter, Pipe-Away (3/8" FPT)	Joins 450 & 350 psig relief valves to vent fittings.
53	13832877	Elbow, Brass 90° (1/2 ODT x 3/8" MPT)	Joins 450 psi relief valve to vent circuit (no S.F.)
57	1110112	Connector (5/8" ODT x 3/8" MPT- 45° Flare)	Connects CO ₂ fill hose to vessel.
59	13833757	Connector, SS (5/16" ODT x 1/4" MPT)	Joins tubing in pressure-maintaining circuit.
60	13669723	Tubing, Stainless (5/16" OD) (12")	Pressure maintenance line (PB) (Mizer).
61	13669731	Tubing, Stainless (5/16" OD) (12")	Pressure maintenance line (Econ.) (Max).
78	11764313	Sure-Fill™ Tube Assembly / MAX 750 HF & Mizer 750 (3/4"-16)	Controls CO ₂ filling and pressure venting.
78	13081524	Sure-Fill™ Tube Assembly / Mizer 300, 450, 550 (3/4"- 16)	Controls CO ₂ filling and pressure venting.
79	11811036	Plug (3/4"-16) [Vessel without Sure-Fill option]	Seals Sure-Fill port.
79a	13832957	O-ring for #78, #79 (.924 ID x 1.13 OD)	Seals S.F. tube assembly or plug.
80	13832914	Connector, Brass, (1/2" ODT x 1/4" MPT)	Joins Sure-Fill assembly to vent circuit.
81	1213092	Tee, Brass, (1/4" FPT x 1/4" FPT x 1/4" MPT)	Joins liquid side of PB circuit to PB reg.
83	13154834 13412514	Regulator, Sure-Fill, 200 psi (1/4" NPT) Rebuild Kit For Sure-Fill Regulator #83	Vents excess pressure during CO ₂ filling.
84	1211102	Plug, Brass (1/4")	Plugs unused port in tee or regulator.
94	3911217	Cap, Black	Covers vacuum pump-out port.
95	3911016	Cap, Blue	Covers vacuum regeneration port.
-	14275380	Label Kit, Carbo-Mizer & Carbo Max	Incl. ID labels for model, circuit, tank operations.
-	3836609	Label, Operations only	Describes vessel safety and operations.
-	11197611	Label Kit, NYCFD Approval, (Stationary Installation)	Operation, caution, approval, and manufacturer.
-	11197646	Label Kit, NYCFD Approval, (Portable Installation)	Operation, caution, approval, and manufacturer.
-	3820099	Label Only, Caution Carbon Dioxide	Included in label kits.
-	3832679	Decal Only, CO ₂ NYCFD COA #4912 (Stationary)	Included in label kit 11197611.
-	10915896	Decal Only, CO ₂ NYCFD COA #4748 (Portable)	Included in label kit 11197646.

Fill Box Parts

Flush-Mount Fill Box Part No. 9723139



Surface-Mount Fill Box Part No. 9722279



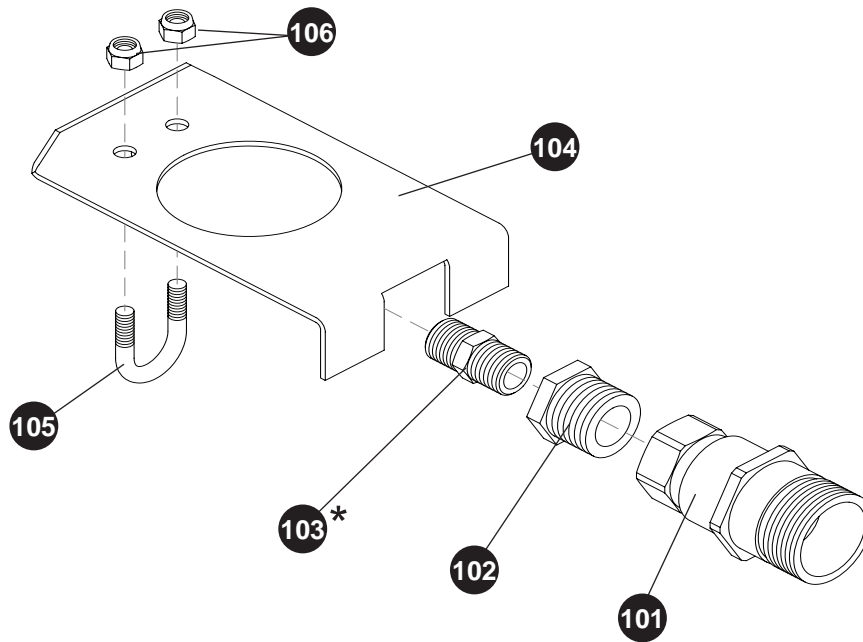
ITEM	PART NO.	DESCRIPTION	FUNCTION
-	11784496	Caution Label	Advisory identification of CO ₂ use.
1	11381021	CO ₂ Fill Fitting, Brass	Connection for CO ₂ delivery vessel hose.
2	13078190	Lock Assembly (includes key)	Locks fill box door.
-	13104087	Key for Lock Assembly (not pictured)	Replacement key for fill box.
3	2914071	Locknut SS w/nyl Insert	Attach fill fitting to fill box studs.
4	11386771	Surface-Mount CO ₂ Fill Box Shell (without fittings)	Allows outdoor filling and venting of vessel.
5	11866871	Flush-Mount CO ₂ Fill Box Shell (without fittings)	Allows outdoor filling and venting of vessel.
-	10802912	CO ₂ Fill Hose only, 5 ft. (2000 psi & FDA)	Transfers liquid CO ₂ from fill box into vessel.
-	10802921	CO ₂ Fill Hose only, 10 ft. (2000 psi & FDA)	Transfers liquid CO ₂ from fill box into vessel.
-	10802947	CO ₂ Fill Hose only, 15 ft. (2000 psi & FDA)	Transfers liquid CO ₂ from fill box into vessel.
-	10802939	CO ₂ Fill Hose only, 25 ft. (2000 psi & FDA)	Transfers liquid CO ₂ from fill box into vessel.
-	10370710	CO ₂ Fill Hose only, 30 ft. (2000 psi & FDA)	Transfers liquid CO ₂ from fill box into vessel.
-	10370728	CO ₂ Fill Hose only, 50 ft. (2000 psi & FDA)	Transfers liquid CO ₂ from fill box into vessel.
-	2811726	Vent Hose (lengths match fill hose)	Vents excess vessel pressure outdoors.
-	11388573	Elbow, BRS (5/8" ODT Fem x Male 45° Flare)	Attaches fill hose to fill box if needed for in-wall installation.

Direct Fill Components

"Direct Fill" Fitting Kit

Part No. 14905901

(For outdoor installations only.)



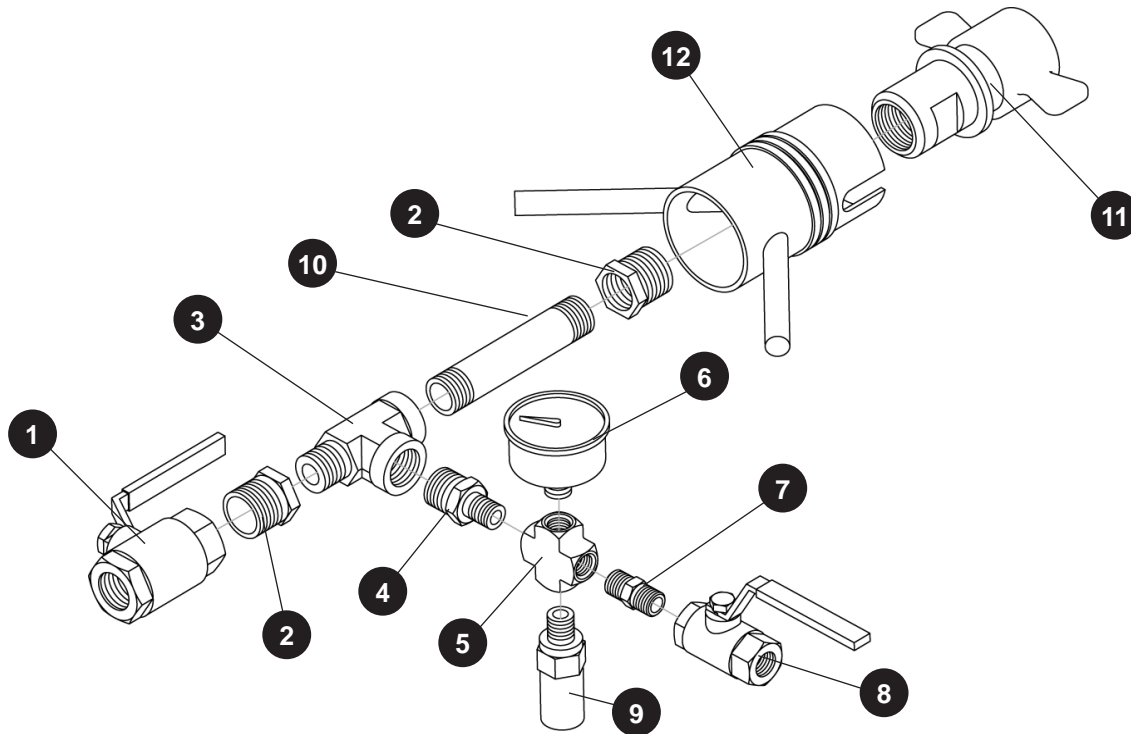
ITEM	PART NO.	DESCRIPTION	FUNCTION
101	10582833	CO ₂ Fill Fitting, Brass (¾" thread)	Fill port connection for CO ₂ delivery.
102	1212062	Hex Bushing (3/8" FPT x ¾" MPT)	Joins fill fitting to hex nipple.
*103	14902814	Pipe Nipple, Brass (3/8" NPT x 2")	Used to join fill fitting to valve on vessel when bracket is used. (recommended)
*103	1310072	Hex Nipple (3/8" NPT x 1-¼" long) (pictured)	Used to join fill fitting to valve on vessel when bracket is not used.
104	10724192	CO ₂ Fill Fitting Support Bracket	Prevents fill fitting from turning with fill (gun) coupling.
105	10644601	U-bolt	Secures fill fitting bracket to fill tube.
106	2914071	Locking Nut	Secures u-bolt to fill fitting bracket and fill tube.

Fill and Vent Hose Kits

PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
10973252	5 ft. Fill & Vent Hose	10973332	25 ft. Fill & Vent Hose
10973308	10 ft. Fill & Vent Hose	10973341	30 ft. Fill & Vent Hose
10973324	15 ft. Fill & Vent Hose	10973359	50 ft. Fill & Vent Hose

Fill "Gun" Components

Fill Gun P/N 11039031



ITEM	PART NO.	DESCRIPTION	FUNCTION
1	12930192	Ball Valve, SS (3/4 FPT)	CO ₂ Supply valve.
2	1210062	Hex Bushing (3/4 MPT x 1/2 FPT)	Connects 3/4 FPT fitting to 1/2 MPT fitting.
3	1212082	Street tee (1/2 FPT x 1/2 MPT)	Joins supply & pressure vent components.
4	10599563	Hex Nipple (1/2 NPT x 1/4 NPT)	Joins street tee to cross.
5	1212922	Cross, BRS (1/4 FPT)	Joins supply, gauge and vent components.
6	2015179	Pressure Gauge, 0-400 PSI (1/4" CBM)	Displays line / tank pressure.
7	1310092	Hex Nipple (1/4 NPT)	Joins manual relief ball valve to cross.
8	1716182	Ball Valve (1/4 NPT)	Manual pressure relief.
9	1811472	Relief Valve, 450 PSI (1/4 MPT)	Safety relief.
10	132032	Nipple, SS (1/2 NPT) 4"	Joins supply control components to quick-connect.
11	1213169	Female Wing Nut Quick Connector	Connects fill gun to wall box fill fitting.
12	9720959	Quick Connector Wrench	Turns quick connector onto wall box fill fitting.

Operation and Troubleshooting

Facts To Know

1. A vessel's normal internal operating pressure (Item 41) is between 125 psi and 150 psi.
2. Vessel pressure can be as high as 300 psi after a delivery but returns to its normal operating pressure after a day or two of normal CO₂ use.
3. The gas supply pressure (Item 44) is normally between 90 psi and 120 psi.
4. Frost or condensation on the vessel is normal during periods of CO₂ use.
5. Frost or condensation on the vessel before starting the daily use of CO₂ is a sign of a CO₂ leak. Have the leak fixed.
6. A Carbo-Mizer 200 holds 201 lb. of CO₂ for a use rate of 10 to 30 lb. per week.
A Carbo-Mizer 300 holds 306 lb. of CO₂ for a use rate of 30 to 60 lb. per week.
Depending on model size, Carbo-Mizers hold from 453 to 771 lb. of CO₂ for use rates of 40 to 150 pounds per week.
A Carbo-Max 750 HF holds about 771 lb. of CO₂ for use rates of 50 - 300 lb. of CO₂ per week.
Refer to the table on pages 16 & 17.
7. The contents gauge (Item 22 or 25) displays the approximate amount of liquid CO₂ in the vessel.
8. CO₂ becomes dry ice below a pressure of 61 psi. Stop using CO₂ from the vessel if its pressure (Item 41) reaches 70 psi or less.
9. An isolation (shut-off) valve is open when its handle is parallel to the valve body and the line. The valve is closed when its handle is perpendicular to the valve body and the line.

General Operation Notes

1. Always use caution when working with CO₂. Read and understand the “**Safety**” section of this manual.
2. The Carbo system does not require adjustment under normal operating conditions.
3. In an emergency the flow of CO₂ from or through the storage tank can be stopped by closing the following valves:
 - Valve 33e to stop the flow of gas from the vessel to the beverage or other use-point system.
 - Valve 30 to stop CO₂ flow or leakage through the fill hose and/or the brass fill fitting in the outdoor fill box.
 - Valve 33a and/or 33b (Mizers) or 33c (MAX) to stop CO₂ flow through the tank's pressure control circuit.
4. For CO₂ equipment issues, call your CO₂ supplier or service specialist. Before calling for service or trouble shooting assistance, please have the following information at hand:
 - Serial number of the vessel
 - Description of the problem
 - Readings from:
 - the vessel contents gauge (Item 22 or 25),
 - the vessel pressure gauge (Item 41) and
 - the final line pressure gauge (Item 44).
 - Observations such as unusual frosting and/or events related to the problem.
5. Every day before starting operations and CO₂ use check for:
 - CO₂ leaks (See “**Safety**”).
 - Pressure readings (Items 41 and 44)
 - CO₂ contents (Item 22 or 25)
 - Abnormal frost or condensation
 - Anything unusual.

Tank Operation and Troubleshooting

INDICATION	POSSIBLE CAUSE	CORRECTIVE ACTION
No CO ₂ to carbonator or use-point system. OR Carbonated drinks are flat.	CO ₂ storage vessel is empty.	<ol style="list-style-type: none"> 1. Switch to emergency CO₂ gas cylinder. 2. Call CO₂ supplier for delivery.
	Isolation valve 33e (Mizer) or 33d (MAX) to final line regulator is closed.	Open valve or valves as required.
	Vessel pressure (41) is low (110 psi or less).	<ol style="list-style-type: none"> 1. Switch to emergency CO₂ gas cylinder. 2. Stop CO₂ withdrawal from bulk CO₂ vessel by closing isolation valve 33e. 3. If vessel pressure fails to rebuild see section on low vessel pressure.
	On Mizer tanks, pressure building regulator (39) is not operating properly; is set too low, plugged, or faulty (closed).	<ol style="list-style-type: none"> 1. Ensure that isolation valves (33a & b) are open. (Valve handles should be parallel with the line.) 2. Call CO₂ service agent.
	On Carbo-Max 750 HF, pressure relief "Economizer" regulator not operating properly; set too low or stuck open	Close supply pressure valve (33e) and switch to emergency CO ₂ gas cylinder. If tank pressure fails to rise within 24 hrs. See section below on low vessel pressure.
	Unknown	Call CO ₂ service agent.
Frost on the bottom, sides, or top of the vessel.	A normal condition during or following CO ₂ use.	None
	Leak in beverage system and/or gas supply lines or CO ₂ fill box.	<ol style="list-style-type: none"> 1. See "Safety". Evacuate & ventilate. Check for frost in the morning before CO₂ has been used. If possible, locate and correct leak. 2. Call appropriate equipment service agent.
Frost on vessel after extended periods of no CO ₂ use; such as in the morning before store operations begin.	<p>Leak from the beverage system, CO₂ vessel's plumbing, or fill box.</p> <p>Bag-in-box pump running because B.I.B. is empty.</p>	<ol style="list-style-type: none"> 1. See "Safety". Evacuate & ventilate the room. 2. Locate & correct leak if possible. 3. Call appropriate service agent.
Constant low vessel pressure. (gauge 41 below 125 psi on Mizers and 140 psi on Max.)	On Carbo-Mizer vessels PB regulator (39) set low or plugged.	Call CO ₂ service agent for service.
	PB shut-off valve (33a or b) closed.	Open valve by turning handle parallel to line.
	On Carbo-Max 750 HF Economizer regulator set too low or stuck open.	Call CO ₂ service agent.
	CO ₂ leak from vessel plumbing, CO ₂ fill box and/or vessel safety system	<ol style="list-style-type: none"> 1. See "Safety". Evacuate & ventilate the room. 2. Call CO₂ service agent.

Tank Operation and Troubleshooting

INDICATION	POSSIBLE CAUSE	CORRECTIVE ACTION
Constant high vessel pressure. (Tank pressure gauge (41) above 200 psi)	Normal condition for several hours following a CO ₂ delivery.	None
	Normal when little or no CO ₂ is used.	None
	On Carbo-Mizer, PB regulator (39) set too high or stuck open.	Call CO ₂ service agent.
	On Carbo-Max 750 HF, Economizer regulator (39) set too high or stuck closed.	Call CO ₂ service agent.
	Tank has a weak vacuum insulation.	Call CO ₂ service agent.
High CO ₂ consumption.	Increased beverage sales or CO ₂ use.	None
	Vessel pressure (41) constantly high.	See section on vessel pressure too high.
	CO ₂ leak from vessel plumbing, CO ₂ fill box, gas lines, and/or beverage or other use-point equipment.	<ol style="list-style-type: none"> 1. See “Safety”. Evacuate & ventilate room. 2. Locate & correct leak if possible 3. Call appropriate service agent.
	Error in CO ₂ supplier invoice.	Check CO ₂ usage history / pattern against supplier invoices. Consult CO ₂ supplier.
CO ₂ vessel will not fill.	CO ₂ vessel is already full.	None
	Fill valve (30) is shut off or is faulty.	Consult CO ₂ service agent.
	Brass fill fitting in CO ₂ fill box and/or on truck’s delivery hose is faulty.	<ol style="list-style-type: none"> 1. Consult with CO₂ supplier or service agent. 2. Have brass fill fitting(s) replaced if necessary.
	Pressure difference between store vessel pressure and delivery pressure is too small.	<ol style="list-style-type: none"> 1. Verify delivery vessel pressure is at least 275 psi and store vessel pressure (41) is between 110 and 150 psi. 2. Vent store vessel to lower pressure if needed. (Never vent store vessel pressure to lower than 125 psi.)
	Sure-Fill™ assembly does not vent gas because S.F. valve (33d) is closed or vessel pressure did not return to normal operating pressure (after previous fill.)	<ol style="list-style-type: none"> 1. Vessel pressure must drop below 200 psi between filling times to allow the 'check' ball to fall into the open position. 2. Check that Sure-Fill valve (33d) is open 2. Consult CO₂ service agent.
	Leak in Sure-Fill™ regulator. (Pressure above S.F. check ball is lower than vessel pressure.)	<ol style="list-style-type: none"> 1. Close valve (33d) at S.F. regulator for several minutes to allow pressure above check ball to equalize and ball to fall into the open position. 2. Contact CO₂ supplier.
	Delivery vessel empty or truck delivery hose is obstructed, e.g. vehicle stopped on hose or hose is bent.	Ask driver to make another delivery or clear obstruction or wait until obstruction clears.

Tank Operation and Troubleshooting

INDICATION	POSSIBLE CAUSE	CORRECTIVE ACTION
Hissing sounds or evidence of gas leak.	Normal for short periods of time from some regulators and relief valves.	Observe leak. If it is not large <u>and</u> does not last long <u>and</u> does not occur frequently, no action is needed.
	Large leaks from elsewhere in the system, sustained leaks, or frequent leaks, are not normal.	<ol style="list-style-type: none"> 1. See “Safety”. 2. Evacuate all personnel from affected areas. 3. Ventilate the area. 4. Call CO₂ service agent.
Final line / gas-use pressure gauge (44) indicates less than 90 psi.	Final line regulator (43) intentionally set lower by beverage service agent.	None
	Final line regulator (43) not operating in proper pressure range.	Call CO ₂ service agent.
	Final line pressure gauge (44) damaged or faulty.	Call CO ₂ service agent.
	One or more of the causes listed in “no CO ₂ ” or “flat drinks” problem section.	<ol style="list-style-type: none"> 1. See indication sections regarding “no CO₂”, “flat drinks” etc. 2. Call CO₂ service agent.

Fill Box Operation and Troubleshooting

INDICATION	POSSIBLE CAUSE	CORRECTIVE ACTION
Fill box door will not close, lock, or open.	Wrong key.	<ol style="list-style-type: none"> 1. Verify correct key and retry. 2. Contact CO₂ supplier for spare key. 3. Order new key.
	Lock dirty or damaged.	<ol style="list-style-type: none"> 1. Clean and oil lock 2. Replace lock if necessary
Brass fill fitting in fill box leaking or hissing.	Particle of ice or debris caught in fill fitting poppet.	<ol style="list-style-type: none"> 1. If driver is still on site, reconnect CO₂ delivery hose and then disconnect. 2. If driver is not available, carefully press poppet with dull instrument to re seat poppet. 3. If leak continues after line warms, close the fill isolation valve (30) and call service agent.
	Fitting is defective or sealing surface is worn due to normal wear.	Close the fill isolation valve (30) on the vessel and call service agent to replace fitting.
Threads on brass fill fitting are worn or stripped.	Normal wear. Fill fitting must be replaced.	Contact CO ₂ service agent to replace fitting.
	Fill fitting cross threaded with the CO ₂ delivery hose coupler	Contact CO ₂ service agent to replace fitting.
CO ₂ is venting from fill box.	Normal during CO ₂ delivery.	None
	Normal for short periods of time if vessel pressure is at or over 300 psi	<ol style="list-style-type: none"> 1. None if for short period(s) of time 2. If vessel pressure consistently over 300 psi, see section on “vessel pressure too high.”
	Fill fitting is not sealing properly.	Call CO ₂ service agent to replace fitting.

Ordering Service and Parts

Service and Maintenance

1. Service or maintenance work on the MVE bulk CO₂ storage system should be performed only by Chart trained and authorized professional service agents who are familiar with CO₂, bulk liquid CO₂ pressure vessels, and all pertinent safety and service procedures. Chart recommends the use of Chart approved replacement parts. Contact Chart for the name of the authorized service agent(s) in your area.
2. Before calling for service or troubleshooting assistance, please have the following information at hand:
 - Serial number of the vessel
 - Description of the problem
 - Readings from:
 - the contents gauge (Item 22 or 25),
 - the vessel pressure gauge (Item 41)
 - the final line pressure gauge (Item 44).
 - Any special observations (for example: unusual frosting or events related to the problem)
3. Chart recommends that a qualified professional service agent perform a thorough preventive

maintenance check on the system at least once every two years. The check should be done to ensure safety and optimal system performance.

4. **The MVE bulk CO₂ storage system has no user serviceable parts. An authorized professional service agent should perform all service work.**

NOTE: Any attempt by an unauthorized person to service or perform unauthorized modifications on the equipment will void the warranty.

Ordering Parts or Service

For service contact your local authorized MVE CO₂ supplier or equipment service agent.

For parts contact your local authorized Chart service agent or order on-line directly from Chart at www.chartparts.com.

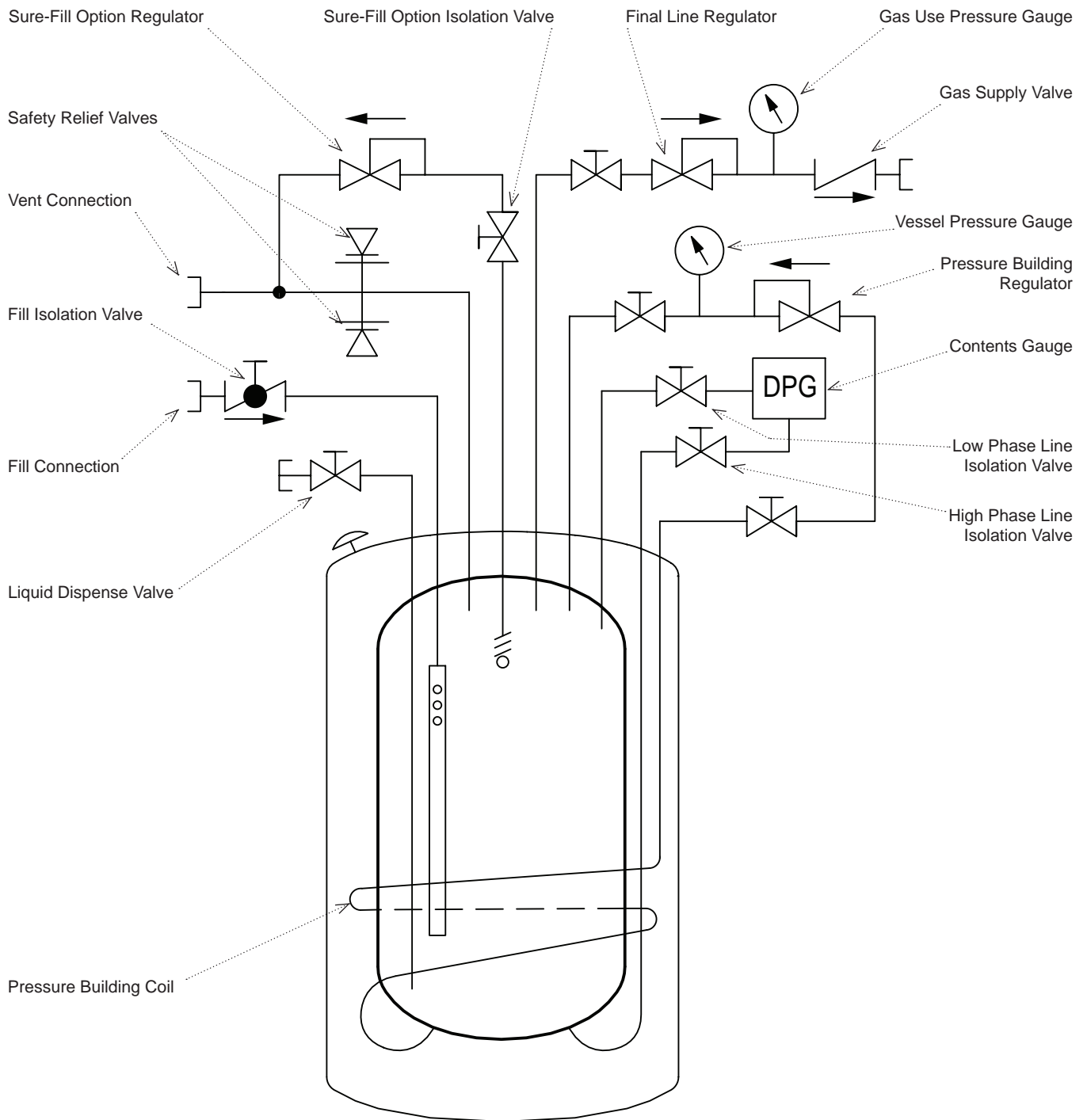
Know the model and serial number of the vessel for which you are ordering parts. To assure that your order is processed promptly, list each item separately, being careful to specify the quantity, the part number, and the description of each item being ordered.

[chartparts.com](http://www.chartparts.com)

Important Telephone Numbers

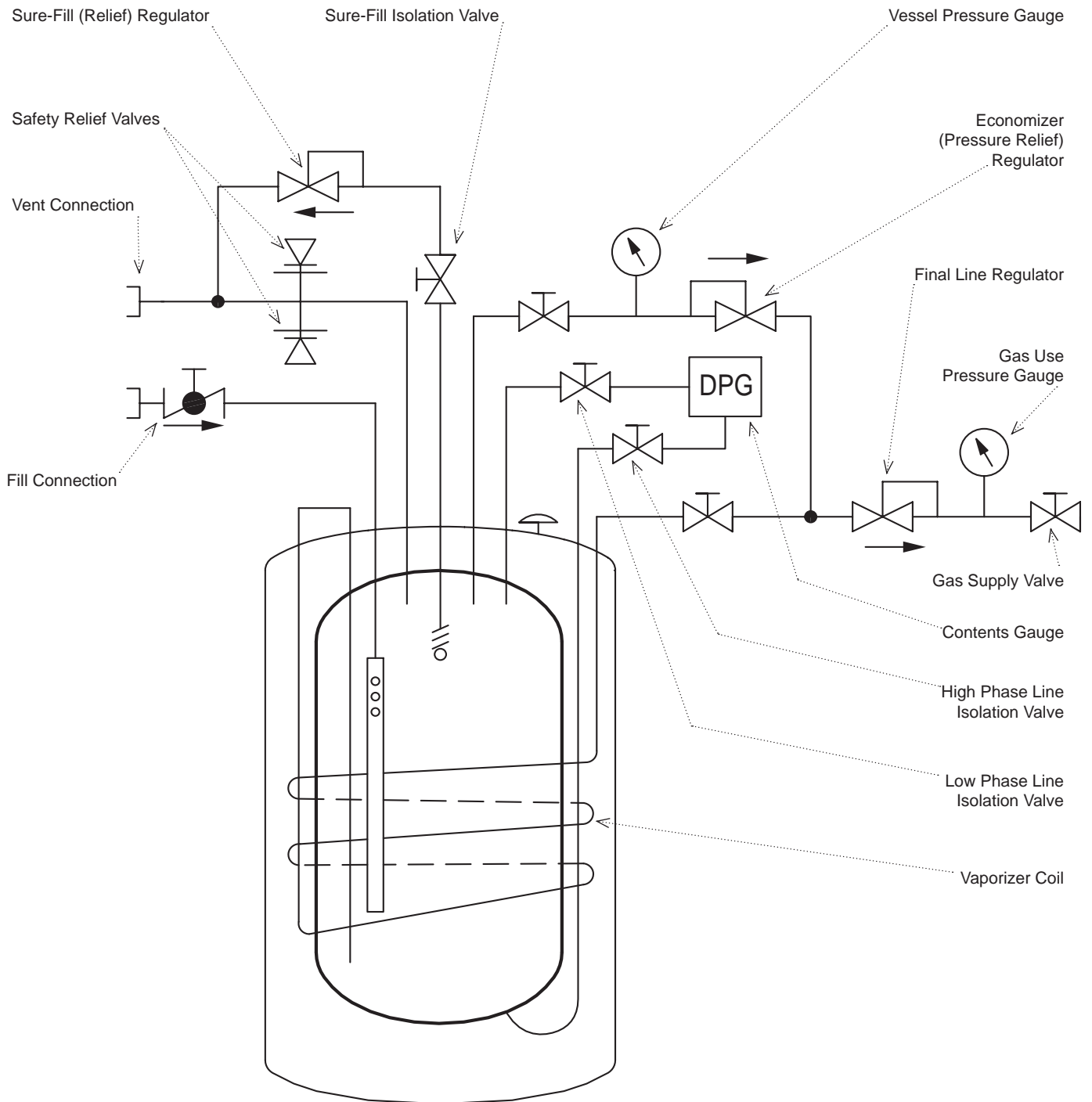
Company	Contact Person	Phone Number
CO ₂ Supplier	_____	_____
	<u>After-Hours / Emergency Number</u>	_____
CO ₂ Service Agent	_____	_____
CO ₂ Equipment Installer	_____	_____
Chart 'Beverage' Customer Service	(800) 247-4446 {toll free in US}	
Chart 'Beverage' Technical Service	(800) 253-1769 {toll free in US}	

Carbo-Mizer Flow Schematic



MVE Carbo Mizer
CO₂ System

Carbo-Max 750 HF Flow Schematic



MVE Carbo-Max 750 HF
CO₂ System

chartparts.com

- Order parts directly from Chart through a personalized account at **www.chartparts.com**.
- Simply establish an account password and “log-in.”
- Service is available 24 hours a day and provides same-day shipping on all stock parts.
- Chartparts provides access to shipment tracking, transaction history, and personalized account information for convenient account management.

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