



MVE® Carbo-Max 750 HF

User Manual



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I Safety

IMPORTANT SAFETY PRECAUTIONS

The type of vessel 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.

WARNINGS

CO₂ gas is a colorless, odorless, tasteless gas that displaces oxygen and will not support life. It is difficult to detect without 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 personnel who are qualified

to work with CO₂ and the bulk liquid CO₂ pressure vessels. They should be familiar with all pertinent safety procedures.

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.

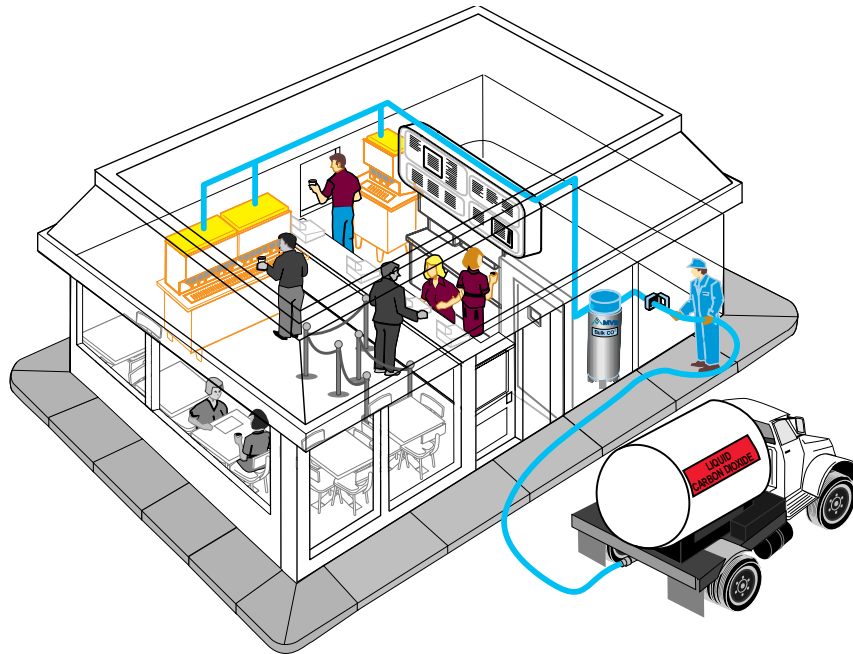
FOR MORE INFORMATION CONTACT:

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

II General Description



System Overview

The MVE Carbo-Max 750 'High Flow' bulk carbon dioxide (CO₂) system is designed for low pressure storage and supply of carbon dioxide gas for beverage carbonation, brewing, beer dispensing, pH control in swimming pools, and other purposes. The system consists of three primary elements: the CO₂ storage vessel, CO₂ fill box, and the fill and vent hoses.

Installation

The Carbo-Max 750 can only be operated as a stationary system. The system is comprised of the permanently installed vessel, an outdoor-mounted CO₂ fill box, and the connecting fill and vent hoses. The fill hose and vent line join the vessel to the outdoor fill box. The fill box allows the CO₂ supplier to fill the vessel from outside the building. The delivery process takes only about 10-15 minutes and does not interrupt the CO₂ user's operations. **Note:** The Carbo-Max 750 bulk CO₂ storage vessel is not DOT regulated and must not be transported when it contains liquid CO₂.

Storage Vessel

The vessel component in a Carbo-Max 750 CO₂ storage system consists of an inner vessel and an outer vessel, much like a Thermos™ bottle. The space between the two vessels contains a nearly perfect vacuum and a

special insulation. The vacuum and insulation minimize the entry of unwanted heat into the liquid CO₂ stored in the inner vessel. When CO₂ gas is needed, liquid CO₂ is withdrawn from the inner vessel, converted to gas and dispensed to the beverage system or other use point.

Vessel Plumbing

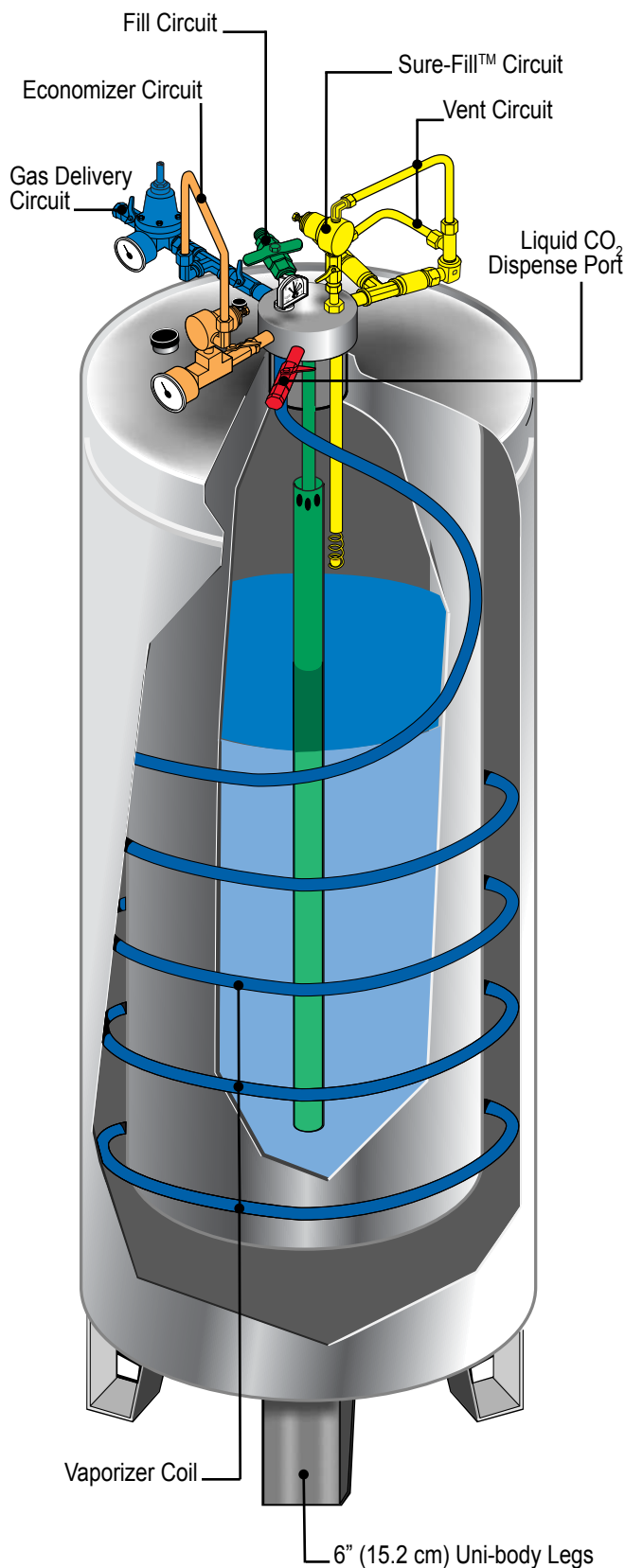
Plumbing components on the Carbo-Max 750 vessel perform six functions:

- Liquid CO₂ fill
- Gas supply (Gas Use)
- Liquid supply (Liquid Use)
- Pressure control (Economizer)
- Safety vent or pressure relief (Sure-Fill & Vent)
- Pressure and contents measurement (Gauges)

Fill Circuit

The fill circuit allows liquid CO₂ to be transferred into the vessel during the delivery process. It consists of a brass fill fitting in the fill box, a fill hose, a valve on the vessel, and MVE's patented Sure-Fill assembly.

Liquid CO₂ is transferred into the vessel through the brass fill box fitting and the fill hose. The shut-off valve on the vessel's fill port allows service to be performed on the fill-box / fill-line segment of the fill circuit without emptying the vessel.



The vessel's Sure-Fill assembly enables fast, trouble-free filling without having to manually vent excess pressure that might develop during a CO₂ delivery. The Sure-Fill automatically maintains the optimum internal vessel pressure during the fill process by venting excess pressure outdoors through the safety vent and fill box. This vent process stops when the vessel is full.

Gas Use Circuit

Carbon dioxide gas is supplied to the use point through the gas use circuit. The Carbo-Max 750 withdraws liquid CO₂ from the bottom of the inner vessel through a vaporizer coil where it converts to gas for final line use.

The conversion from liquid to gas occurs when liquid CO₂ flows through a stainless steel vaporizer/gas use coil located between the inner and outer vessel walls. As it is needed, carbon dioxide gas is produced by the vaporizer coil. Then it passes through the isolation valve and final line regulator to the point of use.

The final line regulator controls gas flow to the use-point. The factory setting on the final line regulator is 90 psi but the pressure may be adjusted to the needs of the application. The regulator setting for soft drinks is commonly between 90 and 115 psi. Secondary pressure regulators may be added 'downstream' for applications such as bag-in-the-box, beer, or diet systems. Consult with the use-point equipment manufacturer for the proper regulator and pressure setting.

Liquid Supply Port

The Carbo-Max 750 is equipped with an alternative liquid CO₂ supply port. This port should be used only for high demand applications that require CO₂ to be dispensed in liquid form. The vessel's gas supply and liquid supply ports may be used simultaneously for separate applications.

Pressure Control Circuit

The pressure control circuit (also called the economizer circuit) assists in regulating the operating pressure of the vessel. It maintains the correct operating pressure while it conserves gas for efficient system performance.

Sufficient internal vessel pressure is needed for supplying CO₂ gas and for preventing the stored liquid

carbon dioxide from changing to 'dry ice,' the solid form of CO₂. However, internal pressure that is too high can cause venting and difficulties refilling the vessel.

The "economizing" process is controlled by a regulator that monitors the vessel's internal pressure. When the vessel pressure exceeds the set point of the regulator (factory set at 140 psi), the regulator opens allowing CO₂ gas to flow directly into the gas use circuit whenever CO₂ gas is being used. By taking gas from the top of the vessel instead of liquid CO₂ from the bottom, the internal pressure of the tank is reduced and controlled.

Safety Vent Circuit

The inner pressure vessel of this storage system is designed to meet or exceed the ASME Section VIII, Division 1 pressure vessel code. The code dictates that the vessel be protected against excess pressure by a safety relief valve. Chart uses two safety relief valves for added safety; an ASME relief valve set at 300 psig and an additional relief valve set at 450 psig. The relief valves must always be vented outdoors by a vent tube, usually through the fill box, to prevent potential concentration of CO₂ within the building. The 300 psig relief valve may open during CO₂ deliveries or when CO₂ is not being used regularly.

Pressure And Contents Gauges

A contents and pressure gauge indicate the status of the CO₂ inside the vessel. The vessel pressure gauge measures the pressure in the top space of the inner vessel. This pressure can normally range between 125 psig and 300 psig but the typical vessel operating pressure is 125 to 150 psig.

The vessel contents gauge measures the approximate level of CO₂ liquid in the vessel. The movement of a magnetic rod "floating" in the liquid CO₂ causes the needle on the contents gauge to move as the level of liquid CO₂ in the vessel changes.

NOTE: Because the float-rod does not actually float on the surface of the liquid CO₂ it does not provide a precise measurement of liquid CO₂ level.

CO₂ Fill Box

The stainless steel CO₂ fill box is the second major element of the Carbo-Max 750 CO₂ storage system. The purpose of the fill box is to provide a convenient

point to fill the storage vessel and to vent excess vessel pressure out of the building. The fill box has a brass fill fitting, a connection for the safety relief vent circuit, a connection point for a safety clip, and a lockable door. Two standard types of fill boxes are available; a surface-mount model and a flush-mount model. Fill boxes must be mounted outside the building where they are easily accessible to the CO₂ supplier and where they can safely disperse excess CO₂ pressure outdoors.

Fill Hose And Vent Line

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

The fill hose is a pressure rated line that connects the brass fill fitting in the fill box to the fill circuit on the vessel. It is constructed with FDA compliant materials,

The vent line is as important as any component in the system. It connects the safety relief valves on the vessel to either the outdoor fill box or to an alternative outdoor vent tube.

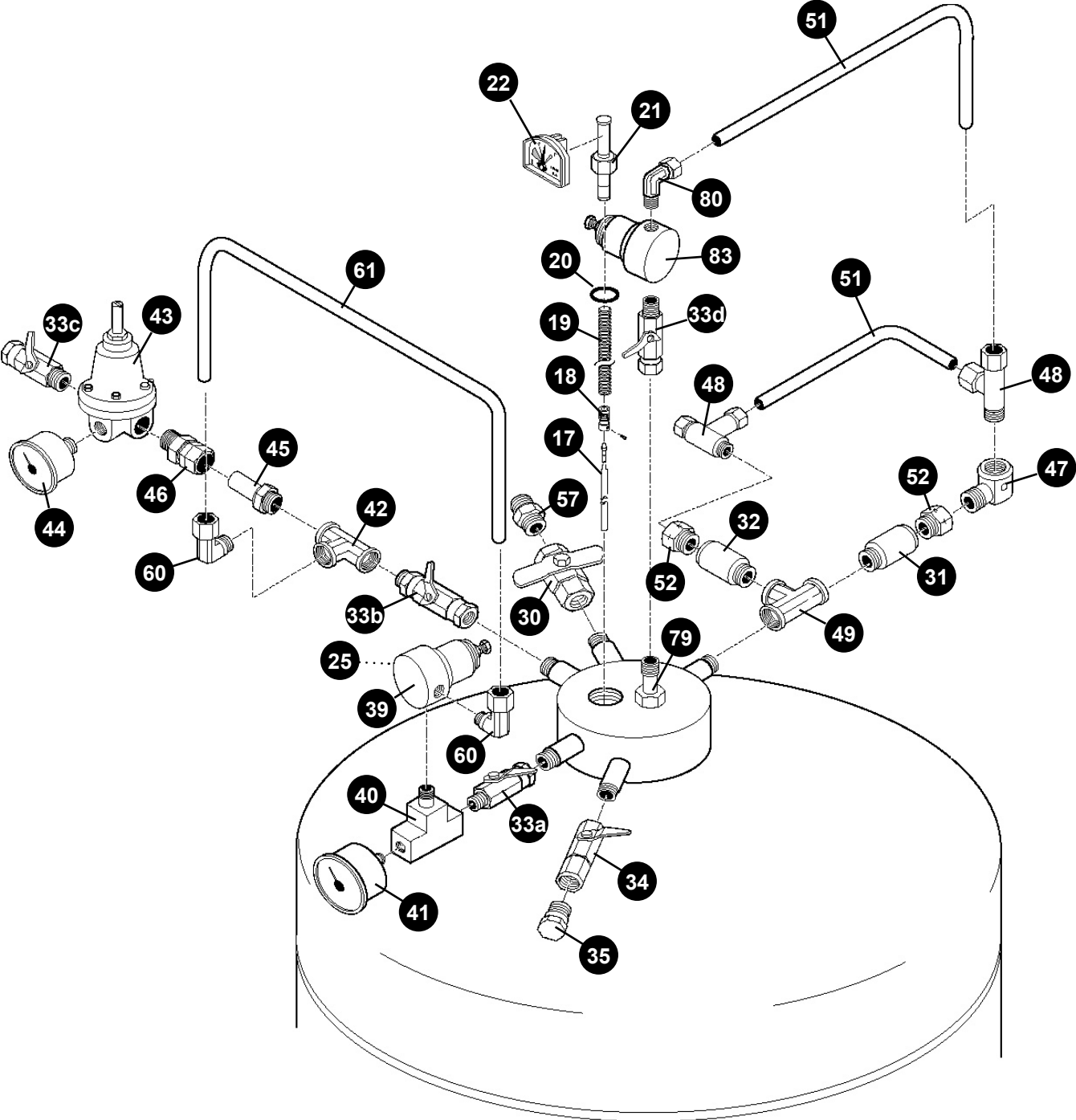
NOTE: The Carbo-Max 750 must always be connected to an outdoor vent line when it contains CO₂ and is indoors.

The Bulk CO₂ Supplier

The bulk CO₂ supplier is also an important part of the system. Most CO₂ suppliers not only provide timely delivery of CO₂ but also install and service the system. For service, parts, information, emergency CO₂ delivery, or other CO₂ related assistance, contact the local Chart authorized CO₂ supplier. A place has been designated on page 14 of this manual to record the name and phone number of the CO₂ supplier and other important service contacts.

III Parts Identification

Carbo-Max 750 (High Flow) Plumbing Components



III Parts Identification Continued

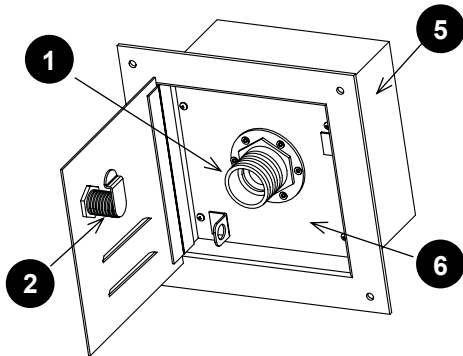
Carbo-Max 750 (High Flow) Plumbing Components

ITEM	PART NO.	DESCRIPTION	QTY	FUNCTION
17	9094119	Float Rod Assembly with Magnet	1	Indicates liquid CO ₂ level in the vessel
18	5411622	Spring Retainer	1	Secures spring to float rod for adjustment
19	5411029	Extension Spring	1	Provides tension on float rod
20	2300244	O-Ring, Liquid Level Gauge	1	Seals brass plug to vessel
21	5411612	Plug, Brass, Liquid Level Gauge (3/4"-16)	1	Secures the contents gauge to the vessel
-	10601088	Liquid Level Gauge Assembly	1	Includes items 17, 18, 19, and 21
22	10591369	Gauge, Liquid Level / Contents (Roto-Cal)	1	Indicates approximate liquid CO ₂ contents
25	1212962	Brass Plug (1/8" MPT) (not pictured)	1	Seals unused port on Economizer regulator
30	11082128	Ball Valve (3/8" FPT)	1	Isolates CO ₂ fill hose from vessel.
31	11708451	Relief Valve, 450 psig (1/2" MPT)	1	Secondary inner vessel safety relief valve
32	11708400	Relief Valve, 300 psig (1/2" MPT)	1	Primary inner vessel safety relief valve
33a	1716162	Ball Valve (1/4" MPT x 1/4" FPT)	1	Isolates liquid-side of Economizer regulator
33b	1716162	Ball Valve (1/4" MPT x 1/4" FPT)	1	Isolates gas-side of Economizer regulator
33c	1716162	Ball Valve (1/4" MPT x 1/4" FPT)	1	On / off control for gas supply
33d	1716162	Ball Valve (1/4" MPT x 1/4" FPT)	1	Opens / closes sure-Fill circuit
34	1717579	Ball Valve, Brass (1/4" NPT)	1	On / off control for liquid CO ₂ supply
35	1211102	Plug, Brass (1/4" MPT)	1	Seals liquid CO ₂ port when not in use
39	1812289	Regulator, Economizer, 140 psi (1/4" FPT)	1	Controls vessel pressure
40	1213092	Tee, Brass (1/4" FPT x 1/4" FPT x 1/4" MPT)	1	Joins Economizer circuit components
41	2015179	Pressure Gauge, 0-400 psi (1/4" MPT CBM)	1	Displays internal vessel pressure
42	1210622	Tee, Brass (1/4" FPT)	1	Connects gas use and economizer circuits
43	2111312	Regulator, Final Line, 90 psi (1/4" FPT)	1	Controls CO ₂ gas pressure to use-point
44	11673631	Pressure Gauge, 0-160 psi (1/8" MPT CBM)	1	Indicates CO ₂ gas pressure to use-point
45	11762975	Tube Stub, Brass (1/4" MPT x 1/2" ODT)	1	Gas use line plumbing extension
46	11762983	Connector, Brass (1/4" x 1/2" ODT)	1	Connects final line regulator to gas use circuit
47	1210482	Elbow, Street, Brass 90D (3/8" MPT)	1	Connects 450 psi relief valve to vent circuit
48	11708442	Tee, Brass Run, (1/2" ODT x 3/8" MPT)	2	Joins vent circuit components
49	11044869	Branch Tee, (1/2" FPT)	1	Manifolds primary & secondary relief valves
51	6910623	Tube, Soft Copper Type L (1/2" OD, Nominal .375")	ft	Joins vent circuit components
52	1611592	Adapter, Pipe-Away (3/8" FPT)	2	Joins 450 & 350 psig relief valves to vent fittings
57	1110112	Connector (5/8" ODT x 3/8" MPT- 45° Flare)	1	Connects CO ₂ fill hose to vessel
60	1013042	Elbow, Brass 90D (5/16" ODT x 1/4" MPT)	2	Joins Economizer line and circuit components
61	5503831	Tubing, Stainless (5/16" OD)	1	Economizer line
79	11720484	Sure-Fill™ Tube Assembly (3/4"-16)	1	Controls CO ₂ filling and pressure venting
80	10654315	Elbow, Brass, 90D (1/2" ODT x 1/4" MPT)	1	Joins Sure-Fill assembly to vent circuit
83	1812279	Regulator, Sure-Fill, 200 psi (1/4" FPT)	1	Vents excess pressure during CO ₂ filling
94	3911217	Cap, Plastic, Black	1	Covers vacuum pump-out port
95	3911016	Cap, Plastic, Blue	1	Covers vacuum regeneration port
-	11789983	Label, Carbo-Max 750 High Flow	1	Denotes vessel model
-	3836609	Label, CO ₂ Operations	1	Describes vessel safety and operations
-	10784072	Label, Chart Industries, Inc.	1	Identifies vessel manufacturer
-	11784496	Label Only, Caution Carbon Dioxide	1	Included in label kits
-	10591140	CO ₂ Regulation Label UN 2187	1	Identifies vessel's contents

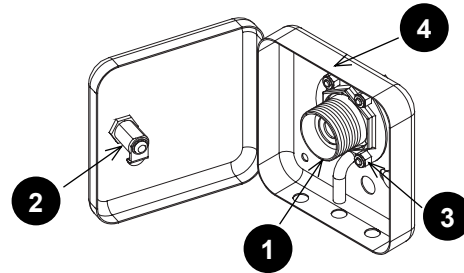
III Parts Identification Continued

Stationary Installation Components

Flush-Mount Fill Box
Part No. 9723139



Surface-Mount Fill Box
Part No. 9722279



ITEM	PART NO.	DESCRIPTION	QTY.	FUNCTION
1	11381021	CO ₂ Fill Fitting, Brass	1	Connection for CO ₂ delivery vessel hose
2	4310689	Lock Assembly (includes key)	1	Locks fill box door
-	4310959	Key for Lock Assembly (not pictured)	-	Replacement key for fill box
3	2914071	Locknut SS w/nyl Insert	4	Attach fill fitting to fill box studs
4	11386771	Surface-Mount CO ₂ Fill Box (without fittings)	1	Allows outdoor filling and venting of vessel
5	9111289	Flush-Mount CO ₂ Fill Box (without fittings)	1	Allows outdoor filling and venting of vessel
6	10503517	Flush-Mount Fill Box Plate	1	Holds brass fill fitting
7	1111182	Connector (3/4" MPT x 5/8" - 45° Flare)	1	Connects fill hose to fill fitting
8	10802912	CO ₂ Fill Hose only, 5 ft. (2000 psi & FDA)	1	Transfers liquid CO ₂ from fill box into vessel
8	10802921	CO ₂ Fill Hose only, 10 ft. (2000 psi & FDA)	1	Transfers liquid CO ₂ from fill box into vessel
8	10802947	CO ₂ Fill Hose only, 15 ft. (2000 psi & FDA)	1	Transfers liquid CO ₂ from fill box into vessel
8	10802939	CO ₂ Fill Hose only, 25 ft. (2000 psi & FDA)	1	Transfers liquid CO ₂ from fill box into vessel
8	10370710	CO ₂ Fill Hose only, 30 ft. (2000 psi & FDA)	1	Transfers liquid CO ₂ from fill box into vessel
8	10370728	CO ₂ Fill Hose only, 50 ft. (2000 psi & FDA)	1	Transfers liquid CO ₂ from fill box into vessel
9	2811726	Vent Hose (lengths match fill hose)	1	Vents excess vessel pressure outdoors

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

IV Vessel Specifications

Carbo-Max 750 HF	
Dimensions	
Diameter	26 in (66 cm)
Height w/o legs (w/legs, add 5 1/2 inches)	68 in (173 cm)
Empty Weight	430 lb (195 kg)
Full Weight	1201 lb (545 kg)
Net Volume	82 gal (310 liters)
Storage Capacity (CO ₂ saturated @125 psig [8.6 bar g])	771 lb (350 kg)
Gas Use Connection	1/4"
Fill Line Connection	5/8" Male 45° Flare
Vent Line Connection	1/2" OD Tubing
Rates and Pressures	
CO ₂ Gas Delivery Rate / Continuous	15 lb/hr (6.8 kg/hr) (approximately 840 - 16 oz. drinks / hr.)
Liquid CO ₂ Delivery	On demand
Evaporation Rate (No loss in normal applications)	3.0 lb/day (1.4 kg/day)
Max. Allowable Working Pressure (MAWP)	300 psig (20.7 bar g)
ASME Relief Valve Setting	300 psig (20.7 bar g)
Additional Relief Valve Setting	450 psig (31.0 bar g)
Sure-Fill Regulator Setting	200 psig (13.8 bar g)
Design Criteria	
Design Specifications	ASME Section VIII, Division 1
Design Specifications	Meets with US and Canadian approvals
Fill System	Single Line, pressure differential
Patented Sure-Fill System	Standard
Insulation Type	Vacuum with Super Insulation
Pressure Control	Economizer Circuit
Liquid Level Gauge	Float Type: Magnetic 'Roto-Cal'
Outer Vessel Material	Stainless Steel
Inner Vessel Material	Stainless Steel
Floor mount Design (Meets NSF standards)	Optional Permanent Legs

V Operation and Troubleshooting

Facts To Know

1. A vessel's normal internal operating pressure (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 (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-Max 750 HF holds about 750 lbs of CO₂ to meet use demands of 50 - 300 lbs of CO₂ per week.
7. The contents gauge (22) 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 (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.
10. Every day before starting operations and CO₂ use check for:
 - CO₂ leaks (See "Safety".)
 - Pressure readings (41 and 44)
 - CO₂ contents (22)
 - Abnormal frost or condensation
 - Anything unusual.

General Operating Instructions

1. Always use caution when working with CO₂. Read and understand the "Safety" section of this manual.
2. The Carbo-Max 750 system does not require adjustment under normal operating conditions.
3. Check the vessel daily before using CO₂. See 'fact to know' number 10.
4. In an emergency the flow of CO₂ from or through the Carbo-Max 750 can be stopped by closing the following valves:
 - Valve 33c to stop the flow of gas from the vessel to the beverage system or other use-point.
 - 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 to stop CO₂ flow through the Economizer circuit. Closing valve 33c will also stop CO₂ flow through the Economizer circuit but will also stop the flow of CO₂ gas to the end use point.
 - Valve 34 controls the flow of liquid CO₂. Be sure valve 34 is closed while removing plug 35 for liquid CO₂ service.
5. 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 (22),
 - the vessel pressure gauge (41) and
 - the final line pressure gauge (44).
 - Observations such as unusual frosting and/or events related to the problem.

CO₂ Storage Vessel

INDICATION	POSSIBLE CAUSE	CORRECTIVE ACTION
No CO ₂ to carbonator or other use-point OR Carbonated drinks are “flat.”	CO ₂ storage vessel is empty.	1. Switch to emergency CO ₂ gas cylinder. 2. Call CO ₂ supplier for delivery.
	Isolation valve (33b) to final line regulator is closed.	Open valve or valves as needed.
	Gas supply Isolation valve (33c) is closed.	
	Vessel pressure (41) is low (110 psi or less).	Check for leak in gas supply lines, beverage system, vessel plumbing, vessel safety system and/or fill box. (Frost should not be present on vessel after extended periods with no CO ₂ use.)
	Economizer regulator (39) is not operating properly; set too low or stuck open.	Close isolation valve (33c) and switch to emergency CO ₂ gas cylinder. If tank pressure fails to rise, see section on low vessel pressure.
	Unknown	Call CO ₂ service agent.
Frost on the bottom or sides or top of the vessel.	A normal condition during or following CO ₂ use.	None. Check vessel for frost / leaks each morning before starting CO ₂ use.
	Leak in beverage system and/or gas supply lines or CO ₂ fill box. (When frost is present after extended periods of no CO ₂ use.)	1. See “Safety.” Evacuate & ventilate room. Check for frost in the morning before CO ₂ has been used. If possible, locate and correct leak. 2. Call appropriate equipment service agent.
Frost on vessel after extended periods with no CO ₂ use (such as in the morning before store operations begin.	CO ₂ leak from the beverage system, vessel’s plumbing, or CO ₂ fill box. (Frost present after extended periods with no intentional CO ₂ use.)	1. See “Safety”. Evacuate & ventilate the room. 2. Call appropriate service agent.
Constant low vessel pressure. [(41) below 125 psi]	Economizer regulator (39) set low or stuck open.	Call CO ₂ service agent.
	CO ₂ leak from vessel plumbing, CO ₂ fill box and/or vessel safety system	1. See “Safety”. Evacuate & ventilate the room. 2. Call CO ₂ service agent.
	Sure-Fill assembly leaking or malfunctioning	1. Close Sure-Fill isolation valve (33d) to stop flow. 2. Call CO ₂ service agent.

V Operation and Troubleshooting

CO₂ Storage Vessel

INDICATION	POSSIBLE CAUSE	CORRECTIVE ACTION
Constant high vessel pressure. [(41) above 200 psi]	Normal condition for a few days following a CO ₂ delivery.	None
	Normal when little or no CO ₂ is used.	None
	Economizer regulator (39) set too high.	Call CO ₂ service agent.
	Vessel has a weak vacuum.	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 needed.
	Differential between store vessel pressure and delivery pressure is too small. (At start of fill, store vessel pressure should be 110 - 150 psi and delivery vessel pressure should be 275 - 300 psi).	<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. Note: Never vent vessel pressure to lower than 110 psi.
	Sure Fill™ assembly not operating (relieving) properly	<ol style="list-style-type: none"> 1. Ensure that Sure-Fill valve 32d is open. 2. Consult CO₂ service agent.
	Leak in Sure Fill™ assembly / regulator. (Pressure above check ball is lower than vessel pressure.)	<ol style="list-style-type: none"> 1. Close Sure-Fill valve 33d for several minutes allowing pressure above check ball to equalize and ball to fall into the open position. 2. Contact CO₂ supplier.
	Delivery vessel is empty.	Consult supplier. Arrange for another delivery.
	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.

V Operation and Troubleshooting

CO₂ Storage Vessel

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> 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.

V Operation and Troubleshooting

Fill Box

INDICATION	POSSIBLE CAUSE	CORRECTIVE ACTION
Fill box door will not close, lock, or open.	Lock dirty or damaged.	<ol style="list-style-type: none"> 1. Check for obstruction 2. Clean and oil lock 3. 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.

VI 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),
 - 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.

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	_____	_____
MVE Customer Service	(612) 882-5000 or (800) 247-4446 [toll free in US]	
MVE Technical Service	(612) 882-5000 or (800) 253-1769 [toll free in US]	

VI Warranty

WARRANTY POLICY

Chart Industries, Inc. warrants to the Purchaser the Carbo-Max bulk CO₂ system equipment for 90 (ninety) days from the Chart invoice date, that said equipment shall be free from any defects in workmanship and materials. Chart also warrants the reliability of the vacuum in the CO₂ storage vessel for 5 (five) years from the date of the original Chart invoice.

Purchaser agrees that as a pre-condition to any Chart liability hereunder, Purchaser or its appointed agents shall fully inspect all goods 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. Chart may elect to repair or replace such equipment or any defective component or part thereof which proves to be defective, or to refund the purchase price paid by the original Purchaser. Chart shall not be liable for defects caused by the effects of normal wear and tear, erosion, corrosion, fire, explosion, misuse, or unauthorized modification.

Alterations or repair by others than those designated and approved by Chart or operation of such equipment in a manner inconsistent with Chart accepted practices and all operating instructions, unless pre-authorized in writing by Chart, shall void this Warranty.

Chart's sole and exclusive liability under this Warranty is to the Purchaser and shall not exceed the lesser of the cost of repair, cost of replacement, or refund of the net purchase price paid by the original Purchaser.

Chart is not liable for any losses (including CO₂), damages, or costs of delays, including incidental or consequential damages. Chart specifically makes no warranties or guarantees, expressed or implied, including the warranties of merchantability or fitness for a particular purpose or use, other than those warranties expressed herein.

WARRANTY CLAIMS PROCEDURE

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

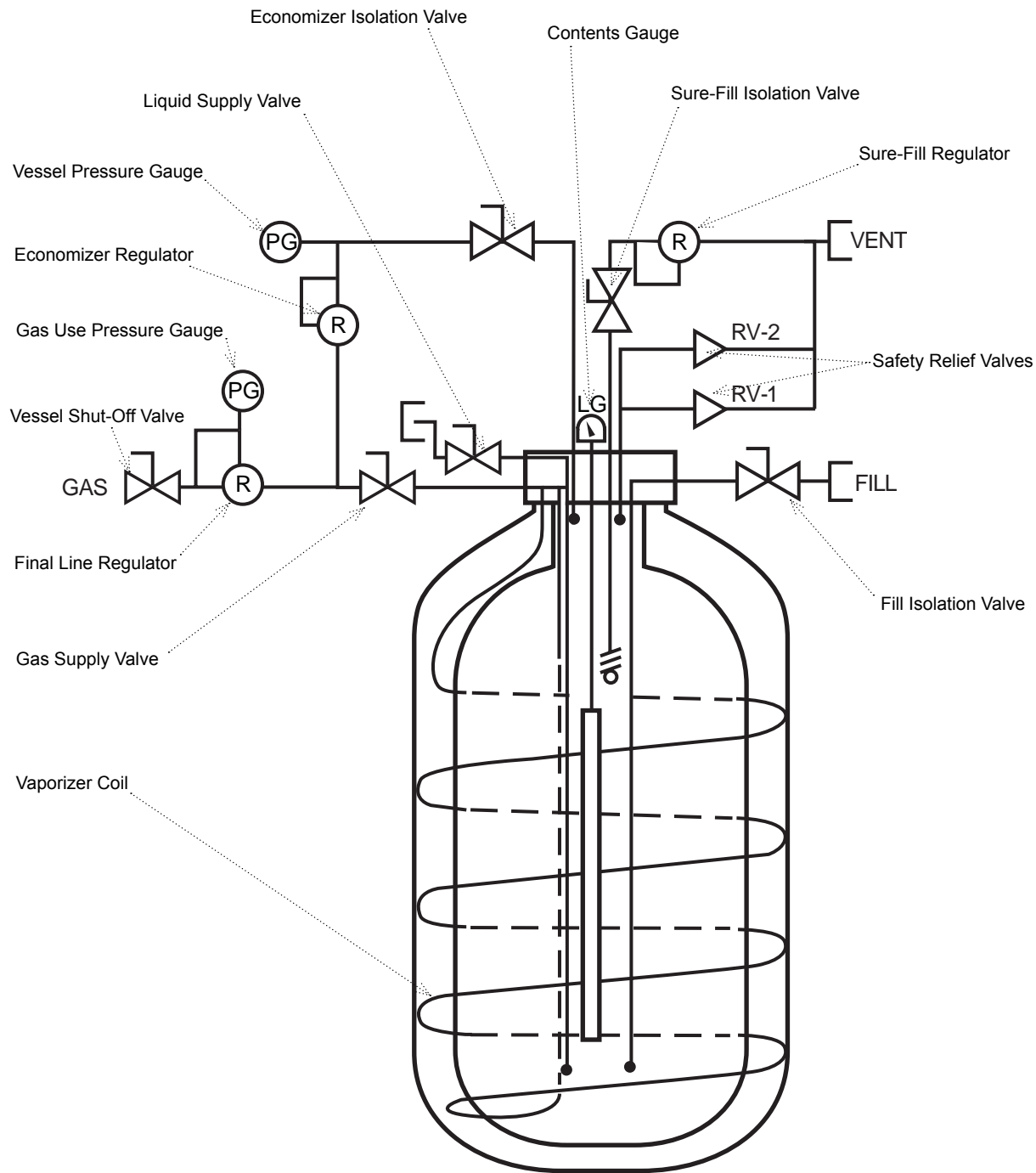
- Telephone: 952-882-5000
800-253-1769
(Toll free in U.S.)
- Facsimile: 952-882-5185

or by writing to:

Chart Industries, Inc.
MVE Beverage System Technical Service
3505 County Road 42 West
Burnsville, MN 55306-3803
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.

VIII System Flow Schematic



MVE Carbo-Max 750 HF
CO₂ System

Chart Industries, Inc.
3505 County Road 42 West
Burnsville, MN 55306-3803



chartbeverage.com

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