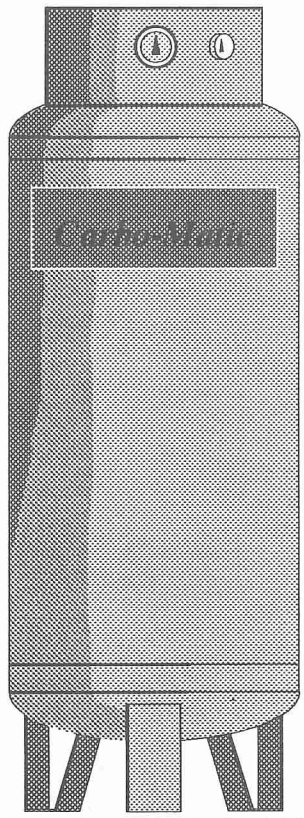
USER'S MANUAL

Carbo-Matic

FOR USE WITH MODELS 200/400/600



CSI

CRYOGENIC SERVICES INCORPORATED

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INTRODUCTION

This manual has been compiled for use in conjunction with Cryogenic Services, Inc. (CSI) Carbo-Matic Model 200 / 400 / 600 liquid carbon dioxide storage units. It is intended to provide a general overview of the equipment and includes all of the information necessary to operate the unit in beverage carbonation service. Any comments or suggestions relating to this publication should be forwarded to:

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SAFETY FIRST

This chapter provides general information regarding the safe handling and use of Carbon Dioxide. The following cautions and warnings should be read and understood by all users of CO2 gas in Carbo-Matic units before operating or attempting to perform any service work on the equipment.

WARNING: Carbon Dioxide gas is heavier than air and will not support life. Exposure to high concentrations of CO2 gas can cause asphyxiation and death. Always store the unit in a well ventilated area and exercise extreme caution when approaching a CO2 tank which is venting or leaking gas to the atmosphere. Be sure that the vent hose from the tank is connected to the filling station to insure outside venting of CO2 gas.

CAUTION: The CSI Carbo-Matic is a pressure vessel designed to store CO2 liquid and gas at cold temperature and pressures. DO NOT attempt to loosen or remove any fittings from this unit. Equipment servicing should be performed only by factory authorized service personnel; and then, only with the CO2 liquid and pressure removed from the vessel.

CAUTION: Liquid CO2 or parts contacting liquid CO2 may be extremely cold (-109 F). Use the proper protection when handling cold equipment.

CAUTION: The installation of the Carbo-Matic should be done so that it does not block electrical boxes or fire escapes. The vent line that connects to the tank's safety relief devices must be free of kinks or obstructions. It must connect to the fill box on the outside of the building. All plumbing connections should be leak free. The hoses connecting the store tank and the filling station should be out of the traffic area and protected from damage.

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FACTS OF OPERATION

The Carbo-Matic system is completely automatic, requiring minimal adjustment or operator monitoring, and little scheduled maintenance. The system is designed to store and deliver carbon dioxide gas (CO2) to your beverage system.

The Carbo-Matic system consists of 3 major assemblies: the remote filling station, the storage tank and their connecting hoses.

The filling station is located on the outside of the building where it is convenient for the CO2 distributor to fill. It is connected to the storage tank with hoses so that liquid CO2 can be transferred into the tank from outside the building. The hoses also connect the storage tank's safety relief valves to the outside where they can vent safely.

The storage tank is a permanently installed vacuum insulated pressure vessel. It is designed to hold cold CO2 for long periods of time. It has a pressure control system that keeps the tank normal operating pressure between 130 and 300 psi. It will supply CO2 gas to any beverage system. The tank pressure can be monitored at the tank pressure gauge (Item 12) and/or at the deluxe fill station (Item 4). The amount of CO2 in the vessel can be determined by looking at the level gauge (Item 13) on the tank or (Item 3) in the deluxe fill station.

The gas is supplied to the beverage equipment through a regulator (Item 11) that is mounted on the outside of the tanks shroud. The outlet pressure of the regulator should be set between 90 and 100 psi. It can be monitored on the regulators gauge (Item.10).

The vaporization of the cold CO2 liquid into gas is done under the shroud in the coil (Item 21). The coil and other plumbing components will sweat or frost during beverage operation.

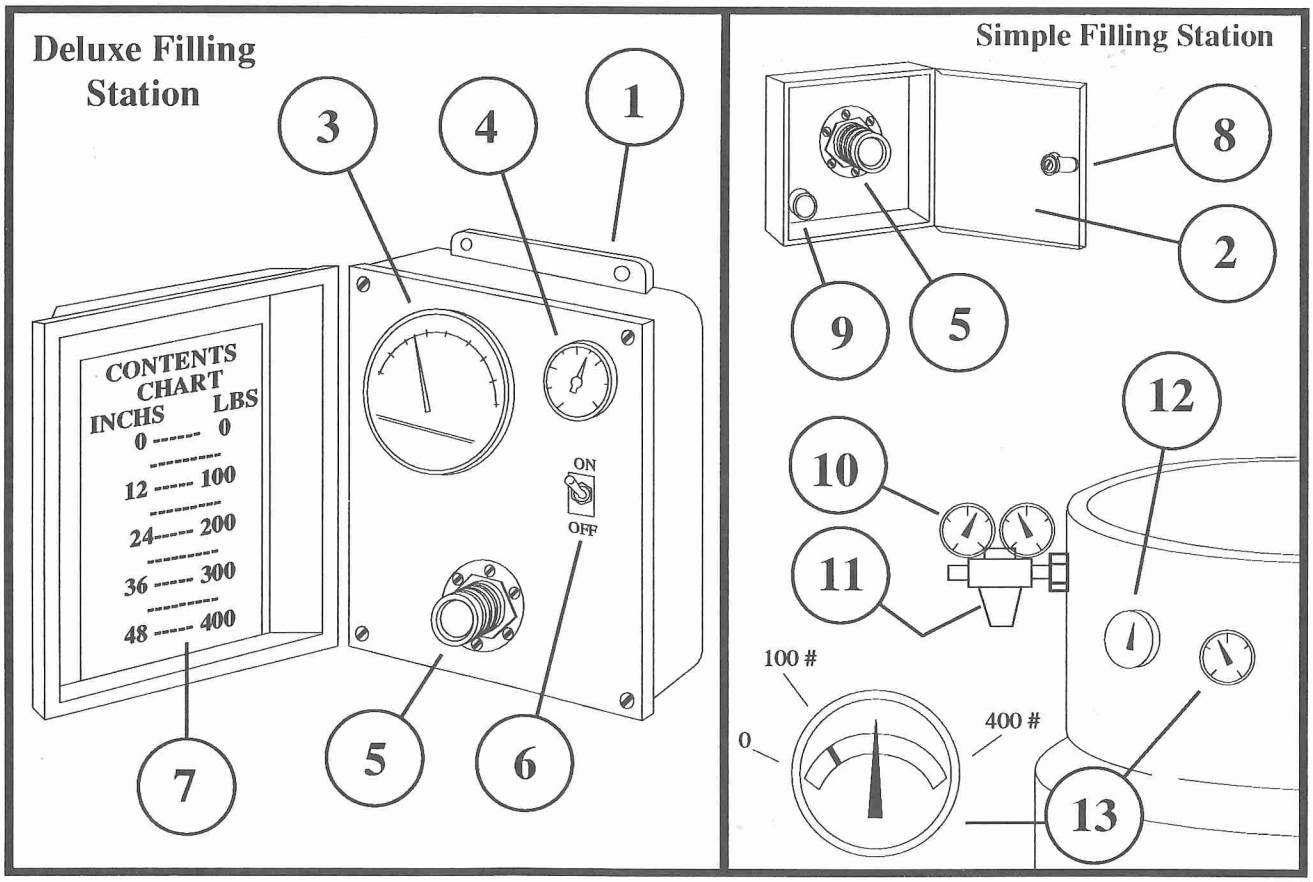
The CO2 gas supply can be shut off by closing the gas supply valve (Item 16). Turn the handle up.

SPECIFICATION : CARBO-MATIC

		MODEL 200	MODEL 400	MODEL 600
Dimensions				
Diameter	(Inches)	16	20	24
Height	(Inches)	52	62	62
Weight, Empty	(pounds)	180	290	375
Weight, Full	(pounds)	380	690	975
Capacity				
Gallon	(gal)	21	48	70
Cubic Feet of gas	(SCF)	1750	4000	5825
Pounds of CO2	(pounds)	200	400	600
Gas Supply Rates				
Maximum flow:	(lbs/hr)	3	5	5
w/ standard coil	(cubic feet/hr)	25	45	45
w/ external vaporizer	(lbs/hr)	30	30	30
Minimum flow	(lbs/day)	1.5	2.5	2.5
	(cubic feet/hr)	0.5	1.0	1.0
Pressure Rates				
Maximum allowable pressure		300 psi	300 psi	300 psi
Relief valve setting (primary)		300 psi	300 psi	300 psi
Relief valve setting (secondary)		450 psi	450 psi	450 psi
Normal working pressure		140-225 psi	140-225 psi	140 -225 psi
Design Criteria				
Maximum allowable pressure		300 psi	300 psi	300 psi
Vessel material (inner)		Stainless steel	Stainless steel	Stainless steel
Code- ASME Section 8 - Division 1		"U" Stamp	"U" Stamp	"U" Stamp

PARTS IDENTIFICATION

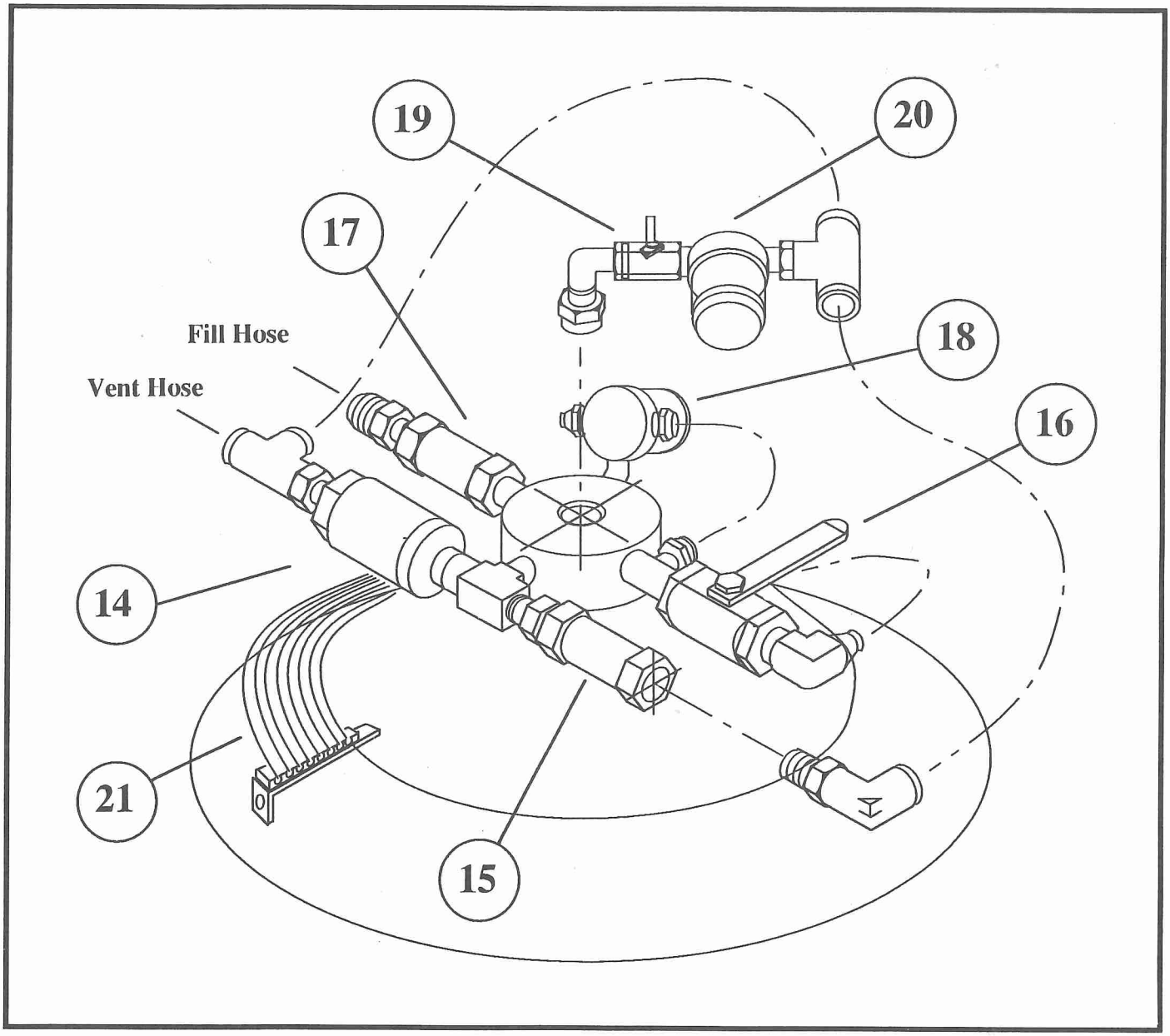
Filling Station and Level Indicators



ITEM	NUMBER	DESCRIPTION	QTY	FUNCTION
1	97-2177-9	Deluxe fill box assembly	1	Completed assembly
2	97-2180-9	Simple fill box assembly	1	Completed assembly
3	20-1377-9	CO2 contents gauge	1	Displays the CO2 liquid level
4	20-1227-9	CO2 pressure gauge	1	Displays the CO2 tank pressure
5	13-1195-2	Liquid fill fitting	1	Connection for filling CO2
6	17-1771-2	Gauge isolation switch	1	Turns the contents gauge on/off
7	38-3087-9	Contents chart	1	Converts the gauge reading into pounds of CO2
8	43-1132-9	Lock assembly & Key	1	Locks the simple fill box
9	10-1345-6	Vent fitting	1	Vents CO2 outside the store
10	*	Pressure gauge	1	Displays line pressure
11	*	Final line regulator	1	Controls gas to beverage equipment
12	20-1432-9	Pressure gauge	1	Displays tank working pressure
13	20-1379-9	Contents gauge	1	Displays CO2 liquid level

* Not included with the Carbo-Matic system

Carbo-Matic Storage tank plumbing components



ITEM	NUMBER	DESCRIPTION	QTY	FUNCTION
14	18-1125-2	Safety relief valve (Primary)	1	Relieves excess pressure (300 psi)
15	18-1206-2	Safety relief valve (Secondary)	1	Relieves excess pressure (450 psi)
16	17-1757-9	Gas supply valve	1	Turns the gas flow on and off.
17	17-1787-2	Fill valve (One way check)	1	Isolates the tank from the fill station
18	18-1228-9	Pressure maintaining regulator	1	Holds the tank pressure at 140 psi
19	17-1616-2	Isolation valve (Sure-Fill)	1	Turns off Sure-Fill system
20	18-1227-9	Regulator (Sure-Fill)	1	Vents excess filling gas at 210 psi
21	28-1183-6	Vaporizer coil	1	Turns cold liquid CO2 into gas

COMPONENT DESCRIPTION

It is important to become familiar with the major components of the Carbo-Matic system.

The **Final Line Regulator (Item 11)** is mounted externally on the Carbo-Matic unit. It maintains the proper line pressure for carbonation. The pressure gauge shows the pressure in the carbonation equipment. Normal operating range for this reading is 90-120 psi. In many cases additional regulators may be required to supply other functions, such as Bag-in-Box pumps or syrup drive systems. Consult with the suppliers of that equipment for proper pressure recommendations.

The **Control Valves** for the Carbo-Matic system are factory set and should not be adjusted. The **Pressure Maintaining Valve (Item 18)** is sometimes called an economizer regulator. It controls the operating pressure of the storage tank and has a set pressure of 140 psi. It delivers liquid CO2 to the vaporizer coil if the tank pressure is below, and gas if above, the set pressure. The filling of the storage tank with liquid CO2 is controlled by two automatic check valves . The **Fill Connection (Item 5)** located in the filling station and the **Fill Isolation Valve (Item 17)** on the tank only allows liquid to flow into the tank.

The Carbo-Matic storage tank is equipped with a **Sure-Fill System (Item 20)** that automatically controls the filling of the tank. It uses a preset regulator to vent a small amount of CO2 gas at the end of the filling operation. The regulator is connected to a float valve located inside the tank. When the rising liquid level shuts off the float valve, the filling operation is automatically stopped. This system guarantees a full tank. There is an **Sure-Fill Isolation Valve (Item 19)** that can be used to turn the system off for servicing.

The pressure vessel inside the Carbo-Matic storage tank is designed to the ASME Section 8, Division 1 pressure vessel code. It has two **Safety Relief Devices (Items 14&15)** that protect it from overpressurization. These devices are vented outside the building into the filling station. The main relief valve (Item 14) may vent during a filling operation.

The Carbo-Matic storage tank pressure is shown on the **Pressure Gauge (Item 12)** that is built into the top shroud. The deluxe filling station has an addition **Pressure Gauge (Item 4)** located in the panel. The CO2 liquid level can be read on the **Contents Gauge (Item 13)** that is located on the shroud next to the pressure gauge. The deluxe filling station includes a larger gauge (Item 3) that can be read within 5 pounds increments.

DAILY OPERATION

Set-Up - The CSI Carbo-Matic is designed to supply gas to the carbonator. The system is designed to be as automatic as possible. The morning set-up of this equipment is minimal. Follow these steps:

1. Check the contents gauge located either in the side of the tanks shroud (Item 13) or in the deluxe fill box on the outside of the store (Item 3). Remember that 1/4 full mark on the small gauge (Item 13) is the red area and equals 100 pounds of CO2. That is about 1 to 2 weeks supply at an average store.
2. Check the storage tank pressure gauge (Item.12) to see that it is above 125 psi. The normal operating pressure is between 140 psi and 175 psi. The pressure can be as high as 300 psi after a CO2 delivery.
3. Check the carbonator pressure gauge (Item.10) to make sure that it is set at 90 psi.
4. Inspect the vaporizer coil (Item.21) for frost build-up. If there has not been a recent CO2 fill or the beverage system has not been used for the last 6-8 hours, frost should not be present.
5. Make sure that the gas supply valve (Item 16) is open. Handle turned down.

Close: No steps are required.

TROUBLESHOOTING GUIDE

Problem	Probable Cause	Corrective Action
Drinks are flat	Out of CO2	Check the contents gauge (Item 13). If empty, contact CO2 supplier for delivery.
	Final line regulator set too low.	1. Pressure gauge (Item 10) should show 90-110 psi 2. If too low, loosen the locknut and adjust the regulator. 3. If drinks are still flat, contact service agent.
	Kink or obstruction in in CO2 line.	Inspect line for kinks or obstructions.
	Large CO2 leak.	1. Listen for leaking gas. 2. Inspect line for holes.
	Tank pressure too low.	Pressure gauge (Item 12) should be 130-300 psi. If less than 100, contact service agent.
	Drink temperature too warm.	See manual for beverage system or call service agent.
	Beverage system malfunction.	Contact service agent
Frost on the plumbing and vaporizer coil.	High CO2 consumption caused by lunch or dinner rush.	None required. Frost will disappear when volume drops.
	Leak in beverage system, figals or bag in box.	If frost appears early in morning or continuously then system has a leak and service agent must be contacted.
Hissing coming from tank.	Safety relief valve (Item 14) is functioning.	Check gauge (Item 12), if reading is 280 psi or higher then device is functioning properly. If the pressure is less than 280 psi then relief valve opens too early. Contact the service agent.
	Leak in the plumbing components.	1. Ventilate area to reduce CO2 concentration. 2. Call the service agent to perform the necessary leak testing and component tightening.

SERVICE AND MAINTENANCE

The Carbo-Matic system is designed to be automatic and only requires the adjustment of the final line regulator (Item 11).

Service or maintenance work should only be performed by CSI Authorized Agents. Contact CSI for the Agent in your area.

Use only CSI replacement parts.

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SYSTEM SCHEMATIC