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## INTELLICARB

### Training Manual



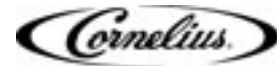
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# INTELLICARB TRAINING MANUAL

The products, technical information, and instructions contained in this manual are subject to change without notice. These instructions are not intended to cover all details or variations of the equipment, nor to provide for every possible contingency in the installation, operation or maintenance of this equipment. This manual assumes that the person(s) working on the equipment have been trained and are skilled in working with electrical, plumbing, pneumatic, and mechanical equipment. It is assumed that appropriate safety precautions are taken and that all local safety and construction requirements are being met, in addition to the information contained in this manual.

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# INTRODUCTION

## UNIT DESCRIPTION

- Built-in cold carbonator produces bottle-quality drinks every time
- No seasonal CO<sub>2</sub> adjustments required for changes in water temperature
- A complete system for simplified installation
- Reduces service frequency and lowers equipment life cost
- Generates increased beverage sales and greater consumer satisfaction
- Illuminated merchandiser delivers unique, high impact marketing message
- Ice used to cool cold plate kept separate from ice dispensed into cups
- One piece ABS thermoformed plastic ice storage hopper. Durabide™ design provides durability and ensures all ice in the hopper is dispensable
- Unit readily accepts top mount cubers with manual ice fill capability

## THEORY OF OPERATION

The rate of CO<sub>2</sub> solubility increases with cold water. IntelliCarb System provides pre-chilled cold water from the cold plate and mix with CO<sub>2</sub> in the carbonator tank. The water is introduced into the tank with a high volume 125gph Procon pump and high torque motor.

The amount of carbonated water reserve is controlled by a probe mounted in the tank. The probe is called a “liquid level probe”. The liquid level probe senses the water level in the tank. Probe controls the pump “ON” and “OFF” cycle through the electronic board called “liquid level board”.

**NOTE: The probe works on a 5 M.V. D.C. current that continually reverses direction to prevent probe corrosion.**

## DESCRIPTION

The “Enduro IntelliCarb” series of ice dispensers solves your ice and beverage service needs in a sanitary, space saving, economical way. Designed to be automatically filled with ice from a top mounted ice machine or manually filled with ice from any remote ice-making source, these dispensers will dispense cubes (up to 1-1/4 inch in size), cubelets, and hard-chipped or cracked ice. In addition, the units include beverage faucets, a cold plate, an internal carbonator tank and an external pump for the carbonator, and are designed to be supplied direct from syrup tanks with no additional cooling required.

**IMPORTANT:** For dispensing compressed or extruded style ice, an Ice Diverter Kit must be installed on the dispenser, see FIGURE 13 on page 9.



## SPECIFICATIONS

|  | ED150   | ED175  | ED200   | ED250  | ED300   |
|--|---|--|---|--|---|
| <b>Model Descriptions:</b>                   | B=(Beverage)<br>C=(Coldplate)<br>H=(Internal Carb)                          | B=(Beverage)<br>C=(Coldplate)<br>H=(Internal Carb)                               | B=(Beverage)<br>C=(Coldplate)<br>H=(Internal Carb)                          | B=(Beverage)<br>C=(Coldplate)<br>H=(Internal Carb)                               | B=(Beverage)<br>C=(Coldplate)<br>H=(Internal Carb)                          |
| <b>Ice Storage:</b>                          | Z=(No DripTray)<br>150 Pounds   | Z=(No DripTray)<br>175 Pounds  | Z=(No DripTray)<br>200 Pounds   | Z=(No DripTray)<br>250 Pounds  | Z=(No DripTray)<br>300 Pounds   |
| <b>Maximum Number of Faucets Available:</b>  | 6   | 8  | 10  | 10   | 12  |
| <b>Built-in Cold Plate:</b>                  | Yes   | Yes  | Yes   | Yes  | Yes   |
| <b>Electrical:</b>                           | 120/1/60, 3.0 Amps Total Unit Draw  |  | 120/1/60, 3.5 Amps Total Unit Draw<br>230/1/50, 2.0 Amps Total Unit Draw    |  | 120/1/60, 4.0 Amps Total Unit Draw<br>230/1/50, 3.0 Amps Total Unit Draw    |
| Outlet should be within 6 feet of dispenser. |   |  |   |  |   |
| <b>Dimensions:</b>                           | Width 22"<br>Deep 30--11/16"<br>High 35--5/8"                               | Width 24.5"<br>Deep 30--11/16"<br>High 35--5/8"                                  | Width 22"<br>Deep 30--11/16"<br>High 35--5/8"                               | Width 24.5"<br>Deep 30--11/16"<br>High 39--5/8"                                  | Width 44--3/8"<br>Deep 31--1/2"<br>High 37"                                 |
| <b>CO<sub>2</sub> Operating Pressure</b>     | Z--Models<br>Width 22"<br>Deep 23--1/16"<br>High 35--5/8"<br>75--psig (max) | Z--Models<br>Width 24--1/2"<br>Deep 23--1/16"<br>High 35--5/8"<br>75--psig (max) | Z--Models<br>Width 22"<br>Deep 23--1/16"<br>High 35--5/8"<br>75--psig (max) | Z--Models<br>Width 24--1/2"<br>Deep 23--1/16"<br>High 39--5/8"<br>75--psig (max) | Z--Models<br>Width 44--3/8"<br>Deep 23--1/16"<br>High 37"<br>75--psig (max) |

## REQUIREMENTS

- **Weight:** counter must be level and able to support 450 lbs.
- **Environment:** Indoor installation only
- **Temperature:** 40 to 100°F
- **CO<sub>2</sub>:** 75 psi at unit
- **Syrup:** 60 psi., 0.70 -- 0.75 ounces per sec. (0.6 gpm) at unit
- **Water:** 60 psi at pump
- **Electrical:** See name plate

## DELIVERY INSPECTION AND UNPACKING

Upon delivery inspect the unit for damage or irregularities and immediately report problems to the delivering carrier and file a claim with that carrier.

- Open loose parts packages and inspect parts.

| Part No.  | Description               | Qty. |
|-----------|---------------------------|------|
| 710000030 | Pump and Motor Assy       | 1    |
| 70970     | 4"Legs                    | 4    |
| 70750     | Clamps                    | 2    |
| 620702201 | Brush                     | 1    |
| 51774     | Drain Pan Drain Line      | 1    |
| 50335     | Drain Line Insulation     | 1    |
| 50952     | Fitting 3/4 Soc x 3/4 Fpt | 1    |
| 51288     | Fitting 3/4 Mpt x 1"Barb  | 1    |

## INSTALLATION

1. Locate the dispenser indoors on a level counter top.
  - A. LEG OPTION  
Unpack the four (4) legs and install them into the threaded holes provided in the bottom of the unit. The installer must provide flexibility in the product and utility supply to permit shifting the position of the dispenser sufficiently to clean the area beneath it.
  - B. COUNTER MOUNTING  
If counter mounted the ice drink dispenser must be sealed to the counter. The template drawing indicates where openings can be cut in the counter. Locate the desired position for the dispenser, then mark the outline dimensions on the counter using the template drawings. Cut openings in counter.  
Apply a continuous bead of NSF International (NSF) silastic sealant (Dow 732 or equal) approximately 1/4--inch inside of the unit outline dimensions and around all openings. Then, position the unit on the counter within the outline dimensions. All excess sealant must be wiped away immediately.
2. The beverage tubes, drain tube and power cord are routed through the large opening in the bottom of the unit. See the mounting template for locating the required clearance opening in the counter for these utility lines.
3. Drip tray assembly: Route the drain tube to an open drain with the end of the tube above the "flood" level of the drain. Use the tubing, fittings, clamps, and insulation provided with the Dispenser to assemble the drain. The completed drain line must pitch continuously downward and contain no "traps" or improper drainage will result. Must have a 4 inch air gap between drain line and drain.

**NOTE: This equipment must be installed with adequate backflow protection to comply with federal, state, and local codes.**

**NOTE: IMI Cornelius Inc. recommends that a water shutoff valve and water filter be installed in the plain water inlet supply line. A Cornelius Water Filter (P/N 313860000) and QUICK DISCONNECT SET (P/N 313867000) are recommended.**

**CAUTION:** Check the minimum flow rate and the maximum pressure of the plain water inlet supply line. MINIMUM FLOW RATE MUST BE AT LEAST 125--GALLONS PER HOUR. If flow rate is less than 125--gallons per hour, starving of the carbonator water pump will occur. Starving will damage the water pump and could cause the carbonator to time out. INCOMING PLAIN WATER INLET SUPPLY LINE WATER TO PUMP PRESSURE MUST REMAIN A MINIMUM OF 10--PSI BELOW THE CARBONATOR CO<sub>2</sub> OPERATING PRESSURE. (Example: Carbonator CO<sub>2</sub> operating pressure is 75--PSI and the maximum water pressure can be no more than 65--psi, etc.). Water over pressure (higher than CO<sub>2</sub> operating pressure) can cause carbonator flooding, malfunction, and leakage through the carbonator relief valve. If water is exceeding maximum pressure specifications, a Water Pressure Regulator Kit (P/N 310150000) or equivalent must be installed in the plain water inlet supply line. If fitting connector is not available, water line must be 1/2" or 3/4" diameter with a shut off valve within 6 feet of the dispenser.

4. Locate the carbonator pump assembly and connect probe wires from Ice/Drink Unit and pump. Connect inlet water to pump and pump outlet to Ice/Drink Unit using 3/8--inch food--grade tubing.

**NOTE: Locate carbonator assembly within 6 feet of the dispenser. Do not lengthen the control board harness.**

5. Connect the beverage system product tubes as indicated in applicable Plumbing Flow Diagram, see page 19. This work should be done by a qualified service person.

**NOTE: Water pressure for non carbonated beverages must be 60 P.S.I. minimum.**

**NOTE: See applicable Flow Diagram or Decal on the lower front of the unit for the location of syrup and water connections.**

6. Clean the hopper interior.
7. Connect the two power cords to a 120 volt, 60 cycle, 3-wire grounded receptacle. For 220--240 Volt International Units, a 3--wire power cord is provided. An adapter plug for the particular country will need to be provided by the Installer.

## Drains

Use a 1 - 1/2" rigid pipe (e.g. ABS or P.V.C.) this is to prevent kinking or collapsing. Make sure to leave a 4 inch air gap between the drain line and the floor drain.

## CORNELIUS INTELLICARB CARBONATOR ASSEMBLY

1. Ice Drink / Drop-In Carbonator Pump & Motor Unit

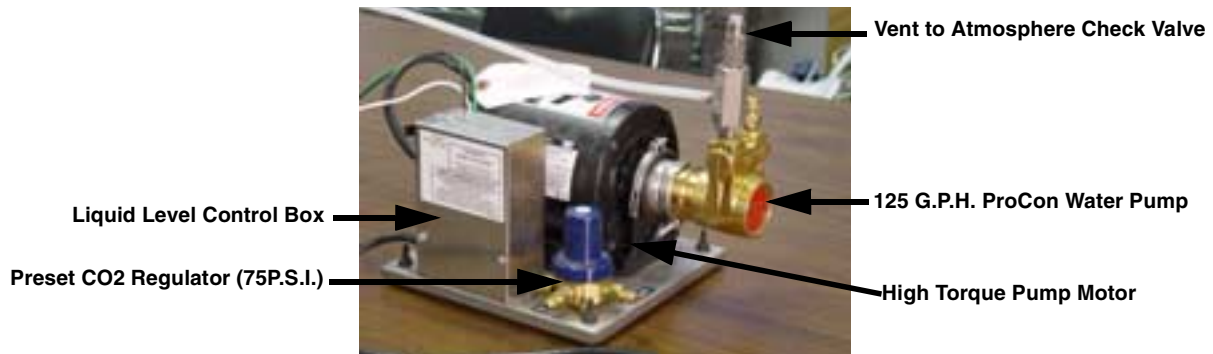


FIGURE 1

## Carbonator Time Out Reset Switch

The board can be set to turn the carbonator off after three or seven minutes of continuous time. The feature can also be disabled. See the carbonator instruction in this manual.

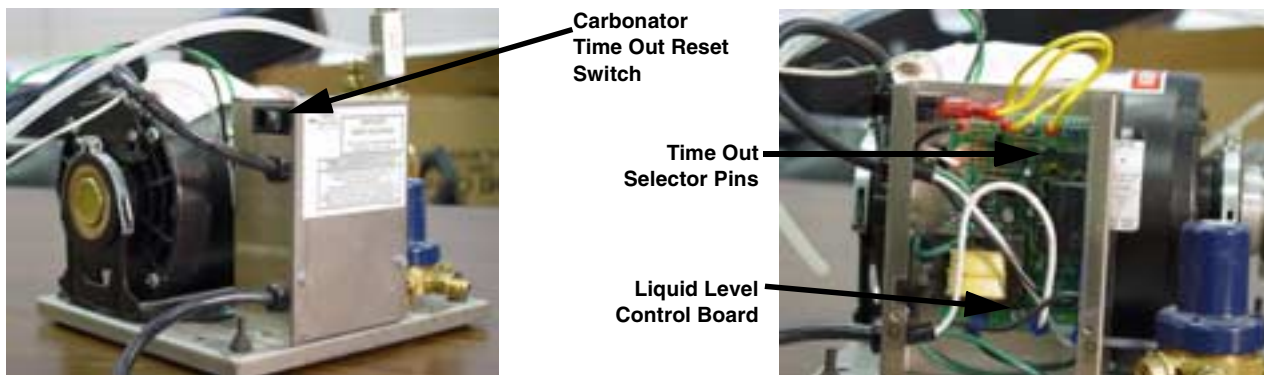


FIGURE 2

FIGURE 3

1. **Locate carbonator assembly below dispenser no more than 6 feet away. Important: Make sure there is clearance for the liquid level control reset switch on the side of the control box to avoid accidentally tripping the switch.** The control board has an internal timer to prevent the pump motor from running continuously. In the event of a water supply interruption or malfunction of the water level probe and/or motor relay circuit. If there is a time-out event, make necessary repairs to what caused the time out, then depress and release the reset switch to put the control board back in service. By moving a jumper on the control you can select either a 7 minute or 3 minute time out or this feature can also be disabled.
  - A. Hook-up a 3/8 ID water supply line 125 G.P.H. minimum (60 psig. max.) to pump inlet. Minimum flowing pressure is 30 psig. **Important: Tap for non-carb water supply must be upstream of pump inlet. Do not tap in the pump outlet.**
  - B. Hook-up a 3/8 (.375 ID) CO<sub>2</sub> supply line (100 psig.) to the inlet of the pre-set CO<sub>2</sub> regulator (75 psig.) on the Pump & Motor base. **Note: If using a bulk CO<sub>2</sub> tank as supply, tank pressure regulator must be set to 100-105 psig. The regulator on the bulk tank should be a secondary.**



- C. **Initial start-up procedure for carbonated water system:** Turn on the CO<sub>2</sub> supply to the carbonator tank, vent air from carbonator tank by pulling the tank relief valve. Turn on water supply to the pump. Connect electrical power to the pump and motor unit. Bleed the air out of the system by energizing a beverage valve until carbonated water is flowing from the valve.

**NOTE:** If the carbonator Pump and Motor does not cycle (turn on and off) properly, check that the probe harness connector and ground lead are secured to the carbonator tank connection points.

- D. If service is required on Ice Drink units, it will be necessary to lower the beverage valve panel to gain access to the probe and ground connection. Remove the lower front panel (2 screws) from the cabinet and the ice chute cover ("snap" fit). Remove the 6 screws that secure the beverage panel to the cabinet. The panel can now be moved downward due to the flexibility of the beverage tubing to expose the carbonator tank connections.

### Carbonator Relief Valve Locations

The carbonator tank is located behind the splash panel, on the right side of the dispenser. You will need to pull the relief valves to purge air from the system after the CO<sub>2</sub> supply has been hooked up. Failure to do this will cause low carbonation volume and popping of the relief valves.



FIGURE 6

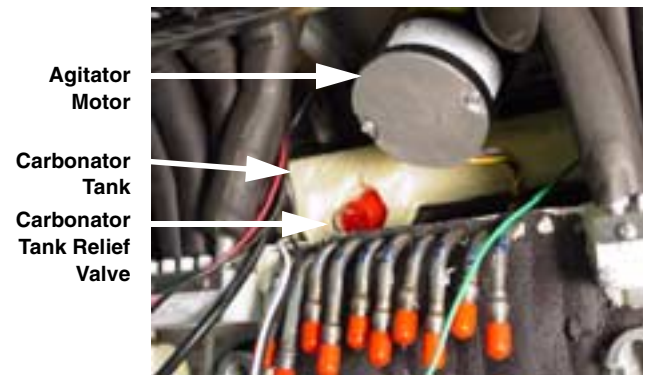


FIGURE 7

### 2. Dispenser

#### Ice Drink Model ED175BCH (Lower Front Panel Removed)

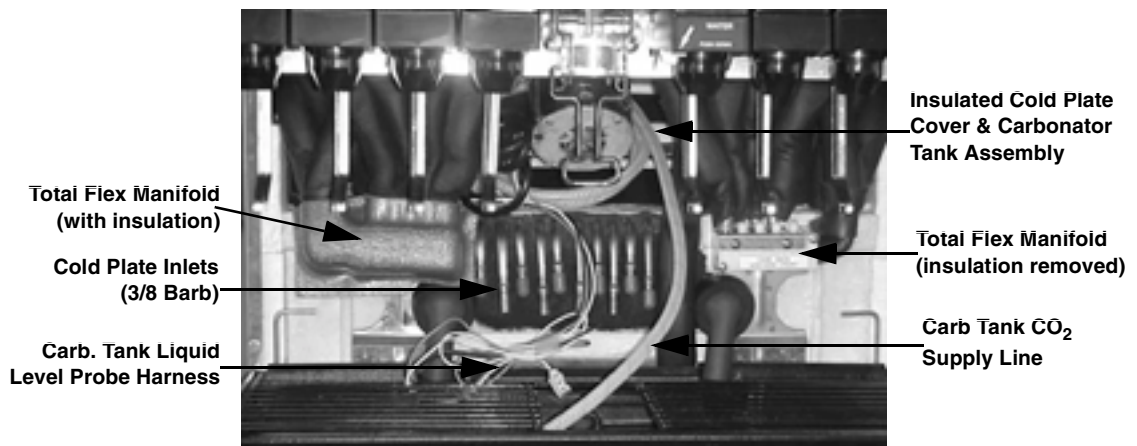
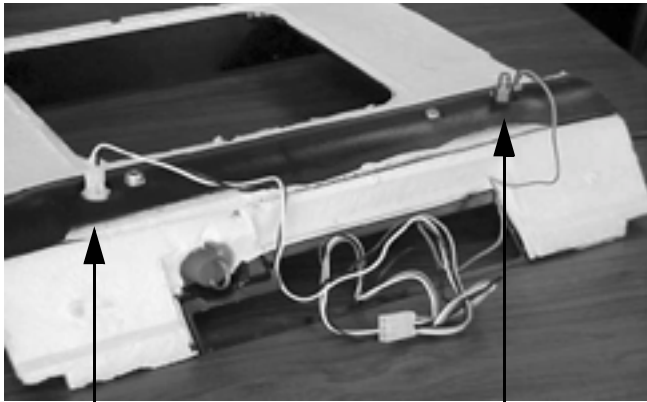


FIGURE 8

Ice Drink Model ED150/175/300 Coldplate Cover

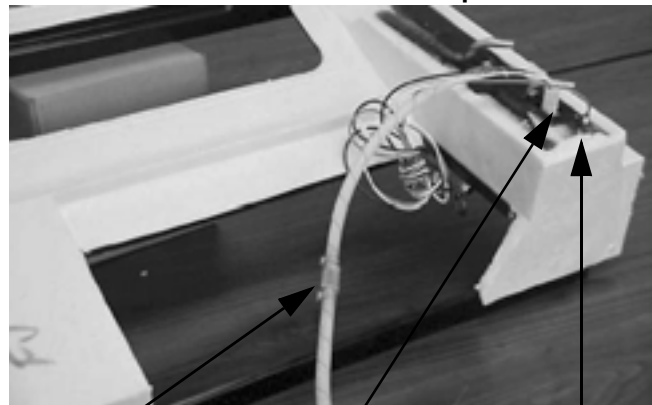


Liquid Level Probe

CO<sub>2</sub> Check Valve with Ground Stud

FIGURE 9

Ice Drink Model ED200/250 Coldplate Cover

In-line CO<sub>2</sub> Check Valve

Probe

Ground Plate/Stud

FIGURE 10

## 3. Total Flex System for Ice Drink Models ED150/175/200/250/300

**Total Flex Manifold (Insulation Removed)**

Water Line

Retainer Clip

Plugs

Manifold Block

FIGURE 11

Total Flex is a system of water manifold blocks located at the front of the cold plate, adjacent to the cold plate inlets, for easy switch over of carbonated / non-carbonated beverage drinks. The right hand manifold block is for the beverage valves located to the right side of the ice chute, and the left block is for the left bank of valves. Each beverage valve on the dispenser can be set up for either carbonated or non-carbonated drinks. Refer to the unit's plumbing diagram for the factory carbonated / non-carbonated valve locations. The procedure for switching carbonated / non-carbonated water lines on a beverage valve is as follows:

- A. Shut off the water supply to the dispenser. Depressurize and drain both the carbonated and non-carbonated water circuits.
  - B. Remove the retainer clip (2 screws) from the manifold block. Switch the plug and water line fitting to their respective carbonated / non-carbonated outlet locations on the block.
  - C. Replace the retainer clip. Turn on the water supply and energize the "switched" valve(s). Check for water leaks.
4. Important: Route the dispenser's drain line to an open drain with the end of the tube above the flood level of the drain. The drain line must pitch downward and contain no "traps".
  5. Connect both the carbonator pump and motor unit and the dispenser to a **grounded** electrical supply outlet.

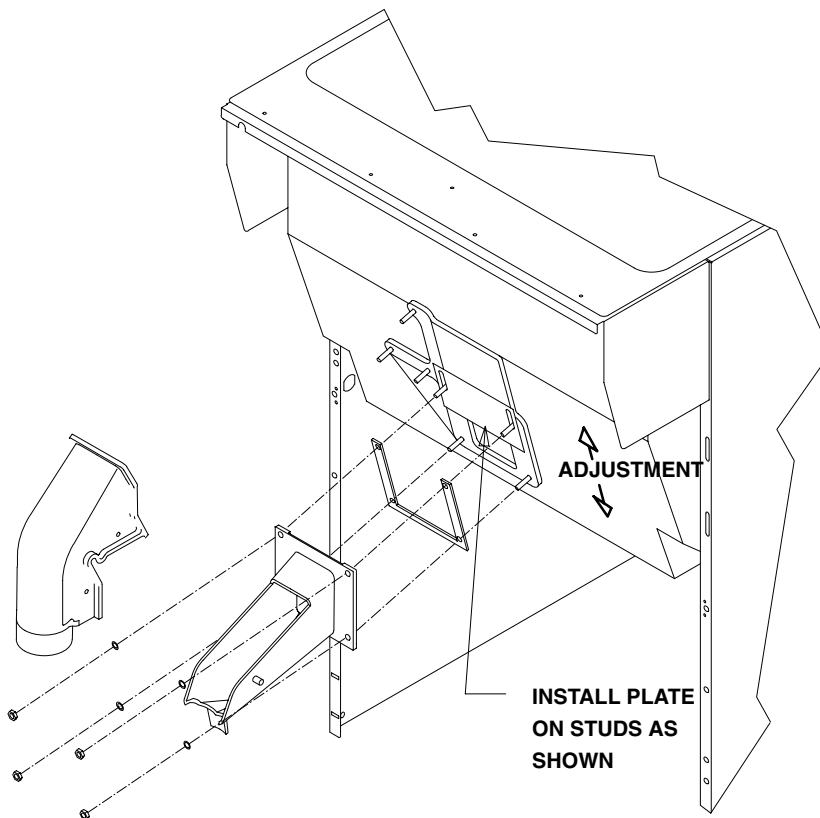
6. **Check list for proper “finished” drink carbonation:**
- A. Fill ice storage hopper with ice.
  - B. Water supply must be from a continuous source (no tank supply).
  - C. Use only filtered water.
  - D. Supply water line to the carbonator pump must be a minimum of .375 ID.
  - E. Syrup supply lines must be a minimum of .265 ID.
  - F. Water inlet pressure range: 45-60 max. static psig. with a minimum flowing pressure of 30 psig.
  - G. Syrup CO<sub>2</sub> secondary regulator pressure set to 60 psig.
  - H. CO<sub>2</sub> supply must be high quality, food grade.
  - I. Purge all water, carb-water, and product lines of air before brixing valves.
  - J. Important: Brix valves with cold product. Allow at least 15-20 minutes for ice to cool down the coldplate on initial start-up before brixing the valves.
  - K. Dispense at least (2) 12 oz. drinks before taking a carbonation level reading.
  - L. Carbonation tester thermometer must read 32-33°F. for accurate carb-level reading. Store tester in ice water bath during use.
  - M. Hold cup at valve nozzle for drink to be tested. Pour drink slowly down the side wall into the carb-tester to avoid agitation during pouring. Press vent valve once on carb-tester after tightening lid.
  - N. Shake carb-tester in vertical motion until peak pressure reading is obtained. Use Pepsi chart for carbonation level reading.

**NOTE: Carbonator troubleshooting procedure located on page 43.**

## MECHANICAL SECTION

### GATE RESTRICTOR PLATE

**NOTE:** Disconnect power to dispenser before installing, removing, or adjusting restrictor.



**FIGURE 12**

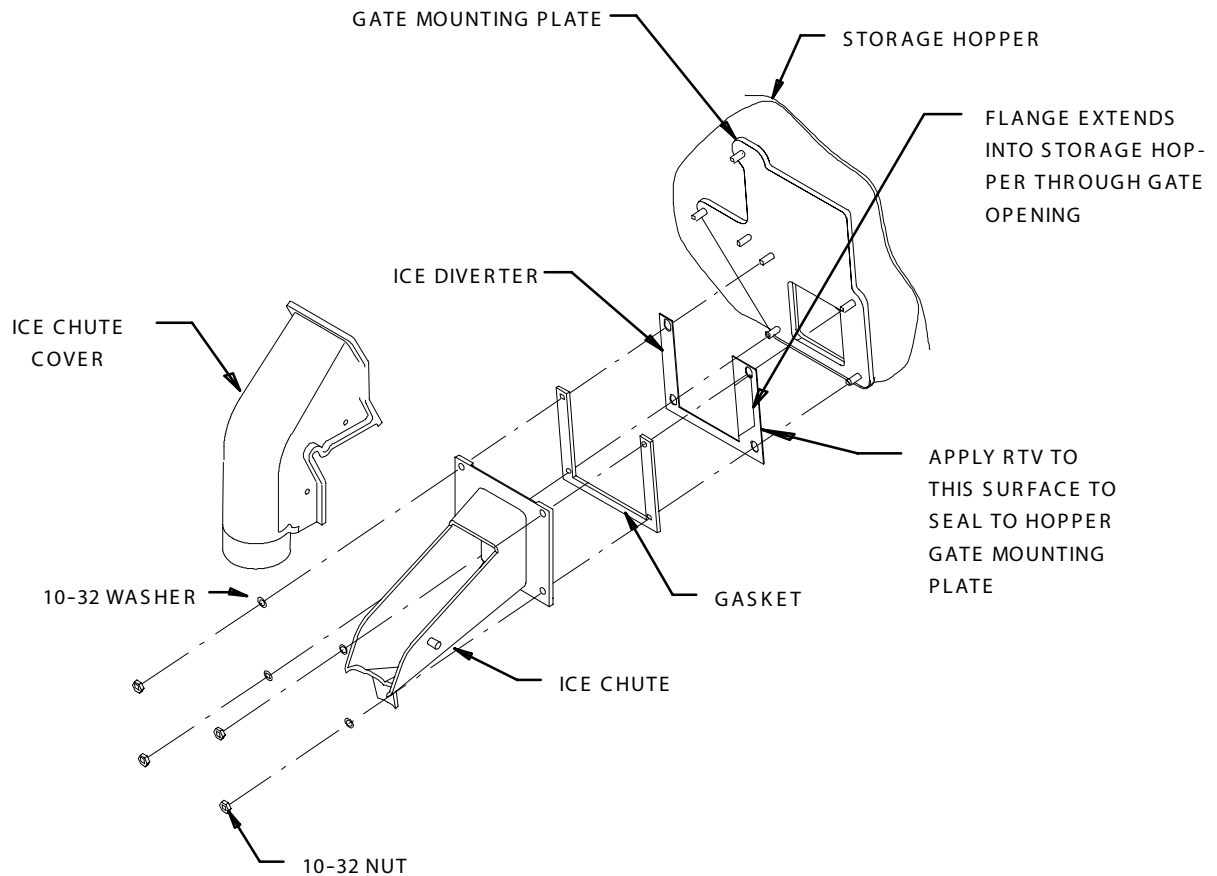
### Adjustment

This plate may be adjusted as shown to reduce or increase the dispensing rate of ice, especially desirable when using glasses or other containers with small openings. Adjustment can be made by sliding up or down with nuts loosened, to obtain the desired amount of restriction.

## ICE DIVERTER KIT 02394

**NOTE: For dispensing Scotsman, Wilshire, and Hoshizaki compressed ice cubes:**

1. Disconnect power to dispenser.
2. Remove Merchandiser from dispenser.
3. Remove ice chute and discard gate restrictor.
4. Install ice diverter on gate mounting plate as shown below.
5. Apply RTV to back surface of ice diverter, to seal to gate mounting plate.
6. Reinstall gasket and ice chute.
7. Reinstall merchandiser and energize unit.

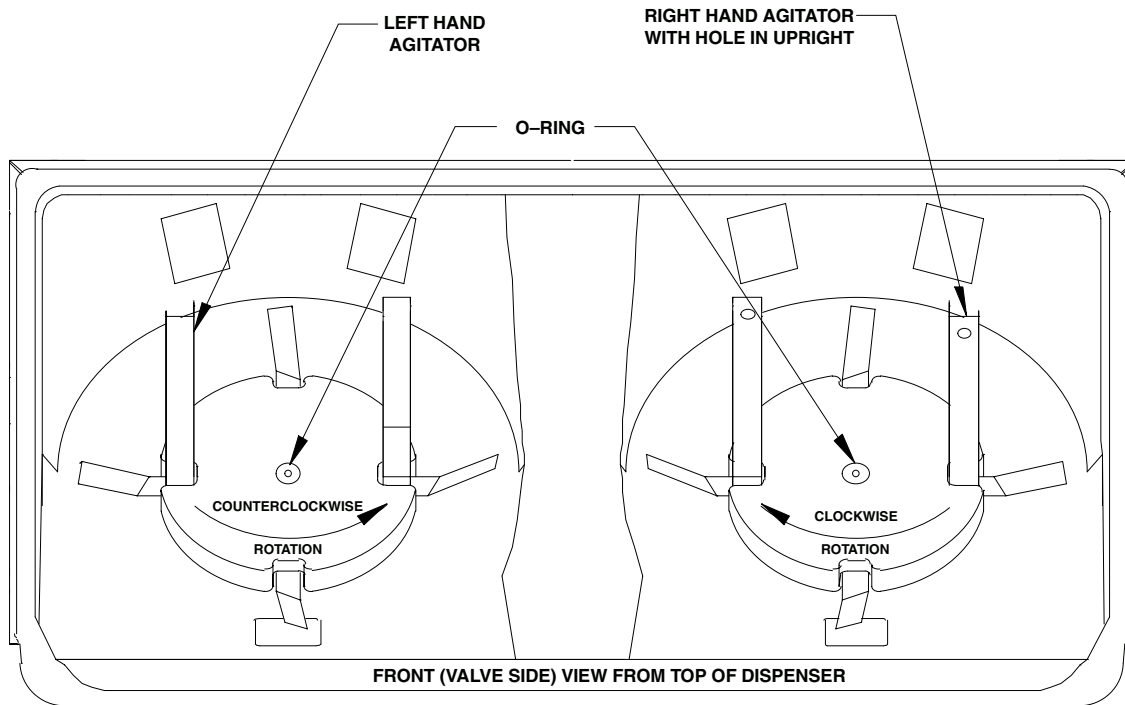


**FIGURE 13**

## REMOVAL AND REPLACEMENT OF AGITATORS

### To Remove Agitators For Cleaning (300 shown)

**NOTE:** All other models have only one agitation Assembly.



**FIGURE 14**

1. Lift agitator and disc from unit.
2. Remove O-Ring starting at notch. Warm the O-Ring with water to ease removal.
3. Lift the plastic agitator disc off of the stainless-steel agitator.
4. Replace by reversing steps.

**NOTE:** Refer to Sanitize Procedure in the Owners Instruction for complete cleaning and sanitizing instructions.

# POST-MIX VALVE SECTION

## SET-UP INSTRUCTIONS



FIGURE 15

A side water lever kit can be added to a valve allowing for dispensing of water without syrup or concentrate. The side water lever can be added to either a carbonated drink valve or a noncarbonated drink valve.

Post-mix valves control:

- the ON-OFF of syrup and water,
- the flow rates of syrup and water,
- the mixing of the two ingredients as they pour into the cup, and
- in some instances - dispensed portion.

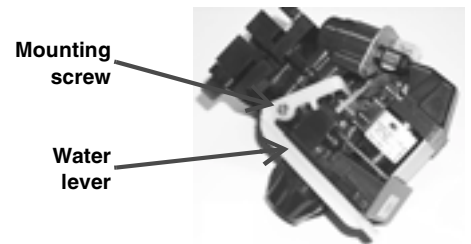


FIGURE 16

## Dimensions & Capacities

|                                       |                              |
|---------------------------------------|------------------------------|
| Fast Flow .....                       | 1 ½ to 3 oz./sec.            |
| UFB-1 .....                           | 2 to 4 oz./sec.              |
| Ultra Flow .....                      | 3 to 4 ½ oz./sec.            |
| Operational temperature range: .....  | 10°C (50°F) to 43°C (110° F) |
| Voltage requirements:.....            | 22 to 27 VAC (50/60 Hz)      |
| Transformer (electronic valves) ..... | 80 VA min.                   |
| Operating Pressure (flowing) .....    | syrup = 20 psi min.          |
| .....                                 | water = 35 psi min.          |

Concentrates and juices that contain particulates must be dispensed from a juice valve.

A slanted drip tray is necessary when using an Optifill valve.

## SYSTEM DETAILS

### Water

#### Water Quality

Water quality issues have an affect on dispensing valves. Chloramine, a combination of chlorine and ammonia is responsible for some degradation of rubber components. Chloramine is used in many U. S. water supplies. Its affects can be minimized by installing and maintaining a water filtration system.

Ultra pure water affects the sensitivity of the Optifill™ valve. Because ultra pure water has less mineral content, it reduces the conductivity of the water keeping the circuit open and overfilling the beverage container.

#### Water Flow

The size of the orifice in the piston varies depending on whether the piston is used for syrup or water, and whether it is high flow or ultra flow valve.

**NOTE: The notched water piston on the Ultra Flow and UFB-1 valve results in at least one orifice in the sleeve always open. This eliminates pulsating and smooths water flow at higher flow rates.**

In operation the liquid flows through the knife-edged orifice in the bottom of the piston and then out the orifices in the sleeve. The outlet orifice size in the sleeve is regulated by the position of the piston. In the illustration, the piston is restricting approximately 1/2 of the outlet orifices.

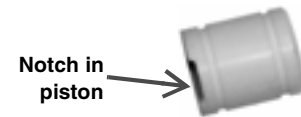


FIGURE 17

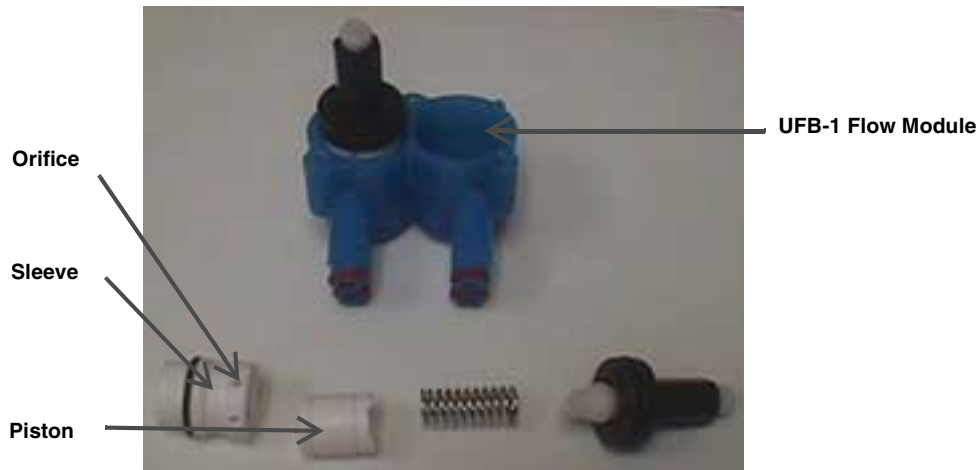


FIGURE 18

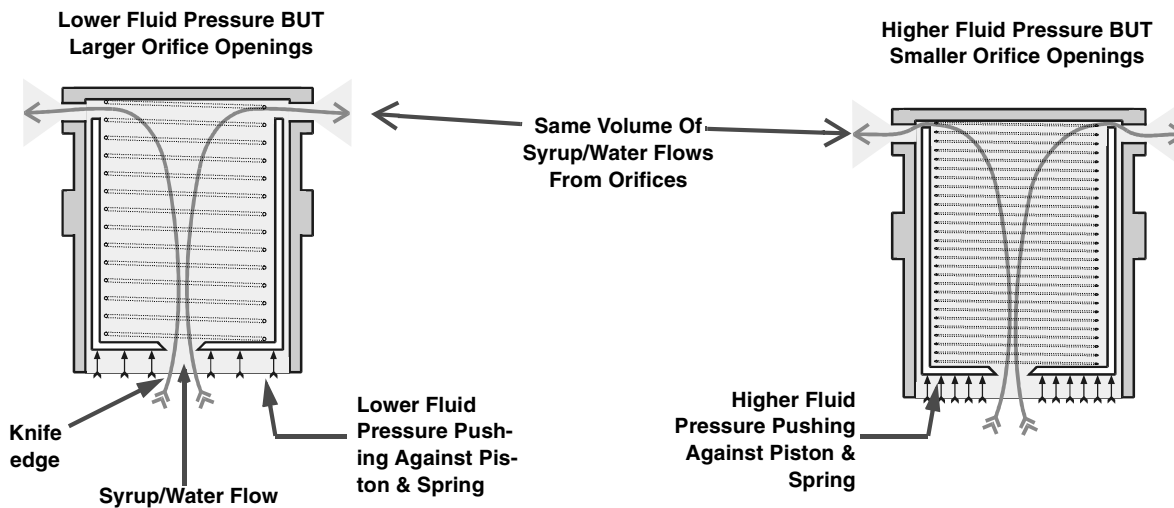


FIGURE 19

The position of the piston inside the sleeve is determined by the upward pressure of the liquid against the base of the piston and the downward pressure of the spring inside the piston (not shown here). The pressure of the spring is regulated by the adjusting screw.

If the pressure of the liquid increases, the flow rate through the knife-edged orifice will increase. The piston is moved upward closing off more of the outlet orifices. The same flow rate is thereby maintained.



### Adjusting Flow Rates

Flow rates of the water and syrup are adjusted based on the desired ratio. For example: if the desired ratio is 5:1, then the flow rate of the water is 5 times that of the syrup.

If the desired finished drink total flow rate is 3.0 ounces per second, then the water flow rate is 2.5 oz./sec and the syrup flow rate is 0.5 oz./sec. (The water at 2.5 oz./sec is five times the 0.5 oz./sec syrup flow rate.)

**NOTE: Always adjust water within its range.**

| Water Flow Rates At Selected Ratios |                                  |                                  |                                   |                                  |
|-------------------------------------|----------------------------------|----------------------------------|-----------------------------------|----------------------------------|
| Water To Syrup Ratio                | Water at 1.5 oz./sec. Total Flow | Water at 3.0 oz./sec. Total Flow | Water at 3.75 oz./sec. Total Flow | Water at 4.5 oz./sec. Total Flow |
| 2 to 1                              | 1.00 oz./sec.                    | 2.00 oz./sec.                    | 2.50 oz./sec.                     | 3.00 oz./sec.                    |
| 3 to 1                              | 1.13 oz./sec.                    | 2.25 oz./sec.                    | 2.81 oz./sec.                     | 3.38 oz./sec.                    |
| 4 to 1                              | 1.20 oz./sec.                    | 2.40 oz./sec.                    | 3.00 oz./sec.                     | 3.60 oz./sec.                    |
| 5 to 1                              | 1.25 oz./sec.                    | 2.50 oz./sec.                    | 3.13 oz./sec.                     | 3.75 oz./sec.                    |
| 6 to 1                              | 1.29 oz./sec.                    | 2.57 oz./sec.                    | 3.21 oz./sec.                     | 3.86 oz./sec.                    |
| 7 to 1                              | 1.31 oz./sec.                    | 2.63 oz./sec.                    | 3.28 oz./sec.                     | 3.94 oz./sec.                    |

### Calculating Flow Rates

The most frequent ratio is 5:1. The charts above list the breakdown for many ratios and flow rates. It is useful to be able to calculate flow rates when a chart is not available.

An example of calculating the water and syrup flow rates given the finished drink flow rate and the water to syrup ratio:

Given:

1. Finished Drink Flow Rate = 3.0 oz./sec.
2. Water to Syrup Ratio = 5 to 1

To calculate Water Flow Rate:

1. Calculate the Total Portions = Water Portion + Syrup Portion  
(example 5 + 1 = 6)
2. Calculate Syrup Flow Rate = Finished Drink Flow Rate ÷ Total Portions  
(example 3.0 oz./sec ÷ 6 = .5 oz./sec)
3. Calculate Water Flow Rate = Finished Drink Flow Rate – Syrup Flow Rate  
(example 3.0 oz./sec - .5 oz./sec = 2.5 oz./sec)

Prove the calculation is correct by adding water flow rate of 2.5 oz./sec + syrup flow rate of .5 oz./sec = finished drink flow rate of 3.0 oz./sec.

Water flowing at 2.5 oz./sec and syrup flowing at .5 oz./sec achieves a ratio of 5:1 and 3.0 oz./sec. flow rate.

### Syrup/Concentrate

**Syrup should always be precooled before setting the ratio.** Syrup takes a path through the valve parallel to the water path. It is introduced in the block, travels through a syrup flow control, banjo, valve head and out the nozzle. Note, concentrate is not cooled.

**High sugar syrups are more viscous (thicker) than diet syrups** and consequently have more pressure drop within a system. This pressure drop results in less flow at the valve and therefore a slower fill time. Increasing the pump pressure will help overcome the pressure drop caused by high sugar syrups.

## Setting Ratios

If the ratio varies and must be adjusted often, it is probably the result of a restricted syrup system. It is then time to clean and sanitize the syrup tubing and cooling coils and check for other problems such as syrup pumps, etc.

**NOTE: Try raising the pressure on the pump before cleaning.**

**Set the water flow rate first, then adjust the syrup to the desired ratio.** This gives the most accurate valve flow setting possible. Measure the ratio and adjust the syrup flow, if necessary. This will result in uniform flow, better carbonation retention, and improved drink quality.

When using a ratio cup always take these precautions to ensure accuracy:

- After installing the separator tube, open the valve to fill the syrup tube before starting the ratio test.
- Clean the cup thoroughly between tests so there is no carry-over from one test to the next.
- Fill the cup to approximately 3/4 full and use approximately the same quantity for each test to ensure accurate settings.
- Take another sample to verify the settings.

### Ratio Cup and Syrup Separator

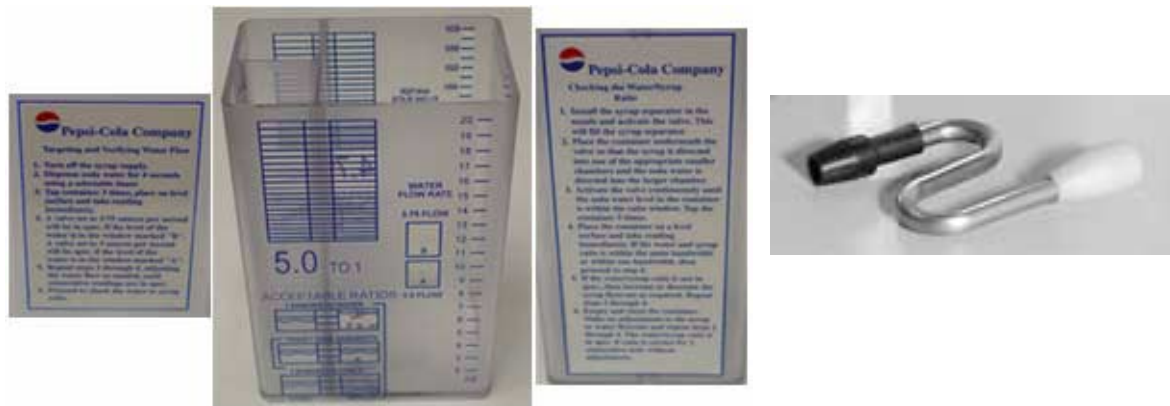


FIGURE 20

**NOTE: Valve troubleshooting information is available on page 39.**

# SHURFLO

## SHURFLOW OVERVIEW

SHURflo's Beverage Gas Pump supplies syrup under pressure to a post-mix dispenser, which mixes the syrup with water to an exact ratio (brix). The pump is used in conjunction with non-pressurized Bag-In-Box (B-I-B) containers and a bag connector (Q.D.) fitting.

The pump can be operated on regulated Co<sub>2</sub>, nitrogen or compressed filtered air. The compressed gas drives the pump and is not in contact with the syrup. Separate syrup and gas chambers prevent contamination, foaming, and purging of the tubing when the B-I-B has emptied.

The pump retains pressure in the outlet line, operating only when syrup is needed. When the dispenser valve is opened, the pump reacts to the pressure drop by operating to maintain pressure in the line. When the dispenser is closed, the incoming gas and output syrup pressures equalize and the pump stops. Actual dynamic line pressure is dependant upon system losses as outlined in the section "Pumping Capability".

The automatic "sold-out" feature within the pump ensures consistent syrup delivery right up to the moment the B-I-B is empty. Vacuum produced by the pump evacuates the syrup within the bag. Once the preset vacuum point is achieved and held, incoming gas pressure to the pump is shutoff causing the outlet syrup pressure to drop to zero. When a new B-I-B is installed, the vacuum drops, the pump automatically restarts and pressurizes the system. The SHURflo Beverage Gas Pump ensures quality from the first drink to the last.

Beverage Gas Pumps are intended for soda syrups and low viscosity concentrates that do not contain solids.

The use of a SHURflo Juice Pump (-09) is recommended for concentrates containing soft solids, classed as round, up to 0.025 in. [0.6 mm] or that are of higher viscosity than soda syrups.

When concentrates contain pulp classed as long/stringy, seed particles or are exceptionally viscous, the Particulate Juice Pump (-10) should be used as it can handle soft solids up to 1/4" [6 mm] cubed.

Standard gas pump models are for installations where geographic elevation is less than 5000 ft.[1523M]. For elevations above 5000 ft. specific high altitude models with a reduced sold-out spring rate must be used to compensate for the loss in atmospheric pressure.

For further application and model information please contact SHURflo.

**NOTE: Shurflow Troubleshooting information available on page 35.**

## SHURFLOW INSTALLATION

- As indicated on the pump, the outlet port is to be mounted up.
- Pumps are to be mounted at the same level or higher than the B-I-B. The best choice is to have the pump above the B-I-B.
- **INLET** tubing from the B-I-B to the pump use; 3/8" I.D. [10mm] minimum, heavy wall (1/8" [3mm]) clear, NSF listed vacuum tubing. Inlet tubing should not have excessive length. Tubing that is allowed to drape down can trap air in the B-I-B creating a potential for pump "sold-out" problems. **The maximum** vertical distance from the bottom of the B-I-B to the pump **must not exceed 5 ft** [1.5 M]. **Maximum** inlet tubing length is 10 ft. [3 M].
- If plumbing multiple B-I-B's to a pump, B-I-B's should be "Teed" **side-by-side** horizontally, rather than one on top of the other (vertically).
- **OUTLET** tubing from the pump to the dispenser should be high pressure rated and NSF listed. Consult "Pumping Capability" (see page 2) for appropriate tubing I.D.
- Always cut CO<sub>2</sub> and outlet tubing at least 2 ft. [.6 M] longer to provide a "service loop" so the B-I-B rack can be moved for cleaning or service.
- Use new (clean), 1/4" I.D. [6 mm], flexible, high pressure, braided tubing from the CO<sub>2</sub>/ air regulator to the pump.

**NEVER** connect a transfer tank "system" in series with a B-I-B system. Syrup contaminants in old components may work their way through the air supply causing premature failure of the gas pump. Gas used to operate pumps **MUST** be clean and contain no contaminants (syrup, oil, rust, water, etc). Air compressors may be used with proper particle filters and moisture separators. Air storage tanks should be drained regularly. Pumps subjected to contaminated air are not covered by warranty.

High concentrations of CO<sub>2</sub> can be fatal as it will displace the air from non-ventilated areas. Pumps operated by CO<sub>2</sub> must be in ventilated areas.

If placed in a confined area (basement, closet, cooler box, etc.), exhaust fans capable of changing the room air on a continuous basis should be used.

- All tubing connections must be secured with stainless steel, stepless Oetiker® clamps.
- Cable-tie all tubing securely to prevent kinks or sags that inhibit performance or cause damage to the pump fittings.

## START-UP PROCEDURE

1. Confirm that all tubing connections are properly clamped, fittings are tight, and tubing is not kinked. Install bag connector to the B-I-B.
2. Adjust gas regulator to about 20 psi. [1.4 bar] allowing the pump to stroke slowly.
3. Operate the valve until all air trapped within the tubing has been purged.
4. Once the air has been purged, adjust the CO<sub>2</sub> regulator to the pressure necessary to maintain the desired brix. The most efficient gas usage occurs at 40 psi. [2.8 bar]. **MAXIMUM** static gas pressure to the pump is 85 psi. [5.8 bar], minimum 20 psi. [1.4 bar].

Flowrates that result in a stroke-rate of more than two strokes per second will decrease pump life. (Consult factory) Pump failure due to "overrunning" is not covered by the limited warranty.

To prevent air from entering the system always leave the bag connector attached to the empty B-I-B until a new B-I-B can be installed. Air entered into the system, via air in the bags or vacuum leaks, may cause brix fluctuation, foaming, spitting, non-operation of the vacuum sold-out or pump "run-on" with the valve closed. Symptoms of this kind can lead to a misdiagnosis of the pump.

# PLUMBING

## TYPICAL INSTALLATION

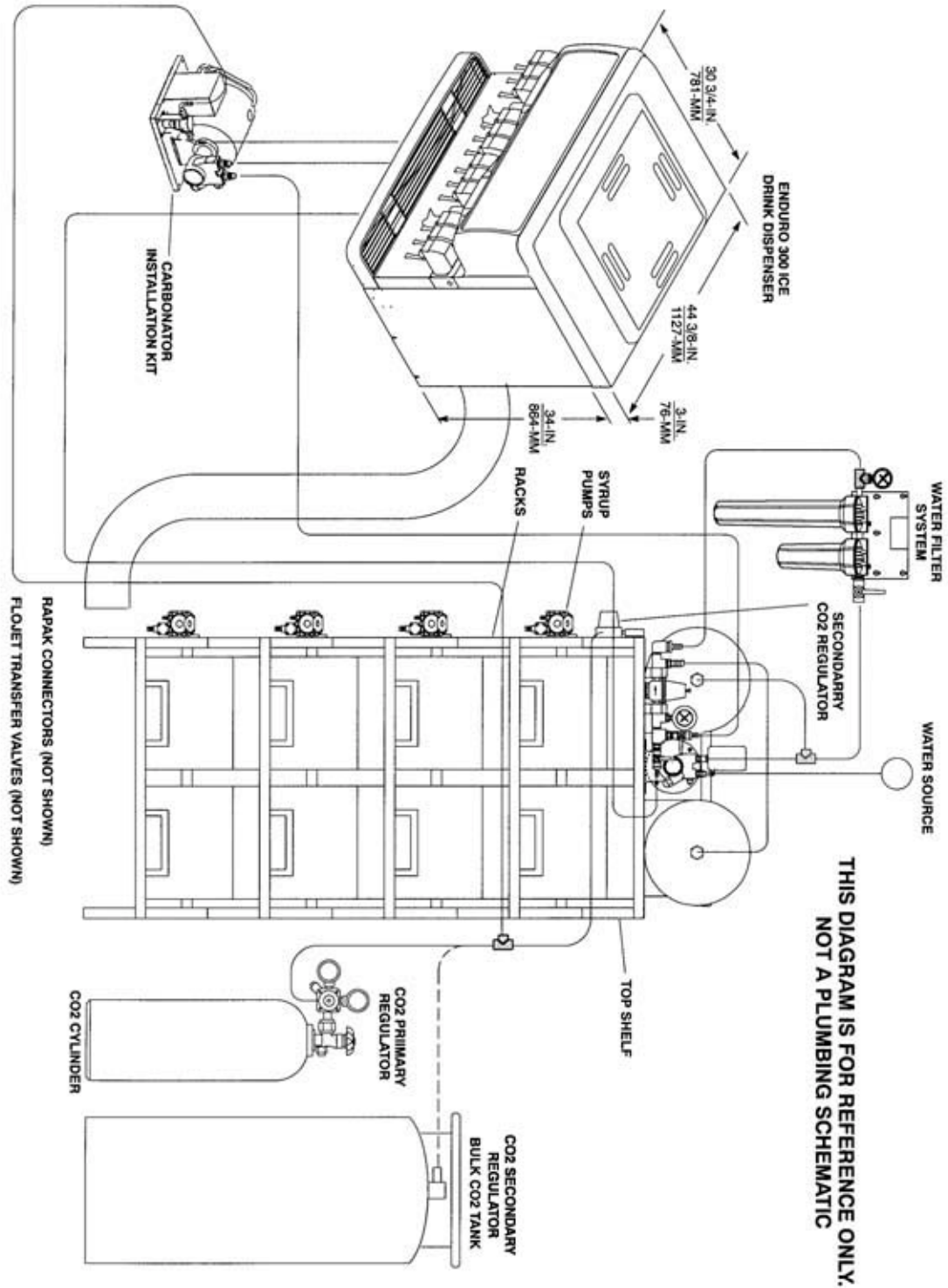


FIGURE 21. Typical Installation

# PLUMBING LAYOUT

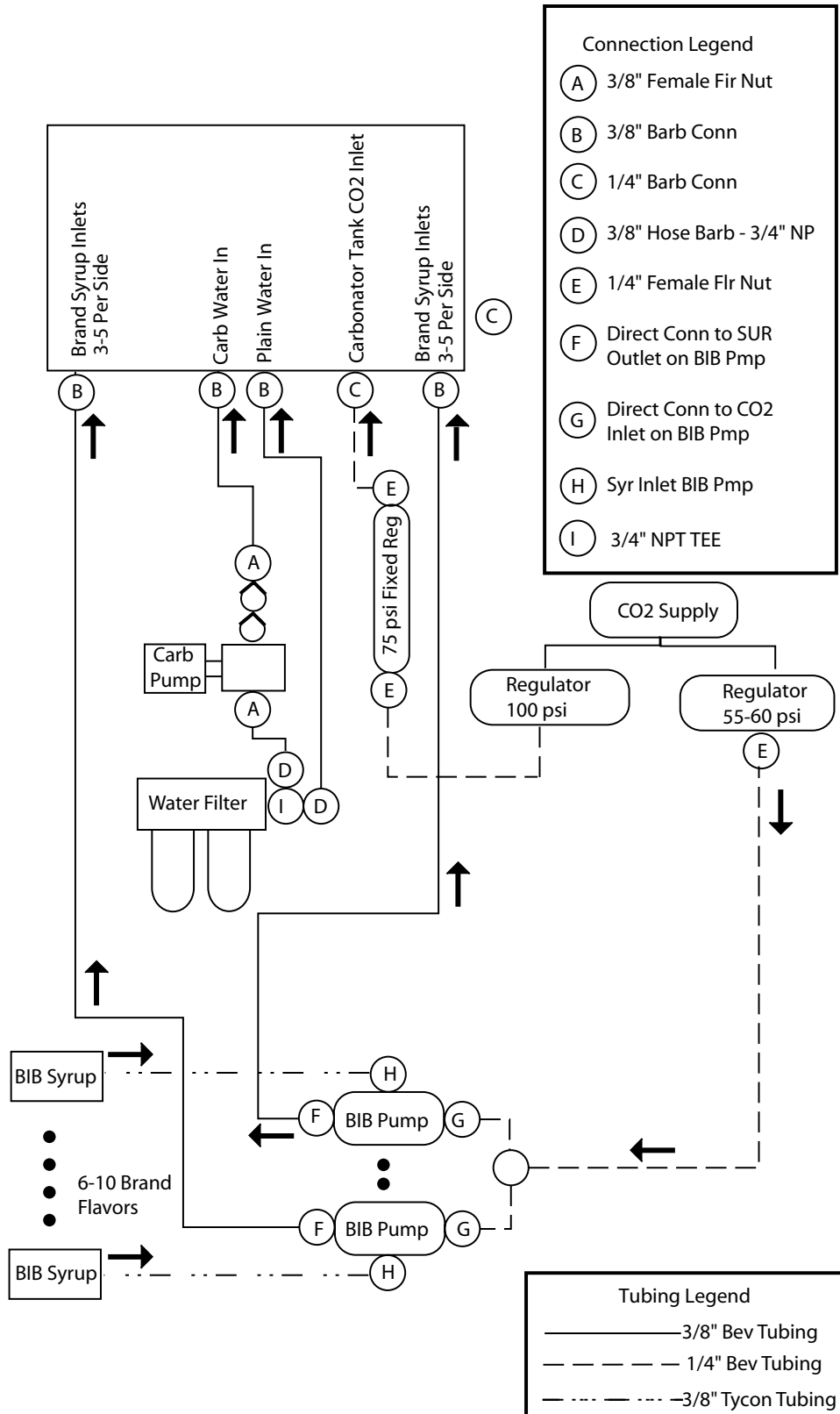


FIGURE 22. Plumbing Layout

# FLOW DIAGRAM 1XX (SIX FLAVOR MODEL)

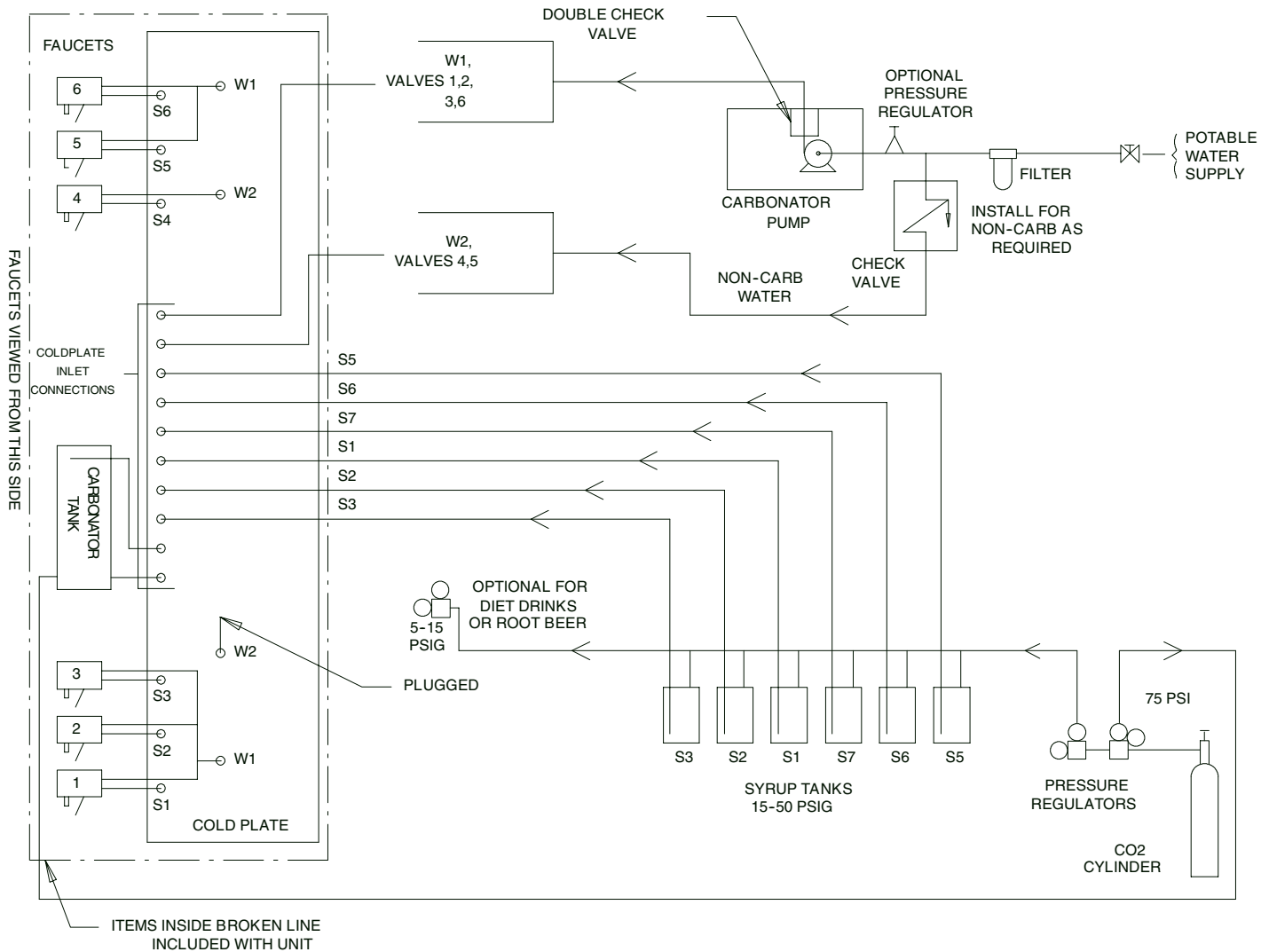


FIGURE 23. Flow Diagram 1xx (Six Flavor Model)



# FLOW DIAGRAM 1XX (EIGHT FLAVOR MODELS)

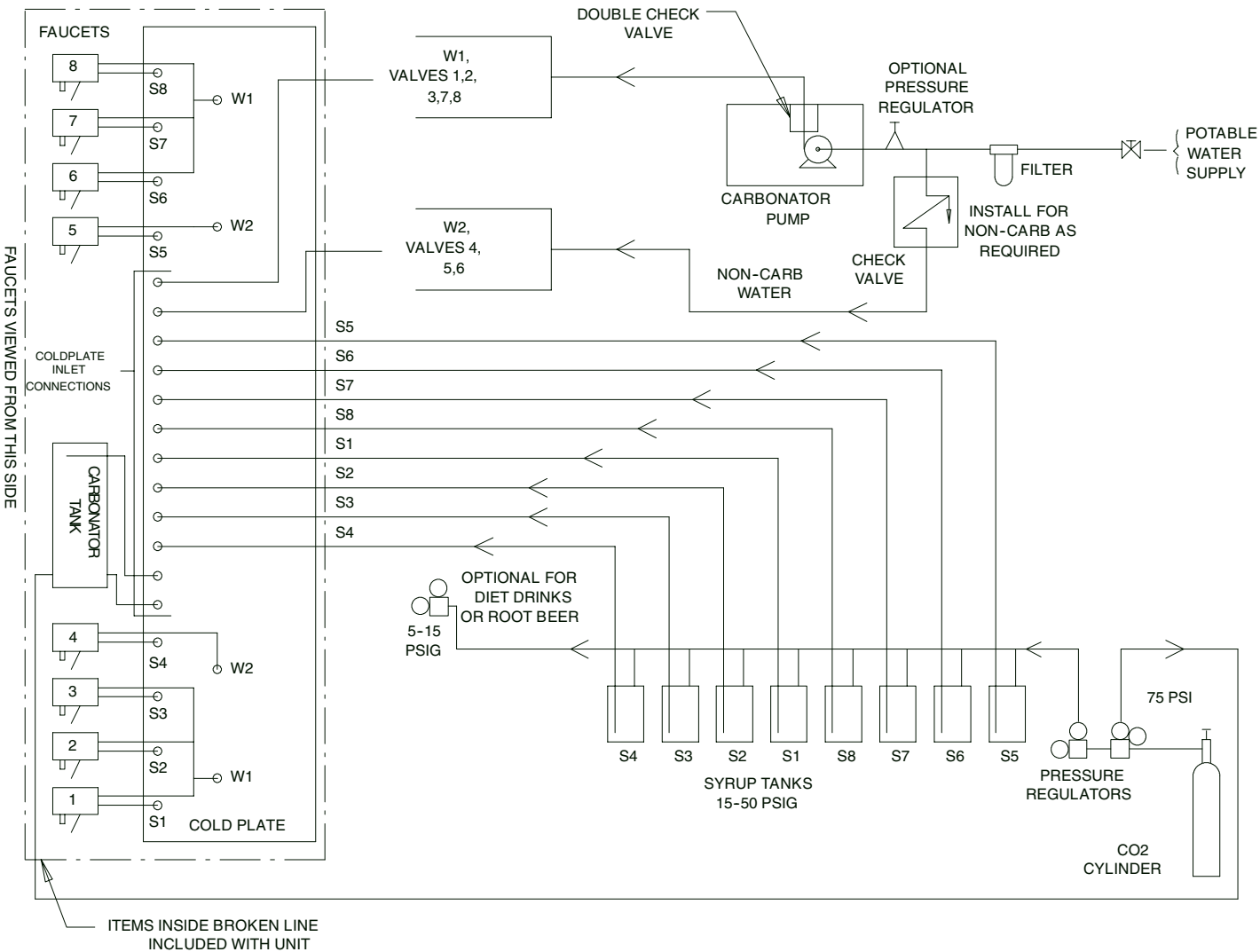


FIGURE 24. Flow Diagram 1XX (Eight Flavor Models)



# FLOW DIAGRAM 2XX (EIGHT FLAVOR MODELS)

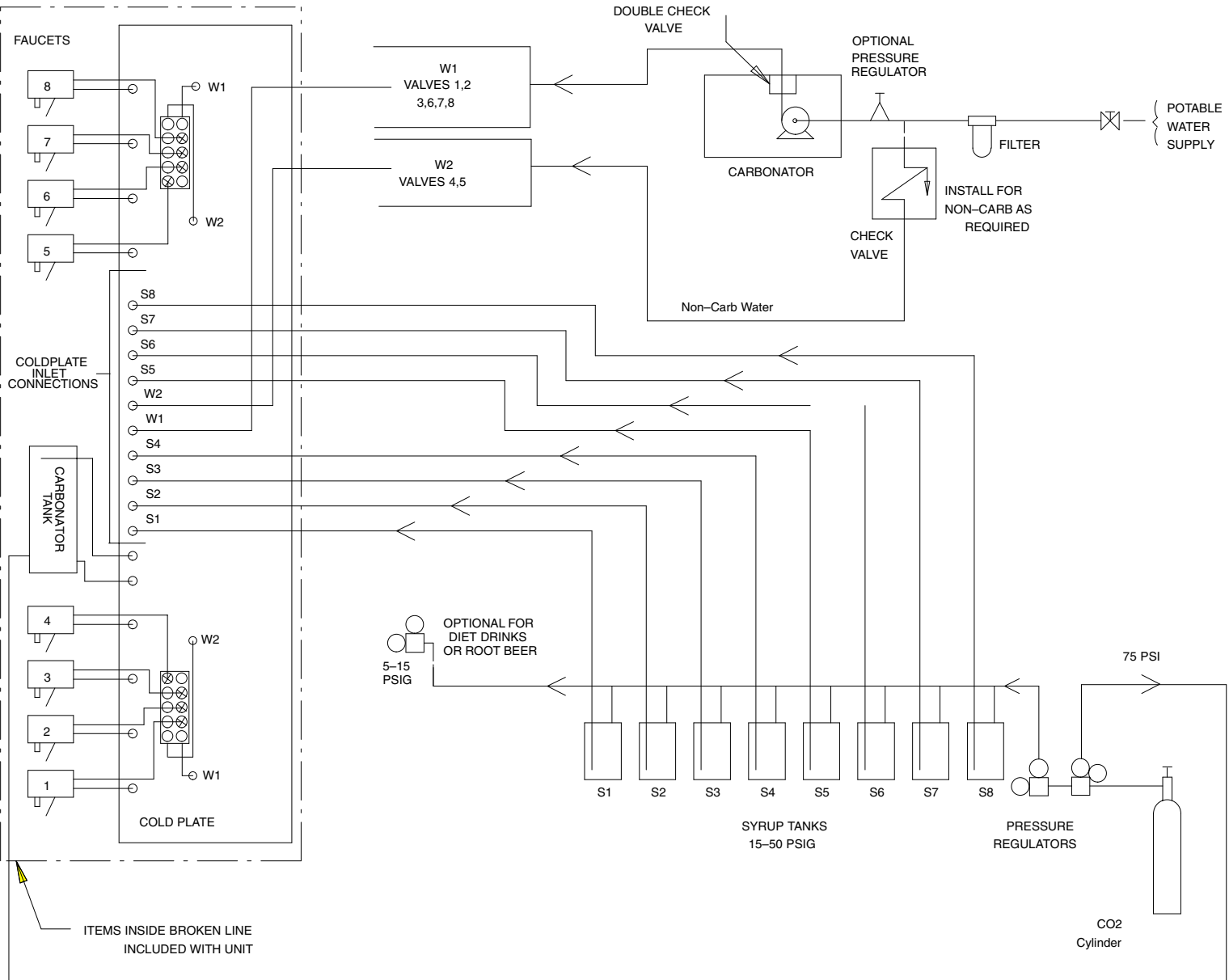
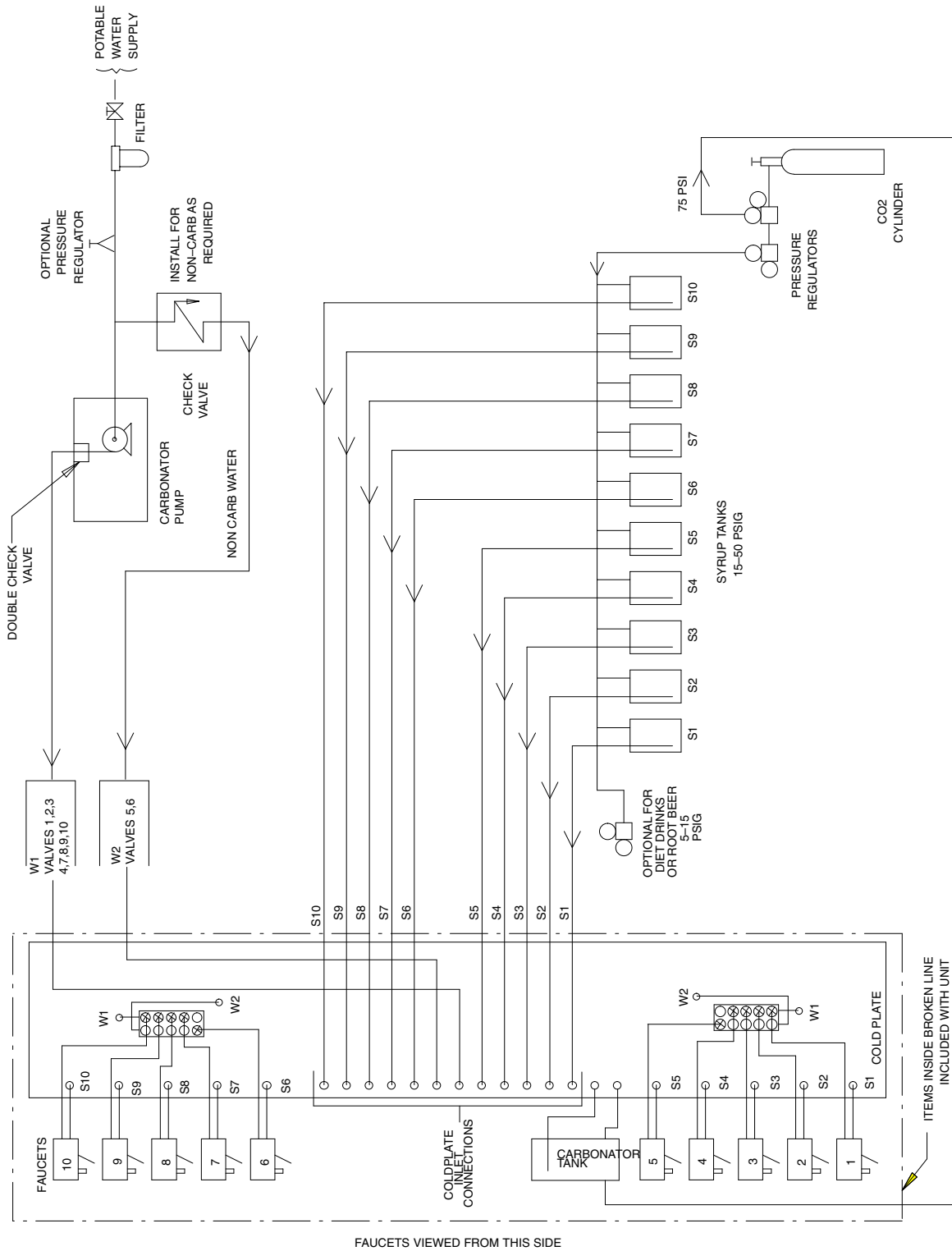


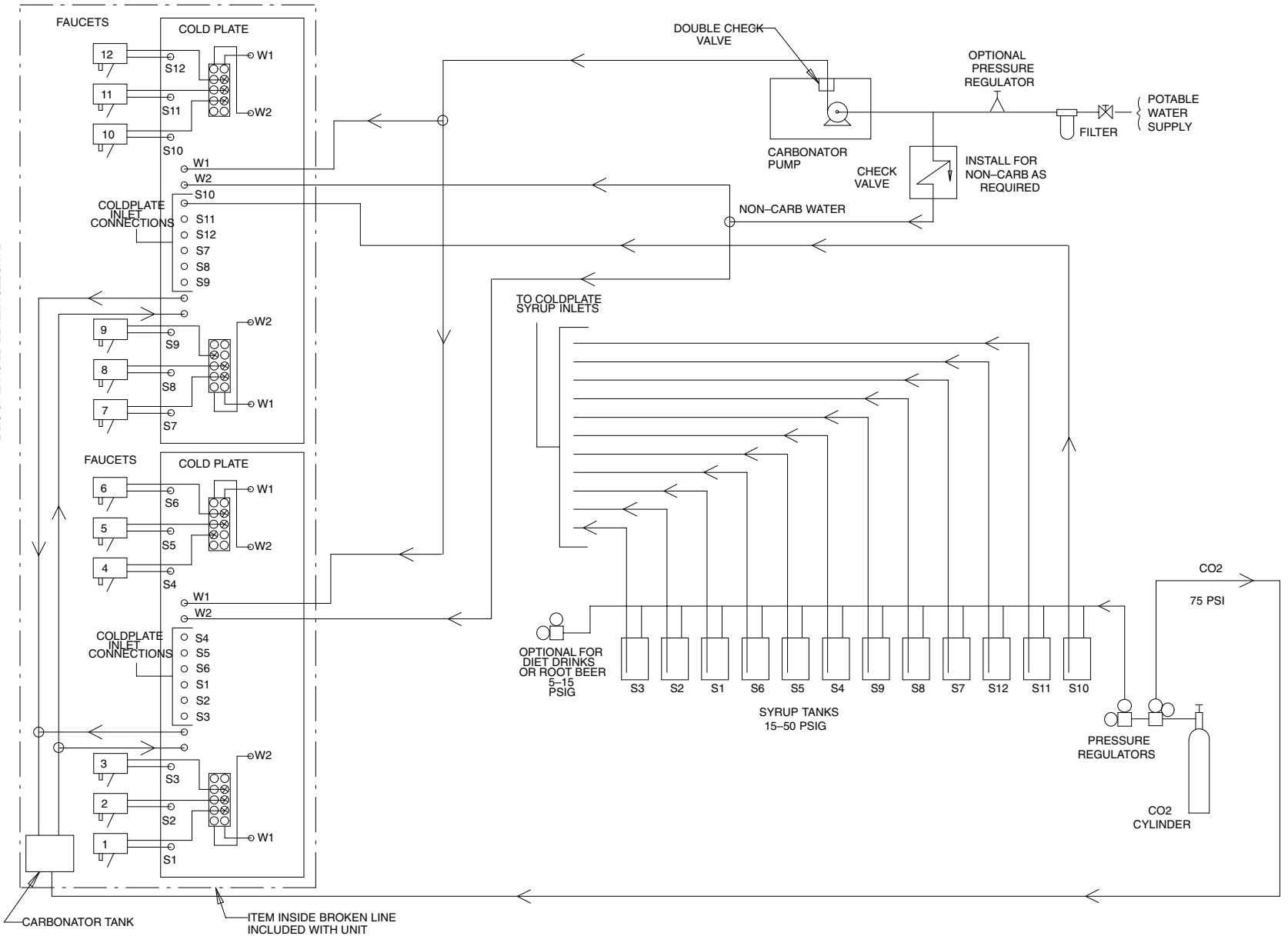
FIGURE 25. Flow Diagram 2xx (Eight Flavor Models)

# FLOW DIAGRAM 2XX (TEN FLAVOR MODELS)



**FIGURE 26. Flow Diagram 2xx (Ten Flavor Models)**

# FLOW DIAGRAM 300 (TWELVE FLAVOR MODELS)



FAUCETS VIEWED FROM THIS SIDE

FIGURE 27. Flow Diagram 300 (Twelve Flavor Models)

# ELECTRICAL SECTION



FIGURE 28. Electrical Box 1x Single Transformer

Control Box Single Transformer Will Power up to Three Valves Simultaneously.



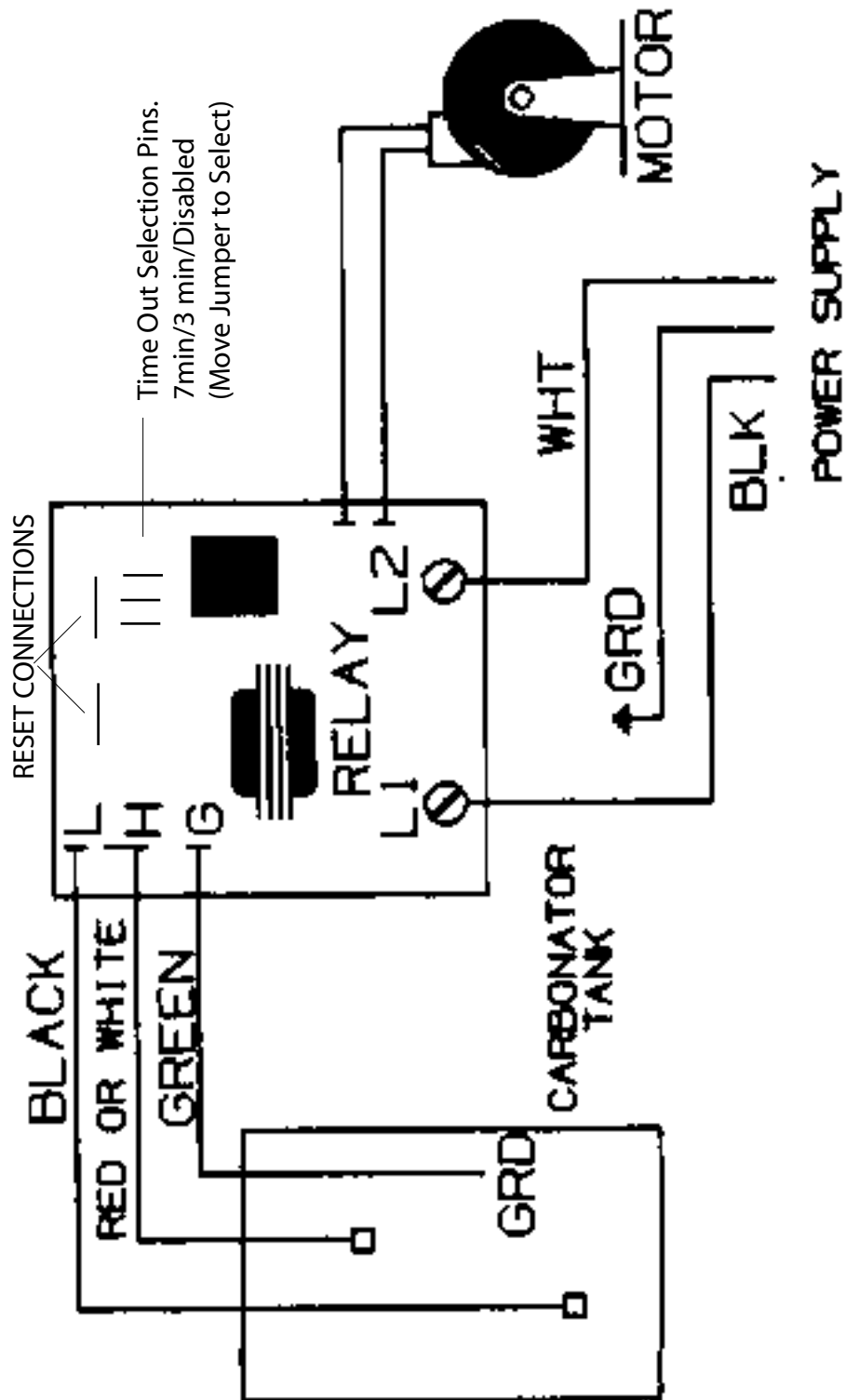
FIGURE 29. Electrical Box 2x Single Transformer

One Transformer Powers the Left Bank and the Other Powers the Right Bank. Will Power All Valves Simultaneously.



FIGURE 30. Electrical Box 2XX Dual Transformer

## CARBONATOR WIRING DIAGRAM





# WIRING DIAGRAM 1XX (120V)

## SERVICE INFORMATION

**DANGER! ELECTRIC SHOCK HAZARD. DISCONNECT POWER BEFORE SERVICING UNIT.**

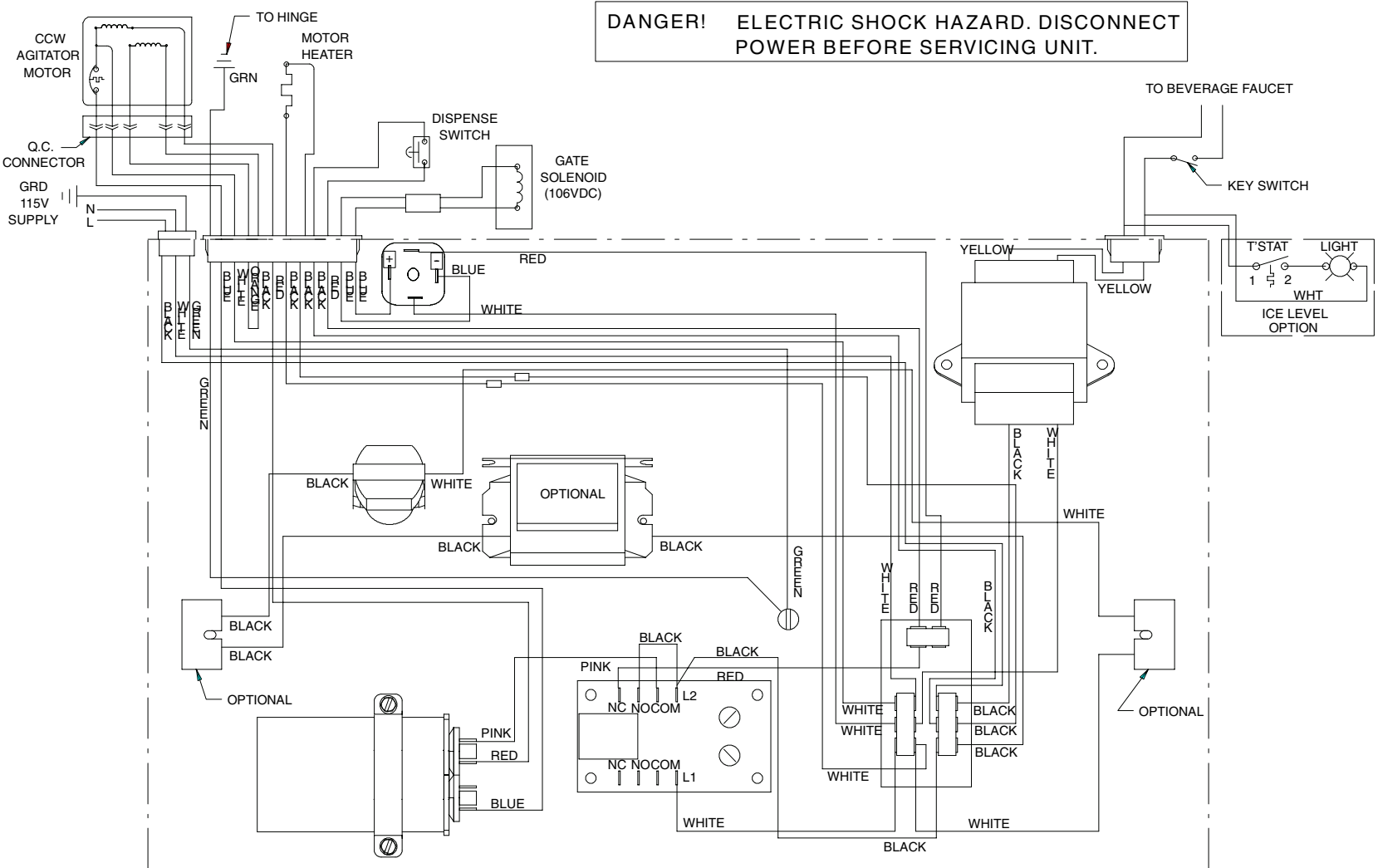


FIGURE 31. Wiring Diagram 1xx (120V)

# SCHEMATIC 1XX

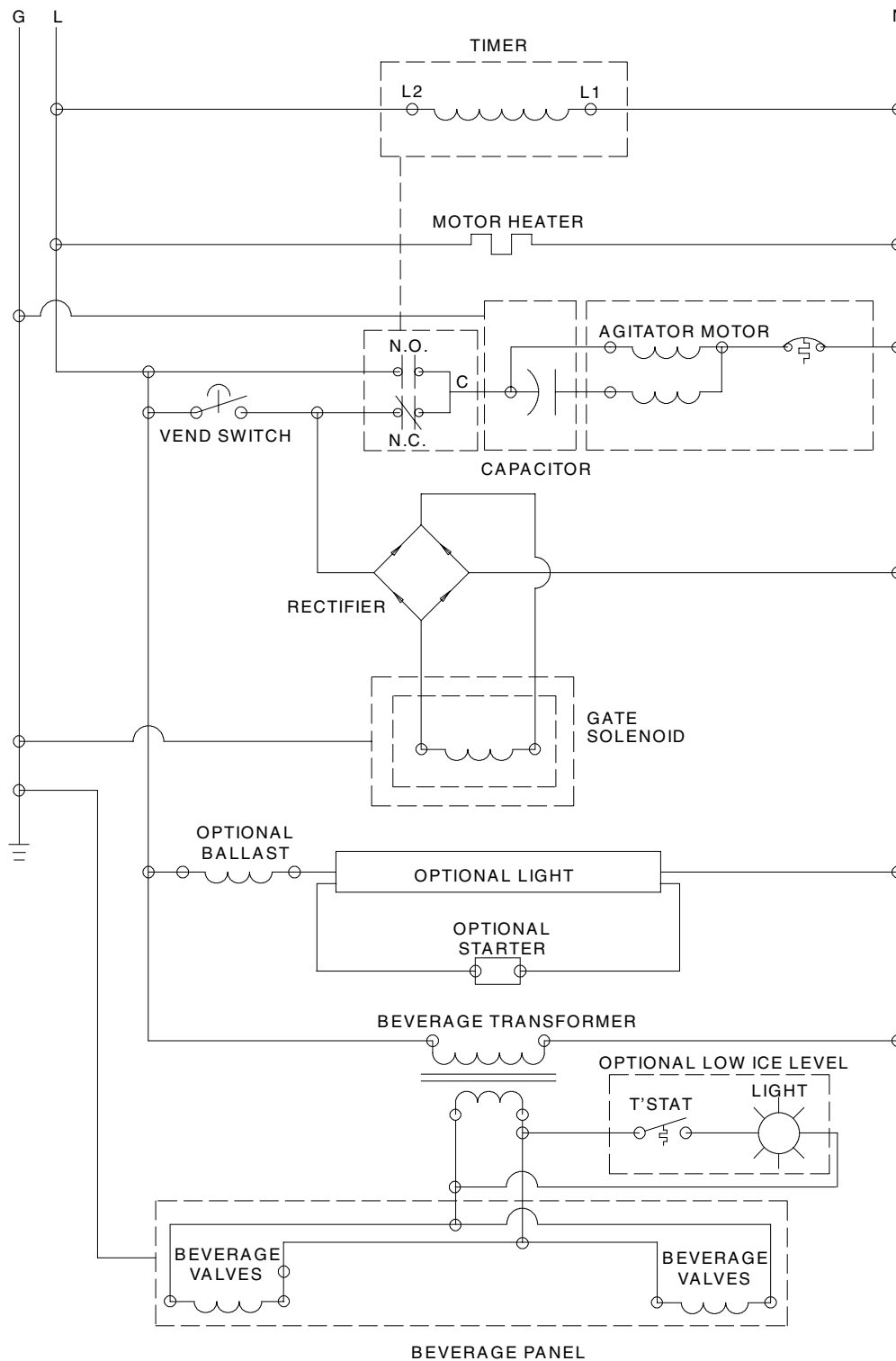


FIGURE 32. Schematic 1xx



# WIRING DIAGRAM 2XX (120V MODEL)

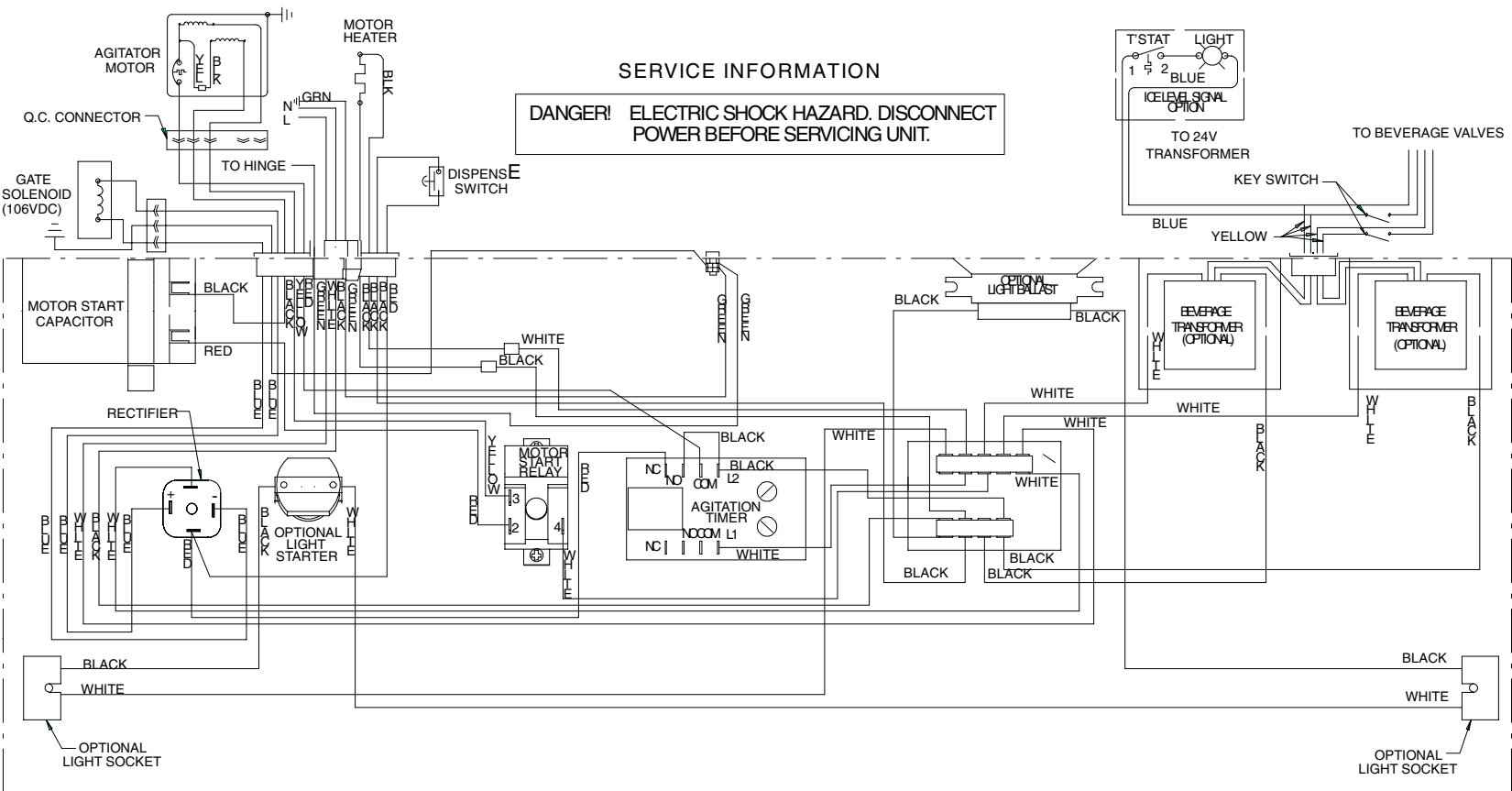
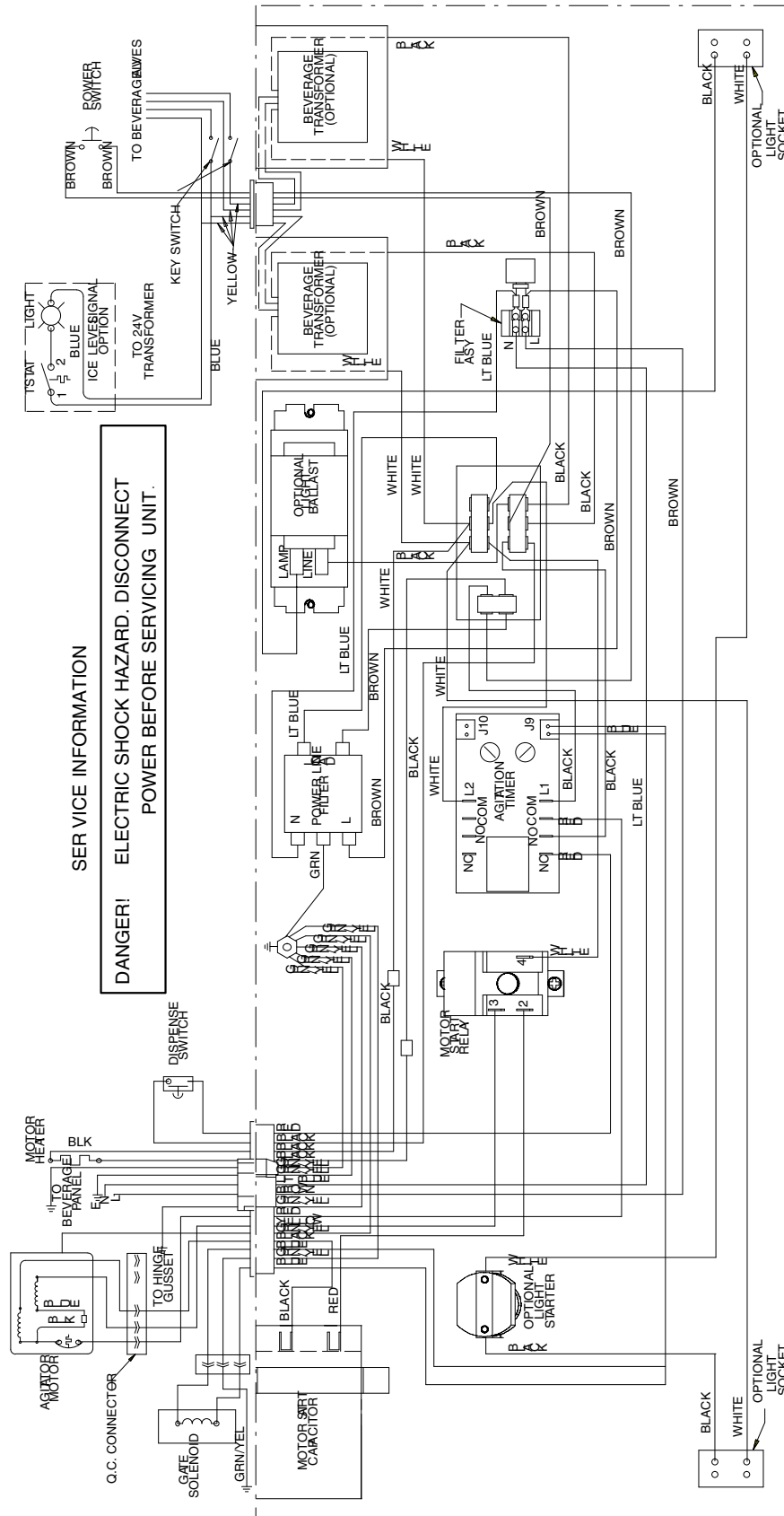


FIGURE 33. Wiring Diagram 2xx (120V Model)

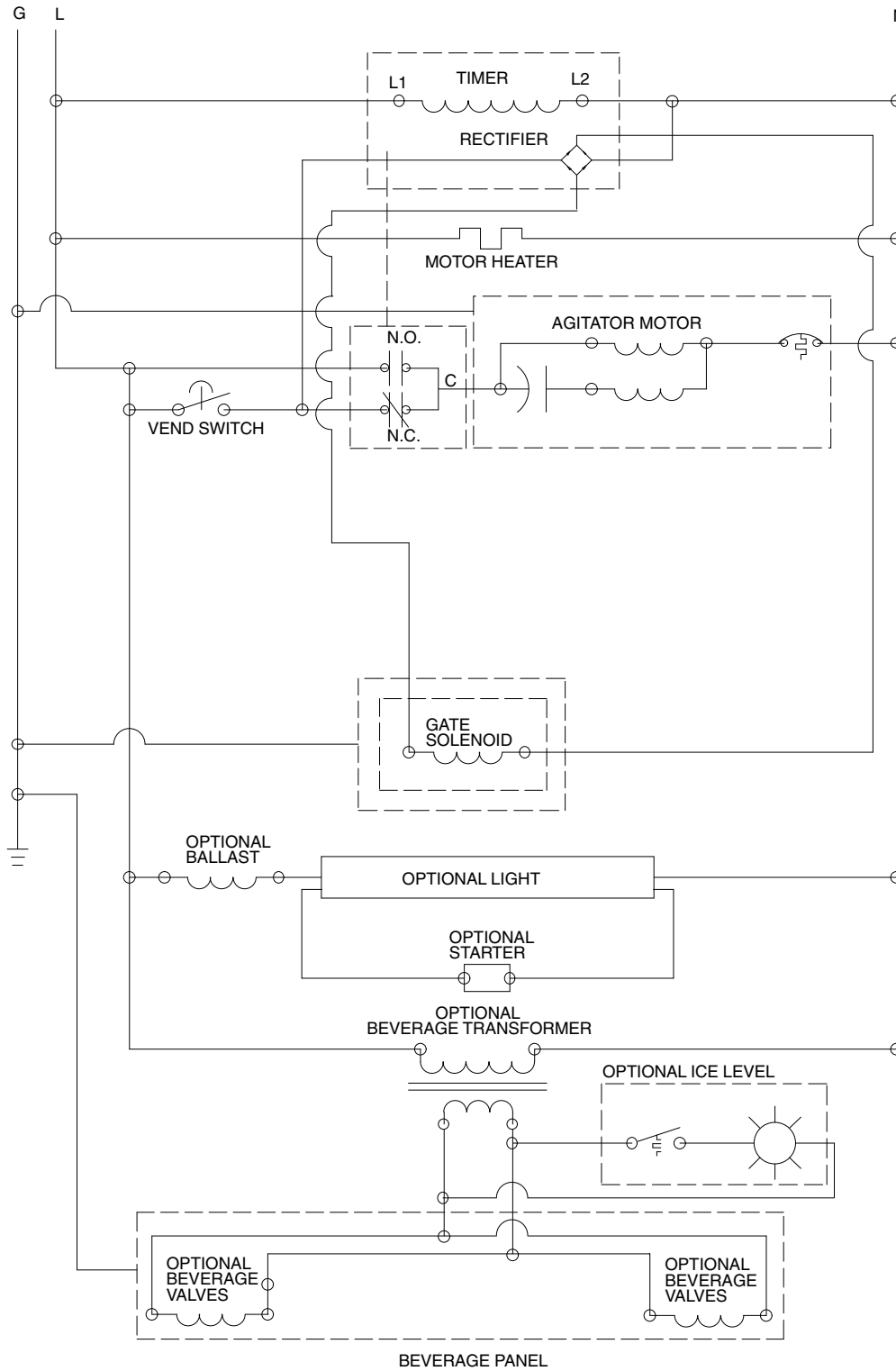


# WIRING DIAGRAM 2XX (220/240V MODELS)



**FIGURE 34. Wiring Diagram 2xx (220/240V Models)**

## WIRING DIAGRAM 2xx (220/240V MODELS)



**FIGURE 35. Wiring Diagram 2xx (220/240V Models)**

# WIRING DIAGRAM 300 (220/240V MODELS)

## SERVICE INFORMATION

**DANGER! ELECTRIC SHOCK HAZARD. DISCONNECT POWER BEFORE SERVICING UNIT.**

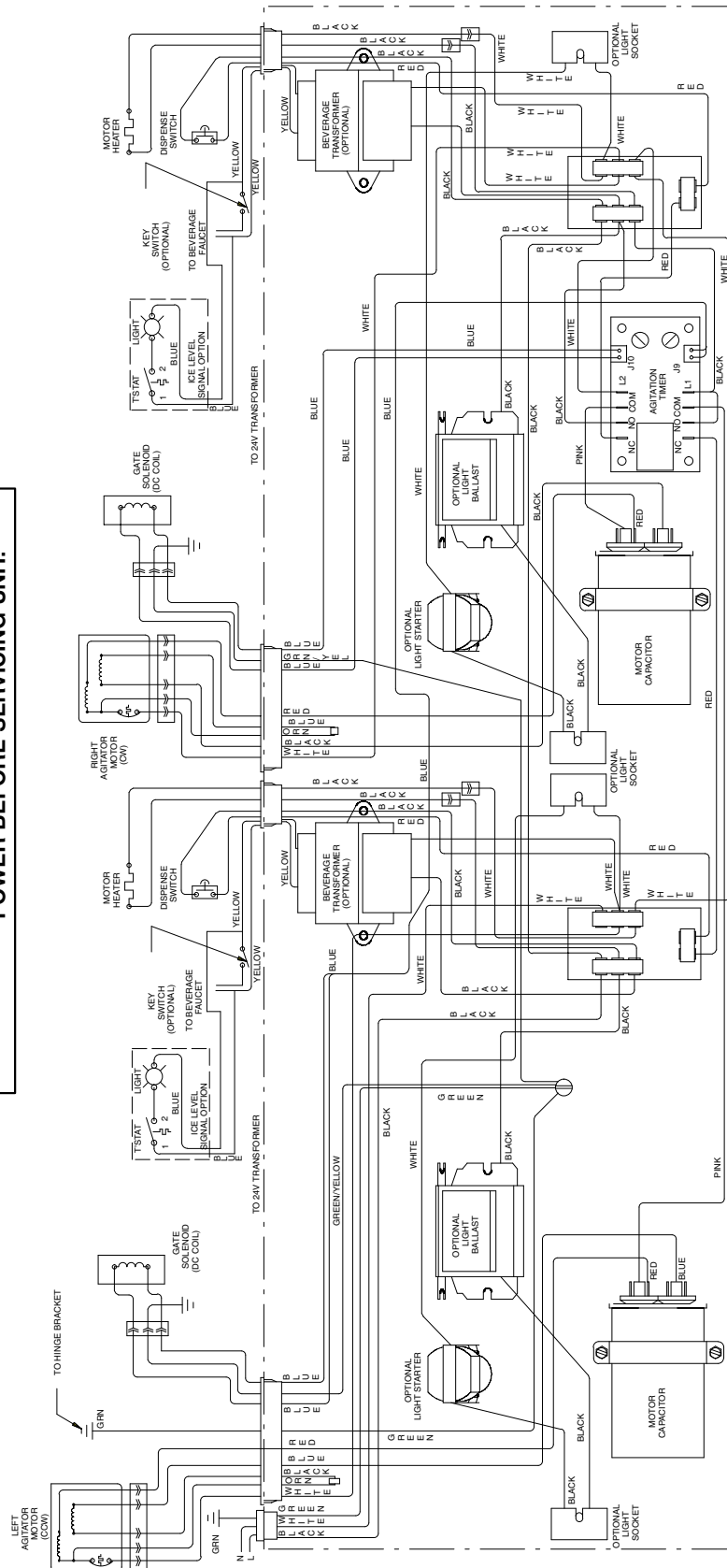
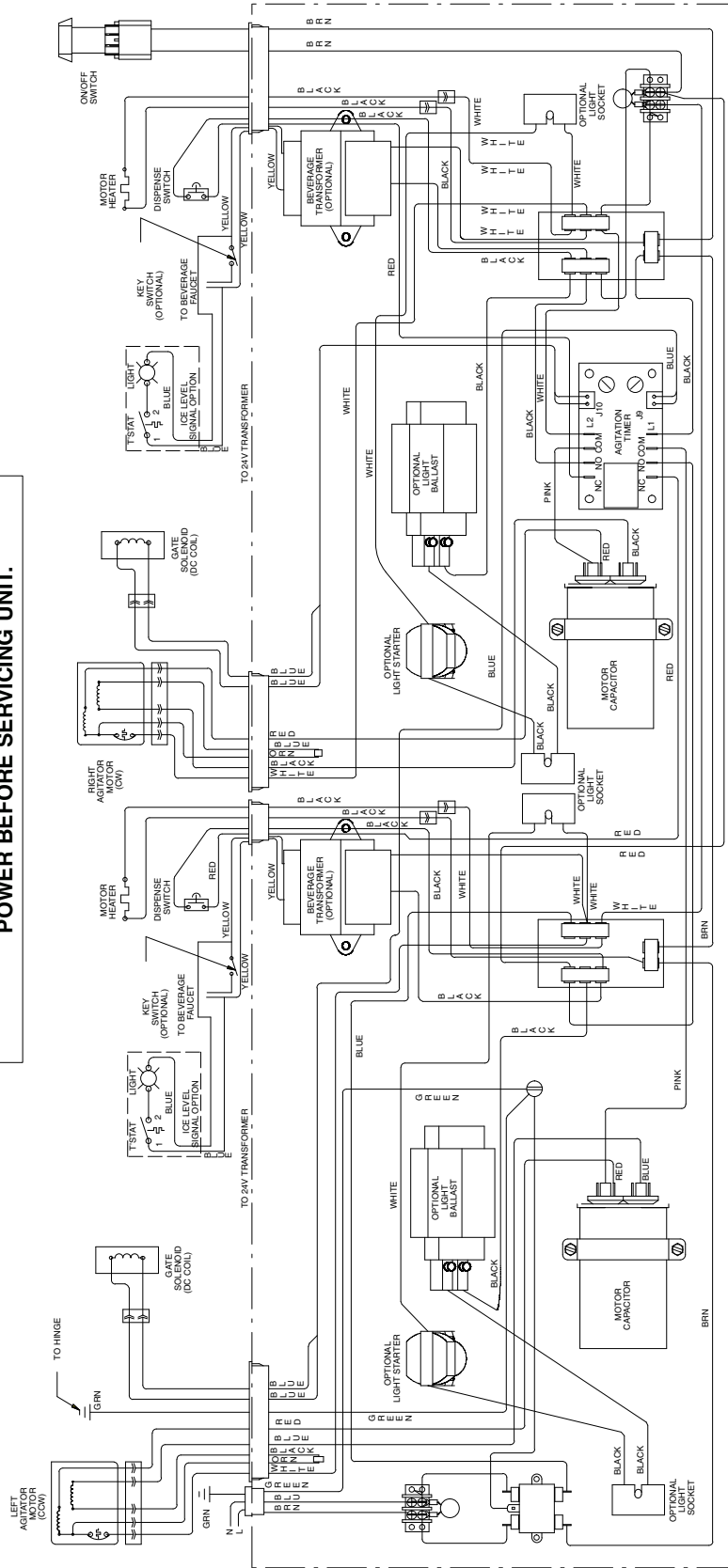


FIGURE 36. Wiring Diagram 300 (220/240V Models)

# WIRING DIAGRAM 300 (220/240V MODELS)

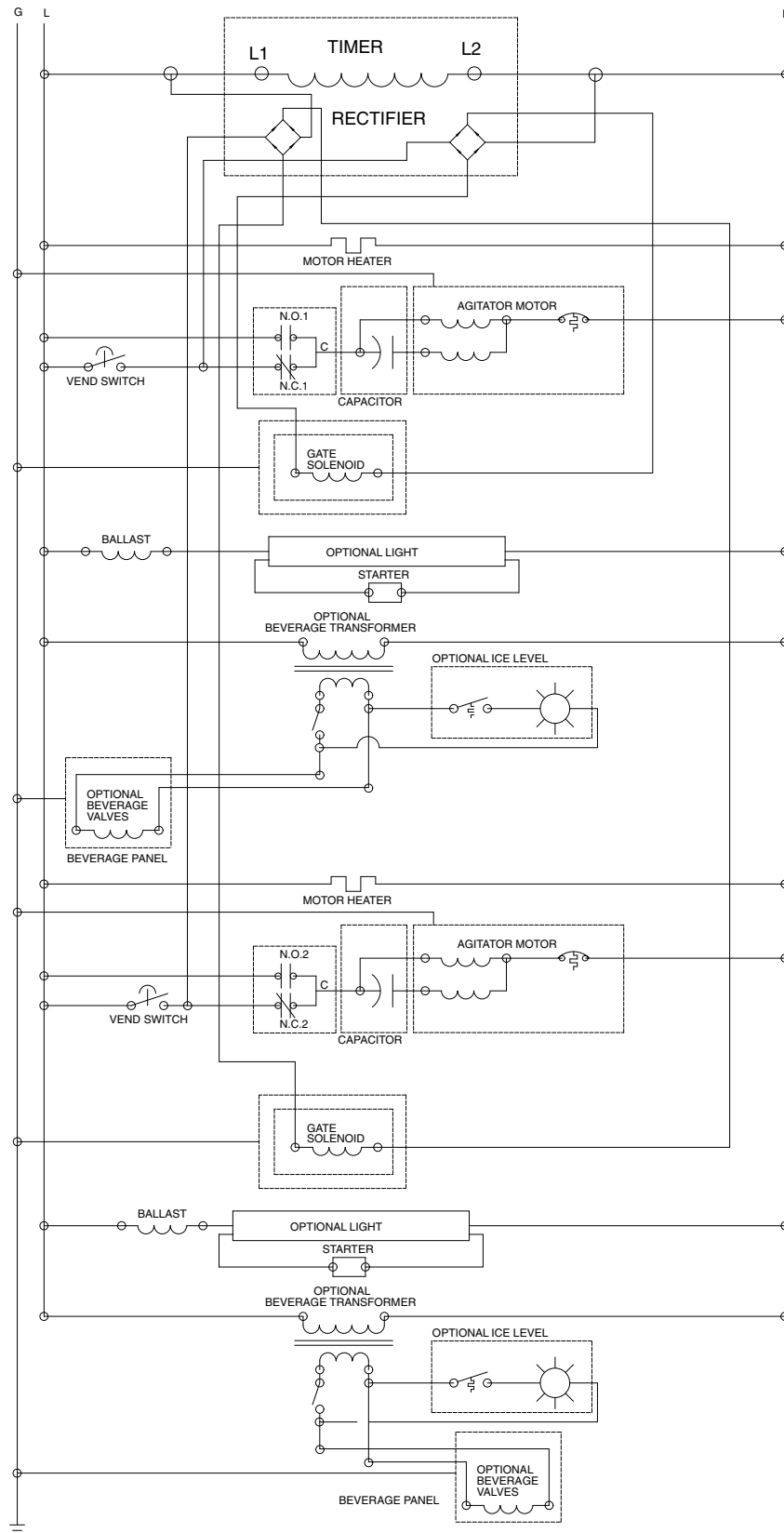
## SERVICE INFORMATION

**DANGER ELECTRIC SHOCK HAZARD. DISCONNECT POWER BEFORE SERVICING UNIT.**



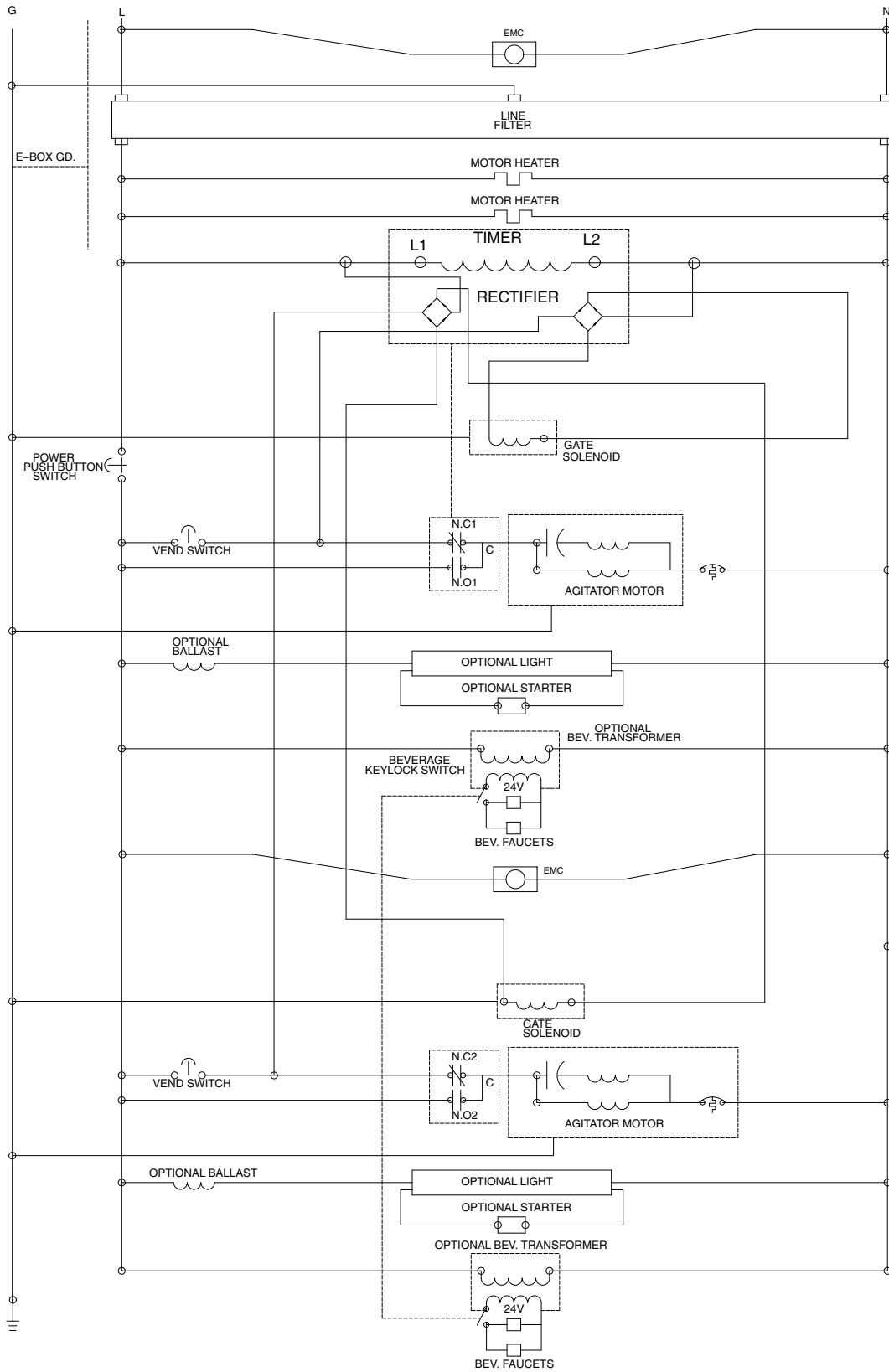
**FIGURE 37. Wiring Diagram 300 (220/240V Models)**

## SCHEMATIC 300 (120V MODELS)



**FIGURE 38. Schematic 300 (120V Models)**

# SCHEMATIC 300 (220/240V MODELS)



**FIGURE 39. Schematic 300 (220/240V Models)**

# TROUBLESHOOTING

## SHURFLOW TROUBLESHOOTING

### Pumping Capability

The distance syrup can be delivered is limited by inherent factors (restrictions) within the inlet & outlet sides of the beverage dispensing system. Due to variances in system configuration and equipment, an accurate determination of pressure drop is difficult. Before deciding on a system's tubing size, SHURflo recommends estimating system losses by considering the following:

- Syrup viscosity and temperature (coldplate, re-circ., etc.).
- Total syrup flow rate of valve(s) connected to a pump.
- Inside diameter of the inlet/outlet tubing, fittings, bag connector, etc.
- Horizontal & vertical distance of the outlet tubing.

Vertical tubing runs will reduce total achievable tubing run length. To estimate the losses within the vertical distance, use the chart to the right. Take 1% of the distance in feet [3% if meters]. The resulting number is multiplied by the vertical distance. This product is then subtracted from the maximum horizontal distance. The resulting length is the total horizontal/vertical (horz./vert.) tubing run that is obtainable for that flow rate, tubing I.D. and viscosity.

For example:

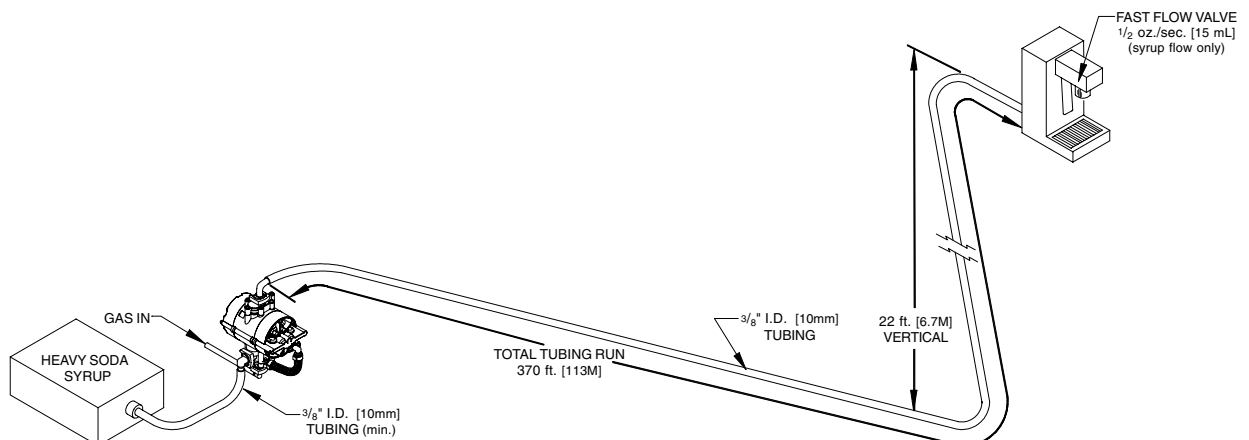
### MAXIMUM HORIZONTAL TUBING LENGTHS BY VISCOSITY

Distances shown are intended as a guideline only.

(cPs.=Centipose)

|  | FLOW RATE /SEC. |      | 1/4" I.D. [6mm] |       | 3/8" I.D. [10mm] |       | 1/2" I.D. [13mm] |       |
|--|-----------------|------|-----------------|-------|------------------|-------|------------------|-------|
|  | oz.             | mL   | Feet            | Meter | Feet             | Meter | Feet             | Meter |
| <b>Diet Soda Syrup</b><br>(5 cPs ± 3)      | .5              | 15   | 500+            | 152+  | 500+             | 152+  | 500+             | 152+  |
|  | .75             | 22.5 | 500             | 152   | 500+             | 152+  | 500+             | 152+  |
|  | 1.0             | 30   | 453             | 138   | 500+             | 152+  | 500+             | 152+  |
|  | 1.5             | 45   | 212             | 65    | 500+             | 152+  | 500+             | 152+  |
|  | 2.0             | 60   | 102             | 31    | 500              | 152   | 500+             | 152+  |
|  | 2.5             | 75   | 64              | 19    | 398              | 121   | 500              | 152   |
|  | 3.0             | 90   | 32              | 9     | 297              | 90    | 500              | 152   |
|  | 3.5             | 105  | --              | --    | 212              | 65    | 500              | 152   |
| <b>Standard Soda Syrup</b><br>(20 cPs ± 3) | .5              | 15   | 500             | 152   | 500              | 152   | 500+             | 152+  |
|  | .75             | 22.5 | 133             | 40    | 500              | 152   | 500+             | 152+  |
|  | 1.0             | 30   | 79              | 24    | 388              | 118   | 500              | 152   |
|  | 1.5             | 45   | 32              | 9     | 193              | 59    | 500              | 152   |
|  | 2.0             | 60   | 10              | 3     | 127              | 39    | 366              | 112   |
| <b>Heavy Soda Syrup</b><br>(35 cPs ± 3)    | .5              | 15   | 129             | 39    | 500              | 152   | 500+             | 152+  |
|  | .75             | 22.5 | 75              | 23    | 345              | 105   | 500+             | 152+  |
|  | 1.0             | 30   | 53              | 16    | 239              | 73    | 500              | 152   |
|  | 1.5             | 45   | 26              | 8     | 127              | 39    | 425              | 129   |

Distances shown are the results of tests conducted at 70°F [21°C] ambient with a static pressure of 85 psi. [5.8 bar] to the pump. All distances assume a dynamic pressure of 35 psi. [2.38 bar] at the dispenser to maintain brix.



The chart indicates that heavy syrup with 1/2 oz./sec [15mL] flow-rate (per the illustration) can be sustained over a horizontal distance of 500 ft. [152M] when 3/8" I.D. [10mm] tubing is used.

**Feet:** Take 1% of 500 ft. (500 x 1%) = 5. Which then is multiplied by the 22 ft. vertical, (22 x 5) = 110 ft.

Subtract this product from the 500 ft. (500 - 110) =390. The results indicate a 390 ft. tubing run (horz./vert.) is possible, while the example only requires a distance of 370 ft.

**Meters:** Take 3% of 152M (152 x 3%) = 4.56. Which then is multiplied by the 6.7M vertical, (4.56 x 6.7) = 30.5M.

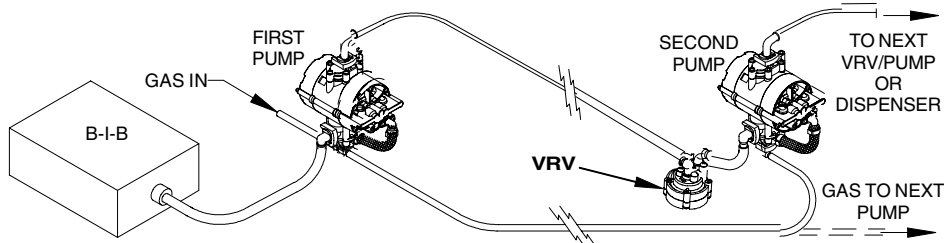
Subtract this product from the 152M (152-30.5)=121.5. The results indicate a 121.5M tubing run (horz./vert.) is possible, while the example only requires a distance of 113M.

**NOTE: Had the example above resulted in a value that was equal to, or less than the necessary total tubing run, consider a larger I.D. tubing or installation of a pump(s) in series using a SHURflo Vacuum Regulator.**

## Pumps in Series for Long Distances

Long tubing runs or high vertical lift can be achieved by installing pumps in series. Standard SHURflo Beverage pumps are not designed to have positive pressure on the inlet side. The SHURflo Vacuum Regulating Valve (VRV) allows the pump to receive liquid from a pressurized source. By positioning a VRV at the inlet of the secondary pump, incoming pressure is reduced to zero, permitting syrup to be drawn in under vacuum.

SHURflo can recommend several other methods to meet the requirements for a particular installation, including Pressurized Inlet Pumps or Accumulators. Contact SHURflo for more information.



## Pump Sanitizing / Winterizing

Sanitization of the SHURflo Beverage Gas Pump is required. **The frequency of Sanitization is dependant on the concentrate type and its manufacturer's requirements.** Factors which also affect the frequency of this procedure are: temperature, concentrate volatility, facility conditions, installation and equipment. The sanitizing procedure fulfills a required 10 minute contact time with a 200 ppm Sodium Hypochlorite solution. Refer to SHURflo Service Bulletin #1025 for the N.S.F. listed sanitizing procedure for the SHURflo pump (only). Pumps that are subjected to freezing (below 32° F [0°C]) must be purged of fluid to prevent damage. Refer to SHURflo Service Bulletin #1025 for complete winterizing procedure. Refer to the equipment manufacturer's instructions for sanitizing and winterizing procedure for carbonators, dispensers and tubing.

Pumps that have been winterized and/or out of service for a period of time should be sanitized prior to being placed back in service.

Never apply pressure to the pump's liquid inlet. Pressurized tanks may damage internal components if used to sanitize or purge fluid from the pump (operating or not).



## Pump Troubleshooting

### **DOES NOT OPERATE / GAS APPLIED / DISPENSER VALVE OPEN**

- B-I-B empty or inlet tubing pinched off activating vacuum "sold-out".
- Gas regulator over-pressurizing. (Pump stalled)
- Outlet tube kinked or restricted.
- Operated without fluid for excessive period. (Dry run)
- Transfer tube and gas lines contaminated (syrup, rust, oil, etc.) [ensure clean gas supply, change out all contaminated pumps]
- Internal damage of control cover.

### **OPERATES BUT WILL NOT PRIME / DISPENSER VALVE OPEN**

[consult Start-up Procedure for proper priming]

- Pump valves have no moisture/dry (add water/syrup to the inlet port with pump stroking slowly).
- Vacuum leaks at Q.D., barb fitting clamps, or inlet fitting o-ring.
- Debris in valve seats or warped/swollen valves.

### **DOES NOT ACHIEVE SOLD-OUT WITH EMPTY B-I-B**

- Vacuum leaks at Q.D., barb fitting clamps, or inlet fitting o-ring.
- Excessive amount of air in B-I-B from improper packaging.
- Air trapped in outlet tubing and/or pump fluid chambers.

### **AIR IN INLET AND/OR OUTLET TUBING**

- Vacuum leaks at Q.D. o-ring or barb fitting clamps.
- Vacuum leaks at inlet fitting; o-ring pinched or missing.
- Large amounts of air noticed *only in the outlet* tubing when pump operates (diaphragm/piston assemblies ruptured).

### **STROKES WITH DISPENSER VALVE CLOSED**

- Air trapped in outlet tubing and/or pump fluid chambers (open outlet and purge air, check for vacuum leaks, or air in B-I-B).
- Debris in outlet valves or warped/swollen valves.

### **FLUID FROM EXHAUST OR VISIBLE WITHIN GAS INLET TUBING**

- Carbonator check valve.
- Ensure clean gas supply.
- Diaphragm/piston assemblies ruptured.
- [change out all contaminated pumps]

### **GAS BLOWING FROM EXHAUST CONTINUOUSLY**

- Control cover subjected to contaminated gas supply or damaged (ensure clean gas supply, change out all contaminated pumps).

## DISPENSER TROUBLESHOOTING

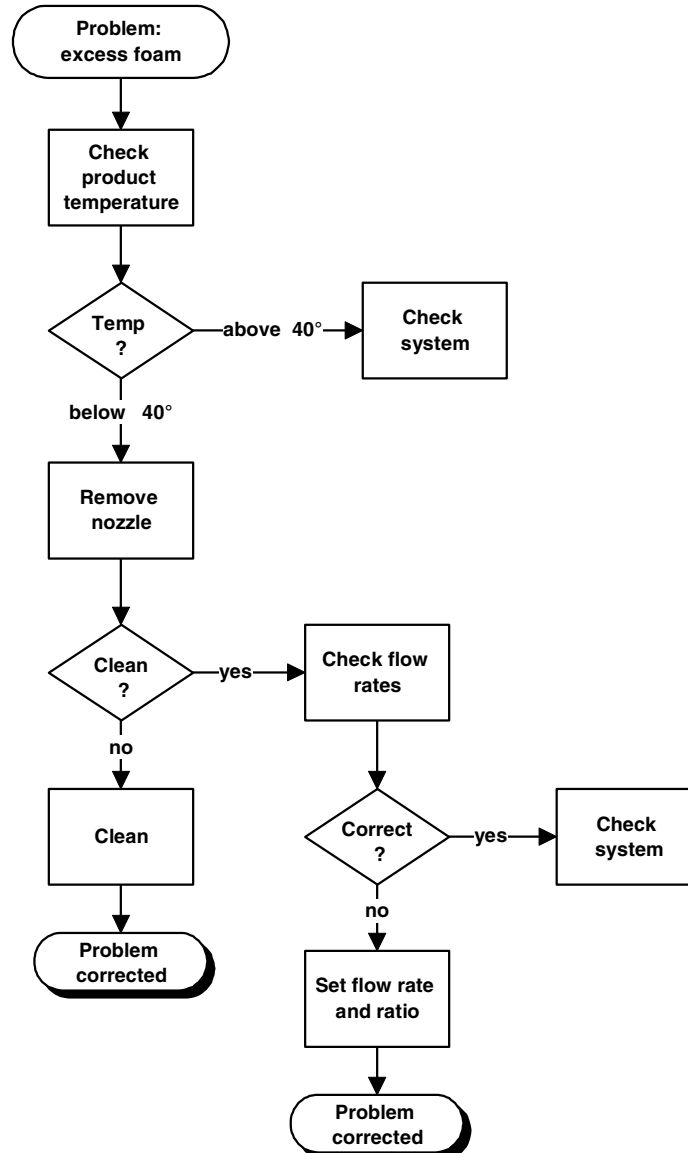
Should your unit fail to operate properly, check that there is power to the unit and that the hopper contains ice. If the unit does not dispense, check the following chart under the appropriate symptoms to aid in locating the defect.

| <b>Trouble</b>                                     | <b>Probable Cause</b>  | <b>Remedy</b>                                |
|--|--|--|
| BLOWN FUSE OR CIRCUIT BREAKER.                     | A. Short circuit in wiring                                     | A. Repair wiring.                            |
|  | B. Inoperable gate solenoid.                                   | B. Replace gate solenoid.                    |
|  | C. Inoperable agitator motor.                                  | C. Replace agitator motor.                   |
| GATE DOES NOT OPEN. AGITATOR DOES NOT TURN.        | A. No power.   | A. Restore power.                            |
|  | B. Bent depressor plate (does not actuate switch).             | B. Replace depressor plate.                  |
|  | C. Inoperable dispensing switch.                               | C. Replace dispensing switch.                |
| GATE DOES NOT OPEN OR IS SLUGGISH. AGITATOR TURNS. | A. Inoperable gate solenoid.                                   | A. Replace gate solenoid.                    |
|  | B. Excessive pressure against gate slide.                      | B. Adjust gate slide.                        |
|  | C. Inoperable rectifier.                                       | C. Replace rectifier.                        |
| ICE DISPENSES CONTINUOUSLY.                        | A. Stuck or bent depressor plate (does not release switch).    | A. Replace depressor plate.                  |
|  | B. Inoperable dispensing switch.                               | B. Replace dispensing switch.                |
|  | C. Improper switch installation.                               | C. Make sure switch is installed properly.   |
| SLUSHY ICE. WATER IN HOPPER.                       | A. Blocked drain.  | A. Unplug drain.                             |
|  | B. Unit not sitting level.                                     | B. Level the unit.                           |
|  | C. Poor ice quality due to water quality or icemaker problems. | C. Correct water quality or repair icemaker. |
|  | D. Improper use of flaked ice.                                 | D. Call Service Person.                      |
| BEVERAGES DO NOT DISPENSE                          | A. No 24 volts power to faucets.                               | A. Restore 24 volt power to faucets.         |
|  | B. No CO <sub>2</sub> pressure.                                | B. Restore CO <sub>2</sub> pressure.         |
| BEVERAGES TOO SWEET                                | A. Carbonator not operating.                                   | A. Repair carbonator.                        |

## VALVE TROUBLESHOOTING

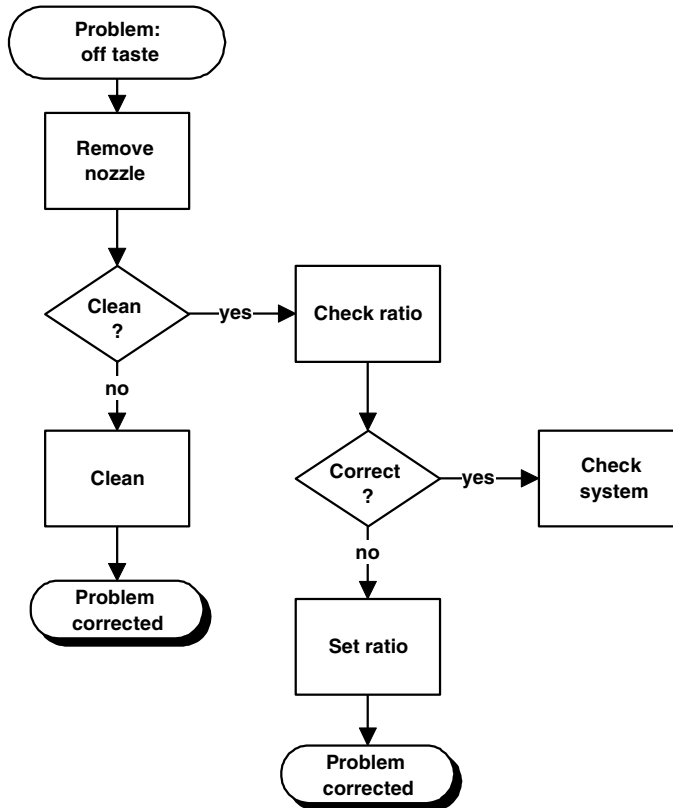
### Excess Foam

#### Excess Foam



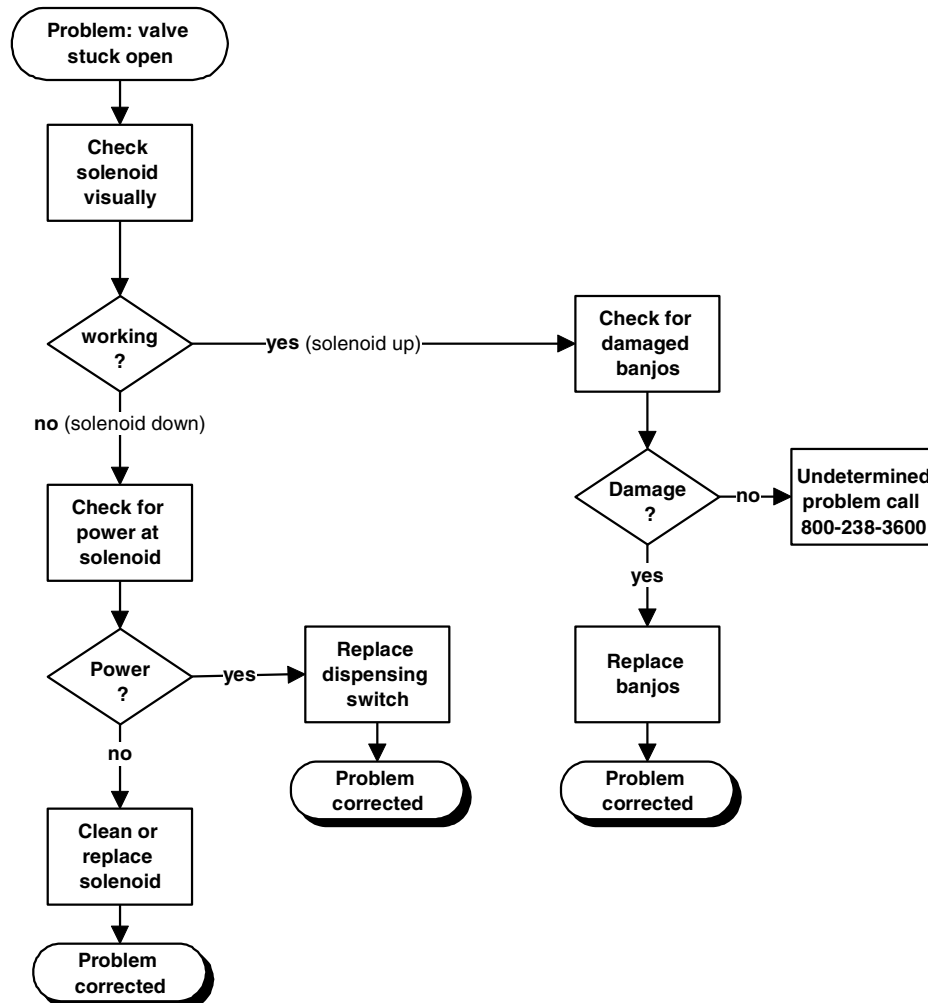
# Off Taste

## Off Taste



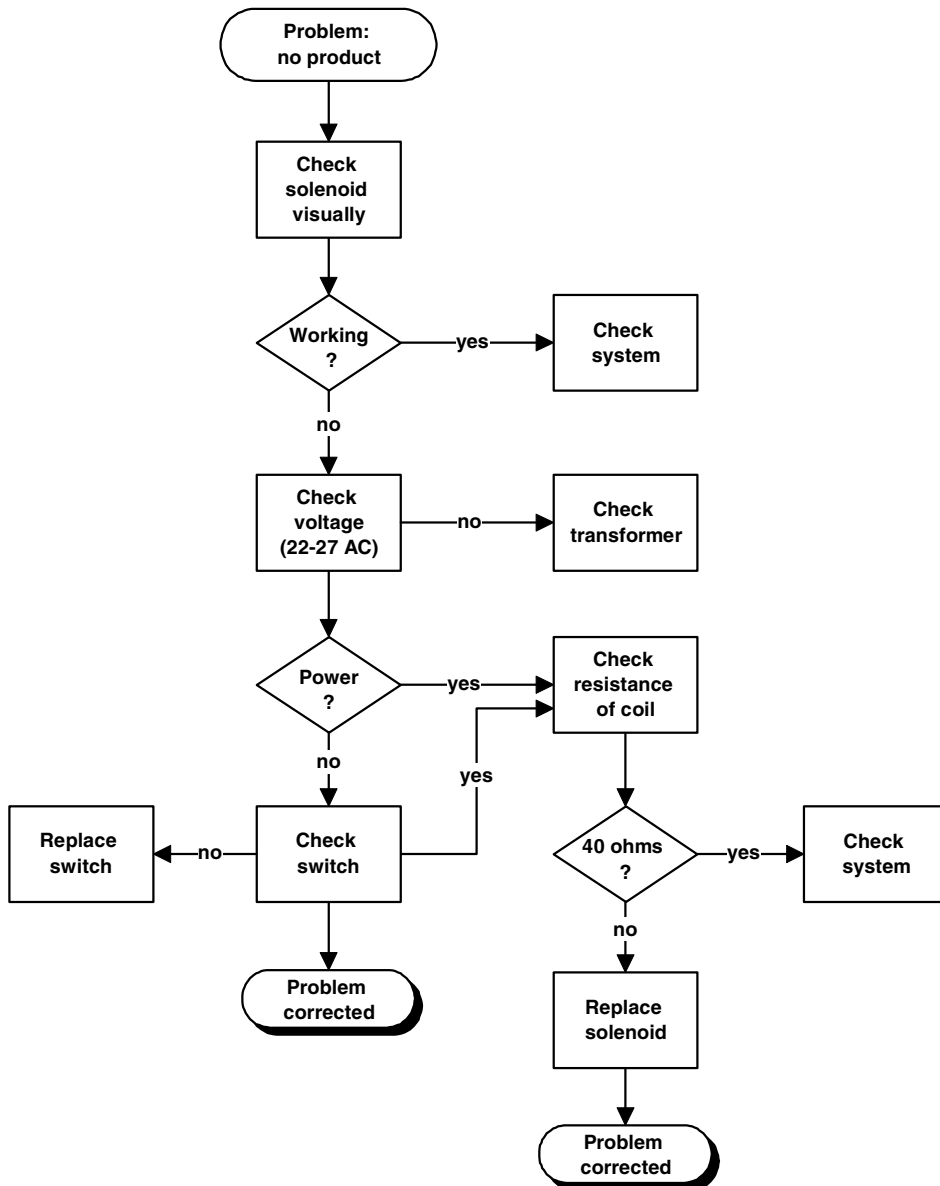
## Valve Stuck Open

### Valve Stuck Open



## No Product

### No Product



## CARBONATOR TROUBLESHOOTING

**WARNING:** Disconnect electrical power to the unit to prevent personal injury before attempting any internal maintenance. Only qualified personnel should service the internal components or the electrical wiring.

If repairs to the carbonated water or the plain water systems must be made, disconnect electrical power to the Unit, then shut off CO<sub>2</sub> and plain water sources. Dispense from dispensing valve until carbonator tank CO<sub>2</sub> pressure has been relieved.

| Trouble   | Probable Cause   | Remedy   |
|---|--|--|
| CARBONATOR WILL NOT OPERATE.  | A. Power cord unplugged or circuit breaker open in panel box.<br>Inoperative carbonator.<br>B. Inoperative carbonator. | A. Plug in power cord or reset circuit breaker.<br>B. Call a qualified Service Person. |
| WATER PUMP MOTOR WILL NOT SHUT OFF.<br>ERRATIC CYCLING OF CARBONATOR. | A. Carbonator internal problem.  | A. Call a qualified Service Person.  |
| WATER PUMP MOTOR OPERATES BUT WATER PUMP DOES NOT PUMP WATER.         | A. Carbonator internal problems or a water supply line problem.  | A. Call a qualified Service Person.  |
| CARBONATOR CARBONATED WATER CAPACITY TOO LOW                          | A. Carbonator internal problems or a water supply line problem.<br>B. Water filter clogged.                            | A. Call a qualified Service Person.<br>B. Replace water filter.                        |

## Solid State Carbonator Level Control

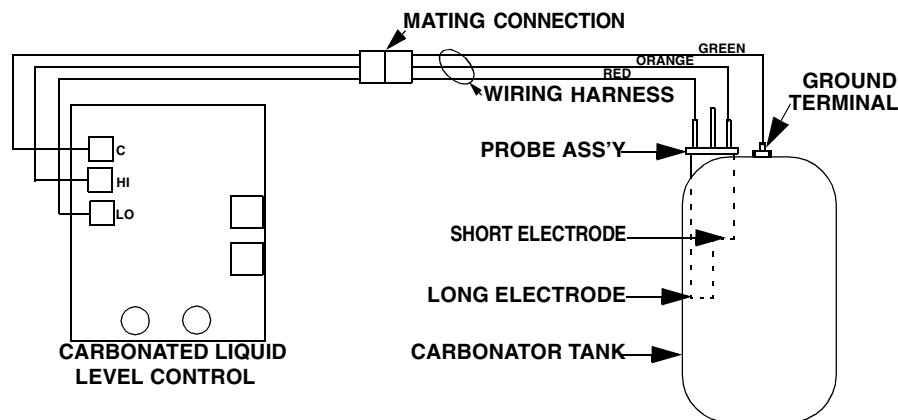


FIGURE 40

**NOTE:** Carbonators that are equipped with a pump safety thermostat will have a black wire instead of green connected to the C terminal.

### Test Solid State Level Control

1. Remove all wires and:  
Carb. motor should run.
2. Jumper C to HI:  
Carb. motor should stop. Do not remove jumper wire.
3. Jumper LO to C:  
Motor should remain stopped.
4. Remove 1st jumper from C and HI:  
Motor should remain stopped.
5. Remove 2nd jumper from C and LO:  
Motor should start.

If level control passes all above test, replace probe.

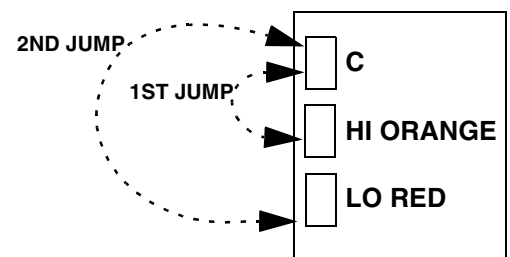


FIGURE 41

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