Multiplex

Beermaster™
Refrigeration Units

Technician's Handbook

This manual is updated as new information and models are released. Visit our website for the latest manual.
www.manitowocfsg.com

America's Quality Choice in Refrigeration

Part Number STH13 9/10

Manitowoc

Safety Notices

As you work on Manitowoc equipment, be sure to pay close attention to the safety notices in this handbook. Disregarding the notices may lead to serious injury and/or damage to the equipment.

Throughout this handbook, you will see the following types of safety notices:

⚠ Warning

Text in a Warning box alerts you to a potential personal injury situation. Be sure to read the Warning statement before proceeding, and work carefully.

⚠ Caution

Text in a Caution box alerts you to a situation in which you could damage the equipment. Be sure to read the Caution statement before proceeding, and work carefully.

Procedural Notices

As you work on Manitowoc equipment, be sure to read the procedural notices in this handbook. These notices supply helpful information which may assist you as you work.

Throughout this handbook, you will see the following types of procedural notices:

Important

Text in an Important box provides you with information that may help you perform a procedure more efficiently. Disregarding this information will not cause damage or injury, but it may slow you down as you work.

NOTE: Text set off as a Note provides you with simple, but useful, extra information about the procedure you are performing.

Read These Before Proceeding:

⚠ Caution

Proper installation, care and maintenance are essential for maximum performance and trouble-free operation of your Manitowoc equipment. If you encounter problems not covered by this handbook, do not proceed, contact Manitowoc Foodservice Group. We will be happy to provide assistance.

Important

Routine adjustments and maintenance procedures outlined in this handbook are not covered by the warranty.

⚠ Warning

PERSONAL INJURY POTENTIAL

Do not operate equipment that has been misused, abused, neglected, damaged, or altered/modified from that of original manufactured specifications.

We reserve the right to make product improvements at any time. Specifications and design are subject to change without notice.

Table of Contents

Charts

Diagrams

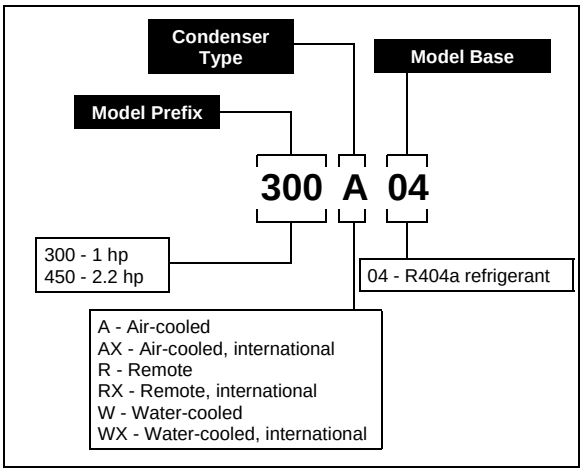
General Information

Model Numbers

This manual covers the following models:

(A) Air Cooled	(W) Water Cooled	(R) Remote cooled
75A04	75W04	75R04
75AX04	75WX04	75RX04
175A04	175W04	175R04
175AX04	175WX04	175RX04
300A04	300W04	300R04
300AX04	300WX04	300RX04
450A04	450W04	450R04
450AX04	450WX04	450RX04

How to Read a Model Number



Accessories

Depending on store type and location, various optional equipment may be added to this system. Install and connect any optional equipment in the desired location according to the installation instructions provided with these kits/equipment.

Special Applications

ATTENTION: MARINE INSTALLATIONS

⚠ Warning

This unit is for use on vessels over 66 ft (20 m) in length. This unit must not be installed in the engine space of a gasoline-powered ship.

NOTE: This unit must be secured to the vessel during installation. Models with part numbers beginning with the letters TO are NOT marine listed.

OUTDOOR APPLICATIONS

TO Multiplex Beverage Recirculating units are approved and listed by Underwriters Laboratories (UL). However they are not UL approved for weather exposure applications. These units must be installed in areas where adequate protection from the elements is provided, all other models are ETL listed.

⚠ Warning

Personal Injury Potential

Do not operate equipment that has been misused, abused, neglected, damaged, or altered/modified from that of original manufactured specifications.

Model/Serial Number Location

These numbers are required when requesting information from your local Manitowoc Distributor, service representative, or Manitowoc Foodservice. The model and serial number are listed on the OWNER WARRANTY REGISTRATION CARD. They are also listed on the MODEL/SERIAL NUMBER DECAL affixed to the unit.

Warranty Information

Consult your local distributor for terms and conditions of your warranty. Your warranty specifically excludes all beverage valve brixing, general adjustments, cleaning, accessories and related servicing.

Your warranty card must be returned to activate the warranty on this equipment. If a warranty card is not returned, the warranty period can begin when the equipment leaves the factory.

No equipment may be returned without a written Return Materials Authorization (RMA). Equipment returned without an RMA will be refused at the dock and returned to the sender at the sender's expense.

Please contact your local distributor for return procedures.

Complete System Overview

BEER PROPERTIES

General Information

The object of every establishment serving draught beer is to deliver the same high quality of beer to the customer that is delivered to it by the beer distributor. Unfortunately, this objective may be more difficult to achieve than the vendor or proprietor realizes, especially if he is not thoroughly familiar with the relationships that exist between temperature, pressure, and beer delivery systems, all of which have a major effect on the quality of the beer delivered to the customer. A brief discussion of these factors may prove helpful in understanding why a problem exists and what corrective action is required.

Beer is a unique liquid; no two barrels (even of the same brand) are exactly alike. There are large variations between brands. Chemically speaking, beer is a “supersaturated” liquid. Simply stated, beer contains excess carbon dioxide (CO_2) which dissipates or “out gasses” if allowed to stand in an open container for a period of time. If this were to happen, the beer would go “flat”. The presence of CO_2 gives beer its effervescent quality and distinct flavor. There are several factors that affect the level of carbonation, and therefore the quality and flavor of the beer that is delivered to the customer.

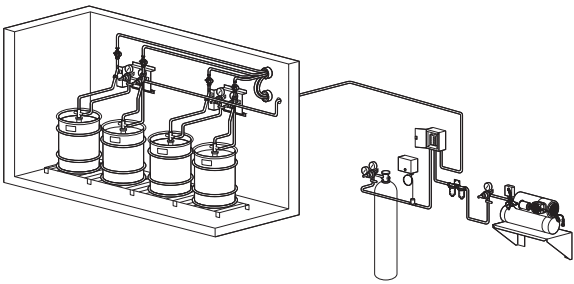
Pressure

Beer is pressurized in the keg by the brewer to his exact specifications, which are optimized for the best possible flavor. For example, under pressurized beer will taste flat and over pressurized beer will taste bitter. It therefore follows that the vendor must carefully balance his system to the beer specifications of the brewer in order to dispense the beer with the best possible flavor to his customers. Failure to do so can result in poor tasting or foamy beer. This is why it is strongly recommended that each keg or beer supply be regulated by its own pressure regulator.

The optimum pressure for most domestic beer, dispensed at normal temperatures and at sea level, is 12 to 14 pounds per square inch (psi) keg pressure.

Some domestic beers require slightly higher pressure and some imported beers require lower pressure, which explains the need for separate pressure regulators for each brand. This information is readily available from the beer distributor. Areas with higher elevations will require higher keg pressure, specifically one psi for each 2,000 ft (609.6 m) elevation above sea level. This increase in keg pressure is necessary to retain the correct carbonation level in the beer itself, since the carbonation level is a function of the “absolute pressure” and not the difference in pressure between keg and atmospheric (which is the pressure maintained by the pressure regulator on the beer system).

The applied CO_2 pressure is also the vehicle for forcing the beer from the keg through the beer lines and into the glass at the dispensing point. Many operators mistakenly believe that this is the only function, or at least the major function, of the applied pressure, and therefore the pressure may be decreased or increased at will to facilitate a desired dispensing rate (flow rate). Because of the effects on the carbonation level of the beer, and therefore the quality of the beer itself, the pressure must not be changed to achieve a desired change in the flow rate. The only acceptable method for adjusting the flow rate is by changing the amount of the restriction or “drag” in the system with respect to the flowing beer. The amount of additional restriction may be adjusted by adding or removing lengths of the main beer lines, or adding or removing shorter portions of smaller sized tubing (choker lines) to the beer lines.

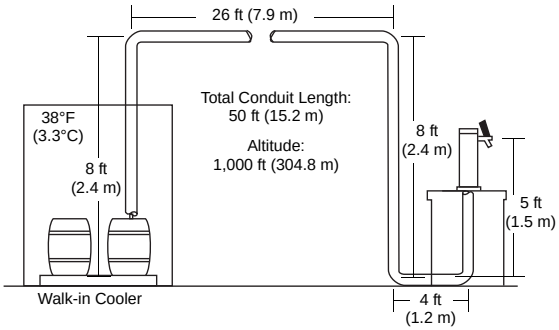


In some beer systems the walk-in cooler or storage room is located remotely and on different levels from the dispensing points. Under these conditions, even with large size beer lines it is often not feasible to dispense beer at an adequate flow rate with normal keg pressures since the drag, or resistance of the lines, as well as vertical lift that may be required can be sufficient to reduce the flow greatly at these standard pressures. In these cases it is often necessary to pressurize the keg as much as two or three times the normal keg pressure in order to provide an acceptable flow rate at the dispensing point. This type of system is commonly known as a “long draw” or “remote” system. Manufacturers of these systems recommend using a blend of gasses or beer pumps (usually a mixture of CO_2 and air or CO_2 and nitrogen) to pressurize the system without over carbonating the beer. The refrigerated chamber containing the kegs can be located more than 450 ft (91.4 m) away from the serving location using these long draw techniques.

Natural Keg Pressures at Sea Level (Pounds/ Square inch)

Brewing Company	Cooler Temperature			
	36°F	38°F	40°F	42°F
Anheuser Busch	11	12	13	14
Adolph Coors (requires 1/4" Ported Shanks)	14.5	15.5	16.5	17.5
Miller	12.5	13.5	14.5	15.5
Schlitz/Stroh’s	12	13	14	15

Add 1 psi to adjust for altitude for every 2,000 ft above sea level.
An additional 1 psi may be required for “Light” beers.



TEMPERATURE

The effects of temperature are manifested in several ways. The temperature itself is very significant. A temperature between 36°F (2.2°C) and 38°F (3.3°C) gives the best dispensing results, and is generally favored by most people as providing the best taste. If the beer is cooled below 36°F (2.2°C), more CO_2 is absorbed and a greater tendency to out gas may occur when the beer is released to atmospheric pressure by dispensing, thereby producing more foam. The greater absorption of CO_2 also imparts a slightly more bitter taste to the beer, which is objectionable to most beer drinkers.

Above 38°F (3.3°C) the CO_2 contained in the beer is at a higher energy level and can escape more easily. Therefore out gassing and foaming can occur more readily. This energy level continues to increase at higher temperatures, resulting in a rapid increase in the beer's tendency to foam.

An increase in temperature in the beer lines or the faucet itself can result in "fracturing" (out gassing) when the beer is dispensed. This generally occurs when un-refrigerated beer lines extend outside of the beer cooler and the ambient temperature surrounding the lines is at a higher temperature than the cooler itself. This can also occur in the beer "tower" at which the faucets are connected when an insufficient amount of coolant is circulated in the tower. The general result is that the first glass dispensed after a delay of several minutes will experience significant fracturing, resulting

in a larger head of foam. To maintain the correct temperature in the tower, care must be taken to ensure that a sufficient amount of coolant is delivered to this area.

THE TEMPERATURE/PRESSURE COMBINATION

Since carbonation of the beer is related to both pressure and temperature, it is important to understand this relationship in order to assure that the highest quality beer product is delivered to the customer. Higher than normal temperatures require higher than normal pressures in order to maintain carbonation. Specifically, in order to maintain proper carbonation, the CO_2 pressure must be increased when there is an increase in the beer temperature. For example, a typical American beer that would be properly carbonated at 12 psi (0.8 bar) at a temperature of 38°F (3.3°C) would require an increase in pressure to maintain the same level of carbonation at a temperature of 39°F (4.2°C). Conversely, lowering the temperature requires a corresponding decrease in CO_2 pressure to prevent over-carbonation. In actual practice pure CO_2 pressures above approximately 16.5 psi (1.1 bar) (at sea level) should be avoided at normal temperature (36°F [2.2°C] to 38°F [3.3°C]) to avoid an unacceptable level of over carbonation which leads to foaming problems. When the pressures above this level are required for good dispensing, the operator should switch to a blend of CO_2 and nitrogen for pressurization or beer pumps.

The beer faucet itself is surrounded by normal ambient room air and will warm slightly over a period of several minutes. Since a small amount of beer is trapped behind the faucet, there is a likelihood that this small amount of beer will also warm slightly. The result will be that this trapped beer will fracture and produce foam on the first beer dispensed after an extended idle time. When all of the slightly warmed beer has been depleted from the faucet and the beer line, subsequent beers drawn immediately following the first should produce about the same amount of foam or head, but less than the first beer.

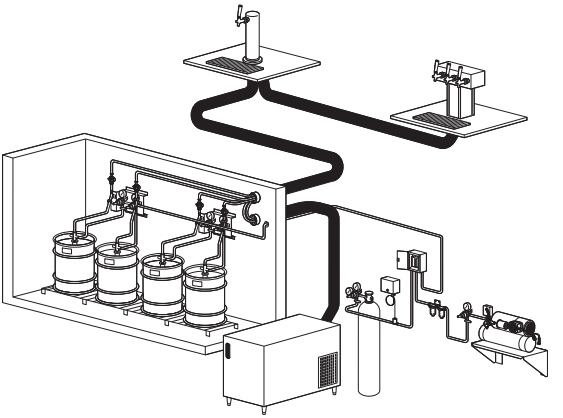
In long draw or remote systems as described above, it is essential to refrigerate the beer lines throughout

their entire length at about the same temperature as the beer in the cooler. Most manufacturers of these systems agree that it is not possible to adequately refrigerate these lines using cold air over distances greater than about 15 ft (4.6 m). Therefore, these systems utilize a liquid refrigerant line continuously cycling propylene glycol at a temperature below 30°F (-1.1°C) (or other suitable liquid coolant) in physical contact with beer lines and with the overall assembly contained in a flexible, insulated housing. These systems, when properly designed and installed, generally offer the best and most consistent draught beer product. On the other hand, an improperly designed, installed, or maintained system (even a rough or damaged gasket) can produce “shots” of foam, continuous foam, or continuously warm and therefore, foamy beer.

NOTE: A properly designed, installed, and maintained draught dispensing system should deliver beer at 1.75 to 2.0 ounces per second. The beer should be dispensed at 38°F (3.3°C) or less. The beer should flow in a solid, clear column smoothly (neither falling or pushing) from the faucet to the glass.

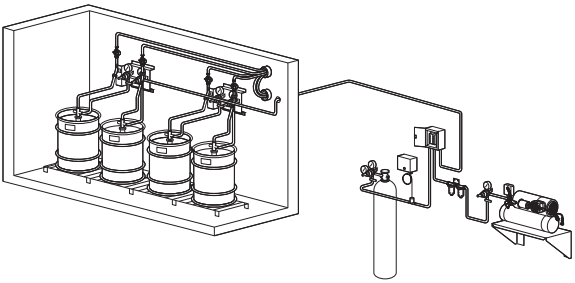
Multiplex Beermaster™ Beer Dispensing System

The beer keg is kept in a refrigerated cooler at the proper temperature for dispensing. The **pressure system** supplies pressurized gas to the kegs at a specific pressure for each keg, this pressure is determined by the installer taking into consideration the distance, vertical rise and fall of the conduit (insulated bundle of tubing), along with the natural pressure in the keg. The beer is pushed through the lines in the conduit from the cooler to the dispensing valve. To maintain the cold temperature in the conduit the **refrigeration system** uses the Multiplex Beermaster™ refrigeration unit which chills a glycol bath. This glycol, which is adjusted to below 30°F (-1.11°C), is circulated through the conduit up to the dispensing faucet and back where it is re-chilled in the bath. These chilled glycol lines are touching the beer lines in the conduit, maintaining the cold temperature of the beer. The beer is then brought up to the **dispensing system** where the conduit tubing is restricted down to a smaller diameter tube of a length, calculated by the installer, that's designed to give a 1.75 ounce per second flow of a perfectly dispensed beer.



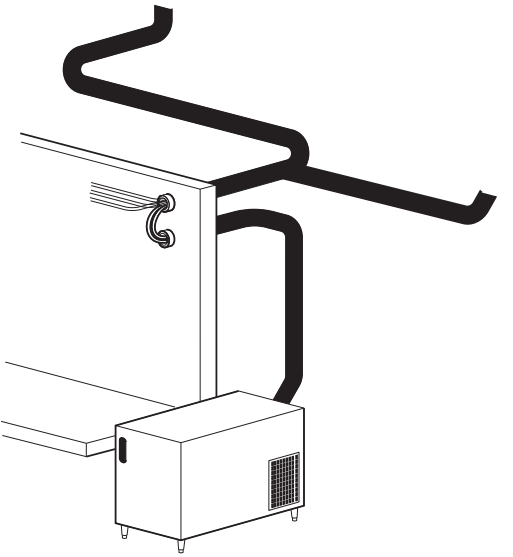
PRESSURE SYSTEM

The pressure system supplies the pressurized gas to the kegs at a specific pressure for each keg. This consists of a high pressure regulator to reduce the CO_2 or mixed gas pressure from the high pressure cylinder to 40 psi (2.8 bar). This gas is fed to the secondary regulators to beer pumps or the optional blender which may nitrogen with the CO_2 to help reduce the chance of providing extra carbonation to the beer. The secondary regulators are adjusted to the installer calculated pressure, calculated for each keg. This pressure is calculated to push the beer through the conduit to the dispensing faucets and flow at a desired 1.75 oz per second flow rate.



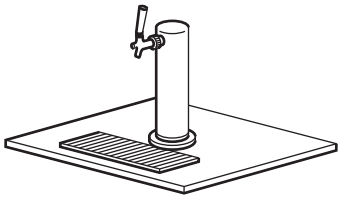
REFRIGERATION SYSTEM

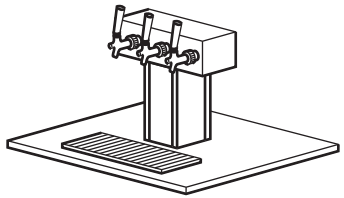
The refrigeration system consists of the Multiplex Beermaster™ refrigeration unit which chills a food grade glycol to below 30°F (-1.11°C). This glycol is circulated through an insulated bundle of tubing (conduit) by a 70 GPH circulating pump and returned to the refrigeration unit for re-chilling. This very cold glycol is continually circulating through independent lines in the conduit. The beer lines (which are also in the conduit) are in contact with the glycol lines which will maintain the temperature of the beer. This ensures that the product is dispensed at the beer cooler temperature. The refrigeration compressor will cycle **ON** and **OFF** as needed to maintain the consistent temperature of glycol. Each size of Beermaster™ Refrigeration Unit is rated for a maximum total conduit length to keep the beer dispensing at a consistently cold temperature, maintaining the proper temperature and taste of the beer.



DISPENSING SYSTEM

The dispensing system consists of one of the many different styles and sizes of dispensing towers which can have any number of dispensing faucets used to dispense the beer into the glass, mug or pitcher. As the beer comes out of the conduit it must be adjusted to give a maximum 2 oz per second flow rate to reduce the chance of foaming and to dispense a proper glass of beer. The proper way to adjust the flow rate of the beer is to reduce the diameter of the tubing, using an installer calculated length, of 3/16" diameter restrictor tubing. The beer then flows through an aluminum or stainless steel heat exchanger, that is kept in contact with the very cold glycol lines, to maintain the cold temperature all the way to the dispensing faucet and into the glass.

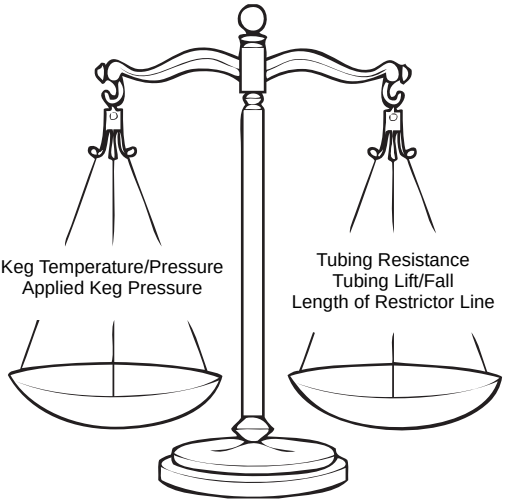




BALANCING THE SYSTEM

To keep the proper amount of carbon dioxide gas in solution in the beer to maintain the proper taste throughout the life of the keg, the system must have the proper balance of temperature, applied pressure to the keg and rate of flow at the faucet.

The installer must calculate, taking into consideration the static resistance in the conduit (amount of vertical rise and fall) as well as frictional resistance (the length of the conduit itself), the internal pressure of the keg according to the Brewmaster, the altitude at the location as well as the temperature of the beer in the cooler. The object is to dispense the beer as fast as possible (2 oz per second) with the proper gas pressure (CO_2 or mixed gas) applied to the keg and adjusted so it will not change the carbonation or taste of the beer. The installer must determine the proper pressure applied to the keg as well as the length of the restrictor attached to the dispensing faucet giving a consistent properly dispensed beer.

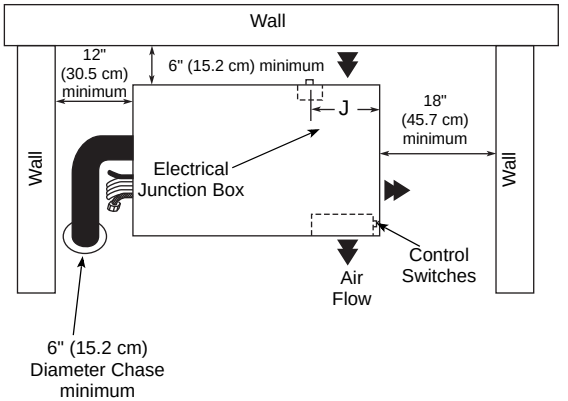


Installation

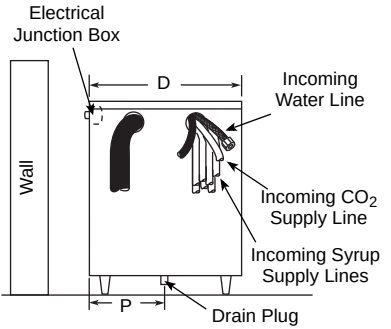
General

- Refrigeration units require a stand or 6" (15.2 cm) legs. Refrigeration unit cannot be placed directly on floor.
- Conduit can be run through floor or ceiling chase.

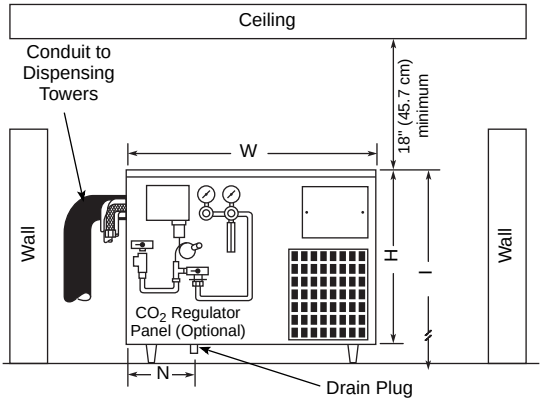
Dimensions and Clearances — All Models



Top View



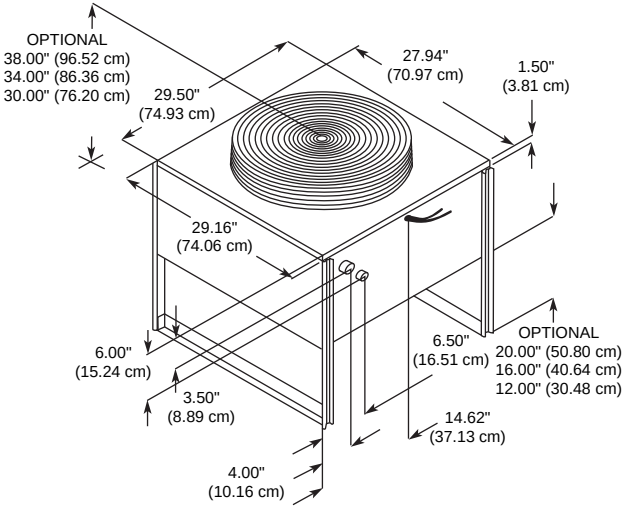
Side View


Ceiling
Conduit to Dispensing Towers
18" (45.7 cm) minimum
W
Wall
Wall
H
I
CO_2 Regulator Panel (Optional)
N
Drain Plug

Front View

Model	W	D	H	I (with stand)	J	N	P
75	27-3/4" (70.5 cm)	16-1/4" (41.3 cm)	18-3/4" (47.7 cm)	—	—	19-3/4" (50.2 cm)	5-1/2" (14.0 cm)
150	36-1/4" (92.1 cm)	19-1/2" (49.5 cm)	21-1/2" (54.6 cm)	—	11" (28 cm)	5" (12.7 cm)	9" (22.9 cm)
300	39-3/4" (101 cm)	24-3/4" (62.9 cm)	28-1/4" (72.4 cm)	60-3/4" (154.3 cm)	11" (28 cm)	6" (15.2 cm)	12" (30.5 cm)
450	42-1/4" (107.3 cm)	28-1/4" (71.8 cm)	32-1/4" (81.9 cm)	66-3/4" (169.5 cm)	11" (28 cm)	8-1/2" (21.6 cm)	14" (35.6 cm)

REMOTE CONDENSER



Safe Installation Do's and Don'ts

⚠ Warning

Read the following warnings before beginning an installation. Failure to do so may result in possible death or serious injury.

- **DO** adhere to all National and Local Plumbing and Electrical Safety Codes.
- **DO** turn OFF incoming electrical service switches when servicing, installing, or repairing equipment.
- **DO** check that all flare fittings are tight. This check must be performed with a wrench to ensure a quality seal.
- **DO** inspect pressure on regulators before starting up equipment.
- **DO** protect eyes when working around refrigerants.

- **DO** use caution when handling metal surface edges of all equipment.
- **DO** handle CO_2 cylinders and gauges with care. Secure cylinders properly against abrasion.
- **DO** store CO_2 cylinder(s) in well ventilated areas.
- **DO NOT** exhaust CO_2 gas (example: syrup pump) into an enclosed area, including all types of walk-in coolers, cellars, and closets.
- **DO NOT** throw or drop a CO_2 cylinder. Secure the cylinder(s) in an upright position with a chain.
- **DO NOT** connect the CO_2 cylinder(s) directly to the product container. Doing so will result in an explosion causing possible death or injury. It is best to connect the CO_2 cylinder(s) to a regulator(s).
- **DO NOT** store CO_2 cylinders in temperature above 125°F (51.7°C) near furnaces, radiator or sources of heat.
- **DO NOT** release CO_2 gas from old cylinder.
- **DO NOT** touch refrigeration lines inside units; some may exceed temperatures of 200°F (93.3°C).

NOTE: All utility connections and fixtures must be sized, installed, and maintained in accordance with Federal, State, and Local codes.

Location Requirements

Select a location for the refrigeration unit that meets the requirements of the building plans, local codes, and personnel. The unit must be positioned for free airflow as well as for future service. The following requirements must be met:

- Beverage quality CO_2 gas (bulk or bottled supply) with a minimum 3/8" (.96 cm) line

NOTE: Refer to serial plate on front of refrigeration unit for voltage and amperage specifications. Make all electrical connections at the junction box located at the top rear of unit. Optional equipment may require additional power supplies.

⚠ Warning

Carbon Dioxide (CO_2) displaces oxygen. Exposure to a high concentration of CO_2 gas causes tremors, which are followed rapidly by loss of consciousness and suffocation. If a CO_2 gas leak is suspected, particularly in a small area, immediately ventilate the area before repairing the leak. CO_2 lines and pumps must not be installed in an enclosed space. An enclosed space can be a cooler or small room or closet. This may include convenience stores with glass door self serve coolers. If you suspect CO_2 may build up in an area, venting of the BIB pumps and/or CO_2 monitors must be utilized.

KITCHEN EQUIPMENT INSTALLER REPRESENTATIVE RESPONSIBILITIES

Prior to scheduling Multiplex Equipment installer, the following steps listed below must be completed:

1. Electrical power supply meeting the requirements for the unit to be installed. (See the specification in this section or refer to the unit's serial plate).
2. CO_2 Gas (bulk or bottled supply); minimum 3/8" line.
3. A 120 VAC, 3-wire, 1 Phase, 60 Hz dual wall receptacle for optional electrical equipment (domestic only).

NOTE: Do not schedule the authorized Multiplex Equipment Installer until all of the above have been completed. It will only result in charge-backs to you for the unnecessary trips.

REQUIREMENTS FOR REFRIGERATION UNITS

- Conduit can be run through floor or ceiling chase.
- 60°F (15.6°C) minimum and 105°F (40.5°C) maximum operating ambient conditions.
- For indoor installation only.
- Beer supply can be located on stand or floor in a walk-in adjacent to refrigeration unit.

Installer Instructions

AMBIENT LOCATION REQUIREMENT

This equipment is rated for indoor use only. It will not operate in sub-freezing temperature. In a situation when temperatures drop below freezing, the equipment must be turned off immediately and properly winterized. Contact the manufacturer for winterization process.

Electrical

GENERAL

⚠ Warning

All wiring must conform to local, state and national codes.

MINIMUM CIRCUIT AMPACITY

The minimum circuit ampacity is used to help select the wire size of the electrical supply. (Minimum circuit ampacity is not the beverage/ice machine's running amp load.) The wire size (or gauge) is also dependent upon location, materials used, length of run, etc., so it must be determined by a qualified electrician. See Specifications section.

GROUNDING INSTRUCTIONS

⚠ Warning

The unit must be grounded in accordance with national and local electrical codes.

This appliance must be grounded. In the event of malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. This appliance is equipped with a cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into an appropriate outlet that is properly installed and grounded in accordance with all local codes and ordinances.

⚠ Warning

Improper connection of the equipment-grounding conductor can result in a risk of electric shock. The conductor with insulation having an outer surface that is green with or without yellow stripes is the equipment grounding conductor. If repair or replacement of the cord or plug is necessary, do not connect the equipment-grounding conductor to a live terminal. Check with a qualified electrician or serviceman if the grounding instructions are not completely understood, or if in doubt as to whether the appliance is properly grounded. Do not modify the plug provided with the appliance — if it will not fit the outlet, have a proper outlet installed by a qualified electrician.

⚠ Warning

When using electric appliances, basic precautions must always be followed, including the following:

a. Read all the instructions before using the appliance.

b. To reduce the risk of injury, close supervision is necessary when an appliance is used near children.

c. Do not contact moving parts.

d. Only use attachments recommended or sold by the manufacturer.

e. Do not use outdoors.

f. For a cord-connected appliance, the following shall be included:

- Do not unplug by pulling on cord. To unplug, grasp the plug, not the cord.
- Unplug from outlet when not in use and before servicing or cleaning.
- Do not operate any appliance with a damaged cord or plug, or after the appliance malfunctions or is dropped or damaged in any manner. Contact the nearest authorized service facility for examination, repair, or electrical or mechanical adjustment.

g. For a permanently connected appliance — Turn the power switch to the off position when the appliance is not in use and before servicing or cleaning.

h. For an appliance with a replaceable lamp — Always unplug before replacing the lamp. Replace the bulb with the same type.

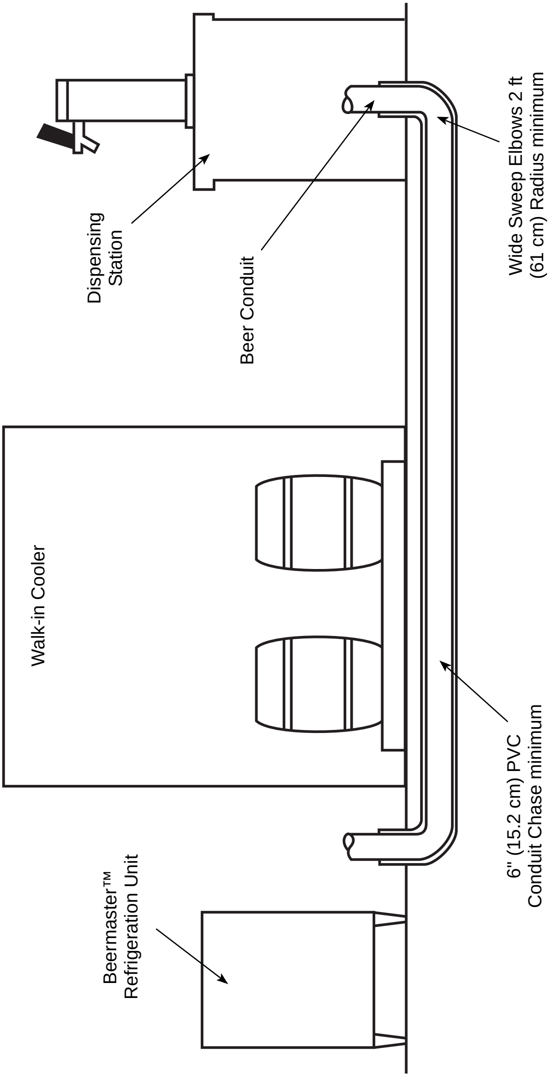
i. For a grounded appliance — Connect to a properly grounded outlet only. See Grounding Instructions.

Conduit

FLOOR CHASES

Before pulling beer conduit through a floor chase, ensure the floor chase contains the following:

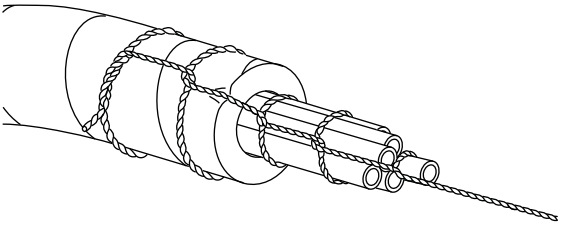
- 6" (15 cm) minimum PVC conduit chase
- Chase openings should extend 6" (15 cm) above floor
- Wide sweep elbows (2 ft [0.6 m] radius minimum)
- Chase must be clean and dry — no foreign materials


Dispensing
Station
Beer Conduit
Wide Sweep Elbows 2 ft
(61 cm) Radius minimum
Walk-in Cooler
6" (15.2 cm) PVC
Conduit Chase minimum
Beermaster™
Refrigeration Unit

Pulling Conduit Through Floor Chase

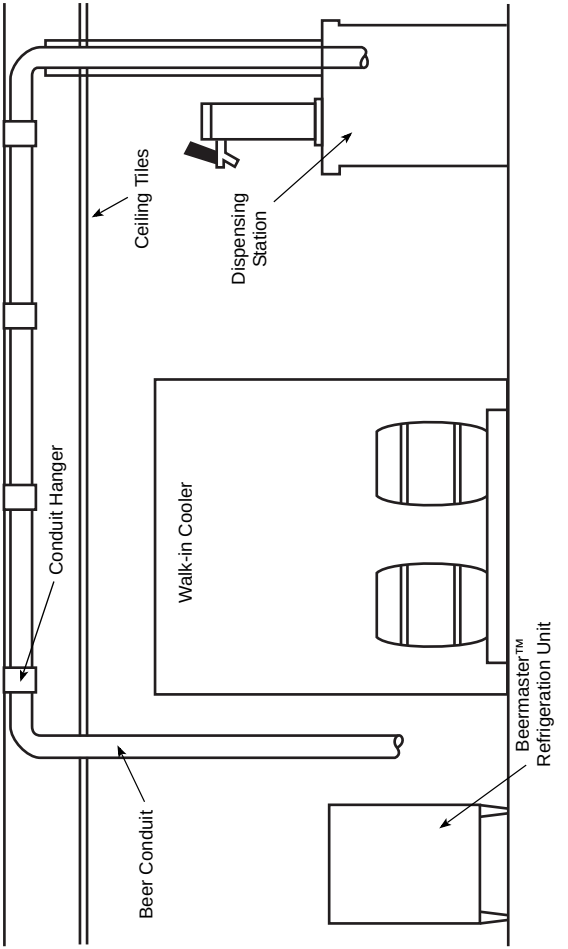
1. Determine the most convenient way of routing conduit, starting at the end which offers adequate room for installation. The conduit installation process requires the assistance of at least two (2) qualified personnel.
2. Route the steel fish tape through chase opening. Push fish tape through entire chase until it appears at opposite end.
3. Locate an appropriate length of rope and tie to end of fish tape (end which was routed through chase in step 2). Approximately 2 ft (0.6 m) from steel fish tape/rope connection, secure a swab to rope (use mop heads or a bundle of rags for swab).
4. Pull end of fish tape from starting point through chase with rope and swab. The swab will clean any construction materials, moisture, or debris that may exist in floor chase. Continue to swab the chase until the swab exits the chase clean and dry.
5. After floor chase has been cleaned, remove steel fish tape and swab from rope. Locate bundle of beer conduit and unspool conduit to allow unrestricted feed during installation process.
6. Locate rope through floor chase opening and connect to proper end of beer conduit.

NOTE: The beer conduit is designed to be pulled through floor chase in the direction of arrows printed on conduit.



7. After rope has been connected, tape end of conduit, including rope, and form conduit end to a point (see figure above). Tape will ensure that no contaminants enter conduit tubes during installation.
8. Place pointed end of the conduit through chase opening. While one person pushes the conduit through chase, another person should be pulling the conduit through the chase with rope at the opposite end.
9. Once the conduit has been routed through the chase, pull enough conduit through the openings to ensure an adequate supply at each end of the chase for connections.

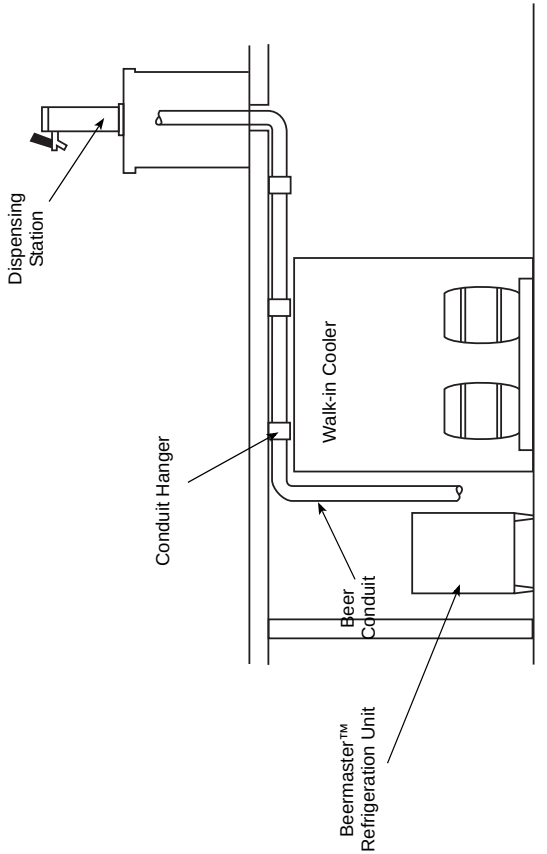
OVERHEAD INSTALLATION



Refer to the figure above for the following:

1. Determine the correct location for routing the beer conduit. Be sure to avoid heat ducts, hoods, grills, or any sharp objects that may exist above drop ceiling tile.
2. Unspool the beer conduit to allow unrestricted feed.
3. Route the conduit above ceiling tiles and connect to ceiling and/or pipes using the appropriate conduit hangers. Be sure the conduit is suspended above ceiling tiles, not lying on the tiles. Care should be taken when determining appropriate method of handing conduit securely. Hangers must not crush or pinch insulation. This will reduce cooling efficiency.
4. Once the conduit has been routed, ensure an adequate supply of conduit is provided at each end to make all connections.

BASEMENT CONSTRUCTION



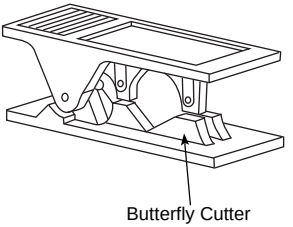
Refer to the figure above for the following:

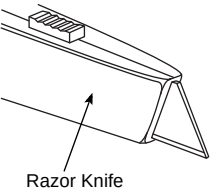
1. Unspool the beer conduit to allow unrestricted feed during installation process.
2. Route the conduit up basement wall and secure with appropriate conduit hangers.
3. After routing the conduit up the basement wall, route conduit overhead on the basement ceiling. Connect to the basement ceiling using appropriate conduit hangers.

4. Once the conduit has been routed, ensure an adequate supply of conduit is on hand to make all connections.

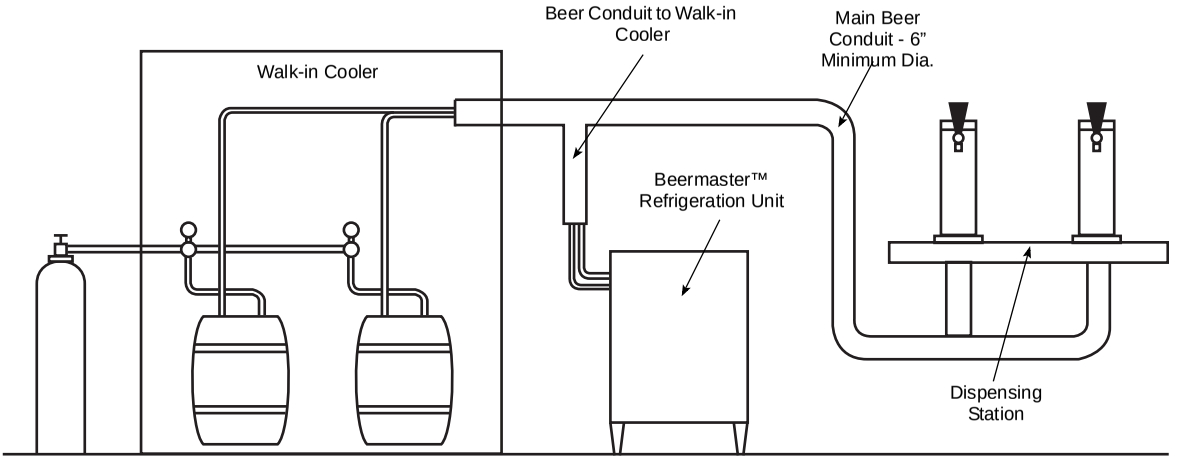
CONNECTING BEER CONDUIT

> **⚠ Caution**
>
> Only an approved cutting tool should be used to cut polyethylene tubing. The cutting tool should contain a razor sharp cutting blade so that the tubing will not be crushed when cutting. A razor blade knife or butterfly tubing cutter is sufficient (see figures). Multiplex packs a butterfly cutter with each Beermaster Glycol Chiller.





NOTE: The 3/8" I.D. poly line used in the beer conduit is thin wall tubing. Barbed fittings should not be used. The usage of barbed fittings causes thin wall tubing to split or crack and leaks will result.


Beer Conduit to Walk-in Cooler
Main Beer Conduit - 6” Minimum Dia.
Walk-in Cooler
Beermaster™ Refrigeration Unit
Dispensing Station

CONDUIT KIT

Kit Contents

Four (4) and Seven (7) line conduit kits

- Three (3) Return bends
- Eight (8) Elbows
- 29 Unions
- Five (5) Tail pieces
- Five (5) Beer nuts
- One (1) 60 ft of PVC tape
- One (1) 60 ft of foil
- One (1) Spanner wrench

10 and 14 line conduit kits

- Four (4) Return bends
- 15 Elbows
- 42 Unions
- Eight (8) Tail pieces
- Eight (8) Beer nuts
- One (1) 60 ft of PVC tape
- One (1) 60 ft of foil
- One (1) Spanner wrench

INSTALLING THE CONDUIT KIT

Connections Preview

Review the three illustrations under “Circuit Diagrams” in the Diagrams section to determine which best illustrates your particular installation. Consider the following while examining the drawings:

Beer conduits have been designed to achieve the proper cooling of each encased beer line. In order to function properly, you must follow these guidelines:

Up to eight line conduit:

- six beer maximum, one glycol circuit (two lines)

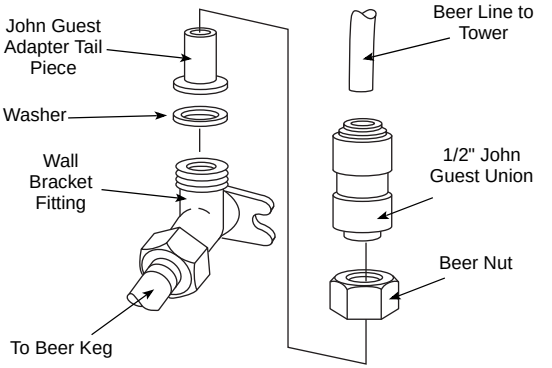
Ten and over line conduit:

- two glycol circuits (four lines)

To ensure colder dispensing temperatures, glycol should flow directly to the dispensing towers before returning to the remote Glycol Chiller Unit. After examining the drawings determine the desired glycol circuit to be achieved and illustrate on paper for referral. Do the same for the assignment of the beer supply lines.

Connecting Main Beer Conduit at Walk-in Cooler

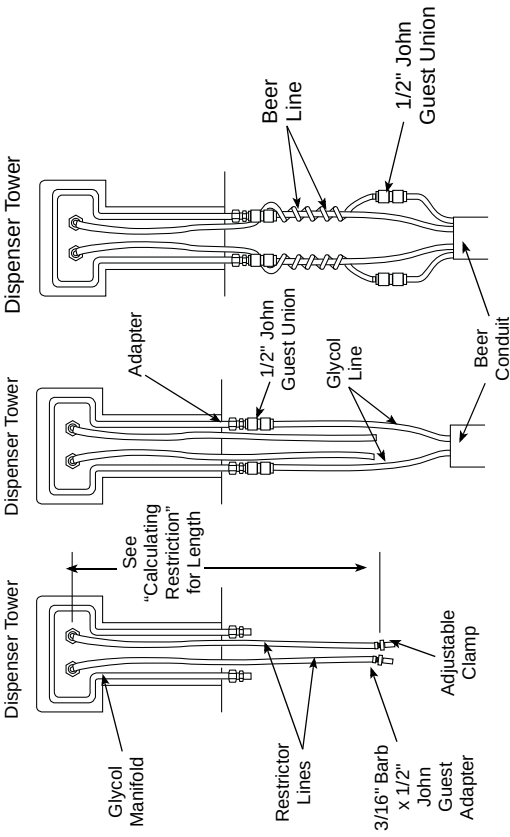
1. At the top of each beer wall bracket fitting, found on the dual secondary regulator, secure a Beer Nut, John Guest adapting tail piece, washer, and 1/2" John Guest union (see the following image).
2. Identify the appropriate beer lines to be connected to each of the wall bracket fittings, cut to length and insert into the proper John Guest 1/2" connector as shown below.



Connecting Beer Conduit to the Tower

Glycol lines in

1. Peel the insulation back from the end of the beer conduit to expose all lines. Locate the appropriate glycol circuit lines, cut to length and attach a 1/2" John Guest union to each line (see the “Tower Connections” image).
2. Attach the opposite end of each 1/2" John Guest union to the 1/2" adapter located at the base of the dispensing tower.



Tower Connections

NOTE: If conduit contains more than one glycol circuit it will be necessary to attach U-bends for each of the additional circuits. Use a 1/2" U-bend quick connect fitting or the U-bend can be built by attaching two (2) 1/2" John Guest elbows to one another by means of a 2" length of 1/2" tubing.

BEER RESTRICTOR LINES

1. Refer to the section on “Balancing the System” in this manual for determining the required length of restrictor line. Calculate the required length for each faucet. Cut each restrictor line to the calculated length and carefully insert the 3/16" Barb x 1/2" John Guest adapter and clamp securely with the adjustable clamps provided (see the “Tower Connections” figure).
2. Identify the beer line to be connected to each of the appropriate restrictor line, cut the beer lines to length and attach a 1/2" John Guest Union to each. Neatly wrap the excess restrictor line securely around the glycol supply lines to ensure good heat exchange. Connect the adapter from each restrictor to the 1/2" connector of each of the appropriate beer lines.

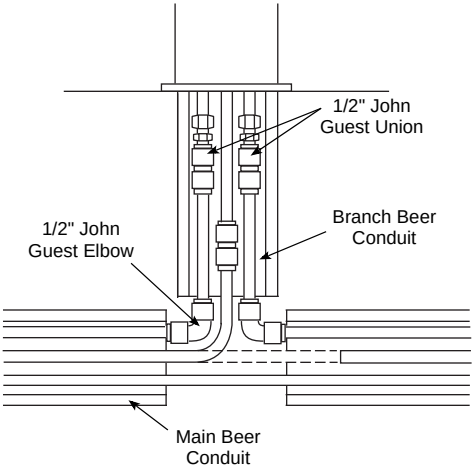
Connecting Main Beer Conduit to Branch Beer Conduit

1. At the required point of connection carefully split open and fold back the insulation on the main beer conduit and identify the correct set of glycol lines (circuit) to connect to the branch beer conduit. Cut the glycol line(s) and attach the appropriate 1/2" elbow or union connections that are best suited to connecting with the main beer conduit (see the “Main Beer Conduit Connections” figure).
2. Peel the insulation back from the end of the branch beer conduit to expose all lines. Locate the glycol circuit lines, cut to length and insert each line into the open end of the previously attached 1/2" connectors at the main beer conduit (see the “Main Beer Conduit Connections” figure).

3. Locate the appropriate beer line(s) in the main beer conduit to be connected to the branch conduit. Cut desired beer line(s) long so that they can be pulled back and then routed in a smooth curve into the branch conduit. Attach appropriate beer line(s) from main beer conduit to beer line(s) in branch beer conduit with 1/2" John Guest Union(s).

⚠ Caution

To avoid agitation use only straight unions when splicing beer lines.



Main Beer Conduit Connections

Balancing the System

DETERMINING RESTRICTOR LINE LENGTH AND APPLIED KEG PRESSURE

In order to ensure a proper, foam-free, beer flow from each faucet, the following instructions and calculations must be completed. Use the formulas found in this section to determine the required restrictor line length and applied keg pressure needed for each beer line. In order to complete these calculations the following information will be needed:

- Brands of beer to be dispensed (if blended gas is used to push the beer, this is not required).
- Temperature of the Walk-In Cooler (default 38°F [3.3°C]).
- Altitude (Distance above sea level).
- Total line length for each beer line.
- Overall lift or drop for each beer line.

To determine the appropriate Applied Keg pressures and Restrictor Line Lengths see attached work sheets and refer to examples A and B.

To properly determine the required restrictor line lengths and applied keg pressure to be used for each beer follow the instructions below.

1. First determine which brands of beer will be dispensed at which faucet. Use the “System Calculators” to record data (see the Charts section).
2. Determine keg temperature at cooler.
3. Once the brand and keg temperature are known the Internal Keg Pressure can be found by referring to the “Natural Keg Pressures Chart” in the Charts section.
4. Determine the number of feet above sea level to adjust natural keg pressure for particular location.
5. If required adjust for “Lite” or “Light” beer by adding 1 psi to natural keg pressure. Check with local beer wholesaler for additional information.

Example:

- Budweiser on faucet number 1
- Walk-in cooler for kegs at 38°F
- Anheuser Busch (Budweiser) at 38°F=12 psi
- Altitude adjustment at 1,000 ft (1 psi/2,000 ft above sea level)=0.5 psi
- “Lite” beer adjustment = 0 Adjusted keg pressure = 12.0 + .5 + 0 = 12.5 psi
- Determine the required Applied Keg Pressure by taking the adjusted keg pressure and adding 2 psi

  Example:

  12.5 psi (adjusted keg pressure)

  + 2.0 psi = 14.5 psi Applied Keg Pressure (pressure the secondary regulator will be adjusted at)

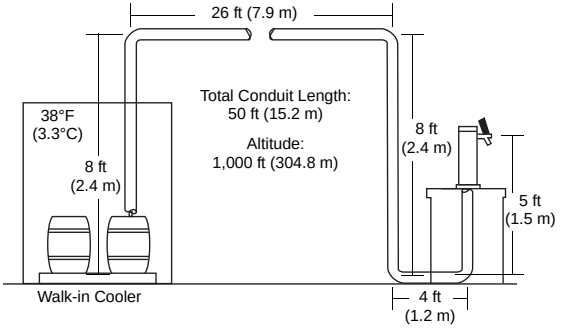
6. Determine the total line length and tubing diameter from bottom of keg to faucet. This must be done for each individual beer line (refer to the figures below for proper method of determining line length).
7. Once the run length is known calculate the amount of restriction.

   Example:

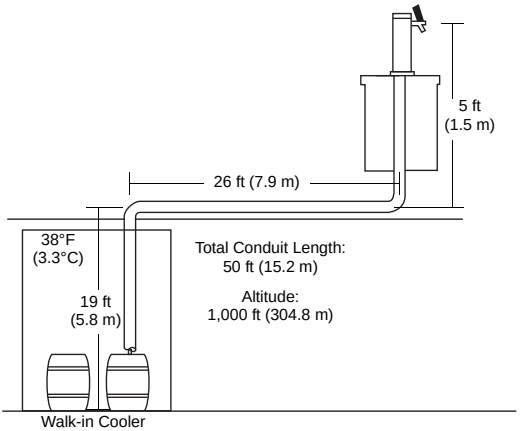
   50 ft (length of conduit)

   x 0.07 (restriction 3/8" ID poly) = 3.5 psi

EXAMPLE A



EXAMPLE B



Restriction (pounds per square inch)

Restrictor Line: 3/16" ID @ ft=3.0 psi

Beer Supply Line: 3/8" ID @ ft=0.07 psi

8. Determine the lift or drop restriction by taking the total vertical lift in feet and subtracting the total vertical drop in feet and multiplying the remainder by 0.5 psi.

Add 1/2 psi for every foot of vertical lift. Subtract 1/2 psi for every foot of vertical drop.

Equal lifts and drops cancel one another.

Example:

13 ft lift - 8 ft drop = 5 ft of lift

5 ft of lift x 0.5 psi = 2.5 psi lift*

**This figure will be negative if the drop exceeds the lift.*

9. Determine the total line restriction by adding each of the previously calculated restriction factors.

Example:

3.5 psi (length of run restriction) + 2.5 psi (lift/drop restriction) = 6.0 psi (total line restriction)

10. Determine the required psi of restriction that will be required by taking the Applied Keg Pressure and subtracting the Total Line Restriction.

Example:

14.5 psi (applied keg pressure) + 6.0 psi (total line restriction) = 8.5 psi (restriction factor)

If this figure is greater than or equal to 6.0 psi proceed to the instructions outlined in step A. below. If this figure is less than 6.0 psi proceed to the instructions outlined in step B. below.

A. To convert the psi of restriction needed to inches of required 3/16" ID restriction line, use the following equation:

Number psi needed ÷ 0.25 psi = number of inches of restrictor

Example:

8.5 psi (restriction factor) ÷ 0.25 psi = 34.0 in (of required restrictor line)

B. This example (refer to the figures above, Example B) reflects an increased vertical lift factor of 24 ft (19 ft of lift + 5 ft of lift=24 ft). It requires a lift/drop restriction of 12 psi (24 x 0.5/ft lift=12 psi).

Example:

14.5 psi (applied keg pressure) - 15.5 psi (total line restriction) = -1.0 psi (restriction factor)

Since the restriction factor in this example is less than 6.0 psi, a 24" fixed restrictor length will be required.

Volumes (liquid oz per linear ft)	
3/16" ID @ ft = 0.18	1/4" ID @ ft = 0.33
5/16" ID @ ft = 0.51	3/8" ID @ ft = 0.73
1/2" ID @ ft = 1.31	

The Adjusted Applied Keg Pressure (the pressure the secondary regulator will be adjusted to) can now be determined by taking the Total Line Restriction and adding 8 psi.

Example:

3.5 psi (run restriction) + 12.0 psi (lift/drop restriction) = 15.5 psi (total line restriction)

15.5 psi (total line restriction) + 8.0 psi = 23.5 psi (adjusted keg pressure)

STARTING UP THE SYSTEM

Before Starting Up the System

Each of the steps below should be done 24 hours prior to the tapping or dispensing of any beer.

1. Place all kegs in a walk-in cooler at 36°F to 38°F and allow them to temper properly.
2. Turn ON the Beermaster Glycol Chiller circulating glycol pump(s).

3. After leak testing all glycol and beer supply lines, wrap the lines firmly with foil (to ensure a good heat exchange) and then insulate all lines; to ensure a minimum of 1" insulation over all areas of exposed beverage line.
4. After glycol has circulated through system for approximately one hour, remove the strainer from the glycol bath. Flush the strainers clean with fresh water and reinstall.

Pressure Setting and Start-up

1. Adjust the primary CO_2 regulator to 40 PSI and secure the lock nut.
2. If a blender is utilized proceed with adjustments provided with blender kit.
3. Adjust the secondary regulators. It is recommended that when applied keg pressures exceed 20 PSI the secondary regulators be adjusted 2 PSI below the calculated pressure. If more pressure is required after tapping keg, increase as needed.
4. Tap the kegs and proceed to draw beer from each valve one at a time. Ensure each brand is properly drawing before proceeding to the next. The proper flow rate for beer at each valve is 2 ounces per second. Beer should be flowing clear with a full flow from the dispensing faucet (a considerable amount of dispensing may be needed).
5. Secure all secondary regulator lock nuts and complete the information label, identifying the product and its applied keg pressure for each appropriate regulator.
6. Instruct operator on proper maintenance and operating requirements.

Beermaster Wine Dispensing Kit

To dispense chilled wine through the Beermaster™ system, the following components are required:

- Wine Dispensing Kit (P.N. 00211504)
- Nitrogen Regulator (P.N. 00219381)
- Wine Tank, Stainless Steel with general disconnects

INSTALLING

Single Faucet

1. Select faucet on beer tower for wine and remove metal beer faucet. Replace metal beer faucet with plastic wine faucet.
2. Locate product line connected to this faucet at walk-in cooler. If connected to beer wall bracket, disconnect and remove beer nut, tail piece, and John Guest tube connector.
3. Assemble 1/2" x 3/8" John Guest tube connector, appropriate length of 3/8" O.D. poly, to reach location of wine tank, 3/8" x 1/4" FF John Guest connector, and liquid disconnect.
4. Connect nitrogen regulator to nitrogen tank and connect gas line to regulator outlet.
5. Connect empty wine tank and turn on nitrogen tank. Adjust to 30 PSI and pressurize system to check for leaks.
6. Turn OFF nitrogen and depressurize system. Determine system pressure resistance and reset regulator for desired flow.

Multiple Faucets from Same Tank

In addition to component required for single faucet installation, each additional faucet requires:

- Faucet (P.N. 00211885)
- Tee (P.N. 00210862)

1. Install faucets at desired locations.
2. Install tees at appropriate places in 1/2" O.D. poly wine line.

POSITIONING OF REFRIGERATION UNIT

Before proceeding with installation, verify that all requirements for roof mounted Remote Condenser Units have been satisfied (if applicable). Refer to the instructions on installing the Remote Condenser supplied with the unit.

If the unit is to rest on the floor, locate the four 6" (15.2 cm) adjustable legs (optional). Screw and tighten the legs into the bottom of the refrigeration unit. Set the unit in desired location and adjust legs until the unit is level and sturdy. If the unit is to be mounted on a stand, position stand and secure the unit to stand. If the unit is to be installed on a wall mount bracket, install the wall mount bracket and position the unit on the bracket at this time. Fasten the unit to the bracket with bolts provided.

EQUIPMENT PLACEMENT

NOTE: All Refrigeration Units must be mounted on either 6" legs or optional stand.

1. Move the stand/refrigeration unit to the designated area and position it near the wall at a distance of at least 6" (15.2 cm) for air circulation in air-cooled units, or at a distance required by local code.
2. Level the stand/unit by adjusting the leg levelers provide on the legs or stand.
3. If the unit is equipped with optional stand, lift the Refrigeration Unit onto the stand. Position the unit in the center of the stand. Be sure to orientate the drain of the refrigeration unit with the drain access hole of the stand. Secure with 5/8"-11 x 1" bolts supplied in kit, use two bolts diagonally. Schedule the electrician to connect the electrical service if you have not already done so (refer to Electrical Requirements for requirements listed in these instructions).
4. Mount any optional equipment at this time. Follow the installation instructions for each kit required.

ELECTRICAL CONNECTIONS

⚠ Caution

Make sure power supply to unit is turned off.

NOTE: The electrician must refer to the nameplate and wiring schematic on the refrigeration unit for correct electrical requirements. All wiring must comply with all safety codes. Make sure all refrigeration unit power switches are in the OFF position.

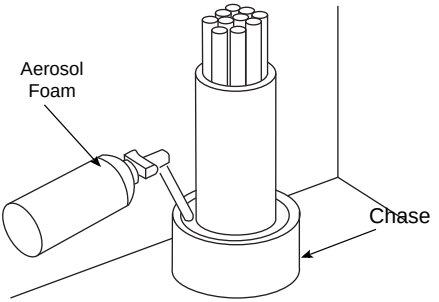
5. Route and connect power supply to leads in the electrical junction box at the top rear of the motor compartment.

NOTE: Be sure to connect ground wire(s) to ground screw located on back panel of junction box.

INSULATING CONNECTIONS

1. Make sure all exposed lines are well insulated on towers to conduit, conduit junctions, refrigeration unit to conduits.
2. To insulate the above, use the leftover conduit sections and tape.
3. Cut the conduit sections to fit snugly over the exposed lines and fittings. A little extra time spent doing a thorough job initially will eliminate a call back in several days to make corrections.

NOTE: Do not inject foam material directly on the connections where the tubing connects to the barb fittings or directly on poly tubing.



4. A can of foam is to be used to fill the openings between the conduit insulation and the inside diameter of the floor chases. The purpose is to provide an air tight seal at the floor level to prevent foreign matter from entering the chases. Please read the foam manufacturer's instructions carefully. We recommend using the adapter with the right angle extension.
5. Insert the adapter into the openings approximately 1" to 2" (2.5 to 5.1 cm) while depressing the adapter.
6. Move the extension around throughout the area where the foam is to be placed. Do not over fill, allow room for expansion. If the chase opening is too deep insert a section of the leftover conduit insulation in the opening prior to using the foam insulation.

Aeroquip Connection

1. Lubricate male half diaphragm and synthetic rubber seal with refrigerant oil.
2. Thread male coupling to its proper female half by hand to ensure proper mating of threads.
3. Use proper wrenches (on coupling body hex and its union nut) and tighten union nut until coupling bodies “bottom”.

NOTE: You must use a wrench on the body to keep the body from turning while tightening the nut with the second wrench. If the body turns excessively, the piercing seal will be damaged.

4. Use proper wrenches to tighten an additional 1/4 turn (90°). This final 1/4 turn is necessary to ensure the formation of a leak proof joint. Alternately, use a torque wrench to tighten the 1/2" coupling to 40 ft-lbs and 3/8" fitting to 11 ft-lbs.
5. Leak check all your connections. If you detect any leaks, repair and recheck.

Condenser and Pre-charged Lines Installation

Before proceeding with installation, verify that all requirements for roof mounted remote condenser units (if applicable) have been satisfied. If unit has a remote condenser, refer to the instructions on installing the remote condenser supplied with the condensing unit and refer to the section on installation of remote refrigeration line sets.

Important

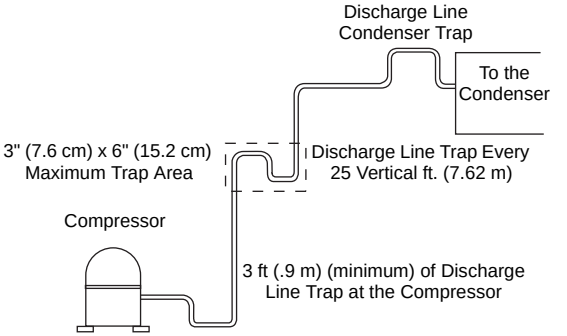
If you are installing a remote unit, there is a refrigeration king valve located behind the compressor. This valve must be back seated prior to starting the compressor. Failure to do so will short cycle and may damage the compressor.

MULTIPLEX REMOTE CONDENSER PRE-INSTALLATION REQUIREMENTS

1. Installation and maintenance are to be performed only by qualified refrigeration personnel. These technicians must have EPA certification (USA), are familiar with local codes and regulations, and are experienced with this type of remote refrigeration equipment.
2. As a condition of the warranty, the check, test and start-up procedure must be performed by qualified personnel. Because of possible shipping damage, check both the condensing unit and refrigeration unit(s) for refrigerant leaks.
3. If the refrigeration unit is located on a roll out platform, you must coil up to one round between the back of the stand and the wall. This allows pull out of the refrigeration unit for servicing.
4. If the refrigeration unit is located in a stationary location, you must remove excess refrigeration tubing as described below.

MULTIPLEX PRE-CHARGED REFRIGERATION LINES PRE-INSTALLATION REQUIREMENTS

1. Both the discharge and liquid remote condensing lines must be kept to a minimum distance for maximum performance. All Multiplex systems are capacity rated to 100 ft (30.5 m) tubing distance between the compressor and condenser.
2. Any vertical rise 25 ft (7.62 m) or greater must have a manufactured or installed trap (bend), in the discharge refrigeration line from the compressor to the remote condenser. A trap is necessary for every additional 25 ft (7.62 m) vertical rise. When excessive vertical rise exists, this trap allows oil to reach the condenser and return to the compressor.
3. The easiest method to create a trap is to bend the tubing (smoothly, no kinks) into the trap form.



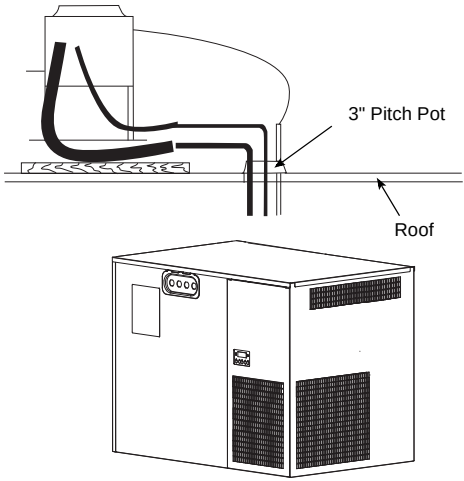
4. The trap(s) must be of minimum height of 3" (7.6 cm) and a width of 6" (15.2 cm) to minimize oil accumulation. The traps can also be bent out of the refrigeration tubing. Carefully bend the tubing down 12", and then sweep the tubing back up.
5. It is critical that the Multiplex remote condensing line size specifications for the specific model be maintained. The specifications are 1/2" discharge and 3/8" liquid lines.

INSTALLING THE MULTIPLEX REMOTE CONDENSER

The Multiplex remote condensing units have a 208-230 Volt, 50/60 HZ, 1 PH fan motor that includes a permanent split capacitor and internal overload protection. The electrical wires from the refrigeration unit wire to the condenser. The electrical installation must be in accordance with local codes, National Electrical Code and regulations.

1. Determine a position for installation that will allow access for maintenance and is free from obstruction. Verify hot air discharge from other condensers does not interfere with the inlet of this condenser.
2. Install the four legs to the sides of the condenser using the mounting bolts provided.

3. The General Contractor or Owner must secure two treated lumber 4" x 4" x 36" (or longer). You may then mount the remote condenser to the treated lumber.
4. The General Contractor or Owner must install a 3" pitch pot in the roof. Then seal for weather protection.



5. Locate the pre-charged refrigeration lines shipped with the system. These lines must be a correct length for the building design. Avoiding any kinks, neatly route these lines from the remote condenser to the refrigeration unit. Excess refrigeration tubing must be handled in one of two ways. When coiling the excess tubing, make sure the inlet to the coil is at the top of the coil and the exit is the bottom of the coil. There can be no more than one turn to the coil. If you have more

tubing, you must cut out the excess before connecting the ends. When cutting the tubing, you must first evacuate the refrigerant (line sets have a positive refrigerant holding charge of two to three ounces). After shortening and welding the tubing together again, you must evacuate the tubing to 250 microns. Then recharge the tubing with 4 ounces of appropriate refrigerant.

⚠ Caution

Excess refrigeration tubing must be properly cared for before being connected to either the remote condenser or the refrigeration unit.

CONNECTING THE PRE-CHARGED REFRIGERATION LINES

NOTE: Before connecting the pre-charged refrigeration lines, the refrigeration unit must be properly located, leveled, and the water bath filled 1" (2.5 cm) below the installed drain pipe.

1. Attach low side gauge set to service port on each line set to verify positive pressure within the line set.

NOTE: If for any reason the lines are damaged and/or leaking or the lines no longer charged, refer to “How to Re-charge the Line Sets”. If the line set is too long for the application, refer to “How to Shorten the Line Sets”.

2. Always make the connections at the condenser first, using the end of the pre-charged lines with the valve ports.
3. Connect the condenser side with the quick connectors (discharge and liquid) up to condenser. Refer to the section titled “Aeroquip Connection” in these instructions.
4. Connect the refrigeration unit side with the quick connects (discharge and liquid). Make sure to provide a discharge trap at back of refrigeration unit, or bend discharge line down 12" and then up smoothly (no kinks) to provide a trap.

5. If a low refrigerant charge is detected, recover and recharge the system adding the unit name plate charge.
6. Repair any damages to the line sets before proceeding.

HOW TO SHORTEN THE LINE SETS

1. Do not connect either end of the tubing to the system before everything is set in place. Standard refrigeration practices must be followed regarding the tubing installation.
2. Excess refrigeration tubing must be handled in one of two ways. With a short amount of excess tubing (about 10 feet), you may coil that amount vertically between the condenser and refrigeration unit. When coiling the excess tubing, make sure the inlet to the coil is at the high side of the coil and the exit is the low side of the coil. There can be no more than one turn to the coil. The coil must continue in a downward spiral with no overlaps, similar to a cork screw. If you have more tubing, you must cut out the excess before connecting the ends. When cutting the tubing, you must first evacuate the refrigerant.
3. After shortening the tubing and welding together again, you must vacuum the tubing to 250 microns.
4. Recharge the tubing with the appropriate refrigerant at 4 ounces per length of tubing.

HOW TO RE-CHARGE THE LINE SETS

NOTE: This procedure to be used only with damaged or evacuated line sets or with unknown refrigerant type.

1. With the remote condenser lines properly hooked and sealed to the condenser, evacuate to 250 microns for 1 hour, using both Schrader ports on the service line set.
2. For units with model numbers beginning with “SS”, charge the condenser and line set as described here. Add 0.72 oz/ft (0.067 kg/m) of remote line set (one way run distance) plus condenser name plate charge.

Example:

45 ft of line set

45 x 0.72 oz = 32.4 oz

32.4 oz + condenser charge = Total charge

If the line set and the main refrigeration unit are connected, you must also add that refrigerant charge.

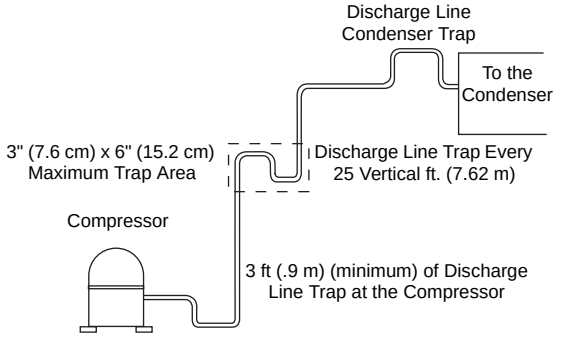
For units with part numbers beginning with “TS”, charge according to the nameplate charge on the refrigeration unit. That is enough refrigerant for up to 100 feet of tubing plus the Multiplex condenser. If you have another brand condenser, please add additional charge for the condenser (example: up to three pounds for a MAC condenser).

3. Connect line sets to the proper discharge and liquid mating connectors on the refrigeration unit using quick connects. Refer to the section titled “Aeroquip Connection” in these instructions.
4. Be sure to observe proper refrigeration techniques when running the line set.
   A. The discharge line must loop down at the compressor end to trap liquid from returning to the compressor, unless you are coiling refrigeration tubing behind the unit.
   B. The discharge line must loop above discharge connector at the condenser to resist liquid returning to the compressor. Any excess tubing must be removed from the line set before the line set is connected to any equipment.
   C. The discharge line must have one P trap every 25 ft (7.6 m) of vertical rise to allow oil to stair-step up to the condenser and eventually return to the compressor.

NOTE: When the connections are made, the seal in the couplings are broken, and if removed for any reason, the refrigerant charge will be lost.

⚠ Caution

Relays and terminal block are energized from each remote unit. Turn OFF switches on each unit before opening quick disconnect switch on condensing unit. On the completion of the wiring of the remote condenser make sure the electrician placed the switch lever in the ON position. This switch must be ON before turning ON the refrigeration toggle switch on the unit. Also, the water bath must be filled with water.



⚠ Caution

Relays and terminal block are energized from each remote unit. Turn OFF switches on each unit before opening quick disconnect switch on condensing unit. On the completion of the wiring of the remote condenser make sure the electrician placed the switch lever in the ON position. This switch must be ON before turning ON the refrigeration toggle switch on the unit. Also, the water bath must be filled with water.

Preparing Glycol

MIXING GLYCOL SOLUTION

1. Inspect the glycol reservoir tank for dirt and/or foreign debris. The tank must be clean before mixing glycol solution.
2. Locate the glycol kit:

Model 75	3 Gallons (19 ltr) Glycol
Model 150	5 Gallons (19 ltr) Glycol
Model 300	15 Gallons (57 ltr) Glycol
Model 450	20 Gallons (75 ltr) Glycol

3. Pour the glycol into the reservoir tank.

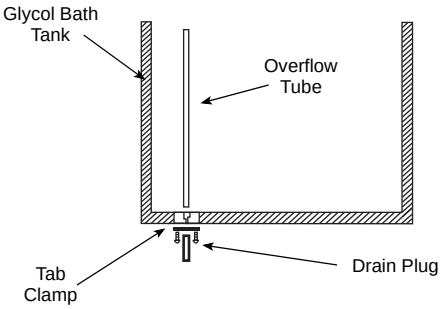
> **⚠ Caution**
>
> Do not turn on the circulating pump(s) until system installation is complete.

4. Add water until level of glycol/water solution reaches the “Fill Here” mark located on tank wall.

NOTE: The glycol/water solution in the water bath is now mixed to the proper ratio.

5. Push the switches marked “Compressor” and “Agitator” if equipped to the ON position. After compressor cycles OFF, check to ensure glycol solution reads 27°F (-2.7°C) to 29°F (-1.6°C).

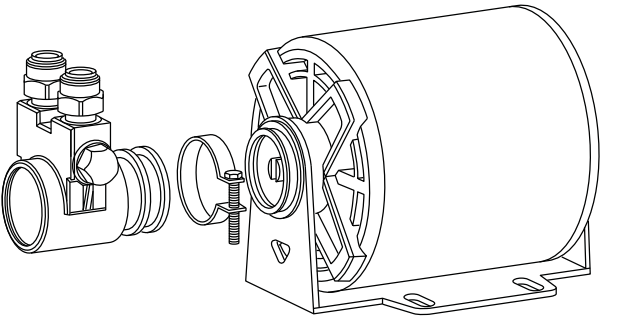
> **⚠ Caution**
>
> Glycol water ratio should be maintained at a 3 to 1 ratio (17-22 Refractometer). Additional water will be required after starting pumps and solution fills circulation system.



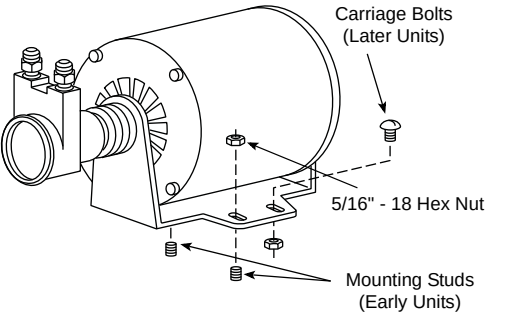
NOTE: Verify that the pump box holding tank is full before proceeding.

6. Turn on the circulator. The circulator must run continuously. Verify that glycol is returning to the glycol bath through the return bulk head fitting.

Additional Glycol Circulating Pump and Motor Kit

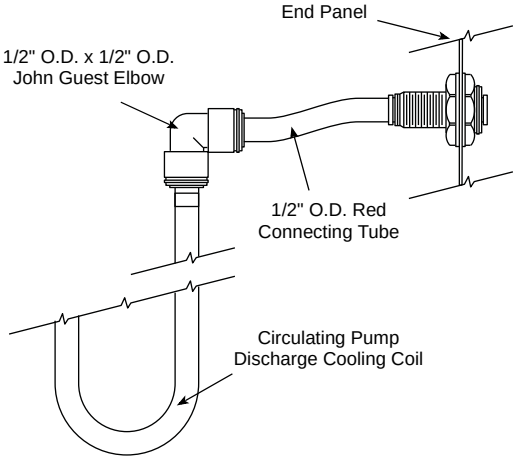


Pump and Motor Kit



Motor Installation

NOTE: Only two fasteners required.



Tube Installation

INSTALLING THE GLYCOL CIRCULATING PUMP AND MOTOR KIT

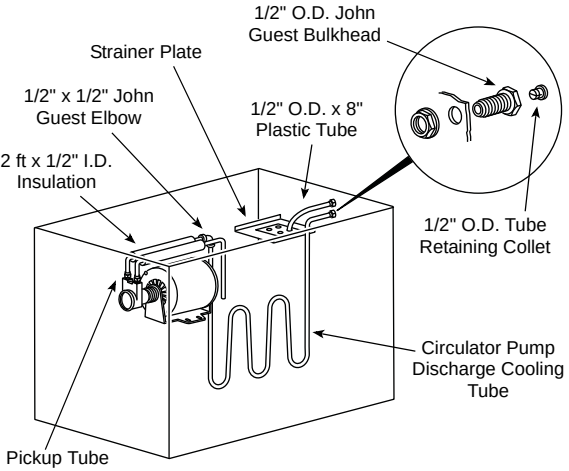
1. Remove the lid from the Beermaster refrigeration unit.
2. Install the glycol circulating motor with pump to the motor shelf located in the Beermaster Glycol Unit motor compartment (see “Motor Installation” figure).

NOTE: Motor must be installed with the glycol pump facing away from the glycol bath.

3. Locate the pickup tube and discharge tube assemblies. Slide one piece of insulation over each of the tube assemblies (see “Tube Installation” figure).
4. Attach the pickup tube to the inlet side of the glycol pump making sure the opposite end from the pump is submerged in glycol bath.
5. Attach the discharge tube to the outlet side of the glycol pump.
6. Slide the 1/2" x 1/2" John Guest Elbow, supplied in kit, onto the end of the discharge tube at pump motor assembly.
7. Locate the circulator pump discharge cooling tube, supplied with kit, and insert into the water bath area. Insert straight end of tube into the John Guest elbow fitting as shown.
8. Insert the two 1/2" O.D. John Guest bulkhead unions, supplied in kit, into the pre-punched holes located in the end of the refrigeration unit.
9. Locate the two 1/2" O.D. tube retaining collets, provided in kit, and insert into each of the John Guest bulkhead unions.
10. Insert the free end (bent end) of the circulator pump coil tube into the lower John Guest bulkhead union.

NOTE: Do Not discard the condensation cover over the reservoir tank. It is necessary to prevent excessive condensation from diluting the water-glycol mixture.

11. Locate the 1/2" O.D. x 4" or 8" plastic tube, provided with kit. Insert one end of this tube into the upper bulkhead fitting. Insert opposite end of this tube into hole of strainer plate (see “Pump Connections” figure).



Pump Connections

12. Locate the 8 ft piece of cork tape, provided with kit, and insulate the glycol pump and all exposed connections to prevent condensation.
13. Remove and discard safety plug from connector of wire harness coming from control box. Attach connector of glycol pump motor to connector of wire harness coming from control box.
14. Installation of glycol circuit pump is now complete. The Beermaster refrigeration unit can now be turned ON.
15. The added glycol circulating pump can now be controlled by a switch located on the switch box.
    - For Model 450, the CIRC #4 switch will control added pump.

NOTE: After starting the new circulator pump, it may be necessary to top off the glycol bath with the proper propylene glycol/water mixture to maintain marked level in tank.

Beermaster Dispensing Towers

INTRODUCTION

The following instructions will cover installation procedures required for properly installing Beermaster Dispensing Towers. Kit includes one (1) Template, (1) Beermaster Dispensing Tower, (4) Mounting Screws (for Wooden Counter Top), (1) Gasket, (2) 3/8" MF x 1/2" John Guest Adapters, (1) 3/16" Barb x 1/2" John Guest Adapter, and (1) Adjustable Clamp.

1. Determine desired location of beer tower.
2. Using the template provided, locate and mark the center of the tower column.
3. Cut a 3" (7.6 cm) hole and place the tower over the hole to locate and mark the mounting screw positions.
4. Drill appropriate holes for mounting (1/8" diameter when using screws provided, if mounting in wood).

NOTE: If more than one tower is being installed, use only the tower intended for each location to mark the mounting screw positions.

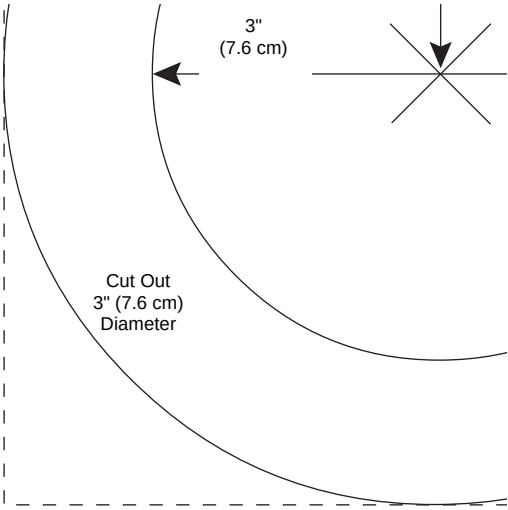
5. Position gasket over top of 3" (7.6 cm) access hole and align holes for mounting screws. It is recommended that a small bead of silicon caulking be placed on both sides of the gasket at this point.
6. Route beer tower beverage lines through 3" (7.6 cm) hole and secure dispensing tower base to counter with mounting hardware.
7. Ensure lines are neatly sealed and wrapped until the necessary beer and glycol connections can be made, as outlined in the Conduit Kit Installation Kit section.

⚠ Caution

The 6 ft beer restrictor lines for beer tower should not be trimmed until completely reviewing the instructions for conduit kits.

DISPENSING TOWER TEMPLATE FOR BEERMASTER DISPENSING TOWER

NOTE: This template is 50% of actual size.



High Pressure CO_2 Regulator (00211500)

INTRODUCTION

The following instructions will cover procedures required for properly installing the Beermaster high pressure CO_2 regulator.

KIT CONTENTS

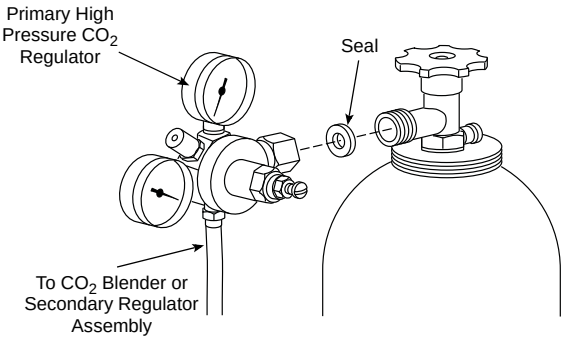
- (1) Beermaster High Pressure CO_2 Gas Regulator with seal
- 20 ft of 5/16" I.D. tubing
- (6) # 8 screws
- (6) tie mounts
- (6) self locking cable ties
- (4) tab clamps

Installation should only be performed by qualified personnel.

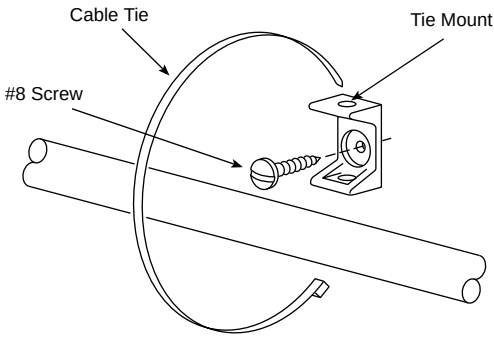
INSTALLING

1. Determine the location where the beer system CO_2 tank(s) will be located. CO_2 tanks must be chained securely in place.
2. Attach the primary regulator to the CO_2 tank. Use seal provided in kit (see the “Attaching Regulator” figure).
3. Neatly route the 5/16" I.D. vinyl tubing from the primary regulator(s) to the secondary regulator in the beer keg cooler or to the optional blender.
4. Secure the vinyl tubing in place with tie mounts and cable ties provided in kit (see the “Securing Vinyl Tubing” figure).

NOTE: At start-up the primary regulator should be adjusted to 40 PSI (2.8 bar) and locked.



Attaching Regulator



Securing Vinyl Tubing

Dual Secondary Regulator Kit (00211400)

INTRODUCTION

The following instructions cover the installation of a Multiplex secondary regulator panel kit. Each dual secondary regulator kit will handle two beer kegs. Additional dual secondary regulator kits can be placed in series to handle additional beer kegs.

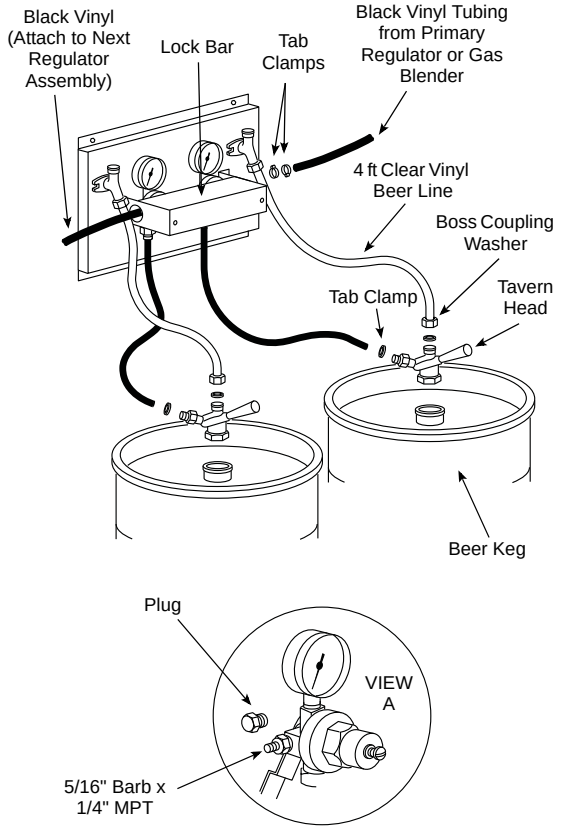
KIT CONTENTS

- (1) dual secondary regulator assembly with wall bracket
- CO_2 gas lines
- Beer lines
- 12 ft - 5/16" I.D. black vinyl tubing
- (10) boss coupling washers
- (8) tab clamps
- (1) 1-1/4" MPT pipe plug
- 6 ft - 3/8" I.D. clear vinyl line assembly

INSTALLING

Refer to the “Secondary Regulator Installation” figure for the following procedures:

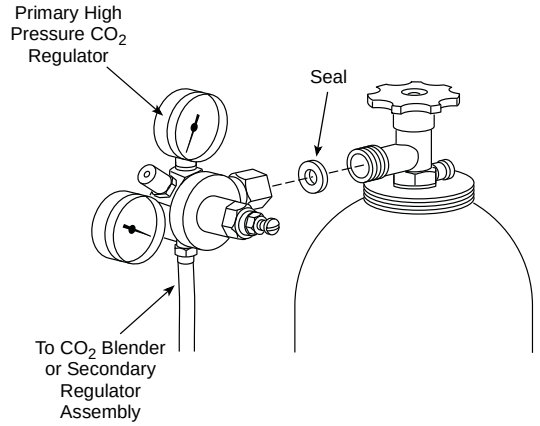
1. Mount the dual secondary regulator panel in a convenient location above the area where beer kegs will be stored.
2. Route the CO_2 gas line from the primary high pressure regulator (or gas blender) and attach to the 5/16" Barb fitting of the secondary regulator. Use two tab clamps.



Secondary Regulator Installation

3. Cut the black vinyl CO_2 gas line looped between the two regulators. Attach each CO_2 gas line to the 5/16" inlet of the tavern head (not provided). Use one tab clamp per connection.
4. Attach each of the clear vinyl beer lines to the beer outlet of the tavern head. Use one boss coupling washer, 3/8" nipple and hex nut (provided in kit) at each connection.
5. Additional dual secondary regulator kits can be placed in series from the first regulator panel. To plug the last regulator in a series of regulators, remove the Barb fitting from the regulator outlet and install the 1/4" MPT plug, provided in kit (see the “Secondary Regulator Installation” figure, View A).

NOTE: Do not adjust pressure regulators at this point. See “Conduit Kit” section for regulator adjustments.



Beermaster Blenders

N_2/CO_2 BLENDER (SINGLE — 00520182, DUAL — 00520183)

Installing

1. Decide where the N_2/CO_2 Blender Kit will be mounted.

NOTE: Be sure the panel is on a wall in a well ventilated, accessible indoor area that is out of harm's way.

2. Mount the panel on the wall.
3. Hook-up panel using thread sealant on threads and a back-up wrench on panel fittings.

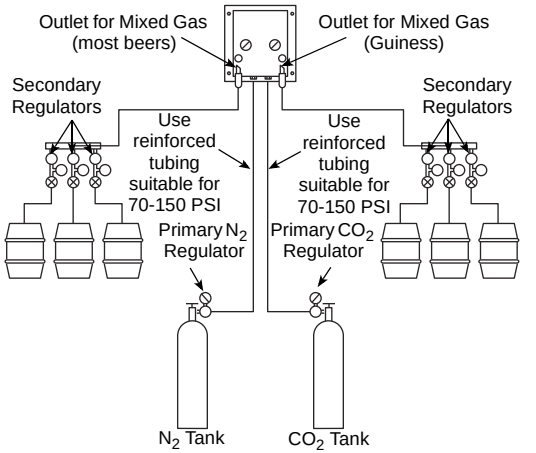
NOTE: Do not use fittings with check valve on inlets. Do not remove 1/4" female threaded fittings from panel, as they contain filters.

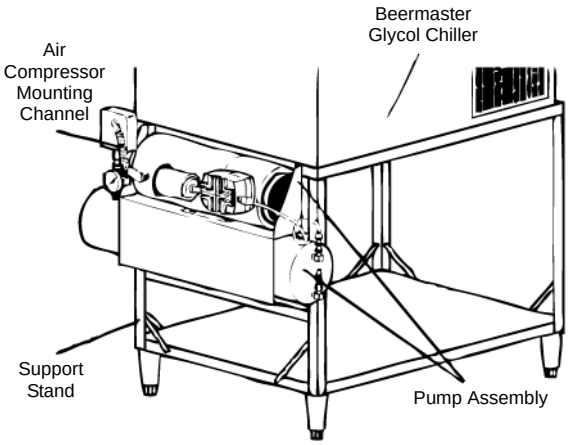
4. Test all fittings for leaks.
5. Use regulators and tubing suitable for 70 – 150 PSI.

NOTE: Regulators set at 50 PSI are suitable on a 50 PSI blender.

6. Secure all cylinders to the wall.

NOTE: Store cylinders in a well ventilated, accessible area.





Beermaster Low CO_2 Alarm Kit

The following instructions cover the installation procedures for installing the Beermaster Low CO_2 Alarm Kit. Installation should be performed by qualified personnel.

INSTALLING THE LOW CO_2 ALARM KIT

1. Turn OFF CO_2 at the CO_2 tank and bleed all pressure from line.
2. Locate the 1/4" x 1/4" x 1/4" stainless steel tee supplied with the alarm kit. Install this tee in the CO_2 pressure line between the high pressure regulator and the medium pressure regulator. Use two tab clamps per connection (refer to the figure below).

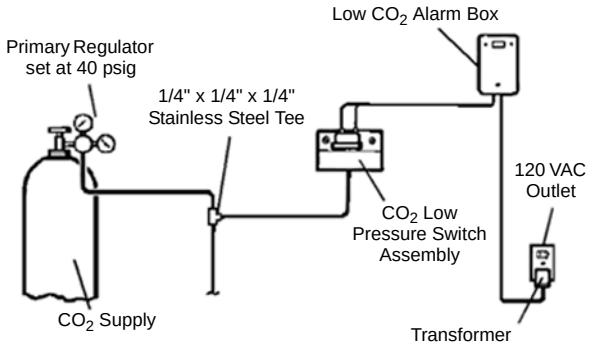
NOTE: If beer system is equipped with an blender, tee must be installed upstream of the blender.

3. Locate the alarm box and transformer supplied with kit. Mount the alarm box in a convenient location near the CO_2 pressure switch. Place slide switch on face of alarm box to “Beeper off” position.

4. Neatly route the two conductor cables of the alarm box to the low pressure switch and attach to the terminal of the pressure switch (refer to the figure below).

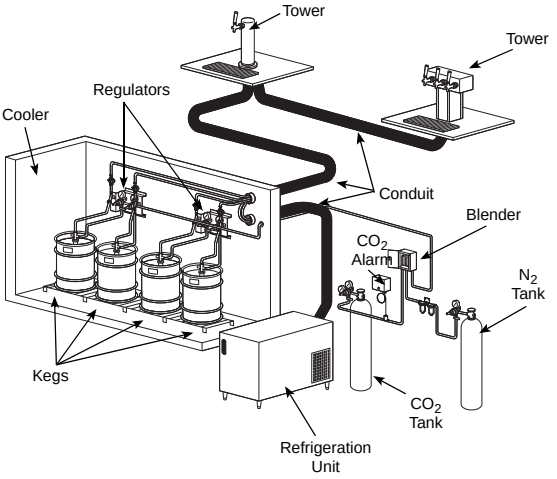
NOTE: Gray cable connector may be shortened.

5. Plug alarm box transformer into 120 VAC, 60 Hz outlet. The CO_2 alarm “Low Pressure” light should illuminate.
6. Turn ON CO_2 at the CO_2 tank. Adjust pressure to 40 psig. Slide the switch to “Normal Operation” position; beeper will sound. Press switch to “Test/Reset” position; light will extinguish and beeper will stop.
7. Installation is complete.



Component Identification

Typical System



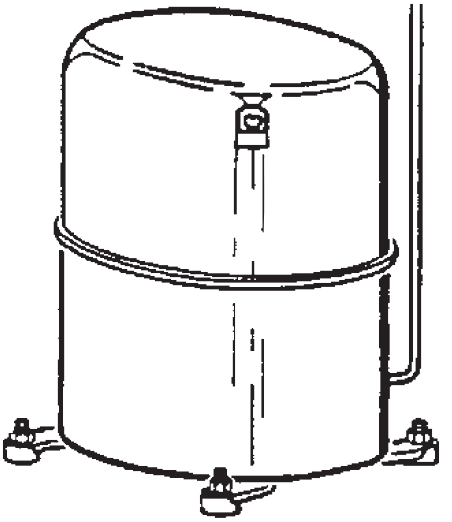
Compressor

FUNCTION OF THE COMPRESSOR

Refrigeration pump which draws a low pressure gas on the cooling side of the refrigeration cycle and squeezes or compresses the gas into high pressure on the condensing side of the cycle.

FAILURE OF THE COMPRESSOR

An inoperative or weak compressor would adversely affect the capability of the unit to chill glycol.



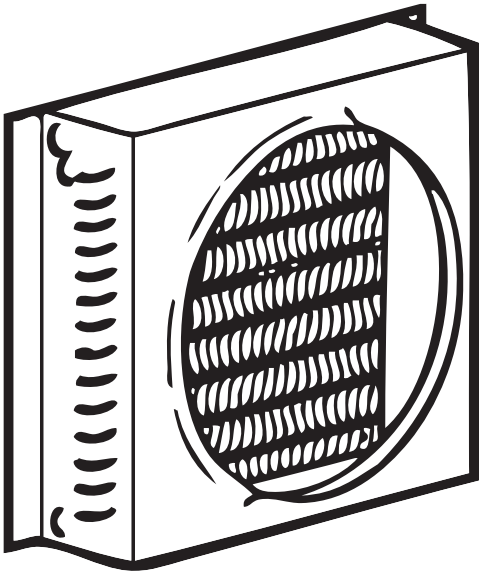
Condenser

FUNCTION OF THE CONDENSER

A heat exchanger which transfers heat from the refrigerant to the surrounding air.

FAILURE OF THE CONDENSER

A non-operational fan/motor or restricted condenser will reduce the cooling efficiency of the refrigeration unit.



Air Cooled Condenser

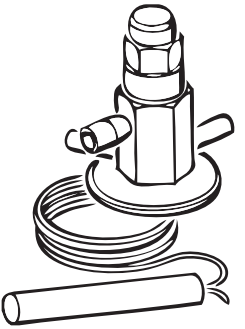
Cap Tube or Expansion Valve

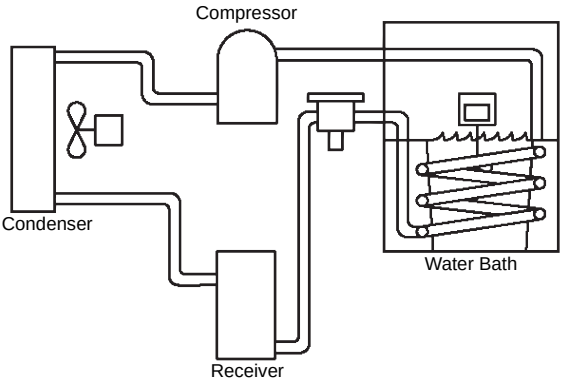
FUNCTION OF THE CAP TUBE OR EXPANSION VALVE

The cap tube or the expansion valve controls the refrigerant flow. Both controls allow the reduction of liquid refrigerant from high pressure to its evaporating pressure. The expansion valve is better suited for varying temperature conditions.

FAILURE OF THE CAP TUBE OR EXPANSION VALVE

A defective expansion valve or cap tube will not properly regulate the flow of refrigerant.





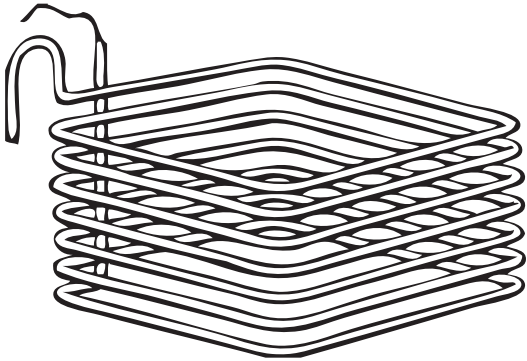
Evaporator Coil

FUNCTION OF THE EVAPORATOR COIL

Coil in the glycol bath in which refrigerant vaporizes and absorbs heat, chilling the bath.

FAILURE OF THE EVAPORATOR COIL

This copper tube assembly is extremely reliable.



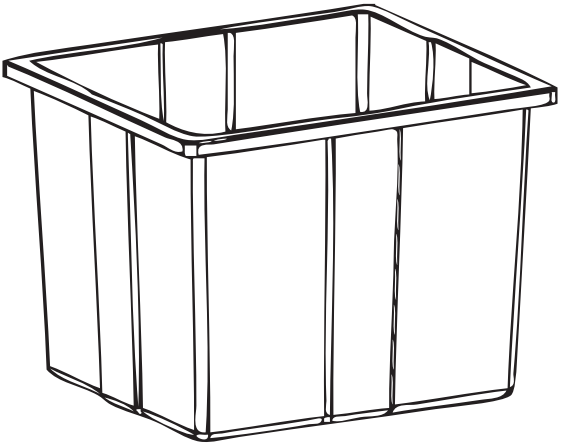
Glycol Bath

FUNCTION OF THE GLYCOL BATH

Water and glycol reservoir, providing an efficient method of removing heat.

FAILURE OF THE GLYCOL BATH

If not maintained and glycol is allowed to dilute, ice may form, reducing efficiency.



NOTE:

- Three parts water to one part glycol (3:1)
- 17° to 22° on a sugar refractometer
- -10°F on an antifreeze tester

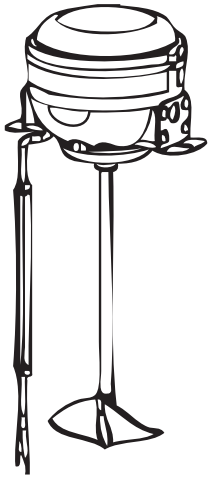
Agitator

FUNCTION OF THE AGITATOR

Agitates the glycol in the glycol bath to distribute heat load and keep the bath a consistent temperature.

FAILURE OF THE AGITATOR

An inoperative agitator will warm beer during busy times, causing foaming at the dispensing faucet.



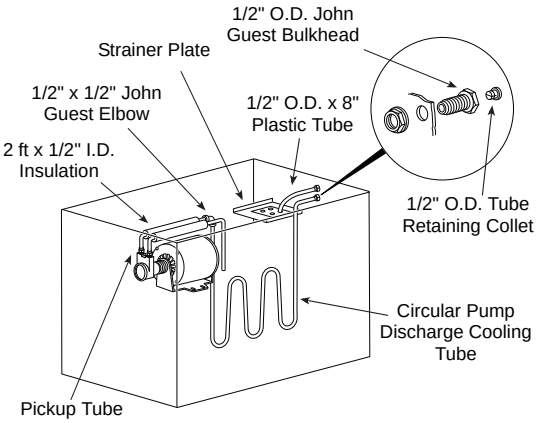
Circulating Pump/Motor

FUNCTION OF THE CIRCULATING PUMP/MOTOR

Circulates glycol from the glycol bath through the conduit, up to the dispensing faucet and back to the bath, maintaining the temperature of the beer.

FAILURE OF THE CIRCULATING PUMP/MOTOR

A weak or defective circulating pump or motor will cause warm beer and foaming at the dispensing faucets.



NOTE:

- Brass Pump
- No strainers in pumps
- 70 GPH pumps

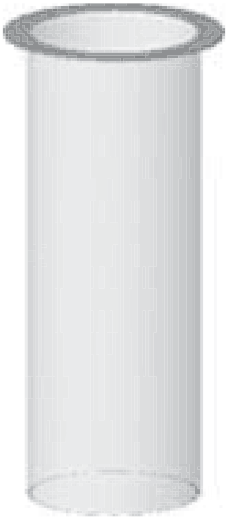
Glycol Bath Strainer

FUNCTION OF THE GLYCOL BATH STRAINER

Keeps debris from continually recirculating throughout the glycol system.

FAILURE OF THE GLYCOL BATH STRAINER

Can restrict the flow of glycol back into the water bath, overflowing the strainer.



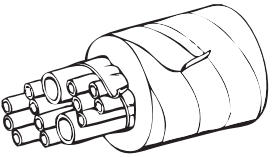
Conduit

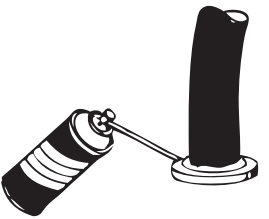
FUNCTION OF THE CONDUIT

Insulated beverage tubing used to move and maintain cold beer and glycol from the refrigeration unit to the dispensing station.

FAILURE OF THE CONDUIT

Temperature will not be maintained and condensation may develop if the conduit is improperly insulated or if the insulation becomes saturated.





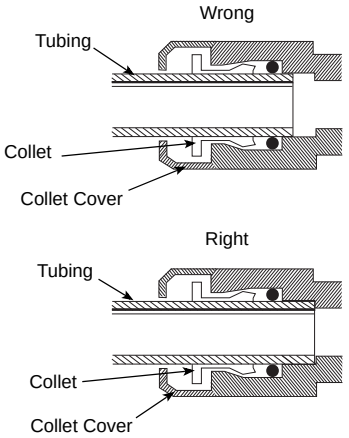
John Guest Fittings

FUNCTION OF THE JOHN GUEST FITTINGS

Provide a “same inside diameter” connection for the beer lines, causing a minimal or no amount of agitation to the beer, reducing foaming. Also are used for the glycol lines in series with the conduit tubing to provide quick and easy connections for the glycol circuit.

FAILURE OF THE JOHN GUEST FITTINGS

These are very reliable fittings when installed properly. The tubing must be cut with a razor type blade to ensure tubing will not be crushed when cutting. The tubing must be pushed completely into the fitting.



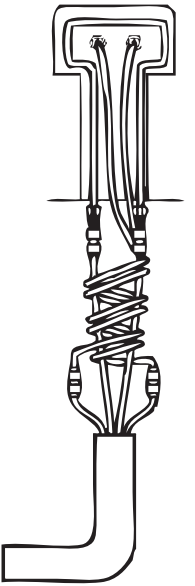
Restriction Line

FUNCTION OF THE RESTRICTION LINE

Reduces the flow of beer from the faucet. Used with the pressure adjustment to the keg to balance the system, giving a proper foam-free beer flow from each dispensing faucet.

FAILURE OF THE RESTRICTION LINE

If the length is not correct will cause foaming at the dispensing faucets.



NOTE: If too long can cause slow flow. Standard flow rate is 2 oz/sec.

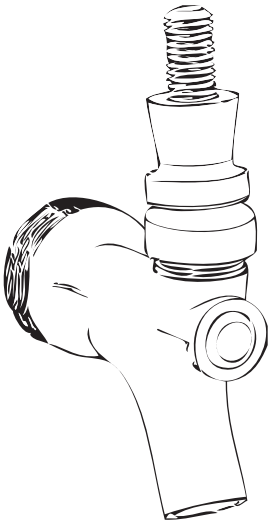
Dispensing Faucet

FUNCTION OF THE DISPENSING FAUCET

To dispense cold beer with very little agitation and the proper head.

FAILURE OF THE DISPENSING FAUCET

Will dispense inferior beer with excessive foam.



NOTE: If dirty inside or worn or swollen gaskets can cause foaming.

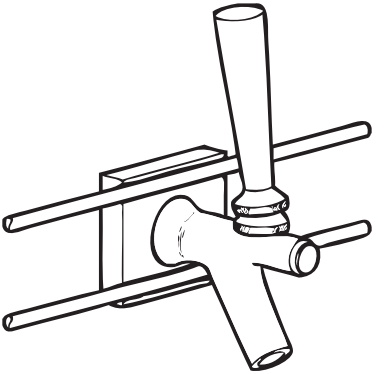
Heat Exchanger

FUNCTION OF THE HEAT EXCHANGER

Provides the heat exchange between the glycol circuit and the dispensing faucet keeping every beer cold.

FAILURE OF THE HEAT EXCHANGER

If heat exchanger is not in direct contact with the dispensing faucet and the glycol circuit, it could cause warm beer after slow or quiet periods.



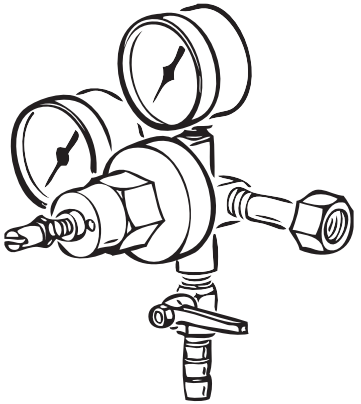
High Pressure Regulator

FUNCTION OF THE HIGH PRESSURE REGULATOR

Regulates the CO_2 tank pressure to maintain a constant 40 psi (2.8 bar) to the secondary regulators, to push the beer from the kegs.

FAILURE OF THE HIGH PRESSURE REGULATOR

Low pressure or a sluggish regulator can cause pressure variations and different flow rates at the dispensing faucet. High pressure or a creeping regulator will cause the relief valve to relieve.



NOTE: 55 psi (3.8 bar) relief

⚠ Caution

Soda regulators should **never** be used for beer.

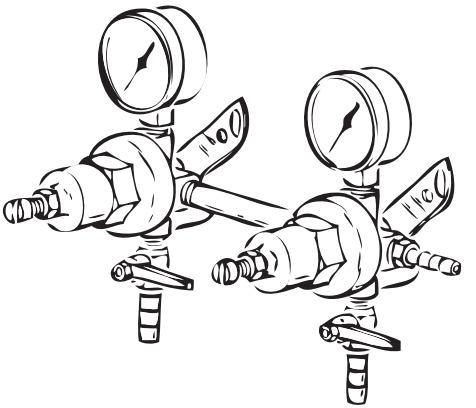
Secondary Regulator

FUNCTION OF THE SECONDARY REGULATOR

Regulates the CO_2 or blended CO_2 and air or blended gas used to push the beer.

FAILURE OF THE SECONDARY REGULATOR

Any fluctuations in pressure will cause beer to be dispensed with excessive foam.



NOTE: 55 psi (3.8 bar) relief

⚠ Caution

Soda regulators should **never** be used for beer.

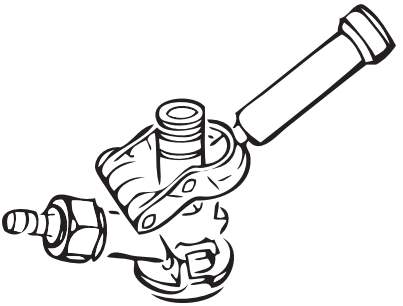
Tavern Head

FUNCTION OF THE TAVERN HEAD

Attaches to the keg and provides the pressure inlet and beer outlet from the keg.

FAILURE OF THE TAVERN HEAD

If defective or worn will leak and/or not allow beer to leave the keg properly.



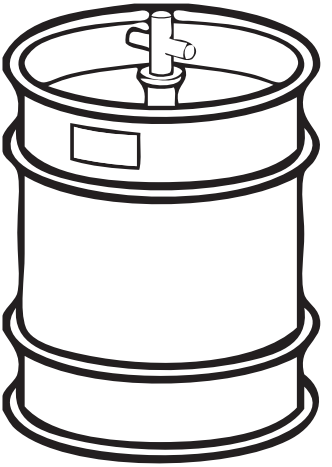
Keg

FUNCTION OF THE KEG

Container that holds the pressurized beer.

FAILURE OF THE KEG

Must be properly chilled and not agitated before dispensing.



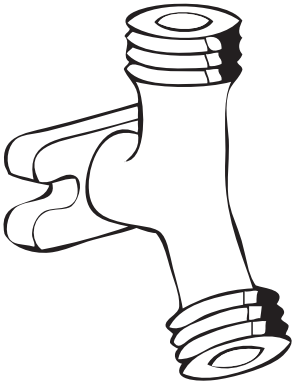
Wall Bracket

FUNCTION OF THE WALL BRACKET

A wall mounted connection point for the tubing coming from the flexible tavern head, connecting to the fixed beer line in the conduit.

FAILURE OF THE WALL BRACKET

This metal fitting is extremely reliable.



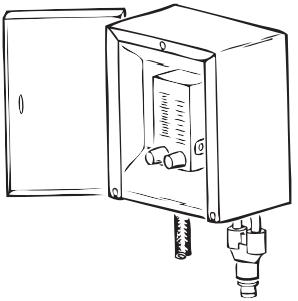
Blender

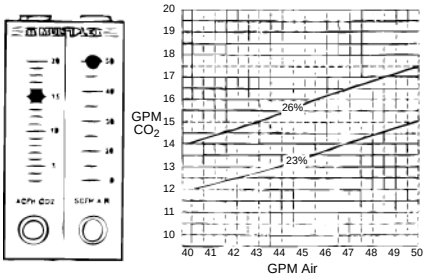
FUNCTION OF THE BLENDER

Metering device that blends air or nitrogen with CO_2 to supply pressure to the beer, reducing the chance of changing the amount of carbonation in the beer.

FAILURE OF THE BLENDER

If not blended properly could cause over or under carbonation in the beer.





NOTE:

- Air and CO_2 adjusted to 40 psi (2.8 bar).
- Desired Air/CO_2 mixture should have 23% to 26% CO_2. The graph on the right can be used as a guide to determine if setting falls in the recommended range.

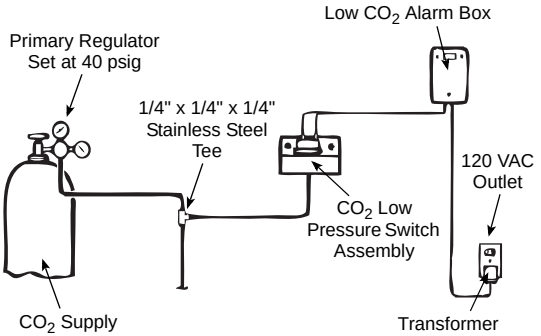
Low CO_2 Alarm

FUNCTION OF THE LOW CO_2 ALARM

Sounds an alarm when the CO_2 tank is empty.

FAILURE OF THE LOW CO_2 ALARM

When you lose CO_2 pressure you will not have pressure to push the beer. With blended gas, if only air is supplied to the blender the beer in the kegs could loose carbonation.



This Page Intentionally Left Blank

Major Components

DISPENSING STATIONS

Daily (365 Times per Year)

- Take temperature of beer. Pour off the first glass and take the temperature of the second glass of beer. The proper temperature of the dispensed beer is 36°F (2.2°C) to 40°F (4.4°C).
- Flush all dispenser drains, pour hot water down drains at closing.

BEVERAGE CONDUITS

Every 4 Months (3 Times per Year)

- Inspect floor chases and seal any open chase ends.
- Inspect beverage conduits for damage. Re-insulate and seal any un-insulated areas.

REFRIGERATION UNIT

Every 4 Months (3 Times per Year)

- Clean the refrigeration unit air cooled condenser using a vacuum cleaner.
- Inspect glycol bath, verify level of glycol solution is to fill mark. If below mark, add food grade glycol solution to bring level back up to mark.
- Clean out all glycol pump strainers.
- Check the temperature difference between the discharge and return glycol lines at the glycol bath. It should be within 3°. Verify proper pump efficiency and temperature control displays between 27°F (-2.7°C) and 29°F (-1.6°C).
- Inspect agitator motor and ensure proper operation.

GAS BLENDER

Every 4 Months (3 Times per Year)

- Inspect gas blender and verify CO_2 and air flow meters are set at the proper flow rate. Adjust if necessary.

CO_2 GAS SUPPLY

Every 4 Months (3 Times per Year)

- Inspect pressure setting at CO_2 high pressure regulator. Verify proper 40 PSI (2.8 bar) pressure setting. Adjust if necessary.
- Inspect all secondary beer regulators. Verify proper pressure settings. Adjust if necessary.
- Inspect system for CO_2 leaks. Repair as required.
- Inspect Beer Pumps.

Scheduled Frequency

Daily (365 Times per Year)

- Take temperature of beer. Pour off the first glass and take the temperature of the second glass of beer. The proper temperature of the dispensed beer is 36°F (2.2°C) to 40°F (4.4°C).
- Flush all dispenser drains, pour hot water down drains at closing.

Monthly (12 Times per Year)

- Drain condensate water from air compressor tank and filters.

Every 4 Months (3 Times per Year)

- Inspect floor chases and seal any open chase ends.
- Inspect beverage conduits for damage. Re-insulate and seal any un-insulated areas.
- Inspect Beer Pumps.
- Inspect secondary air pressure regulator setting to blender, verify proper 40 PSI (2.8 bar) pressure setting. Adjust if necessary.
- Inspect system for air leaks, repair as required.
- Inspect gas blender and verify CO_2 and air flow meters are set at the proper flow rate. Adjust if necessary.
- Inspect pressure setting at CO_2 high pressure regulator. Verify proper 40 PSI (2.8 bar) pressure setting. Adjust if necessary.
- Inspect all secondary beer regulators. Verify proper pressure settings. Adjust if necessary.
- Inspect system for CO_2 leaks. Repair as required.

Shipping, Storage and Relocation

⚠ Caution

Before shipping, storing, or relocating this unit, beer systems must be sanitized. After sanitizing, all liquids (sanitizing solution and water) must be purged from the unit. A freezing environment causes residual sanitizing solution or water remaining inside the unit to freeze, resulting in damage to internal components.

Operation

How the Multiplex Works

The refrigeration units are remote refrigeration units that derive their peak capacity from the water/glycol bath. A tower is used to dispense the beer at the desired location. Conduit (an insulated bundle of tubing) connects the refrigeration unit and kegs of beer to the tower. The conduit has the beer and glycol lines wrapped together and the glycol is circulated to keep the beer in the conduit lines cold. The refrigeration system is controlled by a sensing bulb located on an adjustable bracket in the glycol bath. Depending on the setpoint of the temperature control, the refrigeration system cycles ON and OFF as the temperature of the glycol bath changes.

Start-up

PLACING EQUIPMENT IN OPERATION

Before placing equipment in operation, verify that all requirements for roof mounted Remote Condenser Units (if applicable) have been satisfied. Refer to the instructions on installing the Remote Condenser.

UNITS WITH ROCKER SWITCHES (ETC CONTROLS)

1. Fill the refrigeration unit bath tank with (3:1) water/glycol mix to within 1/2" (1.27 cm) of the top of the overflow tube.
2. Turn on the rocker switch labeled “Refrigeration” to begin cooling the glycol and energize the agitator motor in the glycol bath.
3. The water/glycol bath will reach it’s operating temperature within 2 to 4 hours.
4. If optional CO_2/N_2 Control Panel has been installed, refer to the installation instructions for operation and testing the circuits for leaks.
5. All circuits must be checked for leaks and possible cross circuits before turning ON.

6. Turn on the rocker switches for the circulating pumps.
7. Add glycol/water mix as needed to maintain correct bath level.

Units with Touch Pad (ERC Controls)

NOTE: These units have part numbers that end with “E” and only applies to these units.

1. Fill the refrigeration unit bath tank with (3:1) water/ glycol mix to within 1/2" (1.27 cm) of the top of the overflow tube.
2. Press “Comp/Agit” to begin chilling the water/ glycol bath.
3. The water/glycol bath will reach its operating temperature within 2 to 4 hours.
4. If optional CO_2/N_2 Control Panel has been installed, refer to the installation instructions for operation and testing the circuits for leaks.
5. All circuits must be checked for leaks and possible cross circuits before turning ON.

NOTE: All pumps on a beer unit are factory programmed as circulating pumps.

CIRC A	CIRC 1
CIRC B	CIRC 2
CARB B	CIRC 3
CARB A	CIRC 4

6. In a beer unit temperature control is factory set to come on at 27°F (off at 29°F, 2°F differential)

Sequence of Operation

ELECTRONIC TEMPERATURE CONTROL (ETC)

The Electronic Temperature Control (ETC) has been factory preset and tested. The ETC will turn the refrigeration compressor on and off to maintain the glycol bath temperature between 27°F (-2.7°C) and 29°F (-1.6°C). This is considered the best temperature range for most beer cooling applications. The front panel of the ETC has a liquid crystal display (LCD) and an output relay indicator light-emitting diode (LED). The LCD is visible through a “window” in the cover panel. The LED is visible only when the cover panel is removed.

During normal operation, the LCD displays the glycol bath temperature and an icon (*) indicating the cooling mode. The LCD will also display various codes for programming and for indicating faults. Programming is factory set and locked into the ETC. The following fault codes are defined with associated remedial action:

Fault Code	Definition	Solution
SF flashing alternately with OP sensor	Open temperature sensor or sensor wiring.	Check sensor wiring. Turn wiring power OFF and ON to reset control. Replace sensor.
SF flashing alternately with SH	Shorted temperature sensor or sensor wiring	Check sensor wiring. Turn wiring power OFF and ON to reset control. Replace sensor.
EE	Program failure	Reset control by pressing the Menu button. If problems persist, replace the control.

PROGRAMMING A REPLACEMENT ELECTRONIC TEMPERATURE CONTROL

These instructions apply to programming a Johnson A419 Electronic Temperature control for cooling mode application in a Multiplex Beermaster system. Replacement controls are not pre-programmed at the factory; thus, the following programming steps are required.

Hook-up

The following to be performed/checked prior to power being applied to control:

1. Loosen four cover screws and remove cover to make wiring connections.
2. Refer to unit wiring diagram to connect input power and load wiring. Note: Sensor wires to be connected to two lower terminals of upper left terminal strip.
3. Ensure jumper on P5 is in “Keypad Unlocked” position. (Both pins covered)
4. Ensure jumpers on P4 are in “Cooling Mode, Cut-in at Setpoint” position. (Only one pin on both jumps covered)
5. Re-attach cover loosely. (It will be removed again after programming.)

Programming

The following to be performed when power is applied to control:

1. Press and hold the MENU button until display changes to flashing SP. (This will take about two seconds)
2. Press the MENU button to display the current value. (30)
3. Press the Down ↓ button to change the display to 29.
4. Press the MENU button to save the new value.
5. Press and hold the MENU button until display changes to flashing SP.
6. Press the Up ↑ button until the display changes to dIF.

7. Press the MENU button to display the current value. (5)
8. Press the Down ↓ button to change the display to 2.
9. Press the MENU button to save the new value.
10. Press and hold the MENU button until display changes to flashing SP.
11. Press the Down ↓ button until the display changes to SF.
12. Press the MENU button to display the current value. (1)
13. Press the Down ↓ button to change the display to 0.
14. Press the MENU button to save the new value.
15. Remove cover and place jumper on P5 in "Keypad Locked" position. (One pin exposed)
16. Replace and secure cover. Control is programmed, locked, and ready to operate.

ELECTRONIC REFRIGERATION CONTROL (ERC)

NOTE: These units have part numbers that end with "E" and only applies to these units.

Prerequisites

- The glycol bath must cover the evaporator and low level probe.

Initial Power-up Delay

The control has a 30-second delay when power is connected, or disconnected and reconnected. The display will show Pd (power delay) and the seconds left in the countdown cycle.

Normal Circuit Operation

Pressing the COMP/AGIT button will start the water/glycol bath agitator immediately and initiate a 180 second compressor delay. The display will show Cd99 (compressor delay & 99 seconds) and will start to count down from 99 seconds after the first 81 seconds have elapsed. After 180 seconds the compressor and condenser fan motor energize and the COMP/AGIT LED will start flashing. Pressing any of the CIRC A, CIRC B, CARB B, or CARB A buttons will immediately

energize the circulating pumps and turn on their respective LEDs constantly. The display will show the water/glycol bath temperature.

The compressor and condenser fan will continue to run until set temperature is reached. Once reached the compressor and condenser fan will turn off and the LED will change from flashing to constantly on to display that there is power. A 2°F rise above the set temperature will cause the compressor and condenser fan on again. This cycle will repeat as required depending on load.

Power Interruption

During a power interruption the control will resume from the point of interruption when power is reapplied and the time delay expires. Any switches/components that were energized when power was interrupted will be energized when power is reapplied.

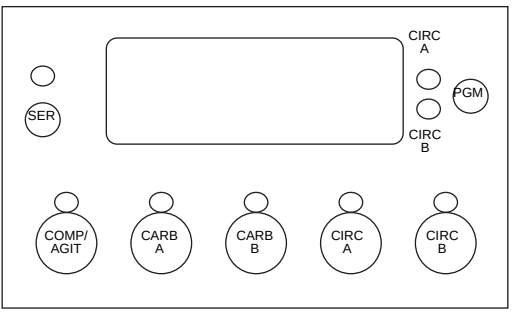
Error Codes

E3 = Water/Glycol mix too low, add mix

E4 = Water/Glycol temp too high (>45°F)

E6 = High refrigeration temperature

NOTE: Error codes will display until corrected.



Control Programming

There are 4 programming modes:

1. View conductivity
2. Add additional (third or fourth) circulation pumps
3. Set water/glycol temperature
4. Temporarily cancel display of error codes

SER Switch

- LED is energized when LON communication network is connected.
- LED is de-energized when LON communication network is disconnected.

PGM Switch

- Used to enter and exit programming modes. To enter, press and hold switch for 3 seconds.

PROGRAM MODE 1

- **0001** will display indicating Mode 1
- Wait 3 seconds **C000** will display
- Press and hold CIRC A switch — Display will indicate water/glycol bath probe conductivity:
  - **CL0** — Water/Glycol mix too low
  - **CL1** — Water/Glycol mix high enough

Press and hold PGM switch for 3 seconds to exit program mode**.**

PROGRAM MODE 2

Add circulation pumps C & D.

- Press PGM button for 3 seconds — Display shows **0001**.
- Press PGM button — Display shows **0002** program mode 2.
- Wait 3 seconds — Display shows **-002** = Factory default setting.
  - Pressing CIRC A button energizes/ de-energizes pump A
  - Pressing CIRC B button energizes/ de-energizes pump B

- Program CIRC C — Press CARB A button — Display shows **-102** = Carb A button energizes/ de-energizes pump C
- Program CIRC D — Press CARB B button — Display shows **-012** = Carb B button energizes/ de-energizes pump D

Press and hold PGM switch for 3 seconds to save settings and exit program mode.

PROGRAM MODE 3

Set water/glycol temperature

- Press PGM button for 3 seconds — Display shows **0001**.
- Press PGM button twice in less than 3 seconds to enter program mode 3 — Display shows **0003**
- Wait 3 seconds, display shows **1273**.
  - 1 = thermistor controlled temperature
  - 27 = 27°F factory default temperature setpoint
  - 3 = program mode 3
- Decrease setpoint — Press CIRC B button
- Increase setpoint — Press CIRC A button
- Differential is 2°F above the set point.

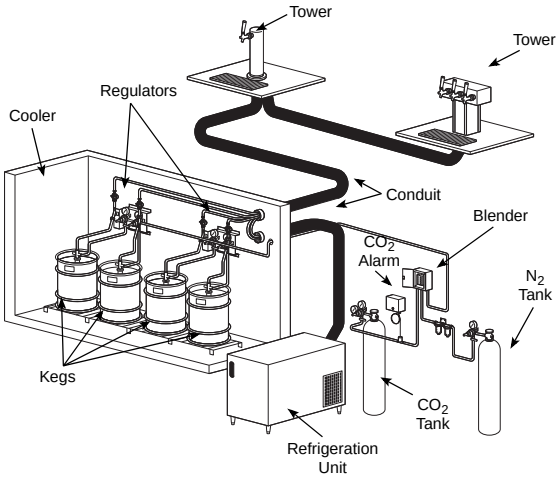
  EXAMPLE: At 27°F (set point) the compressor is off but at 29°F (set point +2°F) the compressor is on.
- Press and hold PGM switch for 3 seconds to save settings and exit program mode.

PROGRAM MODE 4

Temporarily cancel display of error codes. Cancelling the error codes allows circulating glycol temperatures to be displayed until the error can be corrected.

- Press PGM button for 3 seconds — Display shows **0001**.
- Press PGM button three times — Display shows **0004** program mode 4.
- Wait 3 seconds — Display shows **-004** = All error codes will be displayed during run mode.
- Press COMP/AGIT button once — Display shows **---4** = error codes will not be displayed during run mode.

NOTE: Disconnecting and reconnecting main power will reset the control board to the factory setting -004 = Error codes will be displayed in the run mode



Multiplex Beermaster System Operation and Layout

Equipment Setup and Close Procedure

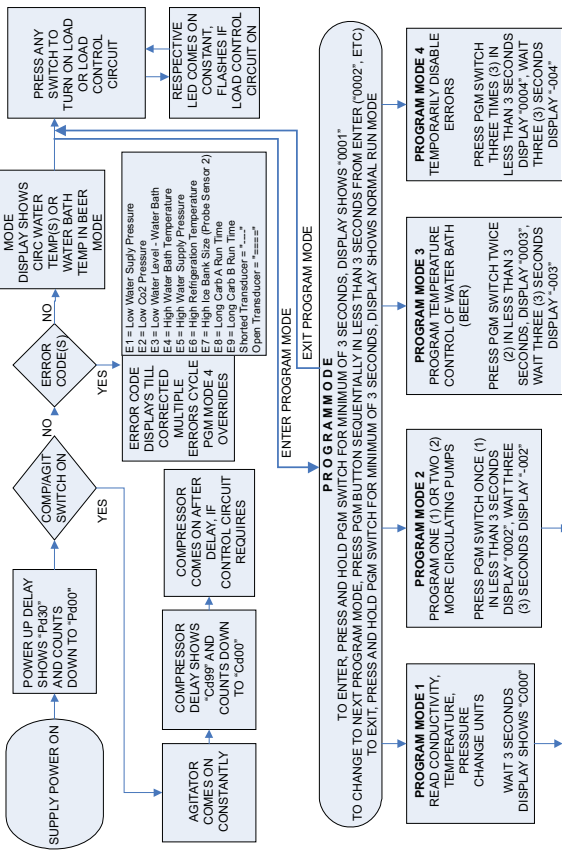
EQUIPMENT SETUP PROCEDURE

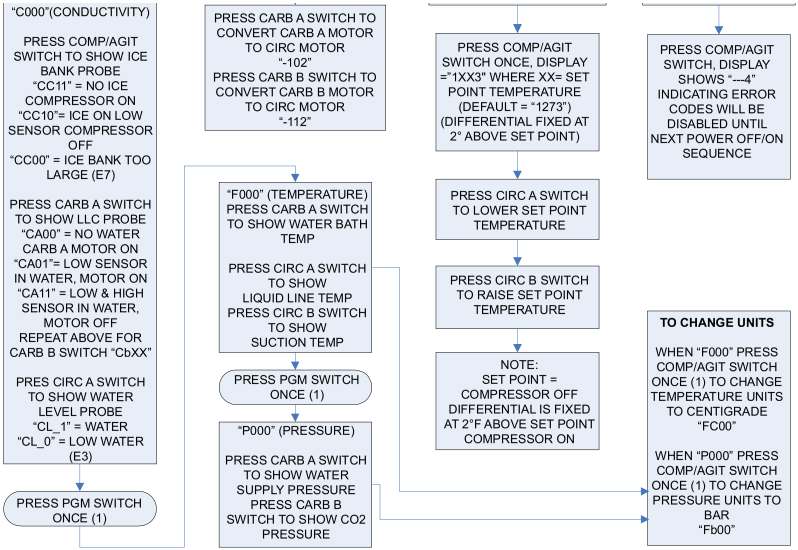
1. Observe pressure of CO_2 high pressure tank of 500 PSI (34 bar) or more, or bulk CO_2 tank of 150 PSI or more. Primary regulator set at 90 PSI (6 bar) and the secondary regulator set at 35-40 PSI (2.4-2.6 bar) depending on the type of beer.
2. Observe the control panel to verify that all pressure gauges are set at correct operating pressures.
3. Check the kegs to make sure a sufficient number of kegs are connected in series to satisfy business volume.
4. Clean beer inlet and outlet quick disconnects at the same time tanks are replaced. Rinse disconnects in clean potable water.

EQUIPMENT CLOSE PROCEDURE

1. Clean the underside of the dispensing tower around the nozzle area with a clean damp towel.
2. Pour at least 60 oz (1.8 liters) of warm water down the drain openings.

MULTIPLEX ELECTRONIC REFRIGERATION CONTROL (ERC) PROGRAMMING





"C000"(CONDUCTIVITY)
PRESS COMP/AGIT SWITCH TO SHOW ICE BANK PROBE
"CC11" = NO ICE COMPRESSOR ON
"CC10"= ICE ON LOW SENSOR COMPRESSOR OFF
"CC00" = ICE BANK TOO LARGE (E7)
PRESS CARB A SWITCH TO SHOW LLC PROBE
"CA00" = NO WATER CARB A MOTOR ON
"CA01"= LOW SENSOR IN WATER, MOTOR ON
"CA11" = LOW & HIGH SENSOR IN WATER, MOTOR OFF
REPEAT ABOVE FOR CARB B SWITCH "CbXX"
PRES CIRC A SWITCH TO SHOW WATER LEVEL PROBE
"CL_1" = WATER
"CL_0" = LOW WATER (E3)
PRESS PGM SWITCH ONCE (1)
PRESS CARB A SWITCH TO CONVERT CARB A MOTOR TO CIRC MOTOR "-102"
PRESS CARB B SWITCH TO CONVERT CARB B MOTOR TO CIRC MOTOR "-112"
"F000" (TEMPERATURE) PRESS CARB A SWITCH TO SHOW WATER BATH TEMP
PRESS CIRC A SWITCH TO SHOW LIQUID LINE TEMP
PRESS CIRC B SWITCH TO SHOW SUCTION TEMP
PRESS PGM SWITCH ONCE (1)
"P000" (PRESSURE)
PRESS CARB A SWITCH TO SHOW WATER SUPPLY PRESSURE
PRESS CARB B SWITCH TO SHOW CO2 PRESSURE
PRESS COMP/AGIT SWITCH ONCE, DISPLAY ="1XX3" WHERE XX= SET POINT TEMPERATURE (DEFAULT = "1273") (DIFFERENTIAL FIXED AT 2° ABOVE SET POINT)
PRESS CIRC A SWITCH TO LOWER SET POINT TEMPERATURE
PRESS CIRC B SWITCH TO RAISE SET POINT TEMPERATURE
NOTE: SET POINT = COMPRESSOR OFF DIFFERENTIAL IS FIXED AT 2°F ABOVE SET POINT COMPRESSOR ON
PRESS COMP/AGIT SWITCH, DISPLAY SHOWS "---4" INDICATING ERROR CODES WILL BE DISABLED UNTIL NEXT POWER OFF/ON SEQUENCE
TO CHANGE UNITS
WHEN "F000" PRESS COMP/AGIT SWITCH ONCE (1) TO CHANGE TEMPERATURE UNITS TO CENTIGRADE "FC00"
WHEN "P000" PRESS COMP/AGIT SWITCH ONCE (1) TO CHANGE PRESSURE UNITS TO BAR "Fb00"

Troubleshooting

Foreword

This Troubleshooting Guide has been developed to assist you in determining what the probable cause for any particular problem you may experience with your Multiplex Beermaster Beverage System could be. It then advises of the proper corrective action to be taken to remedy that problem.

Because of the ever present danger from electrical shock, and the existence of high pressure water and gas on the system, it is strongly recommended that only qualified service personnel perform actual repairs.

Under each of the sections, Section 1: Restriction and Section 2: Beermaster Glycol Chiller System, you'll first find the problem listed in bold type starting on the left margin. It will be followed by three headings also in bold type and each with its own column. The first is a "Qualifier" which is designed to quickly qualify or eliminate the "Symptoms" listed to the right and below the qualifying statement. For example, under Section 2: Glycol Chiller System, you'll find "Too little restriction" for the same problem, "A recovery problem..."; "Since the recovery problem symptoms simulate a low pressure problem,...". Each asking you to determine if "beer had been drawn" before proceeding to the second column "Symptoms". Not all problems have recovery problems. For those that do, first examine each one listed below "Qualifier" before continuing through "Symptoms". The third heading, "Corrective Steps" (found on the far right margin), will direct you in determining if the symptoms are actually responsible for the problem and what should be done to remedy the problem.

On occasion, you'll find "Note" and "Caution" statements which have been included to make special references to items which frequently are misunderstood or ignored.

This guide is intended to assist you in locating the cause of a problem. It is not, however, to be considered a service and repair manual in that Multiplex models vary in design.

It has been written to encompass all model Beermaster Glycol Chillers. Some differences from model to model will become obvious and it will be required of the reader to apply this guide to each unit.

Checklist

If a problem arises during operation of your refrigeration unit, follow the checklist below. Routine adjustments and maintenance procedures are not covered by the warranty.

⚠ Warning

Only trained and certified electrical and plumbing technicians must service this unit. All wiring and plumbing must conform to national and local codes.

⚠ Warning

The unit should be unplugged when servicing, except when electrical tests are required.

Use extreme care during electrical circuit tests. Live circuits may be exposed.

Problem	Possible Cause	To Correct
Section 1: Restriction		
Too little restriction		
Too much or too little restriction in a draught beer system will cause drawing problems. If draught beer system does not have enough restriction it may cause the following problems:		
A recovery problem simply means that the beer is leaving the beer line faster than the keg can fill the line. When this occurs it creates a vacuum in the keg which acts as if there was a low pressure on the beer in the keg. This causes the CO_2 to come out of the beer line causing foaming problems. (The following symptoms occur most frequently during the high volume time of day.)	When drawing one beer, the beer flows very fast.	Since the recovery problem symptoms simulate a low pressure problem, check to make sure that the CO_2 pressure in the keg is flowing and set properly.
	If a pitcher is drawn, the beer starts clear then starts to show intermittent streaks of foam followed by all foam.	Refer to your records to recheck your restriction calculation for the system. If you find your line does not have enough restriction, add the extra restriction to the 3/16" end of the beer line. If you have no records, make up a new beer line with the proper restriction and replace the existing line.
Beer draws too fast. If the beer draws clear but too fast and the pressure is properly set, there may not be enough restriction in the system.	Beer draws clear but foams in the glass.	Follow the second corrective step above.
	The beer draws too fast to satisfy the retailer and his help.	If the beer still flows too fast, continue to add more 3/16" restrictor line to the system to meet the retailer's needs.
Too much restriction		
If a draught beer system is over restricted it may cause the following problems:		
Beer draws too slow	Beer draws too slowly with little or no head.	First, ensure that the keg is properly tapped. Second, ensure that the CO_2 is set at the proper pressure and is flowing to the keg. Check the beer faucet to ensure that there is no burr by the vent hole on the inside of the faucet.
	The beer appears to flutter or swirl out of the faucet causing the CO_2 to break out of the beer and thus creating excess foam.	Systematically remove 6" of the 3/16" restrictor line until the beer flows with a full faucet and at a rate of flow desired by the retailer.

Problem	Possible Cause	To Correct
Section 2: Beermaster Glycol Chiller System		
When troubleshooting a closed remote system, one should consider the following areas:		
Temperature	Beer draws warm and is all foam.	Check coolant circulation by: • Inspecting the coolant circulation pump to ensure it is on and running. • Inspecting the coolant return line in reservoir to ensure it is circulating. Replace pump if necessary. Check coolant temperature by: • Adjusting the range from 27°F (-2.7°C) to 29°F (-1.6°C). • Fill reservoir to proper level with 3:1 glycol mix.
	No beer flows through system.	Check tap check ball and free if stuck. Check Coolant temperature. If it is less than 27°F (-2.7°C), the beer in the lines may be frozen. Turn OFF coolant compressor, then adjust coolant temperature to be between 27°F (-2.7°C) and 29°F (-1.6°C).
	First beer out always seems foamy or streaky.	Ensure that coolant line is in direct contact with the beer line right up to the back of the shank. If not, place aluminum foil between beer line and coolant line, then insulate. This will transfer the cold to the beer line.
	Beer in cooler is above 40°F (4.4°C).	Temperature of cooler ideally should be less than 38°F (3.3°C). Contact an authorized refrigeration service agency to set cooler.
	Glycol is dirty or too weak.	Clean reservoir and add new glycol solution (add new glycol to weak solution). Should give Brix on sugar refractor.
	Glycol solution is too warm.	Check outlet and inspect agitator for proper operation.

Problem	Possible Cause	To Correct
Pressure	Beer runs with streaks.	System may be under restricted. Add additional restriction to system by adding additional 3/16" I.D. vinyl tubing to the faucet end of the system.
	Beer draws great during slow time of day but turns to all foam during peak sale periods.	See above. Check regulator for proper operation. Check primary regulator to see if it allows enough CO_2 for secondary regulators. Check walk-in cooler temperature is 38°F (3.3°C) or less.
Off-taste	Beer is flat.	Adjust air blender by increasing CO_2 in blend and decreasing air in blend. Or there is no Air/CO_2 blender.
	Beer has off-taste (bitter or “skunky”).	Change air intake filters. Check for moisture in air tank. Clean system. Check air intake supply. Check air filter and trap. Ensure proper rotation of kegs in series. Check cleaning schedule for beer lines.

ETC Error Codes

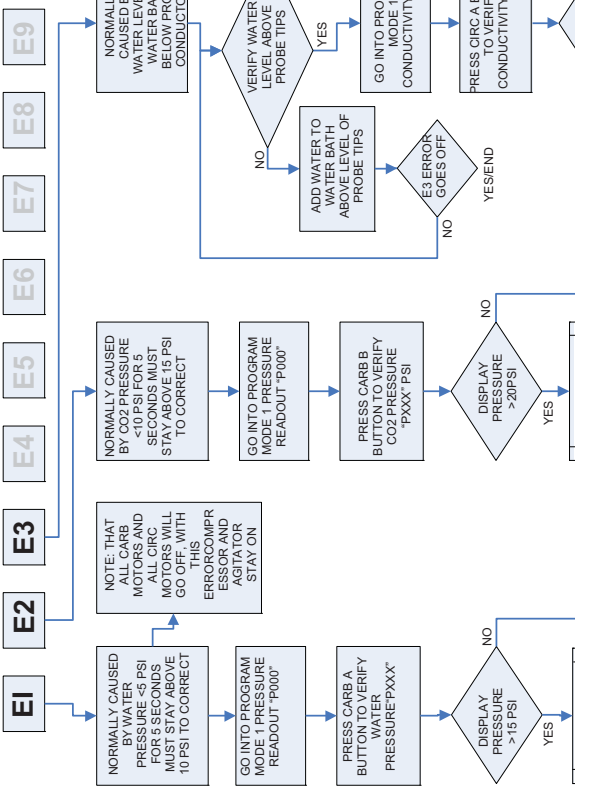
Fault Code	Definition	Solution
SF flashing alternately with OP sensor	Open temperature sensor or sensor wiring.	Check sensor wiring. Turn wiring power OFF and ON to reset control. Replace sensor.
SF flashing alternately with SH	Shorted temperature sensor or sensor wiring	Check sensor wiring. Turn wiring power OFF and ON to reset control. Replace sensor.
EE	Program failure	Reset control by pressing the Menu button. If problems persist, replace the control.

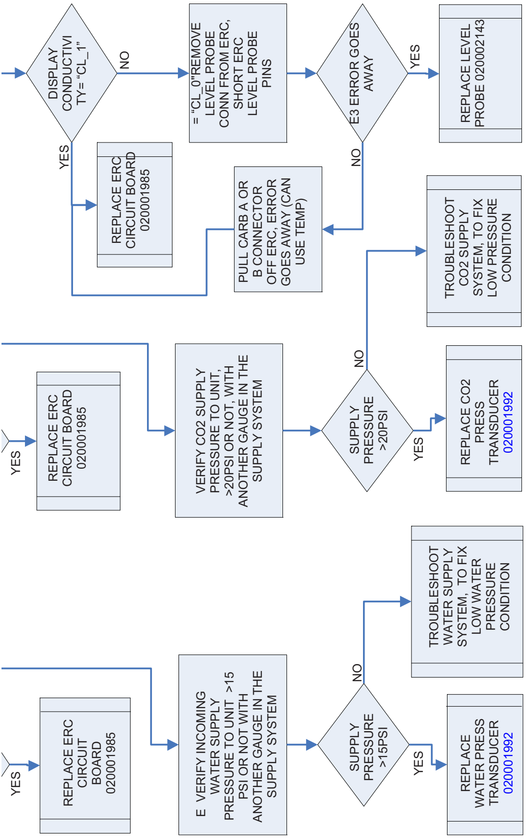
ERC Error Notes

- Error codes will interrupt the temperature display and stay active until the error is corrected.
- If multiple errors are present, the errors will rotate and display every 5 seconds.
- Resetting errors — After correcting the problem, the respective switch for the error must be cycled OFF and then ON to reset.
- Disconnecting and reconnecting power will erase all errors.

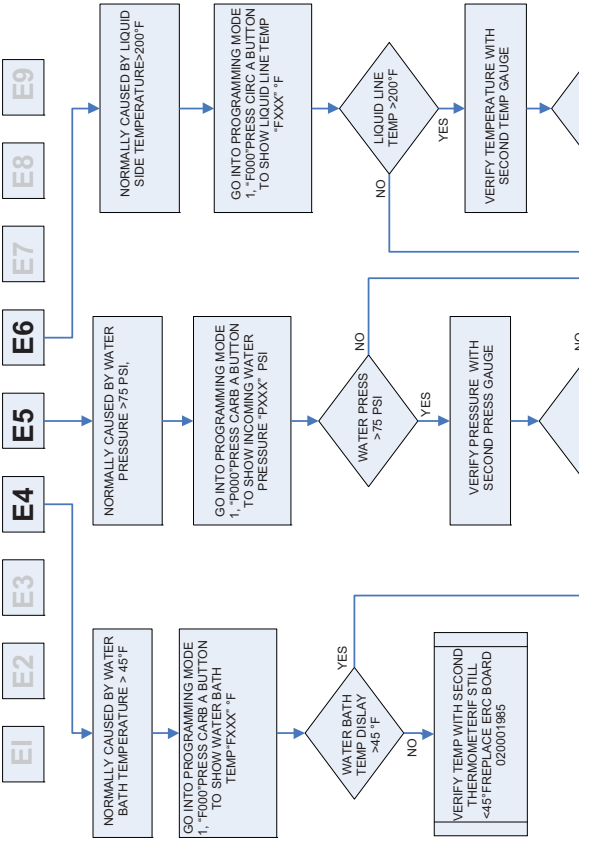
Error Code	Error	Cause
E1	Low Glycol Supply Pressure	Lower than 5 PSI for 5 Seconds
E2	Low CO_2 Pressure	Lower than 10 PSI for 5 Seconds
E3	Low Glycol Level – Glycol Bath	Must Cover Top of Evaporator
E4	High Glycol Bath Temperature	Glycol Bath Temperature Greater Than 45°F
E5	High Glycol Supply Pressure	Glycol Pressure Greater than 75 PSI
E6	High Refrigeration Temperature	Discharge Line Temperature Greater than 190°F
E7	High Ice Bank Size	Ice Contacting Center Ice Bank Probe
E8	Long Carb A Run Time	Energized for 7 Continuous Minutes
E9	Long Carb B Run Time	Energized for 7 Continuous Minutes

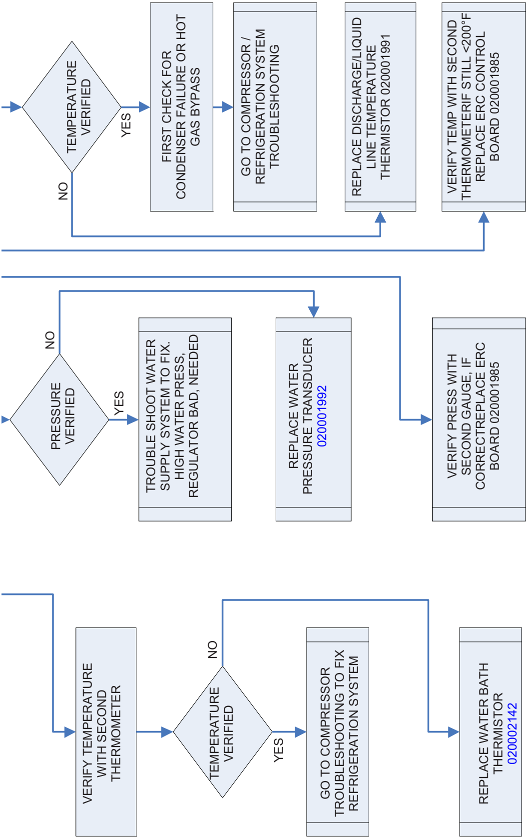
ERROR CODES E1, E2, & E3 FLOWCHART



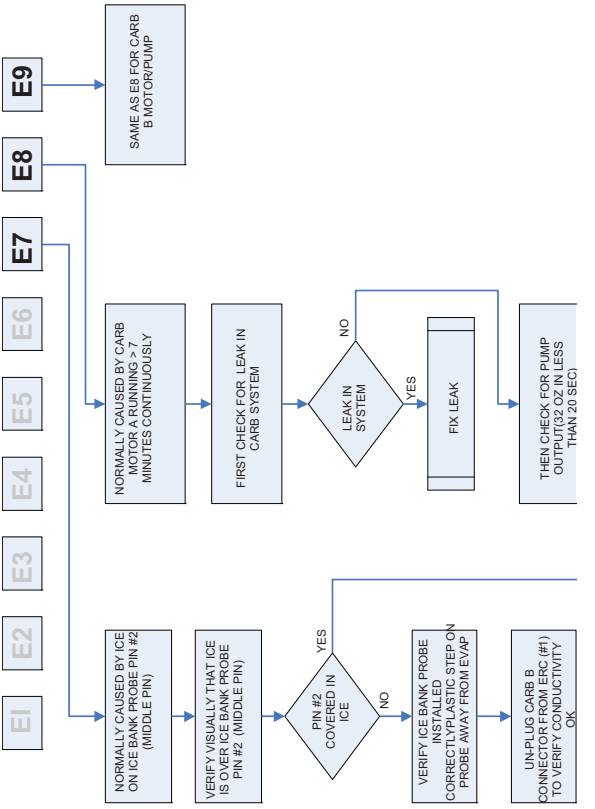

DISPLAY CONDUCTIVITY= "CL_1"
NO
YES
= "CL_0"REMOVE LEVEL PROBE CONN FROM ERC, SHORT ERC LEVEL PROBE PINS
E3 ERROR GOES AWAY
YES
NO
REPLACE LEVEL PROBE 020002143
REPLACE ERC CIRCUIT BOARD 020001985
PULL CARB A OR B CONNECTOR OFF ERC, ERROR GOES AWAY (CAN USE TEMP)
YES
REPLACE ERC CIRCUIT BOARD 020001985
VERIFY CO2 SUPPLY PRESSURE TO UNIT, >20PSI OR NOT, WITH ANOTHER GAUGE IN THE SUPPLY SYSTEM
SUPPLY PRESSURE >20PSI
NO
YES
TROUBLESHOOT CO2 SUPPLY SYSTEM, TO FIX LOW PRESSURE CONDITION
REPLACE CO2 PRESS TRANSDUCER 020001992
YES
REPLACE ERC CIRCUIT BOARD 020001985
E VERIFY INCOMING WATER SUPPLY PRESSURE TO UNIT >15 PSI OR NOT WITH ANOTHER GAUGE IN THE SUPPLY SYSTEM
SUPPLY PRESSURE >15PSI
NO
YES
TROUBLESHOOT WATER SUPPLY SYSTEM, TO FIX LOW WATER PRESSURE CONDITION
REPLACE WATER PRESS TRANSDUCER 020001992

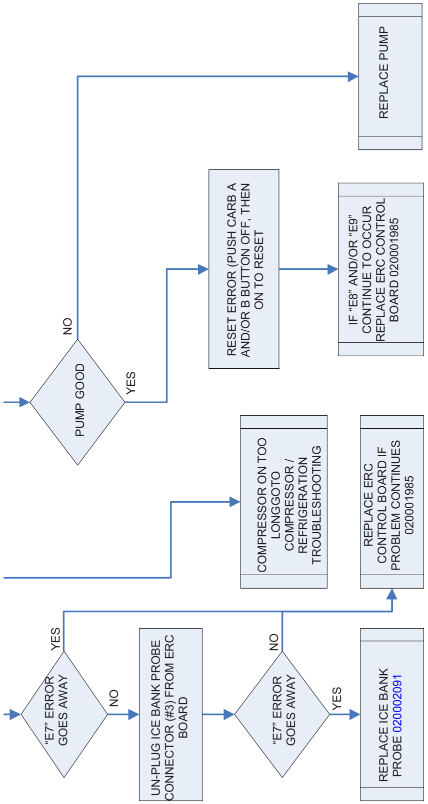
ERROR CODES E4, E5, & E6 FLOWCHART



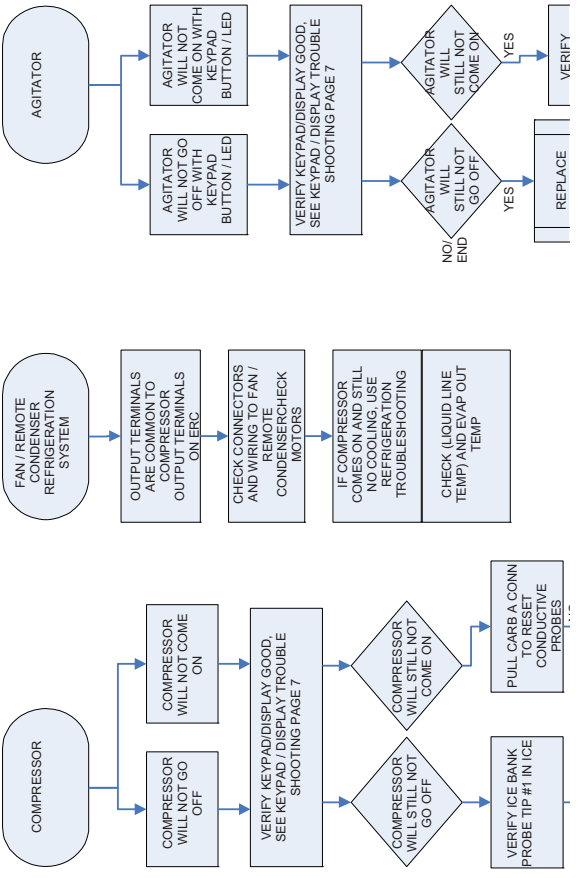

TEMPERATURE VERIFIED
YES
NO
FIRST CHECK FOR CONDENSER FAILURE OR HOT GAS BYPASS
GO TO COMPRESSOR / REFRIGERATION SYSTEM TROUBLESHOOTING
REPLACE DISCHARGE/LIQUID LINE TEMPERATURE THERMISTOR 020001991
VERIFY TEMP WITH SECOND THERMOMETERIF STILL <200°F REPLACE ERC CONTROL BOARD 020001985
PRESSURE VERIFIED
NO
YES
TROUBLE SHOOT WATER SUPPLY SYSTEM TO FIX. HIGH WATER PRESS, REGULATOR BAD, NEEDED
REPLACE WATER PRESSURE TRANSDUCER 020001992
VERIFY PRESS WITH SECOND GAUGE, IF CORRECTREPLACE ERC BOARD 020001985
VERIFY TEMPERATURE WITH SECOND THERMOMETER
TEMPERATURE VERIFIED
NO
YES
GO TO COMPRESSOR TROUBLESHOOTING TO FIX REFRIGERATION SYSTEM
REPLACE WATER BATH THERMISTOR 020002142

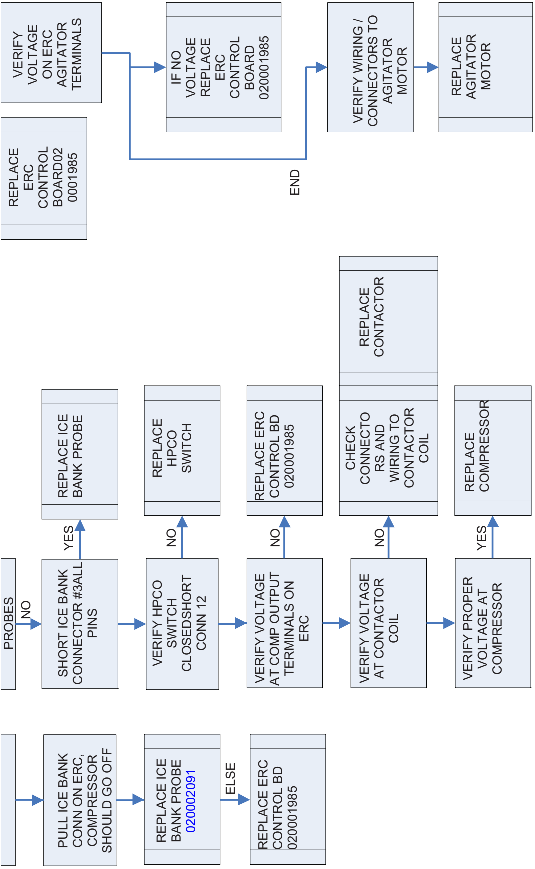
ERROR CODES E7, E8, & E9 FLOWCHART

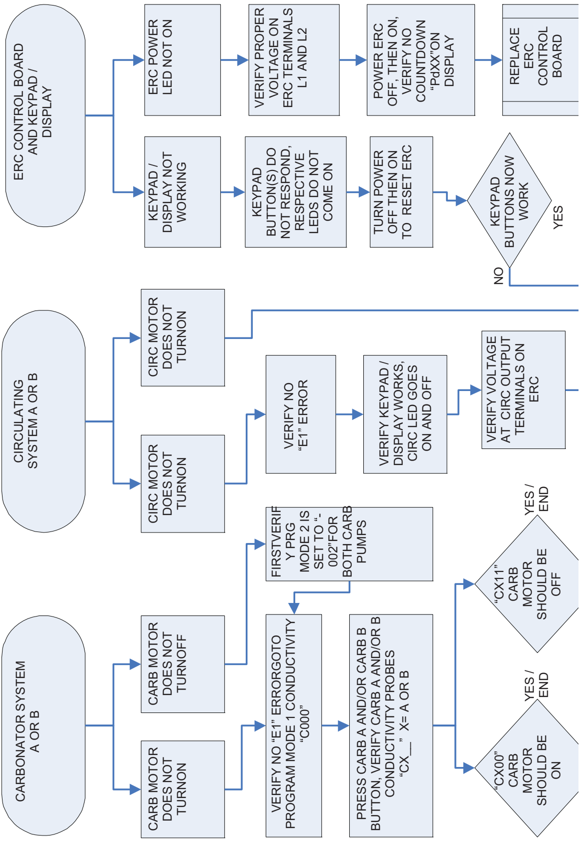


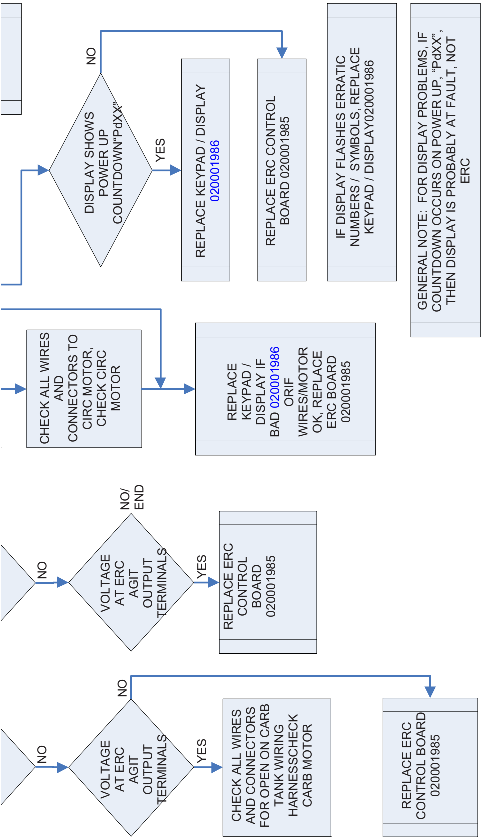

"E7" ERROR GOES AWAY
YES
NO
UN-PLUG ICE BANK PROBE CONNECTOR (#3) FROM ERC BOARD
"E7" ERROR GOES AWAY
NO
YES
REPLACE ICE BANK PROBE 020002091
REPLACE ERC CONTROL BOARD IF PROBLEM CONTINUES 020001985
COMPRESSOR ON TOO LONGGOTO COMPRESSOR / REFRIGERATION TROUBLESHOOTING
PUMP GOOD
YES
NO
RESET ERROR (PUSH CARB A AND/OR B BUTTON OFF, THEN ON TO RESET
IF "E8" AND/OR "E9" CONTINUE TO OCCUR REPLACE ERC CONTROL BOARD 020001985
REPLACE PUMP

COMPONENT TROUBLESHOOTING




PULL ICE BANK CONN ON ERC, COMPRESSOR SHOULD GO OFF
REPLACE ICE BANK PROBE 020002091
ELSE
REPLACE ERC CONTROL BD 020001985
PROBES
NO
SHORT ICE BANK CONNECTOR #3ALL PINS
YES
REPLACE ICE BANK PROBE
VERIFY HPCO SWITCH CLOSEDSHORT CONN 12
NO
REPLACE HPCO SWITCH
VERIFY VOLTAGE AT COMP OUTPUT TERMINALS ON ERC
NO
REPLACE ERC CONTROL BD 020001985
VERIFY VOLTAGE AT CONTACTOR COIL
NO
CHECK CONNECTORS AND WIRING TO CONTACTOR COIL
REPLACE CONTACTOR
VERIFY PROPER VOLTAGE AT COMPRESSOR
YES
REPLACE COMPRESSOR
REPLACE ERC CONTROL BOARD020001985
VERIFY VOLTAGE ON ERC AGITATOR TERMINALS
IF NO VOLTAGE REPLACE ERC CONTROL BOARD 020001985
END
VERIFY WIRING / CONNECTORS TO AGITATOR MOTOR
REPLACE AGITATOR MOTOR


ERC CONTROL BOARD AND KEYPAD / DISPLAY
ERC POWER LED NOT ON
VERIFY PROPER VOLTAGE ON ERC TERMINALS L1 AND L2
POWER ERC OFF, THEN ON, VERIFY NO COUNTDOWN "PdXX"ON DISPLAY
REPLACE ERC CONTROL BOARD
KEYPAD / DISPLAY NOT WORKING
KEYPAD BUTTON(S) DO NOT RESPOND, RESPECTIVE LEDS DO NOT COME ON
TURN POWER OFF THEN ON TO RESET ERC
KEYPAD BUTTONS NOW WORK
YES
NO
CIRCULATING SYSTEM A OR B
CIRC MOTOR DOES NOT TURNON
CIRC MOTOR DOES NOT TURNON
VERIFY NO "E1" ERROR
VERIFY KEYPAD / DISPLAY WORKS, CIRC LED GOES ON AND OFF
VERIFY VOLTAGE AT CIRC OUTPUT TERMINALS ON ERC
CARBONATOR SYSTEM A OR B
CARB MOTOR DOES NOT TURNOFF
CARB MOTOR DOES NOT TURNON
FIRSTVERIFY PRG MODE 2 IS SET TO "-002"FOR BOTH CARB PUMPS
VERIFY NO "E1" ERRORGOTO PROGRAM MODE 1 CONDUCTIVITY "C000"
PRESS CARB A AND/OR CARB B BUTTON, VERIFY CARB A AND/OR B CONDUCTIVITY PROBES "CX__" X= A OR B
"CX11" CARB MOTOR SHOULD BE OFF
YES / END
"CX00" CARB MOTOR SHOULD BE ON
YES / END


DISPLAY SHOWS POWER UP COUNTDOWN"PdXX"
NO
YES
REPLACE KEYPAD / DISPLAY 020001986
REPLACE ERC CONTROL BOARD 020001985
IF DISPLAY FLASHES ERRATIC NUMBERS / SYMBOLS, REPLACE KEYPAD / DISPLAY020001986
GENERAL NOTE: FOR DISPLAY PROBLEMS, IF COUNTDOWN OCCURS ON POWER UP, "PdXX", THEN DISPLAY IS PROBABLY AT FAULT, NOT ERC
CHECK ALL WIRES AND CONNECTORS TO CIRC MOTOR, CHECK CIRC MOTOR
REPLACE KEYPAD / DISPLAY IF BAD 020001986 ORIF WIRES/MOTOR OK, REPLACE ERC BOARD 020001985
NO
NO/ END
VOLTAGE AT ERC AGIT OUTPUT TERMINALS
YES
REPLACE ERC CONTROL BOARD 020001985
NO
NO
VOLTAGE AT ERC AGIT OUTPUT TERMINALS
YES
CHECK ALL WIRES AND CONNECTORS FOR OPEN ON CARB TANK WIRING HARNESSCHECK CARB MOTOR
REPLACE ERC CONTROL BOARD 020001985

This Page Intentionally Left Blank

Head Pressure Control Valve

Multiplex remote systems require head pressure control valves with special settings. Replace defective head pressure control valves only with “original” Multiplex replacement parts.

OPERATION

The R404A head pressure control valve is non adjustable.

At ambient temperatures of approximately 70°F (21°C) or above, refrigerant flows through the valve from the condenser to the receiver inlet. At temperatures below this (or at higher temperatures if it is raining), the head pressure control dome’s nitrogen charge closes the condenser port and opens the bypass port from the compressor discharge line.

In this modulating mode, the valve maintains minimum head pressure by building up liquid in the condenser and bypassing discharge gas directly to the receiver.

DIAGNOSING

1. Determine if the coil is clean. Air passes through the condenser from the bottom up. Verify the coil is clean by looking from the bottom up. Do not look down through the fan.
2. Determine the air temperature entering the remote condenser.
3. Determine if the head pressure is high or low in relationship to the outside temperature. (Refer to the proper “Normal Operating Pressures of Refrigeration Units” in the Charts section.)
4. Determine the temperature of the liquid line entering the receiver by feeling it. This line is normally warm; “body temperature.”
5. Using the information gathered, refer to the chart below.

NOTE: A head pressure control valve that will not bypass, will function properly with condenser air temperatures of approximately 70°F (21°C) or above.

When the temperature drops below 70°F (21°C), the head pressure control valve fails to bypass and the ice machine malfunctions. Lower ambient conditions can be simulated by rinsing the condenser with cool water during the freeze cycle.

Condition	Probable Cause	Corrective Measure
Discharge Pressure - High Liquid Line Temperature - Hot	Valve stuck in bypass	Replace valve
Discharge Pressure - Low Liquid Line Temperature - Cold	Valve not bypassing	Replace valve
Discharge Pressure - Low Liquid Line Temperature - Hot	Ice Machine Low on Charge	Low on Charge Verification

FAN CYCLE CONTROL VS. HEAD PRESSURE CONTROL VALVE

A fan cycle control cannot be used in place of a head pressure control valve. The fan cycle control is not capable of bypassing the condenser coil and keeping the liquid line temperature and pressure up.

This is very apparent when it rains or the outside temperature drops. When it rains or the outside temperature drops, the fan begins to cycle on and off. At first, everything appears normal. But, as it continues raining or getting colder, the fan cycle control can only turn the fan off. All the refrigerant must continue to flow through the condenser coil, being cooled by the rain or low outside temperature.

This causes excessive sub-cooling of the refrigerant. As a result, the liquid line temperature and pressure are not maintained for proper operation.

Charging Multiplex Remote Refrigeration Unit

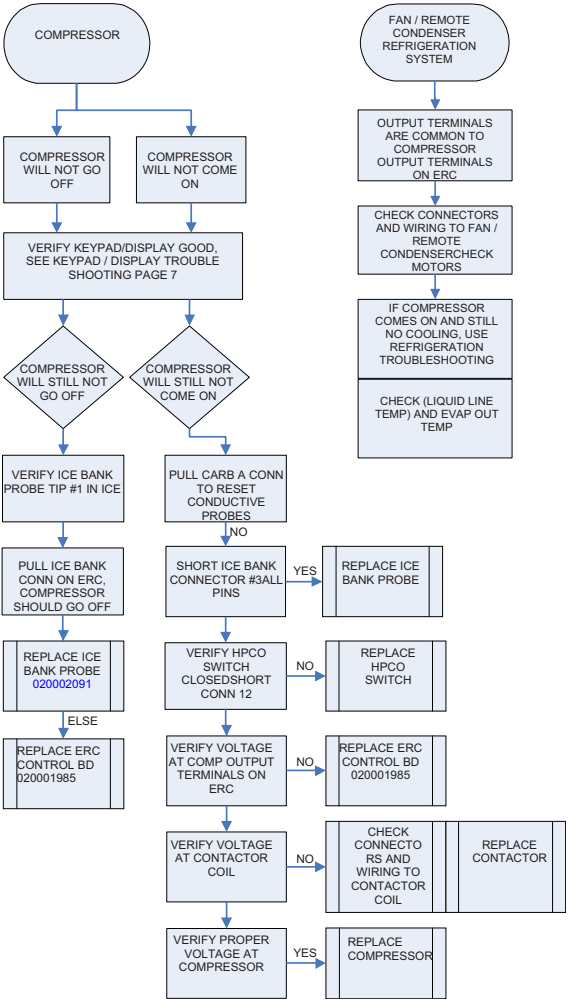
NOTE: System would have been opened for repairs. Once completed, a vacuum of 500 microns would have been maintained for 1/2 hour. The proper procedure for charging the system includes the reintroduction of all refrigerant that had been recovered before making the repair.

1. Attach charging hose of gauge manifold to liquid valve of the recovery cylinder (if no refrigerant was in the system, and thus, no refrigerant was recovered, attach charging hose to Refrigerant cylinder). Open cylinder valve.
2. Place cylinder on charging scale-zero scale.
3. Open high side valve wheel of gauge manifold. DO NOT ATTEMPT TO CHARGE SYSTEM ON LOW SIDE—CHARGE IN A LIQUID STATE ONLY WITH REFRIGERATION SYSTEM OFF.
4. Allow sufficient time for all refrigerant to transfer from cylinder to refrigeration unit. If necessary, put cylinder into bucket of hot water to increase the internal pressure of the cylinder.
5. System total charge is the net result of:
   A. Refrigeration Unit charge on nameplate
   B. Remote line set length X .72 oz./ft.
   C. 90% of condenser volume (cu. ft.) x Refrigerant (wt./cu ft)

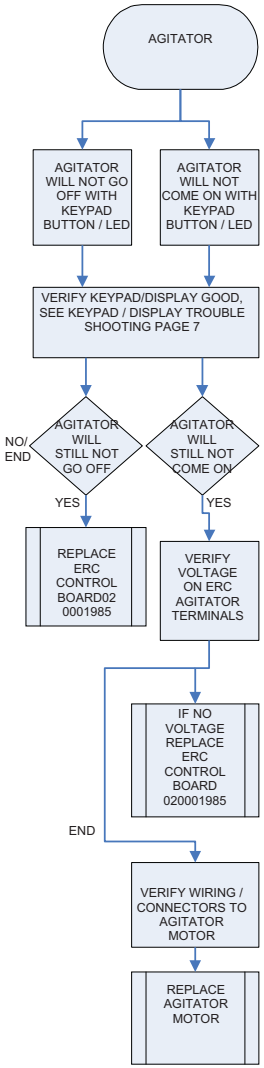
NOTE: Refrigerant weight varies with temperature. R-404A weighs 72 lb/cu. ft. @ 32°; 62 lb/cu. ft. @ 95°

6. When all refrigerant has been transferred, close valve wheel of the manifold.
7. Turn refrigeration unit on.

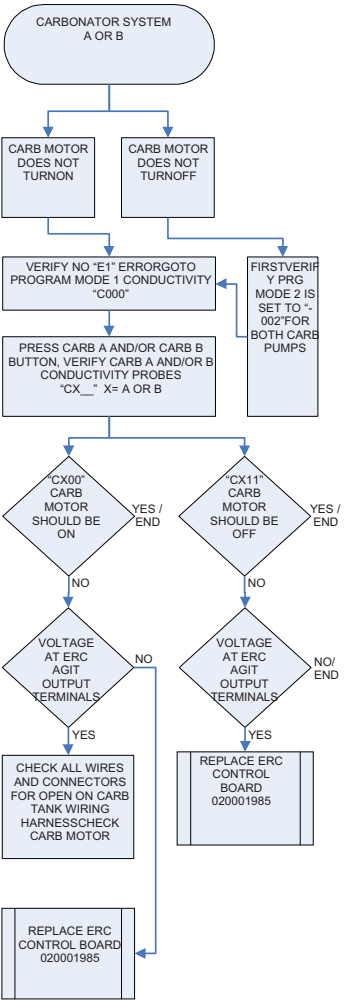
Compressor & Remote Condenser



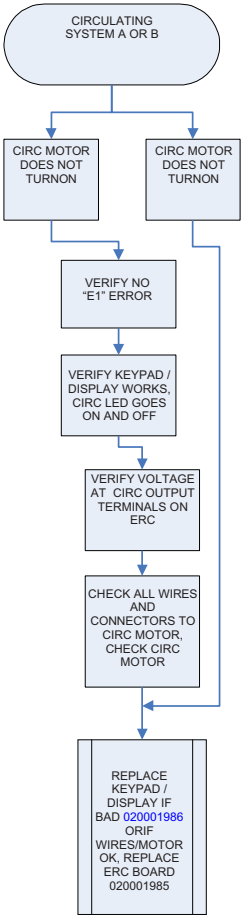
Agitator Condenser



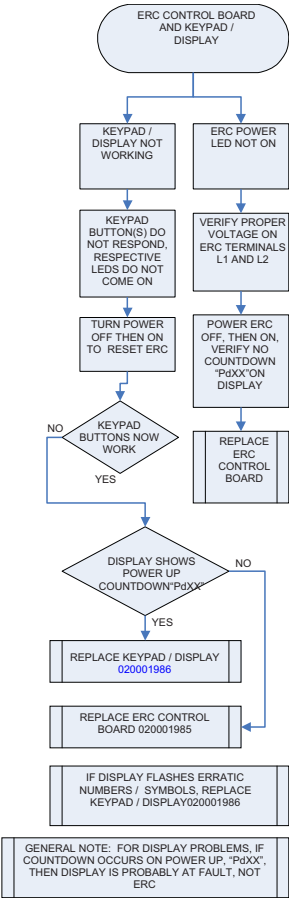
Carbonation System A or B



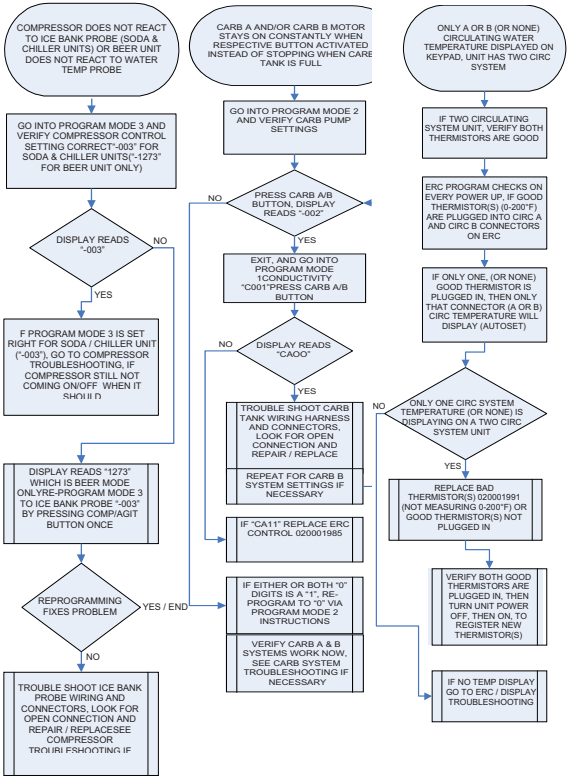
Circulation System A or B



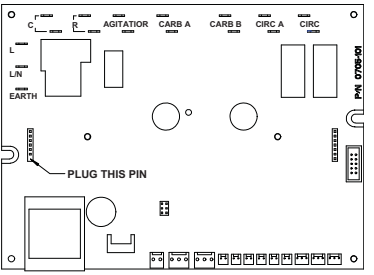
ERC Control Board, Keypad & Display



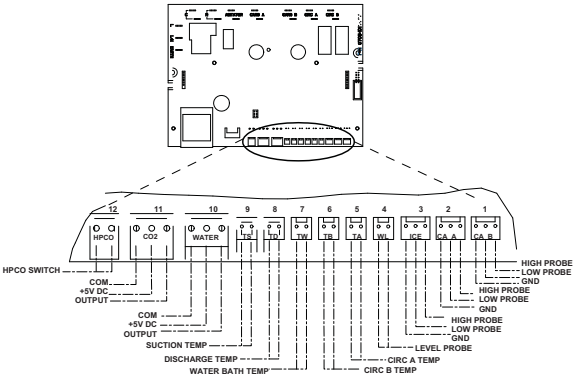
Programming / Auto Set



ERC Component (Output) Connector Layout



ERC Sensor (Input) Connector Layout



Component Specifications

Specifications

MULTIPLEX BEEMASTER SELECTION CHART

Model #*	75	150	300	450
Line length	up to 75'	up to 150'	up to 300'	up to 450'
Included glycol circulation pump	1	1	1	3
Optional glycol circulation pumps	N/A	up to 1 additional	up to 2 additional	one additional
Qty of flavors**	up to 22	up to 32	up to 22	up to 32

* Chiller condensing options are available, refer to Condenser and Pre-charged Lines Installation for details.
** Requires maximum number of optional pumps to reach these levels.

CLEARANCES

Control Side (Right)	18" (45.7 cm)
Connection Side (Left)	12" (30.5 cm)
Back Side	6" (15.2 cm)
Ceiling	18" (45.7 cm)

RATINGS

Model	Evaporator Rating at 20°F (-6.5°C)	Heat Rejection (Max.)
75	2500 BTUH 490 kcal/hr	4500 BTUH 885 kcal/hr
150	5150 BTUH 1,159 kcal/hr	8,638 BTUH 1,949kcal/hr
300	9,700 BTUH 2,340 kcal/hr	13,576 BTUH 3,685 kcal/hr
450	14,900 BTUH 3,310 kcal/hr	20,400 BTUH 4,285 kcal/hr

NOTE: Refer to serial plate on front of refrigeration unit for voltage and amperage specifications. Make all electrical connections at the junction box located at the top rear of unit. Optional equipment may require additional power supplies.

⚠ Warning

Carbon Dioxide (CO_2) displaces oxygen. Exposure to a high concentration of CO_2 gas causes tremors, which are followed rapidly by loss of consciousness and suffocation. If a CO_2 gas leak is suspected, particularly in a small area, immediately ventilate the area before repairing the leak. CO_2 lines and pumps must not be installed in an enclosed space. An enclosed space can be a cooler or small room or closet. This may include convenience stores with glass door self serve coolers. If you suspect CO_2 may build up in an area, venting of the BIB pumps and/or CO_2 monitors must be utilized.

Electrical

⚠ Warning

All wiring must conform to local, state and national codes.

MINIMUM CIRCUIT AMPACITY

The minimum circuit ampacity is used to help select the wire size of the electrical supply. (Minimum circuit ampacity is not the beverage/ice machine's running amp load.) The wire size (or gauge) is also dependent upon location, materials used, length of run, etc., so it must be determined by a qualified electrician.

ELECTRICAL REQUIREMENTS

Refer to Ice Machine Model/Serial Plate for voltage/ amperage specifications.

SPECIFICATIONS

Model	Volt/Cycle/ Phase	Minimum Circuit Amps	Breaker	Compressor
75	120/601 230/50/1	20.3 9.0	25A 16A	1/3 hp .46 kW
150	120/601 230/50/1	21.5 10.7	30A 16A	12 hp .97 kW
300	208-230/60/1 230/50/1	20.6 20.6	30A 25A	1 hp 1.9 kW
450	208-230/60/3 230/400/50/3	25.2 11.6	30A 20A	2.2 hp 2.0 kW

This Page Intentionally Left Blank

Conduit Specification Chart

Choose # of Beer Flavors	Conduit Specifications					
	Brewmaster 2 Conduit Part #	Beer Lines	Glycol Lines	Glycol Circuits	Total Lines	Min Chase Size
2	MC043346	2	2	1	4	6
3	MC053346	3	2	1	5	6
4	MC063346	4	2	1	6	6
5	MC073346	5	2	1	7	6
6*	MC083346	6	2	1	8	6
6*	MC103346	6	4	2	10	6
8	MC123346	8	4	2	12	6
10	MC143346	10	4	2	14	6
12	MC163346	12	4	2	16	6
15	MC193346	15	4	2	19	8
16	MC203346	16	4	2	20	8
glycol line**	MC023346	2	1	2		4

* To maximize system performance on 6-flavor applications, Multiplex recommends using a 10 line conduit with 4 glycol lines/2 circuits.
** 2-line “glycol only” conduit, used between chiller and keg cooler.

Natural Keg Pressures Chart

Natural Keg Pressures at Sea Level (lb/in^2)

Brewing Company	Cooler Temperature			
	36°F	**38°F**	**40°F**	**42°F**
Anheuser Busch	11	12	13	14
Adolph Coors (requires 1/4" Ported Shanks)	14.5	15.5	16.5	17.5
Miller	12.5	13.5	14.5	15.5
Schlitz/Stroh's	12	13	14	15

Add 1 psi to adjust for altitude for every 2000 ft above sea level. An additional 1 psi may be required for “Light” beers.

System Calculators

BEER PUMP, SYSTEM PRESSURE AND CHOKER CALCULATOR

Section A:				
Product you are dispensing			**Cooler Temperature**	°
Natural Keg Pressure for this product at this temperature (see chart below)				A=
Add 1 # If your altitude is above 2,000 feet (per 2000 feet or portion thereof)				B=
			Total push gas pressure to keg Add A + B	C=
Section B:				
Line run length	Feet	X 0.07 # per foot		D=
PLUS Rise from bottom of keg to outlet of faucet	Feet	X 0.5 # per foot		E=
MINUS Fall from bottom of keg to outlet of faucet	Feet	X 0.5 # per foot		F=
PLUS choker	**Trunk Line Length** Up to 100 feet 100 to 125 feet 125 to 150 feet 150 to 175 feet 175 to 200 feet	**3/16" Choker Tube Length** 13 feet 12 feet 11 feet 10.5 feet 10 feet	**# Resistance (G)** 39 lbs. 36 lbs. 33 lbs. 31.5 lbs. 30 lbs.	G=
	Over 200 feet contact factory			
Plus resistance if using Kyees tower		ADD + 4.8		H=
If using Kyees Chill Pak		ADD +4.0		I =
If using bent tube assembly in tower		ADD +3.0		J =
			Total initial resistance Add D +E – F + G +H + I + J	K=
Set the Beer Pump pressure regulator at (K)				

A = Natural Keg Pressure at Sea Level (PSI)					
Product	**Cooler Temperature**				
	32°	**34°**	**26°**	**38°**	**40°**
Anheuser-Busch	9	10	11	12	13
Coors	13	14	15	16	17
Miller	10.5	11.5	12.5	13.5	14.5
Schlitz / Stroh's	10	11	12	13	14

Line run length	Feet	X 0.07 # per foot	
PLUS Rise from bottom of keg to outlet of faucet	Feet	X 0.5 # per foot	+
MINUS Fall from bottom of keg to outlet of faucet	Feet	X 0.5 # per foot	–
PLUS minimum 24" choker			+ 6.0
If using Kyees tower		ADD + 4.8	
If using Kyees Chill Pak		ADD + 4.0	
If using bent tube assembly in tower		ADD + 3.0	
		Total initial resistance	=

If total initial resistance is 20 # or greater *, you have the Applied Keg Pressure and length of choker tube. If initial resistance is less than 20 #, add additional choker as below.		
	Minimum Pressure *	
	Minus Total initial resistance as calculated above	–
	Equals initial additional resistance to add	=
	Times 4	X 4
	Equals initial number of inches choker tube to add	=
	Round up the number of initial inches choker tube to add to the next 1" segment	
	Plus minimum choker length	+ 24"
	Total amount of choker hose to use in the run with 20 # Applied Keg Pressure	=

* If your altitude is above 2,000 feet, add 1 # per 2000 feet or portion thereof to the minimum pressure stated above.

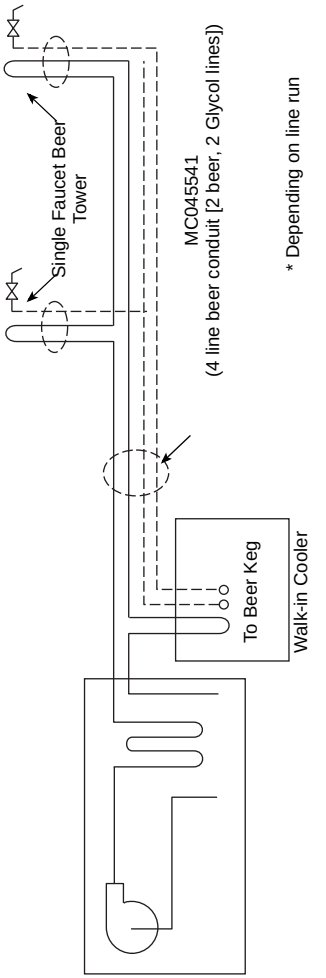
PURE CO_2 BEER SYSTEM PRESSURE AND CHOKER CALCULATOR

Section A:			
Product you are dispensing		**Cooler Temperature**	°
Natural Keg Pressure for this product at this temperature (see chart below)			A=
Add 1 # If your altitude is above 2,000 feet (per 2000 feet or portion thereof)			B=
Total Gas Push Pressure		**USE THIS AS YOUR KEG PRESSURE** Add A + B	C=
Section B:			
Line run length	Feet	X 0.07 # per foot	D=
PLUS Rise from bottom of keg to outlet of faucet	Feet	X 0.5 # per foot	E=
MINUS Fall from bottom of keg to outlet of faucet	Feet	X 0.5 # per foot	F=
PLUS minimum 24" choker	Feet	X 3.0 # per foot	G=
Plus resistance if using Kyees tower		ADD +4.8	H=
If using Kyees Chill Pak		ADD +4.0	I =
If using bent tube assembly in tower		ADD +3.0	J =
		Total initial resistance Add D + E - F + G + H + I + J	K=
Ideal Resistance (C)			L =
Minus Total initial resistance as calculated above (K)			M =
Equals initial additional resistance to add			N =
Take value of (N) Times 4			O =
Round up (O) to the next foot (i.e. 15 inches, round up to two feet)			P =
Add the original 2 feet choker			Q = 2 Feet
Add P + Q		**This is the total amount of choker to use**	R = Feet

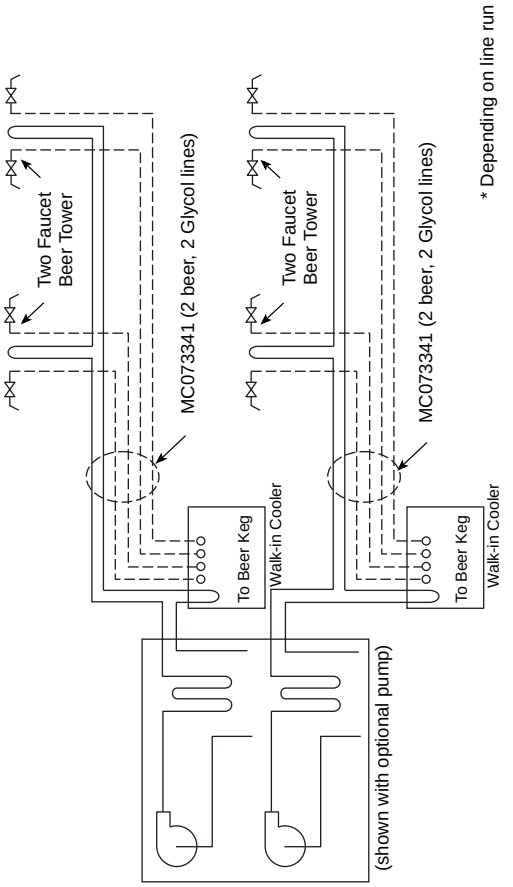
Natural Keg Pressure at Sea Level (PSI)					
Product	**Cooler Temperature**				
	32°	**34°**	**26°**	**38°**	**40°**
Anheuser-Busch	9	10	11	12	13
Adolph Coors	13	14	15	16	17
Miller	10.5	11.5	12.5	13.5	14.5
Schlitz / Stroh's	10	11	12	13	14

This Page Intentionally Left Blank

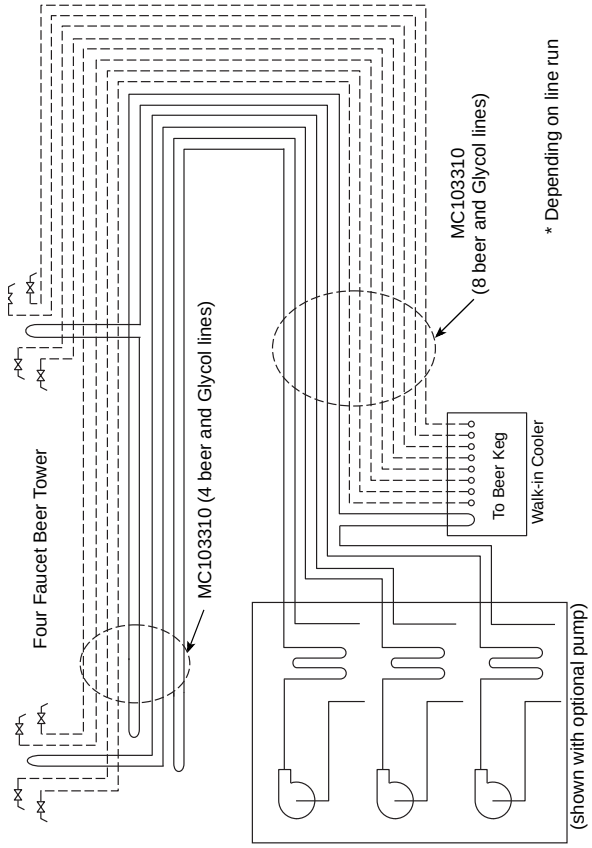
Circuit Diagrams



Single Conduit, Two Beer System



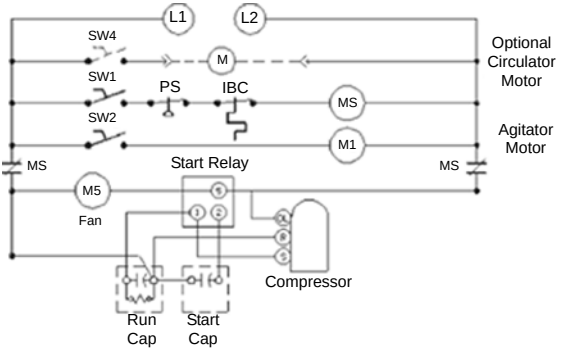
Dual Conduit, Eight Beer System



Single Conduit, Eight Beer System

Wiring Diagrams

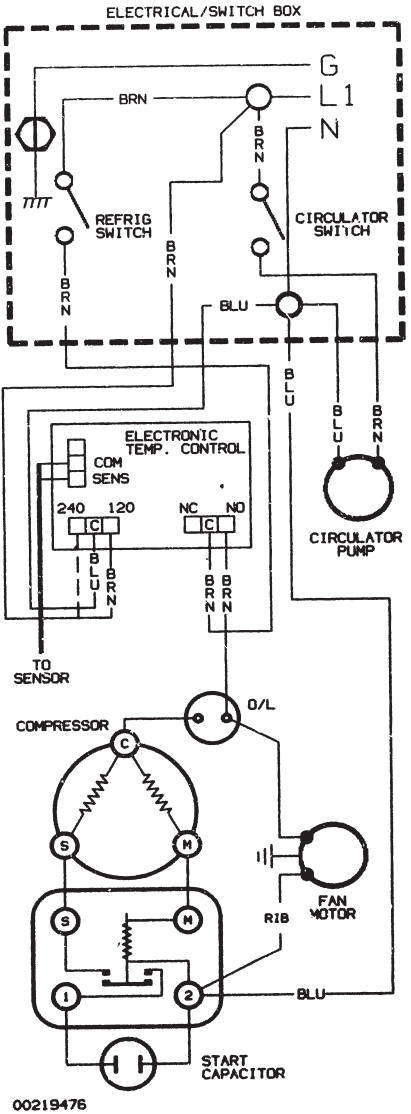
MODEL 75



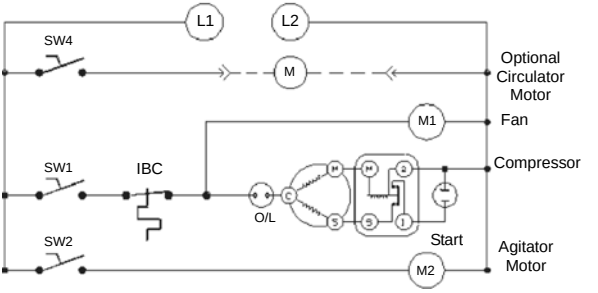
Component Legend

L1	Line 1
L2	Neutral
M	Motor
MS	Contactor
PS	Pressure Switch
IBC	Ice Bank Control

MODEL 75 WITH ELECTRONIC TEMP CONTROLS



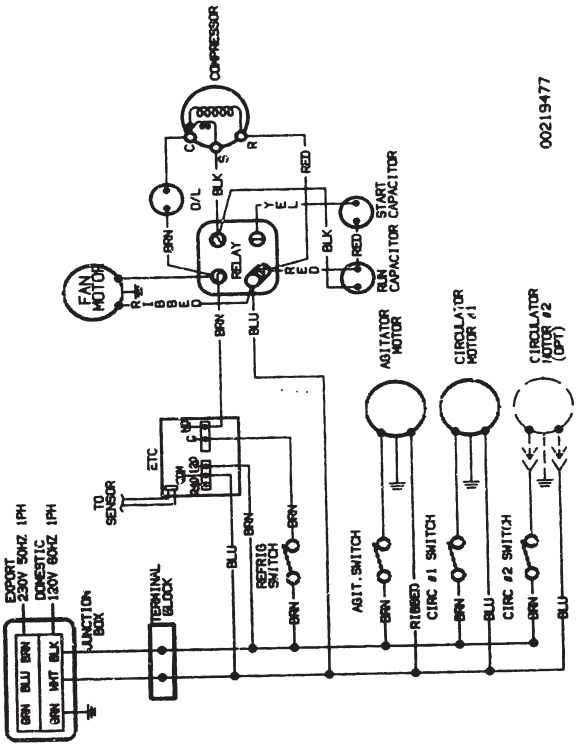
MODEL 150



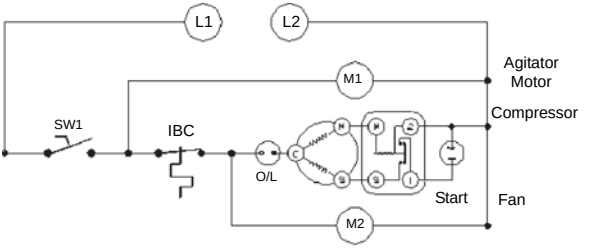
Component Legend

L1	Line 1
L2	Neutral
M	Motor
MS	Contactor
PS	Pressure Switch
IBC	Ice Bank Control

MODEL 150 WITH ELECTRONIC TEMP CONTROLS



MODEL 350

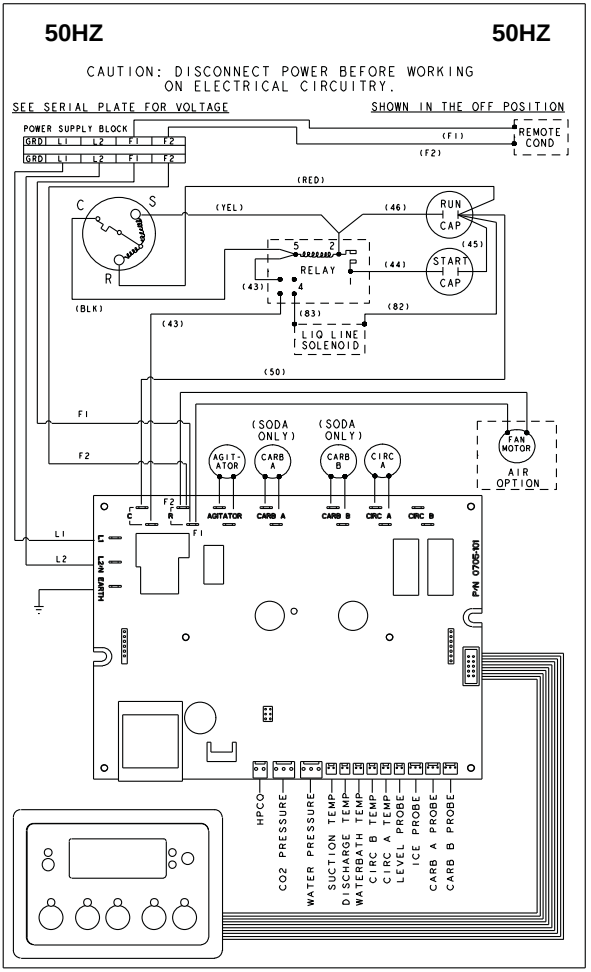


120 Volt, 60 Hz, 1 Phase Domestic
230 Volt, 50 Hz, 1 Phase Export

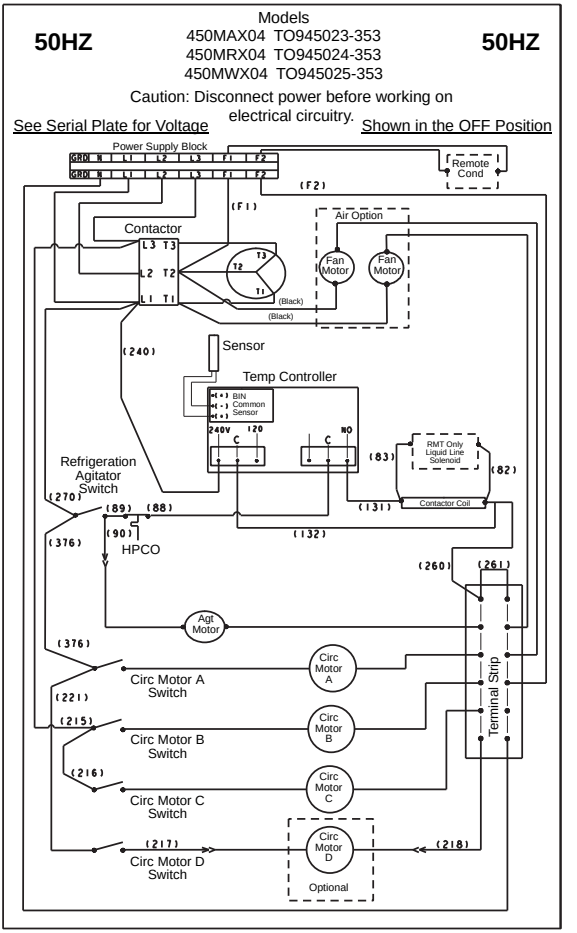
Component Legend

L1	Line 1
L2	Neutral
M	Motor
MS	Contactor
PS	Pressure Switch
IBC	Ice Bank Control

MODEL 350 (WITH ERC 50 HZ)



MODEL 450 (50 HZ)

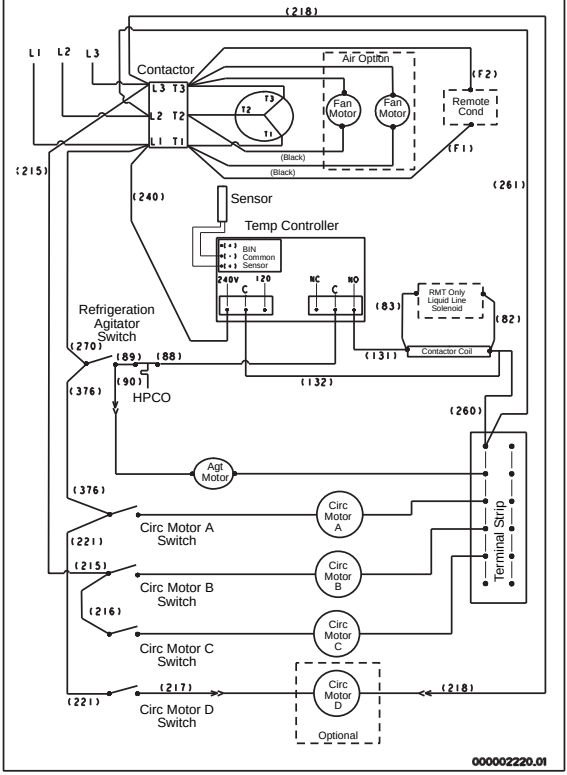


MODEL 450 (60 HZ)

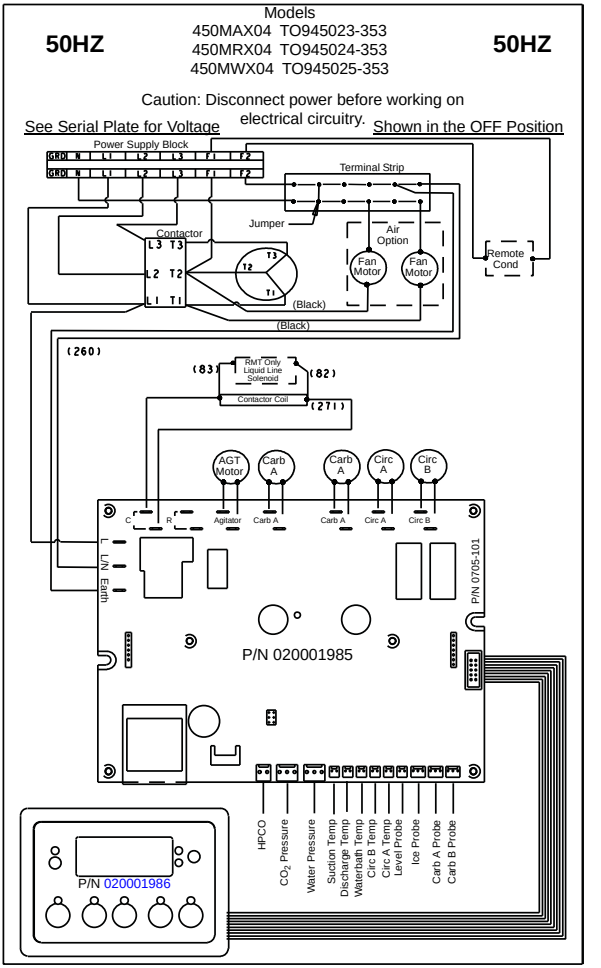
60HZ Models 450MA04 TO945013-363 450MR04 TO945014-363 450MW04 TO945015-363 **60HZ**

Caution: Disconnect power before working on electrical circuitry.

See Serial Plate for Voltage — Shown in the OFF Position



MODEL 450 (WITH ERC 50 HZ)



MODEL 450 (WITH ERC 60 HZ)

60HZ

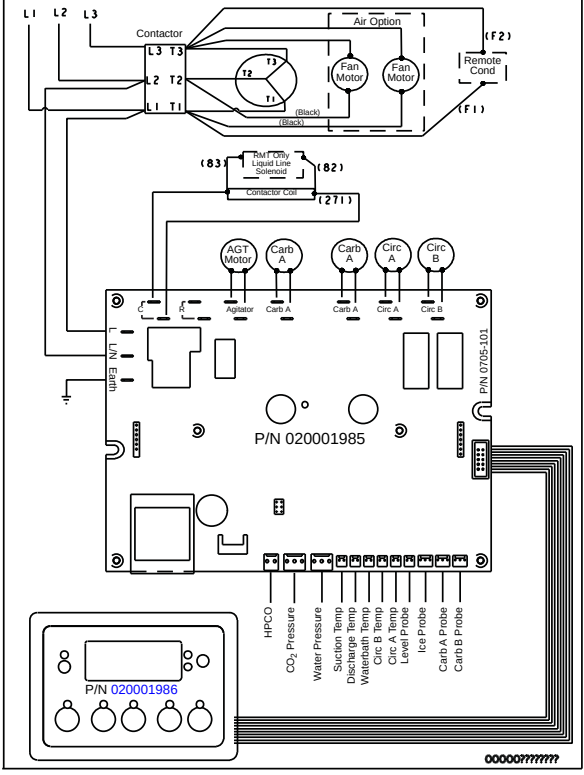
Models
450MA04 TO945013E-363
450MR04 TO945014E-363
450MW04 TO945015E-363

60HZ

Caution: Disconnect power before working on electrical circuitry.

See Serial Plate for Voltage

Shown in the OFF Position



This Page Intentionally Left Blank

Manitowoc

Multiplex

Manitowoc Foodservice
2100 Future Drive
Sellersburg, IN 47172, USA
Ph: 812-246-7000 Fax: 812-246-7024
Visit us online at: *www.manitowocfsg.com*

Part Number STH13 9/10