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Water Regulator

Function of the water regulator
Regulates the incoming water pressure to 55 psi (3.8 bar) preventing "flooding" of the carbonator tank in locations with high water pressure.

Failure of the water regulator
An unregulated water supply can overcome the 90 psi (6.2 bar) CO₂ pressure in the carbonator tank and prevent the proper absorption of CO₂ into the water resulting in poor carbonation.

Notes:
- Look for fluctuations in pressure (poor city water pressure)
- To increase pressure turn clockwise
- Don’t assume plumber flushed pipes
- Regulators can be taken apart and cleaned
**Water Filter**

**Function of the water filter**
Filters out both solid and suspended impurities found in the water supply. Preventing damage to components, insuring proper absorption of CO₂ into the water and a drink free of "off" taste.

**Failure of the water filter**

**Solids**
With use, filter will become restricted to the point of starving water pumps, effecting drink recovery rate.

**Suspended**
With use, filters will become saturated, effecting drink taste.

---

Activate Filter by (activate when system is not in use):

1. Put filter on by-pass.
2. Open activation valve (to relieve pressure).
3. Replace cartridge.
4. Slowly take filter off by-pass (leaving activation valve open).
5. Activate for proper amount of time.

---

**Notes:**

- Examine water pressure gauge, if pressure drops 40 psi (2.8 bar) or more, when carbonator pumps cycle, put filter on by-pass and replace

- Must activate filter to fully coat element and allow for good filtration and filter life (Everpure only)

- Filter life is determined by:
  - Filter Activation
  - Water Volume
  - Water Quality (dirt)
  - Water Pressure

---
Accumulator Tank Pressures

Accumulator tanks have a rubber diaphragm in the middle of the steel tank, air is stored on one side of the diaphragm and water is stored on the other side, a plastic liner protects the steel from rust. Multiplex uses accumulator tanks for several purposes:

Water booster tank

A water booster pump is used to increase the incoming water pressure to 65 psi (4.5 bar) to 85 psi (6.0 bar). We then store that higher pressure water in an accumulator tank. As a result, the pump isn’t running every time water is needed. The air in the tank gives the water a nice push out of the tank so that the water pressure slowly drops, allowing the pump to cycle on run for a short period of time and then cycle off. The air charge of this tank should be 60 psi (4.1 bar) to 65 psi (4.5 bar).

Filtered water accumulator tank

Filtered water is stored in an accumulator tank to be used when the carbonator pumps demand more water than will flow through your restricted water filters, and then slowly refill the tank when the pumps shut “off”. This enables you to use your filters for a longer period of time. The air charge of this tank should be 15 psi (1.0 bar) to 20 psi (1.4 bar).

The air charge in the tank should be filled or checked with no water pressure to the tank, because once you have water pressure applied to the tank the air will compress and equalize with the water pressure and you will get a false reading.

It is very important to use air and not CO₂ to charge the tank, because CO₂ will eventually bleed through the rubber diaphragm, thus reducing the charge in the tank.

On the bigger WX103 tank, when used as a water booster tank, it is critical to have the 60 psi (4.1 bar) to 65 psi (4.3 bar) air charge, because if the air pressure drops below 45 psi (3.1 bar), the diaphragm will break.
Primary Regulator

Function of the primary regulator
Regulates the CO₂ tank pressure to maintain a constant 90 psi (not over, not under) for the production of carbonated water.

Failure of the primary regulator
Low pressure or a "sluggish" regulator will cause poor absorption of CO₂ into the water resulting in poor carbonation.

High pressure or a "creeping" regulator will cause increased absorption of CO₂ into the water resulting in over carbonation.

Notes:
- Check with bubble soap around adjustment screw (for leaking diaphragm)
- Creeping can be caused by a faulty cartridge or a bad diaphragm
- CO₂ gas bursting from the relief valve on regulator could be caused by a defective or frozen regulator
Secondary Regulator (Syrup Regulator)

Function of the secondary regulator
Regulates the CO₂ or air pressure used to push the syrups to the dispensing valves.

Failure of the secondary regulator
Low pressure or a “sluggish” regulator will cause an insufficient supply of syrup during dispensing, resulting in drinks that taste over carbonated (fast dispersing foam).

High pressure or a “creeping” regulator will cause increased supply of syrup during dispensing, resulting in drinks that taste flat and under carbonated (slow lingering foam).

Notes:
- Letting syrup tanks to empty or a defective leaking syrup disconnect will cause air in the lines and foaming at the dispensing valve (especially at the slab stores with underground chases).
- To clear activate both valves at once until air clears.
- When jumping syrup tanks, always put the new tank on the front (syrup feed side) and move the partial tank to the back (gas feed side).

- Check for leaks with bubble soap (always rinse soap from tubing).
- Cartridge could cause pressure to decrease, diaphragm could cause increase
- Sticking check/relief valve can cause lower pressure to a tank or allow syrup to back up into the regulator (remove front of regulator, check for syrup - can be cleaned with warm water)
- To increase pressure, turn clockwise
- Syrup tank disconnect not properly seated or defective could cause restriction
Carbonator Pump and Motor

**Function of the carbonator pump and motor**
Increases the pressure of the water, to overcome the CO₂ pressure and manufacture/replenish the carbonated water supply within the carbonator tank.

**Failure of the carbonator pump and motor**
A weak or defective carbonator pump or motor (key) will cause poor carbonation and limit the capacity of the unit to manufacture carbonated water.

---

To determine the approximate cycle time:

1. Right after the carbonator kicks off, draw the carbonated water into a volume cup until the carbonator starts again.
2. Note how many ounces you have and multiply by 0.28 to determine how many seconds your cycle time should be.

(100 GPH pump = 3.56 oz/second)

**Note:** A unit with two 100 GPH pumps feed the same carbonator tank, multiply by 0.14

---

**Notes:**

- Check water pressure with pumps running (10 psi [0.7 bar] minimum)
- To adjust relief valve setting, dead head to gauge (incoming water pressure + 250 relief setting)
- Check strainer
- Check for frozen coil in water bath (water to carbonator tank coil)
- Check for power to the motor
- Make sure pump turns freely
Carbonator Pumps (continued)

All Multiplex equipment requires carbonator pumps with a 250 psi (17.6 bar) relief setting.

- This relief valve is designed to relieve in emergency situations only (when you have a serious restriction on the outlet of the pump. For example, a freeze up of the cooling coil in the water bath, etc.)
- A standard carbonator pump has a 170 psi (12 bar) relief valve setting. Multiplex equipment generates quite a bit of back pressure, thus causing the standard 170 psi (12 bar) pump to relieve excessively. This causes wear to the relief valve, prematurely weakening the pump.

Determined the strength of a carbonator pump

Note: Do not be dispensing drinks during the test.
1. Dispense carbonated water until the carbonator pump cycles on, then stop.
2. Wait for the carbonator to cycle "off", then turn "off" the electrical switch for the carbonator.
3. Dispense exactly 50 fl oz (2 L) of carbonated water only.
4. Turn "on" the electrical switch for the carbonator and time how many seconds it takes to cycle "off". This is the actual cycle time.
5. From the chart on the following page, determine the expected cycle time.

For example:
50 ounces x .28, for a 100 GPH pump = 14 seconds
2 liters x 9.52 for a 378.5 LPH pump = 19 seconds
6. If your actual cycle time is much greater than your expected cycle time, your pump has been weakened and the capacity of your equipment has been reduced.

### Carbonator pumps chart

<table>
<thead>
<tr>
<th>Gallon Per Hour</th>
<th>Ounces Per Second</th>
<th>Multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>3.56</td>
<td>0.28</td>
</tr>
<tr>
<td>125</td>
<td>4.44</td>
<td>0.23</td>
</tr>
<tr>
<td>200</td>
<td>7.11</td>
<td>0.14</td>
</tr>
<tr>
<td>240</td>
<td>8.53</td>
<td>0.12</td>
</tr>
</tbody>
</table>

### Carbonator pumps metric chart

<table>
<thead>
<tr>
<th>Liters Per Hour</th>
<th>Liters Per Second</th>
<th>Multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 Hz</td>
<td>50 Hz</td>
<td>60 Hz</td>
</tr>
<tr>
<td>378.5</td>
<td>318.2</td>
<td>0.105</td>
</tr>
<tr>
<td>473</td>
<td>397.6</td>
<td>0.131</td>
</tr>
<tr>
<td>757</td>
<td>636.3</td>
<td>0.210</td>
</tr>
<tr>
<td>908.5</td>
<td>763.7</td>
<td>0.252</td>
</tr>
</tbody>
</table>

### Procedure for properly adjusting the relief valve setting on a pump

1. Remove the large acorn nut on the top side of the pump.
2. Mount a gauge on the outlet flow of the pump (as shown, to totally block the discharge flow).
3. Turn "on" the pump. While the pump is running, adjust the relief valve screw so that the gauge reads 275 psi (19.3 bar) (250 psi [17.6 bar] relief setting + 25 psi [1.7 bar] safety factor).
4. Reassemble.
Low Water Pressure Safety Circuit

If water pressure is greater than 4 psi (0.3 bar), the pressure switch will be open and not allow electricity to pass, and the relay will be closed and allow electricity to flow to the motor.

If the water pressure drops below 4 psi (0.3 bar), the pressure switch will close and allow electricity to flow to the relay, heating the relay, causing it to open, stopping the electricity from flowing to the motor.

If the water pressure then goes above 4 psi (0.3 bar), the pressure switch will again open, stopping the electricity from flowing to the relay, the relay will start to cool, after about 3 minutes the relay will close, again sending electricity to the motor.
Check Valves

Function of the check valves
Prevents the back-flow of a liquid or gas by allowing flow in one direction only.

CO₂ Check Valves
Single check valve for incoming CO₂ to prevent water from backing up into the regulator and CO₂ tank.

Water Check Valves
Double check valve and or back-flow preventer to keep CO₂ from backing up into the water supply, and to provide a “shower” of water into the carbonator tank to absorb more CO₂.

Failure of the check valves
CO₂ Check Valves
Liquid could back up into gas regulators and/or CO₂ tank causing damage.

Water Check Valves
CO₂ could back up into the plain water supply or cause back flow preventer to dispel CO₂ or water into the water bath.

Notes:
- Could restrict water flow if sticking
- Check for CO₂ escaping from vent hole or
- Slowly disconnect line from top of check valve, if anything is escaping, check valve needs to be cleaned or replaced
Water Bath Feeder

Function of the water bath feeder
To replenish water in the water bath and skim the surface preventing bacterial buildup.

Failure of the water bath feeder
Restricted will not allow recovery resulting in low water level and dirt buildup. Uncontrolled flow will effect cooling capacity causing poor ice bank buildup.

Notes:
- Water released when the carbonator motor runs
- Old machines have float type fillers (when the water drops below the float level it allows more water into the bath)
- If water continually runs down the stand pipe, check the rubber seat in the relief valve or float
Carbonator Tank

Function of the carbonator tank
To provide a pressure vessel to mix water and CO₂ to manufacture/store carbonated water.

Failure of the carbonator tank
Stainless steel design insures relatively few problems. However, the many connection points require occasional checks for CO₂ or water leaks.

Notes:
Electrode

Function of the electrode
Dual electrodes monitor carbonated water level in the carbonator tank. Electrodes signal the liquid level control and advise it of when to switch on the carbonator pump and motor.

Failure of the electrode
An open electrode circuit of insulated electrode(s) will cause the carbonator pump and motor to run continuously. Grounded electrodes will not allow the liquid level control to switch “on” the carbonator pump and motor. Shorted electrodes will cause short cycling of the carbonator pump and motor.

Notes:
- Could short cycle because of a short to ground or switched electrode wire leads
- Check for leaks in cap or gasket
- Check wires from liquid level control to electrode (broken, bare or shorted)
Electrodes

Special care must be taken to use the correct length electrodes in each carbonator tank. Below are listed the refrigeration units with correct size for each.

<table>
<thead>
<tr>
<th>Electrode</th>
<th>Refrigeration Unit</th>
<th>Part Number</th>
<th>Probe Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1H</td>
<td>Y0208031</td>
<td>Y0208032</td>
<td>7.9&quot; Red</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10.8&quot; Black</td>
</tr>
<tr>
<td>Model 2803</td>
<td>Y0208029</td>
<td>Y0208030</td>
<td>5.9&quot; Red</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8.8&quot; Black</td>
</tr>
<tr>
<td>Model 2000</td>
<td>00701216</td>
<td></td>
<td>7.5&quot; and 5.5&quot;</td>
</tr>
<tr>
<td>Model 1200</td>
<td>(1&quot; Cap)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 72</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 39</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 38H</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 3410</td>
<td>00210828</td>
<td></td>
<td>9.5&quot; and 5.5&quot;</td>
</tr>
<tr>
<td>Model 3610</td>
<td>(1&quot; Cap)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 50H</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 44</td>
<td>Y0212106</td>
<td></td>
<td>6.2&quot; Red</td>
</tr>
<tr>
<td>Model 44K</td>
<td>Y0212105</td>
<td></td>
<td>8.9&quot; Black</td>
</tr>
<tr>
<td></td>
<td>Y0212104</td>
<td></td>
<td>11.6&quot; White</td>
</tr>
<tr>
<td>Model CPSS</td>
<td>Y0212104</td>
<td>00213554</td>
<td>11.6&quot; White</td>
</tr>
<tr>
<td></td>
<td>00213553</td>
<td></td>
<td>9.5&quot; Black</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.5&quot; Red</td>
</tr>
<tr>
<td>Model 44</td>
<td>00701214</td>
<td></td>
<td>5.5&quot;</td>
</tr>
<tr>
<td>(Limited Unit Run)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-Probe Assembly</td>
<td>00211977</td>
<td>00211978</td>
<td>5.5&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6.9&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>00211979</td>
<td>9.5&quot;</td>
</tr>
</tbody>
</table>
Liquid Level Control

Function of the liquid level control
Switches “off” and “on” the carbonator pump and motor when the electrodes indicate a full or empty tank. Continuity across L and H to G cause the liquid level control to switch “off” the carbonator pump and motor. Open circuits across L and H to G cause the liquid level control to switch “on” the carbonator pump and motor.

Failure of the liquid level control
Defective liquid level control will cause the carbonator pump and motor to run continuously or not at all.

Note: For proper voltage meter reading, you must test to ground or you will get a ghost reading.

Notes:
- 90% control fails closed (motor runs all the time)
  10% control fails open (motor does not run)
- If you start two pumps with one liquid level control, you must use the heavy duty 15 AMP control (P/N. 208162)
Cooling Coils

Function of the cooling coils
Located within the 32°F water bath. Coils allow heat to be removed from the syrup, water and carbonated water supply lines.

Failure of the cooling coils
Improperly located cooling coils found outside the designed retaining basket may freeze-up if touching the ice bank.

Notes:
- Check coils for freezing (ice touching the coils)
Circulating Pump and Motor

Function of the circulating pump and motor
Circulates coils carbonated water from the refrigeration unit up to the dispensing valves and back to be re-chilled. This keeps the syrups, water and carbonated water continually chilled.

Failure of the circulating pump and motor
A weak or defective circulating pump or motor will cause warm drinks at the dispensing valves.

How to flush a contaminated system
1. Take the fittings off the circulating pump.
2. Plug one line.
3. Turn "on" water.
4. Turn "off" the water on the CO2.
5. Plug other line.
6. Repeat.

Notes:
- Draw about one gallon of carbonated water if temperature drops, replace pump
- Verify motor is turning (check power to the motor)
- Verify coupling key is operational
- Verify pump turns freely
- Check carbonated water strainer (if equipped with machine)
- 100 gallon pump = fast flow system
  50 gallon pump = standard flow system
- When a pump goes out it can cause black specks to contaminate the carbonated water circuit (carbon veins in the pump breaking up) you must flush circuit
Alternate Suppliers for Carbonator/Circular Motors

In 1992, Multiplex Engineering established P.N. 00213596 as the standard motor for all carbonator and circular motor applications. It is a \( \frac{1}{2} \) hp dual voltage (110-120/220-240 VAC), 50/60 Hz motor. Until recently, this motor was supplied to us only by General Electric.

We now have two additional sources, Motors & Armatures (MARS) and Emerson Electric. The MARS motor has been approved and authorized for production while the Emerson motor is undergoing life testing in our laboratory.

While all three motors are equivalent, the high and low voltage hookups are different for each motor. Illustrated below are the connections for high and low voltage for each motor.
Conduit

Function of conduit
- Insulated beverage tubing used to move and maintain cold syrup, water, and carbonated water from the refrigeration unit to the dispensing station.

Failure of conduit
- Temperature will not be maintained to the dispensing station if the conduit is improperly insulated or if the insulation becomes saturated.

Notes:
- Must be well insulated
Refrigeration Compressor

Function of the refrigeration 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 refrigeration compressor
An inoperative or weak compressor would adversely effect the capability of the unit to manufacture ice.

Notes:
- Check amp load on compressor
- Check water bath feeder, or for leak somewhere in water bath (look at stand pipe)
- Check cleanliness of condenser (temperature of water on water cooled units (100°F - 105°F)
- Check room temperature
- Check refrigeration charge
## Multiplex Refrigeration Components

<table>
<thead>
<tr>
<th>Unit</th>
<th>Refrigerant</th>
<th>Compressor</th>
<th>Start Relay</th>
<th>Start Capacitor</th>
<th>Run Capacitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>2803A, 2803W, 75A</td>
<td>R-12</td>
<td>00755104</td>
<td>00755106 Aspera 175 MFD 165 VAC</td>
<td>00215135 145-19660040182</td>
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<tr>
<td>2803B, 2803W</td>
<td>R-12</td>
<td>00755107</td>
<td>00755109 Aspera 117CA20C 100 MFD 165 VAC</td>
<td>00215135 145-175 MFD 165 VAC</td>
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</tr>
<tr>
<td>2803A, 2803W</td>
<td>R-22</td>
<td>00213997</td>
<td>00207166 Aspera 101 BTF-124C 0.5 MFD 165 VAC</td>
<td>00207186 68-106 MFD 165 VAC</td>
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<tr>
<td>150A</td>
<td>R-12</td>
<td>00755099</td>
<td>00755302 Tecumseh 82-498-1</td>
<td>00801241 137-455 MFD 125 VAC</td>
<td>N/A</td>
</tr>
<tr>
<td>2803A, 2803W, 75A</td>
<td>R-12</td>
<td>00213997</td>
<td>00755109 Aspera 117CA20C 100 MFD 165 VAC</td>
<td>00215135 145-175 MFD 165 VAC</td>
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<tr>
<td>4205A</td>
<td>R-12</td>
<td>00211108</td>
<td>00755022 GE 3 ARR3-AZJ6</td>
<td>00755024 15 MFD 110 VAC</td>
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<tr>
<td>4205A, 150MA, 11MA</td>
<td>R-22</td>
<td>00212830</td>
<td>00755302 Tecumseh 82-498-1</td>
<td>00801241 137-455 MFD 125 VAC</td>
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<td>11A</td>
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<td>00755092</td>
<td>GE 3 ARR3-KCR1763</td>
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<tr>
<td>38R</td>
<td>R-12</td>
<td>00755021</td>
<td>00755022 206-4A 3 ARR3-AZJ6</td>
<td>00755023 15 MFD 250 VAC</td>
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<tr>
<td>38H, 38A, 38B, 38W, 395C, 38HAC</td>
<td>R-12</td>
<td>00755095</td>
<td>00755022 GE 3 ARR3-AZJ6</td>
<td>00755024 15 MFD 110 VAC</td>
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<tr>
<td>300MA, 44KW, 44W, 300A</td>
<td>R-502</td>
<td>00211114</td>
<td>00211173 206-4A 3 ARR3-AZJ6</td>
<td>No P.N. (72-88 MFD 250 VAC)</td>
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<tr>
<td>38HAC, 38HX</td>
<td>R-12</td>
<td>00755080</td>
<td>00801236 GE ARR3-KCR1715</td>
<td>00801237 108-130 MFD 330 VAC</td>
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<td>11MAX</td>
<td>R-22</td>
<td>00214229</td>
<td>00208926 GE ARR3-ASJZ</td>
<td>00208927 121-259 MFD 250 VAC</td>
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<tr>
<td>44A, 44R, 44KA, 44KR</td>
<td>R-12</td>
<td>00755097</td>
<td>00755077 Aspera AH160FT-083-A4 1.4 MFD 230 VAC</td>
<td>00755024 15 MFD 110 VAC</td>
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## Multiplex Refrigeration Components (continued)

<table>
<thead>
<tr>
<th>Unit</th>
<th>Refrig</th>
<th>Compressor</th>
<th>Manufacturer</th>
<th>Start Relay</th>
<th>Start Capacitor</th>
<th>Run Capacitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>4210R</td>
<td>R-22</td>
<td>00213366</td>
<td>TEC-AJ44ME-AJ801ET-361-B4 (1 hp, 1 Phase, 230 VAC)</td>
<td>00208926</td>
<td>00208927 (216-259 MFD 250 VAC)</td>
<td>00208928 (25 MFD 370 VAC)</td>
</tr>
<tr>
<td>44KX, 44KAX, 44KR, 44X, 44A, 44R</td>
<td>R-12</td>
<td>00755098</td>
<td>TEC-AH7480A-AH160UT-08-004 (1.5 hp, 1 Phase, 230 VAC)</td>
<td>00207947 Tecumseh 820AR13C31</td>
<td>00755077 (135-155 MFD 330 VAC)</td>
<td>00755024 (15 MFD 370 VAC)</td>
</tr>
<tr>
<td>50A, 50W</td>
<td>R-12</td>
<td>00755082</td>
<td>TEC-AH7514A-AH3334ET-108-A4 (1.5 hp, 1 Phase, 230 VAC)</td>
<td>00201073 Tecumseh 82477</td>
<td>00201075 (88-108 MFD 250 VAC)</td>
<td>00201074 (35 MFD 370 VAC)</td>
</tr>
<tr>
<td>4KX, 44KX, 44A, 44R, 44W, 3610HR</td>
<td>R-22</td>
<td>00212975</td>
<td>MAN-MT18JA-1 (1.8 hp, 1 Phase, 230 VAC)</td>
<td>00011717 Mars 19003</td>
<td>002129777 (88-108 MFD 250 VAC)</td>
<td>00212976 (15 MFD 440 VAC)</td>
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<tr>
<td>37F, 37T, 50H, 50A, 50R, 50W</td>
<td>R-12</td>
<td>00202124</td>
<td>TEC-AH7514A-AH3334RT-108-A4 (1.5 hp, 3 Phase, 230 VAC)</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>37X, 50HX, 50A, 50R, 50W</td>
<td>R-12</td>
<td>00202842</td>
<td>TEC-AH3030A-AH3030TT-128-A4 (2.0 hp, 2 Phase, 380 VAC)</td>
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<tr>
<td>50MA</td>
<td>R-22</td>
<td>00213594</td>
<td>MAN-MT22JC-3 (2.2 hp, 3 Phase, 380 VAC)</td>
<td>N/A</td>
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<tr>
<td>50MAX</td>
<td>R-22</td>
<td>00213595</td>
<td>MAN-MT22JC-4 (2.2 hp, 3 Phase, 380 VAC)</td>
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<tr>
<td>50HR, 37M, 37A, 37R, 37W</td>
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<td>00212979</td>
<td>MAN-MT28JE-3 (2.8 hp, 3 Phase, 380 VAC)</td>
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<td>37MX, 37A, 37K, 37W, 50MX, 37KX</td>
<td>R-22</td>
<td>00212980</td>
<td>MAN-MT28JE-4 (2.8 hp, 3 Phase, 380 VAC)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>HC900504, HC900-04</td>
<td>R-404A</td>
<td>00215805</td>
<td>CPLND-R564CIE-CAA-232 (0.75 hp, 1 Phase, 115 VAC)</td>
<td>00215816 Copeland 040-0001-38</td>
<td>00215814 (72-86 MFD 350 VAC)</td>
<td>00215815 (30 MFD 440 VAC)</td>
</tr>
<tr>
<td>38MA04M, 38MA04</td>
<td>R-404A</td>
<td>00215805</td>
<td>CPLND-R564CIE-CAA-232 (0.75 hp, 1 Phase, 115 VAC)</td>
<td>00215816 Copeland 040-0001-38</td>
<td>00215814 (72-86 MFD 350 VAC)</td>
<td>00215815 (30 MFD 440 VAC)</td>
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<tr>
<td>HC900X04, 44KAX04</td>
<td>R-404A</td>
<td>00215799</td>
<td>CPLND-R597-CIE-CAZ-232 (1 hp, 1 Phase, 230 VAC)</td>
<td>00215424 Copeland 040-0001-19</td>
<td>00201075 (88-105 MFD 250 VAC)</td>
<td>00214943 (25 MFD 440 VAC)</td>
</tr>
</tbody>
</table>
## Multiplex Refrigeration Components (continued)

<table>
<thead>
<tr>
<th>Unit</th>
<th>Refrig</th>
<th>Compressor</th>
<th>Start Relay</th>
<th>Start Capacitor</th>
<th>Run Capacitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>44MA, 44MA04, 44MA04E</td>
<td>R-404A</td>
<td>CPLND-R597-CIE-CAZ-232 (1 hp, 1 phase, 230 VAC)</td>
<td>00215424 Copeland 040-0001-19</td>
<td>00201075 (88-105 MFD 250 VAC)</td>
<td>00214943 (25 MFD 440 VAC)</td>
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<tr>
<td>150A04, 11MA04</td>
<td>R-404A</td>
<td>TEC-AK9451Z-035-B4 (0.33 hp, 1 phase, 115 VAC)</td>
<td>00215967 Tecumseh 82494-1</td>
<td>00215969 (72-88 MFD 250 VAC)</td>
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<tr>
<td>2803A04, 75A04</td>
<td>R-404A</td>
<td>TEC-AK9472-035-B4 (0.33 hp, 1 phase, 115 VAC)</td>
<td>00755302 Tecumseh 82494-1</td>
<td>00215968 (161-193 MFD 165 VAC)</td>
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<tr>
<td>300MA04</td>
<td>R-404A</td>
<td>CPLND-R597C1E-CAV-232 (1 hp, 1 phase, 230 VAC)</td>
<td>00215424 Copeland 040-0001-19</td>
<td>00201075 (88-108 MFD 250 VAC)</td>
<td>00214943 (25 MFD 440 VAC)</td>
</tr>
<tr>
<td>300MA, 44MX, 44MA, 44MR, 44MW</td>
<td>R-404A</td>
<td>CPLND-R597-CIE-CAZ-232 (1 hp, 1 phase, 230 VAC)</td>
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<td>00201075 (88-108 MFD 250 VAC)</td>
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<tr>
<td>38HA, 38HA, 38HW, 38HAC</td>
<td>R-404A</td>
<td>TEC-AG201AT-026-B4 (0.75 hp, 1 phase, 240 VAC)</td>
<td>00755022 GE 3ARRJ-32J6</td>
<td>00755023 (270-324 MFD 110 VAC)</td>
<td>00755024 (15 MFD 370 VAC)</td>
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<tr>
<td>38HA, 38HR, 38HW</td>
<td>R-404A</td>
<td>TEC-AG201AT-026-B4 (0.75 hp, 1 phase, 240 VAC)</td>
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<td>00755023 (270-324 MFD 110 VAC)</td>
<td>00755024 (15 MFD 370 VAC)</td>
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<td>TEC-AG201AT-026-B4 (0.75 hp, 1 phase, 240 VAC)</td>
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<td>00801237 (108-130 MFD 330 VAC)</td>
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<td>44MA04, 44MA04, 44MA04E</td>
<td>R-404A</td>
<td>CPLND-R597CIE-CAV-232 (1 hp, 1 phase, 230 VAC)</td>
<td>00215424 Copeland 040-0001-19</td>
<td>00201075 (88-108 MFD 250 VAC)</td>
<td>00214943 (25 MFD 440 VAC)</td>
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<tr>
<td>450MA04, 450MR04, 450MW04, 50MA04</td>
<td>R-404A</td>
<td>MAN-MTE22-JC3L (2.2 hp, 3 phase, 203 VAC)</td>
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<td>50MA04</td>
<td>R-404A</td>
<td>MAN-MTE22-JC4 (2.2 hp, 3 phase, 230 VAC)</td>
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<td>361R404C</td>
<td>R-404A</td>
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<td>00201075 (88-108 MFD 250 VAC)</td>
<td>00214943 (25 MFD 440 VAC)</td>
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</tbody>
</table>
Normal Operating Pressures of Domestic Refrigeration Units

Head pressure of domestic refrigeration units

<table>
<thead>
<tr>
<th></th>
<th>R-12 psig</th>
<th>R-502 psig</th>
<th>R-22 psig</th>
<th>R-134A psig</th>
<th>R-404A psig</th>
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<tbody>
<tr>
<td>75°F Condenser Ambient</td>
<td>100-140</td>
<td>200-260</td>
<td>180-240</td>
<td>110-160</td>
<td>210-280</td>
</tr>
<tr>
<td>10-100% Ice on Evaporator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90°F Condenser Ambient</td>
<td>120-170</td>
<td>230-300</td>
<td>210-280</td>
<td>130-180</td>
<td>240-320</td>
</tr>
<tr>
<td>10-100% Ice on Evaporator</td>
<td></td>
<td></td>
<td></td>
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Evaporator pressure of domestic refrigeration units

<table>
<thead>
<tr>
<th></th>
<th>R-12 psig</th>
<th>R-502 psig</th>
<th>R-22 psig</th>
<th>R-134A psig</th>
<th>R-404A psig</th>
</tr>
</thead>
<tbody>
<tr>
<td>75°F Evaporator, or 80°F Water</td>
<td>75</td>
<td>140</td>
<td>130</td>
<td>75</td>
<td>150</td>
</tr>
<tr>
<td>10-100% Ice on Evaporator</td>
<td>9-20</td>
<td>30-50</td>
<td>24-44</td>
<td>6-18</td>
<td>33-55</td>
</tr>
</tbody>
</table>

1. On system with expansion valve (pressure limiting) evaporator gets no higher than:
   - 50 psig on R-12
   - 53 psig on R-502
   - 85 psig on R-22

2. Water system head pressure should be manually set (adjustable water control valve) to maintain 105°F water condenser out temperature.

3. Remote Condenser system head pressure will be controlled by Low Ambient Control.
   - 75 psig on R-12, R-134A
   - 150 psig on R-502, R-22, R-404A
Normal Operating Pressures of International Refrigeration Units

Head pressure of international refrigeration units

<table>
<thead>
<tr>
<th></th>
<th>R-12 bar</th>
<th>R-502 bar</th>
<th>R-22 bar</th>
<th>R-134A bar</th>
<th>R-404A bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>24°C Condenser Ambient</td>
<td>6.9-9.7</td>
<td>13.8-17.9</td>
<td>12.4-16.5</td>
<td>7.6-11.0</td>
<td>14.5-19.3</td>
</tr>
<tr>
<td>10-100% Ice on Evaporator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32°C Condenser Ambient</td>
<td>8.3-11.7</td>
<td>15.9-20.6</td>
<td>14.5-19.3</td>
<td>8.9-12.4</td>
<td>16.5-22.1</td>
</tr>
<tr>
<td>10-100% Ice on Evaporator</td>
<td></td>
<td></td>
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</tbody>
</table>

Evaporator pressure of international refrigeration units

<table>
<thead>
<tr>
<th></th>
<th>R-12 bar</th>
<th>R-502 bar</th>
<th>R-22 bar</th>
<th>R-134A bar</th>
<th>R-404A bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>24°C Evaporator, or 27°C Water</td>
<td>5.2</td>
<td>9.7</td>
<td>9.0</td>
<td>5.2</td>
<td>10.3</td>
</tr>
<tr>
<td>10-100% Ice on Evaporator</td>
<td>0.6-1.4</td>
<td>2.1-3.4</td>
<td>1.7-3.0</td>
<td>0.4-1.2</td>
<td>2.3-3.8</td>
</tr>
</tbody>
</table>

1. On system with expansion valve (pressure limiting) evaporator gets no higher than
   3.4 bars on R-12
   3.7 bars on R-502
   5.9 bars on R-22
2. Water system head pressure should be manually set (adjustable water control valve) to maintain
   41°C water condenser out temperature.
3. Remote Condenser system head pressure will be controlled by Low Ambient Control
   5.2 bars on R-12, R-134A
   10.3 bars on R-502, R-22, R-404A
Condenser

Function of the condenser
A heat exchanger which transfers heat from the refrigerant to the surrounding air or water.

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

Water Cooled Condenser
A restricted water supply to the condenser will reduce the efficiency of the refrigeration unit, a water modulating valve that is stuck open will additionally waste water.

Notes:
- Water cooled condensers should have water exiting condenser 100°F to 105°F regulator adjusts water flow to refrigerant pressure (higher pressure, more flow)
- Clean condenser monthly
Equipment Installation Instructions for
Multiplex Remote Condenser and Pre-charged Refrigeration Lines

Pre-installation requirements

Multiplex Remote Condenser Requirements
1. Installation and maintenance are to be performed only by qualified personnel who are familiar with local codes and regulations, and are experienced with this type of equipment.
2. Equipment of this type is intended for installation by qualified refrigeration mechanics. As a condition of the warranty, the check test and start-up procedure must be performed by qualified personnel. Because of possible shipping damage, both the Condensing Unit and Refrigeration Unit(s) must be checked for refrigerant leaks.
3. Check to insure that the Remote Condensing Unit, the Refrigeration Unit, and the Charged Refrigerant Lines are marked with the same refrigerant.

Multiplex Pre-charged Refrigeration Lines Requirements
1. Both the Discharge and Liquid Remote Condensing lines should be kept to a minimum distance for maximum performance. All Multiplex systems are capacity rated to 100 ft (30.5 m) distance between the Compressor and Condenser. Systems with distances greater than this will experience some efficiency loss in proportion to the distance. This should be a minor capacity loss, less than one drink per minute up to 300 ft (90 m).
2. Any vertical rise greater than 25 ft (7.62 m) must have a manufactured or installed trap (bend), in at least the Discharge Remote Condenser Refrigeration Line. 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 (refer to figure 3).
4. This trap(s) should be of minimum height of 3” (7.6 cm) and a width of 6” (15.2 cm) to minimize oil accumulation.
5. It is critical that the Multiplex Remote Condensing line size specifications for the specific model, be maintained. The specifications are normally 1/2” discharge and 3/8” ID liquid lines.

Installing the multiplex remote condenser

The Multiplex Remote Condensing Units have either a 230 Volt, 50/60 Hz, 1 PH Fan Motor or a 120 Volt, 50/60 Hz, 1 PH Fan Motor that includes a permanent split capacitor and internal inherent overload protection. Motors are factory wired to an external disconnect switch located on the end of the unit.

Refrigeration unit has an electrical nipple extending out of the back left side with the electrical wires from the refrigeration contactor extending through. The electrician must install an electrical box at this location. Connect the conduit to this box and the Remote Condenser. The electrical installation should be in accordance with local codes, National Electrical Code and regulations. Proper fuse protections should be provided for the Fan Motor.

1. Determine a position for installation that will allow access for maintenance and is free from obstruction.
2. Install the four (4) legs to the sides of the condenser using the mounting bolts provided.
3. Secure two (2) treated 4” x 4” to the roof or mounting surface. Mount to the Remote Condenser (refer to figure 1).
4. Install a 3” Pitch Pot in the roof (refer to figure 2). Seal for weather protection.
5. Locate the Pre-charged Refrigeration Lines shipped with the system. These lines should be a correct length for the building design. Neatly avoiding any kinks, route these lines from the Remote Condenser to the Refrigeration Unit.

Caution: Excess refrigeration line should be coiled and placed in a horizontal (flat) position. When stored in a vertical position, the loops act as an oil trap and will effectively reduce the performance of our equipment as well as increase the risk of compressor failure.
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 drain pipe.

1. Attach low side Gauge Set to service port on each line set to verify positive pressure within the line set. If there is positive pressure, assume line set is fully charged.

Note: If for any reason the lines are damaged and/or leaking, or lines are no longer charged, refer to "How To Re-charge 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 one time quick connects (discharge and liquid) up to Condenser. Refer to the section titled "Aeroquip Connection" in these instructions.

4. Check that the sight glass clears during pull down to verify the Line Set charge.

5. If the sight glass does not clear, attach the gauges. Adjust the charge if necessary.

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. Repair any damages to the Line Sets before proceeding.

2. With the Remote Condenser lines properly hooked and sealed to the Condenser, evacuate to 30 in mercury (76.2 cm mercury) for 1 hour, using one or both Schrader ports on the service Line Set.

3. Charge the Condenser and Line Set accordingly. Add 0.72 oz/ft (0.067 kg/m) of Remote Line Set (one way run distance) plus 6 oz (170 g) of refrigerant for any size Condenser.

Example:

50 ft of Line Set
50 x 0.72 = 36 oz
36 oz + 6 oz = 42.0 oz (Total)

4. Connect Line Sets to the proper discharge and liquid mating connectors on the Refrigeration Unit using one (1) time quick connects. Refer to the section titled "Aeroquip Connection" in these instructions.
Equipment Installation Instructions for Multiplex Remote Condenser and Pre-charged Refrigeration Lines  
(continued)

5. Be sure to observe proper refrigeration technique when running the Line Set.

Proper Refrigeration Technique for Running the Line Set

a. The discharge line should loop down at the Compressor end to trap liquid from returning (refer to figure 3).

b. The Discharge Line should loop above discharge connector at the Condenser to resist liquid returning to the Compressor. Any excess line should be coiled horizontally with line from the Compressor at top and line to the Condenser at bottom to keep from trapping oil and returning liquid.

c. Discharge line should be trapped (P Trap) every 20-25 ft (6.1-7.6 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 depleted.

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.

---

Aeroquip Connection

1. Lubricate male diaphragm and synthetic rubber seal with refrigerant oil.

2. Thread male coupling to its proper female half by hand to insure 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 body wrench to keep body from turning while tightening nut with the second wrench. If body turns excessively, 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 insure the formation of a leak proof joint. Alternately use a torque wrench to tighten 1/4. Coupling to 40 ft lbs and 1/4" fitting to 11 ft lbs.

---

![Diagram](image_url)

3' (7.6 cm) x 6' (15.2 cm) Maximum Trap Area

Discharge Line Condenser Trap every 25 vertical ft (7.62 m)

Coil any extra Condensing Lines in a horizontal plane with output below input.

Discharge Line Trap at the Compressor

3 ft (minimum) of Discharge Line Trap at the Compressor

Figure 3
Expansion Valve or Cap Tube

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

Notes:
- O.E.M. part adjusted for our super heat
Evaporator Coil

Function of the evaporator coil

Coll in the water bath in which the refrigerant vaporizes and absorbs heat creating an ice bank.

Failure of the evaporator coil

This copper tube assembly is extremely reliable, however, concern should be given when cleaning around the evaporator to insure no sharp instruments, chemicals/cleaners are used that might damage the evaporator.

Notes:
Water Bath

Function of the water bath
Water and ice reservoir, housing the carbonator tank and cooling coils. Provides an efficient method of removing heat.

Failure of the water bath
Not maintained, dirty water in the bath may cause poor ice bank formation, poor heat exchange and electrolysis.

Notes:
- Restrictions in the flow of water, in the water bath, from the agitator motor could cause an uneven ice bank (or blockage in the flow of water).
Agitator Motor

Function of the agitator motor
Agitates the water within the bath to distribute heat load and keep the ice bank uniform.

Failure of the agitator motor
An inoperative agitator will warm drinks and an irregular ice bank formation.

Notes:
- Make sure agitator motor has a heat sink (it will extend the life of your motor)
- Make sure propeller is secured to the agitator motor
- An inoperative agitator motor will cause foaming at peak times
Ice Bank Control

Function of the ice bank control
Pressure switch that turns on and off the refrigeration compressor when the control bulb indicates the need.

Failure of the ice bank control
Defective ice bank control stuck in the open position will not allow the refrigeration compressor to operate.
Defective ice bank control stuck in the closed position will not allow the refrigeration compressor to cut-off.

Removing the cover mounting plate will alter the switch calibration.

Notes:
- Check circuit breaker
- Check head pressure control (on remote condenser units)
- If the bulb is engulfed in ice, the compressor should not be running
- Check contactor coil for welded points
- Do not change bulb location
- If you have two controls the primary control bulb is positioned closer and lower on the evaporator coil
- A warning light will indicate when the secondary control has taken over
Head Pressure Control (used on Remote Condensing units only)

Function of the head pressure control
As the evaporator discharge pressure drops when the outside temperature drops, gas will by-pass the roof condenser and be metered into the receiver maintaining an adequate head pressure.

Failure of the head pressure control
A valve incapable of by-pass will effect the refrigeration unit when the outside temperature drops below 60°F with little or no ice production.

A valve stuck in by-pass will cause high head pressure and effect the ice production capabilities of the unit.

Notes:
### Condenser unit

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Size</th>
<th>Refrigerant</th>
<th>Charge</th>
<th>Voltage</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>00905222</td>
<td>0.75 ton</td>
<td>R-12</td>
<td>23 oz</td>
<td>120 VAC</td>
<td>60 Hz</td>
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<tr>
<td>00905224</td>
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<td>23 oz</td>
<td>220 VAC</td>
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<tr>
<td>00212551</td>
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<td>R-12</td>
<td>20 oz</td>
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<td>1.5 ton</td>
<td>R-22</td>
<td>12 oz</td>
<td>208/230 VAC</td>
<td>50/60 Hz</td>
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<tr>
<td>00214150</td>
<td>1.5 ton</td>
<td>R-502</td>
<td>6 oz</td>
<td>208/230 VAC</td>
<td>50/60 Hz</td>
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<tr>
<td>00904685</td>
<td>2.0 ton</td>
<td>R-12</td>
<td>6 oz</td>
<td>203/230 VAC</td>
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<td>R-22</td>
<td>6 oz</td>
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<td>50/60 Hz</td>
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<td>00904811</td>
<td>2.0 ton</td>
<td>R-502</td>
<td>6 oz</td>
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### Refrigeration line sets

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<thead>
<tr>
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<th>Refrigerant</th>
<th>Charge (ounces)</th>
<th>Charge (pounds)</th>
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<tbody>
<tr>
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<td>0.72 oz/ft</td>
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<td>00213062</td>
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<td>0.045 lb/ft</td>
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<td>00209602</td>
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<td>00215425</td>
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Refrigeration Unit, Line, and Condenser Cross Reference Chart (continued)

Refrigeration units

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<thead>
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<tr>
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<td>37KR</td>
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<td>172 oz</td>
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<td>00903741</td>
<td>37KRX</td>
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<tr>
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<td>172 oz</td>
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<tr>
<td>00903791</td>
<td>37KR-22</td>
<td>R-22</td>
<td>151 oz</td>
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<tr>
<td>00903794</td>
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<td>172 oz</td>
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<td>00904726</td>
<td>37MR-P</td>
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<td>37MRX-P</td>
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<td>R-502</td>
<td>240 oz</td>
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<td>D3610R</td>
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<td>240 oz</td>
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<td>3610R04</td>
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<td>00936116</td>
<td>3610R04C</td>
<td>R-40A</td>
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<tr>
<td>00942100</td>
<td>D4210HR</td>
<td>R-22</td>
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<tr>
<td>00940102</td>
<td>D4810R</td>
<td>R-40A</td>
<td>240 oz</td>
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</tbody>
</table>

To maintain the high quality of your Multiplex equipment we recommend you to contact your Multiplex Regional Technical Manager for the Authorized Multiplex Service Agent nearest you at (636) 256-9797.
High Pressure Cut-out (limiting switch)

Function of the high pressure cut-out
Pressure operated control which opens electrical circuit if high-side pressure becomes too high.

Failure of the high pressure cut-out
Defective high pressure cutout stuck in the open position will not allow the refrigeration compressor to operate.

Defective high pressure cutout stuck in the closed position will not protect the refrigeration system from a high pressure situation.

Notes:

<table>
<thead>
<tr>
<th>CO 250</th>
<th>CI 200</th>
<th>R-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO 400</td>
<td>CI 350</td>
<td>R-502</td>
</tr>
</tbody>
</table>
Dispensing Valves

Function of the dispensing valves
To dispense cold syrup and carbonated water, consistently at a proper ratio and speed.

Failure of the dispensing valves
Inferior finished product, poor tasting drinks.

Notes:
- Check for operation of solenoids, swollen seats, restricted valve ports and power to the dispensing valve
- Flow Rate:
  5 oz/4 sec (standard flow)
  10 oz/4 sec (fast flow)
- Set the flow rate, then adjust the ratio
Flow Controls

Function of the flow controls
To regulate the flow of syrup or water and compensate for the drop or rise in pressures that occur when more than one dispensing valve is operated from the same supply.

Failure of the flow controls
Defective or dirty flow controls will not retain a proper and constant Brix.

Notes:
- If flow control sticks, replace
- You must not interchange spools and sleeves from different sets
Keyboards and Timers

Function of the keyboards and timers
Activates the solenoid's on the dispensing valve for a specific adjustable amount of time.
Generally allowing for three different time ranges.

Failure of the keyboards and timers
Defective keyboards will cause the continual activation of the timer or no activation at all.
Defective timers will cause continual dispensing of the product, no dispensing of product or will not adjust to the desired portion size.

Notes:
Multiplex Programmable Portion Control Timers

We have received some requests to publish descriptions explaining the differences between the various models of Multiplex programmable portion control timers. The following is not intended to be a step by step procedure, but is only a general overview of the unique features of each timer.

The Model 66 was the first programmable portion control timer. It requires a 9 volt battery to retain its memory during power outages. Its 3 Size timer utilizes a separate rocker switch for calibration. To set the drink sizes:

- Turn the calibration rocker switch to the “on” position.
- Push the respective size pad for each keypad position at each valve.
- Repeat this process for each valve.
- Once complete, turn off the rocker switch to store the programmed sizes into memory.

The Model 64 is similar to the Model 66, except that the 9 volt battery is no longer required, since memory is stored on a memory chip. Its 4 Size timer still requires the rocker switch for calibration.

There are major improvements with the Model 64A Revision B. The 4 Size timer uses a calibration button, integrated into the keypad, rather than a rocker switch. A 4 second pour feature permits easy flow rate adjustments and volume settings for all valves simultaneously from valve number 1, in an emergency. To adjust the flow rate:

- Push the CAL pad three (3) times in less than three (3) seconds to enter calibrate mode. Calibration light will go on.
- Push the STOP/FILL pad once on any valve to achieve a 4 second pour for that valve.
- Once the valve water flow adjustments are complete, push the CAL pad once to exit calibrate mode. Calibration light will go out.
- To adjust the Brix (water to syrup ration) for each valve, push the CAL pad three (3) times again.
- Push the respective size for each valve until you achieve the desired drink level in your cup.
- Exiting calibrate mode (pushing CAL pad once) will lock the programmed sizes to memory.

The Model 64A Revision C is similar to the Model 64A Revision B except that the volume settings can be completely accomplished from any valve. To adjust all valves to the same times:

- Push CAL pad three (3) times and push the STOP/FILL pad on any valve (except valve number 1) two (2) times.
- Program each size for that valve.
- Exit calibration mode by pushing CAL pad once. This will lock the programmed sizes for all valves into memory.

Note: It is extremely important that all valves be adjusted to exactly the same water flow rate. If any valve is adjusted to a different flow rate (no matter how slight), it will have to be re- adjusted separately.

What’s New at Multiplex

You may now order new push-button replacement labels for the 4 Size timers that are used on the Model CPSS150-MID200 and Model 116 tower.

To replace, peel back worn push-button label carefully with a knife edge as shown above. Peel the covering from the back of label. Attach new label and apply light pressure to adhere the new label to the timer. Please see below for correct label to order for your timers.

P.N. 00213493
To be used with timer cover (P.N. 0021693).

P.N. 00213494
To be used with timer cover with soda button (P.N. 0021694).

P.N. 00213495
To be used with timer cover with water button (P.N. 00210695).
Instructions for Proper Dispensing Valve Calibration (Flow, Ratio, and Volume) using the 4-SIZE Portion Control

**Flow (to set the water flow rate only)**

Check that the Primary CO2 tank high pressure regulator or bulk CO2 regulator is adjusted properly. The Medium pressure regulator for sugar-based syrup must be adjusted to 60 psi (4 bar). The Low pressure regulator for sugar-free syrup must be adjusted to 14-16 psi (0.9-1.1 bar).

1. Turn "off" the syrup at the dispensing valve by turning the syrup shut-off (located on the valve mounting block). If there is no syrup shut-off, use a syrup separator.

2. Check the water shut-off (if applicable). It should be in the full open position.

   **Note:** The syrup and water shut-off (if equipped) are not to be used as an alternate for flow controls. They are to be used only for shutting on or off the syrup and/or the water supply.

3. Place a volume cup with 10 oz. (295.7 mL) measurement line, under valve to be adjusted. If using syrup separator, place volume cup under water side of separator only.

4. Use 4-SIZE portion control timer to obtain an accurate 4 second pour as follows:
   a. Press CAL pad three (3) times in less than 3 seconds to enter calibrate mode. Calibrate lamp will light. (Omit this step if already in calibrate mode).
   b. Press STOP-FILL pad of valve to adjusted once to cause 4 second pour into volume cup.

   **Note:** Fast-fill valves will dispense 10 oz in 4 seconds and standard-fill valves will dispense 5 oz in 4 seconds. Diet and other products with high foaming tendencies would be adjusted to 7.6 oz and 3.8 oz respectively.

5. To adjust the water flow rate (if necessary), turn the adjusting screw clockwise to increase and counterclockwise to decrease the flow of water.

6. Repeat 4 second dispense (STOP-FILL pad) and water flow adjustment, until volume is correct.

7. Open syrup shut-off or remove syrup separator (if applicable).

8. Repeat this procedure (steps 1 through 7 above) for each valve.

9. Press CAL button once to exit calibrate mode. Calibrate lamp will go "off".

**Ratio (water to syrup mixture)**

1. Remove valve nozzle by turning the nozzle and pulling down.

2. Place syrup separator on valve to be adjusted. Actuate the valve manually (pad, lever) until both syrup and water flow out of the syrup/water separator.

3. Position the proper ratio cup under the syrup separator. Manually actuate the valve pad or lever valve (pad, lever). Dispense until at least 3/4 of the ratio cup is filled. Both products should fill to the same level.

4. To adjust the syrup flow (if levels are not equal), turn the syrup flow control adjusting screw clockwise to increase and counterclockwise to decrease the flow of syrup.

   **Note:** Do not adjust the water flow during this procedure.

5. After syrup is adjusted, remove the syrup separator and replace the valve nozzle.

6. Repeat this procedure (steps 1 through 5 above) for the remaining valves.

**Volume (setting drink portion sizes)**

1. To enter portion control calibrate mode, press CAL pad three (3) times in less than 3 seconds. Calibrate lamp will light.

2. Use volume cup with finished drink marking lines, or use correct size sample cup with desired volume of ice.

3. Press and hold respective SIZE pad until product gets close to proper finished drink mark, or until close to top of sample cup.

4. Release SIZE pad before reaching final mark or before foam exceeds final mark. Press SIZE pad again momentarily, as many times as is necessary (letting foam settle), to get to the correct finished drink mark.

5. Repeat steps 2 through 4 above for all sizes and all stations (products) needing calibration. Be sure to use the correct volume cup finished drink marking line, or correct sample cup size and ice amount, for each size pad.

   **Note:** If you fill above the final mark or need to "start over" for any reason, you must exit the calibrate mode and then re-enter the calibrate mode to resume.

6. Exit calibrate mode by pressing CAL pad once. Calibrate light will go off. All changes will be permanently saved.
Instructions for Proper Dispensing Valve Calibration (Flow, Ratio, and Volume) using the 4-Size Portion Control (continued)

Special Feature

For use by serviceman only, or to temporarily program all stations (products) in an emergency.

1. When you first enter calibration mode (by pressing CAL pad three [3] times in less than 3 seconds), any station (product) STOP-FILL pad can be pressed two (2) times in less than 2 seconds. The calibrate lamp will flash continuously.

2. The size pads of this station can now be calibrated as in steps 2 through 4 of Volume Instructions. The times will replicate across all stations (products). All stations and all sizes will now have exactly the same pour times.

3. Immediately exit calibration mode by pressing the CAL pad once, to save changes. Calibration light will go out.

Note: All valve flow rates and ratios must be adjusted exactly the same before attempting this ‘one valve adjusts all’ routine.

4. Individual stations/sizes can be re-calibrated when necessary.
Test Procedures

Model MPC64A timer/selection pad

MPC64A Timers can be placed in the test mode as follows:

1. Flip power switch "off".
2. While depressing CAL button on selection pad, flip power switch back on.
3. Release CAL button when red LED comes on. Faucets will energize for 2 seconds, each in sequence, starting with faucet #1 (far left).
   Timer is now in the Test Mode. To stop faucets, use one of two procedures:
   a. Turn power switch off. This will save the programmed times. Use this procedure for testing or sanitizing.
   b. Push CAL button. All programmed times for all stations will go to factory default times. Default times are:
      Size #1: 1 - 1.5 seconds
      Size #2: 4 - 4.5 seconds
      Size #3: 6 - 6.5 seconds
      Size #4: 8 - 8.5 seconds

Pin identification

<table>
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<tr>
<th>J-7</th>
<th>J-8</th>
<th>J-9</th>
<th>J-10</th>
<th>J-11</th>
<th>J-12</th>
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<tbody>
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<td>Valve 1</td>
<td>Valve 2</td>
<td>Valve 3</td>
<td>Valve 4</td>
<td>Valve 5</td>
<td>Valve 6</td>
</tr>
</tbody>
</table>

Check for 24 Volts at each solenoid cable connector, J-7 through J-12, with cables removed.

With cables on, check for 24 VAC across solenoids at dispensing valve while dispensing respective valve.

J-15 Power to Valves 1, 2, 3.

J-20 Power to Valves 4, 5, 6 and microprocessor.

Loss of power at J-15 results in loss of power to valves 1, 2, 3.

Loss of power at J-20 results in loss of power to microprocessor; no valves will work.

J-16 Station and Sizes:

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<th>说明</th>
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<td>Medium</td>
</tr>
<tr>
<td>#4</td>
<td>Small</td>
</tr>
<tr>
<td>#5</td>
<td>Valve 6 (or nothing, on a 5 valve tower)</td>
</tr>
</tbody>
</table>

Use a jumper wire to make these connections to determine if timer is functioning properly.

1. Jump pin 1 to pin 5, 6, 7, 8, 9, 10. Appropriate valve should energize as long as pins are jumped.
2. Jump pin 12 to pin 5, 6, 7, 8, 9, 10. Valves should pour EXTRA LARGE.
3. Jump pin 2 to pin 5, 6, 7, 8, 9, 10. Valves should pour LARGE.
4. Jump pin 3 to pin 5, 6, 7, 8, 9, 10. Valves should pour MEDIUM.
5. Jump pin 4 to pin 5, 6, 7, 8, 9, 10. Valves should pour SMALL.

J-17 calibration button and light

If microprocessor does not go into calibration, remove connector at J-17. With jumper wire, jump 1st and 2nd pins on left 3 times in less than 3 seconds. Replace connector. Calibration light should be on (microprocessor will be in the calibration mode). White & white = calibration button. Red & black = calibration light. If CAL light does not come on, LED is burned out - replace keyboard.
Dual Transformers

**Note:** Dual Transformers must be wired in phase.*

To determine whether transformers are wired in phase: With power on, take voltage reading at HOT wire of each transformer. Reading should be 0 VOLTS*. If you read voltage, transformers are out of phase. The positions of the wires on one transformer must be switched.

* Black to White = 24 VAC +/- 10%

Black to Black = 0 VAC
Service Bulletin

MOV’s field testing

Metal Oxide Varistors installed on the water and carbonated water buttons, on McDonald’s style dispensing towers, are designed to completely absorb electrical spikes keeping them out of the microprocessor circuit eliminating complaints of:

- Not holding calibration
- Valves flowing by themselves
- Two valves coming on at the same time, etc.

Multiplex has designed a field test procedure that will expose a faulty MOV. This procedure will also work on the older style capacitors.

The field test procedure:

Depress separately both the water and soda water button rapidly 5-6 times. While doing this, watch all other valves. If you notice any dripping or any other valve trying to energize, the MOV’s need to be replaced.

Note: Factory installed MOV’s have heat shrink tubes on each terminal leg. Always check to make sure that heat shrink has not slipped down and is insulating the MOV leg inside the terminal connector.

Notes:
New Model MPC84A Portion Control Board

A new portion control board, the Model MPC84A, has been developed to improve the performance and maintain the functions and feature of the previous Model MPC64A. In addition, this Portion Control board has passed the very demanding EMC (radio frequency emissions and interference) testing for European CE approval, at the UL labs. The Model MPC64A has been phased out as of June 1996. Only the Model MPC84A will be used on new production and for service.

The new board is the same size, has the same mounting locations, and uses the same connectors as the previous board. This article is to explain the features (which can be used to your advantage) and minor differences.

The major difference is the same size board. The Model MPC84A can control up to eight stations (dispensing valves) with up to four sizes per station. The Model MPC64A could control up to six stations.

The illustration in Figure 1 depicts the connectors on the Model MPC64A. The illustration in Figure 2 depicts the connectors on the Model MPC84A.

The power connectors J15 and J20 (24 VAC) are the same. The keyboard connectors, J16 for touchpad and J17 for calibration touchpad, are the same.

The Model MPC84A adds one more two pin keyboard connector, the J1. For an eight station tower, this connector, along with a separate two wire cable to the proper keyboard, provides the two extra stations.

The five pin valve connectors, the J7 to J12 on the Model MPC64A, are changed to a two pin connectors, the J7 to the J14 on the MPC84A. These valve connectors are not polarized (does not matter how you connect the two pins) except when the valve has a “water” or a “soda” harness.

The calibrating functions of the new portion control board are the same as the old board.
Instructions for Multiplex Model MPC84AT
Portion Control Board with Top-off

Run Mode

**Size Buttons**
Press any size button (1, 2, 3, etc.) on any station to dispense product for that station for the pre-programmed time for that respective size. For example, at Station 1 press the Small size button. Station 1 should dispense the correct amount of product for a Small size.

**STOP-FILL Buttons**
If no dispense is in progress, press any STOP-FILL button to manually dispense from the station. Press the STOP-FILL button to manually stop and cancel any in-progress dispensing at that station.

Program Mode

**Entering the Program Mode**
To enter the Program Mode, press the CAL button three (3) times in less than 3 seconds. The CAL light will flash each time it is pressed. After 3 seconds, the light will remain “on” constantly (if pressed the proper number of times in the proper time frame).

**Volume Sizing**
*Note:* Use a Calibration cup (or an appropriate size cup with the right amount of ice).
1. Press the respective size button for that cup (small, medium, large, etc.) at that station.
2. Fill the cup with product to the correct level.

*Note: This same size button may be started and stopped as many times as desired to acquire the correct level while letting the drink settle. All times for same station and size are additive in the program session.*
3. Repeat volume sizing procedure for all sizes and stations.

**Flow Rate Calibration**
Press any STOP-FILL button one (1) time. That respective valve will flow for exactly 4 seconds allowing for checking or adjusting the valve flow rate.

**One Station Sets All**
After entering the Calibrate Mode, press any STOP-FILL button two (2) times in less than 1 second. The CAL light will flash constantly. Now all volumes on that station programmed in this session will copy to all other stations.

**Exiting the Program Mode**
To exit the Program Mode, press the CAL button one (1) time turning “off” the CAL light. All volume changes made during this session will permanently be stored.

Top-off program mode

**Entering the Top-off Program Mode**
To enter the Top-off Program Mode, press the CAL button five (5) times in less than 3 seconds. The CAL light will flash each time it is pressed and flash five (5) times after 3 seconds. The light will remain “on”.

**Enabling and/or Disabling the individual station Top-off**
Enabling the individual station Top-off allows every size dispensed on this station to pour all the volume programmed in two (2) pours with a 3 second delay between pours. Disabling the individual station Top-off allows every size dispensed on this station to pour all the volume programmed.

1. Press the STOP-FILL button on the station desired to change the top-off mode.
2. The CAL light will immediately flash five (5) times to indicate the top-off mode has been toggled. If the respective station was disabled for top-off, then it will toggle to enable for top-off. If the respective station was enabled for top-off, then it will toggle to disable for top-off.

**Exiting the Top-off Program Mode**
To exit the Top-off Program Mode, press the CAL button one (1) time turning “off” the CAL light. All station top-off mode changes made during this session will permanently be stored.

Test mode

1. With the power "off", press the CAL button and turn power “on” simultaneously.
2. Release the CAL button. The Portion Control board will sequence each station for 4 seconds starting with the leftmost.
3. Check that each LED on the Portion Control board comes “on” sequentially and all valve solenoids fire.

*Note:* If the LED light does not come “on” for any stations), the Portion Control board is bad. If the LED light comes “on” but the valve does not fire, check wiring and valve solenoids.

Sanitation mode

1. With the power "off", press the CAL button and turn the power “on” simultaneously.
2. Release the CAL button. Each station will come “on” for 4 seconds sequentially. This allows automatic pouring of the sanitation fluid from each station constantly until each line drains.

*Note:* If the drain can support more than one (1) valve pouring at a time, press the STOP-FILL button on the station number for the number of valves flowing simultaneously.

Example: At station number 3, press the STOP-FILL button. Three (3) valves will flow simultaneously.
McDonald’s Portion Control Timer

A common problem associated with the McDonald’s style portion control timer is when one size becomes non-adjustable. This may not be more than the trimming potentiometers being adjusted out of the usable range. To bring them back into range, all that must be done is to turn the screw counterclockwise 20 complete turns, and then clockwise:

<table>
<thead>
<tr>
<th>Number of Complete Turns</th>
<th>Medium</th>
<th>Large</th>
<th>Super-Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast Fill</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Standard Fill</td>
<td>5</td>
<td>7</td>
<td>9</td>
</tr>
</tbody>
</table>

This procedure should eliminate the replacement of many “good” portion control timers.

If you have any questions or comments, please contact Multiplex Technical Service at (314) 256-7777.
Sitco 4-Selection Portion Control Timers

Adjusting portion control for size of drinks dispensed

1. Simultaneously press and hold “S” (SMALL) and “XL” (EXTRA LARGE) push button switches on Coded Autoset Portion Control Module until LED light in center of module starts blinking, then release switches. Blinking LED indicates set mode is active.

2. Put desired amount of ice in cup, place cup under valve and push selected size button (small, medium, large, or extra large). Hold button in until cup fills to desired portion then release button. Wait for foam to settle then actuate button again to top off. Repeat the above procedure for remaining sizes.

3. After programming all drink sizes, press and release “CANCEL/POUR” switch to return the Coded Autoset Portion Control to the operational mode. Blinking LED light will go out.

Note: If top-off is not desired or required, the following steps must be followed:

a. Follow step 1 above.

b. Put desired amount of ice in cup, place cup under valve and push selected size button (small, medium, large, or extra large). Hold button in until cup fills to desired portion then release button.

Note: After actuating the last selected size button, momentarily actuate one of the other size buttons. This will signal the microprocessor that all selected sizes are completed. Failure to do this will signal an incomplete response back to the microprocessor and the last selected size will revert back to its previous program.

If, at a future date, it is decided to change portion size of the drinks or omit or add the top off feature, the individual sizes can be adjusted by the above procedure. It is not necessary to reprogram every size.

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<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>00210693</td>
<td>4-Selection Portion Control for Wilshire Valves</td>
</tr>
<tr>
<td>00210694</td>
<td>4-Selection Portion Control with Soda for Wilshire Valves</td>
</tr>
<tr>
<td>00210695</td>
<td>4-Selection Portion Control with Water for Wilshire Valves</td>
</tr>
<tr>
<td>00210697</td>
<td>4-Selection Portion Control for Lancer Valves</td>
</tr>
</tbody>
</table>

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